
INSTALLATION INSTRUCTIONS

ECONOMIZER WITH EXHAUST

Models:

EWM1-E EWM1-T

For Use with Bard H Series
1 Ton Wall Mount Air Conditioners



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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 75% outside air.
- Enthalpy 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.

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 the economizer package. They are not intended as a step-by-step procedure with which a 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 an additional two stage cooling thermostat in place of the normal single stage cooling thermostat. Also, additional low voltage wire will be required to transmit the second call (8) for cool (i.e., 6 conductor thermostat wire for an air conditioning unit). See Figure 5 on page 8 for thermostat options.

The economizer installation requires a Bard MV5000 controller. It is designed specifically to control two (2) redundant Bard wall mount units equipped with economizers.

Any wall mount unit equipped with an economizer must also have a low ambient control installed. This control can be factory installed or field installed. If field installed, use kit CMA-6 for R22 air conditioner models and kit CMA-28 for R410A air conditioner models.

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 ordering and shipping document to verify that the correct accessory has been shipped.

Inspect the carton housing of each economizer as it is received, and before signing the freight bill, verify that all items have been received and that 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.

DESCRIPTION

The EWM1-E and EWM1-T Series economizers are designed to be used with a wall mount series air conditioner (shown in Table 1) equipped with a low ambient control. 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/outdoor enthalpy is too warm to be sufficient for cooling, the 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 designed 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.

TABLE 1
Model Reference

MODEL ①	FOR USE WITH THE FOLLOWING UNIT
EWM1-E, EWM1-T	H12AAA

① Low ambient is required with economizer for low pressure compressor operation.

INSTALLATION

BASIC INSTALLATION

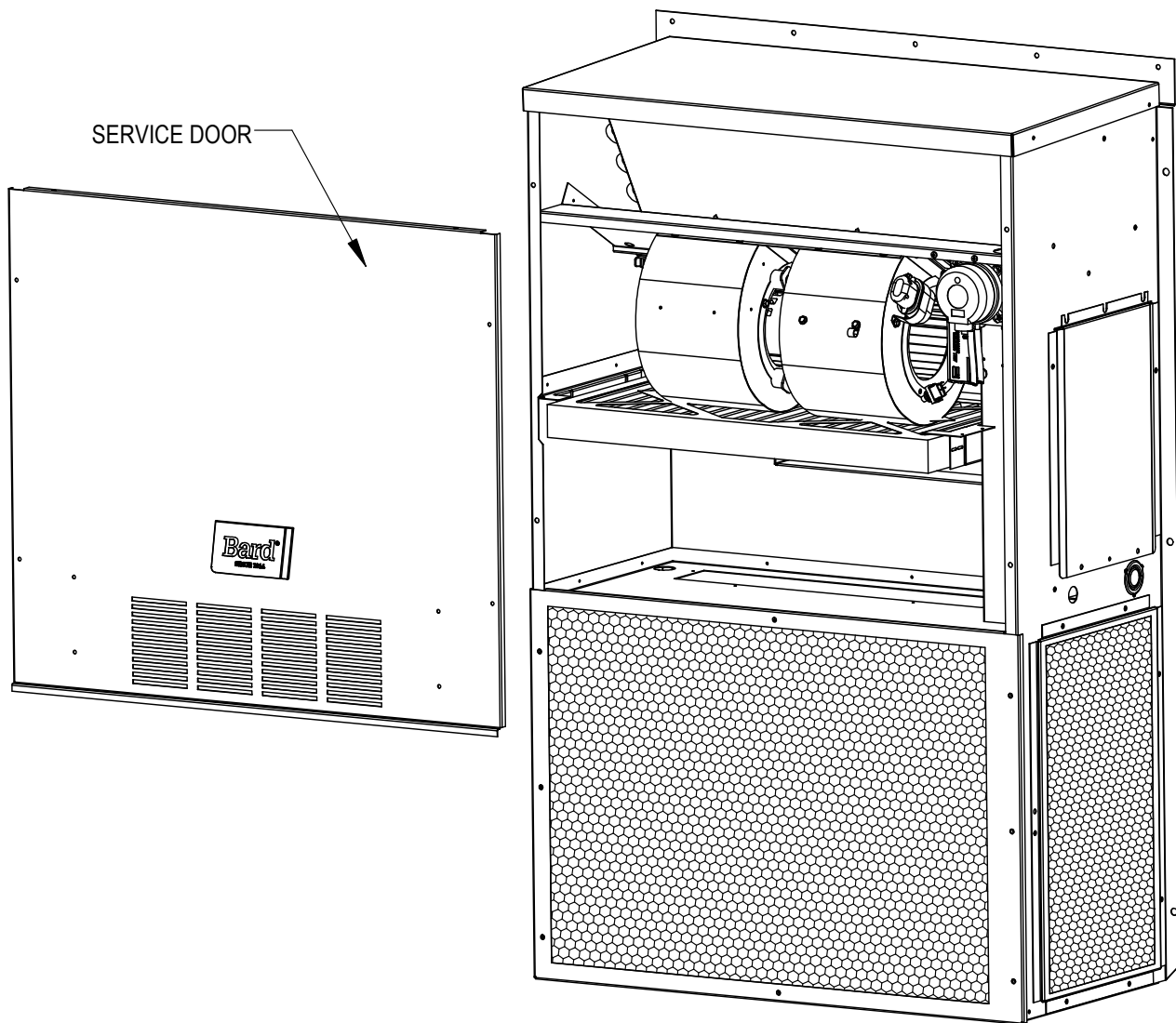


WARNING

Open and lock unit disconnect switch before installing this accessory to prevent injury or death due to electrical shock or contact with moving parts. Turn thermostat to OFF.

1. Unpack the economizer assembly which includes the integral economizer with attached electrical harness, mixed air thermistor, miscellaneous hardware and installation instructions.
2. Remove and save the existing exterior service access panel on the wall mount unit (see Figure 1).

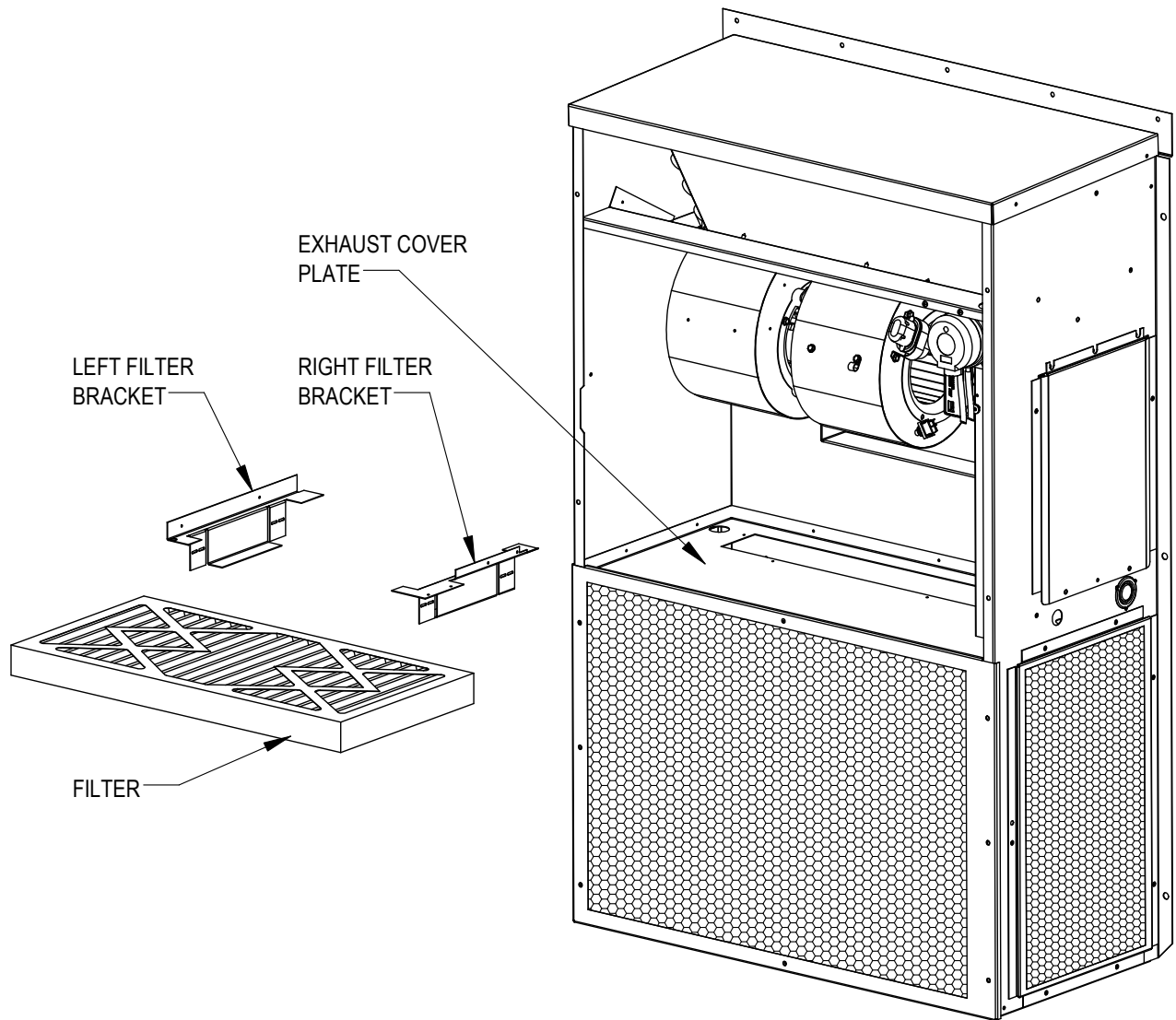
FIGURE 1
Remove Service Access Panel



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3. Remove and save existing right and left side filter brackets. Remove and save filter. See Figure 2.
4. Remove and discard the exhaust cover plate (see Figure 2).

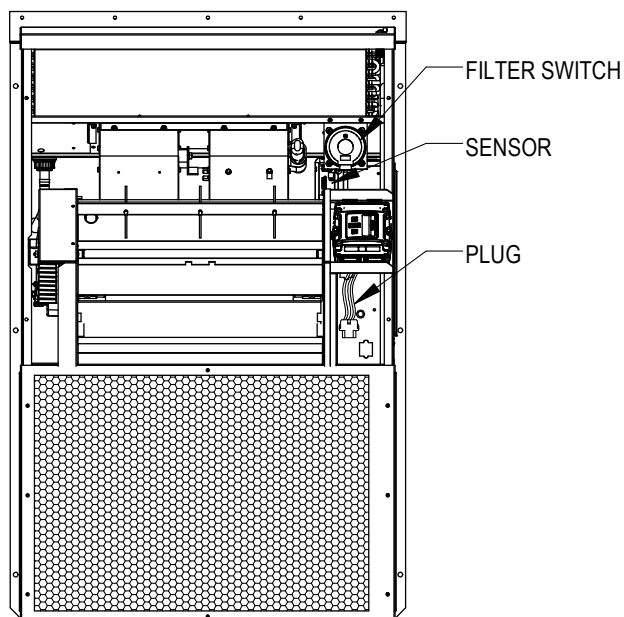
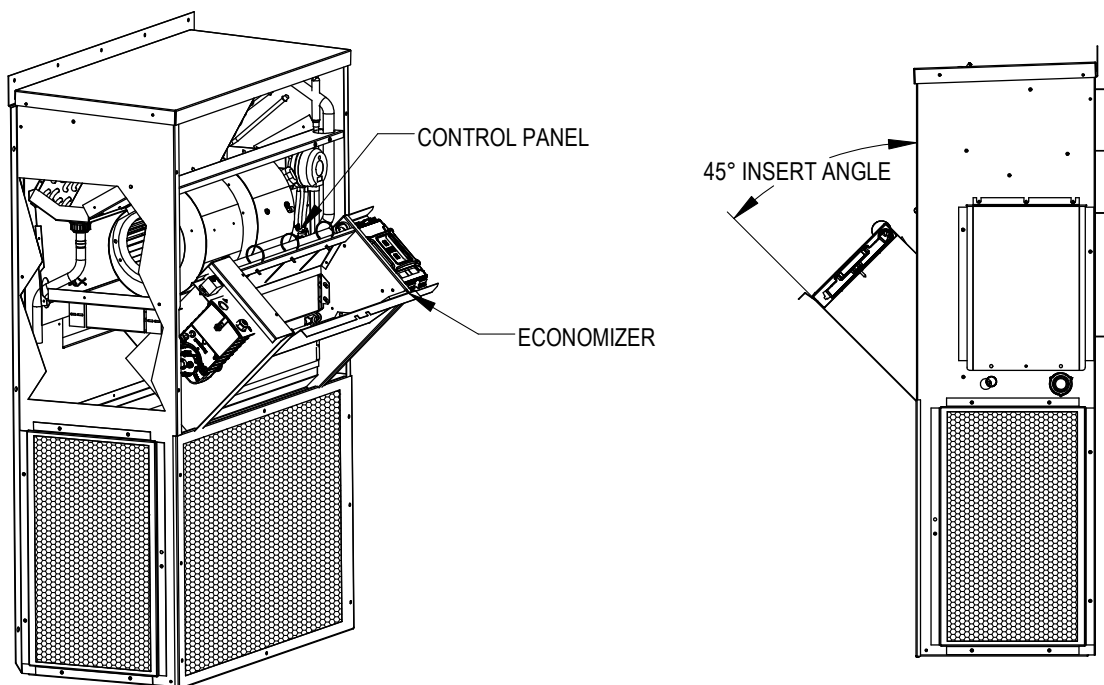
FIGURE 2
Remove Filter Brackets, Filter and Exhaust Cover Plate



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5. Open unit control panel to gain access to unit low voltage terminal block.
6. Install the economizer by inserting into the unit to the far left side. Tilt the economizer back 45° to position the rear seal under the blower. Slide the economizer in far enough that the back bottom of the economizer is inside the unit. Leave the economizer in this position for now.
7. Plug economizer wire harness into the molex connector on the side of the control panel.
8. Now rotate the economizer into the unit until the economizer is level and is clear of the blower. Once the economizer is fully inserted, slide the economizer to the right until tight against the control panel.

FIGURE 3
Installing Economizer in Unit



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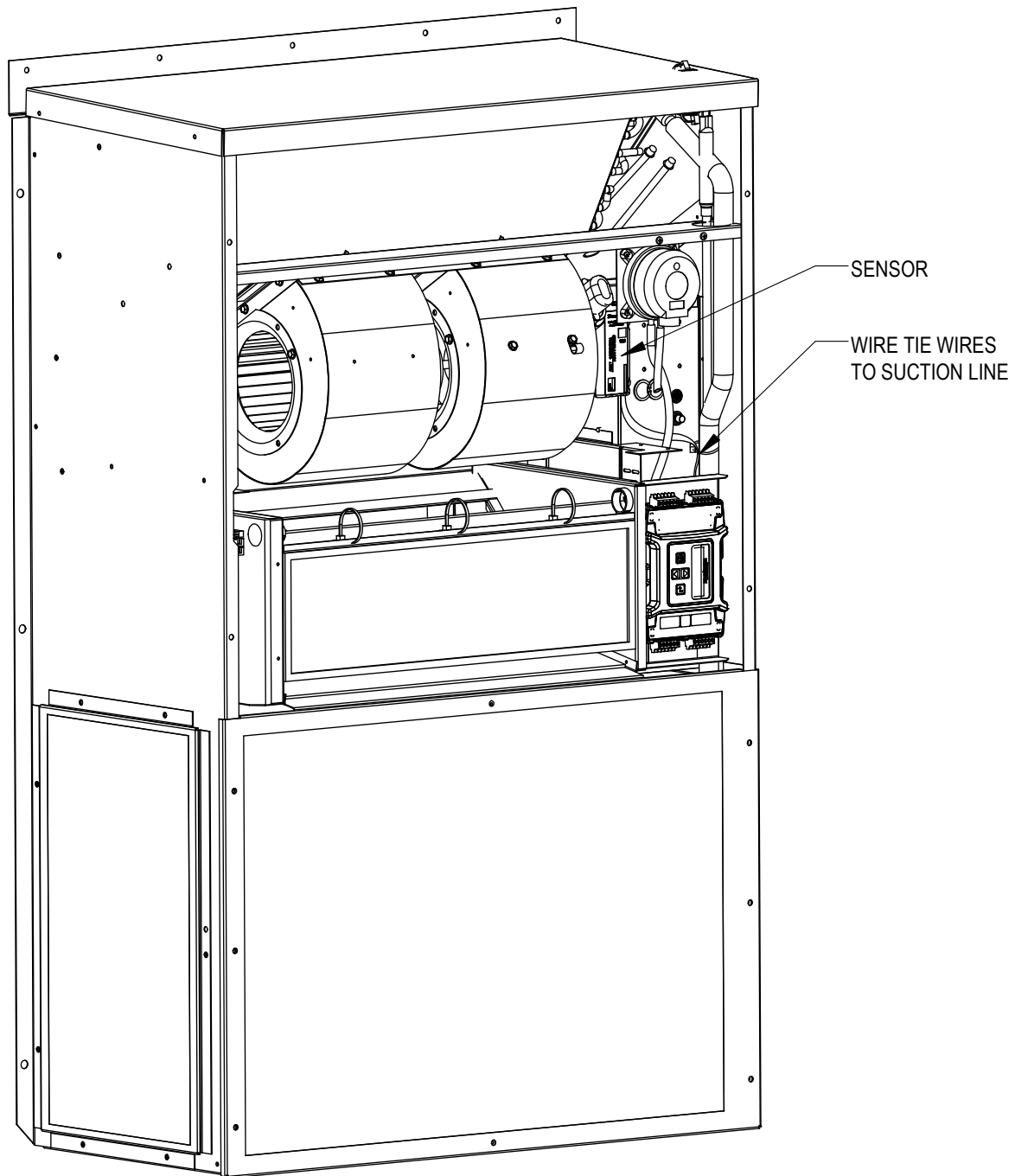
IMPORTANT: Position front lip of economizer over the front grille. This is important to ensure proper drainage of any water entering damper assembly.

9. Mount mixed air thermistor to control panel with screws provided as shown in Figure 4. Route wires as shown and secure with wire tie. Connect orange wires to thermistor.

10. Reinstall filter brackets and filter.

11. Close control panel cover.

FIGURE 4
Mounting and Wiring Sensor



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START-UP/CHECKOUT PROCEDURES

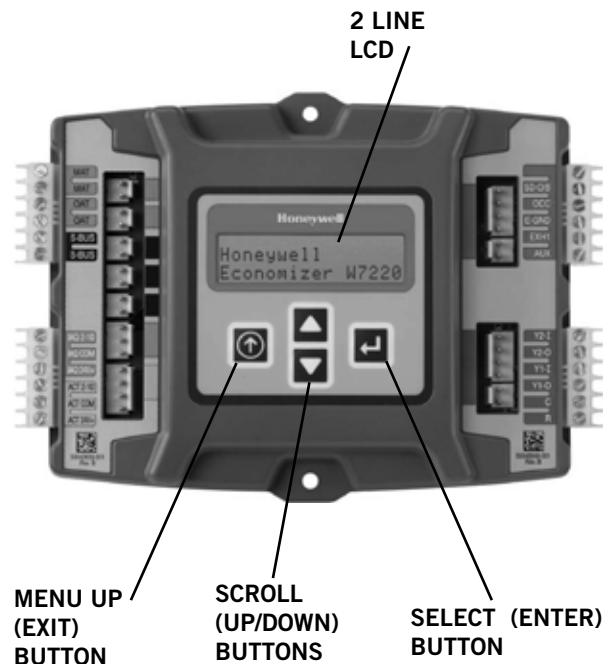
JADE™ ECONOMIZER CONTROLLER

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.

FIGURE 5
JADE™ Economizer Controller



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 – 7. 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.

Review/Customize System Setup

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**.

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
System Setup Menu Levels

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

* 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**.

TABLE 3
Advanced Setup Menu Levels

Menu Level	Default Value	Range	Notes
MA LOW SET	45°F	35-55°	Temp to activate freeze protection — Close Damper
FREEZE POS	CLO	CLO or MIN	Damper position upon freeze protection
STG3 DLY	15 MIN	0 to 4.0h or OFF	Delay for 3rd Stage Cooling – allows for 3 stages of cooling, one stage for econ & two stages for compressor
DMPR POS	CLO	CLO or OPN	Where damper goes upon shutdown signal
MA T CAL	0.0°F	+/-2.5°F from actual reading	Mixed Air Sensor temperature calibration
OA T CAL	0.0°F	+/-2.5°F from actual reading	Outdoor Air Sensor temperature calibration
OAS H CAL	0%	+/-10% from actual reading	Outdoor Air Humidity Sensor calibration for economizers using temp/humidity sensor

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** on page 10.

At this point, the economizer assembly should be fully functional and ready for preliminary testing.

TABLE 4
Setpoints Menu Levels

Menu Level	Default Value	Range	Notes
MAT SET	53°F	38°F to 65°F	Mixed Air Temperature setpoint at which the economizer damper will begin to modulate to maintain setting
LOW T LOCK	0°F	-45°F to 80°F	Low outdoor ambient temperature for compressor lockout
DRYBLB SET	60°F	48°F to 80°F	Maximum outdoor temperature setting for “free” economizer cooling
ENTH CURVE	ES3	ES1, ES2, ES3, ES4 or ES5	Enthalpy boundary “curves” for economizers using temp/humidity sensor, see “Enthalpy Settings” explanation
MIN POS	2.0V	2 to 10 VDC	Actuator voltage for Minimum Position
EXH1	50%	0 to 100%	Setpoint for damper if exhaust fan is powered by economizer
EXH2	6%	0 to 100%	Setpoint for AUX output signal

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**.

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.

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.

TABLE 5
Checkout Menu Levels

Menu Level	Notes
DAMPER VMIN-HS	Positions damper to the minimum amount of opening allowed by actuator
DAMPER VMAX-HS	Opens damper to the MIN POS level indicated in the SETPOINTS menu. See Minimum Position Ventilation Setup Procedure below
DAMPER OPEN	Forces damper to full open position, energizes exhaust contacts
DAMPER CLOSE	Positions damper to completely closed position
CONNECT Y1-O	Forces Y1-OUTPUT to compressor
CONNECT Y2-O	Forces Y2-OUTPUT to compressor
CONNECT AUX	Depending upon AUX OUT setting from SETUP menu: NONE – no action ERV – 24VAC out for ERV & NOT Economizer SYS – 24VAC out for alarm

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**.

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

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.

TABLE 6
Status Menu Levels

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

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.

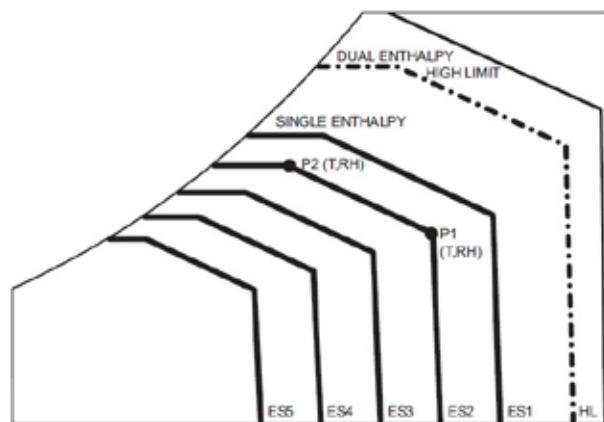
- Push the **SELECT (ENTER) BUTTON** to choose the **ALARM(S)** menu.
- Navigate through the current alarms in **ALARM(S)** by pushing the **SCROLL (UP/DOWN) BUTTONS**.
- Once the alarm has been identified, and the cause has been removed (e.g., replaced faulty sensor), the alarm may erase itself. If 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
Alarm Examples

Alarm(s)	Notes
MA T SENS ERR	Malfunctioning mixed air sensor
OA T SENS ERR	Malfunctioning outdoor air sensor
ACT STALLED	Actuator cannot reach desired percentage of opening
SYS ALARM	If AUX is set to SYS in SETPOINTS menu, SYS will display upon any registered alarm
NOTE: This is not a complete list of alarms. Additional alarms will display depending upon the parameter settings and configuration and attached equipment.	

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”.



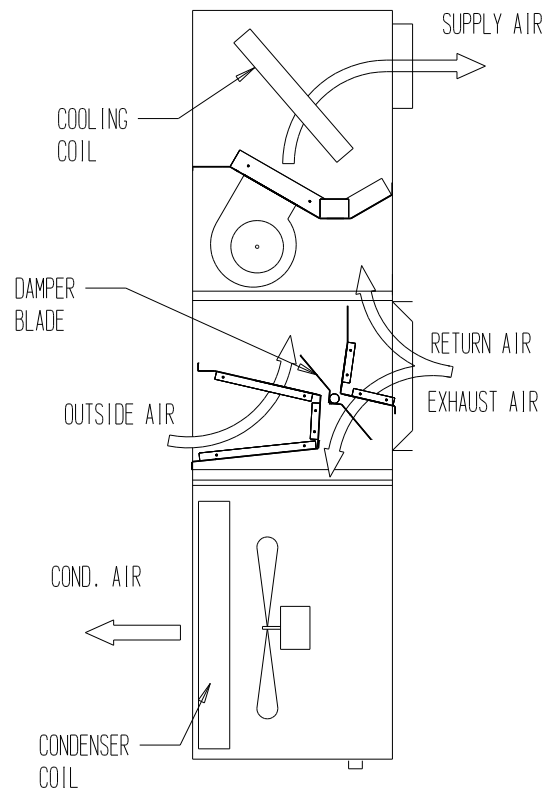
Enthalpy Curve	Temp. Dry Bulb (°F)	Temp. Dewpoint (°F)	Enthalpy (btu/lb/da)	Point P1		Point P2	
				Temp. °F	Humidity %RH	Temp. °F	Humidity %RH
ES1	80.0	60.0	28.0	80.0	36.8	66.3	80.1
ES2	75.0	57.0	26.0	75.0	39.6	63.3	80.0
ES3	70.0	54.0	24.0	70.0	42.3	59.7	81.4
ES4	65.0	51.0	22.0	65.0	44.8	55.7	84.2
ES5	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

ECONOMIZER SEQUENCE OF OPERATION

Condition – Cool/Dry OA Conditions

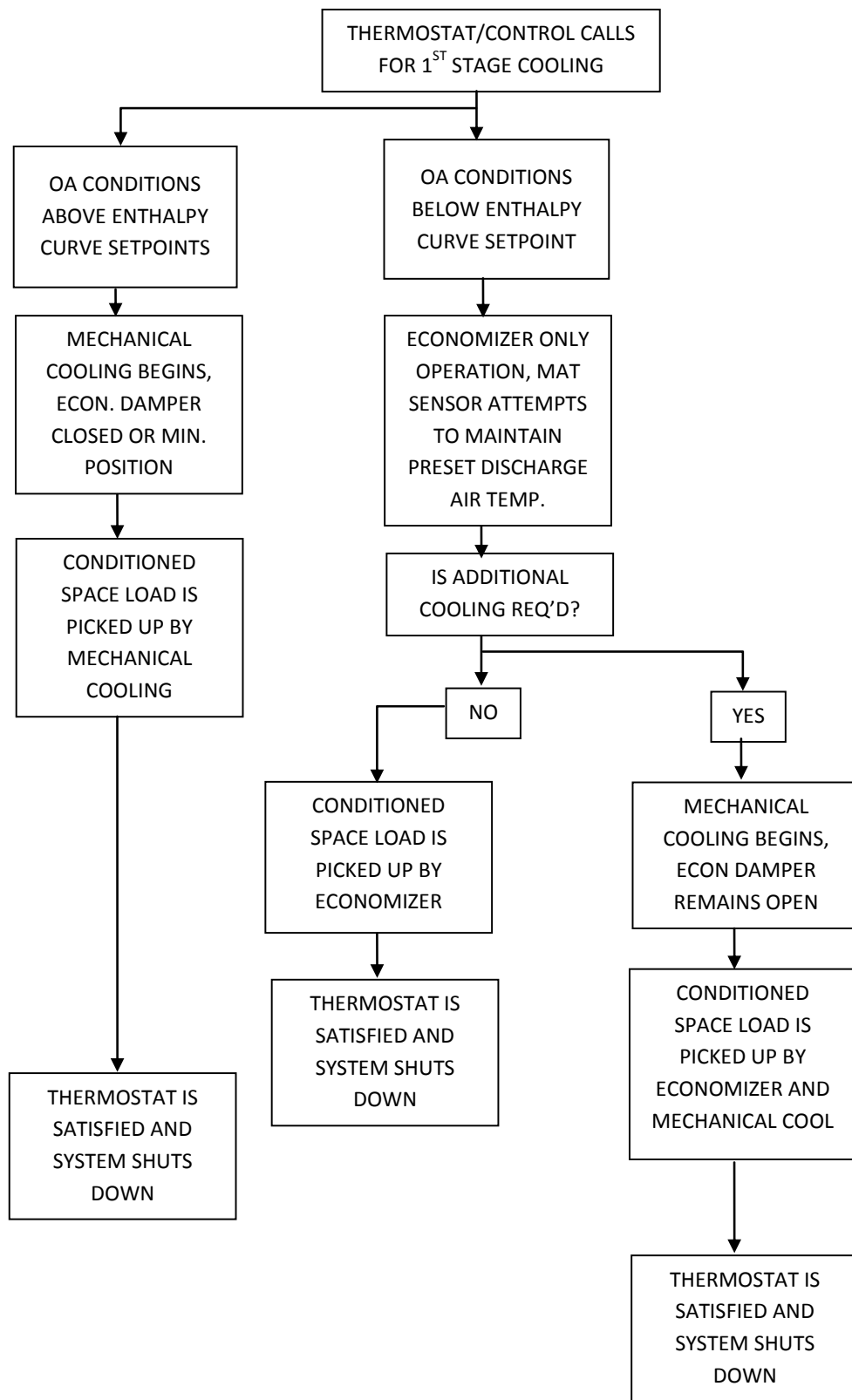
- 1st Stage Cooling closes and sends signal to **JADE™** control. Since the air temperature outside is cooler than the preset **DRYBULB SET** setting, or is below the **ENTH CURVE** boundary in the **SETPOINTS** menu, the actuator will power the economizer damper to “economizer” mode as the indoor blower 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 6.)
- 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.
- 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.

FIGURE 6
Mixed Airflow Path



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Economizer Operation for Single Stage:

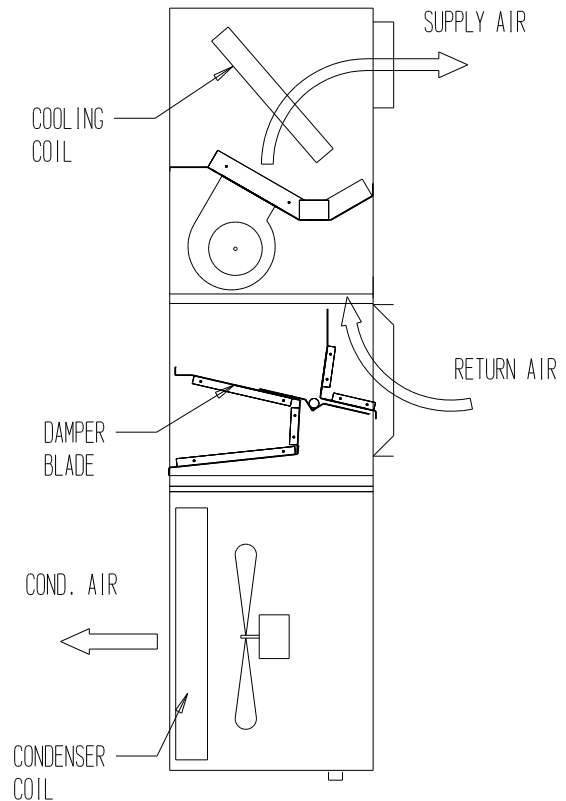


ECONOMIZER SEQUENCE OF OPERATION

Condition – Warm/Humid OA Conditions

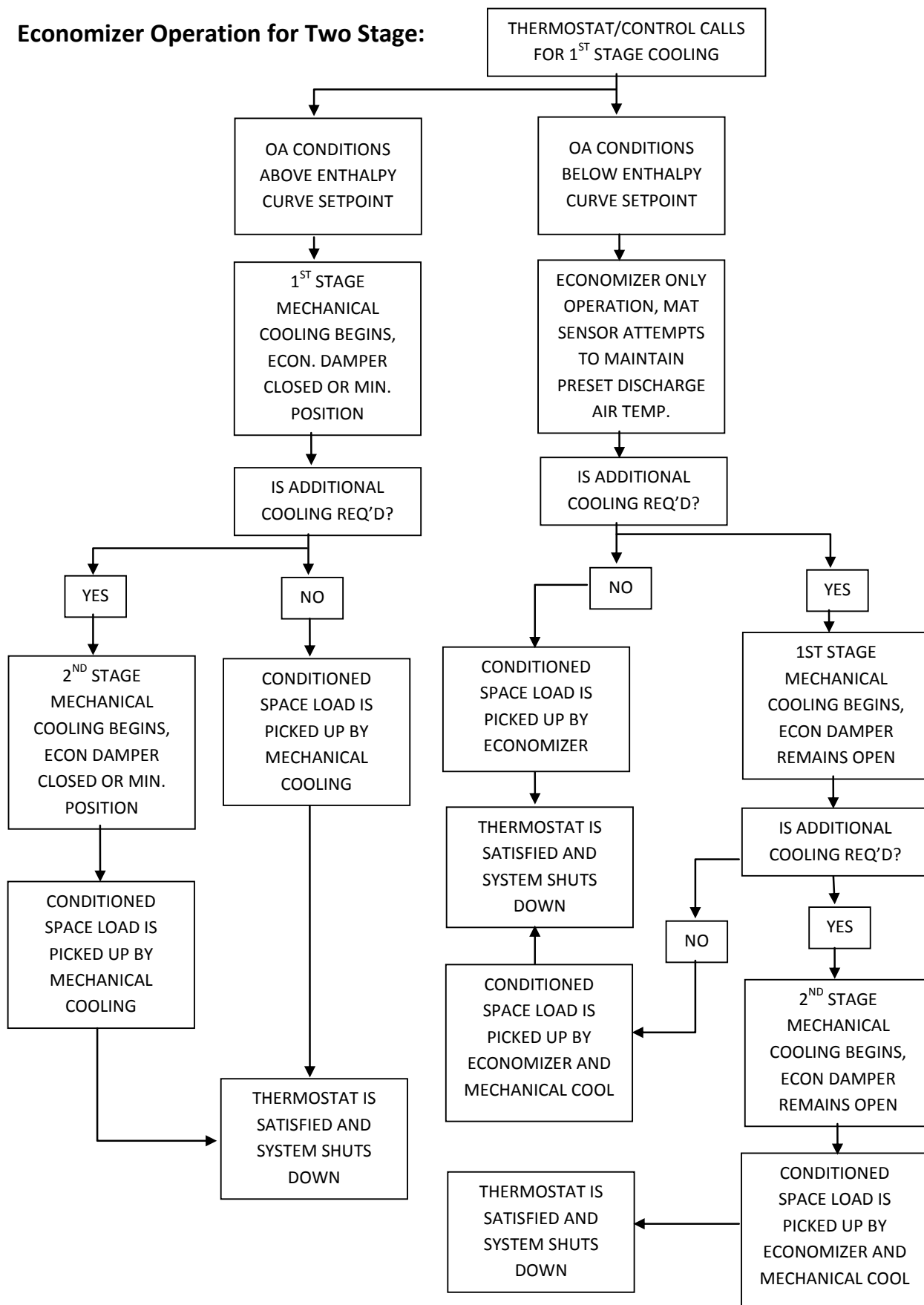
- 1st Stage Cooling closes and sends signal to **JADE™** control. Since the OA conditions are above the preset **DRYBULB SET/ENTH CURVE** setting in the **SETPOINTS** menu, the control will simply close the Y1-O relay to initiate mechanical cooling. **The economizer damper will remain closed or in a minimum ventilation setting depending upon occupied status.** (See Figure 7.)
- 2nd Stage Cooling (if available) closes and sends a signal to **JADE™** control. Since the OA conditions are still above than 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 7.)

FIGURE 7
100% Closed Airflow Path



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Economizer Operation for Two Stage:



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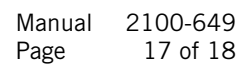
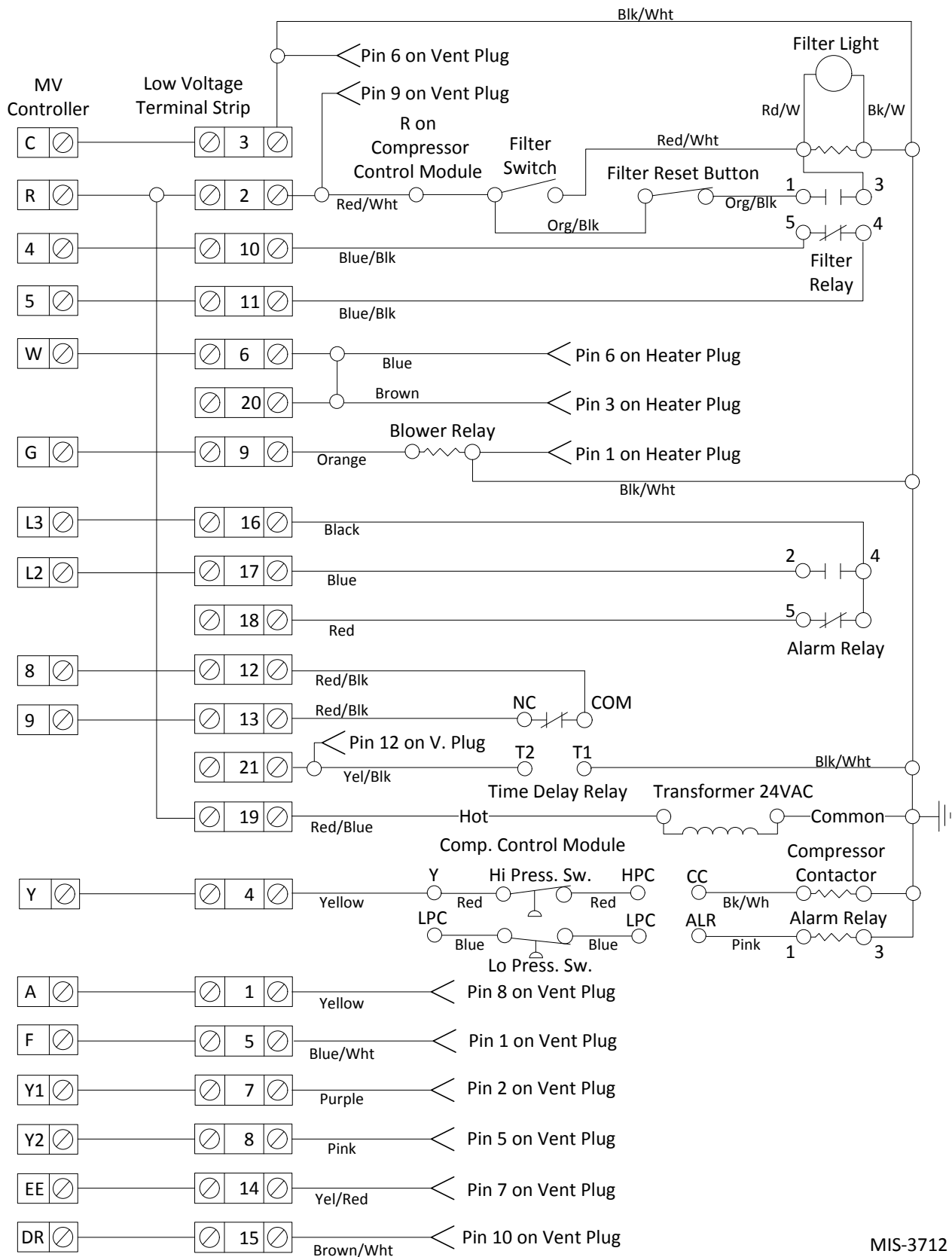


FIGURE 9
H*A Low Voltage Ladder Diagram for Unit and MV Connections**



MIS-3712