

**Identification and Overview**

**Rigid Averaging Duct Temperature Sensors**

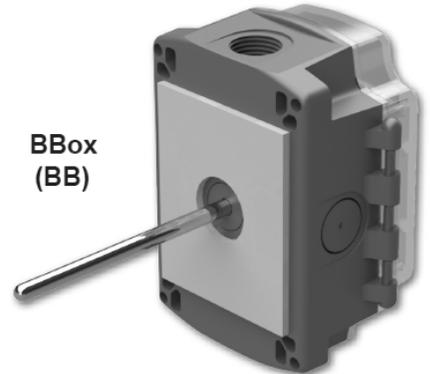
- Averaging Lengths: 12", 2', 3' and 4'
- Five Enclosure Styles including the Box Crossover with Hinged Cover

Rigid Averaging Units feature closed cell foam to seal the probe insertion hole and absorb vibration. Mounting tabs allow for easy installation directly to the wall of the duct. All units have etched Teflon lead wires and encapsulated sensors to create a watertight package that can perform under real world conditions.

Averaging probes should be used wherever there is a chance for stratified layers of hot and cold air. Averaging probes are made of 1/4" diameter stainless steel tubing.

The Rigid Averaging Unit is for duct mounting and temperature measurement of stratified air across the duct to give the average temperature along the length of the sensor.

The rigid Stainless Steel Probe is made in different lengths for a custom duct fit. The units are available in multiple thermistor or RTD types as shown in the specifications. Enclosure mounting styles come in plastic or metal for both NEMA 1 and NEMA 4 applications and are all plenum rated.



<b>Part #s:</b>	<b>N1-10K-2-RA-12-BB-A</b>	<b>N1-10K-2-RA-12-WP-A</b>	<b>N1-10K-2-RA-24-A</b>
	<b>N1-10K-2-RA-24-BB-A</b>	<b>N1-10K-2-RA-24-WP-A</b>	<b>N1-10K-2-RA-36-A</b>
	<b>N1-10K-2-RA-36-BB-A</b>	<b>N1-10K-2-RA-36-WP-A</b>	<b>N1-10K-2-RA-48-A</b>
	<b>N1-10K-2-RA-48-BB-A</b>	<b>N1-10K-2-RA-48-WP-A</b>	

**Specifications**

**Sensor:** 4 sensors per probe  
 Passive Thermistor .2 wire  
 Passive RTD ..... 2 or 3 wire

**Thermistor:** Thermal resistor (NTC)  
 Temp. Output ..... Resistance per order  
 Accuracy (Sstd)..... ±0.36°F, (±0.2°C)  
 Accuracy (Hi)..... ±0.18°F, (±0.1°C), [XP] option  
 Stability..... < 0.036°F/Year, (<0.02°C/Year)  
 Heat dissipation ..... 2.7 mW/°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 ±0.55°F, (±0.3°C)  
 Pt Accuracy (Hi) ..... 0.06% @Ref, or ±0.277°F, (±0.15°C), [A]option Pt  
 Stability ..... ±0.25°F, (±0.14°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  
 RTD (Pt) ..... 3.85Ω/°C for 1KΩ RTD  
 0.385Ω/°C for 100Ω RTD  
 Nickel (Ni)..... 2.95Ω/°F for the JCI RTD

**Lead Wire:** 22awg stranded  
**Insulation:** Etched Teflon, Plenum rated  
**Probe:** Rigid Stainless Steel, 0.25" OD  
**Probe Length:** 12", 2', 4' per order  
**Duct gasket:** 1/8" foam (impervious to mold), 176°F Max

**Enclosure Types**  
 BBox..... **BB**, w/ four 1/2" NPSM & one 1/2" drill-out

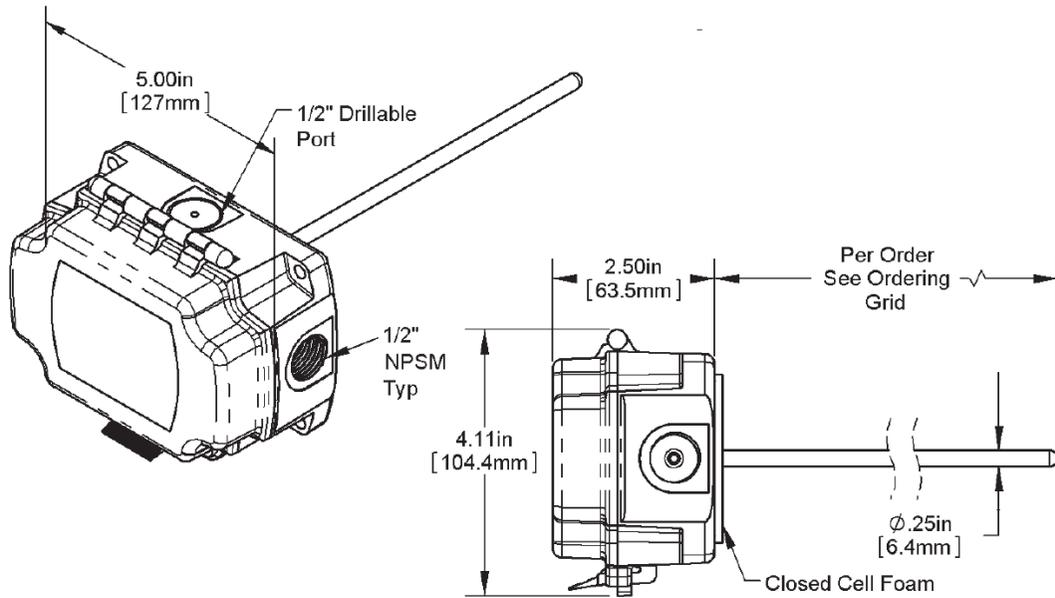
**Enclosure Ratings**  
 BBox..... **BB**, NEMA 4X, IP66

**Enclosure Materials**  
 BBox ..... **BB**, Polycarbonate, UL94V-0, UV rated

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

**Agency**  
 RoHS, \*CE  
 PT= DIN43760, IEC Pub 751-1983, JIS C1604-1989  
 \*Passive Thermistors 20KΩ and smaller are CE compliant

**Dimensional Drawing**



**Rigid Averaging Sensor Option Selection**

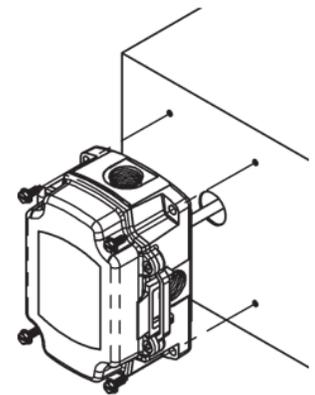
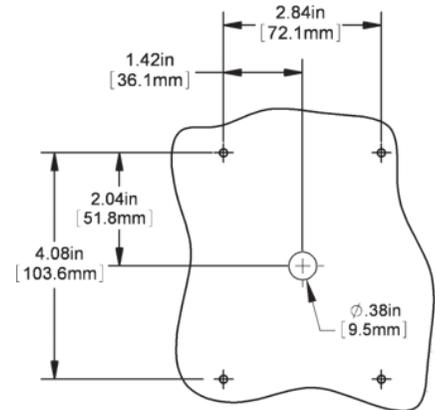
Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

N1- ( #1 ) - ( #2 ) - ( #3 ) - ( #4 ) - A

<b>#1: Temperature Sensor (required)</b>		<b>#2: Probe Type and Length (required)</b>	
1.8K	1.8K Thermistor	RA-12"	Rigid Averaging, 12" (0.3m) Length
3K	3K Thermistor	RA-2'	Rigid Averaging, 2' (0.6m) Length
10K-2	10K-2 Thermistor	RA-3'	Rigid Averaging, 3' (0.9m) Length
10K-3	10K-3 Thermistor	RA-4'	Rigid Averaging, 4' (1.2m) Length
10K-3[11K]	10K-3[11K] Thermistor	<b>#3: Enclosure and Lead Length</b>	
20K	20K Thermistor	BB	BBox (1P66, NEMA 4)
1K[375]	1K Platinum RTD (375 curve)	<b>#4: Test &amp; Balance or Terminal Strip</b>	
1K[Ni]	1K Ω Nickel RTD	TB	Test & Balance Switch
1K	1K Platinum RTD (385 curve)	TS	Terminal Strip Connection
T1K[32 TO 212F]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range		
T1K[20 TO 120F]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range		
T1K[0 TO 100F]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range		
T1K[0 TO 130F]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 130°F Range		
T1K[0 TO 150F]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 150°F Range		
T1K[0 TO 100C]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range		
T1K[-7 TO 49C]	1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range		
T1K[-18 TO 38C]	1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range		

**Mounting**

1. Place the sensor in the middle of the duct away from temperature stratified air, coils or humidifiers to achieve the best temperature reading.
2. Drill the probe hole as depicted below for the enclosure being used. Insert the probe into the duct.
3. Mount the enclosure to the duct using recommended #8 screws through a minimum of two opposing mounting tabs provided. Weatherproof (WP) enclosures will require assembly of the mounting tabs on opposite corners. A 1/8 inch 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.



**Wiring and Termination**

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

 <b>Caution</b>	<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>
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 <b>Tip</b>	<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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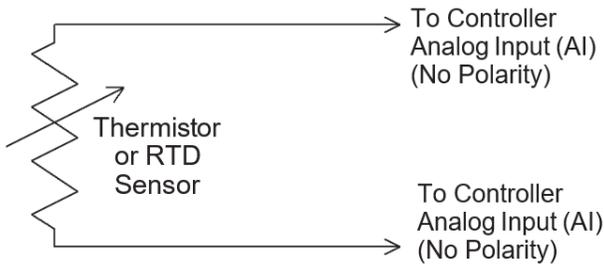


Figure 1: 2 Wire Termination for Thermistor or RTD

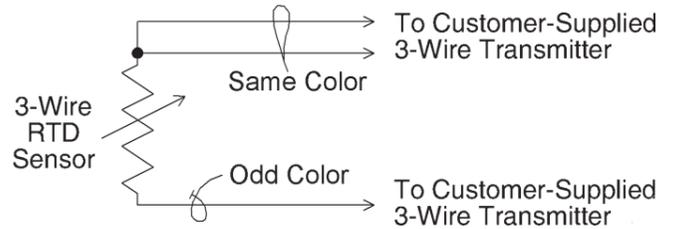


Figure 2: 3 Wire Termination for RTD

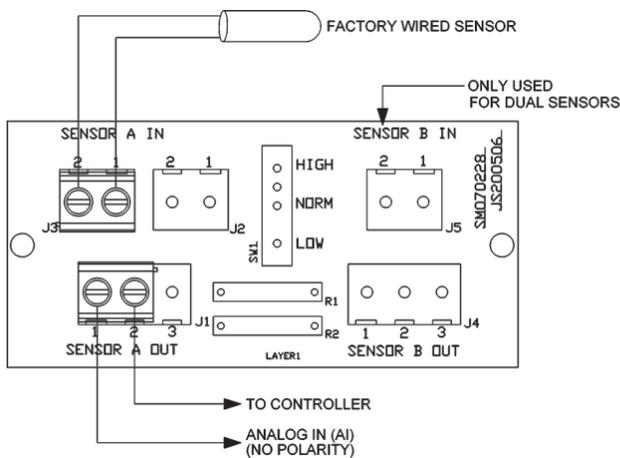


Figure 3: Terminal Strip (-TS) Option for 2 Wire Sensors Termination

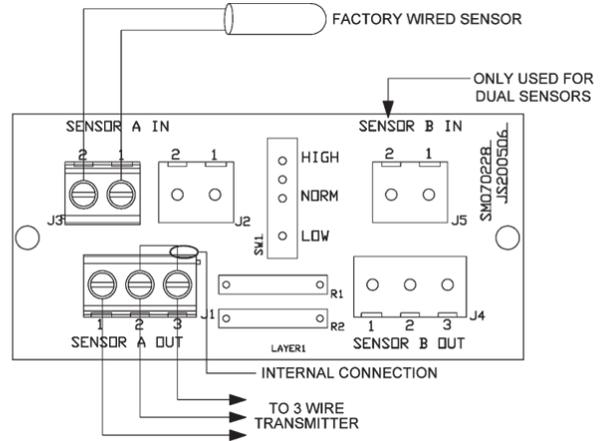


Figure 4: Terminal Strip (-TS) Option for 3 Wire Sensors Termination

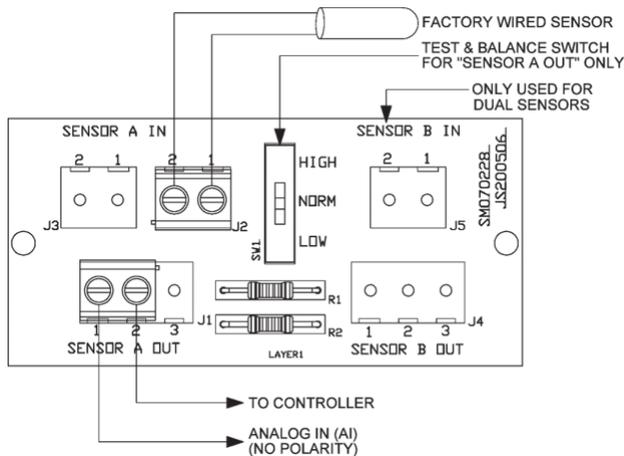


Figure 5: Test & Balance (-TB) Option for 2 Wire Sensors Termination

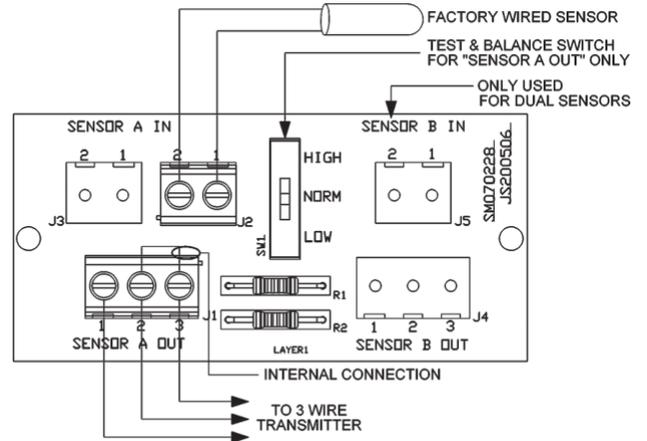


Figure 6: Test & Balance (-TB) Option for 3 Wire Sensors Termination

**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)

Measure the temperature at the temperature sensor’s location using an accurate temperature standard. Disconnect the temperature sensor wires and measure the temperature sensor’s resistance with an ohmmeter. If the measured resistance is different from the temperature table by more than 5%, call technical support.

**Appendix – Symbols Key**

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