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Frequently Asked Questions

1. What is the proper method for testing %RH transmitters in the field?

Here is the abridged answer.

The proper way to test an %RH transmitter in the field is with an electronic handheld reference tester. BAPI recommends that you use an NIST certified reference tester (such as BAPI's Blu-Test wireless temperature and humidity probe).

Measurements should be taken with the tips of the tester and sensor as close together as possible and as far away as possible from human radiant heat or breathing.

After taking the measurement, determine whether the reading is within the COMBINED accuracy of the sensor and tester. To determine the COMBINED accuracy, add the accuracy of the reference tester and the accuracy of the sensor.

Example 1: A ±2% accuracy reference tester (Blu-Test) and a ±2% accuracy humidity sensor has a COMBINED accuracy of ±4%. So if the reading from the reference tester is within 4% of the reading from the sensor, then the sensor is within specification.

Example 2: A humidity reading of 45%RH from a ±2% accuracy sensor and a reading of 49%RH from a ±2% accuracy reference tester would mean that the sensor is just within spec at ±4% (49% - 45%= 4%).

If the sensor was reading 45%RH and the reference tester was reading 40.9%RH, then the sensor would be just out of spec at 4.1% (45% - 40.9% = 4.1%)

2. The readings from the %RH transmitter are off from the actual %RH of the space. What could be wrong?

Make sure your reference is measuring the same air (physically close) to the transmitter.

See the answer to Question 1 above for the correct way to use and interpret your reference readings.

Many times a wall sensor has air infiltrating from behind the wall. Be sure to plug the wall draft with insulation to prevent cold/warm or dry/moist air from influencing your transmitter reading.

Look for other influences that may affect your readings such as an overhead diffuser or base board radiation. Sensors should never be in the sun or mounted on an outside wall.

Since all BAPI sensors are tested for accuracy from the factory, the chance of the sensor being out of calibration is remote. However, one can't ignore the possibility that the sensor needs calibration or that your handheld reference may need calibration as well.

3. What is the difference between resistive and capacitive %RH sensors?

There are two main differences: response time and overall measurement range.

Capacitive sensors generally have a faster response time measured in seconds. (2 to 10 seconds is typical)

Resistive sensors generally have a slower response time measure in seconds. (30 to 60 seconds is typical)

Capacitive sensors generally have a better low humidity measurement range. (5% to 90% is typical)

Resistive sensors generally have a higher humidity measurement range. (Typically 15% to 95%)



Frequently Asked Questions

4. How do you calculate the actual humidity from the transmitter output signal?

4 to 20mA Output:

4mA = 0%RH, 20mA = 100%RH, Span = (20mA – 4 mA) = 16mA, Offset = 4mA

So: (Measured mA – 4mA) / 16mA = %RH

Example with 11.2mA measured Output: (11.2mA – 4mA) / 16mA = 45%RH

0 to 10V Output:

0V = 0%, 10V = 100%, Span = (10V – 0V) = 10V, Offset = 0V

So: Measured V / 10V = %RH

Example with 4.5V measured output: (4.5V / 10V) = 45%RH

0 to 5V Output:

0V = 0%, 5V = 100%, Span = (5V – 0V) = 5V, Offset = 0V

So: Measured V / 5V = %RH

Example with 2.25V measured Output: (2.25V / 5V) = 45%RH

2 to 10V Output:

2V = 0%, 10V = 100%, Span = (10V – 2V) = 8V, Offset = 2V

So: (Measured V – 2V) / 8V = %RH

Example with 6.5V measured output: (6.5V – 2V) / 8V = 45%RH

1 to 5V Output:

1V = 0%, 5V = 100%, Span = (5V – 1V) = 4V, Offset = 1V

So: (Measured V – 1V) / 4V = %RH

Example with 2.8V measured output: (2.8V – 1V) / 4V = 45%RH

5. How do you calculate the transmitter output signal if you know the actual humidity?

4 to 20mA Output:

4mA = 0%, 20mA = 100%, Span = (20mA – 4 mA) = 16mA, Offset = 4mA

So: (%RH x 16mA) + 4mA = Measured mA

Example with 45%RH in the space: (0.45 x 16mA) + 4mA = 11.2mA

0 to 10V Output:

0V = 0%, 10V = 100%, Span = (10V – 0V) = 10V, Offset = 0V

So: %RH x 10 = Measured voltage

Example with 45%RH in the space: 0.45 x 10 = 4.5V

0 to 5V Output:

0V = 0%, 5V = 100%, Span = (5V – 0V) = 5V, Offset = 0V

So: %RH x 5V = Measured voltage

Example with 45%RH in the space: 0.45 x 5V = 2.25v

2 to 10V Output:

2V = 0%, 10V = 100%, Span = (10V – 2V) = 8V, Offset = 2V

So: (%RH x 8V) + 2V = Measured Voltage

Example with 45%RH in the space: (0.45 x 8V) + 2 = 5.6V

1 to 5V Output:

1V = 0%, 5V = 100%, Span = (5V – 1V) = 4V, Offset = 1V

So: (RH% x 4V) + 1 = Measured Voltage

Example with 45%RH in the space: (0.45 x 4V) + 1V = 2.8V



Frequently Asked Questions

6. What is the %RH and temperature response time in the BAPI-Stat 4 “X-Combo” room sensor?

The only definitive answer is the response time specifications of the %RH and Temperature sensor itself.

The Response Time Specifications for the sensor are:

The bare sensor will reach 63.2% of its final step value in 5 seconds in slow moving air*.

The bare sensor will reach 88.5% of its final step value in 10 seconds in slow moving air*.

The bare sensor will reach 95% of its final step value in 15 seconds in slow moving air*.

The bare sensor will reach 98%% of its final step value in 20 seconds in slow moving air*.

The bare sensor will reach 99+% of its final step value in 25 seconds in slow moving air*.

Note: When obstructions or self-heating components are added around the sensor, the response time will increase. That's why BAPI positions the sensor at the bottom of the sensor enclosure away from other components and close to the enclosure edge. BAPI has not run a response time test for the sensor in the BAPI-Stat 4 “X-Combo” enclosure. A lot depends on the air flow around the sensor in the field. If the airflow around the sensor is fast then, the response will also be fast.

*There are no official specs on what “slow moving air” is but one of the most common definitions is 1M/sec.