

Overview and Identification

The Duct Averaging sensor is for temperature measurement of stratified air and provides an average temperature along its length. The flexible probe is made of bendable aluminum. The Averaging Sensor is available in multiple thermistor or RTD.

The BAPI-Box Crossover enclosure has a hinged cover for easy termination and comes with an IP10 rating (or IP44 rating with a pierceable knockout plug installed in the open port).

This instruction sheet is specific to units with the BAPI-Box Crossover Enclosure. For other enclosures, please refer to instruction sheet "20903_ins_duct_avg_passive.pdf" which is available on the BAPI website or by contacting BAPI.

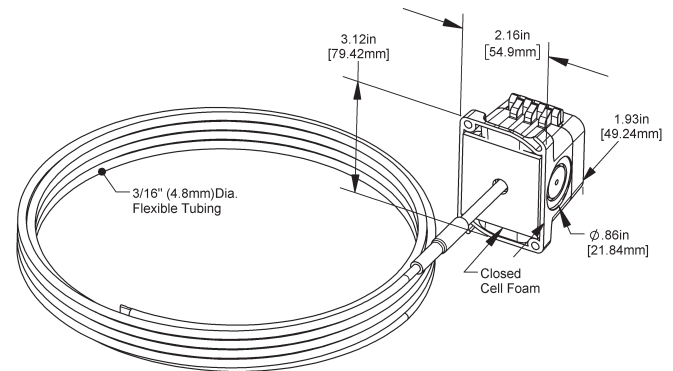


Fig. 1: Duct Averaging Unit with BAPI-Box Crossover Enclosure

Specifications

SENSOR SPECS

Sensor: Passive

Thermistor 4 sensors in 8' and 12' probes
 9 sensors in 24' or longer probes
 RTD Continuous sensor, 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 $< 0.036^{\circ}\text{F}/\text{Year}$, ($< 0.02^{\circ}\text{C}/\text{Year}$)
 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 Temperature Device

Platinum (Pt) $1\text{K}\Omega$ @ 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 $0.4^{\circ}\text{C}/\text{mW}$ @ 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
 See bapihvac.com "Sensor Specs"
 $1\text{K}\Omega$ RTD (Pt) $3.85\Omega/^{\circ}\text{C}$
 Nickel (Ni) $2.95\Omega/^{\circ}\text{F}$ for the JCI RTD

ENCLOSURE AND WIRING SPECS

BAPI-Box Crossover Enclosure Ratings:

IP10, NEMA 1
 IP44 with knockout plug installed in the open port

BAPI-Box Crossover Enclosure Material:

UV-resistant polycarbonate & Nylon, UL94V-0

Environmental Operating Range:

-40 to 185°F (-40 to 85°C)
 0 to 100% RH, Non-condensing

Lead Wire:

22AWG stranded

Wire Insulation:

Etched Teflon, Plenum rated

Probe:

Bendable Copper, 3/16" dia with 4" Sleeve

Probe Length:

2', 4' or 8' per order

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.

Mounting

1. Place the sensor in the middle or top of the duct as shown in Fig 2 or Fig 3 so the flexible probe can enter the duct in a convenient place. Drill the probe and mounting holes as shown in Fig 4.
2. Insert the probe by unrolling the sensor into the duct carefully to avoid kinking the sensor. Serpentine the duct with the sensor at least twice across the stratified air in the duct to achieve the best average temperature reading. At the sensor reversing points, a Flexible Probe Bracket (see Fig. 6) can be used to support the sensor and to avoid kinking the sensor.
3. Mount the enclosure to the duct using BAPI recommended #8 screws through a minimum of two opposing mounting tabs provided. A 1/8" pilot screw hole in the duct makes mounting easier through the mounting tabs. Use the enclosure tabs to mark the pilot hole locations.
4. Snug up the sensors so that the foam backing is depressed to prevent air leakage but do not over-tighten or strip the screw threads.
5. A pierceable knockout plug is available for the open port in the BAPI-Box Crossover enclosure (see Fig. 5). The plug increases the enclosure rating from IP10 to IP44.

Notes:

Use caulk or Teflon tape for your conduit entries to maintain the appropriate IP or NEMA rating for your application.

Conduit entry for outdoor or wet applications should be from the bottom of the enclosure.

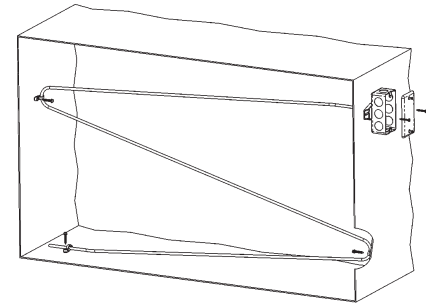


Fig 2: Flexible Sensor Horizontal Mount (Best for Vertical Stratification)

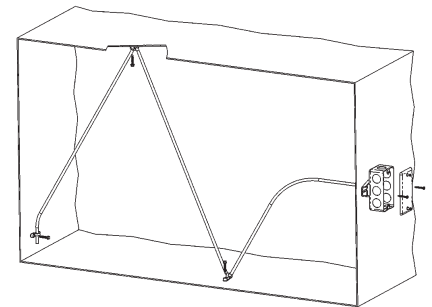


Fig 3: Flexible Sensor Vertical Mount (Best for Horizontal Stratification)

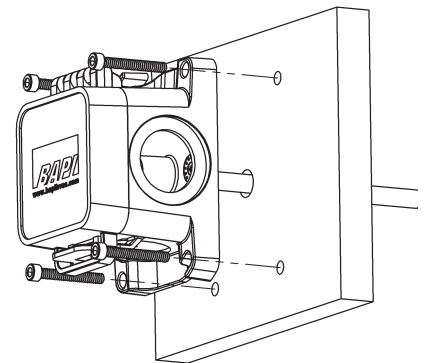


Fig. 4: BAPI-Box Crossover Mounting to the Duct

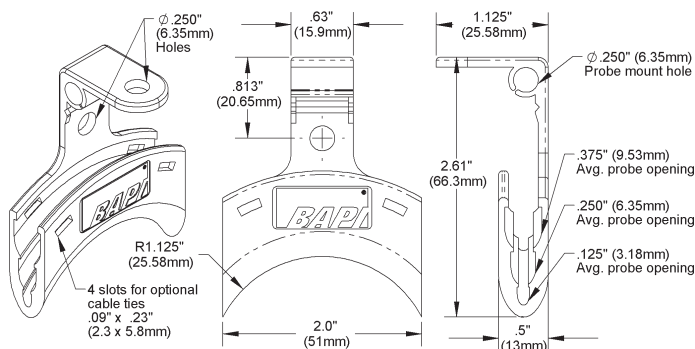


Fig 6: Flexible Probe Bracket (BA/FPB)
(Order Separately)



Fig. 5: Pierceable knockout plug (above) and inserted into the open port of the BAPI-Box Crossover.

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.

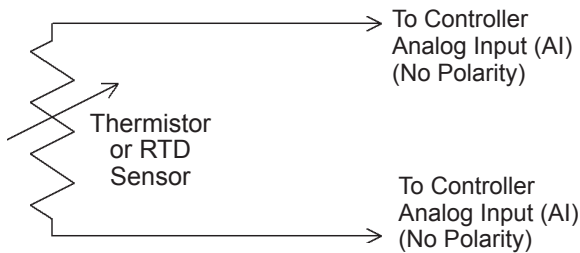


Fig. 7: 2-Wire Termination for Thermistor or RTDs

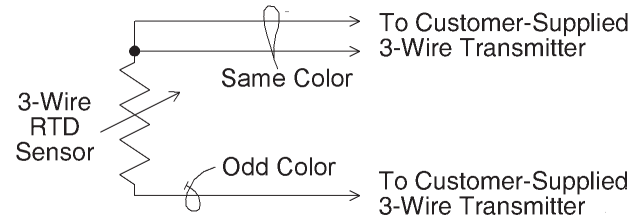


Fig. 8: 3-Wire Termination for RTDs

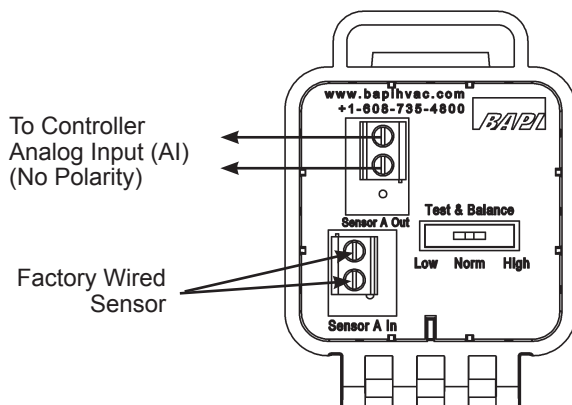


Fig. 9: Terminal Strip (-TS) or Test and Balance (-TB) Option for 2 Wire Sensors

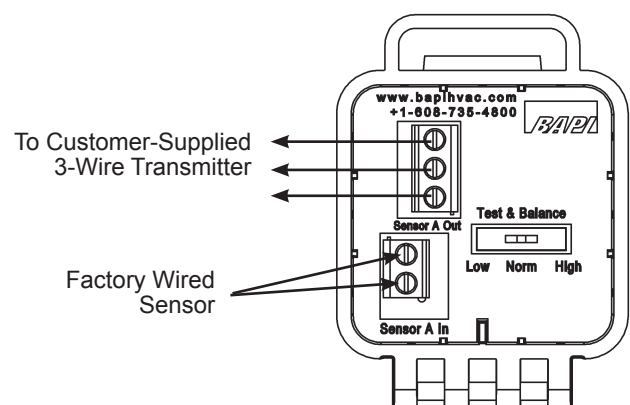


Fig. 10: Terminal Strip (-TS) or Test and Balance (-TB) Option for 3 Wire Sensors

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)

Specifications subject to change without notice.



Duct Averaging Sensors in the BAPI-Box Crossover Enclosure

Installation & Operations

37707_ins_ductavg_passive_bbx

rev. 03/22/18

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 subject to change without notice.