

Vaisala HUMICAP® Sensor for Measuring Relative Humidity



In 1973, Vaisala introduced HUMICAP®, the world's first thin-film capacitive humidity sensor. Since then, Vaisala has become the market leader in relative humidity measurements, and thin-film capacitive humidity sensors have developed from one company's innovation into a global industry standard.

Vaisala HUMICAP sensors guarantee quality and reliability, with their reputation for accuracy, excellent long-term stability, and negligible hysteresis.

How It Works

HUMICAP is a capacitive thin-film polymer sensor consisting of a substrate on which a thin film of polymer is deposited between two conductive electrodes. The sensing surface is coated with a porous metal electrode to protect it from contamination and exposure to condensation. The substrate is typically glass or ceramic.

The thin-film polymer either absorbs or releases water vapor as the relative humidity of the ambient air rises or falls. The dielectric properties of the polymer film depend on the amount of absorbed water. As the relative humidity around the sensor changes,

the dielectric properties of the polymer film change, and so does the capacitance of the sensor. The instrument's electronics measure the capacitance of the sensor and convert it into a humidity reading.

Typical Applications for Humidity Measurement

Vaisala's humidity instruments with HUMICAP sensors are suitable for a wide range of applications. From power and steel to life sciences and building automation, many industries need to measure humidity – here are just a few:

Humidity must be measured and controlled in many drying processes, such as those in construction material and paper manufacturing, and fluid bed dryers. The humidity of the process air is a good indicator of the progression of the drying process.

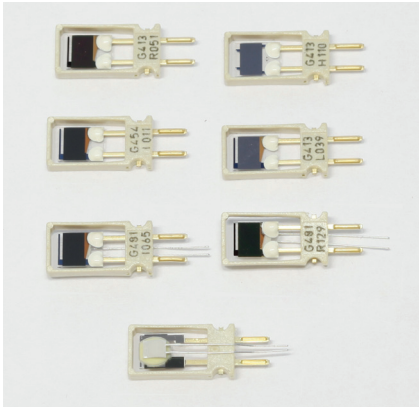
HUMICAP in Brief

- A capacitive thin-film polymer sensor
- Full measurement range 0...100 %RH
- Accurate to ± 1 %RH
- Traceable humidity measurement
- Nearly 40 years on the market

HUMICAP's Unique Benefits

- Excellent long-term stability
- Insensitive to dust and most chemicals
- Chemical purge option for stable measurements in environments with high concentrations of chemicals
- Sensor heating for measurements even in condensing environments
- Full recovery from condensation

Cleanrooms and other critical environments also require high-performance environmental measurements in order to operate consistently and within



Family of HUMICAP sensors.

specifications. In addition, glove boxes and isolators – used for handling moisture or gas-sensitive materials – benefit from accurate and reliable humidity measurements. Measuring humidity in a critical environment can be especially challenging.

In the food industry the dryers and ovens used in bread baking and cereal manufacture require a carefully controlled humidity level to maintain consistent quality and high yield, and to give distinctive characteristics to the finished product.

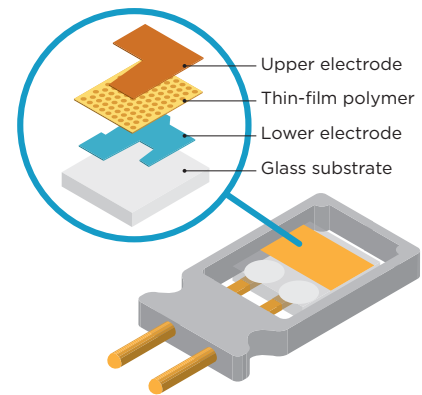
In building automation, optimizing both the temperature and relative humidity of the indoor environment enables a greater level of comfort for occupants than optimizing temperature alone. Careful humidity control is a must in museums, archives, warehouses, and other environments where humidity-sensitive materials are stored.

Vaisala HUMICAP Humidity Products

Vaisala has everything you need for measuring humidity, with a wide range of humidity instruments covering applications from HVAC to the most demanding industrial applications, both indoors and out. Vaisala's humidity instrument offering includes transmitters, modules for volume applications, portable and handheld humidity meters, and humidity calibrators. The full range of humidity products can be found at www.vaisala.com/humidity

Vaisala INTERCAP® Sensor

- Same measurement principle as in the HUMICAP® sensor
- Factory pre-calibrated - no additional calibration or adjustment needed
- Fully interchangeable
- Used in humidity instruments with $\pm 3\%$ RH accuracy



Structure of the HUMICAP sensor.

HUMICAP® - The Story of Innovation

Until the early 1970s, hair hygrometers were commonly used in radiosondes. At that time, reliable humidity measurement was an unresolved challenge and to solve this, Vaisala began developing a new type of humidity sensor using semiconductors and thin-film materials. The revolutionary HUMICAP humidity sensor was introduced two years later, in 1973, at CIMO VI congress.

HUMICAP was a radical innovation that changed humidity measurements for good. The new technology was groundbreaking:

the sensor had no moving parts, and due to the advanced use of semiconductor and thin-film technologies, it was amazingly small. The sensor had a fast response time, good linearity, low hysteresis, and small temperature coefficient.

Despite the fact that the innovation was designed for a new type of a radiosonde, the greatest interest came from elsewhere: people working in environments as diverse as greenhouses, bakeries, warehouses, construction sites, brick and timber kilns, and

museums. The need for reliable humidity measurement was common to all, and instruments that could do this accurately were few and far between.

By 1980, a variety of products based on HUMICAP technology – from hand-held meters to industrial transmitters, calibrators, and other accessories – were being sold in over 60 countries. Since its birth, HUMICAP has been part of Vaisala's core business, propelling the company to industry leadership in the field of humidity measurement.