

Overview

The BA/T10K [xx to yy]-H#### is a Duct or Outside Air temperature and humidity unit with humidity transmitter and T10K temperature transmitter. The humidity transmitter output can be 4 to 20mA, or 0 to 5V, 0 to 10V or 2 to 10V. The T10K temperature transmitter output can be 4 to 20 mA, 0 to 5V and 0 to 10V. The unit is available with a BAPI-Box enclosure or a doublegang Weatherproof enclosure.

Duct Unit Mounting

Mount in the center of the duct wall at least 3 duct diameters from humidifiers. Drill a 1 inch hole in the duct for the probe and use two number 8 sheet metal screws to attach the sensor to the duct. Center the probe in its mounting hole. Be sure that the foam seals the hole, but do not over tighten the screws.

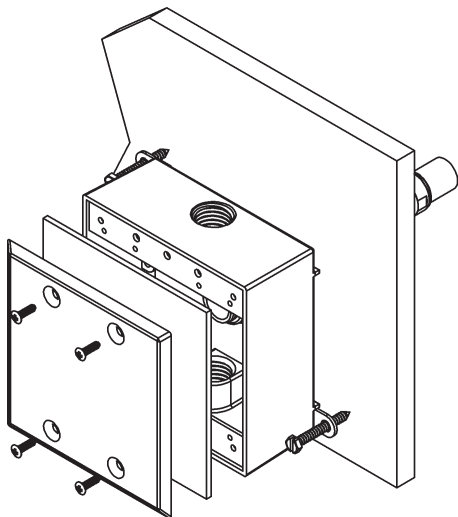


Fig. 1: Duct Humidity Unit in a Weatherproof (WP) Enclosure

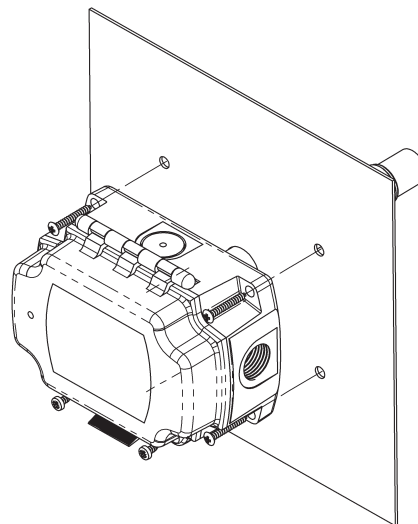


Fig. 2: Duct Humidity Unit in a BAPI-Box (BB) Enclosure

Outside Air Mounting

Mount in a permanently shaded area away from windows and doors. Do not mount in direct sunlight. Mount with the sensor probe pointed down. Drill a hole large enough for your sensor cable through your mounting surface. Mount the unit to the surface with the wiring knock-out centered over the wiring hole. Pull the wiring into the unit and terminate using sealant filled connectors. Best practice is to seal the wiring hole with caulk after the wiring is installed. Be sure that the foam on the back of the unit makes a good weather tight seal.

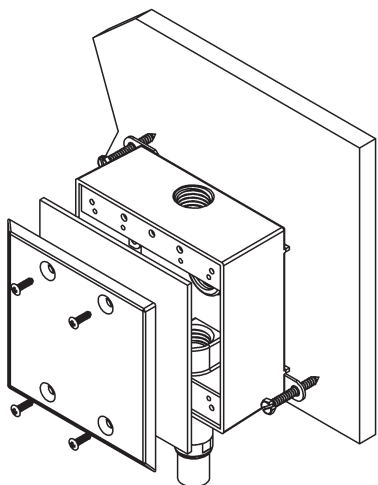


Fig. 3: Outside Air Humidity in a Weatherproof (WP) Enclosure

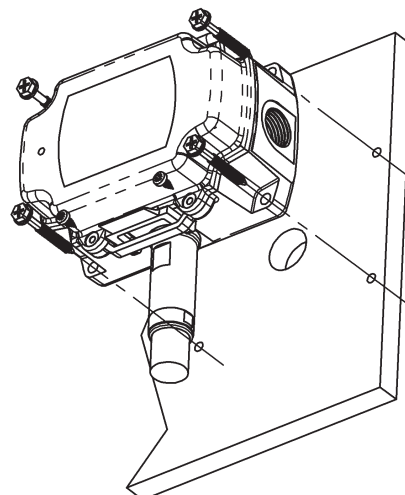


Fig. 4: Outside Humidity Unit in a BAPI-Box (BB) Enclosure

Specifications subject to change without notice.



Duct or Outside Air Temperature and Humidity Unit with T10K Temperature Transmitter and Humidity Transmitter

Installation & Operating Instructions

9941_ins_dual_trans_T10K_duct_out

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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 wiring in the same conduit as AC power wiring. 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.



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.

Wire Color	Purpose	Note
White	Not Used	Not Used (Cap Wires)
Black	Humidity Output	4 to 20 mA, To Analog Input of Controller
Red	Power	10 to 35VDC

Wire Color	Purpose	Note
White	Humidity Output	0 to 5VDC, To Analog Input of Controller
Black	GND (Common)	Ground for Power and Humidity Output
Red	Power	10 to 35VDC or 12 to 27 VAC

Wire Color	Purpose	Note
Green	Humidity Output	0 to 10VDC, To Analog Input of Controller
Black	GND (Common)	Ground for Power and Humidity Output
Red	Power	15 to 35VDC or 15 to 27VAC

Wire Color	Purpose	Note
Brown	Humidity Output	2 to 10VDC, To Analog Input of Controller
Black	GND (Common)	Ground for Power and Humidity Output
Red	Power	15 to 35VDC or 15 to 27VAC

Wire Color	Purpose	Note
Orange	Not Used	Not Used
Black	Temp Output	4 to 20mA, To Analog Input of Controller
Red	Power	10 to 35VDC

Wire Color	Purpose	Note
Orange	Temp Output	0 to 5V, To Analog Input of Controller
Black	GND (Common)	Ground for Power and Temp Output
Red	Power	10 to 35VDC or 12 to 24VAC

Wire Color	Purpose	Note
ORG/BLK	Temp Output	0 to 10V, To Analog Input of Controller
Black	GND (Common)	Ground for Power and Temp Output
Red	Power	15 to 35VDC or 15 to 24VAC

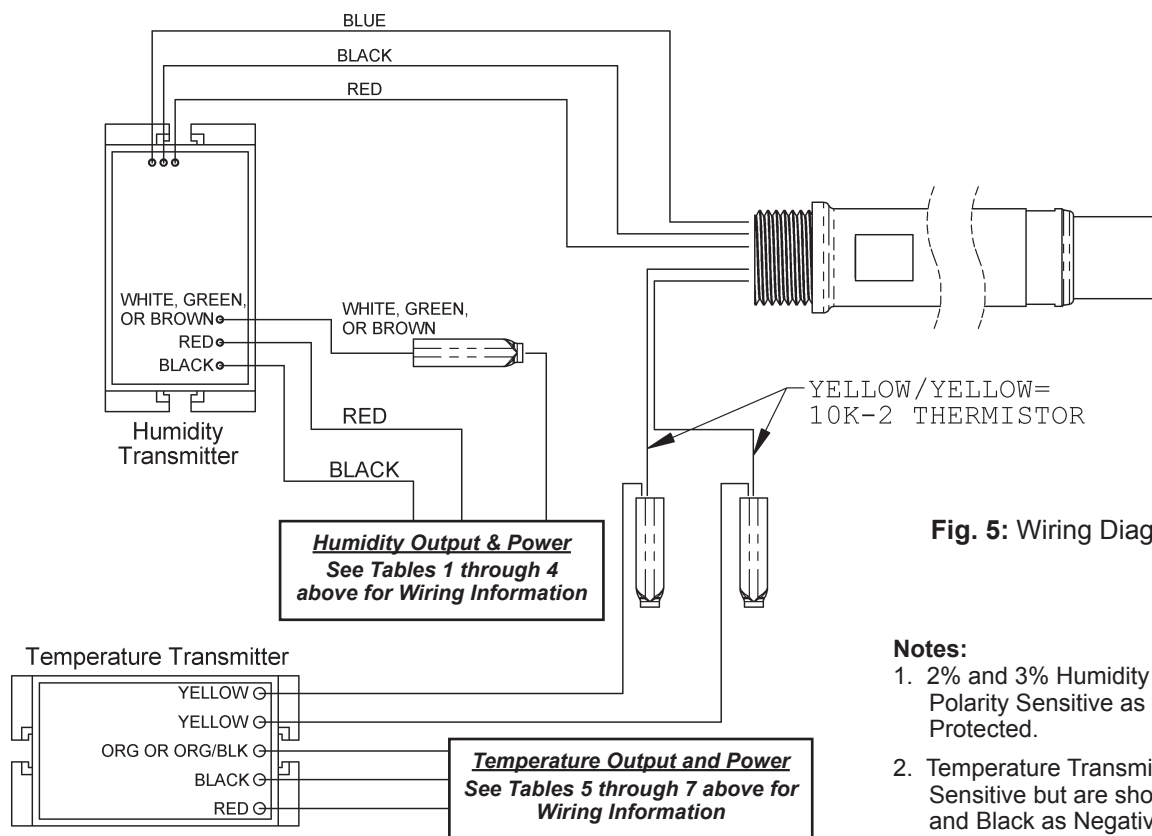


Fig. 5: Wiring Diagram

Notes:

1. 2% and 3% Humidity Transmitters Are Polarity Sensitive as well as Reverse Polarity Protected.
2. Temperature Transmitters Are Not Polarity Sensitive but are shown with Red as Positive and Black as Negative.



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Specifications

Supply Power:

Units with RH Output of 4 to 20mA or 0 to 5VDC: 10 to 35VDC, 22mA max
 Units with RH Output of 0 to 5VDC: 12 to 27VAC, 0.53VA max
 Units with RH Output of 0 to 10VDC or 2 to 10VDC: 15 to 35VDC, 6mA max or 15 to 27VAC, 0.14VA max)

Humidity Sensor: Factory corrected @17 RH points (10 to 90% RH)

Humidity Capacitive Polymer
 RH Accuracy $\pm 2\%$ @ 73°F (23°C) from 10 to 90%
 Drift 0.5% per year
 Response time < 5 seconds in moving air
 RH Linearity Negligible, factory corrected linear from 10 to 90%
 RH Hysteresis Factory corrected to <1%

Humidity Filter: 80 micron sintered stainless steel filter

Humidity Transmitter Output

Transmitter Output 0 to 100%, (Output Impedance)
 H200, H300 4 to 20mA output, 700Ω@24VDC, Voltage drop is 10VDC
 H200, H300 0 to 5VDC output, 10kΩ
 H210, H310 0 to 10VDC output, 10kΩ
 H212, H312 2 to 10VDC output, 10kΩ

Humidity Sensor Calibrated Accuracy: Calibration @17 RH points, (10% to 90%)

RH 2% 2% from 10 to 90% @ 73°F (23°C), Non-condensing
 RH 3% 3% from 10 to 95% @ 73°F (23°C), Non-condensing

%RH Transmitter Wiring: 2 wire current loop, or 3 wire voltage

Transmitter Ambient

Temperature -4 to 158°F (-20 to 70°C)
 Humidity 0 to 100% RH, condensing

Probe Ambient:

Temperature -40° to 158°F, (-40° to 70°C)
 Humidity 0 to 100% RH, condensing

Probe Length:

Duct 5.3" (13.5cm) Duct Insertion, 1" dia.
 Outside Air 2.4" (6.1cm) Below Enclosure, 1" dia.

Dimensions: W x H x D

Weatherproof (WP) 4.5" x 4.5" x 2.2", (114 x 114 x 55 mm)
 (doublegang)
 BAPI-Box (BB) 4.15" x 5" x 2.5", (105.4 x 127 x 63.5mm)

Enclosure Material:

Weatherproof (WP) Cast Aluminum (doublegang)
 BAPI-Box (BB) Polycarbonate, UV resistant

Enclosures Ratings:

Weatherproof (WP) NEMA-3R (doublegang)
 BAPI-Box (BB) NEMA-4, IP66, UL94V-0

Termination:

Open wire
 Crimp 18 to 26 AWG with Sealant Filled
 Crimp Connector (BA/SFC1000-x00)
 Wire Nut 26 to 16 AWG with Sealant Filled
 Wire Nut (BA/SFC2000-x00)

Approvals: RoHs

T10K Thermistor Temperature Transmitter Specs

Supply Voltage:

Units with 0 to 5 VDC or 4 to 20 mA Outputs:
 10 to 35 VDC

Units with 0 to 10 VDC Output:
 15 to 35 VDC

Units with 0 to 5 VDC Outputs:
 12 to 24 VAC

Units with 0 to 10 VDC Output:
 15 to 24 VAC

Transmitter Output:

4 to 20mA, 700Ω@24VDC
 0 to 5, 0 to 10 or 2 to 10VDC, 10KΩ min

Output Wiring: 2 & 3 wire (See wiring diagram)

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

Accuracy: $\pm 1.015^\circ\text{C}$, from (0 to 65°C)

Linearity: $\pm 0.065^\circ\text{C}$, 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

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Filter Care

A filter protects the humidity sensor from various airborne particles that might reduce the sensor's accuracy. Depending on the sensor's location and environment, this filter may need periodic cleaning. To do this, gently unscrew the filter from the probe. Rinse the filter under warm water until clean. Warm soapy water may be used if necessary. Gently replace the filter by screwing it back into the probe. The filter should screw all the way into the probe. Hand tighten only. If a replacement filter or replacement probe is needed, call BAPI.

BA/HDOFS3 Stainless Steel Sintered Filter Replacement

Diagnostics - Humidity

Possible Problems:

Unit will not operate

Humidity output is at its maximum or minimum value

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

Possible Solutions:

- Check for proper supply power. (See the wiring diagram and power specifications)
- Make sure the humidity sensor is wired properly.
- Check all software parameters
- Determine if the sensor is exposed to an external air source different from the measured environment, such as air infiltration through the wiring conduit.
- Check the Humidity transmitter output against a calibrated reference such as a 2% accurate hygrometer. Measure the humidity at the sensor's location using the reference meter, then calculate the humidity transmitter output using the humidity formula at left. Compare the calculated output to the actual humidity transmitter output (see the wiring diagram for the humidity transmitter output wire colors). If the calculated output differs from the humidity transmitter output by more than 5%, contact BAPI technical support.

Output	Humidity Formula
4 to 20mA	%RH = (mA-4)/0.16
0 to 5VDC	%RH = V/0.05
0 to 10VDC	%RH = V/0.1
2 to 10VDC	%RH = (V-2)/0.08

Diagnostics - Temperature

Possible Problems:

Unit will not operate

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

Possible Solutions:

- Check for proper supply power. (See the wiring diagram and power specifications)
- Check all software parameters.
- Determine if the sensor is exposed to an external air source different from the intended measured environment.
- Make sure the temperature sensing element wires are not open or shorted.
- Check the temperature transmitter output against a calibrated reference. Measure the temperature at the sensor's location using the reference meter, then calculate the transmitter output using the voltage or 4 to 20mA formulas below. Compare the calculated output to the actual temperature transmitter output (see the wiring diagram for the temperature transmitter output wire colors). If the calculated output differs from the temperature transmitter output by more than 5%, contact BAPI technical support.

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 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

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