CRECOMZR020A02
CRECOMZR021A03
CRECOMZR008C00

SMALL ROOFTOP UNITS
VERTICAL ECONOMI$ER IV ACCESSORY
2 to 12-1/2 TONS
LARGE ROOFTOP UNITS
VERTICAL AND HORIZONTAL
ECONOMI$ER IV ACCESSORY
13 to 25 TONS

Installation Instructions

TABLE OF CONTENTS

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

PACKAGE CONTENTS

PART NUMBER	QTY	CONTENTS
CRECOMZR020A02 CRECOMZR021A03	1	Hood Top and Sides
	1	Hood Divider
	1	Aluminum Filter
	18	Screws
	1	EconoMi$er IV Assembly
	1	Supply Air Temperature Sensor
CRECOMZR008C00	1	EconoMi$er IV Assembly
	1	Frame Top
	14	Screws
	1	Wiring Assembly
	1	Supply Air Temperature Sensor
	1	Snap Bushing
	1	Wire Tie
	2	Seal Strip

PACKAGE USAGE

UNIT SIZE	PART NUMBER
2 to 6 Ton	CRECOMZR020A02
7–1/2 to 12–1/2 Ton	CRECOMZR021A03
13 to 25 Ton	CRECOMZR008C00

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 the basic maintenance functions. 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. Wear safety glasses and work gloves.

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, and CAUTION. 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 a hazard 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.

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

GENERAL

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 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. Return air temperature, indoor enthalpy, and outdoor enthalpy sensors are available for field installation. Field-installed CO_2 sensors are available. See Table 1 for sensor usage.

Barometric relief dampers provide natural building pressurization control. Barometric relief dampers are built into the design on 2 to 12-$^1/_2$ ton units and are standard. Barometric relief dampers are available as accessories on 13 to 25 ton units. 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.

ACCESSORIES LIST

The EconoMi$er IV has several field-installed accessories available to optimize performance. Refer to Table 2 for authorized parts and 2-6 ton power exhaust description.

Table 1 — EconoMi$er IV Sensor Usage

APPLICATION	ECONOMI$ER IV WITH OUTDOOR AIR DRY BULB SENSOR		
	Accessories Required		
Outdoor Air Dry Bulb	None. The outdoor air dry bulb sensor is factory installed.		
Differential Dry Bulb	CRTEMPSN002A00*		
Single Enthalpy	HH57AC078		
Differential Enthalpy	HH57AC078 and CRENTDIF004A00*		
CO_2 for DCV Control using a Wall–Mounted CO_2 Sensor	33ZCSENCO2 or CGCDXSEN004A00†		
CO_2 for DCV Control using a Duct–Mounted CO_2 Sensor	33ZCSENCO2 or CGCDXSEN004A00† and 33ZCASPCO2 or CGCDXASP001A00**	OR	CRCBDIOX005A00††

* CRENTDIF004A00 and CRTEMPSN002A00 accessories are used on many different base units. As such, these kits may contain parts that will not be needed for installation.

† 33ZCSENCO2 and CGCDXSEN004A00 are accessory CO_2 sensors.

** 33ZCASPCO2 and CGCDXASP001A00 are accessory aspirator boxes required for duct-mounted applications.

††CRCBDIOX005A00 is an accessory that contains both 33ZCSENCO2 and 33ZCASPCO2 accessories.

NOTE: Some R–410A units may have factory-installed enthalpy sensor.

Table 2 — EconoMi$er IV Field-Installed Accessories

DESCRIPTION	PART NUMBER
2–6 Ton Power Exhaust 208–230 v 1 Ph	CRPWREXH030A01
2–6 Ton Power Exhaust 460 v 3 Ph	CRPWREXH021A01
$7^1/_2$–$12^1/_2$ Ton Power Exhaust 208–230 v 1 Ph	CRPWREXH022A01
$7^1/_2$–$12^1/_2$ Ton Power Exhaust 460 v 3 Ph	CRPWREXH023A01
13–25 Ton Power Exhaust (208/230, 460 v)	CRPWREXH008B00
13–25 Ton Power Exhaust (575 v)	CRPWREXH010B00
13–25 Ton Power Exhaust (220, 400 v – 50 Hz)	CRPWREXH009B00
Barometric Relief Package (13 to 25 Tons)	CRBARREL001A00
Return Air Temperature Sensor	CRTEMPSN002A00
Outdoor Air Enthalpy Sensor	HH57AC078
Indoor Air Enthalpy Sensor	CRENTDIF004A00
Return Air CO_2 Sensor (4 to 20 mA)	CRCBDIOX005A00
CO_2 Room Sensor (4 to 20 mA)	33ZCSENCO2 or CGCDXSEN004A00
Aspirator Box for Duct Mount CO_2 (4 to 20 mA)	33ZCASPCO2 or CGCDXASP001A00
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

INSTALLATION

EconoMi$er IV (2 to 12-$^1/_2$ Ton Units)

See Fig. 1 for EconoMi$er IV component locations. To install the vertical EconoMi$er IV, perform the following procedure:

1. Turn off unit power supply and install lockout tag.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

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

2. Remove the existing unit filter access panel. Raise the panel and swing the bottom outward. The panel is now disengaged from the track and can be removed. (See Fig. 2.)
3. Remove the indoor coil access panel and discard. (See Fig 2.)
4. The EconoMi$er IV hood components are shipped with the EconoMi$er IV. Remove hood from packaging. The hood top and sides are shipped factory assembled.

IMPORTANT: If the power exhaust accessory is to be installed on the unit, the hood shipped with the unit will not be used and may be discarded. Save the aluminum filter for use in the power exhaust hood assembly.

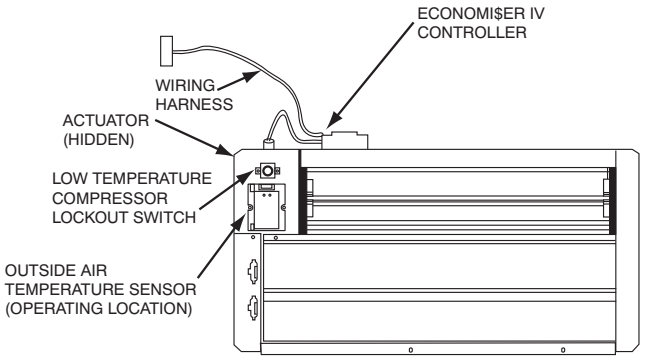

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Fig. 1 - EconoMi$er IV Component Locations — 2 to 12-$^1/_2$ Ton Units (2 to 6 Ton Shown)

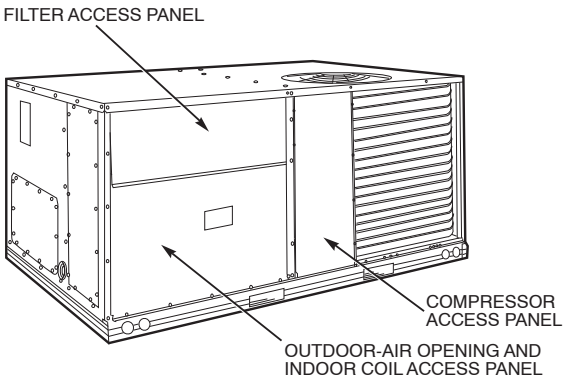

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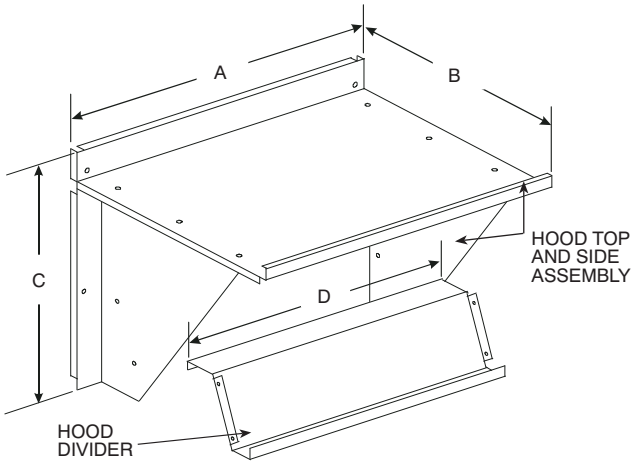
Fig. 2 - Typical Outdoor-Air Section Access Panel Locations (2 to 12-$^1/_2$ Ton Units)

5. Insert the hood divider between the hood sides. (See Fig. 3.) Secure hood divider with 2 screws (provided) on each hood side. Screws should go through the hood sides into the divider. The hood divider is also used as the bottom filter rack for the aluminum filter.

6. Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. (See Fig. 4.)
7. Slide the EconoMi$er IV assembly into the rooftop unit. (See Fig. 5.) Remove the shipping tape holding the EconoMi$er IV barometric relief dampers in place. Be sure to engage the rear EconoMi$er IV flange under the tabs in the return-air opening of the unit base. (See Fig. 6.)
8. Secure the EconoMi$er IV to unit along side and bottom flanges using the screws provided.
9. Remove and save the 12-pin jumper plug from the unit wiring harness (located in the upper left corner of the unit). Insert the EconoMi$er IV plug into the unit wiring harness. See Fig. 7 for wiring diagram.

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

10. The OAT sensor is taped to the economizer divider plate for shipping. Remove tape and relocate to the upper LH front economizer plate as shown in Fig. 1. The OA temperature sensor will mount over the label installed in this location. Secure the sensor with the two screws provided.



ECONOMIZER P/N	A	B	C	D	SHIP WT.
CRECOMZR020A02	33.37	17.43	19.05	29.5	55 lb
CRECOMZR021A03	40.37	22.28	24.48	36.27	80 lb

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Fig. 3 - Hood Assembly (2 to 12-1/2 Ton Units)

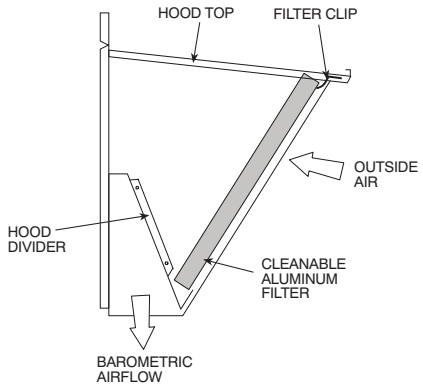

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Fig. 4 - Filter Installation (2 to 12-1/2 Ton Units)

11. Remove the indoor-fan motor access panel. (See Fig. 8.)
12. The supply air temperature sensor looks like an eyelet terminal with wires running to it. The sensor is located on the "crimp end" and is sealed from moisture.
    Mount the supply air temperature sensor (provided) to the lower left section of the indoor fan blower housing. (See Fig. 9.) Use the screw provided and use the existing hole in the blower housing. Connect the violet and pink wires to the corresponding connections on the supply air temperature sensor. (See Fig. 7.)

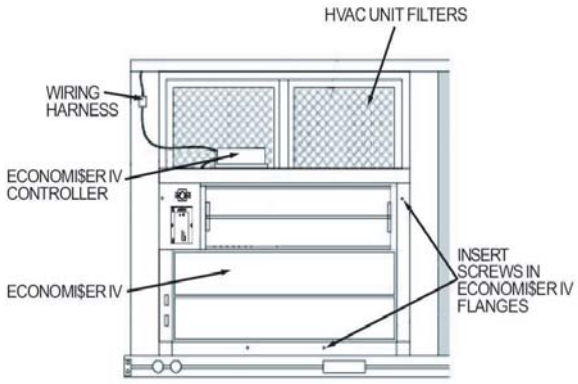

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Fig. 5 - EconoMi$er IV Installed in HVAC Unit (2 to 6 Ton Shown)

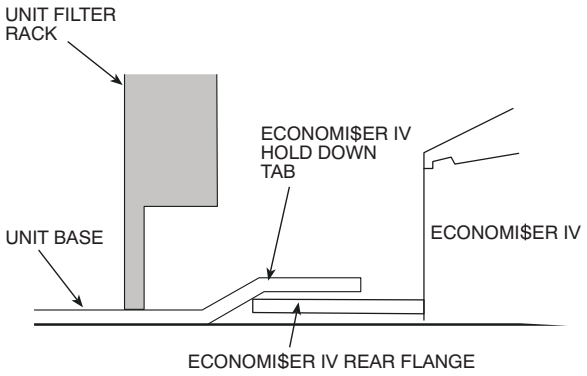

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Fig. 6 - Rear EconoMi$er IV Flange Installation (2 to 12-1/2 Ton Units)

13. Replace the indoor fan motor access panel.
14. Install the EconoMi$er IV hood over the EconoMi$er IV. Use screws provided. (See Fig. 10.)
15. Review the controller setting options in the Operation section.
    a. The standard EconoMi$er IV controller has a factory setting of "C" for the outdoor air temperature changeover and 55°F for the supply air temperature sensor. The outdoor air temperature settings can be adjusted at the EconoMi$er IV controller.
    b. The low temperature compressor lockout switch setting is fixed at 42°F.
    c. The minimum position for the outdoor damper can be configured at the controller.
    d. Settings for the optional return air temperature sensor, outdoor enthalpy sensor, indoor enthalpy sensor, and CO_2 sensor can also be configured at the controller.
16. Replace the filter access panel. Slide top of panel into track and lift. Push bottom of panel into place.
17. Install all EconoMi$er IV accessories.

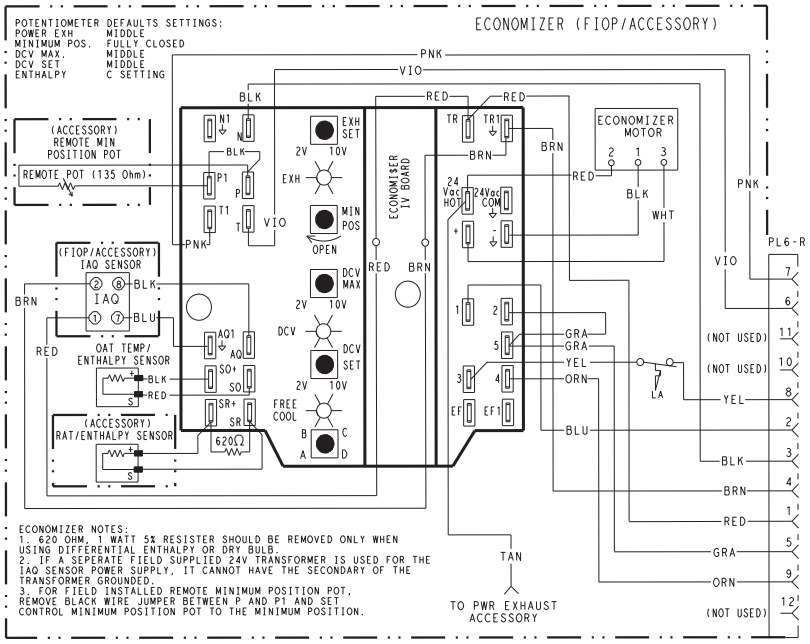

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Fig. 7 - EconoMi$er IV Wiring (2 to 12-1/2 Ton Units)

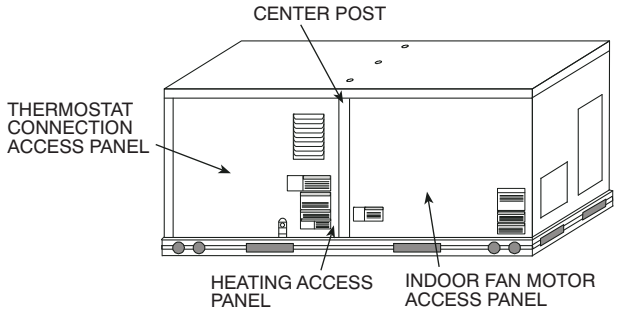

Fig. 8 - Typical Indoor Fan Motor Access Panel Locations (2 to 25 Ton Units)

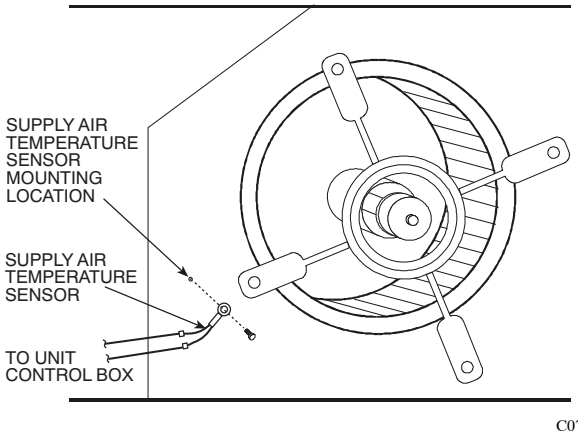

Fig. 9 - Supply Air Sensor Placement (2 to 12-$^1/_2$ Ton Units)

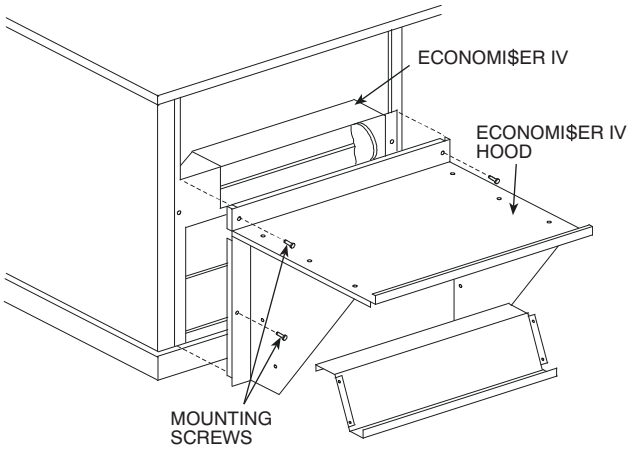

Fig. 10 - EconoMi$er IV Hood Installation (2 to 12-1/2 Ton Units)

EconoMi$er IV (13 to 25 Ton Units)

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Disconnect power supply and install lockout tag.

Install EconoMi$er IV damper assembly as follows:

1. If base unit is installed and in operation, turn off all power to unit.
2. Remove filter access panel. Remove economizer hood. (See Fig. 11.)
3. Remove 25% outdoor air damper section. Save screws. (See Fig. 12.)
4. Remove shorting plug located in the left front of return air compartment at back of unit control box. (See Fig. 12.)
5. Remove EconoMi$er IV damper assembly from shipping carton. (See Fig. 13.)
6. Install seal strip on left and right sides of EconoMi$er IV opening.
7. Slide EconoMi$er IV assembly into unit opening as shown in Fig. 14. Fig. 15 shows the EconoMi$er IV installed in the unit.
8. Secure bottom of assembly to unit. For end view of installed EconoMi$er IV, see Fig. 16. Ensure that EconoMi$er IV bottom flange is positioned on basepan before installing 2 screws connecting bottom flange to unit basepan.

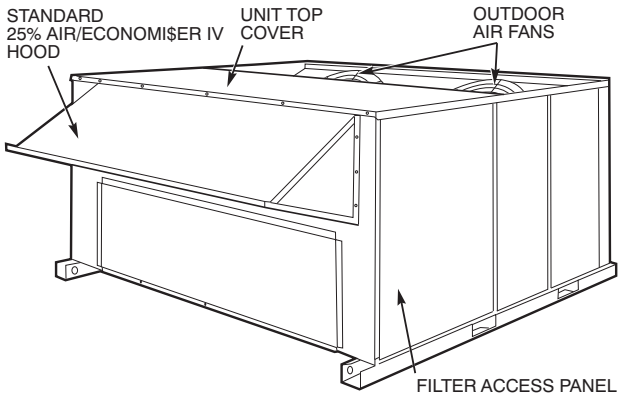

Fig. 11 - Base Unit Details (13 to 25 Ton Units)

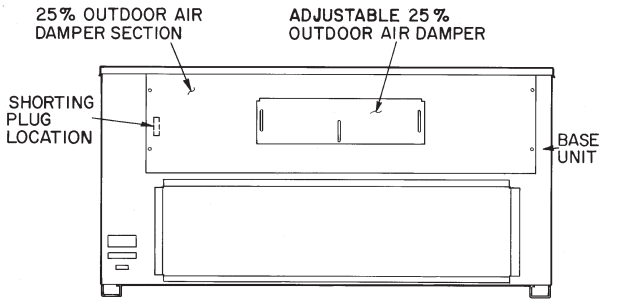

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Fig. 12 - Standard 25% Outdoor-Air Section Details (13 to 25 Ton Units)

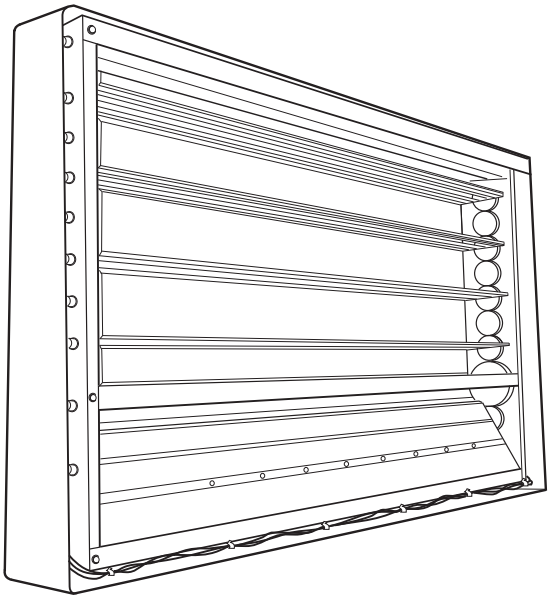

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Fig. 13 - EconoMi$er IV Shipping Packaging (13 to 25 Ton Units)

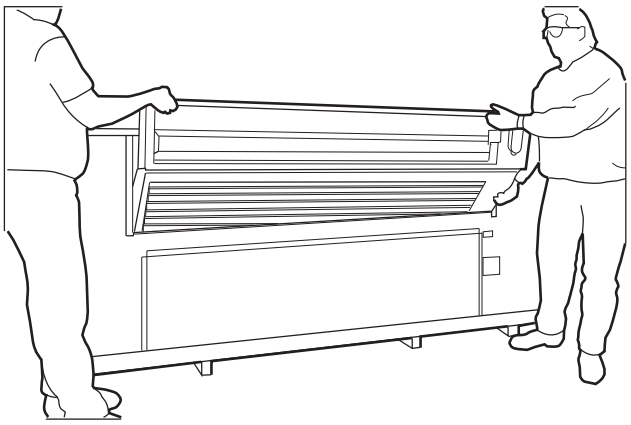

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Fig. 14 - Slide EconoMi$er IV Assembly Into Unit (13 to 25 Ton Units)

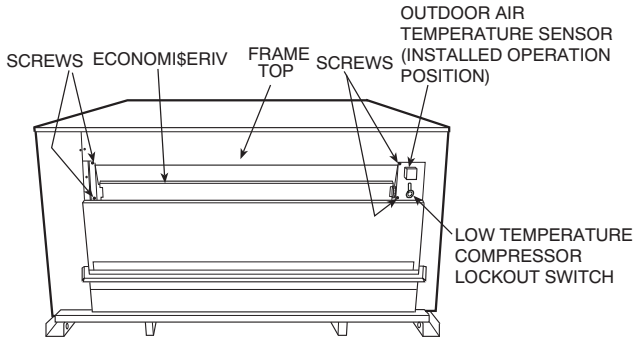

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Fig. 15 - EconoMi$er IV Assembled in Unit — End View (13 to 25 Ton Units)

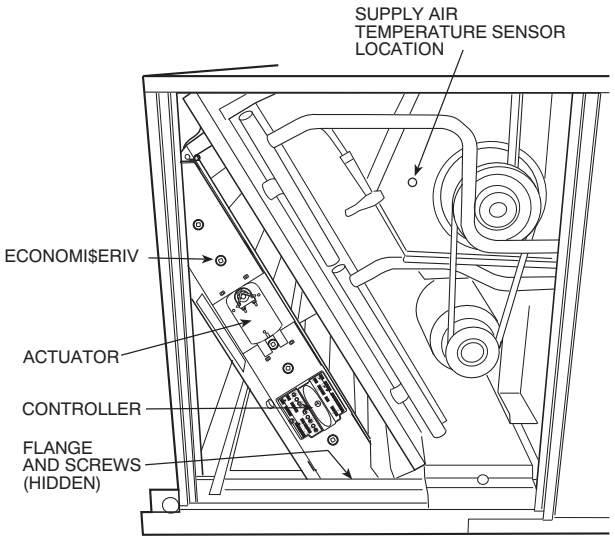

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Fig. 16 - EconoMi$er IV Assembled in Unit — Side View (13 to 25 Ton Units)

9. Using 4 screws removed at Step 3, secure the damper assembly to the unit. (See Fig. 15.)
10. Plug EconoMi$er IV wiring assembly into the receptacle at the back of unit control box where shorting plug was removed. (See Fig. 17.) See Fig. 18 for wiring diagram.
11. Install frame top above damper assembly. (See Fig. 15.)
12. Install supply air temperature sensor in fan section on hole provided on fan housing. (See Fig. 16.) Route wiring to EconoMi$er IV controller through knockout hole in panel. Use bushing provided. Use wire tie to keep wiring away from fan blades.
13. Relocate outdoor air temperature sensor from shipping position to operation position on EconoMi$er IV. (See Fig. 15.)

IMPORTANT: Failure to relocate the sensor will result in the EconoMi$er IV not operating properly.

14. Re-install economizer hood. Refer to base unit installation instructions. (See Fig. 19.)

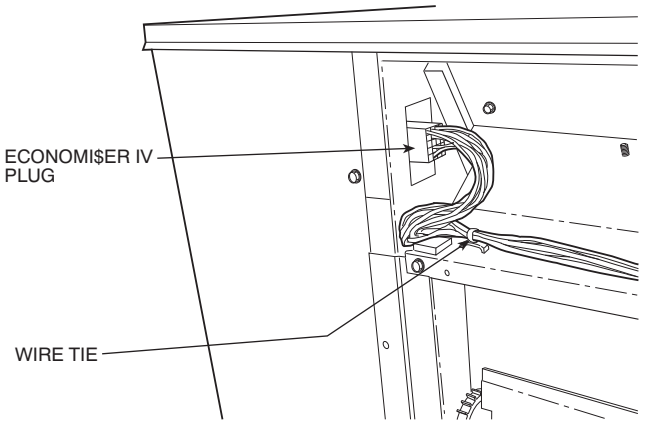


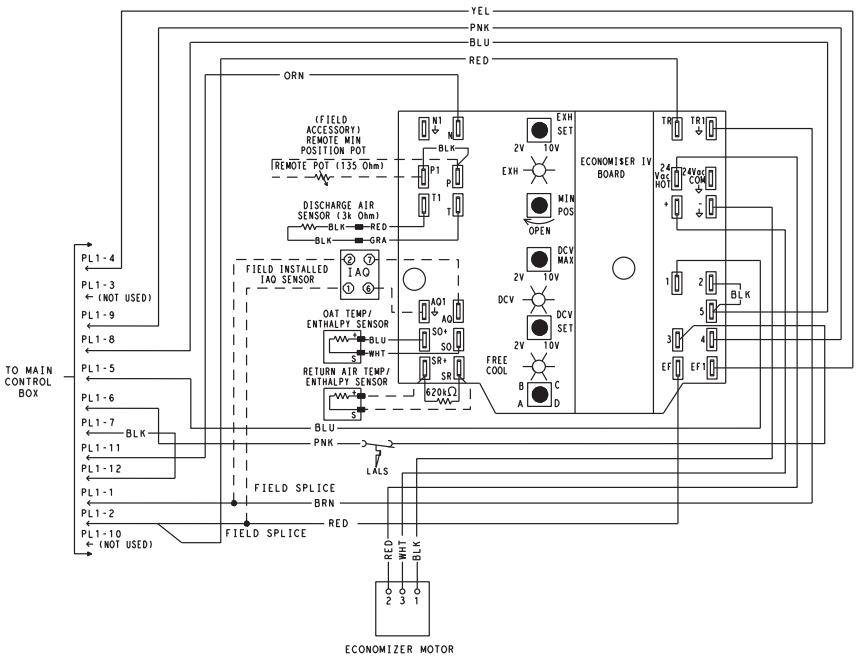
Fig. 17 - EconoMi$er IV Plug (13 to 25 Ton Units)

CONFIGURATION

EconoMi$er IV Standard Sensors

Outdoor Air Temperature (OAT) Sensor

The outdoor air temperature sensor (HH57AC074) 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$er IV can be used for free cooling. The sensor is factory-installed on the EconoMi$er IV in the outdoor airstream on 2 to 12-$^1/_2$ ton units and must be relocated on 13 to 25 ton units. (See Fig. 1 and 15.) The operating range of temperature measurement is 40° to 100°F.



LEGEND

DCV — Demand Controlled Ventilation
IAQ — Indoor Air Quality
LALS — Low Temperature Compressor Lockout Switch
OAT — Outdoor-Air Temperature
POT — Potentiometer

Potentiometer Defaults Settings:

Power Exhaust	Middle
Minimum Pos.	Fully Closed
DCV Max.	Middle
DCV Set	Middle
Enthalpy	C Setting

NOTES:
1. 620 ohm, 1 watt 5% resistor should be removed only when using differential enthalpy or dry bulb.
2. If a separate field-supplied 24 v transformer is used for the IAQ sensor power supply, it cannot have the secondary of the transformer grounded.
3. For field-installed remote minimum position POT, remove black wire jumper between P and P1 and set control minimum position POT to the minimum position.

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Fig. 18 - EconoMi$er IV Wiring (13 to 25 Ton Units)

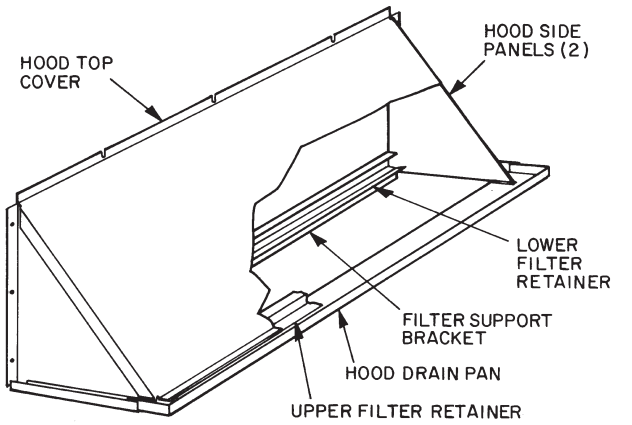

Fig. 19 - Outdoor-Air Hood Details (13 to 25 Ton Units)

Supply Air Temperature (SAT) Sensor

The supply air temperature sensor is a 3 K thermistor located at the inlet of the indoor fan. (See Fig. 9 and 16.) This sensor is field installed. The operating range of temperature measurement is 0° to 158°F. See Table 3 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 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 ambient temperature. (See Fig. 1 and 15.)

EconoMi$er IV Control Modes

Determine the EconoMi$er IV control mode before set up of the control. Some modes of operation may require different sensors. Refer to Table 1. The EconoMi$er IV 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$er IV with outdoor air dry bulb changeover control. Additional accessories can be added to allow for different types of changeover control and operation of the EconoMi$er IV and unit.

When using differential enthalpy or differential temperature control strategies and "integrated economizer operation" is desired, a 2-stage cooling thermostat is required even on 1-stage cooling units (2-6 ton rooftop units). A thermostat lead must be made between Y2-output on thermostat and Y2-input on rooftop unit's Low Voltage Terminal Board (LVTB). Internal wiring between Y2-input on the unit LVTB and the economizer controller's Y2 input already exists in unit wiring harness and the economizer plug, so no field modifications are required.

Table 3 — 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

Outdoor Dry Bulb Changeover

The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air sensor, supply air temperature sensor, and low ambient compressor lockout are included as standard. For this control mode, the outdoor temperature is compared to an adjustable set point selected on the control. If the outdoor-air temperature is above the set point, the EconoMi$er IV will adjust the outdoor air dampers 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 controlled by the free cooling set point potentiometer located on the control. (See Fig. 20.) The scale on the potentiometer is A, B, C, and D. See Fig. 21 for the corresponding temperature changeover values.

Differential Dry Bulb Control

For differential dry bulb control the standard outdoor dry bulb sensor is used in conjunction with an additional accessory return air sensor (part number CRTEMPSN002A00). The accessory sensor must be mounted in the return airstream. (See Fig. 22 and 23.) (See Fig. 7 and 18.)

In this mode of operation, the outdoor-air temperature is compared to the return-air temperature and the lower temperature airstream is used for cooling. When using this mode of changeover control, turn the free cooling/enthalpy set point potentiometer fully clockwise to the D setting. (See Fig. 20.)

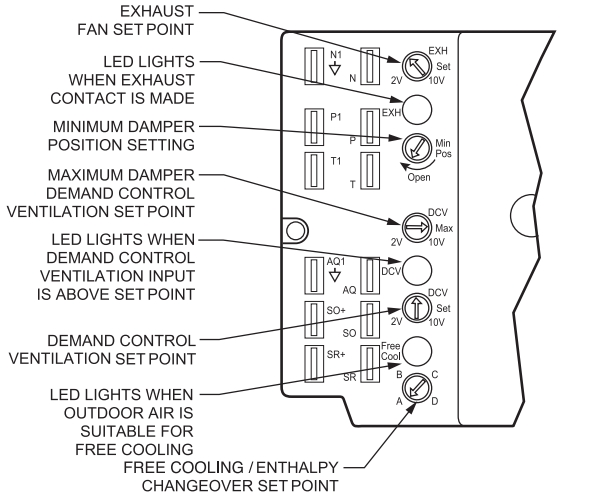

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Fig. 20 - EconoMi$er IV Controller Potentiometer and LED Locations

Outdoor Enthalpy Changeover

For enthalpy control, accessory enthalpy sensor (part number HH57AC078) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. (See Fig. 1 and 15.) 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$er IV controller. The set points are A, B, C, and D. (See Fig. 25.) The factory-installed 620 ohm jumper must be in place across terminals SR and SR+ on the EconoMi$er IV controller. (See Fig. 26.)

Differential Enthalpy Control

For differential enthalpy control, the EconoMi$er IV controller uses two enthalpy sensors (HH57AC078 and CRENTDIF004A00), one in the outside air and one in the return airstream. The EconoMi$er IV controller compares the outdoor air enthalpy to the return air enthalpy to determine EconoMi$er IV use. The controller selects the lower enthalpy air (return or outdoor) for cooling. For example, when the outdoor air has a lower enthalpy than the return air and is below the set point, the EconoMi$er IV 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. 1 and 15. Mount the return air enthalpy sensor in the return air duct (2 to 12-$^1/_2$ ton units) or on the EconoMi$er IV (13 to 25 ton units). (See Fig. 22 and 23.) (See Fig. 7 and 18.) When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting.

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.

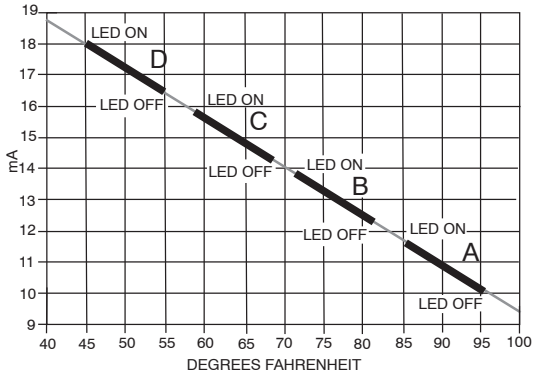
Mount the accessory IAQ sensor according to manufacturer specifications. The IAQ sensor should be wired to the AQ and AQ1 terminals of the controller. Adjust the DCV potentiometers to correspond to the DCV voltage output of the indoor air quality sensor at the user-determined set point. (See Fig. 24.)

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to equipment.

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.



C06035

Fig. 21 - Outdoor Air Temperature Changeover Set Points

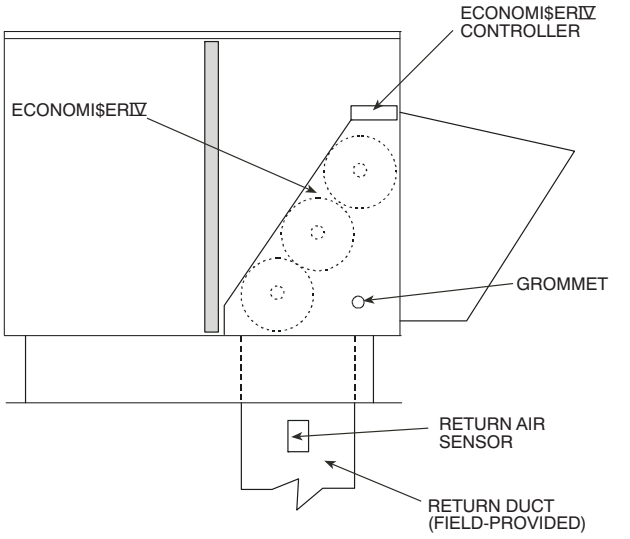


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Fig. 22 - Return Air Temperature or Enthalpy Sensor Mounting Location (2 to 12-1/2 Ton Units)

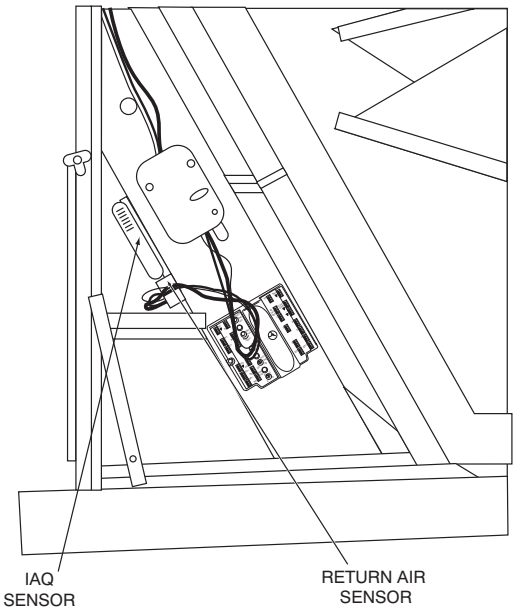

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Fig. 23 - Return Air Temperature or Enthalpy Sensor Mounting Location (13 to 25 Tons)

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. 20.) 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.

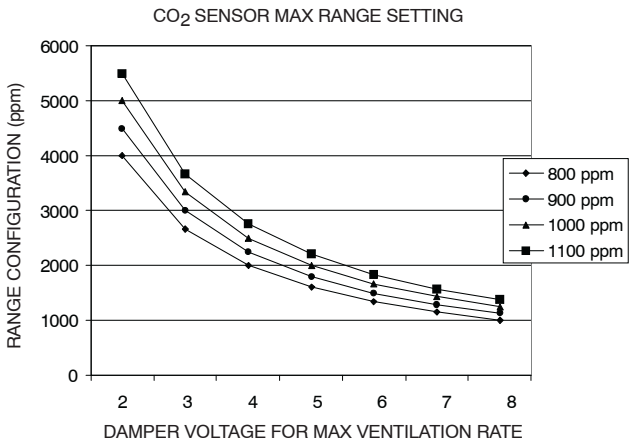
Minimum Position Control

There is a minimum damper position potentiometer on the EconoMi$er IV controller. (See Fig. 20.) 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 volatile organic compound (VOC) 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. The maximum demand ventilation position should be turned fully clockwise.

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.



C06039

Fig. 24 - CO_2 Sensor Maximum Range Setting

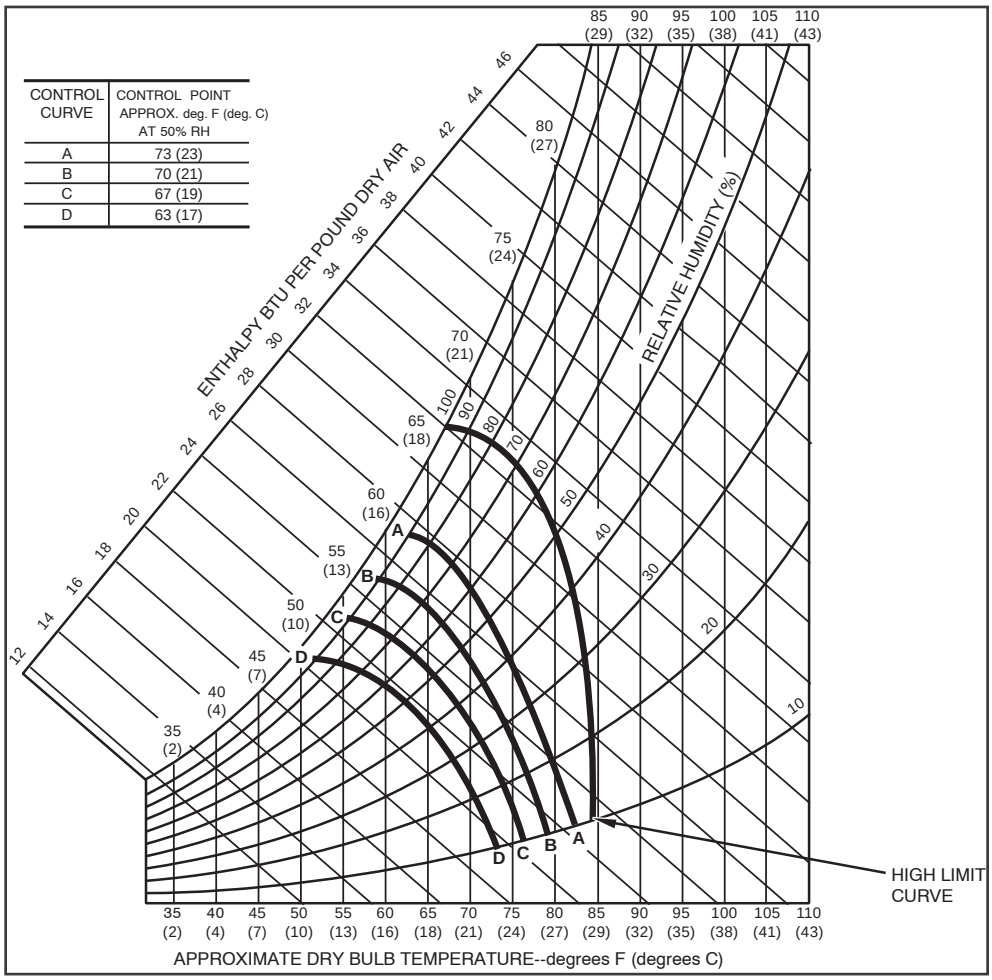


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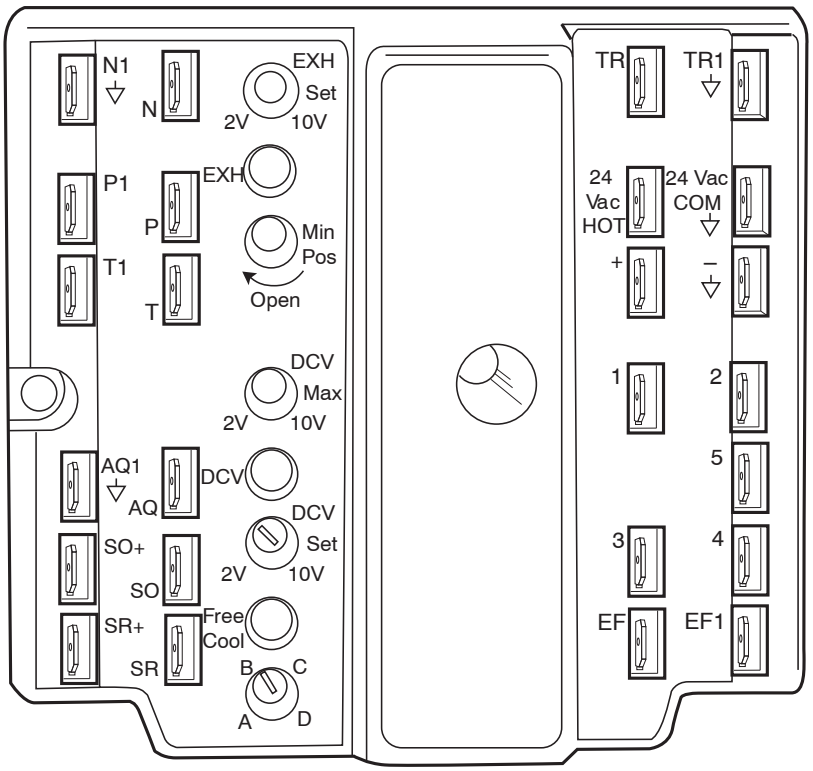
Fig. 25 - Enthalpy Changeover Set Points



C06038

Fig. 26 - EconoMi$er IV Controller

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
   As and example, if local codes require 10% outdoor air during occupied conditions, outdoor-air temperature is 60°F, and return-air temperature is 75°F.
   (60 x 0.10) + (75 x 0.90) = 73.5°F
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. 7 and 18 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$er IV damper is desirable when requiring additional temporary ventilation. If a field-supplied remote potentiometer (Honeywell part number S963B1128) is wired to the EconoMi$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. 26.)

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.

Occupancy Control (R22 Models)

The factory default configuration for the EconoMi$er IV control is occupied mode. Occupied status is provided by the black jumper from terminal TR to terminal N. When unoccupied mode is desired, install a field-supplied timeclock function in place of the jumper between TR and N. (See Fig. 7 and 18.) When the timeclock contacts are closed, the EconoMi$er IV control will be in occupied mode. When the timeclock contacts are open (removing the 24v signal from terminal N), the EconoMi$er IV will be in unoccupied mode.

Occupancy Control (Puron® models)

The factory default configuration for the EconoMi$er IV control is occupied mode. Occupied status is provided by installing a field-supplied timeclock function on the OCCUPANCY terminals on the LCTB (Light Commercial Terminal Board) in the unit's main control box and cutting the "CUT FOR OCCUPANCY" jumper on the LCTB (see Fig. 27) When the timeclock contacts are closed,the EconoMi$er IV control will be in occupied mode. When the timeclock contacts are open (removing the 24v signal from terminal N, see Fig. 27), the EconoMi$er IV will be in unoccupied mode.

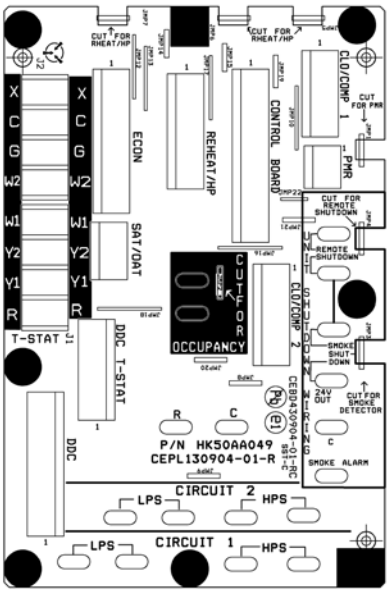


Fig. 27 - Light Commercial Terminal Board

Demand Controlled Ventilation (DCV)

When using the EconoMi$er IV 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 at 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. 24 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. 24 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. Do not set to the maximum 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 settings that can be selected anytime after the sensor is powered up. (See Table 4.)

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 6.)
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 enters 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 applications, 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, an energy recovery unit and/or a dehumidification option should be considered.

Table 4 — 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 & 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° to 55°F supply-air temperature into the zone. As the supply-air temperature fluctuates above 55° or below 50°F, the dampers will be modulated (open or close) to bring the supply-air temperature back within the set points.

Should 100% outside air not be capable of satisfying the space temperature, the space temperature will rise until Y2 is closed. The EconoMi$er IV control will call for compressor operation. Dampers will modulate to maintain SAT at 50° to 55°F concurrent with Compressor 1 operation. The low ambient lockout thermostat will block compressor operation with EconoMi$er operation below 42°F outside-air temperature.

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 supply air temperature, 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 (switch, dry bulb, enthalpy curve, differential dry bulb, 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° to 55°F.

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

Performance Data

Refer to Fig. 27 for barometric relief capacity. Refer to Fig. 28 and Table 5 for outdoor air leakage. Refer to Fig. 29 and Table 6 for return air pressure drop.

Table 5 — CO_2 Sensor Standard Settings

	DAMPER STATIC PRESSURE (in. wg)					
LEAKAGE (cfm)	0.2	0.4	0.6	0.8	1.0	1.2
	35	53	65	75	90	102

Table 6 — Return Air Pressure Drop (in. wg)
(13 to 25 Ton Units)

CFM								
4500	**5000**	**5400**	**6000**	**7200**	**7500**	**7500**	**10,000**	**11,250**
0.040	0.050	0.060	0.070	0.090	0.100	0.110	0.120	0.140

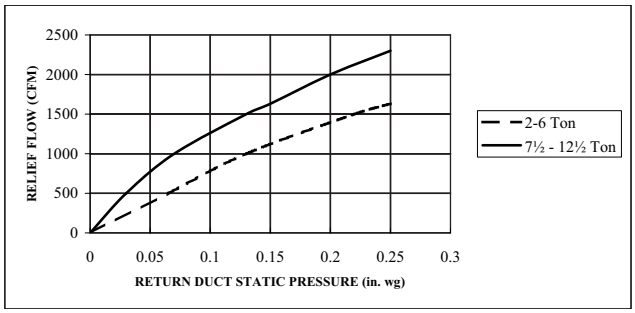


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Fig. 28 - Barometric Relief Flow Capacity
(2 to 12-$^1/_2$ Ton Units)

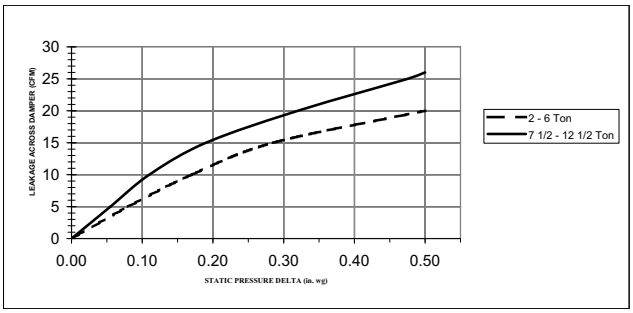

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Fig. 29 - Outdoor Air Damper Leakage
(2 to 12-$^1/_2$ Ton Units)

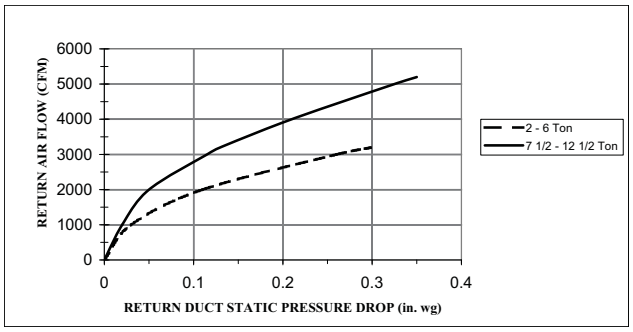

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Fig. 30 - Return Air Pressure Drop
(2 to 12-$^1/_2$ Ton Units)

TROUBLESHOOTING

See Table 7 for EconoMi$er IV logic.

A functional view of the EconoMi$er IV is shown in Fig. 30. Typical settings, sensor ranges, and jumper positions are also shown. An EconoMi$er IV simulator program is available to help with EconoMi$er IV training and troubleshooting.

EconoMi$er IV Preparation

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

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

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 contacts 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 4074EJM 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$er IV preparation procedure has been performed.
2. Place 620 ohm resistor across SO and +.
3. Place 1.2 kilo-ohm resistor across SR and +. The Free Cool LED should be lit.
4. Remove 620 ohm resistor across SO and +. The Free Cool LED should turn off.
5. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

Single Enthalpy

To check single enthalpy:

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

DCV (Demand Controlled Ventilation) and Power Exhaust

To check DCV and Power Exhaust:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Ensure terminals AQ and AQ1 are open. The LED for both DCV and Exhaust should be off. The actuator should be fully closed.
3. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The LED for both DCV and Exhaust should turn on. The actuator should drive to between 90 and 95% open.
4. Turn the Exhaust potentiometer CW until the Exhaust LED turns off. The LED should turn off when the potentiometer is approximately 90%. The actuator should remain in position.
5. Turn the DCV set point potentiometer CW until the DCV LED turns off. The DCV LED should turn off when the potentiometer is approximately 9-v. The actuator should drive fully closed.
6. Turn the DCV and Exhaust potentiometers CCW until the Exhaust LED turns on. The exhaust contacts will close 30 to 120 seconds after the Exhaust LED turns on.
7. Return EconoMi$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$er IV preparation procedure has been performed.
2. Connect a 9v battery to AQ (positive node) and AQ1 (negative node). The DCV LED should turn on. The actuator should drive to between 90 and 95% open.
3. Turn the DCV Maximum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
4. Turn the DCV Maximum Position potentiometer to fully CCW. The actuator should drive fully closed.
5. Turn the Minimum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
6. Turn the Minimum Position Potentiometer fully CW. The actuator should drive fully open.
7. Remove the jumper from TR and N. The actuator should drive fully closed.
8. Return EconoMi$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.
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.
10. Remove jumper from P to P1. Reconnect device at P and P1.
11. Apply power (24 vac) to terminals TR and TR1.

Table 7 — EconoMi$er IV Input/Output Logic

INPUTS					OUTPUTS			
Demand Control 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	Off		
			Off	Off	Off	Off		

* For single enthalpy control, the module compares outdoor enthalpy to the ABCD set point.

† Power at N 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).

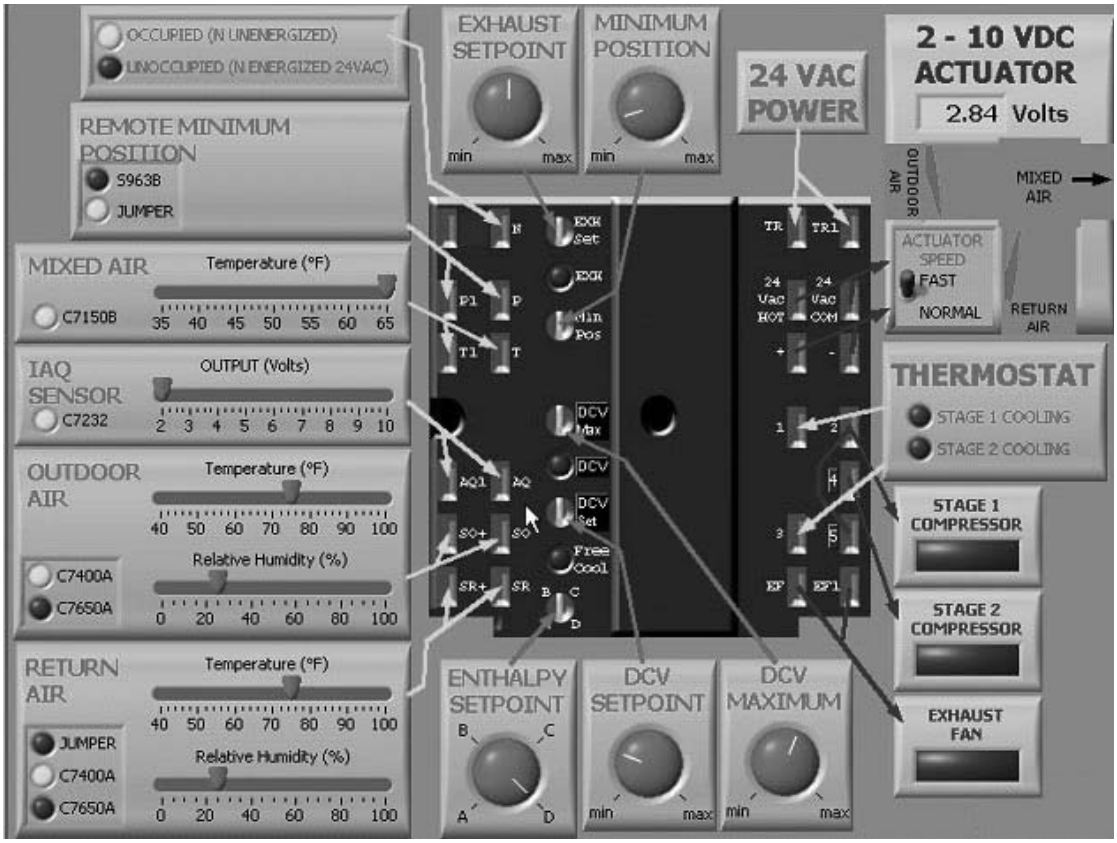

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Fig. 31 - EconoMi$er IV Functional View

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