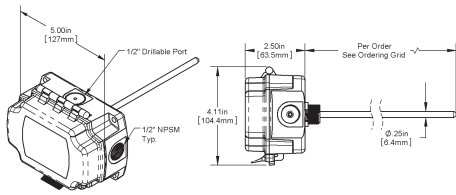
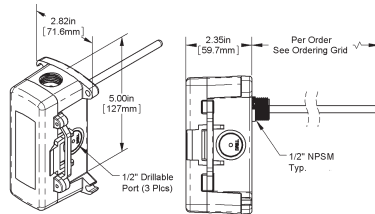


### Overview and Identification

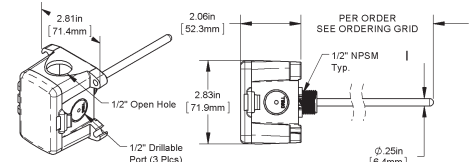
The Immersion Sensor is made for thermowell mounting and temperature measurement in water pipes, water tanks or cooling tower sump applications. The rigid probe is made of Stainless Steel and made in different lengths for a custom thermowell fit. The unit is available with multiple thermistor's or RTD's 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.



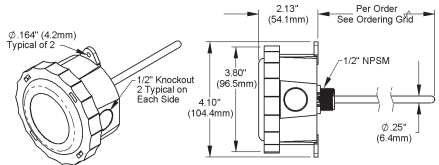
**Fig 1: BAPI-Box (BB) Immersion**



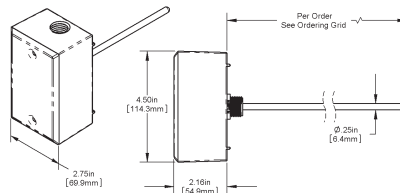
**Fig 2: BAPI-Box 2 (BB2) Immersion**



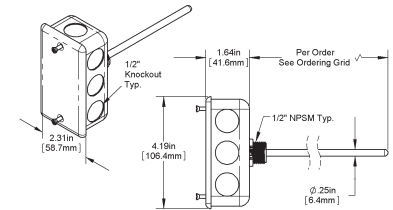
**Fig 3: BAPI-Box 4 (BB4) Immersion**  
(A Pierceable Knockout Plug is available from BAPI for the open port in the BB4. Part #BA/ PKP-100)



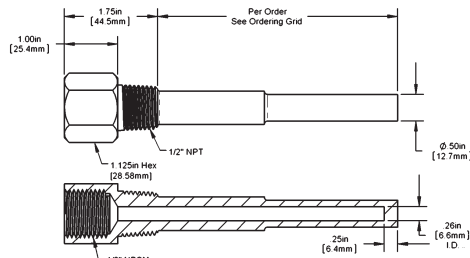
**Fig 4: Weather Tight (EU) Immersion**



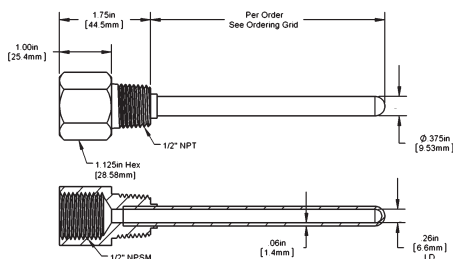
**Fig 5: Weatherproof (WP) Immersion**



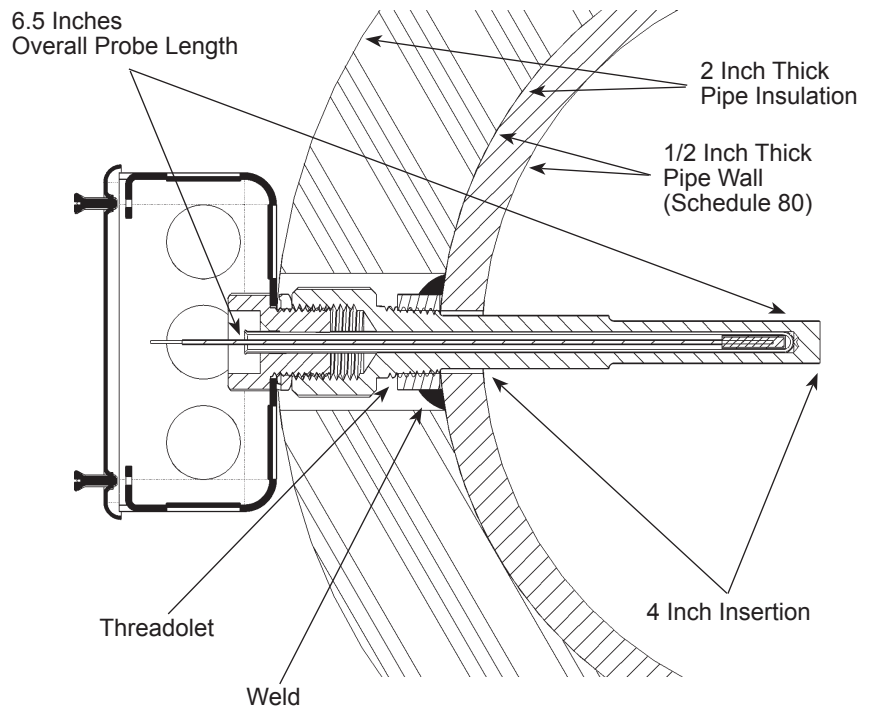
**Fig 6: J-Box Immersion (Standard)**



**Fig 7: Machined Bar Stock ThermoWell**



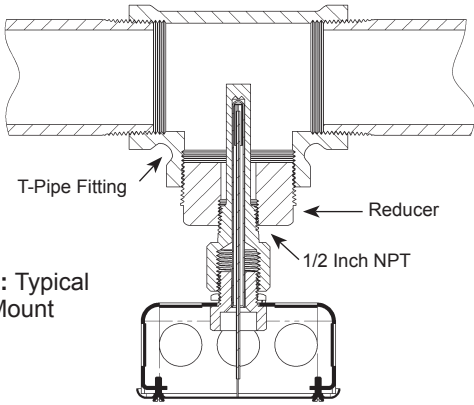
**Fig 8: Two Part Welded Well**



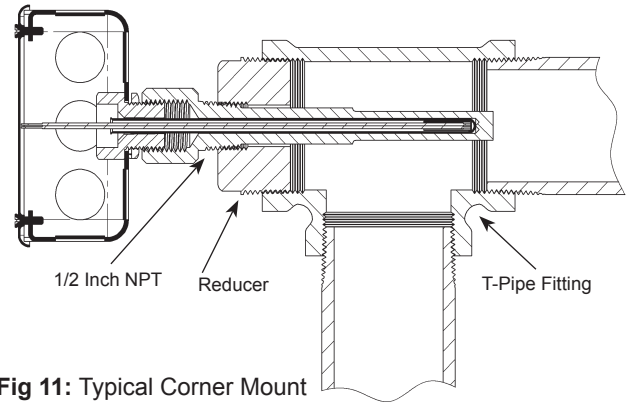
**Fig 9: Typical Installation Identification and Dimensions**

Specifications subject to change without notice.

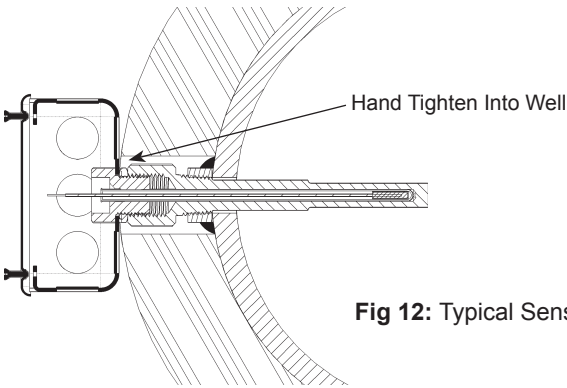
### Mounting



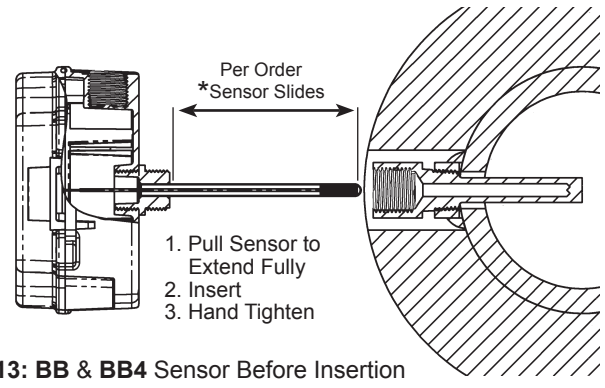
**Fig 10: Typical T-Mount**



**Fig 11: Typical Corner Mount**

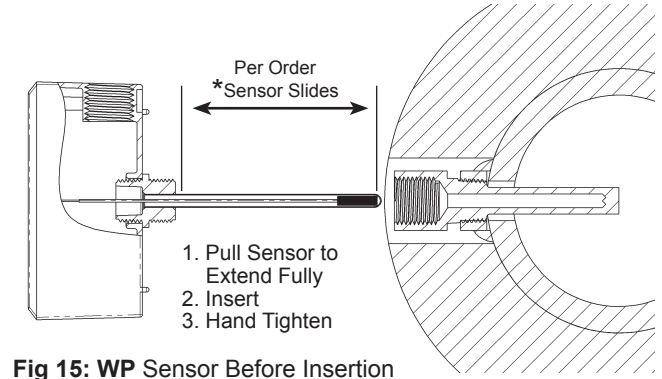
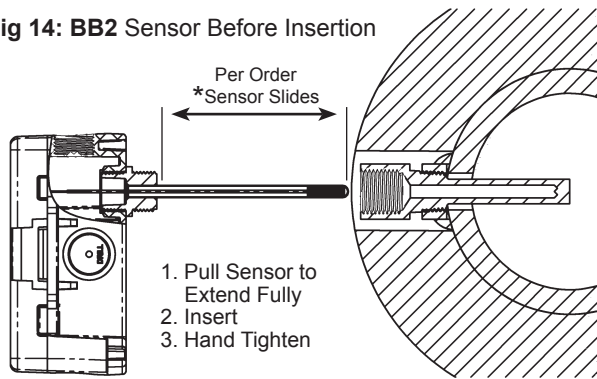


**Fig 12: Typical Sensor Inserted**

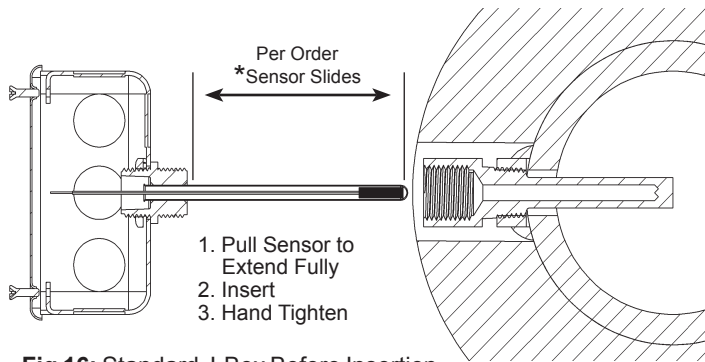


**Fig 13: BB & BB4 Sensor Before Insertion**

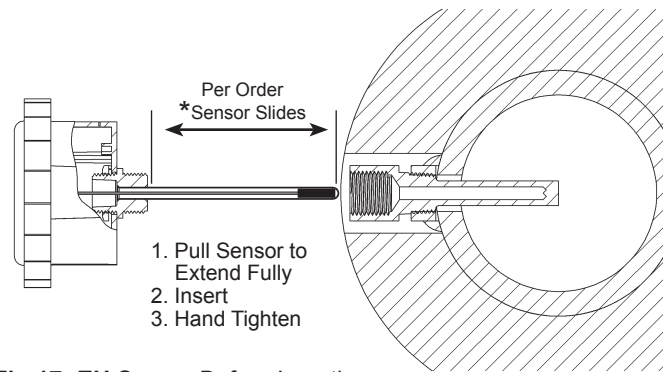
**Fig 14: BB2 Sensor Before Insertion**



**Fig 15: WP Sensor Before Insertion**



**Fig 16: Standard J-Box Before Insertion**



**Fig 17: EU Sensor Before Insertion**

\*As the box is hand screwed, the probe will push into the box as the probe tip bottoms out in the well. The probe can slide up to 1.6 inches.

Specifications subject to change without notice.

### Mounting continued...

- Application:** Figure 9 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. See Application notes "Thermowells Explained" on our web site BAPIHVAC.com
- Thermowell Installer:** Typically a Pipe Fitter drills a 3/4-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 1/2" NPT thread in the center. Thread sealant such as Teflon tape or pipe dope is applied to the 1/2" NPT threads of the thermowell. The thermowell is then inserted into the Threadolet and tightened. Estimates on insertion depths can be seen in our Application note "Thermowells Explained" on our web site BAPIHVAC.com
- 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 well.

### Wiring & Termination

BAPI recommends using twisted pair of at least 22AWG and sealant filled connectors for all wire connections. Larger gauge wire may be required for long runs. All wiring must comply with the National Electric Code (NEC) and local codes. Do NOT run this device's wiring in the same conduit as high or low voltage AC power wiring.

BAPI's tests show that inaccurate signal levels are possible when AC power wiring is present in the same conduit as the sensor wires.

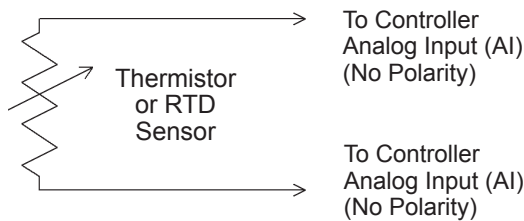


Fig. 18: 2 Wire Lead Wire Termination for Thermistor or RTD

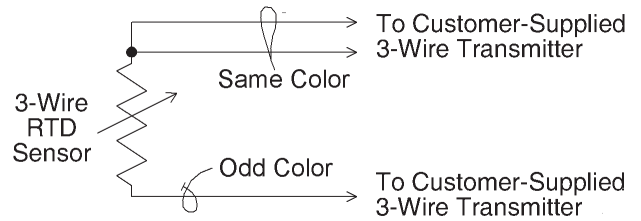


Fig. 19: 3 Wire Lead Wire Termination for RTD

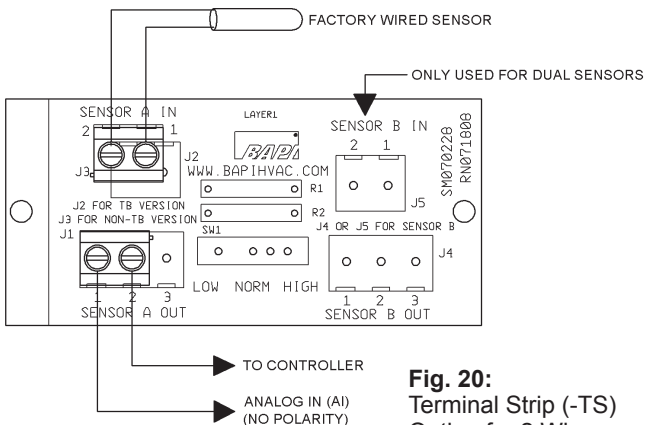


Fig. 20: Terminal Strip (-TS) Option for 2 Wire Sensors Termination

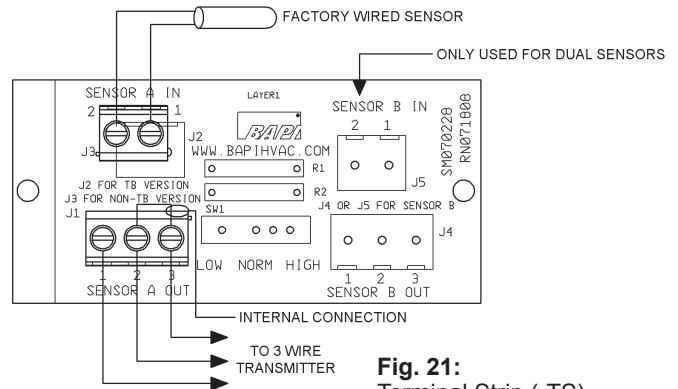


Fig. 21: Terminal Strip (-TS) Option for 3 Wire Sensors Termination

Specifications subject to change without notice.

**Diagnostics****Problems:**

Controller reports higher or lower than actual temperature.

**Possible Solutions:**

- Confirm the input is set up correctly in the front end software
- Check wiring for proper termination & continuity. (shorted or open)
- Disconnect wires and measure sensor resistance and verify the "Sensor" output is correct.

**Specifications**

<b>Sensor:</b>	Passive	<b>Mounting</b>	1/2" NPSM Plastic Threads
Thermistor,	2 wire	<b>Enclosure Types</b>	
RTD,	2 or 3 wire	J-Box	<b>-JB</b> , w/eight 1/2" knockouts
<b>Thermistor</b>	Thermal resistor (NTC)	No Box	<b>-NB</b> , intended for open wiring
Temp. Output	Resistance Per Order 1	Weather Proof	<b>-WP</b> , w/ two 1/2" FNPT entries, (Bell box)
Accuracy	(std) $\pm 0.36^{\circ}\text{F}$ , ( $\pm 0.2^{\circ}\text{C}$ )	BAPI-Box	<b>-BB</b> , w/four 1/2" NPSM & one 1/2" drill-out
Accuracy	(Hi) $\pm 0.18^{\circ}\text{F}$ , ( $\pm 0.1^{\circ}\text{C}$ ), <b>[XP]</b> option	BAPI-Box 2	<b>-BB2</b> , w/three 1/2" NPSM & three 1/2" drill-outs
Stability	0.036 $^{\circ}\text{F}/\text{Year}$ , ( $< 0.02^{\circ}\text{C}/\text{Year}$ )	BAPI-Box 4:	<b>-BB4</b> , w/ three 1/2" drill-outs & one 1/2" open port
Heat dissipation	2.7 mW/ $^{\circ}\text{C}$	Weather Tight	<b>-EU</b> , <b>-EUO</b> , w/two 1/2" knockouts
Temp. Drift	$< 0.02^{\circ}\text{C}$ per year	<b>Enclosure Ratings</b>	
Probe range	$-40^{\circ}$ to $221^{\circ}\text{F}$ ( $-40^{\circ}$ to $105^{\circ}\text{C}$ )	J-Box	<b>-JB</b> , NEMA 1
<b>RTD</b>	Resistance Temp Device (PTC)	No Box	<b>-NB</b> , No rating
Platinum (Pt)	100 $\Omega$ and 1K $\Omega$ @ $0^{\circ}\text{C}$ , 385 curve	Weather Proof	<b>-WP</b> , NEMA 3R, IP14
Platinum (Pt)	1K $\Omega$ @ $0^{\circ}\text{C}$ , 375 curve	BAPI-Box	<b>-BB</b> , NEMA 4X, IP66
Pt Accuracy (Std)	0.12% @Ref, or $\pm 0.55^{\circ}\text{F}$ , ( $\pm 0.3^{\circ}\text{C}$ )	BAPI-Box 2	<b>-BB2</b> , NEMA 4X, IP66
Pt Accuracy (Hi)	0.06% @Ref, or $\pm 0.277^{\circ}\text{F}$ , ( $\pm 0.15^{\circ}\text{C}$ ), <b>[A]</b> option	BAPI-Box 4	<b>-BB4</b> , IP10 (IP44 with Knockout Plug in the open port)
Pt Stability	$\pm 0.25^{\circ}\text{F}$ , ( $\pm 0.14^{\circ}\text{C}$ )	Weather Tight	<b>-EU</b> , NEMA 4X, IP66
Pt Self Heating	0.4 $^{\circ}\text{C}/\text{mW}$ @ $0^{\circ}\text{C}$	Weather Tight	<b>-EUO</b> , NEMA 4X, IP66, UV rated
Pt Probe range	$-40^{\circ}$ to $221^{\circ}\text{F}$ , ( $-40$ to $105^{\circ}\text{C}$ )	<b>Enclosure Materials</b>	
Nickel (Ni)	1000 $\Omega$ @ $70^{\circ}\text{F}$ , JCI curve	J-Box	<b>-JB</b> , Galvanized steel, UL94H-B
Ni Probe range	$-40^{\circ}$ to $221^{\circ}\text{F}$ ( $-40$ to $105^{\circ}\text{C}$ )	No Box	<b>-NB</b> , Nylon 66, UL94H-B
<b>Sensitivity</b>	Approximate @ $32^{\circ}\text{F}$ ( $0^{\circ}\text{C}$ )	Weather Proof	<b>-WP</b> , Cast Aluminum, UV rated
Thermistor	Non-linear – Go to bapihvac.com click "Sensor Specs"	BAPI-Box	<b>-BB</b> , Polycarbonate, UL94V-0, UV rated
RTD (Pt)	3.85 $\Omega/^{\circ}\text{C}$ for 1K $\Omega$ RTD	BAPI-Box 2	<b>-BB2</b> , Polycarbonate, UL94V-0, UV rated
Nickel (Ni)	0.385 $\Omega/^{\circ}\text{C}$ for 100 $\Omega$ RTD	BAPI-Box 4:	<b>-BB4</b> , Polycarbonate & Nylon, UL94V-0
	2.95 $\Omega/^{\circ}\text{F}$ for the JCI RTD	Weather Tight	<b>-EU</b> , ABS Plastic, UL94V-0
<b>Lead wire</b>	22awg stranded	Weather Tight	<b>-EUO</b> , ABS Plastic, UL94V-0, UV rated
<b>Insulation</b>	Etched Teflon, Plenum rated	<b>Ambient (Encl.)</b>	0 to 100% RH, Non-condensing
<b>Probe</b>	Rigid, 304 Stainless Steel, 0.25" OD	All BAPI-Boxes	<b>-BB</b> , <b>BB2</b> , <b>BB4</b> , $-40^{\circ}\text{F}$ to $185^{\circ}\text{F}$ , ( $-40^{\circ}$ to $85^{\circ}\text{C}$ )
<b>Probe Length</b>	2", 4", 8" or custom per order	Weather Tight	<b>-EUO</b> , <b>EU</b> , $-40^{\circ}\text{F}$ to $185^{\circ}\text{F}$ , ( $-40^{\circ}$ to $85^{\circ}\text{C}$ )
		J-Box & No Box	<b>-JB</b> , <b>NB</b> , $-40^{\circ}\text{F}$ to $212^{\circ}\text{F}$ , ( $-40^{\circ}$ to $100^{\circ}\text{C}$ )
		Weatherproof	<b>-WP</b> , $-40^{\circ}\text{F}$ to $212^{\circ}\text{F}$ , ( $-40^{\circ}$ to $100^{\circ}\text{C}$ )
		<b>Agency</b>	RoHS, *CE PT=DIN43760, IEC Pub 751-1983, JIS C1604-1989  *Passive Thermistors 20K $\Omega$ and smaller are CE compliant

Specifications subject to change without notice.