

INSTALLATION INSTRUCTIONS FOR ECONOMIZERS AND OUTDOOR AIR HOODS USED WITH KG/KC/KH 024, 030, 036, 048, 060, 072, 090 UNITS

Note - Disregard shipping and packing list and installation sections when dampers are factory-installed.

Shipping and Packing List

Package 1 of 1 contains:

- 1- Economizer damper assembly^A
- 1- Mixed or supply air sensor (R1)
- 1- GED^B (gravity exhaust/barometric relief damper) assembly
- 1- Exhaust hood kit containing:
 - 1-Exhaust hood top^A
 - 2-Hood sides^C
- 1- Outdoor air hood kit containing:
 - 1-Outdoor air hood top^A
 - 2-Hood sides^D
- 1- Mist eliminator filter^D
- 1- GED seal^D
- 2- Mist eliminator filter brackets^D
- 1- Bag assembly containing:
 - #10-32 X 1/2 Thread-forming screws
 - #10-16 X 5/8 Self-drilling screws
 - #8-32 X 1/2 Thread-forming screws

^AAlready in place when economizer is factory-installed.

^BOptional GED already installed in field-installed economizer

^CShipped under the exhaust air cover when economizer is factory-installed.

^DShipped in the blower section when economizer is factory-installed.

Order Of Installation:

- Return air cover (horizontal airflow)*
- Economizer*
- Mixed air sensor (R1)*
- Remove GED (horizontal airflow and PEF options)*
- Optional OA/RA sensors*
- Power exhaust fans*
- GED in lower hood (horizontal and PEF options)*
- RA Transition (horizontal airflow)*
- RA duct (horizontal airflow)*
- Lower outdoor air hood*
- Upper outdoor air hood*



⚠ 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

Part No.	Unit Application
90W61 - 609258-03	KG/KC 024-060 KH 024-048
90W62 - 609258-04	KG/KC 072, 090 KH 060, 072

The K1ECON economizer is used with KG/KC/KH units in downflow and horizontal 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) measures the supply air sensible temperature.

The mixed air sensor is provided in field-installed kits and installed according to these instructions. The mixed air sensor is factory-installed when the unit is equipped with an economizer.

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.

⚠ CAUTION

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

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 AQ and AQ1 terminals on the A6 enthalpy control located in the filter section.

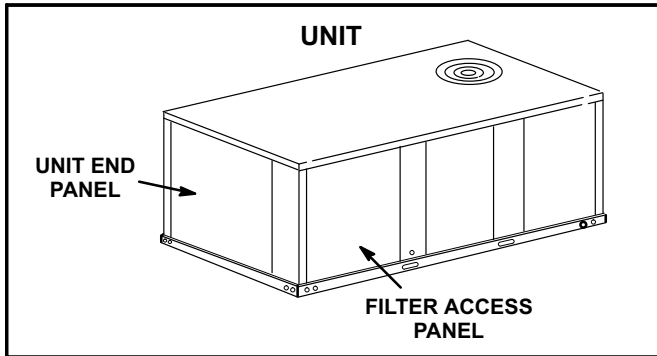


FIGURE 1

Install Economizer - Downflow

- 1- Open unit end panel. See figure 1.
- 2- Install damper assembly through end of unit. Fit opening in bottom of damper assembly over the return air opening. See figure 2.

Install Mixed Air Sensor (R1)

Sensor is factory-installed on units equipped with a factory-installed economizer.

- 1- Disconnect all power to unit and open filter access panel. See figure 1.
- 2- Locate mixed air sensor (R1) in wire bundle. Cut wire ties to separate sensor wiring from bundle.
- 3- Disconnect wires from mixed air sensor.
- 4- Install mixed air sensor on evaporator coil end plate 1-1/2" from the top of the unit. Orient the thermistor toward the inside of the unit. See figure 3.
- 5- Locate the plastic conduit on top of the filter rack. Route the mixed air sensor wires through the conduit to the mixed air sensor. See figure 3.
- 6- Connect wires to terminals on mixed air sensor. See figure 3 and 4. Sensor is not polarity sensitive.

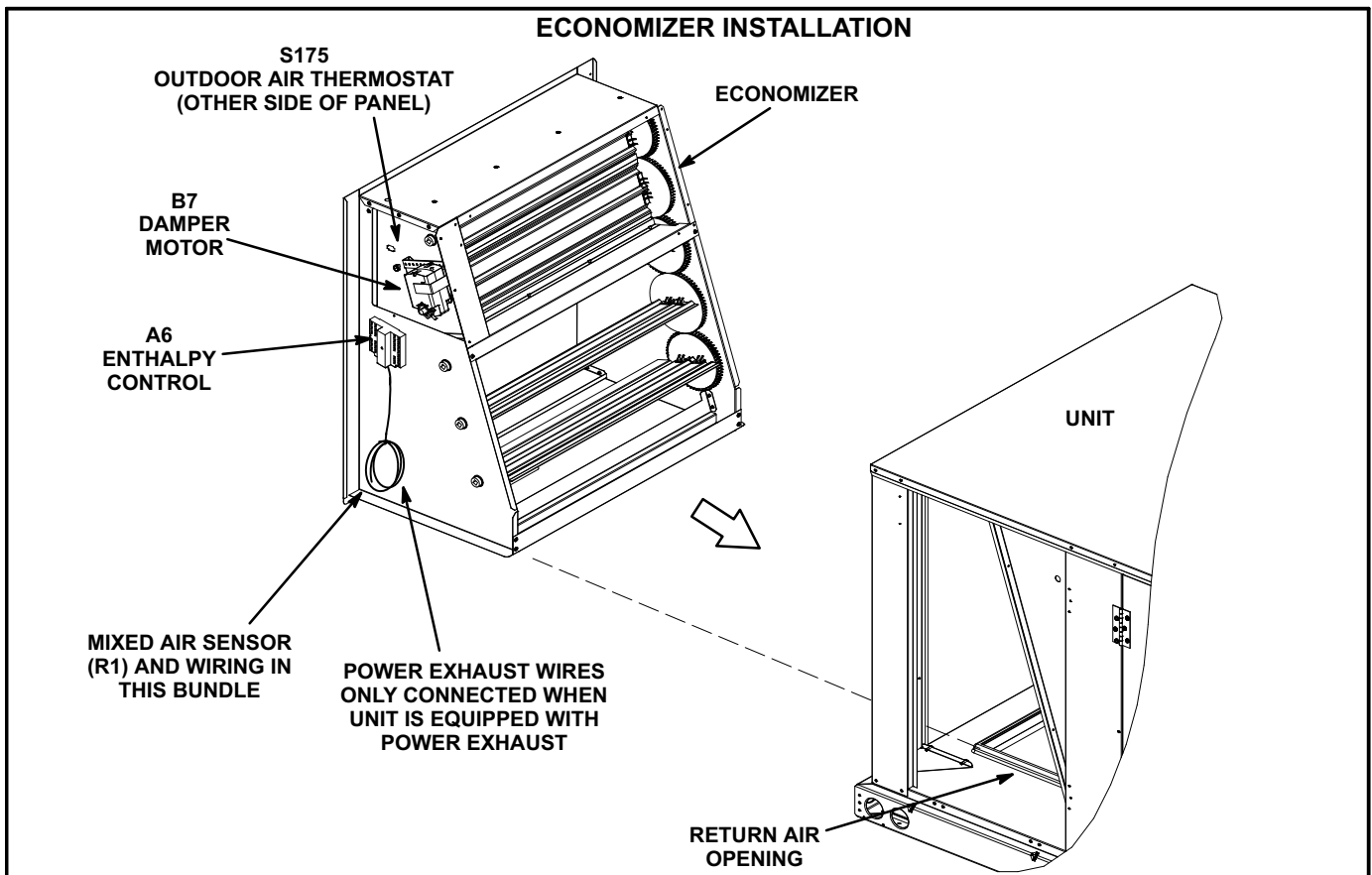


FIGURE 2

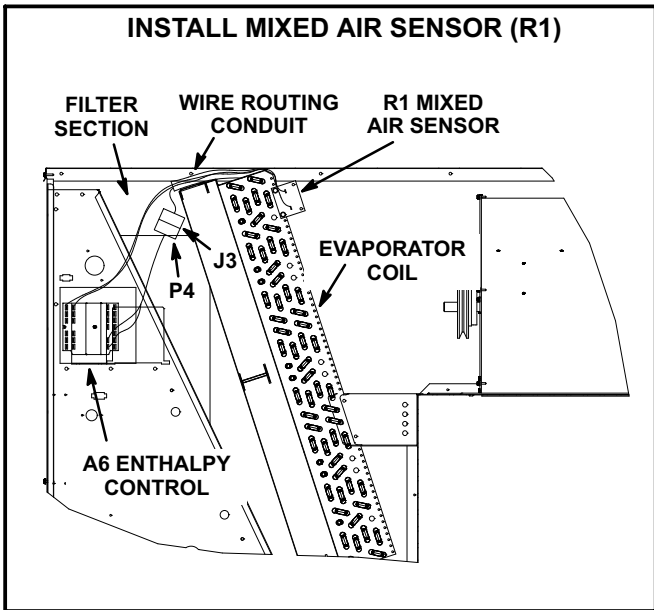


FIGURE 3

Wiring

- 1- Locate 15-pin J3 economizer jack harness hanging on left side of filter compartment. Disconnect P3 jumper plug from J3 and retain jumper plug for future troubleshooting. Connect 15-pin P4 economizer plug on A6 enthalpy controller harness to J3 economizer jack. Refer to figures 3 and 4.
- 2- Connect any optional sensors as shown in figure 4.
- 3- Bundle power exhaust wires and secure away from other components. If optional power exhaust is installed, wire according to instructions provided with power exhaust.
- 4- Affix D1 economizer wiring diagram section to inside of compressor access panel. Position diagram to the right of "C" control wiring diagram section.

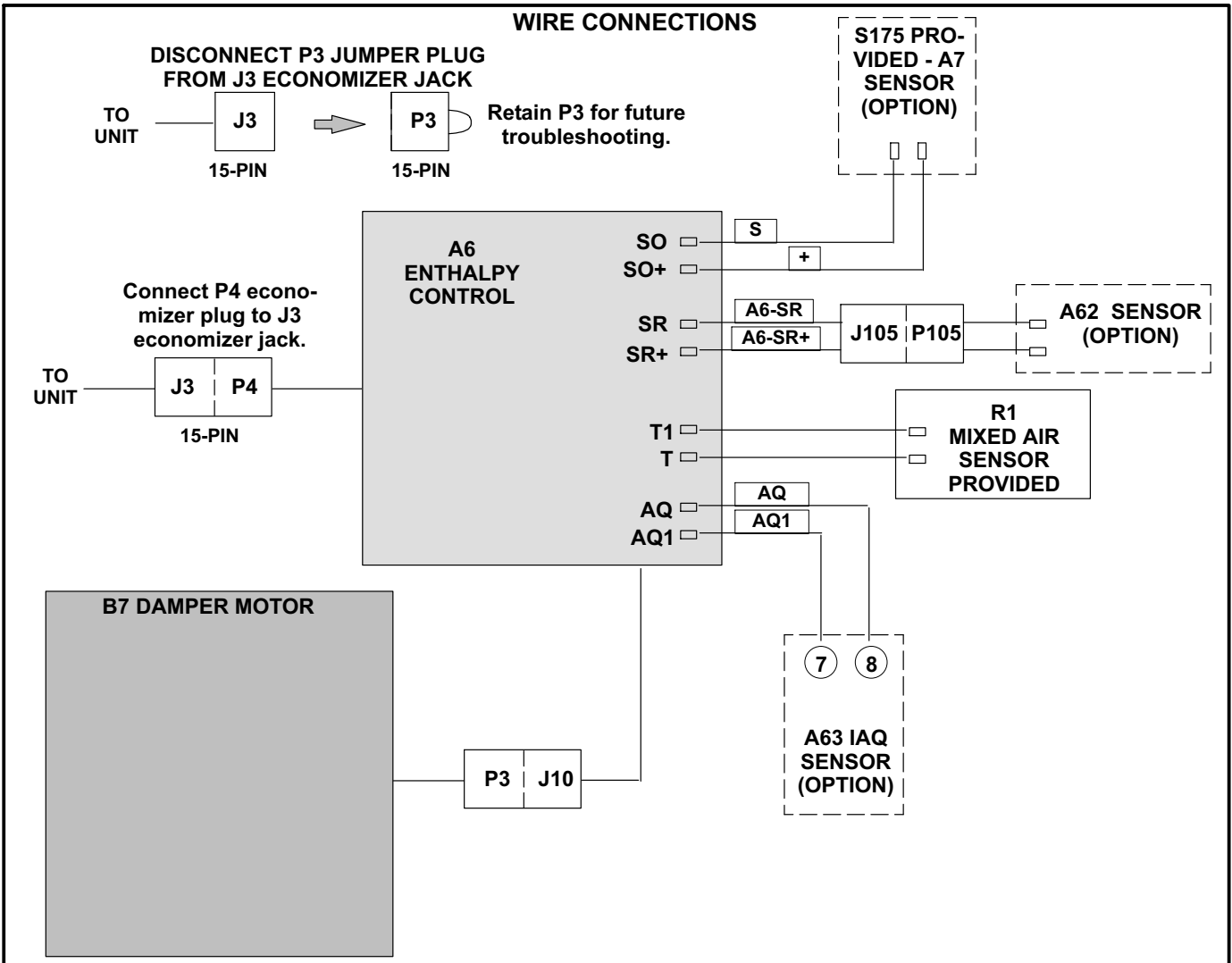


FIGURE 4

GED (Barometric Relief Dampers)

Note - GED is optional when economizer is factory-installed.

Remove GED from the economizer (when present) and install in the exhaust air hood when:

- Optional power exhaust fans are installed
- Economizer is installed in horizontal air flow

- 1- Remove the GED from the economizer. See figure 5.
- 2- Install the GED in the exhaust or lower hood as shown in figure 7.

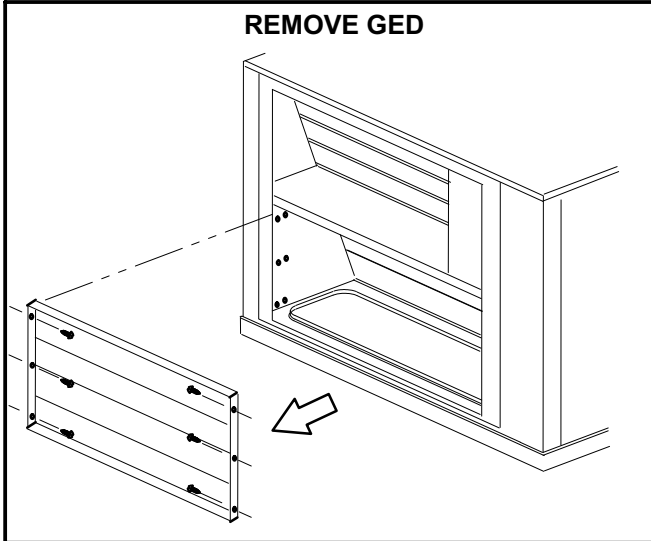


FIGURE 5

Outdoor Air Hoods

Factory-Installed Economizers Only -

Both hood tops and pivot brackets are secured to unit. The lower hood is provided and installed only when the economizer is equipped with an optional GED. Hood parts are located under the exhaust panel and in the blower section. Lift hood tops and assemble hoods as described for field-installed economizers.

- 1- Make sure all sensors and outdoor air section accessories are installed before installing hoods.
- 2- Install pivot brackets and seal on unit as shown in figure 6.
- 3- Assemble hoods as shown in figure 7. Slide top of hoods into the ends of pivot brackets. Install birdscreen bracket after birdscreens are in place.
- 4- Install hoods on unit as shown in figure 8.
- 5- Caulk ends of pivot bracket to seal watertight.

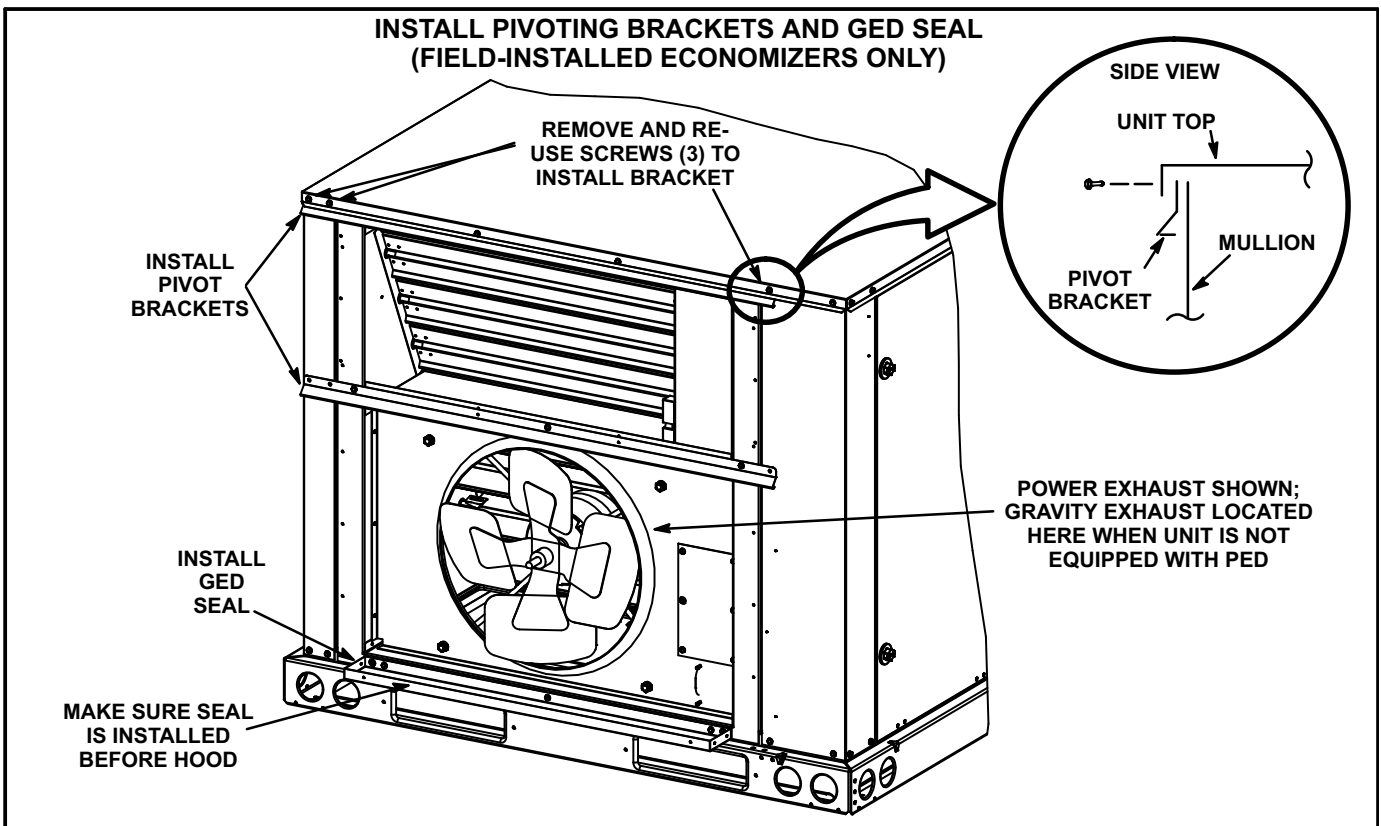


FIGURE 6

ASSEMBLE HOODS

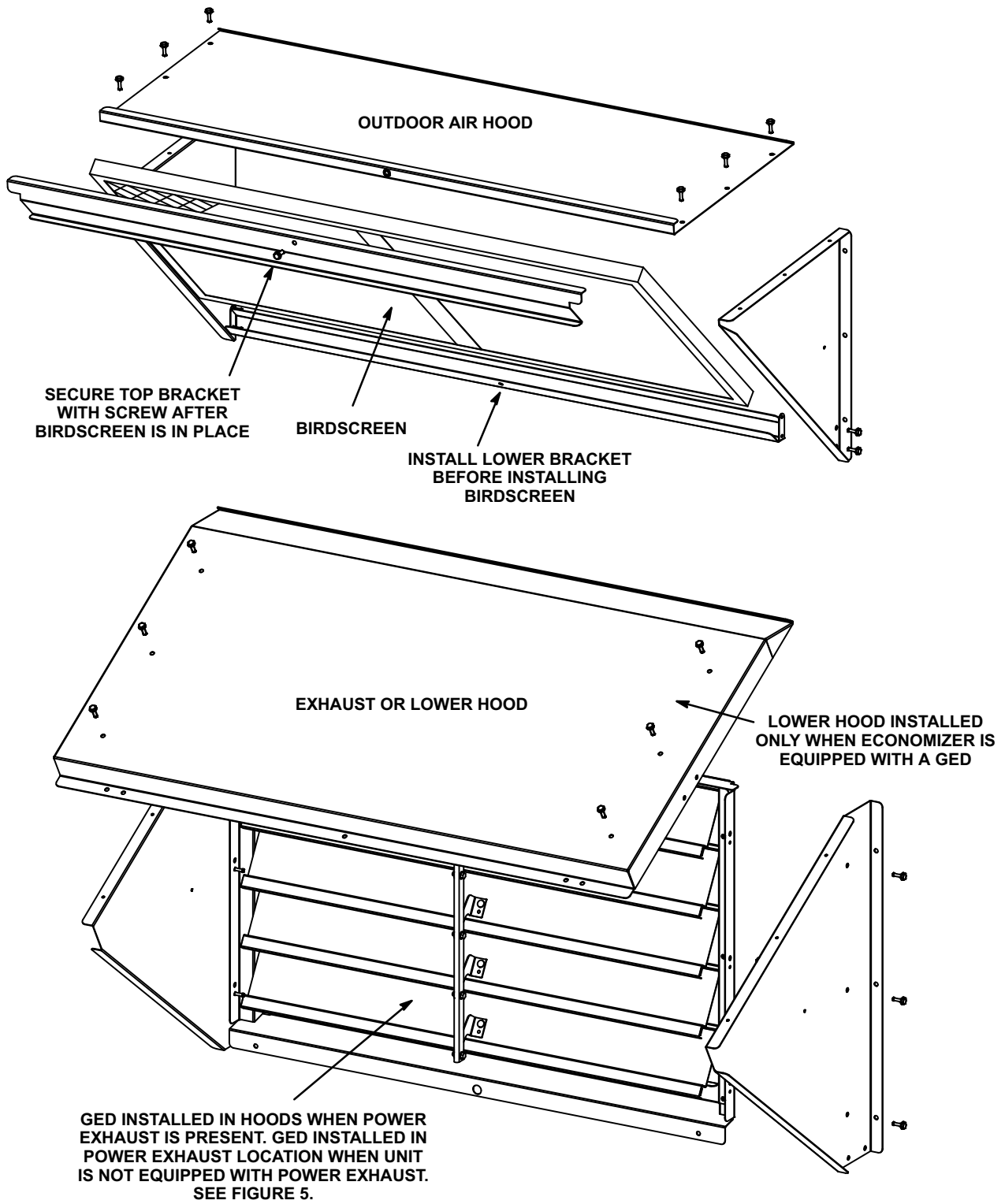
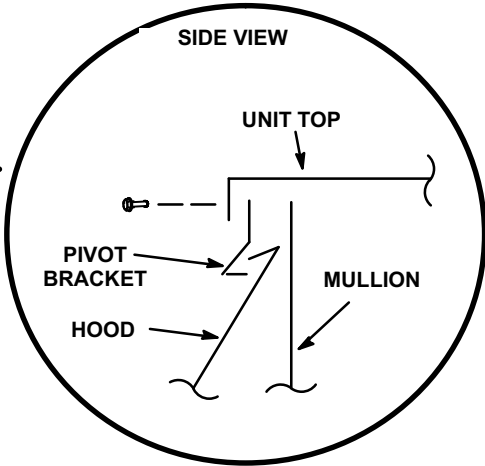
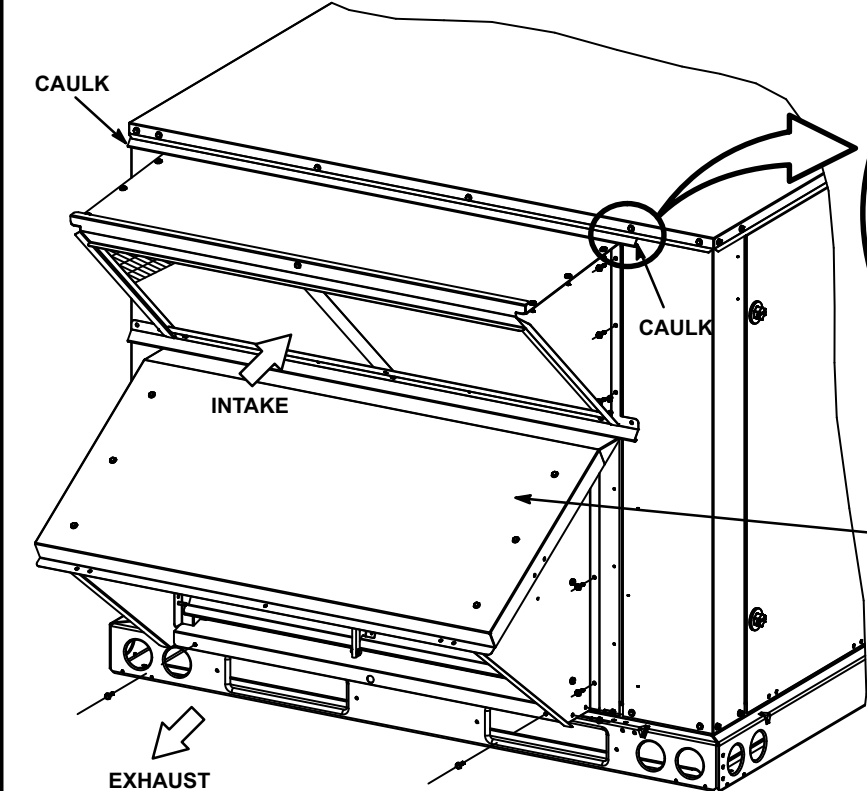


FIGURE 7

INSTALL HOODS



LOWER HOOD INSTALLED ONLY WHEN ECONOMIZER IS EQUIPPED WITH A GED

FIGURE 8

Install Economizer - Horizontal

A field fabricated return air duct transition and duct inlet must be installed in horizontal applications.

- 1- Remove unit end panel. See figure 9.
- 2- Install the downflow return air cover in horizontal airflow applications. Secure with #10 sheet metal screws provided in kit. See figure 9.
- 3- Make sure the horizontal return air cover on the back side of the unit remains in place. The opening is used when an economizer is not installed. See figure 10.
- 4- Install the economizer and R1 mixed air sensor and connect wiring as shown in appropriately named sections of this manual.

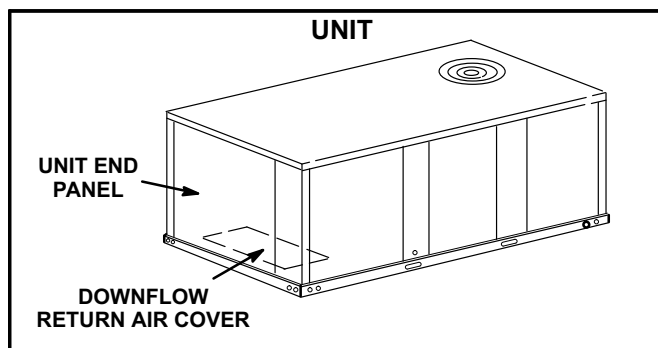


FIGURE 9

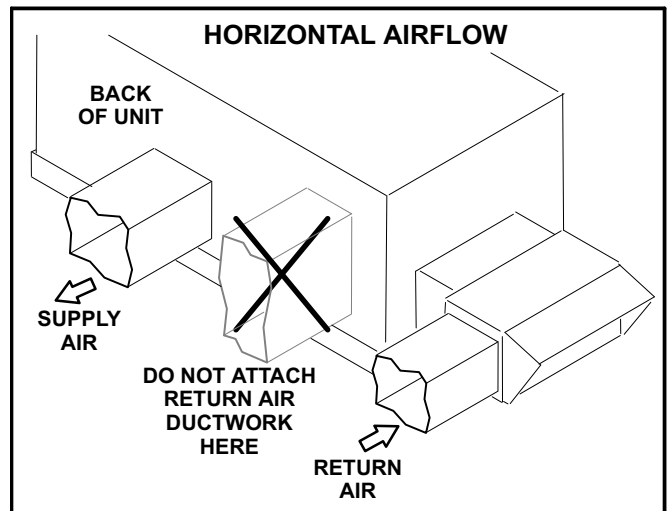


FIGURE 10

- 5- Install the field-fabricated return air duct transition and duct inlet on the unit end. See figure 11. Support the transition and duct inlet as needed.
- 6- Install the lower (exhaust) hood on the return air duct. The barometric relief dampers should already be installed in the hood as shown in the "Barometric Relief Damper" section of this manual.
- 7- Install the upper hood on the unit as shown in appropriate section of this manual.

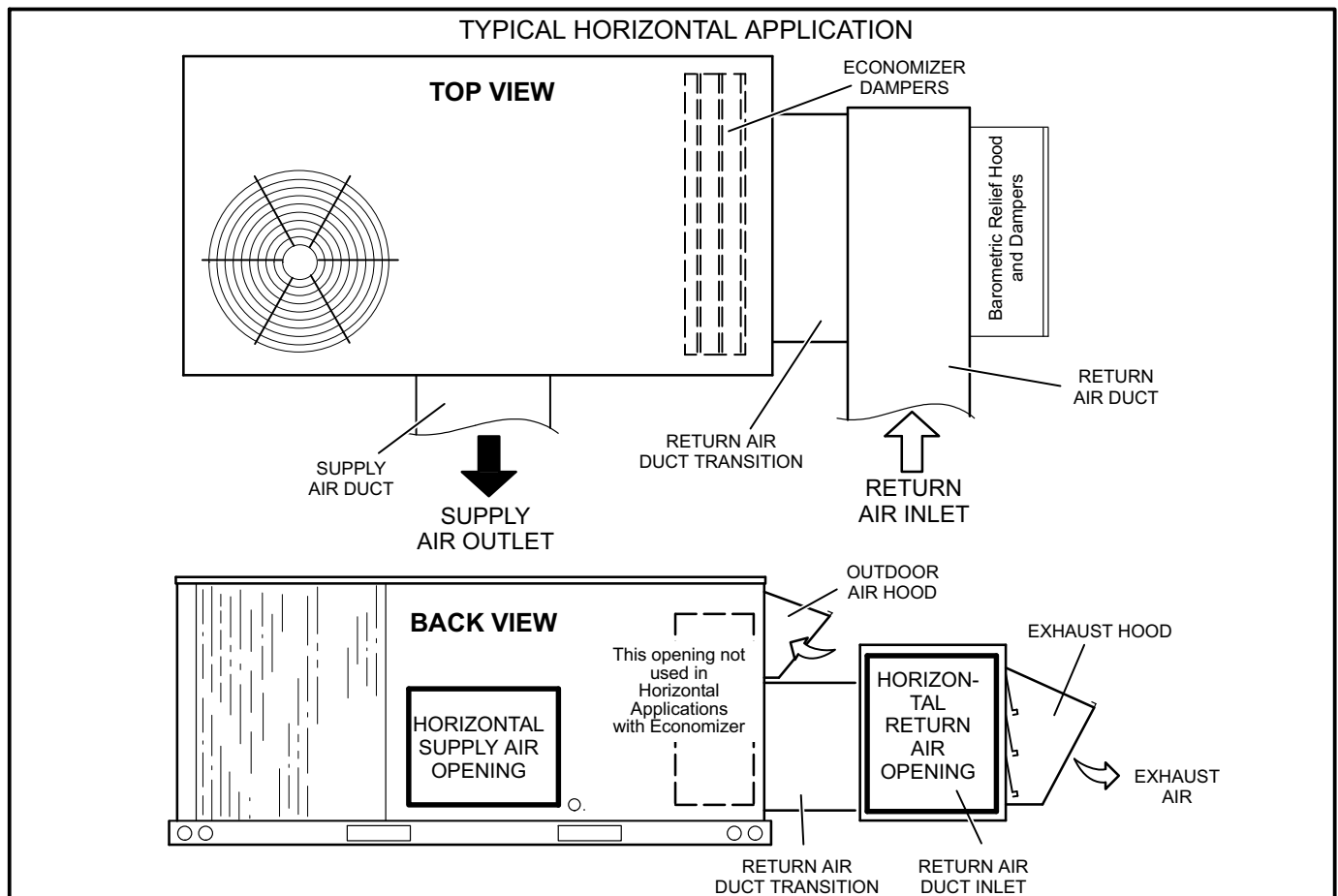


FIGURE 11

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 12.

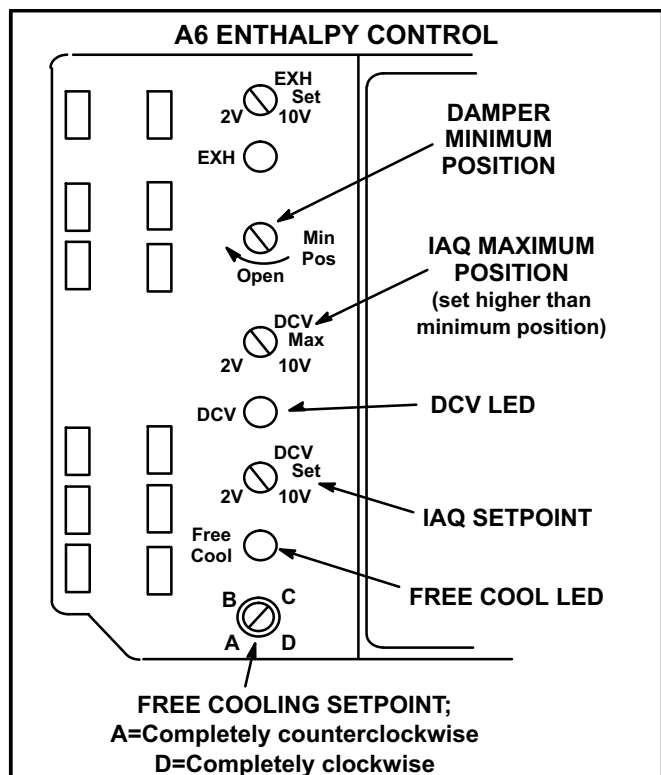


FIGURE 12

FREE COOLING SETPOINT

Note - The following conditions assume unit is operating during occupied time period.

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 12.

Free cooling will be enabled when outdoor air temperature or enthalpy are lower than the free cooling setpoint. The free cooling setpoint 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.

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.

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.

DAMPER MINIMUM POSITION SETTING

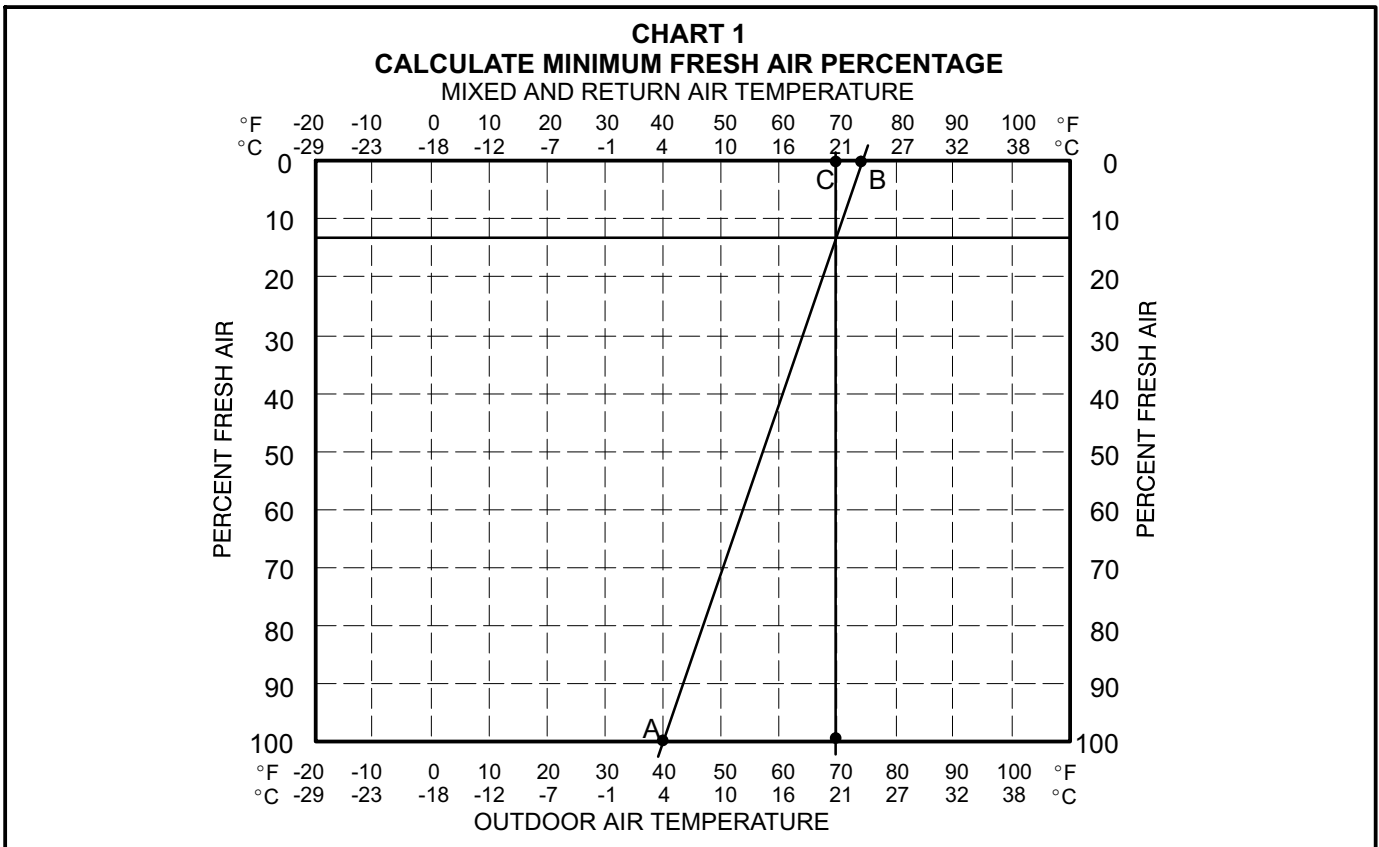
NOTE - 24 volts must be provided at unit TB1 terminals **R** and **OC** to enable economizer operation (allowing minimum fresh air). Typically a separately ordered thermostat or energy management system with an occupied/unoccupied output is connected between TB1 **R** and **OC** terminals. The thermostat will provide 24 volts to the A6 enthalpy control during the occupied time period to enable the economizer. If a device is not used to enable the economizer, install a jumper wire between TB1 terminals **R** and **OC** to maintain minimum position continuously.

Make wire connections to TB1 terminals **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 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.

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.



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 12.

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 12.

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 4 for economizer operation when outdoor air is suitable. See table 5 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 - If 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

THERMOSTAT DEMAND	DAMPER		MECHANICAL COOLING
	UNOCCUPIED	OCCUPIED ¹	
OF	Closed	Closed	No
G	Closed	Minimum	No
Y1	Modulating*	Modulating*	No
Y2	Modulating*	Modulating*	STAGE 1

*IAQ sensor can open damper to DCV max.

¹Damper position when no occupied/unoccupied signal is available from building thermostat or energy management system.

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

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

*IAQ sensor can open damper to DCV max.

¹Damper position when no occupied/unoccupied signal is available from building thermostat or energy management system.