Product XC-80 compensator
Serial number 67GH31
Date of calibration 25 September 24
Customer name
Customer address
Customer reference

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Calibration certificate

Specification

Air pressure sensor accuracy	±1.0 mbar
RH sensor accuracy	±6.0 %RH

Measured values and uncertainties of calibration

Time (mins)	Air pressure (mbar)			Humidity (%RH)			
	Reference	Measured	Error	Reference	Measured	Error	Air Temp
0	1022.5	1022.4	-0.1	51.0	51.3	0.3	23.53
10	1022.5	1022.2	-0.3	51.1	51.5	0.4	23.52
20	1022.3	1022.2	-0.1	51.3	51.6	0.3	23.52
30	1022.3	1022.2	-0.1	51.3	51.6	0.3	23.53
40	1022.3	1022.0	-0.3	51.4	51.6	0.2	23.52
50	1022.1	1021.8	-0.3	51.5	51.8	0.3	23.53
60	1022.1	1021.8	-0.2	51.6	52.0	0.4	23.54
		Mean error	-0.2		Mean error	0.3	
		Uncertainty (k=2)	0.9		Uncertainty (k=2)	4.3	

Reference standards	Ref. no.	Certificate no.	Date
XC-80 (air pressure & humidity)	628T48	628T48-240104-00	04 January 24
XC air temperature sensor	22T156	22T156-240108-00	08 January 24
Test procedure	PT-50304-01		30 January 09

Laser measurement system accuracy: When a Renishaw XL-80 laser is used with a Renishaw XC-80 compensator and a Renishaw air temperature sensor *(all within specification)* the laser measurement system accuracy in linear measurement mode will be within: ±0.5 ppm (k=2) - see the system manual for details.

Authorised signature	Signatory	Position	Date
	**Dave Wall**	**Director & General Manager**	**25 September 2024**

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Certificate number 67GH31-240925-00

L-9908-1127-02

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Calibration notes

1. ***Lasers (XM, XL, ML, HS and RLU)*** are calibrated by comparison to a reference HeNe laser using an optical beat frequency technique. Reference lasers are routinely calibrated against an iodine-stabilised HeNe laser supplied by the National Physical Laboratory (NPL), or by a national standards laboratory. All frequency measurements are taken over a 1 hour period.

2. **Air pressure and relative humidity (RH) sensors are installed in a compensator (XC and RCU).** The air pressure sensors are calibrated over 650 mbar to 1150 mbar range in a temperature controlled oven by direct comparison with a reference pressure meter. The RH sensors (where fitted) are certified by the manufacturer to be within specification. They are calibrated by comparison of the readings with those from a reference RH meter at a single applied humidity.

3. ***Air and material temperature sensors (XC and RCU)*** are calibrated by direct comparison with transfer platinum resistance thermometers (PRTs) in a temperature controlled water bath over 0 °C to 40 °C (50 °C for material sensor). The transfer PRTs are routinely calibrated against reference PRTs.

4. ***Rotary axis calibrators (XR20)*** are calibrated using a HeNe laser angular interferometer.

5. ***Ballbar transducers (QC20 and QC10)*** are calibrated using a HeNe laser interferometer. The scale factor (QC10 only) is calculated and must be entered into the Renishaw application software prior to use.

6. ***Ballbar calibrators*** are calibrated by direct comparison with a reference ballbar calibrator (calibrated by a national standards laboratory) using a reference ballbar as a transfer standard. The measured values for the ballbar calibrator must be entered into the Renishaw application software prior to use.

7. ***Traceability.*** All the reference standards (listed overleaf) used in these calibrations are traceable either directly to major international metrology institutes who have signed the CIPM Mutual Recognition Agreement (e.g. NPL: UK; LNE: France; NIST: USA; PTB: Germany; NMIJ: Japan) or to a national accreditation body (e.g. UKAS: UK; A2LA: USA).

8. ***Environment.*** The equipment used for calibration is in a facility held between 15 °C and 25 °C.

9. ***Uncertainty calculations.*** The uncertainty calculations have been carried out according to the European Co-operation for Accreditation document EA-4/02.

10. ***Quality accreditation.*** All calibrations above are covered by Renishaw's ISO 9001 quality assurance system. The system is audited and certified by an accredited agency.

11. ***Re-calibration.*** Customers may wish to confirm that systems are performing within published specifications over time. If so, it is recommended that they should be periodically re-calibrated. Please note that compensators and temperature sensors are re-calibrated only at a single applied temperature, air pressure and humidity. Please refer to the appropriate system manual for further details.