

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017  
AND ANSI/NCSL Z540-1-1994 (R2002)**

**Cal-Tek Company, Inc.**  
20 Republic Road  
N. Billerica, MA 01862  
Tim Cooke 800-447-4020  
tcooke@repaircalibration.net

**CALIBRATION**

Valid to: **May 22, 2022**

Certificate Number: **AC-1328**

**Electrical – DC/Low Frequency**

<b>Parameter / Equipment</b>	<b>Range</b>	<b>Expanded Uncertainty of Measurement (+/-)</b>	<b>Reference Standard, Method and/or Equipment</b>
DC Voltage – Source <sup>1</sup>	Up to 220 mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) (22 to 220) V 220 V to 1.1 kV	13 $\mu$ V/V + 0.4 $\mu$ V 5.4 $\mu$ V/V + 0.7 $\mu$ V 3.8 $\mu$ V/V + 2.5 $\mu$ V 3.9 $\mu$ V/V + 4 $\mu$ V 5.6 $\mu$ V/V + 40 $\mu$ V 7 $\mu$ V/V + 0.4 mV	Fluke 5720/03 Multiproduct Calibrator
DC Voltage - Measure <sup>1</sup>	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV	15 $\mu$ V/V + 0.3 $\mu$ V 8.4 $\mu$ V/V + 0.3 $\mu$ V 4.2 $\mu$ V/V + 0.5 $\mu$ V 6.4 $\mu$ V/V + 30 $\mu$ V 20 $\mu$ V/V + 0.1 mV	HP 3458A Multimeter
DC Voltage - Measure <sup>1</sup>	(1.02 to 120) kV	1.1 mV/V	Ross VD120-6.2Y-A Voltage Divider with HP34401A Multimeter
DC Current - Source <sup>1</sup>	Up to 220 $\mu$ A 220 $\mu$ A to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A	44 $\mu$ A/A + 6 nA 42 $\mu$ A/A + 7 nA 38 $\mu$ A/A + 40 nA 50 $\mu$ A/A + 0.7 $\mu$ A 88 $\mu$ A/A + 12 $\mu$ A	Fluke 5720/03 Multiproduct Calibrator
DC Current - Source <sup>1</sup>	(2.2 to 3) A (3 to 11) A (11 to 20.5) A	0.8 mA/A + 40 $\mu$ A 0.8 mA/A + 0.5 mA 1.8 mA/A + 0.75 mA	Fluke 5520A Multiproduct Calibrator
DC Current – Source – Current Clamps <sup>1</sup>	(20 to 150) A (150 to 1 000) A	6.3 mA/A + 160 mA 5.3 mA/A + 540 mA	Fluke 5520A with Fluke 5500A/COIL

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
DC Current - Measure <sup>1</sup>	Up to 100 nA 100 nA to 1 $\mu$ A (1 to 10) $\mu$ A (10 to 100) $\mu$ A 100 $\mu$ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	0.11 mA/A + 40 pA 64 $\mu$ A/A + 40 pA 26 $\mu$ A/A + 0.1 nA 25 $\mu$ A/A + 0.8 nA 27 $\mu$ A/A + 5 nA 23 $\mu$ A/A + 50 nA 40 $\mu$ A/A + 0.5 $\mu$ A 0.13 mA/A + 10 $\mu$ A	HP 3458A Multimeter
Resistance - Source <sup>1</sup>	1 $\Omega$ 1.9 $\Omega$ 10 $\Omega$ 19 $\Omega$ 100 $\Omega$ 190 $\Omega$ 1 k $\Omega$ 1.9 k $\Omega$ 10 k $\Omega$ 19 k $\Omega$ 100 k $\Omega$ 190 k $\Omega$ 1 M $\Omega$ 1.9 M $\Omega$ 10 M $\Omega$ 19 M $\Omega$ 100 M $\Omega$	0.19 m $\Omega$ 0.24 m $\Omega$ 0.3 m $\Omega$ 0.52 m $\Omega$ 1.8 m $\Omega$ 2.6 m $\Omega$ 9.6 m $\Omega$ 17 m $\Omega$ 0.1 $\Omega$ 0.17 $\Omega$ 1.2 $\Omega$ 2.4 $\Omega$ 20 $\Omega$ 42 $\Omega$ 0.42 k $\Omega$ 0.96 k $\Omega$ 14 k $\Omega$	Fluke 5720/03 Multiproduct Calibrator
Resistance - Measure <sup>1</sup>	Up to 10 $\Omega$ (10 to 100) $\Omega$ 100 $\Omega$ to 1 k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ 100 k $\Omega$ to 1 M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$ 100 M $\Omega$ to 1 G $\Omega$	20 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 19 $\mu\Omega/\Omega$ + 0.5 m $\Omega$ 11 $\mu\Omega/\Omega$ + 0.5 m $\Omega$ 12 $\mu\Omega/\Omega$ + 5 m $\Omega$ 11 $\mu\Omega/\Omega$ + 50 m $\Omega$ 16 $\mu\Omega/\Omega$ + 2 $\Omega$ 96 $\mu\Omega/\Omega$ + 0.1 k $\Omega$ 0.5 m $\Omega/\Omega$ + 1 k $\Omega$ 7 m $\Omega/\Omega$ + 10 k $\Omega$	HP 3458A Multimeter

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage - Source <sup>1</sup>	Up to 2.2 mV		Fluke 5720/03 Multiproduct Calibrator
	(10 to 20) Hz	1.6 mV/V + 4 μV	
	(20 to 40) Hz	2 mV/V + 4 μV	
	40 Hz to 20 kHz	1.3 mV/V + 4 μV	
	(20 to 50) kHz	2.7 mV/V + 4 μV	
	(50 to 100) kHz	2.9 mV/V + 5 μV	
	(100 to 300) kHz	4.6 mV/V + 10 μV	
	(300 to 500) kHz	7 mV/V + 20 μV	
	500 kHz to 1MHz	8.5 mV/V + 20 μV	
	(2.2 to 22) mV		
	(10 to 20) Hz	0.4 mV/V + 4 μV	
	(20 to 40) Hz	0.32 mV/V + 4 μV	
	40 Hz to 20 kHz	0.26 mV/V + 4 μV	
	(20 to 50) kHz	0.6 mV/V + 4 μV	
	(50 to 100) kHz	0.85 mV/V + 5 μV	
	(100 to 300) kHz	1.6 mV/V + 10 μV	
	(300 to 500) kHz	2.3 mV/V + 20 μV	
	500 kHz to 1MHz	4 mV/V + 20 μV	
	(22 to 220) mV		
	(10 to 20) Hz	0.33 mV/V + 12 μV	
	(20 to 40) Hz	0.2 mV/V + 7 μV	
	40 Hz to 20 kHz	0.17 mV/V + 7 μV	
	(20 to 50) kHz	0.5 mV/V + 7 μV	
	(50 to 100) kHz	0.7 mV/V + 17 μV	
(100 to 300) kHz	1.1 mV/V + 20 μV		
(300 to 500) kHz	1.6 mV/V + 25 μV		
500 kHz to 1MHz	3.1 mV/V + 45 μV		
220 mV to 2.2 V			
(10 to 20) Hz	0.37 mV/V + 40 μV		
(20 to 40) Hz	0.1 mV/V + 15 μV		
40 Hz to 20 kHz	59 μV/V + 8 μV		
(20 to 50) kHz	0.17 mV/V + 10 μV		
(50 to 100) kHz	0.25 mV/V + 30 μV		
(100 to 300) kHz	0.5 mV/V + 80 μV		
(300 to 500) kHz	1.1 mV/V + 0.2 mV		
500 kHz to 1MHz	2.1 mV/V + 0.3 mV		

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage - Source <sup>1</sup>	(2.2 to 22) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1MHz (22 to 220) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1MHz 220 V to 1 kV (15 to 50) Hz 50 Hz to 1 kHz	0.3 mV/V + 0.4 mV 0.26 mV/V + 0.15 mV 0.13 mV/V + 50 μV 0.2 mV/V + 0.1 mV 0.23 mV/V + 0.2 mV 0.45 mV/V + 0.6 mV 1 mV/V + 2 mV 1.7 mV/V + 3.2 mV 0.3 mV/V + 4 mV 0.11 mV/V + 1.5 mV 72 μV/V + 0.6 mV 120 μV/V + 1 mV 0.18 mV/V + 2.5 mV 0.9 mV/V + 16 mV 4.4 mV/V + 40 mV 8 mV/V + 80 mV 0.32 mV/V + 16 mV 85 μV /V + 3.5 mV	Fluke 5720/03 Multiproduct Calibrator
AC Voltage - Measure <sup>1</sup>	Up to 10 mV (1 to 40) Hz 40 Hz to 1kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz 100 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz	1.7 mV/V + 3 μV 1.4 mV/V + 1.1 μV 2.1 mV/V + 1.1 μV 2.8 mV/V + 1.1 μV 13 mV/V + 1.1 μV 15 mV/V + 5 μV 70 mV/V + 7 μV 0.2 V/V + 8 μV	HP 3458A Multimeter

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage – Measure <sup>1</sup>	(10 to 100) mV		HP 3458A Multimeter
	(1 to 40) Hz	0.32 mV/V + 4 μV	
	40 Hz to 1 kHz	0.26 mV/V + 2 μV	
	(1 to 20) kHz	0.29 mV/V + 2 μV	
	(20 to 50) kHz	0.65 mV/V + 2 μV	
	(50 to 100) kHz	1.1 mV/V + 2 μV	
	(100 to 300) kHz	3.3 mV/V + 10 μV	
	300 kHz to 1 MHz	11 mV/V + 10 μV	
	(1 to 2) MHz	16 mV/V + 10 μV	
	(2 to 4) MHz	40 mV/V + 70 μV	
	(4 to 8) MHz	40 mV/V + 80 μV	
	(8 to 10) MHz	0.15 V/V + 0.1 mV	
	100 mV to 1 V		
	(1 to 40) Hz	0.16 mV/V + 40 μV	
	40 Hz to 1kHz	0.13 mV/V + 20 μV	
	(1 to 20) kHz	0.19 mV/V + 20 μV	
	(20 to 50) kHz	0.37 mV/V + 20 μV	
	(50 to 100) kHz	0.85 mV/V + 20 μV	
	(100 to 300) kHz	3.1 mV/V + 0.1 mV	
	300 kHz to 1 MHz	10 mV/V + 0.1 mV	
	(1 to 2) MHz	17 mV/V + 0.1 mV	
	(2 to 4) MHz	40 mV/V + 0.7 mV	
	(4 to 8) MHz	41 mV/V + 0.8 mV	
	(8 to 10) MHz	0.15 V/V + 1 mV	
	(1 to 10) V		
	(1 to 40) Hz	91 μV/V + 0.4 mV	
	40 Hz to 1 kHz	0.14 mV/V + 0.2 mV	
(1 to 20) kHz	0.28 mV/V + 0.2 mV		
(20 to 50) kHz	0.35 mV/V + 0.2 mV		
(50 to 100) kHz	1 mV/V + 0.2 mV		
(100 to 300) kHz	3.1 mV/V + 1 mV		
300 kHz to 1 MHz	10 mV/V + 1 mV		
(1 to 2) MHz	15 mV/V + 1 mV		
(2 to 4) MHz	40 mV/V + 7 mV		
(4 to 8) MHz	41 mV/V + 8 mV		
(8 to 10) MHz	0.15 V/V + 10 mV		

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage – Measure <sup>1</sup>	(10 to 100) V (1 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.29 mV/V + 4 mV 0.23 mV/V + 2 mV 0.39 mV/V + 2 mV 1.2 mV/V + 2 mV 4.1 mV/V + 10 mV 15 mV/V + 10 mV	HP 3458A Multimeter
AC Voltage – Measure <sup>1</sup>	100 V to 1 kV (1 to 10) Hz (10 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz 30 to 100) kHz	0.4 mV/V + 40 mV 0.5 mV/V + 20 mV 1 mV/V + 20 mV 1.5 mV/V + 20 mV 3 mV/V + 20 mV	HP 3458A Multimeter
AC Voltage – Measure <sup>1</sup>	(1 to 84.84) kV 60 Hz	11 mV/V	Ross VD120-6.2Y-A Voltage Divider with HP 34401A Multimeter
AC Current - Source <sup>1</sup>	Up to 220 $\mu$ A (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 $\mu$ A to 2.2 mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (2.2 to 22) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (22 to 220) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.32 mA/A + 16 nA 0.26 mA/A + 10 nA 0.22 mA/A + 8 nA 0.34 mA/A + 12 nA 1.1 mA/A + 65 nA 0.46 mA/A + 40 nA 0.32 mA/A + 35 nA 0.15 mA/A + 35 nA 0.28 mA/A + 0.11 $\mu$ A 1.1 mA/A + 0.65 $\mu$ A 0.36 mA/A + 0.4 $\mu$ A 0.3 mA/A + 0.35 $\mu$ A 0.15 mA/A + 0.35 $\mu$ A 0.28 mA/A + 0.55 $\mu$ A 1.1 mA/A + 5 $\mu$ A 0.36 mA/A + 4 $\mu$ A 0.3 mA/A + 3.5 $\mu$ A 0.14 mA/A + 2.5 $\mu$ A 0.26 mA/A + 3.5 $\mu$ A 1.1 mA/A + 10 $\mu$ A	Fluke 5720/03 Multiproduct Calibrator

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Current - Source <sup>1</sup>	220 mA to 2.2 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) Hz	0.28 mA/A + 35 $\mu$ A 0.5 mA/A + 80 $\mu$ A 7 mA/A + 0.16 mA	Fluke 5720/03 Multiproduct Calibrator
AC Current - Source <sup>1</sup>	(2.2 to 3) A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (3 to 11) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz (11 to 20.5) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	2.8 mA/A + 0.1 mA 1.6 mA/A + 0.1 mA 12 mA/A + 1 mA 36 mA/A + 5 mA 4 mA/A + 2 mA 1.6 mA/A + 2 mA 60 mA/A + 2 mA 2.7 mA/A + 5 mA 2.7 mA/A + 5 mA 45 mA/A + 5 mA	Fluke 5520A Multiproduct Calibrator
AC Current – Source – Current Clamps <sup>1</sup>	(20 to 150) A (45 to 65) Hz (65 to 440) Hz (150 to 1 000) A (45 to 65) Hz (65 to 440) Hz	5.8 mA/A + 260 mA 11 mA/A + 300 mA 5.9 mA/A + 1 A 14 mA/A + 1.3 A	Fluke 5520A with Fluke 5500A/COIL
AC Current - Measure <sup>1</sup>	Up to 100 $\mu$ A (10 to 20) (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz 100 $\mu$ A to 1 mA (10 to 20) (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	4 mA/A + 30 nA 1.6 mA/A + 30 nA 0.66 mA/A + 30 nA 0.7 mA/A + 30 nA 4.1 mA/A + 0.2 $\mu$ A 1.5 mA/A + 0.2 $\mu$ A 0.61 mA/A + 0.2 $\mu$ A 0.32 mA/A + 0.2 $\mu$ A 0.65 mA/A + 0.2 $\mu$ A 4 mA/A + 0.4 $\mu$ A 5.5 mA/A + 1.5 $\mu$ A	HP 3458A Multimeter

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Current - Measure <sup>1</sup>	(1 to 10) mA		HP 3458A Multimeter
	(10 to 20)	4 mA/A + 2 μA	
	(20 to 45) Hz	1.5 mA/A + 2 μA	
	(45 to 100) Hz	0.61 mA/A + 2 μA	
	100 Hz to 5 kHz	0.31 mA/A + 2 μA	
	(5 to 20) kHz	0.63 mA/A + 2 μA	
	(20 to 50) kHz	4 mA/A + 4 μA	
	(50 to 100) kHz	5.5 mA/A + 15 μA	
	(10 to 100) mA		
	(10 to 20)	4 mA/A + 20 μA	
	(20 to 45) Hz	1.6 mA/A + 20 μA	
	(45 to 100) Hz	0.61 mA/A + 20 μA	
	100 Hz to 5 kHz	0.31 mA/A + 20 μA	
	(5 to 20) kHz	0.63 mA/A + 20 μA	
	(20 to 50) kHz	4 mA/A + 40 μA	
	(50 to 100) kHz	5.5 mA/A + 0.15 mA	
	100 mA to 1 A		
	(10 to 20)	4 mA/A + 0.2 mA	
(20 to 45) Hz	1.7 mA/A + 0.2 mA		
(45 to 100) Hz	0.81 mA/A + 0.2 mA		
100 Hz to 5 kHz	1.1 mA/A + 0.2 mA		
(5 to 20) kHz	3.2 mA/A + 0.2 mA		
(20 to 50) kHz	12 mA/A + 0.4 mA		
Electrical Simulation of Thermocouple Indicating Devices <sup>1</sup>	Type B		Fluke 5520A Multiproduct Calibrator
	(600 to 800) °C	0.48 °C	
	(800 to 1 000) °C	0.39 °C	
	(1 000 to 1 550) °C	0.35 °C	
	(1 550 to 1 820) °C	0.38 °C	
	Type C		
	(0 to 150) °C	0.31 °C	
	(150 to 650) °C	0.27 °C	
	(650 to 1 000) °C	0.32 °C	
	(1 000 to 1 800) °C	0.51 °C	
	(1 800 to 2 316) °C	0.85 °C	
	Type E		
	(-250 to -100) °C	0.55 °C	
	(-100 to -25) °C	0.37 °C	
	(-25 to 350) °C	0.25 °C	
(350 to 650) °C	0.26 °C		
(650 to 1 000) °C	0.28 °C		



**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices <sup>1</sup>	Type J		Fluke 5520A Multiproduct Calibrator
	(-210 to -100) °C	0.33 °C	
	(-100 to -30) °C	0.25 °C	
	(-30 to 150) °C	0.25 °C	
	(150 to 760) °C	0.27 °C	
	(760 to 1 200) °C	0.3 °C	
	Type K		
	(-200 to -100) °C	0.44 °C	
	(-100 to -25) °C	0.26 °C	
	(-25 to 120) °C	0.25 °C	
	(120 to 1 000) °C	0.32 °C	
	(1 000 to 1 372) °C	0.44 °C	
	Type L		
	(-200 to -100) °C	0.37 °C	
	(-100 to 800) °C	0.26 °C	
	(800 to 900) °C	0.18 °C	
	Type N		
	(-200 to -100) °C	0.53 °C	
	(-100 to -25) °C	0.29 °C	
	(-25 to 120) °C	0.27 °C	
	(120 to 410) °C	0.31 °C	
	(410 to 1 300) °C	0.35 °C	
	Type R		
	(0 to 250) °C	0.62 °C	
(250 to 400) °C	0.43 °C		
(400 to 1 000) °C	0.43 °C		
(1 000 to 1 767) °C	0.52 °C		
Type S			
(0 to 250) °C	0.51 °C		
(250 to 1 000) °C	0.41 °C		
(1 000 to 1 400) °C	0.42 °C		
(1 400 to 1 767) °C	0.5 °C		
Type T			
(-250 to -150) °C	0.71 °C		
(-150 to 0) °C	0.31 °C		
(0 to 120) °C	0.25 °C		
(120 to 400) °C	0.28 °C		
Type U			
(-200 to 0) °C	0.56 °C		
(0 to 600) °C	0.27 °C		

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment	
Electrical Simulation of RTD indicating devices <sup>1</sup>	Pt 385, 100 Ω		Fluke 5520A Multiproduct Calibrator	
	(-200 to 0) °C	0.051 °C		
	(0 to 100) °C	0.071 °C		
	(100 to 300) °C	0.091 °C		
	(300 to 400) °C	0.1 °C		
	(400 to 630) °C	0.13 °C		
	(630 to 800) °C	0.23 °C		
	Pt 3926, 100 Ω			
	(-200 to 0) °C	0.051 °C		
	(0 to 100) °C	0.071 °C		
	(100 to 300) °C	0.091 °C		
	(300 to 400) °C	0.1 °C		
	(400 to 630) °C	0.12 °C		
	Pt 3916, 100 Ω			
	(-200 to -190) °C	0.25 °C		
	(-190 to -80) °C	0.04 °C		
	(-80 to 0) °C	0.05 °C		
	(0 to 100) °C	0.06 °C		
	(100 to 260) °C	0.07 °C		
	(260 to 300) °C	0.08 °C		
	(300 to 400) °C	0.09 °C		
	(400 to 600) °C	0.11 °C		
	(600 to 630) °C	0.23 °C		
	Pt 385, 200 Ω			
	(-200 to 100) °C	0.04 °C		
	(100 to 260) °C	0.05 °C		
	(260 to 300) °C	0.13 °C		
(300 to 400) °C	0.14 °C			
(400 to 600) °C	0.14 °C			
(600 to 630) °C	0.16 °C			
Pt 385, 500 Ω				
(-200 to -80) °C	0.04 °C			
(-80 to 100) °C	0.05 °C			
(100 to 260) °C	0.06 °C			
(260 to 400) °C	0.08 °C			
(400 to 600) °C	0.09 °C			
(600 to 630) °C	0.12 °C			

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Simulation of RTD indicating devices <sup>1</sup>	Pt 385, 1 000 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 PtNi 385, 120 Ω (Ni 120) (-80 to 100) °C (100 to 260) °C Cu 427, 10 Ω (-100 to 260) °C	0.04 °C 0.04 °C 0.05 °C 0.06 °C 0.07 °C 0.02 °C 0.08 °C 0.14 °C 0.31 °C	Fluke 5520A Multiproduct Calibrator
Oscilloscopes <sup>1</sup> AC Voltage Square wave, 50 Ω Fast Edge, 1 MΩ  Leveled Sine Wave (relative to 50 kHz) < 310 pS rise time, 50 Ω  Time Markers Sinewave  Sine/Squarewave  Spike/Squarewave  Spike Square or 20% Pulse  Spike, Squarewave	1 mV pp to 6.6 V pp 1 mV pp to 130 V pp  5 mV pp to 2.5 V pp 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz  2 ns 5 ns  10 ns  20 ns 50 ns  100 ns to 20 ms  50 ms to 5 s	2.6 mV/V + 40 μV 1 mV/V + 40 μV  23 mV/V + 0.1 mV 30 mV/V + 0.1 mV 50 mV/V + 0.1 mV 57 mV/V + 0.1 mV  2.5 μs/s 2.5 μs/s  2.5 μs/s  2.5 μs/s  2.5 μs/s  1 ms/s +25 μs	Fluke 5520A SC 1100 Multiproduct Calibrator

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Capacitance - Source <sup>1</sup>			Fluke 5520A Multiproduct Calibrator
10 Hz to 10 kHz	190 pF to 1.1 nF	6 mF/F + 10 pF	
10 Hz to 3 kHz	(1.1 to 3.3) nF	6.6 mF/F + 10 pF	
10 Hz to 1 kHz	(3.3 to 11) nF	4 mF/F + 10 pF	
10 Hz to 1 kHz	(11 to 110) nF	3 mF/F + 0.1 nF	
10 Hz to 1 kHz	(110 to 330) nF	3 mF/F + 0.3 nF	
(10 to 600) Hz	330 nF to 1.1 μF	4 mF/F + 1 nF	
(10 to 300) Hz	(1.1 to 3.3) μF	3 mF/F + 3 nF	
(10 to 150) Hz	(3.3 to 11) μF	3 mF/F + 10 nF	
(10 to 120) Hz	(11 to 33) μF	6.6 mF/F + 30 nF	
(10 to 80) Hz	(33 to 110) μF	5 mF/F + 0.1 μF	
(0 to 50) Hz	(110 to 330) μF	6.6 mF/F + 0.3 μF	
(0 to 20) Hz	330 μF to 1.1 mF	5 mF/F + 1 μF	
(0 to 6) Hz	(1.1 to 3.3) mF	6.6 mF/F + 3 μF	
(0 to 2) Hz	(3.3 to 11) mF	5 mF/F + 10 μF	
(0 to 0.6) Hz	(11 to 33) mF	10 mF/F + 30 μF	
(0 to 0.2) Hz	(33 to 110) mF	20 mF/F + 0.1 mF	

**Length – Dimensional Metrology**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Micrometers <sup>1</sup>	Up to 1 in (1 to 6) in (6 to 12) in	52 μin 89 μin 160 μin	Starrett - Weber B89 Grade 0 Gage Blocks, Long Block Set
Depth Micrometers <sup>1</sup>	Up to 12 in	160 μin	
Calipers <sup>1</sup>	Up to 6 in (6 to 12) in (12 to 24) in	70 μin 710 μin 750 μin	Starrett - Weber B89 Grade 0 Gage Blocks, Long Block Set
Test Indicators <sup>1</sup>	Up to 0.1 in	120 μin	
Dial Indicators <sup>1</sup>	Up to 2 in	80 μin	
Height Gages <sup>1</sup>	Up to 24 in	720 μin	Starrett Weber B89 Grade 0 Gage Blocks, Surface Plate
Ring Gages <sup>2,3</sup>	(0.25 to 1) in (1 to 12) in	(5L + 13) μin	Labmaster, Master Rings

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Torque <sup>1</sup>	(10 to 40) lbf·in (40 to 480) lbf·in (40 to 200) lbf·ft	0.023 lbf·in/lbf·in 0.016 lbf·in/lbf·in 0.013 lbf·ft/lbf·ft	Torque Calibrator AKO TSD 6000
Pressure - Source <sup>1</sup>	(1 to 100) psig (100 to 500) psig (500 to 1 000) psig	0.03 psi 0.3 psi 2 psi	Fluke PPC4 Pressure Calibrator

**Thermodynamic**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature - Measure <sup>1</sup>	(-20 to 140) °C	0.081 °C	Burns 18332 PRT with Agilent 3458A Multimeter


**Time and Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency - Source <sup>1</sup>	10 mHz to 1.1 GHz	2.5 μHz /Hz + 5 μHz	Fluke 5520A Multiproduct Calibrator

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ( $k=2$ ), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for all parameters except as noted, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. The use of (L) signifies Length in inches.
3. This measurement capability is available in the laboratory only.
4. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1328



R. Douglas Leonard Jr., VP, PILR SBU