

HG10

Humidity Calibrator



The Michell HG10 Humidity Calibration System is a highly flexible computer-controlled automatic calibration system for humidity sensors. The HG10 is capable of repeatable generation of temperature and relative humidity set points over the range 1 to 95% RH (-50 to +50°Cdp (-58 to +122°Fdp)) at temperatures of +20 to +50°C (+68 to +122°F) with excellent stability. The supplied chilled mirror reference instrument provides traceability directly to national standards, and makes the system suitable for use in high-level calibration laboratories.

The HG10 comprises three main components, the humidity generator, test chamber and reference hygrometer.

Humidity Generator

The humidity generator used in the HG10 is based on the volumetric mixing of dry and wet gases, giving the fastest response when changing between set points in comparison to other dew-point generation technologies such as two-temperature, two-pressure or the combination of two-temperature and two-pressure. The mixing is automated using high-precision mass flow controllers to accurately control the ratio of wet to dry air, generating the required relative humidity.

A dry gas source is fed to the generator from a pressure swing dryer, and split into two streams. One stream is bubbled through liquid water via a sintered glass nozzle ensuring it is completely saturated with water vapor, while the other stream remains dry. The two gas streams are then mixed at atmospheric pressure to generate the target humidity level. The entire enclosure is insulated and temperature controlled ensuring the saturation, and therefore the output is always consistent.

The generated sample gas is passed directly to the hygrometers under test using a heated sample line. Three clear digital displays on the front panel of the generator indicate the generator temperature, heat traced sample line temperature and relative humidity set point.

Test Chamber

The standard HG10 chamber has internal dimensions of 550 x 550 x 320mm (21.6 x 21.6 x 12.6"), (h x w x d) and can be controlled and operated at temperatures from -10 to +50°C (+14 to +122°F). Alternative test-chambers are available in a range of different sizes and configurations. Please contact a Michell Instruments' representative for further details.

Reference Hygrometer

No calibration has validity unless it provides traceability to a recognized national standard. For this reason, the HG10 includes an S8000 Remote Precision Chilled Mirror Hygrometer for precise monitoring of the generated humidity. The S8000 Remote is calibrated in our UKAS laboratory, providing direct traceability to the UK national standard held by the National Physical Laboratory. Michell Instruments also maintains a traceable path directly to the NIST Humidity Standard in Washington, USA.

Automated Operation

The supplied PC software allows the creation of automatic calibration programs, for evaluating the performance of humidity sensors over a range of operating conditions. The measured values from the chilled mirror reference are used in a closed control loop to enable repeatable set point generation, time and time again.

Highlights

- No other single system generates as wide a range of wet to dry dew points
- High accuracy $\pm 0.1^\circ\text{C}$ ($\pm 0.18^\circ\text{F}$) fundamental reference
- User-configurable temperature and humidity profiling allows calibration cycles to be run without constant supervision
- Very fast changes between generated relative humidity points

Technical Specifications

HG10	
General	
Enclosure	19" Rack System, H=2.1m (6.8')
Power supply	100-115 V or 220 to 240 V 50/60Hz
Pressure Swing Dryer	
Gas output	
Flow	7 NI/min (14.8 scfh)
Pressure	0.68 barg (10 psig)
Moisture content	<100ppm _v (<-75°Cdb (<-103°Fdb))
Required gas supply	
Flow	10 NI/min (21.2 scfh)
Pressure	5 to 7 barg (70 to 100 psig)
Moisture content	Oil and liquid water-free
Type	Twin column desiccant, pressure swing
Desiccant	4 Ångström Molecular sieve bead (4-8 mesh)
Timer	Motorized cam
Operating temperature	+5 to +35°C (+41 to +95°F)
Generator	
Generation range	
Humidity	1 to 95% RH (-50 to +50°Cdp (-58 to +122°Fdp))
Temperature	Dependant on temperature chamber
Generated gas output	Air 2 NI/min (4.2 scfh) @ 0.5 barg (7 psig) via heat traced line
Dual stage MFC mixing	Dual mass flow controllers
Power consumption	550 V A maximum
Operating temperature	+5 to +40°C (+41 to -104°F); 10 to 90% RH
Enclosure	19" Rack System, H= 2.1m (6.8")
Control system	Closed loop feedback

S8000 Remote			
Dew-Point Sensor Performance			
Accuracy	±0.1°C (±0.18°F)		
Reproducibility	±0.05°C (±0.09°F)		
Measurement technology	Chilled Mirror		
Sensor	2-Stage	High Temp PEEK	Climatic head
Dew-point range	-40°Cdp @ sensor temp of +20°C +90°Cdp @ sensor temp of +90°C	-40°Cdp @ sensor temp of +20°C +120°Cdp @ sensor temp of +120°C	-10°Cdp @ sensor temp of +20°C +120°Cdp @ sensor temp of +120°C
Temperature range	-40 to +90°C	-40 to +120°C	-40 to +120°C
%RH range	<0.5 to 100%	<0.5 to 100%	10 to 100%
Min measured dew point @ 20°C	-40°C	-40°C	-10°C
Mirror material options	Gold plated copper (standard), gold stud, Platinum stud**		
Sensor body material options	Acetal (standard), high temperature PEEK, Anodized aluminum**		
Response speed	1°C/sec (1.8°F/sec) plus settling time		
Operating pressure	20 barg (290 psig) standard High pressure version: 250 barg (3625 psig) max		

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 MPag
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 ³ , g/kg, ppm _v , %Vol, ppm _w (SF ₆), for calculated humidities
Outputs	
Analog	3 channels, user selectable 4–20 mA, 0–20 mA or 0–1 V
Digital	Modbus RTU over USB and optionally Modbus RTU over RS232 or RS485, or Modbus TCP over ethernet.
Alarm	Two volt free changeover contacts, one process alarm, one fault alarm; 1 A @ 30 V DC
HMI	5.7" LCD with touchscreen
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)	190 x 255 x 215mm (7.5 x 10.0 x 8.4") h x w x d
Dimensions (sensor)	ø45 x 128mm with M36 x 1.5-6g mounting thread
Weight	4.2kg (9.26lbs)
Cable lengths	3, 5 or 10m (9.8, 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

**Recommended for special applications only. Consult Michell Instruments before ordering.

Please note: Michell Instruments adopts a continuous development program which sometimes necessitates specification changes without notice. Please contact us for latest version.

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