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

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CALIBRATION

Valid To: November 30, 2028 Certificate Number: 2260.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations[1, 7]:

I. Acoustical

Parameter/Range	Frequency	CMC[2, 8] (±)	Comments
Sound Level – Measuring Equipment			
(74 to 104) dB	125 Hz to 2 kHz 4 kHz	0.2 dB 0.3 dB	Sound calibrator
114 dB	125 Hz to 2 kHz 4 kHz	0.33 dB 0.33 dB	
Sound Level – Measure			
(74 to 104) dB	125 Hz to 2 kHz 4 kHz	0.2 dB 0.3 dB	Sound calibrator, sound meter, comparison method
114 dB	125 Hz to 2 kHz 4 kHz	0.34 dB 0.34 dB	
(30 to 130) dB	20 Hz to 8 kHz	1.5 dB	Sound meter, direct method

II. Chemical Quantities

Parameter/Equipment	Range	CMC[2, 4, 8] (±)	Comments
pH – Measuring Equipment[3]	(4, 7, 10) pH	0.02 pH	Buffer solutions
pH Simulator & Indicator[3]	(-2000 to 2000) mV (0 to 14) pH	0.009 mV 0.0006 pH	Multifunction calibrator, reference DMM
Conductivity – Measuring Equipment[3]	Up to 12 880 µS/cm 12.88 to 100 mS/cm	0.39 % + 0.11 µS/cm 0.4 %	Standard solutions
Conductivity Simulator[3]	Up to 1000 mS/cm	0.002 %	Multifunction calibrator- reference DMM
Conductivity Indicator[3]	Up to 1000 mS/cm	0.008 %	Multifunction calibrator, reference DMM

III. Dimensional

Parameter/Equipment	Range	CMC[2, 8, 10] (±)	Comments
Micrometers – Flatness Parallelism	Up to 24 in	$(23 + 5.3L)$ µin 2.5 µin 6.2 µin	Gauge block sets, optical flat, optical parallels
Calipers	Up to 24 in	$(300 + 2.3L)$ µin	Gauge block sets, granite surface plate
Height & Depth Gauges	Up to 24 in	$(12 + 5.9L)$ µin	Gauge block sets, granite surface plate

Parameter/Equipment	Range	CMC[2, 4, 8, 10] (±)	Comments
Indicators (Dial, Test, Digital, Linear, LVDT, etc.)	Up to 12 in	(9.6 + 0.91*L*) µin	Head micrometer. gauge block sets, granite comparator
Step Gauges, Height Master, Micrometer Setting Standards Riser Blocks	Up to 12 in	(9.8 + 0.38*L*) µin	Gauge block sets, granite comparator, contact sensor
Feeler Gauges	Up to 5 mm Up to 0.2 in	1.2µm 47 µin	Contact sensor, granite comparator
Foils & Films	Up to 25 mm	0.5 µm or 20 µin	Contact sensor, granite comparator
Coating Thickness Gauge	Up to 2000 µm	0.6 µm + 0.045 %	Standard foils
Ultrasonic Thickness Gauge	Up to 25 mm	1.9 µm	Thickness gauge calibration block set
Grindometer	Up to 250 µm	0.6 µm	Contact sensor, granite comparator
Applicators (Sag Tester) & Wet Film Comb Thickness Gauge	Up to 3000 µm	0.6 µm	Contact sensor, granite comparator
Welding Gauges, Hi-Lo Gauge, Taper Gauge, V-WAC Gauge	Up to 4 in	11 µin	Gauge block sets, granite surface plate, contact sensor

IV. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 4, 9] (±)	Comments
DC Power – Generate[3]			
33 mV to 1020 V			
(0.33 to 330) mA	11 µW to 336 W	0.035 %	Multifunction calibrator
(0.33 to 3) A	11 mW to 3.06 kW	0.037 %	
(3 to 20.5) A	99 mW to 20.9 kW	0.058 %	
DC Voltage – Measure[3]	Up to 200 mV (0.2 to 2) V (>2 to 20) V (>20 to 200) V (>200 to 1050) V	5.0 µV/V + 0.2 µV 3.3 µV/V + 0.9 µV 3.8 µV/V + 5.6 µV 5.5 µV/V + 56 µV 5.7 µV/V + 0.63 mV	Reference DMM
DC Voltage – Generate[3]	(0 to 330) mV >330 mV to 3.3 V (>3.3 to 33) V (>33 to 330) V (>330 to 1020) V	15 µV/V + 0.7 µV 8.1 µV/V + 1.7 µV 8.1 µV/V + 17 µV 12 µV/V + 0.21 mV 13 µV/V + 1.6 mV	Multifunction calibrator
DC Voltage – Generate[3] – High Voltage	(1 to 10) kV	0.032 % + 0.05 V	Fluke 410B
DC Voltage – Measure[3] – High Voltage	(1 to 10) kV	0.036 % + 0.05 V	Precision high voltage meter
DC Current – Measure[3]	Up to 200 µA >200 µA to 2 mA (>2 to 20) mA (>20 to 200) mA >200 mA to 2 A (>2 to 20) A (>20 to 30) A (>30 to 1200) A (>1200 to 2500) A	13 µA/A + 0.4 µA 13 µA/A + 4 µA 14 µA/A + 4 µA 48 µA/A + 8 µA 190 µA/A + 17 µA 400 µA/A + 400 µA 0.06 % + 41 µA 0.061 % 2.3 % + 1 A	Reference DMM, Reference shunts Clamp

Parameter/Equipment	Range	CMC[2, 4, 9] (±)	Comments
DC Current – Generate[3]	Up to 330 µA 330 µA to 3.3 mA (>3.3 to 33) mA (>33 to 330) mA >330 mA to 1.1 A (>1.1 to 3) A (>3 to 11) A (>11 to 20.5) A (>20.5 to 41) A	0.01 % + 14 nA 0.0076 % + 37 nA 0.0073 % + 19 nA 0.0073 % + 2 µA 0.014 % + 34 µA 0.025 % + 41µA 0.035 % + 350 µA 0.07 % + 510 µA 0.1 % + 720 µA	Multifunction calibrators
DC Clamp-On Meters[3] Hall Effect Type	 Up to 41 A (2 Turn) Up to 205A (10 Turn) Up to 1025A (50 Turn) (>1025 to 1500) A (50 Turn)	 0.56 % + 80 mA 0.7 % + 130 mA 0.64 % + 0.24 A 0.91 % + 0.34 A	 DC standard/coil
Resistance – Measure[3,5]	10 µΩ to 7 mΩ 7 mΩ 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 (>2 to 20) GΩ	0.06 % 17 µΩ/Ω + 4 µΩ 9.5 µΩ/Ω + 14 µΩ 8.1 µΩ/Ω + 50 µΩ 8.1 µΩ/Ω + 0.5 mΩ 8.0 µΩ/Ω + 5.1 mΩ 8.1 µΩ/Ω + 50 mΩ 9.5 µΩ/Ω + 1 Ω 17 µΩ/Ω + 10 Ω 65 µΩ/Ω + 1 kΩ 180 µΩ/Ω + 100 kΩ 1.5 mΩ/Ω + 10 MΩ	Reference DMM multifunction calibrator

Parameter/Equipment	Range	CMC[2, 4, 9] (±)	Comments
Resistance – Generate[3,5]	(0 to 11) Ω (>11 to 33) Ω (>33 to 110) Ω (>110 to 330) Ω >330 Ω 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 >330 kΩ 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 >330 MΩ to 1.1 GΩ	30 µΩ/Ω + 0.7 µΩ 20 µΩ/Ω + 1.0 mΩ 19 µΩ/Ω + 0.94 mΩ 19 µΩ/Ω + 1.3 mΩ 20 µΩ/Ω + 1.2 mΩ 19 µΩ/Ω + 14 mΩ 19 µΩ/Ω + 14 mΩ 19 µΩ/Ω + 0.14 Ω 19 µΩ/Ω + 0.15 Ω 22 µΩ/Ω + 1.3 Ω 22 µΩ/Ω + 1.4 Ω 49 µΩ/Ω + 21 Ω 100 µΩ/Ω + 35 Ω 170 µΩ/Ω + 1.7 kΩ 340 µΩ/Ω + 2.2 kΩ 2.5 mΩ/Ω + 66 kΩ 10 mΩ/Ω + 370 kΩ	Multifunction calibrator
Fixed Points	1 Ω 25 Ω 100 Ω 200 Ω 400 Ω 4 kΩ 10 k Ω 40 kΩ 100 kΩ 500 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ 10 GΩ 100 GΩ 1 TΩ	1 µΩ/Ω 0.64 µΩ/Ω 0.52 µΩ/Ω 2.3 µΩ/Ω 2 µΩ/Ω 2 µΩ/Ω 0.68 µΩ/Ω 3.1 µΩ/Ω 3.2 µΩ/Ω 4.4 µΩ/Ω 0.11 % 0.017 % 0.016 % 0.024 % 0.24 % 0.55 % 1.2 %	Resistance fixed points

Parameter/Range	Frequency	CMC[2, 9] (±)	Comments
AC Voltage – Measure[3]			
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	170 µV/V + 14 µV 150 µV/V + 4 µV 130 µV/V + 4 µV 110 µV/V + 3 µV 140 µV/V + 4.5 µV 340 µV/V + 8.6 µV 770 µV/V + 20 µV	Reference 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	150 µV/V + 130 µV 130 µV/V + 20 µV 95 µV/V + 21 µV 78 µV/V + 21 µV 110 µV/V + 21 µV 220 µV/V + 41 µV 580 µV/V + 200 µV 0.3 % + 2 mV 1 % + 20 mV	
(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	160 µV/V + 1.2 mV 130 µV/V + 0.2 mV 95 µV/V + 0.2 mV 78 µV/V + 0.2 mV 110 µV/V + 0.21 mV 220 µV/V + 0.4 mV 580 µV/V + 2 mV 0.3 % + 20 mV 1 % + 200 mV	
(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 >300 kHz to 1 MHz	160 µV/V + 12 mV 130 µV/V + 2 mV 97 µV/V + 2 mV 83 µV/V + 2 mV 120 µV/V + 2 mV 230 µV/V + 4 mV 580 µV/V + 20 mV 0.3 % + 0.2 V 1 % + 2 V	

Parameter/Range	Frequency	CMC[2, 9] (±)	Comments
AC Voltage – Measure[3] (cont)			
(200 to 1050) V	(1 to 10) Hz (>10 to 40) Hz >40 Hz to 10 kHz (>10 to 30) kHz (>30 to 100) kHz	160 µV/V + 72 mV 130 µV/V + 20 mV 130 µV/V + 20 mV 240 µV/V + 34 mV 650 µV/V + 180 mV	Reference DMM
AC Voltage – Measure[3], High Voltage			
(1 to 10) kV	(30 to 200) Hz (>200 to 450) Hz	0.14 % + 0.09 V 0.46 % + 0.16 V	Precision high-voltage meter
AC Voltage – Generate[3]			
(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	530 µV/V + 4.2 µV 110 µV/V + 4.3 µV 140 µV/V + 4.3 µV 670 µV/V + 4.3 µV 2.3 mV/V + 8.2 µV 5.5 mV/V + 33 µV	Multifunction calibrator
(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	200 µV/V + 6 µV 99 µV/V + 6.5 µV 110 µV/V + 6.5 µV 240 µV/V + 6.1 µV 540 µV/V + 22 µV 1.4 mV/V + 46 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	200 µV/V + 35 µV 100 µV/V + 44 µV 130 µV/V + 43 µV 200 µV/V + 36 µV 470 µV/V + 83 µV 1.6 mV/V + 400 µV	
(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	200 µV/V + 450 µV 100 µV/V + 420 µV 160 µV/V + 420 µV 240 µV/V + 410 µV 610 µV/V + 1.1 mV	

Parameter/Range	Frequency	CMC[2, 4, 9] (±)	Comments
AC Voltage – Generate[3] (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	130 µV/V + 2 mV 140 µV/V + 4.5 mV 170 µV/V + 4.5 mV 220 µV/V + 3.8 mV 1.3 mV/V + 33 mV	Multifunction calibrator
(330 to 1020) V	45 Hz to 1 kHz (>1 to 5) kHz (>5 to 10) kHz	200 µV/V + 7.1 mV 170 µV/V + 7.2 mV 250 µV/V + 6.5 mV	
AC Current – Measure[3]			
Up to 200 µA	(1 to 10) Hz >10 Hz to 10 kHz (>10 to 30) kHz (>30 to 100) kHz	510 µA/A + 20 nA 510 µA/A + 20 nA 710 µA/A + 20 nA 0.4 % + 20 nA	Reference DMM
200 µA to 2 mA	(1 to 10) Hz >10 Hz to 10 kHz (>10 to 30) kHz (>30 to 100) kHz	320 µA/A + 200 nA 310 µA/A + 200 nA 720 µA/A + 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	320 µA/A + 2 µA 310 µA/A + 2 µA 720 µA/A + 2 µA 0.4 % + 2 µA	
(20 to 200) mA	(1 to 10) Hz >10 Hz to 10 kHz (>10 to 30) kHz	320 µA/A + 20 µA 300 µA/A + 20 µA 630 µA/A + 20 µA	
200 mA to 2 A	10 Hz to 2 kHz (>2 to 10) kHz (>10 to 30) kHz	620 µA/A + 200 µA 740 µA/A + 200 µA 0.3 % + 200 µA	
(2 to 20) A	10 Hz to 2 kHz (>2 to 10) kHz	830 µA/A + 2 mA 0.25 % + 2 mA	
(20 to 30) A	40 Hz to 2 kHz	0.12 %	
Up to 100 A	45 Hz to 65 Hz	0.066 %	
Up to 2500 A	(10 to 100) Hz	2.3 % + 1 A	Clamp meter

Parameter/Range	Frequency	CMC[2, 9] (±)	Comments
AC Current – Generate[3]			
(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 (>10 to 30) kHz	0.13 % + 0.073 µA 0.1 % + 0.073 µA 0.083 % + 0.074 µA 0.2 % + 0.1 µA 0.54 % + 0.15 µA 1.2 % + 0.25 µA	Multifunction calibrators
(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	0.13 % + 0.11 µA 0.083 % + 0.12 µA 0.067 % + 0.12 µA 0.13 % + 0.21 µA 0.33 % + 0.21 µA 0.67 % + 0.41 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	0.12 % + 1.5 µA 0.06 % + 1.7 µA 0.025 % + 1.8 µA 0.052 % + 1.7 µA 0.13 % + 2.2 µA 0.27 % + 2.7 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	0.12 % + 16 µA 0.059 % + 17 µA 0.025 % + 19 µA 0.066 % + 36 µA 0.13 % + 68 µA 0.27 % + 130 µA	
(0.33 to 3) A	(10 to 45) Hz >45 Hz to 1 kHz (>1 to 5) kHz (>5 to 10) kHz	0.12 % + 87 µA 0.04 % + 120 µA 0.43 % + 590 µA 1.7 % + 3400 µA	
(3 to 11) A	(45 to 100) Hz >100 Hz to 1 kHz (>1 to 5) kHz	0.041 % + 1.4 mA 0.067 % + 1.4 mA 2 % + 1.3 mA	
(11 to 20.5) A	(45 to 100) Hz >100 Hz to 1 kHz (>1 to 5) kHz	0.1 % + 1.3 mA 0.12 % + 1 mA 2 % + 2.8 mA	
(20.5 to 41) A	(45 to 100) Hz >100 Hz to 1 kHz (>1 to 5) kHz	0.14 % + 1.8 mA 0.17 % + 1.4 mA 2.8 % + 4 mA	

Parameter/Range	Frequency	CMC[2, 9] (±)	Comments
AC Current – Generate[3] (cont)			
Clamp-On Only[3]			
Wound Type:			
Up to 41 A (2 Turn)	(30 to 400) Hz	0.45 % + 11 mA	Multifunction calibrator, AC standard/coil
Up to 205 A (10 Turn)		0.5 % + 12 mA	
Up to 1025 A (50 Turn)		0.3 % + 70 mA	
(1025 to 1500) A (50 Turn)		0.42 % + 99 mA	
Clamp-On Only[3]			
Hall effect Type			
Up to 41 A (2 Turn)	(30 to 400) Hz	0.57 % + 82 mA	
Up to 205 A (10 Turn)		0.7 % + 130 mA	
(205 to 1025) A (50 Turn)		0.53 % + 0.48 A	
(1025 to 1500) A (50 Turn)		0.75 % + 0.68 A	
Capacitance – Generate[3]			
(0.19 to 0.4) nF	10 Hz to 10 kHz	0.33 % + 6.9 pF	Multifunction calibrator
(>0.4 to 1.1) nF	10 Hz to 10 kHz	0.29 % + 7.1 pF	
(>1.1 to 3.3) nF	10 Hz to 3 kHz	0.34 % + 6.7 pF	
(>3.3 to 11) nF	10 Hz to 1 kHz	0.17 % + 6.6 pF	
(>11 to 33) nF	10 Hz to 1 kHz	0.17 % + 6.5 pF	
(>33 to 110) nF	10 Hz to 1 kHz	0.17 % + 6.4 pF	
(>110 to 330) nF	10 Hz to 1 kHz	0.17 % + 19 pF	
(0.33 to 1.1) µF	(10 to 600) Hz	0.17 % + 75 pF	
(>1.1 to 3.3) µF	(10 to 300) Hz	0.17 % + 2 nF	
(>3.3 to 11) µF	(10 to 150) Hz	0.19 % + 5.5 nF	
(>11 to 33) µF	(10 to 120) Hz	0.28 % + 20 nF	
(>33 to 110) µF	(10 to 80) Hz	0.33 % + 51 nF	
(>110 to 330) µF	Up to 50 Hz	0.32 % + 190 nF	
(0.33 to 1.1) mF	Up to 20 Hz	0.3 % + 0.77 µF	
(>1.1 to 3.3) mF	Up to 6 Hz	0.3 % + 2 µF	
(>3.3 to 11) mF	Up to 2 Hz	0.31 % + 6.4 µF	
(>11 to 33) mF	Up to 0.6 Hz	0.5 % + 20 µF	
(>33 to 110) mF	Up to 0.2 Hz	0.74 % + 67 µF	
Inductance – Generate[3]	10 µH to 11.11 H	0.05 %	Inductance box, LCR meter

Parameter/Equipment	Range	CMC[2, 4, 9] (±)	Comments
AC Power – Generate[3] PF = 1 @ (45 to 65) Hz			
(33 to 329.999) mV:			
(3.3 to 8.999) mA	(0.1 to 3) mW	0.11 %	Multifunction calibrator
(9 to 32.999) mA	(0.3 to 10.9) mW	0.11 %	
(33 to 89.99) mA	(1.09 to 30) mW	0.11 %	
(90 to 329.99) mA	(3 to 109) mW	0.092 %	
(0.33 to 0.8999) A	(10.9 to 300) mW	0.11 %	
(0.9 to 2.1999) A	(30 to 726) mW	0.098 %	
(33 to 329.999) mV:			
(2.2 to 4.4999) A	(0.072 to 1.49) W	0.11 %	
(4.5 to 20.5) A	(0.148 to 6.77) W	0.097 %	
(0.33 to 1020) V:			
(3.3 to 8.999) mA	(0.001 to 9.18) W	0.10 %	
(9 to 32.999) mA	(0.003 to 33.7) W	0.086 %	
(33 to 89.999) mA	(0.01 to 91.8) W	0.11 %	
(90 to 329.99) mA	(0.03 to 337) W	0.089 %	
(0.33 to 0.8999) A	(0.1 to 918) W	0.098 %	
(0.9 to 2.1999) A	(0.3 to 2244) W	0.095 %	
(2.2 to 4.4999) A	(0.72 to 4590) W	0.11 %	
(4.5 to 20.5) A	(1.49 to 20 910) W	0.092 %	
Three Phase AC Power Measurement [3]			
(3 to 650) V, Up to 100 A, (50 to 60) Hz, PF=1	0.3 W to 195 kW	0.11 %	Reference power meter
Electrical Calibration of Thermocouples & Thermocouple Indicating Devices – Measure & Generate[3]			
Type B	(600 to 800) °C (>800 to 1820) °C	0.16 °C 0.1 °C	Multifunction calibrator, reference DMM, ice point
Type E	(-250 to 1000) °C	0.08 °C	
Type J	(-210 to 1200) °C	0.07 °C	
Type K	(-200 to 1372) °C	0.07 °C	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of Thermocouples & Thermocouple Indicating Devices – Measure & Generate[3] (cont)			
Type N	(-200 to 1300) °C	0.08 °C	Multifunction calibrator, reference DMM, ice point
Type R	(0 to 1767) °C	0.11 °C	
Type S	(0 to 1767) °C	0.11 °C	
Type T	(-250 to 400) °C	0.09 °C	
Electrical Calibration of RTD Indicating Devices – Generate[3,5]			
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	0.033 °C 0.033 °C 0.047 °C 0.06 °C 0.067 °C 0.08 °C 0.16 °C	Multifunction calibrator
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	0.027 °C 0.027 °C 0.027 °C 0.033 °C 0.08 °C 0.087 °C 0.093 °C 0.11 °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	0.17 °C 0.03 °C 0.033 °C 0.04 °C 0.047 °C 0.053 °C 0.06 °C 0.067 °C 0.15 °C	

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Electrical Calibration of RTD Indicating Devices –Generate[3,5] (cont)			
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	0.033 °C 0.033 °C 0.047 °C 0.06 °C 0.067 °C 0.08 °C	Multifunction calibrator
Electrical Calibration of RTD Simulation Devices – Measure[3,5]	(-200 to 850) °C	0.0011 % + 0.003 °C	Reference DMM
Oscilloscopes[3]			
DC Signal 50 Ω Load 1 MΩ Load	 (-6.6 to 6.6) V (-130 to 130) V	 0.25 % + 44 µV 0.05 % + 46 µV	Fluke 5522A-SC600
Square Wave 50 Ω Load 1 MΩ Load	 ±1 mV to 6.6 V_{pp} ±1 mV to 130 V_{pp}	 0.25 % + 45 µV 0.10 % + 45 µV	
Leveled Sine Wave 50 Ω Load	 5 mV to 5 V (50 kHz)	 2 % + 350 µV	
Flatness (@ 50 kHz Reference)	50 kHz to 100 MHz (>100 to 300) MHz (>300 to 600) MHz	3.3 % + 280 µV 4.1 % + 300 µV 6.1 % + 300 µV	
Time Markers 50 Ω Load	 2 ns to 20 ms 50 ms to 5 s	 2.5 µs/s (30 + 1000*t*) µs/s	*t* = time in seconds

V. Fluid Quantities

Parameter/Equipment	Range	CMC[2, 4, 8] (±)	Comments
Gas Flow – Measure[3]	(0 to 10) SCCM	0.2 % + 0.0033 SCCM	Molbloc flow elements
	(>10 to 100) SCCM	0.43 % + 0.2 SCCM	Transfer standard
	(0 to 2) SLM	0.21 % + 0.0004 SLM	
	(>2 to 10) SLM	0.21 % + 0.002 SLM	Molbloc flow elements
	(>10 to 50) SLM	0.21 % + 0.01 SLM	
	(>50 to 100) SLM	0.14 % + 0.02 SLM	
	(>100 to 300) SLM	0.21 % + 0.06 SLM	
	(>300 to 1000) SLM	0.21 % + 0.2 SLM	
Dynamic Viscosity	Up to 446 cP	0.32 %	Reference oil
Kinematic Viscosity Cups	Up to 531 cSt	0.36 %	Reference oil

VI. Mechanical

Parameter/Equipment	Range	CMC[2, 4, 8] (±)	Comments
Pressure – Measure & Measuring Equipment[3]			
Differential	(-30 to 30) inH_2O	0.01 % + 0.0001 inH_2O	Ruska 7250LP pressure calibrator
	(-60 to 60) inH_2O	0.005 % + 0.0037 inH_2O	
Pneumatic	(0 to 15) psig	0.011 % + 0.0016 psig	
	(>15 to 300) psig	0.008 % + 0.0023 psig	Pressure calibrator see footnote 6
	(>300 to 1000) psig	0.0072 % + 0.031 psig	
	(0 to 30) psia	0.006 % + 0.0011 psia	
	(>30 to 300) psia	0.008 % + 0.0004 psia	
	(>300 to 1015) psia	0.007 % + 0.031 psia	
Barometric	(500 to 1200) mbar	0.011 %	Reference pressure monitor
Hydraulic	(200 to 20 000) psi	0.006 %	Primary dead weight tester

Parameter/Equipment	Range	CMC[2, 4, 8] (±)	Comments
Vacuum – Measure & Measuring Equipment[3]	(0 to -14.5) psig	0.0015 psig	Pressure calibrator[6]

VII. Optical Quantities

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Aerosol Particle Counter –			
Counting Efficiency	(0.3 to 1.0) µm	7.8 %	Comparison against particle counter
Particle Size	(0.3 to 5.0) µm	4.4 %	Comparison against standard particles

VIII. Thermodynamic

Parameter/Equipment	Range	CMC[2, 4, 8] (±)	Comments
Temperature – Measure[3]	(-200 to -80) °C (>-80 to 0) °C (>0 to 300) °C (>300 to 660) °C (>660 to 1100) °C (>1100 to 1200) °C (>1200 to 1324) °C	0.0035 % 0.003 °C 0.001 % + 0.003 °C 0.002 % 0.34 °C 0.45 °C 0.6 °C	SPRT & Super thermometer TC-R reference thermometer readout
Infrared Temperature – Measure[3]	(-15 to 100) °C (>100 to 500) °C	0.23 °C 0.2 % + 0.03 °C	Reference black body infrared thermometer (radiometric method)

Parameter/Equipment	Range	CMC[2, 4, 8] (±)	Comments
Temperature – Measuring Equipment[3]	(-95 to <-80) °C (-80 to 200) °C (>200 to 250) °C (>250 to 550) °C (>550 to 1100) °C (>1100 to 1200) °C -196 °C -38.83 °C 0.01 °C 231.928 °C 419.527 °C 660.323 °C	0.06 °C 0.007 °C 0.0035 % 0.004 % 0.4 °C 0.5 °C 6 mK (0.006 °C) 4.4 mK (0.0044 °C) 2 mK (0.002 °C) 4 mK (0.004 °C) 6 mK (0.006 °C) 8 mK (0.008 °C)	Temperature baths, temperature chamber, dry well calibrator Liquid nitrogen & fixed points
Infrared Temperature – Measuring Equipment[3]	(-15 to 50) °C (>50 to 500) °C	0.6 °C 0.4 % + 0.35 °C	Infrared calibrator λ = (8 to 14) µm, where ε = 0.95
Relative Humidity – Measuring Equipment Dew Point Temperature	(0 to 10) % RH (>10 to 50) % RH (>50 to 95) % RH (-95 to -90) °C (>-90 to -80) °C (>-80 to -70) °C (>-70 to 70) °C	0.15 % RH 0.22 % RH 0.32 % RH 0.91 °C 0.6 °C 0.23 °C 0.15 °C	Humidity generator
Humidity – Measure[3]	(0 to 95) % RH	0.7 % RH	Rotronic HygroClip HC2

IX. Time & Frequency

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
Frequency – Measure[3]	1 mHz to 3 Hz >3Hz to 225 MHz	0.05 % + 0.06 mHz 8.6 µHz / Hz + 0.2 nHz	Frequency counter
Frequency – Generate[3]	1 mHz to 200 MHz	2.5 µHz / Hz	Waveform generator

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
Time – Measure[3]	Up to 18.7 s/day	0.058 s/day	Timometer 4500
Tachometer Non-Contact[3]	Up to 99.999 rpm (100 to 999.99) rpm (1000 to 9999.9) rpm (10 000 to 99 999) rpm (100 000 to 200 000) rpm	0.000 22 % + 0.0007 rpm 0.000 27 % + 0.006 rpm 0.0002 % + 0.06 rpm 0.000 041 % + 0.6 rpm 0.000 13 % + 0.75 rpm	Multifunction calibrator & LED
RPM – Measure[3]	Up to 100 000 rpm	0.0032 % + 0.1 rpm	Tachometer

[1] This laboratory offers commercial and field calibration services, where noted.

[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] In the statement of CMC, percentages are percentages of reading/output, unless otherwise noted. FS denotes a percentage of the full scale.

[5] The method used for the CMC is a 4-wire method.

[6] Auto zero function performed referenced to a standard barometer.

[7] This scope meets A2LA's *P112 Flexible Scope Policy*.

[8] 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.

[9] 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. CMCs are expressed as either a specific value that covers the full range or as a fraction/percentage of the reading plus a fixed floor specification.

[10] In the statement of CMC uncertainty, L is the numerical value of the nominal length measured in inches.

Accredited Laboratory

A2LA has accredited

ALPHA CONTROLS AND INSTRUMENTATION, INC

Markham, ON, CANADA

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 4TH day of November 2026.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2260.01
Valid to November 30, 2028

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