

TYDICAL UNIT WIDING DIACDAMO



# Installation Instructions

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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. 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  $\triangle$ . 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.

SINGLE POINT BOXES WITHOUT FUSES LOW-VOLTAGE CONTROL CONNECTIONS

# **↑** DANGER

# ELECTRICAL SHOCK HAZARD

Failure to follow this warning will result in 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.

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

# **MARNING**

# 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

#### PERSONAL INJURY 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.

#### **GENERAL**

These installation instructions cover the 50FC cooling only units. Units are pre-wired and pre-charged with environmentally balanced Puron® (R-410A) refrigerant at the factory.

See Fig. 1 for model number nomenclature. See Fig. 2 for unit dimensions and Fig. 3 for service clearances. See Fig. 4 and 5 for roof curb and leveling tolerance details.

# **Rated Indoor Airflow**

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

Table 1 — AHRI Efficiency — Rated Indoor Airflow

MODEL NUMBER	FULL LOAD AIRFLOW (L/s [cfm])
50FC-*16	2478 [5250]

### **Pre-Installation**

Complete the following checks before installation.

- 1. Consult local building codes and the NEC (National Electrical Code) ANSI/NFPA 70 (or your local equivalent) 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.

	Position:	Г	1 2	2 3	4	5	6	.	7	8	9	10	1.	1 1	2	13	14	15	5 1	6	17	18	1
	Example:	$\vdash$	_	_	c	-	T <sub>N</sub>	-	1	6	A	2	I.	_	9	-	0	A	-	_	Α	0	
Unit Heat Type 50 = Cooling with Optional B Packaged Rooftop	·	-						-															Packaging & Compliance 0 = Standard with Electromechanical Controls 1 = LTL
Model Series - WeatherMa FC = Standard Efficiency (E		Гесl	hnolo	ogy)																		A =	etrical Options None Non-Fused Disconnect
Heat Size - = No heat (Field Installed Available)  Refrig. Systems Options																						F = N = Q = R =	Thru-The-Base Connections Non-Fused Disconnect and Thru-The-Base Connections Phase Monitor/Protection Phase Monitor/Protection and Non-Fused Disconnect Phase Monitor/Protection and Thru-The-Base Connections Phase Monitor/Protection with Non-Fused
M = Two Stage Cooling, Si	ingle Circuit																						Disconnect and Thru-The-Base Connections
Cooling Capacity kW (Ton 16 = 53 (15 tons)	is)																			0 3 6	= =	Nor Hin 4" N Hin	Options ne ged Access Panels MERV 13 High Efficiency Filter Track ged Access Panels and 4" MERV 13 High ciency Filter Track
A = None B = Return Air (RA) Smoke C = Supply Air (SA) Smoke D = RA + SA Smoke Detect E = CO <sub>2</sub> Sensor F = RA Smoke Detector at G = SA Smoke Detector at H = RA + SA Smoke Detect J = Condensate Overflow K = Condensate Overflow M = Condensate Overflow M = Condensate Overflow	e Detector ctor and CO <sub>2</sub> Sen and CO <sub>2</sub> Sen ctor and CO Switch Switch + RA Switch + RA	sor 0 <sub>2</sub> S A S A aı	enso moke nd S	e Det A Sm	oke	Det	ecto	ors											A B F U	= N = T = E = V = E	Nor Fent Ent Fen vith	ne nper halp nper n Bai halp	aust Options ature Economizer with Barometric Relief y Economizer with Barometric Relief ature Ultra Low Leak Economizer rometric Relief y Ultra Low Leak Economizer rometric Relief
N = Condensate Overflow P = Condensate Overflow Q = Condensate Overflow R = Condensate Overflow	Switch + Co Switch + RA Switch + SA	O <sub>2</sub> A S A S	moke	e Det	ecto ecto	r an	d Co	$O_2$	nd	CO <sub>2</sub>								3 =	: E (a : S	lect Illov yste	ro- vs em'	for u Vu™	ols hanical Controller se of field-installed economizers) ' Controller lanical Controls with POL224
Indoor Fan Options 2 = Standard/Medium Stat 3 = High Static Option 5 = Standard/Medium Stat 6 = High Static Option and	tic Option ar				us S	witcl	h											ign	Re	con	ior	nizer 1	ONE (with Fault Detection and Diagnostic)  Revision
Coil Options – (Outdoor – A = Al/Cu – Al/Cu B = Precoat Al/Cu – Al/Cu C = E-coat Al/Cu – Al/Cu	- Indoor – F	lail	Gua	ard)												olt:	_	• 0-3-	50				

Fig. 1 — 50FC-\*16 Units Model Number Nomenclature

D = E-coat Al/Cu - E-coat Al/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

E = Cu/Cu - AI/CuF = Cu/Cu - Cu/Cu

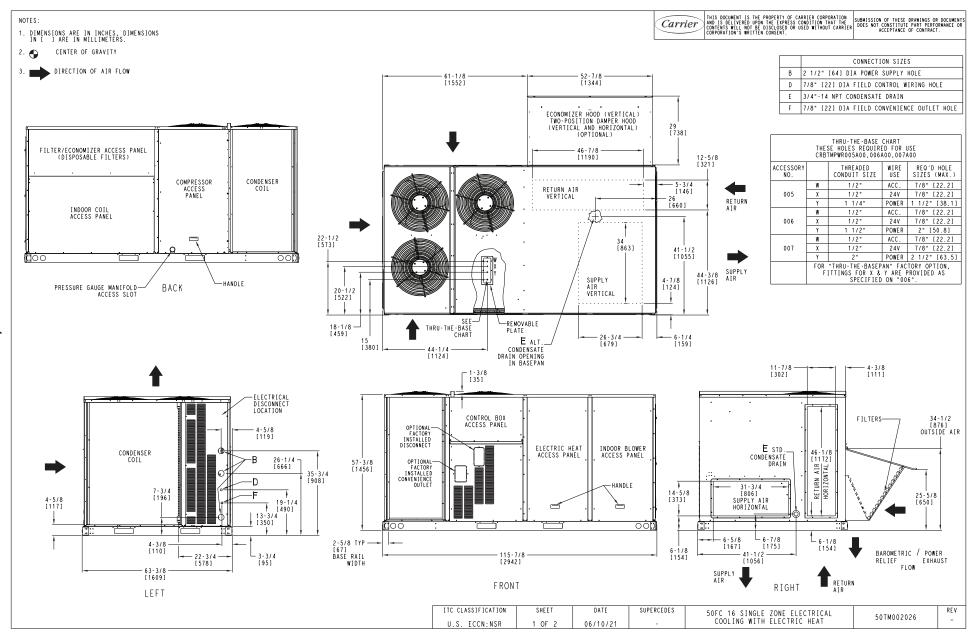


Fig. 2 — 50FC-\*16 Unit Dimensional Drawing

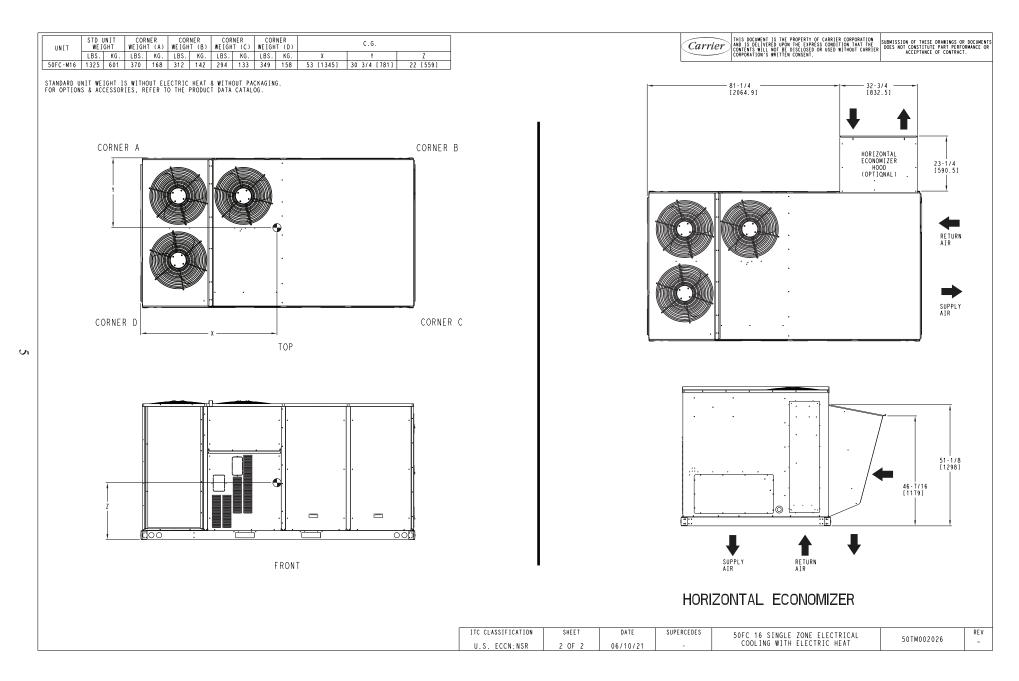
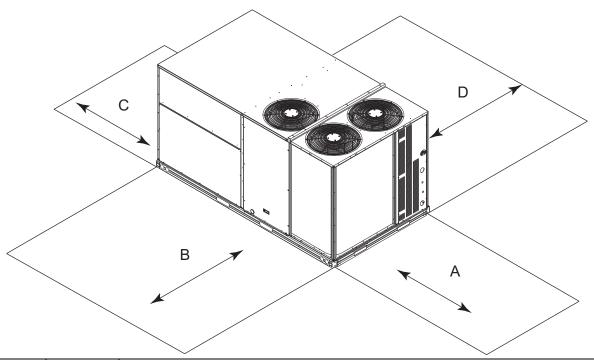


Fig. 2 — 50FC-\*16 Unit Dimensional Drawing (cont)



LOCATION	DIMENSION mm (in.)	CONDITION
Α	1219 (48) 457 (18) 457 (18) 305 (12)	Unit disconnect is mounted on panel. No disconnect, convenience outlet option. Recommended service clearance. Minimum clearance.
В	1067 (42) 914 (36) Special	Surface behind servicer is grounded (e.g., metal, masonry wall). Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass). Check for sources of flue products within 3m (10 ft) of unit fresh air intake hood.
С	914 (36) 457 (18)	Side condensate drain is used. Minimum clearance.
D	1219 (48) 1067 (42) 914 (36) Special	No flue discharge accessory installed, surface is combustible material. Surface behind servicer is grounded (e.g., metal, masonry wall, another unit). Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass). Check for adjacent units or building fresh air intakes within 3m (10 ft) of this unit's flue outlet.

NOTE(S):

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

Fig. 3 — Service Clearances — 50FC-\*16 Units

# INSTALLATION

# Step 1 — Plan for Unit Location

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

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

Select a unit mounting system that provides adequate height to allow for removal and disposal of frost and ice that will form during the heating-defrost mode as well as allow installation of condensate trap per requirements. See Install External Condensate Trap and Line on page 11 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

50FC-*16	kg	lb
Base Unit	601	1325
Economizer		
Vertical	47	130
Horizontal	110	242
Powered Outlet	16	35
Curb		
356 mm (14 in.)	82	180
610 mm (16 in.)	116	245

# 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**

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

# PAD-MOUNTED INSTALLATION

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

#### FRAME-MOUNTED INSTALLATION

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

# Step 3 — Inspect Unit

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

# 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. 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.

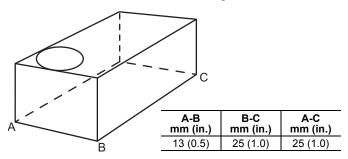


Fig. 4 — Unit Leveling Tolerances

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.

Install insulation, cant strips, roofing felt, and counter flashing as shown. Ductwork must be attached to curb and not to the unit.

# SLAB MOUNT (HORIZONTAL UNITS ONLY)

Provide a level concrete slab that extends a minimum of 150 mm (6 in.) 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 102 mm x 102 mm (4 in. x 4 in.) pads on each side.

# Step 5 — Field Fabricate Ductwork

NOTE: Cabinet return-air static pressure (a negative condition) shall not exceed 87 Pa (0.35 in. wg) with economizer or 112 Pa (0.45 in. wg) 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 458 mm (18 in.) 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.

# FOR UNITS WITH ACCESSORY ELECTRIC HEATERS

All installations require a minimum clearance to combustible surfaces of 25 mm (1 in.) from duct for first 305 mm (12 in.) away from unit.

Outlet grilles must not lie directly below unit discharge.

# **MARNING**

# PERSONAL INJURY HAZARD

Failure to follow this warning could cause personal injury.

For vertical supply and return units, tools or parts could drop into ductwork and cause an injury. Install a 90 degree turn in the return ductwork between the unit and the conditioned space. If a 90 degree elbow cannot be installed, then a grille of sufficient strength and density should be installed to prevent objects from falling into the conditioned space. Due to electric heater, supply duct will require 90 degree elbow.

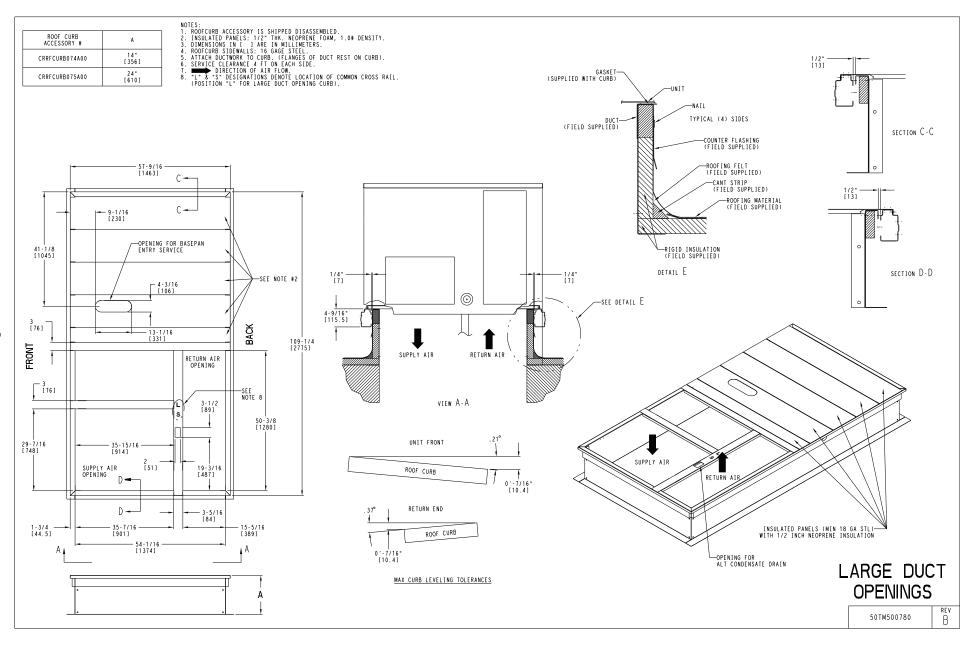
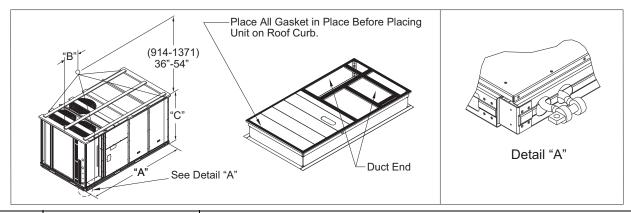


Fig. 5 — 50FC-\*16 Roof Curb Details



	MAYN	/EIGHT	DIMENSIONS									
UNIT	IVIAA	/EIGH1	,	4	E	3	(					
	kg	lb	mm	in.	mm	in.	mm	in.				
50FC-*16	947	2088	2945	116.0	1345	53.0	1510	59.5				

# NOTE(S):

- 1. Dimensions in () are in millimeters.
- 2. SPREADER BARS REQUIRED Top damage will occur if spreader bars are not used.
- Hook rigging shackles through holes in base rail, as shown in detail "A." Holes in base rails are centered around the unit center of gravity. Use wooden top to prevent rigging straps from damaging unit.

Fig. 6 — Rigging Details

# Step 6 - Rig and Place Unit

Keep unit upright and do not drop. Spreader bars are not 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 to prevent base pan damage) must be removed PRIOR to placing the unit on the roof curb.

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

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

#### POSITIONING ON CURB

crate.

For full perimeter curbs CRRFCURB074A00 and 075A00, the clearance between the roof curb and the front and rear base rails should be 6.4 mm (1/4 in.). The clearance between the curb and the end base rails should be 13 mm (1/2 in.). For retrofit applications with curbs CRRFCURB003A01 and 4A01, the unit should be positioned as shown in Fig. 7. Maintain the 394 mm (15-1/2 in.) and 220 mm (8-5/8 in.) clearances and allow the 567 mm (22-5/16 in.) dimension to float if necessary.





Fig. 7 — Retrofit Installation Dimensions

If the alternative condensate drain location through the bottom of the unit is used in conjunction with a retrofit curb, the hole in the curb must be moved 320 mm (12-1/2 in.) towards the duct end of the unit. See Fig. 8.

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

Remove all shipping materials and top skid. Remove extra center post from the condenser end of the unit so that the condenser end of the unit matches Fig. 17 and 18. Recycle or dispose of all shipping materials.

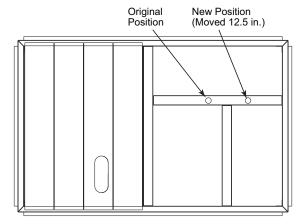


Fig. 8 — Alternative Condensate Drain Hole Positions

# Step 7 — Convert to Horizontal and Connect

Unit is shipped in the vertical duct configuration. Unit without factory-installed economizer or return air smoke detector option may be field-converted to horizontal ducted configuration using accessory CRDUCTCV002A00. To convert to horizontal configuration, remove screws from side duct opening covers and remove covers.

Discard the supply duct cover. Install accessory CRDUCTCV002A00 to cover the vertical supply duct opening. Use the return duct cover removed from the end panel to cover the vertical return duct opening.

#### **ALL UNITS**

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

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

# Step 8 — Install Outside Air Hood

ECONOMIZER HOOD REMOVAL (FACTORY OPTION)

- 1. The hood is shipped in knock-down form and located in the return air compartment. It is attached to the economizer using two plastic tie-wraps.
- To gain access to the hood, remove the filter access panel (see Fig. 9).
- 3. Locate and cut the (2) plastic tie-wraps being careful (see Fig. 10). Be careful to not damage any wiring or cut tie-wraps securing any wiring.
- 4. Carefully lift the hood assembly (with metal tray) through the filter access opening and assemble per the steps outlined in *Economizer and Two-Position Hood Setup*, on page 11.

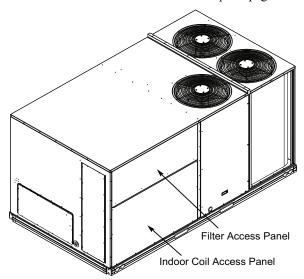


Fig. 9 — Typical Access Panel Locations

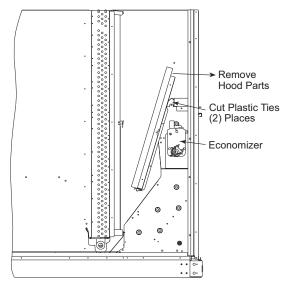


Fig. 10 — Economizer Hood Package Location

TWO-POSITION DAMPER HOOD REMOVAL (FACTORY OPTION)

- The hood is shipped in knock-down form and assembled to a metal support tray using plastic stretch wrap. Located in the return air compartment, the assembly's metal tray is attached to the basepan and also attached to the damper using two plastic tie-wraps.
- To gain access to the hood, remove the filter access panel. See Fig. 9.
- 3. Locate the (2) screws holding the metal tray to the basepan and remove. In order to remove the screws, it may be necessary to remove the panel underneath the two-position damper. Remove the two screws. Locate and cut the (2) plastic tiewraps securing the assembly to the damper. (See Fig. 11.) Be careful to not damage any wiring or cut tie-wraps securing any wiring.
- 4. Carefully lift the hood assembly (with metal tray) through the filter access opening and assemble per the steps outlined in *Economizer and Two-Position Damper Hood Setup*, on page 11.
- 5. If removed, reattach the panel under the damper.

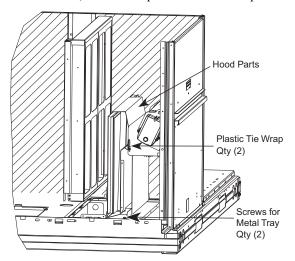


Fig. 11 — Two Position Damper Hood Package Location

# ECONOMIZER AND TWO-POSITION DAMPER HOOD SETUP

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.

- The indoor coil access panel will be used as the top of the hood. If the panel is still attached to the unit, remove the screws along the sides and bottom of the panels. See Fig. 12.
- Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Be careful not to lift the panel too far, as it might fall out. Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 13.
- 3. Remove the shipping tape holding the economizer barometric relief damper in place (economizer only).
- 4. Insert the hood divider between the hood sides. See Fig. 13 and 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.
- 7. Replace the filter access panel.

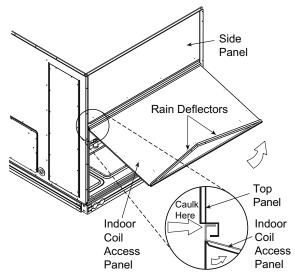


Fig. 12 — Indoor Coil Access Panel Relocation

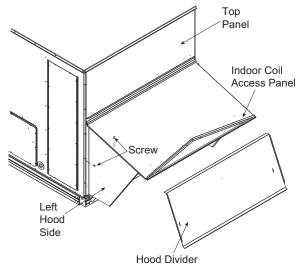


Fig. 13 — Economizer Hood Construction

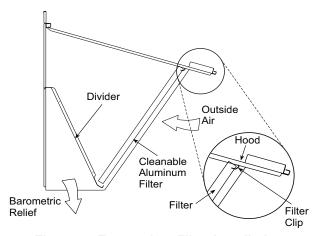


Fig. 14 — Economizer Filter Installation

# Step 9 — Install External Condensate Trap and Line

The unit has one 3/4 in. condensate drain connection on the end of the condensate pan and an alternate connection on the bottom. See Fig. 15. 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. 15 and 16.

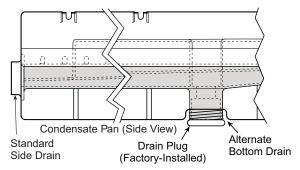
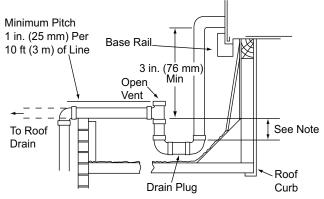


Fig. 15 — Condensate Drain Pan (Side View)

NOTE: If the alternate bottom drain is not used, check the drain plug for tightness prior to setting the unit on the roof curb.



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

# Fig. 16 — Condensate Drain Piping Details

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

# Step 10 — Make Electrical Connections

# **MARNING**

# ELECTRIC SHOCK HAZARD

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

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; ANSI/NFPA 70, latest edition (in Canada, Canadian Electrical Code CSA [Canadian Standards Association] C22.1), and local electrical codes.

NOTE: Check all factory and field electrical connections for tightness. Field-supplied wiring shall conform with the limitations of minimum 33°C (92°F) rise.

#### FIELD POWER SUPPLY

For those units without through-the-curb power, conduit must be used to route the main power from the condenser end, via the power entry in the corner post of the unit (see Fig. 17-19) to either the factory option disconnect or the bottom of the control box. A 1 in. conduit is provided wrapped around compressor. A second conduit is provided with factory-installed powered convenience outlet. For those units that require a conduit larger than 1 in., the conduit must be field-supplied. Figures 17-19 show the wire routings.

If the field disconnect is larger than 100-A, it must be attached to the unit using accessory CRDISBKT001A00 — disconnect switch bracket (see Fig. 20). Follow the instructions provided with this accessory. For smaller field disconnects, be sure to use 1/2 in. screws to mount the disconnect directly to the end panel (see Fig. 21). In either case, set the disconnect vertical location on the unit so that a 90 degree fitting can be used to connect the conduit to the disconnect.

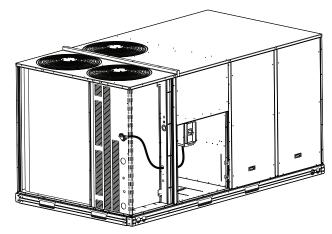


Fig. 17 — Conduit into Factory Option Disconnect

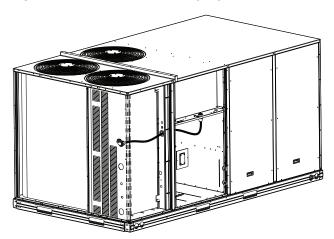


Fig. 18 — Conduit into Control Box

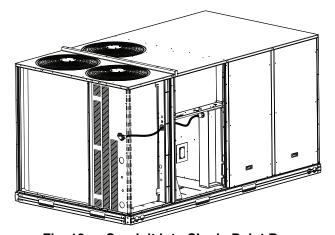


Fig. 19 — Conduit into Single Point Box

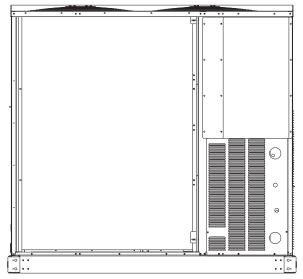


Fig. 20 — Mounting Position for Field Disconnects (over 100A)

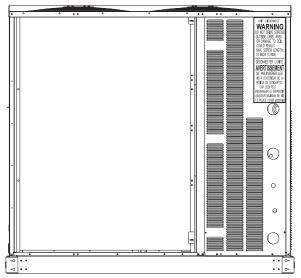


Fig. 21 — Mounting Position for Field Disconnects (up to 100A)

Field power wires are connected to the unit at line-side pressure lugs at the main terminal block (TB1) or at factory-installed option non-fused disconnect switch. See Fig. 22. Max wire size is #2 AWG (copper only). See Fig. 23.

# **<b>⚠WARNING**

# FIRE HAZARD

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

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

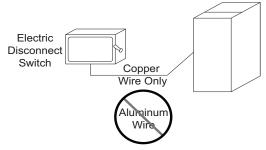
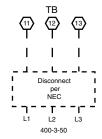


Fig. 22 — Disconnect Switch and Unit

Units Without Non-Fused Disconnect Option



Units With Non-Fused Disconnect Option

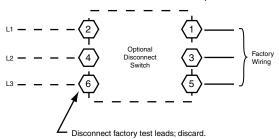


Fig. 23 — Power Wiring Connections

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

# FIELD WIRING

All field wiring must comply with the NEC (or local equivalent) and local requirements.

All units are factory wired for the voltage shown on the nameplate. Refer to unit label diagram for additional information.

Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 23 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is 2/0 AWG per pole.

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

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

Example: Supply voltage is 400-3-50

Average Voltage = 
$$\frac{(394 + 401 + 396)}{3} = \frac{1191}{3} = 397$$

Determine maximum deviation from average voltage.

(AB) 397-394 = 3 v

(BC) 401-397 = 4 v

(AC) 397-396 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

% Voltage Imbalance = 
$$100x - \frac{4}{397} = 1\%$$

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.

#### Fuse on power type

The factory fuse is a Bussman<sup>TM1</sup> "Fusetron<sup>TM</sup>" T-15, non-renewable screw-in (Edison base) type plug fuse.

# **↑** CAUTION

#### UNIT DAMAGE HAZARD

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

# UNITS WITH FACTORY-INSTALLED NON-FUSED DISCONNECT

The factory-installed optional non-fused disconnect (NFD) switch is located in a weatherproof enclosure located under the main control box. The manual switch handle and shaft are shipped in the disconnect enclosure. Assemble the shaft and handle to the switch at this point. Discard the factory test leads (see Fig. 24).

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

# To field install the NFD shaft and handle (see Fig. 25):

- 1. Remove the unit front panel (see Fig. 2).
- 2. Remove (3) hex screws on the NFD enclosure (2) on the face of the cover and (1) on the left side cover.
- 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.
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- Measure the tip of the shaft to the top surface of the pointer to be 95 mm to 99 mm (3.75 in. to 3.88 in.) for 80A and 100A NFD and 87 mm to 90 mm (3.43 in. to 3.56 in.) for 200A NFD.
- 7. Tighten the locking screw to secure the shaft to the NFD.
- 8. Turn the handle to the OFF position with red arrow pointing to OFF.
- 9. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
- 10. Secure the handle to the painted cover with (2) screws and lock washers supplied.
- 11. Engaging the shaft into the handle socket, re-install (3) hex screws on the NFD enclosure.
- 12. Re-install the unit front panel.

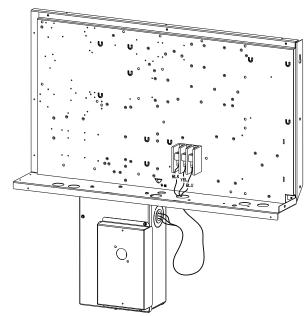


Fig. 24 — Location of Non-Fused Disconnect Enclosure

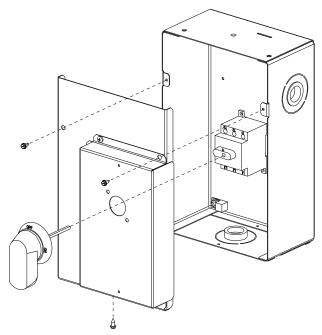


Fig. 25 — Handle and Shaft Assembly for NFD

# UNITS WITHOUT FACTORY-INSTALLED NON-FUSED DISCONNECT

When installing units, provide a disconnect switch per NEC (National Electrical Code), or your local equivalent codes, 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.

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

This service connection kit consists of a 1/2 in. electrical bulkhead connector and a 1-1/2 in. electrical bulkhead connector, connected to an "L" bracket covering the embossed (raised) section of the unit basepan in the condenser section. See Fig. 26. The 1/2 in. bulkhead connector enables the low-voltage control wires to pass through the basepan. The 1-1/2 in. electrical bulkhead connector allows the high-voltage power wires to pass through the basepan.

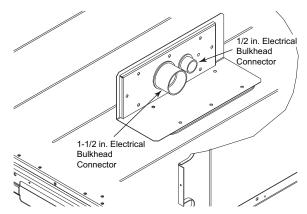


Fig. 26 — Thru-the-Base Option, Shipping Position

- 1. Remove the "L" bracket assembly from the unit.
- Remove connector plate assembly from the "L" bracket and discard the "L" bracket, but retain the washer head screws and the gasket (located between the "L" bracket and the connector plate assembly).
- 3. Take care not to damage the gasket, as it is reused in the following step.
- Place the gasket over the embossed area in the basepan, aligning the holes in the gasket to the holes in the basepan. See Fig. 27.
- Install the connector plate assembly to the basepan using 8 of the washer head screws.

NOTE: If electrical connections are not going to occur at this time, tape or otherwise cover the fittings so that moisture does not get into the building or conduit in the interim.

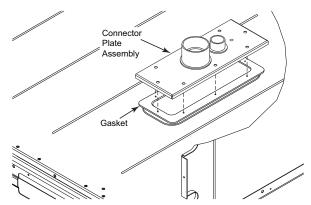


Fig. 27 — Completing Installation of Thru-the-Base Option

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 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

- Install power wiring conduit through side panel openings. Install conduit between disconnect and control box.
- Install power lines to terminal connections as shown in Fig. 23.

# FIELD CONTROL WIRING

The 50FC-\*16 requires an external temperature control device. This device can be a thermostat (field-supplied) or a SystemVu<sup>TM</sup> controller (available as factory-installed option for use on a Carrier Comfort Network® or as a stand-alone control). All field added wire must comply with UL and local NEC standards, or your local equivalent standards. See "Unit without Thru-Base Connection Kit" on page 15 and use routing path shown in Fig. 28 to help with compliance as needed.

All low-voltage wiring should be routed through the provided raceway (see Fig. 28) built into the corner post of the unit or secured to the unit control box with the electrical conduit in order to provide UL-required (or local equivalent) clearance between high-voltage and low-voltage wiring.

#### THERMOSTAT

Install a Carrier-approved accessory 2-stage Cooling/Heating thermostat according to installation instructions included with the accessory. If using an electronic thermostat, configure it for "non-heat pump" operation. Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions.

If the thermostat contains a logic circuit requiring 24-v power, use a thermostat cable or equivalent single leads of different colors with minimum of seven leads. If the thermostat does not require a 24-v source (no "C" connection required), use a thermostat cable or equivalent with minimum of six leads. Check the thermostat installation instructions for additional features which might require additional conductors in the cable. For wire runs up to 15 m (50 ft), use no. 18 AWG (American Wire Gauge) insulated wire (35°C [95°F] minimum).

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

# UNIT WITHOUT THRU-BASE CONNECTION KIT

Pass the thermostat control wires through the bushing on the unit end panel. Route the wire through the snap-in wire tie and up to the web bushing near the control box. Route the wire through the bushing and into the bottom left side of the control box after removing one of the two knockouts in the corner of the box. Use a connector at the control box to protect the wire as it passes into the control box. Pull the wires over to the terminal strip at the upper left corner of the Unit Control Board (UCB). Use the connector at the control box and the wire tie to take up any slack in the thermostat wire to ensure that it will not be damaged by contact with the condenser coil. See Fig. 28.

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.

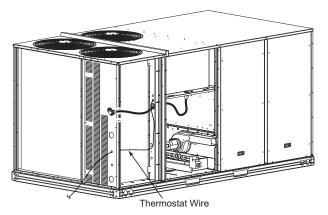


Fig. 28 — Thermostat Wire Routing

#### **Electric Heaters**

The 50FC size 16 units may be equipped with field-installed accessory electric heaters. The heaters are modular in design, with heater frames holding open coil resistance wires strung through ceramic insulators, line-break limit switches and a control contactor.

Heater modules are installed in the compartment below the indoor (supply) fan outlet. Access is through the electric heat access panel. See Fig. 29-31.

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

Refer to the *Small Roof Top Units Accessory Electric Heater and Single Point Box* installation instructions for further details.

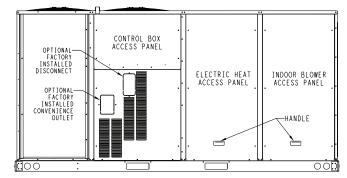


Fig. 29 - Access Panel Location

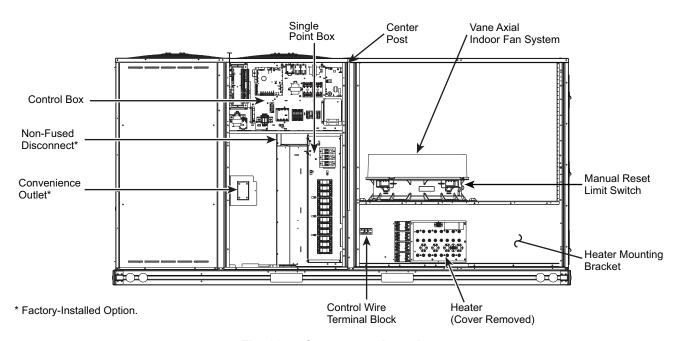


Fig. 30 — Component Location

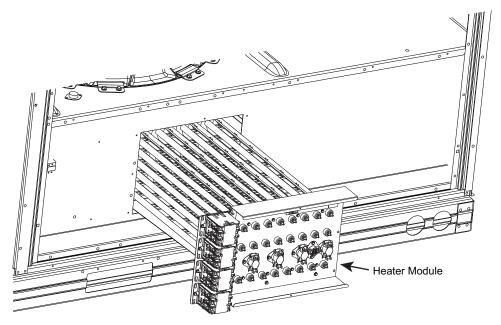


Fig. 31 — Heater Module Installation

# SINGLE POINT BOXES AND SUPPLEMENTARY FUSES

When the unit MOCP device value exceeds 60-A, unit-mounted supplementary fuses are required for each heater circuit. These fuses are included in accessory single point boxes, with power distribution and fuse blocks. The single point box will be installed directly under the unit control box, just to the left of the partition separating the indoor section (with electric heaters) from the outdoor section. The single point box has a hinged access cover. See Fig. 32. The single point box also includes a set of power taps and pigtails to complete the wiring between the single point box and the unit's main control box terminals. Refer to the Small Roof Top Units Accessory Electric Heater and single point box installation instructions for details on tap connections.

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

# SINGLE POINT BOXES WITHOUT FUSES

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

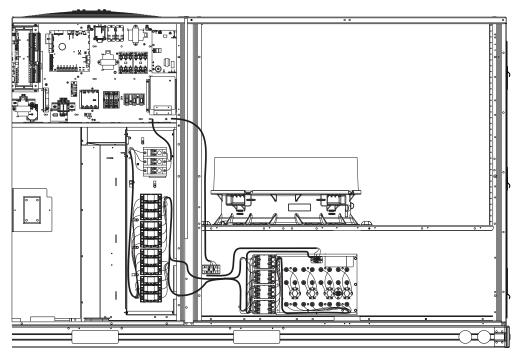


Fig. 32 — Typical Single Point Installation

# LOW-VOLTAGE CONTROL CONNECTIONS

Pull the low-voltage control leads from the heater module — WHT, VIO and BRN to the 4-pole terminal board TB4 located on the heater bulkhead to the left of the Heater module. Connect the WHT lead from Heater circuit #1 to terminal TB4-1. For 2 stage heating, connect the VIO lead from Heater circuit #2 to terminal TB4-2. Connect the BRN lead(s) to terminal TB4-3. See Fig. 33.

# UCB 2 PNK 3 ORN TRAN 1 C ORN PNK BRN Field Connections WHT VIO BRN BRN HR1: Heater Circuit 1 HR2: Heater Circuit 2 (if two-circuit module installed)

Fig. 33 — Accessory Electric Heater Control Connections

# TYPICAL UNIT WIRING DIAGRAMS

See Fig. 34-36 for examples of typical unit control and power wiring diagrams. These wiring diagrams are mounted on the inside of the unit control box. Refer to the wiring diagrams in the unit control box when making field power wiring connections.

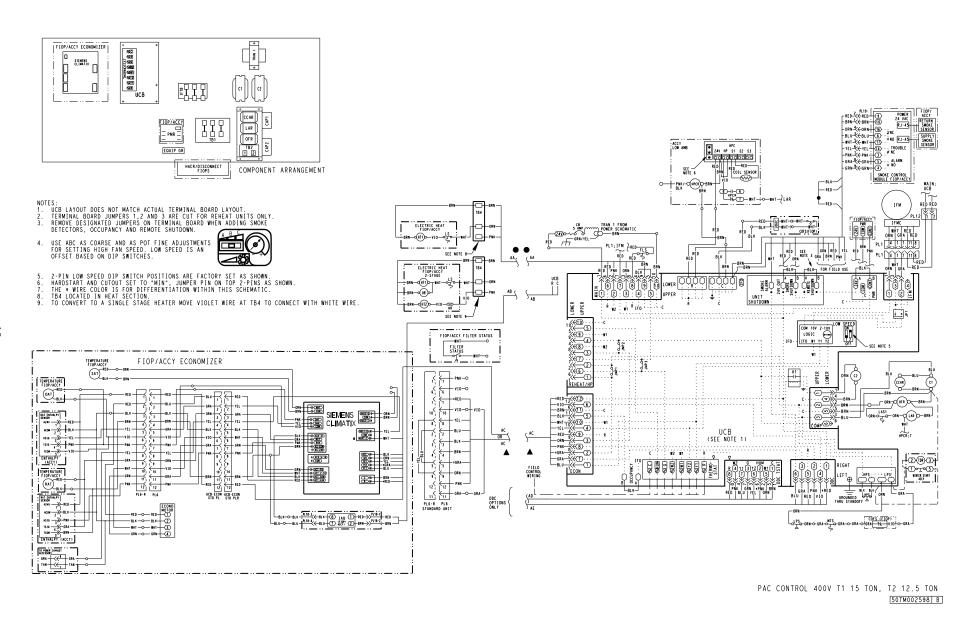


Fig. 34 — 50FC-\*16 Typical Control Wiring Diagram, Electro-Mechanical with POL224 Controller

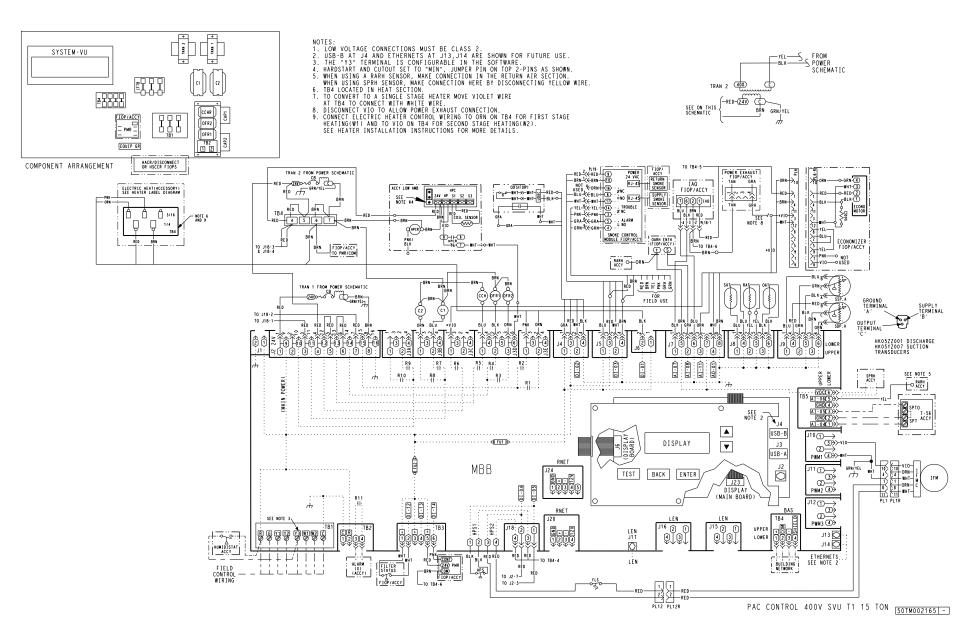


Fig. 35 — 50FC-\*16 Typical Control Wiring Diagram, SystemVu™ Controller

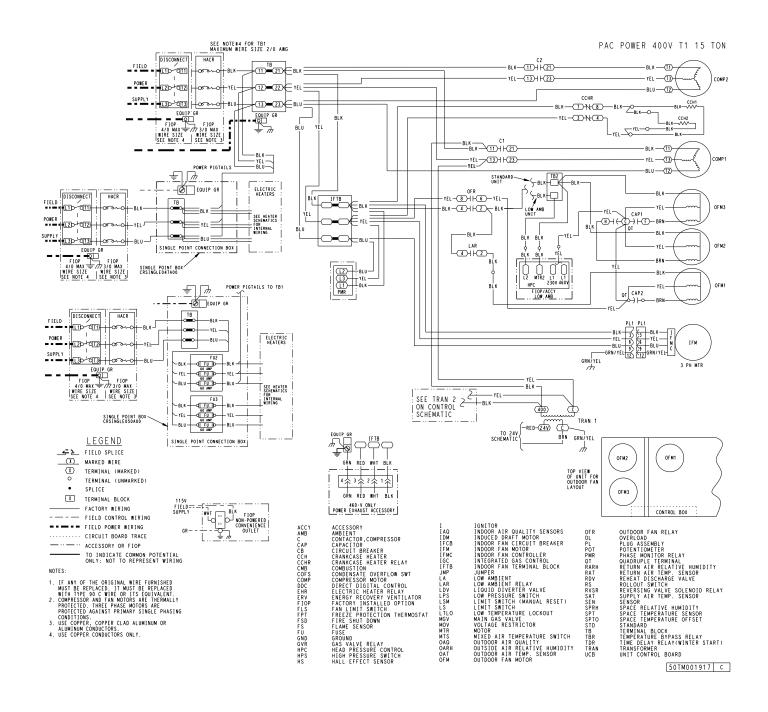


Fig. 36 — 50FC-\*16 Typical Power Wiring Diagram – 400-3-50 Unit Shown

# **EconomizerONE (Factory Option)**

#### **ECONOMIZER SETTINGS**

# Interface Overview

#### **EconomizerONE**

The factory-installed accessory consists of the following:

- Ultra Low Leak Economizer Assembly
- HH79NZ039 OA Dry Bulb Sensor
- HH79NZ039 Mixed Air Sensor
- POL224 Controller
- 50HE005489 Harness

#### POL224 Economizer Module Wiring

The economizer controller used on electromechanical units is a Siemens POL224, which is to be located in the RTU base unit's control box. See Fig. 37 for a button description for the POL224 controller. Refer to the unit dimensional drawings for the location of the control box access panel.

The POL224 controller provides the following:

- One-line LCD After a period of inactivity, the controller displays the default HMI screen (free cooling status, 1FREE-COOL YES, or 1FREE COOL NO). See Fig. 37-41.
- 2. Operation button (Up button) Move to the previous value, step, or category.
- 3. Operation button (Down button) Move to the next value, step, or category.
- 4. Operation button (Enter button):
  - a. Press Enter to edit the current value or option.
  - b. Press Enter to confirm a newly selected value or option.
  - c. Press Enter + Up to jump up one entire category.
- 5. Press Enter + Down to jump down one entire category.

#### User Interface and Keypad

The controller user interface consists of an LCD display and a 3-button keypad for input. The LCD is a 16 character by 1-line dot matrix display. The keypad is used to navigate and change the desired menu items on the display. See Fig. 37.

The Climatix<sup>TM1</sup> mobile application allows for installation, commissioning, and servicing. Scanning a QR code on the controller allows users to download the mobile application on Android<sup>TM1</sup> or Apple iOS<sup>®1</sup>, but a Wi-Fi/WLAN stick is needed. See Fig. 37 and 38. Plug Wi-Fi/WLAN stick into controller USB port for temporary connection for mobile application setup. The Wi-Fi/WLAN stick can be used for multiple units.

#### Menu Structure

Menus are displayed in the economizer controller in categories. There are 8 first-level menus, each of which is represented by a number at the beginning of the line on the LCD. Pressing Enter + Up or Down can toggle between different first-level menus. Submenus follow the numbered first-level menus closely. Pressing Up or Down can toggle between different submenus.

At the end of the line, the LCD displays the value of the current submenu (if any). If the value is editable, pressing Enter will put the terminal in Edit mode. The value is then highlighted for change. After making a change by pressing Up or Down, press Enter to confirm the change and exit the Edit mode. See Fig. 40.

# Powering the Economizer Controller

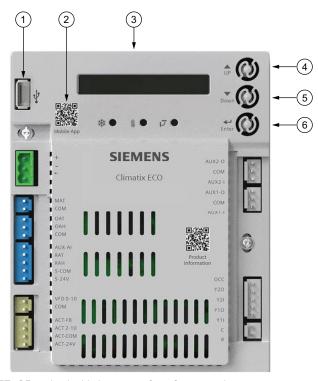
The POL224 controller power connections are made through the economizer harness (P/N 50HE005489). Connections from the harness are made to the C (24 vac common) and R (24 vac power) terminals of the economizer controller. See Fig. 39.

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#### **LED Indication**

NOTE: If different faulty events occur at the same time, the sensor/DAC LED lights up following this priority: Red  $\rightarrow$  Yellow  $\rightarrow$  Off. For example, if there is a humidity sensor error and air temperature failure at the same time, the sensor LED turns red rather than yellow. See Fig. 41 and Table 3.

IMPORTANT: After the economizer controller enters the running state, it may take one minute for peripheral devices to complete initialization. Before that, LED indication might be unstable.



NOTE: QR codes in this image are for reference only.

NO.	DESCRIPTION
1	USB port for Wi-Fi/WLAN stick
2	QR code to download Climatix™ mobile application
3	One-line LCD. After a period of inactivity, the controller displays the default HMI screen (free cooling status, 1FREECOOL YES or 1FREECOOL NO)
4	Operation button (Up button) - Move to the previous value, step or category
5	Operation button (Down button) - Move to the next value, step or category
6	Operation button (Enter button): Press to edit the current value or option. Press to confirm a newly selected value or option. Press Enter + Up to jump up one entire category. Press Enter + Down to jump down one entire category.

Fig. 37 — POL224 Controller



NOTE: QR codes in this image are for reference only.

Fig. 38 — Wi-Fi/WLAN Stick

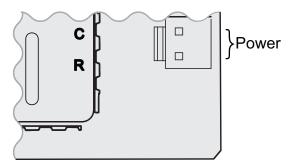
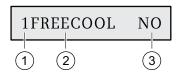


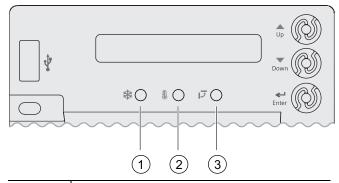
Fig. 39 — Powering the Economizer Controller



No.	Description
1	Number representing the first-level menu of <b>Status Display</b> . Different numbers represent different menus:
	1: Status Display
	2: Basic Settings
	3: Advanced Settings
	4: Alarms
	5: Enter Configuration State and Reset
	6: I/O Config
	7: Testing
	8: Enter Running State
2	Submenu <sup>a</sup>
3	Value of the current submenu <sup>a</sup>

See Setup and Configuration on page 32 for detailed submenus, together with possible values or ranges.

Fig. 40 — Menu Structure Descriptions



NO.	DESCRIPTION
1	Free Cooling LED
2	Sensor LED
3	DAC LED

Fig. 41 — LED Indication

Table 3 — LED Indication

STATUS	FREE COOLING LED	SENSOR LED	DAC LED
Commissioning mode	Yellow Blinking	Yellow Blinking	Yellow Blinking
Power start-up	Yellow On	Yellow On	Yellow On
Free cooling is running	Green On	_	_
Free cooling is available but not running	Green Blinking		_
Not economizing when it should	Red Blinking		_
Economizing when it should not	Red On		_
Sensor working okay	_	Green On	_
Humidity sensor error	_	Yellow On	_
CO <sub>2</sub> sensor error	_	LED Off	_
Air temperature fault/failure	_	Red On	_
Excess outdoor air		Red Blinking	_
Damper working okay	_	_	Green On
Damper not modulating	_	_	Red On
Damper slippage	_	_	Red Blinking
Damper unplugged	_	_	Fast Red Blinking
Terminal ACT-FB is configured but no available feedback signal	_	_	LED Off

#### **Functions**

# Free Cooling Economizing

Free cooling uses unconditioned outside air to cool the space directly. The economizer controller enables or disables free cooling after it judges which control mode is active. It also uses hysteresis to ensure a smooth switchover.

Depending on the sensors that are used, there are 4 different control modes. In different control modes, the assessed conditions are different. See Table 4.

# **Default Hysteresis Setting**

Hysteresis setting (DB) defaults to −16.6°C (2°F). See Fig. 42.

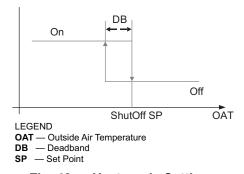


Fig. 42 — Hysteresis Settings

Table 4 — Free Cooling Functions

CONTROL MODE	SENSORS USED	ENABLE FREE COOLING?
Control Mode 1 • Fixed Dry Bulb	OA (outside air) Temperature Sensor and MA (Mixed Air) Temperature Sensor	The outside air dry bulb temperature is compared with the set temperature shutoff set point.  If the outside air dry bulb temperature is below the temperature shutoff set point, then the outside air is used to meet all or part of the cooling demand.
Control Mode 2 • Differential Dry Bulb (Dual Dry Bulbs)	OA Temperature Sensor, RA (Return Air) Temperature Sensor, and MA Temperature Sensor	The outside air dry bulb temperature is compared with the return air dry bulb temperature. If both OAT and RAT are higher than the temperature high limitation, then free cooling is prohibited. If OAT or RAT is lower than the temperature high limitation and the outside air dry bulb temperature is lower than the return air dry bulb temperature, then the outside air is used to meet all or part of the cooling demand.
Control Mode 3 Combination Fixed Enthalpy and Fixed Dry Bulb Control	OA Temperature and Humidity Sensor and MA Temperature Sensor	The outside air dry bulb temperature and enthalpy are compared with the set temperature and enthalpy shutoff set points.  If the outside air enthalpy is lower than the set enthalpy shutoff set point, and the outside air dry bulb temperature is lower than the temperature shutoff set point, then the outside air can be used for economizing.
Control Mode 4     Combination of Differential Enthalpy and Fixed Dry Bulb	OA Temperature and Humidity Sensor, RA Temperature and Humidity Sensor, and MA Temperature Sensor	The outside air dry bulb temperature and enthalpy are compared with the temperature shutoff set point and return air enthalpy. If both OA enthalpy and RA enthalpy are higher than the enthalpy high limitation, then free cooling is prohibited. If OA enthalpy or RA enthalpy is lower than the enthalpy high limitation, outside air enthalpy is lower than the return-air enthalpy, and the outside air dry bulb temperature is lower than the set temperature shutoff set point, then outside air can be used for economizing.

#### <u>Damper Modulation During Free Cooling</u>

Once outside air is suitable for free cooling, the controller modulates the damper based on MAT (mixed air temperature, default) or OAT (outside air temperature). Refer to Table 4.

If MAT is used when free cooling is enabled, then MAT set point (3MAT SET, configurable in Parameter Settings — Advanced — see page 35) is used for MAT modulating. When MAT falls below the anti-freeze set point (3FRZ PROT), the damper either fully closes or opens to the minimum position (configurable in Parameter Settings — Advanced — see page 35).

- If MAT is lower than MAT set point, then the damper is modulated to maintain MAT set point, toward fully closed or open to the minimum position based on occupancy status if MAT continues dropping.
- 2. If MAT is in the range [MAT set point, (MAT set point + neutral zone band [0.5°C (1°F) by default])], then the damper position does not change.
- 3. If MAT is higher than (MAT set point + neutral zone band), then the damper modulates toward fully open.
- 4. If MAT is 5.5°C (10°F) higher than MAT set point, then the damper fully opens to 100%.

If OAT is used when there is a cooling demand, then the damper can be opened to different positions depending on different outside air temperatures:

- 1. If outside air is higher than 10°C (50°F) but lower than the temperature shutoff set point, then the damper is fully open.
- 2. If outside air is higher than OAT lockout set point but lower than 10°C (50°F), then linear modulation is applied when only Cooling Stage 1 Input (Y1I) is ON. Result of the following formula indicate the damper's open position:

([OAT – OAT Lockout Set Point] / [50 – OAT Lockout Set Point]) \* (80% – MIN POS) + MIN POS

NOTE: When both free cooling and mechanical cooling are on, damper remains fully open regardless of the modulating logic.

#### <u>Location-Based Shutoff Set Points</u>

The economizer controller can get location-based temperature and enthalpy shutoff set points automatically if it is connected to the Climatix™ mobile application. Once a Wi-Fi/WLAN stick is plugged in, the economizer controller can establish network connection with the mobile application. The temperature and enthalpy shutoff set points obtained via the phone or tablet's GPS functionality can then be synchronized to the economizer controller.

#### Cooling Stage Operation

The economizer controller accepts inputs for 1 and 2-stage cooling inputs, and reroutes to the RTU through the relay connection Y1 and Y2.

The operation of the cooling stages is determined by the availability of Free Cooling provided by the economizer operation mode. See Cooling Stage I/O Logic tables, see Tables 5-6. Based on the use of Free Cooling, the operating modes are as follows:

- Y1 is Stage 1 Cooling Demand
- Y2 is Stage 2 Cooling Demand
- Free Cooling is always the first cooling stage
- Cooling Stage 1 call from the Commercial Thermostat (Y1) energizes the Y1 input to the Economizer Controller
- Cooling Stage 2 call from the Commercial Thermostat (Y2) energizes the Y2 input to the Economizer Controller

Table 5 — 1 and 2-Stage Cooling Stage I/O Logic

ECONOMIZER CONDITION MET	Y1	Y2	COOLING STAGE 1	COOLING STAGE 2
NO	On	On	On	On
NO	On	Off	On	Off
NO	Off	Off	Off	Off
YES	On	On	On	On/Offa
YES	On	Off	Off	Off
YES	Off	Off	Off	Off

#### NOTE(S):

If OAT ≤ MAT set point (3MAT SET), then Relay 2 is always OFF to disable Cooling Stage 2. Otherwise, if both stages of cooling (Y1 and Y2) are **ON** for more than a set time (15 minutes by default), Y2 remains **ON**, and the OAT is higher than MAT set point, then Relay 2 energizes to allow Y2 pass-through to enable Cooling

Table 6 — 2-Stage Cooling Stage I/O Logic

ECONOMIZER CONDITION MET	Y1	Y2	COOLING STAGE 1	COOLING STAGE 2
NO	On	On	On	On
NO	On	On	On	On
NO	On	Off	On	Off
NO	Off	Off	Off	Off
YES	On	On	On	On
YES	On	On	On	On/Off
YES	On	Off	Off	Off
YES	Off	Off	Off	Off

IMPORTANT: The Economizer Controller can tolerate thermostat wiring mismatch, e.g., Thermostat Y1 → Economizer Y2-IN, Thermostat Y2  $\rightarrow$  Economizer Y1-IN. The handling logic is Stage =Y1I + Y2I. For example, Y1O = 1 if Stage > =1,  $Y\overline{2}O = 1$  if Stage > = 2.

#### Multi-Speed Fan Support

The Economizer Controller supports connection to 1 and 2-speed fans. When the unit is equipped with a multi-speed fan, the damper responds to multiple fan speeds via multiple minimum positions (MIN POS) to keep minimum airflow. See Tables 7-9.

Table 7 — Damper MIN POS for 2-Speed Fana

Y1	Y2	W1 or O/B	Spd L	Spd H	Pos L	Pos H
Х	_	_	Χ	_	Χ	_
X	Х	_	_	Χ	_	Χ
_	_	Х	_	Х	_	Х

#### NOTE(S):

A multi-speed fan is not controlled by the economizer controller but an external logic board.

#### LEGEND

Pos L — Damper MIN POS for Low-Speed Fan Pos H — Damper MIN POS for High-Speed Fan

Spd L — Low Speed (Fan) Spd H — High Speed (Fan)

Table 8 — Different Fan Speeds with Different Configured Outputsa

FAN TYPE	1-SPEED COOLING <sup>b</sup>	2-STAGE COOLING <sup>b</sup>
1-SPEED FAN°	Spd H (regardless of cooling demand, OCC=Yes)	Spd H (regardless of cooling demand, OCC=Yes)
2-SPEED FAN°	Spd L     (0 or 1 cooling     demand)     Spd H     (2 cooling demands)	Spd L     (0 or 1 cooling demand)     Spd H     (2 cooling demands)

#### NOTE(S):

- If a single-speed fan connects to the controller, then it opens directly on the call of cooling/heating. The damper position is Pos H. Configured by Y1O or Y2O.
- Configured by 6FAN.

#### **LEGEND**

Spd L — Low Speed (Fan) Spd H — High Speed (Fan)

Table 9 — Different Damper Minimum Positions with **Different Configured Outputs** 

FAN TYPE	1-SPEED COOLING <sup>a</sup>	2-STAGE COOLING <sup>a</sup>
1-SPEED FAN <sup>b</sup>	Pos H (regardless of cooling demand, OCC=Yes)	Pos H (regardless of cooling demand, OCC=Yes)
2-SPEED FAN <sup>b</sup>	Pos H (regardless of cooling demand, OCC=Yes)	Pos L     (0 or 1 cooling demand)     Pos H     (2 cooling demands)

#### NOTE(S):

- a. Configured by Y1O or Y2O.b. Configured by 6FAN.

#### LEGEND

Pos L — Damper MIN POS for Low-Speed Fan Pos H — Damper MIN POS for High-Speed Fan

If DCV (demand controlled ventilation) is enabled, then each fan speed corresponds to 2 damper position ventilation set points (VENT MIN, VENT MAX), e.g., Pos L corresponds to 2VENTMIN L... 2VENTMAX L. See Table 10 for Different Damper Position Setting with Different Configured Outputs with DCV enabled.

If CO<sub>2</sub> sensor is connected but DCV is disabled, then each fan speed corresponds to one minimum damper position ventilation set point. See Table 11 for Different Damper Position Setting with Different Configured Outputs with DCV disabled.

Table 10 — Different Damper Position Setting with Different Configured Outputs (DCV is Enabled)

FAN TYPE	1-STAGE COOLING <sup>a</sup>	2-STAGE COOLING <sup>a</sup>
1-SPEED FANb	2VENTMIN H to 2VENTMAX H (regardless of cooling demand, OCC=Yes)	2VENTMIN H to 2VENTMAX H (regardless of cooling demand, OCC=Yes)
2-SPEED FAN <sup>b</sup>	2VENTMIN H to 2VENTMAX H (regardless of cooling demand, OCC=Yes)	2VENTMIN L to 2VENTMAX L     (0 or 1 cooling demand)     2VENTMIN H to 2VENTMAX H     (2 cooling demands)

#### NOTE(S):

- a. Configured by Y1O or Y2O.b. Configured by 6FAN.

Table 11 — Different Damper Position Setting with Different Configured Outputs (DCV is Disabled, CO<sub>2</sub> sensor is connected)

FAN TYPE	FAN TYPE 1-STAGE COOLING <sup>a</sup> 2-STAGE COOLIN	
1-SPEED FANb	2VENTMIN H (regardless of cooling demand, OCC=Yes)	2VENTMIN H (regardless of cooling demand, OCC=Yes)
2-SPEED FAN <sup>b</sup>	2VENTMIN H (regardless of cooling demand, OCC=Yes)	2VENTMIN L     (0 or 1 cooling demand)     2VENTMIN H     (2 cooling demands)

#### NOTE(S):

- a. Configured by Y1O or Y2O.b. Configured by 6FAN.

# Cooling Delay via Increasing Fan Speed

If there is cooling demand while outside air is suitable for economizing, then the economizer controller tries to increase fan speed to maximize the use of outside air first. If the cooling demand is not reached within a set time, then mechanical cooling will be enabled

# Typical field application:

- Prerequisites:
  - a. Outside air is suitable for economizing and free cooling is ON.
  - b. Fan connected to the controller supports multiple speeds. Cooling delay function does not work if only a one-speed fan is connected to the controller.
- If it is a 2-speed fan and there are 2 cooling demand inputs/outputs, when Y1-Input is called, the controller sets fan speed to Speed Low. Damper is fully open (100%).

If Y2-Input is also called, then the controller increases fan speed to Speed High and starts fan delay (2FAN DLY) time. After the delay time runs out, the controller starts Y1-Output.

#### <u>Demand Controlled Ventilation (DCV)</u>

If a field-installed CO<sub>2</sub> sensor is connected to the EconomizerONE controller, then a demand-controlled ventilation strategy will operate automatically. As the CO<sub>2</sub> level in the space increases above the set point (on the EconomizerONE controller), the minimum position of the dampers will be increased proportionally until the Maximum Ventilation setting is reached. As the space CO<sub>2</sub> level decreases because of the increase in fresh air, the outdoor damper will follow the higher demand condition from the DCV mode or from the free cooling mode.

The controller modulates the outside air damper based on the CO<sub>2</sub> level through the ppm value selected between the range of 500 and 2000 ppm. The measured CO<sub>2</sub> concentration value is compared with the set DCV set point. If the measured CO<sub>2</sub> concentration value is below the DCV set point, keep the damper to the minimum position. Otherwise, enable DCV. Once DCV is enabled, the DCV PID starts to run to control the indoor CO2 concentration value towards the DCV set point. The damper opens to the maximum position.

NOTE: DCV is disabled if the controller receives no occupancy signal.

DCV operation is available in Occupied and Unoccupied periods with EconomizerONE system. However, a control modification will be required on the unit system to implement the Unoccupied period function. Refer to controller accessory installation instruction manual for further controls and command operation information.

# High Humidity Limitation

The economizer controller applies high limit of humidity to enthalpy-based economizing. When the OA dew point is below the dew point set point, enthalpy-based economizing is available. Otherwise, enthalpy-based economizing is unavailable.

#### Anti-Freeze Protection

The economizer controller initiates the anti-freeze protection if MAT or OAT temperature falls below the anti-freeze set point.

# MAT-Based Anti-Freeze Protection

- If MAT temperature falls below the anti-freeze set point (3FRZ PROT) and:
- If unit type is conventional unit and cooling/heating conventional operation mode is enabled, then the controller closes both damper and compressor.
- If unit type is heat pump and heat pump operation mode is enabled, then the controller closes the damper.
- If the MAT sensor fails, MAT is substituted by OAT to continue the anti-freeze assessment. If OAT sensor also fails, then the controller closes the damper immediately.

# OAT-Based Anti-Freeze Protection

If OAT temperature falls below the OAT lockout set point (3OAT LOCK) and:

- If unit type is conventional unit and cooling/heating conventional operation mode is enabled, then the controller stops the compressor from running.
- If unit type is heat pump and heat pump operation mode is enabled, then the controller compressor is bypassed.

# **Exhaust Fan Operation**

Up to 2 exhaust fans can be connected to the economizer controller.

If Exhaust Fan 1 is connected and configured, then Exhaust Fan 1 parameter group (L, M, and H) is available, depending on fan configuration.

- If Exhaust Fan 2 is connected and configured, then Exhaust Fan 2 parameter group (L, M, and H) is available, depending on fan configuration.
- The controller energizes Exhaust Fan Relay 1 and Exhaust Fan Relay 2 if the damper position reaches Exhaust Fan 1 parameter setting and Exhaust Fan Relay 2 parameter setting respectively. The selection of L, M, or H matches the current fan speed.

NOTE: If terminal ACT-FB is configured, then the damper position is the damper feedback position. If feedback signal is unavailable, then it is the simulated position.

#### Occupancy Input

The economizer controller can receive an occupancy signal from the connected thermostat or work under Occupied mode all the time. This is configurable in the Thermostat setup from Climatix<sup>TM</sup> mobile application or under the menu of I/O Configuration on the inbuilt display. See "Parameter Settings—I/O Configurations" on page 35 for more information.

IMPORTANT: On the call of cooling, when the controller is configured to receive signal from the thermostat but the thermostat is working under the Unoccupied mode, the damper is fully closed if outside air is not suitable for economizing. If outside air is suitable for economizing, then the damper is fully open.

#### Pre-occupancy Purge

The Pre-Occupancy purge demand comes from the configuration of the Auxiliary features in Climatix<sup>TM</sup> mobile application or **6AUX2-I** under the menu of I/O Configuration on the inbuilt display.

During pre-occupancy purge on the call of heating, or when there is no cooling/heating demand, the damper position is MIN POS.

During pre-occupancy purge on the call of cooling, the damper position is MIN POS if outside air is not suitable for economizing. If outside air is suitable for economizing, then the damper is fully open.

# Airflow Commissioning

Airflow measurement station (differential pressure signal) can connect to the controller temporarily to run airflow commissioning to calculate, calibrate, and store 4 fan speed characteristic curves automatically at damper positions 40%, 60%, 80%, and 100%. The controller places the damper to a proper position to meet minimum or any other airflow requests in cfm. Users can enable this function only from the mobile application if the related function is available in the current mobile application version.

# Fault Detection and Diagnostics

The economizer controller can detect and diagnose free cooling faults, sensor operation faults, and damper modulating faults. It can also report anti-freeze and shutdown notifications and actuator errors. Following is a list of all detectable or reportable information:

- Sensor disconnected or has no signal.
- Sensor short or high signal (under range or over range).
- Not economizing.
- Unexpected economizing.
- · Excess outdoor air.
- Damper not modulating.
- Input power monitor and brownout. After detecting brownout, the economizer controller enters the brownout protection mode and disables all of the relay outputs.
- Anti-freeze notifications.
- · Shutdown notifications.
- Actuator errors.
- Leaving air temperature is too low or too high.
- Cooling/heating error.
- Damper actuator cycle count. Parameter 1ACT CNT indicates number of times actuator has cycled. It is resettable via HMI item 8ACT CNT RESET.

IMPORTANT: The first 6 faults are detectable via LEDs or alarm reports on the LCD. See LED Indication on page 23 and Alarms on page 36 for fault indications. These faults can also be displayed in the Operating section of the Climatix $^{\text{TM}}$  mobile application.

#### <u>Firmware Update</u>

NOTE: Back up configurations before firmware update. All the previous configuration data are erased after firmware update.

NOTE: Contact Application Engineering for more information on support for firmware.

IMPORTANT: If the controller enters the configuration state for the convenience of I/O configurations, then users can manually switch to the running state after finishing configurations. To do so, press Enter + Up at the same time, then press Enter to confirm the switch after 8RUN STATE appears on the LCD.

# **MARNING**

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

# Mounting Devices Connected to the Economizer Controller

Devices like damper actuators, sensors (temperature sensor, humidity sensor, combination temperature and humidity sensor,  $CO_2$  sensor), thermostats, and exhaust fans can be connected to the economizer controller. For information on how to mount the devices, see the device's installation instructions. See Fig. 43 and Table 12 for economizer controller wiring details.

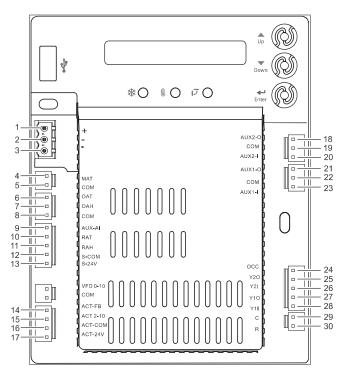


Fig. 43 — Economizer Control Wiring

Table 12 — Economizer Control Wiring Settings

NO.	LABEL	TYPE	DESCRIPTION
1	+	RS485 Modbus A	Line A
2	-	RS485 Modbus B	Line B
3	٦	GND_ISO	Earth Ground
4	MAT	Type II NTC 10K or 0-10 vdc	Mixed or Discharge Air Temperature Sensor
5	COM	COM	Mixed or Discharge Air Temperature Sensor Common
6	OAT	Type II NTC 10K or 0-10 vdc	Outside Air Temperature Sensor
7	OAH	0-10 vdc or 4-20mA	Outside Air Relative Humidity Sensor
8	СОМ	сом	Outside Air Temperature Sensor or Outside Air Relative Humidity Sensor Common
9	AUX-AI	0-10 vdc, 2-10 vdc or 0-5 vdc	Air Quality Sensor or Pressure Sensor
10	RAT	Type II NTC 10K or 0-10 vdc	Return Air Temperature Sensor
11	RAH	0-10 vdc or 4-20mA	Return Air Relative Humidity Sensor
12	S-COM	COM	24 vac Common
13	S-24V	24 vac	24 vac Power Out to Sensors
14	ACT-FB	2-10 vdc	Damper Actuator Feedback
15	ACT2-10	2-10 vdc	Damper Actuator Output
16	ACT-COM	СОМ	Damper Actuator Output Common
17	ACT-24V	24 vac	24 vac Power Out to Damper Actuator
18	AUX2-O	24 vac OUT	Configurable: • Exhaust Fan (1 or 2) • System Alarm Output (Title 24)
19	COM	СОМ	24 vac Common
20	AUX2-I	24 vac IN	Configurable:
21	AUX1-O	24 vac OUT	Configurable:  • Exhaust Fan (1 or 2)  • System Alarm Output (Title 24)
22	COM	СОМ	24 vac Common
23	AUX1-I	24 vac IN	Configurable:
24	OCC	24 vac IN	Occupancy Input
25	Y2O	24 vac OUT	Cooling Stage 2 Output to Stage 2 Mechanical Cooling
26	Y2I	24 vac IN	Cooling Stage 2 Input from Commercial Thermostat
27	Y10	24 vac OUT	Cooling Stage 1 Output to Stage 1 Mechanical Cooling
28	Y1I	24 vac IN	Cooling Stage 1 Input from Commercial Thermostat
29	С	СОМ	24 vac Common
30	R	24 vac	24 vac Power

See Fig. 44-48 for wiring details.

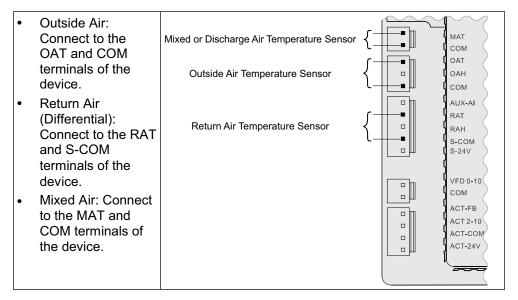


Fig. 44 — Temperature Sensor Connection

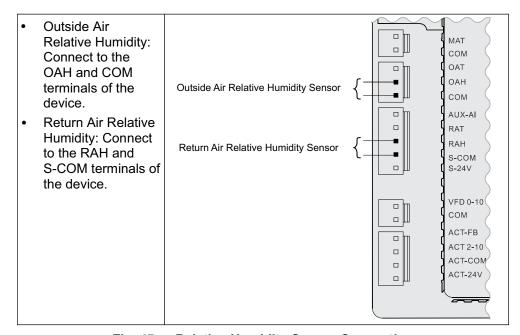


Fig. 45 — Relative Humidity Sensor Connection

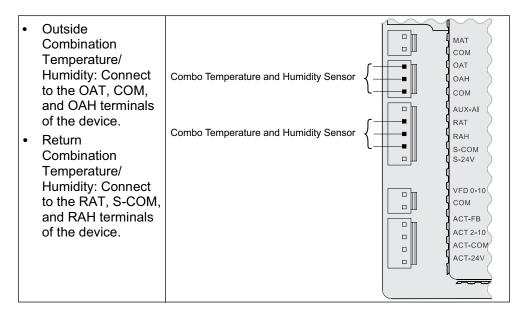


Fig. 46 — Combination Temperature/Humidity Sensor Connection

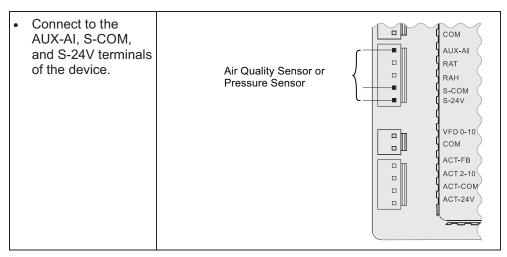


Fig. 47 — CO<sub>2</sub>/Pressure Sensor Connection

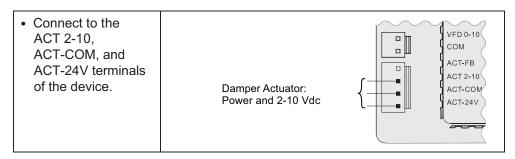


Fig. 48 — Damper Actuator Connection

#### SETUP AND CONFIGURATION

IMPORTANT: Before setup and configuration, it is recommended to obtain some location-based values, such as shutoff points, or utilize the location services in the Climatix<sup>TM</sup> mobile application.

Set up and configure the economizer controller before putting it into usage. This can be accomplished by using the Climatix<sup>™</sup> mobile application or the inbuilt display. After sensor, compressor, thermostat, or actuator is connected to the economizer controller, values/statuses are displayed in the Operating section of the mobile application and on the LCD. Users can manually change basic and advanced settings, configure I/Os, and test the damper operation and any configured outputs by modifying the corresponding parameter values in the local device or mobile application. See Tables 13-20 for a complete list of all parameters that users can find on the LCD display. Refer to it during the setup and configuration process.

NOTE: For all units, the Climatix application login is: **Administrator**. For units coming from the factory with CO<sub>2</sub> configuration or single enthalpy (control mode 3), the controller password is OneBT2.1. For all other units, use the controller password OneBT.

NOTE: Parameters and display menus may display differently/dynamically if different applications are configured. See Tables 13-20.

IMPORTANT: Not all operations are available on the local POL 224. For example, users can only obtain shutoff set points and perform cfm commissioning via the Climatix<sup>™</sup> mobile application. Setup and configuration on the local device are only recommended if operations from the mobile application are unavailable. Check the mobile application for all operations that can be performed from the mobile application end.

IMPORTANT: By connecting the RS485 port to a PC, all parameters are also readable or writable from PC tools such as Modbus Poll.exe via Modbus<sup>®a</sup> and Yabe.exe via BACnet<sup>™a</sup> MSTP (Bps 38400 [default], Bps 9600, Bps 19200, Bps 115200). Note that an external End of Line (EOL) element is required to achieve Baud Rate 115200 at a maximum cable length of 4000 ft (1.2 km).

#### NOTE(S)

a. Third-party trademarks and logos are the property of their respective owners.

# Table 13 — Status Display

PARAMETER	DESCRIPTION	VALUE	
1FREECOOL	Indicates if the system can use outdoor air for free cooling.		
1ECON ENAB	Indicates if outdoor air is being used for the first stage of cooling.		
1OCCUPIED	Indicates if the space is occupied. If users choose <b>ALWAYS</b> for <b>6OCC</b> when configuring I/Os, the parameter value is <b>YES</b> ; if users keep the default selection <b>T-STAT</b> for <b>6OCC</b> and the controller receives 24-v signal from OCC input, the value is <b>YES</b> . Otherwise, the value is <b>NO</b> .	YES NO	
1Y1-IN	Y1-IN call from thermostat for Cooling Stage 1.		
1Y1-OUT	Y1-OUT signal to compressor for Cooling Stage 1.		
1Y2-IN	Y2-IN call from thermostat for Cooling Stage 2.		
1Y2-OUT	Y2-OUT signal to compressor for Cooling Stage 2. <b>Dynamic item:</b> Appears only if Y2-OUT terminal is configured.		
1AUX1-I	Aux1-IN signal. <b>Dynamic item:</b> Appears only if Aux1-In terminal is configured.	ON OFF	
1AUX1-O	Aux1-OUT signal. <b>Dynamic item:</b> Appears only if Aux1-OUT terminal is configured.		
1AUX2-I	Aux2-IN signal. <b>Dynamic item:</b> Appears only if Aux2-In terminal is configured.		
1AUX2-O	Aux2-OUT signal.  Dynamic item: Appears only if Aux2-OUT terminal is configured.		
1COMP STAGE	Indicates compressor current stage.	Off 1 2 3	
1HEAT ENAB	Indicates if heating is enabled.		
1MIX AIR LOW	Indicates if the anti-freeze protection function is enabled for a mixed air temperature sensor. If the detected air temperature is lower than the anti-freeze protection set point (3FRZ PROT), the parameter value is <b>YES</b> . Otherwise, it is <b>NO</b> .	YES NO	
1MAT PRES	Indicates the present value of the mixed air temperature (MAT) sensor. <b>Dynamic item:</b> Appears only if <b>MAT</b> or <b>AUTO</b> is selected for <b>3DIF T LOC</b> under Parameter Settings — Advanced on page 35.		
1LAT PRES	Indicates the present value of the leaving air temperature (LAT) sensor. <b>Dynamic item:</b> Appears only if <b>LAT</b> or <b>AUTO</b> is selected for <b>3DIF T LOC</b> .		
10AT PRES	Indicates the present value of the outdoor air temperature (OAT) sensor. <b>Dynamic item:</b> Appears only if an OAT sensor is configured.	The corresponding detected	
10AH PRES	Indicates the present value of the outdoor air relative humidity (OAH) sensor. <b>Dynamic item:</b> Appears only if an OAH sensor is configured.	The corresponding detected value is displayed on the LCD.	
1RAT PRES	Indicates the present value of the return air temperature (RAT) sensor. <b>Dynamic item:</b> Appears only if a RAT sensor is configured.		
1RAH PRES	Indicates the present value of the return air relative humidity (RAH) sensor. <b>Dynamic item:</b> Appears only if a RAH sensor is configured.		
1CO2 PRES	Indicates the present value of the $CO_2$ sensor. <b>Dynamic item:</b> Appears only if a $CO_2$ sensor is configured.		
1DCV STATUS	Indicates the demand controlled ventilation (DCV) status. <b>Dynamic item:</b> Appears only if a CO <sub>2</sub> sensor is configured.  Displays ON if the measured CO <sub>2</sub> concentration value is above the DCV set point and OFF if below the DCV set point.	ON OFF	
1FAN SPD LV	Indicates the current fan speed status (low, medium, or high). If a one-speed fan is connected and configured, this item is invisible. <b>Dynamic item:</b> Appears only if " <b>6FAN</b> " is configured as " <b>2SPEED</b> " under Parameter Settings — I/O Configurations on page 35.	L H	
1ACT OUT	Indicates current position of damper actuator in v.		
1ACT FB	Indicates feedback signal of damper actuator in v.		
1ACT POS	Indicates current position of damper actuator in % Open.	The corresponding detected	
1ACT CNT	Indicates number of times actuator has cycled (1 cycle = 180 degrees of movement in any direction). Resettable via HMI item <b>8ACT CNT RESET</b> under Enter Running State on page 37.	value is displayed on the LCD.	
1EQUIP	Indicates the equipment type. If HP(O) or HP(B) is chosen for 6AUX1-I, the parameter value is HP(O) or HP(B) respectively. If neither is chosen, the value is CON RTU.	HP(O) HP(B) CON RTU	
10AT LOCK	Indicates status of the OAT cooling lockout function.	NO LCKOUT OVRD	
1INS	Indicates the installation date of the Economizer Controller. If the installation date is incorrect, press Enter to change and confirm month, date and year.	_	

# Table 14 — Parameter Settings — Basic

PARAMETER	DESCRIPTION	RANGE	DEFAULT
2 TEMP OFF	Temperature shutoff set point can be obtained automatically if a smartphone or tablet is connected to the network provided by a Wi-Fi/WLAN stick plugged into the Economizer Controller and the mobile application is installed on the phone or tablet. This can also be a manually defined set point.	4880°F; increment by 1	63°F
2ENTH OFF	Enthalpy shutoff set point can be obtained automatically if a smartphone or tablet is connected to the network provided by a Wi-Fi/WLAN stick plugged into the Economizer Controller and the mobile application is installed on the phone or tablet. This can also be a manually defined set point.  Dynamic item: Appears only if an OAH sensor is configured.	2230 Btu/lbm; increment by 1	28 Btu/lbm
2DVC	Demand controlled ventilation set point can be obtained automatically if a smartphone or tablet is connected to the network provided by a Wi-Fi/WLAN stick plugged into the Economizer Controller and the mobile application is installed on the phone or tablet. This can also be a manually defined set point.  Dynamic item: Appears only if a CO <sub>2</sub> sensor is configured.	3002000PPM; increment by 100	1100PPM
2FAN L ACT	Damper minimum position when fan runs at a low speed.  Dynamic item: Appears only if "6FAN" is configured as "2SPEED" under Parameter Settings — I/O Configurations on page 35.	210V; increment by 0.1	3.6V
2FAN H ACT	Damper minimum position when fan runs at a high speed.  Dynamic item: Appears only if "6FAN" is configured as "1SPEED" or "2SPEED".	210V; increment by 0.1	2.8V
2VENTMAX L	DCV maximum position when fan runs at a low speed. <b>Dynamic item:</b> Appears only if a CO <sub>2</sub> sensor is configured and " <b>6FAN</b> " is configured as " <b>2SPEED</b> ".	210V; increment by 0.1	3.6V
2VENTMAX H	DCV maximum position when fan runs at a high speed. <b>Dynamic item:</b> Appears only if a CO <sub>2</sub> sensor is configured and <b>"6FAN"</b> is configured as <b>"1SPEED"</b> or <b>"2SPEED"</b> .	210V; increment by 0.1	3.6V
2VENTMIN L	DCV minimum position when fan runs at a low speed. <b>Dynamic item:</b> Appears only if a CO <sub>2</sub> sensor is configured and " <b>6FAN</b> " is configured as " <b>2SPEED</b> ".	210V; increment by 0.1	3.1V
2VENTMIN H	DCV minimum position when fan runs at a high speed. <b>Dynamic item:</b> Appears only if a CO <sub>2</sub> sensor is configured and " <b>6FAN</b> " is configured as " <b>1SPEED</b> " or " <b>2SPEED</b> ".	210V; increment by 0.1	2.3V
СЕМ СОММ	Air Flow Chart: <b>CFM commissioning</b> can only be initiated from the mobile application. When <b>CFM commissioning</b> is in progress, the local device reads " <b>CFM COMM</b> ".	_	_
2DEGREES	Temperature unit (°F or °C).	_	°F
2FAN	Fan cfm.	10050,000cfm; increment by 100	5000cfm
2EX1 L	Exhaust Fan 1 low-speed parameter setting.  Dynamic item: Appears only if:  Exhaust Fan 1 is configured.  "6FAN" is configured as "2SPEED".	0100%; increment by 1	65%
2EX1 H	Exhaust Fan 1 high-speed parameter setting.  Dynamic item: Appears only if:  Exhaust Fan 1 is configured.  "6FAN" is configured as "1SPEED" or "2SPEED".	0100%; increment by 1	50%
2EX2 L	Exhaust Fan 2 low-speed parameter setting.  Dynamic item: Appears only if:  Exhaust Fan 2 is configured.  "6FAN" is configured as "2SPEED".	0100%	80%
2EX2 H	Exhaust Fan 2 high-speed parameter setting.  Dynamic item: Appears only if:  Exhaust Fan 2 is configured.  "6FAN" is configured as "1SPEED" or "2SPEED".	0100%; increment by 1	75%
2THL	Temperature high limitation. <b>Dynamic item:</b> Appears only if an RAT sensor is configured.	0100%; increment by 1	83%
2EHL	Enthalpy high limitation. <b>Dynamic item:</b> Appears only if an RAH sensor is configured.	3050 Btu/lbm, increment by 1	33 Btu/lbm
2FAN DLY	Cooling delay via increasing fan speed.	030 min; increment by 1	5 min.

Table 15 - Parameter Settings - Advanced

PARAMETER	DESCRIPTION	VALUE/RANGE	DEFAULT
3FREEZE POS	Anti-freeze protection damper position (closed or minimum).	CLO MIN	CLO
3SD ACT POS	Damper position during shutdown (open or closed).	CLO OPN	CLO
3DIF T LOC	<ul> <li>MAT sensor location:</li> <li>Choose MAT if the sensor is installed before the DX (Direct Expansion) coil.</li> <li>Choose LAT if the sensor is installed after the DX coil.</li> <li>Choose AUTO to let the Economizer Controller automatically detect the location.</li> </ul>	MAT LAT AUTO	LAT
3LAT LOW	Low limit of leaving air temperature.  Dynamic item: Appears only if LAT or AUTO is selected for 3DIF T LOC.	3565°F; increment by 1	45°F
3LAT HIGH	High limit of leaving air temperature.  Dynamic item: Appears only if LAT or AUTO is selected for 3DIF T LOC.	70180°F; increment by 1	80°F
30AT CAL	OAT sensor calibration.	–2.52.5°F; increment by 0.5	0°F
3RAT CAL	RAT sensor calibration. <b>Dynamic item:</b> Appears only if an RAT sensor is configured.	-2.52.5°F; increment by 0.5	_
30AH CAL	OAH sensor calibration. <b>Dynamic item:</b> Appears only if an OAH sensor is configured.	-1010%; increment by 0.5	0%
3RAH CAL	RAH sensor calibration. <b>Dynamic item:</b> Appears only if an RAH sensor is configured.	1 – 10 10%, increment by 0.5	
3MAT CAL	MAT or LAT sensor calibration.	–2.52.5°F; increment by 0.5	0°F
3MAT SET	Set point of MAT or LAT sensor.	3870°F; increment by 1	53°F
3FRZ PROT	Anti-freeze protection set point of MAT sensor.	3555°F; increment by 1	45°F
3ACT TOLR	Actuator tolerance setpoint between output (in percent) and feedback (in percent).	015%; increment by 1	8%
30AT LOCK	OAT lockout set point for anti-freeze protection.	-4580°F; increment by 1	32°F
30AT LCKOVRD	When OAT LOCKOUT is enabled, choose to override the cooling lockout function or not.	YES NO	NO
30AT LOCKODLY	Indicates the overridden time if "YES" is selected for "3OAT LCKOVRD".	0300 min; increment by 1	45 min.

Table 16 — Parameter Settings — I/O Configurations

PARAMETER	DESCRIPTION	VALUE	DEFAULT
60CC	Configures if occupancy status receives signal from the connected thermostat or is displayed as ALWAYS in the Economizer Controller.	T-STAT ALWAYS	T-STAT
6AUX1-I	Auxiliary DI-1. Configurable as:  None. Heat Conventional (W1) from thermostat. Heat pump (reversing valve O). Heat pump (reversing valve B). Pre-occupancy signal from thermostat. Shutdown signal from unit.	NONE HP(O) HP(B) PREOCC SHUTDWN	W1
6AUX2-I	<ul> <li>Auxiliary DI-2. Configurable as:</li> <li>None.</li> <li>Heat stage 1 (W1) from thermostat.</li> <li>Heat pump (reversing valve O).</li> <li>Heat pump (reversing valve B).</li> <li>Pre-occupancy signal from thermostat.</li> <li>Shutdown signal from unit.</li> <li>NOTE: Whichever is chosen for 6AUX1-I does not appear in the list of 6AUX2-I.</li> </ul>	NONE W1 HP(O) HP(B) PREOCC SHUTDWN	NONE
60AT SIG	Configures signal type of OAT sensor.	0-10V NTC10K	NTC10K
6RAT SIG	Configures signal type of RAT sensor.	0-10V NTC10K NONE	NONE
60AH SIG	Configures signal type of OAH sensor.	0-10V	
6RAH SIG	Configures signal type of RAH sensor.	4-20mA NONE	NONE
6MAT SIG	Configures signal type of MAT or LAT sensor.	0-10V NTC10K	NTC10K
6AUX-AI1	<ul> <li>Auxiliary Al-1. Configurable as:</li> <li>CO<sub>2</sub> sensor.</li> <li>Static pressure (temporarily for CFM commissioning) sensor.</li> <li>None.</li> </ul>	PRESSURE CO2 NONE	NONE
6X-AI1 SIG	Configures CO <sub>2</sub> sensor type.  Dynamic item: Appears only if "CO2" is selected for "6AUX-AI1".	0-10V 2-10V 0-5V	0-10V
6CO2 Rng L	Configures the low limit of CO <sub>2</sub> measuring range. <b>Dynamic item</b> : Appears only if "CO2" is selected for "6AUX-AI1".	0500; increment by 10	0
6C02 Rng H	Configures the high limit of CO <sub>2</sub> measuring range. <b>Dynamic item</b> : Appears only if "CO2" is selected for "6AUX-AI1".	10003000; increment by 50	2000

# Table 16 — Parameter Settings — I/O Configurations (cont)

PARAMETER	DESCRIPTION	VALUE	DEFAULT
6AUX-AI2	Choose <b>ACT FB</b> if feedback signal is available from the connected damper actuator. Otherwise, choose <b>NONE</b> .	ACT FB NONE	ACT FB
6Y2O	Choose "COOL 2" if Cooling Stage 2 is available (another compressor is connected to the Economizer). Otherwise, choose "NONE".	COOL 2 NONE	COOL 2
6AUX1-O	<ul> <li>Auxiliary DO-1. Configurable as:</li> <li>None.</li> <li>Exhaust fan (1 or 2).</li> <li>Alarm output to thermostat (Title 24).</li> </ul>	NONE ALARM EXHAUST	EXHAUST
6AUX2-O	Auxiliary DO-2. Configurable as:  None.  Exhaust fan (1 or 2).  Alarm output to thermostat (Title 24).  NOTE: Except for Exhaust Fan, whichever is chosen for 6AUX1-O does not appear in the list of 6AUX2-O.	NONE ALARM EXHAUST	ALARM
6RS485	Switch between MSTP and Modbus.	MSTP MODBUSSLV	MSTP

# Table 17 — Alarm Parameters<sup>a,b</sup>

PARAMETER	DESCRIPTION
NO ALARM	No alarm is activated.
4MAT SEN ALARM	MAT sensor has failed, gone out of range or become disconnected.
4CO2 SEN ALARM	CO <sub>2</sub> sensor has failed, gone out of range or become disconnected.
40AT SEN ALARM	OAT sensor has failed, gone out of range or become disconnected.
40AH SEN ALARM	OAH sensor has failed, gone out of range or become disconnected.
4RAT SEN ALARM	RAT sensor has failed, gone out of range or become disconnected.
4RAH SEN ALARM	RAH sensor has failed, gone out of range or become disconnected.
4FREEZE ALARM	Anti-freeze notification when MAT sensor is below anti-freeze protection set point.
4RTU SHUTDOWN	Notification of Shutdown Active when SHUTDWN is chosen for 6AUX1-I or 6AUX2-I.
4ACTUATOR ALARM	Actuator gets disconnected or has failed.
4ACT UNDER V	Voltage received by the actuator is below expected range.
4ACT OVER V	Voltage received by the actuator is above expected range.
4ACT STALLED	Damper actuator stopped before achieving commanded position.
4ACT SLIPPING	Damper actuator slips after reaching commanded position.
4NOT ECON	Not Economizing when it should.
4ECON SHOULDNT	Economizing when it should not.
4EXCESS OA	Excess outdoor air. Outside air intake is significantly higher than it should be.
4LLA ALARM	Leaving air temperature is lower than the low limit (3LAT LOW).
4HLA ALARM	Leaving air temperature is higher than the high limit (3LAT HIGH).

# NOTE(S):

- a. All alarms are dynamic items. An alarm appears only if a related symptom mentioned above is detected.
   b. An alarm activation triggers a general alarm, then the configured system alarm output (AUX1-O or AUX2-O) is activated. If there is no alarm, NO ALARM is displayed on the HMI.

# Table 18 — Test Commands

PARAMETER	DESCRIPTION	
7DAMPER MIN POS	Press Enter to test if the Economizer Controller can drive damper to minimum position.	
7DAMPER CLOSE	Press Enter to test if the Economizer Controller can drive damper to 100% Closed.	
7DAMPER OPEN	Press Enter to test if the Economizer Controller can drive damper to 100% Open.	
7DAMPER ALL	Press Enter to perform all the above tests.	
7DAMPER	Press Enter to test if the Economizer Controller can drive damper to the selected voltage.	
7Y10	Press Enter to test if the Economizer Controller can turn on or off the first stage of cooling (close or open relay Y1O).	
7Y2O	Press Enter to test if the Economizer Controller can turn on or off the second stage of cooling (close or open relay Y2O).	
7AUX1-O	Press Enter to test AUX1-O connection (close or open relay AUX1-O).	
7AUX2-O	Press Enter to test AUX2-O connection (close or open relay AUX2-O).	

# Table 19 — Enter Running State

PARAMETER	DESCRIPTION
8RUN STATE	Change to Running State. Press Enter to confirm the change.
8ENTER RUN?	Confirm the change to Running State.
8FACTORY DEF	Perform factory reset. Press Enter to confirm the reset. (This action resets the controller password to default: OneBT.)
8DEF CONFIRM?	Confirm the factory reset.
8ACT CNT RESET	Damper count reset.
8VER x.x.x	Firmware version information such as 0.1.10.

# Table 20 — Enter Configuration State and Restart

PARAMETER	DESCRIPTION					
5CONFIG STATE	Change to Configuration State. Press Enter to confirm the change.					
5ENTER CONFIG?	Confirm the change to Configuration State.					
5RESTART	Restart the Economizer Controller. Press Enter to confirm the restart.					
5CONF RESTART	Confirm the restart.					

# INSTALLING OPTIONAL HH57LW001 SINGLE OUTSIDE AIR ENTHALPY SENSOR

When using the HH57LW001 enthalpy sensor (see Fig. 49) for outside air changeover, the existing HH79NZ039 dry bulb sensor (see Fig. 50) must be removed. The enthalpy sensor will be mounted in the same location as the dry bulb sensor (see Fig. 51). When the enthalpy sensor's OA (Outside Air) temperature, enthalpy, and dew point are below their respective set points, outside air can be used for free cooling. When any of these are above their set point, free cooling will not be available. Enthalpy set points are configurable and create an enthalpy boundary according to the user's input. For additional details, see Fig. 52 and Table 21.

Harness 48TC005213 is required to be connected between the EconomizerONE harness in the return air chamber. Harness 48TC005213 has a 5-pin plug that connects directly to the

HH57LW001 enthalpy sensor. The CRENTSEN001A00 accessory kit includes enthalpy sensor (HH57LW001) and associated 5-pin plug (48TC005213) and may be ordered as a finished good.

# **Enthalpy Control Sensor Configuration**

The optional enthalpy control sensor (P/N: HH57LW001) communicates with the POL224 economizer controller using the 5-wire harness, 48TC005213. The HH57LW001 sensor can be used as a single outside air enthalpy, a differential return enthalpy, or a differential return temperature sensor. Refer to the base unit control wiring diagrams found earlier in this book to wire the HH57LW001 enthalpy sensor for each option. See Fig. 49 and Table 23 on page 40 to locate the wiring terminals for each enthalpy control sensor.

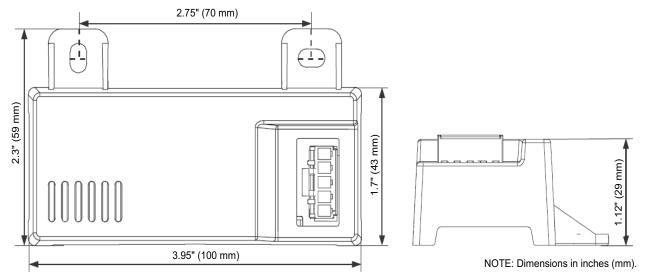


Fig. 49 — HH57LW001 Dimensional, Connection and Switching Information

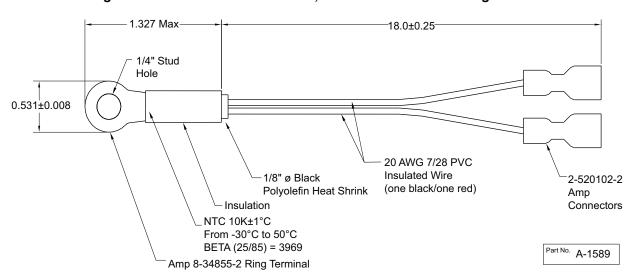


Fig. 50 — HH79NZ039 Dry Bulb and Mixed Air Sensor Wiring

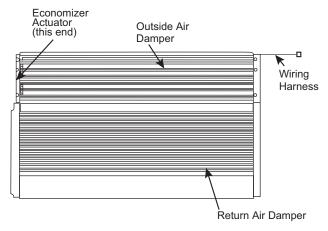


Fig. 51 — EconomizerONE System Component Locations

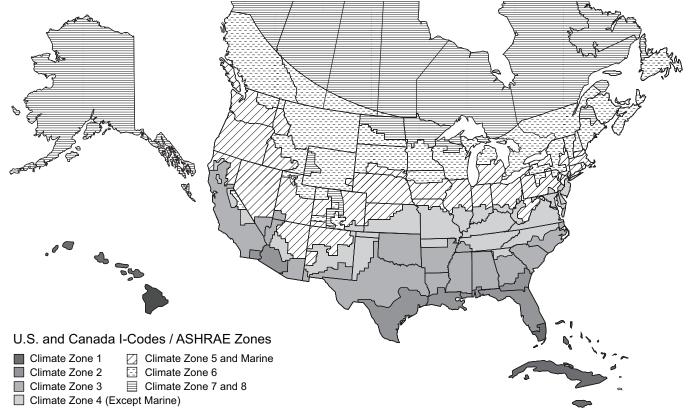


Fig. 52 — U.S. and Canada Climate Zones

Table 21 — Enthalpy Manual Entry Set Points for EconomizerONE Per Climate Zone

CLIMATE ZONES <sup>a</sup>	2 TEMP OFF	LOWEST SETTING	RH%	2 ENTH OFF	RH%	2THL	2EHL	RH%
1	18°C (65°F)	22 Btu/lbm	43%	28 Btu/lbm	86%	28°C (83°F)	33 Btu/lbm	48%
2	18°C (65°F)	22 Btu/lbm	43%	28 Btu/lbm	86%	28°C (83°F)	33 Btu/lbm	48%
3	18°C (65°F)	22 Btu/lbm	43%	28 Btu/lbm	86%	28°C (83°F)	33 Btu/lbm	48%
4	18°C (65°F)	22 Btu/lbm	43%	28 Btu/lbm	86%	28°C (83°F)	33 Btu/lbm	48%
5	21°C (70°F)	22 Btu/lbm	28%	28 Btu/lbm	65%	28°C (83°F)	33 Btu/lbm	48%
6	21°C (70°F)	22 Btu/lbm	28%	28 Btu/lbm	65%	28°C (83°F)	33 Btu/lbm	48%
7 and 8	24°C (75°F)	22 Btu/lbm	19%	28 Btu/lbm	50%	28°C (83°F)	33 Btu/lbm	48%
CONTROLLER DEFAULT SETTINGS	2 TEMP OFF	-	-	2 ENTH OFF	_	2THL	2EHL	RH%
DEFAULT SET POINTS	17°C (63°F)	_	_	28 Btu/lbm	94%	28°C (83°F)	33 Btu/lbm	48%

#### NOTE(S):

a. Refer to Fig. 52 for map of U.S. and Canada climate zones.

Economizers are shipped standard with an HH79NZ039 outside air dry bulb sensor (refer to Fig. 50). System default setting (high temp limit) is 17°C (63°F) and has a range of 9°C to 27°C (48°F to 80°F). Sensor is factory installed on economizer.

NOTE: A second HH79NZ039 sensor is provided for mixed air temperature.

NOTE: California high temperature setting requirements by region are shown in Table 22.

#### Enthalpy Settings (Enthalpy OPTION)

If installing the optional HH57LW001 enthalpy sensor, the HH79NZ039 dry bulb outside air sensor must first be removed. Wire sensor to harness 48TC005213 and the (5) wires from the harness to the EconomizerONE harness in the return air chamber. Harness 48TC005213 has a 5-pin plug that connects directly to the HH57LW001 enthalpy sensor. Refer to the base unit control wiring diagrams earlier in this book for wiring connections. Refer to Fig. 49 and see Table 23.

# California's Title 24 High Temperature Limit Settings

California's Title 24 code requires a high temperature limit setting for all dry bulb outside air economizer changeover. The temperatures vary by the region within California. See Table 22 for high limit settings.

Table 22 — California Title 24 Regional High Limit Dry Bulb Temperature Settings<sup>a</sup>

DEVICE TYPE	CLIMATE ZONES	REQUIRED HIGH LIMIT DESCRIPTION (ECONOMIZER OFF WHEN)					
	1, 3, 5, 11-16	OAT exceeds 23.8°C (75°F)					
FIXED DRY	2, 4, 10	OAT exceeds 22.7°C (73°F)					
BULB	6, 8, 9	OAT exceeds 21.6°C (71°F)					
	7	OAT exceeds 20.5°C (69°F)					
	1, 3, 5, 11-16	OAT exceeds RA temperature					
DIFFERENTIAL	2, 4, 10	OAT exceeds return air temperature -18.8°C (-2°F)					
DRY BULB	6, 8, 9	OAT exceeds return air temperature -20°C (-4°F)					
	7	OAT exceeds return air temperature -21.1°C (-6°F)					
FIXED ENTHALPY° + FIXED DRY BULB	All	OAT exceeds 28 Btu/lb of dry airb or OAT exceeds 23.8°C (75°F)					

#### NOTE(S):

- a. This table is sourced from 2019 California Energy Code, Title 24, Part 6, Table 140.4-E Air Economizer High Limit Shut Off Control Requirements.
   b. Only the high limit control devices listed are allowed to be used and at the set
- b. Only the high limit control devices listed are allowed to be used and at the set points listed. Others, such as Dew Point, Fixed Enthalpy, Electronic Enthalpy, and Differential Enthalpy Controls, may not be used in any climate zone for compliance with Section 140.4(e)1 unless approval for use is provided by the Energy Commission Executive Director.
- c. At altitudes substantially different than sea level, the Fixed Enthalpy limit value shall be set to the enthalpy value at 23.8°C (75°F) and 50% relative humidity. As an example, at an approximately 6,000 foot elevation, the fixed enthalpy limit is approximately 30.7 Btu/lb.

#### LEGENE

OAT — Outdoor-Air Thermostat

RA — Return Air

Table 23 — HH57LW001 Sensor Wiring Terminations

TERMINAL		TVDE	DESCRIPTION				
NUMBER	LABEL	TYPE	DESCRIPTION				
1	TCOM	NTC 10k	Outside Air Temperature Sensor Output				
2	TSIG	NTC 10k	Outside Air Temperature Sensor Output				
3	HSIG	0-10 vdc	Outside Air Relative Humidity Sensor Output				
4	HCOM	COMMON	Sensor 24-v Common Input				
5	H24V	24 vac	Sensor 24-v Operating Voltage Input				

### **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 Test Commands tests (refer to Table 18).

For information about menu navigation and use of the keypad see Interface Overview on page 22.

# **↑** WARNING

#### ELECTRIC SHOCK HAZARD

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

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

If any wiring changes are required, first be sure to remove power from the economizer module before starting work. Pay particular attention to verifying the power connection (24 vac).

# Power Up

After the POL224 module is mounted and wired, apply power. Initial Menu Display

On initial start up, "Welcome" displays on the economizer HMI screen. After a brief pause, the Parameter Settings — I/O Configuration (refer to Table 16) of the software appears, allowing the user to check that presets and default values are configured correctly.

#### 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 (refer to 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 22.

#### Checkout Tests

Use the Test Commands menu (refer to Table 18) to test the damper operation and any configured outputs. Only items that are configured are shown in the Test Commands menu.

NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 22.

To perform a Test Command test:

- 1. Scroll to the desired test in Test Command menu 7 using the Up and Down 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.
- When all desired parameters have been tested, press Enter + Up 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.

# **A** 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

For EconomizerONE troubleshooting issues, see Table 24.

# Table 24 — Operating Issues and Concerns

SYMPTOM	REASON	SOLUTION					
An alarm is displayed on the LCD	Sensor, damper, or the whole working system may not work properly	Check sensor, damper, or the whole working system following the detailed alarm information.					
DAC LED is blinking RED	Damper slippage	Check whether the damper works properly.					
DAC LED is blinking RED quickly	Damper unplugged	Check whether the damper is connected.					
DAC LED is OFF	Terminal ACT-FB is configured but there is no available feedback signal	Check whether the feedback signal is connected; check if ACT-FB is faulty.					
Economizer controller has no alarm, but the Free Cooling LED will not turn on	Shutoff SP setting error	Shutoff temperature and/or enthalpy set point is incorrectly set up. Consult an HVAC professional to set up the shutoff set point correctly.					
	OA temp is too low	The OA temperature is too low; therefore, there is no cooling demand. This could possibly enable anti-freeze protection.					
when the OA seems to be suitable for Free Cooling	OA temp is too high or too humid	In DIFF mode, even though OA temperature is lower than RA temperature, if both OA and RA temperatures exceed the high limit, then Free Cooling turns off.  In Differential Enthalpy control mode, even though OA enthalpy is lower than RA enthalpy, if both OA and RA enthalpy exceed the high limit, then Free Cooling turns off.					
	No input power	Use a multi-meter to check whether there is 24 vac ± 25% (18-30 vac) at the POWER terminals. If there is no voltage or if the voltage is significantly low, then check the transformer output voltage at the RTU. If 24-v is not present at the transformer secondary side, then check the primary line voltage to the transformer. If the line voltage is not present at the transformer primary side, then check the primary power to the RTU, fuses, circuit breaker, and so on.					
Economizer controller/mechanical	Brownout	If voltage is below 17-v, then the economizer controller may be in Brownout Protection mode. This mode disables all of the relay outputs. When the power is 19 vac or higher, the economizer controller and RTU operate normally.					
cooling is not operating	Y1/Y2 signal is missing from the thermostat	Mechanical cooling does not run until there is cooling demand (Y1/Y2 Active). Check the wiring from Y1I and Y2I terminals to the commercial thermostat. 24-v should be present between Y1I/Y2I and Y1O/Y2O respectively.					
	24 vac∼ and 24 vac ⊥ are incorrectly wired	24 vac power supply has polarity when all devices are powered by the same 24 vac transformer; reversing polarity may cause a short circuit that can damage the system. Follow the transformer polarity mark, check the wiring of 24-v~ (or G or 24-v+), and ensure that they are tied to the same polar of 24 vac power supply; while checking the wiring of $\bot$ (or G0 or 24-v- or COM), ensure that they are all tied to another polar of 24 vac power supply.					
Firmware update failure	Application file is damaged, operation is incorrect, and/or USB flash disk does not work properly	Reload a BIN file, restart the controller, update firmware <sup>a</sup> , or change a USB flash disk. Contact service provider if failure still exists.					
Free Cooling LED is solid RED	Sensor, damper, or whole working system may not work properly	Check sensor, damper, or the whole working system following the detailed alarm information.					
Free Cooling LED is blinking RED	Not economizing when it should	Check the whole economizer working system, such as the sensor, damper, and thermostat.					
Incorrect controller password error on mobile application	For CO <sub>2</sub> and single enthalpy (control mode 3) configurations from the factory, the password has changed	For units coming from the factory with CO <sub>2</sub> configuration or single enthalpy (control mode 3), use the controller password OneBT2.1.  For all other units, use the controller password OneBT.  Performing a factory reset on the controller will also reset the password to OneBT.					
RS485 communication failure	RS485 signal or configuration error	Check wiring, configuration, Baud Rate (using mobile application), and other network communication parameters.					
Sensor LED is blinking RED	Excess outdoor air	Check the whole economizer working system, such as the sensor, damper, and thermostat.					
	Mixed Air (MA) sensor error	Check the MA sensor. It must be either a Type II NTC 10K or 0-10 vdc sensor.					
Sensor LED is solid RED	Outside Air (OA)/Return Air (RA) sensor error	Check the wiring and signal of the OA sensor. If in Differential (DIFF) mode, also check the RA sensor. The following sensor signals are valid: Type II NTC 10K or 0-10 vdc temperature. 0-10 vdc or 4-20 mA humidity.					
	Air temperature failure/fault	Check the air temperature sensor signal. The valid signal must be Type II NTC 10K or 0-10 vdc.					
Sensor LED is OFF	CO <sub>2</sub> sensor error	Check CO <sub>2</sub> sensor connection, sensor signal (under range or over range), and sensor signal type.					
Sensor LED is YELLOW	Humidity sensor error	Check humidity sensor connection, sensor signal (under range or over range), and sensor signal type.					
Wi-Fi connection failure	Wi-Fi/WLAN stick error or wrong user name and password	Unplug and re-plug in the Wi-Fi/WLAN stick, enter a correct user name and password, restart the controller, or replace the Wi-Fi/WLAN stick. If the Wi-Fi/WLAN stick is POL903.00/100, then the default user name and password are Siemens-WLAN-Stick and SIBPAdmin. DNS name is siemens.wlanstick. Contact Application Engineering for information on this accessory.					

# NOTE(S):

a. Back up configurations before firmware update. All the previous configuration data is erased after firmware update. Contact Application Engineering for more information on support for firmware.

IMPORTANT: If the controller enters the configuration state for the convenience of I/O configurations, then users can manually switch to the running state after finishing configurations. To do so, press Enter + Up at the same time, then press Enter to confirm the switch after 8RUN STATE appears on the LCD.

# SystemVu™ Controller (Factory Option)

For details on operating 50FC-\*16 units equipped with the factory-installed SystemVu controller option, refer to the FC/GC Series Single Package Rooftop Units with SystemVu Controller Controls, Start-up, Operation and Troubleshooting manual.

## SMOKE DETECTORS

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

Units equipped with factory-optional return-air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 53 for the as-shipped location.

# COMPLETING INSTALLATION OF RETURN-AIR SMOKE SENSOR

- Unscrew the two screws holding the return-air smoke detector assembly. See Fig. 54, Step 1.
- 2. Save the screws.
- 3. Turn the assembly 90 degrees and then rotate end to end. Make sure that the elbow fitting is pointing down. See Fig. 54, Step 2.
- 4. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 54, Step 3.
- Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

#### ADDITIONAL APPLICATION DATA

Refer to the application data sheet titled "Factory-Installed Smoke Detector, for Small and Medium Rooftop Units 2 to 25 Tons" for discussions on additional control features of these smoke detectors including multiple unit coordination.

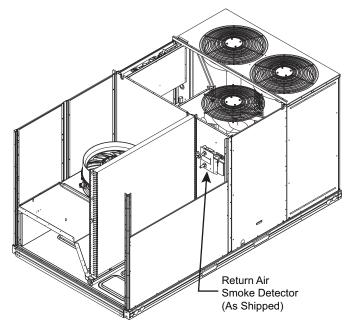


Fig. 53 — Return Air Smoke Detector; Shipping Position

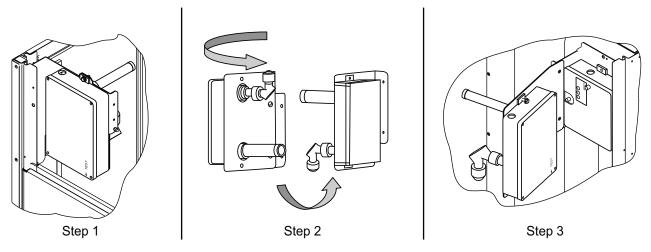


Fig. 54 — Completing Installation of Return Air Smoke Sensor

# Step 11 — Adjust Factory-Installed Options

#### SMOKE DETECTORS

Smoke detector(s) will be connected at the Unit Control Board (UCB), at terminals marked "Smoke Shutdown."

## ECONOMIZERONE OCCUPANCY SWITCH

If external occupancy control is desired, connect a time clock or remotely controlled switch (closed for Occupied, open for Unoccupied sequence) at terminals marked OCCUPANCY. Detach the jumper covering the "Occupancy" terminals on the UCB and then attach the required connections.

# Step 12 — Install Accessories

Available accessories include:

- Roof curb
- Thru-base connection kit (must be installed before unit is set on curb)
- Manual outside air damper
- Two-position motorized outside air damper
- EconomizerONE (with POL224 control)
- EconoMi\$er2 (without control/for external signal)
- · Power exhaust
- Differential dry-bulb sensor (EconomizerONE)
- · Outdoor enthalpy sensor
- Differential enthalpy sensor
- Electric heaters
- Single point kits
- · Low ambient controls
- Thermostat / sensors
- CO<sub>2</sub> sensor
- Louvered hail guard
- Phase monitor control

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

# Step 13 — Fan Speed Set Up

NOTE: The Indoor Fan motor is equipped with an internal protection relay that is designed to disable unit operation if it detects a problem. See Typical Wiring Diagram (Fig. 34 and 35) for the red wires in the Indoor fan plug.

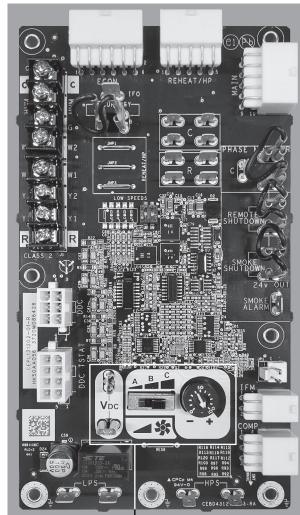
# UNITS WITH ELECTRO-MECHANICAL CONTROLS

The fan speed set up controls are located on the lower section of the Unit Control Board (UCB). See Fig. 55.

- 1. Check the job specifications for the cfm (cubic feet per minute) and ESP (external static pressure) required.
- 2. Using the chart on the Fan Speed Set Up labels (see Fig. 56), calculate the vdc from the cfm and ESP for the base unit. Then add vdc for any accessories installed per the "Field Accessories" section of the label.

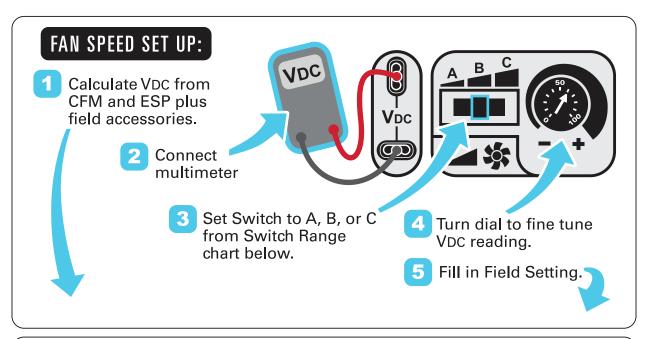
- The Fan Speed Set Up labels are located on the High Voltage cover in the Control Box.
- 4. Connect a multimeter to the vdc terminals on the UCB.
- 5. Set the Range Switch to either A, B, or C per the Switch Range table.
- 6. Using a straight blade screwdriver, turn the vdc control dial to fine tune the vdc reading.
- 7. Record the reading in the Field Setting field.

NOTE: Fan set up vdc is not affected by the operating stage of the unit.



└ Fan Speed Set Up Controls

Fig. 55 — UCB Fan Speed Controls



VDC Calculator			ESP in. wg										F	actory Setting:		
		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0			9.0 VDC		
		3000	5.6	6.1	6.5	6.9	7.3	7.6	8.0	8.3	8.6	8.9		Field Setting:		
NUMBER		3250	6.0	6.4	6.8	7.2	7.6	7.9	8.3	8.6	8.9	9.2				
M		3500	6.4	6.8	7.2	7.6	7.9	8.2	8.6	8.9	9.2	9.5		(Reco	rd field setting here	
$\supseteq$		3750	6.8	7.2	7.5	7.9	8.2	8.6	8.9	9.2	9.5	9.7		VDC VDC		
ᆸ	CFM	4000	7.2	7.6	7.9	8.2	8.6	8.9	9.2	9.5	9.8			0 11 1 0		
MODEL	ರ	4250	7.6	8.0	8.3	8.6	8.9	9.2	9.5	9.8			Switch Range		witch Range: *	
Š		4500	8.0	8.4	8.7	9.0	9.3	9.6	9.8						AB	
		4750	8.5	8.8	9.1	9.3	9.6	9.9						A 4.1 - 7.5 B 6.9 - 8.7		
<b>-</b>		5000	8.9	9.2	9.4	9.7	10.0									
ield	Access	sories:	ories: C 7.7 - 10		7.7 - 10.0											
Economizer		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	* 0	verlap i	in A, B, C switch rang		
												d a	esigned djustme	I for maximum field ent potential. For exam se set at either A or B		

Fig. 56 — Example of Fan Speed Set Up Labels for Electro-Mechanical Controls

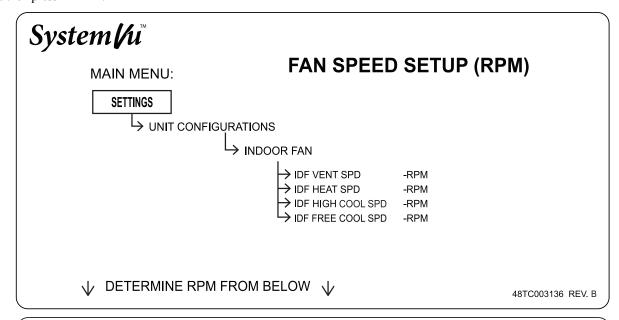
### UNITS WITH SYSTEMVUTM CONTROLS

On units equipped with the factory-installed SystemVu controller, the Fan Speed settings are accessed through the SystemVu interface.

- 1. Check the job specifications for the cfm (cubic feet per minute) and ESP (external static pressure) required.
- 2. Using the chart on the Fan Speed Set Up labels (see Fig. 57), calculate the rpm from the cfm and ESP for the base unit plus any field accessories (as listed on the label).
- 3. If installing any accessories listed at the bottom of the Set Up Label, add accessory rpm to base unit rpm in upper portion of label.
  - NOTE: The Fan Speed Set Up labels are located on the High Voltage cover in the Control Box.
- 4. Press any key on the SystemVu interface to activate the display backlight and then press the MENU key.
- Using the UP and DOWN arrow keys highlight SETTINGS and then press ENTER.

- 6. Use the DOWN arrow key highlight the UNIT CONFIGURATIONS menu then press ENTER.
- 7. Highlight UNIT CONFIGURATIONS then press ENTER.
- 8. Highlight INDOOR FAN and then press ENTER.
- Refer to the job specifications to set the following, determining the values per the RPM Calculator label (see Fig. 57). Use the UP and DOWN arrow keys and the BACK key to set the values. Press ENTER after setting each value to continue to the next selection.
- IDF VENT SPD
- IDF HEAT SPD
- IDF HIGH COOL SPD
- IDF FREE COOL SPD

For further details, see the FC/GC Series Single Package Rooftop Units with SystemVu Controller Controls, Start-up, Operation and Troubleshooting manual.



RPM Calculator				ESP in. wg										
			0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0		
		3000	1250	1348	1441	1528	1610	1688	1762	1832	1899	1963		
#		3250	1336	1428	1515	1598	1677	1753	1824	1893	1959	2021		
NUMBER		3500	1423	1509	1591	1670	1746	1819	1888	1955	2020	2081		
⊋	CFM	3750	1510	1591	1669	1744	1817	1887	1954	2019	2082	2143		
		4000	1598	1675	1749	1820	1890	1957	2022	2085	2146			
MODEL	2	4250	1687	1759	1829	1898	1964	2029	2092	2153				
ĮΣ		4500	1776	1845	1912	1977	2041	2103	2163					
I N		4750	1866	1931	1995	2057	2118	2178						
<u> [2</u>		5000	1955	2018	2079	2138	2197							
Field	Field Accessories:													
	Economizer		89	89	89	89	89	89	89	89	89	89		
oxdot														

Fig. 57 — Example of Fan Speed Set Up Labels for SystemVu™ Controls

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## START-UP CHECKLIST

# 50FC\*\*16 Single Packaged Rooftop Electric Cooling Units

(Remove and use for job file)

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

I. PRELIMINARY INFORM	IATION								
MODEL NO									
JOB NAME									
SERIAL NO.									
ADDRESS									
START-UP DATE									
TECHNICIAN NAME									
ADDITIONAL ACCESSORIES									
II. PRE-START-UP									
Verify that all packaging materials	s have been removed from u	ınit		(Y/N)					
Verify installation of outdoor air h	nood			(Y/N)					
Verify that condensate connection is installed per instructions									
Verify that all electrical connections and terminals are tight									
Verify ground integrity with a cor-				(Y/N)					
Check that indoor-air filters are cl	-			(Y/N)					
Check that outdoor air inlet screen	ns are in place			(Y/N)					
Verify that unit is level				(Y/N)					
Verify that fan assembly is free of	-	-		(Y/N)					
Verify that scroll compressors are	rotating in the correct direct	tion		(Y/N)					
Verify installation of thermostat				(Y/N)					
III. START-UP									
ELECTRICAL									
Supply Voltage	L1-L2	L2-L3	L3-L1						
Supply Voltage to Ground		L2 to Ground	L3 to Ground						
Compressor Amps 1	L1	L2	_ L3						
Compressor Amps 2	L1								
Supply Fan Amps	L1	L2	_ L3						
TEMPERATURES									
Outdoor-air Temperature	°C ]	DB (Dry Bulb)							
Return-air Temperature	°C 1	DB°C`	WB (Wet Bulb)						
Cooling Supply Air Temperature	°C								

# CUT ALONG DOTTED LINE

(Y/N)

# CUT ALONG DOTTED LINE

# Refrigerant Suction STAGE 1 \_\_\_\_\_\_ kPa STAGE 2 \_\_\_\_\_ kPa Refrigerant Discharge STAGE 1 \_\_\_\_\_ kPa STAGE 2 \_\_\_\_\_ kPa Verify Refrigerant Charge using Charging Charts (Y/N) \_\_\_\_ GENERAL Economizer minimum vent and changeover settings to job requirements (if equipped) (Y/N) \_\_\_\_

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**PRESSURES** 

Verify smoke detector unit shutdown by utilizing magnet test