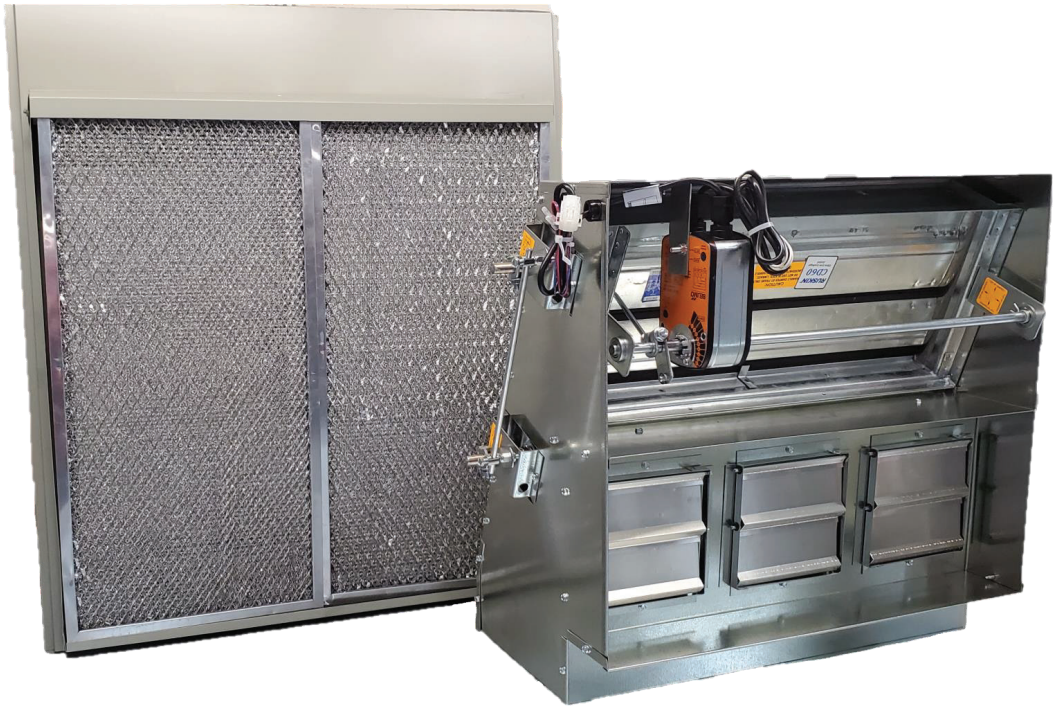
ECONOMIZER FOR SPLIT ROOFTOP UNITS (RTU) INSTALLATION MANUAL



Vertical or Horizontal Applications

Compatible Models:
ARNU363DDA4, ARNU483DDA4,
ARNU603DDA4, ARNU723DDA4

Accessory Model Numbers:
Dry-Bulb Economizer: ZCEC01000DB
Single Enthalpy Economizer: ZCEC01000SE
Dual Enthalpy Economizer: ZCEC01000DE

PROPRIETARY DATA NOTICE

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⃠ Do not throw away, destroy, or lose this manual.
Please read carefully and store in a safe place for future reference.
Content familiarity is required for proper installation.

The instructions included in this manual must be followed to prevent product malfunction, property damage, injury, or death to the user or other people. Incorrect operation due to ignoring any instructions will cause harm or damage. The level of seriousness is classified by the symbols described by the summary list of safety precautions on page 4.

For more technical materials such as submittals, visit www.lghvac.com.

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INTRODUCTION

Installation Supplement

JADE™ Economizer used with LG Split Rooftop Units with 3D Plug Indoor Fan.

(JADE is a is a trademark of Honeywell International, Inc. or its subsidiaries or affiiliates.)

Note:

In the event that this JADE W7220 economizer is used with an LG 3 to 6 ton rooftop unit with 3D Plug (Centrifugal) Fan, the harness provided with the accessory kit must be field-connected to the JADE W7220 economizer controller.

Kit Instructions:

1. Install the JADE W7220 controller and transformer in the unit control box, per economizer instructions. ⃠ Do not connect wire.
2. Install the LG Dry Contact in the unit control box. The dry contact model names that should be used according to the type of thermostat are as follows.

Note:

LG Dry Contact must be purchased separately.

Table 1: LG Dry Contacts.

Remote Controller	Dry Contact Model No.
LG Thermostat	PDRYCB400
Third-Party Thermostat	PDRYCB320

TABLE OF SYMBOLS

⚠ **DANGER**	*This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.*
⚠ **WARNING**	*This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.*
⚠ **CAUTION**	*This symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.*
⚠ **NOTE**	*This symbol indicates situations that may result in equipment or property damage accidents only.*
Note:	*This symbol indicates information related to the current procedure.*
⃠	*This symbol indicates an action that should not be performed.*

Read these instructions completely before attempting to install the Economizer Accessory.

Safety Precautions

When installing this accessory, observe precautions in the literature and on any labels attached to the equipment and all other safety precautions may apply.

- *Follow all safety codes.*
- *Wear safety glasses and work gloves.*
- *Use care in handling and installing the accessory.*

Installation

⚠WARNING

Because of system pressure, electrical components, and the equipment, installation of this accessory may result in death or serious injury. Only trained qualified installer and service technicians should install, start-up, and service this equipment.

Electrical Shock Hazard

Before performing service or maintenance operations on the unit, always turn off main power switch to unit and install lock(s) and lockout tag(s). Unit may have more than one power switch. Ensure electrical service to rooftop unit agrees with voltage and amperage listed on the unit rating plate.

Failure to follow this warning can cause personal injury or death.

⚠CAUTION

Cut Hazard

- *Failure to follow this caution could result in minor or moderate injury. Sheet metal parts may have sharp edges or burrs.*
- *Use care and wear appropriate protective clothing, safety glasses, and gloves when handling parts and servicing rooftop units.*

Cover the duct opening as a pre-caution so individuals cannot fall into the return duct opening. Be sure to remove the cover when installation is complete.

Failure to follow this caution may cause minor or moderate injury.

⚠NOTE

Failure to follow this caution may result in damage to the unit. Cover the duct opening as a precaution so objects cannot fall into the return duct opening. Be sure to remove the cover when installation is complete.

SAFETY PRECAUTIONS

Wiring

⚠ DANGER

High voltage electricity is required to operate this system. Adhere to the National Electrical Codes and these instructions when wiring.
Improper connections and inadequate grounding can cause accidental injury or death.

Always ground the unit following local, state, and National Electrical Codes.

Turn the power off at the nearest disconnect before servicing the equipment.
Electric shock can cause physical injury or death.

Properly size all circuit breakers or fuses.
There is risk of fire, electric shock, explosion, physical injury or death.

⚠ WARNING

The information contained in this manual is intended for use by an experienced, trained electrician familiar with the U.S. National Electric Code (NEC) who is equipped with the proper tools and test instruments.
Failure to carefully read and follow all instructions in this manual can result in injury or death.

Ensure the unit is connected to a dedicated power source that provides adequate power.
If the power source capacity is inadequate or the electric work is not performed properly, it may result in fire, electric shock, physical injury or death.

Refer to local, state, and federal codes, and use power wires of sufficient current capacity and rating.
Wires that are too small may generate heat and cause a fire and physical injury or death.

Secure all field wiring connections with appropriate wire strain relief.
Improperly securing wires will create undue stress on equipment power lugs. Inadequate connections may generate heat, cause a fire and physical injury or death.

Properly tighten all power connections.
Loose wiring may overheat at connection points, causing a fire, physical injury or death.

⚠ NOTE

The information contained in this manual is intended for use by an experienced, trained electrician familiar with the U.S. National Electric Code (NEC) who is equipped with the proper tools and test instruments.
Failure to carefully read and follow all instructions in this manual can result in equipment malfunction or property damage.

General Product Data

The economizer system utilizes the latest technology available for integrating the use of free cooling with mechanical cooling for packaged rooftop units. The code compliant JADE W7220 control system optimizes energy consumption, zone comfort, and equipment cycling by operating the compressors when the outdoor-air is too warm or humid, integrating the compressor with outdoor air when free cooling is available, and locking out the compressor when outdoor-air temperature is too cold. Demand control ventilation is supported.

This economizer can be used with variable speed indoor fan motor units. (1 speed fan setup).

Economizer actuators are spring return for full 100% shutdown upon power loss. The economizer system comes standard with fault detection and diagnostics (FDD), an outdoor air sensor, and mixed air temperature sensor (also called supply air temperature sensor). Outdoor enthalpy and CO2 sensors are available for field installation. See Table 2 for sensor usage.

Standard integrated barometric relief dampers provide natural building pressurization control. A power exhaust system is available for applications requiring even greater exhaust capabilities. Refer to LG's power exhaust documentation (examples: submittals and installation manual) for more details.

Accessory List

Table 2: Package Contents.

Economizer Model No.	Quantity	Contents
ZCEC01000DB	1	Economizer Damper Assembly with Communicating Actuator
	1	JADE (HW:W7220) Controller with attached Harness*
	1	Mixed Air Sensor (C7250A1001)
	1	Outside Air Sensor (C7250A1001)
	1	Hood Assembly with Top, Bottom and 2 Sides
	2	Separators (Horizontal [1], Vertical [1])
	2	Aluminum Filter
	1	Hardware Kit (Wiring harness, Transformer)
ZCEC01000SE	1	Economizer Damper Assembly with Communicating Actuator
	1	JADE (HW:W7220) Controller with attached Harness*
	1	Mixed Air Sensor (C7250A1001)
	1	Single Enthalpy Sensor Sylkbus (C7400S1000)
	1	Hood Assembly with Top and 2 Sides
	2	Separators (Horizontal [1], Vertical [1])
	2	Aluminum Filter
	1	Hardware kit (Wirings, Transformer)
ZCEC01000DE	1	Economizer Damper Assembly with Communicating Actuator
	1	JADE (HW:W7220) Controller with attached Harness*
	2	Single Enthalpy Sylkbus Sensor (C7400S1000)
	1	Mixed Air Sensor (C7250A1001)
	1	Hood Assembly with Top and 2 Sides
	2	Separators (Horizontal [1], Vertical [1])
	2	Aluminum Filter
	1	Hardware Kit (Wirings, Transformer)

* Shipped in hardware kit for field installation.

HW = Honeywell® (Honeywell is a registered trademark of Honeywell International Inc. or its subsidiaries or affiliates).

Accessory List, continued.

Table 3: Economizer Sensor Usage.

Application	Economizer with Outdoor Air Dry Bulb Sensor
Outdoor Air Dry Bulb	Outside air dry bulb (C7250A1001) sensor is factory installed on economizer.
Single Enthalpy	Outside air enthalpy sensor(C7400S1000) is factory provided and field installed.
Mixed Air Sensor	Factory provided and field installed.
Differential Enthalpy Sensor	Outside air enthalpy sensor (C7400S1000) is factory mounted. Return air enthalpy sensor (C7400S1000) is factory provided and field mounted in return duct.*

* Includes C7400S sensor and wiring harness.

Compliance

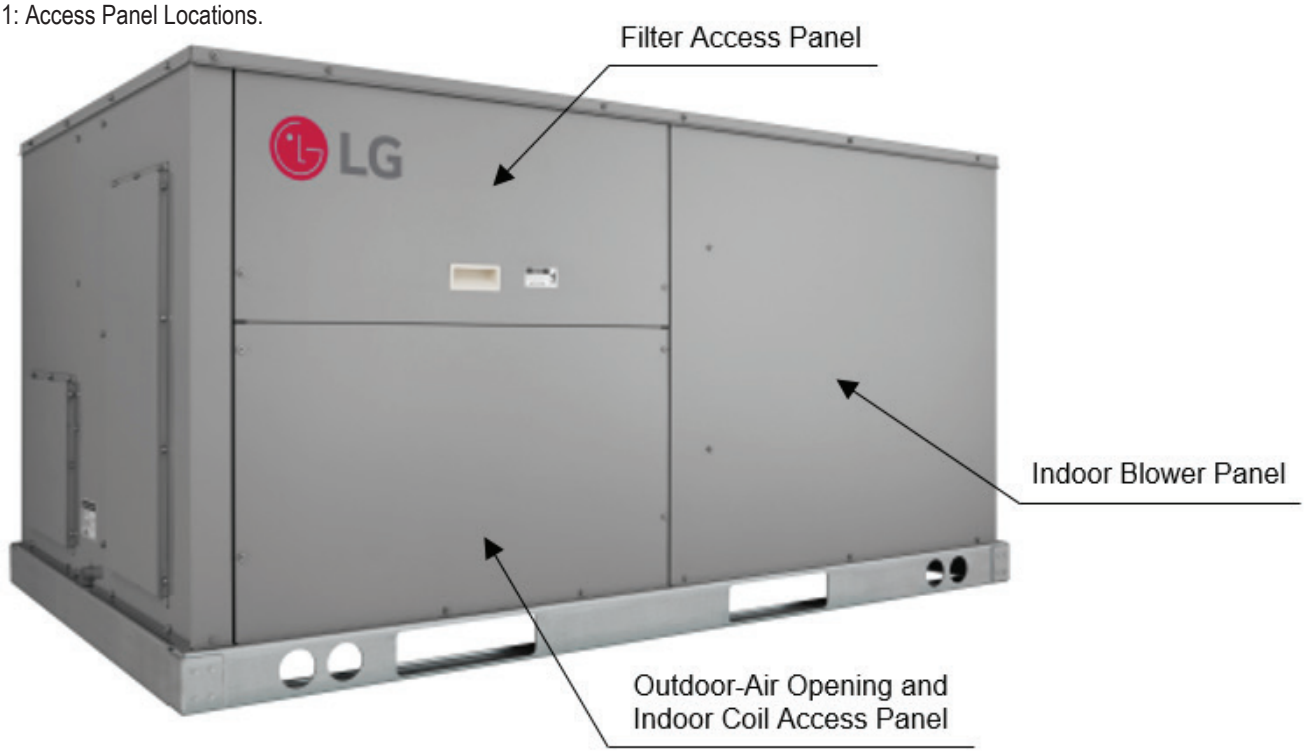
- Economizers meet California Energy Commission Title 24 mandatory section 120.2.i for Fault Detection and Diagnostic controls.
- Economizers meet ASHRAE® 90.1 Fault Detection and Diagnostic requirements.
- Economizers meet IECC Fault Detection and Diagnostic requirements.

(ASHRAE and the ASHRAE logo are registered trademarks of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.)

Note:

IECC requires differential return air sensor, which must be ordered separately. See Honeywell C7400S sensor.

Figure 1: Access Panel Locations.



Vertical Type Installation

Step 1:

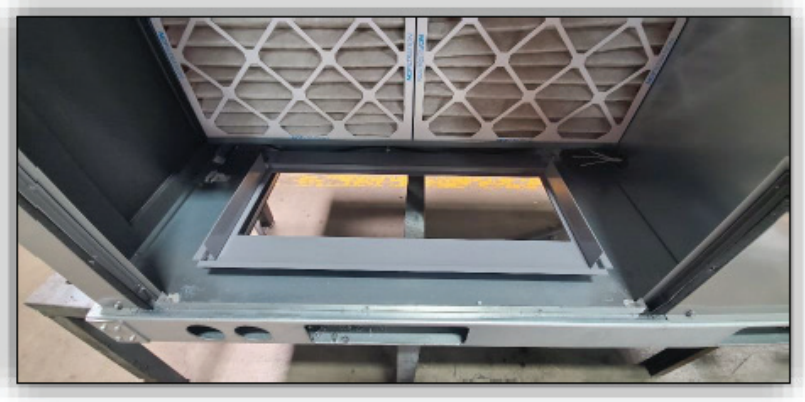
Remove the existing panels, as shown in Figure 2.

Figure 2: Remove Panels (Step 1).

Step 2:

Insert the adaptor over the return air opening. Secure the adaptor to the unit floor using the provided pilot holes, located on the bottom side flange of the adaptor. See Figure 3.

Figure 3: Insert the adaptor (Step 2).



INSTALLATION

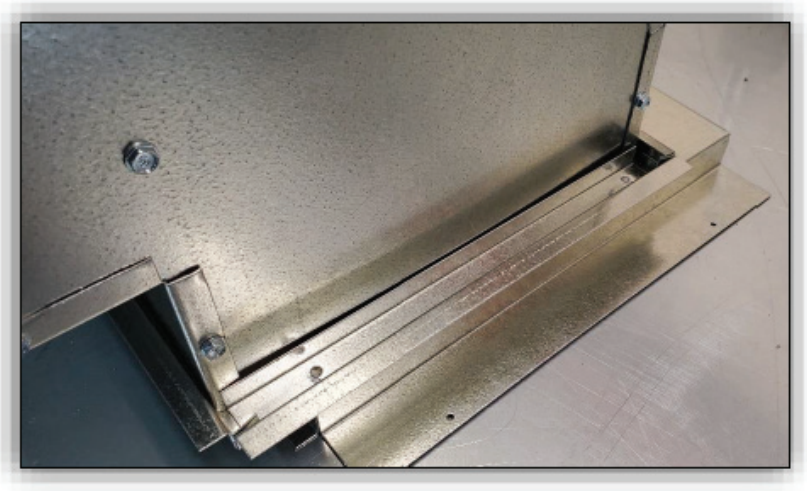
Vertical Type Installation

Vertical Type Installation, continued.

Step 3:

Insert the bottom of the economizer in the top of the adaptor, using the alignment rails. See Figure 4.

Figure 4: Insert the economizer in top of the adaptor (Step 3).



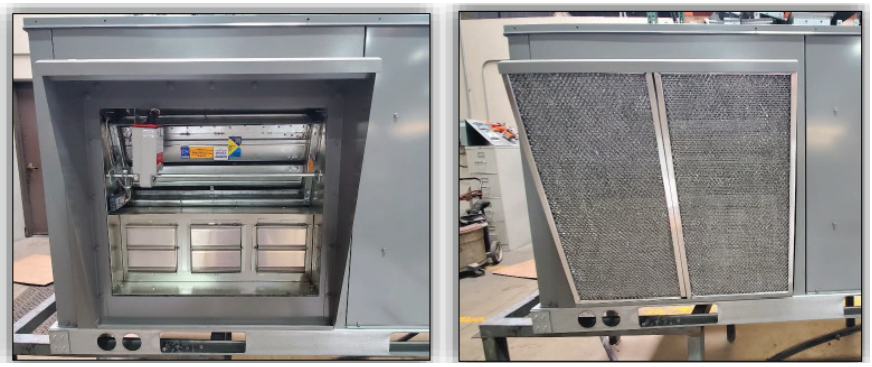
Step 4:

Ensure all the connections from the economizer to the unit are properly installed.

Step 5:

Install the down shot outside air panel, secure the OA panel to the unit along the vertical side flanges.

Figure 5: Install outside air panel (Step 5).



Horizontal Type Installation

Step 1:

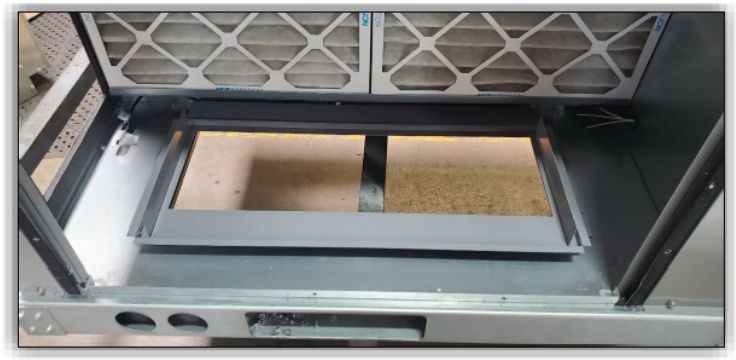
Remove the existing panels and horizontal cover, see Figure 6.

Figure 6: Remove Panels (Step 1).

Step 2:

Insert the adaptor over the return air opening. Secure the adaptor to the unit floor using the provided pilot holes, located on the bottom side flange of the adaptor.

Figure 7: Insert the adaptor (Step 2).



Step 3:

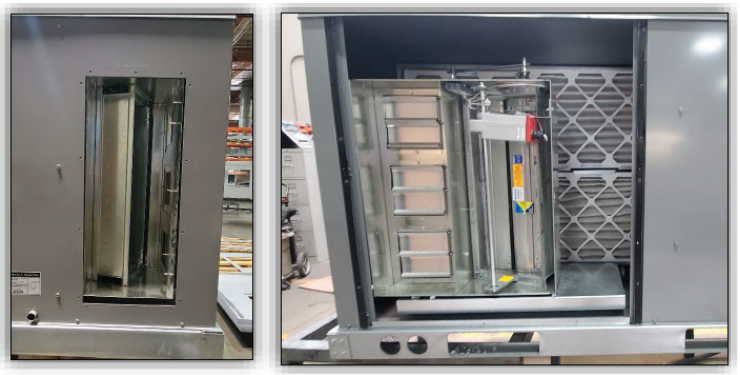
Install the adaptor cover, see Figure 8.

Figure 8: Install the adaptor cover (Step 3).

Step 4:

Insert the economizer on its side, ensuring that the bottom opening of the economizer is inserted into the horizontal opening. Secure the economizer to the horizontal opening side flange and the top of the adaptor cover, by using the provided screws. See Figure 9.

Figure 9: Insert the economizer (Step 4).



INSTALLATION

Horizontal Type Installation

Horizontal Type Installation, continued.

Step 5:

Rotate all three (3) barometric relief dampers to the horizontal position. See Figure 10.

Figure 10: Rotate three (3) barometric relief dampers.

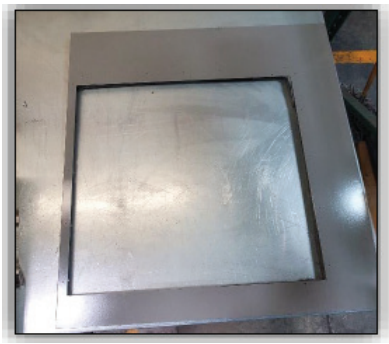
Step 6:

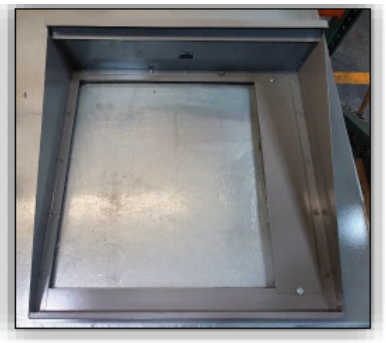
Ensure all the connections from the economizer to the unit are properly installed.

Step 7:

Remove the OA hood from the down shot outside air panel and re-install it on to the provided horizontal panel. Ensure to also install the filter access panel. See Figure 11.

Figure 11: Install horizontal panel (Step 7).

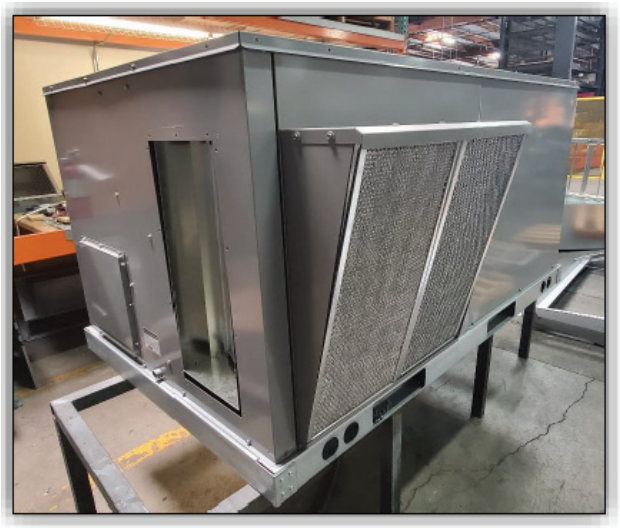




Step 8:

Install the horizontal outside air panel with the horizontal filter access panel, secure the OA panel to the unit along the vertical side flanges. See Figure 12.

Figure 12: Install horizontal filter access panel (Step 8).



Air Flow Separator Installation

Note:

The installation of the air flow separator is the same process for both the vertical and horizontal orientation, only the separator itself changes.

Step 1:

Remove one of the filters exposing the economizer. See Figure 13.

Figure 13: Vertical or Horizontal (Step 1).

Vertical Orientation

Horizontal Orientation

Step 2:

If you are using the economizer in the vertical orientation use the separator shown in Figure 14, otherwise use the separator shown in Figure 15 for the horizontal orientation.

Once which separator required has been chosen, attach the black bulb gasket on to the edge opposite of the pilot holes. If necessary, trim the bulb gasket to length.

Figure 14: Vertical Separator (Step 2).

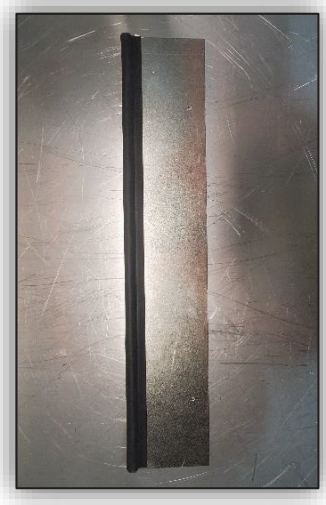


Figure 15: Horizontal Separator Step 2).

INSTALLATION

Air Flow Separator Installation

Air Flow Separator Installation, continued.

Step 3:

Insert the separator into the economizer with the bulb gasket facing the opening.

For the horizontal orientation, ensure that the notch on the splitter is facing upward and the edge follows the filter contour.

Figure 16: Vertical Orientation (Step 3).

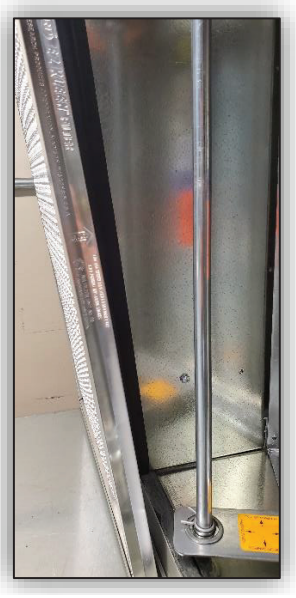
Figure 17: Horizontal Orientation Step 3).

Step 4:

Secure the filter separator to the splitter using the pilot holes.

Figure 18: Vertical Orientation (Step 4).

Figure 19: Horizontal Orientation Step 4).



FILTER ACCESS

Vertical / Horizontal Orientation

Filter Access, Vertical Orientation

Filter access is gained by removing the unit horizontal panel. Push the middle filter rack up allowing the bottom filter to be pulled out.

Figure 20: Removing the Horizontal Panel.

Figure 21: Pushing Middle Filter Rack Up.

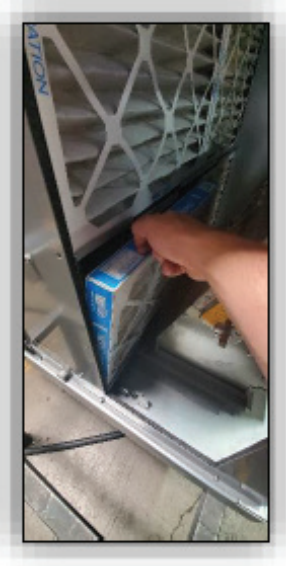


Figure 22: Pulling Out the Bottom Filter.

Filter Access, Horizontal Orientation

Filter access is gained by removing the filter panel. Push the middle filter rack up allowing the bottom filter to be pulled out. Rotate the filter 90° inside the unit, and then pull the filter out.

Figure 23: Removing the Filter Panel.

Figure 24: Pushing Middle Filter Rack Up.

Figure 25: Pulling Out the Bottom Filter.

VERTICAL AND HORIZONTAL APPLICATIONS

Figure 26: Economizer: Vertical and Horizontal Applications.

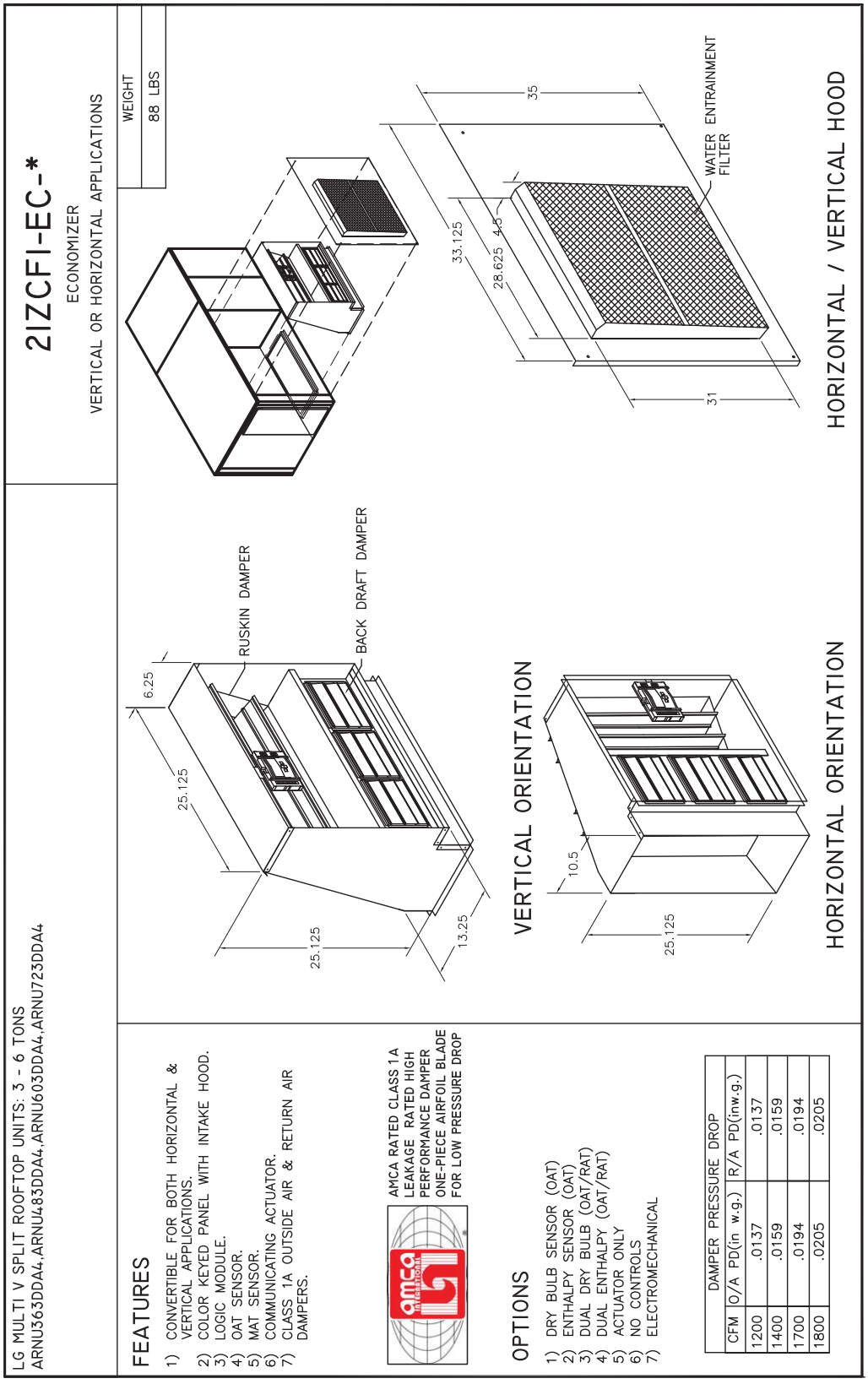
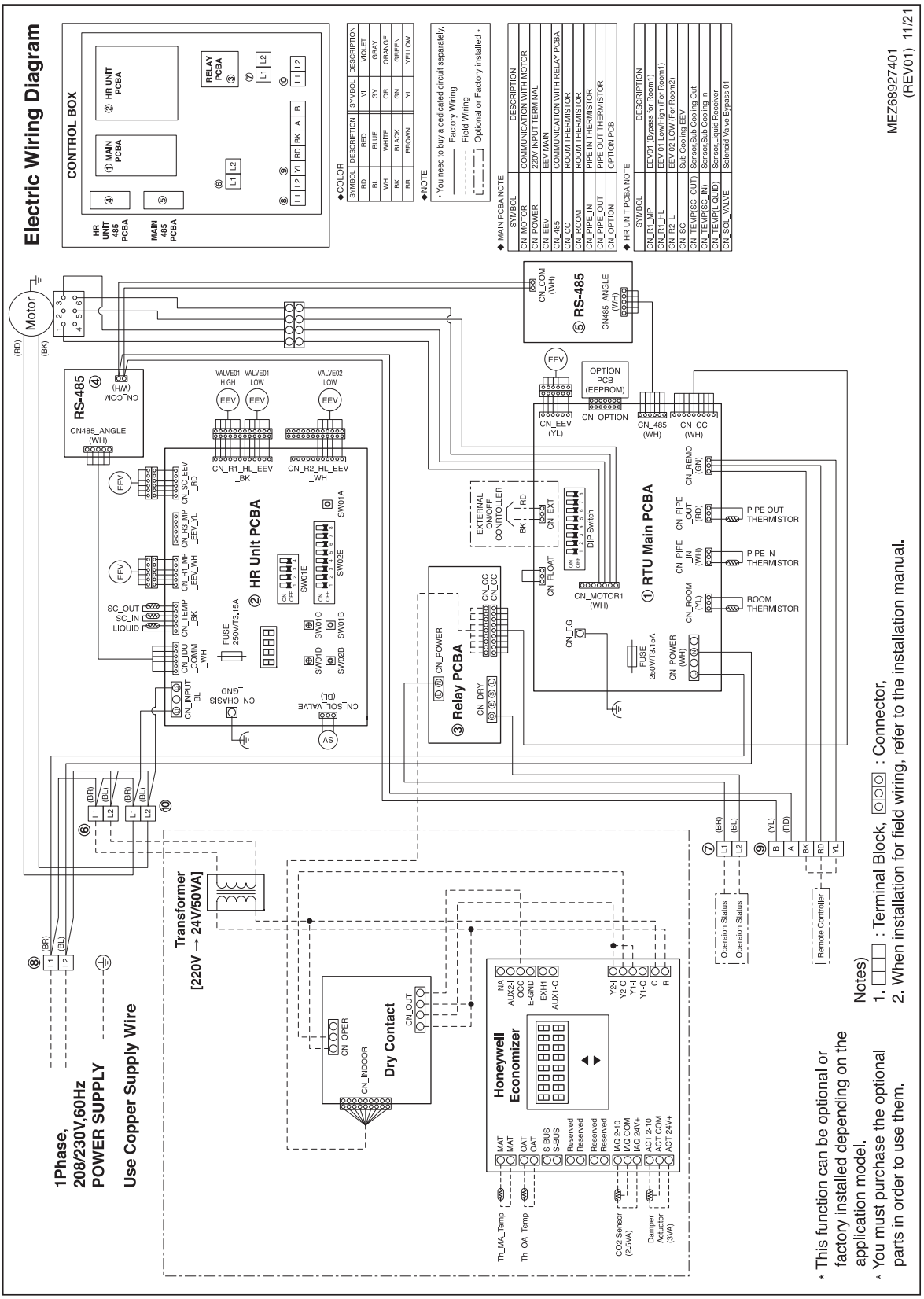


Figure 27: Economizer Wiring Diagram with PDRYCB400.



WIRING DIAGRAMS

Figure 28: Economizer Wiring (Single Dry Bulb) with PDRYCB400.

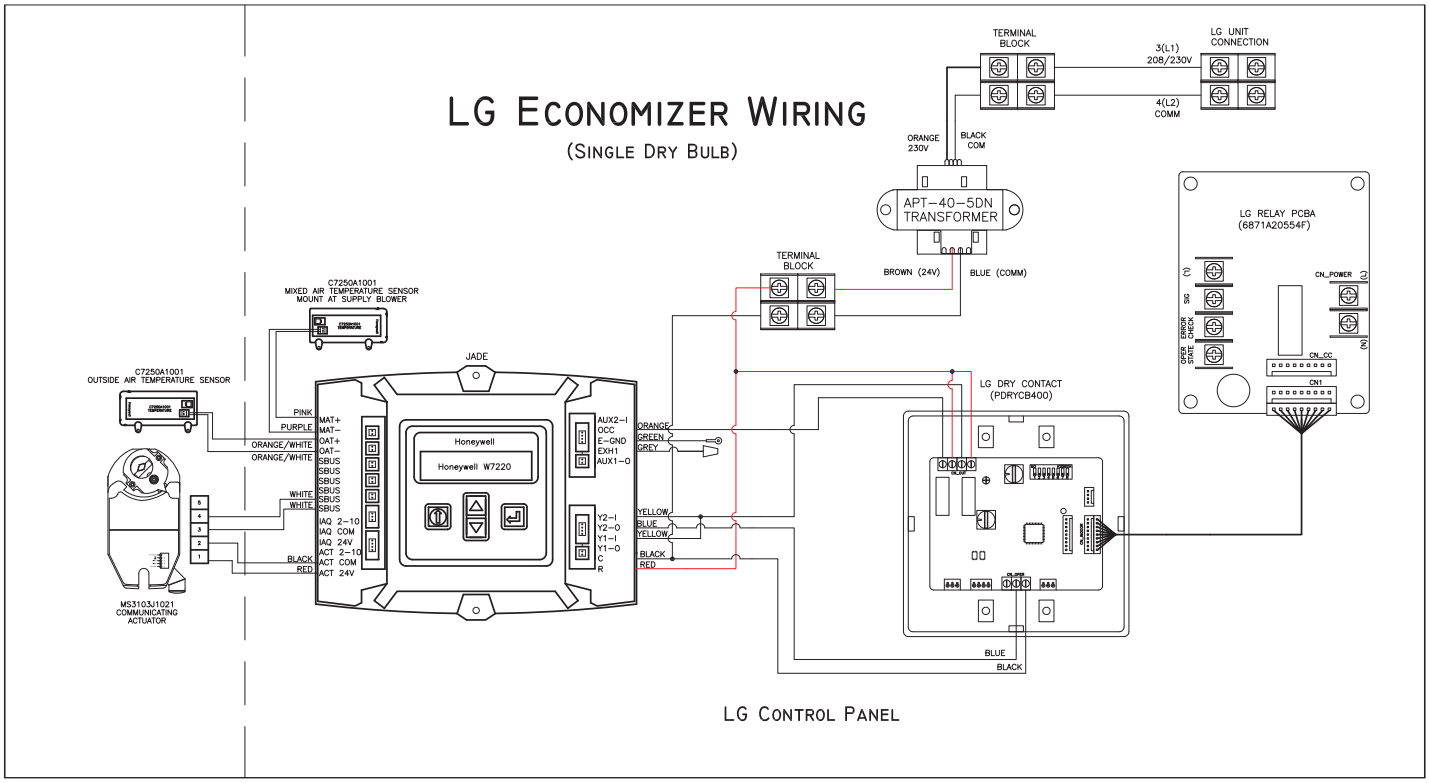


Figure 29: Economizer Wiring (Single Enthalpy) with PDRYCB400.

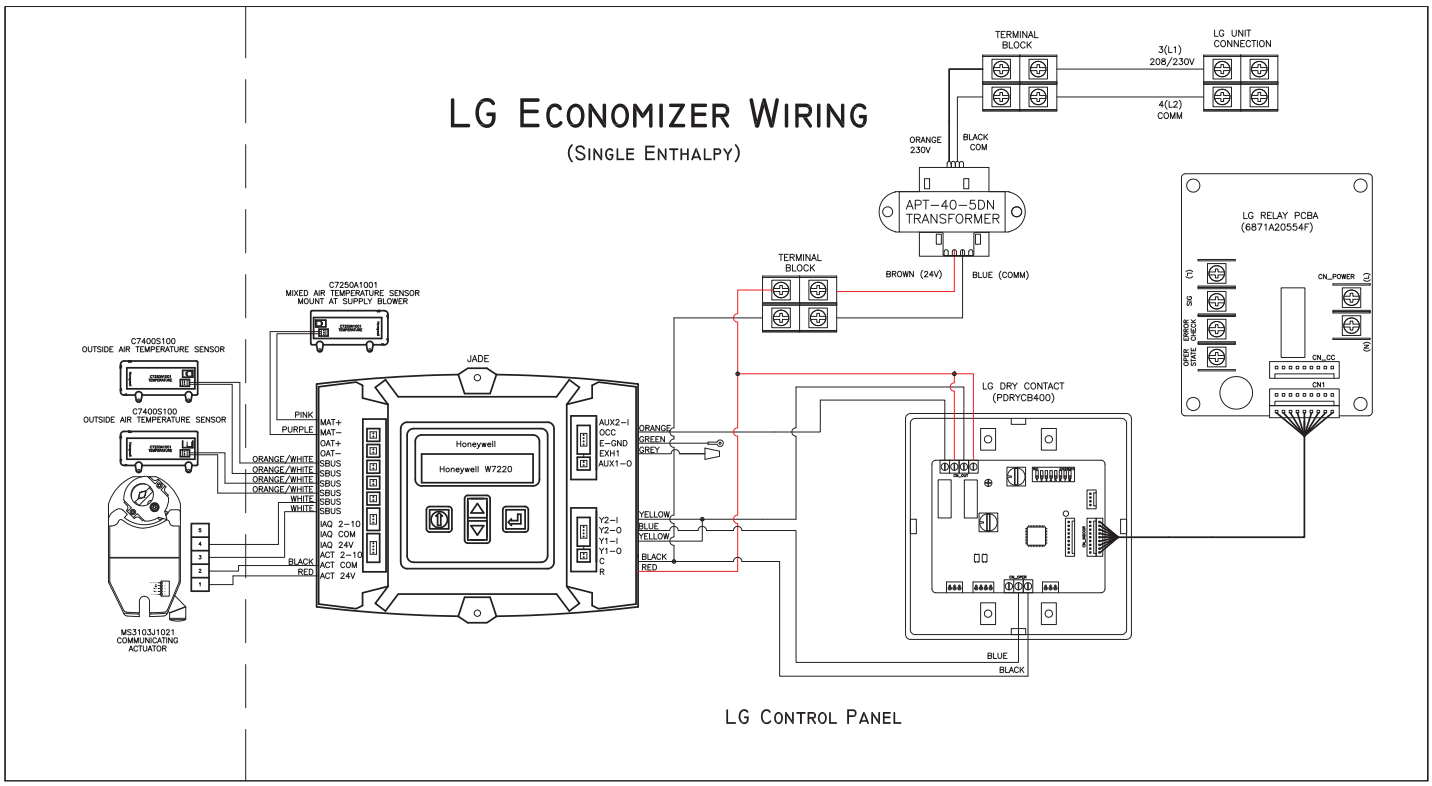
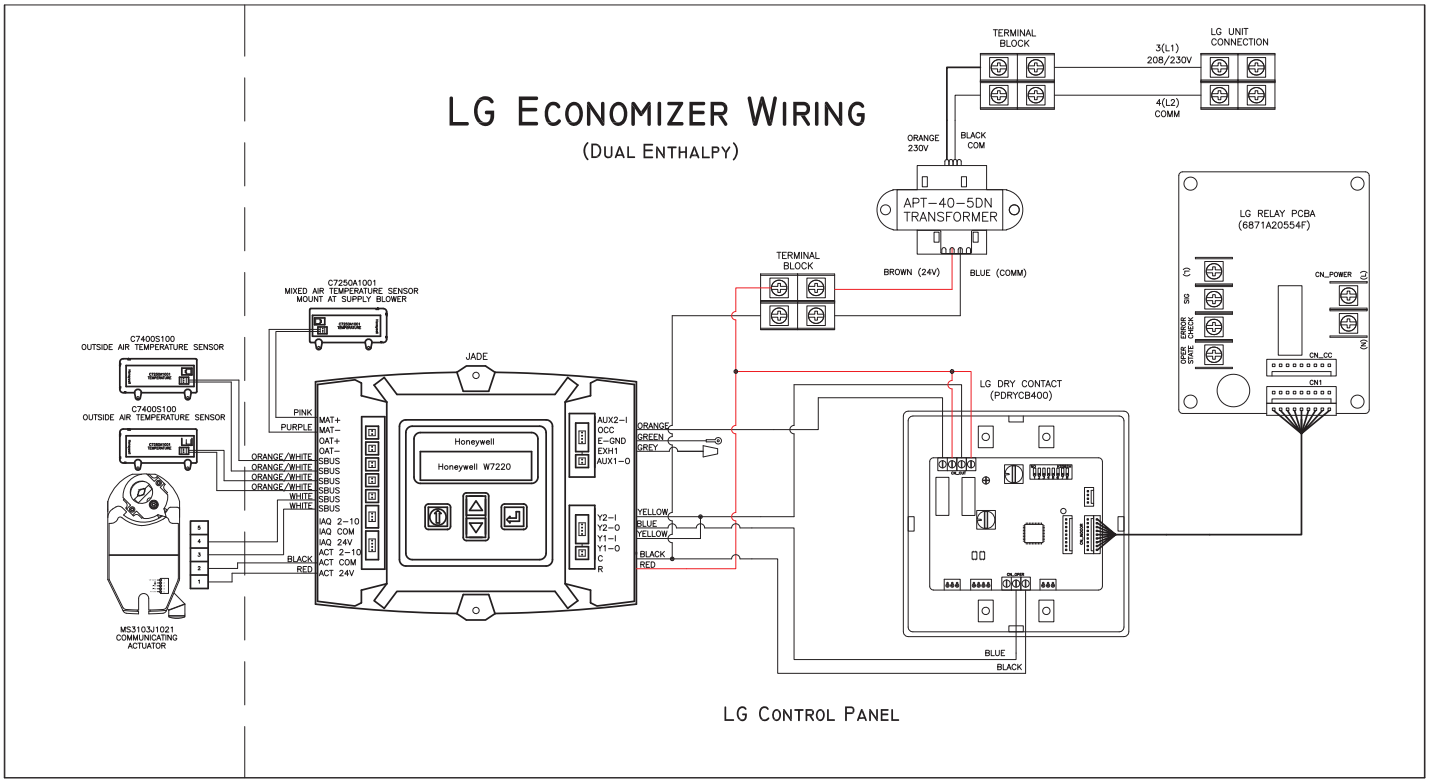


Figure 30: Economizer Wiring (Dual Enthalpy) with PDRYCB400.



WIRING DIAGRAMS

Figure 31: Economizer Wiring Diagram with PDRYCB320.

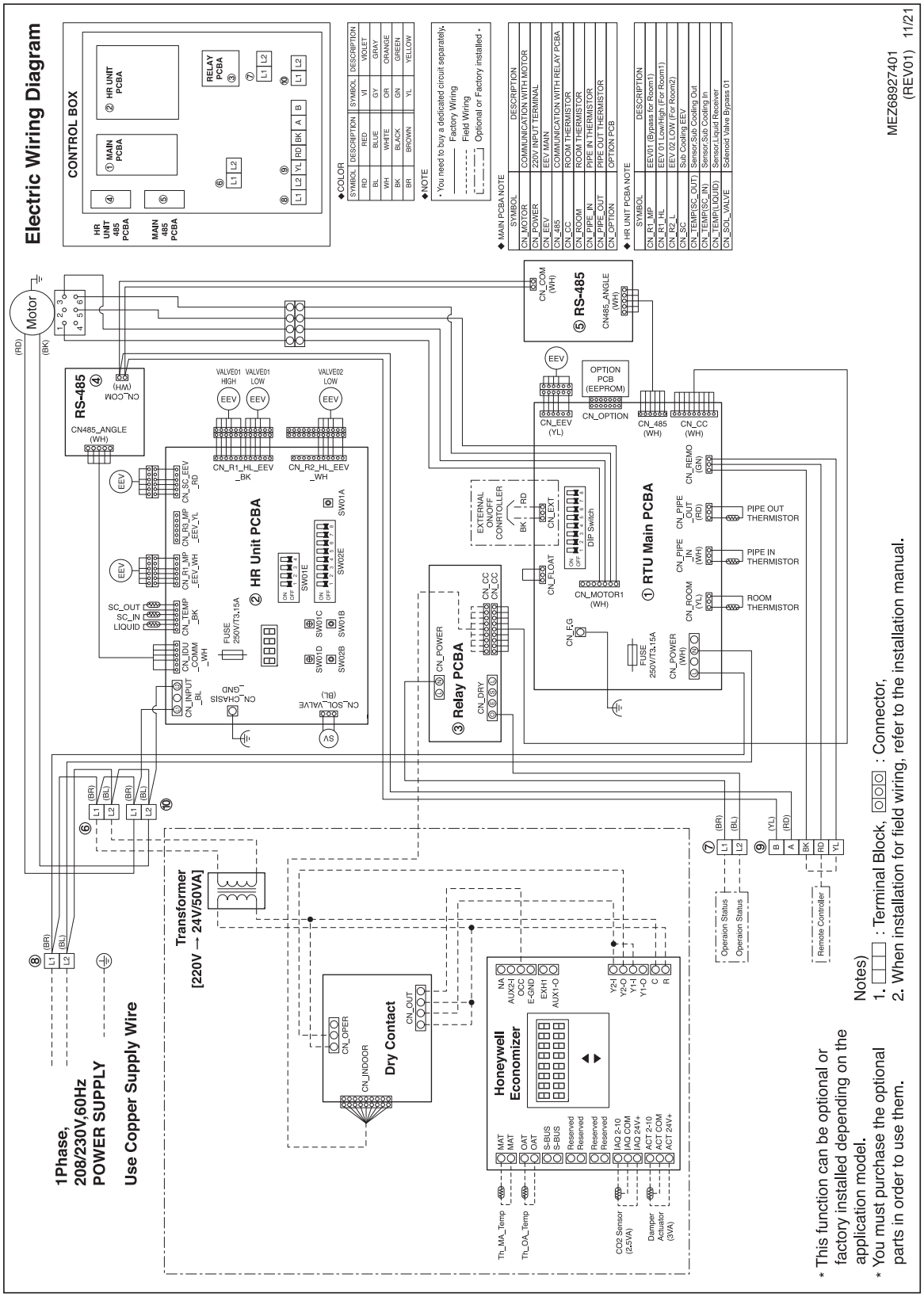


Figure 32: Economizer Wiring (Single Dry Bulb) with PDRYCB320.

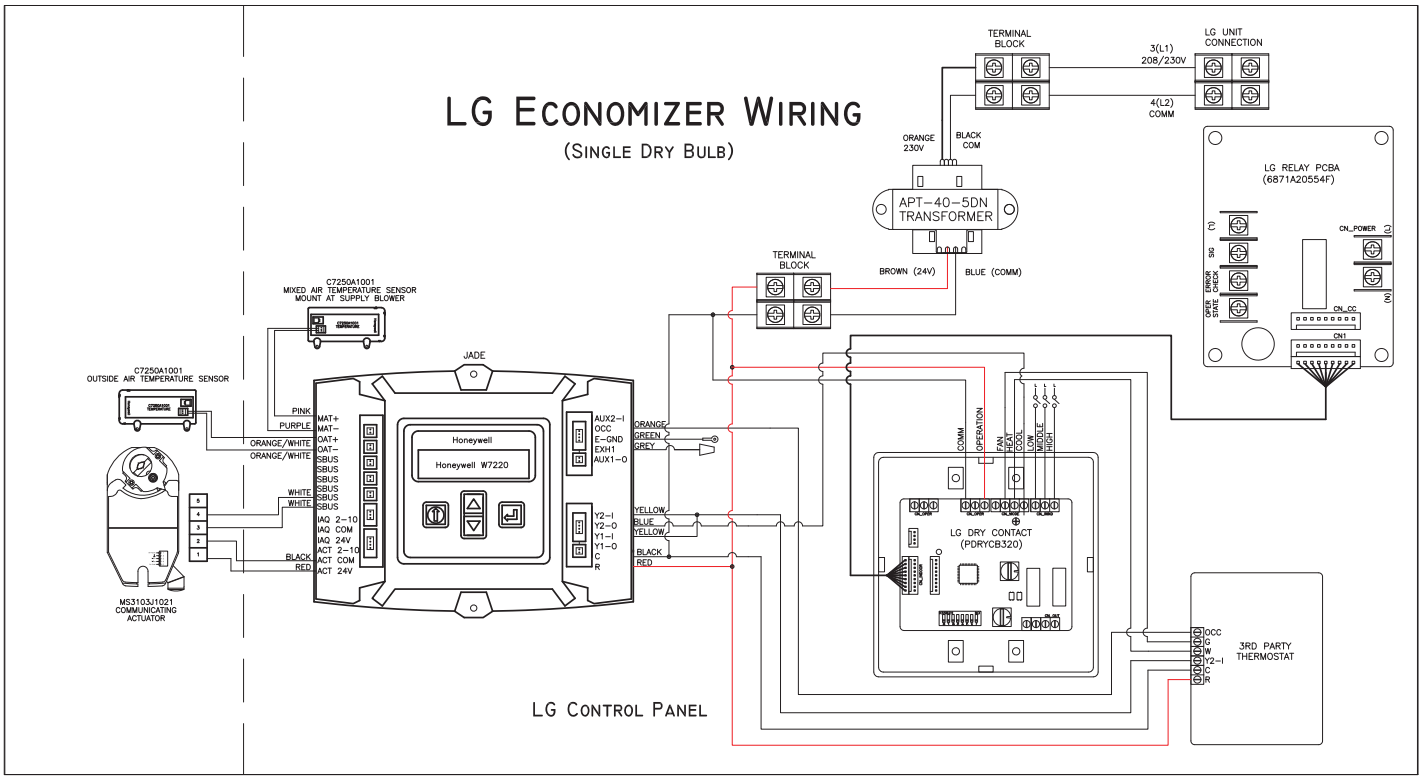
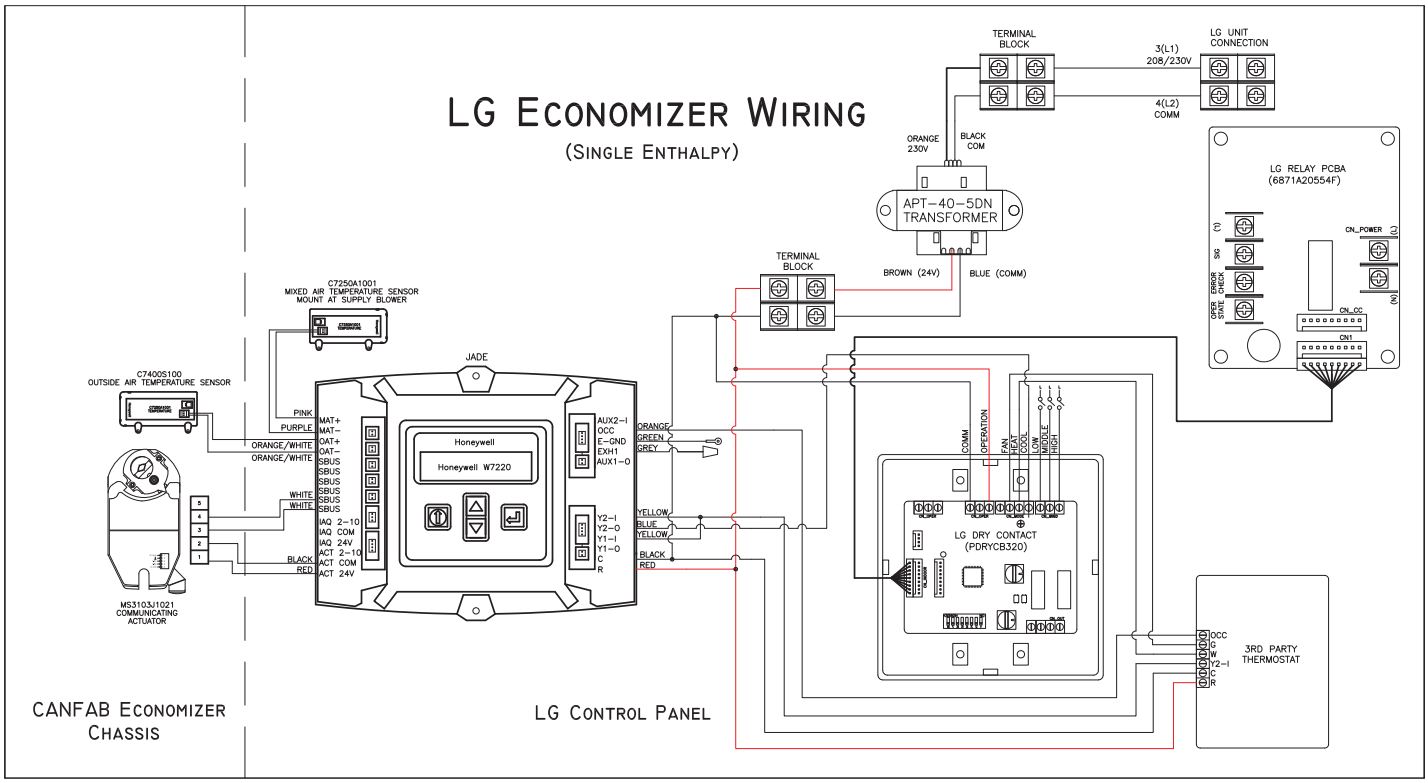
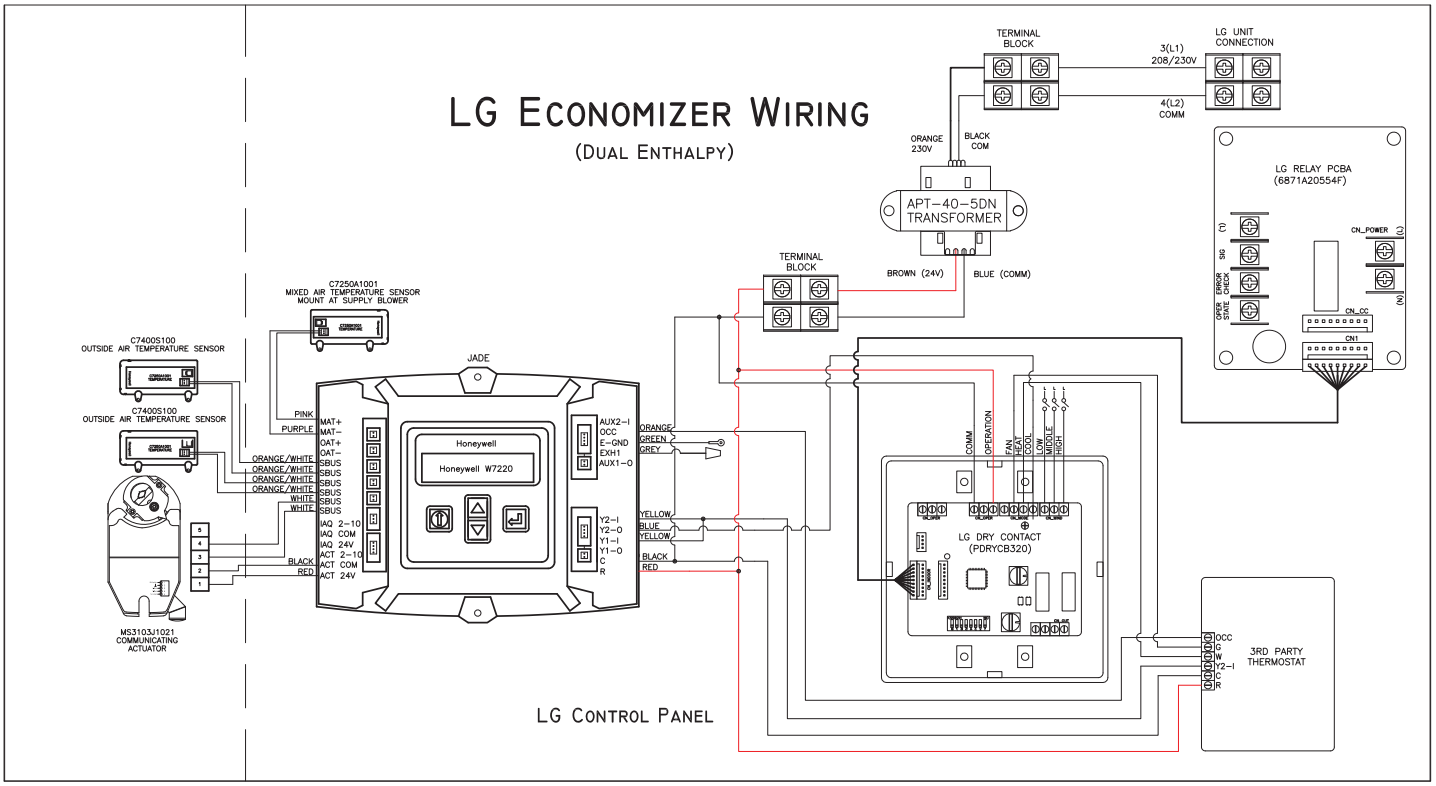


Figure 33: Economizer Wiring (Single Enthalpy) with PDRYCB320.



WIRING DIAGRAMS

Figure 34: Economizer Wiring (Dual Enthalpy) with PDRYCB320.



Wiring Harness

Figure 35: Economizer Wiring Harness Information.

Left

Yellow VCR Block: Connects to the communicating actuator.

Green VCR Block: Connects to the CO2 sensor (option).

Brown SB Block: Connects to the communicating actuator.

Orange OA Block: Connects to the outside air temperature sensor.

Orange MA Block: Connects to the mixed are temperature sensor mounted at supply blower.

Right

Blue Block: Connects to the Honeywell Relay and LG Dry Contact.

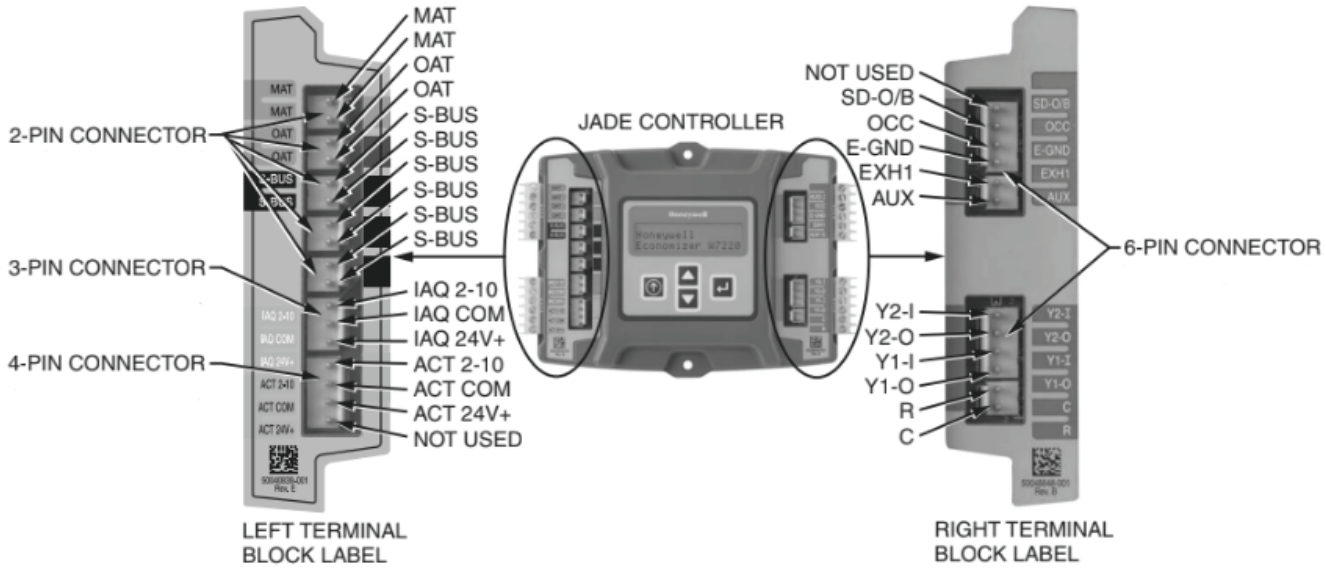
Grey Block: Connects to the LG Dry Contact.

The images above show the color of wires that correspond to the location on the Honeywell controller.

WIRING HARNESS

Wiring Harness, continued.

Figure 36: OEM Wiring Harness (Refer to previous wiring diagrams for detailed application wiring).



Single Outside Air Enthalpy Sensor

When the enthalpy sensor's OA temperature, enthalpy and dew point are below the respective setpoints, the outside air can be used for free-cooling. When any of these is above the setpoint, free-cooling will not be available. Figure 37 shows the enthalpy boundaries in the W7220 JADE controller. There are (5) enthalpy boundaries (setpoints ES1 thru ES5), which are defined by dry bulb temperature, enthalpy, and dew point. ES3 is the default setting. Table 4 shows the High Limit Curves for each setting.

Note:

To use the (C7400S) sensor for outside air sensor, the DIP switches on the sensor must be set to OFF-OFF-OFF. See Table 5.

Figure 37: Enthalpy Curve Boundaries.

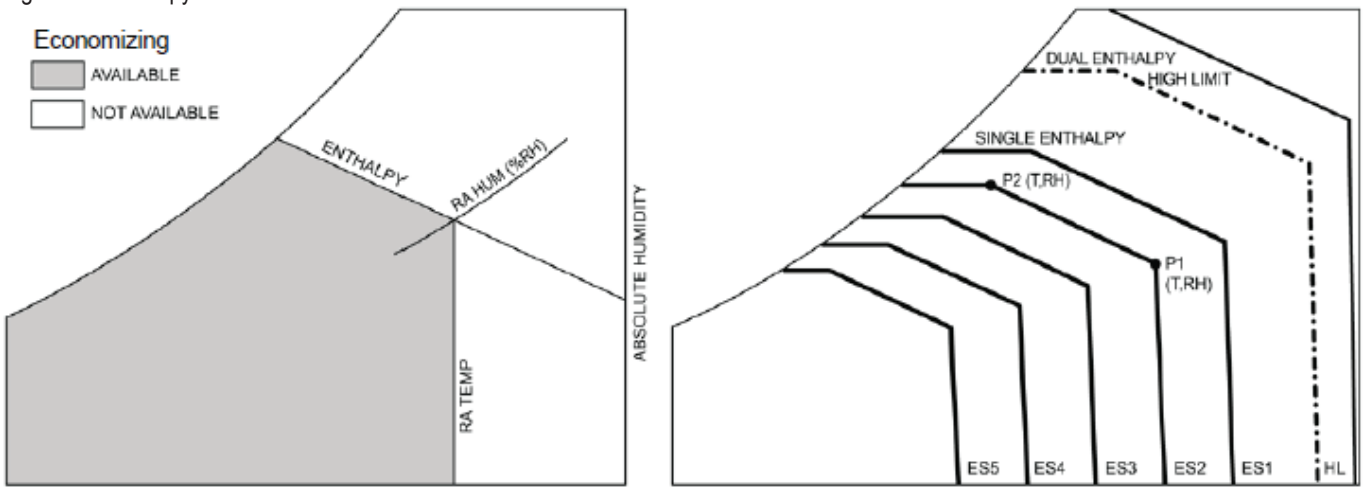


Table 4: Single Enthalpy and Dual Enthalpy High Limit Curves.

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	60	28	80	36.8	66.3	80.1
ES2	75	57	26.0	75	39.6	63.3	80.0
ES3	70	54	34.0	70	42.3	59.7	81.4
ES4	65	51	22.0	60	46.9	51.3	88.5
ES5	60	48	20.0	60	46.9	51.3	88.5
HL	86	66	32.4	86	38.9	72.4	80.3

Figure 38: (7400S) Dimensional, Connection and Switching Information.

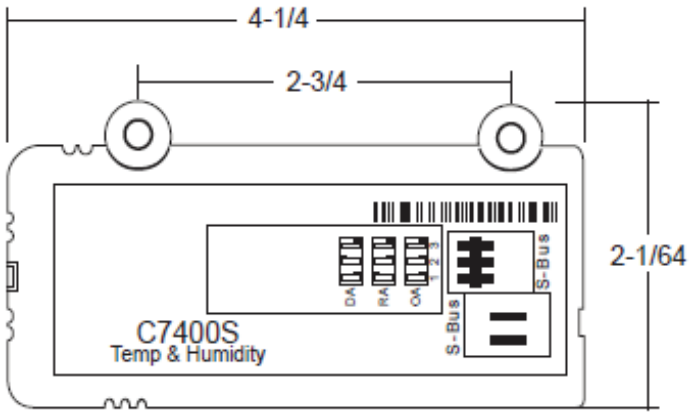


Table 5: (7400S) Sensor DIP Switch Settings.

Use	DIP Switch Positions For Switches 1, 2, and 3		
	1	2	3
DA	OFF	ON	OFF
RA	ON	OFF	OFF
OA	OFF	OFF	OFF

DA – Discharge Air (Not used on economizer)
RA – Return Air
OA – Outside Air
Default Setting = OFF – OFF – OFF

INSTALLING DIFFERENTIAL RETURN AIR SENSOR

Installing Differential Return Air Sensor

When using the differential return enthalpy or dry bulb temperature option, differential return sensor must be field mounted in the system's return duct work. In addition to using the sensor (Honeywell C7400S) for a single enthalpy sensor, it can also be used as a differential return enthalpy or dry bulb sensor. Figure 37 shows the dual enthalpy boundaries in the W7220 JADE controller. With dual enthalpy The HIGH LIMIT boundary is ES1 when there are no stages of mechanical cooling energized and HL (high limit) when a compressor stage is energized. Table 4 shows the High Limit Curves for each setting.

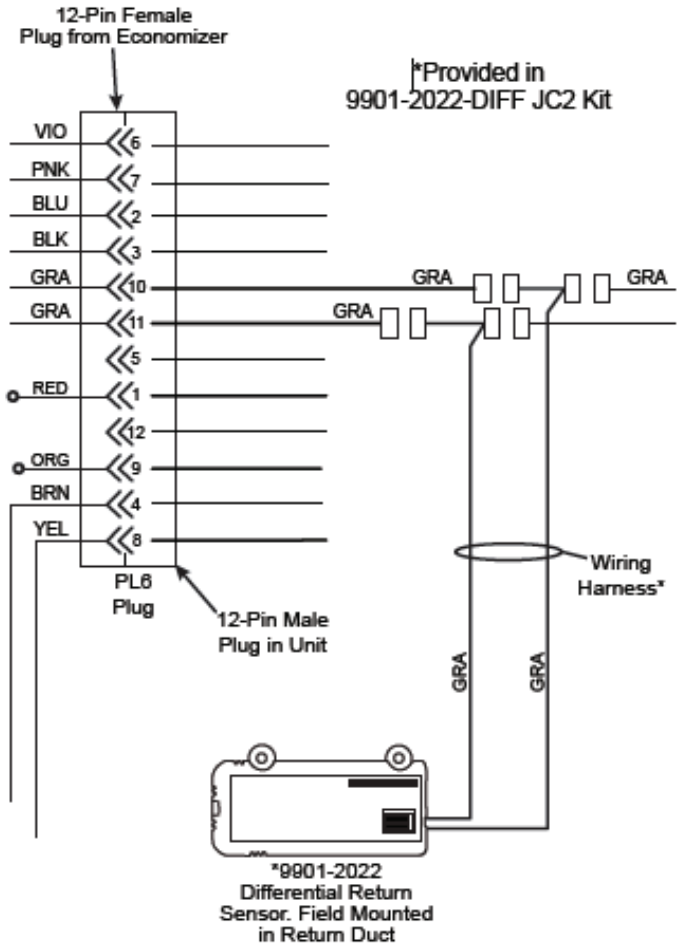
Note:

To use the differential return air sensor, the DIP switches on the sensor must be set to ON-OFF-OFF. See Table 5.

Note:

See Table 6 for California Title 24 setting requirements by region.

Figure 39: Wiring the Differential Return Air Sensor.



California's Title 24 High Temperature Limit Settings

California's Title 24 code requires a high temperature limit setting for all dry bulb outside air economizer change over. The temperatures vary by the region within California. See Table 6 for high limit settings.

Table 6: California Title 24 Regional High Limit Dry Bulb Temperature Settings.

Device Type*	Climate Zones	Required High Limit (Economizer Off When):
Fixed Dry Bulb	1, 3, 5, 11-16	OAT Exceeds 75°F
	2, 4, 10	OAT Exceeds 73°F
	6, 8, 9	OAT Exceeds 71°F
	7	OAT Exceeds 69°F
Differential Dry Bulb	1, 3, 5, 11-16	OAT Exceeds RA Temp.
	2, 4, 10	OAT Exceeds RA Temp. -2°F
	6, 8, 9	OAT Exceeds RA Temp. -4°F
	7	OAT Exceeds RA Temp. -4°F
Fixed Enthalpy** + Fixed Dry Bulb	All	OAT Exceeds 28 Btu/lb. of dry air or OAT Exceeds 75°F

*Only the high limit control devices listed are allowed to be used and at the set points listed. Others such as Dew Point, Fixed Enthalpy, Electronic Enthalpy, and Differential Enthalpy Controls, may not be used in any climate zone for compliance with Section 140.4(e) 1 unless approval for use is provided by the Energy Commission Executive Director.

**At altitudes substantially different than sea level, the Fixed Enthalpy limit value shall be set to the enthalpy value at 75°F and 50% relative humidity. As an example, at approximately 6,000 foot elevation, the fixed enthalpy limit is approximately 30.7 Btu/lb.

Remote (Downstairs) Monitoring of Controller's Fault Detection and Diagnostics

Many codes including IECC, Title 24, and ASHRAE 90.1 require that the economizer's faults be accessible by operating or service personal, or annunciated locally on zone thermostat. To setup remote monitoring on the controller, under SYSTEM SETUP, AUX1-OUT must be set to SYS.

The latest versions of Honeywell's TH8321WF or TH8321R thermostats are options for meeting this requirement. Figure 40 shows an example of the thermostat wiring to the JADE controller. Follow instructions provided with Honeywell thermostat.

Another option that is acceptable to some codes is an annunciator light visible by service personnel. See Figure 41 for typical wiring to the JADE controller. Refer to codes for proper labeling of light.

Figure 40: Thermostat Wired for Remote FDD.

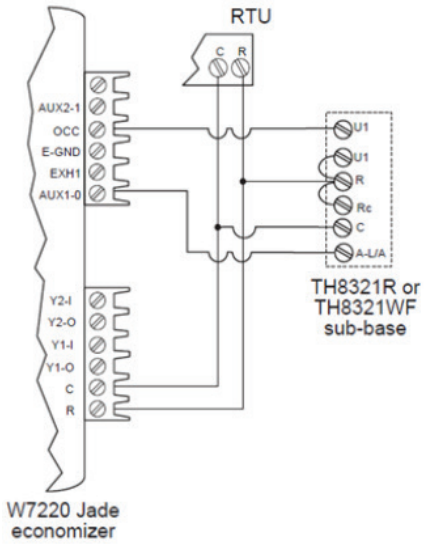
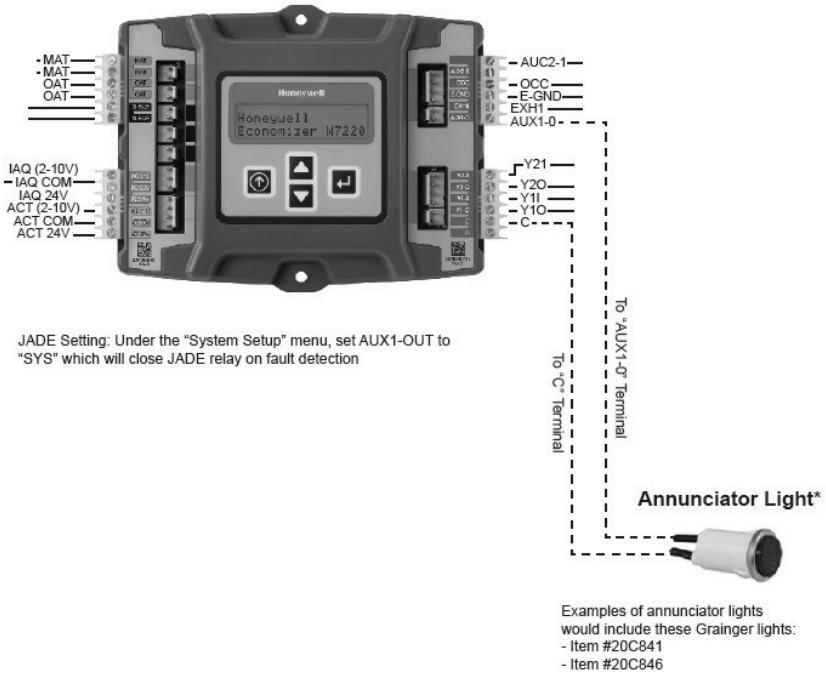


Figure 41: Annunciator Light for Remote FDD.



ECONOMIZER CONTROLLER

General Information

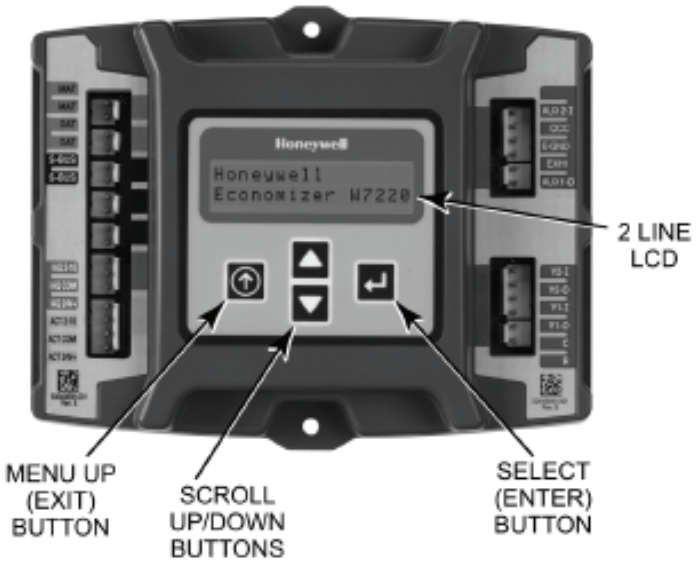
W7220 Economizer Controller

The economizer controller used on electro-mechanical units is a Honeywell W7220, which is to be located in the RTU base unit's Control Box. See the Installation Instruction for your base unit for the location of the Control Box access panel.

The W7220 controller provides the following:

- Two-line LCD interface screen for setup, configuration and trouble-shooting.
- On-board fault detection and diagnostics.
- Sensor failure loss of communications identification.
- Automatic sensor detection.
- Capabilities for use with multiple-speed indoor fan systems.

Figure 42: W7220 Controller.



User Interface

The user interface consists of an LCD display and a 4- button keypad on the front of the economizer controller.

Keypad

The four navigation buttons are used to scroll through the menus and menu items, select menu items, and change parameter and configuration settings. See Figure 42.

Using the Keypad with Menus

To use the keypad when working with menus:

- Press ▲ (Up arrow) button to move to previous menu.
- Press ▼ (Down arrow) button to move to next menu.
- Press ↵ (Enter) button to display first item in currently displayed menu.
- Press ⓘ (Menu Up/Exit) button 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:

1. Navigate to desired menu.
2. Press ↵ (Enter) button to display first item in the currently displayed menu.
3. Use ▲ and ▼ buttons to scroll to desired parameter.
4. Press ↵ (Enter) button to display value of the currently displayed item.
5. Press ▲ button to increase (change) the displayed parameter value.
6. Press ▼ button to decrease (change) the displayed parameter value.

Note:

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

7. Press ↵ (Enter) button to accept the displayed value and store it in nonvolatile RAM.
8. "CHANGE STORED" displays.
9. Press ↵ (Enter) button to return to current menu parameter.
10. Press ⓘ (Menu Up/Exit) button to return to previous menu.

Menu Structure

Table 11 illustrates the complete hierarchy of menus and parameters for the Economizer system.

The Menus in display order are:

- STATUS
- SETPOINTS
- SYSTEM SETUP
- ADVANCED SETUP
- CHECKOUT
- ALARMS

Programming the JADE W7220 Controller

The next several pages detail the different status displays, setpoints, setup, and alarms available on the controller. This list below and Table 4 summarizes the inputs required for a standard application with a single outside air sensor. NOTE: instead of setting the SETPOINTS you can use the defaults already set in the JADE controller – see default settings below. See Table 7 for summarized standard settings or for more detail see Table 8 – Menu Structure.

Setpoints

- MAT SET: This sets the mixed air temperature (MAT) setting. The controller has a default of 53°, but the range is anywhere from 38°F to 70°F.
- LOW T LOCK: This setting locks out the compressor (or mechanical cooling) at a given temperature. The default is 32°F, but the controller's range is from -45°F to +80°F.
- DRYBULB SET: if you have an economizer with a dry bulb outside air sensor you will see and set the DRYBULB SET. The default setting is 63 degrees F but the controller's range is 48°F to 80°F.
- ENTH CURVE: If there is a single enthalpy outside air sensor instead of a dry bulb, see and set the ENTH CURVE setting. There are five (5) setting options: ES1 thru ES5. Check the economizer literature for the limits for each of these settings. ES3 is the default setting.
- MIN POS: The minimum position allows for ventilation even when not in the free-cooling mode. If there is a single speed unit, there will be only one minimum position setting. The default is 2.8 volts, but the range is 2-10Vdc.

System Setup

- INSTALL: Allows setting of the current date. Use the keypad buttons to scroll to the correct date.
- EQUIPMENT: Always set to CONV even if the unit is a heat pump.
- AUX2 IN: Always set to W1.
- FAN TYPE: Set for either single or 2 speed. The default is 2 speed.
- AUX1 OUT: If remote Fault Detection and Diagnostic (FDD) monitoring is required select SYS.
- OCC: Occupancy, always set to INPUT

ECONOMIZER CONTROLLER

Menu Structure

Table 7: Standard JADE W7220 Controller Configuration.

Category	Controller Menu	Item Default	Set To:	Note
Setpoints	MAT SET	53°F	38° to 70°F	
	LOW T LOCK	32°F	-45° to +80°F	
	DRYBULB SET	63°F	48° to 80°F	Only displayed if using single DB OA sensor
	ENTH CURVE	ES3	ES1 to ES5	Only displayed if using a single enthalpy OA sensor
	MIN POS	2.8 Vdc	2 to 10 Vdc	Only displayed if set up for single speed unit
	MIN POS H	NA	NA	Only displayed if set up for 2 speed unit
	MIN POS L	NA	NA	Only displayed if set up for 2 speed unit
System Setup	INSTALL	1/1/2010	Current date	
	EQUIPMENT	CONV	CONV	Always set to CONV
	AUX2 I	W1*	W1	Always set to W1
	FAN TYPE	2 speed*	1 speed	Always set to 1 Speed
	AUX1 OUT	NONE	SYS	Set to SYS for remote FDD monitoring
	OCC I	INPUT	INPUT	Always set to INPUT

*Available on Firmware 1.15 June 2018 and later.

Note:

- *The default setting on the W7220 controller is for a "Fan Type" with 2 speeds. It should be changed to 1 speed. The setting under SYSTEM SETUP > FAN TYPE must be changed to 1 Speed.*
- *The default setting on the W7220 controller is for a "STG3 DLY" with 2.0h. It should be changed to OFF.*
- *The default setting on the W7220 controller is for a "MIN POS" with 4.4V. LG RTU can cover 4.4V or less.*
- *Table 8 illustrates the complete hierarchy. Menu parameters may be different depending on computer configuration.*

Table 8: Menu Structure.

Menu	Parameter	Parameter Default Value	Parameter Range and Increment	Notes
STATUS	ECON AVAIL	NO	YES/NO	ECONOMIZING AVAILABLE YES = economizing available; the system can use outside air for free cooling when required.
	ECONOMIZING	NO	YES/NO	ECONOMIZING ACTIVE YES = Outside air being used for 1st stage cooling. NO = Economizing not active.
	OCCUPIED	NO	YES/NO	OCCUPIED 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	COOL HEAT	HEAT PUMP MODE (Not available on 2-Speed configuration)
	COOL Y1—IN	OFF	ON/OFF	FIRST STAGE COOLING DEMAND (Y1---IN) Y1-I signal from space thermostat or unitary controller for Cooling Stage 1. ON = 24 Vac on terminal Y1-I OFF = 0 Vac on terminal Y1-I
	COOL Y1—OUT	OFF	ON/OFF	FIRST STAGE COOLING RELAY OUTPUT ON = 24 Vac on terminal Y1-O; Stage 1 mechanical cooling called on. OFF = 0 Vac on terminal Y1-O; no mechanical cooling.
	COOL Y2—IN	OFF	ON/OFF	SECOND STAGE COOLING DEMAND (Y2---IN) Y2-I signal from space thermostat or unitary controller for Cooling Stage 2. ON = 24 Vac on terminal Y2-I OFF = 0 Vac on terminal Y2-I
	COOL Y2—OUT	OFF	ON/OFF	SECOND STAGE COOLING RELAY OUTPUT ON = 24 Vac on terminal Y2-O; Stage 2 mechanical cooling called on. OFF = 0 Vac on terminal Y2-O; no Stage 2 mechanical cooling
	MA TEMP	nn°F (or °C)	0 to 140°F (-18 to +60°C)	MIXED AIR TEMPERATURE, Cooling Mode Displays value of measured mixed/cooled air from MAT sensor in fan section. Displays --.- if not connected, short or out-of-range.

Table 5: Menu Structure, continued.

Menu	Parameter	Parameter Default Value	Parameter Range and Increment	Notes
STATUS	DA TEMP	nn°F (or °C)	0 to 140°F (-18 to +60°C)	DISCHARGE AIR TEMPERATURE, after Heating section (Accessory sensor required) Displays when Discharge Air sensor is connected and displays measured discharge temperature. Displays ------ if sensor sends invalid value, if not connected, short or out-of-range
	OA TEMP	nn°F (or °C)	1 to 140°F (-18 to +60°C)	OUTSIDE AIR TEMPERATURE Displays measured value of outdoor air temperature. Displays ----- if sensor sends invalid value, if not connected, short or out-of-range
	OA HUM	nn%	0 to 100%	OUTSIDE AIR RELATIVE HUMIDITY Displays measured value of outdoor humidity from accessory OA enthalpy sensor.
	RA TEMP	nn°F (or °C)	0 to 140°F (-18 to +60°C)	RETURN AIR TEMPERATURE (Accessory sensor required) Displays measured value of return air temperature from return air sensor.
	RA HUM	nn%	0 to 100%	RETURN AIR RELATIVE HUMIDITY (Accessory enthalpy sensor required) Displays measured value of return air humidity from return air sensor.
	IN CO2	___ppm	0 to 2000 ppm	SPACE/RETURN AIR CO2 (CO2 sensor required, accessory or factory option) Displays value of measured CO2 from CO2 sensor. Invalid if not connected, short or out-of-range
	DCV STATUS	n/a	ON/OFF	DEMAND CONTROL VENTILATION STATUS (CO2 sensor required, accessory or factory option) Displays ON if IN CO2 value above setpoint DCV SET and OFF if below setpoint DCV SET.
	DAMPER OUT	2.0V	2.0 to 10.0V	Displays voltage output to the damper actuator. 0% = OA Damper fully closed 100%= OA Damper full open
	ACT POS	nn%	0 to 100%	Displays actual position of outdoor air damper actuator 2.0V = OA Damper fully closed 10.0V = OA Damper full open
	ACT COUNT	n/a	1 to 65535	Displays number of times actuator has cycled. 1 Cycle equals accrued 180° of actuator 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	EXHAUST STAGE 1 RELAY OUTPUT Output of EXH1 terminal: ON = relay closed OFF = relay open
	EXH2 OUT	OFF	ON/OFF	EXHAUST STAGE 2 RELAY OUTPUT Output of EXH2 terminal: ON = relay closed OFF = relay open
	ERV	OFF	ON/OFF	ENERGY RECOVERY UNIT RELAY OUTPUT Output of AUX terminal; displays only if AUX = ERV ON = relay closed OFF = relay open
	MECH COOL ON	0	0, 1, or 2	Displays stage of mechanical cooling that is active.
	FAN SPEED	n/a	LOW or HIGH	SUPPLY FAN SPEED Displays speed setting of fan on a 2-speed fan unit.
	W (HEAT ON)	n/a	ON/OFF	HEAT DEMAND STATUS Displays status of heat demand on a 2-speed fan unit.

ECONOMIZER CONTROLLER

Menu Structure

Table 5: Menu Structure, continued.

Menu	Parameter	Parameter Default Value	Parameter Range and Increment	Notes
SETPOINTS	MAT SET	53°F (12°C)	38° to 70°F (3° to 18°C); increment by 1	MIXED AIR SETPOINT Setpoint determines where the economizer will modulate the OA damper to maintain the mixed air temperature.
	LOW T LOCK	32°F (0°C)	-45° to +80°F (-43° to +27°C); increment by 1	COMPRESSOR LOW TEMPERATURE LOCKOUT Setpoint determines outdoor temperature when the mechanical cooling cannot be turned on.
	DRYBLB SET	63°F (17°C)	48° to 80°F (9° to 27°C); increment by 1	OA DRY BULB TEMPERATURE CHANGEOVER SETPOINT Setpoint determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.: at 63°F (17°C), unit will economize at 62°F (16.7°C) and below and not economize at 64°F (17.8°C) and above. There is a 2°F (1.1°C) deadband. DRYBULB SET is only displayed if the economizer has a single dry bulb sensor.
	DRYBLB DIF (Available firmware 1.15, June 2018 and later	0°F	0 to 6°F; increment by 2	Drybulb Differential will only show if using dual drybulb, i.e., when an outdoor air temperature sensor C7250 is attached to OAT terminals, and a C7400S enthalpy sensor is wired to S-Bus and configured for RAT (return air). Free cooling will be assumed whenever OA temp is at or below RAT minus this drybulb differential setting.
	ENTH CURVE	ES3	ES1, ES2, ES3, ES4, or ES5	ENTHALPY CHANGEOVER CURVE (Requires enthalpy sensor option) Enthalpy boundary “curves” for economizing using single enthalpy.
	DCV SET	1100 ppm	500 to 2000 ppm; increment by 100	DEMAND CONTROL VENTILATION SETPOINT Displays only if CO2 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	VENTILATION MINIMUM POSITION. Only displayed if controller is set for single speed unit under FANTYPE, and if DCV is NOT used.
	MIN POS L	3.2 V	2 to 10 Vdc	VENTILATION MINIMUM POSITION AT LOW SPEED Displays ONLY if used on 2 speed units and CO2 sensor is NOT used.
	MIN POS H	2.8 V	2 to 10 Vdc	VENTILATION MINIMUM POSITION AT HIGH SPEED Displays ONLY if used on 2 speed units and CO2 sensor is NOT used.
	VENTMAX L	2.8 V	2 to 10 Vdc	DCV MAXIMUM DAMPER POSITION AT LOW SPEED (Requires CO2 sensor connected)
	VENTMAX H	4.4 V	2 to 10 Vdc	DCV MAXIMUM DAMPER POSITION AT HIGH SPEED (Requires CO2 sensor connected)
	VENTMIN L	2.25 V	2 to 10 Vdc	DCV MINIMUM DAMPER POSITION AT LOW SPEED (Requires CO2 sensor connected)
	VENTMIN H	2.8 V	2 to 10 Vdc	DCV MINIMUM DAMPER POSITION AT HIGH SPEED (Requires CO2 sensor connected)
	ERV OAT SP	32°F (0°C)	0° to 50°F (-18° to +10°C); increment by 1	ENERGY RECOVERY VENTILATION UNIT OUTDOOR AIR TEMPERATURE SETPOINT Only displayed when AUX1 O = ERV
	EXH1 SET	50%	0 to 100%	Exhaust fan set point for single speed units. Based on OA Damper position to activate power exhaust.
	EXH1 L SET	65%	0 to 100%; increment by 1	EXHAUST FAN SETPOINT AT LOW SPEED (on 2 speed unit) Setpoint for OA damper position when exhaust fan is powered by the economizer
	EXH1 H SET	50%	0 to 100%; increment by 1	EXHAUST FAN SETPOINT AT HIGH SPEED (on 2 speed unit) Setpoint for OA damper position when exhaust fan is powered by the economizer
	EXH2 L SET	80%	0 to 100%; increment by 1	EXHAUST FAN STAGE 2 SETPOINT AT LOW SPEED Setpoint for OA damper position when exhaust fan 1 is powered by the *economizer. Only used when AUX1-O is set to EHX2.* ***Note:*** *Standard power exhaust kits have only 1 speed, therefore EXH2 is not applicable.*
	EXH2 H SET	75%	0 to 100%; increment by 1	EXHAUST FAN STAGE 2 SETPOINT AT HIGH SPEED Setpoint for OA damper position when exhaust fan 1 is powered by the *economizer. Only used when AUX1-O is set to EHX2.* ***Note:*** *Standard power exhaust kits have only 1 speed, therefore EXH2 is not applicable.*

Table 5: Menu Structure, continued.

Menu	Parameter	Parameter Default Value	Parameter Range and Increment	Notes
SYSTEM SETUP	INSTALL	01/10/01		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	Conventional or HP	Always set to CONV even for heat pump
	AUX2 I	W1	Always set to W1	Always set to W1
	FAN TYPE	2 speed	1 speed / 2 speed	Sets the economizer controller for operation of 1 speed or 2 speed indoor *fan system.* ***Note:*** *Defaults may vary on some models.*
	FAN CFM	5000cfm	100 to 15000 cfm; increment by 100	UNIT DESIGN AIRFLOW (CFM) Enter ONLY if using DCVCAL ENA = AUTO
	AUX1 OUT	NONE	NONE ERV EXH2 SYS	Select OUTPUT for AUX1 O relay NONE = not configured (output is not used) ERV = Energy Recovery Ventilator EXH2 = second damper position relay closure for second exhaust fan SYS = use output as an FDD remote alarm signal
	OCC	INPUT	INPUT or ALWAYS	Always set to INPUT
	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.
CHECKOUT	DAMPER VMIN.HS	n/a	n/a	Positions OA damper to VMIN High Speed position
	DAMPER VMAX .HS	n/a	n/a	Positions OA damper to VMAX High Speed position
	DAMPER OPEN	n/a	n/a	Positions OA damper to the full open position
	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 AUX1O	n/a	n/a	Energizes the AUX1O 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. • SYS --- 24 Vac out. Issues a system alarm
ALARMS	***Alarms display only when they are active. The menu title "ALARMS(_)" Includes the number of active alarms in parenthesis ( ).***			
	MA T SENS ERR	n/a	n/a	MIXED AIR TEMPERATURE SENSOR ERROR
	CO2 SENS ERR	n/a	n/a	CO2 SENSOR ERROR
	OA T SENS ERR	n/a	n/a	OUTSIDE AIR TEMPERATURE SENSOR ERROR OAT sensor connected at input terminals OAT
	OA SYLK SENS ERR	n/a	n/a	OUTSIDE AIR ENTHALPY SENSOR ERROR OAT sensor connected on S-bus
	DA T SENS ERR	n/a	n/a	DISCHARGE AIR TEMPERATURE SENSOR ERROR
	SYS ALARM	n/a	n/a	When AUX1-0 is set to SYS and there is any alarm (e.g., failed sensors, etc.), the AUX1-0 terminal provides 24 Vac out.
	ACT UNDER V	n/a	n/a	ACTUATOR VOLTAGE LOW Voltage received at actuator is below expected range
	ACT OVER V	n/a	n/a	ACTUATOR VOLTAGE HIGH Voltage received at actuator is above expected range
	ACT STALLED	n/a	n/a	ACTUATOR STALLED Actuator stopped before reaching commanded position

ECONOMIZER CONTROLLER

Menu Structure

Checkout Tests

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

Note:

See User Interface 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 desired parameters have been tested, press the ⓘ (Menu up) button to end the test.

Checkout test can be performed at any time during the operation of the system as a test that the system is operable.

⚠NOTE

Equipment Damage Hazard

Failure to follow can result in damage to equipment. Be sure to allow enough time for compressor startup and shutdown between checkout tests so that the compressors do not short cycle.

Setup and Configuration - W7220 Economizer Module Wiring

Use Figure 43, and Tables 9 and 10 to locate the wiring terminals for the economizer module.

Note:

The four terminal blocks are removable. Each terminal block can slide out, wire it, and then slide it back into place.

Figure 43: W7220 Economizer Module Terminal Block Connection Labels.

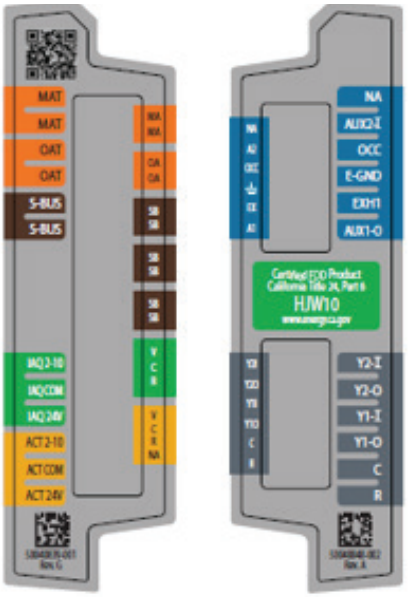


Table 9: Economizer Module – Left Hand Terminal Blocks.

Label	Type	Description
Top Left Terminal Block		
MAT	20k NTC and COM	Mixed Air Temperature Sensor (Polarity Insensitive Connections)
OAT	20k NTC and COM	Outdoor Air Temperature Sensor (Polarity Insensitive Connections)
S-BUS	S-BUS (Sylk BUS)	Enthalpy Control Sensor (Polarity Insensitive Connections)
Bottom Left Terminal Block		
IAQ 2-10	2-10 VDC	Air Quality Sensor Input (e.g. CO2 Sensor)
IAQ COM	COM	Air Quality Sensor Common
IAQ 24	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 24	24 VAC	Damper Actuator 24 VAC Source

W7220 Economizer Module Wiring, continued.

Table 10: Economizer Module – Right Hand Terminal Blocks.

Label	Type	Description
Top Right Terminal Block		
	N/A	The First Terminal Is Not Used
AUX2 I	24 VAC IN	Shut Down (SD) or Heat (W) Conventional Only and Heat Pump Changeover (O?B) in Heat Pump Mode
OCC	24 VAC IN	Occupied / Unoccupied Input
E -GND	E-GND	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		
Y 2-1	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 2 Input from Space Thermostat
Y1-O	24 VAC OUT	Y1 out - Cooling Stage 2 Output to Stage 2 Mechanical Cooling
C	COM	24 VAC Common
R	24 VAC	24 VAC Power (Hot)

Time-Out and Screen Saver

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

Operation

Cooling, Unit with Economizer

For occupied mode operation of Economizer, there must be a 24V signal at terminals R and OCC. Removing the signal at OCC places the Economizer control in unoccupied mode.

During occupied mode operation, indoor fan operation will be accompanied by economizer dampers moving to minimum position set point for ventilation. If indoor fan is off, dampers will close. During unoccupied mode operation, dampers will remain closed unless a cooling (by free cooling) or DCV demand is received.

When free cooling using outside air is not available, the unit cooling sequence will be controlled directly by the space thermostat.

Outside air damper position will be closed or minimum position as determined by occupancy mode and fan signal.

When free cooling is available as determined by the appropriate changeover command, a call for cooling (Y1 closes at the thermostat) will cause the economizer control to modulate the dampers open and closed to maintain the unit supply air temperature. Default supply air temperature is 53°F with a range of 38°F to 70°F.

When space temperature demand is satisfied (thermostat Y1 opens), dampers return to minimum damper position if indoor fan is running or fully closed if fan is off. Damper movement from full closed to full open (or vice versa) will take between 1-1/2 and 2-1/2 minutes.

Heating with Economizer

During occupied mode operation, indoor fan operation will be accompanied by economizer dampers moving to minimum position set point for ventilation. If indoor fan is off, dampers will close.

During unoccupied mode operation, dampers will remain closed unless a DCV demand is received. When the room temperature calls for heat (W1 closes), the heating controls are energized.

Troubleshooting

Power Loss (Outage or Brownout)

All set points and advanced settings are restored after any power loss or interruption as all settings are stored in the Economizer controller's non- volatile flash memory.

Note:

If the power falls below 18 VAC, the W7220 controller module assumes a power loss and the five (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:

When the unit is powered on, the module waits several seconds before checking for alarms. This allows time for all 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 five minutes, the alarms menu displays and cycles through the active alarms. Navigate to the alarms menu at any time. See Table 11 for the alarms menu.

Clearing Alarms

Once the alarm is identified and the cause removed (e.g. replaced faulty sensor), it 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 (Menu up/Exit) button to complete the action and return to the previous menu.

Note:

If the alarm still exists, it reappears within five (5) seconds.

Table 11: Operating Issues and Concerns.

Issue or Concern	Possible Cause and Solution
Outdoor temperature reading on the STATUS menu is not accurate	Check the sensor wiring: Enthalpy sensors are to be wired to the S-BUS terminals. Temperature sensors are to be wired to the OAT and MAT terminals.
If the enthalpy sensor drifts in accuracy over time, can it be recalibrated?	The sensor is not able to be recalibrated in the field. There is a menu item under the ADVANCED menu, however, where it is possible to input a limited off set in temperature and humidity for each sensor that is connected to the economizer.
Can I go back to factory defaults and start over?	The setpoints can be changed to the factory defaults under the SYSTEM SETUP menu.
Will I be able to see the LCD screen when it is in the unit?	The LCD screen has a backlight that is always illuminated.
What is a good setpoint for Mixed Air Temperature (MAT)?	The mixed air temperature is the temperature of air that you want to supply to the space. In a commercial building, this is between 50°F to 55°F (10°C to 13°C). The mixed air is the mixing of the return air and the outdoor air.
I am using enthalpy sensors. Why did the control ask me to input a dry bulb changeover temperature?	In the event the humidity sensor in the enthalpy sensor fails, the backup algorithm in the control is to default to the temperature sensor in the enthalpy sensor.
In checkout, the outdoor damper closes when I command it to open.	Check the actuator linkage or rotation. In the CHECKOUT mode, the outdoor damper should drive open to closed with the return air damper having the opposite effect.
How do I set my minimum position?	Minimum position is set using VENTMIN and VENTMAX setup in the SETPOINTS menu. VENTMIN is minimum ventilation required when using an occupancy sensor, and VENTMAX is minimum ventilation when not using an occupancy sensor for Demand Control Ventilation. VENMAX position is set the same as with the potentiometer on the analog economizer and is the output voltage to the damper actuator. The range is 2 VDC closed OA damper and 10 VDC open OA damper.
What if the damper does not completely close in the checkout position?	Check the damper linkage or hub to make sure the damper is able to closed completely.
How do I set the OCC?	There are two settings for the OCC setting: INPUT and ALWAYS. INPUT is from the space thermostat, if it has an occupancy output. ALWAYS is the unit in the occupied mode, if the economizer is powered (fan on).
Does the economizer save the program values if the unit loses power?	Yes, once the changes are stored in the controller, they will be stored until changed by the operator.
If the unit is left in checkout, how long will the unit stay in checkout mode without input?	The unit will remain in checkout for ten (10) minutes, then return to normal operation.

LG Electronics, U.S.A., Inc.
Air Conditioning Technologies
4300 North Point Parkway
Alpharetta, Georgia 30022
www.lghvac.com

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