Use of chilled mirror hygrometers as reference instruments in calibration laboratories

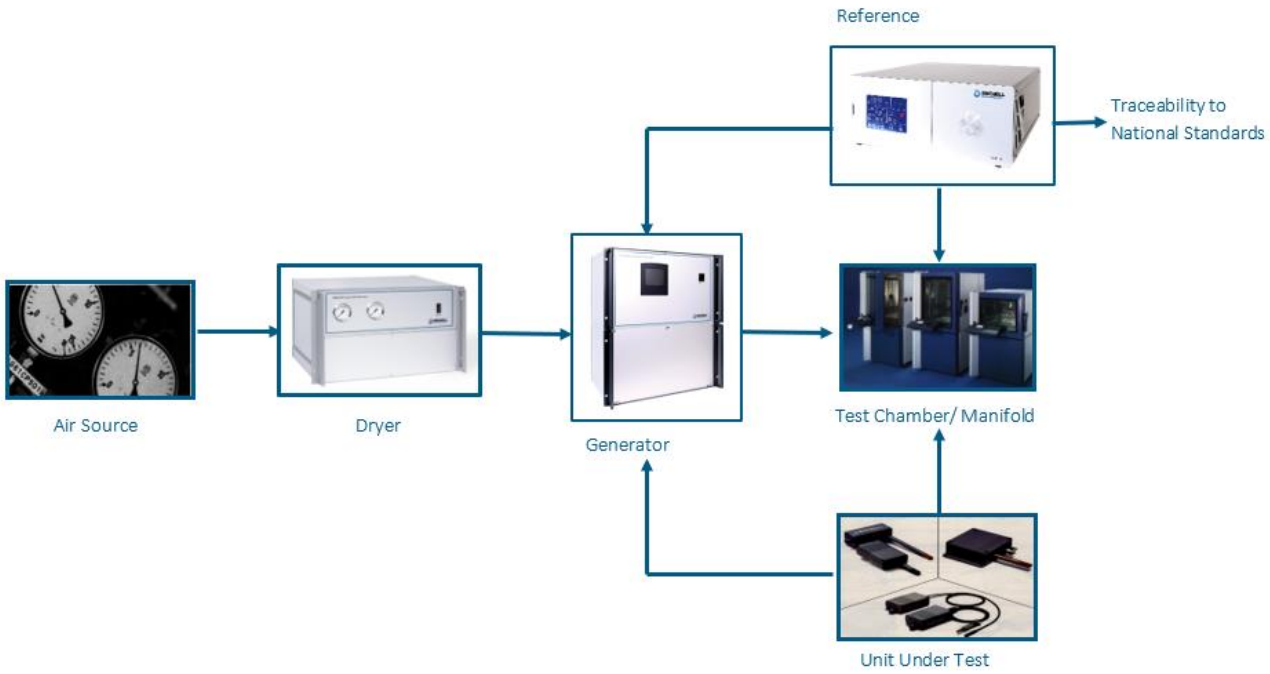
Background

For large Pharmaceutical manufacturing plants, Power plants and other industrial/process plants which operate large quantities of dew point sensors, it is usually more cost effective to calibrate these in-house rather than sending them away to a calibration lab. This also provides the facility to error check probes at any time.

Meteorological offices & Standards Laboratories will operate a number of generation systems which are used to calibrate 'transfer' standards (either within the lab or the hygrometers of other institutions) against the primary standard of the laboratory. Working instruments can then be calibrated against the transfer standard; this provides a chain of traceability from the instrument in the field to the primary standard.

Dew point generation

Michell Instruments offers a large range of customizable dew point calibration equipment, which caters for a variety of different calibration ranges. These start from manually operated volumetric flow mixing generators, up to fully automatic mass flow-controlled systems.



A dew point calibration system consists of the following components, which can appear in a number of different packages; a clean **compressed air supply** is required to feed a **pressure swing dryer**, this dryer provides a constant source of dry air, which forms the lowest calibration point, and also the base from which all other points are generated.

A dew point generator contains a saturator, which bubbles a proportion of the dry air through liquid water to 'saturate' it with moisture – i.e. water vapour pressure = saturation water vapour pressure at the temperature of the saturator. This saturated air is then blended in different proportions (and often in multiple stages to increase resolution, depending on the device) to create air with different moisture contents. The entire generator assembly is usually temperature controlled to ensure stability of the device and a known saturation quantity.

The air which is output from the generator is then fed into a manifold or chamber which houses the devices under test.

Fundamental reference hygrometers

When calibrating sensors, very little real information can be gained by simply monitoring the readings of the sensors under test against the set point on the generator. As the generators only use mixing techniques they cannot produce a definite dew point, so in order to make a correct assessment of the performance of a sensor, a reliable, fundamental reference measurement is required to make a comparison against.

Michell Instruments offers a range of chilled mirror hygrometers, which measure a primary characteristic of moisture – the temperature at which condensation forms on a surface. This means that chilled mirror instruments are inherently repeatable and so are integral for laboratories looking to achieve low measurement uncertainties.

The S8000 range provides a number of options for dependable reference measurements all of them specified at ±0.1 °Cfrost point(fp)/dew point(dp). For calibration requirements down to -60 °Cfp we have the standard S8000 (otherwise known as the Integrale). The S8000 RS is also available in two different configurations, for calibration requirements to -80 °Cfp or -90 °Cfp.

And Introducing the S8000-100 a new high precision chilled mirror hygrometer offering the lowest possible measurement range down to -100 °Cfp.

The S8000 -100 is the result of 40 years' experience of developing chilled mirror technology. As one of the world's largest producers of high-quality dew-point sensors, we use the S8000-100, along with other instruments in the Michell chilled mirror range, as the workhorses of our manufacturing and calibration operations.

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