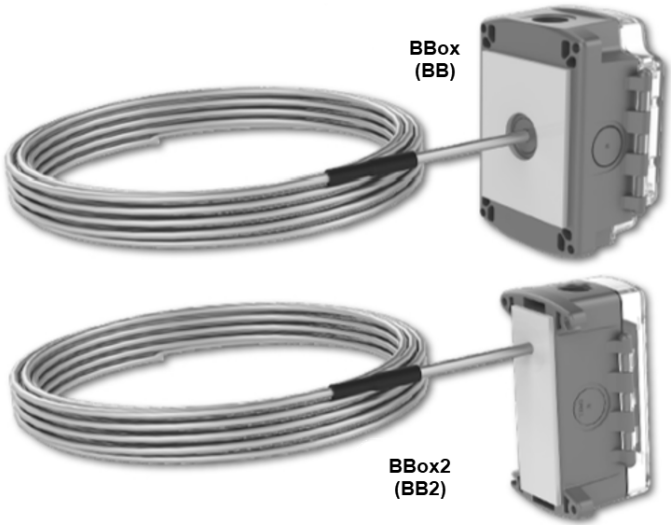
Identification and Overview

Duct Averaging Temperature Transmitters

Flexible Duct Averaging Temperature Transmitters can be ordered with a 1KΩ (385) RTD that has a field adjustable 1 to 5, 0 to 5, 2 to 10, 0 to 10VDC or 4 to 20 mA output over a selected temperature range. These adjustable outputs can be set at the factory to order or default set to 4 to 20mA. They can also be ordered with a special high accuracy matched RTD transmitter which matches the sensor to the transmitter for improved accuracy.

This transmitter can also be ordered in a variety or probe lengths and mounting enclosures as shown below. They are available with a wired connection via flying leads or a pluggable terminal block (-TS).

The Flexible Probe Bracket is used to mount averaging sensors. It makes a smooth arc at direction changes to eliminate the risk of kinking.



Part #s:

N1-T1K[20 TO 120F]-A-12-BB2-A
N1-T1K[20 TO 120F]-A-24-BB2-A
N1-T1K[20 TO 120F]-A-50-BB2-A
N1-T1K[-30 TO 130F]-A-12-BB2-A
N1-T1K[-30 TO 130F]-A-24-BB2-A
N1-T1K[-30 TO 130F]-A-8-BB2-A
N1-T1K[32 TO 212F]-A-24-BB2-A
N1-T1K[-7 TO 49C]-A-24-BB-A

Specifications

Transmitter Circuit
Power Required: ..... 12 to 40VDC
Transmitter Output: ..... 4 to 20mA, 0 to 5, 1 to 5, 0 to 10 or 2 to 10VDC, 850Ω@24VDC
Output Wiring: ..... 2 wire loop
Output Limits: ..... <1mA (short), <22.35mA (open)
Span: ..... Min. 30ºF (17ºC), Max 1000ºF, (555ºC)
Zero: ..... Min. -148°F (-100°C), Max 900ºF (482ºC)
System Accuracy: ..... ±0.065% of span
Linearity: ..... ±(0.125 * T-20ºC)/100
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: ..... -40 to 221ºF, (-40 to 105ºC)
Wire Colors: ..... General color code (other colors possible)
1KΩ, Class B ..... Orange/Orange (no polarity)
1KΩ, Class A ..... Orange/White (no polarity)

RTD Sensitivity:
3.85Ω/ºC for 1KΩ RTD, Approximate @ 32ºF (0ºC)
Lead Wire: 22awg stranded
Insulation: Etched Teflon, Plenum rated
Environmental Operating Range:
-40 to 185ºF (-40 to 85ºC)
0 to 100% RH, Non-condensing
Probe: Flexible aluminum tube, 3/16" (4.8mm) OD
Probe Length: 8', 12' & 24' (2.4m, 3.7m, 7.3m) per order
Enclosure Types:
BBox..... BB, w/ four ½" NPSM & one ½" drill-out
BBox2..... BB2, w/ three ½" NPSM & three ½" drill-outs
Enclosure Ratings:
BBox..... BB, NEMA 4, IP66, UV Rated
BBox2..... BB2, NEMA 4, IP66, UV Rated
Enclosure Material:
BBox..... BB, Polycarbonate, UL94V-0, UV rated
BBox2..... BB2, Polycarb, UL94V-0, UV rated
Ambient (Enclosure): 0 to 100% RH, Non-condensing
BBox..... BB, -40ºF to 185ºF, (-40º to 85ºC)
BBox2..... BB2, -40ºF to 185ºF, (-40º to 85ºC)
Agency
RoHS
PT=DIN43760, IEC Pub 751-1983, JIS C1604-1989

Dimensional Drawing

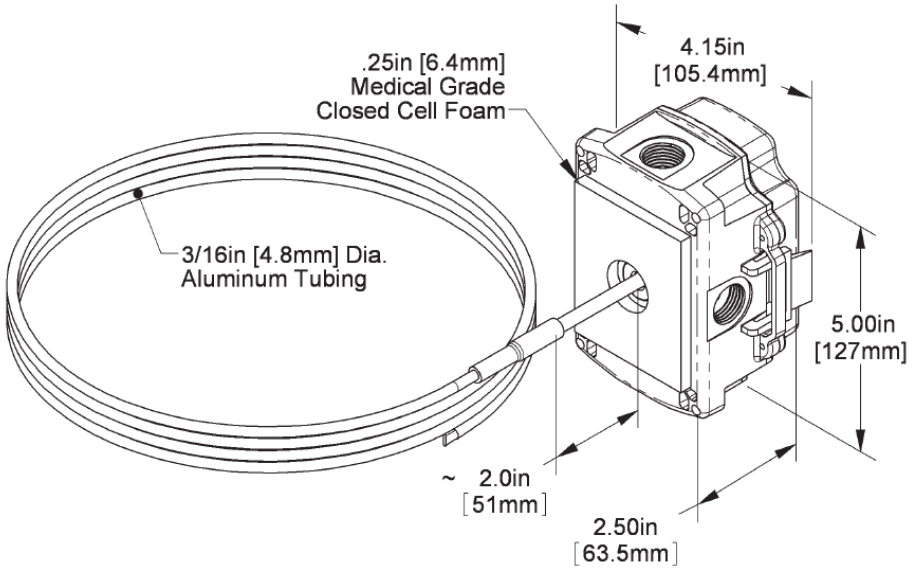


Figure 1: BBox (BB) Enclosure

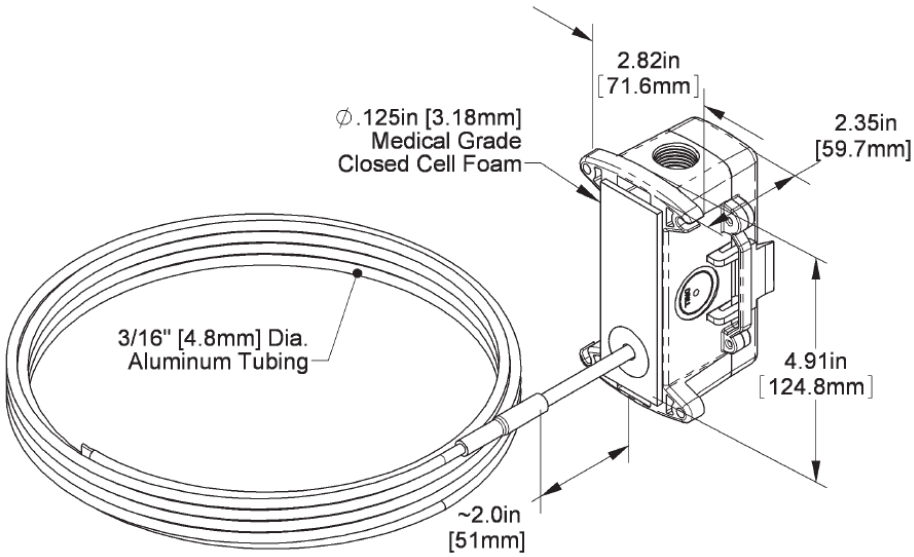


Figure 2: BBox2 Enclosure

Mounting

1. Place the sensor in the middle or top of the duct as shown in **Figs 3** and **4** 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, 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 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.
4. Snug up the sensors so that the foam backing is depressed to prevent air leakage but do not over-tighten.

NOTES

- Do not to drill into the enclosures which will violate the NEMA and/or the IP rating.
- Seal your conduit entries to maintain the appropriate NEMA or IP rating for your application if required.

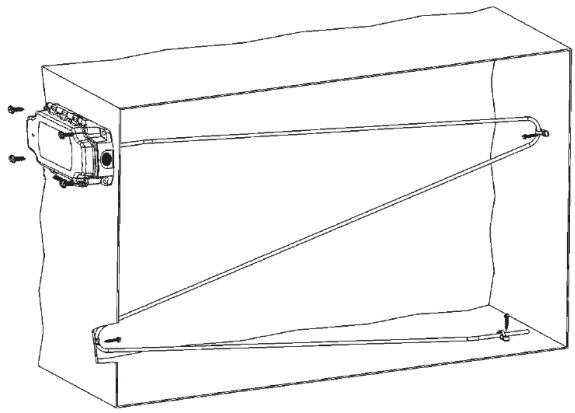


Figure 3: Flexible Sensor Horizontal Mount (Best for Vertical Stratification)

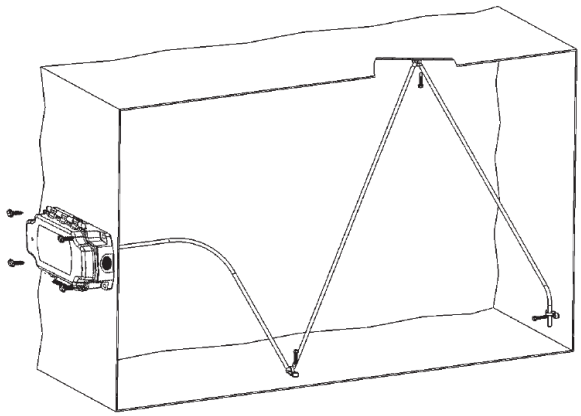


Figure 4: Flexible Sensor Vertical Mount (Best for Horizontal Stratification)

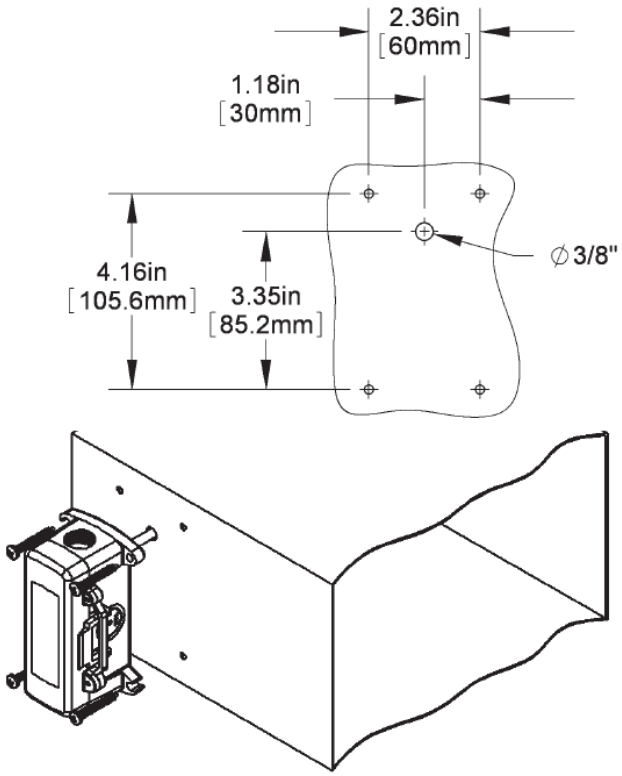


Figure 5: BBox2 (BB2) Mounting Holes and installation

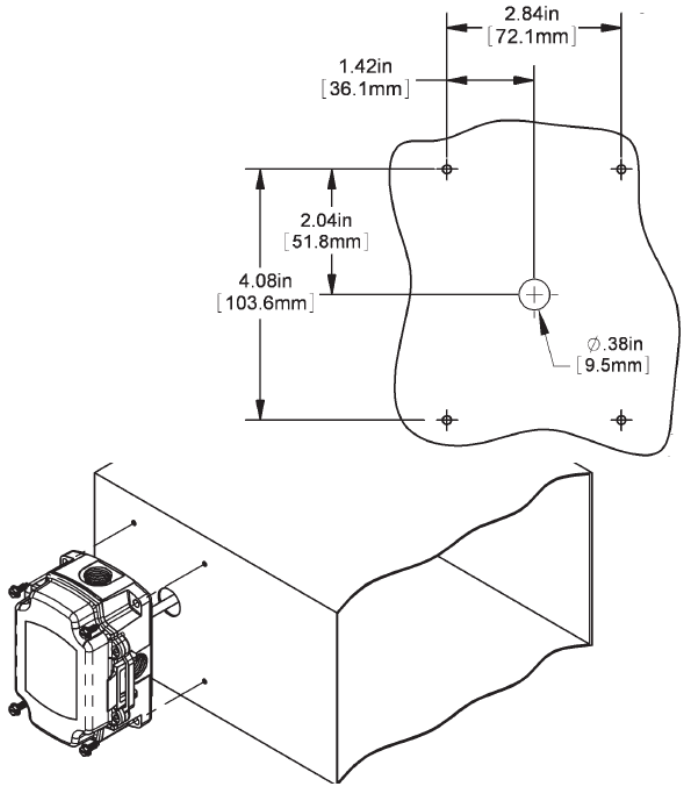


Figure 6: BBox (BB) Enclosure Mounting and installation Holes (Rotate 90° for Horizontal Mounting)

Termination

Warning	Wire the product with power disconnected. Proper supply voltage, polarity, and wiring connections are important to a successful installation. Not observing these recommendations may damage the product and will void the warranty.

Caution	• Do NOT run this device's wiring in the same conduit as AC power wiring of NEC class1 or NEC class 2, NEC class 3 or with wiring used to supply highly inductive loads such as motors, contactors and relays. Tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines. • All wiring must comply with the National Electric Code (NEC) and local codes.

Tip	• 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. • Keep transmitter at least 5 feet from any radio wave-emitting device (i.e.: 2 way radio). Transmitters that are less than 5 feet from a radio wave-emitting device can cause unwanted interference.

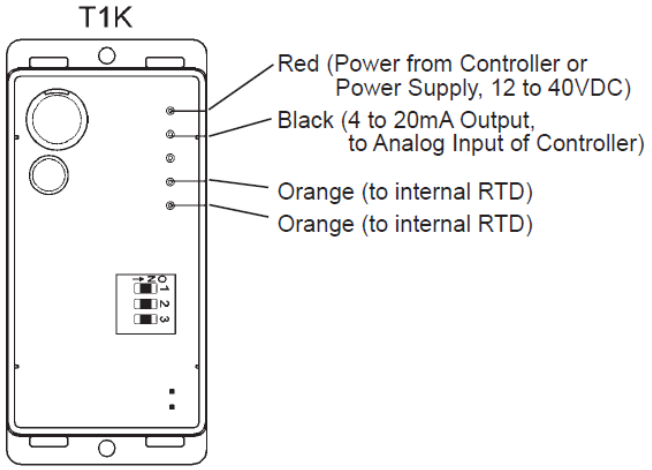


Figure 7: Typical 4 to 20mA Output Transmitter with Flying Leads

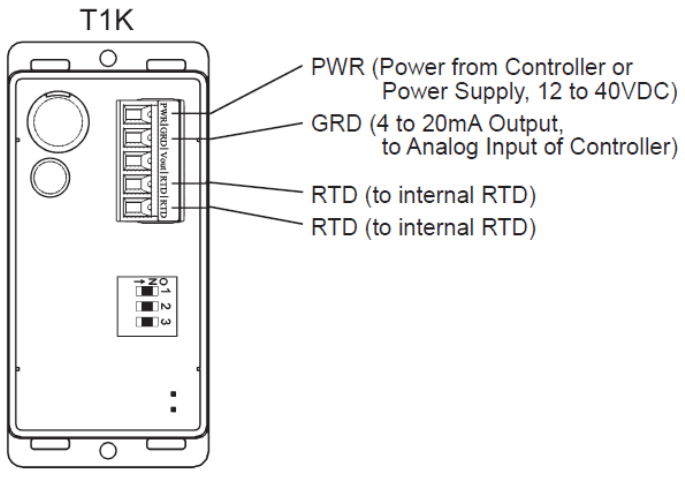


Figure 8: Typical 4 to 20mA Output Transmitter with Terminals

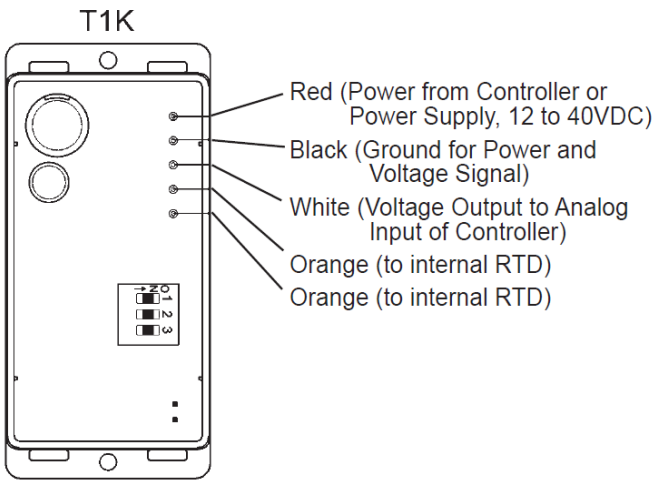


Figure 9: Typical Voltage Output Transmitter with Flying Leads

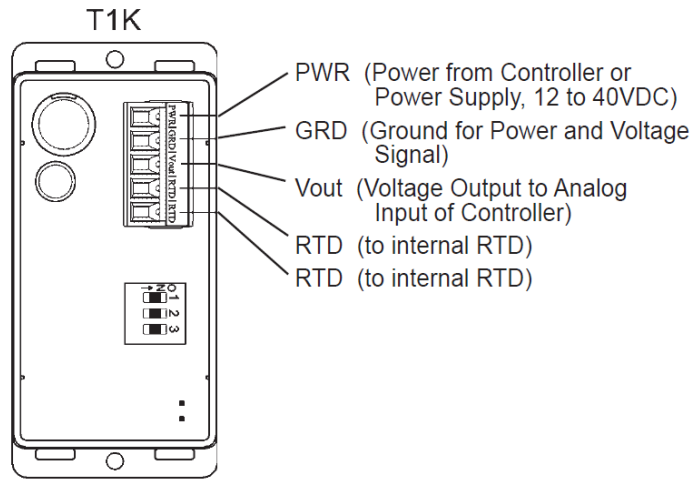
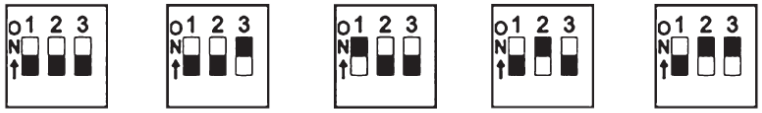


Figure 10: Typical Voltage Output Transmitter with Terminals

DIP Switch Settings for Field-Selectable Output

The transmitter circuit board has a three-position DIP switch that controls the temperature output value. This switch is set at the factory at the time of the order. The settings of the switch are shown below in case you want to change them in the field. Be aware that the power requirements for the unit change depending on the temperature output value. See the specifications section for power requirements.



Diagnostics

Possible Problems:	Possible Solutions:
Unit will not operate.	• Measure the power supply voltage by placing a voltmeter across the transmitter's (+) and (-) terminal. Make sure that it matches the drawings above and power requirements in the specifications. • Check if the RTD wires are physically open or shorted together and are terminated to the transmitter.
The reading is incorrect in the controller. **Voltage Temperature Equation** $T = T_{Low} + \frac{(V \times T_{Span})}{V_{Span}}$ T = Temperature at sensor T_{Low} = Low temperature of span T_{High} = High temperature of span T_{Span} = $T_{High} - T_{Low}$ V_{Low} = Low transmitter voltage usually=(0, 1 or 2v) V_{High} = High transmitter voltage usually=(5 or 10v) V_{Span} = $V_{High} - V_{Low}$ V = Signal reading in volts	• Determine if the input is set up correctly in the controllers and BAS software. • For a 4 to 20mA current transmitter 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 to the left. • For a voltage transmitter, measure the signal with a volt meter (Orange or Orange/Black to Black). The signal should read according to the "Voltage Temperature Equation" shown below. **4-20mA Temperature Equation** $T = T_{Low} + \frac{(A - 4) \times (T_{Span})}{16}$ T = Temperature at sensor T_{Low} = Low temperature of span T_{High} = High temperature of span T_{Span} = $T_{High} - T_{Low}$ A = Signal reading in mA

Appendix – Symbols Key

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