


Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

 <p>0361</p> <p>Accredited to ISO/IEC 17025:2005</p>	<h3>Pennine Instrument Services Limited</h3> <p>Issue No: 032 Issue date: 27 February 2017</p>	
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<p>Calibration performed at the above address only</p>		

DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ($k = 2$)	Remarks
ELECTRICAL CALIBRATION			
DC Voltage Measurement	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1100 V	9.0 ppm + 0.60 μ V 5.0 ppm 4.0 ppm 7.0 ppm 7.0 ppm	
Generation	0 mV to 330 mV 330 mV to 3.3 V 3.3 V to 33 V 33 V to 330 V 330 V to 1020 V	13 ppm + 1.6 μ V 8.0 ppm 9.0 ppm 11 ppm 12 ppm	
AC Voltage Measurement	1 mV to 12 mV 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	160 ppm + 0.8 μ V 100 ppm + 0.8 μ V 100 ppm + 0.8 μ V 160 ppm + 0.8 μ V 250 ppm + 0.8 μ V 0.63 % + 0.8 μ V	
	12 mV to 120 mV 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 1 MHz to 2 MHz	110 ppm 100 ppm 100 ppm 170 ppm 250 ppm 0.62 % 0.63 % 0.63 %	



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Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ($k = 2$)	Remarks
AC Voltage (cont'd) Measurement (cont'd)	120 mV to 1.2 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 1 MHz to 2 MHz 1.2 V to 12 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 2 MHz 12 V to 120 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 120 V to 700 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 ppm 100 ppm 100 ppm 160 ppm 250 ppm 280 ppm 0.62 % 0.62 % 110 ppm 100 ppm 100 ppm 100 ppm 390 ppm 410 ppm 0.62 % 130 ppm 110 ppm 120 ppm 250 ppm 680 ppm 690 ppm 720 ppm 230 ppm 210 ppm 260 ppm 260 ppm 260 ppm	



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Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ($k = 2$)	Remarks
AC Voltage (cont'd) Generation	<p><i>10 Hz to 45 Hz</i> 1 mV to 33 mV 33 mV to 33 V</p> <p><i>45 Hz to 10 kHz</i> 1 mV to 33 mV 33 mV to 330 V</p> <p><i>10 kHz to 20 kHz</i> 1 mV to 33 mV 33 mV to 330 mV 330 mV to 3.3 V 3.3 V to 33 V 33 V to 330 V</p> <p><i>20 kHz to 50 kHz</i> 1 mV to 33 mV 33 mV to 330 mV 330 mV to 3.3 V 3.3 V to 33 V 33 V to 330 V</p> <p><i>50 kHz to 100 kHz</i> 1 mV to 33 mV 33 mV to 330 mV 330 mV to 3.3 V 3.3 V to 33 V 33 V to 330 V</p> <p><i>100 kHz to 500 kHz</i> 1 mV to 33 mV 33 mV to 330 mV 330 mV to 3.3 V</p> <p>330 V to 1020 V 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz</p>	<p>0.060 % + 2.6 μV 0.030 %</p> <p>0.050 % + 2.6 μV 0.010 %</p> <p>0.050 % + 2.6 μV 0.020 % 0.010 % 0.010 % 0.010 %</p> <p>0.050 % + 2.6 μV 0.020 % 0.010 % 0.010 % 0.030 %</p> <p>0.060 % + 2.6 μV 0.020 % 0.040 % 0.010 % 0.090 %</p> <p>0.13 % + 2.6 μV 0.20 % 0.20 %</p> <p>0.010 % 0.010 % 0.030 %</p>	



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Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ($k = 2$)	Remarks
DC Current Measurement	0 μ A to 1.2 μ A 1.2 μ A to 12 μ A 12 μ A to 120 μ A 0.12 mA to 120 mA 0.12 A to 1.2 A 1.2 A to 2 A 2 A to 11 A	140 ppm + 0.50 nA 22 ppm + 0.50 nA 21 ppm 21 ppm 60 ppm 63 ppm 150 ppm	
DC Current Generation	0 μ A to 330 μ A 0.33 mA to 3.3 mA 3.3 mA to 33 mA 33 mA to 330 mA 0.33 A to 1.1 A 1.1 A to 3 A 3 A to 11 A 11 A to 20.5 A	110 ppm + 3.8 nA 35 ppm 33 ppm 42 ppm 190 ppm 190 ppm 350 ppm 440 ppm	
AC Current Measurement	20.5 A to 150 A 150 A to 1025 A	0.61 % 0.60 %	For the calibration of clampmeters only
AC Current Measurement	10 Hz to 1 kHz 2 μ A to 200 μ A 0.2 mA to 2 mA 2 mA to 20 mA 20 mA to 200 mA 0.2 A to 2 A	0.030 % + 2.0 nA 0.030 % 0.027 % 0.030 % 0.040 %	
AC Current Measurement	1 kHz to 5 kHz 2 μ A to 120 μ A	0.073 % + 2.0 nA	
AC Current Measurement	1 kHz to 10 kHz 0.12 mA to 12 mA 12 mA to 120 mA 120 mA to 1.05 A	0.040 % 0.050 % 0.12 %	
AC Current Measurement	1 kHz to 5 kHz 1.05 A to 2 A	0.16 %	
AC Current Measurement	20 Hz to 2 kHz 2 A to 11 A	0.040 %	
AC Current Measurement	2 kHz to 5 kHz 2 A to 11 A	0.084 %	
AC Current Generation	10 Hz to 20 Hz 30 μ A to 330 μ A 330 μ A to 3.3 mA 3.3 mA to 33 mA 33 mA to 330 mA	0.15 % + 60 nA 0.10 % 0.14 % 0.13 %	
AC Current Generation	20 Hz to 45 Hz 30 μ A to 330 μ A 330 μ A to 3.3 mA 3.3 mA to 330 mA	0.15 % + 60 nA 0.10 % 0.060 %	



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AC Current (cont'd) Generation (cont'd)	<i>10 Hz to 45 Hz</i> 330 mA to 1.1 A 1.1 A to 3 A <i>45 Hz to 1 kHz</i> 30 μ A to 330 μ A 330 μ A to 3.3 mA 3.3 mA to 330 mA 330 mA to 1.1 A 1.1 A to 3 A <i>1 kHz to 5 kHz</i> 30 μ A to 330 μ A 330 μ A to 3.3 mA 3.3 mA to 33 mA 33 mA to 330 mA 330 mA to 1.1 A 1.1 A to 3 A 3 A to 11 A 11 A to 20.5 A <i>5 kHz to 10 kHz</i> 30 μ A to 330 μ A 330 μ A to 3.3 mA 3.3 mA to 33 mA 33 mA to 330 mA <i>45 Hz to 100 Hz</i> 3 A to 11 A 11 A to 20.5 A <i>100 Hz to 1 kHz</i> 3 A to 11 A 11 A to 20.5 A <i>10 A to 1025 A</i> 45 Hz to 65 Hz 65 Hz to 100 Hz	0.050 % 0.04 % 0.14 % + 60 nA 0.10 % 0.060 % 0.050 % 0.040 % 0.24 % + 60 nA 0.12 % 0.090 % 0.070 % 0.090 % 0.040 % 0.23 % 0.25 % 0.28 % + 60 nA 0.13 % 0.14 % 0.10 % 0.060 % 0.080 % 0.070 % 0.090 % 0.40 % 0.90 %	For the calibration of clampmeters only
DC Resistance Measurement	0 Ω to 20 Ω 20 Ω to 200 Ω 200 Ω to 12 k Ω 12 k Ω to 120 k Ω 0.12 M Ω to 1.2 M Ω 1.2 M Ω to 12 M Ω 12 M Ω to 200 M Ω 200 M Ω to 2 G Ω	22 ppm + 1.0 $\mu\Omega$ 12 ppm 8.0 ppm 11 ppm 18 ppm 42 ppm 450 ppm 720 ppm	



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Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks
DC Resistance (cont'd)			
Generation			
Specific Values	0.0001 Ω	660 ppm	
	0.001 Ω	290 ppm	
	0.01 Ω	180 ppm	
	0.1 Ω	80 ppm	
	1 Ω	28 ppm	
	1.9 Ω	28 ppm	
	10 Ω	11 ppm	
	19 Ω	12 ppm	
	100 Ω	9.0 ppm	
	190 Ω	9.0 ppm	
	1 kΩ	6.0 ppm	
	1.9 kΩ	7.5 ppm	
	10 kΩ	8.5 ppm	
	19 kΩ	9.5 ppm	
	100 kΩ	9.0 ppm	
	190 kΩ	9.5 ppm	
	1 MΩ	9.5 ppm	
	1.9 MΩ	15 ppm	
	10 MΩ	29 ppm	
	19 MΩ	53 ppm	
	100 MΩ	190 ppm	
Other Values	0 Ω to 11 Ω	71 ppm + 60 μΩ	
	11 Ω to 33 Ω	79 ppm	
	33 Ω to 110 Ω	34 ppm	
	110 Ω to 330 Ω	20 ppm	
	330 Ω to 1.1 kΩ	12 ppm	
	1.1 kΩ to 3.3 kΩ	14 ppm	
	3.3 kΩ to 11 kΩ	12 ppm	
	11 kΩ to 33 kΩ	12 ppm	
	33 kΩ to 110 kΩ	12 ppm	
	110 kΩ to 330 kΩ	23 ppm	
	330 kΩ to 1.1 MΩ	18 ppm	
	1.1 MΩ to 3.3 MΩ	59 ppm	
	3.3 MΩ to 11 MΩ	64 ppm	
	11 MΩ to 33 MΩ	230 ppm	
	33 MΩ to 110 MΩ	300 ppm	
	110 MΩ to 330 MΩ	0.14 %	
	330 MΩ to 1.1 GΩ	0.55 %	
DC Power	Voltage: 1 V to 1000 V Current: 10 mA to 20 A 10 mW to 20 kW	500 ppm	
	Voltage: 1 V to 1000 V Current: 1 A to 1000 A 1 W to 1000 kW	0.70 %	For the calibration of power clamp meters



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Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks
AC Power	50 Hz to 1 kHz Voltage: 1 V to 1000 V Current: 10 mA to 20 A 10 mW to 20 kW	0.12 %	For the calibration of power clamp meters
	50 Hz to 1 kHz Voltage: 1 V to 1000 V Current: 1 A to 1000 A 1 W to 1000 kW	0.71 %	
Phase Angle	50 Hz to 1 kHz 0 ° to 360 °	0.16 °	
Frequency	0.01 Hz to 1 Hz	6.0 ppm	
	1 Hz to 100 kHz	1.0 in 10 ⁶	
	100 kHz to 1 MHz	1.0 in 10 ⁷	
	1 MHz to 125 MHz	3.0 in 10 ⁸	
Capacitance	1 kHz		
	190 pF to 400 pF	1.0 %	
	0.4 nF to 1.1 nF	0.30 %	
	1.1 nF to 3.3 nF	0.22 %	
	3.3 nF to 11 µF	0.20 %	
	11 µF to 33 µF 33 µF to 110 mF	0.240 % 0.28 %	
Temperature Indicators, calibration by electrical simulation			
Cold junction	21 °C to 25 °C	0.20 °C	For reporting CJ value in ambient conditions for electrical simulation of temperature.
Noble metal thermocouples	0 °C to 1820 °C	0.30 °C	Excluding cold junction compensation
	0 °C to 1820 °C	0.35 °C	Including cold junction compensation
Base metal thermocouples	- 200 °C to - 100 °C	0.25 °C	Excluding cold junction compensation
	- 100 °C to + 1380 °C	0.20 °C	
Resistance sensors (Pt 100)	- 200 °C to - 100 °C	0.35 °C	Including cold junction compensation
	- 100 °C to + 1380 °C	0.25 °C	
17th Edition capability			
Insulation Resistance	- 200 °C to + 800 °C	0.020 °C	
	10 kΩ to 5 MΩ	700 ppm	
	5 MΩ to 90 MΩ	0.36 %	
	90 MΩ to 1 GΩ 1 GΩ to 10 GΩ	1.2 % 1.4 %	



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Insulation Resistance: Voltage measurement	50 V to 1 kV @ 0.5 mA or 1 mA	0.09 %	
Continuity resistance	20 mΩ to 1 Ω	1.9 %	
	1 Ω to 20 Ω	1.5 %	
	100 Ω	0.2 %	
	1 kΩ	0.2 %	
Continuity resistance current	0 mA to 320 mA @ 1 Ω	0.62 %	
Loop impedance	50 Hz		
	0.2 mΩ to 0.4 Ω	30 mΩ	
	0.4 Ω to 0.8 Ω	31 mΩ	
	0.8 Ω to 3 Ω	32 mΩ	
	3 Ω to 8 Ω	33 mΩ	
	8 Ω to 20 Ω	42 mΩ	
	20 Ω to 200 Ω	210 mΩ	
200 Ω to 1 kΩ	1.2 Ω		
RCD Trip Current	50 Hz		
	1 mA to 60 mA	0.64 %	
	60 mA to 3 A	0.36 %	
RCD Trip time	20 ms to 400 ms	0.80 ms	
	400 ms to 5 s	8.3 ms	
PAT Testers			
Earth Bond resistance	0.2 Ω to 2 Ω	10 mΩ	
	2 Ω to 8 Ω	16 mΩ	
	8 Ω to 20 Ω	29 mΩ	
	20 Ω to 200 Ω	150 mΩ	
	200 Ω to 1 kΩ	1.60 Ω	
Earth bond current	0 mA to 300 mA	3.0 %	
	300 mA to 8 A	0.60 %	
	8A to 30 A	0.50 %	
Insulation resistance	10 kΩ to 5 MΩ	700 ppm	
	5 MΩ to 90 MΩ	0.36 %	
	90 MΩ to 300 MΩ	1.2 %	
	300 MΩ to 1 GΩ	1.2 %	
	1 GΩ to 2 GΩ	1.4 %	
Leakage current	50 Hz		
	1 μA to 10 mA	1.6 %	
Load	50 Hz		
	0.13 kW	2.5 %	
Flash voltage	1 kV to 1.8 kV	2.5 %	
	2 kV to 3.6 kV	2.5 %	
Flash current	0.3 mA to 3 mA	4.0 %	



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DIMENSIONAL CALIBRATION			
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED			
Length			All linear calibrations may also be made in inch units.
Feeler gauges	As BS 957:2008 0.02 to 1.00	3.0	
Gap Gauges (Plain parallel)	As BS 969:2008 0.5 to 100	3.0	
	100 to 200	3.5	
	200 to 300	4.0	
Length Gauges, Flat and Spherical-ended (excluding length bars)	0 to 3000	1.0 + (8.0 x length in m)	
Plain Plug Gauges (parallel) cylindrical setting standards and rollers	Diameter: 1 to 50	0.80	
	50 to 100	1.0	
	100 to 150	1.5	
Plain ring gauges (parallel)	5 to 15	2.0	
	15 to 50	1.8	
	50 to 100	2.0	
	100 to 150	2.5	
	150 to 200	3.0	
	200 to 500	8.0	
Measurement Instruments and Equipment	As BS 907:2008 and BS 2795:1981		
Dial gauges	0 to 50	1.0	
Micrometers	BS 870:2008 0 to 600)	
) Heads: 2.0 between any two points.
Internal	BS 959:2008 0 to 1000) Setting and extension rods:) 1.0 + (8.0 x length in m)	
Depth	BS 6468:2008 0 to 300)	
)	
Vernier caliper gauges	BS 887:2008 0 to 1000)	
)	
Vernier depth gauges	BS 6365:2008 0 to 600) Overall performance) 10 + (30 x length in m)	
)	
Vernier height gauges	BS 1643:2008 (withdrawn) ISO13225:2012 0 to 1000)	
)	



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ACOUSTICS			
Sound pressure level of sound calibrators			
CEL type 282			
Sound pressure level	1000 Hz	0.12 dB	With Brüel and Kjaer microphone type 4192 or 4134
Frequency		0.02 Hz	
Distortion		0.08%	
Verification of sound level meters to BS 7580:Part 1:1997			Sound level meter CEL type 424 HSE with microphone type CEL 425 supplied with appropriate sound calibrator
AIR VELOCITY			
Calibration of anemometers and pitot tubes with a digital display	0.3 m/s to 0.8 m/s 0.8 m/s to 1.5 m/s 1.5 m/s to 3 m/s 3 m/s to 5 m/s 5 m/s to 6 m/s 6 m/s to 7 m/s 7 m/s to 9 m/s 9 m/s to 11 m/s 11 m/s to 21 m/s 21 m/s to 26 m/s 26 m/s to 30 m/s	0.13 m/s 0.14 m/s 0.19 m/s 0.26 m/s 0.32 m/s 0.29 m/s 0.30 m/s 0.30 m/s 0.45 m/s 0.52 m/s 0.67 m/s	Calibration of devices up to 100 mm diameter may be undertaken
PRESSURE			
<u>Hydraulic pressure (gauge)</u>			
Calibration of pressure indicating instruments and gauges	140 kPa to 410 kPa 410 kPa to 4.1 MPa 4.1 MPa to 289 MPa	0.021 % 0.019 % 0.011 %	Calibration of pressure measuring devices with an electrical output may be undertaken.
<u>Hydraulic pressure (absolute)</u>			
Calibration of pressure indicating instruments and gauges	240 kPa to 510 kPa 510 kPa to 4.2 MPa 4.2 MPa to 289 MPa	0.021 % + 12 Pa 0.019 % + 12 Pa 0.011 % + 12 Pa	
<u>Gas pressure (gauge)</u>			
Calibration of pressure indicating instruments and gauges	-90 kPa to -1.5 kPa 1.5 kPa to 200 kPa 200 kPa to 7.1 MPa	0.016 % 0.015 % 0.024 % + 70 Pa	



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<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 315 kPa 315 kPa to 7.2 MPa	0.016 % + 12 Pa 0.016 % + 12 Pa 0.015 % + 12 Pa 0.024 % + 71 Pa	
END			