



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994 & ANSI/NCSL Z540.3

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CALIBRATION

Valid To: March 31, 2026

Certificate Number: 2353.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 8}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2, 5} (±)	Comments
Dial & Digital Indicators	Up to 2 in	15 µin + 3.9 µin/in	Gage blocks
Micrometers			
Linearity	Up to 40 in	9.2 µin + 7.6 µin/in	Gage blocks
Parallelism	50 µin	11 µin	
Flatness	Up to 1 in	6.2 µin	Optical flat
Height Gages	Up to 40 in	15 µin + 7.6 µin/in	Gage blocks, surface plate
Depth Gages	Up to 40 in	15 µin + 7.6 µin/in	Gage blocks, surface plate
Calipers			
Outside Diameter	Up to 40 in	9.2 µin + 7.8 µin/in	Gage blocks
Inside Diameter	1.0 in	32 µin	Ring gages
Step & Depth	Up to 40 in	15 µin + 7.6 µin/in	Gage blocks, surface plate
Rulers	Up to 36 in	0.0014 in + 62 µin/in	Gage blocks, master rule

Parameter/Equipment	Range	CMC ^{2, 5} ($\pm$)	Comments
Pin Gages	(0 to 2) in	13 μ in + 9.3 μ in/in	ULM, gage blocks

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} ($\pm$)	Comments
DC Voltage ³ – Generate	Up 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	0.49 μ V + 5.7 nV/mV 0.8 μ V + 3.5 μ V/V 2.9 μ V + 2.5 μ V/V 4.3 μ V + 2.5 μ V/V 43 μ V + 3.5 μ V/V 0.42 mV + 4.5 μ V/V	Fluke 5720A
	(0 to 120) mV (0 to 1.2) V (0 to 12) V (0 to 120) V (0 to 1020) V	0.8 μ V + 9.3 μ V/V 1.9 μ V + 5.8 μ V/V 10 μ V + 6.2 μ V/V 0.1 mV + 8.5 μ V/V 1 mV + 8.5 μ V/V	Fluke 5560A
Fixed Point	10.0 V	42 μ V	Fluke 732A
DC Voltage ³ – Measure	(0 to 0.1) V (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1100) V	0.33 μ V + 17 nV/mV 0.52 μ V + 8 μ V/V 8.8 μ V + 8.1 μ V/V 35 μ V + 10 μ V/V 2 mV + 11 μ V/V	Agilent 3458A
DC High Voltage ³ – Measure	(1 to 45) kV	0.13 %	Ross VD45 w/Fluke 187
	(45 to 160) kV	0.13 %	Ross VMP200 w/Fluke 187

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} (±)	Comments
DC Current ³ – Generate	Up to 220 µA (0.22 to 2.2) mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A (2.2 to 11) A (11 to 20.5) A ± (0 to 120) µA ± (0 to 1.2) mA ± (0 to 12) mA ± (0 to 120) mA ± (0 to 1.2) A ± (0 to 3.1) A ± (0 to 12) A ± (0 to 30.2) A	6 nA + 35 pA/µA 7.1 nA + 30 nA/mA 41 nA + 30 nA/mA 0.73 µA + 50 nA/mA 12 µA + 0.11 mA/A 0.49 mA + 0.34 mA/A 9.4 mA + 0.8 mA/A 6 nA + 97 µA/A 15 nA + 78 µA/A 82 nA + 78 µA/A 0.82 µA + 78 µA/A 10 µA + 0.12 mA/A 0.15 mA + 0.23 mA/A 0.25 mA + 0.23 mA/A 0.5 mA + 0.78 mA/A	Fluke 5720A w/5725A Fluke 5522A Fluke 5560A
Clamp-On Only ³	(10 to 16.5) A (16.5 to 150) A (150 to 1025) A	50 mA + 6.5 mA/A 0.18 A + 3.4 mA/A 0.83 A + 3.3 mA/A	Fluke 5522A w/coil
DC Current ³ – Measure	(0 to 100) nA (0.1 to 1) µA (0.1 to 10) µA (0.1 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 20) A	41 pA + 89 fA/nA 41 pA + 28 pA/µA 0.4 nA + 24 pA/µA 0.83 nA + 22 pA/µA 5.8 nA + 24 nA/mA 53 nA + 20 nA/mA 0.53 µA + 37 nA/mA 10 µA + 0.11 mA/A 0.0069 %	Agilent 3458A w/Fluke Y5020
Resistance ³ – Measure	1 mΩ 10 mΩ 100 mΩ	0.0024 % 0.0024 % 0.0031 %	Current transfer using L&N shunts, Agilent 3458A

Parameter/Equipment	Range	CMC ^{2, 4, 5} ($\pm$)	Comments
Resistance ³ – Generate	(0 to 10.9999) Ω (11 to 32.9999) Ω (33 to 109.9999) Ω (110 to 329.9999) Ω (0.33 to 1.099 999) k Ω (1.1 to 3.299 999) k Ω (3.3 to 10.999 99) k Ω (11 to 32.999 99) k Ω (33 to 109.999) k Ω (110 to 329.999) k Ω (0.33 to 1.099 99) M Ω (1.1 to 3.299 00) M Ω (3.3 to 10.9999) M Ω (11 to 32.9999) M Ω (33 to 109.9999) M Ω (110 to 329.9999) M Ω (330 to 1100) M Ω	1.2 m Ω + 24 $\mu\Omega/\Omega$ 1.5 m Ω + 24 $\mu\Omega/\Omega$ 1.9 m Ω + 22 $\mu\Omega/\Omega$ 4.1 m Ω + 22 $\mu\Omega/\Omega$ 9.1 m Ω + 22 $\mu\Omega/\Omega$ 41 m Ω + 22 $\mu\Omega/\Omega$ 92 m Ω + 22 $\mu\Omega/\Omega$ 0.41 Ω + 22 $\mu\Omega/\Omega$ 0.9 Ω + 22 $\mu\Omega/\Omega$ 8.4 Ω + 26 $\mu\Omega/\Omega$ 14 Ω + 26 $\mu\Omega/\Omega$ 93 Ω + 48 $\mu\Omega/\Omega$ 0.4 k Ω + 0.1 m Ω/Ω 4.4 k Ω + 0.2 m Ω/Ω 16 k Ω + 0.4 m Ω/Ω 0.35 M Ω + 2.4 m Ω/Ω 4.4 M Ω + 12 m Ω/Ω	Fluke 5522A
	(0 to 12) Ω (12 to 120) Ω 120 Ω to 1.2 k Ω (1.2 to 12) k Ω (12 to 120) k Ω 120 k Ω to 1.2 M Ω (1.2 to 12) M Ω (12 to 120) M Ω (120 to 1200) M Ω	1 m Ω + 19 $\mu\Omega/\Omega$ 1.2 m Ω + 19 $\mu\Omega/\Omega$ 4.4 m Ω + 19 $\mu\Omega/\Omega$ 44 m Ω + 19 $\mu\Omega/\Omega$ 0.44 Ω + 19 $\mu\Omega/\Omega$ 4.4 Ω + 19 $\mu\Omega/\Omega$ 63 Ω + 27 $\mu\Omega/\Omega$ 6.5 k Ω + 0.33 m Ω/Ω 0.47 M Ω + 3.1 m Ω/Ω	Fluke 5560A
Fixed Points	0 Ω 1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 k Ω 1.9 k Ω 10 k Ω 19 k Ω 100 k Ω 190 k Ω 1 M Ω 1.9 M Ω 10 M Ω 19 M Ω 100 M Ω	50 $\mu\Omega$ 95 $\mu\Omega$ 0.18 m Ω 0.26 m Ω 0.48 m Ω 1.1 m Ω 2 m Ω 9 m Ω 17 m Ω 90 m Ω 0.17 Ω 1.1 Ω 2.1 Ω 18 Ω 36 Ω 0.37 k Ω 0.89 k Ω 10 k Ω	Fluke 5720A

Parameter/Equipment	Range	CMC ^{2, 4, 5} (±)	Comments
Resistance ³ – Generate (cont)	1 mΩ 10 mΩ 100 mΩ 100 Ω 1 kΩ 1 MΩ	23 nΩ 0.12 μΩ 1.2 μΩ 1.2 mΩ 12 mΩ 23 Ω	L&N shunts
Resistance ³ – Generate, Fixed Point, High Voltage Up to 100 V Up to 1000 V Up to 5000 V	 10 MΩ 100 MΩ 1 GΩ 10 GΩ 100 GΩ 1 TΩ 10 TΩ 10 MΩ 100 MΩ 1 GΩ 10 GΩ 100 GΩ 1 TΩ 10 TΩ	 1.2 kΩ 18 kΩ 7.1 MΩ 75 MΩ 1.5 GΩ 29 GΩ 0.72 TΩ 54 kΩ 0.5 MΩ 8.7 MΩ 87 MΩ 1.5 GΩ 29 GΩ 0.76 TΩ	IET VRS-100-11-1K- BP-10KV
Resistance ³ – Measure	(0 to 10) Ω (10 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 (10 to 100) MΩ (0.1 to 1) GΩ	55 μΩ + 15 μΩ/Ω 0.52 mΩ + 13 μΩ/Ω 0.53 mΩ + 10 μΩ/Ω 5.3 mΩ + 10 μΩ/Ω 53 mΩ + 11 μΩ/Ω 2.3 Ω + 17 μΩ/Ω 0.1 kΩ + 55 μΩ/Ω 1 kΩ + 0.52 mΩ/Ω 10 kΩ + 5.1 mΩ/Ω	Agilent 3458A

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
AC Voltage ³ – Generate			
Up 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 500 kHz to 1 MHz	4 μ V + 0.33 μ V/mV 4 μ V + 85 nV/mV 4 μ V + 75 nV/mV 4 μ V + 0.18 μ V/mV 5 μ V + 0.46 μ V/mV 10 μ V + 0.9 μ V/mV 20 μ V + 1.2 μ V/mV 20 μ V + 2.5 μ V/mV	Fluke 5720A
(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 500 kHz to 1 MHz	4.5 μ V + 0.22 μ V/mV 4.2 μ V + 85 nV/mV 4.2 μ V + 75 nV/mV 4.4 μ V + 0.18 μ V/mV 6.1 μ V + 0.46 μ V/mV 12 μ V + 0.9 μ V/mV 23 μ V + 1.2 μ V/mV 26 μ V + 2.5 μ V/mV	
(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 500 kHz to 1 MHz	17 μ V + 0.22 μ V/mV 9 μ V + 85 nV/mV 8.7 μ V + 75 nV/mV 11 μ V + 0.18 μ V/mV 16 μ V + 0.46 μ V/mV 31 μ V + 0.9 μ V/mV 48 μ V + 1.2 μ V/mV 78 μ V + 2.5 μ V/mV	

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
AC Voltage ³ – Generate (cont)			
220 mV 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 500 kHz to 1 MHz	90 μ V + 0.22 mV/V 34 μ V + 79 μ V/V 18 μ V + 39 μ V/V 26 μ V + 70 μ V/V 54 μ V + 0.11 mV/V 0.16 mV + 0.34 mV/V 0.56 mV + 0.83 mV/V 0.64 mV + 1.5 mV/V	Fluke 5720A
(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 500 kHz to 1 MHz	0.89 mV + 0.22 mV/V 0.34 mV + 80 μ V/V 0.15 mV + 40 μ V/V 0.26 mV + 70 μ V/V 0.41 mV + 0.1 mV/V 1.2 mV + 0.26 mV/V 4 mV + 0.9 mV/V 6.1 mV + 1.3 mV/V	
(22 to 220) 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 500 kHz to 1 MHz	8.9 mV + 0.22 mV/V 3.4 mV + 80 μ V/V 1.7 mV + 47 μ V/V 3.5 mV + 72 μ V/V 5.9 mV + 0.13 mV/V 34 mV + 0.8 mV/V 0.13 V + 4.2 mV/V 0.24 V + 7 mV/V	* 220 V range subject to 2.2E7 V- Hz limitation
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	93 mV + 0.36 mV/V 0.34 V + 1.3 mV/V	w/5725A
(220 to 1100) V	40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz	22 mV + 80 μ V/V 34 mV + 0.13 mV/V 93 mV + 0.36 mV/V	

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
AC Voltage – Generate			
(1 to 12) mV	(0.01 to 3) Hz (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 (300 to 500) kHz	0.11 mV + 50 mV/V 8.9 μ V + 1.9 mV/V 7.7 μ V + 0.68 mV/V 6.1 μ V + 0.12 mV/V 6.3 μ V + 0.29 mV/V 16 μ V + 1.2 mV/V 36 μ V + 6.2 mV/V 36 μ V + 6.2 mV/V	Fluke 5560A
(12 to 120) mV	(0.01 to 3) Hz (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 (300 to 500) kHz	1.2 mV + 50 mV/V 30 μ V + 1.9 mV/V 15 μ V + 0.68 mV/V 7.4 μ V + 0.11 mV/V 11 μ V + 0.27 mV/V 28 μ V + 0.62 mV/V 49 μ V + 1.6 mV/V 49 μ V + 1.6 mV/V	
(0.12 to 1.2) V	(0.01 to 3) Hz (3 to 5) Hz (5 to 10) Hz (10 to 40) Hz 40.01 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz	12 mV + 50 mV/V 0.3 mV + 1.9 mV/V 0.15 mV + 0.68 mV/V 74 μ V + 0.11 mV/V 21 μ V + 0.11 mV/V 42 μ V + 0.23 mV/V 0.11 mV + 0.54 mV/V 0.26 mV + 1.5 mV/V 0.26 mV + 1.5 mV/V	
(1.2 to 12) V	(0.01 to 3) Hz (3 to 5) Hz (5 to 10) Hz (10 to 40) Hz 40.01 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz	0.12 V + 50 mV/V 3 mV + 1.9 mV/V 1.6 mV + 0.68 mV/V 0.49 mV + 0.11 mV/V 0.18 mV + 0.11 mV/V 0.33 mV + 0.23 mV/V 0.77 mV + 0.54 mV/V 2.5 mV + 1.6 mV/V 2.5 mV + 1.6 mV/V	
(12 to 120) V	(0.01 to 3) Hz (3 to 5) Hz (5 to 10) Hz (10 to 40) Hz 40.01 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz**	1.2 V + 50 mV/V 30 mV + 1.9 mV/V 16 mV + 0.68 mV/V 4.8 mV + 0.11 mV/V 1.8 mV + 0.11 mV/V 3.3 mV + 0.23 mV/V 7.7 mV + 0.54 mV/V 39 mV + 1.6 mV/V	
			** Max output 70 V

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
AC Voltage – Generate (cont)			
(120 to 330) V	(3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.3 V + 1.9 mV/V 0.16 V + 0.68 mV/V 21 mV + 0.11 mV/V 36 mV + 0.23 mV/V 0.16 V + 1.2 mV/V	Fluke 5560A
(330 to 1020) V	(3 to 5) Hz (5 to 10) Hz 10 Hz to 10 kHz	0.7 V + 1.9 mV/V 0.3 V + 0.68 mV/V 0.12 V + 0.11 mV/V	
AC Voltage ³ – Measure			
(0.1 to 10) 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	6.1 μ V + 0.3 μ V/mV 4.1 μ V + 0.2 μ V/mV 4.2 μ V + 0.3 μ V/mV 4.9 μ V + 1 μ V/mV 8.9 μ V + 5 μ V/mV 45 μ V + 40 μ V/mV	Agilent 3458A
(10 to 100) 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 (1 to 2) MHz	12 μ V + 70 nV/mV 2.7 μ V + 70 nV/mV 11 μ V + 0.14 μ V/mV 12 μ V + 0.3 μ V/mV 17 μ V + 0.8 μ V/mV 47 μ V + 3 μ V/mV 0.12 mV + 10 μ V/mV 3.8 mV + 15 μ V/mV	
100 mV to 1 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 (1 to 2) MHz	0.12 mV + 70 μ V/V 0.1 mV + 70 μ V/V 0.11 mV + 0.14 mV/V 0.12 mV + 0.3 mV/V 0.17 mV + 0.8 mV/V 0.47 mV + 3 mV/V 1.2 mV + 10 mV/V 38 mV + 15 mV/V	
(1 to 10) 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 (1 to 2) MHz	1.2 mV + 70 μ V/V 1 mV + 70 μ V/V 1.1 mV + 0.14 mV/V 1.2 mV + 0.3 mV/V 1.7 mV + 0.8 mV/V 4.7 mV + 3 mV/V 12 mV + 10 mV/V 0.38 V + 15 mV/V	

Parameter/Range	Frequency	CMC ^{2, 4, 5, 6} (±)	Comments
AC Voltage ³ – Measure (cont)			
(10 to 100) 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	13 mV + 0.2 mV/V 11 mV + 0.2 mV/V 11 mV + 0.2 mV/V 13 mV + 0.35 mV/V 21 mV + 1.2 mV/V 57 mV + 4 mV/V 0.17 V + 15 mV/V	Agilent 3458A
(100 to 1000) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	99 mV + 0.4 mV/V 85 mV + 0.4 mV/V 99 mV + 0.6 mV/V 0.14 V + 1.2 mV/V 0.26 V + 3 mV/V	
AC High Voltage ³ – Measure			
(1 to 30) kV	60 Hz	0.59 %	Ross VD45 w/Fluke 187
(30 to 100) kV	60 Hz	0.59 %	Ross VD200 w/Fluke 187
AC Current ³ – Generate			
Up to 220 µA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	63 nA + 0.13 nA/µA 12 nA + 0.14 nA/µA 9 nA + 0.11 nA/µA 15 nA + 0.25 nA/µA 75 nA + 0.9 nA/µA 0.69 µA + 13 nA/µA	Fluke 5720A w/5725A Fluke 5522A
(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 (10 to 30) kHz	93 nA + 0.23 µA/mA 67 nA + 0.14 µA/mA 60 nA + 0.11 µA/mA 0.15 µA + 0.18 µA/mA 0.85 µA + 0.9 µA/mA 3.4 µA + 8 µA/mA	Fluke 5720A w/5725A Fluke 5522A
(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 (10 to 30) kHz	0.92 µA + 0.23 µA/mA 0.69 µA + 0.14 µA/mA 0.6 µA + 0.11 µA/mA 0.95 µA + 0.18 µA/mA 7 µA + 0.9 µA/mA 14 µA + 3.2 µA/A	Fluke 5720A w/5725A Fluke 5522A

Parameter/Range	Frequency	CMC ^{2, 4, 5} ($\pm$)	Comments
AC Current ³ – Generate (cont)			
(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 (10 to 30) kHz	9.3 μ A + 0.23 μ A/mA 6.8 μ A + 0.14 μ A/mA 5 μ A + 0.11 μ A/mA 7.5 μ A + 0.18 μ A/mA 30 μ A + 0.9 μ A/mA 0.27 mA + 3.2 μ A/mA	Fluke 5720A w/5725A Fluke 5522A
(0.22 to 2.2) A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	89 μ A + 0.24 mA/A 0.17 mA + 0.39 mA/A 1.5 mA + 6 mA/A	Fluke 5720A
(2.2 to 11) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	1.1 mA + 0.4 mA/A 2.3 mA + 0.85 mA/A 8 mA + 3.3 mA/A	Fluke 5720A w/5725A
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	15 mA + 0.96 mA/A 17 mA + 1.2 mA/A 0.27 A + 24 mA/A	Fluke 5522A
Clamp-On Only ³			
Toroidal			
(10 to 16.5) A (16.5 to 150) A (150 to 1025) A	(45 to 65) Hz	26 mA + 2.1 mA/A 50 mA + 1.9 mA/A 0.34 A + 1.9 mA/A	Fluke 5522A w/coil
(10 to 16.5) A (16.5 to 150) A (150 to 1025) A	(65 to 440) Hz	60 mA + 6 mA/A 0.11 A + 5.3 mA/A 0.86 A + 5.3 mA/A	
Non-Toroidal			
(10 to 16.5) A (16.5 to 150) A (150 to 1025) A	(45 to 65) Hz	60 mA + 3.8 mA/A 0.23 A + 3.7 mA/A 1.2 A + 3.7 mA/A	
(10 to 16.5) A (16.5 to 150) A (150 to 1025) A	(65 to 440) Hz	90 mA + 7.2 mA/A 0.28 A + 6.7 mA/A 1.6 A + 6.7 mA/A	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
AC Current – Generate			
(12 to 120) µA	(3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	12 nA + 0.19 mA/A 12 nA + 0.19 mA/A 12 nA + 0.19 mA/A 52 nA + 1.2 mA/A 1 µA + 3.9 mA/A	Fluke 5560A
(0.12 to 1.2) mA	(3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.13 µA + 0.19 mA/A 0.13 µA + 0.19 mA/A 0.13 µA + 0.19 mA/A 0.25 µA + 1.2 mA/A 5.5 µA + 3.9 mA/A	
(1.2 to 12) mA	(3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	1.3 µA + 0.19 mA/A 1.3 µA + 0.19 mA/A 1.3 µA + 0.19 mA/A 2.5 µA + 1.2 mA/A 15 µA + 3.9 mA/A	
(12 to 120) mA	(3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	13 µA + 0.19 mA/A 6.5 µA + 0.12 mA/A 10 µA + 0.19 mA/A 25 µA + 1.2 mA/A 0.15 mA + 3.9 mA/A	
(0.12 to 1.2) A	(3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.13 mA + 0.18 mA/A 75 µA + 0.19 mA/A 0.1 mA + 0.19 mA/A 0.53 mA + 1.9 mA/A 0.77 mA + 3.9 mA/A	
(1.2 to 3.1) A	(3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.85 mA + 0.29 mA/A 0.58 mA + 0.23 mA/A 0.65 mA + 0.29 mA/A 2.8 mA + 1.9 mA/A	
(3.1 to 12) A	(3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	1.9 mA + 0.29 mA/A 1.2 mA + 0.23 mA/A 1.7 mA + 0.29 mA/A 6.9 mA + 1.9 mA/A	
(12 to 30) A	(3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	19 mA + 0.78 mA/A 15 mA + 0.54 mA/A 55 mA + 3.9 mA/A	

Parameter/Range	Frequency	CMC ^{2, 4, 5, 6} (±)	Comments
AC Current ³ – Measure			
(5 to 100) μ A	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz	57 nA + 4 nA/ μ A 45 nA + 1.5 nA/ μ A 41 nA + 0.64 nA/ μ A	Agilent 3458A
(0.05 to 1) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.43 μ A + 4.1 μ A/mA 0.31 μ A + 1.6 μ A/mA 0.26 μ A + 0.67 μ A/mA 0.25 μ A + 0.37 μ A/mA 0.26 μ A + 0.67 μ A/mA 0.63 μ A + 4.1 μ A/mA 1.8 μ A + 5.6 μ A/mA	
(0.05 to 10) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	2.4 μ A + 4.1 μ A/mA 2.3 μ A + 1.6 μ A/mA 2.3 μ A + 0.67 μ A/mA 2.3 μ A + 0.37 μ A/mA 2.3 μ A + 0.67 μ A/mA 4.5 μ A + 4.1 μ A/mA 16 μ A + 5.6 μ A/mA	
(5 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	42 μ A + 4.1 μ A/mA 30 μ A + 1.6 μ A/mA 25 μ A + 0.6 μ A/mA 24 μ A + 0.37 μ A/mA 25 μ A + 0.6 μ A/mA 62 μ A + 4 μ A/mA 0.18 mA + 5.5 μ A/mA	
(0.05 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz	0.42 mA + 4.1 mA/A 0.3 mA + 1.7 mA/A 0.26 mA + 0.9 mA/A 0.27 mA + 1.1 mA/A 0.378 mA + 3.1 mA/A 0.92 mA + 10 mA/A	
	Up to 50 Hz 100 Hz to 1 kHz (1 to 4) kHz (4 to 5) kHz	0.02 % 0.016 % 0.021 % 0.032 %	w/Fluke Y5020
AC Impedance ³ – Generate			
0 Ω 100 m Ω 1 Ω 10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω	1 kHz	0.32 m Ω 0.32 m Ω 0.51 m Ω 2.5 m Ω 20 m Ω 0.2 Ω 2 Ω 24 Ω	HP 16074

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
Capacitance ³ – Generate			
(0.19 to 0.3999) nF	10 Hz to 10 kHz	8.8 pF + 4 pF/nF	Fluke 5522A
(0.4 to 1.0999) nF	10 Hz to 10 kHz	9.7 pF + 4 pF/nF	
(1.1 to 3.299) nF	10 Hz to 3 kHz	13 pF + 4 pF/nF	
(3.3 to 10.999) nF	(10 to 1000) Hz	15 pF + 2 pF/nF	
(11 to 32.9999) nF	(10 to 1000) Hz	0.1 nF + 2 pF/nF	
(33 to 109.999) nF	(10 to 1000) Hz	0.15 nF + 2 pF/nF	
(110 to 329.99) nF	(10 to 1000) Hz	0.46 nF + 2 pF/nF	
(0.33 to 1.0999) µF	(10 to 600) Hz	1.5 nF + 2 nF/µF	
(1.1 to 3.2999) µF	(10 to 300) Hz	4.6 nF + 2 nF/µF	
(3.3 to 10.999) µF	(10 to 150) Hz	15 nF + 2 nF/µF	
(11 to 32.999) µF	(10 to 120) Hz	59 nF + 3.2 nF/µF	
(33 to 109.99) µF	(10 to 80) Hz	0.2 µF + 3.6 nF/µF	
(110 to 329.99) µF	Up to 50 Hz	0.64 µF + 3.6 nF/µF	
(0.33 to 1.0999) mF	Up to 20 Hz	2 µF + 3.6 µF/mF	
(1.1 to 3.2999) mF	Up to 6 Hz	7 µF + 3.5 µF/mF	
(3.3 to 10.999) mF	Up to 2 Hz	38 µF + 2.6 µF/mF	
(11 to 32.999) mF	Up to 0.6 Hz	90 µF + 6 µF/mF	
(33 to 110) mF	Up to 0.2 Hz	0.37 mF + 8.8 µF/mF	
200 pF to 1.2 nF	100 Hz to 10 kHz	2.4 pF + 0.86 mF/F	Fluke 5560A
(1.2 to 12) nF	150 Hz to 5 kHz	6.2 pF + 0.9 mF/F	
(> 3 to 12) nF	(10 to 150) Hz	7.8 pF + 0.9 mF/F	
(12 to 120) nF	200 Hz to 1.3 kHz	43 pF + 1 mF/F	
(> 30 to 120) nF	(10 to 200) Hz	61 pF + 1 mF/F	
(0.12 to 1.2) µF	(2 to 310) Hz	0.42 nF + 1 mF/F	
(1.2 to 12) µF	(0.5 to 110) Hz	4.2 nF + 1 mF/F	
(12 to 120) µF	(0.5 to 40) Hz	40 nF + 1.2 mF/F	
(0.12 to 1.2) mF	(0.1 to 11) Hz	0.48 µF + 1.9 mF/F	
(1.2 to 12) mF	(0.03 to 4) Hz	5.3 µF + 1.9 mF/F	
(12 to 120) mF	(0.01 to 1.3) Hz	77 µF + 3.9 mF/F	
Fixed Points			
1 pF	1 kHz	0.56 fF	Agilent 16380A
10 pF		3.7 fF	
100 pF		35 fF	
1000 pF		0.35 pF	
10 nF		1.4 pF	Agilent 16380AC
100 nF		7.7 pF	
1 µF		0.45 nF	

Parameter/Range	Frequency	CMC ^{2, 4, 5, 6} (±)	Comments
Capacitance³ – Measure (1 to 10) pF (10 to 100) pF (100 to 1000) pF (1 to 10) nF (10 to 100) nF 100 nF to 1 µF	100 kHz 1 kHz 1 kHz 1 kHz 1 kHz 1 kHz	0.8 % 0.4 % 0.22 % 0.15 % 0.15 % 0.16 %	HP 4263A
Inductance³ – Generate, Fixed Points 100 µH 1 mH 10 mH 100 mH 1 H 10 H	100 Hz 200 Hz 400 Hz 1 kHz 10 kHz 100 Hz 200 Hz 400 Hz 1 kHz 10 kHz 100 Hz 200 Hz 400 Hz 1 kHz 10 kHz 100 Hz, 200 Hz 400 Hz, 1 kHz, 10 kHz 100 Hz, 200 Hz, 400 Hz, 1 kHz 100 Hz, 200 Hz, 400 Hz 1 kHz	0.48 µH 0.18 µH 74 nH 95 nH 76 nH 0.27 µH 0.72 µH 0.49 µH 0.6 µH 0.47 µH 0.77 µH 0.82 µH 0.49 µH 0.46 µH 0.57 µH 3.8 µH 3.7 µH 37 µH 68 µH 69 µH	GenRad 1482 series

Parameter/Range	Frequency	CMC ^{2, 4, 5, 6} (±)	Comments
Inductance – Generate			
(13 to 120) µH	(490 to 550) Hz (550 to 999) Hz 1 kHz (1.001 to 13) kHz (13 to 17) kHz	1.5 % 0.67 % 0.38 % 0.67 % 1.5 %	Fluke 5560A
(0.12001 to 1.2) mH	(260 to 330) Hz (330 to 999) Hz 1 kHz (1.001 to 1.6) kHz (1.6 to 2.5) kHz	1.4 % 0.49 % 0.2 % 0.49 % 1.4 %	
(1.2001 to 3.3) mH	(0.5 to 999) Hz 110 Hz (111 to 800) Hz (800 to 980) Hz	0.74 % 0.46 % 0.74 % 1.6 %	
(3.3 to 12) mH	(0.5 to 109) Hz 110 Hz (111 to 1000) Hz (1 to 1.4) kHz	0.49 % 0.2 % 0.49 % 1.4 %	
(12 to 83) mH	(0.1 to 99) Hz 100 Hz (101 to 180) Hz (180 to 230) Hz	0.53 % 0.25 % 0.53 % 1.4 %	
(83 to 120) mH	(0.1 to 99) Hz 100 Hz (101 to 320) Hz (320 to 1000) Hz	0.49 % 0.2 % 0.49 % 1.4 %	
(0.120 01 to 0.65) H	(0.05 to 9.9) Hz 10 Hz (10.1 to 30) Hz (30 to 50) Hz	0.61 % 0.32 % 0.6 % 1.5 %	
(0.65 to 1.2) H	(0.05 to 9.9) Hz 10 Hz (10.1 to 100) Hz (100 to 170) Hz	0.52 % 0.24 % 0.52 % 1.4 %	
(1.2001 to 5.5) H	(0.01 to 2.99) Hz 3 Hz (3.01 to 8) Hz (8 to 16) Hz	0.68 % 0.4 % 0.68 % 1.6 %	

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} (±)	Comments
Inductance – Generate (cont)			
(5.5 to 12) H	(0.01 to 2.99) Hz 3 Hz (3.01 to 19) Hz (19 to 37) Hz	0.57 % 0.28 % 0.57 % 1.4 %	Fluke 5560A
(12.001 to 30) H	(0.005 to 1.99) Hz 2 Hz (2.01 to 4) Hz (4 to 16) Hz	0.89 % 0.61 % 0.89 % 1.8 %	
(30 to 120) H	(0.005 to 1.99) Hz 2 Hz (2.01 to 7) Hz (7 to 14) Hz	0.61 % 0.32 % 0.6 % 1.5 %	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of RTDs ³ – Generate			
Pt 385, 100 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.057 °C 0.056 °C 0.068 °C 0.081 °C 0.088 °C 0.1 °C 0.19 °C	Fluke 5522A
Electrical Simulation – RTD (ITS-90 or IPTS-68)			
Pt 385, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.047 °C 0.058 °C 0.081 °C 0.093 °C 0.1 °C 0.21 °C	Fluke 5560A

Parameter/Equipment	Range	CMC ^{2, 5} (±)	Comments
Electrical Simulation – Thermocouple (ITS-90 or IPTS-68)			
Type E	(-250 to -150) °C (-150 to -25) °C (-25 to 350) °C (350 to 650) °C (350 to 1000) °C	0.36 °C 0.13 °C 0.12 °C 0.16 °C 0.21 °C	Fluke 5560A
Type J	(-210 to -100) °C (-100 to 150) °C (150 to 760) °C (760 to 1200) °C	0.22 °C 0.12 °C 0.14 °C 0.19 °C	
Type K	(-210 to -100) °C (-100 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.26 °C 0.12 °C 0.19 °C 0.32 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.46 °C 0.27 °C 0.26 °C 0.32 °C	
Type S	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.38 °C 0.28 °C 0.3 °C 0.38 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 400) °C	0.54 °C 0.19 °C 0.12 °C	

Parameter/Equipment	Range	CMC ^{2, 5} (±)	Comments
Thermocouple ³ – Indicating Systems & Measure			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.39 °C 0.13 °C 0.12 °C 0.13 °C 0.17 °C	Fluke 5522A
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.21 °C 0.13 °C 0.12 °C 0.14 °C 0.18 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.26 °C 0.15 °C 0.13 °C 0.21 °C 0.31 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.46 °C 0.28 °C 0.27 °C 0.33 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.37 °C 0.28 °C 0.29 °C 0.36 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.49 °C 0.21 °C 0.15 °C 0.14 °C	

Parameter/Equipment		Range		CMC ^{2, 4, 5, 6} (±)		Comments
AC Power – Generate		See table below		See table below		Fluke 5560A
(45 to 65) Hz	(1.22 to 12.2) W	(12.2 to 122) W	(0.122 to 1.22) kW	(1.22 to 3.16) kW	(3.16 to 12.2) kW	(12.2 to 30.8) kW
Ø 0 ° PF=1.000	0.038 %	0.029 %	0.034 %	0.048 %	0.04 %	0.11 %
Ø 10 ° PF=0.985	0.049 %	0.042 %	0.046 %	0.057 %	0.051 %	0.11 %
Ø 20 ° PF=0.940	0.074 %	0.07 %	0.072 %	0.079 %	0.075 %	0.12 %
Ø 30 ° PF=0.866	0.11 %					0.15 %
Ø 40 ° PF=0.766	0.15 %					
Ø 50 ° PF=0.643	0.21 %					
Ø 60 ° PF=0.500	0.3 %					
Ø 70 ° PF=0.342	0.48 %					
Ø 80 ° PF=0.174	0.99 %					
(65 to 500) Hz	(12.2 to 122) W	(0.122 to 1.22) kW	(1.22 to 3.16) kW	(3.16 to 12.2) kW	(12.2 to 30.8) kW	
Ø 0 ° PF=1.000	0.029 %	0.034 %	0.048 %	0.04 %	0.11 %	
Ø 10 ° PF=0.985	0.068 %	0.071 %	0.078 %	0.074 %	0.12 %	
Ø 20 ° PF=0.940	0.14 %					0.17 %
Ø 30 ° PF=0.866	0.2 %		0.21 %			0.23 %
Ø 40 ° PF=0.766	0.29 %	0.3 %				0.31 %
Ø 50 ° PF=0.643	0.42 %					
Ø 60 ° PF=0.500	0.61 %					
Ø 70 ° PF=0.342	0.96 %					
Ø 80 ° PF=0.174	2 %					

Parameter/Equipment		Range		CMC ^{2, 4, 5, 6} (±)		Comments
AC Power – Generate (cont)		See table below		See table below		Fluke 5560A
500 Hz to 1 kHz	(12.2 to 122) W	(0.122 to 1.22) kW	(1.22 to 3.16) kW	(3.16 to 12.2) kW	(12.2 to 30.8) kW	
Ø 0 ° PF=1.000	0.029 %	0.034 %	0.048 %	0.04 %	0.11 %	
Ø 10 ° PF=0.985	0.13 %				0.16 %	
Ø 20 ° PF=0.940	0.26%				0.28 %	
Ø 30 ° PF=0.866	0.41%				0.42 %	
Ø 40 ° PF=0.766	0.59 %				0.6 %	
Ø 50 ° PF=0.643	0.83 %					
Ø 60 ° PF=0.500	1.2 %					
Ø 70 ° PF=0.342	1.9 %					
Ø 80 ° PF=0.174	4 %					
(1 to 5) kHz	(6 to 60) W	(60 to 600) W		(0.6 to 1.55) kW		
Ø 0 ° PF=1.000	0.071 %			0.082 %		
Ø 10 ° PF=0.985	0.64 %					
Ø 20 ° PF=0.940	1.3 %					
Ø 30 ° PF=0.866	2 %					
Ø 40 ° PF=0.766	2.8 %					
Ø 50 ° PF=0.643	4 %					
(5 to 10) kHz	(3 to 30) W		(30 to 300) W			
Ø 0 ° PF=1.000	0.28 %		0.34 %			
Ø 10 ° PF=0.985	1.4 %					
Ø 20 ° PF=0.940	2.7 %					
Ø 30 ° PF=0.866	4.2 %					
(10 to 30) kHz	(3 to 300) W					
Ø 0 ° PF=1.000	1.1 %					

Parameter/Equipment		Range		CMC ^{2, 4, 5, 6} (±)		Comments
AC Power – Generate (cont)		See table below		See table below		Fluke 5560A
(5 to 10) kHz	(3 to 30) W			(30 to 300) W		
Ø 10 ° PF=0.985	3.4 %					
Ø 20 ° PF=0.940	5.9%					
(45 to 65) Hz	(3.366 to 33.66) W	(33.66 to 336.6) W	(0.3366 to 1.122) kW	(1.122 to 3.06) kW	(3.06 to 11.22) kW	(11.22 to 20.9) kW
Ø 0 ° PF=1.000	0.052 %		0.068 %	0.076 %	0.083 %	0.17 %
Ø 10 ° PF=0.985	0.06 %		0.075 %	0.082 %	0.088 %	0.18 %
Ø 20 ° PF=0.940	0.082 %		0.093 %	0.099 %	0.1 %	0.18 %
Ø 30 ° PF=0.866	0.11 %		0.12 %	0.13 %		0.2 %
Ø 40 ° PF=0.766	0.16 %			0.17 %		0.23 %
Ø 50 ° PF=0.643	0.21 %		0.22 %			0.27 %
Ø 60 ° PF=0.500	0.31 %					0.35 %
Ø 70 ° PF=0.342	0.48 %			0.49 %		0.51 %
Ø 80 ° PF=0.174	0.99 %					1 %
(65 to 500) Hz	(33.66 to 336.6) W	(0.3366 to 1.122) kW	(1.122 to 3.06) kW	(3.06 to 11.22) kW	(11.22 to 20.9) kW	
Ø 0 ° PF=1.000	0.052 %	0.068 %	0.076 %	0.12 %	0.21 %	
Ø 10 ° PF=0.985	0.094 %	0.1 %	0.11 %	0.14 %	0.22 %	
Ø 20 ° PF=0.940	0.17 %		0.18 %	0.2 %	0.26 %	
Ø 30 ° PF=0.866	0.26 %			0.28 %	0.33 %	
Ø 40 ° PF=0.766	0.37 %			0.39 %	0.42 %	

Parameter/Equipment		Range		CMC ^{2, 4, 5, 6} (±)		Comments
AC Power ³ – Generate (cont)		See table below		See table below		Fluke 5520A
(65 to 500) Hz	(33.66 to 336.6) W	(0.3366 to 1.122) kW	(1.122 to 3.06) kW	(3.06 to 11.22) kW	(11.22 to 20.9) kW	
Ø 50 ° PF=0.643	0.53 %					0.56 %
Ø 60 ° PF=0.500	0.76 %			0.77 %		0.78 %
Ø 70 ° PF=0.342	1.2 %					
Ø 80 ° PF=0.174	2.5 %					
500 Hz to 1 kHz	(33.66 to 336.6) W	(0.3366 to 1.122) kW	(1.122 to 3.06) kW	(3.06 to 11.22) kW	(11.22 to 20.9) kW	
Ø 0 ° PF=1.000	0.052 %	0.068 %	0.076 %	0.12 %		0.21 %

Parameter/Equipment		Range		CMC ^{2, 4, 5, 6} (±)		Comments
DC Power – Generate ³						
Up to 330 µA Up to 3.3 mA Up to 33 mA Up to 330 mA Up to 1.1 A Up to 3 A Up to 11 A Up to 20.5 A	Up to 1020 V					Fluke 5522A
	Up to 337 mW			0.017 %		
	(0.337 to 3.366) W			0.021 %		
	(3.366 to 33.66) W			0.0093 %		
	(33.66 to 336.6) W			0.0093 %		
	(0.3366 to 1.122) kW			0.019 %		
	(1.122 to 3.06) kW			0.043 %		
	(3.06 to 11.22) kW			0.044 %		
Up to 120 µA/1020 V Up to 1.2 mA/1020 V Up to 12 mA/1020 V Up to 120 mA/1020 V Up to 1.2 A/1020 V Up to 3.1 A/1020 V Up to 12 A/1020 V Up to 30.2 A/1020 V	Up to 1020 V					Fluke 5560A
	Up to 122 mW			0.015 %		
	(0.12 to 1.224) W			0.0092 %		
	(1.225 to 12.24) W			0.0087 %		
	(12.25 to 122.4) W			0.0087 %		
	(0.1224 to 1.224) kW			0.013 %		
	(1.224 to 3.162) kW			0.028 %		
	(3.162 to 12.24) kW			0.025 %		
	(12.24 to 30.8) kW			0.08 %		

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} (±)	Comments
Duty Cycle	(1 to 9.99) % (10 to 49.99) % 50 % (50.01 to 90) % (90.01 to 99) %	0.33 % 0.021 % 0.013 % 0.021 % 0.33 %	Fluke 5522A
Phase ³ – (10 to 65) Hz, PF (0 to 1) – Generate	(10 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.1° 0.26° 0.5° 2.6° 5.1° 10°	Fluke 5522A
Phase ³ – Generate Ø (0 to 90) °	(3 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	Ø 0.1° Ø 0.2° Ø 0.4° Ø 1.9° Ø 3.9° Ø 7.8°	Fluke 5560A
Phase Angle ³ – Measure (0 to 359.9) °	(10 to 50) Hz 50 Hz to 10 kHz (10 to 50) kHz (50 to 500) kHz	0.42° 0.13° 0.99° 1°	Dranetz 305C

Parameter/Range	Frequency	CMC ^{2, 5, 6} (±)	Comments
Distortion ³ (THD) (-60 to 0) dB	20 Hz to 20 kHz (20 to 100) kHz	1.2 dB 2.3 dB	Agilent 8903B
(-145 to 0) dB (-147 to 0) dB (-143 to 0) dB (-140 to 0) dB (-136 to 0) dB	100 kHz to 2.9 GHz (2.9 to 6.46) GHz (6.46 to 13.2) GHz (13.2 to 22) GHz (22 to 26.5) GHz	2.3 dB 2.7 dB 3.3 dB 3.6 dB 3.3 dB	HP 8565EC

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} ($\pm$)	Comments
Oscilloscopes ³ –			
Squarewave Signal			
50 Ω	1 mV _{p-p} to 6.6 V _{p-p} 10 Hz to 10 kHz	91 μ V + 4.4 mV/V	Fluke 5522A/SC1100
1 M Ω	1 mV _{p-p} to 130 V _{p-p} 10 Hz to 1 kHz (1 to 10) kHz	0.2 mV + 0.8 mV/V 0.24 mV + 2 mV/V	
DC Signal			
50 Ω	(0 to $\pm$ 6.6) V	33 μ V + 2 mV/V	
1 M Ω	(0 to $\pm$ 130) V	33 μ V + 0.39 mV/V	
Leveled Sine Wave			
Amplitude –			
Range: 5 mV to 5.5 V _{p-p}	50 kHz reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	0.33 mV + 17 mV/V 0.4 mV + 31 mV/V 0.43 mV + 36 mV/V 0.53 mV + 57 mV/V	
Range: 4 mV to 3.5 V _{p-p}	(600 to 1100) MHz	0.58 mV + 67 mV/V	
Time Marker into 50 Ω	5 s to 50 ms	0.0021 % + (t/1000) %	t = seconds
	20 ms to 1 ns	0.000 36 %	
Edge into 50 Ω	(200 to 300) ps 100 kHz to 2 MHz	82 ps	
	(200 to 350) ps (2 to 10) MHz	82 ps	

III. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC ^{2, 5, 6} ($\pm$)	Comments
Power Meter – Power Reference, @ 1 mW	50 MHz	1.1 %	Agilent 432A w/478A, 3458A
Power Meter – Power Accuracy	3 μ W to 100 mW	0.29 %	HP 11683A

Parameter/Range	Frequency	CMC ^{2, 4, 5, 6} ($\pm$)	Comments
Amplitude Modulation – Measure			
Rate: 50 Hz to 10 kHz Depths: (5 to 99) %	150 kHz to 10 MHz	0.14 % depth + 0.024 % depth/% depth	HP 8902A
Rate: 20 Hz to 10 kHz Depths: Up to 99 %	150 kHz to 10 MHz	0.11 % depth + 0.023 % depth/% depth	
Rate: 50 Hz to 50 kHz Depths: (5 to 99) %	10 MHz to 1.3 GHz	0.15 % depth + 0.01 % depth/% depth	
Rate: 20 Hz to 100 kHz Depths: Up to 99 %	10 MHz to 1.3 GHz	0.11 % depth + 0.023 % depth/% depth	
Rate: 50 Hz to 50 kHz Depths: (5 to 99) %	(1.3 to 26.5) GHz	1.2 % depth + 0.004 % depth/% depth	
Rate: 20 Hz to 100 kHz Depths: Up to 99 %	(1.3 to 26.5) GHz	1.2 % depth + 0.015 % depth/% depth	
Phase Modulation – Measure	Carrier:		
Rate: 200 Hz to 10 kHz (0 to 100) rad	$150 \text{ kHz} \leq f_c < 10 \text{ MHz}$	36 mrad + 37 mrad/rad	HP 8902A
Rate: 200 Hz to 20 kHz (0 to 100) rad	$10 \text{ MHz} \leq f_c < 1.3 \text{ GHz}$	36 mrad + 37 mrad/rad	
Rate: 200 Hz to 20 kHz (0 to 100) rad	$10 \text{ MHz} \leq f_c < 26.5 \text{ GHz}$	36 mrad + 37 mrad/rad	

Parameter/Range	Frequency	CMC ^{2, 4, 5, 6} (±)	Comments
Absolute Power – Measure			Agilent 437B / E4418B:
(+10 to +20) dBm	100 kHz to 4.2 GHz	3.6 %	8482A
	(4.2 to 18) GHz	3.7 %	8481A
	(18 to 26.5) GHz	3.9 %	8485A
	(26.5 to 34) GHz	4 %	8487A
	(34 to 38) GHz	4.1 %	
	(38 to 50) GHz	4.5 %	
(-30 to +10) dBm	100 kHz to 4.2 GHz	1 %	8482A
	(4.2 to 18) GHz	1.2 %	8481A
	(18 to 26.5) GHz	1.8 %	8485A
	(26.5 to 34) GHz	2.1 %	8487A
	(34 to 38) GHz	2.2 %	
	(38 to 50) GHz	2.8 %	
(-70 to -30) dBm	10 MHz to 18 GHz	4.3 %	8484A
	(18 to 20) GHz	3.2 %	8487D
	(20 to 26) GHz	3.5 %	
	(26 to 28) GHz	3.7 %	
	(28 to 34) GHz	5.7 %	
	(34 to 38) GHz	6.9 %	
	(38 to 42) GHz	8.7 %	
	(42 to 49) GHz	9.8 %	
	(49 to 50) GHz	12 %	
(+10 to +20) dBm – 75 Ω	100 kHz to 2 GHz	3.7 %	
(-30 to +10) dBm – 75 Ω	100 kHz to 2 GHz	1.3 %	8483A

IV. Mechanical

Parameter/Equipment		Range	CMC ^{2, 5, 6} (±)				Comments
Accelerometers ³ Voltage Sensitivity – Frequency Response (100 mV/g) (1 to 10) g		(5 to < 10) Hz (10 to < 100) Hz 100 Hz ref > 100 Hz to 1 kHz (> 1 to 5) kHz (> 5 to 10) kHz	3.4 % 2.0 % 1.5 % 1.7 % 2.2 % 2.6 %				9155C vibration calibration system
Balances ³		Up to 55 kg for Unit Under Test resolution 0.1 mg to 10 g				Class 1 & 3 weights	
Mass	Unit Under Test Resolution multiplied by						
	0.0001 g	0.001 g	0.01 g	0.1 g	1 g	10 g	
Up to 5 g	0.91	0.82					
(5 to 10) g	1.0						
(10 to 20) g	1.2						
(20 to 30) g	1.2						
(30 to 50) g	1.7						
(50 to 100) g	3.0	0.83	0.85				
		0.87					
(100 to 200) g		2.5					
(200 to 300) g		3.6					
(300 to 500) g		5.8					
(0.5 to 1) kg		12	1.4	2.5 0.85			
(1 to 2) kg							3.6 0.89
(2 to 3) kg							5.8 1.0
(3 to 5) kg				1.5 0.83			
(5 to 10) kg				2.5 0.85			
(10 to 20) kg				3.1 0.87			
(20 to 25) kg				3.7 0.89			
(25 to 30) kg				6.1 1.0			
(30 to 55) kg							

Parameter/Equipment	Range	CMC ^{2, 5, 6, 7} ($\pm$)	Comments
Scales ³	Up to 500 lbs	0.82 x R	Class 6 & F weights
Force Gages ³	Up to 500 lbf	0.0023 %	Class 6 & F weights
Torque Tools ³	(20 to 200) ozf·in (4 to 50) lbf·in (50 to 400) lbf·in (400 to 1000) lbf·in (83 to 250) lbf·ft (250 to 600) lbf·ft	0.32 % 0.32 % 0.35 % 0.31 % 0.32 % 0.3 %	CDI SureTest transducers & display
Pressure – Measuring Equipment ³ –			
Pneumatic	(-14.6 to 330) psig (> 300 to 1000) psig (8 to 17) psia	0.027 psi 0.008 % 0.01 %	Mensor CPC6050 Process calibrator w/:
	(-13.5 to < 0) psiv (> 0 to 100) psig (100 to 1000) psig (1000 to 5000) psig (0 to 1) inH ₂ O (0 to 10) inH ₂ O	0.067 psi 0.069 psi 0.59 psi 4.6 psi 0.0064 inH ₂ O 0.037 inH ₂ O	700PD6 700PD6 700P08 700P30 700P01 700P00
Hydraulic	(10 to 10 000) psig	0.023 %	Ametek DM-T-100 DWT
	(0 to 1000) psig	0.29 psi	Additel ADT672-1K
	(1000 to 10 000) psig	2.6 psi	Additel ADT672-10K

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 7} (±)	Comments
Relative Humidity ³ – Measure	(10 to 90) % RH	1.4 % RH	Vaisala HM41/HMP46 & HM70/HMP77B
Temperature ³ – Measure	(-195 to < 0) °C (0 to 420) °C	0.27 °C 0.14 °C	Burns 12001 PRT w/ Fluke 2180A
Relative Humidity – Measuring Equipment	Approx. (11, 32, 52 & 75) % RH	1.4 % RH	Vaisala HM41/HMP46 & HM70/HMP77B w/salt solutions & chamber
Temperature – Measuring Equipment	0 °C (-20 to 100) °C (25 to 260) °C	0.14 °C 0.30 °C 0.24 °C	Burns 12001 PRT w/ Fluke 2180A, baths
Infrared Temperature Measuring Equipment ³	(35 to 500) °C	0.54 °C + 0.0042 x Δ T _{change} from 35 °C	Fluke 4181

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 7} (±)	Comments
Frequency – Measuring Equipment	10 MHz	10 μHz	GPS-controlled rubidium
Frequency – Measuring Equipment	1 μHz to 20 MHz 20 MHz to 50 GHz	0.58 μHz + 29 pHz/Hz 0.58 mHz + 1.2 pHz/Hz	GPS-controlled rubidium w/function or signal generator

Parameter/Equipment	Range	CMC ^{2, 7} ($\pm$)	Comments
Frequency – Measure	1 mHz to 225 MHz 225 MHz to 26.5 GHz (26.5 to 50) GHz	58 pHz + 59 pHz/Hz 1.3 Hz 2.4 Hz	GPS-controlled rubidium w/counter or spectrum analyzer
Tachometers – Optical	(1 to 100 000) rpm	0.000 54 rpm + 0.000 038 rpm/rpm	3325B w/LED
Stopwatches & Timers	$\pm$ (0 to 19.99) sec/day	0.037 sec/day	Timometer

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

² Calibration and Measurement Capability Uncertainty (CMC) 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 or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

³ Field calibration service is available for this calibration. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found 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 actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

⁴ The stated measured values are determined using the indicated instruments (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.

⁵ CMC components that can be reasonably attributed to the Unit Under Test have not been utilized in the calculation of the CMC value of this measurement parameter.

⁶ In the statement of CMC, percentages are to be read as percent of reading unless indicated otherwise; R is the resolution of the unit under test.

⁷ The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

⁸ This scope meets A2LA's P112 *Flexible Scope Policy*.



Accredited Laboratory

A2LA has accredited

TRESCAL, INC.

Boonton, NJ

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and the requirements of ANSI/NCSL Z540.3-2006 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 4th day of March 2024.

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2353.01
Valid to March 31, 2026

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.