

#20903 – 6/5/24

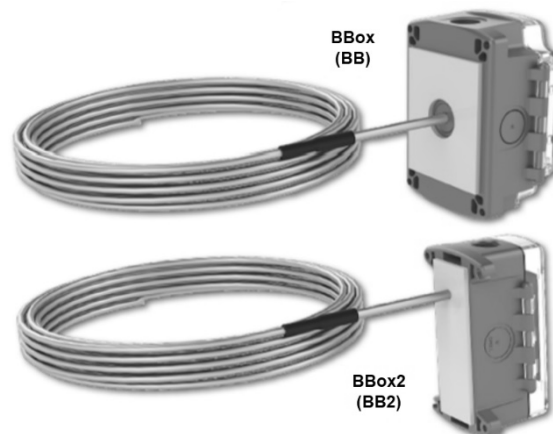
Identification and Overview

Averaging Duct Temperature Sensors

The Averaging Duct Temperature Sensor measures stratified air to give the average temperature along the length of the sensor. The probe is made of flexible aluminum and is available in multiple thermistor or RTD options and multiple enclosure styles.

RTDs have continuous wire strands that measure an average temperature along their entire length. Averaging probes with an RTD will measure an average temperature along their entire length without gaps between the sensing elements.

Thermistors are multi-point discrete sensing elements. Averaging units with thermistors will have 4 or 9 individual thermistors spread evenly throughout the tube. Coils less than 24' (7.3m) have 4 sensors, and coils 24' and greater have 9 sensors



Part #s:	N1-10K-2-A-12-BB-C	N1-10K-2-A-12-NB-C	N1-10K-2-A-24-BB-C
	N1-10K-2-A-24-NB-C	N1-10K-2-A-50-C	N1-10K-2-A-50-BB2-C
	N1-10K-2-A-50-BB-C	N1-10K-2-A-8-BB-C	N1-10K-2-A-8-NB-C

Specifications

Sensor: Passive

Thermistor	4 sensors in < 24' probes
	9 sensors in > 24' probes
RTD	Continuous sensor, 2 or 3 wire

Thermistor: Thermal resistor (NTC)

Temp. Output.....	Resistance per order
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 mW/ $^{\circ}\text{C}$
Temp. Drift.....	< 0.02°C per year
Probe range.....	-40° to 221°F (-40° to 105°C)

RTD: Resistance Temp Device (PTC)

Platinum (Pt).....	100Ω and 1KΩ @0°C, 385 curve
Platinum (Pt).....	1KΩ @0°C, 375 curve
Pt Accuracy (std)	0.12% @Ref or $\pm 0.55^{\circ}\text{F}$, ($\pm 0.3^{\circ}\text{C}$)
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).....	1000Ω @70°F, JCI curve
Ni Probe Range	-40° to 221°F (-40 to 105°C)

Sensitivity: Approximate

Thermistor	Non-linear
Plat. RTD.....	3.85Ω/ $^{\circ}\text{C}$ for 1KΩ RTD
	0.385Ω/ $^{\circ}\text{C}$ for 100Ω RTD
Nickel RTD	2.95Ω/ $^{\circ}\text{F}$ for the JCI RTD

Lead Wire: 22AWG stranded, etched Teflon, plenum-rated

Probe: Flexible aluminum tube, 3/16" (4.8mm) OD

Probe Length: 8', 12' & 24' (2.4m, 3.7m, 7.3m) per order

Duct Gasket: 1/4" (6.4mm) closed cell foam (impervious to mold)

Enclosure Ratings

No Box.....	NB, No rating
BBox	BB, NEMA 4X, IP66
BBox 2	BB2, NEMA 4X, IP66

Enclosure Materials

No Box.....	NB, Nylon 66, UL94H-B
BBox	BB, Polycarbonate, UL94V-0, UV rated
BBox 2	BB2, Polycarbonate, UL94V-0, UV rated

Ambient (Encl.) 0 to 100% RH, Non-condensing

All BBoxes BB, BB2, -40°F to 185°F, (-40° to 85°C)

No Box..... NB, -40°F to 212°F, (-40° to 100°C)

Agency

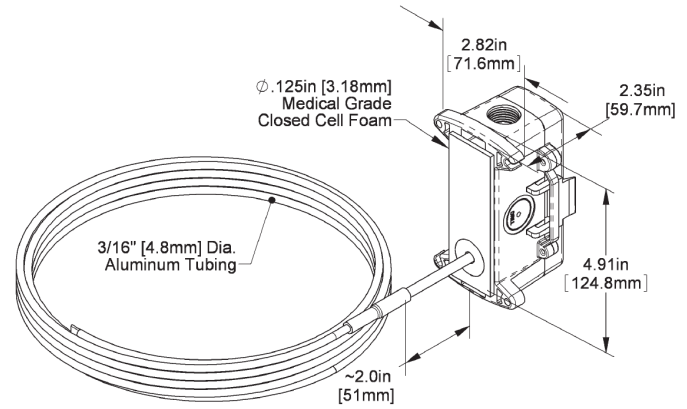
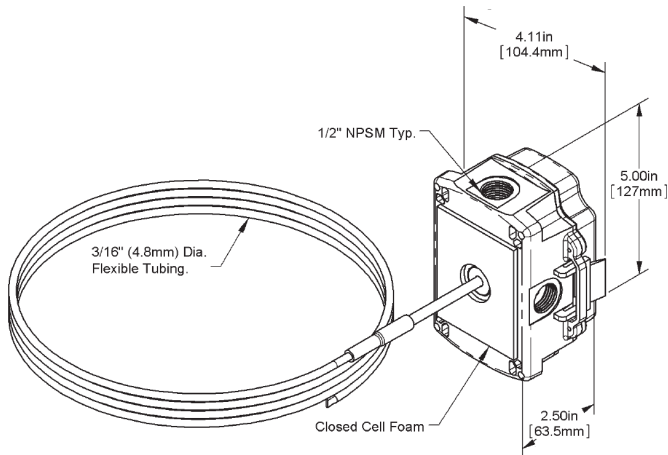
RoHS, *CE

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

*Passive Thermistors 20KΩ and smaller are CE

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Dimensional Drawing



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Mounting

1. Place the sensor in the middle or top of the duct as shown in Figs 5 and 6 and drill the probe and mounting holes as depicted for the enclosure being used.
2. Insert the probe by unrolling it into the duct carefully to avoid kinking. Serpentine the probe at least twice across the stratified air in the duct to achieve the best average temperature reading. At the probe reversing points, a Flexible Probe Bracket can be used to support the sensor, avoid kinking and provide isolation from the duct wall.
3. Mount the enclosure to the duct using recommended 5/16" self-tapping, self-drilling sheet metal screws through a minimum of two opposing mounting tabs. 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. Weatherproof (WP) enclosures require assembly of the mounting tabs on opposite corners.
4. Snug up the sensors so that the foam backing is depressed to prevent air leakage but do not over-tighten or strip the duct wall.

NOTES

- Be sure not to drill into the weatherproof enclosures (BB, BB2) which will violate the NEMA and/or the IP rating.
- Be sure to seal your conduit entries to maintain the appropriate NEMA or IP rating for your application if required.

Thermistor Sensor Element Locations in Averaging Probes

8' (2.4m) - First element located about 8" (200mm) from the tip. Spacing between thermistors is 27-1/2" (700mm).

12' (3.7m) - First element located about 8" (200mm) from the tip. Spacing between thermistors is 42-1/2" (1080mm).

24' (7.3m) - First element located about 15-3/4" (400mm) from the tip. Spacing between thermistors is 31-1/2" (800mm).

50' (15.2m) - First element located about 15-3/4" (400mm) from the tip. Spacing between thermistors is 70-3/4" (1800mm).

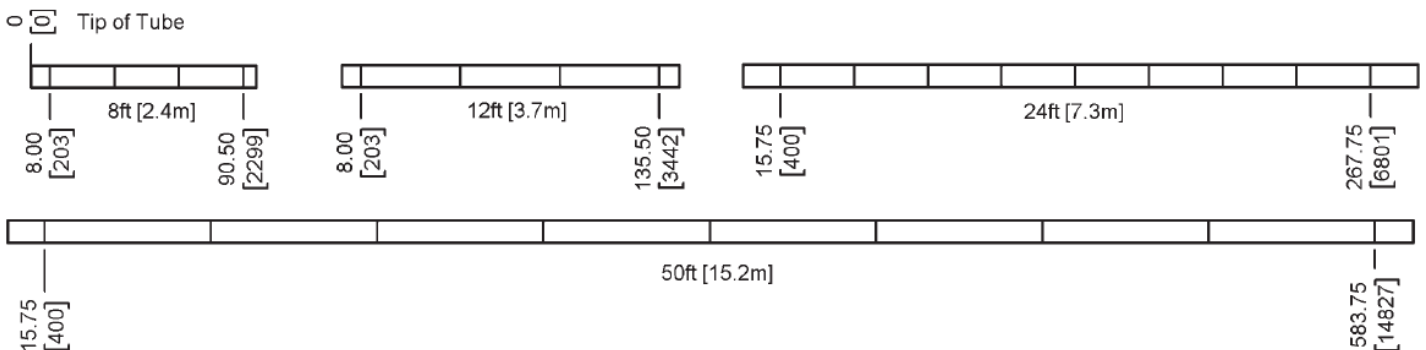


Figure 5: Thermistor Sensor Element Location in Probes

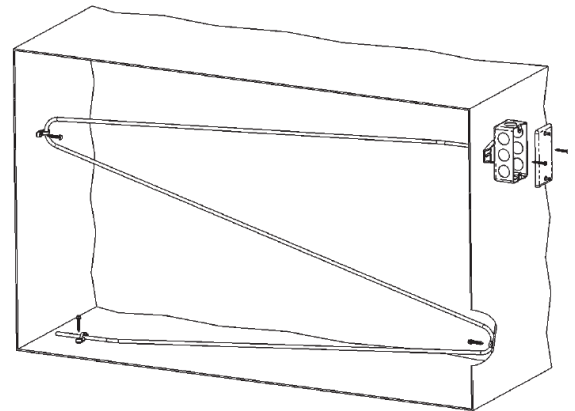


Figure 3: Flexible Sensor Horizontal Mount (Best for Vertical Stratification)

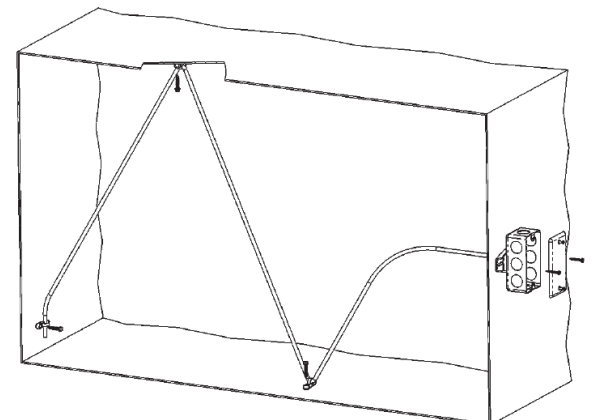


Figure 4: Flexible Sensor Vertical Mount (Best for Horizontal Stratification)

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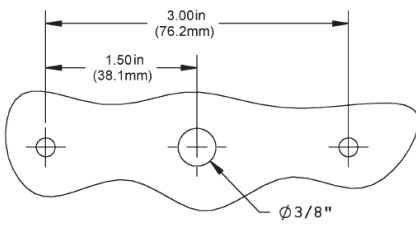


Figure 6: Junction Box or No Box (NB)

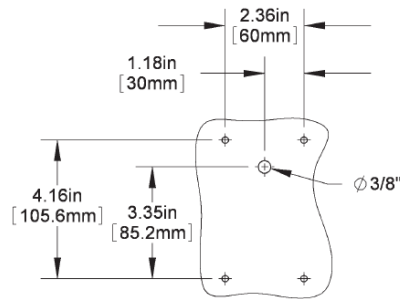


Figure 7: BBox2 (BB2) Mounting Holes and installation

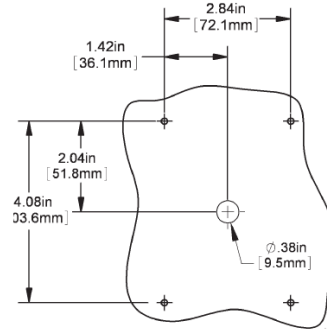


Figure 8: BBox (BB) Enclosure Mounting and installation Holes (Rotate 90° for Horizontal Mounting)

Wiring and Termination

All wiring must comply with the National Electric Code (NEC) and local codes.

 Caution	<p>Do NOT run this device's wiring in the same conduit as high or low voltage AC power wiring. Tests show that inaccurate signal levels are possible when AC power wiring is present in the same conduit as the sensor wires.</p>
 Tip	<p>We recommend using twisted pair of at least 22AWG and sealant filled connectors for all wire connections. Larger gauge wire may be required for long runs</p>

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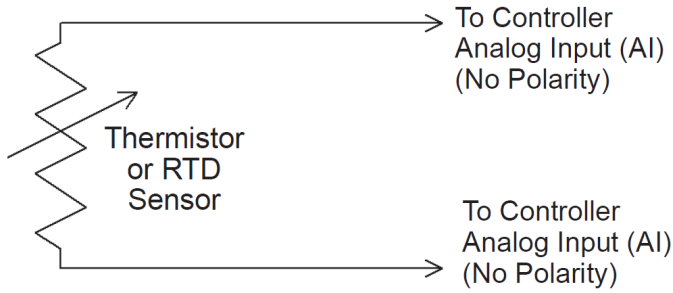


Figure 9: 2 Wire Termination for Thermistor or RTD

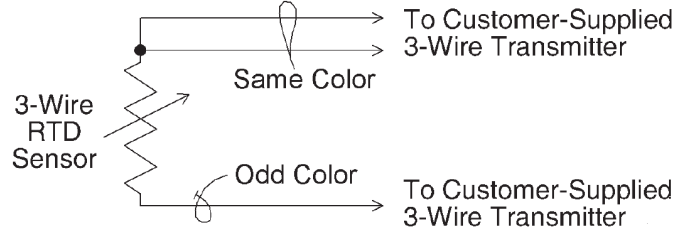


Figure 10: 3 Wire Termination for RTD

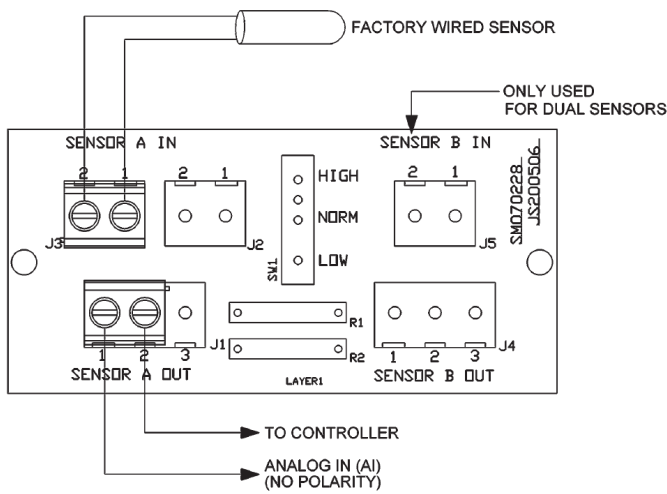


Figure 11: Terminal Strip (-TS) Option for 2 Wire Sensors Termination

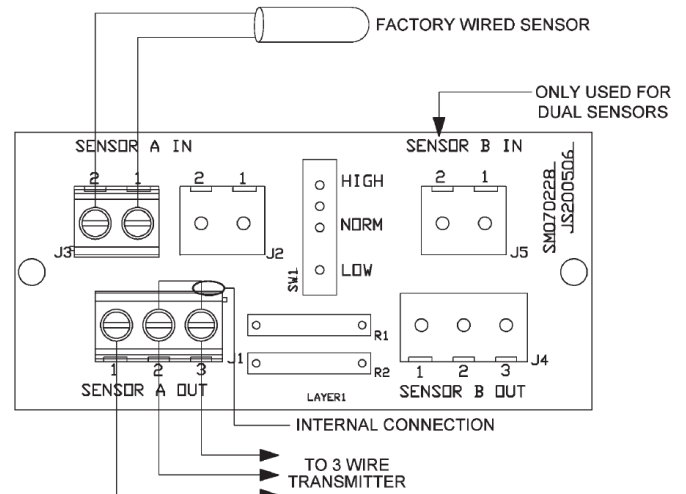


Figure 12: Terminal Strip (-TS) Option for 3 Wire Sensors Termination

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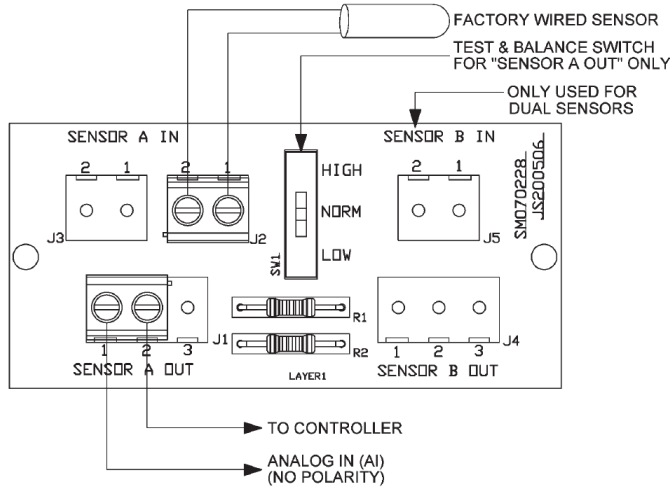


Figure 13: Test & Balance (-TB) Option for 2 Wire Sensors Termination

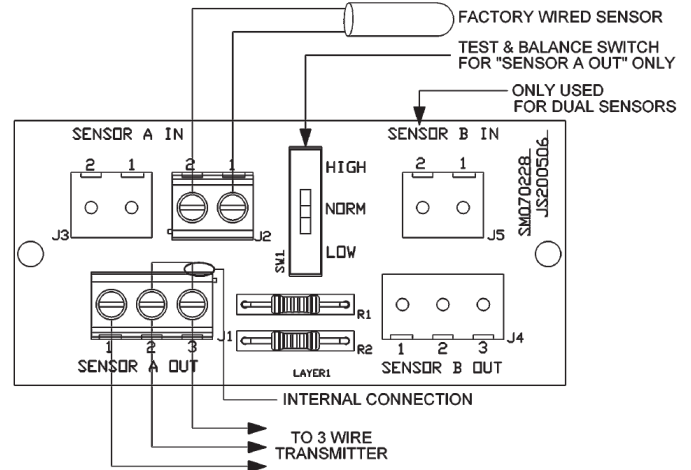


Figure 14: Test & Balance (-TB) Option for 3 Wire Sensors Termination

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.

Appendix – Symbols Key

<p>Warning</p>	<p>Potential for death, serious injury, or permanent damage to a system.</p>
<p>Caution</p>	<p>Potential for injury, damage to a system, or system failure.</p>
<p>Tip</p>	<p>Useful information not related to injury or system damage.</p>