Outside Air Temperature Sensors with BAPI-Box Crossover Enclosure

Installation & Operations

Overview and Identification

Outside Air Units are designed to be mounted outdoors. The UV-resistant plastic shield keeps the sensor out of the sunlight and allows for excellent air circulation. The unit is available with multiple thermistor or RTD sensors as shown in the specifications.

The BAPI-Box Crossover enclosure has a hinged cover for easy termination and comes with an IP44 rating.

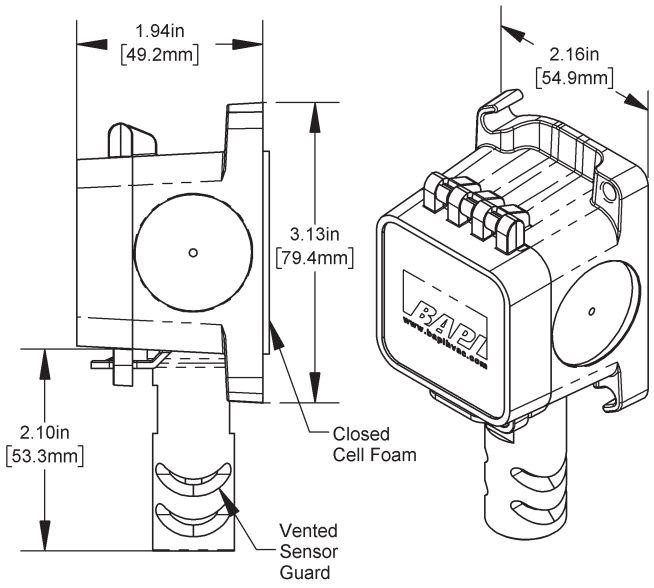

Fig 1: Outside Air Sensor with BAPI-Box Crossover Enclosure

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 figures 5-8. 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 and latch the thumb latch.

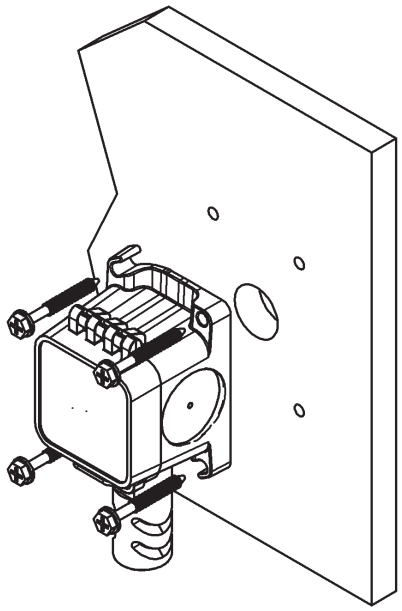

Fig 2: Outside Air Sensor with BAPI-Box Crossover Enclosure Installation

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.

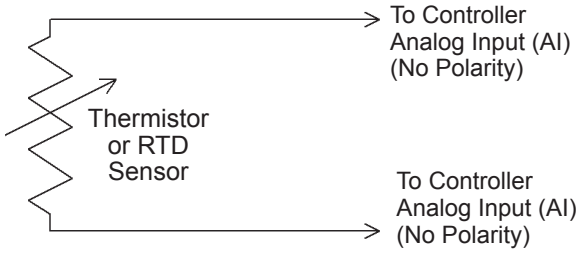

Fig. 3: 2-Wire Termination for Thermistor or RTDs

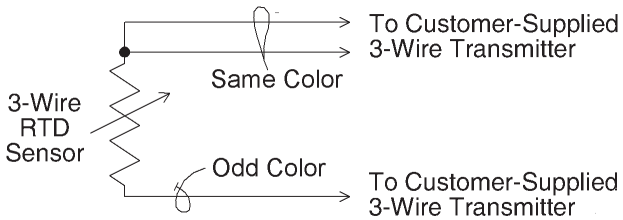

Fig. 4: 3-Wire Termination for RTDs

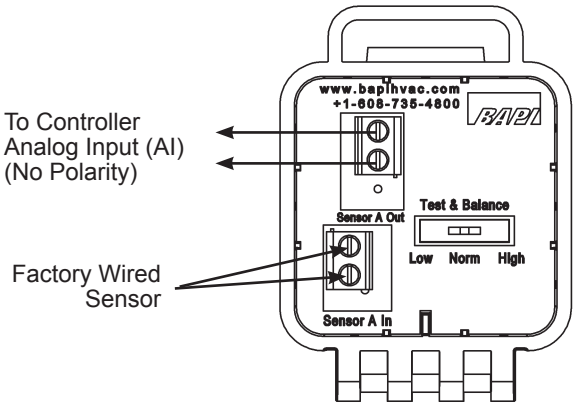

Fig. 5: Terminal Strip (-TS) or Test and Balance (TB) Option for 2 Wire Sensors

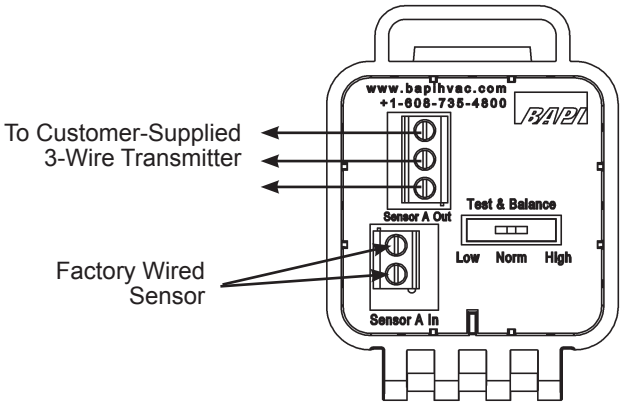

Fig. 6: Terminal Strip (-TS) or Test and Balance (TB) Option for 3 Wire Sensors

Test and Balance Switch:
For units with a Test and Balance Switch, the Norm position allows the real sensor at be monitored at "Sensor A Out". The High position forces the "Sensor A Out" to a very hot reading and the Low position forces "Sensor A Out" to a very cold reading (see Table below).

Sensor Type	Low Temp (40° F) Resistance Value	High Temp (105°F) Resistance Value
1000Ω RTD	1.02KΩ (41.20°F)	1.15KΩ (101.5°F)
3000Ω Thermistor	7.87KΩ (39.8°F)	1.5KΩ (106.8°F)
10K-2 Thermistor	30.1KΩ (34.9°F)	4.75Ω (109.1°F)
10K-3 Thermistor	26.7KΩ (35.9°F)	5.11KΩ (108.4°F)
10K-3(11K) Thermistor	7.32KΩ (43.7°F)	3.65Ω (105.2°F)

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)
- If the unit has a Test and Balance switch, make sure that the switch is in the center “Norm” position.
- Measure the physical temperature at the temperature sensor’s location using an accurate temperature standard. Disconnect the temperature sensor wires and measure the temperature sensor’s resistance across the sensor output pins 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. Find BAPI’s website at www.bapihvac.com; click on “Resource Library” and “Sensor Specs” then click on the type of sensor you have.

Specifications

SENSOR SPECS

Sensor: Passive
Thermistor ..... NTC, 2 wire
RTD ..... PTC, 2 or 3 wire

Thermistor: Thermal resistor
Temp. Output..... Resistance
Accuracy (Std) ..... ±0.36ºF, (±0.2ºC)
Accuracy (High) ..... ±0.18ºF, (±0.1ºC), **[XP]** option
Stability ..... < 0.036ºF/Year, (<0.02ºC/Year)
Heat Dissipation ..... 2.7 mW/ºC
Temp. Drift..... <0.02ºC per year
Probe Range ..... -40º to 221ºF (-40º to 105ºC)

RTD: Resistance Temperature Device
Platinum (Pt) ..... 100Ωor 1KΩ @0ºC, 385 curve,
Platinum (Pt) ..... 1KΩ @0ºC, 375 curve
Pt Accuracy (Std) ... 0.12% @Ref, or ±0.55ºF, (±0.3ºC)
Pt Accuracy (High) . 0.06% @Ref, or ±0.277ºF (±0.15ºC), **[A]**option
Pt Stability ..... ±0.25ºF, (±0.14ºC)
Pt Self Heating ..... 0.4 ºC/mW @0ºC
Pt Probe Range ..... -40º to 221ºF, (-40 to 105ºC)
Nickel (Ni) ..... 1000Ω @70ºF, JCI curve
Ni Probe range ..... -40º to 221ºF (-40 to 105ºC)

Sensitivity: Approximate @ 32ºF (0ºC)
Thermistor ..... Non-linier
See bapihvac.com “Sensor Specs”
1KΩ RTD (Pt) 3.85Ω/ºC
100Ω RTD 0.385Ω/ºC
Nickel (Ni) ..... 2.95Ω/ºF for the JCI RTD

ENCLOSURE AND WIRING SPECS

BAPI-Box Crossover Enclosure Rating:
IP44

BAPI-Box Crossover Enclosure Material:
UV-resistant polycarbonate & Nylon, UL94V-0

Environmental Operating Range:
-40 to 185ºF (-40 to 85ºC)
0 to 100% RH, Non-condensing

Lead Wire:
22AWG stranded

Wire Insulation:
Etched Teflon, Plenum rated

Probe:
Vented polycarbonate shield, ½” OD

Probe Length:
1.2” w/ ½” NPT threads

Duct Gasket:
1/4” Closed cell foam (impervious to mold)

Agency:
RoHS
PT= DIN43760, IEC Pub 751-1983, JIS C1604-1989

Specifications subject to change without notice.