

Overview and Identification

BAPI's Outside Air temperature Sensor is available with multiple thermistors or RTDs as shown in the specifications section. The probe is made to protect the sensor from rain, sleet, snow or bird droppings.

Enclosures come in plastic or metal for both **NEMA 3R** and **NEMA 4** applications and are all UV rated.

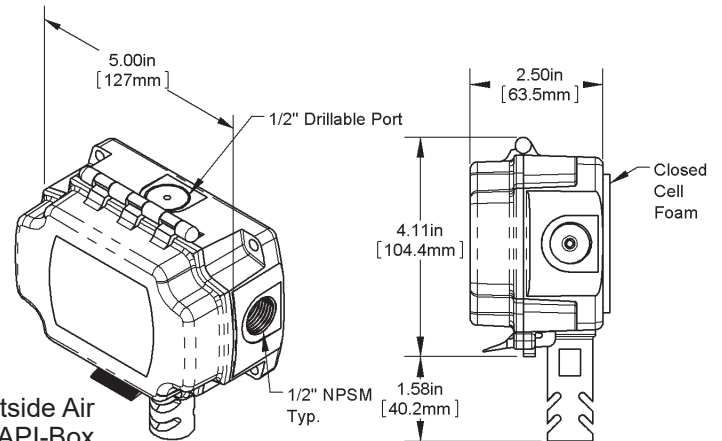


Fig. 1: Outside Air Sensor in a BAPI-Box (-BB) Enclosure

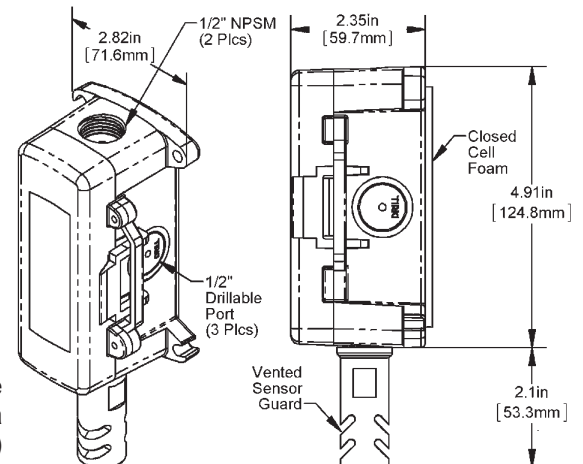


Fig. 2: Outside Air Sensor in a BAPI-Box 2 (-BB2) Enclosure

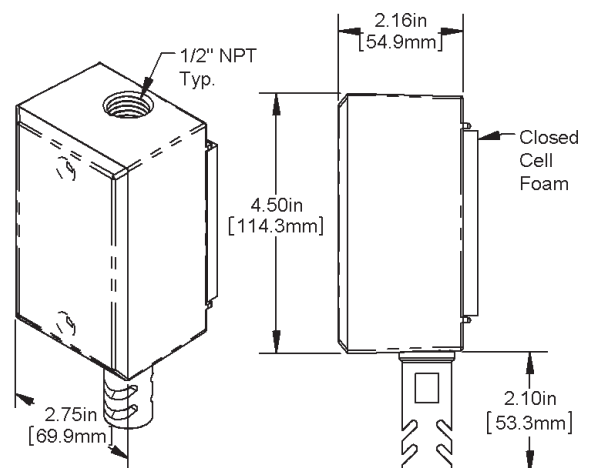


Fig. 3: Outside Air Sensor in a Weatherproof (-WP) Enclosure

Specifications subject to change without notice.

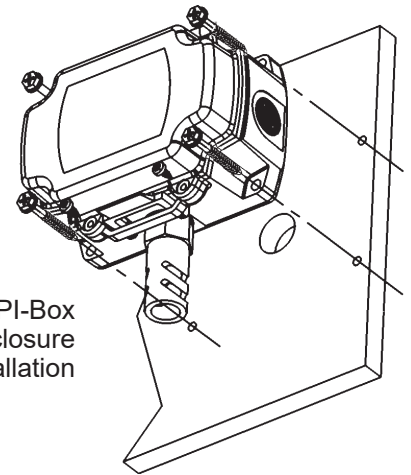
Mounting

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.

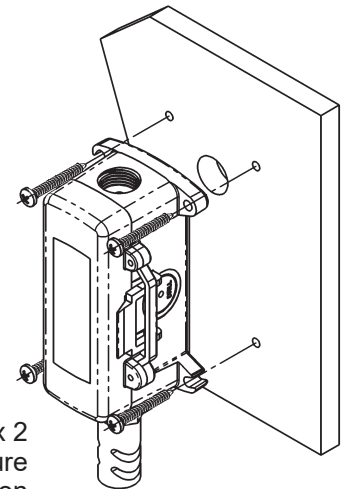
The sensor shield and probe should always point down and mounted between four feet above the ground/roof and one foot minimum below the eave. (Note: Four feet keeps the sensor above the ground or roof top radiation and one foot under the eave prevents measurement of trapped heat from under the eave.)

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.

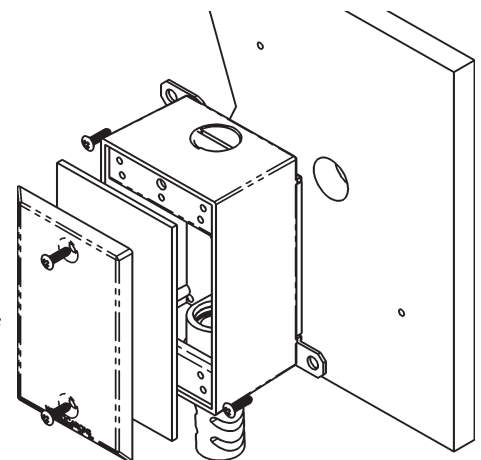
Route the wires into the box and terminate with sealant filled connectors to prevent water from attacking the connection, thereby preventing costly callbacks. Best practice is to caulk the wiring hole after the wiring is installed. Close the cover of the enclosures and secure with provided cover security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



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



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



**Fig. 6: Weatherproof
(-WP) Enclosure
Installation**

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.

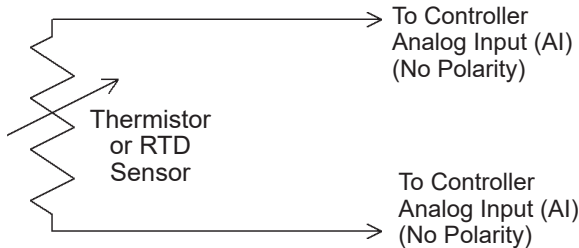


Fig. 7: 2 Wire Termination for Thermistor or RTD

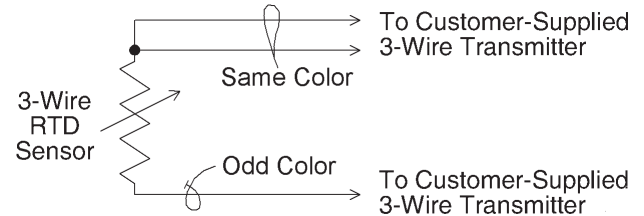


Fig. 8: 3 Wire Termination for RTD

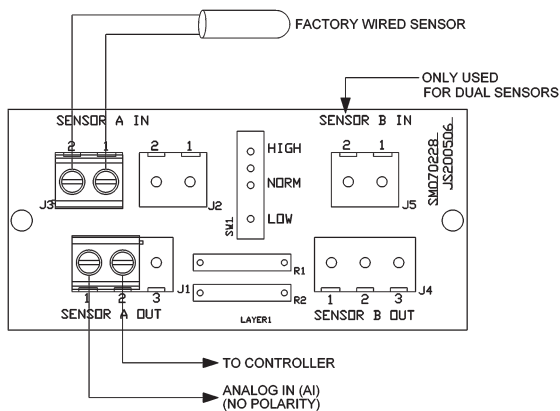


Fig. 9: Terminal Strip (-TS) Option for 2 Wire Sensors Termination

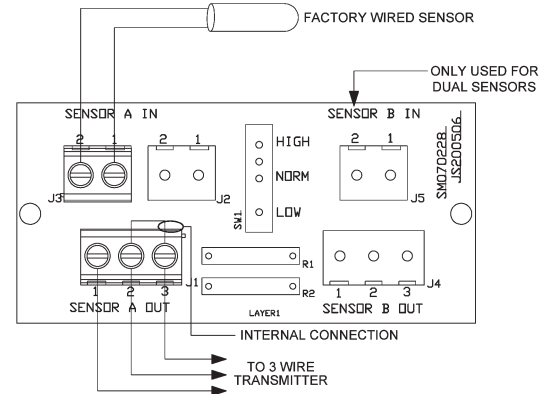


Fig. 10: Terminal Strip (-TS) Option for 3 Wire Sensors Termination

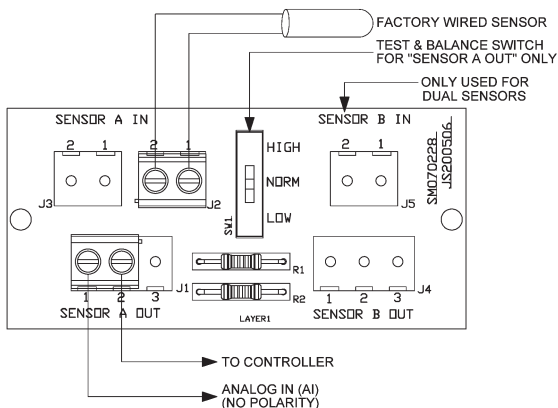


Fig. 11: Test & Balance (-TB) Option for 2 Wire Sensors Termination

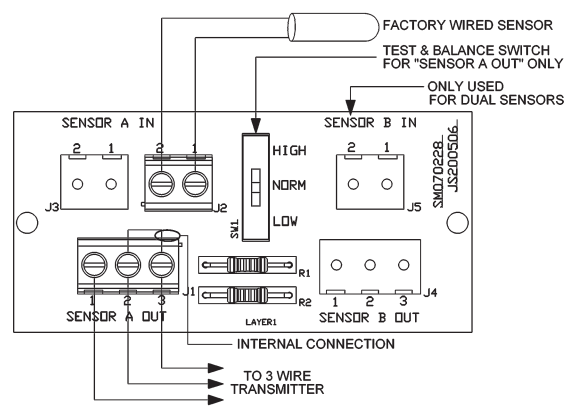


Fig. 12: Test & Balance (-TB) Option for 3 Wire Sensors Termination

Specifications subject to change without notice.

**Diagnostics****Possible Problem:**

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

Thermistor NTC, 2 wire
RTD PTC, 2 or 3 wire

Thermistor: Thermal resistor

Temp. Output Resistance
Accuracy (Std) $\pm 0.36^{\circ}\text{F}$, ($\pm 0.2^{\circ}\text{C}$)
Accuracy (High) $\pm 0.18^{\circ}\text{F}$, ($\pm 0.1^{\circ}\text{C}$), **[XP]** option
Stability $< 0.036^{\circ}\text{F/Year}$, ($< 0.02^{\circ}\text{C/Year}$)
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 Temperature Device

Platinum (Pt) 100Ω or $1\text{K}\Omega$ @ 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 (High) 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°C/mW @ 0°C
Pt Probe range -40 to 221°F , (-40 to 105°C)
Nickel (Ni) $1\text{K}\Omega$ @ 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"

$1\text{K}\Omega$ RTD (Pt) $3.85\Omega/^{\circ}\text{C}$
 100Ω RTD (Pt) $0.385\Omega/^{\circ}\text{C}$
Nickel (Ni) $2.95\Omega/^{\circ}\text{F}$ for the JCI RTD

Lead Wire: 22awg stranded

Wire Insulation: Etched Teflon, Plenum rated

Probe: Vented polycarbonate shield, $\frac{1}{2}$ " OD

Probe Length: 1.2" w/ $\frac{1}{2}$ " NPT threads

Wall Gasket: Closed cell foam (impervious to mold)

Enclosure Types

Weatherproof .. **-WP**, w/ two $\frac{1}{2}$ " FNPT entries, (Bell box)
BAPI-Box **-BB**, w/ four $\frac{1}{2}$ " NPSM & one $\frac{1}{2}$ " drill-outs
BAPI-Box 2 **-BB2**, w/ three $\frac{1}{2}$ " NPSM & three $\frac{1}{2}$ " drill-outs

Enclosure Ratings

Weatherproof .. **-WP**, NEMA 3R, IP14
BAPI-Box **-BB**, NEMA 4, IP66
BAPI-Box 2 **-BB2**, NEMA 4, 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

Ambient (Enclosure)

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

Agency

RoHS, CE (CE for all sensors below $10\text{K}\Omega$)
PT = DIN43760, IEC Pub 751-1983,
JIS C1604-1989

*Passive Thermistors $20\text{K}\Omega$ and smaller are CE Compliant

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