



**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005  
AND ANSI/NCSL Z540-1-1994 (R2002)**

**Cal-Tek Company, Inc.**  
 20 Republic Road  
 N. Billerica, MA 01862  
 David Hoy 800-447-4020  
 davidhoy@repaircalibration.net

**CALIBRATION**

Valid to: **May 22, 2020**

Certificate Number: **AC-1328**

**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
DC Voltage - Source	Up to 220 mV	12 $\mu$ V/V + 0.4 $\mu$ V	Fluke 5700A/EP3 Multiproduct Calibrator
	220 mV to 2.2 V (2.2 to 11) V (11 to 22) (22 to 220) V 220 V to 1.1 kV	5.3 $\mu$ V/V + 0.7 $\mu$ V 3.7 $\mu$ V/V + 2.5 $\mu$ V 4 $\mu$ V/V + 4 $\mu$ V 5.6 $\mu$ V/V + 40 $\mu$ V 7.0 $\mu$ V/V + 0.4 mV	
DC Voltage - Measure	Up to 100 mV	15 $\mu$ V/V + 0.3 $\mu$ V	HP 3458A Multimeter
	100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV	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	
	(1.02 to 120) kV	1.1 mV/V	Ross VD120-6.2Y-A Voltage Divider with HP34401A Multimeter
DC Current - Source	Up to 220 $\mu$ A	43 $\mu$ A/A + 6 nA	Fluke 5700A/EP3 Multiproduct Calibrator
	220 $\mu$ A to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A	39 $\mu$ A/A + 7 nA 38 $\mu$ A/A + 40 nA 49 $\mu$ A/A + 0.7 $\mu$ A 97 $\mu$ A/A + 12 $\mu$ A	
	(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



Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
DC Current - Measure	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	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 $\Omega$ 0.25 m $\Omega$ 0.28 m $\Omega$ 0.16 m $\Omega$ 1.8 m $\Omega$ 2.6 m $\Omega$ 9.4 m $\Omega$ 18 m $\Omega$ 0.11 $\Omega$ 0.17 $\Omega$ 1.2 $\Omega$ 2.2 $\Omega$ 21 $\Omega$ 46 $\Omega$ 0.50 k $\Omega$ 0.95 k $\Omega$ 14 k $\Omega$	Fluke 5700A/EP3 Multiproduct Calibrator
Resistance - Measure	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	Up to 2.2 mV		Fluke 5700A/EP3 Multiproduct Calibrator
	(10 to 20) Hz	1.7 mV/V + 4 μV	
	(20 to 40) Hz	1.7 mV/V + 4 μV	
	40 Hz to 20 kHz	1.4 mV/V + 4 μV	
	(20 to 50) kHz	2.8 mV/V + 4 μV	
	(50 to 100) kHz	2.9 mV/V + 5 μV	
	(100 to 300) kHz	4.7 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	0.41 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	0.65 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 mV/V + 20 μV	
	500 kHz to 1MHz	4 mV/V + 20 μV	
	(22 to 220) mV		
	(10 to 20) Hz	0.34 mV/V + 12 μV	
	(20 to 40) Hz	0.2 mV/V + 7 μV	
	40 Hz to 20 kHz	0.18 mV/V + 7 μV	
	(20 to 50) kHz	0.51 mV/V + 7 μV	
	(50 to 100) kHz	0.68 mV/V + 17 μV	
(100 to 300) kHz	1.1 mV/V + 20 μV		
(300 to 500) kHz	1.5 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	0.11 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	0.19 mV/V + 30 μV		
(100 to 300) kHz	0.73 mV/V + 80 μV		
(300 to 500) kHz	1.1 mV/V + 0.2 mV		
500 kHz to 1MHz	2 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	(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	0.3 mV/V + 0.4 mV 0.26 mV/V + 0.15 mV 0.12 mV/V + 50 μV 0.2 mV/V + 0.1 mV 0.22 mV/V + 0.2 mV 0.45 mV/V + 0.6 mV 1 mV/V + 2 mV 1.7 mV/V + 3.2 mV	Fluke 5700A/EP3 Multiproduct Calibrator
	(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	0.30 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 + 4 mV 85 μV /V + 3.2 mV	
AC Voltage - Measure	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



AC Voltage – Measure	(10 to 100) mV		
	(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		
(10 to 100) V			
(1 to 40) Hz	0.29 mV/V + 4 mV		
40 Hz to 20 kHz	0.23 mV/V + 2 mV		
(20 to 50) kHz	0.39 mV/V + 2 mV		
(50 to 100) kHz	1.2 mV/V + 2 mV		
(100 to 300) kHz	4.1 mV/V + 10 mV		
300 kHz to 1 MHz	15 mV/V + 10 mV		
		HP 3458A Multimeter	



Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage – Measure	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 1.0 mV/V + 20 mV 1.5 mV/V + 20 mV 3 mV/V + 20 mV	HP 3458A
	(1 to 84.84) kV 60 Hz	11 mV/V	Ross VD120-6.2Y-A Voltage Divider with HP 34401A Multimeter
AC Current - Source	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 220 mA to 2.2 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) Hz	0.32 mA/A + 16 nA 0.25 mA/A + 10 nA 0.22 mA/A + 8 nA 0.31 mA/A + 12 nA 1.2 mA/A + 65 nA 0.46 mA/A + 40 nA 0.32 mA/A + 35 nA 0.15 mA/A + 35 nA 0.29 mA/A + 0.11 $\mu$ A 1.2 mA/A + 0.65 $\mu$ A 0.35 mA/A + 0.4 $\mu$ A 0.31 mA/A + 0.35 $\mu$ A 0.15 mA/A + 0.35 $\mu$ A 0.28 mA/A + 0.55 $\mu$ A 1.2 mA/A + 5 $\mu$ A 0.36 mA/A + 4 $\mu$ A 0.29 mA/A + 3.5 $\mu$ A 0.15 mA/A + 2.5 $\mu$ A 0.27 mA/A + 3.5 $\mu$ A 1.2 mA/A + 10 $\mu$ A 0.29 mA/A + 35 $\mu$ A 0.49 mA/A + 80 $\mu$ A 7.1 mA/A + 0.16 mA	Fluke 5700A/EP3 Multiproduct Calibrator

**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>
AC Current - Source	(2.2 to 3) A	2.8 mA/A + 0.1 mA	Fluke 5520A Multiproduct Calibrator
	(10 to 45) Hz	1.6 mA/A + 0.1 mA	
	45 Hz to 1 kHz	12 mA/A + 1 mA	
	(1 to 5) kHz	36 mA/A + 5 mA	
	(5 to 10) kHz		
	(3 to 11) A	4.0 mA/A + 2 mA	
	(45 to 100) Hz	1.6 mA/A + 2 mA	
	100 Hz to 1 kHz	60 mA/A + 2 mA	
	(1 to 5) kHz		
	(11 to 20.5) A	2.7 mA/A + 5 mA	
AC Current - Measure	(45 to 100) Hz	2.7 mA/A + 5 mA	HP 3458A Multimeter
	100 Hz to 1 kHz	45 mA/A + 5 mA	
	(1 to 5) kHz		
	Up to 100 $\mu$ A	4 mA/A + 30 nA	
	(10 to 20)	1.6 mA/A + 30 nA	
	(20 to 45) Hz	0.66 mA/A + 30 nA	
	(45 to 100) Hz	0.7 mA/A + 30 nA	
	100 Hz to 5 kHz		
	100 $\mu$ A to 1 mA	4.1 mA/A + 0.2 $\mu$ A	
	(10 to 20)	1.5 mA/A + 0.2 $\mu$ A	
	(20 to 45) Hz	0.61 mA/A + 0.2 $\mu$ A	
	(45 to 100) Hz	0.32 mA/A + 0.2 $\mu$ A	
	100 Hz to 5 kHz	0.65 mA/A + 0.2 $\mu$ A	
	(5 to 20) kHz	4 mA/A + 0.4 $\mu$ A	
	(20 to 50) kHz	5.5 mA/A + 1.5 $\mu$ A	
	(50 to 100) kHz		
	(1 to 10) mA	4 mA/A + 2 $\mu$ A	
	(10 to 20)	1.5 mA/A + 2 $\mu$ A	
	(20 to 45) Hz	0.61 mA/A + 2 $\mu$ A	
	(45 to 100) Hz	0.31 mA/A + 2 $\mu$ A	
100 Hz to 5 kHz	0.63 mA/A + 2 $\mu$ A		
(5 to 20) kHz	4 mA/A + 4 $\mu$ A		
(20 to 50) kHz	5.5 mA/A + 15 $\mu$ A		
(50 to 100) kHz			



Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Current - Measure	(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 + 20 $\mu$ A 1.6 mA/A + 20 $\mu$ A 0.61 mA/A + 20 $\mu$ A 0.31 mA/A + 20 $\mu$ A 0.63 mA/A + 20 $\mu$ A 4 mA/A + 40 $\mu$ A 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	HP 3458A Multimeter
Electrical Simulation of Thermocouple Indicating devices	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 Type J (-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1 200) °C	0.48 °C 0.39 °C 0.35 °C 0.38 °C 0.31 °C 0.27 °C 0.32 °C 0.51 °C 0.85 °C 0.55 °C 0.37 °C 0.25 °C 0.26 °C 0.28 °C 0.33 °C 0.25 °C 0.25 °C 0.27 °C 0.3 °C	Fluke 5520A Multiproduct Calibrator





Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Simulation of Thermocouple Indicating devices	Type K		Fluke 5520A Multiproduct Calibrator
	(-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 Simulation of RTD indicating devices	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	



Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Simulation of RTD indicating devices	Pt 3926, 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	0.12 °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		
Pt 385, 1 000 Ω			
(-200 to 0) °C	0.04 °C		
(0 to 100) °C	0.04 °C		
(100 to 260) °C	0.05 °C		
(260 to 300) °C	0.06 °C		
(300 to 600) °C	0.07 °C		
(600 to 630) °C	0.02 °C		



Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Simulation of RTD indicating devices	PtNi 385, 120 Ω (Ni 120) (-80 to 100) °C (100 to 260) °C Cu 427, 10 Ω (-100 to 260) °C	0.08 °C 0.14 °C 0.31 °C	Fluke 5520A Multiproduct Calibrator
<b>Oscilloscopes</b> 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 to 6.6 V p-p 1 mV to 130 V p-p  5 mv to 2.5 V p-p 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  2.5 μs/s  1 ms/s +25 μs	Fluke 5520A SC 1100 Multiproduct Calibrator
Capacitance - Source 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 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz	190 pF to 1.1 nF (1.1 to 3.3) nF (3.3 to 11) nF (11 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	6 mF/F + 10 pF 6.6 mF/F + 10 pF 4 mF/F + 10 pF 3 mF/F + 0.1 nF 3 mF/F + 0.3 nF 4 mF/F+ 1 nF 3 mF/F + 3 nF 3 mF/F+ 10 nF 6.6 mF/F + 30 nF	Fluke 5520A Multiproduct Calibrator



**Electrical – DC/Low Frequency**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Capacitance - Source			
(10 to 80) Hz	(33 to 110) $\mu$ F	5 mF/F + 0.1 $\mu$ F	Fluke 5520A Multiproduct Calibrator
(0 to 50) Hz	(110 to 330) $\mu$ F	6.6 mF/F + 0.3 $\mu$ F	
(0 to 20) Hz	330 $\mu$ F to 1.1 mF	5 mF/F + 1 $\mu$ F	
(0 to 6) Hz	(1.1 to 3.3) mF	6.6 mF/F + 3 $\mu$ F	
(0 to 2) Hz	(3.3 to 11) mF	5 mF/F + 10 $\mu$ F	
(0 to 0.6) Hz	(11 to 33) mF	10 mF/F + 30 $\mu$ F	
(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	Up to 1 in (1 to 6) in (6 to 12) in	52 $\mu$ in 89 $\mu$ in 160 $\mu$ in	Starrett - Weber B89 Grade 0 Gage Blocks, Long Block Set
Depth Micrometers	Up to 12 in	160 $\mu$ in	
Calipers	Up to 6 in (6 to 12) in (12 to 24) in	70 $\mu$ in 710 $\mu$ in 750 $\mu$ in	
Test Indicators	Up to 0.1 in	120 $\mu$ in	
Dial Indicators	Up to 2 in	80 $\mu$ in	
Height Gages	Up to 24 in	720 $\mu$ in	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) $\mu$ in	Labmaster, Master Rings



**Mass**

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Torque	(10 to 40) lbf in (40 to 400) lbf in (40 to 200) lbf ft	1.5 lbf in 0.03 lbf in/lbf in 0.09 lbf ft/lbf ft	Torque Calibrator Mountz M100 CDI 4002-I-DDT Seekonk TAF200
Pressure - Source	(1 to 100) psi (100 to 500) psi (500 to 1 000) psi	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	(-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	10 mHz to 1.1 GHz	0.12 mHz/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.

  
 Vice President