



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

The Calibration Solution, LLC
9865 North Alpine Road
Machesney Park, IL 61115

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.
The current scope of accreditation can be verified at www.anab.org.

A handwritten signature in black ink, appearing to be 'J. Stine', is positioned above a horizontal line.

Jason Stine, Vice President

Expiry Date: 20 May 2027

Certificate Number: L1002-1



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)

The Calibration Solution, LLC

9865 North Alpine Road
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 James Patton 815-877-0880

CALIBRATION

ISO/IEC 17025 Accreditation Granted: **20 May 2025**

Certificate Number: L1002-1 Certificate Expiry Date: **20 May 2027**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Capacitance – Source ¹ (Simulation)	(0.19 to 0.4) nF	15 pF	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
	(0.4 to 1.1) nF	18 pF	
	(1.1 to 3.3) nF	27 pF	
	(3.3 to 11) nF	37 pF	
	(11 to 33) nF	0.18 nF	
	(33 to 110) nF	1.1 nF	
	(110 to 330) nF	10 nF	
	(0.33 to 1.1) µF	11 nF	
	(1.1 to 3.3) µF	15 nF	
	(3.3 to 11) µF	38 nF	
	(11 to 33) µF	0.16 µF	
	(33 to 110) µF	0.57 µF	
	(110 to 330) µF	1.8 µF	
	(0.33 to 1.1) mF	5.7 µF	
	(1.1 to 3.3) mF	7.6 µF	
(3.3 to 11) mF	55 µF		
(11 to 33) mF	0.26 mF		
(33 to 110) mF	1.2 mF		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Source ¹	(0 to 330) μ A (0.3 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 1.1) A (1.1 to 3) A (3 to 11) A (11 to 20) A	89 pA/ μ A + 27 nA 76 nA/mA + 0.18 μ A 73 nA/mA + 1.7 μ A 70 nA/mA + 18 μ A 0.2 mA/A + 45 μ A 0.23 mA/A + 0.84 mA 0.18 mA/A + 9.6 mA 0.85 mA/A + 6.1 mA	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
DC Current Clamp-on Meters ¹	(20 to 50) A (50 to 150) A (150 to 550) A (550 to 1 000) A	4.5 mA/A + 0.24 A 6.6 mA/A + 0.14 A 7.2 mA/A + 52 mA 7.2 mA/A + 26 mA	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator, 50-turn Coil
AC Current – Source ¹	(29 to 330) μ A (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (0.33 to 3.3) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (3.3 to 33) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (33 to 330) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	2.1 nA/ μ A + 0.42 μ A 1.5 nA/ μ A + 0.43 μ A 1 nA/ μ A + 0.43 μ A 1.3 nA/ μ A + 5.2 μ A 5.2 nA/ μ A + 5 μ A 2.3 nA/ μ A + 35 μ A 2.3 μ A/mA + 0.98 μ A 1.3 μ A/mA + 0.98 μ A 0.89 μ A/mA + 0.93 μ A 4 μ A/mA + 3.8 μ A 9.2 μ A/mA + 2.8 μ A 8.7 μ A/mA + 29 μ A 2.2 μ A/mA + 4.6 μ A 0.96 μ A/mA + 4.8 μ A 0.68 μ A/mA + 5.6 μ A 2.6 μ A/mA + 5.2 μ A 6.1 μ A/mA + 5.2 μ A 9 μ A/mA + 6.7 μ A 2.2 μ A/mA + 45 μ A 0.97 μ A/mA + 46 μ A 0.42 μ A/mA + 41 μ A 1 μ A/mA + 68 μ A 2.2 μ A/mA + 0.11 mA 6.3 μ A/mA + 0.17 mA	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source ¹	(0.33 to 1.1) A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (1.1 to 3) A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (3 to 11) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz (11 to 20.5) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.15 μA/A + 0.44 mA 0.15 μA/A + 0.44 mA 1.1 μA/A + 4.1 mA 0.5 μA/A + 0.13 mA 2.6 mA/A + 0.18 μA 0.58 mA/A + 1.7 mA 10 mA/A + 0.6 mA 30 mA/A + 6.1 mA 1.7 mA/A + 3.2 mA 1.3 mA/A + 3.3 mA 31 mA/A + 2.5 mA 2 mA/A + 5.5 mA 1.7 mA/A + 6 mA 31 mA/A + 6.6 mA	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
AC Current Clamp-on Meters ¹	(20 to 50) A (45 to 65) Hz (65 to 440) Hz (50 to 150) A 45 Hz to 1 kHz (150 to 550) A (45 to 100) Hz 100 Hz to 1 kHz (550 to 1 000) A (45 to 100) Hz 100 Hz to 1 kHz	18 mA/A 17 mA/A + 19 mA 7.5 mA/A + 44 mA 2.9 mA/A + 1 A 7.1 mA/A + 37 mA 7.2 mA/A 20 mA/A + 1.8 A	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator, 50-turn Coil
DC Current – Measure ¹	(0 to 10) μA (10 to 100) μA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	7.1 pA/μA + 0.67 nA 19 pA/μA + 0.99 nA 19 pA/μA + 7.5 nA 18 nA/mA + 76 nA 34 nA/mA + 0.69 μA 0.11 μA/mA + 16 μA	Comparison to Agilent 3458A 8.5 Digit Multimeter
DC Current – Measure ¹	(1 to 5) A (5 to 10) A (10 to 50) A (50 to 100) A (100 to 150) A	1 mA 2.4 mA 10 mA 20 mA 30 mA	Comparison to Agilent 3458A 8.5 Digit Multimeter, Current Shunt

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure ¹	Up to 100 μ A		Comparison to Agilent 3458A 8.5 Digit Multimeter
	(10 to 20) Hz	4 nA/ μ A + 31 nA	
	(20 to 45) Hz	1.5 nA/ μ A + 31 nA	
	(45 to 100) Hz	0.59 nA/ μ A + 32 nA	
	100 Hz to 5 kHz	0.59 nA/ μ A + 32 nA	
	(0.1 to 1) mA		
	(10 to 20) Hz	4 μ A/mA + 0.2 μ A	
	(20 to 45) Hz	1.5 μ A/mA + 0.2 μ A	
	(45 to 100) Hz	0.6 μ A/mA + 0.2 μ A	
	100 Hz to 5 kHz	0.3 μ A/mA + 0.21 μ A	
	(5 to 20) kHz	0.6 μ A/mA + 0.2 μ A	
	(20 to 50) kHz	4 μ A/mA + 0.4 μ A	
	(50 to 100) kHz	5.5 μ A/mA + 1.5 μ A	
	(1 to 10) mA		
	(10 to 20) Hz	4 μ A/mA + 2 μ A	
	(20 to 45) Hz	1.5 μ A/mA + 2 μ A	
	(45 to 100) Hz	0.6 μ A/mA + 2.1 μ A	
	100 Hz to 5 kHz	0.3 μ A/mA + 2.1 μ A	
	(5 to 20) kHz	0.6 μ A/mA + 2.1 μ A	
	(20 to 50) kHz	4 μ A/mA + 4 μ A	
	(50 to 100) kHz	5.5 μ A/mA + 15 μ A	
	(10 to 100) mA		
	(10 to 20) Hz	4 μ A/mA + 20 μ A	
	(20 to 45) Hz	1.5 μ A/mA + 21 μ A	
	(45 to 100) Hz	0.6 μ A/mA + 21 μ A	
	100 Hz to 5 kHz	0.3 μ A/mA + 21 μ A	
	(5 to 20) kHz	0.6 μ A/mA + 21 μ A	
	(20 to 50) kHz	4 μ A/mA + 40 μ A	
	(50 to 100) kHz	5.5 μ A/mA + 0.15 A	
	(0.1 to 1) A		
(10 to 20) Hz	4 μ A/mA + 0.2 mA		
(20 to 45) Hz	1.6 μ A/mA + 0.21 mA		
(45 to 100) Hz	0.8 μ A/mA + 0.21 mA		
100 Hz to 5 kHz	1 μ A/mA + 0.21 mA		
(5 to 20) kHz	3 μ A/mA + 0.2 mA		
(20 to 50) kHz	10 μ A/mA + 0.4 mA		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure ¹	(1 to 5) A (45 to 400) Hz	1.2 mA	Comparison to Agilent 3458A 8.5 Digit Multimeter, Current Shunt
	(5 to 10) A (45 to 400) Hz	2.4 mA	
	(10 to 50) A (45 to 400) Hz	12 mA	
	(50 to 100) A (45 to 400) Hz	24 mA	
	(100 to 150) A (45 to 400) Hz	36 mA	
DC Power – Source ¹	Up to 336 W	0.14 W	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
	336 W to 3.06 kW (3.06 to 20.91) kW	0.054 % of reading 0.13 % of reading	
AC Power – Source ¹ (45 to 65) Hz	(0.11 to 3) mW	0.19 % of reading	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
	(3 to 11) mW	0.14 % of reading	
	(11 to 30) mW	0.17 % of reading	
	(30 to 110) mW	0.12 % of reading	
	(110 to 300) mW	0.29 % of reading	
	(0.3 to 0.73) W	0.18 % of reading	
	(0.73 to 1.5) W	0.28 % of reading	
	(1.5 to 6.8) W	0.26 % of reading	
	(6.8 to 9.2) W	0.19 % of reading	
	(9.2 to 34) W	0.14 % of reading	
	(34 to 92) W	0.17 % of reading	
	(92 to 337) W	0.12 % of reading	
	(337 to 918) W	0.29 % of reading	
	(918 to 2 244) W	0.18 % of reading	
2 244 W to 4.59 kW (4.59 to 20.91) kW	0.28 % of reading 0.26 % of reading		
Resistance – Source ¹ (Simulation)	Up to 11 Ω	9.9 mΩ/Ω + 0.99 Ω	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
	(11 to 33) Ω	16 μΩ/Ω + 1.4 mΩ	
	(33 to 110) Ω	21 μΩ/Ω + 1.1 mΩ	
	(110 to 330) Ω	25 μΩ/Ω + 1.3 mΩ	
	(0.33 to 1.1) kΩ	27 μΩ/Ω + 2.2 mΩ	
	(1.1 to 3.3) kΩ	27 μΩ/Ω + 7.5 mΩ	
	(3.3 to 11) kΩ	25 μΩ/Ω + 50 mΩ	
	(11 to 33) kΩ	23 μΩ/Ω + 0.24 Ω	
	(33 to 110) kΩ	25 μΩ/Ω + 0.5 Ω	
	(110 to 330) kΩ	27 μΩ/Ω + 2.3 Ω	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Source ¹ (Simulation)	(0.33 to 1.1) MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ (0.33 to 1.1) GΩ	36 μΩ/Ω + 0.2 Ω 75 μΩ/Ω + 9.4 Ω 0.14 mΩ/Ω + 51 Ω 0.25 mΩ/Ω + 1.5 kΩ 0.53 mΩ/Ω + 0.97 kΩ 3.1 mΩ/Ω + 3.8 kΩ 15 mΩ/Ω + 15 kΩ	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
Resistance – Measure ¹	Up 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	13 μΩ/Ω + 79 μΩ 11 μΩ/Ω + 0.7 mΩ 9.7 μΩ/Ω + 0.95 mΩ 9.7 μΩ/Ω + 9.6 mΩ 9.5 μΩ/Ω + 0.13 Ω 15 Ω/MΩ + 3.6 Ω 79 Ω/MΩ + 75 Ω 0.5 kΩ/MΩ + 1.5 kΩ 5 kΩ/MΩ + 14 kΩ	Comparison to Agilent 3458A 8.5 Digit Multimeter
Electrical Simulation of RTD Indicating Devices – Source ¹	Cu 427, 10 Ω (-100 to 260) °C PtNi 385, 120 Ω (-80 to 0) °C (0 to 100) °C (100 to 260) °C Pt 3916, 100 Ω (-200 to -190) °C (-190 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C Pt 3926, 100 Ω (-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.3 °C 0.081 °C 0.081 °C 0.14 °C 0.25 °C 0.041 °C 0.051 °C 0.061 °C 0.071 °C 0.08 °C 0.09 °C 0.1 °C 0.23 °C 0.051 °C 0.051 °C 0.071 °C 0.09 °C 0.1 °C 0.12 °C	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator

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, 200 Ω		Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
	(-200 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.04 °C	
	(0 to 100) °C	0.04 °C	
	(100 to 260) °C	0.05 °C	
	(260 to 300) °C	0.12 °C	
	(300 to 400) °C	0.13 °C	
	(400 to 600) °C	0.14 °C	
	(600 to 630) °C	0.16 °C	
	Pt 385, 500 Ω		
	(-200 to -80) °C	0.043 °C	
	(-80 to 0) °C	0.052 °C	
	(0 to 100) °C	0.052 °C	
	(100 to 260) °C	0.062 °C	
	(260 to 300) °C	0.081 °C	
	(300 to 400) °C	0.081 °C	
	(400 to 600) °C	0.091 °C	
	(600 to 630) °C	0.11 °C	
	Pt 385, 1 000 Ω		
	(-200 to -80) °C	0.08 °C	
	(-80 to 0) °C	0.08 °C	
	(0 to 100) °C	0.084 °C	
	(100 to 260) °C	0.089 °C	
	(260 to 300) °C	0.095 °C	
(300 to 400) °C	0.1 °C		
(400 to 600) °C	0.1 °C		
(600 to 630) °C	0.24 °C		
Pt 385, 100 Ω			
(-200 to -80) °C	0.051 °C		
(-80 to 0) °C	0.051 °C		
(0 to 100) °C	0.071 °C		
(100 to 300) °C	0.09 °C		
(300 to 400) °C	0.1 °C		
(400 to 630) °C	0.12 °C		
(630 to 800) °C	0.23 °C		
DC Voltage – Source ¹	Up to 330 mV	18 nV/mV + 2.4 μV	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
	(0.3 to 3.3) V	12 μV/V + 2.7 μV	
	(3.3 to 33) V	11 μV/V + 64 μV	
	(33 to 330) V	18 μV/V + 0.47 mV	
	(330 to 1 000) V	21 μV/V + 4.7 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source ¹	(1 to 33) mV		Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
	(10 to 45) Hz	0.88 $\mu\text{V/mV}$ + 37 μV	
	45 Hz to 10 kHz	0.17 $\mu\text{V/mV}$ + 37 μV	
	(10 to 20) kHz	0.29 $\mu\text{V/mV}$ + 37 μV	
	(20 to 50) kHz	1 $\mu\text{V/mV}$ + 36 μV	
	(50 to 100) kHz	3.4 $\mu\text{V/mV}$ + 33 μV	
	(100 to 500) kHz	8 $\mu\text{V/mV}$ + 61 μV	
	(33 to 330) mV		
	(10 to 45) Hz	0.65 $\mu\text{V/mV}$ + 51 μV	
	45 Hz to 10 kHz	0.2 $\mu\text{V/mV}$ + 37 μV	
	(10 to 20) kHz	0.29 $\mu\text{V/mV}$ + 38 μV	
	(20 to 50) kHz	0.7 $\mu\text{V/mV}$ + 38 μV	
	(50 to 100) kHz	1.2 $\mu\text{V/mV}$ + 50 μV	
	(100 to 500) kHz	2.1 $\mu\text{V/mV}$ + 92 μV	
	(0.33 to 3.3) V		
	(10 to 45) Hz	0.64 mV/V + 0.27 mV	
	45 Hz to 10 kHz	0.21 mV/V + 0.11 mV	
	(10 to 20) kHz	0.31 mV/V + 0.11 mV	
	(20 to 50) kHz	0.68 mV/V + 0.11 mV	
	(50 to 100) kHz	1.1 mV/V + 0.17 mV	
(100 to 500) kHz	2.5 mV/V + 0.78 mV		
(3.3 to 33) V			
(10 to 45) Hz	0.64 mV/V + 2.7 mV		
45 Hz to 10 kHz	0.21 mV/V + 1.1 mV		
(10 to 20) kHz	0.41 mV/V + 1.1 mV		
(20 to 50) kHz	0.89 mV/V + 1.1 mV		
(50 to 100) kHz	2.2 mV/V + 1.6 mV		
(33 to 330) V			
45 Hz to 1 kHz	0.64 mV/V + 5.4 mV		
(1 to 10) kHz	0.28 mV/V + 8.8 mV		
(10 to 20) kHz	2.5 mV/V + 5 mV		
(20 to 50) kHz	2.5 mV/V + 7.1 mV		
(50 to 100) kHz	4.5 mV/V + 48 mV		
(330 to 1 000) V			
45 Hz to 1 kHz	0.68 mV/V + 18 mV		
(1 to 5) kHz	0.38 mV/V + 19 mV		
(5 to 10) kHz	0.41 mV/V + 19 mV		
DC Voltage – Measure ¹	Up to 100 mV	3.5 nV/mV + 2.1 μV	Comparison to Agilent 3458A 8.5 Digit Multimeter
	(0.1 to 1) V	7 $\mu\text{V/V}$ + 1.8 μV	
	(1 to 10) V	7.9 $\mu\text{V/V}$ + 2.7 μV	
	(10 to 100) V	9.7 $\mu\text{V/V}$ + 72 μV	
	(100 to 1 000) V	22 $\mu\text{V/V}$ + 0.24 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC High Voltage – Measure ¹	(10 to 6 000) V	20 mV/V + 1.7 V	Comparison to Greenlee 4.5 Digit Multimeter, Fluke 80k-40 HV Probe
AC Voltage – Measure ¹	(1 to 100) 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 (0.3 to 1) MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz (0.1 to 1) V (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 (0.3 to 1) MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz (1 to 10) V (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 (0.3 to 1) MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz	66 nV/mV + 4.9 μV 59 nV/mV + 4 μV 0.13 μV/mV + 3.4 μV 0.29 μV/mV + 3.3 μV 0.77 μV/mV + 6.7 μV 3 μV/mV + 12 μV 20 μV/mV + 64 μV 40 μV/mV + 77 μV 40 μV/mV + 87 μV 0.15 mV/mV + 0.1 mV 69 μV/V + 44 μV 69 μV/V + 23 μV 0.14 mV/V + 21 μV 0.3 mV/V + 24 μV 0.8 mV/V + 20 μV 3 mV/V + 0.1 mV 20 mV/V + 0.5 mV 40 mV/V + 0.7 mV 40 mV/V + 0.8 mV 0.15 V/V + 1 mV 63 μV/V + 0.56 mV 70 μV/V + 0.21 mV 0.14 mV/V + 0.21 mV 0.3 mV/V + 0.21 mV 0.8 mV/V + 0.21 mV 3 mV/V + 1 mV 20 mV/V + 5 mV 40 mV/V + 7 mV 40 mV/V + 8 mV 0.15 V/V + 10 mV	Comparison to Agilent 3458A 8.5 Digit Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	(10 to 100) V (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 (0.3 to 1) MHz (100 to 1 000) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.2 mV/V + 4.3 mV 0.2 mV/V + 2.2 mV 0.2 mV/V + 2.1 mV 0.35 mV/V + 2.9 mV 1.2 mV/V + 2.1 mV 4 mV/V + 10 mV 15 mV/V + 10 mV 0.4 mV/V + 41 mV 0.4 mV/V + 22 mV 0.6 mV/V + 21 mV 1.2 mV/V + 21 mV 3 mV/V + 20 mV	Comparison to Agilent 3458A 8.5 Digit Multimeter
AC High Voltage – Measure ¹	10 V to 5 kV (45 to 500) Hz	1.9 mV/V + 59 V	Comparison to Greenlee 4.5 Digit Multimeter, Fluke 80k-40 HV Probe
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 Type C (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 316) °C Type E (-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C	0.47 °C 0.38 °C 0.34 °C 0.37 °C 0.34 °C 0.31 °C 0.35 °C 0.53 °C 0.86 °C 0.53 °C 0.23 °C 0.21 °C 0.23 °C 0.26 °C	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure ¹	Type J		Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
	(-210 to -100) °C	0.31 °C	
	(-100 to -30) °C	0.23 °C	
	(-30 to 150) °C	0.21 °C	
	(150 to 760) °C	0.23 °C	
	(760 to 1 200) °C	0.28 °C	
	Type K		
	(-200 to -100) °C	0.37 °C	
	(-100 to -25) °C	0.24 °C	
	(-25 to 120) °C	0.23 °C	
	(120 to 1 000) °C	0.31 °C	
	(1 000 to 1 372) °C	0.43 °C	
	Type N		
	(-200 to -100) °C	0.43 °C	
	(-100 to -25) °C	0.27 °C	
	(-25 to 120) °C	0.25 °C	
	(120 to 410) °C	0.24 °C	
	(410 to 1 300) °C	0.31 °C	
	Type R		
	(0 to 250) °C	0.59 °C	
(250 to 400) °C	0.38 °C		
(400 to 1 000) °C	0.37 °C		
(1 000 to 1 767) °C	0.43 °C		
Type S			
(0 to 250) °C	0.5 °C		
(250 to 400) °C	0.39 °C		
(400 to 1 000) °C	0.4 °C		
(1 000 to 1 767) °C	0.49 °C		
Type T			
(-250 to -150) °C	0.65 °C		
(-150 to 0) °C	0.29 °C		
(0 to 120) °C	0.23 °C		
(120 to 400) °C	0.21 °C		
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure ¹	Type K (-25 to 120) °C	0.019 % of reading + 0.34 °C	Comparison to Fluke 726 Process Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes ¹			
Amplitude – DC Voltage into 50 Ω load	Up to 25 mV (25 to 110) mV (0.11 to 2.2) V (2.2 to 6.6) V	0.1 mV 0.33 mV 5.5 mV 17 mV	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
into 1 MΩ load	Up to 25 mV (25 to 110) mV (0.11 to 2.2) V (2.2 to 11) V (11 to 130) V	54 μV 54 μV 1.2 mV 5.7 mV 90 mV	
Amplitude – Square Wave into 50 Ω load	10 Hz to 100 kHz Up to 25 mV (25 to 110) mV (0.11 to 2.2) V (2.2 to 6.6) V	0.1 mV 0.33 mV 5.5 mV 17 mV	
into 1 MΩ load	10 Hz to 1 kHz Up to 25 mV (25 to 110) mV (0.11 to 2.2) V (2.2 to 11) V (11 to 130) V	61 μV 0.17 mV 2.1 mV 11 mV 0.14 V	
Amplitude – Leveled Sine Wave into 50 Ω load	5 mVp-p to 5.5 Vp-p 50 kHz (reference) 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz	23 mV/V + 21 μV 41 mV/V + 0.3 μV 41 mV/V + 11 μV 61 mV/V + 7.8 μV 71 mV/V + 6.7 μV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscope ¹ Leveled Sine Wave Flatness (Relative to 50 kHz) into 50 Ω load	5 mVp-p to 5.5 Vp-p 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz	20 mV/V + 2.6 μV 24 mV/V + 2.1 μV 43 mV/V + 1.2 μV 52 mV/V + 2.9 μV	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
Leveled Sine Wave – Frequency into 50 Ω load	50 kHz 1 100 MHz	2.7 Hz 1 MHz	
Leading Edge Risetime 1 kHz to 10 MHz into 50 Ω load	5 mVp-p to 2.5 Vp-p (200 to 350) ps	320 ps	
Time Markers into 50 Ω load	1 ns to 20 ms 50 ms 0.1 s 0.2 s 0.5 s 1 s 2 s 5 s	2.7 μs/s 3.8 μs 13 μs 45 μs 260 μs 1 ms 4.1 ms 25 ms	

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Caliper Checker ²	Up to 72 in	(42 + 3.3L) μin	Comparisons to Gage Blocks, Electronic Amp
Geometric References (Flatness, Parallelism, Straightness)	(1 to 36) in (36 to 60) in	58 μin 87 μin	Comparisons to Gage Blocks, Electronic Amp

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Grade 1 Gage Blocks, Steel ²	(0.01 to 4) in	$(3.8 + 0.28L) \mu\text{in}$	Comparison to Gage Block Comparator
All other Grade Gage Blocks, Steel ²	(0.01 to 4) in	$(4 + 1.6L) \mu\text{in}$	Comparison to Gage Block Comparator
Gage Blocks, Steel ²	(5 to 20) in	$(6.3 + 0.24L) \mu\text{in}$	Comparison to Johansson Comparator, Surface Plate
Gage Blocks, TC/CC/Ceramic ²	(0.01 to 4) in	$(3.9 + 4.2L) \mu\text{in}$	Comparison to Gage Block Comparator
Gage Block Comparator	0.01 in	4 μin	Comparison to Master Gage Blocks
Kalmaster ²	Up to 12 in	$(42 + 3.3L) \mu\text{in}$	Comparisons to Gage Blocks, Electronic Amp
Length Standards ^{1,2}	Up to 20 in	$(42 + 3.3L) \mu\text{in}$	Comparisons to Gage Blocks, Electronic Amp
Micrometer Master ² Depth	Up to 12 in	$(42 + 3.3L) \mu\text{in}$	Comparisons to Gage Blocks, Electronic Amp
Outside Diameter	Up to 12 in	$(42 + 3.3L) \mu\text{in}$	
Optical Flats and Parallels ² Flatness	(1 to 6) inD	3.3 μin	Comparison to Master Optical Flat, Gage Block Comparator
Parallelism	Up to 1 in	6 μin	
Parallels	Up to 36 in (36 to 60) in	58 μin 87 μin	Comparison to Electronic Amp, Surface Plate
Pitch Gages (1 to 100) TPI ²	Up to 0.1 in	$(430 + 17L) \mu\text{in}$	Comparison to Optical Comparator
Cylindrical Plug Gage ^{1,2}	Up to 14 in	$(10 + 1.8D) \mu\text{in}$	Direct Measure using Precimar Universal Length Measuring Machine
Cylindrical Ring Gage ^{1,2} (Inside Diameter)	(0.05 to 14) in	$(8.2 + 1.8D) \mu\text{in}$	Direct measure using Precimar Universal Length Measuring Machine (ULM)
Steel Ball ² (Size Only)	(0.05 to 1) in	$(22 + 1.9D) \mu\text{in}$	Comparisons to Supermicrometer [®] , Gage Blocks

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Steel Rule ^{1,2}	(1 to 48) in (48 to 144) in	(5 700 + 2.3L) μin (5 700 + 1.5L) μin	Comparison to Gage Blocks
Straight Edge	(1 to 36) in (36 to 60) in	58 μin 87 μin	Comparison to Electronic Amp, Surface Plate
Thickness Gages, Feeler Gages, Pin Gages ^{1,2}	(0.001 to 1) in	(22 + 1.9D) μin	Direct measure using Supermicrometer [®]
Thread Measuring Wires	Up to 0.25 in	31 μin	Direct Measure using Supermicrometer [®]
1-2-3 Blocks ²	(1 to 3) in	(42 + 3.3L) μin	Comparisons to Electronic Amp, Gage Blocks
Angle Gage Blocks ²	Up to 45°	6.4"	Comparisons to Sine Bar, Electronic Amp
Arbors	Up to 14 in	58 μin	Direct measure using Supermicrometer [®] / Bench Center / Amp
Fixtures/Functional Gages ²			
Length	Up to 6 in	(610 + 1.8L) μin	Direct measure using Optical Comparator
Angle	Up to 360°	0.065°	
Protractors ^{1,2}	Up to 360°	0.065°	Direct measure using Optical Comparator
Protractors ^{1,2}	Up to 45°	6.4"	Comparison to Sine Bar, Gage Blocks
Radius Gage ²	(0.015 6 to 2) in	(610 + 1.8L) μin	Direct measure using Optical Comparator
Sine Plates, Sine Bars ²	(5 to 20) in	(68 + 12L) μin	Comparisons to Electronic Amp, Surface Plate, Gage Blocks
Squares ^{1,2}	(1 to 24) in	(48 + 3.5L) μin	Comparisons to Granite Square, Electronic Amp

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
V-Blocks	Up to 12 in ³	150 μin	Comparisons to Electronic Amp, Arbor, Surface Plate, Square
NPT Thread Ring ²	(0.062 5 to 2.5) in	(190 + 1.5D) μin	Tactile Fit using NPT Plugs
NPTF Taper Plugs ²	(0.062 5 to 6) in	(55 + 2.3D) μin	Comparisons to Supermicrometer [®] , Sine Block
Surface Finish Standard ^{1,2}	(12 to 120) μin Ra	Cal High: 2.6 μin Cal Low: 2.9 μin Stylus Cal: 1.4 μin	Direct measure using Profilometer
Thread Plugs ^{1,2} (6 to 80) TPI	Up to 14 in	(130 + 2PD) μin	Comparisons to Supermicrometer [®] , Thread Wires
Surface Plates ^{1,2}			In accordance with Fed Spec GGG-P-463 using Autocollimator
Overall Flatness	(24 to 144) in	(48 + 0.091L) μin	
Local Area Flatness (Repeat Readings)	0.002 in	(34 + 0.1L) μin	Repeat-o-Meter
Thread Plug Gage, Tapered ²	(0.125 to 6) in	(130 + 2D) μin	Comparisons to Supermicrometer [®] , Thread Wires, Sine Block
Thread Ring Gage ^{1,2} (6 to 80) TPI	(0.1 to 1.5) in	(190 + 1.5PD) μin	Comparison to Set Plugs
Thread Ring Gage ^{1,2} (6 to 80) TPI	(0.2 to 5) in	(200 + 1.1PD) μin	Direct Measure using Precimar ULM
Fixtures / Functional Gages	X Axis to 28 in Y Axis to 28 in Z Axis to 24 in	430 μin 430 μin 440 μin	CMM incorporated into the Measurement Process.
Plain Taper Arbor	Up to 20 in	430 μin	Direct measure using CMM
Bench Micrometer ^{1,2}	Up to 2 in	(48 + 11L) μin	Comparison to Gage Blocks

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Calipers ^{1,2} Resolution: 0.000 5 in	Up to 24 in	(450 + 6L) μin	Comparison to Gage Blocks, Ring Gages
0.001 in	Up to 24 in	(670 + 4L) μin	
0.001 in	(24 to 72) in	(350 + 15L) μin	
Dial Bore Gage ¹	(1 to 10) in	41 μin	Direct measure using Supermicrometer [®]
Dial Indicator Calibrator ²	Up to 1 in	(16 + 1.1L) μin	Comparisons to Gage Blocks, Electronic Amp
Dial/Test/Elect Indicators ^{1,2} Resolution: 0.000 04 in	Up to 4 in	(50 + 8L) μin	Comparison to Gage Blocks
0.000 05 in	Up to 4 in	(53 + 8L) μin	
0.000 08 in	Up to 4 in	(64 + 7L) μin	
0.000 1 in	Up to 4 in	(62 + 5L) μin	
0.000 4 in	Up to 4 in	(230 + 10L) μin	
0.000 5 in	Up to 4 in	(290 + 2L) μin	
0.001 in	Up to 4 in	(580 + 1L) μin	
Electronic Amp ²	Up to 0.008 in	(75 + 110L) μin	Comparison to Gage Blocks
Electronic Amp ²	Up to 0.008 in	(9.9 + 3.5L) μin	Direct Measure using Precimar ULM
Height Gage ^{1,2}	Up to 48 in	(44 + 6.4L) μin	Comparison to Gage Blocks
Height Master ^{1,2}	Up to 48 in	(42 + 3.3L) μin	Comparisons to Gage Blocks, Electronic Amp
Intramic/Bore Micrometer ²	(0.2 to 6) in	(150 + 27D) μin	Comparison to Ring Gages
High Precision Indicators	0.002 in	3.5 μin	Comparison to Grade 1 Gage Blocks
Inside Micrometers ^{1,2}	Up to 12 in	(21 + 2.5L) μin	Direct measure using Supermicrometer [®]

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Inside Micrometers ^{1,2}	(12 to 60) in	(42 + 3.3L) μin	Comparisons to Gage Blocks, Electronic Amp
Outside Micrometer ^{1,2} Resolution: 0.000 05 in	Up to 24 in	(50 + 14L) μin	Comparison to Gage Blocks
0.000 1 in	Up to 24 in	(70 + 13L) μin	
0.001 in	Up to 24 in	(120 + 11L) μin	
0.001 in	(25 to 72) in	(47 + 11L) μin	
Depth Micrometers ^{1,2}	Up to 24 in	(110 + 8L) μin	Comparison to Gage Blocks
Micrometer Heads	Up to 2 in	24 μin	Direct measure using Precimar ULM
Supermicrometer ^{® 2} Outside Diameter	Up to 1 in (1 to 3) in (3 to 6) in (6 to 12) in (12 to 18) in	(19 + 5L) μin (12 + 1.7L) μin (5.2 + 4L) μin (5.5 + 4L) μin (2.5 + 4.2L) μin	Comparison to Gage Blocks
Laser Micrometers ²	Up to 1 in	(36 + 14L) μin	Comparison to Master Pins
Bench Centers ¹	Up to 48 in	140 μin	Comparisons to Arbor, Electronic Amp
Dial Sink, Counter Bore Gages	Up to 2 in	130 μin	Comparison to Ring Gage
Levels	0.000 5 in per 12 in	290 μin	Comparison to Surface Plate
Optical Comparators ^{1,2} Linearity	Up to 6 in	(430 + 17L) μin	Comparison to Glass Scale
Angularity	Up to 360°	0.02°	
Profilometers ^{1,5} Calibration Linearity Stylus	Ra: 120 μin Ra: 17 μin Ra: (12 to 20) μin	3.7 μin 2.2 μin 1.7 μin	Comparison to 3-patch Surface Finish Standard

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Force Gages	(0 to 6 000) gf	0.002 % of reading + 5.6 µg	ASTM E617 Class 7 Weights
Force Gages	(0.5 to 220) lbf	0.003 5 % of reading	NIST Class F Weights
Durometers Spring Force Only Type A Type D Type M	(0 to 90) Duro (0 to 90) Duro (0 to 90) Duro	1.3 Duro 1.4 Duro 0.6 Duro	Partial Verification using a Balance per ASTM D2240.
Microhardness Testers ¹ 500 gf load Knoop Vickers	Low Middle High Middle	5.3 HK 18 HK 12 HK 19 HV	Indirect Verification per ASTM E384 using hardness test blocks.
Brinell Hardness Testers ¹	500 kgf Load Low Middle High 1 500 kgf Load Low Middle High 3 000 kgf Load Low Middle High	4.5 HB 4.9 HB 5.3 HB 4.7 HB 5.3 HB 5.4 HB 7.4 HB 6.4 HB 6.4 HB	Indirect Verification per ASTM E10 using hardness test blocks.
Rockwell Hardness Testers ¹	HRA Low Middle High HRBW Low Middle High HRC Low Middle High	0.71 HRA 0.56 HRA 0.47 HRA 1.1 HRBW 0.94 HRBW 0.71 HRBW 0.74 HRC 0.53 HRC 0.47 HRC	Indirect Verification per ASTM E18 using hardness test blocks.

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rockwell Superficial Hardness Testers ¹	HR15TW		Indirect Verification per ASTM E18 using hardness test blocks.
	Low	1 HR15TW	
	Middle	1 HR15TW	
	High	0.8 HR15TW	
	HR30TW		
	Low	0.9 HR30TW	
	Middle	1 HR30TW	
	High	0.86 HR30TW	
	HR45TW		
	Low	0.64 HR45TW	
	Middle	0.87 HR45TW	
	High	0.7 HR45TW	
	HR15N		
	Low	0.73 HR15N	
	Middle	0.84 HR15N	
High	0.74 HR15N		
Rockwell Superficial Hardness Testers ¹	HR30N		Indirect Verification per ASTM E18 using hardness test blocks.
	Low	0.85 HR30N	
	Middle	0.9 HR30N	
	High	0.79 HR30N	
	HR45N		
	Low	0.79 HR45N	
Middle	0.76 HR45N		
High	0.8 HR45N		
Pressure Devices			Comparison to Deadweight Tester
1 psi resolution	(5 to 1 000) psi (1 000 to 10 000) psi	1.7 psi 12 psi	
2 psi resolution	(5 to 1 000) psi	2 psi	
5 psi resolution	(5 to 1 000) psi	3.3 psi	
10 psi resolution	(5 to 1 000) psi (1 000 to 10 000) psi	6 psi 13 psi	
20 psi resolution	(1 000 to 10 000) psi	16 psi	
50 psi resolution	(1 000 to 10 000) psi	31 psi	
100 psi resolution	(1 000 to 10 000) psi	59 psi	

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pneumatic Pressure Devices ²	(-12.3 to 300) psi (-5 to 5) psi	(0.025 + 0.002 8X) psi 0.005 8 psi	Comparison to Pneumatic Pressure Calibrator, Low Pressure Cell
Weighing System ¹ 0.001 g resolution 0.001 lb resolution	Up to 6 000 g Up to 12 lb	0.002 % of reading + 5.6 µg 0.001 5 lb	ASTM E617 Class 7 weights and NIST HB 44 utilized in the calibration of the weighing system.
Weighing System ¹ 0.001 lb resolution 0.01 lb resolution 0.1 lb resolution 1 lb resolution 2 lb resolution	Up to 220 lb Up to 220 lb Up to 220 lb Up to 220 lb Up to 220 lb	0.01 % of reading 0.011 % of reading + 0.037 lb 0.001 % of reading + 0.06 lb 0.001 % of reading + 0.6 lb 0.000 6 % of reading + 1.2 lb	ASTM E617 Class 7 weights and NIST HB 44 utilized in the calibration of the weighing system.
Weighing System ^{1,3} Floor Scales	Up to 500 lb	0.11 % of reading	ASTM E617 Class 6 weights and NIST HB 44 utilized in the calibration of the weighing system.
Weighing System Lab Balances Resolution: 0.000 1 g 0.001 g 0.01 g 0.1 g	(1 to 1 000) g (1 to 2) kg (2 to 3) kg (3 to 5) kg (5 to 13) kg (1 to 2 000) g (2 to 13) kg 1 g to 13 kg 1 g to 13 kg	0.2 mg 0.23 mg 0.27 mg 0.39 mg 0.47 mg 2.1 mg 2.2 mg 8.4 mg 58 mg	ASTM E617 Class 1 weights and NIST HB 44 utilized in the calibration of the weighing system.
Torque Watches ²	(1 to 80) ozf·in	(0.11 + 0.002 4X) ozf·in	Comparison to Torque Wheels, NIST Class F Weights

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Torque Transducers, Torque Calibrators ²	(5 to 50) ozf·in (15 to 200) ozf·in (4 to 50) lbf·in (30 to 400) lbf·in (80 to 1 000) lbf·in (20 to 250) lbf·ft (60 to 600) lbf·ft (100 to 1 000) lbf·ft (200 to 2 000) lbf·ft	0.006 ozf·in/ozf·in (0.001 9 + 0.005 7X) ozf·in (0.008 6 + 0.005 6X) lbf·in (0.001 2 + 0.005 3X) lbf·in (0.005 6 + 0.006 2X) lbf·in (0.002 5 + 0.001 3X) lbf·ft (0.011 + 0.008 3X) lbf·ft (0.008 9 + 0.008 3X) lbf·ft (0.021 + 0.008 3X) lbf·ft	Comparison to Torque Wheels, Torque Arms, NIST Class F Weights
Torque Tools ^{1,2,4}	(5 to 50) ozf·in (15 to 200) ozf·in (4 to 50) lbf·in (30 to 400) lbf·in (80 to 1 000) lbf·in (20 to 250) lbf·ft (60 to 600) lbf·ft (100 to 1 000) lbf·ft (200 to 2 000) lbf·ft	(0.033 + 0.018X) ozf·in (0.61 + 0.006 3X) ozf·in (0.052 + 0.007 1X) lbf·in (0.69 + 0.001 2X) lbf·in (1.7 + 0.012X) lbf·in (0.61 + 0.007 9X) lbf·ft (4 + 0.002 1X) lbf·ft (1.2 + 0.013X) lbf·ft (17 + 0.001 5X) lbf·ft	Comparison to CDI Torque Tester

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Humidity – Source (Humidity Measuring Equipment)	(11, 35, 75) %RH Within ± 5 %RH	0.047 % of reading + 1.3 %RH	Comparison to Saturated Salts, Thermohygrometer
Humidity – Measure ¹	(5 to 90) %RH	1.5 %RH	Direct measure using Thermohygrometer
Temperature – Source (Probes, Thermometers, etc.)	(-40 to 250) °C	0.12 °C	Comparison to Temperature Bath, SPRT
Temperature – Source (Probes, Thermometers, etc.)	(50 to 250) °C	0.047 % of reading + 0.046 °C	Comparison to Drywell Calibrator, SPRT
Temperature – Measure	(20 to 25) °C	0.42 °C	Direct Measure using Thermohygrometer
Temperature – Measure	(0 to 200) °C	0.013 % of reading + 0.074 °C	Direct Measure using Process Calibrator, Type K TC probe

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Measure	(-40 to 250) °C	0.049 °C	Direct Measure using Instrulab Indicator, PRT


Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Stopwatches and Timers	Up to 3 h	40 ms	Comparison to Frequency Counter
Tachometers ^{1,2} (Non-Contact)	Up to 120 rpm (> 120 to 1 000) rpm (> 1 000 to 1 200) rpm (> 1 200 to 12 000) rpm (> 12 000 to 99 999) rpm	0.9 rpm 4 rpm 4.1 rpm 39 rpm 390 rpm	Comparison to Fluke 5520A Multifunction Calibrator, LED
Frequency – Source ¹	10 Hz to 12 kHz (12 to 500) kHz	0.38 μHz/Hz + 5.7 mHz 2.7 μHz/Hz + 34 mHz	Comparison to Fluke 5520A/SC1100 Multiproduct Calibrator
Frequency – Reference	10 MHz	4.6 Hz	Comparison to HP 5335A Universal Counter
Frequency – Measure ¹	(1 to 40) Hz 40 Hz to 10 kHz (10 to 100) kHz 100 kHz to 1 MHz	0.52 mHz/Hz + 1.3 nHz 0.17 Hz/kHz 0.17 Hz/kHz 0.17 Hz/MHz + 34 nHz	Comparison to Agilent 3458A 8.5 Digit Multimeter

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; D = Diameter in inches; PD = Pitch Diameter in inches; X = Value of reading; " = arc-second; rpm = revolutions per minute.
3. 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.
4. $0.6R$ will be added to the Measurement Uncertainty at the time of calibration, where R = resolution of the device.
5. These values are approximate values and may vary ± 5 . Actual values will be utilized at the time of calibration.
6. Unless otherwise specified in the far-right hand column, the calibration procedure being utilized by the laboratory was written and validated internally.



Jason Stine, Vice President

