

**INSTALLATION INSTRUCTIONS FOR ECONOMIZER AND OUTDOOR AIR HOOD
 (604592-03; 54W77) USED WITH KG/KC/KH 180-300S UNITS**

Shipping and Packing List

Package 1 of 1 contains:

Damper Assembly

- 1- Economizer damper assembly
- 1- Enthalpy control (A6) and harness
- 1- Mixed air sensor (R1)
- 1 Economizer end plate (secured to packaging)
- 1- Thermostat (S175)
- 1- Harness (A7)
- 1- Resistor assembly
- 1- Mounting bracket
- 1- Bag assembly containing:
 - #10-16 X 5/8 Self-drilling screws
 - #4-40 X 3/8 Thread forming screw
 - D1 economizer section wiring diagram

Hood Assembly

- 1- Hood top
- 1- Hood top seal
- 2- Hood sides
- 2- Top filter brackets
- 1- Bottom filter bracket
- 2- Side filter brackets
- 3- Filters
- 1- Hood top stiffener
- 1- Top seal stiffener

Note - Gravity exhaust dampers are required with economizers and should be installed before the economizer. Refer to installation instructions provided with gravity exhaust dampers. If return air sensor(s) are specified, install sensor(s) before gravity exhaust.

⚠ 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

⚠ CAUTION

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

Application

The economizer is used with KG/KC/KH 180-300S units in downflow air discharge applications. Economizer dampers will modulate to maintain 55°F (13°C) supply air when outdoor air is suitable. The mixed air temperature sensor (R1) is provided in this kit and measures the supply air sensible temperature.

Note - On units equipped with an inverter (VFD) drive indoor blower motor, refer to the unit installation instructions for additional setup requirements.

Outdoor Air Suitability

The OA sensible control is the default economizer control. The OA thermostat, S175, is provided in this kit. See table 1 for outdoor and return air (OA and RA) sensor options. Refer to instructions provided with sensors for installation.

TABLE 1

Sensors	Dampers modulate to maintain 55°F mixed air (R1) when:
Single OA Sensible	OA temperature (S175) is lower than free cooling setpoint.
Single OA Enthalpy	OA temperature and humidity (A7) is lower than free cooling setpoint.
Differential Enthalpy - 1 in OA & 1 in RA	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.



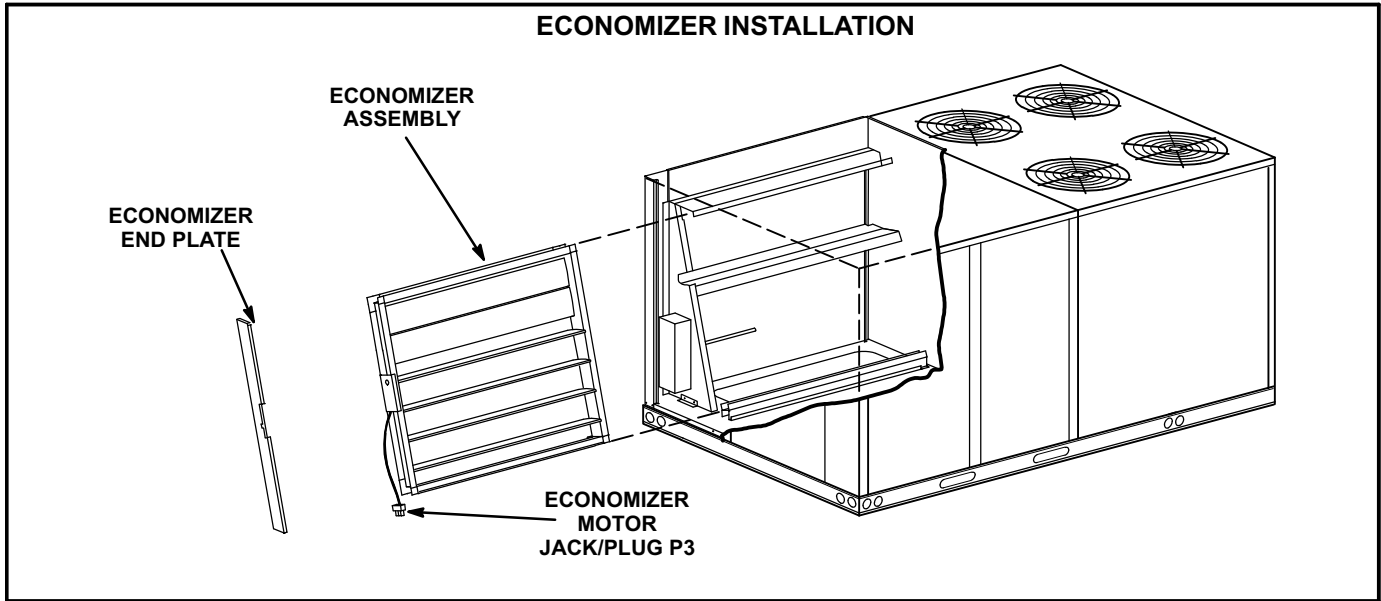


FIGURE 1

IAQ SENSING (A63)

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 A6 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 sensor leads to two stripped wires in filter section labeled AQ and AQ1. Wires are located in the upper left of the filter access compartment.

- 3- Insert 2-pin J104 jack from enthalpy control harness into opening on side panel and snap into place. See figure 3 for location of opening.
- 4- Connect 15-pin J10 economizer jack to P3 economizer motor plug as shown in figures 3 and 4.
- 5- Affix D1 economizer wiring diagram section to inside of compressor access panel. Position diagram to the right of C1 control wiring diagram section.

Install Economizer

- 1- Disconnect all power to unit and open filter access panel.
- 2- Remove horizontal return air panel.
- 3- Align bottom of economizer with economizer support bracket and slide economizer into unit. See figure 1. Make sure the flanges align as shown in figure 2.
- 4- Fit economizer end plate over end of economizer and secure end plate with #10 self drilling screws.

Install Enthalpy Control (A6)

- 1- Install A6 enthalpy control on economizer side panel as shown in figure 2. Secure with #4-40 screws provided.
- 2- Locate 15-pin J3 economizer jack harness hanging on left side of compartment. Disconnect P3 jumper plug from J3 and retain for future troubleshooting. Connect 15-pin P4 economizer plug on A6 enthalpy control harness to J3 economizer jack. Refer to figures 3 and 4. Enthalpy control harness is shown in bold.

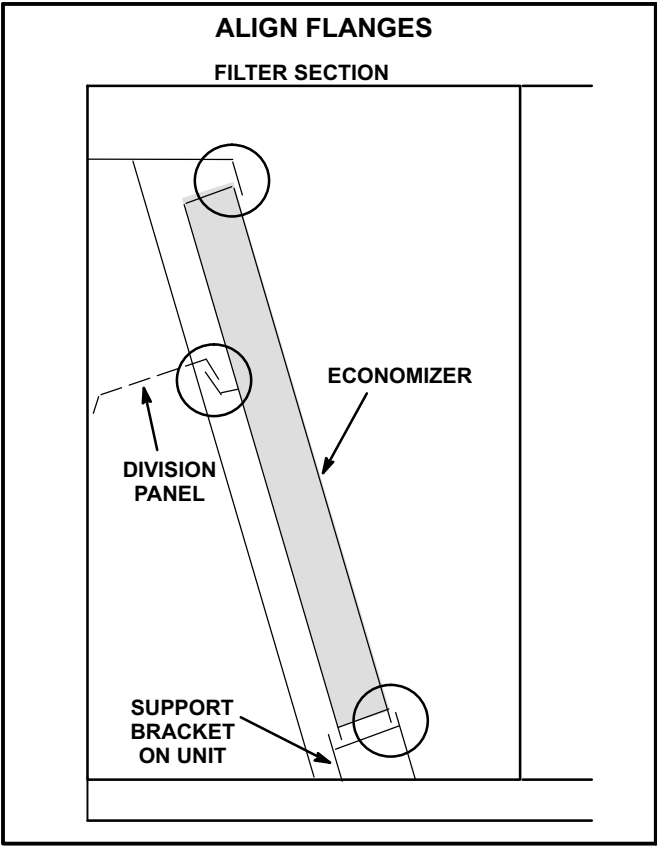


FIGURE 2

Install Enthalpy Control (A6) - Cont.

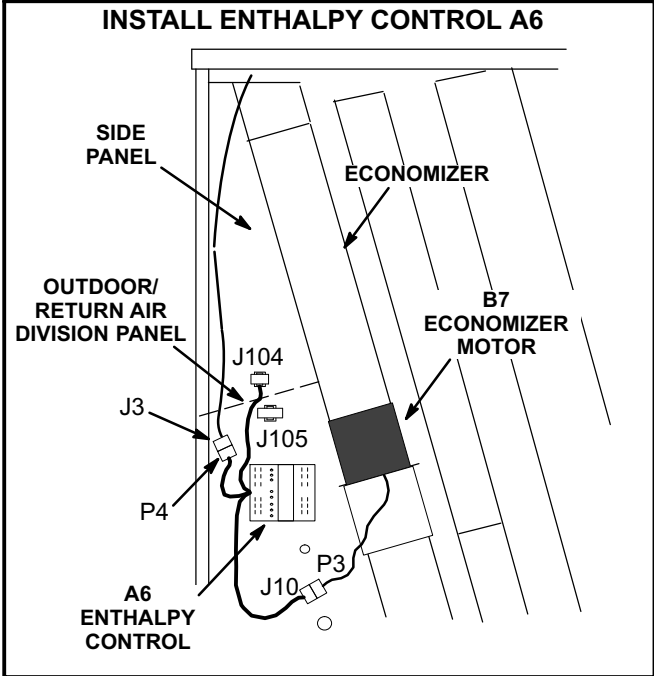


FIGURE 3

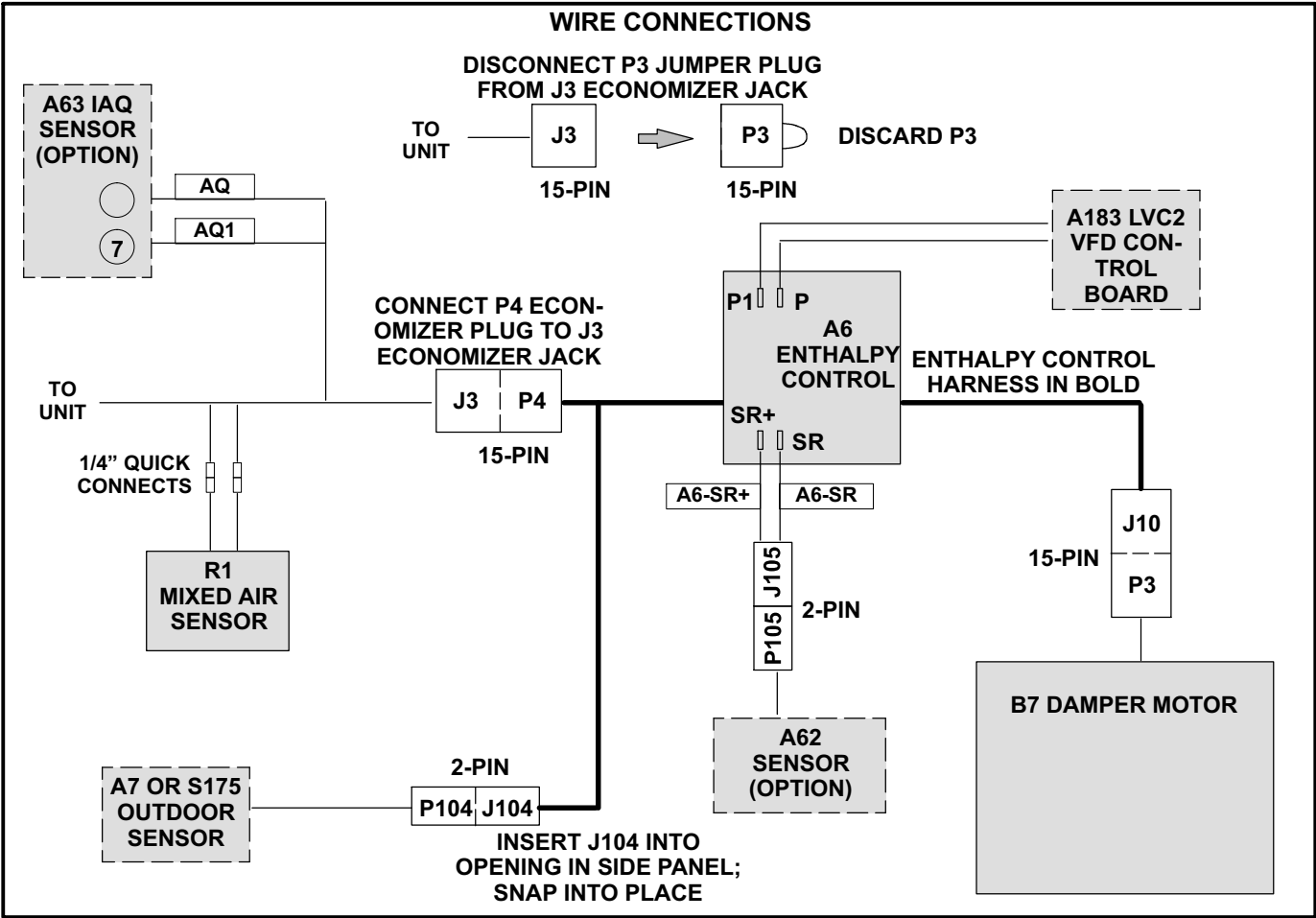


FIGURE 4

Install Enthalpy Control (A6) - Cont.

Units Equipped With An Optional VFD Only

- 6- Remove the jumper between P and P1 terminals on A6 enthalpy control. See figure 5.
- 7- Locate the wires marked P and P1 in the economizer compartment. Connect the P and P1 wires to P and P1 terminals on A6 respectively.
- 8- Adjust the minimum position potentiometer (MIN POS) on A6 fully open (completely clockwise).

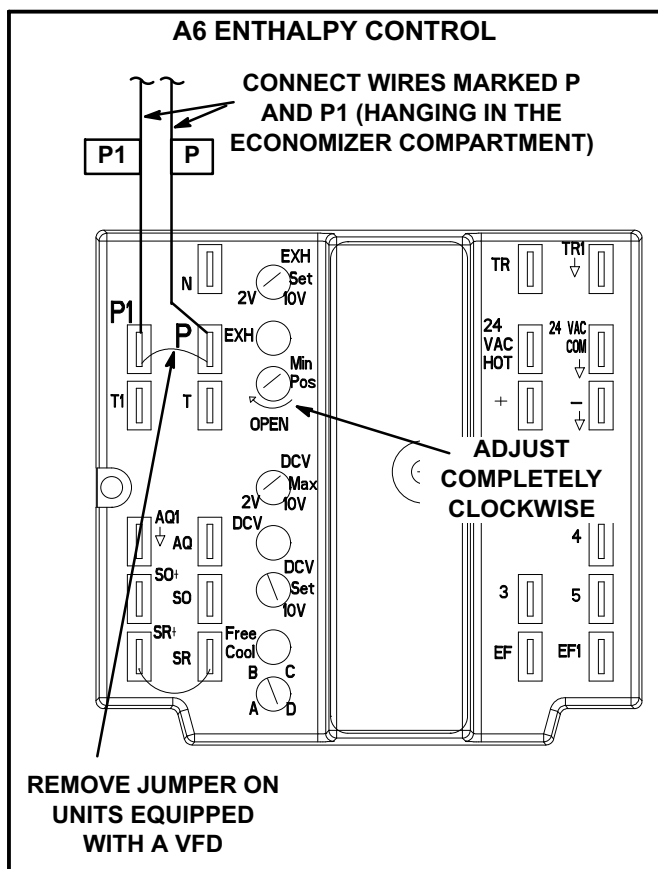


FIGURE 5

Install Mixed Air Sensor (R1)

- 1- Remove blower access panel.
- 2- Install sensor on bracket as shown in figure 6.
- 3- Locate two wires labeled R1 in wire bundle in top of blower section. Connect spade connectors on wire to sensor terminals.

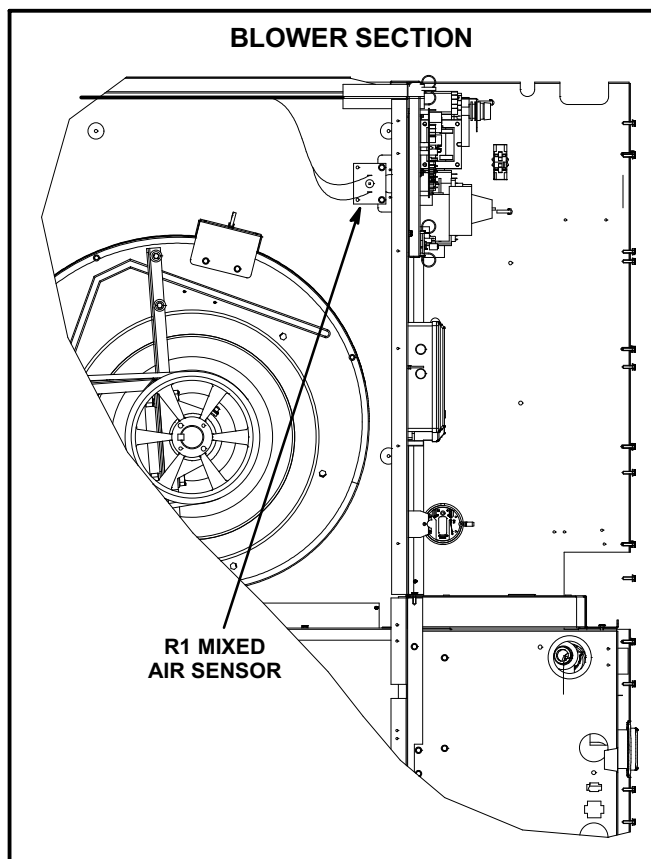


FIGURE 6

Install Single Sensible Control (S175)

- 1- Install S175 thermostat on mounting bracket using 1/2" screws.
- 2- Install mounting bracket on divider panel as shown in figure 8.
- 3- Make wiring connections as shown in figure 7. Secure harness with wire tie provided in kit.
- 4- Insert P104 plug into the side of the economizer as shown in figure 8.

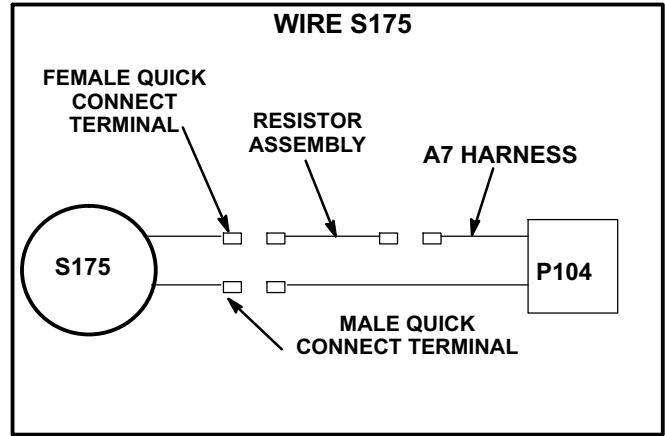


FIGURE 7

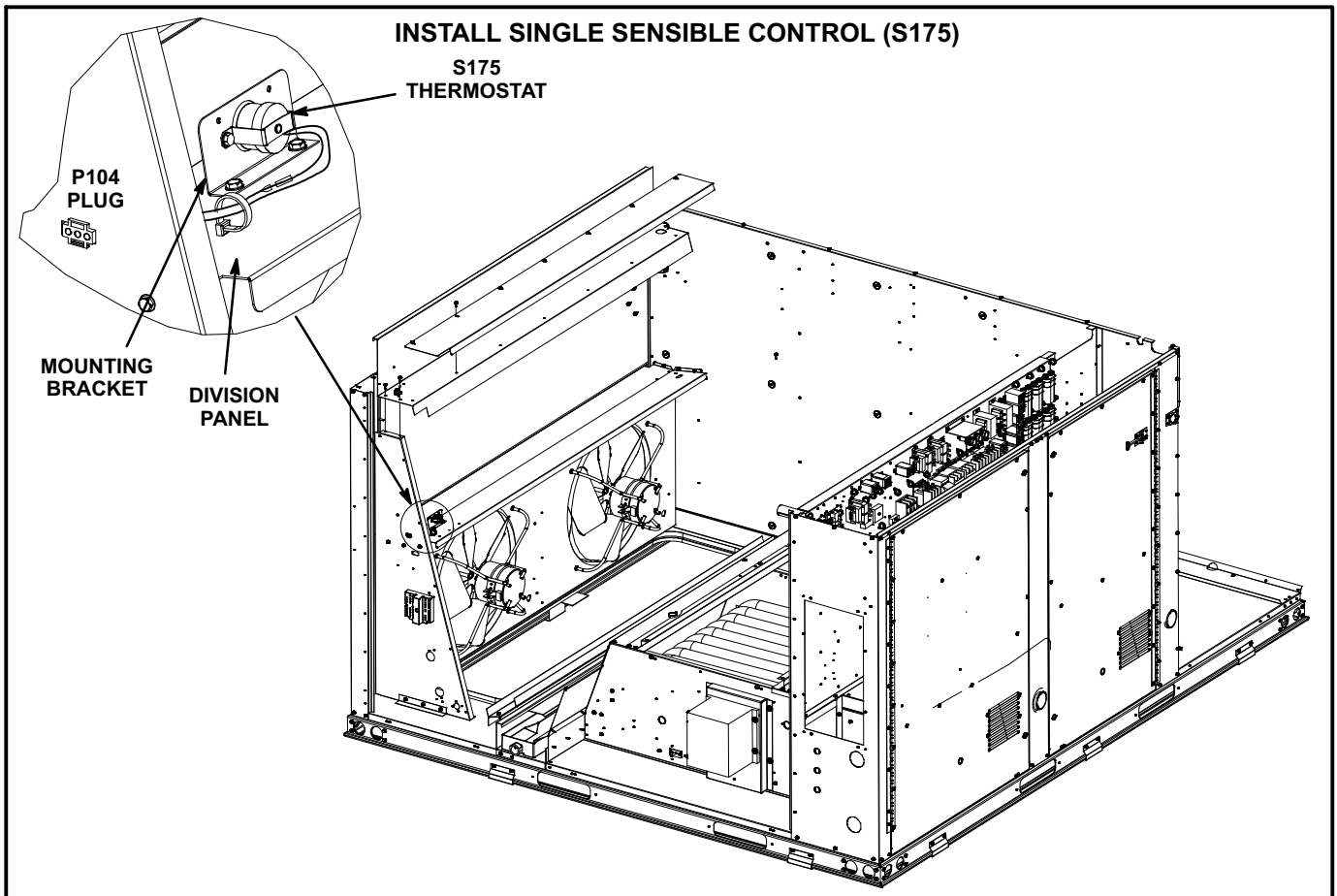


FIGURE 8

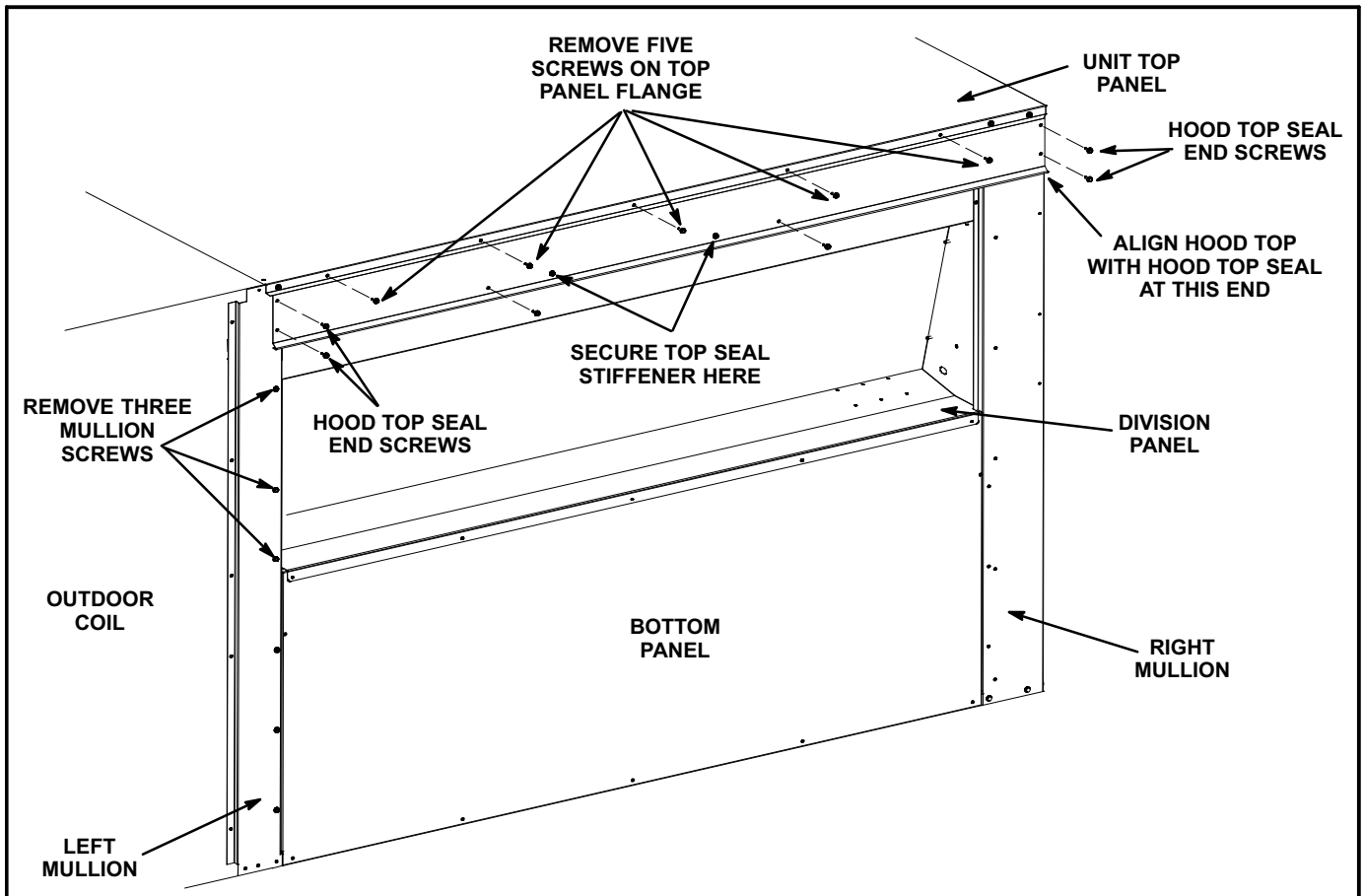


FIGURE 9

Outdoor Air Hood

Note: Install outdoor air sensor according to instructions provided with the sensor before installing hood.

The outdoor air hood is packaged separately but attached to the damper assembly crate. Use #10 self drilling screws to install hood unless noted otherwise. Refer to figures 9, 10, 11 and 12.

- 1- Remove and retain screws securing unit top back panel; remove and discard panel.
- 2- Secure top seal stiffener to back side of hood top seal. See figures 9 and 10.
- 3- Slide hood top seal under unit cabinet top and secure using five retained top screws. Install, but do not tighten, the two screws on each end of the hood to seal. Refer to figure 9.
- 4- Remove and retain top three screws on the left mullion of the outdoor air section. See figure 9.
- 5- Secure hood top stiffener to unpainted side of the hood top with ten screws. See figures 10 and 11.
- 6- Position the hood top edge V-channel under the corresponding V-channel on the hood top seal and slide into place from right to left. See figure 9 and 9.

- 7- Tighten the two screws on each end of the hood top seal left loose in step 3.

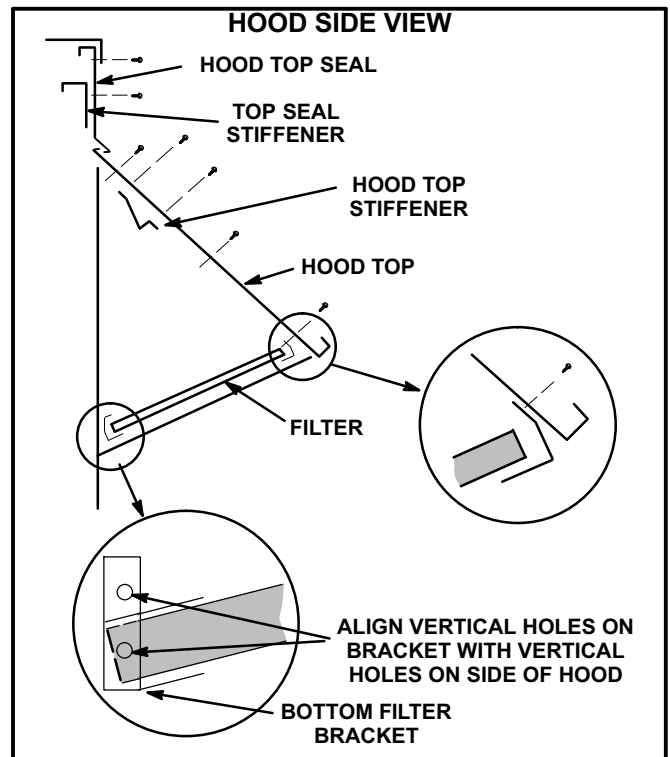


FIGURE 10

- 8- Install L-shaped left side filter bracket to left hood side. See figure 11.
- 9- Secure left hood side to the hood top. See figure 12. Secure the left hood side to the unit using three screws removed in step 4. See figure 12.
- 10- Install the right side filter bracket to the right hood side. See figure 11.
- 11- Secure the right hood side to the hood top. See figure 13. Do NOT secure the right hood side to unit.
- 12- Align the two holes on the left hood side with the two holes in the bottom filter bracket. See figures 10 and 12. Secure with screws.
- 13- Secure bottom filter bracket to right hood side in the same manner. See figures 10 and 13.

- 14- Secure the right hood side to the unit as shown in figure 13.
- 15- Secure the top filter bracket (long) to the hood top. See figures 10 and 11. Slide two filters into place.
Note - Slide the filters to the left side of the hood. Make sure there are no air gaps between either two filters or the filter and the left hood side.
- 16- Insert the third filter into the bottom filter bracket. Position the top filter bracket (short) as shown in figures 10 and 11. Secure the bracket to the hood top with screws.
- 17- Make sure there are no gaps between the filters by sliding the filters to the left.
- 18- Caulk (field-provided) both ends of the top seal and hood top as shown in figures 12 and 13.

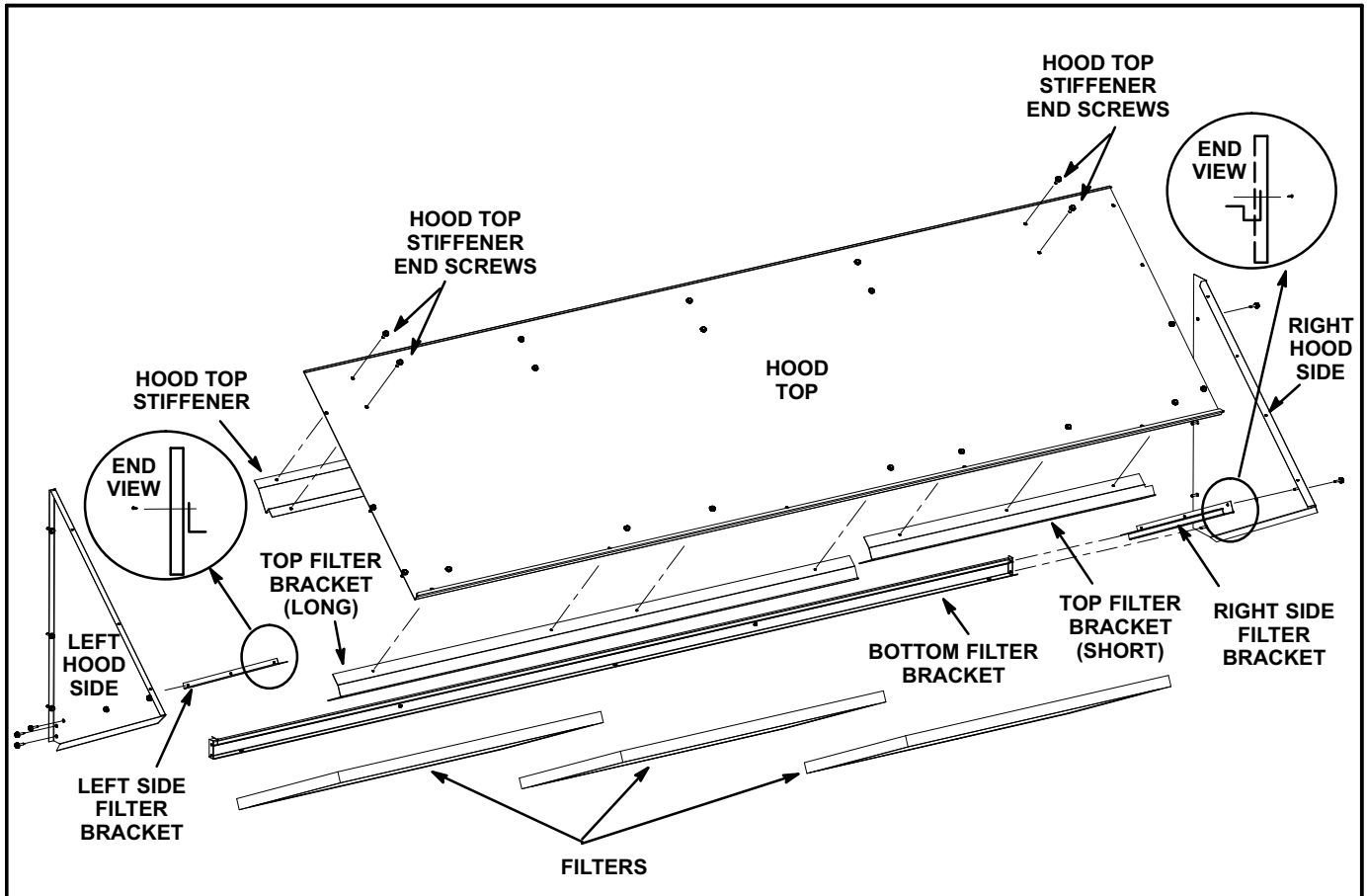


FIGURE 11

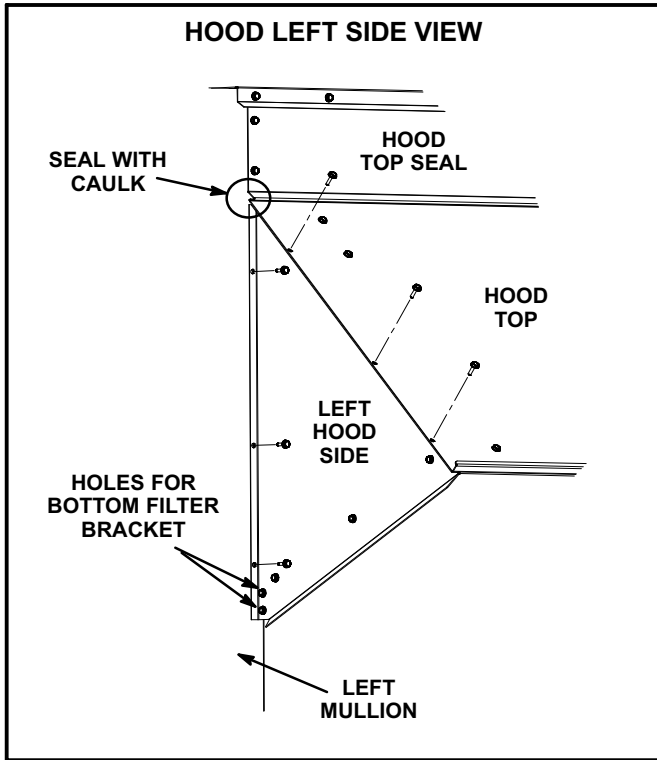


FIGURE 12

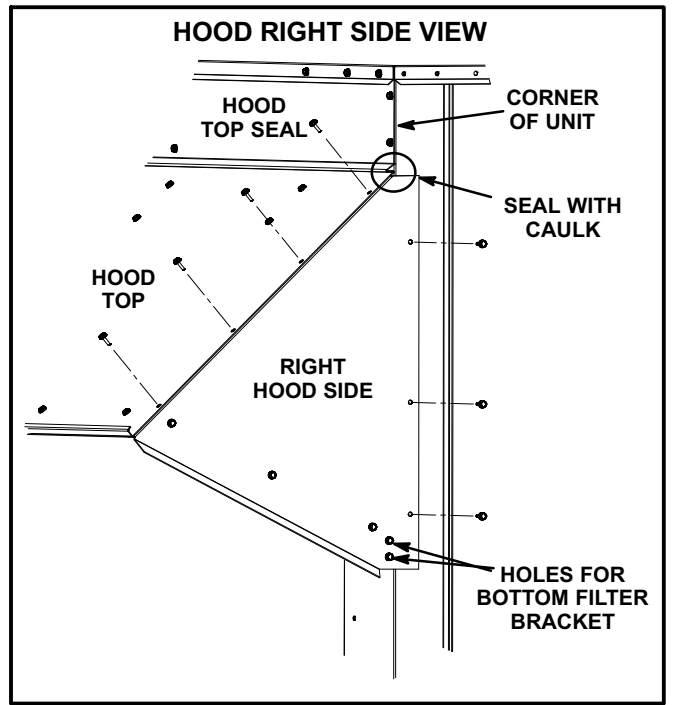


FIGURE 13

Enthalpy Control (A6)

LED'S

A steady green Free Cool LED indicates that outdoor air is suitable for free cooling. A steady green DCV LED indicates that the IAQ reading is higher than setpoint requiring more fresh air. See figure 14.

FREE COOLING SETPOINT

Single Temperature or Enthalpy Sensing:

The enthalpy control (A6) setpoint may be adjusted when an enthalpy (A7) sensor is used to determine outdoor air suitability, See figure 14.

Free cooling will be enabled when outdoor air temperature or enthalpy are lower than the free cooling setpoint. The free cooling setpoints for sensible temperature sensors is 55°F. Table 2 shows the free cooling setpoints for enthalpy sensors. Use the recommended setpoint and adjust as necessary.

For example: At setting A (table 2), free cooling will be enabled when outdoor air enthalpy is lower than 73°F and 50% RH. If indoor air is too warm or humid, lower the setpoint to B. At setting B, free cooling will be enabled at 70°F and 50% RH.

**TABLE 2
ENTHALPY FREE COOLING SETPOINTS**

Control Setting	Enthalpy Setpoint At 50% RH
A*	73° F (23° C)
B	70° F (21° C)
C	67° F (19° C)
D	63° F (17° C)

*Setting A is recommended.

Differential Sensing:

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. Adjust the free cooling setpoint to "D" in this application.

When return air is cooler than outdoor air, the damper will modulate to the minimum position.

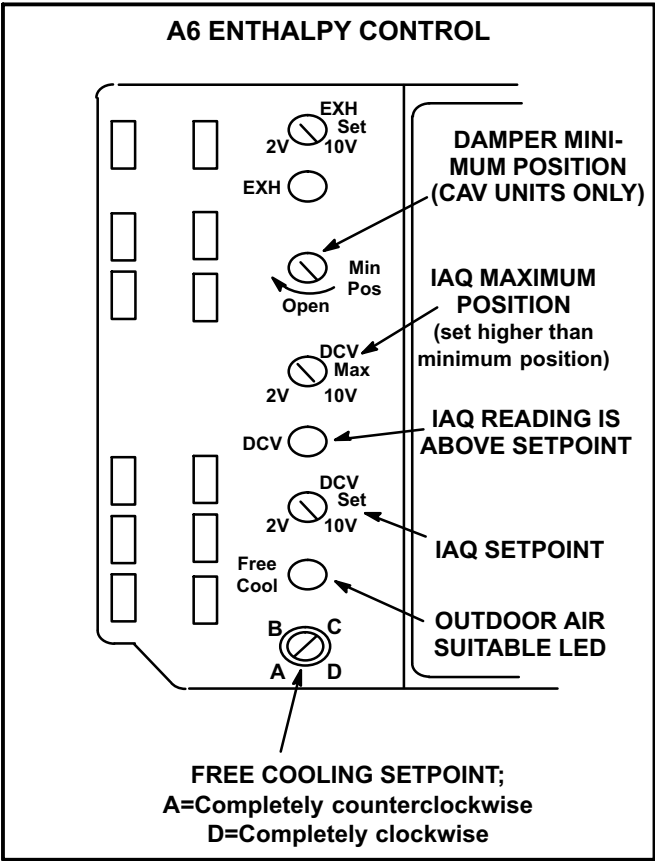


FIGURE 14

DAMPER MINIMUM POSITION SETTING

NOTE - A jumper is factory-installed between TB1 R and OC terminals to maintain occupied status (allowing minimum fresh air). See figure 15. When using an electronic thermostat or energy management system with an occupied/unoccupied feature, remove jumper. Make wire connections to R and OC as shown in literature provided with thermostat or energy management system literature. Either the jumper wire or optional device must be connected to R and OC for the economizer to function.

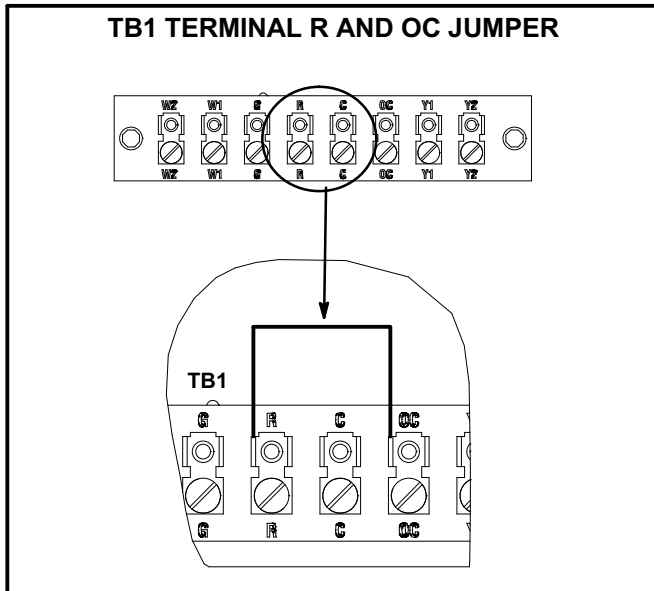


FIGURE 15

Units Equipped With A VFD - Set minimum damper position on the VFD control board. Refer to unit installation instructions for details.

- 1- Set thermostat to occupied mode if the feature is available. Make sure jumper is in place between TB1 terminals R and OC if using a thermostat which does not have the feature.

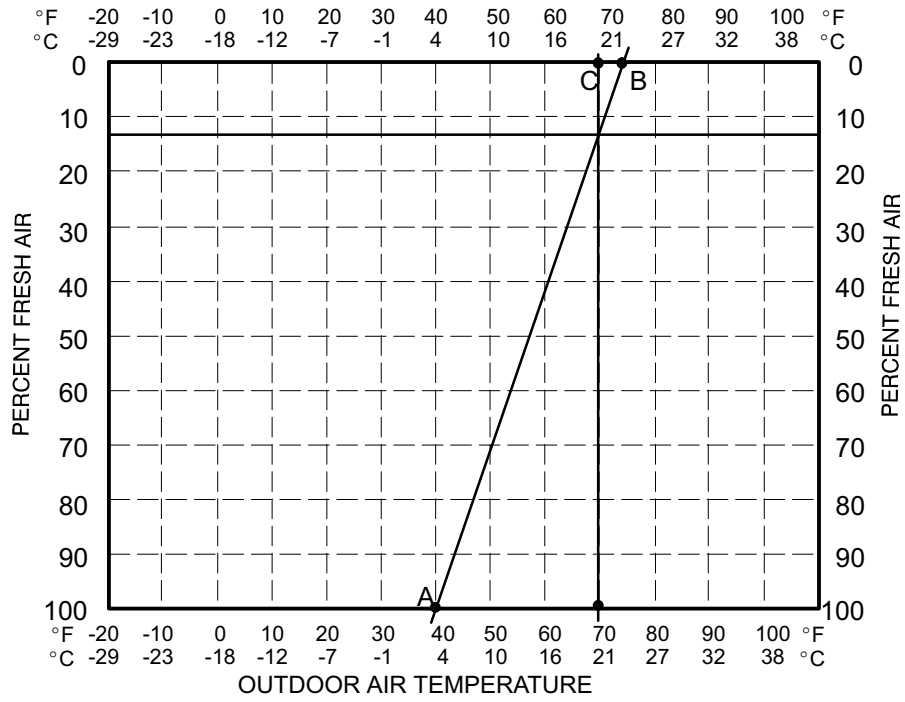
- 2- Rotate MIN POS SET potentiometer to approximate desired fresh air percentage.

IMPORTANT - On unit equipped with an inverter (VFD) driven supply air blower motor, the VFD control board controls the economizer minimum damper position. Refer to the unit installation instructions for additional setup requirements.

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

- 3- Measure outdoor air temperature. Mark the point on the bottom line of chart 1 and label the point "A" (40°F, 4°C shown).
- 4- Measure return air temperature. Mark that point on the top line of chart 1 and label the point "B" (74°F, 23°C shown).
- 5- 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).
- 6- Draw a straight line between points A and B.
- 7- Draw a vertical line through point C.
- 8- Draw a horizontal line where the two lines meet. Read the percent of fresh air intake on the side.
- 9- If fresh air percentage is less than desired, adjust MIN POS SET potentiometer clockwise (further open). If fresh air percentage is more than desired, adjust MIN POS SET potentiometer counterclockwise (less open). Repeat steps 3 through 8 until calculation reads desired fresh air percentage.

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



DCV SET AND DCV MAX SETTINGS

The DCV SET potentiometer is factory-set at approximately 50% of the potentiometer range. Using a standard 1-2000ppm CO₂ sensor, dampers will start to open when the IAQ sensor reads approximately 1000ppm. Adjust the DCV SET potentiometer to the approximate setting specified by the controls contractor. Refer to figure 14.

The DCV MAX potentiometer is factory-set at approximately 50% of the potentiometer range or 6VDC. Dampers will open approximately half way when CO₂ rises above setpoint. Adjust the DCV MAX potentiometer to the approximate setting specified by the controls contractor. Refer to figure 14.

Note - DCV Max must be set higher than economizer minimum position setting for proper demand control ventilation.

Economizer Operation

When the outdoor air is suitable, dampers will modulate between minimum position and full open to maintain 55°F (12.8°C) supply air.

See table 3 for economizer operation when outdoor air is suitable. See table 4 for economizer operation when outdoor air is NOT suitable.

IAQ Sensor

During the occupied period, dampers will open to DCV MAX when IAQ reading is above setpoint (regardless of thermostat demand or outdoor air suitability). DCV MAX will NOT override damper full-open position. The DCV MAX setting may override damper free cooling position when occupancy is high and outdoor air temperatures are low.

Note - R1 senses mixed air temperature below 45°F (7°C), dampers will move to minimum position until mixed air temperature rises to 48°F (9°C).

**TABLE 3
ECONOMIZER OPERATION-OUTDOOR AIR IS SUITABLE FOR FREE COOLING – FREE COOL LED “ON”**

THERMOSTAT DEMAND	DAMPER POSITION		MECHANICAL COOLING
	UNOCCUPIED	OCCUPIED	
Off	Closed	Closed	No
G	Closed	Minimum	No
Y1	Modulating	Modulating	No
Y2	Modulating	Modulating	Stage 1

**TABLE 4
ECONOMIZER OPERATION-OUTDOOR AIR IS NOT SUITABLE FOR FREE COOLING – FREE COOL LED “OFF”**

THERMOSTAT DEMAND	DAMPER POSITION		MECHANICAL COOLING
	UNOCCUPIED	OCCUPIED	
Off	Closed	Closed	No
G	Closed	Minimum*	No
Y1	Closed	Minimum*	Stage 1
Y2	Closed	Minimum*	Stage 2

*IAQ sensor can open damper to DCV max.