

INSTALLATION INSTRUCTIONS FOR ECONOMIZERS AND OUTDOOR AIR HOODS USED WITH KG/KC/KH/KD 024, 030, 036, 048, 060, 072, 074, 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 assembly¹
(23T20 shipped separately)
- 1- GED² (gravity exhaust/barometric relief damper) assembly - hood top¹ covers the outdoor air opening and divider panel⁵ covers the exhaust air opening
- 1- Combination hood kit containing:³
 - 1-Hood top filter bracket
 - 2-Hood sides
 - 1-Bag containing screws
- 1- Filter kit containing:
 - 1-Filter⁴
 - 1-Pivot bracket
 - 1-Wiring diagram
- 1- Bag assembly containing:
 - 1-OA sensor S175 (23B17)
 - 1-Resistor assembly (23B17)
 - #10-32 X 1/2 TFS screw (23B17)
 - #6-32 X 7/8 TFS screw (23G22)
 - Mixed air sensor (R1)
 - 1-Screw-in wire tie

¹Already in place when economizer is factory-installed.
²GED is shipped and ordered separately for factory PEF units.
³Shipped in the return air section when economizer is factory-installed.
⁴Shipped in the blower section when economizer is factory-installed.
⁵The divider panel is shipped and ordered with the GED for factory PEF units.

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
- RA Transition (horizontal airflow)
- RA duct (horizontal airflow)
- Outdoor air hood
- GED in lower hood (horizontal and PEF options)

⚠ CAUTION

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

⚠ 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 licensed professional HVAC installer or equivalent, service agency, or the gas supplier

Application	
Part No.	Type
23B17 - 609258-16 Hood +	Standard Economizer
23T20 - 103491-07 Economizer Only (shipped separately)	
23G22 - 609258-15	High Performance Economizer

The economizer is used with KG/KC/KH/KD units in downflow and horizontal air discharge applications. For horizontal air applications, use the separately shipped GEDH kit. 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.

STANDARD 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
SENSOR OPTIONS - STANDARD**

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.



HIGH PERFORMANCE (LOW LEAK) ECONOMIZER

The high performance economizer is equipped with a 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 (provided in this kit). See table 2 for outdoor and return air (OA and RA) sensor options. Refer to manufacturer's instructions provided for more details.

**TABLE 2
SENSOR OPTIONS - HIGH PERFORMANCE**

Sensors	Dampers modulate to maintain 55°F mixed air (R1) when:
Single OA Sensible DEFAULT - approved for CA Title24	OA temperature (RT26) is lower than free cooling setpoint.
Single OA Enthalpy - approved for CA Title24	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.

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. When using the standard economizer, connect sensor leads to AQ and AQ1 terminals on the A6 economizer control located in the filter section.

⚠ WARNING

To prevent serious injury or death:

- 1- Lock-out/tag-out before performing maintenance.
- 2- If system power is required (e.g., smoke detector maintenance), disable power to blower, remove fan belt where applicable, and ensure all controllers and thermostats are set to the "OFF" position before performing maintenance.
- 3- Always keep hands, hair, clothing, jewelry, tools, etc., away from moving parts.

Install Economizer - Downflow

- 1- Remove hood top from economizer outdoor air opening and hood divider panel from economizer exhaust air opening.
- 2- Disconnect all power to unit and open filter access and unit end panel. See figure 1.
- 3- *High Performance Economizers Only* - Install damper assembly by inserting the damper motor first. See figure 2.
- 4- Install damper assembly through end of unit. Fit opening in bottom of damper assembly over the return air opening. See figure 3 or 4.

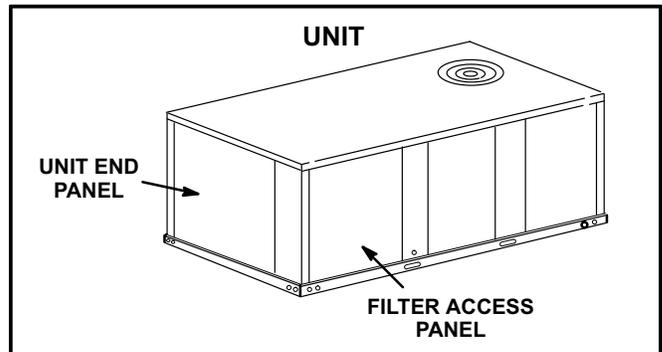


FIGURE 1

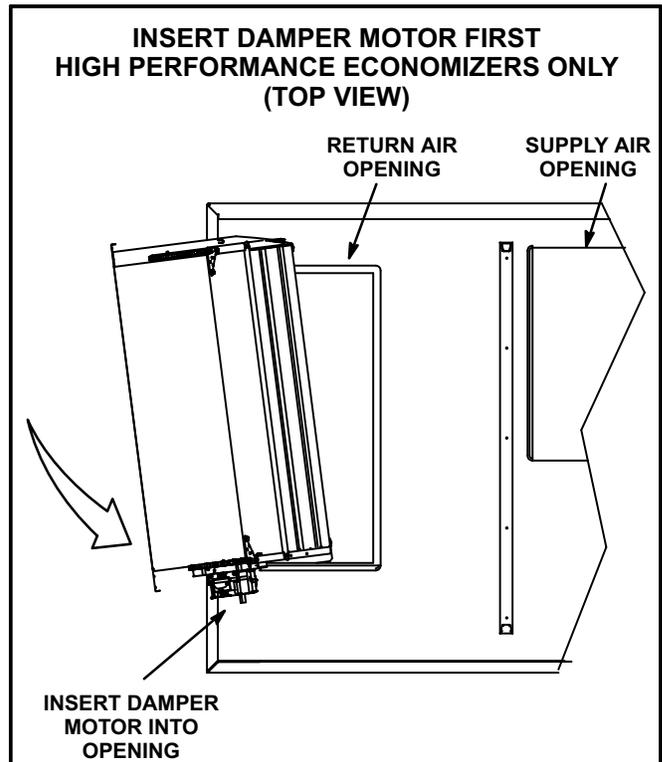


FIGURE 2

STANDARD ECONOMIZER INSTALLATION

OUTDOOR AIR SENSOR LOCATED ON OTHER SIDE OF PANEL.

OUTDOOR AIR SENSOR OPTIONS INCLUDE:

S175 Outdoor Air Thermostat
(Standard Economizers with Sensible Sensor)

A7 Outdoor Air Enthalpy Sensor
(Economizer with Single Enthalpy Sensors)

**ECONOMIZER
(STANDARD SHOWN)**

Note - Take care not to damage the A6 economizer control module and wiring during installation. Remove the corner mullion if necessary.

**B7
DAMPER
MOTOR**

**A6
ECONOMIZER
CONTROL**

**MIXED AIR SENSOR
WIRING IN THIS
BUNDLE**

**POWER EXHAUST WIRES
ONLY CONNECTED WHEN
UNIT IS EQUIPPED WITH
POWER EXHAUST**

**RETURN AIR
OPENING**

UNIT

FIGURE 3

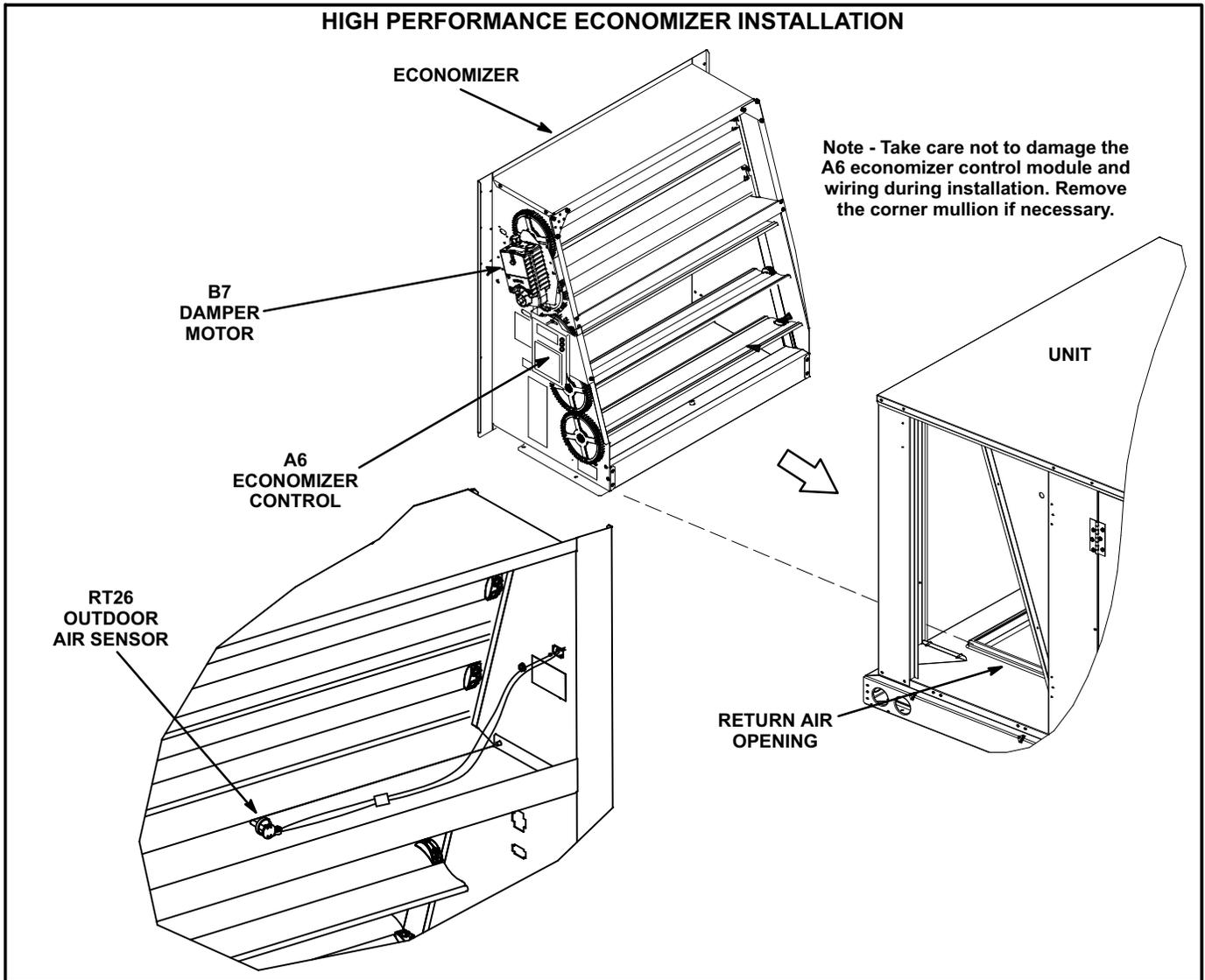


FIGURE 4

Install S175 Outdoor Air Sensor

STANDARD ECONOMIZER

See figure 5.

- 1- Install sensor, provided in kit, onto bracket. Install bracket in outdoor air section.
- 2- Make resistor assembly wire connections to wires labeled SO and SO+. SO and SO+ wires are hanging in the outdoor air section of economizer.

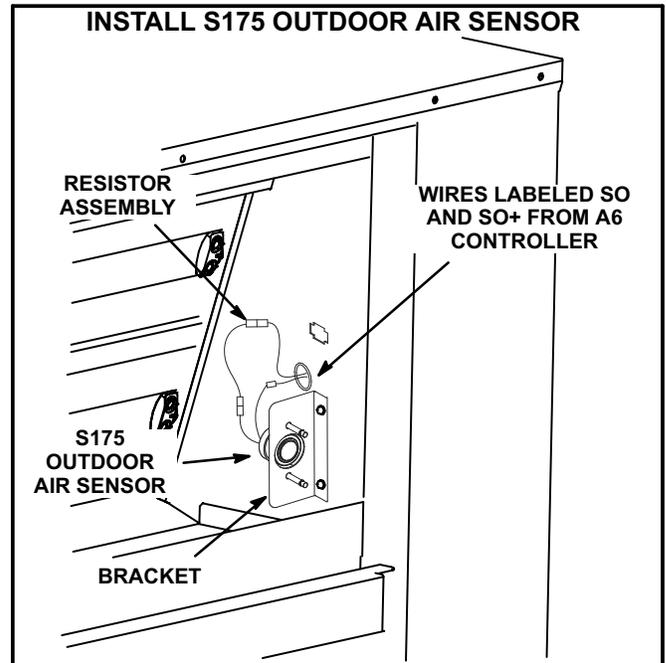


FIGURE 5

Install Mixed Air Sensor (R1)

STANDARD ECONOMIZER

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

- 1- Locate mixed air sensor wires connected to the T/T1 terminals on the A6 economizer control.
- 2- Install mixed air sensor, provided in kit, on indoor coil bracket. Secure with screw as shown in figure 6.
- 3- 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 6.
- 4- Connect wires to terminals on mixed air sensor. See figures 6 and 8. Sensor is not polarity sensitive.

HIGH PERFORMANCE ECONOMIZER

- 1- Install mixed air sensor R1, provided in kit, on indoor coil bracket. Connect the mixed air sensor to the "R1" plug hanging in the blower compartment. Secure with screw-in wire tie. See figure 7. Secure excess wire to the suction line.

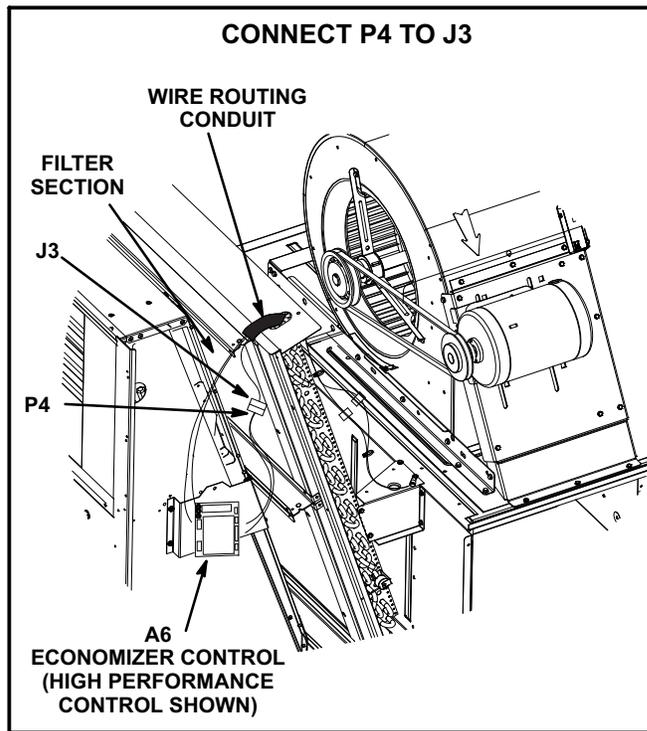


FIGURE 6

INSTALL MIXED AIR SENSOR (R1) - HIGH PERFORMANCE ECONOMIZER

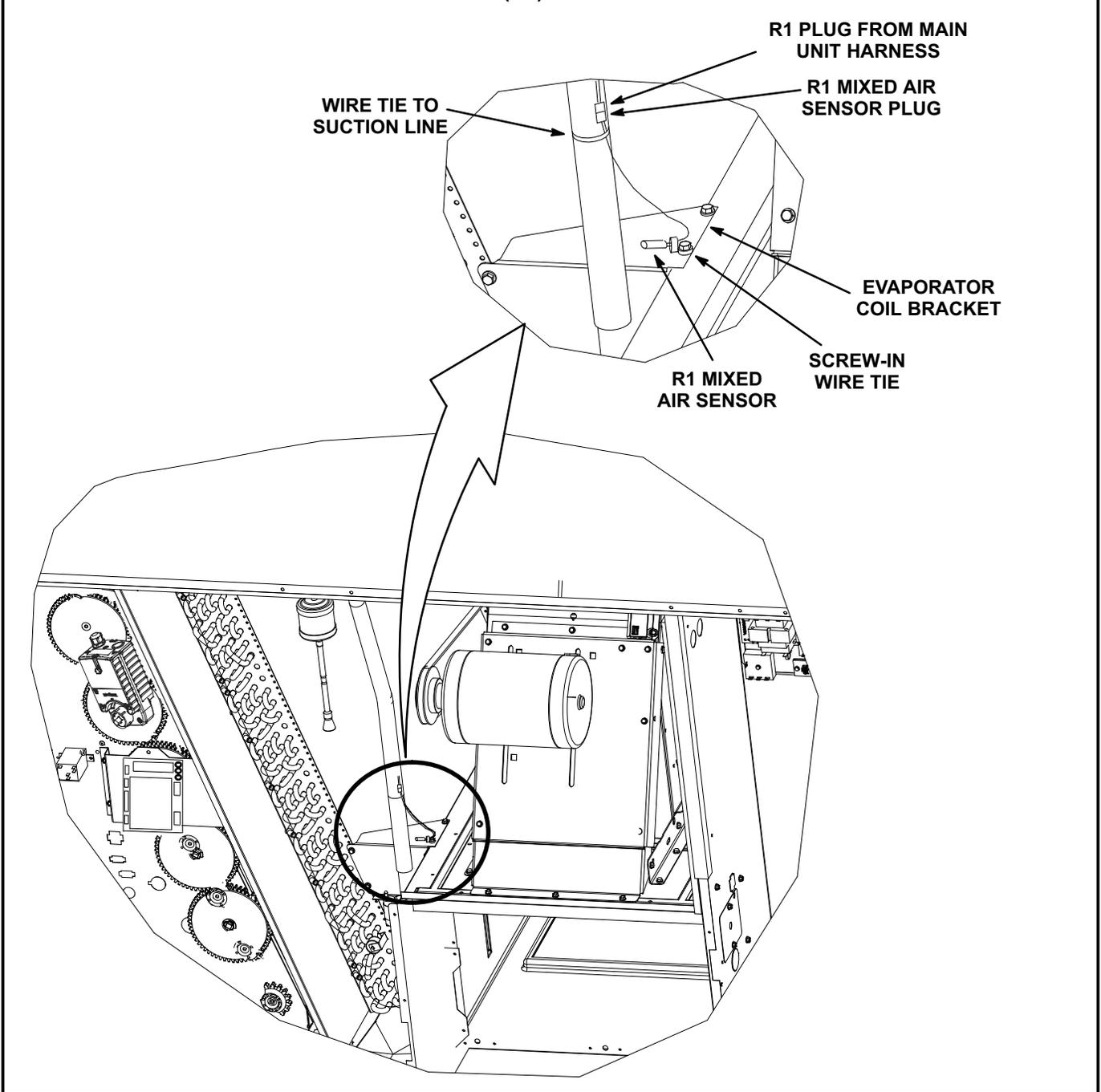


FIGURE 7

Wiring

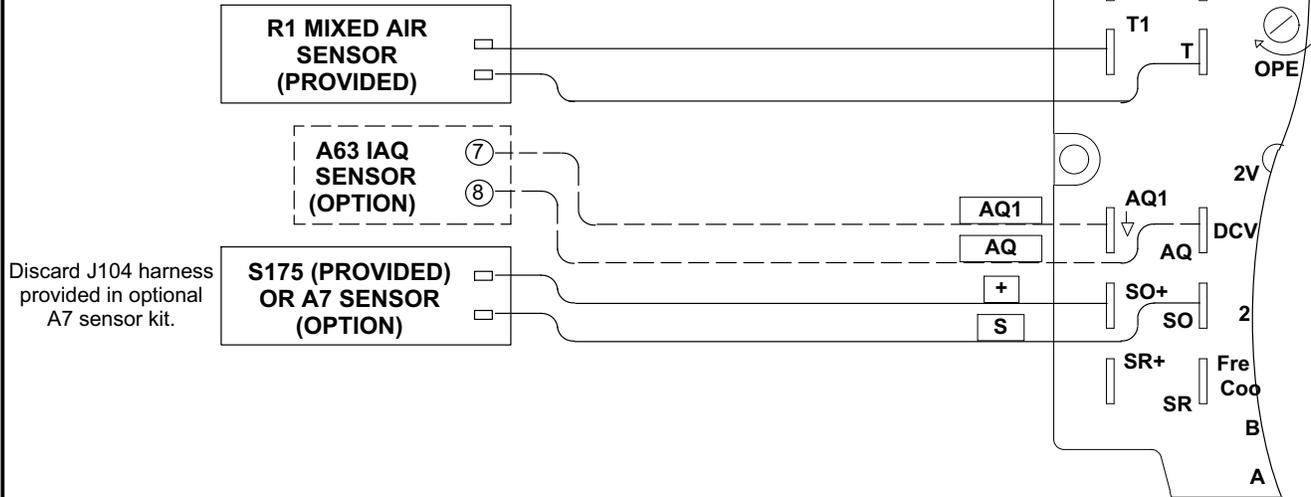
- 1- Locate 15-pin J3 economizer jack harness hanging on left side of filter compartment. See figure 6.
- 2- Disconnect P3 jumper plug from J3 and retain jumper plug for future troubleshooting. Connect 15-pin P4 economizer plug on A6 economizer control harness to J3 economizer jack. See figure 6.
- 3- Connect any optional sensors as shown in figure 8 or 9.
- 4- Bundle power exhaust wires and secure away from other components. If optional power exhaust is installed, wire according to instructions provided with power exhaust.
- 5- *High Performance Economizers* - Affix D1 economizer wiring diagram section to inside of compressor access panel. Position diagram to the right of "C" control wiring diagram section.

WIRE CONNECTIONS - STANDARD ECONOMIZERS

Field-Installed - - - -

SINGLE SENSING

**A6
ECONOMIZER
CONTROL**



DIFFERENTIAL SENSING

**A6
ECONOMIZER
CONTROL**

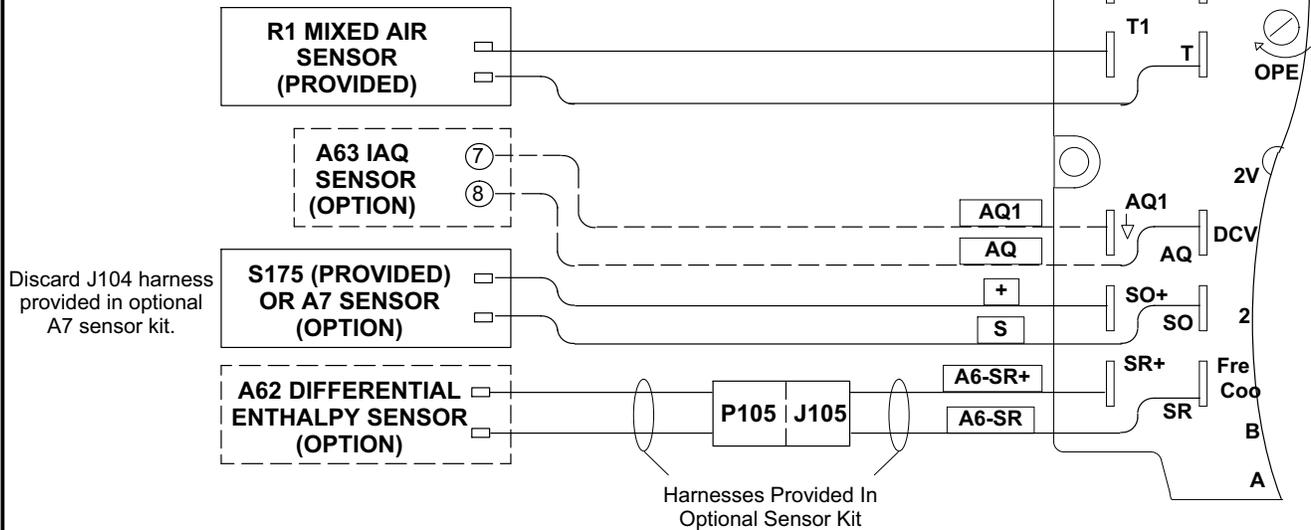
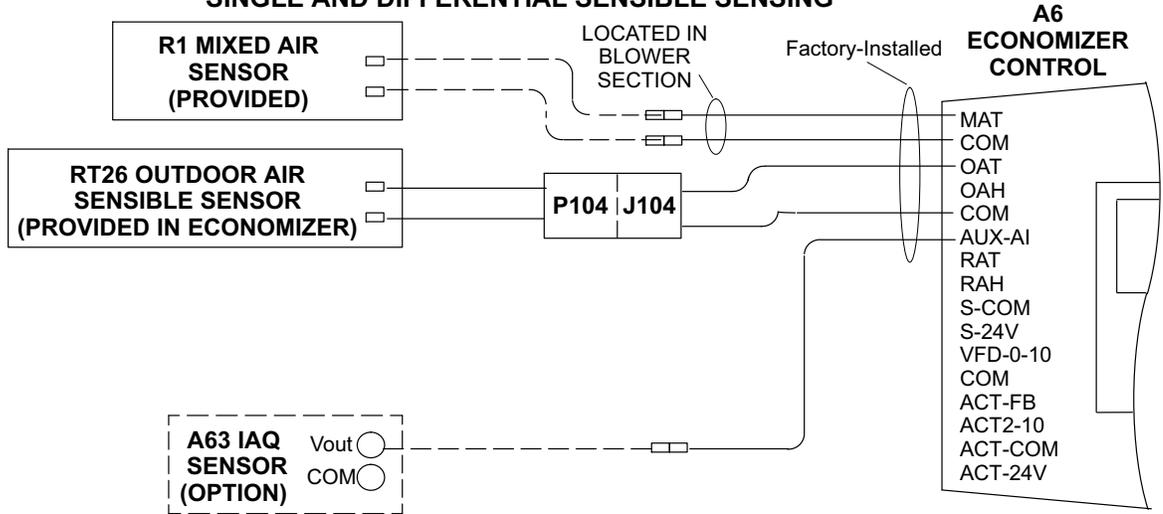


FIGURE 8

WIRE CONNECTIONS - HIGH PERFORMANCE ECONOMIZERS

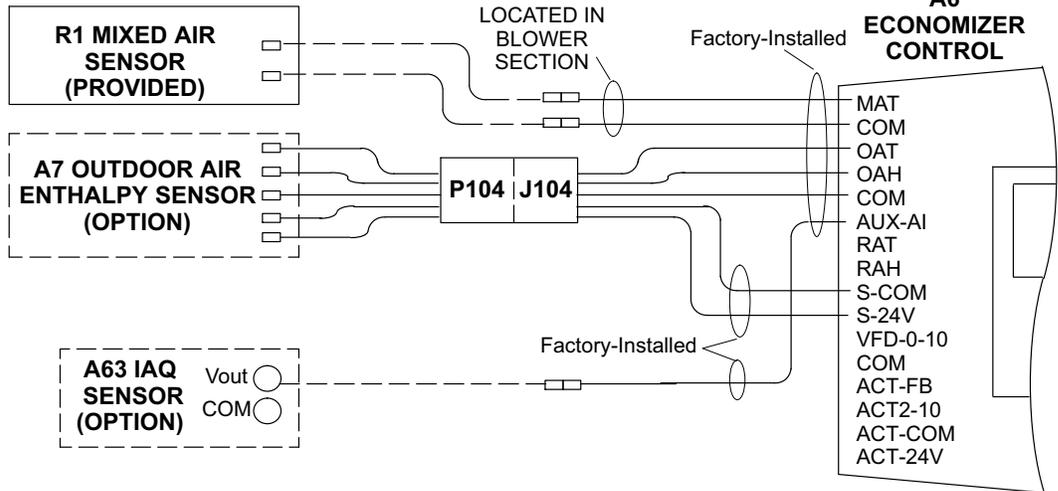
Field-Installed - - - -

SINGLE AND DIFFERENTIAL SENSIBLE SENSING



SINGLE ENTHALPY SENSING

1- Replace RT26 with A7.



DIFFERENTIAL ENTHALPY SENSING

Factory-Installed RT26 -

1- Two optional enthalpy sensor kits are required. Replace RT26 with A7 from first optional sensor kit.

2- 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.

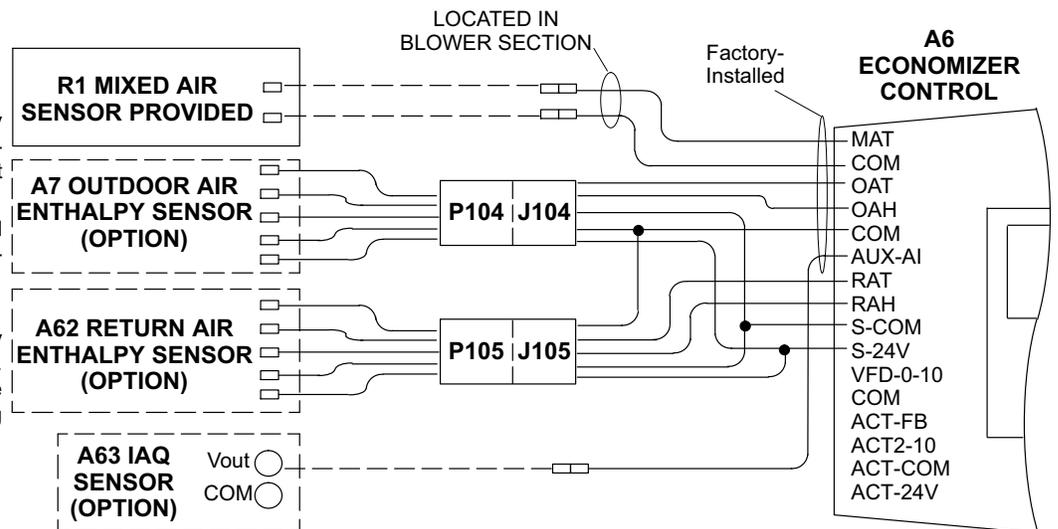


FIGURE 9

GED and Optional PEF

For horizontal airflow applications, a separately shipped GEDH gravity exhaust damper kit is required. Refer to instructions provided with GEDH kit.

OPTIONAL PEF

Factory-Installed PEF only - When the PEF is factory-installed, the PEF field-installed kit is packaged separately and shipped with the unit. Remove the block-off cover over the exhaust air opening before installing. In addition to a PEF kit, a GED kit is packaged separately and shipped with the unit. Both kits contain a GED seal; discard one of the GED seals.

- 1- Remove GED from the economizer and install in the fresh / exhaust air hood when optional power exhaust fans are installed. See figure 10.
- 2- Install the power exhaust fans and GED seal in the unit. See figure 11 and the power exhaust instructions. See the next section to install the outdoor/exhaust air hood. Install the GED in the lower/exhaust hood. See figure 12.

Outdoor Air Hoods - Downflow

Factory-Installed Economizers Only - The hood top and pivot bracket is installed over the unit fresh (outdoor) air opening. The hood divider panel is secured over the unit exhaust air opening. Hood sides and top filter bracket are located in the return air section. Lift hood top and divider panel 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 bracket as shown in figure 11.

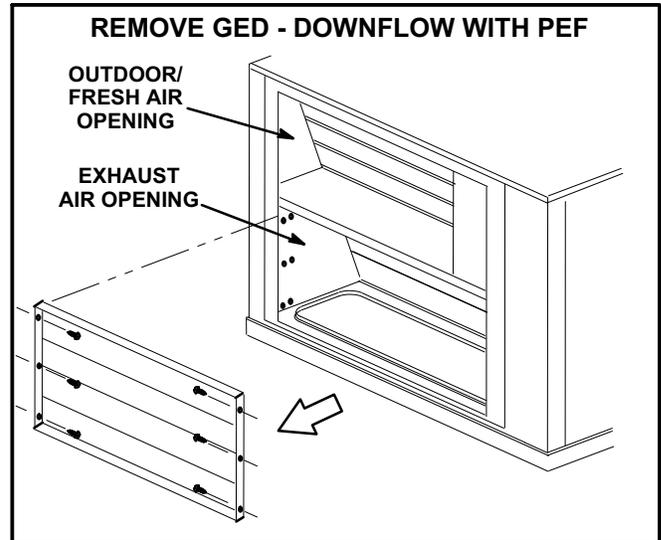


FIGURE 10

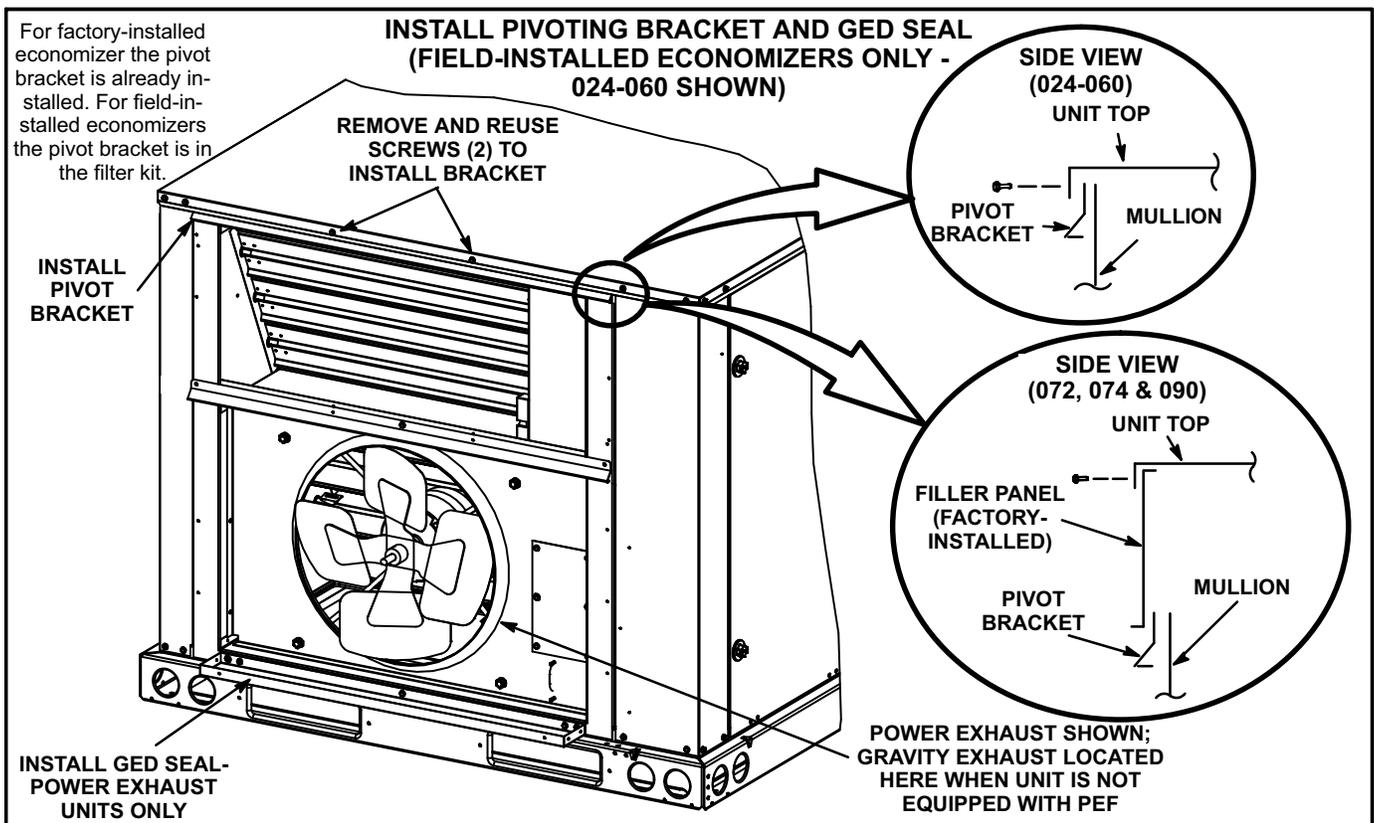


FIGURE 11

Outdoor Air Hoods - Downflow - continued

- 3- Assemble hood as shown in figure 12. Slide top of hood into the ends of pivot bracket. Install top filter bracket after filter is in place.
- 4- Install hoods on unit.
- 5- Caulk ends of pivot bracket to seal watertight.

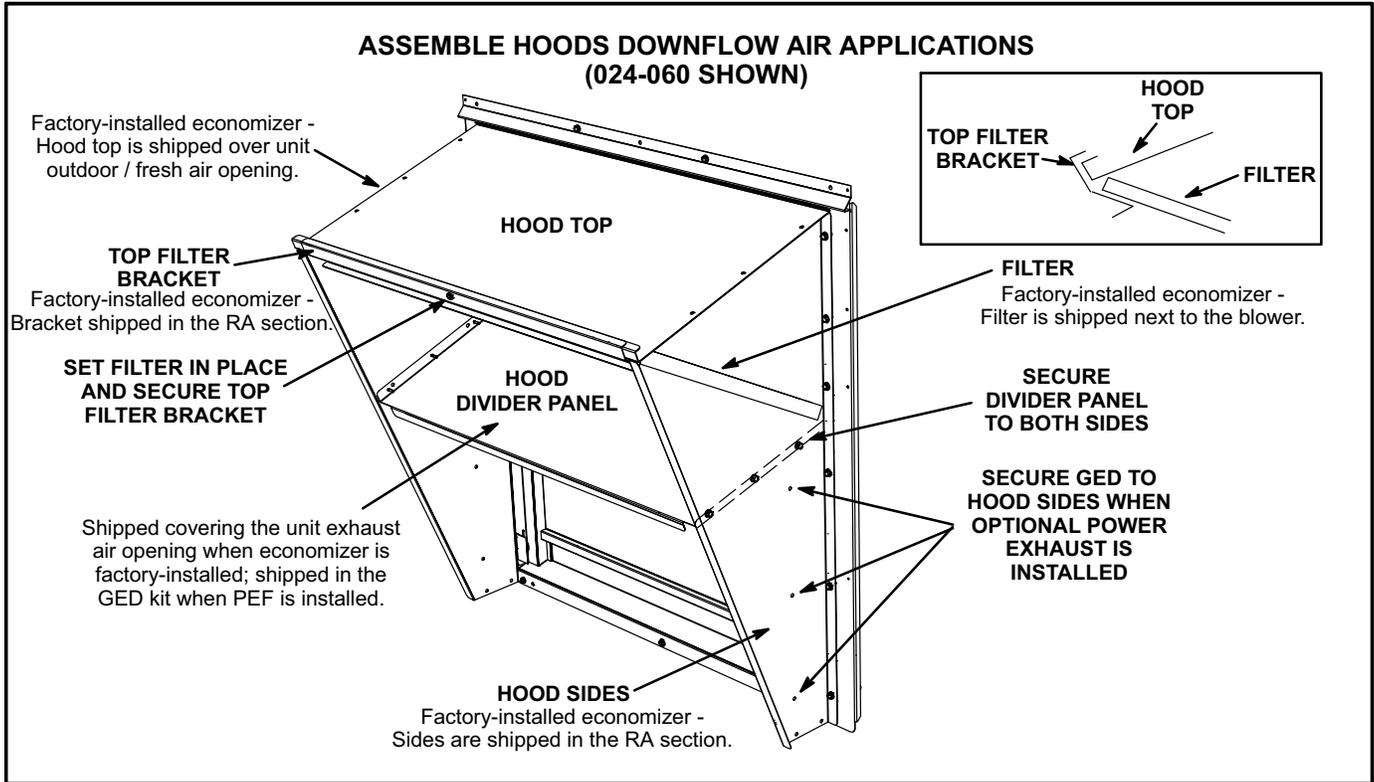


FIGURE 12

Install Economizer - Horizontal

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

The GEDH kit contains exhaust dampers and exhaust hood parts. The kit also contains the outdoor air only hood sides and bottom filter bracket.

Refer to the *Install Economizer - Horizontal* section and the instructions provided in the GEDH kit. The GEDH has a lower profile than the downflow GED and is installed in the horizontal return duct.

- 1- Remove unit end panel. See figure 13.
- 2- Install the downflow return air cover in horizontal airflow applications. Secure with #10 sheet metal screws provided in kit. See figure 13.
- 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 14.
- 4- Install the economizer and R1 mixed air sensor and connect wiring as shown in appropriately named sections of this manual.

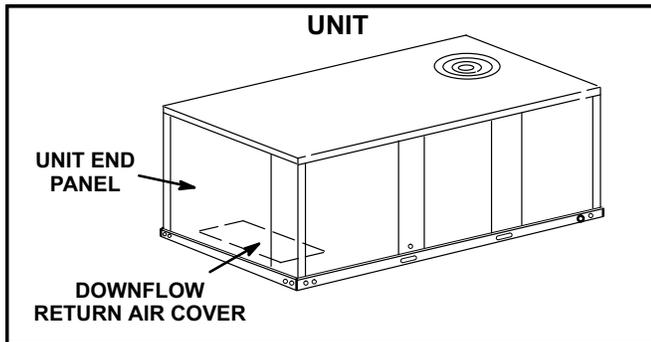


FIGURE 13

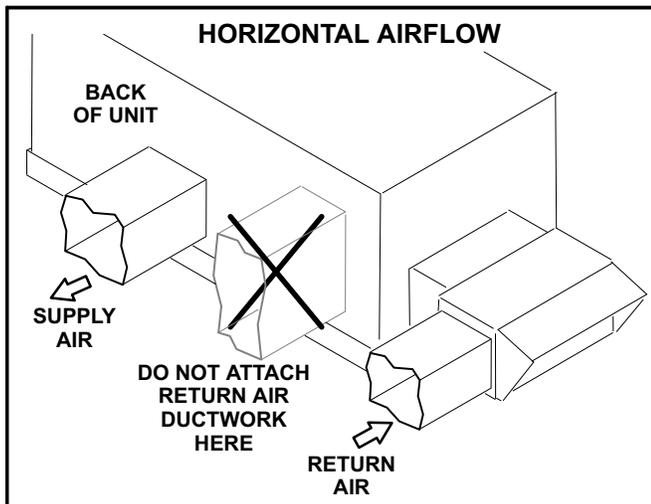


FIGURE 14

- 5- Install the field-fabricated return air duct transition and duct inlet on the unit end. See figure 16. Support the transition and duct inlet as needed.
- 6- Install the lower (exhaust) hood on the return air duct as shown in the GEDH kit instruction.
- 7- Install the upper hood on the unit as shown in figure 15.

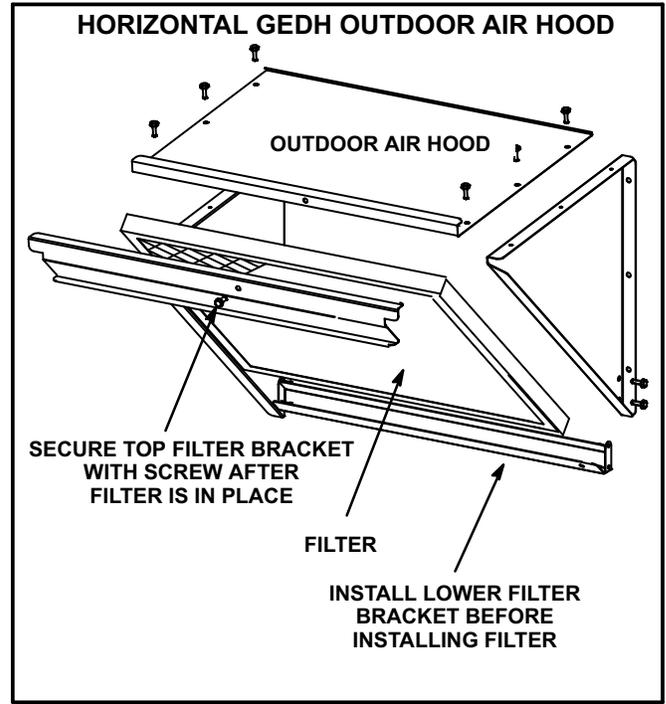


FIGURE 15

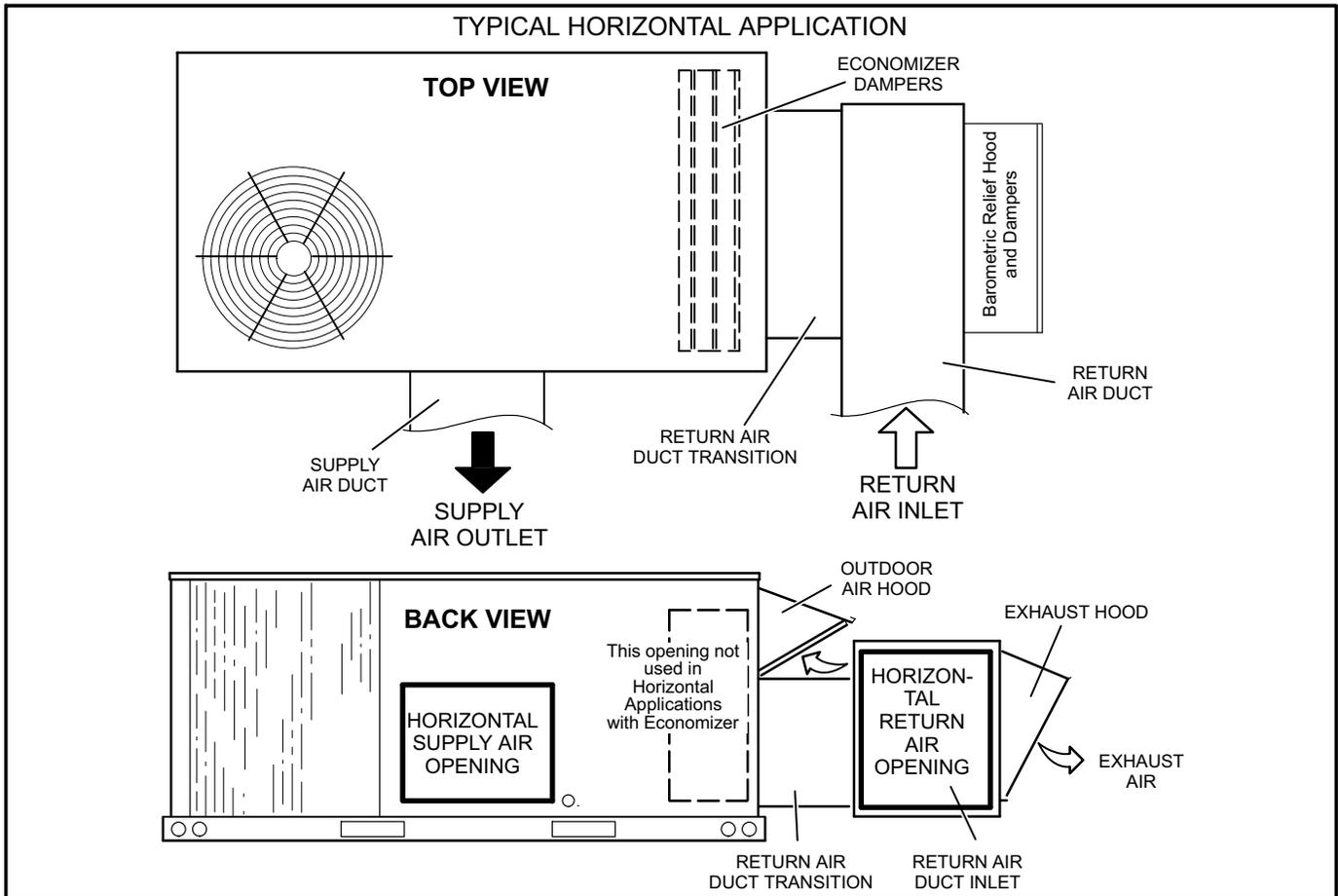


FIGURE 16

Economizer Control (A6) - Standard Economizer

LEDS

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 17.

FREE COOLING SETPOINT

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

Single Temperature or Enthalpy Sensing:

The economizer control (A6) setpoint may be adjusted when an enthalpy (A7) sensor is used to determine outdoor air suitability, See figure 17.

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 3 shows the free cooling setpoints for enthalpy sensors. Use the recommended setpoint and adjust as necessary.

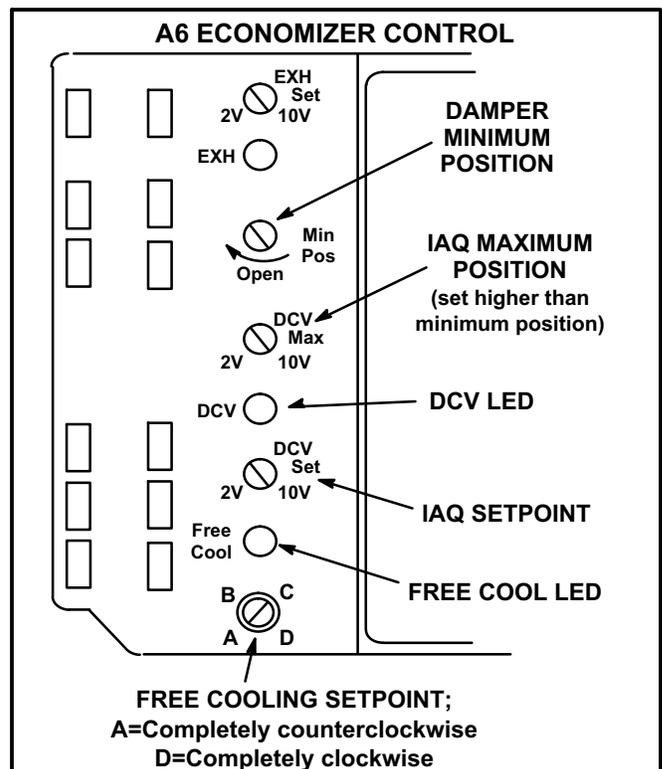


FIGURE 17

For example: At setting A (table 3), 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 3
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)

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 17.

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 17.

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

Economizer Control (A6) - High Performance Economizer

USER INTERFACE

See figure 18.

- 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.

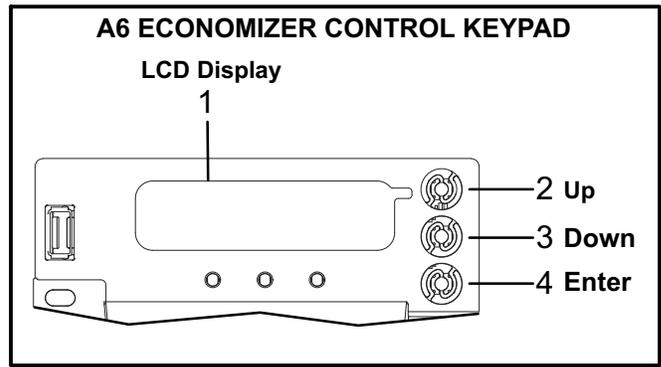


FIGURE 18

4- 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 19.

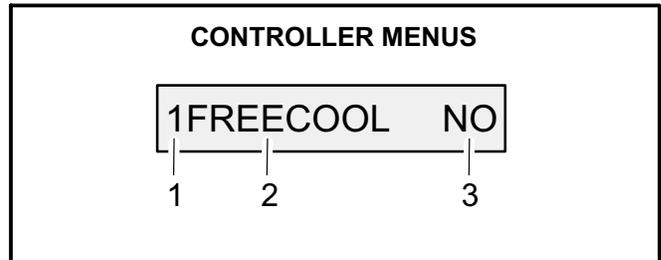


FIGURE 19

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 4.
- 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 4.

TABLE 4

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
- 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

Damper Minimum Position Setting - Both Standard and High Performance Economizers

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 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 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 OCP if using a thermostat which does not have the feature.
- 2- Turn on the blower using the thermostat or a jumper between TB1 terminals R and G.
- 3- *Standard Economizers* - Rotate MIN POS SET potentiometer to approximate desired fresh air percentage.

High Performance Economizers-

On units with single-speed blowers, navigate to the "BASIC SETTINGS" menu and select "2FAN H ACT". Adjust value (2-10VDC) to the approximate desired fresh air percentage.

On units with two-speed blowers, once high speed minimum position is set (steps 4- through 11-), adjust "2FAN L ACT" in the same manner.

- 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.

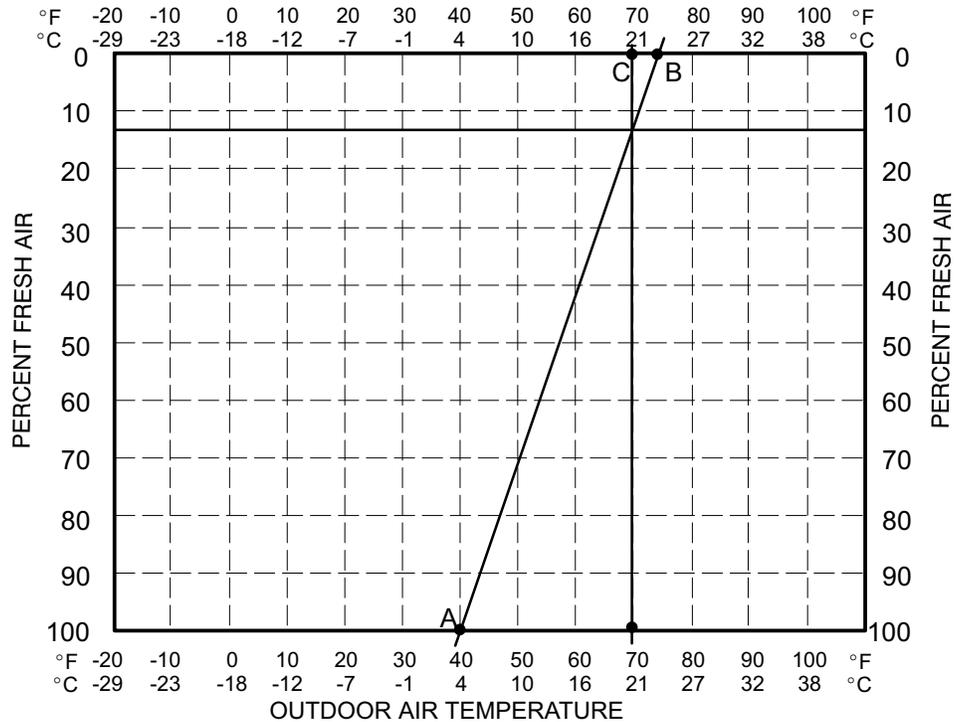
- 4- *High Performance Economizers* - Navigate through the "BASIC SETTINGS" menu and select "7DAMPER MIN POS".
Damper will drive to the setpoint value stored in step 3-.
- 5- Measure outdoor air temperature. Mark the point on the bottom line of chart 1 and label the point "A" (40°F, 4°C shown).
- 6- Measure return air temperature. Mark that point on the top line of chart 1 and label the point "B" (74°F, 23°C shown).
- 7- 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).
- 8- Draw a straight line between points A and B.
- 9- Draw a vertical line through point C.
- 10- Draw a horizontal line where the two lines meet. Read the percent of fresh air intake on the side.
- 11- *Standard Economizers* -
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 5- through 10- until calculation reads desired fresh air percentage.

High Performance Economizers -

If fresh air percentage is less than desired, use the A6 keypad to adjust "2FAN H ACT" values higher (further open). If fresh air percentage is more than desired, adjust "2FAN H ACT" values lower (less open). Repeat steps 4- through 10- until calculation reads desired fresh air percentage.

On units with two-speed blowers, after high speed is adjusted, use "2FAN L ACT" in the same manner.

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



DEMAND CONTROL VENTILATION (DCV)

When a 0-10VDC CO₂ sensor is wired to the POL224.00 economizer control A6 (lead 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 to the A6 controller.

- 1- Locate the white wire labeled “AUX-AI” near the A6 economizer control in the filter section.

- 2- Install a female ¼” q.c. Terminal on the A63 CO₂ sensor voltage output lead.

- 3- Connect the A6 “AUX-AI” lead to the A63 voltage output lead.

The economizer harness does not include a location to land the CO₂ sensor common lead.

CO₂ 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.

Standard 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 5 for economizer operation when outdoor air is suitable. See table 6 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 fully closed until mixed air temperature rises to 48 °F (9 °C).

TABLE 5
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 6
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.

High Performance Economizer Operation

Refer to tables 7, 8, 9 or 10.

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 “2SP FAN DELAY” 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 7
ECONOMIZER OPERATION - NO DCV (CO₂ 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 8
ECONOMIZER OPERATION - WITH DCV (CO₂ 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

**TABLE 9
ECONOMIZER OPERATION - NO DCV (CO₂ 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 2SP FAN DELAY (Advance Setup 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 10
ECONOMIZER OPERATION - WITH DCV (CO₂ 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 2SP FAN DELAY (Advance Setup 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.