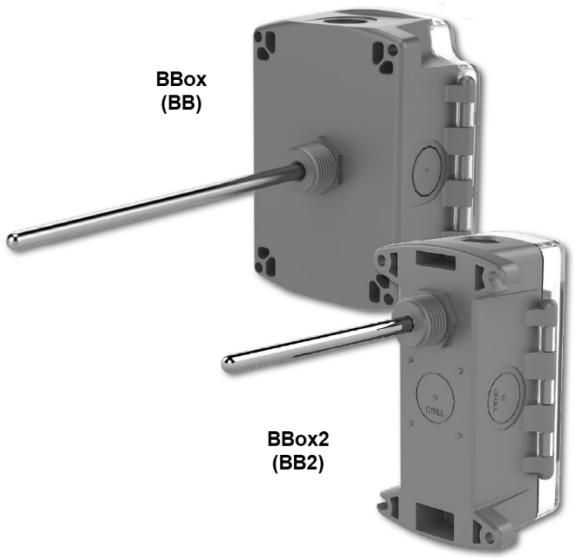
Identification and Overview

Immersion Temperature Sensors

The Immersion Sensors are made for thermowell mounting and temperature measurement in water pipes, water tanks or cooling tower sump applications. The probe is made of Stainless Steel and made in different lengths for a custom thermowell fit. The units are available with multiple thermistors or RTDs as shown in the specifications. Enclosure mounting styles come in plastic or metal for both NEMA 1 and NEMA 4 applications and are all plenum rated.



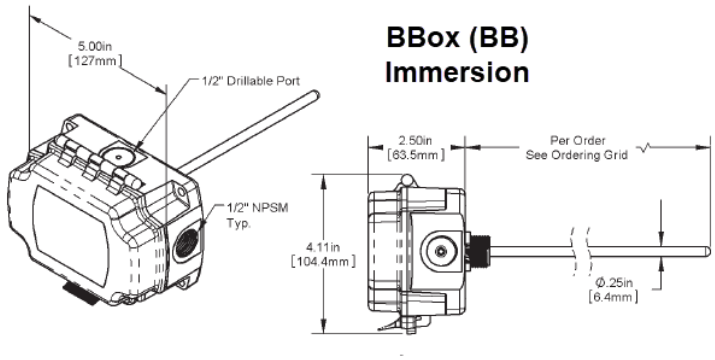
Part #s:

N1-10K-2[XP]-I-2-BB2-A	**N1-10K-2[XP]-I-4-BB2-A**
N1-10K-2[XP]-I-8-BB2-A	**N1-10K-2-I-2-BB2-MB-A**
N1-10K-2-I-2-BB4-M304-A	**N1-10K-2-I-2-BB-A**
N1-10K-2-I-2-BB-M304-A	**N1-10K-2-I-2-BB-MB-A**
N1-10K-2-I-2-WP-A	**N1-10K-2-I-2-WP-M304-A**
N1-10K-2-I-4-BB4-DUAL-A	**N1-10K-2-I-4-BB4-M304-A**
N1-10K-2-I-4-BB4-MB-A	**N1-10K-2-I-4-BB-A**
N1-10K-2-I-4-BB-M304-A	**N1-10K-2-I-4-WP-A**
N1-10K-2-I-4-WP-M304-A	**N1-10K-2-I-8-BB4-M304-A**
N1-10K-2-I-8-BB-A	**N1-10K-2-I-8-BB-M304-A**
N1-10K-2-I-8-WP-M304-A	**N1-10K-2-I-8-BB2-M304-A**

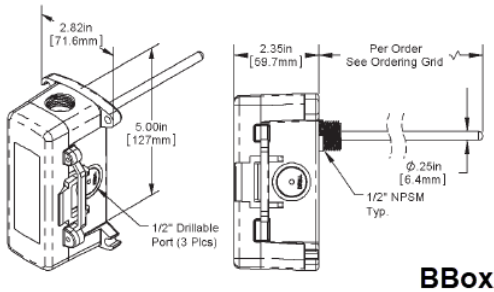
Specifications

Sensor: Passive
Thermistor ..... 2 wire
RTD ..... 2 or 3 wire
Thermistor: Thermal resistor (NTC)
Temp. Output ..... Resistance Per Order1
Accuracy ..... (std) ±0.36ºF, (±0.2ºC)
Accuracy ..... (Hi) ±0.18ºF, (±0.1ºC), [XP] option
Stability..... 0.036ºF/Year, (<0.02ºC/Year)
Heat dissipation..... 2.7 mW/ºC
Temp. Drift ..... <0.02ºC per year
Probe range-40º to 221ºF (-40º to 105ºC)
RTD: Resistance Temp Device (PTC)
Platinum (Pt) ..... 100Ω and 1KΩ @0ºC, 385 curve
Platinum (Pt) ..... 1KΩ @0ºC, 375 curve
Pt Accuracy (Std) ... 0.12% @Ref, or ±0.55ºF, (±0.3ºC)
Pt Accuracy (Hi) ..... 0.06% @Ref, or ±0.277ºF, (±0.15ºC), [A]option
Pt Stability ..... ±0.25ºF, (±0.14ºC)
Pt Self Heating ..... 0.4 ºC/mW @0ºC
Pt Probe range ..... -40º to 221ºF, (-40 to 105ºC)
Nickel (Ni)..... 1000Ω @70ºF, JCI curve
Ni Probe range ..... -40º to 221ºF (-40 to 105ºC)
Sensitivity: Approximate @ 32ºF (0ºC)
Thermistor ..... Non-linier
RTD (Pt) ..... 3.85Ω/ºC for 1KΩ RTD, 0.385Ω/ºC for 100Ω RTD
Nickel (Ni)..... 2.95Ω/ºF for the JCI RTD
Lead Wire: 22awg stranded
Insulation: Etched Teflon, Plenum rated
Probe: Rigid, 304 Stainless Steel, 0.25" OD
Mounting: ½" NPSM Plastic Threads
Enclosure Types
Weather Proof ..... WP, w/ two ½" FNPT entries, (Bell box)
BBox..... BB, w/four ½" NPSM & one ½" drill-out
BBox2..... BB2, w/three ½" NPSM & three ½" drill-outs
BBox4:..... BB4, w/ three ½" drill-outs & one ½" open port
Enclosure Ratings
Weather Proof ..... WP, NEMA 3R, IP14
BBox..... BB, NEMA 4X, IP66
BBox2..... BB2, NEMA 4X, IP66
BBox4..... BB4, IP10, (IP44 with Knockout Plug in the open port)
Probe Length: 2", 4", 8" or custom per order
Enclosure Materials
Weather Proof ..... WP, Cast Aluminum, UV rated
BBox..... BB, Polycarbonate, UL94V-0, UV rated
BBox2..... BB2, Polycarbonate, UL94V-0, UV rated
BBox4:..... BB4, Polycarbonate & Nylon, UL94V-0
Ambient (Encl.): 0 to 100% RH, Non-condensing
BBoxes ..... BB, BB2, BB4, -40 to 185ºF, (-40 to 85ºC)
Weatherproof..... WP, -40 to 212ºF, (-40 to 100ºC)
Agency
RoHS, *CE
PT=DIN43760, IEC Pub 751-1983, JIS C1604-1989
*Passive Thermistors 20KΩ and smaller are CE compliant

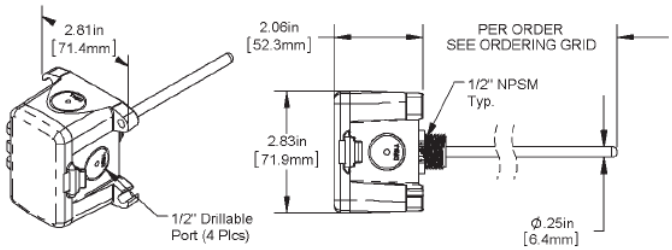
Dimensional Drawing



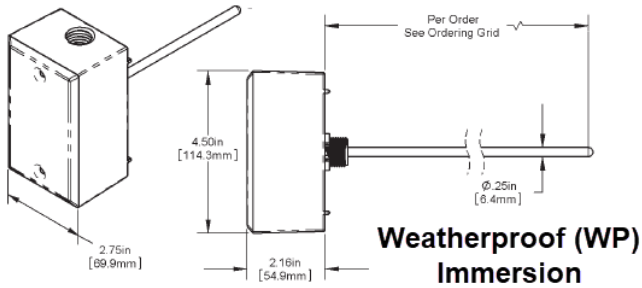
BBox (BB) Immersion



BBox2 (BB2) Immersion



BBox4 (BB4) Immersion



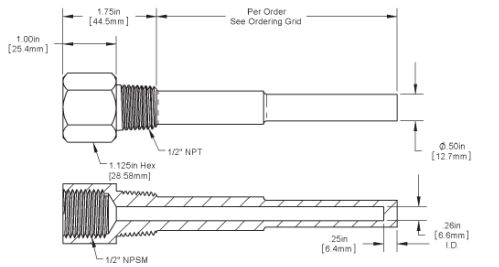
Weatherproof (WP) Immersion

Mounting

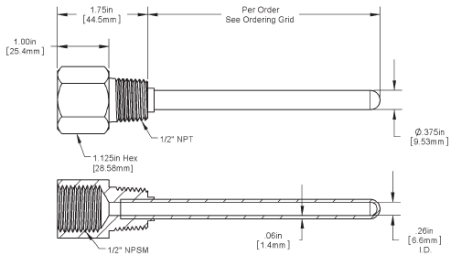
Application: The Typical Installation Identification and Dimensions figure shows a typical four-inch thermowell and four-inch immersion probe installed into an eight inch pipe. In a properly insulated pipe with liquid or steam, the temperature is essentially the same across the entire cross section of the pipe. Usually thermowells are sized to extend to the center of the pipe; however, shorter thermowells will give proper temperature readings if properly insulated. The shorter thermowells are used in pipes with high flow velocities.

Thermowell Installer: Typically a Pipe Fitter drills a ¾-inch hole into the pipe where the thermowell is needed. A customer provided fitting, called a Threadolet or Weldolet, is welded to the pipe over the hole. The Threadolet has a ½" NPT thread in the center. Thread sealant such as Teflon tape or pipe dope is applied to the ½" NPT threads of the thermowell. The thermowell is then inserted into the Threadolet and tightened.

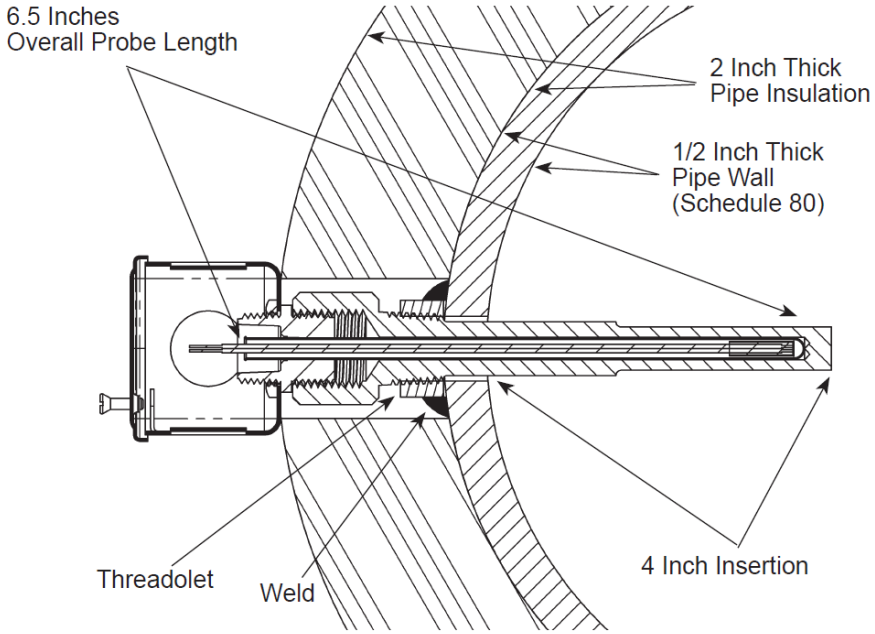
Sensor Installation: Insert the immersion sensor into the well with the plastic screw fitting into the opening on the well. Hand tighten the immersion sensor snugly without too much torque. Make sure that the tip of the immersion sensor is in contact with the bottom of the well by pushing on the top of the probe, without damaging the wires, to bottom out the probe in the thermowell. The unit is designed so that the temperature probe slides in the junction box as the sensor hits the bottom of the thermowell.



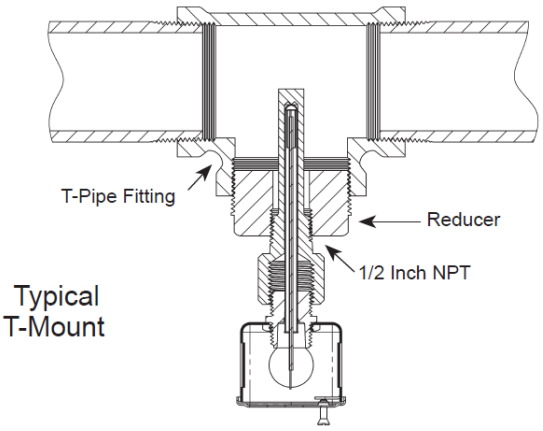
Machined Bar Stock Thermowell



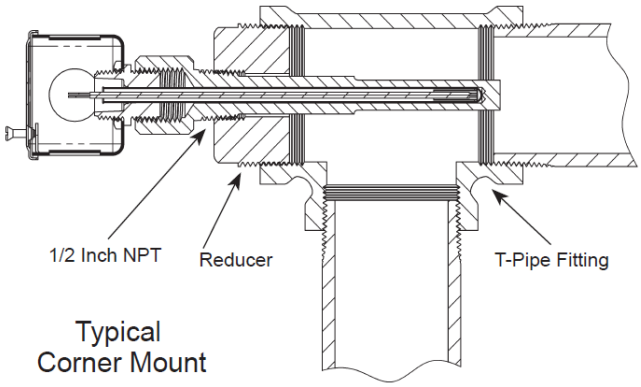
Two Part Welded Thermowell



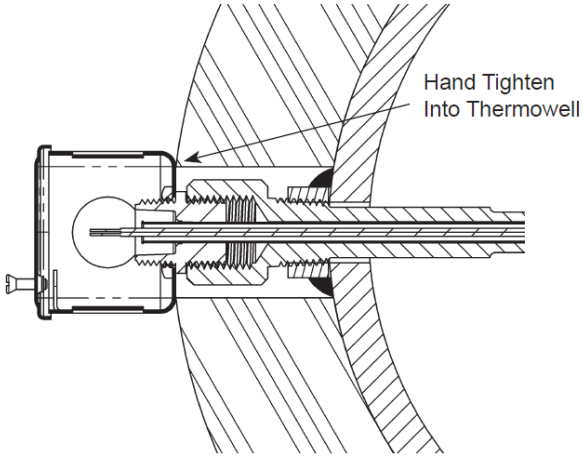
Typical Installation Identification and Dimensions



Typical
T-Mount



Typical
Corner Mount



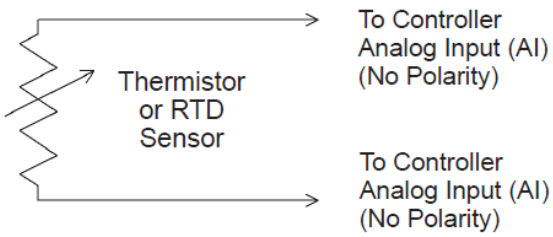
Typical Sensor Inserted

Wiring and Termination

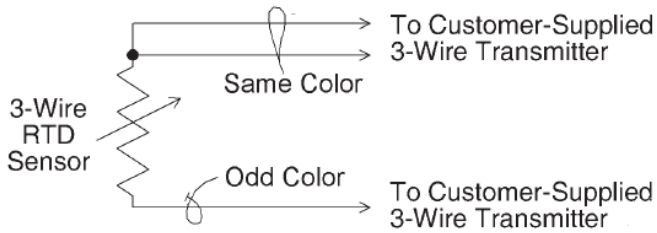
All wiring must comply with the National Electric Code (NEC) and local codes.

Caution	Do NOT run this device's wiring in the same conduit as high or low voltage AC power wiring. Tests show that inaccurate signal levels are possible when AC power wiring is present in the same conduit as the sensor wires.

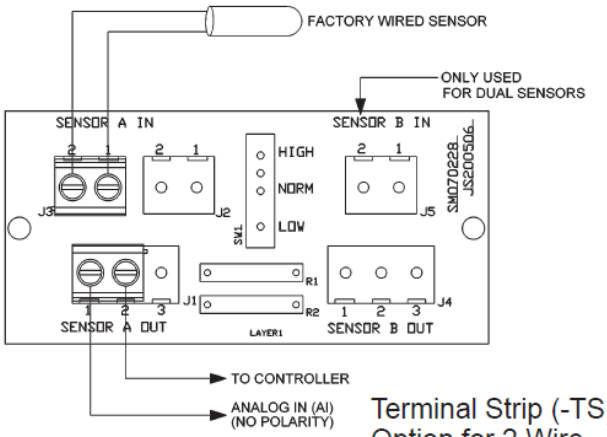
Tip	We recommend using twisted pair of at least 22AWG and sealant filled connectors for all wire connections. Larger gauge wire may be required for long runs.



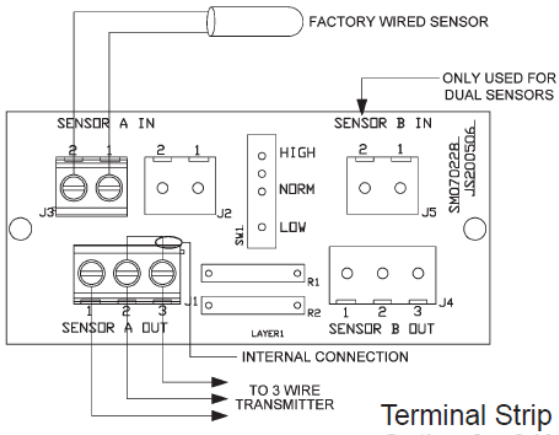
2 Wire Termination for Thermistor or RTD



3 Wire Termination for RTD



Terminal Strip (-TS) Option for 2 Wire Sensors Termination



Terminal Strip (-TS) Option for 3 Wire Sensors Termination

Diagnostics

Possible Problems:	Possible Solutions:
Controller reports higher or lower than actual temperature.	• Confirm the input is set up correctly in the front end software • Check wiring for proper termination & continuity. (shorted or open) • Measure the temperature at the temperature sensor's location using an accurate temperature standard. Disconnect the temperature sensor wires and measure the temperature sensor's resistance with an ohmmeter. Compare the temperature sensor's resistance to the appropriate temperature sensor table.

Appendix – Symbols Key

 **Warning**	Potential for death, serious injury, or permanent damage to a system.
 **Caution**	Potential for injury, damage to a system, or system failure.
 **Tip**	Useful information not related to injury or system damage.