

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 probe is made of Stainless Steel and made in different lengths for a custom thermowell fit. The unit is 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.

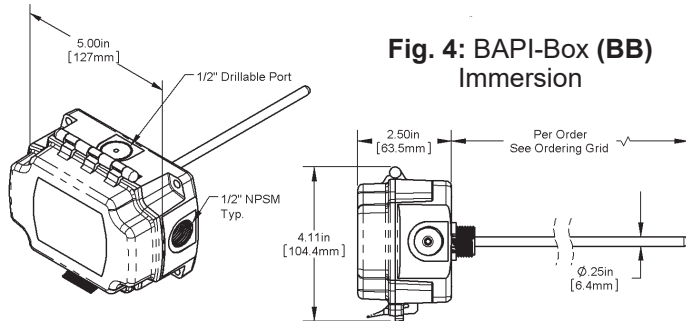


Fig. 4: BAPI-Box (BB) Immersion

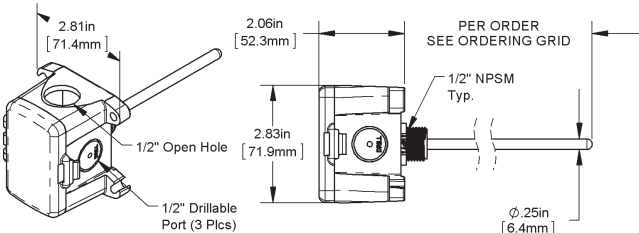


Fig. 5: BAPI-Box 4 (BB4) Immersion

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

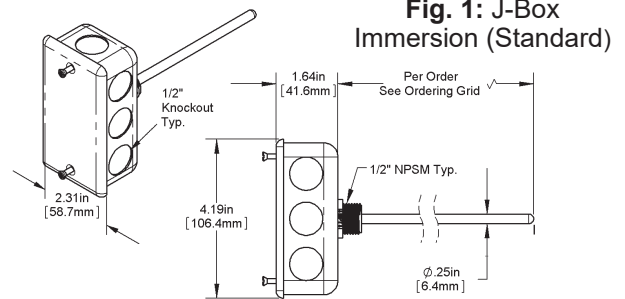


Fig. 1: J-Box Immersion (Standard)

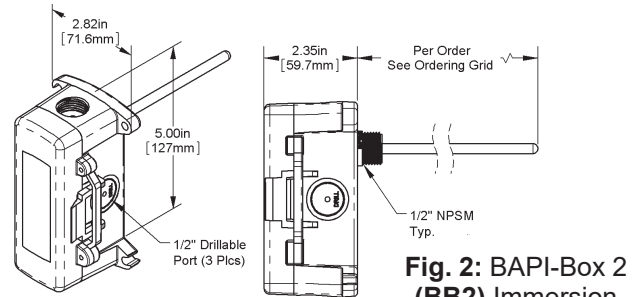


Fig. 2: BAPI-Box 2 (BB2) Immersion

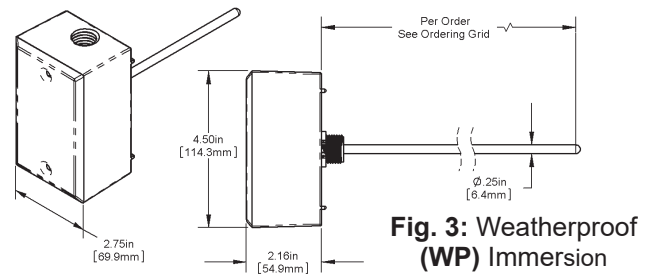


Fig. 3: Weatherproof (WP) Immersion

Mounting

- **Application:** Fig 8 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 website at www.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 website at www.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 thermowell.

Specifications subject to change without notice.

Mounting continued...

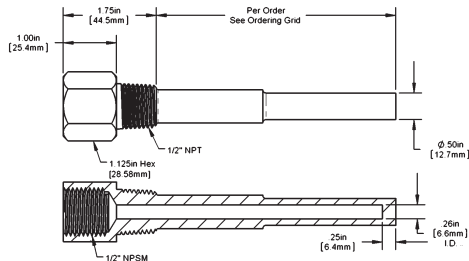


Fig. 6: Machined Bar Stock Thermowell

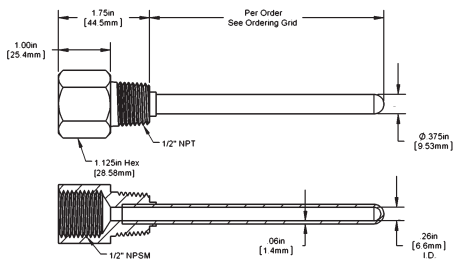


Fig. 7: Two Part Welded Thermowell

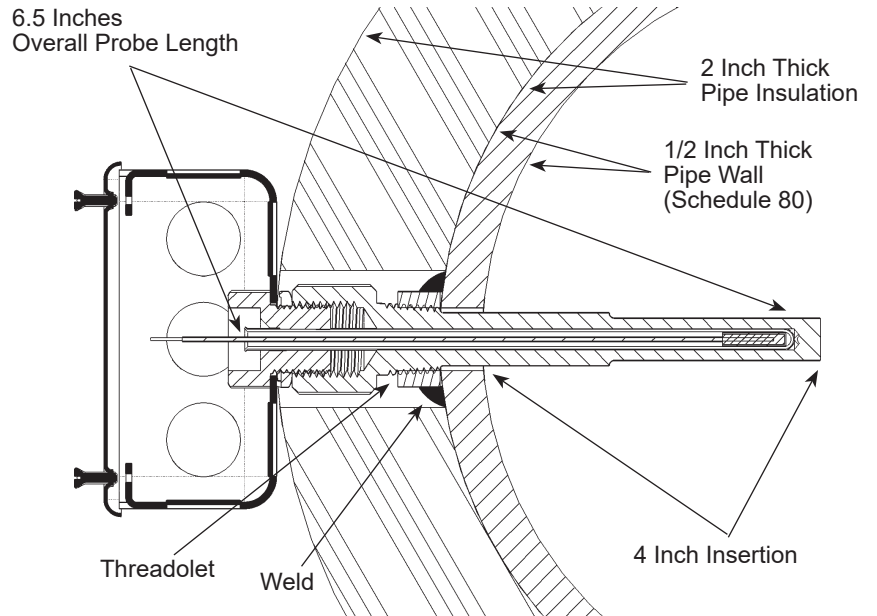


Fig. 8: Typical Installation Identification and Dimensions

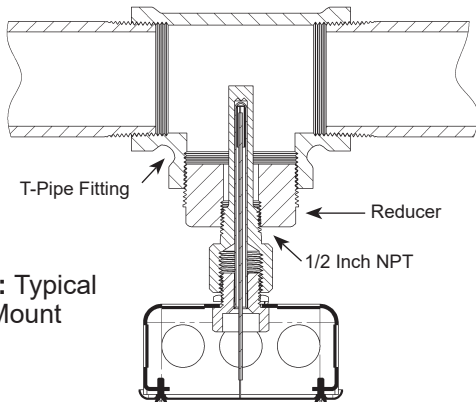


Fig. 9: Typical T-Mount

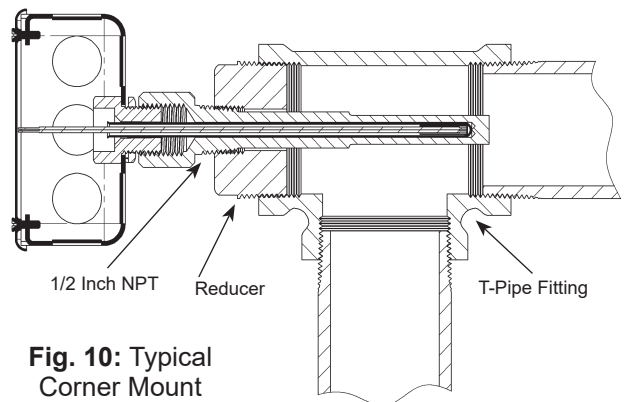


Fig. 10: Typical Corner Mount

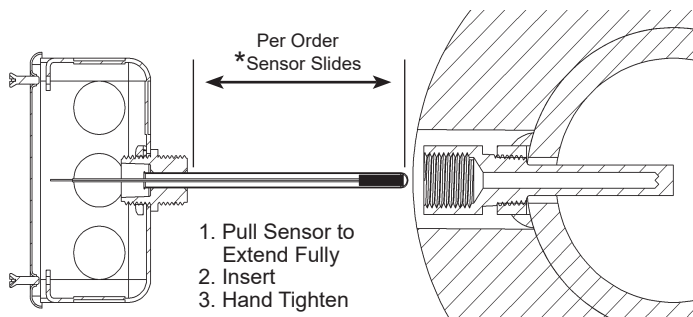


Fig. 11: Standard J-Box Before Insertion
(J-Box shown but process is the same for all enclosures)

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

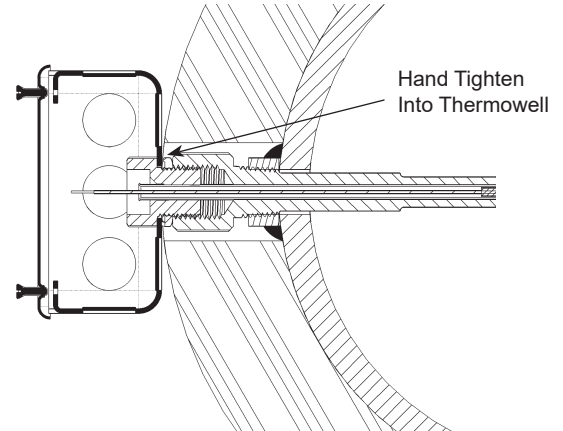


Fig. 12: Typical Sensor Inserted

Specifications subject to change without notice.

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.

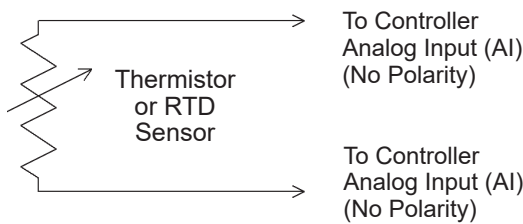


Fig. 13: 2 Wire Termination for Thermistor or RTD

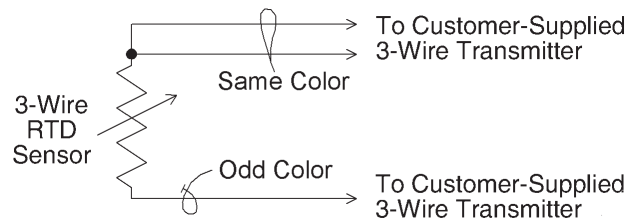


Fig. 14: 3 Wire Termination for RTD

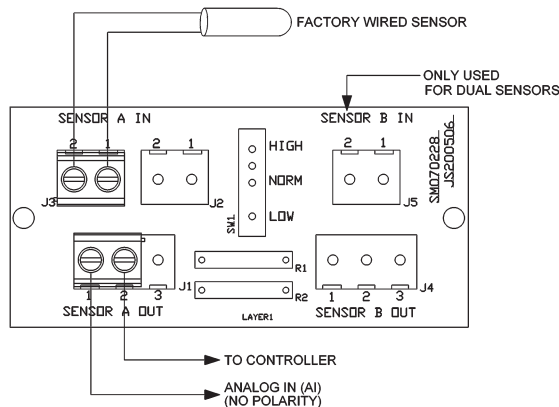


Fig. 15: Terminal Strip (-TS) Option for 2 Wire Sensors Termination

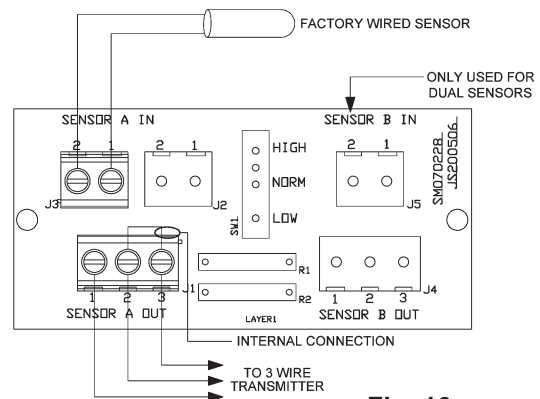


Fig. 16: Terminal Strip (-TS) Option for 3 Wire Sensors Termination

Diagnostics

Possible 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)
- 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 on the BAPI website. If the measured resistance is different from the temperature table by more than 5%, call BAPI technical support. BAPI's website is found at www.bapihvac.com; click on the "Resources" then "BAPI Sensors Overview" and then click on the type of sensor you have.

Specifications subject to change without notice.



Specifications

Sensor: Passive

- Thermistor 2 wire
- RTD 2 or 3 wire

Thermistor: Thermal resistor (NTC)

- Temp. Output Resistance Per Order 1
- Accuracy (std) $\pm 0.36^{\circ}\text{F}$, ($\pm 0.2^{\circ}\text{C}$)
- Accuracy (Hi) $\pm 0.18^{\circ}\text{F}$, ($\pm 0.1^{\circ}\text{C}$), [XP] option
- Stability $0.036^{\circ}\text{F}/\text{Year}$, ($< 0.02^{\circ}\text{C}/\text{Year}$)
- Heat dissipation $2.7 \text{ mW}/^{\circ}\text{C}$
- Temp. Drift $< 0.02^{\circ}\text{C}$ per year
- Probe range -40° to 221°F (-40° to 105°C)

RTD: Resistance Temp Device (PTC)

- Platinum (Pt) 100Ω and $1\text{K}\Omega$ @ 0°C , 385 curve
- Platinum (Pt) $1\text{K}\Omega$ @ 0°C , 375 curve
- Pt Accuracy (Std) 0.12% @ Ref, or $\pm 0.55^{\circ}\text{F}$, ($\pm 0.3^{\circ}\text{C}$)
- Pt Accuracy (Hi) 0.06% @ Ref, or $\pm 0.277^{\circ}\text{F}$, ($\pm 0.15^{\circ}\text{C}$), [A]option
- Pt Stability $\pm 0.25^{\circ}\text{F}$, ($\pm 0.14^{\circ}\text{C}$)
- Pt Self Heating..... $0.4^{\circ}\text{C}/\text{mW}$ @ 0°C
- Pt Probe range ... -40° to 221°F , (-40 to 105°C)
- Nickel (Ni) 1000Ω @ 70°F , JCI curve
- Ni Probe range ... -40° to 221°F (-40 to 105°C)

Sensitivity: Approximate @ 32°F (0°C)

- Thermistor Non-linear – Go to bapihvac.com click “Resources” and “BAPI Sensors Overview”
- RTD (Pt) $3.85\Omega/^{\circ}\text{C}$ for $1\text{K}\Omega$ RTD
 $0.385\Omega/^{\circ}\text{C}$ for 100Ω RTD
- Nickel (Ni) $2.95\Omega/^{\circ}\text{F}$ for the JCI RTD

Lead Wire: 22awg stranded

Insulation: Etched Teflon, Plenum rated

Probe: Rigid, 304 Stainless Steel, 0.25” OD

Probe Length: 2”, 4”, 8” or custom per order

Mounting: 1/2” NPSM Plastic Threads

Enclosure Types

- J-Box -JB, w/eight 1/2” knockouts
- No Box -NB, intended for open wiring
- Weather Proof -WP, w/ two 1/2” FNPT entries, (Bell box)
- BAPI-Box -BB, w/four 1/2” NPSM & one 1/2” drill-out
- BAPI-Box 2 -BB2, w/three 1/2” NPSM & three 1/2” drill-outs
- BAPI-Box 4: -BB4, w/ three 1/2” drill-outs & one 1/2” open port

Enclosure Ratings

- J-Box -JB, NEMA 1
- No Box -NB, No rating
- Weather Proof -WP, NEMA 3R, IP14
- BAPI-Box -BB, NEMA 4X, IP66
- BAPI-Box 2 -BB2, NEMA 4X, IP66
- BAPI-Box 4 -BB4, IP10
(IP44 with Knockout Plug in the open port)

Enclosure Materials

- J-Box -JB, Galvanized steel, UL94H-B
- No Box -NB, Nylon 66, UL94H-B
- Weather Proof -WP, Cast Aluminum, UV rated
- BAPI-Box -BB, Polycarbonate, UL94V-0, UV rated
- BAPI-Box 2 -BB2, Polycarbonate, UL94V-0, UV rated
- BAPI-Box 4: -BB4, Polycarbonate & Nylon, UL94V-0

Ambient (Encl.): 0 to 100% RH, Non-condensing

- All BAPI-Boxes -BB, BB2, BB4, -40 to 185°F , (-40 to 85°C)
- J-Box & No Box ... -JB, NB, -40 to 212°F , (-40 to 100°C)
- Weatherproof -WP, -40 to 212°F , (-40 to 100°C)

Agency

- RoHS, *CE
- PT=DIN43760, IEC Pub 751-1983,
- JIS C1604-1989

*Passive Thermistors 20K Ω and smaller are CE compliant

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