



# S4000 *Integrale*

## Precision Dewpointmeter



A precision dew-point hygrometer for field or laboratory use with the ultimate accuracy, reliability and long-term performance for humidity measurement and calibration



S4000 *Integrale*

### The Portable Standard

The S4000 *Integrale* Precision Dewpointmeter offers unmatched accuracy and reliability in dew point measurements of air and gas systems and in field use or in calibration laboratories. Its powerful three-stage Peltier thermoelectric heat pump gives a depression capability of more than 80 °C at normal operating temperature. The S4000 *Integrale* can measure and control at dew points (frost points) down to -60 °C. As it's name suggests, the S4000 *Integrale* is a fully integrated hygrometer contained in a 19" x 3U bench mounting case that makes it suitable for use in a laboratory environment or as a roving transfer standard.

### Contamination Compensation

Any optical system carries a risk of contamination. The S4000 automatically compensates for any such build-up with its ABC (Automatic Balance Compensation) System. ABC ensures continuous optimum operation of the sensor by periodically driving off condensation to allow the optical loop to be re-balanced. When the contamination level is too high the control electronics provide a visible alarm and the sensor optical system may be cleaned with distilled water or a high purity solvent (eg acetone).

ABC cycle time, duration and recovery time can all be adjusted according to the type of application to minimise the effect of contamination risk. The S4000 also features a sophisticated data hold system, which maintains the instrument's signal outputs during an ABC cycle, allowing the S4000 to be used for process control applications.

### Dual Optics for Supreme Sensitivity

At low frost points the rate of formation of frost on the mirror surface is extremely slow. As a result other cooled mirror hygrometers may give reduced accuracy, poor control stability and extremely long response times at low moisture levels. The S4000 is unique in that it utilises a dual optics detection system that measures both the increase in scattered light intensity and the reduction in reflected light intensity from the mirror surface as frost forms. This greatly increases the sensitivity of the optical loop and response, stability and sensitivity are improved by orders of magnitude at low frost points.

In addition the S4000 *Integrale* can optionally be fitted with Michell's unique speed pipe technology, giving further improvements in response speed at low moisture levels. The speed pipe concentrates the formation of ice crystals on the mirror surface and can reduce response times by a factor of four times.

### Features

- Dual optics detection system for supreme accuracy and sensitivity
- Easily transportable 3U 19" case design
- Three stage Peltier cooling
- Precision 100 Ω 4 wire platinum resistance thermometer
- Accuracy 0.1 °C dew point
- Dual multi-function LED display with unit indicator
- Current, voltage outputs and RS232 digital communications

Dew point °C	+10	-20	-50	-60
Response time, minutes	0.5	4	20	40



The Dew Point Specialists



## Unbeatable Measurement Capability

The S4000 **Integrale** uses a highly accurate 4 wire PT100 temperature sensor and has a proven measurement capability of better than 0.1 °C dew point.

## Visual Verification

Every S4000 **Integrale** is delivered complete with an M4K Viewing Microscope. Fitting neatly into the sensor viewing port, this microscope allows the user to confirm the presence of water or ice on the mirror surface.

## Calibration Integrity

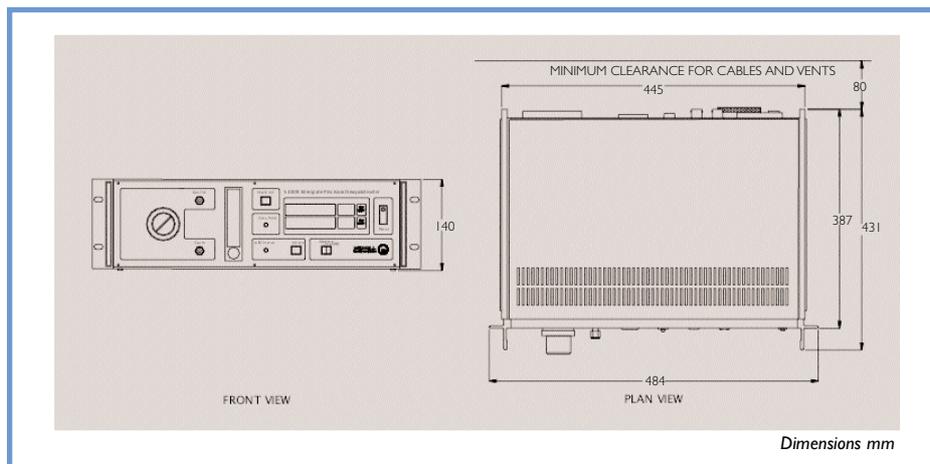
The S4000 is unique amongst dew-point hygrometers. It is the only instrument that is delivered, as standard, with a full UKAS certificate providing official traceability to the UK National Standard. UKAS is the United Kingdom member of European Co-operation on Accreditation (EA), the International Laboratory Accreditation Cooperation (ILAC) and the International Accreditation Forum (IAF). As an additional benefit, the S4000 has a direct traceability path to the NIST (Washington DC, USA) National Humidity Standard. No other hygrometer provides such comprehensive traceability to a worldwide network of standards organisations. That's why the S4000 is used by so many of these very organisations as part of their own humidity referencing systems.

From the Cooled Mirror Range

## Technical Specifications

<b>Display</b>	Dual 6 digit LED, with 2 digit eng. unit indicators
<b>Units</b>	°C, °F dew point; °C, °F temp; % rh, ppm v, ppm w, gm <sup>-3</sup> , gkg <sup>-1</sup> , ppm w for SF <sub>6</sub>
<b>Resolution</b>	0.01 for all units
<b>Accuracy</b>	±0.1 °C dew point (typical system accuracy)
<b>Response speed</b>	0.5 °C s <sup>-1</sup> + settling time (dew point dependent)
<b>Sensitivity</b>	0.01 °C
<b>Repeatability</b>	Better than 0.1 °C
<b>Auxiliary input</b>	Pressure transducer 4-20 mA input for automatic (optional) pressure compensation. Range = 0 to 344.0 kPa absolute (0-50 psia)
<b>Sensor pressure</b>	1 MPa (max)
<b>Sample flow rate</b>	0.05 to 0.2 Nlmin <sup>-1</sup> (recommended)
<b>Integrated flowmeter</b>	0 to 0.5 Nlmin <sup>-1</sup> (dual scale air and SF <sub>6</sub> )
<b>Measurement</b>	Fundamental cooled (chilled) mirror, optical principle detection. Primary cooling: 3-stage Peltier heat pump
<b>Dual optics detection</b>	Wide band red LED with dual photo sensors, all quartz insulated
<b>Outputs: analogue</b>	10 mV/°C dew point, 4-20 mA
<b>digital</b>	RS232; data hold, ABC status, optics alarm (logic)
<b>Temp measurement</b>	Four wire 1/10 DIN 100 Ω platinum resistance thermometer
<b>Measurement range</b>	- 60 to +40 °C dew point
	<b>Ambient Temp</b> <b>Lowest Dew Point</b>
	+10 °C                      -60 °C
	+20 °C                      -55 °C
	+35 °C                      -45 °C
<b>Operating temp</b>	0 to +40 °C (recommended)
<b>Storage temp</b>	-10 to +50 °C
<b>Auxiliary cooling</b>	Integral fan
<b>Sensor housing type</b>	Integral bench unit (19" mounting standard, carry handle optional)
<b>Dimensions</b>	484W x 431D x 140H mm
<b>Weight</b>	9.8 kg
<b>Power supply</b>	90 to 265 V AC; 50-60 Hz
	90 to 265 V AC (sensor)

## Dimensions



S4000 Integrale - Ref: SI-05-01

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