



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

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CALIBRATION

Valid To: August 31, 2024

Certificate Number: 1995.03

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1, 10</sup>:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2, 4, 8</sup> (±)	Comments
DC Voltage <sup>3</sup> – Generate	(0 to 220) mV	13 µV/V + 0.6 µV	Fluke 5700A
	(0.22 to 2.2) V	8.6 µV/V + 1.0 µV	
	(2.2 to 11) V	8.2 µV/V + 3.5 µV	
	(11 to 22) V	8.2 µV/V + 6.5 µV	
	(22 to 220) V	9.8 µV/V + 80 µV	
	(220 to 1100) V	11 µV/V + 500 µV	Fluke 5522A
	(0 to 330) mV	24 µV/V + 1 µV	
	(0.33 to 33) V	13 µV/V + 2 µV	
	(3.3 to 33) V	15 µV/V + 20 µV	
	(33 to 330) V	21 µV/V + 0.15 mV	
(330 to 1020) V	21 µV/V + 1.5 mV		

Parameter/Equipment	Range	CMC <sup>2, 4, 8</sup> ( $\pm$ )	Comments
DC Current <sup>3</sup> – Generate	(0 to 220) $\mu$ A (0.22 to 22) mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A	60 $\mu$ A/A + 8 nA 59 $\mu$ A/A + 8 nA 61 $\mu$ A/A + 80 nA 73 $\mu$ A/A + 0.8 $\mu$ A 110 $\mu$ A/A + 2.5 $\mu$ A	Fluke 5700A
	up to 330 $\mu$ A (0.33 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 1.1) A (1.1 to 3) A (3 to 11) A (11 to 20.5) A	0.017 % + 0.02 $\mu$ A 0.012 % + 0.05 $\mu$ A 0.012 % + 0.25 $\mu$ A 0.012 % + 2.5 $\mu$ A 0.023 % + 40 $\mu$ A 0.044 % + 40 $\mu$ A 0.059 % + 0.5 mA 0.12 % + 0.75 mA	Fluke 5522A
	(10 to 16.5) A (16.5 to 150) A (150 to 1025) A	0.25 % + 0.002 A 0.26 % + 0.015 A 0.28 % + 0.05 A	Fluke 5522A, 50 turn coil
Resistance – Generate			
Fixed Points	0 $\Omega$ 1 $\Omega$ 1.9 $\Omega$ 10 $\Omega$ 19 $\Omega$ 100 $\Omega$ 190 $\Omega$ 1 k $\Omega$ 1.9 k $\Omega$ 10 k $\Omega$ 19 k $\Omega$ 100 k $\Omega$ 190 k $\Omega$ 1 M $\Omega$ 1.9 M $\Omega$ 10 M $\Omega$ 19 M $\Omega$ 100 M $\Omega$	41 $\mu\Omega$ 0.013 % 0.019 % 34 $\mu\Omega/\Omega$ 35 $\mu\Omega/\Omega$ 20 $\mu\Omega/\Omega$ 21 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 14 $\mu\Omega/\Omega$ 14 $\mu\Omega/\Omega$ 17 $\mu\Omega/\Omega$ 17 $\mu\Omega/\Omega$ 26 $\mu\Omega/\Omega$ 29 $\mu\Omega/\Omega$ 54 $\mu\Omega/\Omega$ 63 $\mu\Omega/\Omega$ 0.016 %	Fluke 5700A

Parameter/Equipment	Range	CMC <sup>2,8</sup> (±)	Comments
Resistance <sup>3</sup> – Generate	Up to 11 Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ (0.33 to 1.1) MΩ (1.1 to 33) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ (330 to 1100) MΩ	51 μΩ/Ω + 0.001 Ω 35 μΩ/Ω + 0.0015 Ω 33 μΩ/Ω + 0.0014 Ω 33 μΩ/Ω + 0.002 Ω 33 μΩ/Ω + 0.002 Ω 33 μΩ/Ω + 0.02 Ω 33 μΩ/Ω + 0.02 Ω 33 μΩ/Ω + 0.2 Ω 33 μΩ/Ω + 0.2 Ω 37 μΩ/Ω + 2 Ω 38 μΩ/Ω + 2 Ω 70 μΩ/Ω + 30 Ω 0.015 % + 50 Ω 0.029 % + 2.5 kΩ 0.060 % + 3 kΩ 0.35 % + 0.1 MΩ 1.7 % + 0.5 MΩ	Fluke 5522A
DC Power <sup>3</sup> – Generate	Up to 109 μW (0.109 to 1.09) mW (1.09 to 10.9) mW (10.9 to 109) mW (0.109 to 1.09) W (1.09 to 10.9) W (10.9 to 109) W (109 to 337) W (337 to 990) W (0.99 to 3.06) kW (3.06 to 11.2) kW (11.2 to 20.9) kW	0.023 % 0.014 % 0.013 % 0.013 % 0.013 % 0.013 % 0.013 % 0.013 % 0.013 % 0.027 % 0.045 % 0.064 % 0.12 %	Fluke 5522A

Parameter/Range	Frequency	CMC <sup>2,8</sup> (±)	Comments
AC Voltage <sup>3</sup> – Generate			
Up to 33 mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.095 % + 6 μV 0.019 % + 6 μV 0.024 % + 6 μV 0.12 % + 6 μV 0.4 % + 12 μV 0.93 % + 50 μV	Fluke 5522A
(33 to 330) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.035 % + 8 μV 0.017 % + 8 μV 0.019 % + 8 μV 0.041 % + 8 μV 0.093 % + 32 μV 0.23 % + 70 μV	
(0.33 to 3.3) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.035 % + 50 μV 0.017 % + 60 μV 0.022 % + 60 μV 0.035 % + 50 μV 0.081 % + 0.13 mV 0.28 % + 0.6 mV	
(3.3 to 33) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.035 % + 0.65 mV 0.017 % + 0.6 mV 0.028 % + 0.6 mV 0.04 % + 0.6 mV 0.1 % + 1.6 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.022 % + 2 mV 0.023 % + 6 mV 0.029 % + 6 mV 0.035 % + 6 mV 0.23 % + 50 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.035 % + 10 mV 0.029 % + 10 mV 0.035 % + 10 mV	

Parameter/Range	Frequency	CMC <sup>2, 4, 8</sup> (±)	Comments
AC Voltage <sup>3</sup> – 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 (0.5 to 1) MHz	0.21 % + 4.5 μV 0.13 % + 4.5 μV 0.11 % + 4.5 μV 0.16 % + 4.5 μV 0.22 % + 7 μV 0.59 % + 13 μV 0.56 % + 25 μV 1.5 % + 25 μV	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	0.069 % + 5 μV 0.030 % + 5 μV 0.022 % + 5 μV 0.048 % + 5 μV 0.11 % + 7 μV 0.16 % + 12 μV 0.22 % + 25 μV 0.43 % + 25 μV	
(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	0.070 % + 13 μV 0.025 % + 8 μV 0.013 % + 8 μV 0.044 % + 8 μV 0.10 % + 25 μV 0.13 % + 25 μV 0.20 % + 35 μV 0.41 % + 80 μV	
(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	0.060 % + 80 μV 0.020 % + 25 μV 0.011 % + 6 μV 0.015 % + 16 μV 0.030 % + 70 μV 0.054 % + 130 μV 0.13 % + 350 μV 0.33 % + 850 μV	
(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	0.058 % + 800 μV 0.019 % + 250 μV 90 μV/V + 60 μV 0.015 % + 160 μV 0.030 % + 350 μV 0.065 % + 1.5 mV 0.16 % + 4.3 mV 0.38 % + 8.5 mV	

Parameter/Range	Frequency	CMC <sup>2, 4, 8</sup> ( $\pm$ )	Comments
AC Voltage <sup>3</sup> – Generate (cont)			
(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	0.062 % + 8 mV 0.031 % + 2.5 mV 0.028 % + 0.8 mV 0.034 % + 3.5 mV 0.077 % + 8 mV 0.23 % + 90 mV 0.59 % + 90 mV	Fluke 5700A
(220 to 250) V	(15 to 50) Hz	0.045 % + 16 mV	
(220 to 1100) V	50 Hz to 1 kHz	97 $\mu$ V/V + 3.5 mV	
AC Current <sup>3</sup> – Generate			
Up to 330 $\mu$ A	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.23 % + 0.1 $\mu$ A 0.17 % + 0.1 $\mu$ A 0.14 % + 0.1 $\mu$ A 0.35 % + 0.15 $\mu$ A 0.92 % + 0.2 $\mu$ A 1.8 % + 0.4 $\mu$ A	Fluke 5522A
(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 (10 to 30) kHz	0.23 % + 0.15 $\mu$ A 0.14 % + 0.15 $\mu$ A 0.12 % + 0.15 $\mu$ A 0.23 % + 0.2 $\mu$ A 0.58 % + 0.3 $\mu$ A 1.2 % + 0.6 $\mu$ A	
(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 (10 to 30) kHz	0.21 % + 2 $\mu$ A 0.1 % + 2 $\mu$ A 0.046 % + 2 $\mu$ A 0.092 % + 2 $\mu$ A 0.23 % + 3 $\mu$ A 0.46 % + 4 $\mu$ A	
(0.33 to 1.1) A	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.21 % + 20 $\mu$ A 0.1 % + 20 $\mu$ A 0.046 % + 20 $\mu$ A 0.12 % + 50 $\mu$ A 0.23 % + 0.1 mA 0.46 % + 0.2 mA	

Parameter/Range	Frequency	CMC <sup>2, 4, 8</sup> ( $\pm$ )	Comments
AC Current <sup>3</sup> – Generate			
(10 to 200) $\mu$ A	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.082 % + 25 nA 0.042 % + 20 nA 0.018 % + 16 nA 0.74 % + 40 nA 0.2 % + 80 nA	Fluke 5700A
220 $\mu$ A 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	0.082 % + 40 nA 0.042 % + 35 nA 0.017 % + 35 nA 0.07 % + 0.4 $\mu$ A 0.19 % + 0.8 $\mu$ A	
(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	0.082 % + 0.4 $\mu$ A 0.041 % + 0.35 $\mu$ A 0.017 % + 0.35 $\mu$ A 0.07 % + 4 $\mu$ A 0.19 % + 8 $\mu$ 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	0.083 % + 4 $\mu$ A 0.042 % + 3.5 $\mu$ A 0.017 % + 3.5 $\mu$ A 0.07 % + 40 $\mu$ A 0.19 % + 80 $\mu$ A	
220 mA to 2.2 A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.077 % + 35 $\mu$ A 0.12 % + 80 $\mu$ A 1 % + 0.16 mA	
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.21 % + 0.1 mA 0.069 % + 0.1 mA 0.69 % + 1 mA 2.9 % + 5 mA	
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.069 % + 2 mA 0.12 % + 2 mA 3.5 % + 2 mA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.14 % + 5 mA 0.17 % + 5 mA 3.5 % + 5 mA	

Parameter/Range	Frequency	CMC <sup>2,8</sup> (±)	Comments
AC Current <sup>3</sup> – Generate (cont)			
Up to 330 µA	(10 to 100) Hz 100 Hz to 1 kHz	0.29 % + 0.2 µA 0.69 % + 0.5 µA	Fluke 5522A with LCOMP On
(0.33 to 3.3) mA	(10 to 100) Hz 100 Hz to 1 kHz	0.29 % + 0.3 µA 0.69 % + 0.8 µA	
(3.3 to 33) mA	(10 to 100) Hz 100 Hz to 1 kHz	0.092 % + 4 µA 0.23% + 10 µA	
(33 to 330) mA	(10 to 100) Hz 100 Hz to 1 kHz	0.092 % + 40 µA 0.23 % + 0.1 mA	
(0.33 to 3) A	(10 to 100) Hz (100 to 400) Hz	0.14 % + 0.2 µA 0.35 % + 1 mA	
(3 to 20.5) A	(10 to 100) Hz (100 to 400) Hz	0.14 % + 2 mA 1.2 % + 5 mA	
(10 to 16.5) A	(45 to 65) Hz (65 to 440) Hz	0.029 % + 0.003 A 0.083 % + 0.003 A	Fluke 5522A, 50 turn coil
(16.5 to 150) A	(45 to 65) Hz (65 to 440) Hz	0.32 % + 0.025 A 0.87 % + 0.027 A	
(150 to 1025) A	(45 to 65) Hz (65 to 440) Hz	0.32 % + 0.09 A 1.5 % + 0.1 A	
AC Power <sup>3</sup> – Generate (45 to 65 Hz, PF=1)	Up to 10.9 µW (10.9 to 109 µW (0.109 to 1.09) mW (1.09 to 10.9) mW (10.9 to 109) mW (0.109 to 1.09) W (1.09 to 10.9) W (10.9 to 37) W (37 to 337) W (0.337 to 1.12) kW (1.12 to 3.06) kW (3.06 to 11.2) kW (11.2 to 20.9) kW	0.17 % 0.13 % 0.06 % 0.056 % 0.055 % 0.055 % 0.055 % 0.058 % 0.063 % 0.076 % 0.081 % 0.09 % 0.17 %	Fluke 5522A



Parameter/Equipment	Range	CMC <sup>2,8</sup> (±)	Comments
Capacitance <sup>3</sup> – Generate	(220 to 400) pF (0.4 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 (110 to 330) μF (0.33 to 1.1) mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	0.58 % + 0.01 nF 0.58 % + 0.01 nF 0.58 % + 0.01 nF 0.29 % + 0.01 nF 0.29 % + 0.1 nF 0.29 % + 0.1 nF 0.29 % + 0.3 nF 0.29 % + 1 nF 0.29 % + 3 nF 0.29 % + 10 nF 0.46 % + 30 nF 0.52 % + 0.1 μF 0.52 % + 0.3 μF 0.52 % + 1 μF 0.52 % + 3 μF 0.52 % + 10 μF 0.87 % + 30 μF 1.2 % + 100 μF	Fluke 5522A
Electrical Calibration of Thermocouple Indicators <sup>3</sup> – Generate & 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 0.19 °C	

Parameter/Equipment	Range	CMC <sup>2,8</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicators <sup>3</sup> – Generate & Measure (cont)			
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 0.20 °C 0.31 °C	Fluke 5522A
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.31 °C 0.18 °C 0.16 °C 0.15 °C 0.21 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.49 °C 0.20 °C 0.13 °C 0.12 °C	
Electrical Calibration of RTD Indicators <sup>3</sup> – 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	0.06 °C 0.06 °C 0.08 °C 0.11 °C 0.12 °C 0.14 °C 0.27 °C	Fluke 5522A
Electrical Calibration of Phase Indicators <sup>3</sup> – 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	0.12 °phase 0.3 °phase 0.6 °phase 2.9 °phase 6 °phase 12 °phase	Fluke 5522A

Parameter/Equipment	Range	CMC <sup>2, 5, 8</sup> ( $\pm$ )	Comments
DC Voltage <sup>3</sup> – Measure	(0 to 100) mV (0.10 to 1.0) V (1.0 to 10) V (10 to 100) V (100 to 1000) V	16 $\mu$ V/V + 0.3 $\mu$ V 12 $\mu$ V/V + 0.3 $\mu$ V 11 $\mu$ V/V + 0.5 $\mu$ V 14 $\mu$ V/V + 30 $\mu$ V 15 $\mu$ V/V + 100 $\mu$ V	Agilent 3458A
Resistance <sup>3</sup> – Measure	Up to 10 $\Omega$ (10 to 100) $\Omega$ (0.1 to 1) k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ (0.1 to 1) M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$	28 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 18 $\mu\Omega/\Omega$ + 0.5 m $\Omega$ 16 $\mu\Omega/\Omega$ + 0.5 m $\Omega$ 16 $\mu\Omega/\Omega$ + 5 m $\Omega$ 18 $\mu\Omega/\Omega$ + 50 m $\Omega$ 27 $\mu\Omega/\Omega$ + 2 $\Omega$ 77 $\mu\Omega/\Omega$ + 100 $\Omega$ 0.06 % + 1 k $\Omega$	Agilent 3458A
DC Current <sup>3</sup> – Measure	Up to 100 $\mu$ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A  (1 to 1000) A	33 $\mu$ A/A + 0.8 nA 29 $\mu$ A/A + 5 nA 35 $\mu$ A/A + 50 nA 49 $\mu$ A/A + 0.5 $\mu$ A 0.015% + 10 $\mu$ A  0.30 %	Agilent 3458A  Agilent 3458A, Empro shunts

Parameter/Equipment	Range	CMC <sup>2, 5, 8</sup> (±)	Comments
AC Voltage <sup>3</sup> – Measure			
(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	0.04 % + 3 μV 0.046 % + 1.1 μV 0.076 % + 1.1 μV 0.46 % + 1.1 μV 0.77 % + 1.1 μV 4.7 % + 2 μV	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 300 kHz to 1 MHz	0.011 % + 4 μV 0.014 % + 2 μV 0.026 % + 2 μV 0.12 % + 2 μV 0.23 % + 2 μV 0.41 % + 10 μV 1.2 % + 10 μV	
(0.1 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 300 kHz to 1 MHz	0.011 % + 40 μV 0.015 % + 20 μV 0.023 % + 20 μV 0.042 % + 20 μV 0.11 % + 20 μV 0.36 % + 100 μV 1.2 % + 100 μV	
(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 300 kHz to 1 MHz	0.01 % + 0.4 mV 0.012 % + 0.2 mV 0.02 % + 0.2 mV 0.04 % + 0.2 mV 0.1 % + 0.2 mV 0.37 % + 1 mV 1.2 % + 1 mV	
(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 300 kHz to 1 MHz	0.025 % + 4 mV 0.025 % + 2 mV 0.03 % + 2 mV 0.05 % + 2 mV 0.15 % + 2 mV 0.47 % + 10 mV 1.7 % + 10 mV	
(100 to 700) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.048 % + 40 mV 0.048 % + 20 mV 0.07 % + 20 mV 0.14 % + 20 mV 0.35 % + 20 mV	

Parameter/Equipment	Range	CMC <sup>2, 5, 8</sup> (±)	Comments
AC Current <sup>3</sup> – Measure			
Up to 100 µA	(10 to 20) Hz (20 to 40) Hz (40 to 100) Hz (0.1 to 5) kHz	0.46 % + 0.03 µA 0.17 % + 0.03 µA 0.072 % + 0.03 µA 0.072 % + 0.03 µA	Agilent 3458A
(0.1 to 1) mA	(10 to 20) Hz (20 to 40) Hz (40 to 100) Hz (0.1 to 5) kHz (5 to 10) kHz	0.46 % + 0.2 µA 0.17 % + 0.2 µA 0.073 % + 0.2 µA 0.041 % + 0.2 µA 0.069 % + 0.2 µA	
(0.1 to 10) mA	(10 to 20) Hz (20 to 40) Hz (40 to 100) Hz (0.1 to 5) kHz (5 to 10) kHz	0.46 % + 2 µA 0.17 % + 2 µA 0.072 % + 2 µA 0.041 % + 2 µA 0.069 % + 2 µA	
(10 to 100) mA	(10 to 20) Hz (20 to 40) Hz (40 to 100) Hz (0.1 to 5) kHz (5 to 10) kHz	0.46 % + 20 µA 0.17 % + 20 µA 0.073 % + 20 µA 0.041 % + 20 µA 0.069 % + 20 µA	
(0.1 to 1) A	(10 to 20) Hz (20 to 40) Hz (40 to 100) Hz (0.1 to 5) kHz (5 to 10) kHz	0.47 % + 200 µA 0.2 % + 200 µA 0.11 % + 200 µA 0.13 % + 200 µA 0.35 % + 200 µA	
(1 to 1000) A	(45 to 65) Hz	0.30 %	

II. Mechanical

Parameter/Equipment	Range	CMC <sup>2, 6, 9</sup> (±)	Comments
Mass –	1 mg to 10 g (10 to 50) g (50 to 200) g (200 to 1000) g (1000 to 5000) g	0.000 042 g 0.000 048 g 0.000 21 g 0.0014 g 0.010 g	Single substitution
Absolute Pressure <sup>3</sup> – Measure and Measuring Equipment  Pressure – Hydraulic  Effective Area Determination of High Accuracy Piston-Cylinder Unit (PCU)  Calibration of Transfer Standards & Pressure Devices	(0 to 15) PSIA (0 to 50) PSIA  (100 to 1500) psi (1000 to 15 000) psi  (100 to 1500) psi (1500 to 15 000) psi	0.0032 PSIA 0.010 PSIA  0.0045 % 0.0045 %  0.0040 % 0.0040 %	Mensor 2320 DPG  Direct cross-float method- Ruska 2400, Std. Mass set  Ametek Type-T
Pneumatic Pressure – Measure and/or Measuring Equipment  Effective Area Determination of High Accuracy Piston-Cylinder Unit (PCU) or Ball-Nozzle Units (BNU)  Calibration of Transfer Standards & Pressure Devices	(0.14 to 30) psi  (0.14 to 300) psi	0.0085 %  0.0081 %	Direct cross-float method– PK DWT, Std. Mass  RK-300/1100WC
Torque Wrenches <sup>3</sup>	5 lbf·in to 2000 lbf·ft	1.2 %	Torque Calibrator

### III. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2,9</sup> (±)	Comments
Temperature – Measure	(-38 to 660) ° C	0.045 °C	PRT, readout
Temperature – Measuring Equipment	(-25 to 250) ° C	0.045 °C	PRT, readout, bath

### IV. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2,9</sup> (±)	Comments
Frequency – Measuring Equipment <sup>3</sup>	0.1 Hz to 20 MHz	2.3 parts in 10 <sup>7</sup>	Agilent 33220A ref. to Fluke PM6680B
	0.01 Hz to 2 MHz	29 µHz/Hz	Fluke 5522A
Frequency - Measure <sup>3</sup>	0.1 Hz to 225 MHz	2.3 parts in 10 <sup>7</sup>	Fluke PM 6680B
Time Interval – Timers & Stop Watches			NIST SP 960-12
Time Base <sup>7</sup>	(0 to 24) hours	0.020 seconds/day	Fluke PM6680B
Totalize Method	(0 to 24) hours	0.12 seconds	Fluke PM6680B, function generator

<sup>1</sup> This laboratory offers commercial calibration service and field calibration services.

<sup>2</sup> Calibration and Measurement Capability (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 Generate. 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.

<sup>3</sup> Field calibration service is available for these calibrations. 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. Field environmental conditions are limited to 15 °C to 30 °C and <80% relative humidity to 30 °C.<sup>4</sup> Fluke 5700A and 5522A series CMCs are based upon the temperature the standard was calibrated ( $t_{cal} \pm 5 \text{ }^\circ\text{C}$ ) 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  $\pm 1 \text{ }^\circ\text{C}$  of use. For AC Current, CMCs are determined with the LCOMP off and ON. CMCs are also based upon 1-year floor specifications. CMCs are expressed as either a specific value that covers the full range or as a percentage or fraction of the reading plus a fixed floor specification.

<sup>5</sup> Agilent 3458A CMCs are based upon the temperature the standard was calibrated ( $t_{cal} \pm 5 \text{ }^\circ\text{C}$ ) and an auto calibration (ACAL) was performed within the previous 24 hours ( $\pm 1 \text{ }^\circ\text{C}$  of ambient temperature.) CMCs are also based upon 1-year floor specifications. CMCs are expressed as either a specific value that covers the full range or as a combination of a percent or the fraction of the reading/output plus a range specification.

<sup>6</sup> In the statement of CMC, percentages are percentages of reading, unless otherwise indicated.

<sup>7</sup> Applicable when the internal time base (oscillator) of the device under test is/can be measured directly by the frequency counter.

<sup>8</sup> The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMCs 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.

<sup>9</sup> 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.

<sup>10</sup> This scope meets A2LA's P112 *Flexible Scope Policy*.





# Accredited Laboratory

A2LA has accredited

**JM TEST SYSTEMS, INC.**

*Clute, TX*

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/NC SL Z540-1-1994 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 19<sup>th</sup> day of September 2022.

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 1995.03  
Valid to August 31, 2024

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