

S8000 *Integrale*

High Performance Chilled Mirror Dewpointmeter

A high-precision, high accuracy hygrometer, offering very high sensitivity to changes in moisture content.



Highlights

- Fundamental, accurate and drift-free measurement
- Rapid measurement response speed
- -60 to +40°Cdp measurement range
- $\pm 0.1^\circ\text{Cdp}$ accuracy
- FAST – guaranteed frost formation below 0°C
- Data logging to USB or SD card
- Vertical or horizontal configuration
- Operates at pressure up to 1.7 MPa (17 barg)

Applications

- Metrology laboratories
- High voltage switchgear
- Clean/dry rooms
- Pharmaceutical
- Fuel cell research
- Engine testing
- ... and many more

S8000 *Integrale* High Performance Chilled Mirror Dewpointmeter

The S8000 *Integrale* provides a direct measurement of dew-point, temperature and pressure. Dew-point measurement is based on the proven, fundamental optical chilled mirror measurement principle, giving long-term drift-free performance over the entire operating range. The S8000 uses this measurement to offer a range of available measurement units including ppm_v , absolute humidity, relative humidity and ppm_w .

To further improve the accuracy of pressure-derived calculated values (ppm_v , ppm_w , absolute humidity) an optional internal pressure transducer can be supplied, which provides real-time pressure. This allows for continued measurement stability even during fluctuations in sample pressure.

The integral dew-point sensor measures to an accuracy of 0.1°C dew-point, and coupled with the 0.1°C accuracy of the remote temperature probe provides high precision relative humidity readings. With accuracy of 1% RH or better up to 70% RH, and 1.5% RH or better between 70-98% RH, the S8000 *Integrale* is better than other products currently on the market.

Dual Optics for Supreme Sensitivity

The S8000 *Integrale* utilizes a unique advanced dual optics system to detect very small changes in the quantity of moisture condensed on the mirror surface, resulting in very high sensitivity and fast response to changes in frost point, even at low levels of moisture. The rate of formation of frost on the mirror surface is slower at lower frost points. This is due to the very low quantity of water molecules which are present – it takes time for enough molecules to pass the mirror to form a layer of frost. An accurate and reliable measurement with a non-fundamental hygrometer can be difficult to perform.



Measurement Reliability

The S8000 *Integrale* utilizes a system called DCC (Dynamic Contamination Correction). The DCC system is intuitive, and adapts the instrument control to the operating conditions to achieve optimum measurement performance at all times. This is attained by periodically re-balancing the optics to compensate for any reduction in light intensity caused by contamination of the components in the optical path. Although the DCC system is fully automatic it can be configured by the user for individual applications.

Confidence of Seeing your Measurement

It is possible for moisture to exist as liquid water at temperatures down to -40°C. The difference in condensation temperature between water and ice can be 10% of the reading. The S8000 *Integrale* takes two approaches to ensure confidence in the phase of water condensate being measured (dew or frost):

Frost Assurance (FAST)

Frost Assurance determines whether the dew-point of the sample is in the temperature region where super-cooled water can exist, and if so, will drive the mirror down to below -40°C to ensure that ice is present on the mirror surface.

Microscope

A viewing microscope is supplied as standard. This enables the user to inspect the mirror directly during the measurement process, and determine whether the condensation on the mirror is water or ice.

Data Communication and Application Software

The instrument provides three user-configurable analog outputs and MODBUS RTU communications, allowing the instrument to be monitored by a suitable computer, data logger, PLC system or other device. A pair of adjustable isolated alarm contacts allow the S8000 *Integrale* to be used for direct process control.

Flexible application software is provided with the S8000 *Integrale*, allowing the operator to control all the functions of the instrument directly from a PC. An expanded parameter display simultaneously shows all of the measured and calculated parameters and a customizable graph is provided to display any combination of parameters against a time base. Data logging functionality is provided, allowing log files to be created and saved directly on the host PC.

High Contrast Display with Built-in Data Logging

A clear, bright and highly visible LCD display is capable of showing any three user-selectable parameters in large clear text. The display also features a stability graph and displays the operational status of the unit. An easy to use menu system enables control and configuration of the instrument using the front panel buttons.

A sophisticated built-in logging system provides the facility to log the values of all the instrument parameters at operator specified intervals. The log files are saved directly onto a removable SD memory card (supplied), allowing the logs to be easily transferred to a PC for analysis or correlation with test results.

Technology: Chilled Mirror

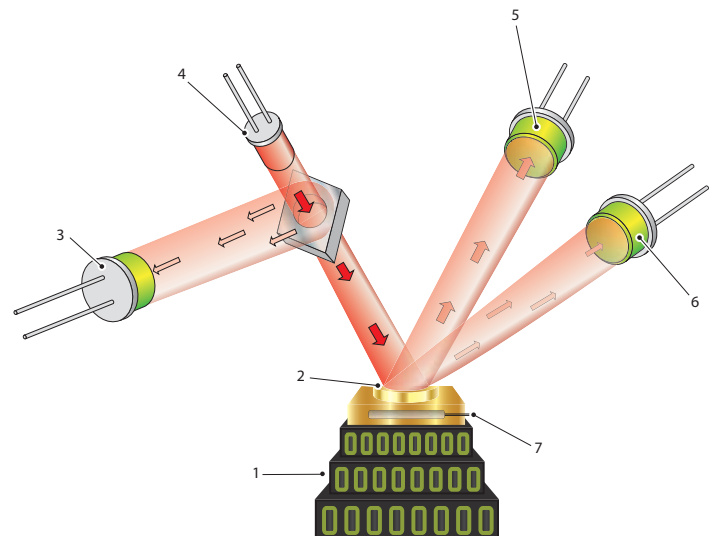
Michell's chilled mirror dew-point hygrometers are precision instruments for critical measurement and control applications. Chilled mirror sensors measure a primary characteristic of moisture – the temperature at which condensation forms on a surface. This means that chilled mirror instruments:

- 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 chilled mirror sensor consists of a temperature controlled mirror and an advanced optical detection system. A beam of light from an LED (4) is focused on the mirror surface (2) with a fixed intensity. As the mirror is cooled less light is reflected due to the scattering effect of the condensate formed on the mirror surface. The levels of reflected and scattered light are measured by two photo-detectors (5 & 6) and compared against a third reference detector (3) measuring the intensity of light from the LED.

The signals from this optics system are used to precisely control the drive to a solid state thermoelectric cooler (TEC) (1), which heats or cools the mirror surface. The mirror surface is then controlled in an equilibrium state whereby evaporation and condensation are occurring at the same rate. In this condition the temperature of the mirror, measured by a platinum resistance thermometer (7), is equal to the dew point temperature of the gas.

Our chilled mirror instruments prove their reliability on a daily basis in our production processes and service centres, as well as in our UKAS-accredited calibration laboratory.



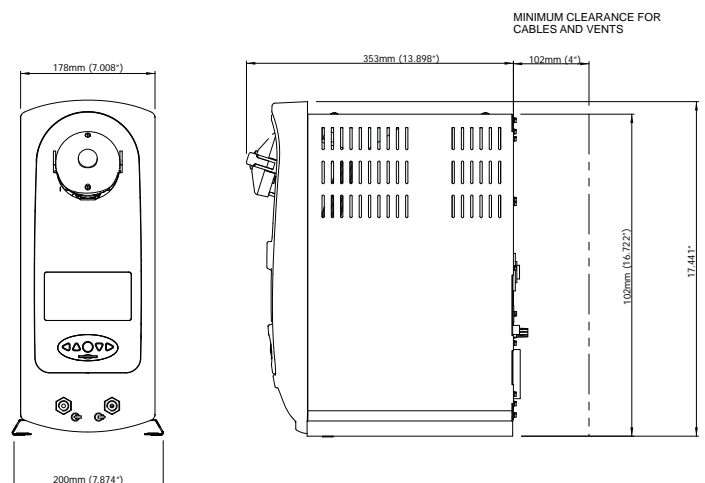
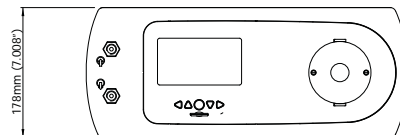
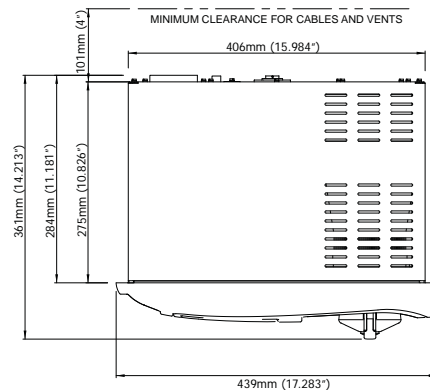
Technical Specifications

Dew-Point Sensor Performance	
Measurement technology	Chilled Mirror
Operating temperature range	-20 to +50°C
Measurement range	-60 to +40°Cdp
Accuracy*	±0.1°C
Reproducibility	±0.05°C
Operating pressure	
Low pressure version	0 to 1 barg
High pressure version	0 to 17 barg
Sample flow rate	0.1 to 1 NI/min (0.2 to 2.1 scfh)
Detection system	Temperature regulated emitter with dual optic detection
Remote PRT	
Temperature measurement	4 wire Pt100, 1/10 DIN class B
Measurement accuracy	±0.1°C
Cable length	2m (250m max)
Flow Sensor	
Measurement accuracy	Typical ±5% uncalibrated
Measurement range	0 to 1000ml/min
Optional Integrated Pressure Sensor	
Measurement range	0 to 25 bara (0 to 377 psia)
Measurement accuracy*	0.25% Full Scale
Measurement units	psia, bara, KPa or MPag
Monitor	
Resolution	User-selectable to 0.001 dependant on parameter
Measurement units	°C and °F for dew point and temperature %RH, g/m ³ , g/kg, ppm _v , ppm _w (SF ₆), for calculated humidities
Outputs	
Analog	3 channels, user selectable 4-20 mA, 0-20 mA or 0-1 V
Digital	PC Communications using Modbus RTU over USB
Alarm	Two volt free changeover contacts, one process alarm, one fault alarm; 1 A @ 30 V DC
HMI	High definition, blue LCD User-adjustable contrast Menu navigation via five button keypad
Data logging	SD Card (512Mb supplied) and USB interface SD Card (FAT-16) - 2Gb max. that allows 24 million logs or 560 days, logging at 2 second intervals
Environmental conditions	-20 to +50°C
Power supply	85 to 264 V AC, 47/63 Hz
Power consumption	100 VA
EMC - Class A emissions industrial location immunity	Complies with EN61236:1997 (+A1/A2/A3)

Mechanical Specifications	
Dimensions	
Vertical	445 x 200 x 350mm (17.5 x 7.9 x 13.8") h x w x d 415mm (16.3") deep when microscope is mounted
Horizontal	185 x 440 x 350mm (7.3 x 17.3 x 18.8") h x w x d 415mm (16.3") deep when microscope is mounted
Weight	
Vertical	10.75kg
Horizontal	9.9kg
General	
Storage temperature	-40 to +60°C
Calibration	3-point traceable in-house calibration as standard UKAS accredited calibrations optional - please consult Michell

* Measurement accuracy means maximum deviation between instrument under test and corrected reference. To this must be added the uncertainties associated with the calibration system and the environmental conditions during testing or subsequent use.

Dimensions



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Michell Instruments adopts a continuous development programme which sometimes necessitates specification changes without notice.
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