Use of Optical Hygrometers as Reference Instruments in Calibration Laboratories

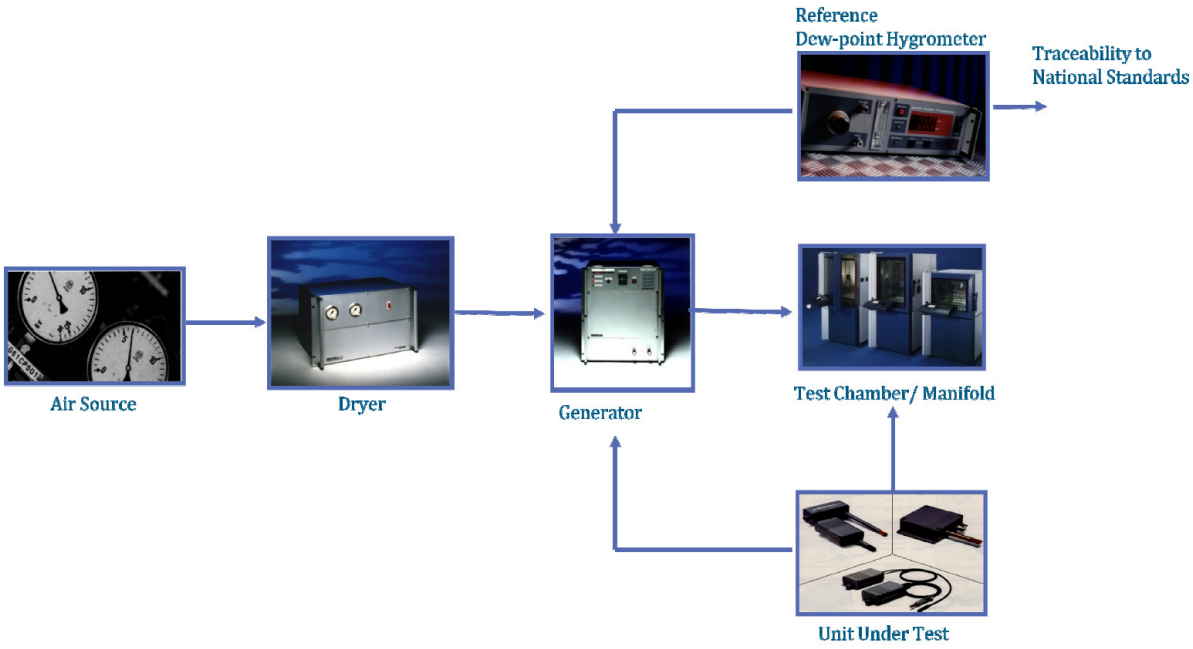
Background

For large pharmaceutical manufacturing plants, power plants, and other industrial/process plants which use large quantities of dew point sensors, it is usually more cost effective to calibrate these in-house rather than sending them to a calibration laboratory. In-house capability also allows probes to be verified at any time.

Meteorological offices & calibration laboratories will operate a number of generation systems which are used to calibrate 'transfer' standards (either within the laboratory 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

Kahn Instruments offers a large range of customizable dewpoint calibration equipment, for a variety of calibration ranges. These include manually operated volumetric flow mixing generators, up to fully automatic mass flow controlled systems.



A dewpoint 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 provides the lowest calibration point, and also the base from which all other points are generated.

A dewpoint generator contains a saturator, which bubbles a proportion of the dry air through liquid water to 'saturate' it with moisture – i.e. water vapor pressure = saturation water vapor 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 that 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 dewpoint. In order to make a correct assessment of the performance of a sensor, a reliable, fundamental reference measurement is required.

Kahn Instruments offers a range of optical hygrometers, which measure a primary characteristic of moisture – the temperature at which condensation forms on a surface. This means that chilled mirror instruments:

- Have no drift: the temperature at which condensation forms is measured directly so there are no calculated variables that could shift over time.
- Are inherently repeatable, giving reliable results every time.

The Optisure Hygrometer family provides a number of options for dependable reference measurements. For calibration requirements to -60°C dewpoint, the Optisure is an ideal choice – providing the ±0.1°C dewpoint accuracy of measurement. The Optisure Remote with capability to -40°C dewpoint offers a remote sensor for ease of use in certain applications. The Optisure RS is also available in two different configurations, for calibration requirements to -80°C dewpoint or -90°C dewpoint. Both instruments are capable of data logging, and are provided with NIST traceable calibration certificate.