

# Uponor

RADIANT HEATING SYSTEMS

PRO SERIES SENSORS

## INSTRUCTION SHEET

### Introduction

#### Outdoor Sensor

The Uponor Outdoor Sensor (A3060070) includes a 10 kΩ thermistor which provides an accurate measurement of the outdoor temperature. The sensor is protected by a white UV-resistant PVC plastic enclosure.

#### Universal Sensor

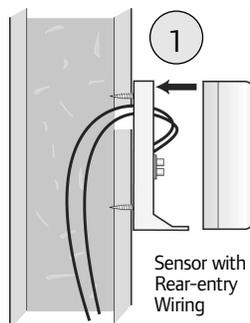
The Uponor Universal Sensor (A3060071) has a zinc sleeve for fast response and a wide operating range. It is supplied with 30 inches (750mm) of 2-conductor wire.

### Installing the Outdoor Sensor

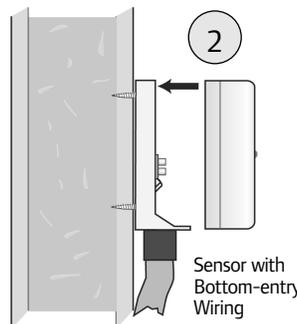
#### Mounting the Outdoor Sensor

**Note:** The temperature sensor (thermistor) is built into the Outdoor Sensor enclosure.

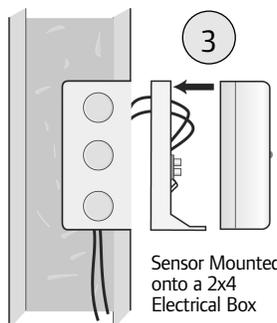
1. Remove the screw and pull the front cover off the sensor enclosure.



2. Mount the Outdoor Sensor directly onto a wall or a 2x4 electrical box. When wall-mounting the Outdoor Sensor, ensure the wiring enters through the back or bottom of the enclosure. Do not mount the Outdoor Sensor with the conduit knockout facing up as rain could enter the enclosure and damage the sensor.

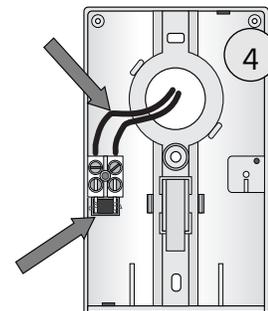


3. It may be necessary to install an insulating barrier behind the enclosure to prevent the sensor reading from being affected by heat transmitted through the wall.



4. Mount the Outdoor Sensor on an exterior wall, which best represents

actual outdoor temperature (a north-facing wall). Do not expose the sensor to heat sources such as solar gain, exhaust ventilation or window openings.



Mounting the Sensor

5. Install the Outdoor Sensor at an elevation above the ground that will prevent accidental damage or tampering, typically under an eave.

#### Wiring and Testing the Outdoor Sensor

1. Connect 18 AWG or similar wire to the two terminals provided in the enclosure and run the wires from the Outdoor Sensor to the control.



**Caution:** Do not run the wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference, use shielded cable or twisted pair, or run the wires in a grounded metal conduit. If using shielded cable, connect the shield wire to the Com terminal on the control and not to the ground.

If the sensor wires are located in an area with strong sources of electromagnetic interference, use shielded cable or twisted pair, or run the wires in a grounded metal conduit. If using shielded cable, connect the shield wire to the Com terminal on the control and not to the ground.

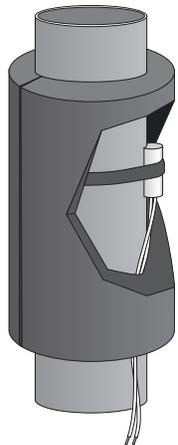
2. Follow the sensor testing instruction in this instruction sheet, and connect the wires to the control.
3. Replace the front cover of the sensor enclosure.

## Installing the Universal Sensor

### Mounting the Universal Sensor

**Note:** These sensors are designed to mount on a pipe or in a temperature immersion well.

1. Strap the Universal Sensor directly to the pipe using the cable tie provided.
2. Place insulation around the sensor to reduce the effect of air currents on the sensor measurement.



**Note:** The stiff wire of the Universal Sensor allows it to be inserted into deep temperature wells such as those found on domestic hot water (DHW) tanks.

3. Place the Universal Sensor downstream from a pump or after an elbow or similar fitting. This is especially important if large diameter pipes are used because the thermal stratification within the pipe can result in erroneous sensor readings. Proper sensor location requires that the fluid is thoroughly mixed within the pipe before it reaches the sensor.

4. The Universal Sensor may also be used to measure slab temperature. The stiff wire of the Universal Sensor allows it to be inserted into a conduit with a minimum ½" (12mm) internal diameter (i.d.). It is also possible to push the sensor around gentle bends in the conduit.

### Wiring and Testing the Universal Sensor



**Caution:** Do not run sensor wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference, use shielded cable or twisted pair, or run the wires in a grounded metal conduit. If using shielded cable, connect the shield wire to the Com terminal on the control and not to the ground.

**Note:** If using a Universal Sensor Enclosure 080 (available from tekmar®) to mount the Uponor Universal Sensor, follow the installation instructions provided below.

1. Without the Universal Sensor Enclosure 080, it is necessary to connect 18 AWG wire to the two sensor wires. Wire nuts can be used to hold the wires together.
2. Follow the sensor testing instructions outlined in this instruction sheet, and then connect the wires to the control.

### Installing the Universal Sensor Enclosure 080

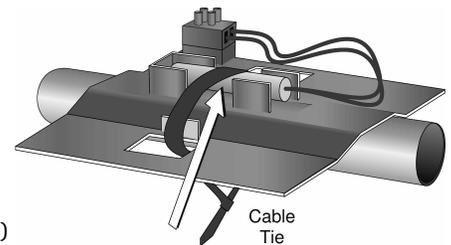
(Available from tekmar®)



If the sensor wires are run in conduit, a Universal Sensor Enclosure 080 is suitable to mount the sensor and provide a connection for the conduit.

### Mounting the Universal Sensor Enclosure 080 Directly to a Pipe

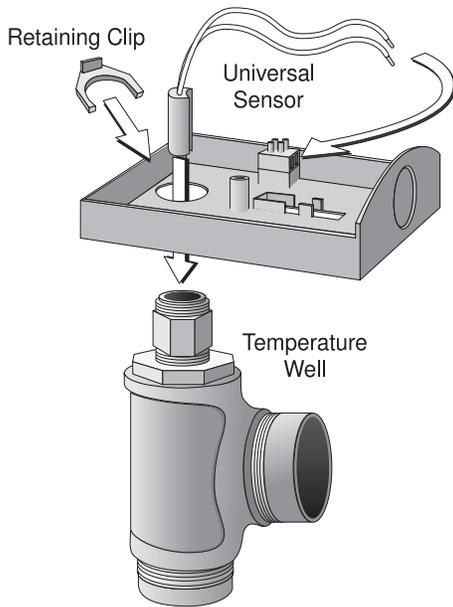
1. Place the Uponor Universal Sensor into the sensor block with the flat side of the sensor facing the pipe.
2. Strap the sensor and enclosure onto a 1 to 4" (25 to 100mm) diameter pipe with the cable tie provided. Make sure there is good contact between the sensor and the pipe.



3. Connect the sensor wires to the terminal block in the enclosure.
4. Use the other side of the terminal block to connect the wires from the control.
5. You can use the Universal Sensor to measure slab temperature. The stiff wire of the Universal Sensor allows it to be inserted into a conduit with a minimum ½" (12mm) i.d. It is also possible to push the sensor around gentle bends in the conduit.

### Mounting a Temperature Well

If mounting an Uponor Universal Sensor onto 1-inch (25mm) diameter L-type copper pipe, expect about an eight-second delay between a sudden change in water temperature and the time the sensor measures the temperature change. This delay increases considerably when using mild steel (black iron) pipe. In general, use a temperature well for steel pipe with a diameter greater than 1¼ inches (32mm).



1. To install the well, plumb a 'T' into the pipe, and fix the well into the T.
2. Remove the 3/8" (22mm) back knockout from the enclosure and fit the enclosure over the temperature well.
3. Insert the Universal Sensor into the well, and snap the enclosure retaining clip onto the well end groove. If the well has a threaded end, supply a standard threaded conduit retaining ring.
4. Connect the two wires from the sensor to the terminal block provided in the enclosure. Use the other side of the terminal block to connect the wires from the control.

Temperature wells are also recommended when large diameter pipes are used and fluid stratification is present. The Uponor Universal Sensor and the tekmar Universal Sensor Enclosure 080 are specifically designed to mount onto a 3/8-inch (10mm) i.d. temperature well that is supplied with an end groove.

### Sensor Testing Instructions

Use a good quality test meter capable of measuring up to 5,000 k  $\Omega$  (1 k  $\Omega$  = 1000  $\Omega$ ) to measure the sensor resistance. In addition, measure the actual temperature with a good quality digital thermometer.

If a thermometer is not available, place a second sensor beside the one to be tested and compare the readings.

1. Measure the temperature using the thermometer, and then measure the resistance of the sensor at the control.

**Note:** The wires from the sensor should not be connected to the control while performing the test.

2. Using the information in **Table 1**, estimate the temperature measured by the sensor. The sensor and thermometer readings should be close. If the test meter reads a very high resistance, this may indicate a broken wire, a poor wiring connection or a defective sensor. If the resistance is very low, this may indicate a wiring short, moisture in the sensor or a defective sensor. To test for a defective sensor, measure the resistance directly at the sensor location.

**Note:** Do not apply voltage to a sensor at any time as it may cause damage to the sensor.

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

Table 1: Temperature and Resistance Table

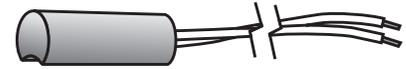
## Technical Data

### Outdoor Sensor

Literature	pro Series Sensors Instruction Sheet
Package Weight	0.35 lb. (160 g), Enclosure E, white PVC plastic
Dimensions	4½" H x 2¼" W x 1½" D (73 x 114 x 38mm)
Approvals	CSA C US, UL listed
Operating Range	-60 to 140°F (-50 to 60°C)
Sensor	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C), β=3892

### Universal Sensor

Literature	pro Series Sensors Instruction Sheet
Package Weight	0.08 lb. (35 g), zinc sleeve, 30" (762mm) 20 AWG XPE wire
Dimensions	¾" o.d. x ¾" (9.5 o.d. x 19mm)
Approvals	CSA C US, UL listed
Operating Range	-60 to 255°F (-50 to 125°C)
Sensor	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C), β=3892



**Uponor, Inc.**  
5925 148th Street West  
Apple Valley, MN 55124  
Tel: (800) 321-4739  
Fax: (952) 891-1409  
**Web: [www.uponor-usa.com](http://www.uponor-usa.com)**  
**E-mail: [learnmore@uponor-usa.com](mailto:learnmore@uponor-usa.com)**

**Uponor Ltd.**  
655 Park Street  
Regina, SK S4N 5N1  
Tel (888) 994-7726  
Fax (800) 638-9517  
**Web: [www.uponor.ca](http://www.uponor.ca)**  
**E-mail: [info@uponor.ca](mailto:info@uponor.ca)**

**uponor**