Extreme Temperature RTD Sensors
BA/1x[1,2,3] Temperature Sensor
Installation & Operating Instructions

8612_ins_RTD_EXTRM rev. 07/07/16

Overview

The Extreme Temperature Sensor is made for thermowell mounting, direct insertion or remote probe mounting. The probe is made of Stainless Steel and made in different lengths for a custom fit. The RTD's are available in 100Ω or 1KΩ 385 curve as shown in the specifications. The enclosures come in plastic or metal for both NEMA 3R and NEMA 4 applications and are all plenum rated.

Identification

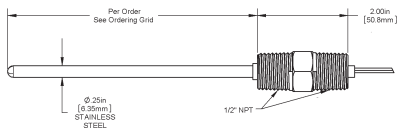


Fig. 1: Extreme Temp Immersion Sensor

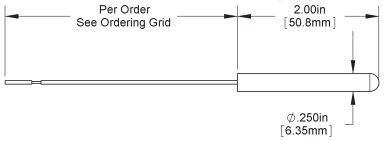


Fig. 2: Extreme Temp Remote Probe

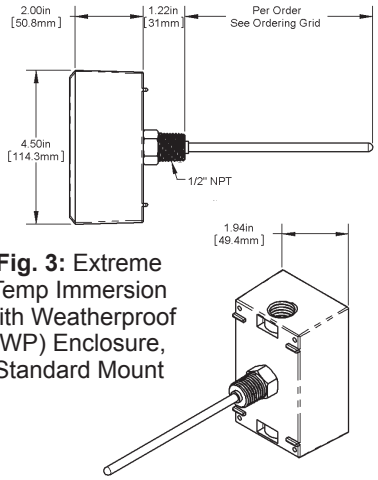
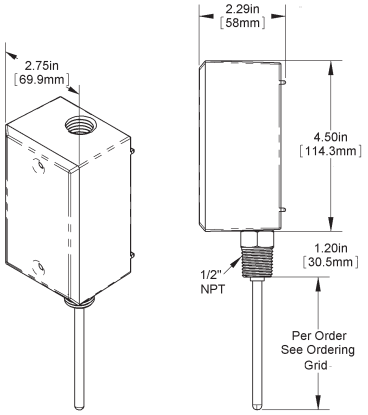


Fig. 3: Extreme Temp Immersion with Weatherproof (WP) Enclosure, Standard Mount

Fig. 4: Extreme Temp Immersion with Weatherproof (WP) Enclosure, Outside Mount



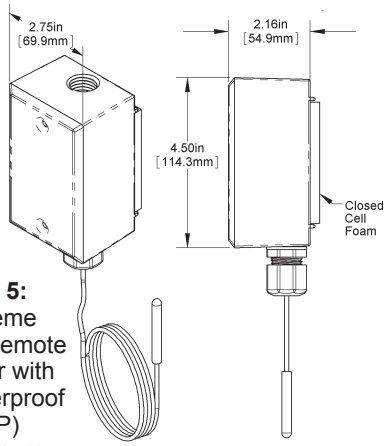
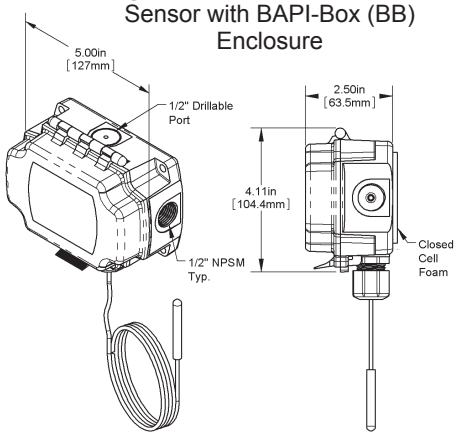


Fig. 5: Extreme Temp Remote Sensor with Weatherproof (WP) Enclosure

Fig. 6: Extreme Temp Remote Sensor with BAPI-Box (BB) Enclosure



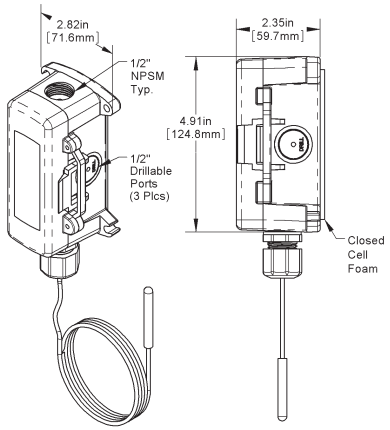


Fig. 7: Extreme Temp Remote Sensor with BAPI-Box 2 (BB2) Enclosure

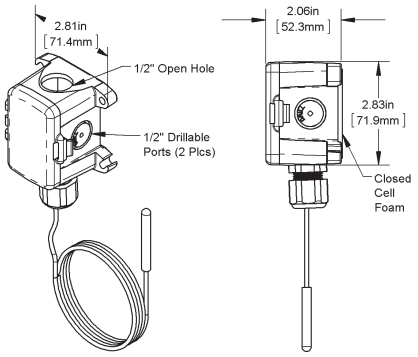


Fig. 8: Extreme Temp Remote Sensor with BAPI-Box 4 (BB4) Enclosure

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

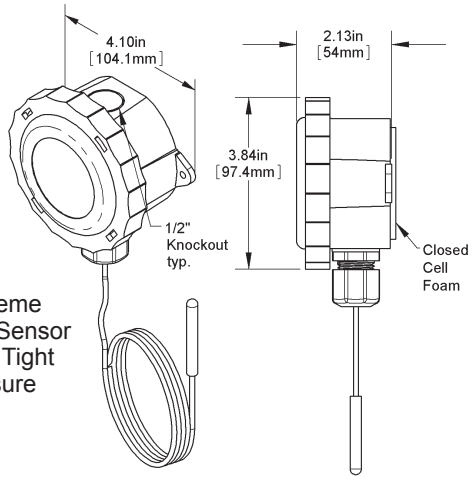


Fig. 9: Extreme Temp Remote Sensor with Weather Tight **(EU)** Enclosure

Specifications subject to change without notice.

Building Automation Products, Inc., 750 North Royal Avenue, Gays Mills, WI 54631 USA
Tel:+1-608-735-4800 • Fax+1-608-735-4804 • E-mail:sales@bapihvac.com • Web:www.bapihvac.com

Mounting

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 website at *www.bapihvac.com*

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. 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 stainless steel 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 inserted as close to the well bottom as possible. The well is close fitting to the sensor and will offer an accurate reading without the need for thermal compound.

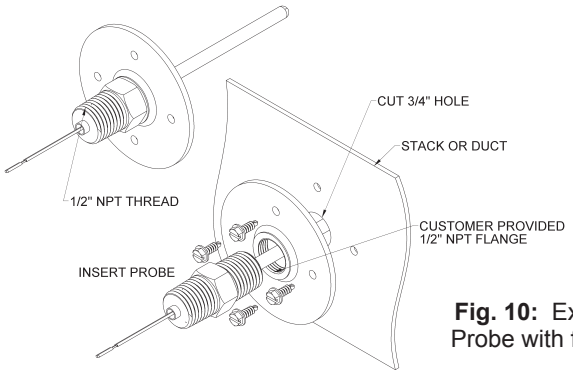


Fig. 10: Extreme Temp Probe with flange mount

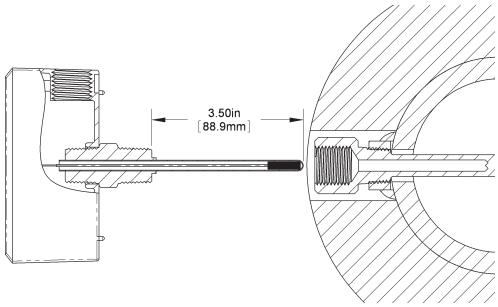
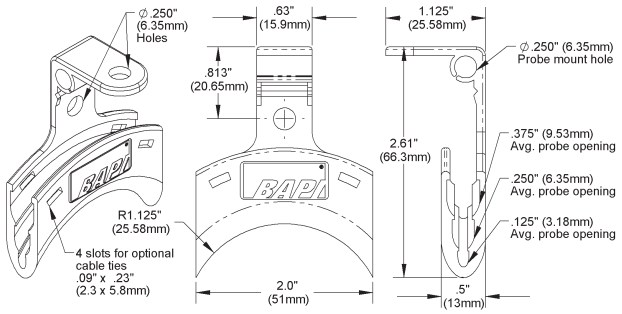


Fig. 11: Extreme Temp Immersion with Weatherproof Enclosure



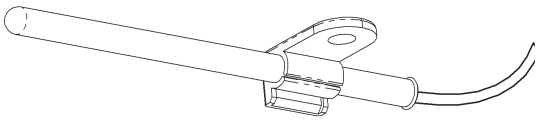


Fig. 12: Remote Sensor mounting using the scored break off of the Flexible Probe Bracket (FPB) which is shown at left.

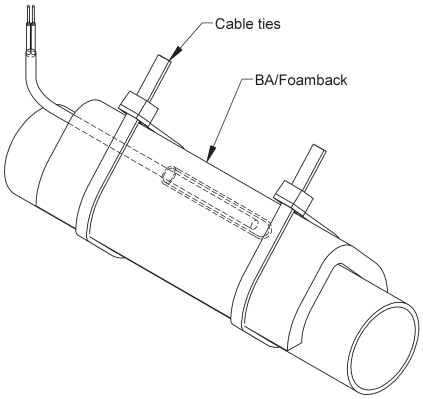


Fig. 13: Extreme Temp Remote Sensor in a strap-on application

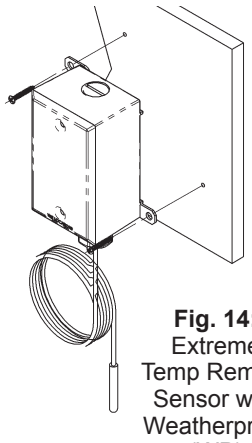


Fig. 14: Extreme Temp Remote Sensor with Weatherproof (WP) Enclosure

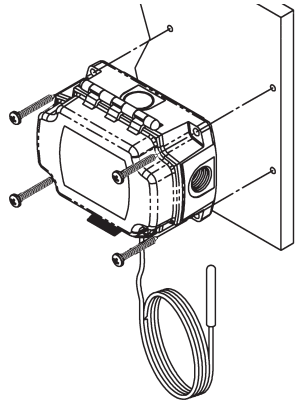


Fig. 15: Extreme Temp Remote Sensor with BAPI-Box (BB)

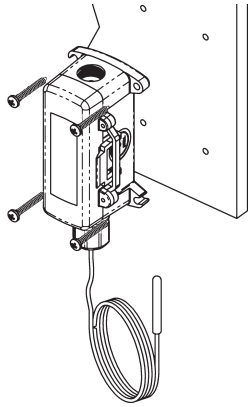


Fig. 16: Remote Sensor with BAPI-Box 2 (BB2)

Mounting continued....

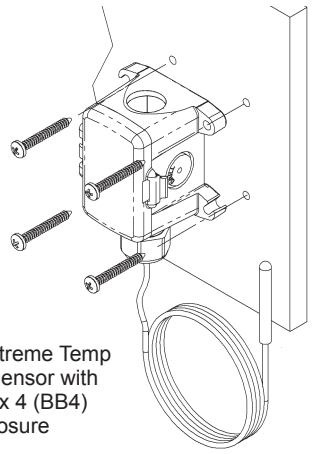


Fig. 17: Extreme Temp Remote Sensor with BAPI-Box 4 (BB4) Enclosure

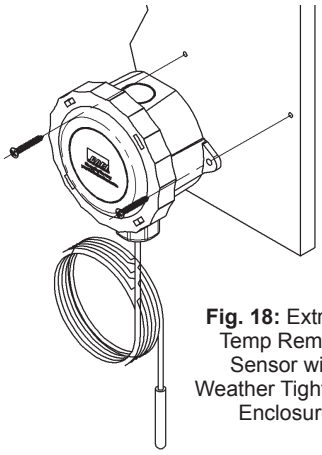


Fig. 18: Extreme Temp Remote Sensor with Weather Tight (EU) Enclosure

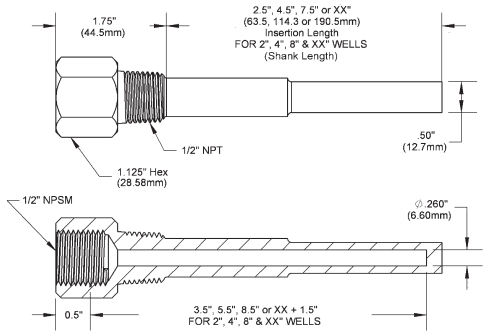


Fig. 19: Immersion Thermowell

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.

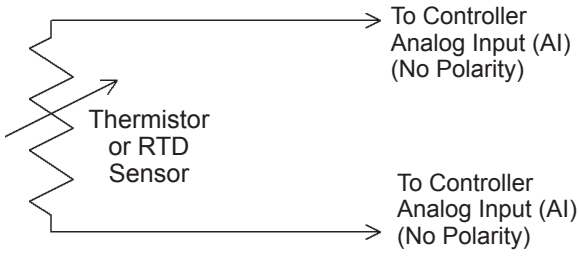


Fig. 20: 2 Wire Lead Wire Termination for Thermistor or RTD

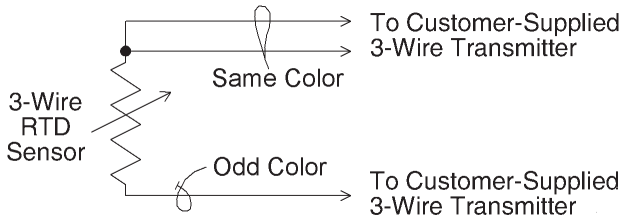


Fig. 21: 3 Wire Lead Wire Termination for RTD

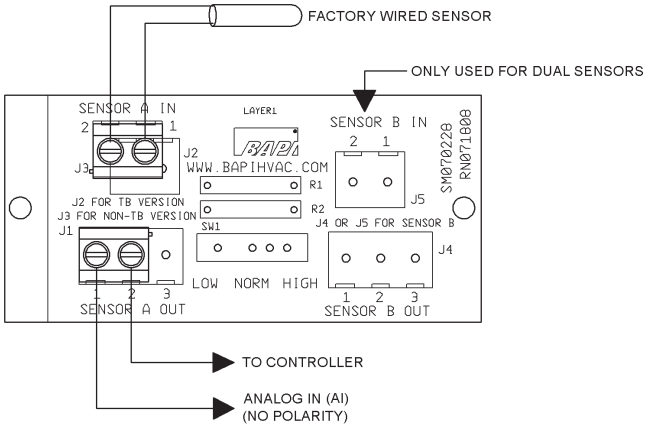


Fig. 22: Terminal Strip (-TS) Option for 2 Wire Sensors Termination

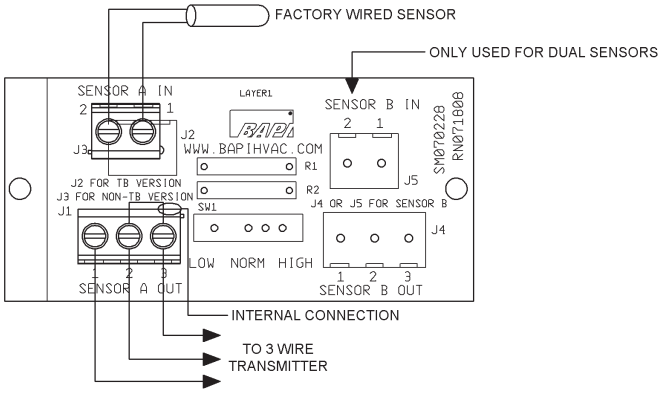


Fig. 23: Terminal Strip (-TS) Option for 3 Wire Sensors Termination

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

Sensor	Passive resistance
RTD	PTC, 2 or 3 wire
RTD	Resistance Temperature Device
Platinum (Pt)	1KΩ @0ºC, 385 curve,
Pt Accuracy (std)	0.12% @Ref, or ±0.55ºF, (±0.3ºC)
Pt Stability	±0.25ºF, (±0.14ºC)
Pt Self Heating	0.4 ºC/mW @0ºC
RTD Probe range	
1KΩ [1]	-328 to 32ºF, (-200 to 0ºC)
1KΩ [2]	77 to 500ºF, (25 to 260ºC)
1KΩ [3]	77 to 1,112ºF, (25 to 600ºC)
Sensitivity	Approximate @ 32ºF (0ºC)
RTD (Pt)	3.85Ω/ºC for 1KΩ RTD 0.385Ω/ºC for 100Ω RTD
Lead wire	22awg stranded
Wire Insulation	Plenum rated
1KΩ[1]	PTFE, -328 to 32ºF, (-200 to 0ºC)
1KΩ[2]	PTFE, 77 to 500ºF, (25 to 260ºC)
1KΩ[3]	Fiberglass, 77 to 1,112ºF, (25 to 600ºC)
Probe	Rigid, 304 Stainless Steel, 0.25" OD
Probe Length	
Probe	2", 4", 8" or custom per order
Remote Sensor	2" w/ customer cable length
Mounting	
Probe	½" NPT Double Threaded
Remote Sensor	Probe with or without enclosure

Enclosure Types

Note: The double threaded immersion probe is only available with the Weatherproof (-WP) box due to the very high or very low temperature RTD capabilities.

Weatherproof	**-WP,** w/ two ½" FNPT entries, (Bell box)
BAPI-Box	**-BB,** w/ our ½" NPSM & one ½" drill-out
BAPI-Box 2	**-BB2,** w/ three ½" NPSM & three ½" drill-outs
BAPI-Box 4:	**-BB4,** w/ four ½" drill-outs & one ½" open port
Weather Tight	**-EU,** w/ two ½" knockouts

Enclosure Ratings

Weatherproof	**-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)
Weather Tight	**-EU,** NEMA 4X, IP66

Enclosure Materials

Weatherproof	**-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
Weather Tight	**-EU,** ABS Plastic, UL94V-0
Ambient (Encl.)	0 to 100% RH, Non-condensing
All 3 BAPI-Boxes	-40ºF to 185ºF, (-40º to 85ºC)
Weather Tight	-40ºF to 185ºF, (-40º to 85ºC)
Weatherproof	-100ºF to 1,000ºF, (-73º to 538ºC)
Agency	RoHS, CE PT= DIN43760, IEC Pub 751-1983, JIS C1604-1989

Building Automation Products, Inc., 750 North Royal Avenue, Gays Mills, WI 54631 USA
Tel:+1-608-735-4800 • Fax+1-608-735-4804 • E-mail:sales@bapihvac.com • Web:www.bapihvac.com