



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

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CALIBRATION

Valid To: July 31, 2021

Certificate Number: 3471.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1,6}:

I. Dimensional

Parameter/Equipment	Range	CMC ² (±)	Comments
Calipers	Up to 12 in	130 µin + 2.3 µin/in	Gage blocks
Dial Indicators	Up to 2 in	140 µin + 1.2 µin/in	Gage blocks
Micrometers	Up to 24 in	140 µin + 1.5 µin/in	Gage blocks
Gage Blocks	Up to 1 in (1 to 2) in (2 to 3) in (3 to 4) in	5.5 µin 9.6 µin 14 µin 19 µin	Comparator w/ reference blocks

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
DC Voltage ³ – Generate	Up to 220 mV 220 mV to 2.2 V (2.2 to 22) V (22 to 220) V (220 to 1000) V	7.8 µV/V + 400 nV 5.6 µV/V + 700 nV 3.7 µV/V + 4 µV 5 µV/V + 40 µV 7.4 µV/V + 400 µV	Fluke 5720A

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
DC Voltage ³ – Generate (cont)	10 V	0.38 µV/V	Fluke 732B
DC Voltage ³ – Measure	Up to 200 mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1000) V	8 µV/V + 100 nV 5.5 µV/V + 400 nV 5.5 µV/V + 4 µV 8 µV/V + 40 µV 7.5 µV/V + 500 µV	Fluke 8508A
	(1000 to 5000) V	0.2 %	w/ Fluke 80B-5
	(1000 to 10 000) V	0.2 %	w/ Fluke 80E
DC Current ³ – Generate	Up to 220 µA 220 µA to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2 A	41 µA/A + 6 nA 36 µA/A + 7 nA 39 µA/A + 40 nA 45 µA/A + 700 nA 82 µA/A + 12 µA	Fluke 5720A
	(1 to 11) A	4 mA/A + 480 µA	w/ Fluke 5725A
	(2 to 20) A (20 to 100) A	2.6 mA/A + 4 mA 0.3 % + 20 mA	w/ Ballantine 1620
DC Current ³ – Measure	Up to 220 µA 200 µA to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A	20 µA/A + 400 nA 20 µA/A + 4 nA 22 µA/A + 40 nA 66 µA/A + 800 nA 0.048 % + 16 µA	Fluke 8508A

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
DC Current ³ – Measure	DC to 60 Hz	0.046 %	Leeds and Northrup 4360
		0.041 %	Leeds and Northrup 4361

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
DC/AC Current ³ – Generate, Clamp Meters (10 to 1025) A	DC to 440 Hz	1 % + 0.9 A	Fluke 5720A w/ coil

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Resistance ³ – Generate Fixed Points	1 Ω, 1.9 Ω 10 Ω, 19 Ω 100 Ω, 190 Ω 1 kΩ, 1.9 kΩ 10 kΩ, 19 kΩ 100 kΩ, 190 kΩ 1 MΩ, 1.9 MΩ 10 MΩ, 19 MΩ 100 MΩ, 190 MΩ	100 μΩ 96 μΩ 2.4 mΩ 9.2 mΩ 91 mΩ 1.2 Ω 21 Ω 420 Ω 11 kΩ	Fluke 5720A
	1 Ω 10 kΩ	1.2 μΩ 10 mΩ	Fluke 742A-1 Fluke 742A-10K
	Up 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) kΩ (1.1 to 3.299 999) kΩ (3.3 to 10.99 999) kΩ (11 to 32.99 999) kΩ (33 to 109.999) kΩ (110 to 329.999) kΩ	40 μΩ/Ω + 1.0 mΩ 30 μΩ/Ω + 2.0 mΩ 28 μΩ/Ω + 2.0 mΩ 28 μΩ/Ω + 4.0 mΩ 28 μΩ/Ω + 13 mΩ 28 μΩ/Ω + 13 mΩ 28 μΩ/Ω + 30 mΩ 28 μΩ/Ω + 0.30 Ω 28 μΩ/Ω + 0.30 Ω 32 μΩ/Ω + 2.0 Ω	Fluke 5520 series 4 wire
	(0.33 to 1.09999) MΩ (1.1 to 3.29900) MΩ (3.3 to 10.9999) MΩ (11 to 32.9999) MΩ (33 to 109.9999) MΩ (110 to 329.9999) MΩ (330 to 1100) MΩ	32 μΩ/Ω + 2.2 Ω 60 μΩ/Ω + 39 Ω 0.013 % + 63 Ω 0.025 % + 2.5 kΩ 0.050 % + 3.0 kΩ 0.30 % + 0.10 MΩ 1.5 % + 0.50 MΩ	Fluke 5520 series 2 wire

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Resistance ³ – Measure	(0 to 2) Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 kΩ (2 to 20) kΩ (20 to 200) kΩ 200 kΩ to 2 MΩ (2 to 20) MΩ (20 to 200) MΩ	26 μΩ/Ω + 4 μΩ 15 μΩ/Ω + 14 μΩ 15 μΩ/Ω + 50 μΩ 15 μΩ/Ω + 0.5 mΩ 15 μΩ/Ω + 5 mΩ 15 μΩ/Ω + 50 mΩ 15 μΩ/Ω + 1 Ω 58 μΩ/Ω + 100 Ω 0.046 % + 10 kΩ	Fluke 8508A

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
Capacitance ³ – Generate @ 1 kHz, Fixed Points	1 pF	0.041 pF	HP 16380A (set)
	10 pF	3.9 fF	
	100 pF	39 fF	
	1000 pF	0.41 pF	
	10 000 pF	4.0 pF	HP 16385A
	1 μF	0.5 nF	HP 16387A
Capacitance ³ – Measure @ 1 kHz	11 aF to 1.1 μF	0.017 % + 0.00003 pF	GenRad 1615-A
Inductance ³ – Measure, 12 Hz to 100 kHz	(0 to 1) mH	0.21 %	GenRad 1689 M
	(1 to 10) mH	0.21 %	
	(10 to 100) mH	0.21 %	
	100 mH to 1 H	0.23 %	
	(1 to 10) H	0.25 %	
Inductance ³ – Generate, Fixed Points, 100 Hz to 1 kHz	100 μH	0.26 μH	GenRad 1482 B GenRad 1482 E GenRad 1482 H GenRad 1482 L GenRad 1482 P
	1 mH	0.25 μH	
	10 mH	3.1 μH	
	100 mH	31 μH	
	1 H	310 μH	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage ³ – Generate			
220 μV 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	0.029 % + 4 μV 0.029 % + 4 μV 0.04 % + 4 μV 0.021 % + 4 μV 0.28 % + 5 μV 0.20 % + 10 μV 0.18 % + 20 μV 0.32 % + 20 μV	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	0.034 % + 4 μV 0.021 % + 4 μV 0.019 % + 4 μV 0.028 % + 4 μV 0.068 % + 5 μV 0.13 % + 10 μV 0.18 % + 20 μV 0.34 % + 20 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 500 kHz to 1 MHz	0.029 % + 12 μV 0.011 % + 7 μV 0.01 % + 7 μV 0.025 % + 7 μV 0.06 % + 17 μV 0.12 % + 20 μV 0.16 % + 25 μV 0.32 % + 45 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 500 kHz to 1 MHz	0.14 % + 40 μV 0.011 % + 15 μV 0.01 % + 8 μV 0.024 % + 10 μV 0.057 % + 30 μV 0.12 % + 80 μV 0.16 % + 200 μV 0.045 % + 300 μV	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage ³ – Generate (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 500 kHz to 1 MHz	0.028 % + 400 μV 0.011 % + 150 μV 0.01 % + 50 μV 0.023 % + 100 μV 0.057 % + 200 μV 0.12 % + 600 μV 0.16 % + 2 mV 0.33 % + 3.2 mV	Fluke 5720A
(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	0.029 % + 4 mV 0.011 % + 1.5 mV 0.011 % + 0.6 mV 0.024 % + 1 mV 0.058 % + 2.5 mV	Fluke 5720A
(220 to 700) V	(50 to 300) Hz 300 Hz to 1 kHz	0.034 % + 16 mV 0.12 % + 3.5 mV	
AC Voltage ³ – Measure			
(20 to 200) mV	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.016 % + 14 μV 0.013 % + 4 μV 0.011 % + 4 μV 0.011 % + 2 μV 0.011 % + 4 μV 0.031 % + 8 μV 0.071 % + 20 μV	Fluke 8508A
(0.2 to 2) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.014 % + 120 μV 0.011 % + 20 μV 85 μV/V + 20 μV 65 μV/V + 20 μV 85 μV/V + 20 μV 0.021 % + 40 μV 0.051 % + 200 μV	
(2 to 20) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.014 % + 1.2 mV 0.011 % + 200 μV 85 μV/V + 200 μV 65 μV/V + 200 μV 85 μV/V + 200 μV 0.021 % + 400 μV 0.051 % + 2 mV	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage ³ – Measure (cont)			
(20 to 200) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.014 % + 12 mV 0.011 % + 2 mV 85 µV/V + 2 mV 65 µV/V + 2 mV 85 µV/V + 2 mV 0.021 % + 4 mV 0.051 % + 20 mV	Fluke 8508A
(200 to 1000) V	(1 to 10) Hz (10 to 40) Hz 40 Hz to 1 kHz	0.014 % + 70 mV 0.011 % + 20 mV 0.011 % + 20 mV	
AC Current ³ – Measure			
(20 to 200) µA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.065 % + 20 nA 0.065 % + 20 nA 0.065 % + 20 nA 0.4 % + 20 nA	Fluke 8508A
(0.2 to 2) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.065 % + 200 nA 0.065 % + 200 nA 0.065 % + 200 nA 0.4 % + 200 nA	
(2 to 20) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.07 % + 2 µA 0.07 % + 2 µA 0.065 % + 2 µA 0.4 % + 2 µA	
(20 to 200) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.06 % + 20 µA 0.06 % + 20 µA 0.06 % + 20 µA	
(0.2 to 2) A	(1 to 2) Hz 2 Hz to 10 kHz (10 to 30) kHz	0.13 % + 200 µA 0.15 % + 200 µA 0.31 % + 200 µA	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Current ³ – Generate			
(20 to 220) µA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.026 % + 16 nA 0.017 % + 10 nA 0.013 % + 8 nA 0.032 % + 12 nA 0.11 % + 65 nA	Fluke 5720A
(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	0.026 % + 40 nA 0.017 % + 35 nA 0.013 % + 35 nA 0.021 % + 110 nA 0.11 % + 650 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	0.026 % + 400 nA 0.017 % + 350 nA 0.013 % + 350 nA 0.026 % + 550 nA 0.11 % + 5 µA	
(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	0.028 % + 4 µA 0.017 % + 3.5 µA 0.013 % + 2.5 µA 0.021 % + 3.5 µA 0.11 % + 10 µA	
(0.22 to 2.2) A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.027 % + 35 µA 0.05 % + 80 µA 0.7 % + 160 µA	
(2.2 to 11) A	40 Hz to 1 kHz 1 kHz to 10 kHz	1.3 % + 380 µA 3.7 % + 750 µA	Fluke 5720A w/ Fluke 5725A
(2 to 20) A	DC to 1 kHz	0.26 % + 4 mA	Ballantine 1620A
(20 to 100) A	DC to 1 kHz	0.3 % + 20 mA	Fluke 5720A w/ Fluke 5725A

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
Oscilloscopes ³ –			
Square: 50 Ω @ 1 kHz Source 1 MΩ @ 1 kHz Source	1 mV to 130 V 1 mV to 130 V	0.25 % + 40 μV 0.09 % + 5 μV	Fluke 5820A
Leveled Sine Amplitude: 50 kHz Reference	50 kHz to 100 MHz (100 to 300) MHz (300 to 500) MHz	3.5 % + 300 μV 4.0 % + 300 μV 5.5 % + 300 μV	
10 MHz Reference	(500 to 600) MHz 600 MHz to 1.1 GHz (1.1 to 1.6) GHz (1.6 to 2.1) GHz	6.0 % + 300 μV 7.0 % + 300 μV 7.0 % + 300 μV 8.0 % + 300 μV	
Leveled Sine Flatness: Relative to 50 kHz	50 kHz to 100 MHz (100 to 300) MHz (300 to 500) MHz	3.1 % + 100 μV 3.7 % + 100 μV 4.3 % + 100 μV	
Relative to 10 MHz	(500 to 600) MHz 600 MHz to 1.1 GHz (1.1 to 1.6) GHz (1.6 to 2.1) GHz	7.4 % + 100 μV 8.0 % + 100 μV 7.9 % + 100 μV 9.3 % + 100 μV	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouple Indicators and Indicating Systems ³ –			
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	0.51 °C 0.20 °C 0.20 °C 0.20 °C 0.25 °C	Martel M3001

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouple Indicators and Indicating Systems ³ – (cont)			
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	0.29 °C 0.28 °C 0.21 °C 0.18 °C 0.25 °C	Martel M3001
Type K	-200 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 1 000 °C 1000 °C to 1372 °C	0.36 °C 0.28 °C 0.21 °C 0.27 °C 0.41 °C	
Type R	0 °C to 250 °C 250 °C to 400 °C 400 °C to 1000 °C 1000 °C to 1750 °C	0.59 °C 0.36 °C 0.34 °C 0.41 °C	
Type S	0 °C to 250 °C 250 °C to 1000 °C 1000 °C to 1400 °C 1400 °C to 1750 °C	0.57 °C 0.40 °C 0.40 °C 0.50 °C	
Type T	-250 °C to -150 °C -150 °C to 0 °C 0 °C to 120 °C 120 °C to 400 °C	0.64 °C 0.25 °C 0.17 °C 0.17 °C	
Electrical Calibration of RTD Indicators and Indicating Systems ³ –			
Pt 385, 100 Ω	-200 °C to 800 °C	0.06 °C	Martel 3001M

III. Mechanical

Parameter/Equipment	Range	CMC ^{2,5,7} (±)	Comments
Balances and Scales	(1 to 1000) g	0.012 g + 0.6R	Class M3 weights
	200 mg to 200 g	0.00058 g + 0.6R	Class 1 weights
	(0.5 to 8) oz (1 to 218) lb	0.0022 oz + 0.6R 0.025 lb + 0.6R	Class F weights
	(2. 2) kg	46 g	Class 4 weights
Pressure – Measure & Measuring Equipment			
Gage Pressure	(-12 to 150) psi (0 to 500) psi (0 to 3000) psi	0.09 psi 0.15 psi 1.8 psi	Martel - Betaports
Absolute Pressure	(0 to 15) psi	0.009 psi	
Torque – Measure	(0.8 to 80) in·ozf (0.5 to 50) in·lbf (50 to 250) in·lbf (5 to 50) ft·lbf	0.3 in·ozf 0.29 in·lbf 1.6 in·lbf 0.29 ft·lbf	Torque tester
Torque – Measuring Equipment	(0.11 to 16) in·ozf (1.25 to 1000) in·lbf	0.2 % 0.2 %	Reference wheel w/ weights

IV. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Relative Humidity – Measuring Equipment	(20 to 80) % RH	1.4 %	Saturated salts/ Vaisala MI70 w/ HMP 77B

V. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,7} (\pm)	Comments
Frequency – Measuring Equipment	1 mHz to 26.5 GHz 1 mHz to 40 GHz 1 mHz to 26.5 GHz	5 pHz/Hz 590 pHz/Hz 590 pHz/Hz	GPS and signal generator
Frequency – Measure	1 mHz to 26.5 GHz 1 mHz to 40 GHz 1 mHz to 26.5 GHz	5 pHz/Hz 590 pHz/Hz 590 pHz/Hz	GPS and counter

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 and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* 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.

⁴ 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. 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 In the statement of CMC, percentages are to be read as percent of reading unless otherwise noted. In the statement of CMC, R represents the resolution of the unit under test.

⁶ This scope meets A2LA's P112 *Flexible Scope Policy*.

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

TRESCAL, INC.

Bohemia, NY

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 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 15th day of November 2019.

A handwritten signature in blue ink, written over a horizontal line.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3471.01
Valid to July 31, 2021

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