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.*

Specifications

**SENSOR SPECS**

Sensor: Passive
- Thermistor: 4 sensors in 8’ and 12’ probes
- RTD: 9 sensors in 24’ or longer probes

**Thermistor:**
- Temp. Res.: ±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:**
- 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)
- Ni: 1000Ω @70ºF, JCI curve
- Ni Probe range: -40º to 221ºF (-40 to 105ºC)

**Sensitivity:**
- Approximate @ 32ºF (0ºC)
- Thermistor: Non-linear
- See bapihvac.com “Sensor Specs”
- 1KΩ RTD (Pt): 3.85Ω/ºC
- Nickel (Ni): 2.95Ω/ºF 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 185ºF (-40 to 85ºC)
- 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.
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.

**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).

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

Specifications subject to change without notice.
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.