



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

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CALIBRATION

Valid To: May 31, 2020

Certificate Number: 3601.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1,7</sup>:

I. Dimensional

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Micrometers	Up to 12 in (12 to 40) in	(21 + 1.2L) μin	Grade 0 gage blocks
Calipers	Up to 40 in	(29 + 1.4L) μin	Grade 0 gage blocks
Length & Travel Indicators	Up to 6 in	62 μin	Grade 0 gage blocks
Micrometer Standards	Up to 40 in	(26 + 2.2L) μin	Pratt & Whitney Model C Supermicrometer™ and Grade 0 gage blocks

II. Electrical DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,6</sup> (±)	Comments
DC Voltage – Generate <sup>3</sup>	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1020) V	2.4 μV/V + 3 μV 2.1 μV/V + 5 μV 4.5 μV/V + 50 μV 5.5 μV/V + 500 μV 16 μV/V + 1500 μV	Fluke 5502A
DC Current – Generate <sup>3</sup>	(0 to 330) μA (0.33 to 33) 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	0.017 % + 0.07 μA 0.002 % + 0.45 μA 0.016 % + 3.6 μA 0.022 % + 36 μA 0.002 % + 44 μA 0.11 % + 1.2 mA 0.08 % + 7.5 mA 2 % + 200 mA  0.25 % + 2 mA 0.26 % + 15 mA 0.28 % + 50 mA	Fluke 5502A          Fluke 5502A, 50 turn coil
DC Voltage – Measure <sup>3</sup>	(0 to 200) mV (0 to 2) V (0 to 20) V (0 to 200) V (0 to 1000) V	3.2 μV/V + 0.78 μV 6.3 μV/V + 0.85 μV 7.7 μV/V + 5.3 μV 12 μV/V + 38 μV 15 μV/V + 1.1 mV	Fluke 8508A
DC Current – Measure <sup>3</sup>	(0 to 200) μA (0 to 2) mA (0 to 20) mA (0 to 200) mA (0 to 2) A (0 to 20) A	0.012 % + 0.01 μA 48 μA/A + 0.04 μA 80 μA/A + 0.20 μA 120 μA/A + 1.8 μA 0.070 % + 51 μA 0.12 % + 370 μA	Fluke 8508A

Parameter/Range	Frequency	CMC <sup>2,6</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup>			
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	0.15 % + 20 μV 0.10 % + 20 μV 0.15 % + 20 μV 0.20 % + 20 μV 0.4 % + 33 μV 1.2 % + 60 μV	Fluke 5502A
(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	0.055 % + 20 μV 0.033 % + 20 μV 0.073 % + 20 μV 0.10 % + 40 μV 0.23 % + 170 μV 0.50 % + 330 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	0.055 % + 60 μV 0.11 % + 60 μV 0.07 % + 60 μV 0.06 % + 60 μV 0.15 % + 0.2 mV 0.50 % + 0.9 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	0.017 % + 0.8 mV 0.058 % + 0.6 mV 0.088 % + 0.6 mV 0.10 % + 0.6 mV 0.23 % + 0.2 mV	

Parameter/Range	Frequency	CMC <sup>2, 6</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup> (cont)			
(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	0.052 % + 3 mV 0.091 % + 9 mV 0.10 % + 9 mV 0.12 % + 9 mV 0.24 % + 80 mV	Fluke 5502A
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.051 % + 20 mV 0.08 % + 20 mV 0.09 % + 20 mV	
AC Current – Generate <sup>3</sup>			
Up 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	0.23 % + 0.1 µA 0.25 % + 0.1 µA 0.24 % + 0.1 µA 0.36 % + 0.15 µA 0.85 % + 0.2 µA 1.6 % + 0.4 µA	Fluke 5502A with LCOMP off
(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	0.29 % + 0.15 µA 0.24 % + 0.15 µA 0.22 % + 0.15 µA 0.28 % + 0.2 µA 0.58 % + 0.3 µA 1.0 % + 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	0.18 % + 2 µA 0.09 % + 2 µA 0.05 % + 2 µA 0.08 % + 2 µA 0.20 % + 3 µA 0.42 % + 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	0.18 % + 20 µA 0.09 % + 20 µA 0.04 % + 20 µA 0.10 % + 50 µA 0.20 % + 0.1 mA 0.42 % + 0.2 mA	

Parameter/Range	Frequency	CMC <sup>2, 6</sup> (±)	Comments
AC Current – Generate <sup>3</sup> (cont)			
(0.33 to 1.1) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.44 % + 0.1 mA 0.15 % + 0.1 mA 0.62 % + 1 mA 2.5 % + 5 mA	Fluke 5502A with LCOMP off
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.19 % + 0.1 mA 0.16 % + 0.1 mA 2.1 % + 1 mA 3.2 % + 5 mA	
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.41 % + 0.1 mV 0.23 % + 0.1 mV 3.0 % + 1 mV	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.16 % + 0.1 mV 0.19 % + 0.1 mV 3.0 % + 1 mV	
AC Voltage – Measure			
(0 to 200) mV	(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	0.027 % + 7.3 μV 0.019 % + 7.2 μV 0.018 % + 6.0 μV 0.017 % + 7.0 μV 0.036 % + 6.4 μV 0.06 % + 30 μV	Fluke 8508A
(0 to 2) V	(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	0.029 % + 36 μV 0.029 % + 41 μV 0.006 % + 43 μV 0.031 % + 39 μV 0.031 % + 82 μV 0.030 % + 390 μV 0.043 % + 420 μV 0.13 % + 5.4 mV	
(0 to 20) V	(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	0.015 % + 460 μV 0.015 % + 400 μV 0.015 % + 420 μV 0.015 % + 380 μV 0.015 % + 970 μV 0.016 % + 6.2 mV	

Parameter/Range	Frequency	CMC <sup>2, 5, 6</sup> (±)	Comments
AC Voltage – Measure (cont)			
(0 to 200) V	(40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.015 % + 1.4 mV 0.015 % + 2.8 mV 0.015 % + 4.0 mV 0.015 % + 2.4 mV 0.016 % + 250 mV	Fluke 8508A
(0 to 1000) V	40 Hz to 5 kHz	0.029 % + 250 mV	
AC Current – Measure			
(0 to 200) µA	10 Hz to 10 kHz (10 To 30) kHz	0.026 % 0.065 %	Fluke 8508A
(0 to 2) mA	10 Hz to 10 kHz (10 to 30) kHz	0.080 % 0.11 %	
(0 to 20) mA	10 Hz to 10 kHz (10 to 30) kHz	0.050 % 0.065 %	
(0 to 200) mA	10 Hz to 10 kHz (10 to 30) kHz	0.05 % 0.06 %	
(0 to 2) A	10 Hz to 2 kHz (2 to 10) kHz	0.07 % 0.09 %	
(0 to 20) A	10 Hz to 2 kHz (2 to 10) kHz	0.018 % 0.039 %	

Parameter/Equipment	Range	CMC <sup>2, 6</sup> (±)	Comments
Capacitance – Generate <sup>3</sup>	(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	0.43 % + 0.01 nF 0.61 % + 0.01 nF 0.73 % + 0.01 nF 0.56 % + 0.01 nF 0.58 % + 0.1 nF 0.56 % + 0.1 nF 0.58 % + 0.3 nF 0.58 % + 1 nF 0.58 % + 3 nF 0.62 % + 10 nF 0.58 % + 30 nF 0.57 % + 0.1 μF 0.70 % + 0.3 μF 0.71 % + 1 μF 0.48 % + 3 μF 0.46 % + 10 μF 0.91 % + 30 μF 1.3 % + 100 μF	Fluke 5502A
Resistance – Generate <sup>3</sup>	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 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ (0.33 to 1.1) GΩ	0.025 % + 0.001 Ω 0.014 % + 0.0015 Ω 0.01 % + 0.0014 Ω 0.01 % + 0.002 Ω 0.01 % + 0.002 Ω 0.01 % + 0.02 Ω 0.01 % + 0.02 Ω 0.01 % + 0.2 Ω 0.012 % + 0.2 Ω 0.012 % + 2 Ω 0.015 % + 2 Ω 0.015 % + 30 Ω 0.06 % + 50 Ω 0.10 % + 2.5 kΩ 0.55 % + 3 kΩ 0.52 % + 0.1 MΩ 1.3 % + 0.5 MΩ	Fluke 5502A
Resistance – Measure	Up to 2 Ω Up to 20 Ω Up to 200 Ω Up to 2 kΩ Up to 20 kΩ Up to 200 kΩ Up to 2 MΩ Up to 20 MΩ Up to 200 MΩ Up to 2 GΩ	41 μΩ /Ω + 7.6 mΩ 0.009 % + 6.4 mΩ 45 μΩ /Ω + 12 mΩ 0.012 % + 31 mΩ 30 μΩ /Ω + 150 mΩ 77 μΩ /Ω + 1.7 Ω 0.005 % + 43 Ω 0.03 % + 990 Ω 0.04 % + 15 kΩ 2.0 % + 450 kΩ	Fluke 8508A



Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
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	0.50 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C	Fluke 5502A
Type J	(-250 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.28 °C 0.17 °C 0.15 °C 0.18 °C 0.24 °C	
Type K	(-250 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.33 °C 0.19 °C 0.17 °C 0.26 °C 0.40 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.63 °C 0.24 °C 0.16 °C 0.14 °C	
Electrical Calibration of RTD Indicators <sup>3</sup> – Generate			
Pt 385, 100°	(-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	0.07 °C 0.07 °C 0.10 °C 0.13 °C 0.15 °C 0.17 °C 0.33 °C	Fluke 5502A



Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Oscilloscope <sup>3</sup> –			
DC Volt Function Into 50 Ω	(0 to 6.6) V	0.23 mV	Fluke 5502A/SC600
Into 1 MΩ	(1 to 2.5) mV (2.5 to 500) mV (1 to 2.2) V (2.3 to 11) V (12 to 130) V	0.014 mV 0.019 mV 0.082 mV 0.27 mV 1.1 mV	
Square Wave Signal 10 Hz to 10 kHz Into 50 Ω	1 mV to 6.6 V	0.43 mV	
Into 1 MΩ	(1 to 25) mV (26 to 110) mV (111 to 500) mV (1 to 2.2) V (2.3 to 11) V (11 to 130) V	0.045 mV 0.018 mV 0.061 mV 0.24 mV 0.35 mV 17 mV	
Level Sinewave Signal 5 mV to 5.5 V Into 50 Ω	50 kHz 51 kHz to 100 MHz (101 to 300) MHz (301 to 600) MHz	0.024 mV 0.093 mV 0.11 mV 0.87 mV	
Time Markers Into 50 Ω 1 V-pk	5 s to 2 ns	0.05 ns	

III. Mechanical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments	
Scales and Balances <sup>3</sup>	100 g	30 µg	Class 0 weights	
	50 g	15 µg		
	20 g	9 µg		
	10 g	6 µg		
	(1 to 5) g	4 µg		
	(1 to 500) mg	1.2 µg		
	22.7 kg (50 lb)	15 mg		Class 1 weights
	11.34 kg (25 lb)	4.8 mg		
	4.54 kg (10 lb)	1.3 mg		
	2.27 kg (5 lb)	0.66 mg		
	25 kg	8.4 mg		
	20 kg	9.1 mg		
	10 kg	1.5 mg		
	5 kg	0.85 mg		
	2 kg	0.46 mg		
	1 kg	0.13 mg		
	500 g	68 µg		
	200 g	40 µg		
	100 g	24 µg		
	50 g	9.6 µg		
	20 g	5.6 µg		
	10 g	5.0 µg		
	5 g	3.5 µg		
	3 g	2.9 µg		
	2 g	2.1 µg		
	1 g	1.8 µg		
	500 mg	1.3 µg		
	300 mg	1.0 µg		
	200 mg	1.0 µg		
	100 mg	1.0 µg		
	50 mg	1.0 µg		
	20 mg	0.66 µg		
	10 mg	0.76 µg		
5 mg	0.5 µg			
3 mg	0.41 µg			
2 mg	0.38 µg			
1 mg	0.43 µg			

Parameter/Equipment	Range	CMC <sup>2,8</sup> (±)	Comments
Scales and Balances <sup>3</sup> (cont)	453.6 kg (1000 lb) 226.8 kg (500 lb) 22.7 kg (50 lb) 11.34 kg (25 lb) 4.54 kg (10 lb) 2.27 kg (5 lb) 0.91 kg (2 lb) 0.46 kg (1 lb) 0.23 kg (0.5 lb)	11 g 2.8 g 580 mg 210 mg 120 mg 27 mg 11 mg 8.5 mg 2.3 mg	Class F weights
	500 kg 200 kg 25 kg 20 kg 10 kg 5 kg 2 kg 1 kg 500 g  2268 kg (5000 lb) 2721.5 kg (6000 lb)	7 g 3 g 630 mg 280 mg 110 mg 0.78 mg 0.44 mg 0.12 mg 0.069 mg  170 g 230 g	Test cart
Torque – Measuring Equipment	(5 to 50) in·lbf (50 to 500) in·lbf (25 to 250) ft·lbf (250 to 2500) ft·lbf	0.2 in·lbf 1.9 in·lbf 1.3 ft·lbf 9.2 ft·lbf	Mountz torque transducers
	(250 to 2500) ft·lbf (750 to 7500) ft·lbf (2500 to 25 000) ft·lbf	8.8 ft·lbf 27 ft·lbf 340 ft·lbf	AWS torque transducers
Force – Measuring Equipment			
	Compression	(0 to 20 000) lbf (0 to 200 000) lbf	0.44 lbf 8.9 lbf
Tension	(0 to 20 000) lbf (0 to 200 000) lbf	0.44 lbf 8.9 lbf	

Parameter/Equipment	Range	CMC <sup>2,8</sup> (±)	Comments
Mass, Fixed Points	22.7 kg (50 lb) 11.34 kg (25 lb) 4.54 kg (10 lb) 2.27 kg (5 lb)	1.6 g 740 mg 300 mg 160 mg	Class 1 weights
	25 kg 20 kg 10 kg 5 kg	1.7 g 1.4 g 670 mg 330 mg	
Pressure – Measuring Equipment	(-15 to 0) psig (0 to 500) psig (0 to 1000) psig (0 to 5000) psig (0 to 20 000) psig (0 to 40 000) psig	0.003 psig 0.045 psig 0.11 psig 0.65 psig 2.3 psig 7.6 psig	Pressure transducers

#### IV. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2,8</sup> (±)	Comments
Temperature – Measure	(-197 to 0) °C (0 to 157) °C (157 to 232) °C (232 to 420) °C (420 to 660) °C	0.027 °C 0.027 °C 0.027 °C 0.029 °C 0.053 °C	Fluke 9144 field metrology well with Fluke 5609 PRT  Fluke 1502A, 5616 PRT
	(-197 to 0) °C (0 to 157) °C (157 to 232) °C (232 to 420) °C	0.017 °C 0.017 °C 0.017 °C 0.026 °C	
Temperature – Generate	(Up to 50) °C (50 to 200) °C (200 to 420) °C (420 to 550) °C (550 to 660) °C	0.08 °C 0.11 °C 0.14 °C 0.17 °C 0.2 °C	Fluke 9144 field metrology well

V. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2,6</sup> (±)	Comments
Frequency – Measuring Equipment	(0.01 to 119.99) Hz (120 to 1199.9) Hz (1.2 to 11.999) kHz (12 to 119.99) kHz	0.004 % + 4 mHz 0.003 % + 30 mHz 0.003 % + 300 mHz 0.0024 % + 3 Hz	Fluke 5502A

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

<sup>2</sup> 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.

<sup>3</sup> 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.

<sup>4</sup> In the statement of CMC,  $L$  is the numerical value of the nominal length in inches.

<sup>5</sup> In the statement of CMC, percent is to be read as percent of reading.

<sup>6</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. 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.

<sup>7</sup> This scope meets A2LA’s P112 *Flexible Scope Policy*.

<sup>8</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.



## Accredited Laboratory

A2LA has accredited

**G.T. MICHELLI COMPANY, INC.**

*Harahan, LA*

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 17<sup>th</sup> day of August 2018.

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

President and CEO  
For the Accreditation Council  
Certificate Number 3601.01  
Valid to May 31, 2020  
Revised on August 30, 2018

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