

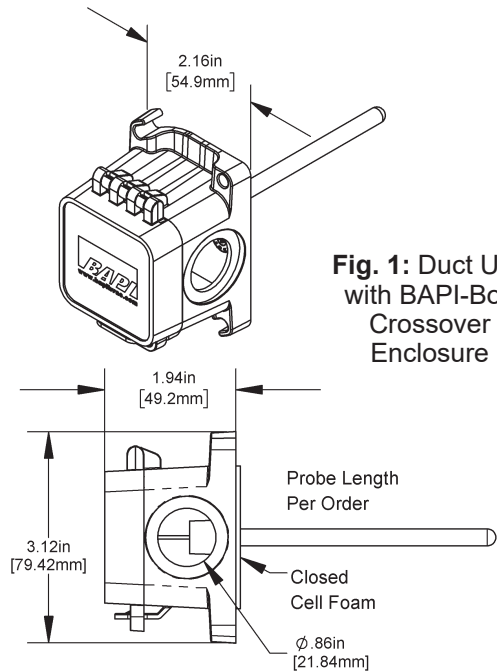
### Overview and Identification

BAPI's Temperature Transmitters in the BAPI-Box Crossover enclosure (BBX) can be ordered with a 1K $\Omega$  (385) RTD that has a field adjustable 0 to 5, 1 to 5, 0 to 10, 2 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.

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 "20913\_ins\_Duct\_Active.pdf" which is available on the BAPI website or by contacting BAPI.***



**Fig. 1:** Duct Unit with BAPI-Box Crossover Enclosure

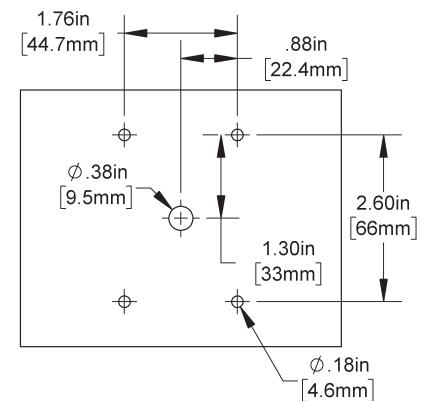
### Mounting

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 shown in Fig. 2. Insert the probe into the duct.
3. Mount the enclosure to the duct using BAPI recommended #8 screws through a minimum of two opposing mounting tabs. 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 sensor 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. 4). 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.

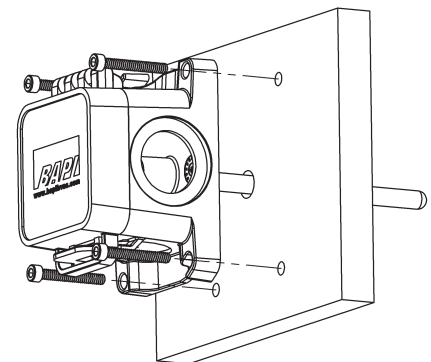
Conduit entry for outdoor or wet applications should be from the bottom of the enclosure.



**Fig. 2:** BAPI-Box Crossover Enclosure Mounting Holes



**Fig. 4:** Pierceable knockout plug (above) and inserted into the open port of the BAPI-Box Crossover.



**Fig. 3:** BAPI-Box Crossover Mounting to the Duct

### Wiring & Termination

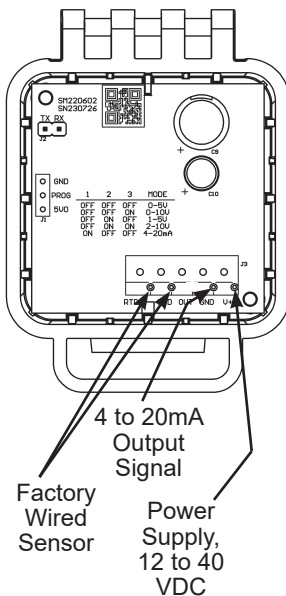
BAPI recommends using twisted pair of at least 22AWG and sealant filled connectors for all wire connections. Larger gauge wire may be required for long runs. All wiring must comply with the National Electric Code (NEC) and local codes. Do NOT run this device's wiring in the same conduit as high or low 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. **Note:** Keep transmitter at least 5 feet from any radio wave-emitting device (ie: 2 way radio). Transmitters that are less than 5 feet from a radio wave-emitting device can cause unwanted interference.

A green LED on cover face will light when power is applied.



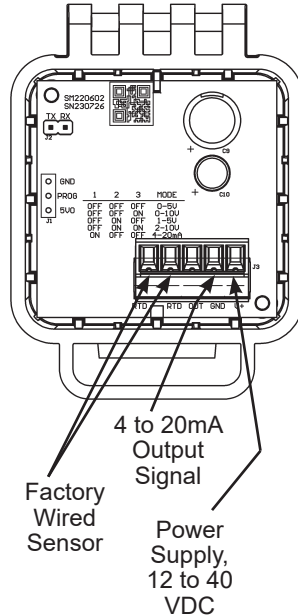
BAPI recommends wiring the product with power disconnected. Proper supply voltage, polarity, and wiring connections are important to a successful installation. Not observing these recommendations may damage the product and will void the warranty.

**4 to 20mA Output with Flying Leads**



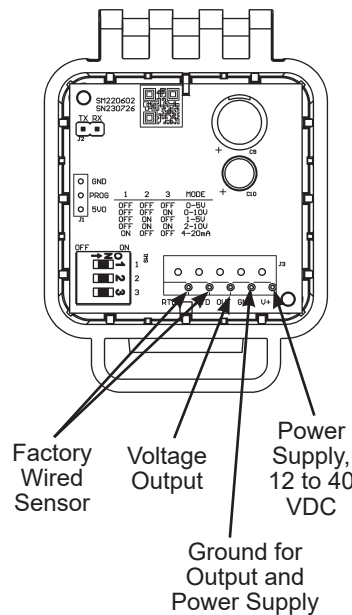
**Fig. 4:** Typical 4 to 20mA Output Transmitter with Flying Leads

**4 to 20mA Output with Terminals**



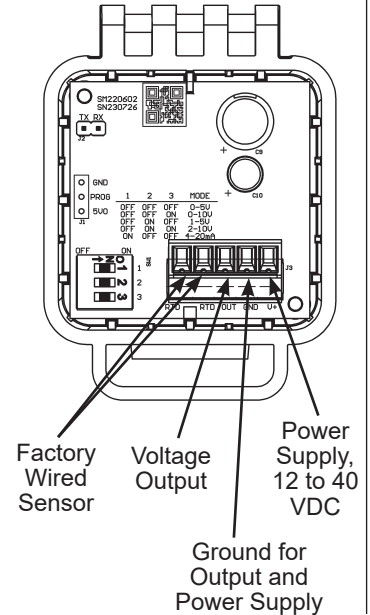
**Fig. 5:** Typical 4 to 20mA Output Transmitter with Terminals

**Voltage Output with Flying Leads**



**Fig. 6:** Typical Voltage Output Transmitter with Flying Leads

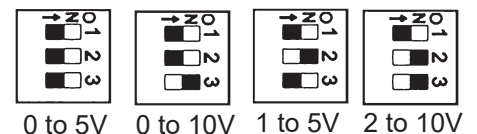
**Voltage Output with Terminals**



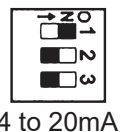
**Fig. 7:** Typical Voltage Output Transmitter with Terminals

### DIP Switch Settings for Field-Selectable Voltage Output Units

The circuit board for voltage output units has a 3-position DIP switch that controls the output value. This switch is set at the factory at the time of the order but may be changed in the field.



Note: Units ordered with Voltage Output can be switched to 4 to 20mA output with the DIP switch setting shown at right. The middle flying lead or middle terminal would not be used in that case and the unit would be wired similar to Figs 4 and 5 above.





### Diagnostics

#### Possible Problems:

Green power LED is not on.

The reading is incorrect in the controller.

#### Possible Solutions:

- Measure the power supply voltage by placing a multi-meter across the transmitter's "V+" and "GND" leads or terminals. Make sure that the power is 12 to 40 VDC.
- Make sure that the "V+" and "GND" wires are not open or shorted together and are terminated correctly to the controller.
- Determine if the input is set up correctly in the BAS and controller's software.
- Compare the transmitted current or voltage to the actual temperature measurement at the sensor location. Measure the physical temperature at the temperature sensor's location using an accurate temperature standard. Measure the current or voltage output from the sensor and compare it to the appropriate equation below. If the output differs from the equation by more than 5%, call BAPI technical support.

#### 4 to 20mA Temperature Equation

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

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

#### Voltage Temperature Equation

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

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

### Specifications

#### RTD Transmitter

Power Required:..... 12 to 40VDC  
 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. 30°F (17°C), Max 1,000°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 × T-20°C)/100  
 RTD Sensor:..... 2 wire Platinum, 385 curve  
 Transmitter Ambient .. -4 to 158°F (-20 to 70°C)  
 0 to 95% RH, Non-condensing)

#### RTD Sensor: Resistance Temp Device (Bare Sensor)

Platinum RTD: ..... 1KΩ @ 0°C, 385 curve  
 Sensitivity: ..... 3.85Ω/°C, Approximate @ 32°F (0°C)  
 Accuracy (Standard): .. 0.12% @Ref, or ±0.55°F, (±0.3°C)  
 Accuracy (High): ..... 0.06% @Ref, or ±0.277°F, (±0.15°C),  
 [A]option  
 Stability: ..... ±0.25°F, (±0.14°C)  
 Self Heating: ..... 0.4 °C/mW @0°C  
 Probe Range: ..... -40° to 221°F, (-40 to 105°C)

**Lead Wire:** 22AWG stranded

**Insulation:** Etched Teflon, Plenum rated

**Probe:** 304 Stainless steel, 0.25" OD

**Probe Length:** 2", 4", 8", 12" and 18" per order

#### Duct Gasket:

1/4" closed cell foam (impervious to mold)

**Mounting:** Extension tabs (ears), 3/16" holes

#### 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 185°F (-40 to 85°C)

0 to 100% RH, Non-condensing

#### Agency:

CE EN 61326-1:2013 EMC (Industrial Electromagnetic Environment) / RoHS / PT= DIN43760, IEC Pub 751-1983 / JIS C1604-1989

Specifications subject to change without notice.