

Calibration of Relative Humidity Sensors

What are relative humidity sensors?

Capacitive or resistance type relative humidity (RH) sensors measure the vapor pressure of the air related to saturation with electronic components. These produce an electrical output signal proportional to the relative humidity of the air.

Why is calibration important?

The measurement error of electronic sensors and circuits usually changes over time and therefore frequent calibration is needed.

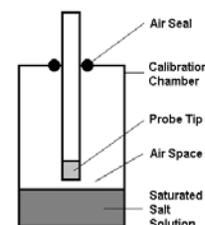
How to calibrate



Electronic RH sensor
(housing removed)

Usually it is sufficient to perform a two-point calibration at two different RH readings using known humidity standards such as saturated salt solutions. Saturated salt solutions maintain a salt specific RH level in the air above the solution provided that they are kept in an airtight calibration chamber (right). If desired a 0% calibration can be done using a desiccant.

Always consult follow the calibration instructions in the manual of the instrument.



Calibration Chamber

Saturated salt solution

Prepare the saturated salt solutions as follows:

- Prepare the solutions a few days ahead of time to allow them to stabilize.
- Select the salt, most common is Lithium chloride (RH=11.3%) and sodium chloride (cooking salt, RH=75.3%)
- Spread dry salt about 3 mm deep in an airtight container. Add water to moisten the salt until the salt looks damp.

Relative Humidity values (%) of different saturated salt solutions at different temperatures

Salt / Temp., °C	5.0	10.0	15.0	20.0	25.0
Lithium chloride, LiCl	11.3	11.3	11.3	11.3	11.3
Magnesium chloride	33.6	33.5	33.3	33.1	32.8
Potassium carbonate	43.1	43.1	43.1	43.2	43.2
Sodium bromide	63.5	62.2	60.7	59.1	57.6
Sodium chloride, NaCl	75.7	75.7	75.6	75.7	75.3
Potassium chloride	87.7	86.8	85.9	85.1	84.3
Potassium sulphate	98.5	98.2	97.9	97.6	97.3

Note the following:

- Saturated salts that have equilibrium RH below ambient will continue to absorb water indefinitely and overflow.
- The 98% RH calibration can only be done in a room with constant temperature.

For more information contact

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Two point Calibration

- Position the probe tip in the container with the first salt solution as close as possible above the saturated salt solution.
- Do not allow the tip of the probe to contact the salt solution. This might damage the sensor.
- Seal the holes where electronic sensors or cables penetrate the container airtight.
- Allow enough time for the RH to adjust after the probe was inserted. Smaller probes not less than 15 minutes, larger instruments up to several hours. The RH is adjusted if there is no change in reading for 5-10 minutes.
- Adjust the reading of the sensor according to the manual.
- Repeat the calibration using the second salt solution.

Repeat both calibration points until there is no change in readings anymore.

Calibration at Zero RH

If calibration at a RH of 0% is needed the following dehydrating agents (desiccants) can be used:

- Silica gel. A widely used desiccant sometimes with an indicator that changes color at too high an RH for calibration purposes.
- Anhydrous copper sulfate: Works very well, and is reusable by baking to a grey color.

All these desiccants can be regenerated by heating at 150C.