Vertical and Horizontal Low Leak EconoMi$er® IV Accessory for Medium Rooftop Units 15 to 27.5 Tons

Installation Instructions

Part No. CRECOMZR052A00 and CRECOMZR053A00

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IMPORTANT: Read these instructions completely before attempting to install the EconoMi$er® IV accessory.

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes, including ANSI (American National Standards Institute) Z223.1. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

It is important to recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices, which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury and/or death.

Before beginning any modification, be certain that the main-line electrical disconnect switch is in the OFF position. Close the main gas supply shutoff valve. Tag disconnect switch and gas valve with suitable warning labels.

⚠ WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

Disconnect power supply and install lockout tag before attempting to install accessory.

PACKAGE USAGE AND CONTENTS

Table 1 — Package Usage and Contents

UNIT	CARRIER MODEL	BRYANT MODEL	ICP MODEL	QTY	CONTENTS
CRECOMZR052A00	48/50TC 17- 24 50TCQ 17, 24 48/50HC 17, 20	580J/558J 17-24 548J 17, 24 581J/551J 17, 20	RGS/RAS 210-243 RHS 181-243 RGH/RAH 181-213	1	Damper Assembly*
				1	Upper End Economizer Panel
				1	Bottom Panel w/Relief Damper (for vertical only)
				1	Bottom Panel #2 (for horizontal only)
				1	Side Replacement Panel (for horizontal only)
				3	Filter Supports
				3	Central Retainer
				1	Hood Top
				1	Left Hood Side
				1	Right Hood Side
				2	Side Retainer
				2	Top Diverters
				3	Deflector
				4	Outside Air Filter Screens
				1	Supply Air Temperature Sensor (SAT)
				60	Screws
				1	Seal Strip
CRECOMZR053A00	48/50TC 25-30 48/50HC 24, 28	580J/558J 25-30 581J/551J 17, 20	RGS/RAS 300-336 RGH/RAH 240-303	1	Damper Assembly*
				1	Upper End Economizer Panel
				1	Bottom Panel w/Relief Damper (for vertical only)
				1	Bottom Panel #2 (for horizontal only)
				3	Filter Supports
				3	Central Retainer
				1	Hood Top
				1	Left Hood Side
				1	Right Hood Side
				2	Side Retainer
				2	Top Diverters
				3	Deflector
				4	Outside Air Filter Screens
				1	Supply Air Temperature Sensor (SAT)
				60	Screws
				1	Seal Strip

* Damper assembly includes W7212 controller, damper actuator, low ambient temperature lockout sensor, and outside air sensor, all factory installed on the economizer.

Table 2 — EconoMi$er IV Sensor Usage

APPLICATION	ECONOMI$ER IV WITH OUTDOOR AIR DRY BULB SENSOR	
	Accessories Required	
	Carrier and Bryant units	ICP units
Outdoor Air Dry Bulb	None. The outdoor air dry bulb sensor is factory installed.	
Single Enthalpy	HH57AC078	AXB078ENT
Differential Enthalpy	HH57AC078 and CRENTDIF004A00*	AXB078ENT and CRENTDIF004A00*
CO_2 for DCV Control using a Wall-Mounted CO_2 Sensor	33ZCSENCO2†	
CO_2 for DCV Control using a Duct-Mounted CO_2 Sensor	33ZCSENCO2 and 33ZCASPCO2** or CRCBDIOX005A00††	

* CRENTDIF004A00 accessory is used on many different base units. As such, these kits may contain parts that will not be needed for installation.
† 33ZCSENCO2 is an accessory CO_2 sensor.
** 33ZCASPCO2 is an accessory aspirator box required for duct-mounted applications.
†† CRBDIOX005A00 is an accessory that contains both 33ZCSENCO2 and 33ZCASPCO2 accessories.

GENERAL

See Table 1 for Package Usage and Contents.

The EconoMi$er IV system utilizes the latest technology available for integrating the use of free cooling with mechanical cooling for packaged rooftop units. The solid-state control system optimizes energy consumption, zone comfort, and equipment cycling by operating the compressors when the outdoor-air temperature is too warm, integrating the compressor with outdoor air when free cooling is available, and locking out the compressor when outdoor-air temperature is too cold. Demand controlled ventilation is supported.

The EconoMi$er IV system utilizes gear-drive technology with a direct-mount spring return actuator that will close upon loss of power. The EconoMi$er IV system comes standard with an outdoor air temperature sensor, supply air temperature sensor, and low temperature compressor lockout switch. (See Fig. 1.) Return air temperature, indoor enthalpy and outdoor enthalpy sensors are available for field installation. Field-installed CO_2 sensors are available. (See Table 2.)

Barometric relief dampers provide natural building pressurization control. Barometric relief dampers are built into the design and are standard. An optional power exhaust system is available for applications requiring even greater exhaust capabilities. The power exhaust set point is adjustable at the EconoMi$er IV controller. See Table 2 for sensor usage.

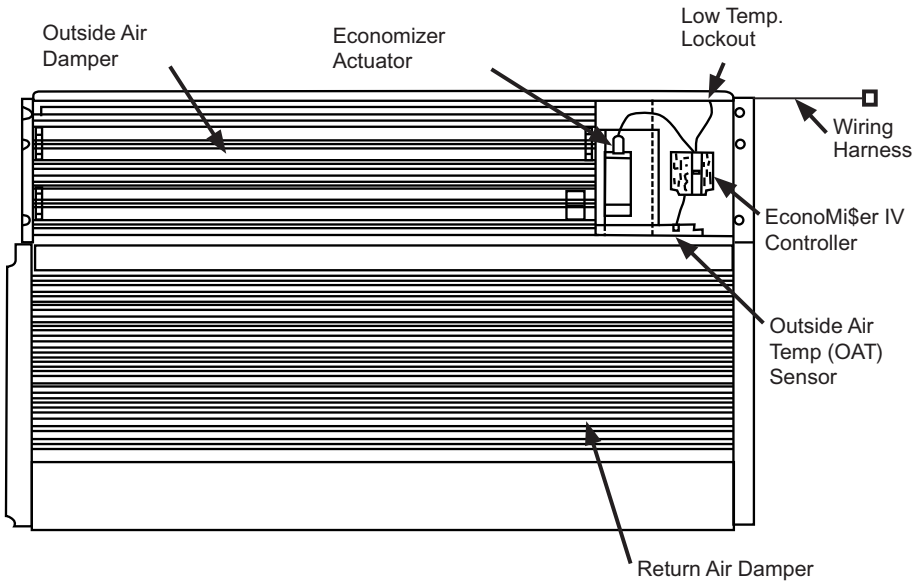


Fig. 1 — EconoMi$er IV Component Locations

ACCESSORIES LIST

The EconoMi$er IV assembly has several field-installed accessories available to optimize performance. Refer to Table 3 for authorized parts.

Table 3 — EconoMi$er IV Field-Installed Accessories

DESCRIPTION	PART NUMBER
Power Exhaust 208-230 v 3 Ph	CRPWREXH068A00
Power Exhaust 460 v 3 Ph	CRPWREXH069A00
Power Exhaust 575 v 3 Ph	CRPWREXH070A00
Outdoor Air Enthalpy Sensor	HH57AC078 (Carrier and Bryant only)
	AXB078ENT (ICP only)
Indoor Air Enthalpy Sensor	CRENTDIF004A00
Return Air CO_2 Sensor (4 to 20 mA)	CRCBDIOX005A00
CO_2 Room Sensor (4 to 20 mA)	33ZCSENC02
Aspirator Box for Duct Mount CO_2 (4 to 20 mA)	33ZCASPCO2
Space Temperature and CO_2 Room Sensor with Override (4 to 20 mA)	33ZCT55CO2
Space Temperature and CO_2 Room Sensor with Override and Set Point (4 to 20 mA)	33ZCT56CO2

VERTICAL INSTALLATION

These economizers are designed to work in both a vertical and horizontal applications. These instructions are for a vertical installation.

1. Turn off unit power supply and install lockout tag.
2. Prepare the unit for economizer installation:
   a. For units with two position damper installed, remove the outside air hood. Unplug the damper actuator and remove assembly from unit.
   b. For units with manual damper installed, remove the manual damper and hood.
3. Remove the upper panel and bottom panel (provided with the HVAC unit) on the end of the unit to expose the return section. (See Fig. 2.) Save the screws for use later when replacing the panel. The panels can be discarded.

⚠ CAUTION

PERSONAL INJURY HAZARD

Failure to follow this caution can result in personal injury and damage to the unit.

Cover the duct opening as a precaution so objects cannot fall into the return duct opening. Be sure to remove the cover when installation is complete.

4. Remove the unit's left side corner post and left side panel from the unit to allow for easy economizer installation. (See Fig. 3.)
5. Install economizer, as shown in Fig. 3, into the return air section of the unit. Be careful not to pinch the wires during installation. The bottom of the economizer will rest on the base of the unit. (See Fig. 4.)
6. Reinstall the left side corner post on to the unit. Note the corner post will sit behind the economizer flange. (See Fig. 5.) Screw through the corner post and through the economizer. (See Fig. 5 and 6.)

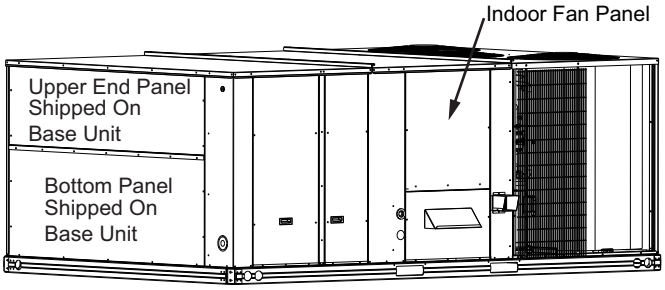


Fig. 2 — Upper and Bottom Panel on End of Unit

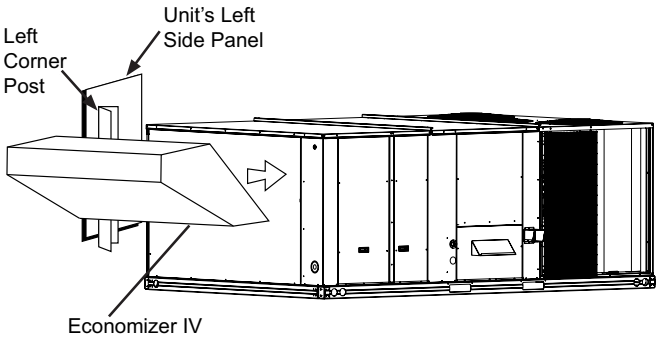


Fig. 3 — Unit Left Side Panel and Corner Post

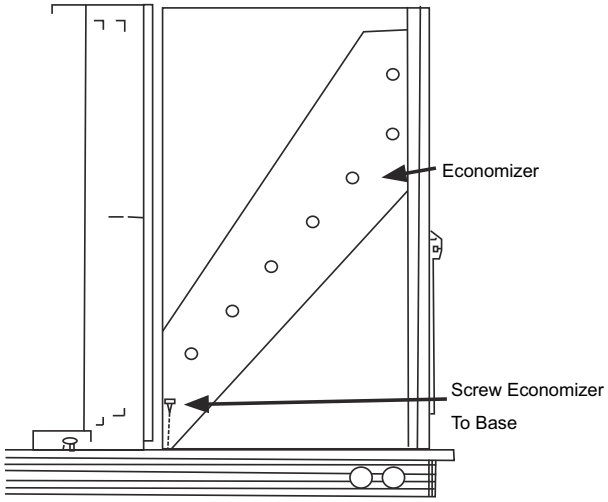


Fig. 4 — Side View

7. Insert provided screw through the bottom left rear of the economizer and into the unit base. (See Fig. 4.) Reinstall the unit's left side panel.
8. Before the economizer is secured in place on the right hand side, remove and save the 12-pin jumper plug from the unit wiring harness. (See Fig. 7.) Insert the economizer plug into the unit wiring harness plug.

NOTE: The 12-pin jumper plug should be saved for future use in the event that the EconoMi$er IV assembly is removed from the unit. The jumper plug is not needed as long as the EconoMi$er IV assembly is installed.

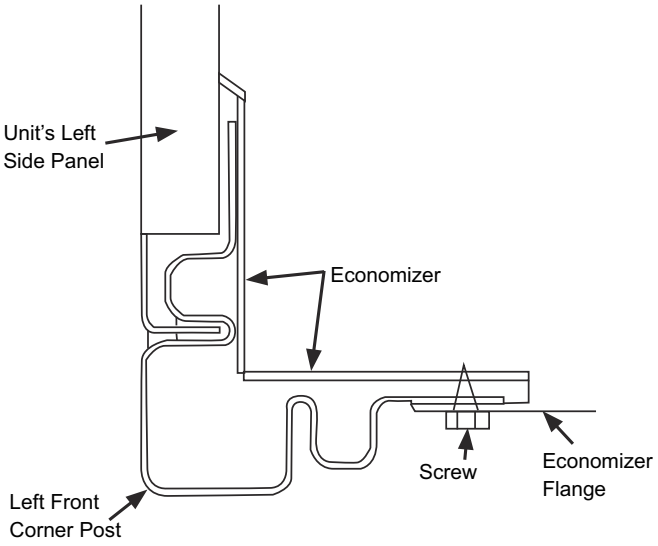


Fig. 5 — Top View

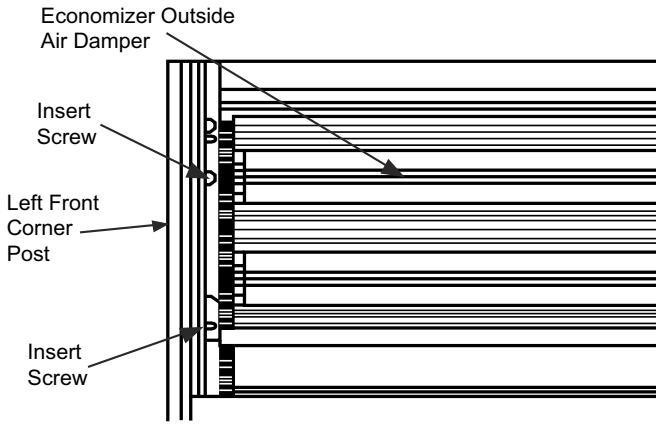


Fig. 6 — Front Left View

9. Remove the indoor-fan motor access panel. (See Fig. 2.)
10. Install the supply air temperature sensor (SAT). The sensor looks like an eyelet terminal with 2 attached wires, and is shipped in the economizer hardware bag. The sensor is located on the "crimped" end and is sealed for moisture. Mount the SAT to the indoor blower housing. (See Fig. 8.) Use the provided screw to secure in place. Attach the PINK and VIOLET wires in the unit to the sensor.
11. Replace the indoor-fan motor access panel.
12. Install the bottom panel with the relief damper attached on the unit. (See Fig. 9.) Screw panel in place.

NOTE: Remove the bottom screw holding the relief blade closed.

13. Install the upper end economizer panel over the economizer's outside air damper, and above the bottom panel. Screw panel in place and screw panel into economizer in two places. (See Fig. 9.)
14. Assemble the outside air hood per Fig. 10 -12 (see Fig. 10 for hood component locations):
    a. Install filters supports (Item #1) to the upper end panel using the screws provided.
    b. Install each deflector (Item #8) on to each filter support (Item #1) using the screws provided.
    c. Apply seal strip to mating flanges on side plates of hood (Items #4 and #5).
    d. Secure side panels (Items #4 and #5) to upper panel using the screws provided.
    e. Apply seal strip to mating flange of the hood (see Fig. 10).
    f. Secure hood top (Item #3) to upper panel using the screws provided. (On 44 in. chassis, remove the screws from across top cover of unit. The rear flange of hood top will slide behind unit top over flange.)
    g. Secure side retainers (Item #6) to side panels (Items #4 and #5) using the screws provided, screwing from outside of the hood.
    h. Secure each central retainer (Item #2) to the hood top (Item #3). Then align central retainers to holes located on filter support (Item #1), so central retainer is perpendicular to hood and each filter support. Secure using screws provided.
    i. Apply seal strip to top diverters (Item #7).
    j. Secure top diverters (Item #7) to hood top (Item #3).
    k. Install outdoor air screens by sliding them into each of the four spaces created by the hood, filter support and central retainers. To do so, first insert the air screens into pocket created at the end of hood (Item #3), then fully put the air screen into place, then slide them back into pocket created in the filter support (Item #1). Repeat this for each air screen. (See Fig. 11.) See Fig. 12 for completed hood assembly.

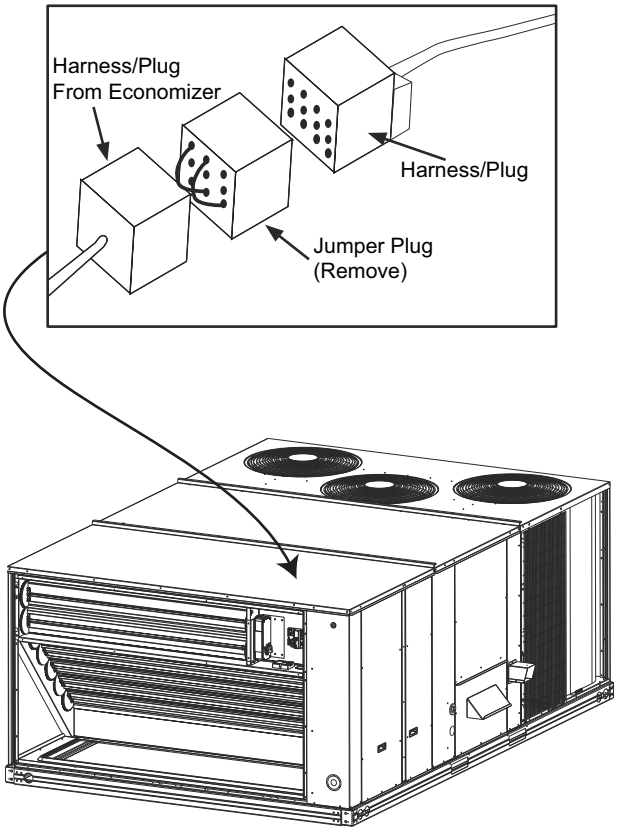


Fig. 7 — Unit Wiring Harness

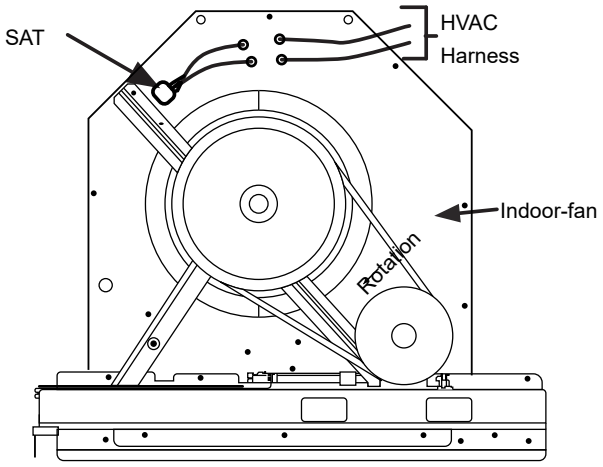


Fig. 8 — Blower Housing

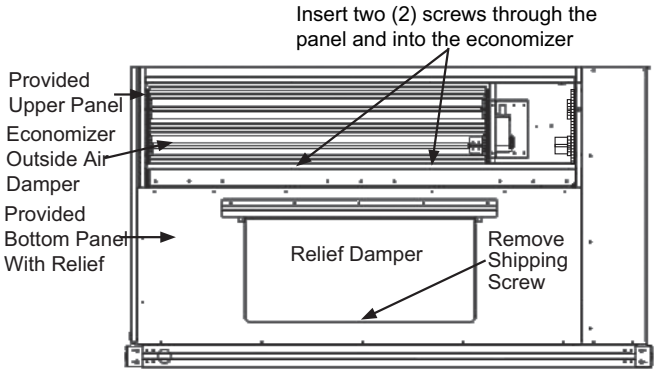
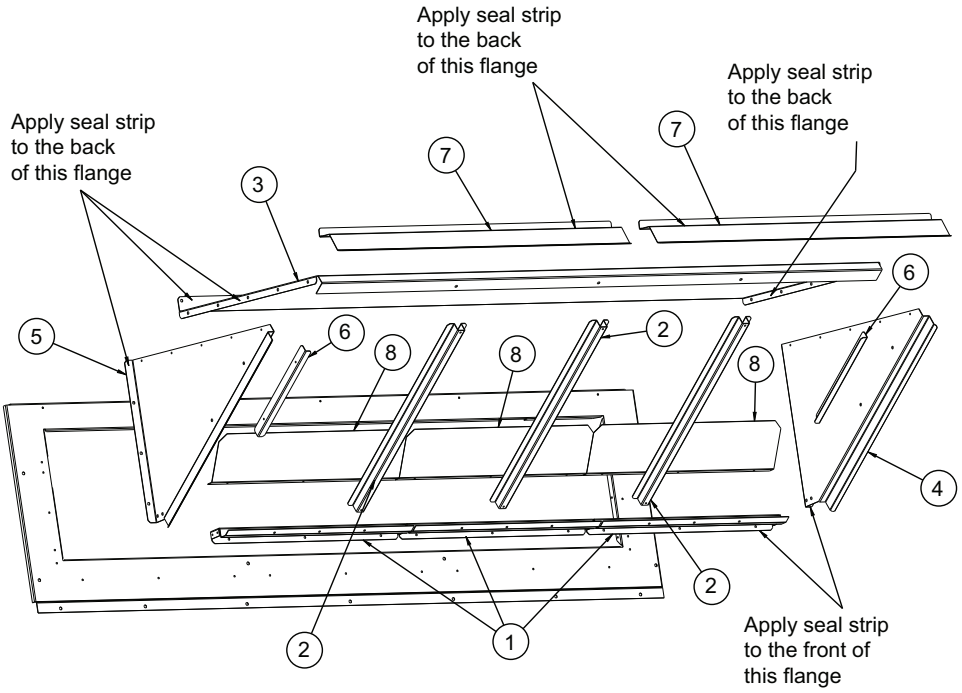


Fig. 9 — End View of Unit



ITEM #	DESCRIPTION	QTY
1	Filter Supports	3
2	Central Retainer	3
3	Hood Top	1
4	Left Hood Side	1
5	Right Hood Side	1
6	Side Retainer	2
7	Top Diverters	2
8	Deflector	3

Fig. 10 — Hood Assembly and Hood Part Identification/Seal Strip Application Areas

15. Install the hood assembly on to the unit (see Fig. 12 and 13).
16. Through the outdoor air hood, review and adjust the EconoMi$er IV controller settings. See “Operation” section of this manual for details.
    a. The standard EconoMi$er IV controller has a factory setting of 63°F for the outdoor air temperature changeover and 55°F (fixed) for the supply air temperature sensor. The outdoor air temperature changeover setting is adjusted on the sensor by setting the dip switches on the sensor. (See Fig 14.) The ABCD potentiometer on the controller should be set to the “D” position.
    b. The low temperature compressor lockout switch is fixed at 42°F.
    c. The minimum position for the outdoor air damper can be configured for specific job requirements at the controller. When not using with a CO_2 sensor, the DCV Max potentiometer on the controller must be fully closed (CCW) for the Minimum Position potentiometer to function correctly.
    d. Settings for the optional outdoor enthalpy sensor, indoor enthalpy sensor, power exhaust, and CO_2 sensor can be configured at the controller.
17. Install the hood screens and other approved EconoMi$er IV accessories.

NOTE: See Fig. 15 for wiring diagram.

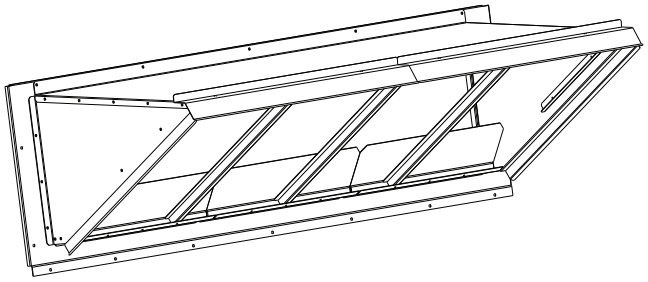


Fig. 12 — Completed Hood Assembly

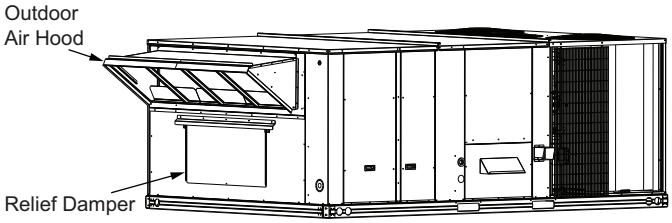


Fig. 13 — Hood Assembly Installed on Unit

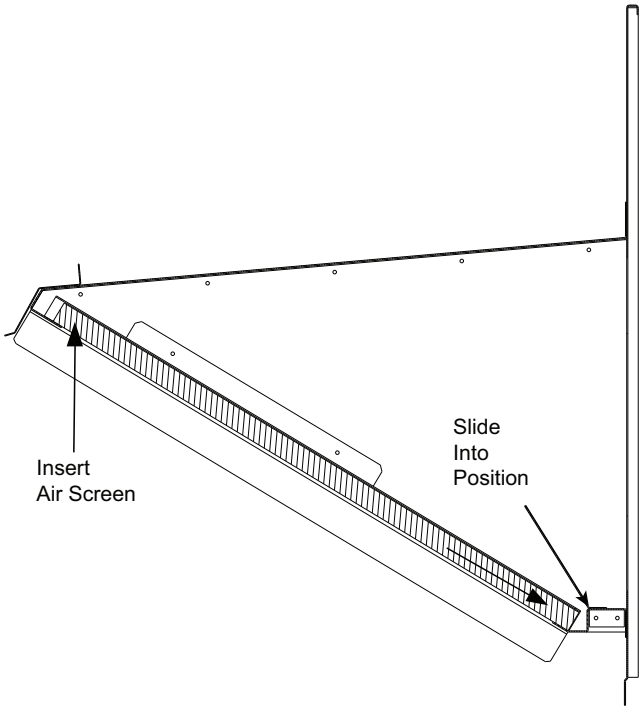


Fig. 11 — Outdoor Air Screen Installation

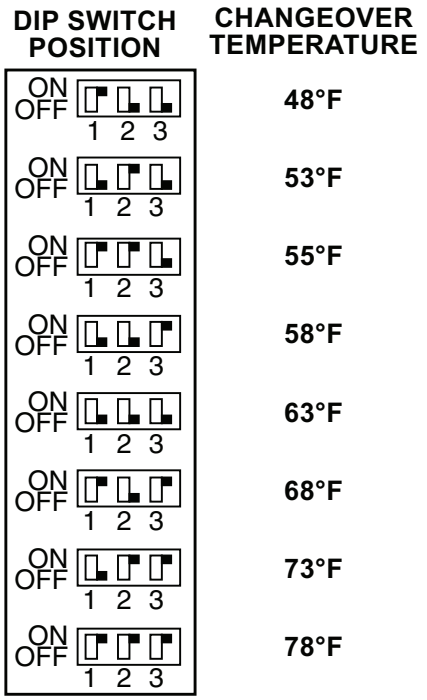


Fig. 14 — Selectable Temperature Options

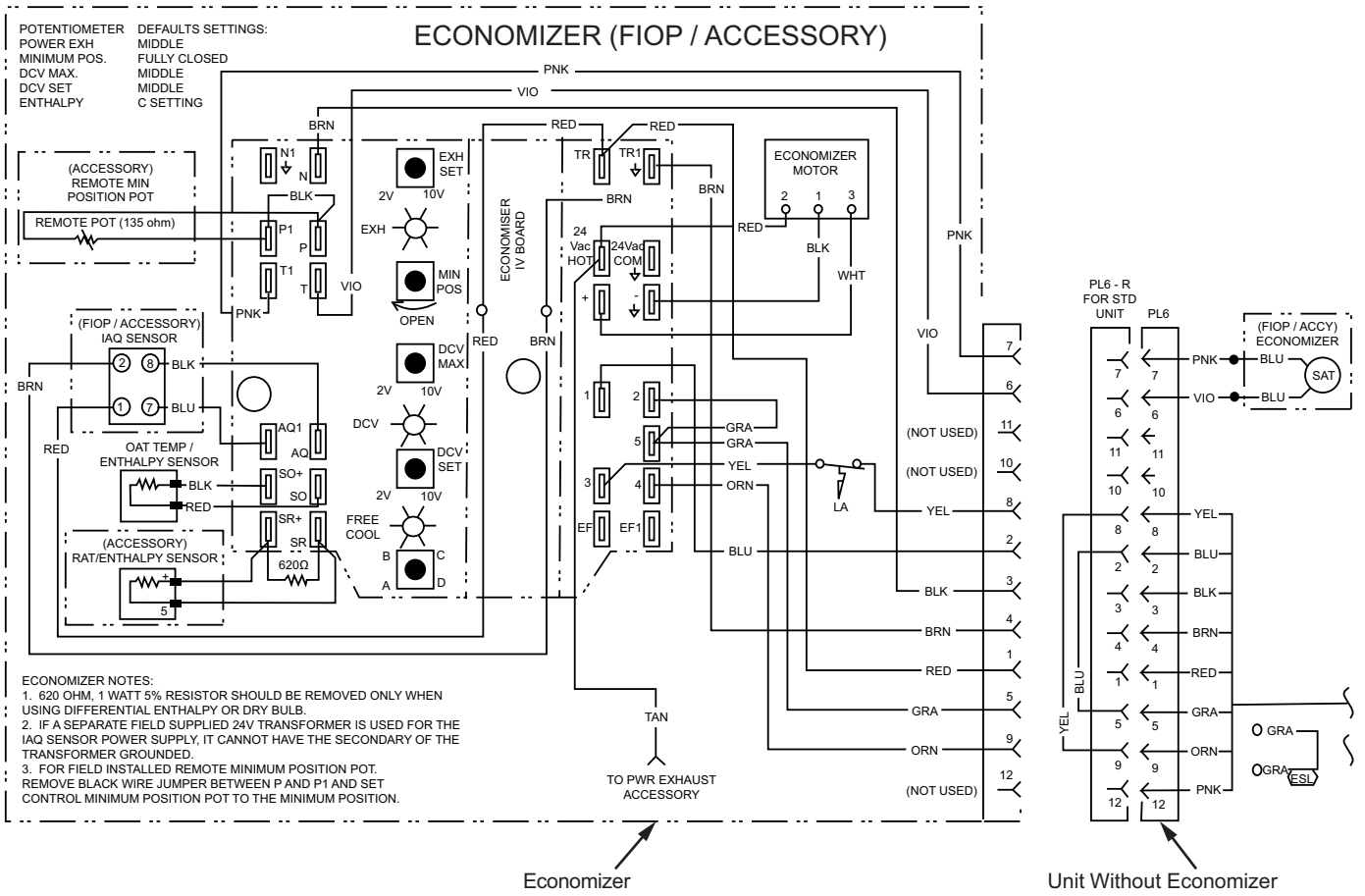


Fig. 15 — Economizer Wiring Diagram

HORIZONTAL INSTALLATION

These economizers are designed to work in both vertical and horizontal applications. These instructions are for a horizontal application.

The unit has a horizontal duct opening next to the horizontal supply duct opening. However, in this application, with an economizer, the horizontal duct will actually come into the unit underneath the outdoor air hood. (See Fig. 16.)

1. Turn off unit power supply and install lockout tag.
2. Prepare the unit for economizer installation:
   a. For units with 2 position damper installed, remove the outside air hood. Unplug the damper actuator and remove assembly from unit.
   b. For units with manual damper installed, remove the manual damper and hood.
3. Remove the upper panel and bottom panel (provided with the HVAC unit). On the end of the unit to expose the return section. (See Fig. 17.) Save the screws for use later when replacing the panel. The panels can be discarded.
4. Remove the unit's left side corner post and left side panel from the unit to allow for easy economizer installation. (See Fig. 18.)

NOTE: The unit's left side panel has a duct opening in it, but this panel / duct opening will not be used in this application and can be discarded.

5. Install economizer, as shown in Fig. 19, into the return air section of the unit. Be careful not to pinch the wires during installation. Bottom of economizer will rest on the base of the unit. (See Fig. 20.)
6. Reinstall the left side corner post on to the unit. Note the corner post will sit behind the economizer flange. (See Fig. 21.) Screw through the corner post and through the economizer. (See Fig. 21 and 22.)
7. Insert provided screw through the bottom left rear of the economizer and into the unit base. (See Fig. 20.) Install the new (provided) left side panel - without the duct opening on the unit.
8. Before the economizer is secured in place on the right hand side, remove and save the 12-pin jumper plug from the unit wiring harness. Insert the EconoMi$er IV plug into the unit wiring harness plug. (See Fig. 23.)

NOTE: The 12-pin jumper plug should be saved for future use in the event that the EconoMi$er IV assembly is removed from the unit. The jumper plug is not needed as long as the EconoMi$er IV assembly is installed.

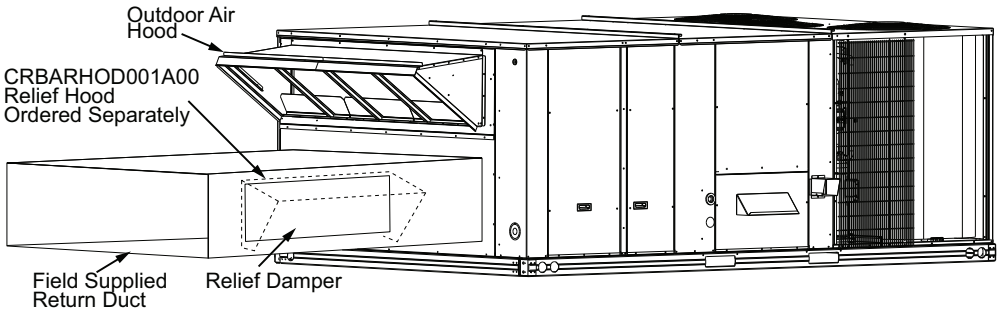


Fig. 16 — Hinges and Damper on Return Duct

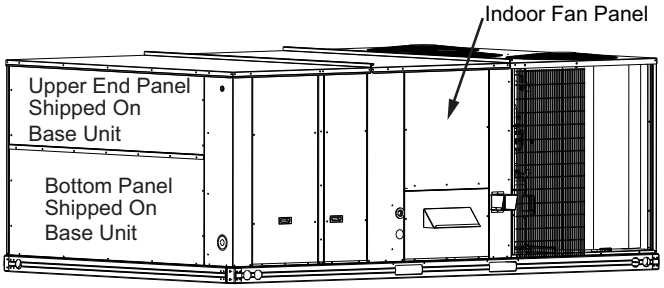


Fig. 17 — Upper and Bottom Panel on End of Unit

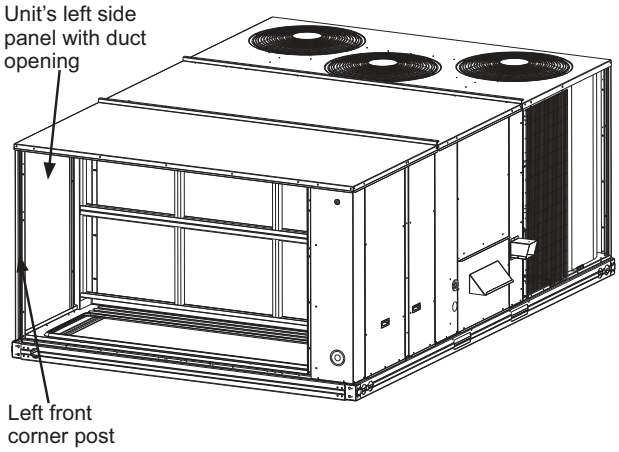


Fig. 18 — Remove Unit Corner Post and Side Panel

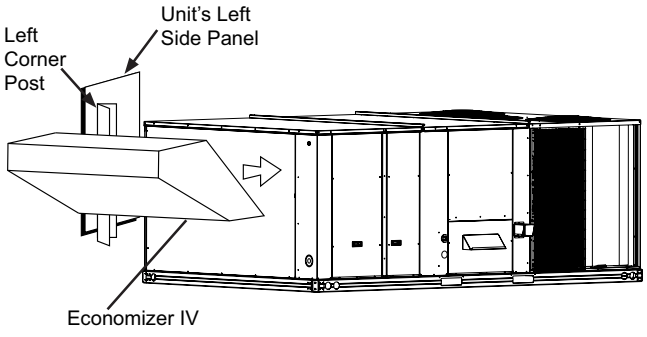


Fig. 19 — Unit Left Side Panel and Corner Post

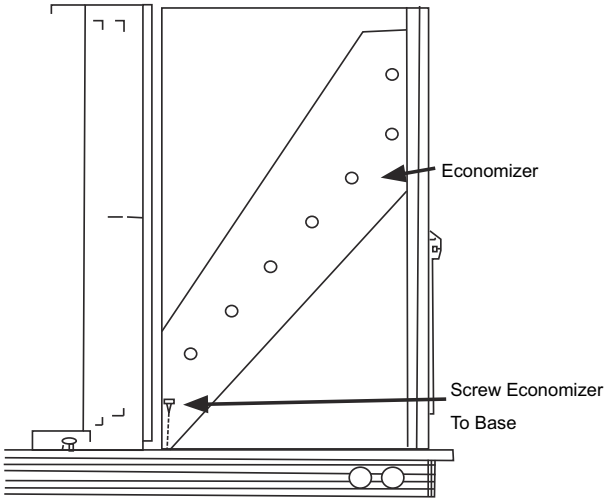


Fig. 20 — Side View

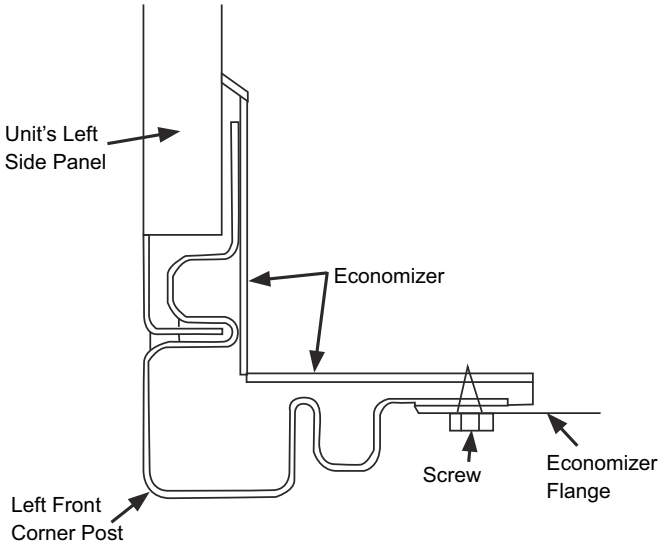


Fig. 21 — Top View

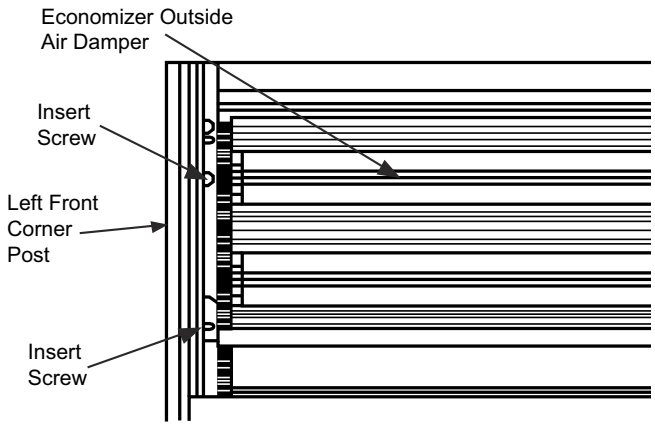


Fig. 22 — Front Left View

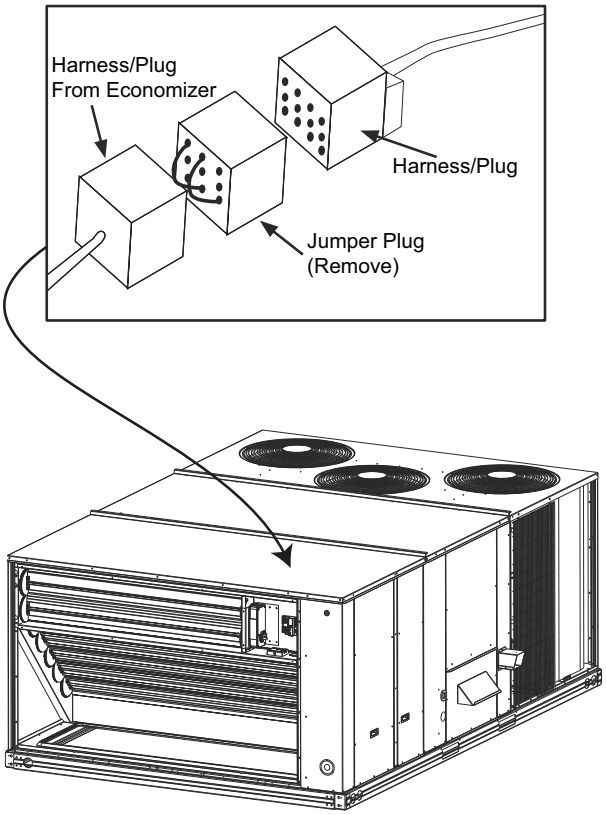


Fig. 23 — Unit Wiring Harness

9. Remove the indoor-fan motor access panel. (See Fig.17.)
10. Install the supply air temperature sensor (SAT). The sensor looks like an eyelet terminal with 2 attached wires, and is shipped in the economizer hardware bag. The sensor is located on the "crimped" end and is sealed for moisture. Mount the SAT to the indoor blower housing. (See Fig. 24.) Use the provided screw to secure in place. Attach the PINK and VIOLET wires in the unit to the sensor.
11. Replace the indoor-fan motor access panel.
12. Install the (provided) bottom panel with the horizontal return duct opening on the unit.(See Fig. 25.) Screw panel in place.
13. Install the upper end economizer panel in place over the economizer's outside air damper, and above the bottom panel. Screw panel in place and screw panel into economizer in two places.
14. Assemble the outside air hood per Fig. 26-28 (see Fig. 26 for hood component locations):
    a. Install filters supports (Item #1) to the upper end panel using the screws provided.
    b. Install each deflector (Item #8) on to each filter support (Item #1) using the screws provided.
    c. Apply seal strip to mating flanges on side plates of hood (Items #4 and #5).
    d. Secure side panels (Items #4 and #5) to upper panel using the screws provided.
    e. Apply seal strip to mating flange of the hood (see Fig. 26).
    f. Secure hood top (Item #3) to upper panel using the screws provided. (On 44 in. chassis, remove the screws from across top cover of unit. The rear flange of hood top will slide behind unit top over flange.)
    g. Secure side retainers (Item #6) to side panels (Items #4 and #5) using the screws provided, screwing from outside of the hood.
    h. Secure each central retainer (Item #2) to the hood top (Item #3). Then align central retainers to holes located on filter support (Item #1), so central retainer is perpendicular to hood and each filter support. Secure using screws provided.
    i. Apply seal strip to top diverters (Item #7).
    j. Secure top diverters (Item #7) to hood top (Item #3).
    k. Install outdoor air screens by sliding them into each of the four spaces created by the hood, filter support and central retainers. To do so, first insert the air screens into pocket created at the end of hood (Item #3), then fully put the air screen into place, and then slide them back into pocket created in the filter support (Item #1). Repeat this for each air screen. (See Fig. 27.) See Fig. 28 and 29 for completed hood assembly.
15. Install the hood assembly on to the unit (see Fig. 28 and 16.)
16. Through the outdoor air hood, review and adjust the EconoMi$er IV controller settings. See "Operation" section of this manual for details.
    a. The standard EconoMi$er IV controller has a factory setting of 63°F for the outdoor air temperature changeover and 55°F (fixed) for the supply air temperature sensor. The outdoor air temperature changeover setting is adjusted on sensor. (See Fig. 39.) The ABCD potentiometer on the controller should be set to the "D" position.
    b. The low temperature compressor lockout switch is fixed at 42°F.
    c. The minimum position for the outdoor air damper can be configured for specific job requirements at the controller. When not using a CO_2 sensor, the DCV Max potentiometer must be fully closed (CCW) for the Minimum Position potentiometer to function correctly.
    d. Settings for the optional, outdoor enthalpy sensor, indoor enthalpy sensor, power exhaust, and CO_2 sensor can be configured at the controller.
17. If barometric relief is required, remove the relief damper and hinges from the (provided) bottom panel used on vertical applications. Reinstall the hinges and damper on the side of the field supplied return duct. (See Fig. 16.)

NOTE: A relief hood for the horizontal application can be ordered separately or can be field supplied.

18. Install the hood screens and other approved EconoMi$er IV accessories.

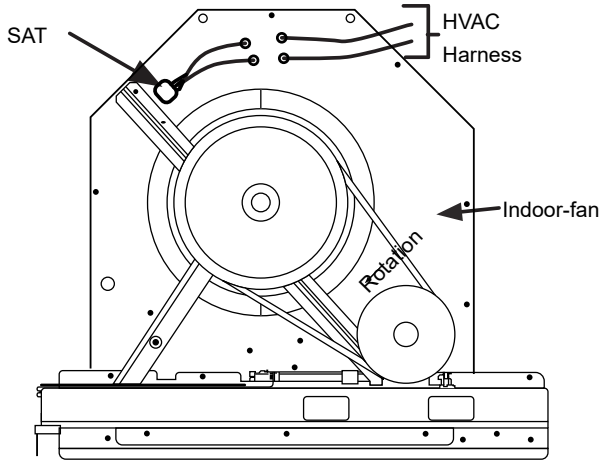


Fig. 24 — Blower Housing

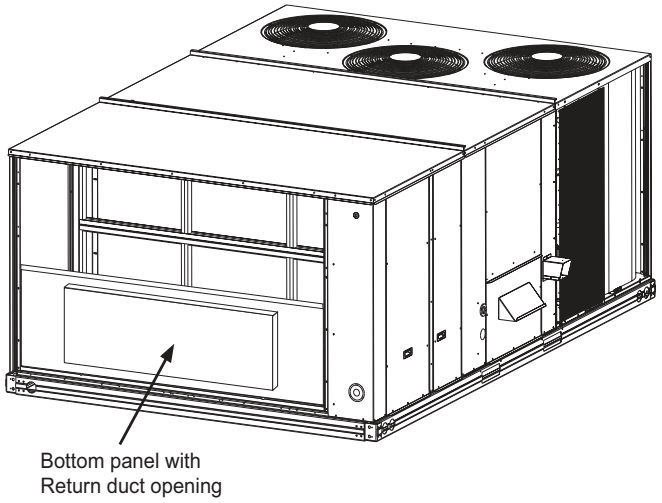
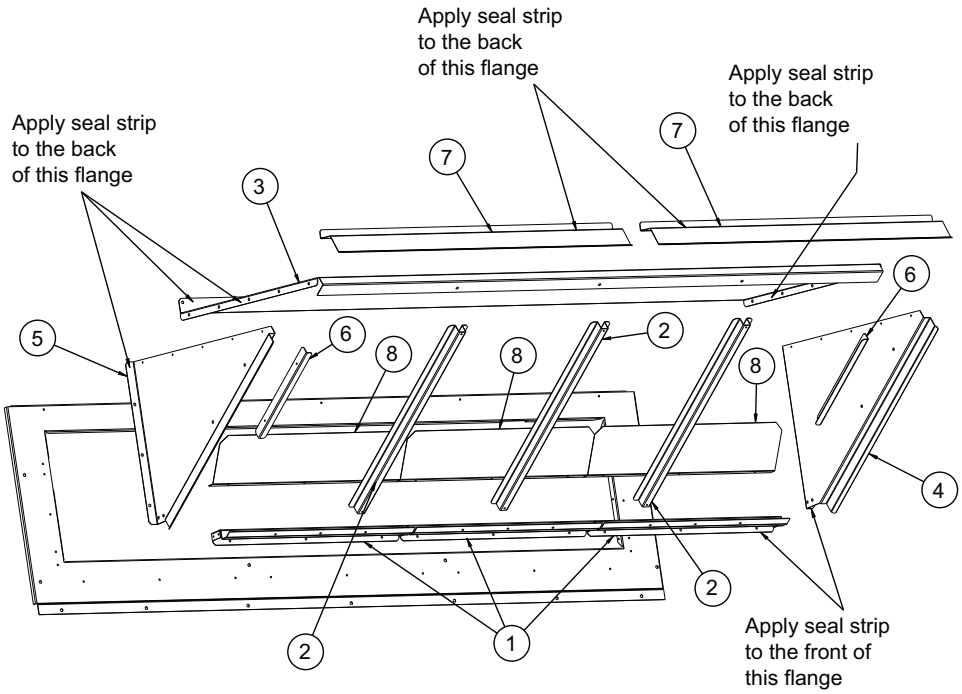


Fig. 25 — Install Bottom Panel with Horizontal Return Duct Opening



ITEM #	DESCRIPTION	QTY
1	Filter Supports	3
2	Central Retainer	3
3	Hood Top	1
4	Left Hood Side	1
5	Right Hood Side	1
6	Side Retainer	2
7	Top Diverters	2
8	Deflector	3

Fig. 26 — Hood Assembly and Hood Part Identification/Seal Strip Application Areas

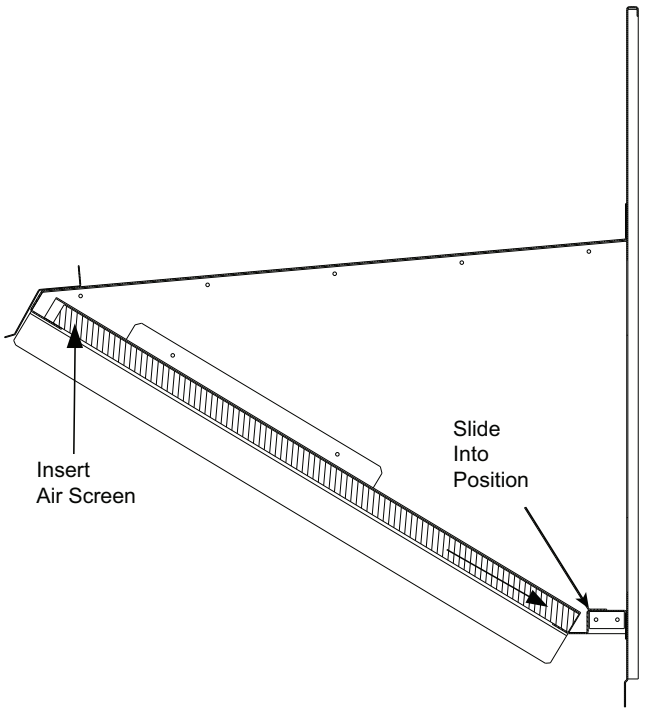


Fig. 27 — Outdoor Air Screen Installation

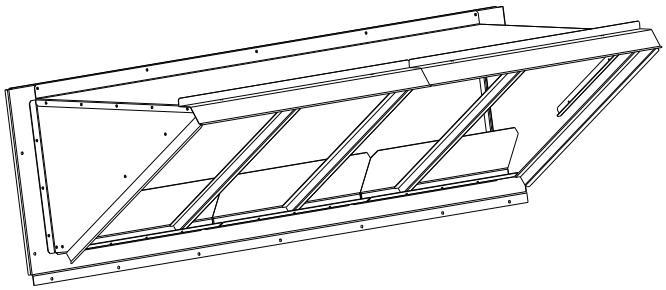


Fig. 28 — Completed Hood Assembly

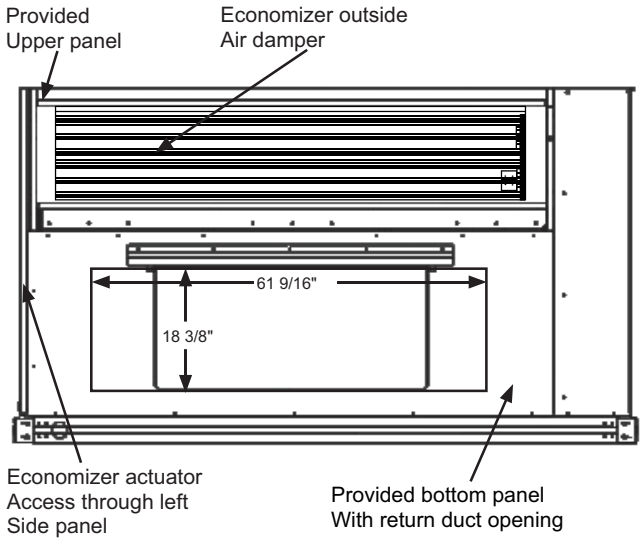


Fig. 29 — End View

Barometric Hood Assembly

The barometric hood can be assembled in vertical or horizontal configuration. Figure 30 illustrates the barometric hood parts.

BAROMETRIC HOOD (VERTICAL CONFIGURATION)

1. Remove the hood top panel from its shipping position on the unit end. (See Fig. 31.)
2. Remove the side panels located in the hood parts box (see Fig. 32).
3. Install parts as shown in the following exploded view (see Fig. 33) using the seal strip and screws provided in the parts box. Figure 34 illustrates the installed barometric hood parts.

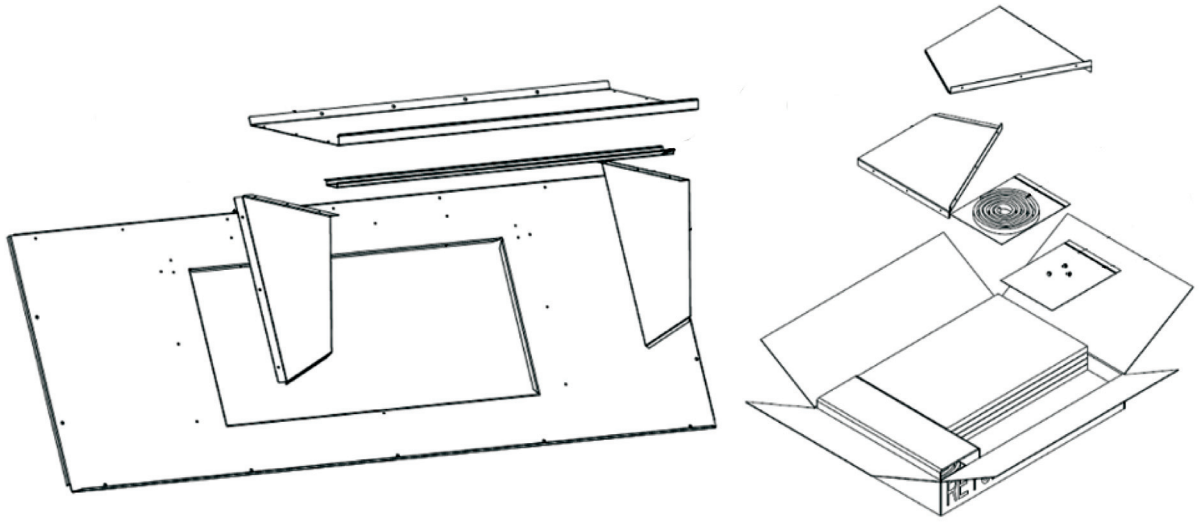


Fig. 30 — Barometric Hood Parts

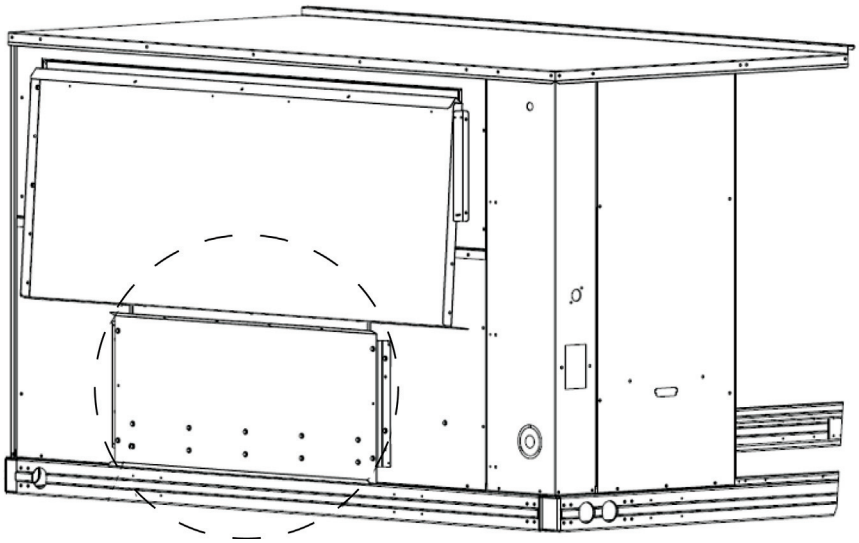


Fig. 31 — Shipping Location, Vertical Units

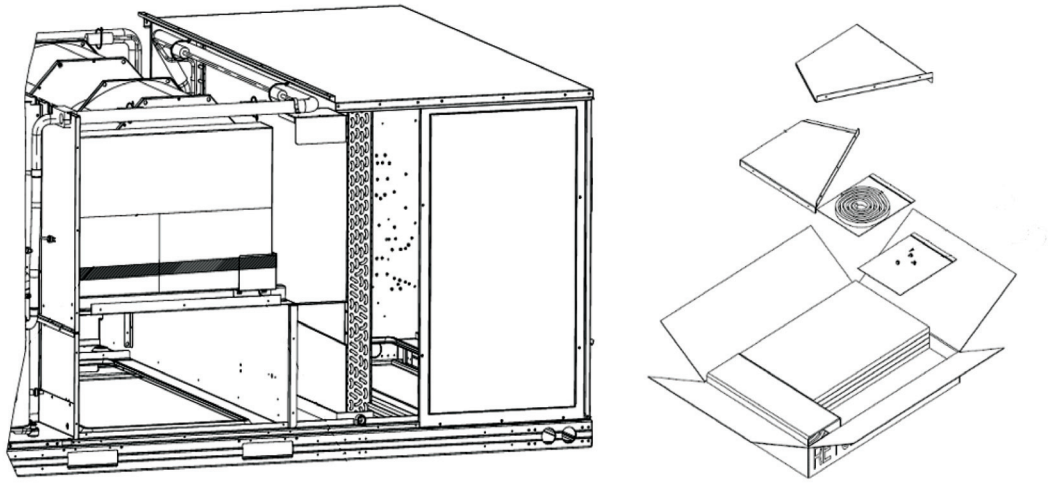


Fig. 32 — Barometric Hood Box Parts Location

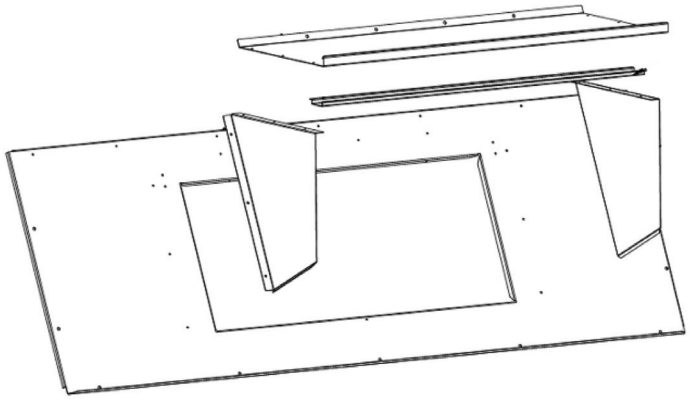


Fig. 33 — Barometric Hood Exploded View

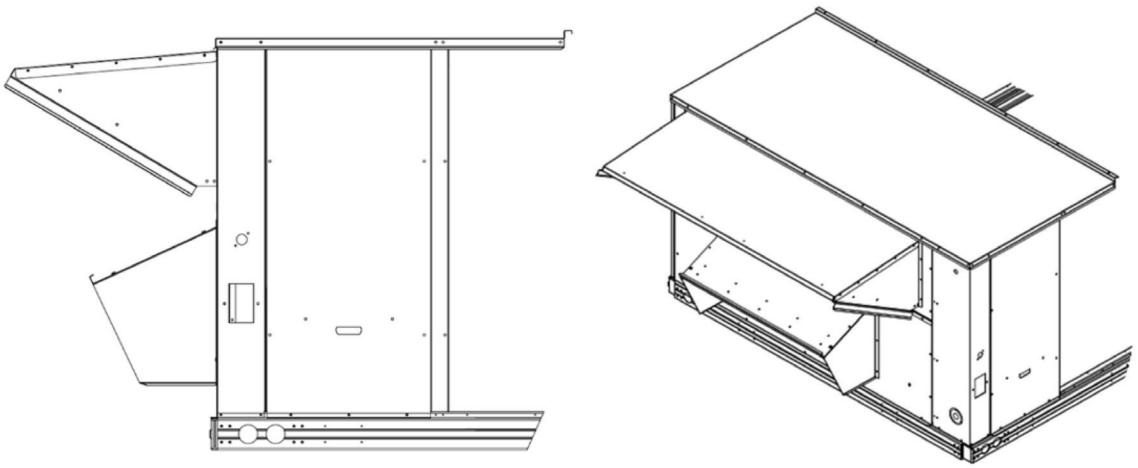


Fig. 34 — Installed Barometric Hood Side View and Isometric View

BAROMETRIC HOOD (HORIZONTAL CONFIGURATION)

For horizontal return and field-installed economizer, install the economizer as follows:

1. Install the field provided horizontal ductwork onto the unit. Duct height must be at least 19-1/2 in. high, however the duct can be no taller than the top of the relief opening in the bottom panel, or airflow into the outside air hood will be restricted. (See Fig. 35.)
2. Cut a 16 in. x 36 in. opening in the return duct for the relief damper. (See Fig. 35).
3. On the field installed economizer (CRECOMZR0**A00), a birdscreen or hardware cloth is shipped attached to the bottom panel used for vertical applications.

NOTE: This panel is not used for horizontal return applications. Remove the screen from the provided panel and install it over the relief opening cut in return duct.

4. Using the blade brackets, install the relief damper onto the side of the return duct (see Fig. 36). The two brackets and relief damper are provided with the economizer.
5. Using the provided hardware, screw the CRBARHOD001A00 hood sides and top together. (See Fig. 37.)

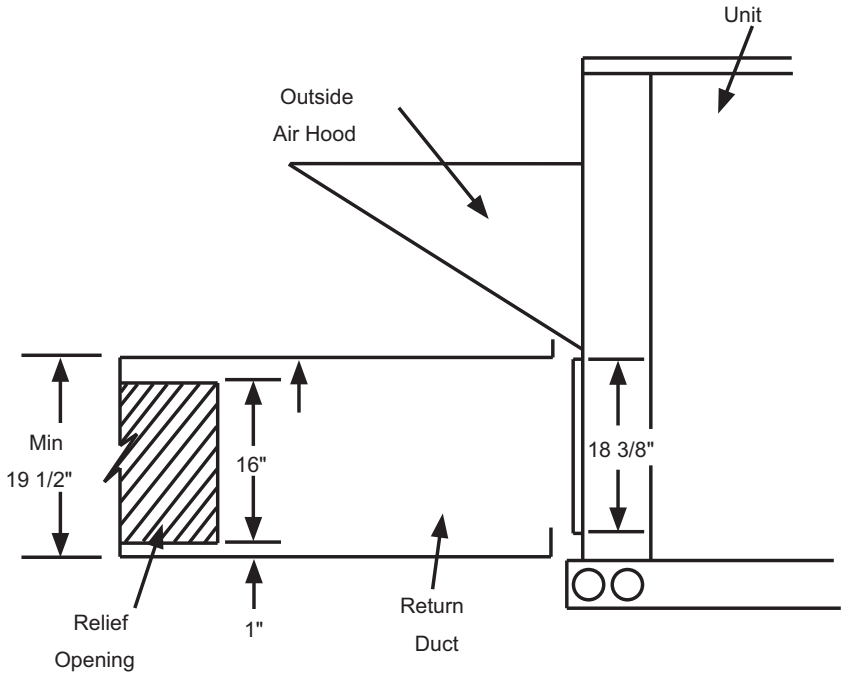


Fig. 35 — Relief Damper

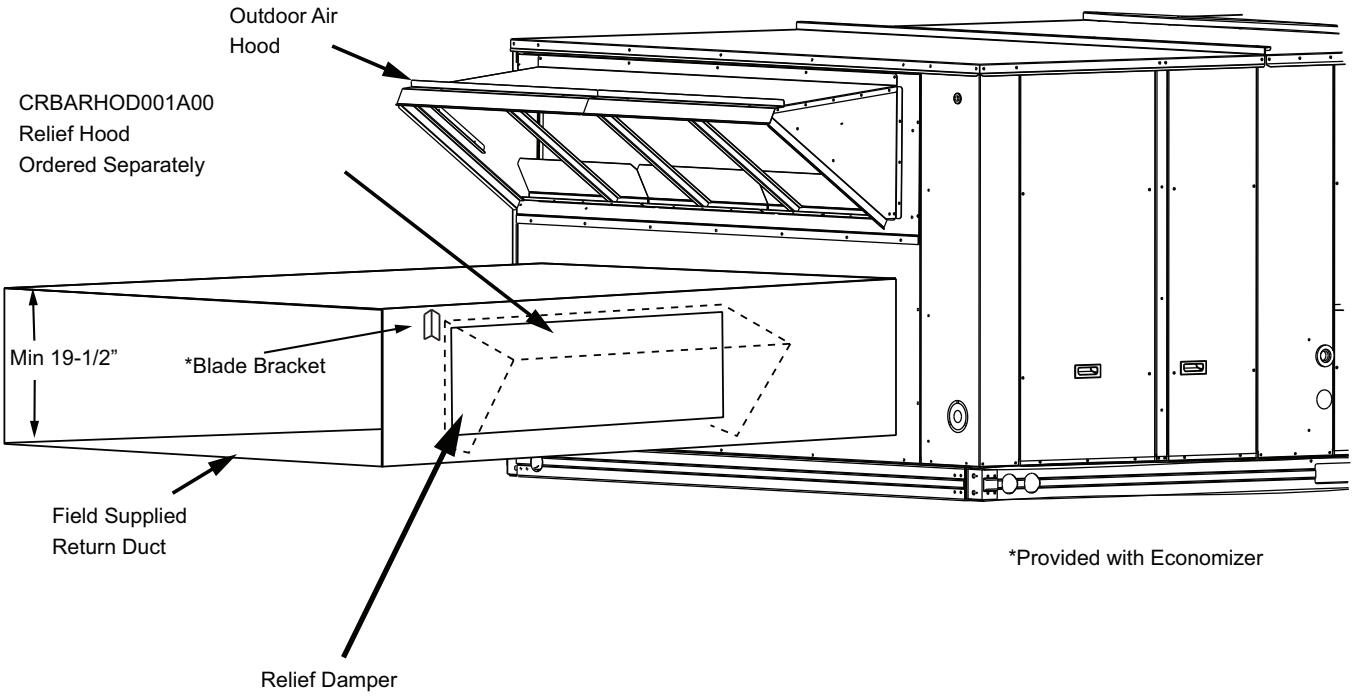


Fig. 36 — Installing CRBARHOD001A00 Over Relief Damper

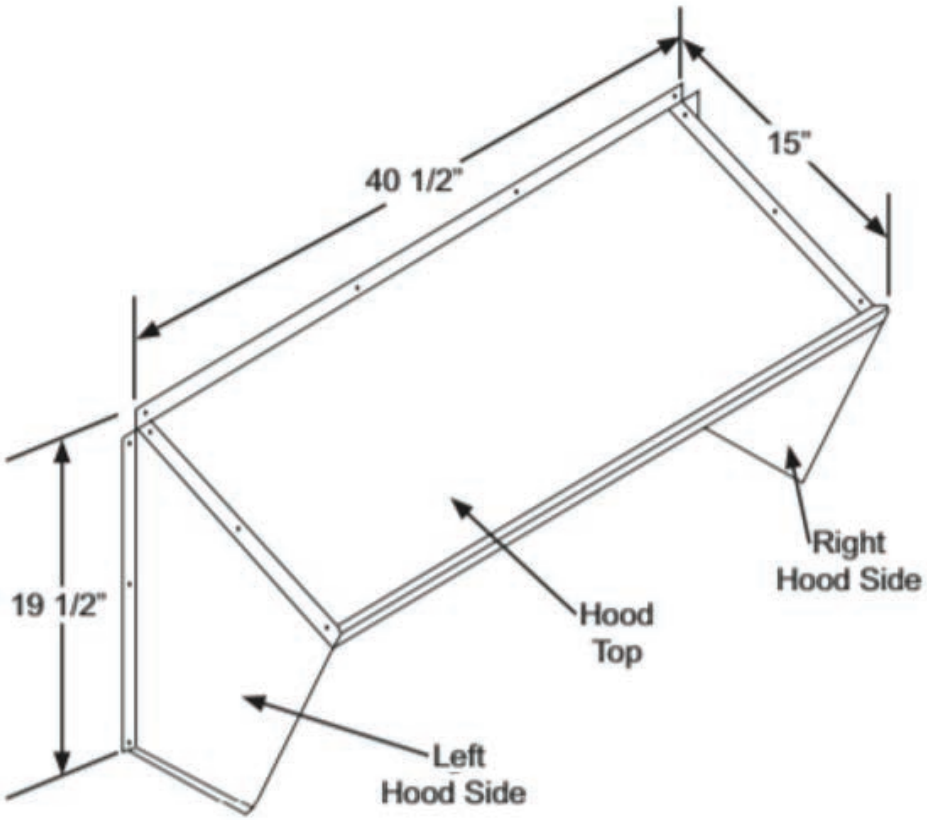


Fig. 37 — CRBARHOD001A00 Hood Sides and Top

Caulk the backside of the mating flanges to ensure a watertight seal. Install the CRBARHOD001A00 over the relief damper and screw to the return duct, as illustrated in Fig. 36.

CONFIGURATION

EconoMi$er IV Standard Sensors

OUTDOOR AIR TEMPERATURE (OAT) SENSOR

The outdoor air temperature sensor is a 10 to 20 mA device used to measure the outdoor-air temperature. The outdoor-air temperature is used to determine when the EconoMi$er IV system can be used for free cooling. The sensor is factory-installed on the EconoMi$er IV in the outdoor airstream. (See Fig. 38.) The sensor has 8 selectable temperature changeover set points, ranging from 48°F (9°C) to 78°F (25°C). The temperature changeover is set using the 3 dip switches on the sensor. The ABCD potentiometer on the controller should be set to the "D" position.

SUPPLY AIR TEMPERATURE (SAT) SENSOR

The supply air temperature sensor is a 3K thermistor located at the inlet of the indoor fan. (See Fig. 38.) This sensor is field installed. The operating range of temperature measurement is 0°F (-18°C) to 158°F (70°C). See Table 4 for sensor temperature/resistance values.

The temperature sensor looks like an eyelet terminal with wires running to it. The sensor is located in the "crimp end" and is sealed from moisture.

LOW TEMPERATURE COMPRESSOR LOCKOUT SWITCH

The EconoMi$er IV assembly is equipped with a low ambient temperature lockout switch located in the outdoor airstream which is used to lock out the compressors below a 42°F (6°C) ambient temperature. (See Fig. 38.)

Table 4 — Supply Air Sensor Temperature/ Resistance Values

TEMPERATURE (°F)	RESISTANCE (ohms)
–58	200,250
–40	100,680
–22	53,010
–4	29,091
14	16,590
32	9,795
50	5,970
68	3,747
77	3,000
86	2,416
104	1,597
122	1,080
140	746
158	525
176	376
185	321
194	274
212	203
230	153
248	116
257	102
266	89
284	70
302	55

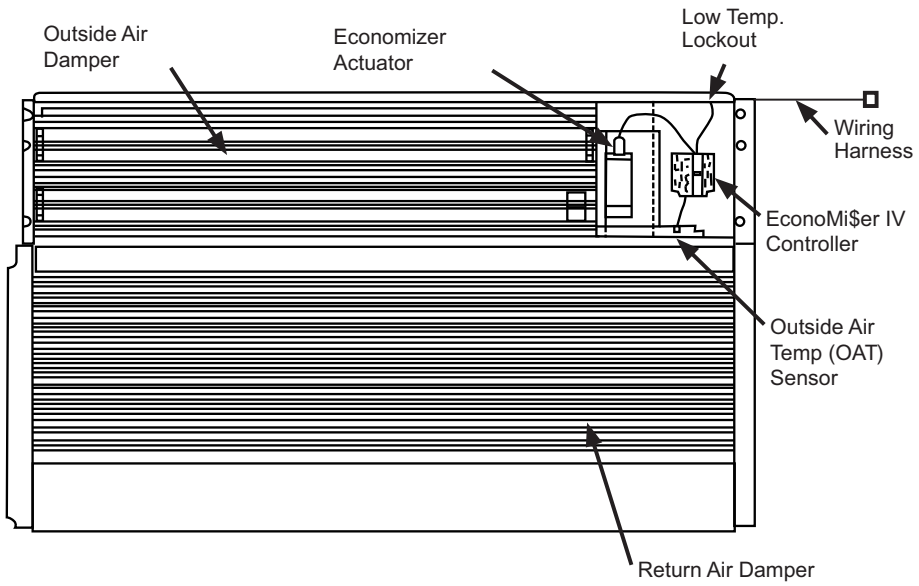


Fig. 38 — EconoMi$er IV Component Locations

ECONOMI$ER IV CONTROL MODES

Determine the EconoMi$er IV control mode before set up of the control. Some modes of operation may require different sensors. (See Table 2.) The EconoMi$er IV assembly is supplied from the factory with a supply air temperature sensor, a low temperature compressor lockout switch, and an outdoor air temperature sensor. This allows for operation of the EconoMi$er IV assembly with outdoor air dry bulb changeover control. Additional accessories can be added to allow for different types of changeover control and operation of the EconoMi$er IV controller and unit.

OUTDOOR DRY BULB CHANGEOVER

The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air and supply air temperature sensors are included as standard. For this control mode, the outdoor temperature is compared to a selectable set point sensor. (See Fig. 39.) If the outdoor-air temperature is above the set point, the EconoMi$er IV controller will adjust the outdoor air damper to minimum position. If the outdoor-air temperature is below the set point, the position of the outdoor-air dampers will be controlled to provide free cooling using outdoor air. When in this mode, the LED next to the free cooling set point potentiometer will be on. The changeover temperature set point is selected by the switches on the sensor. See Fig. 39 for the corresponding temperature changeover values.

OUTDOOR ENTHALPY CHANGEOVER

For enthalpy control, accessory enthalpy sensor (part number CRENTDIF004A00 for Carrier and Bryant, AXB078ENT for ICP) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. (See Fig. 38.) When the outdoor air enthalpy rises above the outdoor enthalpy changeover set point, the outdoor-air damper moves to its minimum position.

The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi$er IV controller. The set points are A, B, C and D. (See Fig. 40.) The factory-installed 620-ohm jumper must be in place across terminals SR and SR+ on the EconoMi$er IV controller. (See Fig. 15.)

DIFFERENTIAL ENTHALPY CONTROL

For differential enthalpy control, the EconoMi$er IV controller (see Fig. 41) uses two enthalpy sensors (AXB078ENT and CRENTDIF004A00), one in the outside air and one in the return airstream. The EconoMi$er IV controller compares the outdoor air enthalpy to the return air enthalpy to determine EconoMi$er IV controller use. The controller selects the lower enthalpy air (return or outdoor) for cooling. For example, when the outdoor air has a lower enthalpy than the return air and is below the set point, the EconoMi$er IV damper opens to bring in outdoor air for free cooling.

Replace the standard outside air dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. (See Fig. 38.) Mount the return air enthalpy sensor in the return air duct. (See Fig. 42.) When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting.

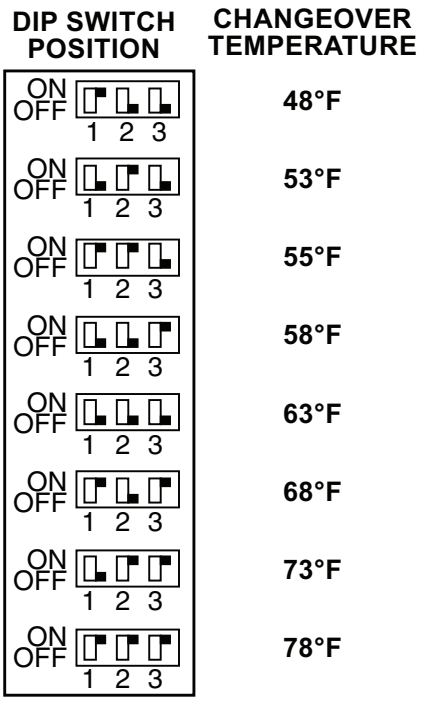


Fig. 39 — Selectable Temperature Options

CONTROL CURVE	CONTROL POINT APPROX. °F (°C) AT 50% RH
A	73 (23)
B	70 (21)
C	67 (19)
D	63 (17)

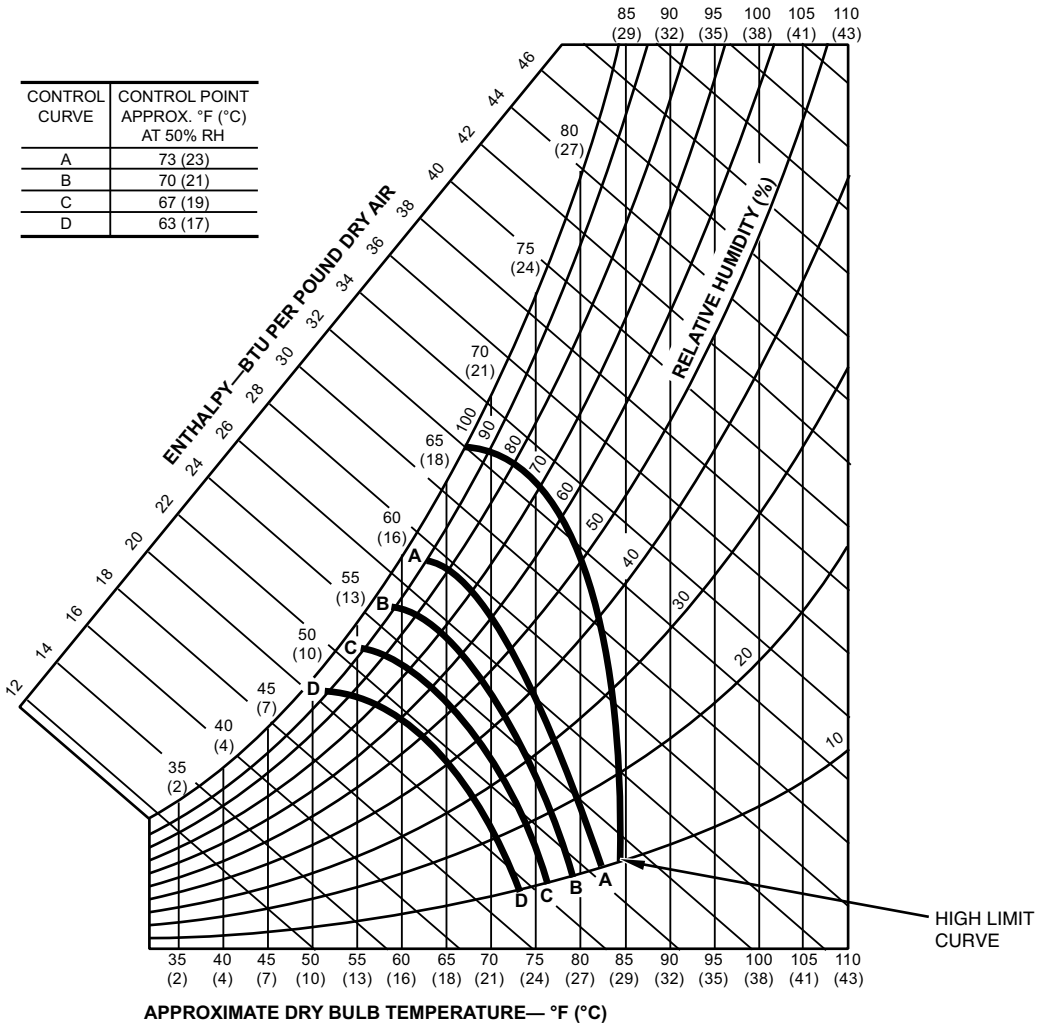


Fig. 40 — Enthalpy Changeover Setpoints

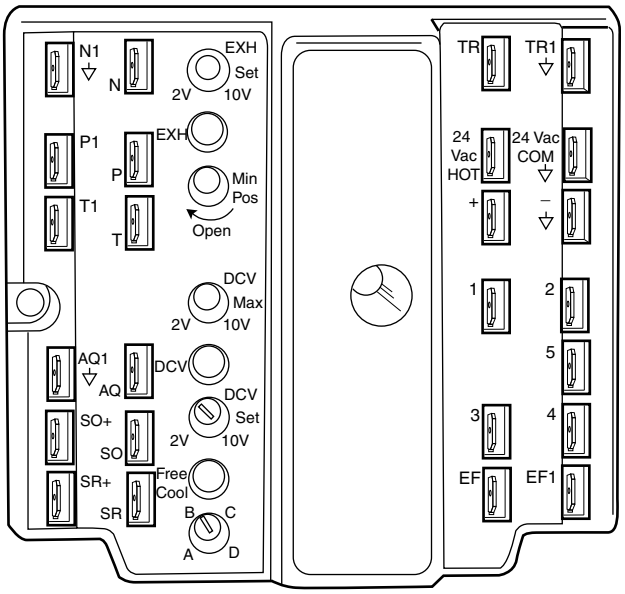


Fig. 41 — EconoMi$er IV Controller

INDOOR AIR QUALITY (IAQ) SENSOR INPUT

The IAQ input can be used for demand control ventilation control based on the level of CO_2 measured in the space or return air duct. Mount the accessory IAQ sensor according to manufacturer specifications. The IAQ sensor should be wired to the AQ and AQ1 terminals of the controller. Adjust the DCV voltage output of the indoor air quality sensor at the user-determined set point. (See Fig. 43.)

If a separate field-supplied transformer is used to power the IAQ sensor, the sensor must not be grounded or the EconoMi$er IV control board will be damaged.

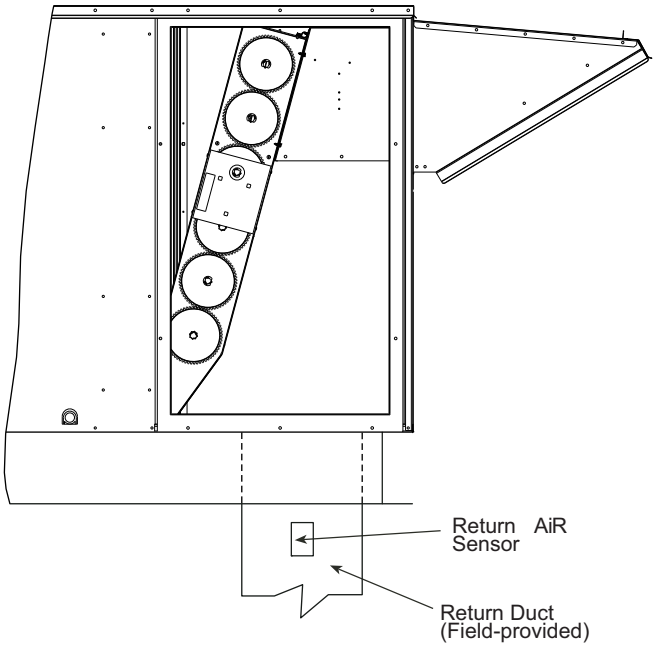


Fig. 42 — Return Air Temperature or Enthalpy Sensor Mounting Location

EXHAUST SET POINT ADJUSTMENT

The exhaust set point will determine when the exhaust fan runs based on damper position (if accessory power exhaust is installed). The set point is modified with the Exhaust Fan Set Point (EXH SET) potentiometer. (See Fig. 44.) The set point represents the damper position above which the exhaust fans will be turned on. When there is a call for exhaust, the EconoMi$er IV controller provides a 45 ±15 second delay before exhaust fan activation to allow the dampers to open. This delay allows the damper to reach the appropriate position to avoid unnecessary fan overload.

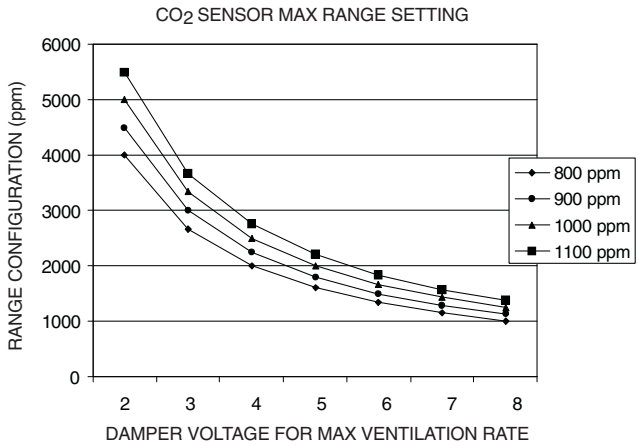


Fig. 43 — CO_2 Sensor Maximum Range Setting

MINIMUM POSITION CONTROL

There is a minimum damper position potentiometer on the EconoMi$er IV controller. (See Fig. 44.) The minimum damper position maintains the minimum airflow into the building during the occupied period.

When using demand ventilation, the minimum damper position represents the minimum ventilation position for VOC (volatile organic compound) ventilation requirements. The maximum demand ventilation position is used for fully occupied ventilation.

When demand ventilation control is not being used, the minimum position potentiometer should be used to set the occupied ventilation position. When not using a CO_2 sensor, the DCV MAX potentiometer must be fully closed (CCW) for the Minimum Position potentiometer to function correctly.

Adjust the minimum position potentiometer to allow the minimum amount of outdoor air, as required by local codes, to enter the building. Make minimum position adjustments with at least 10°F temperature difference between the outdoor and return-air temperatures.

To determine the minimum position setting perform the following procedure:

1. Calculate the appropriate mixed air temperature using the following formula:

$$T_O \times \frac{OA}{100} + (T_R \times \frac{RA}{100}) = T_M$$

T_O = Outdoor-Air Temperature

OA = Percent of Outdoor Air

T_R = Return-Air Temperature

RA = Percent of Return Air

T_M = Mixed-Air Temperature

2. Disconnect the supply air sensor from terminals T and T1.
3. Ensure that the factory-installed jumper is in place across terminals P and P1. If remote damper positioning is being used, make sure that the terminals are wired according to Fig. 15 and that the minimum position potentiometer is turned fully clockwise.
4. Connect 24 vac across terminals TR and TR1.
5. Carefully adjust the minimum position potentiometer until the measured mixed-air temperature matches the calculated value.
6. Reconnect the supply air sensor to terminals T and T1.

Remote control of the EconoMi$er IV damper is desirable when requiring additional temporary ventilation. If a field-supplied remote potentiometer is wired to the EconoMi$er IV controller, the minimum position of the damper can be controlled from a remote location.

To control the minimum damper position, remotely remove the factory-installed jumper on the P and P1 terminals on the EconoMi$er IV controller. Wire the field-supplied potentiometer to the P and P1 terminals on the EconoMi$er IV controller. (See Fig. 15.)

DAMPER MOVEMENT

Damper movement from full open to full closed (or vice versa) takes 2-1/2 minutes.

THERMOSTATS

The EconoMi$er IV control works with conventional thermostats that have a Y1 (cool stage 1), Y2 (cool stage 2), W1 (heat stage 1), W2 (heat stage 2), and G (fan). The EconoMi$er IV control does not support space temperature sensors. Connections are made at the thermostat terminal connection board located in the main control box.

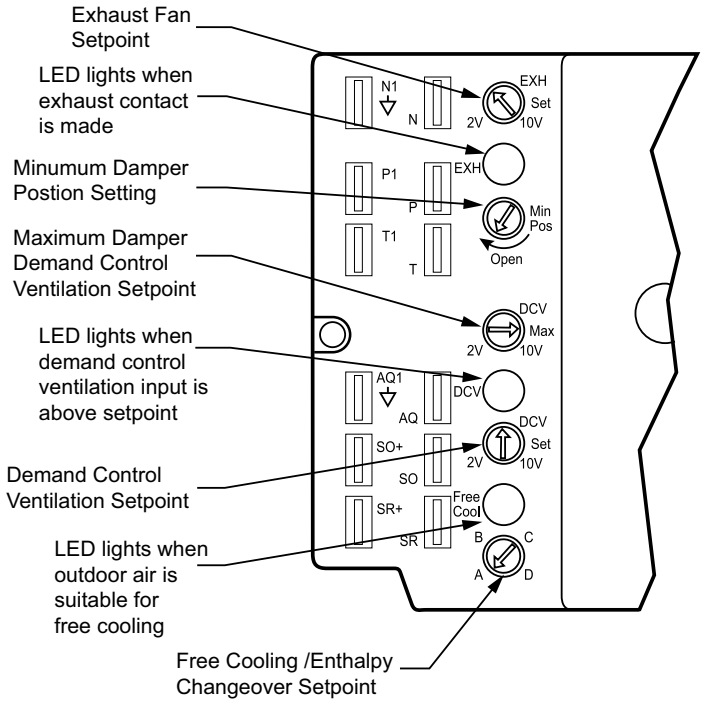


Fig. 44 — EconoMi$er IV Controller Potentiometer and LED Locations

OCCUPANCY CONTROL

The factory default configuration for the economizer control is occupied mode. Occupied status is provided by the black wire from Pin 3. When unoccupied mode is desired, install a field-supplied time clock function in place of the jumper between TR and N. (See Fig. 15.) When the time clock contacts are closed, the EconoMi$er IV control will be in occupied mode. When the time clock contacts are open (removing the 24-v signal from terminal N), the economizer will be in unoccupied mode.

DEMAND CONTROLLED VENTILATION

When using the EconoMi$er IV system for demand controlled ventilation, there are some equipment selection criteria which should be considered. When selecting the heat capacity and cool capacity of the equipment, the maximum ventilation rate must be evaluated for design conditions. The maximum damper position must be calculated to provide the desired fresh air.

Typically the maximum ventilation rate will be about 5% to 10% more than the typical cfm required per person, using normal outside air design criteria.

An exponential anticipatory strategy should be taken with the following conditions: a zone with a large area, varied occupancy, and equipment that cannot exceed the required ventilation rate design conditions. Exceeding the required ventilation rate means the equipment can condition air at a maximum ventilation rate that is greater than the required ventilation rate for maximum occupancy. An exponential-anticipatory strategy will cause the fresh air supplied to increase as the room CO_2 level increases even though the CO_2 set point has not been reached. By the time the CO_2 level reaches the set point, the damper will be at maximum ventilation and should maintain the set point.

In order to have the CO_2 sensor control the economizer damper in this manner, first determine the damper voltage output for minimum or base ventilation. Base ventilation is the ventilation required to remove contaminants during unoccupied periods. The following equation may be used to determine the percent of outside-air entering the building for a given damper position. For best results, there should be at least a 10 degree difference in outside and return-air temperatures.

$$T_O \times \frac{OA}{100} + (T_R \times \frac{RA}{100}) = T_M$$

T_O = Outdoor-Air Temperature

OA = Percent of Outdoor Air

T_R = Return-Air Temperature

RA = Percent of Return Air

T_M = Mixed-Air Temperature

Once base ventilation has been determined, set the minimum damper position potentiometer to the correct position.

The same equation can be used to determine the occupied or maximum ventilation rate to the building. For example, an output of 3.6 volts to the actuator provides a base ventilation rate of 5% and an output of 6.7 volts provides the maximum ventilation rate of 20% (or base plus 15 cfm per person). Use Fig. 43 to determine the maximum setting of the CO_2 sensor. For example, a 1100 ppm set point relates to a 15 cfm per person design. Use the 1100 ppm curve on Fig. 43 to find the point when the CO_2 sensor output will be 6.7 volts. Line up the point on the graph with the left side of the chart to determine that the range configuration for the CO_2 sensor should be 1800 ppm. The EconoMi$er IV controller will output the 6.7 volts from the CO_2 sensor to the actuator when the CO_2 concentration in the space is at 1100 ppm. The DCV set point may be left at 2 volts since the CO_2 sensor voltage will be ignored by the EconoMi$er IV controller until it rises above the 3.6 volt setting of the minimum position potentiometer.

Once the fully occupied damper position has been determined, set the maximum damper demand control ventilation potentiometer to this position as this can result in over-ventilation to the space and potential high-humidity levels.

CO_2 SENSOR CONFIGURATION

The CO_2 sensor has preset standard voltage setting that can be selected anytime after the sensor is powered up. (See Table 5.)

Use setting 1 or 2 for this equipment. (See Table 5.)

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.

3. Use the Up/Down button to select the preset number. (See Table 5.)
4. Press Enter to lock in the selection.
5. Press Mode to exit and resume normal operation.

The custom settings of the CO_2 sensor can be changed anytime after the sensor is energized. Follow the steps below to change the non-standard settings:

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enter the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.
3. Use the Up/Down button to toggle to the NONSTD menu and press Enter.
4. Use the Up/Down button to toggle through each of the nine variables, starting with Altitude, until the desired setting is reached.
5. Press Mode to move through the variables.
6. Press Enter to lock in the selection, then press Mode to continue to the next variable.

DEHUMIDIFICATION OF FRESH AIR WITH DCV CONTROL

Information from ASHRAE indicates that the largest humidity load on any zone is the fresh air introduced. For some application, an energy recovery unit can be added to reduce the moisture content of the fresh air being brought into the building when the enthalpy is high. In most cases, the normal heating and cooling processes are more than adequate to remove the humidity loads for most commercial applications. If normal rooftop heating and cooling operation is not adequate for the outdoor humidity level, and energy recovery unit and/or a dehumidification option should be considered.

Table 5 — CO_2 Sensor Standard Settings

SETTING	EQUIPMENT	OUTPUT	VENTILATION RATE (cfm/Person)	ANALOG OUTPUT	CO_2 CONTROL RANGE (ppm)	OPTIONAL RELAY SETPOINT (ppm)	RELAY HYSTERESIS (ppm)
1	Interface w/Standard Building Control System	Proportional	Any	0-10V 4-20 mA	0-2000	1000	50
2		Proportional	Any	2-10V 4-20 mA	0-2000	1000	50
3		Exponential	Any	0-10V 4-20 mA	0-2000	1100	50
4	Economizer	Proportional	15	0-10V 4-20 mA	0-1100	1100	50
5		Proportional	20	0-10V 4-20 mA	0-900	900	50
6		Exponential	15	0-10V 4-20 mA	0-1100	1100	50
7		Exponential	20	0-10V 4-20 mA	0- 900	900	50
8	Health and Safety	Proportional	—	0-10V 4-20 mA	0-9999	5000	500
9	Parking/Air Intakes/ Loading Docks	Proportional	—	0-10V 4-20 mA	0-2000	700	50

LEGEND
ppm — Parts Per Million

OPERATION

Sequence of Operation

When free cooling is not available, the compressors will be controlled by the zone thermostat. When free cooling is available, the outdoor-air damper is modulated by the EconoMi$er IV control to provide a 50°F to 55°F supply-air temperature into the zone. As the supply-air temperature fluctuates above 55°F or below 50°F, the dampers will be modulated (open or close) to bring the Supply-air temperature back within the set points. For EconoMi$er IV operation, there must be a thermostat call for the fan (G). This will move the damper to its minimum position during the occupied mode.

Above 50°F supply-air temperature, the dampers will modulate from 100% open to the minimum open position. From 50°F to 45°F supply-air temperature, the dampers will maintain at the minimum open position. Below 45°F, the dampers will be completely shut. As the supply-air temperature rises, the dampers will come back open to the minimum open position once the supply-air temperature rises to 48°F.

If optional power exhaust is installed, as the outdoor-air damper opens and closes, the power exhaust fans will be energized and de-energized.

If field-installed accessory CO_2 sensors are connected to the EconoMi$er IV control, a demand controlled ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 set point, the minimum position of the damper will be increased proportionally. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed. Damper position will follow the higher demand condition from DCV mode or free cooling mode.

Damper movement from full closed to full open (or vice versa) will take between 1-1/2 and 2-1/2 minutes.

If free cooling can be used as determined from the appropriate changeover command (dry bulb, enthalpy curve, or differential enthalpy), a call for cooling (Y1 closes at the thermostat) will cause the control to modulate the dampers open to maintain the supply air temperature set point at 50°F to 55°F.

As the supply air temperature drops below the set point range of 50°F to 55°F, the control will modulate the outdoor-air dampers closed to maintain the proper supply-air temperature.

TROUBLESHOOTING

See Table 6 on page 24 for EconoMi$er IV system logic.

EconoMi$er IV System Preparation

This procedure is used to prepare the EconoMi$er IV controller for troubleshooting. No troubleshooting or testing is done by performing the following procedure.

NOTE: This procedure requires a 9-v battery, 1.2 kilo-ohm resistor, and a 5.6 kilo-ohm resistor which are not supplied with the EconoMi$er IV controller.

IMPORTANT: Be sure to record the positions of all potentiometers before starting troubleshooting.

1. Disconnect power at TR and TR1. All LEDs should be off. Exhaust fan contact should be open.
2. Disconnect device at P and P1.
3. Jumper P to P1.
4. Disconnect wires at T and T1. Place 5.6 kilo-ohm resistor across T and T1.
5. Jumper TR to 1.
6. Jumper TR to N.
7. If connected, remove sensor from terminals SO and +. Connect 1.2 kilo-ohm checkout resistor across terminals SO and +.
8. Put 620-ohm resistor across terminals SR and +.
9. Set minimum position, DCV set point, and exhaust potentiometers fully CCW (counterclockwise).
10. Set DCV maximum position potentiometer fully CW (clockwise).
11. Set enthalpy potentiometer to D.
12. Apply power (24 vac) to terminals TR and TR1.

Differential Enthalpy

To check differential enthalpy:

1. Make sure EconoMi$er IV system preparation procedure has been performed.
2. Place 620-ohm resistor across SO and +.
3. Place 1.2 kilo-ohm resistor across SR and +. The Free Cool LED should be lit.
4. Remove 620-ohm resistor across SO and +. The Free Cool LED should turn off.
5. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

Single Enthalpy

To check single enthalpy:

1. Make sure the EconoMi$er IV system preparation procedure has been performed.
2. Set the enthalpy potentiometer to A (fully CCW). The Free Cool LED should be lit.
3. Set the enthalpy potentiometer to D (fully CW). The Free Cool LED should turn off.
4. Return EconoMi$er IV system settings and wiring to normal after completing troubleshooting.

DCV (Demand Controlled Ventilation) and Power Exhaust

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Ensure terminals AQ and AQ1 are open. The LED for both DCV and Exhaust should be off. The actuator should be fully closed.
3. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The LED for both DCV and Exhaust should turn on. The actuator should drive to between 90 and 95% open.
4. Turn the Exhaust potentiometer CW until the Exhaust LED turns off. The LED should turn off when the potentiometer is approximately 90%. The actuator should remain in position.
5. Turn the DCV set point potentiometer CW until the DCV LED turns off. The DCV LED should turn off when the potentiometer is approximately 9-v. The actuator should drive fully closed.
6. Turn the DCV and Exhaust potentiometers CCW until the Exhaust LED turns on. The exhaust contact will close 30 to 120 seconds after the Exhaust LED turns on.
7. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

DCV Minimum and Maximum Position

To check the DCV minimum and maximum position:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The DCV LED should turn on. The actuator should drive to between 90 and 95% open.
3. Turn the DCV Maximum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
4. Turn the DCV Maximum Position potentiometer to fully CCW. The actuator should drive fully closed.
5. Turn the Minimum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
6. Turn the Minimum Position potentiometer fully CW. The actuator should drive fully open.
7. Remove the jumper from TR and N. The actuator should drive fully closed.
8. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

Supply-Air Input

To check supply-air input:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Set the Enthalpy potentiometer to A. The Free Cool LED turns on. The actuator should drive to between 20 and 80% open.
3. Remove the 5.6 kilo-ohm resistor and jumper T to T1. The actuator should drive fully open.
4. Remove the jumper across T and T1. The actuator should drive fully closed.
5. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

EconoMi$er IV Troubleshooting Completion

This procedure is used to return the EconoMi$er IV to operation. No troubleshooting or testing is done by performing the following procedure:

1. Disconnect power at TR and TR1.
2. Set enthalpy potentiometer to previous setting.
3. Set DCV maximum position potentiometer to previous setting. Note: when not using a CO_2 sensor the DCV Max potentiometer must be fully closed (CCW) for the Minimum Position potentiometer to function correctly.
4. Set minimum position, DCV set point, and exhaust potentiometers to previous settings.
5. Remove 620-ohm resistor from terminals SR and +.
6. Remove 1.2 kilo-ohm checkout resistor from terminals SO and +. If used, reconnect sensor from terminals SO and +.
7. Remove jumper from TR to N.
8. Remove jumper from TR to 1.
9. Remove 5.6 kilo-ohm resistor from T and T1. Reconnect wires at T and T1.

Table 6 — EconoMi$er IV Input/Output Logic

INPUTS					OUTPUTS			
Demand Controlled Ventilation (DCV)	Enthalpy*		Y1	Y2	Compressor		N Terminal†	
	Outdoor	Return			Stage 1	Stage 2	Occupied	Unoccupied
							Damper	
Below set (DCV LED Off)	High (Free Cooling LED Off)	Low	On	On	On	On	Minimum position	Closed
			On	Off	On	Off		
			Off	Off	Off	Off		
	Low (Free Cooling LED On)	High	On	On	On	Off	Modulating** (between min. position and full-open)	Modulating** (between closed and full-open)
			On	Off	Off	Off		
			Off	Off	Off	Off	Minimum position	Closed
Above set (DCV LED On)	High (Free Cooling LED Off)	Low	On	On	On	On	Modulating†† (between min. position and DCV maximum)	Modulating†† (between closed and DCV maximum)
			On	Off	On	Off		
			Off	Off	Off	Off		
	Low (Free Cooling LED On)	High	On	On	On	Off	Modulating***	Modulating†††
			On	Off	Off O	ff		
			Off	Off	Off	Off		

* For single enthalpy control, the module compares outdoor enthalpy to the ABCD set point.
† Power at B terminal determines Occupied/Unoccupied setting: 24 vac (Occupied), no power (Unoccupied).
** Modulation is based on the supply-air sensor signal.
†† Modulation is based on the DCV signal.
*** Modulation is based on the greater of DCV and supply-air sensor signals, between minimum position and either maximum position (DCV) or fully open (supply-air signal).
††† Modulation is based on the greater of DCV and supply-air sensor signals, between closed and either maximum position (DCV) or fully open (supply-air signal).