Submersible Averaging Temperature Transmitters in the BAPI-Box Crossover Enclosure

Installation & Operations

37724_ins_subavg_active_bbx rev. 03/23/18

Overview and Identification

The Submersible Averaging unit is for duct mounting and temperature measurement of moisture saturated, stratified air across a duct with a humidifier or OSA intake to give the average mixed air temperature along the length of the sensor. The unit may also be used as a sump sensor to average the water temperature in a water tank. The flexible probe is made of copper and comes in different lengths for a custom duct fit. The units come with 4 to 20mA output and can be ordered with a 1KΩ Platinum RTD or special high accuracy RTD matched transmitters which match the sensor to the transmitter for improved accuracy.

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 temperature transmitter units with the BAPI-Box Crossover Enclosure. For all other temperature transmitter units, please refer to instruction sheet "20917_ins_SubmersibleAvg_Active.pdf" which is available on the BAPI website or by contacting BAPI.

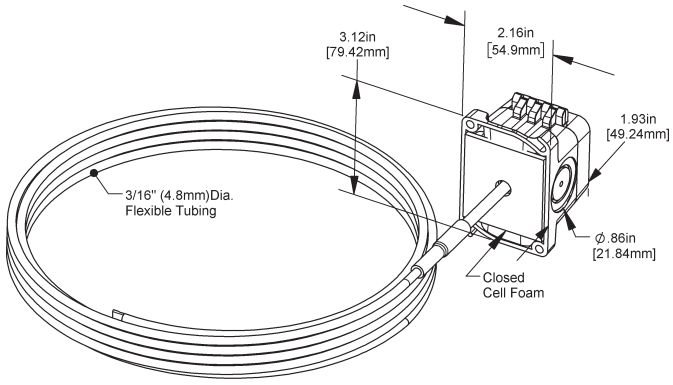

Fig 1: Submersible Averaging Unit with BAPI-Box Crossover Enclosure.

Specifications

SENSOR SPECS

RTD Transmitter

Power Required: ..... 10 to 40VDC
Output: ..... 4 to 20mA, 850Ω@24VDC
Output Wiring: ..... 2 wire loop
Output Limits: ..... <1mA (short), <22.35mA (open)
Span: ..... Min. 30ºF (17ºC), Max 1,000ºF, (555ºC)
Zero: ..... Min. -148°F (-100°C), Max 900ºF (482ºC)
Zero & Span Adjust: 10% of span
Accuracy: ..... ±0.065% of span
Linearity: ..... ±0.125% of span
Power Output Shift: ±0.009% of span
RTD Sensor: ..... 2 wire Platinum (Pt), 385 curve
Transmitter Ambient: -4 to 158ºF(-20 to 70ºC) 0 to 95% RH, Non-condensing)

RTD Sensor: Resistance Temp Device (Bare Sensor)
Platinum (Pt): ..... 1KΩ @0ºC, 385 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)

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

Lead Wire:
22AWG stranded

Wire Insulation:
Etched Teflon, Plenum rated

Probe:
Flexible Aluminum tube, 0.19" OD

Probe Length:
8', 12', 24' 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.

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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) should 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.

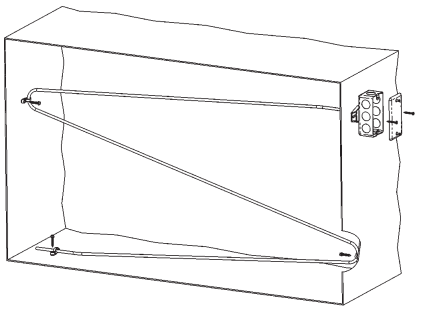

Fig 2: Flexible Sensor Horizontal Mount (Best for Vertical Stratification)

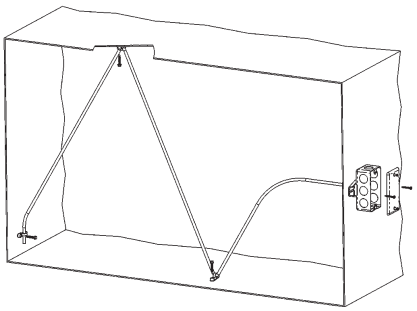

Fig 3: Flexible Sensor Vertical Mount (Best for Horizontal Stratification)

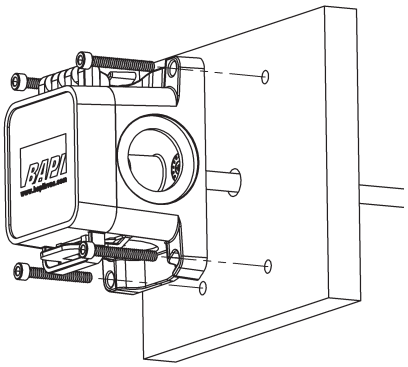

Fig. 4: BAPI-Box Crossover Mounting to the Duct

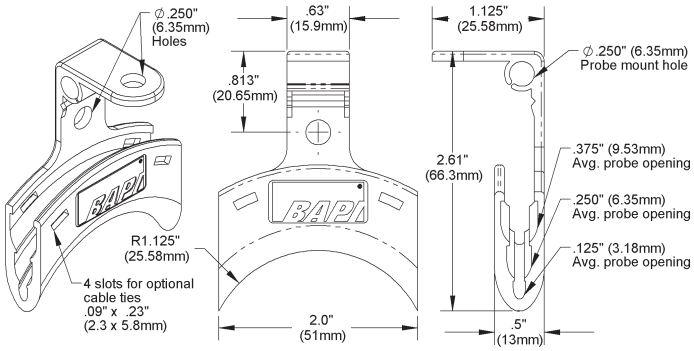

Fig 6: Flexible Probe Bracket **(BA/FPB)** (Order Separately)

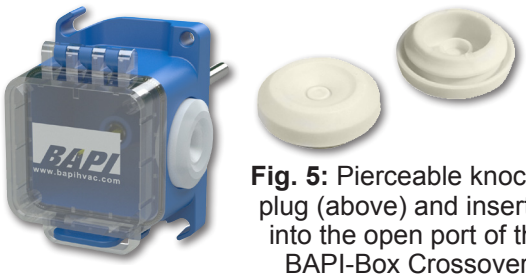

Fig. 5: Pierceable knockout plug (above) and inserted into the open port of the BAPI-Box Crossover.

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.

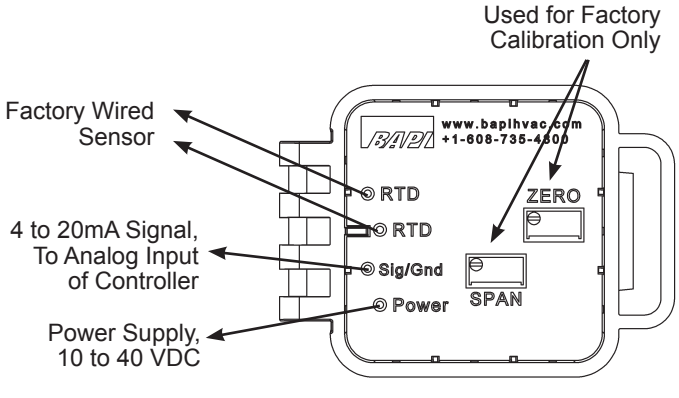

Fig. 5: Transmitter with Flying Leads

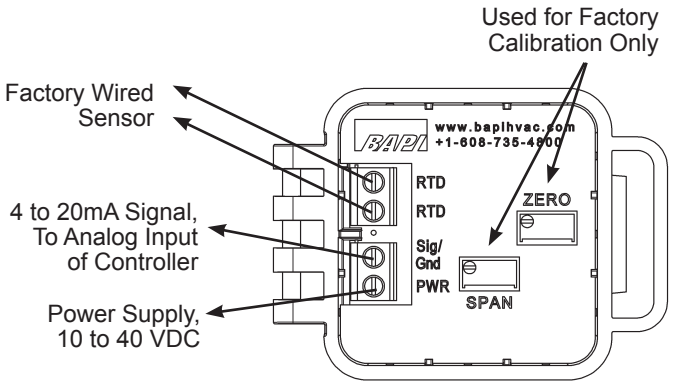

Fig. 6: Transmitter with Terminals

Note: Green LED on cover face will light when power is applied.

Diagnostics

Possible Problems:	**Possible Solutions:**
Green power LED is not on.	- Measure the power supply voltage by placing a multi-meter across the transmitter's "Power" and "Sig/Gnd" leads or terminals. Make sure that the power is 10 to 40 VDC. - Make sure that the "Power" and "Signal/Gnd" wires are not open or shorted together and are terminated correctly to the controller.
The reading is incorrect in the controller.	- Determine if the input is set up correctly in the BAS and controller's software. - Compare the transmitted current to the actual temperature measurement at the sensor location. Measure the physical temperature at the temperature sensor's location using an accurate temperature standard. 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. If the measured resistance is different from the temperature table by more than 5% call BAPI technical support.

4 to 20mA Temperature Equation

$$T = \frac{TLow + (A - 4) \times (TSpan)}{16}$$

T = Temperature at sensor
TLow = Low temperature of span
THigh = High temperature of span
TSpan = THigh - TLow
A = Signal reading in mA

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