The following instructions describe how to install the Marvair External Bolt-On Field Installed Economizer on a Marvair ComPac I air conditioner, models, AVPA 42-48-60.

The Marvair External Bolt-On Field Installed Economizer is compatible with the following Marvair HVAC controllers:
- LL357
- CommStat™ 3
- CommStat™ 4 (Requires additional wiring. Refer to CommStat 4 product manual for details.)

Prior to making these modifications, power must be turned OFF to the unit.

TABLE OF CONTENTS

Kit Contents ............................................................................................................. 2
Tools Required ................................................................................................. 3
Safety Information ............................................................................................ 3
Chapter 1: Installation Instructions for Kit #K/01264
Remote Sensor Assembly .................................................................................. 4
Chapter 2: Installation Instructions for Kit #K/04894 & K/04893
Enthalpy or Dry Bulb Sensor ............................................................................. 14

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Kit Contents

The economizer installation kit consists of:

1. Economizer hood with filters
2. Top Door
3. Internal Sensor Bracket (Kit #K/04894 & K/04893 only. Included in Hardware Pack)
4. Block-Off Plate
5. 2-Piece Control Box Cover
6. Prism Remote Sensor Assembly w/50’ Shielded Cable and Mounting Bracket (For Economizer Kit #K/01264-XXX)
7. Honeywell Enthalpy Sensor (For Economizer Kit #K/04894-XXX)
8. Honeywell Dry Bulb Sensor (For Economizer Kit #K/04893-XXX) (XXX = Cabinet Color)
9. Hardware pack containing enthalpy or dry bulb sensor mounting bracket, screws, tinnerman clips, wiring diagrams, etc. (not pictured)
Tools Required

- 5/16” or #10 Nut Driver
- 5/16” or #10 Socket
- 1/8” Drill Bit
- 3/16” Flat Blade Screwdriver
- Socket Wrench
- 6’ Ladder
- Electric Drill

Safety Information

This is the safety alert symbol ☢. When you see this symbol on the air conditioning unit and in this instruction manual, be alert to the potential for personal injury. Understand the signal words WARNING, IMPORTANT and CAUTION. These words are used to identify levels of the seriousness of the hazard.

⚠️ WARNING
Failure to comply will result in death or severe personal injury and/or property damage.

⚠️ IMPORTANT
Failure to comply could result in death or severe personal injury and/or property damage.

⚠️ CAUTION
Failure to comply could result in minor personal injury and/or property damage.

⚠️ WARNING
BEFORE INSTALLING THE ECONOMIZER, TURN THE POWER OFF TO THE UNIT. FAILURE TO DO SO COULD RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH.

⚠️ IMPORTANT
ECONOMIZER MUST BE INSTALLED IN THE UNIT’S PERMANENT LOCATION. IT IS NOT DESIGNED TO BE TRANSPORTED AFTER INSTALLATION.

⚠️ CAUTION
THE ECONOMIZER ASSEMBLY WEIGHS 91 LBS (41 KG) AND REQUIRES TWO PEOPLE TO SAFELY LIFT AND INSTALL.
Chapter 1: Installation Instructions for Kit #K/01264 w/Remote Sensor Assembly

Installation

1. Remove the six screws attaching the existing top door to the unit. This door will be replaced by the new top door and will be discarded.

2. Remove the four screws attaching the bottom door to the unit - two on the left and two on the right. This door will be replaced by the economizer hood and will be discarded.
3. Remove and discard the existing filter in the unit. (This filter will not be used since the economizer hood utilizes internal filters).

4. The standard filter in the ComPac I air conditioner is a 2” filter. However, if the unit has a 1” filter, push down the four filter guide tabs on each side.

5. Slide filter block-off plate in the filter rail and fasten with two screws in front and middle left and right sides. **Note:** the block off plate has two holes in the rear. It is not necessary to use these holes.
6. Remove and discard the control box cover.

7. Remove the ten screws holding the condenser coil guard to the unit and remove the guard.

8. Remove the Front Panel from the economizer hood by removing the eleven screws along the top, bottom and sides.
9. Install included tinnerman clips to existing mounting holes in both side panels. These were the mounting holes for the discarded top and bottom doors.

![Image of Tinnerman Clip]

10. Lift the economizer hood (two man task) and hang the hood on the drain pan lip/edge. Secure the hood with four screws along the left side and four screws on the right side. **Note:** Use a socket wrench to install the screw behind the motor box on the left side.

![Image of Economizer Installation]

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**CAUTION**

THE ECONOMIZER WEIGHS 91 LBS (41 KG). LIFTING AND INSTALLATION SHOULD ONLY BE PERFORMED BY TWO PEOPLE OR WITH AN APPROPRIATE MECHANICAL LIFTING DEVICE.
11. Drill three 1/8” pilot holes through the three clearance holes in the top of the economizer hood into the top of the drain pan.

12. Install the new top door and secure with two screws at the top. Make sure that the clearance holes along the bottom of the door align with the three clearance holes in the economizer hood. Secure the top hood with the three screws, going through the three clearance holes in the economizer hood and into the 1/8” holes drilled in step 11.

13. Reinstall the condenser coil guard.
Electrical Connections

1. Push the electrical leads with flag terminals through the hole shown until wires are visible below the control box. Then insert the wires into the control box through the grommeted openings on either the bottom or rear of the control box.

2. Connect the wiring to the electrical control box. Refer to included wiring diagram on page 26.

3. Install the external sensor on the north or east side of the shelter.
4. Wire the external sensor and unit according to the included wiring diagram.

**CAUTION**

BE SURE TO OBSERVE PROPER POLARITY WHEN CONNECTING THE RED (+) AND GREEN (–) SENSOR WIRES. DO NOT REVERSE POLARITY OR THE CONTROL BOARD MAY BE DAMAGED.
5. Configure Economizer board according to the settings in the following photo and table.

1. FIELD CONNECTION FROM COMMSTAT 4 (2) TERMINAL THIS FORCES MECHANICAL COOLING WHEN ECONOMIZER IS UNABLE TO MAINTAIN COOLING
2. FIELD CONNECTION FROM COMMSTAT 4 (MAR) TERMINAL FORCES DAMPER OPEN DURING A HYDROGEN FAULT
3. W3 SENSOR TYPE SELECTOR PIN JUMPER:
   JUMPER PINS 2 & 3 FOR PRISM TEMP/HUMIDITY SENSOR | JUMPER PINS 1 & 2 FOR HONEYWELL SENSORS (DEFAULT SETTING)
4. FIELD CONNECTION FOR HONEYWELL ENTHALPY OR DRY BULB SENSORS
5. FIELD CONNECTION FOR PRISM TEMP/HUMIDITY REMOTE EXTERNAL SENSOR
   **NOTE:** DO NOT SHORT THE ENTHALPY OR DRY BULB SENSOR TO SIMULATE AN ECONOMIZER CONDITION. THIS WILL CAUSE DAMAGE TO THE ECONOMIZER CONTROL BOARD. **OBSERVE PROPER POLARITY WHEN CONNECTING SENSOR WIRES.**
6. MINIMUM POSITION POTENTIOMETER ADJUSTMENT 0 TO 100% ONLY WHEN ENABLED BY W2 PIN JUMPER 2 & 3
7. THE PRISM REMOTE SENSOR CAN BE CONFIGURED FOR EITHER DRY BULB OR ENTHALPY OPERATION, SEE SETTINGS TABLE ON PAGE 12
8. W1 ECONOMIZER SENSOR SELECTOR PIN JUMPER: JUMPER PINS 1 & 2 FOR ENTHALPY | JUMPER PINS 2 & 3 FOR DRY BULB
9. W2 MINIMUM POSITION POTENTIOMETER PIN JUMPER: JUMPER PINS 1 & 2 TO DISABLE (DEFAULT) | JUMPER PINS 2 & 3 TO ENABLE
   **SHOWN CONFIGURED FOR DRY BULB SENSOR (PINS 2 & 3 SELECTED) MINIMUM POSITION POTENTIOMETER ENABLED (PINS 2 & 3 SELECTED)**
10. GREEN LED TO INDICATE UNIT IS IN ECONOMIZER MODE
11. GREEN LED TO INDICATE UNIT IS IN THE MECHANICAL COOLING MODE
12. GREEN LED TO INDICATE POWER
13. RED STATUS LED WILL BLINK EVERY 2 SECONDS IN NORMAL OPERATION
   **FAULT CODE:**
   2 QUICK BLINKS = SENSOR FAULT OR DISCONNECTED
   3 QUICK BLINKS = SENSOR NOT CONNECTED TO MIXED AIR
   NO RED LED = DEFECTIVE CONTROL BOARD

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There are no connections required from the LL357A, LL357D4, or CommStat 3 controllers.
Control Board Configuration for External Economizer with Prism Remote Sensor

**NOTE:** Jumper W3 (labeled with a T/H) must be placed in the T/H (2-3) position for all below configurations

Enthalpy Sensor Mode: Jumper W1 in ENT position (pins 1-2)

<table>
<thead>
<tr>
<th>Control Curve @ 50% Humidity</th>
<th>Econ Select (S1) A</th>
<th>Econ Select (S1) B</th>
<th>Econ Select (S1) C</th>
<th>Econ Select (S1) D</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (73°F)</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>B (70°F)/Default</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>C (67°F)</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>D (63°F)</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

Dry Bulb Sensor Mode: Jumper W1 in DRY position (pins 2-3)

<table>
<thead>
<tr>
<th>Temperature Setpoint</th>
<th>Econ Select (S1) A</th>
<th>Econ Select (S1) B</th>
<th>Econ Select (S1) C</th>
<th>Econ Select (S1) D</th>
</tr>
</thead>
<tbody>
<tr>
<td>48°F</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>53°F</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>55°F</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>58°F</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>63°F/Default</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>68°F</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>73°F</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>78°F</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

6. Reconnect power to the unit and check Economizer operation.

7. Install the new 2-piece control box cover and secure with four screws.
8. Reinstall front panel to the economizer hood.

9. Installation is complete.
Chapter 2: Installation Instructions for Kit #K/04894 & K/04893 w/Enthalpy or Dry Bulb Sensor

Installation

1. Remove the six screws attaching the existing top door to the unit. This door will be replaced by the new top door and will be discarded.

2. Remove the four screws attaching the bottom door to the unit - two on the left and two on the right. This door will be replaced by the economizer hood and will be discarded.
3. Remove and discard the existing filter in the unit. (This filter will not be used since the economizer hood utilizes internal filters).

4. The standard filter in the ComPac I air conditioner is a 2” filter. However, if the unit has a 1” filter, push down the four filter guide tabs on each side.

5. Slide filter block-off plate in the filter rail and fasten with two screws in front and middle left and right sides. **Note:** the block off plate has two holes in the rear. It is not necessary to use these holes.
6. Remove and discard the control box cover.

7. Remove the ten screws holding the condenser coil guard to the unit and remove the guard.

8. Remove the Front Panel from the economizer hood by removing the eleven screws along the top, bottom and sides.
9. Install included tinnerman clips to existing mounting holes in both side panels. These were the mounting holes for the discarded top and bottom doors.

![Tinnerman Clip](image)

10. Lift the economizer hood (two man task) and hang the hood on the drain pan lip/edge. Secure the hood with four screws along the left side and four screws on the right side. **Note:** Use a socket wrench to install the screw behind the motor box on the left side.

![Installation Photos](image)

**CAUTION**

THE ECONOMIZER WEIGHS 91 LBS (41 KG). LIFTING AND INSTALLATION SHOULD ONLY BE PERFORMED BY TWO PEOPLE OR WITH AN APPROPRIATE MECHANICAL LIFTING DEVICE.
11. Drill three 1/8” pilot holes through the three clearance holes in the top of the economizer hood into the top of the drain pan.

12. Install the new top door and secure with two screws at the top. Make sure that the clearance holes along the bottom of the door align with the three clearance holes in the economizer hood. Secure the top hood with the three screws, going through the three clearance holes in the economizer hood and into the 1/8” holes drilled in step 11.

13. Reinstall the condenser coil guard.
Electrical Connections

1. Push the electrical leads with flag terminals through the hole shown until wires are visible below the control box. Then insert the wires into the control box through the grommeted openings on either the bottom or rear of the control box.

2. Connect the wiring to the electrical control box. Refer to included wiring diagram on page 27.

3. Remove the side grille on the same side of the cabinet as the economizer motor box (left side).
4. Install the sensor inside the cabinet.

5. Wire the sensor and unit according to the included wiring diagram.

6. Reinstall the side grille.
7. Configure Economizer board according to the settings in the following photo and table.

1. **FIELD CONNECTION FROM COMMSTAT 4 (2) TERMINAL**
   THIS FORCES MECHANICAL COOLING WHEN ECONOMIZER IS UNABLE TO MAINTAIN COOLING^1

2. **FIELD CONNECTION FROM COMMSTAT 4 (MAR) TERMINAL**
   FORCES DAMPER OPEN DURING A HYDROGEN FAULT^1

3. **W3 SENSOR TYPE SELECTOR PIN JUMPER**:
   JUMPER PINS 2 & 3 FOR PRISM TEMP/HUMIDITY SENSOR  |  JUMPER PINS 1 & 2 FOR HONEYWELL SENSORS (DEFAULT SETTING)

4. **FIELD CONNECTION FOR HONEYWELL ENTHALPY OR DRY BULB SENSORS**

5. **FIELD CONNECTION FOR PRISM TEMP/HUMIDITY REMOTE SENSOR**
   **NOTE:** DO NOT SHORT THE ENTHALPY OR DRY BULB SENSOR TO SIMULATE AN ECONOMIZER CONDITION. THIS WILL CAUSE DAMAGE TO THE ECONOMIZER CONTROL BOARD. **OBSERVE PROPER POLARITY WHEN CONNECTING SENSOR WIRES.**

6. **MINIMUM POSITION POTENTIOMETER ADJUSTMENT 0 TO 100% ONLY WHEN ENABLED BY W2 PIN JUMPER 2 & 3**

7. **FOR HONEYWELL ENTHALPY SENSOR:**
   DIP SWITCHES SELECT ONLY (1) SETPOINT  LEFT = ON / RIGHT = OFF
   1 = A = 73F  |  2 = B = 70F  |  3 = C = 67F  |  4 = D = 63F  (RECOMMENDED SETTING)
   SETPOINTS ARE THE SAME AS PREVIOUS HONEYWELL CONTROLS

8. **W1 ECONOMIZER SENSOR SELECTOR PIN JUMPER:**
   JUMPER PINS 1 & 2 FOR ENTHALPY  |  JUMPER PINS 2 & 3 FOR DRY BULB

9. **W2 MINIMUM POSITION POTENTIOMETER PIN JUMPER:**
   JUMPER PINS 1 & 2 TO DISABLE (DEFAULT)  |  JUMPER PINS 2 & 3 TO ENABLE
   **PIN POSITIONS**
   1
   2
   3
   **SHOWN CONFIGURED FOR DRY BULB SENSOR**
   (PINS 2 & 3 SELECTED)
   **MINIMUM POSITION POTENTIOMETER ENABLED**
   (PINS 2 & 3 SELECTED)

10. **GREEN LED TO INDICATE UNIT IS IN ECONOMIZER MODE**

11. **GREEN LED TO INDICATE UNIT IS IN THE MECHANICAL COOLING MODE**

12. **GREEN LED TO INDICATE POWER**

13. **RED STATUS LED WILL BLINK EVERY 2 SECONDS IN NORMAL OPERATION**

   **FAULT CODE:**
   2 QUICK BLINKS = SENSOR FAULT OR DISCONNECTED
   3 QUICK BLINKS = SENSOR NOT CONNECTED TO MIXED AIR
   NO RED LED = DEFECTIVE CONTROL BOARD

^1There are no connections required from the LL357A, LL357D4, or CommStat 3 controllers.
8. Economizer changeover control (W1 Jumper)
The economizer can be controlled by either an enthalpy sensor or a dry bulb sensor. On a call for cooling from the wall-mounted thermostat, if outdoor conditions are suitable, the sensor will open the damper and admit outside air (i.e., economizer free cooling). If the outdoor ambient is too hot or humid (enthalpy sensor only), the sensor will place the actuator in the closed or minimum open position and activate mechanical cooling. The compressor is locked-out during the economizer cooling mode.

During the testing of the air conditioner at the Marvair factory, the control board has been configured for the sensor in the air conditioner. There should be no need to change the sensor configuration. For kit #04894 with an enthalpy sensor, pins 1 & 2 should be jumpered on the board. For kit #04893 with a dry bulb sensor, pins 2 & 3 should be jumpered. See #8 in the photo on page 20 for the location of this jumper.

9. Economizer changeover control setting - Enthalpy Sensor
The enthalpy sensor responds to the total heat content of the outdoor air to provide the changeover to outside air for free cooling. The control board must be configured for proper operation of the economizer by selecting the desired changeover temperature. The desired temperature is selected by four dip switches on the control board.

10. Selecting the set point for the enthalpy sensor. Located on the control board there are four dip switches – 1, 2, 3 & 4 - that determine the ambient temperature at which the economizer damper opens. See #7 on page 20. These dip switches correspond to the following temperatures:

<table>
<thead>
<tr>
<th>DIP Switch #</th>
<th>Previous Honeywell Controller Setting</th>
<th>Temperature °F/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 4 Switches Off</td>
<td>A</td>
<td>73°/23.8°C</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>73°/23.8°C</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>70°F/21.1°C</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>67°F/19.4°C</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>63°F/17.2°C</td>
</tr>
</tbody>
</table>

Gently push the dip switch left to the ON position to select the desired set point temperature. The factory setting is for dip switches number 1, 2, & 3 to be in the OFF position and #4 to be in the ON position. With dip switch #4 in the ON position, the economizer damper will begin to open when the ambient temperature is 63°F/17.2°C. **Note:** Only one switch should be in the ON position.

**Note:** Setting all four switches in the OFF position is the same as setting the #1 switch in the ON position.
11. Economizer changeover control – Dry Bulb Sensor
The dry bulb sensor only responds to the dry bulb temperature of the outside air and ignores the humidity. The sensor has eight set points. The factory setting is 58°F (14.5°C). These set points can be changed by moving the dip switches on the top of the dry bulb sensor. See Fig. 2.

Once either the enthalpy or dry bulb sensor has determined that the outside air is suitable for cooling, the damper will open. The mixed air sensor will limit the air temperature delivered to the space by modulating the damper blade to mix warm indoor air with cooler outdoor air to provide a constant 50°F to 56°F (10°C to 13.5°C)

12. Mixed Air Sensor:
The mixed air sensor is a thermistor mounted on a bracket adjacent to the right side of the blower assembly. The thermistor senses the air temperature entering the structure, and provides a signal to the economizer controller for modulating the position of the damper.

13. Minimum Position Potentiometer (W2 jumper):
The potentiometer controls the amount of outside air introduced in the building when the economizer damper closes or the air conditioner is Off or in Mechanical Cooling. The factory setting is for the damper to close completely when the unit is off or in Mechanical Cooling. (Pins 1 & 2 are jumpered)

If outside air is desired during mechanical cooling or whenever the indoor blower is running, jumper pins 2 & 3. Refer to #9 in the photo on page 20 for the location of the jumper.

If the potentiometer is enabled, the next step is to select how much outside air should be brought into the building.

The potentiometer is adjustable from 0% to 100%. Setting the potentiometer to MIN means that the damper will close completely and NO outside air will be brought into the building. Setting the potentiometer to MAX means that the damper stays in the full OPEN position at all times. Factory setting is 50%.
14. Brand of Sensor Selection (W3 jumper)
Honeywell enthalpy and dry bulb sensors are currently the only brand of sensors used in the Marvair air conditioners. Jumper W3 allows us to use alternative brands at a future date. On all current Marvair air conditioners, pins 1 & 2 are jumpered on W3. See #3 in the photo on page 20 for its location.

15. Reconnect power to the unit and check Economizer operation.

16. Install the new 2-piece control box cover and secure with four screws.
17. Reinstall front panel to the economizer hood.

18. Installation is complete.
Dimensional Drawings w/Airflow Diagram
Dimensional Drawings