Installation Instructions

0 to 100% Low Leak Economizer – Downflow

Foundation™ Packaged Cooling and Gas/Electric 3 to 5 Tons

⚠ SAFETY WARNING
Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**

- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labeling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**

- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

> # ⚠WARNING
>
> **Follow EHS Policies!**
>
> **Failure to follow instructions below could result in death or serious injury.**
>
> - **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
> - **Non-Trane personnel should always follow local regulations.**

> # ⚠WARNING
>
> **R-454B Flammable A2L Refrigerant!**
>
> **Failure to use proper equipment or components as described below could result in equipment failure, and possibly fire, which could result in death, serious injury, or equipment damage.**
> **The equipment described in this manual uses R-454B refrigerant which is flammable (A2L). Use ONLY R-454B rated service equipment and components. For specific handling concerns with R-454B, contact your local representative.**

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General Information

Inspection

1. Check carefully for shipping damage. If any damage is found, report it immediately, and file a claim against the transportation company. Replace damaged parts with authorized parts only.

2. Compare the order number on the shipping label with the accessory identification information on the ordering and shipping documents to verify that the correct accessory has been received.

Parts List

Table 1 lists components shown in Figure 1 and Figure 2, p. 6.

Table 1. Major economizer component list

Item	Description	Qty
1	Low leak economizer assembly	1
2	End panel	1
3	Filter access door	1
4	Panel fresh air hood, bottom	1
5	Panel fresh air hood, Top	1
6	Panel fresh air hood, RH	1
7	Panel fresh air hood, LH	1

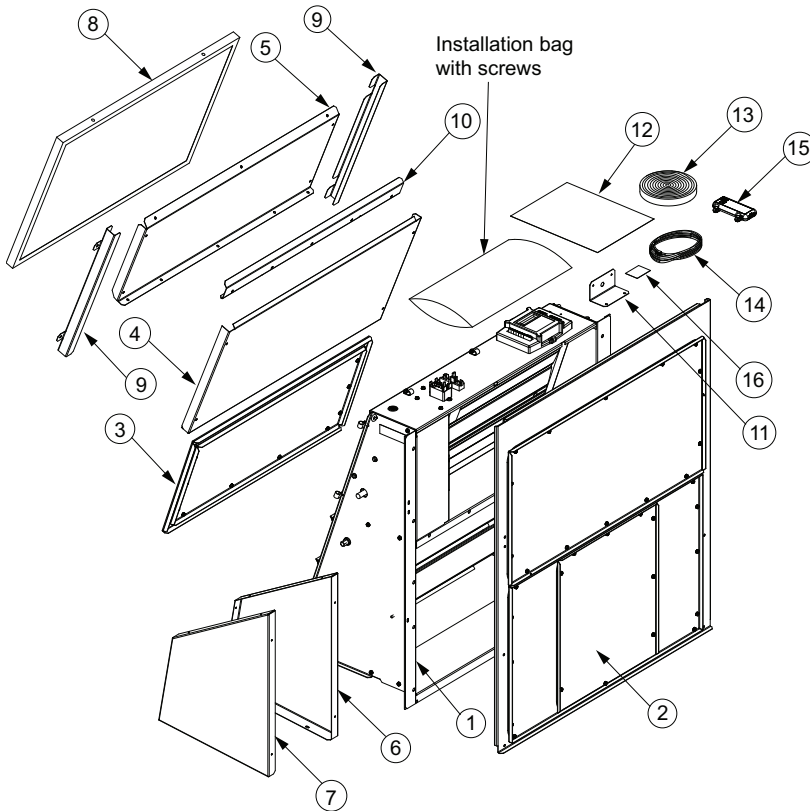**Table 1. Major economizer component list (continued)**

Item	Description	Qty
8	Mist eliminator	1
9	Bracket bottom, Mist eliminator	2
10	Bracket, Mist eliminator	1
11	Bracket, Mixed air sensor	1
12	Literature	1
13	Roll of gasket	1
14	Harness, Mixed air sensor	1
15	Mixed air sensor	1
16	Label	1
Tube Sealant - Trane recommends Sikaflex 221 (SEL00439)		1
Installation bag with screws		

Field Supplied Part

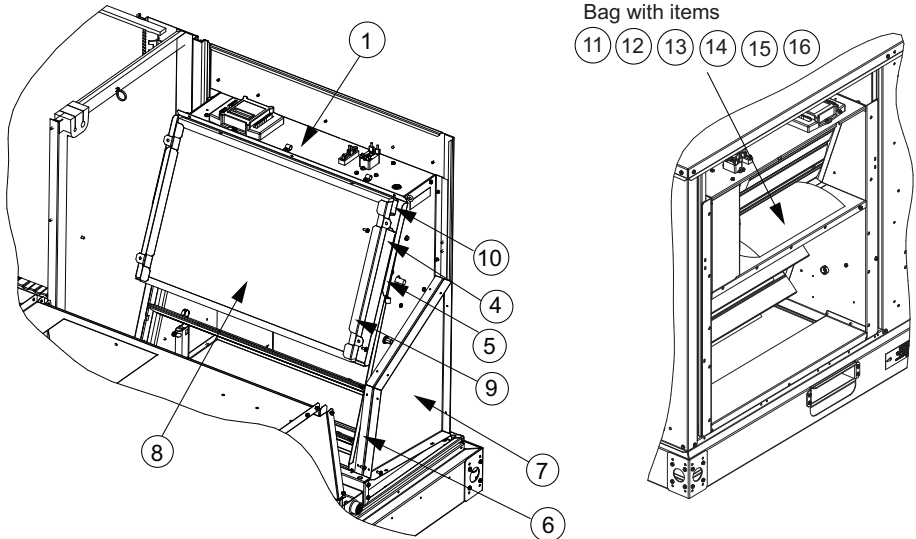| NOTICE |
|--------|
| **Corrosion Damage!** |
| **Failure to use recommended caulking/sealant could cause corrosion related failures to refrigerant components.** |

Figure 1. Major economizer components – field installed options

Figure 2. Major economizer components – factory installed options[a]

(a) Mixed air temperature sensor and bracket are already installed in unit for factory installed option.

Installation

Field Installed Option

Economizer and Fresh Air Hood Installation

1. Remove the filter access panel, unit end panel and horizontal return panel. See Figure 3.

Figure 3.   Panel removal
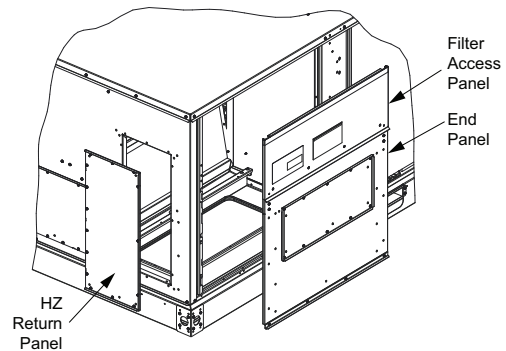
2. Assemble economizer onto unit. Align edge of both side of economizer panel flange with LH and RH side post as shown for positioning and economizer should rest on return base pan as illustrated in Figure 4.

Figure 4.   Economizer installation

3. Build the fresh air hood assembly per Figure 5.

   a. Apply gasket to 4, aligning to top edge of 4.

   b. Apply gasket to 6 and 7 as shown.

   c. Attach 9 to 6 and 7 using two screws on each side.

   d. Attach 5 to 4 using three screws.

   e. Attach assembly built in Step d to 6 and 7 using five screws on each side.

   f. Apply gasket to the fresh air hood assembly, aligning with three sides of the assembly.

   g. Insert and slide 8 through 9.

Figure 5.   Fresh air hood assembly

4. Install economizer end panel using 10 screws and filter access door using 13 screws. See Figure 6.

Figure 6.   End panel and filter access door installation
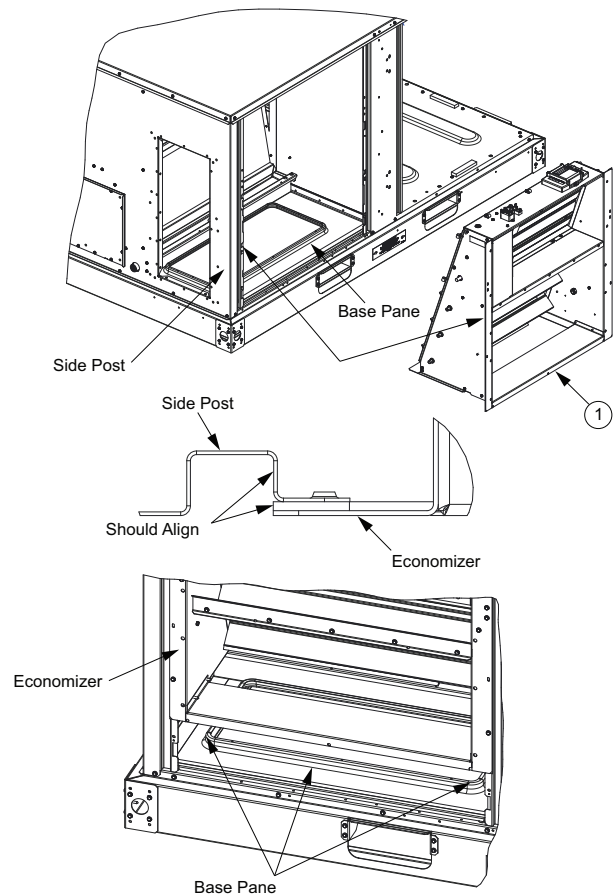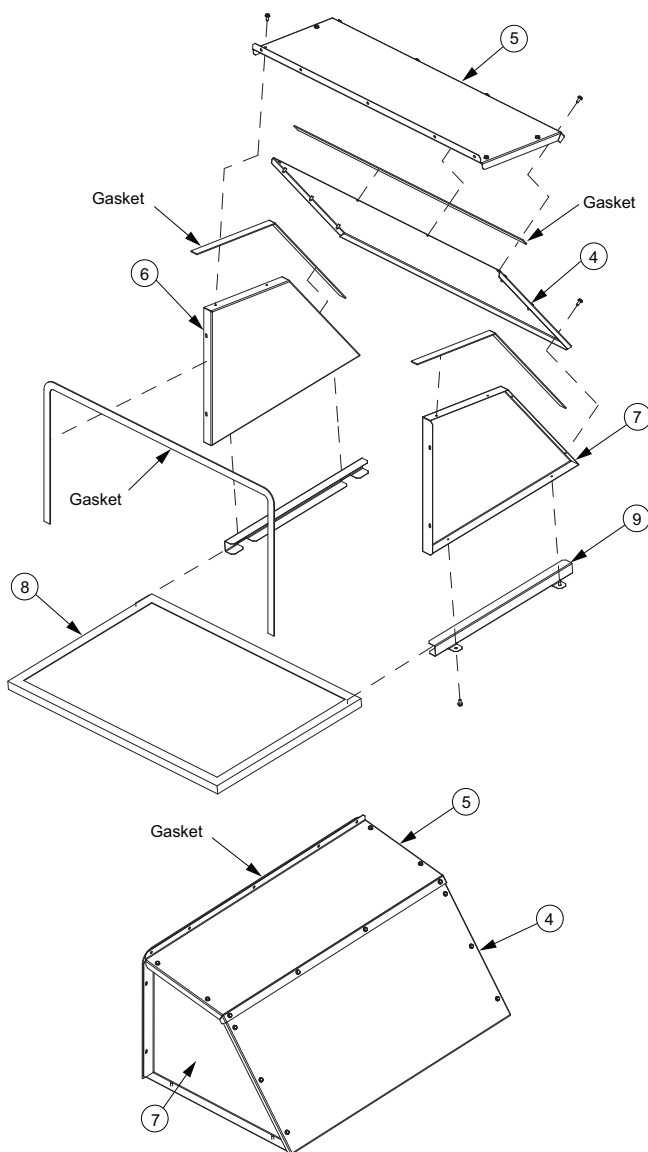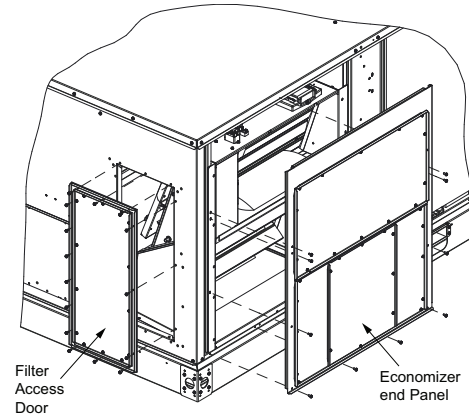

5. Locate unit economizer control wiring harness plug PPM2A. The plug is located in the upper front section of the return air (attached to unit divider panel). Remove the mating connector plug and connect PPM2A to the economizer wire harness. See Figure 7.

Figure 7.   Mating connector plug removal
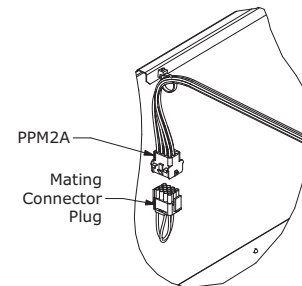
6. Remove unit top cover and control box access panel. Route relay harness as shown in Figure 8.

   a. Locate economizer fault relay (EFR) wire harness (wires 163A and 164A looped near economizer section).

   b. Secure unterminated end of the harness with a wire tie in the control panel to the left side of the power terminal block (near the Customer Connection LTB terminal strip).

   c. Connect economizer fault relay (EFR) to smart thermostat. Strip 163A and 164A wires and individually wirenut them to the two fault input wires from the thermostat. Terminate the fault input wires on the appropriate input terminals on the thermostat. The thermostat wires need to be rated for 600V, 105C, and UL 1230 or 1231.

   d. After mounting and powering the thermostat, configure the thermostat to display a fault message (e.g., Economizer Fault) whenever the dry contact input goes high. See the thermostat user manual for detailed instructions.

e. Configure the thermostat Wi-Fi for connection to the Internet. See the thermostat user manual for detailed instructions.

Figure 8. Economizer fault relay harness (EFR) routing
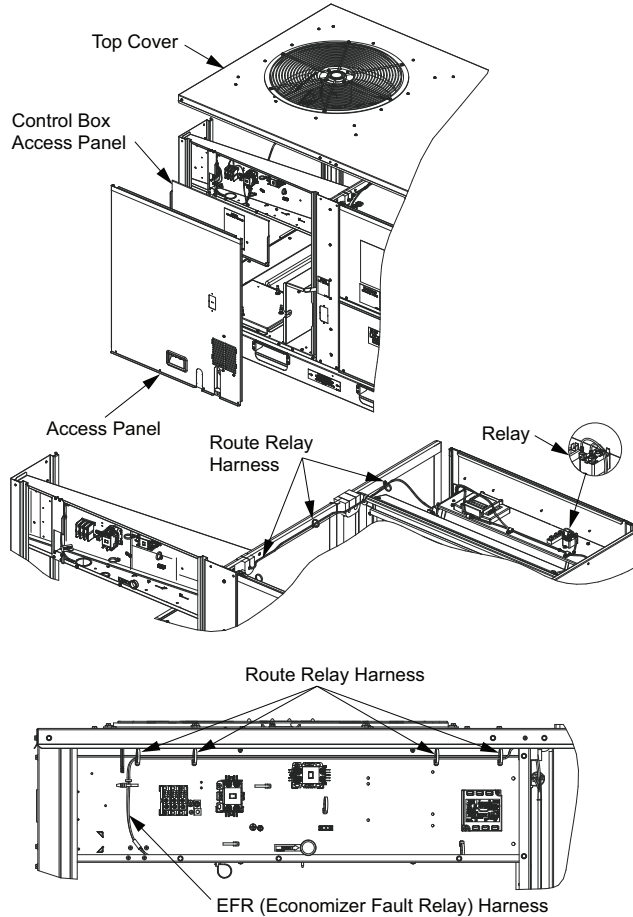
7. Remove block-off panel from the economizer end panel. See Figure 9.

Figure 9. Economizer block off removal
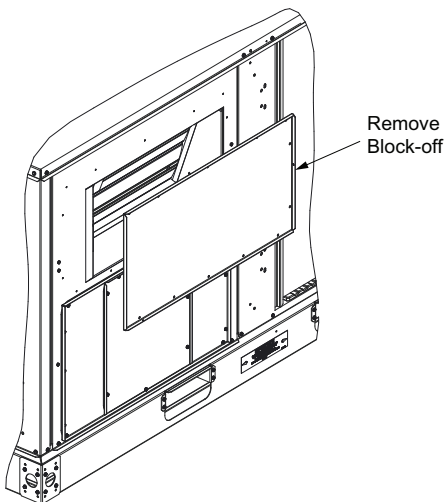
8. Install gasket on mist eliminator bracket. Assembly mist eliminator bracket onto end panel using five screws. See Figure 10.

Figure 10. Gasket installation
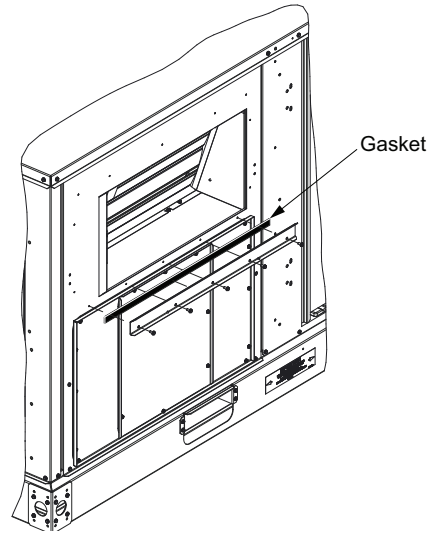
9. Install the fresh air hood build in Step 3 on unit using nine screws and filter access door assembly using 13 screws. See Figure 11.

Figure 11. Fresh air hood installation
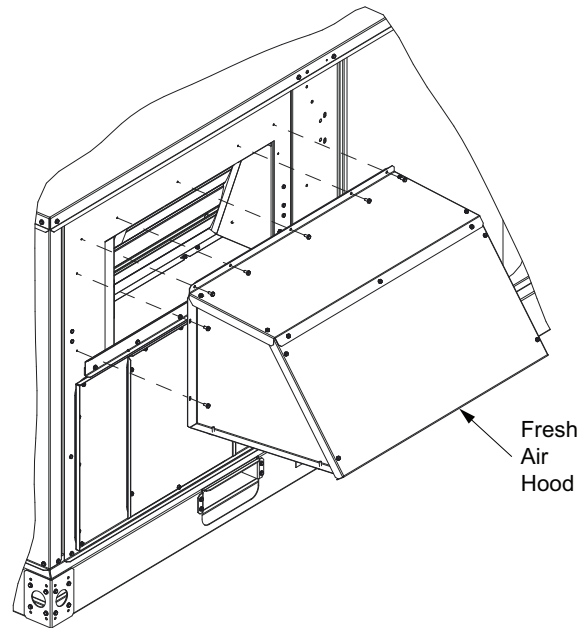
10. Using field supplied silicone sealant, seal all seams, cracks and gaps around the outdoor air damper. See Figure 12.

Figure 12. End panel and fresh air hood sealing

Seal along with fresh air hood Flanges

Seal along with End panel Flanges (both sides)

Seal along with fresh air hood Flanges (both sides)
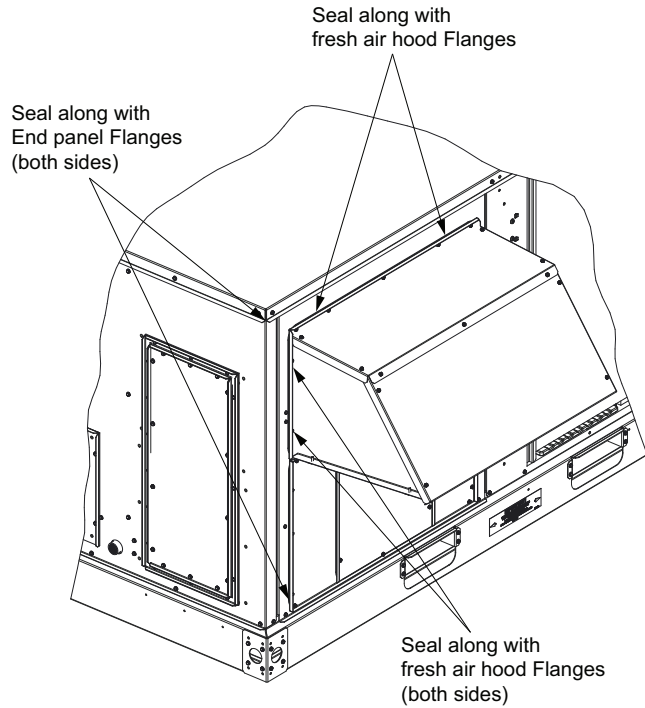
Mixed Air Temperature Sensor Installation

NOTICE

Electrostatic Discharge!

Electrostatic discharge can short equipment circuitry. Ensure that you are properly grounded before handling sensitive electronic equipment.

See Figure 13 for following steps.

1. Remove the front access panel and unit top cover (for field installed only) of the unit.

2. Remove mixed air sensor, two #6 screws and bracket from kit bag (item 11). Attach mixed air sensor to bracket using the two screws.

3. Remove mixed air sensor wire harness from the bag (item 14). Connect harness to the economizer controller MAT pin.

4. Route the mixed air sensor wire harness through the bushing located at the top of the evaporator coil and connect to the sensor.

Figure 13. Mixed air temperature sensor installation

Top Cover

Access Panel

Pop-in wire tie

Grommet

Mixed Air Temperature Sensor Wire Harness

Mixed Air Temperature Sensor Wire Harness

Pop-in wire tie

Sensor mounting Screws (x2)

Mixed Air Temperature Sensor Mounting Bracket

Mounting Bracket Screws (x2)

Mixed Air Temperature Sensor Wire Harness end connection

ACC-SVN203E-EN
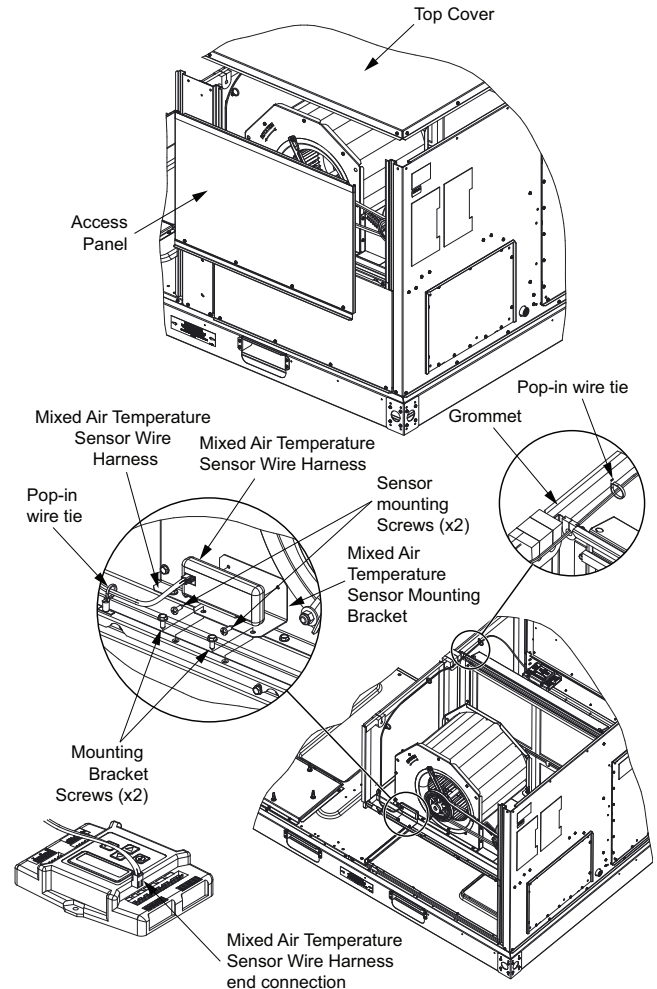
Factory Installed Option – Field Setup

Each economizer ships inside the unit and requires partial assembly and setup in the field.

1. Remove economizer end panel and filter access door. See Figure 14.

Figure 14. Access panel removal
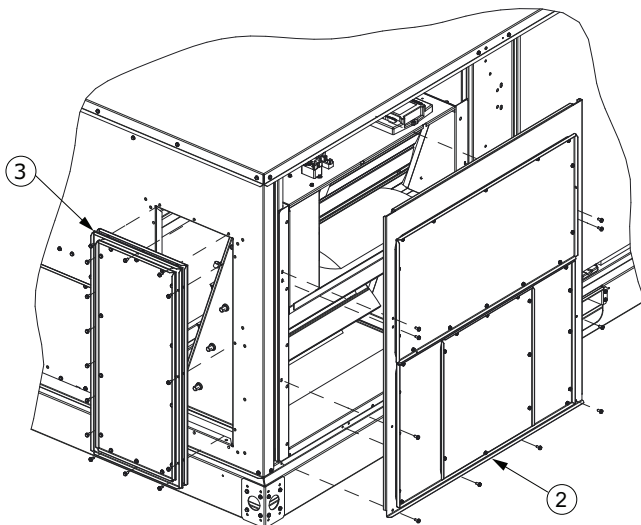
2. Remove items 4, 5, 6, 7, 8, 9, 10, 12, and 13 from the economizer section as shown in Figure 15.

Figure 15. Economizer parts – factory installed

Bag with items 11, 12, 13, 14, 15 and 16
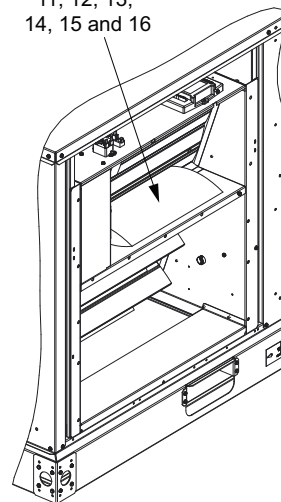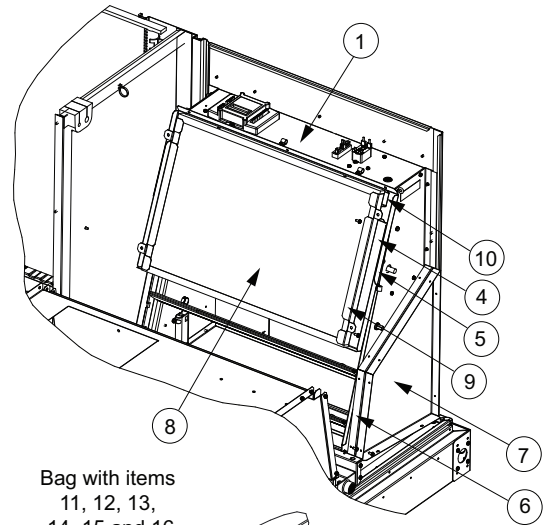
3. Remove economizer block-off. See Figure 9, p. 9.
4. Build the fresh air hood assembly is shown in Figure 5, p. 8.
5. Install the fresh air hood onto the unit using nine screws. See Figure 11, p. 9.
6. Using field supplied silicone sealant, seal all seams, cracks and gaps around the outdoor air damper as illustrated in Figure 12, p. 10.

Economizer Controller

Notes:

- *At power up or after a power outage or brownout (or if power goes below 18 Vac), the controller begins a **5 minute** power up delay before enabling mechanical cooling. Power must be above 18 VAC for the delay to become functional.*

- *The controller will be in setup mode for the first **60 minutes** after powered. If a sensor for outside air or one of the Sylk Bus devices (sensor or actuator) is disconnected during the set up mode, the controller will not alarm that failure. The mixed air temperature sensor is a system critical sensor. If removed during set up mode the controller will alarm. After 60 minutes the controller will change to operation mode and all components removed or failed, will alarm in the operation mode.*

- *The terminals on MAT, OAT and S-BUS sensors are polarity insensitive.*

Controller User Interface and Keypad

The user interface consists of an LCD display and a four-button keypad on the front of the economizer module. The LCD is a 16 character by 2 line dot matrix display.

Figure 16. Controller user interface and keypad

Menu Up (Exit) Button

Scroll (up/down) Buttons

2 Line LCD

Select (Enter) Button
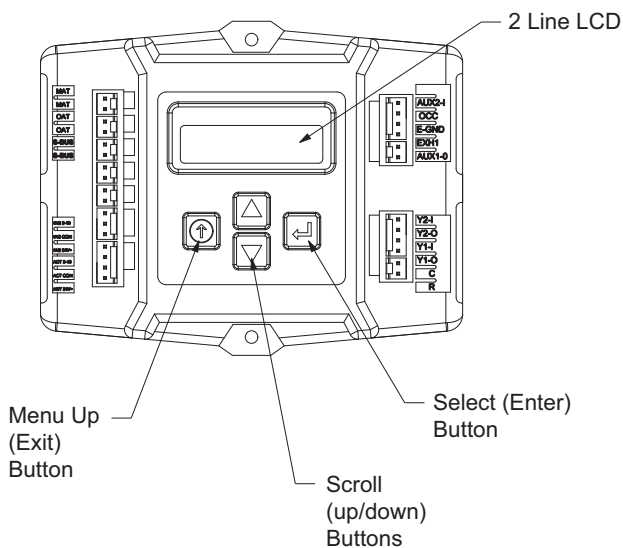
Table 2. Economizer module - left hand terminal blocks

Label	Type	Description
Top Left Terminal Block		
MAT MAT	20k NTC and COM	Mixed Air Temperature Sensor (polarity insensitive connection)
OAT OAT	20k NTC and COM	Outdoor Air Temperature Sensor (polarity insensitive connection)
S-BUS S-BUS	SYLK Bus	Sylk Bus 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
	n/a	The last pin is not used

Table 3. Economizer module - right hand terminal blocks

Label	Type	Description
Top Right Terminal Block		
	n/a	The first pin is not used
AUX2 I	24 Vac IN	Shut Down (SD) or Heat (W) Conventional only or Heat Pump Changeover (O/B) in Heat Pump mode
OCC	24 Vac IN	Occupied / Unoccupied Input
E-GND	EGND	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 Block		
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 1 Input from Space Thermostat
Y1-O	24 Vac OUT	Y1 out - Cooling Stage 1 Output to Stage 1 Mechanical Cooling
C	COM	24 Vac Common
R	24 Vac	24 Vac Power (Hot)

Use of the Keypad When Working with Menus

- Navigate to the desired menu.
- Press the ⏎ button (Enter) to display the first item in the currently displayed menu.
- Use the △ and ▽ buttons to scroll to the desired parameter.
- Press the ⏎ button (Enter) to display the value of the currently displayed item.
- Press the △ button to increase (change) the displayed parameter value.
- Press the ▽ button to decrease (change) the displayed parameter value.

Note: *When values are displayed, pressing and holding the △ or ▽ buttons causes the display to automatically increment.*

- Press the ⏎ button to accept the displayed value and store it in non-volatile RAM.
- CHANGE STORED displays.
- Press the ⬆ button (Menu Up) to return to the menu list.

Time-out and Screensaver

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

Controller Menu Structure

Important: *Table 4, p. 14 illustrates the complete hierarchy. Menu parameters will be different depending on your configuration. If you do not have a DCV (CO_2) sensor, then none of the DCV parameters appear and only MIN POS will display. If you have a CO_2 sensor, the DCV MIN and DCV MAX will appear and if you have two speed fan DCV MIN (high and low speed) and DCV MAX (high and low speed) will appear.*

The menus in display order are:

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

Table 4.   Controller menu structure

Menu	Parameter	Parameter Default Value	Parameter Range and Increment[a]	Parameter Recommended Value[b]	Notes
STATUS	ECON AVAIL[c]	NO	YES/NO	N/A	YES = economizing available; the system can use Outdoor Air for free cooling when required
	ECONOMIZING[c]	NO	YES/NO	N/A	YES = Outdoor Air being used for 1st stage cooling.
	OCCUPIED[c]	NO	YES/NO	N/A	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	COOL HEAT	N/A	HEAT PUMP is not available.
	COOL Y1-IN[c]	OFF	ON/OFF	N/A	Y1-I signal from space thermostat or unitary controller for cooling stage 1 ON = 24 Vac on term Y1-I OFF = 0 Vac on term Y1-I
	COOL Y1-OUT[c]	OFF	ON/OFF	N/A	Cool Stage 1 Relay Output to mechanical cooling (Y1-OUT terminal)
	COOL Y2-IN[c]	OFF	N/A	N/A	COOL Y2-IN is not available
	COOL Y2-OUT[c]	OFF	N/A	N/A	COOL Y2-OUT is not available
	MA TEMP[c]	_ _._ °F	-40 to 140°F	N/A	Displays value of measured mixed air from MAT sensor. Displays --.- if not connected, short, or out- of-range
	DA TEMP	_ _._ °F	-40 to 140°F	N/A	DA TEMP is not available
	OA TEMP[c]	_ _._ °F	-40 to 140°F	N/A	Displays measured value of outdoor air temperature. Displays --°F if sensor sends invalid value, if not connected, short or out-of-range
	OA HUM[c]	_ _ %	0 to 100%	N/A	Displays measured value of outdoor humidity from OA Sylk Bus sensor. Displays --% if not connected, short, or out- of-range
	RA TEMP[c]	_ _._ °F	0 to 140°F	N/A	Displays measured value of return air temperature from RA Sylk Bus sensor. Displays --°F if sensor sends invalid value, if not connected, short or out-of-range
	RA HUM[c]	_ _ %	0 to 100%	N/A	Displays measured value of return air humidity from RA Sylk Bus sensor. Displays --% if sensor sends invalid value, if not connected, short or out-of-range
	IN CO_2[c]	_ _ _ ppm	0 to 2000 ppm	N/A	Displays value of measured CO_2 from CO_2 sensor. Invalid if not connected, short or out-of-range. May be adjusted in Advanced menu by Zero offset and Span. 0-10 Vdc CO_2 sensors require CO_2 ZERO to be 400 and CO_2 SPAN to be 1600 in Advanced Setup menu
	DCV STATUS[c]	N/A	ON/OFF	N/A	Displays ON if above setpoint and OFF if below setpoint, and ONLY if a CO_2 sensor is connected
	DAMPER OUT[c]	2.0V	2.0 to 10.0 V	N/A	Displays output voltage or position to the damper actuator[d]
	ACT POS[c]	N/A	0 to 100%	N/A	Displays actual position of actuator
	ACT COUNT[c]	N/A	1 to 65,535	N/A	Displays number of times actuator has cycled. 1 Cycle equals the sum of 180° of movement in any direction
	ACTUATOR[c]	N/A	OK/Alarm (on Alarm menu)	N/A	Displays Error if voltage or torque is below actuator range
STATUS	EXH1 OUT[c]	OFF	ON/OFF	N/A	Output of EXH1 terminal. Displays ON when damper position reaches programmed percentage setpoint. ON = 24 Vac Output; OFF = No Output
	EXH2 OUT	OFF	ON/OFF	N/A	EXH2 OUT is not available
	ERV	OFF	ON/OFF	N/A	ERV is not available
	MECH COOL ON[c]	0	0, 1, or 2	N/A	Displays number of mechanical cooling stages that are active
	FAN SPEED[c]	N/A	LOW or HIGH	N/A	Displays speed of fan on a 2-speed fan unit
	W (HEAT IN)[c]	N/A	ON/OFF	N/A	Displays status of heat on a 2-speed fan unit.

Table 4.   Controller menu structure (continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment[a]	Parameter Recommended Value[b]	Notes
SETPOINTS SETPOINTS	MAT SET[c]	53ºF	38 to 70°F; increment by 1	53ºF	The economizer will modulate the OA damper to maintain the mixed air temperature at the setpoint
	LOW T LOCK[c]	32ºF	-45 to 80°F; increment by 1	32ºF	Setpoint determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout. At or below the setpoint the Y1-O will not be energized on the controller
	DRYBLB SET[c]	63ºF	48 to 80°F; increment by 1	67ºF	Setpoint determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.; at 63ºF setpoint unit will economizer at 62ºF and below and not economize at 64ºF and above. There is a a 2ºF deadband
	ENTH CURVE[c]	ES3	ES1, ES2, ES3, ES4, or ES5	ES3	Enthalpy boundary "curves" for economizing using single enthalpy See Table for description of enthalpy curves
	DCV SET[c]	1100ppm	500 to 2000 ppm increment by 100	1100ppm	Displays ONLY if a CO_2 sensor is connected. Setpoint for Demand Control 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 setpoint
	MIN POS[c]	2.8 V	2 to 10 Vdc	2.8V/3.2V LO/2.8V HI	Displays ONLY if a CO_2 sensor is NOT connected. With 2-speed fan units MIN POS L (low speed fan) and MIN POS H (high speed fan) settings are required. Default for MIN POS L is 3.2V and MIN POS H is 2.8V
	VENTMAX[c]	2.8 V	2 to 10 Vdc or 100 to 9990 cfm increment by 10	2.8V/3.2V LO/2.8V HI	Displays only if a CO_2 sensor is connected. Used for Vbz (ventilation max cfm) setpoint. VENTMAX is the same setting as MIN POS would be if you did not have the CO_2 sensor. Displays 2 to 10 V if <3 sensors (RA,OA and MA). In DCV CAL ENABLE AUTO mode dampers controlled by CFM With 2-speed fan units VENTMAX L (low speed fan) and VENTMAX H (high speed fan) settings are required. Default for VENTMAX L is 3.2V and VENTMAX H is 2.8V
	VENTMIN[c]	2.25 V	2 to 10 Vdc or 100 to 9990 cfm increment by 10	2.25V/2.5V LO/2.25V HI	Displays only if CO_2 sensor is connected. Used for Va (ventilation min cfm) setpoint. This is the ventilation for less than maximum occupancy of the space. Displays 2 to 10 V if <3 sensors (RA,OA and MA). Va is only set if DCV is used In DCV CAL ENABLE AUTO mode dampers controlled by CFM With 2-speed fan units VENTMIN L (low speed fan) and VENTMIN H (high speed fan) settings are required. Default for VENTMIN L is 2.5V and VENTMIN H is 2.25V
	ERV OAT SP	32ºF	0 to 50°F; increment by 1	N/A	ERV OAT SP is not available
	EXH1 SET[c]	50%	1 to 100%; increment by 1	50%/65% LO/50% HI	Setpoint for OA damper position when exhaust fan 1 is powered by the economizer With 2-speed fan units Exh1 L (low speed fan) and Exh1 H (high speed fan) settings are required Default for Exh1 L is 65% and Exh1 H is 50%
	EXH2 SET	75%	0 to 100%; increment by 1	N/A	EXH2 SET is not available

Table 4. Controller menu structure (continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment[a]	Parameter Recommended Value[b]	Notes
SYSTEM SETUP	INSTALL[c]	1/1/2011		Present date	Display order = MM/DD/YY Setting order = DD, MM, then YY
	UNITS DEG[c]	ºF	°F or °C	ºF	Sets economizer controller in degrees Fahrenheit or Celsius
	EQUIPMENT[c]	CONV	CONV HP	CONV	CONV = conventional HP is not available
	AUX2 I[c]	N/A	Shutdown (SD) Heat (W1) HP(O) HP(B)	Heat (W1)	In CONV mode: SD = Enables configuration of shutdown (default); W = Informs controller that system is in heating mode NOTE: If using 2-speed fan mode, you must program CONV mode for W. Shutdown is not available in the two-speed fan mode In HP O/B mode: HP(O) = energize heat pump on Cool (default); HP(B) = energize heat pump on Heat
	FAN SPEED[c]	1 speed	1 speed/ 2 speed	See unit nameplate: Digit 15 = 0 or 1 - 1 speed; Digit 15 = 7 or 9 - 2 speed	Sets economizer controller for operation of 1 speed or 2 speed supply fan. The controller does not control the fan but positions the OA and RA dampers to the heating or cooling mode. See page 23 for modes and position NOTE: 2-speed fan option also needs Heat (W1) programmed in AUX 2 In
	FAN CFM[c]	5000cfm	100 to 15000 cfm; increment by 100	5000cfm	This is the capacity of the RTU. The value is found in the Unit Catalog. The cfm of the fan is only used with DCV CAL ENABLE AUO
	AUX1 OUT	NONE	NONE ERV EXH2 SYS	NONE	AUX1 OUT is a programmable output used for System Alarm output
	OCC[c]	INPUT	INPUT or ALWAYS	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[c]	NO	NO or YES	NO	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 factory default values
ADVANCED SETUP	MA LO SET[c]	45ºF	35 to 55°F; increment by 1°F	45ºF	Temp to activate Freeze Protection (close damper or modulate to MIN POS if temp falls below set value)
	FREEZE POS[c]	CLO	CLO MIN	CLO	Damper position when freeze protection is active (closed or MIN POS)
	CO_2 ZERO[c]	0ppm	0 to 500 ppm; increment by 10	0ppm	CO_2 ppm level to match CO_2 sensor start level. 0-10 Vdc CO_2 sensors require CO2 ZERO to be 400
	CO_2 SPAN[c]	2000ppm	1000 to 3000 ppm; increment by 50	2000ppm	CO_2 ppm span to match CO_2 sensor; e.g.; 500-1500 sensor output would be 500 CO_2 zero and 1000 CO_2 span. 0-10 Vdc CO_2 sensors require CO_2 SPAN to be 1600
	STG3 DLY	2.0h	0 min, 5 min, 15 min, then 15 min intervals. Up to 4h or OFF	2.0h	Delay after stage 2 for cool has been active. Turns on 2nd stage of mechanical cooling when economizer is 1st stage call and mechanical cooling is 2nd stage call. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling

Table 4.   Controller menu structure (continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment[a]	Parameter Recommended Value[b]	Notes
ADVANCED SETUP	SD DMPR POS	CLO	CLO OPN	CLO	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., Y1-O, EXH1, etc. will shutoff
	DCVCAL ENA	MAN	MAN (manual) AUTO	MAN	Turns on the DCV automatic control of the dampers. Resets ventilation based on the RA, OA and MA sensor conditions. Requires all sensors (RA, OA, MA and CO_2). This operation is not operable with a 2-speed fan unit
	MAT T CAL[c]	0.0 F°	(+/-2.5°F)	0.0 F°	Allows for the operator to adjust for an out of calibration temperature sensor
	OA T CAL[c]	0.0 F°	(+/-2.5°F)	0.0 F°	Allows for the operator to adjust for an out of calibration temperature sensor
	OA H CAL[c]	0% RH	(+/-10% RH)	0% RH	Allows for the operator to adjust for an out of calibration humidity sensor
	RA T CAL[c]	0.0 F°	(+/-2.5°F)	0.0 F°	Allows for the operator to adjust for an out of calibration temperature sensor
	RA H CAL[c]	0% RH	(+/-10% RH)	0% RH	Allows for the operator to adjust for an out of calibration humidity sensor
	DA T CAL[c]	0.0 F°	(+/-2.5°F)	0.0 F°	DA T CAL is not available
	2SP FAN DELAY[c]	5 Minutes	0 to 20 minutes in 1 minute increments.	5 Minutes	When in economizing mode this is the delay for the high speed fan to try to satisfy the call for second stage cooling before the first stage mechanical cooling is enabled
CHECKOUT	DAMPER VMIN-HS	N/A	N/A	N/A	Positions damper to VMIN position
	DAMPER VMAX-HS (LS)[c]	N/A	N/A	N/A	Positions damper to VMAX position. With 2-speed fan units the damper will position to VMAX low speed fan
	DAMPER OPEN[c]	N/A	N/A	N/A	Positions damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test Make sure you pause in this mode to allow for exhaust contacts to energize due to the delay in the system
	DAMPER CLOSE[c]	N/A	N/A	N/A	Positions damper to the fully closed position
	CONNECT Y1-O[c]	N/A	N/A	N/A	Closes the Y1-O relay (Y1-O) See "Electrostatic Discharge!," p. 19
	CONNECT Y2-O[c]	N/A	N/A	N/A	N/A
	CONNECT AUX1-O[c]	N/A	N/A	N/A	CONNECT AUX1 O energizes the AUX1-O output. If AUX1-O 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 good for ERV operation • SYS — 24 Vax out. Issues a system alarm
	CONNECT EXH1[c]	N/A	N/A	N/A	Closes the power exhaust fan 1 relay (EXH1)
ALARMS(_)[e]	MAT SENS ERR	N/A	N/A	N/A	
	CO_2 SENS ERR[c]	N/A	N/A	N/A	
	OAT SENS ERR[c]	N/A	N/A	N/A	
	DA ENTHL ERR	N/A	N/A	N/A	DA ENTHL ERR is not available
	SYS ALARM	N/A	N/A	N/A	When AUX1-O is set to SYS and there is any alarm the AUX1-O terminal has 24 Vac out
	ACT UNDER V[c]	N/A	N/A	N/A	Voltage received by Actuator is above expected range
	ACT OVER V[c]	N/A	N/A	N/A	Voltage received by Actuator is below expected range
	ACT STALLED[c]	N/A	N/A	N/A	Actuator stopped before achieving commanded position

(a) When values are displayed, pressing and holding the Up or Down button causes the display to automatically increment.
(b) N/A = Not Applicable
(c) This parameter is directly associated with the LLE economizer.
(d) The Honeywell™ communicating actuator will report in XX.X% open versus XX.X Vdc for damper out.
(e) Alarms display only when they are active. The menu title "ALARMS (_)" includes the number of active alarms in parenthesis ().

Sequence of Operation

Table 5. Dry bulb operation no DCV (CO_2 sensor) - 1 speed fan

DCV	OA Good to economize?	Y1-I	FAN SPD	Y1-O	Occupied	Unoccupied
None	No	Off	High	0-v/Off	MIN POS	Closed
		On	High	24-v/On	MIN POS	Closed
None	Yes	Off	High	0-v/Off	MIN POS	Closed
		On	High	0-v/Off	MIN POS to Full- Open	Closed to Full-Open
		On	High	24-v/On	MIN POS to Full- Open	Closed to Full-Open

Table 6. Dry bulb operation with DCV (CO_2 sensor) - 1 speed fan

DCV	OA Good to economize?	Y1-I	FAN SPD	Y1-O	Occupied	Unoccupied
Below CO_2 set	No	Off	High	0-v/Off	VENTMIN	Closed
		On	High	24-v/On	VENTMIN	Closed
	Yes	Off	High	0-v/Off	VENTMIN	Closed
		On	High	0-v/Off	VENTMIN to Full- Open	Closed to Full-Open
		On	High	24-v/On	VENTMIN to Full- Open	Closed to Full-Open
Above CO_2 set	No	Off	High	0-v/Off	VENTMIN to VENTMAX	Closed
		On	High	24-v/On	VENTMIN to VENTMAX	Closed
	Yes	Off	High	0-v/Off	VENTMIN to VENTMAX	Closed
		On	High	0-v/Off	VENTMIN to Full- Open	Closed to Full-Open
		On	High	24-v/On	VENTMIN to Full- Open	Closed to Full-Open

Table 7. Enthalpy operation no DCV (CO_2 sensor) - 1 speed fan

DCV	OA Good to economize?	Y1-I	FAN SPD	Y1-O	Occupied	Unoccupied
None	No	Off	High	0-v/Off	MIN POS	Closed
		On	High	24-v/On	MIN POS	Closed
None	Yes	Off	High	0-v/Off	MIN POS	Closed
		On	High	0-v/Off	MIN POS to Full- Open	Closed to Full-Open
		On	High	24-v/On	MIN POS to Full- Open	Closed to Full-Open

Table 8. Enthalpy operation with DCV (CO_2 sensor) - 1 speed fan

DCV	OA Good to economize?	Y1-I	FAN SPD	Y1-O	Occupied	Unoccupied
Below set	No	Off	High	0-v/Off	VENTMIN	Closed
		On	High	24-v/On	VENTMIN	Closed
	Yes	Off	High	0-v/Off	VENTMIN	Closed
		On	High	0-v/Off	VENTMIN to Full- Open	Closed to Full-Open
		On	High	24-v/On	VENTMIN to Full- Open	Closed to Full-Open

Table 8. Enthalpy operation with DCV (CO_2 sensor) - 1 speed fan (continued)

DCV	OA Good to economize?	Y1-I	FAN SPD	Y1-O	Occupied	Unoccupied
Above set	No	Off	High	0-v/Off	VENTMIN to VENTMAX	Closed
		On	High	24-v/On	VENTMIN L to VENTMAX	Closed
	Yes	Off	High	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	High	0-v/Off	VENTMIN to Full- Open	Closed to Full-Open
		On	High	DELAY 24-v/On	VENTMIN to Full- Open	Closed to Full-Open

Initiation of Operating Modes

The JADE controller is able to initiate the following modes: Compressor, Economizer, Fans, Heating System, and Cooling System.

Compressor mode is initiated by either the OAT going above the DRYBLB SET setting or by the thermostat initiating a call to cool when the damper is at 100 percent open. The Economizer mode is controlled by the MAT getting above the MAT SET setting while the OAT is below the DRYBLB SET setting. While the fans are not controlled by the controller, the Fan mode is dependent on what state the system is in (OCC or Y1 states will cause the damper to go to a LOW fan speed damper setting, while W state will cause the controller to open the damper to the HIGH fan speed damper setting). The Heating System mode requires an input to the AUX2-1 terminal from the thermostat, and the Cooling System mode requires an input to the Y1 IN terminals from the thermostat.

Economizer Setup and Configuration (Field and Factory Installed Option)

Before being placed into service the controller must be setup and configured for the installed system.

Important: *During setup, the economizer controller is live at all times.*

1. Using the keypad on the controller scroll through the Setpoints, System Setup, and Advanced Setup menus and verify or set/change the parameters. See Table 4, p. 14.

2. Install front filter access panel back on to unit and secure with previous screws.

Notes:

• *The W (heating mode) is not controlled by the controller but it requires the status to know where to position the outside air damper for minimum position for the fan speed.*

• *All setpoints and advanced settings are restored after any power loss or interruption.*

Enthalpy Settings

⚠ **NOTICE**
Electrostatic Discharge!
Electrostatic discharge can short equipment circuitry. Ensure that you are properly grounded before handling sensitive electronic equipment.

When the outside air temperature, enthalpy, and dew point are below the respective setpoints, the outdoor air can be used for economizing. See Figure 17, p. 20

Note: *The controller calculates the enthalpy and dew point using the outside air temperature and humidity input from the outside air sensor.*

1. There are five boundaries (setpoints ES1 through ES5), which are defined by dry bulb temperature, enthalpy and dew point. See Table 9, p. 19.

2. When conditions are below the selected boundary, the economizer sets the economizing mode to YES and economizing is available. When conditions are above the selected boundary, the conditions are not good to economize and the mode is set to NO.

Note: *When using the enthalpy (Sylk Bus) sensors, there will be a slight delay while the controller and the sensor communicate. Analog sensors do not communicate on the Sylk Bus and output a 20k ohm signal to the controller with an instantaneous response time.*

Table 9. Single enthalpy and dual enthalpy boundaries (parameters ES1 through ES5)

Enth. Curve	Temp. dry-Bulb (ºF)	Temp. dew point (ºF)	Enth. (btu/lb/da)	Point P1		Point P2	
				Temp. ºF	Humid. %RH	Temp. ºF	Humid. %RH
ES1	80.0	60.0	28.0	80.0	36.8	66.3	80.1
ES2	75.0	57.0	26.0	75.0	39.6	63.3	80.0
ES3	70.0	54.0	24.0	70.0	42.3	59.7	81.4
ES4	65.0	51.0	22.0	65.0	44.8	55.7	84.2
ES5	60.0	48.0	20.0	60.0	46.9	51.3	88.5
HL	86.0	66.0	32.4	86.0	38.9	72.4	80.3

Note: *For differential enthalpy there is a high limit boundary. The high limit boundary is ES1 when there are no stages of mechanical cooling energized and HL when a compressor stage is energized.*

Figure 17. Single enthalpy curve and boundaries
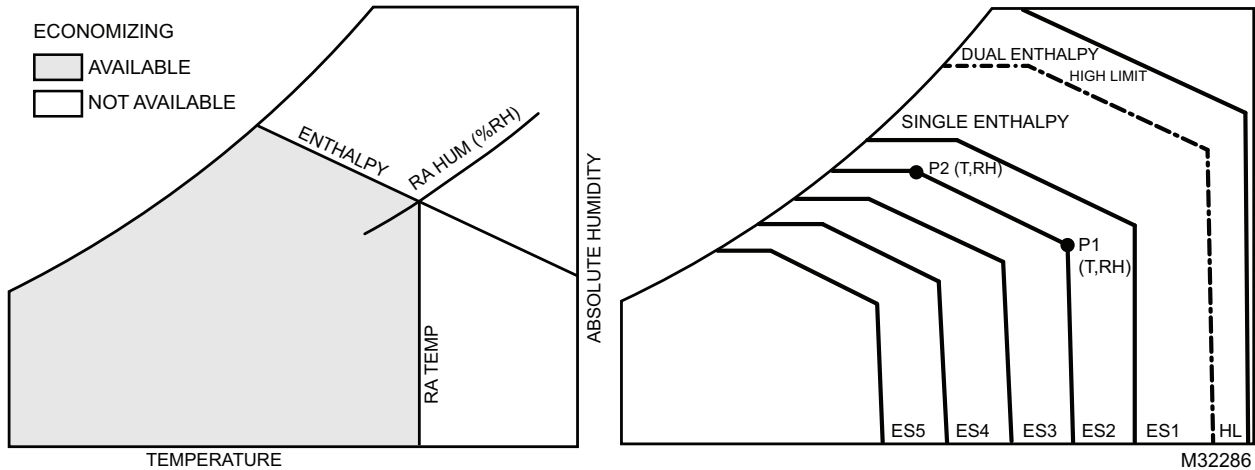
Note: *When the OA temperature, OA humidity, and the OA dew point are all below the selected boundary, the economizer sets the economizing mode to YES (economizing is available).*

Powered Exhaust

To configure the LLE controller, set EXH1 SET in the SETPOINTS menu.

CO_2 Sensor

This optional sensor can be added for Demand Control Ventilation (DCV) functionality. To configure the JADE controller, set the following parameters:

SETPOINTS Menu:

DCV SET = desired CO_2 ppm to start DCV

VENTMAX = desired maximum position w/DCV and occupied status

VENTMIN = desired minimum position w/DCV and occupied status

ADVANCED SETUP Menu:

CO_2 ZERO = set to detectors start level

CO_2 SPAN = detectors max level minus start level

Attach the sensor to the CO_2 and **R** terminals (at customer connections).

Note: *When using any 0-10 Vdc CO_2 sensor with the JADE set CO_2 ZERO to 400 ppm and the CO_2 SPAN to 1600 ppm in the ADVANCED SETUP menu.*

Occupancy Sensor

A customer-supplied occupancy sensor can also be added to provide damper control based on occupied/unoccupied conditions. To configure the JADE controller, set:

SYSTEM SETUP menu: OCC = INPUT

Attach the occupancy sensor to the OCC SENSOR wire and **R** terminal (at customer connections). The occupancy sensor must utilize a normally open contact for proper operation.

If an occupancy sensor is not used, another option to controlling occupied and unoccupied status is to use the **G** input (fan is running). Connect the G input to the OCC SENSOR wire (at customer connections). The controller will then operate in the occupied mode every time the indoor fan is running.

Checkout

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

Inspect all wiring connections at the economizer modules terminals, and verify compliance with the installation wiring diagrams.

For checkout, review the status of each configured parameter and perform the checkout tests.

Power Up

After the module is mounted and wired, apply power.

Power Up Delay

At power up (or after a power outage or brownout), the controller module begins a 5 minute power up delay before enabling mechanical cooling.

Initial Menu Display

On initial start-up, **Honeywell** displays on the first line and **Economizer W7220** on the second line. After a brief pause, the revision of the software appears on the first line and the second line will be blank.

Power Loss

All setpoints and advanced settings are restored after any power loss or interruption.

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

Status

Use the Status menu (see Table 4, p. 14) to check the parameter values for the various devices and sensors configured.

Note: *See "Controller User Interface and Keypad," p. 12" for information about menu navigation and use of the keypad.*

Checkout Tests

NOTICE
Compressor Damage!

Failure to ensure enough time for compressor start-up and shutdown between checkout tests could result in compressor damage.
Do not short-cycle compressors.

Use the Checkout menu (Table 4, p. 14) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

To perform checkout tests:

1. Scroll to the desired test in the Checkout menu using the △ and ▽ buttons.
2. Press the ↵ button to select the item.
3. **RUN?** is displayed.
4. Press ↵ to start the test.
5. The unit pauses and then displays **IN PROGRESS**.
6. When the test is complete, **DONE** appears.
7. When all parameters have been tested, press ⬆ (Menu Up) to end the test (e.g. turn off the relay).

Notes:
* *The checkout tests can all be performed at the time of installation or any time during the operation of the system.*
* *To disable economizer for functional testing (optional), use 10 mm wrench to loosen shaft coupling on actuator. After testing, securely tighten coupling onto damper shaft using minimum 120 lb-in. (13.6 Nm) to maximum 180 lb-in. (20.3 Nm) torque.*

Troubleshooting

⚠WARNING
Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

NOTICE
Compressor Damage!

Failure to ensure enough time for compressor start-up and shutdown between checkout tests could result in compressor damage.
Do not short-cycle compressors.

The economizer controller provides alarm messages that display on the 2-line LCD.

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 menu at any time.

Note: *Upon power up, the module waits 60 minutes before checking for alarms. This allows time for all the configured devices (e.g. sensors, actuator) to become operational. The exception is the MA sensor which will alarm immediately.*

Table 10. FDD troubleshooting

TESTS	Air temp. sensor failure/ fault	Not econo-mizing when it should	Econo-mizing when it should not	Damper not modula-ting	Excess outdoor air
Damper Stuck Open			x	x	x
Damper Stuck at Minimum		x		x	
Bad or Unplugged Actuator		x	x	x	
Sensor Hard Failure	x	x	x		x
Actuator Mechanically Disconnected		x	x	x	x

To Clear an Alarm

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.

1. Navigate to the desired alarm.
2. Press ↵.
3. **ERASE?** is displayed.

4. Press ⏎ .

5. **ALARM ERASED** is displayed.

6. Press ⬆ (Menu Up) to complete the action and return to the previous menu.

Note: *If an alarm still exists after you clear it, it redisplays within 5 seconds.*

Fault Detection and Diagnostics (FDD) Certification

The JADE controller is a certified FDD product (HJW10) by California Title 24, Part 6.

Figure 18. Ultra low leak economizer wiring diagram
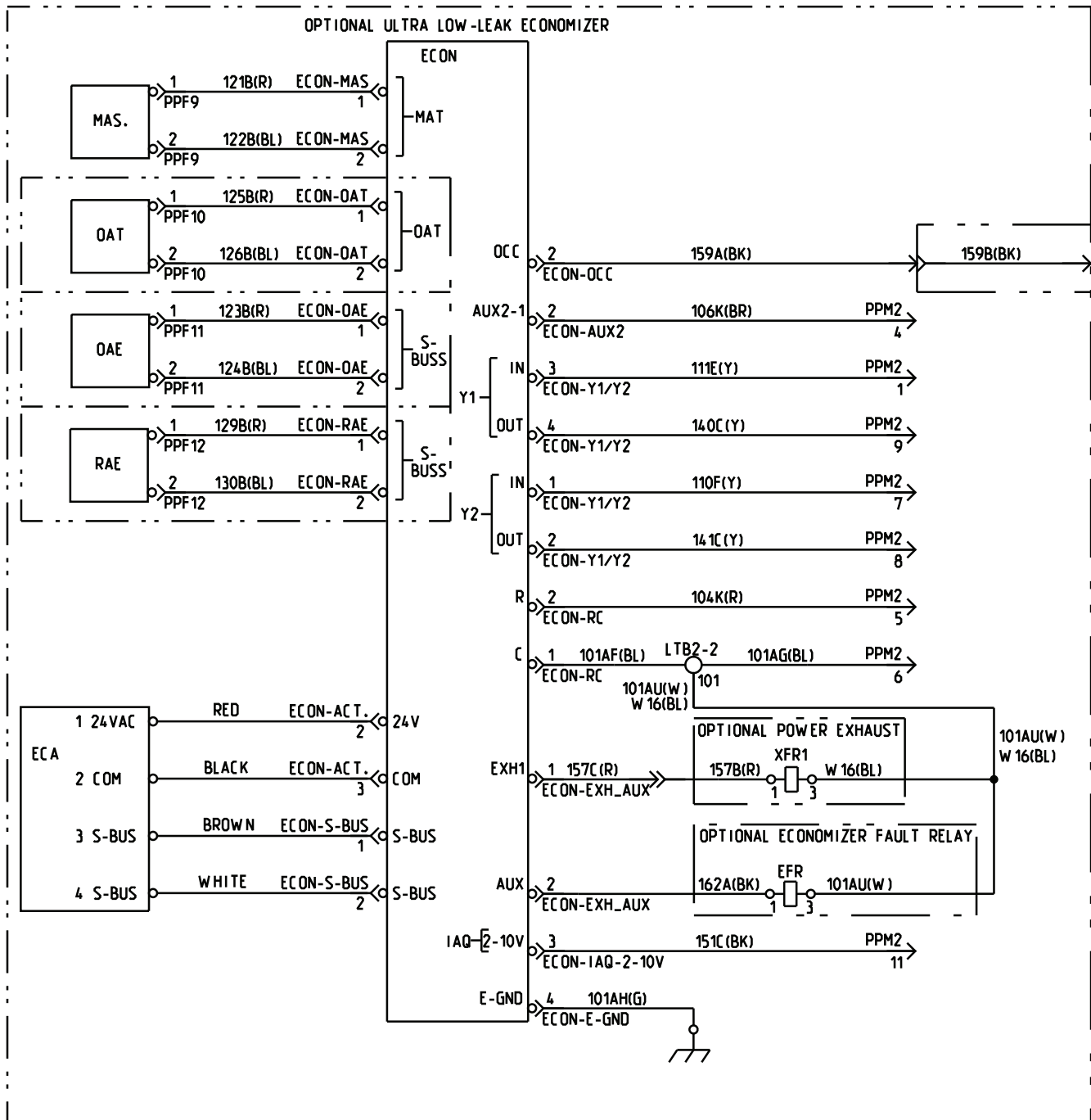
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