

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

 <p>UKAS CALIBRATION</p> <p>0361</p> <p>Accredited to ISO/IEC 17025:2005</p>	<h3>Pennine Instrument Services Limited</h3> <p>Issue No: 022 Issue date: 02 February 2011</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	7.0 ppm + 1.0 μ V 6.0 ppm 7.0 ppm 8.0 ppm 9.0 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	20 ppm + 2.0 μ V 11 ppm 12 ppm 18 ppm 18 ppm	
AC Voltage			
Measurement	1.0 Hz to 10 Hz 1 mV to 12 mV	0.052 % + 2.0 μ V	
	10 Hz to 100 Hz 1 mV to 12 mV	0.023 % + 2.0 μ V	
	100 Hz to 10 kHz 1 mV to 12 mV	0.037 % + 2.0 μ V	
	10 kHz to 100 kHz 1 mV to 12 mV	0.056 % + 2.0 μ V	
	100 kHz to 300 kHz 1 mV to 12 mV	0.063 % + 2.0 μ V	
	1 Hz to 20 kHz 12 mV to 120 V 120 v to 700 V	0.010 % 0.027 %	
	10 Hz to 20 kHz 700 V to 1100 V	0.03 %	



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AC Voltage (cont'd) Measurement (cont'd)	20 kHz to 50 kHz 12 mV to 120 V 120 V to 700 V	0.015 % 0.032 %	
	20 kHz to 30 kHz 700 V to 1100 V	0.090 %	
	50 kHz to 100 kHz 12 mV to 1.2 V 1.2 v to 12 V 12 V to 120 V 120 v to 700 V	0.021 % 0.033 % 0.038 % 0.050 %	
	100 kHz to 300 kHz 12 mV to 12 V 12 V to 120 V	0.038 % 0.049 %	
	300 kHz to 1 MHz 12 mV to 12 V 12 v to 120 V	0.41 % 0.46 %	
	1 MHz to 2 MHz 12 mV to 12 V	0.46 %	
	50 Hz 1.1 kV to 3.6 kV	65 V	
Generation	10 Hz to 45 Hz 1 mV to 33 mV 33 mV to 33 V	0.080 % + 3.0 μ V 0.030 %	
	45 Hz to 10 kHz 1 mV to 33 mV 33 mV to 33 V 33 V to 330 V	0.016 % + 3.0 μ V 0.015 % 0.020 %	
	10 kHz to 20 kHz 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	0.020 % + 3.0 μ V 0.018 % 0.019 % 0.024 % 0.025 %	
	20 kHz to 50 kHz 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	0.10 % + 3.0 μ V 0.035 % 0.030 % 0.035 % 0.03 %	



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AC Voltage (cont'd) Generation (cont'd)	<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 <i>100 kHz to 500 kHz</i> 1 mV to 33 mV 33 mV to 330 mV 330 mV to 3.3 V 330 V to 1020 V 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.25 % + 3.0 μ V 0.080 % 0.070 % 0.090 % 0.20 % 0.6 % + 3.0 μ V 0.21 % 0.24 % 0.030 % 0.025 % 0.030 %	
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 20.5 A to 1025 A	150 ppm + 4 nA 100 ppm 100 ppm 100 ppm 200 ppm 380 ppm 500 ppm 0.10 % 0.60 %	For the calibration of clampmeters only
AC Current Measurement	<i>10 Hz to 1 kHz</i> 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 <i>1 kHz to 5 kHz</i> 2 μ A to 120 μ A <i>1 kHz to 10 kHz</i> 0.12 mA to 12 mA 12 mA to 120 mA 120 mA to 1.05 A	0.030 % + 2.0 nA 0.030 % 0.027 % 0.030 % 0.040 % 0.073 % + 2.0 nA 0.040 % 0.050 % 0.12 %	



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AC Current (cont'd) Measurement (cont'd)	1 kHz to 5 kHz 1.05 A to 2 A	0.16 %	
	20 Hz to 2 kHz 2 A to 11 A	0.040 %	
	2 kHz to 5 kHz 2 A to 11 A	0.084 %	
	50 Hz 11 A to 30 A	300 mA	
Generation	10 Hz to 20 Hz 30 μ A to 330 μ A 330 μ A to 3.3 mA 3.3 mA to 330 mA	0.20 % + 60 nA 0.20 % 0.18 %	
	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 0.13 % 0.090 %	
	10 Hz to 45 Hz 330 mA to 3 A	0.18 %	
	45 Hz to 1 kHz 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	0.13 % + 60 nA 0.10 % 0.040 % 0.050 % 0.060 %	
	1 kHz to 5 kHz 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 3 A 3 A to 11 A 11 A to 20.5 A	0.30 % + 60 nA 0.50 % 0.080 % 0.10 % 0.060 % 3.0 % 3.0 %	
	5 kHz to 10 kHz 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	0.80 % + 60 nA 1.0 % 0.20 % 0.20 %	
	45 Hz to 100 Hz 3 A to 11 A 11 A to 20.5 A	0.060 % 0.12 %	
	100 Hz to 1 kHz 3 A to 11 A 11 A to 20.5 A	0.10 % 0.15 %	



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AC Current (cont'd)			
Generation (cont'd)	1.1 A to 1025 A	0.40 %	For the calibration of clampmeters only
	45 Hz to 65 Hz		
	65 Hz to 100 Hz	1.0 %	
DC Resistance			
Measurement	0 Ω to 20 Ω	22 ppm + 1.0 $\mu\Omega$	
	20 Ω to 200 Ω	12 ppm	
	200 Ω to 12 k Ω	8.0 ppm	
	12 k Ω to 120 k Ω	11 ppm	
	0.12 M Ω to 1.2 M Ω	18 ppm	
	1.2 M Ω to 12 M Ω	400 ppm	
	12 M Ω to 120 M Ω	700 ppm	
	120 M Ω to 2 G Ω	720 ppm	
Generation			
Specific Values	0.0001 Ω	0.90 %	
	0.001 Ω	350 ppm	
	0.01 Ω	300 ppm	
	0.1 Ω	140 ppm	
	1 Ω	36 ppm	
	1.9 Ω	32 ppm	
	10 Ω	20 ppm	
	19 Ω	20 ppm	
	100 Ω	18 ppm	
	190 Ω	18 ppm	
	1 k Ω	16 ppm	
	1.9 k Ω	16 ppm	
	10 k Ω	16 ppm	
	19 k Ω	16 ppm	
	100 k Ω	16 ppm	
	190 k Ω	16 ppm	
	1 M Ω	18 ppm	
	1.9 M Ω	22 ppm	
	10 M Ω	48 ppm	
	19 M Ω	82 ppm	
	100 M Ω	240 ppm	
Other Values	0 Ω to 11 Ω	50 ppm + 60 $\mu\Omega$	
	11 Ω to 33 Ω	63 ppm	
	33 Ω to 110 Ω	34 ppm	
	110 Ω to 330 Ω	28 ppm	
	330 Ω to 1.1 k Ω	28 ppm	
	1.1 k Ω to 3.3 k Ω	28 ppm	
	3.3 k Ω to 11 k Ω	28 ppm	
	11 k Ω to 33 k Ω	28 ppm	
	33 k Ω to 110 k Ω	28 ppm	
	110 k Ω to 330 k Ω	32 ppm	
	330 k Ω to 1.1 M Ω	32 ppm	
	1.1 M Ω to 3.3 M Ω	60 ppm	



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DC Resistance (cont'd)			
Other Values (cont'd)	3.3 M Ω to 11 M Ω 11 M Ω to 33 M Ω 33 M Ω to 110 M Ω 110 M Ω to 330 M Ω 330 M Ω to 1.1 G Ω	130 ppm 250 ppm 500 ppm 0.30 % 0.90 %	
AC Resistance	50 Hz 0.1 Ω to 5 Ω 5 Ω to 10 Ω 10 Ω to 100 Ω 1 k Ω	50 m Ω 70 m Ω 250 m Ω 1.4 Ω	Nominal values for the calibration of earth loop testers
Frequency	0.01 Hz to 1 Hz 1 Hz to 100 kHz 100 kHz to 1 MHz 1 MHz to 125 MHz	6.0 ppm 1.0 in 10 ⁶ 1.0 in 10 ⁷ 3.0 in 10 ⁸	
Time Interval	20 ms to 390 ms 400 ms to 3 s	1.2 ms 8.5 ms	Appropriate for the calibration of RCD testers
Capacitance	1 kHz 190 pF to 400 pF 0.4 nF to 3.3 nF 3.3 nF to 11 μ F 11 μ F to 33 μ F 33 μ F to 11 mF 11 mF to 33 mF 33 mF to 110 mF	1.2 % 0.50 % 0.25 % 0.40 % 0.45 % 0.75 % 1.1 %	
Temperature Indicators, calibration by electrical simulation			
Cold junction	21 $^{\circ}$ C to 25 $^{\circ}$ C	0.20 $^{\circ}$ C	For reporting CJ value in ambient conditions for electrical simulation of temperature.
Noble metal thermocouples	0 $^{\circ}$ C to 1820 $^{\circ}$ C	0.40 $^{\circ}$ C	Excluding cold junction compensation
Base metal thermocouples	- 200 $^{\circ}$ C to - 100 $^{\circ}$ C - 100 $^{\circ}$ C to + 1380 $^{\circ}$ C	0.25 $^{\circ}$ C 0.15 $^{\circ}$ C	Excluding cold junction compensation
	- 200 $^{\circ}$ C to - 100 $^{\circ}$ C - 100 $^{\circ}$ C to + 1380 $^{\circ}$ C	0.40 $^{\circ}$ C 0.25 $^{\circ}$ C	Including cold junction compensation
Resistance sensors (Pt 100)	- 200 $^{\circ}$ C to + 800 $^{\circ}$ C	0.020 $^{\circ}$ C	
DIMENSIONAL CALIBRATION			



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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	3.0	
Gap Gauges (Plain parallel)	As BS 969:2008		
	0.5 to 100	3.0	
	100 to 200	5.0	
	200 to 300	8.0	
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			
Dial gauges	As BS 907:2008 and BS 2795:1981	1.0	
Micrometers			
External	As BS 870:2008 and above	Heads: 2.0 between any two points.	
Internal	As BS 959:2008 and above	Setting and extension rods: 1.0 + (8.0 x length in m)	
Depth	As BS 6468:2008		
Vernier caliper gauges	As BS 887:2008	Overall performance	
Vernier depth gauges	As BS 6365:2008	10 + (30 x length in m)	
Vernier height gauges	As BS 1643:2008		



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ACOUSTICS Sound pressure level of sound calibrators CEL type 282 Verification of sound level meters to BS 7580:Part 1:1997	1000 Hz	0.13 dB	With Brüel and Kjaer microphone type 4192 and 4134 Sound level meter CEL type 424 HSE with microphone type CEL 425 supplied with appropriate sound calibrator
END			