Honeywell

JADE™ Economizer Module
(MODEL W7220)

The W7220 Economizer Module automatically detects sensors by polling the Sylk Bus to determine which sensors are present. If a sensor loses communications after it has been detected, the W7220 Economizer indicates a device fail error on its LCD.

System Components

The JADE™ Economizer System includes an Economizer Module, 20k mixed air sensor, damper actuator, an optional CO_2 sensor, and either a 20k outdoor air temperature sensor or Sylk Bus sensors for measuring outside air and return air enthalpy, temperature, and humidity.

Economizer Module

This is the core of the JADE™ Economizer System and includes the user interface for the system. The W7220 Economizer Module provides the basic inputs and outputs to provide simple economizer control. When used with the optional Sylk Bus sensors, the Economizer Module provides more advanced economizer functionality.

Sylk Bus Sensors (optional)

The Sylk Bus Sensor is a combination temperature and humidity sensor which is powered by and communicates on the Sylk Bus. Up to three sensors may be configured with the JADE™ Economizer Module.

CO_2 Sensor (optional)

A CO_2 sensor (non-communicating or non-Sylk Bus) can be added for Demand Control Ventilation (DCV).

PRODUCT DESCRIPTION

The JADE™ Economizer System is an expandable economizer control system, which includes a W7220 Economizer Module (controller) with an LCD and keypad. The W7220 can be configured with optional sensors.

The W7220 Economizer Module can be used as a stand-alone economizer module wired directly to a commercial set back space thermostat and sensors to provide outside air dry-bulb economizer control.

The W7220 Economizer Module can be connected to optional Sylk Bus sensors for single or differential economizer control. The W7220 Economizer Module provides power and communications on the Sylk Bus for the Sylk Bus sensors.

Contents

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SPECIFICATIONS

W7220A Economizer Module

The module is designed for use with any Honeywell 2 to 10 Vdc or Honeywell Sylkbus communicating actuator. The module includes terminals for a CO_2 sensor, Mixed Air sensor, and an Outdoor Dry Bulb sensor. Enthalpy and other options are available with Sylk Bus sensors.

User Interface: Provides status for normal operation, setup parameters, checkout tests, and alarms and error conditions with a 2-line 16 character LCD display and a four button keypad.

Electrical

Rated Voltage: 20 to 30 Vac RMS; 50/60 Hz

Nominal Power Consumption (at 24 Vac, 60 Hz): 11.5 VA without sensors and actuator

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

External Sensors Power Output: 21 Vdc +/- 5% @ 48mA

IMPORTANT

> *All inputs and outputs must be Class 2 wiring.*

Inputs

SENSORS:

NOTE: A Mixed air (MA) analog sensor is required on all W7220 units; either an OA (Outdoor Air) sensor for dry bulb change over or an OA Sylkbus sensor for outdoor enthalpy change over is required in addition to the MA sensor. An additional Return Air (RA) Sylkbus sensor can be added to the system for differential enthalpy changeover.

Dry Bulb Temperature and Mixed Air, C7250A:
2-wire (18 to 22 AWG);
Temperature range -40 to 150 °F (-40 to 65 °C).

Temperature and Humidity, C7400S1000 (optional):
Sylk Bus; 2-wire (18 to 22 AWG)
Temperature: range -40 to 150 °F (-40 to 65 °C)
Humidity: range 0 to 100% RH with 5% accuracy.

NOTE: Up to three (3) SYLK Bus sensors may be connected to the JADE™ Economizer module.

DCV (CO_2) Sensor (C7232):
2-10 Vdc control signal; minimum impedance >50k ohm.

4 Binary inputs:
1-wire 24 Vac + common GND (see page 5 for wiring details). 24 Vac power supply: 20 to 30 Vac 50/60Hz; 100 VA Class 2 transformer.

Outputs

Actuator signal: 2-10 Vdc; minimum actuator impedance is 2k ohm

Exhaust fan and AUX: Contact closure (24 Vac)

24 Vac Out: 100 VA Class 2 transformer

Environmental

Operating Temperature: -40 to 150 °F (-40 to 65 °C). Exception of display operation down to -4 °F with full recovery at -4 °F from exposure to -40 °F

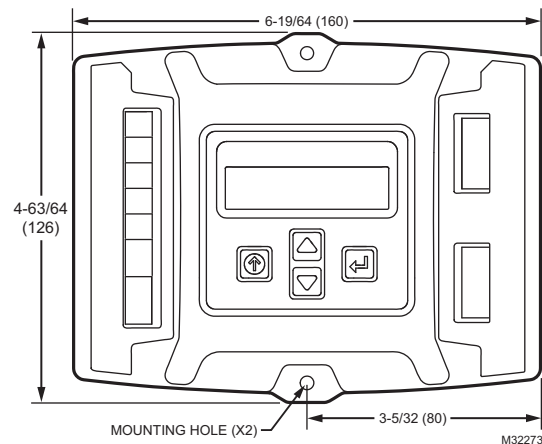**Storage Temperature:** -40 to 150 °F (-40 to 65 °C)

Shipping Temperature: -40 to 150 °F (-40 to 65 °C)

Relative Humidity: 5% to 95% RH non-condensing

Dimensions (See Fig. 1 on page 2):
Height: 4.98 inches (126.4 mm)
Width: 6.3 inches (160 mm)
Depth: 1.34 inches (34 mm)

Weight: 0.58 lb. (0.265 kg)

Fig. 1. Dimensions in inches and (mm) showing mounting holes.

BEFORE INSTALLATION

Review the "Specifications" on page 2 before installing the The JADE™ Economizer System.

When Installing This Product

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check ratings given in instructions and on the product to ensure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

INSTALLATION AND SETUP

The following installation procedures should be performed in the order listed:

1. Mounting — see "Mounting" on this page.
2. Wiring — see "Wiring" on this page.
3. Interface and Programming overview – see page 11.
4. Setup and Configuration — see page 15
5. Checkout — see page 18.

Troubleshooting and Alarms begin on page 20.

MOUNTING

This section describes the mounting procedures for the JADE™ Economizer module and the sensors.

Economizer Module Location and Mounting

IMPORTANT

> *Avoid mounting in areas where acid fumes or other deteriorating vapors can attack the metal parts of the module's circuit board, or in areas where escaping gas or other explosive vapors are present.*

IMPORTANT

> *The module must be mounted in a position that allows clearance for wiring, servicing, and removal.*

Mount the Economizer module on any convenient interior location using the two mounting holes provided on the enclosure using #6 or #8 screws (screws are not provided and must be obtained separately). Use the dimensions in Fig. 1 on page 2 as a guide.

The Economizer module may be mounted in any orientation. However, mounting in the orientation shown in Fig. 1 on page 2 permits proper viewing of the LCD display and use of the keypad.

Sensor Location and Mounting

The JADE™ Economizer W7220 uses digital sensors for control. The MAT[a] and OAT[b] sensors are 20k NTC sensors. A MAT sensor is required for all applications and is mounted in the mixed air section of a rooftop unit either directly to the sheet metal using self tapping sheet metal screws or in the air stream using the duct mounting kit.

Optional OAT, RAT[c] and DAT[d] Sylkbus sensors communicate with the W7220 on the two-wire communication bus and can either be wired using a two pin header or using a side connector. Each Sylkbus sensor includes a two pin Euro connector with the packaging. The SKU number of the Sylkbus sensor is C7400S. All OAT, RAT and DAT sensors are the same SKU number. The sensor is set for the appropriate type of sensing using the three position DIP switch located on the sensor. OAT position is OFF, OFF, OFF; RAT is ON, OFF, OFF and DAT is OFF, ON, OFF. During installation the sensors are set for the usage desired. See "Sylk Bus Sensor Wiring" on page 6 for DIP switch details.

Once installed, a sensor can be changed to a different application by simply changing the DIP switch setting.

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[a] MAT = Mixed Air Temperature
[b] OAT = Outside Air Temperature
[c] RAT = Return Air Temperature
[d] DAT = Discharge Air Temperature

Sensor Mounting

The sensors can be mounted directly on to the sheet metal of unit or can be mounted in the air stream using the duct mounting kit.

The kit contains a rod to hold the sensor in the duct, a flange to secure the sensor rod to the duct wall and fill the hole and a gasket to prevent air from leaking through the duct wall. See Fig. 2.

The rod has slots for threading the wire to prevent loose or hanging wire in the duct and can be adjusted for 6 or 12 inch length. The flange has extended relief for ease of mounting. See 3.
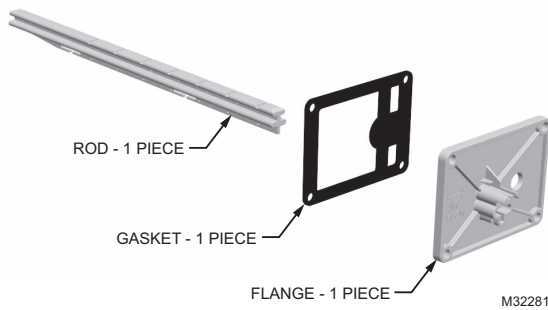

ROD - 1 PIECE

GASKET - 1 PIECE

FLANGE - 1 PIECE

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Fig. 2. Duct Mounting Kit (Part Nbr. 50053060-001).

WIRE HOLDER

LENGTH ADJUSTS TO 6 OR 12 INCHES
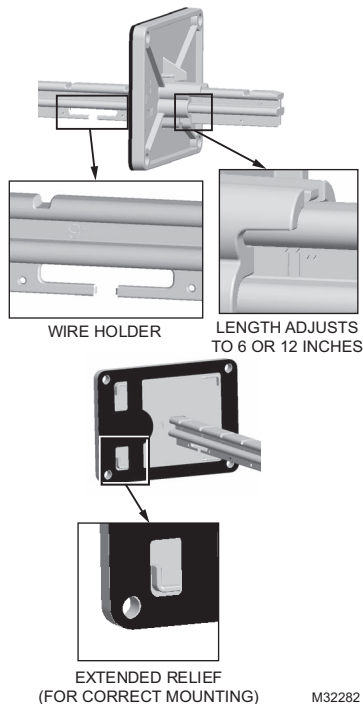
EXTENDED RELIEF
(FOR CORRECT MOUNTING)

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Fig. 3. Duct Mounting Adjustments.

WIRING

All wiring must comply with applicable electrical codes and ordinances, or as specified on installation wiring diagrams. Module wiring in the field is terminated to the four screw terminal blocks located on the left and right sides.

Module wiring at the OEM factory is terminated via the header pin terminals located on the left and right sides. The header terminal pins and the terminal blocks have common terminations for the appropriate input or output. The part number of the mating female connector for OEMs is 0035977.

The remainder of this section describes the wiring for the JADE™ Economizer module, W7220A.

⚠ 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.

⚠ CAUTION

Equipment Damage Hazard.
Electrostatic discharge can short equipment circuitry.
Ensure that you are properly grounded before handling the unit.
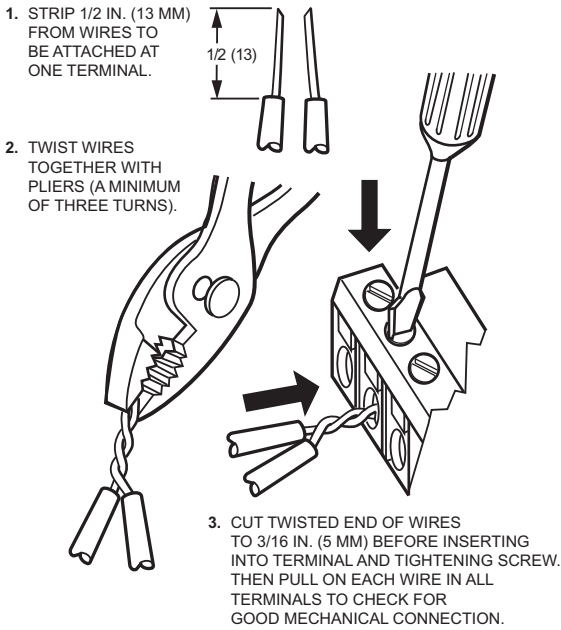
Economizer Module Wiring Method

Wire the sensors and outputs, then wire the power connection.

Each terminal can accommodate the following gauges of wire:
- Single wire – from 18 AWG to 22 AWG solid or stranded
- Multiple wires – up to two 22 AWG stranded
- For the 24 Vac connections: single wire – from 14 to 18 AWG solid or stranded

Prepare wiring for the terminal blocks, as follows:
1. Strip 1/2 in. (13 mm) insulation from the conductor.
2. Cut a single wire to 3/16 in. (5 mm). Insert the wire in the required terminal location and tighten the screw.
3. If two or more wires are being inserted into one terminal location, twist the wires together a minimum of three turns before inserting them to ensure proper electrical contact. See Fig. 4 on page 5.
4. Cut the twisted end of the wires to 3/16 in. (5 mm) before inserting them into the terminal and tightening the screw.
5. Pull on each wire in all terminals to check for good mechanical connection.

1. STRIP 1/2 IN. (13 MM) FROM WIRES TO BE ATTACHED AT ONE TERMINAL.

1/2 (13)

2. TWIST WIRES TOGETHER WITH PLIERS (A MINIMUM OF THREE TURNS).

3. CUT TWISTED END OF WIRES TO 3/16 IN. (5 MM) BEFORE INSERTING INTO TERMINAL AND TIGHTENING SCREW. THEN PULL ON EACH WIRE IN ALL TERMINALS TO CHECK FOR GOOD MECHANICAL CONNECTION.

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Fig. 4. Attaching two or more wires at terminal blocks.

Economizer Module Wiring Details

The wiring connection terminals for each module/sensor are:
• "JADE™ Economizer Module Wiring" on this page.
• "Sylk Bus Sensor Wiring" on page 6.

JADE™ Economizer Module Wiring

Use Fig. 5 and Tables 1 and 2 to locate the wiring terminals for the Economizer module.

NOTE: The four terminal blocks are removable. You can slide out each terminal block, wire it, and then slide it back into place.
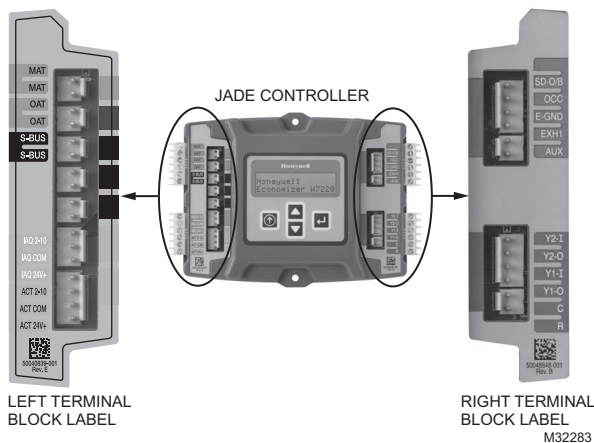

JADE CONTROLLER

LEFT TERMINAL BLOCK LABEL

RIGHT TERMINAL BLOCK LABEL

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Fig. 5. W7220 Economizer module terminal connection labels.

Table 1. Economizer Module - Left hand terminal blocks.

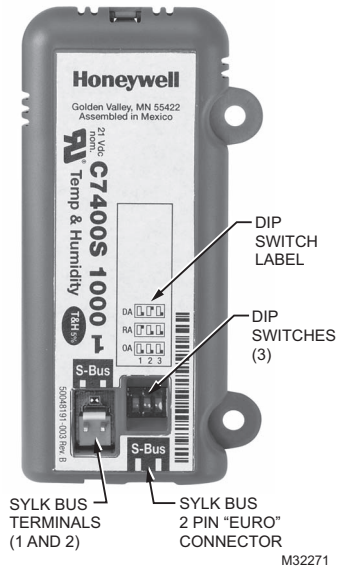| Label	Type	Description
Top Left Terminal Block		
MAT MAT	20k NTC and COM	Mixed Air Temperature Sensor (polarity insensitive connection)
OAT OAT	20k NTC and COM	Outside Air Temperature Sensor (polarity insensitive connection)
S-BUS S-BUS	SYLK Bus	Sylk Bus sensor (polarity insensitive connection)
Bottom Left Terminal Block		
IAQ COM	COM	Air Quality Sensor Common
IAQ 2-10	2-10 Vdc	Air Quality Sensor Input (e.g. CO_2 sensor)
IAQ 24V	24 Vac	Air Quality Sensor 24 Vac Source
ACT 2-10	2-10 Vdc	Damper Actuator Output (2-10 Vdc)
ACT COM	COM	Damper Actuator Output Common
ACT 24V	24 Vac	Damper Actuator 24 Vac Source

Table 2. Economizer Module - Right hand terminal blocks.

Label	Type	Description
Top Right Terminal Block		
	n/a	The first terminal is not used
SD-O/B	24 Vac IN	Shut Down (SD) Conventional only or Heat Pump Changeover (O/B)
OCC	24 Vac IN	Occupied / Unoccupied Input
E-GND	EGND	Earth Ground
EXH1	24 Vac OUT	Exhaust Fan 1 Output
AUX	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

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

Table 4. SYLK Bus Sensor DIP Switch Settings.

Use	DIP Switch Positions for Switches 1, 2, & 3		
	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 = Outside Air
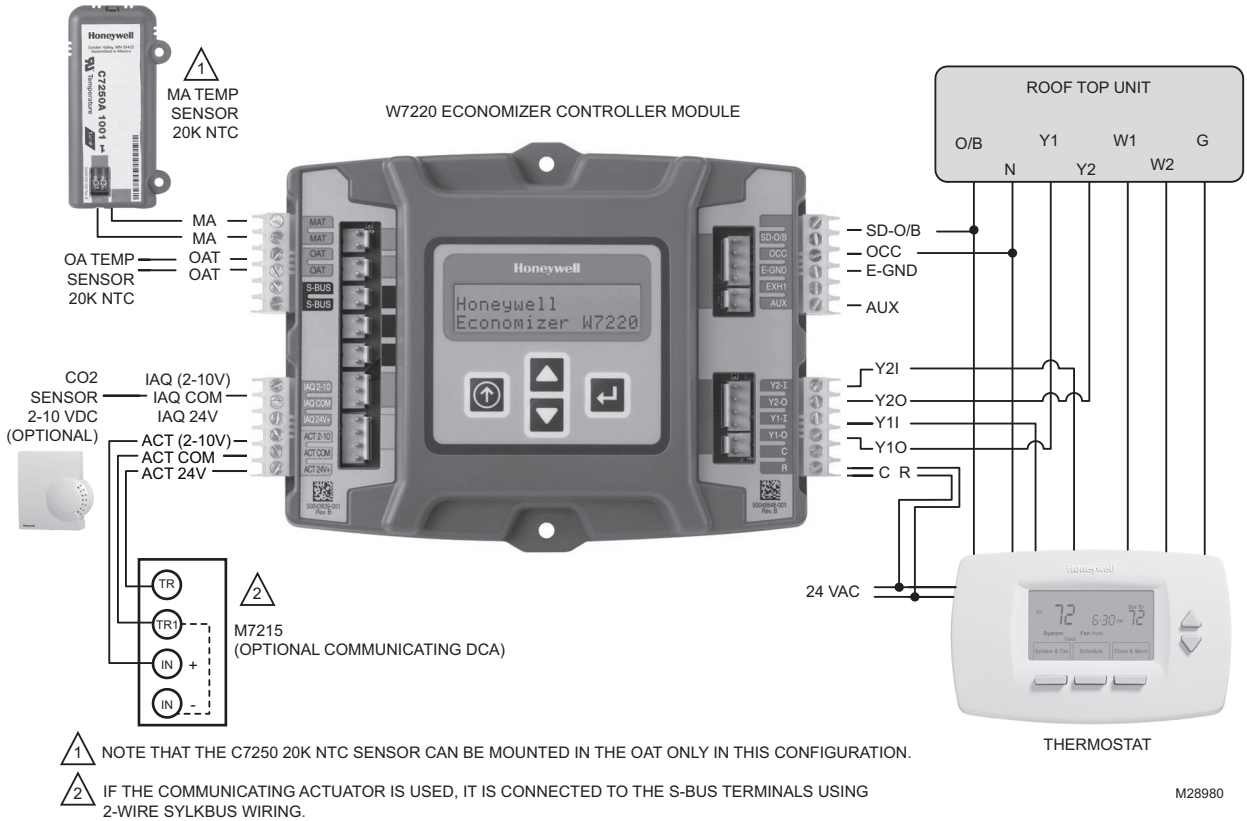
WIRING APPLICATION EXAMPLES

This section describes the wiring configurations for the JADE™ Economizer system. The configurations are:

— "Stand-alone Economizer"

— "Economizer with Sylk Bus Sensors" on page 9
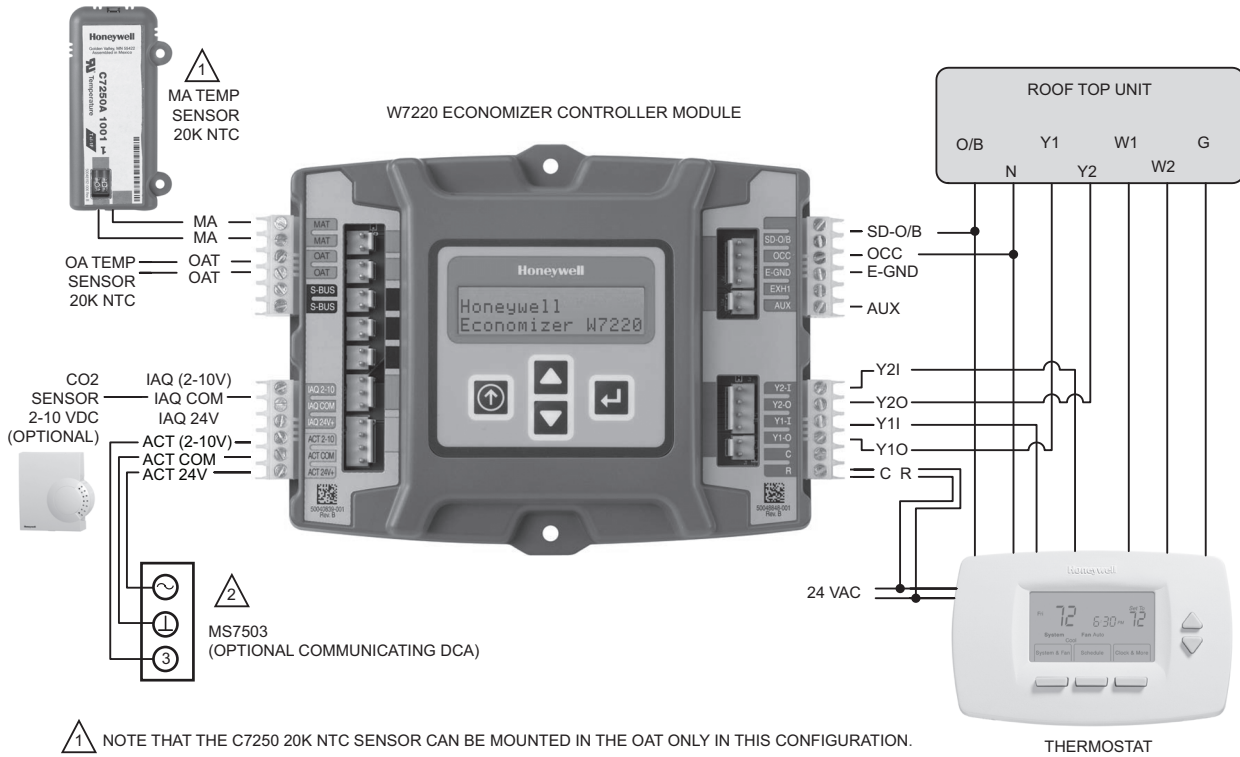
Stand-alone Economizer

The most basic configuration is the stand-alone Economizer (see Fig. 7 and Fig. 8 on page 8).

A stand-alone Economizer is directly wired to sensors, actuators, thermostat, and mechanical 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 IF THE COMMUNICATING ACTUATOR IS USED, IT IS CONNECTED TO THE S-BUS TERMINALS USING 2-WIRE SYLKBUS WIRING.

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Fig. 7. Stand-alone dry bulb Economizer configuration with black motor M7215.

Fig. 8. Stand-alone dry-bulb Economizer configuration with Honeywell MS7503 Direct Coupled Actuator.

Economizer with Sylk Bus Sensors

A standalone economizer with Sylk Bus sensors has additional sensors attached using Sylk Bus communications (see Fig. 9 and Fig. 10 on page 10). The Sylk Bus reduces wiring requirements while providing additional functionality.
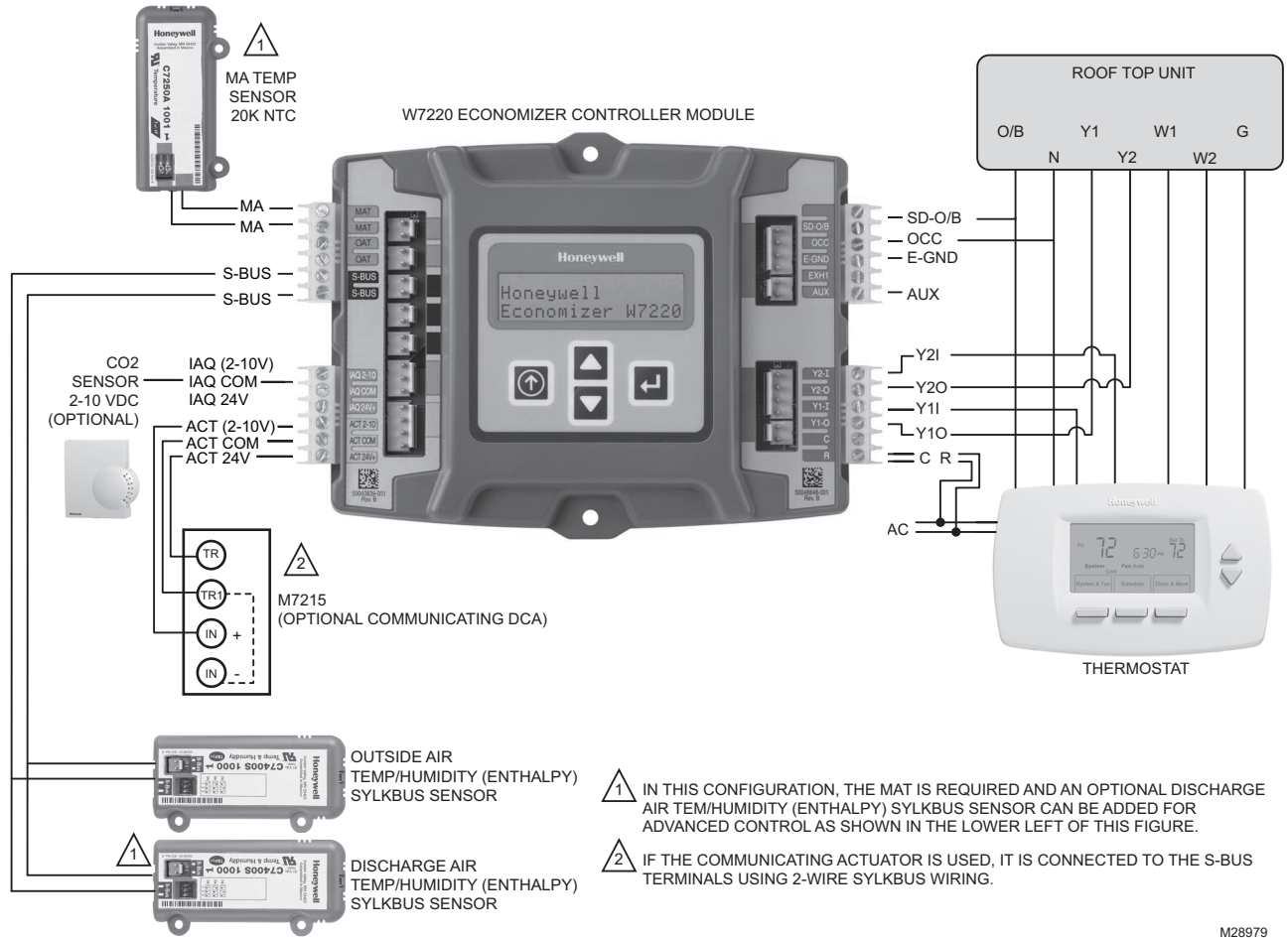
Fig. 9. Economizer with Sylk Bus sensors for enthalpy configuration with Honeywell M7215 black motor.
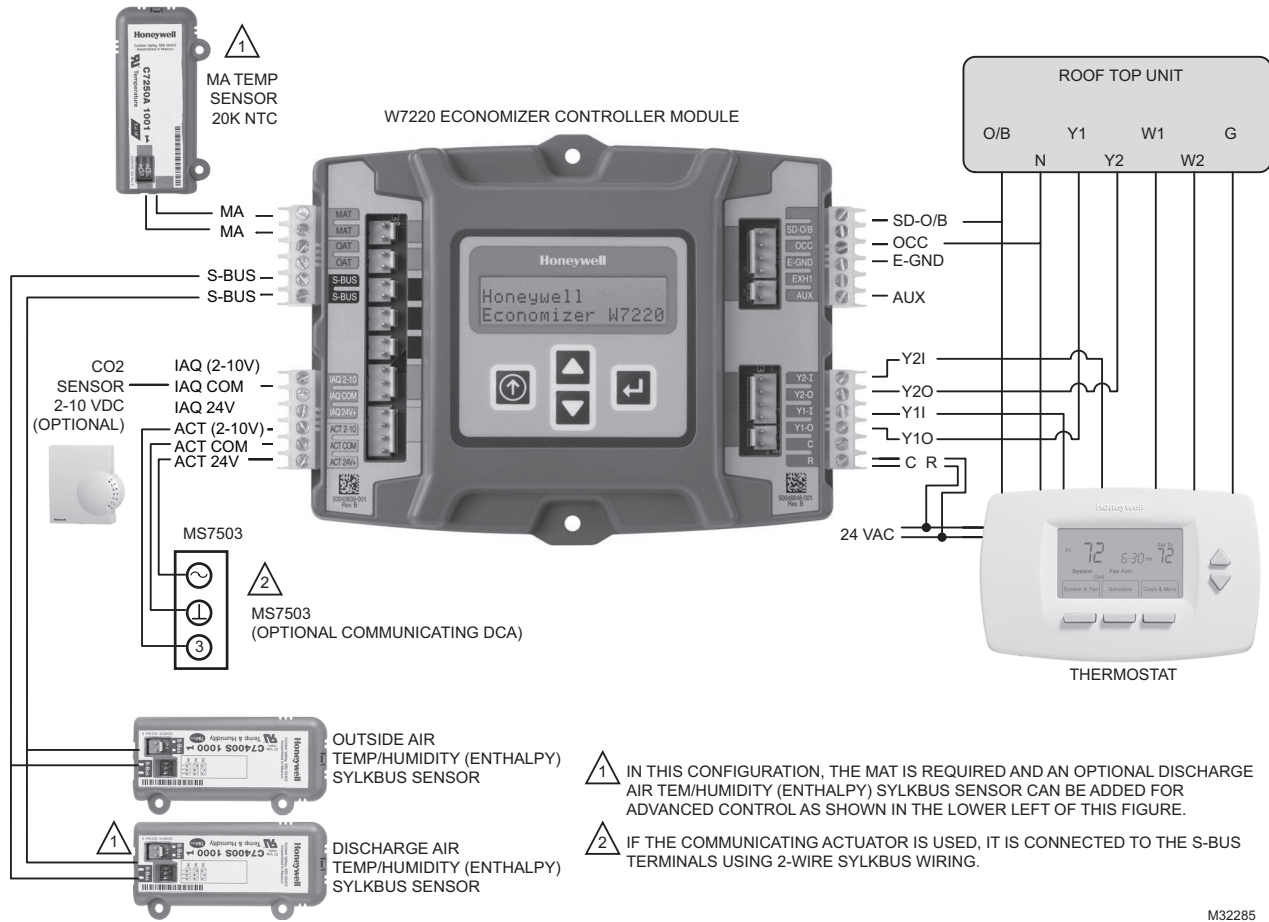
Fig. 10. Economizer with Sylk Bus sensors for enthalpy configuration with a Honeywell MS7305 Direct Coupled Actuator.

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.
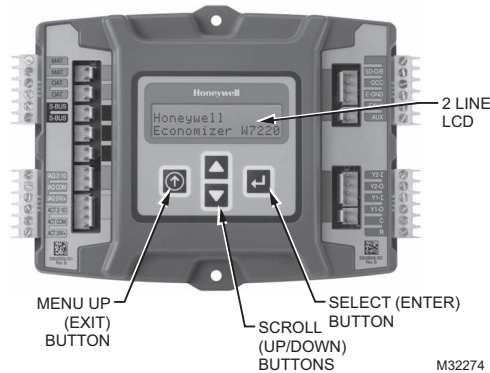

Fig. 11. Economizer LCD and Keypad Layout.

Keypad

The four navigation buttons illustrated in Fig. 11 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 (Enter) to return to the current menu parameter.
*   Press the ⬆ button (MenuUp/Exit) to return to the previous menu.

Menu Structure

Table 5 on page 12 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 12 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.*

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

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 outside air for free cooling when required.
	ECONOMIZING	NO	YES/NO	YES = outside 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 stage 1 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	_ _._ ºF	0 to 140 ºF	Displays value of measured mixed air from MAT sensor. Displays --.- if not connected, short, or out- of-range.
	DA TEMP	_ _._ ºF	0 to 140 ºF	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	_ _._ ºF	-40 to 140 ºF	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 QA Sylkbus sensor. Displays --% if not connected, short, or out- of-range.
	RA TEMP	_ _._ ºF	0 to 140 ºF	Displays measured value of return air temperature from RAT 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 sensor sends invalid value, 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.
	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 voltage output to the damper actuator.
	EXH1 OUT	OFF	ON/OFF	Output of EXH1 terminal. ON = relay closed; OFF = relay open.
	EXH2 OUT	OFF	ON/OFF	Output of AUX terminal; displays only if AUX = EXH2
	ERV	OFF	ON/OFF	Output of AUX terminal; displays only if AUX = ERV
	MECH COOL ON	0	0, 1, or 2	Displays stage of mechanical cooling that is active.

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

Menu	Parameter	Parameter Default Value	Parameter Range and Increment[b]	Notes
SETPOINTS	MAT SET	53°F	38 to 65 °F; increment by 1	Setpoint determines where the economizer will modulate the OA damper to maintain the mixed air temperature.
	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.
	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 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 "Enthalpy Settings" on page 15 and Product Data sheet form 63-2700 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.
	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. Displays 2 to 10 V if <3 sensors (RA,OA and MA).
	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. Displays 2 to 10 V if <3 sensors (RA,OA and MA). Va is only set if DCV is used. This is the ventilation for less than maximum occupancy of the space.
	ERV OAT SP	32°F	0 to 50 °F; increment by 1	Only when AUX = ERV
	EXH1 SET	50%	0 to 100%; increment by 1	Setpoint for OA damper position when exhaust fan 1 is powered by the economizer.
	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 AUX is set to EHX2.
SYSTEM SETUP	INSTALL	01/01/10		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(O) HP(B)	CONV = conventional; enables configuration of shutdown parameter. HP(O) = energize heat pump on Cool HP(B) = energize heat pump on Heat
	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.
	AUX OUT	NONE	NONE ERV EXH2 SYS	• NONE = not configured (output is not used) • ERV= Energy Recovery Ventilator[d] • EXH2 = second damper position relay closure 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 ad 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	45ºF	35 to 55 ºF; increment by 1º	Temp to activate Freeze Protection (close damper and alarm if temp falls below setup 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.
	STG3 DLY	2.0h	0 to 4.0 hours or OFF; increment by 0.5	Delay after stage 2 for cool has been active. Turns on 2nd stage of cooling when economizer is 1st stage and mechanical cooling is 2nd stage. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling.
	INTERSTG DLY	5 min	1 to 9 minutes increment by 1	Delay between stages 1 and 2 for cool
	SD INPUT	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., fans, 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. See Product Data sheet 63-2700 for details. Requires all 3 RA, OA and MA sensors.
CHECKOUT	DAMPER VMIN-HS	n/a	n/a	Positions damper to VMIN position
	DAMPER VMAX-HS	n/a	n/a	Positions damper to VMAX position
	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)
	CONNECT Y2-O	n/a	n/a	Closes the Y2-O relay (Y2-O)
	CONNECT AUX	n/a	n/a	Energizes the AUX output. If Aux 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.
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 AUX is set to SYS and there is any alarm (e.g., failed sensors, etc.), the AUX terminal has 24 Vac out.
	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.

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:

Enthalpy Settings

When the OA temperature, enthalpy and dew point are below the respective setpoints, the outside air can be used for economizing. Fig. 12 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 6 for the ENTH CURVE setpoint values.
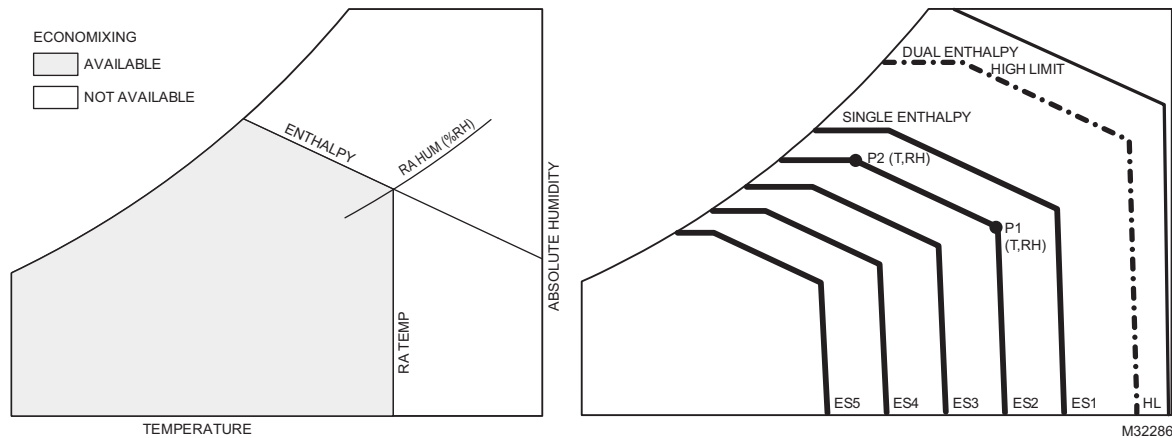
Fig. 12. Single Enthalpy curve and boundaries.

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

Fig. 12 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 6 provides the values for each boundary limit.

Table 6. 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

Economizer Setup and Configuration

To setup and configure the Economizer module, use the System Setup menu, the Advanced Setup menu (if necessary), and the Setpoints menu. Refer to Table 7.

Setup and configure the module in the following order:
1. Enter the System Setup parameters.
2. If needed, enter the Advanced Setup parameters.
3. Enter the Setpoint settings.

To make a parameter or setpoint change:
1. Use the ▲ and ▼ buttons to move to the desired menu.
2. Press the ↵ button (Enter) to display to the first parameter.
3. Use the ▲ and ▼ buttons to move to the desired parameter.
4. Press the ↵ button (Enter) to select the parameter and display its value.
5. Use the ▲ and ▼ buttons to change or increase/decrease the parameter value.

6. Press the ↵ button (Enter) to store the new value for the parameter.
7. CHANGE STORED displays.
8. Press the ↵ button (Enter) to return to the current menu parameter.
9. Repeat steps 4 through 8 for each parameter you want to change.
10. When finished, press the (↑) button (MenuUp/Exit) to return to the previous menu.
11. Repeat the above steps for each of the three menus - System Setup, Advanced Setup, and Setpoints.

Table 7. Setup and Setpoint Menus.

Menu	Parameter	Parameter Default Value	Parameter Range and Increment	Notes
SYSTEM SETUP	INSTALL	01/01/10		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(O) HP(B)	CONV = conventional; enables configuration of shutdown parameter. HP(O) = energize heat pump on Cool HP(B) = energize heat pump on Heat
	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.
	AUX OUT	NONE	NONE ERV EXH2 SYS	• NONE = not configured (output is not used) • ERV= Energy Recovery Ventilator[a] • EXH2 = second damper position relay closure 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 ad 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.
ADVANCED SETUP	MA LO SET	45°F	35 to 55 °F; increment by 1°	Temp to activate Freeze Protection (close damper and alarm if temp falls below setup 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.
	STG3 DLY	2.0h	0 to 4.0 hours or OFF; increment by 0.5	Delay after stage 2 for cool has been active. Turns on 2nd stage of cooling when economizer is 1st stage and mechanical cooling is 2nd stage. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling.

Table 7. Setup and Setpoint Menus. (Continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment	Notes
ADVANCED SETUP (continued)	SD INPUT	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., fans, 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. See Product Data sheet 63-2700 for details. Requires all 3 RA, OA and MA sensors.
SETPOINTS	MAT SET	53ºF	38 to 65 ºF; increment by 1	Setpoint determines where the economizer will modulate the OA damper to maintain the mixed air temperature.
	LOW T LOCK	32ºF	-45 to 80 ºF; increment by 1	Setpoint determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout.
	DRYBLB SET	63ºF	48 to 80 ºF; increment by 1	Setpoint determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.; at 63 ºF unit will economizer at 62 ºF and below and not economize at 64 ºF and above. There is a a 2 ºF deadband.
	ENTH CURVE	ES3	ES1, ES2, ES3, ES4, or ES5	Enthalpy boundary "curves" for economizing using single enthalpy. See "Enthalpy Settings" on page 15 and Product Data sheet form 63-2700 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.
	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. Displays 2 to 10 V if <3 sensors (RA,OA and MA).
	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. Displays 2 to 10 V if <3 sensors (RA,OA and MA). Va is only set if DCV is used. This is the ventilation for less than maximum occupancy of the space.
	ERV OAT SP	32ºF	0 to 50 ºF; increment by 1	Only when AUX = ERV
	EXH1 SET	50%	0 to 100%; increment by 1	Setpoint for OA damper position when exhaust fan 1 is powered by the economizer.
	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 AUX is set to EHX2.

[a] 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.

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 11. 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.

Status

Use the Status menu (see Table 8) to check the parameter values for the various devices and sensors configured.

NOTE: See "Interface Overview" on page 11. for information about menu navigation and use of the keypad.

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

Table 8. Status Menu.

Menu	Parameter	Parameter Default Value	Parameter Range and Increment	Notes
STATUS	ECON AVAIL	NO	YES/NO	YES = economizing available; the system can use outside air for free cooling when required.
	ECONOMIZING	NO	YES/NO	YES = outside 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[a]	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 stage 1 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	0 to 140 °F	Displays value of measured mixed air from MAT sensor. Displays --.- if not connected, short, or out- of-range.

Table 8. Status Menu. (Continued)

Menu	Parameter	Parameter Default Value	Parameter Range and Increment	Notes
STATUS (continued)	DA TEMP	_ _._ ºF	0 to 140 ºF	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	_ _._ ºF	-40 to 140 ºF	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 QA Sylkbus sensor. Displays --% if not connected, short, or out- of-range.
	RA TEMP	_ _._ ºF	0 to 140 ºF	Displays measured value of return air temperature from RAT 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 sensor sends invalid value, 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.
	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 voltage output to the damper actuator.
	EXH1 OUT	OFF	ON/OFF	Output of EXH1 terminal. ON = relay closed; OFF = relay open.
	EXH2 OUT	OFF	ON/OFF	Output of AUX terminal; displays only if AUX = EXH2
	ERV	OFF	ON/OFF	Output of AUX terminal; displays only if AUX = ERV
	MECH COOL ON	0	0, 1, or 2	Displays stage of mechanical cooling that is active.

[a] n/a = not applicable

Checkout Tests

Use the Checkout menu (Table 9) 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 11. 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? appears.
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.

Table 9. Checkout Menu.

Checkout Item	Checkout Test
DAMPER VMIN-HS	Positions damper to VMIN position
DAMPER VMAX-HS	Positions damper to VMAX position
DAMPER OPEN	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	Positions damper to the fully closed position.
CONNECT Y1-O	Closes the Y1-O relay (Y1-O). See **CAUTION** on this page
CONNECT Y2-O	Closes the Y2-O relay (Y2-O). See **CAUTION** on this page
CONNECT AUX	Energizes the AUX output. If Aux 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.[a] • SYS – 24 Vac out. Issues a system alarm.

[a] 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.

⚠ 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

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.

Alarms

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

NOTE: Upon power up, the module waits several seconds before checking for alarms. This allows time for all the configured devices (e.g. sensors, actuator) to become operational.

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.

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

You can also navigate to the Alarms menu at any time.

Table 10. Alarms Menu.

Menu	Alarm
ALARMS(_)	MA T SENS ERR
	CO2 SENS ERR
	OA T SENS ERR
	DA ENTHL ERR
	SYS ALARM[a]
NOTES: 1. The Alarms menu displays only when alarm(s) are active and includes the number of active alarms in parenthesis (). 2. The alarms listed are a few examples. Additional alarms display depending on the parameter settings and configuration.	

[a] When AUX is set to SYS and there is any alarm (e.g., failed sensors, etc.), the AUX terminal has 24 Vac out and the LCD displays the SYS ALARM.

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.