

Digital Room Sensor Technical Guide



Table of Contents

OVERVIEW.....	3
BASIC OPERATION.....	4
Sensor Operation.....	4
LED Operation.....	4
MOUNTING AND WIRING.....	5
Environmental Requirements.....	5
Indoor Reading Range.....	5
Outdoor Reading Range.....	5
Important Wiring Considerations.....	5
Mounting.....	5
SENSOR OPERATION.....	6
Main Sensor Display Screens.....	6
Temperature and Humidity Status Screen.....	6
Outside Air Temperature Humidity Status Screen.....	6
Unit Information Screen.....	6
Setpoint Adjust Screen.....	6
TROUBLESHOOTING.....	7
Temperature Sensor Testing for OE217-00.....	7
APPENDIX.....	8
Sensor Configuration and Test Screens.....	8
Sensor Configuration & Test Screen.....	8
Pixel Test Screen.....	8
Sensor Info & LED Test Screen.....	8
LCD Backlight Test Screens.....	9
Thermistor Averaging Screen.....	9
Display Options - Temperature/Setpoint.....	9
Connecting to VAV/Zone Controller & VCM-X Controller.....	10
Connecting a Remote Sensor.....	11



www.orioncontrols.com

WattMaster Controls Inc.
8500 NW River Park Drive · Parkville, MO 64152
Toll Free Phone: 866-918-1100
PH: (816) 505-1100 · FAX: (816) 505-1101 · E-mail: mail@wattmaster.com
Visit our web site at www.orioncontrols.com

AAON® is a registered trademark of AAON, Inc., Tulsa, OK.
WattMaster Controls, Inc. assumes no responsibility for errors or omissions.
This document is subject to change without notice.
Form: OR-DRS-TGD-01E Copyright January 2012 WattMaster Controls, Inc.

Overview

The OE217 series of Digital Room Sensors are used to sense Space Temperature only or Space Temperature & Space Humidity. See **Figure 1**. The OE217-00 model is the Space Temperature Sensor only model and can be used with the VCM-X Controller (OE332-23-VCMX) and VAV/Zone Controller (OE324-02). The OE217-01 is a combination Space Temperature & Space Humidity Sensor model and can only be used with the VCM-X Controller.

The sensor provides the following useful functions:

- Provides 112 x 64 monochrome Graphical LCD display with LED backlight
- Displays the Current Space Temperature or Cooling/Heating Setpoint on the *Main Display Screen*
- Displays Outdoor Air Temperature (if controller is configured with OA Temperature Sensor)
- Displays the Current Space Humidity (OE217-01 Model Only)
- Displays Outdoor Air Relative Humidity (OE217-01 Model if controller is configured with OA Humidity Sensor)

- Displays the Current Zone Setpoint Temperature
- Equipped with Push Buttons for changing the Zone Setpoint Temperature
- Equipped with an Override Button for forcing the VAV/Zone Controller or VCM-X Controller into Occupied Operation from Unoccupied Operation
- Provides graphics to indicate the Mode of Operation
- Provides LEDs to indicate Schedule Override, Button Push, and Alarms
- Can display Temperature reading from a Remote Sensor (see **Figure 19** on page 11 for instructions)
- Can be used with the OE256-01 or OE256-02 CO₂ Sensor (see notes in **Figures 17** and **18** on page 10 for instructions)

Both sensors connect to the controllers using various lengths of TSDRSC modular cables connected between the controller and the sensor. The TSDRSC modular cables should not run in conduit with other AC line voltage wiring or with any conductors carrying highly inductive loads.

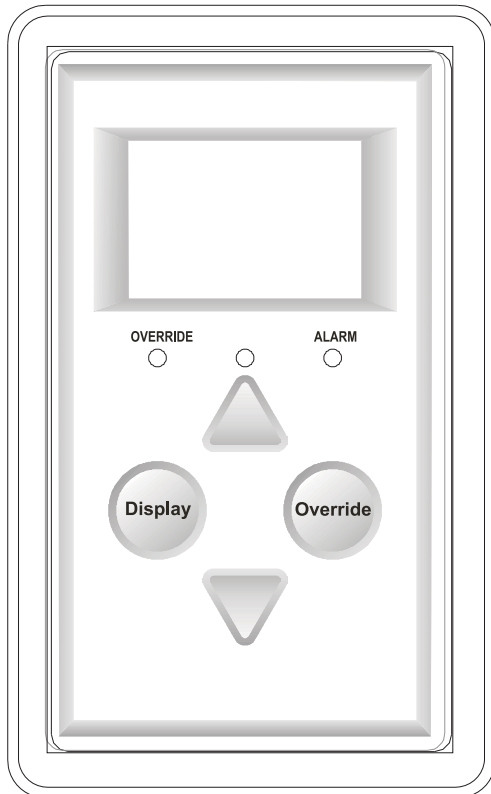


Figure 1: Digital Room Sensor

Basic Operation

Sensor Operation

When power is first applied to the OE217-00 Digital Room Sensor, the sensor will display the Current Room Temperature or the Cooling/Heating Setpoint and the current setting of the slide offset. The OE217-01 model will also display Relative Humidity.

NOTE: The sensor readings are not accurate until the controller that the sensor is connected to is done calibrating.

The sensor has 4 buttons—<Display>, <Override>, <Up>, and <Down>. You can also access certain functions by *touching* the area below the <Display> and <Override> buttons. The sensor has 3 LEDs—one to indicate an Override, one to indicate an Alarm, and one to indicate that a button has been pressed. See **Figure 2** for LED and Button Descriptions.

An icon for the current mode of operation will appear in the sensor display. The operation mode icons are a Snowflake for Cooling Mode, a Flame for Heating Mode, a Fan in motion for Vent Mode, and a Moon for Unoccupied Mode. When the unit is in Unoccupied Mode, the screen's background will turn dark. See **Figure 8** on page 6 for examples of operation modes.

LED Operation

Refer to **Figure 2** below for LED locations.

Alarm LED: The Alarm LED will blink when there is an alarm from the Controller.

Sense LED: The Sense LED will blink when the sensor gets a valid touch.

Override LED: The Override LED is inoperable when in Occupied Mode. In Unoccupied Mode, if you *touch* the <Override> button, the Override LED will blink, indicating an override request. The Controller will respond by sending the unit into override. The Override LED will then stay on for the duration of the Override. Any time the Unit is in Override, you can request to cancel the override by *touching* the <Override> button, and the Override LED will blink. The Unit will then cancel the override. The Override LED will then turn off.

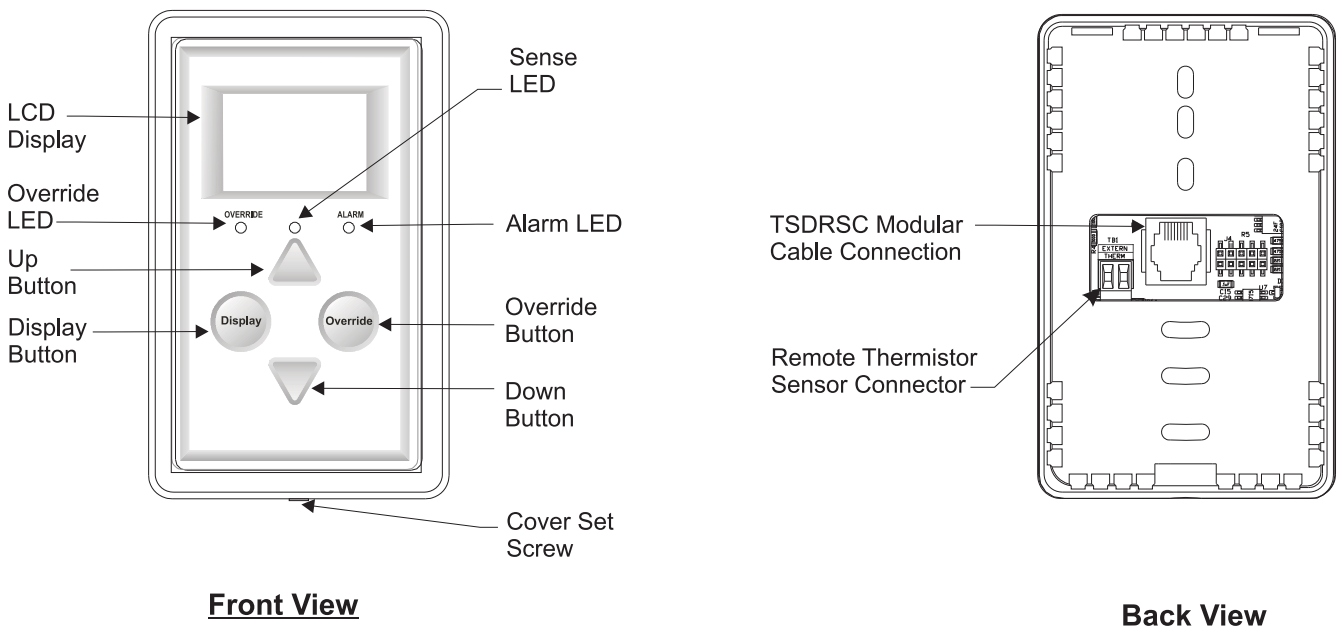


Figure 2: Digital Room Sensor Components

Environmental Requirements

The Digital Room Sensor needs to be installed in an environment that does not exceed a temperature greater than 150°F or less than -30°F and does not exceed 90% relative humidity levels (non-condensing).

Indoor Reading Range

The Digital Room Sensor’s Indoor Reading Range is 40°F to 120°F and 0-100% RH (RH is available on the OE217-01 Model). Its temperature reading accuracy is +/- .5°F, and its RH reading accuracy is +/-2%. Its sensor element is the integral communicating digital sensing device or external Type III Thermistor 10K Ohm @ 77°F.

Outdoor Reading Range

If your Digital Room Sensor is set up to read an Outdoor Air Temperature Sensor, any outdoor air temperature below -40°F will not appear on the Digital Room Sensor’s display.

Important Wiring Considerations

The OE217-00 and OE217-01 Space Sensors connect to the VCM-X Controller (OE332-23-VCMX) or VAV/Zone Controller (OE324-02) using various lengths of TSDRSC modular cables connected between the controller and the sensor. The TSDRSC modular cables should not run in conduit with other AC line voltage wiring or with any conductors carrying highly inductive loads. See **Figures 17** and **18** on page 10 for wiring.

Mounting

The Digital Room Sensor is designed to be mounted to a vertical 2” x 4” electrical box recessed in the wall. If the wall cannot be penetrated, a plastic surface mount box such as those made by Wiremold™ may be used to mount the sensor to the wall surface.

The Sensor is mounted by removing the front cover and fastening the housing base to the electrical box using the supplied (2) 6/32” x 1” machine screws. The modular cable is then plugged into the phone jack located on the circuit board that is mounted on the cover. The cover is then placed onto the housing base, and the Allen Screw on the bottom of the base is adjusted to hold the cover in place.

See **Figure 3** for Digital Room Sensor dimensions.

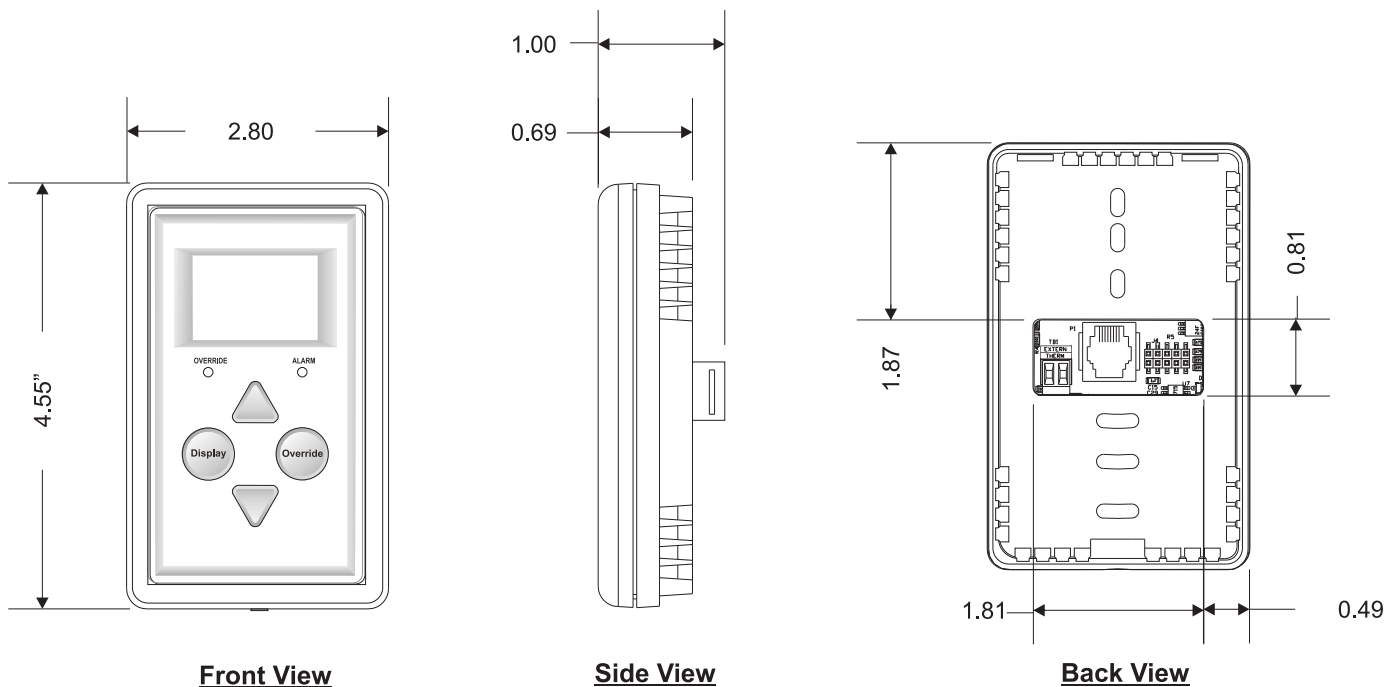


Figure 3: Digital Room Sensor Dimensions

Sensor Operation

Main Sensor Display Screens

There are 3 Main Sensor Display Screens. The first screen displays the Current Room Temperature or Cooling/Heating Setpoint, Operation Mode, Slide Offset, and RH (RH is available on the OE217-01 Model). The second screen displays the Outside Air Temperature and/or Humidity if Outdoor Air Temperature and/or Outdoor Air Humidity is being monitored. The third screen displays the unit information for the controller that the Digital Room Sensor is connected to.

Temperature and Humidity Status Screen

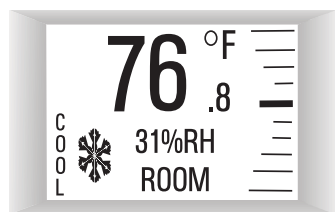


Figure 4: Main Display Screen

The *Main Display Screen* displays the current room temperature or Cooling/Heating Setpoint, the humidity in the room (RH is available on the OE217-01 Model), the current setting of the slide offset, and an icon for the current mode of operation once the controller it is connected to is done calibrating.

The different icons shown are a Snowflake for cooling mode, a Flame for heating mode, a Fan in motion for vent mode, and a Moon for unoccupied mode. When the unit is in unoccupied mode, the screen's background will turn dark. Refer to **Figure 8** for operation mode screen examples.

Outside Air Temperature Humidity Status Screen

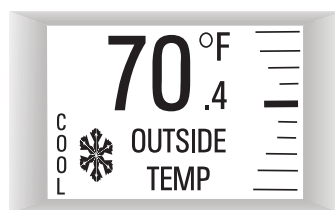


Figure 5: Outdoor Status Screen

If the connected controller is receiving an outdoor air temperature and/or humidity broadcast, *touching* <Display> will first bring up the *Outdoor Status Screen*.

Unit Information Screen

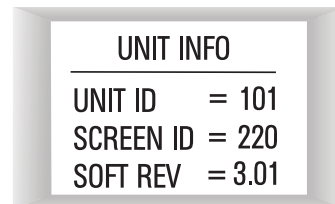


Figure 6: Unit Information Screen

Touching <Display> again will bring up the *Unit Information Screen* which contains the controller's address or ID number, screen ID, and software version of the controller connected to the sensor.

Setpoint Adjust Screen

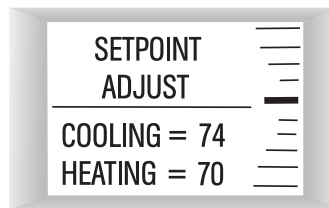
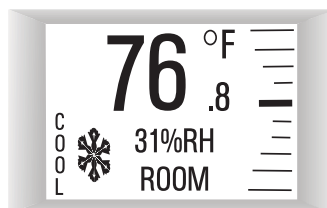


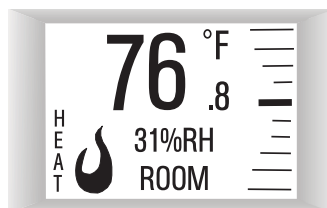
Figure 7: Setpoint Adjust Screen

Touching <△> or <▽> will display the *Setpoint Adjust Screen*. You can adjust the cooling and heating setpoints from this screen based on the VCM-X controller or VAV/Zone controller slide offset setpoint. For example, if the connected controller's Max Slide Offset Setpoint is set for five, you can adjust the setpoint up five degrees and down five degrees.

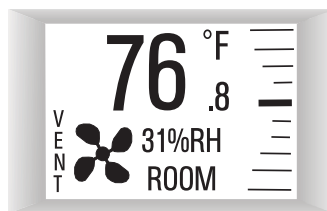
NOTE: If the VCM-X Controller or VAV/Zone Controller's slide offset setpoint is set to Zero, this screen will not appear when you *touch* <△> or <▽>.



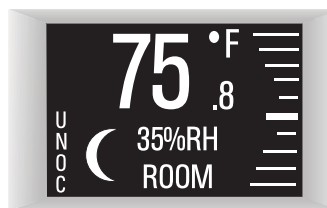
Cooling Mode with Snowflake Icon



Heating Mode with Flame Icon



Vent Mode with Fan in Motion Icon



Unoccupied Mode with Moon Icon

Figure 8: Operation Mode Screens

Temperature - Resistance - Voltage for Type III 10K Ohm Thermistor Sensors		
Temp (°F)	Resistance (Ohms)	Voltage @ Input (VDC)
-10	93333	2.98
-5	80531	2.94
0	69822	2.89
5	60552	2.83
10	52500	2.77
15	45902	2.71
20	40147	2.64
25	35165	2.57
30	30805	2.49
35	27140	2.41
40	23874	2.33
45	21094	2.24
50	18655	2.15
52	17799	2.11
54	16956	2.08
56	16164	2.04
58	15385	2.00
60	14681	1.96
62	14014	1.93
64	13382	1.89
66	12758	1.85
68	12191	1.81
69	11906	1.79
70	11652	1.78

Temperature - Resistance - Voltage for Type III 10K Ohm Thermistor Sensors		
Temp (°F)	Resistance (Ohms)	Voltage @ Input (VDC)
71	11379	1.76
72	11136	1.74
73	10878	1.72
74	10625	1.70
75	10398	1.68
76	10158	1.66
78	9711	1.63
80	9302	1.59
82	8893	1.55
84	8514	1.52
86	8153	1.48
88	7805	1.45
90	7472	1.41
95	6716	1.33
100	6047	1.24
105	5453	1.16
110	4923	1.09
115	4449	1.02
120	4030	.95
125	3656	.88
130	3317	.82
135	3015	.76
140	2743	.71
145	2502	.66
150	2288	.61

Table 1: Temperature/Resistance for Type III 10K Ohm Thermistor Sensors

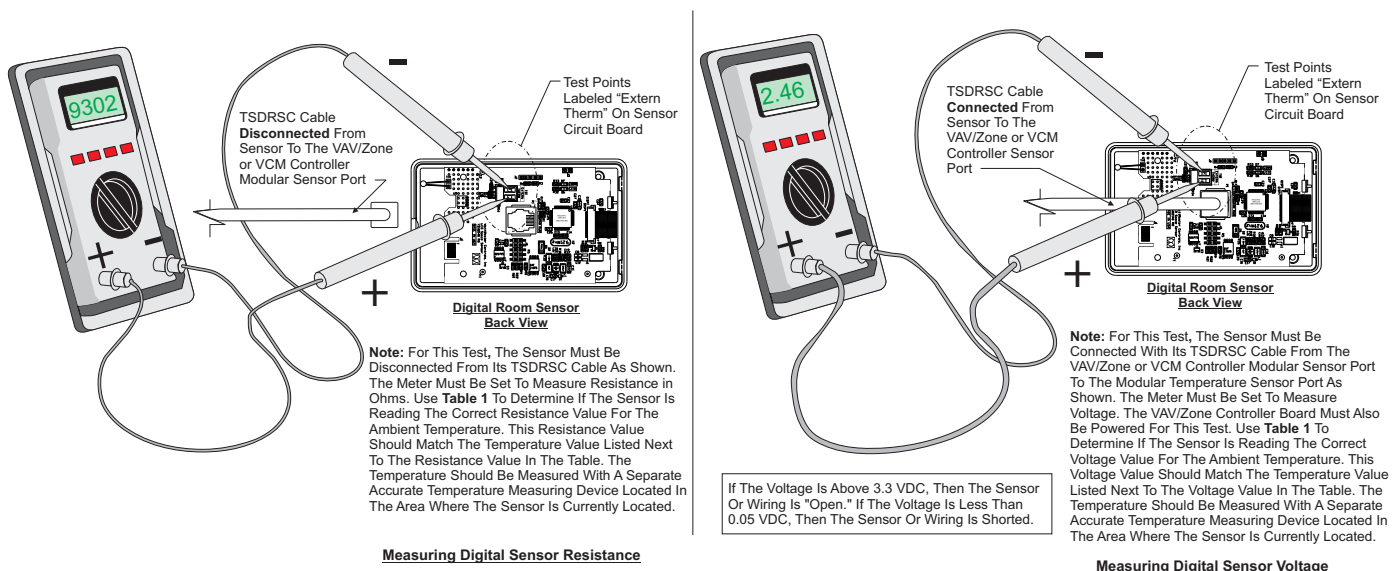


Figure 9: Temperature/Resistance/Voltage Testing

Appendix

Sensor Configuration and Test Screens

To access the *Sensor Configuration & Test Screens*, you first need to access the *Unit Information Screen* by touching <Display> while at the *Main Display Screen*.

NOTE: While in the *Sensor Configuration & Test Screens*, the <Display> button functions as an exit key to return to the previous screen or menu. After a few seconds, however, the sensor will automatically revert to the *Main Display Screen*. Refer to **Figure 10** when reading the instructions that follow.

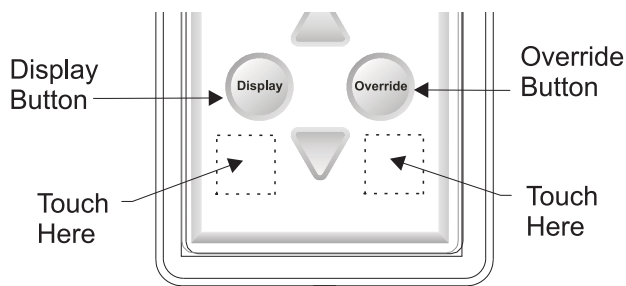


Figure 10: Digital Room Sensor Buttons

Sensor Configuration & Test Screen

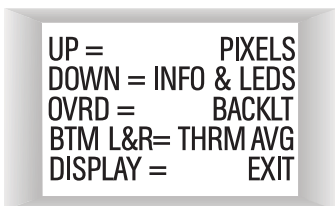


Figure 11: Sensor Configuration & Test Screen

While the *Unit Information Screen* is being displayed, you can enter the *Sensor Configuration & Test Screen* options by touching simultaneously below the <Display> and <Override> buttons. (See **Figure 10** which shows where to touch to access this option.)

Pixel Test Screen

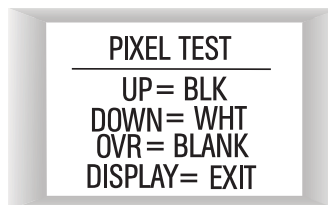


Figure 12: Sensor Info & LED Test Screen

To select the first option—**Pixels**—touch <△> while at the *Sensor Configuration & Test Screen* (**Figure 11**). The *Pixel Test Screen* tests the pixels of the LCD display, allowing you to make the screen white with black characters, black with white characters, or a black or white screen. To exit this screen, touch <Display>.

Sensor Info & LED Test Screen

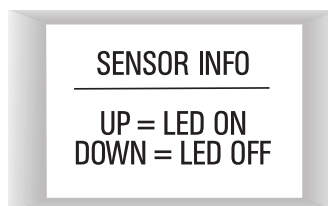


Figure 13: Sensor Info & LED Test Screen

To select the second option—**Info & LEDS**—touch <▽> while at the *Sensor Configuration & Test Screen* (**Figure 11**). The *Sensor Info & LED Test Screen* shows the version of software that the sensor is running and allows you to test the LEDs that are used on the controller. Touching <△> will turn the LEDs on and touching <▽> will turn the LEDs off. To exit this screen, touch <Display>.

LCD Backlight Test Screens

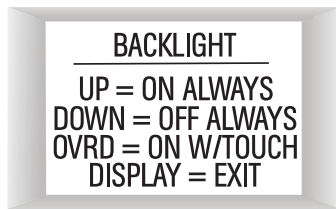


Figure 14: Backlight Test & Configuration Screen

To select the third option—**BACKLT**—touch <Override> while at the *Sensor Configuration & Test Screen* (Figure 11). This option allows you to control when the LCD backlight turns on and off. You can configure the backlight to stay on at all times, remain off at all times, or to come on when any button is touched on the sensor.

To exit this screen, touch <Display>.

Thermistor Averaging Screen

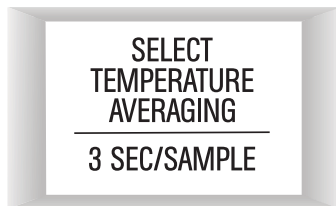


Figure 15: Temperature Averaging Screen

To select the fourth and final option—**THRM AVG**—, while at the *Sensor Configuration & Test Screen* (Figure 11), touch simultaneously below the <Display> and <Override> buttons. (See Figure 10 which shows where to touch to access this option.)

This option allows you to set the rate—from 1-15 seconds—at which the sensor takes a new temperature reading. Touch <△> to increase the number of seconds and touch <▽> to decrease the number of seconds.

To exit this screen, touch <Display>.

NOTE: The sensor takes the average of the last 10 readings based on the number that is entered in this screen. For example, if you want a 3-second sample, the sensor will take the average of the last 10 readings every 3 seconds over a 30-second span. Therefore, if you have your sensor next to an outside doorway, you would want to enter a higher number for your sample to give a more accurate reading for the room temperature in case the outside door is opened often.

Display Options - Temperature/Setpoint

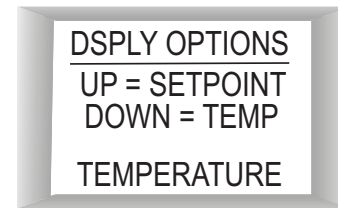


Figure 16: Address Screen

To access the *Display Options Screen*, while at the *Thermistor Averaging Screen*, (Figure 15), touch the <Override> button.

This option allows you to set the main screen display. Touch <△> to display the Cooling/Heating Setpoint on the *Main Display Screen*. Touch <▽> to display the current room temperature on the *Main Display Screen*. The default is temperature.

If the Setpoint option is chosen, when the unit is in the Cooling Mode, the Cooling Setpoint will appear on the *Main Display Screen*. When the unit is in the Heating Mode, the Heating Setpoint will appear on the *Main Display Screen*. When the unit is in Unoccupied Mode or Vent Mode, the setpoint that appears on the *Main Display Screen* will be half way between the Cooling and Heating Setpoint.

To exit this screen, touch <Display>.

Connecting a Remote Sensor

Sometimes due to the requirements of a job, the sensor must be located outside the conditioned space due to special requirements such as hospital surgical room codes, security, or tampering considerations. In these cases, the Digital Room Sensor can be mounted in a different room and have a remote sensor connected to it. Typically, this would be a Return Air Duct Temperature Sensor. Usually, you will be using the OE231 Return Air Temperature Sensor, but you can also use any Type III 10K Ohm Thermistor Sensor.

To connect a remote sensor to the Digital Room Sensor, you must first remove the Digital Sensor's back cover. You will see a loop of wire hanging off of the sensor circuit board. See **Figure 19**. This is the external thermistor loop wire. Clip the external thermistor loop wire so that the sensor will read the remote temperature input. Be sure to cut the ends of the wire close to the circuit board so that the sensor loop wire ends won't short between each other. The remote sensor then wires to the remote sensor terminal block on the back of the Digital Room Sensor.

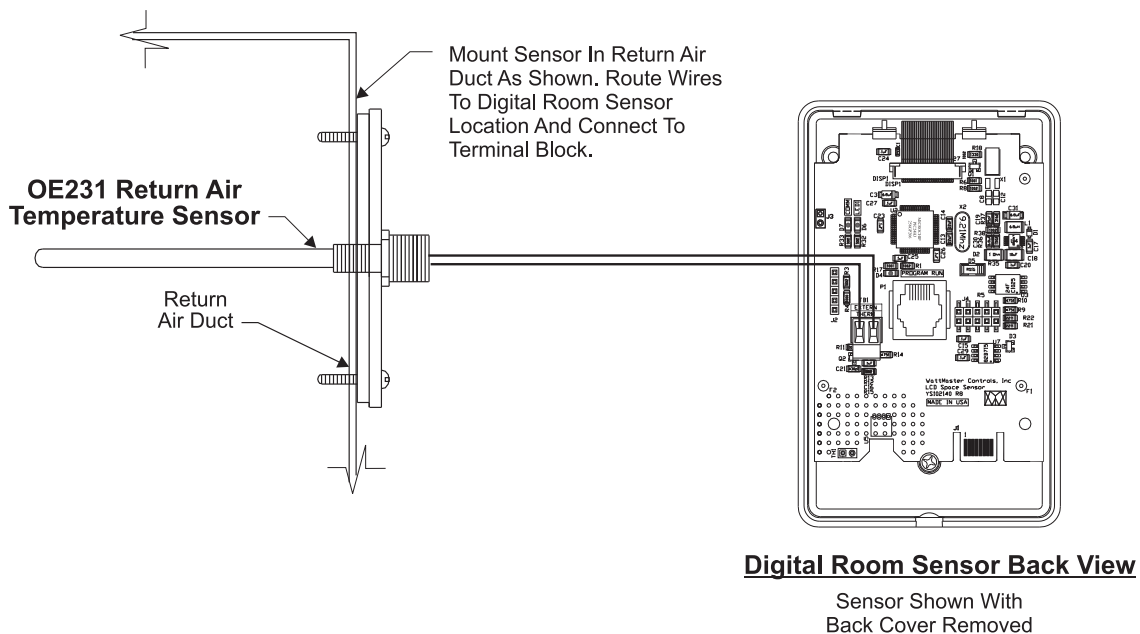
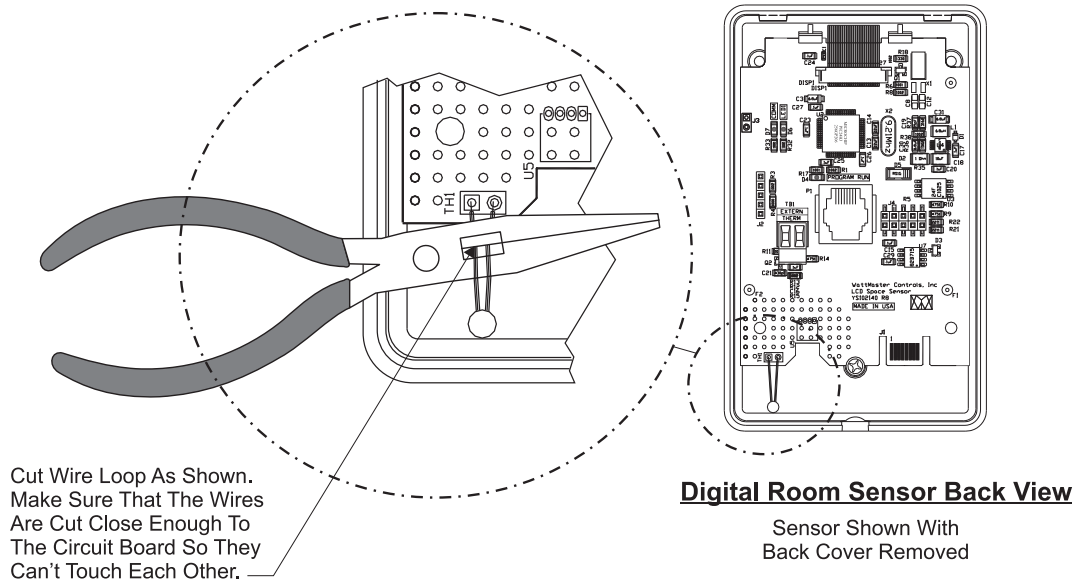


Figure 19: Attaching a Remote Sensor



Form: OR-DRS-TGD-01E
All rights reserved.

Printed in the USA

January 2012
Copyright 2012

WattMaster Controls Inc. • 8500 NW River Park Drive • Parkville, MO • 64152
Phone: 866-918-1100 • www.orioncontrols.com • Fax (816) 505-1101
