

# S4000 RS & TRS

## Precision Dew-Point Hygrometers

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



### Highlights

- 0.1°Cdp accuracy
- Measurement range: -100 to +20°Cdp
- Precision 100  $\Omega$  4 wire platinum resistance thermometer
- Dual optics detection system
- Available with VCR couplings for optimum trace moisture sampling
- Dual multi-function LED display with unit indicator

### Applications

- Standards Laboratory reference instrument
- Research and development
- Battery manufacture
- Industrial gases

## S4000 RS and TRS Precision Dew-Point Meters

### The Laboratory Standard

The S4000 range of high precision chilled mirror dew-point Meters offer unmatched accuracy and reliability in dew-point measurement and calibration. The powerful three-stage Peltier thermoelectric heat pump, coupled with integrated auxiliary refrigerant cooling, gives an effective measurement range down to -85°C dew point for the S4000 RS and to -100°C dew point for the S4000 TRS.



### 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 dew-point meters may give reduced accuracy, poor control stability and extremely long response times at low moisture levels. The S4000 RS and TRS is unique in that it utilises a dual optics detection system. This greatly increases the sensitivity of the optical loop and response, stability and sensitivity are improved by orders of magnitude at low frost points.

Typical response times are as follows:

Dew point °C	+10	-20	-50	-70	-100
Response time, minutes	0.5	4	20	40	100

### Calibration Integrity

The S4000 RS and TRS 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 RS and TRS 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. The S4000 RS and TRS is used by many of these organisations as part of their own humidity referencing systems.

### 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 a visible alarm is generated. The sensor optical system may be cleaned with distilled water or a suitable high purity solvent such as 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.

### Unbeatable Measurement Capability

The S4000 RS and TRS use a highly accurate 4 wire PT100 temperature sensor and have a proven measurement capability of better than  $\pm 0.1^\circ\text{C}$  dew point.

### Visual Verification

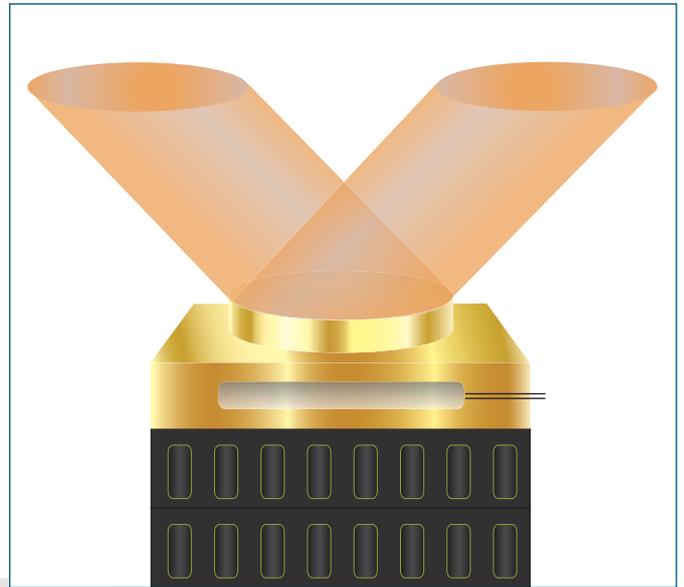
Every S4000 Remote is delivered complete with an M4K Viewing Microscope. Fitting neatly into the sensor viewing port, this microscope allows the user to confirm the presence of water or ice on the mirror surface.

**Technology:  
Chilled Mirror**

Michell's chilled mirror dew-point meters are precision instruments for critical measurement and control applications. The fundamental nature of this method means that chilled mirror instruments can be used as either extremely reliable and stable field instruments or as laboratory reference standards for the calibration of other devices. Michell's chilled mirror sensors are fundamental in their method of operation.

A miniature mirror is cooled by a solid state Peltier thermoelectric heat pump until it reaches the dew point of the gas under test. When this temperature has been reached, condensation will begin to form on the mirror surface. An electro-optical loop detects that condensation is forming, by a reduction in the intensity of light reflected from the mirror surface and through the control electronics of the chilled mirror instrument. This modulates the cooling power applied to the Peltier.

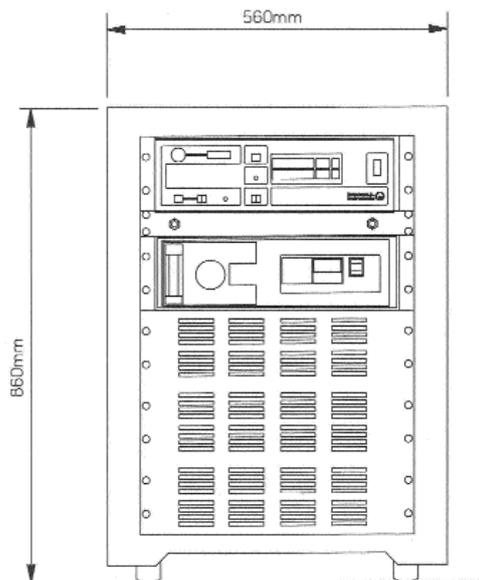
The mirror surface is then controlled in an equilibrium state whereby evaporation and condensation are occurring at the same rate. In this condition the temperature of the mirror (measured by a platinum resistance thermometer) is equal to the dew-point temperature of the gas.



## Technical Specifications

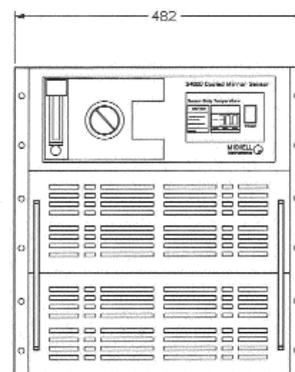
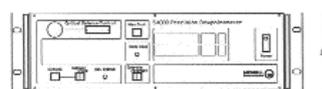
Performance	
Measurement Technology	Chilled Mirror
Measurement range	RS: -85 to +20°Cdp TRS: -100 to +20°Cdp
Measurement accuracy	±0.1°Cdp ±0.1°C temperature
Measurement units	°Cdp, °Fdp; °C, °F temperature; % RH, ppm <sub>w</sub> , ppm <sub>w</sub> g/m <sup>3</sup> , g/kg, ppm <sub>w</sub> for SF <sub>6</sub>
Response speed	0.5°C/sec + settling time (dew point dependent)
Sensitivity	0.01°C
Repeatability	Better than 0.1°C
Resolution	0.01 (0.1 for % RH)
Dew-Point Sensor	
Mirror	Gold plated copper
Temperature measurement	4 wire Pt100, 1/10 DIN class B
Sample flow rate	0.1 to 0.7 l/min (recommended)
Integrated flowmeter	0 to 1 l/min
Sensor pressure	Atmospheric
Auxiliary cooling	Internal refrigeration
Remote PRT	
Temperature measurement	4 wire Pt100, 1/10 DIN class B
Monitor	
Resolution	0.01°C
Dual optics detection	Wide band red LED with dual photo sensors, all system insulated
Outputs:	
Analog	2 channels 10 mV/°Cdp, 4-20 mA
Digital	RS-232
Logic	data hold, ABC Logic status, optics alarm
Auxiliary input	4-20 mA input for automatic compensation 0-0.34 MPa (0-50 psia) (optional)
Pressure transducer	
Operating temp	0 to +40°C
Dimensions	
RS	482 x 510 x 402mm (w x d x h) - Sub Rack
TRS	560 x 600 x 860mm (w x d x h)- Mini Rack
Weight	
RS	31.5 kg
TRS	85.0 kg
Power supply	
monitor	90 to 265 V AC; 50-60 Hz
sensor	100-115 or 220-240 V AC 50-60 Hz

## Dimensions



Depth = 700 mm (inc clearance)

S4000TRS



Depth = 604 mm (inc clearance)

S4000RS

Michell Instruments 48 Lancaster Way Business Park, Ely, Cambridgeshire, CB6 3NW  
Tel: +44 (0) 1353 658000, Fax: +44 (0) 1353 658199, Email: [uk.info@michell.com](mailto:uk.info@michell.com), Web: [www.michell.com/uk](http://www.michell.com/uk)

Michell Instruments adopts a continuous development programme which sometimes necessitates specification changes without notice.  
Issue no: S4000 TRS\_97146\_V3\_UK\_0611