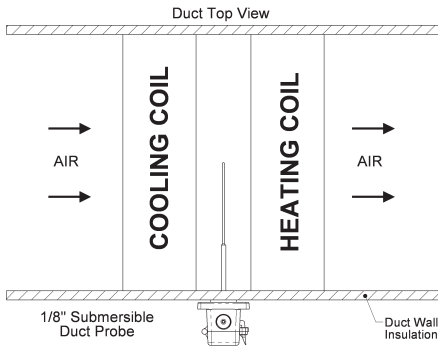


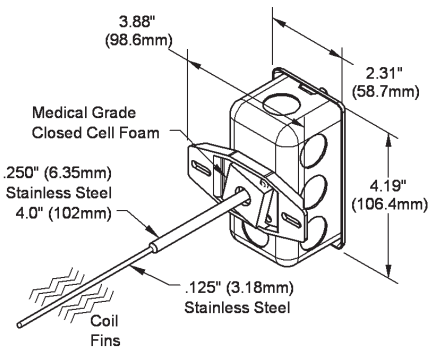
### Overview

The **BA/# -SD** is for duct mounting 4-20mA or Voltage temperature transmitter for measurement of air across cooling coils or wet locations. The Stainless Steel probe tip is very small (1/8") to fit between coil fins and made in different lengths for a custom duct fit. The 4 to 20mA transmitter can be ordered with 100Ω (385), 1KΩ (385) RTDs or 10KΩ type 2 thermistor sensors. A 0 to 5VDC or 0 to 10VDC transmitter is also available with the 10KΩ type 2 thermistor sensor. Special high accuracy RTD matched transmitters (**M**) are available which match the sensor to the transmitter for improved accuracy. Enclosure mounting styles come in plastic or metal for both NEMA 1 and NEMA 4 applications and are all plenum rated.

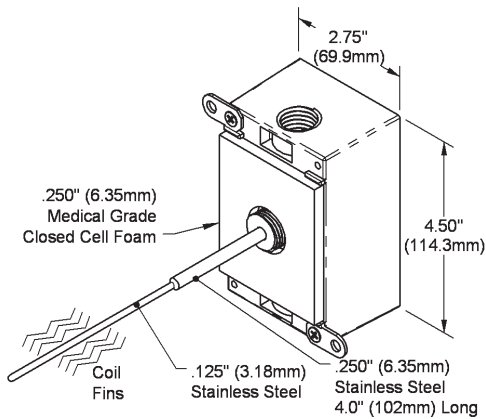
### Identification



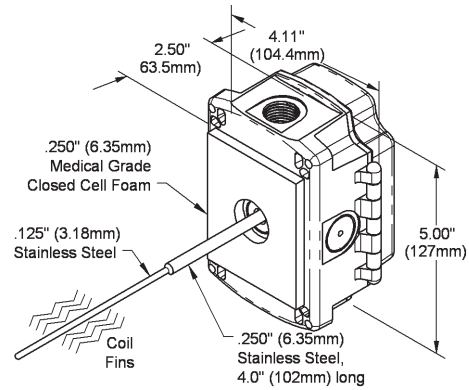
**Fig 1:** Typical Submersible Duct Application



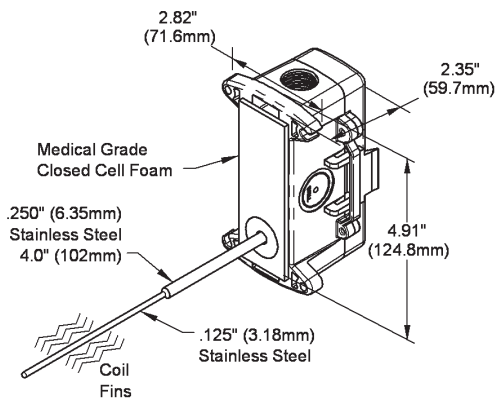
**Fig 2:** Submersible Duct Unit with J-Box (Standard)



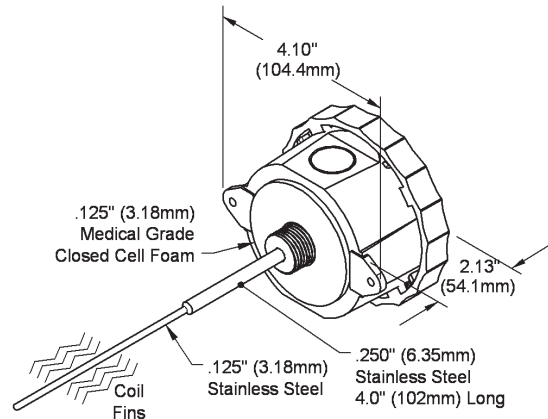
**Fig 3:** Submersible Duct Unit with Weatherproof (**WP**) Enclosure



**Fig 4:** Submersible Duct Unit with BAPI-Box (**BB**) Enclosure



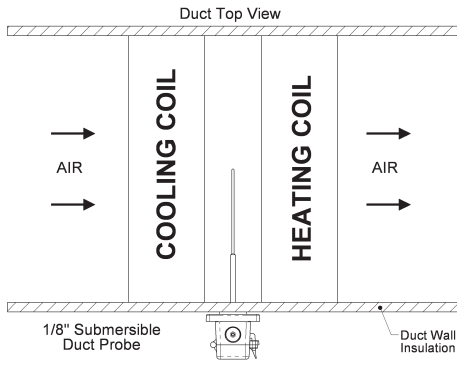
**Fig 5:** Submersible Duct Unit with BAPI-Box 2 (**BB2**) Enclosure



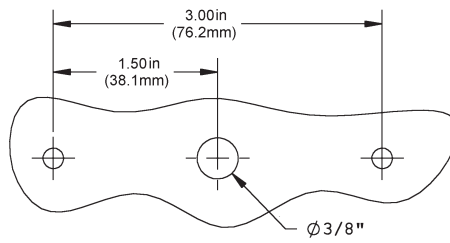
**Fig 6:** Submersible Duct Unit with Weather Tight (**EU**) Enclosure

Specifications subject to change without notice.

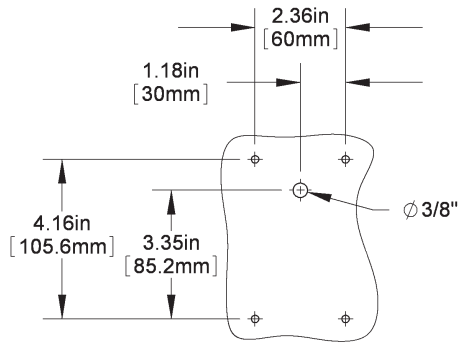
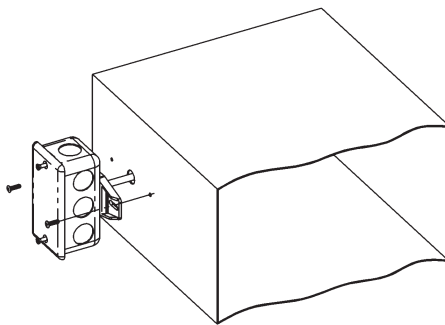
### Mounting



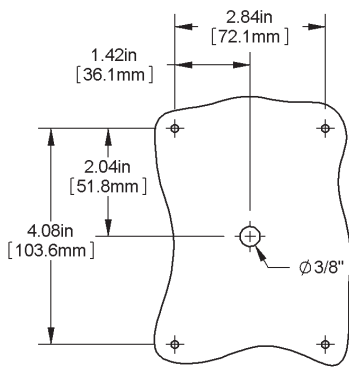
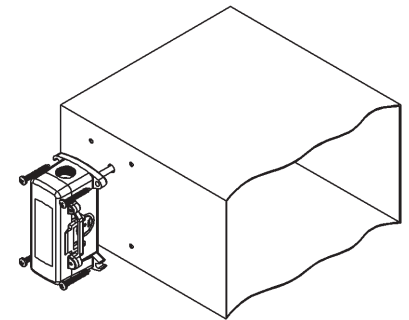
**Fig 7: Cooling Coil Discharge Air Temperature Application**



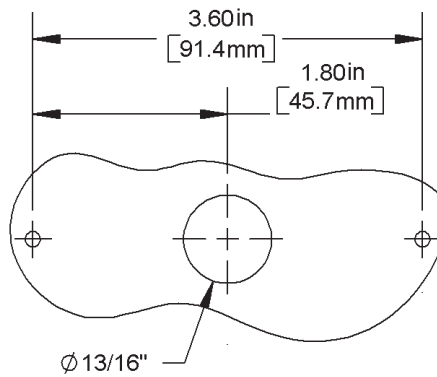
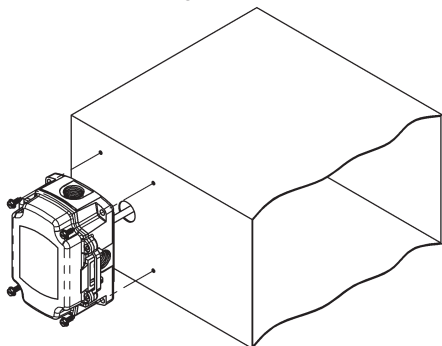
**Fig 8: Junction Box (JB) Mounting Holes**



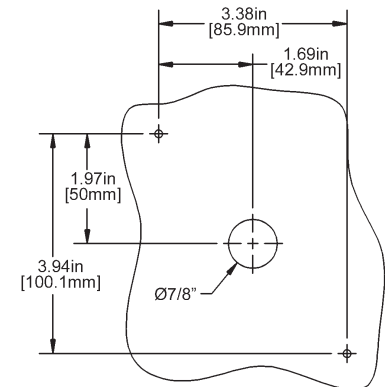
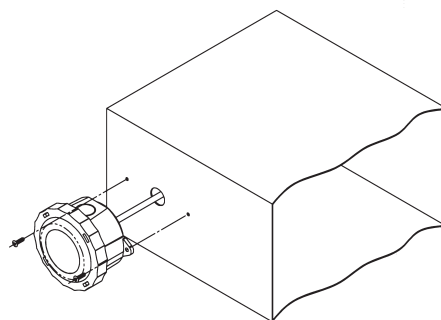
**Fig 9: BAPI-Box 2 (BB2) Mounting Holes**



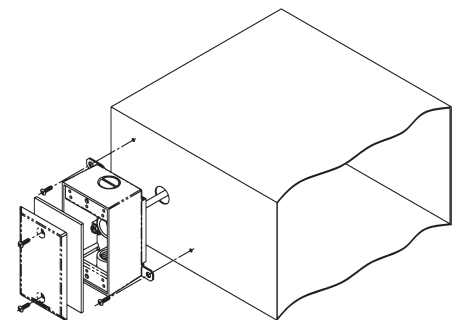
**Fig 10: BAPI-Box (BB) Mounting Holes, Rotate Holes 90° for Horizontal Mounting**



**Fig 11: Weather Tight (EU or EUO) Enclosure Mounting Holes**



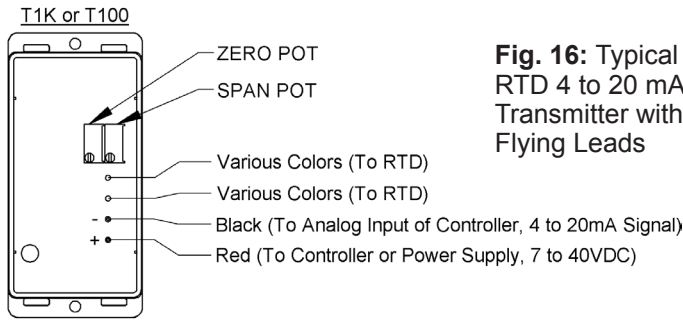
**Fig 12: Weatherproof (WB) Enclosure Mounting Holes**



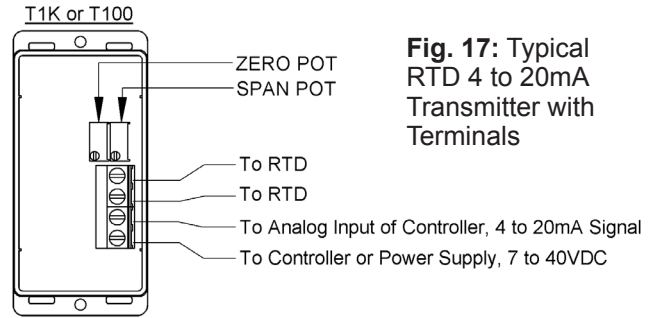
Specifications subject to change without notice.

### Wiring & Termination

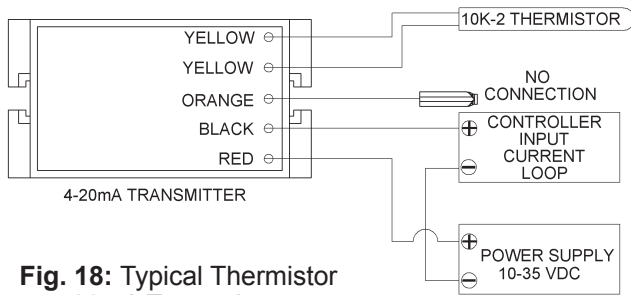
BAPI recommends using twisted pair of at least 22AWG and sealant filled connectors for all wire connections. Larger gauge wire may be required for long runs. All wiring must comply with the National Electric Code (NEC) and local codes. Do NOT run this device's wiring in the same conduit as high or low 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.



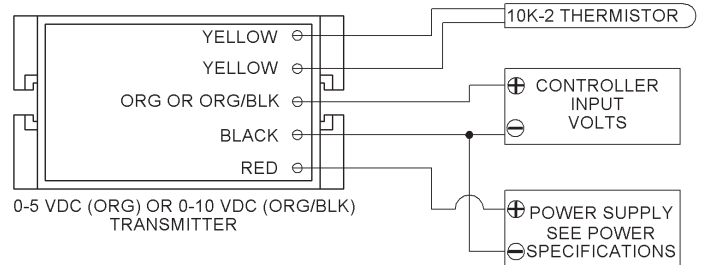
**Fig. 16:** Typical RTD 4 to 20 mA Transmitter with Flying Leads



**Fig. 17:** Typical RTD 4 to 20mA Transmitter with Terminals



**Fig. 18:** Typical Thermistor 4 to 20mA Transmitter



**Fig. 19:** Typical Thermistor Voltage Transmitter

### Diagnostics

#### Possible Problems:

- Unit will not operate.
- The reading is incorrect in the controller.

#### Possible Solutions:

- 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.
- 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 with an ohmmeter. Compare the temperature sensor's resistance to the appropriate temperature sensor table on the BAPI web site.
- Determine if the input is set up correctly in the controllers and BAS software.
- For a 4-20mA current transmitter measure the transmitter current by placing an ammeter in series with the controller input. The current should read according to the "4-20mA Temperature Equation" shown below.
- 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.

#### Voltage Temperature Equation

$$T = T_{Low} + \frac{(V \times T_{Span})}{V_{Span}}$$

- T = Temperature at sensor
- T<sub>Low</sub> = Low temperature of span
- T<sub>High</sub> = High temperature of span
- T<sub>Span</sub> = T<sub>High</sub> - T<sub>Low</sub>
- V<sub>Low</sub> = Low transmitter voltage usually=(0, 1 or 2v)
- V<sub>High</sub> = High transmitter voltage usually=(5 or 10v)
- V<sub>Span</sub> = V<sub>High</sub> - V<sub>Low</sub>
- V = Signal reading in volts

#### 4-20mA Temperature Equation

$$T = T_{Low} + \frac{(A - 4) \times (T_{Span})}{16}$$

- T = Temperature at sensor
- T<sub>Low</sub> = Low temperature of span
- T<sub>High</sub> = High temperature of span
- T<sub>Span</sub> = T<sub>High</sub> - T<sub>Low</sub>
- A = Signal reading in mA

Specifications subject to change without notice.



**Specifications**

**RTD Transmitter**

Power Required: 7 to 40VDC  
 Transmitter Output: 4 to 20mA, 850Ω@24VDC  
 Output Wiring: 2 wire loop  
 Output Limits: <1mA (short), <22.35mA (open)  
 Span: Min. 30°F (17°C), Max 1000°F, (555°C)  
 Zero: Min. -148°F (-100°C), Max 900°F (482°C)  
 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 158°F(-20 to 70°C)  
 0 to 95% RH, Non-condensing

**Thermistor Transmitter**

Supply Voltage:  
 10 to 35 VDC (0 to 5 VDC or 4 to 20 mA Outputs)  
 15 to 35 VDC (0 to 10 VDC Output)  
 12 to 24 VAC (0 to 5 VDC Outputs)  
 15 to 24 VAC (0 to 10 VDC Output)  
 Transmitter Output: 4 to 20mA, 700Ω@24VDC  
 0 to 5 & 0 to 10VDC, 10KΩ min  
 Output Wiring: 2 & 3 wire (See wiring detail on pg. 3)  
 Transmitter Limits: -40 to 185°F, (-40 to 85°C)  
 Accuracy: ±1.015°C, from (0 to 65°C)  
 Linearity: ±0.065°C, from (0 to 65°C)  
 Resolution: Span/1024  
 Thermistor Sensor: 10K-2 Thermistor, 10KΩ @77°F  
 Transmitter Ambient: 32 to 158°F, (0° to 70°C)  
 0 to 95% RH, Noncondensing

**Thermistor:** 10K-2, Thermal Resistor (Bare Sensor)  
 Accuracy (Std): ±0.36°F, (±0.2°C)  
 Accuracy (High): ±0.18°F, (±0.1°C), [XP] option  
 Stability: < 0.036°F/Year, (<0.02°C/Year)  
 Heat Dissipation: 2.7 mW/°C  
 Probe Range: -40° to 221°F (-40° to 105°C)  
 Wire Colors:  
 Standard: Yellow/Yellow (no polarity)  
 High Acc. [XP]: Yellow/Yellow (no polarity)

**RTD:** Resistance Temp Device (Bare Sensor)  
 Platinum (Pt): 100Ω and 1KΩ @0°C, 385 curve,  
 Pt Accuracy (Std): 0.12% @Ref, or ±0.55°F, (±0.3°C)  
 Pt Accuracy (High): 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)  
 Wire Colors: General color code (other colors possible)  
 1KΩ, Class B Orange/Orange (no polarity)  
 1KΩ, Class A Orange/White (no polarity)  
 100Ω, Class B Red/Red (no polarity)  
 100Ω, Class A Red/Red-w/black stripe (no polarity)

**Sensitivity:** Approximate @ 32°F (0°C)  
 Thermistor: Non-linear - (See www.bapihvac.com, click "Sensor Specs")  
 RTD (Pt): 3.85Ω/°C for 1KΩ RTD  
 0.385Ω/°C for 100Ω RTD  
**Lead Wire:** 22awg stranded  
**Insulation:** Etched Teflon, Plenum rated  
**Probe:** Flexible Copper tube, 0.19"OD  
**Probe Length:** 2', 4', 8' or per order  
**Duct Gasket:** 1/4" Closed cell foam (impervious to mold)  
**Mounting:** Extension tabs (ears), 3/16" holes  
**Enclosure Types:** (Part number designator in bold)  
 J-Box: **-JB**, w/ eight 1/2" knock-outs  
 Weatherproof: **-WP**, w/ two 1/2" FNPT entries, (Bell box)  
 BAPI-Box: **-BB**, w/ four 1/2" NPSM & one 1/2" drill-out  
 BAPI-Box 2: **-BB2**, w/ three 1/2" NPSM & three 1/2" drill-outs  
 Weather Tight: **-EU, EUO**, w/ two 1/2" knock-outs  
**Enclosure Ratings:** (Part number designator in bold)  
 J-Box: **-JB**, NEMA 1  
 Weatherproof: **-WP**, NEMA 3R, IP14  
 BAPI-Box: **-BB**, NEMA 4, IP66, UV Rated  
 BAPI-Box 2: **-BB2**, NEMA 4, IP66, UV Rated  
 Weather Tight: **-EU**, NEMA 4, IP66  
 Weather Tight: **-EUO**, NEMA 4, IP66, UV rated  
**Enclosure Material:** (Part number designator in bold)  
 J-Box: **-JB**, UL94H-B  
 Weatherproof: **-WP**, Cast Aluminum, UV rated  
 BAPI-Box: **-BB**, Polycarbonate, UL94V-0, UV rated  
 BAPI-Box 2: **-BB2**, Polycarbonate, UL94V-0, UV rated  
 Weather Tight: **-EU**, ABS Plastic, UL94V-0  
 Weather Tight: **-EUO**, ASA (Geloy) Plastic, UL94V-0, UV rated  
**Ambient (Encl.)** 0 to 100% RH, Non-condensing  
 J-Box **-JB**, -40°F to 212°F, (-40° to 100°C)  
 Weatherproof **-WP**, -40°F to 212°F, (-40° to 100°C)  
 BAPI-Box **-BB**, -40°F to 185°F, (-40° to 85°C)  
 BAPI-Box 2 **-BB2**, -40°F to 185°F, (-40° to 85°C)  
 Weather Tight **-EUO, EU**, -40°F to 185°F, (-40° to 85°C)  
**Agency** RoHS  
 PT=DIN43760, IEC Pub 751-1983,  
 JIS C1604-1989

Specifications subject to change without notice.