



# Installation Instructions

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

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## SAFETY CONSIDERATIONS

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

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

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

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

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-

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

**⚠ WARNING**

**FIRE, EXPLOSION HAZARD**

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

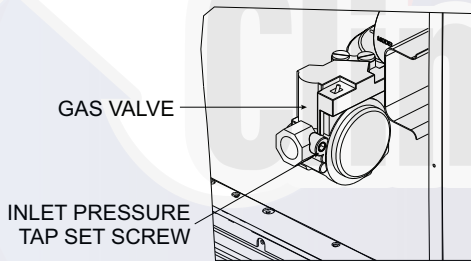
Disconnect gas piping from unit when pressure testing at pressure greater than 0.5 psig (3450 Pa). Pressures greater than 0.5 psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig, it must be replaced before use. When pressure testing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

**⚠ WARNING**

**FIRE HAZARD**

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

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

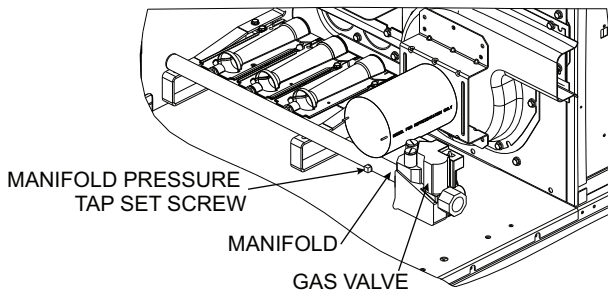


**⚠ WARNING**

**FIRE HAZARD**

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

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



**⚠ WARNING**

**CARBON-MONOXIDE POISONING HAZARD**

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

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

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

**⚠ AVERTISSEMENT**

**RISQUE D'INTOXICATION AU MONOXYDE DE CARBONE**

Si ces directives ne sont pas suivies, cela peut entraîner des blessures graves ou une intoxication au monoxyde de carbone pouvant causer la mort, si des produits de combustion s'infiltrent dans le bâtiment.

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

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

**⚠ WARNING**

**ELECTRICAL SHOCK HAZARD**

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

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

**⚠ WARNING**

**UNIT OPERATION AND SAFETY HAZARD**

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

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

**⚠ WARNING**

**PERSONAL INJURY AND ENVIRONMENTAL HAZARD**

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

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

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

**CAUTION**

**CUT HAZARD**

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

**Rated Indoor Airflow (cfm)**

Table 1 lists the rated indoor airflow used for the AHRI efficiency rating for the units covered in this document. See Fig. 1 for unit options, Fig. 2 for unit dimensions, and Fig. 3 for service clearances.

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

MODEL NUMBER	FULL LOAD AIRFLOW (CFM)
48LC**07	2250

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	7	A	1	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  
S = Low Heat w/ Stainless Steel Exchanger  
R = Medium Heat w/ Stainless Steel Exchanger  
T = High Heat w/ Stainless Steel Exchanger

**Refrig. Systems Options**  
0 = Three stage cooling capacity control with TXV  
A = Three stage cooling capacity control with TXV and Humidi-MiZer® System

**Cooling Tons**  
07 - 6 ton

**Sensor Options**  
A = None  
B = RA Smoke Detector  
C = SA Smoke Detector  
D = RA + SA Smoke Detector  
E = CO<sub>2</sub>  
F = RA Smoke Detector and CO<sub>2</sub>  
G = SA Smoke Detector and CO<sub>2</sub>  
H = RA + SA Smoke Detector and CO<sub>2</sub>

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

**Coil Options: Fin/Tube (Condenser- Evaporator - Hail Guard)**  
A = Al/Cu - Al/Cu  
B = 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

**Packaging**  
0 = Standard  
1 = LTL

**Electrical Options**  
A = None  
B = HACR Circuit Breaker  
C = Non-Fused Disconnect  
D = Thru-The-Base Connections  
E = HACR Circuit Breaker and Thru-The Base Connections  
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 = Low Leak Temperature Economizer with Barometric Relief  
E = Low Leak Enthalpy Economizer with Barometric Relief  
N = Ultra Low Leak Temperature Economizer with Barometric Relief  
R = Ultra Low Leak Enthalpy Economizer with Barometric Relief

**Base Unit Controls**  
0 = Electro-mechanical Controls  
1 = RTU Open Multi-Protocol Controller  
4 = SystemVu™ Controller

**Design Revision**  
- = Factory Design Revision

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

**Fig. 1 — Model Number Nomenclature**

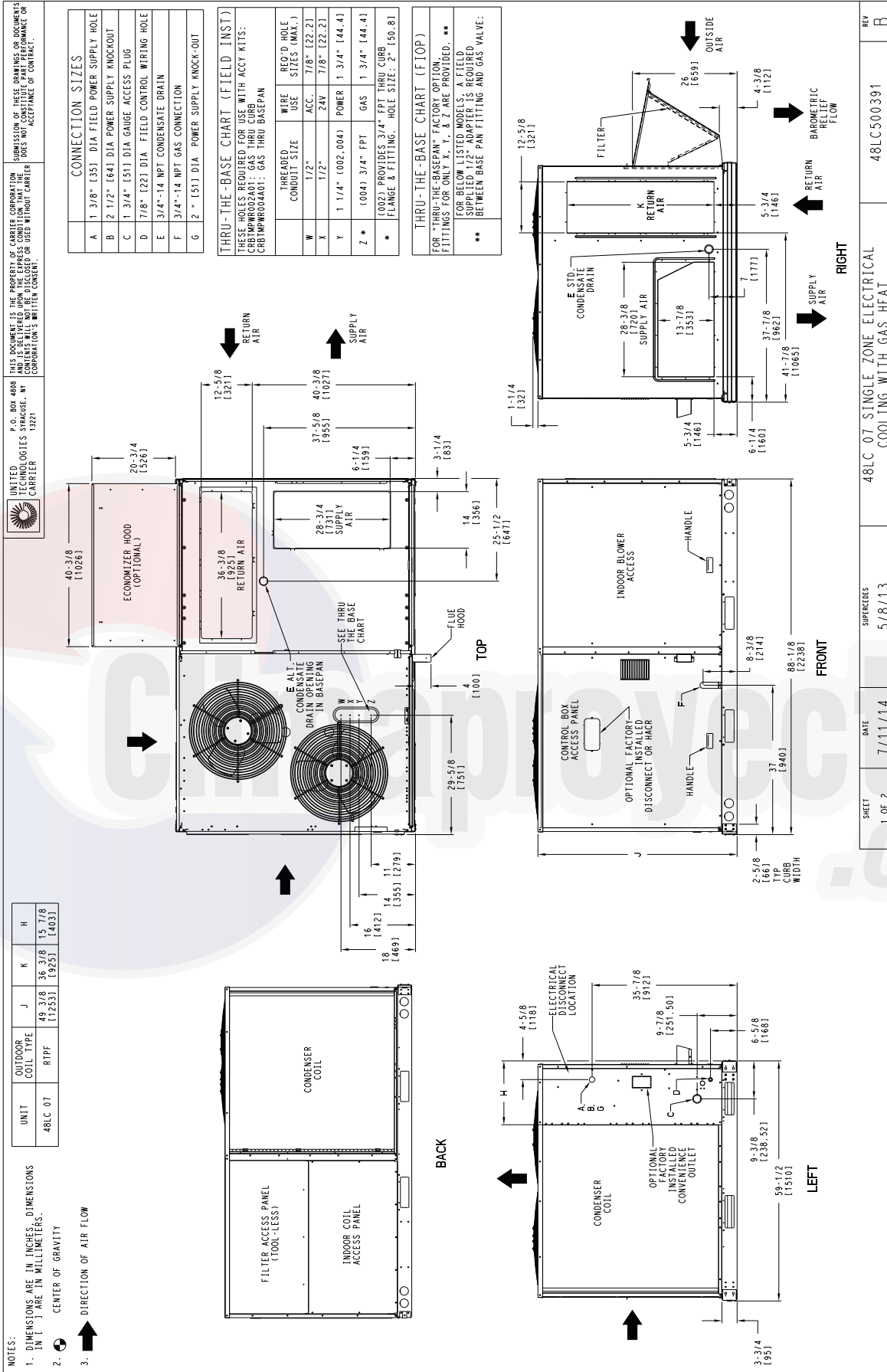


Fig. 2 — Unit Dimensional Drawing



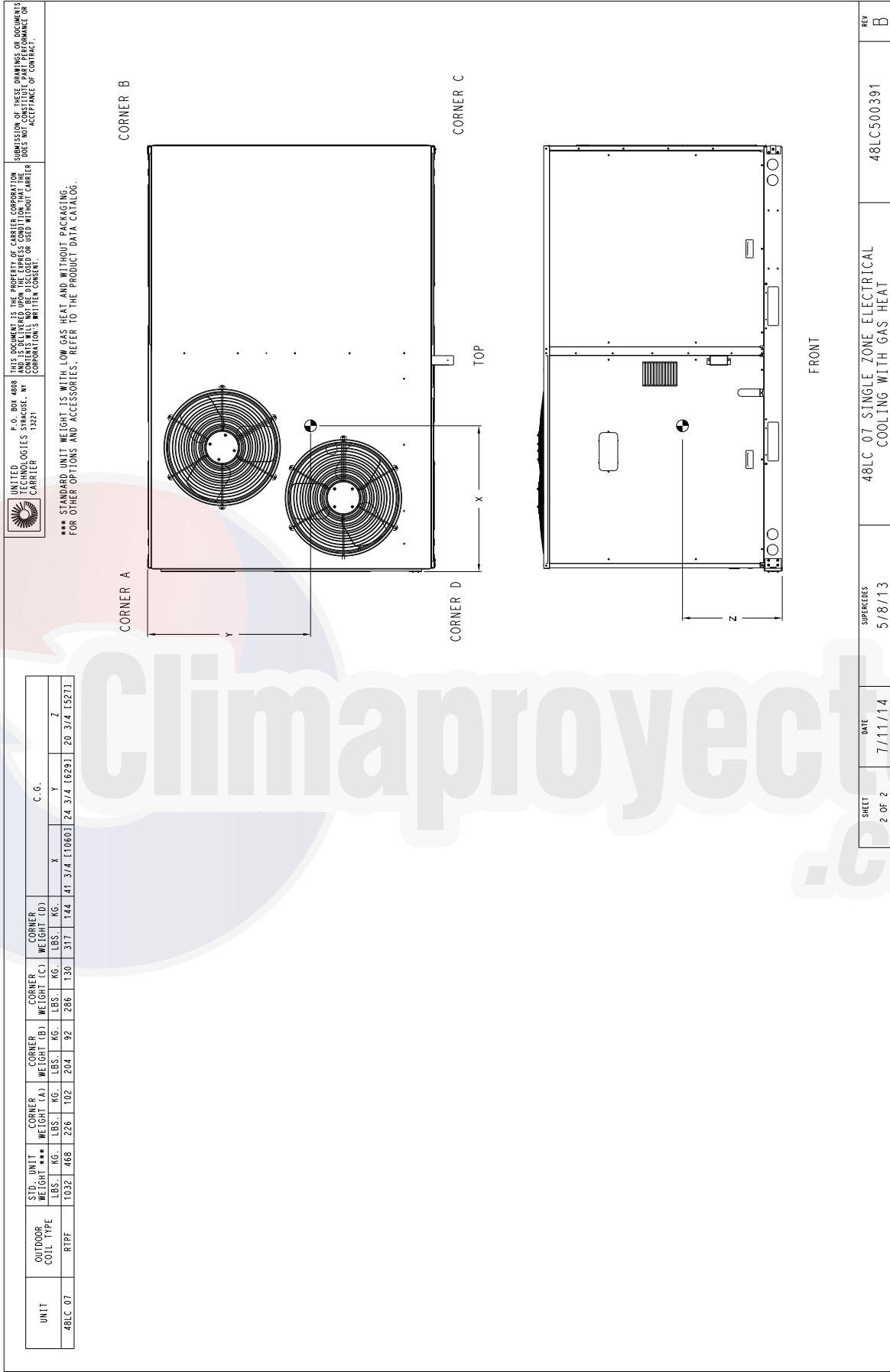
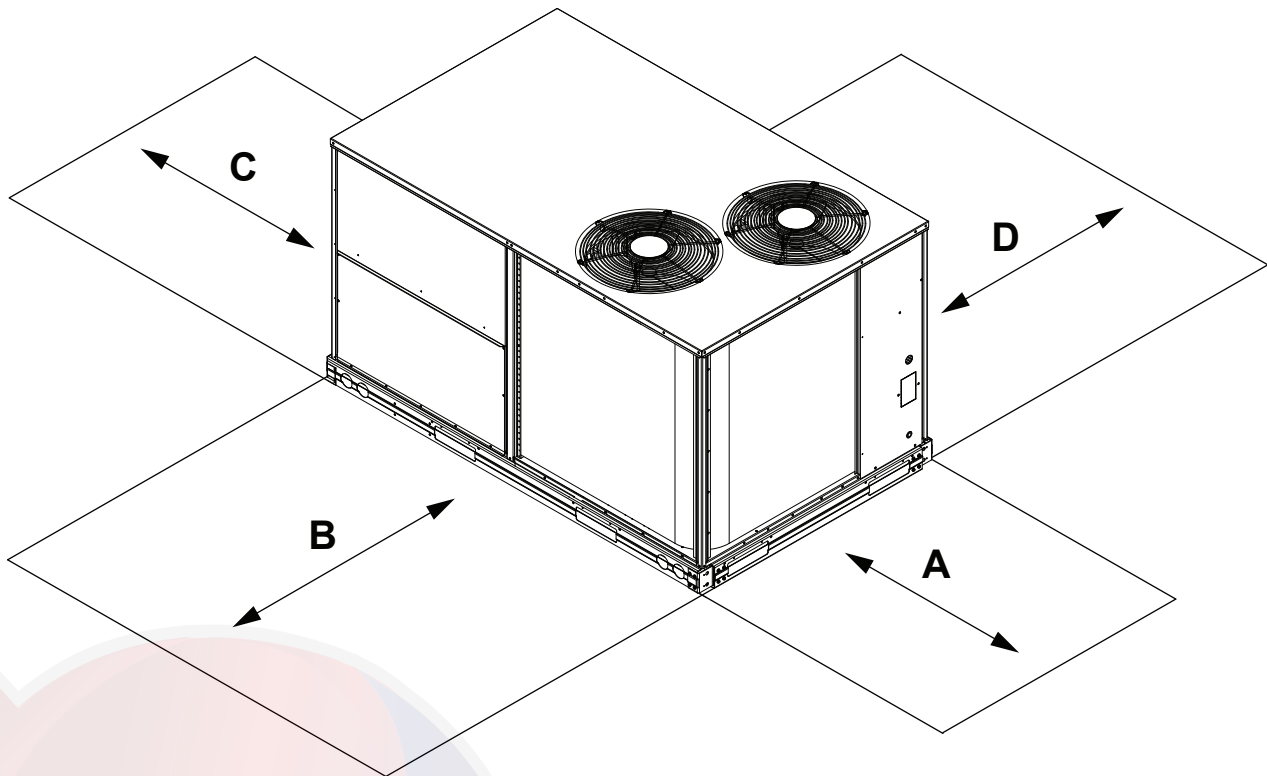


Fig. 2 — Unit Dimensional Drawing (cont)



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

NOTE: Unit not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.

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

**INSTALLATION**

**Jobsite Survey**

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

**Step 1 — Plan for Unit Location**

Select a location for the unit and its support system (curb or other) that provides for the minimum clearances required for safety. This includes the clearance to combustible surfaces, unit performance and service access below and around unit as specified in Fig. 3.

NOTE: Consider also the effect of adjacent units.  
Be sure that unit is installed such that snow will not block the combustion intake or flue outlet.

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

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

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

Select a unit mounting system that provides adequate height to allow installation of condensate trap per requirements. Refer to “Step 11 — Install External Condensate Trap and Line” on page 15 for required trap dimensions.

#### ROOF MOUNT

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

**Table 2 — Operating Weights**

48LC**07	UNITS LB (KG)
<b>Base Unit</b>	1032 (468)
<b>Economizer</b>	
<b>Vertical</b>	75 (34)
<b>Horizontal</b>	122 (55)
<b>Powered Outlet</b>	35 (16)
<b>Curb</b>	
<b>14-in. (356 mm)</b>	143 (65)
<b>24-in. (610 mm)</b>	245 (111)

#### Step 2 — Plan for Sequence of Unit Installation

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

##### CURB-MOUNTED INSTALLATION

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

##### PAD-MOUNTED INSTALLATION

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

##### FRAME-MOUNTED INSTALLATION

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

#### Step 3 — Inspect Unit

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

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

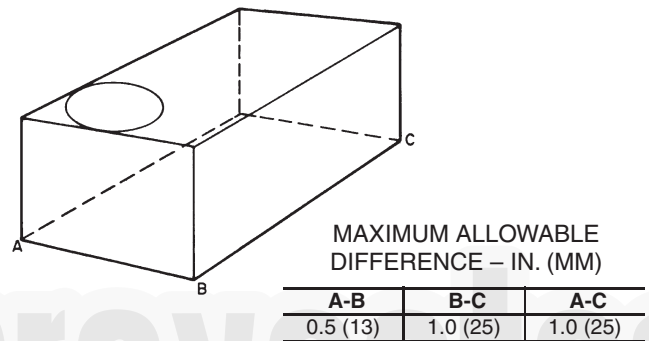
#### Step 4 — Provide Unit Support

##### ROOF CURB MOUNT

Accessory roof curb details and dimensions are shown in Fig. 5. Assemble and install accessory roof curb in accordance with instructions shipped with the curb.

NOTE: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 5. Improperly applied gasket can also result in air leaks and poor unit performance.

Curb should be level. This is necessary for unit drain to function properly. Unit leveling tolerances are shown in Fig. 4. Refer to Accessory Roof Curb Installation Instructions for additional information as required.



**Fig. 4 — Unit Leveling Tolerances**

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

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

##### SLAB MOUNT (HORIZONTAL UNITS ONLY)

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

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

##### ALTERNATE UNIT SUPPORT (IN LIEU OF CURB OR SLAB MOUNT)

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

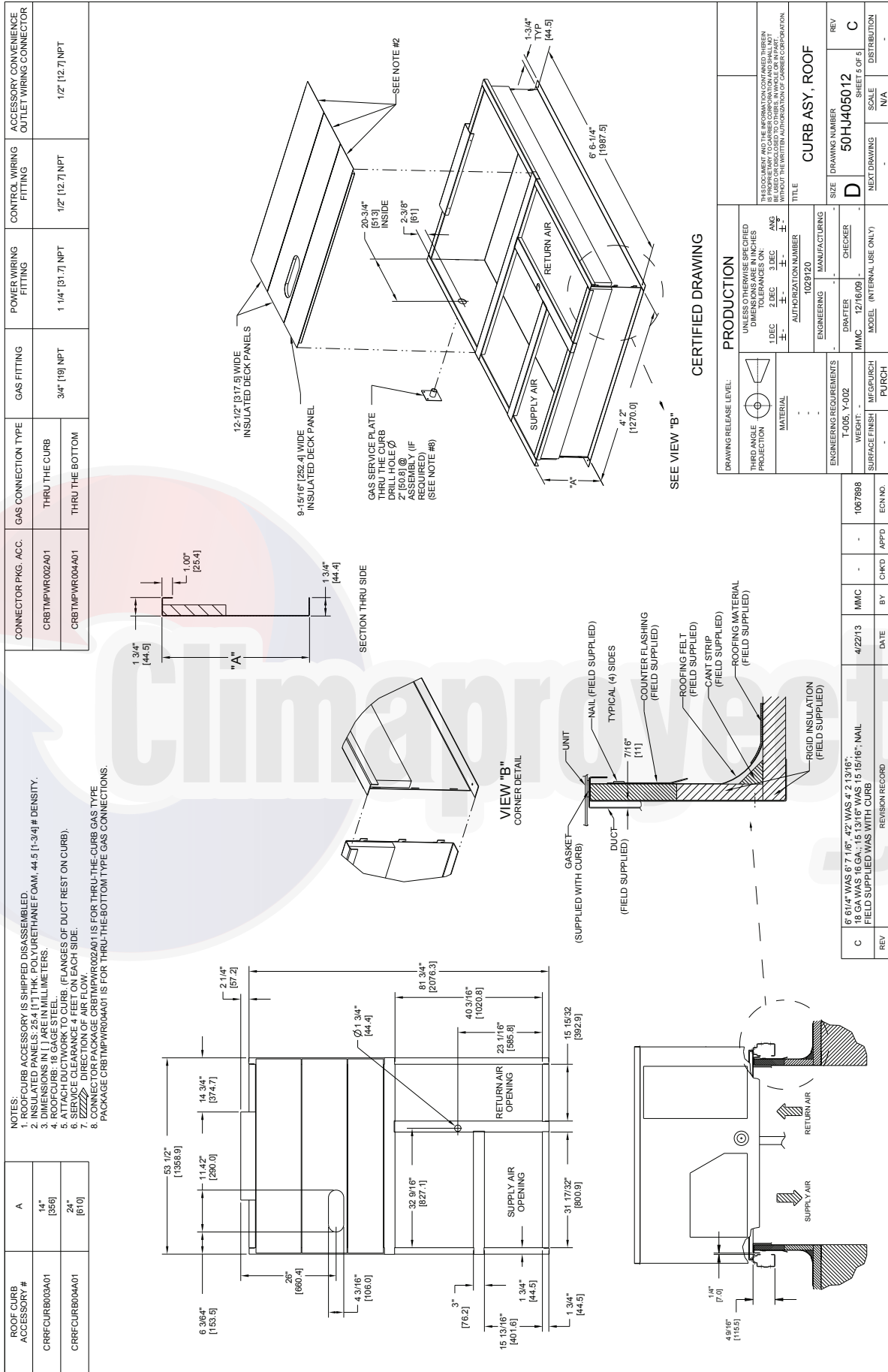


Fig. 5 — Roof Curb Details

## 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.

### ⚠ CAUTION

#### PROPERTY DAMAGE HAZARD

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

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

## Step 6 — Rig and Place Unit

Keep unit upright and do not drop. Spreader bars are required. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 2 and Fig. 6 for additional information.

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

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

When using the standard side drain connection, ensure the red plug in the alternate bottom connection is tight. Do this before setting the unit in place. The red plug can be tightened with a 1/2-in. square socket drive extension. For further details see “Step 11 — Install External Condensate Trap and Line” on page 15.

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

### ⚠ CAUTION

#### UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

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

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

#### POSITIONING ON CURB

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

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

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

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

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

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

After the unit is in position remove all riggings, shipping materials and top skid. Recycle or dispose of all shipping materials.



**⚠ CAUTION - NOTICE TO RIGGERS:**  
**⚠ AVERTISSEMENT - REMARQUE À L'ATTENTION DES MONTEURS**

**ALL PANELS MUST BE IN PLACE WHEN RIGGING.**  
**TOUS LES CAPOTS DOIVENT ÊTRE EN PLACE AVANT LE LEVAGE**

- Hook rigging shackles through holes in base rail, as shown in Detail "A".
- Use wooden top skid, when rigging, to prevent rigging straps from damaging unit.
- Max weight includes base unit plus shipping pallet plus all available FIOP's which could be on that size unit.
- "B" dimension is based on base unit plus economizer option only. This dimension may vary slightly with units configured with other FIOP options.
- Spreader bars required to lift and transport the unit.
- Accrocher les manilles des élingues de levages dans les trous situés dans le rail de base comme indiqué au Détail "A".
- Utiliser des cales en bois lors du levage pour éviter que les élingues n'endommagent le haut de l'appareil.
- Le poids maximum inclut la configuration de base, le poids de la palette d'expédition, ainsi que toutes les options pouvant être installées en usine (FIOP) pour la plateforme sélectionnée.
- La dimension de "B" provient de la configuration de base qui inclut l'option economizer seulement, Cette dimension peut varier légèrement en fonction des différentes options sélectionnées installées en usine (FIOP).
- Barres d'écartement requises pour soulever et transporter l'unité.

PLACE ALL SEAL STRIP IN PLACE BEFORE PLACING UNIT ON ROOF CURB.  
 INSTALLER TOUTES LES BANDES D'ISOLATION EN PLACE AVANT DE PLACER L'APPAREIL SUR LE REBORD DE TOIT.

**DETAIL A**  
**DÉTAIL "A"**

MODEL	MAX WEIGHT		A		B		C	
	LB	KG	IN	MM	IN	MM	IN	MM
48LC_007	1145	520	88	2235	32	812	49 1/2	1257
50LC_007	1080	491	88	2235	30 3/8	772	49 1/2	1257

48TM504503 REV -

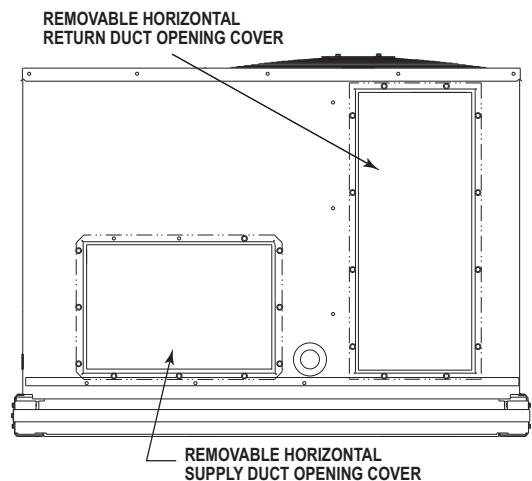
**Fig. 6 — Rigging Label**

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

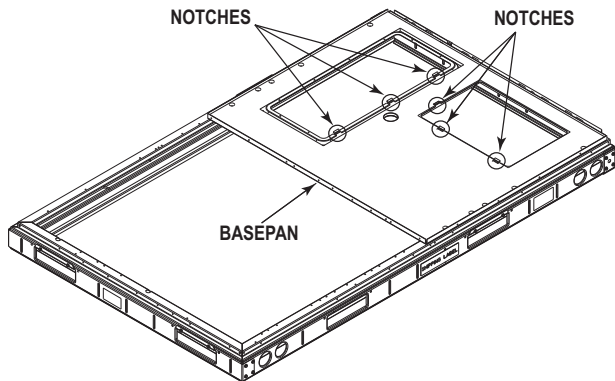
Unit is shipped in the vertical duct configuration. Unit without factory-installed economizer or return-air smoke detector option may be field-converted to horizontal ducted configuration. To convert to horizontal configuration, remove screws from side duct opening covers (see Fig. 7) and remove covers.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

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

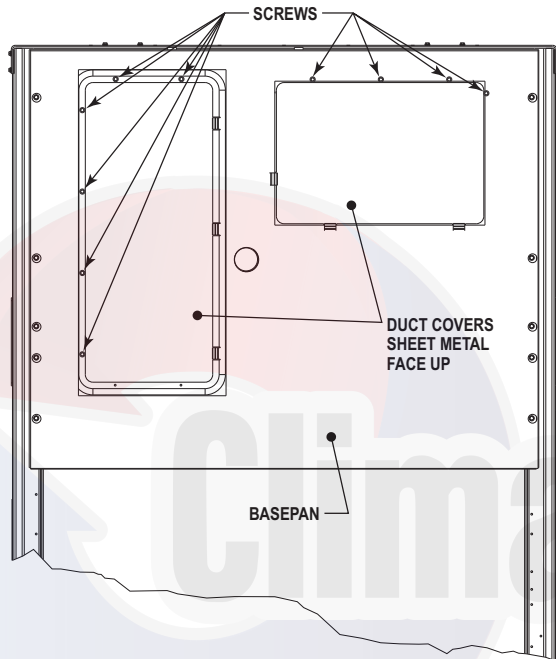
Do not cover or obscure visibility to the unit's informative data plate when insulating horizontal ductwork.



**Fig. 7 — Horizontal Conversion Panels**



**Fig. 8 — Location of Notches**

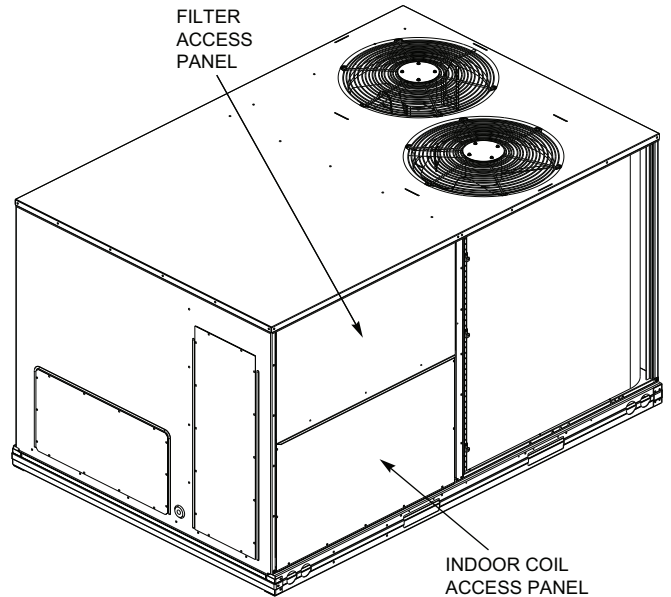


**Fig. 9 — Horizontal Duct Panels In Place**

**Step 8 — Install Outside Air Hood**

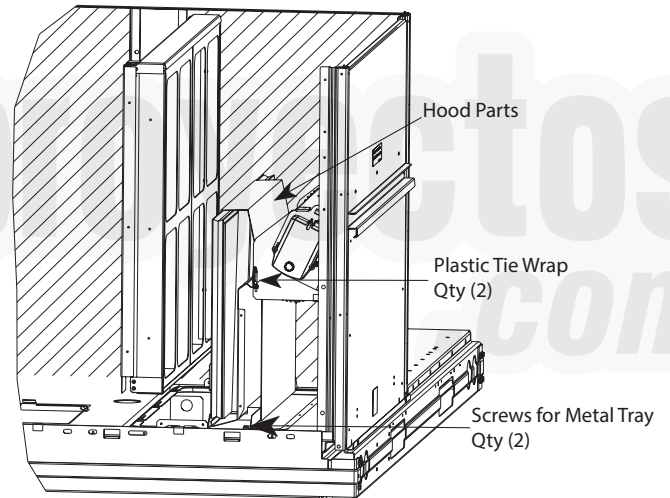
**ECONOMIZER HOOD PACKAGE REMOVAL AND SETUP - FACTORY OPTION**

1. The hood is shipped in knock-down form and must be field-assembled. The indoor coil access panel is used as the hood top while the hood sides, divider and filter are packaged together, attached to a metal support tray using plastic stretch wrap, and shipped in the return-air compartment behind the indoor coil access panel. The hood assembly's metal tray is attached to the basepan and also attached to the damper using two plastic tie-wraps.
2. To gain access to the hood, remove the filter access panel. (See Fig. 10)



**Fig. 10 — Access Panel Locations**

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



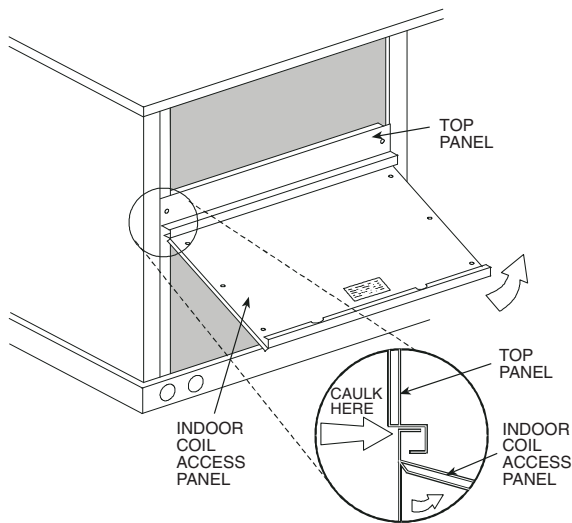
**Fig. 11 — Economizer Hood Parts Location**

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

**ECONOMIZER HOOD**

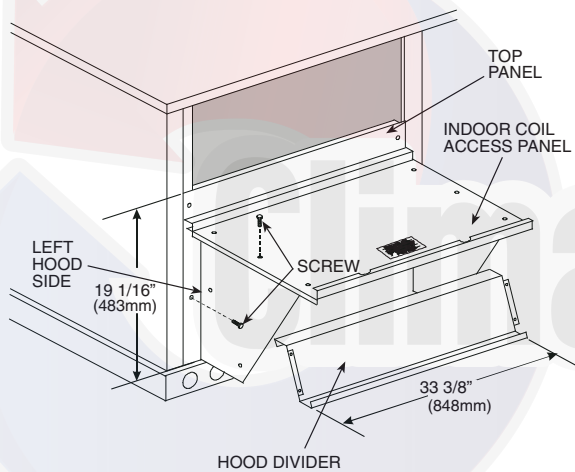
**NOTE:** If the power exhaust accessory is to be installed on the unit, the hood shipped with the unit will not be used and must be discarded. Save the aluminum filter for use in the power exhaust hood assembly.

1. The indoor coil access panel will be used as the top of the hood. Remove the screws along the sides and bottom of the indoor coil access panel. See Fig. 12.



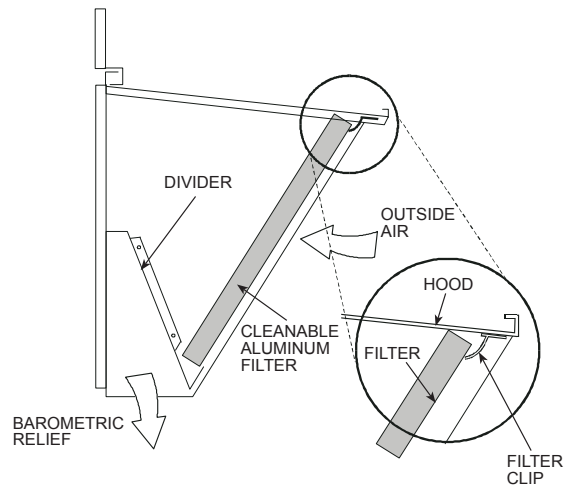
**Fig. 12 — Indoor Coil Access Panel Relocation**

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



**Fig. 13 — Economizer Hood Construction**

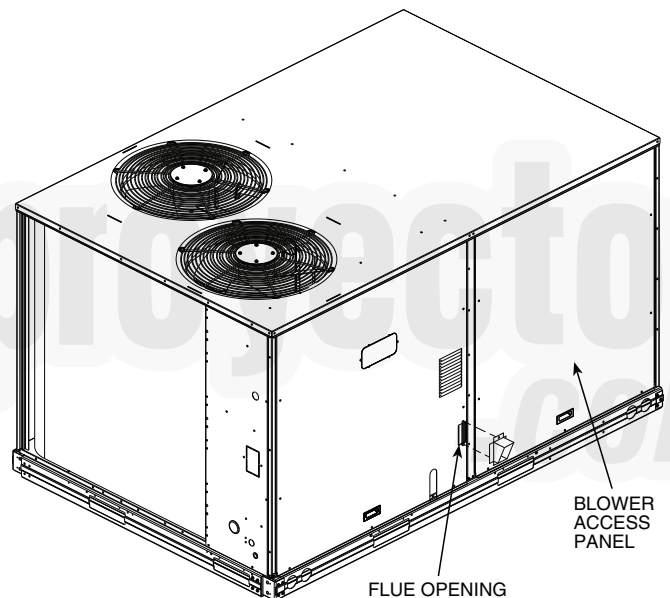
- Remove the shipping tape holding the economizer barometric relief damper in place (economizer only).
- Insert the hood divider between the hood sides. See Fig. 13 and Fig. 14. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.
- Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 14.
- Caulk the ends of the joint between the unit top panel and the hood top.
- Replace the filter access panel.



**Fig. 14 — Economizer Filter Installation**

### Step 9 — Install Flue Hood

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



**Fig. 15 — Flue Hood Details**

### Step 10 — Install Gas Piping

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

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

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

For natural gas applications, gas pressure at unit gas connection must not be less than 4 in. wg (996 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating. On 48LCF/T007 (high-heat)

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

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

**Table 3 — Natural Gas Supply Line Pressure Ranges**

UNIT MODEL	UNIT SIZE	MIN	MAX
48LCD/E/S/R0	07	4.0 in. wg (996 Pa)	13.0 in. wg (3240 Pa)
48LCF/T0 (High Heat units only)	07	5.0 in. wg (1245 Pa)	13.0 in. Wg (3240 Pa)

**Table 4 — Liquid Propane Supply Line Pressure Ranges**

UNIT MODEL	UNIT SIZE	MIN	MAX
48LCD/F/E/S/R/T0	07	11.0 in. wg (2740 Pa)	13.0 in. wg (3240 Pa)

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

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

**Table 5 — Natural Gas Manifold Pressure Ranges**

UNIT MODEL	UNIT SIZE	HIGH FIRE	LOW FIRE
48LCD/E/S/R0	07	3.5 in. wg (872 Pa)	1.7 in. wg (423 Pa)
48LCF/T0 (High Heat units only)	07	3.5 in. wg (872 Pa)	2.0 in. wg (498 Pa)

**Table 6 — Liquid Propane Manifold Pressure Ranges**

UNIT MODEL	UNIT SIZE	HIGH FIRE	LOW FIRE
48LCD/E/S/R0	07	10.0 in. wg (2490 Pa)	5.0 in. wg (1245 Pa)
48LCF/T0 (High Heat units only)	07	10.0 in. wg (2490 Pa)	5.7 in. wg (1420 Pa)

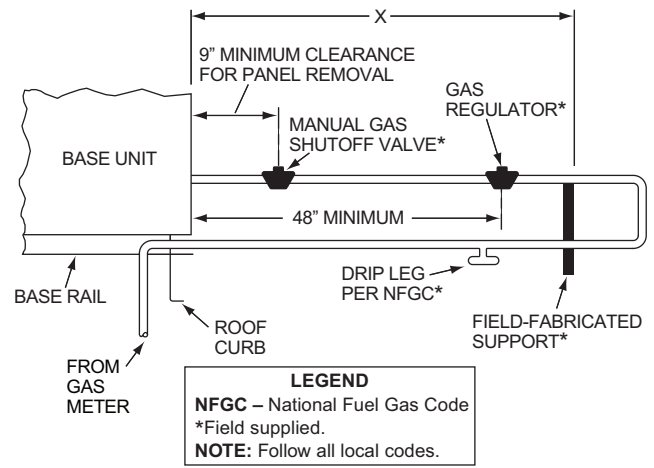
**⚠ CAUTION**

**EQUIPMENT DAMAGE**

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

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

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

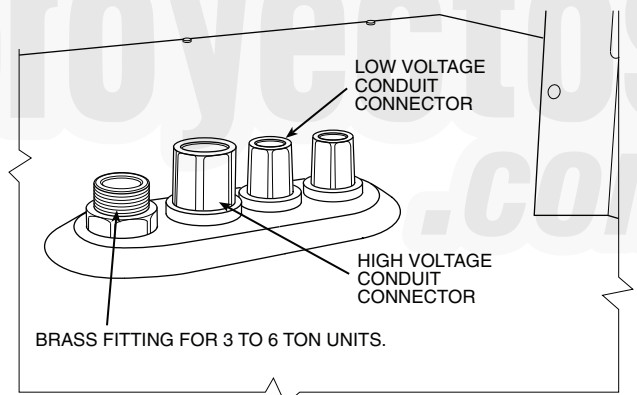


STEEL PIPE NOMINAL DIAMETER (in.)	SPACING OF SUPPORTS X DIMENSION (ft)
1/2	6
3/4 or 1	8
1 1/4 or larger	10

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

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

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



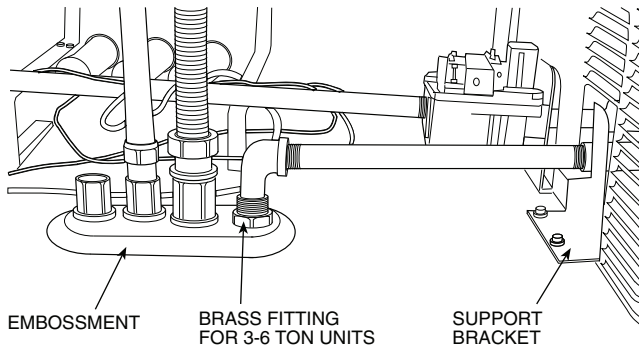
**Fig. 17 — Fittings**

The thru-base gas connector has male and female threads. The male threads protrude above the basepan of the unit; the female threads protrude below the basepan.

Check tightness of connector lock nuts before connecting gas piping.

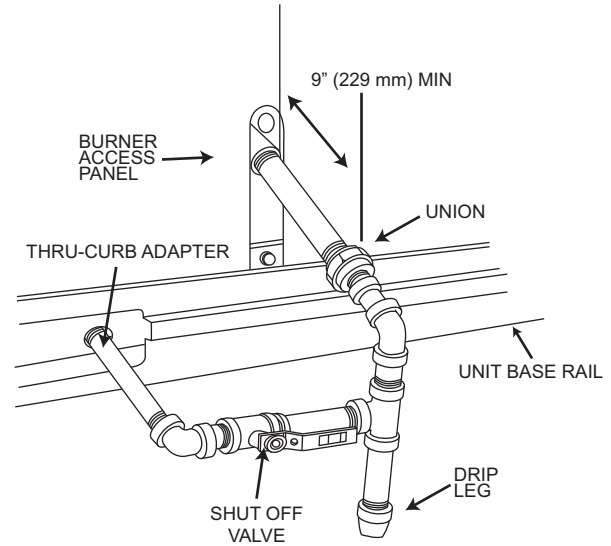
Install a 3/4-in. NPT street elbow on the thru-base gas fitting. Attach a 3/4-in. pipe nipple with minimum length of 16-in. (406 mm) (field-supplied) to the street elbow and extend it through the access panel at the gas support bracket. See Fig. 18.



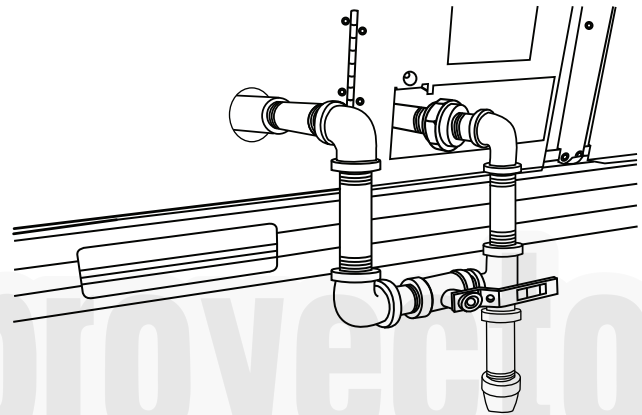


**Fig. 18 — Gas Line Piping for 6 Ton Units**

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



**Fig. 20 — Gas Piping with Offset Drip Leg**



**Fig. 21 — Gas Piping Thru-Base Connections**

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<sup>1</sup>) tape, ensure the material is Double Density type and is labeled for use on gas lines. Apply tape per manufacturer's instructions.
4. Pressure-test all gas piping in accordance with local and national plumbing and gas codes before connecting piping to unit.

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

1. Teflon is a registered trademark of DuPont.



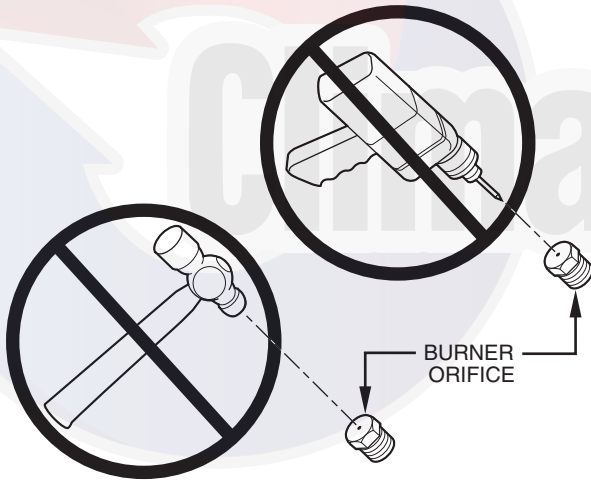
disconnected from the gas valve during the testing of the piping systems when test pressure is in excess of 0.5 psig (3450 Pa). Pressure test the gas supply piping system at pressures equal to or less than 0.5 psig (3450 Pa). The unit heating section must be isolated from the gas piping system by closing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

**⚠ WARNING**

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

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

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



**Fig. 22 — Orifice Hole**

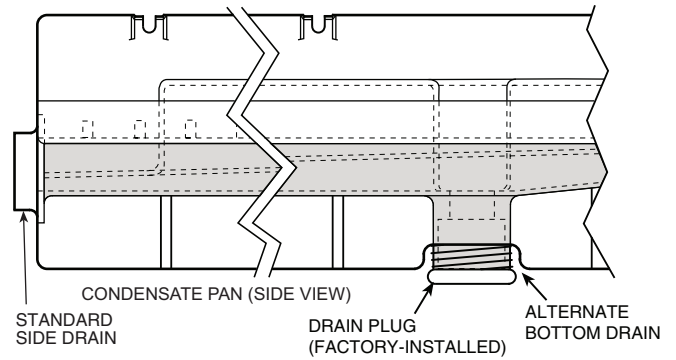
**Step 11 — Install External Condensate Trap and Line**

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

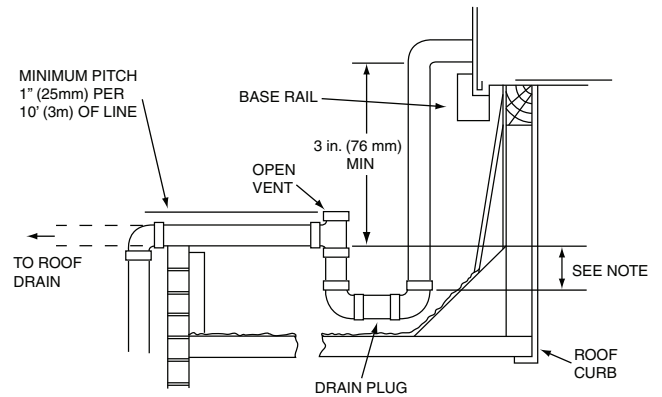
To use the alternate bottom drain connection, remove the red drain plug from the bottom connection (use a 1/2-in. square socket drive extension) and install it in the side drain connection.

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

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



**Fig. 23 — Condensate Drain Pan (Side View)**



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

**Fig. 24 — Condensate Drain Piping Details**

**Step 12 — 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-energize via unit disconnect switch operation of the convenience outlet is desired, connect the source leads to the load side of the unit disconnect. On a unit without a unit-mounted disconnect, connect the source leads to compressor contactor C and indoor fan contactor IFC pressure lugs with unit field power leads (see Fig. 25).

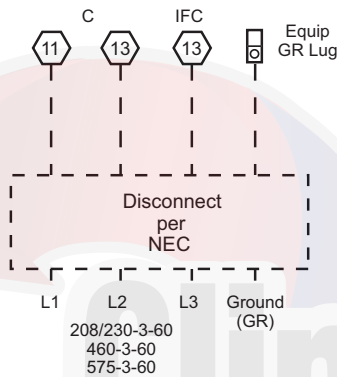
Refer to Fig. 40 for power transformer connections and the discussion on connecting the convenience outlet on page 25.

Field power wires will be connected at line-side pressure lugs on the power terminal block or at factory-installed option non-fused disconnect or HACR.

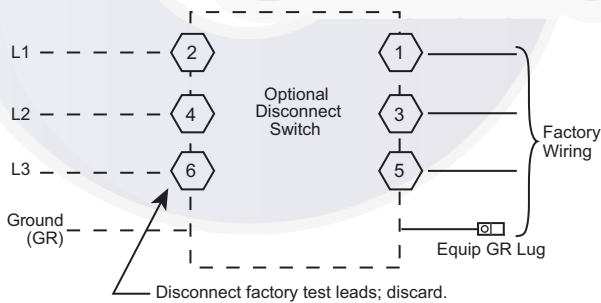
Field power wires are connected to the unit at line-side pressure lugs on compressor contactor C and indoor fan contactor IFC (see wiring diagram label for control box component arrangement), at factory-installed option non-fused disconnect switch or HACR. Max wire size is #4 AWG (copper only) per pole on contactors and #2ga AWG (copper only) per pole on optional non-fused disconnect or HACR. See Fig. 25 and the unit label diagram for field power wiring connections.

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

Units Without Disconnect or HACR Option



Units With Disconnect or HACR Option



**Fig. 25 — Power Wiring Connections**

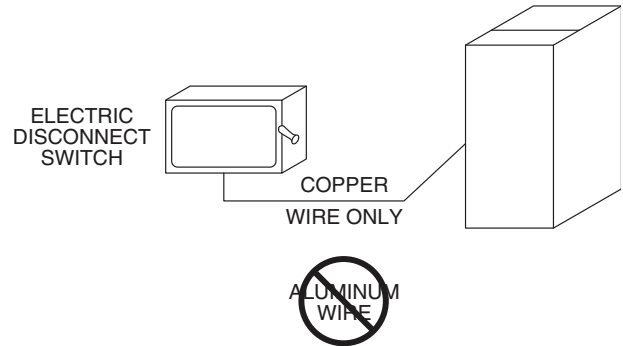
**WARNING**

**FIRE HAZARD**

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

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

See Fig. 26 for disconnect switch information. See Fig. 27-33 for wiring diagrams.



**Fig. 26 — Disconnect Switch and Unit**

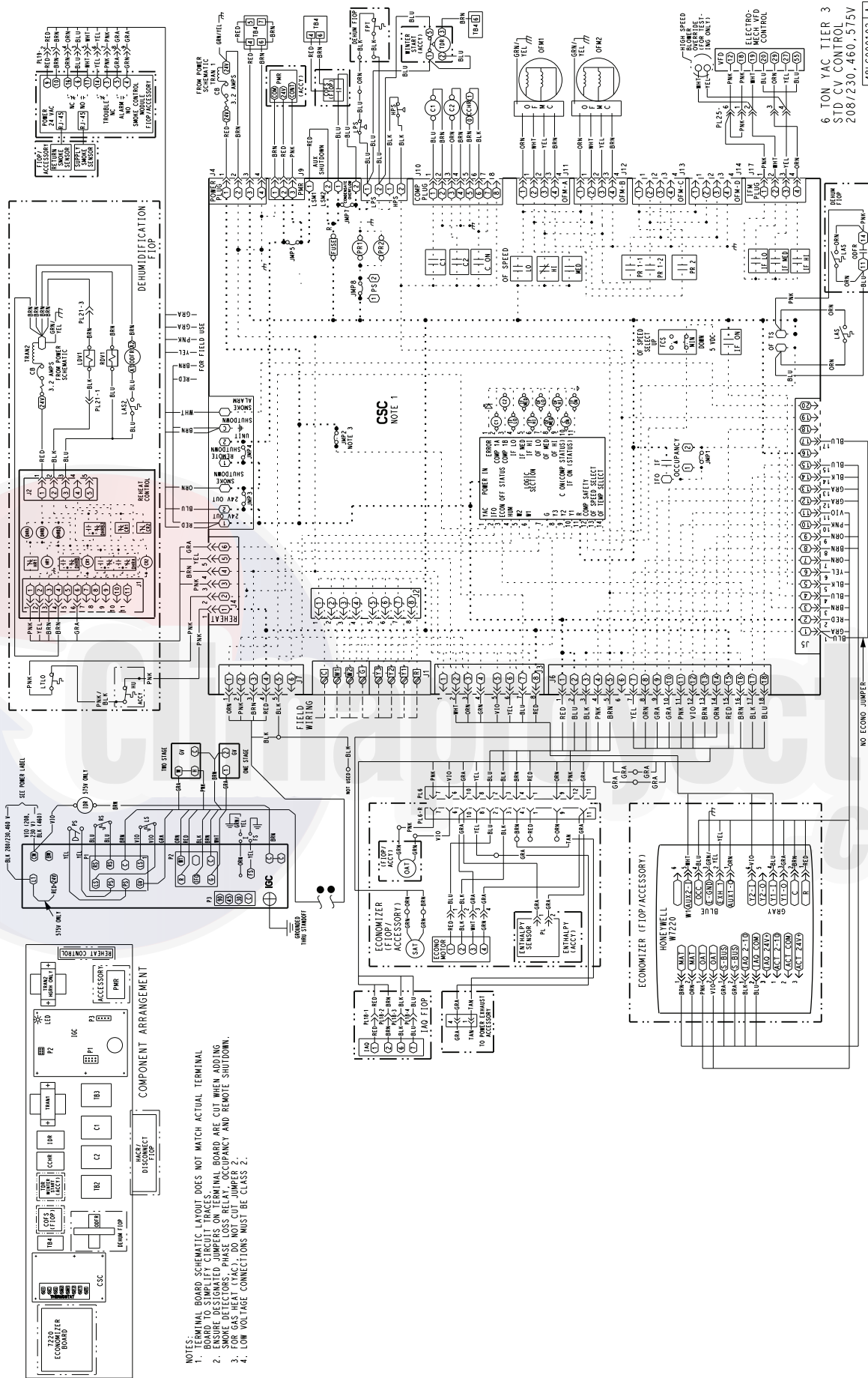
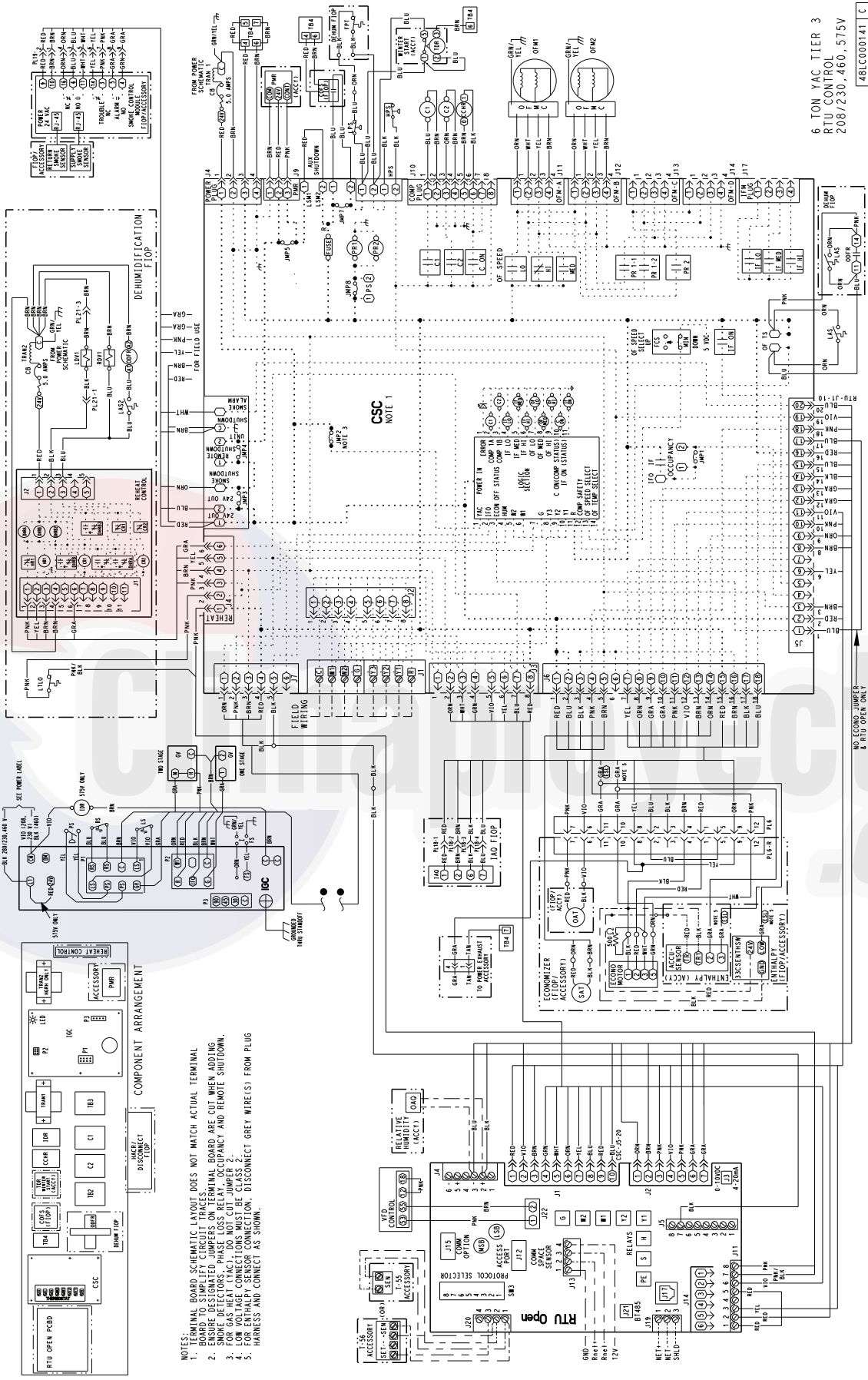


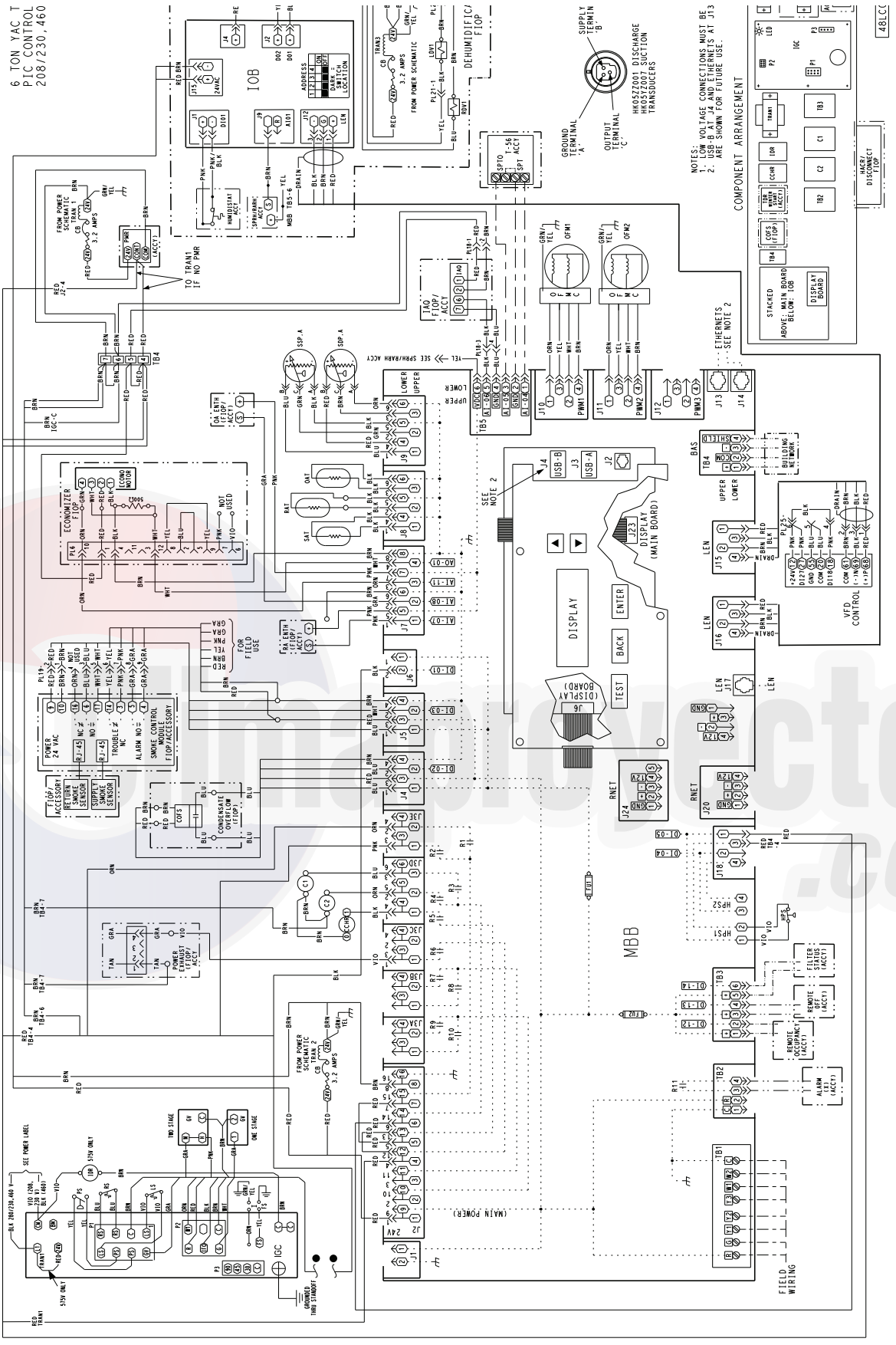
Fig. 27 — 48LC 07 Electro-mechanical Control Wiring Diagram



- NOTES:
1. TERMINAL BOARD SCHEMATIC LAYOUT DOES NOT MATCH ACTUAL TERMINAL BOARD.
  2. ENSURE DESIGNATED JUMPERS ON TERMINAL BOARD ARE CUT WHEN ADDING SMOKE DETECTORS, PHASE LOSS RELAY, OCCUPANCY AND REMOTE SHUTDOWN.
  3. FOR GAS HEAT CONTROL DO NOT CUT JUMPER 2.
  4. FOR GAS HEAT CONTROL DO NOT CUT JUMPER 3.
  5. FOR ENTHALPY SENSOR CONNECTION, DISCONNECT GREY WIRE(S) FROM PLUG HARNESS AND CONNECT AS SHOWN.

Fig. 28 — 48LC 07 RTU Open Control Wiring Diagram

6 TON YAC TIER 3  
RTU CONTROL  
208/230, 460, 575V  
48LC000141 C



6 TON YAC T  
PIC CONTROL  
208/230, 460

- NOTES:  
1. LOW VOLTAGE CONNECTIONS MUST BE  
2. USB-WITHIN J7 AND J10 USE  
3. ARE SHOWN FOR FUTURE USE.

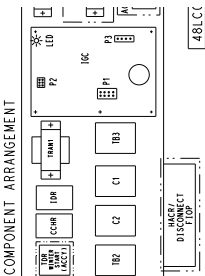


Fig. 29 — 48LC 07 SystemVu™ Control Wiring Diagram



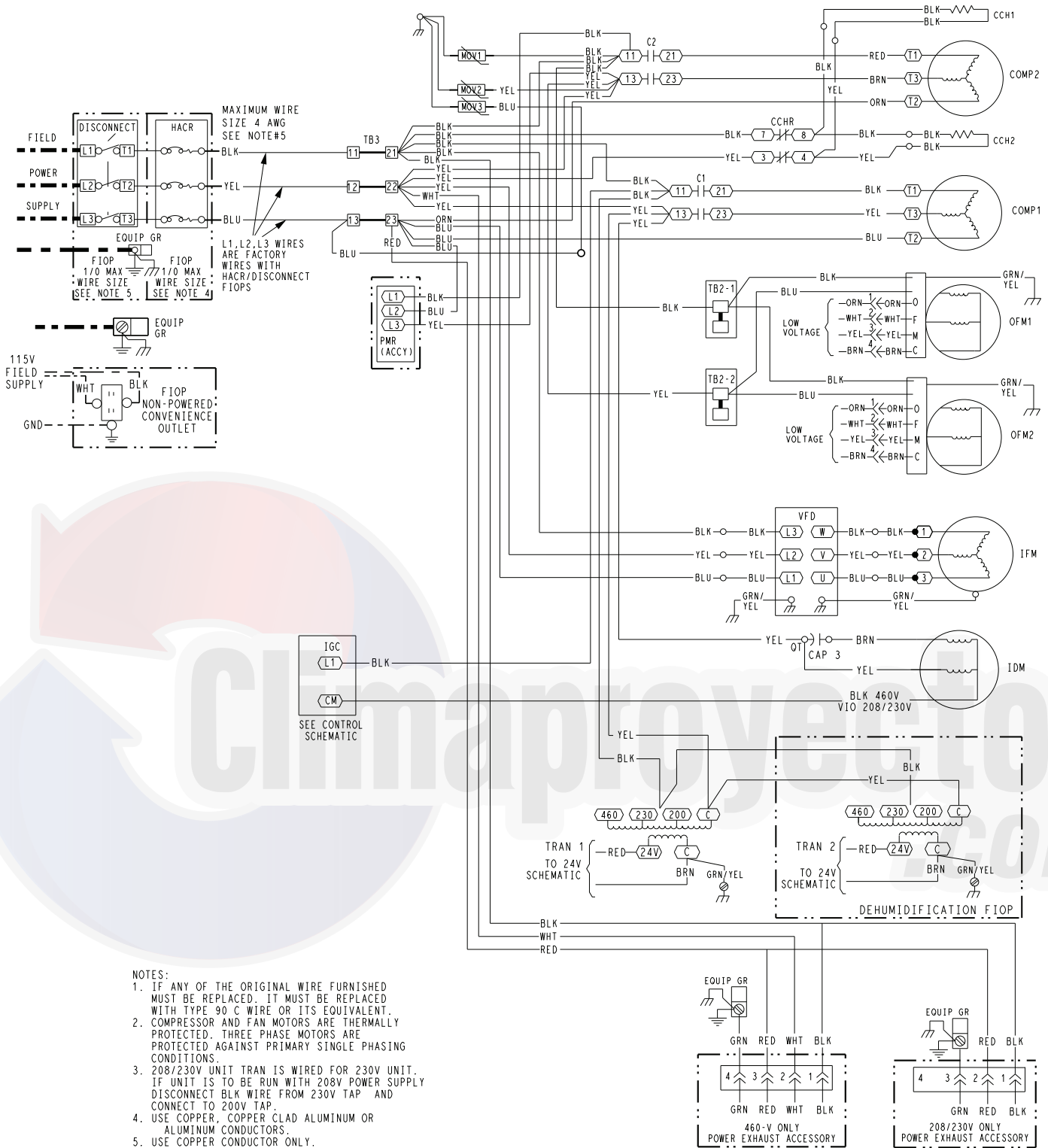
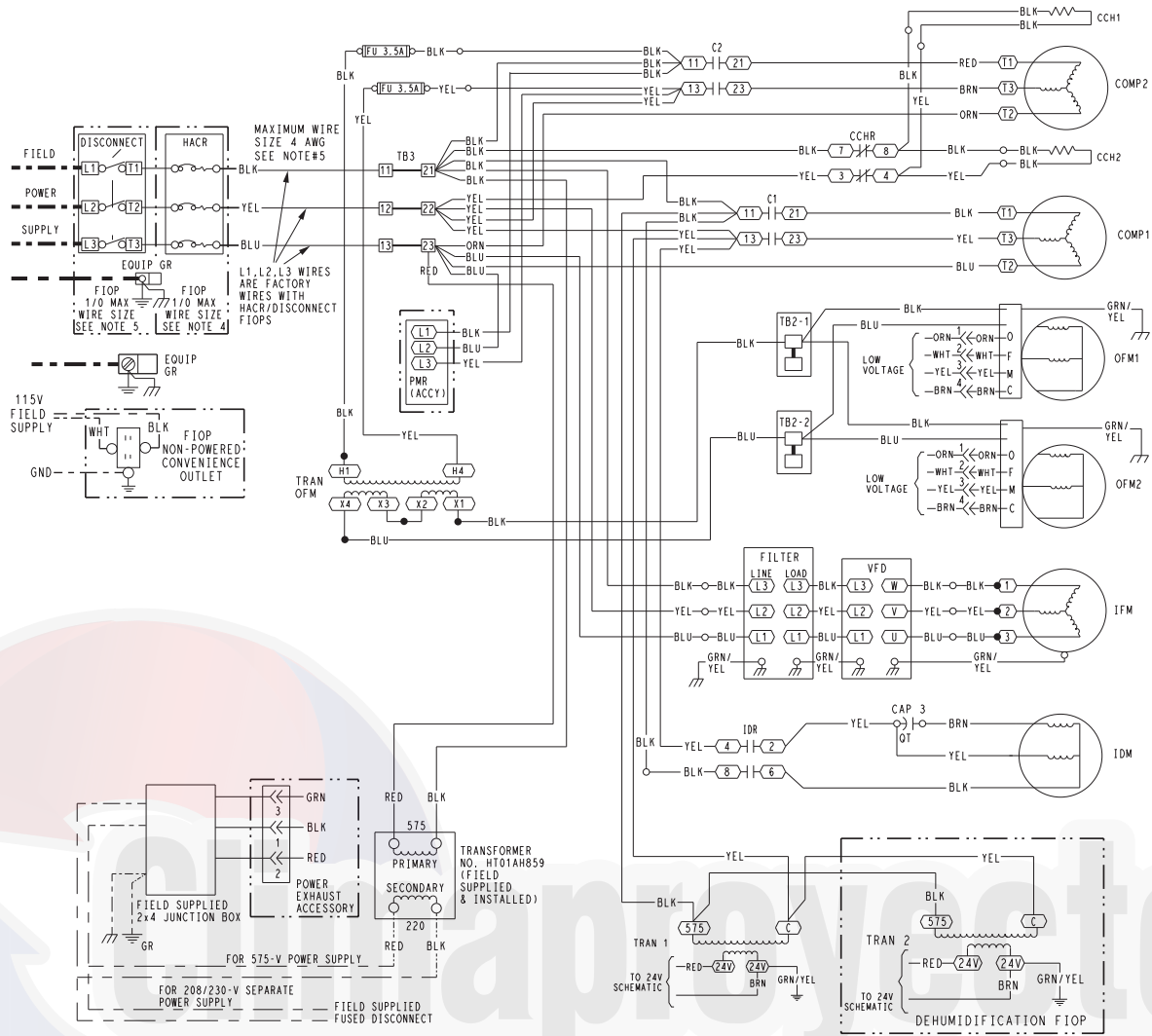


Fig. 30 — 48LC 07 Power Wiring Diagram, Electro-mechanical and RTU Open Controls (208/230v and 460v Units)

YAC POWER TIER3 - 6 TON 208/230, 460V 3Ø  
48LC500463 E



NOTES:

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. TRAN IS WIRED FOR 575V UNIT.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.

YAC POWER TIER3 - 6 TON 575V 3Ø

48LC500464 B

**Fig. 31 — 48LC 07 Power Wiring Diagram, Electro-mechanical and RTU Open Controls (575v Units)**

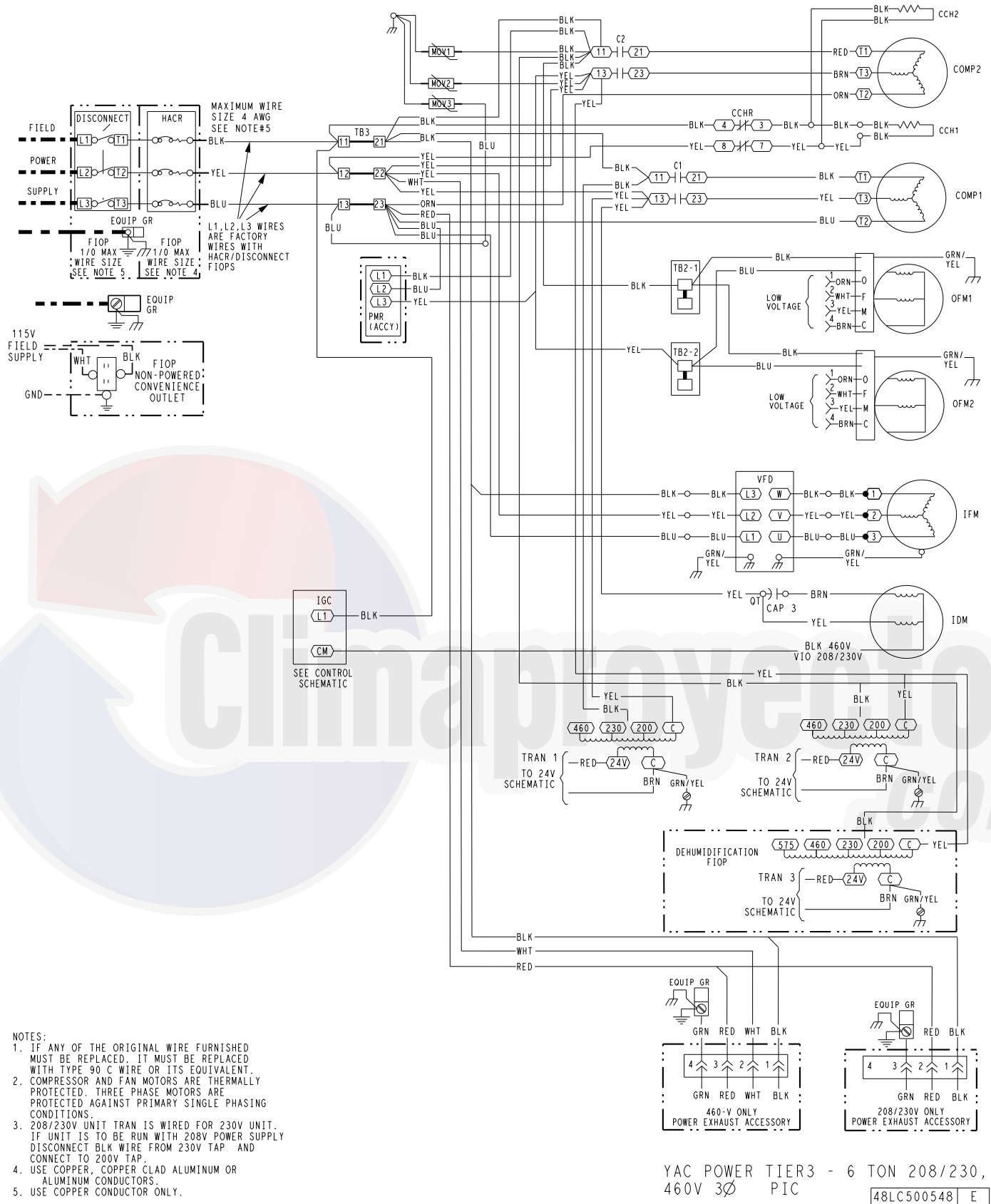
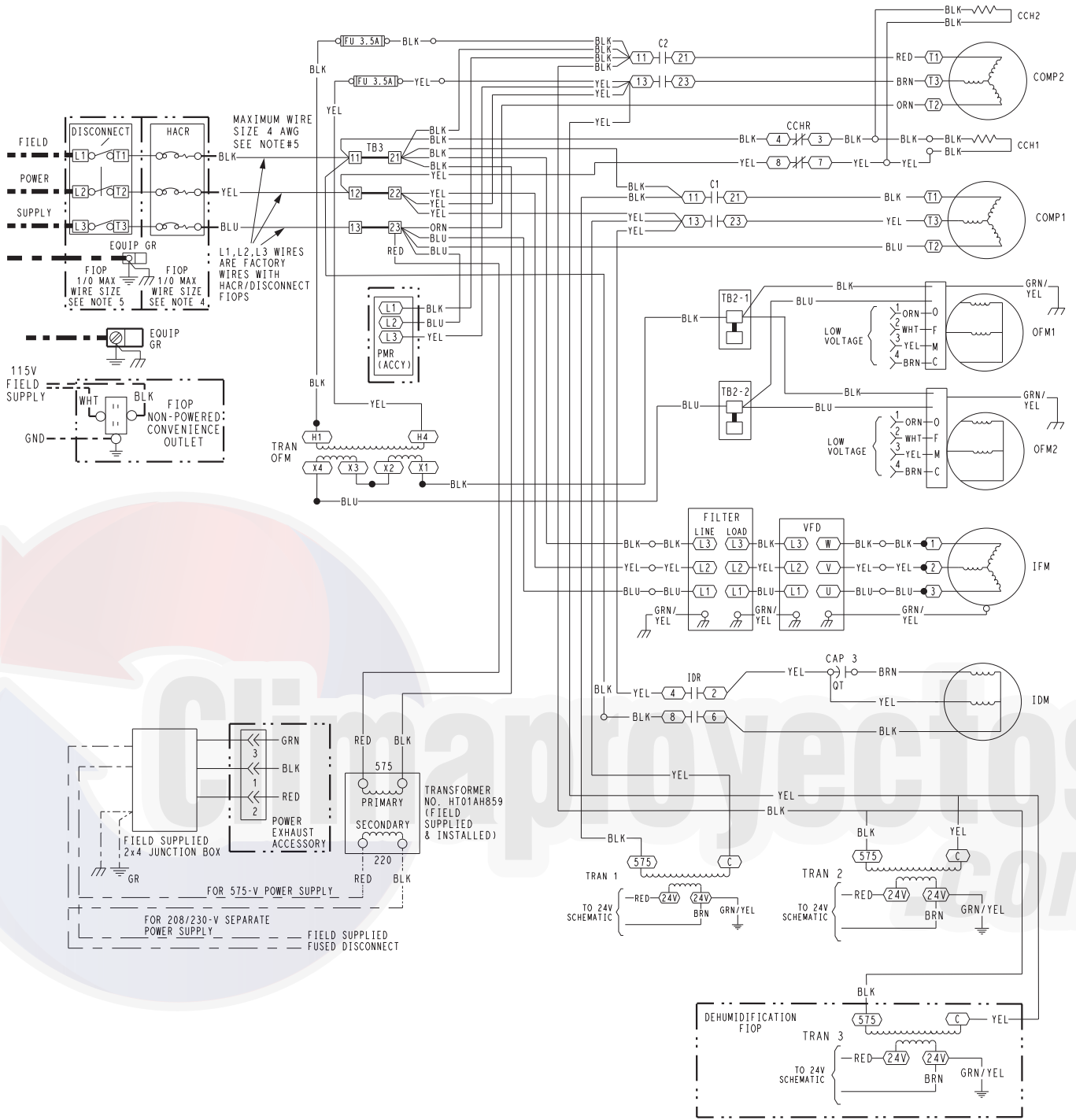


Fig. 32 — 48LC 07 Power Wiring Diagram, SystemVu™ Control (208/230v and 460v Units)



NOTES:

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. TRAN IS WIRED FOR 575V UNIT.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.

YAC POWER TIER3 - 6 TON 575V 3Ø  
 PIC  
 48LC500549 C

Fig. 33 — 48LC 07 Power Wiring Diagram, SystemVu™ Control (575v Units)

## UNITS WITH FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR

The factory-installed optional non-fused disconnect (NFD) or HACR switch is located in a weatherproof enclosure located under the main control box. The manual switch handle and shaft is shipped in the disconnect or HACR enclosure. Assemble the shaft and handle to the switch at this point. Discard the factory test leads (see Fig. 25). Connect field power supply conductors to LINE side terminals when the switch enclosure cover is removed to attach the handle.

### Field-Install the NFD Shaft and Handle

1. Remove the Control Box access panel. The NFD enclosure is located below the Control Box (see Fig. 34).
2. Remove (3) cap head screws that secure the NFD enclosure front cover — (2) on the face of the cover and (1) on the left side cover. See Fig. 35.
3. Remove the front cover of the NFD enclosure.
4. Make sure the NFD shipped from the factory is at OFF position (the arrow on the black handle knob is at OFF).
5. Insert the shaft with the cross pin on the top of the shaft in the horizontal position. See Fig. 35.
6. Measure from the tip of the shaft to the top surface of the black pointer; the measurement should be 3.75 to 3.88 in. (95 to 99 mm).
7. Tighten the locking screw to secure the shaft to the NFD.
8. Turn the handle to the OFF position with red arrow pointing at OFF.
9. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
10. Secure the handle to the painted cover with (2) screws and lock washers supplied.
11. Engaging the shaft into the handle socket, re-install (3) cap head screws on the NFD enclosure.
12. Re-install the unit front panel.

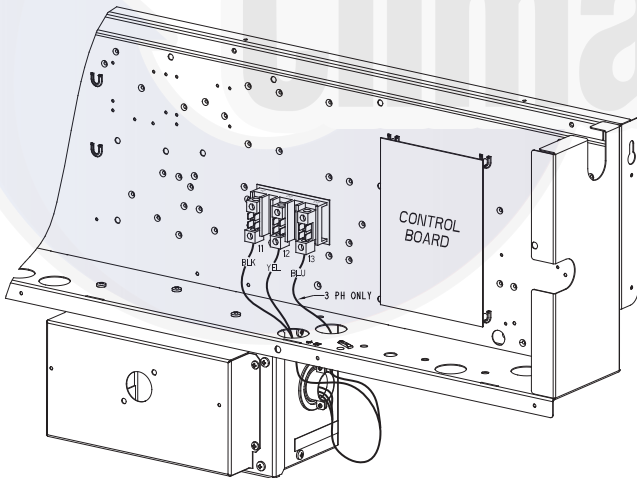


Fig. 34 — NFD Enclosure Location

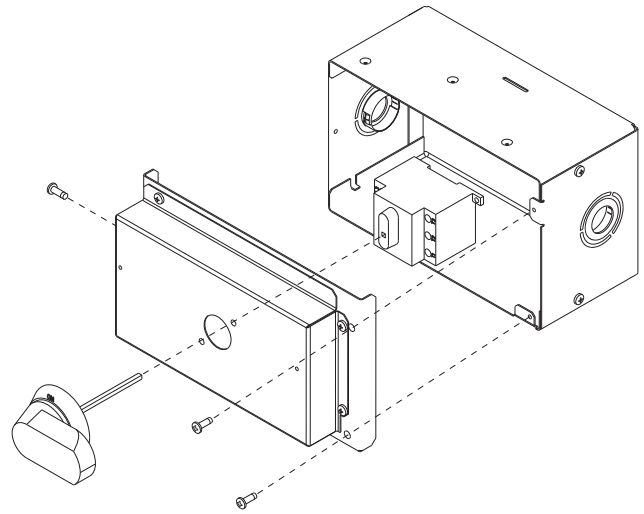


Fig. 35 — NFD Handle and Shaft Assembly

### Field-Install the HACR Shaft and Handle

1. Remove the Control Box access panel. The HACR enclosure is located below the Control Box (see Fig. 36).
2. Remove (3) cap head screws that secure the HACR enclosure — (2) on the face of the cover and (1) on the left side cover. See Fig. 37.
3. Remove the front cover of the HACR enclosure.
4. Make sure the HACR shipped from the factory is at OFF position (the white arrow pointing at OFF).
5. Insert the shaft all the way with the cross pin on the top of the shaft in the horizontal position. See Fig. 37.
6. Tighten the locking screw to secure the shaft to the HACR.
7. Turn the handle to the OFF position with red arrow pointing at OFF.
8. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
9. Secure the handle to the painted cover with (2) screws and lock washers supplied.
10. Engaging the shaft into the handle socket, re-install (3) cap head screws on the HACR enclosure.
11. Re-install the unit front panel.

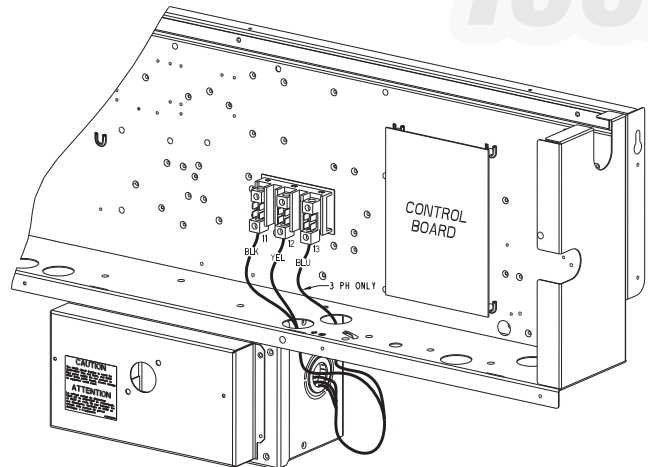
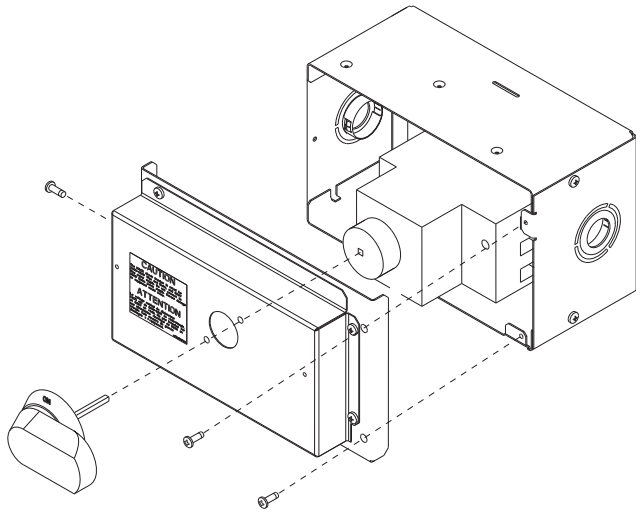


Fig. 36 — HACR Enclosure Location





**Fig. 37 — HACR Handle and Shaft Assembly**

**UNITS WITHOUT FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR**

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

**ALL UNITS**

All field wiring must comply with NEC and all local codes. Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 25 and unit label diagram for power wiring connections to the unit and equipment ground. Maximum wire size is #4 ga AWG (copper only) per pole on contactors and #2 ga AWG (copper only) per pole on optional non-fused disconnect or HACR.

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

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

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

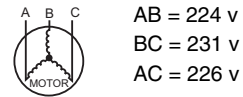
All units except 208/230-v units are factory wired for the voltage shown on the nameplate. *If the 208/230-v unit is to be connected to a 208-v power supply, the control transformer must be rewired by moving the black wire with the 1/4-in. female spade connector from the 230-v connection and moving it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

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

% Voltage Imbalance:

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 230-3-60



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

Determine maximum deviation from average voltage.

(AB) 227-224 = 3 v

(BC) 231-227 = 4 v

(AC) 227-226 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

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

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

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

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

**CONVENIENCE OUTLETS**

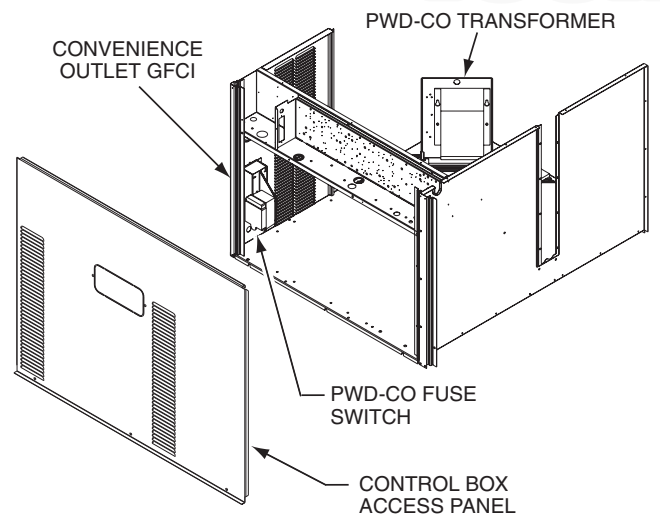
**⚠ WARNING**

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



**Fig. 38 — 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

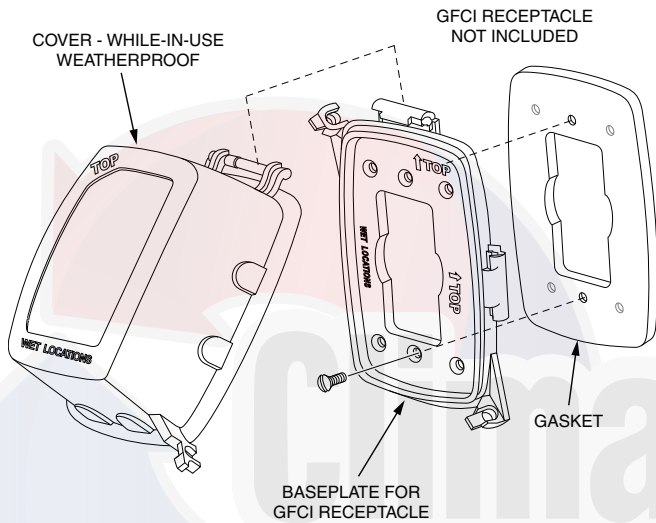
installed at unit installation. For shipment, the convenience outlet is covered with a blank cover plate.

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 CONVE-NIENCE OUTLET. LOCK-OUT AND TAG-OUT ALL POWER.**

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

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

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



**Fig. 39 — Weatherproof Cover Installation**

**Non-powered type**

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

**Unit-powered type**

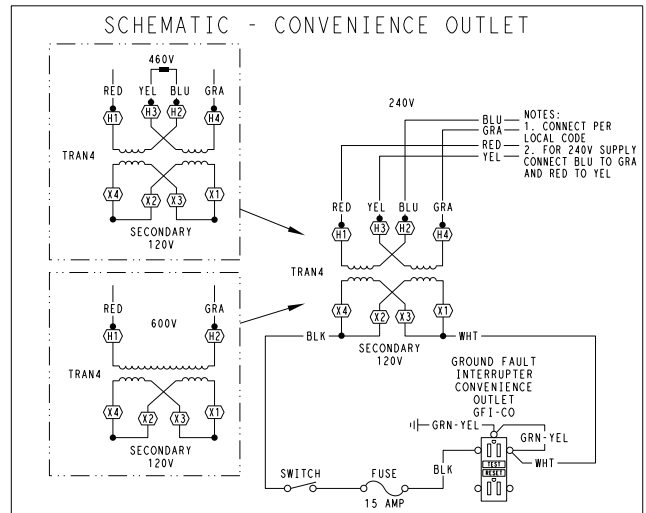
A unit-mounted transformer is factory-installed to stepdown the main power supply voltage to the unit to 115-v at the duplex receptacle. This option also includes a manual switch with fuse, located in a utility box and mounted on a bracket behind the convenience outlet; access is through the unit's control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

The primary leads to the convenience outlet transformer are not factory-connected. Selection of primary power source is a customer option. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect or HACR breaker switch; this will provide service power to the unit when the unit disconnect switch or HACR switch is open. Other connection methods will result in the convenience outlet circuit being de-energized when the unit disconnect or HACR switch is open. See Fig. 40.

**Using unit-mounted convenience outlets**

Units with unit-mounted convenience outlet circuits will often require that two disconnects be opened to de-energize all power to the unit. Treat all units as electrically energized until the convenience outlet power is also checked and de-energization

is confirmed. Observe National Electrical Code Article 210, Branch Circuits, for use of convenience outlets.



UNIT VOLTAGE	CONNECT AS	PRIMARY CONNECTIONS	TRANSFORMER TERMINALS
208, 230	240	L1: RED +YEL L2: BLU + GRA	H1 + H3 H2 + H4
460	480	L1: RED Splice BLU + YEL L2: GRA	H1 H2 + H3 H4
575	600	L1: RED L2: GRA	H1 H2

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

**Fuse on power type**

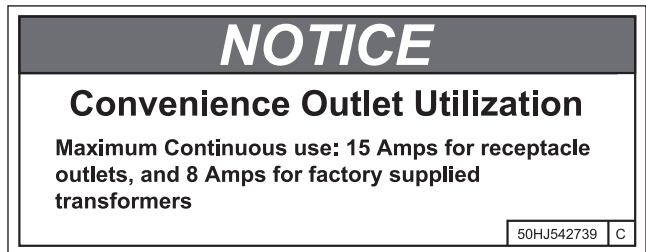
The factory fuse is a Bussman<sup>1</sup> “Fusetron” T-15, non-renewable screw-in (Edison base) type plug fuse.

**Duty Cycle**

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

**Convenience outlet usage rating**

See Fig. 41.



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

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

**HACR**

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

1. Bussman and Fusetron are trademarks of Cooper Technologies Company.

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

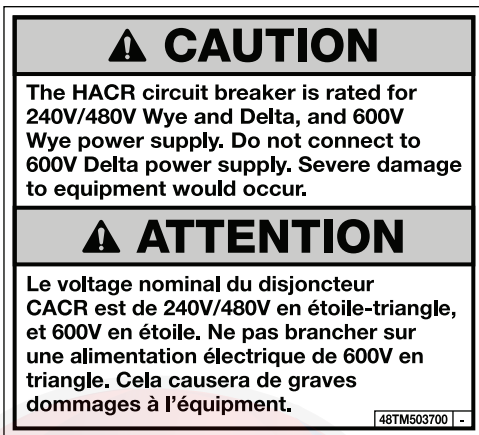


Fig. 42 — HACR Caution Label

#### FACTORY-OPTION THRU-BASE CONNECTIONS (ELECTRICAL CONNECTIONS)

This service connection kit consists of a 1/2-in. electrical bulkhead connector and a 1 1/4-in. electrical bulkhead connector, all factory-installed in the embossed (raised) section of the unit basepan in the condenser section. The 1/2-in. bulkhead connector enables the low-voltage control wires to pass through the basepan. The 1 1/4-in. electrical bulkhead connector allows the high-voltage power wires to pass through the basepan. See Fig. 17.

Check tightness of connector lock nuts before connecting electrical conduits.

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

#### UNITS WITHOUT THRU-BASE CONNECTIONS

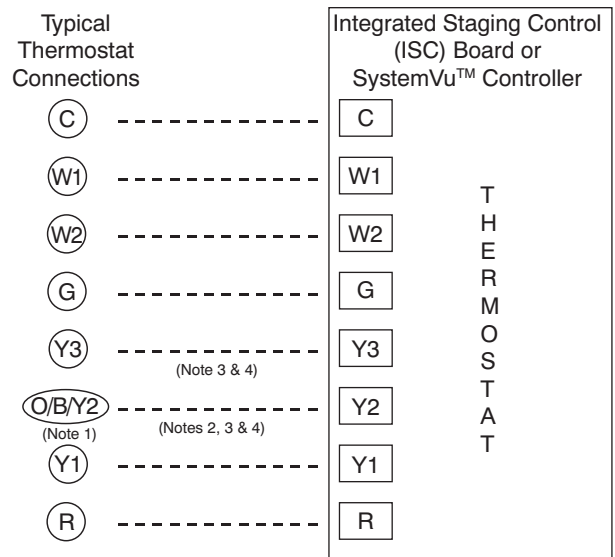
1. Install power wiring conduit through side panel openings. Install conduit between disconnect and control box.
2. Install power lines to terminal connections as shown in Fig. 25.

#### FIELD CONTROL WIRING

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

#### THERMOSTAT

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



- Note 1: Typical multi-function marking. Follow manufacturer's configuration instructions to select Y2.
- Note 2: Y2 to Y3 connection required for 2-stage cooling operation and when integrated economizer function is desired.
- Note 3: To Connect a 2-Stage Thermostat:  
Y2 to Y3 connection required for 2-stage cooling operation which provides low and high cooling states.
- Note 4: SystemVu controller is default configured for 3-stage cooling and 2-stage heating thermostats; it can be configured for other thermostat types.
- Field Wiring

Fig. 43 — Low-Voltage Connections

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 eight leads. If the thermostat does not require a 24-v source (no "C" connection required), use a thermostat cable or equivalent with minimum of seven leads. Check the thermostat installation instructions for additional features which might require additional conductors in the cable.

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

#### UNIT WITHOUT THRU-BASE CONNECTION KIT

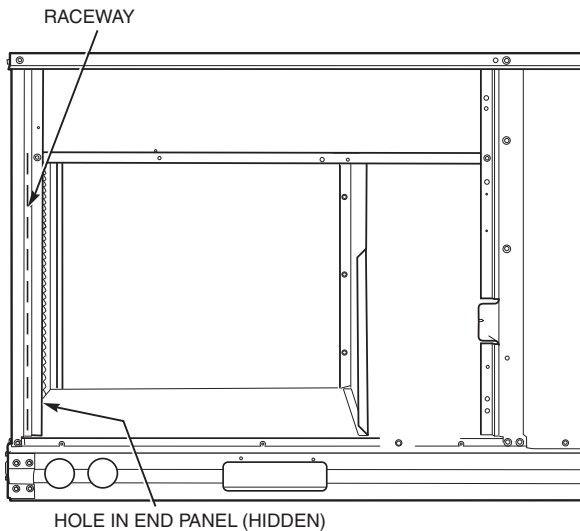
Pass the thermostat control wires through the hole provided in the corner post; then feed the wires through the raceway built into the corner post (see Fig. 44) to the control box. Pull the wires over to the terminal strip on the upper-left corner of the Controls Connection Board.

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

#### HEAT ANTICIPATOR SETTINGS

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





**Fig. 44 — Field Control Wiring Raceway**

### Humidi-MiZer® System Control Connections

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

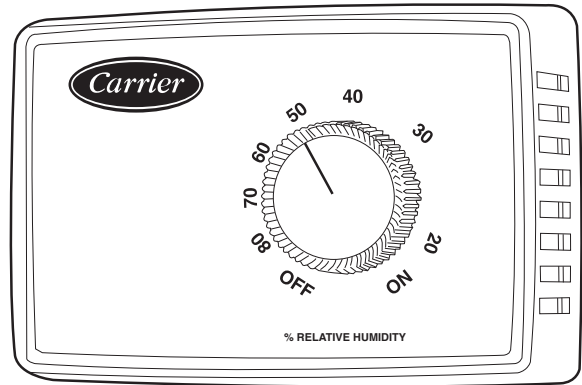
#### HUMIDI-MIZER SYSTEM – SPACE RH CONTROLLER

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

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

To connect the Carrier humidistat (HL38MG029) (Fig. 45):

1. Route the humidistat 2-conductor cable (field-supplied) through the hole provided in the unit corner post.
2. Feed wires through the raceway built into the corner post (see Fig. 44) to the 24-v barrier located on the left side of the control box. The raceway provides the UL-required clearance between high-voltage and low-voltage wiring.
3. Use wire nuts to connect humidistat cable to the leads in the low-voltage wiring (as shown in Fig. 46), connecting PNK to PNK and PNK/BLK to PNK/BLK.



**Fig. 45 — Accessory Field-Installed Humidistat**

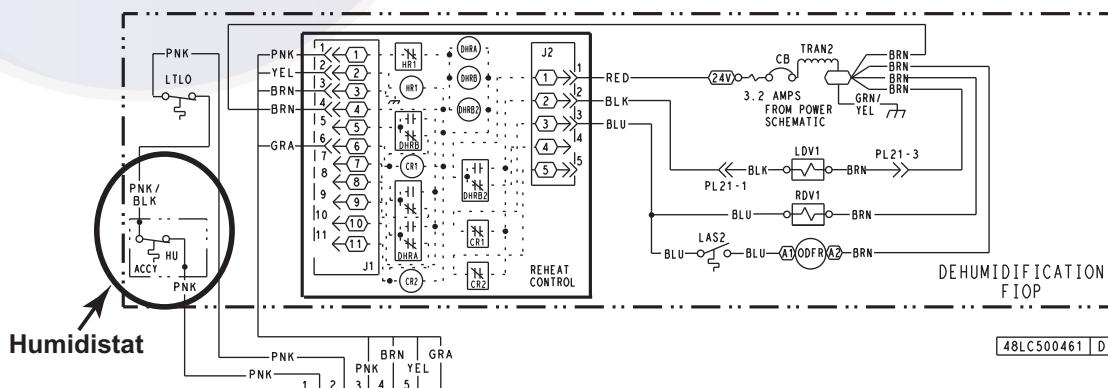
NOTE: 48LC\*\*07 units require a 3-stage cooling thermostat device and are not compatible with Carrier's Edge® Pro thermostat.

#### RTU Open Controller (Factory-Installed Option)

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

#### SystemVu Controller (Factory-Installed Option)

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



**Fig. 46 — Typical Humidi-MiZer Adaptive Dehumidification System Humidistat Wiring**

# Integrated Staging Control (ISC) Board

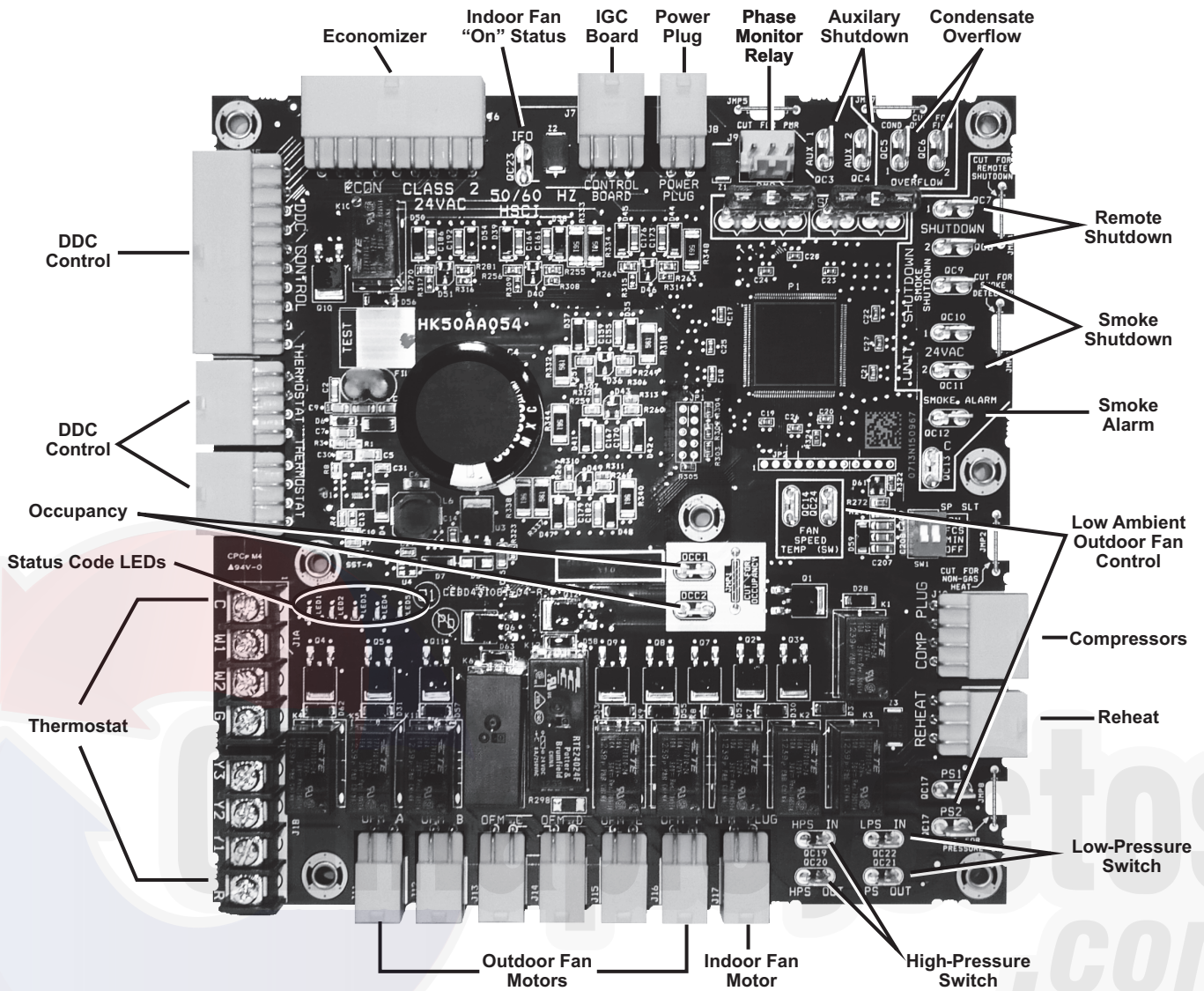


Fig. 47 — Integrated Staging Control (ISC) Board

Table 7 — Status Code Descriptions for ISC Board LEDs

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

NOTES:

1. Green LED Blinking at 1Hz indicates normal operation.
2. Solid red LED indicates an error exists, see above LED configuration.



## ISC BOARD - SEQUENCE OF OPERATION

### General

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

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

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

### Ventilation

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

### Cooling

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

INPUT	OUTPUT			
	COMPRESSOR C1	COMPRESSOR C2	INDOOR FAN SPEED	OUTDOOR FAN SPEED
First Stage Cooling (Y1)	On	Off	Low	Low (700 rpm)
Second Stage Cooling (Y2)	Off	On	Medium	Medium (800 rpm)
Third Stage Cooling (Y3)	On	On	High	High (1000 rpm)

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

### Humidi-MiZer® System (Optional)

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

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

At hot-gas-bypass reheating mode (reheat-2), when there is a call for dehumidification without a call for cooling, a portion of the hot

gas from the compressor bypasses the condenser coil when RDV opens and hot gas is fed into the liquid line, TWV closes in this mode and the system provides mainly latent cooling. Indoor airflow will rise until reaching 100% of Speed, Outdoor airflow will run at High speed as long as outdoor temperature is above 80°F (26.7°C); when operating in this mode below 80°F (26.7°C) OAT, the system outdoor fan will operate as shown in the table below.

48LC SIZE	RPM	NUMBER OF FANS ON	NUMBER OF FANS OFF
07	250	2	0

### Economizer (Optional)

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

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

If field-installed accessory CO<sub>2</sub> sensors are connected to the Economizer, a demand controlled ventilation strategy will begin to operate. As the CO<sub>2</sub> level in the zone increases above the CO<sub>2</sub> set-point, the minimum position of the damper will be increased proportionally. As the CO<sub>2</sub> level decreases because of the increase of fresh air, the outdoor-air damper will be proportionally closed. For economizer operation, there must be a thermostat call for the fan (G). If the unit is occupied and the fan is on, the damper will operate at minimum position. Otherwise, the damper will be closed.

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

In Low Ambient RTU conditions when the temperature is between 55°F (13°C) and 40°F (4°C), the Low Ambient Switch (LAS) will be active and the outdoor fans will run to the pre-set factory outdoor-fan speed. When the temperature is greater than 65°F (18°C), the Low Ambient Switch will deactivate and the outdoor fans will run in the standard cooling mode. If the Outdoor Fan Select Switch (see Fig. 46) is in the ON position, the outdoor fans will run in the Fan Cycle Speed Mode (FCS) set to 250 rpm. If the Outdoor Fan Select Switch is in the OFF position, the outdoor fans will run in the Minimum Fan Speed Mode (MIN) set to 160 rpm regardless of the cooling demand.

The 48LC size 07 units have a SPST normally open Low Ambient Switch (LAS) wired across the TS and OF terminal and a jumper placed across the PS terminal (see Fig. 47). When the LAS is active, the switch will close making contact to the OF terminal. This is done for units that require all outdoor fans to run at the same pre-set factory Low Ambient Speed. See Fig. 48 and 49.

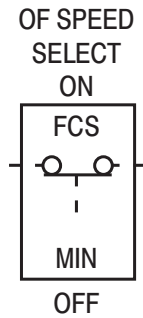


Fig. 48 — Outdoor Fan Speed Select Switch

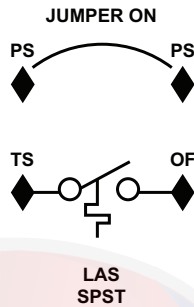


Fig. 49 — Schematic of SPST Low Ambient Switch

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

Table 8 — Low Ambient Temperature Outdoor Fan Controls

48LC SIZE	NO. OF FANS ON	NO. OF FANS OFF	SWITCH	OUTDOOR FAN SELECT SWITCH	RPM
07	2	0	SPST	Up	250

**Heating**

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

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

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

When W1 is turned OFF, the IGC board turns off the gas valve. The IGC board has a delay time before it turns IFO=OFF. At this time, the ISC board sees W1=OFF and IFO=ON. The ISC will keep the indoor fan ON high speed. Once the IGC board delay times out, the ISC board will see W1=OFF and IFO=OFF, which then turns the indoor fan OFF.

If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto, the indoor fan motor will continue to operate for an additional

45 seconds, then stop. If the over temperature limit opens after the indoor motor is stopped, but within 10 minutes of W1 becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan OFF delay will not change back to 45 seconds unless power is reset to the control. A LED indicator is provided on the IGC to monitor operation.

When additional heat is required, W2 closes and initiates power to the second stage of the main gas valve. When the thermostat is satisfied, the gas valve closes, interrupting the flow of gas to the main burners.

**EconoMiSer® X (Factory Option)**

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



Fig. 50 — W7220 Economizer Module

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

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

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

**SYSTEM COMPONENTS**

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

**Economizer Module**

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

**S-Bus Enthalpy Control Sensors**

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

### CO<sub>2</sub> Sensor (optional)

The CO<sub>2</sub> sensor can be added for Demand Controlled Ventilation (DCV).

### SPECIFICATIONS

#### W7220 Economizer Module

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

#### User Interface

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

#### Electrical

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

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

### INPUTS

#### Sensors

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

#### Dry Bulb Temperature (optional) and Mixed Air (required), 20k NTC

2-wire (18 to 22 AWG);

Temperature range -40°F to 150°F (-40°C to 66°C)

Temperature accuracy: 0°F/+2°F

#### Temperature and Humidity, C7400S1000 (optional)

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

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

Temperature accuracy: 0°F/+2°F (-18°C/-17°C)

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

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

#### 4 Binary Inputs

1-wire 24 vac + common GND (see page 33 for wiring details).

#### 24 vac power supply

20 to 30 vac 50/60Hz; 100 VA Class 2 transformer.

### OUTPUTS

#### Actuator Signal

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

### Exhaust fan, Y1, Y2 and AUX1 O

All Relay Outputs (at 30 vac):

Running: 1.5A maximum

Inrush: 7.5A maximum

### ENVIRONMENTAL

#### Operating Temperature

-40°F to 150°F (-40°C to 65°C).

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

#### Storage Temperature

-40°F to 150°F (-40°C to 65°C)

#### Shipping Temperature

-40°F to 150°F (-40°C to 65°C)

#### Relative Humidity

5% to 95% RH non-condensing

### ECONOMIZER MODULE WIRING DETAILS

Use Fig. 51 and Tables 9 and 10 to locate the wiring terminals for the Economizer module.

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

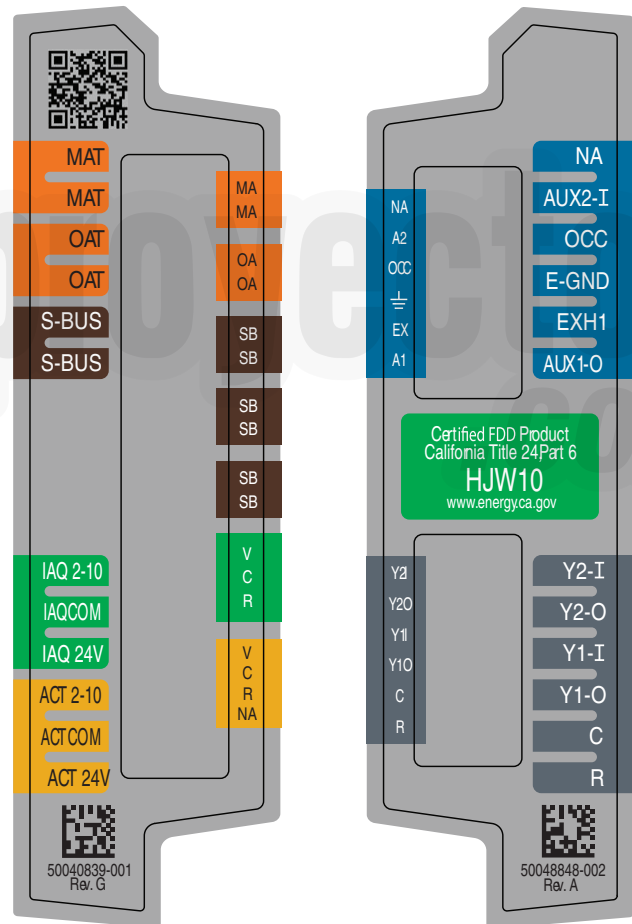


Fig. 51 — W7220 Wiring Terminals



**Table 9 — Economizer Module  
(Left Hand Terminal Blocks)**

LABEL	TYPE	DESCRIPTION
<b>Top Left Terminal Block</b>		
<b>MAT</b> <b>MAT</b>	20k NTC and COM	Mixed Air Temperature Sensor (Polarity Insensitive Connection)
<b>OAT</b> <b>OAT</b>	20k NTC and COM	Outdoor Air Temperature Sensor (Polarity Insensitive Connection)
<b>S-BUS</b> <b>S-BUS</b>	S-BUS (Sylk* Bus)	Enthalpy Control Sensor (Polarity Insensitive Connection)
<b>Bottom Left Terminal Block</b>		
<b>IAQ 2-10</b>	2-10 vdc	Air Quality Sensor Input (e.g. CO <sub>2</sub> sensor)
<b>IAQ COM</b>	COM	Air Quality Sensor Common
<b>IAQ 24V</b>	24 vac	Air Quality Sensor 24 vac Source
<b>ACT 2-10</b>	2-10 vdc	Damper Actuator Output (2-10 vdc)
<b>ACT COM</b>	COM	Damper Actuator Output Common
<b>ACT 24v</b>	24 vac	Damper Actuator 24 vac Source

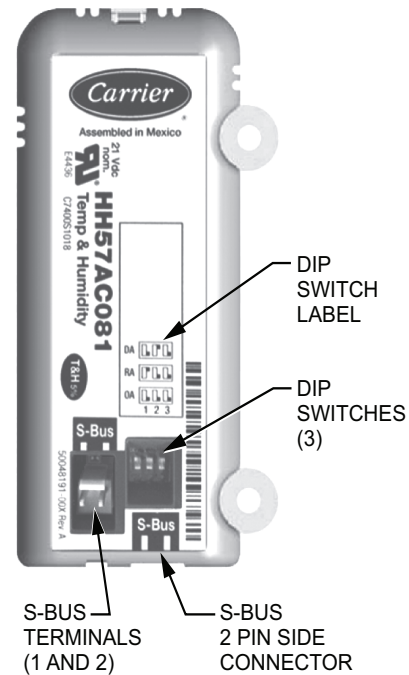
\*Sylk is a trademark of Honeywell International Inc.

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

LABEL	TYPE	DESCRIPTION
<b>Top Right Terminal Blocks</b>		
<b>AUX2 I</b>	24 vac IN	The first terminal is not used.
<b>OCC</b>	24 vac IN	Shut Down (SD) or HEAT (W) Conventional only and Heat Pump Changeover (O-B) in Heat Pump mode.
<b>E-GND</b>	E-GND	Occupied/Unoccupied Input
<b>EXH1</b>	24 vac OUT	Exhaust Fan 1 Output
<b>AUX1 O</b>	24 vac OUT	Programmable: Exhaust fan 2 output or ERV or System alarm output
<b>Bottom Right Terminal Blocks</b>		
<b>Y2-I</b>	24 vac IN	Y2 in - Cooling Stage 2 Input from space thermostat
<b>Y2-O</b>	24 vac OUT	Y2 out - Cooling Stage 2 Output to stage 2 mechanical cooling
<b>Y1-I</b>	24 vac IN	Y1 in - Cooling Stage 2 Input from space thermostat
<b>Y1-O</b>	24 vac OUT	Y1 out - Cooling Stage 2 Output to stage 2 mechanical cooling
<b>C</b>	COM	24 vac Common
<b>R</b>	24 vac	24 vac Power (hot)

**S-Bus Sensor Wiring**

The labels on the sensors and controller are color coded for ease of installation. Orange labeled sensors can only be wired to orange terminals on the controller. Brown labeled sensors can only be wired to S-bus (brown) terminals. Use Fig. 52 and Table 11 to locate the wiring terminals for each S-Bus and enthalpy control sensor.



**Fig. 52 — S-Bus Sensor DIP Switches**

**Table 11 — HH57AC081 Sensor Wiring Terminations**

NUMBER	TERMINAL		TYPE	DESCRIPTION
	NUMBER	LABEL		
1	S-BUS	S-BUS	S-BUS	S-BUS Communications (Enthalpy Control Sensor Bus)
2	S-BUS	S-BUS	S-BUS	S-BUS Communications (Enthalpy Control Sensor Bus)

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

**Table 12 — HH57AC081 Sensor DIP Switch**

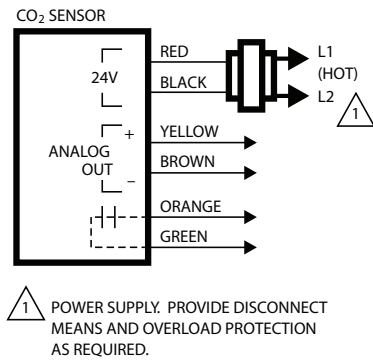
USE	DIP SWITCH POSITIONS FOR SWITCHES 1, 2, AND 3		
	1	2	3
<b>DA</b>	OFF	ON	OFF
<b>RA</b>	ON	OFF	OFF
<b>OA</b>	OFF	OFF	OFF

NOTE: When an S-Bus sensor is connected to an existing network, it will take 60 minutes for the network to recognize and auto-configure itself to use the new sensor.

During the 60-minute setup period, no alarms for sensor failures (except SAT) will be issued and no economizing function will be available.

**CO<sub>2</sub> Sensor Wiring**

When using a CO<sub>2</sub> sensor, the black and brown common wires are internally connected and only one is connected to “IAQ COM” on the W7220. Use the power from the W7220 to power the CO<sub>2</sub> sensor OR make sure the ground for the power supplies are common. See Fig. 53 for CO<sub>2</sub> sensor wiring.



**Fig. 53 — CO<sub>2</sub> Sensor Wiring**

**INTERFACE OVERVIEW**

This section describes how to use the EconoMiSer<sup>®</sup> user interface for:

- Keypad and menu navigation
- Settings and parameter changes
- Menu structure and selection

**User Interface**

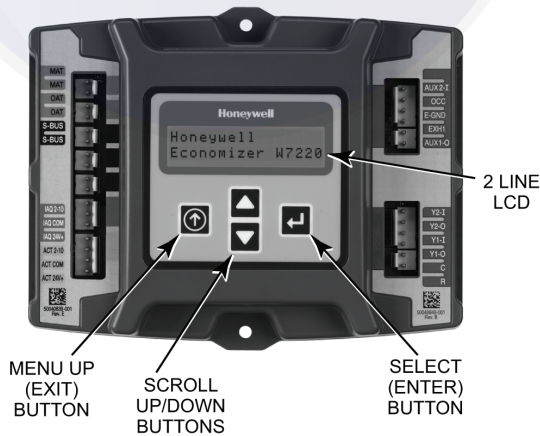
The user interface consists of a 2-line LCD display and a 4-button keypad on the front of the economizer controller.

**Keypad**

Use the four navigation buttons (see Fig. 54) to scroll through the menus and menu items, select menu items, and to change parameter and configuration settings.

To use the keypad when working with menus:

- Press the ▲ (Up arrow) button to move to the previous menu.
- Press the ▼ (Down arrow) button to move to the next menu.
- Press the ↵ (Enter) button to display the first item in the currently displayed menu.
- Press the ⏴ (Menu Up/Exit) button to exit a menu's item and return to the list of menus.



**Fig. 54 — W7220 Controller Navigation Buttons**

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

1. Navigate to the desired menu.
2. Press the ↵ (Enter) button to display the first item in the currently displayed menu.
3. Use the ▲ and ▼ buttons to scroll to the desired parameter.

4. Press the ↵ (Enter) button to display the value of the currently displayed item.
5. Press the ▲ button to increase (change) the displayed parameter value.
6. Press the ▼ button to decrease (change) the displayed parameter value.

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

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

**Menu Structure**

Table 13 illustrates the complete hierarchy of menus and parameters for the EconoMiSer<sup>®</sup> X system.

The Menus in display order are:

- STATUS
- SETPOINTS
- SYSTEM SETUP
- ADVANCED SETUP
- CHECKOUT
- ALARMS

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

**SETUP AND CONFIGURATION**

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

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

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

**Time-Out and Screensaver**

When no buttons have been pressed for 10 minutes, the LCD displays a screen saver, which cycles through the Status items. Each Status items displays in turn and cycles to the next item after 5 seconds.



**Table 13 — W7220 Menu Structure\***

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

**Table 13 — W7220 Menu Structure\* (cont)**

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
STATUS (cont)	EXH2 OUT	OFF	ON/OFF	EXHAUST STAGE 2 RELAY OUTPUT Output of AUX1 O terminal Displays ON when damper position reaches programmed percentage set point. ON = 24 vac output OFF = No output Displays only if AUX1 O = EXH2
	ERV	OFF	ON/OFF	ENERGY RECOVERY VENTILATOR Output of AUX1 O terminal; displays only if AUX1 O = ERV ON = 24 vac output OFF = No Output
	MECH COOL ON or HEAT STAGES ON	0	0, 1, or 2	Displays stage of mechanical cooling that is active. Displays the stage of heat pump heating that is active.
	FAN SPEED	N/A	LOW or HIGH	SUPPLY FAN SPEED Displays speed setting of fan on a 2-speed fan unit.
	W (HEAT IN)	N/A	ON/OFF	HEAT DEMAND STATUS Displays status of heat demand on a 2-speed fan unit.
SETPOINTS	MAT SET	53°F (12°C)	38°F to 70°F (3°C to 21°C); increment by 1 degree	SUPPLY AIR SETPOINT The economizer will modulate the OA damper to maintain the mixed air temperature at the set point
	LOW T LOCK	32°F (0°C)	-45°F to 80°F (-43°C to 27°C); increment by 1 degree	COMPRESSOR LOW TEMPERATURE LOCKOUT Set point determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout. At or below the set point, the Y1-O and Y2-O will not be energized on the controller.
	DRYBLB SET	63°F (17°C)	48°F to 80°F (9°C to 27°C); increment by 1 degree	OA DRY BULB TEMPERATURE CHANGEOVER SETPOINT <i>Dry bulb set point will only appear if using dry bulb changeover.</i> Set point determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.; at 63°F unit will economize at 62°F and below and not economize at 64°F and above. There is a 2°F deadband.
	ENTH CURVE	ES3	ES1,ES2,ES3,ES4, or ES5	ENTHALPY CHANGEOVER CURVE ES curve will only appear if using enthalpy changeover. Enthalpy boundary "curves" for economizing using single enthalpy. See page 43 for description of enthalpy curves.
	DCV SET	1100ppm	500 to 2000 ppm; increment by 100	DEMAND CONTROLLED VENTILATION Displays only if CO <sub>2</sub> sensor is connected. Set point for Demand Controlled Ventilation of space. Above the set point, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the set point.
	MIN POS	2.8 V	2 to 10 vdc	VENTILATION MINIMUM POSITION Displays ONLY if a CO <sub>2</sub> sensor is NOT connected. With 2-speed fan units, MIN POS L (low speed fan) and MIN POS H (high speed fan) settings are required. Default for MIN POS L is 3.2V and MIN POS H is 2.8V.
	VENTMAX	2.8 V	2 to 10 vdc	DCV MAXIMUM DAMPER POSITION Displays only if a CO <sub>2</sub> sensor is connected. Used for Vbz (ventilation max cfm) set point. VENTMAX is the same setting as MIN POS would be if unit did not have CO <sub>2</sub> sensor.
			100 to 9990 cfm; increment by 10	If OA, MA, RA, and CO <sub>2</sub> sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 CFM.
			2 to 10 vdc	With 2-speed fan units, VENTMAX L (low speed fan) and VENTMAX H (high speed fan) settings are required. Default for VENTMAX L is 3.2V and VENTMAX H is 2.8V
	VENTMIN	2.25 V	2 to 10 vdc or 100 to 9990 cfm increment by 10	DCV MINIMUM DAMPER POSITION Displays only if a CO <sub>2</sub> sensor is connected. Used for Va (ventilation min cfm) set point. This is the ventilation for less than maximum occupancy of the space.
100 to 9990 cfm; increment by 10			If OA, MA, RA, and CO <sub>2</sub> sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 CFM.	
2 to 10 vdc			With 2-speed fan units VENTMIN L (low speed fan) and VENTMIN H (high speed fan) settings are required. Default for VENTMIN L is 2.5V and VENTMIN H is 2.25V	
ERV OAT SP††	32°F (0°C)	0°F to 50°F (-18°C to 10°C); increment by 1 degree	ENERGY RECOVERY VENTILATOR UNIT OUTDOOR AIR TEMPERATURE SETPOINT Only when AUX1 O = ERV	

**Table 13 — W7220 Menu Structure\* (cont)**

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT	EXPANDED PARAMETER NAME Notes
SETPOINTS (cont)	EXH1 SET	50%	0 to 100%; increment by 1	EXHAUST FAN STAGE 1 SETPOINT Set point for OA damper position when exhaust fan 1 is powered by the economizer. With 2-speed fan units, Exh1 L (low speed fan) and Exh1 H (high speed fan) settings are required. Default for Exh1 L is 65% and Exh1 H is 50%
	EXH2 SET	75%	0 to 100%; increment by 1	EXHAUST FAN STAGE 2 SETPOINT Set point for OA damper position when exhaust fan 2 is powered by the economizer. Only used when AUX1 O is set to EHX2. With 2-speed fan units, Exh2 L (low speed fan) and Exh2 H (high speed fan) settings are required. Default for Exh2 L is 80% and Exh2 H is 75%
SYSTEM SETUP	INSTALL	01/01/10	N/A	Display order = MM/DD/YY Setting order = DD, MM, then YY.
	UNITS DEG	°F	°F or °C	Sets economizer controller in degrees Fahrenheit or Celsius
	EQUIPMENT	CONV	CONV or HP	CONV = conventional; HP O/B = Enable Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller.
	AUX2 IN	W	Shutdown (SD) Heat (W1) HP(O) HP(B)	In CONV mode: SD = Enables configuration of shutdown (default); W = Informs controller that system is in heating mode. NOTE: If using 2-speed fan mode, you must program CONV mode for W. Shutdown is not available in 2-speed fan mode. In HP O/B mode: HP(O) = energize heat pump on Cool (default); HP(B) = energize heat pump on heat.
	FAN SPEED	2 speed	1 speed/2 speed	Sets the economizer controller for operation of 1 speed or 2 speed supply fan. The controller does not control the fan, but positions the OA and RA dampers to heating or cooling mode. NOTE: 2-speed fan option also needs Heat (W1) programmed in AUX 2 In.
	FAN CFM	5000 cfm	100 to 15000 cfm; increment by 100	UNIT DESIGN AIRFLOW (CFM) Enter only if using DCVCL ENA = AUTO This is the capacity of the RTU. The value is found on the nameplate label for the specific unit.
	AUX1 OUT	NONE	NONE ERV EXH2 SYS	Select OUTPUT for AUX1 O relay • NONE = not configured (output is not used) • ERV = Energy Recovery Ventilator†† • EXH2 = second damper position 24 vac out for second exhaust fan • SYS = use output as an alarm signal
	OCC	INPUT	INPUT or ALWAYS	OCCUPIED MODE BY EXTERNAL SIGNAL When using a setback thermostat with occupancy out (24 vac), the 24 vac is input "INPUT" to the OCC terminal. If no occupancy output from the thermostat, then change program to "ALWAYS" OR add a jumper from terminal R to OCC terminal.
	FACTORY DEFAULT	NO	NO or YES	Resets all set points to factory defaults when set to YES. LCD will briefly flash YES and change to NO but all parameters will change to the factory default values.
ADVANCED SETUP	MA LO SET	45°F (7°C)	35°F to 65°F (2°C to 18°C); Increment by 1 degree	SUPPLY AIR TEMPERATURE LOW LIMIT Temperature to activate Freeze Protection (close damper or modulate to MIN POS if temp falls below set value).
	FREEZE POS	CLO	CLO or MIN	FREEZE PROTECTION DAMPER POSITION Damper position when freeze protection is active (closed or MIN POS).
	CO2 ZERO	0ppm	0 to 500 ppm; Increment by 10	CO <sub>2</sub> ppm level to match CO <sub>2</sub> sensor start level.
	CO2 SPAN	2000ppm	1000 to 3000 ppm; Increment by 50	CO <sub>2</sub> ppm span to match CO <sub>2</sub> sensor, e.g.: 500-1500 sensor output would be 500 CO <sub>2</sub> zero and 1000 CO <sub>2</sub> span.
	STG3 DLY	2.0h	0 min, 5 min, 15 min, then 15 min intervals. Up to 4 hrs or OFF	COOLING STAGE 3 DELAY Delay after stage 2 cool has been active. Turns on second stage of cooling when economizer is first stage call and mechanical cooling is second stage call. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling
	SD DMPR POS	CLO	CLO or OPN	Indicates shutdown signal from space thermostat or unitary controller. When controller receives 24 vac input on the SD terminal in conventional mode, the OA damper will open if programmed for OPN and OA damper will close if programmed for CLO. All other controls, e.g., fans, etc. will shut off.
	DA LO ALM	45°F (7°C)	NONE 35°F to 65°F (2°C to 18°C); Increment by 5°F	Used for alarm for when the DA air temperature is too low. Set lower range of alarm, below this temperature the alarm will show on the display.

**Table 13 — W7220 Menu Structure\* (cont)**

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
ADVANCED SETUP (cont)	DA HI ALM	80°F (27°C)	NONE 70°F to 180°F (21°C to 82°C); Increment by 5°F	Used for alarm for when the DA air temperature is too high. Sets upper range of alarm; above this temperature, the alarm will show on the display.
	DCVCAL ENA	MAN	MAN (manual) AUTO	Turns on the DCV automatic control of the dampers. Resets ventilation based on the RA, OA, and MA sensor conditions. Requires all (RA, OA, MA, CO <sub>2</sub> ) sensors. This operation is not operable with a 2-speed fan unit.
	MAT T CAL	0.0°F	± 2.5°F	SUPPLY AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	OAS T CAL	0.0°F	± 2.5°F	OUTSIDE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	OA H CAL	0% RH	±10% RH	OUTSIDE AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor.
	RA T CAL	0.0°F	± 2.5°F	RETURN AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	RA H CAL	0% RH	±10% RH	RETURN AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor.
	DA T CAL	0.0°F	± 2.5°F	DISCHARGE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	2SP FAN DELAY	5 Minutes	0 to 20 minutes in 1 minute increments	TIME DELAY ON SECOND STAGE ECONOMIZING When in economizing mode, this is the delay for the high speed fan to try to satisfy the call for second stage cooling before the first stage mechanical cooling is enabled.
CHECKOUT***	DAMPER MINIMUM POSITION	N/A	N/A	The checkout for the damper minimum position is based on the system. See Table 14.
	DAMPER OPEN	N/A	N/A	Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure to pause in the mode to allow exhaust contacts to energize due to the delay in the system.
	DAMPER CLOSE	N/A	N/A	Positions damper to the fully closed position
	CONNECT Y1-O	N/A	N/A	Closes the Y1-O relay (Y1-O)
	CONNECT Y2-O	N/A	N/A	Closes the Y2-O relay (Y2-O)
	CONNECT AUX1-O	N/A	N/A	Energizes the AUX output. If Aux setting is: • NONE — no action taken • ERV — 24 vac out. Turns on or signals an ERV that the conditions are not good for economizing but are for ERV operation.†† • SYS — 24 vac out. Issues a system alarm
CONNECT EXH1	N/A	N/A	Closes the power exhaust fan 1 relay (EXH1)	
ALARMS	Alarms display only when they are active. The menu title "ALARMS(#)" includes the number of active alarms in parenthesis ( ). When using SYLK bus sensors, "SYLK" will appear on the screen, and when using 20k OA temperature sensors, "SENS T" will appear on the screen			
	MA T SENS ERR	N/A	N/A	SUPPLY AIR TEMPERATURE SENSOR ERROR Mixed air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	CO2 SENS ERR	N/A	N/A	CO <sub>2</sub> SENSOR ERROR CO <sub>2</sub> sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues.
	OA SYLK T ERR	N/A	N/A	OUTSIDE AIR S-BUS SENSOR ERROR Outdoor air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	OA SYLK H ERR	N/A	N/A	OUTSIDE AIR S-BUS SENSOR ERROR Outdoor air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	RA SYLK T ERR	N/A	N/A	RETURN AIR S-BUS SENSOR ERROR Return air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	RA SYLK H ERR	N/A	N/A	RETURN AIR S-BUS SENSOR ERROR Return air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	DA SYLK T ERR	N/A	N/A	DISCHARGE AIR S-BUS SENSOR ERROR Discharge air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	OA SENS T ERR	N/A	N/A	OUTSIDE AIR TEMPERATURE SENSOR ERROR Outdoor air temperature sensor has failed or become disconnected - check wiring, then replace if the alarm continues.
ACT ERROR	N/A	N/A	ACTUATOR ERROR Actuator has failed or become disconnected - check for stall, over voltage, under voltage and actuator count. Replace actuator if damper is movable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu.	

**Table 13 — W7220 Menu Structure\* (cont)**

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

**LEGEND**

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

**NOTES:**

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

\* Table 13 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration. For example, if you do not have a DCV (CO<sub>2</sub>) sensor, then none of the DCV parameters appear.

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

\*\* N/A = Not Applicable.

†† ERV Operation: When in cooling mode AND the conditions are NOT OK for economizing - the ERV terminal will be energized. In the Heating mode, the ERV terminal will be energized when the OA is below the ERV OAT set point in the set point menu.

\*\*\* After 10 minutes without a command or mode change, the controller will change to normal operation.

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

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

DEMAND CONTROLLED VENTILATION (CO <sub>2</sub> SENSOR)	FAN SPEED	SETPOINTS	CHECKOUT
<b>NO</b>	1	MIN POS	VMAX-HS
		N/A	N/A
	2	MIN POS H	VMAX-HS
		MIN POS L	VMAX-LS
<b>YES</b>	1	VENT MIN	VMAX-HS
		VENT MAX	VMAX-HS
	2	VENT MIN H	VMAX-HS
		VENT MAX H	VMAX-LS
		VENT MIN L	N/A
		VENT MAX L	N/A



**Table 15 — Dry Bulb Operation without DCV (CO<sub>2</sub> Sensor) — 1 Speed Fan**

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
NONE	No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
		On	On	High	24-v/On	24-v/On	MIN POS	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	MIN POS to Full-Open	Closed to Full-Open

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

**Table 16 — Dry Bulb Operation with DCV (CO<sub>2</sub> Sensor) — 1 Speed Fan**

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
Below CO <sub>2</sub> set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	VENTMIN to Full-Open	Closed to Full-Open
Above CO <sub>2</sub> set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN to VENTMAX	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	VENTMIN to Full-Open	Closed to Full-Open

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

**Table 17 — Enthalpy Operation without DCV (CO<sub>2</sub> Sensor) — 1 Speed Fan**

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
NONE	No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
		On	On	High	24-v/On	24-v/On	MIN POS	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	MIN POS to Full-Open	Closed to Full-Open

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

**Table 18 — Enthalpy Operation with DCV (CO<sub>2</sub> Sensor) — 1 Speed Fan**

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
Below CO <sub>2</sub> set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off†	VENTMIN to Full-Open	Closed to Full-Open
Above CO <sub>2</sub> set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H to VENTMAX	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	DELAY* 24-v/On	0-v/Off†	VENTMIN to Full-Open	Closed to Full-Open

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

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

**Table 19 — Dry Bulb Operation without DCV (CO<sub>2</sub> Sensor) — 2 Speed Fan**

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

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

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

**Table 20 — Dry Bulb Operation with DCV (CO<sub>2</sub> Sensor) — 2 Speed Fan**

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
Below CO <sub>2</sub> Set	No	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN	Closed
		ON	OFF	LOW	24v/On	0v/Off	VENTMIN	Closed
		ON	ON	HIGH	24v/On	24v/On	VENTMIN	Closed
	Yes	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN	Closed
		ON	OFF	LOW	0v/Off	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
		ON	ON	HIGH	24v/On	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
Above CO <sub>2</sub> Set	No	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN to VENTMAX	Closed
		ON	OFF	LOW	24v/On	0v/Off	VENTMIN to VENTMAX	Closed
		ON	ON	HIGH	24v/On	24v/On	VENTMIN to VENTMAX	Closed
	Yes	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN to VENTMAX	Closed
		ON	OFF	LOW	0v/Off	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
		ON	ON	HIGH	DELAY* 24v/On	0v/Off†	VENTMIN to Full-Open	Closed to Full-Open

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

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

**Table 21 — Enthalpy Operation without DCV (CO<sub>2</sub> Sensor) — 2 Speed Fan**

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
NO CO <sub>2</sub> SENSOR	NO	OFF	OFF	LOW	0v/Off	0v/Off	MIN POS	Closed
		ON	OFF	LOW	24v/On	0v/Off	MIN POS	Closed
		ON	ON	HIGH	24v/On	24v/On	MIN POS	Closed
	YES	OFF	OFF	LOW	0v/Off	0v/Off	MIN POS	Closed
		ON	OFF	LOW	0v/Off	0v/Off	MIN POS to Full Open	Closed to Full-Open
		ON	ON	HIGH	DELAY* 24v/On	0v/Off†	MIN POS to Full Open	Closed to Full-Open

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

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

**Table 22 — Enthalpy Operation With DCV (CO<sub>2</sub> Sensor) — 2 Speed Fan**

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
Below CO <sub>2</sub> Set	No	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN	Closed
		ON	OFF	LOW	24v/On	0v/Off	VENTMIN	Closed
		ON	ON	HIGH	24v/On	24v/On	VENTMIN	Closed
	Yes	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN	Closed
		ON	OFF	LOW	0v/Off	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
		ON	ON	HIGH	24v/On	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
Above CO <sub>2</sub> Set	No	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN to VENTMAX	Closed
		ON	OFF	LOW	24v/On	0v/Off	VENTMIN to VENTMAX	Closed
		ON	ON	HIGH	24v/On	24v/On	VENTMIN to VENTMAX	Closed
	Yes	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN to VENTMAX	Closed
		ON	OFF	LOW	0v/Off	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
		ON	ON	HIGH	DELAY* 24v/On	0v/Off*	VENTMIN to Full-Open	Closed to Full-Open

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

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

**ENTHALPY SETTINGS**

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

Refer to Table 24 for ENTH CURVE set point values.

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

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

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

**TWO-SPEED FAN OPERATION**

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

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

**Table 23 — Fan Speed**

STATE	FAN SPEED
OCC	Low
Y1	Low
Y2	High
W	High

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

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

After the delay one of two actions will happen:

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

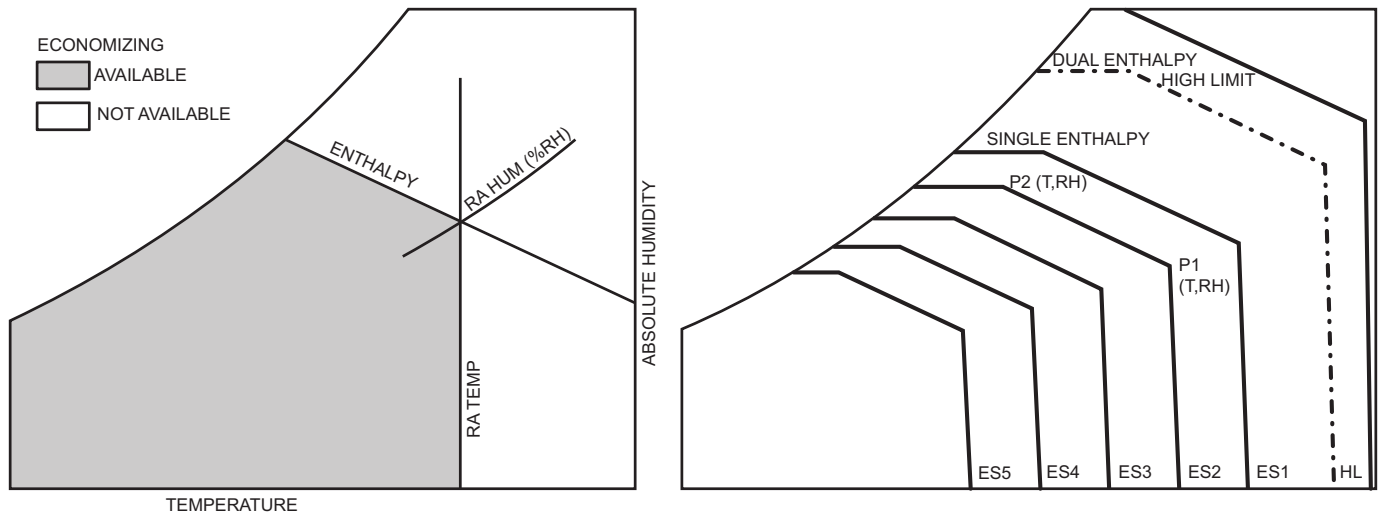


Fig. 55 — Single Enthalpy Curve Boundaries

Table 24 — Single Enthalpy and Dual Enthalpy High Limit Curves

ENTHALPY CURVE	TEMP. DRY BULB (F)	TEMP. DEWPOINT (F)	ENTHALPY (btu/lb/da)	POINT P1		POINT P2	
				TEMP. (F)	HUMIDITY (%RH)	TEMP. (F)	HUMIDITY (%RH)
ES1	80	60	28.0	80	36.8	66.3	80.1
ES2	75	57	26.0	75	39.6	63.3	80.0
ES3	70	54	24.0	70	42.3	59.7	81.4
ES4	65	51	22.0	65	44.8	55.7	84.2
ES5	60	48	20.0	60	46.9	51.3	88.5
HL	86	66	32.4	86	38.9	72.4	80.3

**CHECKOUT**

Inspect all wiring connections at the economizer module’s terminals, and verify compliance with the installation wiring diagrams. For checkout, review the Status of each configured parameter and perform the Checkout tests.

NOTE: For information about menu navigation and use of the keypad see Interface Overview on page 34.

**Power Up**

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

**Initial Menu Display**

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

**Power Loss (Outage or Brownout)**

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

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

**Status**

Use the Status menu (see Table 13) to check the parameter values for the various devices and sensors configured.

NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 34.

**Checkout Tests**

Use the Checkout menu (see page 38) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 34.

To perform a Checkout test:

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

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

**⚠ CAUTION**

**EQUIPMENT DAMAGE HAZARD**

Failure to follow this caution may result in equipment damage. Be sure to allow enough time for compressor start-up and shutdown between checkout tests so that you do not short-cycle the compressors.

**TROUBLESHOOTING**

**Alarms**

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

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

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






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

### Clearing Alarms

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

To clear an alarm, perform the following:

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

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

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

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

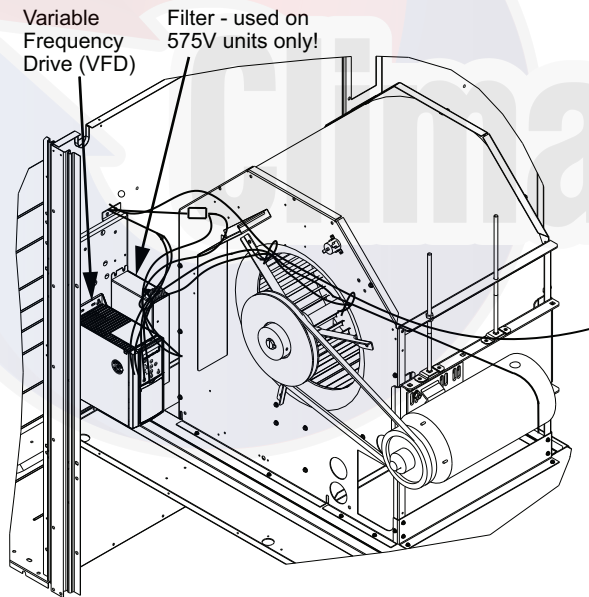


Fig. 56 — VFD Location

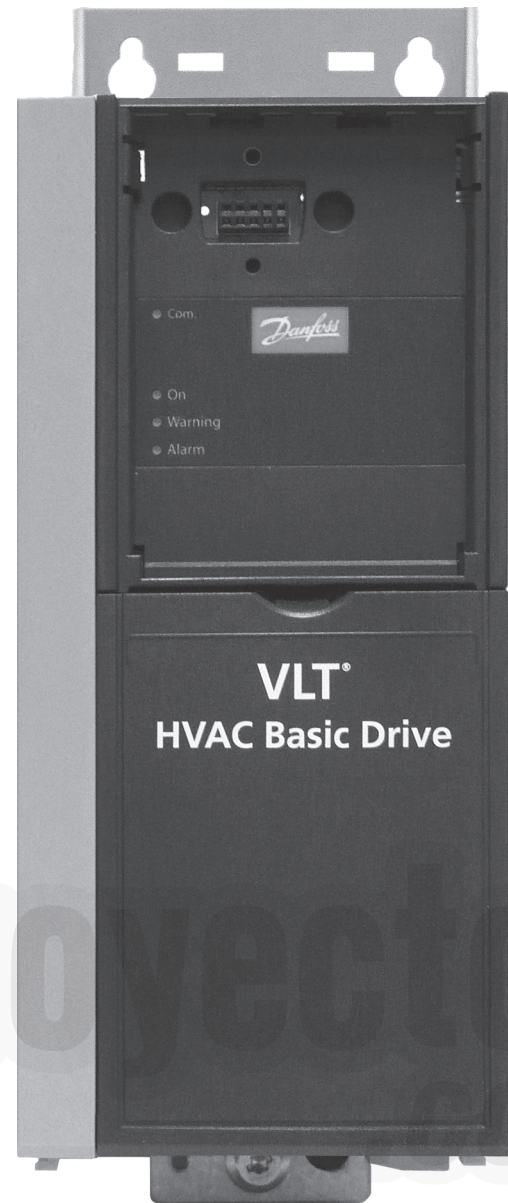
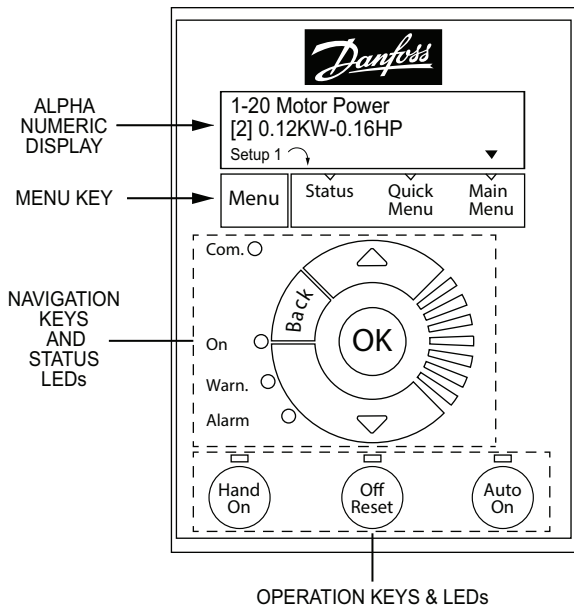


Fig. 57 — Variable Frequency Drive (VFD)  
Multi-Speed VFD Display Kit (Field-Installed Accessory)

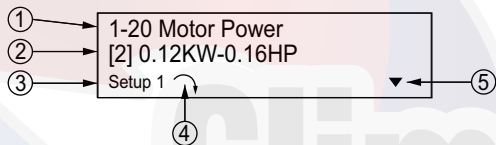
NOTE: The Remote VFD Keypad is part of the Multi-Speed VFD display kit (P/N: CRDISKIT002A00) which is a field-installed accessory. It is not included with the 48LC 07 base unit. The VFD keypad as shown in Fig. 58 consists of the following sections.



**Fig. 58 — VFD Keypad**

**ALPHA NUMERIC DISPLAY**

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



1	Parameter number and name.
2	Parameter value.
3	Setup number shows the active setup and the edit setup. If the same set-up acts as both the active and edit set-up, only that setup number is shown (factory setting). When the active and edit setup differ, both numbers are shown in the display (SETUP 12). The flashing number indicates the edit setup.
4	The symbol in the number 4 position in the figure above indicates motor direction. The arrow point either clockwise or counter-clockwise to show the motor's current direction.
5	The position of the triangle indicates the currently selected menu: Status, Quick Menu or Main Menu.

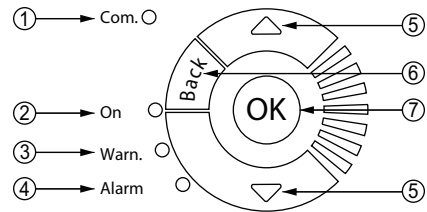
**Fig. 59 — LCD Alpha Numeric Display**

**MENU KEY**

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

**NAVIGATION KEYS AND STATUS LEDs**

The Navigation keys and Status LEDs are detailed in Fig. 60.

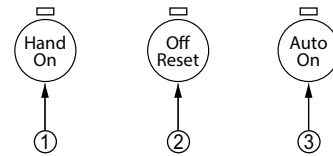


1	<b>Com. LED:</b> Flashes when bus communications is communicating.
2	<b>Green LED/On:</b> Control selection is working.
3	<b>Yellow LED/Warn.:</b> Indicates a warning.
4	<b>Flashing Red LED/Alarm:</b> Indicates an alarm.
5	<b>Arrows ▲ ▼ :</b> Use the Up and Down arrow keys to navigate between parameter groups, parameters and within parameters. Also used for setting local reference.
6	<b>Back key:</b> Press to move to the previous step or layer in the navigation structure.
7	<b>OK key:</b> Press to select the currently displayed parameter and for accepting changes to parameter settings.

**Fig. 60 — Navigation Keys and Status LEDs**

**OPERATION KEYS AND LEDS**

Figure 61 details the functions of the Operating keys. An illuminated yellow LED above the key indicates the active key.



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

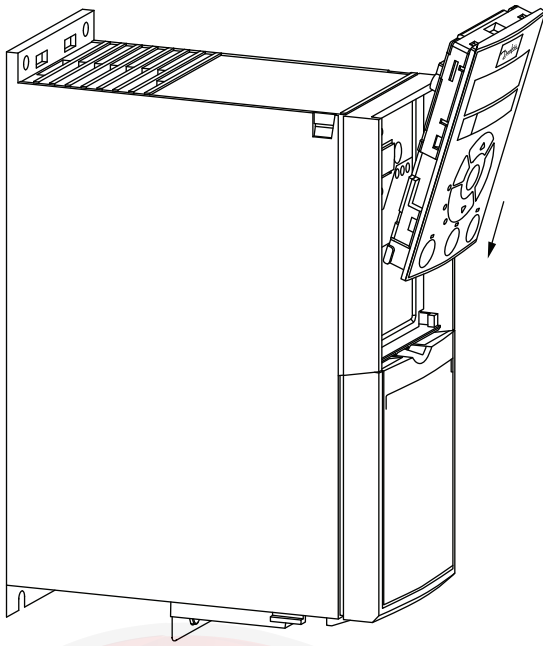
**Fig. 61 — Operating Keys**

**CONNECTING THE KEYPAD TO THE VFD**

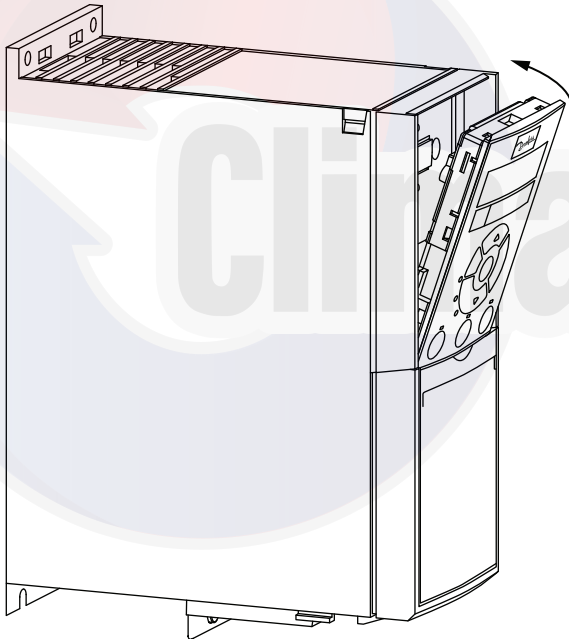
The VFD keypad can be mounted directly to the variable frequency drive, provided you can easily access the front panel of the VFD. If you do not have easy access to the VFD front panel, use the cable included with the kit to connect the keypad to the VFD.

**Connecting the Keypad Directly to the VFD**

1. Place the bottom of the VFD keypad into the variable frequency drive as shown in Fig. 62.
2. Push the top of the VFD keypad into the variable frequency drive as shown in Fig. 63.



**Fig. 62 — Align Bottom of VFD Keypad with Opening in VFD Front Panel**

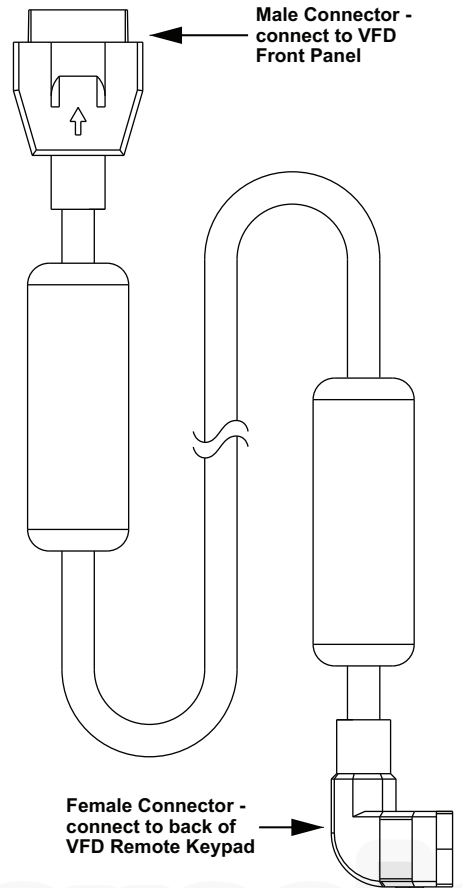


**Fig. 63 — Secure Keypad in Place**

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

The VFD keypad can be connected to the variable frequency drive via the cable included with the Multi-Speed VFD display kit (PN: CRDISKIT002A00). See Fig. 64.

1. Connect the male end of the cable to the front panel of the variable frequency drive. Use 2 of the screws included with the kit to secure the cable to the VFD.
2. Connect the female end of the cable to the back panel of the VFD Remote keypad. Secure the cable to the remote keypad using the 2 remaining screws from the kit.

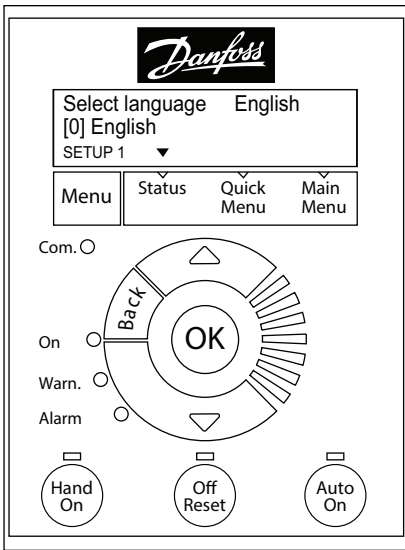


**Fig. 64 — VFD Remote Keypad Cable**

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

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

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



**Fig. 65 — Keypad with Power Up Screen Displayed**

**To program the VFD for 3 discreet indoor fan motor speeds**

1. At Power-Up:

At the first power up, the LCD displays the Select Language screen (see Fig. 65). The default setting is English. To change the language, press the OK key and use the ▲ and ▼ keys to scroll to the desired language and then press OK.

2. Selecting Regional Settings:

- Press the Off Reset key.
- Press the Menu key to move the ▼ (triangle icon) so it is positioned over Main Menu. The display shows the following.

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

- Press the OK key and the display changes to:

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

- With the top row highlighted, press OK. The display changes to:

```
0--01 Language
[0] English
```

NOTE: If English is not the desired language, press OK, select the desired language and press OK again.

- Press ▼ (Down Arrow key) once; the display changes to:

```
0--03 Regional Settings
[0] International
```

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

```
0--03 Regional Settings
[1] North America
```

- Press OK

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

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

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

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

```
4--** Limits / Warnings
5--** Digital In/Out
```

- Press OK. The display changes to:

```
5--0* Digital I/O Mode
5--1* Digital Inputs
```

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

```
5--10 Terminal 18 Digital In...
[8] Start
```

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

```
5--12 Terminal 27 Digital In...
[7] External Interlock
```

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

```
5--12 Terminal 27 Digital In...
[0] No operation
```

- Press OK.
- Press Off Reset. The Alarm indicator disappears.

4. Entering Grid Type:

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

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

- Press OK twice; the display changes to:

```
0--01 Language
[0] English
```

- Press ▼ (Down Arrow) three times to reach the following display:

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

- Press OK to highlight the number in the bracket and then use the ▲ and ▼ (Up and Down Arrow) keys to select the desired voltage and Hertz for the unit.
- Press OK to accept the selection and continue.

5. Entering Motor Data:

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

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

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

- Press OK, the display changes to:

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



- d. Press ▼ (Down Arrow) twice to reach the following display:

1—1* Motor Selection
1—2* Motor Data

- e. Press OK; the following display appears:

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

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

- f. Press OK and then use the ▲ and ▼ (Up and Down Arrow) keys to scroll to the proper motor horsepower. Press OK again to set the selected hp.  
 g. Press ▼ (Down Arrow) once, the following display appears:

1-22 Motor Voltage
230V

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

1-23 Motor Frequency
60Hz

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

1-24 Motor Current
6.61A

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

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

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

1-25 Motor Nominal Speed
1740rpm

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

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

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

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

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

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

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

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

- e. Press OK, the following display appears:

1-71 Start Delay
2.0s

- f. Press OK to highlight the number and then use the ▲ and ▼ (Up and Down Arrow) keys to select the number provided in Table 25. Press OK again to set the selected value.  
 g. Press ▼ (Down Arrow) twice, the following display appears:

1-73 Flying Start
[1] Enabled

- h. Press OK to highlight the number in the bracket and then use the ▲ and ▼ (Up and Down Arrow) keys to select the number provided in Table 25. Press OK again to set the selected value.  
 i. Press the Back key once, the following display appears:

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

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

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

- k. Press OK, the following display appears:

1-80 Function at Stop
[0] Coast

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

1-82 Min Speed for Functio...
1.0 Hz

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

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

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

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

1—8* Stop Adjustments
1—9* Motor Temperature

- p. Press OK, the following display appears:

1-90 Motor Thermal Prote...
[4] ETR trip 1

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

7. Setting References:

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

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

- b. Press ▼ (Down Arrow) three times, the following display appears:

2—** Brakes
3—** Reference / Ramps

- c. Press OK, the following display appears:

3—0* Reference Limits
3—1* References

- d. Press OK again, the following display appears:

3-02 Minimum Reference
0.000

NOTE: If the bottom row displays a number other than 0.000, press OK and use the ▲ and ▼ (Up and Down Arrow) key to select 0.000.

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

3-03 Maximum Reference
60.000

NOTE: If the bottom row displays a number other than 60.000, press OK and use the ▲ and ▼ (Up and Down Arrow) key to select 60.000.

- f. Press the Back key until the following display appears:

3—0* Reference Limits
3—1* References

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

3-10 Preset Reference
[0]0.00%

- h. Press OK once to highlight the number in the bracket. Press OK again; the highlight moves to the current percent value. Use the ▲ and ▼ (Up and Down Arrow) keys and the table below to enter the required Preset Reference values.

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

8. Setting the Ramp Time:

- a. Press the Back key until the following display appears:

3—0* Reference Limits
3—1* References

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

3—1* References
3—4* Ramp 1

- c. Press OK, the following display appears:

3-41 Ramp 1 Ramp up Time
3.00s

- d. Press OK again to highlight the bottom row and use the ▲ and ▼ (Up and Down Arrow) keys to select 10.00s. Press OK again to set the selected Ramp up Time.

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

3-42 Ramp 1 Ramp Down Time
3.00s

- f. Press OK again to highlight the bottom row and use the ▲ and ▼ (Up and Down Arrow) keys to select 10.00s. Press OK again to set the selected Ramp Down Time.

9. Setting Limits:

- a. Press the Back key until the following display appears:

2—** Brakes
3—** Reference / Ramps

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

3—** Reference / Ramps
4—** Limits / Warnings

- c. Press OK, the following display appears:

4—1* Motor Limits
4—4* Adj. Warning 2

- d. Press OK again, the following display appears:

4-10 Motor Speed Direction
[2] Both Directions

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

4-12 Motor Speed Low Limi...
0.0Hz

- f. Press ▼ (Down Arrow) again, the following display appears:

4-14 Motor Speed High Limi...
65.0Hz

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

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

4-18 Current Limit
110%

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

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

4-19 Max Output Frequency
65.0Hz

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

10. Setting Digital Inputs:

- a. Press the Back key until the following display appears:

3—** Reference / Ramps
4—** Limits / Warnings

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

4—** Limits / Warnings
5—** Digital In/Out

- c. Press OK, the following display appears:

5—0* Digital I/O mode
5—1* Digital Inputs

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

5-10 Terminal 18 Digital In...
[8] Start

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

5-11 Terminal 19 Digital In...
[16] Preset ref bit 0

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

5-12 Terminal 27 Digital In...
[17] Preset ref bit 1

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

5-13 Terminal 29 Digital In...
[18] Preset ref bit 2

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

11. Setting Analog Inputs:

- a. Press the Back key until the following display appears:

4—** Limits / Warnings
5—** Digital In/Out

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

5—** Digital In/Out
6—** Analog In/Out

- c. Press OK, the following display appears:

6—** Analog In/Out
6—1* Analog Input 53

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

6-10 Terminal 53 Low Voltage
2V

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

6-11 Terminal 53 High Voltage
[10V]

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

6-14 Set Min Reference
[0 Hz]

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

6-15 Set Max Reference
[60 Hz]

12. Setting Reset Mode and RFI Filter:

- a. Press the Back key until the following display appears:

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

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

13—** Smart Logic
14—** Special Functions

- c. Press OK, the following display appears:

14—0* Inverter Switching
14—1* Mains On/Off

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

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

- e. Press OK, the following display appears:

14-20 Reset Mode
[0] Manual reset

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

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

14-20 Reset Mode
[3] Automatic reset x 3

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

14-21 Automatic Restart T...
10s

- i. Press OK to highlight the number of seconds and use the ▲ and ▼ (Up and Down Arrow) keys to select 600 seconds. Press OK again to set the selected value.

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

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

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

14—4* Energy Optimising
14—5* Environment

l. Press OK, the following display appears:

14-50 RFI Filter [1] On
----------------------------

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

13. To Complete Reprogramming:

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

**Table 25 — VFD Unit Parameters - 48LC 07 Units**

					REGIONAL SETTINGS	GRID TYPE	MOTOR POWER	MOTOR VOLTAGE	MOTOR FREQUENCY (Hz)	MOTOR CURRENT (MUST-HOLD AMPS)	MOTOR NOMINAL SPEED (RPM)
Motor Option	Voltage	Motor P/N	VFD Carrier P/N	VFD Mfr P/N	0-03	0-06	1-20	1-22	1-23	1-24	1-25
STD	208/230V	HD56FR233	HK30WA370	131L9795	[1]	[102]	[9]	230	60	5.8	1695
	460V	HD56FR463	HK30WA376	131L9863	[1]	[122]	[9]	460	60	2.9	1690
	575V	HD56FR579	HK30WA382	131N0225	[1]	[132]	[9]	575	60	3.1	1690
MID	208/230V	HD56FR233	HK30WA370	131L9795	[1]	[102]	[9]	230	60	5.8	1695
	460V	HD56FR463	HK30WA376	131L9863	[1]	[122]	[9]	460	60	2.9	1690
	575V	HD56FR579	HK30WA382	131N0225	[1]	[132]	[9]	575	60	3.1	1690
HIGH	208/230V	HD58FE654	HK30WA371	131L9796	[1]	[102]	[10]	230	60	9.2	1735
	460V	HD58FE654	HK30WA377	131L9864	[1]	[122]	[10]	460	60	4.2	1735
	575V	HD58FE577	HK30WA383	131N0227	[1]	[132]	[11]	575	60	4.9	1710

		START DELAY (SEC)	FLYING START	MIN SPEED FOR FUNCTION (Hz)	MOTOR THERMAL PROTECTION	PRESET REFERENCE							
Motor Option	Voltage	1-71	1-73	1-82	1-90	3-10 [0]	3-10 [1]	3-10 [2]	3-10 [3]	3-10 [4]	3-10 [5]	3-10 [6]	3-10 [7]
STD	208/230V	2.0	[1]	1.0	[4]	0%	66.50%	66.50%	100%	100%	0%	0%	0%
	460V	2.0	[1]	1.0	[4]	0%	66.50%	66.50%	100%	100%	0%	0%	0%
	575V	2.0	[1]	1.0	[4]	0%	66.50%	66.50%	100%	100%	0%	0%	0%
MID	208/230V	2.0	[1]	1.0	[4]	0%	66.50%	66.50%	100%	100%	0%	0%	0%
	460V	2.0	[1]	1.0	[4]	0%	66.50%	66.50%	100%	100%	0%	0%	0%
	575V	2.0	[1]	1.0	[4]	0%	66.50%	66.50%	100%	100%	0%	0%	0%
HIGH	208/230V	2.0	[1]	1.0	[4]	0%	66.50%	66.50%	100%	100%	0%	0%	0%
	460V	2.0	[1]	1.0	[4]	0%	66.50%	66.50%	100%	100%	0%	0%	0%
	575V	2.0	[1]	1.0	[4]	0%	66.50%	66.50%	100%	100%	0%	0%	0%

		RAMP UP TIME (SEC)	RAMP DOWN TIME (SEC)	CURRENT LIMIT	TERMINAL 18 DIGITAL INPUT	TERMINAL 19 DIGITAL INPUT	TERMINAL 27 DIGITAL INPUT	TERMINAL 29 DIGITAL INPUT
Motor Option	Voltage	3-41	3-42	4-18	5-10	5-11	5-12	5-13
STD	208/230V	10.00	10.00	100%	[8]	[16]	[17]	[18]
	460V	10.00	10.00	100%	[8]	[16]	[17]	[18]
	575V	10.00	10.00	100%	[8]	[16]	[17]	[18]
MID	208/230V	10.00	10.00	100%	[8]	[16]	[17]	[18]
	460V	10.00	10.00	100%	[8]	[16]	[17]	[18]
	575V	10.00	10.00	100%	[8]	[16]	[17]	[18]
HIGH	208/230V	10.00	10.00	100%	[8]	[16]	[17]	[18]
	460V	10.00	10.00	100%	[8]	[16]	[17]	[18]
	575V	10.00	10.00	100%	[8]	[16]	[17]	[18]



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

		TERMINAL 53 LOW VOLTAGE	TERMINAL 53 HIGH VOLTAGE	TERMINAL 53 LOW REFERENCE	TERMINAL 53 HIGH REFERENCE	RESET MODE	AUTO. RESTART TIME (S)	RFI FILTER
Motor Option	Voltage	6-10	6-11	6-14	6-15	14-20	14-21	14-50
STD	208/230V	2	[10]	0	[60]	[3]	600	[0]
	460V	2	[10]	0	[60]	[3]	600	[0]
	575V	2	[10]	0	[60]	[3]	600	[0]
MID	208/230V	2	[10]	0	[60]	[3]	600	[0]
	460V	2	[10]	0	[60]	[3]	600	[0]
	575V	2	[10]	0	[60]	[3]	600	[0]
HIGH	208/230V	2	[10]	0	[60]	[3]	600	[0]
	460V	2	[10]	0	[60]	[3]	600	[0]
	575V	2	[10]	0	[60]	[3]	600	[0]

**Smoke Detectors**

Smoke detectors are available as factory-installed options on 48LC models. Smoke detectors may be specified for supply air only, for return air without or with economizer, or in combination of supply air and return air. All components necessary for operation are factory-provided and mounted. The unit is factory-configured for immediate smoke detector shutdown operation; additional wiring or modifications to the Integrated Staging Control (ISC) board may be necessary to complete the unit and smoke detector configuration to meet project requirements.

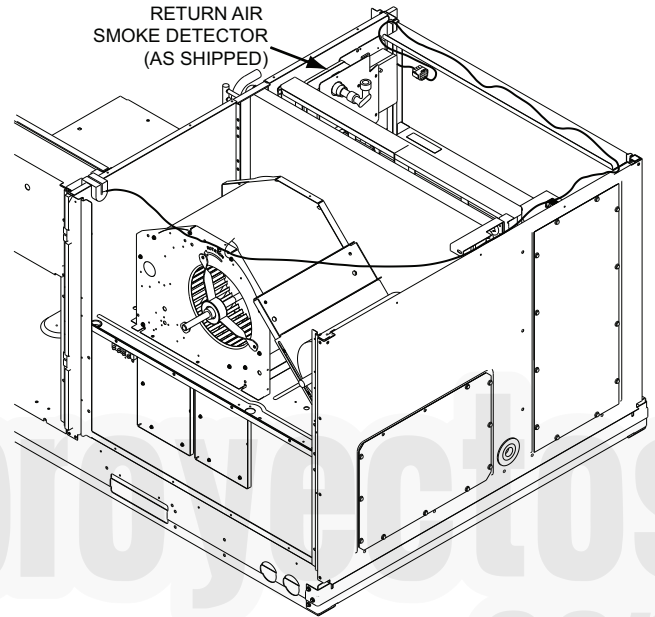
Units equipped with factory-optional return air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 66 for the as-shipped location.

**COMPLETING INSTALLATION OF RETURN AIR SMOKE SENSOR**

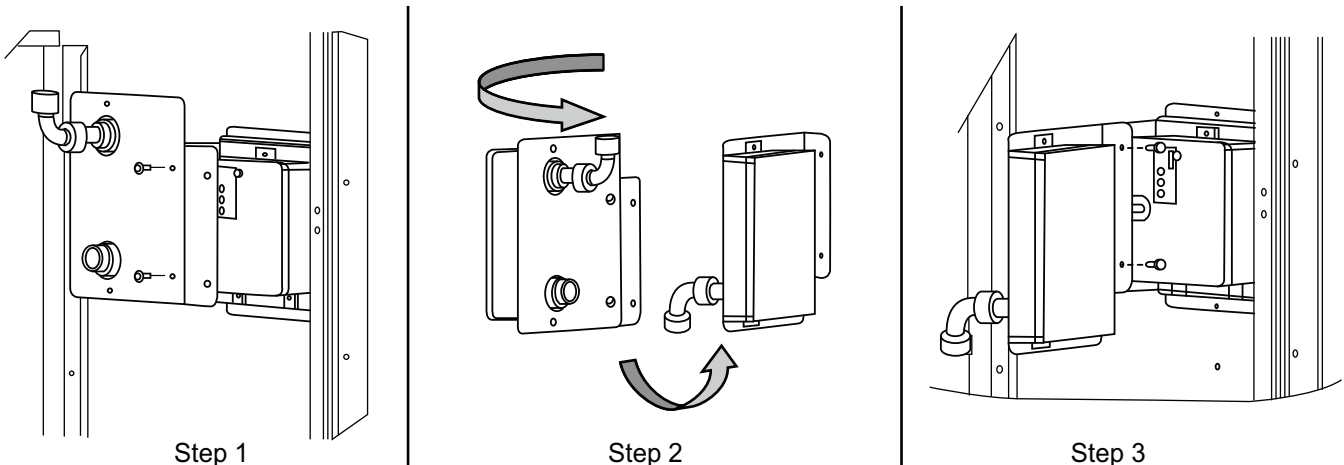
1. Unscrew the two screws holding the return air smoke detector assembly. See Fig. 67, Step 1. Save the screws.
2. Turn the assembly 90 degrees and then rotate end to end. Make sure that the elbow fitting is pointing down. See Fig. 67, Step 2.
3. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 67, Step 3.
4. Connect the flexible tube on the sampling inlet to the sampling tube on the base pan.

**ADDITIONAL APPLICATION DATA**

Refer to *Factory-Installed Smoke Detectors for Small and Medium Rooftop Units 2 to 25 Tons* for discussions on additional control features of these smoke detectors, including multiple unit coordination.



**Fig. 66 — Return Air Smoke Detector, Shipping Position**



**Fig. 67 — Completing Installation of Return Air Smoke Sensor**

## Step 13 — Adjust Factory-Installed Options

### SMOKE DETECTORS

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

## Step 14 — Install Accessories

Available field-installed accessories include:

- Roof Curb (must be installed before unit)
- Thru-base connection kit (must be installed before unit is set on curb)
- EconoMi\$er® X (with control)
- Power Exhaust
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- CO<sub>2</sub> sensor
- Temperature and Humidity sensors
- Louvered hail guard
- Phase monitor control

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

## Step 15 — Check Belt Tension

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

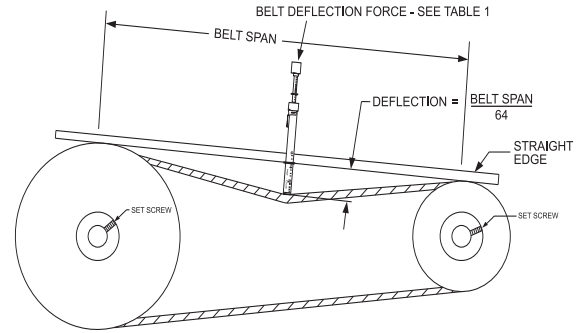
$$32 \times \frac{1}{64} = \frac{1}{2}\text{-in. deflection.}$$

### BELT FORCE — DEFLECTION METHOD

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

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

Adjust belt tension by loosening the motor mounting plate front bolts and rear bolt (see Fig. 69) and slide the plate towards the fan (to reduce tension) or away from the fan (to increase tension). Ensure the blower shaft and motor shaft are parallel to each other (pulleys aligned). Tighten all bolts securely when finished.



TORQUE ALL SHEAVE SET SCREWS TO 110-130 IN LBS.

BELT CROSS SECTION	SMALLEST SHEAVE DIAMETER	BELT DEFLECTION FORCE (LBS)			
		UNNOTCHED BELTS		NOTCHED BELTS	
		USED	NEW	USED	NEW
A, AX	3.0-3.6	3.7	5.5	4.1	6.1
	3.8-4.8	4.5	6.8	5.0	7.4
	5.0-7.0	5.4	8.0	5.7	8.4
B, BX	3.4-4.2	—	—	4.9	7.2
	4.4-5.6	5.3	7.9	7.1	10.5
	5.8-8.6	6.3	9.4	8.5	12.6

Table 1

BELT CONDITION	TENSION FORCE IN BELT (LBS)
New	100
Used	80

Table 2

Fig. 68 — V-Belt Force Label

### BELT TENSION METHOD

Requires belt tension gage that measures tension in belt in units of lbs force.

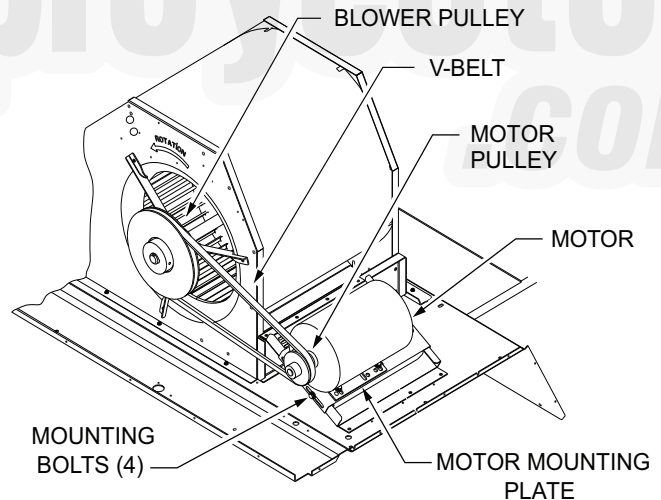


Fig. 69 — Belt Drive Motor Mounting

## 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](http://www.hvacpartners.com)).

# START-UP CHECKLIST FOR 48LC SINGLE PACKAGE ROOFTOP UNIT

(Remove and Store in Job File)

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

## I. PRELIMINARY INFORMATION

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 Supply Air Temperature \_\_\_\_\_ °F

### PRESSURES

Gas Inlet Pressure \_\_\_\_\_ IN. WG  
Gas Manifold Pressure STAGE 1 \_\_\_\_\_ IN. WG  
STAGE 2 \_\_\_\_\_ IN. WG

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

Refrigerant Suction CIRCUI A \_\_\_\_\_ PSIG  
CIRCUI B \_\_\_\_\_ PSIG  
Refrigerant Discharge CIRCUI A \_\_\_\_\_ PSIG  
CIRCUI B \_\_\_\_\_ PSIG  
Verify Refrigerant Charge using Charging Charts (Y/N) \_\_\_\_\_

**GENERAL**

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

**IV. HUMIDI-MIZER® START-UP**

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

**STEPS**

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

**OBSERVE AND RECORD**

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

**OBSERVE**

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

**OBSERVE**

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

**REPEAT PROCESS FOR 2 COMPRESSOR SYSTEMS.**

CUT ALONG DOTTED LINE