

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

 0152 Accredited to ISO/IEC 17025:2017	ServiceCal Limited Issue No: 038 Issue date: 17 August 2023	
	Unit A9 Axis Point Hareshill Business Park Hilltop Road Heywood Lancashire OL10 2RQ	Contact: Mr G D Taylor Tel: +44 (0)1706 367008 Fax: +44 (0)1706 622469 E-Mail: info@servicecal.co.uk Website: www.servicecal.co.uk

Calibration performed by the Organisation at the locations specified

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details	Activity	Location code
Unit A9 Axis Point Hareshill Business Park Hilltop Road Heywood Lancashire OL10 2RQ Local contact Mr G D Taylor Tel: +44 (0)1706 367008 Email: info@servicecal.co.uk	All	Lab

Site activities performed away from the locations listed above:

Location details	Activity	Location code
The customers' site or premises must be suitable for the nature of the particular calibrations undertaken and will be the subject of contract review arrangements between the laboratory and the customer.	Electrical	Site



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Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL				
DC RESISTANCE				
Generation				
Specific Values	0.01 Ω 0.1 Ω 1 Ω 10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω 100 M Ω	30 $\mu\Omega/\Omega$ 30 $\mu\Omega/\Omega$ 8.0 $\mu\Omega/\Omega$ 5.0 $\mu\Omega/\Omega$ 7.0 $\mu\Omega/\Omega$ 6.0 $\mu\Omega/\Omega$ 11 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 30 $\mu\Omega/\Omega$ 70 $\mu\Omega/\Omega$ 100 $\mu\Omega/\Omega$	Using standard resistors in a 2-terminal or a 4-terminal configuration as appropriate to the resistance value.	Site & Lab
	1 Ω 10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω 100 M Ω	24.8 $\mu\Omega/\Omega$ 12.8 $\mu\Omega/\Omega$ 9.3 $\mu\Omega/\Omega$ 8.0 $\mu\Omega/\Omega$ 5.6 $\mu\Omega/\Omega$ 7.3 $\mu\Omega/\Omega$ 8.9 $\mu\Omega/\Omega$ 26.8 $\mu\Omega/\Omega$ 87.7 $\mu\Omega/\Omega$	Using multifunction calibrator in a 2-terminal or a 4-terminal configuration as appropriate to the resistance value.	Site & Lab
Other Values	0 Ω to 20 Ω 20 Ω to 200 Ω 200 Ω to 200 k Ω 200 k Ω to 2 M Ω 2 M Ω to 20 M Ω 20 M Ω to 200 M Ω 200 M Ω to 2 G Ω	30 $\mu\Omega/\Omega$ + 60 $\mu\Omega$ 20 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 30 $\mu\Omega/\Omega$ 70 $\mu\Omega/\Omega$ 650 $\mu\Omega/\Omega$ 0.65 %	By comparison with known resistance values.	Site & Lab
Measurement				
Specific Values	0.01 Ω 0.1 Ω 1 Ω 10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω 100 M Ω	30 $\mu\Omega/\Omega$ 30 $\mu\Omega/\Omega$ 8.0 $\mu\Omega/\Omega$ 5.0 $\mu\Omega/\Omega$ 7.0 $\mu\Omega/\Omega$ 6.0 $\mu\Omega/\Omega$ 11 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 30 $\mu\Omega/\Omega$ 70 $\mu\Omega/\Omega$ 100 $\mu\Omega/\Omega$	By comparison with known resistance values.	Site & Lab



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ($k = 2$)	Remarks	Location Code
ELECTRICAL (cont'd)				
DC RESISTANCE (cont'd)				
Other Values	0 Ω to 20 Ω 20 Ω to 200 Ω 200 Ω to 200 k Ω 200 k Ω to 2 M Ω 2 M Ω to 20 M Ω 20 M Ω to 200 M Ω 200 M Ω to 2 G Ω	30 $\mu\Omega/\Omega$ + 60 $\mu\Omega$ 20 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 30 $\mu\Omega/\Omega$ 70 $\mu\Omega/\Omega$ 650 $\mu\Omega/\Omega$ 0.65 %	Using digital multimeter.	Site & Lab
DC VOLTAGE				
Generation	0 mV to 220 mV 220 mV to 2.2 V 2.2 V to 22 V 22 V to 220 V 220 V to 1100 V	7 $\mu V/V$ + 0.50 μV 5 $\mu V/V$ + 0.80 μV 3.8 $\mu V/V$ 3.3 $\mu V/V$ 4.6 $\mu V/V$	Using multifunction calibrator	Site & Lab
Specific Values	100 mV 1 V 10 V 100 V 1 kV	7 $\mu V/V$ 3.8 $\mu V/V$ 3.6 $\mu V/V$ 3.8 $\mu V/V$ 4.6 $\mu V/V$		
Measurement	100 μV to 200 mV 200 mV to 20 V 20 V to 1100 V	12 μV 8.0 $\mu V/V$ + 2.0 μV 15 $\mu V/V$	Using digital multimeter.	Site & Lab
DC CURRENT				
Generation	0 μA to 220 μA 220 μA to 2.2 mA 2.2 mA to 22 mA 22 mA to 220 mA 220 mA to 2.2 A 2.2 A to 20 A	15 $\mu A/A$ + 7.0 nA 15 $\mu A/A$ + 8.0 nA 10 $\mu A/A$ 30 $\mu A/A$ 40 $\mu A/A$ 550 $\mu A/A$ + 190 μA	Using multifunction calibrator	Site & Lab
	20 A to 1000 A	610 $\mu A/A$	For calibration of clamp-on ammeters and similar devices, using a multi-turn coil method.	Site & Lab
Specific values	100 μA 1 mA 10 mA 100 mA 1 A 10 A	75 $\mu A/A$ 15 $\mu A/A$ 10 $\mu A/A$ 30 $\mu A/A$ 40 $\mu A/A$ 500 $\mu A/A$	Using multifunction calibrator.	Site & Lab



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ($k = 2$)	Remarks	Location Code
ELECTRICAL (cont'd)				
DC CURRENT (cont'd)				
Measurement	0 μ A to 200 μ A 200 μ A to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A 10 A and 20 A	130 μ A/A + 9.0 nA 130 μ A/A + 90 nA 130 μ A/A 150 μ A/A 280 μ A/A 380 μ A/A	Using digital multimeter.	Site & Lab
			Using digital multimeter and current shunt.	Site & Lab
AC VOLTAGE				
Generation	2 mV to 200 V 10 Hz to 100 kHz	0.080 % + 50 μ V	Using multifunction calibrator.	Site & Lab
	200 V to 1 kV 55 Hz to 1 kHz	0.030 % + 50 μ V		
Specific values	10 Hz to 100 kHz: 2 mV 20 mV 100 mV 1 V 10 V 100 V	0.15 % 0.04 % 0.025 % 0.017 % 0.017 % 0.017 %	Using multifunction calibrator.	Site & Lab
	55 Hz to 1 kHz 1000 V	0.015 %		
	100 mV 500 Hz 1 kHz 10 kHz 50 kHz	0.008 % 0.008 % 0.008 % 0.008 %		
	1 V 500 Hz 1 kHz 10 kHz 50 kHz	0.012 % 0.012 % 0.012 % 0.012 %		
	10 V 500 Hz 1 kHz 10 kHz 50 kHz	0.012 % 0.012 % 0.012 % 0.012 %		



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ($k = 2$)	Remarks	Location Code
ELECTRICAL (cont'd)				
AC VOLTAGE (cont'd)				
Generation, Specific values (continued)	100 V 500 Hz 1 kHz 10 kHz 50 kHz	0.012 % 0.012 % 0.012 % 0.012 % 0.015 %		Site & Lab
	1000 V 500 Hz 1 kHz	0.015 % 0.015 %		
Measurement	20 mV to 200 mV 20 Hz to 10 kHz 10 kHz to 100 kHz	0.040 % 0.15 %	Using digital multimeter.	Site & Lab
	200 mV to 200 V 20 Hz to 10 kHz 10 kHz to 100 kHz	0.020 % 0.15 %		
	200 V to 1000 V 55 Hz to 10 kHz 10 kHz to 30 kHz	0.020 % 0.15 %		
Specific values	300 Hz, 1 kHz, 10 kHz 100 mV 1 V, 10 V, 100 V, 1 kV	0.020 % 0.015 %		Site & Lab
	30 kHz 100 mV, 1 V, 10 V, 100 V, 1 kV	0.060 %		
AC CURRENT				
Generation	55 Hz to 5 kHz 100 μ A 1 mA 10 mA 100 mA 1 A	0.031 % 0.018 % 0.018 % 0.018 % 0.014 %	Using multifunction calibrator.	Site & Lab
	2 A to 20 A 30 Hz to 500 Hz	0.17 %		
	50 Hz 10 A to 1000 A	0.17 %	For calibration of clamp-on ammeters and similar devices, using a multi-turn coil method.	Site & Lab



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ($k = 2$)	Remarks	Location Code
ELECTRICAL (cont'd)				
AC CURRENT (cont'd)				
Measurement	55 Hz to 5 kHz 20 μ A to 200 mA	0.15 %	Using digital multimeter.	Site & Lab
	55 Hz to 1 kHz 200 mA to 2 A	0.25 %		
Specific values	55 Hz, 300 Hz, 1.0 kHz 100 μ A, 1 mA, 10 mA, 100 mA 1 A	0.050 % 0.10 %		
	50 Hz and 140 Hz 10 A and 20 A	0.090 %	Using digital multimeter and current shunt.	Site & Lab
FREQUENCY				
Measurement	0.1 Hz to 10 Hz 10 Hz to 1 GHz	1.0 in 10^6 2.0 in 10^9	Using frequency standard and divider.	Lab
Generation	0.1 Hz to 10 Hz 10 Hz to 1 GHz	1.0 in 10^6 2.0 in 10^9	Using frequency counter.	Lab
Mechanical Tachometer	60 rpm to 600 rpm 600 rpm to 3700 rpm	2.5 rpm 7.0 rpm	By comparison with optical tachometer.	Lab
Optical Tachometers	6 rpm 60 rpm 600 rpm 1500 rpm 3000 rpm 6000 rpm 15000 rpm 30000 rpm 60000 rpm	0.0070 rpm 0.0070 rpm 0.020 rpm 0.10 rpm 0.10 rpm 0.10 rpm 1.0 rpm 1.0 rpm 1.0 rpm	Using light pulses synchronised to frequencies that correspond to the stated rpm values.	Lab
CALIBRATION OF 16TH/17TH EDITION TEST EQUIPMENT				
Insulation Resistance	10 k Ω to 1 M Ω 1 M Ω to 5 M Ω 5 M Ω to 10 M Ω 10 M Ω to 30 M Ω 30 M Ω to 100 M Ω 100 M Ω to 500 M Ω 500 M Ω to 1 G Ω 1 G Ω to 2 G Ω	12 k Ω 170 k Ω 350 k Ω 1.0 M Ω 3.5 M Ω 18 M Ω 36 M Ω 130 M Ω	Using dedicated calibrator that covers all relevant functions.	Site & Lab
Continuity Resistance	20 m Ω to 1 Ω 1 Ω to 2 Ω 2 Ω to 5 Ω 5 Ω to 10 Ω 10 Ω to 20 Ω 20 Ω to 50 Ω 50 Ω to 100 Ω 100 Ω to 1 k Ω	33 m Ω 44 m Ω 88 m Ω 150 m Ω 260 m Ω 610 m Ω 1.2 Ω 12 Ω		



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CALIBRATION OF 16TH/17TH EDITION TEST EQUIPMENT (continued)				
Continuity Resistance	20 mΩ to 1 Ω 1 Ω to 2 Ω 2 Ω to 5 Ω 5 Ω to 10 Ω 10 Ω to 20 Ω 20 Ω to 50 Ω 50 Ω to 100 Ω 100 Ω to 1 kΩ	33 mΩ 44 mΩ 88 mΩ 150 mΩ 260 mΩ 610 mΩ 1.2 Ω 12 Ω		Site & Lab
Continuity Current	200 mA	3.7 mA		
Insulation Voltage (DC)	50 V 100 V 250 V 500 V 1000 V	2.0 V 2.5 V 4.0 V 7.0 V 13 V		
Loop Resistance at 50 Hz	0.22 Ω 0.33 Ω 0.5 Ω 1 Ω 5 Ω 10 Ω 100 Ω 1000 Ω	43 mΩ 43 mΩ 43 mΩ 44 mΩ 56 mΩ 80 mΩ 590 mΩ 5.8 Ω		Site & Lab
RCD Current at 50 Hz	10 mA 20 mA 30 mA 40 mA 50 mA 100 mA 150 mA 200 mA 300 mA 500 mA 1 A	1.9 mA 2.2 mA 2.6 mA 3.1 mA 3.6 mA 6.2 mA 9.1 mA 12 mA 18 mA 29 mA 58 mA	At 100 ms At 100 ms At 100 ms At 100 ms At 100 ms At 100 ms At 100 ms At 100 ms At 100 ms At 100 ms At 100 ms	Site & Lab
RCD Current at 50 Hz	100 mA 1000 mA	2.2 mA 14 mA	At 1000 ms At 1000 ms	
RCD Trip Time	20 ms 30 ms 40 ms 50 ms 100 ms 250 ms 500 ms 1000 ms	0.96 ms 0.96 ms 0.96 ms 0.96 ms 0.96 ms 0.96 ms 0.96 ms 0.96 ms		Site & Lab
Earth Bond Current	At 50 Hz: 100 mA 10 A 20 A	22 mA 240 mA 420 mA		



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CALIBRATION OF 16TH/17TH EDITION TEST EQUIPMENT (continued)				
Earth Bond Resistance <i>at 50 Hz</i>	0 Ω to 10 Ω 10 Ω to 100 Ω	35 m Ω 590 m Ω		Site & Lab
Earth Leakage Current Test <i>at 50 Hz</i>	2.0 mA at 240 V 4.7 mA at 240 V 7.7 mA at 240 V	40 μ A 85 μ A 140 μ A		
Flash Voltage Test <i>At 50 Hz</i>	1500 V (Class 1) 3000 V (Class 2)	170 V 260 V		
Flash Current Test <i>At 50 Hz</i>	1 mA at 1500 V (Class 1) 1 mA at 3000 V (Class 2)	63 μ A 63 μ A		
AC Voltage <i>At 50 Hz</i>	100 V to 400 V	4.5 V		
AC Line Voltage	225 V to 264 V	2.9 V		
Oscilloscope Calibration				
Amplitude	5 mV to 190 mV 190 mV to 190 V	0.89 % 0.30 %	Using signals of known peak to peak voltage.	Site & Lab
Timebase	0.5 ns to 10 ms	0.50 %	Using time markers.	
Bandwidth	50 kHz to 1.1 GHz 1.1 GHz to 3.2 GHz	4.5 % 5.2 %	50 Ω and 1 M Ω 50 Ω Only Results are normally reported in terms of the frequency at which the -3 dB points is reached, relative to a low frequency reference.	
Temperature simulation				
Calibration of temperature indicators, recorders and similar instruments.	Type K -160 $^{\circ}$ C to 0 $^{\circ}$ C 0 $^{\circ}$ C to 1300 $^{\circ}$ C	0.79 $^{\circ}$ C 0.47 $^{\circ}$ C	Using DC voltages corresponding to the equivalent temperature, with the internal cold junction enabled.	Site & Lab
	Type K -160 $^{\circ}$ C to 0.0 $^{\circ}$ C 0.0 $^{\circ}$ C to 1300 $^{\circ}$ C	0.73 $^{\circ}$ C 0.36 $^{\circ}$ C	Using DC voltages corresponding to the equivalent temperature, with the internal cold junction disabled.	
Ambient Temperature Measurement	18 $^{\circ}$ C to 22 $^{\circ}$ C	0.15 $^{\circ}$ C	Using mercury in glass thermometer; in support of cold junction calibration.	



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PRESSURE			Methods consistent with EURAMET CG17.	
<u>Hydraulic pressure (gauge)</u>				
Calibration of pressure indicating instruments and gauges	0 MPa to 10 MPa 10 MPa to 100 MPa 100 MPa to 400 MPa	0.0050 % + 3.5 kPa 0.010 % + 28 kPa 1.3 MPa	Calibration of pressure devices with an electrical output may be undertaken	Lab
<u>Gas pressure (gauge)</u>				
Calibration of pressure indicating instruments and gauges	-80 kPa to -100 Pa -100 Pa to 10 kPa 10 kPa to 0.50 MPa 0.5 MPa to 1.0 MPa 1.0 MPa to 2.0 MPa 2.0 MPa to 10 MPa	85 Pa 0.10 % + 40 Pa 85 Pa 150 Pa 300 Pa 1.0 kPa	Absolute pressure within these ranges can be generated and will attract an additional uncertainty of 72 Pa.	Lab
AIR VELOCITY				
Calibration of 25 to 100 mm Vane Anemometers	0.5 m/s to 2 m/s 2 m/s to 5 m/s 5 m/s to 15 m/s 15 m/s to 25 m/s	0.72 % + 0.090 m/s 0.80 % + 0.16 m/s 0.81 % + 0.25 m/s 0.90 % + 0.50 m/s	Comparison with reference anemometers in a characterised airstream.	Lab
Calibration of Thermal Anemometers by comparison	0.3 m/s to 2 m/s 2 m/s to 5 m/s 5 m/s to 15 m/s 15 m/s to 25 m/s	0.080 m/s 0.13 m/s 0.62 m/s 1.9 m/s		
END				



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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: $Q[a, b] = [a^2 + b^2]^{1/2}$