HORIZONTAL ECONOMIZERS

24G01 HIGH PERFORMANCE ECONOMIZERS

INSTALLATION INSTRUCTIONS FOR ECONOMIZERS USED WITH ZC,ZG,ZH 092-150 UNITS

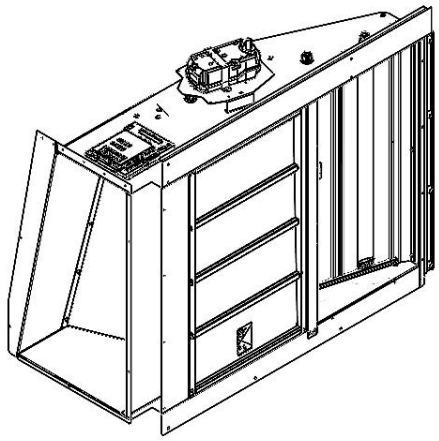

Figure 1

Shipping and Packing List

Package 1 of 1 contains:

1 - Economizer damper assembly
- 1 - Outdoor air damper
- 1 - Return air damper
- 1 - Gravity exhaust damper
- 1 - Horizontal blank-off panel
- 1 - Economizer actuator
- 1 - Economizer control module
- 1 - Outdoor air temperature sensor

1 - Hardware bag
- 1 - Mixed air sensor
- 3 - #10-14 x 3/4” screws with washer
- 11 - #10-16 x 5/8” screws

1 - Side economizer panel

1 - Wiring diagram label

Order Of Installation

Economizer
Mixed air sensor
Optional OA, RA, and CO2 sensors
Power Exhaust fans (optional)
Side economizer panel

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer, service agency or the gas supplier

Application

The 24G01 high performance economizer is used with ZC, ZG 092-150 and ZH 092-120 units in horizontal air discharge applications. Economizer dampers will modulate to maintain 55°F (31°C) supply air when outdoor air is suitable. The mixed air temperature sensor measures the supply air sensible temperature.

An outdoor air sensor is used to determine whether outdoor air is suitable for free cooling. The outdoor air sensor is factory-installed in all economizers. The high performance economizer is equipped with POL224.00 control module A6. The default OA temperature sensor or high limit sensor (RT26) is a CEC approved, California Title 24 fixed dry bulb device.

See Table 1 for outdoor and return air (OA and RA) sensor options. Refer to manufacturer’s instructions provided for more detail.

TABLE 1

Sensors	Dampers modulate to maintain 55°F mixed air (R1) when:
Single OA Sensible DEFAULT - approved for CA Title 24	OA temperature (RT26)is lower than free cooling setpoint
Single OA Enthalpy Not approved for CA Title 24	OA temperature and humidity (A7) is lower than free cooling setpoint
Differential Enthalpy - 1 in OA & 1 in RA Not approved for CA Title 24	OA temperature and humidity (A7) is lower than RA temperature and humidity (A62).
IAQ Sensor	CO_2 sensed (A63) is higher than CO_2 setpoint

INDOOR AIR QUALITY SENSOR

An IAQ sensor is used when demand control ventilation (DCV) is specified. Damper minimum position can be set lower than traditional minimum air requirements resulting in cost savings. The IAQ sensor allows the economizer control module to open dampers to traditional ventilation requirements as room occupancy (CO_2) increases.

For proper operation, the IAQ sensor must provide a 2-10VDC, 100 ohm impedance signal. Connect sensors to the green IAQ leads provided on the economizer control module in the filter section as shown in Figure 8.

⚠ CAUTION

Danger of sharp metallic edges. Can cause injury. Take care when servicing unit to avoid accidental contact with sharp edges.

Install Economizer

1. Disconnect all power sources to the unit
2. Remove the following panels from the unit;
   - Filter door panel
   - Return chamber panel
   - Blower access panel
   - Control panel

   When filter access door and return chamber panels are removed there will be a cross support still in the unit stretching from side-to-side of the return chamber.
3. Remove panel covering the horizontal return air opening on unit and reinstall on base of unit, covering bottom return opening. See unit instructions for details.

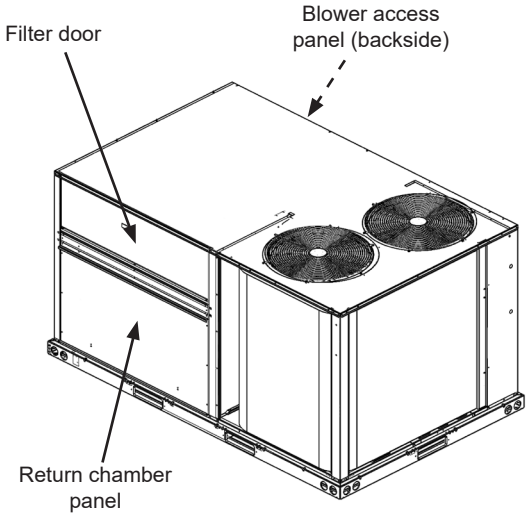

Figure 2

4. Install damper assembly into unit where return chamber panel was. Economizer will sit inside of unit, and will rest on base rail. (See Fig. 4.) Remove screws from lower corner of supply and return panel and pull panel slightly away from base to ease installation. Reinstall screws after economizer is installed.
5. Screw left side flange on economizer to HVAC unit using provided (4) #10-14 x 3/4" screws with washer.
6. Align the holes in the base flange of the economizer into the holes in the base rail of the HVAC unit. Secure in place using (2) #10-16 x 5/8" screws.
7. When economizer is installed it will not cover the entire horizontal return air opening in the unit. Install provided blank-off above economizer covering the top part of the horizontal return air opening. Screw in place. (Fig. 4)
8. Economizer hood is shipped assembled. Install over economizer and screw in place on both sides and top flanges. See Fig 6.
9. Install field supplied horizontal return duct per unit instructions. Caulk or gasket seam to ensure water tight seal. See Fig. 6.

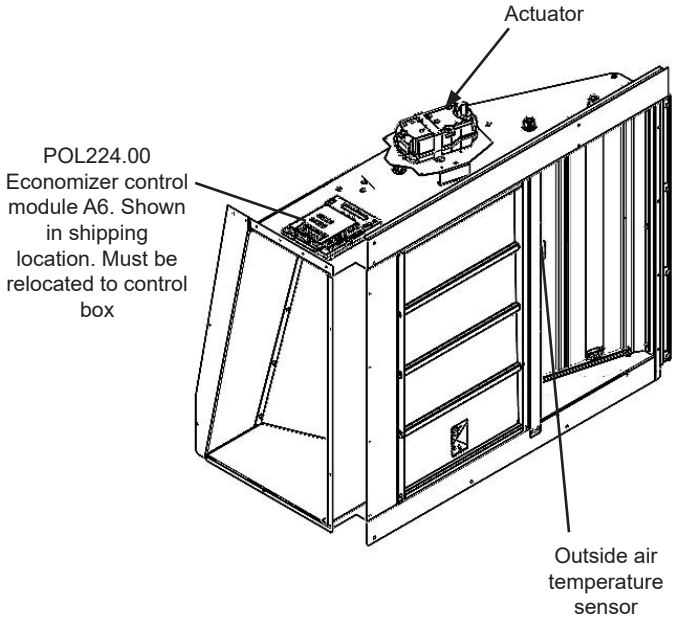

Figure 3 - Economizer Control (shown w/o relief damper)

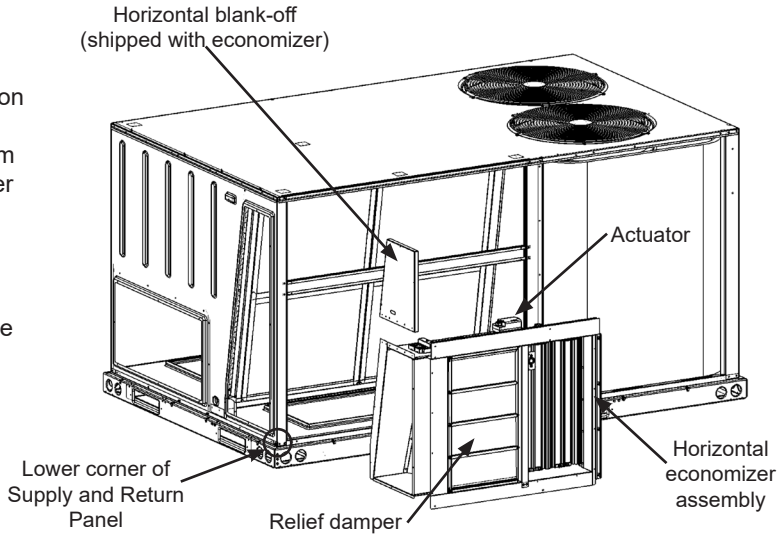

Figure 4 - Economizer Installation

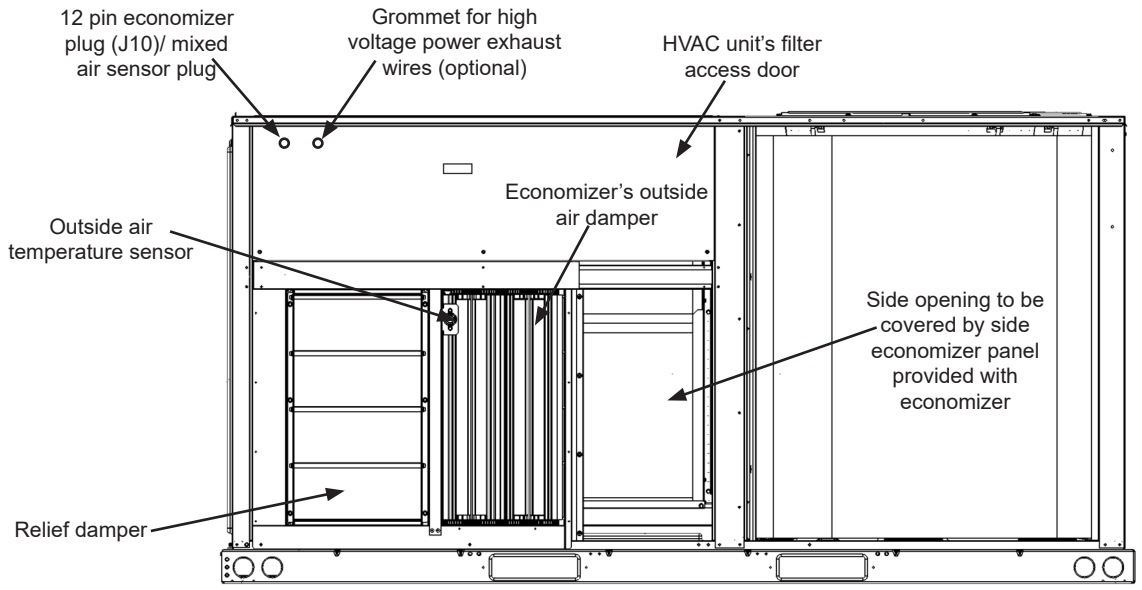

Figure 5 - Front View

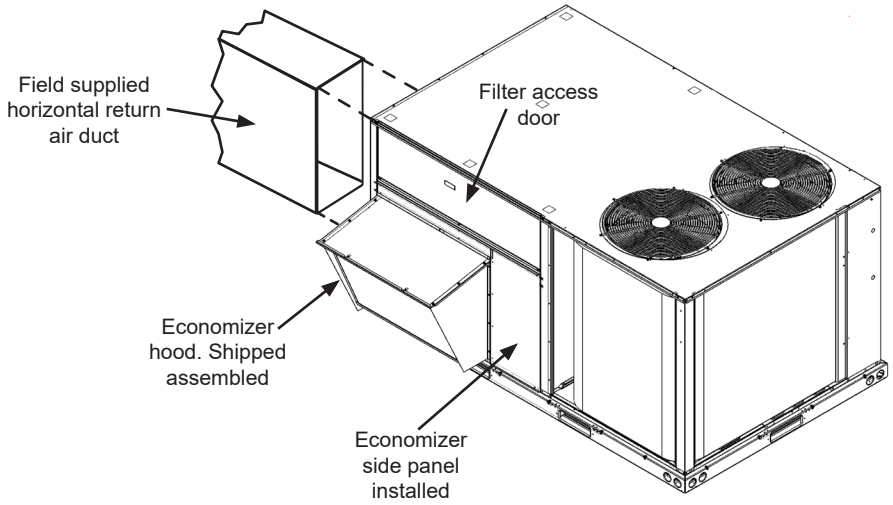

Figure 6 - Installed Economizer

Economizer Wiring

1. The economizer control module and harness are located next to actuator for shipping. Relocate the control module to the unit control box, see Fig. 9.
2. Route the control wires to unit terminal block (TB1) and connect these wires to TB1 as follows (see Fig. 7):
   - Connect all female terminals to TB1.
   - Disconnect the factory installed terminals Y1 and Y2 at TB1. Connect these terminals to the control wire male terminals Y1 and Y2.
3. Attach the control harness jack (J142) to the prewired harness plug (P142).
4. At economizer/filter compartment, attach economizer plug P10 to prewired jack (J10).
5. Connect any optional sensors as shown in Fig. 8.
6. If optional power exhaust is used, wire according to instructions provided with power exhaust. See Fig. 7.
7. Apply wiring diagram to the control panel. See Fig. 11.

Install Mixed Air Sensor

1. Remove mixed air sensor, mixed air sensor harness, wire tie and screw from the economizer parts bag.
2. Locate the 2 mixed air sensor wire connectors in the unit blower compartment. They are in the harness routed over the blower housing. Attach these 2 wires to the mixed air sensor harness.
3. Mount the mixed air sensor to the sheet metal bracket. Then mount the bracket and sensor to the blower housing as shown in Fig. 10.
4. Secure wires in place so they don't interfere with unit operation.
5. Replace all panels.

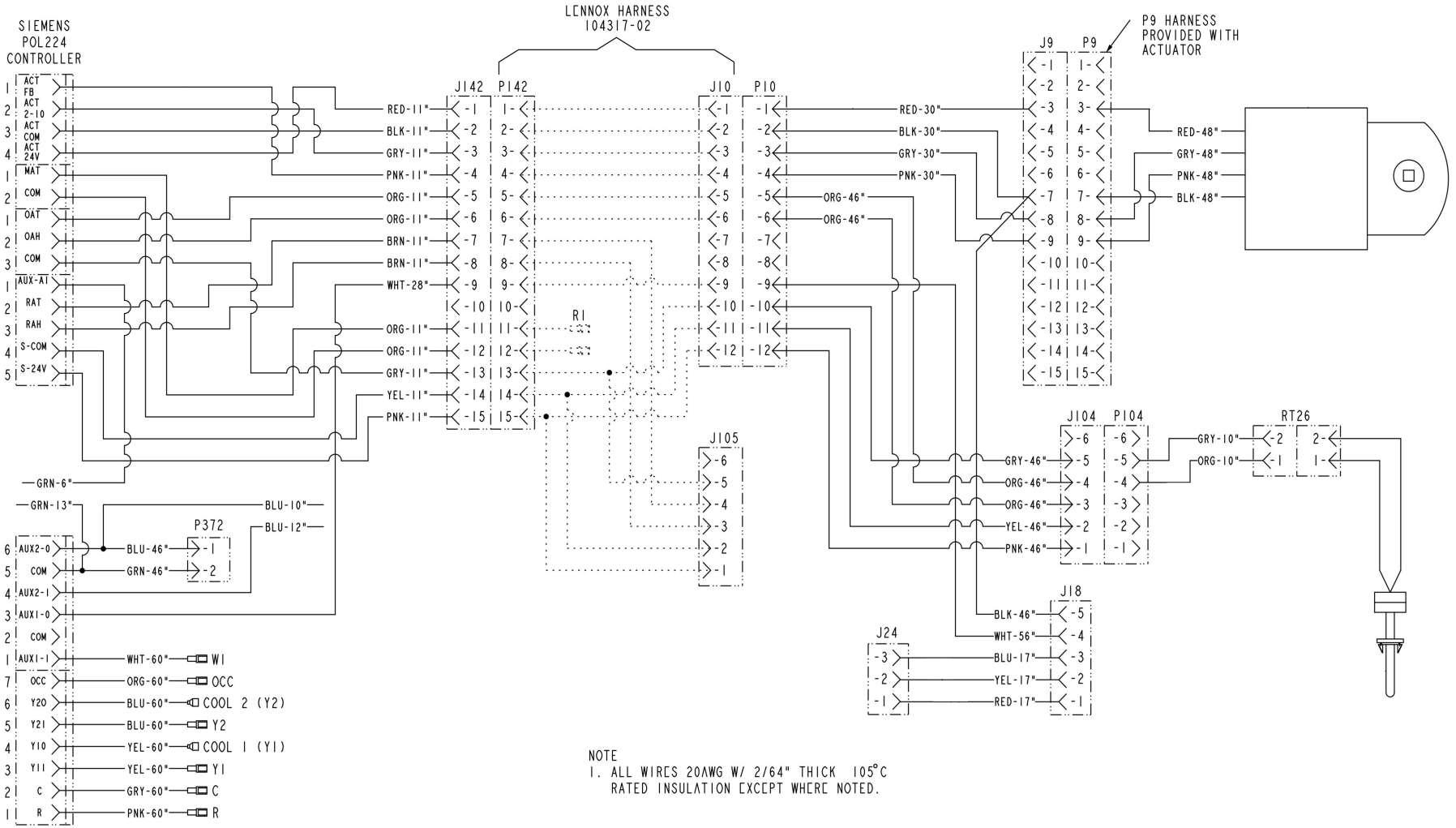

Figure 7 - Wiring Detail

High Performance Economizer - Electrical

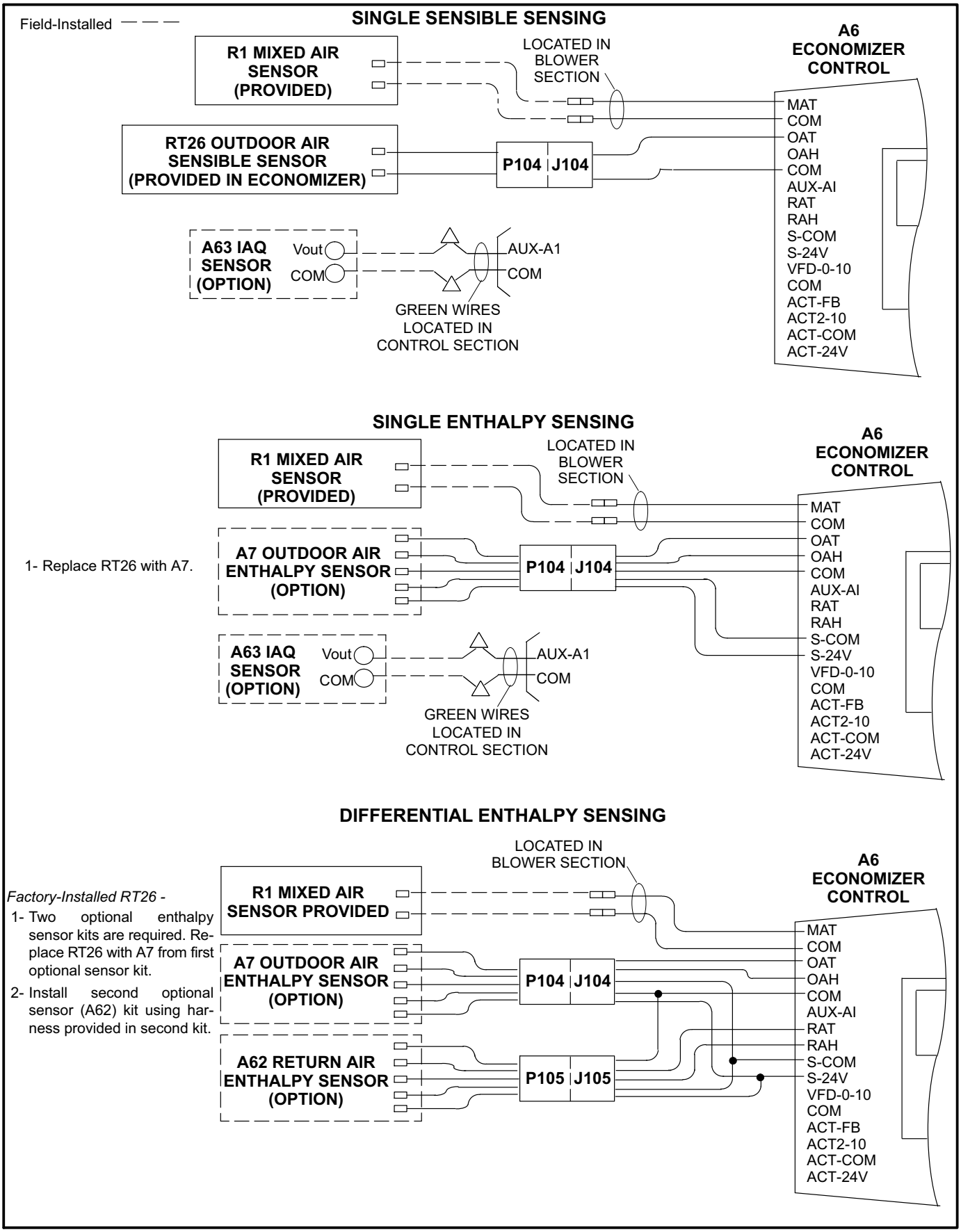

Figure 9

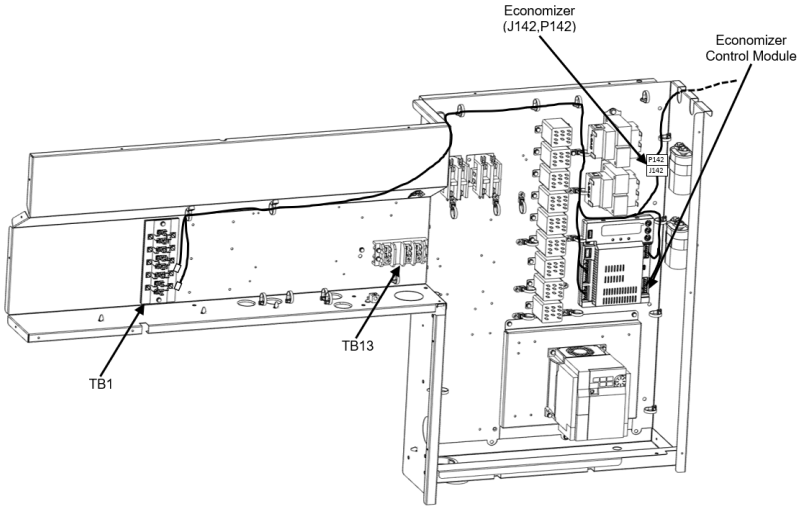

Figure 9 - HVAC Control Box

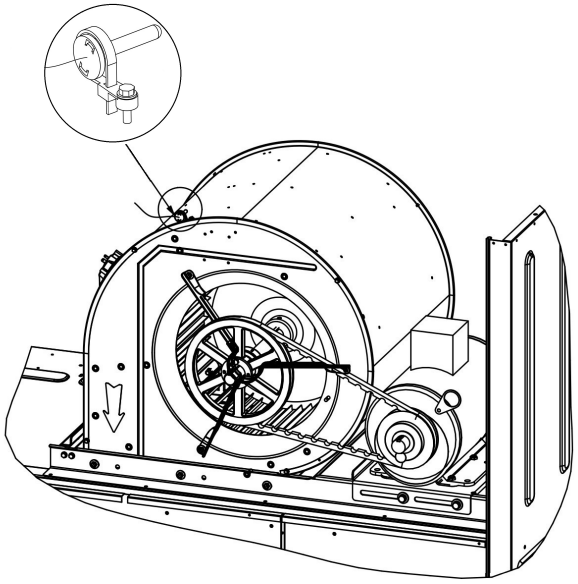

Figure 10 - Mixed Air Sensor Location

Economizer Side Panel

1. Install economizer side panel to the right side of economizer, see Fig. 5 and 6. Screw panel to economizer on left side, and into door bracket on right side of panel.
2. Caulk all seams and gaps along sides and bottom of economizer and economizer side panel sheet metal. Allow time for caulk to cure prior to placing unit into operation.
3. Reinstall unit's filter access door above economizer (Fig. 6).

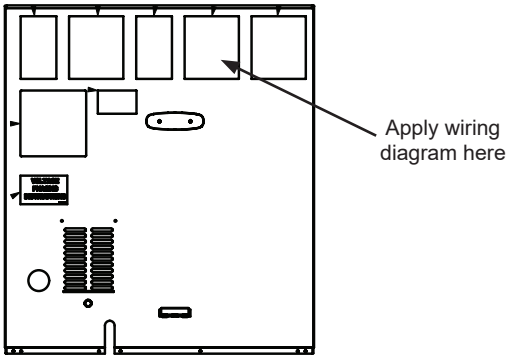

Figure 11 - Label Installation

High Performance Economizer - A6 Control

USER INTERFACE

See figure 12

1- One-line LCD. After a period of inactivity, the controller displays the default HMI screen (free cooling status: “1FREECOOL YES” or “1FREECOOL NO”).

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.

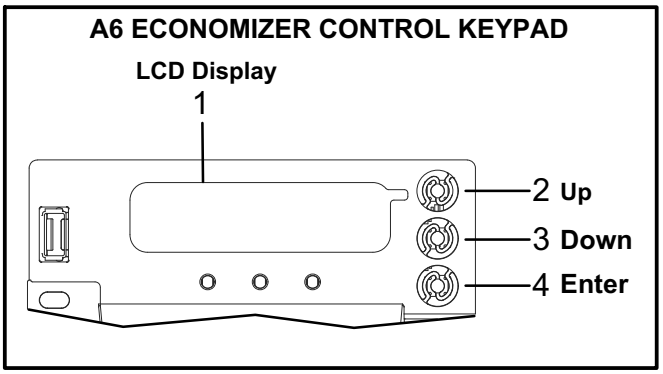

Figure 12

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.

MENU STRUCTURE

See figure 13.

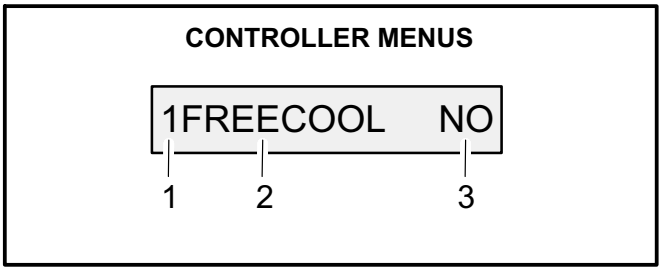

Figure 13

1- Menus are displayed in the Economizer Controller as per categories. There are eight first-level menus. Each menu is represented by a number at the beginning of the line on the LCD. Press Enter + Up or Down to toggle between different first-level 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- Sub-menus follow the numbered first-level menus closely. Pressing Up or Down can toggle between different sub-menus.

3- At the end of the line, the LCD displays the value of the current sub-menu (if any). Enter the Edit mode by pressing Enter (if the value is editable). Press Up or Down to change the highlighted value. Press Enter to confirm the change and exit the Edit mode.

For a complete list of parameters refer to the Siemens installation manual provided in this kit.

FREE COOLING SETPOINT

Single OA Sensible Sensing (Default) -

The default free cooling setpoint or high limit setpoint is 63°F. This means that the outdoor air is suitable for free cooling at 62°F and below and not suitable at 64°F and above. This setpoint is adjustable.

For *California Title 24* compliance, adjust the free cooling setpoint based on:

-The climate zone where the unit is installed. See table 7.

-The setpoint requirement published by the California Energy Commission. See *Section 140.4 - Prescriptive Requirements for Space Conditioning Systems of the 2013 Building Energy Efficiency Standards.*

***NOTE** - Values in the referenced standard will supersede values listed in table 7.*

TABLE 7
FREE COOLING SETPOINT - SINGLE SENSIBLE

Climate Zone	Setpoint
1, 3, 5, 11-16	75°F
2, 4, 10	73°F
6, 8, 9	71°F
7	69°F

To adjust the setpoint, navigate to the *“BASIC SETTINGS”* menu and change the *“2TEMP OFF”* parameter accordingly.

Single OA Enthalpy Sensing (Optional) -

To adjust the enthalpy setpoint, navigate to the "BASIC SETTINGS" menu and change the "2ENTH OFF" parameter accordingly.

Differential Sensing (Optional) -

Two sensors can be used to compare outdoor air to return air. When outdoor air is cooler than return air, outdoor air is suitable for free cooling. When return air is cooler than outdoor air, the damper will modulate to the minimum position.

SETUP AND CONFIGURATION - FACTORY-INSTALLED ECONOMIZER

Program the following parameters into the controller. Navigate to the specific menus to make the changes required.

1INS	(MM/DD/YY) enter installation date
2FAN L ACT*	( ) adjust VDC value until desired fresh air setpoint is reached when fan runs at low speed. **Appears only if unit is configured as 2SPEED.*
2FAN H ACT	( ) adjust VDC value until desired fresh air setpoint is reached

SETUP AND CONFIGURATION - FIELD-INSTALLED ECONOMIZER

Program the following parameters into the controller. Navigate to the specific menus to make the changes required.

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 mobile application.

Menus are displayed in the Economizer Controller as per categories. There are eight first-level menus. Each of them is represented by a number at the beginning of the line on the LCD. Press Enter + Up or Down to toggle between different first-level menus.

Navigate to the applicable menus and set the following parameters based on the unit configuration:

1INS	(MM/DD/YY) enter installation date
2FAN L ACT	( ) adjust VDC value until desired fresh air set point is reached when fan runs at low speed (*Appears only if unit is configured as 2SPEED)
2FAN H ACT	( ) adjust VCD value until desired fresh air set point is reached
3DIF T LOC	(LAT)
3STG3 DLY	(120)
6Y2O	(NONE) For single-stage units (COOL 2) For 2-stage units
6FAN	(1 SPEED) For CAV units (2 SPEED) For MSAV units

ALARM MONITORING

The controller is equipped with a 24V output signal that can be configured for remote alarm monitoring. Field-wire to provided blue wire marked "Aux2-O" near the controller for remote alarm monitoring.

Note - Newer units are factory-wired to facilitate feedback wiring connections when a BACnet™ *option is installed. Newer units can be identified by a P372 plug located near TB1 in the control box. One white and one gray wire are connected to P372. On older units, call 1-800-453-6669 for wiring assistance.*

DEMAND CONTROL VENTILATION (DCV)

When a 0-10VDC CO_2 sensor is wired to the POL224.00 economizer control A6 (leads provided), the *2DCV*, *2VENTMAX L, 2VENTMAX H, 2 VENTMIN L and 2VENTMIN H* parameters will appear under *"BASIC SETTINGS"* menu. Navigate to the *"BASIC SETTINGS"* menu to adjust setpoints as desired. Refer to the Siemens manual provided for more details.

For proper operation, the IAQ sensor must provide a 0-10VDC signal. Connect sensor leads to the provided white wire marked "AUX-AI" located near the A6 economizer control located in the filter section.

CO_2 Sensor Used With High Performance Economizers-

When using any 0-10VDC sensor, set the ppm range using the POL224.00 economizer control A6 menu. Set the 6CO2 Rng L to 400 ppm and the 6CO2 Rng H to 1600 ppm.

High Performance Economizer - Sequence of Operation

Refer to tables 8, 9, 10 or 11.

When the outdoor air is suitable and a thermostat demand calls for 1st stage cooling (Y1), the economizer will modulate the dampers between the minimum and fully open positions to maintain a 55°F (12.8°C) mixed air temperature. When there is an increased thermostat demand for second stage cooling (Y2), the economizer damper opens 100% and the economizer controller (A6) will bring on the compressor. The damper will stay open 100% with the compressor running simultaneously until Y2 demand is met.

NOTE – If a two-speed fan is installed, the economizer controller (A6) will delay the compressor start for 5 minutes (default). To adjust the delay from 1 to 20 minutes, adjust the "2FAN DLY" setting.

NOTE – *When there is a Y1 cooling demand, the economizer controller (A6) will display the mixed air temperature (R1). When there is a Y2 cooling demand and compressors are operating, the economizer controller (A6) will display the outdoor air temperature (RT26 or A7). In either case, the economizer controller (A6) will use the mixed air sensor for low temperature lock-out.*

TROUBLESHOOTING, ALARMS AND CHECKOUT TESTS

Refer to the Siemens manual provided for details.

TABLE 8

ECONOMIZER OPERATION - NO DCV (CO_2 SENSOR, 1-SPEED SUPPLY FAN)

DCV	OA Good to Economize?	Y1-I	Y2-I	Y1-O	Y2-O	Occupied	Unoccupied
None	No	Off	Off	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	24-v/On	0-v/Off	MIN POS	Closed
		On	On	24-v/On	24-v/On	MIN POS	Closed
None	Yes	Off	Off	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	On	24-v/On	0-v/Off	Full-Open	Full-Open

TABLE 9

ECONOMIZER OPERATION - WITH DCV (CO_2 SENSOR, 1-SPEED SUPPLY FAN)

DCV	OA Good to Economize?	Y1-I	Y2-I	Y1-O	Y2-O	Occupied	Unoccupied
Below set	No	Off	Off	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	24-v/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	24-v/On	0-v/Off	Full-Open	Full-Open
Above set	No	Off	Off	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	24-v/On	0-v/Off	VENTMIN to VENTMAX	Closed
		On	On	24-v/On	24-v/On	VENTMIN to VENTMAX	Closed
	Yes	Off	Off	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	24-v/On	0-v/Off	Full-Open	Full-Open

High Performance Economizer - Sequence of Operation (continued)

TABLE 10

ECONOMIZER OPERATION - NO DCV (CO_2 SENSOR, 2-SPEED SUPPLY FAN)

DCV	OA Good to Economize?	Y1-I	Y2-I	Fan Speed	Y1-O	Y2-O	Occupied	Unoccupied
None	No	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	24-v/On	0-v/Off	MIN POS L	Closed
		On	On	High	24-v/On	24-v/On	MIN POS H	Closed
None	Yes	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS L to Full-Open	Closed to Full-Open
		On	On	High	Delay (b) 24-v/On	0-v/Off	Full-Open	Full-Open

(b) With 2FAN DLY (Basic Settings Menu), when in the economizing mode, there is a delay for the high speed fan to try to satisfy the call for second-stage cooling by turning on the fan to high and opening the OA dampers to 100% before the first-stage mechanical cooling is enabled.

TABLE 11

ECONOMIZER OPERATION - WITH DCV (CO_2 SENSOR, 2-SPEED SUPPLY FAN)

DCV	OA Good to Economize?	Y1-I	Y2-I	Fan Speed	Y1-O	Y2-O	Occupied	Unoccupied
Below set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN L to Full-Open	Closed to Full-Open
		On	On	High	Delay (b) 24-v/On	0-v/Off	Full-Open	Full-Open
Above set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX L	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L to VENTMAX L	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H to VENTMAX H	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX L	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN L to Full-Open	Closed to Full-Open
		On	On	High	Delay (b) 24-v/On	0-v/Off	Full-Open	Full-Open

(b) With 2FAN DLY (Basic Settings Menu), when in the economizing mode, there is a delay for the high speed fan to try to satisfy the call for second-stage cooling by turning on the fan to high and opening the OA dampers to 100% before the first-stage mechanical cooling is enabled.