Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

0208
Accredited to
ISO/IEC 17025:2017

Scotia Instrumentation Ltd

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Calibration performed at the above address only

Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
PRESSURE			Methods consistent with EURAMET CG3 and CG17.
<u>Gas Pressure (Gauge)</u>			
Calibration of pressure indicating instruments and gauges	-100 kPa to +3.5 kPa 3.5 kPa to 10 kPa 10 kPa to 100 kPa 100 kPa to 700 kPa 700 kPa to 900 kPa 900 kPa to 12 MPa	0.012 % 0.008 0 % 0.006 5 % 0.007 0 % 0.009 5 % 0.008 0 %	The calibration of Instruments with an electrical output may be undertaken.
Pressure equivalent calibration of dead weight testers including ball/nozzle type instruments	3.5 kPa to 10 kPa 10 kPa to 100 kPa 100 kPa to 700 kPa 700 kPa to 900 kPa 900 kPa to 12 MPa	0.008 0 % 0.006 5 % 0.007 0 % 0.009 5 % 0.008 0 %	
<u>Gas Pressure (Absolute)</u>			
Calibration of pressure indicating instruments and gauges	10 kPa to 80 kPa 80 kPa to 115 kPa 115 kPa to 800 kPa 800 kPa to 1.1 MPa 1.1 MPa to 12.1 MPa	0.040 % + 10 Pa 0.020 % + 0.80 Pa 0.007 0 % + 30 Pa 0.009 5 % + 30 Pa 0.008 0 % + 30 Pa	
<u>Hydraulic Pressure (Gauge)</u>			
Calibration of pressure indicating instruments and gauges	600 kPa to 6 MPa 6 MPa to 120 MPa	0.008 6 % + 40 Pa 0.013% + 40 Pa	
Pressure equivalent calibration of Dead Weight Testers	600 kPa to 6 MPa 6 MPa to 120 MPa	0.009 0 % + 40 Pa 0.013% + 40 Pa	
<u>Gas Pressure (Differential)</u>			
Calibration of pressure indicating instruments and gauges	0.25 kPa to 420 kPa (line pressures 1.2 MPa to 2.1 MPa) 0.25 kPa to 420 kPa (line pressures 2.1 MPa to 20 MPa)	0.60 Pa/MPa of line pressure, + 0.007 5 % of differential pressure + 11 Pa 0.60 Pa/MPa of line pressure, + 0.006 0 % of differential pressure + 11 Pa	Differential pressure cells may be calibrated using the digital communication protocol.

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
TEMPERATURE			Calibration performed within Liquid Baths
Liquid-in-glass thermometers	-30 °C to +250 °C	0.070 °C	Liquid-in-glass thermometers can be examined for compliance with the published specification marked on them if requested.
Resistance thermometers	-30 °C to +250 °C	0.045 °C	
Electronic thermometers with sensors	-30 °C to +250 °C	0.040 °C plus: Analogue- Half scale division Digital- One least significant digit	
Temperature indicators and recorders, with temperature sensor(s)	-10 °C to +40 °C -20 °C to +80 °C	1.1 °C 2.2 °C	Analogue type chart recorders
Block calibrators	-30 °C to +250 °C	0.75 °C	
ELECTRICAL MEASUREMENTS			
DC Resistance			
	10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ	50 µΩ/Ω 17 µΩ/Ω 17 µΩ/Ω 17 µΩ/Ω 17 µΩ/Ω 50 µΩ/Ω 85 µΩ/Ω 200 µΩ/Ω 630 kΩ	These are source values available for the calibration of measuring equipment.
	0 Ω to 20 Ω 20 Ω to 200 Ω 200 Ω to 2 kΩ 2 kΩ to 20 kΩ 20 kΩ to 200 kΩ 200 kΩ to 2 MΩ 2 MΩ to 20 MΩ 20 MΩ to 200 MΩ 200 MΩ to 2 GΩ	50 µΩ/Ω + 40 µΩ 17 µΩ/Ω + 100 µΩ 17 µΩ/Ω + 1.0 mΩ 17 µΩ/Ω + 10 mΩ 17 µΩ/Ω + 100 mΩ 50 µΩ/Ω + 2.0 Ω 85 µΩ/Ω + 100 Ω 200 µΩ/Ω + 10 kΩ 370 µΩ/Ω + 100 kΩ	Measurement of the output of sources using a digital multimeter and generation, for application to measuring devices, using a multi-function calibrator.
DC Voltage	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1 kV	11 µV/V + 1.0 µV 8.0 µV/V + 1.5 µV 5.0 µV/V + 3.5 µV 7.0 µV/V + 50 µV 9.0 µV/V + 500 µV	
DC Current	0 µA to 200 µA 200 µA to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A 2 A to 10 A	150 µA/A + 2.0 nA 60 µA/A + 10 nA 60 µA/A + 100 nA 60 µA/A + 1.0 µA 150 µA/A + 20 µA 350 µA/A + 100 µA	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
DC Current (continued)			
Generation only	10 A to 1000 A	0.060 % + 100 mA	For the calibration of current clamps and similar devices, using multi-turn coil technique.
AC Voltage	2 mV to 20 mV		Measurement of the output of sources using a digital multimeter and generation, for application to measuring devices, using a multi-function calibrator.
	10 Hz to 30 Hz	350 µV/V + 5.5 µV	
	30 Hz to 1 kHz	350 µV/V + 5.5 µV	
	1 kHz to 10 kHz	350 µV/V + 5.5 µV	
	10 kHz to 100 kHz	800 µV/V + 5.5 µV	
	20 mV to 200 mV		
	30 Hz to 1 kHz	200 µV/V + 5.5 µV	
	1 kHz to 10 kHz	200 µV/V + 5.5 µV	
	10 kHz to 100 kHz	500 µV/V + 5.5 µV	
	200 mV to 2 V		
	10 Hz to 300 Hz	120 µV/V + 5.5 µV	
	300 Hz to 1 kHz	80 µV/V + 5.5 µV	
	1 kHz to 10 kHz	50 µV/V + 5.5 µV	
	10 kHz to 30 kHz	80 µV/V + 5.5 µV	
	30 kHz to 100 kHz	220 µV/V + 10 µV	
	2 V to 20 V		
	10 Hz to 300 Hz	120 µV/V + 50 µV	
	300 Hz to 1 kHz	60 µV/V + 50 µV	
	1 kHz to 10 kHz	75 µV/V + 50 µV	
	10 kHz to 30 kHz	90 µV/V + 50 µV	
	30 kHz to 100 kHz	500 µV/V + 100 µV	
	20 V to 200 V		
	10 Hz to 300 Hz	120 µV/V + 2.5 mV	
	300 Hz to 1 kHz	60 µV/V + 1.0 mV	
	1 kHz to 10 kHz	75 µV/V + 1.0 mV	
	10 kHz to 30 kHz	90 µV/V + 2.0 mV	
	30 kHz to 100 kHz	500 µV/V + 2.5 mV	
	200 V to 1 kV		
	40 Hz to 1 kHz	180 µV/V + 20 mV	
	1 kHz to 10 kHz	180 µV/V + 20 mV	
	10 kHz to 30 kHz	300 µV/V + 25 mV	
AC Current	10 µA to 200 µA		
	10 Hz to 1 kHz	300 µA/A + 15 nA	
	1 kHz to 5 kHz	0.16% + 20 nA	
	200 µA to 2 mA		
	10 Hz to 1 kHz	200 µA/A + 0.15 µA	
	1 kHz to 5 kHz	350 µA/A + 0.15 µA	
	2 mA to 20 mA		
	10 Hz to 1 kHz	200 µA/A + 1.5 µA	
	1 kHz to 5 kHz	350 µA/A + 1.5 µA	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
AC Current (continued)	20 mA to 200 mA *10 Hz to 1 kHz* *1 kHz to 5 kHz* 200 mA to 2 A *10 Hz to 1 kHz* *1 kHz to 5 kHz* 2 A to 10 A *40 Hz to 100 Hz* *100 Hz to 1 kHz* 10 A to 820 A *50 Hz*	 250 µA/A + 15 µA 350 µA/A + 15 µA 500 µA/A + 110 µA 700 µA/A + 150 µA 800 µA/A 0.15 % 0.080 % + 100 mA	Measurement of the output of sources using a digital multimeter and generation, for application to measuring devices, using a multi-function calibrator. For the calibration of current clamps and similar devices, using multi-turn coil technique.
Frequency	1.0 Hz to 2.4 GHz	2.4 in 10^9	Using GPS receiver and frequency counter.
Optical Tachometry	60 rpm to 60,000 rpm	2.6 rpm	Optical simulation.
Oscilloscope Calibration			
Vertical deflection	1 mV to 320 mV 320 mV to 3.2 V 3.2 V to 32 V 32 V to 320 V 320 V to 1 kV	0.18 % + 4.2 µV 0.15 % + 42 µV 0.15 % + 420 µV 0.15 % + 4.5 mV 0.15 % + 20 mV	Using oscilloscope calibrator.
Horizontal deflection Time markers	10 ns to 100 µs 100 µs to 5 s	6.1 ns 10 µs/s + 6.1 µs	Using oscilloscope calibrator.
Temperature indicators and simulators, calibration by electrical simulation			
Base and Noble metal thermocouples	-250 °C to -200 °C -200 °C to 0 °C 0 °C to 1372 °C -250 °C to -200 °C -200 °C to 0 °C 0 °C to 1372 °C	1.8 °C 0.64 °C 0.34 °C 1.8 °C 0.60 °C 0.27 °C	Including cold junction compensation Excluding cold junction compensation

END

Appendix - Calibration and Measurement Capabilities

Introduction

The definitive statement of the accreditation status of a calibration laboratory is the Accreditation Certificate and the associated Schedule of Accreditation. This Schedule of Accreditation is a critical document, as it defines the measurement capabilities, ranges and boundaries of the calibration activities for which the organisation holds accreditation.

Calibration and Measurement Capabilities (CMCs)

The capabilities provided by accredited calibration laboratories are described by the Calibration and Measurement Capability (CMC), which expresses the lowest measurement uncertainty that can be achieved during a calibration. If a particular device under calibration itself contributes significantly to the uncertainty (for example, if it has limited resolution or exhibits significant non-repeatability) then the uncertainty quoted on a calibration certificate will be increased to account for such factors.

The CMC is normally used to describe the uncertainty that appears in an accredited calibration laboratory's schedule of accreditation and is the uncertainty for which the laboratory has been accredited using the procedure that was the subject of assessment. The measurement uncertainty is calculated according to the procedures given in the GUM and is normally stated as an expanded uncertainty at a coverage probability of 95 %, which usually requires the use of a coverage factor of $k = 2$. An accredited laboratory is not permitted to quote an uncertainty that is smaller than the published measurement uncertainty in certificates issued under its accreditation.

Expression of CMCs - symbols and units

It should be noted that the percentage symbol (%) represents the number 0.01. In cases where the measurement uncertainty is stated as a percentage, this is to be interpreted as meaning percentage of the measurand.
Thus, for example, a measurement uncertainty of 1.5 % means $1.5 \times 0.01 \times q$, where q is the quantity value.

The notation Q[a, b] stands for the root-sum-square of the terms between brackets: $Q[a, b] = [a^2 + b^2]^{1/2}$