ECONOMIZERS WITH EXHAUST
for EQUIPMENT BUILDING APPLICATIONS

Models
ECONWMT-T2B* & ECONWMT-T3B*
(Factory Installed Vent Option “T”)
with D.B. OUTDOOR CONTROL
&
ECONWMT-E2B* & ECONWMT-E3B*
(Factory Installed Vent Option “W”)
with ENTHALPY OUTDOOR CONTROL

For Use with 1-1/2 through 3 Ton
Wall Mount Air Conditioners
and Heat Pumps

NOTE: These instructions are written to cover field-installed economizers, but are also included with factory installed economizers. For factory installed economizers, all portions addressing “installation” are for reference only.
CONTENTS

GENERAL
Nomenclature .......................................................... 3
General Information ................................................. 3
Unpacking................................................................ 3
Description............................................................... 3

INSTALLATION
Basic Installation............................................. 4-5 & 7
Control Wiring Connection ...................................... 8
Intake Air Hood Assembly ...................................... 14
Left-Hand Applications Only .................................. 14
Outdoor Air Sensor Factory Installed Deploy ........ 14
JADE™ Economizer Controller ......................... 17
Start-Up / Checkout Procedures ..................... 18 - 21
Enthalpy Settings (Figure & Table) ...................... 21
Economizer Sequence of Operation
  Condition - Cool Outdoor Ambient Conditions .... 22
  Condition - Warm Outdoor Ambient Conditions .. 22
Economizer Features............................................. 23
Economizer Operation for Single Stage................. 24
Economizer Operation for Two Stage .................... 25

PHOTOS
Photo 1 Outdoor Air Sensor (Factory-Installed) .. 15
Photo 2 Outdoor Air Sensor (Factory-Install.) .... 5 & 15
Photo 3 Wire Harness .......................................... 8
Photo 4 Low Voltage Terminal Block .................... 8
Photo 5 JADE™ Controller................................. 8

FIGURES
Figure 1 HVAC Unit Access Panels ..................... 4
Figure 2 Left & Right Filter Brackets .................... 5
Figure 3 Condenser Exh. Plate w/Screen .......... 6
Figure 4 Mixed Air Sensor Location ..................... 7
Figure 5 Mixed Air Sensor Location ................. 7
Figure 6 24V Control Wiring w/1-Stage A/C .... 9
Figure 7 24V Control Wiring w/2-Stage A/C .... 10
Figure 8 24V Control Wiring w/1-Stage HP .... 11
Figure 9 24V Control Wiring w/2-Stage HP .... 12
Figure 10 2-Stage HP w/Dehum. & Opt. Elec. Heat .. 13
Figure 11 Economizer Hood Install Steps .......... 16
Figure 12 Left Hand Economizer ......................... 17
Figure 13 100% Outside Airflow Path ............... 22
Figure 14 Mixed Airflow Path ......................... 22
Figure 15 100% Closed Loop Airflow Path ....... 23

TABLES
Table 1 Economizer Application ......................... 3
Table 2 System Setup ........................................ 18
Table 3 Advanced Setup ................................... 19
Table 4 Setpoints ............................................. 19
Table 5 Checkout ............................................. 20
Table 6 Status ................................................. 20
Table 7 Alarms ................................................. 21
GENERAL INFORMATION

The economizer should only be installed by a trained heating and air conditioning technician. These instructions serve as a guide to the technician installing an economizer package, not as a step-by-step procedure with which the mechanically inclined owner can install the package.

The economizer housing is shipped in one carton, which contains the electrical harness, miscellaneous hardware and installation instructions.

The economizer installation requires the use of a 2-stage cooling thermostat (if there is not one already present) and requisite amounts of low voltage conductor wire for two-stage cooling. The number of low-voltage control conductors will vary depending upon application.

If using a master controller, the MC4000 controller is designed specifically to control two (2) redundant wall mount units equipped with economizers.

Any wall mount unit equipped with an economizer must also have a factory/field installed low ambient control. Please refer to appropriate model/year Specification Sheet for requisite field installed low ambient control kit part numbers.

UNPACKING

Upon receipt of the equipment, be sure to compare the model number found on the shipping label with the accessory identification information on the orders and shipping document to verify that the correct accessory has been shipped.

Inspect the carton housing of each economizer assembly as it is received, and before signing the freight bill – verify that all items have been received and there is no visible damage. Note any shortages or damage on all copies of the freight bill. The receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier’s agent. Concealed damage not discovered until after loading must be reported to the carrier within 15 days of its receipt.

NOTE: Factory installed Telcom economizers have the air intake hood shipped knocked-down. See “Intake Air Hood Assembly” section for shipping location of hood parts and follow the assembly instructions.

DESCRIPTION

The ECONWMT-T, -E economizer is designed to be used with wall mount series air conditioners and heat pumps, shown in Table 1, equipped with low ambient controls. They are electromechanical economizer systems designed to provide “free” cooling where the outdoor air temperature/enthalpy is cool enough to provide the needed cooling without running the compressor, or in addition to the compressor. When cooling is required, the system automatically takes advantage of cold outdoor air when available and uses it for first stage cooling. This then reduces the need to run the air conditioning compressor providing lower operating costs and increasing the service life of the equipment. If the outdoor air temperature/enthalpy is too warm to be sufficient for cooling, the dry bulb outdoor air temperature sensor detects the condition and automatically closes the outdoor air intake/exhaust damper, opens the return air damper, and switches to compressor-only operation. Without attention from the end user, the economizer assembly is meant to automatically achieve maximum savings while ensuring appropriately cool space temperatures. The economizer utilizes a fully-modulating damper actuator, which will control intake/exhaust in order to obtain and maintain a factory-set minimum supply air temperature. As a secondary feature, the economizer assembly can be programmed for a minimum ventilation based on an “occupied” (or otherwise dedicated) 24V signal to satisfy fresh air ventilation on populated structures or dilution of internal pollutants.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>FOR USE WITH FOLLOWING UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECONWMT-T3B*</td>
<td>W30A S26H W30L T24H</td>
</tr>
<tr>
<td>ECONWMT-T3B*-E3B*</td>
<td>W36A S31H W36L T24S</td>
</tr>
<tr>
<td>ECONWMT-T2B*</td>
<td>W17A W18H W17L T30H T30S</td>
</tr>
<tr>
<td>ECONWMT-T2B*-E2B*</td>
<td>W18A W24H W18L</td>
</tr>
<tr>
<td></td>
<td>W24A W24L</td>
</tr>
</tbody>
</table>

NOTE: Low ambient control is required w/economizer for low temperature operation.

ECONWMT Series Economizers are not for use with variable capacity ECU models.
INSTALLATION of FIELD (INSTALLED) ECONOMIZER

BASIC INSTALLATION

1. Unpack the economizer assembly, which includes the integral economizer with attached electrical harness, mixed air sensor, body panels, miscellaneous hardware, and installation instructions.

2. From existing wall mount unit, remove and save Blower Access Panel and Filter Access Panel. Remove and discard the Ventilation Access Panel. Remove and save the existing filter. (See Figure 1.)

3. Remove and discard the exhaust cover plate. (See Figure 1.)

4. Install new condenser exhaust plate with screen over the opening. (See Figure 3.)

5. Remove and save existing unit return air filter. Remove and discard the right and left filter brackets. (See Figure 2.)

Outdoor Air Sensor Field Installation

a.) Disconnect power to the unit.

b.) Install the outdoor air sensor in the lower condenser section on the side opposite the compressor with two (2) screws provided. Sensor should protrude approximately 1½" below the base. (See Photo #2.)

c.) Route the wire harness across the back of the units and secure to the back with the two (2) push mount wire ties provided. Route the wire harness up through the grommet in the bottom of the control panel and secure with the wire tie (provided) to the remaining wires in the grommet. Ensure the wire harness cannot contact any moving parts or hot tubes. (See Photo #3.)

d.) Install a grommet in the side of the low voltage terminal block and route the wire harness through the low voltage terminal block and through the side of the control panel through the existing grommet. (See Photo #4.)

e.) Route the wire harness up into economizer control box and connect to terminals OAT on the JADE™ controller. (See Photo #5.)

WARNING

ELECTRICAL SHOCK CAN RESULT IN SERIOUS INJURY OR DEATH

DISCONNECT THE REMOTE ELECTRIC POWER SUPPLY OR SUPPLIES BEFORE SERVICING

AVERTISSEMENT

HAZARD OF ELECTRICAL SHOCK

UN CHOC ELECTRIQUE PEUT Tuer OU CAUSER DES BLESSURES GRAVES

COUPEZ LES ALIMENTATIONS ELECTRIQUES AVANT D’EFFECTUER LA MAINTENANCE

FIGURE 1

NOTE: ON OLDER UNITS THIS WAS A 1-PIECE PANEL.

(Figure 1: Diagram showing Blower Access Panel, Filter Access Panel, Vent Option Panel, and Outdoor Air Sensor.)
6. In the open cavity between the filter rack and the condenser section, begin to insert the main economizer assembly. Slide the assembly inside, being careful not to tear the existing insulation. Do not completely recess the assembly. (See Figure 4.)

7. Unravel the attached economizer wiring harness and separate the two (2) orange wires connected to a white, two-pin sensor plug. The remainder of the low voltage wires can be routed through the existing wiring grommet located near the bottom of the wall mount electrical control panel. (See Figure 4.)
FIGURE 3
CONDENSER EXHAUST PLATE WITH SCREEN

SECURE USING (4) SCREWS PART #1012-086

INSTALL COVER PLATE SCREEN MEDIA FACING PARTITION

CONDENSER COVER PLATE

CONDENSER PARTITION

BACK BLANK-OFF PLATE

SECURE WITH PROVIDED SCREWS

ECONOMIZER ASSEMBLY

MIS-2955

MIS-3094
8. Pull wires gently through grommet so that low voltage wires protrude underneath wall mount terminal board.

9. Route two (2) orange wires connected to a white two-pin sensor plug along refrigerant lines and behind the filter bracket to terminate at the blower partition. (See Figure 4.)

10. Fully seat economizer assembly to the rear of the wall mount cavity, making sure economizer control panel opposite filler strip is fully recessed into cabinet. (See Figure 5.)

11. Install temperature sensor bracket and mixed air temperature sensor in blower partition. Insert white two-pin sensor into sensor housing. (See Figure 5.)

12. Install filter retained from Step #2 in filter bracket of new economizer. Reinstall Blower Access Panel and Filter Access Panel. **NOTE: Newer models already have the bottom screws approximately 1" from the corners. If not, drill in one (1) screw at each lower corner.** (Reference Figure 1.)

13. Connect all low voltage leads to terminal board of wall mount unit as required according to installed equipment and controls. Figure 6 shows the basic economizer wiring, and is followed by typical control wiring diagrams for single unit applications. Refer to MC4000 Lead/Lag Controller Instructions Manual 2100-563 for dual unit control connections.
The control wiring diagrams on the following pages represent typical control wiring for single units controlled by individual thermostats. If thermostats other than those referenced are used, the installer must verify output functions accordingly.

For dual unit installation utilizing lead/lag controller systems, complete details are contained in MC4000 Series Lead/Lag Controller Manual 2100-563.

**NOTE:** Since observation of motor/damper operation is difficult after air hood installation, it is recommended the unit be enabled for start-up now. If high voltage power is available and the wall mount unit can be energized, turn to Page 18 for programming and start-up/checkout procedures. If no power is available, or if immediate start-up is not desired, continue with the basic installation process. The air hood assembly can be partially disassembled at a later time for start-up/checkout procedures.

**CONTROL WIRING CONNECTION DIAGRAMS**

*For operation with MV4000. See MV4000 Installation Manuals.*
Factory installed jumper. Remove for 2-stage operation on units with 15 or more kw.

Must be energized to enable minimum position. NOTE: Economizer Control Default Setting is 10V (100%). Depending upon application may require setting to lower value.

Factory jumper installed.

Change "system type", set up function 1, from 5 (2 heat/1 cool heat pump) to 6 (2 heat/2 cool conventional).

Change model configuration from heat pump to heat/cool, and must be configured for economizer for YO/D output to be active as first stage cooling.

Older units may not have Y1 and Y2 connections on 24v terminal block.

If not present wire nuts must be used.

8403-058 (TH5220D1151)

Thermostat part #8403-060

A/C UNIT 24V TERMINALS

Low Voltage Wiring Diagram
Change "system type", set up function 1, from 5 (2 heat/1 cool heat pump) to 6 (2 heat/2 cool conventional).

Economizer for YO/D output to be active as first stage cooling. Must be energized to enable minimum position. NOTE: Economizer Control Default Setting Factory Jumper Installed. on units with 15 or more kw.

Depending upon application may require setting to lower value. Factory installed jumper. Remove for 2-stage operation on units with 15 or more kw.

Change model configuration from heat pump to heat/cool, and must be configured for economizer for YO/D output to be active as first stage cooling.
Must be energized to enable minimum position. NOTE: Economizer Control Default Setting is 10V (100%). Depending upon application may require setting to lower value.

Must be configured for heat pump / multistage / no economizer / to enable YO/D output to be active as dehumidification output

Factory Jumper Installed.

MIS-2981 B
FIGURE 9
2-STAGE HEAT PUMP WITH OPTIONAL ELECTRIC HEAT
WITH ECONWM* STYLE ECONOMIZER

Low Voltage Wiring Diagram

Thermostat part #8403-060

24V Low Voltage Terminal Block

Economizer Wiring Harness

Must be energized to enable minimum position. NOTE: Economizer Control Default Setting is 10V (100%). Depending upon application may require setting to lower value.

Must be configured for heat pump and economizer to enable YO/D output to be active as 1st-stage cooling

Factory Jumper Installed.

MIS-2982 B
FIGURE 10
2-STAGE HEAT PUMP WITH DEHUMIDIFICATION & OPTIONAL ELECTRIC HEAT
WITH ECONOMIZER STYLE ECONOMIZER

Low Voltage Wiring Diagram

Must be energized to enable minimum position. NOTE: Economizer Control Default Setting is 10V (100%). Depending upon application may require setting to lower value.

Must be configured for heat pump / no economizer / to enable YO/D output to be active as dehumidification output

Factory Jumper Installed.

MIS-2995 B
INTAKE AIR HOOD ASSEMBLY

The Telcom/Equipment Building version economizers utilize an air intake hood to maximize outdoor airflow performance and to be able to introduce this at low intake velocity.

FACTORY INSTALLED ECONOMIZERS

The main economizer assembly is installed in the unit’s ventilation cavity, but the air intake hood is shipped knocked down. The intake hood pieces are located on the back side of the A/C unit.

NOTE: Some applications on equipment buildings necessitate the air intake hood assembly be shipped inside the building for installation at the final site. In this case, the solid panel covering the economizer section must be left in place to protect and weatherize the equipment during transit.

ECONOMIZER HOOD INSTALLATION

A.) For Factory Installed Economizer Only: Detach plate by removing three (3) screws and filter door. Discard cover plate and replace filter door (See Step #1.)

B.) For Field Installed Economizer Only:

1. Attach hood mounting door by inserting top lip under hook bend on upper panel. Use four (4) ½” hex head screws to fasten hood mounting door to unit. (See Step #1.)
2. Use four (4) screws to attach right side assembly and left side assembly. (See Step #2.)
3. Hood bottom requires pre-assembly of bottom filter bracket. Bottom filter bracket is attached to primed non-textured side of base using two (2) ½” hex head screws. (See Step #3.)
4. Install hood top assembly to hood mounting door using three (3) ½” hex head screws. Side bends of top assembly should overlap left and right side assemblies. Attach top to side assemblies using four (4) ½” hex head screws. (See Step #4.)
5. Insert hood bottom assembly between side assemblies with back bend resting on hook bend of hood mounting door. Attach to left side assembly and right side assembly using four (4) ½” hex head screws. (See Step #4.)
6. Insert mist eliminator. Install hood front using two (2) attached retainer clip screws. (See Step #5.)

LEFT-HAND APPLICATIONS ONLY

1. Before installation into wall mount cavity, rotate economizer 180° so JADE controller will now be adjacent to the wall mount unit control panel. (See Figure 12.)
2. Remove two (2) side angles and block off plate. (See Figure 12.)
3. Reinstall two (2) side angles in upper position. Reinstall block off plate in lower position. (See Figure 12.)
4. Loosen actuator shaft adaptor clamp from damper blade rod. (See Figure 12.)
5. Remove actuator assembly from economizer. (See Figure 12.)
6. Pull adaptor clamp retainer clip; remove adaptor clamp from actuator assembly and reinstall on the opposite side of the actuator on the “0” position. (See Figure 12.)
7. Reinstall actuator assembly with adaptor clamp facing away from the economizer assembly. (See Figure 12.)
8. Ensure position of the economizer damper is closed, then tighten shaft adaptor clamp. (See Figure 12.)
9. Hood mounting door will use alternate control panel door location. (See Figure 13.)

Outdoor Air Sensor Factory Installed Deployment

The factory installed outdoor air sensor is shipped in a position to prevent damage during transit. (See Photo #1.) The outdoor air sensor is located in the condenser section on the side opposite the compressor. To deploy the mixed air sensor to its working position, remove the upper screw and install it loosely in the lower hole in the slot of the bracket. Loosen the lower screw and slide the outdoor air sensor down. Tighten both screws. (See Photo #2.)
To deploy sensor to operating position, lower sensor as shown in Photo #2.
**STEP 1**

Install Hood Mounting Door (Field install only)

Remove filter access panel and replace once cover plate is discarded (Factory install only)

Remove cover plate and discard (Factory install only)

**STEP 3**

Install left side cover plate after plate removal

**STEP 2**

1/2 hex head screws

**STEP 4**

Install hood top and hood bottom to sides and mounting door

**STEP 5**

Install hood front using (2) attached retainer clip screws

Install Mist Eliminator
**JADE™ ECONOMIZER CONTROLLER**

W7220 Controller offers unparalleled flexibility and expansion in a dependable and solid electronic platform.

- Multiple economizer applications from one controller.
- Nearly limitless customization of setpoints.
- Internal Checkout menu provides fast performance assessment.
- Alarms menu provides assistance in troubleshooting.

**Memory:** User defined setpoints remain in non-volatile flash memory regardless of electrical outage duration. Control voltage below 18V may cause erratic performance.
START-UP / CHECKOUT PROCEDURES

From the factory, the JADE™ economizer controller has been preset with “default” values that were pre-determined as optimum for equipment buildings, and these are shown in Tables 2 - 4. However, it is important to review and/or customize these operational values per owner specifications in order to guarantee satisfactory performance. The installing contractor can easily access the JADE™ programming by the integral keypad and LCD display.

There are six (6) basic MENU categories to navigate:

1. **STATUS** – provides real-time access to sensor input, damper and equipment operation.
2. **SETPOINTS** – customizable operational parameters.
3. **SYSTEM SETUP** – customizable application programming.
4. **ADVANCED SETUP** – further application and operational options.
5. **CHECKOUT** – instantly activate and verify economizer functions.
6. **ALARMS** – displays alarms and pinpoints problem areas.

Before being placed in service, the JADE™ economizer controller programming should be reviewed/customized through the following steps:

1. **SYSTEM SETUP:** from the main screen, press the **SCROLL (UP/DOWN) BUTTONS** to navigate through the six (6) basic menu items to the **SYSTEM SETUP** menu.
   - Push the **SELECT (ENTER) BUTTON** to choose the **SYSTEM SETUP** menu.
   - Navigate through the multiple levels of **SYSTEM SETUP** by pushing the **SCROLL (UP/DOWN) BUTTONS**.
   - To change a specific parameter in the **SYSTEM SETUP** menu, press the **SELECT (ENTER) BUTTON** to display its current value. Press the **SCROLL (UP/DOWN) BUTTONS** to change or increase/decrease value. Press the **SELECT (ENTER) BUTTON** to save the new customized value — **“CHANGE STORED”** will be displayed. Press the **SELECT (ENTER) BUTTON** again to return to current menu parameter.
   - For specific **SYSTEM SETUP** level information, refer to Table 2.

**NOTE:** During an extended level of inactivity, the display of the JADE™ economizer controller will begin to automatically scroll through the various levels of the STATUS menu as a screensaver. Each level will stay for approximately 5 seconds before changing to the next level.

## Table 2

<table>
<thead>
<tr>
<th>Menu Level</th>
<th>Default Value</th>
<th>Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSTALL</td>
<td>01/01/10</td>
<td></td>
<td>Display Order = MM/DD/YY Setting Order = DD/MM/YY</td>
</tr>
<tr>
<td>UNITS DEG</td>
<td>°F</td>
<td>°F/°C</td>
<td>Sets controller to read in either measurements</td>
</tr>
<tr>
<td>EQUIPMENT</td>
<td>HP(B)</td>
<td>HP</td>
<td>Heat Pump HP CONV = A/C See Note *</td>
</tr>
<tr>
<td>AUX IN</td>
<td>HP(B)</td>
<td>HP(O)</td>
<td>Energize on Cool Energize on Heat See Note *</td>
</tr>
<tr>
<td>FAN SPEED</td>
<td>1 Speed</td>
<td>1 Speed 2 Speed</td>
<td></td>
</tr>
<tr>
<td>FAN CFM</td>
<td>5000</td>
<td>100 to 15000</td>
<td>Not applicable</td>
</tr>
<tr>
<td>AUX OUT</td>
<td>EXH2</td>
<td>NONE ERV EXH2 SYS</td>
<td>Product can be used to signal other devices</td>
</tr>
<tr>
<td>OCC</td>
<td>INPUT</td>
<td>INPUT or ALWAYS</td>
<td>INPUT is for dedicated OCC signal. ALWAYS is for all other situations</td>
</tr>
<tr>
<td>FACTORY DEFAULT</td>
<td>NO</td>
<td>YES or NO</td>
<td>Resets to factory defaults if changed to YES</td>
</tr>
</tbody>
</table>

**NOTE *:** In SYS SETUP the correct Equipment setting is HP and for the AUX2 IN is HP (B) in all applications. This is correct for both Air Conditioner and Heat Pump equipment in order to have correct operating sequences for the economizers. DO NOT change to CONV = A/C setting just because the equipment is an air conditioner and not a heat pump.

2. **ADVANCED SETUP:** from the main screen, press the **SCROLL (UP/DOWN) BUTTONS** to navigate through the six (6) basic menu items to the **ADVANCED SETUP** menu.
   - Push the **SELECT (ENTER) BUTTON** to choose the **ADVANCED SETUP** menu.
   - Navigate through the multiple levels of **ADVANCED SETUP** by pushing the **SCROLL (UP/DOWN) BUTTONS**.
   - To change a specific parameter in the **ADVANCED SETUP** menu, press the **SELECT (ENTER) BUTTON** to display its current value. Press the **SCROLL (UP/DOWN) BUTTONS** to change or increase/decrease value. Press the **SELECT (ENTER) BUTTON** to save the new customized value — **“CHANGE STORED”** will be displayed. Press the **SELECT (ENTER) BUTTON** again to return to current menu parameter.
   - For specific **ADVANCED SETUP** level information, refer to Table 3.
3. SETPOINTS: from the main screen, press the SCROLL (UP/DOWN) BUTTONS to navigate through the six (6) basic menu items to the SETPOINTS menu.

   - Push the SELECT (ENTER) BUTTON to choose the SETPOINTS menu.
   - Navigate through the multiple levels of SETPOINTS by pushing the SCROLL (UP/DOWN) BUTTONS.
   - To change a specific parameter in the SETPOINTS menu, press the SELECT (ENTER) BUTTON to display its current value. Press the SCROLL (UP/DOWN) BUTTONS to change or increase/decrease value. Press the SELECT (ENTER) BUTTON to save the new customized value — “CHANGE STORED” will be displayed. Press the SELECT (ENTER) BUTTON again to return to current menu parameter.
   - For specific SETPOINTS level information, refer to Table 4.

4. CHECKOUT: from the main screen, press the SCROLL (UP/DOWN) BUTTONS to navigate through the six (6) basic menu items to the CHECKOUT menu.

   - Push the SELECT (ENTER) BUTTON to choose the CHECKOUT menu.
   - Navigate through the multiple levels of CHECKOUT by pushing the SCROLL (UP/DOWN) BUTTONS.
   - To perform a specific test in the CHECKOUT menu, press the SELECT (ENTER) BUTTON to choose a particular exercise, “RUN?” will appear. Press the SELECT (ENTER) BUTTON again to activate this exercise. After a short pause, “IN PROGRESS” will appear as the test activates. “DONE” will display after the test is complete. Press the MENU UP (EXIT) BUTTON to end the test and/or turn off the activated relay.
   - For specific CHECKOUT level information, refer to Table 5.

NOTE: CHECKOUT functions bypass the normal 5-minute delay for compressor protection. Be sure to allow for enough time to pass between tests so the compressor is not damaged from extreme short-cycling.

**MINIMUM POSITION NOTE:** Minimum position setting has been preset to 10V which when connected to MC4000 Lead/Lag Controller System will allow economizer to drive wide open per emergency ventilation strategy as detailed in MC4000 Instructions. This may require resetting to a lower value per job specifications.
### TABLE 5
CHECKOUT (Menu Levels)

<table>
<thead>
<tr>
<th>Checkout Item</th>
<th>Checkout Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAMPER VMIN-HS</td>
<td>Positions damper to the minimum amount of opening allowed by actuator</td>
</tr>
<tr>
<td>DAMPER VMAX-HS</td>
<td>Opens damper to the MIN POS level indicated in the SETPOINTS menu. See Minimum Position Ventilation Setup Procedure (Pg. 16)</td>
</tr>
<tr>
<td>DAMPER OPEN</td>
<td>Forces damper to full open position, energizes exhaust contacts</td>
</tr>
<tr>
<td>DAMPER CLOSE</td>
<td>Positions damper to completely closed position</td>
</tr>
<tr>
<td>CONNECT Y1-O</td>
<td>Forces Y1-OUTPUT to compressor</td>
</tr>
<tr>
<td>CONNECT Y2-O</td>
<td>Forces Y2-OUTPUT to compressor</td>
</tr>
<tr>
<td>CONNECT AUX</td>
<td>Depending upon AUX OUT setting from SETUP menu:</td>
</tr>
<tr>
<td></td>
<td>NONE – no action</td>
</tr>
<tr>
<td></td>
<td>ERV – 24VAC out for ERV &amp; NOT Economizer SYS – 24VAC out for alarm</td>
</tr>
</tbody>
</table>

**NOTE:** Economizer assembly should be ready to put into service. At any point during operation, in economizer mode or idle, real-time information from sensors and integral components can be accessed from the **STATUS** menu.

5. **STATUS:** from the main screen, press the **SCROLL (UP/DOWN) BUTTONS** to navigate through the six (6) basic menu items to the **STATUS** menu.
   - Push the **SELECT (ENTER) BUTTON** to choose the **STATUS** menu.
   - Navigate through the multiple levels of **STATUS** by pushing the **SCROLL (UP/DOWN) BUTTONS**.
   - As the **STATUS** menu simply gives input/output information in real-time, there is no way to change or otherwise alter the displayed criteria. It is simply a window into the operation of the economizer controller.
   - For specific **STATUS** level information, refer to Table 6.

**NOTE:** Upon power-up (or after power failure or low voltage condition), the controller will begin a 5-minute time delay before enabling mechanical cooling.

### TABLE 6
STATUS (Menu Levels)

<table>
<thead>
<tr>
<th>Menu Level</th>
<th>Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON AVAIL</td>
<td>YES/NO</td>
<td>Indicates if conditions are favorable for economizing</td>
</tr>
<tr>
<td>ECONOMIZING</td>
<td>YES/NO</td>
<td>Indicates if economizer is actively economizing</td>
</tr>
<tr>
<td>OCCUPIED</td>
<td>YES/NO</td>
<td>Indicates if dedicated 24V occupied signal is being received on terminal OCC</td>
</tr>
<tr>
<td>HEAT PUMP</td>
<td>COOL/HEAT</td>
<td>Displays actual compressor use if in HEAT PUMP mode</td>
</tr>
<tr>
<td>COOL Y1-IN</td>
<td>ON/OFF</td>
<td>Indicates if 24V signal is being received on terminal Y1-I</td>
</tr>
<tr>
<td>COOL Y1-OUT</td>
<td>ON/OFF</td>
<td>Displays if controller is actively calling for mechanical compressor cooling (24V on Y1-O)</td>
</tr>
<tr>
<td>COOL Y2-IN</td>
<td>ON/OFF</td>
<td>Indicates if 24V signal is being received on terminal Y2-I</td>
</tr>
<tr>
<td>COOL Y2-OUT</td>
<td>ON/OFF</td>
<td>Displays if controller is actively calling for Stg. 2 cooling (24V on Y2-O)</td>
</tr>
<tr>
<td>MA TEMP</td>
<td>0° to 140°F</td>
<td>Current mixed air temp</td>
</tr>
<tr>
<td>OA TEMP</td>
<td>-40° to 140°F</td>
<td>Current outdoor air temp</td>
</tr>
<tr>
<td>OA HUM</td>
<td>0% to 100%</td>
<td>Current outdoor air humidity for economizers using temp/humidity sensor</td>
</tr>
<tr>
<td>DAMPER OUT</td>
<td>2.0 to 10.0</td>
<td>Displays voltage to actuator</td>
</tr>
<tr>
<td>ACT POS</td>
<td>0 to 100%</td>
<td>Current % of opening</td>
</tr>
<tr>
<td>ACT COUNT</td>
<td>N/A</td>
<td>Current count of actuator cycles from installation</td>
</tr>
<tr>
<td>ACTUATOR OK</td>
<td>YES/NO</td>
<td>Indicates potential fault</td>
</tr>
<tr>
<td>EXH1 OUT</td>
<td>ON/OFF</td>
<td>Output of EXH1 Terminal</td>
</tr>
<tr>
<td>MECH COOL ON</td>
<td>0, 1, or 2</td>
<td>Stages of mechanical cooling currently active</td>
</tr>
</tbody>
</table>

**NOTE:** If there are any potential problems recognized by the economizer controller, it may be registered in the form of an alarm in the **ALARM(S)** menu. If there is a period of inactivity AND there is an alarm registering, the controller will randomly scroll through the **ALARM(S)** menu items as a screensaver.
ENTHALPY SETTINGS

If economizer is enthalpy-based, and was shipped with the temp/humidity sensor, the economizer must be programmed for the specific enthalpy curve boundary desired for “free” outdoor cooling. The available enthalpy boundaries are all subject to specific OA temperature, OA humidity, and OA dew points. If all of the OA conditions are below the specific points outlined in each boundary, the conditions are good to economize and economizer mode is set to “YES”. If some or all the OA conditions are above the specific points outlined in each boundary, the conditions are not good to economize and the economizer mode is set to “NO”.

*ES3 is Factory Default.*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ES1</td>
<td>80.0</td>
<td>60.0</td>
<td>28.0</td>
<td>80.0</td>
<td>36.8</td>
<td></td>
<td>66.3</td>
<td>80.1</td>
<td></td>
</tr>
<tr>
<td>ES2</td>
<td>75.0</td>
<td>57.0</td>
<td>26.0</td>
<td>75.0</td>
<td>39.6</td>
<td></td>
<td>63.3</td>
<td>80.0</td>
<td></td>
</tr>
<tr>
<td>ES3</td>
<td>70.0</td>
<td>54.0</td>
<td>24.0</td>
<td>70.0</td>
<td>42.3</td>
<td></td>
<td>59.7</td>
<td>81.4</td>
<td></td>
</tr>
<tr>
<td>ES4</td>
<td>65.0</td>
<td>51.0</td>
<td>22.0</td>
<td>65.0</td>
<td>44.8</td>
<td></td>
<td>55.7</td>
<td>84.2</td>
<td></td>
</tr>
<tr>
<td>ES5</td>
<td>60.0</td>
<td>48.0</td>
<td>20.0</td>
<td>60.0</td>
<td>46.9</td>
<td></td>
<td>51.3</td>
<td>88.5</td>
<td></td>
</tr>
<tr>
<td>HL</td>
<td>86.0</td>
<td>66.0</td>
<td>32.4</td>
<td>86.0</td>
<td>38.9</td>
<td></td>
<td>72.4</td>
<td>80.3</td>
<td></td>
</tr>
</tbody>
</table>

ALARM(S): from the main screen, press the **SCROLL (UP/DOWN) BUTTONS** to navigate through the six (6) basic menu items to the **ALARM(S)** menu.

- Push the **SELECT (ENTER) BUTTON** to choose the **ALARM(S)** menu.
- Navigate through the current alarms in **ALARM(S)** by pushing the **SCROLL (UP/DOWN) BUTTONS**.
- Once the alarm has been identified, and the cause has been removed (e.g. replaced faulty sensor), the alarm may erase itself. If a manual alarm-erasing is required, it can be cleared from the display by navigating to the desired alarm and pressing the **SELECT (ENTER) BUTTON** to choose that specific alarm. “ERASE?” will display. Press the **SELECT (ENTER) BUTTON** again. “ALARM ERASED” will appear. Press the **MENU UP (EXIT) BUTTON** to complete the action and return to the previous menu.

- For specific **ALARM(S)** information, refer to **Table 7**.

**TABLE 7**

<table>
<thead>
<tr>
<th>Alarm(s)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA T SENS ERR</td>
<td>Malfunctioning mixed air sensor</td>
</tr>
<tr>
<td>OA T SENS ERR</td>
<td>Malfunctioning outdoor air sensor</td>
</tr>
<tr>
<td>ACT STALLED</td>
<td>Actuator cannot reach desired percentage of opening</td>
</tr>
<tr>
<td>SYS ALARM</td>
<td>If AUX is set to SYS in SETPOINTS menu, SYS will display upon any registered alarm</td>
</tr>
</tbody>
</table>

NOTE: This is not a complete list of alarms. Additional alarms will display depending upon the parameter settings and configuration and attached equipment.
ECONOMIZER SEQUENCE OF OPERATION

Condition — Cool / Dry OA Conditions

- 1st Stage Cooling closes and sends signal to JADE™ control. Since the air temperature outside is cooler than the preset DRYBULB SET setting, or is below the ENTH CURVE boundary in the SETPOINTS menu, the actuator will power the economizer damper to “economizer” mode as the indoor blower motor starts. The mixed air sensor senses a mixture of return air and cool outdoor air and modulates opening to achieve preset MAT SET setting in SETPOINTS menu. Compressor operation is inhibited. (See Figure 13.)

- 2nd Stage Cooling closes and sends a signal to JADE™ control, which closes the Y1-O relay to begin mechanical cooling. The economizer damper REMAINS OPEN in tandem operation with the compressor as long as the OA conditions do not drop below the preset DRYBULB SET/ENTH CURVE settings in the SETPOINTS menu. (See Figure 14.)

- 3rd Stage Cooling (if available) closes and sends a signal to JADE™ control, which closes the Y2-O relay to begin 2nd stage mechanical cooling. The economizer damper REMAINS OPEN in tandem operation with the compressor as long as the temperature outside does not drop below the preset DRYBULB SET setting in the SETPOINTS menu. (See Figure 14.)

Condition — Warm / Humid OA Conditions

- 1st Stage Cooling closes and sends signal to JADE™ control. Since the OA conditions are above the preset DRYBULB SET/ENTH CURVE setting in the SETPOINTS menu, the control will simply close the Y1-O relay to initiate mechanical cooling. The economizer damper will remain closed or in a minimum ventilation setting depending upon occupied status. (See Figure 15.)

- 2nd Stage Cooling (if available) closes and sends a signal to JADE™ control. Since the OA conditions are still above the preset DRYBULB SET/ENTH CURVE setting in the SETPOINTS menu, the control will simply close the Y2-O relay to initiate 2nd stage mechanical cooling. The economizer damper will remain closed or in a minimum ventilation setting depending upon occupied status. (See Figure 15.)
ECONOMIZER FEATURES

- One piece construction – easy to install. Direct-drive actuator eliminates linkage.
- Exhaust air damper – built in with positive closed position. Provides exhaust air capability to prevent pressurization of tight buildings.
- JADE™ controller provides nearly limitless customization on a solid, intuitive electronic platform.
- Actuator Motor – 24 volt, power-open, spring-return, direct-coupled with stall protection. Self-centering shaft clamp and access cover facilitate ease of replacement/maintenance.
- Proportioning-type control – for maximum “free” cooling economy and comfort with up to 100% outside air.
- Drybulb sensor to monitor outdoor air temperature.
- Minimum Ventilation Position available for required ventilation of occupants or dilution of pollutants.
- Mixed air sensor to monitor outdoor and return air to automatically modulate damper position.
Economizer Operation for Single Stage:

THERMOSTAT/CONTROL CALLS FOR 1ST STAGE COOLING

OA CONDITIONS ABOVE DRYBULB OR ENTHALPY CURVE SETPOINTS

MECHANICAL COOLING BEGINS, ECON. DAMPER CLOSED OR MIN. POSITION

CONDITIONED SPACE LOAD IS PICKED UP BY MECHANICAL COOLING

THERMOSTAT IS SATISFIED AND SYSTEM SHUTS DOWN

OA CONDITIONS BELOW DRYBULB OR ENTHALPY CURVE SETPOINT

ECONOMIZER ONLY OPERATION, MAT SENSOR ATTEMPTS TO MAINTAIN PRESET DISCHARGE AIR TEMP.

IS ADDITIONAL COOLING REQ'D?

NO

CONDITIONED SPACE LOAD IS PICKED UP BY ECONOMIZER

THERMOSTAT IS SATISFIED AND SYSTEM SHUTS DOWN

YES

MECHANICAL COOLING BEGINS, ECON DAMPER REMAINS OPEN

CONDITIONED SPACE LOAD IS PICKED UP BY ECONOMIZER AND MECHANICAL COOL

THERMOSTAT IS SATISFIED AND SYSTEM SHUTS DOWN
Economizer Operation for Two Stage:

THERMOSTAT/CONTROL CALLS FOR 1ST STAGE COOLING

OA CONDITIONS ABOVE DRYBULB OR ENTHALPY CURVE SETPOINT

1ST STAGE MECHANICAL COOLING BEGINS, ECON. DAMPER CLOSED OR MIN. POSITION

IS ADDITIONAL COOLING REQ'D?

YES

2ND STAGE MECHANICAL COOLING BEGINS, ECON DAMPER CLOSED OR MIN. POSITION

CONDITIONED SPACE LOAD IS PICKED UP BY MECHANICAL COOLING

CONDITIONED SPACE LOAD IS PICKED UP BY ECONOMIZER

THERMOSTAT IS SATISFIED AND SYSTEM SHUTS DOWN

CONDITIONED SPACE LOAD IS PICKED UP BY ECONOMIZER AND MECHANICAL COOL

THERMOSTAT IS SATISFIED AND SYSTEM SHUTS DOWN

NO

OA CONDITIONS BELOW DRYBULB OR ENTHALPY CURVE SETPOINT

ECONOMIZER ONLY OPERATION, MAT SENSOR ATTEMPTS TO MAINTAIN PRESET DISCHARGE AIR TEMP.

IS ADDITIONAL COOLING REQ'D?

NO

1ST STAGE MECHANICAL COOLING BEGINS, ECON DAMPER REMAINS OPEN

IS ADDITIONAL COOLING REQ'D?

YES

2ND STAGE MECHANICAL COOLING BEGINS, ECON DAMPER REMAINS OPEN

CONDITIONED SPACE LOAD IS PICKED UP BY ECONOMIZER AND MECHANICAL COOL

THERMOSTAT IS SATISFIED AND SYSTEM SHUTS DOWN

CONDITIONED SPACE LOAD IS PICKED UP BY ECONOMIZER AND MECHANICAL COOL

THERMOSTAT IS SATISFIED AND SYSTEM SHUTS DOWN

NO

CONDITIONED SPACE LOAD IS PICKED UP BY MECHANICAL COOLING

THERMOSTAT IS SATISFIED AND SYSTEM SHUTS DOWN

YES