CERTIFICATE OF ACCREDITATION

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Accredited Labs dba Tescom Calibration
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Cedar Park, TX 78613
(and satellite location listed on the scope)

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
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Jason Stine, Vice President

Expiry Date: 20 November 2027

Certificate Number: AC-1417

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. 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).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

AND

ANSI/NCSL Z540-1-1994 (R2002)

Accredited Labs dba Tescom Calibration
3317 El Salido Parkway
Cedar Park, TX 78613
Alex Arzdorf 719-641-8976

CALIBRATION

ISO/IEC 17025 Accreditation Granted: **29 August 2025**

Certificate Number: **AC-1417** Certificate Expiry Date: **20 November 2027**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source [1]	(0 to 220) mV (0.22 to 2.2) V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1 100) V	7.7 µV/V + 0.4 µV 5.1 µV/V + 0.7 µV 3.6 µV/V + 2.5 µV 3.6 µV/V + 4 µV 5.1 µV/V + 40 µV 6.6 µV/V + 0.4 mV	Comparison to Fluke 5720A Multiproduct Calibrator, Fluke 5725A Amplifier
DC Voltage – Source (Fixed Artifact)	10 V	0.11 µV/V	Comparison to Fluke 732A/732B DC Voltage Reference Standard
DC Voltage – Measure [1]	(0 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1 000) V	5 µV/V + 0.1 µV 2.9 µV/V + 0.3 µV 2.9 µV/V + 0.5 µV 4.3 µV/V + 30 µV 4.4 µV/V + 0.5 mV	Comparison to Fluke 8508A/8588A 8.5 Digit Multimeter
DC Voltage – Source/Measure (Fixed Points)	Floor 100 mV 1 V 10 V 100 V 1 000 V	60 nV 0.51 µV/V 0.23 µV/V 0.11 µV/V 0.23 µV/V 0.51 µV/V	Comparison to Fluke 732A/732B DC Reference Standard, Fluke 752A Reference Divider

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source/Measure (Variable Points)	Up to 202 mV 202 mV to 2.02 V (2.02 to 20.2) V (20.2 to 202) V (202 to 1 050) V	0.79 µV/V 0.29 µV/V 0.19 µV/V 1.2 µV/V 1.3 µV/V	Ratio Metric Comparison using Fluke 732A/732B DC Reference Standard, Fluke 752A Reference Divider, Multiproduct Calibrator, and Reference Multimeter.
DC High Voltage – Measure [1,3]	(1 to 60) kV	1 mV/V	Comparison to Ross Engineering VD 60 High Voltage Divider, Fluke 8508A Opt. 01 8.5 Digit Multimeter
DC Current – Source [1]	(0 to 220) µA (0.22 to 2.2) mA (2.2 to 22) mA (22 to 100) mA (100 to 220) mA (0.22 to 1) A (1 to 2.2) A	41 µA/A + 6 nA 36 µA/A + 7 nA 36 µA/A + 40 nA 46 µA/A + 0.7 µA 46 µA/A + 0.7 µA 82 µA/A + 12 µA 82 µA/A + 12 µA	Comparison to Fluke 5720A/5730A Multiproduct Calibrator
DC Current – Source [1]	(2.2 to 3) A	0.23 mA/A + 0.15 mA	Comparison to Fluke 5560A/1G Multiproduct Calibrator
DC Current – Source [1]	(3 to 20) A (20 to 100) A	80 µA/A + 0.8 mA 82 µA/A + 4 mA	Comparison to Fluke 5720A/5730A Multiproduct Calibrator, Fluke 52120A Amplifier
DC Current Clamp-on Meters [1]	(10 to 16.5) A (16.5 to 20) A (20 to 100) A (100 to 1 000) A (1 000 to 6 000) A	40 mA 80 mA 90 mA 0.29 A 3.4 A	Comparison to Multiproduct Calibrator, 50-turn Current Coil
DC Current – Measure [1]	(0 to 20) µA (> 20 to 200) µA (> 0.2 to 2) mA (> 2 to 20) mA (> 20 to 200) mA (> 0.2 to 2) A (> 2 to 20.02) A (> 20.02 to 30) A	27 µA/A + 0.4 nA 9.8 µA/A + 0.4 nA 9.2 µA/A + 4 nA 14 µA/A + 40 nA 48 µA/A + 0.8 µA 0.13 mA/A + 16 µA 0.23 mA/A + 0.4 mA 0.55 mA/A + 4.4 mA	Comparison to Fluke 8508A/8588A 8.5 Digit Multimeter

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DC Current – Measure [1]	(> 30 to 100) A	0.04 % of reading	Comparison to Fluke 8508A/8588A 8.5 Digit Multimeter, L & N 4361 Shunt
DC Current – Measure	(1 to 50) nA (50 to 500) nA (0.5 to 1) µA (1 to 100) µA (100 to 500) µA 500 µA to 1 mA (1 to 3) mA (3 to 10) mA (10 to 50) mA (50 to 100) mA (100 to 500) mA 500 mA to 1 A (1 to 3) A (3 to 10) A (10 to 30) A (30 to 100) A	4.8 µA/A 2.8 µA/A 2.3 µA/A 2 µA/A 0.56 µA/A 0.73 µA/A 0.73 µA/A 0.7 µA/A + 6 µA/A/Watt 0.7 µA/A + 6 µA/A/Watt 0.5 µA/A + 6 µA/A/Watt 0.7 µA/A + 6 µA/A/Watt 1.7 µA/A 1.9 µA/A 2.6 µA/A 6.9 µA/A 4.6 µA/A	Comparison to Fluke 8508A/8588A 8.5 Digit Multimeter, Resistance Standards
Inductance – Source [1] (Simulation) 1 kHz 1 kHz 110 Hz 100 Hz 10 Hz 3 Hz 2 Hz	 (13 to 120) µH (> 0.12 to 1.2) mH (> 1.2 to 12) mH (> 12 to 120) mH (> 0.12 to 1.2) H (> 1.2 to 12) H (> 12 to 120) H	 1.6 mH/H + 0.1 µH 0.92 mH/H + 1 µH 0.92 mH/H + 10 µH 0.92 mH/H + 0.1 mH 1.2 mH/H + 1 mH 1.6 mH/H + 10 mH 1.9 mH/H + 0.1 H	Comparison to Fluke 5560A/1G Multiproduct Calibrator
Inductance – Source (Fixed Artifacts)	1 mH 100 Hz 200 Hz 400 Hz 1 kHz 10 kHz 10 mH 100 Hz 200 Hz 400 Hz 1 kHz 10 kHz	 0.44 µH 0.39 µH 0.38 µH 1.2 µH 0.42 µH 6.1 µH 3.8 µH 3.8 µH 17 µH 14 µH	Comparison to General Radio 1482 Series Inductance Standards

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Inductance – Source (Fixed Artifacts)	100 mH 100 Hz 200 Hz 400 Hz 1 kHz 10 kHz 1 H 100 Hz 200 Hz 400 Hz 1 kHz	 18 µH 37 µH 37 µH 21 µH 1.5 mH 0.2 mH 0.38 mH 0.44 mH 1.6 mH	Comparison to General Radio 1482 Series Inductance Standards
Inductance – Measure	(1 to 10) mH (20 to 100) Hz 100 Hz to 1 kHz 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (10 to 100) mH (20 to 100) Hz 100 Hz to 1 kHz 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (0.1 to 1) H (20 to 100) Hz 100 Hz to 1 kHz 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz	 0.34 % of reading + 36 µH 0.15 % of reading + 2.2 µH 0.12 % of reading + 0.2 µH 0.1 % of reading 0.11 % of reading 0.26 % of reading 0.34 % of reading + 36 µH 0.09 % of reading + 8 µH 0.06 % of reading + 6 µH 0.094 % of reading + 0.6 µH 0.17 % of reading 1.4 % of reading 0.39 % of reading 0.098 % of reading 0.098 % of reading 0.1 % of reading 0.28 % of reading 13 % of reading	Ratio metric comparison to Inductance Reference Standards in Range, using Hewlett Packard 4284A LCR Meter.
Capacitance – Source [1,3] (Simulation) 100 Hz to 10 kHz 150 Hz to 5 kHz 200 Hz to 1.3 kHz (2 to 310) Hz (0.5 to 110) Hz	 (0.2 to 1.2) nF (> 1.2 to 12) nF (> 12 to 120) nF (> 0.12 to 1.2) µF (> 1.2 to 12) µF	 0.92 mF/F + 2 pF 0.92 mF/F + 5 pF 1 mF/F + 30 pF 1 mF/F + 0.3 nF 1 mF/F + 3 nF	Comparison to Fluke 5560A/1G Multiproduct Calibrator

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Capacitance – Source [1,3] (Simulation) (0.5 to 40) Hz (0.1 to 11) Hz 30 mHz to 4 Hz 10 mHz to 1.3 Hz	 (> 12 to 120) µF (> 0.12 to 1.2) mF (> 1.2 to 12) mF (> 12 to 120) mF	 1.2 mF/F + 25 nF 1.9 mF/F + 0.25 µF 1.9 mF/F + 3 µF 4 mF/F + 30 µF	Comparison to Fluke 5560A/1G Multiproduct Calibrator
Capacitance – Source (Fixed Artifacts)	1 pF 10 pF 100 pF 1 000 pF 10 nF 100 nF 1 µF	0.17 % of reading 0.17 % of reading 0.000 96 % of reading 0.000 93 % of reading 0.013 % of reading 0.009 3 % of reading 0.011 % of reading	Standard Capacitors
Capacitance – Measure	(1 to 10) pF 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (10 to 100) pF 100 Hz to 1 kHz 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (0.1 to 1) nF (20 to 100) Hz 100 Hz to 1 kHz 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (1 to 10) nF (20 to 100) Hz 100 Hz to 1 kHz 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz	 24 % of reading 24 % of reading 2.1 % of reading + 1 aF 0.35 % of reading + 1.1 aF 2.4 pF 0.11 % of reading + 0.2 fF 0.11 % of reading + 0.2 fF 0.093 % of reading + 27 aF 0.09 % of reading + 10 aF 0.33 % of reading + 33 pF 0.12 % of reading + 2.3 pF 0.054 % of reading + 0.26 pF 0.094 % of reading + 26 fF 0.094 % of reading + 26 fF 0.088 % of reading 0.58 % of reading + 30 pF 0.094 % of reading + 2.6 pF 0.06 % of reading + 0.2 pF 0.095 % of reading + 20 fF 0.097 % of reading 0.15 % of reading	Comparison to Hewlett Packard 4284A LCR Meter

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Capacitance – Measure	(10 to 100) nF (20 to 100) Hz 100 Hz to 1 kHz 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (0.1 to 1) µF (20 to 100) Hz 100 Hz to 1 kHz 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz	 0.71 % of reading + 17 pF 0.098 % of reading + 2.2 pF 0.061 % of reading + 0.1 pF 0.096 % of reading 0.1 % of reading 0.43 % of reading 0.69 % of reading 0.1 % of reading 0.062 % of reading 0.17 % of reading 0.26 % of reading 2.7 % of reading	Comparison to Hewlett Packard 4284A LCR Meter
Capacitance – Measure	(0.2 to 1.2) mF (> 1.2 to 12.1) mF (> 12.1 to 120) mF	68 µF/F 44 µF/F 40 µF/F	Comparison to Time/Charge Method utilizing the HP 3458A/ Fluke 8508A/8588A 8.5 Digit Multimeter
Phase – Measure	(-180 to 180)° (0 to 360)° 10 mV to 630 V (5 to 400) Hz 400 Hz to 2 kHz (2 to 5) kHz (5 to 10) kHz (10 to 50) kHz (50 to 200) kHz	 0.021° 0.024° 0.033° 0.042° 0.052° 0.21°	Comparison to Clarke-Hess 6000A Phase Meter
Resistance – Source [1] (Fixed Artifacts)	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω	97 µΩ/Ω 97 µΩ/Ω 23 µΩ/Ω 23 µΩ/Ω 10 µΩ/Ω 10 µΩ/Ω	Comparison to Fluke 5720A/5730A Multiproduct Calibrator

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Resistance – Source [1] (Fixed Artifacts)	1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	6.6 μΩ/Ω 6.6 μΩ/Ω 6.6 μΩ/Ω 6.6 μΩ/Ω 8.7 μΩ/Ω 8.7 μΩ/Ω 18 μΩ/Ω 18 μΩ/Ω 41 μΩ/Ω 48 μΩ/Ω 0.1 mΩ/Ω	Comparison to Fluke 5720A/5730A Multiproduct Calibrator
Resistance – Source [1] (Simulation)	(0 to 12) Ω (> 12 to 120) Ω (> 0.12 to 1.2) kΩ (> 1.2 to 12) kΩ (> 12 to 120) kΩ (> 0.12 to 1.2) MΩ (> 1.2 to 12) MΩ (> 12 to 120) MΩ (0.12 to 1.2) GΩ	20 μΩ/Ω + 1 mΩ 19 μΩ/Ω + 1.4 mΩ 19 μΩ/Ω + 2 mΩ 19 μΩ/Ω + 20 mΩ 19 μΩ/Ω + 0.2 Ω 19 μΩ/Ω + 2 Ω 28 μΩ/Ω + 50 Ω 0.34 mΩ/Ω + 3 kΩ 3.2 mΩ/Ω + 0.5 MΩ	Comparison to Fluke 5560A/1G Multiproduct Calibrator
Resistance – Source/Measure (Fixed Artifacts)	0.001 Ω 0.01 Ω 0.1 Ω 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ 10 GΩ 100 GΩ	4.2 μΩ/Ω 0.92 μΩ/Ω 0.93 μΩ/Ω 0.21 μΩ/Ω 0.25 μΩ/Ω 0.27μΩ/Ω 0.27 μΩ/Ω 0.37 μΩ/Ω 0.37 μΩ/Ω 0.5 μΩ/Ω 4.7 μΩ/Ω 24 μΩ/Ω 33 μΩ/Ω 0.43 mΩ/Ω 6.3 mΩ/Ω	Standard Resistors: L&N 4223-B L&N 4222-B Tinsley 5686 0.1 Ω Tinsley 5685A 1 Ω Tinsley 5685A 10 Ω Tinsley 5685A 100 Ω Tinsley 5685A 100 Ω ESI SR104 ESI SR104 ESI SR104 Fluke 742A-10M Guildline 9336-100M Fluke 8508A-7000K Guildline 65206/10G Guildline 65206/100G

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Resistance – Source/Measure (Ranges)	(0 to 1) mΩ (1 to 10) mΩ (10 to 100) mΩ 100 mΩ to 1 Ω (1 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 (1 to 10) GΩ (10 to 100) GΩ	4.2 µΩ/Ω 0.92 µΩ/Ω 0.93 µΩ/Ω 0.21 µΩ/Ω 0.25 µΩ/Ω 0.27µΩ/Ω 0.27 µΩ/Ω 0.37 µΩ/Ω 0.37 µΩ/Ω 0.5 µΩ/Ω 4.8 µΩ/Ω 24 µΩ/Ω 33 µΩ/Ω 0.43 mΩ/Ω 6.3 mΩ/Ω	Ratio metric comparison against Reference Resistance Standards, using Fluke 8508A/8588A 8.5 Digit Multimeter or Guildline 6530 Teraohmmeter, applying Current up to 100 A or Voltage up to 1 000 V.
Resistance – Measure [1]	(0 to 2) Ω (2 to 20) Ω (20 to 200) Ω (0.2 to 2) kΩ (2 to 20) kΩ (20 to 200) kΩ (0.2 to 2) MΩ (2 to 20) MΩ (20 to 200) MΩ (0.2 to 2) GΩ	17 µΩ/Ω + 4 µΩ 9.5 µΩ/Ω + 14 µΩ 8 µΩ/Ω + 50 µΩ 8 µΩ/Ω + 0.5 mΩ 8 µΩ/Ω + 5 mΩ 8 µΩ/Ω + 50 mΩ 9 µΩ/Ω + 1 Ω 20 µΩ/Ω + 0.1 kΩ 0.12 mΩ/Ω + 10 kΩ 1.3 mΩ/Ω + 1 MΩ	Comparison to Fluke 8508A/8588A 8.5 Digit Multimeter
AC Voltage – Source [1]	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 (0.5 to 1) MHz	 0.25 mV/V + 4 µV 92 µV/V + 4 µV 82 µV/V + 4 µV 0.2 mV/V + 4 µV 0.51 mV/V + 5 µV 1.1 mV/V + 10 µV 1.4 mV/V + 20 µV 2.8 mV/V + 20 µV	Comparison to Fluke 5720A Multiproduct Calibrator

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AC Voltage – Source [1]	(2.2 to 22) mV		Comparison to Fluke 5720A Multiproduct Calibrator
	(10 to 20) Hz	0.25 mV/V + 4 µV	
	(20 to 40) Hz	92 µV/V + 4 µV	
	40 Hz to 20 kHz	82 µV/V + 4 µV	
	(20 to 50) kHz	0.2 mV/V + 4 µV	
	(50 to 100) kHz	0.51 mV/V + 5 µV	
	(100 to 300) kHz	1.1 mV/V + 10 µV	
	(300 to 500) kHz	1.4 mV/V + 20 µV	
	(0.5 to 1) MHz	2.8 mV/V + 20 µV	
	(22 to 220) mV		
	(10 to 20) Hz	0.25 mV/V + 12 µV	
	(20 to 40) Hz	92 µV/V + 7 µV	
	40 Hz to 20 kHz	58 µV/V + 7 µV	
	(20 to 50) kHz	0.12 mV/V + 7 µV	
	(50 to 100) kHz	0.32 mV/V + 17 µV	
	(100 to 300) kHz	0.67 mV/V + 20 µV	
	(300 to 500) kHz	1.4 mV/V + 25 µV	
	(0.5 to 1) MHz	2.8 mV/V + 45 µV	
AC Voltage – Source [1]	(0.22 to 2.2) V		Comparison to Fluke 5720A/5730A Multiproduct Calibrator
	(10 to 20) Hz	0.25 mV/V + 40 µV	
	(20 to 40) Hz	92 µV/V + 15 µV	
	40 Hz to 20 kHz	43 µV/V + 8 µV	
	(20 to 50) kHz	68 µV/V + 10 µV	
	(50 to 100) kHz	87 µV/V + 30 µV	
	(100 to 300) kHz	0.34 mV/V + 80 µV	
	(300 to 500) kHz	1 mV/V + 0.2 mV	
	(0.5 to 1) MHz	1.7 mV/V + 0.3 V	
	(2.2 to 22) V		
	(10 to 20) Hz	0.25 mV/V + 0.4 mV	
	(20 to 40) Hz	92 µV/V + 0.15 mV	
	40 Hz to 20 kHz	43 µV/V + 50 µV	
	(20 to 50) kHz	68 µV/V + 0.1 mV	
	(50 to 100) kHz	85 µV/V + 0.2 mV	
	(100 to 300) kHz	0.26 mV/V + 0.6 mV	
	(300 to 500) kHz	1 mV/V + 2 mV	
	(0.5 to 1) MHz	1.5 mV/V + 3.2 mV	

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AC Voltage – Source [1]	(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 (0.5 to 1) MHz	 0.25 mV/V + 4 mV 92 µV/V + 1.5 mV 53 µV/V + 0.6 mV 82 µV/V + 1 mV 0.15 mV/V + 2.5 mV 0.92 mV/V + 16 mV 4.5 mV/V + 40 mV 8.2 mV/V + 80 mV	Comparison to Fluke 5720A/5730A Multiproduct Calibrator
AC Voltage – Source [1]	(220 to 750) V (30 to 50) kHz (50 to 100) kHz (220 to 1 100) V (15 to 50) Hz 50 Hz to 1 kHz 40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz	 0.61 mV/V + 11 mV 2.3 mV/V + 45 mV 0.31 mV/V + 16 mV 72 µV/V + 3.5 mV 92 µV/V + 4 mV 0.17 mV/V + 6 mV 0.61 mV/V + 11 mV	Comparison to Fluke 5720A/5730A Multiproduct Calibrator, Fluke 5725A Amplifier
AC Voltage – Source/Measure [1]	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 1 MHz (2.2 to 7) 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 1 MHz	 0.13 % of reading + 1 µV 0.056 % of reading + 1 µV 0.032 % of reading + 1 µV 0.062 % of reading + 1.5 µV 0.091 % of reading + 1.9 µV 0.17 % of reading + 3 µV 0.2 % of reading + 6.1 µV 0.38 % of reading + 6.1 µV 0.065 % of reading + 1 µV 0.028 % of reading + 1 µV 0.016 % of reading + 1 µV 0.031 % of reading + 1.5 µV 0.046 % of reading + 1.9 µV 0.091 % of reading + 3 µV 0.11 % of reading + 6.1 µV 0.27 % of reading + 6.1 µV	Comparison to Fluke 5790A Opt. 03 AC Measurement Standard, Fluke Multiproduct Calibrator

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AC Voltage – Source/Measure [1]	(7 to 22) mV		Comparison to Fluke 5790A Opt. 03 AC Measurement Standard, Fluke Multiproduct Calibrator
	(10 to 20) Hz	0.022 % of reading + 1 µV	
	(20 to 40) Hz	0.015 % of reading + 1 µV	
	40 Hz to 20 kHz	0.008 % of reading + 1 µV	
	(20 to 50) kHz	0.016 % of reading + 1.5 µV	
	(50 to 100) kHz	0.024 % of reading + 1.9 µV	
	(100 to 300) kHz	0.062 % of reading + 3 µV	
	(300 to 500) kHz	0.076 % of reading + 6.1 µV	
	500 kHz to 1 MHz	0.2 % of reading + 6.1 µV	
	(22 to 70) mV		
	(10 to 20) Hz	0.018 % of reading + 1.1 µV	
	(20 to 40) Hz	0.01 % of reading + 1.1 µV	
	40 Hz to 20 kHz	0.005 % of reading + 1.1 µV	
	(20 to 50) kHz	0.01 % of reading + 1.5 µV	
	(50 to 100) kHz	0.02 % of reading + 1.9 µV	
	(100 to 300) kHz	0.04 % of reading + 3 µV	
	(300 to 500) kHz	0.052 % of reading + 6.1 µV	
	500 kHz to 1 MHz	0.1 % of reading + 6.1 µV	
	(70 to 220) mV		
	(10 to 20) Hz	0.016 % of reading + 1.1 µV	
	(20 to 40) Hz	0.007 % of reading + 1.1 µV	
	40 Hz to 20 kHz	0.003 % of reading + 1.1 µV	
	(20 to 50) kHz	0.0056 % of reading + 1.5 µV	
	(50 to 100) kHz	0.012 % of reading + 1.9 µV	
	(100 to 300) kHz	0.021 % of reading + 3 µV	
	(300 to 500) kHz	0.03 % of reading + 6.1 µV	
	500 kHz to 1 MHz	0.091 % of reading + 6.1 µV	
	(220 to 700) mV		
	(10 to 20) Hz	0.016 % of reading + 1.1 µV	
	(20 to 40) Hz	0.006 % of reading + 1.1 µV	
	40 Hz to 20 kHz	0.003 % of reading + 1.1 µV	
	(20 to 50) kHz	0.004 % of reading + 1.5 µV	
	(50 to 100) kHz	0.0064 % of reading + 1.9 µV	
	(100 to 300) kHz	0.016 % of reading + 3 µV	
	(300 to 500) kHz	0.026 % of reading + 6.1 µV	
	500 kHz to 1 MHz	0.091 % of reading + 6.1 µV	

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source/Measure [1]	(0.7 to 2.2) V		Comparison to Fluke 5790A Opt. 03 AC Measurement Standard, Fluke Multiproduct Calibrator
	(10 to 20) Hz	0.015 % of reading	
	(20 to 40) Hz	0.005 % of reading	
	40 Hz to 20 kHz	0.002 % of reading	
	(20 to 50) kHz	0.004 % of reading	
	(50 to 100) kHz	0.0058 % of reading	
	(100 to 300) kHz	0.015 % of reading	
	(300 to 500) kHz	0.024 % of reading	
	500 kHz to 1 MHz	0.091 % of reading	
	(2.2 to 7) V		
	(10 to 20) Hz	0.015 % of reading	
	(20 to 40) Hz	0.005 % of reading	
	40 Hz to 20 kHz	0.002 % of reading	
	(20 to 50) kHz	0.004 % of reading	
	(50 to 100) kHz	0.0067 % of reading	
	(100 to 300) kHz	0.017 % of reading	
	(300 to 500) kHz	0.036 % of reading	
	500 kHz to 1 MHz	0.11 % of reading	
	(7 to 22) V		
	(10 to 20) Hz	0.015 % of reading	
	(20 to 40) Hz	0.005 % of reading	
	40 Hz to 20 kHz	0.002 % of reading	
	(20 to 50) kHz	0.004 % of reading	
	(50 to 100) kHz	0.0065 % of reading	
	(100 to 300) kHz	0.017 % of reading	
	(300 to 500) kHz	0.036 % of reading	
	500 kHz to 1 MHz	0.11 % of reading	
	(22 to 70) V		
	(10 to 20) Hz	0.015 % of reading	
	(20 to 40) Hz	0.0055 % of reading	
	40 Hz to 20 kHz	0.003 % of reading	
	(20 to 50) kHz	0.0048 % of reading	
	(50 to 100) kHz	0.0084 % of reading	
	(100 to 300) kHz	0.017 % of reading	
	(300 to 500) kHz	0.039 % of reading	
	500 kHz to 1 MHz	0.11 % of reading	

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source/Measure [1]	(70 to 220) V		Comparison to Fluke 5790A Opt. 03 AC Measurement Standard, Fluke Multiproduct Calibrator
	(10 to 20) Hz	0.015 % of reading	
	(20 to 40) Hz	0.0055 % of reading	
	40 Hz to 20 kHz	0.0029 % of reading	
	(20 to 50) kHz	0.005 9 % of reading	
	(50 to 100) kHz	0.008 4 % of reading	
	(100 to 300) kHz	0.02 % of reading	
	(300 to 500) kHz	0.053 % of reading	
	(220 to 700) V		
	(10 to 20) Hz	0.015 % of reading	
	(20 to 40) Hz	0.008 4 % of reading	
	40 Hz to 20 kHz	0.003 6 % of reading	
	(20 to 50) kHz	0.011 % of reading	
	(50 to 100) kHz	0.065 % of reading	
	700 V to 1 kV		
	(10 to 20) Hz	0.015 % of reading	
	(20 to 40) Hz	0.008 4 % of reading	
	40 Hz to 20 kHz	0.003 % of reading	
	(20 to 50) kHz	0.011 % of reading	
	(50 to 100) kHz	0.065 % of reading	
AC Voltage – Measure Wideband (Relative to 1 kHz)	Up to 2.2 mV		Comparison to Fluke 5790A Opt. 03 AC Measurement Standard
	(10 to 30) Hz	1.1 mV/V	
	(30 to 120) Hz	0.57 mV/V	
	120 Hz to 1.2 kHz	0.57 mV/V	
	(1.2 to 120) kHz	0.57 mV/V	
	(120 to 500) kHz	8 mV/V + 1.1 µV	
	500 kHz to 1.2 MHz	0.8 mV/V + 1.1 µV	
	(1.2 to 2) MHz	0.8 mV/V + 1.1 µV	
	(2 to 10) MHz	1.9 mV/V + 1.1 µV	
	(10 to 20) MHz	3.4 mV/V + 1.1 µV	
	(20 to 30) MHz	8 mV/V + 2.3 µV	

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure Wideband (Relative to 1 kHz)	(2.2 to 7) mV		Comparison to Fluke 5790A Opt. 03 AC Measurement Standard
	(10 to 30) Hz	1.1 mV/V	
	(30 to 120) Hz	0.57 mV/V	
	120 Hz to 1.2 kHz	0.57 mV/V	
	(1.2 to 120) kHz	0.57 mV/V	
	(120 to 500) kHz	0.8 mV/V + 1.1 µV	
	500 kHz to 1.2 MHz	0.8 mV/V + 1.1 µV	
	(1.2 to 2) MHz	0.8 mV/V + 1.1 µV	
	(2 to 10) MHz	1.1 mV/V + 1.1 µV	
	(10 to 20) MHz	1.9 mV/V + 1.1 µV	
	(20 to 30) MHz	4.2 mV/V + 1.1 µV	
	(7 to 22) mV		
	(10 to 30) Hz	1.1 mV/V	
	(30 to 120) Hz	0.57 mV/V	
	120 Hz to 1.2 kHz	0.57 mV/V	
	(1.2 to 120) kHz	0.57 mV/V	
	(120 to 500) kHz	0.8 mV/V	
	500 kHz to 1.2 MHz	0.8 mV/V	
	(1.2 to 2) MHz	0.8 mV/V	
	(2 to 10) MHz	1.1 mV/V	
	(10 to 20) MHz	1.9 mV/V	
	(20 to 30) MHz	4.2 mV/V	
	(22 to 70) mV		
	(10 to 30) Hz	1.1 mV/V	
	(30 to 120) Hz	0.57 mV/V	
	120 Hz to 1.2 kHz	0.57 mV/V	
	(1.2 to 120) kHz	0.57 mV/V	
	(120 to 500) kHz	0.57 mV/V	
	500 kHz to 1.2 MHz	0.57 mV/V	
	(1.2 to 2) MHz	0.57 mV/V	
	(2 to 10) MHz	1.1 mV/V	
	(10 to 20) MHz	1.7 mV/V	
	(20 to 30) MHz	4 mV/V	

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure Wideband (Relative to 1 kHz)	(70 to 220) mV		Comparison to Fluke 5790A Opt. 03 AC Measurement Standard
	(10 to 30) Hz	1.1 mV/V	
	(30 to 120) Hz	0.46 mV/V	
	120 Hz to 1.2 kHz	0.46 mV/V	
	(1.2 to 120) kHz	0.46 mV/V	
	(120 to 500) kHz	0.46 mV/V	
	500 kHz to 1.2 MHz	0.57 mV/V	
	(1.2 to 2) MHz	0.57 mV/V	
	(2 to 10) MHz	1.1 mV/V	
	(10 to 20) MHz	1.7 mV/V	
	(20 to 30) MHz	4 mV/V	
	(220 to 700) mV		
	(10 to 30) Hz	1.1 mV/V	
	(30 to 120) Hz	0.34 mV/V	
	120 Hz to 1.2 kHz	0.34 mV/V	
	(1.2 to 120) kHz	0.34 mV/V	
	(120 to 500) kHz	0.34 mV/V	
	500 kHz to 1.2 MHz	0.57 mV/V	
	(1.2 to 2) MHz	0.57 mV/V	
	(2 to 10) MHz	1.1 mV/V	
	(10 to 20) MHz	1.7 mV/V	
	(20 to 30) MHz	4 mV/V	
	700 mV to 2.2 V		
	(10 to 30) Hz	1.1 mV/V	
	(30 to 120) Hz	0.34 mV/V	
	120 Hz to 1.2 kHz	0.34 mV/V	
	(1.2 to 120) kHz	0.34 mV/V	
	(120 to 500) kHz	0.34 mV/V	
	500 kHz to 1.2 MHz	0.57 mV/V	
	(1.2 to 2) MHz	0.57 mV/V	
	(2 to 10) MHz	1.1 mV/V	
	(10 to 20) MHz	1.7 mV/V	
	(20 to 30) MHz	4 mV/V	

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure Wideband (Relative to 1 kHz)	(2.2 to 7) V (10 to 30) Hz (30 to 120) Hz 120 Hz to 1.2 kHz (1.2 to 120) kHz (120 to 500) kHz 500 kHz to 1.2 MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	 1.1 mV/V 0.34 mV/V 0.34 mV/V 0.34 mV/V 0.34 mV/V 0.57 mV/V 0.57 mV/V 1.1 mV/V 1.7 mV/V 4 mV/V	Comparison to Fluke 5790A Opt. 03 AC Measurement Standard
AC High Voltage – Measure [1,3]	(1 to 60) kV 60 Hz	 5 mV/V	Comparison to Ross Engineering VD 60 High Voltage Divider, Fluke 8508A Opt. 01 8.5 Digit Multimeter
AC Current – Source [1]	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	 0.26 mA/A + 16 nA 0.16 mA/A + 10 nA 0.11 mA/A + 8 nA 0.29 mA/A + 12 nA 1.1 mA/A + 65 nA 0.26 mA/A + 40 nA 0.16 mA/A + 35 nA 0.11 mA/A + 35 nA 0.2 mA/A + 0.11 µA 1.1 mA/A + 0.65 µA 0.26 mA/A + 0.4 µA 0.16 mA/A + 0.35 µA 0.11 mA/A + 0.35 µA 0.2 mA/A + 0.55 µA 1.1 mA/A + 5 µA	Comparison to Fluke 5720A/5730A Multiproduct Calibrator

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source [1]	(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) kHz	 0.26 mA/A + 4 µA 0.16 mA/A + 3.5 µA 0.11 mA/A + 2.5 µA 0.2 mA/A + 3.5 µA 1.1 mA/A + 10 µA 0.25 mA/A + 35 µA 0.46 mA/A + 80 µA 7.1 mA/A + 0.16 mA	Comparison to Fluke 5720A/5730A Multiproduct Calibrator
AC Current – Source [1]	(2.2 to 11) A 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	 0.47 mA/A + 0.17mµA 0.97 mA/A + 0.38 mA 3.7 mA/A + 0.75 mA	Comparison to Fluke 5720A/5730A Multiproduct Calibrator, Fluke 5725A Amplifier
AC Current – Source [1]	(11 to 20) A (10 to 65) Hz (65 to 300) Hz 300 Hz to 1 kHz (1 to 3) kHz (3 to 6) kHz (6 to 10) kHz (20 to 120) A (10 to 65) Hz (65 to 300) Hz 300 Hz to 1 kHz (1 to 3) kHz (3 to 6) kHz (6 to 10) kHz	 0.13 mA/A + 9.4 mA 0.24 mA/A + 9.4 mA 0.8 mA/A + 9.4 mA 2.4 mA/A + 31 mA 7.9 mA/A + 62 mA 24 mA/A + 94 mA 0.14 mA/A + 19 mA 0.24 mA/A + 28 mA 0.8 mA/A + 94 mA 2.4 mA/A + 0.23 A 7.9 mA/A + 0.42 A 32 mA/A + 0.7 A	Comparison to Fluke 5720A/5730A Multiproduct Calibrator, Fluke 52120A Amplifier
AC Current – Measure [1]	Up to 20.2 µA 1 Hz to 30 kHz (20.2 to 202) µA 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz 202 µA to 2.02 mA 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	 0.2 mA/A + 2.5 nA 0.28 mA/A + 5 nA 0.53 mA/A + 5 nA 0.74 mA/A + 5 nA 0.4 mA/A + 10 nA 0.28 mA/A + 50 nA 0.53 mA/A + 50 nA 0.74 mA/A + 50 nA 0.4 mA/A + 0.1 µA	Comparison to Fluke 8508A/8588A 8.5 Digit Multimeter

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure [1]	(2.02 to 20.2) mA 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (20.2 to 202) mA 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz 202 mA to 2.02 A 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (2.02 to 20.2) A 10 Hz to 10 kHz (20.2 to 30.2) A 10 Hz to 2 kHz (2 to 10) kHz	 0.28 mA/A + 0.5 µA 0.53 mA/A + 0.5 µA 0.74 mA/A + 0.5 µA 0.4 mA/A + 1 µA 0.28 mA/A + 5 µA 0.52 mA/A + 5 µA 0.74 mA/A + 5 µA 0.3 mA/A + 0.1 mA 0.55 mA/A + 0.1 mA 0.79 mA/A + 0.1 mA 0.84 mA/A + 0.5 mA 0.84 mA/A + 12 mA 1.2 mA/A + 12 mA	Comparison to Fluke 8508A/8588A 8.5 Digit Multimeter
AC Current – Measure (Fixed Points)	10 µA (3 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz 19 µA (1 to 10) kHz 33 µA (1 to 10) kHz (10 to 30) kHz 100 µA 45 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz 121 µA (3 to 10) Hz 10 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz	 0.24 mA/A 0.23 mA/A 0.37 mA/A 0.17 mA/A 0.12 mA/A 0.18 mA/A 79 µA/A 93 µA/A 0.11 mA/A 61 µA/A 78 µA/A 92 µA/A 0.11 mA/A	Comparison to AC/DC Current Shunts, Fluke 5790A AC Measurement Standard, Fluke 8588A 8.5 Digit Multimeter

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure (Fixed Points)	0.19 mA		Comparison to AC/DC Current Shunts, Fluke 5790A AC Measurement Standard, Fluke 8588A 8.5 Digit Multimeter
	10 Hz to 1 kHz	75 µA/A	
	(1 to 10) kHz	90 µA/A	
	(10 to 30) kHz	0.11 mA/A	
	0.33 mA		
	10 Hz to 1 kHz	72 µA/A	
	(1 to 10) kHz	87 µA/A	
	(10 to 30) kHz	95 µA/A	
	1.1 mA		
	(3 to 10) Hz	57 µA/A	
	10 Hz to 1 kHz	67 µA/A	
	(1 to 10) kHz	83 µA/A	
	(10 to 30) kHz	90 µA/A	
	1.9 mA		
	10 Hz to 1 kHz	67 µA/A	
	(1 to 10) kHz	83 µA/A	
	(10 to 30) kHz	90 µA/A	
	3.29 mA		
	(10 to 45) Hz	0.21 mA/A	
	45 Hz to 1 kHz	0.12 mA/A	
	(1 to 10) kHz	0.13 mA/A	
	(10 to 30) kHz	0.14 mA/A	
	3.3 mA		
	(1 to 10) kHz	0.18 mA/A	
	(10 to 30) kHz	0.19 mA/A	
	10 mA		
	(3 to 10) Hz	50 µA/A	
	10 Hz to 1 kHz	94 µA/A	
	(1 to 10) kHz	95 µA/A	
	(10 to 30) kHz	0.1 mA/A	
	12.1 mA		
	(3 to 10) Hz	51 µA/A	
	10 Hz to 10 kHz	0.15 mA/A	
	(10 to 30) kHz	0.16 mA/A	
	19 mA		
	10 Hz to 1 kHz	0.12 mA/A	
	(1 to 10) kHz	55 µA/A	
	(10 to 30) kHz	0.13 mA/A	

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure (Fixed Points)	32.9 mA (10 to 45) Hz 45 Hz to 10 kHz (10 to 30) kHz 33 mA (1 to 10) kHz (10 to 30) kHz 100 mA (3 to 10) Hz 10 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz 121 mA (3 to 10) Hz 10 Hz to 30 kHz 190 mA 10 Hz to 30 kHz 329 mA (10 to 45) Hz 45 Hz to 10 kHz (10 to 30) kHz 330 mA 10 Hz to 10 kHz 1 A (3 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz 1.09 A (10 to 45) Hz 45 Hz to 10 kHz 1.21 A (3 to 10) Hz 10 Hz to 10 kHz 1.9 A 10 Hz to 10 kHz	 0.2 mA/A 0.12 mA/A 0.13 mA/A 0.18 mA/A 0.19 mA/A 49 µA/A 94 µA/A 95 µA/A 0.11 mA/A 52 µA/A 0.21 mA/A 68 µA/A 0.2 mA/A 0.12 mA/A 0.14 mA/A 0.32 mA/A 48 µA/A 0.14 mA/A 0.15 mA/A 0.29 mA/A 0.24 mA/A 52 µA/A 0.36 mA/A 0.13 mA/A	Comparison to AC/DC Current Shunts, Fluke 5790A AC Measurement Standard, Fluke 8588A 8.5 Digit Multimeter

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure (Fixed Points)	2.99 A (10 to 45) Hz 45 Hz to 10 kHz 3 A (3 to 10) Hz (10 to 45) Hz 45 Hz to 10 kHz 3.11 A (3 to 10) Hz (10 to 45) Hz 45 Hz to 10 kHz 3.3 A 45 Hz to 5 kHz 10 A (3 to 10) Hz (10 to 45) Hz 45 Hz to 10 kHz 10.9 A (10 to 300) Hz 300 Hz to 1 kHz (1 to 5) kHz 12.1 A (3 to 10) Hz (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz 20 A (3 to 10) Hz (10 to 300) Hz 300 Hz to 5 kHz 30 A (3 to 10) Hz 10 Hz to 5 kHz	 0.43 mA/A 0.4 mA/A 55 µA/A 0.29 mA/A 0.29 mA/A 55 µA/A 0.32 mA/A 0.32 mA/A 0.66 mA/A 51 µA/A 0.26 mA/A 0.27 mA/A 68 µA/A 76 µA/A 77 µA/A 0.16 mA/A 67 µA/A 76 µA/A 77 µA/A 0.16 mA/A 65 µA/A 74 µA/A 50 µA/A 23 µA/A	Comparison to AC/DC Current Shunts, Fluke 5790A AC Measurement Standard, Fluke 8588A 8.5 Digit Multimeter
AC Current Clamp-on Meters [1]	(10 to 16.5) A (45 to 65) Hz (65 to 440) Hz (16.5 to 20) A (45 to 65) Hz (65 to 440) Hz	 40 mA 90 mA 80 mA 0.17 A	Comparison to Multiproduct Calibrator, 50-turn Current Coil

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current Clamp-on Meters [1]	(20 to 100) A (50 to 65) Hz (65 to 400) Hz (100 to 1 000) A (50 to 65) Hz (65 to 400) Hz (1 000 to 6 000) A (50 to 65) Hz (65 to 400) Hz	 90 mA 90 mA 0.29 A 0.29 A 3.4 A 3.5 A	Comparison to Multiproduct Calibrator, 50-turn Current Coil
Oscilloscopes [1,2]			Comparison to Fluke 5520A/SC 1100 Multiproduct Calibrator
Amplitude – DC			
into 50 Ω Load	Up to ± 6.6 V	1.9 mV/V + 40 µV	
into 1 MΩ Load	Up to ± 130 V	0.39 mV/V + 40 µV	
Amplitude – Square Wave 10 Hz to 10 kHz			
into 50 Ω Load	1 mVp-p to 6.6 Vp-p	1.9 mV/V + 40 µV	
into 1 MΩ Load	1 mVp-p to 130 Vp-p	0.9 mV/V + 40 µV	
Amplitude – Leveled Sine Wave Flatness (Relative to 50 kHz)	5 mV to 5.5 V		
	50 kHz to 100 MHz	16 mV/V + 0.1 mV	
	(100 to 300) MHz	19 mV/V + 0.1 mV	
	(300 to 600) MHz	33 mV/V + 0.1 mV	
Amplitude – Leveled Sine (Absolute Amplitude)	4 mV to 3.5 V		
	600 MHz to 1.1 GHz	41 mV/V + 0.1 mV	
	5 mV to 5.5 V		
	50 kHz Reference	15 mV/V + 0.3 mV	
Time Marker			
into 50 Ω Load	50 ms to 5 s	(20 + 1 000*t*) µs/s	
(Spike, Square Wave	100 ns to 20 ms	2 µs/s	
Spike, Square, 20 % Pulse	(20 to 50) ns	2 µs/s	
Spike or Square Wave	10 ns	2 µs/s	
Square or Sine Wave)	(1 to 5) ns	2 µs/s	
Edge Specs into 50 Ω Load			
Rise Time	< 300 ps	7.5 ps	

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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 [1]	Type B (600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C	 0.35 °C 0.27 °C 0.24 °C 0.26 °C	Comparison to Fluke 5560A/1G Multiproduct Calibrator
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure [1]	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 D (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 315) °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 G (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 315) °C Type J (-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1 200) °C Type K (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C	 0.19 °C 0.16 °C 0.2 °C 0.36 °C 0.62 °C 0.19 °C 0.16 °C 0.2 °C 0.35 °C 0.62 °C 0.32 °C 0.11 °C 0.09 °C 0.12 °C 0.16 °C 0.4 °C 0.27 °C 0.2 °C 0.34 °C 0.61 °C 0.19 °C 0.1 °C 0.09 °C 0.11 °C 0.16 °C 0.23 °C 0.1 °C 0.09 °C 0.16 °C 0.28 °C	Comparison to Fluke 5560A/1G Multiproduct Calibrator

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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 [1]	Type L		Comparison to Fluke 5560A/1G Multiproduct Calibrator
	(-200 to -100) °C	0.25 °C	
	(-100 to 800) °C	0.16 °C	
	(800 to 900) °C	0.09 °C	
	Type N		
	(-200 to -100) °C	0.27 °C	
	(-100 to -25) °C	0.12 °C	
	(-25 to 120) °C	0.09 °C	
	(120 to 410) °C	0.09 °C	
	(410 to 1 300) °C	0.16 °C	
	Type R		
	(0 to 250) °C	0.41 °C	
	(250 to 400) °C	0.24 °C	
	(400 to 1 000) °C	0.21 °C	
	(1 000 to 1 767) °C	0.27 °C	
	Type S		
	(0 to 250) °C	0.34 °C	
	(250 to 1 000) °C	0.25 °C	
	(1 000 to 1 400) °C	0.26 °C	
	(1 400 to 1 767) °C	0.33 °C	
	Type T		
	(-250 to -150) °C	0.48 °C	
	(-150 to 0) °C	0.16 °C	
	(0 to 120) °C	0.1 °C	
	(120 to 400) °C	0.09 °C	
	Type U		
	(-200 to 0) °C	0.32 °C	
	(0 to 600) °C	0.09 °C	

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Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Absolute RF Power – Measure	50 MHz 1 mW Reference	0.27 % of reading	Comparison to HP 478A-H76 Thermistor, HP 432A Power Meter, Fluke 8508A/8588A 8.5 Digit Multimeter
Absolute RF Power – Measure	9 kHz to 6 GHz (-60 to -36.5) dBm (-36.5 to 20) dBm	0.15 dB 0.064 dB	Comparison to Keysight E9304A RF Power Sensor, Agilent E4419B Power Meter
Power Range Accuracy – Measure	(3 to 100) µW 300 µW to 100 mW	0.22 % of reading 0.25 % of reading	Comparison to HP 11683A RF Power Meter, Range Calibrator

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Dial/Digital Indicators [1]	Up to 1 in (1 to 2) in	33 µin 50 µin	Comparison to Gage Blocks
Outside Micrometers [1,2]	Up to 12 in	(57 + 9*L*) µin	Comparison to Gage Blocks
Calipers [1,2]	Up to 40 in	(520 + 6.9*L*) µin	Comparison to Gage Blocks
Gage Blocks [2]	Up to 12 in	(6 + 0.73L) µin	Direct measure using ULM, Master Gage Blocks
Length/Outside Diameter Measurements [2]	Up to 12 in	(7.7 + 0.66L) µin	Direct measure using ULM, Master Gage Blocks
Ring Gages [2]	(0.04 to 12) in	(9 + 1.8L) µin	Direct measure using ULM, Master Gage Blocks

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Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
External Thread Gages [2] Major Diameter Pitch Diameter	(0.06 to 12) in (4 to 80) TPI	(7.7 + 0.66L) µin (110 + 1.1L) µin	Measurement with ULM and Master Gage Blocks with Thread Wires
Thread Ring Gages [2] Functional Pitch Diameter	(0.06 to 6) in	(110 + 1.1L) µin	In accordance with ASME B1.2, Paragraph 5.1.1; the Ring is sized to a Plug with the Plug's Uncertainty Given. Class X or W Set Plugs to be used, as available.
Height Gages [1,2]	Up to 40 in	(27 + 18L) µin	Comparison to Master Gage Blocks
Protractors/Inclinometers [1]	Up to 90°	0.033°	Comparison to Angle Blocks
Precision Levels [1]	Level	23 µin	Comparison on Reference Plane
Universal Length Measurement Machines [1,2] Length Jaw Force Flatness Parallelism	 (0.05 to 12) in Up to 40 ozf - -	 (4.3 + 3.5L) µin 0.064 ozf 4.8 µin 1.2 µin	Comparison to Master Gage Blocks Force Gauge Optical Flats Optical Parallels

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Force Measuring Systems, Load Cells [1]	(0.5 to 500) lbf (100 to 5 000) lbf (1 000 to 60 000) lbf	0.046 % of reading 0.056 % of reading + 0.13 lbf 0.056 % of reading + 1.5 lbf	Comparison to Reference Weights, Reference Load Cells
Pressure Measuring Devices (Gauge)	(-15 to 15.5) psig (12 to 600) psig (400 to 20 000) psig	0.000 8 % of reading + 0.000 15 psi 0.002 % of reading 0.017 % of reading	Comparison to Deadweight Tester
Pressure Measuring Devices (Absolute)	(0.7 to 30) psia (12 to 600) psia	0.007 3 psi 0.001 1 % of reading + 0.007 3 psi	Comparison to Deadweight Tester

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Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Balances [1,4,5]	(1 to 500) mg 1 g 2 g 3 g 5 g 10 g 20 g 30 g 50 g 100 g 200 g 300 g 500 g 1 kg 2 kg 5 kg 10 kg 20 kg	12 µg 41 µg 41 µg 41 µg 41 µg 60 µg 89 µg 89 µg 0.14 mg 0.3 mg 0.6 mg 0.91 mg 1.5 mg 3 mg 6 mg 14 mg 0.24 g 0.48 g	ASTM E617 Class 1 through Class 4 weights and internal calibration procedure utilized for the calibration of the weighing system.
Scales [1,4,5] (0.5 to 10 000) lb	0.5 lb 1 lb 2 lb 5 lb 10 lb 20 lb 50 lb 100 lb	54 mg 84 mg 0.11 g 0.28 g 0.54 g 1.1 g 2.8 g 5.4 g	ASTM E617 Class 6, Class F weights and internal calibration procedure utilized for the calibration of the weighing system.
Torque Tools	(4 to 50) ozf·in (4 to 50) lbf·in (30 to 1 000) lbf·in (20 to 600) lbf·ft	0.9 % of reading 0.9 % of reading 0.8 % of reading 0.8 % of reading	Comparison to CDI 2000-400-02 Torque Calibration System

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Relative Humidity – Generate	(10 to 95) % RH	0.5 % RH	Comparison to Thunder Scientific 2500 Humidity Generator

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Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Relative Humidity – Measure [1]	(10 to 90) % RH (> 90 to 95) % RH	1 % RH 1.7 % RH	Comparison to Vaisala MI70/HMP75 Temp/Humidity Probe/Indicator
Temperature – Source (Temperature Probes, Thermometers, etc.)	(-95 to -5) °C (-5 to 110) °C (110 to 140) °C (140 to 400) °C	0.007 °C 0.004 °C 0.006 °C 0.005 °C	Comparison to Liquid Bath, Drywells, Platinum Resistance Thermometer
Temperature – Measure [1,3]	(-196 to 400) °C	0.004 °C	Comparison to Platinum Resistance Thermometer

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Source (Sinewave)	10 mHz to 119.99 Hz (120 to 1 199.9) Hz (1.2 to 11.999) kHz (12 to 119.99) kHz (120 to 1 199.9) kHz (1.2 to 2) MHz	1.9 µHz/Hz 1.9 µHz/Hz 1.9 µHz/Hz 1.9 µHz/Hz 1.9 µHz/Hz 1.9 µHz/Hz	Comparison to Fluke 5560A/1G Multiproduct Calibrator (Main Output)
Frequency – Source (Sinewave)	(2 to 1 100) MHz	1.9 µHz/Hz	Comparison to Fluke 5560A/1G Multiproduct Calibrator (Scope Output)
Frequency – Reference	10 MHz	3 pHz/Hz	Comparison to GPS Receiver
Frequency – Measure	Up to 12.4 GHz (12.4 to 26.5) GHz	3 pHz/Hz 3 pHz/Hz + 1.8 Hz	Comparison to Electronic Counter, GPS Receiver

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Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Dial/Digital Indicators [1,2]	Up to 1 in (1 to 2) in	33 µin 50 µin	Comparison to Gage Blocks
Outside Micrometers [1,2]	Up to 12 in	(70 + 1.8*L*) µin	Comparison to Gage Blocks
Calipers [1,2]	Up to 40 in	(638 + 15*L*) µin	Comparison to Gage Blocks
Length/Outside Diameter Measurements [2]	Up to 12 in	(7.7 + 0.66L) µin	Direct measure using ULM, Master Gage Blocks
Height Gages [1,2]	Up to 40 in	(27 + 18L) µin	Comparison to Master Gage Blocks
Protractors/Inclinometers [1]	Up to 90°	0.033°	Comparison to Angle Blocks
Precision Levels [1]	Level	23 µin	Comparison on Reference Plane
Rulers, Length Measuring Scales [1]	Up to 80 in	0.015 in	Comparison to Master Ruler
Tape Measures [1,2]	Up to 40 ft	(0.019 + 0.000 029*L*) in	Comparison to Master Tape
Universal Length Measurement Machines [1,2] Length	(0.05 to 12) in	(4.3 + 3.5L) µin	Comparison to Master Gage Blocks
Jaw Force	Up to 40 ozf	0.064 ozf	Force Gauge
Flatness	-	4.8 µin	Optical Flats
Parallelism	-	1.2 µin	Optical Parallels

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Mass and Mass Related

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Pressure Measuring Devices (Gauge)	(-15 to 15.5) psig (12 to 600) psig (400 to 20 000) psig	0.000 8 % of reading + 0.000 15 psi 0.002 % of reading 0.017 % of reading	Comparison to Deadweight Tester
Pressure Measuring Devices (Absolute)	(0.7 to 30) psia (12 to 600) psia	0.007 3 psi 0.001 1 % of reading + 0.007 3 psi	Comparison to Deadweight Tester
Balances [1,4,5]	(1 to 500) mg 1 g 2 g 3 g 5 g 10 g 20 g 30 g 50 g 100 g 200 g 300 g 500 g 1 kg 2 kg 5 kg 10 kg 20 kg	12 µg 41 µg 41 µg 41 µg 41 µg 60 µg 89 µg 89 µg 0.14 mg 0.3 mg 0.6 mg 0.91 mg 1.5 mg 3 mg 6 mg 14 mg 0.24 g 0.48 g	ASTM E617 Class 1 through Class 4 weights and internal calibration procedure utilized for the calibration of the weighing system.
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Torque Tools	(4 to 50) ozf·in (4 to 50) lbf·in (30 to 1 000) lbf·in (20 to 600) lbf·ft	0.9 % of reading 0.9 % of reading 0.8 % of reading 0.8 % of reading	Comparison to CDI 2000-400-02 Torque Calibration System

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Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Relative Humidity – Measure [1]	(10 to 90) % RH (> 90 to 95) % RH	1 % RH 1.7 % RH	Comparison to Vaisala MI70/HMP75 Temp/Humidity Probe/Indicator
Temperature – Source (Temperature Probes, Thermometers, etc.)	(-95 to -5) °C (-5 to 110) °C (110 to 140) °C (140 to 400) °C	0.007 °C 0.004 °C 0.006 °C 0.005 °C	Comparison to Liquid Bath, Drywells, Platinum Resistance Thermometer
Temperature – Measure [1,3]	(-90 to 100) °C (100 to 200) °C (200 to 420) °C	0.043 °C 0.055 °C 0.091 °C	Comparison to Platinum Resistance Thermometer

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 this parameter, 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. Uncertainties do not include possible contributions from a "best available" unit under test, and/or contributions due to repeatability. In these cases, these contributors will be included in reported expanded uncertainties at time of calibration.
4. The CMC for scales and balances is highly dependent upon the resolution of the unit under test. The CMC presented here does not include the resolution of the unit under test. The resolution will be included in the reported measurement uncertainty at the time of calibration.
5. CMC value is shown per applied mass of the corresponding nominal.
6. Unless otherwise specified in the far-right hand column, the calibration method or procedure has been written and validated internally.

Jason Stine, Vice President

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