



# Humidity Calibration

## Services

From the Calibration Range

Michell's Humidity Calibration Laboratory provides facilities for calibration of dew-point sensors and relative humidity instruments, from trace moisture to saturation, with UKAS accreditation and traceability to NPL and NIST



### The Importance of Regular Calibration

The correct operation of a hygrometer, and indeed any measuring instrument, can only be verified by periodic calibration against a dependable reference system. Most hygrometers are delivered with a calibration certificate, but this alone does not guarantee that they will provide good measurement throughout their operating life. Incorrect operation, exposure to contaminants and corrosive gases, sensor deterioration (ageing) and drift in electronics can all contribute to changes in the instrument accuracy over a period of time. It is therefore vital that a hygrometer is re-calibrated at regular intervals in order to ensure that the process to which it is applied is measured and controlled correctly.

### What is Calibration?

This is a common source of confusion. Strictly speaking, calibration of an instrument is simply the comparison of that instrument against a known reference, with a certificate provided to give an indication of the difference in reading between the two instruments with an associated assessment of the uncertainty of measurement. However, in many cases the calibration process may also include adjustment of the instrument under test to reduce the errors at particular points in the measurement range. Some manufacturers claim that their instrument has an "automatic calibration" facility by which a single point adjustment in the field (often against ambient air) constitutes a calibration. This is simply untrue and is more dangerous than performing no local adjustment at all. Such an "automatic calibration" only adjusts the gain of the instrument electronics against an arbitrary test point and takes no account of the other factors affecting this instrument, such as zero, linearity and hysteresis. The only way to be sure of the quality of measurement is to calibrate an instrument across its entire operating range against a known reference standard.

### How Often Should I Calibrate My Hygrometer?

This is difficult to answer. The calibration interval for a hygrometer depends both on the type of instrument and its usage. As a general guide, an impedance type instrument should be calibrated every year. If it is used in a critical application or in an aggressive environment, the calibration interval should be reduced accordingly. A cooled mirror dew-point hygrometer can have a longer calibration interval - perhaps as long as two years. However this interval is only recommended if you have two or more instruments with which you can perform a periodic cross reference in your own facility. Otherwise, annual calibration is recommended. A relative humidity instrument (impedance type) should be calibrated at least every year, but some types exhibit a high rate of drift and should be calibrated more frequently - perhaps every six months..

### Calibrations Traceable to National Standards

Michell Instruments maintains a comprehensive humidity calibration laboratory with direct traceability to the national humidity standards of the National Physical Laboratory (UK) and National Institute for Standards and Technology (USA). Every one of our twelve calibration systems has this traceability, maintained by regular inter-comparison against a Transfer Standard hygrometer that has been directly calibrated at either NPL or NIST during the previous year. This rolling programme of inter-comparison ensures that every hygrometer manufactured, delivered and re-calibrated by Michell has a comprehensive traceability with full uncertainty analysis.

### UKAS Calibration Laboratory

Our UKAS (United Kingdom Accreditation Service) laboratory was the first in the UK to be accredited for the calibration of dew-point hygrometers and we have maintained continuous accreditation since 1986. We operate two parallel systems for dew point giving a calibration capability from -90 to +20 °C dew point with a measurement capability of  $\pm 0.15$  °C dew point at +20 °C dp, rising to  $\pm 0.45$  at -75 °C dp (at a coverage factor of  $k=2$ ).



The Dew Point Specialists



In addition Michell Instruments is UKAS accredited for high dew point and relative humidity measurement. This facility, using a combination of environmental test chamber, divided flow dew-point generator, precision temperature measurement and NPL-calibrated reference dew-point hygrometer, enables us to offer UKAS dew point calibrations from +20 to +82 °C and relative humidity calibrations from 10 to 98% rh over the temperature range 10 to 82 °C and 10 to 73% rh from 82 to 90 °C ambient.

UKAS accreditation indicates the highest level of confidence, from the UK's national accreditation service, in a laboratory's ability to perform calibrations in a controlled and repeatable manner. Our accreditation requires us to consistently demonstrate our capability and is regularly audited by UKAS and the NPL.

## Traceable Dew Point Calibration

We are able to calibrate almost any hygrometer (Michell or other manufacturers) over the dew point range -100 to +82 °C with traceability to national standards over the range -90 to +82 °C dew point. We can calibrate your hygrometer display in any engineering unit (referenced back to dew point) or an analogue or digital output if you prefer.

We can provide a standard re-calibration of Michell products (without verification of as-received data) or for a small extra charge give you an as-received analysis of the accuracy of your instrument. Note that for non-Michell products it may not be possible for us to adjust the instrument if it is out of tolerance.

## Sensor Exchange Programme

For our latest generation Impedance products we also offer a sensor exchange programme. This gives you the quickest possible turnaround provided you don't need your original sensor to be recalibrated. To qualify for the special exchange pricing simply return your sensor to us for a replacement to be despatched, normally within 10 working days of receipt. Alternatively, order an exchange sensor in advance and then simply return the old one to us within 14 days.

## Repair Service

We have a dedicated Customer Service team who will be happy to advise you on the repair of any Michell product and can provide quick quotations for a repair and re-calibration, normally within 24 hours of us receiving the product in our factory.

## Calibration Contract

For complete peace of mind we have developed a range of calibration contract options that will give you extended warranty cover on your instrument for up to five years, including repair parts and labour and annual calibration. Please consult with our Customer Service team for more information.

## Details of Calibration Services

### Traceability

**NPL:** Two Michell S4000 Precision Dewpointmeters are calibrated at the NPL in alternate years, with intermediate intercomparison checks to maintain traceability.

**NIST:** Three Michell S4000 Precision Dewpointmeters (two located in the laboratory of our US affiliate, Kahn Instruments and one in Michell's Cambridge, UK laboratory) are calibrated at NIST every year, with intermediate intercomparison checks to maintain traceability.

**Relative Humidity Traceability:** Calibration by comparison with a transfer standard (Dewmet and S4000), UKAS calibrated for rh and temperature. Intermediate internal intercomparison checks maintain traceability between these instruments.

### UKAS Calibration Capability

Measurement range -90 to +20 °C dew point  
Uncertainty  $\pm 0.15$  at +20 °C dp rising to  $\pm 0.29$  at -60 °C dp, then rising linearly to  $\pm 0.45$  at -75 °C dp. (coverage factor  $k=2$ )  
Number of systems Two  
System pressure Nominal atmospheric pressure  
Laboratory temp  $21 \pm 2$  °C

Measurement range +20 to +82 °C dew point  
Uncertainty  $\pm 0.2$  °C dp, (coverage factor  $k=2$ )  
Number of systems One  
System pressure Nominal atmospheric pressure  
Laboratory temp  $21 \pm 2$  °C

### UKAS Relative Humidity Calibration Capability

Measurement range 10 to 98% rh, 10 to 82 °C ambient  
10 to 73% rh, 82 to 90 °C ambient  
Uncertainty +/- 2.3% of reading at temperatures from 10 to 20 °C, +/- 2.0 % of reading at temperatures from 20 to 90 °C (coverage factor  $k=2$ )  
Number of systems One  
System pressure Nominal atmospheric pressure  
Laboratory temp  $21 \pm 2$  °C

### Traceable Dew Point Calibration (using S4000 TRS as Reference)

Measurement range -100 to +20 °C dew point  
Uncertainty  $\pm 0.20$  at +20 °C dew point rising linearly to  $\pm 0.34$  at -60 °C dp, then rising linearly to  $\pm 0.55$  at -75 °C dp, then rising linearly to  $\pm 1.00$  at -100 °C dp  
Number of systems Three  
System pressure Nominal atmospheric pressure  
Laboratory temp  $21 \pm 2$  °C

### Traceable Dew Point Calibration DG-3 without Reference hygrometer)

Measurement range -80 to +20 °C dew point  
Uncertainty  $\pm 0.70$  from +20 to -60 °C dp, and  $\pm 1.5$  at -80 °C dp. (NB: the dew points are in 10 °C dp steps and there is not a -70 °C dp.)  
Number of systems Four  
System pressure Nominal atmospheric pressure  
Laboratory temp  $21 \pm 2$  °C

### Traceable Relative Humidity Calibration

Measurement range 1 to 98 % rh, at -20 to +82 °C ambient  
Uncertainty  $\pm 2$  % of reading (coverage factor  $k=2$ )  
Number of systems One  
System pressure Nominal atmospheric pressure  
Laboratory temp  $21 \pm 2$  °C  
Chamber control From +10 to +90 °C temperature

Michell Instruments Ltd  
Nuffield Close, Cambridge CB4 1SS UK  
Tel: +44 (0)1223 434800 Fax: +44 (0)1223 434895  
e-mail: info@michell.co.uk  
www.michell-instruments.com



Q6284 (UK)



0179 (UK)



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