

Overview

The BAT1x-(H2xx, H3xx) is a humidity transmitter which comes in 2% or 3% accuracies and an RTD temperature transmitter. It can be ordered for either Duct or Outside Air applications with a doublegang Weatherproof Enclosure (NEMA 3R) or a BAPI-Box Enclosure (NEMA 4, IP66). The humidity transmitter can be ordered with 4 to 20 mA, 0 to 5VDC, 0 to 10V or 2 to 10V output while the temperature transmitter has a 4 to 20mA output.

Duct Unit Mounting

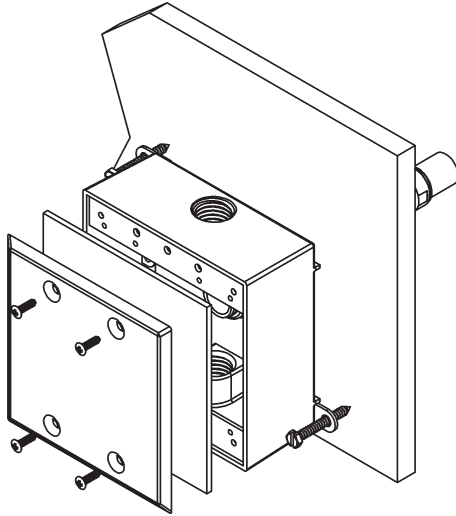


Fig. 1: Duct Humidity Unit in a Weatherproof (WP) Enclosure

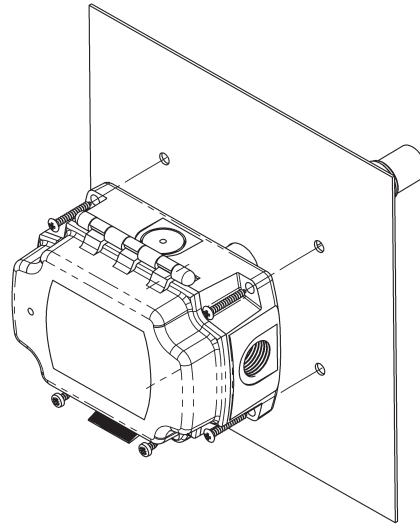


Fig. 2: Duct Humidity Unit in a BAPI-Box (BB) Enclosure

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.

Outside Air Mounting

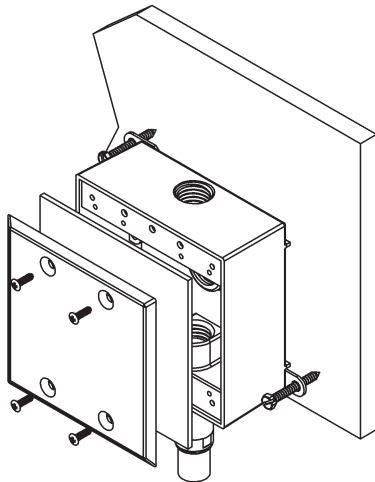


Fig. 3: Outside Air Humidity in a Weatherproof (WP) Enclosure

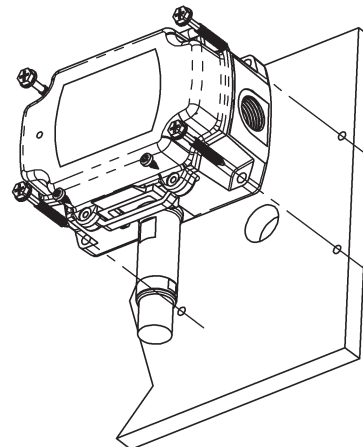


Fig. 4: Outside Humidity Unit in a BAPI-Box (BB) Enclosure

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.

Specifications subject to change without notice.



Duct & Outside Air Humidity Units with RTD Temperature Transmitter

Humidity Output (4 to 20mA, 0 to 5V, 0/2 to 10V), Temperature Output (4 to 20mA)

Installation and Operating Instructions

26415_ins_hum_RTD_temp_trans_duct_out

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Termination

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
Black	Temperature Output	4 to 20mA, To Analog Input of Controller
Red	Power	7 to 40VDC

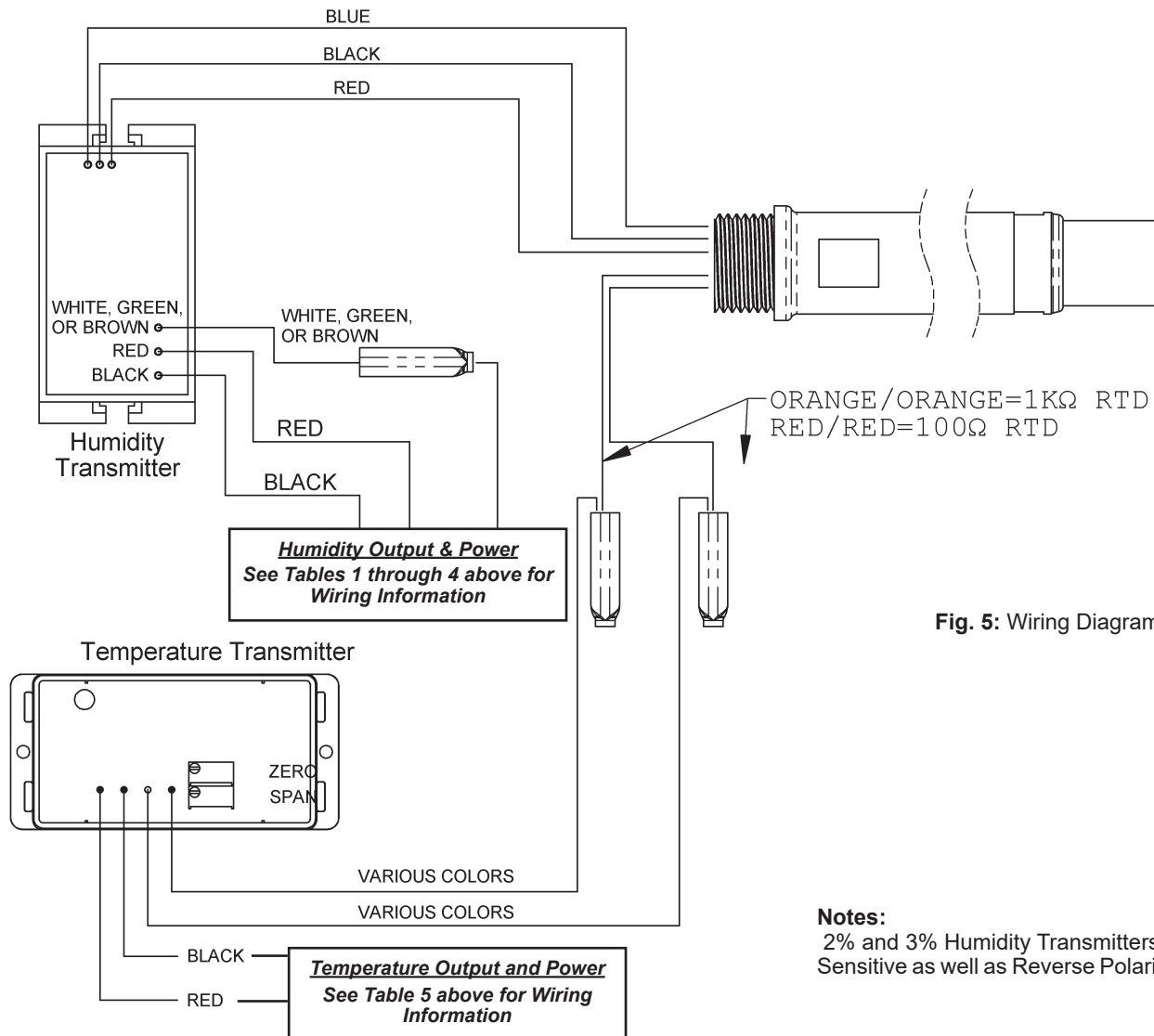


Fig. 5: Wiring Diagram

Notes:
 2% and 3% Humidity Transmitters Are Polarity Sensitive as well as Reverse Polarity Protected.

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Duct & Outside Air Humidity Units with RTD Temperature Transmitter Humidity Output (4 to 20mA, 0 to 5V, 0/2 to 10V), Temperature Output (4 to 20mA)

Installation and Operating Instructions

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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

Specifications

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
Units with Temperature Output of 4 to 20mA: 7 to 40VDC, 22mA max

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

Humidity.....Capacitive Polymer
RH Accuracy±2% @ 73°F (23°C) from 10 to 90%
Drift0.5% per year
Response time.....< 5 seconds in moving air
RH Linearity.....Negligible, factory corrected linier from 10 to 90%
RH HysteresisFactory corrected to <1%

Humidity Filter: 80 micron sintered stainless steel filter

Humidity Transmitter Output

Transmitter Output .0 to 100%
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

Output 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

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

Dimensions: W x H x D

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

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

Temperature Sensor:

T1K.....Platinum 1KΩ RTD

RTD Transmitter Output

Transmitter Output4 to 20mA, 850Ω@24VDC
Output Wiring2 wire loop
Output Limits<1mA (short), <22.35mA (open)
Span Min.30°F (17°C), Max 1000°F, (555°C)
Zero Min.....Min -130°F (-90°C)
Zero MaxMax 900°F (482°C)
Accuracy±0.065% of span
Linearity±0.125% of span
Power Output Shift±0.009% of span
RTD Sensor2 wire Platinum (Pt), 385 curve
Transmitter Ambient ..-4 to 158°F (-20 to 70°C)
0 to 100% RH, condensing

Specifications subject to change without notice.



Duct & Outside Air Humidity Units with RTD Temperature Transmitter Humidity Output (4 to 20mA, 0 to 5V, 0/2 to 10V), Temperature Output (4 to 20mA)

Installation and Operating Instructions

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Diagnostics - Humidity

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

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

Possible Solutions:

- Check for proper supply power. (See the wiring diagram and power specifications)
- Make sure the humidity sensor is wired properly.
- Verify humidity with a reference sensor. If humidity drops to 5% or below in the environment, the output will go to the maximum value.
- 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.

Diagnostics - Temperature

Possible Problems:

Unit will not operate

Temperature sensor reading is inaccurate at the controller software

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 = Ammeter reading in mA

Possible Solutions:

- Check for proper supply power (7 to 40VDC) to the temperature transmitter. (See pages 2 for wiring diagram and power specifications.)
- Determine if the input is set up correctly in the controller's front end software.
- Check if the RTD sensor wires are physically open or shorted.
- 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 resistance of the temperature sensor (located inside the unit's probe) against an accurate temperature standard. Measure the temperature at the sensor's location using a reference meter. Disconnect the temperature sensor wires (2 Red Wires for a 100 Ohm Platinum RTD sensor or 2 Orange Wires for a 1,000 Ohm Platinum RTD sensor) and measure the temperature sensor's resistance with an ohmmeter. Compare this resistance to the appropriate temperature sensor's Output Table on the BAPI website. (Go to www.bapihvac.com; click on "Resource Library" and "Sensor Specs" and then on the 100 Ohm Plat. RTD or the 1,000 Ohm Plat. RTD.) If the measured resistance is different from the Output Table by more than 5%, contact BAPI technical support.
- Check the output current of the temperature transmitter (located inside the unit's enclosure) against an accurate temperature standard. Measure the temperature at the sensor's location using a reference meter. Measure the transmitter current by placing an ammeter in series with the controller input (the black wire on the temperature transmitter). The current should read according to the equation at left. If the measured output is different from the calculated output, call BAPI technical support. If the measured output is the same as the calculated output, then check the wiring between the unit and the controller.

Note:

The temperature surrounding the transmitter must be between -4 and 158°F (-20 and 70°C).

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