



CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Micro Precision Calibration Pte. Ltd.

Blk 5008 Ang Mo Kio Ave 5

#07-04 TechPlace II, Singapore 569874

has been assessed by ANAB and meets the requirements of international standard

ISO/IEC 17025:2017

and national standards

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

while demonstrating technical competence in the field of

CALIBRATION

Refer to the accompanying Scope of Accreditation for information regarding the types of calibrations to which this accreditation applies.

AC-1969.15
Certificate Number


ANAB Approval

Certificate Valid: 10/24/2018-10/31/2020
Version No. 006 Issued: 10/24/2018



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).



ANSI-ASQ National Accreditation Board

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017,
ANSI/NCSL Z540-1-1994 (R2002) AND ANSI/NCSL Z540.3-2006 (R2013)**

Micro Precision Calibration Pte. Ltd.

Blk 5008 Ang Mo Kio Ave 5, #07-04 TechPlace II

Singapore 569874

Zheng Jian Juan Phone: + 65 91003267

jian.juan@microprecision.com

www.microprecision.com

CALIBRATION

Valid to: **October 31, 2020**

Certificate Number: **AC-1969.15**

Acoustics and Vibration

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Sound ¹ (125 to 2 000) Hz	(74 to 114) dB SPL	0.34 dB	Sound calibrator
4 000 Hz	(74 to 114) dB SPL	0.45 dB	Sound meter
			Electronic counter

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Conductivity Meters ¹	1015.6 µS 1408.8 µS 111.32 mS	3.4 µS 3.9 µS 0.4 mS	Standard Conductivity Solutions
pH Meters ¹	(4, 7, 10) pH units	0.019 pH unit	Standard pH Solutions

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source ¹ Fixed Values	1 V 1.018V 10 V	1.6 µV/V 1.6 µV/V 1.2 µV/V	DC Reference Standard

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 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV	10 $\mu\text{V/V} + 0.5 \mu\text{V}$ 6 $\mu\text{V/V} + 0.8 \mu\text{V}$ 4 $\mu\text{V/V} + 3 \mu\text{V}$ 4 $\mu\text{V/V} + 4.5 \mu\text{V}$ 4 $\mu\text{V/V} + 4 \mu\text{V}$ 5 $\mu\text{V/V} + 5 \mu\text{V}$	Multiproduct Calibrator
DC Voltage - Measure	Up to 100 mV 100 mV to 1 V (1 to 10) V (20 to 100) V 100 V to 1 kV	6.1 $\mu\text{V/V} + 0.3 \mu\text{V}$ 5.0 $\mu\text{V/V} + 0.3 \mu\text{V}$ 5.0 $\mu\text{V/V} + 0.5 \mu\text{V}$ 7.3 $\mu\text{V/V} + 30 \mu\text{V}$ 26 $\mu\text{V/V} + 0.10 \text{ mV}$	Multimeter
	(1 to 10) kV (10 to 20) kV (20 to 70) kV	0.3 mV/V 0.3 mV/V 0.3 mV/V	High Voltage Meter with Probe
DC Current - Source ¹	Up to 220 μA 220 μA to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A	41 $\mu\text{A/A} + 7 \text{ nA}$ 34 $\mu\text{A/A} + 8 \text{ nA}$ 35 $\mu\text{A/A} + 45 \text{ nA}$ 46 $\mu\text{A/A} + 0.8 \mu\text{A}$ 82 $\mu\text{A/A} + 13 \mu\text{A}$	Multiproduct Calibrator
DC High Current - Source ¹	(2.2 to 11) A	0.17 mA/A	Multiproduct Calibrator
	(11 to 20) A (20 to 1 000) A	1.5 mA/A + 1 mA 4.6 mA/A	Multiproduct Calibrator with 50 turn Coil
DC Current ¹ – Measure	Up to 100 nA 100 nA to 1 μA (1 to 10) μA (10 to 100) μA 100 μA to 10 mA (10 to 100) mA 100 mA to 1 A	35 $\mu\text{A/A} + 400 \mu\text{A}$ 25 $\mu\text{A/A} + 40 \mu\text{A}$ 25 $\mu\text{A/A} + 10 \mu\text{A}$ 25 $\mu\text{A/A} + 5 \mu\text{A}$ 25 $\mu\text{A/A} + 5 \mu\text{A}$ 40 $\mu\text{A/A} + 5 \mu\text{A}$ 0.12 mA/A + 10 μA	Multimeter
	(1 to 20) A (20 to 300) A	0.14 mA/A 3.2 mA/A	Fluke Shunt w/ Multimeter
Inductance – Source at 1 kHz	(1 to 10) mH (10 to 100) mH 100 mH to 1 H (1 to 10) H	0.03 mH 0.15 mH 2 mH 11 mH	Decade Inductor
Resistance - Source ¹ Fixed Points	1 Ω 10 k Ω 1 M Ω to 1G Ω	10 $\mu\Omega/\Omega$ 10 $\mu\Omega/\Omega$ 1.5 m Ω/Ω	Standard Resistors

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance - Source ¹ Fixed Points	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	91 $\mu\Omega/\Omega$ 24 $\mu\Omega/\Omega$ 24 $\mu\Omega/\Omega$ 10 $\mu\Omega/\Omega$ 10 $\mu\Omega/\Omega$ 8.5 $\mu\Omega/\Omega$ 8.5 $\mu\Omega/\Omega$ 8.5 $\mu\Omega/\Omega$ 8.5 $\mu\Omega/\Omega$ 10 $\mu\Omega/\Omega$ 10 $\mu\Omega/\Omega$ 18 $\mu\Omega/\Omega$ 18 $\mu\Omega/\Omega$ 37 $\mu\Omega/\Omega$ 46 $\mu\Omega/\Omega$ 0.1 m Ω/Ω	Multiproduct Calibrator
Resistance – Measure ¹	(0 to 100) Ω 100 Ω to 100 k Ω 100 k Ω to 1 M Ω (1 to 10) M Ω (10 to 100) M Ω 100 M Ω to 1 G Ω	14 $\mu\Omega/\Omega$ 12 $\mu\Omega/\Omega$ 18 $\mu\Omega/\Omega$ 55 $\mu\Omega/\Omega$ 0.57 m Ω/Ω + 1.1 k Ω 5.7 m Ω/Ω + 11 k Ω	Multimeter
Electrical Simulation of Thermocouple Indicating Systems ¹	Type E (-250 to -100) $^{\circ}\text{C}$ (-100 to 650) $^{\circ}\text{C}$ (650 $^{\circ}\text{C}$ to 1 000) $^{\circ}\text{C}$ Type J (-210 to -100) $^{\circ}\text{C}$ (-100 to 760) $^{\circ}\text{C}$ (760 to 1 200) $^{\circ}\text{C}$ Type K (-200 to -100) $^{\circ}\text{C}$ (-100 to 120) $^{\circ}\text{C}$ (120 to 1 000) $^{\circ}\text{C}$ (1 000 to 1 372) $^{\circ}\text{C}$ Type S (0 to 250) $^{\circ}\text{C}$ (250 to 1 000) $^{\circ}\text{C}$ (1 000 to 1 400) $^{\circ}\text{C}$ (1 400 to 1 767) $^{\circ}\text{C}$	0.5 $^{\circ}\text{C}$ 0.17 $^{\circ}\text{C}$ 0.21 $^{\circ}\text{C}$ 0.27 $^{\circ}\text{C}$ 0.17 $^{\circ}\text{C}$ 0.23 $^{\circ}\text{C}$ 0.5 $^{\circ}\text{C}$ 0.43 $^{\circ}\text{C}$ 0.46 $^{\circ}\text{C}$ 0.46 $^{\circ}\text{C}$ 0.53 $^{\circ}\text{C}$ 0.41 $^{\circ}\text{C}$ 0.42 $^{\circ}\text{C}$ 0.52 $^{\circ}\text{C}$	Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Systems ¹	Type T		Multiproduct Calibrator
	(-250 to -150) °C	0.71 °C	
	(-150 to 0) °C	0.27 °C	
	(0 to 120) °C	0.18 °C	
	(120 to 400) °C	0.16 °C	
	Type B		
	(600 to 800) °C	0.5 °C	
	(800 to 1 000) °C	0.38 °C	
	(1 000 to 1 550) °C	0.34 °C	
	(1 550 to 1 820) °C	0.37 °C	
	Type N		
	(-200 to -100) °C	0.45 °C	
	(-100 to -25) °C	0.25 °C	
	(-25 to 120) °C	0.22 °C	
	(120 to 410) °C	0.2 °C	
	(410 to 1 300) °C	0.31 °C	
	Type R		
	(0 to 250) °C	0.65 °C	
	(250 to 400) °C	0.40 °C	
	(400 to 1 000) °C	0.37 °C	
	(1 000 to 1 767) °C	0.45 °C	
	Type C		
	(0 to 150) °C	0.34 °C	
	(150 to 650) °C	0.29 °C	
	(650 to 1 000) °C	0.35 °C	
	(1 000 to 1 800) °C	0.57 °C	
	(1 800 to 2 316) °C	0.95 °C	
Electrical Calibration of RTD Indicating Systems ¹	Pt 385, 100 Ω		Multiproduct Calibrator
	(-200 to 0) °C	0.05 °C	
	(0 to 100) °C	0.07 °C	
	(100 to 400) °C	0.1 °C	
	(400 to 630) °C	0.12 °C	
	(630 to 800) °C	0.23 °C	
	Pt 3926, 100 Ω		
	(-200 to 0) °C	0.05 °C	
	(0 to 100) °C	0.07 °C	
	(100 to 400) °C	0.1 °C	
	(400 to 600) °C	0.12 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Calibration of RTD Indicating Systems ¹	Pt 3916, 100 Ω		Multiproduct Calibrator
	(-200 to 190) $^{\circ}\text{C}$	0.25 $^{\circ}\text{C}$	
	(-190 to 0) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(0 to 300) $^{\circ}\text{C}$	0.08 $^{\circ}\text{C}$	
	(300 to 600) $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	
	(600 to 630) $^{\circ}\text{C}$	0.23 $^{\circ}\text{C}$	
	Pt 385, 200 Ω		
	(-200 to 100) $^{\circ}\text{C}$	0.04 $^{\circ}\text{C}$	
	(100 to 260) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(260 to 600) $^{\circ}\text{C}$	0.14 $^{\circ}\text{C}$	
	(600 to 630) $^{\circ}\text{C}$	0.16 $^{\circ}\text{C}$	
	Pt 385, 500 Ω		
	(-200 to 100) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(100 to 260) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(260 to 600) $^{\circ}\text{C}$	0.09 $^{\circ}\text{C}$	
	(600 to 630) $^{\circ}\text{C}$	0.11 $^{\circ}\text{C}$	
	Pt 385, 1k Ω		
	(-200 to 100) $^{\circ}\text{C}$	0.03 $^{\circ}\text{C}$	
	(100 to 260) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(260 to 600) $^{\circ}\text{C}$	0.07 $^{\circ}\text{C}$	
	(600 to 630) $^{\circ}\text{C}$	0.23 $^{\circ}\text{C}$	
	PtNi 385, 100 Ω		
	(-80 to 100) $^{\circ}\text{C}$	0.08 $^{\circ}\text{C}$	
	(100 to 260) $^{\circ}\text{C}$	0.14 $^{\circ}\text{C}$	
	Cu 427, 10 Ω		
	(-100 to 260) $^{\circ}\text{C}$	0.3 $^{\circ}\text{C}$	
AC Voltage – Source ¹	200 μV to 2.2 mV		Multiproduct Calibrator
	(10 to 20) Hz	0.55 mV/V + 4.5 μV	
	(20 to 40) Hz	0.21 mV/V + 4.5 μV	
	40 Hz to 20 kHz	0.11 mV/V + 4.5 μV	
	(20 to 50) kHz	0.37 mV/V + 4.5 μV	
	(50 to 100) kHz	0.85 mV/V + 7 μV	
	(100 to 300) kHz	1.1 mV/V + 13 μV	
	(300 to 500) kHz	1.7 mV/V + 25 μV	
	500 kHz to 1 MHz	3.4 mV/V + 25 μV	

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) mV		Multiproduct Calibrator
	(10 to 20) Hz	0.55 mV/V + 5 μ V	
	(20 to 40) Hz	0.21 mV/V + 5 μ V	
	40 Hz to 20 kHz	0.11 mV/V + 5 μ V	
	(20 to 50) kHz	0.37 mV/V + 5 μ V	
	(50 to 100) kHz	0.85 mV/V + 7 μ V	
	(100 to 300) kHz	1.1 mV/V + 12 μ V	
	(300 to 500) kHz	1.7 mV/V + 25 μ V	
	500 kHz to 1 MHz	3.4 mV/V + 25 μ V	
	(22 to 220) mV		
	(10 to 20) Hz	0.55 mV/V + 13 μ V	
	(20 to 40) Hz	0.21 mV/V + 8 μ V	
	40 Hz to 20 kHz	0.11 mV/V + 8 μ V	
	(20 to 50) kHz	0.32 mV/V + 8 μ V	
	(50 to 100) kHz	0.85 mV/V + 25 μ V	
	(100 to 300) kHz	1.1 mV/V + 25 μ V	
	(300 to 500) kHz	1.7 mV/V + 35 μ V	
	500 kHz to 1 MHz	3.4 mV/V + 80 μ V	
	220 mV to 2.2 V		
	(10 to 20) Hz	0.5 mV/V + 80 μ V	
	(20 to 40) Hz	0.16 mV/V + 25 μ V	
	40 Hz to 20 kHz	0.16 mV/V + 6 μ V	
	(20 to 50) kHz	0.12 mV/V + 16 μ V	
	(50 to 100) kHz	0.25 mV/V + 70 μ V	
	(100 to 300) kHz	0.43 mV/V + 130 μ V	
	(300 to 500) kHz	1.1 mV/V + 350 μ V	
	500 kHz to 1 MHz	2.2 mV/V + 850 μ V	
	(2.2 to 220) V		
	(10 to 20) Hz	0.5 mV/V + 8 mV	
	(20 to 40) Hz	0.16 mV/V + 2.5 mV	
	40 Hz to 20 kHz	0.16 mV/V + 0.8 mV	
	(20 to 50) kHz	0.22 mV/V + 3.5 mV	
	(50 to 100) kHz	0.5 mV/V + 8 mV	
	(100 to 300) kHz	1.5 mV/V + 90 mV	
	(300 to 500) kHz	4.7 mV/V + 90 mV	
	500 kHz to 1 MHz	12 mV/V + 190 mV	
	(220 to 1 100) V		
	(15 to 50) Hz	0.4 mV/V + 16 mV	
	50 Hz to 1 kHz	0.5 mV/V + 4 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	Up to 10 mV		Multimeter in Synchronous sub-sampled mode
	(1 to 40) Hz	0.3 mV/V + 3 μ V	
	40 Hz to 1 kHz	0.3 mV/V + 1 μ V	
	(1 to 20) kHz	0.3 mV/V + 1 μ V	
	(20 to 50) kHz	0.8 mV/V + 1 μ V	
	(50 to 100) kHz	4.1 mV/V + 1 μ V	
	(100 to 300) kHz	33 mV/V + 2 μ V	
	(10 to 100) mV		
	(1 to 40) Hz	0.07 mV/V + 40 μ V	
	40 Hz to 1 kHz	0.07 mV/V + 20 μ V	
	(1 to 20) kHz	0.12 mV/V + 20 μ V	
	(20 to 50) kHz	0.25 mV/V + 20 μ V	
	(50 to 100) kHz	0.67 mV/V + 20 μ V	
	(100 to 300) kHz	26 mV/V + 100 μ V	
	300 kHz to 1 MHz	8.4 mV/V + 100 μ V	
	(1 to 2) MHz	13 mV/V + 100 μ V	
	100 mV to 1 V		
	(1 to 40) Hz	0.07 mV/V + 400 μ V	
	40 Hz to 1 kHz	0.07 mV/V + 200 μ V	
	(1 to 20) kHz	0.12 mV/V + 200 μ V	
	(20 to 50) kHz	0.26 mV/V + 200 μ V	
	(50 to 100) kHz	0.67 mV/V + 200 μ V	
	(100 to 300) kHz	2.5 mV/V + 1 mV	
	300 kHz to 1 MHz	8.4 mV/V + 1 mV	
	(1 to 2) MHz	13 mV/V + 1 mV	
	(1 to 10) V		
	(1 to 40) Hz	0.07 mV/V + 4 mV	
	40 Hz to 1 kHz	0.07 mV/V + 2 mV	
	(1 to 20) kHz	0.12 mV/V + 2 mV	
	(10 to 100) V		
	(20 to 50) kHz	0.26 mV/V + 2mV	
	(50 to 100) kHz	0.68 mV/V + 2mV	
	(100 to 300) kHz	2.6 mV/V + 10 mV	
	300 kHz to 1 MHz	8.4 mV/V + 10 mV	
	(1 to 2) MHz	13 mV/V + 10 mV	



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	(100 to 700) V 1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.4 mV/V + 40 mV 0.4 mV/V + 20 mV 0.6 mV/V + 20 mV 1.3 mV/V + 20 mV 3.1 mV/V + 20 mV	Multimeter in Synchronous sub-sampled mode
AC Voltage – Measure ¹	(1 to 10) kV (50 to 100) Hz (10 to 20) kV (50 to 60) Hz (20 to 35) kV (rms) (50 to 60) Hz	1.5 mV/V + 0.6 V 1.4 mV/V + 0.6 V 1.4 mV/V + 0.6 V	High Voltage Meter with Probe
AC Current – Source ¹	(9 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 220 μ A 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 220 mA to 2.2 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.71 mA/A + 25 nA 0.36 mA/A + 20 nA 0.15 mA/A + 16 nA 0.65 mA/A + 40 nA 1.7 mA/A + 80 nA 0.71 mA/A + 40 nA 0.36 mA/A + 35 nA 0.15 mA/A + 35 nA 0.65 mA/A + 0.4 μ A 1.7 mA/A + 0.8 μ A 0.71 mA/A + 0.4 μ A 0.36 mA/A + 0.35 μ A 0.15 mA/A + 0.35 μ A 0.65 mA/A + 4 μ A 1.7 mA/A + 8 μ A 0.71 mA/A + 4 μ A 0.36 mA/A + 3.5 μ A 0.15 mA/A + 3.5 μ A 0.65 mA/A + 40 μ A 1.7 mA/A + 80 μ A 0.7 mA/A + 35 μ A 0.76 mA/A + 80 μ A 8.6 mA/A + 0.16 mA	Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source ¹	(2.2 to 20.5) A 50 Hz to 1 kHz (1 to 5) kHz	0.51 mA/A + 1 mA 0.5 mA/A + 5.8 mA	Transconductance Amplifier
	(20 to 1 000) A (45 to 440) Hz	5.9 mA/A + 40 mA	Multiproduct Calibrator with 50 Turn Coil
AC Current – Measure ¹	(5 to 100) μ A		Multimeter in Synchronous sub-sampled mode
	(10 to 20) Hz	4.6 mA/A + 0.03 μ A	
	(20 to 45) Hz	1.7 mA/A + 0.03 μ A	
	(45 to 100) Hz	0.7 mA/A + 0.03 μ A	
	100 Hz to 1 kHz	0.7 mA/A + 0.03 μ A	
	100 μ A to 1 mA		
	(10 to 20) Hz	5.0 mA/A + 0.2 μ A	
	(20 to 45) Hz	1.7 mA/A + 0.2 μ A	
	(45 to 100) Hz	0.7 mA/A + 0.2 μ A	
	100 Hz to 5 kHz	0.4 mA/A + 0.2 μ A	
	(1 to 10) mA		
	10 to 20) Hz	4.6 mA/A + 2 μ A	
	(20 to 45) Hz	1.7 mA/A + 2 μ A	
	(45 to 100) Hz	0.7 mA/A + 2 μ A	
	100 Hz to 5 kHz	0.4 mA/A + 2 μ A	
	(10 to 100) mA		
	(10 to 20) Hz	4.6 mA/A + 20 μ A	
	(20 to 45) Hz	1.7 mA/A + 20 μ A	
	(45 to 100) Hz	0.7 mA/A + 20 μ A	
	100 Hz to 5 kHz	0.4 mA/A + 20 μ A	
	100 mA to 1 A		
	(10 to 20) Hz	4.6 mA/A + 200 μ A	
	(20 to 45) Hz	1.8 mA/A + 200 μ A	
	(45 to 100) Hz	0.9 mA/A + 200 μ A	
	100 Hz to 5 kHz	1.2 mA/A + 200 μ A	
AC Current – Measure ¹	(0.001 to 5) A 10 Hz to 50 kHz	0.3 mA/A	Current Shunt
	(5 to 20) A 10 Hz to 50 kHz	0.4 mA/A	



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Resistance ¹ – Generate 100 Hz to 100 kHz	0 Ω 0.1 Ω 1.0 Ω 10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω	0.13 m Ω 0.022 m Ω 0.05 m Ω 0.49 m Ω 15 m Ω 0.1 Ω 1.5 Ω 4.7 Ω	RL Standard
Capacitance ¹ - Source at 1kHz	(330 to 500) pF 500 pF to 1.1 nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) μ F (33 to 110) μ F (110 to 330) μ F 330 μ F to 1.1 mF (1.1 to 3.3) mF	33 mF/F 14 mF/F 7.3 mF/F 5.1 mF/F 5.4 mF/F 3.2 mF/F 3.2 mF/F 2.9 mF/F 3.7 mF/F	Multiproduct Calibrator
Capacitance ¹ - Source Fixed Values	(1, 10, 100, 1 000) pF (1 to 5) MHz (5 to 13) MHz	1.1 mF/F 3 mF/F	Capacitance Set
Oscilloscope ¹ – Rise/Fall Time (10 to 90) %	7 ps to 3.5s	1.6 ps	Calibration Head
Oscilloscope ¹ Sq Wave 50 Ω or 1 M Ω Load impedance – <10 kHz Horizontal Deflection (Time)	40 μ V to 1 mV (pp) 1 mV to 5 V (pp) 180.10 ps to 55.00 s	2.5 % of reading 0.13 % of reading 0.4 parts in 10 ⁶ s	Oscilloscope Calibrator
Oscilloscope ¹ Vertical Deflection (Amplitude)	$\pm$ 1 mV to 200 V	0.05 % of reading	Oscilloscope Calibrator Multimeter
Oscilloscope ¹ Bandwidth	100 mHz to 300 MHz (300 to 500) MHz	2.4 % of reading 3 % of reading	Oscilloscope Calibrator
	550 MHz to 3 GHz (3 to 26.5) GHz (26.5 to 50) GHz	4.1 % of reading 5.8 % of reading 7 % of reading	Calibration Head, Power Sensors

Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pulse – Measure ¹	33 MHz to 3.0 GHz	1.4 % of reading + 5 ps	Oscilloscope
RF Power Sensors – Calibration Factors	Referenced at 1 mW 100 kHz to 100 MHz 100 MHz to 5 GHz (5 to 10) GHz (10 to 18) GHz (18 to 26.5) GHz (26.5 to 40) GHz (40 to 50) GHz	0.14 % of reading 0.97 % of reading 1.3 % of reading 1.4 % of reading 2.1 % of reading 2.3 % of reading 4.1 % of reading	Coaxial Thermistor, Power Sensors
Tuned RF Power, Relative ¹ – Measure 2.5 MHz to 26.5 GHz	(0.0 to -3) dB (-3 to -10) dB (-10 to -40) dB (-40 to -50) dB (-50 to -80) dB (-80 to -90) dB (-90 to -110) dB (-110 to -127) dB	0.06 dB 0.08 dB 0.11 dB 0.14 dB 0.2 dB 0.31 dB 0.34 dB 0.4 dB	Measuring Receiver, Power Sensors
RF Power – Absolute ¹ Measure 100 kHz to 50 GHz	(-70 to -30) dBm (-30 to -20) dBm (-20 to 0) dBm (0 to 20) dBm	0.64 dB 0.06 dB 0.068 dB 1.2 % of reading	Power Meter, Measuring Receiver, Power Sensors
RF Power - Source ¹	(-127 to 13) dBm 10 kHz to 20 MHz	1.2 dB	Signal Generator
	(-110 to 10) dBm 20 MHz to 2 GHz	1.2 dB	Signal Generator
	(2 to 20) GHz	1.3 dB	
	(20 to 40) GHz (40 to 50) GHz	1.9 dB 2.8 dB	
Amplitude Modulation – Source 10 kHz to 13.5 MHz	Rate: 50 Hz to 100 kHz Depths: 5 % to 95 %	0.6 % of reading	AM/FM Test Source
10 kHz to 13.5 MHz	Rate: 50 Hz to 100 kHz Depths: 95 % to 99 %	0.6 % of reading	



Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Amplitude Modulation ¹ – Measure 50 Hz to 10 kHz 20 Hz to 10 kHz 50 Hz to 10 kHz 20 Hz to 10 kHz	Rate: 150 kHz to 10 MHz Depth: (5 to 99) % Rate: 10 MHz to 1.3 GHz Depth: (5 to 99) %	2.5 % of reading 3.6 % of reading 1.6 % of reading 3.6 % of reading	Measuring Receiver
Amplitude Modulation ¹ – Measure 50 Hz to 50 kHz 20 Hz to 100 kHz	Depth: (5 to 99) % 1.3 GHz to 26.5 GHz	3.6 % of reading 3.2 % of reading	Measuring Receiver with Power Sensor
Frequency Modulation – Source Rate: 20 Hz to 200 kHz Dev.: ≤ 400 kHz peak	10 kHz to 432 MHz	0.6 % of reading	AM/FM Test Source
Harmonic Measurements ¹	30 Hz to 50 GHz	1.5 dB	Spectrum Analyzer
Phase Modulation ¹ – Rate: 10 MHz to 1.3 GHz	200 Hz to 20 kHz	3.6 % of reading	Measuring Receiver
Phase Modulation ¹ – Rate: (1.3 to 26.5) GHz	200 Hz to 20 kHz	4.7 % of reading	Measuring Receiver with Power Sensor
Distortion ¹ – Measure (0 to 99.9) dB: 20 Hz to 20 kHz (20 to 100) kHz	(50 to 500) kHz (50 to 500) kHz	1.3 dB 2.4 dB	Audio Analyzer

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 24) in (24 to 48) in	(300 + 2.4L) μin (360 + 2.4L) μin (450 + 2.4L) μin (510 + 2.4L) μin	Gage Blocks
Height Gages ^{1,2}	(0.10 to 48) in	(48 μin + 10L) μin	
Gage Blocks	(0.5 to 10) mm (>10 to 50) mm (>50 to 100) mm	0.12 μm 0.13 μm 0.14 μm	Gage Blocks, Measuring machine (Mechanical comparison)



Length – Dimensional metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Cylindrical Plug and Pin Gages	Up to 12 in	26 μ in	Measuring Machine
Pin Gages, Diameter ²	(0.02 to 2.00) in	(12 + 3.2L) μ in	Measuring Machine
Indicators ¹ Resolution: 20 μ in 50 μ in 100 μ in	(0.1 to 4) in	14 μ in 30 μ in 74 μ in	Gage Blocks
Micrometers ² - 100 μ in resolution 50 μ in resolution	(0.1 to 48) in	(66 + 10L) μ in (32 + 10L) μ in	Gage Blocks
Rules and Tape Measures ²	Up to 72 in (12 to 72) in	(17+2L) μ in (5 800 + 0.05L) μ in	Gage Blocks
Length Standards ²	Up to 12 in	(120+2.5L) μ in	Measuring machine
Optical Comparators and Vision Systems ^{1,2} X Axis Y Axis Z Axis	Up to 300 mm Up to 300 mm Up to 300 mm	(3 + 0.002L) μ m (3 + 0.002L) μ m (3 + 0.002L) μ m	Glass Scales, gage blocks, precision square, dial test indicator

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure ¹	(-15 to 100) psi (0 to 5) psi (0 to 1 000) psi 0 up to 10 000 psi	0.06 psi 0.007 psi 0.53 psi 8.5 psi	Pressure Modules
Scales & Balances ¹	(1 to 200) mg (0 to 200) gm (Up to 1) kg (Up to 5) kg (Up to 30) kg	0.001 mg 0.07 mg 0.8 mg 2.0 mg 4.0 mg	Verification w/ Class E1, E2 and F1 weights
Scales & Balances ¹	Up to 100 kg Up to 1 000 lb	19 mg 0.32 lb	Verification with class F weights

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Mass Fixed Points	(1 to 20) mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 10 kg	0.003 7 mg 0.004 9 mg 0.006 1 mg 0.007 4 mg 0.01 mg 0.014 mg 0.02 mg 0.023 mg 0.033 mg 0.039 mg 0.05 mg 0.06 mg 0.13 mg 0.32 mg 0.8 mg 1.4 mg 4.3 mg 9 mg	Class E1 & E2 and Balance
Air Velocity ²	(0.01 to 80.0) mph	2.3 % of reading + R	Wind Tunnel
Torque Testers ¹	(15 to 200) ozf·in (4 to 150) lbf·in (2.5 to 250) lbf·ft	0.12 % of reading 0.12 % of reading 0.12 % of reading	Torque Wheel, Torque Standard, Calibration Arms, Weights
Torque ¹	(2 to 40) N·m (30 to 1 500) N·m	0.55 % of reading 0.72 % of reading	Torque System

Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Optical Power ¹ – Measure (800 to 1 000) nm (1 000 to 1 310) nm (1 310 to 1 700) nm	(-90 to 10) dB (-110 to 10) dB (-110 to 10) dB	2.9 % of reading + 0.01 dB 2.9 % of reading + 0.01 dB 2.9 % of reading + 0.01 dB	Optical Test System
Optical Power ¹ – Measure	(0.01 to 10) W	2 % of reading	Power Sensors



Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Optical Wavelength ¹ – Measure	(700 to 1 650) nm	0.007 nm	Wavelength Meter
Fiber Optic Wavelength – Source ¹	(1 510 to 1 540) nm	1.5 parts in 10 ⁶ m	NIST SRM 2519, 2517
Illuminance	(0 to 500) fc	1.8 % of reading	Comparison to Standard Light Meter

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Relative Humidity ¹	(11 to 95) %RH	1.7 %RH	Indicator, Probe w/ Humidity Generator
Infrared Thermometers	(30 to 300) °C	1.9 °C	Black Body Calibrator $\epsilon = 0.95$, $\lambda = (8 \text{ to } 14) \mu\text{m}$
Temperature ¹	(-40 to 400) °C	0.07 °C	Thermometer, PRT

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency ¹ - Source	0.01 Hz to 10 MHz	5.7×10^{-11} Hz/Hz	GPS Receiver, Signal Generator
	10 MHz to 50.0 GHz	1.1×10^{-11} Hz/Hz	GPS Receiver Signal Generator
Frequency ¹ – Measure	0.1 Hz to 3 GHz	2.3×10^{-11} Hz/Hz	GPS Receiver, Counter
	500 MHz to 26.5 GHz	1.4×10^{-11} Hz/Hz	GPS Receiver Counter
Frequency – Measure Fixed Point	10 MHz	6×10^{-12} Hz/Hz	GPS Receiver
Time Interval ¹ – Measure	25 ps to 1 s	1.2 % + 5 ps	Oscilloscope

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Photo Tachometer	(0 to 100 000) rpm	0.001 6 rpm + 0.000 17 %	Generator with Lamp

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, R = resolution of unit under test.
3. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1969.15.



Vice President