TriangleTube

INSTALLATION AND OPERATION INSTRUCTIONS

3-in-1
Temperature Sensor

Immersion, Outdoor, and Strap-On Sensor Installation
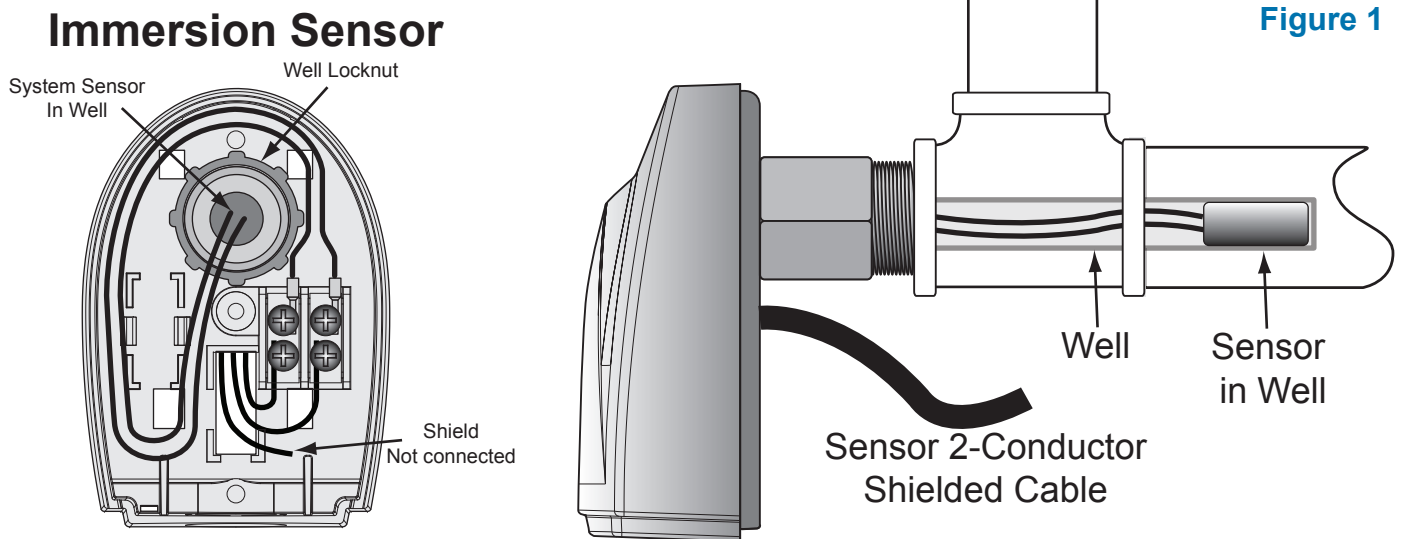
The Triangle Tube Sensor Enclosure can be used for Immersion, Outdoor, or Strap-On installations. The enclosure material is designed to tolerate temperatures up to 220°F/105°C as well as withstand outdoor weather conditions. The package comes complete with the Enclosure, Temperature Sensor, Strap-on Tie Wrap, and Outdoor Weather Sealing Label.
- The sensor wires can be extended up to 500' using a shielded 2-conductor 18 gauge cable (Belden #8760 or equivalent #18/2).
- DO NOT ground the shield at the sensor. Connect the shield at the control using the sensor terminals marked with a "COM" or "O".
- Do not run sensor wires in conduit with line voltage wiring.

> ⚠ **ALERT**
> **DO NOT CONNECT the shield at the sensor end. However, the shield must be connected at the control sensor terminal marked with "COM" or "O" with one of the other sensor wires.**

Immersion Sensor

System Sensor In Well

Well Locknut

Shield Not connected

Figure 1

Sensor 2-Conductor Shielded Cable

Well

Sensor in Well

Immersion Sensor Installation
- The Immersion Sensor is designed to be installed in a well.
- For accurate system temperature reading, place the sensor well approximately 10' feet past the last heating/cooling unit on the common supply header before any takeoffs.
- The well's threaded locknut should hold the Sensor Enclosure Base in place.
- Insert the sensor into the well and connect the sensor wires to the upper terminals as show in "Figure 1".
- Snake the extension cable through a knockout and connect the wires to the lower terminals as shown in "Figure 1".
- Screw the Sensor Enclosure Cover to the Base.
- When the control is powered, check for sensor temperature reading.
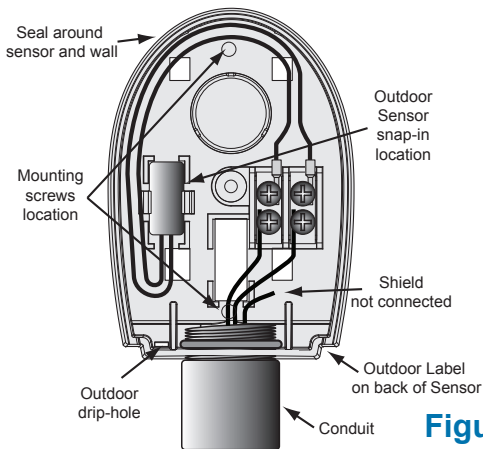
Outdoor Sensor

Seal around sensor and wall

Mounting screws location

Outdoor drip-hole

Outdoor Sensor snap-in location

Shield not connected

Outdoor Label on back of Sensor

Conduit

Figure 2

Strap-On Sensor

System Strap-On Sensor

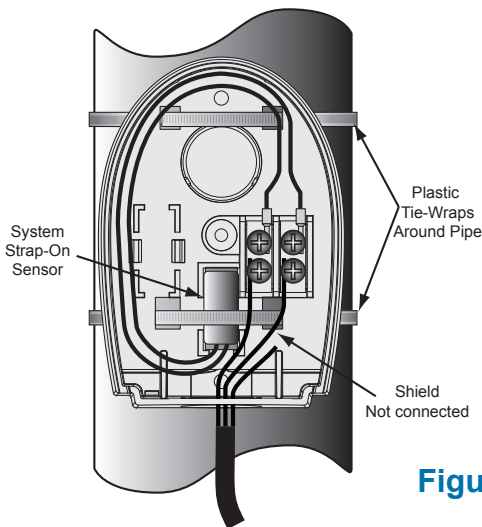Plastic Tie-Wraps Around Pipe

Shield Not connected

Figure 3

Outdoor Sensor Installation
- Locate the sensor in the shade on the north side of the building. The sensor should away from doors, windows, exhaust fans, vents, or other possible heat sources and away from direct sunlight.
- The sensor should be mounted approximately 10' feet above ground.
- Adhere the Outdoor Label provided to the back of the sensor base.
- Use the Enclosure Base bottom knockout for the conduit. Use the locknut to hold the conduit and enclosure base together.
- If screws are used to affix the enclosure to the wall, make sure to seal around the sensor and wall except from the bottom.
- The sensor should be secured to the base as shown in "Figure 2".
- Connect the sensor wires to the upper terminals.
- Connect the extension cable wires to the lower terminals.
- Screw the Sensor Enclosure Cover to the Base.
- When the control is powered, check for sensor temperature reading.

⚠ ALERT
Determining the proper location for the Outdoor Sensor is very important. The heating control will base its operation on the outdoor temperature information it receives from this location. If the sensor is in the sun or covered with ice, its reading will be different from the actual outdoor temperature.

Strap-On Sensor Installation
- For accurate system temperature reading, place the sensor approximately 10' feet past the last heating/cooling unit on the common supply header before any takeoffs.
- Insert the sensor in the middle bottom opening making sure that the concave side of the sensor is facing and touching the pipe.
- Use the provided tie-wraps to hold the sensor and base in place while tying it to the pipe as shown in "Figure 3".
- Connect the sensor wires to the upper terminals as show in "Figure 3".
- Snake the extension cable through the bottom knockouts and connect the wires to the lower terminals.
- Screw the Sensor Enclosure Cover to the Base.
- When the control is powered, check for sensor temperature reading.

Troubleshooting
Display shows Sensor OPEN
Check the sensor is connected and the wires are continuous to the control. Short the sensor terminals at the control. The display should read SHORT. If it does not, the control may be damaged.

Display shows Sensor SHORT
Remove the wires from the sensor terminals. The display should change to read OPEN. If it does not, the control may be damaged.

Display shows an Incorrect Temperature Display
Remove the wires from the input terminals. The display should change to read Open. If it doesn't, the control may be damaged. Otherwise, take an ohm reading across the detached sensor wires. The ohm reading should correspond to the Temperature Sensor Ohm Values Table. If the difference is within 5°F adjust the Trim of the sensor. Otherwise, the sensor may be damaged.

250°F/120°C Temperature Sensor Chart

TEMPERATURE		Value (in Ohms)	TEMPERATURE		Value (in Ohms)
°F	°C		°F	°C	
OPEN		150000	90	32	3667
-30	-34	117720	100	38	2914
-20	-29	82823	110	43	2332
-10	-23	59076	120	49	1879
0	-18	42683	130	54	1524
10	-12	31215	140	60	1243
20	-7	23089	150	66	1021
25	-4	19939	160	71	842
30	-1	17264	170	77	699
35	2	14985	180	82	583
40	4	13040	190	88	489
45	7	11374	200	93	412
50	10	9944	210	99	349
55	13	8714	220	104	297
60	16	7653	230	110	253
70	21	5941	240	116	217
80	27	4649	250	121	187
			SHORT		100