



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

USCALIBRATION  
17922 Sky Park Circle, Suite P  
Irvine, CA 92614  
Jim Simmons Phone: 949 724 9474

CALIBRATION

Valid To: August 31, 2019

Certificate Number: 2092.01

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

I. Chemical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Conductivity	9.62 µS/cm 101.1 µS/cm 1413 µS/cm 99 938 µS/cm	0.76 µS 3.0 µS 9.3 µS 530 µS	Conductivity standards

II. Dimensional

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Calipers <sup>3</sup> – Digital	Up to 4 in (4 to 12) in (12 to 36) in	300 µin (280 + 4.5L) µin (230 + 8.9L) µin	Gage blocks
Vernier	Up to 4 in (4 to 12) in (12 to 36) in	1200 µin (1100 + 6.1L) µin (1100 + 5.4L) µin	

Parameter/Equipment	Range	CMC <sup>2, 5</sup> ( $\pm$ )	Comments
Micrometers <sup>3</sup> –  Digital  Vernier	Up to 1 in (1 to 4) in (4 to 12) in (12 to 36) in  Up to 1 in (1 to 4) in (4 to 12) in (12 to 36) in	80 $\mu$ in 99 $\mu$ in (70 + 9.0L) $\mu$ in (290 + 5.0L) $\mu$ in  130 $\mu$ in 140 $\mu$ in (60 + 12L) $\mu$ in (50 + 12L) $\mu$ in	Gage blocks
Height Gages	Up to 36 in	1400 $\mu$ in	Gage blocks, surface plate
Depth Gages	Up to 4 in (4 to 12) in (12 to 36) in	210 $\mu$ in 260 $\mu$ in 510 $\mu$ in	Gage blocks, surface plate
Dial Indicators	(0.05 to 6) in	340 $\mu$ in	Gage blocks, surface plate, height gage
Thickness Gages <sup>3</sup>	(0.05 to 1) in	40 $\mu$ in	Gage blocks
Pin Gauges	(0.011 to 1) in	38 $\mu$ in	Supermicrometer <sup>TM</sup> , gage blocks
Plain Plugs	(0.011 to 1) in (1 to 6) in (6 to 14) in	38 $\mu$ in (26 + 10D) $\mu$ in (22 + 12D) $\mu$ in	Supermicrometer <sup>TM</sup> , gage blocks
Protractors	0° to 90°	0.059°	Angle blocks, surface plate

Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
Optical Comparators <sup>3</sup> – Linearity	(0.05 to 12) in	(120 + 7.1L) μin	Gage blocks
Steel Rules <sup>3</sup>	(0.05 to 6) in (6 to 36) in	0.010 in 0.036 in	Gage blocks
Precision Balls	Up to 1 in	41 μin	Supermicrometer <sup>TM</sup> , gage blocks
Feeler/Thickness Gage	Up to 0.2 in	25 μin	Supermicrometer <sup>TM</sup> , gage blocks
Length Standards	Up to 1 in (1 to 4) in (4 to 12) in (12 to 20) in	28 μin (31 + 6.8L) μin (35 + 11L) μin (27 + 12L) μin	Supermicrometer <sup>TM</sup> , gage blocks
Thread Ring Gages	(0.12 to 7) in	(47 + 3.7D) μin	Labmaster Universal <sup>TM</sup> , gage blocks, master plain rings
Inner Diameter Gages	(0.12 to 4) in	0.000 14 in	Ring gage set
Ring Gages	(0.04 to 14) in	(15 + 3.5D) μin	Labmaster <sup>TM</sup> , gage blocks
Radius Gages	Up to 4 in	0.000 47 in	Optical comparator
Thread Plug Gages – Pitch Diameter	Up to 20 in	(87 + 4.0D) μin	Supermicrometer <sup>TM</sup> , gage blocks, thread measuring wires
Major Diameter	Up to 20 in	(37 + 12D) μin	Supermicrometer <sup>TM</sup> , gage blocks
Ultrasonic Thickness Gages <sup>3</sup>	Up to 4 in	580 μin	Gage blocks

Parameter/Equipment	Range	CMC <sup>2,5,6</sup> (±)	Comments
Coating Thickness Gages	Up to 60.25 mils	0.55 % + 0.021 mils	Standard shims
Gage Blocks	Up to 4 in (4 to 13) in	(4.8 + 0.88L) μin (10 + 1.3L) μin	Master gage blocks

### III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
DC Voltage <sup>3</sup> – Generate	(0 to 330) mV (0 to 3.3) V (0 to 33) V (30 to 330) V (100 to 1020) V	13 μV/V + 2.2 μV 7.6 μV/V + 7.2 μV 10 μV/V + 17 μV 12 μV/V + 0.94 mV 13 μV/V + 3.3 mV	Fluke 5520A-PQ/6
DC Current <sup>3</sup> – Generate	(0 to 3.3) mA (0 to 33) mA (0 to 330) mA (0 to 1.1) A (0 to 3.0) A (0 to 11) A (0 to 20) A	77 μA/A + 0.052 μA 63 μA/A + 0.94 μA 65 μA/A + 9.0 μA 0.015 % + 51 μA 0.024 % + 0.2 mA 0.032 % + 1.4 mA 0.052 % + 7.0 mA	Fluke 5520A-PQ/6
Clamp-On Only	(20 to 50) A  (20 to 1000) A	0.022 % + 3.6 mA  0.54 % + 1.1 A	Power supply, Fluke 8508A, Ohm Labs CS300 shunt  Fluke 5520A-PQ/6, 50 turn coil
Resistance <sup>3</sup> – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (33 to 330) Ω (0.33 to 1.1) kΩ 1.1 Ω 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	31 μΩ/Ω + 0.8 mΩ 23 μΩ/Ω + 1.2 mΩ 23 μΩ/Ω + 1.1 mΩ 20 μΩ/Ω + 2.4 mΩ 18 μΩ/Ω + 8.0 mΩ 20 μΩ/Ω + 25 mΩ 20 μΩ/Ω + 57 mΩ 20 μΩ/Ω + 0.25 Ω 20 μΩ/Ω + 0.54 Ω 25 μΩ/Ω + 2.2 Ω 24 μΩ/Ω + 6.0 Ω 44 μΩ/Ω + 46 Ω 0.01 % + 100 Ω 0.017 % + 3.4 kΩ 0.033 % + 12 kΩ 0.24 % + 78 kΩ 1.1 % + 1.4 MΩ	Fluke 5520A-PQ/6

Parameter/Equipment	Range	CMC <sup>2,4</sup> ( $\pm$ )	Comments
AC Voltage <sup>3</sup> – 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	0.059 % + 6.5 $\mu$ V 0.01 % + 6.1 $\mu$ V 0.015 % + 6.0 $\mu$ V 0.071 % + 7.7 $\mu$ V 0.26 % + 15 $\mu$ V 0.60 % + 50 $\mu$ V	Fluke 5520A-PQ/6
(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	0.021 % + 16 $\mu$ V 0.01 % + 16 $\mu$ V 0.011 % + 13 $\mu$ V 0.024 % + 20 $\mu$ V 0.06 % + 35 $\mu$ V 0.13 % + 0.17 mV	
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	0.023 % + 74 $\mu$ V 0.011 % + 97 $\mu$ V 0.015 % + 77 $\mu$ V 0.021 % + 0.15 mV 0.051 % + 0.24 mV 0.17 % + 1.1 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	0.023 % + 0.92 mV 0.011 % + 0.9 mV 0.018 % + 0.89 mV 0.025 % + 1.5 mV 0.066 % + 2.7 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.013 % + 9.8 mV 0.014 % + 13 mV 0.019 % + 11 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.021 % + 33 mV 0.018 % + 33 mV 0.021 % + 33 mV	

Parameter/Range	Frequency	CMC <sup>2, 4</sup> (±)	Comments	
AC Current <sup>3</sup> – Generate				
(30 to 330) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.15 % + 0.11 µA 0.11 % + 0.11 µA 0.097 % + 0.1 µA 0.22 % + 0.17 µA 0.62 % + 0.18 µA	Fluke 5520A-PQ/6	
330 µA 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	0.15 % + 0.56 µA 0.09 % + 0.4 µA 0.071 % + 0.43 µA 0.14 % + 0.76 µA 0.34 % + 2.4 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	0.14 % + 4.8 µA 0.065 % + 3.8 µA 0.024 % + 5.6 µA 0.054 % + 5.1 µA 0.15 % + 7.7 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	0.14 % + 43 µA 0.065 % + 38 µA 0.025 % + 47 µA 0.061 % + 0.12 mA 0.11 % + 0.35 mA		
(0.33 to 1.1) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.14 % + 0.25 mA 0.04 % + 0.12 mA 0.47 % + 0.89 mA		
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.14 % + 0.25 mA 0.038 % + 0.61 mA 0.47 % + 0.89 mA		
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.04 % + 2.8 mA 0.072 % + 2.6 mA 2.4 % + 1.9 mA		
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.092 % + 4.8 mA 0.12 % + 4.2 mA 2.4 % + 4.1 mA		
Clamp-On Only				
(20 to 1000) A	(45 to 65) Hz	0.69 % + 1.1 A		Fluke 5520A-PQ/6, 50 turn coil
(20 to 150) A	(65 to 440) Hz	1.3 % + 0.30 A		

Parameter/Equipment	Range	CMC <sup>2, 4, 6</sup> ( $\pm$ )	Comments
Capacitance <sup>3</sup> – Generate	(0.33 to 0.3999) nF (0.4 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) $\mu$ F (1.1 to 3.2999) $\mu$ F (3.3 to 10.999) $\mu$ F (11 to 32.999) $\mu$ F (33 to 109.99) $\mu$ F (110 to 329.99) $\mu$ F (330 to 1.1) mF	0.4 % + 0.009 nF 0.35 % + 0.01 nF 0.36 % + 0.01 nF 0.19 % + 0.01 nF 0.18 % + 0.1 nF 0.19 % + 0.1 nF 0.19 % + 0.3 nF 0.19 % + 1.1 nF 0.19 % + 3.0 nF 0.19 % + 12 nF 0.28 % + 56 nF 0.3 % + 0.16 $\mu$ F 0.31 % + 0.58 $\mu$ F 0.33 % + 1.2 $\mu$ F	Fluke 5520A-PQ/6
DC Voltage <sup>3</sup> – Measure	Up to 200 mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1000) V  (1 to 30) kV	6.0 $\mu$ V/V + 0.6 $\mu$ V 3.8 $\mu$ V/V + 0.25 $\mu$ V 3.8 $\mu$ V/V + 0.25 $\mu$ V 6.0 $\mu$ V/V + 0.25 $\mu$ V 6.1 $\mu$ V/V + 0.6 $\mu$ V  0.21 % + 7.3 V	Fluke 8508A     Fluke 187, Ross Engineering VMP30E
Electrical Simulation of Thermocouples – Generate <sup>3</sup>			
Type C	(0 to 150) $^{\circ}$ C (150 to 650) $^{\circ}$ C (650 to 1000) $^{\circ}$ C (1000 to 1800) $^{\circ}$ C (1800 to 2316) $^{\circ}$ C	0.24 $^{\circ}$ C 0.22 $^{\circ}$ C 0.26 $^{\circ}$ C 0.40 $^{\circ}$ C 0.66 $^{\circ}$ C	Fluke 5520A-PQ/6
Type J	(-210 to -100) $^{\circ}$ C (-100 to -30) $^{\circ}$ C (-30 to 150) $^{\circ}$ C (150 to 760) $^{\circ}$ C (760 to 1200) $^{\circ}$ C	0.22 $^{\circ}$ C 0.14 $^{\circ}$ C 0.13 $^{\circ}$ C 0.15 $^{\circ}$ C 0.18 $^{\circ}$ C	
Type K	(-200 to -100) $^{\circ}$ C (-100 to -25) $^{\circ}$ C (-25 to 120) $^{\circ}$ C (120 to 1000) $^{\circ}$ C (1000 to 1372) $^{\circ}$ C	0.27 $^{\circ}$ C 0.15 $^{\circ}$ C 0.14 $^{\circ}$ C 0.21 $^{\circ}$ C 0.32 $^{\circ}$ C	

Parameter/Equipment	Range	CMC <sup>2, 4, 6</sup> (±)	
Electrical Simulation of Thermocouples <sup>3</sup> – Generate (cont)			
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.5 °C 0.2 °C 0.14 °C 0.13 °C	Fluke 5520A-PQ/6
Electrical Calibration of Thermocouple Simulators <sup>3</sup> – Measure			
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 0.22 °C 0.26 °C 0.40 °C 0.66 °C	Fluke 5520A-PQ/6 “Measure” refers to measurement of thermocouple simulators/source
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 0.11 °C 0.13 °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 0.14 °C 0.13 °C 0.2 °C 0.31 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.49 °C 0.19 °C 0.13 °C 0.12 °C	



Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Calibration of RTD Indicating Systems <sup>3</sup> – Generate			
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	0.04 °C 0.04 °C 0.055 °C 0.071 °C 0.08 °C 0.094 °C 0.18 °C	Fluke 5520A-PQ/6
Pt 385, 200 Ω	(-200 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.032 °C 0.04 °C 0.094 °C 0.11 °C 0.12 °C 0.13 °C	
Pt 385, 500 Ω	(-200 to -80) °C (-80 to 100) °C (100 to 260) °C (260 to 400) °C (400 to 600) °C (600 to 630) °C	0.035 °C 0.042 °C 0.049 °C 0.064 °C 0.072 °C 0.087 °C	
Pt 385, 1000 Ω	(-200 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 600) °C (600 to 630) °C	0.028 °C 0.035 °C 0.042 °C 0.054 °C 0.067 °C 0.18 °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	0.2 °C 0.032 °C 0.04 °C 0.048 °C 0.055 °C 0.063 °C 0.07 °C 0.079 °C 0.18 °C	

Parameter/Equipment	Range	CMC <sup>2, 4, 6</sup> ( $\pm$ )	Comments
Electrical Calibration of RTD Indicating Systems <sup>3</sup> – Generate (cont)			
Pt 3926, 100 $\Omega$	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.04 °C 0.055 °C 0.071 °C 0.079 °C 0.095 °C	Fluke 5520A-PQ/6
PtNi 385, 120 $\Omega$ (Ni 120)	(-80 to 100) °C (100 to 260) °C	0.063 °C 0.11 °C	
Cu 427, 10 $\Omega$	(-100 to 260) °C	0.24 °C	
Oscilloscope Calibration <sup>3</sup> – Generate			
Amplitude DC Signal 50 $\Omega$ Load 1 M $\Omega$ Load	(-6.6 to 6.6) V (-130 to 130) V	0.25 % + 40 $\mu$ V 0.05 % + 40 $\mu$ V	Fluke 5520A-PQ/6
Amplitude Square Wave Signal 50 $\Omega$ Load 1 M $\Omega$ Load	$\pm$ 1 mV to $\pm$ 6.6 V <sub>p-p</sub> $\pm$ 1 mV to $\pm$ 130 V <sub>p-p</sub>	0.25 % + 40 $\mu$ V 0.10 % + 40 $\mu$ V*	*For square wave frequencies above 1 kHz, $\pm$ (0.25% of output + 40 $\mu$ V)
Leveled Sine Wave Flatness Into 50 $\Omega$ , Relative to 50 kHz 5 mV <sub>pp</sub> to 5.5 V <sub>pp</sub>	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	1.5 % + 0.1 mV 2.0 % + 0.1 mV 4.0 % + 0.1 mV	
(+14 to +20) dBm (-17 to +14) dBm (-48 to -17) dBm (-17 to +14) dBm (-48 to -17) dBm	(300 to 1400) MHz (300 to 1400) MHz (300 to 1400) MHz (1400 to 3000) MHz (1400 to 3000) MHz	0.32 dBm 0.31 dBm 0.47 dBm 0.48 dBm 0.67 dBm	Fluke 9640A-LPN
Time Marker into 50 $\Omega$	5 s to 50 ms 20 ms to 2 ns	(25 + 1000t) $\mu$ s/s 65 $\mu$ s/s	Fluke 5520A-PQ/6 t = time in seconds
Rise Time into 50 $\Omega$ Load	$\leq$ 600 ps	(+0 ps / -100 ps)	

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
DC Current <sup>3</sup> – Measure	Up to 200 $\mu$ A 200 $\mu$ A to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	14 $\mu$ A /A + 0.31 nA 14 $\mu$ A/A + 3.1 nA 15 $\mu$ A/A + 31 nA 48 $\mu$ A/A + 0.62 $\mu$ A 0.018 % + 13 $\mu$ A 0.042 % + 20 $\mu$ A	Fluke 8508A
	(20 to 50) A (50 to 100) A	0.051 % + 8.0 mA 0.056 % + 6.0 mA	Fluke 8508A, Ohm Labs CS-300
Resistance <sup>3</sup> – Measure	Up to 2 $\Omega$ (2 to 20) $\Omega$ (20 to 200) $\Omega$ 200 $\Omega$ to 2 k $\Omega$ (2 to 20) k $\Omega$ (20 to 200) k $\Omega$ 200 k $\Omega$ to 2 M $\Omega$ (2 to 20) M $\Omega$ (20 to 200) M $\Omega$ 200 M $\Omega$ to 2 G $\Omega$	20 $\mu\Omega/\Omega$ + 4.0 $\mu\Omega$ 11 $\mu\Omega/\Omega$ + 62 $\mu\Omega$ 10 $\mu\Omega/\Omega$ + 10 $\mu\Omega$ 8.7 $\mu\Omega/\Omega$ + 0.5 m $\Omega$ 8.4 $\mu\Omega/\Omega$ + 5.0 m $\Omega$ 8.0 $\mu\Omega/\Omega$ + 0.15 $\Omega$ 8.0 $\mu\Omega/\Omega$ + 12 $\Omega$ 22 $\mu\Omega/\Omega$ + 120 $\Omega$ 0.013 % + 11 k $\Omega$ 0.14 % + 1.0 M $\Omega$	Fluke 8508A
AC Voltage <sup>3</sup> – Measure			
Up 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	0.014 % + 3.9 $\mu$ V 0.011 % + 3.9 $\mu$ V 0.011 % + 3.1 $\mu$ V 0.014 % + 3.9 $\mu$ V 0.032 % + 7.8 $\mu$ V 0.068 % + 19 $\mu$ V	Fluke 8508A
200 mV 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 to 1000) kHz	0.012 % + 19 $\mu$ V 96 $\mu$ V/V + 20 $\mu$ V 73 $\mu$ V/V + 19 $\mu$ V 0.011 % + 19 $\mu$ V 0.021 % + 39 $\mu$ V 0.052 % + 0.19 mV 0.24 % + 1.9 mV 0.78 % + 19 mV	
(2 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	0.011 % + 0.19 mV 89 $\mu$ V/V + 0.19 mV 74 $\mu$ V/V + 0.19 mV 0.011 % + 0.19 mV 0.021 % + 0.39 mV 0.051 % + 1.9 mV	Fluke 8508A
(20 to 200) V	(40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	92 $\mu$ V/V + 2.3 mV 77 $\mu$ V/V + 2.0 mV 0.011 % + 1.9 mV 0.021 % + 3.9 mV 0.051 % + 19 mV	

Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Voltage <sup>3</sup> – Measure (cont)			
(200 to 1000) V	40 Hz to 10 kHz	0.012 % + 20 mV	Fluke 8508A
Up to 1 kV (1 to 21) kV	60 Hz 60 Hz	0.011 kV 1.2 % + 0.017 kV	Fluke 187 plus Ross Engineering VMP30E Probe
AC Current <sup>3</sup> – Measure			
(0 to 200) µA	10 Hz to 10 kHz (10 to 30) kHz	0.034 % + 0.019 µA 0.065 % + 0.019 µA	Fluke 8508A
200 µA to 2 mA	10 Hz to 10 kHz (10 to 30) kHz	0.03 % + 0.19 µA 0.063 % + 0.19 µA	
(2 to 20) mA	10 Hz to 10 kHz (10 to 30) kHz	0.031 % + 1.9 µA 0.063 % + 1.9 µA	
(20 to 200) mA	10 Hz to 10 kHz (10 to 30) kHz	0.030 % + 19 µA 0.058 % + 19 µA	
200 mA to 2 A	10 Hz to 2 kHz (2 to 10) kHz	0.074 % + 0.19 mA 0.083 % + 0.19 mA	
(2 to 20) A	10 Hz to 2 kHz	0.072 % + 1.9 mA	

#### IV. Electrical – RF/Microwave

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
RF Voltage Low Frequency – Generate and Measure	10 Hz to 1 MHz	0.09 Vrms	Fluke 9640A-LPN, Fluke 8508A
RF Power <sup>3</sup> – Generate			
(+14 to +20) dBm	Up to 1.4 GHz	0.32 dBm	Fluke 9640A-LPN
(-17 to +14) dBm	Up to 1.4 GHz	0.31 dBm	
(-48 to -17) dBm	Up to 1.4 GHz	0.48 dBm	
(-17 to +14) dBm	(1.4 to 3) GHz	0.40 dBm	
(-48 to -17) dBm	(1.4 to 3) GHz	0.52 dBm	
(-48 to +14) dBm	(3 to 4) GHz	0.52 dBm	

V. Mechanical

Parameter/Equipment	Range	CMC <sup>2, 5, 6</sup> (±)	Comments
Pressure Gages <sup>3</sup>	(0.2 to 1) inH <sub>2</sub> O (0 to 5) psi	0.043 inH <sub>2</sub> O 0.0036 psi @ FS	Fluke pressure module
	(0 to 100) psi (5 to 500) psi (500 to 2000) psi (1500 to 10 000) psi	0.036 psi 0.15 psi 0.63 psi 3.8 psi	Additel pressure modules
	Up to 100 psia	0.13 psia	Fluke pressure module
Vacuum <sup>3</sup>	Up to -30 inHg	0.027 inHg	Additel ADT681-CP30
Torque <sup>3</sup> –  Wrenches, Screwdrivers	(15 to 200) in.oz (4 to 50) in·lbf (50 to 400) in·lbf (400 to 1000) in·lbf (1000 to 3000) in·lbf	2.9 in·oz 0.30 in·lbf (0.0013Q + 2.7) in·lbf (0.0016Q + 3.6) in·lbf (0.0015Q + 9.1) in·lbf	Torque transducers
Weights <sup>3</sup>	(0.001 to 2) g (2 to 20) g (20 to 210) g (210 to 500) g	0.22 mg 0.30 mg 0.93 mg 1.9 mg	Sartorius MSE524S with Class 1 weights
	(500 to 3000) g (3000 to 7000) g	28 mg 58 mg	Scale and Class 4 weights
Scales <sup>3</sup>	(1 to 500) mg	0.58R + 0.000 35 %	Class 1 weights
	(0.5 to 5) g	0.58R + 0.026 mg	Class 4 weights
	(5 to 1000) g	0.58R + 0.000 43 %	
	(1000 to 10 000) g	0.58R + 0.000 73 %	
(20 to 500) lbs	0.58R + 0.008 lbs	Class F weights	
Up to 1150 lb	2.1 lb	Class F weights, bulk substitution weights	

Parameter/Equipment	Range	CMC <sup>2, 6</sup> (±)	Comments
Force <sup>3</sup> –  Tension Only	(0 to 50 lbf) (50 to 150) lbf	0.0083 lbf 0.060 lbf	Class F weights
Tension and Compression	(0 to 500) lbf (0 to 5000) lbf	0.011 % + 0.18 lbf 0.025 % + 2.0 lbf	Interface load cells

#### VI. Thermodynamic

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Temperature <sup>3</sup> – Measure	(-200 to 0) °C (0 to 200) °C (200 to 420) °C  (32 to 1000) °F (1000 to 1999) °F (1999 to 2150) °F	0.065 °C 0.088 °C 0.081 °C  3.0 °F 2.8 °F 6.0 °F	Hart scientific 1523, 5627A PRT  Fluke 5520A w thermocouple
Temperature <sup>3</sup> – Measuring Equipment	(-25 to 0) °C (0 to 150) °C	0.083 °C 0.086 °C	Hart Scientific 1523 readout + 5627 PRT + 9142 bath
Relative Humidity <sup>3</sup>	(10 to 75) % RH	1.8 % RH	Kaymont M2000SPA- X

#### VII. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2, 4, 6</sup> (±)	Comments
Timers and Stop Watches <sup>3</sup>	(0 to 10 000) s	1 µs/s + 0.014 s	Fluke 5520A HP 53131A
Tachometers – Non- Contact	(30 to 100 000) RPM	0.000 20 % + 0.04 RPM	Fluke 5520A-PQ/6

Parameter/Equipment	Range	CMC <sup>2, 4, 6</sup> ( $\pm$ )	Comments
Frequency <sup>3</sup> – Measuring Equipment			
AC Voltage	(0.01 to 119.99) Hz (120.0 to 1199.9) Hz (1.200 to 9.999) kHz (10.000 to 11.999) kHz (12.00 to 119.99) kHz (120.0 to 1199.9) kHz (1.200 to 2.000) MHz	20 $\mu$ Hz/Hz + 1.0 mHz 20 $\mu$ Hz/Hz + 1.0 mHz 20 $\mu$ Hz/Hz + 1.5 mHz 22 $\mu$ Hz/Hz + 15 mHz 20 $\mu$ Hz/Hz + 15 mHz 20 $\mu$ Hz/Hz + 15 mHz 20 $\mu$ Hz/Hz + 15 mHz	Fluke 5520A-PQ/6
Leveled Sine Wave	50 kHz to 600 MHz (10 kHz Resolution)	2.0 $\mu$ Hz/Hz + 30 Hz	Fluke 5520A-PQ/6
Frequency <sup>3</sup> – Measure	10 Hz to 3 GHz	2.0 $\mu$ Hz/Hz	Agilent 53131A

<sup>1</sup> This laboratory offers commercial 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> 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 percent or fraction of the reading plus a fixed floor specification.

<sup>5</sup> In the statement of CMC,  $R$  is the resolution of the unit under test,  $L$  is the numerical value of the nominal length measured in inches,  $D$  is the numerical value of the nominal length of the diameter measured in inches, and  $Q$  is the numerical value of the nominal torque measured in in·lbf.

<sup>6</sup> In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.



## Accredited Laboratory

A2LA has accredited

**USCALIBRATION INC.**

*Irvine, CA*

for technical competence in the field of

**Calibration**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *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 2<sup>nd</sup> day of August 2017.

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

President and CEO  
For the Accreditation Council  
Certificate Number 2092.01  
Valid to August 31, 2019  
Revised on March 19, 2018

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