

Overview and Identification

The outside air temperature transmitter is designed to handle the harshest outside environments. The probe and enclosure are made to protect the sensor from impediments such as rain, sleet, snow or bird droppings.

BAPI's Temperature Transmitter can be ordered with a 1KΩ (385) RTD that has a field adjustable 1 to 5, 0 to 5, 2 to 10, 0 to 10VDC or 4 to 20 mA output over a selected temperature range. These adjustable outputs can be set at the factory to order or default set to 4 to 20mA.

This transmitter can also be ordered in a variety of mounting enclosures as shown at right.

Special high accuracy RTD matched transmitters (M) are available which match the sensor to the transmitter for improved accuracy. Enclosure mounting styles come in plastic or metal for both NEMA 3R and NEMA 4 applications and are all UV rated.

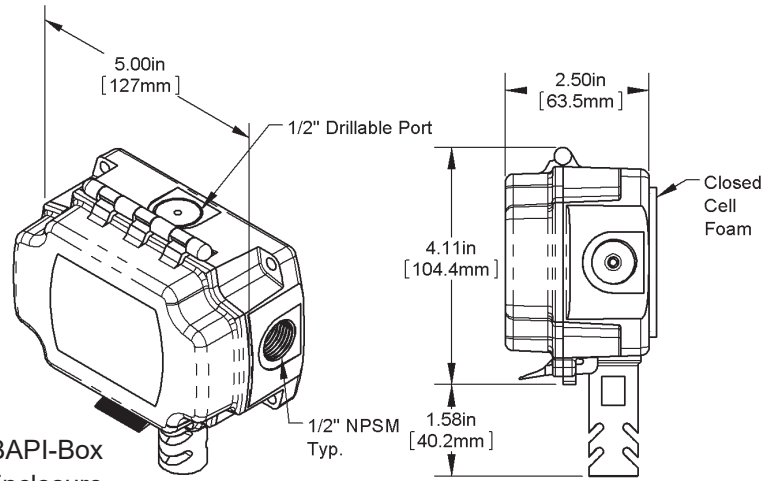


Fig. 1: BAPI-Box (-BB) Enclosure

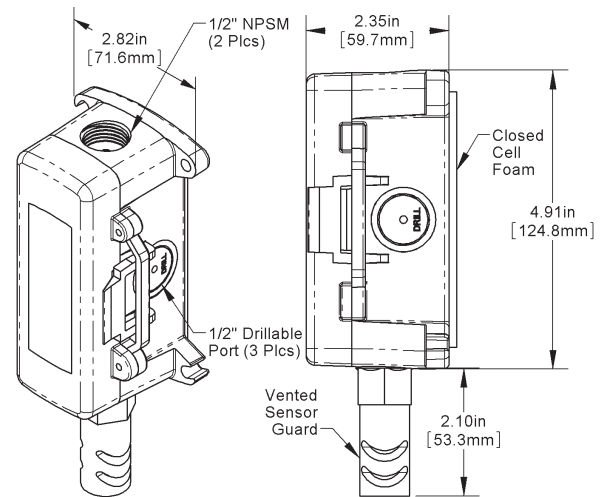


Fig. 2: BAPI-Box 2 (-BB2) Enclosure

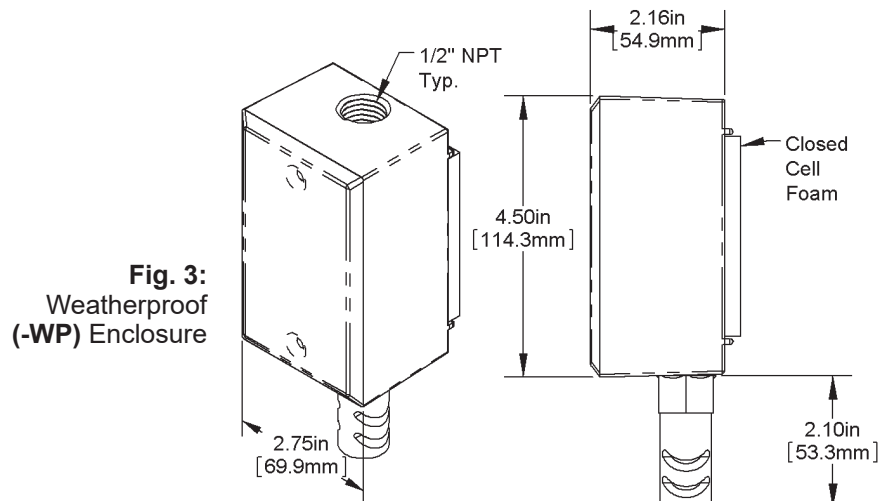


Fig. 3: Weatherproof (-WP) Enclosure

Mounting

Outside Air (OSA) sensor placement is critical to good performance. The OSA sensor must be mounted in the shade away from building windows, doors or vents. They should never be in direct sunlight or you will have higher than expected temperature readings by as much as +30%. The ideal shaded location in the Northern hemisphere is on the North side of the building. In the Southern hemisphere the South side of the building is ideal.

The sensor shield and probe should always point down and mounted between four feet above the ground/roof and one foot minimum below the eave. (Note: Four feet keeps the sensor above the ground or roof top radiation and one foot under the eave prevents measurement of trapped heat from under the eave.)

Drill the mounting holes and mount as shown in the figs 4-6. Snug up the mounting screws to ensure that the foam backing compresses to about 50% of its thickness to make a gasket type seal against the wall surface.

Route the wires into the box and terminate with sealant filled connectors to prevent water from attacking the connection, thereby preventing costly callbacks. Best practice is to caulk the wiring hole after the wiring is installed. Close the cover of the enclosures and secure with provided cover security screws.

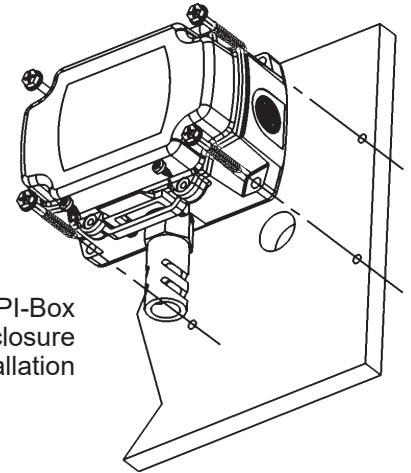


Fig. 4: BAPI-Box (-BB) Enclosure Installation

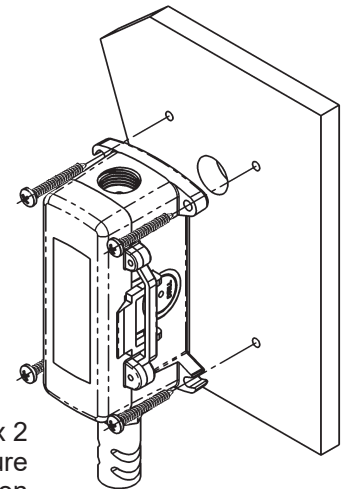


Fig. 5: BAPI-Box 2 (-BB2) Enclosure Installation

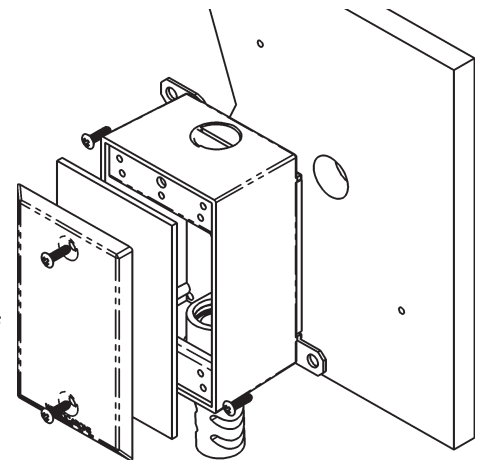


Fig. 6: Weatherproof (-WP) Enclosure Installation

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 AC power wiring of NEC class 1 or NEC class 2, NEC class 3 or with wiring used to supply highly inductive loads such as motors, contactors and relays. BAPI's tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines. *Note: Keep transmitter at least 5 feet from any radio wave-emitting device (ie: 2 way radio). Transmitters that are less than 5 feet from a radio wave-emitting device can cause unwanted interference.*



BAPI recommends wiring the product with power disconnected. Proper supply voltage, polarity, and wiring connections are important to a successful installation. Not observing these recommendations may damage the product and will void the warranty.

4 to 20mA Output with Flying Leads

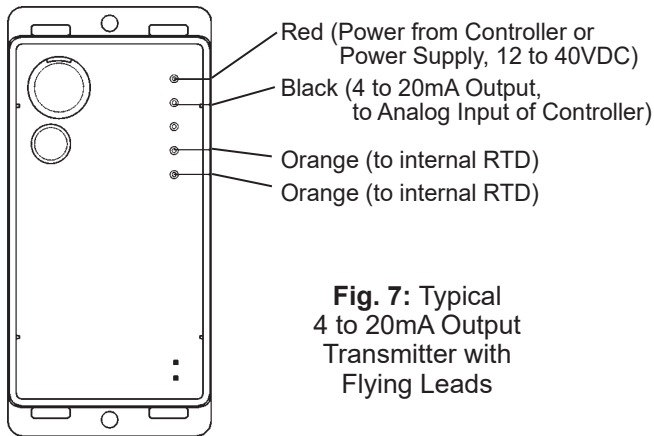


Fig. 7: Typical 4 to 20mA Output Transmitter with Flying Leads

4 to 20mA Output with Terminals

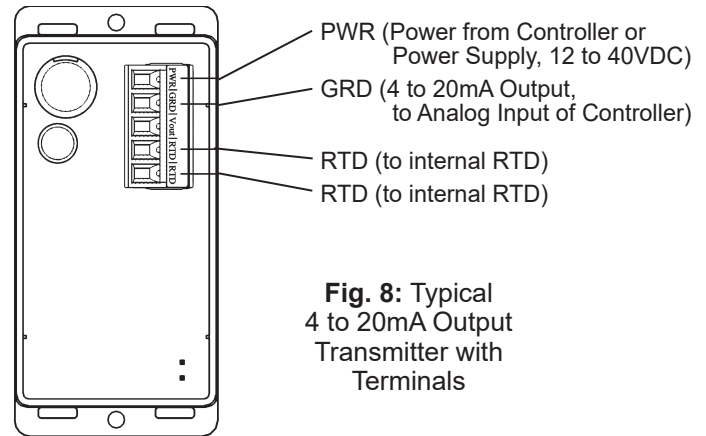


Fig. 8: Typical 4 to 20mA Output Transmitter with Terminals

Voltage Output with Flying Leads

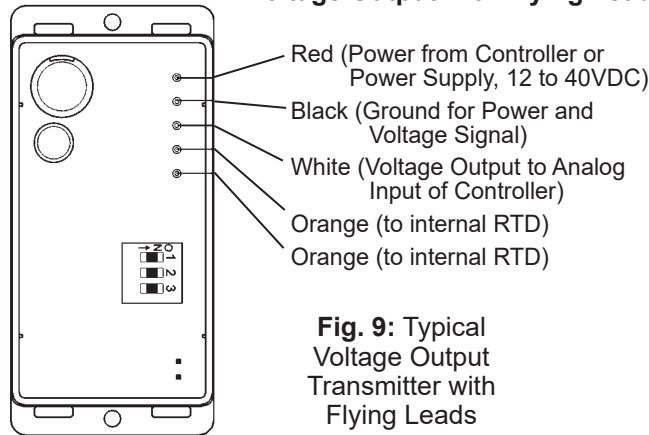


Fig. 9: Typical Voltage Output Transmitter with Flying Leads

Voltage Output with Terminals

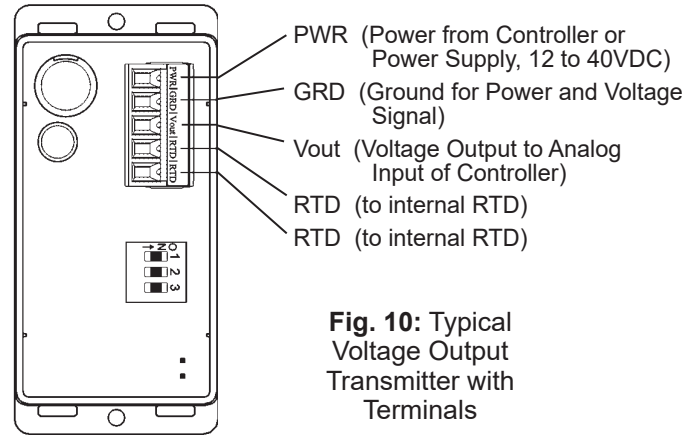
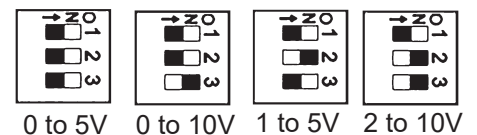


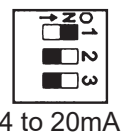
Fig. 10: Typical Voltage Output Transmitter with Terminals

DIP Switch Settings for Field-Selectable Voltage Output Units

The circuit board for voltage output units has a 3-position DIP switch that controls the output value. This switch is set at the factory at the time of the order but may be changed in the field.



Note: Units ordered with Voltage Output can be switched to 4 to 20mA output with the DIP switch setting shown at right. The middle flying lead or middle terminal would not be used in that case and the unit would be wired similar to Figs 7 and 8 above.





Outside Air (OSA) Temperature Transmitters

BA/T1# -O Temperature Sensor

Installation & Operations

20920_ins_OSA_Active

rev. 03/11/24

Diagnostics

Possible Problems:

- Unit will not operate.

Possible Solutions:

- Measure the power supply voltage by placing a voltmeter across the transmitter's (+) and (-) terminal. Make sure that it matches the drawings above and power requirements in the specifications.
- Check if the RTD wires are physically open or shorted together and are terminated to the transmitter.
- Determine if the input is set up correctly in the controllers and BAS software.
- For a 4 to 20mA current transmitter measure the transmitter current by placing an ammeter in series with the controller input. The current should read according to the "4 to 20mA Temperature Equation" shown below.
- For a voltage transmitter, measure the signal with a volt meter (Orange or Orange/Black to Black). The signal should read according to the "Voltage Temperature Equation" shown below.

4 to 20mA Temperature Equation

$$T = T_{Low} + \frac{(A - 4) \times (T_{Span})}{16}$$

T	= Temperature at sensor
T _{Low}	= Low temperature of span
T _{High}	= High temperature of span
T _{Span}	= T _{High} - T _{Low}
A	= Signal reading in mA

Voltage Temperature Equation

$$T = T_{Low} + \frac{(V \times T_{Span})}{V_{Span}}$$

T	= Temperature at sensor
T _{Low}	= Low temperature of span
T _{High}	= High temperature of span
T _{Span}	= T _{High} - T _{Low}
V _{Low}	= Low transmitter voltage usually=(0, 1 or 2v)
V _{High}	= High transmitter voltage usually=(5 or 10v)
V _{Span}	= V _{High} - V _{Low}
V	= Signal reading in volts

Specifications

Transmitter Circuit

Power Required:..... 12 to 40VDC
 Transmitter Output:.... 4 to 20mA, 0 to 5, 1 to 5, 0 to 10 or 2 to 10VDC, 850Ω@24VDC
 Output Wiring:..... 2 wire loop
 Output Limits: <1mA (short), <22.35mA (open)
 Span: Min. 30°F (17°C), Max 1000°F, (555°C)
 Zero: Min. -148°F (-100°C), Max 900°F (482°C)
 System Accuracy: ±0.065% of span
 Linearity: ±(0.125 * T-20°C)/100
 RTD Sensor: 2 wire Platinum (Pt), 385 curve
 Transmitter Ambient: -4 to 158°F (-20 to 70°C)
 0 to 95% RH, Non-condensing

RTD Sensor: Resistance Temp Device (Bare Sensor)
 Platinum RTD: 1KΩ @ 0°C, 385 curve
 Sensitivity: 3.85Ω/°C, Approximate @ 32°F (0°C)
 Accuracy (Standard): .0.12% @Ref, or ±0.55°F, (±0.3°C)
 Accuracy (High): 0.06% @Ref, or ±0.277°F, (±0.15°C),
 [A]option
 Stability: ±0.25°F, (±0.14°C)
 Self Heating: 0.4 °C/mW @0°C
 Probe Range: -40 to 221°F, (-40 to 105°C)

Lead Wire: 22awg stranded

Insulation: Etched Teflon, Plenum rated

Probe: Vented polycarbonate shield, ½" OD

Probe Length: 1.2" with ½" NPT threads

Wall Gasket: 1/4" Closed cell foam (impervious to mold)

Enclosure Types: (Part number designator in bold)
 Weatherproof...-**WP**, w/ two ½" FNPT entries, (Bell box)
 BAPI-Box.....-**BB**, w/ four ½" NPSM & one ½" drill-out
 BAPI-Box 2.....-**BB2**, w/ three ½" NPSM & three ½" drill-outs

Enclosure Ratings: (Part number designator in bold)
 Weatherproof...-**WP**, NEMA 3R, IP14
 BAPI-Boxes.....-**BB**, **BB2**, NEMA 4, IP66, UV Rated

Enclosure Material: (Part number designator in bold)
 Weatherproof:..-**WP**, Cast Aluminum, UV rated
 BAPI-Boxes.....-**BB**, **BB2** Polycarb., UL94V-0, UV rated

Ambient (Enclosure): 0 to 100% RH, Non-condensing
 Weatherproof...-**WP**, -40°F to 212°F, (-40° to 100°C)
 BAPI-Boxes.....-**BB**, **BB2**, -40°F to 185°F, (-40° to 85°C)

Agency

CE EN 61326-1:2013 EMC (Industrial Electromagnetic Environment) / RoHS /
 PT=DIN43760, IEC Pub 751-1983 / JIS C1604-1989

Specifications subject to change without notice.