

Installation Instructions

Part No. CXCAECON08B00, CXCAECON12B00, CXCAECON16B00,
CXCAECON24B00

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SAFETY CONSIDERATIONS

Installing, starting up, and servicing air-conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location.

Only trained, qualified installers and service mechanics should install, start up, and service this equipment.

Untrained personnel can perform basic maintenance functions such as cleaning coils. All other operations should be performed by trained service personnel.

When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment.

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

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.

GENERAL

The economizer system (Fig. 1) integrates the use of free cooling with mechanical cooling for packaged 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 X system utilizes gear-drive technology with a direct-mount spring return actuator that will close upon loss of power. The EconoMi\$er X system comes standard with an outdoor air temperature sensor and a mixed (supply) air sensor. Outdoor air enthalpy, indoor (return) dry bulb or enthalpy, and CO₂ sensors are available for field installation.

IMPORTANT: These economizers meet all the economizer requirements as laid out in ASHRAE 90.1 and California's Title 24 mandatory section 120.2 (fault detection diagnostics) and prescriptive section 140.4 (life-cycle tests, damper leakage, sensor accuracy, etc). Economizer must be installed perfectly square to avoid damper leakage or binding. Squareness tolerance is $\pm 1/32$ in.

Barometric relief dampers (field provided and installed) provide natural building pressurization control. An optional power exhaust system (field provided and installed) for applications requiring even greater exhaust capabilities is available. The power exhaust set point is adjustable at the economizer controller.

See Table 1 for package usage and contents. Table 2 shows economizer sensor usage.

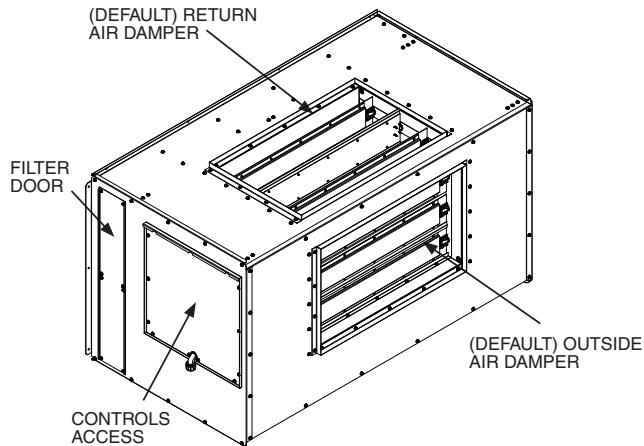


Fig. 1 — 50XC Economizer

Table 1 — Package Usage and Contents

UNIT	ECONOMIZER PART NUMBER	KIT CONTENTS
50XCA06-08 50XCW06-08 50XCR06-08	CXCAECON08B00	1 - economizer assembly, 1 - outside air temperature sensor, 1 - supply air temperature sensor, 1 - low temperature compressor lock out switch, 1 - gasket, 1/8 in. thick, 3/4 in. Type 14 - No. 10 x 1/2 in. Type AB screws (to mount economizer), 1 - No. 10 x 1/2 in. Type AB screw (to mount SAT sensor), 1 - economizer harness adapter plate, part no. 073-531008-001 (for harness routing) 5 - adhesive mounts, 5 - zip-ties
50XCA12 50XCW12-14 50XCR12-14	CXCAECON12B00	
50XCA14-16 50XCW16 50XCR16	CXCAECON16B00	
50XCA24 50XCW24 50XCR24	CXCAECON24B00	

Figure 2 shows the side view of the economizer. For economizer dimensions, see Fig. 3. Figure 3 shows the standard rear return/top supply air discharge. For optional front supply, actuator/ control wiring and control access doors should be relocated to the opposite side of the economizer. See Appendix A for instructions on relocating the actuator and controls. The economizer accommodates 1 in., 2 in., and 4 in. filters. The default filter rack spacing is for 1 in. filters. Pre-punched holes allow for adjusting for filter rails to accommodate 2 in. and 4 in. filters.

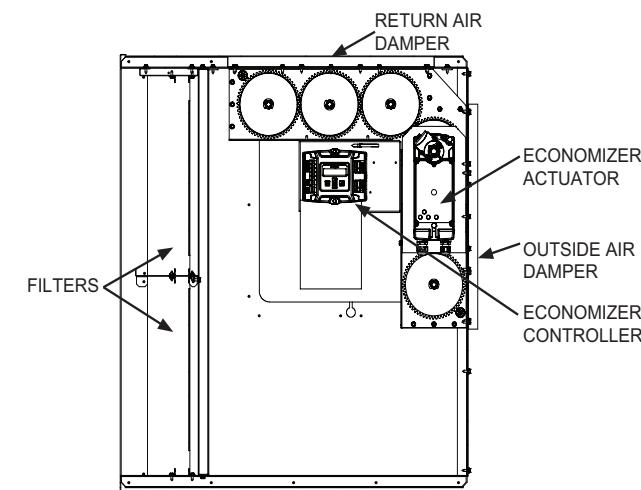


Fig. 2 — Economizer Side View

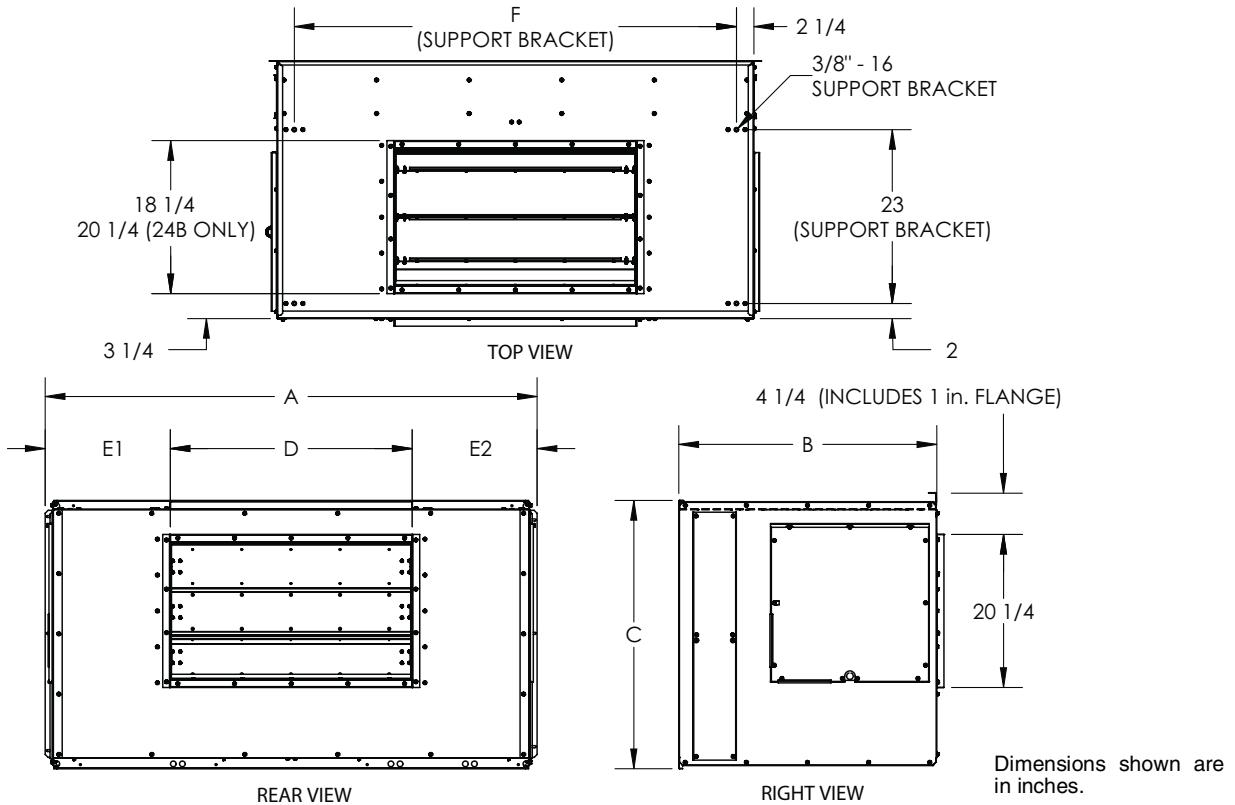
Table 2 — Economizer Sensor Usage

APPLICATION	ECONOMIZER WITH OUTDOOR AIR DRY BULB SENSOR		
	Accessories Required		
Outdoor Air Dry Bulb	The outdoor air dry bulb sensor is supplied with the economizer and is field-installed in ductwork.		
Differential Dry Bulb		HH57AC081	
Single Enthalpy		HH57AC081	
Supply Air	The supply air temperature sensor HH79AH001 is supplied with the economizer and is field-installed in the indoor fan section.		
Differential Enthalpy		HH57AC081	
CO ₂ for DCV Control using a Wall-Mounted CO ₂ Sensor		33ZCSENC02 or CGCDXSEN004A00	
CO ₂ for DCV Control using a Duct-Mounted CO ₂ Sensor	33ZCSENC02 or CGCDXSEN004A00† and 33ZCASPCO2 or CGCDXASP00100**	or	CRCBDIOX005A00††

†33ZCSENC02 and CGCDXSEN004A00 are accessory CO₂ sensors.

**33ZCASPCO2 and CGCDXASP00100 are accessory aspirator boxes required for duct-mounted applications.

††CRCBDIOX005A00 is an accessory that contains both 33ZCSENC02 and 33ZCASPCO2 accessories.



ECONOMIZER PART NUMBER	A*		B		C		D		E1		E2		F		WEIGHT†	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lb	kg
CXCAECON08B00	52 1/8	1324	34	867	30 13/16	886	24	610	14	356	14	356	45 1/2	1156	215	98
CXCAECON12B00	65 1/8	1654	34 1/8	867	35 1/2	902	32	813	16 1/2	419	16 1/2	419	58 1/2	1486	250	113
CXCAECON16B00	85 1/8	2162	34 1/8	867	35 1/2	902	48	1219	18 1/2	470	18 1/2	470	78 1/2	1994	280	127
CXCAECON24B00	85 3/4	2178	34 1/8	867	39 1/2	1003	60	1524	13	330	12 3/4	324	78 7/8	2003	305	138

* Measurement includes flanges.

† Weight is approximate, ± 5 lb of actual weight.

Fig. 3 — Economizer Dimensions

PRE-INSTALLATION

Complete Pre-Installation Checks

Remove accessory packaging and inspect shipment for damage. File claim with shipping company if accessory is damaged or incomplete.

Check Unit Clearance

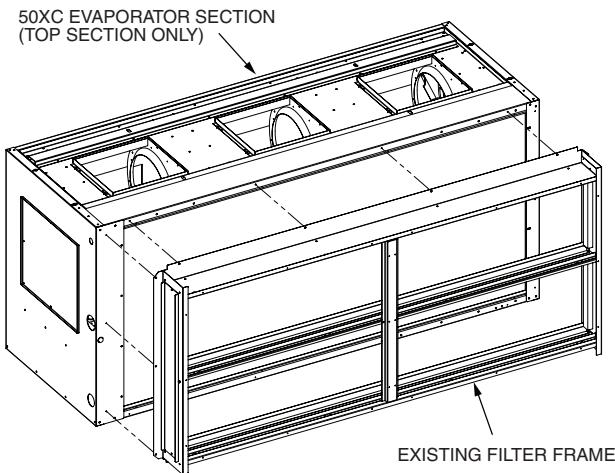
Provide sufficient space for airflow clearance and servicing accessory after it is mounted in unit.

INSTALLATION

WARNING

Before beginning installation of this kit, be sure all power to the unit is disconnected, and that tags are properly placed to alert others. Electrical shock can cause personal injury and death.

1. Turn off unit power supply and install lockout tag.
2. Remove parts bag, outdoor air temperature sensor, supply air temperature sensor from the economizer.
3. Remove the filters from the 50XC unit and set aside for later use.
NOTE: If a 4 in. filter track is supplied with the 50XC06,08 units, the 4 in. filter access door and filter track slide must be set aside for later use. For 50XC12-24 units, the filter access door and filter track slide provided with the economizer unit is used.
4. Remove 50XC filter frame. Using a $5/16$ in. nut driver, remove and retain screws from filter frame and detach filter frame from evaporator cabinet of 50XC unit. Place filter frame in a safe location. See Fig. 4.



NOTES:

1. 50XC condenser section not shown for clarity.
2. Evaporator fan position shown in vertical orientation.

Fig. 4 — Remove Filter Frame from 50XC Unit

5. Remove 4 in. filter access door and filter track slide along with the filter rack from the 50XC unit and set aside for later use.
6. Determine 50XC unit location and set in place. Follow 50XC unit instructions. These instructions apply to the standard rear return / top supply air discharge positioning of the 50XC unit. For optional front supply arrangement, the actuator/control wiring and control access doors should be relocated to opposite side. Refer to Appendix A for the procedure for relocating actuator/controls to opposite side (outside air damper side).
7. Use $3/8$ in. hanging rods to support and lift the economizer with the support nuts. See Fig. 5. If not available, field provide temporary support for underneath the economizer as it is being attached to the unit.

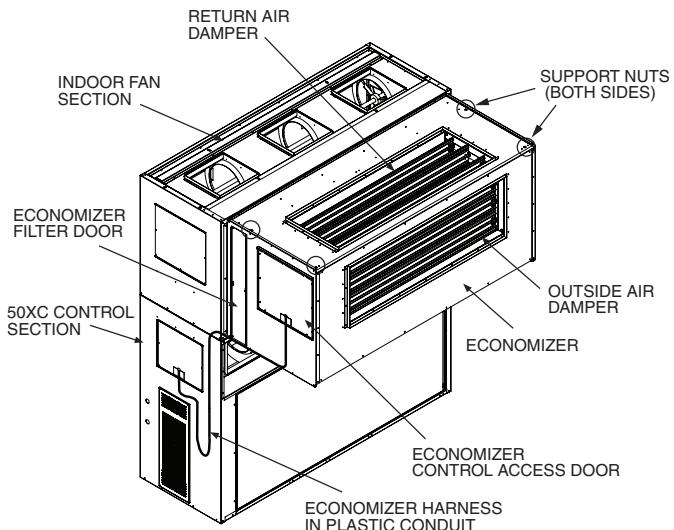


Fig. 5 — Economizer Support Nut and Access Door Locations

8. Install gasket supplied with economizer or caulk on the front mating flanges of the economizer to provide an airtight seal against the unit.
9. Lift the economizer in place over the return air opening. Using screws provided, secure economizer to the 50XC unit through pre-punched holes. See Fig. 5
10. Remove controls access door on side of economizer and condenser section access panel on the 50XC unit. See Fig. 6 for 50XC06,08 units. See Fig. 7 for 50XC12-24 units.

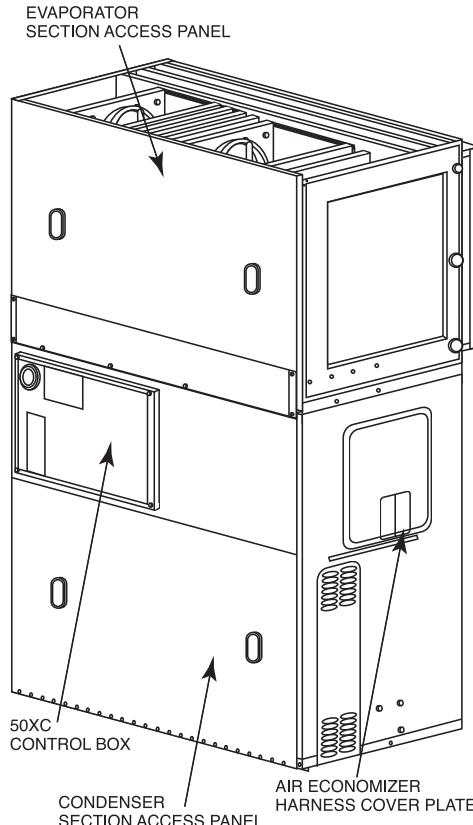


Fig. 6 — Access Panels — 50XC06,08 Units

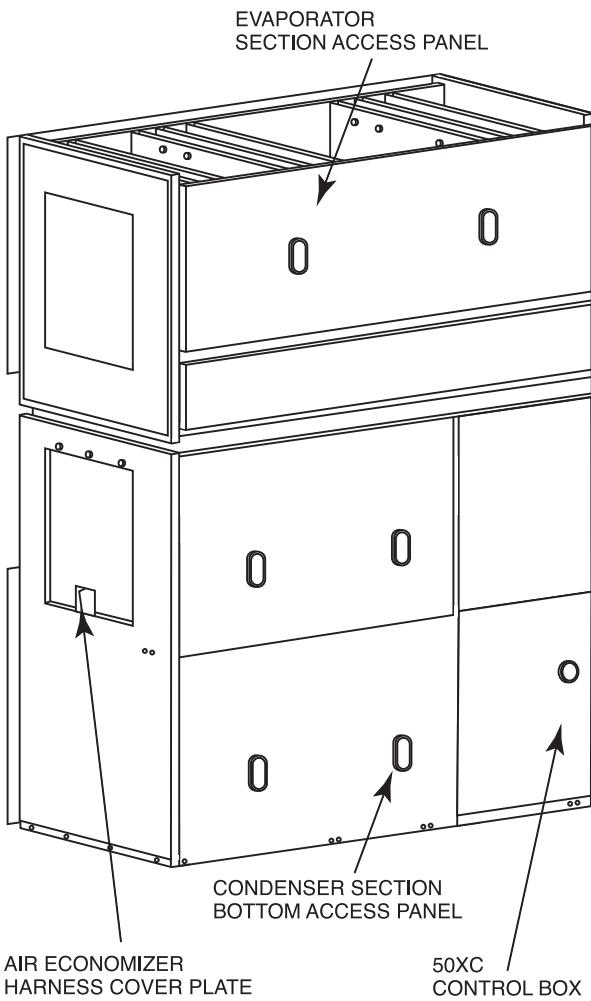


Fig. 7 — Access Panels - 50XC12-24 Units

11. Remove and save the 12-pin jumper plug from the unit wiring harness (located in 50XC control box section). The jumper plug is located on the right side of the control box for 50XC06,08 units (Fig. 8) and on the left side of control box for 50XC12-24 units (Fig. 9).

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

12. The economizer harness is shipped wrapped on the outside of the economizer. Route the economizer harness (inside of the provided plastic conduit) down the side of the 50XC unit and into the 50XC condenser section. See Fig. 5. Replace economizer cover plate with economizer harness adapter plate, part number 073-531008-001. Attach the conduit connector through the adapter plate and secure with lock nut. Plug the economizer harness into the 50XC control box plug shown in Fig. 8 or 9. Insert the economizer plug into the unit wiring harness. Refer to Fig. 10 for wiring diagram.
13. Economizer sensor locations are shown in Fig. 11. Locate the supply air temperature sensor mounting location by removing the evaporator section access panel on the 50XC unit. See Fig. 6 for 50XC06,08 units and Fig. 7 for 50XC12-24 units. The supply air temperature sensor looks like an eyelet terminal with two wires running to it. The sensor is located on the "crimped end" and is sealed for moisture. Wire the sensor as shown in Fig. 10. The sensor should be mounted to the blower rails located in the evaporation section and installed

between two blowers of the indoor fan section using a no. 10 x 1/2 in. type AB screw provided with the economizer. See Fig. .

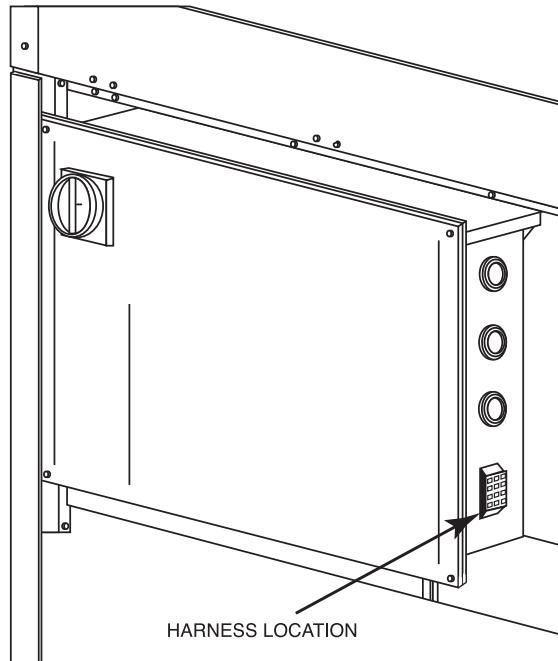


Fig. 8 — Jumper Plug Location - 50XC06,08 Units

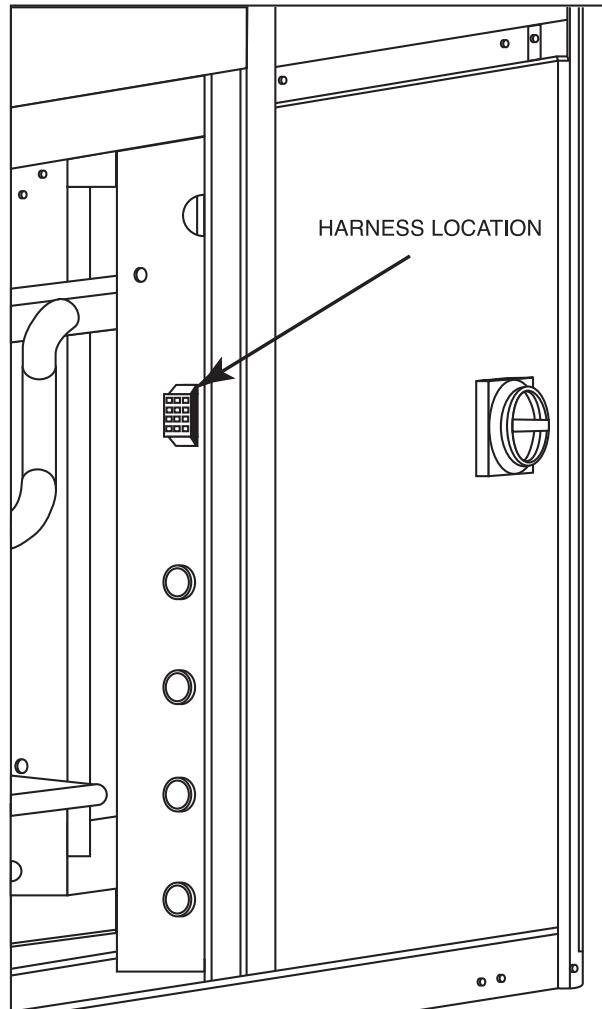


Fig. 9 — Jumper Plug Location - 50XC12-24 Units

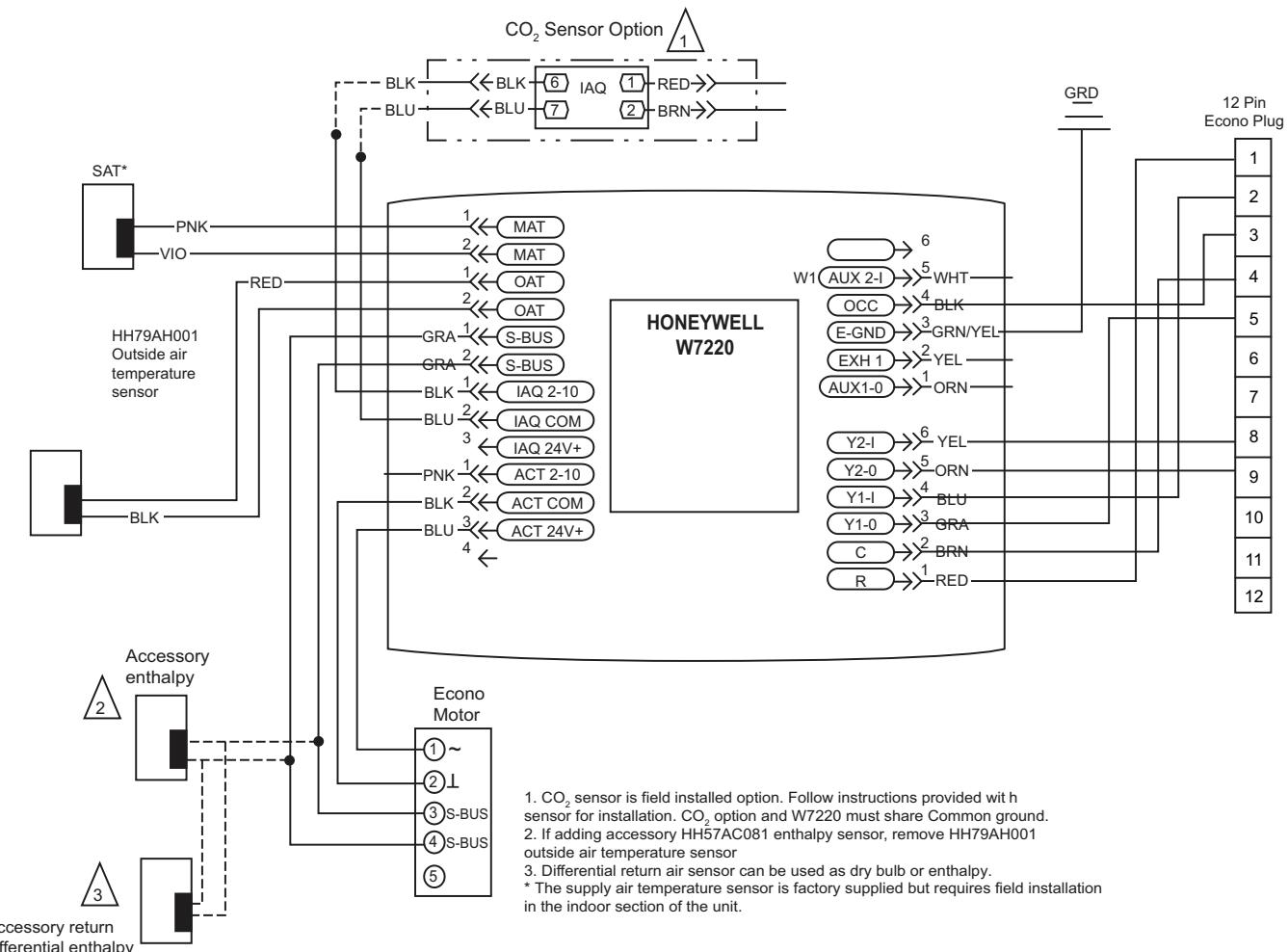


Fig. 10 — 50XC Economizer X Wiring Diagram

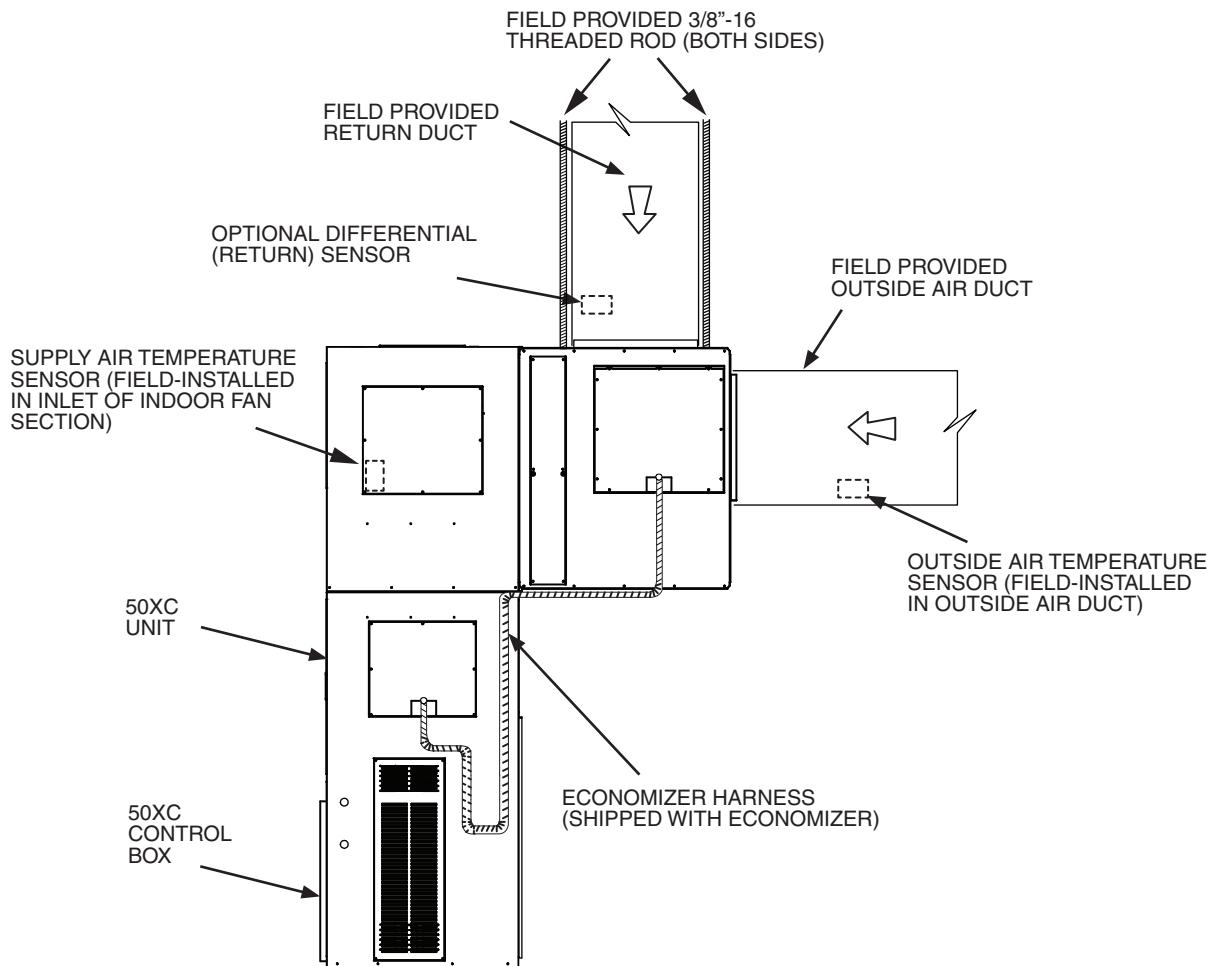


Fig. 11 — Economizer Sensor Locations

14. Install the outside air temperature sensor and low temperature compressor lockout switch in the outside air duct, as shown in Fig. 11. Mount as close to outside space as possible. Wire sensors per Fig. 10.
15. Review the controller setting options in the Operation section. Review all settings as listed in Table 3.
16. Re-install all access doors to the economizer and 50XC units.
17. Remove the filter door on the economizer. See Fig. 5. Install the filters and filter track slide previously removed from the 50XC unit into the economizer, and replace the filter door. Use 4 in. filter door from 50XC filter rack on CXCAECON08A00 unit only when using 4 in. filters. If 4 in. filters are ordered with the size 24 50XC unit, a separate kit (part number AIRECONFK4A00) is sold separately and must be installed for the size 24 economizer.
18. To hang and support the economizer: Screw in field provided 3/8 in.- 16 threaded rod into support nuts on top surface of economizer. See Fig. 5 and 11. Support threaded rod from building structure. Remove temporary support from under the economizer.

EconoMi\$er X

The field-installed accessory consist of the following:

- Economizer assembly
- W7220 economizer controller
- Mixed air (supply) air sensor
- Outside air temperature sensor

W7220 Economizer

The economizer controller used on electro mechanical units is a Honeywell W7220 which is to be located in the RTU base unit's Control Box. See the Installation Instruction for your base unit for the location of the Control Box access panel.

The W7220 controller provides the following:

- 2-line LCD interface screen for setup, configuration and troubleshooting.
- On-board fault detection and diagnostics
- Sensor failure loss of communications identification
- Automatic sensor detection
- Capabilities for use with multiple-speed indoor fan systems

User Interface

The user interface consists of a LCD display and a 4-button keypad on the front of the economizer controller.

Keypad

The four navigation button (see Fig.) are used to scroll through the menus and menu items, select menu items, and to change parameter and configuration settings.

Using the Keypad with Menus

To use the keypad when working with menus:

- Press the ▲ (Up arrow) button to move to the previous menu.
- Press the ▼ (Down arrow) button to move to the next menu.
- Press the ↲ (Enter) button to display the first item in the currently displayed menu.
- Press the ⌂ (Menu Up/Exit) button to exit a menu's item and return to the list of menus.

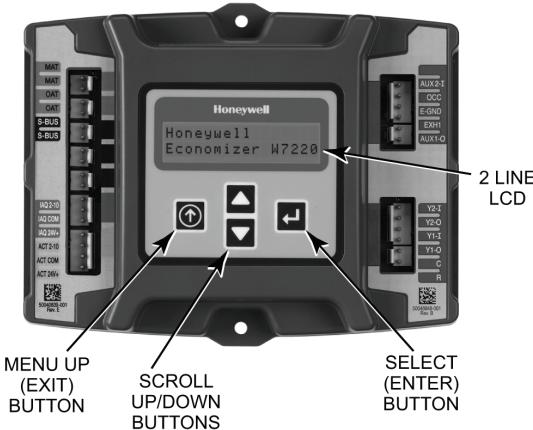


Fig. 12 — W7220 Controller

Using the Keypad with Settings and Parameters

To use the keypad when working with Setpoints, System and Advanced Settings, Checkout tests and Alarms:

1. Navigate to the desire menu.
2. Press the ↲ (Enter) button to display the first item in the currently displayed menu.
3. Use the ▲ and ▼ buttons to scroll to the desired parameter.
4. Press the ↲ (Enter) button to display the value of the currently displayed item.
5. Press the ▲ button to increase (change) the displayed parameter value.
6. Press the ▼ button to decrease (change) the displayed parameter value.

NOTE: When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment.

7. Press the ↲ (Enter) button to accept the displayed value and store it in nonvolatile RAM.
8. “CHANGE STORED” displays.
9. Press the ↲ (Enter) button to return to the current menu parameter.
10. Press the ⌂ (Menu Up/Exit) button to return to the previous menu.

Menu Structure

Table 3 illustrates the complete hierarchy of menus and parameters for the EconoMi\$er X system.

The Menus in display order are:

- STATUS
- SETPOINTS
- SYSTEM SETUP
- ADVANCED SETUP
- CHECKOUT
- ALARMS

IMPORTANT: The default setting on the W7220 controller is for a “Fan Type” with 2 speed. If your unit is 1 (single speed) fan, the setting under SYSTEM SETUP > FAN TYPE must be changed to 1 speed.

IMPORTANT: Table 3 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration. For example if you do not have DCV (CO₂) sensor, then none of the DCV parameters appear.

Table 3 — Menu Structure¹

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT ²	NOTES
STATUS	ECON AVAIL	NO	YES/NO	YES = economizing available; the system can use outside air for free cooling when required
	ECONOMIZING	NO	YES/NO	YES = outside air being used for first stage cooling
	OCCUPIED	NO	YES/NO	YES = OCC signal received from space thermostat or unitary controller YES = 24 vac on terminal OCC NO = 0 vac on terminal OCC
	HEAT PUMP	n/a ³	COOL HEAT	Displays COOL or HEAT when system is set to heat pump (Non-conventional)
	COOL Y1—IN	OFF	ON/OFF	Y1—I signal from space thermostat or unitary controller for cooling stage 1. ON = 24 vac on terminal Y1—I OFF = 0 vac on terminal Y1—I
	COOL Y1—OUT	OFF	ON/OFF	Cool stage 1 Relay Output to stage 1 mechanical cooling (Y1—OUT terminal)
	COOL Y2—IN	OFF	ON/OFF	Y2—I signal from space thermostat or unitary controller for second stage cooling. ON = 24 vac on terminal Y2—I OFF = 0 vac on terminal Y2—I
	COOL Y2—OUT	OFF	ON/OFF	Cool Stage 2 Relay Output to mechanical cooling (Y2—OUT terminal)
	MA TEMP	__ . __ °F	0°F to 140°F	Displays value of measured mixed air from MAT sensor. Displays __ . __ F if not connected, short or out of range.
	DA TEMP	__ . __ °F	0°F to 140°F	Displays when Discharge Air sensor is connected and displays measured discharge temperature. Displays __ . __ F if sensor sends invalid value, if not connected, short or out of range.
	OA TEMP	__ . __ °F	—40°F to 140°F	Displays measured value of outdoor air temperature. Displays __ . __ F if sensor sends invalid value, short or out of range.
	OA HUM	__ %	0 to 100%	Displays measured value of outdoor humidity from OA Sylk Bus sensor. Displays __ % if not connected short, or out of range.
	RA TEMP	__ . __ °F	0°F to 140°F	Displays measured value of return air temperature from RAT sensor. Displays __ . __ F if sensor sends invalid value, if not connected, short or out of range
	RA HUM	__ %	0 to 100%	Displays measured value of return air humidity from RA sensor. Displays __ % if sensor sends invalid value, if not connected, short or out of range
	IN CO ₂	__ __ ppm	0 to 2000 ppm	Displays value of measured CO ₂ from CO ₂ sensor. Invalid if not connected, short or out of range.
	DCV STATUS	n/a	ON/OFF	Displays ON if above set point and OFF if below set point, and ONLY if a CO ₂ sensor is connected.
	DAMPER OUT	2.0v	2.0 to 10.0v	Displays voltage output to the damper actuator.
	EXH1 OUT	OFF	ON/OFF	Output of EXH1 terminal: ON = relay closed OFF = relay open
	EXH2 OUT	OFF	ON/OFF	Output of AUX terminal; displays only if AUX= EXH2
	ERV	OFF	ON/OFF	Output of AUX terminal; displays only if AUX= ERV
	MECH COOL ON	0	0, 1, or 2	Displays stage of mechanical cooling that is active.

Table 3 — Menu Structure¹ (cont)

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT ²	NOTES
SETPOINTS	MAT SET	53°F	38°F to 65°F; increment by 1	Setpoint determines where the economizer will modulate the OA damper to maintain the mixed air temperature.
	LOW T LOCK	32°F	-45°F to 80°F; increment by 1	Setpoint determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout.
	DRYBLB SET	63°F	48°F to 80°F; increment by 1	Setpoint determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.; at 63°F unit will economize at 62°F and below and not economize at 64°F and above. There is a 2°F deadband.
	ENTH CURVE	ES3	ES1,ES2,ES3,ES4, or ES5	Enthalpy boundary “curves” for economizing using single enthalpy.
	DCV SET	1100ppm	500 to 2000 ppm; increment by 100	Displays only if CO ₂ sensor is connected. Setpoint for Demand Controlled Ventilation of space. Above the setpoint, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the set point.
	MIN POS	4.4 V	2 to 10 Vdc	Displays ONLY if a CO ₂ sensor is NOT connected.
	VENTMAX With 2-speed fan units VENTMAX L (low speed fan) and VENTMAX H (high speed fan) settings are required	4.4 V	2 to 10 vdc or 100 to 9990 cfm increment by 10	Displays only if a CO ₂ sensor is connected. Used for Vbz (ventilation max cfm) setpoint. Displays 2 to 10 V if <3 sensors (RA, OA, and MA). In AUTO mode dampers controlled by CFM.
	VENTMAX L	6 V		
	VENTMAX H	4.4 V		
	VENTMIN With 2-speed fan units VENTMIN L (low speed fan) and VENTMIN H (high speed fan) set	2.8 V	2 to 10 vdc or 100 to 9990 cfm increment by 10	Displays only if a CO ₂ sensor is connected. Used for Ba (ventilation min cfm) setpoint. Displays 2 to 10 V if <3 sensors (RA, OA, and MA). Va is only set if DCV is used. This is the ventilation for less than maximum occupancy of the space. In AUTO mode dampers controlled by CFM.
	VENTMIN L	3.7 V		
	VENTMIN H	2.8 V		
	ERV OAT SP	32°F	0°F to 50°F; increment by 1	Only when AUX1 O = ERV
	EXH1 SET With 2-speed fan units Exh1 L (low speed fan) and Exh1 H (high speed fan) settings are required	50%	0 to 100%; increment by 1	Setpoint for OA damper position when exhaust fan 1 is powered by the economizer.
	EXH1 L	65%		
	EXH1 H	50%		
SYSTEM SETUP	EXH2 SET With 2-speed fan units Exh2 L (low speed fan) and Exh2 H (high speed fan) settings are required	75%	0 to 100%; increment by 1	Set point for OA damper position when exhaust fan 2 is powered by the economizer. Only used when AUX is set to EHX2.
	EXH2 L	80%		
	EXH2 H	75%		
	INSTALL	01/01/10		Display order = MM/DD/YY Setting order = DD, MM, then YY.
	UNITS DEG	°F	°F or °C	Sets economizer controller in degrees Fahrenheit or Celsius
	EQUIPMENT	CONV	CONV or HP	CONV = conventional; HP O/B = Enable Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller.
	AUX2 I	W	SD/W or HP(O)/ HP(B)	In CONV mode: SD + Enables configuration of shutdown (default); W = Informs controller that system is in heating mode. In HP O/B mode: HP(O) = energize heat pump on Cool (default); HP(B) = energize heat pump on heat.
	FAN TYPE	2 speed	1 speed/2 speed	Sets the economizer controller for operation of 1 speed or 2 speed supply fan.
	FAN CFM	5000 cfm	100 to 15000 cfm; increment by 100	This is the capacity of the RTU. The value is found in the Project Submittal documents for the specific RTU.
	AUX OUT	NONE	NONE ERV EXH2 SYS	<ul style="list-style-type: none"> • NONE = not configured (output is not used) • ERV = Energy Recovery Ventilator⁴ • EXH2 = second damper position relay closure for second exhaust fan • SYS = use output as an alarm signal
	OCC	INPUT	INPUT or ALWAYS	When using a setback thermostat with occupancy out (24 vac), the 24 vac is input “INPUT” to the OCC terminal. If no occupancy output from the thermostat, then change program to “ALWAYS” OR add a jumper from terminal R to OCC terminal.
	FACTORY DEFAULT	NO	NO or YES	Resets all set points to factory defaults when set to YES. LCD will briefly flash YES and change to NO but all parameters will change to the factory default values.

Table 3 — Menu Structure¹ (cont)

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT ²	NOTES
ADVANCED SETUP	MA LO SET	45°F	35°F to 55°F; Increment by 1°F	Temperature to achieve Freeze Protection (close damper and alarm if temperature falls below setup value).
	FREEZE POS	CLO	CLO or MIN	Damper position when freeze protection is active (closed or MIN POS).
	CO2 ZERO	0ppm	0 to 500 ppm; Increment by 10	CO ₂ ppm level to match CO ₂ sensor start level.
	CO2 SPAN	2000ppm	1000 to 3000 ppm; Increment by 50	CO ₂ ppm span to match CO ₂ sensor.
	STG3 DLY	2.0h	0 min, 5 min, 15 min, then 15 min intervals. Up to 4 h or OFF	Delay after stage 2 cool has been active. Turns on second stage of cooling when economizer is first stage and mechanical cooling is second stage. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling
	SD DMPR POS	CLO	CLO or OPN	Indicates shutdown signal from space thermostat or unitary controller. When controller receives 24 Vac input on the SD terminal in conventional mode, the OA damper will open if programmed for OPN and OA damper will close if programmed for CLO. All other controls, e.g., fans, etc. will shut off.
	DCVCAL ENA	MAN	MAN (manual) AUTO	Turns on the DCV automatic control of the dampers. Resets ventilation based on the RA, OA, and MA sensor conditions. Requires all (RA, OA, MA, CO ₂) sensors. This operation is not operable with a 2-speed fan unit.
	MAT T CAL	0.0°F	± 2.5°F	Allows for the operator to adjust for an out of calibration temperature sensor.
	OAT T CAL	0.0°F	± 2.5°F	Allows for the operator to adjust for an out of calibration temperature sensor.
	OAH CAL	0% RH	±10% RH	Allows for operator to adjust for an out of calibration humidity sensor.
	RAT CAL	0.0°F	± 2.5°F	Allows for the operator to adjust for an out of calibration temperature sensor.
	RAH CAL	0% RH	±10% RH	Allows for operator to adjust for an out of calibration humidity sensor.
	DAT CAL	0.0°F	± 2.5°F	Allows for the operator to adjust for an out of calibration temperature sensor.
CHECKOUT	DAMPER VMIN-HS	n/a	n/a	Positions damper to VMIN position.
	DAMPER VMAX-HS	n/a	n/a	Positions damper to VMAX position.
	DAMPER OPEN	n/a	n/a	Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure to pause in the mode to allow exhaust contacts to energize due to the delay in the system.
	DAMPER CLOSE	n/a	n/a	Positions damper to the fully closed position
	CONNECT Y1-O	n/a	n/a	Closes the Y1-O relay (Y1-O).
	CONNECT Y2-O	n/a	n/a	Closes the Y2-O relay (Y2-O).
	CONNECT AUX	n/a	n/a	Energizes the AUX output. If Aux setting is: • NONE — no action taken • ERV — 24 Vac out. Turns on or signals an ERV that the conditions are not good for economizing but are for ERV operation. ⁴ • SYS — 24 Vac out. Issues a system alarm.

Table 3 — Menu Structure¹ (cont)

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT ²	NOTES
ALARMS(#)				
	Alarms display only when they are active. The menu title "ALARMS(#)" includes the number of active alarms in parenthesis (). When using SYLK bus sensors, "SYLK" will appear on the screen, and when using 20k OA temperature sensors, "SENS T" will appear on the screen.			
	MA T SENS ERR	n/a	n/a	Mixed air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	CO2 SENS ERR	n/a	n/a	CO ₂ sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues.
	OA SYLK T ERR	n/a	n/a	Outdoor air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	OA SYLK H ERR	n/a	n/a	Outdoor air temperature sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	RA SYLK T ERR	n/a	n/a	Return air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	RA SYLK H ERR	n/a	n/a	Return air temperature sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	DA SYLK T ERR	n/a	n/a	Discharge air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	DA SENS T ERR	n/a	n/a	Discharge air temperature sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	ACT ERROR	n/a	n/a	Actuator has failed or become disconnected - check for stall, over voltage, under voltage and actuator count. Replace actuator if damper is movable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu.
	FREEZE ALARM	n/a	n/a	Check if outdoor temperature is below the LOW Temp Lockout on setpoint menu. Check if Mixed air temperature on STATUS menu is below the Lo Setpoint on Advanced menu. When conditions are back in normal range, the alarm will go away.
	SHUTDOWN ACTIVE	n/a	n/a	AUX2 IN is programmed for SHUTDOWN and 24 V has been applied to AUX2 IN terminal.
	DMP CAL RUNNING	n/a	n/a	If DCV Auto enable has been programmed, when the Jade is completing a calibration on the dampers, this alarm will display. Wait until the calibration is completed and the alarm will go away. Must have OA, MA and RA sensors for DCV calibration; set up in the Advanced setup menu.
	DA SENS ALM	n/a	n/a	Discharge air temperature is out of the range set in the ADVANCED SETUP Menu. Check the temperature of the discharge air.
	SYS ALARM	n/a	n/a	When AUX1-O is set to SYS and there is any alarm (e.g., failed sensors, etc.), the AUX1-O terminal has 24 vac out.
	ACT UNDER V	n/a	n/a	Voltage received by actuator is above expected range.
	ACT OVER V	n/a	n/a	Voltage received by actuator is below expected range.
	ACT STALLED	n/a	n/a	Actuator stopped before achieving commanded position.

NOTES:

1. Table 3 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration. For example if you do not have a DCV (CO₂) sensor, then none of the DCV parameters appear.
2. When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment.
3. n/a = not applicable
4. ERV Operation: When in Cooling mode AND the conditions are NOT OK for economizing - the ERV terminal will be energized. In the Heating mode the ERV terminal will be energized when the OA is below the ERV OAT setpoint in the setpoint menu.

Checkout Tests

Use the Checkout menu (see Table 3) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

NOTE: See User Interface section for information about menu navigation and use of the keypad.

To perform a Checkout test:

1. Scroll to the desired test in the Checkout menu using the **▲** and **▼** buttons.
2. Press the **↔** button to select the item.
3. **RUN?** appears.
4. Press the **↔** button to start the test.
5. The unit pauses and then displays **IN PROGRESS**.
6. When the test is complete, **DONE** appears.
7. When all desired parameters have been tested, press the **↑** button to end the test.

Checkout test can be performed at any time during the operation of the system as a test that the system is operable.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to equipment. Be sure to allow enough time for compressor startup and shutdown between checkout tests so that you do not short-cycle the compressors.

SETUP AND CONFIGURATION

W7220 Economizer Module Wiring

Use Fig. 13 and Tables 4 and 5 to locate the wiring terminals for the economizer module.

NOTE: The four terminal blocks are removable. You can slide out each terminal block, wire it, and then slide it back into place.

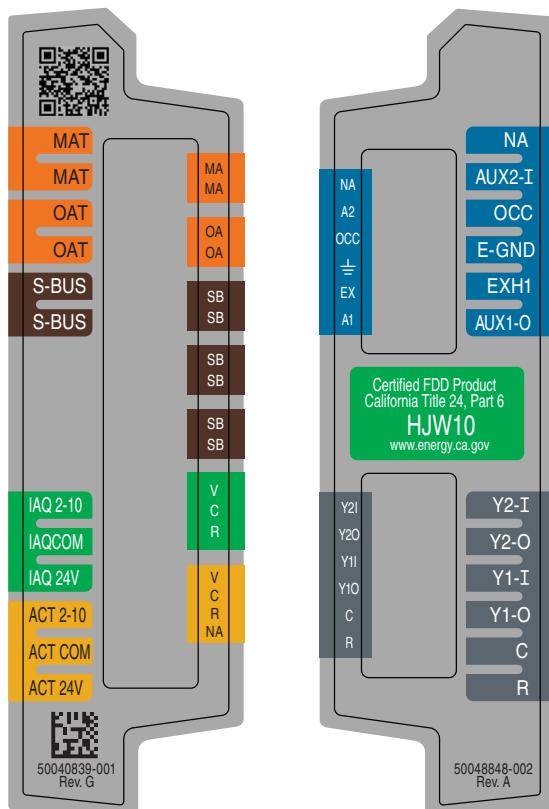


Fig. 13 — W7220 Economizer Module Terminal Connection Labels

Table 4 — Economizer Module - Left Hand Terminal Blocks

LABEL	TYPE	DESCRIPTION
Top Left Terminal Block		
MAT	20k NTC and COM	Mixed Air Temperature Sensor (Polarity Insensitive Connection)
OAT	20k NTC and COM	Outdoor Air Temperature Sensor (Polarity Insensitive Connection)
S-BUS	S-BUS (Sylk Bus)	Enthalpy Control Sensor (Polarity Insensitive Connection)
Bottom Left Terminal Block		
IAQ 2-10	2-10 Vdc	Air Quality Sensor Input (e.g. CO ₂ sensor)
IAQ COM	COM	Air Quality Sensor Common
IAQ 24V	24 Vac	Air Quality Sensor 24 Vac Source
ACT 2-10	2-10 Vdc	Damper Actuator Output (2-10 Vdc)
ACT COM	COM	Damper Actuator Output Common
ACT 24v	24 Vac	Damper Actuator 24 Vac Source

Table 5 — Economizer Module - Right Hand Terminal Blocks

LABEL	TYPE	DESCRIPTION
Top Right Terminal Blocks		
	n/a	The first terminal is not used.
AUX2 I	24 Vac IN	Shut Down (SD) or HEAT (W) Conventional only and Heat Pump Changeover (O-B) in Heat Pump mode.
OCC	24 Vac IN	Occupied/Unoccupied Input
E-GND	E-GND	Earth Ground - System Required
EXH1	24 Vac OUT	Exhaust Fan 1 Output
AUX1 O	24 Vac OUT	Programmable: Exhaust fan 2 output or ERV or System alarm output
Bottom Right Terminal Blocks		
Y2-I	24 Vac IN	Y2 in - Cooling Stage 2 Input from space thermostat
Y2-O	24 Vac OUT	Y2 out - Cooling Stage 2 Output to stage 2 mechanical cooling
Y1-I	24 Vac IN	Y1 in - Cooling Stage 2 Input from space thermostat
Y1-O	24 Vac OUT	Y1 out - Cooling Stage 2 Output to stage 2 mechanical cooling
C	COM	24 Vac Common
R	24 Vac	24 Vac Power (hot)

Time-out and Screen Saver

When no buttons have been pressed for 10 minutes, the LCD displays a screen saver, which cycles through the Status items. Each Status item displays in turn and cycles to the next item after 5 seconds.

HH79AH001 Dry Bulb Sensor

Economizers are shipped standard with an HH79AH001 outside air dry bulb sensor. System default setting (high temp limit) is 63°F, and has a range of 48 to 80°F. Sensor is factory installed on economizer (note: a second HH79AH001 sensor is provided for mixed air temperature).

Note: California high temperature setting requirements by region or shown below in Table 6.



Fig. 14 — HH79AH001 Dry Bulb and Mixed Air Sensor

Table 6 — California Title 24 Regional High Limit Dry Bulb Temperature Settings
(Table 140.4-B Air Economizer High Limit Shut Off Control Requirements)

DEVICE TYPE ¹	CLIMATE ZONES	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN):	
		DESCRIPTION	
Fixed Dry Bulb	1, 3, 5, 11-16	Outdoor air temperature exceeds 75°F	
	2, 4, 10	Outdoor air temperature exceeds 73°F	
	6, 8, 9	Outdoor air temperature exceeds 71°F	
	7	Outdoor air temperature exceeds 69°F	
Differential Dry Bulb	1, 3, 5, 11-16	Outdoor air temperature exceeds return air temperature	
	2, 4, 10	Outdoor air temperature exceeds return air temperature minus 2°F	
	6, 8, 9	Outdoor air temperature exceeds return air temperature minus 4°F	
	7	Outdoor air temperature exceeds return air temperature minus 6°F	
Fixed Enthalpy ² + Fixed Dry Bulb	All	Outdoor air enthalpy exceeds 28 Btu/lb of dry air or outdoor air temperature exceeds 75°F	

1. Only the high limit control devices listed are allowed to be used and at the setpoints listed. Others such as Dew Point, Fixed Enthalpy, Electronic Enthalpy, and Differential Enthalpy Controls, may not be used in any climate zone for compliance with Section 140.4(e)1 unless approval for use is provided by the Energy Commission Executive Director.
2. At altitudes substantially different than sea level, the Fixed Enthalpy limit value shall be set to the enthalpy value at 75°F and 50% relative humidity. As an example, at approximately 6,000 foot elevation, the fixed enthalpy limit is approximately 30.7 Btu/lb.

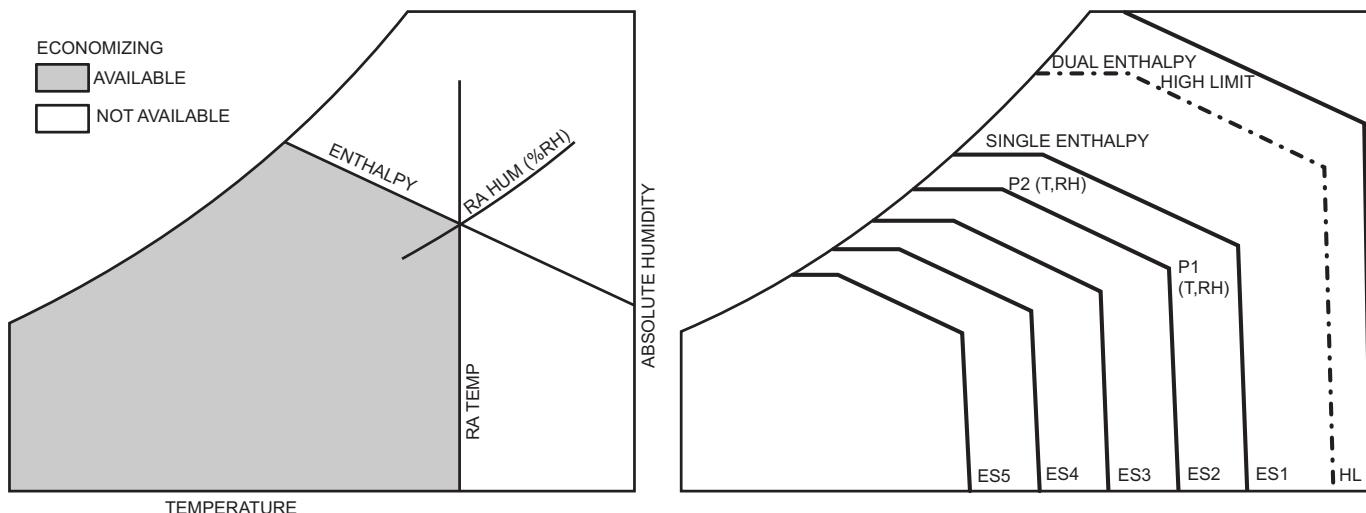


Fig. 15 — Single Enthalpy Curve Boundaries

Table 7 — Single Enthalpy and Dual Enthalpy High Limit Curves

ENTHALPY CURVE	TEMP. DRY BULB (F)	TEMP. DEWPOINT (F)	ENTHALPY (btu/lb/da)	POINT P1		POINT P2	
				TEMP. (F)	HUMIDITY (%RH)	TEMP. (F)	HUMIDITY (%RH)
ES1	80	60	28.0	80	36.8	66.3	80.1
ES2	75	57	26.0	75	39.6	63.3	80.0
ES3	70	54	24.0	70	42.3	59.7	81.4
ES4	65	51	22.0	65	44.8	55.7	84.2
ES5	60	48	20.0	60	46.9	51.3	88.5
HL	86	66	32.4	86	38.9	72.4	80.3

Enthalpy Settings (Enthalpy Optional)

When the OA temperature, enthalpy and dew point are below the respective setpoints, the Outdoor Air can be used for economizing. Fig. 15 shows the new single enthalpy boundaries in the W7220. There are 5 boundaries (setpoints ES1 thru ES5), which are defined by dry bulb temperature, enthalpy and dew point.

Refer to Table 7 for ENTH CURVE setpoint values.

To use enthalpy the W7220 must have a HH57AC081 enthalpy control sensor for OA. The W7220 calculates the enthalpy and dewpoint using the OA temperature and humidity input from the OA sensor. When the OA temperature, OA humidity and OA dew point are all below the selected boundary, the economizer sets the economizing mode to YES, economizing is available.

When all of the OA conditions are above the selected boundary, the conditions are not good to economize and the mode is set to NO.

If using OA enthalpy sensor option, remove and discard the dry bulb sensor shipped with the economizer. System default setting is ES3 enthalpy curve.

See Table 6 for California Title 24 high limit dry bulb temperature settings.

Fig. 15 shows the 5 current boundaries. There is also a high limit boundary for differential enthalpy. The high limit boundary is ES1 when there are no stages of mechanical cooling energized and HL (high limit) when a compressor stage is energized.

Table 7 provided the values for each boundary limit.

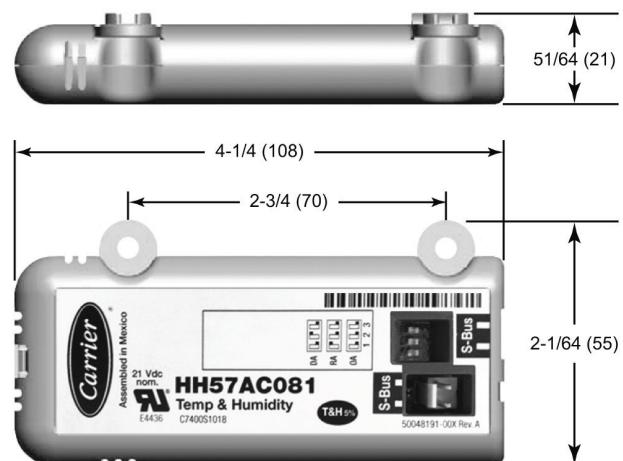
Enthalpy Control Sensor Configuration

The optional Enthalpy Control sensor (Part Number: HH57AC081) communicates with the W7220 Economizer controller on the two-wire communications bus and can either be wired using a two pin header or using a side connector. This sensor is used for all OAT (Outdoor Air Temperature), RAT (Return Air Temperature), Return air enthalpy, and DAT (discharge Air Temperature), depending on how its three position DIP switch is set.

Use Fig. 16 and Table 8 to locate the wiring terminals for each Enthalpy Control sensor.

Use Fig. 16 and Table 9 to set the DIP switches for the desired use of the sensor.

If using differential (return) enthalpy or temperature option, see Table 6 for California Title 24 setting requirements by region.



NOTE: Dimensions in () are in mm

Fig. 16 — HH57AC081 Sensor, Dimensions and DIP Switch Location

Table 8 — HH57AC081 Sensor Wiring Terminations^a

TERMINAL		TYPE	DESCRIPTION
NUMBER	LABEL		
1	S-BUS	S-BUS	S-BUS Communications (Enthalpy Control Sensor Bus)
2	S-BUS	S-BUS	S-BUS Communications (Enthalpy Control Sensor Bus)

Table 9 — HH57AC081 Sensor DIP Switch

USE	DIP SWITCH POSITIONS FOR SWITCHES 1, 2, AND 3		
	1	2	3
DA ¹	OFF	ON	OFF
RA ²	ON	OFF	OFF
OA ³	OFF	OFF	OFF

1. DA = Discharge Air or Supply Sensor
2. RA = Return Air
3. OA = Outside Air

OPERATION

Cooling, Unit with EconoMi\$er X

For Occupied mode operation of EconoMi\$er X, there must be a 24-v signal at terminals R and OCC. Removing the signal at OCC places the EconoMi\$er X control in Unoccupied mode.

During Occupied mode operation, indoor fan operation will be accompanied by economizer dampers moving to Minimum Position setpoint for ventilation. If indoor fan is off, dampers will close. During Unoccupied mode operation, dampers will remain closed unless a Cooling (by free cooling) or DCV demand is received. See Table 10 for damper position at different operational scenarios.

When free cooling using outside air is not available, the unit cooling sequence will be controlled directly by the space thermostat. Outside air damper position will be closed or Minimum Position as determined by Occupancy mode and fan signal.

When free cooling is available as determined by the appropriate changeover command (dry bulb, outdoor enthalpy, differential dry bulb or differential enthalpy), a call for cooling (Y1 closes at the thermostat) will cause the economizer control to modulate the dampers open and closed to maintain the unit supply air temperature as set on the W7220 controller. Compressor will not run.

During free cooling operation, a supply air temperature (SAT) above setpoint will cause the dampers to modulate between Minimum Position setpoint and 100% open.

Should 100% outside air not be capable of satisfying the space temperature, space temperature will rise until Y2 is closed. The economizer control will call for compressor operation. Dampers will modulate to maintain SAT setpoint concurrent with Compressor 1 operation.

When space temperature demand is satisfied (thermostat Y1 opens), the dampers will return to Minimum Damper position if indoor fan is running or fully closed if fan is off.

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

Heating with EconoMi\$er X

During Occupied mode operation, indoor fan operation will be accompanied by economizer dampers moving to Minimum Position setpoint for ventilation. If indoor fan is off, dampers will close. During Unoccupied mode operation, dampers will remain closed unless a DCV demand is received.

When the room temperature calls for heat (W1 closes), the heating controls are energized.

Demand Controlled Ventilation

If a field-installed CO₂ sensor is connected to the EconoMi\$er X control, a Demand Controlled Ventilation strategy will operate automatically. As the CO₂ level in the space increases above the set-point (on the EconoMi\$er X controller), the minimum position of the dampers will be increased proportionally, until the Maximum Ventilation setting is reached. As the space CO₂ level decreases because of the increase in fresh air, the outdoor damper will follow the higher demand condition from the DCV mode or from the free cooling mode.

DCV operation is available in Occupied and Unoccupied periods with EconoMi\$er X. However, a control modification will be required on the air handling units to implement the Unoccupied period function.

Table 10 — Damper Position Control, 2-Speed Fan Motor, Economizer Cooling Not Available

INPUT					
OCC	0 - V	24 - V	24 - V	24 - V	24 - V
Y1	0 - V	0 - V	24 - V	24 - V	0 - V
Y2	0 - V	0 - V	0 - V	24 - V	0 - V
W1	0 - V	0 - V	0 - V	0 - V	24 - V

SUPPLY FAN MOTOR SPEED	OFF	LOW	LOW	HIGH	HIGH
DAMPER POSITION					
NO CO ₂ SENSOR	CLOSED	MIN POS	MIN POS	MIN POS	MIN POS
W/ CO ₂ SENSOR	CLOSED	FROM VENTMIN L TO VENTMAX L	FROM VENTMIN L TO VENTMAX L	FROM VENTMIN H TO VENTMAX H	FROM VENTMIN H TO VENTMAX H

TROUBLESHOOTING

Power Loss (Outage or Brownout)

All setpoints and advanced settings are restored after any power loss or interruption, as all settings are stored in the Economizer controller's non-volatile flash memory.

NOTE: If the power goes below 18 Vac, the W7220 controller module assumes a power loss and the 5 minute power up delay will become functional when power returns above 18 Vac.

Alarms

The Economizer module provides alarm messages that display on the 2-line LCD.

NOTE: Upon power up, the module waits several seconds before checking for alarms. This allows time for all the configured devices (e.g. sensors, actuator) to become operational.

If one or more alarms are present and there has been no keypad activity for at least 5 minutes, the Alarms menu displays and cycles through the active alarms.

You can also navigate to the Alarms menus at any time.

See Table 3 for the Alarms menu.

Clearing Alarms

Once the alarm has been identified and the cause has been removed (e.g. replaced faulty sensor). The alarm can be cleared from the display.

To clear an alarm, perform the following:

1. Navigate to the desired alarm.
2. Press the  button.
3. ERASE? displays.
4. Press the  button.
5. ALARM ERASED displays.
6. Press the  (Menu up/Exit) button to complete the action and return to the previous menu.

NOTE: If the alarm still exists after you clear it, it is redisplayed within 5 seconds.

Table 11 — Operating Issues and Concerns

Issue Or Concern	Possible Cause And Remedy
My outdoor temperature reading on the STATUS menu is not accurate	Check the sensor wiring: • Enthalpy sensors are to be wired to the S-Bus terminals. • Temperature sensors are to be wired to the OAT and MAT terminals.
If my enthalpy sensor drifts in accuracy over time, can I re-calibrate it?	The sensor is not able to be re-calibrated in the field. However there is a menu item under the ADVANCED menu where you are able to input a limited off set in temperature and humidity for each sensor you have connected to the economizer.
Can I go back to factory defaults and start over?	Under the SYSTEM SETUP menu you can change the setpoints to the factory defaults.
Will I be able to see the LCD screen when it is in the unit?	The LCD screen has a backlight that is always illuminated.
What is a good setpoint for the Mixed Air Temperature (MAT)?	The mixed are temperature is the temperature of air that you want to supply to the space. In a commercial building, this is between 50 to 55°F (10 to 13°C). The mixed are is the mixing of the return air and the outdoor air.
I am using enthalpy sensors. Why did the control ask me to input a dry bulb changeover temperature?	In the even the humidity sensor in the enthalpy sensors fails, the backup algorithm in the control is to default to the temperature sensor in the enthalpy sensor.
In checkout, the outdoor damper closes when I command it to open.	Check the actuator linkage or rotation. In the CHECKOUT mode, the outdoor damper should drive open or closed with the return air damper having the opposite effect.
How do I set my minimum position?	The minimum position is set using the VENTMIN and VENTMAX setup in the SETPOINTS menu. VENTMIN is the minimum ventilation required when using an occupancy sensor and VENTMAX is the minimum ventilation when not using an occupancy sensor for Demand Control Ventilation. The VENTMAX position is set the same as with the potentiometer on the analog economizers and is the output voltage to the damper actuator. The range is 2 Vdc closed OA damper and 10 Vdc open OA damper.
What if my damper does not go completely closed in the checkout operation?	Check the damper linkage or hub to make sure the damper is able to close completely.
How do I set the OCC?	There are two setting for the OCC setting, INPUT and ALWAYS, INPUT is from the space thermostat, if it has an occupancy output. ALWAYS is the unit in the occupied mode, if the economizer is powered (fan on).
Does the economizer save my program values if the unit loses power?	Yes, once the changes are stored in the controller they will be stored until they are changed by the operator.
If the unit is left in checkout, how long will the unit stay in checkout mode without input?	The unit will remain in checkout for 10 minutes, then return to normal operation.

APPENDIX A — RELOCATE ACTUATOR AND CONTROLS TO OPPOSITE SIDE

The standard orientation of the economizer is for rear return/top supply air discharge positioning of the economizer on the 50XC unit. For optional front return, the actuator/controller and control access doors must be relocated to opposite side of outdoor air damper using the following procedure:

1. Remove economizer control access doors on both sides of the economizer. See Fig. A.
2. Loosen lock nut on wiring harness (90-degree connector) at economizer side panel. See Fig. A.
3. Cut tape and remove wire through slot. See Fig. B.

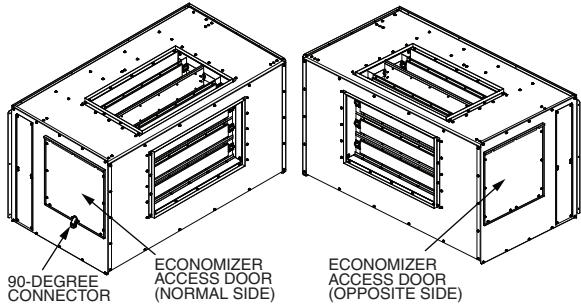


Fig. A — Economizer Access Doors

4. Loosen drive pin at actuator. Remove and retain for later use. See Fig. C.
5. Remove 4 retaining screws (2 inside and 2 outside) to actuator/controller mount and remove actuator/control from unit. See Fig. B and C.
6. Remove bolt that holds actuator to mount. See Fig. C.
7. Move all actuator drive pin hardware from a counterclockwise spring orientation to a clockwise spring orientation.

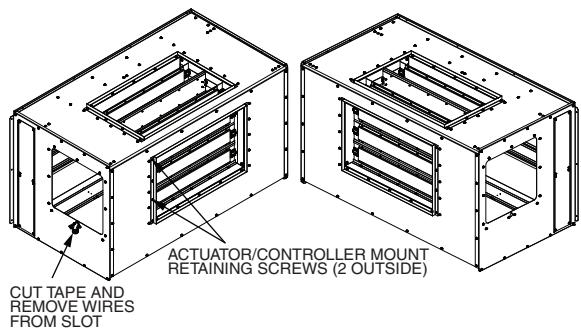


Fig. B — Remove Actuator/Controller Mount

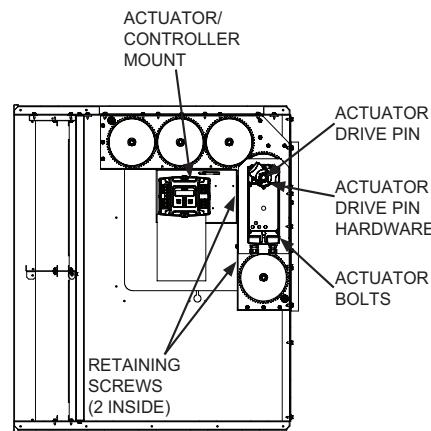


Fig. C — Actuator Hardware Locations

8. Remount actuator to actuator/controller mount with mounting bolt removed in Step 6.
9. Reinstall actuator/control mount assembly on the opposite side of outdoor air damper. Secure using 4 retaining screws removed in Step 5.
10. Slide wires through slot on opposite control access door of economizer. Tape over slot and empty slot hole on normal side where wires were previously positioned.
11. Secure lock nut removed in Step 2 to wiring harness (90-degree connector) on opposite side of economizer.
12. Slide drive pin removed in Step 4 into actuator and seat units into gear bracket. It is recommended to power actuator fully open. Position outside air blades in fully open position before securing drive pin to actuator. When not powered, spring return should close. Check to verify damper blades close and compress seals.
13. Reattach economizer control access doors removed in Step 1 by switching to opposite sides. See Fig. A.

