HORIZONTAL ECONOMIZERS

Z1ECON33B (20V25) HIGH PERFORMANCE ECONOMIZERS

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

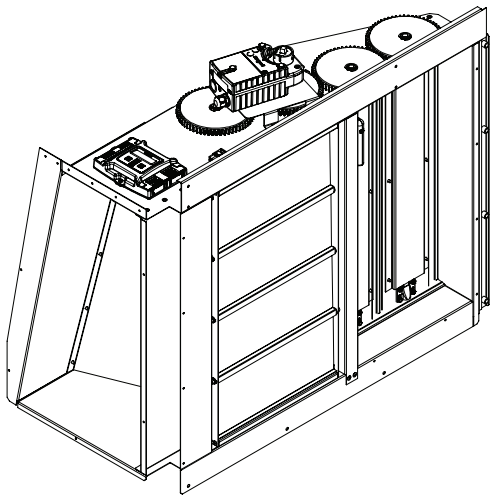


Figure 1

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 Z1ECON33B (20V25) 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 W7220 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.

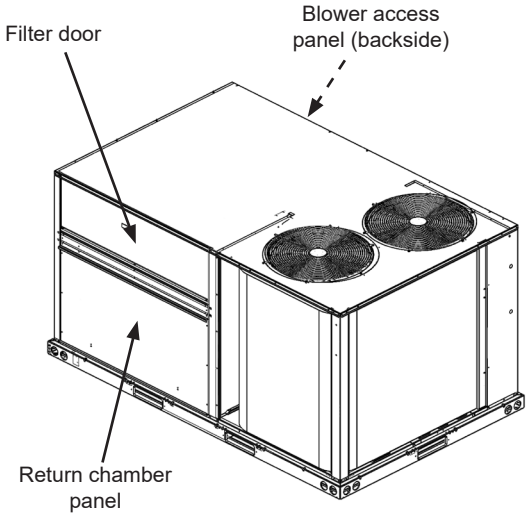


Figure 2

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.

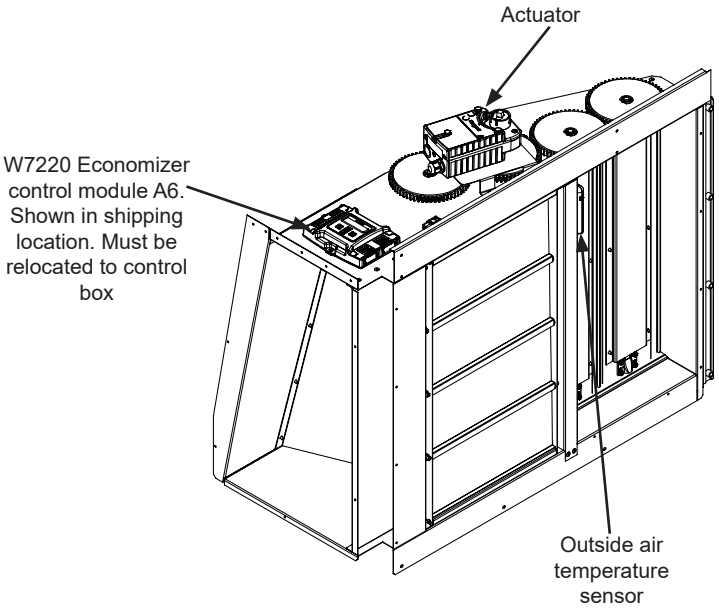


Figure 3 - Economizer Control (shown w/o relief damper)

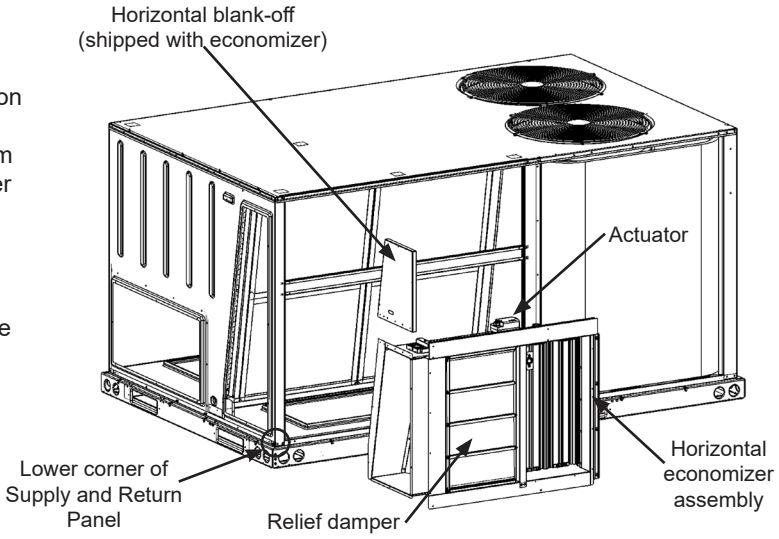


Figure 4 - Economizer Installation

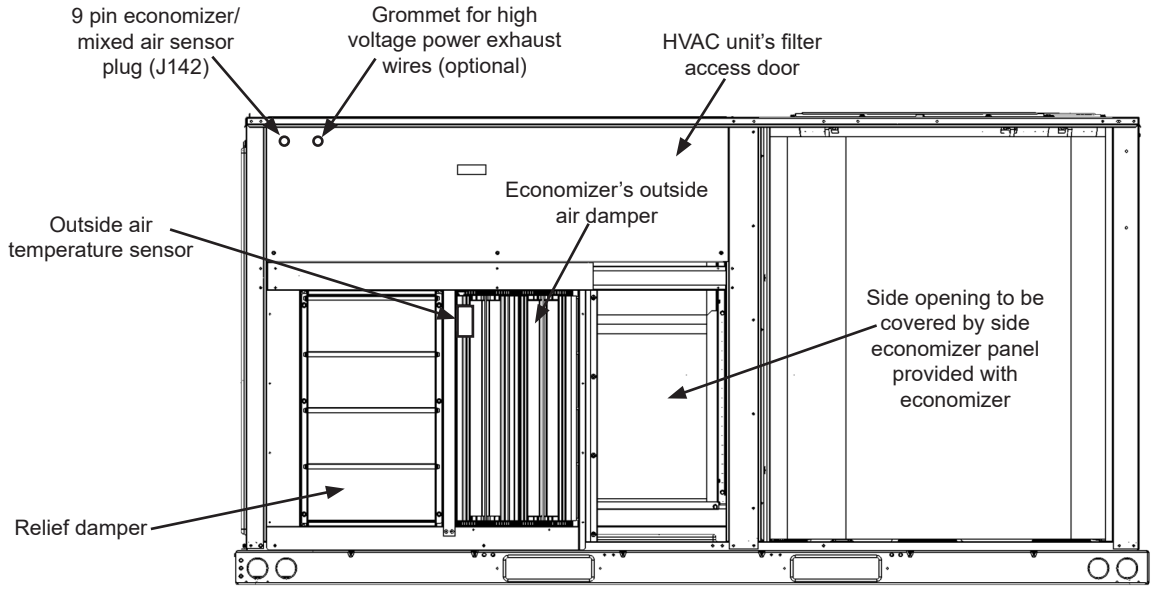


Figure 5 - Front View

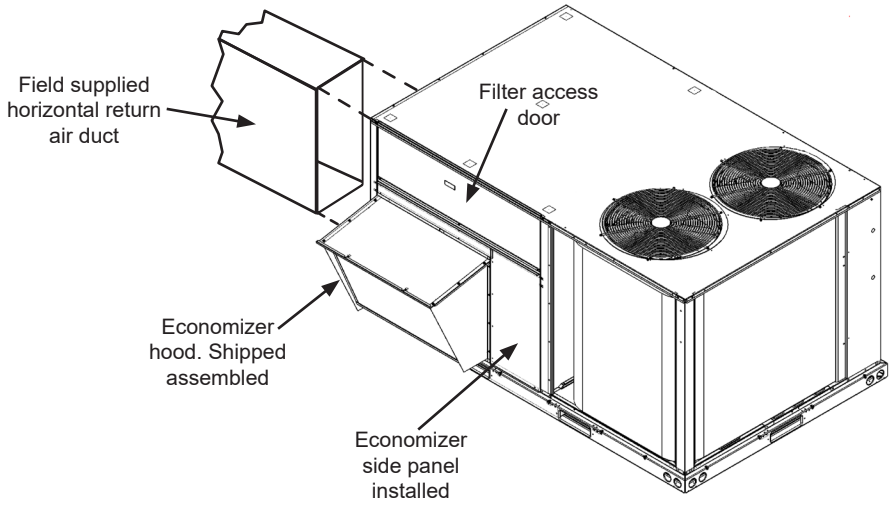


Figure 6 - Installed Economizer

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 - Pink (24V) to R; Yel (Cool 1) to Y1; Blue (Cool 2) to Y2.
   - Disconnect the factory installed terminals Y1 and Y2 at TB1. Connect these terminals to the control wire male terminals Y1 and Y2.
3. Connect control wire Grey (GND) to ground terminal block TB13.
4. Attach the control harness jack (J142) to the prewired harness plug (P142).
5. At economizer/filter compartment, attach economizer plug P10 to prewired jack (J10).
6. Connect any optional sensors as shown in Fig. 8.
7. If optional power exhaust is used, wire according to instructions provided with power exhaust. See Fig. 7.
8. Apply wiring diagram to the control panel. See Fig. 11.

Install Mixed Air Sensor

1. Remove mixed air sensor, mixed air sensor harness and sheet metal bracket 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.

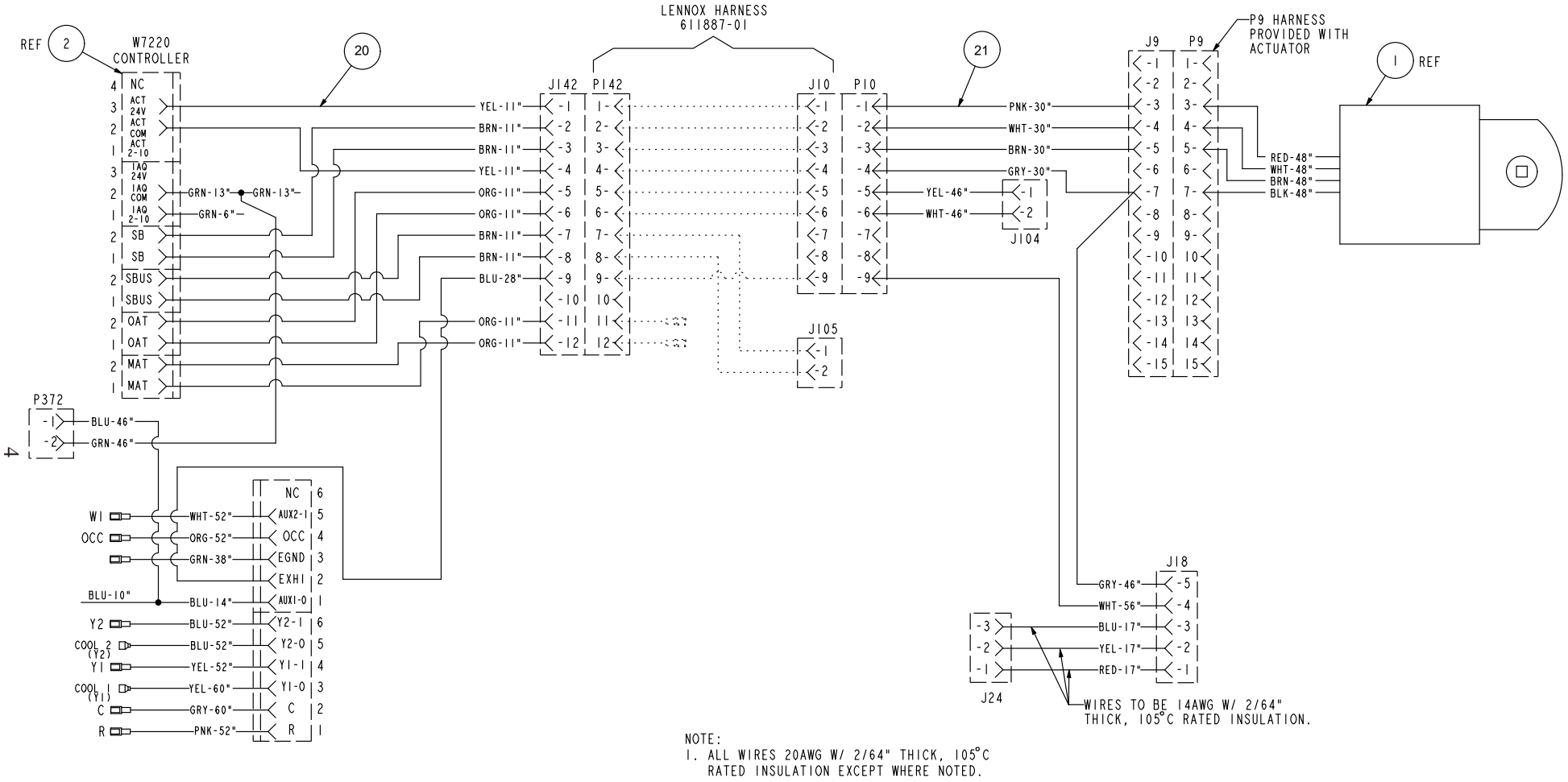
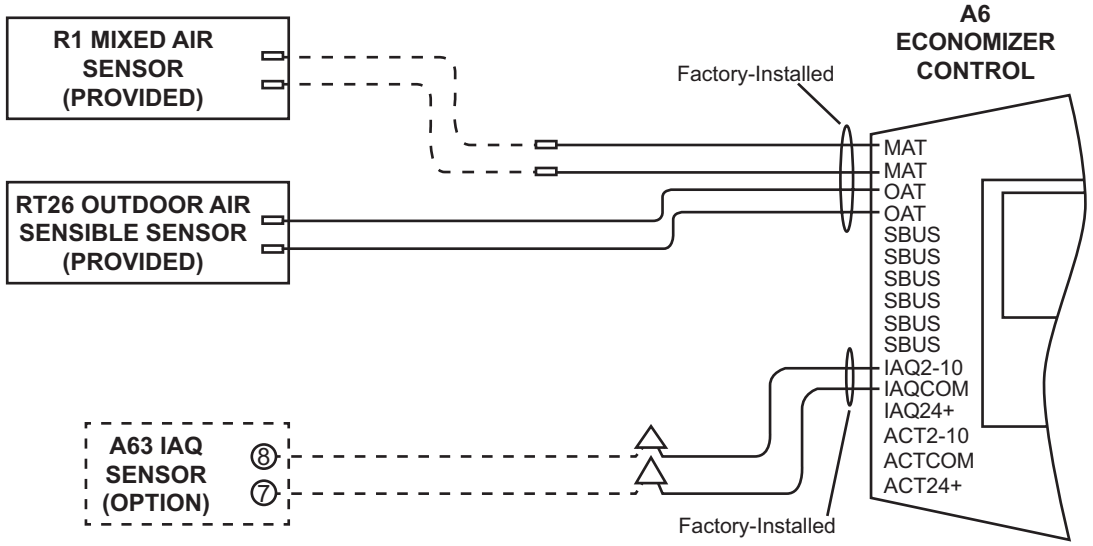


Figure 7 - Wiring Detail

WIRE CONNECTION - HIGH PERFORMANCE ECONOMIZERS

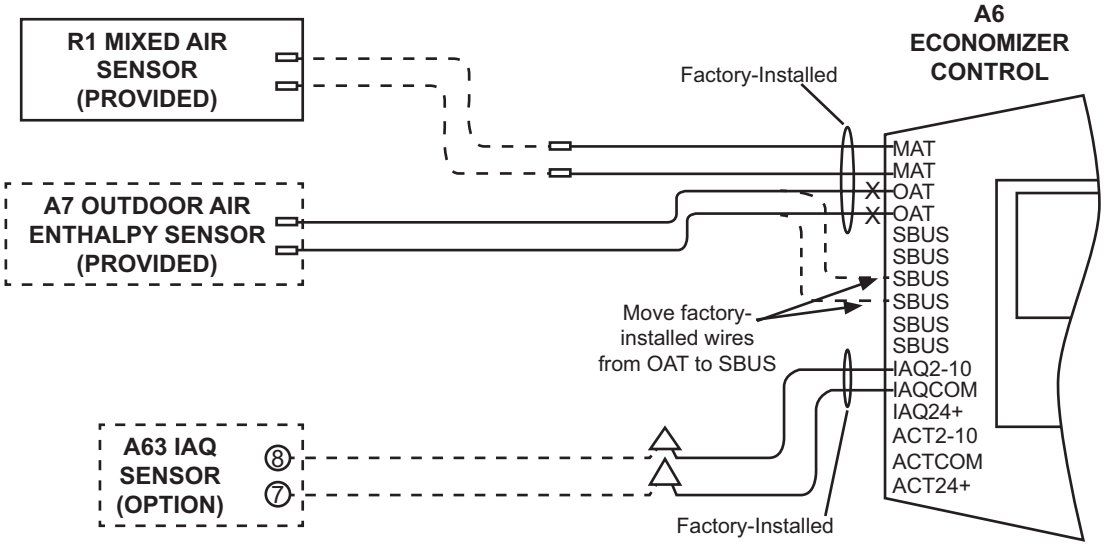
Field-Installed — — —

SINGLE SENSIBLE SENSING



SINGLE ENTHALPY SENSING

1- Replace RT26 with A7.
2- Move wiring on A6 controller as shown. Discard harness provided in optional sensor kit.
3- Set DIP switch on A7 to appropriate setting "OA".



1- Set DIP on A7 to appropriate setting "OA". Set DIP switch on A62 to "RA".

Factory-Installed RT26 -

1- Two optional sensor kits are required. Replace RT26 with A7 from first optional sensor kit.
2- Move wiring on controller A6 as shown. Discard harness provided in first optional sensor kit.
3- Install second optional sensor (A62) kit using harness provided in second kit.

Factory-Installed A7 -

1- One optional enthalpy sensor kit (A62) is required. Install optional temperature & humidity sensor kit using harness provided in kit.

DIFFERENTIAL ENTHALPY SENSING

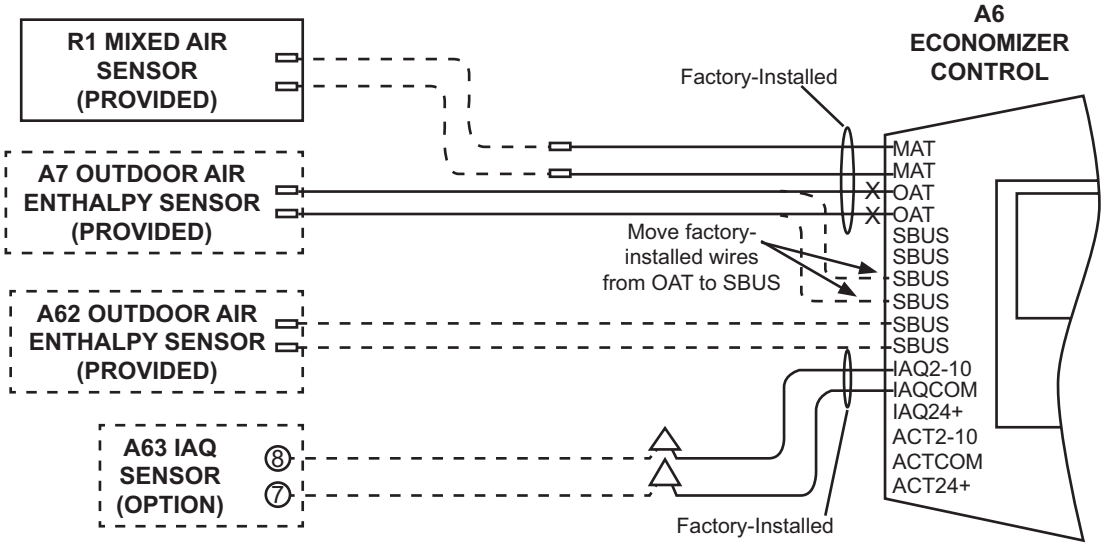


Figure 8

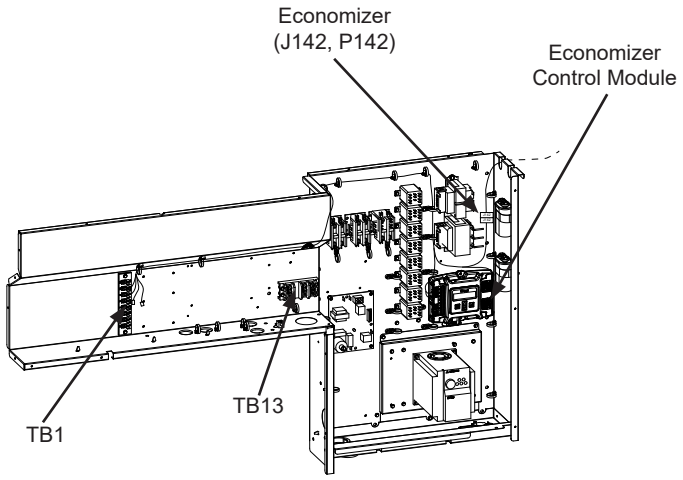


Figure 9 - HVAC Control Box

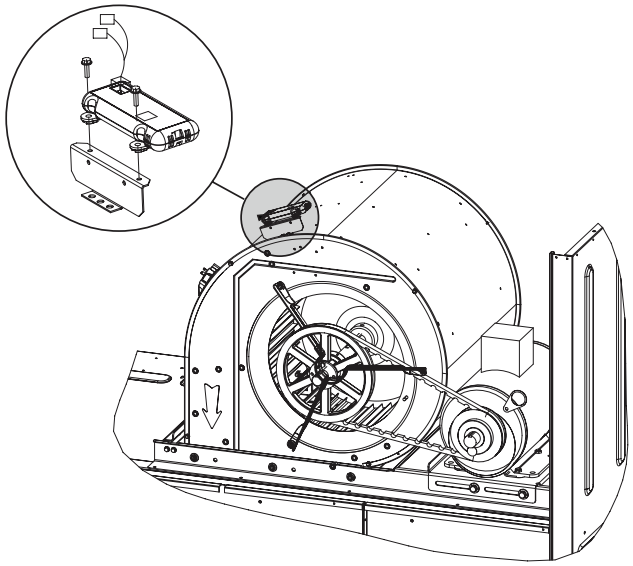


Figure 10 - Mixed Air Sensor Location

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).

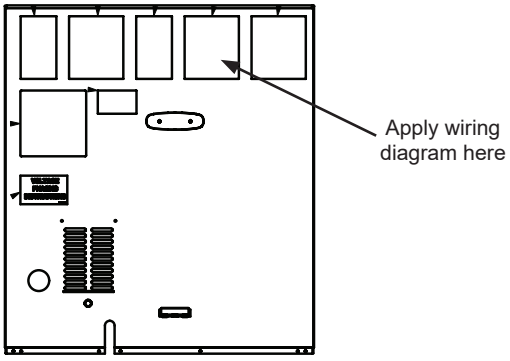


Figure 11 - Label Installation

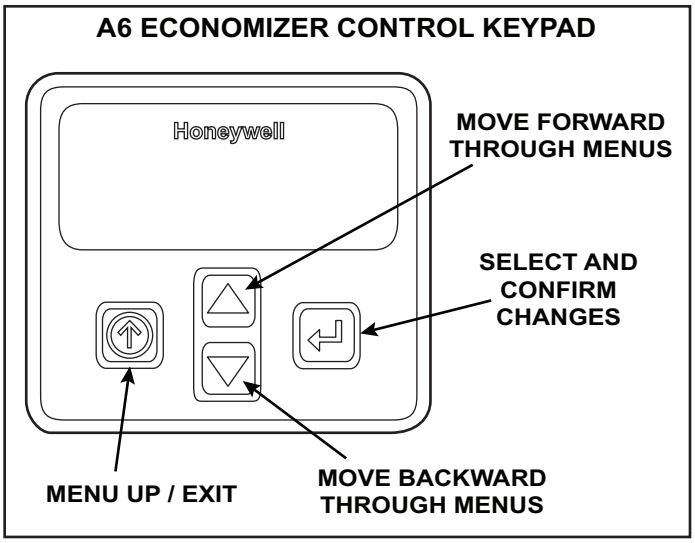
Economizer Control Module

Note - The A6 economizer control will be in the "setup" mode for the first sixty minutes after powered. If a sensor for outdoor air or SBUS device (sensor, actuator) is disconnected during the set up mode, the A6 will not alarm that failure. The R1 mixed air sensor is a system "critical" sensor; if the mixed air sensor is removed during the set up mode, the A6 will alarm. After sixty minutes the A6 will change to operation mode and all components removed or failed will alarm in the operation mode.

INITIAL SETUP

Field-Installed Economizer -

A default program must be modified for proper operation in each application. *See 'Setup and Configuration Field-Installed Economizer' section.*



USING THE KEYPAD

Use the keypad as follows:

- Navigate to the desired menu.
- Press the button ↵ (enter) to display the first item in the currently displayed menu.
- Use the ▲ and ▼ buttons to scroll to the desired parameter.
- Press the enter button ↵ (enter) to display the value of the currently displayed item.
- Press the ▲ button to increase (change) the displayed parameter value.a
- Press the ▼ button to decrease (change) the displayed parameter value.a
- Press the enter button ↵ (enter) to accept the displayed value and store it in non-volatile RAM.
- CHANGE STORED displays.
- Press the button ↵ (enter) to return to the current menu parameter.
- Press the button ⓘ (Menu Up/Exit) to return to the previous menu.

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

MENU STRUCTURE

The menus in display order are:

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

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

***IMPORTANT** - Menu parameters will be different depending on each configuration. For example: if a DCV (CO2) sensor is not used, none of the DCV parameters will appear and only MIN POS will display. If CO2 sensor is used, the DCV SET, VENTMIN and VENTMAX will appear.*

SETUP AND CONFIGURATION

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

***IMPORTANT** - During setup, the economizer control is live at all times.*

The setup process uses a hierarchical structure.

Press the ▲ and ▼ arrow buttons to move forward and backward through the menus and press the ↵ button to select and confirm setup item changes.

In the SYSTEM SETUP Menu

INSTALL (MM/DD/YY) enter installation date

EQUIPMENT (CONV)

AUX2 IN (HEAT W1)

FAN SPEED (1SPEED)

FAN CFM ( ) enter rooftop unit indoor blower CFM

AUX1 OUT (NONE) change to SYS if A6 controller is wired for remote alarm monitoring.

OCC (INPUT)

In the ***ADVANCED SETUP*** Menu

MA LO SET (45°F)
FREEZE POS (CLOSE)
STG3 DLY (2HRS)
SD DMPR POS (CLOSED)

In the ***SETPOINTS*** Menu

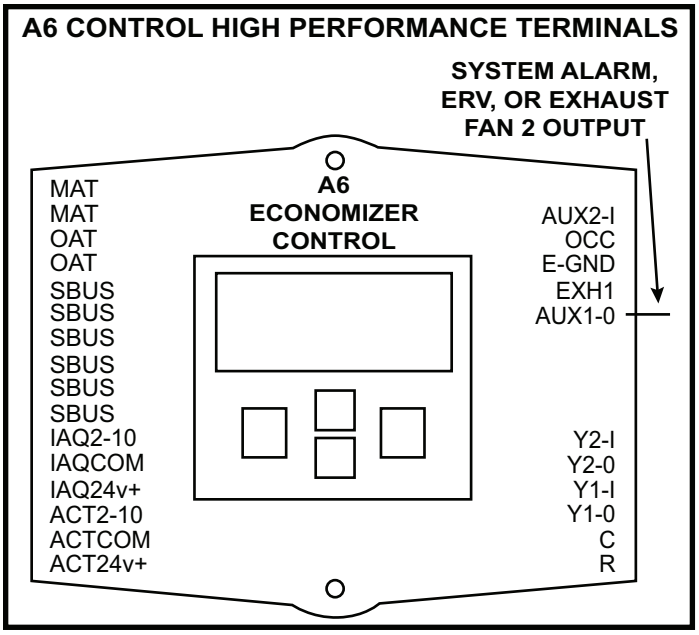
See Damper Minimum Position section for details

ALARM MONITORING

The controller is equipped with a 24V output signal that can be configured for remote alarm monitoring.

In the “SYSTEM SETUP” menu change the “AUX1 OUT” setting to “SYS”.

NOTE - Call 1-800-453-6669 for wiring assistance when a BACnet™ option is installed.



High Performance Economizer - Settings

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 1.

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

Note - Values in the referenced standard will supersede values listing shown.

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 "*SETPOINTS*" menu and change the "*DRYBLB SET*" parameter accordingly.

Single OA Enthalpy Sensing (Optional) -

The controller uses enthalpy boundary "curves" for economizing when used with an enthalpy sensor. Refer to the Honeywell installation instruction for details.

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.

DAMPER MINIMUM POSITION

*Note - 24 volts must be provided at unit thermostat connection leads **R** and **OC** to enable economizer operation (allowing minimum fresh air). Typically a separately ordered thermostat or energy management system with and occupied/unoccupied output is connected between leads **R** and **OC**. The thermostat will provide 24 volts to the A6 economizer control during the occupied time period to enable economizer minimum position. If a device is not used to enable the economizer, install a jumper wire between leads **R** and **OC** to maintain minimum position continuously..*

*Make wire connection to leads **R** and **OC** as shown in literature provided with thermostat or energy management system.*

1- Set thermostat to occupied mode if the feature is available. Make sure jumper is in place between leads R and OC if using a thermostat which does not have the feature.

2- Turn on the blower using the thermostat or a jumper between leads R and G.

3- Navigate to the "SETPOINTS" menu and select "MIN POS". Adjust value (2-10VDC) to approximate desired fresh air percentage.

3.0 VDC - 12% Open Damper
3.5 VDC - 18% Open Damper
4.0 VDC - 25% Open Damper
4.5 VDC - 31% Open Damper
5.0 VDC - 37% Open Damper
5.5 VDC - 43% Open Damper
6.0 VDC - 50% Open Damper

Note - Damper minimum position can be set lower than traditional minimum air requirements when an IAQ sensor is specified.

4- Measure outdoor air temperature. Mark the point on the bottom line of chart 1 and label the point "A" (40°F, 4°C shown).

5- Measure return air temperature. Mark that point on the top line of chart 1 and label the point "B" (74°F, 23°C shown).

6- Measure mixed air (outdoor and return air) temperature. Mark that point on the top line of chart 1 and label point "C" (70°F, 21°C shown).

7- Draw a straight line between points A and B.

8- Draw a vertical line through point C.

9- Draw a horizontal line where the two lines meet. Read the percent of fresh air intake on the side.

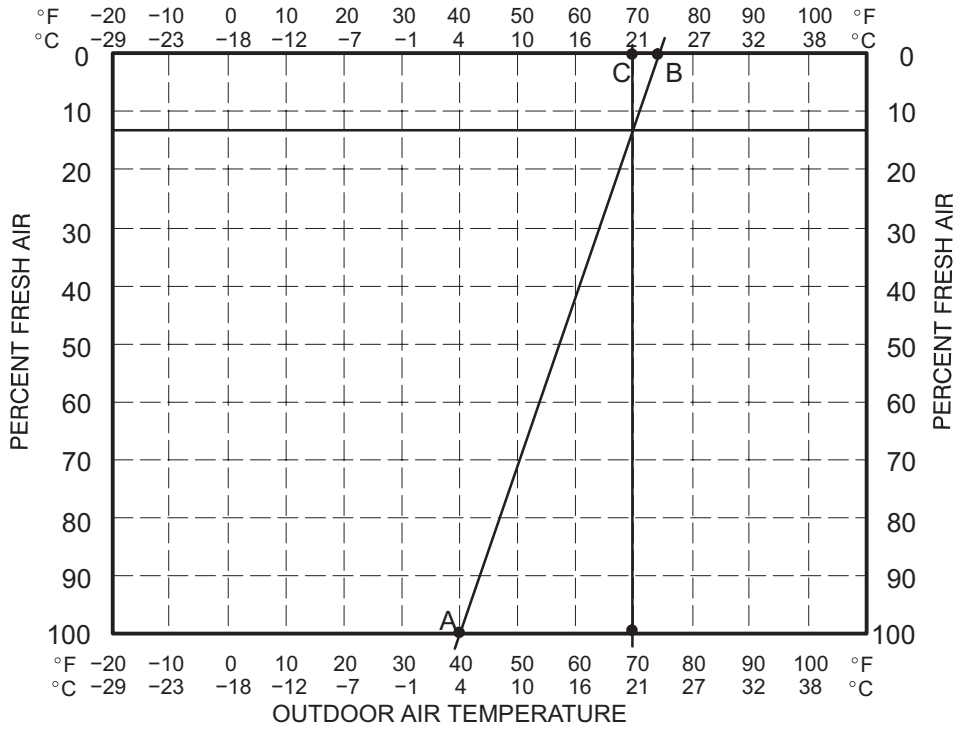
10- Repeat steps 3 through 8 until calculation reads desired fresh air percentage.

If fresh air percentage is less than desired, use the A6 keypad to adjust "MIN POS" values higher (further open). If fresh air percentage is more than desired, adjust "MIN POS" values lower (less open). Repeat steps 3 through 8 until calculation reads desired fresh air percentage.

DEMAND CONTROL VENTILATION (DCV)

When a 2- 10VDC CO2 sensor is wired to the controller (leads provided), the *DCV SET, VENTMIN*, and *VENTMAX* parameter will appear under "*SETPOINTS*" menu. Navigate to the "*SETPOINTS*" menu to adjust setpoints as desired. Refer to the Honeywell manual provided for more details.

CHART 1
CALCULATE MINIMUM FRESH AIR PERCENTAGE
MIXED AND RETURN AIR TEMPERATURE



High Performance Economizer - Sequence of Operation

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 - 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 Honeywell manual provided for details.

ECONOMIZER OPERATION - NO DCV (CO_2 SENSOR)

DCV	OA Good to Economizer?	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

ECONOMIZER OPERATION - WITH DCV (CO_2 SENSOR)

DCV	OA Good to Economizer?	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