

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 AC power wiring of NEC class 1 or NEC class 2, NEC class 3 or with wiring used to supply highly inductive loads such as motors, contactors and relays. BAPI's tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines. *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.*



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

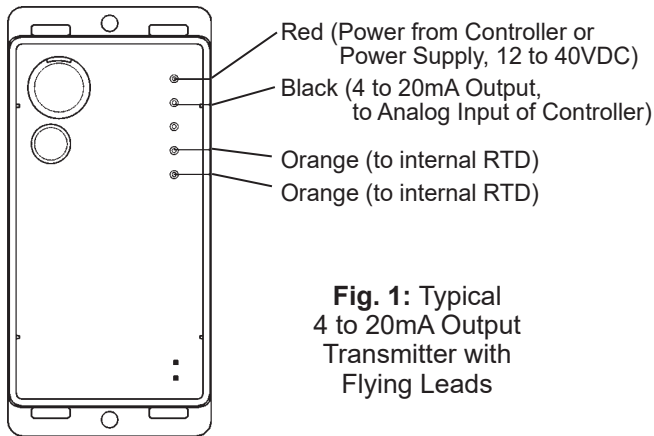


Fig. 1: Typical 4 to 20mA Output Transmitter with Flying Leads

4 to 20mA Output with Terminals

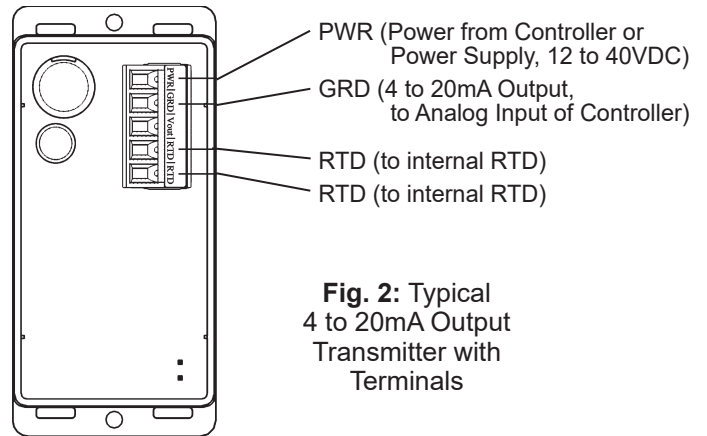


Fig. 2: Typical 4 to 20mA Output Transmitter with Terminals

Voltage Output with Flying Leads

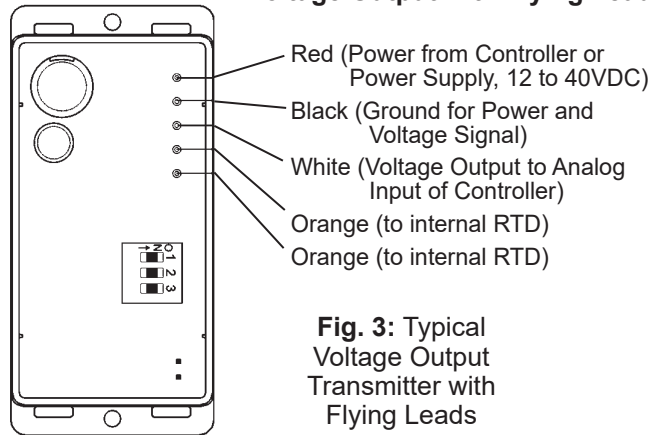


Fig. 3: Typical Voltage Output Transmitter with Flying Leads

Voltage Output with Terminals

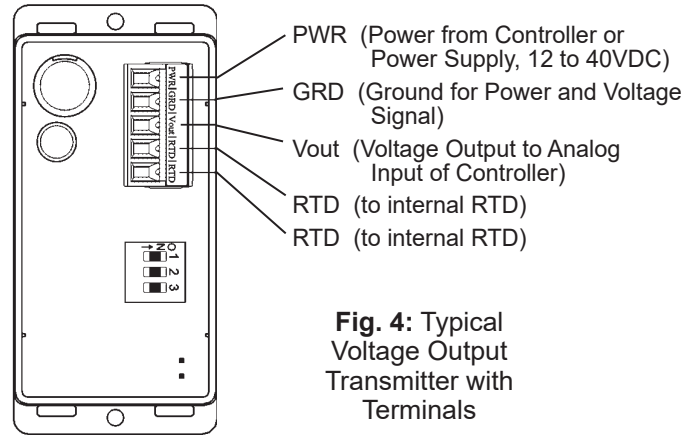
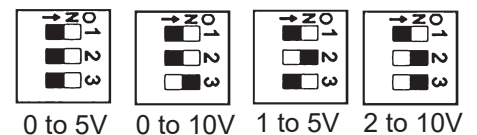


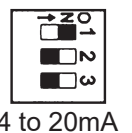
Fig. 4: Typical Voltage Output Transmitter with Terminals

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 1 and 2 above.



BAPI-Box (BB) Mounting

The BAPI-Box Enclosure is watertight and carries an IP66 rating (similar to a NEMA 4X rating) when the included screws are fastened on the latch. The BAPI-Box is made of high impact, UV-resistant polycarbonate and features a hinged cover with multiple knockouts. It is available for the full line of BAPI temperature sensors.

Duct Mounting

Mount the unit to its mounting surface with four #10 screws through the holes in the mounting feet. #10 sheet metal screws require 5/32" (4mm) pilot holes. For concrete or cinder block, drill four 5/32" (4mm) holes, 1-3/4" (45mm) deep. Make sure that all screws are started in their holes before tightening evenly. If unit has a foam gasket, only squeeze to about 1/2 of its original thickness. Be sure to seal conduit connector threads and holes in mounting surface to maintain the integrity of the box.

Outside Mounting

The sensor must be mounted in the shade away from building windows, doors or vents. The ideal shaded location in the Northern hemisphere is on the North side of the building. In the Southern hemisphere the South side of the building is ideal. The probe should point down and the unit should be mounted between 4 feet above the ground/roof and one foot minimum below the eave.

Drill the mounting holes and mount as shown in the Fig 8. Snug the mounting screws to compress the foam backing to about 50% of its original thickness to make a good seal to the wall surface. Route the wires into the box and terminate with sealant filled connectors. Best practice is to caulk the wiring hole after the wiring is installed. Close the cover of the BAPI-Box and secure with provided cover screws.

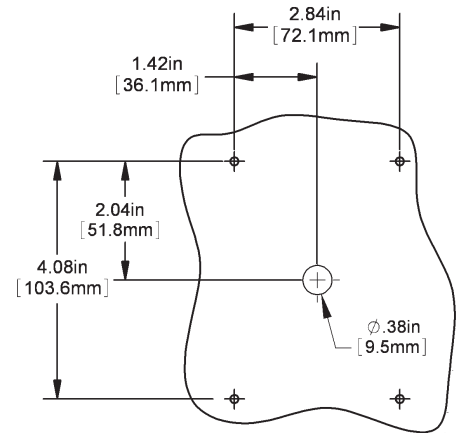


Fig. 5: BAPI-Box enclosure mounting holes, rotate 90° for horizontal mount

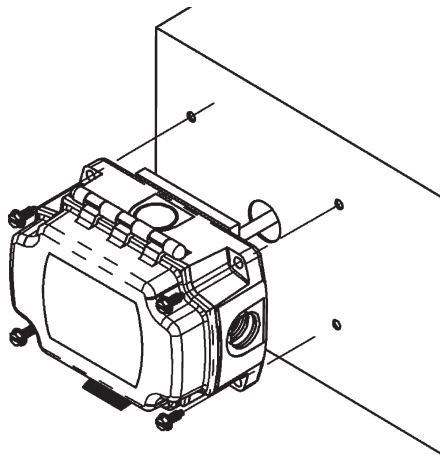


Fig. 6: BAPI-Box Duct Horizontal Installation

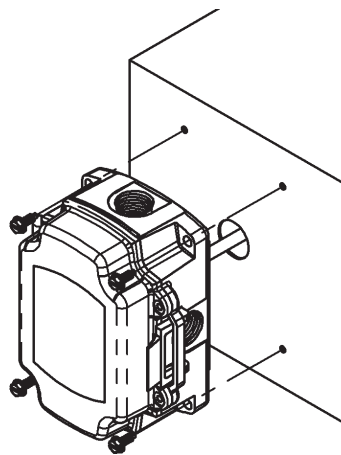


Fig. 7: BAPI-Box Duct Vertical Installation

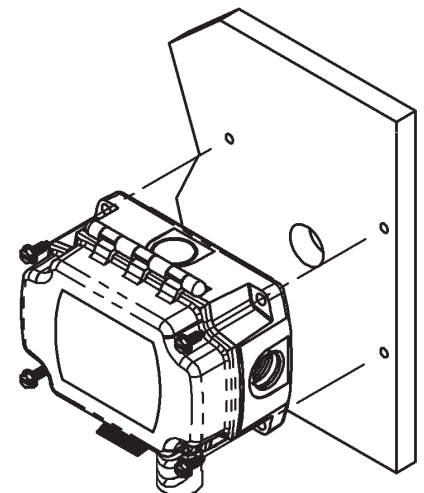


Fig. 8: BAPI-Box Outdoor Air Installation

Weatherproof (WP) Enclosure Mounting

The weatherproof enclosure is intended for outdoor or equipment room mounting. Use the mounting tabs provided to mount the enclosure as shown in figures 11-14. **DO NOT** drill screw holes through the back wall of the box. This destroys the integrity of the box and may void the warranty.

Duct Mounting

BAPI recommends using #8 sheet metal screws that need 1/8" pilot holes to attach the sensor to the duct. After placing the sensing element in the duct, secure the mounting tabs to the duct; center the plastic fitting holding the probe in the mounting hole. Be sure that the foam seals the hole; do not over tighten the screws. Place the foam gasket between the cover and the box before securing the cover in place with the screws provided. To keep water out of the box, be sure to coat the threads of the box plugs or conduit connectors with caulk before screwing them into the enclosure.

Outside Mounting

The sensor must be mounted in the shade away from building windows, doors or vents. The ideal shaded location in the Northern hemisphere is on the North side of the building. In the Southern hemisphere the South side of the building is ideal. The probe should point down and the unit should be mounted between 4 feet above the ground/roof and one foot minimum below the eave.

Drill the mounting holes and mount as shown in the Fig 12. Snug the mounting screws to compress the foam backing to about 50% of its original thickness to make a good seal to the wall surface. Route the wires into the box and terminate with sealant filled connectors. Best practice is to caulk the wiring hole after the wiring is installed. Close the cover of the enclosure and secure with provided cover screws.

Note: Air temperature units are shown. Temperature and humidity units are available in doublegang weatherproof enclosures only.

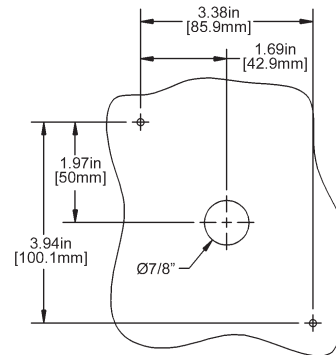


Fig. 9: Weatherproof Enclosure mounting holes

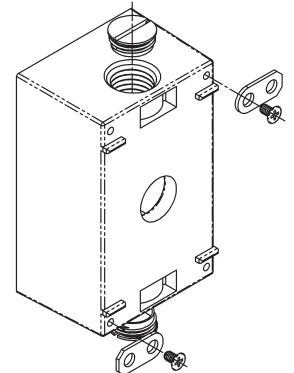


Fig. 10: Weatherproof Enclosure Mounting Tabs

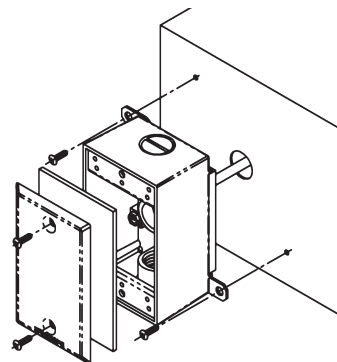


Fig. 11: Weatherproof Enclosure Duct Installation

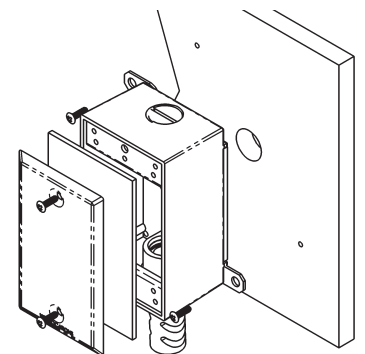


Fig. 12: Weatherproof Enclosure Outside Installation

Immersion Sensor Mounting

Place the thermowell into the pipe nipple using Teflon tape and/or pipe dope. Tighten securely but do not over torque. Insert the immersion sensor into the thermowell with the plastic fitting screwing into the opening on the thermowell. Tighten the immersion sensor snugly by hand without too much torque. Make sure that the tip of the immersion sensor is in contact with the bottom of the thermowell. The unit is designed so that the temperature probe moves slightly into the enclosure as the sensor hits the bottom of the well. Fig 14 shows a BAPI-Box 2 installation, but Weatherproof or BAPI-Box enclosures may be used as well.

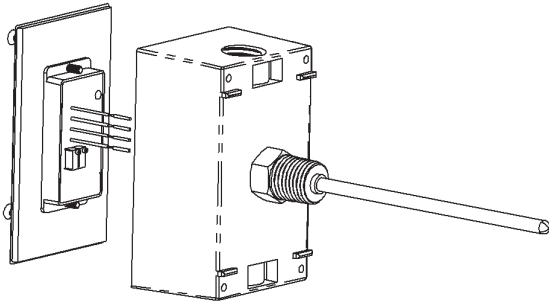


Fig. 13: Transmitter mounted to the cover of a Weatherproof Enclosure with an immersion probe

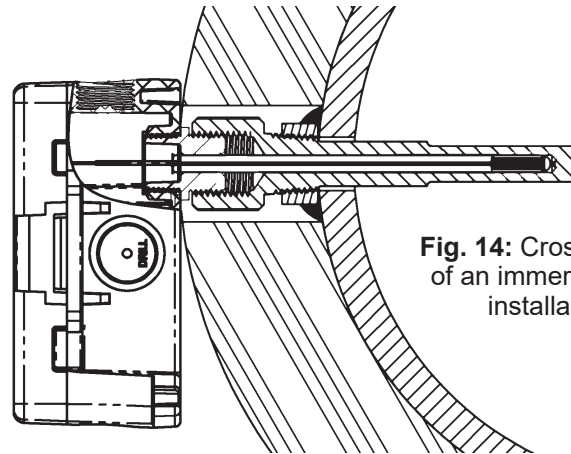


Fig. 14: Cross section of an immersion unit installation

Strap Sensor Mounting

Spring-Loaded Straps

The Spring-Loaded Strap Sensor is used when a large section of insulation cannot be removed from a pipe. It accommodates insulation of up to 2" thick and is sized for pipe diameters of 5 to 12.5", including the insulation.

Cut a 1-1/4" diameter hole in the insulation and remove the insulation from the hole down to the bare pipe. Be sure to remove all insulation and debris from the hole. Place the copper pad on the end of the spring-mounted foam into the hole and make sure it has good physical contact with the pipe. Tighten the straps until the strap-mounting bracket contacts the insulation.

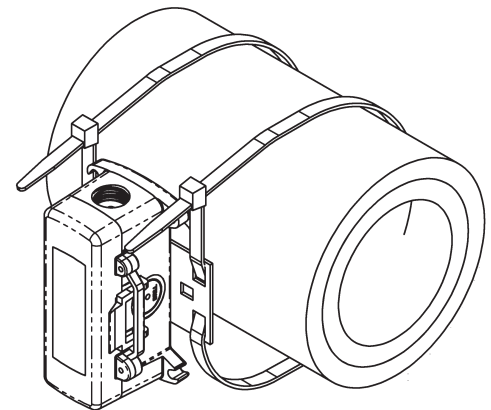


Fig. 15: Spring-Loaded Strap installation

Clamp-On Straps

Place the Clamp-On Strap Sensor on bare pipe, or a section of pipe with the insulation removed. The clamp-on strap sensor is sized for bare pipes of 2 to 4.5" in diameter.

Make sure that the copper pad on the foam is in good physical contact with the pipe. Snug the straps so that the assembly does not rotate around the pipe when moderate pressure is applied to the enclosure. Do not over tighten. You may place pipe insulation over the whole assembly. Add another pipe clamp if needed.

Fig 16 shows a BAPI-Box 2 installation, but a BAPI-Box enclosure may be used as well.

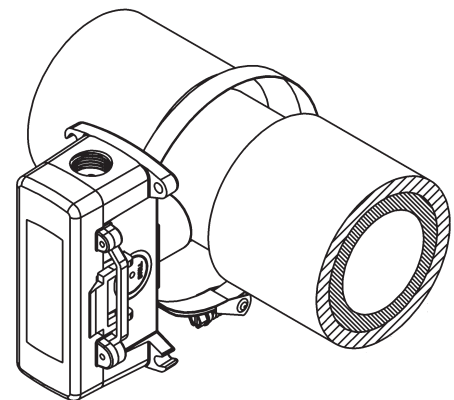


Fig. 16: Clamp-On Strap installation

Wall Plate Mounting

Ensure the plate does not touch the wall when it is mounted as this will lead to slower response rates when the environment changes.

The Stainless Steel Wall Plate is intended for indoor mounting to a 2x4" Junction Box. Install a Junction Box as shown in the Fig 17. Terminate your wiring cables to the red and black wires, preferably with sealant filled connectors. Secure the Wall Plate to the Junction Box with the screws provided. Tighten screws until the foam gasket on the back plate is compressed about 50%. Ensure the plate doesn't touch the wall as shown in Fig 18.

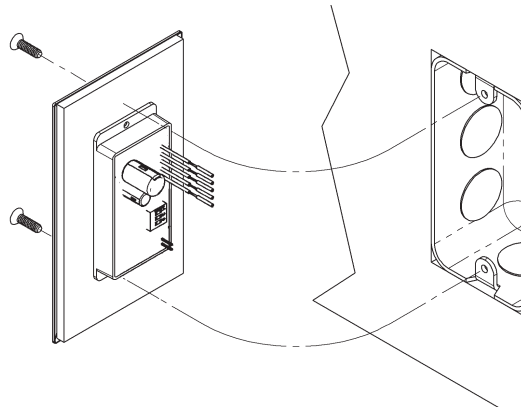


Fig. 17: Wall Plate Transmitter Installation

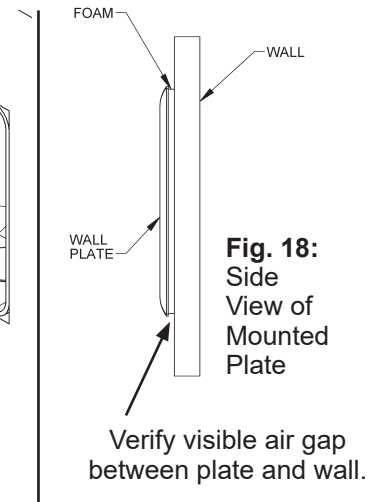


Fig. 18: Side View of Mounted Plate

Remote Probe Mounting

Mount Remote Probes as shown in the figures below with the wire connector down. Route the temperature probe to the spot where you wish to measure the temperature. Best practice is to tie down the wire every two feet. Make sure to caulk the upper screw-in plug on the Weatherproof enclosure. Center mounting hole shown is only used if you are wiring through the mounting surface.

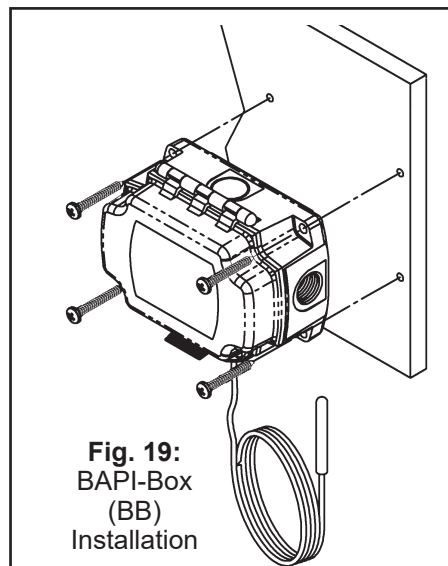


Fig. 19: BAPI-Box (BB) Installation

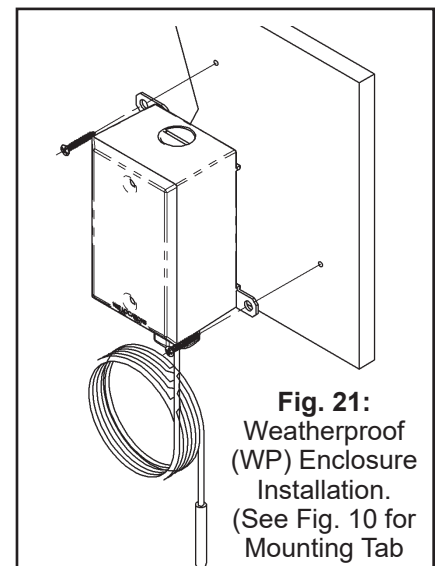


Fig. 21: Weatherproof (WP) Enclosure Installation. (See Fig. 10 for Mounting Tab installation.)

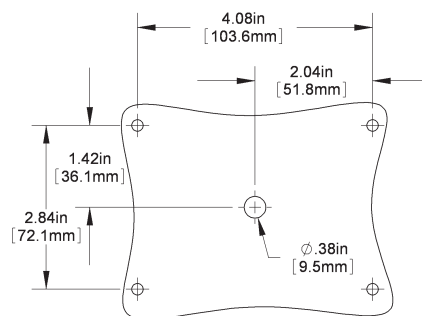


Fig. 20: BAPI-Box (BB) mounting holes

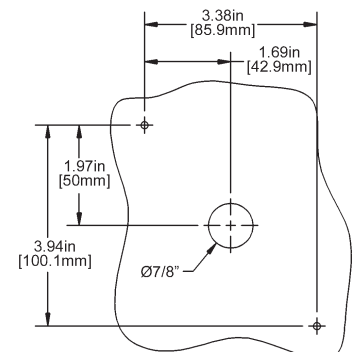


Fig. 22: Weatherproof (WP) Enclosure mounting holes



Temperature Transmitters

Installation & Operating Instructions

9518_ins_txmtr

rev. 03/11/24

Diagnostics

Possible Problems:

- Unit will not operate.
- 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.
- Determine if the input is set up correctly in the controller 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 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_{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

4 to 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

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. 30°F (17°C), Max 1000°F, (555°C)
- Zero:Min. -148°F (-100°C), Max 900°F (482°C)
- System Accuracy:±0.065% of span
- Linearity:±(0.125 * T-20°C)/100
- RTD Sensor:.....2 wire Platinum (Pt), 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

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.