Uponor Heat-only Thermostat with Touchscreen

Installation and operation manual

Overview

The Uponor Heat-only Thermostat (A3100101) is designed for precise temperature control of hydronic radiant heating applications. The thermostat includes an option to add a floor sensor (A9010599) to measure floor temperature for enhanced comfort and to protect the surface from overheating.

Additional features

- Operative temperature sensing
- Two-wire power sharing (easier installation)
- Capacitive touchscreen
- Color-enhanced display
- Slim, aesthetic design

Getting started

It is the installer's responsibility to ensure this thermostat is safely installed in accordance with all applicable codes and standards. Uponor is not responsible for damages resulting from improper installation and/or maintenance.

To avoid personal injury and damage to the equipment:

- Read the manuals and documentation to familiarize yourself with the product.
- Leave the manuals in an accessible location for the user's reference. (**Note:** Replacement manuals and documentation on this product are available on uponorpro.com.)
- Turn off power to zone boards and other devices prior to connecting the thermostat.
- Follow proper installation and operation practices for this thermostat. Improper installation or use of the thermostat could result in damage to the equipment.
- Do not open the thermostat. There are no serviceable parts inside the thermostat and opening it will void the warranty.

This thermostat works effortlessly with other Uponor components. However, some commonly used third-party devices (e.g., relays, zone valves, etc.) may have compatibility issues with this thermostat. If connecting the thermostat to a third-party control device, refer to that device's installation instructions for specific information regarding operation with a power-sharing thermostat. A 10K Ohm, 0.25 Watt resistor is included in the packaging when compatibility issues arise.

Refer to the wiring examples on **page 7** for the most common wiring applications. For additional information, contact Uponor Technical Services at 800.321.4739 (U.S.) or 888.994.7726 (Canada).

Tools required

- Small, flathead screwdriver
- Phillips screwdriver (mounting hardware)
- Wire stripper and cutter
- Volt meter (floor sensor installations)
- Digital thermometer
- Multimeter

Installation overview

Prior to installing the Uponor thermostat, follow the instructions below. (**Note:** Only experienced and trained professionals familiar with low-voltage wiring should attempt to install the thermostat.)

1. Thoroughly read this manual to understand the proper procedures for installation and operation. Failure to do so could result in damage to the thermostat or its connected equipment, creating a safety hazard.
2. Ensure the function and rating of the thermostat is suitable for the application.
3. Uponor recommends installers use 18 AWG LVT wiring for all low-voltage connections (as regulated by local building codes).

Placing the thermostat

Where you place the thermostat is extremely important. Install the thermostat approximately 5 ft. (1.5m) above the floor on a smooth, flat surface. *Avoid mounting the thermostat in the following locations.*

- On outside walls
- On interior walls susceptible to solar gains
- On interior walls where the wall is unconditioned
- On a return-air chase
- Near windows
- Near fireplaces
- Near stoves, lamps, televisions or other electronics and appliances
- In the corner of a room
- In damp areas
- Behind doors
- In areas where the temperature inside the wall differs from the room temperature

Installing the thermostat

The thermostat can mount to a wall surface or a standard electrical wall box using suitable hardware. The thermostat is composed of two parts: the back plate and the controller. Refer to the steps below to complete the installation.

1. Remove the back plate from the thermostat by pulling the bottom of the plate away from the controller. The back plate is hinged at the top of the controller.
2. Locate the back plate on the wall so the connection wires are run through the rectangular wiring opening. The wiring opening is right next to the wiring terminals.
3. Align the holes of the back plate with the holes in the electrical wall box. Attach the plate with screws. If mounting directly on sheetrock, use wall anchors and screws.

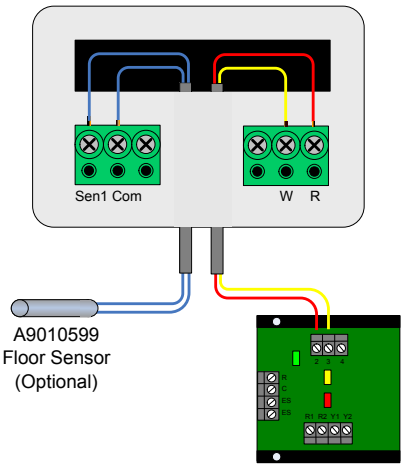
Note: Avoid mounting the thermostat on a return-air chase or where the temperature inside the wall differs from the room temperature. If that is unavoidable, it may be necessary to plug or seal the wire hole opening to prevent the environment inside the wall from affecting the thermostat's readings.

Wiring

⚠ **Caution:** Disconnect electrical power to the system to prevent electrical shock and damage.

1. Remove 3⁄16" of insulation from the wire ends. Ensure the wire ends are clean, dry and free from corrosion.
2. Connect the power wires to the Rh and W terminals. This corresponds to terminals 2 and 3 on the Uponor Zone Control Module (A3031003 or A3031004). The RH and W terminals are not polarity sensitive.

A3100101 Uponor Thermostat with Floor Sensor



3. Connect the optional floor sensor to the SEN1 and COM terminals.

Note: The floor sensor is detected when power is first applied to the thermostat. Connecting the floor sensor with power applied will prevent the floor functions from operating and may damage the thermostat.

Important! Do not connect power to the floor sensor terminals as damage to the device may occur.

Attaching the thermostat to the back plate

1. Locate the tabs and holes on the controller and back plate.
2. Align the back plate tab with the controller holes by leaning the top of the controller on the back plate until it hooks.
3. Gently hinge the bottom of the thermostat onto the wiring terminals until the thermostat engages with the terminal connectors.
4. Use gentle pressure on the bottom of the thermostat until the controller clicks into its locked position.

Important! Only gentle pressure is needed to engage the controller onto the back plate. If resistance is felt, realign the controller to the left or to the right to ensure the controller pins are correctly aligned with the terminals. Do not apply extreme pressure to the display area as damage to the equipment may result.

Installing the floor sensor (optional)

The floor sensor (A9010599) comes with a 10-ft. wire. Install the sensor and wire in a manner so it can be replaced should it fail. If additional wire is needed to connect the sensor to the thermostat, use 24/2 AWG. Uponor recommends installers solder the connections (versus wire nuts) and place the connections in an accessible junction box.

- **Concrete/lightweight applications —** If installing a floor sensor in a lightweight application, make sure the sensor is installed within a conduit (without splices) for easy removal and replacement should the sensor fail. The floor sensor and conduit should be placed equidistant between two parallel runs of pipe for optimal sensing and control.
- **Joist Trak™ installation —** When installing a floor sensor beneath the subfloor and the surface above is finished, cut a piece of 1" rigid insulation a minimum of 6" x 6". Cut a ¼" groove from the outside edge to the center of the insulation. Insert the floor sensor into the insulation and run the sensor wire through the channel. Attach the insulation to the subfloor with adhesive or other suitable material. Make sure the sensor is placed in the center of the joist, between the two plates.
- **Quik Trak® installations —** Prior to the finished flooring being installed over the Quik Trak panels, cut or router a ¼" groove into the subfloor to accommodate the sensor and wire. Route the wire to a location where the sensor can be wired into the thermostat.

Testing the sensor — The floor sensor should be tested prior to pouring concrete, closing up a ceiling or installing the finished flooring. The installation will require a multimeter and digital thermometer to properly test the resistance (ς) through the sensor wires. Using the thermometer, read or measure the temperature around the floor sensor location. Using the multimeter, measure the resistance between the two wire leads of the sensor. (**Note:** The wires should NOT be connected to the thermostat.)

Compare the resistance value read on the meter to the value on the table based on the temperature on the thermometer. The values do not have to match but they should be close. If the value on the meter is reading high, check for broken wires or a bad sensor. If the value is reading low, there may be moisture inside the sensor or the wiring is shorted.

Sequence of operation

This thermostat is designed to control hydronic radiant applications. The dynamics of these types of systems differ from a typical forced-air furnace or baseboard heating application. A radiant system heats the mass and the objects in the room. This thermostat uses fully automatic differential and pulse width modulation (PWM) control functions to ensure zone is comfortable and energy efficient.

Heating modes

This thermostat can operate a hydronic radiant system heating operation based on the air sensor measure operative temperature, a floor sensor, or a combination of both to provide the optimal level of comfort and control.

- **Air temperature only:** When a floor sensor is not connected, the thermostat will maintain the room's air temperature based on the desired temperature setting.
- **Air and floor:** If using both sensors, the thermostat will maintain the room's air temperature along with maintaining a minimum floor temperature. Early in the heating season when the room is not experiencing high loads, it may be desirable to have a warmer floor. The floor setpoint can be adjusted to maintain the floor temperature. When the outdoor temperature drops and the room load increases, the air sensor will take over. This maintains the air temperature and provides a warm floor.
- **Floor sensor only:** The air sensor can be disabled or turned off should the application require it (e.g., bathrooms). In this instance, the thermostat will only maintain the floor temperature.

Heating operation

When the thermostat is set to HEAT mode of operation, it will compare the setpoint values for the air and floor sensor (optional) versus the actual temperature sensor readings.

- **Air sensor:** When the air temperature drops 1°F (0.5°C) below the setpoint, the heating call will begin. The heating call will end when the air temperature rises above the setpoint.
- **Floor sensor:** When the floor temperature drops 1°F (0.5°C) below the setpoint, the heating call will begin. The heating call will end when the air temperature rises 1°F (0.5°C) above the setpoint.

Operative temperature sensing

Operative temperature is what people experience thermally in a space by combining the effects of air temperature, air speed and thermal radiation. This provides superior control of a radiant heating system while maximizing comfort and efficiency. The design of the thermostat closely senses room conditions the way the human body does.

PWM mode

When the room temperature is 1°F to 3°F (0.5°C to 1.5°C) below the desired room setting, the thermostat manages the application of heat by varying the on-and-off cycles (PWM). The on-and-off times vary depending on the difference between room and desired temperatures—the greater the distance between the room temperature and the desired temperature, the greater the on time. This prevents the room temperature from rising above the desired temperature. The heating system will run continuously at temperature differences greater than 3°F (1.5°C).

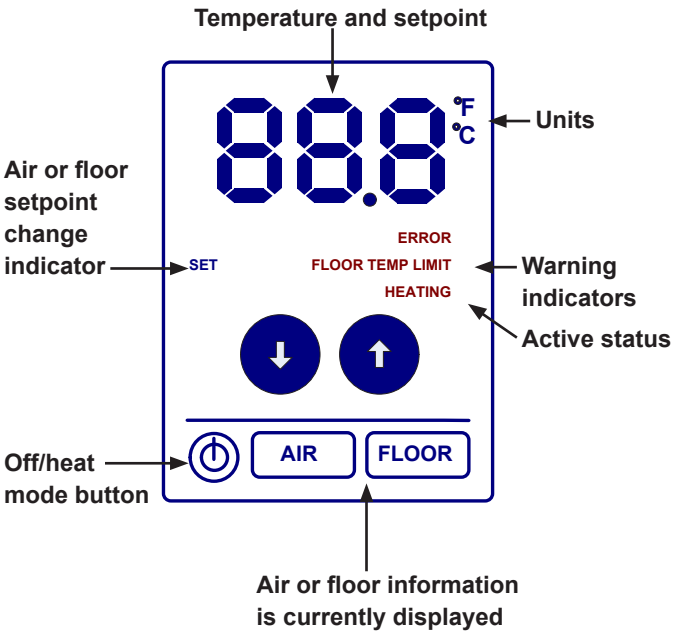
Note: In PWM mode, the heating equipment may temporarily turn off even when the heating indicator is flashing (showing a call for heat).

Freeze protection

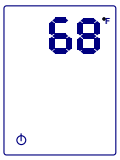
A mode is built into the thermostat that will attempt to protect the space from freezing in the event the thermostat was left in the OFF mode during the winter months. When the air sensor reads the space temperature below 37°F (3°C), the heating output will turn on to keep the space at 37°F (3°C) while in the OFF mode. If the thermostat is turned on (heat mode), freeze protection will be ignored and the user/installer is allowed to choose a set temperature down to 34°F (1°C).

Thermostat display

This thermostat employs a capacitive touchscreen display (i.e., the screen reacts to electrical impulses generated by a finger). The user operates the functions of the thermostat by touching the icons on the display. Below are the elements of the thermostat display.



Change from off to heat mode



As shown, when the thermostat is in OFF mode, the up and down arrows will not be displayed to remind the user that heating will not take place.

- To change from OFF to HEAT mode, press the OFF/HEAT mode power button in the lower left-hand corner of the screen.

Viewing the current air temperature

When the thermostat has detected no user interaction for five seconds, it will display the current air temperature reading. Notice the rectangle around the AIR button. This is to confirm the user is viewing the current air temperature.

Adjusting the air temperature setting

To make the air temperature warmer or cooler, change the air setpoint. To adjust this value:

- Make sure the thermostat is turned on and in the HEAT mode as shown.
- Press the up or down arrow to adjust the new room temperature. The temperature now showing is the new air temperature setpoint.
- Confirm this action by checking that the SET indicator appears and flashes with the horizontal bar.

Viewing the current floor temperature

When the thermostat has detected no user interaction for five seconds, it will display the current air temperature reading. Press FLOOR to display the current floor temperature. This is confirmed when the rectangle appears around FLOOR.

Adjusting the floor temperature setting

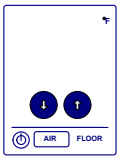
To make the floor temperature warmer or cooler, the floor setpoint will need to be changed. To adjust this value:

- Make sure the thermostat is turned on and in the HEAT mode.
- Make sure the rectangle is around the FLOOR button. Press the FLOOR button once if needed.
- Press the up or down arrow to adjust the new room temperature. The temperature now showing is the new floor temperature setpoint.
- Confirm this action by checking that the SET indicator appears and flashes with the horizontal bar.

Advanced settings

This Uponor thermostat features advanced settings which can help better manage the system. These settings should only be accessed and changed by a qualified installer. Improper adjustment of these settings can result in incorrect operation of the heating system.

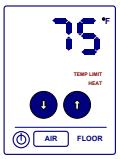
Changing the temperature units



The thermostat is set to display all of the temperature information in Fahrenheit. To change the units from Fahrenheit to Celsius:

- Make sure the thermostat is turned on and in the HEAT mode and the SET indicator is not flashing.
- Ensure the rectangle is around the AIR button. If no rectangle is present, press the AIR button once to make the rectangle appear.
- Once the rectangle appears around the AIR button, press the AIR button once more. The unit indicator will begin to flash.
- Press the up or down arrow to set the new units. After five seconds, the change will be accepted and the new units will be displayed.

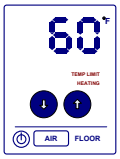
Setting the maximum air set temperature



Depending on the installation or application, it may be necessary to limit how warm the room gets based on energy consumption or air temperature needed (e.g., the garage). To adjust the maximum air set temperature allowed:

- Make sure the thermostat is turned on and in the HEAT mode and the SET indicator is not flashing.
- Press the AIR button twice. If done correctly, the rectangle will appear around the AIR button. The SET, TEMP LIMIT and HEAT indicators will begin to flash.
- Press the up or down arrow to set the new maximum air temperature allowed.

Setting the minimum air set temperature



Depending on the installation or application, it may be necessary to lower the room set temperature past the default (for energy savings). To adjust the minimum air set temperature allowed:

- Make sure the thermostat is turned on and in the HEAT mode and the SET indicator is not flashing.
- Press the AIR button three times. If done correctly, the rectangle will appear around the AIR button and the SET, TEMP LIMIT and COOL indicators will begin to flash.
- Press the up or down arrow to set the new minimum air temperature allowed.

Note: The default setting is 59°F (15°C) for the minimum air set temperature and can be adjusted down to 34°F (1°C).

Setting the maximum floor protection limit

Depending on the installation or application, it may be necessary to limit how warm the floor gets to protect the wood flooring installed above the radiant system. When this temperature is reached, a warning will be displayed on the screen. To adjust the maximum floor set temperature allowed:

- Make sure the thermostat is turned on and in the HEAT mode and the SET indicator is not flashing.
- Press the FLOOR button twice. If done correctly, the rectangle will appear around the FLOOR button. The FLOOR TEMP LIMIT and HEAT indicators will appear.
- Press the up or down arrow to set the new maximum floor temperature allowed.
- If the floor temperature falls 2°F (1°C) below the maximum floor protection limit, the warning will go away.

Turn off the air sensor

In some installations it may be necessary to operate the heating equipment by the floor sensor only. Applications would include a bathroom floor or public space where the physical thermostat is located outside of that room. To turn the air sensor off:

- Make sure the thermostat is turned on and in the HEAT mode and the SET indicator is not flashing.
- Press the AIR button. If done correctly, the rectangle will appear around the AIR button.
- Press the down arrow and lower the set temperature past the lowest allowed setting (34°F/1°C). The display should read OFF.

Important! The air sensor cannot be turned off if no floor sensor is connected.

Note: The thermostat accepts the new setting immediately and will return to the main screen when the thermostat has detected no user interaction for five seconds. The display reverts to indicate the current room temperature. Continuously touching the AIR button will cause the menu to repeat.

Error codes

This thermostat includes a feature to help diagnose any issues that may arise with the air or floor sensors.

Important! Installers and users should be familiar with how the thermostat will protect the installation in the case of a floor sensor failure.

- When the thermostat is set up for air and floor sensor operation and the floor sensor fails, ERROR will appear on the display. The thermostat will ignore any slab setpoint temperature and set the air temperature for 65°F (18°C).
- When the thermostat is set up for floor sensor operation (no air) and the floor sensor fails, ERROR will appear on the display. The thermostat will ignore any slab setpoint temperature. The air sensor will turn on and set the air temperature for 65°F (18°C).

To clear the error, press the AIR button to switch to the AIR display, correct the issue with the floor sensor, and cycle the power off and on again. It will be necessary to readjust the set temperatures and other settings after the thermostat turns back on.

Open code

This code indicates that the air or floor sensor was functioning and reading properly and now it is no longer detected (electrically disconnected). Check the floor sensor connections at the terminal strip to make sure they are attached securely and the screws do not need to be tightened. If not, the wire may have been cut or the sensor has failed and the sensor will need to be replaced. If the floor sensor connections are attached securely, then the air sensor has failed and the thermostat will need to be replaced.

Short code

This code indicates that the floor sensor was connected and reading properly, but is now unable to read a temperature within the acceptable range. Check the sensor connections at the terminal strip to make sure the wires are not touching each other or connections are not wet. If not, there may be moisture in the sensor, a nail or screw has damaged the wires or the sensor is defective and will need to be replaced.

Temperature displays

The following information explains the different temperature displays.

Low temperature display

When the air or floor temperature falls below 33°F (0.5°C), LO will display as shown. When the temperature rises above that limit, the actual temperature will display.

High temperature display

When the air temperature rises above 95°F (35°C) or the floor temperature rises above 140°F (60°C), HI will display as shown. When the temperature drops below those limits, the actual temperature will display.

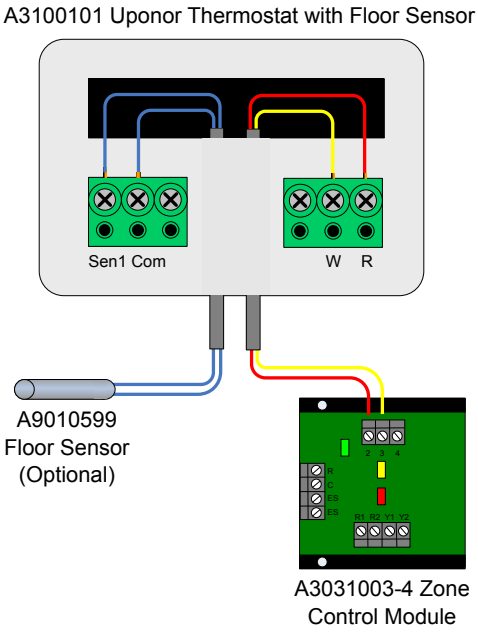


Figure 1: Uponor thermostat wired to a zone control module

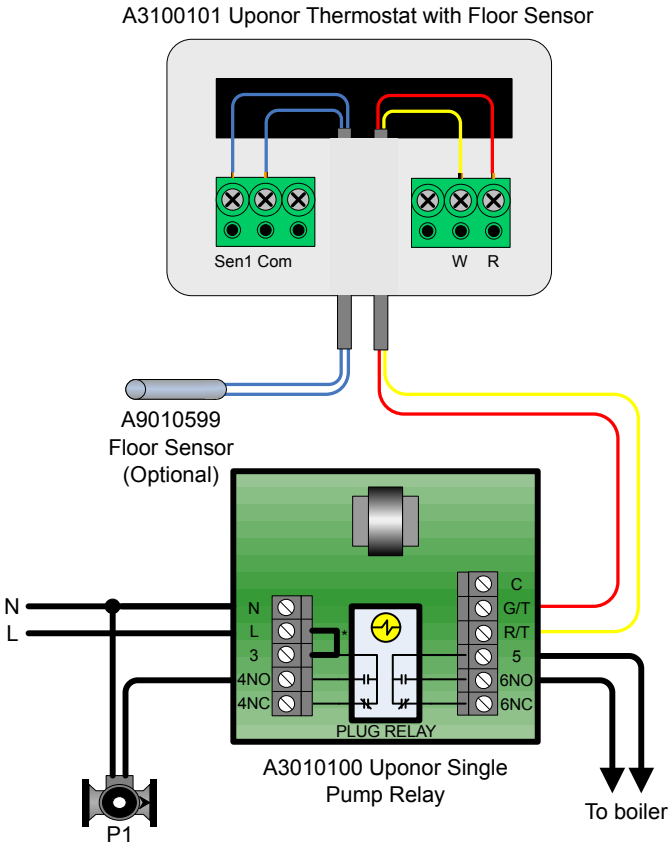


Figure 2: Uponor thermostat wired to a pump relay

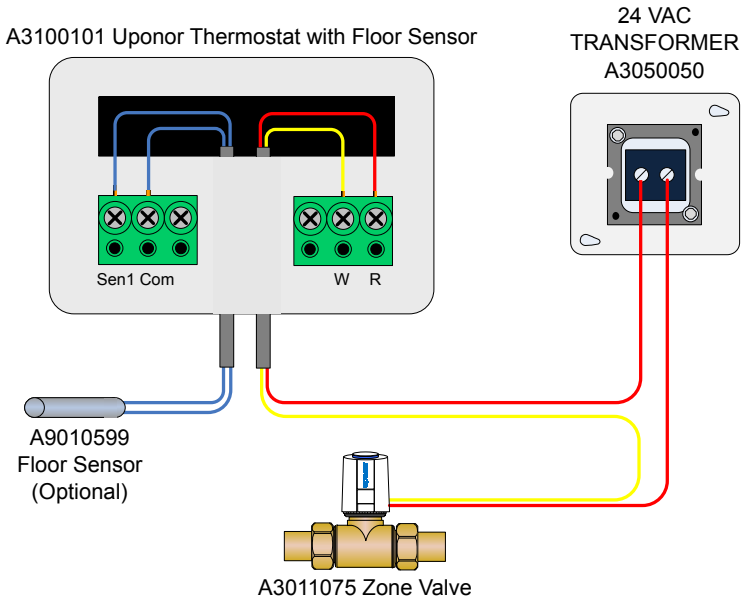


Figure 3: Uponor thermostat wired to an actuator or zone valve

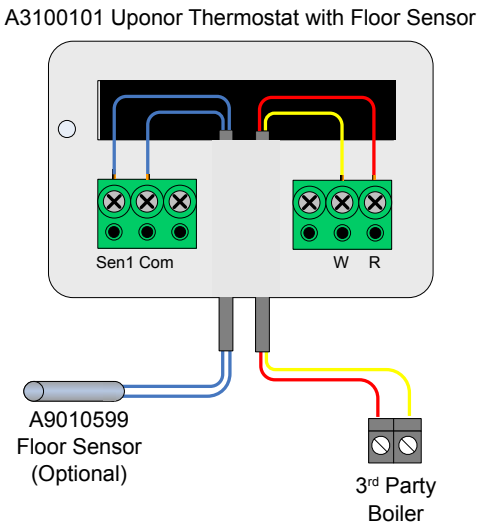


Figure 4: Uponor thermostat wired to a boiler

Technical specifications

Operating voltage	24 VAC +/- 10% Class II circuits only
Maximum load	1.3 Amps at 24VAC or equivalent of 6 thermal valve actuators
Air display range	32°F to 95°F (0°C to 35°C)
Floor display range	32°F to 140°F (0°C to 60°C)
Air setting range	34°F to 86°F (1°C to 30°C) 68°F (20°C) default
Floor setting range	34°F to 95°F (1°C to 35°C) 68°F (20°C) default
Air maximum setting	Adjustable to 86°F (30°C)
Floor maximum setting	Adjustable to 95°F (35°C)
Resolution	1°F (0.5°C) displayed, 0.25° calculated
Temperature ranges	Shipping and storage: 14°F to 158°F (-10°C to 70°C) Operation: 32°F to 104°F (0°C to 40°C)
Humidity	20 to 90% non-condensing
Size	5.39" (136.91mm) H x 3.22" (81.79mm) W x 0.63" (16mm) D

CAN ICES-3 (B)/NMB-3(B) compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment to a different circuit from that to which the receiver is connected
- Consult the dealer or an experienced radio/TVG technician for help

Setpoint limits settings

Minimum range	38°F (3°C) to maximum limit setting 50°F (10°C) default
Maximum range	Minimum limit setting to 99°F (37°C) 86°F (30°C) default
Floor sensor	10K J curve, 250 ft. maximum with 18 AWG
Units	User-configurable Fahrenheit or Celsius
Memory	Permanent for all settings and modes

Sensor temperature vs. resistance table

Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω
-50	-46	490,813	90	32	7,334
-45	-43	405,710	95	35	6,532
-40	-40	336,606	100	38	5,828
-35	-37	280,279	105	41	5,210
-30	-34	234,196	110	43	4,665
-25	-32	196,358	115	46	4,184
-20	-29	165,180	120	49	3,760
-15	-26	139,402	125	52	3,383
-10	-23	118,018	130	54	3,050
-5	-21	100,221	135	57	2,754
0	-18	85,362	140	60	2,490
5	-15	72,918	145	63	2,255
10	-12	62,465	150	66	2,045
15	-9	53,658	155	68	1,857
20	-7	46,218	160	71	1,689
25	-4	39,913	165	74	1,538
30	-1	34,558	170	77	1,403
35	2	29,996	175	79	1,281
40	4	26,099	180	82	1,172
45	7	22,763	185	85	1,073
50	10	19,900	190	88	983
55	13	17,436	195	91	903
60	16	15,311	200	93	829
65	18	13,474	205	96	763
70	21	11,883	210	99	703
75	24	10,501	215	102	648
80	27	9,299	220	104	598
85	29	8,250	225	107	553

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