String-Loaded Strap and Clamp-On Strap Temperature Transmitters in a BAPI-Box Crossover Enclosure

Installation & Operations

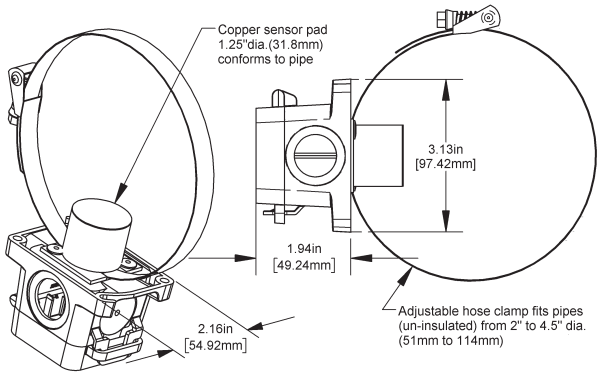
Overview and Identification

Strap Unit Temperature Transmitters in the BAPI-Box Crossover enclosure are available with a 4 to 20mA output. They can be ordered with a 1KΩ Platinum RTD or special high accuracy RTD matched transmitters which match the sensor to the transmitter for improved accuracy.

Strap Sensors are made for direct pipe mounting and temperature measurement of water pipe applications. The Clamp-On units are for mounting before any insulation is on the pipe and the Spring-Loaded units are for mounting to pipes with up to 2” of insulation using a unique spring sensor extension. Strap units are available in multiple thermistor or RTD types as shown in the specifications.

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 “20922_ins_Strap on_ Active.pdf” which is available on the BAPI website or by contacting BAPI.



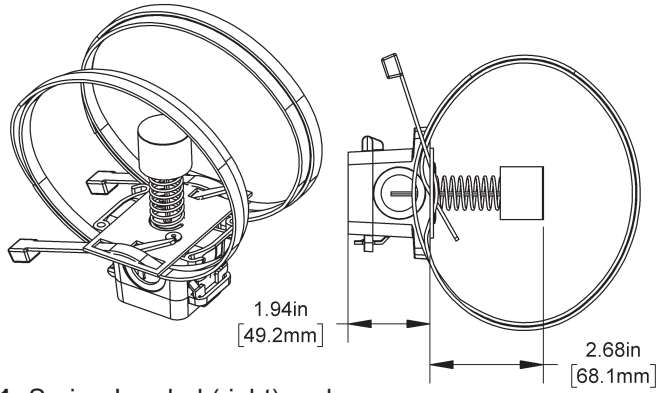


Fig. 1: Spring-Loaded (right) and Clamp-On Strap Sensors in a BAPI-Box Crossover Enclosure

Mounting of Clamp-On Strap Units

This sensor technique is for reading the fluid temperature in a pipe by reading the temperature of the pipe. Properly installed strap sensors with insulation around the local strap-on sight will offer a very accurate temperature of the water inside the pipe to within .5 °F or better of the inside pipe water temperature.

1. Fig 2 shows a typical installation for pipes from 2” to 4.5”. Stripping away insulation is OK.
2. Larger pipes can be accommodated by adding another, customer supplied, stainless steel hose clamp extending the possible pipe diameter.
3. If there is insulation, clean away a section of the pipe insulation a minimum of 2” all around the pipe. The copper sensor pad and SS strap must be in direct contact with the metal or plastic pipe. Nothing should be between the copper plate sensor and the bare pipe.
4. Tighten the strap-so that the sensor does not rotate around the pipe and so that the foam is compressed not more than 50% allowing the copper sensor plate to form (bend) to the pipe curvature for maximum temperature conduction. BAPI recommends pre-forming the copper plate by bending it around the pipe with your fingers.
5. After the sensor is securely mounted, add insulation a minimum of 1” thick and a minimum of 4 pipe diameters on each side of the copper sensor pad. (Example: A 2” pipe should have 8” of insulation on each side of the sensor). Only cover the sensor box to the top of the door hinge.

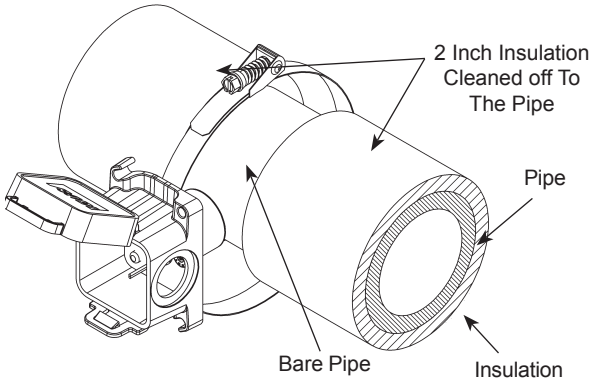


Fig 2: Clamp-On Strap with BAPI-Box Crossover Enclosure installation

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Installation & Operations

Mounting of Spring-Loaded Strap Units

This sensor technique is for reading the fluid temperature in a pipe by reading the temperature of the pipe. Properly installed strap sensors with insulation around the local strap-on sight will offer a very accurate temperature of the water inside the pipe to within .5 °F or better of the inside pipe water temperature.

1. Fig 3 shows a typical installation for insulated pipes from 5” to 14” and insulation thickness from 0.5” to 2.5”.
2. Larger pipes can be accommodated by adding another, customer supplied, tie rap strap extending the possible pipe diameter.
3. Make a 1.5 inch diameter hole in the insulation where the sensor is to be placed and clean the pipe from debris. Extend the spring so the copper sensor pad is in direct contact with the metal or plastic pipe. No debris should be between the copper plate sensor and the bare pipe. The spring can retract to a minimum insulation thickness of ~.5” compressed to ~2.5” extended.
4. Position the box and sensor over the hole.
5. Tighten the strap so that the sensor spring is compressed no more than 50% allowing the copper sensor plate to form (bend) to the pipe curvature for maximum temperature conduction. BAPI recommends pre-forming the copper plate by bending it around the pipe with your fingers. Extend the spring further by turning it clockwise if the copper sensor plate contact is questionable. The copper sensor plate must be in direct contact with the pipe.
6. After the strap on sensor is securely mounted, add insulation back in (backfill) around the spring extension, using the removed insulation, so that no heat or cold from the pipe can escape.
7. If more insulation is desired, only cover the sensor box to the top of the door hinge.

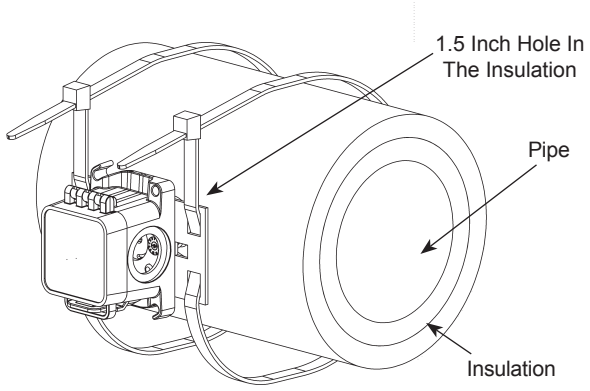

Fig 3: Spring-Loaded Strap with BAPI-Box Crossover Enclosure installation

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.

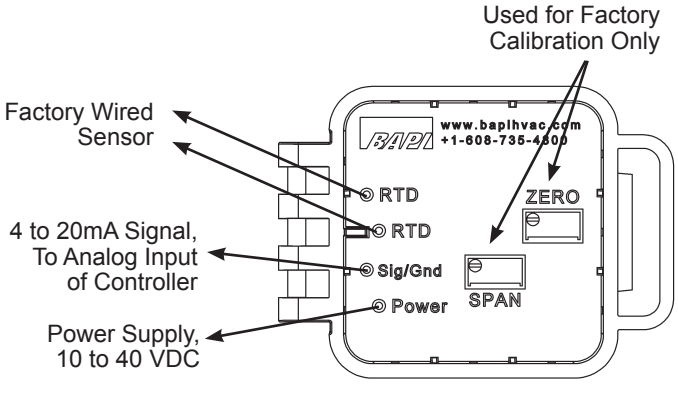

Fig. 5: Transmitter with Flying Leads

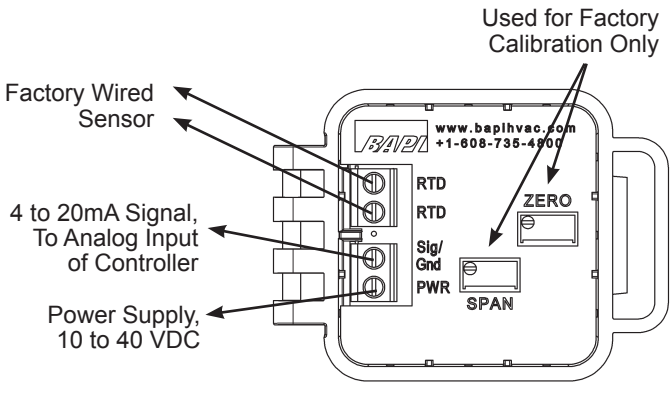

Fig. 6: Transmitter with Terminals

Note: Green LED on cover face will light when power is applied.

Diagnostics

Possible Problems:	**Possible Solutions:**
Green power LED is not on.	- Measure the power supply voltage by placing a multi-meter across the transmitter's "Power" and "Sig/Gnd" leads or terminals. Make sure that the power is 10 to 40 VDC. - Make sure that the "Power" and "Signal/Gnd" wires are not open or shorted together and are terminated correctly to the controller.
The reading is incorrect in the controller.	- Determine if the input is set up correctly in the BAS and controller's software. - Compare the transmitted current 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 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 at right. If the measured resistance is different from the temperature table by more than 5% call BAPI technical support.

4 to 20mA Temperature Equation

$$T = \frac{TLow + (A - 4) \times (TSpan)}{16}$$

T = Temperature at sensor
TLow = Low temperature of span
THigh = High temperature of span
TSpan = THigh - TLow
A = Signal reading in mA

Specifications

RTD Transmitter

Power Required: .....10 to 40VDC
Output: .....4 to 20mA, 850Ω@24VDC
Output Wiring: .....2 wire loop
Output Limits: .....<1mA (short), <22.35mA (open)
Span: .....Min. 30ºF (17ºC), Max 1,000ºF, (555ºC)
Zero: .....Min. -148°F (-100°C), Max 900ºF (482ºC)
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 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: .....-40º to 221ºF, (-40 to 105ºC)

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 185ºF (-40 to 85ºC)
0 to 100% RH, Non-condensing

Lead Wire:
22AWG stranded

Wire Insulation:
Etched Teflon, Plenum rated

Probe:
Copper sensor plate, 24 AWG, 1.25" diameter

Mounting
Clamp-On Unit: 1/2" SS worm gear hose clamp
Spring-Loaded Unit: 48" Nylon tie strap, 1/2" wide

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

Specifications subject to change without notice.