



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

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CALIBRATION

Valid To: September 30, 2025

Certificate Number: 1995.06

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations¹:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,3,5} (±)	Comments
DC Voltage – Generate	(0 to 330) mV (0.33 to 33) V (3.3 to 33) V (33 to 330) V (330 to 1020) V	47 µV/V + 3 µV 39 µV/V + 5 µV 39 µV/V + 50 µV 43 µV/V + 0.5 mV 43 µV/V + 1.5 mV	Fluke 5502A
DC Current – Generate	Up to 330 µA (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 (10 to 16.5) A (16.5 to 150) A (150 to 1025) A	0.012 % + 0.02 µA 0.010 % + 0.05 µA 78 µA/A + 0.25 µA 78 µA/A + 2.5 µA 0.030 % + 44 µA 0.030 % + 44 µA 0.047 % + 0.5 mA 0.078 % + 0.75 mA 0.25 % + 0.002 A 0.26 % + 0.015 A 0.27 % + 0.05 A	Fluke 5502A Fluke 5502A, 50 turn coil

Parameter/Equipment	Range	CMC ^{2,3,5} (\pm)	Comments
Resistance – Generate	Up 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 33) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω (110 to 330) M Ω (330 to 1100) M Ω	0.011 % + 0.001 Ω 95 $\mu\Omega/\Omega$ + 0.0015 Ω 70 $\mu\Omega/\Omega$ + 0.0014 Ω 70 $\mu\Omega/\Omega$ + 0.002 Ω 70 $\mu\Omega/\Omega$ + 0.002 Ω 70 $\mu\Omega/\Omega$ + 0.02 Ω 70 $\mu\Omega/\Omega$ + 0.02 Ω 70 $\mu\Omega/\Omega$ + 0.2 Ω 86 $\mu\Omega/\Omega$ + 0.2 Ω 93 $\mu\Omega/\Omega$ + 2 Ω 0.012 % + 2 Ω 0.012 % + 30 Ω 0.047 % + 50 Ω 0.078 % + 2.5 k Ω 0.39 % + 3 k Ω 0.39 % + 0.1 M Ω 1.2 % + 0.5 M Ω	Fluke 5502A
DC Power – Generate	Up to 109 μ W (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	0.019 % 0.013 % 0.010 % 0.0090 % 0.0090 % 0.0090 % 0.010 % 0.010 % 0.010 % 0.032 % 0.032 % 0.052 % 0.080 %	Fluke 5502A

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
AC Voltage – Generate			
(1 to 33) mV	(0.01 to 10) Hz (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	3.9 % + 170 µV 0.12 % + 20 µV 0.078 % + 20 µV 0.12 % + 20 µV 0.16 % + 20 µV 0.27 % + 33 µV 0.78 % + 60 µV	Fluke 5502A
(33 to 330) mV	(0.01 to 10) Hz (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	3.9 % + 1.7 mV 0.039 % + 20 µV 0.023 % + 20 µV 0.054 % + 20 µV 0.078 % + 40 µV 0.18 % + 170 µV 0.39 % + 330 µV	
(0.33 to 3.3) V	(0.01 to 10) Hz (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	3.9 % + 17 mV 0.042 % + 60 µV 0.023 % + 60 µV 0.054 % + 60 µV 0.078 % + 60 µV 0.18 % + 0.2 mV 0.39 % + 0.9 mV	
(3.3 to 33) V	(0.01 to 10) Hz (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	3.9 % + 0.17 V 0.042 % + 0.8 mV 0.023 % + 0.6 mV 0.054 % + 0.6 mV 0.078 % + 0.6 mV 0.18 % + 2 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	0.039 % + 3 mV 0.062 % + 9 mV 0.070 % + 9 mV 0.093 % + 9 mV 0.19 % + 80 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.039 % + 20 mV 0.062 % + 20 mV 0.070 % + 20 mV	

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
AC Current – Generate			
(0.029 to 330) µA	(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	0.16 % + 0.1 µA 0.12 % + 0.1 µA 0.099 % + 0.1 µA 0.23 % + 0.15 µA 0.62 % + 0.2 µA 1.2 % + 0.4 µA	Fluke 5502A
(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	0.16 % + 0.15 µA 0.099 % + 0.15 µA 0.08 % + 0.15 µA 0.16 % + 0.2 µA 0.39 % + 0.3 µA 0.78 % + 0.6 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 (10 to 30) kHz	0.14 % + 2 µA 0.072 % + 2 µA 0.036 % + 2 µA 0.065 % + 2 µA 0.16 % + 3 µA 0.31 % + 4 µA	
(33 to 330) 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	0.14 % + 20 µA 0.072 % + 20 µA 0.036 % + 20 µA 0.08 % + 50 µA 0.16 % + 0.1 mA 0.31 % + 0.2 mA	
(0.33 to 1.1) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.15 % + 0.1 mA 0.043 % + 0.1 mA 0.05 % + 1 mA 1.9 % + 5 mA	
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.15 % + 0.1 mA 0.05 % + 0.1 mA 0.47 % + 1 mA 1.9 % + 5 mA	
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.05 % + 2 mA 0.08 % + 2 mA 2.3 % + 2 mA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.095 % + 5 mA 0.12 % + 5 mA 2.3 % + 5 mA	

Parameter/Range	Frequency	CMC ^{2,3,5} (±)	Comments	
AC Current – Generate (cont)				
Up to 330 µA	(10 to 100) Hz 100 Hz to 1 kHz	0.19 % + 0.2 µA 0.47 % + 0.5 µA	Fluke 5502A with LCOMP On	
(0.33 to 3.3) mA	(10 to 100) Hz 100 Hz to 1 kHz	0.19 % + 0.3 µA 0.47 % + 0.8 µA		
(3.3 to 33) mA	(10 to 100) Hz 100 Hz to 1 kHz	0.065 % + 4 µA 0.16 % + 10 µA		
(33 to 330) mA	(10 to 100) Hz 100 Hz to 1 kHz	0.065 % + 40 µA 0.16 % + 0.1 mA		
(0.33 to 3) A	(10 to 100) Hz (100 to 400) Hz	0.095 % + 0.2 mA 0.23 % + 1 mA		
(3 to 20.5) A	(10 to 100) Hz (100 to 400) Hz	0.095 % + 2 mA 0.78 % + 5 mA		
(10 to 16.5) A	(45 to 65) Hz (65 to 440) Hz	0.29 % + 0.003 A 0.81 % + 0.003 A		Fluke 5502A, 50 turn coil
(16.5 to 150) A	(45 to 65) Hz (65 to 440) Hz	0.30 % + 0.025 A 0.83 % + 0.027 A		
(150 to 1025) A	(45 to 65) Hz (65 to 440) Hz	0.30 % + 0.09 A 1.2 % + 0.1 A		
AC Power – 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	0.19 % 0.13 % 0.090 % 0.051 % 0.049 % 0.049 % 0.049 % 0.058 % 0.059 % 0.066 % 0.067 % 0.080 % 0.13 %	Fluke 5502A	

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Capacitance – Source	(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	0.39 % + 0.01 nF 0.39 % + 0.01 nF 0.39 % + 0.01 nF 0.20 % + 0.01 nF 0.19 % + 0.1 nF 0.19 % + 0.1 nF 0.20 % + 0.3 nF 0.21 % + 1 nF 0.20 % + 3 nF 0.21 % + 10 nF 0.32 % + 30 nF 0.36 % + 0.1 μF 0.35 % + 0.3 μF 0.36 % + 1 μF 0.42 % + 3 μF 0.40 % + 10 μF 0.76 % + 30 μF 0.85 % + 100 μF	Fluke 5502A
Electrical Calibration of Thermocouple Indicators – 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 5502A
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	
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 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	

Parameter/Equipment	Range	CMC ^{2,3,4} (±)	Comments
Electrical Calibration of Thermocouple Indicators – Generate & Measure (cont) 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	Fluke 5502A
Electrical Calibration of RTD Indicators – 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	0.04 °C 0.04 °C 0.06 °C 0.07 °C 0.08 °C 0.09 °C 0.18 °C	Fluke 5502A
DC Voltage – Measure	(0 to 100) mV (0.10 to 1.0) V (1.0 to 10) V (10 to 100) V (100 to 1000) V	11 μV/V + 0.3 μV 10 μV/V + 0.3 μV 10 μV/V + 0.5 μV 13 μV/V + 30 μV 14 μV/V + 100 μV	Agilent 3458A
Resistance – Measure	Up 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	21 μΩ/Ω + 50 μΩ 18 μΩ/Ω + 0.5 mΩ 17 μΩ/Ω + 0.5 mΩ 16 μΩ/Ω + 5 mΩ 19 μΩ/Ω + 50 mΩ 24 μΩ/Ω + 2 Ω 70 μΩ/Ω + 100 Ω 0.060 % + 1 kΩ	Agilent 3458A

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
DC Current – Measure	Up to 100 µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	35 µA/A + 0.8 nA 35 µA/A + 5 nA 40 µA/A + 50 nA 53 µA/A + 0.5 µA 0.018 % + 10 µA	Agilent 3458A
	(1 to 1000) A	0.30 %	Agilent 3458A, Empro shunts

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Measure	(1 to 10) mV	(10 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.051 % + 3 µV 0.056 % + 1.1 µV 0.083 % + 1.1 µV 0.46 % + 1.1 µV 0.78 % + 1.1 µV 4.7 % + 2 µV
	(10 to 100) mV	(10 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	0.013 % + 4 µV 0.016 % + 2 µV 0.027 % + 2 µV 0.12 % + 2 µV 0.23 % + 2 µV 0.41 % + 10 µV 1.2 % + 10 µV
	(0.1 to 1) V	(10 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 0.016 % + 20 µV 0.024 % + 20 µV 0.041 % + 20 µV 0.11 % + 20 µV 0.36 % + 100 µV 1.2 % + 100 µV
	(1 to 10) V	(10 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	0.029 % + 0.4 mV 0.012 % + 0.2 mV 0.020 % + 0.2 mV 0.037 % + 0.2 mV 0.095 % + 0.2 mV 0.36 % + 1 mV 1.2 % + 1 mV

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Measure (cont)			
(10 to 100) V	(10 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 0.026 % + 2 mV 0.048 % + 2 mV 0.15 % + 2 mV 0.47 % + 10 mV 1.7 % + 10 mV	Agilent 3458A
(100 to 700) V	(10 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 0.070 % + 20 mV 0.14 % + 20 mV 0.35 % + 20 mV	
AC Current – Measure			Agilent 3458A
Up to 100 µA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	0.46 % + 0.03 µA 0.18 % + 0.03 µA 0.074 % + 0.03 µA 0.074 % + 0.03 µA	
(0.1 to 1) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 10) kHz	0.46 % + 0.2 µA 0.18 % + 0.2 µA 0.076 % + 0.2 µA 0.047 % + 0.2 µA 0.074 % + 0.2 µA	
(1 to 10) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 10) kHz	0.46 % + 2 µA 0.18 % + 2 µA 0.077 % + 2 µA 0.048 % + 2 µA 0.075 % + 2 µA	
(10 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 10) kHz	0.46 % + 20 µA 0.18 % + 20 µA 0.077 % + 20 µA 0.049 % + 20 µA 0.075 % + 20 µA	

Parameter/Range	Frequency	CMC ^{2,4,5} (±)	Comments
AC Current – Measure (cont)			
(0.1 to 1) A	(45 to 65) Hz	0.47 % + 200 μA 0.20 % + 200 μA 0.12 % + 200 μA 0.14 % + 200 μA 0.35 % + 200 μA	Agilent 3458A
(1 to 1000) A	(45 to 65) Hz	0.30 %	Agilent 3458A, Empro shunts

II. Mechanical

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Torque Devices	5 lbf-in to 2000 lbf-ft	0.94 %	CDI & AWS Torque Testers
Pressure (Pneumatic) – Measuring Equipment			
Calibration of Transfer Standards & Pressure Gauges			
Absolute	(0.3 to 15) psia (15 to 50) psia	0.0035 psia 0.015 psia	Mensor CPG 2300
Gauge & Differential	(0 to 300) psi	0.0081 %	RK-300/1100WC

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Pressure (Hydraulic) – Measuring Equipment Calibration of Transfer Standards & Pressure Gauges	(25 to 15 000) psi	0.018 %	Ametek Type T Deadweight Tester

III. Thermodynamic

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Temperature – Measure	(-38 to 0.0) °C (0 to 156) °C (156 to 420) °C (420 to 660) °C	0.019 °C 0.023 °C 0.052 °C 0.099 °C	PRT & readout
Temperature – Measuring Equipment	(-25 to 0) °C (0 to 156) °C (156 to 250) °C	0.013 °C 0.019 °C 0.051 °C	PRT, readout, bath

IV. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Frequency – Measuring Equipment ³	0.1 Hz to 10 MHz	1.5 parts in 10 ⁶	Keysight 33210A ref. to Fluke PM6680B
	0.01 Hz to 2 MHz	29 µHz/Hz	Fluke 5502A
Frequency – Measure ³	0.1 Hz to 225 MHz	1.5 parts in 10 ⁶	Fluke PM 6680B

Parameter/Equipment	Range	CMC ² (±)	Comments
Time Interval – Timers & Stop Watches			NIST SP 960-12
Time Base ⁶	Up to 24 hours	0.043 seconds	Fluke PM6680B
Totalize Method	Up to 24 hours	0.12 seconds/day	Fluke PM6680B, function generator

¹ This laboratory offers commercial calibration service.

² 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. Calibration and Measurement Capabilities 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 Fluke 5502A 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 $^\circ\text{C}$. 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 fraction of the reading plus a fixed floor specification.

⁴ 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.

⁵ In the statement of CMC, percentages are percentages of reading, unless otherwise indicated.

⁶ Applicable when the internal time base (oscillator) of the device under test is/can be measured directly by the frequency counter.

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.



Accredited Laboratory

A2LA has accredited

JM TEST SYSTEMS, LLC.

Mattoon, IL

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 13th day of October 2023.

A blue ink signature of Mr. Trace McInturff, written in a cursive style.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1995.06
Valid to September 30, 2025

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