Honeywell

Advanced RTU Retrofit with LCBS

TECHNICAL REFERENCE MANUAL

Energy costs are one of the largest building operating expenses, yet ASHRAE research shows that a rooftop air handling unit (RTU) retrofit can save up to 40% on energy costs, with very quick payback.

The Department of Energy reports that buildings consume more than 70% of the electricity produced in North America, and roughly half of that is used to circulate air and water. Honeywell VFDs maximize energy savings by optimizing the speed of fans and pumps in HVAC systems.

Many utilities now offer incentives when a RTU is upgraded with advanced rooftop solutions. These incentives encourage building owners and operators to retrofit their RTU's with advanced controls such as VFDs and economizers. These help save energy and the environment.

Incentives often have these characteristics:

- Integrated economizer functionality for free cooling, when available, instead of using mechanical equipment for all cooling.
- Controls that modulate the outdoor air damper control to maintain ASHRAE standard 62.1 under different fan speeds. CO2 is used as a trigger to control the outdoor air damper for optimum ventilation instead of holding the damper in one position during occupied periods. This is called demand control ventilation (DCV).
- VFD multispeed supply fan control that reduces speed for some modes of operation such as occupied ventilation mode or first stage of equipment. This saves significant energy over running the blower at 100% for all modes.

Incentives and codes may require some or all of these characteristics. Some may also require remote control, monitoring and alerting. Check with your utility and local government to learn what incentives are offered.

Honeywell's Advanced Rooftop Solution combines a LCBS system to control the equipment and economizer, with a VFD for fan speed control. A LGW1000 Gateway is used if remote monitoring and alerting are required.

38-00063-01

Two common advanced rooftop solutions are:

Option 1: LCBS for equipment and integrated economizer control with VFD multispeed fan operation. May also have DCV and remote access.

Option 2: LCBS for equipment control and VFD multispeed fan operation.

Either of these options can be connected to the LGW1000 Gateway for web-enabled control, monitoring and alarms. One Gateway can connect up to 30 RTU's to the Honeywell cloud system, providing secure remote access and control for the contractor and the building owner with a connection to computers, tablets, and smart-phones. It also provides remote monitoring and diagnostics, and real-time text or email alerts.

Table 1. Parts List

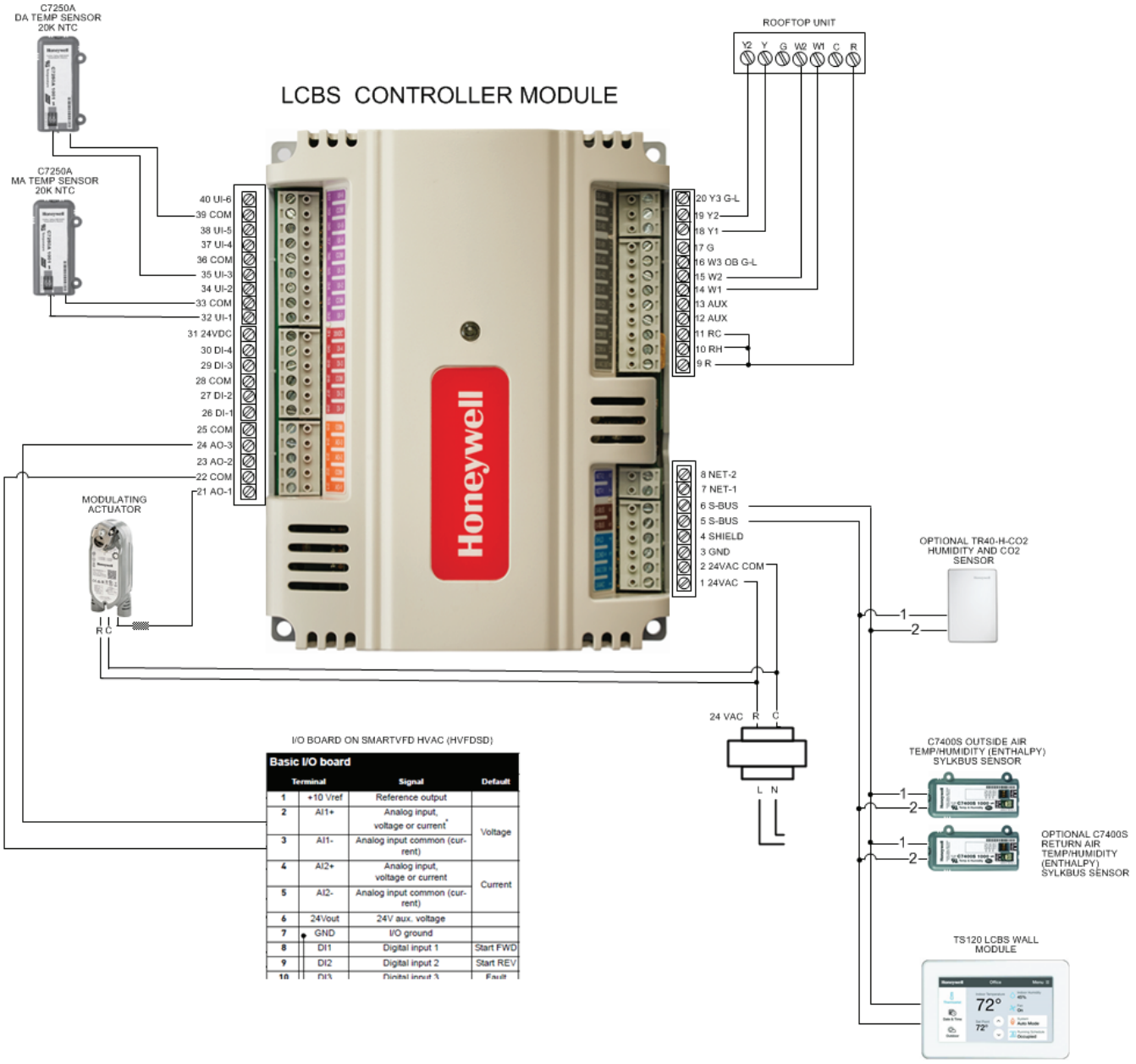
Wall Module and Controller			**Option 1**	**Option 2**
YCRL6438SR1000	TS120 Wall Module and equipment controller	Matched pair of products for basic LCBS system	Required	Required
LGW1000	LCBS Gateway	Web-enabled control, monitoring, and alarms. Required for Title 24 and some incentives	Optional	Optional
WPM-8000	Plug in transformer	To power Gateway. Alternatively use another 24 VAC source	Optional	Optional
Sensors				
C7400S1000	Sylk Enthalpy Sensor for Outdoor Temperature & Humidity	Differential dry bulb & enthalpy economizer	Optional	Not Required
C7400S1000	Sylk Enthalpy Sensor Return Air Temperature & Humidity	Differential dry bulb & enthalpy economizer	Optional	Not Required
C7250A1001	20k Mixed Air Temperature Sensor	Economizer	Required	Not Required
C7250A1001	20k Discharge Air Temperature Sensor	High limit	Optional	Optional
TR40-H-CO2	Wall Module for CO2	Demand control ventilation	Optional	Not Required
Actuators				
MS7103A1021	This or other suitable 0(2)-10 VDC Actuator	Economizer operation	Required	Not Required
Variable Frequency Drive				
HVFDSD or HVFD2	Use the cpq.Honeywell.com selection tool to select a VFD	Blower speed control	Required	Required

⚠ 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

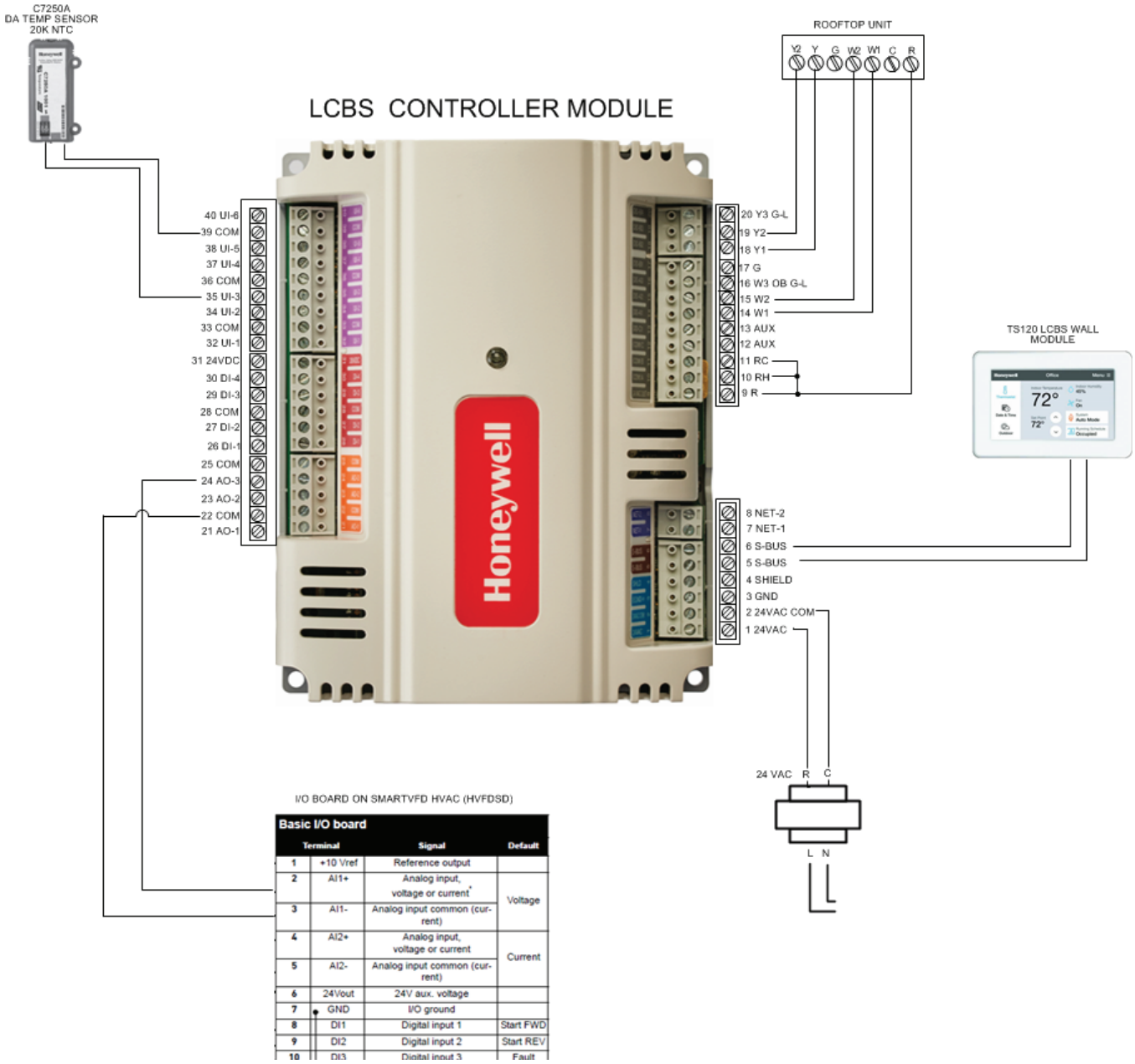
Equipment Damage Hazard.
Electrostatic discharge can short equipment circuitry.
Ensure that you are properly grounded before handling the unit.



I/O BOARD ON SMARTVFD HVAC (HVFDSD)

Basic I/O board			
Terminal		Signal	Default
1	+10 Vref	Reference output	
2	AI1+	Analog input, voltage or current	Voltage
3	AI1-	Analog input common (current)	
4	AI2+	Analog input, voltage or current	Current
5	AI2-	Analog input common (current)	
6	24Vout	24V aux. voltage	
7	GND	I/O ground	
8	DI1	Digital input 1	Start FWD
9	DI2	Digital input 2	Start REV
10	DI3	Digital input 3	Fault

Fig. 1. LCBS with Economizer and Multi-Speed Fan Control (option 1)



Basic I/O board

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6	24Vout	24V aux. voltage	
7	GND	I/O ground	
8	DI1	Digital input 1	Start FWD
9	DI2	Digital input 2	Start REV
10	DI3	Digital input 3	Fault

Fig. 2. LCBS with SmartVDF HVAC for Multi-Speed Fan Control (option 2)

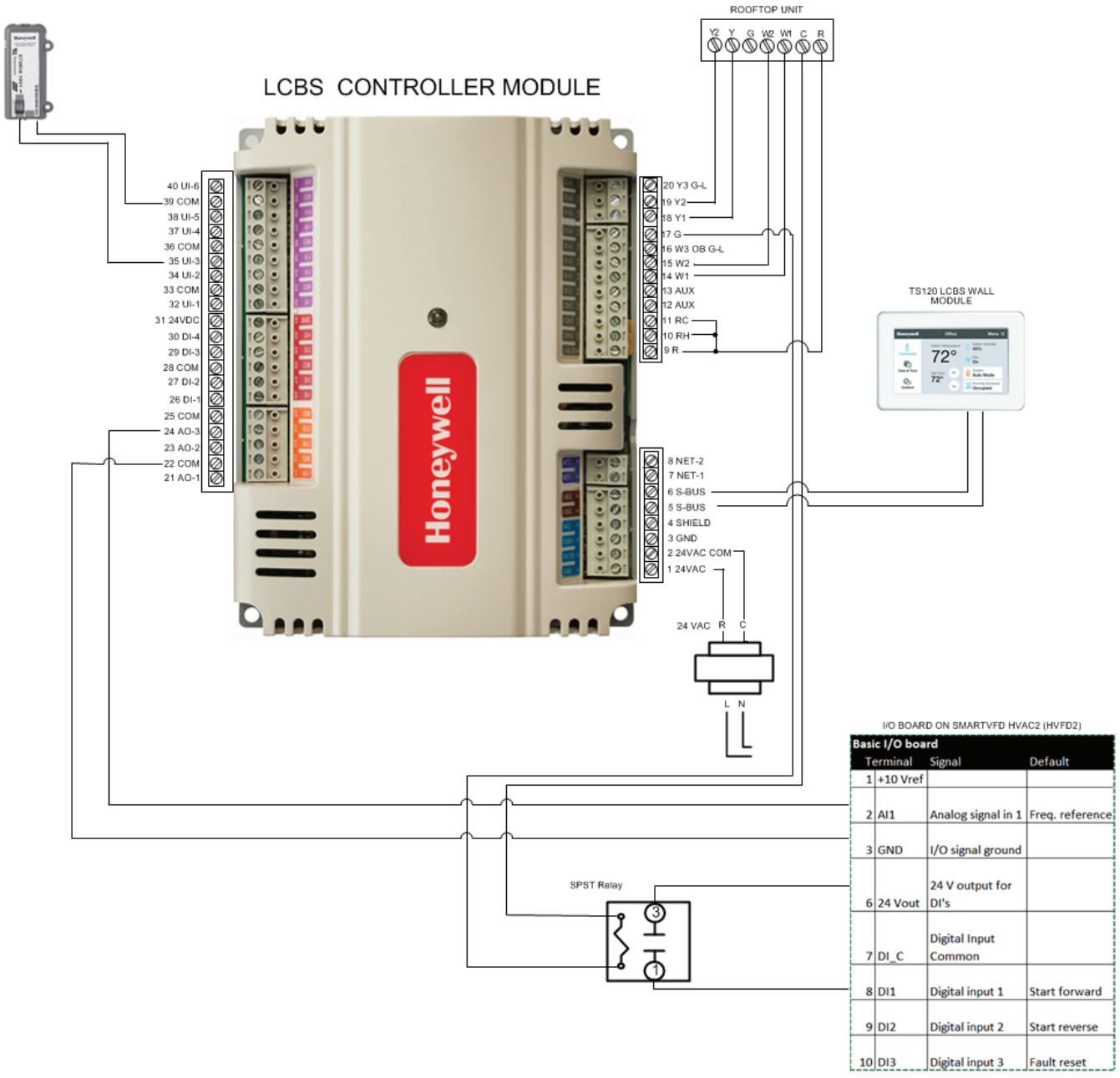

Fig. 3. LCBS with SmartVFD HVAC2 for Multi-Speed Fan Control (option 2)

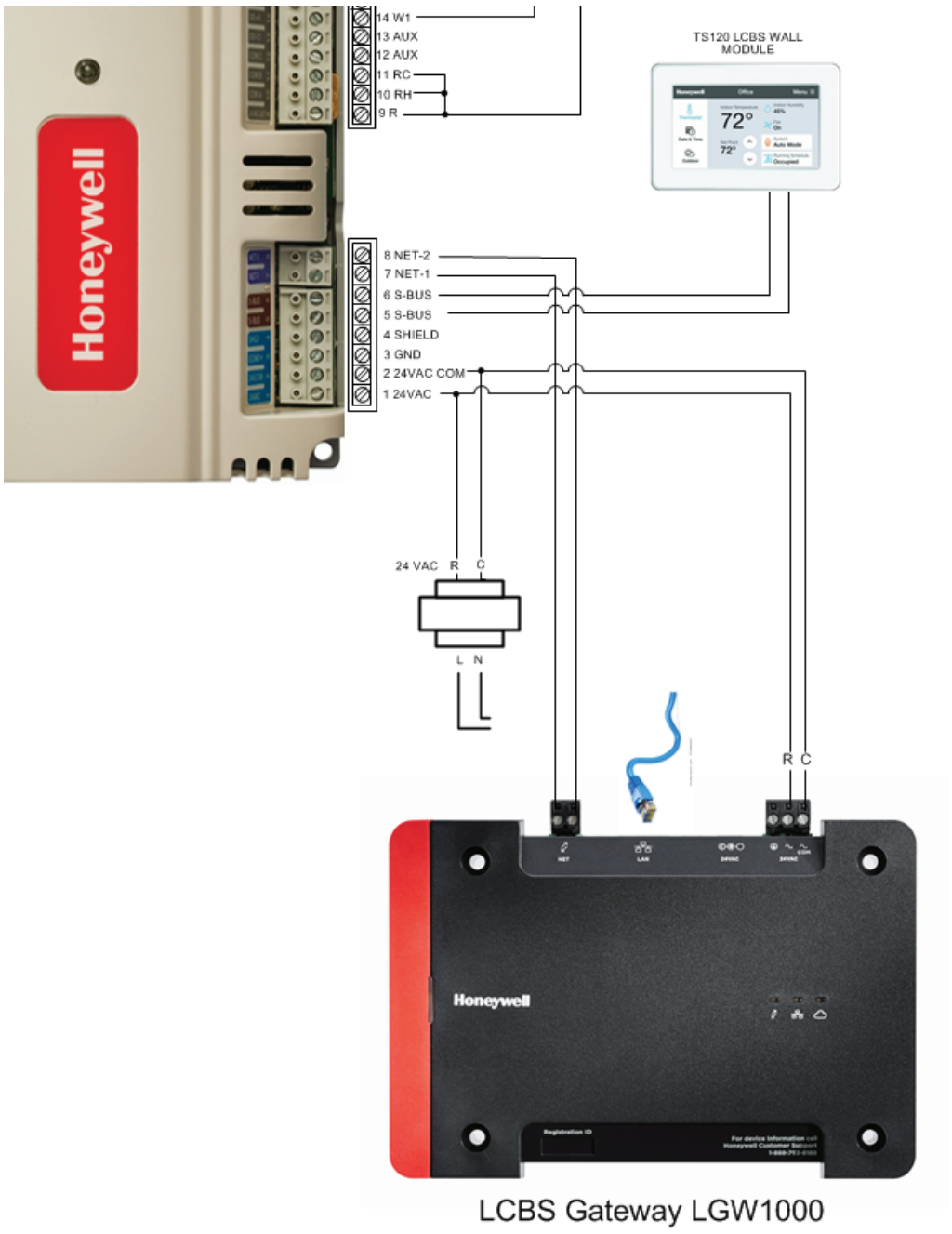

Fig. 4. LCBS with Gateway

INSTRUCTIONS

1. Select products from Table 1.
2. For all systems:
   a. Install the LCBS wall module and controller following the instructions included with YCRL6438SR1000.
   b. Complete the basic LCBS configuration.
3. For multi-speed fan control, see the **Multi-Speed Fan** section below.
4. For economizer operation, see the **Economizer** section below.
5. For demand control ventilation see the **Demand Control Ventilation** section below.
6. For web-enabled control, monitoring, and alarms:
   a. Install the LCBS Gateway.
   b. See LCBS and Gateway installation instructions and Fig. 4.

Contact the Honeywell LCBS Hotline at 1-888-793-8188 or at buildingsproductsupport@honeywell.com if you need assistance.

MULTI-SPEED FAN

1. Install SmartVFD following installation instructions
   a. Wire the VFD to the LCBS controller. For the HVAC, refer to Fig. 2. For the HVAC2, refer to Fig. 3.
2. On the TS120 wall module, select “Menu,” then “Configuration,” then “Advanced,” then follow these steps to configure A03 for multi-speed fan:
   a. Select “Equipment.”
   b. Select “Terminal Assignments.”
   c. Select “Output Assignments.”
   d. Select “A03 for Multispeed Fan” see Fig. 5.
   e. Then “Multi-speed Fan”. This configures the analog output that is wired to the 0-10 VDC input on the VFD, see Fig. 6.
   f. Then select “Done” Note that the configurations described in step 3 are not allowed unless this terminal assignment step is completed.

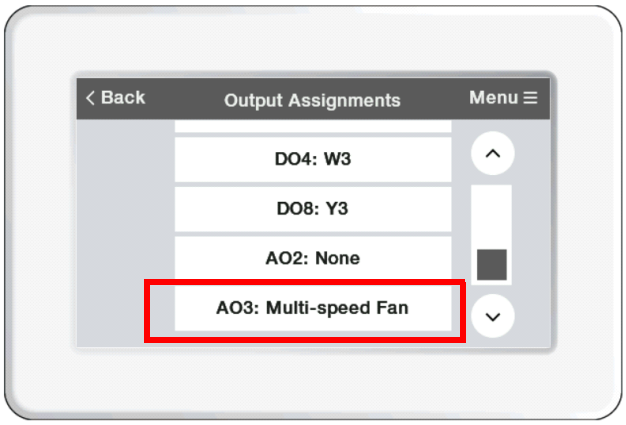

Fig. 5.

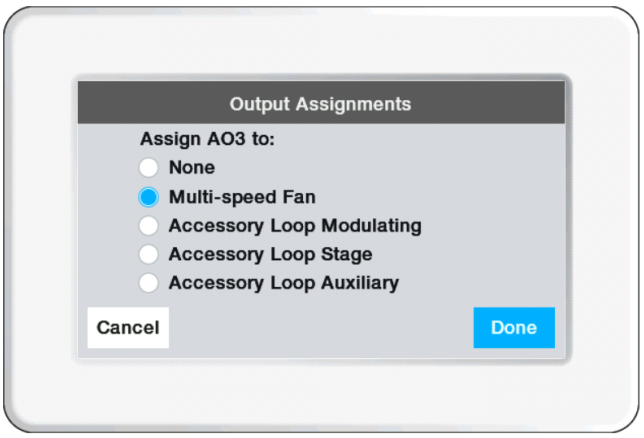

Fig. 6.

3. Next configure the blower speeds
   a. Select “Fan Options” from the equipment menu.
   b. Select “Type.”
   c. Select “Variable Speed”, then “Done.”
   d. Then select scroll down and select “Speeds.”
      (1) Use the up and down arrow buttons to set the desired speeds.
      (2) 3 speeds can be configured on this screen, press “Next” to configure three more for up to 6 speeds, see Fig. 7.
      (3) Speeds from 40% to 100% are allowed. If not selected, the default is 100%.
      (4) Step 4 is used to assign which of these speeds will be used for each equipment mode (heating, cooling, etc).
      (5) Select “Done” when finished.

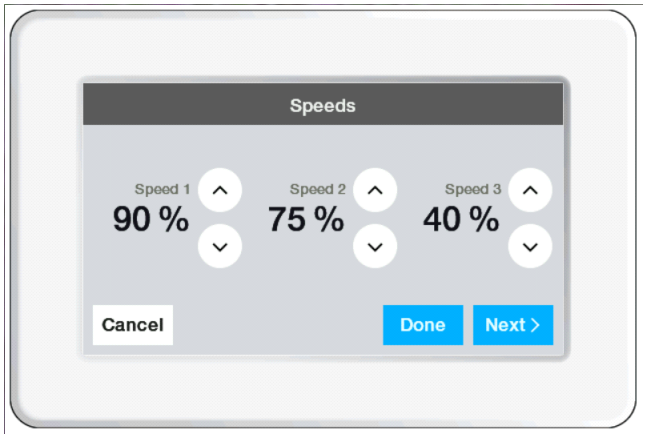

Fig. 7.

⚠ CAUTION

Refer to HVAC equipment manufacturer instructions when selecting blower speeds to avoid equipment and property damage.

4. Next assign blower speeds for each equipment mode.
   a. Select “Speed Assignment.”
      (1) This will open a menu with each equipment mode. Select the ones desired, then select the blower speed. In this example speed 3 (40%), from Fig. 7, is configured for ventilation, refer to Fig. 8 and Fig. 9.
      (2) Click “Done”, then configure the speed for each equipment mode, repeat as needed.
      (3) When done, then select “Menu”, then “Home.”

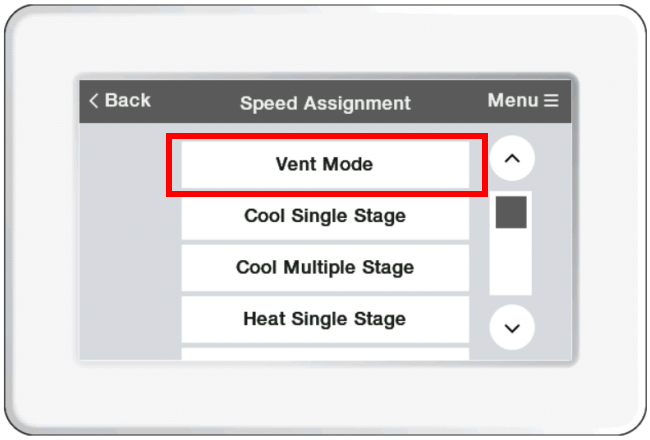

Fig. 8.

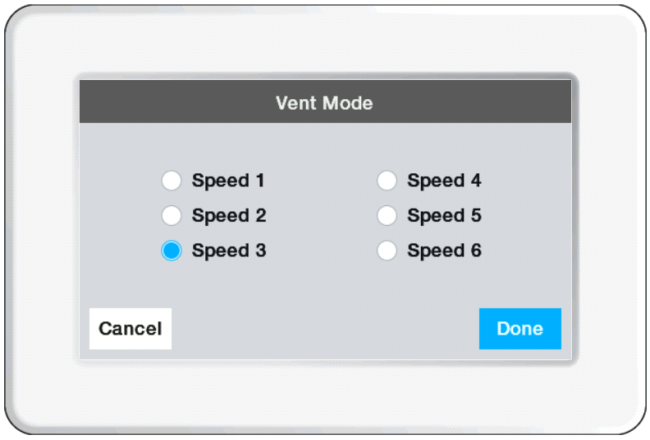

Fig. 9.

ECONOMIZER

1. Install sensors needed for dry bulb or enthalpy economizer control. Refer to Figure 1
2. Install and wire an appropriately sized actuator for economizer control of outdoor air and return air
   a. The output AO1 is pre-configured for 2-10 VDC economizer damper control
   b. Note that a separate 24VAC power supply is required to power the actuator. Note that the LCBS requires a modulating (2-10VDC) actuator.
3. On the TS120 wall module, select “Menu,” then “Configuration,” then “Advanced,” then follow these steps to configure the economizer control:
   a. Select “Economizer”
   b. Select “Type”
   c. Select “Modulating Economizer,” refer to Fig. 10.
      (1) Note that “External/Packaged Economizer” selection refers to a separate economizer such as the Jade W7220 or other stand-a-lone economizer.
      (2) Select “Done.”
   d. Select “Operation.”
      (1) Select the economizer functionality needed for your application, refer to Fig. 11.
      (2) Select “Done.”

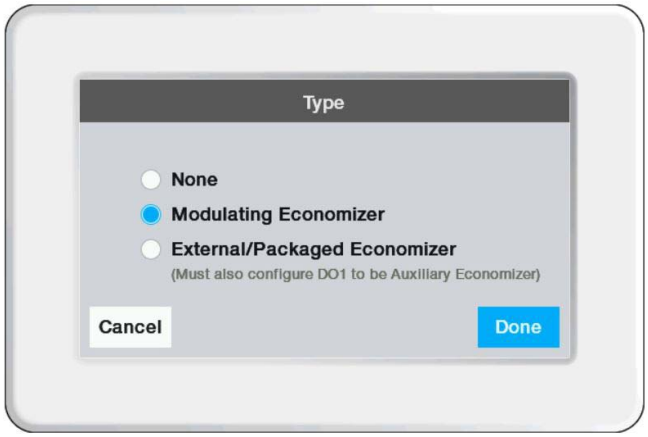

Fig. 10.

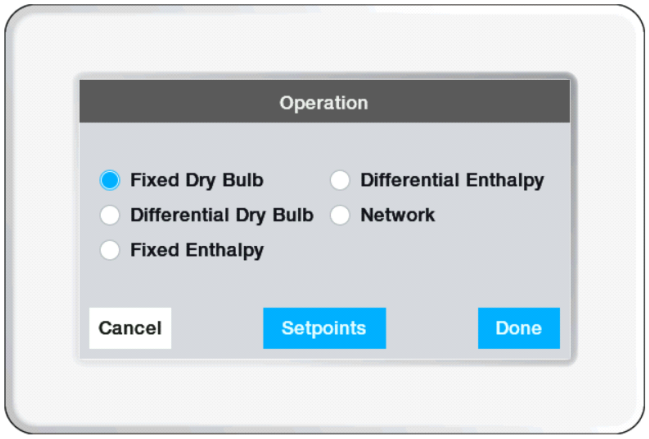

Fig. 11.

e. Select “Mixed Air Setpoints.”
(1) Use up and down arrow buttons to select setpoints, refer to Fig. 12.
(2) If desired, adjust throttling ranges and deadbands by selecting “Gains.”
(3) Select “Done.”

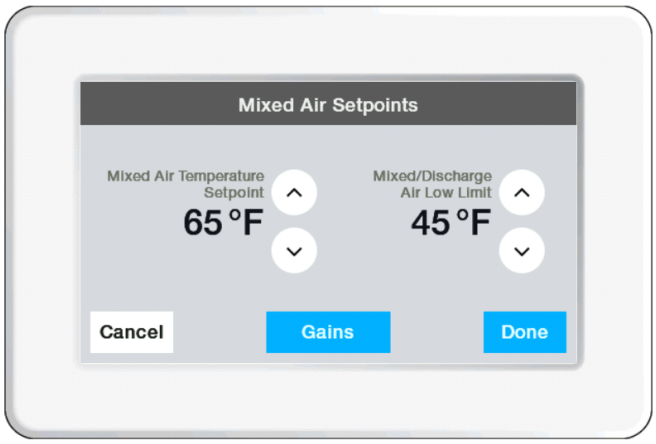

Fig. 12.

f. Select “Damper Positions” to set the minimum outdoor air damper position. If multi-speed fan is not configured, then this screen will have only one configuration called “Minimum Position.”
(1) Use up and down arrow buttons to select outdoor damper positions, refer to Fig. 13.
(2) Select “Done.”

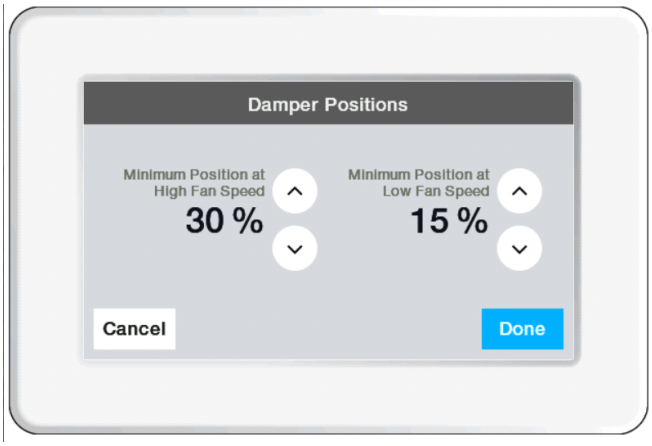

Fig. 13.

DEMAND CONTROL VENTILATION

1. To configure Demand Control Ventilation install a CO2 sensor such as the one listed in Table 1 and shown in Fig. 1.
2. Select“Menu” on the TS120 wall module, then “Configuration,” then “Advanced,” then follow these steps:
   a. Select “Demand Control Ventilation.”
   b. Select “Type.”
   c. Select “Enable DCV”, then “Done.”
   d. Select “Damper Positions” to set minimum damper positions, refer to Fig. 14.
   (1) If multi-speed fan control is configured this will set damper positions for fan at high speed.
   (2) Select “Next” to configure minimum damper positions at low speed fan.

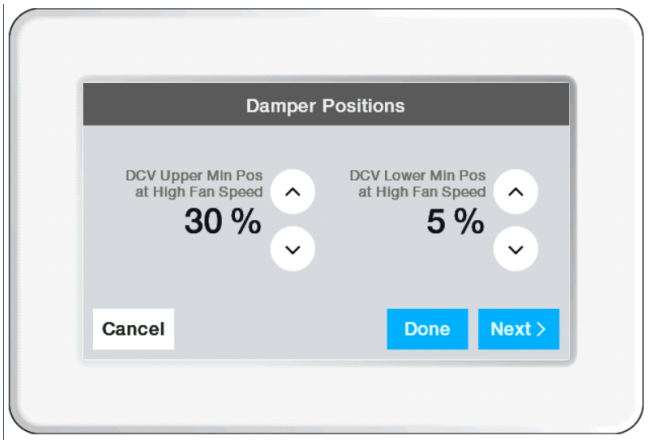

Fig. 14.

3. Lastly, Select “Indoor CO2 Setpoint.”
   a. Use the up and down arrows to select the CO2 ppm high limit, refer to Fig. 15.
   b. Select “Done.”

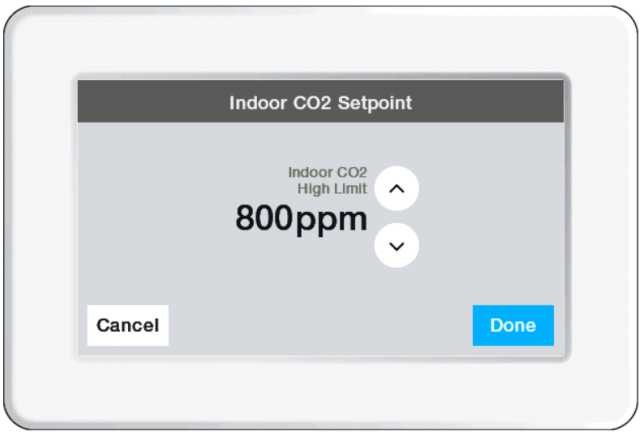

Fig. 15.

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