WeatherExpert® 48LC 07
Single Package Rooftop Unit
Gas Heat/Electric Cooling
with Puron® (R-410A) Refrigerant

Installation Instructions

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

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SAFETY CONSIDERATIONS

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

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

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

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

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

**WARNING**

**FIRE, EXPLOSION HAZARD**
Failure to follow this warning could result in death, serious personal injury and/or property damage.

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

**WARNING**

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

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

**WARNING**

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

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

**WARNING**

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

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

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

**AVERTISSEMENT**

**RISQUE D’INTOXICATION AU MONOXYDE DE CARBONE**
Si ces directives ne sont pas suivies, cela peut entrainer des blessures graves ou une intoxication au monoxyde de carbone pouvant causer la mort, si des produits de combustion s’infilrent dans le bâtiment.

Vérifier que toutes les ouvertures pratiquées dans le mur extérieur autour du ou des tuyaux d’évent (et de la prise d’air) sont scellées de manière à empêcher l’infiltration de produits de combustion dans le bâtiment.

Veiller à ce que la ou les sorties de l’évent de l’appareil de chauffage (et la prise d’air) ne soient, en aucune façon, obstruées, quelle que soit la saison.

**WARNING**

**ELECTRICAL SHOCK HAZARD**
Failure to follow this warning could cause personal injury or death.

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

**WARNING**

**UNIT OPERATION AND SAFETY HAZARD**
Failure to follow this warning could cause personal injury, death and/or equipment damage.

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

**WARNING**

**PERSONAL INJURY AND ENVIRONMENTAL HAZARD**
Failure to follow this warning could cause personal injury or death.

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

Wear safety glasses and gloves when handling refrigerants. Keep torches and other ignition sources away from refrigerants and oils.
Table 1 lists the rated indoor airflow used for the AHRI efficiency rating for the units covered in this document. See Fig. 1 for unit options, Fig. 2 for unit dimensions, and Fig. 3 for service clearances.

### Table 1 — Rated Indoor Airflow (cfm)

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>FULL LOAD AIRFLOW (CFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48LC**07</td>
<td>2250</td>
</tr>
</tbody>
</table>

### Cutting Hazard

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

### Rated Indoor Airflow (cfm)

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

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

#### Model Series - WeatherExpert®
LC - Ultra High Efficiency

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

#### Refrigeration Systems Options
- 0 = Three stage cooling capacity control with TXV
- A = Three stage cooling capacity control with TXV and Humidi-Mizer System

#### Cooling Tons
07 - 6 ton

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

#### Indoor Fan Options
- 1 = Standard Static Belt Drive with VFD controller
- 2 = Medium Static Belt Drive with VFD controller
- 3 = High Static Belt Drive with VFD controller

#### Coil Options: Fin/Tube (Condenser- Evaporator - Hail Guard)
- A = Al/Cu - Al/Cu
- B = Precast Al/Cu - Al/Cu
- C = E-coat Al/Cu - Al/Cu
- D = E-coat Al/Cu - E-coat Al/Cu
- E = Cu/Cu - Al/Cu
- F = Cu/Cu - Cu/Cu
- M = Al/Cu - Al/Cu — Louvered Hail Guard
- N = Precast Al/Cu - Al/Cu — Louvered Hail Guard
- P = E-coat Al/Cu - Al/Cu — Louvered Hail Guard
- Q = E-coat Al/Cu - E-coat Al/Cu — Louvered Hail Guard
- R = Cu/Cu - Al/Cu — Louvered Hail Guard
- S = Cu/Cu - Cu/Cu — Louvered Hail Guard

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

### Intake / Exhaust Options
- A = None
- B = Low Leak Temperature Economizer with Barometric Relief
- E = Low Leak Enthalpy Economizer with Barometric Relief
- N = Ultra Low Leak Temperature Economizer with Barometric Relief
- R = Ultra Low Leak Enthalpy Economizer with Barometric Relief

### Packaging
- 0 = Standard
- 1 = LTL

### Design Revision
- - = Factory Design Revision

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

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**Fig. 1 — Model Number Nomenclature**
Fig. 2 — Unit Dimensional Drawing
NOTE: Unit not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.

Fig. 3 — Service Clearance Dimensional Drawing

**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 and around unit as specified in Fig. 3.

NOTE: Consider also the effect of adjacent units.

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

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

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

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

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

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>DIMENSION</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>48-in. (1219 mm)</td>
<td>Unit disconnect is mounted on panel</td>
</tr>
<tr>
<td></td>
<td>18-in. (457 mm)</td>
<td>No disconnect, convenience outlet option</td>
</tr>
<tr>
<td></td>
<td>18-in. (457 mm)</td>
<td>Recommended service clearance</td>
</tr>
<tr>
<td></td>
<td>12-in. (305 mm)</td>
<td>Minimum clearance</td>
</tr>
<tr>
<td>B</td>
<td>42-in. (1067 mm)</td>
<td>Surface behind servicer is grounded (e.g., metal, masonry wall)</td>
</tr>
<tr>
<td></td>
<td>36-in. (914 mm)</td>
<td>Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass)</td>
</tr>
<tr>
<td></td>
<td>Special</td>
<td>Check sources of flue products within 10 ft of unit fresh air intake hood</td>
</tr>
<tr>
<td>C</td>
<td>36-in. (914 mm)</td>
<td>Side condensate drain is used</td>
</tr>
<tr>
<td></td>
<td>18-in. (457 mm)</td>
<td>Minimum clearance</td>
</tr>
<tr>
<td>D</td>
<td>42-in. (1067 mm)</td>
<td>Surface behind servicer is grounded (e.g., metal, masonry wall, another unit)</td>
</tr>
<tr>
<td></td>
<td>36-in. (914 mm)</td>
<td>Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass)</td>
</tr>
</tbody>
</table>
Select a unit mounting system that provides adequate height to allow installation of condensate trap per requirements. Refer to “Step 11 — Install External Condensate Trap and Line” on page 15 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**

<table>
<thead>
<tr>
<th>48LC**07</th>
<th>UNITS LB (KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base Unit</strong></td>
<td>1032 (468)</td>
</tr>
<tr>
<td><strong>Economizer</strong></td>
<td></td>
</tr>
<tr>
<td>Vertical</td>
<td>75 (34)</td>
</tr>
<tr>
<td>Horizontal</td>
<td>122 (55)</td>
</tr>
<tr>
<td><strong>Powered Outlet</strong></td>
<td></td>
</tr>
<tr>
<td>Curb</td>
<td></td>
</tr>
<tr>
<td>14-in. (356 mm)</td>
<td>143 (65)</td>
</tr>
<tr>
<td>24-in. (610 mm)</td>
<td>245 (111)</td>
</tr>
</tbody>
</table>

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

CURB-MOUNTED INSTALLATION
1. Install curb
2. Install field-fabricated ductwork inside curb
3. Install accessory thru-base service connection package (affects curb and unit) (refer to accessory installation instructions for details)
4. Prepare bottom condensate drain connection to suit planned condensate line routing (refer to “Step 11 — Install External Condensate Trap and Line” on page 15 for details)
5. Rig and place unit
6. Install outdoor air hood
7. Install flue hood
8. Install gas piping
9. Install condensate line trap and piping
10. Make electrical connections
11. Install other accessories

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

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

**Step 3 — Inspect Unit**
Inspect unit for transportation damage. File any claim with transportation agency.
Confirm before installation of unit that voltage, amperage and circuit protection requirements listed on unit data plate agree with power supply provided.

**Step 4 — Provide Unit Support**

ROOF CURB MOUNT
Accessory roof curb details and dimensions are shown in Fig. 5. 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. 5. Improperly applied gasket can also result in air leaks and poor unit performance.
Curb should be level. This is necessary for unit drain to function properly. Unit leveling tolerances are shown in Fig. 4. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

![](image)

**Fig. 4 — Unit Leveling Tolerances**

| MAXIMUM ALLOWABLE DIFFERENCE – IN. (MM) |
| A-B | B-C | A-C |
| 0.5 (13) | 1.0 (25) | 1.0 (25) |

Install insulation, cant strips, roofing felt, and counter flashing as shown. Ductwork must be attached to curb and not to the unit. The accessory thru-the-base power and gas connection package must be installed before the unit is set on the roof curb. If field-installed thru-the-roof curb gas connections are desired, use factory-supplied 1/2-in. pipe coupling and gas plate assembly to mount the thru-the-roof curb connection to the roof curb. Gas connections and power connections to the unit must be field-installed after the unit is installed on the roof curb.

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

SLAB MOUNT (HORIZONTAL UNITS ONLY)
Provide a level concrete slab that extends a minimum of 6-in. (150 mm) beyond unit cabinet. Install a gravel apron in front of condenser coil air inlet to prevent grass and foliage from obstructing airflow.
NOTE: Horizontal units may be installed on a roof curb if required.

ALTERNATE UNIT SUPPORT (IN LIEU OF CURB OR SLAB MOUNT)
A non-combustible sleeper rail can be used in the unit curb support area. If sleeper rails cannot be used, support the long sides of the unit with a minimum of 3 equally spaced 4-in. x 4-in. (102 mm x 102 mm) pads on each side.
Fig. 5 — Roof Curb Details

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 IN [ ] ARE IN MILLIMETERS.
4. ROOF CURB: 18 GA. STEEL.
5. ATTACH ELECTRONIC TO CURB (FLANGES OF DUCT REST ON CURB).
6. SERVICE CLEARANCE: 4 FEET ON EACH SIDE.
7. DIRECTION OF AIR FLOW.
8. CONNECTOR PACKAGE CRBTMPWR002A01 IS FOR THRU-THE-CURB GAS TYPE.
   PACKAGE CRBTMPWR004A01 IS FOR THRU-THE-BOTTOM TYPE GAS CONNECTIONS.

CONNECTOR PG. NO.
CRBTMPWR002A01
CRBTMPWR004A01
CRBTMPWR006A01
CRBTMPWR008A01

GAS CONNECTION TYPE
THRU-THE-CURB
THRU-THE-BOTTOM

GAS FITTINGS
3/4" [19] NPT
1 1/4" [31.7] NPT
1 1/2" [32.7] NPT
1 1/2" [38] NPT

POWER WIRING FITTING
1/2" [12.7] NPT
1/2" [12.7] NPT

CONTROL WIRING FITTING
N/A
N/A

ACCESSORY CONVENIENCE OUTLET WIRING CONNECTOR
N/A
N/A

1 DEC 2 DEC 3 DEC
ENGINEERING MANUFACTURING
ENGINEERING REQUIREMENTS — — —
SIZE DRAWING NUMBER EXP
T-005, Y-002
DRAFTER CHECKER

12-1/2" WIDE INSULATED DECK PANELS
9-15/16" [252.4] WIDE INSULATED DECK PANEL

SEE NOTE #2
SEE VIEW "B"

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

SUPPLY AIR
RETURN AIR
OPENING
OPENING
Step 5 — Field Fabricate Ductwork
Cabinet return-air static pressure (a negative condition) shall not exceed 0.35 in. wg (87 Pa) with economizer or 0.45 in. wg (112 Pa) without economizer.

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

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

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

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

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

A minimum clearance is not required around ductwork.

Step 6 — Rig and Place Unit
Keep unit upright and do not drop. 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. 6 for additional information.

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

Rigging materials under unit (cardboard 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 plug can be tightened with a 1/2-in. square socket drive extension. For further details see “Step 11 — Install External Condensate Trap and Line” on page 15.

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

<table>
<thead>
<tr>
<th>PROPERTY DAMAGE HAZARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to follow this caution may result in damage to roofing materials.</td>
</tr>
<tr>
<td>Membrane roofs can be cut by sharp sheet metal edges. Be careful when placing any sheet metal parts on such roof.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIT DAMAGE HAZARD</td>
</tr>
<tr>
<td>Failure to follow this caution may result in equipment damage.</td>
</tr>
<tr>
<td>All panels must be in place when rigging. Unit is not designed for handling by fork truck when packaging is removed.</td>
</tr>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

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 35/16 in. (84 mm).

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

Flue vent discharge must have a minimum horizontal clearance of 4 ft (1220 mm) from electric and gas meters, gas regulators, and gas relief equipment. Minimum distance between unit and other electrically live parts is 48-in. (1220 mm).

Flue gas can deteriorate building materials. Orient unit such that flue gas will not affect building materials.

Locate mechanical draft system flue assembly at least 48-in. (1220 mm) from an adjacent building or combustible material.

NOTE: Installation of accessory flue discharge deflector kit will reduce the minimum clearance to combustible material to 18-in. (460 mm).

After the unit is in position remove all riggings, shipping materials and top skid. Recycle or dispose of all shipping materials.
Step 7 — Convert to Horizontal and Connect Ductwork (when required)

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

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

Do not cover or obscure visibility to the unit’s informative data plate when insulating horizontal ductwork.
Fig. 8 — Location of Notches

Fig. 9 — Horizontal Duct Panels In Place

Step 8 — Install Outside Air Hood

ECONOMIZER HOOD PACKAGE REMOVAL AND SETUP - FACTORY OPTION

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

2. To gain access to the hood, remove the filter access panel. (See Fig. 10)

Fig. 10 — Access Panel Locations

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

Fig. 11 — Economizer Hood Parts Location

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

ECONOMIZER 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. 12.
2. Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 13.

3. Remove the shipping tape holding the economizer barometric relief damper in place (economizer only).

4. Insert the hood divider between the hood sides. See Fig. 13 and Fig. 14. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.

5. Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 14.

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

7. Replace the filter access panel.

Step 9 — Install Flue Hood

The flue hood is shipped screwed to the basepan beside the burner compartment access panel. Remove from shipping location and using screws provided, install flue hood and screen in location shown in Fig. 15.

Step 10 — Install Gas Piping

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

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

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

For natural gas applications, gas pressure at unit gas connection must not be less than 4 in. wg (996 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating. On 48LCF/T007 (high-heat)
units, the gas pressure at unit gas connection must not be less than 5 in. wg (1245 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating. For liquified petroleum applications, the gas pressure must not be less than 11 in. wg (2740 Pa) or greater than 13.0 in. wg (3240 Pa) at the unit connection. See Tables 3 and 4.

The gas supply pipe enters the unit at the burner access panel on the front side of the unit, through the long slot at the bottom of the access panel. The gas connection to the unit is made to the 3/4-in. FPT gas inlet port on the unit gas valve.

Table 3 — Natural Gas Supply Line Pressure Ranges

<table>
<thead>
<tr>
<th>UNIT MODEL</th>
<th>UNIT SIZE</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>48LCD/E/S/R0</td>
<td>07</td>
<td>4.0 in. wg (996 Pa)</td>
<td>13.0 in. wg (3240 Pa)</td>
</tr>
<tr>
<td>48LCF/T0 (High Heat units only)</td>
<td>07</td>
<td>5.0 in. wg (1245 Pa)</td>
<td>13.0 in. wg (3240 Pa)</td>
</tr>
</tbody>
</table>

Table 4 — Liquid Propane Supply Line Pressure Ranges

<table>
<thead>
<tr>
<th>UNIT MODEL</th>
<th>UNIT SIZE</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>48LCD/F/E/S/R/T0</td>
<td>07</td>
<td>11.0 in. wg (2740 Pa)</td>
<td>13.0 in. wg (3240 Pa)</td>
</tr>
<tr>
<td>48LCF/T0 (High Heat units only)</td>
<td>07</td>
<td>11.0 in. wg (2740 Pa)</td>
<td>13.0 in. wg (3240 Pa)</td>
</tr>
</tbody>
</table>

Manifold pressure is factory-adjusted for natural gas (NG) fuel use. Adjust as required to obtain best flame characteristics. See Table 5.

Manifold pressure for liquid propane (LP) fuel use must be adjusted to specified range. Follow instructions in the accessory kit to make initial readjustment. See Table 6.

Table 5 — Natural Gas Manifold Pressure Ranges

<table>
<thead>
<tr>
<th>UNIT MODEL</th>
<th>UNIT SIZE</th>
<th>HIGH FIRE</th>
<th>LOW FIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>48LCD/E/S/R0</td>
<td>07</td>
<td>3.5 in. wg (872 Pa)</td>
<td>1.7 in. wg (423 Pa)</td>
</tr>
<tr>
<td>48LCF/T0 (High Heat units only)</td>
<td>07</td>
<td>3.5 in. wg (872 Pa)</td>
<td>2.0 in. wg (498 Pa)</td>
</tr>
</tbody>
</table>

Table 6 — Liquid Propane Manifold Pressure Ranges

<table>
<thead>
<tr>
<th>UNIT MODEL</th>
<th>UNIT SIZE</th>
<th>HIGH FIRE</th>
<th>LOW FIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>48LCD/E/S/R0</td>
<td>07</td>
<td>10.0 in. wg (2490 Pa)</td>
<td>5.0 in. wg (1245 Pa)</td>
</tr>
<tr>
<td>48LCF/T0 (High Heat units only)</td>
<td>07</td>
<td>10.0 in. wg (2490 Pa)</td>
<td>5.7 in. wg (1420 Pa)</td>
</tr>
</tbody>
</table>

CAUTION

EQUIPMENT DAMAGE
Failure to follow this caution may result in equipment damage. When connecting the gas line to the unit gas valve, the installer MUST use a backup wrench to prevent damage to the valve.

Install a gas supply line that runs to the unit heating section. Refer to the NFPA 54/NFGC or equivalent code for gas pipe sizing data. Do not use a pipe size smaller than 1/2-in. Size the gas supply line to allow for a maximum pressure drop of 0.5-in. wg (124 Pa) between gas regulator source and unit gas valve connection when unit is operating at high-fire flow rate.

The gas supply line can approach the unit in three ways: horizontally from outside the unit (across the roof), thru-curb/under unit basepan (accessory kit required) or through unit basepan (factory-option or accessory kit required). Consult accessory kit installation instructions for details on these installation methods. Observe clearance to gas line components per Fig. 16.

FACTORY-OPTION THRU-BASE CONNECTIONS (GAS CONNECTIONS)
This service connection kit consists of a 3/4-in. NPT gas adapter fitting (brass), two 1/2-in. electrical bulkhead connectors and a 3/4-in. electrical bulkhead connector, all factory-installed in the embossed (raised) section of the unit basepan in the condenser section.

Fig. 16 — Gas Piping Guide (with Accessory Thru-the-Curb Service Connections)

Fig. 17 — Fittings

The thru-base gas connector has male and female threads. The male threads protrude above the basepan of the unit; the female threads protrude below the basepan. Check tightness of connector lock nuts before connecting gas piping.

Install a 3/4-in. NPT street elbow on the thru-base gas fitting. Attach a 3/4-in. pipe nipple with minimum length of 16-in. (406 mm) (field-supplied) to the street elbow and extend it through the access panel at the gas support bracket. See Fig. 18.
Other hardware required to complete the installation of the gas supply line will include a manual shutoff valve, a sediment trap (drip leg) and a ground-joint union. A pressure regulator valve may also be required (to convert gas pressure from pounds to inches of pressure). The manual shutoff valve must be located within 6 ft (1.83 m) of the unit. The union, located in the final leg entering the unit, must be located at least 9-in. (230 mm) away from the access panel to permit the panel to be removed for service. If a regulator valve is installed, it must be located a minimum of 4 ft (1220 mm) away from the unit’s flue outlet. Some municipal codes require that the manual shutoff valve be located upstream of the sediment trap. See Fig. 19 and 20 for typical piping arrangements for gas piping that has been routed through the sidewall of the curb. See Fig. 21 for typical piping arrangement when thru-base is used. Ensure that all piping does not block access to the unit’s main control box or limit the required working space in front of the control box.

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

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

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

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

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

NOTE: Pressure test the gas supply system after the gas supply piping is connected to the gas valve. The supply piping must be

1. Teflon is a registered trademark of DuPont.
disconnected from the gas valve during the testing of the piping systems when test pressure is in excess of 0.5 psig (3450 Pa). Pressure test the gas supply piping system at pressures equal to or less than 0.5 psig (3450 Pa). The unit heating section must be isolated from the gas piping system by closing the external main manual shutoff valve and slightly opening the ground-joint union. Check for gas leaks at the field-installed and factory-installed gas lines after all piping connections have been completed. Use soap-and-water solution (or method specified by local codes and/or regulations).

**WARNING**

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

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

NOTE: If orifice hole appears damaged or if it is suspected to have been redrilled, check orifice hole with a numbered drill bit of correct size. Never redrill an orifice. A burr-free and squarely aligned orifice hole is essential for proper flame characteristics. See Fig. 22.

**Step 11 — Install External Condensate Trap and Line**

The unit has one 3/4-in. condensate drain connection on the end of the condensate pan and an alternate connection on the bottom. See Fig. 23. Unit airflow configuration does not determine which drain connection to use. Either drain connection can be used with vertical or horizontal applications.

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

The piping for the condensate drain and external trap can be completed after the unit is in place. See Fig. 24.

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.).

**WARNING**

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

Do not use gas piping as an electrical ground.

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

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

**FIELD POWER SUPPLY**

*If equipped with optional powered convenience outlet*

The power source leads to the convenience outlet’s transformer primary are not factory connected. Installer must connect these leads according to required operation of the convenience outlet. If an always-energized convenience outlet operation is desired, connect the source leads to the line side of the unit-mounted disconnect. (Check with local codes to ensure this method is acceptable in your area.) If a de-energize via unit disconnect switch operation of the convenience outlet is desired, connect the source leads to the load side of the unit disconnect. On a unit without a unit-mounted disconnect, connect the source leads to compressor contactor C and indoor fan contactor IFC pressure lugs with unit field power leads (see Fig. 25).
Refer to Fig. 40 for power transformer connections and the discussion on connecting the convenience outlet on page 25.

Field power wires will be connected at 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), at factory-installed option non-fused disconnect switch or HACR. Max wire size is #4 AWG (copper only) per pole on contactors and #2 ga AWG (copper only) per pole on optional non-fused disconnect or HACR. See Fig. 25 and the 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. These leads are for factory run-test purposes only; remove and discard before connecting field power wires to unit connection points. Make field power connections directly to line connection pressure lugs only.

WARNING
FIRE HAZARD
Failure to follow this warning could result in personal injury, death, or property damage.
Do not connect aluminum wire between disconnect switch and unit. Use only copper wire.

See Fig. 26 for disconnect switch information. See Fig. 27-33 for wiring diagrams.
Fig. 28 — 48LC 07 RTU Open Control Wiring Diagram
Fig. 30 — 48LC 07 Power Wiring Diagram, Electro-mechanical and RTU Open Controls
(208/230v and 460v Units)
Fig. 31 — 48LC 07 Power Wiring Diagram, Electro-mechanical and RTU Open Controls (575v Units)

NOTES:

1. IF ANY OF THE ORIGINAL WIRE OR EQUIPMENT MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 50 C WIRE OR EQUIVALENT.
2. CONVERSION AND R40 MOTORS AND THE BILGE PUMPS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING.
3. FAN IS DIRECT FOR 575v UNITS.
4. USE COPPER, COPPER ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.
Fig. 32 — 48LC 07 Power Wiring Diagram, SystemVu™ Control
(208/230v and 460v Units)

NOTES
1. If any of the original wire furnished
must be replaced, it must be replaced
with Type SC wire or its equivalent.
2. Compression and fan motors are thermostatically
protected. Single phase motors are
protected against primary single phasing
conditions.
3. 208/230v unit than is wired for 230v unit.
   If unit is to be run with 208v power supply,
   disconnect 46v wire from 230v tap and
   connect to 208v tap.
4. Use copper, copper clad aluminum or
   aluminum conductors.
5. Use copper conductor only.
Fig. 33 — 48LC 07 Power Wiring Diagram, SystemVu™ Control (575v Units)
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 is 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. 25). Connect field power supply conductors to LINE side terminals when the switch enclosure cover is removed to attach the handle.

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

1. Remove the Control Box access panel. The NFD enclosure is located below the Control Box (see Fig. 34).
2. Remove (3) cap head screws that secure the NFD enclosure front cover — (2) on the face of the cover and (1) on the left side cover. See Fig. 35.
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. 35.
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) cap head screws on the NFD enclosure.
12. Re-install the unit front panel.

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

1. Remove the Control Box access panel. The HACR enclosure is located below the Control Box (see Fig. 36).
2. Remove (3) cap head screws that secure the HACR enclosure — (2) on the face of the cover and (1) on the left side cover. See Fig. 37.
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. 37.
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) cap head screws on the HACR enclosure.
11. Re-install the unit front panel.
Fig. 37 — 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. 25 and unit label diagram for power wiring connections to the unit and equipment ground. Maximum wire size is #4 ga AWG (copper only) per pole on contactors and #2 ga AWG (copper only) per pole on optional non-fused disconnect or HACR.

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

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

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

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

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate. On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown 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.

% Voltage Imbalance:

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

Example: Supply voltage is 230-3-60

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

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

Determine maximum deviation from average voltage.

(AB) 227-224 = 3 v
(BC) 231-227 = 4 v
(AC) 227-226 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

\[
\% \text{ Voltage Imbalance} = 100 \times \frac{4}{2} = 1.78\%
\]

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.

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

CONVENIENCE OUTLETS

Electrical Operation Hazard

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

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

Two types of convenience outlets are offered on 48LC models: non-powered and unit-powered. Both types provide a 125-v GFCI (ground-fault circuit interrupter) duplex receptacle rated at 15-A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 38.

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.

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

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

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

Mount the weatherproof cover to the backing plate as shown in Fig. 39. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover. Check for full closing and latching.

**Fig. 39 — Weatherproof Cover Installation**

**Non-powered type**

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

**Unit-powered type**

A unit-mounted transformer is factory-installed to stepdown the main power supply voltage to the unit to 115-v at the duplex receptacle. This option also includes a manual switch with fuse, located in a utility box and mounted on a bracket behind the convenience outlet; access is through the unit’s control box access panel. See Fig. 38.

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. 40.

**Using unit-mounted convenience outlets**

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

**Fuse on power type**

The factory fuse is a Bussman1 “Fusetron” T-15, non-renewable screw-in (Edison base) type plug fuse.

**Duty Cycle**

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

**Convenience outlet usage rating**

See Fig. 41.

**Fig. 40 — Powered Convenience Outlet Wiring**

**Primary connections**

<table>
<thead>
<tr>
<th>UNIT VOLTAGE</th>
<th>CONNECT AS</th>
<th>PRIMARY CONNECTIONS</th>
<th>TRANSFORMER TERMINALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>208, 230</td>
<td>240</td>
<td>L1: RED + YEL</td>
<td>H1 + H3</td>
</tr>
<tr>
<td>460</td>
<td>480</td>
<td>L1: RED</td>
<td>H1</td>
</tr>
<tr>
<td>575</td>
<td>600</td>
<td>L1: RED</td>
<td>H1</td>
</tr>
</tbody>
</table>

**Fig. 41 — Convenience Outlet Utilization Notice Label**

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

**HACR**

The amp rating of the HACR factory-installed option is based on the size, voltage, indoor motor and other electrical options

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1. Bussman and Fusetron are trademarks of Cooper Technologies Company.
of the unit as shipped from the factory. If field-installed accessories are added or changed in the field (i.e. power exhaust, etc.), the HACR may no longer be of the proper amp rating and therefore will need to be removed from the unit. See unit nameplate and label on factory-installed HACR for the amp rating of the HACR that was shipped with the unit from the factory. See unit nameplates for the proper fuse, HACR or maximum over-current protection device required on the unit with field-installed accessories. See Fig. 42.

![Fig. 42 — HACR Caution Label](image)

FACTORY-OPTION THRU-BASE CONNECTIONS (ELECTRICAL 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. 17.

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 CONNECTION KIT

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. 25.

FIELD CONTROL WIRING

The 48LC unit requires an external temperature control device such as a thermostat (field-supplied).

THERMOSTAT

Install a Carrier-approved accessory thermostat according to installation instructions included with the accessory. See Fig. 43. For complete economizer function and 3-stage compressor operation select a three-stage cooling thermostat. If a 3-stage cooling thermostat is not available, use a 2-stage cooling thermostat instead, but note that this will limit cooling to just 2 stages. Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions.

![Typical Thermostat Connections](image)

Integrated Staging Control (ISC) Board or SystemVu™ Controller

Typical Thermostat Connections

<table>
<thead>
<tr>
<th>C</th>
<th>W1</th>
<th>W2</th>
<th>G</th>
<th>Y3</th>
</tr>
</thead>
</table>

(Note 1) (Notes 2, 3 & 4)

Y3 to Y2 connection required for 2-stage cooling operation and when integrated economizer function is desired.

Note 3: To connect a 2-stage thermostat:
Y2 to Y3 connection required for 2-stage cooling operation which provides low and high cooling states.

Note 2: Y2 to Y3 connection required for 2-stage cooling operation and when integrated economizer function is desired.

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

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.

UNIT WITHOUT THRU-BASE CONNECTION KIT

Pass the thermostat control wires through the hole provided in the corner post; then feed the wires through the raceway built into the corner post (see Fig. 44) to the control box. Pull the wires over to the terminal strip on the upper-left corner of the Controls Connection Board.

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.
Humidi-MiZer® System Control Connections

NOTE: It is suggested to ensure the Auto-Changeover function of an installed thermostat is enabled when used in conjunction with the Humidi-MiZer Adaptive Dehumidification system.

HUMIDI-MIZER SYSTEM – SPACE RH CONTROLLER

The Humidi-MiZer dehumidification system requires a field-supplied and installed space relative humidity control device. This device may be a separate humidistat control (contact closes on rise in space RH above control setpoint) or a combination thermostat-humidistat control device with isolated contact set for dehumidification control.

NOTE: Use of a humidistat device is not permitted on 48LC units equipped with RTU Open control; these units require use of a field-supplied RH sensor (33ZCSENSRH-02 or 33ZHCSENDRH-02) or a ZS series sensor with humidity sensing. SystemVu™ controls requires a Space Humidistat (HL38MG029), a Wall Mount Space Humidity Sensor (33ZCSENSRH-01), or a Duct Mount Humidity Sensor (33ZCSENDRH-01).

To connect the Carrier humidistat (HL38MG029) (Fig. 45):
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. 44) 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. 46), connecting PNK to PNK and PNK/BLK to PNK/BLK.

RTU Open Controller (Factory-Installed Option)

For details on operating 48LC**07 units equipped with the factory-installed RTU Open controller option, refer to 48/50LC 07-26 Factory Installed Option RTU Open Multi-Protocol Controller Controls, Start-up, Operation and Troubleshooting manual.

SystemVu Controller (Factory-Installed Option)

For details on operating 48LC**07 units equipped with the factory-installed SystemVu control option, refer to 48/50LC 04-26 Single Package Rooftop Units with SystemVu Controls Version 2.X Controls, Start-up, Operation and Troubleshooting manual.
## Integrated Staging Control (ISC) Board

**Fig. 47 — Integrated Staging Control (ISC) Board**

### Table 7 — Status Code Descriptions for ISC Board LEDs

<table>
<thead>
<tr>
<th>ERROR #</th>
<th>ERROR NAME</th>
<th>LED INDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check Smoke Detector/PMR/AUX</td>
<td>LED01: RED, LED02: RED, LED03: Blinking Green LED (Note 1)</td>
</tr>
<tr>
<td>2</td>
<td>Check HPS/LPS/COFS</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>3</td>
<td>Call for Y3 with no call for Y1. Check Y1 wiring.</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>4</td>
<td>Call for Y3 with no call for Y1/Y2. Check Y1 wiring.</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>5</td>
<td>Call for Y2 with no call for Y1. Check Y1 wiring.</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>6</td>
<td>Call for W2 with no call for W1. Check W1 wiring.</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>7</td>
<td>Call for heat (W1/W2) and cooling (Y1/Y2/Y3). Check thermostat wiring.</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>8</td>
<td>Call for heat (W1/W2) with no G. Check G wiring.</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>9</td>
<td>Call for cooling (Y1/Y2/Y3) with no G. Check G wiring.</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>10</td>
<td>Call for heat (W1/W2) and cooling (Y1/Y2/Y3) with no G. Check thermostat and G wiring.</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>11</td>
<td>Check ISC Board and the thermostat wiring</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>12</td>
<td>Check ISC Board and the thermostat wiring</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>13</td>
<td>Check ISC Board and the thermostat wiring</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>14</td>
<td>Check ISC Board and the thermostat wiring</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
<tr>
<td>15</td>
<td>Check ISC Board and the thermostat wiring</td>
<td>LED01: RED, LED02: RED, LED03: RED, LED04: RED, LED05: RED</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Green LED Blinking at 1Hz indicates normal operation.
2. Solid red LED indicates an error exists, see above LED configuration.
**ISC BOARD - SEQUENCE OF OPERATION**

**General**

The Carrier Integrated Staging Control (ISC) is intended for use with a standard thermostat or direct digital controls (DDC) capable of three cooling stages. After initial power to the board, a Green LED will blink with a 1 second duty cycle indicating the unit is running properly. In the event of the ISC board failing, the Green LED will be OFF or continuously ON. When the unit is not running properly, the Green LED will blink along with Red LED lights. The Red LED light configuration will indicate the type of error the board has identified. See Fig. 47 for LED locations and Table 7 for a list of the status codes.

The ISC board can be remotely shutdown by removing Jumper 4 and wiring to the Remote Shutdown terminal. The Smoke Control Module can shutdown the unit by removing Jumper 3 and wiring to the Smoke Shutdown terminal. The Smoke Alarm terminal on the ISC Board provides a pass through connection should a smoke alarm signal be connected. In the case of the RTU Open option, the RTU Open controller provides the signal which is passed through the ISC board to the Smoke Alarm terminal.

The crankcase heater will run at all times except when the compressors are running. An auxiliary power supply (24Vac) available at TB-4 Terminal is provided to power auxiliary equipment. An optional Phase Monitor Relay can be wired to the PMR terminal by removing Jumper 5. An optional Condensate Flow Switch can be wired to the COFS Terminal by removing Jumper 7.

**Ventilation**

In the Ventilation/Fan Mode (G on the thermostat), the indoor-fan will run at low speed and the damper will operate at minimum position.

**Cooling**

In the Cooling Mode, the small and large compressors will be sequenced to maintain the thermostat temperature setpoint. The table below shows the cooling operation based on the following conditions.

<table>
<thead>
<tr>
<th>THERMOSTAT</th>
<th>INPUT</th>
<th>COMPRESSOR C1</th>
<th>COMPRESSOR C2</th>
<th>INDOOR FAN SPEED</th>
<th>OUTDOOR FAN SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Stage Cooling (Y1)</td>
<td>On</td>
<td>Off</td>
<td>Low</td>
<td>Low (700 rpm)</td>
<td></td>
</tr>
<tr>
<td>Second Stage Cooling (Y2)</td>
<td>Off</td>
<td>On</td>
<td>Medium</td>
<td>Medium (800 rpm)</td>
<td></td>
</tr>
<tr>
<td>Third Stage Cooling (Y3)</td>
<td>On</td>
<td>On</td>
<td>High</td>
<td>High (1000 rpm)</td>
<td></td>
</tr>
</tbody>
</table>

The outdoor fan and VFD controlled indoor-fan will operate at low, medium and high speed. The indoor-fan speed (rpm) is factory set by the CFM and static pressure requirements for the unit installed.

**Humidi-MiZer® System (Optional)**

In the Dehumidification Mode, both compressors will run and Indoor airflow will be rise to High Speed.

At subcooler reheating mode (reheat-1), during part load conditions when the room temperature and humidity are above the set point, the unit initiates the sub-cooling mode of operation; a call for cooling and dehumidification. RDV (Reheat Discharge Valve) and TWV (Three Way Valve) close; Indoor and Outdoor airflow will rise until reaching 100% of Speed.

At hot-gas-bypass reheating mode (reheat-2), when there is a call for dehumidification without a call for cooling, a portion of the hot gas from the compressor bypasses the condenser coil when RDV opens and hot gas is fed into the liquid line, TWV closes in this mode and the system provides mainly latent cooling. Indoor airflow will rise until reaching 100% of Speed, Outdoor airflow will run at High speed as long as outdoor temperature is above 80°F (26.7°C); when operating in this mode below 80°F (26.7°C) OAT, the system outdoor fan will operate as shown in the table below.

<table>
<thead>
<tr>
<th>48LC SIZE</th>
<th>RPM</th>
<th>NUMBER OF FANS ON</th>
<th>NUMBER OF FANS OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>07</td>
<td>250</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

**Economizer (Optional)**

When the economizer is in Free Cooling Mode and a demand for cooling exists (Y1 on the thermostat), the economizer will modulate the outdoor-air damper to provide a 50°F (10°C) to 55°F (13°C) mixed-air temperature into the zone and run the indoor fan at high speed. As mixed-air temperature fluctuates above 55°F (13°C) or below 50°F (10°C) dampers will be modulated (open or close) to bring the mixed-air temperature back within control. Upon more call for cooling (Y2 on the thermostat), the outdoor-air damper will maintain its current position, compressor C1 will run and the outdoor fan will run at low speed. If there is further demand for cooling, the outdoor-air damper will maintain its current position, only compressor C2 will run and the outdoor fan will run at medium speed. The VFD-controlled indoor fan will operate at high speed regardless of the cooling demand.

If the increase in cooling capacity causes the mixed-air temperature to drop below 45°F (7°C), the outdoor-air damper will return to the minimum position. If the mixed-air temperature continues to fall, the outdoor-air damper will close. Control returns to normal once the mixed-air temperature rises above 48°F (9°C). The power exhaust fans will be energized and de-energized, if installed, as the outdoor-air damper opens and closes.

If field-installed accessory CO₂ sensors are connected to the Economizer, a demand controlled ventilation strategy will begin to operate. As the CO₂ level in the zone increases above the CO₂ set-point, the minimum position of the damper will be increased proportionally. As the CO₂ level decreases because of the increase of fresh air, the outdoor-air damper will be proportionally closed. For economizer operation, there must be a thermostat call for the fan (G). If the unit is occupied and the fan is on, the damper will operate at minimum position. Otherwise, the damper will be closed.

**Low Ambient Cooling Operation down to 40°F (4°C)**

In Low Ambient RTU conditions when the temperature is between 55°F (13°C) and 40°F (4°C), the Low Ambient Switch (LAS) will be active and the outdoor fans will run to the pre-set factory outdoor-fan speed. When the temperature is greater than 65°F (18°C), the Low Ambient Switch will deactivate and the outdoor fans will run in the standard cooling mode. If the Outdoor Fan Select Switch (see Fig. 46) is in the ON position, the outdoor fans will run in the Fan Cycle Speed Mode (FCS) set to 250 rpm. If the Outdoor Fan Select Switch is in the OFF position, the outdoor fans will run in the Minimum Fan Speed Mode (MIF) set to 160 rpm regardless of the cooling demand. The 48LC size 07 units have a SPST normally open Low Ambient Switch (LAS) wired across the TS and OF terminal and a jumper placed across the PS terminal (see Fig. 47). When the LAS is active, the switch will close making contact to the OF terminal. This is done for units that require all outdoor fans to run at the same pre-set factory Low Ambient Speed. See Fig. 48 and 49.
Fig. 48 — Outdoor Fan Speed Select Switch

Fig. 49 — Schematic of SPST Low Ambient Switch

Table 8 shows the operation of the outdoor fan for size 07 units.

<table>
<thead>
<tr>
<th>SIZE</th>
<th>NO. OF FANS ON</th>
<th>NO. OF FANS OFF</th>
<th>SWITCH</th>
<th>OUTDOOR FAN SELECT SWITCH</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>07</td>
<td>2</td>
<td>0</td>
<td>SPST</td>
<td>Up</td>
<td>250</td>
</tr>
</tbody>
</table>

Heating

In the Heating Mode (W1 and G on the thermostat), the ISC board sends power to W on the IGC board. Assuming the unit is controlled through a room thermostat set for fan auto, the indoor-fan motor will energize and the outdoor-air dampers will open to their minimum position. The ISC board upon seeing W1 and G ON will turn the indoor fan to high speed.

The IGC board starts its gas ignition process. A check is made to ensure that the rollout switch and limit switch are closed. If the check was successful, the induced draft motor is energized, and when its speed is satisfactory, as proven by the flue gas pressure switch, the ignition activation period begins. The burners will ignite within 5 seconds. If the burners do not light, there is a 22-second delay before another 5-second attempt. This sequence is repeated for 15 minutes or until the burners light. If, after the 15 minutes, the burners still have not lit, heating is locked out. To reset the control, break 24 vac power to the thermostat.

When gas ignition occurs, the IGC board will continue to monitor the condition of the rollout switch, the limit switches, the flue gas pressure switch, as well as the flame sensor.

When W1 is turned OFF, the IGC board turns off the gas valve. The IGC board has a delay time before it turns IFO=OFF. This sequence is repeated for 15 minutes or until the burners light. If, after the 15 minutes, the burners still have not lit, heating is locked out. To reset the control, break 24 vac power to the thermostat.

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.

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 CO₂ 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**
- A Mixed Air (MA) analog sensor is required on all W7220 units; either an Outdoor Air (OA) sensor for dry bulb changeover or an OA bus sensor for outdoor enthalpy changeover is required in addition to the MA sensor. An additional Return Air (RA) bus sensor can be added to the system for differential enthalpy or dry bulb changeover. A 20k ohm sensor is required in the OA and a bus sensor in the RA. DIP switch on RA bus sensor must be set in the RA position.

**Dry Bulb Temperature (optional) and Mixed Air (required), 20k NTC**
2-wire (18 to 22 AWG);
Temperature range –40°F to 150°F (–40°C to 65°C)
Temperature accuracy: 0°F/+2°F

**Temperature and Humidity, C7400S1000 (optional)**
S-Bus; 2-wire (18 to 22 AWG)
Temperature: range –40°F to 150°F (–40°C to 65°C)
Temperature accuracy: 0°F/+2°F (-18°C/-17°C)
Humidity: range 0 to 100% RH with 5% accuracy.

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

**4 Binary Inputs**
1-wire 24 vac + common GND (see page 33 for wiring details).
24 vac power supply
20 to 30 vac 50/60Hz; 100 VA Class 2 transformer.

**OUTPUTS**

**Actuator Signal**
2 to 10 vdc; minimum actuator impedance is 2k ohm; bus two-wire output for bus communicating actuators.

**Exhaust fan, Y1, Y2 and AUX1 O**
All Relay Outputs (at 30 vac):
Running: 1.5A maximum
Inrush: 7.5A maximum

**ENVIRONMENTAL**

**Operating Temperature**
–40°F to 150°F (–40°C to 65°C).
Exception of display operation down to –4°F (–20°C) with full recovery at –4°F (–20°C) from exposure to –40°F (–40°C)

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

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

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

**ECONOMIZER MODULE WIRING DETAILS**
Use Fig. 51 and Tables 9 and 10 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.

**Fig. 51 — W7220 Wiring Terminals**
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 11 to locate the wiring terminals for each S-Bus and enthalpy control sensor.

Table 9 — 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 10 — Economizer Module (Right Hand Terminal Blocks)

<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>
</tbody>
</table>

*Sylk is a trademark of Honeywell International Inc.

Table 11 — HH57AC081 Sensor Wiring Terminations

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

Use Fig. 52 and Table 12 to set the DIP switches for the desired use of the sensor.

Table 12 — HH57AC081 Sensor DIP Switch

Use DIP SWITCH POSITIONS FOR SWITCHES 1, 2, AND 3

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

NOTE: When an S-bus sensor is connected to an existing network, it will take 60 minutes for the network to recognize and auto-configure itself to use the new sensor. During the 60-minute setup period, no alarms for sensor failures (except SAT) will be issued and no economizing function will be available.

CO₂ Sensor Wiring

When using a CO₂ sensor, the black and brown common wires are internally connected and only one is connected to “IAQ COM” on the W7220. Use the power from the W7220 to power the CO₂ sensor OR make sure the ground for the power supplies are common. See Fig. 53 for CO₂ sensor wiring.
This section describes how to use the EconoMi$er® user inter-
face 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.

Menu Structure

Table 13 illustrates the complete hierarchy of menus and parameters for the EconoMi$er® X system.

The Menus in display order are:

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

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

SETUP AND CONFIGURATION

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

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

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

Time-Out and Screensaver

When no buttons have been pressed for 10 minutes, the LCD displays a screen saver, which cycles through the Status items. Each Status items displays in turn and cycles to the next item after 5 seconds.
<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT†</th>
<th>EXPANDED PARAMETER NAME</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON AVAL</td>
<td>NO</td>
<td>YES/NO</td>
<td></td>
<td>FIRST STAGE COOLING DEMAND (Y1–IN)</td>
<td>YES = economizing available; the system can use outside air for free cooling when required</td>
</tr>
<tr>
<td>ECONOMIZING</td>
<td>NO</td>
<td>YES/NO</td>
<td></td>
<td>FIRST STAGE COOLING RELAY OUTPUT</td>
<td>YES = outside air being used for first stage cooling</td>
</tr>
<tr>
<td>OCCUPIED</td>
<td>NO</td>
<td>YES/NO</td>
<td></td>
<td>OCCUPIED</td>
<td>YES = OCC signal received from space thermostat or unitary controller</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>YES = 24 vac on terminal OCC</td>
<td>NO = 0 vac on terminal OCC</td>
</tr>
<tr>
<td>HEAT PUMP</td>
<td>N/A**</td>
<td>COOL</td>
<td>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></td>
<td>FIRST STAGE COOLING DEMAND (Y1-IN)</td>
<td>Y1–I signal from space thermostat or unitary controller for cooling stage 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ON = 24 vac on terminal Y1–I</td>
<td>OFF = 0 vac on terminal Y1–I</td>
</tr>
<tr>
<td>COOL Y1—OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td></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></td>
<td>SECOND STAGE COOLING DEMAND (Y2–IN)</td>
<td>Y2–I signal from space thermostat or unitary controller for second stage cooling. ON = 24 vac on terminal Y2–I OFF = 0 vac on terminal Y2–I</td>
</tr>
<tr>
<td>COOL Y2—OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td></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>–40°F to 150°F</td>
<td></td>
<td>SUPPLY AIR TEMPERATURE, Cooling Mode</td>
<td>Displays value of measured mixed air from MAT sensor. Displays _ _ °F if not connected, short or out of range.</td>
</tr>
<tr>
<td></td>
<td>(or _ _ °C)</td>
<td>(–40°C to 66°C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DA TEMP</td>
<td>_ _ °F</td>
<td>–40°F to 150°F</td>
<td></td>
<td>DISCHARGE AIR TEMPERATURE, after Heating section</td>
<td>Displays when Discharge Air Sylk Bus sensor is connected and displays measured discharge temperature. Displays _ _ °F if sensor sends invalid value, if not connected, short or out of range.</td>
</tr>
<tr>
<td></td>
<td>(or _ _ °C)</td>
<td>(–40°C to 66°C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OA TEMP</td>
<td>_ _ °F</td>
<td>–40°F to 140°F</td>
<td></td>
<td>OUTSIDE AIR TEMPERATURE</td>
<td>Displays measured value of outdoor air temperature. Displays _ _ °F if sensor sends invalid value, short or out of range.</td>
</tr>
<tr>
<td></td>
<td>(or _ _ °C)</td>
<td>(–40°C to 60°C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OA HUM</td>
<td>_ _ %</td>
<td>0 to 100%</td>
<td></td>
<td>OUTSIDE AIR RELATIVE HUMIDITY</td>
<td>Displays measured value of outdoor humidity from OA Sylk Bus sensor. Displays _ _% if not connected, short or out of range.</td>
</tr>
<tr>
<td>RA TEMP</td>
<td>_ _ °F</td>
<td>0°F to 140°F</td>
<td></td>
<td>RETURN AIR TEMPERATURE</td>
<td>Displays measured value of return air temperature from RAT Sylk Bus sensor. Displays _ _ °F if sensor sends invalid value, if not connected, short or out of range.</td>
</tr>
<tr>
<td></td>
<td>(or _ _ °C)</td>
<td>(–18°C to 60°C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RA HUM</td>
<td>_ _ %</td>
<td>0 to 100%</td>
<td></td>
<td>RETURN AIR RELATIVE HUMIDITY</td>
<td>Displays measured value of return air humidity from RA Sylk Bus sensor. Displays _ _% if sensor sends invalid value, if not connected, short or out of range.</td>
</tr>
<tr>
<td>IN CO2</td>
<td>_ _ ppm</td>
<td>0 to 2000 ppm</td>
<td></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></td>
<td>DEMAND CONTROLLED VENTILATION STATUS</td>
<td>Displays ON if above set point and OFF if below set point, and ONLY if a CO₂ sensor is connected.</td>
</tr>
<tr>
<td>DAMPER OUT</td>
<td>2.0v</td>
<td>2.0 to 10.0v</td>
<td></td>
<td>Displays voltage output to the damper actuator.***</td>
<td></td>
</tr>
<tr>
<td>ACT POS</td>
<td>N/A</td>
<td>0 to 100%</td>
<td></td>
<td>Displays actual position of actuator</td>
<td></td>
</tr>
<tr>
<td>ACT COUNT</td>
<td>N/A</td>
<td>1 to 65,535</td>
<td></td>
<td>Displays number of times actuator has cycled. 1 cycle equals 180 degrees 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></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></td>
<td>EXHAUST STAGE 1 RELAY OUTPUT</td>
<td>Displays ON when damper position reaches programmed percentage set point. Output of EXH1 terminal: ON = relay closed OFF = relay open</td>
</tr>
</tbody>
</table>
# Table 13 — W7220 Menu Structure* (cont)

<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT</th>
<th>EXPANDED PARAMETER NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATUS (cont)</td>
<td>EXH2 OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>EXHAUST STAGE 2 RELAY OUTPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Output of AUX1 O terminal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Displays ON when damper position reaches programmed percentage set point.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ON = 24 vac output</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OFF = No output</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Displays only if AUX1 O = EXH2</td>
</tr>
<tr>
<td></td>
<td>ERV</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>ENERGY RECOVERY VENTILATOR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Output of AUX1 O terminal; displays only if AUX1 O = ERV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ON = 24 vac output</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OFF = No Output</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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Displays the stage of heat pump heating that is active.</td>
</tr>
<tr>
<td>FAN SPEED</td>
<td>N/A</td>
<td>LOW or HIGH</td>
<td>SUPPLY FAN SPEED</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Displays speed setting of fan on a 2-speed fan unit.</td>
</tr>
<tr>
<td>W (HEAT IN)</td>
<td>N/A</td>
<td>ON/OFF</td>
<td>HEAT DEMAND STATUS</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Displays status of heat demand on a 2-speed fan unit.</td>
</tr>
<tr>
<td></td>
<td>MAT SET</td>
<td>53°F (12°C)</td>
<td>38°F to 70°F (3°C to 21°C); increment by 1 degree</td>
<td>SUPPLY AIR SETPOINT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The economizer will modulate the OA damper to maintain the mixed air temperature at the set point</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>COMRESSOR LOW TEMPERATURE LOCKOUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Set point determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout. At or below the set point, the Y1-O and Y2-O will not be energized on the controller.</td>
</tr>
<tr>
<td></td>
<td>LOW T LOCK</td>
<td>32°F (0°C)</td>
<td>6°F to 80°F (–18°C to 27°C); increment by 1 degree</td>
<td>OA DRY BULB TEMPERATURE CHANGEOVER SETPOINT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Set point determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.; at 63°F unit will economize at 62°F and below and not economize at 64°F and above. There is a 2°F deadband.</td>
</tr>
<tr>
<td></td>
<td>DRYBLB SET</td>
<td>63°F (17°C)</td>
<td>48°F to 80°F (9°C to 27°C); increment by 1 degree</td>
<td>ENTHALPY CHANGEOVER CURVE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ES curve will only appear if using enthalpy changeover. Enthalpy boundary &quot;curves&quot; for economizing using single enthalpy. See page 43 for description of enthalpy curves.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ES3</td>
<td>ES1,ES2,ES3,ES4, or ES5</td>
<td></td>
</tr>
<tr>
<td>SETPOINTS</td>
<td>ENTH CURVE</td>
<td>ES3</td>
<td>ES1,ES2,ES3,ES4, or ES5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DCV SET</td>
<td>1100ppm</td>
<td>500 to 2000 ppm; increment by 100</td>
<td>DEMAND CONTROLLED VENTILATION</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Displays only if CO2 sensor is connected. Set point for Demand Controlled Ventilation of space. Above the set point, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the set point.</td>
</tr>
<tr>
<td></td>
<td>MIN POS</td>
<td>2.8 V</td>
<td>2 to 10 vdc</td>
<td>VENTILATION MINIMUM POSITION</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>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>
</tr>
<tr>
<td></td>
<td>VENTMAX</td>
<td>2.8 V</td>
<td>2 to 10 vdc</td>
<td>DCV MAXIMUM DAMPER POSITION</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Displays only if a CO2 sensor is connected. Used for Va (ventilation max cfm) set point. VENTMAX is the same setting as MIN POS would be if unit did not have CO2 sensor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100 to 9990 cfm; increment by 10</td>
</tr>
<tr>
<td></td>
<td>VENTMIN</td>
<td>2.25 V</td>
<td>2 to 10 vdc</td>
<td>DCV MINIMUM DAMPER POSITION</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Displays only if a CO2 sensor is connected. Used for Va (ventilation min cfm) set point. This is the ventilation for less than maximum occupancy of the space.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100 to 9990 cfm; increment by 10</td>
</tr>
<tr>
<td></td>
<td>ERV OAT SP††</td>
<td>32°F (0°C)</td>
<td>0°F to 50°F (–18°C to 10°C); increment by 1 degree</td>
<td>ENERGY RECOVERY VENTILATOR UNIT OUTDOOR AIR TEMPERATURE SETPOINT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Only when AUX1 O = ERV</td>
</tr>
</tbody>
</table>

---

*The table continues with additional parameters and their settings.*
### Table 13 — W7220 Menu Structure* (cont)

<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT*</th>
<th>EXPANDED PARAMETER NAME</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SETPOINTS (cont)</td>
<td>EXH1 SET</td>
<td>50%</td>
<td>0 to 100%; increment by 1</td>
<td>EXHAUST FAN STAGE 1 SETPOINT</td>
<td>Set point for OA damper position when exhaust fan 1 is powered by the economizer. With 2-speed fan units, Exh1 L (low speed fan) and Exh1 H (high speed fan) settings are required. Default for Exh1 L is 65% and Exh1 H is 50%</td>
</tr>
<tr>
<td></td>
<td>EXH2 SET</td>
<td>75%</td>
<td>0 to 100%; increment by 1</td>
<td>EXHAUST FAN STAGE 2 SETPOINT</td>
<td>Set point for OA damper position when exhaust fan 2 is powered by the economizer. Only used when AUX1 O is set to EHX2. With 2-speed fan units, Exh2 L (low speed fan) and Exh2 H (high speed fan) settings are required. Default for Exh2 L is 80% and Exh2 H is 75%</td>
</tr>
<tr>
<td></td>
<td>INSTALL</td>
<td>01/01/10</td>
<td>N/A</td>
<td>Display order = MM/DD/YY</td>
<td>Setting order = DD, MM, then YY.</td>
</tr>
<tr>
<td></td>
<td>UNITS DEG</td>
<td>°F</td>
<td>°F or °C</td>
<td>Sets economizer controller in degrees Fahrenheit or Celsius</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EQUIPMENT CONV</td>
<td>CONV or HP</td>
<td>CONV = conventional; HP O/B = Enable Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AUX2 IN</td>
<td>W</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. In HP O/B mode: HP(O) = energize heat pump on Cool (default); HP(B) = energize heat pump on heat.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FAN SPEED</td>
<td>2 speed</td>
<td>1 speed/2 speed</td>
<td>Sets the economizer controller for operation of 1 speed or 2 speed supply fan. The controller does not control the fan, but positions the OA and RA dampers to heating or cooling mode. NOTE: 2-speed fan option also needs Heat (W1) programmed in AUX 2 In.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FAN CFM</td>
<td>5000 cfm</td>
<td>100 to 15000 cfm; increment by 100</td>
<td>UNIT DESIGN AIRFLOW (CFM)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AUX1 OUT</td>
<td>NONE</td>
<td>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>
<td></td>
</tr>
<tr>
<td></td>
<td>OCC INPUT</td>
<td>INPUT or ALWAYS</td>
<td>OCCUPIED MODE BY EXTERNAL SIGNAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FACTORY DEFAULT</td>
<td>NO</td>
<td>NO or YES</td>
<td>Resets all set points to factory defaults when set to YES. LCD will briefly flash YES and change to NO but all parameters will change to the factory default values.</td>
<td></td>
</tr>
<tr>
<td>ADVANCED SETUP</td>
<td>MA LO SET</td>
<td>45°F (7°C)</td>
<td>35°F to 65°F (2°C to 18°C); increment by 1 degree</td>
<td>SUPPLY AIR TEMPERATURE LOW LIMIT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FREEZE POS</td>
<td>CLO</td>
<td>CLO or MIN</td>
<td>FREEZE PROTECTION DAMPER POSITION</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>
<td></td>
</tr>
<tr>
<td></td>
<td>CO2 SPAN</td>
<td>2000ppm</td>
<td>1000 to 3000 ppm; increment by 50</td>
<td>CO2 ppm span to match CO2 sensor; e.g.: 500-1500 sensor output would be 500 CO2 zero and 1000 CO2 span.</td>
<td></td>
</tr>
<tr>
<td></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</td>
<td></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 OPN and OA damper will close if programmed for CLO. All other controls, e.g.: fans, etc. will shut off.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DA LO ALM</td>
<td>45°F (7°C)</td>
<td>NONE</td>
<td>Used for alarm when the DA air temperature is too low. Set lower range of alarm, below this temperature the alarm will show on the display.</td>
<td></td>
</tr>
</tbody>
</table>

†† Energy Recovery Ventilator
<table>
<thead>
<tr>
<th>ADVANCED SETUP (cont)</th>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT</th>
<th>EXPANDED PARAMETER NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DA HI ALM</td>
<td>80°F (27°C)</td>
<td>NONE 70°F to 180°F (21°C to 82°C); increment by 5°F</td>
<td>Used for alarm when the DA air temperature is too high. Sets upper range of alarm; above this temperature, the alarm will show on the display.</td>
<td></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 (RA, OA, MA, CO₂) sensors. This operation is not operable with a 2-speed fan unit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAT T CAL</td>
<td>0.0°F</td>
<td>± 2.5°F</td>
<td>SUPPLY AIR TEMPERATURE CALIBRATION</td>
<td>Allows for the operator to adjust for an out of calibration temperature sensor.</td>
</tr>
<tr>
<td></td>
<td>OAS T CAL</td>
<td>0.0°F</td>
<td>± 2.5°F</td>
<td>OUTSIDE AIR TEMPERATURE CALIBRATION</td>
<td>Allows for the operator to adjust for an out of calibration temperature sensor.</td>
</tr>
<tr>
<td></td>
<td>OA H CAL</td>
<td>0% RH</td>
<td>±10% RH</td>
<td>OUTSIDE AIR HUMIDITY CALIBRATION</td>
<td>Allows for operator to adjust for an out of calibration humidity sensor.</td>
</tr>
<tr>
<td></td>
<td>RA T CAL</td>
<td>0.0°F</td>
<td>± 2.5°F</td>
<td>RETURN AIR TEMPERATURE CALIBRATION</td>
<td>Allows for the operator to adjust for an out of calibration temperature sensor.</td>
</tr>
<tr>
<td></td>
<td>RA H CAL</td>
<td>0% RH</td>
<td>±10% RH</td>
<td>RETURN AIR HUMIDITY CALIBRATION</td>
<td>Allows for operator to adjust for an out of calibration humidity sensor.</td>
</tr>
<tr>
<td></td>
<td>DA T CAL</td>
<td>0.0°F</td>
<td>± 2.5°F</td>
<td>DISCHARGE AIR TEMPERATURE CALIBRATION</td>
<td>Allows for the operator to adjust for an out of calibration temperature sensor.</td>
</tr>
<tr>
<td></td>
<td>2SP FAN DELAY</td>
<td>5 Minutes</td>
<td>0 to 20 minutes in 1 minute increments</td>
<td>TIME DELAY ON SECOND 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</td>
<td>N/A</td>
<td>The checkout for the damper minimum position is based on the system. See Table 14.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DAMPER OPEN</td>
<td>N/A</td>
<td>N/A</td>
<td>Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure to pause in the mode to allow exhaust contacts to energize due to the delay in the system.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DAMPER CLOSE</td>
<td>N/A</td>
<td>N/A</td>
<td>Positions damper to the fully closed position</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONNECT Y1–O</td>
<td>N/A</td>
<td>N/A</td>
<td>Closes the Y1-O relay (Y1-O)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONNECT Y2–O</td>
<td>N/A</td>
<td>N/A</td>
<td>Closes the Y2-O relay (Y2-O)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONNECT AUX1–O</td>
<td>N/A</td>
<td>N/A</td>
<td>Energizes the AUX output. If Aux setting is:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONNECT EXH1</td>
<td>N/A</td>
<td>N/A</td>
<td>Closes the power exhaust fan 1 relay (EXH1)</td>
<td></td>
</tr>
</tbody>
</table>

**CHECKOUT***

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

<table>
<thead>
<tr>
<th>ALARMS</th>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT</th>
<th>EXPANDED PARAMETER NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MAT SENS ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>SUPPLY AIR TEMPERATURE SENSOR ERROR</td>
<td>Mixed air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>CO2 SENS ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>CO₂ SENSOR ERROR</td>
<td>CO₂ sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>OA SYLK T ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>OUTSIDE AIR S-BUS SENSOR ERROR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OA SYLK H ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>Outdoor air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RA SYLK T ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>RETURN AIR S-BUS SENSOR ERROR</td>
<td>Return air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>RA SYLK H ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>RETURN AIR S-BUS SENSOR ERROR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DA SYLK T ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>DISCHARGE AIR S-BUS SENSOR ERROR</td>
<td>Discharge air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>DA SYLK H ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>DISCHARGE AIR S-BUS SENSOR ERROR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OA SENS T ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>OUTSIDE AIR TEMPERATURE SENSOR ERROR</td>
<td>Outdoor air temperature sensor has failed or become disconnected - check wiring, then replace if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>ACT ERROR</td>
<td>N/A</td>
<td>N/A</td>
<td>ACTUATOR ERROR</td>
<td>Actuator has failed or become disconnected - check for stall, over voltage, under voltage and actuator count. Replace actuator if damper is movable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu.</td>
</tr>
</tbody>
</table>
Table 13 — W7220 Menu Structure* (cont)

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

ALARMS (CONT)

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

Notes:
1. 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 OCCUPANCY jumper to the ECONO connector and to the W7220’s OCC input terminal. An external timer 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 control sensor. On these rooftop units, the economizer control sensor is located downstream of the evaporator/indoor coil in the supply fan section where this sensor is designated as Supply Air Temperature (SAT) sensor.
3. SETPOINTS —> DRYBLB SET — This point is not displayed if a Return Air (differential) temperature sensor or an Outdoor Air enthalpy sensor is connected.
4. SYSTEM SETUP parameters must be configured as noted for 2-Speed unit operation:
   EQUIPMENT = CONV
   AUX2 I = W
   FAN SPEED = 2SPEED

For damper minimum position settings and checkout menu readings, see Table 14. For dry bulb operation with a 1 speed indoor fan, with or without DCV, see Tables 15 and 16. For enthalpy operation with a 1 speed indoor fan, with or without DCV, see Tables 17 and 18. For dry bulb operation with a 2 speed indoor fan, with or without DCV, see Tables 19 and 20. For enthalpy operation with a 2 speed indoor fan, with or without DCV, see Tables 21 and 22.

Table 14 — Damper Minimum Position Settings and Readings on Checkout Menu

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (CO2 SENSOR)</th>
<th>FAN SPEED</th>
<th>SETPOINTS</th>
<th>CHECKOUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>MIN POS</td>
<td>VMAX–HS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>MIN POS H</td>
<td>VMAX–HS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MIN POS L</td>
<td>VMAX–LS</td>
<td></td>
</tr>
<tr>
<td>YES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>VENT MIN</td>
<td>VMAX–HS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VENT MAX</td>
<td>VMAX–HS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VENT MIN H</td>
<td>VMAX–HS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VENT MAX H</td>
<td>VMAX–LS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VENT MIN L</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VENT MAX L</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>
*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2–O after the delay if the call for Y–I and Y2–I have not been satisfied.

### Table 15 — Dry Bulb Operation without DCV (CO₂ Sensor) — 1 Speed Fan

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (DCV)</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NONE</strong></td>
<td></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><strong>Yes</strong></td>
<td></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>0-v/Off</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>0-v/Off*</td>
<td>MIN POS to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
</tbody>
</table>

### Table 16 — Dry Bulb Operation with DCV (CO₂ Sensor) — 1 Speed Fan

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (DCV)</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below CO₂ set</td>
<td></td>
<td>Off</td>
<td>Off</td>
<td>High</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>High</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>On</td>
<td>High</td>
<td>24-v/On</td>
<td>24-v/On</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></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 to Full-Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>High</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN to VENTMAX</td>
<td>Closed to Full-Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>On</td>
<td>High</td>
<td>24-v/On</td>
<td>0-v/Off*</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
</tbody>
</table>

| Above CO₂ set                       |                               | Off  | Off  | High      | 0-v/Off | 0-v/Off | VENTMIN to VENTMAX | Closed     |
|                                    |                               | On   | Off  | High      | 24-v/On | 0-v/Off | VENTMIN to VENTMAX | Closed     |
|                                    |                               | On   | On   | High      | 24-v/On | 24-v/On | VENTMIN to VENTMAX | Closed     |
|                                      |                               | Off  | Off  | High      | 0-v/Off | 0-v/Off | VENTMIN to VENTMAX | Closed     |
|                                      |                               | On   | Off  | High      | 0-v/Off | 0-v/Off | VENTMIN to VENTMAX | Closed     |
|                                      |                               | On   | On   | High      | 24-v/On | 0-v/Off*| VENTMIN to Full-Open | Closed to Full-Open |

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

### Table 17 — Enthalpy Operation without DCV (CO₂ Sensor) — 1 Speed Fan

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (DCV)</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NONE</strong></td>
<td></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><strong>Yes</strong></td>
<td></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>0-v/Off</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>0-v/Off*</td>
<td>MIN POS to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
</tbody>
</table>

*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2–O after the delay if the call for Y–I and Y2–I have not been satisfied.
### Table 18 — Enthalpy Operation with DCV (CO₂ Sensor) — 1 Speed Fan

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (DCV)</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Below CO₂ set</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Off Off High 0-v/Off 0-v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On Off High 24-v/On 0-v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On On High 24-v/On 24-v/On</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Off Off High 0-v/Off 0-v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On Off High 24-v/On 0-v/Off†</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Above CO₂ set</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Off Off High 0-v/Off 0-v/Off</td>
<td>VENTMIN to VENTMAX</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On Off High 24-v/On 0-v/Off</td>
<td>VENTMIN L to VENTMAX</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On On High 24-v/On 24-v/On</td>
<td>VENTMIN H to VENTMAX</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Off Off High 0-v/Off 0-v/Off</td>
<td>VENTMIN L to VENTMAX</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On Off High 24-v/On 0-v/Off†</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On On High DELAY* 24-v/On 0-v/Off†</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.
†With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2–O after the delay if the call for Y–I and Y2–I have not been satisfied.

### Table 19 — Dry Bulb Operation without DCV (CO₂ Sensor) — 2 Speed Fan

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (DCV)</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NONE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Off Off Low 0-v/Off 0-v/Off</td>
<td>MIN POS L</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On Off Low 24-v/On 0-v/Off</td>
<td>MIN POS L</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On On High 24-v/On 24-v/On</td>
<td>MIN POS H</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NONE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Off Off Low 0-v/Off 0-v/Off</td>
<td>MIN POS L</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On Off Low 24-v/On 0-v/Off†</td>
<td>MIN POS H to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On On High DELAY* 24-v/On 0-v/Off†</td>
<td>MIN POS H to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.
†With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2–O after the delay if the call for Y–I and Y2–I have not been satisfied.
Table 20 — Dry Bulb Operation with DCV (CO₂ Sensor) — 2 Speed Fan

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

*With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.
†With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2–O after the delay if the call for Y1–I and Y2–I have not been satisfied.

Table 21 — Enthalpy Operation without DCV (CO₂ Sensor) — 2 Speed Fan

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (DCV)</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NO CO₂ SENSOR</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>OFF  OFF  LOW  0v/Off  0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>OFF  LOW  24v/On  0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>ON  HIGH  24v/On  24v/On</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YES</td>
<td>OFF  OFF  LOW  0v/Off  0v/Off</td>
<td>MIN POS to Full Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>OFF  LOW  0v/Off  0v/Off</td>
<td>MIN POS to Full Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>ON  HIGH  DELAY*  24v/On  0v/Off†</td>
<td>MIN POS to Full Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.
†With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2–O after the delay if the call for Y1–I and Y2–I have not been satisfied.
ENTHALPY SETTINGS

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

Refer to Table 24 for ENTH CURVE set point values.

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

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

Figure 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.

TWO-SPEED FAN OPERATION

NOTE: Two-Speed Fan operation applies to size 07 models only.

The W7220 controller has the capability to work with a system using a 2-speed supply fan. The W7220 does not control the supply directly but uses the following input status to determine the speed of the supply fan and controls the OA damper to the required position, see Table 23.

Table 22 — Enthalpy Operation With DCV (CO₂ Sensor) — 2 Speed Fan

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

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

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

Table 23 — Fan Speed

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

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

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

After the delay one of two actions will happen:
• The Y2 In call will be satisfied with the damper 100% open and fan on high speed and the call will turn off
• OR
• If the call for additional cooling in the space has not been satisfied then the first stage of mechanical cooling will be enabled through Y1 Out or Y2 Out.
CHECKOUT
Inspect all wiring connections at the economizer module’s terminals, and verify compliance with the installation wiring diagrams. For checkout, review the Status of each configured parameter and perform the Checkout tests.
NOTE: For information about menu navigation and use of the keypad see Interface Overview on page 34.

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

Status
Use the Status menu (see Table 13) to check the parameter values for the various devices and sensors configured.
NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 34.

Checkout Tests
Use the Checkout menu (see page 38) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.
NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 34.

Table 24 — Single Enthalpy and Dual Enthalpy High Limit Curves

<table>
<thead>
<tr>
<th>ENTHALPY CURVE</th>
<th>TEMP. DRY BULB (F)</th>
<th>TEMP. DEWPOINT (F)</th>
<th>ENTHALPY (btu/lb/da)</th>
<th>POINT P1</th>
<th>POINT P2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TEMP. (F)</td>
<td>HUMIDITY (%RH)</td>
<td>TEMP. (F)</td>
<td>HUMIDITY (%RH)</td>
<td></td>
</tr>
<tr>
<td>ES1</td>
<td>80</td>
<td>60</td>
<td>28.0</td>
<td>80</td>
<td>36.8</td>
</tr>
<tr>
<td>ES2</td>
<td>75</td>
<td>57</td>
<td>26.0</td>
<td>75</td>
<td>39.6</td>
</tr>
<tr>
<td>ES3</td>
<td>70</td>
<td>54</td>
<td>24.0</td>
<td>70</td>
<td>42.3</td>
</tr>
<tr>
<td>ES4</td>
<td>65</td>
<td>51</td>
<td>22.0</td>
<td>65</td>
<td>44.8</td>
</tr>
<tr>
<td>ES5</td>
<td>60</td>
<td>48</td>
<td>20.0</td>
<td>60</td>
<td>46.9</td>
</tr>
<tr>
<td>HL</td>
<td>86</td>
<td>66</td>
<td>32.4</td>
<td>86</td>
<td>38.9</td>
</tr>
</tbody>
</table>

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

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

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 \( \text{Enter} \) button. ERASE? displays.
3. Press the \( \text{Enter} \) button. ALARM ERASED displays.
4. Press the \( \text{Menu up/Exit} \) 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.

**Staged Air Volume (SAV™) with Variable Frequency Drive**

The Staged Air Volume (SAV) system utilizes a Variable Frequency Drive (VFD) to automatically adjust the indoor fan motor speed in sequence with the unit’s ventilation, cooling and heating operation. Per ASHRAE 90.1-2016, during the first stage of cooling operation the SAV system will adjust the fan motor to provide 66% of the design airflow rate for the unit. When the call for the second stage of cooling is required, the SAV system will allow the design airflow rate for the unit established (100%). During the heating mode, the SAV system will allow total design airflow rate (100%) operation. During ventilation mode, the SAV system will operate the fan motor at 66% speed. See Fig. 56 and 57.

**NOTE:** The Remote VFD Keypad is part of the Multi-Speed VFD display kit (P/N: CRDISKIT002A00) which is a field-installed accessory. It is not included with the 48LC 07 base unit. The VFD keypad as shown in Fig. 58 consists of the following sections.
Fig. 58 — VFD Keypad

**ALPHA NUMERIC DISPLAY**
The LCD display is backlit with 2 alpha-numeric lines. All data is displayed on the LCD. See Fig. 59.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-20 Motor Power</td>
<td>[2] 0.12KW-0.16HP</td>
<td>Setup 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MENU KEY**
Use the Menu key to select between Status, Quick Menu or Main Menu. The triangle icon at the bottom of the LCD display indicates the currently selected mode. (See number 5 in Fig. 59.)

**NAVIGATION KEYS AND STATUS LEDS**
The Navigation keys and Status LEDs are detailed in Fig. 60.

**OPERATION KEYS & LEDS**
Figure 61 details the functions of the Operating keys. An illuminated yellow LED above the key indicates the active key.

1. **Hand On** key: Starts the motor and enables control of the variable frequency drive (VFD) via the VFD Keypad option. **NOTE:** Please note that terminal 27 Digital Input (5-12 Terminal 27 Digital Input) has coast inverse as default setting. This means that the Hand On key will not start the motor if there is no 24V to terminal 27, so be sure to connect terminal 12 to terminal 27.
2. **Off/Reset** key: Stops the motor (off). If in alarm mode the alarm will be reset.
3. **Auto On** key: The variable frequency drive is controlled either via control terminals or serial communication.

**CONNECTING THE KEYPAD TO THE VFD**
The VFD keypad can be mounted directly to the variable frequency drive, provided you can easily access the front panel of the VFD. If you do not have easy access to the VFD front panel, use the cable included with the kit to connect the keypad to the VFD.

**Connecting the Keypad Directly to the VFD**
1. Place the bottom of the VFD keypad into the variable frequency drive as shown in Fig. 62.
2. Push the top of the VFD keypad into the variable frequency drive as shown in Fig. 63.
The VFD keypad can be connected to the variable frequency drive via the cable included with the Multi-Speed VFD display kit (PN: CRDISKIT002A00). See Fig. 64.

1. Connect the male end of the cable to the front panel of the variable frequency drive. Use 2 of the screws included with the kit to secure the cable to the VFD.

2. Connect the female end of the cable to the back panel of the VFD Remote keypad. Secure the cable to the remote keypad using the 2 remaining screws from the kit.

**Using the Cable to Connect the Keypad to the VFD**

**PROGRAM THE VFD FOR 3 DISCRETE INDOOR FAN SPEEDS**

**IMPORTANT:** The 48LC 07 units are programmed at the factory for 3 discrete indoor fan speeds. The following procedure is only to be used to recover this function after an event such as a system crash.

**NOTE:** This procedure requires use of the VFD Keypad which is included as part of the field-installed Multi-Speed VFD display kit (P/N: CRDISKIT002A00). If the VFD keypad is not already installed, install it. See “Connecting the Keypad to the VFD” for details.
To program the VFD for 3 discreet indoor fan motor speeds

1. At Power-Up:
   At the first power up, the LCD displays the Select Language screen (see Fig. 65). The default setting is English. To change the language, press the OK key and use the ▲ and ▼ keys to scroll to the desired language and then press OK.
2. Selecting Regional Settings:
   a. Press the Off Reset key.
   b. Press the Menu key to move the ▼ (triangle icon) so it is positioned over Main Menu. The display shows the following.
   c. Press the OK key and the display changes to:
   
   d. With the top row highlighted, press OK. The display changes to:
       
  NOTE: If English is not the desired language, press OK, select the desired language and press OK again.
   e. Press ▼ (Down Arrow key) once; the display changes to:

3. Clearing Alarm 060: External Interlock:
   a. Press the Menu key twice to position the ▼ (triangle icon) over Main Menu; the display changes to:

   b. Press the ▼ (Down Arrow) key until the following display appears:

   c. Press OK. The display changes to:

   d. Press ▼ (Down Arrow) once to highlight the bottom row and press OK. The display changes to

   e. Press ▼ (Down Arrow) twice; the following display appears:

   f. Press OK to highlight the number in the bracket.
   g. Press ▼ (Down Arrow) until the following display appears:

   h. Press OK.
   i. Press Off Reset. The Alarm indicator disappears.
4. Entering Grid Type:
   a. Press the Menu key to move the ▼ (triangle icon) so it is positioned over Main Menu. The display shows the following:
   b. Press (Down Arrow) once to highlight the bottom row.
   c. Press OK, the display changes to:
   
   0—** Operation / Display
   1—** Load and Motor

   0—0* Basic Settings
   0—1* Set-up Operations

   0—01 Language
   [0] English

   0—03 Regional Settings
   [0] International

   f. Press OK; the [0] is now highlighted.
   g. Press ▼ (Down Arrow) key once; the display changes to:

   0—03 Regional Settings
   [1] North America

   h. Press OK
   NOTE: If the Alarm 060 appears, follow Step 3 to clear the alarm. Make sure to press Off Reset when done. If there is no alarm, continue at Step 4.

5. Entering Motor Data:
   a. Press the Menu key to move the ▼ (triangle icon) so it is positioned over Main Menu. The display shows the following:

   b. Press (Down Arrow) once to highlight the bottom row.
   c. Press OK, the display changes to:

   0—06 Grid Type
   [102] 200-240V/60Hz

   d. Press OK to highlight the number in the bracket and then use the ▲ and ▼ (Up and Down Arrow) keys to select the desired voltage and Hertz for the unit.
   e. Press OK to accept the selection and continue.
d. Press ▼ (Down Arrow) twice to reach the following display:

```
1—1* Motor Selection
1—2* Motor Data
```

e. Press OK; the following display appears:

```
1-20 Motor Power
[9] 1.5kW - 2 hp
```

**NOTE:** The number in the bracket may be different from what is shown above.

f. Press OK and then use the ▲ and ▼ (Up and Down Arrow) keys to scroll to the proper motor horsepower. Press OK again to set the selected hp.

g. Press ▼ (Down Arrow) once, the following display appears:

```
1-22 Motor Voltage
230V
```

h. Press OK to highlight the voltage value. Use the ▲ and ▼ (Up and Down Arrow) keys to select the nameplate voltage. Press OK again to set the selected voltage.

i. Press ▼ (Down Arrow) once to display the following:

```
1-23 Motor Frequency
60Hz
```

j. Press OK to highlight the Frequency value and then use the ▲ and ▼ (Up and Down Arrow) keys to select the nameplate Hz. Press OK again to set the selected Hz.

k. Press ▼ (Down Arrow) once to display the following:

```
1-24 Motor Current
6.61A
```

l. Press OK to highlight the Current value and then use the ▲ and ▼ (Up and Down Arrow) keys to select the Max Amps value provided. Press OK again to set the selected Max Amps.

**NOTE:** The Max Amps is greater than the nameplate value. Check the VFD Unit Parameters (see Table 25 on page 52) and use the value listed for the given unit in the column labeled “Motor Current Must-Hold Amps”.

m. Press ▼ (Down Arrow) once to display the following:

```
1-25 Motor Nominal Speed
1740rpm
```

n. Press OK to highlight the rpm value and then use the ▲ and ▼ (Up and Down Arrow) keys to select the nameplate rpm. Press OK again to set the selected rpm.

6. Entering Parameters for 1-71, 1-73, 1-82, and 1-90:

a. Press the Menu key to move the B (triangle icon) so it is positioned over Main Menu. The display shows the following:

```
0—** Operation / Display
1—** Load and Motor
```

b. Press ▼ (Down Arrow) once to highlight the bottom row.

c. Press OK, the display changes to:

```
1—0* General Settings
1—1* Motor Selection
```

d. Press ▼ (Down Arrow) until the following display appears:

```
1—6* Load Depen. Setting
1—7* Start Adjustments
```

e. Press OK, the following display appears:

```
1-71 Start Delay
2.0s
```

f. Press OK to highlight the number and then use the ▲ and ▼ (Up and Down Arrow) keys to select the number provided in Table 25. Press OK again to set the selected value.

g. Press ▼ (Down Arrow) twice, the following display appears:

```
1-73 Flying Start
[1] Enabled
```

h. Press OK to highlight the number in the bracket and then use the ▲ and ▼ (Up and Down Arrow) keys to select the number provided in Table 25. Press OK again to set the selected value.

i. Press the Back key once, the following display appears:

```
1-6* Load Depen. Setting
1—7* Start Adjustments
```

j. Press ▼ (Down Arrow) once, the following display appears:

```
1—7* Start Adjustments
1—8* Stop Adjustments
```

k. Press OK, the following display appears:

```
1-80 Function at Stop
[0] Coast
```

l. Press ▼ (Down Arrow) once, the following display appears:

```
1—8* Stop Adjustments
```

m. Press OK to highlight the number and then use the ▲ and ▼ (Up and Down Arrow) keys to select the number provided in Table 25. Press OK again to set the selected value.

n. Press the Back key once, the following display appears:

```
1—7* Start Adjustments
1—8* Stop Adjustments
```

o. Press ▼ (Down Arrow) once, the following display appears:

```
1—9* Motor Temperature
```

p. Press OK, the following display appears:

```
1—90 Motor Thermal Prote...
[4] ETR trip 1
```

q. Press OK to highlight the number in the bracket then use the ▲ and ▼ (Up and Down Arrow) keys to select the number provided in Table 25. Press OK again to set the selected value.
7. Setting References:
   a. Press the Menu key to move the ▼ (triangle icon) so it is positioned over Main Menu. The display shows the following:
   
   | 0—** Operation / Display |
   | 1—** Load and Motor        |
   b. Press ▼ (Down Arrow) three times, the following display appears:
   
   | 2—** Brakes               |
   | 3—** Reference / Ramps     |
   c. Press OK, the following display appears:
   
   | 3—0* Reference Limits      |
   | 3—1* References            |
   d. Press OK again, the following display appears:
   
   | 3-02 Minimum Reference     |
   | 0.000                      |
   
   NOTE: If the bottom row displays a number other than 0.000, press OK and use the ▲ and ▼ (Up and Down Arrow) key to select 0.000.
   e. Press ▼ (Down Arrow) once, the following display appears:
   
   | 3-03 Maximum Reference     |
   | 60.000                     |
   
   NOTE: If the bottom row displays a number other than 60.000, press OK and use the ▲ and ▼ (Up and Down Arrow) key to select 60.000.
   f. Press the Back key until the following display appears:
   
   | 3—0* Reference Limits      |
   | 3—1* References            |
   g. Press ▼ (Down Arrow) once to move the highlight to the bottom row and then press OK. The following display appears:
   
   | 3-10 Preset Reference      |
   | [0]0.00%                   |
   h. Press OK once to highlight the number in the bracket. Press OK again; the highlight moves to the current percent value. Use the ▲ and ▼ (Up and Down Arrow) keys and the table below to enter the required Preset Reference values.

<table>
<thead>
<tr>
<th>0</th>
<th>0.00%</th>
<th>Stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LL.LL%</td>
<td>Low Speed (see Table 25, column labeled “Preset References 3—10[1]” for the proper % for each unit)</td>
</tr>
<tr>
<td>2</td>
<td>MM.MM%</td>
<td>Medium Speed (see Table 25, column labeled “Preset References 3—10[2]” for the proper % for each unit)</td>
</tr>
<tr>
<td>3</td>
<td>100%</td>
<td>Override (High Speed)</td>
</tr>
<tr>
<td>4</td>
<td>100%</td>
<td>High Speed (100% or close to 100% to achieve the required CFM at high speed)</td>
</tr>
<tr>
<td>5</td>
<td>0.00%</td>
<td>Stop</td>
</tr>
<tr>
<td>6</td>
<td>0.00%</td>
<td>Stop</td>
</tr>
<tr>
<td>7</td>
<td>0.00%</td>
<td>Stop</td>
</tr>
</tbody>
</table>

8. Setting the Ramp Time:
   a. Press the Back key until the following display appears:
   
   | 3—0* Reference Limits      |
   | 3—1* References            |
   b. Press ▼ (Down Arrow) twice, the following display appears:
   
   | 3—1* References |
   | 3—4* Ramp 1      |
   c. Press OK, the following display appears:
   
   | 3-41 Ramp 1 Ramp up Time |
   | 3.00s                  |
   d. Press OK again to highlight the bottom row and use the ▲ and ▼ (Up and Down Arrow) keys to select 10.00s. Press OK again to set the selected Ramp up Time.
   e. Press ▼ (Down Arrow) once, the following display appears:
   
   | 3-42 Ramp 1 Ramp Down Time |
   | 3.00s                      |
   f. Press OK again to highlight the bottom row and use the ▲ and ▼ (Up and Down Arrow) keys to select 10.00s. Press OK again to set the selected Ramp Down Time.

9. Setting Limits:
   a. Press the Back key until the following display appears:
   
   | 2—** Brakes               |
   | 3—** Reference / Ramps     |
   b. Press ▼ (Down Arrow) once, the following display appears:
   
   | 3—** Reference / Ramps     |
   | 4—** Limits / Warnings     |
   c. Press OK, the following display appears:
   
   | 4—1* Motor Limits          |
   | 4—4* Adj. Warning 2       |
   d. Press OK again, the following display appears:
   
   | 4-10 Motor Speed Direction |
   | [2] Both Directions        |
   e. Press ▼ (Down Arrow) once, the following display appears:
   
   | 4-12 Motor Speed Low Limi… |
   | 0.0Hz                      |
   f. Press ▼ (Down Arrow) again, the following display appears:
   
   | 4-14 Motor Speed High Limi… |
   | 65.0Hz                     |
   
   NOTE: Press OK to highlight the Hz value and then use the ▲ and ▼ (Up and Down Arrow) keys to enter the required values.
   g. Press ▼ (Down Arrow) once, the following display appears:
   
   | 4-18 Current Limit         |
   | 110%                       |

   
   NOTE: Press OK to highlight the % value and then use the ▲ and ▼ (Up and Down Arrow) keys to enter the required value. See Table 25 for proper selection of the value for this parameter, then press OK to set the selected value.
h. Press ▼ (Down Arrow) once, the following display appears:

\[
\begin{array}{c}
4-19 \text{ Max Output Frequency} \\
65.0Hz
\end{array}
\]

NOTE: Press OK to highlight the Hz value and then use the ▲ and ▼ (Up and Down Arrow) keys to enter the required values.

10. Setting Digital Inputs:
   a. Press the Back key until the following display appears:

\[
\begin{array}{c}
3---* \text{ Reference / Ramps} \\
4---* \text{ Limits / Warnings}
\end{array}
\]

b. Press ▼ (Down Arrow) once, the following display appears:

\[
\begin{array}{c}
4---* \text{ Limits / Warnings} \\
5---* \text{ Digital In/Out}
\end{array}
\]

c. Press OK, the following display appears:

\[
\begin{array}{c}
5-0* \text{ Digital I/O mode} \\
5-1* \text{ Digital Inputs}
\end{array}
\]

d. Press ▼ (Down Arrow) once to move the highlight to the bottom row and then press OK. The following display appears:

\[
\begin{array}{c}
5-10 \text{ Terminal 18 Digital In...} \\
[8] \text{ Start}
\end{array}
\]

e. Press ▼ (Down Arrow) again. The following display appears:

\[
\begin{array}{c}
5-11 \text{ Terminal 19 Digital In...} \\
[16] \text{ Preset ref bit 0}
\end{array}
\]

f. Press ▼ (Down Arrow) again. The following display appears:

\[
\begin{array}{c}
5-12 \text{ Terminal 27 Digital In...} \\
[17] \text{ Preset ref bit 1}
\end{array}
\]

g. Press ▼ (Down Arrow) again. The following display appears:

\[
\begin{array}{c}
5-13 \text{ Terminal 29 Digital In...} \\
[18] \text{ Preset ref bit 2}
\end{array}
\]

NOTE: By pressing OK, the number in the bracket can be changed until the desired number appears. Press OK again to set the selected value.

11. Setting Analog Inputs:
   a. Press the Back key until the following display appears:

\[
\begin{array}{c}
4---* \text{ Limits / Warnings} \\
5---* \text{ Digital In/Out}
\end{array}
\]

b. Press ▼ (Down Arrow) until the following display appears:

\[
\begin{array}{c}
5---* \text{ Digital In/Out} \\
6---* \text{ Analog In/Out}
\end{array}
\]

c. Press OK, the following display appears:

\[
\begin{array}{c}
6---* \text{ Analog In/Out} \\
6-1* \text{ Analog Input 53}
\end{array}
\]

d. Press ▼ (Down Arrow) once to move the highlight to the bottom row and then press OK. The following display appears:

\[
\begin{array}{c}
6:10 \text{ Terminal 53 Low Voltage} \\
2V
\end{array}
\]

e. Press ▼ (Down Arrow) once to move the highlight to the bottom row and then press OK. The following display appears:

\[
\begin{array}{c}
6-11 \text{ Terminal 53 High Voltage} \\
[10V]
\end{array}
\]

f. Press ▼ (Down Arrow) once to move the highlight to the bottom row and then press OK. The following display appears:

\[
\begin{array}{c}
6-14 \text{ Set Min Reference} \\
[0 \text{ Hz}]
\end{array}
\]

g. Press ▼ (Down Arrow) once to move the highlight to the bottom row and then press OK. The following display appears:

\[
\begin{array}{c}
6-15 \text{ Set Max Reference} \\
[60 \text{ Hz}]
\end{array}
\]

12. Setting Reset Mode and RFI Filter:
   a. Press the Back key until the following display appears:

\[
\begin{array}{c}
0---* \text{ Operation / Display} \\
1---* \text{ Load and Motor}
\end{array}
\]

b. Press ▼ (Down Arrow) until the following display appears:

\[
\begin{array}{c}
13---* \text{ Smart Logic} \\
14---* \text{ Special Functions}
\end{array}
\]

c. Press OK, the following display appears:

\[
\begin{array}{c}
14-0* \text{ Inverter Switching} \\
14-1* \text{ Mains On/Off}
\end{array}
\]

d. Press ▼ (Down Arrow) twice. The following display appears:

\[
\begin{array}{c}
14-1* \text{ Mains On/Off} \\
14-2* \text{ Reset Functions}
\end{array}
\]

e. Press OK, the following display appears:

\[
\begin{array}{c}
14-20 \text{ Reset Mode} \\
[0] \text{ Manual reset}
\end{array}
\]

f. Press OK to highlight the number in the bracket.

g. Use the ▲ and ▼ (Up and Down Arrow) keys to change the number to 3 for 3 automatic resets and then press OK. The display changes to:

\[
\begin{array}{c}
14-20 \text{ Reset Mode} \\
[3] \text{ Automatic reset x 3}
\end{array}
\]

h. Press ▼ (Down Arrow) once, the following display appears:

\[
\begin{array}{c}
14-21 \text{ Automatic Restart T...} \\
10s
\end{array}
\]

i. Press OK to highlight the number of seconds and use the ▲ and ▼ (Up and Down Arrow) keys to select 600 seconds. Press OK again to set the selected value.
j. Press the Back key once, the following display appears:

14—1* Mains On/Off
14—2* Reset Functions

k. Press ▼ (Down Arrow) twice, the following display appears:

14—4* Energy Optimising
14—5* Environment

l. Press OK, the following display appears:

m. Press OK to highlight the number in the bracket and use the ▲ and ▼ (Up and Down Arrow) keys to select [0]. Press OK again to set the selected value.

13. To Complete Reprogramming:

a. Press the Auto On key before disconnecting the VFD Remote Keypad from the variable frequency drive.

<table>
<thead>
<tr>
<th>Motor Option</th>
<th>Voltage</th>
<th>Motor P/N</th>
<th>VFD Carrier P/N</th>
<th>VFD Mfr P/N</th>
<th>0-03</th>
<th>0-06</th>
<th>1-20</th>
<th>1-22</th>
<th>1-23</th>
<th>1-24</th>
<th>1-25</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD</td>
<td>208/230V</td>
<td>HD56FR233</td>
<td>HK30WA370</td>
<td>131L9795</td>
<td>[1]</td>
<td>[102]</td>
<td>[9]</td>
<td>230</td>
<td>60</td>
<td>5.8</td>
<td>1695</td>
</tr>
<tr>
<td></td>
<td>460V</td>
<td>HD56FR463</td>
<td>HK30WA376</td>
<td>131L9863</td>
<td>[1]</td>
<td>[122]</td>
<td>[9]</td>
<td>460</td>
<td>60</td>
<td>2.9</td>
<td>1690</td>
</tr>
<tr>
<td></td>
<td>575V</td>
<td>HD56FR579</td>
<td>HK30WA382</td>
<td>131N0225</td>
<td>[1]</td>
<td>[132]</td>
<td>[9]</td>
<td>575</td>
<td>60</td>
<td>3.1</td>
<td>1690</td>
</tr>
<tr>
<td>MID</td>
<td>208/230V</td>
<td>HD56FR233</td>
<td>HK30WA370</td>
<td>131L9795</td>
<td>[1]</td>
<td>[102]</td>
<td>[9]</td>
<td>230</td>
<td>60</td>
<td>5.8</td>
<td>1695</td>
</tr>
<tr>
<td></td>
<td>460V</td>
<td>HD56FR463</td>
<td>HK30WA376</td>
<td>131L9863</td>
<td>[1]</td>
<td>[122]</td>
<td>[9]</td>
<td>460</td>
<td>60</td>
<td>2.9</td>
<td>1690</td>
</tr>
<tr>
<td></td>
<td>575V</td>
<td>HD56FR579</td>
<td>HK30WA382</td>
<td>131N0225</td>
<td>[1]</td>
<td>[132]</td>
<td>[9]</td>
<td>575</td>
<td>60</td>
<td>3.1</td>
<td>1690</td>
</tr>
<tr>
<td>HIGH</td>
<td>208/230V</td>
<td>HD58FE654</td>
<td>HK30WA371</td>
<td>131L9796</td>
<td>[1]</td>
<td>[102]</td>
<td>[10]</td>
<td>230</td>
<td>60</td>
<td>9.2</td>
<td>1735</td>
</tr>
<tr>
<td></td>
<td>460V</td>
<td>HD58FE654</td>
<td>HK30WA377</td>
<td>131L9684</td>
<td>[1]</td>
<td>[122]</td>
<td>[10]</td>
<td>460</td>
<td>60</td>
<td>4.2</td>
<td>1735</td>
</tr>
</tbody>
</table>

Table 25 — VFD Unit Parameters - 48LC 07 Units
Smoke Detectors

Smoke detectors are available as factory-installed options on 48LC models. Smoke detectors may be specified for supply air only, for return air without or with economizer, or in combination of supply air and return air. All components necessary for operation are factory-provided and mounted. The unit is factory-configured for immediate smoke detector shutdown operation; additional wiring or modifications to the Integrated Staging Control (ISC) 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. 66 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. 67, 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. 67, Step 2.
3. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 67, Step 3.
4. Connect the flexible tube on the sampling inlet to the sampling tube on the base pan.

ADDITIONAL APPLICATION DATA

Refer to 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.

Table 25 — VFD Unit Parameters - 48LC 07 Units (cont)

<table>
<thead>
<tr>
<th>Motor Option</th>
<th>Voltage</th>
<th>TERMINAL 53 LOW VOLTAGE</th>
<th>TERMINAL 53 HIGH VOLTAGE</th>
<th>TERMINAL 53 LOW REFERENCE</th>
<th>TERMINAL 53 HIGH REFERENCE</th>
<th>RESET MODE</th>
<th>AUTO. RESTART TIME (S)</th>
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<tbody>
<tr>
<td>STD</td>
<td>208/230V</td>
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<td>[60]</td>
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<tr>
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<tr>
<td></td>
<td>575V</td>
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<td>[0]</td>
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<td>0</td>
<td>[60]</td>
<td>3</td>
<td>600</td>
<td>[0]</td>
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</tbody>
</table>

Fig. 66 — Return Air Smoke Detector, Shipping Position

Fig. 67 — Completing Installation of Return Air Smoke Sensor
Step 13 — Adjust Factory-Installed Options

SMOKE DETECTORS

Smoke detector(s) will be connected at the Integrated Staging Control (ISC) board, at terminals marked “Smoke Shutdown”. Remove jumper JMP 3 when ready to energize unit.

Step 14 — Install Accessories

Available field-installed accessories include:
- Roof Curb (must be installed before unit)
- Thru-base connection kit (must be installed before unit is set on curb)
- EconoMi$er® X (with control)
- Power Exhaust
- Outdoor enthalpy sensor
- Differential enthalphy sensor
- CO₂ sensor
- Temperature and Humidity sensors
- Louvered hail guard
- Phase monitor control

Refer to separate installation instructions for information on installing these accessories. See Price Pages for a complete list of field-installed accessories.

Step 15 — Check Belt Tension

Measure the belt span length as shown in Fig. 68. Calculate the required deflection by multiplying the belt span length by 1/64. For example, if the belt span length is 32 inches:

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

BELT FORCE — DEFLECTION METHOD

Check the belt tension with a spring-force belt force deflection gage (available from drive belt manufacturer).

1. Place a straightedge along the belt between the two pulleys. Measure the distance between the motor shaft and the blower shaft.
2. Set the tension gage to the desired tension (see Table 1 in Fig. 68). Place the large O-ring at that point.
3. Press the tension checker downward on the belt until the large O-ring is at the bottom of the straightedge.
4. Adjust the belt tension as needed.

Adjust belt tension by loosing the motor mounting plate front bolts and rear bolt (see Fig. 69) 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.

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).
START-UP CHECKLIST FOR 48LC SINGLE PACKAGE ROOFTOP UNIT
(Remove and Store in Job File)

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

I. PRELIMINARY INFORMATION

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>JOB NAME</th>
<th>SERIAL NO.</th>
<th>ADDRESS</th>
<th>START-UP DATE</th>
<th>TECHNICIAN NAME</th>
<th>ADDITIONAL ACCESSORIES</th>
</tr>
</thead>
</table>

II. PRE-START-UP

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

III. START-UP

ELECTRICAL

<table>
<thead>
<tr>
<th>Supply Voltage</th>
<th>L1-L2</th>
<th>L2-L3</th>
<th>L3-L1</th>
</tr>
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<tbody>
<tr>
<td>Compressor Amps 1</td>
<td>L1</td>
<td>L2</td>
<td>L3</td>
</tr>
<tr>
<td>Compressor Amps 2</td>
<td>L1</td>
<td>L2</td>
<td>L3</td>
</tr>
<tr>
<td>Supply Fan Amps</td>
<td>L1</td>
<td>L2</td>
<td>L3</td>
</tr>
</tbody>
</table>

TEMPERATURES

<table>
<thead>
<tr>
<th>Outdoor-air Temperature</th>
<th>°F DB (Dry Bulb)</th>
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</thead>
<tbody>
<tr>
<td>Return-air Temperature</td>
<td>°F DB</td>
</tr>
<tr>
<td>Cooling Supply Air Temperature</td>
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</tr>
<tr>
<td>Gas Heat Supply Air Temperature</td>
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</table>

PRESSURES

<table>
<thead>
<tr>
<th>Gas Inlet Pressure</th>
<th>STAGE 1 IN. WG</th>
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</thead>
<tbody>
<tr>
<td>Gas Manifold Pressure</td>
<td>STAGE 1 IN. WG</td>
</tr>
<tr>
<td></td>
<td>STAGE 2 IN. WG</td>
</tr>
</tbody>
</table>
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® START-UP
NOTE: Units equipped with either SystemVu™ or RTU Open controls have Service Test menus or modes that can assist with the Humidi-MiZer System Start-Up function and provide the means to make the observations listed for this start-up.

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

OBSERVE AND RECORD
A. Suction pressure _______________ PSIG
B. Discharge pressure _______________ PSIG
C. Entering air temperature _______________ ° F
D. Liquid line temperature at outlet or reheat coil _______________ ° F
E. Confirm correct rotation for compressor (Y/N) _____
F. Check for correct ramp-up of outdoor fan motor as condenser coil warms (Y/N) _____

4. Check unit charge per charging chart (Y/N) _____
(Jumper 32L Motormaster® temperature sensor during this check. Remove jumper when complete.)
5. Switch unit to high-latent mode (sub-cooler) by closing humidistat with Y1 closed (Y/N) _____

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

6. Switch unit to dehumid (reheat) by opening Y1 (Y/N) _____

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

REPEAT PROCESS FOR 2 COMPRESSOR SYSTEMS.