

Installation Instructions

0-100% Low Leak Economizer - Downflow/Horizontal

Foundation™ Packaged Cooling and
Gas/Electric
15 to 25 Tons

Model Number:	Used With
BAYECON350*	E/G*(C,D)180-300
BAYECON351*	E/G*C180-300

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-including industry replacements for CFCs and HCFCs such as saturated or unsaturated HFCs and HCFCs.

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 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.

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Revision History

Removed silicone sealant information in General Information and Installation chapters.

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General Information

Inspection

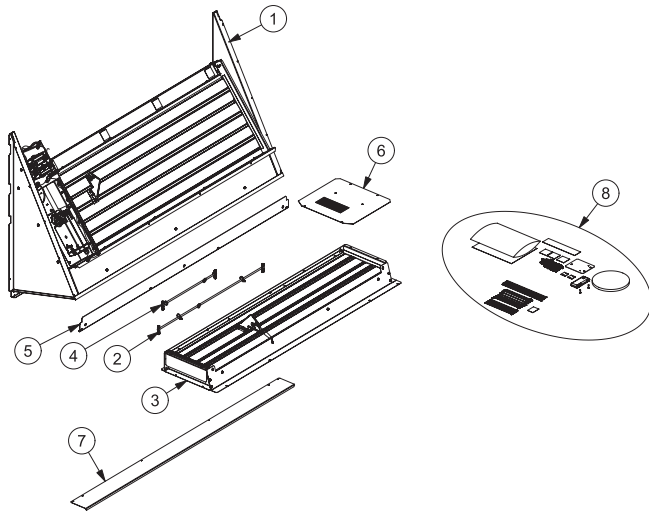
1. Unpack all components of the kit and check carefully for any shipping damage.
2. If concealed damage is discovered, stop unpacking the shipment.
3. Do not remove damaged material from the receiving location. Take photos of the damage, if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.
4. Notify the carrier's terminal of damage immediately by phone and by mail. Request an immediate joint inspection of the damage by the carrier and the consignee.

Note: Do not attempt to repair any damaged parts until the parts are inspected by the carrier's representative.

Parts List

Field Installed Option

Figure 1. Major economizer components



1. Outside Air Damper Assembly.
2. Longer Connecting Rod Assembly (for the Return Opening Closest to the Evaporator Coil).

Note: Kits for horizontal low leak economizer come with one rod only.

3. Return Air Damper Assembly.
4. Shorter Connecting Rod Assembly (for the Return Opening Farthest from the Evaporator Coil).

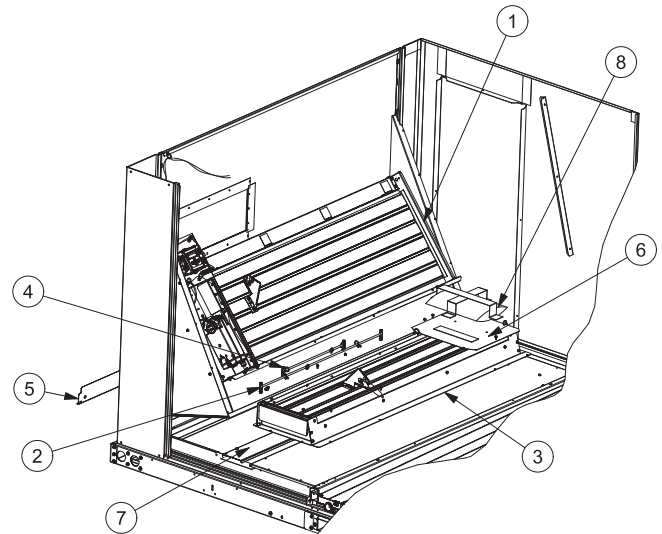
Note: Kits for horizontal low leak economizer come with one rod only.

5. Outside Air Block-off Panel.

6. Return Air Block-off Panel (Downflow kits only).
7. Rain Block-off Panel.
8. Plastic Bag Containing:
 - 1 Mixed Air Temperature Sensor
 - 34 #10-32 Screws
 - Mixed Air Temperature Sensor Mounting Bracket
 - 2 #6-32 Screws (Used to Mount Sensor)
 - Gasket Roll (1/2-inch Wide X 1/8-inch 3 Thick)
 - 3 Pieces of Aluminum Tape (2-inch Wide X 2-inch Long)
 - 1 Piece of Aluminum Tape (2-inch Wide X 9-inch Long)
 - Installation and Operation Manual
 - 7 Pop-in Wire Ties
 - 5 Wire Ties 11-inch Long
 - 1 Label
 - 2 Adhesive Backed Wire Tie Mounting Base
 - 7 Black Wire Ties

Factory Installed Option (Downflow Only)

Figure 2. Major economizer components



1. Outside Air Damper Assembly (Stowed).
2. Longer Connecting Rod Assembly (for the Return Opening Closest to the Evaporator Coil).
3. Return Air Damper Assembly (Shipping Position).
4. Shorter Connecting Rod Assembly (for the Return Opening Farthest from the Evaporator Coil).
5. Outside Air Block-off Panel (Attached to Outside Econ wall).

General Information

6. Return Block-off Panel (Shipping Position).
7. Rain Block-off Panel.
8. Plastic Bag Containing:
 - 34 #10-32 Screws
 - Gasket Roll (1/2-inch Wide X 1/8-inch Thick)
 - 3 Pieces of Aluminum Tape (2-inch Wide X 2-inch Long)
 - 1 Piece of Aluminum Tape (2-inch Wide X 9-inch Long)
 - Installation and Operation Manual

Note: *Mixed air temperature sensor and bracket are already installed in unit for factory installed option.*

Field Supplied Part

NOTICE

Corrosion Damage!

Use of non-recommended caulking/sealant could cause corrosion related failures to refrigeration components.

1 - Tube Sealant - Trane recommends Sikaflex 221 (SEL00439).

Installation

⚠ WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels 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 following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

⚠ CAUTION

Heavy Object!

Economizer weighs over 50lbs and should be installed with two people. Failure to follow instructions could result in minor to moderate injury and equipment damage.

Field Installed Option

⚠ WARNING

Hazardous Voltage with Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

NOTICE

Equipment Damage!

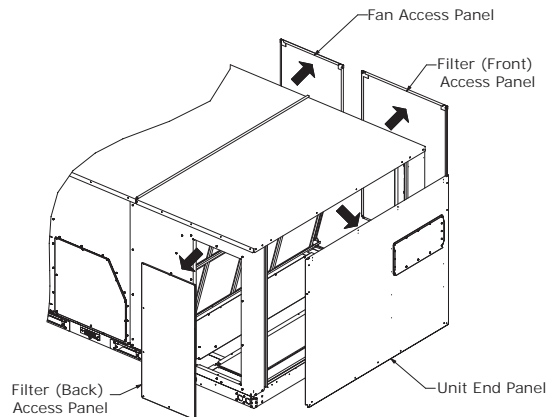
Never turn the motor shaft by hand or with a wrench. Forcibly turning the motor shaft can damage the gear train and motor beyond repair.

1. Remove the filter/fan compartment access panels and the unit end panel (evaporator end). See [Figure 3, p. 7](#).

Note: On unit end panel, inside the unit, the unit economizer's control wire harness is attached to

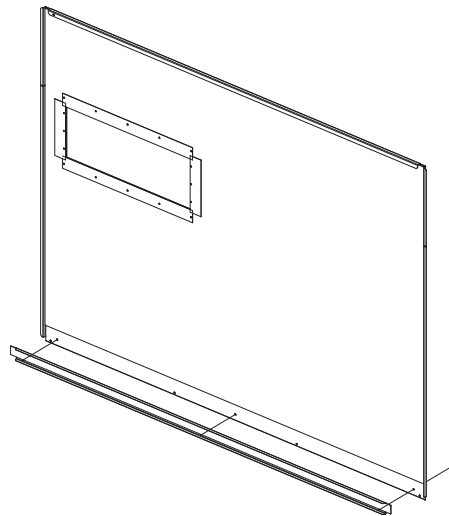
the top flange with a pop-in wire tie. This wire tie needs to be cut in order to remove the panel.

Figure 3. Remove panels



2. Remove C channel from bottom of unit end panel and discard. See [Figure 4, p. 7](#).

Figure 4. Remove channel from unit end panel



3. Install return damper - downflow configuration only (for horizontal configuration skip to [Step 4](#)):

Note: Cut the wire tie that secures the return damper blades. This wire tie goes through the hole on the bracket attached to the blade and through another hole in the return damper side.

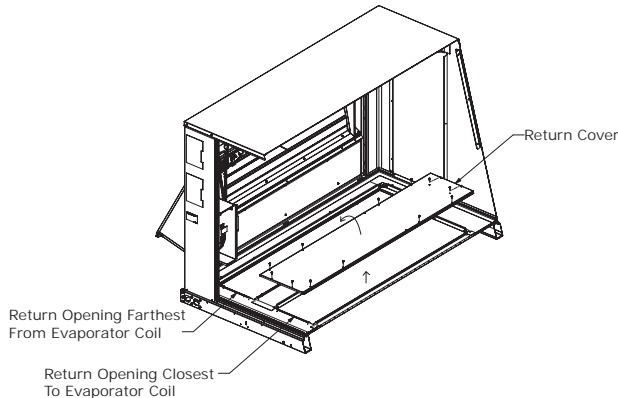
- a. The unit is shipped configured for the return opening that is farthest from the evaporator coil (with the return opening that is closest to the evaporator coil covered). Skip step "b" to use return opening farthest from the evaporator coil. See [Figure 5, p. 8](#).
- b. To use the return opening closest to the evaporator coil, remove the screws that secure the return cover

Installation

and place the return cover on the return opening farthest from the evaporator coil, then secure return cover using the previous screws. See [Figure 5, p. 8](#).

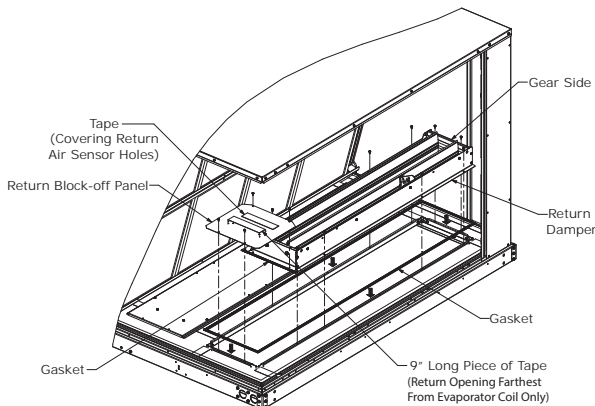
Note: The return opening that is NOT being used must have the return cover secured to this return opening.

Figure 5. Swapping return cover



- c. Using the gasket provided in kit, place the gasket on the 4 return duct opening flanges, outline the return duct opening keeping the gasket as one piece, and cut off excess gasket. Set the remainder of the gasket to the side. See [Figure 6, p. 8](#).

Figure 6. Install return damper and gasket



- d. Place return damper on the return opening with the slanted side of the damper facing the evaporator coil and the gear end towards the front access panel.
- e. With the screws provided, secure the return damper to the return duct opening flanges as illustrated in [Figure 6, p. 8](#).
- f. Using the remainder of the gasket, place gasket on the top of the return damper flange (non gear end) aligning with the edge of the flange and running the full width of the damper. See [Figure 6, p. 8](#).
- g. If barometric relief or power exhaust is not installed then install the return block-off panel to seal off the

remainder of the return duct opening. See [Figure 6, p. 8](#).

- h. Place block-off on top of the return damper flange and return duct opening flanges. Using 4 screws provided, secure return block-off to the return damper flange and return duct opening flanges as illustrated in [Figure 6, p. 8](#).
- i. When using the return opening farthest from the evaporator coil, place the 9" long piece of aluminum tape over the 2 holes in the return block-off panel that would be used to secure the return block-off panel to the return opening closest to the evaporator coil.

NOTICE

Equipment Damage!

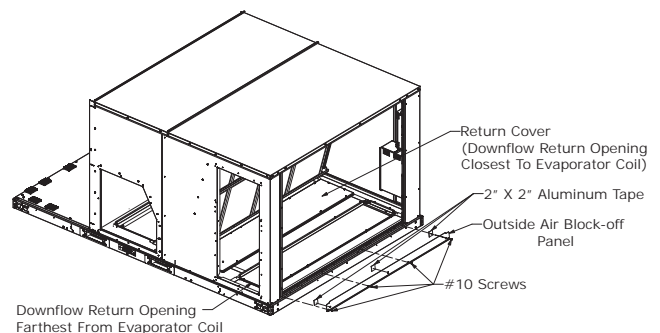
Electrostatic discharge can short equipment circuitry. Ensure that you are properly grounded before handling the sensor.

Note: If using optional comparative enthalpy, set DIP switch settings on sensor to RA per label on sensor. Secure return air sensor to the bottom of the return block-off plate, insert bushing, and connect/route return air wire harness before securing the return block-off plate to the return damper and return duct opening.

4. Install outside air damper assembly:
 - a. Using the 3 pre-cut pieces of the 2" X 2" aluminum tape, place one piece over each one of the 3 big holes in the outside air block off (item 5).
 - b. Attach outside air block off (item 5) to unit using four screws as illustrated in [Figure 7, p. 8](#).

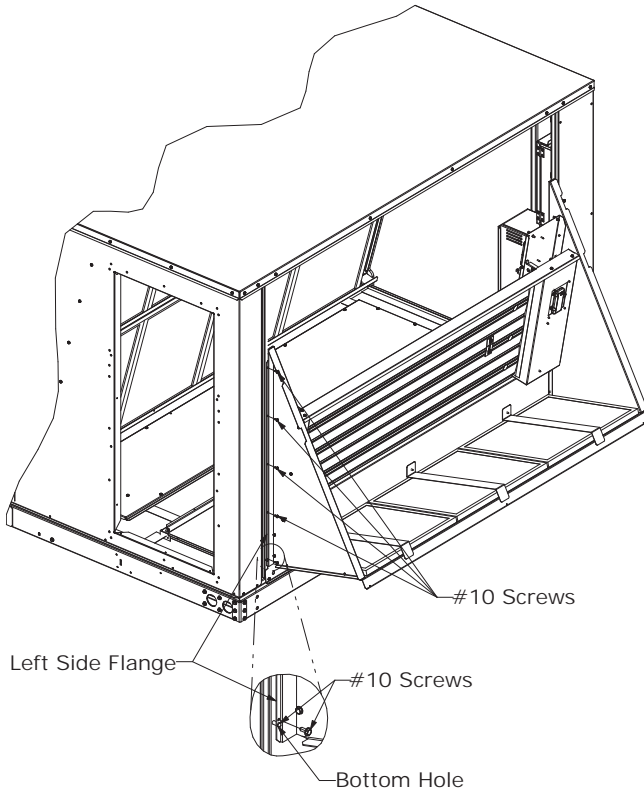
Note: The block-off is designed to close the opening created between the economizer and the base, when the economizer assembly is in its operating position.

Figure 7. Install outside air block-off



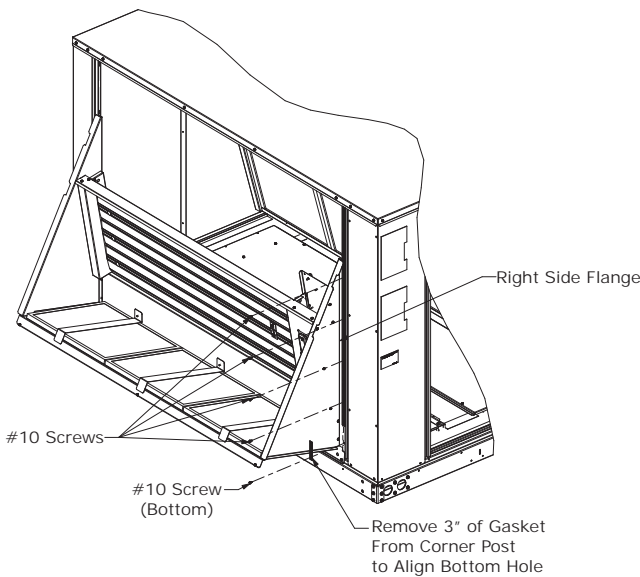
- c. Position the left side flange (side with no actuator) on the outside air damper in front of the corner post flange. This outside air damper flange would be on the outside of the unit. See [Figure 8, p. 9](#).

Figure 8. Install left side of outside air damper



d. Position the right side flange (side with actuator) on the outside air damper in back of the corner post flange. This outside air damper flange would be on the inside of the unit. See Figure 9, p. 9.

Figure 9. Install right side flange of outside air damper



e. With the screws provided, use one screw to secure the bottom left side of the economizer assembly by inserting the screw through the clearance hole in

the economizer assembly and into the engagement hole of the corner post. See Figure 8, p. 9.

- f. Pull up gasket on the bottom of the corner post flange for the outside air damper right side flange to locate clearance holes on corner post.
- g. Using one screw, secure the bottom right hand side of the economizer assembly by inserting the screw through the clearance hole in the corner post and into the engagement hole in the economizer assembly. See Figure 9, p. 9.
- h. Then using 4 screws per side, secure the left hand side and right hand side of the outside air damper as illustrated in Figure 8, p. 9 and Figure 9, p. 9.

Note: Horizontal Configuration Only: If using optional comparative enthalpy, set DIP switch settings on sensor to RA per label on sensor. Secure return air sensor to the provided plate on the horizontal damper connect/route sensor wire harness.

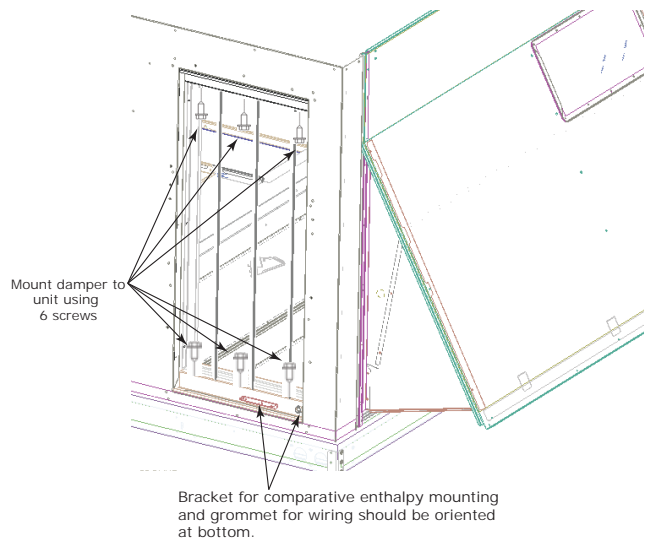
5. Install Return Damper - horizontal configuration only (for downflow configuration, skip to Step 6):

Note: Cut the wire tie that secures the return damper blades. This wire tie goes through the hole on the bracket attached to the blade. Both of the downflow return openings should be covered using the unit horizontal conversion kit.

- a. Place the gasket provided in kit on the top and bottom duct opening keeping the gasket as one piece, and cut off excess gasket.
- b. Secure the return damper with the 6 screws provided to the return duct opening flanges as illustrated in Figure 10, p. 9.

Note: This damper can be installed from either inside or outside the unit; so it can be done before or after duct installation.

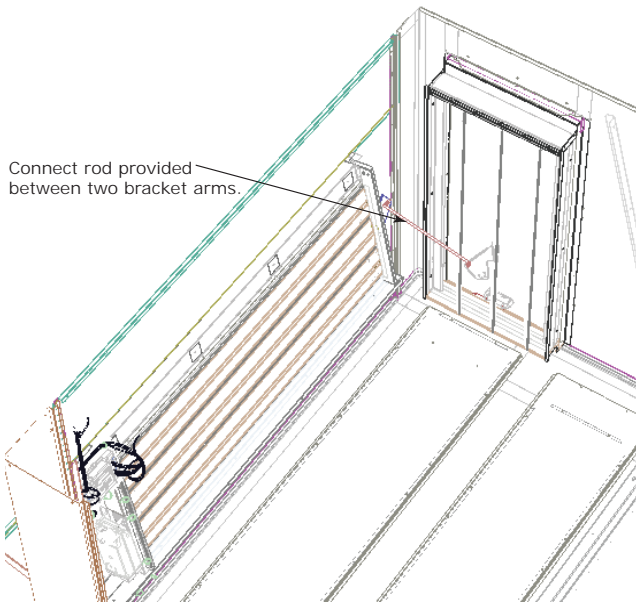
Figure 10. Secure return damper



Installation

- c. If not using comparative enthalpy use the provided aluminum tape to cover the bushing shown in [Figure 10, p. 9](#).
- d. Secure the connecting rod between the return and fresh air assemblies as shown in [Figure 11, p. 10](#). Torque to 80-100 in-lbs.

Figure 11. Secure connecting rod



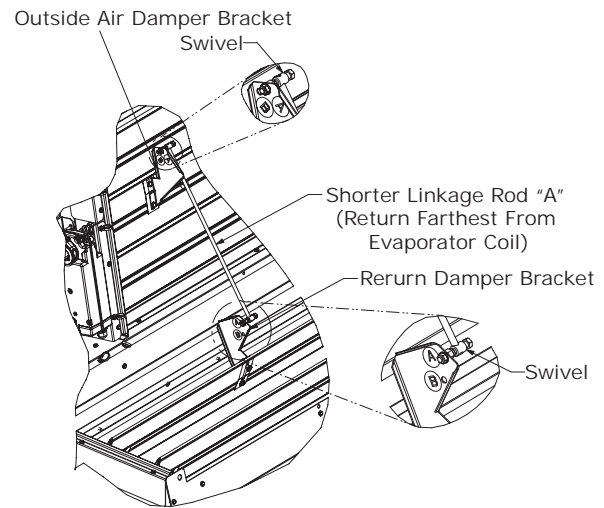
6. Attach connecting rod to dampers - downflow configuration only:

Note: Connecting rods are secured to the side of the return damper with wire ties for shipping. Cut and remove wire ties.

Note: The length of the rod in relation to the swivel is set to the required length needed to achieve a damper blade opening angle of 70 degrees on the outdoor air damper and a damper blade opening angle of 75 degrees on the return air damper.

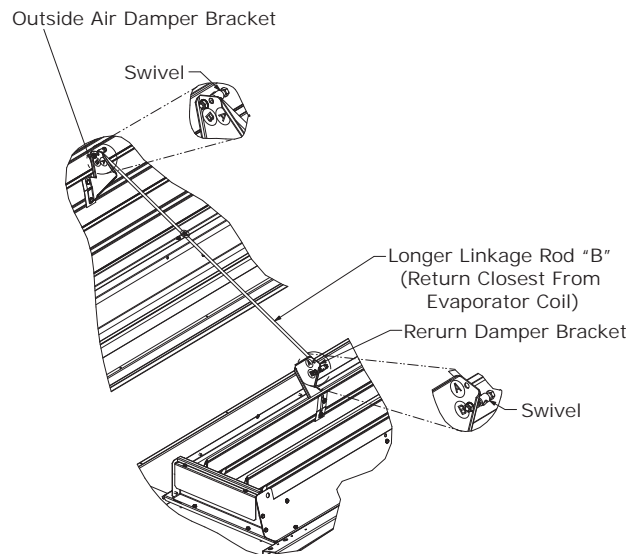
- a. For the downflow return opening farthest from the evaporator coil: Assemble the shorter connecting rod labeled "A" to bracket on return damper. Remove nut from end of swivel on connecting rod and place in hole on return bracket labeled "A". Secure nut back on to swivel (torque nut to 80-100 in-lbs). See [Figure 12, p. 10](#).

Figure 12. Attach connecting rod (return opening farthest from evaporator coil)



- b. For the downflow return opening closest to the evaporator coil: Assemble the longer connecting rod labeled "B" to bracket on return damper. Remove nut from end of swivel on connecting rod and place in hole on return bracket labeled "B". Secure nut back on to swivel (torque nut to 80-100 in-lbs). See [Figure 13, p. 10](#).

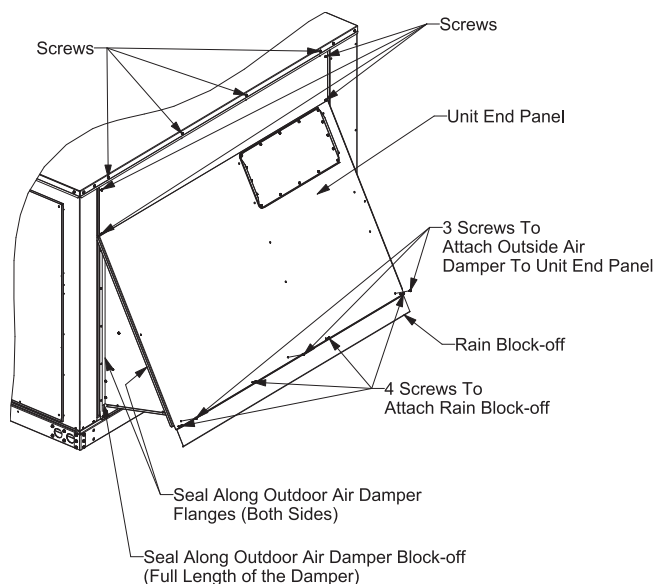
Figure 13. Attach connecting rod (return opening closest to evaporator coil)



- c. For the return opening farthest from the evaporator coil: Assemble the other end of the shorter connecting rod labeled "A" to the bracket on the outdoor air damper. Remove the nut from the end of swivel on connecting rod and place in hole on outdoor air damper bracket labeled "A". Secure nut back on to swivel (torque nut to 80-100 in-lbs). See [Figure 12, p. 10](#).

- d. For the return opening closest to the evaporator coil: Assemble the other end of the longer connecting rod labeled "B" to the bracket on the outdoor air damper. Remove the nut from the end of swivel on connecting rod and place in hole on outdoor air damper bracket labeled "B". Secure nut back on to swivel (torque nut to 80-100 in-lbs). See [Figure 13, p. 10](#).
7. Place end panel on to the outdoor air damper with the top of the panel behind the unit roof. Using 3 screws (provided) secure the end panel to the outdoor air damper. Using the previous screws (from [Step 1](#)) secure the end panel to the corner posts on both sides and the unit roof as illustrated in [Figure 14, p. 11](#).
8. Place rain block-off panel with flange pointing towards unit, on the inside of the unit end panel and secure with 4 screws passing through the clearance holes on the unit end panel into the engaging holes on rain block-off. See [Figure 14, p. 11](#).

Figure 14. End panel install and sealing



9. Using field supplied silicone sealant, seal all seams, cracks and gaps as illustrated in [Figure 14, p. 11](#).

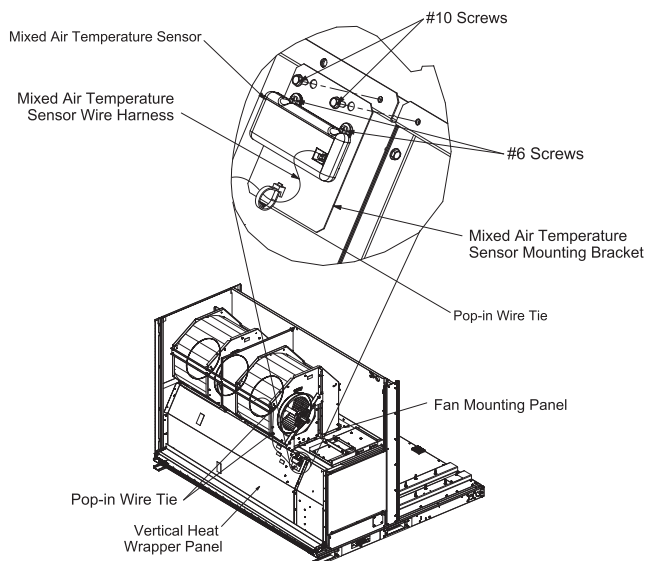
NOTICE

Equipment Damage!

Electrostatic discharge can short equipment circuitry. Ensure that you are properly grounded before handling the sensor.

10. Install mixed air sensor:
 - a. Remove mixed air sensor, 2 #6 screws, and bracket from kit bag (item 7). Attach mixed air sensor to mixed air sensor bracket using the 2 screws. [Figure 15, p. 11](#).

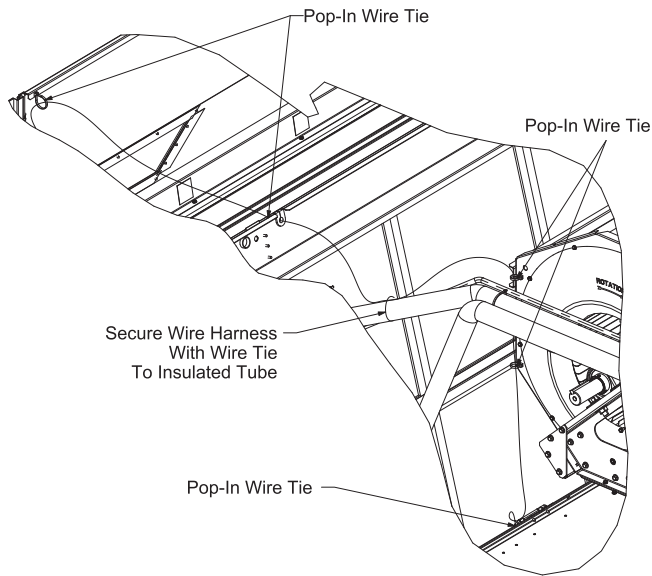
Figure 15. Install mixed air temperature sensor



- b. In the indoor fan compartment, remove the 2 screws from the vertical heat wrapper panel. See [Figure 15, p. 11](#).
- c. Align holes in bracket with holes in vertical heat wrapper panel. Using the 2 screws removed in previous step, secure the mixed air sensor panel.
- d. Remove the pop-in and 11-inch long wire ties from the kit bag.
- e. Locate the mixed air sensor wire harness that is attached to the economizer controller MAT pin and bundled with the economizer control wires. Remove mixed air sensor wire harness from bundle.
- f. Leaving the one end connected to the MAT pin on the controller, route the mixed air sensor wire harness through the bushing located at the top of the evaporator coil and connect to the sensor. See [Figure 16, p. 12](#).

Installation

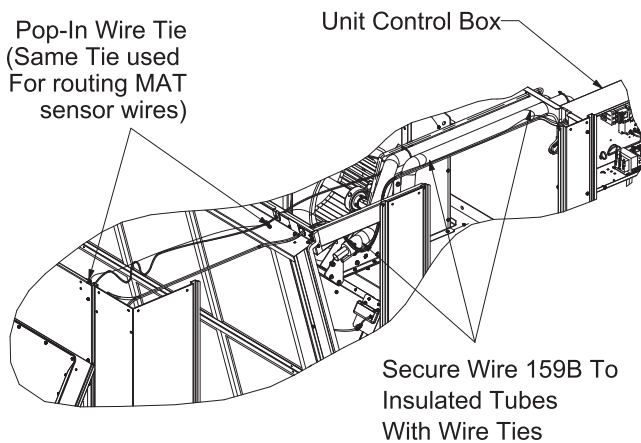
Figure 16. Wire routing



11. Locate occupancy sensor wire 159B (bundled at economizer controller). Route wire along defined path as shown in [Figure 17, p. 12](#), to the low voltage section of the unit control box per unit wiring diagram.

Note: Wire 159B can be disconnected from wire 159A (which connects to the economizer controller) for wire routing purposes. Connect wire 159B back together with 159A, after routing wire.

Figure 17. Wire routing for occupancy sensor



12. Connect occupancy sensor to wire 159B and terminal block per unit wiring diagram. See [Figure 18, p. 12](#)

Figure 18. Occupancy wiring connections (Applicable for E/GA Models)

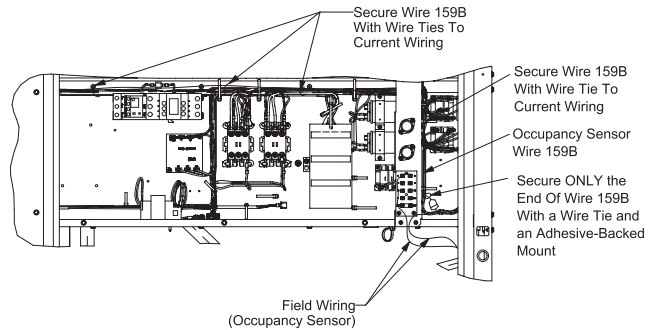
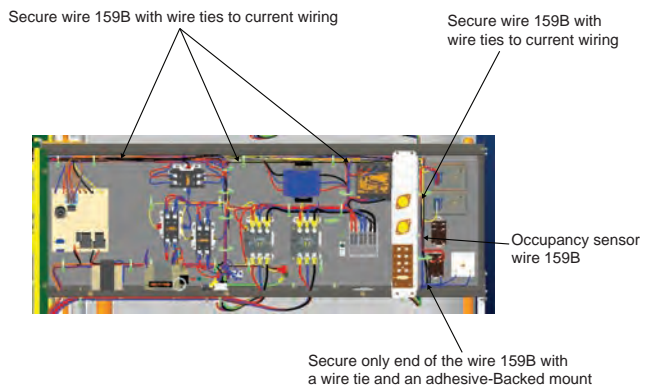


Figure 19. Occupancy wiring connection (Applicable for E/GB Models)

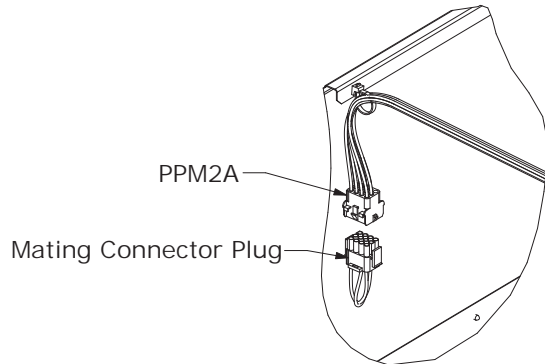


13. Place pop-in wire ties, 3 of the 11" long wire ties, adhesive backed wire tie mount, and 3 standard wire ties in the areas specified to secure the occupancy sensor wire (159B) and MAT sensor wire harness. See [Figure 16, p. 12](#), [Figure 17, p. 12](#) and [Figure 18, p. 12](#). Route wires through wire ties, away from moving parts, sharp edges, and hot tubes. Bundle any excess wire using additional wire ties provided.

14. Place back access panel and fan access panel on to unit and secure using previous screws.

15. Locate unit economizer control wiring harness plug PPM2A. The plug is located in the upper front section of the return air (attached to unit end panel). Remove the mating connector plug and connect PPM2A to the economizer wire harness. See [Figure 20, p. 13](#).

Figure 20. Remove mating connector plug



16. Connect economizer fault relay (EFR) to smart thermostat:

- a. Locate economizer fault relay (EFR) wire harness (wires 163B and 164B near customer connections terminal strip). Strip 163A and 164A wires and individually wirenut them to the two fault input wires from the smart 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.

Figure 21. Economizer fault relay routing

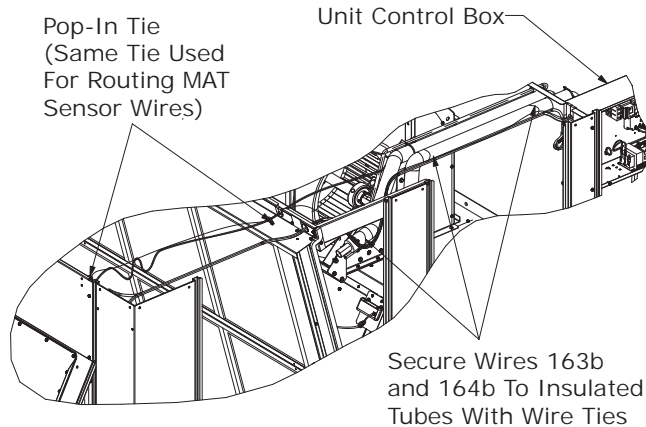
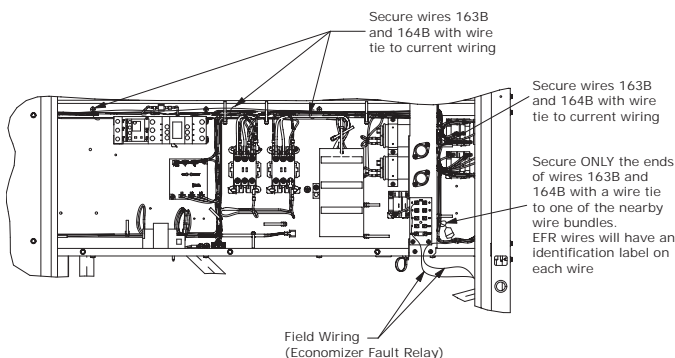


Figure 22. Economizer fault wiring connections



- b. 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. Consult thermostat's user manual for detailed instructions.
- c. Configure the thermostat's Wi-Fi for connection to the internet. Consult thermostat's user manual for detailed instructions.

Factory Installed Option (Field Set Up, Downflow Only)

⚠ WARNING

Hazardous Voltage with Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

NOTICE

Equipment Damage!

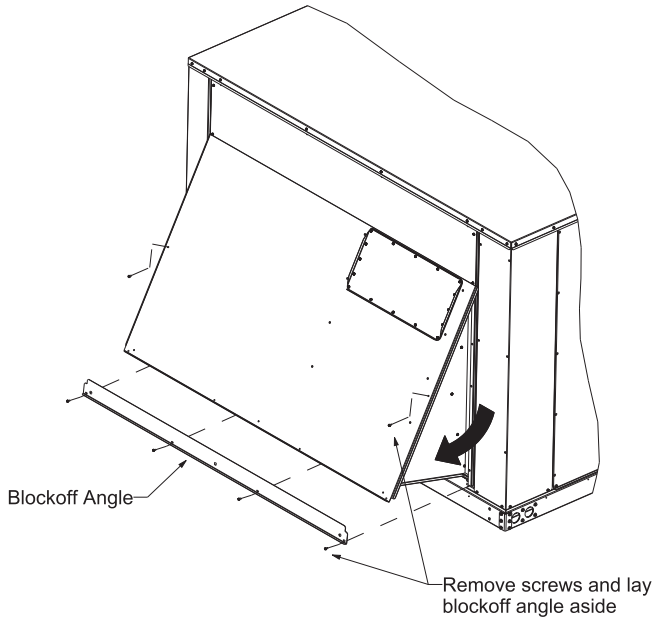
Never turn the motor shaft by hand or with a wrench. Forcibly turning the motor shaft can damage the gear train and motor beyond repair.

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

1. Remove the front and back filter compartment access panels.
2. Remove the lower row of screws and the 2 screws in the middle of the unit end panel. See [Figure 23, p. 14](#). Lay block-off angle aside for later installation.

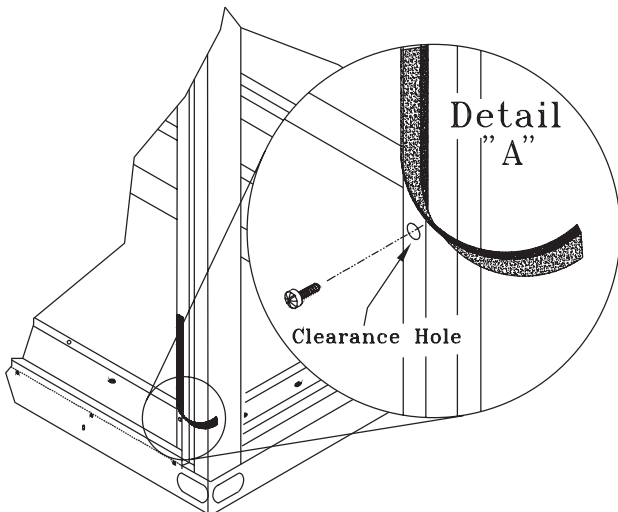
Installation

Figure 23. Pull economizer assembly outward



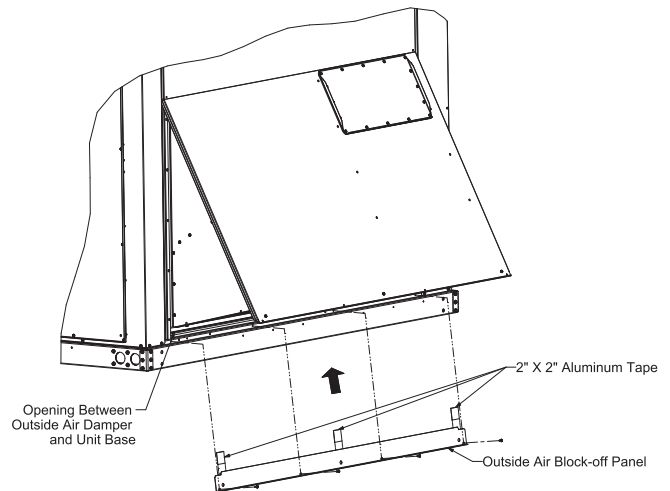
3. Do not remove the 4 screws in the upper rows of the end panel.
4. Grasp the bottom of the end panel and pull the economizer assembly outward into the operating position. See [Figure 23, p. 14](#).
5. Remove approximately 3" of gasket material from the bottom of each corner post to expose the holes used to attach the economizer assembly to the unit. See [Figure 24, p. 14](#).
6. With the screws provided, secure each side of the economizer assembly by inserting a screw through the clearance hole in the bottom of the corner post and into the engagement hole in the economizer assembly. Refer to [Figure 24, p. 14](#).

Figure 24. Remove gasket material



7. Install the outside air block-off panel underneath the outside air damper. Refer to [Figure 25, p. 14](#). The blockoff angle is designed to close the opening created between the outside air damper and the base when the economizer assembly is in its operating position.
 - a. Using the 3 pre-cut pieces of the 2" X 2" aluminum tape (from installers bag), place one piece over each one of the 3 big holes in the outside air block off panel.
 - b. Holding the outside air block-off panel with the holes at the bottom and the bottom flange outward, tilt the top forward and insert it into the opening between the economizer and the unit base.
 - c. Press the bottom of the outside air block-off panel against the unit base and line up the holes. Using the provided screws, secure it into place.

Figure 25. Outside air block-off installation



8. Install the rain block-off panel on to the unit end panel.
 - a. Remove the screws that are securing the rain block-off from it's shipping position within the unit to the return duct opening flanges. See [Figure 2, p. 5](#).
 - b. Place rain block-off panel with flange pointing towards the unit, on the inside of the unit end panel and secure with 4 screws passing through the clearance holes on the unit end panel into the engaging holes on rain block-off. See [Figure 14, p. 11](#).
9. Install return damper:

Note: Cut the wire tie that secures the return damper blades. (This wire tie goes through the hole on the bracket attached to the blade and through another hole in the damper side.)

- a. The unit is shipped with the return damper secured to the top of the return cover (return opening closest to the evaporator coil).
- b. Remove the screws that secured the return damper. Cut 3 wire ties that secured the return block-off

panel to the top of the return damper and set the block-off panel to the side.

- c. The unit is shipped configured for the return opening that is farthest from the evaporator coil (with the return opening that is closest to the evaporator coil covered). Skip step "d" to use return opening farthest from the evaporator coil.
- d. To use the return opening closest to the evaporator coil, remove the screws that secure the return cover and place the return cover on the return opening farthest from the evaporator coil, then secure return cover using the previous screws. See [Figure 5, p. 8](#).

Note: *The return opening that is NOT being used must have the return cover secured to the return opening.*

- e. Using the gasket provided (in the shipping bag item 7), place the gasket on the 4 return duct opening flanges, out line the return duct opening keeping the gasket as one piece, and cut off excess gasket. Set the remainder of the gasket to the side. See [Figure 6, p. 8](#).
- f. Place return damper on the return opening with the slanted side of the damper facing the evaporator coil and the gear end towards the front access panel.
- g. With the screws provided, secure the return damper to the return flanges as illustrated in [Figure 6, p. 8](#).
- h. Using the remainder of the gasket, place gasket on the top of the return damper flange (non gear end) aligning with the edge of the flange and running the full width of the damper. See [Figure 6, p. 8](#).
- i. If barometric relief or power exhaust is not installed then install the return block-off panel to seal off the remainder of the return duct opening. [Figure 6, p. 8](#).
- j. Place block-off on top of the return damper flange and return duct opening flanges. Using 4 screws provided, secure return block-off to the return damper flange and return duct opening flanges as illustrated in [Figure 6, p. 8](#).

NOTICE

Equipment Damage!

Electrostatic discharge can short equipment circuitry. Ensure that you are properly grounded before handling the sensor.

Note: *If unit has optional comparative enthalpy installed, verify the dip switch settings on the return air sensor (attached to return block-off panel) are set to RA per the label on sensor. Route return air sensor wire harness through bushing and connect to sensor before securing the return block-off plate to the return damper and return duct opening flanges.*

10. Attach connecting rod to dampers:

Notes:

- *Connecting rods are secured to the side of the return damper with wire ties for shipping. Cut and remove wire ties.*
 - *The length of the rod in relation to the swivel is set to the required length needed to achieve a damper blade opening angle of 70 degrees on the outdoor air damper and a damper blade opening angle of 75 degrees on the return air damper.*
 - a. For the return opening farthest from the evaporator coil: Assemble the shorter connecting rod labeled "A" to bracket on Return damper. Remove nut from end of swivel on connecting rod and place in hole on return bracket labeled "A". Secure nut back on to swivel (torque nut to 80-100 in-lbs). See [Figure 12, p. 10](#).
 - b. For the return opening closest to the evaporator coil: Assemble the longer connecting rod labeled "B" to bracket on Return damper. Remove nut from end of swivel on connecting rod and place in hole on return bracket labeled "B". Secure nut back on to swivel (torque nut to 80-100 in-lbs). See [Figure 13, p. 10](#).
 - c. For the return opening farthest from the evaporator coil: Assemble the other end of the shorter connecting rod labeled "A" to the bracket on the outdoor air damper. Remove the nut from the end of swivel on connecting rod and place in hole on outdoor air damper bracket labeled "A". Secure nut back on to swivel (torque nut to 80-100 in-lbs). See [Figure 12, p. 10](#).
 - d. For the return opening closest to the evaporator coil: Assemble the other end of the longer connecting rod labeled "B" to the bracket on the outdoor air damper. Remove the nut from the end of swivel on connecting rod and place in hole on outdoor air damper bracket labeled "B". Secure nut back on to swivel (torque nut to 80-100 in-lbs). See [Figure 13, p. 10](#).
11. Using field supplied silicone sealant, seal all seams, cracks and gaps around the outdoor air damper as illustrated in [Figure 14, p. 11](#).
 12. Place back filter access panel on to unit and secure using previous screws.
 13. Locate Occupancy sensor wire 159B (located in the low voltage section of the unit control box). Connect occupancy sensor to wire 159B and terminal block per unit wiring diagram. See [Figure 18, p. 12](#).
 14. Locate unit wiring harness plug PPM2A. The plug is located in the upper front section of the return air (attached to unit end panel). Remove the mating connector plug and connect PPM2A to the economizer wire harness. See [Figure 20, p. 13](#).

Mist Eliminator Servicing

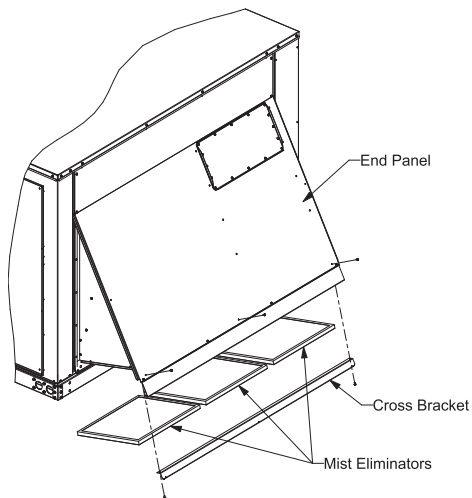
NOTICE

Equipment Damage!

Do not attempt to clean mist eliminators with the screws still installed in the outside air damper. This could result in equipment damage.

1. Remove the 3 screws from the bottom of the end panel that secure the bottom cross bracket on the outdoor air damper.
2. Remove 1 screw from each side on the bottom of the outdoor air damper to remove the cross bracket.
3. Set bracket to the side and remove mist eliminators.
4. Clean mist eliminators.
5. Insert mist eliminators and reinstall the cross bracket.
6. Secure cross bracket with a screw on each side from the bottom and the 3 screws for the end panel.

Figure 26. Mist eliminator removal



Economizer Controller

NOTICE

Equipment Damage!
 Electrostatic discharge can short equipment circuitry. Ensure that you are properly grounded before handling the sensor.

Notes:

- Upon 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 it is removed during the set up mode the controller will ACC-SVN178G-EN 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 4-button keypad on the front of the economizer module. The LCD is a 16 character by 2 line dot matrix display.

Figure 27. Controller user interface and keypad

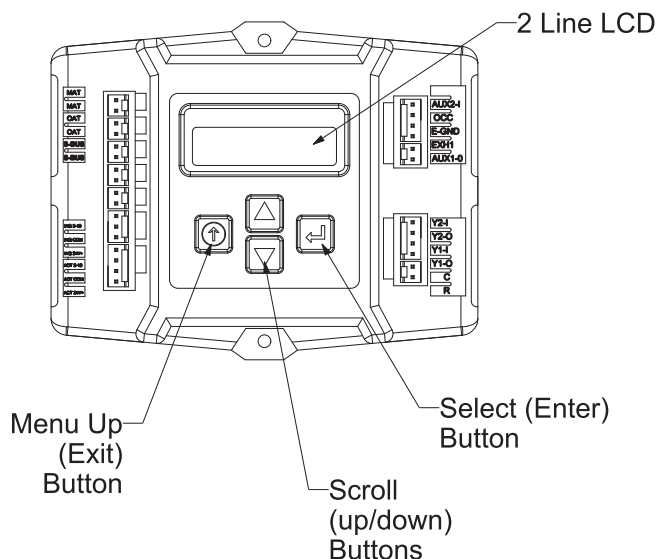


Table 1. Economizer module - left hand terminal blocks







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 bottom pin is not used



Table 2. 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)

Economizer Controller

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 3, p. 19 illustrates the complete hierarchy. Your menu parameters will be different depending on your configuration. For example if you do not have a DCV (CO₂) sensor, then none of the DCV parameters appear and only MIN POS will display. If you have a CO₂ sensor, the DCV MIN and DCV MAX will appear AND if you have 2 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 3. 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 1 st 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	ON/OFF	N/A	Y2-I signal from space thermostat or unitary controller for second stage cooling ON = 24 Vac on term Y2-I OFF = 0 Vac on term Y2-I
	COOL Y2-OUT ^(c)	OFF	ON/OFF	N/A	Cool Stage 2 Relay Output to mechanical cooling (Y2-OUT terminal)
	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 CO2 ^(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

Economizer Controller

Table 3. Controller menu structure (continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment ^(a)	Parameter Recommended Value ^(b)	Notes
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
SETPOINTS	MAT SET ^(c)	53°F	38 to 70 °F; increment by 1	53°F	The economizer will modulate the OA damper to maintain the mixed air temperature at the setpoint
	LOW T LOCK ^(c)	32°F	-45 to 80 °F; increment by 1	32°F	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 and Y2-O will not be energized on the controller
	DRYBLB SET ^(c)	63°F	48 to 80 °F; increment by 1	67°F	Setpoint determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.: at 63°F setpoint unit will economize at 62°F and below and not economize at 64 °F and above. There is a 2°F 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	32°F	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%	

Table 3. Controller menu structure (continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment(a)	Parameter Recommended Value(b)	Notes
SETPOINTS	EXH2 SET	75%	0 to 100%; increment by 1	N/A	EXH2 SET is not available
SYSTEM SETUP	INSTALL(c)	1/1/2011		Present date	Display order = MM/DD/YY Setting order = DD, MM, then YY
	UNITS DEG(c)	°F	°F or °C	°F	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 Inch
	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)	45°F	35 to 55 °F; increment by 1°	45°F	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)
	CO2 ZERO(c)	0ppm	0 to 500 ppm; increment by 10	0ppm	CO2 ppm level to match CO2 sensor start level. 0-10 Vdc CO2 sensors require CO2 ZERO to be 400.
	CO2 SPAN(c)	2000ppm	1000 to 3000 ppm; increment by 50	2000ppm	CO2 ppm span to match CO2 sensor; e.g.; 500-1500 sensor output would be 500 CO2 zero and 1000 CO2 span. 0-10 Vdc CO2 sensors require CO2 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

Economizer Controller

Table 3. 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, Y2-O, EXH1, etc. will shut off
	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°	(+/-2.5F°)	0.0 F°	Allows for the operator to adjust for an out of calibration temperature sensor
	OA T CAL ^(c)	0.0 F°	(+/-2.5F°)	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°	(+/-2.5F°)	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°	(+/-2.5F°)	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 "Equipment Damage!," p. 28
	CONNECT Y2-O ^(c)	N/A	N/A	N/A	Closes the Y2-O relay (Y2-O). See "Equipment Damage!," p. 28
	CONNECT AUX1-O ^(c)	N/A	N/A	N/A	CONNECT AUX1 O is not available.
	CONNECT EXH1 ^(c)	N/A	N/A	N/A	Closes the power exhaust fan 1 relay (EXH1)

Table 3. Controller menu structure (continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment ^(a)	Parameter Recommended Value ^(b)	Notes
ALARMS() ^(e)	MAT SENS ERR	N/A	N/A	N/A	
	CO2 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 an alarm, a 24Vac output is generated
	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 4. Dry bulb operation no DCV (CO₂ sensor) - 1 speed fan

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
None	No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
		On	On	High	24-v/On	24-v/On	MIN POS	Closed
None	Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS to Full- Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off ^(a)	MIN POS to Full- Open	Closed to Full-Open

(a) With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on 2nd stage of mechanical cooling Y2 -O after the delay if the call for Y1-I and Y2-I have not been satisfied.

Table 5. Dry bulb operation with DCV (CO₂ sensor) - 1 speed fan

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
Below CO ₂ set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full- Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off ^(a)	VENTMIN to Full- Open	Closed to Full-Open

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Table 5. Dry bulb operation with DCV (CO₂ sensor) - 1 speed fan (continued)

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
Above CO ₂ set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN to VENTMAX	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full- Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off(a)	VENTMIN to Full- Open	Closed to Full-Open

(a) With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on 2nd stage of mechanical cooling Y2 -O after the delay if the call for Y1-I and Y2-I have not been satisfied.

Table 6. Enthalpy operation no DCV (CO₂ sensor) - 1 speed fan

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
None	No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
		On	On	High	24-v/On	24-v/On	MIN POS	Closed
None	Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS to Full- Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off(a)	MIN POS to Full- Open	Closed to Full-Open

(a) With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on 2nd stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

Table 7. Enthalpy operation with DCV (CO₂ sensor) - 1 speed fan

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
Below set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full- Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off(a)	VENTMIN to Full- Open	Closed to Full-Open

Table 7. Enthalpy operation with DCV (CO₂ sensor) - 1 speed fan (continued)

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
Above set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H to VENTMAX	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full- Open	Closed to Full-Open
		On	On	High	DELAY (b) 24-v/On	0-v/Off(a)	VENTMIN to Full- Open	Closed to Full-Open

(a) With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on 2nd stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

Table 8. Dry bulb operation no DCV (CO₂ sensor) - 2 speed fan

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
None	No	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	24-v/On	0-v/Off	MIN POS L	Closed
		On	On	High	24-v/On	24-v/On	MIN POS H	Closed
None	Yes	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	0-v/Off	0-v/Off	MIN POS L to Full- Open	Closed to Full-Open
		On	On	High	DELAY 24-v/On(a)	0-v/Off(b)	MIN POS H to Full- Open	Closed to Full-Open

(a) With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

(b) With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on 2nd stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

Table 9. Dry bulb operation with DCV (CO₂ sensor) - 2 speed fan

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
Below set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	Low	0-v/Off	0-v/Off	VENTMIN L to Full- Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off(a)	VENTMIN H to Full- Open	Closed to Full-Open

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Table 9. Dry bulb operation with DCV (CO₂ sensor) - 2 speed fan (continued)

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
Above set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H to VENTMAX	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	Low	0-v/Off	0-v/Off	VENTMIN L to Full-Open	Closed to Full-Open
		On	On	High	DELAY 24-v/On ^(b)	0-v/Off ^(a)	VENTMIN H to Full-Open	Closed to Full-Open

(a) With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on 2nd stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

(b) With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

Table 10. Enthalpy operation no DCV (CO₂ sensor) - 2 speed fan

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
NO CO ₂ SENSOR	No	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	24-v/On	0-v/Off	MIN POS L	Closed
		On	On	High	24-v/On	24-v/On	MIN POS H	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	0-v/Off	0-v/Off	MIN POS L to Full-Open	Closed to Full-Open
		On	On	High	DELAY 24-v/On ^(a)	0-v/Off ^(b)	MIN POS H to Full-Open	Closed to Full-Open

(a) With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

(b) With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on 2nd stage of mechanical cooling Y2 -O after the delay if the call for Y1-I and Y2-I have not been satisfied.

Table 11. Enthalpy operation with DCV (CO₂ sensor) - 2 speed fan

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
Below set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L	Closed
		On	Off	Low	0-v/Off	0-v/Off	VENTMIN L to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off ^(a)	VENTMIN H to Full-Open	Closed to Full-Open

Table 11. Enthalpy operation with DCV (CO₂ sensor) - 2 speed fan (continued)

DCV	OA Good to economize?	Y1-I	Y2-I	FAN SPD	Y1-O	Y2-O	Occupied	Unoccupied
Above set	No	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	Low	24-v/On	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H to VENTMAX	Closed
	Yes	Off	Off	Low	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	Low	0-v/Off	0-v/Off	VENTMIN L to Full-Open	Closed to Full-Open
		On	On	High	DELAY 24-v/On ^(b)	0-v/Off ^(a)	VENTMIN H to Full-Open	Closed to Full-Open

(a) With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on 2nd stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.
 (b) With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

Initiation of Operating Modes

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

The 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% 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 Y2 or W states 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 Y2 IN and/or the Y1 IN terminals from the thermostat.

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.

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 3, p. 19](#).
2. Install front filter access panel back on to unit and secure with previous screws.

Enthalpy Settings

NOTICE

Equipment Damage!
 Electrostatic discharge can short equipment circuitry. Ensure that you are properly grounded before handling the sensor.

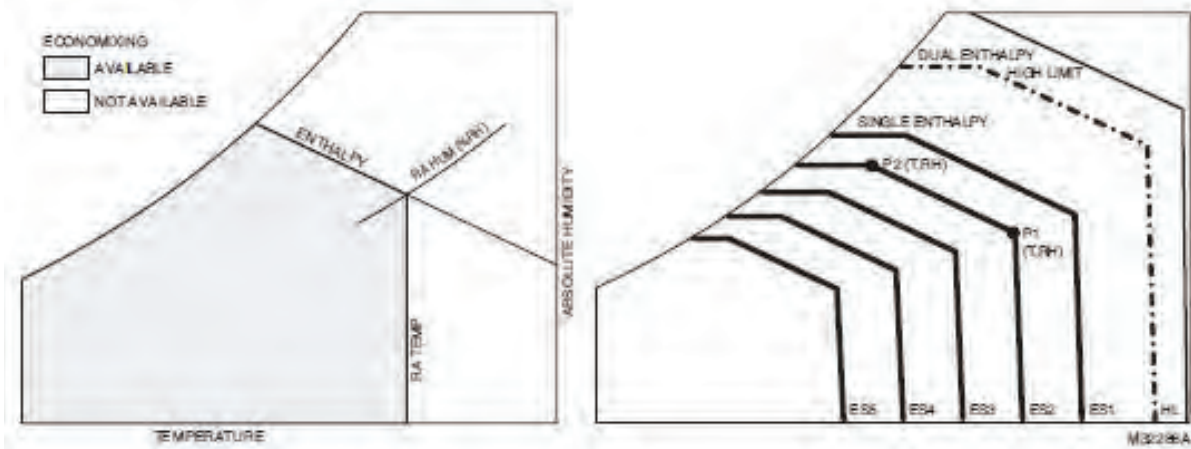
When the outside air temperature, enthalpy, and dew point are below the respective setpoints, the outdoor air can be used for economizing. See [Figure 28, p. 28](#)

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 5 boundaries (setpoints ES1 through ES5), which are defined by dry bulb temperature, enthalpy and dew point. See [Table 12, p. 28](#).
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.

Figure 28. 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).

Table 12. Single enthalpy and dual enthalpy boundaries (parameters ES1 through ES5)

Enth. Curve	Temp. dry-Bulb (°F)	Temp. dew point (°F)	Enth (btu/lb/da)	Point P1		Point P2	
				Temp. °F	Humid. %RH	Temp. °F	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.

Powered Exhaust

To configure the LLE controller, set EXH1 SET (or EXH1 L & EXH1 H with two-speed fan) in the SETPOINTS menu. 2-speed fan mode requires AUX2 I set as W.

CO₂ 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 CO₂ ppm to start DCV

VENTMAX = desired maximum position w/DCV and occupied status (2-speed applications require LO and HI settings)

VENTMIN = desired minimum position w/DCV and occupied status (2-speed applications require LO and HI settings)

ADVANCED SETUP Menu:

CO₂ ZERO = set to detector's start level

CO₂ SPAN = detector's max level minus start level

Attach the sensor to the CO₂ and "R" terminals (at customer connections).

Note: When using any 0-10 Vdc CO₂ sensor with the JADE you will need to set CO₂ ZERO to 400 ppm and the CO₂ 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 follow instructions below could result in death or serious injury. Power down the outdoor unit before making contact with the inverter circuit board. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized.

Inspect all wiring connections at the Economizer module's 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

Upon 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 3, p. 19](#)) to check the parameter values for the various devices and sensors configured.

Note: See "[Controller User Interface and Keypad](#)," p. 17" for information about menu navigation and use of the keypad.

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Checkout Tests

NOTICE

Compressor Damage!

Be sure to allow enough time for compressor start-up and shutdown between checkout tests so that you do not short-cycle the compressors.

Use the Checkout menu (Table 3, p. 19) 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 \triangle and ∇ buttons.
2. Press the \leftarrow button to select the item.
3. "RUN?" is displayed.
4. Press \leftarrow 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 \uparrow (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 follow instructions below could result in death or serious injury. Power down the outdoor unit before making contact with the inverter circuit board. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized.

NOTICE

Compressor Damage!

Be sure to allow enough time for compressor start-up and shutdown between checkout tests so that you do not short-cycle the 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 13. FDD troubleshooting

TESTS	FAULTS				
	Air temp. sensor failure/fault	Not economizing when it should	Economizing when it should not	Damper not modulating	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.

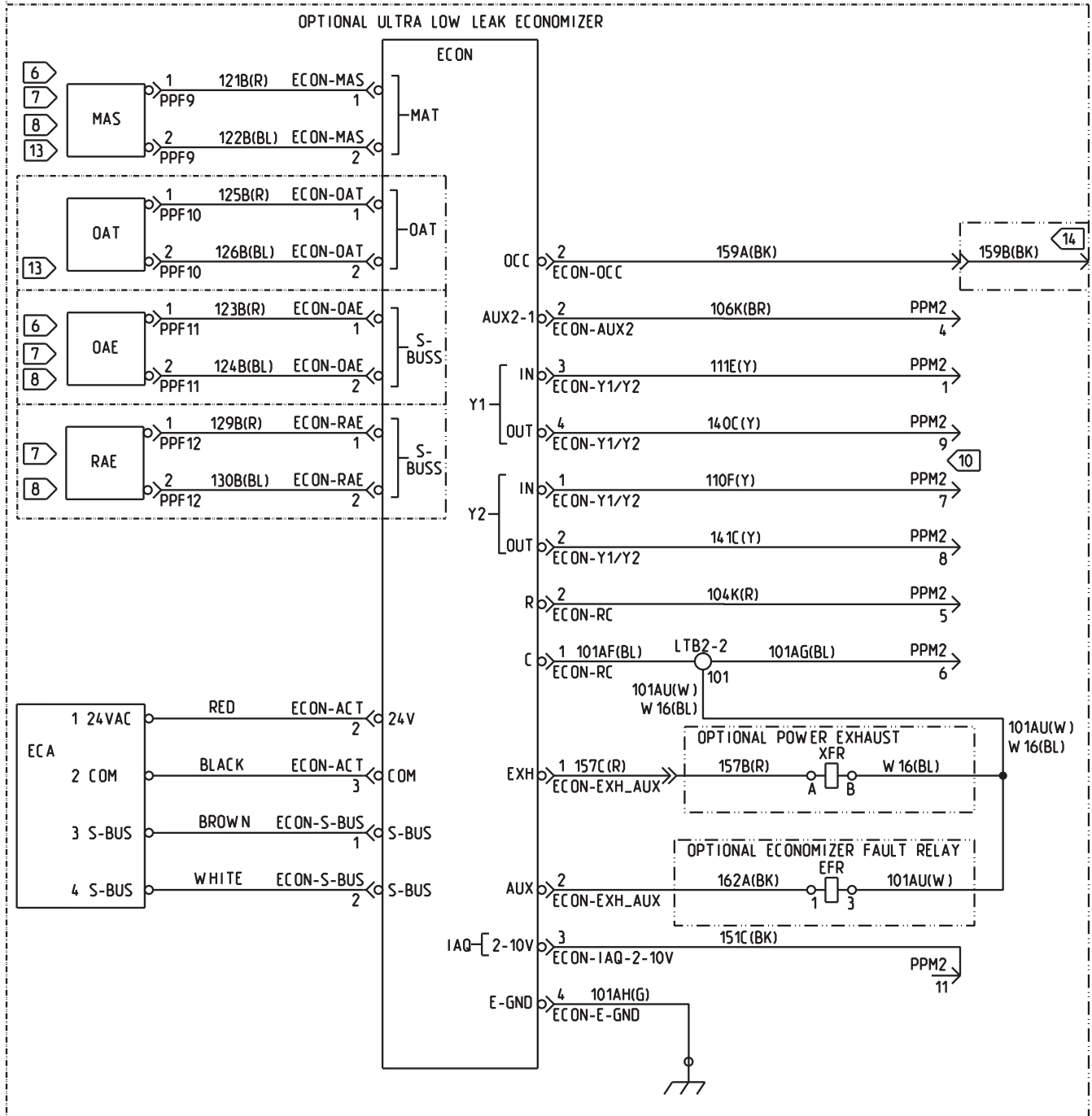
1. Navigate to the desired alarm.
2. Press \leftarrow .
3. "ERASE?" is displayed.
4. Press \leftarrow .
5. "ALARM ERASED" is displayed.
6. Press \uparrow (Menu Up) to complete the action and return to the previous menu.

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

Fault Detection & Diagnostics (FDD) Certification

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

Figure 29. Ultra low leak economizer wiring diagram



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