

# S8000 Remote

## High Precision Chilled Mirror Hygrometer

A hygrometer offering a combination of market-leading  $\pm 0.1^\circ\text{C}$  accuracy with the flexibility of a remote sensor, allowing for straightforward installation and precision monitoring of environmental moisture. This highly sensitive, adaptable instrument can provide extremely accurate measurements in situ in the area of interest, or in an industrial process.



### Highlights

- Fundamental, accurate and drift-free measurement
- Remote sensor
- Open design allows remote sensor to be mounted into a sample flow or simply placed in an environment to be monitored
- $-40$  to  $+90^\circ\text{C}$  dew-point range with  $\pm 0.1^\circ\text{C}$  accuracy
- Data logging to USB or SD card
- 'FAST' guarantees frost formation below  $0^\circ\text{C}$
- Sensor operates in pressures up to 20 barg

### Applications

- Engine test cell monitoring – from commercial vehicle to high performance engines
- Environmental chamber verification for:
  - Component testing
  - Corrosion testing
  - Pharmaceutical validation
- Precision HVAC control
- Lithium Ion battery manufacture



## S8000 Remote Precision Optical Dew-point Hygrometer

### Setting the Standard

The S8000 Remote chilled-mirror sensor directly measures the formation of condensation, giving long-term, drift-free readings of dew-point and relative humidity. It offers a wide measurement range from the equivalent of <0.5 to 100% RH (dew point range: -40 to +90°C) at temperatures up to +90°C.

### Precision Measurements

The S8000 Remote features a new sensor design, incorporating a high precision 1/10DIN PT100 to provide  $\pm 0.1^\circ\text{C}$  accuracy of dew-point measurement. Combined with the  $\pm 0.1^\circ\text{C}$  accuracy temperature measurement sensor, the RH measurement accuracy of the S8000 Remote is better than other products currently available on the market.

To further improve the accuracy of pressure-derived calculated values an optional external pressure transducer can be supplied, which provides real-time pressure compensation for these parameters. This allows for continued measurement stability even during sample pressure fluctuations.

### 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 allows the S8000 Remote to be used for direct process control.

Flexible application software is provided with the S8000 Remote, 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.

### Flexibility of Use & Simplicity of Installation

The remote sensor design eliminates the potential problems usually associated with building sampling systems. The open cell sensor can now be placed directly into the environment to be monitored and does not always need a complex and expensive sampling arrangement or pump to convey the gas to be measured to the instrument.

For more challenging applications, where direct insertion is not possible, the sensor can be mounted in a sample block and included in a sampling system. This means that the product can be used for a wide range of applications, and with trace heating - including those up to dew-point temperatures of +90°C.



Application: Climatic chamber monitoring

## Technology: Chilled Mirror

Michell's chilled mirror 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.

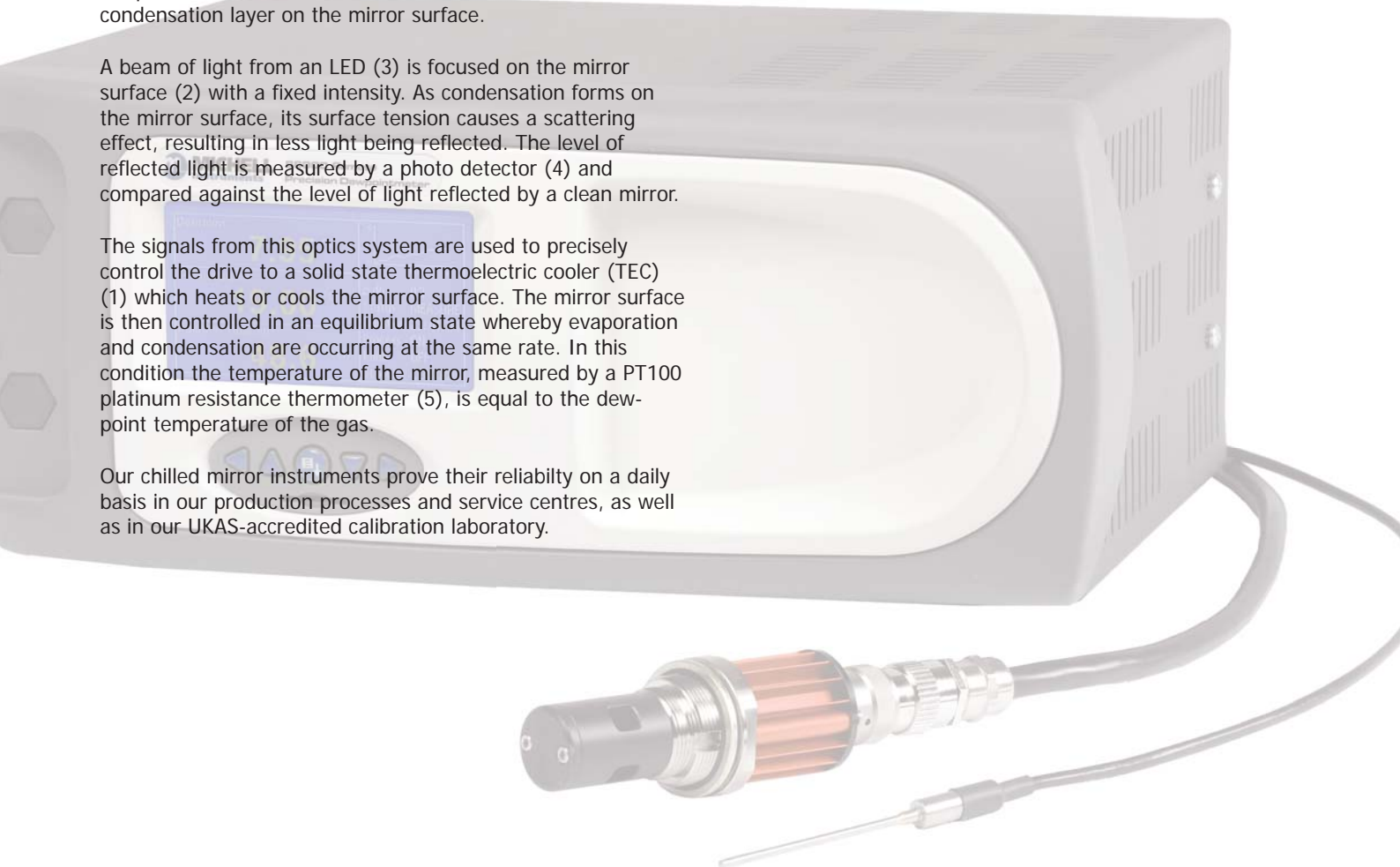
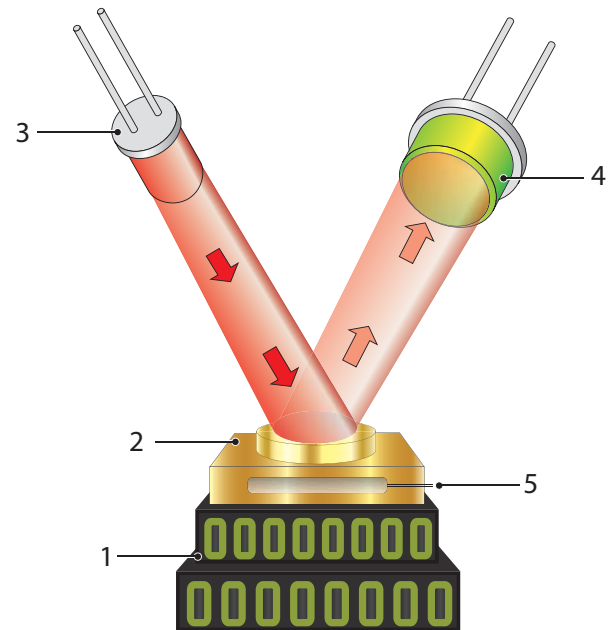
The gas sample is passed over the surface of the polished mirror contained within the open sensor housing. At a temperature dependent upon the moisture content in the gas, and the operating pressure, the moisture in the gas condenses out on the surface of the mirror.

The optical system is used to detect the point at which this occurs. This information is used to control the mirror temperature and maintain a constant thickness of the condensation layer on the mirror surface.

A beam of light from an LED (3) is focused on the mirror surface (2) with a fixed intensity. As condensation forms on the mirror surface, its surface tension causes a scattering effect, resulting in less light being reflected. The level of reflected light is measured by a photo detector (4) and compared against the level of light reflected by a clean mirror.

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 PT100 platinum resistance thermometer (5), 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	
Sensor type	Acetal	Aluminium
Dew-point range	-40°Cdp @ sensor temp of +20°C to +90°Cdp @ sensor temp of +90°C	-20°Cdp @ sensor temp of +20°C to +90°Cdp @ sensor temp of +90°C
Operating temperature	-40 to +90°C (-40 to +194°F)	
%RH range	< 0.5-100%	< 4.5-100%
Accuracy	±0.1°C (±0.18°F)	
Response speed	1°C/sec (1.8°F/sec) plus settling time	
Reproducibility	±0.05°C (±0.09°F)	
Operating pressure	0 to 20 barg (0 to 290 psig)	
Remote PRT		
Temperature measurement	4 wire Pt100, 1/10 DIN class B	
Accuracy	±0.1°C (±0.18°F)	
Cable length	2m (6.6ft) (250m (820ft) max)	
Optional Remote Pressure Sensor		
Measurement range	0 to 25 bara (0 to 377 psia)	
Accuracy	0.25% Full Scale	
Measurement units	psia, bara, KPa or MPa	
Pressure transducer thread	1/8" NPT	

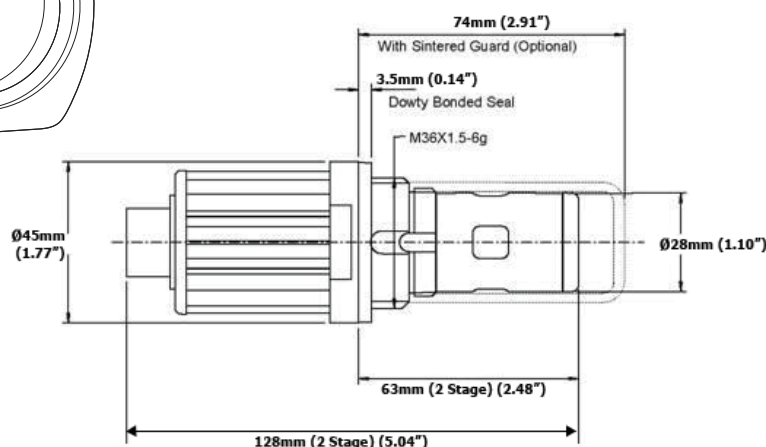
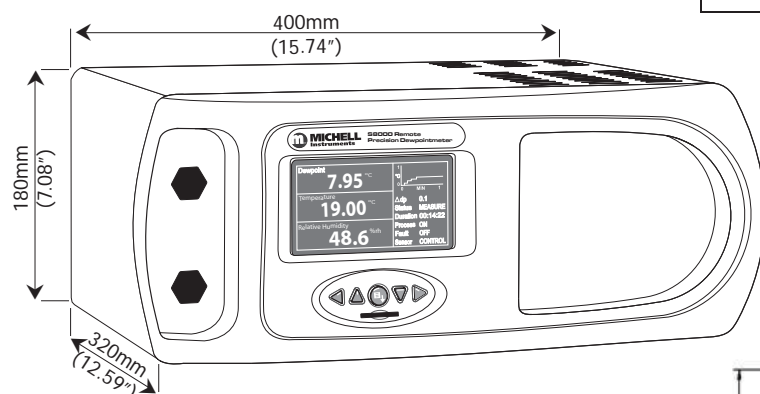
### Monitor

Resolution	User-selectable to 0.001 dependant on parameter
Measurement units	°C and °F for dew point and temperature %RH, g/m <sup>3</sup> , g/kg, ppm <sub>v</sub> , ppm <sub>w</sub> (SF <sub>6</sub> ), for calculated humidities
Outputs	<b>Analog</b> 3 channels, user selectable 4-20 mA, 0-20 mA or 0-1 V <b>Digital Alarm</b> PC Communications using Modbus RTU over USB 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 (-4 to +122°F)
Power Supply	85 to 264 V AC, 47/63 Hz
Power Consumption	100 V A

### Mechanical Specifications

Dimensions (instrument)	180 x 400 x 320mm (7.1 x 15.7 x 12.5") h x w x d
Dimensions (sensor)	Ø45 x 128mm with M36 x 1.5-6g mounting thread
Weight	7.9kg (17.41lbs)
Cable lengths	2, 5 or 10m (6.6, 16.4 or 32.8ft)
General	
Storage temperature	-40 to +60°C (-40 to +140°F)
Detection system	Single optics detection system with auto adjustment
Calibration	4-point traceable in-house calibration as standard; UKAS accredited calibrations optional - please consult Michell Instruments

## Dimensions



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

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