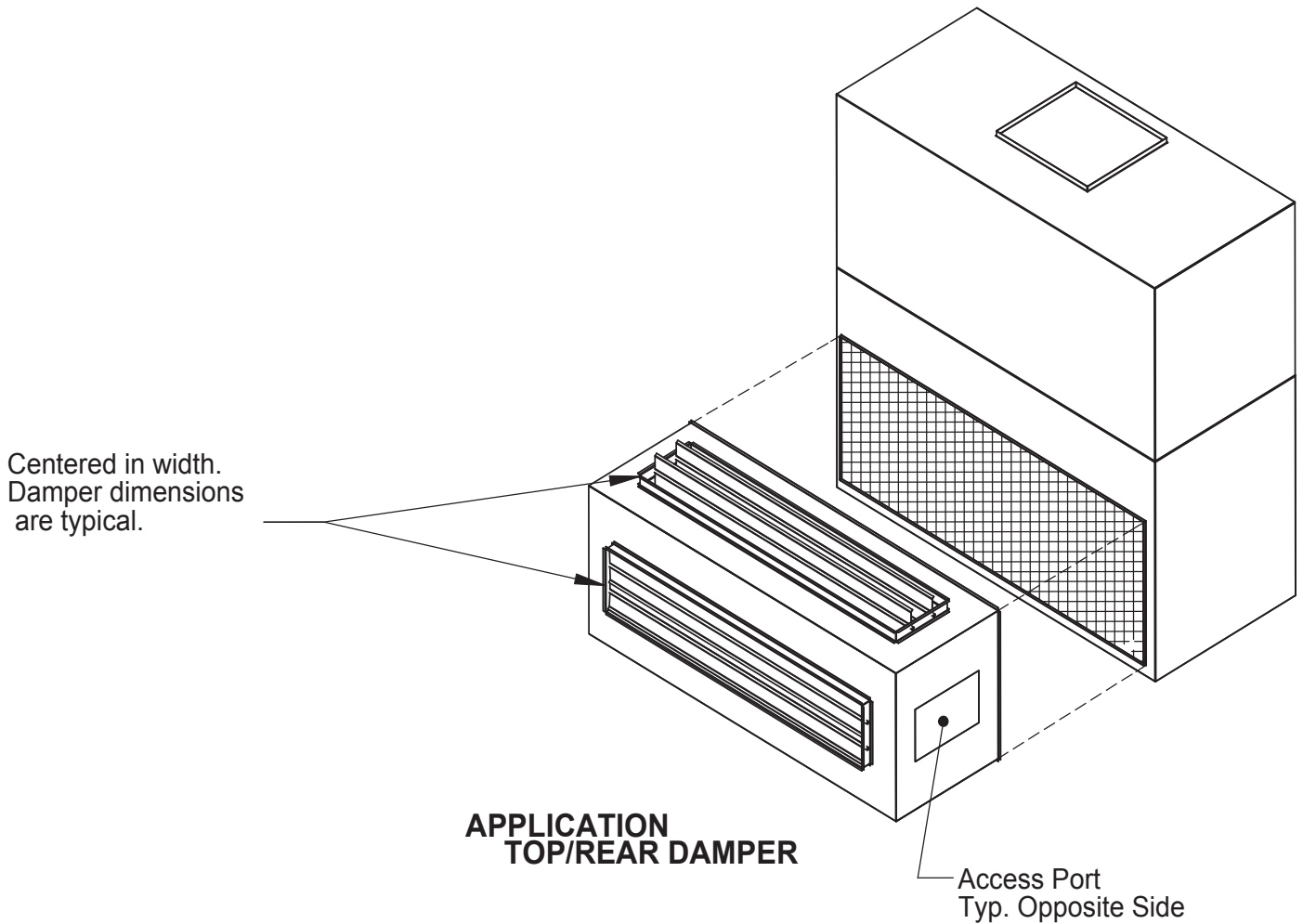## Before Starting Installation

Warning
Shut power to unit prior to any work being done. Personal injury or death could result.
Only qualified HVAC service personnel should install, troubleshoot, repair or service HVAC and related HVAC equipment.

PARTS INCLUDED	QTY.
Outside Air Sensor	1
Screws for Outside Air Sensor	2
Sensor Connectors	2
Discharge Air Sensor	1
#12 x 3/4" Screw	1 Set

ILL. 1

Centered in width.
Damper dimensions
are typical.

**APPLICATION
TOP/REAR DAMPER**

Access Port
Typ. Opposite Side

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)

Sylk Bus Sensor Wiring

The labels on the sensors and controller are color coded for ease of installation. Orange labeled sensors can only be wired to orange terminals on the controller. Brown labeled sensors can only be wired to S-bus (brown) terminals. Use Fig. 6 and Table 3 to locate the wiring terminals for each Sylk Bus sensor.

Use Fig. 6 and Table 4 to set the DIP switches for the desired use of the sensor.
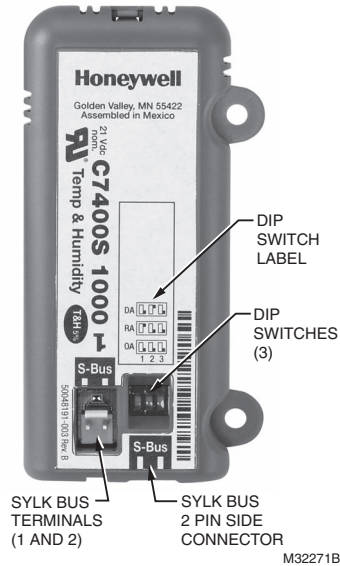
Fig. 6. Sylk Bus sensor DIP switches.

Table 3. SYLK Bus Sensor Wiring Terminations.

Terminal			
Nbr	Label	Type	Description
1	S-BUS	SYLK Bus	Sylk Bus Communications (Sensor Bus) polarity insensitive
2	S-BUS	SYLK Bus	Sylk Bus Communications (Sensor Bus) polarity insensitive

Table 4. SYLK Bus Sensor DIP Switch Settings.

	DIP Switch Positions for Switches 1, 2, & 3		
Use	**1**	**2**	**3**
DA[a]	OFF	ON	OFF
RA[b]	ON	OFF	OFF
OA[c]	OFF	OFF	OFF

[a] DA = Discharge Air

[b] RA = Return Air

[c] OA = Outdoor Air

NOTE: When using the Sylkbus sensors there will be a slight delay while the Jade controller and the sensor communicate. Analog sensors do not communicate on the Sylkbus and output a 20k ohm signal to the Jade controller so the response time is instantaneous.

Actuator Wiring Options:

1. The JADE economizer controller can only have one (1) communicating actuator connected to it.
2. Up to four (4) non-communicating and two (2) 2-position actuators (1 each on EXH1 and AUX1 O)
3. One (1) communicating and up to four (4) non-communicating and two (2) 2-position actuators (1 each on EXH1 and AUX1 O). When using a 2-position actuator on the AUX1 O, the AUX1 O must be programmed for Exh2 and the % open is the % open of the outdoor damper when the 2-pos actuator opens. Connect 24 V to Exh1 and/or AUX1 O and ground to the Jade "C" terminal.
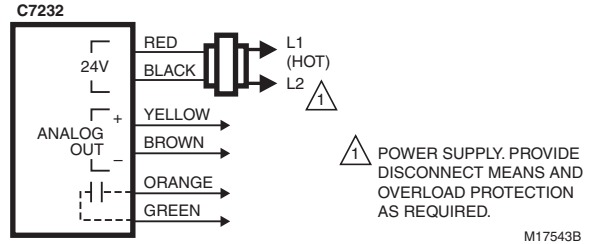
CO2 Sensor Wiring

When using the C7232 Honeywell CO2 sensors the black and brown common wires are internally connected and only one is connected to "IAQ COM" on the Jade. Use the power from the Jade to power the CO2 sensor OR make sure the ground for the power supplies are common. See wiring diagram below for the C7232 and C7632 wiring diagrams.

NOTE: **When using the C7632 (or any 0-10 Vdc CO2 sensor) with the Jade you will need to set the CO2ZERO to 400 ppm and the CO2SPAN to 1600 ppm in the ADVANCED SETUP menu.**
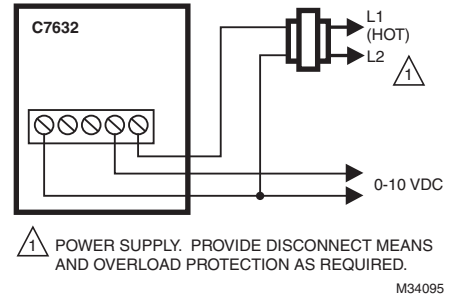

Fig. 7. Wiring for C7232
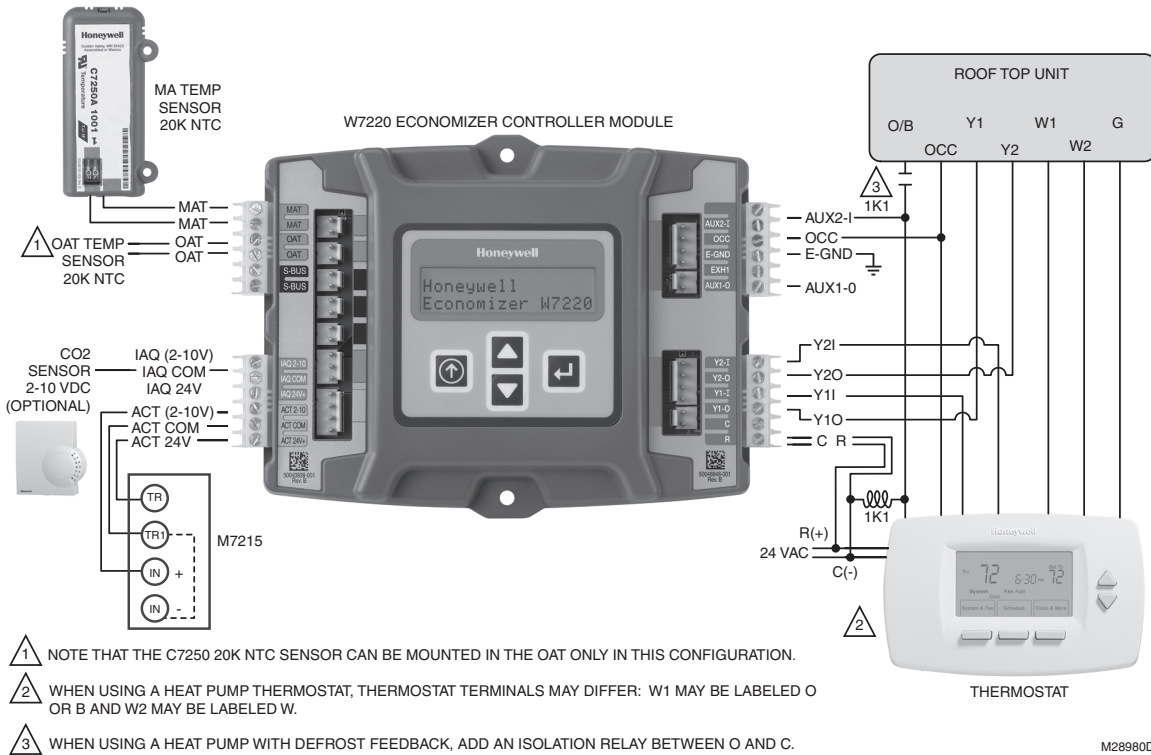

Fig. 8. Wiring for C7632

WIRING APPLICATION EXAMPLES

This section shows the wiring configurations for the JADE™ Economizer system.
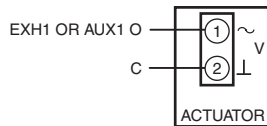
Stand-alone Economizer

The most basic configuration is the stand-alone Economizer (see Fig. 9 and Fig. 11).

A stand-alone Economizer is directly wired to sensors, actuators, thermostat, and mechanical cooling controls in the roof top unit. It does not require Sylk Bus communications.

1. NOTE THAT THE C7250 20K NTC SENSOR CAN BE MOUNTED IN THE OAT ONLY IN THIS CONFIGURATION.

2. WHEN USING A HEAT PUMP THERMOSTAT, THERMOSTAT TERMINALS MAY DIFFER: W1 MAY BE LABELED O OR B AND W2 MAY BE LABELED W.

3. WHEN USING A HEAT PUMP WITH DEFROST FEEDBACK, ADD AN ISOLATION RELAY BETWEEN O AND C.

M28980D

Fig. 9. Stand-alone dry bulb Economizer configuration with black motor M7215.

NOTE: ON/OFF ACTUATORS CAN BE USED ON THE EXH1 OR AUX1 O TERMINAL WITH GROUND TO THE C TERMINAL. WHEN PROGRAMMING THE EXH1 OR AUX1 O, THE % IS THE PERCENT OPEN POSITION OF THE OUTDOOR AIR DAMPER WHEN THE EXH1 OR AUX1 O TERMINAL IS ENERGIZED AND THE 2-POS DAMPER GOES OPEN. IF USING THE AUX1 O TERMINAL PROGRAM AUX1 O FOR EXH2.

M33409

Fig. 10. 2-position actuator.

EXH1 and EXH2 wiring:

You will not have to add an external relay for the power exhaust fans if the power draw of the fan is below these limits:

Relay Digital Output Rating at 30 Vac (maximum powerfrom Class 2 input only): 1.5A run;
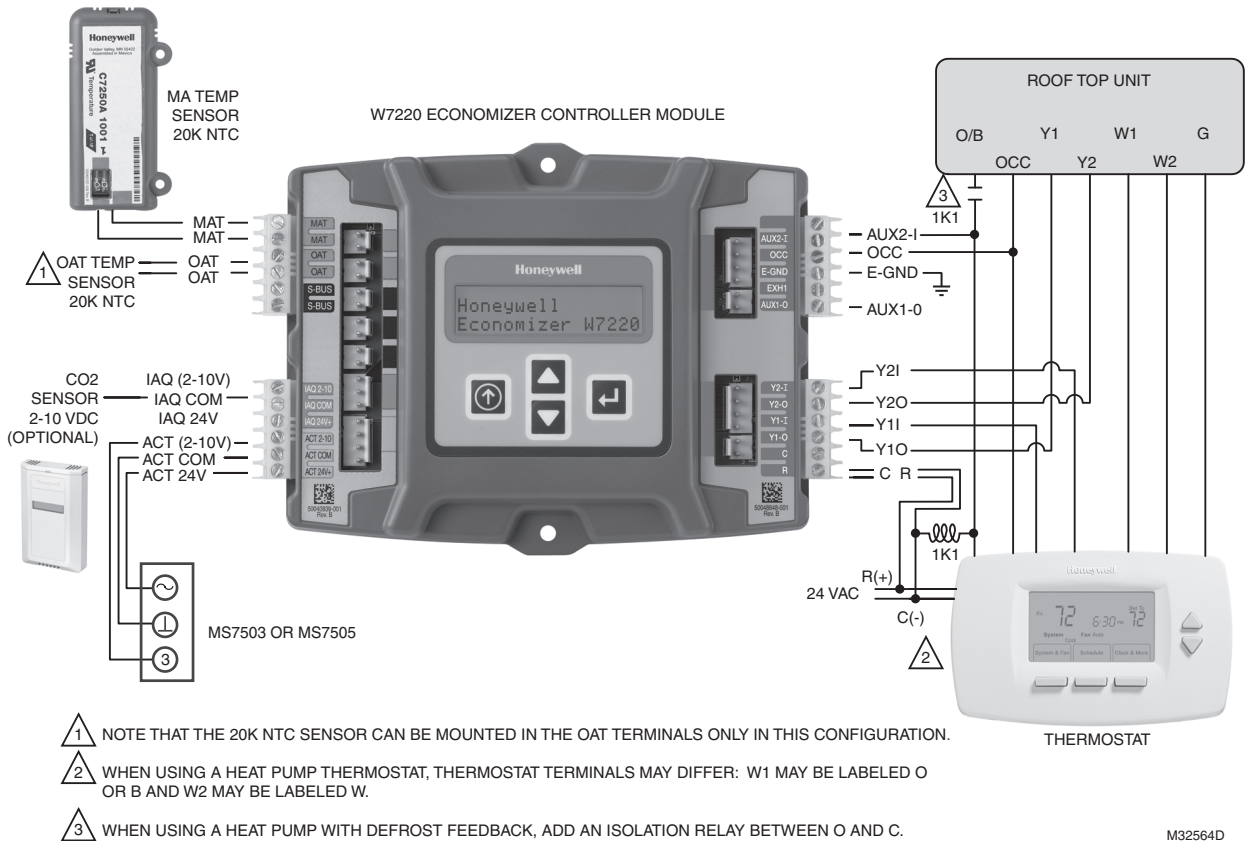 3.5A inrush @ 0.45PF (200,000 cycles) or
 7.5A inrush @ 0.45PF (100,000 cycles)

If the inrush or FLA amps is above listed limits OR if the fan is a line voltage fan, an external relay will be required.

If no relay is required, the EXH1 or AUX1 out is wired to one side of the fan and the other side is wired to system common "C" on the W7220 or equipment terminal board. (W7220 powered off the system transformer).

If a relay is required, the coil of the relay would be wired between the EXH1 or AUX1 and the C terminal of the W7220.

1 NOTE THAT THE 20K NTC SENSOR CAN BE MOUNTED IN THE OAT TERMINALS ONLY IN THIS CONFIGURATION.

2 WHEN USING A HEAT PUMP THERMOSTAT, THERMOSTAT TERMINALS MAY DIFFER: W1 MAY BE LABELED O OR B AND W2 MAY BE LABELED W.

3 WHEN USING A HEAT PUMP WITH DEFROST FEEDBACK, ADD AN ISOLATION RELAY BETWEEN O AND C.

M32564D

Fig. 11. Stand-alone dry-bulb Economizer configuration with Honeywell MS7503 or MS7505 Direct Coupled Actuator.
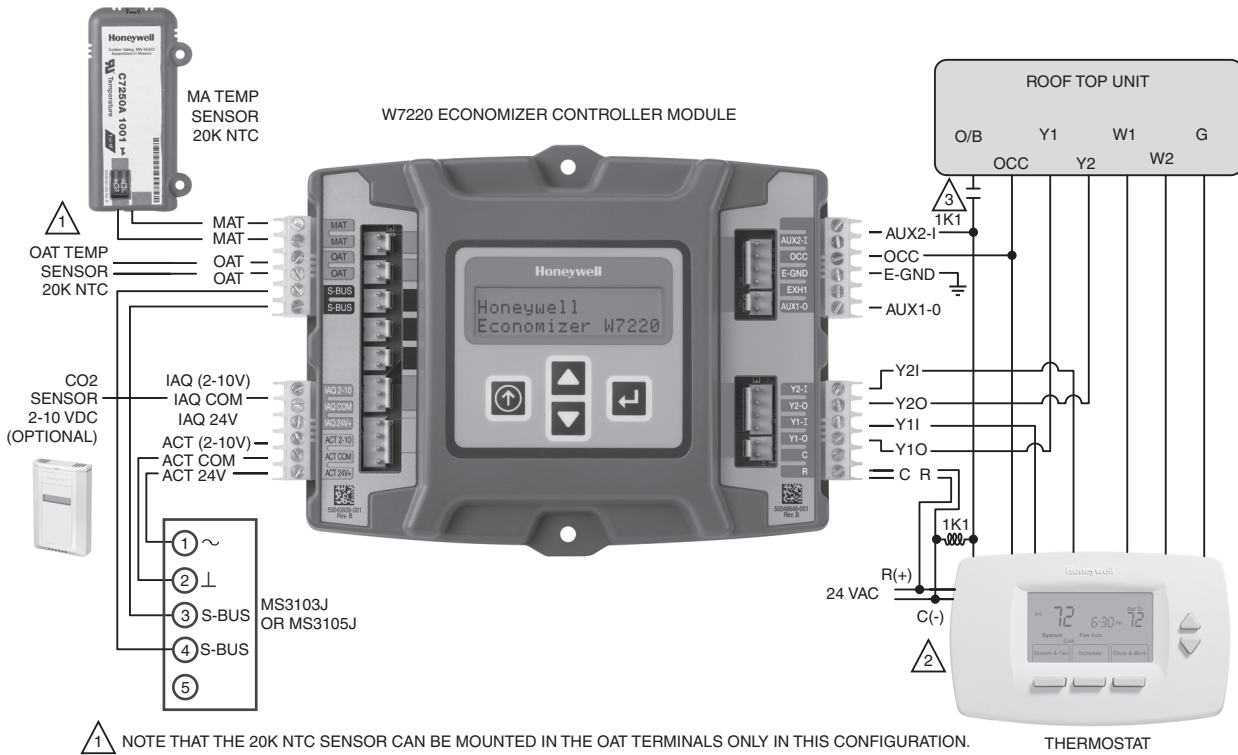
MA TEMP
SENSOR
20K NTC

W7220 ECONOMIZER CONTROLLER MODULE

ROOF TOP UNIT

O/B   Y1   W1   G
    OCC   Y2   W2

1 OAT TEMP
SENSOR
20K NTC

MAT
MAT
OAT
OAT
S-BUS
S-BUS

AUX2-I
OCC
E-GND
EXH1
AUX1-O

AUX2-I
OCC
E-GND
AUX1-0

3 1K1

CO2
SENSOR
2-10 VDC
(OPTIONAL)

IAQ (2-10V)
IAQ COM
IAQ 24V
ACT (2-10V)
ACT COM
ACT 24V

IAQ 2-10
IAQ COM
IAQ 24V
ACT 2-10
ACT COM
ACT 24V+

Honeywell
Economizer W7220

Y2-I
Y2-O
Y1-I
Y1-O
C
R

Y2I
Y2O
Y1I
Y1O
C R

1 ~
2 ⊥
3 S-BUS
4 S-BUS
5

MS3103J
OR MS3105J

1K1

R(+)
24 VAC
C(-)

2

THERMOSTAT

1 NOTE THAT THE 20K NTC SENSOR CAN BE MOUNTED IN THE OAT TERMINALS ONLY IN THIS CONFIGURATION.

2 WHEN USING A HEAT PUMP THERMOSTAT, THERMOSTAT TERMINALS MAY DIFFER: W1 MAY BE LABELED O OR B AND W2 MAY BE LABELED W.

3 WHEN USING A HEAT PUMP WITH DEFROST FEEDBACK, ADD AN ISOLATION RELAY BETWEEN O AND C.

M32650D

Fig. 12. Stand-alone dry-bulb Economizer configuration with Honeywell MS3103J or MS3105J communicating actuators.
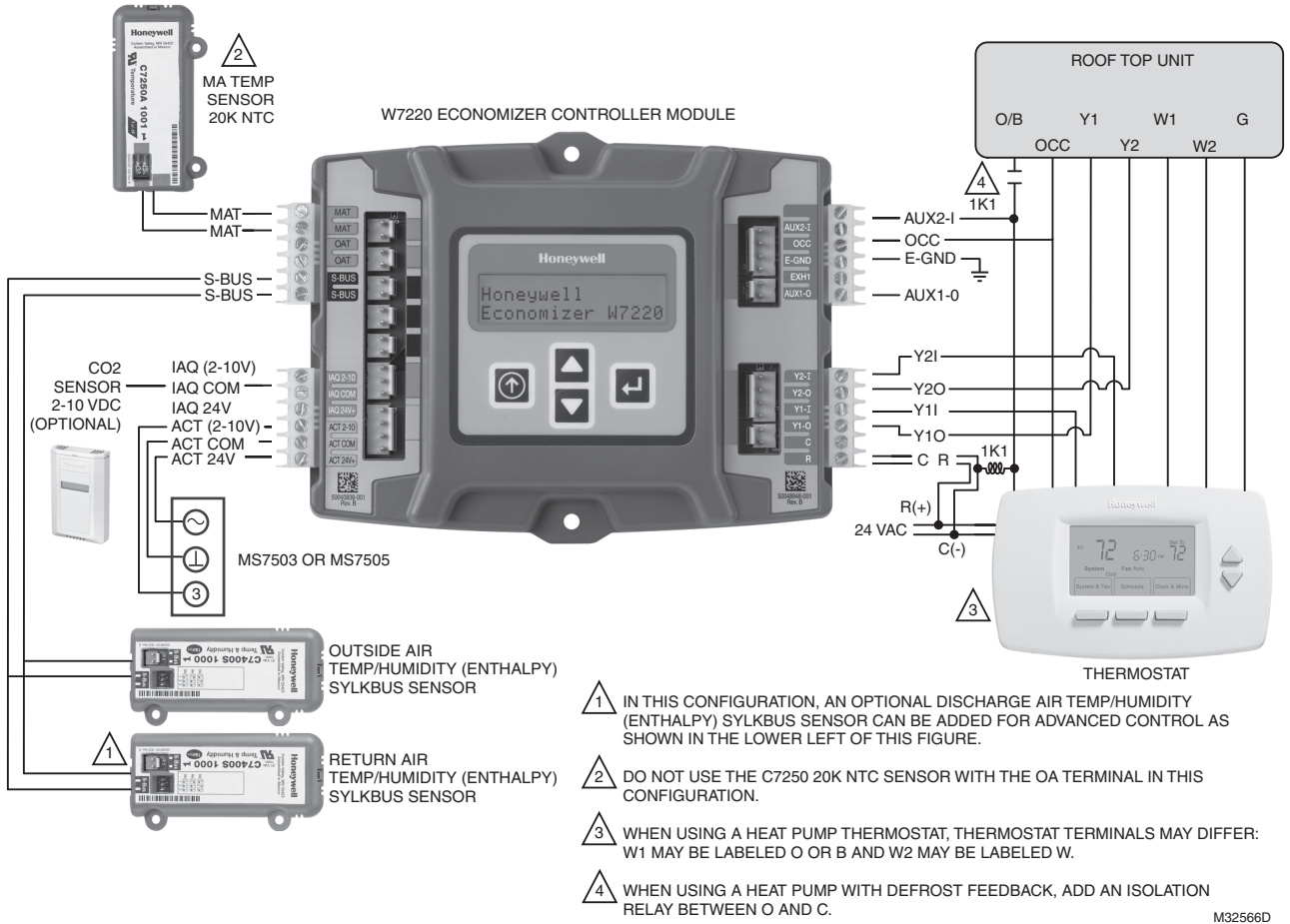
Economizer with Sylk Bus Sensors

A standalone economizer with Sylk Bus sensors uses Sylk Bus communications (see Fig. 13, Fig. 14 and Fig. 15). The Sylk Bus reduces wiring requirements while providing additional functionality.
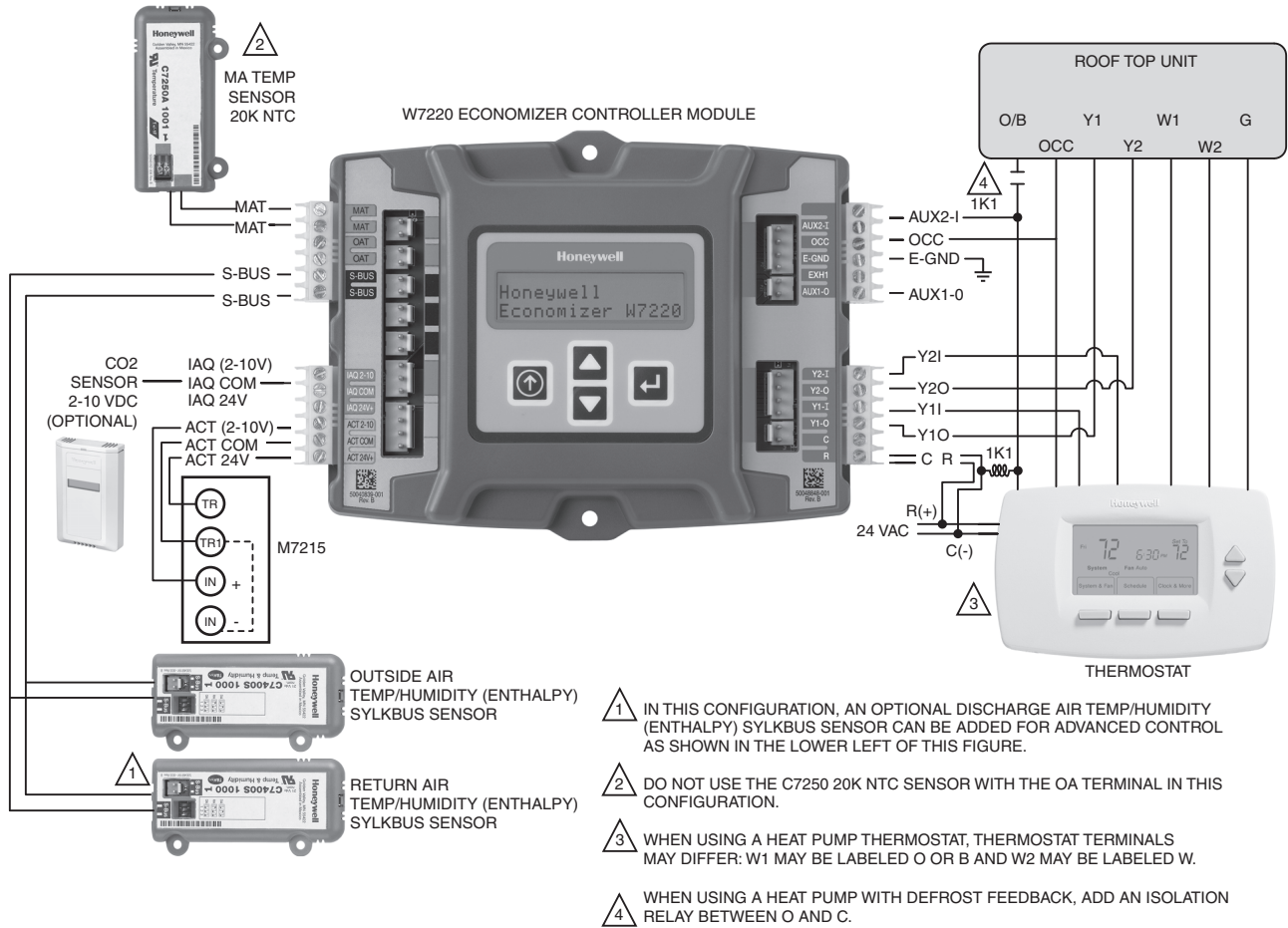
Fig. 13. Economizer with Sylk Bus sensors for enthalpy configuration with Honeywell M7215 black motor.

1. IN THIS CONFIGURATION, AN OPTIONAL DISCHARGE AIR TEMP/HUMIDITY (ENTHALPY) SYLKBUS SENSOR CAN BE ADDED FOR ADVANCED CONTROL AS SHOWN IN THE LOWER LEFT OF THIS FIGURE.

2. DO NOT USE THE C7250 20K NTC SENSOR WITH THE OA TERMINAL IN THIS CONFIGURATION.

3. WHEN USING A HEAT PUMP THERMOSTAT, THERMOSTAT TERMINALS MAY DIFFER: W1 MAY BE LABELED O OR B AND W2 MAY BE LABELED W.

4. WHEN USING A HEAT PUMP WITH DEFROST FEEDBACK, ADD AN ISOLATION RELAY BETWEEN O AND C.
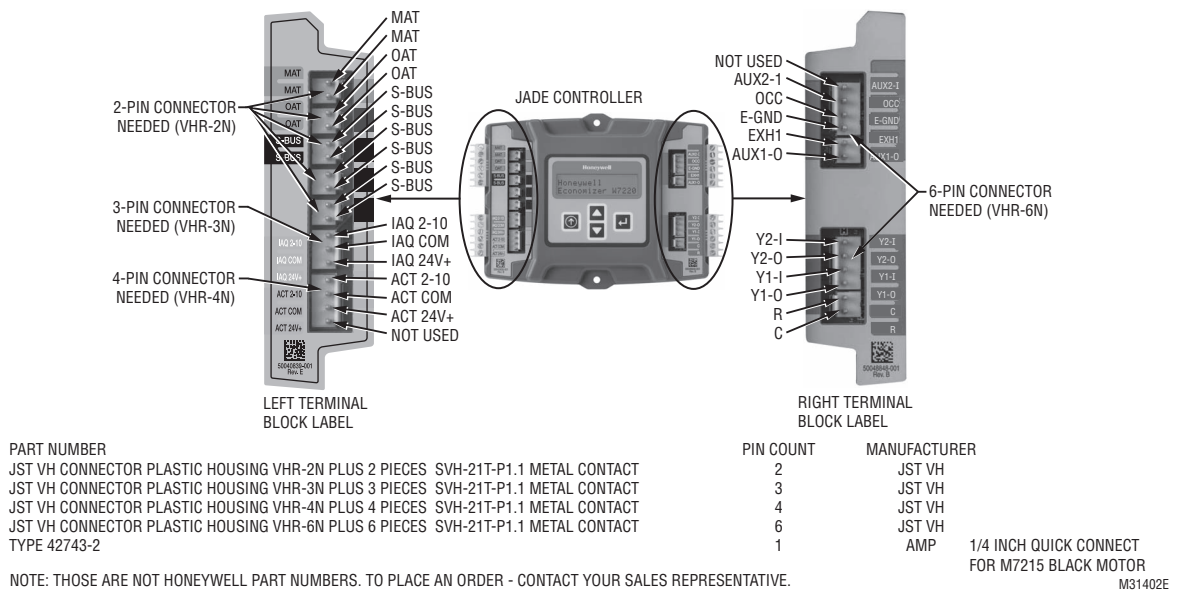
M32565D

Fig. 14. Economizer with Sylk Bus sensors for enthalpy configuration with a Honeywell MS7503 or MS7505 Direct Coupled Actuator.
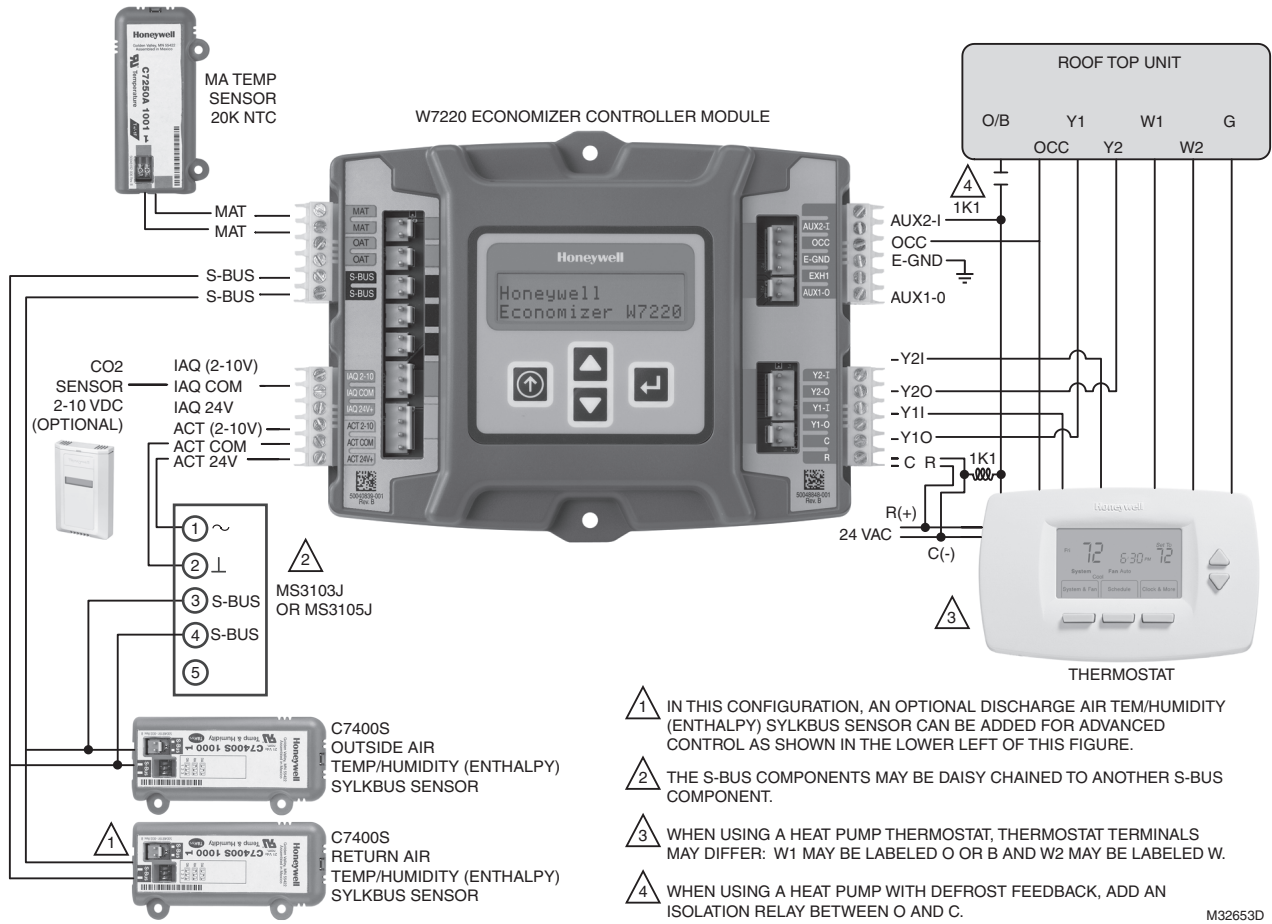
Fig. 15. Economizer with Sylk Bus sensors for enthalpy configuration with a Honeywell MS3103J or MS3105J communicating actuators.

Annotations in Fig. 15:

1. IN THIS CONFIGURATION, AN OPTIONAL DISCHARGE AIR TEM/HUMIDITY (ENTHALPY) SYLKBUS SENSOR CAN BE ADDED FOR ADVANCED CONTROL AS SHOWN IN THE LOWER LEFT OF THIS FIGURE.

2. THE S-BUS COMPONENTS MAY BE DAISY CHAINED TO ANOTHER S-BUS COMPONENT.

3. WHEN USING A HEAT PUMP THERMOSTAT, THERMOSTAT TERMINALS MAY DIFFER: W1 MAY BE LABELED O OR B AND W2 MAY BE LABELED W.

4. WHEN USING A HEAT PUMP WITH DEFROST FEEDBACK, ADD AN ISOLATION RELAY BETWEEN O AND C.

M32653D

PART NUMBER	PIN COUNT	MANUFACTURER	
JST VH CONNECTOR PLASTIC HOUSING VHR-2N PLUS 2 PIECES SVH-21T-P1.1 METAL CONTACT	2	JST VH	
JST VH CONNECTOR PLASTIC HOUSING VHR-3N PLUS 3 PIECES SVH-21T-P1.1 METAL CONTACT	3	JST VH	
JST VH CONNECTOR PLASTIC HOUSING VHR-4N PLUS 4 PIECES SVH-21T-P1.1 METAL CONTACT	4	JST VH	
JST VH CONNECTOR PLASTIC HOUSING VHR-6N PLUS 6 PIECES SVH-21T-P1.1 METAL CONTACT	6	JST VH	
TYPE 42743-2	1	AMP	1/4 INCH QUICK CONNECT FOR M7215 BLACK MOTOR

NOTE: THOSE ARE NOT HONEYWELL PART NUMBERS. TO PLACE AN ORDER - CONTACT YOUR SALES REPRESENTATIVE.

M31402E

Fig. 16. OEM wiring harness information. Refer to previous wiring diagrams for detailed application wiring.

INTERFACE OVERVIEW

This section describes how to use the Economizer's user interface for:
• Keypad and menu navigation
• Settings and parameter changes
• Menu structure and selection

User Interface

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.
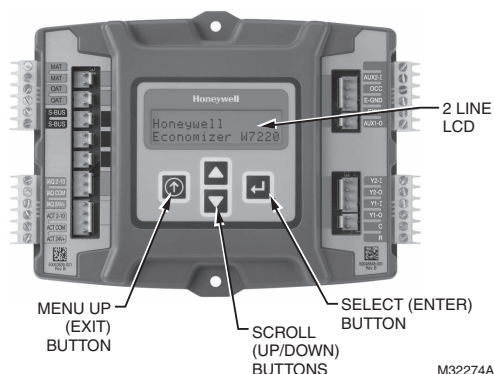

Fig. 17. Economizer LCD and Keypad Layout.

Keypad

The four navigation buttons illustrated in Fig. 17 are used to scroll through the menus and menu items, select menu items, and to change parameter and configuration settings.

Using the Keypad with Menus

To use the keypad when working with menus:
• Press the ▲ button to move to the previous menu.
• Press the ▼ button to move to the next menu.
• Press the ↵ button (Enter) to display the first item in the currently displayed menu.
• Press the ⬆ button (Menu up) to exit a menu's item and return to the list of menus.

Using the Keypad with Settings and Parameters

To use the keypad when working with Setpoints, System and Advanced Settings, Checkout tests, and Alarms:
• 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.[a]
• Press the ▼ button to decrease (change) the displayed parameter value.[a]
• Press the ↵ button to accept the displayed value and store it in non-volatile RAM.
• CHANGE STORED displays.
• Press the ⬆ button (MenuUp/Exit) to return to the previous menu.

[a] When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment.

Menu Structure

Table 5 on page 15 illustrates the complete hierarchy of menus and parameters for the JADE™ Economizer system.

The Menus in display order are:
• STATUS
• SETPOINTS
• SYSTEM SETUP
• ADVANCED SETUP
• CHECKOUT
• ALARMS

IMPORTANT

> *Table 5 on page 15 illustrates the complete hierarchy. Your menu parameters will be different depending on your configuration.*
>
> *For example if you do not have a DCV (CO_2) sensor, then none of the DCV parameters appear and only MIN POS will display. If you have a 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).*

SETUP AND CONFIGURATION

Before being placed into service, the JADE™ Economizer module must be setup and configured for the installed system.

IMPORTANT

> *During setup, the Economizer module is live at all times.*

The setup process uses a hierarchical menu structure that is easy to use. You press the ▲ and ▼ arrow buttons to move forward and backward through the menus and press the ↵ button to select and confirm setup item changes.

Time-out and Screensaver

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

Table 5. Menu Structure[a].

Menu	Parameter	Parameter Default Value	Parameter Range and Increment[b]	Notes
STATUS	ECON AVAIL	NO	YES/NO	YES = economizing available; the system can use Outdoor Air for free cooling when required.
	ECONOMIZING	NO	YES/NO	YES = Outdoor Air being used for 1st stage cooling.
	OCCUPIED	NO	YES/NO	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[c]	COOL HEAT	Displays COOL or HEAT when system is set to heat pump (non-conventional)
	COOL Y1-IN	OFF	ON/OFF	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	OFF	ON/OFF	Cool Stage 1 Relay Output to mechanical cooling (Y1-OUT terminal).
	COOL Y2-IN	OFF	ON/OFF	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	OFF	ON/OFF	Cool Stage 2 Relay Output to mechanical cooling (Y2-OUT terminal).
	MA TEMP	_ _._ °F	-40 to 150 °F	Displays value of measured mixed air from MAT sensor. Displays --.- if not connected, short, or out- of-range.
	DA TEMP	_ _._ °F	-40 to 150 °F	Displays when Discharge Air Sylk Bus sensor is connected and displays measured discharge air temperature. Displays --.-°F if sensor sends invalid value, if not connected, short or out-of-range.
	OA TEMP	_ _._ °F	-40 to 140 °F	Displays measured value of outdoor air temperature. Displays --°F if sensor sends invalid value, if not connected, short or out-of-range.
	OA HUM	_ _ %	0 to 100%	Displays measured value of outdoor humidity from OA Sylkbus sensor. Displays --% if not connected, short, or out- of-range.
	RA TEMP	_ _._ °F	0 to 140 °F	Displays measured value of return air temperature from RA Sylkbus sensor. Displays --°F if sensor sends invalid value, if not connected, short or out-of-range.
	RA HUM	_ _ %	0 to 100%	Displays measured value of return air humidity from RA Sylkbus sensor. Displays --% if not connected, short or out-of-range.
	IN CO2	_ _ _ ppm	0 to 2000 ppm	Displays value of measured CO2 from CO2 sensor. Invalid if not connected, short or out-of-range. May be adjusted in Advanced menu by Zero offset and Span. See note on page 6 concerning C7632 sensor.
	DCV STATUS	n/a	ON/OFF	Displays ON if above setpoint and OFF if below setpoint, and ONLY if a CO2 sensor is connected.
	DAMPER OUT	2.0V	2.0 to 10.0 V	Displays output voltage or position to the damper actuator.[e]
	ACT POS	n/a	0 to 100%	Displays actual position of actuator.
	ACT COUNT	n/a	1 to 65,535	Displays number of times actuator has cycled. 1 Cycle equals the sum of 180° of movement in any direction.
	ACTUATOR	n/a	OK/Alarm (on Alarm menu)	Displays Error if voltage or torque is below actuator range
	EXH1 OUT	OFF	ON/OFF	Output of EXH1 terminal. Displays ON when damper position reaches programmed percentage setpoint. ON = 24 Vac Output; OFF = No Output.

Table 5. Menu Structure[a]. (Continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment[b]	Notes
STATUS CONTINUED	EXH2 OUT	OFF	ON/OFF	Output of AUX1 O terminal Displays ON when damper position reaches programmed percentage setpoint ON = 24 Vac Output, OFF = No Output; displays only if AUX1 O = EXH2
	ERV	OFF	ON/OFF	Output of AUX1 O terminal, ON = 24 Vac Output, OFF = No Output; displays only if AUX1 O = ERV
	MECH COOL ON	0	0, 1, or 2	Displays number of mechanical cooling stages that are active.
	FAN SPEED	n/a	LOW or HIGH	Displays speed of fan on a 2-speed fan unit
	W (HEAT IN)	n/a	ON/OFF	Displays status of heat on a 2-speed fan unit.
SETPOINTS	MAT SET	53°F	38 to 70 °F; increment by 1	The economizer will modulate the OA damper to maintain the mixed air temperature at the setpoint.
	LOW T LOCK	32°F	-45 to 80 °F; increment by 1	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	63°F	48 to 80 °F; increment by 1	Setpoint determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.; at 63 °F setpoint unit will economizer at 62 °F and below and not economize at 64 °F and above. There is a a 2 °F deadband.
	ENTH CURVE	ES3	ES1, ES2, ES3, ES4, or ES5	Enthalpy boundary "curves" for economizing using single enthalpy. See page 22 for description of enthalpy curves.
	DCV SET	1100ppm	500 to 2000 ppm increment by 100	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	2.8 V	2 to 10 Vdc	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	2.8 V	2 to 10 Vdc or 100 to 9990 cfm increment by 10	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	2.25 V	2 to 10 Vdc or 100 to 9990 cfm increment by 10	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[d]	32°F	0 to 50 °F; increment by 1	Only when AUX1 O = ERV
	EXH1 SET	50%	0 to 100%; increment by 1	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 5. Menu Structure[a]. (Continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment[b]	Notes
SETPOINTS CONTINUED	EXH2 SET	75%	0 to 100%; increment by 1	Setpoint for OA damper position when exhaust fan 2 is powered by the economizer. Only used when AUX1 O is set to EHX2. With 2-speed fan units Exh2 L (low speed fan) and Exh2 H (high speed fan) settings are required. Default for Exh2 L is 80% and Exh2 H is 75%
SYSTEM SETUP	INSTALL	01/01/11		Display order = MM/DD/YY Setting order = DD, MM, then YY.
	UNITS DEG	°F	°F or °C	Sets economizer controller in degrees Fahrenheit or Celsius.
	EQUIPMENT	CONV	CONV HP	CONV = conventional. HP O/B = Enables Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller.
	AUX2 I	n/a	Shutdown (SD) Heat (W1) HP(O) HP(B)	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	1 speed	1 speed/ 2 speed	Sets economizer controller for operation of 1 speed or 2 speed supply fan. The controller does not control the fan but positions the OA and RA dampers to the heating or cooling mode. See page 23 for modes and position. **NOTE: 2-speed fan option also needs Heat (W1) programmed in AUX 2 In.**
	FAN CFM	5000cfm	100 to 15000 cfm; increment by 100	This is the capacity of the RTU. The value is found on the label from the RTU manufacturer. The cfm of the fan is only used with DCV CAL ENABLE AUO
	AUX1 OUT	NONE	NONE ERV EXH2 SYS	• NONE = not configured (output is not used) • ERV= Energy Recovery Ventilator[d] • EXH2 = second damper position 24 Vac out for second exhaust fan. • SYS = use output as an alarm signal
	OCC	INPUT	INPUT or 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	NO	NO or YES	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.

Table 5. Menu Structure[a]. (Continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment[b]	Notes
ADVANCED SETUP	MA LO SET	45°F	35 to 55 °F; increment by 1°	Temp to activate Freeze Protection (close damper or modulate to MIN POS if temp falls below set value)
	FREEZE POS	CLO	CLO MIN	Damper position when freeze protection is active (closed or MIN POS).
	CO2 ZERO	0ppm	0 to 500 ppm; increment by 10	CO2 ppm level to match CO2 sensor start level.
	CO2 SPAN	2000ppm	1000 to 3000 ppm; increment by 50	CO2 ppm span to match CO2 sensor; e.g.; 500-1500 sensor output would be 500 CO2 zero and 1000 CO2 span. See note on page 6 for C7632 CO2 sensor.
	STG3 DLY	2.0h	0 min, 5 min, 15 min, then 15 min intervals. Up to 4h or OFF	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.
	SD DMPR POS	CLO	CLO OPN	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	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 CO2). This operation is not operable with a 2-speed fan unit.
	MAT T CAL	0.0 F°	+/-2.5F°	Allows for the operator to adjust for an out of calibration temperature sensor
	OA T CAL	0.0F°	+/-2.5F°	Allows for the operator to adjust for an out of calibration temperature sensor
	OA H CAL	0% RH	+/-10% RH	Allows for the operator to adjust for an out of calibration humidity sensor
	RA T CAL	0.0F°	+/-2.5F°	Allows for the operator to adjust for an out of calibration temperature sensor
	RA H CAL	0% RH	+/-10% RH	Allows for the operator to adjust for an out of calibration humidity sensor
	DA T CAL	0.0 F°	+/-2.5F°	Allows for the operator to adjust for an out of calibration temperature sensor
	2SP FAN DELAY	5 Minutes	0 to 20 minutes in 1 minute increments.	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.

Table 5. Menu Structure[a]. (Continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment[b]	Notes
CHECKOUT[f]	DAMPER VMIN-HS	n/a	n/a	Positions damper to VMIN position.
	DAMPER VMAX-HS (LS)	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	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	n/a	n/a	Positions damper to the fully closed position.
	CONNECT Y1-O	n/a	n/a	Closes the Y1-O relay (Y1-O). See **CAUTION** on page 25
	CONNECT Y2-O	n/a	n/a	Closes the Y2-O relay (Y2-O). See **CAUTION** on page 25
	CONNECT AUX1-O	n/a	n/a	Energizes the AUX1-O output. If AUX1-O setting is: • NONE – no action taken • ERV – 24 Vac out. Turns on or signals an ERV that the conditions are not good for economizing but are good for ERV operation.[d] • SYS – 24 Vac out. Issues a system alarm.
	CONNECT EXH1	n/a	n/a	Closes the power exhaust fan 1 relay (EXH1)
ALARMS(_)	MA T SENS ERR	n/a	n/a	Alarms display only when they are active. The menu title "ALARMS (_)" includes the number of active alarms in parenthesis ().
	CO2 SENS ERR	n/a	n/a	
	OA T SENS ERR	n/a	n/a	
	DA ENTHL ERR	n/a	n/a	
	SYS ALARM	n/a	n/a	When AUX1-O is set to SYS and there is any alarm (e.g., failed sensors, etc.), the AUX1-O terminal has 24 Vac out.
	ACT UNDER V	n/a	n/a	Voltage received by Actuator is above expected range
	ACT OVER V	n/a	n/a	Voltage received by Actuator is below expected range
	ACT STALLED	n/a	n/a	Actuator stopped before achieving commanded position
	NOTE: The alarms listed are examples. Additional alarms display depending on the parameter settings and configuration.			

[a] Table 5 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration. For example if you do not have a DCV (CO_2) sensor, then none of the DCV parameters appear.

[b] When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment.

[c] n/a = not applicable

[d] ERV Operation: When in Cooling mode AND the conditions are NOT OK for economizing - the ERV terminal will be energized. In the Heating mode the ERV terminal will be energized when the OA is below the ERV OAT setpoint in the setpoint menu.

[e] When used with Honeywell communicating actuator the damper out is reported in XX.X% open versus XX.X Vdc.

[f] After 10 minutes without a command or mode change, the controller will change to normal operation.

SEQUENCE OF OPERATION

Table 6. 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 7. 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 CO2 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
Above CO2 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 8. 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 9. 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
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 10. 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[b] 24-v/On	0-v/Off[a]	MIN POS 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 11. 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
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[b] 24-v/On	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 12. 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 CO2 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[b] 24-v/On	0-v/Off[a]	MIN POS 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.
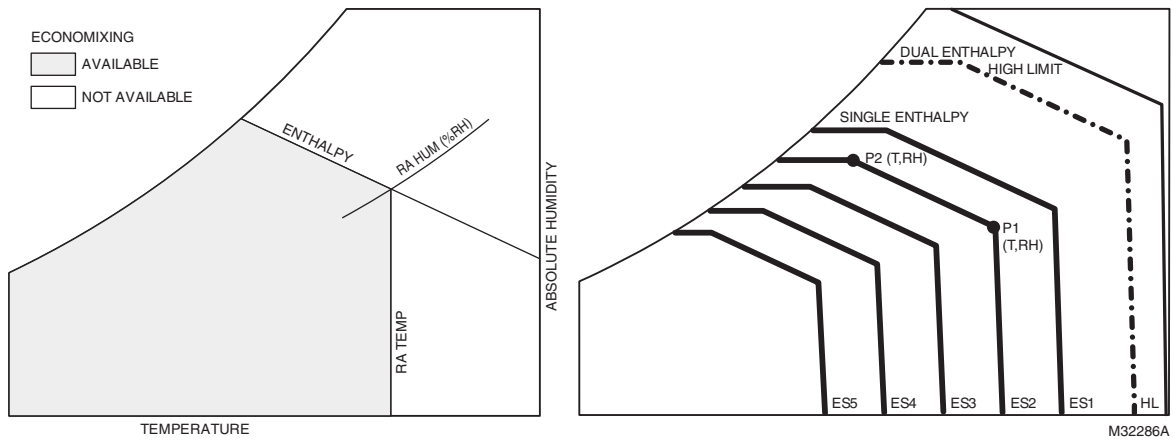
[b] With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

Table 13. 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
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[b] 24-v/On	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.

Fig. 18. Single Enthalpy curve and boundaries.

Table 14. Single Enthalpy and Dual Enthalpy High Limit Curves.

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

Enthalpy Settings

When the OA temperature, enthalpy and dew point are below the respective setpoints, the Outdoor Air can be used for economizing. Fig. 18 shows the new single enthalpy boundaries in the W7220. There are 5 boundaries (setpoints ES1 through ES5), which are defined by dry bulb temperature, enthalpy and dew point.

Refer to Table 14 for the ENTH CURVE setpoint values.

To use enthalpy the W7220 must have a C7400S Sylkbus sensor for OA. The W7220 calculates the enthalpy and dew point using the OA temperature and humidity input from the OA sensor. When the OA temperature, OA humidity and OA dew point are all below the selected boundary, the economizer sets the economizing mode to YES, economizing is available.

When conditions are above the selected boundary, the conditions are not good to economize and the mode is set to NO.

Fig. 18 shows the 5 current boundaries. There is also a high limit boundary for differential enthalpy. The high limit boundary is ES1 when there are no stages of mechanical cooling energized and HL when a compressor stage is energized.

Table 14 provides the values for each boundary limit.

Two-Speed Fan Operation

The later versions of the W7220 Jade controller have the capability to work with a system using a 2-speed supply fan. The W7220 does not control the supply directly but uses the following input status to determine the speed of the supply fan and controls the OA damper to the required position.

State	Fan Speed
OCC	Low
Y1	Low
Y2	High
W	High

The W (heating mode) is not controlled by the W7220 but it requires the status to know where to position the OA damper for minimum position for the fan speed.

The 2 speed fan delay is available when the system is programmed for 2 speed fan (in the System Setup menu item). The 2 speed fan delay is defaulted to 5 minutes and can be changed in the Advanced Setup menu item. When the unit has a call for Y1 In and in the free cooling mode and there is a call for Y2 In, the 2-speed fan delay starts and the OA damper will modulate 100% open, the supply fan should be set to high speed by the unit controller. After the delay one of two actions will happen:

- The Y2 In call will be satisfied with the damper 100% open and fan on high speed and the call will turn off

OR

- If the call for additional cooling in the space has not been satisfied then the first stage of mechanical cooling will be enabled through Y1 Out or Y2 Out.

CHECKOUT

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.

NOTE: **See "Interface Overview" on page 14. for information about menu navigation and use of the keypad.**

⚠ WARNING

Electrical Shock Hazard.
Can cause severe injury, death or property damage.
Disconnect power supply before beginning wiring or making wiring connections, to prevent electrical shock or equipment damage.
If any wiring changes are required, first be sure to remove power from the Economizer module before starting work. Pay particular attention to verifying the power connection (24 Vac).

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 W7220 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 (Outage or Brownout)

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

NOTE: **If power goes below 18 Vac, the W7220 controller module assumes a power loss and the 5 minute power up delay will become functional when power returns above 18 Vac.**

[a] All settings are stored in non-volatile flash memory.

Status

Use the Status menu (see Table 5) to check the parameter values for the various devices and sensors configured.

NOTE: **See "Interface Overview" on page 14. for information about menu navigation and use of the keypad.**

Checkout Tests

Use the Checkout menu (Table 5) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

NOTE: **See "Interface Overview" on page 14. for information about menu navigation and use of the keypad.**

To perform a Checkout test:
1. Scroll to the desired test in the Checkout menu using the ▲ and ▼ buttons.
2. Press the ↵ button to select the item.
3. RUN? displays.
4. Press the ↵ button 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 the ⬆ button (Menu up) to end the test (e.g. turn off the relay).

The checkout tests can all be performed at the time of installation or any time during the operation of the system as a test that the system is operable.

⚠ CAUTION

Equipment damage may result.
Be sure to allow enough time for compressor startup and shutdown between checkout tests so that you do not short-cycle the compressors.

TROUBLESHOOTING

Alarms

The Economizer module provides alarm messages that display on the 2-line LCD.

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.**

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.

Clearing Alarms

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.

To clear an alarm, perform the following:
1. Navigate to the desired alarm.
2. Press the ↵ button.
3. ERASE? displays.
4. Press the ↵ button.
5. ALARM ERASED displays.
6. Press the ⬆ button (MenuUp/Exit) to complete the action and return to the previous menu.

NOTE: **If an the alarm still exists after you clear it, it re-displays within 5 seconds.**