



Dual Transmitter T10K Duct and Outside Air Temp/Humidity BA/T10K[x]-H### Humidity Transmitter

Installation & Operating Instructions

9941_ins_dual_trans_T10K_duct_out

rev.03/17/11

Overview

The BA/T10K [xx to yy]-H### is a dual temperature and humidity transmitter for duct or OSA mounting. The dual transmitters offer 4-20mA, or 0-5VDC outputs, however both outputs have to be the same signal type.

Identification

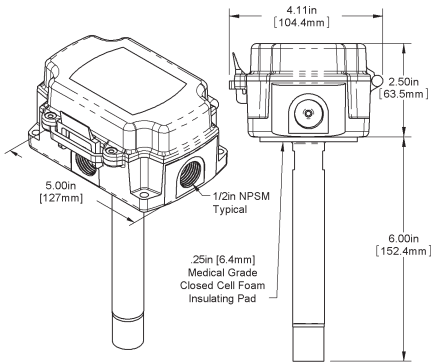


Fig 1. BAPI-Box Duct RH & T Transmitter (-BB)

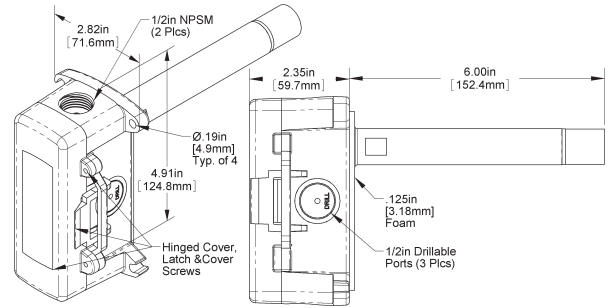


Fig 2. BAPI-Box 2 Duct RH & T Transmitter (-BB2)

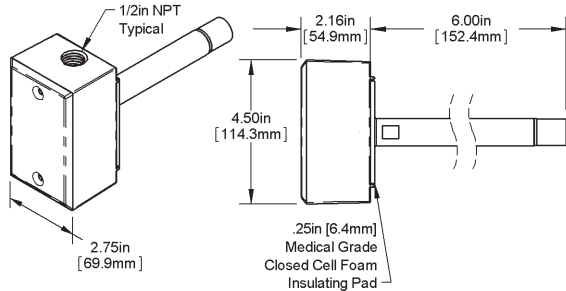


Fig 3. Weather resistant Duct RH & T Transmitter (-WP)

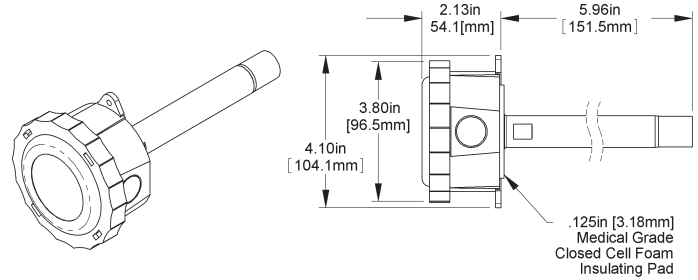


Fig 4. Round European Duct RH Transmitter (-EU)

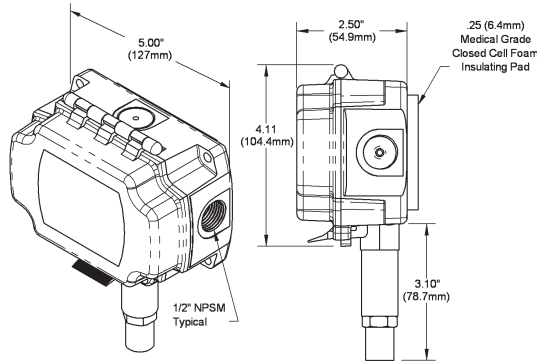


Fig 5. BAPI-Box OSA RH & T Transmitter (-BB)

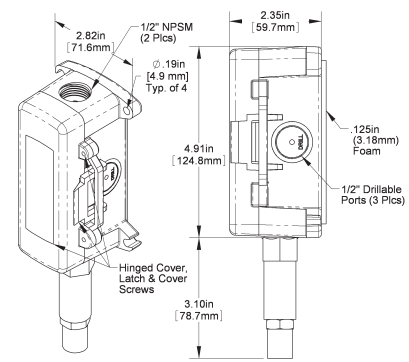


Fig 6. BAPI-Box 2 OSA RH & T Transmitter (-BB2)

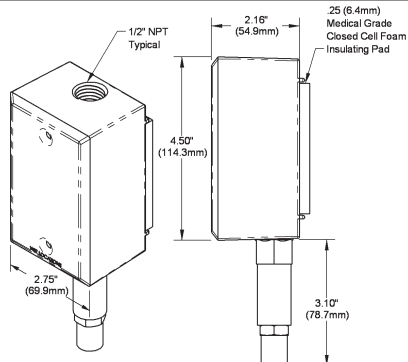


Fig 7. Weather resistant OSA RH & T Transmitter (-WP)

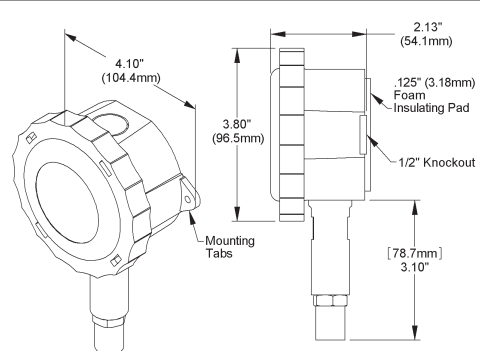


Fig 8. Round European OSA RH Transmitter (-EU)

Specifications subject to change without notice.



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Specifications

General Transmitter Requirements

Voltage Required: 2 wire, 10 to 30VDC
Current required: 4-22mA (4-20mA or 0-5VDC output)

Outputs: Both outputs must be the same
2-(4-20mA) or 2-(0-5VDC)

Probe Material:
Duct ABS Plastic, UL94V-HB
OSA Polycarbonate, UV resistant, UL94V-HB

Filter:
OSA 100 micron sintered stainless steel filter
Duct 100 micron porous plastic, plenum rated UL94 V-0

Environmental Ambient Range:
-40° to 185°F, (-40° to 85°C)
0% to 100% RH

Agency: RoHS

Thermistor Temperature Transmitter

Transmitter Output: 1 wire Loop, 4-20mA, 700Ω@24VDC
1 wire, 0-5VDC, 10KΩ min

Temp. Output: 4-20mA = specified range on order
0-5VDC = specified range on order

Transmitter Limits -40°F to 185°F, (-40°C to 85°C)

Accuracy ±1.015°C, from (0 to 65°C)

Linearity ±0.065°C, from (0 to 65°C)

Resolution Span/200

Thermistor Sensor 10K-2 Thermistor, 10KΩ @77°F (25°C)

Humidity RH Transmitter

Humidity Sensor: Resistive (Impedance)

Accuracy: 2%, (-200) From 15% to 90%RH @77°F
3%, (-300) From 15% to 90%RH @77°F

Transmitter Output: 0-100%
1 wire Loop, 4-20mA, 700Ω@24VDC
1 wire, 0-5VDC, 10KΩ min

Mounting

Duct Mount Application:

The Duct transmitter should be mounted about 4 duct diameters from coils or corners to avoid stratified air and offer the best accuracy for Temperature and Relative Humidity measurements. It should be mounted away from any humidifiers by at least 4 duct diameters to avoid water spray or condensation.

Duct Mount Installation:

1. Center the Duct Temperature/Humidity transmitter probe on the duct wall.
2. Keep the sensor tip away from humidifiers by at least 4 duct diameters or liquid water may cause a poor RH reading.
3. Mark and Drill a 1 inch hole into the duct for the probe as shown in Figure 9,10,11 and 12.
4. Mount into the duct using at least two of the number 8 sheet metal screws to attach the enclosure to the duct.
5. Be sure that the foam backing is compressed about 50% to seal the hole. Do not over tighten the screws.

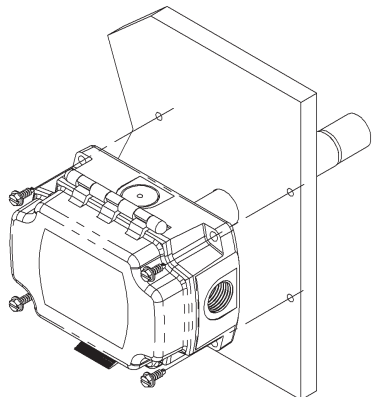


Fig 9. Duct RH & T BAPI-Box (-BB) Installation, NEMA-4

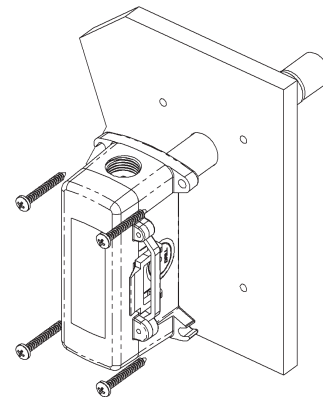


Fig 10. Duct RH & T BAPI-Box 2 (-BB2) Installation, NEMA-4

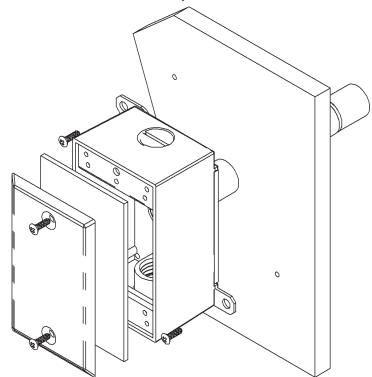


Fig 11. Duct RH & T Weather resistant (-WP) Installation, NEMA-3R

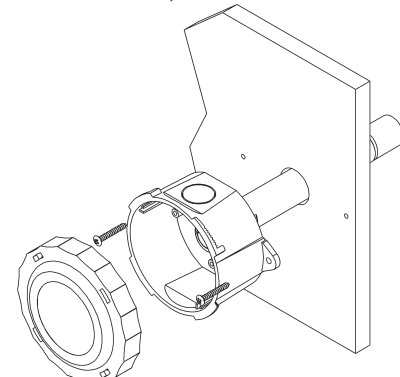


Fig 12. Duct RH & T Round European (-EU) Installation, NEMA-4

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Outside Air Mount Application:

The OSA transmitter should be mounted in a permanently shaded location and away from windows, doors or loading docks. Do not mount in direct sunlight. The sensor tip should always point down to avoid rain from filling the probe cavity resulting in an inaccurate reading.

Outside Air Mount Installation:

1. Center the OSA Temperature/Humidity transmitter probe over the exiting wall conduit so the rear knock-out can be used as the wire-way. If a horizontal conduit is used for the connecting wire-way, be sure it enters the enclosure from the bottom to avoid water infiltration. Water tight connectors should be used if entering from the side. Never enter from the top.
2. Keep the sensor tip pointing down so that water cannot enter the probe cavity and cause a poor RH reading.
3. Mount with at least two number 8 sheet metal screws or concrete anchors to attach the enclosure to the outside wall.
4. Be sure that the foam backing is compressed about 50% to seal the hole and to insulate the box from the wall. Do not over tighten the screws.

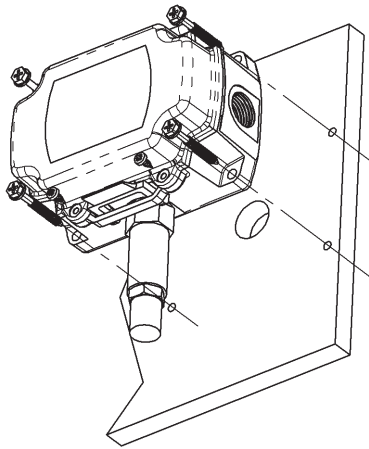


Fig 13. OSA RH & T BAPI-Box (-BB)
Installation, NEMA-4

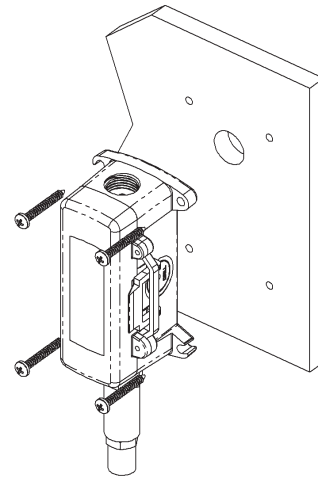


Fig 14. OSA RH & T BAPI-Box 2(-BB2)
Installation, NEMA-4

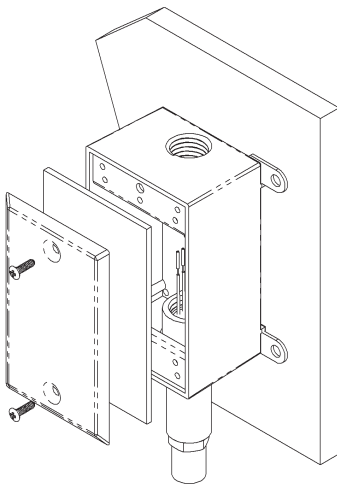


Fig 15. OSA RH & T Weather resistant (-WP)
Installation, NEMA-3R

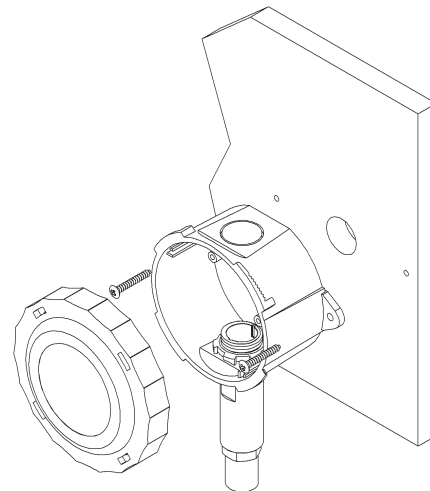


Fig 16. OSA RH & T Round European (-EU)
Installation, NEMA-4

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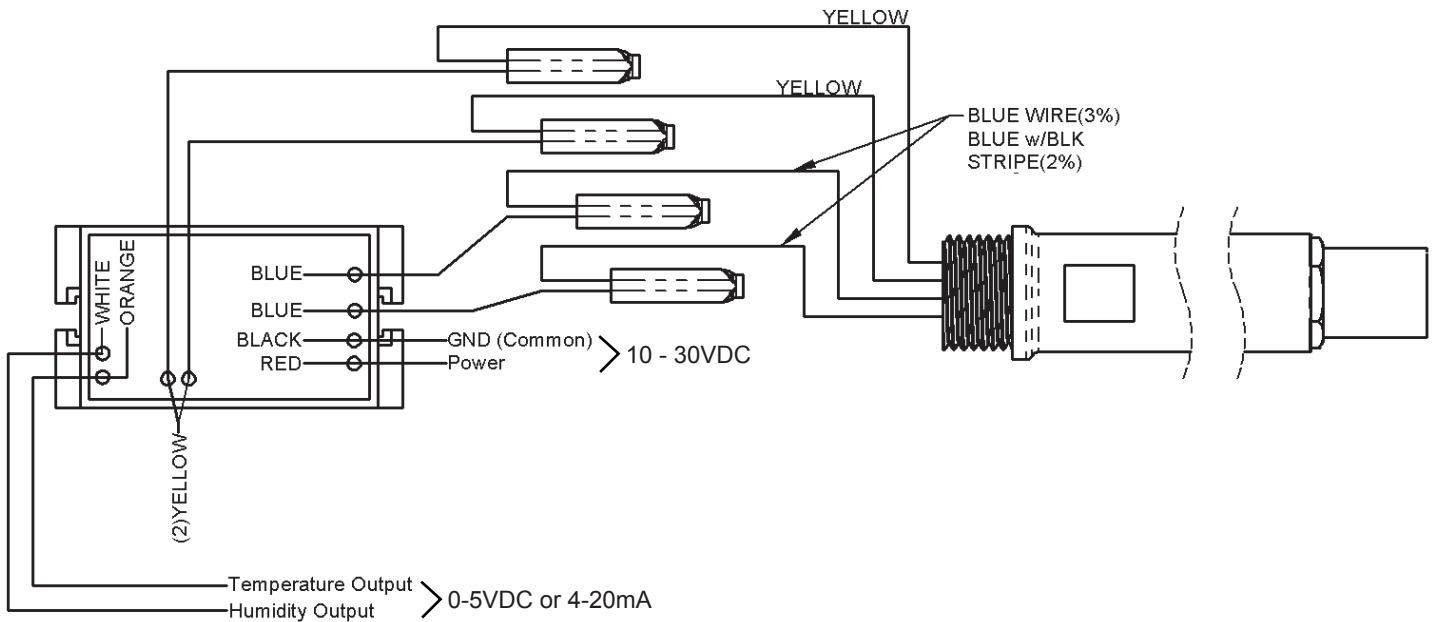
Wiring & Termination

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 AC power wiring of NEC class 1, 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. If you are experiencing any of these difficulties, please contact your BAPI representative.



BAPI does not recommend wiring the sensor with power applied as accidental arcing may damage the product and will void the warranty



Humidity Transmitter Table		
Wire color	Purpose	Note
Yellow	Temperature Sensor	Factory connection, no customer connection allowed
Yellow	Temperature Sensor	Factory connection, no customer connection allowed
Blue	Humidity Sensor	Factory connection, no customer connection allowed
Blue	Humidity Sensor	Factory connection, no customer connection allowed
White	Humidity Output	4 to 20mA or 0 to +5VDC, To Analog Input of Controller
Black	GND (Common)	Ground
Red	Power	10 to 30 VDC (0-5 VDC or 4-20 mA outputs)
Orange	Temperature Output	4 to 20mA or 0 to +5VDC, To Analog Input of Controller

Note 1: Both temperature & humidity outputs must be either 0-5VDC or 4-20mA, not mixed.

Note 2: The 4-20mA output is not a loop powered output. All four field wires are required (+, -, Temp out, RH out)

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Diagnostics - Humidity

Possible Problems:

Unit will not operate

Humidity reading is maximum 5V or 20mA

Humidity reading is minimum 0V or 4mA

Humidity reading in controller's software appears to be off more than the specified accuracy

Possible Solutions:

- Check power supply/controller voltage supply for power.
- Disconnect humidity transmitter power wires, check the wire coming from the power supply for power,
- Make sure the humidity sensor is installed properly and is not shorted
- QUICK CHECK: Open one of the blue wire connections. Does the reading change? If so, the sensor may be faulty. If not, contact BAPI technical support.
- Verify that the humidity sensor is installed
- QUICK CHECK: Short the two blue wire connections with a short piece of wire. Does the reading change? If so, the sensor may be faulty. If not, contact BAPI technical support.
- Check all software parameters
- If available, check the sensor against a calibrated control such as a hygrometer
- Measure the humidity transmitter's output. Using the humidity formula, calculate the output. If it is different from the software reading, contact BAPI technical support.
- Determine if the sensor is exposed to an external source different from the measured environment.

Diagnostics - Temperature

Possible Problems:

Temperature sensor in front end software is reading high

Temperature sensor in front end software is reading low

Possible Solutions:

- Check if the sensor is damaged
- Make sure wiring is correct
- Disconnect yellow wires and measure temperature sensor with an Ohm meter
- Determine if the sensor is exposed to an external source different from the measured environment
- Verify the "Sensor" output is correct (See note below)
- Check if the sensor is damaged
- Verify that wiring is correct
- Disconnect yellow wires and measure temperature sensor with an Ohm meter
- Determine if the sensor is exposed to an external source different from the measured environment
- Verify the "Sensor" output is correct (See note below)

Temperature Equation (4 to 20mA)

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

T = Temperature at sensor
 T_{low} = Low temperature of span
 T_{high} = High temperature of span
 T_{span} = T_{high} - T_{low}
 A = Ammeter reading in mA

Temperature Equation (0 to +5VDC)

$$T = T_{low} + \frac{(V_{out})}{5} \times (T_{span})$$

T = Temperature at sensor
 T_{low} = Low temperature of span
 T_{high} = High temperature of span
 T_{span} = T_{high} - T_{low}
 V_{out} = Voltmeter reading in Volts

Note: 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. If the measured resistance is different from the temperature table by more than 5%, call BAPI technical support. BAPI's web site is found at www.bapihvac.com; click on the button labeled SENSORS on the left of the screen and then click on the type of sensor you have.

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