

#### Overview

The BA\*-(H210, H212, H310 & H312) Duct and Outside Air humidity transmitters come in both 2% and 3% accuracies and transmit a 0 to 10V or 2 to 10V signal proportional to the relative humidity. They can have an optional RTD or thermistor temperature sensor mounted for use by any automation controller. They are powered from a 15 to 35VDC or a 15 to 27 VAC power source. The transmitters are housed in either a Weatherproof (WP), Weather Tight (EU), BAPI-Box (BB), or BAPI-Box 2 (BB2) Enclosure.

#### Duct Unit Mounting

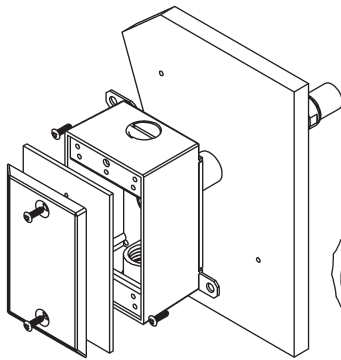


Fig. 1: Duct Humidity in a Weatherproof (WP) Enclosure

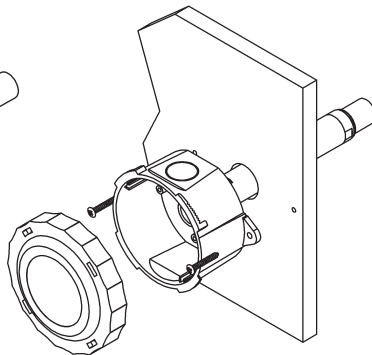


Fig. 2: Duct Humidity in a Weather Tight (EU) Enclosure

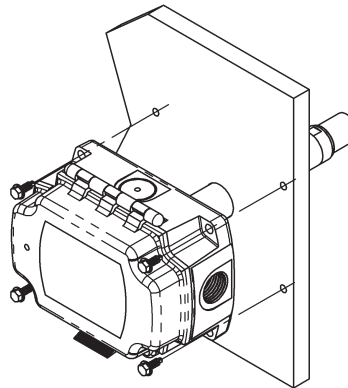


Fig. 3: Duct Humidity in a BAPI-Box (BB) Enclosure

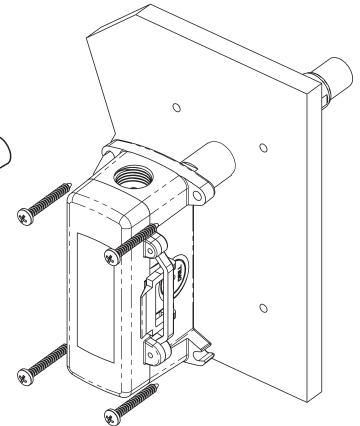


Fig. 4: Duct Humidity in a BAPI-Box 2 (BB2) Enclosure

Mount at least three (3) duct diameters from humidifiers in the center of the duct wall. Drill a 1 inch hole for the probe in the duct 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, do not over tighten the screws.

#### Outside Air Mounting

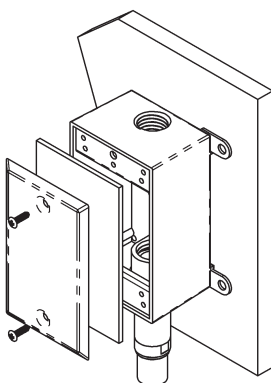


Fig. 5: Outside Humidity in a Weatherproof (WP) Enclosure

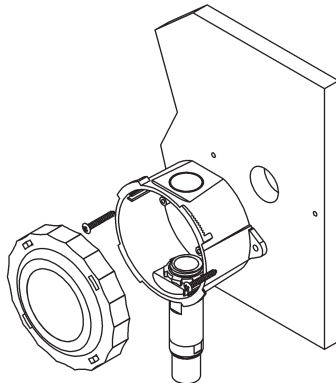


Fig. 6: Outside Humidity in a Weather Tight (EU) Enclosure

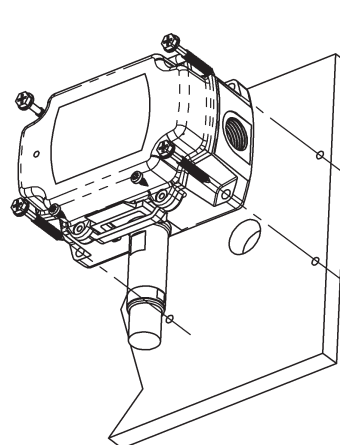


Fig. 7: Outside Humidity in a BAPI-Box (BB) Enclosure

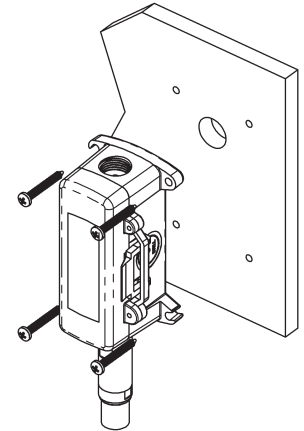


Fig. 8: Outside Humidity in a BAPI-Box 2 (BB2) Enclosure

Mount in a permanently shaded area away from windows and doors. Do not mount in direct sunlight. Mount with the sensor probe pointing down. Drill a hole large enough for your sensor cable to go through your mounting surface. Mount the unit 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.

Specifications subject to change without notice.

### 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 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
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
Green	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

Thermistors		Platinum RTDs - 2 Wire	
1.8K $\Omega$	Orange/Red	100 $\Omega$	Red/Red
2.2K $\Omega$	Brown/White	1K $\Omega$	Orange/Orange
3K $\Omega$	Yellow/Black	<b>Nickel RTD</b>	
3.25K $\Omega$	Brown/Green	1K $\Omega$	Green/Green
3.3K $\Omega$	Yellow/Brown	<b>Silicon RTD</b>	
10K-2 $\Omega$	Yellow/Yellow	2K $\Omega$	Brown/Blue
10K-3 $\Omega$	Yellow/Red	<b>Platinum RTDs - 3 Wire</b>	
10K-3(11K) $\Omega$	Yellow/Blue	100 $\Omega$	Red/Red/Black*
20K $\Omega$	White/White	1K $\Omega$	Orange/Orange/Black*
47K $\Omega$	Yellow/Orange	*In the 3-Wire RTD sensors listed above, the two wires of similar color are connected together.	
50K $\Omega$	White/Blue		
100K $\Omega$	Yellow/White		

Additional sensors are available so your sensor may not be listed on this table.

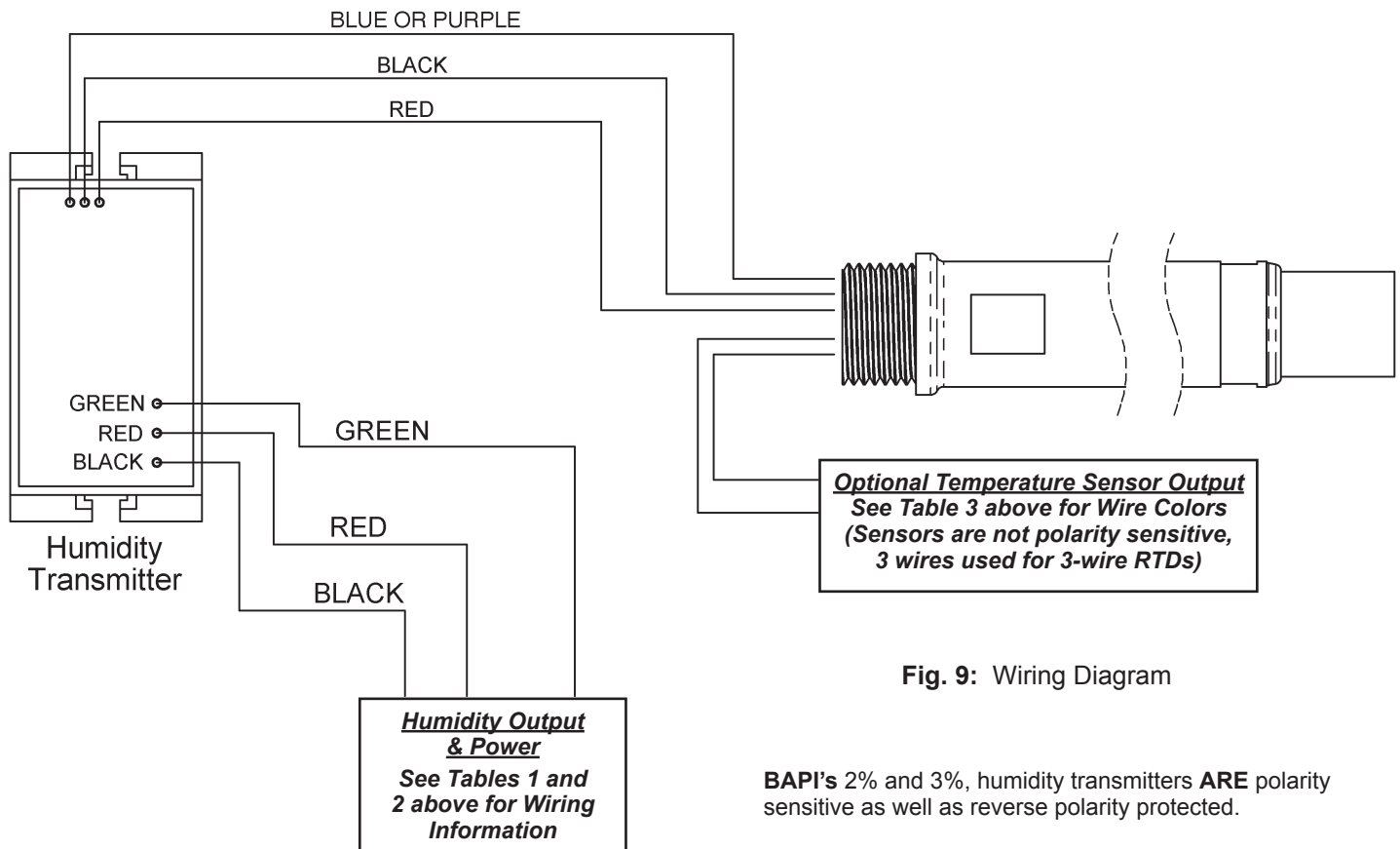


Fig. 9: Wiring Diagram

BAPI's 2% and 3%, humidity transmitters ARE polarity sensitive as well as reverse polarity protected.

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# Duct or Outside Air Humidity Transmitter 0 to 10V or 2 to 10V Humidity Output with Optional Temp. Sensor

Termination and Troubleshooting

14324\_ins\_hum\_temp\_duct\_out\_10

rev. 02/15/18

## Specifications

<b>Power:</b>	15 to 35 VDC, 6mA max 15 to 27 VAC, 0.14VA max
<b>Sensor:</b>	Factory corrected @17 RH points (10 to 90% RH)
Humidity	Capacitive Polymer
RH Accuracy	±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%
Opt. Temp.	Passive RTD or Thermistor
<b>Filter:</b>	80 micron sintered stainless steel filter
<b>Calibrated Accuracy:</b>	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
Thermistor	±0.36°F (0.2°C) from 32 to 158°F (0 to 70°C) - High accuracy units are available
RTD	±0.55°F (0.31°C) @ 32°F (0°C) - High accuracy units are available
<b>Output:</b>	Selectable via wiring detail
Humidity	0 to 5VDC or 4 to 20mA at 0 to 100% RH
Opt. Temp.	Resistance RTD or Thermistor
<b>Humidity Output Impedance:</b>	
Current	700Ω@ 24VDC, Voltage drop is 10VDC (Supply Voltage DC – Transmitter voltage drop 10VDC) / 0.02 Amps = Max load Impedance
Voltage	10KΩ
<b>Probe Length:</b>	
Duct	5.3" (13.5cm) Duct Insertion, 1" diameter
Outside Air	2.4" (6.1cm) Below Enclosure, 1" diameter
<b>Dimensions:</b>	W x H x D
Weatherproof (WP)	2.75" x 4.5" x 2.2", (70 x 114 x 55 mm)
Weather Tight (EU)	4.1" x 3.8" x 2.1", (105 x 97 x 54 mm)
BAPI-Box (BB)	4.15" x 5" x 2.5", (105.4 x 127 x 63.5mm)
BAPI-Box 2 (BB2)	4.9" x 2.8" x 2.35", (124.8 x 71.6 x 59.7mm)
<b>Termination:</b>	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)
<b>Enclosure Material:</b>	
Weatherproof (WP)	Cast Aluminum
Weather Tight (EU)	ABS plastic, UV resistant
BAPI-Boxes (BB, BB2)	Polycarbonate, UV resistant
<b>Enclosures Ratings:</b>	
Weatherproof (WP)	NEMA-3R
Weather Tight (EU)	IP66, UL94V-0
BAPI-Boxes (BB, BB2)	NEMA-4, IP66, UL94V-0
<b>Environmental Operation Range:</b>	-40° to 158°F (-40° to 70°C) • 0% to 100% RH
<b>Approvals:</b>	RoHs

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## Filter Care

A sintered filter protects the humidity sensor from various airborne particles and may need periodic cleaning. To do this, gently unscrew the filter from the probe. Rinse the filter in warm soapy water and rinse until clean. A nylon brush 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 is needed, call BAPI.

**BA/HDOFS3** Stainless Steel Sintered Filter Replacement for Outside Air Units

## Humidity Diagnostics

### Possible Problems:

Unit will not operate

Humidity output is at its maximum value of 10V

Humidity output is at its minimum value of 0V or 2V

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

### Possible Solutions:

- Check for proper supply power. (See page 2 for wiring diagram and power specifications)
- Make sure the humidity sensor is wired properly.
- 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 intended measured environment or reference device.
- 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 on page 2 for the humidity transmitter output wire colors). If the calculated output differs from the humidity transmitter output by more than 4% to 5%, contact BAPI technical support.

Output	Humidity Formula
0 to 10 VDC	%RH = V/0.10
2 to 10 VDC	%RH = (V-2)/0.08

## Temperature Diagnostics

### Possible Problems:

Controller reports Incorrect temperature

### Possible Solutions:

- Confirm the input is set up correctly in the controller's software
- Verify that the sensor wires are not physically shorted or open
- Check wiring for proper termination
- Measure the 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](http://www.bapihvac.com); click on the button labeled Sensor Specs on the left of the screen and then click on the type of sensor you have.

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