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 a 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.

**GENERAL**

See Fig. 1 for unit options. See Fig. 2 and 3 for unit dimensions. See Fig. 4 for corner weights and clearances. See Fig. 5 for base rail details. See Fig. 6 for thru-the-base charts.
Rated Indoor Airflow (cfm)

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

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>FULL LOAD AIRFLOW (CFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48LC**04</td>
<td>1050</td>
</tr>
<tr>
<td>48LC**05</td>
<td>1400</td>
</tr>
<tr>
<td>48LC**06</td>
<td>1750</td>
</tr>
</tbody>
</table>

**Example:**

Position: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Example: 4 8 L C D 0 0 6 A 0 A 5 - 0 A 0 A 0

- **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
  - L = Low NOx – Low Gas Heat
  - M = Low NOx – Medium Gas Heat
  - N = Low NOx – High Gas Heat
  - S = Low Heat w/ Stainless Steel Exchanger
  - R = Medium Heat w/ Stainless Steel Exchanger
  - T = High Heat w/ Stainless Steel Exchanger
  (Low NOx models include – Stainless Steel HX)

- **Refrig. Systems Options**
  - 0 = Two stage cooling capacity
  - A = Two stage cooling capacity with Humidi-MiZer® System

- **Cooling Tons**
  - 04 – 3 ton
  - 05 – 4 ton
  - 06 – 5 ton

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

- **Indoor Fan Options**
  - 0 = Standard Electrical (Direct) Drive x13 ECM Motor
  - 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 = Precoat Al/Cu – Al/Cu
  - C = E-coat Al/Cu – Al/Cu
  - D = E-coat Al/Cu – E-coat Al/Cu
  - E = Cu/Cu – Al/Cu
  - F = Cu/Cu – Cu/Cu
  - M = Al/Cu – Al/Cu – Louvered Hail Guard
  - N = Precoat Al/Cu – Al/Cu – Louvered Hail Guard
  - P = E-coat Al/Cu – Al/Cu – Louvered Hail Guard
  - Q = E-coat Al/Cu – E-coat Al/Cu – Louvered Hail Guard
  - R = Cu/Cu – Al/Cu – Louvered Hail Guard
  - S = Cu/Cu – Cu/Cu – Louvered Hail Guard

**Design Revision**

- – = Factory Design Revision

**Voltage**

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

**Packaging**

- 0 = Standard
- 1 = LTL

**Electrical Options**

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

**Service Options**

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

**Intake / Exhaust Options**

- A = None
- B = Temperature Economizer with Barometric Relief
- E = Enthalpy Economizer with Barometric Relief
- N = Ultra Low Leak Temperature Economizer with Barometric Relief
- R = Ultra Low Leak Enthalpy Economizer with Barometric Relief

**Base Unit Controls**

- 0 = Base Electromechanical Controls
- 1 = RTU Open Multi-Protocol Controller
- 4 = SystemVu™ Controller

**Fig. 1 — 48LC 04-06 Model Number Nomenclature**
Fig. 4 — Corner Weights and Clearances

- Standard unit weights with condenser and evaporator components.
- Corner options and accessories refer to the product data catalog.

## Corner Weights and Clearances

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td>48 [112.3 kg]</td>
</tr>
<tr>
<td>Left</td>
<td>48 [112.3 kg]</td>
</tr>
<tr>
<td>Back</td>
<td>48 [112.3 kg]</td>
</tr>
<tr>
<td>Back W/hood</td>
<td>36 [81.6 kg]</td>
</tr>
<tr>
<td>Right</td>
<td>36 [81.6 kg]</td>
</tr>
<tr>
<td>Top</td>
<td>32 [14.5 kg]</td>
</tr>
</tbody>
</table>

### Dimensions

- Front: 74.5 [1900 mm]
- Left: 50 [1270 mm]
- Back: 74.5 [1900 mm]
- Top: 32 [127 mm]

### Notes
1. For all minimum clearances, local codes and jurisdictions may prevail.

### Clearance

<table>
<thead>
<tr>
<th>Service With</th>
<th>Conductive Barrier</th>
<th>Non-conductive Barrier</th>
<th>Operating Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td>48 [112.3 mm]</td>
<td>36 [91.4 mm]</td>
<td>18 [457 mm]</td>
</tr>
<tr>
<td>Left</td>
<td>48 [112.3 mm]</td>
<td>42 [1067 mm]</td>
<td>18 [457 mm]</td>
</tr>
<tr>
<td>Back</td>
<td>48 [112.3 mm]</td>
<td>42 [1067 mm]</td>
<td>18 [457 mm]</td>
</tr>
<tr>
<td>Back W/hood</td>
<td>36 [91.4 mm]</td>
<td>36 [91.4 mm]</td>
<td>18 [457 mm]</td>
</tr>
<tr>
<td>Right</td>
<td>36 [91.4 mm]</td>
<td>36 [91.4 mm]</td>
<td>18 [457 mm]</td>
</tr>
<tr>
<td>Top</td>
<td>32 [127 mm]</td>
<td>32 [127 mm]</td>
<td>12 [305 mm]</td>
</tr>
</tbody>
</table>

### Additional Information

- **I.T.C. Classification:** U.S. ECON INSR
- **Revision:** 3 of 5
- **Date:** 12/18/2018
- **Suppliers:** A.R.L.C 06-06 SINGLE ZONE ELECTRICAL COOLING WITH GAS HEAT
Fig. 5 — Base Rail Details

Inside Base Rail Dimensions
Bottom

Filter Access Panel
Compressor Access Panel
Condenser Coil

Electrical Equipment Location

Control Box Access Panel
Evaporator Coils Access Panel

Detail D
Typ 2 PLCs

Detail B
Typ 2 PLCs

Detail C
Typ 2 PLCs

Back
Left
Front
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. 4.

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.

Select a unit mounting system that provides adequate height to allow installation of condensate trap per requirements. Refer to “Step 12 — Install External Condensate Trap and Line” on page 17 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**</th>
<th>UNITS LB (KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>04</td>
</tr>
<tr>
<td>Base Unit</td>
<td>505 (229)</td>
</tr>
<tr>
<td>Economizer</td>
<td>50 (23)</td>
</tr>
<tr>
<td>Vertical</td>
<td>80 (36)</td>
</tr>
<tr>
<td>Horizontal</td>
<td>50 (23)</td>
</tr>
<tr>
<td>Humidi-Mizer® System</td>
<td>25 (11)</td>
</tr>
<tr>
<td>Cu Fins</td>
<td>35 (16)</td>
</tr>
<tr>
<td>Powered Outlet</td>
<td>115 (52)</td>
</tr>
<tr>
<td>Curb 14-in./356 mm</td>
<td>197 (89)</td>
</tr>
<tr>
<td>24-in./610 mm</td>
<td></td>
</tr>
</tbody>
</table>

Step 2 — Plan for Sequence of Unit Installation

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

Curb-Mounted Installation

1. Install curb
2. Install field-fabricated ductwork inside curb
3. Install accessory thru-base service connection package (affects curb and unit) (refer to accessory installation instructions for details)
4. Prepare bottom condensate drain connection to suit planned condensate line routing (refer to “Step 12 — Install External Condensate Trap and Line” on page 17 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. 8 (see page 11). Assemble and install accessory roof curb in accordance with instructions shipped with the curb.

NOTE: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 8. Improperly applied gasket can also result in air leaks and poor unit performance.

Curb should be level. This is necessary for unit drain to function properly. Unit leveling tolerances are show in Fig. 7. Refer to Accessory Roof Curb Installation Instructions for additional information as required.
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.

---

Fig. 7 — Unit Leveling Tolerances

<table>
<thead>
<tr>
<th>MAXIMUM ALLOWABLE DIFFERENCE – IN. (MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-B</td>
</tr>
<tr>
<td>0.5 (13)</td>
</tr>
<tr>
<td>B-C</td>
</tr>
<tr>
<td>1.0 (25)</td>
</tr>
<tr>
<td>A-C</td>
</tr>
<tr>
<td>1.0 (25)</td>
</tr>
</tbody>
</table>

---

Step 6 — Rig and Place Unit

Keep unit upright and do not drop. Spreaders 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. 9 for additional information.

Lifting holes are provided in base rails as shown in Fig. 9. Refer to rigging instructions on unit.

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

When using the standard side drain connection, ensure the red plug in the alternate bottom connection is tight. Do this before setting the unit in place. The red drain pan plug can be tightened with a 1/2-in. square socket drive extension. For further details, see “Step 12 — Install External Condensate Trap and Line” on page 17.

---

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

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

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

---

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

POSITIONING ON CURB

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

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

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 unit is in position, remove rigging skids and shipping materials.
Fig. 8 — Roof Curb Details

Notes:
1. Roof curb accessory is shipped disassembled.
2. Insulated panels: 2-1/2" (64 mm) thick polyurethane foam, 4.45 MPa (340 kPa) @ 95°F (35°C) density.
3. Roof curb: 16-gage steel.
4. Attach exterior flange, if flanges of duct rest on curb.
5. See clearance of #7 on each side.
6. Connector package CRBTMPWR002A01 is for thru-the-curb gas type.
7. Connector package CRBTMPWR003A01 is for thru-the-bottom type gas connections.

Dimensions are in inches. Tolerances on this document and the information contained therein is proprietary to Carrier Corporation and shall not be used or disclosed to others, in whole or in part, without the written authorization of Carrier Corporation.

1 DEC 2 DEC 3 DEC ANG

Material --- -

Certified Drawing

Section thru side

See View "B"

Technical Drawing

Drawing Number: T-005, Y-002

Rev.

Sheet 5 of 5

1067898 - MMC 4/22/13

NOTES:
1. Roof curb accessory is shipped disassembled.
2. Insulated panels: 25.4 [1"] thick polyurethane foam, 44.5 [1-3/4" # density.
3. Dimensions in [ ] are in millimeters.
5. Attach exterior flange, if flanges of duct rest on curb.
6. See clearance of #7 on each side.
7. Connector package CRBTMPWR002A01 is for thru-the-curb gas type.
8. Connector package CRBTMPWR004A01 is for thru-the-bottom type gas connections.

Perforated view of thru-the-curb gas service plate and thru-the-bottom gas service plate.

Supply air and return air openings for thru-the-curb gas service.

Nail (field supplied) --- -

Certified Drawing

View "B"

Corner Detail

Section thru side

See View "B"
**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. 10) 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. 11 for position of the notches in the basepan. Seals around duct openings must be tight. Secure with screws as shown in Fig. 12. Cover seams with foil duct tape.

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

Do not cover or obscure visibility to the unit’s informative data plate when insulating horizontal ductwork.
ECONOMIZER HOOD PACKAGE REMOVAL AND SETUP - FACTORY OPTION

**Step 8 — Install Outside Air Hood**

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. 13.)

3. Locate the 2 screws holding the metal tray to the basepan and remove. Locate and cut the 2 plastic tie-wraps securing the assembly to the damper. (See Fig. 14.) Be careful to not damage any wiring or cut tie-wraps securing any wiring.

4. Carefully lift the hood assembly (with metal tray) through the filter access opening and assemble per the steps outlined in Economizer Hood, 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. 15.
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. 16.

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. 16 and Fig. 17. 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. 17.

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

7. Replace the filter access panel.

Step 9 — Units with Hinged Panels Only

Relocate latch shipped inside the hinged compressor door to location shown in Fig. 18 after unit installation. If the unit does not have hinged panels, skip Step 9 and continue at Step 10.

Step 10 — Install Flue Hood

Flue hood is shipped screwed to the basepan beside the burner compartment access panel. Remove from shipping location and using screws provided, install flue hood and screen in location shown in Fig. 19.

Step 11 — 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 (NF-GC). 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 (NG) fuel at elevations up to 2000 ft (610 m) above sea level. Unit may be field converted for operation at elevations above 2000 ft (610 m) and/or for use with liquefied petroleum fuel. See accessory kit installation instructions regarding these accessories.

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

For natural gas applications, gas pressure at unit gas connection must not be less than 4 in. wg (996 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating. On 48LCF/N/T*05-06 (high-heat) units, the gas pressure at unit gas connection must not be less than 5 in. wg (1245 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating. For liquefied 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.

### 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/L/M/S/R</td>
<td>04, 05, 06</td>
<td>4.0 in. wg (996 Pa)</td>
<td>13.0 in. wg (3240 Pa)</td>
</tr>
<tr>
<td>48LCF/N/T (High Heat units only)</td>
<td>05, 06</td>
<td>5.0 in. wg (1245 Pa)</td>
<td>13.0 in. wg (3240 Pa)</td>
</tr>
</tbody>
</table>

### 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/E/S/R</td>
<td>04, 05, 06</td>
<td>11.0 in. wg (2740 Pa)</td>
<td>13.0 in. wg (3240 Pa)</td>
</tr>
<tr>
<td>48LCF/T (High Heat units only)</td>
<td>05, 06</td>
<td>11.0 in. wg (2740 Pa)</td>
<td>13.0 in. wg (3240 Pa)</td>
</tr>
</tbody>
</table>

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

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

### 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/L/M/S/R</td>
<td>04, 05, 06</td>
<td>3.5 in. wg (872 Pa)</td>
<td>1.7 in. wg (423 Pa)</td>
</tr>
<tr>
<td>48LCF/N/T (High Heat units only)</td>
<td>05, 06</td>
<td>3.5 in. wg (872 Pa)</td>
<td>1.7 in. wg (423 Pa)</td>
</tr>
</tbody>
</table>

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 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/R</td>
<td>04, 05, 06</td>
<td>10.0 in. wg (2490 Pa)</td>
<td>5.0 in. wg (1245 Pa)</td>
</tr>
<tr>
<td>48LCF/T (High Heat units only)</td>
<td>05, 06</td>
<td>10.0 in. wg (2490 Pa)</td>
<td>5.0 in. wg (1245 Pa)</td>
</tr>
</tbody>
</table>

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. 20.

#### 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.

![Gas Piping Guide (with Accessory Thru-the-Curb Service Connections)](image-url)

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

This service connection kit consists of a 1/2-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.
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 1/2-in. NPT street elbow on the thru-base gas fitting. Attach a 1/2-in. pipe nipple with minimum length of 16-in. (406 mm) (field-supplied) to the street elbow and extend it through the access panel at the gas support bracket. See Fig. 22.

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. 23 and 24 for typical piping arrangements for gas piping that has been routed through the sidewall of the curb. See Fig. 25 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 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 it is suspected to have been re-drilled, check orifice hole with a numbered drill bit of correct size. Never re-drill an orifice. A burr-free and squarely aligned orifice hole is essential for proper flame characteristics. See Fig. 26.

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

**Step 13 — Make Electrical Connections**

**WARNING**

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

Do not use gas piping as an electrical ground.

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

NOTE: 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-energized 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 terminal block (IFTB) pressure lugs with unit field power leads. Refer to Fig. 41 for power transformer connections and the discussion on connecting the convenience outlet on page 25.

Field power wires are connected to the unit at line-side pressure lugs on compressor contactor C and indoor fan terminal block (IFTB) (see wiring diagram label for control box component arrangement) or at factory-installed option non-fused disconnect switch or HACR. Max wire size is #2ga AWG (copper only) per pole on contactors. #2ga AWG per pole on optional disconnect or HACR and 4/0 AWG per pole on terminal or fuse block on units with single point box. See Fig. 29 and unit label diagram for field power wiring connections. See Fig. 30-33 for typical wiring diagrams.
Fig. 30 — 48LC Control Wiring Diagram
Fig. 31 — 48LC Control Wiring Diagram with Humidi-MiZer® System
Fig. 32 — 48LC Power Wiring Diagram, 208/230-v, 460-v 3 Phase
Fig. 33 — 48LC Power Wiring Diagram, 575-v 3 Phase
Fig. 34 — Disconnect Switch and Unit

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.

TO 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. 35).
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. 36.
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.
6. Measure from the tip of the shaft to the top surface of the black pointer; the measurement should be 3.75-in. to 3.88-in. (95 mm 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 front cover.

Re-install the unit front panel.

TO 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. 37).
2. Remove (3) cap head screws that secure the HACR enclosure front cover – (2) on the face of the cover and (1) on the left side cover. See Fig. 38.
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.
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 front cover.

Re-install the unit front panel.

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.

Fig. 35 — Location of Non-Fused Disconnect Enclosure

Fig. 36 — Handle and Shaft Assembly for NFD
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 disconnect sizing data 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. 29 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is #2 ga AWG per pole on contactors. #2 ga AWG per pole on optional disconnect or HACR. See Fig. 29 and unit label diagram for field power wiring connections.

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

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

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

All units except 208/230-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.

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

CONVENIENCE OUTLETS

WARNING

ELECTRICAL OPERATION HAZARD

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

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

Two types of convenience outlets are offered: 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. 39.

Fig. 37 — Location of HACR Enclosure

Fig. 38 — Handle and Shaft Assembly for HACR

Fig. 39 — Convenience Outlet Location
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 are exposed. Press the gasket over the screw heads. Slip the backing plate over the screw heads at the keyhole slots and align with the gasket; tighten the two screws until snug (do not over-tighten).

Mount the weatherproof cover to the backing plate as shown in Fig. 40. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover. Check for full closing and latching.

Non-powered type:
This type requires the field installation of a general-purpose 125-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. 36.

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. 41.

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

Fuse on power type:
The factory fuse is a Bussman® “Fusetron” T-15, non-renewable screw-in (Edison base) type plug fuse.
The 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 of the unit as shipped from the factory. If field-installed accessories are added or changed in the field (i.e. electric heat, power exhaust, ERV), the HACR may no longer be of the proper amp rating and therefore will need to be removed from the unit. See unit nameplate and label on factory-installed HACR for the amp rating of the HACR that was shipped with the unit from the factory. See unit nameplates for the proper fuse, HACR, or maximum over-current protection device required on the unit with field-installed accessories. See Fig. 43.

**Fig. 43 — HACR Caution Label**

FACTORY-OPTION THRU-BASE CONNECTIONS (ELECTRICAL CONNECTIONS)

This service connection kit consists of a 1/2-in. NPT gas adapter fitting (brass), a 1/2-in. electrical bulkhead connector and a 3/4-in. electrical bulkhead connector, all factory-installed in the embossed (raised) section of the unit basepan in the condenser section. The 3/4-in. bulkhead connector enables the low-voltage control wires to pass through the basepan. The 1/2-in. electrical bulkhead connector allows the high-voltage power wires to pass through the basepan. See Fig. 21.

Check tightness of connector lock nuts before connecting electrical conduits.

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

**UNITS WITHOUT THRU-BASE CONNECTIONS**

1. Install power wiring conduit through side panel openings. Install conduit between disconnect and control box.
2. Install power lines to terminal connections as shown in Fig. 29.

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 following formula 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.

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

Example: Supply voltage is 230-3-60

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

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

Determine maximum deviation from average voltage.

\[
\text{Maximum deviation} = 4 \, \text{v}
\]

Determine percent of voltage imbalance.

\[
\text{% Voltage Imbalance} = \frac{100 \times 4}{227} = 1.78\%
\]

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

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

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

FIELD CONTROL WIRING

The 48LC unit requires an external-temperature control device. This device can be a thermostat (field-supplied) or, the RTU Open Controller for Building Management Systems using non-CCN protocols (RTU Open is available as a factory-installed option only), or a space temperature sensor (SPT) with factory installed SystemVu™ controller.

**THERMOSTAT**

Install a Carrier-approved accessory thermostat according to installation instructions included with the accessory. For complete economizer function and two-stage compressor operation, select a two-stage cooling thermostat. Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions.

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

For wire runs up to 50 ft. (15 m), use no. 18 AWG (American Wire Gage) insulated wire [35°C (95°F) minimum]. For 50 to 75 ft. (15 to 23 m), use no. 16 AWG insulated wire [35°C (95°F) minimum]. For over 75 ft. (23 m), use no. 14 AWG insulated wire [35°C (95°F) minimum]. All wire sizes larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and splice at the thermostat. See Fig. 44.
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 to the control box. Pull the wires over to the terminal strip on the upper-left corner of the Controls Connection Board. See Fig. 45.

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® Control Connections

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

HUMIDI-MIZER – SPACE RH CONTROLLER

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

To connect the Carrier humidistat (HL38MG029):

1. Route the humidistat 2-conductor cable (field-supplied) through the hole provided in the unit corner post.
2. Feed wires through the raceway built into the corner post (see Fig. 45) 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. 48), connecting PKN to PNK and PNK/BLK to PNK/BLK.

To connect the Thermidistat device (33CS2PPRH-03):

1. Route the Thermidistat multi-conductor thermostat cable (field-supplied) through the hole provided in the unit corner post.
2. Feed wires through the raceway built into the corner post (see Fig. 45) to the 24-v barrier located on the left side of the control box. The raceway provides the UL-required clearance between high-voltage and low-voltage wiring.
3. The Thermidistat has dry contacts at terminals D1 and D2 for dehumidification operation (see Fig. 52). The dry contacts must be wired between CTB terminal R and the PNK/BLK lead to the LTLO switch with field-supplied wire nuts. Refer to the installation instructions included with the Carrier Edge Thermidistat device for more information.
Figure 46 — Accessory Field-Installed Humidistat

Figure 47 — Edge® Pro Thermidistat

Figure 48 — Typical Humidi-MiZer® Adaptive Dehumidification System Humidistat Wiring

Table 7 — Control Modes with Humidi-MiZer System Output and Valve States versus Circuit Mode

<table>
<thead>
<tr>
<th>DEMAND AND MODE</th>
<th>OUTPUTS</th>
<th>48LC 04-06 VALVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space Humidity</td>
<td>Circuit Cooling Demand</td>
<td>Circuit Mode</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>No power</td>
</tr>
<tr>
<td>Low</td>
<td>No</td>
<td>Off</td>
</tr>
<tr>
<td>Low</td>
<td>Yes</td>
<td>Cool</td>
</tr>
<tr>
<td>High</td>
<td>Yes</td>
<td>Reheat 1</td>
</tr>
<tr>
<td>High</td>
<td>No</td>
<td>Reheat 2</td>
</tr>
</tbody>
</table>
REHEAT MODES
Dehumidification (reheat) is a cooling mode function. Refer to Cooling Operation for cooling mode control. With Humidi-MiZer units, there are three additional HVAC Mode (HVAC) expanded texts available for the user: Reheat1, Reheat2, and Reheat1/Reheat2. Selection of the reheat mode for each refrigerant circuit is determined by the dehumidification demand and the cooling demand. Table 7 shows the corresponding circuit mode and output status for the different demand combinations. Units with multiple circuits can operate with a combination of Reheat1 and Reheat2 circuits, as determined by the amount of space cooling demand.

NOTE: Compressor staging control for Humidi-MiZer units requires that circuit A always operates when circuit B is on. This applies to normal operation, service test, and for control alarm responses. This operation difference is required due to the fact that the Motormaster outdoor fan control senses circuit A only. Operation of the revised refrigerant circuit for each mode is described below.

Normal Cooling
For 48LC04-6 units, refrigerant flows from the outdoor condenser through the normally open Cooling Liquid Valve (CLV) to the expansion device. Reheat Liquid Valve (RLV) and Reheat Discharge Valve (RDV) are closed. (See Fig. 49.)

Reheat 1 (Subcooling Mode)
This mode increases latent cooling and decreases sensible cooling compared to normal cooling.
For 48LC04-6 units, refrigerant flows from the outdoor condenser, through the normally open Reheat Liquid Valve (RLV), and through the reheat condenser coil to the expansion device. Cooling Liquid Valve (CLV) and Reheat Discharge Valve (RDV) are closed. (See Fig. 50.)

Reheat 2 (Hot Gas Reheat Mode)
This mode provides maximum latent cooling with little to no sensible capacity. This mode can operate to provide dehumidification when there is no cooling demand. Similar to Reheat 1 mode, refrigerant flows from the outdoor condenser, through the normally open Reheat Liquid Valve (RLV1), or through the energized 3-way Liquid Diverter Valve (LDV), and through the reheat condenser coil to the expansion device. Reheat Discharge Valve (RDV) is open, which provides some compressor discharge gas to the reheat condenser to further increase the reheating of the evaporator air stream (See Fig. 51).
**EconoMi$er® X (Factory-Installed Option)**

For details on operating 48LC units equipped with the factory-installed EconoMi$er X option, refer to *EconoMi$er X Factory-Installed Option Low Leak Economizer for 2 Speed SAV™ (Staged Air Volume) Systems*.

**SystemVu™ Controller (Factory-Installed Option)**

For details on operating 48LC 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*.

**RTU Open Control System**

For details on operating 48LC**04-06 units equipped with the factory-installed RTU Open controller option, refer to the Factory Installed Option RTU Open Multi-Protocol Controller Controls, Start-Up, Operation, Troubleshooting manual. See Fig. 53 and 54.

---

*Connection not required.*
Fig. 53 — RTU Open System Control Wiring Diagram
Fig. 54 — RTU Open System Control Wiring Diagram with Humidi-MiZer® System
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 unit terminal board may be necessary to complete the unit and smoke detector configuration to meet project requirements.

Units equipped with factory-optional return-air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 55 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. 56, 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. 56, Step 2.
3. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 56, Step 3.
4. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

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

![Fig. 55 — Return-Air Smoke Detector, Shipping Position](image)

![Fig. 56 — Completing Installation of Return-Air Smoke Sensor](image)
Step 14 — Adjust Factory-Installed Options

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

Step 15 — Install Accessories
Available accessories include:
- Curb
- EconoMiSer® X (with control)
- EconoMiSer2 (without control/for external signal)
- Power Exhaust
- Differential dry-bulb sensor (EconoMiSer2)
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- CO₂ sensor
- Louvered hail guard
- Phase monitor control
Refer to separate installation instructions for information on installing these accessories.

Step 16 — Check Belt Tension
Measure the belt span length as shown in Fig. 57. 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. 57). 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. 58) 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).
APPENDIX A — VFD OPERATION WITH REMOTE KEYPAD

All 48LC size 04-06 units are equipped with a VFD (Variable Frequency Drive) to automatically adjust the indoor-fan motor speed in sequence with the unit’s ventilation, cooling and heating operation. The VFD keypad is included as standard on electromechanical and RTU Open models. See Fig. B for location of the VFD and the VFD keypad in these units.

NOTE: SystemVu™ models do not include the VFD keypad as VFD control operation is accessed through the SystemVu™ controls.

The VFD keypad is shown in Fig. A. The function of SOFT KEYS 1 and 2 change depending on what is displayed on the screen. The function of SOFT KEY 1 matches the word in the lower left-hand box on the display screen. The function of SOFT KEY 2 matches the word in the lower right-hand box on the display screen. If the box is empty, then the SOFT KEY does not have a function on that specific screen. The UP and DOWN keys are used to navigate through the menus. The OFF key is used to turn off the VFD. The AUTO key is used to change control of the drive to automatic control. The HAND key is used to change control of the drive to local (hand held) control. The HELP button is used to access the help screens.

For the VFD to operate on the units covered by this document, the drive must be set in AUTO mode. The word “AUTO” will appear in the upper left hand corner of the VFD display. Press the AUTO button to set the drive in AUTO mode.

Use the RJ-45 (CAT5) cable (bundled with the Control Harness - see Fig. B) to provide easier access for using the VFD Remote Keypad. The cable’s length is long enough to route it through to the unit’s control box, if desired.

To Connect the VFD Keypad using the RJ-45 Cable
1. Remove the Keypad from the front of the VFD.
2. Remove the RJ-45 adapter from the back of the Remote Keypad and insert the adapter into the RJ-45 port on the front of the VFD.
3. Separate the RJ-45 (CAT5) cable from the Control Harness.
4. Use the CAT5 cable to connect the Remote Keypad to the VFD.

START UP WITH ASSISTANT
Initial start-up has been performed at the factory. Use of the start-up assistant will override factory VFD configurations. DO NOT USE THE START-UP ASSISTANT ON THESE LC UNITS!
Start Up by Changing Parameters Individually

Initial start-up is performed at the factory. To start up the VFD by changing individual parameters, perform the following procedure:

1. Select MENU (SOFT KEY 2). The Main menu will be displayed.
2. Use the UP or DOWN keys to highlight PARAMETERS on the display screen and press ENTER (SOFT KEY 2).
3. Use the UP or DOWN keys to highlight the desired parameter group and press SEL (SOFT KEY 2).
4. Use the UP or DOWN keys to highlight the desired parameter and press EDIT (SOFT KEY 2).
5. Use the UP or DOWN keys to change the value of the parameter.
6. Press SAVE (SOFT KEY 2) to store the modified value. Press CANCEL (SOFT KEY 1) to keep the previous value. Any modifications that are not saved will not be changed.
7. Choose another parameter or press EXIT (SOFT KEY 1) to return to the listing of parameter groups. Continue until all the parameters have been configured and then press EXIT (SOFT KEY 1) to return to the main menu.

NOTE: The current parameter value appears above the highlight parameter. To view the default parameter value, press the UP and DOWN keys simultaneously. To restore the default factory settings, select the application macro “HVAC Default.”

VFD Modes

The VFD has several different modes for configuring, operating, and diagnosing the VFD. The modes are:

- Standard Display mode—shows drive status information and operates the drive
- Parameters mode—edits parameter values individually
- Start-up Assistant mode—guides the start up and configuration. DO NOT USE THE START-UP ASSISTANT ON THESE LC UNITS!
- Changed Parameters mode—shows all changed parameters
- Drive Parameter Backup mode—stores or uploads the parameters
- Clock Set mode—sets the time and date for the drive
- I/O Settings mode—checks and edits the I/O settings

STANDARD DISPLAY MODE

Use the standard display mode to read information on the drive status and operate the drive. To reach the standard display mode, press EXIT until the LCD display shows status information as described below. (See Fig. C.)

The top line of the LCD display shows the basic status information of the drive. The HAND icon indicates that the drive control is local from the control panel. The AUTO icon indicates that the drive is in remote control mode, such as the basic I/O or field bus.
The arrow icon indicates the drive and motor rotation status. A rotating arrow (clockwise or counterclockwise) indicates that the drive is running and at setpoint and the shaft direction is forward or reverse. A rotating blinking arrow indicates that the drive is running but not at setpoint. A stationary arrow indicates that the drive is stopped. For the units covered in this manual, the correct display rotation is clockwise.

The upper-right corner shows the frequency setpoint that the drive will maintain.

Using parameter group 34, the middle of the LCD display can be configured to display 3 parameter values. The default display shows parameters 0103 (OUTPUT FREQ) in percent speed, 0104 (CURRENT) in amperes, and 0120 (ALL) in voltage DC.

The bottom corners of the LCD display show the functions currently assigned to the two soft keys. The lower middle screen displays the current time (if configured to show the time).

The first time the drive is powered up, it is in the OFF mode. To switch to local hand-held control and control the drive using the control panel, press and hold the HAND button. Pressing the HAND button switches the drive to hand control while keeping the drive running. Press the AUTO button to switch to remote input control. To start the drive press the HAND or AUTO buttons, to stop the drive press the OFF button.

**Fig. C — Standard Display Example**

To adjust the speed in HAND mode, press the UP or DOWN buttons (the reference changes immediately). The reference can be modified in the local control (HAND) mode, and can be parameterized (using Group 11 reference select) to also allow modification in the remote control mode.

**PARAMETERS MODE**

The Parameters mode is used to change the parameters on the drive. To change parameters, perform the following procedure. See Tables A through C for a listing of the VFD parameters per motor and VFD drive models:

1. Select MENU (SOFT KEY 2). The main menu will be displayed.
2. Use the UP or DOWN keys to highlight PARAMETERS on the display screen and press ENTER (SOFT KEY 2).
3. Use the UP or DOWN keys to highlight the desired parameter group and press SEL (SOFT KEY 2).
4. Use the UP or DOWN keys to highlight the desired parameter and press EDIT (SOFT KEY 2).
5. Use the UP or DOWN keys to change the value of the parameter.
6. Press SAVE (SOFT KEY 2) to store the modified value. Press CANCEL (SOFT KEY 1) to keep the previous value. Any modifications that are not saved will not be changed.
7. Choose another parameter or press EXIT (SOFT KEY 1) to return to the listing of parameter groups. Continue until all the parameters have been configured and then press EXIT (SOFT KEY 1) to return to the main menu.

**NOTE:** The current parameter value appears above the highlight parameter. To view the default parameter value, press the UP and DOWN keys simultaneously. To restore the default factory settings, select the Carrier application macro.

**CHANGED PARAMETERS MODE**

The Changed Parameters mode is used to view and edit recently changed parameters on the drive. To view the changed parameters, perform the following procedure:

1. Select MENU (SOFT KEY 2). The main menu will be displayed.
2. Use the UP or DOWN keys to highlight CHANGED PAR on the display screen and press ENTER (SOFT KEY 2). A list of the recently changed parameters will be displayed.
3. Use the UP or DOWN keys to highlight the desired parameter group and press EDIT (SOFT KEY 2) to change the parameter if desired.
4. Press EXIT (SOFT KEY 1) to exit the Changed Parameters mode.

**DRIVE PARAMETER BACKUP MODE**

The drive parameter back-up mode is used to export the parameters from one drive to another. The parameters can be uploaded from a VFD to the removable control panel. The control panel can then be transferred to another drive and the parameters are downloaded into memory.

Depending on the motor and application, there are two options available. The first option is to download all parameters. This copies both application and motor parameters to the drive from the control panel. This is recommended when using the same application for drives of the same size.

The second option downloads only the application parameters to the drive. This is recommended when using the same application for drives of different sizes.

**Upload All Parameters**

To upload and store parameters in the control panel from the VFD, perform the following procedure:

1. Select MENU (SOFT KEY 2). The main menu will be displayed.
2. Use the UP or DOWN keys to highlight PAR BACKUP on the display screen and press ENTER (SOFT KEY 2).
3. Use the UP or DOWN keys to highlight UPLOAD TO PANEL and press SEL (SOFT KEY 2).
4. The text “Copying Parameters” will be displayed with a progress indicator. To stop the process, select ABORT (SOFT KEY 1).
5. When the upload is complete, the text “Parameter upload successful” will be displayed.
6. The display will then return to the PAR BACKUP menu.
7. The control panel can now be disconnected from the drive.

**Download All Parameters**

To download all parameters from the control panel to the VFD, perform the following procedure:

1. Install the control panel with the correct parameters onto the VFD.
2. Select MENU (SOFT KEY 2). The main menu will be displayed.
3. Use the UP or DOWN keys to highlight PAR BACKUP on the display screen and press ENTER (SOFT KEY 2).
4. Use the UP or DOWN keys to highlight DOWNLOAD TO DRIVE ALL and press SEL (SOFT KEY 2).
5. The text “Restoring Parameters” will be displayed with a progress indicator. To stop the process, select ABORT (SOFT KEY 1).
6. When the download is complete, the text “Parameter download successful” will be displayed.
7. The display will then return to the PAR BACKUP menu.
8. Select EXIT (SOFT KEY 1) to return to the main menu.
8. The control panel can now be disconnected from the drive.

**Download Application Parameters**

To download application parameters only to the control panel from the VFD, perform the following procedure:

1. Install the control panel with the correct parameters onto the VFD.
2. Select MENU (SOFT KEY 2). The main menu will be displayed.
3. Use the UP or DOWN keys to highlight PAR BACKUP on the display screen and press ENTER (SOFT KEY 2).
4. Use the UP or DOWN keys to highlight DOWNLOAD APPLICATION and press SEL (SOFT KEY 2).
5. The text “Downloading Parameters (partial)” will be displayed with a progress indicator. To stop the process, select ABORT (SOFT KEY 1).
6. When the download is complete, the text “Parameter download successful” will be displayed.
7. The display will then return to the PAR BACKUP menu. Select EXIT (SOFT KEY 1) to return to the main menu.
8. The control panel can now be disconnected from the drive.

**CLOCK SET MODE**

The clock set mode is used for setting the date and time for the internal clock of the VFD. In order to use the timer functions of the VFD control, the internal clock must be set. The date is used to determine weekdays and is visible in the fault logs.

To set the clock, perform the following procedure:

1. Select MENU (SOFT KEY 2). The main menu will be displayed.
2. Use the UP or DOWN keys to highlight CLOCK SET on the display screen and press ENTER (SOFT KEY 2). The clock set parameter list will be displayed.
3. Use the UP or DOWN keys to highlight CLOCK VISIBILITY and press SEL (SOFT KEY 2). This parameter is used to display or hide the clock on the screen. Use the UP or DOWN keys to change the parameter setting. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
4. Use the UP or DOWN keys to highlight SET TIME and press SEL (SOFT KEY 2). Use the UP or DOWN keys to change the hours and minutes. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
5. Use the UP or DOWN keys to highlight TIME FORMAT and press SEL (SOFT KEY 2). Use the UP or DOWN keys to change the parameter setting. Press OK (SOFT KEY 2) to save the configuration and return to the Clock Set menu.
6. Press EXIT (SOFT KEY 1) twice to return to the main menu.

**I/O SETTINGS MODE**

The I/O Settings mode is used for viewing and editing the I/O settings.

To configure the I/O settings, perform the following procedure:

1. Select MENU (SOFT KEY 2). The main menu will be displayed.
2. Use the UP or DOWN keys to highlight I/O SETTINGS on the display screen and press ENTER (SOFT KEY 2). The I/O Settings parameter list will be displayed.
3. Use the UP or DOWN keys to select the parameter to view. Press OK (SOFT KEY 2). Use the UP or DOWN keys to change the parameter setting. Press SAVE (SOFT KEY 2) to save the configuration. Press CANCEL (SOFT KEY 1) to keep the previous value. Any modifications that are not saved will not be changed.
4. Press EXIT (SOFT KEY 1) twice to return to the main menu.

**Table A — 48LC 04 VFD Parameters**

<table>
<thead>
<tr>
<th>PARAMETER GROUP</th>
<th>PARAMETER NUMBER</th>
<th>MOTOR DESCRIPTION</th>
<th>1.7 HP 575v</th>
<th>1.7 HP 208-230v</th>
<th>1.7 HP 460v</th>
<th>2.4 HP 575v</th>
<th>2.4 HP 208-230v</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive/Motor Voltage</td>
<td>575v</td>
<td>208-230v</td>
<td>460v</td>
<td>575v</td>
<td>208-230v</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Part Number</td>
<td>HD56FR579</td>
<td>HD56FR233</td>
<td>HD56FR463</td>
<td>HD56FE577</td>
<td>HD56FE653</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VFD Part Number</td>
<td>HK30WA048</td>
<td>HK30WA045</td>
<td>HK30WA046</td>
<td>HK30WA048</td>
<td>HK30WA001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>START-UP DATA</td>
<td>9902</td>
<td>Application Macro</td>
<td>(1) HVAC DEFAULT</td>
<td>(1) HVAC DEFAULT</td>
<td>(1) HVAC DEFAULT</td>
<td>(1) HVAC DEFAULT</td>
<td>(1) HVAC DEFAULT</td>
</tr>
<tr>
<td></td>
<td>9905</td>
<td>Motor Nominal Voltage</td>
<td>575</td>
<td>230</td>
<td>460</td>
<td>575</td>
<td>230</td>
</tr>
<tr>
<td></td>
<td>9906</td>
<td>Motor Nominal Current</td>
<td>3.1</td>
<td>5.8</td>
<td>2.9</td>
<td>3.4</td>
<td>7.9</td>
</tr>
<tr>
<td></td>
<td>9907</td>
<td>Motor Nominal Frequency</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>9908</td>
<td>Motor Nominal Speed</td>
<td>1725</td>
<td>1725</td>
<td>1725</td>
<td>1725</td>
<td>1725</td>
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<tr>
<td></td>
<td>9909</td>
<td>Motor Nominal Power</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>START/STOP/DIR</td>
<td>1001</td>
<td>EXT1 Commands</td>
<td>(1) Di1</td>
<td>(1) Di1</td>
<td>(1) Di1</td>
<td>(1) Di1</td>
<td>(1) Di1</td>
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<td></td>
<td>1003</td>
<td>Direction</td>
<td>(1) Forward</td>
<td>(1) Forward</td>
<td>(1) Forward</td>
<td>(1) Forward</td>
<td>(1) Forward</td>
</tr>
<tr>
<td>REFERENCE SELECT</td>
<td>1103</td>
<td>REF1 Select</td>
<td>(1) Di1</td>
<td>(1) A1</td>
<td>(1) A1</td>
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<tr>
<td></td>
<td>1104</td>
<td>REF1 Minimum</td>
<td>0 Hz</td>
<td>0 Hz</td>
<td>0 Hz</td>
<td>0 Hz</td>
<td>0 Hz</td>
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<tr>
<td></td>
<td>1105</td>
<td>REF1 Maximum</td>
<td>60 Hz</td>
<td>60 Hz</td>
<td>60 Hz</td>
<td>60 Hz</td>
<td>60 Hz</td>
</tr>
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</table>
### Constant Speeds

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1201</td>
<td>Constant Speed Select (8)</td>
<td>DI2,3</td>
</tr>
<tr>
<td>1202</td>
<td>Constant Speed 1</td>
<td>52.4</td>
</tr>
<tr>
<td>1203</td>
<td>Constant Speed 2</td>
<td>60 Hz</td>
</tr>
<tr>
<td>1204</td>
<td>Constant Speed 3</td>
<td>60 Hz</td>
</tr>
<tr>
<td>1205</td>
<td>Minimum Al-1</td>
<td>20.0%</td>
</tr>
<tr>
<td>1206</td>
<td>Maximum Al-1</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

### Analog Inputs

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1301</td>
<td>Relay Output 1 (1) Ready</td>
<td></td>
</tr>
<tr>
<td>1302</td>
<td>Relay Output 2 (2) Run</td>
<td></td>
</tr>
</tbody>
</table>

### Relay Outputs

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1303</td>
<td>EM STOP Sel</td>
<td>(0) NOT SEL</td>
</tr>
<tr>
<td>1304</td>
<td>Acc/Dec 1/2 Sel</td>
<td>(0) NOT SEL</td>
</tr>
<tr>
<td>1305</td>
<td>Decelerate Time</td>
<td>10.0 s</td>
</tr>
</tbody>
</table>

### Motor

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1306</td>
<td>Motor Load Curve</td>
<td>100%</td>
</tr>
<tr>
<td>1307</td>
<td>Zero Speed Load</td>
<td>%00705</td>
</tr>
<tr>
<td>1308</td>
<td>Break Point Frequency</td>
<td>35 Hz</td>
</tr>
</tbody>
</table>

### Fault Functions

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1309</td>
<td>Motor Therm Prot</td>
<td>(1) Fault</td>
</tr>
<tr>
<td>1310</td>
<td>Motor Thermal Time</td>
<td>1050 s</td>
</tr>
<tr>
<td>1311</td>
<td>Motor Load Curve</td>
<td>100%</td>
</tr>
<tr>
<td>1312</td>
<td>Zero Speed Load</td>
<td>%00705</td>
</tr>
<tr>
<td>1313</td>
<td>Break Point Frequency</td>
<td>35 Hz</td>
</tr>
</tbody>
</table>

### Automatic Reset

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1314</td>
<td>AR Overcurrent</td>
<td>(0) DISABLE</td>
</tr>
<tr>
<td>1315</td>
<td>AR Overvoltage</td>
<td>(1) ENABLE</td>
</tr>
<tr>
<td>1316</td>
<td>AR Undervoltage</td>
<td>(1) ENABLE</td>
</tr>
</tbody>
</table>

### EFB Protocol

<table>
<thead>
<tr>
<th>Parameter Number</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1317</td>
<td>EFB PROTOCOL ID</td>
<td>0601 (hex)</td>
</tr>
<tr>
<td>1318</td>
<td>EFB STATION ID</td>
<td>41</td>
</tr>
<tr>
<td>1319</td>
<td>EFB BAUD RATE</td>
<td>38400</td>
</tr>
<tr>
<td>1320</td>
<td>EFB PARITY</td>
<td>8 NONE 1</td>
</tr>
<tr>
<td>1321</td>
<td>EFB CTRL PROFILE</td>
<td>DCU PROFILE</td>
</tr>
<tr>
<td>1322</td>
<td>COMM PROT SEL</td>
<td>6 (LEN)</td>
</tr>
<tr>
<td>UNIT SIZE</td>
<td>48LC 04</td>
<td>1.7 HP 575v</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
<td>------------</td>
</tr>
</tbody>
</table>

### Parameter Number

<table>
<thead>
<tr>
<th>PARAMETER GROUP</th>
<th>PARAMETER NUMBER</th>
<th>48LC 04</th>
<th>1.7 HP 575v</th>
<th>1.7 HP 208-230v</th>
<th>1.7 HP 460v</th>
<th>2.4 HP 575v</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Description</td>
<td>2.4 HP 460v</td>
<td>1.7 HP 575v</td>
<td>1.7 HP 208-230v</td>
<td>1.7 HP 460v</td>
<td>2.4 HP 575v</td>
<td></td>
</tr>
<tr>
<td>Drive/motor Voltage</td>
<td>460v</td>
<td>575v</td>
<td>208-230v</td>
<td>460v</td>
<td>575v</td>
<td></td>
</tr>
<tr>
<td>Motor Part Number</td>
<td>HD56FE053</td>
<td>HD56FR233</td>
<td>HD56FR463</td>
<td>HD56FE057</td>
<td>HD56FE577</td>
<td></td>
</tr>
<tr>
<td>VFD Part Number</td>
<td>HK30WA008</td>
<td>HK30WA048</td>
<td>HK30WA045</td>
<td>HK30WA046</td>
<td>HK30WA048</td>
<td></td>
</tr>
</tbody>
</table>

### Start-up Data

| Application Macro | (1) HVAC DEFAULT | (1) HVAC DEFAULT | (1) HVAC DEFAULT | (1) HVAC DEFAULT | (1) HVAC DEFAULT |

### Motor Nominal Voltage

| Motor Nominal Voltage | 460 | 575 | 230 | 460 | 575 |

### Motor Nominal Current

| Motor Nominal Current | 4.0 | 3.1 | 5.8 | 2.9 | 3.4 |

### Motor Nominal Frequency

| Motor Nominal Frequency | 60 | 60 | 60 | 60 | 60 |

### Motor Nominal Speed

| Motor Nominal Speed | 1725 | 1725 | 1725 | 1725 | 1725 |

### Motor Nominal Power

| Motor Nominal Power | 2.4 | 1.7 | 1.7 | 2.4 | 2.4 |

### Start/Stop/Dir

| EXT1 Commands | (1) DI1 | (1) DI1 | (1) DI1 | (1) DI1 | (1) DI1 |

### Direction

| Forward | (1) Forward | (1) Forward | (1) Forward | (1) Forward | (1) Forward |

### REF/SEL

| REF1 Select | (1) AI1 | (1) AI1 | (1) AI1 | (1) AI1 | (1) AI1 |

### REF1 Minimum

| 0 Hz | 0 Hz | 0 Hz | 0 Hz | 0 Hz |

### REF1 Maximum

| 60 Hz | 60 Hz | 60 Hz | 60 Hz | 60 Hz |

### Constant Speeds

| Constant Speed Select | (8) DI2,3 | (8) DI2,3 | (8) DI2,3 | (8) DI2,3 | (8) DI2,3 |

### Constant Speed 1

| Constant Speed 1 | 52.4 | 42.6 | 42.6 | 42.6 | 42.6 |

### Constant Speed 2

| Constant Speed 2 | 60 Hz | 60 Hz | 60 Hz | 60 Hz | 60 Hz |

### Constant Speed 3

| Constant Speed 3 | 60 Hz | 60 Hz | 60 Hz | 60 Hz | 60 Hz |

### Analog Inputs

| Minimum AI-1 | 20.00% | 20.00% | 20.00% | 20.00% | 20.00% |

### Maximum AI-1

| 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

### Relay Outputs

| Relay Output 1 | (1) Ready | (1) Ready | (1) Ready | (1) Ready | (1) Ready |

### Relay Output 2

| Run | (2) Run | (2) Run | (2) Run | (2) Run | (2) Run |

### Fault Reset Sel

| 0 (Keypad) | 0 (Keypad) | 0 (Keypad) | 0 (Keypad) | 0 (Keypad) |

### Start Enable 1

| (4) DI4 | (4) DI4 | (4) DI4 | (4) DI4 | (4) DI4 |

### Override

| Override Sel | (0) NOT SEL | (0) NOT SEL | (0) NOT SEL | (0) NOT SEL | (0) NOT SEL |

### Maximum Current

| 4.6 | 3.6 | 6.7 | 3.3 | 3.9 |

### Minimum Frequency

| 0.0 Hz | 0.0 Hz | 0.0 Hz | 0.0 Hz | 0.0 Hz |

### Maximum Frequency

| 60 Hz | 60 Hz | 60 Hz | 60 Hz | 60 Hz |

### Start Function

| AUTO | AUTO | AUTO | AUTO | AUTO |

### Stop Function

| Coast | Coast | Coast | Coast | Coast |

### EM STOP Sel

| (0) NOT SEL | (0) NOT SEL | (0) NOT SEL | (0) NOT SEL | (0) NOT SEL |

### Accelerator Time

| 30.0 s | 30.0 s | 30.0 s | 30.0 s | 30.0 s |

### Decelerator Time

| 10.0 s | 10.0 s | 10.0 s | 10.0 s | 10.0 s |

### Switching Frequency

| 4 kHz | 4 kHz | 4 kHz | 4 kHz | 4 kHz |

### Switching Frequency Control

| (1) ON | (1) ON | (1) ON | (1) ON | (1) ON |
### Table B — 48LC 04-06 VFD Parameters (cont)

<table>
<thead>
<tr>
<th>PARAMETER GROUP</th>
<th>PARAMETER NUMBER</th>
<th>Fault Functions</th>
<th>Automatic Reset</th>
<th>EFB Protocol</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Description</td>
<td>3005 Motor Therm Prot</td>
<td>3006 Motor Thermal Time</td>
<td>3007 Motor Load Curve</td>
<td>3008 Zero Speed Load</td>
<td>3009 Break Point Frequency</td>
</tr>
<tr>
<td>Drive/motor Voltage</td>
<td>3006 1050 s</td>
<td>3007 100%</td>
<td>3008 %00705</td>
<td>3009 35 Hz</td>
<td></td>
</tr>
<tr>
<td>Motor Part Number</td>
<td>HD56FE653</td>
<td>HD56FR579</td>
<td>HD56FR233</td>
<td>HD56FR463</td>
<td>HD56FE577</td>
</tr>
<tr>
<td>VFD Part Number</td>
<td>HK30WA008</td>
<td>HK30WA048</td>
<td>HK30WA045</td>
<td>HK30WA046</td>
<td>HK30WA048</td>
</tr>
<tr>
<td>FAULT FUNCTIONS</td>
<td>3005 Motor Therm Prot</td>
<td>Fault</td>
<td>3006 Motor Thermal Time</td>
<td>1050 s</td>
<td>3007 Motor Load Curve</td>
</tr>
<tr>
<td>3008 Zero Speed Load</td>
<td>%00705</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3009 Break Point Frequency</td>
<td>35 Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUTOMATIC RESET</td>
<td>3104 AR Overcurrent</td>
<td>DISABLE</td>
<td>3105 AR Overvoltage</td>
<td>ENABLE</td>
<td>3106 AR Undervoltage</td>
</tr>
<tr>
<td>5301 EFB PROTOCOL ID</td>
<td>0601 (hex)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5302 EFB STATION ID</td>
<td>41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5303 EFB BAUD RATE</td>
<td>38400</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5304 EFB PARITY</td>
<td>NONE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5305 EFB CTRL PROFILE</td>
<td>DUCU PROFILE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPTIONS</td>
<td>9802 COMM PROT SEL</td>
<td>6 (LEN)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table C — 48LC 05-06 VFD Parameters

<table>
<thead>
<tr>
<th>PARAMETER GROUP</th>
<th>PARAMETER NUMBER</th>
<th>Start-Up Data</th>
<th>Start/Stop/Dir</th>
<th>Reference Select</th>
<th>Constant Speeds</th>
<th>Analog Inputs</th>
<th>Relay Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Description</td>
<td>9902 Application Macro</td>
<td>9905 Motor Nominal Voltage</td>
<td>9906 Motor Nominal Current</td>
<td>9907 Motor Nominal Frequency</td>
<td>9908 Motor Nominal Speed</td>
<td>9909 Motor Nominal Power</td>
<td>1001 EXT1 Commands</td>
</tr>
<tr>
<td>Drive/Motor Voltage</td>
<td>9908 230</td>
<td>9906 7.9</td>
<td>9907 60</td>
<td>9908 1725</td>
<td>9909 2.4</td>
<td>1003 (1) Di1</td>
<td>1103 (1) A11</td>
</tr>
<tr>
<td>Motor Part Number</td>
<td>9908 HD56FE653</td>
<td>9906 HD56FE653</td>
<td>9907 60</td>
<td>9908 1725</td>
<td>9909 2.4</td>
<td>1003 (1) Di1</td>
<td>1103 (1) A11</td>
</tr>
<tr>
<td>VFD Part Number</td>
<td>9908 HK30WA001</td>
<td>9906 HK30WA001</td>
<td>9907 60</td>
<td>9908 1725</td>
<td>9909 2.4</td>
<td>1003 (1) Di1</td>
<td>1103 (1) A11</td>
</tr>
<tr>
<td>ABB Part Number</td>
<td>ACH550-CARUH-012A-2</td>
<td>ACH550-CARUH-06A9-4</td>
<td>42.6</td>
<td>60 Hz</td>
<td>60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>START-UP DATA</td>
<td>9905 Motor Nominal Voltage</td>
<td>9906 Motor Nominal Current</td>
<td>9907 Motor Nominal Frequency</td>
<td>9908 Motor Nominal Speed</td>
<td>9909 Motor Nominal Power</td>
<td>1001 EXT1 Commands</td>
<td></td>
</tr>
<tr>
<td>START/STOP/DIR</td>
<td>9908 230</td>
<td>9906 7.9</td>
<td>9907 60</td>
<td>9908 1725</td>
<td>9909 2.4</td>
<td>1003 (1) Di1</td>
<td>1103 (1) A11</td>
</tr>
<tr>
<td>REFERENCE SELECT</td>
<td>9908 (1) A11</td>
<td>9906 (1) A11</td>
<td>9907 60</td>
<td>9908 1725</td>
<td>9909 2.4</td>
<td>1003 (1) Di1</td>
<td>1103 (1) A11</td>
</tr>
<tr>
<td>CONSTANT SPEEDS</td>
<td>9908 (8) D12.3</td>
<td>9906 (8) D12.3</td>
<td>9907 42.6</td>
<td>9908 (8) D12.3</td>
<td>9909 2.4</td>
<td>1003 (1) Di1</td>
<td>1103 (1) A11</td>
</tr>
<tr>
<td>ANALOG INPUTS</td>
<td>9908 Minimum AI-1</td>
<td>9908 Maximum AI-1</td>
<td>9908 20.00%</td>
<td>9908 Maximum AI-1</td>
<td>9908 20.00%</td>
<td>1003 (1) Ready</td>
<td>1301 (1) Ready</td>
</tr>
<tr>
<td>RELAY OUTPUTS</td>
<td>9908 Minimum AI-1</td>
<td>9908 Maximum AI-1</td>
<td>9908 20.00%</td>
<td>9908 Maximum AI-1</td>
<td>9908 20.00%</td>
<td>1003 (1) Ready</td>
<td>1301 (1) Ready</td>
</tr>
<tr>
<td>1401 Relay Output 1</td>
<td>(1) Ready</td>
<td>(1) Ready</td>
<td>(1) Ready</td>
<td>(1) Ready</td>
<td>(1) Ready</td>
<td>(1) Ready</td>
<td>(1) Ready</td>
</tr>
<tr>
<td>1402 Relay Output 2</td>
<td>(2) Run</td>
<td>(2) Run</td>
<td>(2) Run</td>
<td>(2) Run</td>
<td>(2) Run</td>
<td>(2) Run</td>
<td>(2) Run</td>
</tr>
<tr>
<td>1403 Relay Output 3</td>
<td>(16) FLT/ALARM</td>
<td>(16) FLT/ALARM</td>
<td>(16) FLT/ALARM</td>
<td>(16) FLT/ALARM</td>
<td>(16) FLT/ALARM</td>
<td>(16) FLT/ALARM</td>
<td>(16) FLT/ALARM</td>
</tr>
</tbody>
</table>
moves the fault message. The message reappears after a few
seconds if the control panel is not touched and the fault is still active.

Alarms (Green LED Flashing)
For less severe errors, called alarms, the diagnostic display is advisory. For these situations, the drive is simply reporting that it detects something unusual.

In these situations, the drive:
1. Flashes the green LED on the drive (does not apply to alarms that arise from control panel operation errors)
2. Sets an appropriate bit in an Alarm Word parameter (0308 or 0309)
3. Overrides the control panel display with the display of an alarm code and/or name

Alarm messages disappear from the control panel display after a few seconds. The message returns periodically as long as the alarm condition exists.

Correcting Faults
The recommended corrective action for faults is shown in Table D. The VFD can also be reset to remove the fault. If an external source for a start command is selected and is active, the VFD may start immediately after fault reset.

To reset a fault indicated by a flashing red LED, turn off the power for 5 minutes. To reset a fault indicated by a red LED (not flashing), press RESET from the control panel or turn off the power for 5 minutes. Depending on the value of parameter 1604 (FAULT RESET SELECT), digital input or serial communication could...
also be used to reset the drive. When the fault has been corrected, the motor can be started.

**History**

For reference, the last three fault codes are stored into parameters 0401, 0412, 0413. For the most recent fault (identified by parameter 0401), the drive stores additional data (in parameters 0402 through 0411) to aid in troubleshooting a problem. For example, a parameter 0404 stores the motor speed at the time of the fault. To clear the fault history (all of Group 04, Fault History parameters), follow these steps:

1. In the control panel, Parameters mode, select parameter 0401.
2. Press EDIT.
3. Press the UP and DOWN buttons simultaneously.
4. Press SAVE.

**Correcting Alarms**

To correct alarms, first determine if the Alarm requires any corrective action (action is not always required). Use Table E to find and address the root cause of the problem.

If diagnostics troubleshooting has determined that the drive is defective during the warranty period, contact ABB Automation Inc., at 1-800-435-7365, option 4, option 3. A qualified technician will review the problem with the caller and make a determination regarding how to proceed. This may involve dispatching a designated service station (DSS) representative from an authorized station, dispatching a replacement unit, or advising return for repair.

**Control Panel Cleaning**

Use a soft damp cloth to clean the control panel. Avoid harsh cleaners which could scratch the display window.

**Battery Replacement**

A battery is only used in assistant control panels that have the clock function available and enabled. The battery keeps the clock operating in memory during power interruptions. The expected life for the battery is greater than ten years. To remove the battery, use a coin to rotate the battery holder on the back of the control panel. Replace the battery with type CR2032.

### Table D — FAULT CODES

<table>
<thead>
<tr>
<th>FAULT CODE</th>
<th>FAULT NAME IN PANEL</th>
<th>DESCRIPTION AND RECOMMENDED CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OVERCURRENT</td>
<td>Output current is excessive. Check for excessive motor load, insufficient acceleration time (parameters 2202 ACCELER TIME 1, default 30 seconds), or faulty motor, motor cables or connections.</td>
</tr>
<tr>
<td>2</td>
<td>DC OVERVOLT</td>
<td>Intermediate circuit DC voltage is excessive. Check for static or transient over voltages in the input power supply, insufficient deceleration time (parameters 2203 DECELER TIME 1, default 30 seconds), or undersized brake chopper (if present).</td>
</tr>
<tr>
<td>3</td>
<td>DEV OVERTEMP</td>
<td>Drive heat sink is overheated. Temperature is at or above 115°C (235°F). Check for fan failure, obstructions in the airflow, dirt or dust coating on the heat sink, excessive ambient temperature, or excessive motor load.</td>
</tr>
<tr>
<td>4</td>
<td>SHORT CIRC</td>
<td>Fault current. Check for short-circuit in the motor cable(s) or motor or supply disturbances.</td>
</tr>
<tr>
<td>5</td>
<td>OVERLOAD</td>
<td>Inverter overload condition. The drive output current exceeds the ratings.</td>
</tr>
<tr>
<td>6</td>
<td>DC OVERVOLT</td>
<td>Intermediate circuit DC voltage is not sufficient. Check for missing phase in the input power supply, blown fuse, or under voltage on main circuit.</td>
</tr>
<tr>
<td>7</td>
<td>A11 LOSS</td>
<td>Analog input 1 loss. Analog input value is less than A11 FLT LIMIT (3021). Check source and connection for analog input and parameter settings for A11 FLT LIMIT (3021) and 3001 AI&lt;MIN FUNCTION.</td>
</tr>
<tr>
<td>8</td>
<td>A12 LOSS</td>
<td>Analog input 2 loss. Analog input value is less than A12 FLT LIMIT (3022). Check source and connection for analog input and parameter settings for A12 FLT LIMIT (3022) and 3001 AI&lt;MIN FUNCTION.</td>
</tr>
<tr>
<td>9</td>
<td>MOT OVERTEMP</td>
<td>Motor is too hot, as estimated by the drive. Check for overloaded motor. Adjust the parameters used for the estimate (3005 through 3009). Check the temperature sensors and Group 35 parameters.</td>
</tr>
<tr>
<td>10</td>
<td>PANEL LOSS</td>
<td>Panel communication is lost and either drive is in local control mode (the control panel displays LOC), or drive is in remote control mode (REM) and is parameterized to accept start/stop, direction or reference from the control panel. To correct check the communication lines and connections. Check parameter 3002 PANEL COMM ERROR, parameters in Group 10: Command Inputs and Group 11:Reference Select (if drive operation is REM).</td>
</tr>
<tr>
<td>11</td>
<td>ID RUN FAIL</td>
<td>The motor ID run was not completed successfully. Check motor connections.</td>
</tr>
<tr>
<td>12</td>
<td>MOTOR STALL</td>
<td>Motor or process stall. Motor is operating in the stall region. Check for excessive load or insufficient motor power. Check parameters 3010 through 3012.</td>
</tr>
<tr>
<td>13</td>
<td>RESERVED</td>
<td>Not used.</td>
</tr>
<tr>
<td>14</td>
<td>EXT FAULT 1</td>
<td>Digital input defined to report first external fault is active. See parameter 3003 EXTERNAL FAULT 1.</td>
</tr>
<tr>
<td>15</td>
<td>EXT FAULT 2</td>
<td>Digital input defined to report second external fault is active. See parameter 3004 EXTERNAL FAULT 2.</td>
</tr>
<tr>
<td>16</td>
<td>EARTH FAULT</td>
<td>The load on the input power system is out of balance. Check for faults in the motor or motor cable. Verify that motor cable does not exceed maximum specified length.</td>
</tr>
<tr>
<td>17</td>
<td>UNDERLOAD</td>
<td>Motor load is lower than expected. Check for disconnected load. Check parameters 3013 UNDERLOAD FUNCTION through 3015 UNDERLOAD CURVE.</td>
</tr>
<tr>
<td>18</td>
<td>THERM FAIL</td>
<td>Internal fault. The thermistor measuring the internal temperature of the drive is open or shorted. Contact Carrier.</td>
</tr>
<tr>
<td>19</td>
<td>OPEX LINK</td>
<td>Internal fault. A communication-related problem has been detected between the OMIO and OINT boards. Contact Carrier.</td>
</tr>
<tr>
<td>20</td>
<td>OPEX PWR</td>
<td>Internal fault. Low voltage condition detected on the OINT board. Contact Carrier.</td>
</tr>
<tr>
<td>21</td>
<td>CURR MEAS</td>
<td>Internal fault. Current measurement is out of range. Contact Carrier.</td>
</tr>
<tr>
<td>22</td>
<td>SUPPLY PHASE</td>
<td>Ripple voltage in the DC link is too high. Check for missing main phase or blown fuse.</td>
</tr>
<tr>
<td>23</td>
<td>RESERVED</td>
<td>Not used.</td>
</tr>
<tr>
<td>24</td>
<td>OVERSPEED</td>
<td>Motor speed is greater than 120% of the larger (in magnitude) of 2001 MINIMUM SPEED or 2002 MAXIMUM SPEED parameters. Check parameter settings for 2001 and 2002. Check adequacy of motor braking torque. Check applicability of torque control. Check brake chopper and resistor.</td>
</tr>
<tr>
<td>25</td>
<td>RESERVED</td>
<td>Not used.</td>
</tr>
<tr>
<td>26</td>
<td>DRIVE ID</td>
<td>Internal fault. Configuration block drive ID is not valid.</td>
</tr>
</tbody>
</table>
### Table D — FAULT CODES (cont)

<table>
<thead>
<tr>
<th>FAULT CODE</th>
<th>FAULT NAME IN PANEL</th>
<th>DESCRIPTION AND RECOMMENDED CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>CONFIG FILE</td>
<td>Internal configuration file has an error. Contact Carrier.</td>
</tr>
<tr>
<td>28</td>
<td>SERIAL 1 ERR</td>
<td>Field bus communication has timed out. Check fault setup (3018 COMM FAULT FUNC and 3019 COMM FAULT TIME). Check communication settings (Group 51 or 53 as appropriate). Check for poor connections and/or noise on line.</td>
</tr>
<tr>
<td>29</td>
<td>EFB CON FILE</td>
<td>Error in reading the configuration file for the field bus adapter.</td>
</tr>
<tr>
<td>30</td>
<td>FORCE TRIP</td>
<td>Fault trip forced by the field bus. See the field bus reference literature.</td>
</tr>
<tr>
<td>31</td>
<td>EFB 1</td>
<td>Fault code reserved for the EFB protocol application. The meaning is protocol dependent.</td>
</tr>
<tr>
<td>32</td>
<td>EFB 2</td>
<td>Fault code reserved for the EFB protocol application. The meaning is protocol dependent.</td>
</tr>
<tr>
<td>33</td>
<td>EFB 3</td>
<td>Fault code reserved for the EFB protocol application. The meaning is protocol dependent.</td>
</tr>
<tr>
<td>34</td>
<td>MOTOR PHASE</td>
<td>Fault in the motor circuit. One of the motor phases is lost. Check for motor fault, motor cable fault, thermal relay fault, or internal fault.</td>
</tr>
<tr>
<td>35</td>
<td>OUTP WIRING</td>
<td>Error in power wiring suspected. Check that input power is wired to drive output. Check for ground faults.</td>
</tr>
<tr>
<td>101-105</td>
<td>SYSTEM ERROR</td>
<td>Error internal to the drive. Contact Carrier and report the error number.</td>
</tr>
<tr>
<td>201-206</td>
<td>SYSTEM ERROR</td>
<td>Error internal to the drive. Contact Carrier and report the error number.</td>
</tr>
<tr>
<td>1000</td>
<td>PAR HZRPM</td>
<td>Parameter values are inconsistent. Check for any of the following: 2001 MINIMUM SPEED &gt; 2002 MAXIMUM SPEED 2007 MINIMUM FREQ &gt; 2008 MAXIMUM FREQ 2001 MINIMUM SPEED / 9908 MOTOR NOM SPEED is outside of the range: -128/+128 2002 MAXIMUM SPEED / 9908 MOTOR NOM SPEED is outside of the range: -128/+128 2007 MINIMUM FREQ / 9907 MOTOR NOM FREQ is outside of the range: -128/+128 2008 MAXIMUM FREQ / 9907 MOTOR NOM FREQ is outside of the range: -128/+128</td>
</tr>
<tr>
<td>1001</td>
<td>PAR PFA REFNG</td>
<td>Parameter values are inconsistent. Check that 2007 MINIMUM FREQ is negative, when 8123 PFA ENABLE is active.</td>
</tr>
<tr>
<td>1002</td>
<td>PAR PFA ICONF</td>
<td>Parameter values are inconsistent. The number of programmed PFA relays does not match with Interlock configuration, when 8123 PFA ENABLE is active. Check consistency of RELAY OUTPUT parameters 1401 through 1403, and 1410 through 1412. Check 8117 NR OF AUX MOTORS, 8118 AUTOCHANGE INTERV, and 8120 INTERLOCKS.</td>
</tr>
<tr>
<td>1003</td>
<td>PAR AI SCALE</td>
<td>Parameter values are inconsistent. Check that parameter 1301 AI 1 MIN &gt; 1302 AI 1 MAX and that parameter 1304 AI 2 MIN &gt; 1305 AI 2 MAX.</td>
</tr>
<tr>
<td>1004</td>
<td>PAR AO SCALE</td>
<td>Parameter values are inconsistent. Check that parameter 1504 AO 1 MIN &gt; 1505 AO 1 MAX and that parameter 1510 AO 2 MIN &gt; 1511 AO 2 MAX.</td>
</tr>
<tr>
<td>1005</td>
<td>PAR PCU 2</td>
<td>Parameter values for power control are inconsistent: Improper motor nominal kVA or motor nominal power. Check the following parameters: 1.1 &lt; (9906 MOTOR NOM CURR * 9905 MOTOR NOM VOLT * 1.73 / PN) &lt; 2.6 Where: PN = 1000 * 9909 MOTOR NOM POWER (if units are kW) or PN = 746 * 9909 MOTOR NOM POWER (if units are HP, e.g., in US)</td>
</tr>
<tr>
<td>1006</td>
<td>PAR EXT RO</td>
<td>Parameter values are inconsistent. Check the extension relay module for connection and 1410 through 1412 RELAY OUTPUTS 4 through 6 have non-zero values.</td>
</tr>
<tr>
<td>1007</td>
<td>PAR FBUS</td>
<td>Parameter values are inconsistent. Check that a parameter is set for field bus control (e.g., 1001 EXT1 COMMANDS = 10 (COMM)), but 9802 COMM PROT SEL = 0.</td>
</tr>
<tr>
<td>1008</td>
<td>PAR PFA MODE</td>
<td>Parameter values are inconsistent. The 9904 MOTOR CTRL MODE must = 3 (SCALAR SPEED) when 8123 PFA ENABLE activated.</td>
</tr>
<tr>
<td>1009</td>
<td>PAR PCU 1</td>
<td>Parameter values for power control are inconsistent or improper motor nominal frequency or speed. Check for both of the following: 1 &lt; (60 * 9907 MOTOR NOM FREQ / 9908 MOTOR NOM SPEED &lt; 16 0.8 &lt; 9908 MOTOR NOM SPEED / (120 * 9907 MOTOR NOM FREQ / Motor poles) &lt; 0.992</td>
</tr>
<tr>
<td>1010</td>
<td>OVERRIDE/PFA CONFLICT</td>
<td>Override mode is enabled and PFA is activated at the same time. This cannot be done because PFA interlocks cannot be observed in the override mode.</td>
</tr>
<tr>
<td>ALARM CODE</td>
<td>ALARM NAME IN PANEL</td>
<td>DESCRIPTION AND RECOMMENDED CORRECTIVE ACTION</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>2001</td>
<td>-</td>
<td>Reserved</td>
</tr>
<tr>
<td>2002</td>
<td>-</td>
<td>Reserved</td>
</tr>
<tr>
<td>2003</td>
<td>-</td>
<td>Reserved</td>
</tr>
<tr>
<td>2004</td>
<td>DIR LOCK</td>
<td>The change in direction being attempted is not allowed. Do not attempt to change the direction of motor rotation, or change parameter 1003 DIRECTION to allow direction change (if reverse operation is safe).</td>
</tr>
<tr>
<td>2005</td>
<td>I/O COMM</td>
<td>Field bus communication has timed out. Check fault setup (3018 COMM FAULT FUNC and 3019 COMM FAULT TIME). Check communication settings (Group 51 or 53 as appropriate). Check for poor connections and/or noise on line.</td>
</tr>
<tr>
<td>2006</td>
<td>AI1 LOSS</td>
<td>Analog input 1 is lost, or value is less than the minimum setting. Check input source and connections. Check the parameter that sets the minimum (3021) and the parameter that sets the Alarm/Fault operation (3001).</td>
</tr>
<tr>
<td>2007</td>
<td>AI2 LOSS</td>
<td>Analog input 2 is lost, or value is less than the minimum setting. Check input source and connections. Check parameter that sets the minimum (3022) and the parameter that sets the Alarm/Fault operation (3001).</td>
</tr>
<tr>
<td>2008</td>
<td>PANEL LOSS</td>
<td>Panel communication is lost and either the VFD is in local control mode (the control panel displays HAND), or the VFD is in remote control mode (AUTO) and is parameterized to accept start/stop, direction or reference from the control panel. To correct, check the communication lines and connections, Parameter 3002 PANEL LOSS, and parameters in groups 10 COMMAND INPUTS and 11 REFERENCE SELECT (if drive operation is REM).</td>
</tr>
<tr>
<td>2009</td>
<td>-</td>
<td>Reserved</td>
</tr>
<tr>
<td>2010</td>
<td>MOT OVERTEMP</td>
<td>Motor is hot, based on either the VFD estimate or on temperature feedback. This alarm warns that a Motor Overload fault trip may be near. Check for overloaded motor. Adjust the parameters used for the estimate (3005 through 3009). Check the temperature sensors and Group 35 parameters.</td>
</tr>
<tr>
<td>2011</td>
<td>UNDERLOAD</td>
<td>Motor load is lower than expected. This alarm warns that a Motor Underload fault trip may be near. Check that the motor and drive ratings match (motor is NOT undersized for the drive). Check the settings on parameters 3013 to 3015.</td>
</tr>
<tr>
<td>2012</td>
<td>MOTOR STALL</td>
<td>Motor is operating in the stall region. This alarm warns that a Motor Stall fault trip may be near.</td>
</tr>
<tr>
<td>2013*</td>
<td>AUTORESET</td>
<td>This alarm warns that the drive is about to perform an automatic fault reset, which may start the motor. To control automatic reset, use parameter group 31 (AUTOMATIC RESET).</td>
</tr>
<tr>
<td>2014</td>
<td>AUTOCHANGE</td>
<td>This alarm warns that the PFA autochange function is active. To control PFA, use parameter group 81 (PFA) and the Pump Alternation macro.</td>
</tr>
<tr>
<td>2015</td>
<td>PFA INTERLOCK</td>
<td>This alarm warns that the PFA interlocks are active, which means that the drive cannot start any motor (when Autochange is used), or a speed regulated motor (when Autochange is not used).</td>
</tr>
<tr>
<td>2016</td>
<td>-</td>
<td>Reserved</td>
</tr>
<tr>
<td>2017*</td>
<td>OFF BUTTON</td>
<td>This alarm indicates that the OFF button has been pressed.</td>
</tr>
<tr>
<td>2018</td>
<td>PID SLEEP</td>
<td>This alarm warns that the PID sleep function is active, which means that the motor could accelerate when the PID sleep function ends. To control PID sleep, use parameters 4022 through 4026 or 4122 through 4126.</td>
</tr>
<tr>
<td>2019</td>
<td>ID RUN</td>
<td>The VFD is performing an ID run.</td>
</tr>
<tr>
<td>2020</td>
<td>OVERRIDE</td>
<td>Override mode is activated.</td>
</tr>
<tr>
<td>2021</td>
<td>START ENABLE 1 MISSING</td>
<td>This alarm warns that the Start Enable 1 signal is missing. To control Start Enable 1 function, use parameter 1608. To correct, check the digital input configuration and the communication settings.</td>
</tr>
<tr>
<td>2022</td>
<td>START ENABLE 2 MISSING</td>
<td>This alarm warns that the Start Enable 2 signal is missing. To control Start Enable 2 function, use parameter 1609. To correct, check the digital input configuration and the communication settings.</td>
</tr>
<tr>
<td>2023</td>
<td>EMERGENCY STOP</td>
<td>Emergency stop is activated.</td>
</tr>
</tbody>
</table>

Table E — ALARM CODES
START-UP CHECKLIST FOR 48LC SINGLE PACKAGE ROOFTOP COOLING ONLY
(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

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

II. PRE-START-UP

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

III. START-UP

ELECTRICAL

Supply Voltage L1-L2___________ L2-L3___________ L3-L1___________
Compressor Amps 1 L1___________ L2___________ L3___________
Compressor Amps 2 L1___________ L2___________ L3___________
Supply Fan Amps L1___________ L2___________ L3___________

TEMPERATURES

Outdoor-Air Temperature _____________ °F DB (Dry Bulb)
Return-Air Temperature _____________ °F DB _____________ °F Wb (Wet Bulb)
Cooling Supply Air Temperature _____________ °F
Gas Heat Air Temperature _____________ °F
**PRESSURES**

<table>
<thead>
<tr>
<th>Description</th>
<th>Stage 1</th>
<th>Stage 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Inlet Pressure</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>Gas Manifold Pressure STAGE 1</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>Refrigerant Suction CIRCUIT A</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>Refrigerant Discharge CIRCUIT A</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>Refrigerant Suction CIRCUIT B</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>Refrigerant Discharge CIRCUIT B</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

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 opens
- 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.**