

DOWNFLOW ECONOMIZERS

Z1ECON32B-1 (12B44) HIGH PERFORMANCE ECONOMIZER

INSTALLATION INSTRUCTIONS FOR ECONOMIZERS USED WITH ZC,ZG 092-150 and ZH 092-120 UNITS

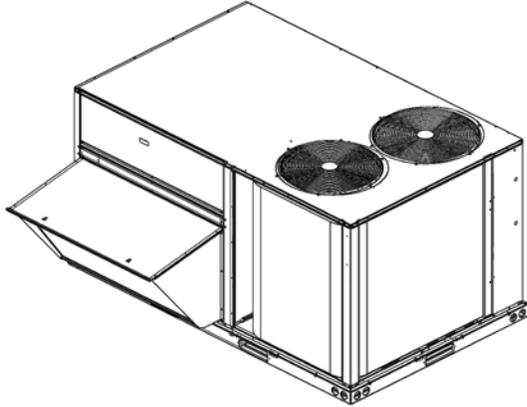


Figure 1

Application

The Z1ECON32B-1 (12B44) high performance economizer is used with ZC, ZG 092-150 and ZH 092-120 units in vertical 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 (CO₂) 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 9.

CAUTION

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

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 - Economizer actuator
 - 1 - Economizer control module
 - 1 - Outdoor air temperature sensor
 - 1 - Top seal panel
 - 1 - Lower panel (hood top)
- 1 - Mixed air sensor and adaptor harness
- 1 - Hardware bag
- 1 - Hood parts package
 - 1 - Left hood side
 - 1 - Right hood side
 - 1 - Hood divider
 - 1 - Hood filter
- 1 - Wiring Diagram Label

Order Of Installation

- Economizer
- Mixed air sensor
- Optional OA, RA and CO₂ (IAQ) sensors
- Optional Power Exhaust Fans

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

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 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.

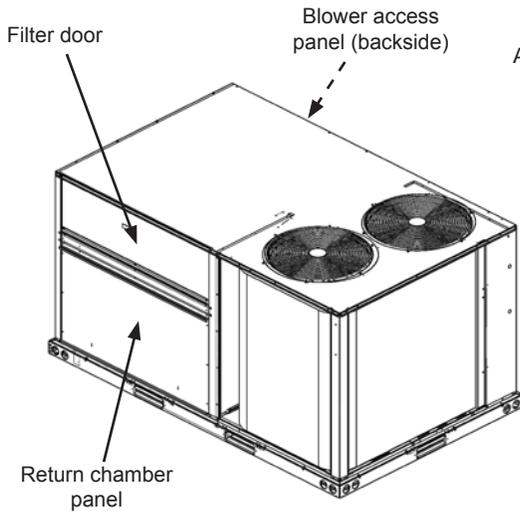


Figure 2

3. Remove hood parts package.
4. Install damper assembly into unit under the cross support. Fit opening in bottom of damper assembly over the return air opening. See Figure 3.
5. The upper panel of the economizer will screw into the cross support through pre-punched holes.
6. Secure the economizer to unit base pan with five screws.

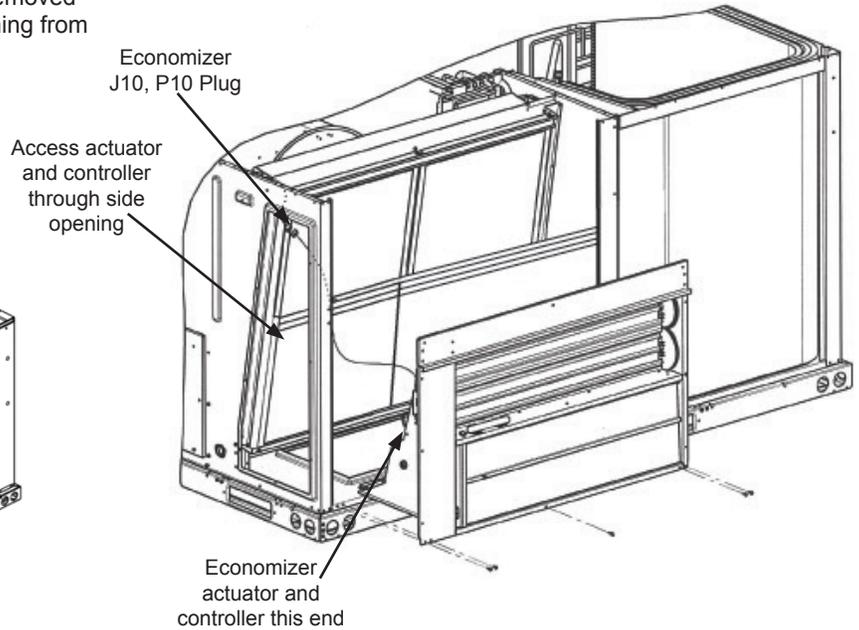


Figure 3 - Economizer Installation

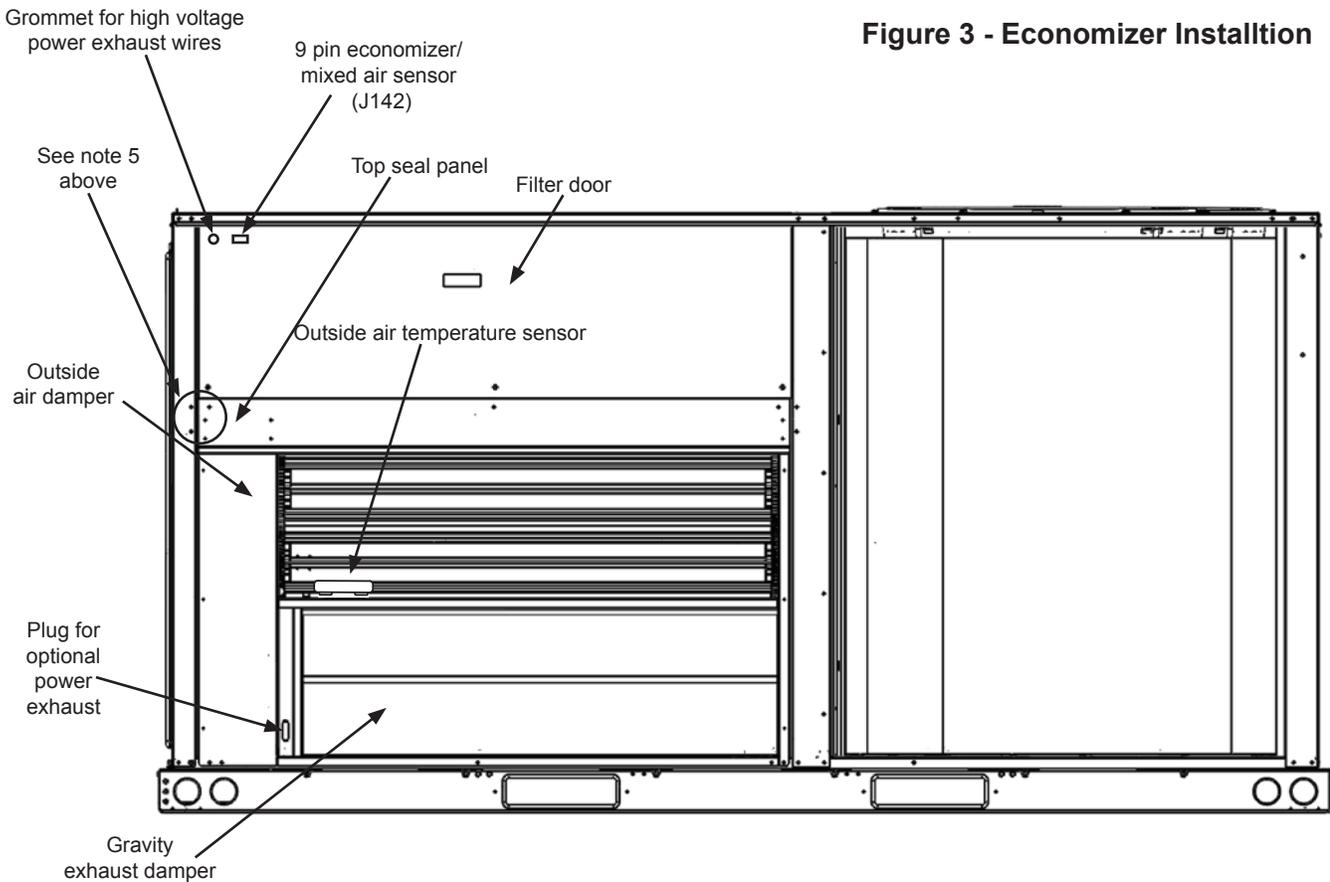


Figure 4

Economizer Wiring

1. The economizer control module, relay and harness are located below the actuator for shipping. Relocate the control and relay to the unit control box, see Fig. 6.
2. Route the control wires to unit terminal block (TB1) and connect these wires to TB1 as follows (see Fig. 6):
 - 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). See Fig. 3.
6. Connect any optional sensors as shown in Fig. 9.
7. If optional power exhaust is used, wire according to instructions provided with power exhaust. See Fig. 5.
8. Apply wiring diagram to the control panel. See Fig. 7.

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. 8.
4. Secure wires in place so they don't interfere with unit operation.
5. Replace all panels.

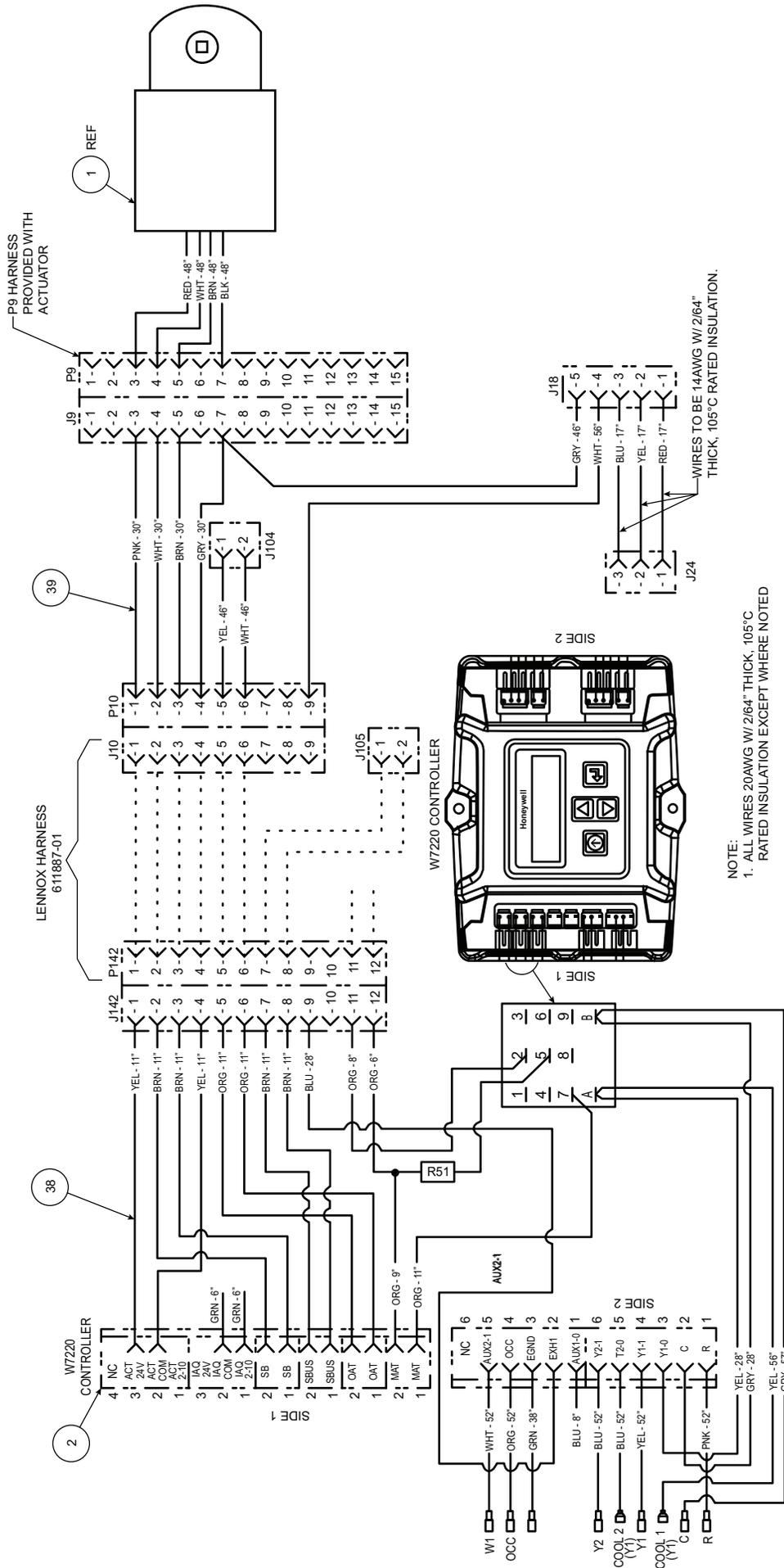


Figure 5 - Wiring Detail

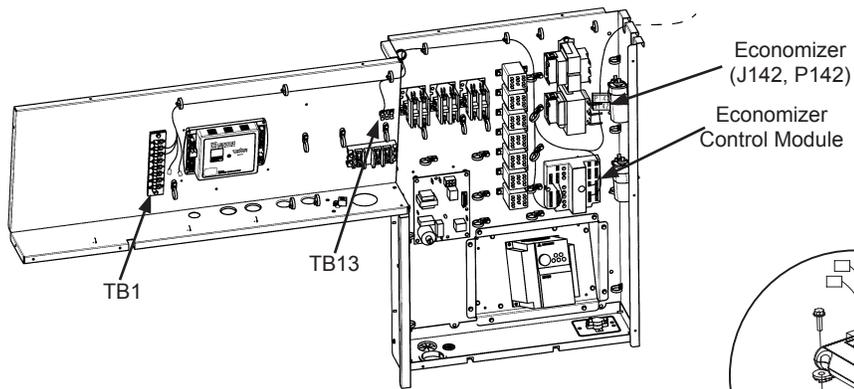


Figure 6 - HVAC Control Box

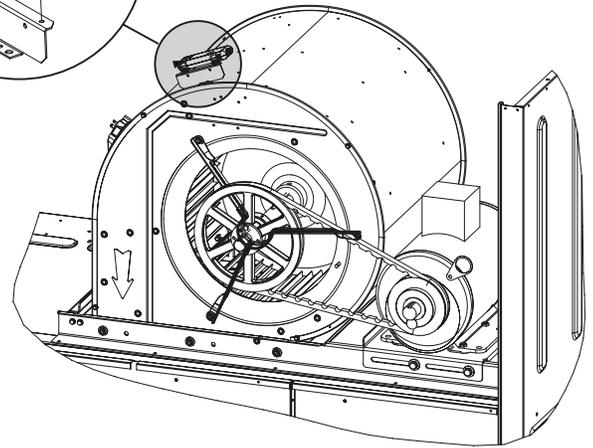
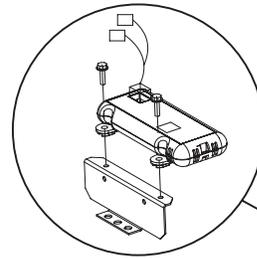


Figure 8 - Mixed Air Sensor

Apply wiring diagram here

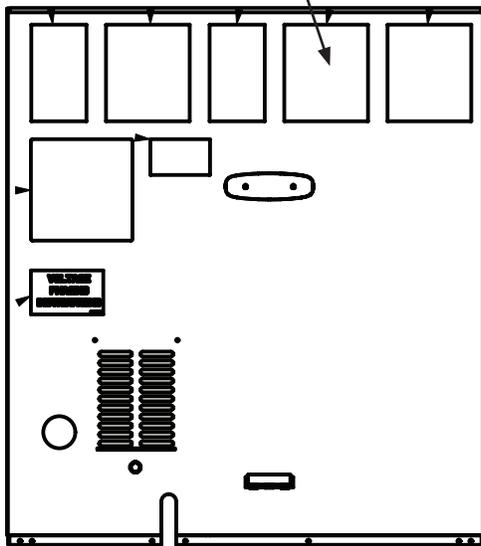


Figure 7

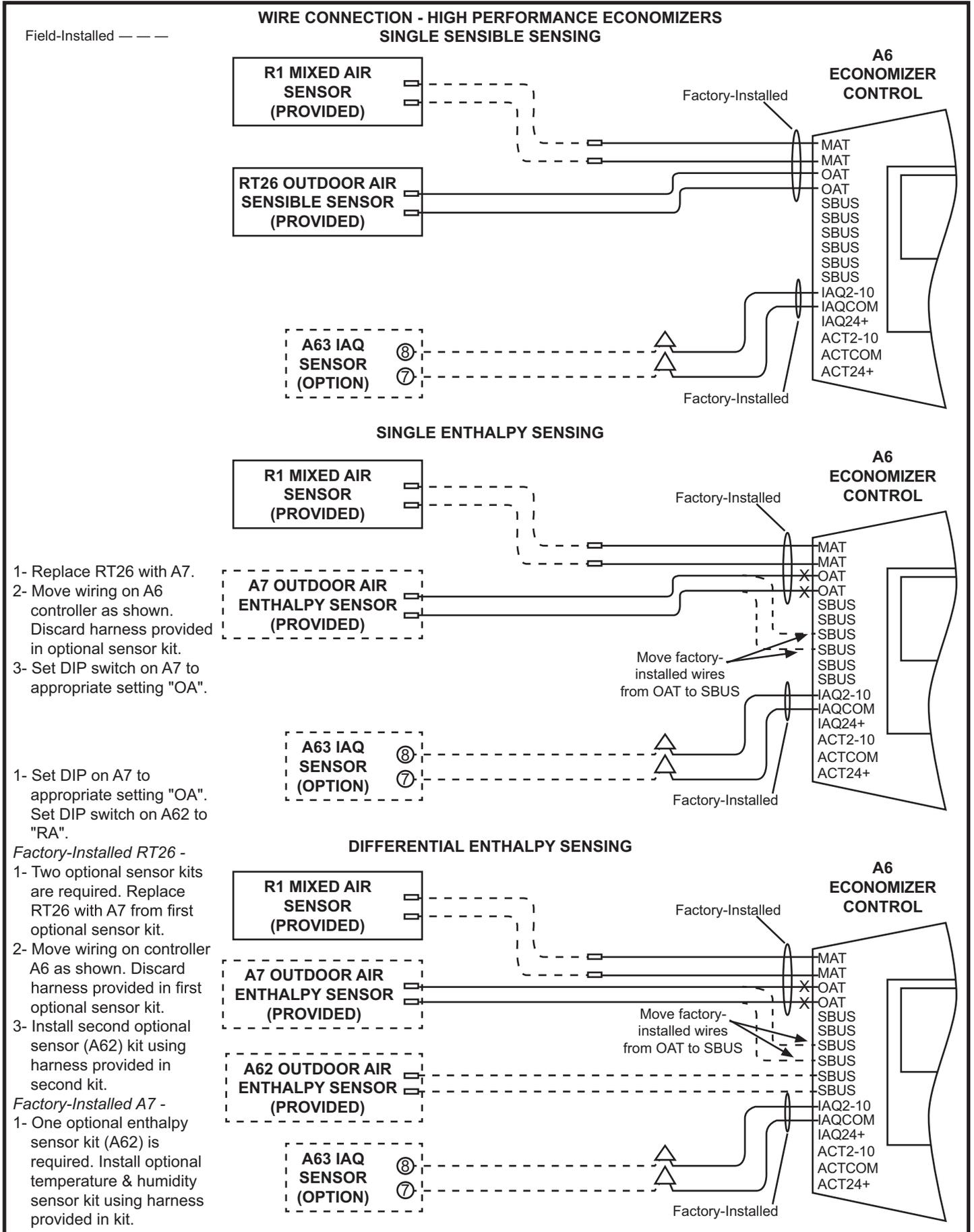


Figure 9

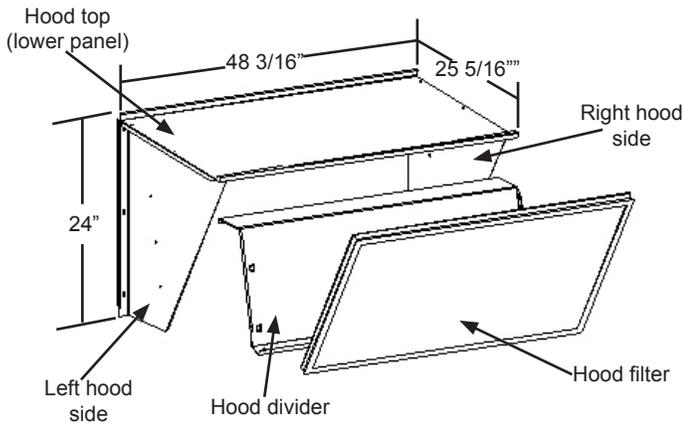


Figure 10

Outdoor Air Hood

If using a power exhaust accessory skip this step. The hood parts shipped with the economizer will not be used.

1. Remove the hood top from the economizer assembly.
2. Install the hood sides to the hood top, see Figure 10.
3. Screw the hood divider to the hood sides. Divider sits between the left and right hood side. Bottom angle of divider is used for the filter rack.
4. Open the filter clips on the underneath side of the hood top and insert filter. See Figure 11.
5. With hood assembled, fit the mating flange on hood top underneath the "knuckle" on the top seal panel. Install the hood over economizer as shown in Figure 4, 10 and 12.
6. Screw hood to unit as shown in figure 12.

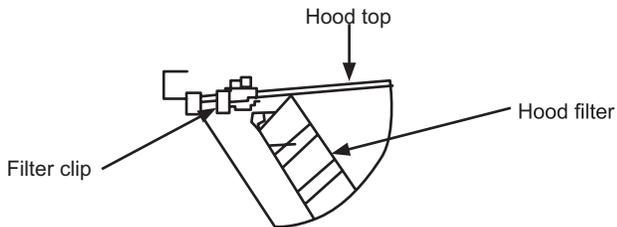


Figure 11

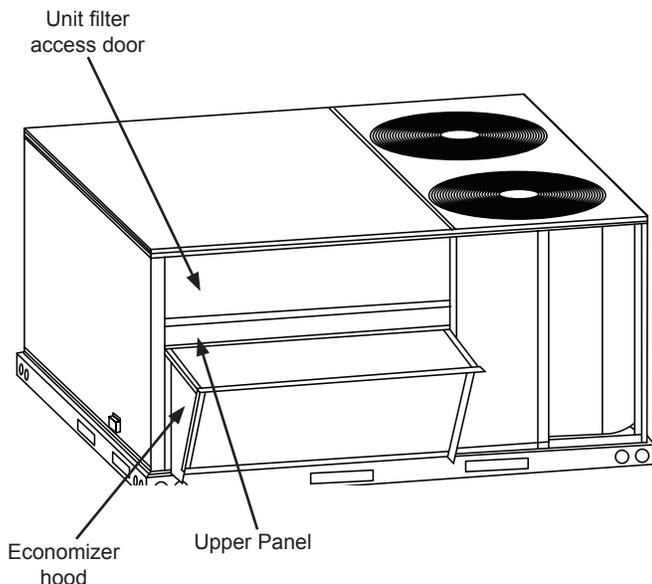


Figure 12

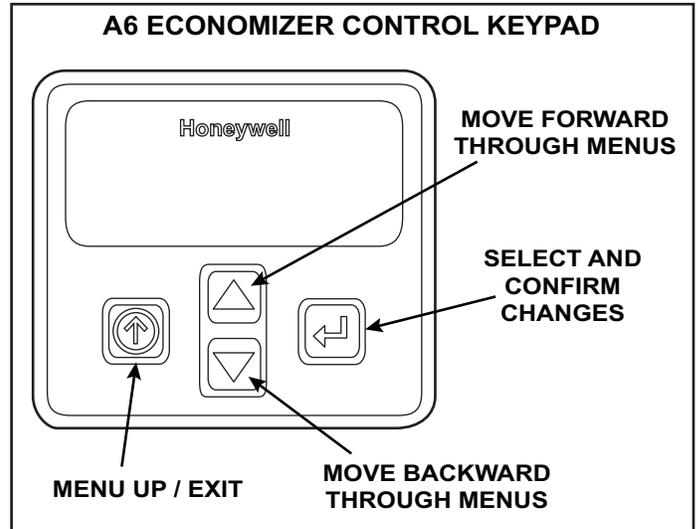
Economizer Control Module

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)

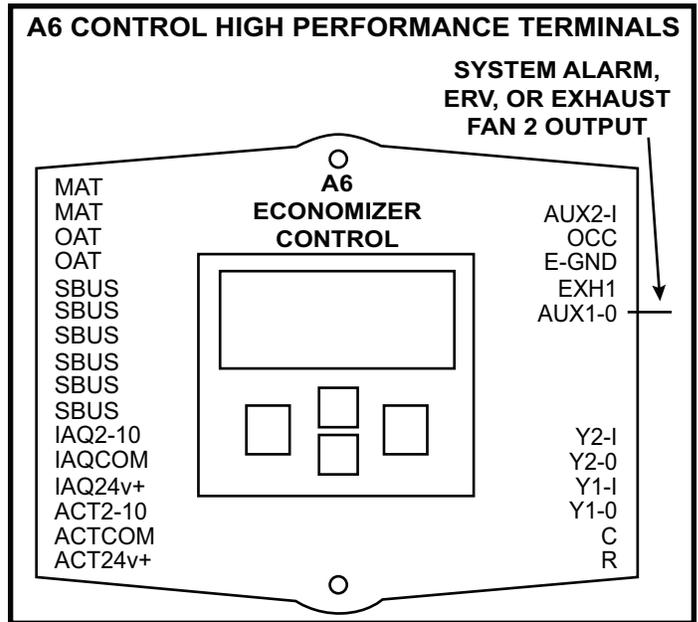
In the **SETPOINTS** Menu

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".



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.

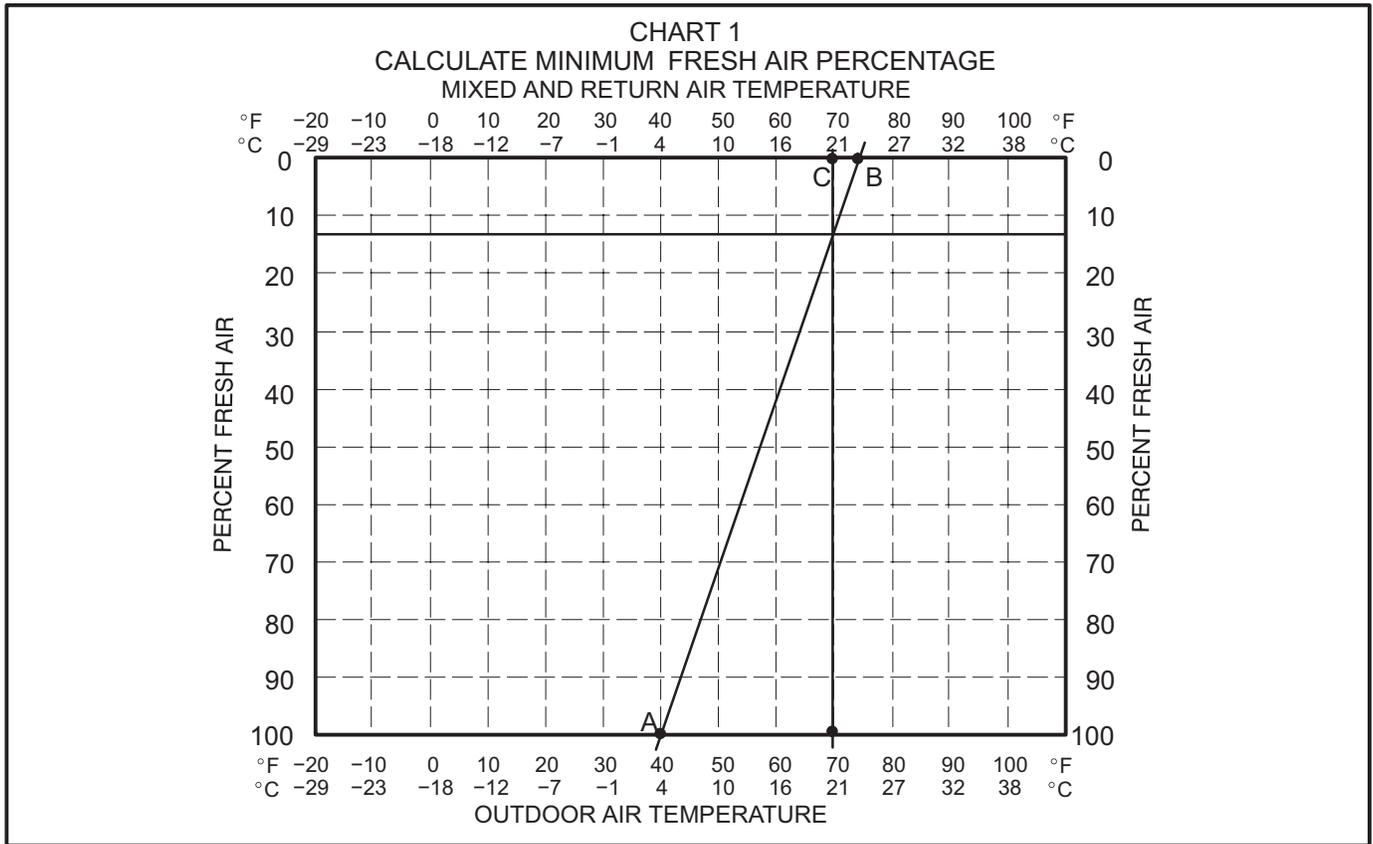
9- Draw a horizontal line where the two lines meet. Read the percent of fresh air intake on the side.

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.



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. At that point, K8 relay will switch from the R1 mixed air sensor to R51 resistor allowing the economizer damper to stay open 100%. The damper will stay open 100% with the compressor running simultaneously until Y2 demand is met.

NOTE - Because of the sensor location, the mixed air temperature displayed on the economizer controller (A6) is only true when no mechanical cooling or heating is initiated. During mechanical cooling (compressor running), the MA temperature displayed will be the temperature equivalent of the fixed resistor and not the actual MA temperature.

TROUBLESHOOTING, ALARMS AND CHECKOUT TESTS

Refer to the Honeywell manual provided for details.

ECONOMIZER OPERATION - NO DCV (CO₂ 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 (CO₂ 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 |