



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Premier Scales & Systems, Inc.
4901 N. St. Joseph Avenue
Evansville, IN 47720
(and satellite location as shown on the scope)

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

In the field (s) of

CALIBRATION and DIMENSIONAL MEASUREMENT

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.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 17 May 2022

Certificate Number: AC-1222



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)**

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CALIBRATION AND DIMENSIONAL MEASUREMENT

Valid to: **May 17, 2022**

Certificate Number: **AC-1222**

CALIBRATION

Acoustics and Vibration

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Sound Level Meters @ 1 kHz	94 dB 114 dB	0.6 dB	Sound Calibrator

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
pH Meters	4 pH 7 pH 10 pH	0.06 pH 0.04 pH 0.05 pH	pH Buffer Solutions
Conductivity Meters	1 μ S/cm 10 μ S/cm 100 μ S/cm 1 000 μ S/cm	0.65 μ S/cm 0.56 μ S/cm 2.3 μ S/cm 6.1 μ S/cm	Conductivity Solutions
Viscosity Cups	(34 to 124) cSt	1 cSt + 0.43 % of reading	Viscosity Standards, Solutions, Stopwatch
Volumetric Dispensers	(1 to 100) mL (1 to 1 000) mL	0.063 mL 0.075 mL	Analytical Balance ASTM E 542-01 OEM validated procedures
Pipettes	(1 to 10) μ L (100 to 1 000) μ L	0.11 μ L 5.0 μ L	Balance, Thermometer



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source ¹	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (100 to 1 000) V	1.6 μV 16 μV 0.13 mV 1.3 mV 3.1 mV	Multiproduct Calibrator
DC Voltage - Measure ¹	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1 000) V	2.4 μV 6.4 μV 0.052 mV 0.67 mV 9.6 mV	Precision Digital Multimeter
DC Current - Source ¹	Up to 330 μA 330 μA to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3) A (3 to 11) A (11 to 20.5) A	0.014 μA 0.19 μA 0.48 μA 4.4 μA 77 μA 0.31 mA 1.5 mA 23 mA	Multiproduct Calibrator
DC Current - Source for Clamp on Current Meters ¹	(20 to 200) A (200 to 500) A (500 to 1 000) A	0.41 A 1.1 A 2.1 A	Multiproduct Calibrator w/ 50 turn coil.
DC Current - Measure ¹	Up to 100 μA 100 μA to 1 mA (1 to 10) mA (10 to 100) mA (100 to 400) mA 400 mA to 1 A (1 to 3) A (3 to 10) A	0.018 μA 0.67 μA 1.7 μA 6.7 μA 20 μA 0.27 mA 1.1 mA 3.5 mA	Precision Digital Multimeter
DC Withstanding	(0.100 – 6.00) kV	(200 μV + 1% of reading) + 5V	GW Instek Power Supply
Resistance - Source ¹	(3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ (330 to 1 100) MΩ	0.39 kΩ 3.5 kΩ 13 kΩ 0.29 MΩ 3.7 MΩ	Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance - Source ¹	Up to 11 Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) k Ω (1.1 to 3.3) k Ω (3.3 to 11) k Ω (11 to 33) k Ω (33 to 110) k Ω (110 to 330) k Ω (0.33 to 1.1) M Ω (1.1 to 3.3) M Ω	0.67 m Ω 1.4 m Ω 1.7 m Ω 3.4 m Ω 9.6 m Ω 38 m Ω 96 m Ω 0.39 Ω 0.99 Ω 3.8 Ω 32 Ω 79 Ω	Multiproduct Calibrator
Resistance - Measure ¹	Up to 10 Ω (10 to 100) Ω (0.1 to 1) k Ω (1 to 10) k Ω (10 to 100) k Ω (0.1 to 1) M Ω (1 to 10) M Ω (10 to 100) M Ω (0.1 to 1) G Ω	2 m Ω 3.6 m Ω 14 m Ω 0.14 Ω 1.4 Ω 14 Ω 3.3 k Ω 60 k Ω 1.4 M Ω	Precision Digital Multimeter
AC Voltage - Source ¹	(1 to 33) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz (33 to 330) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	4.7 μ V 4.1 μ V 4.2 μ V 4.8 μ V 10 μ V 39 μ V 15 μ V 11 μ V 14 μ V 15 μ V 39 μ V 92 μ V	Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Source ¹	(0.33 to 3.3) V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz (3.3 to 33) V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (33 to 330) V 45 Hz to 1 kHz 1 kHz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (330 to 1 020) V 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.12 mV 0.086 mV 0.09 mV 0.16 mV 0.28 mV 0.93 mV 1.2 mV 1.2 mV 1.7 mV 1.5 mV 3.1 mV 8.7 mV 9.1 mV 11 mV 12 mV 78 mV 73 mV 63 mV 73 mV	Multiproduct Calibrator
AC Voltage - Measure ¹	Up to 100 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 100 mV to 1 V (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	0.027 mV 0.027 mV 0.027 mV 0.033 mV 0.053 mV 0.33 mV 0.87 mV 0.43 mV 0.24 mV 0.41 mV 0.93 mV 6 mV	Precision Digital Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Measure ¹	(1 to 10) V		Precision Digital Multimeter
	(3 to 5) Hz	8.7 mV	
	(5 to 10) Hz	4.3 mV	
	10 Hz to 20 kHz	2.4 mV	
	(20 to 50) kHz	4.1 mV	
	(50 to 100) kHz	9.3 mV	
	(100 to 300) kHz	60 mV	
	(10 to 100) V		
	(3 to 5) Hz	87 mV	
	(5 to 10) Hz	43 mV	
	10 Hz to 20 kHz	24 mV	
	(20 to 50) kHz	41 mV	
	(50 to 100) kHz	93 mV	
	(100 to 300) kHz	0.6 V	
	(100 to 1 000) V		
	(3 to 5) Hz	0.82 V	
(5 to 10) Hz	0.38 V		
10 Hz to 20 kHz	0.19 V		
(20 to 50) kHz	0.33 V		
(50 to 100) kHz	0.8 V		
(100 to 300) kHz	5.2 V		
AC Current - Source ¹	(29 to 330) μ A		Multiproduct Calibrator
	(10 to 20) Hz	0.11 μ A	
	(20 to 45) Hz	0.1 μ A	
	45 Hz to 1 kHz	0.096 μ A	
	(1 to 5) kHz	0.16 μ A	
	(5 to 10) kHz	0.29 μ A	
	(10 to 30) kHz	0.58 μ A	
	(0.33 to 3.3) mA		
	(10 to 20) Hz	0.55 μ A	
	(20 to 45) Hz	0.39 μ A	
	45 Hz to 1 kHz	0.4 μ A	
	(1 to 5) kHz	0.61 μ A	
	(5 to 10) kHz	1.4 μ A	
	(10 to 30) kHz	2.6 μ A	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current - Source ¹	(3.3 to 33) mA		Multiproduct Calibrator
	(10 to 20) Hz	5.3 μ A	
	(20 to 45) Hz	3.3 μ A	
	45 Hz to 1 kHz	3.2 μ A	
	(1 to 5) kHz	3.7 μ A	
	(5 to 10) kHz	7 μ A	
	(10 to 30) kHz	12 μ A	
	(33 to 330) mA		
	(10 to 20) Hz	0.055 mA	
	(20 to 45) Hz	0.037 mA	
	45 Hz to 1 kHz	0.03 mA	
	(1 to 5) kHz	0.056 mA	
	(5 to 10) kHz	0.11 mA	
	(10 to 30) kHz	0.22 mA	
	(0.33 to 1.1) A		
	(10 to 45) Hz	0.47 mA	
	45 Hz to 1kHz	0.18 mA	
	(1 to 5) kHz	2 mA	
	(5 to 10) kHz	8.8 mA	
	(1.1 to 3) A		
(10 to 45) Hz	1.4 mA		
45 Hz to 1kHz	0.6 mA		
(1 to 5) kHz	8 mA		
(5 to 10) kHz	22 mA		
(3 to 11) A			
(45 to 100) Hz	2.7 mA		
100 Hz to 1 kHz	3.4 mA		
(1 to 5) kHz	61 mA		
(11 to 20.5) A			
(45 to 100) Hz	17 mA		
100 Hz to 440 Hz	18 mA		
AC Current - Source for Clamp on Current Meters ¹	(20 to 200) A		Multiproduct Calibrator w/ 50 turn coil
	(45 to 440) Hz	0.44 A	
	(200 to 500) A		
	(45 to 200) Hz	1.2 A	
(500 to 1 000) A			
(45 to 200) Hz	2.5 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 (3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz (5 to 10) kHz 100 μ A to 1 mA (3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz (5 to 10) kHz	0.29 μ A 0.14 μ A 0.041 μ A 0.47 μ A 6 μ A 0.74 μ A 0.34 μ A 1.8 μ A	Precision Digital Multimeter
AC Current – Measure ¹	(1 to 10) mA (3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz (5 to 10) kHz (10 to 100) mA (3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz (5 to 10) kHz (100 to 400) mA (3 to 5) Hz (5 to 10) Hz 10 Hz to 1 kHz (1 to 10) kHz 400 mA to 1 A (3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz (5 to 10) kHz (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	0.12 mA 0.012 mA 0.005 mA 0.049 mA 0.81 mA 0.13 mA 0.23 mA 0.18 mA 0.93 mA 0.49 mA 0.33 mA 2 mA 5.3 mA 1.7 mA 0.53 mA 5.6 mA 8.5 mA 3.5 mA 2.3 mA 16 mA 26 mA 11 mA 7.3 mA 54 mA	Precision Digital Multimeter



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	
Capacitance – Source ¹			Multiproduct Calibrator	
10 Hz to 10 kHz	(0.19 to 0.40) nF	0.007 3 nF		
10 Hz to 10 kHz	(0.40 to 1.1) nF	0.009 9 nF		
10 Hz to 3 kHz	(1.1 to 3.3) nF	0.012 nF		
10 Hz to 1 kHz	(3.3 to 11) nF	0.06 nF		
10 Hz to 1 kHz	(11 to 33) nF	0.12 nF		
10 Hz to 1 kHz	(33 to 110) nF	0.6 nF		
10 Hz to 1 kHz	(110 to 330) nF	0.69 nF		
(10 to 600) Hz	(0.33 to 1.1) μ F	0.006 1 μ F		
(10 to 300) Hz	(1.1 to 3.3) μ F	0.006 9 μ F		
(10 to 150) Hz	(3.3 to 11) μ F	0.059 μ F		
(10 to 120) Hz	(11 to 33) μ F	0.076 μ F		
(10 to 80) Hz	(33 to 110) μ F	0.60 μ F		
Up to 50 Hz	(110 to 330) μ F	0.78 μ F		
Up to 20 Hz	(0.33 to 1.1) mF	0.006 mF		
Up to 6 Hz	(1.1 to 3.3) mF	0.012 mF		
Up to 2 Hz	(3.3 to 11) mF	0.061 mF		
Up to 0.6 Hz	(11 to 33) mF	0.14 mF		
Up to 0.2 Hz	(33 to 110) mF	0.38 mF		
Capacitance – Measure ¹			Precision Digital Multimeter	
	Up to 1 nF	0.017 nF		
	(1 to 10) nF	0.041 nF		
	(10 to 100) nF	0.4 nF		
	(0.1 to 1) μ F	0.004 μ F		
	(1 to 10) μ F	0.04 μ F		
	(10 to 100) μ F	0.4 μ F		
	(0.1 to 1) mF	0.004 1 mF		
	(1 to 10) mF	0.04 mF		
	(10 to 100) mF	1.6 mF		
DC Power to Source ¹	(33 mv to 1 020 V) (0.33 to 330) mA (0.33 to 3) A (3 to 20.5) A	0.052 % of output in Watts 0.45 % of output in Watts 9.8 % of output in Watts	Multiproduct Calibrator	
Electrical Simulation of Thermocouple Devices ¹	Type B (600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C	0.62 °C 0.34 °C 0.31 °C 0.37 °C		Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Devices ¹	Type C		Multiproduct Calibrator
	(0 to 150) °C	0.42 °C	
	(150 to 650) °C	0.38 °C	
	(650 to 1 000) °C	0.31 °C	
	(1 000 to 1 800) °C	0.5 °C	
	(1 800 to 2 316) °C	0.84 °C	
	Type E		
	(-250 to -100) °C	0.51 °C	
	(-100 to -25) °C	0.16 °C	
	(-25 to 350) °C	0.15 °C	
	(350 to 650) °C	0.17 °C	
	(650 to 1 000) °C	0.21 °C	
	Type J		
	(-210 to -100) °C	0.27 °C	
	(-100 to -30) °C	0.17 °C	
	(-30 to 150) °C	0.14 °C	
	(150 to 760) °C	0.17 °C	
	(760 to 1 200) °C	0.23 °C	
	Type K		
	(-200 to -100) °C	0.34 °C	
	(-100 to -25) °C	0.18 °C	
	(-25 to 120) °C	0.16 °C	
	(120 to 1 000) °C	0.26 °C	
	(1 000 to 1 372) °C	0.4 °C	
	Type L		
	(-200 to -100) °C	0.38 °C	
	(-100 to 800) °C	0.26 °C	
	(800 to 900) °C	0.17 °C	
Type N			
(-200 to -100) °C	0.64 °C		
(-100 to -25) °C	0.54 °C		
(-25 to 120) °C	0.19 °C		
(120 to 410) °C	0.19 °C		
(410 to 1 300) °C	0.28 °C		
Type R			
(0 to 250) °C	0.48 °C		
(250 to 400) °C	0.37 °C		
(400 to 1 000) °C	0.37 °C		
(1 000 to 1 767) °C	0.46 °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 Devices ¹	Type S		Multiproduct Calibrator
	(0 to 250) °C	0.49 °C	
	(250 to 1000) °C	0.37 °C	
	(1 000 to 1 400) °C	0.37 °C	
	(1 400 to 1 767) °C	0.46 °C	
	Type T		
	(-250 to -150) °C	0.83 °C	
	(-150 to 0) °C	0.59 °C	
	(0 to 120) °C	0.34 °C	
	(120 to 400) °C	0.33 °C	
	Type U		
	(-200 to 0) °C	0.57 °C	
(0 to 600) °C	0.3 °C		
Electrical Simulation of RTD Devices ¹	Pt 385, 100 Ω		Multiproduct Calibrator
	(-200 to -80) °C	0.034 °C	
	(-80 to 0) °C	0.034 °C	
	(0 to 100) °C	0.047 °C	
	(100 to 300) °C	0.06 °C	
	(300 to 400) °C	0.068 °C	
	(400 to 630) °C	0.08 °C	
	(630 to 800) °C	0.15 °C	
	Pt 3926, 100 Ω		
	(-200 to -80) °C	0.033 °C	
	(-80 to 0) °C	0.036 °C	
	(0 to 100) °C	0.047 °C	
	(100 to 300) °C	0.06 °C	
	(300 to 400) °C	0.067 °C	
	(400 to 630) °C	0.08 °C	
	Pt 3916, 100 Ω		
	(-200 to -190) °C	0.17 °C	
	(-190 to -80) °C	0.027 °C	
	(-80 to 0) °C	0.03 °C	
	(0 to 100) °C	0.04 °C	
	(100 to 260) °C	0.05 °C	
	(260 to 300) °C	0.05 °C	
	(300 to 400) °C	0.06 °C	
	(400 to 600) °C	0.07 °C	
(600 to 630) °C	0.2 °C		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Devices ¹	Pt 385, 200 Ω		Multiproduct Calibrator
	(-200 to -80) °C	0.027 °C	
	(-80 to 0) °C	0.027 °C	
	(0 to 100) °C	0.027 °C	
	(100 to 260) °C	0.034 °C	
	(260 to 300) °C	0.08 °C	
	(300 to 400) °C	0.088 °C	
	(400 to 600) °C	0.094 °C	
	(600 to 630) °C	0.11 °C	
	Pt 385, 500 Ω		
	(-200 to -80) °C	0.027 °C	
	(-80 to 0) °C	0.034 °C	
	(0 to 100) °C	0.034 °C	
	(100 to 260) °C	0.041 °C	
	(260 to 300) °C	0.054 °C	
	(300 to 400) °C	0.053 °C	
	(400 to 600) °C	0.064 °C	
	(600 to 630) °C	0.073 °C	
	Pt 385, 1000 Ω		
	(-200 to -80) °C	0.02 °C	
	(-80 to 0) °C	0.02 °C	
(0 to 100) °C	0.027 °C		
(100 to 260) °C	0.033 °C		
(260 to 300) °C	0.04 °C		
(300 to 400) °C	0.047 °C		
(400 to 600) °C	0.047 °C		
(600 to 630) °C	0.15 °C		
PtNi 385, 120 Ω			
(-80 to 0) °C	0.053 °C		
(0 to 100) °C	0.053 °C		
(100 to 260) °C	0.093 °C		
Cu 427, 10 Ω			
(-100 to 260) °C	0.2 °C		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power – Source ¹ @ (45 to 65) Hz, PF = 1	(33 to 330) mV (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (0.33 to 0.9) A (0.9 to 2.2) A (2.2 to 4.5) A (4.5 to 20.5) A 33 mV to 1 020 V (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (0.33 to 0.9) A (0.9 to 2.2) A (2.2 to 4.5) A (4.5 to 20.5) A	0.002 8 % of output in Watts 0.007 3 % of output in Watts 0.028 % of output in Watts 0.073 % of output in Watts 0.26 % of output in Watts 0.53 % of output in Watts 0.001 3 % of output in Watts 0.005 % of output in Watts 0.007 3 % of output in Watts 0.018 % of output in Watts 0.073 % of output in Watts 0.18 % of output in Watts 0.67 % of output in Watts 1.4 % of output in Watts 3.7 % of output in Watts 14 % of output in Watts	Multiproduct Calibrator
AC Withstanding	(0.1 to 5.0) kV	(200 μ V + 1.5 % of reading) + 30 V	GW Instek Power Supply
Oscilloscopes ¹			
Amplitude DC Signal	1 mV to 100 V	0.5 mV \pm 40 mV	Multiproduct Calibrator
DC Voltage (1 M Ω)	5 mV to 5.5 V	8 mV \pm 0.33 mV	
Leveled Sine Wave 50 kHz to 600 mHz	10 ns to 5 s	0.000 12 s \pm 0.005 s	
Time Markers	100 ns to 20 ms	12 ms	
20 % Duty Cycle	1.8 mV to 55 V	0.031 V \pm 1.65 mV	
Wave Generator (1 M Ω)	10 Hz to 10 kHz	0.56 mHz \pm 50 mHz	

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Gage Balls ²	(0.039 37 to 2) in	(13 + 0.4L) μ in	ULM

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Gage Blocks ²	Up to 4 in	(2.9 + 1.2L) μin	Dual Head Comparator Grade 00 Gage Blocks
Plain Ring Gages ²	(0.4 to 4) in	(10 + 4.3L) μin	ULM XXX Master Rings
Angle Indicators and Protractors	(0 to 360) °	1.5 arc sec 30 arc sec	Sine Plate Optical Comparator
Micrometers, ID, OD & Depth ^{1,2}	Up to 6 in (6 to 60) in	(21 + 9.8L) μin (34 + 6L) μin	Gage Blocks Federal Grade 2 / ASME Grade 0
Calipers, ID, OD & Depth ^{1,2}	Up to 6 in (6 to 84) in	(57 + 0.96L) μin (30 + 3.1L) μin	Gage Blocks Federal Grade 2 / ASME Grade 0
Indicators ^{1,2}	Up to 2 in	(27 + 1.2L) μin	Gage Blocks / ULM
Pin Gages ²	Up to 1 in	(11 + 1.5L) μin	Gage Blocks / ULM
Plain Plug Gages ²	Up to 2 in (2 to 4) in	(11 + 1.5L) μin (3.5 + 6.5L) μin	Gage Blocks / ULM
Micrometer Standards (End Rods)	(0.5 to 20) in	15 μin	Gage Blocks / ULM
Rulers ¹	Up to 24 in	0.009 6 in	Master Steel Ruler
Height Gauges ^{1,2}	Up to 24 in	(44 + 2.1L) μin	Gage Blocks Federal Grade 2 / ASME Grade 0
Optical Comparators ¹ Linearity X-Y Squareness Angle	(0 to 10) in (0 to 0.5) in (0 to 90) °	0.000 12 in 0.000 17 in 30 arc sec	Gage Blocks, Glass Master Angle Plates
Optical Comparator ¹ Magnification	(10, 20, 31.25, 50, 61.25, and 100) x	25 μin + 0.06 μin	Glass Master
Profilometers ¹	(2 to 250) μin RA	4.8 nm	Roughness Specimen
Surface Plates ^{1,2} Repeat readings Overall Flatness	0.002 in Up to 161 in diagonal	20 μin (10 + 0.007D) μin	Repeat -O-Meter Electronic Levels
Thread Plug Gages Major Diameter Pitch Diameter	Up to 4 in	(3.5 + 6.5L) μin 72 μin	ULM, Thread Wires



ANSI National Accreditation Board

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Extrusion Plastometers ¹ Bore Diameter Piston Diameter	(0 to 0.25) in (0 to 1) in	0.003 in 0.001 in	Caliper, Pin Gages, Gage Block
CMMs Linear Accuracy Volumetric Accuracy Sphere Repeatability	Up to 24 in 1 in	(120 + 4 L) μin (270 + 4L) μin 170 μin	Step Bar Ball Bar Sphere

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Class I & Unclassified Balances ¹ Resolution: 0.01 mg 0.02 mg 0.05 mg 0.1 mg 0.2 mg 0.5 mg	Up to 100 g Up to 100 g Up to 100 g Up to 200 g Up to 200 g Up to 200 g	0.034 mg 0.036 mg 0.045 mg 0.089 mg 0.13 mg 0.3 mg	ASTM Class 1 Weights NIST Handbook 44 and WI-09
Class II & Unclassified Balances ¹ Resolution: 0.001 g 0.002 g 0.005 g 0.01 g 0.02 g 0.05 g 0.1 g 0.2 g 0.5 g 1 g 2 g 5 g	Up to 100 g Up to 200 g Up to 500 g Up to 1 kg Up to 2 kg Up to 5 kg Up to 10 kg Up to 20 kg Up to 50 kg Up to 50 kg Up to 50 kg Up to 50 kg	0.58 mg 1.2 mg 2.9 mg 5.8 mg 12 mg 29 mg 58 mg 0.12 g 0.29 g 0.58 g 1.2 g 2.9 g	ASTM Class 1 or 2 Weights NIST Handbook 44 and WI-09

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Class III & Unclassified Light Capacity Scales ¹ Resolution: 0.000 1 lb 0.000 2 lb 0.000 5 lb 0.001 lb 0.002 lb 0.005 lb 0.01 lb 0.02 lb	Up to 1 lb Up to 2 lb Up to 5 lb Up to 10 lb Up to 20 lb Up to 50 lb Up to 100 lb Up to 200 lb	0.026 g 0.054 g 0.13 g 0.26 g 0.54 g 1.3 g 2.6 g 5.4 g	NIST Class F Weights NIST Handbook 44 and WI-09
Class III & Unclassified Medium Capacity Scales ¹ Resolution: 0.05 lb 0.1 lb 0.2 lb 0.5 lb 1 lb 2 lb 5 lb	Up to 500 lb Up to 1 000 lb Up to 2 000 lb Up to 5 000 lb Up to 10 000 lb Up to 20 000 lb Up to 50 000 lb	0.029 lb 0.058 lb 0.12 lb 0.29 lb 0.58 lb 1.2 lb 2.9 lb	NIST Class F Weights Specific Customer Mass NIST Handbook 44 and WI-09
Class III & Unclassified Heavy Capacity Scales ¹ Resolution: 10 lb 20 lb 50 lb	Up to 50 000 lb Up to 200 000 lb Up to 400 000 lb	5.8 lb 12 lb 29 lb	NIST Class F Weights Specific Customer Mass NIST Handbook 44 and WI-09
Class IV & Unclassified Scales ¹ Resolution: 10 lb 20 lb 50 lb	Up to 12 000 lb Up to 24 000 lb Up to 60 000 lb	5.8 lb 12 lb 29 lb	NIST Class F Weight Specific Customer Mass NIST Handbook 44 and WI-09s
Mass - Avoirdupois lb	25 lb 50 lb 250 lb 500 lb 1 000 lb 2 500 lb 3 000 lb 5 000 lb 6 000 lb	0.1 g 0.13 g 0.54 g 6.4 g 7.2 g 50 g 50 g 54 g 75 g	NIST Class F Weights NISTIR 6969 SOP 4, SOP 5 or SOP 8



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Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Mass ³ - Avoirdupois lb Resolution: 0.5 lb 1 lb 2 lb 5 lb 10 lb 20 lb 50 lb	(5 000 to 150 000) lb	0.29 lb 0.58 lb 1.2 lb 2.9 lb 5.8 lb 12 lb 29 lb	Onsite calibration of customer supplied mass using WI-10 modified Single Substitution and Class III, IIIL, or Unclassified Scale.
Mass - Avoirdupois (lb)	1 lb 2 lb 3 lb 5 lb 10 lb 20 lb 30 lb	0.062 mg 0.098 mg 0.38 mg 0.53 mg 1 mg 1.8 mg 31 mg	ASTM Class 4 Weights NISTIR 6969 SOP 4, SOP 7 or SOP 8
Mass - Avoirdupois (oz)	1/32 oz 1/16 oz 1/8 oz 1/4 oz 1/2 oz 1 oz 2 oz 4 oz 8 oz	2.3 µg 3.3 µg 4.0 µg 8.0 µg 21 µg 0.32 mg 0.22 mg 0.038 mg 0.039 mg	ASTM Class 4 Weights NISTIR 6969 SOP 4, SOP 7 or SOP 8
Mass - Metric	20 kg 25 kg 200 kg	0.18 g 0.17 g 5.1 g	NIST Class F Weights NISTIR 6969 SOP 4, SOP 7 or SOP 8
Mass - Metric	100 g 200 g 300 g 500 g 1 kg 2 kg 3 kg 4 kg 5 kg 10 kg	0.034 mg 0.1 mg 0.1 mg 0.076 mg 0.19 mg 0.41 mg 0.79 mg 0.68 mg 0.84 mg 1.6 mg	ASTM Class 0 Weights NISTIR 6969 SOP 4, SOP 5 or SOP 8

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Mass - Metric	1 mg	1.1 µg	ASTM Class 0 Weights NISTIR 6969 SOP 4, SOP 5 or SOP 8
	2 mg	1.1 µg	
	3 mg	1.1 µg	
	5 mg	1.1 µg	
	10 mg	1.1 µg	
	20 mg	1.1 µg	
	30 mg	1.1 µg	
	50 mg	1.1 µg	
	100 mg	1.1 µg	
	200 mg	1.1 µg	
	300 mg	1.1 µg	
500 mg	1.1 µg		
Mass - Metric	1 g	3.8 µg	ASTM Class 0 Weights NISTIR 6969 SOP 4, SOP 5 or SOP 8
	2 g	2.3 µg	
	3 g	3.3 µg	
	5 g	3.6 µg	
	10 g	7.4 µg	
	20 g	7.6 µg	
	30 g	11 µg	
50 g	17 µg		
Force ¹	(2 to 200 lbf)	0.04 lbf	Dead Weights Load Cells
	(200 to 10 000) lbf	0.64 lbf	
	(10 000 to 100 000) lbf	0.24 lbf	
Pressure Gauges ¹	Up to 3 000 psi	0.93 psi	Pressure Calibrator with Pressure Module
	Up to 10 000 psi	0.91 psi	
Pressure / Vacuum ¹	(-15 to 100) psi	0.074 psi	Pressure Calibrator with pressure Module
Torque Tools ¹	(Up to 50) lbf·in	0.07 lbf·in	Torque Transducers
	(50 to 250) lbf·in	0.44 lbf·in	
	(250 to 400) lbf·in	1.2 lbf·in	
	(400 to 1 000) lbf·in	2.9 lbf·in	
	(1 000 to 2 500) lbf·in	7.2 lbf·in	
	(Up to 100) lbf·ft	0.22 lbf·ft	
	(100 to 250) lbf·ft	1.7 lbf·ft	
(250 to 600) lbf·ft	4.1 lbf·ft		
Torque Transducers ¹	(8 to 83) lbf·ft	0.012 % of reading	Radius Arms w/Class F Weights
	(83 to 250) lbf·ft	0.018 % of reading	
	(250 to 2 000) lbf·ft	0.032 % of reading	

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment		
Rockwell and Superficial Hardness Testers ¹	HRA 82.9	0.97 HRA	ASTM E-18 Indirect Verification using Hardness Test Blocks		
	HRA 84.3	0.54 HRA			
	HRB 91.3	0.54 HRB			
	HRB 92.9	1.5 HRB			
	HRC 25.1	1.5 HRC			
	HRC 45.4	0.60 HRC			
	HRC 47.3	1.4 HRC			
	HRC 64.2	0.43 HRC			
	Weight Carts	3 000 lb		0.17 lb	SOP 33
		5 000 lb		0.31 lb	
	6 000 lb	0.34 lb			
Durometers Shore A, B, C, D Force	(0 to 822) gf (0 to 10) gf	0.25 gf 0.55 gf	Durocalibrator		
Indenter Geometry	(30 to 35) ° 0.098 in	40 arc sec 0.000 12 in	Optical Comparator		

Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Visible Light - Measure	(0 to 2 000) lux	(0.000 68 + 0.05 reading) lux	Digital Radiometer
UV-A Light - Measure	(1 000 to 5 000) μW/cm ²	(0.001 6 + 0.05 reading) μW/cm ²	Digital Radiometer
Gloss Meters 20°, 60°, 85°	(40 to 100) GU	0.65 GU	Standard Gloss Tiles

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Relative Humidity Sensors ¹	(5 to 95) %RH	1.9 %RH	Humidity Chamber w/ Reference Probe Thermohygrometer



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Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature -Infrared Non-Contact Measuring Equipment ¹	35 °C 100 °C 200 °C 350 °C 500 °C	1.2 °C 1.7 °C 2.4 °C 3.7 °C 5 °C	Blackbody Source $\epsilon = 0.95, \lambda = (8 \text{ to } 14) \mu\text{m}$
Temperature - Measure ¹	(-200 to 660) °C (660 to 1 450) °C	0.028 °C 3.5 °C	Dry Well and Indicator with PRT or Type S Thermocouple Thermohygrometer
Temperature - Source ¹	(-70 to 660) °C (660 to 1 200) °C	0.044 °C 4.8 °C	Dry Well and Indicator with PRT or Type S Thermocouple Environmental Chamber
Extrusion Plastometers Temperature ¹	(100 to 400) °C	0.24 °C	Indicator w/ T

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Stopwatches/Timers ¹	Up to 86 400 s	3.5 s / 24 hrs	US National Time Stopwatch NIST SP 960-12
Frequency – Source ¹	(0.01 to 120) Hz (120 to 1200) Hz (1.2 to 12) kHz (12 to 120) kHz (120 to 1200) kHz (1.2 to 2) MHz	0.18 mHz 0.2 mHz 0.059 Hz 0.12 Hz 0.66 Hz 0.058 kHz	Multiproduct Calibrator
Frequency – Measure ¹	(3 to 5) Hz (5 to 10) Hz (10 to 40) Hz (40 to 1000) Hz (1 to 300) kHz 300 kHz to 1 MHz	3.6 mHz 6.9 mHz 16 mHz 19 mHz 0.16 kHz 0.16 kHz	Precision Digital Multimeter
Tachometer ¹ Non - Contact	500 to 40 000 rpm	.08 % of reading	Tachometer



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DIMENSIONAL MEASUREMENT

Dimensional Measurement 2D

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Angle	(0 to 360) °	36 arc sec	CMM

Dimensional Measurement 3D

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Gages / Fixtures	Up to 24 x 12 x 8 in	(250 + 8L) µin	CMM

Services performed at satellite location

7133 Global Drive
Louisville, KY 40258

CALIBRATION

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source ¹	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (100 to 1 000) V	1.6 µV 16 µV 0.13 mV 1.3 mV 3.1 mV	Multiproduct Calibrator
DC Voltage - Measure ¹	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1 000) V	2.4 µV 6.4 µV 0.052 mV 0.67 mV 9.6 mV	Precision Digital Multimeter
DC Current - Source ¹	Up to 330 µA 330 µA to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3) A (3 to 11) A (11 to 20.5) A	0.014 µA 0.19 µA 0.48 µA 4.4 µA 77 µA 0.31 mA 1.5 mA 23 mA	Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current - Source for Clamp on Current Meters ¹	(20 to 200) A (200 to 500) A (500 to 1 000) A	0.41 A 1.1 A 2.1 A	Multiproduct Calibrator w/ 50 turn coil
DC Current - Measure ¹	Up to 100 μ A 100 μ A to 1 mA (1 to 10) mA (10 to 100) mA (100 to 400) mA 400 mA to 1 A (1 to 3) A (3 to 10) A	0.018 μ A 0.67 μ A 1.7 μ A 6.7 μ A 20 μ A 0.27 mA 1.1 mA 3.5 mA	Precision Digital Multimeter
Resistance - Source ¹	Up to 11 Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) k Ω (1.1 to 3.3) k Ω (3.3 to 11) k Ω (11 to 33) k Ω (33 to 110) k Ω (110 to 330) k Ω (0.33 to 1.1) M Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω (110 to 330) M Ω (330 to 1 100) M Ω	0.67 m Ω 1.4 m Ω 1.7 m Ω 3.4 m Ω 9.6 m Ω 38 m Ω 96 m Ω 0.39 Ω 0.99 Ω 3.8 Ω 32 Ω 79 Ω 0.39 k Ω 3.5 k Ω 13 k Ω 0.29 M Ω 3.7 M Ω	Multiproduct Calibrator
Resistance - Measure ¹	Up to 10 Ω (10 to 100) Ω (0.1 to 1) k Ω (1 to 10) k Ω (10 to 100) k Ω (0.1 to 1) M Ω (1 to 10) M Ω (10 to 100) M Ω (0.1 to 1) G Ω	2 m Ω 3.6 m Ω 14 m Ω 0.14 Ω 1.4 Ω 14 Ω 3.3 k Ω 60 k Ω 1.4 M Ω	Precision Digital Multimeter

Electrical – DC/Low Frequency

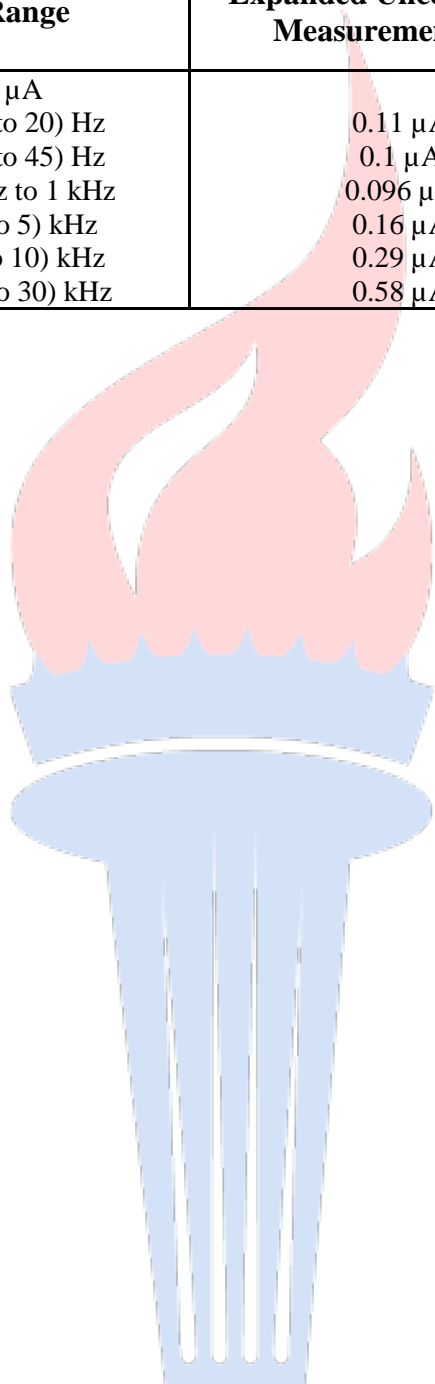
Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Source ¹	(1 to 33) mV		Multiproduct Calibrator
	(10 to 45) Hz	4.7 μ V	
	45 Hz to 10 kHz	4.1 μ V	
	(10 to 20) kHz	4.2 μ V	
	(20 to 50) kHz	4.8 μ V	
	(50 to 100) kHz	10 μ V	
	(100 to 500) kHz	39 μ V	
AC Voltage - Source ¹	(33 to 330) mV		Multiproduct Calibrator
	(10 to 45) Hz	15 μ V	
	45 Hz to 10 kHz	11 μ V	
	(10 to 20) kHz	14 μ V	
	(20 to 50) kHz	15 μ V	
	(50 to 100) kHz	39 μ V	
	(100 to 500) kHz	92 μ V	
	(0.33 to 3.3) V		
	(10 to 45) Hz	0.12 mV	
	45 Hz to 10 kHz	0.086 mV	
	(10 to 20) kHz	0.09 mV	
	(20 to 50) kHz	0.16 mV	
	(50 to 100) kHz	0.28 mV	
	(100 to 500) kHz	0.93 mV	
	(3.3 to 33) V		
	(10 to 45) Hz	1.2 mV	
	45 Hz to 10 kHz	1.2 mV	
	(10 to 20) kHz	1.7 mV	
	(20 to 50) kHz	1.5 mV	
	(50 to 100) kHz	3.1 mV	
	(33 to 330) V		
	45 Hz to 1 kHz	8.7 mV	
	1 kHz to 10 kHz	9.1 mV	
	(10 to 20) kHz	11 mV	
(20 to 50) kHz	12 mV		
(50 to 100) kHz	78 mV		
(330 to 1 020) V			
45 Hz to 1 kHz	73 mV		
(1 to 5) kHz	63 mV		
(5 to 10) kHz	73 mV		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Measure ¹	Up to 100 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	0.027 mV 0.027 mV 0.027 mV 0.033 mV 0.053 mV 0.33 mV	Precision Digital Multimeter
AC Voltage - Measure ¹	100 mV to 1 V (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 (1 to 10) V (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 (10 to 100) V (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 (100 to 1 000) V (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	0.87 mV 0.43 mV 0.24 mV 0.41 mV 0.93 mV 6 mV 8.7 mV 4.3 mV 2.4 mV 4.1 mV 9.3 mV 60 mV 87 mV 43 mV 24 mV 41 mV 93 mV 0.6 V 0.82 V 0.38 V 0.19 V 0.33 V 0.8 V 5.2 V	Precision Digital Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
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	0.11 μ A 0.1 μ A 0.096 μ A 0.16 μ A 0.29 μ A 0.58 μ A	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	(0.33 to 3.3) mA		Multiproduct Calibrator
	(10 to 20) Hz	0.55 μ A	
	(20 to 45) Hz	0.39 μ A	
	45 Hz to 1 kHz	0.4 μ A	
	(1 to 5) kHz	0.61 μ A	
	(5 to 10) kHz	1.4 μ A	
	(10 to 30) kHz	2.6 μ A	
	(3.3 to 33) mA		
	(10 to 20) Hz	5.3 μ A	
	(20 to 45) Hz	3.3 μ A	
	45 Hz to 1 kHz	3.2 μ A	
	(1 to 5) kHz	3.7 μ A	
	(5 to 10) kHz	7 μ A	
	(10 to 30) kHz	12 μ A	
	(33 to 330) mA		
	(10 to 20) Hz	0.055 mA	
	(20 to 45) Hz	0.037 mA	
	45 Hz to 1 kHz	0.03 mA	
	(1 to 5) kHz	0.056 mA	
	(5 to 10) kHz	0.11 mA	
	(10 to 30) kHz	0.22 mA	
	(0.33 to 1.1) A		
	(10 to 45) Hz	0.47 mA	
	45 Hz to 1kHz	0.18 mA	
	(1 to 5) kHz	2 mA	
	(5 to 10) kHz	8.8 mA	
	(1.1 to 3) A		
	(10 to 45) Hz	1.4 mA	
45 Hz to 1kHz	0.6 mA		
(1 to 5) kHz	8 mA		
(5 to 10) kHz	22 mA		
(3 to 11) A			
(45 to 100) Hz	2.7 mA		
100 Hz to 1 kHz	3.4 mA		
(1 to 5) kHz	61 mA		
(11 to 20.5) A			
(45 to 100) Hz	17 mA		
100 Hz to 440 Hz	18 mA		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current - Source for Clamp on Current Meters ¹	(20 to 200) A (45 to 440) Hz	0.44 A	Multiproduct Calibrator w/ 50 turn coil
	(200 to 500) A (45 to 200) Hz	1.2 A	
	(500 to 1 000) A (45 to 200) Hz	2.5 A	
AC Current – Measure ¹	Up to 100 μ A (3 to 5) Hz	0.29 μ A	Precision Digital Multimeter
	(5 to 10) Hz	0.14 μ A	
	10 Hz to 5 kHz	0.041 μ A	
	(5 to 10) kHz	0.47 μ A	
	100 μ A to 1 mA (3 to 5) Hz	6 μ A	
	(5 to 10) Hz	0.74 μ A	
	10 Hz to 5 kHz	0.34 μ A	
	(5 to 10) kHz	1.8 μ A	
	(1 to 10) mA (3 to 5) Hz	0.12 mA	
	(5 to 10) Hz	0.012 mA	
	10 Hz to 5 kHz	0.005 mA	
	(5 to 10) kHz	0.049 mA	
	(10 to 100) mA (3 to 5) Hz	0.81 mA	
	(5 to 10) Hz	0.13 mA	
	10 Hz to 5 kHz	0.23 mA	
	(5 to 10) kHz	0.18 mA	
	(100 to 400) mA (3 to 5) Hz	0.93 mA	
	(5 to 10) Hz	0.49 mA	
	10 Hz to 1 kHz	0.33 mA	
	(1 to 10) kHz	2 mA	
	400 mA to 1 A (3 to 5) Hz	5.3 mA	
(5 to 10) Hz	1.7 mA		
10 Hz to 5 kHz	0.53 mA		
(5 to 10) kHz	5.6 mA		

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	8.5 mA 3.5 mA 2.3 mA 16 mA 26 mA 11 mA 7.3 mA 54 mA	Precision Digital Multimeter
Capacitance – Source ¹ 10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz Up to 50 Hz Up to 20 Hz Up to 6 Hz Up to 2 Hz Up to 0.6 Hz Up to 0.2 Hz	(0.19 to 0.40) nF (0.40 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF (0.33 to 1.1) μF (1.1 to 3.3) μF (3.3 to 11) μF (11 to 33) μF (33 to 110) μF (110 to 330) μF (0.33 to 1.1) mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	0.007 3 nF 0.009 9 nF 0.012 nF 0.06 nF 0.12 nF 0.6 nF 0.69 nF 0.006 1 μF 0.006 9 μF 0.059 μF 0.076 μF 0.60 μF 0.78 μF 0.006 mF 0.012 mF 0.061 mF 0.14 mF 0.38 mF	Multiproduct Calibrator
Capacitance – Measure ¹	Up 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	0.017 nF 0.041 nF 0.4 nF 0.004 μF 0.04 μF 0.4 μF 0.004 1 mF 0.04 mF 1.6 mF	Precision Digital Multimeter



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes ¹			
Amplitude DC Signal	1 mV to 100 V	0.5 mV ± 40 mV	Multiproduct Calibrator
DC Voltage (1 MΩ)	5 mV to 5.5 V	8 mV ± 0.33 mV	
Leveled Sine Wave 50 kHz to 600 mHz	10 ns to 5 s	0.000 12 s ± 0.005 s	
Time Markers	100 ns to 20 ms	12 ms	
20 % Duty Cycle	1.8 mV to 55 V	0.031 V ± 1.65 mV	
Wave Generator (1 MΩ)	10 Hz to 10 kHz	0.56 mHz ± 50 mHz	
Electrical Simulation of Thermocouple Devices ¹	Type B (600 to 800) °C	0.62 °C	Multiproduct Calibrator
	(800 to 1 000) °C	0.34 °C	
	(1 000 to 1 550) °C	0.31 °C	
	(1 550 to 1 820) °C	0.37 °C	
	Type C (0 to 150) °C	0.42 °C	
	(150 to 650) °C	0.38 °C	
	(650 to 1 000) °C	0.31 °C	
	(1 000 to 1 800) °C	0.5 °C	
	(1 800 to 2 316) °C	0.84 °C	
	Type E (-250 to -100) °C	0.51 °C	
	(-100 to -25) °C	0.16 °C	
	(-25 to 350) °C	0.15 °C	
	(350 to 650) °C	0.17 °C	
	(650 to 1 000) °C	0.21 °C	
	Type J (-210 to -100) °C	0.27 °C	
	(-100 to -30) °C	0.17 °C	
	(-30 to 150) °C	0.14 °C	
(150 to 760) °C	0.17 °C		
(760 to 1 200) °C	0.23 °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 Devices ¹	Type K		Multiproduct Calibrator
	(-200 to -100) °C	0.34 °C	
	(-100 to -25) °C	0.18 °C	
	(-25 to 120) °C	0.16 °C	
	(120 to 1 000) °C	0.26 °C	
	(1 000 to 1 372) °C	0.4 °C	
	Type L		
	(-200 to -100) °C	0.38 °C	
	(-100 to 800) °C	0.26 °C	
	(800 to 900) °C	0.17 °C	
	Type N		
	(-200 to -100) °C	0.64 °C	
	(-100 to -25) °C	0.54 °C	
	(-25 to 120) °C	0.19 °C	
	(120 to 410) °C	0.19 °C	
	(410 to 1 300) °C	0.28 °C	
	Type R		
	(0 to 250) °C	0.48 °C	
	(250 to 400) °C	0.37 °C	
	(400 to 1 000) °C	0.37 °C	
	(1 000 to 1 767) °C	0.46 °C	
Type S			
(0 to 250) °C	0.49 °C		
(250 to 1000) °C	0.37 °C		
(1 000 to 1 400) °C	0.37 °C		
(1 400 to 1 767) °C	0.46 °C		
Type T			
(-250 to -150) °C	0.83 °C		
(-150 to 0) °C	0.59 °C		
(0 to 120) °C	0.34 °C		
(120 to 400) °C	0.33 °C		
Type U			
(-200 to 0) °C	0.57 °C		
(0 to 600) °C	0.3 °C		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Devices ¹	Pt 385, 100 Ω		Multiproduct Calibrator
	(-200 to -80) °C	0.034 °C	
	(-80 to 0) °C	0.034 °C	
	(0 to 100) °C	0.047 °C	
	(100 to 300) °C	0.06 °C	
	(300 to 400) °C	0.068 °C	
	(400 to 630) °C	0.08 °C	
	(630 to 800) °C	0.15 °C	
	Pt 3926, 100 Ω		
	(-200 to -80) °C	0.033 °C	
	(-80 to 0) °C	0.036 °C	
	(0 to 100) °C	0.047 °C	
	(100 to 300) °C	0.06 °C	
	(300 to 400) °C	0.067 °C	
	(400 to 630) °C	0.08 °C	
	Pt 3916, 100 Ω		
	(-200 to -190) °C	0.17 °C	
	(-190 to -80) °C	0.027 °C	
	(-80 to 0) °C	0.03 °C	
	(0 to 100) °C	0.04 °C	
	(100 to 260) °C	0.05 °C	
	(260 to 300) °C	0.05 °C	
	(300 to 400) °C	0.06 °C	
	(400 to 600) °C	0.07 °C	
	(600 to 630) °C	0.2 °C	
	Pt 385, 200 Ω		
	(-200 to -80) °C	0.027 °C	
	(-80 to 0) °C	0.027 °C	
(0 to 100) °C	0.027 °C		
(100 to 260) °C	0.034 °C		
(260 to 300) °C	0.08 °C		
(300 to 400) °C	0.088 °C		
(400 to 600) °C	0.094 °C		
(600 to 630) °C	0.11 °C		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Devices ¹	Pt 385, 500 Ω		Multiproduct Calibrator
	(-200 to -80) °C	0.027 °C	
	(-80 to 0) °C	0.034 °C	
	(0 to 100) °C	0.034 °C	
	(100 to 260) °C	0.041 °C	
	(260 to 300) °C	0.054 °C	
	(300 to 400) °C	0.053 °C	
	(400 to 600) °C	0.064 °C	
	(600 to 630) °C	0.073 °C	
	Pt 385, 1000 Ω		
	(-200 to -80) °C	0.02 °C	
	(-80 to 0) °C	0.02 °C	
	(0 to 100) °C	0.027 °C	
	(100 to 260) °C	0.033 °C	
	(260 to 300) °C	0.04 °C	
	(300 to 400) °C	0.047 °C	
(400 to 600) °C	0.047 °C		
(600 to 630) °C	0.15 °C		
PtNi 385, 120 Ω			
(-80 to 0) °C	0.053 °C		
(0 to 100) °C	0.053 °C		
(100 to 260) °C	0.093 °C		
Cu 427, 10 Ω			
(-100 to 260) °C	0.2 °C		
AC Power – Source1 @ (45 to 65) Hz, PF = 1	(33 to 330) mV		Multiproduct Calibrator
	(3.3 to 9) mA	0.002 8 % of output in Watts	
	(9 to 33) mA	0.007 3 % of output in Watts	
	(33 to 90) mA	0.028 % of output in Watts	
	(90 to 330) mA	0.073 % of output in Watts	
	(0.33 to 0.9) A	0.26 % of output in Watts	
	(0.9 to 2.2) A	0.53 % of output in Watts	
	(2.2 to 4.5) A	0.001 3 % of output in Watts	
	(4.5 to 20.5) A	0.005 % of output in Watts	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power – Source1 @ (45 to 65) Hz, PF = 1	33 mV to 1 020 V (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (0.33 to 0.9) A (0.9 to 2.2) A (2.2 to 4.5) A (4.5 to 20.5) A	0.007 3 % of output in Watts 0.018 % of output in Watts 0.073 % of output in Watts 0.18 % of output in Watts 0.67 % of output in Watts 1.4 % of output in Watts 3.7 % of output in Watts 14 % of output in Watts	Multiproduct Calibrator

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Micrometers, ID, OD & Depth ^{1,2}	Up to 6 in (6 to 60) in	(21 + 9.8L) μin (34 + 6L) μin	Gage Blocks Federal Grade 2 / ASME Grade 0
Calipers, ID, OD & Depth ^{1,2}	Up to 6 in (6 to 84) in	(57 + 0.96L) μin (30 + 3.1L) μin	Gage Blocks Federal Grade 2 / ASME Grade 0
Surface Plates ^{1,2} Repeat reading	0.002 in	20 μin	Repeat -O-Meter
Overall Flatness	Up to 161 in diagonal	(10 + 0.007D) μin	Electronic Levels

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Class I & Unclassified Balances ¹ Resolution: 0.01 mg 0.02 mg 0.05 mg 0.1 mg 0.2 mg 0.5 mg	Up to 100 g Up to 100 g Up to 100 g Up to 200 g Up to 200 g Up to 200 g	0.034 mg 0.036 mg 0.045 mg 0.089 mg 0.13 mg 0.3 mg	ASTM Class 1 Weights NIST Handbook 44 and WI-09



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Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Class II & Unclassified Balances ¹ Resolution: 0.001 g 0.002 g 0.005 g 0.01 g 0.02 g 0.05 g 0.1 g 0.2 g 0.5 g 1 g 2 g 5 g	Up to 100 g Up to 200 g Up to 500 g Up to 1 kg Up to 2 kg Up to 5 kg Up to 10 kg Up to 20 kg Up to 50 kg Up to 50 kg Up to 50 kg	0.58 mg 1.2 mg 2.9 mg 5.8 mg 12 mg 29 mg 58 mg 0.12 g 0.29 g 0.58 g 1.2 g 2.9 g	ASTM Class 1 or 2 Weights NIST Handbook 44 and WI-093
Class III & Unclassified Light Capacity Scales ¹ Resolution: 0.000 1 lb 0.000 2 lb 0.000 5 lb 0.001 lb 0.002 lb 0.005 lb 0.01 lb 0.02 lb	Up to 1 lb Up to 2 lb Up to 5 lb Up to 10 lb Up to 20 lb Up to 50 lb Up to 100 lb Up to 200 lb	0.026 g 0.054 g 0.13 g 0.26 g 0.54 g 1.3 g 2.6 g 5.4 g	NIST Class F Weights NIST Handbook 44 and WI-09
Class III & Unclassified Medium Capacity Scales ¹ Resolution: 0.05 lb 0.1 lb 0.2 lb 0.5 lb 1 lb 2 lb 5 lb	Up to 500 lb Up to 1 000 lb Up to 2 000 lb Up to 5 000 lb Up to 10 000 lb Up to 20 000 lb Up to 50 000 lb	0.029 lb 0.058 lb 0.12 lb 0.29 lb 0.58 lb 1.2 lb 2.9 lb	NIST Class F Weights Specific Customer Mass NIST Handbook 44 and WI-09
Class III & Unclassified Heavy Capacity Scales ¹ Resolution: 10 lb 20 lb 50 lb	Up to 50 000 lb Up to 200 000 lb Up to 400 000 lb	5.8 lb 12 lb 29 lb	NIST Class F Weights Specific Customer Mass NIST Handbook 44 and WI-09

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Class IV & Unclassified Scales ¹ Resolution: 10 lb 20 lb 50 lb	Up to 12 000 lb Up to 24 000 lb Up to 60 000 lb	5.8 lb 12 lb 29 lb	NIST Class F Weight Specific Customer Mass NIST Handbook 44 and WI-09s
Mass ³ - Avoirdupois lb Resolution: 0.5 lb 1 lb 2 lb 5 lb 10 lb 20 lb 50 lb	(5 000 to 150 000) lb	0.29 lb 0.58 lb 1.2 lb 2.9 lb 5.8 lb 12 lb 29 lb	Onsite calibration of customer supplied mass using WI-10 modified Single Substitution and Class III, IIL, or Unclassified Scale.
Force ¹	2 to 200 lbf (200 to 10 000) lbf (10 000 to 100 000) lbf	0.04 lbf 0.64 lbf 0.24 lbf	Dead Weights Load Cells
Pressure Gauges ¹	Up to 3 000 psi Up to 10 000 psi	0.93 psi 0.91 psi	Pressure Calibrator with Pressure Module
Pressure / Vacuum ¹	(-15 to 100) psi	0.074 psi	Pressure Calibrator with pressure Module
Torque Tools ¹	(Up to 50) lbf·in (50 to 250) lbf·in (250 to 400) lbf·in (400 to 1 000) lbf·in (1 000 to 2 500) lbf·in (Up to 100) lbf·ft (100 to 250) lbf·ft (250 to 600) lbf·ft	0.07 lbf·in 0.44 lbf·in 1.2 lbf·in 2.9 lbf·in 7.2 lbf·in 0.22 lbf·ft 1.7 lbf·ft 4.1 lbf·ft	Torque Transducers

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Relative Humidity Sensors ¹	(5 to 95) %RH	1.9 %RH	Humidity Chamber w/ Reference Probe Thermohygrometer
Temperature - Measure ¹	(-200 to 660) °C (660 to 1 450) °C	0.028 °C 3.5 °C	Dry Well and Indicator with PRT or Type S Thermocouple Thermohygrometer

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature - Source ¹	(-40 to 660) °C (660 to 1 200) °C	0.044 °C 4.8 °C	Dry Well and Indicator with PRT or Type S Thermocouple

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Source ¹	(0.01 to 120) Hz (120 to 1 200) Hz (1.2 to 12) kHz (12 to 120) kHz (120 to 1 200) kHz (1.2 to 2) MHz	0.18 mHz 0.2 mHz 0.059 Hz 0.12 Hz 0.66 Hz 0.058 kHz	Multiproduct Calibrator
Frequency – Measure ¹	(3 to 5) Hz (5 to 10) Hz (10 to 40) Hz (40 to 1 000) Hz (1 to 300) kHz 300 kHz to 1 MHz	3.6 mHz 6.9 mHz 16 mHz 19 mHz 0.16 kHz 0.16 kHz	Precision Digital 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.
3. The uncertainties for mass calibration onsite using WI-10 do not account for local environmental contributors. These contributors will be included in the reported uncertainties at the time of calibration.
4. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1222.



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