CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Transcat - St. Louis
647 Trade Center Blvd
Chesterfield, MO 63005

Fulfills the requirements of

ISO/IEC 17025:2017

and the national standards

ANSI/NCSL Z540-1-1994 (R2002) AND
ANSI/NCSL Z540.3-2006 (R2013)

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

Jason Stine, Vice President

Expiry Date: 07 September 2027
Certificate Number: AC-2489.13

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)
ANSI/NCSL Z540.3-2006 (R2013)

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CALIBRATION AND DIMENSIONAL MEASUREMENT

ISO/IEC 17025 Accreditation Granted: **30 August 2025**

Certificate Number: **AC-2489.13** Certificate Expiry Date: **07 September 2027**

Acoustics and Vibration

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Sound Level Measure [1]	250 Hz 94 dB 114 dB 1 kHz 94 dB 114 dB	 0.55 dB 0.55 dB 0.55 dB 0.55 dB	Comparison to SPL Calibrator, Sound Level Meter
Sound Measuring Equipment [1]	250 Hz 94 dB 114 dB 1 kHz 94 dB 114 dB	 0.52 dB 0.52 dB 0.52 dB 0.52 dB	Comparison to SPL Calibrator

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
pH Meters [1,2]	4 pH 7 pH 10 pH	0.013 pH 0.013 pH 0.013 pH	Comparison to Accredited pH Solutions

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Conductivity Meters [1,2]	10 µS 100 µS 1 000 µS 1 413 µS	0.62 µS 2.1 µS 5.4 µS 5.8 µS	Comparison to Accredited Conductivity Solutions

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure [1]	Up to 100 µA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz 100 µA to 1 mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (1 to 10) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (10 to 100) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz 100 mA to 1 A (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	 0.46 % of reading + 35 nA 0.17 % of reading + 35 nA 0.072 % of reading + 35 nA 0.072 % of reading + 35 nA 0.46 % of reading + 0.23 µA 0.17 % of reading + 0.23 µA 0.071 % of reading + 0.23 µA 0.038 % of reading + 0.23 µA 0.46 % of reading + 2.3 µA 0.17 % of reading + 2.3 µA 0.071 % of reading + 2.3 µA 0.038 % of reading + 2.3 µA 0.48 % of reading + 23 µA 0.17 % of reading + 23 µA 0.071 % of reading + 23 µA 0.037 % of reading + 23 µA 0.46 % of reading + 0.23 mA 0.19 % of reading + 0.23 mA 0.097 % of reading + 0.23 mA 0.12 % of reading + 0.23 mA	Comparison to Keysight 3458A Opt 002 8.5 Digit Multimeter

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure [1]	(1 to 3) A (3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz (5 to 10) kHz (3 to 10) A (3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz (5 to 10) kHz	 0.85 % of reading + 1.4 mA 0.27 % of reading + 1.4 mA 0.12 % of reading + 1.4 mA 0.27 % of reading + 16 mA 0.85 % of reading + 4.7 mA 0.28 % of reading + 4.7 mA 0.13 % of reading + 4.7 mA 0.28 % of reading + 54 mA	Comparison to Fluke 8846A 6.5 Digit Multimeter
AC Current – Source [1]	Up to 120 µA (3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (0.12 to 1.2) mA (3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (1.2 to 12) mA (3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (12 to 120) mA (3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	 0.02 % of reading + 7.8 nA 0.02 % of reading + 7.8 nA 0.02 % of reading + 7.8 nA 0.12 % of reading + 32 nA 0.39 % of reading + 0.78 µA 0.02 % of reading + 78 nA 0.02 % of reading + 78 nA 0.02 % of reading + 78 nA 0.12 % of reading + 78 nA 0.39 % of reading + 3.9 µA 0.02 % of reading + 0.78 µA 0.02 % of reading + 0.78 µA 0.02 % of reading + 0.78 µA 0.12 % of reading + 0.78 µA 0.39 % of reading + 7.8 µA 0.02 % of reading + 7.8 µA 0.012 % of reading + 3.9 µA 0.02 % of reading + 6.3 µA 0.12 % of reading + 7.8 µA 0.39 % of reading + 78 µA	Comparison to Fluke 5560A Multiproduct Calibrator

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source [1]	(0.12 to 1.2) A (3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (1.2 to 3.1) A (3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (3.1 to 12) A (3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (12 to 30.2) A (3 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	 0.02 % of reading + 78 µA 0.02 % of reading + 39 µA 0.02 % of reading + 63 µA 0.12 % of reading + 0.24 mA 0.39 % of reading + 0.24 mA 0.03 % of reading + 0.39 mA 0.024 % of reading + 0.24 mA 0.03 % of reading + 0.24 mA 0.2 % of reading + 0.39 mA 0.03 % of reading + 0.78 mA 0.024 % of reading + 0.39 mA 0.03 % of reading + 0.63 mA 0.2 % of reading + 0.78 mA 0.078 % of reading + 7.8 mA 0.055 % of reading + 6.3 mA 0.39 % of reading + 6.3 mA	Comparison to Fluke 5560A Multiproduct Calibrator
AC Current Clamp-on Meters [1] (Toroidal Type) Transformer Type Sensor	(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 (1 000 to 1 500) A (45 to 440) Hz	 0.24 % of reading + 19 mA 0.62 % of reading + 21 mA 0.24 % of reading + 70 mA 0.61 % of reading + 78 mA 0.51% of reading + 0.31 A	Comparison to Fluke 5522A Multiproduct Calibrator, Fluke 5500A/COIL 50-turn Coil
AC Current Clamp-on Meters [1] (Non-Toroidal Type) Hall Effect Sensor	(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 (1 000 to 1 500) A (45 to 440) Hz	 0.5 % of reading + 0.19 A 0.9 % of reading + 0.19 A 0.52 % of reading + 0.7 A 0.9 % of reading + 0.7 A 0.53% of reading + 0.31 A	Comparison to Fluke 5522A Multiproduct Calibrator, Fluke 5500A/COIL 50-turn Coil

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power – Source [1, 3] (10 to 65) Hz Power Factor = 1	(3.3 to 9) mA (0.11 to 3) mW 3 mW to 9 W (9 to 33) mA (0.3 to 10) mW 10 mW to 33 W (33 to 90) mA (1 to 30) mW 30 mW to 90 W (90 to 330) mA (3 to 100) mW 100 mW to 300 W (0.33 to 0.9) A (11 to 300) mW 300 mW to 900 W (0.9 to 2.2) A 30 mW to 0.72 W 720 mW to 2 kW (2.2 to 4.5) A 80 mW to 1.4 W 1.4 W to 4.5 kW (4.5 to 20.5) A (0.15 to 6.7) W 6.7 W to 20 kW	 0.13 % of reading 0.077 % of reading 0.089 % of reading 0.077 % of reading 0.071 % of reading 0.057 % of reading 0.089 % of reading 0.078 % of reading 0.071 % of reading 0.081 % of reading 0.089 % of reading 0.079 % of reading 0.088 % of reading 0.18 % of reading 0.17 % of reading 0.17 % of reading	Comparison to Fluke 5522A Multiproduct Calibrator
AC Voltage – Measure [1]	(1 to 10) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 4) MHz	 0.04 % of reading + 3.5 µV 0.03 % of reading + 1.2 µV 0.04 % of reading + 1.2 µV 0.15 % of reading + 1.2 µV 0.59 % of reading + 1.2 µV 4.6 % of reading + 2.3 µV 1.5 % of reading + 5.8 µV 8.1 % of reading + 8.1 µV	Comparison to Keysight 3458A Opt 002 8.5 Digit Multimeter

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure [1]	(10 to 100) mV		Comparison to Keysight 3458A Opt 002 8.5 Digit Multimeter
	(1 to 40) Hz	0.013 % of reading + 4.6 µV	
	40 Hz to 1 kHz	0.009 7 % of reading + 2.3 µV	
	(1 to 20) kHz	0.017 % of reading + 2.3 µV	
	(20 to 50) kHz	0.038 % of reading + 2.3 µV	
	(50 to 100) kHz	0.093 % of reading + 2.3 µV	
	(100 to 300) kHz	0.36 % of reading + 12 µV	
	300 kHz to 1 MHz	1.2 % of reading + 12 µV	
	(1 to 2) MHz	1.8 % of reading + 12 µV	
	(2 to 4) MHz	4.7 % of reading + 81 µV	
	(4 to 8) MHz	4.7 % of reading + 92 µV	
	(8 to 10) MHz	17 % of reading + 0.12 mV	
	(0.1 to 1) V		
	(1 to 40) Hz	0.008 8 % of reading + 46 µV	
	40 Hz to 1 kHz	0.008 3 % of reading + 23 µV	
	(1 to 20) kHz	0.017 % of reading + 23 µV	
	(20 to 50) kHz	0.036 % of reading + 23 µV	
	(50 to 100) kHz	0.093 % of reading + 23 µV	
	(100 to 300) kHz	0.35 % of reading + 0.12 mV	
	300 kHz to 1 MHz	1.2 % of reading + 0.12 mV	
	(1 to 2) MHz	1.8 % of reading + 0.12 mV	
	(2 to 4) MHz	4.6 % of reading + 0.81 mV	
	(4 to 8) MHz	4.6 % of reading + 0.92 mV	
	(8 to 10) MHz	17 % of reading + 1.2 mV	
	(1 to 10) V		
	(1 to 40) Hz	0.009 5 % of reading + 0.46 mV	
	40 Hz to 1 kHz	0.023 % of reading + 0.23 mV	
	(1 to 20) kHz	0.017 % of reading + 0.23 mV	
	(20 to 50) kHz	0.036 % of reading + 0.23 mV	
	(50 to 100) kHz	0.093 % of reading + 0.23 mV	
	(100 to 300) kHz	0.35 % of reading + 1.2 mV	
	300 kHz to 1 MHz	1.2 % of reading + 1.2 mV	
	(1 to 2) MHz	1.8 % of reading + 1.2 mV	
	(2 to 4) MHz	4.6 % of reading + 8.1 mV	
	(4 to 8) MHz	4.6 % of reading + 9.2 mV	
	(8 to 10) MHz	17 % of reading + 12 mV	

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure [1]	(10 to 100) V		Comparison to Keysight 3458A Opt 002 8.5 Digit Multimeter
	(1 to 40) Hz	0.024 % of reading + 4.6 mV	
	40 Hz to 1 kHz	0.024 % of reading + 2.3 mV	
	(1 to 20) kHz	0.024 % of reading + 2.3 mV	
	(20 to 50) kHz	0.041 % of reading + 2.3 mV	
	(50 to 100) kHz	0.14 % of reading + 2.3 mV	
	(100 to 300) kHz	0.46 % of reading + 12 mV	
	300 kHz to 1 MHz	1.7 % of reading + 12 mV	
	(100 to 700) V		
	(1 to 40) Hz	0.048 % of reading + 46 mV	
	40 Hz to 1 kHz	0.048 % of reading + 23 mV	
	(1 to 20) kHz	0.071 % of reading + 23 mV	
	(20 to 50) kHz	0.19 % of reading + 23 mV	
	(50 to 100) kHz	0.35 % of reading + 23 mV	
AC High Voltage – Measure [1]	(0.7 to 5) kV		Comparison to Vitrek 4700 Digital HV Meter, Associated High Voltage Probes
	10 mHz to 10 Hz	0.14 % of reading + 0.17 V	
	(10 to 30) Hz	0.12 % of reading + 0.29 V	
	(30 to 50) Hz	0.099 % of reading + 0.37 V	
	(50 to 70) Hz	0.068 % of reading + 0.37 V	
	(70 to 100) Hz	0.099 % of reading + 0.37 V	
	(100 to 200) Hz	0.099 % of reading + 0.37 V	
	(200 to 450) Hz	0.48 % of reading + 0.17 V	
	(450 to 600) Hz	0.47 % of reading + 0.17 V	
	(5 to 30) kV		
	10 mHz to 10 Hz	0.19 % of reading + 2.4 V	
	(10 to 30) Hz	0.13 % of reading + 2.4 V	
	(30 to 50) Hz	0.11 % of reading + 2.4 V	
	(50 to 70) Hz	0.077 % of reading + 2.4 V	
	(70 to 100) Hz	0.11 % of reading + 2.4 V	
	(100 to 200) Hz	0.11 % of reading + 2.4 V	
	(200 to 450) Hz	0.7 % of reading + 2.4 V	
	(450 to 600) Hz	1.4 % of reading + 2.4 V	
	(30 to 50) kV		
	10 mHz to 10 Hz	0.24 % of reading + 2.5 V	
	(10 to 30) Hz	0.18 % of reading + 2.5 V	
	(30 to 50) Hz	0.13 % of reading + 2.5 V	
	(50 to 70) Hz	0.1 % of reading + 2.5 V	
	(70 to 100) Hz	0.13 % of reading + 2.5 V	
	(100 to 200) Hz	0.69 % of reading + 2.5 V	
	(200 to 450) Hz	2.9 % of reading + 2.5 V	

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC High Voltage – Measure [1]	(50 to 70) kV 10 mHz to 10 Hz (10 to 30) Hz (30 to 50) Hz (50 to 70) Hz (70 to 100) Hz (100 to 200) Hz (200 to 450) Hz	 0.37 % of reading + 2.6 V 0.26 % of reading + 2.6 V 0.16 % of reading + 2.6 V 0.16 % of reading + 2.6 V 1.2 % of reading + 2.6 V 1.2 % of reading + 2.6 V 17 % of reading + 2.6 V	Comparison to Vitrek 4700 Digital HV Meter, Associated High Voltage Probes
AC Voltage – Source [1]	Up to 12 mV (3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (12 to 120) mV (3 to 5) Hz (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.12 to 1.2) V (3 to 5) Hz (5 to 10) Hz (10 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz	 0.2 % of reading + 5.5 µV 0.068 % of reading + 5.5 µV 0.012 % of reading + 4.7 µV 0.03 % of reading + 4.7 µV 0.12 % of reading + 12 µV 0.63 % of reading + 24 µV 0.63 % of reading + 24 µV 0.2 % of reading + 5.5 µV 0.068 % of reading + 5.5 µV 0.011 % of reading + 4.7 µV 0.028 % of reading + 6.3 µV 0.063 % of reading + 16 µV 0.16 % of reading + 24 µV 0.16 % of reading + 24 µV 0.2 % of reading + 59 µV 0.068 % of reading + 55 µV 0.011 % of reading + 47 µV 0.011 % of reading + 6.3 µV 0.024 % of reading + 11 µV 0.055 % of reading + 32 µV 0.15 % of reading + 63 µV 0.15 % of reading + 63 µV	Comparison to Fluke 5560A Multiproduct Calibrator

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AC Voltage – Source [1]	(1.2 to 12) V		Comparison to Fluke 5560A Multiproduct Calibrator
	(3 to 5) Hz	0.2 % of reading + 0.59 mV	
	(5 to 10) Hz	0.068 % of reading + 0.59 mV	
	(10 to 40) Hz	0.011 % of reading + 0.28 mV	
	40 Hz to 20 kHz	0.011 % of reading + 39 µV	
	(20 to 50) kHz	0.024 % of reading + 39 µV	
	(50 to 100) kHz	0.055 % of reading + 98 µV	
	(100 to 300) kHz	0.16 % of reading + 0.47 mV	
	(300 to 500) kHz	0.16 % of reading + 0.47 mV	
	(12 to 70) V		
	(3 to 5) Hz	0.2 % of reading + 5.9 mV	
	(5 to 10) Hz	0.068 % of reading + 5.9 mV	
	(10 to 40) Hz	0.011 % of reading + 2.8 mV	
	40 Hz to 20 kHz	0.011 % of reading + 0.39 mV	
	(20 to 50) kHz	0.024 % of reading + 0.39 mV	
	(50 to 100) kHz	0.055 % of reading + 0.97 mV	
	(100 to 300) kHz	0.14 % of reading + 16 mV	
	(70 to 120) V		
	(3 to 5) Hz	0.2 % of reading + 5.9 mV	
	(5 to 10) Hz	0.068 % of reading + 5.9 mV	
	(10 to 40) Hz	0.011 % of reading + 2.8 mV	
	40 Hz to 20 kHz	0.011 % of reading + 0.39 mV	
	(20 to 50) kHz	0.024 % of reading + 0.39 mV	
	(50 to 100) kHz	0.055 % of reading + 0.97 mV	
	(120 to 330) V		
	(3 to 5) Hz	0.2 % of reading + 59 mV	
	(5 to 10) Hz	0.068 % of reading + 59 mV	
	10 Hz to 20 kHz	0.011 % of reading + 6.3 mV	
	(20 to 50) kHz	0.024 % of reading + 6.3 mV	
	(50 to 100) kHz	0.12 % of reading + 9.7 mV	
	(330 to 1 020) V		
	(3 to 5) Hz	0.2 % of reading + 59 mV	
	(5 to 10) Hz	0.068 % of reading + 59 mV	
	10 Hz to 10 kHz	0.011 % of reading + 63 mV	
DC Current – Measure [1]	(0 to 100) µA	0.003 3 % of reading + 0.92 nA	Comparison to Keysight 3458A Opt 002 8.5 Digit Multimeter
	(0.1 to 1) mA	0.002 9 % of reading + 5.8 nA	
	(1 to 10) mA	0.002 9 % of reading + 58 nA	
	(10 to 100) mA	0.004 6 % of reading + 0.58 µA	
	(0.1 to 1) A	0.013 % of reading + 12 µA	
DC Current – Measure [1]	(1 to 3) A	0.096 % of reading + 0.47 mA	Comparison to Fluke 8846A 6.5 Digit Multimeter
	(3 to 10) A	0.012 % of reading + 0.62 mA	

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC High Current – Measure [1]	(10 to 100) A	0.3 % of reading	Comparison to Empro Current Shunt, Keysight 3458A Opt 002 8.5 Digit Multimeter
DC Current – Source [1]	(0 to 120) µA (0.12 to 1.2) mA (1.2 to 12) mA (12 to 120) mA (0.12 to 1.2) A (1.2 to 3.1) A (3.1 to 12) A (12 to 30.2) A	0.009 8 % of reading + 4.7 nA 0.007 8 % of reading + 12 nA 0.007 8 % of reading + 63 nA 0.007 8 % of reading + 0.63 µA 0.013 % of reading + 7.8 µA 0.024 % of reading + 0.12 mA 0.024 % of reading + 0.2 mA 0.078 % of reading + 0.39 mA	Comparison to Fluke 5560A Multiproduct Calibrator
DC Current Clamp-on Meters [1] (Non-Toroidal Type) Hall Effect Sensor	(20 to 55) A (55 to 150) A (150 to 550) A (550 to 1 000) A (1 000 to 1 500) A	0.47 % of reading + 0.11 A 0.41 % of reading + 0.11 A 0.45 % of reading + 0.39 A 0.51 % of reading + 0.39 A 0.6 % of reading + 20 mA	Comparison to Fluke 5522A Multiproduct Calibrator, Fluke 5560A Multiproduct Calibrator, Fluke 5500A/COIL 50-turn Coil
DC Power – Source [1, 3]	(0.33 to 330) mA 11 µW to 1.1 mW (1.1 to 110) mW (0.11 to 110) W (110 to 330) W (0.33 to 3) A 11 µW to 110 mW (0.11 to 990) W (0.99 to 3) kW (3 to 20.5) A (99 to 990) mW 0.99 W to 6.8 kW (6.8 to 20.5) kW	 0.024 % of reading 0.027 % of reading 0.024 % of reading 0.018 % of reading 0.044 % of reading 0.053 % of reading 0.009 6 % of reading 0.088 % of reading 0.07 % of reading 0.04 % of reading	Comparison to Fluke 5522A Multiproduct Calibrator
DC Voltage – Measure [1]	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 500) V (500 to 800) V (800 to 1 000) V	0.000 83 % of reading + 0.58 µV 0.000 53 % of reading + 0.58 µV 0.000 53 % of reading + 0.58 µV 0.000 77 % of reading + 35 µV 0.001 5 % of reading + 0.12 mV 0.001 8 % of reading + 0.12 mV 0.002 1 % of reading + 0.12 mV	Comparison to Keysight 3458A Opt 002 8.5 Digit Multimeter

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC High Voltage – Measure [1]	(1 to 10) kV (10 to 20) kV (20 to 30) kV (30 to 40) kV (40 to 50) kV (50 to 60) kV (60 to 70) kV (70 to 80) kV (80 to 90) kV (90 to 100) kV	0.039 % of reading + 92 mV 0.038 % of reading + 2.4 V 0.041 % of reading + 2.4 V 0.047 % of reading + 2.4 V 0.056 % of reading + 2.4 V 0.071 % of reading + 2.4 V 0.089 % of reading + 2.4 V 0.12 % of reading + 2.5 V 0.15 % of reading + 2.5 V 0.17 % of reading + 2.5 V	Comparison to Vitrek 4700 Digital HV Meter, Associated High Voltage Probes
DC Voltage – Source [1]	(0 to 120) mV (0.12 to 1.2) V (1.2 to 12) V (12 to 120) V (120 to 1 020) V	0.000 93 % of reading + 0.62 µV 0.000 64 % of reading + 0.78 µV 0.000 62 % of reading + 7.8 µV 0.000 85 % of reading + 78 µV 0.000 86 % of reading + 0.78 mV	Comparison to Fluke 5560A Multiproduct Calibrator
DC Resistance – Measure/Source [1]	(0 to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ (0.1 to 1) GΩ	18 µΩ/Ω + 58 µΩ 15 µΩ/Ω + 0.58 mΩ 13 µΩ/Ω + 0.58 mΩ 12 µΩ/Ω + 5.8 mΩ 13 µΩ/Ω + 58 mΩ 21 µΩ/Ω + 2.3 Ω 62 µΩ/Ω + 0.12 kΩ 0.059 % of reading + 1.2 kΩ 0.82 % of reading + 12 kΩ	Comparison to Keysight 3458A Opt 002 8.5 Digit Multimeter characterized with a High Accuracy Decade Resistor.
DC 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	0.002 % of reading + 0.78 mΩ 0.002 % of reading + 0.78 mΩ 0.002 % of reading + 1.6 mΩ 0.002 % of reading + 16 mΩ 0.002 % of reading + 0.16 Ω 0.002 % of reading + 1.6 Ω 0.002 8 % of reading + 24 Ω 0.034 % of reading + 2 kΩ 0.32 % of reading + 78 kΩ	Comparison to Fluke 5560A Multiproduct Calibrator (4-wire Configuration)

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Resistance – Source [1] (Fixed Artifacts)	1 mΩ 10 mΩ 100 mΩ 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ	0.074 % of reading 0.073 % of reading 0.074 % of reading 0.005 7 % of reading 0.004 % of reading 0.005 1 % of reading 0.004 4 % of reading 0.004 3 % of reading 0.004 % of reading 0.004 8 % of reading	Comparison to Standard Resistors
DC High Resistance – Source [1] (Variable Artifact)	(100 to 1 000) kΩ (1 to 10) MΩ (10 to 100) MΩ (100 to 1 000) MΩ (1 to 10) GΩ (10 to 100) GΩ (100 to 1 000) GΩ	0.037% of reading 0.037 % of reading + 1.2 µΩ/Ω/V 0.12 % of reading + 1.2 µΩ/Ω/V 0.23 % of reading + 1.2 µΩ/Ω/V 0.59 % of reading + 1.2 µΩ/Ω/V 1.2 % of reading + 1.2 µΩ/Ω/V 1.2 % of reading + 1.2 µΩ/Ω/V	Comparison to High Accuracy Decade Resistor
Capacitance – Source [1] (Simulation)	Up to 1.2 nF (20 to 40) Hz (40 to 100) Hz 100 Hz to 10 kHz (10 to 12) kHz (12 to 14) kHz (1.2 to 3) nF (10 to 150) Hz 150 Hz to 5 kHz (5 to 6) kHz (6 to 8) kHz (3 to 12) nF 10 Hz to 5 kHz (5 to 6) kHz (6 to 8) kHz (12 to 30) nF (20 to 200) Hz 200 Hz to 1.3 kHz (1.3 to 2.7) kHz (2.7 to 3.7) kHz (30 to 120) nF 10 Hz to 1.3 kHz (1.3 to 2.7) kHz (2.7 to 3.7) kHz	 0.87 % of reading + 1.6 pF 0.49 % of reading + 1.6 pF 0.094 % of reading + 1.6 pF 0.48 % of reading + 1.6 pF 0.87 % of reading + 1.6 pF 0.49 % of reading + 3.9 pF 0.09 % of reading + 3.9 pF 0.48 % of reading + 3.9 pF 0.87 % of reading + 3.9 pF 0.09 % of reading + 3.9 pF 0.48 % of reading + 3.9 pF 0.87 % of reading + 3.9 pF 0.49 % of reading + 24 pF 0.1 % of reading + 24 pF 0.49 % of reading + 24 pF 0.88 % of reading + 24 pF 0.1 % of reading + 24 pF 0.49 % of reading + 24 pF 0.88 % of reading + 24 pF	Comparison to Fluke 5560A Multiproduct Calibrator

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Capacitance – Source [1] (Simulation)	(0.12 to 1.2) µF (2 to 310) Hz (310 to 800) Hz 800 Hz to 1.1 kHz (1.2 to 12) µF 500 mHz to 110 Hz (110 to 250) Hz (250 to 350) Hz (12 to 120) µF (100 to 500) mHz 500 mHz to 40 Hz (40 to 80) Hz (80 to 110) Hz (0.12 to 1.2) mF 100 mHz to 11 Hz (11 to 18) Hz (18 to 25) Hz (1.2 to 12) mF 30 mHz to 4 Hz (4 to 6) Hz (6 to 8) Hz (12 to 120) mF 10 mHz to 1.3 Hz (1.3 to 1.7) Hz (1.7 to 2.5) Hz	 0.1 % of reading + 0.24 nF 0.49 % of reading + 0.24 nF 0.88 % of reading + 0.24 nF 0.1 % of reading + 2.4 nF 0.49 % of reading + 2.4 nF 0.88 % of reading + 2.4 nF 0.5 % of reading + 20 nF 0.12 % of reading + 20 nF 0.5 % of reading + 20 nF 0.89 % of reading + 20 nF 0.2 % of reading + 0.2 µF 0.58 % of reading + 0.2 µF 1 % of reading + 0.2 µF 0.19 % of reading + 2.4 µF 0.58 % of reading + 2.4 µF 1 % of reading + 2.4 µF 0.39 % of reading + 24 µF 0.78 % of reading + 24 µF 1.2 % of reading + 24 µF	Comparison to Fluke 5560A Multiproduct Calibrator
Capacitance – Measure [1]	1 kHz 1 pF to 1 nF (1 to 10) nF (10 to 100) nF (0.1 to 1) µF (1 to 10) µF (10 to 100) µF (0.1 to 1) mF (1 to 10) mF (10 to 100) mF	 1.9 % of reading + 19 pF 0.83 % of reading + 39 pF 0.83 % of reading + 0.39 nF 0.83 % of reading + 3.9 nF 0.82 % of reading + 39 nF 0.9 % of reading + 0.39 µF 0.89 % of reading + 3.9 µF 0.89 % of reading + 39 µF 3.2 % of reading + 0.16 mF	Comparison to Fluke 8846A 6.5 Digit Multimeter

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Inductance – Source [1] (Simulation)	Up to 120 µH		Comparison to Fluke 5560A Multiproduct Calibrator
	(490 to 550) Hz	0.93 % of reading + 0.16 µH	
	550 Hz to 1 kHz	0.35 % of reading + 0.16 µH	
	1 kHz	0.16 % of reading + 0.16 µH	
	(1 to 13) kHz	0.35 % of reading + 0.16 µH	
	(13 to 17) kHz	0.93 % of reading + 0.16 µH	
	(0.12 to 1.2) mH		
	(260 to 330) Hz	0.87 % of reading + 0.78 µH	
	330 Hz to 1 kHz	0.29 % of reading + 0.78 µH	
	1 kHz	0.094 % of reading + 0.78 µH	
	(1 to 1.6) kHz	0.29 % of reading + 0.78 µH	
	(1.6 to 2.5) kHz	0.87 % of reading + 0.78 µH	
	(1.2 to 3.3) mH		
	500 mHz to 110 Hz	0.3 % of reading + 7.8 µH	
	110 Hz	0.094 % of reading + 7.8 µH	
	(110 to 800) Hz	0.29 % of reading + 7.8 µH	
	(800 to 980) Hz	0.87 % of reading + 7.8 µH	
	(3.3 to 12) mH		
	500 mHz to 110 Hz	0.29 % of reading + 7.8 µH	
	110 Hz	0.093 % of reading + 7.8 µH	
	110 Hz to 1 kHz	0.29 % of reading + 7.8 µH	
	(1 to 1.4) kHz	0.87 % of reading + 7.8 µH	
	(12 to 83) mH		
	100 mHz to 100 Hz	0.29 % of reading + 78 µH	
	100 Hz	0.093 % of reading + 78 µH	
	(100 to 180) Hz	0.29 % of reading + 78 µH	
	(180 to 230) Hz	0.87 % of reading + 78 µH	
	(83 to 120) mH		
	100 mHz to 100 Hz	0.29 % of reading + 78 µH	
	100 Hz	0.093 % of reading + 78 µH	
	(100 to 320) Hz	0.3 % of reading + 78 µH	
	320 Hz to 1 kHz	0.87 % of reading + 78 µH	
	(120 to 650) mH		
	50 mHz to 10 Hz	0.32 % of reading + 0.78 mH	
	10 Hz	0.14 % of reading + 0.78 mH	
	(10 to 30) Hz	0.32 % of reading + 0.78 mH	
	(30 to 55) Hz	0.9 % of reading + 0.78 mH	

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Inductance – Source [1] (Simulation)	(0.65 to 1.2) H 50 mHz to 10 Hz 10 Hz (10 to 100) Hz (100 to 170) Hz (1.2 to 5.5) H 10 mHz to 3 Hz 3 Hz (3 to 8) Hz (8 to 16) Hz (5.5 to 12) H 10 mHz to 3 Hz 3 Hz (3 to 19) Hz (19 to 37) Hz (12 to 30) H 5 mHz to 2 Hz 2 Hz (2 to 4) Hz (4 to 9) Hz (30 to 120) H 5 mHz to 2 Hz 2 Hz (2 to 7) Hz (7 to 14) Hz	 0.32 % of reading + 0.78 mH 0.14 % of reading + 0.78 mH 0.32 % of reading + 0.78 mH 0.9 % of reading + 0.78 mH 0.36 % of reading + 7.8 mH 0.17 % of reading + 7.8 mH 0.36 % of reading + 7.8 mH 0.93 % of reading + 7.8 mH 0.36 % of reading + 7.8 mH 0.17 % of reading + 7.8 mH 0.36 % of reading + 7.8 mH 0.93 % of reading + 7.8 mH 0.39 % of reading + 78 mH 0.21 % of reading + 78 mH 0.39 % of reading + 78 mH 1 % of reading + 78 mH 0.39 % of reading + 78 mH 0.21 % of reading + 78 mH 0.39 % of reading + 78 mH 1 % of reading + 78 mH	Comparison to Fluke 5560A Multiproduct Calibrator
Inductance – Source [1] (Fixed Artifacts)	100 Hz 200 µH 500 µH 1 mH 5 mH 20 mH 50 mH 200 Hz 500 µH	 0.63 pH 0.66 pH 2.8 µH 6.6 µH 25 µH 66 µH 0.66 pH	Comparison to General Radio Standard Inductors

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Inductance – Source [1] (Fixed Artifacts)	400 Hz 50 µH 100 µH 200 µH 500 µH 1 mH 5 mH 20 mH 50 mH 1 kHz 50 µH 100 µH 200 µH 500 µH 1 mH 5 mH 20 mH 50 mH 10 kHz 100 µH 500 µH	 0.3 pH 0.31 pH 0.63 pH 0.61 pH 2.8 µH 6.6 µH 25 µH 66 µH 0.3 pH 0.31 pH 0.63 pH 0.59 pH 2.8 µH 6.6 µH 25 µH 66 µH 0.31 pH 0.59 pH	Comparison to General Radio Standard Inductors
LF Phase – Source [1]	(0 to 180)° (10 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 20) kHz	 0.11° 0.21° 0.39° 1.9° 3.9° 7.8°	Comparison to Fluke 5522A 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 RTD Indicating Devices – Source [1]	Pt 385, 100 Ω		Comparison to Fluke 5560A Multiproduct Calibrator
	(-200 to -80) ºC	0.039 ºC	
	(-80 to 0) ºC	0.039 ºC	
	(0 to 100) ºC	0.054 ºC	
	(100 to 300) ºC	0.070 ºC	
	(300 to 400) ºC	0.078 ºC	
	(400 to 630) ºC	0.093 ºC	
	(630 to 800) ºC	0.18 ºC	
	Pt 385, 200 Ω		
	(-200 to -80) ºC	0.031 ºC	
	(-80 to 0) ºC	0.031 ºC	
	(0 to 100) ºC	0.031 ºC	
	(100 to 260) ºC	0.039 ºC	
	(260 to 300) ºC	0.093 ºC	
	(300 to 400) ºC	0.1 ºC	
	(400 to 600) ºC	0.11 ºC	
	(600 to 630) ºC	0.12 ºC	
	Pt 385, 500 Ω		
	(-200 to -80) ºC	0.031 ºC	
	(-80 to 0) ºC	0.039 ºC	
	(0 to 100) ºC	0.039 ºC	
	(100 to 260) ºC	0.047 ºC	
	(260 to 300) ºC	0.062 ºC	
	(300 to 400) ºC	0.062 ºC	
	(400 to 600) ºC	0.07 ºC	
	(600 to 630) ºC	0.085 ºC	
	Pt 385, 1 000 Ω		
	(-200 to -80) ºC	0.023 ºC	
	(-80 to 0) ºC	0.023 ºC	
	(0 to 100) ºC	0.031 ºC	
	(100 to 260) ºC	0.039 ºC	
	(260 to 300) ºC	0.047 ºC	
	(300 to 400) ºC	0.054 ºC	
	(400 to 600) ºC	0.054 ºC	
	(600 to 630) ºC	0.18 ºC	

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicating Devices – Source [1]	Pt 3916, 100 Ω		Comparison to Fluke 5560A Multiproduct Calibrator
	(-200 to -190) ºC	0.19 ºC	
	(-190 to -80) ºC	0.031 ºC	
	(-80 to 0) ºC	0.039 ºC	
	(0 to 100) ºC	0.047 ºC	
	(100 to 260) ºC	0.054 ºC	
	(260 to 300) ºC	0.062 ºC	
	(300 to 400) ºC	0.07 ºC	
	(400 to 600) ºC	0.078 ºC	
	(600 to 630) ºC	0.18 ºC	
	Pt 3926, 100 Ω		
	(-200 to -80) ºC	0.039 ºC	
	(-80 to 0) ºC	0.039 ºC	
	(0 to 100) ºC	0.054 ºC	
	(100 to 300) ºC	0.07 ºC	
	(300 to 400) ºC	0.078 ºC	
	(400 to 630) ºC	0.093 ºC	
	Ni 672, 120 Ω		
	(-80 to 0) ºC	0.06 ºC	
	(0 to 100) ºC	0.06 ºC	
	(100 to 260) ºC	0.11 ºC	
	Cu 427, 10 Ω		
	(-80 to 260) ºC	0.23 ºC	
	Cu 428, 50 Ω		
	(-180 to 200) ºC	0.31 ºC	
	Cu 428, 100 Ω		
	(-180 to 40) ºC	0.31 ºC	
	(40 to 200) ºC	0.5 ºC	
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure [1]	Type B		Comparison to Ectron 1140A Thermocouple Calibrator/Simulator
	(250 to 350) °C	1.2 °C	
	(350 to 445) °C	0.9 °C	
	(445 to 580) °C	0.71 °C	
	(580 to 750) °C	0.55 °C	
	(750 to 1 000) °C	0.45 °C	
	(1 000 to 1 820) °C	0.35 °C	

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure [1]	Type E		Comparison to Ectron 1140A Thermocouple Calibrator/Simulator
	(-270 to -245) °C	1.6 °C	
	(-245 to -195) °C	0.24 °C	
	(-195 to -155) °C	0.12 °C	
	(-155 to -90) °C	0.095 °C	
	(-90 to 0) °C	0.08 °C	
	(0 to 15) °C	0.076 °C	
	(15 to 890) °C	0.064 °C	
	(890 to 1 000) °C	0.074 °C	
	Type J		
	(-210 to -180) °C	0.15 °C	
	(-180 to -120) °C	0.12 °C	
	(-120 to -50) °C	0.093 °C	
	(-50 to 990) °C	0.08 °C	
	(990 to 1 200) °C	0.094 °C	
	Type K		
	(-270 to -255) °C	2.5 °C	
	(-255 to -195) °C	0.85 °C	
	(-195 to -115) °C	0.16 °C	
	(-115 to -55) °C	0.12 °C	
	(-55 to 1 000) °C	0.087 °C	
	(1 000 to 1 372) °C	0.096 °C	
	Type N		
	(-270 to -260) °C	5.4 °C	
	(-260 to -200) °C	1.5 °C	
	(-200 to -140) °C	0.29 °C	
	(-140 to -70) °C	0.18 °C	
	(-70 to 25) °C	0.14 °C	
	(25 to 160) °C	0.12 °C	
	(160 to 1 300) °C	0.11 °C	
	Type R		
	(-50 to -30) °C	0.8 °C	
	(-30 to 45) °C	0.69 °C	
	(45 to 160) °C	0.49 °C	
	(160 to 380) °C	0.35 °C	
	(380 to 775) °C	0.3 °C	
	(775 to 1 768) °C	0.26 °C	

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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 S (-50 to -30) °C (-30 to 45) °C (45 to 105) °C (105 to 310) °C (310 to 615) °C (615 to 1 768) °C Type T (-270 to -255) °C (-255 to -240) °C (-240 to -210) °C (-210 to -150) °C (-150 to -40) °C (-40 to 100) °C (100 to 400) °C	 0.76 °C 0.68 °C 0.49 °C 0.41 °C 0.35 °C 0.31 °C 1.9 °C 0.6 °C 0.36 °C 0.22 °C 0.15 °C 0.095 °C 0.08 °C	Comparison to Ectron 1140A Thermocouple Calibrator/Simulator
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 2 315) °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 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	 0.19 °C 0.16 °C 0.2 °C 0.35 °C 0.61 °C 0.19 °C 0.16 °C 0.2 °C 0.34 °C 0.61 °C 0.39 °C 0.26 °C 0.2 °C 0.33 °C 0.6 °C	Comparison to Fluke 5560A Multiproduct Calibrator

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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure [1]	Type L (-200 to -100) °C (-100 to 800) °C (800 to 900) °C Type U (-200 to 0) °C (0 to 600) °C Type BP (0 to 1 000) °C (1 000 to 2 000) °C (2 000 to 2 500) °C Type XK (-200 to 300) °C (300 to 800) °C	 0.24 °C 0.16 °C 0.09 °C 0.31 °C 0.09 °C 0.31 °C 0.47 °C 0.62 °C 0.16 °C 0.23 °C	Comparison to Fluke 5560A Multiproduct Calibrator
Oscilloscopes [1, 6] Amplitude – DC into 50 Ω load into 1 MΩ load Amplitude – Square Wave into 50 Ω load into 1 MΩ load Time Markers into 50 Ω load	 (-6.6 to 6.6) V (-130 to 130) V 1 mVp-p to 6.6 Vp-p 10 Hz to 10 kHz 1 mVp-p to 130 Vp-p 10 Hz to 1 kHz (1 to 10 kHz) 1 ns to 20 ms 50 ms 100 ms 200 ms 500 ms 1 s 2 s 5 s	 0.22 % of reading + 31 µV 0.12 % of reading + 31 µV 0.22 % of reading + 31 µV 0.14 % of reading + 31 µV 0.22 % of reading + 31 µV 0.000 22 % of reading 0.005 9 % of reading 0.009 8 % of reading 0.018 % of reading 0.041 % of reading 0.08 % of reading 0.16 % of reading 0.39 % of reading	Comparison to Fluke 55xx/11 Multiproduct Calibrator with 1.1 GHz Scope Option

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes [1, 6]			
Rise Time			
into 50 Ω Load	5 mVp-p to 2.5 Vp-p		
Rate: 1 kHz to 2 MHz	(200 to 300) ps	50 ps	
Rate: 2 MHz to 10 MHz	(250 to 350) ps	50 ps	
Level Sine Wave			
into 50 Ω load	5 mVp-p to 5.5 Vp-p		
	50 kHz	1.8 % of reading + 0.23 mV	
	50 kHz to 100 MHz	2.8 % of reading + 0.23 mV	
	(100 to 300) MHz	3.2 % of reading + 0.23 mV	
	(300 to 600) MHz	4 % of reading + 0.23 mV	
	5 mVp-p to 3.5 Vp-p		
	600 MHz to 1.1 GHz	5.5 % of reading + 0.23 mV	
Bandwidth Flatness (50 kHz Reference)			Comparison to Fluke 55xx/11 Multiproduct Calibrator with 1.1 GHz Scope Option
into 50 Ω load	5 mVp-p to 5.5 Vp-p		
	50 kHz to 100 MHz	1.4 % of reading + 78 µV	
	(100 to 300) MHz	1.8 % of reading + 78 µV	
	(300 to 600) MHz	3.2 % of reading + 78 µV	
	5 mVp-p to 3.5 Vp-p		
	600 MHz to 1.1 GHz	4 % of reading + 78 µV	
Input Impedance Measure	(40 to 60) Ω	0.082 % of reading	
	(0.5 to 1.5) MΩ	0.081 % of reading	
Input Capacitance Measure	(5 to 50) pF	3.9 % of reading + 0.39 pF	
Wave Generator (Sine, Square, Triangle)			
Amplitude			
into 50 Ω load	1.8 mVp-p to 2.5 Vp-p		
	10 Hz to 10 kHz	2.3 % of reading + 78 µV	
into 1 MΩ load	1.8 mVp-p to 55 Vp-p		
	10 Hz to 10 kHz	2.3 % of reading + 78 µV	
Frequency	10 Hz to 10 kHz	0.001 9 % of reading + 12 mHz	
Electrical Conductivity Meters (Eddy Current)	Up to 72 % IACS 60 kHz	0.83 % of reading + 0.3 % IACS	Comparison to Eddy Current Conductivity Standards

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Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Angle Measuring Devices [1,4] (Protractors, Inclinometers, Squares, Angle Gages, etc.)	0.005 6″ to 5° (5 to 20)° (20 to 35)° (35 to 45)° (45 to 60)° (60 to 75)° (75 to 85)° 90°	5.3″ 7.2″ 11″ 15″ 25″ 53″ 160″ 18″	Comparisons to 5 in Sine Bar, Gage Blocks Master Square
Machinist Levels [4]	Up to 72 in	3″	Comparison to Gage Blocks, Surface Plate
Micrometers [1,4] (Outside, Inside, Depth)	Up to 60 in	(13 + 3.6*L*) µin	Comparisons to Gage Blocks
Anvil Flatness [1]	Up to 1 in	6.2 µin	Comparison to Optical Flats
Anvil Parallelism [1,4]	Up to 1 in (1 to 60) in	13 µin (9 + 0.45*L*) µin	Comparison to Optical Parallels
Calipers [1,4] (Outside, Inside, Depth, Step)	Up to 64 in	(51 + 3.6*L*) µin	Comparisons to Gage Blocks
Bore Gages [1,4]	Up to 1 in (1 to 12) in	52 µin (47 + 6*L*) µin	Comparison to Characterized Cylindrical Rings
Indicators [1,4] (Dial, Digital, Test, Snap)	Up to 1 in (1 to 4) in (4 to 12) in	(27 + 2.4*L*) µin (26 + 3.6*L*) µin (27 + 5.1*L*) µin	Comparisons to Gage Blocks, Surface Plate
Gage Blocks [4]	(0.01 to 1) in (1 to 7) in	(9 + 1.2*L*) µin (5 + 5.5*L*) µin	Comparison to Universal Length Measuring Machine, Master Gage Blocks
Spheres Basic Diameter	Up to 1 in	14 µin	Comparison to Universal Length Measuring Machine

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Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Single Axis Length Measurement [4]			
Outside	Up to 1 in	(10 + 1*L*) µin	Comparison to Universal Length Measuring Machine
	(1 to 7) in	(12 + 2.9*L*) µin	
	(7 to 12) in	(10 + 3.7*L*) µin	
Inside	(0.04 to 1) in	(10 + 1*L*) µin	
	(1 to 2.5) in	(9 + 3*L*) µin	
	(2.5 to 10) in	(10 + 3.4*L*) µin	
	(10 to 14) in	(15 + 4.2*L*) µin	
Single Axis Length Measurement [4] Outside	(12 to 48) in	(24 + 4*L*) µin	Comparisons to Gage Amplifier with Probe, Gage Blocks, Surface Plate
Chamfer Gages, Countersink Gages [1, 4]	Up to 0.825 in	71 µin	Comparison to Cylindrical Rings
	(0.825 to 1.260) in	(68 + 28*L*) µin	
Height Gages [1,4]	Up to 24 in	(71 + 3.6*L*) µin	Comparison to Gage Blocks, Surface Plate
Height Masters, Riser Blocks, Stands [1,4]	Up to 24 in	(27 + 4*L*) µin	Comparisons to Gage Amplifier with Probe, Gage Blocks, Surface Plate
Straightness (Size up to 72 in)	Up to 0.05 in	120 µin	Comparisons to Gage Amplifier with Probe, Surface Plate
Optical Comparators [1,4]			
X-Y Length	(0.01 to 6) in	150 µin	Comparisons to Calibration Grids
Angle	Up to 330°	70 µin	
Magnification	10X to 50X	0.002 3 in	
Cylindrical Ring Gages [4] Inside Diameter	(0.04 to 0.25) in	(18 + 2.4*L*) µin	Comparison to Universal Length Measuring Machine
	(0.25 to 4) in	(17 + 2.4*L*) µin	
	(4 to 14) in	(18 + 2.4*L*) µin	
Cylindrical Plug Gages [4] Outside Diameter	(0.01 to 0.25) in	(6.3 + 2.4*L*) µin	Comparison to Universal Length Measuring Machine
	(0.25 to 4) in	(6.4 + 2.4*L*) µin	
	(4 to 12) in	(9.7 + 2.4*L*) µin	

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Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pin Gages [4] Outside Diameter	(0.011 to 1) in	(25 + 17*L*) µin	Comparison to Pratt & Whitney Supermicrometer®
Measuring Tapes, Rulers [4]	Up to 100 in (100 to 3 600) in	0.002 5 in (74*L*) µin	Comparison to Fowler Trimos Horizon Length Measuring Machine
Surface Plates [1,4] Overall Flatness	(12 to 168) in*DL*	(24 + √*DL*) µin	In accordance with ASME B89.3.7 using Electronic Level System
Local Area Flatness (Repeat Readings)	Up to 0.001 in	33 µin	Supramess with Repeat-o-Meter
Thread Plug Gages [4] Pitch Diameter	Up to 1 in (> 1 to 4) in (> 4 to 10) in	(82 + 17*L*) µin (82 + 17*L*) µin (83 + 17*L*) µin	Comparison to Pratt & Whitney Supermicrometer®, Master Thread Wires
Major Diameter	Up to 1 in (> 1 to 4) in (> 4 to 10) in	(40 + 17*L*) µin (40 + 17*L*) µin (42 + 17*L*) µin	Pratt & Whitney Supermicrometer®
Step Height	Up to 1 in	51 µin	Gage Amplifier with Probe, Surface Plate
Tapered Plug Gages [4] Pitch Diameter	Up to 3 in	(90 + 17*L*) µin	Comparisons to Pratt & Whitney Supermicrometer®, Master Thread Wires
Standoff	Up to 1 in	51 µin	Gage Amplifier with Probe, Surface Plate
Thread Ring Gage [4] Inner Pitch Diameter	Up to 1 in (> 1 to 4) in (> 4 to 10) in	(82 + 17*L*) µin (82 + 17*L*) µin (83 + 17*L*) µin	Comparison to Master Plug
Tapered Thread Ring Gage [4] Inner Pitch Diameter	Up to 3 in	(90 + 17*L*) µin	Comparison to Master Plug
Radius Gages	Up to 1 in	440 µin	Comparisons to Optical Comparator
Feeler Gages, Thickness Gages [4]	(0.001 5 to 0.25) in	(28 + 17*L*) µin	Comparisons to Pratt & Whitney Supermicrometer®

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Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Coating Thickness Testers (Eddy Current)	Up to 0.06 in	1.2 % of reading + 79 µin	Comparison to Master Films
Coating Thickness Standards [4]	(0.001 to 0.01) in	(10 + 170*L*) µin	Comparison to Universal Length Measuring Machine
Coating Thickness Standards [4]	(0.01 to 0.36) in	(28 + 170*L*) µin	Comparison to Pratt & Whitney Supermicrometer®
Sine Plates/Bars [4] (Up to 15 in) Flatness Parallelism Angle	 Up to 0.05 in Up to 0.05 in Up to 45°	 11 µin 70 µin 6"	Comparison to Gage Amplifier with Probe, Gage Blocks, Surface Plate
Parallels Steel (Up to 1.5 in x 6 in) Granite (Up to 8 in x 48 in)	 Up to 0.05 in Up to 0.05 in	 74 µin 74 µin	Comparison to Gage Amplifier with Probe, Surface Plate
V-Blocks (Up to 8 in x 8 in x 8 in) Parallelism V Center Squareness & Parallelism Squareness of Block	 Up to 0.05 in Up to 0.05 in Up to 0.05 in	 74 µin 52 µin 71 µin	Comparisons to Gage Amplifier with Probe, Surface Plate, Master Setting Disks
Bench Micrometers [4]	Up to 10 in	(14 + 4.2*L*) µin	Comparison to Gage Blocks, Long Gage Blocks
Distance Measuring Equipment [4]	Up to 99 999 ft	(0.06 + 0.000 17*X*) ft	Comparison to Cylinder with Square Ends with Incremental Counter

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Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Gas Flow Measuring Devices [1]	(0.1 to 20) sccm (20 to 100) sccm (100 to 500) sccm (0.5 to 2) slpm (2 to 20) slpm (20 to 100) slpm (100 to 500) slpm	0.51 % of reading + 0.054 sccm 0.51 % of reading + 0.26 sccm 0.51 % of reading + 1.2 sccm 0.51 % of reading + 0.005 1 slpm 0.56 % of reading + 0.051 slpm 0.71 % of reading + 0.26 slpm 0.49 % of reading + 1.2 slpm	Comparison to Reference Flow Meters; Referenced to Standard Atmospheric Conditions
Pneumatic Absolute Pressure Devices [1]	(0 to 14.7) psia (14.7 to 39.7) psia (39.7 to 514.7) psia	0.002 5 psi 0.000 71% of reading + 0.002 3 psi 0.006 5 % of reading	Comparison to Ruska 7250xi Pneumatic Pressure Controller/Calibrator
Pneumatic Absolute Pressure Devices [1]	(514.7 to 1 015) psia	0.01 % of reading + 0.048 psi	Comparison to Mensor CPC6050 Pneumatic Pressure Controller/Calibrator
Pneumatic Gauge Pressure Devices [1]	(-60 to -22) inH_2O (-22 to 22) inH_2O (22 to 60) inH_2O (60 to 72) inH_2O (72 to 804) inH_2O	0.009 % of reading + 0.000 15 inH_2O 0.002 2 inH_2O 0.009 % of reading + 0.000 15 inH_2O 0.006 7 inH_2O 0.009 % of reading + 0.000 15 inH_2O	Comparison to Fluke PPC4 Pneumatic Pressure Controller/Calibrator
Pneumatic Gauge Pressure Devices [1]	(-14.7 to < 0) psig (0 to 25) psig (25 to 500) psig	0.000 64 % of reading + 0.001 3 psi 0.001 4 % of reading + 0.001 3 psi 0.006 7 % of reading	Comparison to Ruska 7250xi Pneumatic Pressure Controller/Calibrator
Pneumatic Gauge Pressure Devices [1]	(500 to 1 000) psig	0.011 % of reading + 0.000 1 psi	Comparison to Fluke P3031 Deadweight Tester
Hydraulic Gauge Pressure Devices [1]	Up to 150 psig (150 to 1 500) psig (50 to 1 500) psig (1 500 to 15 000) psig	0.032 psi 0.008 % of reading + 0.02 psi 0.14 psi 0.008 % of reading + 0.02 psi	Comparison to Deadweight Tester
Scales and Balances [1,5] (SI)	Up to 500 mg (0.5 to 5) g (5 to 10) g (10 to 20) g (0.02 to 40) kg (40 to 50) kg	12 µg 40 µg 60 µg 90 µg 0.000 31 % of reading 0.000 28 % of reading	ASTM E617 Class 1 weights and internal calibration procedure utilized for the calibration of the weighing system.

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Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Scales and Balances [1,5] (Avoirdupois)	Up to 1 lb (1 to 5) lb (5 to 1 000) lb	0.026 % of reading 0.018 % of reading 0.012 % of reading	NIST Class F Weights and internal calibration procedure utilized for the calibration of the weighing system.
Mass Determination (SI)	(10 to 300) mg 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 3 kg 5 kg 10 kg 20 kg 25 kg 30 kg	26 µg 27 µg 49 µg 0.13 mg 0.13 mg 0.14 mg 0.18 mg 0.26 mg 0.37 mg 0.74 mg 1.3 mg 2.4 mg 3.7 mg 6.1 mg 12 mg 24 mg 36 mg 60 mg 0.65 g 0.69 g 0.71 g 0.73 g	Single Substitution Method; Comparison to Reference Weights, Electronic Balances
Mass Determination (Avoirdupois)	0.031 25 oz 0.062 5 oz 0.125 oz 0.25 oz 0.5 oz 1 oz 2 oz 4 oz 8 oz 1 lb 2 lb 5 lb	45 µg 61 µg 0.14 mg 0.19 mg 0.23 mg 0.32 mg 0.76 mg 1.3 mg 2.5 mg 4 mg 7.2 mg 24 mg	Single Substitution Method; Comparison to Reference Weights, Electronic Balances

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Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Mass Determination (Avoirdupois)	7.5 lb 10 lb 15 lb 20 lb 25 lb 30 lb 50 lb	36 mg 39 mg 62 mg 71 mg 0.65 g 0.65 g 0.69 g	Single Substitution Method; Comparison to Reference Weights, Electronic Balances
Rockwell Hardness and Superficial Testers [1]	HRA Scale ≤ 69 HRA (70 to 79) HRA ≥ 80 HRA HRBW Scale ≤ 59 HRBW (60 to 79) HRBW ≥ 80 HRBW HRC Scale ≤ 34 HRC (35 to 59) HRC ≥ 60 HRC HREW Scale ≤ 83) HREW (84 to 92) HREW ≥ 93 HREW HRHW Scale ≤ 95 HRHW ≥ 96 HRHW HR15N Scale ≤ 77 HR15N (78 to 89) HR15N ≥ 90 HR15N HR15TW Scale ≤ 80 HR15TW (81 to 86) HR15TW ≥ 87 HR15TW	 0.35 HRA 0.22 HRA 0.3 HRA 0.38 HRBW 0.72 HRBW 0.57 HRBW 0.41 HRC 0.41 HRC 0.36 HRC 0.38 HREW 0.61 HREW 0.56 HREW 0.41 HRHW 0.37 HRHW 0.48 HR15N 0.56 HR15N 0.52 HR15N 0.62 HR15TW 0.63 HR15TW 0.41 HR15TW	Indirect verification per ASTM E18, ASTM E110 using Hardness Test Blocks

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Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rockwell Hardness and Superficial Testers [1]	HR30N Scale ≤ 54 HR30N (55 to 76) HR30N ≥ 77 HR30N HR30TW Scale ≤ 56 HR30TW (57 to 69) HR30TW ≥ 70 HR30TW HR45N Scale ≤ 36 HR45N (37 to 65) HR45N ≥ 66 HR45N HR45TW Scale ≤ 32 HR45TW (33 to 52) HR45TW ≥ 53 HR45TW	 0.59 HR30N 0.56 HR30N 0.52 HR30N 0.49 HR30TW 0.46 HR30TW 0.51 HR30TW 0.54 HR45N 0.52 HR45N 0.5 HR45N 0.58 HR45TW 0.63 HR45TW 0.59 HR45TW	Indirect verification per ASTM E18, ASTM E110 using Hardness Test Blocks
Brinell Hardness Testers [1]	HBW 10/500/15 Scale (15.9 to 62) HBW (63 to 109) HBW HBW 10/3000/15 Scale (95.5 to 350) HBW (351 to 650) HBW	 1 % of reading 3 % of reading 1 % of reading 1.3 % of reading	Indirect verification per ASTM E10, ASTM E110 using Hardness Test Blocks.
Knoop Hardness Testers [1]	HK 0.5 Scale (250 to 650) HK > 650 HK	 3.4 % of reading 2.6 % of reading	Indirect verification per ASTM E92 using Hardness Test Blocks.
Vickers Hardness Testers [1]	HV 0.3 Scale (240 to 600) HV HV 0.5 Scale > 600 HV	 2 % of reading 2.1 % of reading	Indirect verification per ASTM E92 using Hardness Test Blocks.
Leeb Hardness Testers [1]	HLD Scale (300 to 900) HLD	 2.5 % of reading	Indirect verification per ASTM A956 using Hardness Test Blocks.
Durometers (Types A, D) Indenter Dimensions Radius Angle Length Spring Force	 Up to 1 in Up to 40° Up to 1 in Up to 100 Duro	 260 µin 0.009° 210 µin 0.55 Duro	Direct verification per ASTM D2240 using Optical Comparator Durometer Calibrator

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Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Force Measuring Equipment [1] (Tension and Compression)	(1 to 10) lbf (10 to 50) lbf (50 to 500) lbf	0.15 % of reading 0.014 % of reading 0.02 % of reading	Comparison to NIST Class F Weights
Force Measuring Equipment [1] (Tension)	(500 to 2 000) lbf (2 000 to 10 000) lbf (10 000 to 30 000) lbf	0.006 5 % of reading + 2.8 lbf 14 lbf 36 lbf	Comparison to Reference Load Cells
Force Measuring Equipment [1] (Compression)	(500 to 2 000) lbf (2 000 to 10 000) lbf (10 000 to 30 000) lbf (30 000 to 100 000) lbf	0.006 5 % of reading + 2.8 lbf 14 lbf 36 lbf 0.006 5 % of reading + 84 lbf	Comparison to Reference Load Cells
Torque Tools [1]	(1 to 10) lbf·in 10 lbf·in to 2 000 lbf·ft	0.84 % of reading + 0.012 lbf·in 0.84 % of reading	Comparison to AKO Torque Transducers with Display
Viscosity [1] (Dynamic)	10 cP 100 cP 500 cP 1 000 cP 5 000 cP 12 500 cP 30 000 cP	0.063 cP 0.45 cP 1.8 cP 8.3 cP 20 cP 55 cP 117 cP	Comparison to Accredited Viscosity Solutions, Thermometer

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Humidity – Measure [1]	(-10 to 10) °C Up to 95 %RH (10 to 30) °C Up to 95 %RH (30 to 35) °C Up to 95 %RH (35 to 50) °C Up to 50 %RH (50 to 95) %RH (50 to 70) °C Up to 50 %RH (50 to 95) %RH	 1.6 %RH 1.1 %RH 1.6 %RH 1.6 %RH 1.7 %RH 2.1 %RH 2.2 %RH	Direct measure using Rotronic HP23-A Temp/Humidity Indicator, Rotronic HC2A-SH Temp/Humidity Probe

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Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Measure [1]	(-195 to 0) °C (0 to 160) °C (160 to 420) °C (420 to 660) °C	0.015 °C 0.015 °C 0.02 °C 0.032 °C	Direct measure using SPRT, Digital Temperature Indicator
Temperature – Source [1] (Temp Measuring Devices)	(-30 to -20) °C	0.041 °C	Comparison to Micro-Bath, SPRT, Digital Temperature Indicator
Temperature – Source [1] (Temp Measuring Devices)	(-20 to 25) °C (25 to 150) °C	0.018 °C 0.021 °C	Comparison to Liquid Bath, SPRT, Digital Temperature Indicator
Temperature – Source [1] (Temp Measuring Devices)	(150 to 160) °C (160 to 300) °C (300 to 600) °C	0.062 °C 0.14 °C 0.52 °C	Comparison to Dry-well, SPRT, Digital Temperature Indicator
Infrared Thermometer [1]	(35 to 100) °C (100 to 120) °C (120 to 200) °C (200 to 350) °C (350 to 500) °C	0.69 °C 0.73 °C 0.98 °C 1.6 °C 2.2 °C	Comparison to Blackbody Source (flat plate) ε = (0.9 to 1), λ = (8 to 14) µm

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Reference	10 MHz	6.5 mHz	Comparison to SRS FS725 Rubidium Frequency Standard
Frequency – Measure [1]	1 Hz to 10 kHz 10 kHz to 10 MHz (10 to 225) MHz	0.64 nHz/Hz + 4.5 µHz 0.64 nHz/Hz + 5 µHz 0.65 nHz/Hz	Comparison to Keysight 53132A Universal Counter, SRS FS725 Rubidium Frequency Standard

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Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Source [1]	1 Hz to 20 MHz	0.65 nHz/Hz	Comparison to Keysight 33220A Function Generator, SRS FS725 Rubidium Frequency Standard
Period – Measure [1]	(1 to 100) s	45 µS	Comparison to Keysight 53132A Universal Counter, SRS FS725 Rubidium Frequency Standard
Period – Source [1]	(1 to 100) s	0.65 ns/s	Comparison to Keysight 33220A Function Generator, SRS FS725 Rubidium Frequency Standard
AC Duty Cycle – Source [1] Square Wave: < 3.3 Vp-p Freq: 10 mHz to 100 kHz	(10 to 49) % Duty Cycle 10 µs to 100 s 50 % Duty Cycle 10 µs to 100 s (51 to 90) % Duty Cycle 10 µs to 100 s	0.039 % of reading + 78 ns 0.016 % of reading + 78 ns 0.039 % of reading + 78 ns	Comparison to Fluke 5560A Multiproduct Calibrator
Stopwatches, Timers [1]	Up to 19.99 s/d	64 ms/d	Comparison to Vibrograf 4500 Timometer
Tachometers – Optical Pickup [1,4]	Up to 100 000 rpm	0.003 2 % of reading + 0.01 rpm	Comparison to Keysight 33220A Function Generator, LED
Non-contact Rate of Rotation – Measure [1,4]	(6 to 8 300) rpm (8 300 to 25 000) rpm (25 000 to 99 999) rpm	1.6 rpm 2.6 rpm 0.006 9 % of reading + 3.6 rpm	Direct measure using Optical Tachometer

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DIMENSIONAL MEASUREMENT

3 Dimensional

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Geometric Measurement of Fixtures, Gauges, Dies, and Molds	Up to 72 in	0.002 in	Faro Articulating Arm Coordinate Measuring Machine utilized as the reference standard for 3D measurements.

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. The values listed here are Nominal values. The actual certified values and associated Measurement Uncertainty will be utilized at the time of calibration.
3. The uncertainties shown are for the most favorable conditions. There is an increase in uncertainty that corresponds to the laboratory's AC voltage and current uncertainties at different frequencies other than the ones shown. Power factors (PF) other than the one shown contribute to the power uncertainty. PF is related to the cosine of phase. Therefore, uncertainties track the laboratory's phase uncertainty closely at PF near one but are magnified heavily as PF approaches zero. The lab may also report reactive power, apparent power, and power factor under this accreditation. If needed, contact the laboratory for more information regarding uncertainties at frequency and power factor combinations other than the ones shown.
4. L = length in inches; rpm = revolutions per minute; ″ = arc-second; DL = diagonal length in inches; X = distance in feet.
5. 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.
6. The stated uncertainty is the laboratory's ability to source a fast rise pulse that is approximately 250 ps. In the typical application of measuring rise time of an oscilloscope, this value is one of the contributing factors, but other factors are derived from the DUT.
7. Unless otherwise specified in the far-right column, the calibration procedure/method utilized was written and validated internally.
8. The legal entity for this client is Transcat, Inc.

Jason Stine, Vice President

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