Duplicate and Outside Air Humidity(H200-H300) w/592 or 334 Temperature

Installation and Operating Instructions

Overview

The BA/♦(H200, H300) is a humidity transmitter which comes in 2% or 3% accuracies and a solid state temperature sensor. The solid state temperature sensor can either a LM334 (334) or AD592 (592). It can be ordered for either Duct or Outside air applications with enclosures rated for NEMA-3R or NEMA-4 (IP66). The transmitter can be wired for either a 0-5VDC output or a loop powered 4-20mA output. The unit is powered with 10 to 35VDC. The 0-5VDC output transmitter can also operate with 12 to 24VAC power.

Mounting

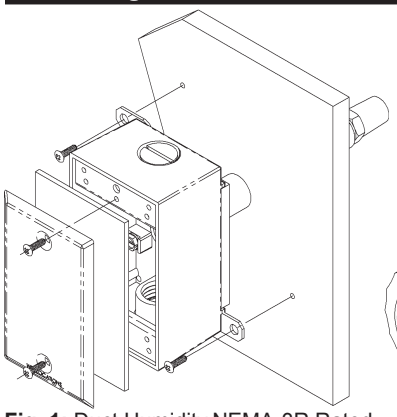

Fig. 1: Duct Humidity.NEMA-3R Rated

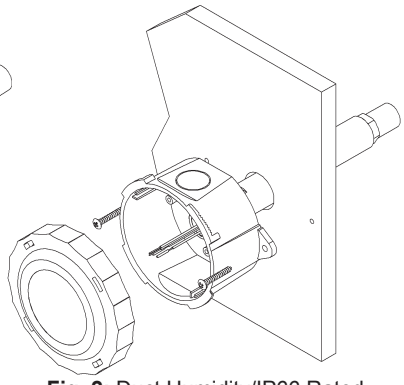

Fig. 2: Duct Humidity/IP66 Rated

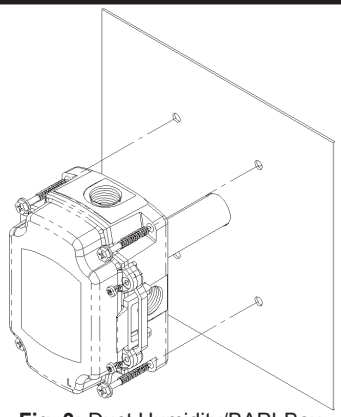

Fig. 3: Duct Humidity/BAPI-Box, IP66 Rated

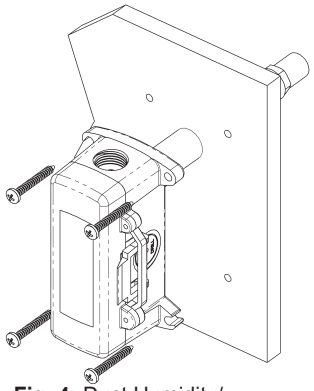

Fig. 4: Duct Humidity/ BAPI-Box 2, IP66 Rated

Mount at least 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.

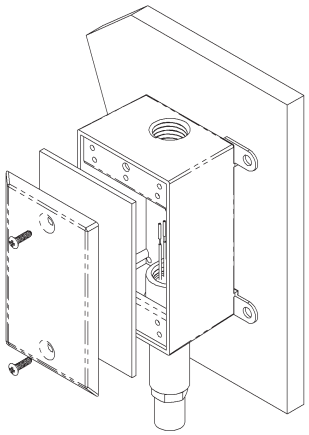

Fig. 5: Outside Humidity/ Weatherproof

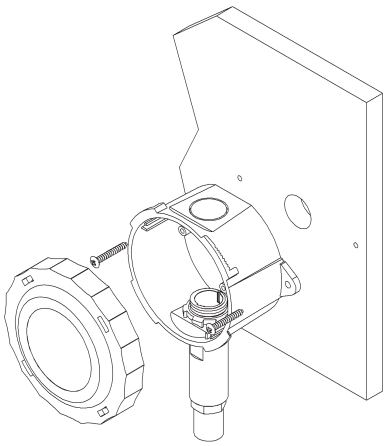

Fig. 6: Outside Humidity/ Weatherproof

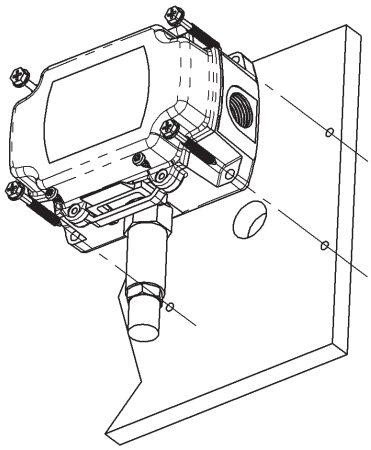

Fig. 7: Outside Humidity/ BAPI-Box, IP66 Rated

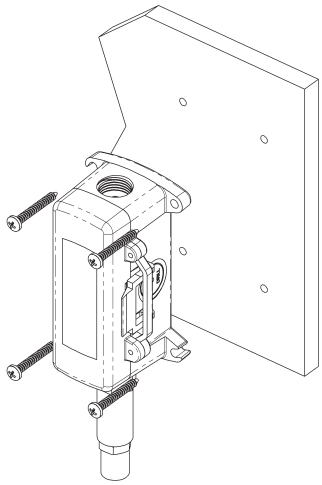

Fig. 8: Outside Humidity/ BAPI-Box 2, IP66 Rated

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 caulk the wiring hole after the wiring is installed. Be sure that the foam on the back of the unit makes a good weather tight seal.

Wiring and Termination

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

Table 1: Humidity Transmitter Terminations

Wire Color	Purpose	Note
Yellow	Temperature Sensor	Factory Connection, no customer connection allowed
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Blue	Humidity Sensor	Factory Connection, no customer connection allowed
Blue	Humidity Sensor	Factory Connection, no customer connection allowed
White	Voltage Output	0 to 5 VDC, To Analog Input of Controller
Black	GND (Common)	0 to 5 VDC Output to Ground; (AC or DC Power) 4 to 20 mA Output, To Analog Input of Controller
Red	Power	10 to 35 VDC, (12 to 24 VAC for 0-5 VDC Output)

Table 2: Temperature Sensor Termination Table

592 or 334 2-Wire - From Probe		
Wire Color	**Purpose**	**Note**
Red	Power	Connect to +5 to +30 VDC
Black	Output	Connect to Controller's Analog Input*
592 or 334 3-Wire - From Probe		
Red	Power	Connect to +5 to +30 VDC
Black	Ground	Connect to Ground
White	Output	Connect to Controller's Analog Input

***Note -** For 2-wire 592 or 334, a 0.1% resistor must be installed between the black output wire and the controllers ground.

Fig. 7: Humidity Transmitter with 2-wire 592 or 334 TemperatureTransmitter (592 Shown)

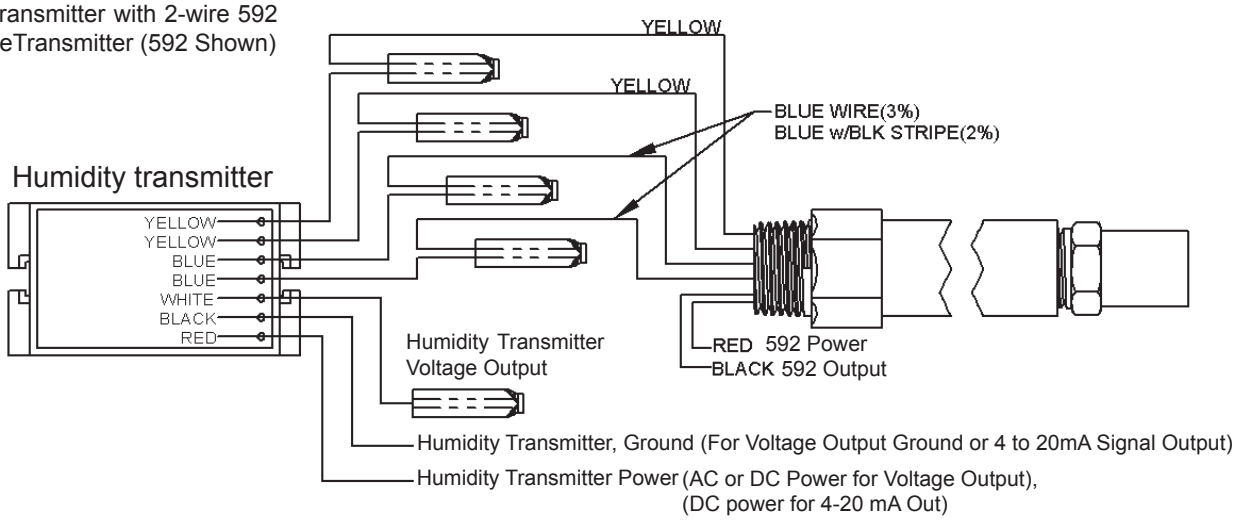
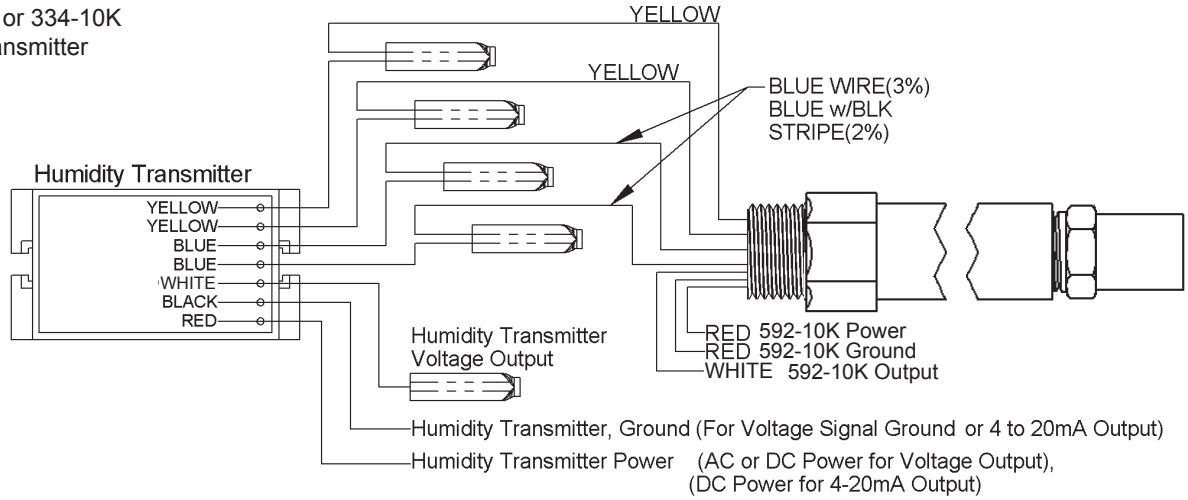


Fig. 8: Humidity Transmitter with 2-wire 592-10K or 334-10K Temperature Transmitter (592 Shown)



Humidity Diagnostics

Possible Problems:
Unit will not operate

Possible Solutions:
- Check power supply/controller voltage supply.
- Disconnect transmitter from controller and check wires for proper operation with a meter

Humidity reading in software appears to be off more than specified accuracy

- Check all software parameters- If available, check the sensor against a calibrated control such as a hygrometer
- Use the 4 to 20mA or 0 to 5V signal formula to calculate the output at the transmitter with a meter.
- Determine if the sensor is exposed to an external source different from the measured environment. (Draft)

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

Temperature Diagnostics

The AD592 or LM334 sensor transforms temperature into current. The output changes 1micro-amp for every one degree Celsius change in temperature (0.56micro-amp per degree Fahrenheit). Since most meters that field technicians use cannot accurately measure currents this low BAPI recommends that a 10,000 ohm 0.1% resistor be placed between the sensor output and ground. The 10,000 Ω resistor changes the current into a voltage that varies 0.01 volts per one degree Celsius temperature change (0.0055 volts per degree Fahrenheit), easily in the range of most meters used by field technicians. Resistors with other tolerances can be used, but you will have greater temperature errors, see the 10K error table.

BAPI provides two styles of humidity probes with 592 or 334, one with and one without the 10,000 Ω 0.1% resistor. The one with the resistor has three wires; red, black and white. The one without the resistor has two wires; red and black.

If the humidity transmitter is set up for 4 to 20mA output there is no signal ground at the sensor to use as a reference for voltage measurements for two wire 592 or 334 units. The ground pin at a local power plug may be at the correct potential or you may have to pull a temporary ground wire from the controller in order to make voltage measurements. There will be a ground in 3-wire 592 or 334 units.

1. Measure voltage from the controller ground (black meter lead) to the red power lead for +5 to +30 VDC.

2. For 2-wire units, make sure that there is a 10K ohm 0.1% resistor from the black wire to the controllers ground

3. Measure the mV from the controllers ground (black meter lead) to the black wire (2-wire units) or the white wire (3-wire units) (red meter lead).
   Compare the voltage measurement to the voltage listed in the sensor output table.

   Note: Be sure to include the error from the 10KΩ Error Table 3.

4. If the sensor reads properly, verify that the controller is operating correctly, otherwise call BAPI support.

5. Determine if the sensor is exposed to an external source different from the room environment (conduit draft).

Table 3: 10K Error Table

10K Resistor Tolerance	Temperature Inaccuracy
0.10%	±3.3°F/1.8°C
1%	±8.3°F/4.6°C
5%	±30.7°F/17.1°C

Table 4:592 or 334 Output Table

Temperature		**592 or 334 Semiconductor**	
°F	°C	Output Current uA	Output Voltage across 10KΩ
50	10.00	283.2	2.832
60	15.56	288.8	2.888
62	16.67	289.9	2.899
64	17.78	291.0	2.910
66	18.89	292.1	2.921
68	20.00	293.2	2.932
70	21.11	294.3	2.943
72	22.22	295.4	2.954
74	23.33	296.5	2.965
76	24.44	297.6	2.976
77	25.00	298.2	2.982
78	25.56	298.8	2.988
80	26.67	299.9	2.999
82	27.78	301.0	3.010
84	28.89	302.1	3.021
86	30.00	303.2	3.032
88	31.11	304.3	3.043
90	32.22	305.4	3.054
100	37.78	311.0	3.110

Temperature Sensor Offset

This is how BAPI calculates the offset value provided on the equipment label for the AD592 or LM334 Sensor:

Therm Reading_____
The actual temperature reading according to a thermometer that is NIST certified traceable

Sensor Reading _____
The temperature reading according to the sensor, using the output in either uA or mV.

Offset_____
The difference between the Thermometer Reading and the Sensor Reading

To correct the Sensor Reading, simply add the offset value to the sensor reading so that it equals the thermometer reading.

e.g. Therm Reading 74.6 Sensor Reading 73.0 Offset +1.6
Correction: Add (+1.6) °F to the sensor at the controller for an accurate reading: 73 + 1.6 = 74.6°F

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, or at the most having only one or two threads showing. Hand tighten only. If a replacement filter or replacement probe is needed, call ***BAPI*** .

BA/HDOFS Stainless Steel Sintered Filter Replacement

Specifications

Power:
(0-5 VDC or 4-20 mA outputs) 10 to 35 VDC, 22mA max,
(0 to 5 VDC) Output 12 to 24 VAC, 0.53VA max

Sensor:
Humidity Resistive
Temperature AD529 or LM334

Filter: 100 micron sintered stainless steel

Accuracy:
200 2%, 15% to 95% @77ºF
300 3%, 15% to 95% @77ºF
529 ±3.3ºF (1.8ºC) from -13 to 221ºF
334 ±3.3ºF (1.8ºC) from 32 to 158ºF
See table 3

Output:
Humidity 4-20mA = 0-100%RH
0-5VDC = 0-100%RH
Temperature 2.83 to 3.1 VDC = 50º to 100F
.283 to .31 mA = 50º to 100ºF
See Table 4

Impedance:
Humidity 700Ω @ 24VDC
Temperature10KΩ, 0.1%accuracy

Enclosures material:
WP Cast Aluminum
EU ABS plastic, UV resistant
BB Polycarbonate, UV resistant

Enclosures Ratings:
WP NEMA-3R
EU IP66, UL94V-0
BB IP66, UL94V-0

Environmental Ambient Range:
-22º to 158ºF, (-30º to 70ºC)
0% to 100%