

Medium Rooftop Units Vertical and Horizontal EconoMiSer® 2 Accessory 15 to 27.5 Tons

Installation Instructions

Part No: CRECOMZR072A01 and CRECOMZR073A01

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SAFETY CONSIDERATIONS


Installation of this accessory can be hazardous due to system pressures, electrical components, and equipment location (such as a roof or elevated structure). Only trained, qualified installers and service technicians should install, start-up, and service this equipment.

When installing this accessory, observe precautions in the literature, labels attached to the equipment, and any other safety precautions that apply:


- Follow all safety codes
- Wear safety glasses and work gloves
- Use care in handling and installing this accessory

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 can cause personal injury and death. Shut off all power to this equipment during installation. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

 **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.

GENERAL

IMPORTANT: Read these instructions completely before attempting to install the accessory economizer.

The EconoMiSer® 2 accessories, with 4 to 20 mA actuator signal control, do not have a built-in controller. The economizer actuator is operated by a 4 to 20 mA signal from an existing field-supplied controller (such as PremierLink™ control). A 12-pin plug is provided for connection to the control.

Refer to the specific DDC (Direct Digital Controls) literature for how to indicate economizer alarm/errors in the building space. Alarm/error indication may be required for local regulation compliance.

The EconoMiSer 2 system uses gear-drive technology with a direct-mount spring return actuator that will close upon loss of power. Differential dry bulb, enthalpy, and differential enthalpy sensors are available for field installation. Field-installed CO₂ sensors are available. (See Table 5.)

Optional barometric relief dampers provide natural building pressurization control. An optional power exhaust system is available for applications requiring even greater exhaust capabilities. The power exhaust set point is adjustable at the EconoMiSer 2 controller.

To see which economizer is used on specific Carrier, Bryant, or ICP models see Tables 1-3. See Table 4 for package contents and Table 5 for PremierLink™ controller sensor usage.

Compliance

EconoMiSer 2 outside air dampers meet the ASHRAE (American Society of Heating, Refrigeration, and Air-Conditioning Engineers) 90.1-2016, IECC (International Energy Conservation Code) 2015, and Title 24 2016 leakage requirements.

Economizers meet California Energy Commission Title 24-2013 / 2016 prescriptive section 140.4 (damper leakage etc.), and when used with Carrier ComfortLink, RTU Open, PremierLink™, SystemVu™, or I/O Flex 6126 control systems, meet mandatory section 120.2.i for Fault Detection and Diagnostic requirements.

Economizers meet ASHRAE 90.1-2013 / 2016 damper leakage requirements as stated in Section 6.5.1.1.4 and Table 6.4.3.4.3, and meet 2016 Fault Detection and Diagnosis requirements in section 6.4.3.12 when used with Carrier ComfortLink, RTU Open, PremierLink, SystemVu, or I/O Flex control systems.

Economizers meet IECC 2012 section C402.4.5.2 and, IECC 2015 sections C403.2.4.3 and C403.3.3.5 for outside air, return air, and relief air damper leakage requirements, and when used with Carrier ComfortLink, RTU Open, Premierlink, SystemVu, or I/O Flex control systems meet IECC 2015 section C403.2.4.7 for Fault Detection and Diagnostic requirements. Note: IECC 2015 section C403.2.4.7.1 requires differential return air sensor, which must be ordered separately.

Outside air and return air (volume) dampers are AMCA (Air Movement and Control Association) rated. Relief air dampers are also AMCA rated.

Table 4 — Package Contents

EconoMiSer®2 PART NUMBER	QTY	CONTENTS
CRECOMZR072A01	1	Damper Assembly With Shroud
	1	Upper End Economizer Panel
	1	Bottom Panel With 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
	2	Side Retainer
	1	Hood Top
	1	Left Hood Side
	1	Right Hood Side
	2	Top Diverter
	3	Deflector
	4	Outside Air Filter Screens
	60	Screws #10 — 16 x 7/8 in.
	14	Seal Strip (ft) — 1/8 in. x 3/4 in.
	CRECOMZR073A01	1
1		Upper End Economizer Panel
1		Bottom Panel With Relief Damper (for vertical only)
1		Bottom Panel #2 (for horizontal only)
3		Filter Supports
3		Central Retainer
2		Side Retainer
1		Hood Top
1		Left Hood Side
1		Right Hood Side
2		Top Diverter
3		Deflector
4		Outdoor Air Filter Screens
60		Screws #10 — 16 x 7/8 in.
14		Seal Strip (ft) — 1/8 in. x 3/4 in.

Table 1 — Carrier Usage Chart

CARRIER MODEL NUMBER	EconoMiSer®2 PART NUMBER
48/50TC 17-24	CRECOMZR072A01
48/50HC 17-20	
50TCQ 17, 24	
48/50TC 28-30	CRECOMZR073A01
48/50HC 24-28	

Table 2 — Bryant Usage Chart

BRYANT MODEL NUMBER	EconoMiSer®2 PART NUMBER
580J, 558J 17-24	CRECOMZR072A01
581J, 551J 17-20	
548J 17-24	
580J, 558J 28	CRECOMZR073A01
581J, 551J 24-28	

Table 3 — ICP Usage Chart

ICP MODEL NUMBER	EconoMiSer®2 PART NUMBER
RGS, RAS 181, 183, 210, 213, 240, 243	CRECOMZR072A01
RGH, RAH 181, 210	
RHS 181, 240	
RGS, RAS 300, 303, 336	CRECOMZR073A01
RGH, RAH 240, 300	

Table 5 — PremierLink™ Controller Sensor Usage

DESIRED CONTROL METHOD	FIELD-INSTALLED DRY BULB ACCESSORY EconoMi\$er®2	FACTORY-INSTALLED DRY BULB SENSOR EconoMi\$er®2	FACTORY-INSTALLED ENTHALPY SENSOR EconoMi\$er®2
SINGLE DRY BULB TEMPERATURE CONTROL	NONE: Outside air dry bulb sensor is factory-installed	NONE: Outside air dry bulb sensor is factory-installed	N/A
DIFFERENTIAL DRY BULB TEMPERATURE CONTROL	(1) CRTEMPN001A00 or (1) 33ZCT55SPT, T56, T59 or (1) 33PILOT-01	(1) CRTEMPN001A00 or (1) 33ZCT55SPT, T56, T59 or (1) 33PILOT-01	N/A
SINGLE ENTHALPY	(1) 33CSENTHSW	(1) 33CSENTHSW	NONE: Outside air dry bulb sensor is factory-installed
DIFFERENTIAL ENTHALPY	(1) 33CSENTHSW OR (1) 33CSENTSEN	(1) 33CSENTHSW and (1) 33CSENTSEN	Outside Air Enthalpy sensor is factory-installed plus (1) 33CSENTSEN

LEGEND

N/A — Not available

NOTES:

1. CO₂ Sensors (Optional)
2. OAT (Outdoor-Air Thermistor) included with EconoMi\$er accessory. Space sensor required when using PremierLink controls

INSTALLATION

Vertical Installation

These economizers are designed to work in both vertical and horizontal applications. For a vertical installation:

1. Turn off unit's 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. Save the screws for later when replacing the bottom panel. The panels shipped with the unit can be discarded. (See Fig. 1.)
4. Remove the unit's left side corner post and left side panel to allow for easy economizer installation. (See Fig. 2.)

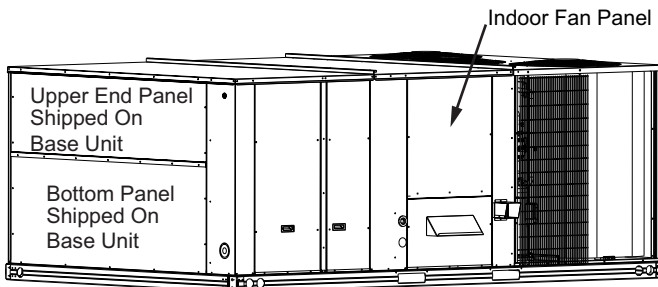


Fig. 1 — Upper and Bottom Panel on End of Unit

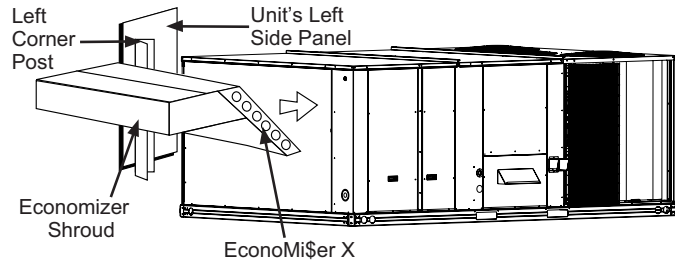


Fig. 2 — Unit Left Side Panel and Corner Post

5. Install economizer, with shroud attached as shown in Fig. 2, into the return air section of the unit. Be careful not to pinch the wires during installation. The bottom of economizer will rest on the base of the unit. (See Fig. 3 and 4.)

NOTE: The outside air damper is rated to meet ASHRAE requirements for leakage. It is important that the damper be perfectly square in the unit.

6. Reinstall the left side corner post on to the unit.

NOTE: The corner post will sit behind the economizer shroud flange. (See Fig. 5.) Screw through the corner post and through the economizer shroud. (See Fig. 3 and 5.)

7. Insert provided screw through the bottom left rear of the economizer and into the unit base. (See Fig. 3.) Reinstall the unit's left side panel.

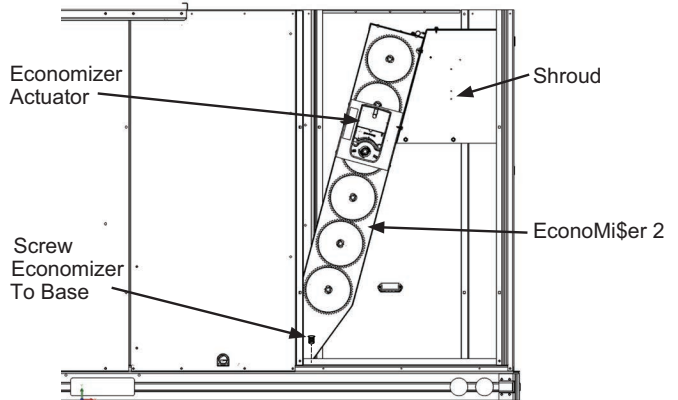


Fig. 3 — Side View

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. 6.) Insert the economizer plug into the unit wiring harness plug. (See Fig. 6.)

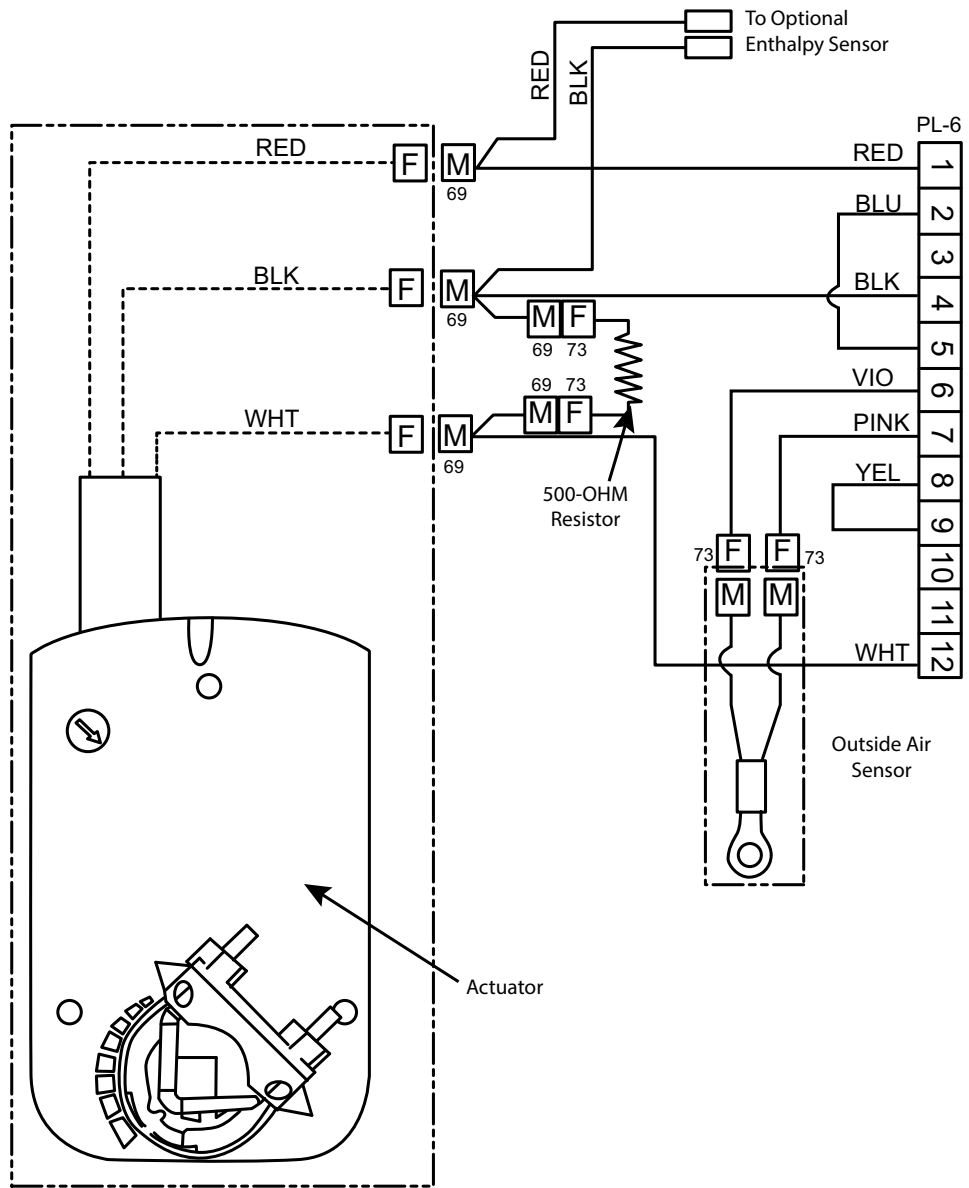


Fig. 4 — Wiring Diagram

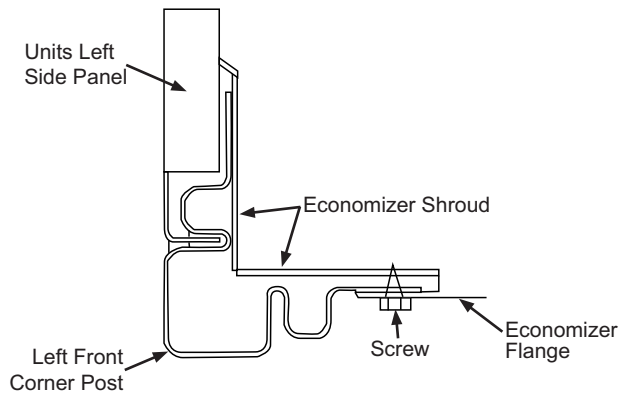


Fig. 5 — Top View

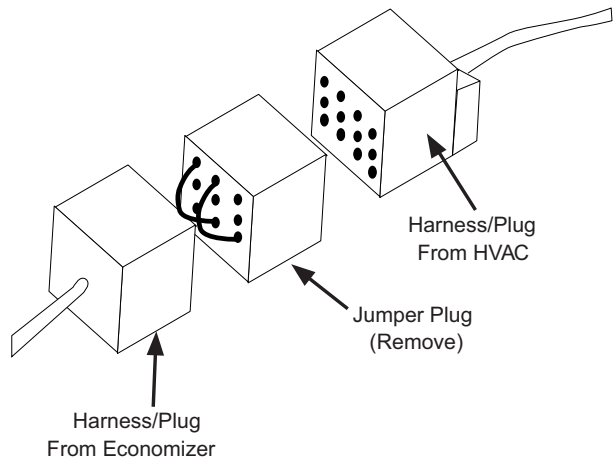


Fig. 6 — Harness and Jumper Plug

NOTE: The 12-pin jumper plug should be saved for future use in the event that the EconoMiSer®2 is removed from the unit. The jumper plug is not needed as long as the EconoMiSer®2 system is installed.

9. Install the bottom panel with the relief damper attached on the unit. (See Fig. 7.) Screw panel in place.

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

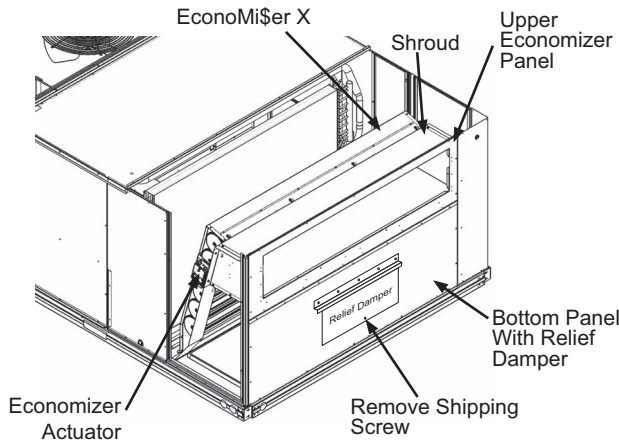
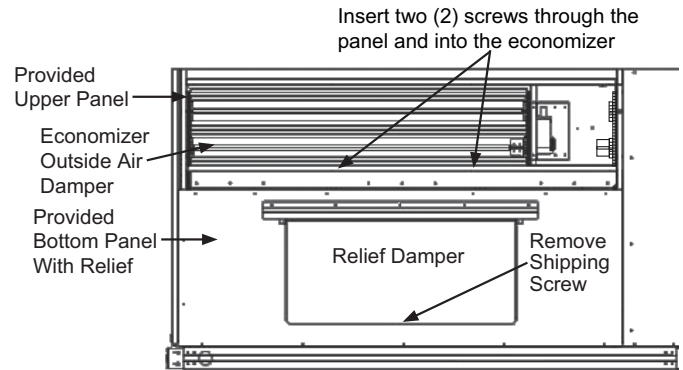


Fig. 7 — Bottom Panel Installation

10. 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 2 places. (See Fig. 8.)
11. Assemble the outside air hood per Fig. 9-11.
 - a. Install filter 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 the side plates of the hood (Item # 4 and #5).
 - d. Secure the side panels (Item #4 and #5) to the upper panel using the screws provided.
 - e. Apply the seal strip to the mating flange of the hood. (See Fig. 9).
 - f. Secure hood top (Item #3) to the upper panel using the screws provided. On the 44 in. chassis remove the screws from across the top cover of the unit. The rear flange of the hood top will slide behind the unit top over the flange.

NOTE: Screens may be left out at this time to allow for EconoMiSer®2 adjustments.

- g. Secure side retainers (Item #6) to side panels (Item #4 and #5) using the screws provided, screwing from the outside of the hood.
- h. Secure each central retainer (Item #2) to the hood top (Item #3). Align the central retainers to the holes located on the filter support (Item #1), so the central retainer is perpendicular to the hood and each filter support. Secure using the screws provided.
- i. Apply seal strip to top diverters (Item #7).
- j. Secure top diverters (Item #7) to the 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. (See Fig. 10.) First insert the air screens into the pocket created at the end of the hood (Item #3), then fully put the air screen into place. Slide the air screens back into the pocket created in the filter support (Item#1). Repeat this step for each air screen. (See Fig. 10.) See Fig. 11 for complete hood assembly.



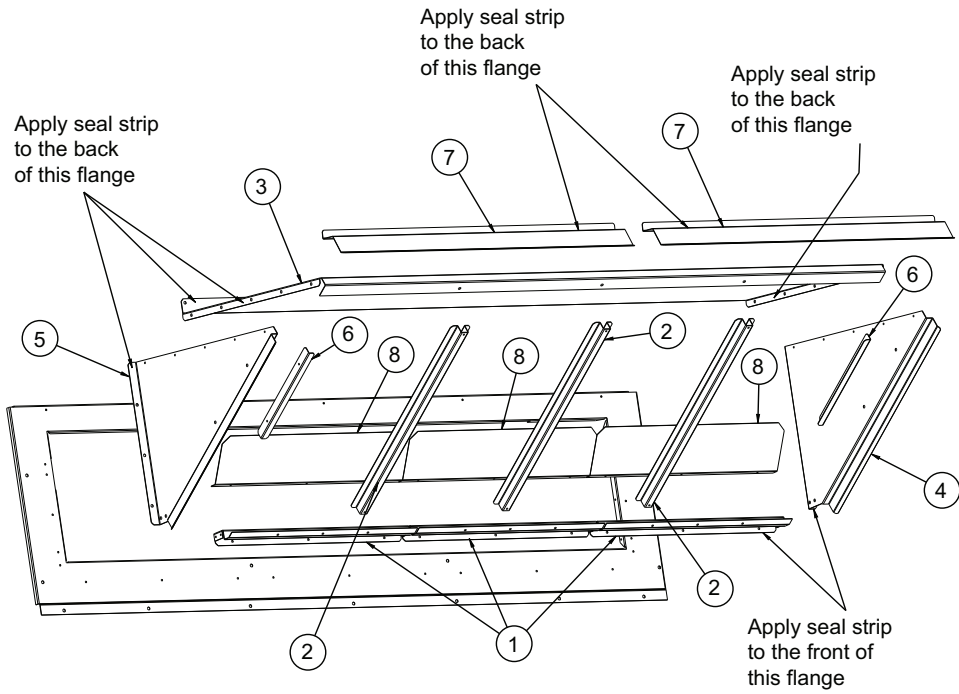
NOTE: Access to the economizer actuator is through the HVAC units left side panel.

Fig. 8 — End View of Unit

12. Install the hood screens and other approved EconoMiSer®2 accessories.
13. Install the hood assembly onto the unit (see Fig. 10 and 11).
14. 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. 12.)

NOTE: A relief hood for the horizontal application can be ordered separately (part number CRBARHOD001A00) or can be field-supplied.

15. Install the hood screens and other approved EconoMiSer®2 accessories.



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

Fig. 9 — Hood Assembly and Hood Part Identification/Seal Strip Application Areas

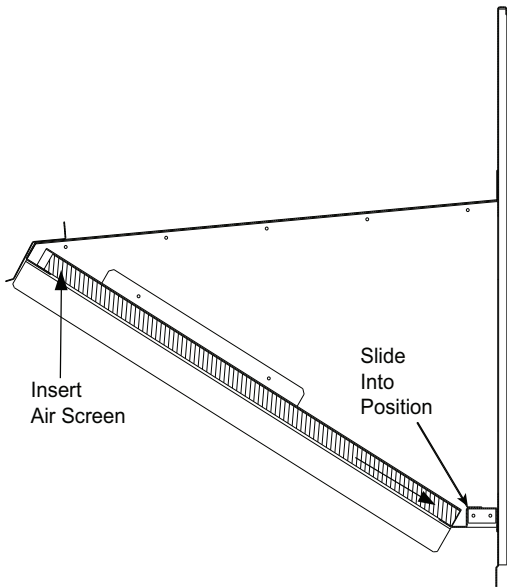


Fig. 10 — Air Screen Installation

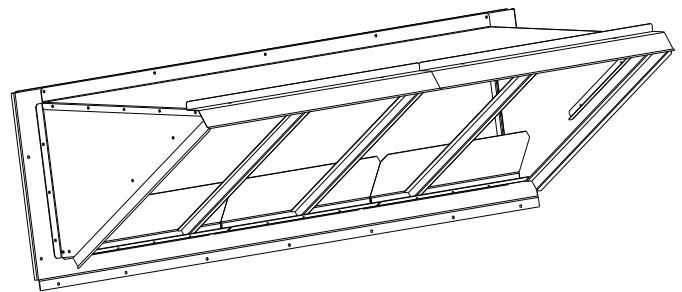


Fig. 11 — Hood Assembly Complete

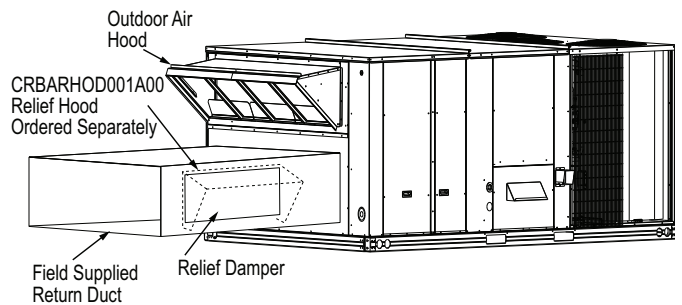
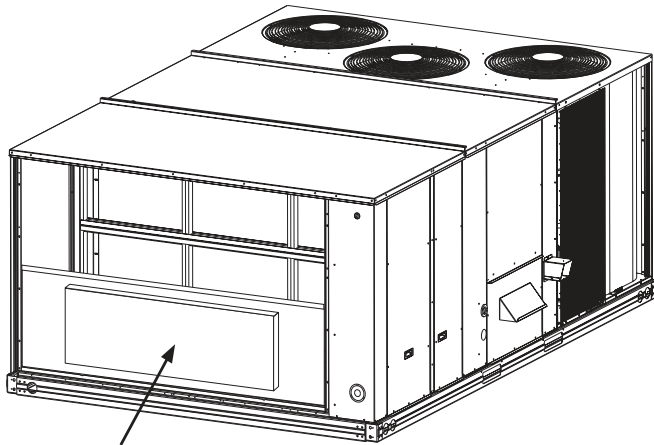


Fig. 12 — Reinstall Hinges and Damper on Return Duct

Horizontal Installation

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

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. 13.)



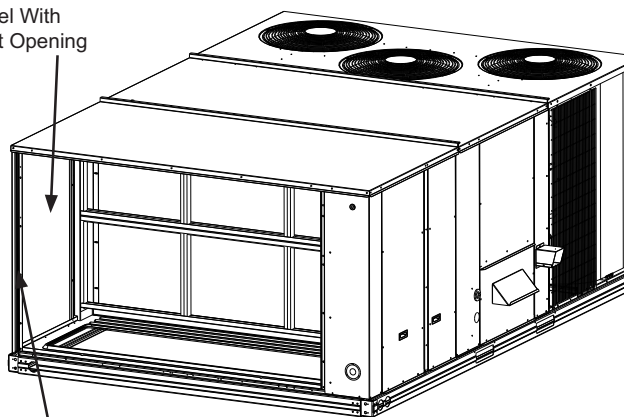
Bottom Panel With
Return Duct Opening

Fig. 13 — Install Bottom Panel with Horizontal Return Duct Opening

1. Turn off unit power supply and install lockout tag.
2. Prepare the unit for economizer installation:
For units with 2 position damper installed, remove the outside air hood. Unplug the damper actuator and remove assembly from unit.
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. 1.) Save the screws for later, when replacing the panel. The panels shipped with the unit can be discarded.
4. Remove the unit's left side corner post and left side panel to allow for easy economizer installation. (See Fig. 14.)

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.

Unit's Left Side
Panel With
Duct Opening



Left Front
Corner Post

Fig. 14 — Remove Unit Corner Post and Side Panel

5. Install economizer with shroud attached, as shown in Fig. 3, 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. 3.)

NOTE: The outside air damper is rated to meet the ASHRAE requirements for leakage. It is important that the damper be installed perfectly square in the unit.

6. Reinstall the left side corner post on to the unit. Note the corner post will sit behind the economizer shroud flange. (See Fig. 5.) Screw through the corner post and through the economizer shroud. (See Fig. 5 and 6.)
7. Insert provided screw through the bottom left rear of the economizer and into the unit base. (See Fig. 3.) 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. (See Fig. 6.) Insert the EconoMiSer®2 plug into the unit wiring harness plug. (See Fig. 6.)

NOTE: The 12-pin jumper plug should be saved for future use in the event that the EconoMiSer2 is removed from the unit. The jumper plug is not needed as long as the EconoMiSer 2 is installed.

9. Install the (provided) bottom panel with the horizontal return duct opening on the unit. (See Fig. 13.) Screw panel in place.
10. Install the upper end economizer panel in place over the economizer's outside air damper, and above the bottom panel. (See Fig. 12.) Screw panel in place and screw panel into economizer in 2 places. (See Fig. 8.)
11. Assemble the outside air hood per Fig. 9-11.
 - a. Install filter 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 the side plates of the hood (Item # 4 and #5).
 - d. Secure the side panels (Item #4 and #5) to the upper panel using the screws provided.
 - e. Apply the seal strip to the mating flange of the hood. (See Fig. 9).
 - f. Secure hood top (Item #3) to the upper panel using the screws provided. On the 44 in. chassis remove the screws from across the top cover of the unit. The rear flange of the hood top will slide behind the unit top over the flange.
 - g. Secure side retainers (Item #6) to side panels (Item #4 and #5) using the screws provided, screwing from the outside of the hood.
 - h. Secure each central retainer (Item #2) to the hood top (Item #3). Align the central retainers to the holes located on the filter support (Item #1), so the central retainer is perpendicular to the hood and each filter support. Secure using the screws provided.
 - i. Apply seal strip to top diverters (Item #7).
 - j. Secure top diverters (Item #7) to the 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. First insert the air screens into the pocket created at the end of the hood (Item #3), then fully put the air screen into place. Slide the air screens back into the pocket created in the filter support (Item #1). Repeat this step for each air screen. (See Fig. 10.) See Fig. 11 for complete hood assembly.

12. Install the hood assembly onto the unit (see Fig. 9-11).
13. 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. 12.)

NOTE: A relief hood for the horizontal application can be ordered separately (part number CRBARHOD001A00) or can be field supplied.

14. Install the hood screens and other approved EconoMiSer2 accessories.

Barometric Hood Assembly

The barometric hood can be assembled in vertical or horizontal configuration. Figure 15 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. 16.)
2. Remove the side panels located in the hood parts box (see Fig. 17).
3. Install parts as shown in the following exploded view (see Fig. 18) using the seal strip and screws provided in the parts box.

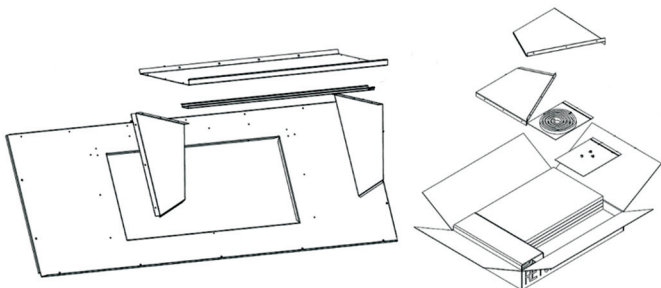


Fig. 15 — Barometric Hood Parts

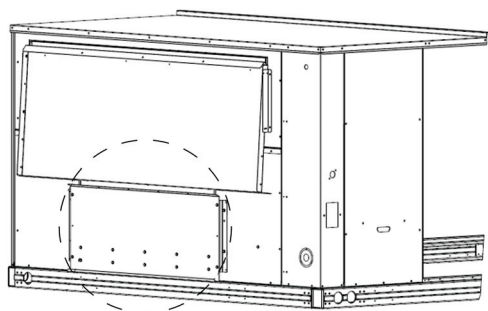


Fig. 16 — Shipping Location, Vertical Units

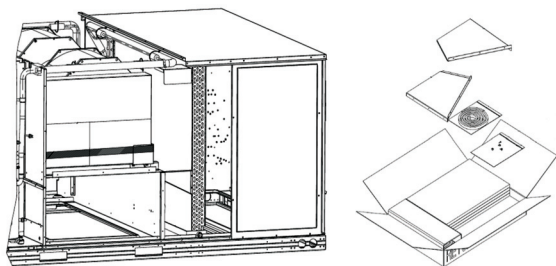


Fig. 17 — Barometric Hood Box Parts Location

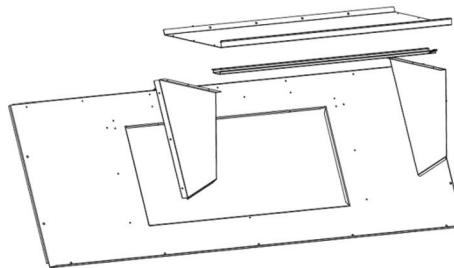


Fig. 18 — Barometric Hood Exploded View

Figure 19 illustrates the installed barometric hood parts.

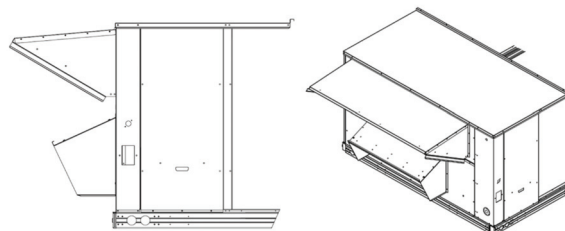


Fig. 19 — Installed Barometric Hood Side View and Isometric View

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 inches 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. 20.)
2. Cut a 16 in. x 36 in. opening in the return duct for the relief damper (see Fig. 20).
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. 21). 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. 22).

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. 21.

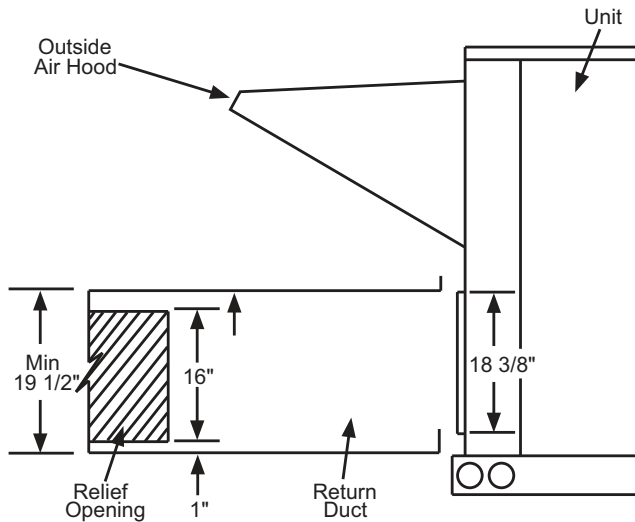


Fig. 20 — Relief Damper

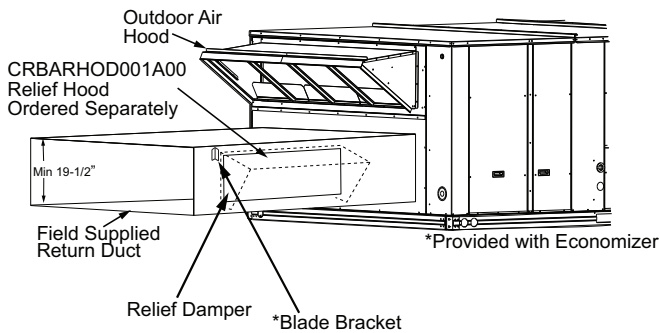


Fig. 21 — Installing CRBARHOD001A00 Over Relief Damper

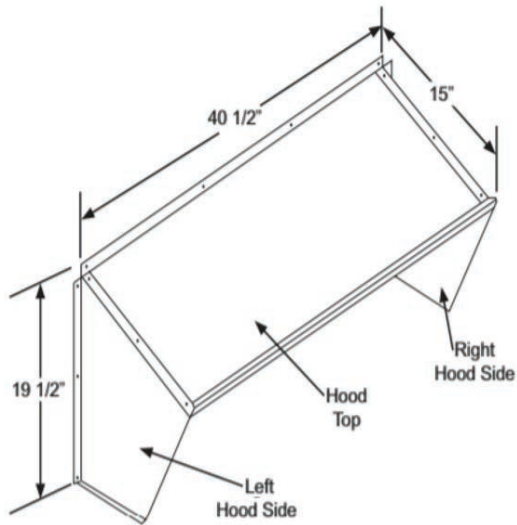


Fig. 22 — CRBARHOD001A00 Hood Sides and Top

Accessories

SUPPLY AIR TEMPERATURE SENSOR (SAT)

When the unit is supplied with a factory-mounted PremierLink™ control, the supply air temperature (SAT) sensor (33ZCENSAT) is factory supplied and wired. The wiring is routed from the Premier-Link control over the control box, through a grommet, into the fan section, down along the back side of the fan, and along the fan deck over to the supply-air opening.

The SAT sensor is wire tied to the supply air opening (on the horizontal opening end) in its shipping position. Remove the sensor for installation. Re-position the sensor in the flange of the supply air opening or in the supply air duct (as required by local codes). Drill or punch a 1/2 in. hole in the flange or duct. Use two field-supplied, self-drilling screws to secure the sensor probe in a horizontal orientation.

NOTE: The sensor must be mounted in the discharge airstream downstream of the cooling coil and any heating devices. Be sure the probe tip does not come in contact with any of the unit or heat surfaces.

OUTDOOR AIR TEMPERATURE SENSOR (OAT)

When the unit is supplied with a factory-mounted PremierLink™ control, the outdoor air temperature sensor (OAT) is factory supplied and wired. The pink and violet wires of the 12-pin economizer harness (pin 5 and 6) are used to connect the OAT sensor to the PremierLink board.

INDOOR AIR QUALITY (CO₂) SENSOR

Mount the optional indoor air quality (CO₂) sensor according to manufacturer specifications.

A separate field-supplied transformer must be used to power the CO₂ sensor.

Wire the CO₂ sensor to the COM and IAQI terminals of J5 on the PremierLink controller. Refer to the PremierLink Installation, Start-up, and Configuration Instructions for detailed wiring and configuration information.

ENTHALPY SENSORS AND CONTROL

Two different sets of enthalpy sensors can be used with the PremierLink control. For single enthalpy control, either the HH57AC077 or 33CENTHSW outdoor enthalpy sensor can be used. For differential enthalpy control, either the HH57AC077 and HH57AC078 sensors or the 33CENTHSW and 33CENTSEN sensors are used. Refer to the appropriate sections below for sensor installation.

OUTDOOR AIR ENTHALPY SENSOR/ENTHALPY CONTROLLER (HH57AC077)

The enthalpy control (HH57AC077) is supplied as a field-installed accessory to be used with the economizer damper control option. The outdoor air enthalpy sensor is part of the enthalpy control. (See Fig. 23.) The separate field-installed accessory return air enthalpy sensor (HH57AC078) is required for differential enthalpy control. (See Fig. 24.)

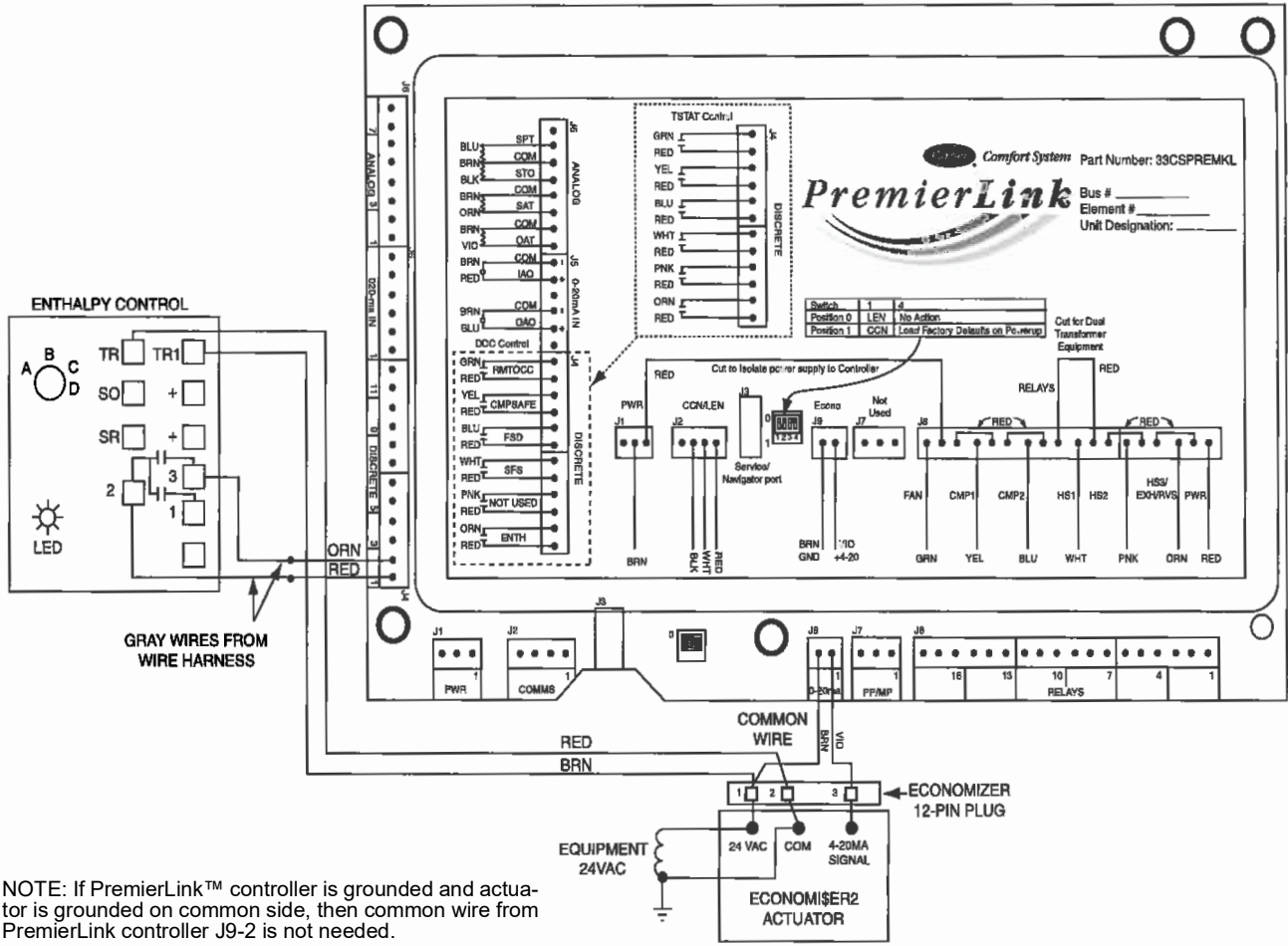


Fig. 23 — PremierLink™ Controller Wiring — Enthalpy Control (HH57AC077)

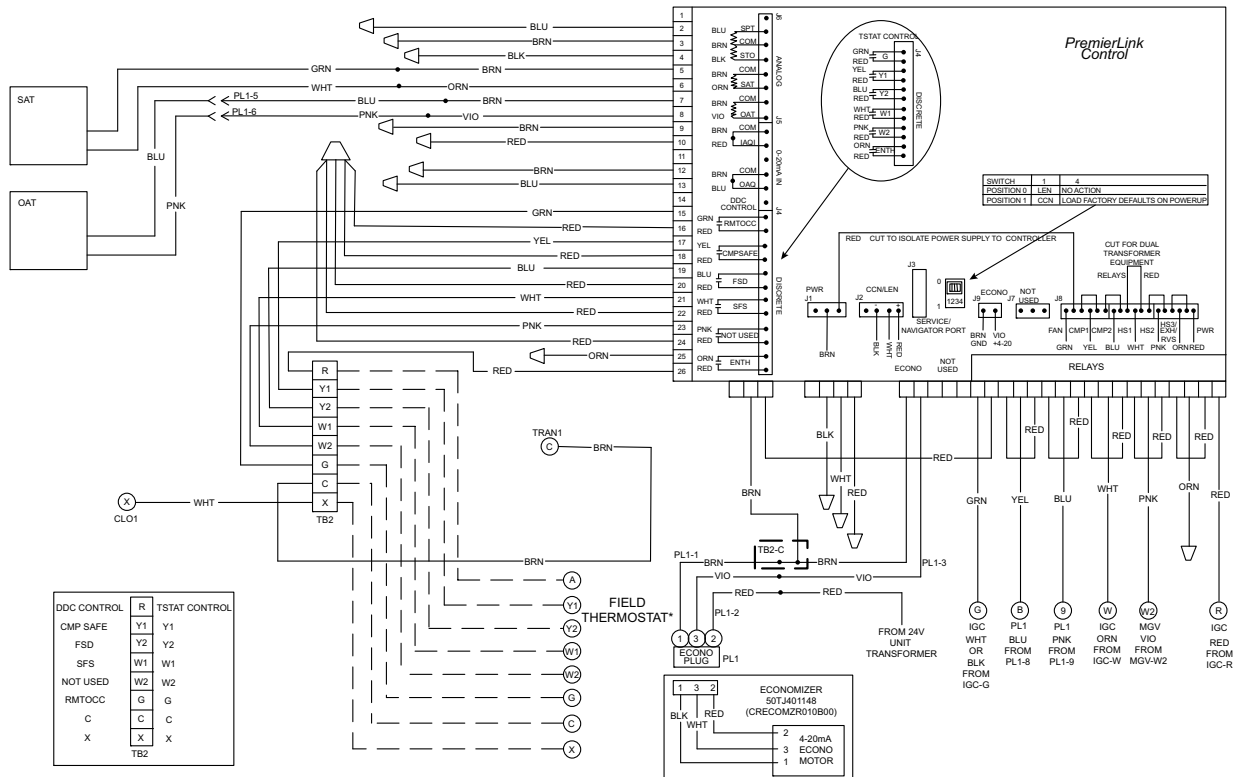


Fig. 24 — PremierLink™ Controller Wiring

NOTE: The enthalpy control must be set to the “D” setting for differential enthalpy control to work properly.

The enthalpy control receives the indoor and return enthalpy from the outdoor and return air enthalpy sensors and provides a dry contact switch input to the PremierLink™ controller. Locate the controller in place of an existing economizer controller or near the actuator. The mounting plate may not be needed if an existing bracket is used.

A closed contact indicates that outside air is preferred to the return air. An open contact indicates that the economizer should remain at minimum position.

To wire the outdoor air enthalpy sensor, perform the following (see Fig. 4 and 23):

NOTE: The outdoor air sensor can be removed from the back of the enthalpy controller and mounted remotely.

1. Use a 4-conductor, 18 or 20 AWG (American Wire Gage) cable to connect the enthalpy control to the PremierLink controller and power transformer.
2. Connect the following 4 wires from the wire harness located in rooftop unit to the enthalpy controller:
 - a. Connect the BRN wire to the 24 vac terminal (TR1) on enthalpy control and to pin 1 on 12-pin harness.
 - b. Connect the RED wire to the 24 vac GND terminal (TR) on enthalpy sensor and to pin 2 on 12-pin harness.
 - c. Connect the ORN/GRAY wire to J4-2 on PremierLink controller and to terminal 3 on enthalpy sensor.
 - d. Connect the RED/GRAY wire to J4-1 on PremierLink controller and to terminal 2 on enthalpy sensor.

NOTE: If installing in a Carrier rooftop, use the two gray wires provided from the control section to the economizer to connect PremierLink controller to terminals 2 and 3 on enthalpy sensor. If NOT using Carrier equipment, wires may need to be field-supplied and installed.

RETURN AIR ENTHALPY SENSOR (HH57AC078)

Mount the return air enthalpy sensor (HH57AC078) in the return air duct. The return air sensor is wired to the enthalpy controller (HH57AC077) (see Fig. 25 and 26). The outdoor enthalpy changeover set point is set at the controller.

To wire the return air enthalpy sensor, perform the following (see Fig. 26):

1. Use a 2-conductor, 18 or 20 AWG, twisted pair cable to connect the return air enthalpy sensor to the enthalpy controller.
2. At the enthalpy control remove the factory-installed resistor from the (SR) and (+) terminals.
3. Connect the field-supplied RED wire to (+) spade connector on the return air enthalpy sensor and the (SR+) terminal on the enthalpy controller. Connect the BLK wire to (S) spade connector on the return air enthalpy sensor and the (SR) terminal on the enthalpy controller. (See Fig. 26.)

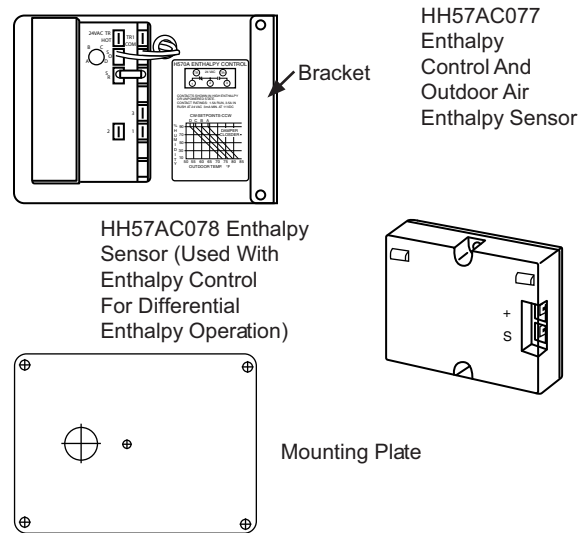


Fig. 25 — Enthalpy Control, Sensor and Mounting Plate

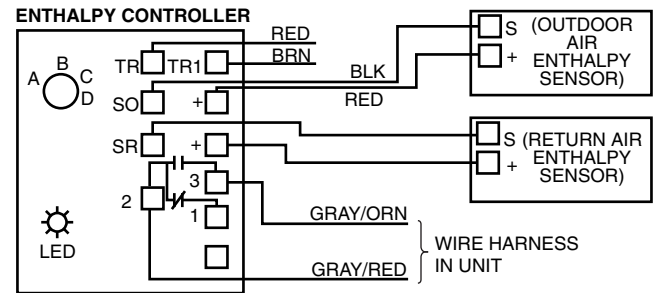


Fig. 26 — Outdoor and Return Air Enthalpy Sensor Wiring

NOTE: Remove factory-installed jumper across SE and + before connecting wires from return air enthalpy sensor. Switches are shown in high outdoor air enthalpy state. Terminals 2 and 3 close on low outdoor air enthalpy relative to indoor air enthalpy. Remove sensor mounted on back of control and locate in outside air-stream.

ENTHALPY SWITCH/RECEIVER (33CSENTHSW)

The accessory enthalpy switch/receiver (33CSENTHSW) senses temperature and humidity of the air surrounding the device and calculates the enthalpy when used without an enthalpy sensor. The relay is energized when enthalpy is high and de-energized when enthalpy is low (based on ASHRAE 90.1 [American Society of Heating, Refrigeration and Air Conditioning Engineers] criteria). If an accessory enthalpy sensor (33CSENTSEN) is attached to the return air sensor input, then differential enthalpy is calculated. The relay is energized when the enthalpy detected by the return air enthalpy sensor is less than the enthalpy at the enthalpy switch/receiver. The relay is de-energized when the enthalpy detected by the return air enthalpy switch/receiver (differential enthalpy control). (See Fig. 27 and 28.)

NOTE: The enthalpy calculation is done using an average altitude of 1000 ft above sea level.

Mount the enthalpy switch/receiver in a location where the outdoor air can be sampled (such as the outdoor air intake). The enthalpy switch/receiver is not a NEMA 4 (National Electrical Manufacturers Association) enclosure and should be mounted in a location that is not exposed to outdoor elements such as rain or snow. Use two field-supplied no. 8 x 3/4 in. TEK screws. Insert the screws through the holes in the sides of the enthalpy switch/receiver.

Carrier recommends the use of 18 or 22 AWG (American Wire Gage) twisted pair or shielded cable for all wiring. All connections must be made with 1/4 in. female spade connectors.

A 24 vac transformer is required to power the enthalpy switch/receiver. The PremierLink™ board provides 24 vac, as shown in Fig. 29. Connect the GND and 24 vac terminals on the enthalpy switch/receiver to the terminals on the transformer. On some applications, the power from the economizer harness can be used to power the enthalpy switch/receiver. To power the enthalpy switch/receiver from the economizer harness, connect power of the enthalpy switch/receiver to the red and brown wires (1 and 4) on the economizer harness.

For connection to rooftop units with PremierLink control, connect the LOW enthalpy terminal on the enthalpy switch/receiver to J4-pin 2 of the PremierLink control on the HVAC unit. The switch can be powered through the PremierLink control board if desired. Wire the 24 vac terminal on the enthalpy switch/receiver to J4-pin 1 on the PremierLink control. Wire the GND terminal on the enthalpy switch/receiver to J1- pin 2 on the PremierLink control. The HI enthalpy terminal is not used. (See Fig. 29.)

DIFFERENTIAL ENTHALPY CONTROL REQUIRES BOTH AN ENTHALPY SWITCH/RECEIVER (33CSENTHSW) AND AN ENTHALPY SENSOR (33CSENTSEN).

The enthalpy switch/receiver is mounted in the outdoor air inlet and calculates outdoor air enthalpy. The enthalpy sensor is mounted in the return airstream and calculates the enthalpy of the indoor air.

For differential enthalpy control, the enthalpy switch/receiver energizes the HI enthalpy relay output when the outdoor enthalpy is greater than the indoor enthalpy. The LOW enthalpy terminal is energized when the outdoor enthalpy is lower than the indoor enthalpy. The relay output is wired to the unit economizer which will open or close depending on the output of the switch.

NOTE: The enthalpy calculation is done using an average altitude of 1000 ft above sea level.

Mount the enthalpy sensor in a location where the indoor air can be sampled (such as the return air duct). The enthalpy sensor is not a NEMA 4 enclosure and should be mounted in a location that is not exposed to outdoor elements such as rain or snow. Use two field-supplied no. 8 x 3/4 in. female spade connectors.

The PremierLink board provides 24 vac to power the enthalpy switch/receiver. Connect the GND and 24 vac terminals on the enthalpy switch/receiver to the terminals on the transformer. On some applications, the power from the economizer harness can be used to power the enthalpy switch/receiver. To power the enthalpy switch/receiver from the economizer harness, connect power of the enthalpy switch/receiver to the red and brown wires (1 and 4) on the economizer harness. Connect the LOW enthalpy terminal on the enthalpy switch/receiver to J4-pin 2 of the PremierLink control on the HVAC unit. The switch can be powered through the PremierLink control board, if desired. Wire the 24 vac terminal on the enthalpy switch/receiver to J4-pin 1 on the PremierLink control. Wire the GND terminal on the enthalpy switch/receiver to J1-pin 2 on the PremierLink control. The HI enthalpy terminal is not used. (See Fig. 29.)

Connect the 4-20 mA IN terminal on the enthalpy switch/receiver to the 4-20 mA OUT terminal on the return air enthalpy sensor.

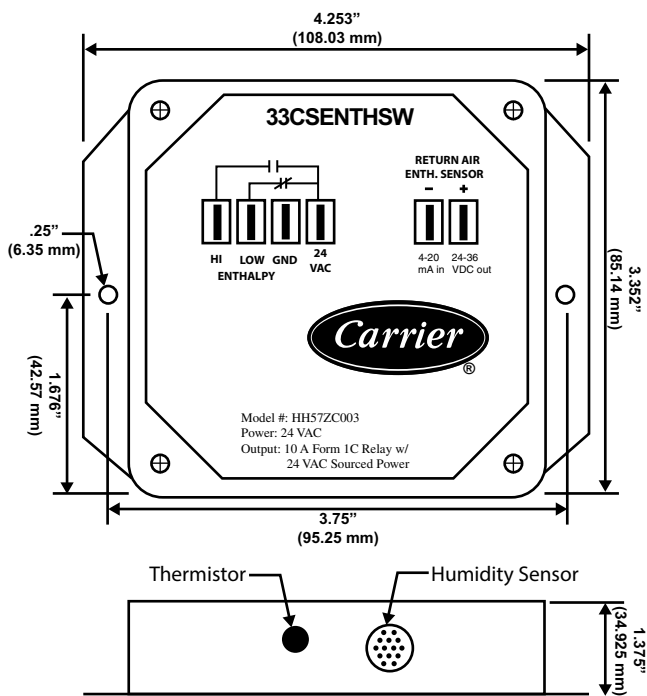


Fig. 27 — Enthalpy Switch/Receiver Dimension (33CSENTHSW)

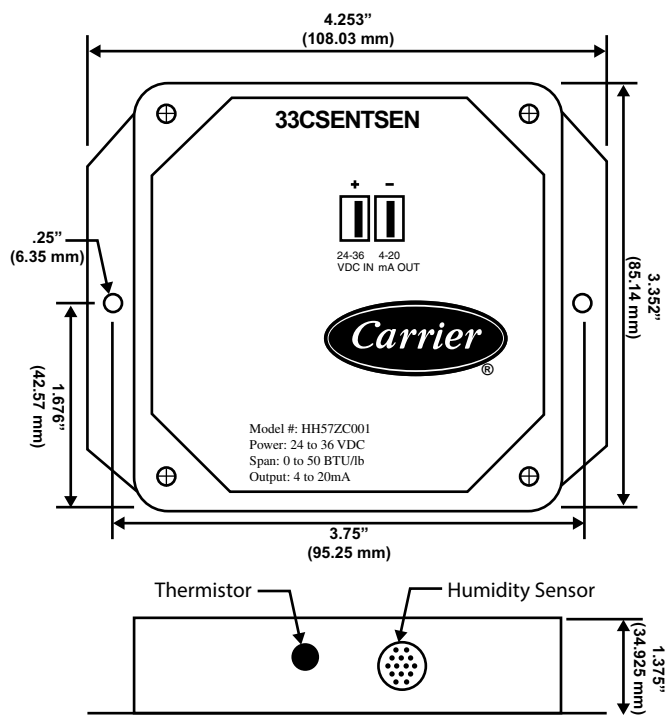


Fig. 28 — Enthalpy Sensor Dimensions

OUTDOOR ENTHALPY CONTROL REQUIRES ONLY AN ENTHALPY SWITCH/RECEIVER (33CSENTHSW).

The enthalpy switch/receiver is mounted in the outdoor air inlet and calculates outdoor air enthalpy. The enthalpy switch/receiver energizes the relay output when the outdoor enthalpy is above 28 Btu/lb OR dry bulb temperature is above 75°F and is de-energized when the outdoor enthalpy is below 27 Btu/lb AND dry bulb temperature is below 74.5°F. The relay output is wired to the unit economizer which will open or close depending on the output of the switch.

Connect the 24-36 VDC OUT terminal on the enthalpy switch/receiver to the 24-36 VDC IN terminal on the return air enthalpy sensor. (See Fig. 30.)

There are two jumpers. One jumper determines the mode of the enthalpy sensor. The other jumper is not used. To access the jumpers, remove the 4 screws holding the cover on the enthalpy sensor and then remove the cover. The factory settings for the jumpers are M3 and OFF.

The mode jumper should be set to M3 for 4 to 20 mA output. The factory test jumper should remain OFF or the enthalpy sensor will not calculate enthalpy.

Power Exhaust

Refer to the accessory power exhaust installation instructions for information on installing the power exhaust accessory.

Demand Controlled Ventilation

When using the EconoMiSer® 2 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 used about 5 to 10% more than the typical cfm required per person, using normal outside air design criteria. The ventilator software (demand control ventilation software) may be used to determine the CO₂ recovery rate at maximum ventilation.

A proportional anticipatory strategy should be taken with the following condition: 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. A proportional anticipatory strategy will cause the fresh air supplied to increase as the room CO₂ level increases even though the CO₂ set point has not been reached. By the time the CO₂ level reaches the set point, the damper will be at maximum ventilation and should maintain the set point.

In order to have the CO₂ 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. $(TO \times OA) + (TR \times RA) = TM$

- TO = Outdoor-Air Temperature
- OA = Percent of Outdoor-Air
- TR = Return-Air Temperature
- RA = Percent of Return-Air
- TM = Mixed-Air Temperature

Fire and Smoke Control

The PremierLink™ or third party control can be wired to a smoke detector or alarm system to provide fire and smoke control functions. (See Fig. 29.)

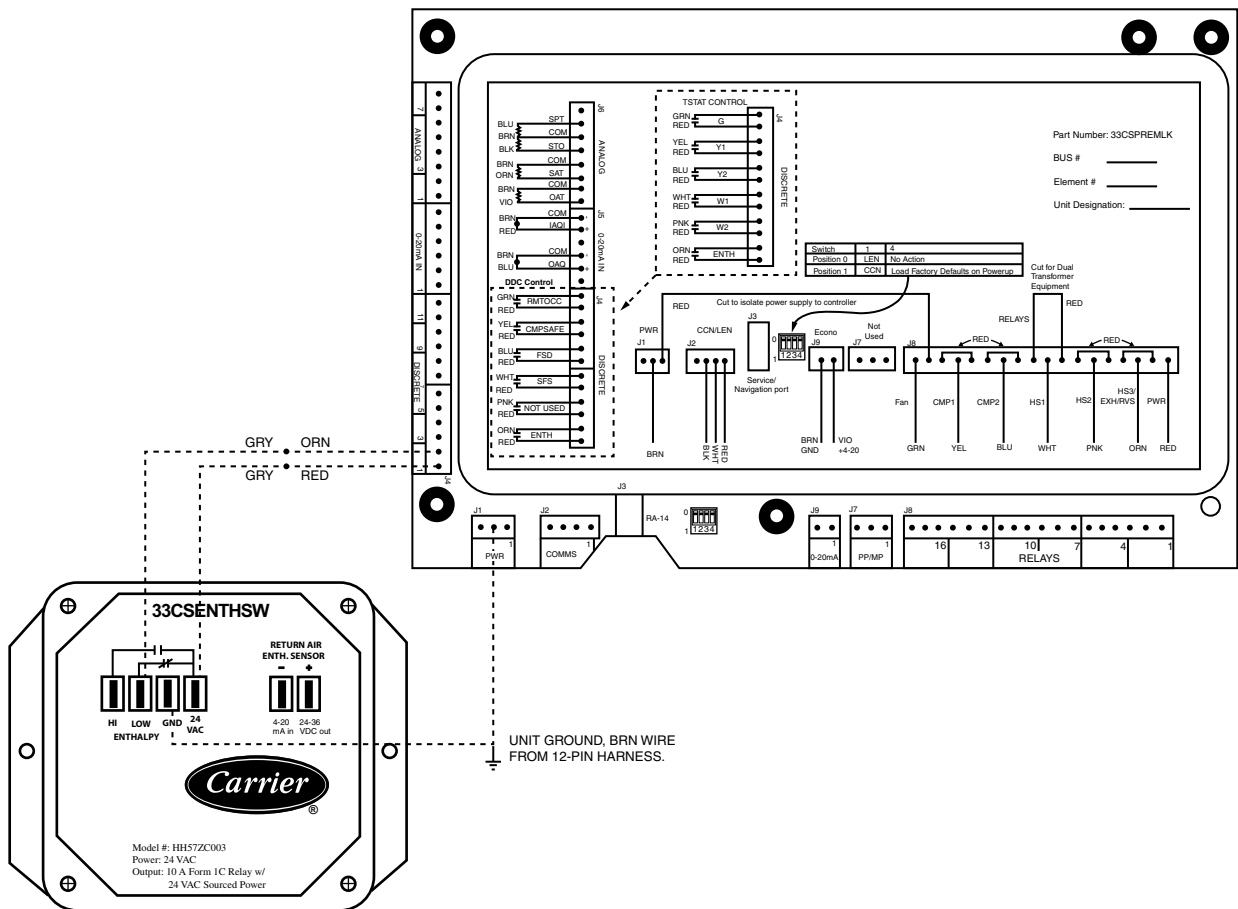
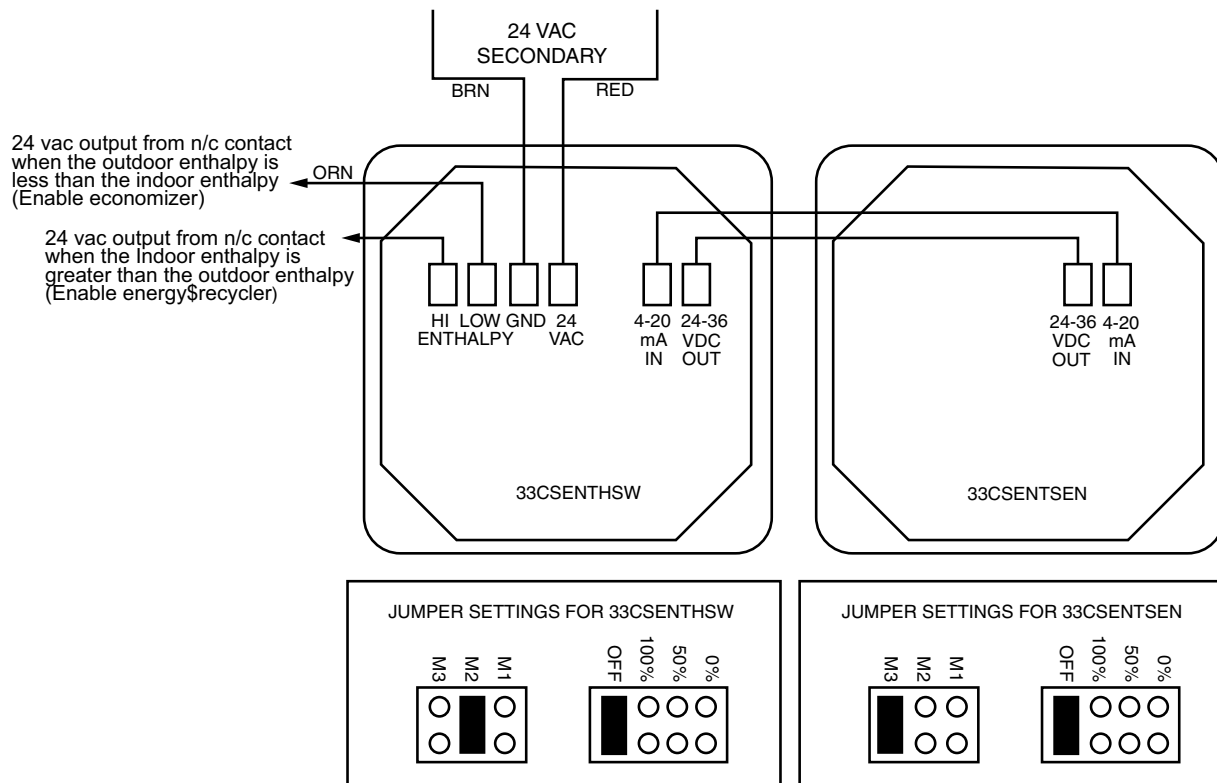


Fig. 29 — PremierLink™ Controller Wiring — Enthalpy Control (33CSEnthSW)



LEGEND
 N/C - Normally Closed
 N/O - Normally Open

Fig. 30 — Differential Enthalpy Control Wiring (33CSEnthSW and 33CSEntSen)

START-UP

Follow the procedure in Table 6 to check the EconoMiSer2 system when the unit is started.

OPERATION

NOTE: For units using a third party control, operation of the EconoMiSer2 system is based on the type of control and sensors used. The following operation sections are for units with PremierLink control only.

Cooling, Units with EconoMiSer 2, PremierLink Control and a Thermostat

When free cooling is not available, the compressors will be controlled by the PremierLink control in response to the Y1 and Y2 inputs from the thermostat.

The PremierLink control will use the following information to determine if free cooling is available:

- Indoor fan has been on for at least 30 seconds.
- The SPT, SAT, and OAT inputs must have valid readings.
- OAT must be less than 75°F.
- OAT must be less than SPT.

- Enthalpy must be LOW (may be jumpered if an enthalpy sensor not available).
- Economizer position is NOT forced.

Pre-cooling occurs when there is no call from the thermostat except G. Pre-cooling is defined as the economizer modulates to provide 70°F supply air.

When free cooling is available, the PremierLink control will control the compressors and economizer to provide a supply air temperature determined to meet the Y1 and Y2 calls from the thermostat using the following 3 routines. The 3 control routines are based on OAT.

The 3 routines are based on OAT where:

- SASP = Supply Air Set Point
- XCTLO = Direct Expansion Cooling Lockout Set Point
- PID = Proportional Integral

ROUTINE 1 (OAT < DXCTLO)

- Y1 energized - economizer maintains a SASP = (SATLO1 + 3)
- Y2 energized - economizer maintains a SASP = (SATLO2 + 3)

Table 6 — Start-Up Procedures

STEP	PROCEDURE	EXPECTED RESPONSE	EconoMi\$er2 RESPONDS CORRECTLY	EconoMi\$er2 RESPONDS INCORRECTLY
1.	Remove power to reset actuator. Re-apply power. Apply control signal to actuator	Actuator will move to its "Control Signal" position	Actuator operates properly Step 8	No response at all Step 2 Operation is reversed Step 3 Does not drive toward "Control Signal" Position Step 4
2.	Check power wiring. Correct any problems. See Note.	Power supply rating should be the total power requirement of the actuator(s). Minimum voltage of 19.2 vac or 21.6 vdc	Power wiring corrected, actuator begins to drive Step 1	Power wiring corrected, actuator still does not drive Step 4
3.	Turn reversing switch to the correct position. Make sure the switch is turned all the way left or right.	Actuator will move to its "Control Signal" position.	Actuator operates properly Step 8	Does not drive toward "Control Signal" Position Step 4
4.	Make sure the control signal positive (+) is connected to Wire No. 3 and control signal negative (-) is connected to Wire No. 1. Most control problems are caused by reversing these two wires. Verify that the reversing switch is all the CCW or CW.	Drives to "Control Signal" Position	Actuator operates properly Step 8	Step 5
5.	Check input signal with a digital volt meter (DVM). Make sure the input is within the range of the actuator (2 to 10 vdc or 4 to 20 mA). NOTE: The input signal must be above the 2vdc or 4 mA to have the actuator move.	Input voltage or current should be $\pm 1\%$ of what controller's adjustment or programming indicate.	Controller output (actuator input) is correct Input Polarity Correct Step 6	Reprogram, adjust, repair or replace controller as needed. Step 1
6.	Loosen the nuts on the V- bolt and move the damper by hand from fully closed to fully open.	Damper will go from fully closed to fully open.	Damper moves properly. Step 7	Find cause of damper jam and repair. Move damper back to fully closed position and tighten the nuts Step 1
7.	Check damper torque requirement	Torque requirement is actuator's minimum torque.	Defective Actuator Replace Actuator	Recalculate actuator requirement and correct installation
8.	Actuator works properly. Test controller by following controller manufacturer's instructions.	—	—	—

NOTE: Check that the transformer(s) are sized properly. If a common transformer is used, make sure that polarity is observed on the secondary. This means connect all No. 1 wires to one leg of the transformer and all No. 2 wires to the other leg of the transformer. If multiple transformers are used with one control signal, make sure all No. 1 wires are tied together and tied to control signal negative (-). Controllers and actuators must have separate 24 vac/vdc power sources.

ROUTINE 2 (DXCTLO < OAT < 68°F)

- If only Y1 energized, the economizer maintains a $SASP = (SATLO1 + 3)$
- If $SAT > SASP + 5$ and economizer position > 80% economizer will go to minimum position for 3 minutes or until $SAT > 68^\circ F$.
- First stage of mechanical cooling will be energized.
- Integrator resets.
- Economizer opens again and controls to current $SASP$ after stage one on for 90 seconds.
- With Y1 and Y2 energized, economizer maintains a $SASP = SATLO2 + 3$
- If $SAT > SASP + 5$ and economizer position > 80% economizer will go to minimum position for 3 minutes or until $SAT > 68^\circ F$.
- If compressor one is on then second stage of mechanical cooling will be energized. Otherwise the first stage will be energized.
- Integrator resets.
- Economizer opens again and controls to $SASP$ after stage one on for 90 seconds.

ROUTINE 3 (OAT > 68°F)

- Economizer is opened 100%
- Compressors 1 and 2 are cycled based on Y1 and Y2 using minimum on and off times and watching the supply air temperature as compared to $SATLO1$ and $SATLO2$ set points.

Heating, Units with EconoMiSer 2, PremierLink™ Control and a Thermostat

When the thermostat calls for heating, terminal W1 is energized. The PremierLink control will move the economizer damper to the minimum position if there is a call for G and closed if there is a call for W1 without G. In order to prevent thermostat from short cycling, the unit is locked into the heating mode for at least 10 minutes when W1 is energized. The induced draft motor is then energized and the burner ignition sequence begins.

On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is de-energized, the IFM stops after 45 second time-off delay, unless G is still maintained.

Cooling, Units with EconoMiSer2, PremierLink Control and a Room Sensor

When free cooling is not available, the compressors will be controlled by the PremierLink controller using a Proportional Integral Derivative Loop (PID) Error reduction calculation as indicated by Fig. 31.

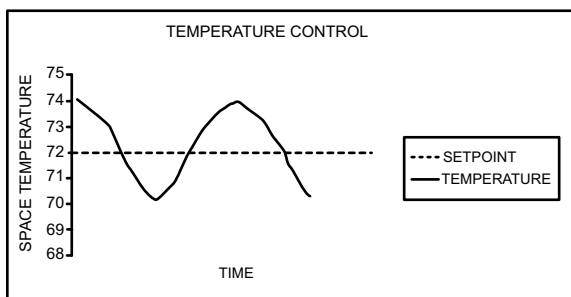


Fig. 31 — DX Cooling Temperature Control Example

NOTE: PremierLink control performs smart staging of 2 stages of DX cooling and up to 3 stages of heat.

The PremierLink controller will use the following information to determine if free cooling is available:

- Indoor fan has been on for at least 30 seconds.
- The SPT, SAT, and OAT inputs must have valid readings.
- OAT must be less than 75°F.
- OAT must be less than SPT.
- Enthalpy must be LOW (may be jumpered if an enthalpy sensor is not available).
- Economizer position is NOT forced.

When free cooling is available, the outdoor air damper is positioned through the use of a Proportional Integral Derivative Loop (PID) control process to provide a calculated supply air temperature into the zone. The supply air will maintain the space temperature between the heating and cooling set points as indicated in Fig. 32.

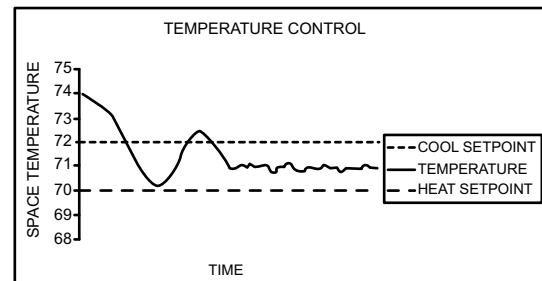


Fig. 32 — Economizer Temperature Control Example

The PremierLink controller will integrate the compressor stages with the economizer based on similar logic as the three routines listed in the previous section. The $SASP$ will float up and down based on the error reduction calculations that compare space temperature and space set point.

When outside air temperature conditions require the economizer to close for a compressor stage-up sequence, the economizer control integrator is reset to zero after the stage-up sequence is completed. This prevents the supply air temperature from dropping too quickly and creating a freeze condition that would make the compressor turn off prematurely.

The high space set point is used for DX (direct expansion) cooling control, while the economizer space set point is a calculated value between the heating and cooling set points. The economizer set point will always be at least one degree below the cooling set point, allowing for a smooth transition from mechanical cooling with economizer assist, back to economizer cooling as the cooling set point is achieved. The compressors may be used for initial cooling then the PremierLink controller will modulate the economizer using an error reduction calculation to hold the space temperature between the heating and cooling set point (See Fig. 32).

The controller uses the following conditions to determine economizer cooling:

- Enthalpy is low
- SAT reading is available
- OAT reading is available
- SPT reading is available
- $OAT \leq SPT$
- Economizer position is NOT forced

If any of the above conditions are not met, the economizer submaster reference (ECSR) is set to the maximum limit and the damper moves to minimum position. The operating sequence is complete. The ECSR is recalculated every 30 seconds.

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

If field-installed accessory CO₂ sensors are connected to the PremierLink control, a PID-controlled demand ventilation strategy will begin to operate. As the CO₂ level in the zone increases above the CO₂ set point, the minimum position of the damper will be increased proportionally. As the CO₂ level decreases because of the increase in fresh air, the outdoor air damper will be proportionally closed.

Heating Unit with EconoMi\$er2, PremierLink Control and a Room Sensor

Every 40 seconds the controller will calculate the required heat stages (maximum of 3) to maintain supply air temperature (SAT) if the following qualifying conditions are met:

- Indoor fan has been on for at least 30 seconds.
- COOL mode is not active.
- OCCUPIED, TEMP. COMPENSATED START or HEAT mode is active.
- SAT reading is available.
- Fire shutdown mode is not active.

If all of the above conditions are met, the number of heat stages is calculated; otherwise, the required number of heat stages will be set to 0.

If the PremierLink controller determines that heat stages are required, the economizer damper will be moved to minimum position if occupied and closed if unoccupied.

Staging should be as follows:

IF HEATING PID STAGES=2

- HEAT STAGES=1 (50% capacity) will energize HS1
- HEAT STAGES=2 (100% capacity) will energize HS2

IF HEATING PID STAGES=3 AND AUXOUT=HS3

- HEAT STAGES=1 (33% capacity) will energize HS1
- HEAT STAGES=2 (66% capacity) will energize HS2
- HEAT STAGES=3 (100% capacity) will energize HS3

In order to prevent short cycling, the unit is locked into the heating mode for at least 10 minutes when HS1 is deenergized. When HS1 is energized, the induced draft motor is then energized and the burner ignition sequence begins. On units equipped for two stages of heat, when additional heat is needed, HS2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the space condition is satisfied and HS1 is deenergized, the IFM stops after a 45 second time-off delay, unless in the occupied mode. The fan will run continuously in the occupied mode as required by national energy and fresh air standards.

