

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: November 30, 2010

Certificate Number: 1995.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Dimensional

Parameter/Equipment	Range	Best Uncertainty ² (±)	Comments
Gage Blocks	(0.01 to 1) in (2 to 4) in (5 to 20) in	(3.7 + 2.2L) μin (1.2 + 4.3L) μin (1.2 + 4.4L) μin	By mechanical comparison
Length Standards ³	(1 to 20) in. flat end (21 to 80) in. flat end (1 to 20) in. spherical end (21 to 80) in. spherical end	(8.6 + 4.1L) μin (15 + 4.3L) μin (36 + 4.0L) μin (57 + 3.9L) μin	P&W 80 in LMM, supermic
Micrometers ³	(0 to 1) in (1 to 40) in	(48 + 0.2L) μin (70 + 4.8L) μin	Gage blocks
Calipers ³	Up to 6 in (6 to 40) in	(58 + 1.2L) μin (290 + 1.3L) μin	Gage blocks

Parameter/Equipment	Range	Best Uncertainty ² (\pm)	Comments
Ruled Standards ³ – Steel Rules Steel Tape	Up to 40 in Up to 100 ft	0.012 in 0.04 in	Starrett precision rule
Ring Gages ³	(0.06 to 1) in (1 to 4) in (4 to 12) in	15 μ in 20 μ in 28 μ in	Internal comparator
Pitch Diameter ³	(4 to 80) pitch	34 μ in	Van Keuren thread wires with P&W Supermic
Surface Flatness ³	0.0194 in Rise over 4 in 0.0155 in Rise over 4 in 0.0116 in Rise over 4 in 0.0078 in Rise over 4 in 0.0039 in Rise over 4 in 0.0019 in Rise over 4 in	110 μ in 90 μ in 67 μ in 45 μ in 22 μ in 12 μ in	Federal EMD-832P-50

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	Best Uncertainty ^{2, 6} (\pm)	Comments
DC Voltage Measuring Equipment ^{3, 4} –	(0 to 220) mV (0.22 to 2.2) V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	8 μ V/V + 0.6 μ V 7 μ V/V + 1.0 μ V 7 μ V/V + 3.8 μ V 7 μ V/V + 6.7 μ V 8 μ V/V + 82 μ V 9 μ V/V + 520 μ V	Fluke 5700A
	(0 to 330) mV (0 to 3.3) V (0 to 33) V (30 to 330) V (100 to 1020) V	49 μ V/V + 10 μ V 41 μ V/V + 93 μ V 42 μ V/V + 130 μ V 46 μ V/V + 840 μ V 46 μ V/V + 1.8 mV	Fluke 5500A

Parameter/Equipment	Range	Best Uncertainty ^{2,6} (\pm)	Comments
DC Voltage – Measuring Equipment, Fixed Points ^{3,4}	0.1 V	2.2 μ V/V	Datron 4910 with divider
	1 V	1.4 μ V/V	Datron 4910
	10 V	0.7 μ V/V	
	100 V	1.8 μ V/V	
	1000 V	2.2 μ V/V	Datron 4910 with divider
DC Voltage ^{3,5} – Measure	(0 to 120) mV (0.12 to 1.2) V (1.2 to 12) V (12 to 120) V (120 to 1050) V	13 μ V/V + 1 μ V 13 μ V/V + 9 μ V 12 μ V/V + 92 μ V 14 μ V/V + 89 μ V 15 μ V/V + 520 μ V	HP 3458A
	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V	58 μ V/V + 4 μ V 47 μ V/V + 8 μ V 41 μ V/V + 59 μ V 53 μ V/V + 710 μ V 53 μ V/V + 12 mV	HP 34401A
DC Current – Measuring Equipment ^{3,4}	(0 to 220) μ A (0.22 to 22) mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A	51 μ A/A + 8 nA 51 μ A/A + 8 nA 51 μ A/A + 8 nA 61 μ A/A + 0.8 μ A 82 μ A/A + 26 μ A	Fluke 5700A
	(0 to 3.3) mA (0 to 33) mA (0 to 330) mA (0 to 2.1) A (0 to 11) A	0.013 % + 92 nA 0.012 % + 1 μ A 0.020 % + 37 μ A 0.030 % + 140 μ A 0.050 % + 310 μ A	Fluke 5500A
DC Current ^{3,5} – Measure	(0 to 120) nA (0.12 to 1.2) μ A (1.2 to 12) μ A (12 to 120) μ A (0.12 to 1.2) mA (1.2 to 12) mA (12 to 120) mA (0.12 to 1.05) A	62 μ A/A + 8 nA 56 μ A/A + 8 nA 56 μ A/A + 8 nA 56 μ A/A + 8 nA 56 μ A/A + 10 nA 56 μ A/A + 82 nA 73 μ A/A + 820 nA 0.015 % + 26 nA	HP 3458A
	(0 to 20) A	8.9 μ A/A	Fluke Y5020 shunt

Parameter/Equipment	Range	Best Uncertainty ^{2, 6} (\pm)	Comments
DC Current ^{3, 5} – Measure (cont)	(0 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 3) A	0.06 % + 2 μ A 0.06 % + 6 μ A 0.12 % + 0.12 mA 0.15 % + 0.8 mA	HP 34401A
	(0 to 1000) A	0.32 %	HP 3458A with current shunts
Resistance – Measuring Equipment ^{3, 4}	Fixed Points	0 Ω (1, 1.9) Ω 10 Ω 19 Ω (100, 190) Ω (1, 1.9) k Ω (10, 19) k Ω (100, 190) k Ω 1 M Ω 1.9 M Ω 10 M Ω 19 M Ω 100 M Ω	Fluke 5700A
	Range	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) k Ω (1.1 to 3.3) k Ω (3.3 to 11) k Ω (11 to 33) k Ω (33 to 110) k Ω (110 to 330) k Ω (0.33 to 1.1) M Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω	Fluke 5500A
	By Decades	(1 to 10) Ω (0.1 to 1) k Ω (1 to 10) k Ω (0.1 to 1) M Ω (10 to 100) M Ω	3.9 $\mu\Omega/\Omega$ 0.95 $\mu\Omega/\Omega$ 0.7 $\mu\Omega/\Omega$ 1.1 $\mu\Omega/\Omega$ 8.2 $\mu\Omega/\Omega$

Parameter/Equipment	Range	Best Uncertainty ^{2,6} (±)	Comments
Resistance ^{3,5} – Measure	(0 to 12) Ω (12 to 120) Ω (0.12 to 1.2) kΩ (1.2 to 12) kΩ (12 to 120) kΩ (0.12 to 1.2) MΩ (1.2 to 12) MΩ (12 to 120) MΩ	33 μΩ/Ω + 59 μΩ 22 μΩ/Ω + 580 μΩ 18 μΩ/Ω + 590 μΩ 17 μΩ/Ω + 6 mΩ 18 μΩ/Ω + 59 mΩ 27 μΩ/Ω + 2 Ω 71 μΩ/Ω + 120 Ω 0.06 % + 1 kΩ	HP 3458A
	(0 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (0 to 100) MΩ	0.012 % + 0.11 mΩ 0.012 % + 12 mΩ 0.012 % + 0.12 Ω 0.012 % + 2 Ω 0.012 % + 12 Ω 0.05 % + 120 Ω 0.9 % + 12 kΩ	HP 34401A
Capacitance – Measuring Equipment ^{3,4}	(0.33 to 0.5) nF (0.5 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF (0.33 to 1.1) μF (1.1 to 3.3) μF (3.3 to 11) μF (11 to 33) μF (33 to 110) μF	0.58 % + 12 pF 0.58 % + 12 pF 0.58 % + 12 pF 0.58 % + 12 pF 0.29 % + 120 pF 0.29 % + 120 pF 0.29 % + 350 pF 0.29 % + 1 nF 0.40 % + 4 nF 0.40 % + 12 nF 0.46 % + 35 nF 0.60 % + 120 nF	Fluke 5500A
Electrical Calibration of Thermocouple Indicator – Measuring Equipment and Measure ^{3,4} Type E	-250 °C to -100 °C -100 °C to -25 °C -25 °C to 350 °C 350 °C to 650 °C 650 °C to 1000 °C	0.58 °C 0.19 °C 0.16 °C 0.18 °C 0.24 °C	Fluke 5500A

Parameter/Equipment	Range	Best Uncertainty ² (±)	Comments
Electrical Calibration of Thermocouple Indicator – Measuring Equipment and Measure ^{3,4} (cont.)			Fluke 5500A
Type J	-210 °C to -100 °C -100 °C to -30 °C -30 °C to 150 °C 150 °C to 760 °C 760 °C to 1200 °C	0.31 °C 0.19 °C 0.16 °C 0.2 °C 0.27 °C	
Type K	-200 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C	0.38 °C 0.21 °C 0.19 °C 0.3 °C 0.46 °C	
Type R	0 °C to 250 °C 250 °C to 400 °C 400 °C to 1000 °C 1000 °C to 1767 °C	0.66 °C 0.4 °C 0.38 °C 0.46 °C	
Type S	0 °C to 250 °C 250 °C to 1000 °C 1000 °C to 1400 °C 1400 °C to 1767 °C	0.54 °C 0.42 °C 0.43 °C 0.53 °C	
Type T	-250 °C to -150 °C -150 °C to 0 °C 0 °C to 120 °C 120 °C to 400 °C	0.73 °C 0.28 °C 0.19 °C 0.16 °C	
Electrical Calibration of RTD Indicator – Measuring Equipment ^{3,4}			Fluke 5500A
Pt 385, 100 Ω	-200 °C to -80 °C -80 °C to 0 °C 0 °C to 100 °C 100 °C to 300 °C 300 °C to 400 °C 400 °C to 630 °C 630 °C to 800 °C	0.059 °C 0.059 °C 0.082 °C 0.11 °C 0.12 °C 0.14 °C 0.27 °C	

Parameter/Range	Frequency	Best Uncertainty ^{2, 6} (\pm)	Comments
AC Voltage – Measuring Equipment ^{3, 4}			
(0.2 to 2.2) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.056 % + 4.6 μ V 0.022 % + 4.6 μ V 0.011 % + 4.6 μ V 0.038 % + 4.6 μ V 0.087 % + 7.1 μ V 0.11 % + 13 μ V 0.17 % + 26 μ V 0.35 % + 26 μ V	Fluke 5700A
(2.2 to 22) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.056 % + 5.1 μ V 0.021 % + 5.1 μ V 0.011 % + 5.1 μ V 0.038 % + 5.1 μ V 0.087 % + 7.1 μ V 0.11 % + 12 μ V 0.17 % + 26 μ V 0.35 % + 26 μ V	
(22 to 220) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.056 % + 13 μ V 0.021 % + 8 μ V 0.011 % + 8 μ V 0.038 % + 8 μ V 0.087 % + 26 μ V 0.11 % + 26 μ V 0.17 % + 36 μ V 0.35 % + 82 μ V	
(0.22 to 2.2) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.051 % + 82 μ V 0.016 % + 26 μ V 77 μ V/V + 6 μ V 0.012 % + 16 μ V 0.026 % + 71 μ V 0.044 % + 130 μ V 0.11 % + 360 μ V 0.22 % + 870 μ V	

Parameter/Range	Frequency	Best Uncertainty ^{2, 6} (\pm)	Comments
AC Voltage – Measuring Equipment ^{3, 4} (cont.) (2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.051 % + 820 μ V 0.016 % + 260 μ V 77 μ V/V + 62 μ V 0.012 % + 160 μ V 0.026 % + 360 μ V 0.051 % + 2 mV 0.13 % + 4 mV 0.28 % + 9 mV	Fluke 5700A
AC Current – Measuring Equipment ^{3, 4} (0 to 220) μ A	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.071 % + 26 nA 0.036 % + 20 nA 0.014 % + 16 nA 0.061 % + 41 nA 0.16 % + 82 nA	Fluke 5700A
(0.22 to 2.2) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.071 % + 42 nA 0.036 % + 38 nA 0.014 % + 38 nA 0.061 % + 41 nA 0.16 % + 82 nA	
(2.2 to 22) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.071 % + 420 nA 0.036 % + 380 nA 0.014 % + 380 nA 0.061 % + 4.1 μ A 0.16 % + 8.2 μ A	
(22 to 220) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.071 % + 4.2 μ A 0.036 % + 3.8 μ A 0.014 % + 3.8 μ A 0.061 % + 41 μ A 0.16 % + 82 μ A	

Parameter/Range	Frequency	Best Uncertainty ^{2,6} (±)	Comments
AC Current – Measuring Equipment ^{3,4} (cont.)			
(0.22 to 2.2) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.066 % + 38 µA 0.077 % + 82 µA 0.87 % + 160 µA	Fluke 5700A
(0.03 to 0.33) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.51 % + 300 nA 0.21 % + 300 nA 0.12 % + 550 nA 0.32 % + 550 nA 1.9 % + 9.6 µA	Fluke 5500A
(0.33 to 3.3) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.50 % + 2.8 µA 0.20 % + 2.7 µA 0.11 % + 2.7 µA 0.18 % + 6.7 µA 2.4 % + 12 µA	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.50 % + 28 µA 0.20 % + 27 µA 0.10 % + 54 µA 0.18 % + 37 µA 1.7 % + 130 µA	
(33 to 330) mA	(20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.22 % + 270 µA 0.17 % + 270 µA 0.22 % + 280 µA 1.9 % + 360 µA	
(0.33 to 2.2) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.26 % + 360 µA 0.22 % + 360 µA 0.60 % + 370 µA	
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz (0.5 to 1) kHz	0.05 % + 1.8 mA 0.08 % + 1.8 mA 0.26 % + 1.8 mA	

Parameter/Range	Frequency	Best Uncertainty ^{2, 6} (\pm)	Comments
AC Voltage ^{3, 5} – Measure			
(0 to 12) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.066 % + 5.7 μ V 0.026 % + 5.2 μ V 0.036 % + 5.2 μ V 0.12 % + 5.2 μ V 0.58 % + 7.1 μ V 4.6 % + 12 μ V	HP 3458A
(12 to 120) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.057 % + 13 μ V 0.014 % + 8.3 μ V 0.019 % + 8.3 μ V 0.051 % + 8.3 μ V 0.051 % + 8.3 μ V 1.2 % + 28 μ V 3.7 % + 81 μ V	
(0.12 to 1.2) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.052 % + 92 μ V 0.011 % + 24 μ V 0.018 % + 24 μ V 0.037 % + 28 μ V 0.096 % + 74 μ V 0.35 % + 170 μ V 1.2 % + 860 μ V	
(1.2 V to 12) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.052 % + 9.2 μ V 0.011 % + 240 μ V 0.018 % + 240 μ V 0.037 % + 280 μ V 0.096 % + 420 μ V 0.35 % + 1.9 mV 1.2 % + 8.6 mV	
(12 to 120) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.056 % + 9.2 mV 0.025 % + 2.4 mV 0.025 % + 2.4 mV 0.046 % + 4.4 mV 0.15 % + 8.3 mV 0.49 % + 90 mV 2.1 % + 190 mV	
(120 to 1050) V	(1 to 40) Hz	0.047 % + 23 mV	

Parameter/Range	Frequency	Best Uncertainty ^{2,6} (±)	Comments
AC Voltage ³ – Measure (cont)			
100 mV	(3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	1.2 % + 48 uV 0.41 % + 48 uV 0.07 % + 47 uV 0.14 % + 58 uV 0.70 % + 96 uV 4.8 % + 580 uV	HP 34401A
(1 to 220) V	(3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	1.2 % + 77 mV 0.41 % + 77 mV 0.07 % + 76 mV 0.14 % + 130 mV 0.70 % + 200 mV 4.6 % + 1.3 V	
(220 to 750) V	(50 to 100) kHz	0.07 % + 3.9 mV	
AC Current ^{3,5} – Measure			
(0 to 120) µA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 1) kHz	0.47 % + 34 nA 0.18 % + 31 nA 0.07 % + 31 nA 0.07 % + 28 nA	HP 3458A
(0.12 to 120) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz	0.47 % + 230 nA 0.18 % + 230 nA 0.07 % + 230 nA 0.07 % + 460 nA 1.6 % + 8.3 µA	
(0.12 to 12) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz	0.47 % + 2.3 µA 0.18 % + 2.3 µA 0.07 % + 2.3 µA 0.07 % + 4.6 µA 1.6 % + 8.3 µA	
(12 to 120) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz	0.47 % + 23 µA 0.18 % + 23 µA 0.071 % + 23 µA 0.070 % + 46 µA 1.6 % + 83 µA	

Parameter/Range	Frequency	Best Uncertainty ^{2,6} (±)	Comments
AC Current ^{3,5} – Measure (cont)			
(0.12 to 1.05) A	(20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz	0.20 % + 230 μA 0.11 % + 230 μA 0.14 % + 230 μA 0.93 % + 280 μA	HP 3458A
(0 to 1) A	(3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz	1.2 % + 590 μA 0.4 % + 590 μA 0.6 % + 590 μA	HP 34401A
(0 to 3) A	(3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz	1.3 % + 2.7 mA 0.4 % + 2.7 mA 0.3 % + 2.7 mA	HP 34401A
(0 to 20) A	DC to 5 kHz	0.013 %	Fluke Y5020 shunt

III. Mechanical

Parameter/Equipment	Range	Best Uncertainty ^{2,6} (±)	Comments
Torque Wrenches ³	(5 to 20) in·lb (50 to 250) in·lb (25 to 2000) ft·lb	2.2 % 1.4 % 1.3 %	CDI torque tester
Absolute Pressure ³	(0 to 30) psia	0.0054 psia	Mensor 2101 DPG

Parameter/Equipment	Range	Best Uncertainty ^{2, 6} (±)	Comments
Pressure Gauges ³	(4 to 854) inH ₂ O (1 to 30) psi	0.011 %	Ametek PKII deadweight tester
	(4 to 1100) inH ₂ O (1 to 300) psi	0.011 %	Ametek RK deadweight tester
	(0.1 to 17.5) psi (1.7 to 70) psi (2 to 700) psi	0.013 % 0.013 % 0.016 %	Ruska 2465
	(100 to 2500) psi	0.01 %	Ruska 2470
	(6 to 2400) psi (30 to 12 000) psi	0.0055 % 0.0070 %	Ruska 2400
	(100 to 1500) psi (500 to 7500) psi (1000 to 15 000) psi	0.0096 % 0.012 % 0.012 %	Ametek type T
Mass ³	(1 to 3) lb (4 to 5) lb (10 to 25) lb (30 to 50) lb	0.003 g (6.7 µlb) 0.03 g (67 µlb) 0.5 g (1200 µlb) 0.33 g (730 µlb)	Mass standards calibrated with digital scales using the single substitution method
	(0.0005 to 0.3) oz (0.5 to 1) oz (2 to 4) oz (4 to 8) oz	0.06 mg (0.13 µlb) 0.08 mg (0.18 µlb) 0.3 mg (0.67 µlb) 3.4 mg (7.5 µlb)	
	1 mg to 20 g (20 to 50) g (50 to 100) g	0.006 mg 0.09 mg 0.34 mg	
	(0 to 100) g (100 to 200) g (200 to 400) g	0.06 mg 0.3 mg 0.01 g	
	(1 to 1.2) kg (0.5 to 2) kg (2 to 4) kg (4 to 12) kg (12 to 30) kg	0.03 g 0.05 g 0.1 g 0.6 g 0.8 g	

IV. Thermodynamics

Parameter/Equipment	Range	Best Uncertainty ² (±)	Comments
Temperature – Measuring Equipment			
Triple Point of Water Cell	0.01 °C	0.00035 °C	Hart 5901A
Temperature Bath	-100 °C to -40 °C -40 °C to 150 °C 150 °C to 300 °C	5 °C 1 °C 5 °C	Hart 5309
Temperature – Measure ³	-200 °C to 660 °C -200 °C to 660 °C	0.015 °C 0.016 °C	Hart 5628 PRT
	0 °C to 1000 °C 1000 °C to 1100 °C 1100 °C to 1200 °C 1200 °C to 1300 °C 1300 °C to 1450 °C	0.37 °C 0.9 °C 1.5 °C 2.1 °C 2.9 °C	Hart 5650 with type S thermocouple

V. Time & Frequency

Parameter/Equipment	Range	Best Uncertainty ^{2,6} (±)	Comments
Frequency ³ – Measure	(1 to 40) Hz 40 Hz to 10 MHz	0.059 % 0.016 %	HP 3458A
	(3 to 5) Hz (5 to 10) Hz (10 to 40) Hz 40 Hz to 300 kHz	0.12 % 0.06 % 0.04 % 0.02 %	HP 34401A
	DC to 50 MHz	0.076 µHz/Hz	HP 5245L

¹ This laboratory offers commercial calibration service and field calibration services.

- ² “Best Uncertainty” is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer’s device, to the environment and to influences from the circumstances of the specific calibration.
- ³ Field calibration service is available for this calibration and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the uncertainties achievable on a customer's site can normally be expected to be larger than the Best Measurement Capabilities (BMC) that the accredited laboratory has been assigned as Best Uncertainty on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the calibration uncertainty being larger than the BMC. Field environmental conditions are limited to 15 °C to 30 °C and <80% relative humidity to 30 °C.
- ⁴ Fluke 5700A and 5500A best uncertainties are based upon the temperature the standard was calibrated ($t_{cal} \pm 5$ °C) and assuming the instrument is zeroed at least every seven days or when the ambient temperature changes more than 5 °C. For Resistance, a zero calibration is performed at least every 12 hours within ± 1 °C of use. For AC Current, best uncertainties are determined with the LCOMP off. Best uncertainties are also based upon 1-year floor specifications. Best measurement uncertainties are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.
- ⁵ HP 3458A best uncertainties are based upon the temperature the standard was calibrated ($t_{cal} \pm 5$ °C) and an auto calibration (ACAL) was performed within the previous 24 hours (± 1 °C of ambient temperature.) Best uncertainties are also based upon 1-year floor specifications. Best measurement uncertainties are expressed as either a specific value that covers the full range or as a combination of the fraction of the reading/output plus a range specification.
- ⁶ In the statement of best uncertainty, percentages are percentages of reading, unless otherwise indicated.