


# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

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

 <b>UKAS</b> CALIBRATION  8239  Accredited to ISO/IEC 17025:2017	<b>PASS (Portable Appliance Safety Services) Ltd</b>  Issue No: 014 Issue date: 06 December 2023	
	1 Wilson Street Thornaby Stockton-On-Tees TS17 7AR United Kingdom	Contact: Mr Ibrahim Ibrahim Tel: +44 (0) 1642 626148 Fax: +44 (0) 870 143 1869 E-Mail: <a href="mailto:ibrahim@calibrate.co.uk">ibrahim@calibrate.co.uk</a> Website: <a href="http://www.calibrate.co.uk">www.calibrate.co.uk</a>

Calibration performed by the Organisations at the locations specified below

### Locations covered by the organisation and their relevant activities

#### Laboratory locations:

Location details	Activity	Location code
<b>Address</b> 1 Wilson Street Thornaby Stockton-On-Tees TS17 7AR United Kingdom	<b>Local contact</b> Ibrahim Ibrahim	Temperature, Electrical and Pressure  A
<b>Address</b> Parkburn Court Burnbank Hamilton Scotland ML3 0QQ	<b>Local contact</b> Barry Atkins	Dimensional and Electrical  B

#### Site activities performed away from the locations listed above:

Location details	Activity	Location code
At customer's premises  The customer's 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.	Dimensional	C



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Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
<b>ELECTRICAL</b>			All electrical calibrations are performed as a comparison against a reference standard	A
<b>DC RESISTANCE</b>				
Fixed value sources for the calibration of measuring instruments	0.1 $\Omega$ 0.2 $\Omega$ 0.3 $\Omega$ 1 $\Omega$ 10 $\Omega$ 100 $\Omega$ 1 k $\Omega$ 10 k $\Omega$ 100 k $\Omega$ 1 M $\Omega$ 10 M $\Omega$ 100 M $\Omega$ 1 G $\Omega$	5.8 m $\Omega$ 41 m $\Omega$ 41 m $\Omega$ 6.0 m $\Omega$ 8.2 m $\Omega$ 490 $\mu\Omega$ 4.8 m $\Omega$ 49 m $\Omega$ 980 m $\Omega$ 33 $\Omega$ 3.1 k $\Omega$ 210 k $\Omega$ 12 M $\Omega$		
For generating a stimulus that can be applied to measuring instruments also for measuring a stimulus provided by the device being calibrated	0 $\Omega$ to 10 $\Omega$ 10 $\Omega$ to 100 $\Omega$ 100 $\Omega$ to 1 k $\Omega$ 1 k $\Omega$ to 10 k $\Omega$ 10 k $\Omega$ to 100 k $\Omega$ 100 k $\Omega$ to 1M $\Omega$ 1 M $\Omega$ to 10 M $\Omega$ 10 M $\Omega$ to 100 M $\Omega$ 100 M $\Omega$ to 1 G $\Omega$	17 $\mu\Omega/\Omega$ + 59 $\mu\Omega$ 14 $\mu\Omega/\Omega$ + 590 $\mu\Omega$ 12 $\mu\Omega/\Omega$ + 740 $\mu\Omega$ 12 $\mu\Omega/\Omega$ + 6.6 m $\Omega$ 12 $\mu\Omega/\Omega$ + 76 m $\Omega$ 17 $\mu\Omega/\Omega$ + 3.3 $\Omega$ 58 $\mu\Omega/\Omega$ + 130 $\Omega$ 580 $\mu\Omega/\Omega$ + 2.8 k $\Omega$ 0.58 % + 94 k $\Omega$		
<b>DC VOLTAGE</b>				
Values can be generated for the calibration of measuring instruments	0 mV to 202 mV 202 mV to 1 V 1 V to 2.02 V 2.02 V to 10 V 10 V to 20.2 V 20.0 V to 100 V 100 V to 202 V 202 V to 1020 V	17 $\mu\text{V}/\text{V}$ + 2.5 $\mu\text{V}$ 10 $\mu\text{V}/\text{V}$ + 3.6 $\mu\text{V}$ 10 $\mu\text{V}/\text{V}$ + 7.6 $\mu\text{V}$ 9.8 $\mu\text{V}/\text{V}$ + 43 $\mu\text{V}$ 9.8 $\mu\text{V}/\text{V}$ + 72 $\mu\text{V}$ 14 $\mu\text{V}/\text{V}$ + 430 $\mu\text{V}$ 14 $\mu\text{V}/\text{V}$ + 720 $\mu\text{V}$ 14 $\mu\text{V}/\text{V}$ + 2.8 mV		
For measurement of instrument Outputs	0 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	5.8 $\mu\text{V}/\text{V}$ + 390 nV 4.6 $\mu\text{V}/\text{V}$ + 430 nV 4.6 $\mu\text{V}/\text{V}$ + 1.2 $\mu\text{V}$ 6.9 $\mu\text{V}/\text{V}$ + 54 $\mu\text{V}$ 15 $\mu\text{V}/\text{V}$ + 1.3 mV		



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
DC CURRENT				A
Values can be generated for the calibration of measuring instruments	0 $\mu$ A to 202 $\mu$ A 202 $\mu$ A to 1 mA 1 mA to 2.02 mA 2.02m A to 10 mA 10 mA to 20.2 mA 20.2 mA to 100 mA 100 mA to 202 mA 202 mA to 1 A 1 A to 2.02 A 2.02 A to 10 A 10 A to 20.2 A 20.2 A to 30 A	120 $\mu$ A/A + 12 nA 58 $\mu$ A/A + 35 nA 58 $\mu$ A/A + 49 nA 58 $\mu$ A/A + 230 n 58 $\mu$ A/A + 440 nA 58 $\mu$ A/A + 2.3 $\mu$ A 58 $\mu$ A/A + 9.0 $\mu$ A 150 $\mu$ A/A + 36 $\mu$ A 150 $\mu$ A/A + 100 $\mu$ A 350 $\mu$ A/A + 590 $\mu$ A 350 $\mu$ A/A + 760 $\mu$ A 580 $\mu$ A/A + 4.4 mA		
For measurement of instrument outputs	20 A to 1500 A	0.26 % + 13 mA	Simulation with coil	
	0 $\mu$ A to 1 $\mu$ A 1 $\mu$ A to 10 $\mu$ A 10 $\mu$ A to 100 $\mu$ A 100 $\mu$ A to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 3 A 3 A to 5 A 5 A to 10 A	24 $\mu$ A/A + 48 pA 23 $\mu$ A/A + 130 pA 23 $\mu$ A/A + 950 pA 23 $\mu$ A/A + 6.0 nA 23 $\mu$ A/A + 60 nA 40 $\mu$ A/A + 630 nA 130 $\mu$ A/A + 13 $\mu$ A 0.23 % + 750 $\mu$ A 0.14 % + 2.6 mA 0.27 % + 4.4 mA		
AC VOLTAGE				A
Values can be generated for the calibration of measuring instruments	20 mV to 202 mV 10 Hz to 44 Hz 45 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 100 kHz 100 kHz to 500 kHz	920 $\mu$ V/V + 62 $\mu$ V 190 $\mu$ V/V + 62 $\mu$ V 230 $\mu$ V/V + 56 $\mu$ V 0.12 % + 84 $\mu$ V 0.46 % + 2.5 mV		
	202 mV to 2.02 V 10 Hz to 44 Hz 45 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 100 kHz	580 $\mu$ V/V + 320 $\mu$ V 180 $\mu$ V/V + 280 $\mu$ V 240 $\mu$ V/V + 450 $\mu$ V 750 $\mu$ V/V + 530 $\mu$ V		
	2.02 V to 20.2 V 10 Hz to 44 Hz 45 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 100 kHz	580 $\mu$ V/V + 3.0 mV 180 $\mu$ V/V + 2.7 mV 240 $\mu$ V/V + 4.4 mV 690 $\mu$ V/V + 5.3 mV		
	20.2 V to 202 V 30 Hz to 44 Hz 45 Hz to 1 kHz 1 kHz to 10 kHz 10 kHz to 40 kHz	580 $\mu$ V/V + 33 mV 170 $\mu$ V/V + 28 mV 270 $\mu$ V/V + 30 mV 350 $\mu$ V/V + 53 mV		



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
Generation (continued)	202 V to 1020 V 30 Hz to 44 Hz 45 Hz to 1 kHz 1 kHz to 10 kHz	640 $\mu$ V/V + 250 mV 230 $\mu$ V/V + 110 mV 290 $\mu$ V/V + 200 mV		A
For measurement of instrument outputs	10 $\mu$ V to 10 mV 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 100 kHz	230 $\mu$ V/V + 2.6 $\mu$ V 350 $\mu$ V/V + 2.6 $\mu$ V 0.12 % + 2.6 $\mu$ V		
	10 mV to 100 mV 40 Hz to 1 kHz 1 kHz to 20 kHz	82 $\mu$ V/V + 3.3 $\mu$ V 160 $\mu$ V/V + 3.3 $\mu$ V		
	100 mV to 1 V 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	82 $\mu$ V/V + 48 $\mu$ V 82 $\mu$ V/V + 27 $\mu$ V 160 $\mu$ V/V + 28 $\mu$ V 350 $\mu$ V/V + 30 $\mu$ V 920 $\mu$ V/V + 31 $\mu$ V		
	1 V to 10 V 10 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz	82 $\mu$ V/V + 510 $\mu$ V 82 $\mu$ V/V + 270 $\mu$ V 160 $\mu$ V/V + 270 $\mu$ V 350 $\mu$ V/V + 310 $\mu$ V 920 $\mu$ V/V + 320 $\mu$ V 0.35 % + 1.2 mV 1.2 % + 3.2 mV		
	10 V to 100 V 10 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	230 $\mu$ V/V + 4.9 mV 230 $\mu$ V/V + 2.8 mV 230 $\mu$ V/V + 2.9 mV 400 $\mu$ V/V + 3.2 mV 0.14 % + 3.8 mV		
	100 V to 700 V 10 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz	460 $\mu$ V/V + 52 mV 460 $\mu$ V/V + 26 mV 690 $\mu$ V/V + 28 mV		



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AC CURRENT				A	
Values can be generated for the calibration of measuring Instruments	20 $\mu$ A to 202 $\mu$ A 40 Hz to 1 kHz	580 $\mu$ A/A + 180 nA			
	202 $\mu$ A to 2.02 mA 40 Hz to 1 kHz	460 $\mu$ A/A + 460 nA			
	2.02 mA 20.2 mA 40 Hz to 1 kHz	400 $\mu$ A/A + 4.6 $\mu$ A			
	20.2 mA to 202 mA 40 Hz to 1 kHz	400 $\mu$ A/A + 46 $\mu$ A			
	202 mA to 2.02 A 40 Hz to 1 kHz	460 $\mu$ A/A + 550 $\mu$ A			
	2.02 A to 20 A 40 Hz to 100 Hz	650 $\mu$ A/A + 6.0 mA			
	20 A to 30 A 40 Hz to 100 Hz	650 $\mu$ A/A + 13 mA			
	20 A to 1500 A 40 Hz to 60 Hz	0.26 % + 13 mA	Simulation using coil		
	For measurement of instrument outputs	50 nA to 100 $\mu$ A 100 Hz to 5 kHz	700 $\mu$ A/A + 46 nA		
		100 $\mu$ A to 1 mA 100 Hz to 5 kHz	350 $\mu$ A/A + 230 nA		
		1 mA to 10 mA 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 5 kHz	0.46 % + 2.3 $\mu$ A 0.17 % + 2.3 $\mu$ A 690 $\mu$ A/A + 2.3 $\mu$ A		
		10 mA to 100 mA 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 5 kHz	0.17 % + 24 $\mu$ A 690 $\mu$ A/A + 24 $\mu$ A 350 $\mu$ A/A + 24 $\mu$ A		
		100 mA to 1 A 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 5 kHz	0.46 % + 240 $\mu$ A 920 $\mu$ A/A + 240 $\mu$ A 0.12 % + 240 $\mu$ A		
		1 A to 3 A 10 Hz to 5 kHz	0.27 % + 580 $\mu$ A		
3 A to 5 A 10 Hz to 5 kHz		0.27 % + 11 mA			
5 A to 10 A 10 Hz to 5 kHz	0.29 % + 11 mA				



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
<b>CAPACITANCE</b> Values can be generated for the calibration of measuring Instruments  These range values can also be measured	<i>At 1 kHz:</i> 1 nF 10 nF 20 nF 50 nF 100 nF 1 $\mu$ F 10 $\mu$ F  1 pF to 100 pF  100 pF to 1000 pF 1 nF to 10 nF 10 nF to 100 nF 0.1 $\mu$ F to 1 $\mu$ F 1 $\mu$ F to 10 $\mu$ F	3.5 pF 31 pF 64 pF 150 pF 290 pF 4.6 nF 69 nF  0.12 % + 0.12 pF  0.12 % + 0.33 pF 0.12 % + 3.1 pF 0.12 % + 31 pF 0.12 % + 310 pF 0.12 % + 0.31 nF	Comparison against LCR bridge	A
<b>INDUCTANCE</b> Values can be generated for the calibration of measuring instruments  These range values can also be measured	<i>At 1 kHz:</i> 1 mH 10 mH 100 mH 1 H  0.1 mH to 1 mH  1 mH to 10 mH 10 mH to 100 mH 0.1 H to 1 H	5.9 $\mu$ H 58 $\mu$ H 580 $\mu$ H 5.8 mH  0.12 % + 0.39 $\mu$ H  0.27 % + 3.9 $\mu$ H 0.12 % + 35 $\mu$ H 0.12 % + 300 $\mu$ H	Comparison against LCR bridge	A
<b>FREQUENCY</b> Value can be generated for the calibration of measuring instruments  For generating a stimulus that can be applied to measuring instruments also for measuring a stimulus provided by the device being calibrated  Rotational speed - Optical Measurement  Generation	10 MHz reference  1 Hz to 30 MHz 30 MHz to 4 GHz    10 RPM to 99.99 RPM 100 RPM to 999.9 RPM 1000 RPM to 99999 RPM  60 RPM to 3000 RPM 3000 RPM to 60000 RPM	1.0 part in to $10^{12}$  1.5 parts in to $10^{12}$ + 0.60 $\mu$ Hz  2.0 parts in to $10^{12}$    2.3 RPM 2.4 RPM 3.3 RPM  0.12 RPM 1.2 RPM	Frequency may also expressed time; 1/f for repetitive signals, in terms of seconds or other units such as RPM.	A



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
TEMPERATURE SIMULATION				A
PT 100	-200 °C to +800 °C	0.065 °C		
Ambient	17 °C to 23 °C	0.20 °C		
junction compensation INCLUDED				
Base Thermocouples				
Type E	-200 °C to -100 °C -100 °C to 0 °C 0 °C to 1000 °C	0.22 °C 0.21 °C 0.22 °C		
Type J	-200 °C to -100 °C -100 °C to 0 °C 0 °C to 1200 °C	0.24 °C 0.21 °C 0.22 °C		
Type K	-200 °C to -100 °C -100 °C to 0 °C 0 °C to 1372 °C	0.27 °C 0.22 °C 0.24 °C		
Type N	-200 °C to -100 °C -100 °C to 0 °C 0 °C to 1300 °C	0.35 °C 0.24 °C 0.24 °C		
Type T	-200 °C to -100 °C -100 °C to 0 °C 0 °C to 400 °C	0.27 °C 0.23 °C 0.21 °C		
Noble thermocouples				
Type B	600 °C to 1820 °C	0.52 °C		
Type R	-50 °C to 0 °C 0 °C to 400 °C 400 °C to 1767 °C	0.78 °C 0.57 °C 0.36 °C		
Type S	-50 °C to 0 °C 0 °C to 400 °C 400 °C to 1767 °C	0.65 °C 0.55 °C 0.40 °C		



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
Temperature indicators and calibrators by electrical simulation Reference junction compensation EXCLUDED				A
Base Thermocouples				
Type E	-200 °C to -100 °C -100 °C to 0 °C 0 °C to 1000 °C	0.22 °C 0.19 °C 0.20 °C		
Type J	-200 °C to -100 °C -100 °C to 0 °C 0 °C to 1200 °C	0.24 °C 0.19 °C 0.20 °C		
Type K	-200 °C to -100 °C -100 °C to 0 °C 0 °C to 1372 °C	0.26 °C 0.21 °C 0.22 °C		
Type N	-200 °C to -100 °C -100 °C to 0 °C 0 °C to 1300 °C	0.35 °C 0.22 °C 0.22 °C		
Type T	-200 °C to -100 °C -100 °C to 0 °C 0 °C to 400 °C	0.26 °C 0.21 °C 0.20 °C		
Noble thermocouples				
Type B	600 °C to 1820 °C	0.52 °C		
Type R	-50 °C to 0 °C 0 °C to 400 °C 400 °C to 1767 °C	0.77 °C 0.56 °C 0.35 °C		
Type S	-50 °C to 0 °C 0 °C to 400 °C 400 °C to 1767 °C	0.65 °C 0.55 °C 0.39 °C		





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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
EQUIPMENT FOR IEE 16 <sup>TH</sup> / 17 <sup>TH</sup> / 18 <sup>TH</sup> EDITION WIRING TESTING				
LOOP TESTERS				
AC Resistance at 50 Hz	Nominal applied resistances			A
	0.05 $\Omega$	4.7 m $\Omega$		
	0.10 $\Omega$	4.8 m $\Omega$		
	0.21 $\Omega$	4.9 m $\Omega$		
	0.32 $\Omega$	5.1 m $\Omega$		
	0.5 $\Omega$	5.6 m $\Omega$		
	1 $\Omega$	8.6 m $\Omega$		
	5 $\Omega$	31 m $\Omega$		
	10 $\Omega$	59 m $\Omega$		
	100 $\Omega$	580 m $\Omega$		
	1 k $\Omega$	5.9 $\Omega$		
CONTINUITY TESTERS				
DC Resistance				A
	20 m $\Omega$	29 m $\Omega$		
	200 m $\Omega$ to 2 $\Omega$	29 m $\Omega$		
	4 $\Omega$	31 m $\Omega$		
	6 $\Omega$	34 m $\Omega$		
	8 $\Omega$	37 m $\Omega$		
	10 $\Omega$	41 m $\Omega$		
	20 $\Omega$	65 m $\Omega$		
	100 $\Omega$	290 m $\Omega$		
	1 k $\Omega$	2.9 $\Omega$		
Continuity Current Measurement				
	10 mA	1.1 mA		
	100 mA	1.7 mA		
	200 mA	3.1 mA		
	300 mA	4.6 mA		



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INSULATION TESTERS				A
DC Resistance	10 k $\Omega$ 20 k $\Omega$ 30 k $\Omega$ 40 k $\Omega$ 60 k $\Omega$ 100 k $\Omega$ 200 k $\Omega$ 400 k $\Omega$ 600 k $\Omega$ 1 M $\Omega$ 2 M $\Omega$ 3 M $\Omega$ 4 M $\Omega$ 5 M $\Omega$ 6 M $\Omega$ 7 M $\Omega$ 8 M $\Omega$ 9 M $\Omega$ 10 M $\Omega$ 20 M $\Omega$ 30 M $\Omega$ 40 M $\Omega$ 50 M $\Omega$ 60 M $\Omega$ 70 M $\Omega$ 80 M $\Omega$ 90 M $\Omega$ 100 M $\Omega$ 200 M $\Omega$ 400 M $\Omega$ 600 M $\Omega$ 800 M $\Omega$ 1 G $\Omega$ 10 G $\Omega$	12 $\Omega$ 23 $\Omega$ 35 $\Omega$ 46 $\Omega$ 69 $\Omega$ 120 $\Omega$ 230 $\Omega$ 460 $\Omega$ 690 $\Omega$ 1.2 k $\Omega$ 2.3 k $\Omega$ 3.5 k $\Omega$ 4.6 k $\Omega$ 58 k $\Omega$ 69 k $\Omega$ 81 k $\Omega$ 92 k $\Omega$ 100 k $\Omega$ 120 k $\Omega$ 230 k $\Omega$ 350 k $\Omega$ 460 k $\Omega$ 580 k $\Omega$ 690 k $\Omega$ 810 k $\Omega$ 930 k $\Omega$ 1.0 M $\Omega$ 1.2 M $\Omega$ 2.8 M $\Omega$ 5.6 M $\Omega$ 8.5 M $\Omega$ 11 M $\Omega$ 14 M $\Omega$ 580 M $\Omega$		
DC Voltage	50 V 100 V 150 V 200 V 250 V 500 V 1000 V	1.1 V 1.5 V 2.0 V 2.5 V 3.0 V 5.9 V 12 V		



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<b>EARTH BOND TESTERS</b>				A
AC Resistance at 50 Hz	Nominal applied resistance			
	0.04 $\Omega$	4.7 m $\Omega$		
	0.1 $\Omega$	4.8 m $\Omega$		
	0.15 $\Omega$	4.8 m $\Omega$		
	0.27 $\Omega$	5.0 m $\Omega$		
	0.38 $\Omega$	5.2 m $\Omega$		
	0.55 $\Omega$	5.8 m $\Omega$		
	1 $\Omega$	7.8 m $\Omega$		
	5 $\Omega$	30 m $\Omega$		
	10 $\Omega$	59 m $\Omega$		
	100 $\Omega$	580 m $\Omega$		
	1 k $\Omega$	5.8 $\Omega$		
AC Current at 50 Hz				
	100 mA	7.3 mA		
	200 mA	7.9 mA		
	400 mA	9.9 mA		
	4 A	100 mA		
	8 A	160 mA		
	10 A	190 mA		
	20 A	440 mA		
<b>LEAKAGE TESTERS</b>				A
DC Current				
	2 mA	36 $\mu$ A		
	5 mA	82 $\mu$ A		
	10 mA	130 $\mu$ A		
<b>RCD TESTERS</b>				A
RCD Trip Time				
	20 ms	680 $\mu$ s		
	40 ms	680 $\mu$ s		
	100 ms	680 $\mu$ s		
	200 ms	680 $\mu$ s		
	390 ms	680 $\mu$ s		
	900 ms	8.1 ms		
RCD Trip Current at 50 Hz				
	10 mA	620 $\mu$ A		
	30 mA	1.7 mA		
	90 mA	5.2 mA		
	100 mA	5.8 mA		
	110 mA	6.4 mA		
	150 mA	17 mA		
	300 mA	17 mA		
	1 A	58 mA		
	2 A	120 mA		
AC Voltage Source at 50 Hz				
	100 V	0.37 V		
	200 V	0.45 V		
	230 V	0.65 V		
	300 V	0.82 V		
	400 V	0.99 V		
Line Voltage Measurement	200 V to 260 V	2.4 V		



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<b>PRESSURE</b>				A
Gas Pressure (Gauge)			Methods consistent with EURAMET CG17. Calibration of devices with an electrical output may be undertaken.	
Calibration of pressure indicating instruments and gauges	-95 kPa to -10 kPa -10 kPa to -1.5 kPa 1.5 kPa to 10 kPa 10 kPa to 100 kPa 100 kPa to 2.5 MPa 2.5 MPa to 11.1 MPa	0.005 1 % 0.004 7 % + 0.15 Pa 0.003 8 % + 0.15 Pa 0.004 1 % 0.004 4 % 0.006 6 %	Calibration using deadweight testers. Absolute pressures can be generated over these ranges attracting an additional uncertainty of 0.15 Pa.	
Calibration of pressure indicating instruments and gauges	3.5 kPa to 200 kPa 100 kPa to 2.1 MPa -95 kPa to +21 MPa	0.004 6 % + 13 Pa 0.002 5 % + 90 Pa 0.006 1 % + 2.0 kPa	Calibration using pressure controllers.	
Gas Pressure (Absolute)				
Calibration of pressure indicating instruments and gauges	3.5 kPa to 100 kPa 3.5 kPa to 800 kPa 3.5 kPa to 7 MPa 100 kPa to 41.4 MPa	0.007 5 % + 3.8 Pa 0.018 % + 24 Pa 0.010 % + 210 Pa 0.007 4 % + 1.7 kPa	Calibration using pressure controllers.	
Hydraulic Pressure (Gauge)				
Calibration of pressure indicating instruments and gauges	0.6 MPa to 6.0 MPa 6 MPa to 70 MPa 70 MPa to 138 MPa	0.007 6 % 0.006 2 % 0.010 %	Calibration using deadweight testers. Absolute pressures can be generated over these ranges attracting an additional uncertainty of 0.15 Pa.	
<b>TEMPERATURE</b>				A
Sensors with indicators				
	-95 °C to -50 °C -50 °C to +140 °C 140 °C to 660 °C	0.10 °C 0.050 °C 0.10 °C	Calibrations performed in a Metal block	
	-80 °C to 0 °C 0 °C to 100 °C	0.011 °C 0.011 °C	Calibrations performed in liquid bath	
	0.01 °C	0.0050 °C	Triple point of water	
Metal block calibrators and portable liquid baths	-95 °C to +660 °C	Uncertainty as for sensor and indicator		



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
HUMIDITY				A
Relative humidity	At 0 °C 5 %rh 50 %rh 90 %rh	0.20 %rh 0.90 %rh 1.6 %rh		
	At 23 °C 5 %rh to 10 %rh 10 %rh to 50 %rh 50 %rh to 95 %rh	0.21 %rh 0.75 %rh 1.8 %rh		
Relative humidity	At 60 °C 5 %rh 50 %rh 90 %rh	0.20 %rh 0.60 %rh 1.0 %rh		
TEMPERATURE IN AIR	0 °C to 23 °C 23 °C 23 °C to 60 °C	0.14 °C 0.12 °C 0.14 °C		A



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
<b>DIMENSIONAL CALIBRATIONS</b>	RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED			
<b>LENGTH</b>			<b>NOTES</b> 1 All linear calibrations may be given in inch units.	
Plain Plug Gauges (Parallel)	1 to 50 diameter 50 to 100 100 to 200 200 to 300	0.80 1.5 2.0 3.0	on diameter.	B
Length Gauges, Flat and Spherical Ended (excluding Length Bars)	25 to 1000	1.0 + (8.0 x length in m)	Comparison to gauge blocks using a length measuring machine.	B
<b>ANGLE</b>			2 The uncertainty quoted is for the departure from flatness, straightness, parallelism or squareness, i.e., the distance separating the two parallel planes which just enclose the surface under consideration.	
Squares Blade Type	50 to 300 300 to 450	3.0 on squareness 5.0 See Note 2	BS 939:2007 Comparison to master square.	B
<b>MEASURING INSTRUMENTS AND MACHINES</b>				
<b>Micrometers</b>			Comparison to length standards BS 870:2008	B
External	0 to 1000	Heads 2.0 between any two points		B
Internal Micrometers	0 to 900	Setting and extension rods	BS 959:2008	B
Depth Micrometers	0 to 300	1.0 + (8.0 x length in m)	BS 6468:2008	B
Vernier, dial and digital type gauges			Comparison to length standards.	B
Calliper	0 to 1000	Overall performance 10 + (30 x length in m)	As BS 887:2008	
Height	0 to 1000	Overall performance 10 + (10 x length in m)	ISO13225:2012 and BS 1643:2008	
Depth	0 to 600	Overall performance 10 + (30 x length in m)	As BS 6365:2008	



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<b>MEASURING INSTRUMENTS AND MACHINES (continued)</b>				
Dial Gauges and Dial Test Indicators	0 to 50	1.0	BS 907:2008 and BS 2795:1981 using a length measuring machine.	B
Surface Plates Granite Cast Iron	160 x 100 to 4000 x 4000 Flatness of working surface:  Local variation of working surface:	1.5 + (0.80 x diagonal in m) See Note 2  2.7	BS 817:2008 and above using an electronic level and variation gauge.	B and C
Feeler Gauges	0.025 to 1.0	2.0	BS 957:2008 using a length measuring machine.	B
<b>ELECTRICAL CALIBRATIONS</b>				
<b>DC RESISTANCE</b> Specific values				B
Measurement	10 $\Omega$ 100 $\Omega$ 1 k $\Omega$ 10 k $\Omega$ 100 k $\Omega$ 1 M $\Omega$ 10 M $\Omega$ 100 M $\Omega$ 1 G $\Omega$ 10 G $\Omega$ 100 G $\Omega$ 1 T $\Omega$	14 $\mu\Omega/\Omega$ 9.6 $\mu\Omega/\Omega$ 8.0 $\mu\Omega/\Omega$ 8.8 $\mu\Omega/\Omega$ 9.6 $\mu\Omega/\Omega$ 24 $\mu\Omega/\Omega$ 110 $\mu\Omega/\Omega$ 440 $\mu\Omega/\Omega$ 0.40 % 0.59 % 2.0 % 1.4 %	Using digital multimeter.	
Other values Measurement	0 $\Omega$ to 1 $\Omega$ 1 $\Omega$ to 10 $\Omega$ 10 $\Omega$ to 100 $\Omega$ 100 $\Omega$ to 1 k $\Omega$ 1 k $\Omega$ to 10 k $\Omega$ 10 k $\Omega$ to 100 k $\Omega$ 100 k $\Omega$ to 1 M $\Omega$ 1 M $\Omega$ to 10 M $\Omega$ 10 M $\Omega$ to 100 M $\Omega$ 100 M $\Omega$ to 1 G $\Omega$	41 $\mu\Omega/\Omega$ 41 $\mu\Omega/\Omega$ 40 $\mu\Omega/\Omega$ 10 $\mu\Omega/\Omega$ 10 $\mu\Omega/\Omega$ 10 $\mu\Omega/\Omega$ 29 $\mu\Omega/\Omega$ 130 $\mu\Omega/\Omega$ 450 $\mu\Omega/\Omega$ 0.40 %	Using digital multimeter.	B



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
DC RESISTANCE (continued)				B
Generation				
Specific values	10 $\Omega$ 100 $\Omega$ 1 k $\Omega$ 10 k $\Omega$ 100 k $\Omega$ 1 M $\Omega$ 10 M $\Omega$ 100 M $\Omega$	420 $\mu\Omega$ 7.2 m $\Omega$ 20 m $\Omega$ 190 m $\Omega$ 2.3 $\Omega$ 39 $\Omega$ 1.4 k $\Omega$ 47 k $\Omega$	Using multifunction calibrator or decade resistance box.	
DC VOLTAGE				B
Measurement				
Specific values	100 mV 1 V 10 V 100 V 1000 V	11 $\mu V/V$ 9.4 $\mu V/V$ 9.4 $\mu V/V$ 12 $\mu V/V$ 12 $\mu V/V$	Using digital multimeter.	
Other values	0 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	2.5 $\mu V$ 10 $\mu V/V$ 9.5 $\mu V/V$ 12 $\mu V/V$ 12 $\mu V/V$	Using digital multimeter.	
	1 kV to 20 kV 20 kV to 38 kV	1.3 % 1.2 %	Using high voltage divider.	
Generation	0 mV to 220 mV 220 mV to 2.2 V 2.2 V to 11 V 11 V to 22 V 22 V to 220 V 220 V to 1000 V	10 $\mu V/V + 9.0 \mu V$ 13 $\mu V/V + 1.4 \mu V$ 15 $\mu V/V + 4.6 \mu V$ 15 $\mu V/V + 9.2 \mu V$ 18 $\mu V/V + 0.12 mV$ 18 $\mu V/V + 0.69 mV$	Using multifunction calibrator.	
DC CURRENT				B
Measurement				
Specific values	1 $\mu A$ 10 $\mu A$ 100 $\mu A$ 1 mA 10 mA 100 mA 1 A	45 $\mu A/A$ 25 $\mu A/A$ 24 $\mu A/A$ 24 $\mu A/A$ 24 $\mu A/A$ 41 $\mu A/A$ 87 $\mu A/A$	Using digital multimeter.	





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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
DC CURRENT (continued) Measurement (continued) Other values	0 $\mu$ A to 1 $\mu$ A 1 $\mu$ A to 10 $\mu$ A 10 $\mu$ A to 100 $\mu$ A 100 $\mu$ A to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A	320 pA 82 $\mu$ A/A 67 $\mu$ A/A 46 $\mu$ A/A 46 $\mu$ A/A 57 $\mu$ A/A 120 $\mu$ A/A	Using digital multimeter.	B
Generation	0 $\mu$ A to 220 $\mu$ A 220 $\mu$ A 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 11 A	110 $\mu$ A/A + 12 nA 83 $\mu$ A/A + 12 nA 19 $\mu$ A/A + 12 nA 140 $\mu$ A/A + 12 nA 180 $\mu$ A/A + 120 nA 0.10 %	Using multifunction calibrator.	B
	11 A to 200 A 200 to 550 A 550 to 1000 A	200 $\mu$ A/A + 0.16 A 0.10 % + 0.50 A 0.10 % + 0.85 A	For the calibration of clamp on ammeters and similar devices, using multi-turn method.	
AC VOLTAGE Measurement Specific values	<i>At 1 kHz</i> 10 mV 100 mV  <i>40 Hz to 1 kHz</i> 1 V 10 V 100 V 700 V  <i>1 kHz to 100 kHz</i> 1 V 10 V 100 V	190 $\mu$ V/V 73 $\mu$ V/V  64 $\mu$ V/V 65 $\mu$ V/V 160 $\mu$ V/V 310 $\mu$ V/V  620 $\mu$ V/V 620 $\mu$ V/V 930 $\mu$ V/V	Using digital multimeter.	B
Other values	<i>At 1 kHz</i> 1 mV to 10 mV 10 mV to 100 mV 100 mV to 1 V  <i>40 Hz to 1 kHz</i> 1 V to 10 V 10 V to 100 V 100 V to 700 V 700 V to 1 kV  <i>1 kHz to 100 kHz</i> 100 mV to 1 V 1 V to 10 V 10 V to 100 V	0.090 % 0.020 % 0.020 %  0.020 % 0.022 % 0.035 % 0.23 %  0.064 % 0.064 % 0.10 %	Using digital multimeter.	B



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
AC VOLTAGE (continued) Measurement (continued)	<i>At 50 Hz</i> 1 kV to 20 kV 20 kV to 28 kV	2.1 % 3.0 %	Using high voltage divider.	B
Generation	<i>At 1 kHz</i> 22 $\mu$ V to 2.2 mV 2.2 mV to 22 mV 22 mV to 220 mV	0.090 % + 5.8 $\mu$ V 0.024 % + 7.0 $\mu$ V 0.027 % + 12 $\mu$ V	Using multifunction calibrator.	
	<i>40 Hz to 20 kHz</i> 220 mV to 2.2 V 2.2 V to 22 V 22 V to 220 V 220 V to 700 V	0.022 % + 8.0 $\mu$ V 0.024 % + 81 $\mu$ V 0.036 % + 1.2 mV 0.23 % + 11 mV		
AC CURRENT Measurement Specific Values	<i>At 1 kHz</i> 100 $\mu$ A 1 mA	0.056 % 0.051 %	Using digital multimeter.	B
	<i>45 Hz to 1 kHz</i> 10 mA 100 mA 1 A	0.050 % 0.050 % 0.080 %		
Other values	<i>At 1 kHz</i> 5 $\mu$ A to 100 $\mu$ A 100 $\mu$ A to 1 mA	0.24 % 0.16 %	Using digital multimeter.	
	<i>45 Hz to 1 kHz</i> 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A	0.16 % 0.16 % 0.18 %		
Generation	<i>At 1 kHz</i> 9 $\mu$ A to 220 $\mu$ A 220 $\mu$ A to 2.2 mA	0.18 % + 23 nA 0.16 % + 47 nA	Using multifunction calibrator.	
	<i>45 Hz to 1 kHz</i> 2.2 mA to 22 mA 22 mA to 220 mA 220 mA to 2.2 A 1 A to 2.2 A 2.2 A to 11 A	0.16 % + 1.0 $\mu$ A 0.18 % + 4.6 $\mu$ A 0.16 % + 46 $\mu$ A 0.13 % 0.90 %		
	11 A to 200 A 200 A to 550 A	0.60 A 1.7 A	For the calibration of clamp on ammeters and similar devices, using multi-turn method.	



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
FREQUENCY	1 Hz to 1 MHz 1 MHz to 2.1 GHz	21 in $10^8 + 2.0$ mHz 21 in $10^8$	Using frequency counter.	B
Tachometer calibration	10 rpm to 50000 rpm	1.2 rpm	Using optical technique.	
Elapsed time	0 ms to 390 ms 391 ms to 100 s	1.0 ms 8.0 ms	Using counter timer.	B
17 <sup>TH</sup> EDITION TYPE EQUIPMENT Earth Loop	0.05 $\Omega$ 0.1 $\Omega$ 0.22 $\Omega$ 0.33 $\Omega$ 0.5 $\Omega$ 1 $\Omega$ 5 $\Omega$ 10 $\Omega$ 100 $\Omega$ 1 k $\Omega$	10 m $\Omega$ 11 m $\Omega$ 8.0 m $\Omega$ 8.0 m $\Omega$ 8.0 m $\Omega$ 10 m $\Omega$ 30 m $\Omega$ 59 m $\Omega$ 580 m $\Omega$ 5.8 m $\Omega$	Using dedicated calibrator.	B
RCD testers				B
Trip current	At 50 Hz 3 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 3 A	620 $\mu$ A 5.8 mA 59 mA 120 mA	Up to 5 seconds.	
Trip Time	At 30 mA, 50 Hz 10 ms to 390 ms 390 ms to 1 s	1.0 ms 8.1 ms		
Earth leakage current	0.2 mA to 7.7 mA	15 $\mu$ A		B
PAT Testers Earth bond current	At 50 Hz 100 mA 100 mA to 10 A 10 A to 30 A	8.0 mA 190 mA 520 mA		B
Earth Bond resistance Nominal values	0.05 $\Omega$ 0.1 $\Omega$ 0.22 $\Omega$ 0.33 $\Omega$ 0.5 $\Omega$ 1 $\Omega$ 5 $\Omega$ 10 $\Omega$ 100 $\Omega$ 1 k $\Omega$	7.5 m $\Omega$ 7.5 m $\Omega$ 7.6 m $\Omega$ 7.7 m $\Omega$ 8.0 m $\Omega$ 9.5 m $\Omega$ 30 m $\Omega$ 58 m $\Omega$ 580 m $\Omega$ 5.8 $\Omega$		B



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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty ( $k = 2$ )	Remarks	Location Code
17 <sup>TH</sup> EDITION TYPE EQUIPMENT (continued)				B
Insulation resistance Nominal source values	100 kΩ 500 kΩ 1 MΩ 5 MΩ 10 MΩ 20 MΩ 50 MΩ 100 MΩ	12 kΩ 12 kΩ 12 kΩ 21 kΩ 37 kΩ 72 kΩ 180 kΩ 350 kΩ		B
Load Tests	3 kVA	2.5 %		B
Flash tests	At 50 Hz 700 V to 1.9 kV	1.5 % + 5.0 V		
ELECTRICAL SIMULATION OF TEMPERATURE				B
Ambient temperature	17 °C to 23 °C	0.11 °C	In support of cold junction measurements.	
Temperature simulators and indicators, calibration by electrical simulation				
Base metal thermocouples	-200 °C to -100 °C	0.47 °C	Excluding cold junction compensation.	
	0 °C to +1370 °C	0.36 °C	Excluding cold junction compensation.	
	-200 °C to -100 °C	0.47 °C	Including cold junction compensation.	
	-100 °C to +1300 °C	0.38 °C	Including cold junction compensation.	
Noble metal thermocouples	0 °C to 1700 °C	1.8 °C	Excluding cold junction compensation.	
	0 °C to 1700 °C	1.8 °C	Including cold junction compensation.	
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:  $Q[a, b] = [a^2 + b^2]^{1/2}$