

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017**

**AND**

**ANSI/NCSL Z540-1-1994 (R2002)**

**Cal-Tek Company, Inc.**

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**CALIBRATION**

Valid to: **May 22, 2024**

Certificate Number: **AC-1328**

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
DC Voltage – Source <sup>1</sup>	Up to 220 mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV	8.6 $\mu$ V/V + 0.4 $\mu$ V 3.9 $\mu$ V + 0.7 $\mu$ V 2.7 $\mu$ V/V + 2.5 $\mu$ V 2.9 $\mu$ V/V + 4 $\mu$ V 3.8 $\mu$ V/V + 40 $\mu$ V 4.8 $\mu$ V/V + 0.4 mV	Fluke 5730A 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 8.5 Digit Multimeter
DC Voltage – Measure <sup>1</sup>	(1.02 to 120) kV	1.1 mV/V	Ross VD120-6.2Y-A Voltage Divider, HP 34401A 6.5 Digit 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	38 $\mu$ A/A + 6 nA 35 $\mu$ A/A + 7 nA 32 $\mu$ A/A + 40 nA 41 $\mu$ A/A + 0.7 $\mu$ A 66 $\mu$ A/A + 12 $\mu$ A	Fluke 5730A Multiproduct Calibrator
DC Current – Source <sup>1</sup>	(2.2 to 3) A (3 to 11) A (11 to 20.5) A	0.41 mA/A + 40 $\mu$ A 0.5 mA/A + 0.5 mA 1.1 mA/A + 0.75 mA	Fluke 5522A Multiproduct Calibrator

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
DC Current Clamps – Source <sup>1</sup>	(20 to 150) A (150 to 1 000) A	5.1 mA/A + 0.16 A 5.3 mA/A + 0.54A	Fluke 5522A Multiproduct Calibrator, Fluke 5500A/COIL
DC Current – Measure <sup>1</sup>	Up to 100 nA 100 nA to 1 μA (1 to 10) μA (10 to 100) μA 100 μA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	0.11 mA/A + 40 pA 64 μA/A + 40 pA 26 μA/A + 0.1 nA 25 μA/A + 0.8 nA 27 μA/A + 5 nA 23 μA/A + 50 nA 40 μA/A + 0.5 μA 0.13 mA/A + 10 μA	HP 3458A 8.5 Digit Multimeter
Resistance – Source <sup>1</sup> (Simulated-Fixed Values)	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	88 μΩ 0.16 mΩ 0.22 mΩ 0.41 mΩ 0.92 mΩ 1.9 mΩ 6 mΩ 12 mΩ 60 mΩ 0.11 Ω 0.79 Ω 1.6 Ω 13 Ω 29 Ω 0.32 kΩ 0.85 kΩ 11 kΩ	Fluke 5730A Multiproduct Calibrator
Resistance – Source <sup>1</sup> (Simulated)	(0 to 11) Ω (11 to 33) Ω (33 to 100) 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	49 μΩ/Ω + 1 mΩ 40 μΩ/Ω + 1.5 mΩ 31 μΩ/Ω + 1.4 mΩ 29 μΩ/Ω + 2 mΩ 33 μΩ/Ω + 2 mΩ 29 μΩ/Ω + 20 mΩ 29 μΩ/Ω + 20 mΩ 29 μΩ/Ω + 0.2 Ω 29 μΩ/Ω + 0.2 Ω 37 μΩ/Ω + 2 Ω 35 μΩ/Ω + 2 Ω 87 μΩ/Ω + 30 Ω 0.14 mΩ/Ω + 50 Ω	Fluke 5522A Multiproduct Calibrator

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Resistance – Source <sup>1</sup> (Simulated)	(11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ (330 to 1 100) MΩ	0.47 mΩ/Ω + 2.5 kΩ 0.66 mΩ/Ω + 3 kΩ 4.7 mΩ/Ω + 0.1 MΩ 16 mΩ/Ω + 0.5 MΩ	Fluke 5522A Multiproduct Calibrator
Resistance – Measure <sup>1</sup>	Up to 10 Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	20 μΩ/Ω + 50 μΩ 19 μΩ/Ω + 0.5 mΩ 11 μΩ/Ω + 0.5 mΩ 12 μΩ/Ω + 5 mΩ 11 μΩ/Ω + 50 mΩ 16 μΩ/Ω + 2 Ω 96 μΩ/Ω + 0.1 kΩ 0.5 mΩ/Ω + 1 kΩ 7 mΩ/Ω + 10 kΩ	HP 3458A 8.5 Digit Multimeter
AC Voltage – Source <sup>1</sup>	Up to 2.2 mV (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 (2.2 to 22) mV (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) mV (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	0.42 mV/V + 4 μV 0.34 mV/V + 4 μV 0.35 mV/V + 4 μV 0.47 mV/V + 4 μV 0.76 mV/V + 5 μV 1.5 mV/V + 10 μV 1.9 mV/V + 20 μV 4.5 mV/V + 20 μV 0.25 mV/V + 4 μV 0.15 mV/V + 4 μV 0.13 mV/V + 4 μV 0.24 mV/V + 4 μV 0.58 mV/V + 5 μV 0.95 mV/V + 10 μV 1.3 mV/V + 20 μV 2.6 mV/V + 20 μV 0.23 mV/V + 12 μV 92 μV/V + 7 μV 61 μV/V + 7 μV 0.12 mV/V + 7 μV 0.31 mV/V + 17 μV 0.6 mV/V + 20 μV 1.3 mV/V + 25 μV 2.6 mV/V + 45 μV	Fluke 5730A Multiproduct Calibrator

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage – Source <sup>1</sup>	220 mV to 2.2 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 (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	0.23 mV/V + 40 μV 84 μV/V + 15 μV 43 μV/V + 8 μV 66 μV/V + 10 μV 89 μV/V + 30 μV 0.31 mV/V + 80 μV 0.92 mV/V + 0.2 mV 1.6 mV/V + 0.3 mV 0.23 mV/V + 0.4 mV 86 μV/V + 0.15 mV 49 μV/V + 50 μV 87 μV/V + 0.1 mV 95 μV/V + 0.2 mV 0.27 mV/V + 0.6 mV 0.92 mV/V + 2 mV 1.5 mV/V + 3.2 mV 0.23 mV/V + 4 mV 88 μV/V + 1.5 mV 51 μV/V + 0.6 mV 78 μV/V + 1 mV 0.14 mV/V + 2.5 mV 0.82 mV/V + 16 mV 4.3 mV/V + 40 mV 9.3 mV/V + 80 mV 0.27 mV/V + 16 mV 66 μV /V + 3.5 mV	Fluke 5730A 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 8.5 Digit 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 8.5 Digit 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 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	0.29 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 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 8.5 Digit Multimeter
AC High Voltage – Measure <sup>1</sup>	(1 to 84.84) kV 60 Hz	11 mV/V	Ross VD120-6.2Y-A Voltage Divider, HP 34401A 6.5 Digit Multimeter
AC Current – Source <sup>1</sup>	Up to 220 μA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 μA 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	0.26 mA/A + 16 nA 0.18 mA/A + 10 nA 0.12 mA/A + 8 nA 0.3 mA/A + 12 nA 1.1 mA/A + 65 nA 0.27 mA/A + 40 nA 0.17 mA/A + 35 nA 0.13 mA/A + 35 nA 0.2 mA/A + 0.11 μA 0.96 mA/A + 0.65 μA 0.26 mA/A + 0.4 μA 0.18 mA/A + 0.35 μA 0.11 mA/A + 0.35 μA 0.21 mA/A + 0.55 μA 1.1 mA/A + 5 μA 0.27 mA/A + 4 μA 0.17 mA/A + 3.5 μA 0.12 mA/A + 2.5 μA 0.21 mA/A + 3.5 μA 0.95 mA/A + 10 μA	Fluke 5730A 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) kHz	0.26 mA/A + 35 $\mu$ A 0.42 mA/A + 80 $\mu$ A 6.1 mA/A + 0.16 mA	Fluke 5730A 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	1.8 mA/A + 0.1 mA 0.62 mA/A + 0.1 mA 6.2 mA/A + 1 mA 25 mA/A + 5 mA 0.64 mA/A + 2 mA 1.1 mA/A + 2 mA 30 mA/A + 2 mA 1.2 mA/A + 5 mA 1.5 mA/A + 5 mA 30 mA/A + 5 mA	Fluke 5522A Multiproduct Calibrator
AC Current Clamps – Source <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 + 0.26 A 11 mA/A + 0.3 A 5.8 mA/A + 1 A 15 mA/A + 1.3 A	Fluke 5522A Multiproduct Calibrator, 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 8.5 Digit 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 (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 (10 to 100) 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 100 mA to 1 A (10 to 20) (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	4 mA/A + 2 μA 1.5 mA/A + 2 μA 0.61 mA/A + 2 μA 0.31 mA/A + 2 μA 0.63 mA/A + 2 μA 4 mA/A + 4 μA 5.5 mA/A + 15 μA 4 mA/A + 20 μA 1.6 mA/A + 20 μA 0.61 mA/A + 20 μA 0.31 mA/A + 20 μA 0.63 mA/A + 20 μA 4 mA/A + 40 μA 5.5 mA/A + 0.15 mA 4 mA/A + 0.2 mA 1.7 mA/A + 0.2 mA 0.81 mA/A + 0.2 mA 1.1 mA/A + 0.2 mA 3.2 mA/A + 0.2 mA 12 mA/A + 0.4 mA	<p style="text-align: center;">HP 3458A 8.5 Digit Multimeter</p>
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure <sup>1</sup>	Type B (600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C Type C (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 316) °C Type E (-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C	0.45 °C 0.35 °C 0.31 °C 0.34 °C 0.31 °C 0.27 °C 0.32 °C 0.51 °C 0.85 °C 0.52 °C 0.18 °C 0.16 °C 0.18 °C 0.22 °C	<p style="text-align: center;">Fluke 5522A Multiproduct Calibrator</p>



**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure <sup>1</sup>	Type J		Fluke 5522A Multiproduct Calibrator
	(-210 to -100) °C	0.33 °C	
	(-100 to -30) °C	0.19 °C	
	(-30 to 150) °C	0.19 °C	
	(150 to 760) °C	0.20 °C	
	(760 to 1 200) °C	0.25 °C	
	Type K		
	(-200 to -100) °C	0.35 °C	
	(-100 to -25) °C	0.2 °C	
	(-25 to 120) °C	0.18 °C	
	(120 to 1 000) °C	0.27 °C	
	(1 000 to 1 372) °C	0.41 °C	
	Type L		
	(-200 to -100) °C	0.39 °C	
	(-100 to 800) °C	0.28 °C	
	(800 to 900) °C	0.19 °C	
	Type N		
	(-200 to -100) °C	0.41 °C	
	(-100 to -25) °C	0.24 °C	
	(-25 to 120) °C	0.21 °C	
	(120 to 410) °C	0.2 °C	
	(410 to 1 300) °C	0.28 °C	
	Type R		
	(0 to 250) °C	0.48 °C	
(250 to 400) °C	0.37 °C		
(400 to 1 000) °C	0.38 °C		
(1 000 to 1 767) °C	0.47 °C		
Type S			
(0 to 250) °C	0.48 °C		
(250 to 1 000) °C	0.37 °C		
(1 000 to 1 400) °C	0.38 °C		
(1 400 to 1 767) °C	0.47 °C		
Type T			
(-250 to -150) °C	0.67 °C		
(-150 to 0) °C	0.28 °C		
(0 to 120) °C	0.2 °C		
(120 to 400) °C	0.17 °C		
Type U			
(-200 to 0) °C	0.57 °C		
(0 to 600) °C	0.28 °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 5522A Multiproduct Calibrator
	(-200 to -80) °C	0.11 °C	
	(-80 to 0) °C	0.11 °C	
	(0 to 100) °C	0.12 °C	
	(100 to 300) °C	0.14 °C	
	(300 to 400) °C	0.15 °C	
	(400 to 630) °C	0.17 °C	
	(630 to 800) °C	0.26 °C	
	Pt 3926, 100 Ω		
	(-200 to -80) °C	0.11 °C	
	(-80 to 0) °C	0.11 °C	
	(0 to 100) °C	0.12 °C	
	(100 to 300) °C	0.14 °C	
	(300 to 400) °C	0.15 °C	
	(400 to 630) °C	0.16 °C	
	Pt 3916, 100 Ω		
	(-200 to -190) °C	0.27 °C	
	(-190 to -80) °C	0.1 °C	
	(-80 to 0) °C	0.11 °C	
	(0 to 100) °C	0.12 °C	
	(100 to 260) °C	0.12 °C	
	(260 to 300) °C	0.13 °C	
	(300 to 400) °C	0.14 °C	
	(400 to 600) °C	0.15 °C	
(600 to 630) °C	0.26 °C		
Pt 385, 200 Ω			
(-200 to -80) °C	0.06 °C		
(-80 to 0) °C	0.07 °C		
(0 to 100) °C	0.08 °C		
(100 to 260) °C	0.09 °C		
(260 to 300) °C	0.1 °C		
(300 to 400) °C	0.11 °C		
(400 to 600) °C	0.12 °C		
(600 to 630) °C	0.24 °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, 500 Ω		Fluke 5522A Multiproduct Calibrator
	(-200 to -80) °C	0.06 °C	
	(-80 to 0) °C	0.06 °C	
	(0 to 100) °C	0.06 °C	
	(100 to 260) °C	0.07 °C	
	(260 to 300) °C	0.14 °C	
	(300 to 400) °C	0.16 °C	
	(400 to 600) °C	0.17 °C	
	(600 to 630) °C	0.17 °C	
	Pt 385, 1 000 Ω		
	(-200 to -80) °C	0.03 °C	
	(-80 to 0) °C	0.03 °C	
	(0 to 100) °C	0.04 °C	
	(100 to 260) °C	0.05 °C	
	(260 to 300) °C	0.06 °C	
	(300 to 400) °C	0.07 °C	
	(400 to 600) °C	0.07 °C	
(600 to 630) °C	0.23 °C		
PtNi 385, 120 Ω (Ni 120)			
(-80 to 0) °C	0.11 °C		
(0 to 100) °C	0.09 °C		
(100 to 260) °C	0.15 °C		
Cu 427, 10 Ω			
(-100 to 260) °C	0.96 °C		
Oscilloscopes <sup>1</sup>			Fluke 5522A/11 Multiproduct Calibrator with 1.1 GHz Scope Option
AC Voltage			
50 Ω	1 mVp-p to 6.6 Vp-p	2.9 mV/V + 40 μV	
1 MΩ	1 mVp-p to 130 Vp-p	1 mV/V + 40 μV	
DC Voltage			
50 Ω	(-6.6 to 6.6) V	3 mV/V + 40 μV	
1 MΩ	(-130 to 130) V	0.5 mV/V + 40 μV	
Leveled Sine Wave			
50 Ω	5 mVp-p to 2.5 Vp-p		
	50 kHz	22 mV/V + 0.2 mV	
	50 kHz to 100 MHz	18 mV/V + 0.1 mV	
	(100 to 300) MHz	24 mV/V + 0.1 mV	
	(300 to 600) MHz	42 mV/V + 0.1 mV	
	5 mVp-p to 3.5 Vp-p		
	600 MHz to 1.1 GHz	54 mV/V + 0.1 mV	

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Oscilloscopes <sup>1,2</sup> Time Markers Sinewave Sine/Square-wave Spike/Square-wave Spike. Square-wave, Pulse Spike, Square-wave	(2 to 5) ns 10 ns (20 to 50) ns 100 ns to 20 ms 50 ms to 5 s	2.8 μs/s 2.6 μs/s 2.5 μs/s 2.6 μs/s (25 + 1 000T) μs/s	Fluke 5522A/11 Multiproduct Calibrator with 1.1 GHz Scope Option
Capacitance – Source <sup>1</sup> 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 (0 to 50) Hz (0 to 20) Hz (0 to 6) Hz (0 to 2) Hz (0 to 0.6) Hz (0 to 0.2) Hz	(220 to 400) pF 400 pF to 1.1 μF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF 330 nF 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 330 μF to 1.1 mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	6.7 mF/F + 10 pF 5.7 mF/F + 10 pF 5.3 mF/F + 10 pF 3.4 mF/F + 10 pF 2.8 mF/F + 0.1 nF 3.4 mF/F + 0.1 nF 3.2 mF/F + 0.3 nF 3.4 mF/F + 1 nF 3.2 mF/F + 3 nF 3.4 mF/F + 10 nF 4.7 mF/F + 30 nF 5 mF/F + 0.1 μF 4.7 mF/F + 0.3 μF 4.5 mF/F + 1 μF 4.7 mF/F + 3 μF 4.6 mF/F + 10 μF 7.7 mF/F + 30 μF 13 mF/F + 0.1 mF	Fluke 5522A Multiproduct Calibrator

**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	Starrett - Weber B89

**Length – Dimensional Metrology**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Dial Indicators <sup>1</sup>	Up to 2 in	80 μin	Grade 0 Gage Blocks, Long Block Set
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 Indicating Devices <sup>1</sup>	(4 to 40) ozf·in (2 to 20) lbf·in (20 to 200) lbf·in (10 to 100) lbf·ft (100 to 1000) lbf·ft	2.2 % of reading + 0.005 ozf·in 0.19 % of reading + 0.002 lbf·in 0.19 % of reading + 0.02 lbf·in 0.29 % of reading + 0.01 lbf·ft 1.3 % of reading + 0.1 lbf·ft	AKO TSD 6500 Torque Calibrator
Pressure – Source <sup>1</sup>	(0 to 30) psig (30 to 100) psig (100 to 300) psig (300 to 1 000) psig	0.003 6 psi 0.018 % of reading 0.057 psi 0.018 % of reading	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, Agilent 3458A 8.5 Digit Multimeter

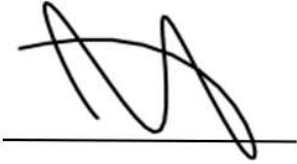
**Time and Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Source <sup>1</sup>	10 mHz to 1.1 GHz	2.6 μHz/Hz + 5 μHz	Fluke 5522A/11 Multiproduct Calibrator with 1.1 GHz Scope Option

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.  $L$  = length in inches;  $T$  = time in seconds.
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.



Jason Stine, Vice President

