



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

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CALIBRATION

Valid To: March 31, 2020

Certificate Number: 1636.01

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	CMC ² (±)	Comments
Micrometers	Up to 6 in	110 µin	Gage blocks
Calipers	Up to 6 in (7 to 20) in (21 to 36) in	320 µin 540 µin 840 µin	Gage blocks
Dial Indicators	Up to 6 in	87 µin	Gage blocks
Steel Rules	Up to 36 in	900 µin	Gage blocks

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
DC Voltage ³ – Generate	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (30 to 330) V (330 to 1020) V	23 μV 0.2 mV 2 mV 22 mV 65 mV	Fluke 5500A
DC Voltage – Measure	(0 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1000) V	1.6 μV 11 μV 95 μV 1.4 mV 7 mV	Fluke 8508A, 8.5-digit DMM
DC Current ³ – Generate	(0 to 3.3) mA (3.3 to 33) mA (33 to 330) mA 330 mA to 2.2 A (2.2 to 11) A	0.5 μA 3.8 μA 38 μA 0.8 mA 7.7 mA	Fluke 5500A
Clamp-Type Current Meter Calibration, Toroidal	(11 to 550) A	0.8 A	Fluke 5500A w/ 50 turn coil
Clamp-Type Current Meter Calibration, Non-Toroidal	(11 to 550) A	0.8 A	Fluke 5500A w/ 50 turn coil
DC Current – Measure	(20 to 200) mA 200 mA to 2 A (2 to 20) A	11 μA 0.5 mA 11 mA	Fluke 8508A, 8.5-digit DMM
Resistance ³ – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 330) Ω 330 Ω to 3.3 kΩ (3.3 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ to 3.3 MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ	0.02 Ω 0.02 Ω 0.03 Ω 0.25 Ω 1.6 Ω 3.5 Ω 17 Ω 320 Ω 1.6 kΩ 15 kΩ 69 kΩ 1.5 MΩ	Fluke 5500A

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Resistance – 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 200 MΩ to 2 GΩ	0.54 mΩ 0.6 mΩ 2 mΩ 22 mΩ 29 mΩ 2.2 Ω 25 Ω 510 Ω 23 kΩ 2.1 MΩ	Fluke 8508A, 8.5-Digit DMM
Capacitance – Generate	Up to 0.5 nF (0.5 to 1) nF (1 to 10) nF (10 to 100) nF (100 to 300) nF 300 nF to 1 μF (1 to 10) μF (10 to 100) μF 100 μF to 1 mF	0.012 nF 0.013 nF 0.032 nF 0.32 nF 1 nF 0.003 μF 0.045 μF 0.59 μF 0.012 mF	Fluke 5500A

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage ³ – Generate (1 to 33) mV (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 (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	0.12 mV 73 μV 90 μV 0.13 mV 0.35 mV 0.35 mV 0.9 mV 0.2 mV 0.6 mV 0.9 mV 2.5 mV 2.4 mV	Fluke 5500A

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage ³ – Generate (cont)			
330 mV 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	5.2 mV 2.8 mV 4.9 mV 8.5 mV 18 mV 18 mV	Fluke 5500A
(3.3 to 33) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	14 mV 28 mV 66 mV 85 mV 85 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.28 V 0.31 V 0.31 V	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	2.3 V 2.4 V 2.4 V	
AC Voltage – Measure			
Up 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	48 µV 43 µV 43 µV 43 µV 43 µV 88 µV 0.2 mV	Fluke 8508A 8.5-digit DMM
200 mV 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 (100 to 300) kHz 300 kHz to 1 MHz	0.3 mV 0.2 mV 0.2 mV 0.2 mV 0.2 mV 0.6 mV 1.3 mV 28 mV 36 mV	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Measure (cont)			
(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 (100 to 300) kHz 300 kHz to 1 MHz	3 mV 2 mV 2 mV 2 mV 2 mV 6 mV 13 mV 0.77 mV 0.4 V	Fluke 8508A 8.5-digit DMM
(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 (100 to 300) kHz	23 mV 23 mV 18 mV 23 mV 23 mV 57 mV 0.1 V 0.7 V	
(200 to 1050) V	(1 to 10) Hz (10 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz	0.1 V 0.1 V 0.2 V 0.4 V	
AC Current – Measure			
Up to 200 µA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	29 µA 29 µA 29 µA	Fluke 8508A 8.5-digit DMM
200 µA to 2 mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	1 µA 1 µA 2 µA	
(2 to 20) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	14 µA 10 µA 19 µA	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments
AC Current – Measure (cont)			
(20 to 200) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.1 mA 87 µA 0.17 mA	Fluke 8508A 8.5-digit DMM
200 mA to 2 A	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	1.7 mA 1.9 mA 6.9 mA	
(2 to 20) A	(2 to 10) kHz	58 mA	
AC Current ³ – Generate			
(29 to 330) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	6 µA 6 µA 6 µA 6 µA 7 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	10 µA 7 µA 7 µA 10 µA 24 µA	
(3.3 to 33) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	77 µA 39 µA 35 µA 76 µA 0.2 mA	
(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	0.8 mA 0.4 mA 0.3 mA 0.8 mA 2.3 mA	
(0.33 to 2.2) A	10 Hz to 45 Hz 45 Hz to 1 kHz (1 to 5) kHz	2.7 mA 19 mA 19 mA	

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Current ³ – Generate (cont)			
(2.2 to 11) A	(45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	14 mA 42 mA 42 mA	Fluke 5500A
(11 to 550) A	(45 to 65) Hz (65 to 440) Hz	0.8 A 0.8 A	Fluke 5500A w/ 50- turn coil

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of RTD Indicators & Indicating Systems ³ –			
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 0.08 °C 0.1 °C 0.12 °C 0.14 °C 0.12 °C 0.27 °C	Multifunction calibrator
Pt 3926, 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	0.06 °C 0.08 °C 0.10 °C 0.12 °C 0.14 °C 0.27 °C	
Pt 3916, 100 Ω	(-200 to -190) °C (-190 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.29 °C 0.06 °C 0.07 °C 0.08 °C 0.07 °C 0.09 °C 0.09 °C 0.12 °C 0.27 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of RTD Indicators & Indicating Systems (cont) –			
Pt 385, 200 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.05 °C 0.05 °C 0.05 °C 0.05 °C 0.14 °C 0.13 °C 0.15 °C 0.19 °C	Multifunction calibrator
Pt 385, 500 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.013 °C 0.05 °C 0.07 °C 0.093 °C 0.094 °C 0.10 °C 0.11 °C 0.13 °C	
Pt 385, 1000 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.037 °C 0.05 °C 0.06 °C 0.07 °C 0.08 °C 0.07 °C 0.08 °C 0.26 °C	
PtNi 385, 120 Ω (Ni 120)	(-80 to 0) °C (0 to 100) °C (100 to 260) °C	0.09 °C 0.13 °C 0.16 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.35 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of Thermocouple Indicators & Indicating Systems ³ –			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.19 °C 0.16 °C 0.19 °C 0.25 °C 0.25 °C	Multifunction calibrator
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.20 °C 0.17 °C 0.20 °C 0.27 °C 0.27 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.23 °C 0.20 °C 0.31 °C 0.47 °C 0.47 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.41 °C 0.39 °C 0.47 °C 0.47 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.44 °C 0.45 °C 0.54 °C 0.54 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.30 °C 0.21 °C 0.19 °C 0.19 °C	

III. Fluid Quantities

Parameter/Equipment	Range	CMC ² (±)	Comments
Mass Flow – Flowmeters	(Up to 5) lb/min (5 to 25) lb/min (25 to 50) lb/min (50 to 100) lb/min (100 to 350) lb/min	0.6 % of rdg 0.6 % of rdg 0.6 % of rdg 0.6 % of rdg 0.6 % of rdg	Measurement w/ mass scale & timer

IV. Mechanical

Parameter/Equipment	Range	CMC ² (±)	Comments
Scales & Balances ³	(1 to 2) g (2 to 10) g (10 to 20) g (20 to 50) g (50 to 100) g (100 to 200) g (200 to 400) g 10 mg to 2 g (2 to 200) g (0.44 to 5) lb (5 to 25) lb (25 to 50) lb (50 to 500) lb (500 to 1000) lb (1000 to 5000) lb (5000 to 25 000) lb (25 000 to 200 000) lb	0.13 mg 0.13 mg 0.13 mg 0.11 mg 0.11 mg 0.4 mg 0.56 mg 0.14 mg 1.3 mg 0.000 57 lb 0.0057 lb 0.0078 lb 0.087 lb 0.15 lb 0.74 lb 6.2 lb 70 lb	Verification w/ ASTM Class 1 weights Verification w/ NIST Class F weights
NIST Class F weights	1 lb 2 lb 5 lb 10 lb 20 lb 50 lb 500 lb 1000 lb	12 mg 14 mg 11 mg 15 mg 0.1 g 0.2 g 18 g 13 g	Verification w/ NIST Class F weights

Parameter/Equipment	Range	CMC ² (±)	Comments
Compression – Measure	(0 to 50 000) lbf	0.2 % of rdg	50 000 lb load cell
Pressure ³ (Hydraulic)	(300 to 500) psig (500 to 1000) psig (1000 to 5000) psig (5000 to 10 000) psig	0.064 psig 0.13 psig 0.64 psig 1.3 psig	Fluke dead weight tester
Pressure/Vacuum ³ (Pneumatic)	(0 to 10) in·H ₂ O (-14 to 0) psig (0 to 15) psig (15 to 30) psig (30 to 100) psig (100 to 200) psig (200 to 300) psig (300 to 500) psig (500 to 1000) psig	0.07 in·H ₂ O 0.0008 psig 0.001 psig 0.005 psig 0.006 psig 0.012 psig 0.022 psig 0.033 psig 0.063 psig	Digital pressure gauge Digital Pressure modules
Torque ³ – Wrenches, Screwdrivers	(0 to 100) in·lbf (100 to 1000) in·lbf (0 to 150) ft·lbf (150 to 600) ft·lbf	0.6 % of rdg 0.6 % of rdg 0.7 % of rdg 0.6 % of rdg	AWS calibration system
Torque – Measuring Equipment	(40 to 400) in·ozf (0 to 100) in·lbf (100 to 1000) in·lbf (0 to 150) ft·lbf (150 to 250) ft·lbf (0 to 400) in·ozf (0 to 1000) in·lbf (0 to 700) ft·lbf	0.6 % of rdg 0.6 % of rdg 0.6 % of rdg 0.7 % of rdg 0.6 % of rdg 0.10 % of rdg 0.085 % of rdg 0.085 % of rdg	CDI torque wrench calibration system CDI torque standard calibration system

V. Thermodynamics

Parameter/Equipment	Range	CMC ² (±)	Comments
Temperature ³ – Measuring Equipment	(0 to 300) °C (300 to 661) °C	0.041 °C 0.086 °C	Comparison with furnace, SPRT & precision readout device
Temperature ³ – Measure	(-200 to 300) °C (300 to 661) °C	0.015 °C 0.021 °C	SPRT & precision readout device
Relative Humidity – Measure	(10 to 90) % RH	1.7 % RH	Digital humidity gauge

VI. Time & Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
Frequency ³ – Measure	0 Hz to 10 MHz 10 MHz to 1.3 GHz	1.5 Hz 150 Hz	Frequency counter
Frequency ³ – Measuring Equipment	(0 to 2) MHz (> 2 to 600) MHz	0.0029 % of rdg 0.00031 % of rdg	Multifunction calibrator with SC600
Time ³ – Measure	(0 to 60) s (0 to 24) hr	40 ms 0.1 ms	Stop Watch PM6680B

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.