



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Instrument Calibration and Technical Services, Inc.
5312 Peters Creek Road, Suite E
Roanoke, VA 24019

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.

Jason Stine, Vice President

Expiry Date: 11 November 2026

Certificate Number: AC-1195



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)

Instrument Calibration and Technical Services, Inc.

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CALIBRATION

Valid to: **November 11, 2026**

Certificate Number: **AC-1195**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source ¹	Up 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	2.9 μ V 16 μ V 55 μ V 0.11 mV 1.6 mV 11 mV	Fluke 5730A Multifunction Calibrator; Direct Measure
DC Voltage – Measure ¹	Up to 100 mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1 000) V	0.1 μ V 13 μ V 0.12 mV 1.4 mV 14 mV	HP 3458A 8.5 Digit Multimeter; Direct Measure
DC High Voltage – Measure ¹	Up to 100 V (100 to 200) V (0.2 to 1) kV (1 to 4) kV (4 to 9) kV	71 mV 0.11 V 0.39 V 1.5 V 3.6 V	Vitrek 4700 High Voltage Meter; Direct Measure
DC High Voltage – Measure ¹	(9 to 10) kV (10 to 30) kV	4.2 V 28 V	Vitrek 4700 High Voltage Meter, Vitrek HVL-35 High Voltage Probe; Direct Measure



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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	(30 to 50) kV (50 to 70) kV (70 to 90) kV	41 V 0.2 kV 0.44 kV	Vitrek 4700 High Voltage Meter, Vitrek HVL-100 High Voltage Probe; Direct Measure
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 (50to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (2.2 to 22) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (22 to 220) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (0.22 to 2.2) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	6.6 μV 6.1 μV 2.6 μV 6.5 μV 8.5 μV 17 μV 33 μV 39 μV 14 μV 8.8 μV 8.4 μV 12 μV 22 μV 47 μV 73 μV 0.12 mV 94 μV 39 μV 27 μV 48 μV 0.13 mV 0.23 mV 0.47 mV 0.92 mV 0.82 mV 0.31 mV 0.14 mV 0.23 mV 0.31 mV 1.1 mV 3.4 mV 5.7 mV	Fluke 5730A Multifunction Calibrator; Direct Measure

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source ¹	(2.2 to 22) V		Fluke 5730A Multifunction Calibrator; Direct Measure
	(10 to 20) Hz	8.2 mV	
	(20 to 40) Hz	3.1 mV	
	40 Hz to 20 kHz	1.4 mV	
	(20 to 50) kHz	2.3 mV	
	(50 to 100) kHz	3 mV	
	(100 to 300) kHz	8.8 mV	
	(300 to 500) kHz	34 mV	
	500 kHz to 1 MHz	52 mV	
	(22 to 220) V		
	(10 to 20) Hz	76 mV	
	(20 to 40) Hz	28 mV	
	40 Hz to 20 kHz	17 mV	
	(20 to 50) kHz	27 mV	
	(50 to 100) kHz	48 mV	
(100 to 300) kHz	0.28 V		
(300 to 500) kHz	1.4 V		
500 kHz to 1 MHz	2.5 V		
(220 to 1 100) V			
(15 to 50) Hz	0.46 V		
50 Hz to 1 kHz	0.11 V		
AC Voltage – Measure ¹	Up to 10 mV		HP 3458A 8.5 Digit Multimeter; Direct Measure
	40 Hz to 1 kHz	1.2 μV	
	(1 to 20) kHz	1.2 μV	
	(20 to 50) kHz	2.1 μV	
	(10 to 100) mV		
	40 Hz to 1 kHz	21 μV	
	(1 to 20) kHz	4 μV	
	(20 to 50) kHz	7 μV	
	100 mV to 1 V		
	40 Hz to 1 kHz	0.21 mV	
	(1 to 20) kHz	30 μV	
	(20 to 50) kHz	50 μV	
	(1 to 10) V		
	40 Hz to 1 kHz	2 mV	
	(1 to 20) kHz	0.2 mV	
(20 to 50) kHz	0.5 mV		
(10 to 100) V			
40 Hz to 1 kHz	20 mV		
(1 to 20) kHz	3 mV		
(20 to 50) kHz	5 mV		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	(100 V to 1 000) V 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz	40 mV 13 mV 13 mV	HP 3458A 8.5 Digit Multimeter; Direct Measure
AC High Voltage – Measure ¹	Up to 1 kV 10 mHz to 600 Hz (1 to 9) kV 10 mHz to 600 Hz	1.5 V 13 V	Vitrek 4700 High Voltage Meter; Direct Measure
AC High Voltage – Measure ¹	(9 to 10) kV 10 mHz to 600 Hz (10 to 30) kV 10 mHz to 600 Hz	12 V 35 V	Vitrek 4700 High Voltage Meter, Vitrek HVL-35 High Voltage Probe; Direct Measure
AC High Voltage – Measure ¹	(30 to 70) kV 10 mHz to 600 Hz	81 V	Vitrek 4700 High Voltage Meter, Vitrek HVL-100 High Voltage Probe; Direct Measure
DC Current – Source ¹	Up to 220 μ A (0.22 to 2.2) mA (2.2 to 22) mA (22 to 220) mA (0.22 to 2.2) A	12 nA 0.11 μ A 1.1 μ A 14 μ A 0.25 mA	Fluke 5730A Multifunction Calibrator; Direct Measure
DC Current – Source ¹	(2.2 to 3) A (3 to 11) A (11 to 20.5) A	1.4 mA 7 mA 24 mA	Fluke 5520A Multifunction Calibrator; Direct Measure
DC Current – Source Clamp-On Meters ¹	(10 to 50) A (50 to 100) A (100 to 250) A (250 to 500) A (500 to 1 000) A	0.29 mA 0.96 mA 3.6 mA 6.4 mA 24 mA	Fluke 5520A Multifunction Calibrator, Fluke 5500A/COIL 50-turn Coil; Direct Measure
DC Current – Measure ¹	(0.1 to 1) μ A (1 to 10) μ A (10 to 100) μ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	0.82 nA 0.9 nA 3.3 nA 24 nA 0.24 μ A 4.1 μ A 0.13 μ A	HP 3458A 8.5 Digit Multimeter; Direct Measure



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Measure ¹	(1 to 10) A (10 to 100) A	0.041 % of reading 0.041% of reading	HP 3458A 8.5 Digit Multimeter, Rubicon 1166 Current Shunt; Direct Measure
AC Current – Source ¹	Up to 220 μ A (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (0.22 to 2.2) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (2.2 to 22) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (22 to 220) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (0.22 to 2.2) A 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.1 μ A 65 nA 43 nA 0.11 μ A 0.42 μ A 0.82 μ A 0.56 μ A 0.36 μ A 0.77 μ A 4.2 μ A 8.3 μ A 5.6 μ A 3.6 μ A 7.1 μ A 40 μ A 83 μ A 56 μ A 35 μ A 68 μ A 0.35 mA 0.82 mA 1.4 mA 21 mA	Fluke 5730A Multifunction Calibrator; Direct Measure

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source ¹	Up to 220 μ A (10 to 30) kHz	4.1 μ A	Fluke 5520A Multifunction Calibrator; Direct Measure
	220 μ A to 2.2 mA (10 to 30) kHz	26 μ A	
	(2.2 to 22) mA (10 to 30) kHz	0.11 mA	
	(22 to 220) mA (10 to 30) kHz	1.3 mA	
	(2.2 to 3) A (10 to 45) Hz	6.4 mA	
	45 Hz to 1kHz	2.2 mA	
	(1 to 5) kHz	22 mA	
	(5 to 10) kHz	88 mA	
	AC Current – Source ¹	(3 to 11) A (45 to 100) Hz	
100 Hz to 1 kHz (1 to 5) kHz		15 mA	
(11 to 20.5) A (45 to 100) Hz		0.38 A	
100 Hz to 1kHz (1 to 5) kHz		34 mA	
		41 mA	
		0.79 A	
AC Current – Source Clamp-on Meters ¹	(10 to 50) A (45 to 60) Hz	0.27 A	Fluke 5520A Multifunction Calibrator, Fluke 5500A/COIL 50-turn Coil; Direct Measure
	(60 to 400) Hz	0.64 A	
	(50 to 100) A (45 to 60) Hz	0.49 A	
	(60 to 400) Hz	1.2 A	
	(100 to 250) A (45 to 60) Hz	1.5 A	
	(60 to 400) Hz	3.3 A	
	(250 to 500) A (45 to 60) Hz	2.8 A	
	(60 to 400) Hz	6.5 A	
	(500 to 1 000) A (45 to 60) Hz	5.6 A	
	(60 to 400) Hz	13 A	

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 (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (0.1 to 1) mA (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (1 to 10) mA (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (10 to 100) mA (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (0.1 to 1) A (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	4.1 μ A 4.1 μ A 4.1 μ A 3.4 μ A 3 μ A 2.8 μ A 22 μ A 9.7 μ A 9.4 μ A 0.2 mA 93 μ A 58 μ A 4 mA 3.6 mA 3.7 mA	HP 3458A 8.5 Digit Multimeter; Direct Measure
Resistance – Source ¹ Simulated (Fixed)	0 Ω 1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 k Ω 1.9 k Ω 10 k Ω 19 k Ω 100 k Ω 190 k Ω 1 M Ω 1.9 M Ω 10 M Ω 19 M Ω 100 M Ω	64 $\mu\Omega$ 0.13 m Ω 0.24 m Ω 0.32 m Ω 0.6 m Ω 1.4 m Ω 2.7 m Ω 9.4 m Ω 18 m Ω 95 m Ω 0.18 Ω 1.2 Ω 2.7 Ω 18 Ω 57 Ω 0.54 k Ω 1.3 k Ω 16 k Ω	Fluke 5730A Multifunction Calibrator; Direct Measure



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Source ¹ Simulated (Variable)	(0 to 11) Ω	1.8 mΩ	Fluke 5520A Multifunction Calibrator; Direct Measure
	(11 to 33) Ω	3 mΩ	
	(33 to 110) Ω	5.1 mΩ	
	(110 to 330) Ω	13 mΩ	
	(0.33 to 1.1) kΩ	31 mΩ	
	(1.1 to 3.3) kΩ	0.11 Ω	
	(3.3 to 11) kΩ	0.31 Ω	
	(11 to 33) kΩ	1.1 Ω	
	(33 to 110) kΩ	3.1 Ω	
	(110 to 330) kΩ	13 Ω	
	(0.33 to 1.1) MΩ	46 Ω	
	(1.1 to 3.3) MΩ	0.26 kΩ	
Resistance – Source ¹ Simulated (Variable)	(3.3 to 11) MΩ	1.6 kΩ	Fluke 5520A Multifunction Calibrator; Direct Measure
	(11 to 33) MΩ	16 kΩ	
	(33 to 110) MΩ	72 kΩ	
Resistance – Measure ¹	(110 to 330) MΩ	1.6 MΩ	HP 3458A 8.5 Digit Multimeter; Direct Measure
	(330 to 1 100) MΩ	16 MΩ	
	Up to 10 Ω	6.4 mΩ	
	(10 to 100) Ω	2.2 mΩ	
	(0.1 to 1) kΩ	12 mΩ	
	(1 to 10) kΩ	0.12 Ω	
	(10 to 100) kΩ	1.3 Ω	
	(0.1 to 1) MΩ	20 Ω	
Capacitance – Source ¹ Simulated (Variable)	(1 to 10) MΩ	0.7 kΩ	Fluke 5520A Multifunction Calibrator; Direct Measure
	(10 to 100) MΩ	59 kΩ	
	(100 to 300) MΩ	0.59 MΩ	
	(0.19 to 1.1) nF	18 pF	
	(1.1 to 3.3) nF	31 pF	
	(3.3 to 11) nF	44 pF	
	(11 to 33) nF	0.21 nF	
	(33 to 110) nF	0.44 nF	
	(110 to 330) nF	1.3 nF	
	(0.33 to 1.1) μF	4.4 nF	
	(1.1 to 3.3) μF	15 nF	
	(3.3 to 11) μF	44 nF	
	(11 to 33) μF	0.19 μF	
	(33 to 110) μF	0.71 μF	
(110 to 330) μF	2.1 μF		
(0.33 to 1.1) mF	6.9 μF		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Power – Source ¹ (Derived)	33 mV to 1 000 V (0.33 to 330) mA (0.33 to 3) A (3 to 20) A	42 mW 1.4 W 24W	Fluke 5520A Multifunction Calibrator; Direct Measure
AC Power – Source ¹ (Derived) (45 to 65) Hz Power Factor = 1	(33 to 330) mV (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (330 to 900) mA (0.9 to 2.2) A (2.2 to 4.5) A (4.5 to 20) A	4.7 μW 16 μW 0.11 mW 0.18 mW 0.62 mW 1.2 mW 4.4 mW 12 mW	Fluke 5520A Multifunction Calibrator; Direct Measure
AC Power – Source ¹ (Derived) (45 to 65) Hz Power Factor = 1	330 mV to 1 020 V (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (330 to 900) mA (0.9 to 2.2) A (2.2 to 4.5) A (4.5 to 11) A	15 mW 49 mW 0.17 W 0.49 W 1.9 W 3.4 W 14 W 31 W	Fluke 5520A Multifunction Calibrator; Direct Measure
Oscilloscopes ¹ Amplitude – DC into 50 Ω load into 1 MΩ load Amplitude – Square Wave into 50 Ω load into 50 Ω load	(0 to 6.6) V (0 to 130) V 1 mV to 6.6 Vp-p 1 mV to 130 Vp-p	19 mV 38 mV 3.3 mV 15 mV	Fluke 5520A/SC1100 Multifunction Calibrator; Direct Measure

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes ¹ Leveled Sine Wave Amplitude into 50 Ω load (Reference 50 kHz)	5 mV to 5.5 V		Fluke 5520A/SC1100 Multifunction Calibrator; Direct Measure
	50 kHz to 100 MHz	3.8 mV	
	(100 to 300) MHz	37 mV	
	(300 to 600) MHz	56 mV	
Flatness into 50 Ω load (Relative to 50 kHz)	5 mV to 5.5 V		Fluke 5520A/SC1100 Multifunction Calibrator; Direct Measure
	50 kHz to 100 MHz	13 mV	
	(100 to 300) MHz	3.2 mV	
	(300 to 600) MHz	3.4 mV	
Time Marker into to 50 Ω load	50 ms to 5 s	0.7 μs	Fluke 5520A/SC1100 Multifunction Calibrator; Direct Measure
	1 ns to 20 ms	20 ps	
Rise Time into 50 Ω load	≤ 300 ps	8.3 ps	Fluke 5520A/SC1100 Multifunction Calibrator; Direct Measure
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure ¹	Type E		Ectron 1140A Thermocouple Simulator
	(-175 to -155) °C	0.13 °C	
	(-155 to -90) °C	0.1 °C	
	(-90 to 15) °C	0.09 °C	
	(15 to 890) °C	0.07 °C	
	(890 to 950) °C	0.08 °C	
	Type J		
	(-210 to -105) °C	0.32 °C	
	(-105 to -50) °C	0.1 °C	
	(-50 to 990) °C	0.08 °C	
	(990 to 1 100) °C	0.08 °C	
	Type K		
	(-200 to -195) °C	0.81 °C	
	(-195 to -115) °C	0.15 °C	
	(-115 to -55) °C	0.11 °C	
(-55 to 1 000) °C	0.08 °C		
(1 000 to 1 200) °C	0.1 °C		

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 R		Ectron 1140A Thermocouple Simulator
	(0 to 45) °C	0.66 °C	
	(45 to 160) °C	0.48 °C	
	(160 to 380) °C	0.36 °C	
	(380 to 775) °C	0.32 °C	
	(775 to 1 600) °C	0.28 °C	
	Type S		
	(0 to 45) °C	0.57 °C	
	(45 to 105) °C	0.47 °C	
	(105 to 310) °C	0.4 °C	
	(310 to 615) °C	0.35 °C	
	(615 to 1 700) °C	0.31 °C	
	Type T		
(-250 to -150) °C	0.73 °C		
(-150 to -135) °C	0.29 °C		
(-135 to -40) °C	0.15 °C		
(-40 to 100) °C	0.14 °C		
(100 to 300) °C	0.08 °C		
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure ¹	Type E		Fluke 5520A Multifunction Calibrator; Direct Measure
	(-250 to -175) °C	0.58 °C	
	(950 to 1 000) °C	0.25 °C	
	Type J		
	(1 100 to 1 200) °C	0.27 °C	
	Type K		
	(1 200 to 1 372) °C	0.47 °C	
	Type R		
	(1 600 to 1 767) °C	0.48 °C	
	Type S		
(1 700 to 1 767) °C	0.58 °C		
Type T			
(300 to 400) °C	0.17 °C		

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Micrometers ^{1,2}	Up to 4 in (4 to 12) in	(29 + 0.8L) μin (52 + 5.2L) μin	Gage Blocks; Direct Measure

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Calipers ^{1,2}	Up to 6 in (6 to 12) in (12 to 36) in	(289 + 0.29L) μin (324 + 20L) μin (558 + 5L) μin	Gage Blocks; Direct Measure
Dial Indicators ^{1,2}	Up to 1 in	(45 + 2.5L) μin	Gage Blocks; Direct Measure
Height Gages ^{1,2}	Up to 4 in (4 to 20) in (20 to 24) in	(221 + 55L) μin (562 + 1.4L) μin (582 + 2.2L) μin	Gage Blocks, Surface Plate; Direct Measure

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure Devices ¹	(-13 to -5) psig (-5 to 5) psig (5 to 15) psig (15 to 30) psig (30 to 100) psig (100 to 300) psig (300 to 600) psig (600 to 1 000) psig (1 000 to 2 000) psig (2 000 to 3 000) psig (3 000 to 5 000) psig (5 000 to 10 000) psig	0.011 psi 0.002 6 psi 0.018 psi 0.012 psi 0.028 psi 0.076 psi 0.15 psi 0.25 psi 0.53 psi 0.78 psi 1.3 psi 8.5 psi	Additel Precision Pressure Gages; Comparison Method
Torque Tools ¹	Up to 100 lbf·in	0.2 lbf·in	AKO TSD-011 Torque Transducer; Direct Measure
Torque Tools ¹	Up to 20 lbf·ft (20 to 50) lbf·ft (50 to 100) lbf·ft (100 to 200) lbf·ft (200 to 300) lbf·ft (300 to 400) lbf·ft (400 to 500) lbf·ft	0.042 lbf·ft 0.072 lbf·ft 0.15 lbf·ft 0.63 lbf·ft 0.64 lbf·ft 0.85 lbf·ft 0.48 lbf·ft	AKO TSD-111 Torque Transducer, AKO TSD-511 Torque Transducer; Direct Measure
Force Gages ¹	Up to 5 lbf (5 to 11) lbf (11 to 50) lbf (50 to 500) lbf	0.002 9 lbf 0.003 1 lbf 0.05 lbf 0.12 lbf	Master Weights; Direct Measure

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	
Balances and Scales ^{1,3} (SI)	Up to 1 g	59 µg	Master weights and internal calibration procedure utilized in the calibration of these weighing systems.	
	(1 to 10) g	0.12 mg		
	(10 to 50) g	0.47 mg		
	(50 to 100) g	0.94 mg		
	(100 to 200) g	1.9 mg		
	(200 to 300) g	4.2 mg		
	(300 to 400) g	6.1 mg		
	(400 to 500) g	8.2 mg		
	(500 to 1 000) g	9.3 mg		
	(1 000 to 2 000) g	19 mg		
(2 000 to 4 000) g	37 mg			
(4 000 to 6 000) g	56 mg			
Scales ¹ (Avoirdupois) (0.000 1 lb resolution)	Up to 1 lb	0.000 13 lb	Master weights and internal calibration procedure utilized in the calibration of these weighing systems.	
	(1 to 5) lb	0.000 59 lb		
	(0.001 lb resolution)	(5 to 10) lb		0.001 3 lb
		(10 to 20) lb		0.002 3 lb
		(20 to 40) lb		0.004 6 lb
		(40 to 50) lb		0.005 9 lb
Scales ¹ (Avoirdupois) (0.005 lb resolution)	(50 to 60) lb	0.007 4 lb	Master weights and internal calibration procedure utilized in the calibration of these weighing systems.	
	(60 to 70) lb	0.008 lb		
	(0.1 lb resolution)	(70 to 100) lb		0.06 lb
		(100 to 200) lb		0.09 lb
	(1 lb resolution)	(200 to 400) lb		0.58 lb
		(400 to 600) lb		0.58 lb
		(600 to 800) lb		0.59 lb
		(800 to 1 000) lb		0.59 lb
		(1 000 to 1 500) lb		0.6 lb

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Source ¹ (Temperature Indicating Devices, Probes, etc.)	(-38 to 0.1) °C (0.1 to 400) °C	0.02 °C 0.05 °C	Temperature Bath, Hart 5614 Platinum Resistance Thermometer; Direct Measure
Temperature – Source ¹ (Temperature Indicating Devices, Probes, etc.)	(400 to 600) °C	0.24 °C	Dry-well, Isotech 935-14-95H Semi-standard Platinum Resistance Thermometer; Direct Measure
Temperature – Measure ¹	(-196 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C	0.07 °C 0.05 °C 0.04 °C 0.08 °C	Hart 5614 Platinum Resistance Thermometer; Direct Measure
Temperature – Measure ¹	(400 to 600) °C	0.11 °C	Isotech 935-14-95H Semi-standard Platinum Resistance Thermometer; Direct Measure
Infrared Thermometers ¹	Up to 35 °C (35 to 100) °C (100 to 200) °C (200 to 350) °C (350 to 500) °C	0.39 °C 0.56 °C 0.8 °C 1.4 °C 1.9 °C	Fluke 4181 Infrared Calibrator $\epsilon = (0.9 \text{ to } 1)$, $\lambda = (8 \text{ to } 14) \mu\text{m}$; Direct Measure
Humidity – Source/Measure ¹	(11 to 80) %RH (80 to 94) %RH 33 %RH 75 %RH	1.4 %RH 2.5 %RH 1.6 %RH 1.7 %RH	Vaisala MI70/HMP77 Thermohygrometer Saturated Salt Solutions; Comparison Method

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency Reference ¹	10 MHz	1.2 mHz	Spectracom 8194B GPS Master Oscillator, HP 3225B Function Generator; Direct Measure

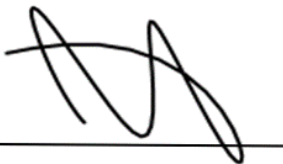
Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Source ¹	Up to 100 Hz 100 Hz to 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (1 to 10) MHz (10 to 20) MHz (20 to 80) MHz	0.94 mHz 0.37 mHz 3.7 mHz 2.5 mHz 0.14 Hz 0.35 Hz 1.3 Hz 0.19 kHz	Spectracom 8194B GPS Master Oscillator, HP 3225B Function Generator; Direct Measure
Frequency – Measure ¹	Up to 100 Hz 100 Hz to 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (1 to 10) MHz (10 to 100) MHz	0.89 mHz 0.45 mHz 0.3 mHz 1.5 mHz 3.1 mHz 27 mHz 0.17 Hz	HP 53131A Universal Counter; Direct Measure
Stopwatch/Timers ¹	Up to 59 min 59 min to 24 h	5.9 ms 1.1 s	Spectracom 8194B GPS Master Oscillator, HP 3225B Function Generator; Totalize Method

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.
3. CMC for scales and balances is highly dependent upon the resolution of the unit under test. The CMC presented here does not include resolution of the unit under test. The resolution will be included in the reported measurement uncertainty at the time of calibration.
4. Unless otherwise specified in the far-right column, the calibration method/procedure was internally written.
5. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1195.



Jason Stine, Vice President