



**TRANE®**

*Cooling and Heating  
Systems and Services*

# Installation, Operation, and Maintenance

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## Wired Temperature Sensors



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**⚠ CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

**NOTICE:** Indicates a situation that may result in equipment or property-damage-only accidents.

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# General Information

This section provides a description of the wired temperature sensors, as well as part numbers and dimensions.

## Product Description

**Note:** *The information in this manual applies to both factory and field installed versions of Trane wired temperature sensors.*

Trane® wired temperature sensors are compatible with any Trane unit controller that uses a standard 10 kW temperature input. Temperature monitoring is standard on all models. Additional features are available on some models:

- Fan control
- System control
- Dual or single temperature setpoint control
- Occupancy (timed override) request function
- COMM module—Optional accessory that provides an RJ22 connection for a Trane service tool for system communication. Must be ordered separately.

## Part Numbers

The following table lists part numbers for each sensor type.

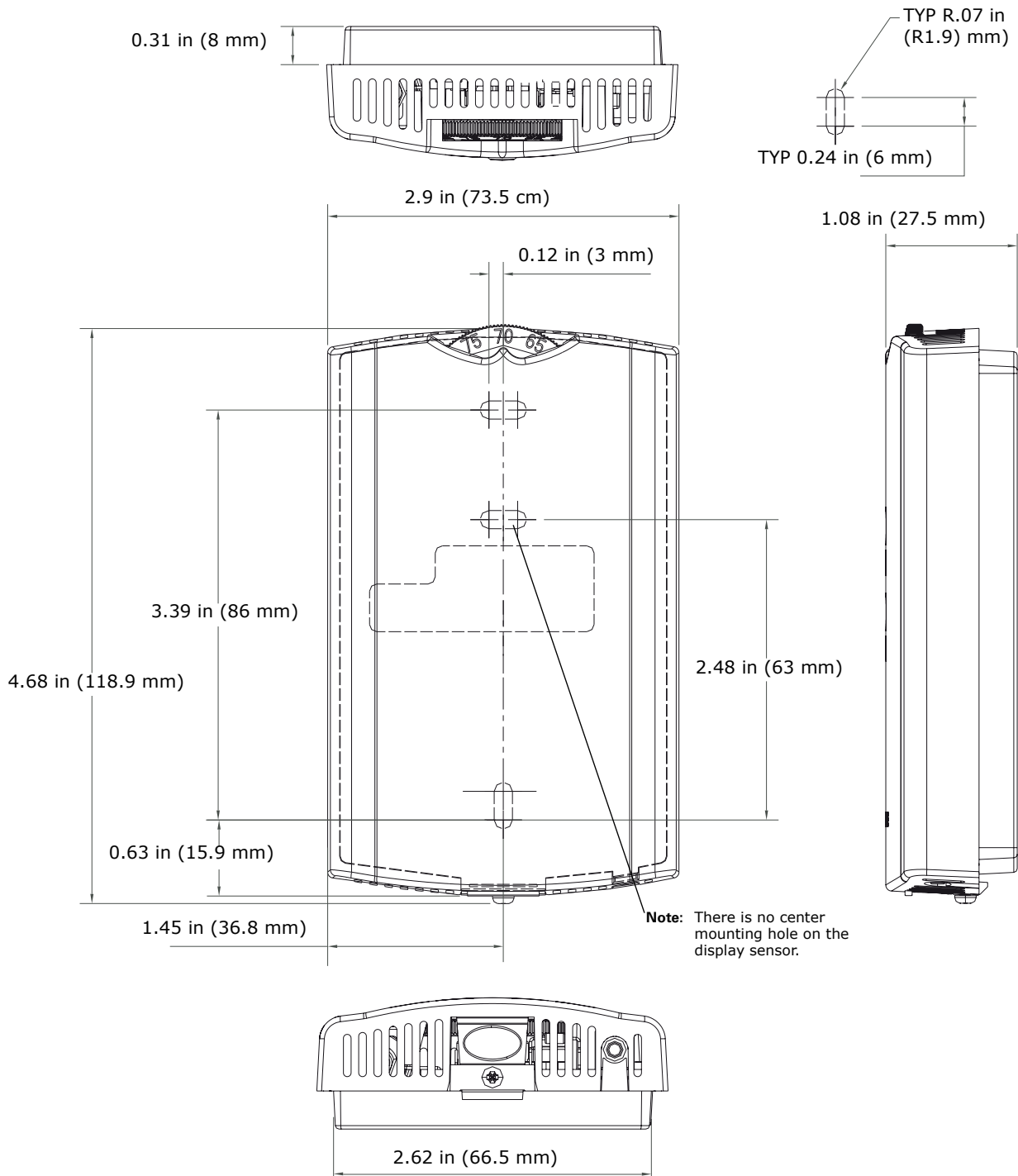
Sensor type	Features					Part number	BAYSENS	Global parts
	Setpoint	Fan control	System	Occupancy	LEDs			
Temperature sensors	Single	No	No	Yes	No	X1351152701	BAYSENS074A	SEN01447
	No			No		X1351152801	BAYSENS077A	SEN01448
	Single			No		X1351152901	BAYSENS075A	SEN01449
Temperature sensors with fan and system control	Dual	Auto/High	Cool/Off/Auto/Heat/Em Heat	No	Yes (4)	X1379084701	BAYSENS109A	SEN01523

The following table lists part numbers for optional accessories.

Accessory	Available for . . .	Part number	BAYSENS	Global parts
COMM module (box of 12)	All sensors other than the display sensor	X1365146702	BAYCOMM005A	CON01313

## Dimensions

The following illustration provides specific dimension details. The dimensions are the same for all models.



## Pre-Installation

This section provides the following pre-installation information:

- Location considerations
- Height requirements
- Mounting surfaces

### Location Considerations

Placement of the sensor is critical to proper operation. When selecting a location, avoid the following:

- Areas of direct sunlight
- Areas in the direct airstream of air diffusers
- Exterior walls and other walls that have a temperature differential between the two sides
- Areas that are close to heat sources such as sunlight, appliances, concealed pipes, chimneys, or other heat-generating equipment
- Drafty areas
- Dead spots behind doors, projection screens, or corners
- Walls that are subject to high vibration
- Areas with high humidity
- High traffic areas (to reduce accidental damage or tampering)

### Height Requirements

The recommended maximum mounting height is 54 inches from the bottom of the back plate to the floor. If a parallel approach by a person in a wheelchair is required, reduce the maximum height to 48 inches.

**Note:** Consult section 4.27.3 of the 2002 ADA (Americans with Disability Act) guideline, and local building codes, for further details regarding wheelchair requirements.

### Mounting Surfaces

Using the hardware provided, mount the back plate to a flat surface such as sheetrock or plaster, or an electrical junction box. The sensor must be mounted plumb for accurate temperature control and to ensure proper air movement through the sensor.

- If mounting onto sheetrock or plaster, use the plastic threaded anchors (pre-drilling holes is not usually necessary) and the two M3.5 x 20 mm mounting screws.
- For mounting onto an electrical junction box, use the two 6-32 x 3/4 in. screws.

## Installation: All Models Other Than the Display Sensor

This section provides step-by-step installation instructions for all sensor models other than the display sensor. Read through the pre-installation information before proceeding with the installation.

**Note:** Before installing a wired sensor, ensure that a wire access hole is available at the sensor location and the wire is accessible through the hole. The technician should assume that the wires are attached to the appropriate unit controller, that there is continuity between the location and the controller, and that the wires are accurately labeled or identified by color.

### Mounting the Back Plate

#### **WARNING**

#### **Hazardous voltage!**

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

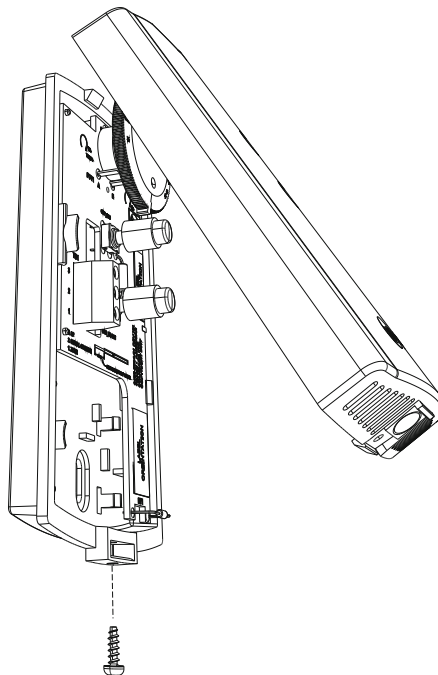
#### **NOTICE**

#### **Equipment damage!**

Applying excessive voltage to the sensor will permanently damage it.

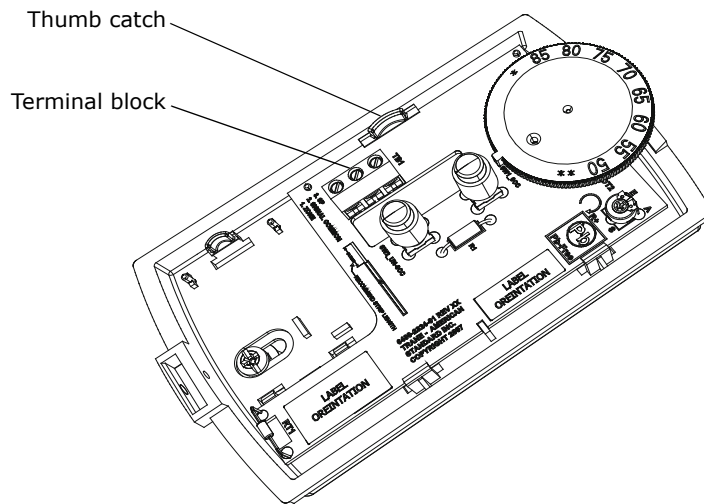
1. Shut off power to the unit controller.
2. Remove the cover by firmly pressing the thumb tab at the bottom of the cover and pulling the cover away from the back plate.

**Note:** If present, remove the security screw before removing the cover.

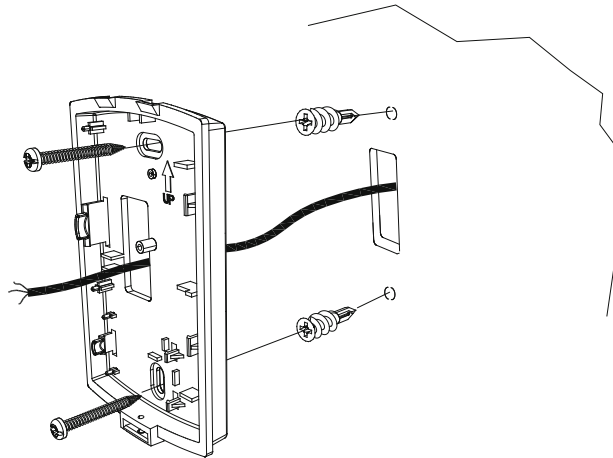


## Installation: All Models Other Than the Display Sensor

3. Remove the circuit board by pressing the thumb catch on the left side of the board. Use the terminal block to lift the circuit board from the back plate.



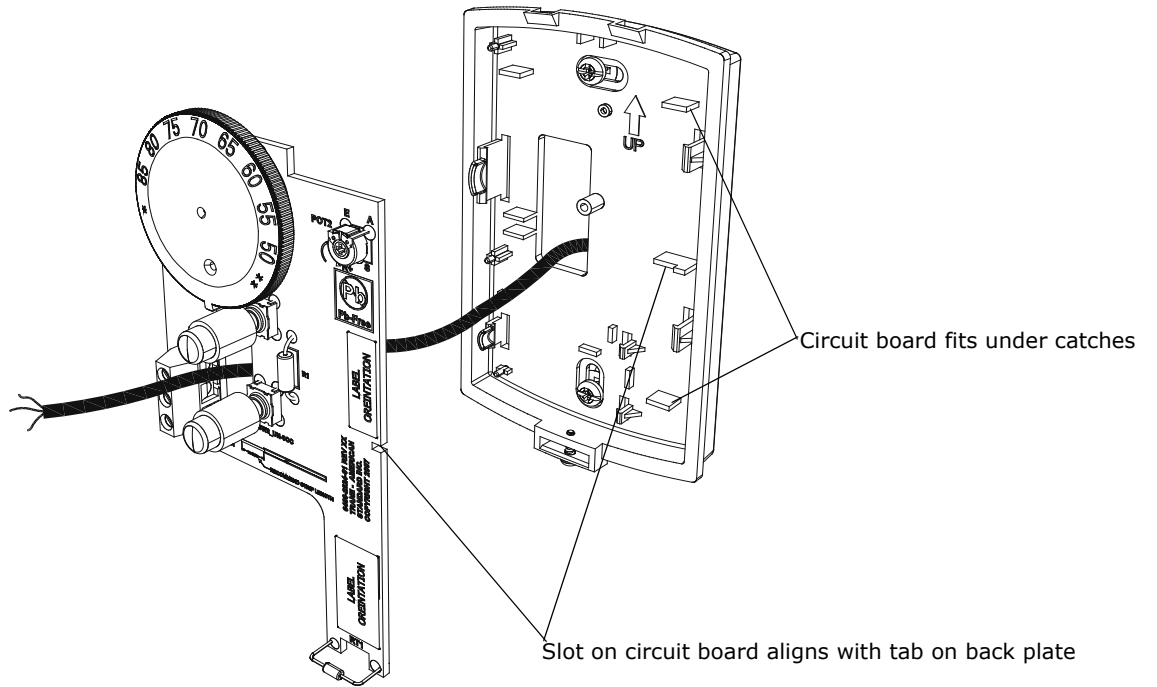
4. Feed the wires through the opening in the back plate.
5. Hold the back plate against the mounting surface and mark the screw locations.
6. Secure the back plate to the mounting surface using the included hardware.



7. Feed the wires through the opening in the circuit board.
8. Replace the circuit board by sliding the right side of the board under the two catches on the right side of the back plate, while aligning slot on board with tab on back plate. Press firmly on the left side of the circuit board to snap it into place.



## Installation: All Models Other Than the Display Sensor

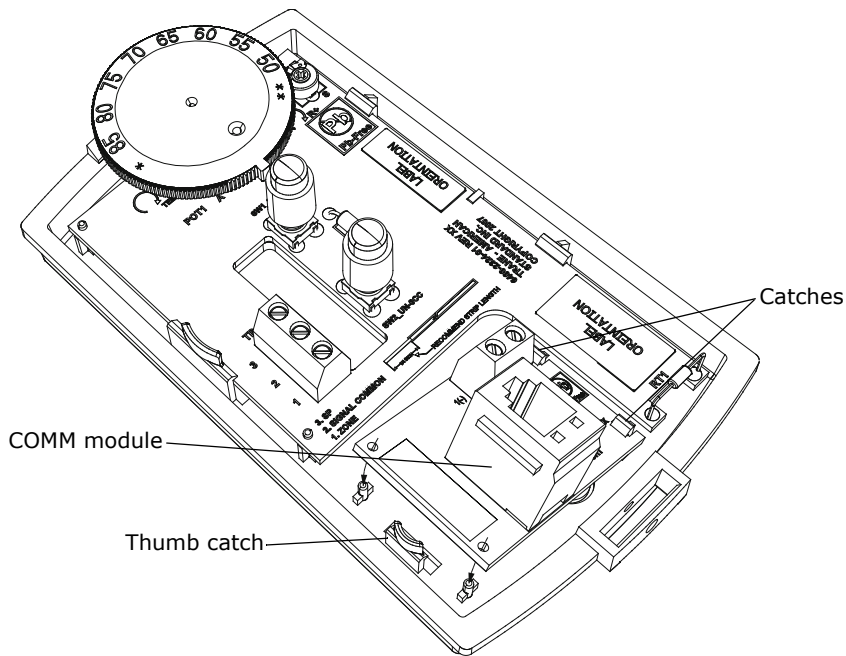


## Installing the COMM Module (optional)

An optional COMM module is available that provides a local RJ22 connection to a Trane service tool for maintenance use. It must be ordered separately.

Install the COMM module before wiring the sensor:

1. Slide the two cutouts on the right side of the COMM module into the two keys on the back plate.
2. Press firmly on the left side of the COMM module board until it snaps into place.



## Changing the Setpoint Thumb Wheel (optional)

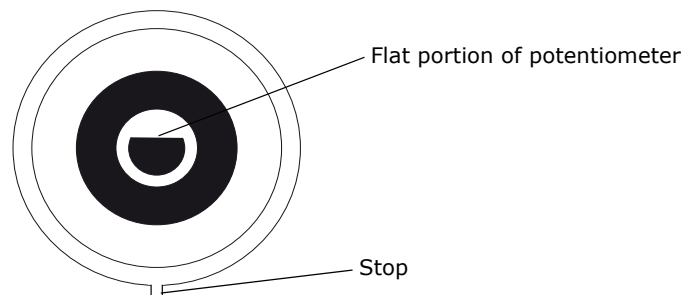
Sensors with temperature setpoint control have pre-installed Fahrenheit setpoint thumb wheels. A Celsius setpoint thumb wheel is included with these sensors. An optional hot/cold setpoint thumbwheel can be ordered separately.

To change the thumb wheel:

1. Remove the cover by firmly pressing the thumb tab at the bottom of the cover and pulling the cover away from the back plate.

**Note:** *If present, remove the security screw before removing the cover.*

2. Remove the existing thumb wheel by pulling it straight out while holding the circuit board securely onto the back plate.
3. Rotate the replacement thumb wheel until the stop is opposite the flat portion of the potentiometer. Push down on the thumb wheel until the ribs touch the potentiometer. After it is inserted, the thumb wheel should turn freely.



## Wiring the Sensor

### **WARNING**

#### **Hazardous voltage!**

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

### **NOTICE**

#### **Equipment damage!**

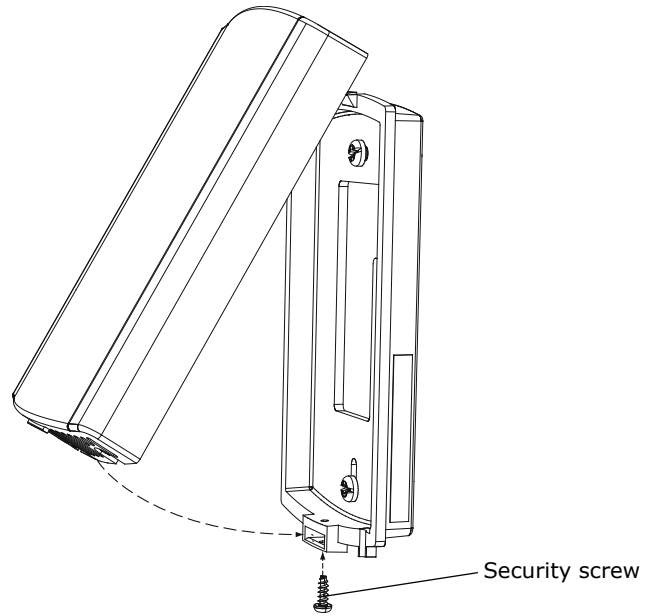
**Applying excessive voltage to the sensor will permanently damage it.**

**Note:** *Strip 1/4 inch of insulation from wires before connecting them to the terminal block.*

## Replacing the Cover

To replace the cover:

1. Hook the cover over the top of the back plate. Apply light pressure to the bottom of the cover until it snaps in place.
2. Secure the cover by installing the security screw into the bottom of the cover.



# Operation

This section describes sensor operations.

## Changing Temperature Settings

To change temperature settings:

- For sensors with temperature setpoint thumb wheels (located on top of the sensor), rotate the thumb wheel to the desired temperature setting.
- For sensors with dual temperature sliders (located on the right front of the sensor): Slide the blue (*cool*) slider to the desired maximum temperature setting. Slide the red (*heat*) slider to the desired minimum temperature setting.

## Changing System Settings

To change system settings:

- For sensors with system thumb wheels (located on the upper left side), rotate the thumb wheel to the desired setting.

*Notes:*

- *Not all sensor models have all system setting options.*
- *The effect of setting changes are dependent on the unit controller. See specific unit controller manual for details.*

## Changing Fan Settings

To change fan settings:

- For sensors with fan thumb wheels (located on the lower left side), rotate the thumb wheel to the desired setting.

*Notes:*

- *Not all sensor models have all fan setting options.*
- *The effect of setting changes are dependent on the unit controller. See specific unit controller manual for details.*

## Selecting Temporary Occupancy (Timed Override)

Temporary occupancy (timed override) is available on some sensors. Temporary occupancy can be selected to adjust temperature, fan, or heat/cool settings after the system has changed to unoccupied mode. System control will revert to unoccupied after a pre-determined time period.

**Note:** *Not all systems support the occupancy function.*

### Sensors with Occupied/Unoccupied buttons

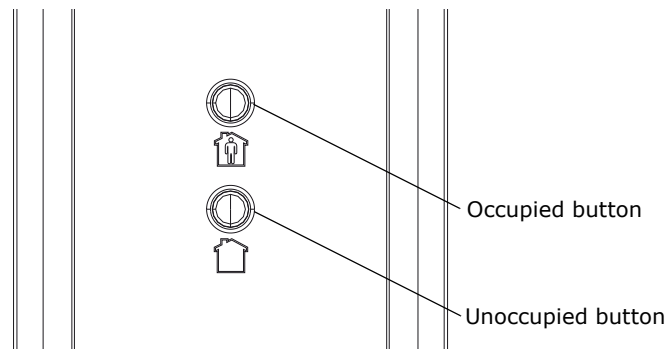
To select temporary occupancy, press the Occupied button (Figure 1) for 0.2–6 seconds. The following occurs:

- Space temperature output is driven to 10  $\Omega$  (nominal).
- The output generates for 4 seconds.

To cancel temporary occupancy, press the Unoccupied button (Figure 1) for 0.2–6 seconds. The following occurs:

- Space temperature output is driven to 1330  $\Omega$  (nominal).
- The output generates for 4 seconds.

**Figure 1. Locations of Occupied button and Unoccupied buttons**



## Service Pin Request

Some sensor models can communicate a service pin request to their connected unit controller.

### Sensors with Occupied/Unoccupied Buttons

To initiate a service pin request, press the Occupied button (Figure 1, p. 14) for 10–25 seconds. The following occurs:

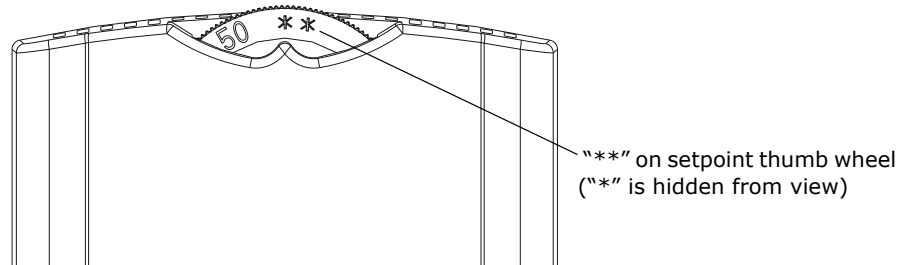
- Space temperature output is driven to 10  $\Omega$  (nominal).
- The output generates for 15 seconds.

## Sensors with Thumb Wheels

Turning the thumb wheel clockwise makes the star(\*) visible; turning it counter-clockwise makes the double star(\*\*) visible (see Figure 2).

- Star(\*): A value of 95°F (35°C) is communicated.
- Double star(\*\*): A value of 44.6°F (7°C) is communicated.

**Figure 2. Star/Double star on thumb wheel**







# Maintenance and Troubleshooting

This section describes sensor features that can be used for maintenance and troubleshooting.

## LEDs

Some sensor models have LEDs. They are located on the front cover and convey the following information:

	Service LED (red)	The red service LED indicates that service is needed. <ul style="list-style-type: none"> <li>The LED may blink or stay on solid, depending on the unit controller</li> </ul>
	Cool LED (green)	The green cool LED indicates that the system is in cooling mode. <ul style="list-style-type: none"> <li>Stays on solid during normal cooling operation</li> <li>Blinks to indicate a cooling system failure</li> </ul>
	Heat LED (green)	The green heat LED indicates that the system is in heating mode. <ul style="list-style-type: none"> <li>Stays on solid during normal heating operation</li> <li>Blinks to indicate a heating system failure</li> </ul>
	System LED (green)	The green system LED indicates the state of the system. <ul style="list-style-type: none"> <li>Stays on solid to during normal operation</li> <li>Blinks to indicate that the system is in Test mode</li> </ul>

## Measuring Output Resistance

Measure output resistance as follows, according to sensor type.

### All Models Other Than the Display Sensor

For all other wired sensors, measure the outputs for temperature and setpoints and, if applicable, the system/fan mode and heat setpoint:

- To measure zone temperature resistance, measure between SIGNAL COMMON (terminal 2) and ZONE TEMP (terminal 1). Compare resistance measurements to those in Table 1.
- To measure setpoint resistance:
  - For single setpoint systems, measure between SIGNAL COMMON (terminal 2) and SETPOINT (terminal 3).
  - For dual setpoint system, measure between SIGNAL COMMON (terminal 2) and CSP (terminal 3), and between SIGNAL COMMON (terminal 2) and HSP (terminal 5).

Compare resistance measurements to those in Table 1.

- To measure the system/fan mode resistance, measure between SIGNAL COMMON (terminal 2) and MODE (SYS/FAN SWITCH) (terminal 4). Compare resistance measurements to those in Table 2.

**Note:** The output circuits are not electrically powered; consequently, resistance can be measured without risk of damage to the volt-ohm meter.



**Table 1. Resistance measurements for zone temperature and setpoints**

Zone or setpoint temperature	Nominal zone temperature output resistance	Nominal setpoint and heating setpoint output resistance
**	NA	938 $\Omega$
55°F (12.8°C)	17.47 k $\Omega$	792 $\Omega$
60°F (15.6°C)	15.3 k $\Omega$	695 $\Omega$
65°F (18.3°C)	13.5 k $\Omega$	597 $\Omega$
70°F (21.1°C)	11.9 k $\Omega$	500 $\Omega$
75°F (23.9°C)	10.5 k $\Omega$	403 $\Omega$
80°F (26.7°C)	9.3 k $\Omega$	305 $\Omega$
85°F (29.4°C)	8.25 k $\Omega$	208 $\Omega$
*	NA	49 $\Omega$
<b>Notes:</b> 1. Sensors are calibrated at 70°F (21.1°C). 2. Single setpoint systems: Varies $\pm 28 \Omega$ at 70°F (21.1°C); varies $\pm 128 \Omega$ at endpoints of scale 55°F (12.8°C) and 85°F (29.4°C). Dual setpoint systems: Cooling setpoint varies $\pm 10 \Omega$ at 70°F (21.1°C); varies at $\pm 110 \Omega$ at endpoints of scale. Heating setpoint varies $\pm 20 \Omega$ at 70°F (21.1°C); varies at $\pm 120 \Omega$ at endpoints of scale.		

**Table 2. Resistance measurements for fan and system modes**

Fan mode	System mode	Nominal output resistance
Auto or invalid	Emergency heat	35,000 $\Omega$
Auto or invalid	Heat	19,480 $\Omega$
Auto or invalid	Auto	7680 $\Omega$
Auto or invalid	Off	2320 $\Omega$
Auto or invalid	Cool	4870 $\Omega$
On	Emergency heat	43,450 $\Omega$
On	Heat	27,930 $\Omega$
On	Auto	16,130 $\Omega$
On	Off	10,770 $\Omega$
On	Cool	13,320 $\Omega$
High	Invalid (fan control only)	16,130 $\Omega$
Med	Invalid (fan control only)	13,320 $\Omega$
Low	Invalid (fan control only)	10,770 $\Omega$
Auto	Invalid (fan control only)	2320 $\Omega$
Off	Invalid (fan control only)	4870 $\Omega$

### Cleaning the Sensor

***NOTICE***

**Equipment damage!**

**Spraying glass cleaner or any other solution directly on the sensor may damage it.**

You can clean the sensor by applying glass cleaner to a soft, non-abrasive cloth, and gently wiping the face, including the buttons and LCD display. Use of a pre-moistened towelette designed for lens or screen cleaning is also acceptable.

Avoid inadvertent pressing buttons on sensors that have them or the keypad on the display sensor, as this may result in an unwanted timed override or settings change.

### Replacing the Thumb Wheel

If you need to replace a setpoint thumb wheel, see “Changing the Setpoint Thumb Wheel (optional),” p. 11.





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