



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994 & ANSI/NCSL Z540.3-2006

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CALIBRATION

Valid To: May 31, 2025

Certificate Number: 2737.04

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 5}:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
DC Voltage ³ – Generate	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (330 to 1000) V	2.5 μV + 47 nV/mV 18 μV + 35 μV/V 95 μV + 38 μV/V 1.7 mV + 43 μV/V 5.9 mV + 45 μV/V	Fluke 5500A
DC Voltage ³ – Measure	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V	0.33 μV + 17 nV/mV 0.52 μV + 8 μV/V 8.8 μV + 8.1 μV/V 35 μV + 10 μV/V 1.2 mV + 11 μV/V	HP 3458A
DC Current ³ – Generate	(0 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 2.2) A (2.2 to 11) A	70 nA + 93 nA/mA 0.21 μA + 78 nA/mA 2.6 μA + 78 nA/mA 35 μA + 0.23 mA/A 0.38 mA + 0.46 mA/A	Fluke 5500A

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
DC Current ³ – Measure	(0 to 100) nA (0.1 to 1) μA (1 to 10) μA (10 to 100) μA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	41 pA + 89 fA/nA 70 pA + 21 pA/μA 0.7 nA + 18 pA/μA 5.8 nA + 9.2 pA/μA 58 nA + 9.7 nA/mA 0.58 μA + 8 nA/mA 5.8 μA + 17 nA/mA 59 μA + 81 μA/A	HP 3458A
DC Resistance ³ – Generate	(0 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 109.9999) kΩ (11 to 32.999 99) kΩ (33 to 109.9999) kΩ (110 to 329.9999) kΩ (0.33 to 1.099 999) MΩ (1.1 to 3.299 999) MΩ (3.3 to 10.999 99) MΩ (11 to 32.999 99) MΩ (33 to 109.9999) MΩ (110 to 330) MΩ	4.8 mΩ + 92 μΩ/Ω 8.8 mΩ + 95 μΩ/Ω 10 mΩ + 71 μΩ/Ω 16 mΩ + 70 μΩ/Ω 70 mΩ + 87 μΩ/Ω 0.14 Ω + 68 μΩ/Ω 0.7 Ω + 87 μΩ/Ω 1.3 Ω + 70 μΩ/Ω 7.5 Ω + 86 μΩ/Ω 15 Ω + 96 μΩ/Ω 82 Ω + 130 μΩ/Ω 180 Ω + 0.15 mΩ/Ω 2 kΩ + 0.47 mΩ/Ω 9 kΩ + 0.78 mΩ/Ω 13 kΩ + 3.9 mΩ/Ω 440 kΩ + 3.9 mΩ/Ω	Fluke 5500A
DC Resistance ³ – Measure	(0 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 (0.1 to 1) GΩ	55 μΩ + 15 μΩ/Ω 0.52 mΩ + 13 μΩ/Ω 0.53 mΩ + 10 μΩ/Ω 5.3 mΩ + 10 μΩ/Ω 53 mΩ + 11 μΩ/Ω 2.3 Ω + 17 μΩ/Ω 0.1 kΩ + 55 μΩ/Ω 1 kΩ + 0.52 mΩ/Ω 10 kΩ + 5.1 mΩ/Ω	HP 3458A

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouples & Indicators ³ –			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1820) °C	0.34 °C 0.27 °C 0.24 °C 0.26 °C	Fluke 5500A
Type C	(0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.24 °C 0.21 °C 0.24 °C 0.39 °C 0.65 °C	
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	
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 0.18 °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 0.15 °C 0.15 °C 0.21 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.44 °C 0.27 °C 0.26 °C 0.31 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.37 °C 0.28 °C 0.29 °C 0.36 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.49 °C 0.21 °C 0.15 °C 0.14 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouples & Indicators ³ – (cont)			
Type U	(-200 to 0) °C (0 to 600) °C	0.44 °C 0.21 °C	Fluke 5500A
Electrical Calibration of RTD Indicators ³ –			
Pt 385, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.057 °C 0.056 °C 0.068 °C 0.081 °C 0.10 °C 0.18 °C	Fluke 5500A
Pt 3926, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.056 °C 0.056 °C 0.068 °C 0.081 °C 0.10 °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	0.20 °C 0.051 °C 0.056 °C 0.062 °C 0.068 °C 0.074 °C 0.081 °C 0.088 °C 0.18 °C	
Pt 385, 100 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	0.051 °C 0.051 °C 0.051 °C 0.057 °C 0.10 °C 0.11 °C 0.12 °C 0.13 °C	
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	0.051 °C 0.056 °C 0.056 °C 0.062 °C 0.074 °C 0.074 °C 0.081 °C 0.095 °C	

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Electrical Calibration of RTD Indicators ³ – (cont)			
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	0.047 °C 0.047 °C 0.051 °C 0.057 °C 0.062 °C 0.068 °C 0.068 °C 0.18 °C	Fluke 5500A
PtNi 385, 120 Ω	(-80 to 0) °C (0 to 100) °C (100 to 260) °C	0.075 °C 0.075 °C 0.12 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.24 °C	
Oscilloscope ³ –			
Amplitude – DC Signal:			
50 Ω Load	(-6.6 to 6.6) V	33 μV + 2 mV/V	Fluke 5500A SC 600
1 MΩ Load	(-130 to 130) V	33 μV + 0.39 mV/V	
Amplitude – Square Wave:			
50 Ω Load	1mV _{p-p} to 6.6 V _{p-p} 10 Hz to 100 kHz	91 μV mV + 4.3 mV/V	
1 MΩ Load	1mV _{p-p} to 130 V _{p-p} 10 Hz to 1 kHz	0.2 mV + 0.8 mV/V	
	1mV _{p-p} to 130 V _{p-p} (1 to 100) kHz	0.24 mV + 2 mV/V	
Bandwidth	5 mV to 5.5 V		
	50 kHz (Reference)	0.33 mV + 17 mV/V	
	50 kHz to 100 MHz	0.4 mV + 31 mV/V	
	(100 to 300) MHz	0.43 mV + 36 mV/V	
	(300 to 600) MHz	0.53 mV + 57 mV/V	
Time Markers	5 s to 50 ms 20 ms to 1 ns	0.000 63 % + t x 0.1 % 0.000 52 %	t = time in seconds

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage ³ – Generate			
(1 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	20 μV + 2.7 μV/mV 17 μV + 1.2 μV/mV 17 μV + 1.5 μV/mV 18 μV + 1.9 μV/mV 29 μV + 2.7 μV/mV 61 μV + 7.6 μV/mV	Fluke 5500A
(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	0.1 mV + 1.9 μV/mV 37 μV + 0.37 μV/mV 43 μV + 0.77 μV/mV 73 μV + 1.2 μV/mV 0.19 mV + 1.9 μV/mV 0.47 mV + 5.4 μV/mV	
(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	0.83 mV + 1.1 mV/V 0.15 mV + 0.22 mV/V 0.27 mV + 0.62 mV/V 0.6 mV + 1.1 mV/V 1.9 mV + 1.9 mV/V 4 mV + 3.8 mV/V	
(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	5.9 mV + 1.2 mV/V 1.8 mV + 0.3 mV/V 0.43 mV + 0.62 mV/V 8.8 mV + 1.5 mV/V 19 mV + 1.9 mV/V	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	22 mV + 0.38 mV/V 34 mV + 0.62 mV/V 50 mV + 0.7 mV/V	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.19 V + 0.39 mV/V 0.59 V + 1.6 mV/V 0.9 V + 1.6 mV/V	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage ³ – Measure			
(0 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	6.1 μV + 0.3 μV/mV 4.1 μV + 0.2 μV/mV 4.2 μV + 0.3 μV/mV 4.9 μV + 1 μV/mV 8.9 μV + 5 μV/mV 45 μV + 40 μV/mV	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 (0.3 to 1) MHz (1 to 2) MHz	12 μV + 70 nV/mV 2.7 μV + 70 nV/mV 11 μV + 0.14 μV/mV 12 μV + 0.3 μV/mV 17 μV + 0.8 μV/mV 47 μV + 3 μV/mV 0.12 mV + 10 μV/mV 3.8 mV + 15 μV/mV	
(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 (0.3 to 1) MHz (1 to 2) MHz	0.12 mV + 70 μV/V 0.1 mV + 70 μV/V 0.11 mV + 0.14 mV/V 0.12 mV + 0.3 mV/V 0.17 mV + 0.8 mV/V 0.47 mV + 3 mV/V 1.2 mV + 10 mV/V 38 mV + 15 mV/V	
(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 (0.3 to 1) MHz (1 to 2) MHz	1.2 mV + 70 μV/V 1 mV + 70 μV/V 1.1 mV + 0.14 mV/V 1.2 mV + 0.3 mV/V 1.7 mV + 0.8 mV/V 4.7 mV + 3 mV/V 12 mV + 10 mV/V 0.38 V + 15 mV/V	
(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 (0.3 to 1) MHz	13 mV + 0.2 mV/V 11 mV + 0.2 mV/V 11 mV + 0.2 mV/V 13 mV + 0.35 mV/V 21 mV + 1.2 mV/V 57 mV + 4 mV/V 0.17 V + 15 mV/V	
(100 to 10 000) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	99 mV + 0.4 mV/V 85 mV + 0.4 mV/V 99 mV + 0.6 mV/V 0.14 V + 1.2 mV/V 0.26 V + 3 mV/V	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
Capacitance ³ – Generate (0.33 to 0.4999) nF (0.5 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.999) nF (11 to 32.999) nF (33 to 109.99) nF (110 to 329.99) nF (0.33 to 1.0999) μF (1.1 to 3.2999) μF (3.3 to 10.999) μF (11 to 32.999) μF (33 to 109.99) μF (110 to 329.99) μF (0.33 to 1.1) mF	10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz (10 to 50) Hz (10 to 20) Hz	8.5 pF + 3.9 pF/nF 9.4 pF + 3.9 pF/nF 12 pF + 3.8 pF/nF 21 pF + 3.9 pF/nF 99 pF + 1.9 pF/nF 0.14 nF + 1.9 pF/nF 0.45 nF + 1.9 pF/nF 1.4 nF + 1.9 nF/μF 5.3 nF + 2.7 nF/μF 17 nF + 2.7 nF/μF 58 nF + 3.1 nF/μF 0.21 μF + 3.9 nF/μF 0.83 μF + 5.4 nF/μF 2.8 μF + 7.8 μF/mF	Fluke 5500A
AC Current ³ – Generate (0.029 to 0.329 99) mA (0.33 to 3.2999) mA (3.3 to 32.999) mA (33 to 329.99) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	6.8 μA + 24 μA/mA 6.8 μA + 24 μA/mA 6.8 μA + 24 μA/mA 6.8 μA + 24 μA/mA 6.8 μA + 25 μA/mA 0.75 μA + 1.6 μA/mA 0.49 μA + 0.78 μA/mA 0.49 μA + 0.78 μA/mA 0.75 μA + 1.6 μA/mA 1.8 μA + 4.7 μA/mA 7.4 μA + 1.6 μA/mA 4.9 μA + 0.78 μA/mA 4.6 μA + 0.7 μA/mA 7.5 μA + 1.6 μA/mA 18 μA + 4.7 μA/mA 75 μA + 1.6 μA/mA 50 μA + 0.78 μA/mA 48 μA + 0.7 μA/mA 76 μA + 1.6 μA/mA 0.18 mA + 4.7 μA/mA	Fluke 5500A

Parameter/Range	Frequency	CMC ^{2, 4} (±)	Comments
AC Current ³ – Generate (cont)			
(0.33 to 2.199 99) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.75 mA + 1.6 mA/A 0.49 mA + 0.8 mA/A 2.2 mA + 5.8 mA/A	Fluke 5500A
(2.2 to 11) A	(45 to 60) Hz (65 to 500) Hz 500 Hz to 1 kHz	3 mA + 0.46 mA/A 4 mA + 0.77 mA/A 9.3 mA + 2.6 mA/A	
AC Current ³ – Measure			
(5 to 100) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz	57 nA + 4 nA/µA 45 nA + 1.5 nA/µA 41 nA + 0.64 nA/µA	Agilent 3458A
(0.05 to 1) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.43 µA + 4.1 µA/mA 0.31 µA + 1.6 µA/mA 0.26 µA + 0.67 µA/mA 0.25 µA + 0.37 µA/mA 0.26 µA + 0.67 µA/mA 0.63 µA + 4.1 µA/mA 1.8 µA + 5.6 µA/mA	
(0.05 to 10) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	2.4 µA + 4.1 µA/mA 2.3 µA + 1.6 µA/mA 2.3 µA + 0.67 µA/mA 2.3 µA + 0.37 µA/mA 2.3 µA + 0.67 µA/mA 4.5 µA + 4.1 µA/mA 16 µA + 5.6 µA/mA	
(5 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	42 µA + 4.1 µA/mA 30 µA + 1.6 µA/mA 25 µA + 0.6 µA/mA 24 µA + 0.37 µA/mA 25 µA + 0.6 µA/mA 62 µA + 4 µA/mA 0.18 mA + 5.5 µA/mA	
(0.05 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz	0.42 mA + 4.1 mA/A 0.3 mA + 1.7 mA/A 0.26 mA + 0.9 mA/A 0.27 mA + 1.1 mA/A 0.38 mA + 3.1 mA/A 0.92 mA + 10 mA/A	

II. Mechanical

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Pressure Gauges, Transducers & Calibrators	(0 to 30) psia (0 to 100) psi (0 to 500) psi (0 to 1000) psi (0 to 10 000) psi	0.025 psia 0.062 psi 0.29 psi 0.59 psi 9.4 psi	Fluke 700PA5 Fluke 700P06 Fluke 700P07 Fluke 700P08 Fluke 700P31
Torque – Measure	4 lbf·in to 600 lbf·ft	0.31 %	CDI torque transducers

III. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Frequency – Measuring Equipment	0.1 Hz to 21 MHz	55 µHz + 25 pHz/Hz	Function generator, GPS
Frequency – Measure	0.1 Hz to 225 MHz	5.8 µHz + 59 pHz/Hz	53131A counter, GPS

¹ This laboratory offers commercial calibration 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. 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 This scope meets A2LA's *P112 Flexible Scope Policy*.

⁶ 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.

Aiea, HI

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 the requirements of ANSI/NC SL Z540.3-2006 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 3rd day of November 2023.

A blue ink signature of Mr. Trace McInturff, written over a horizontal line.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2737.04
Valid to May 31, 2025

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