



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Royal Air Force Calibration Center

**Ministry of Defense, Headquarters
P.O. Box 722, Postal Code 111, Oman**

Fulfills the requirements of

ISO/IEC 17025:2017

and national standards

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

In the field of

CALIBRATION

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

Jason Stine, Vice President

Expiry Date: 24 March 2026

Certificate Number: AC-2861



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory
quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

AND

ANSI/NCSL Z540-1-1994 (R2002)

ANSI/NCSL Z540.3-2006 (R2013)

Royal Air Force Calibration Center

Ministry of Defense, Headquarters

P.O. Box 722, Postal Code 111, Oman

Lt. Col. Ishaq Rashid Said Al Shammakhi (968) 24 324 200

CALIBRATION

Valid to: **March 24, 2026**

Certificate Number: **AC-2861**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source ¹	(0 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	9.1 μ V/V + 0.5 μ V 5.7 μ V/V + 0.8 μ V 7.1 μ V/V + 2.6 μ V 6 μ V/V + 4.1 μ V 7 μ V/V + 41 μ V 8.2 μ V/V + 405 μ V	Multiproduct Calibrator
DC Voltage – Source ¹ Fixed Values	1.018V 10 V	1.6 μ V/V 1.2 μ V/V	DC Voltage Standard
DC Voltage – Measure ¹	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V 100 V to 1 kV	12 μ V/V + 0.3 μ V 12 μ V/V + 0.3 μ V 12 μ V/V + 0.5 μ V 12 μ V/V + 30 μ V 12 μ V/V + 0.1 mV	Multimeter
DC Current – Source ¹	(0 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	65 μ A/A + 6 nA 60 μ A/A + 7 nA 75 μ A/A + 40 nA 125 μ A/A + 0.7 μ A 150 μ A/A + 12 μ A 425 μ A/A + 480 μ A 1 200 μ A/A + 750 μ A	Multiproduct Calibrator
DC High Current – Source ¹	(20 to 60) A (60 to 100) A	0.1 % of reading 0.1 % of reading	Calibrator & Amplifier

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC High Current – Source ¹ Toroidal-type Clamps	(10 to 16.5) A (16.5 to 150) A (150 to 1 025) A	0.45 % of reading + 0.004 A 0.4 % of reading + 0.02 A 0.4 % of reading + 0.06 A	Calibrator & Coil
DC High Current – Source ¹ Other types of Clamps	(10 to 16.5) A (16.5 to 150) A (150 to 1 025) A	0.65 % of reading + 0.03 A 0.65 % of reading + 0.15 A 0.65 % of reading + 0.6 A	Calibrator & Coil
DC Current – Measure ¹	(0.1 to 100) nA (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	45 μ A/A + 0.04 nA 30 μ A/A + 0.4 nA 30 μ A/A + 4 nA 30 μ A/A + 0.04 μ A 30 μ A/A + 0.4 μ A 30 μ A/A + 4 μ A 50 μ A/A + 0.04 mA 0.14 mA/A + 0.4 mA	Multimeter
DC Current – Measure ¹	(1 to 20) A (20 to 100) A	40 μ A/A 48 μ A/A	Multimeter & Shunt
Inductance – Source ¹ 1 kHz	100 mH	0.5 mH/H	Standard Inductors
Resistance – Source ¹ Fixed Points	0 Ω 1.0 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	70 $\mu\Omega$ 130 $\mu\Omega/\Omega$ 120 $\mu\Omega/\Omega$ 35 $\mu\Omega/\Omega$ 50 $\mu\Omega/\Omega$ 20 $\mu\Omega/\Omega$ 20 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 20 $\mu\Omega/\Omega$ 30 $\mu\Omega/\Omega$ 30 $\mu\Omega/\Omega$ 115 $\mu\Omega/\Omega$ 85 $\mu\Omega/\Omega$ 625 $\mu\Omega/\Omega$ 600 $\mu\Omega/\Omega$	Calibrator & Amplifier

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Measure ¹	(0 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 20 GΩ	25 μΩ/Ω + 0.1 mΩ 25 μΩ/Ω + 1 mΩ 20 μΩ/Ω + 1 mΩ 20 μΩ/Ω + 10 mΩ 50 μΩ/Ω + 100 mΩ 25 μΩ/Ω + 4 Ω 100 μΩ/Ω + 0.1 kΩ 3 mΩ/Ω + 1 kΩ 12 mΩ/ Ω + 10 kΩ	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 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz DC to 50 Hz DC to 20 Hz DC to 6 Hz DC to 2 Hz DC to 0.6 Hz DC to 0.2 Hz	(0.35 to 0.4) nF (0.4 to 1.1) nF (1.1 nF 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	6 mF/F + 0.01 nF 6 mF/F + 0.01 nF 6 mF/F + 0.01 nF 3 mF/F + 0.01 nF 3 mF/F + 0.1 nF 3 mF/F + 0.1 nF 3 mF/F + 0.3 nF 3 mF/F + 1 nF 3 mF/F + 3 nF 3 mF/F + 10 nF 5 mF/F + 30 nF 5.5 mF/F + 100 nF 5.5 mF/F + 300 μF 5.5 mF/F + 1 μF 5.5 mF/F + 3 μF 5.5 mF/F + 10 μF 9 mF/F + 30 μF 13 mF/F + 100 μF	Multifunction Calibrator
Phase – Measure ¹	(0 to 360)° (10 to 60) mV 10 Hz to 10 kHz (10 to 40) kHz (40 to 100) kHz (60 to 250) mV 10 Hz to 40 kHz (40 to 100) kHz (0.25 to 10) V 10 Hz to 40 kHz (40 to 100) kHz	 0.25° 0.5° 0.8° 0.1° 0.4° 0.1° 0.4°	Phase Meter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Phase – Measure ¹	(0 to 360)° (10 to 20) V 10 Hz to 40 kHz (40 to 100) kHz (10 to 75) V 10 Hz to 40 kHz (40 to 100) kHz	0.1° 0.4° 0.1° 0.4°	Phase Meter
Phase – Source ^{1,2}	(3.2 V) Voltage Ratio = 1 (1 to 6.25) kHz (6.25 to 50) kHz (50 to 100) kHz 7 V to 70 V Ratio (1 to 6.25) kHz (6.25 to 50) kHz (50 to 100) kHz 1 V to 100 V Ratio 1 kHz to 6.25 kHz 6.25 kHz to 50 kHz 50 kHz to 100 kHz 100 V to 1 V Ratio 1 kHz to 6.25 kHz 6.25 kHz to 50 kHz 50 kHz to 100 kHz 70 V to 7 V Ratio 1 kHz to 6.25 kHz 6.25 kHz to 50 kHz 50 kHz to 100 kHz	(12 + 0.1 R) m° (30 + 0.25 R) m° (60 + 0.5 R) m° (12 + 0.1 R) m° (30 + 0.25 R) m° (60 + 0.5 R) m° (12 + 0.1 R) m° (30 + 0.25 R) m° (60 + 0.5 R) m° (12 + 0.1 R) m° (30 + 0.25 R) m° (60 + 0.5 R) m°	Phase Standard
Electrical Calibration of Thermocouple Indicators 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	0.5 °C 0.4 °C 0.4 °C 0.4 °C 0.35 °C 0.35 °C 0.4 °C 0.6 °C 1 °C	Multi-function Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Calibration of Thermocouple Indicators ¹	Type E		Multi-function Calibrator
	(-250 to -100) °C	0.6 °C	
	(-100 to -25) °C	0.2 °C	
	(-25 to 350) °C	0.2 °C	
	(350 to 650) °C	0.2 °C	
	(650 to 1 000) °C	0.3 °C	
	Type J		
	(-210 to -100) °C	0.4 °C	
	(-100 to -30) °C	0.2 °C	
	(-30 to 150) °C	0.2 °C	
	(150 to 760) °C	0.2 °C	
	(760 to 1 200) °C	0.3 °C	
	Type K		
	(-200 to -100) °C	0.4 °C	
	(-100 to -25) °C	0.3 °C	
	(-25 to 120) °C	0.2 °C	
	(120 to 1 000) °C	0.3 °C	
	(1 000 to 1 372) °C	0.5 °C	
	Type L		
	(-200 to -100) °C	0.5 °C	
	(-100 to 800) °C	0.3 °C	
	(800 to 900) °C	0.2 °C	
	Type N		
	(-200 to -100) °C	0.5 °C	
	(-100 to -25) °C	0.3 °C	
	(-25 to 120) °C	0.3 °C	
	(120 to 410) °C	0.3 °C	
	(410 to 1 300) °C	0.4 °C	
	Type R		
	(0 to 250) °C	0.7 °C	
	(250 to 400) °C	0.4 °C	
	(400 to 1 000) °C	0.4 °C	
	(1 000 to 1767) °C	0.5 °C	
	Type S		
	(0 to 250) °C	0.6 °C	
	(250 to 1 000) °C	0.5 °C	
	(1 000 to 1 400) °C	0.5 °C	
	(1 400 to 1 767) °C	0.6 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Calibration of Thermocouple Indicators ¹	Type T (-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C Type U (-200 to 0) °C (0 to 600) °C	0.8 °C 0.3 °C 0.2 °C 0.2 °C 0.7 °C 0.4 °C	Multi-function Calibrator
Electrical Calibration of RTD Indicators ¹	Pt 385, 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 (630 to 800) °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 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	0.11 °C 0.11 °C 0.12 °C 0.2 °C 0.2 °C 0.25 °C 0.4 °C 0.1 °C 0.1 °C 0.1 °C 0.2 °C 0.2 °C 0.2 °C 0.4 °C 0.1 °C 0.1 °C 0.1 °C 0.15 °C 0.15 °C 0.15 °C 0.15 °C 0.35 °C	Multi-function Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Calibration of RTD Indicators ¹	Pt 385, 200 Ω		Multi-function Calibrator
	(-200 to -80) °C	0.1 °C	
	(-80 to 0) °C	0.1 °C	
	(0 to 100) °C	0.1 °C	
	(100 to 260) °C	0.1 °C	
	(260 to 300) °C	0.2 °C	
	(300 to 400) °C	0.2 °C	
	(400 to 600) °C	0.25 °C	
	(600 to 630) °C	0.25 °C	
	Pt 385, 500 Ω		
	(-200 to -80) °C	0.1 °C	
	(-80 to 0) °C	0.1 °C	
	(0 to 100) °C	0.1 °C	
	(100 to 260) °C	0.1 °C	
	(260 to 300) °C	0.15 °C	
	(300 to 400) °C	0.15 °C	
	(400 to 600) °C	0.15 °C	
	(600 to 630) °C	0.2 °C	
	Pt 385, 1 k Ω		
	(-200 to -80) °C	0.11 °C	
	(-80 to 0) °C	0.11 °C	
	(0 to 100) °C	0.11 °C	
	(100 to 260) °C	0.11 °C	
	(260 to 300) °C	0.11 °C	
	(300 to 400) °C	0.11 °C	
	(400 to 600) °C	0.11 °C	
	(600 to 630) °C	0.35 °C	
	PtNi 385, 100 Ω		
	(-80 to 0) °C	0.15 °C	
	(0 to 100) °C	0.15 °C	
	(100 to 260) °C	0.25 °C	
	Cu 427, 10 Ω		
	(-100 to 260) °C	0.5 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source ¹	220 μ V to 2.2 mV		Multiproduct Calibrator
	(10 to 20) Hz	1.5 mV/V + 5 μ V	
	(20 to 40) Hz	1.1 mV/V + 5 μ V	
	40 Hz to 20 kHz	1.1 mV/V + 5 μ V	
	(20 to 50) kHz	2 mV/V + 4 μ V	
	(50 to 100) kHz	2.1 mV/V + 5 μ V	
	(100 to 300) kHz	4.5 mV/V + 11 μ V	
	(300 to 500) kHz	6.5 mV/V + 21 μ V	
	500 kHz to 1 MHz	8.5 mV/V + 21 μ V	
	(2.2 to 22) mV		
	(10 to 20) Hz	0.5 mV/V + 5 μ V	
	(20 to 40) Hz	0.25 mV/V + 5 μ V	
	40 Hz to 20 kHz	0.2 mV/V + 5 μ V	
	(20 to 50) kHz	0.4 mV/V + 5 μ V	
	(50 to 100) kHz	0.75 mV/V + 5 μ V	
	(100 to 300) kHz	2 mV/V + 11 μ V	
	(300 to 500) kHz	2.3 mV/V + 21 μ V	
	500 kHz to 1 MHz	4 mV/V + 21 μ V	
	(22 to 220) mV		
	(10 to 20) Hz	0.3 mV/V + 13 μ V	
	(20 to 40) Hz	0.15 mV/V + 8 μ V	
	40 Hz to 20 kHz	0.12 mV/V + 8 μ V	
	(20 to 50) kHz	0.3 mV/V + 8 μ V	
	(50 to 100) kHz	0.6 mV/V + 18 μ V	
	(100 to 300) kHz	1.3 mV/V + 21 μ V	
	(300 to 500) kHz	2 mV/V + 26 μ V	
	500 kHz to 1 MHz	3.5 mV/V + 46 μ V	
	220 mV to 2.2 V		
	(10 to 20) Hz	0.3 mV/V + 41 μ V	
	(20 to 40) Hz	0.15 mV/V + 16 μ V	
	40 Hz to 20 kHz	0.1 mV/V + 9 μ V	
	(20 to 50) kHz	0.1 mV/V + 11 μ V	
	(50 to 100) kHz	0.2 mV/V + 31 μ V	
	(100 to 300) kHz	0.55 mV/V + 81 μ V	
	(300 to 500) kHz	1.5 mV/V + 0.3 mV	
	500 kHz to 1 MHz	2.5 mV/V + 0.4 mV	

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		Multiproduct Calibrator
	(10 to 20) Hz	0.3 mV/V + 401 μ V	
	(20 to 40) Hz	0.15 mV/V + 151 μ V	
	40 Hz to 20 kHz	0.1 mV/V + 51 μ V	
	(20 to 50) kHz	0.1 mV/V + 101 μ V	
	(50 to 100) kHz	0.15 mV/V + 201 μ V	
	(100 to 300) kHz	0.5 mV/V + 0.7 mV	
	(300 to 500) kHz	1.5 mV/V + 3 mV	
	500 kHz to 1 MHz	2 mV/V + 3.3 mV	
	(22 to 220) V		
	(10 to 20) Hz	0.3 mV/V + 5 mV	
	(20 to 40) Hz	0.2 mV/V + 1.6 mV	
	40 Hz to 20 kHz	0.1 mV/V + 0.7 mV	
	(20 to 50) kHz	0.15 mV/V + 2 mV	
AC Voltage – Source ¹	(50 to 100) kHz	0.21 mV/V + 2.6 mV	Multiproduct Calibrator with Amplifier
	(220 to 1 100) V		
	(15 to 50) Hz	0.4 mV/V + 16 mV	
	50 Hz to 1 kHz	0.2 mV/V + 3.7 mV	
	(220 to 750) V		
	(20 to 50) kHz	0.7 mV/V + 12 mV	
AC Voltage – Measure ¹	(50 to 100) kHz	3 mV/V + 46 mV	AC/DC Transfer Standard and Multimeter
	(750 to 1 100) V		
	40 Hz to 1 kHz	0.5 mV/V + 5 mV	
	(1 to 20) kHz	0.5 mV/V + 7 mV	
	(20 to 30) kHz	0.8 mV/V + 12 mV	
	22 mV Range (2 mV)		
AC Voltage – Measure ¹	10 Hz	382 μ V/V	AC/DC Transfer Standard and Multimeter
	20 Hz	387 μ V/V	
	40 Hz	374 μ V/V	
	100 Hz	352 μ V/V	
	1 kHz	326 μ V/V	
	10 kHz	323 μ V/V	
	20 kHz	357 μ V/V	
	50 kHz	323 μ V/V	
	100 kHz	409 μ V/V	
	300 kHz	526 μ V/V	
	500 kHz	725 μ V/V	
	800 kHz	818 μ V/V	
	1 MHz	808 μ V/V	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	22 mV Range (6 mV)		AC/DC Transfer Standard and Multimeter
	10 Hz	232 μ V/V	
	20 Hz	224 μ V/V	
	40 Hz	190 μ V/V	
	100 Hz	165 μ V/V	
	1 kHz	160 μ V/V	
	10 kHz	175 μ V/V	
	20 kHz	193 μ V/V	
	50 kHz	225 μ V/V	
	100 kHz	325 μ V/V	
	300 kHz	488 μ V/V	
	500 kHz	528 μ V/V	
	800 kHz	565 μ V/V	
	1 MHz	693 μ V/V	
	22 mV Range (10 mV)		
	10 Hz	98 μ V/V	
	20 Hz	71 μ V/V	
	40 Hz	74 μ V/V	
	100 Hz	72 μ V/V	
	1 kHz	88 μ V/V	
	10 kHz	82 μ V/V	
	20 kHz	84 μ V/V	
	50 kHz	98 μ V/V	
	100 kHz	163 μ V/V	
	300 kHz	235 μ V/V	
	500 kHz	346 μ V/V	
	800 kHz	349 μ V/V	
	1 MHz	416 μ V/V	
	22 mV Range (20 mV)		
	10 Hz	85 μ V/V	
	20 Hz	68 μ V/V	
	40 Hz	75 μ V/V	
	100 Hz	79 μ V/V	
	1 kHz	77 μ V/V	
	10 kHz	71 μ V/V	
	20 kHz	77 μ V/V	
	50 kHz	89 μ V/V	
	100 kHz	170 μ V/V	
	300 kHz	255 μ V/V	
	500 kHz	331 μ V/V	
	800 kHz	435 μ V/V	
	1 MHz	427 μ V/V	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	220 mV Range (20 mV)		AC/DC Transfer Standard and Multimeter
	10 Hz	92 $\mu\text{V/V}$	
	20 Hz	87 $\mu\text{V/V}$	
	40 Hz	83 $\mu\text{V/V}$	
	100 Hz	74 $\mu\text{V/V}$	
	1 kHz	68 $\mu\text{V/V}$	
	10 kHz	73 $\mu\text{V/V}$	
	20 kHz	71 $\mu\text{V/V}$	
	50 kHz	98 $\mu\text{V/V}$	
	100 kHz	157 $\mu\text{V/V}$	
	300 kHz	223 $\mu\text{V/V}$	
	500 kHz	280 $\mu\text{V/V}$	
	800 kHz	386 $\mu\text{V/V}$	
	1 MHz	356 $\mu\text{V/V}$	
	220 mV Range (60 mV)		
	10 Hz	67 $\mu\text{V/V}$	
	20 Hz	38 $\mu\text{V/V}$	
	40 Hz	34 $\mu\text{V/V}$	
	100 Hz	39 $\mu\text{V/V}$	
	1 kHz	35 $\mu\text{V/V}$	
	10 kHz	30 $\mu\text{V/V}$	
	20 kHz	32 $\mu\text{V/V}$	
	50 kHz	42 $\mu\text{V/V}$	
	100 kHz	81 $\mu\text{V/V}$	
	300 kHz	163 $\mu\text{V/V}$	
	500 kHz	243 $\mu\text{V/V}$	
	800 kHz	282 $\mu\text{V/V}$	
	1 MHz	340 $\mu\text{V/V}$	
	220 mV Range (100 mV)		
	10 Hz	50 $\mu\text{V/V}$	
	20 Hz	30 $\mu\text{V/V}$	
	40 Hz	18 $\mu\text{V/V}$	
	100 Hz	18 $\mu\text{V/V}$	
	1 kHz	17 $\mu\text{V/V}$	
	10 kHz	19 $\mu\text{V/V}$	
	20 kHz	19 $\mu\text{V/V}$	
	50 kHz	30 $\mu\text{V/V}$	
	100 kHz	47 $\mu\text{V/V}$	
	300 kHz	91 $\mu\text{V/V}$	
	500 kHz	142 $\mu\text{V/V}$	
	800 kHz	196 $\mu\text{V/V}$	
	1 MHz	226 $\mu\text{V/V}$	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	220 mV Range (200 mV)		AC/DC Transfer Standard and Multimeter
	10 Hz	28 $\mu\text{V/V}$	
	20 Hz	27 $\mu\text{V/V}$	
	40 Hz	16 $\mu\text{V/V}$	
	100 Hz	16 $\mu\text{V/V}$	
	1 kHz	16 $\mu\text{V/V}$	
	10 kHz	15 $\mu\text{V/V}$	
	20 kHz	17 $\mu\text{V/V}$	
	50 kHz	28 $\mu\text{V/V}$	
	100 kHz	47 $\mu\text{V/V}$	
	300 kHz	89 $\mu\text{V/V}$	
	500 kHz	135 $\mu\text{V/V}$	
	800 kHz	184 $\mu\text{V/V}$	
	1 MHz	211 $\mu\text{V/V}$	
	700 mV Range (200 mV)		
	10 Hz	31 $\mu\text{V/V}$	
	20 Hz	28 $\mu\text{V/V}$	
	40 Hz	16 $\mu\text{V/V}$	
	100 Hz	16 $\mu\text{V/V}$	
	1 kHz	17 $\mu\text{V/V}$	
	10 kHz	16 $\mu\text{V/V}$	
	20 kHz	16 $\mu\text{V/V}$	
	50 kHz	23 $\mu\text{V/V}$	
	100 kHz	46 $\mu\text{V/V}$	
	300 kHz	81 $\mu\text{V/V}$	
	500 kHz	118 $\mu\text{V/V}$	
	800 kHz	174 $\mu\text{V/V}$	
	1 MHz	208 $\mu\text{V/V}$	
	700 mV Range (600 mV)		
	10 Hz	32 $\mu\text{V/V}$	
	20 Hz	24 $\mu\text{V/V}$	
	40 Hz	14 $\mu\text{V/V}$	
	100 Hz	14 $\mu\text{V/V}$	
	1 kHz	13 $\mu\text{V/V}$	
	10 kHz	13 $\mu\text{V/V}$	
	20 kHz	13 $\mu\text{V/V}$	
	50 kHz	13 $\mu\text{V/V}$	
	100 kHz	18 $\mu\text{V/V}$	
	300 kHz	29 $\mu\text{V/V}$	
	500 kHz	34 $\mu\text{V/V}$	
	800 kHz	54 $\mu\text{V/V}$	
	1 MHz	73 $\mu\text{V/V}$	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	2.2 V Range (0.6 V)		AC/DC Transfer Standard and Multimeter
	10 Hz	27 $\mu\text{V/V}$	
	20 Hz	22 $\mu\text{V/V}$	
	40 Hz	13 $\mu\text{V/V}$	
	100 Hz	13 $\mu\text{V/V}$	
	1 kHz	13 $\mu\text{V/V}$	
	10 kHz	12 $\mu\text{V/V}$	
	20 kHz	13 $\mu\text{V/V}$	
	50 kHz	14 $\mu\text{V/V}$	
	100 kHz	16 $\mu\text{V/V}$	
	300 kHz	26 $\mu\text{V/V}$	
	500 kHz	29 $\mu\text{V/V}$	
	800 kHz	33 $\mu\text{V/V}$	
	1 MHz	45 $\mu\text{V/V}$	
	2.2 V Range (1 V)		
	10 Hz	63 $\mu\text{V/V}$	
	20 Hz	60 $\mu\text{V/V}$	
	40 Hz	58 $\mu\text{V/V}$	
	100 Hz	58 $\mu\text{V/V}$	
	1 kHz	58 $\mu\text{V/V}$	
	10 kHz	58 $\mu\text{V/V}$	
	20 kHz	58 $\mu\text{V/V}$	
	50 kHz	58 $\mu\text{V/V}$	
	100 kHz	59 $\mu\text{V/V}$	
	300 kHz	61 $\mu\text{V/V}$	
	500 kHz	63 $\mu\text{V/V}$	
	800 kHz	65 $\mu\text{V/V}$	
	1 MHz	70 $\mu\text{V/V}$	
	2.2 V Range (2 V)		
	10 Hz	39 $\mu\text{V/V}$	
	20 Hz	34 $\mu\text{V/V}$	
	40 Hz	31 $\mu\text{V/V}$	
	100 Hz	31 $\mu\text{V/V}$	
	1 kHz	31 $\mu\text{V/V}$	
	10 kHz	31 $\mu\text{V/V}$	
	20 kHz	31 $\mu\text{V/V}$	
	50 kHz	31 $\mu\text{V/V}$	
	100 kHz	32 $\mu\text{V/V}$	
	300 kHz	36 $\mu\text{V/V}$	
	500 kHz	39 $\mu\text{V/V}$	
	800 kHz	42 $\mu\text{V/V}$	
	1 MHz	50 $\mu\text{V/V}$	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	7 V Range (2 V)		AC/DC Transfer Standard and Multimeter
	10 Hz	39 $\mu\text{V/V}$	
	20 Hz	34 $\mu\text{V/V}$	
	40 Hz	31 $\mu\text{V/V}$	
	100 Hz	31 $\mu\text{V/V}$	
	1 kHz	31 $\mu\text{V/V}$	
	10 kHz	31 $\mu\text{V/V}$	
	20 kHz	31 $\mu\text{V/V}$	
	50 kHz	31 $\mu\text{V/V}$	
	100 kHz	32 $\mu\text{V/V}$	
	300 kHz	36 $\mu\text{V/V}$	
	500 kHz	39 $\mu\text{V/V}$	
	800 kHz	42 $\mu\text{V/V}$	
	1 MHz	50 $\mu\text{V/V}$	
	7 V Range (6 V)		
	10 Hz	29 $\mu\text{V/V}$	
	20 Hz	21 $\mu\text{V/V}$	
	40 Hz	16 $\mu\text{V/V}$	
	100 Hz	16 $\mu\text{V/V}$	
	1 kHz	16 $\mu\text{V/V}$	
	10 kHz	16 $\mu\text{V/V}$	
	20 kHz	16 $\mu\text{V/V}$	
	50 kHz	16 $\mu\text{V/V}$	
	100 kHz	16 $\mu\text{V/V}$	
	300 kHz	25 $\mu\text{V/V}$	
	500 kHz	29 $\mu\text{V/V}$	
	800 kHz	33 $\mu\text{V/V}$	
	1 MHz	51 $\mu\text{V/V}$	
	22 V Range (6 V)		
	10 Hz	29 $\mu\text{V/V}$	
	20 Hz	21 $\mu\text{V/V}$	
	40 Hz	16 $\mu\text{V/V}$	
	100 Hz	16 $\mu\text{V/V}$	
	1 kHz	16 $\mu\text{V/V}$	
	10 kHz	16 $\mu\text{V/V}$	
	20 kHz	16 $\mu\text{V/V}$	
	50 kHz	16 $\mu\text{V/V}$	
	100 kHz	16 $\mu\text{V/V}$	
	300 kHz	25 $\mu\text{V/V}$	
	500 kHz	29 $\mu\text{V/V}$	
	800 kHz	33 $\mu\text{V/V}$	
	1 MHz	51 $\mu\text{V/V}$	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	22 V Range (10 V)		AC/DC Transfer Standard and Multimeter
	10 Hz	32 $\mu\text{V/V}$	
	20 Hz	19 $\mu\text{V/V}$	
	40 Hz	14 $\mu\text{V/V}$	
	100 Hz	14 $\mu\text{V/V}$	
	1 kHz	14 $\mu\text{V/V}$	
	10 kHz	14 $\mu\text{V/V}$	
	20 kHz	14 $\mu\text{V/V}$	
	50 kHz	14 $\mu\text{V/V}$	
	100 kHz	15 $\mu\text{V/V}$	
	300 kHz	29 $\mu\text{V/V}$	
	500 kHz	29 $\mu\text{V/V}$	
	800 kHz	38 $\mu\text{V/V}$	
	1 MHz	46 $\mu\text{V/V}$	
	22 V Range (20 V)		
	10 Hz	33 $\mu\text{V/V}$	
	20 Hz	20 $\mu\text{V/V}$	
	40 Hz	13 $\mu\text{V/V}$	
	100 Hz	13 $\mu\text{V/V}$	
	1 kHz	13 $\mu\text{V/V}$	
	10 kHz	13 $\mu\text{V/V}$	
	20 kHz	13 $\mu\text{V/V}$	
	50 kHz	14 $\mu\text{V/V}$	
	100 kHz	18 $\mu\text{V/V}$	
	300 kHz	26 $\mu\text{V/V}$	
	500 kHz	28 $\mu\text{V/V}$	
	800 kHz	39 $\mu\text{V/V}$	
	1 MHz	44 $\mu\text{V/V}$	
	70 V Range (20 V)		
	10 Hz	32 $\mu\text{V/V}$	
	20 Hz	21 $\mu\text{V/V}$	
	40 Hz	13 $\mu\text{V/V}$	
	100 Hz	13 $\mu\text{V/V}$	
	1 kHz	13 $\mu\text{V/V}$	
	10 kHz	13 $\mu\text{V/V}$	
	20 kHz	13 $\mu\text{V/V}$	
	50 kHz	14 $\mu\text{V/V}$	
	100 kHz	17 $\mu\text{V/V}$	
	300 kHz	29 $\mu\text{V/V}$	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	70 V Range (60 V)		AC/DC Transfer Standard and Multimeter
	10 Hz	33 $\mu\text{V/V}$	
	20 Hz	22 $\mu\text{V/V}$	
	40 Hz	13 $\mu\text{V/V}$	
	100 Hz	13 $\mu\text{V/V}$	
	1 kHz	13 $\mu\text{V/V}$	
	10 kHz	13 $\mu\text{V/V}$	
	20 kHz	13 $\mu\text{V/V}$	
	50 kHz	15 $\mu\text{V/V}$	
	100 kHz	16 $\mu\text{V/V}$	
	300 kHz	11 $\mu\text{V/V}$	
	220 V Range (60 V)		
	10 Hz	30 $\mu\text{V/V}$	
	20 Hz	20 $\mu\text{V/V}$	
	40 Hz	13 $\mu\text{V/V}$	
	100 Hz	13 $\mu\text{V/V}$	
	1 kHz	13 $\mu\text{V/V}$	
	10 kHz	13 $\mu\text{V/V}$	
	20 kHz	13 $\mu\text{V/V}$	
	50 kHz	14 $\mu\text{V/V}$	
	100 kHz	16 $\mu\text{V/V}$	
	300 kHz	36 $\mu\text{V/V}$	
	220 V Range (100 V)		
	10 Hz	32 $\mu\text{V/V}$	
	20 Hz	20 $\mu\text{V/V}$	
	40 Hz	13 $\mu\text{V/V}$	
	100 Hz	14 $\mu\text{V/V}$	
	1 kHz	13 $\mu\text{V/V}$	
	10 kHz	13 $\mu\text{V/V}$	
	20 kHz	13 $\mu\text{V/V}$	
	50 kHz	14 $\mu\text{V/V}$	
	100 kHz	20 $\mu\text{V/V}$	
	220 V Range (200 V)		
	10 Hz	38 $\mu\text{V/V}$	
	20 Hz	23 $\mu\text{V/V}$	
	40 Hz	14 $\mu\text{V/V}$	
	100 Hz	14 $\mu\text{V/V}$	
	1 kHz	15 $\mu\text{V/V}$	
	10 kHz	14 $\mu\text{V/V}$	
	20 kHz	14 $\mu\text{V/V}$	
	50 kHz	16 $\mu\text{V/V}$	
	100 kHz	21 $\mu\text{V/V}$	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	1 000 V Range (200 V)		AC/DC Transfer Standard and Multimeter
	10 Hz	41 $\mu\text{V/V}$	
	20 Hz	20 $\mu\text{V/V}$	
	40 Hz	14 $\mu\text{V/V}$	
	100 Hz	14 $\mu\text{V/V}$	
	1 kHz	15 $\mu\text{V/V}$	
	10 kHz	14 $\mu\text{V/V}$	
	20 kHz	15 $\mu\text{V/V}$	
	50 kHz	17 $\mu\text{V/V}$	
	100 kHz	33 $\mu\text{V/V}$	
	1 000 V Range (600 V)		
	40 Hz	17 $\mu\text{V/V}$	
	100 Hz	16 $\mu\text{V/V}$	
	1 kHz	16 $\mu\text{V/V}$	
	10 kHz	18 $\mu\text{V/V}$	
	20 kHz	18 $\mu\text{V/V}$	
	50 kHz	22 $\mu\text{V/V}$	
	100 kHz	52 $\mu\text{V/V}$	
	1 000 V Range (1 000 V)		
	40 Hz	16 $\mu\text{V/V}$	
	100 Hz	17 $\mu\text{V/V}$	
	1 kHz	17 $\mu\text{V/V}$	
	10 kHz	18 $\mu\text{V/V}$	
	20 kHz	16 $\mu\text{V/V}$	
	30 kHz	17 $\mu\text{V/V}$	
AC Voltage – Measure ¹ Flatness – 500 kHz to 30 MHz (Relative to 1 kHz)	600 μV to 2.2 mV 500 kHz to 1.2 MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz (2.2 to 7) mV	1.2 mV/V + 1 μV 1.2 mV/V + 1 μV 2.3 mV/V + 1 μV 4.2 mV/V + 1 μV 8.5 mV/V + 2 μV	AC Measurement Standard
500 kHz to 30 MHz (Relative to 1 kHz)	500 kHz to 1.2 MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	1.2 mV/V + 1 μV 1.2 mV/V + 1 μV 1.8 mV/V + 1 μV 2.5 mV/V + 1 μV 4.7 mV/V + 1 μV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹ Flatness – 500 kHz to 30 MHz (Relative to 1 kHz) 500 kHz to 30 MHz (Relative to 1 kHz)	(7 to 22) mV 500 kHz to 1.2 MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz 22mV to 7 V 500 kHz to 1.2 MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	1 mV/V 1 mV/V 1.5 mV/V 2.3 mV/V 4.7 mV/V 1 mV/V 1 mV/V 1.5 mV/V 2.1 mV/V 4.6 mV/V	AC Measurement Standard
AC Voltage – Measure ¹	Up to 10 mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 10 mV 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 300 kHz to 1 MHz (1 to 2) MHz 100 mV 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 300 kHz to 1 MHz (1 to 2) MHz	0.5 mV/V + 3 μ V 0.4 mV/V + 1.1 μ V 0.5 mV/V + 1.1 μ V 1.3 mV/V + 1.1 μ V 6 mV/V + 1.1 μ V 46 mV/V + 2 μ V 0.3 mV/V + 40 μ V 0.3 mV/V + 20 μ V 0.4 mV/V + 20 μ V 0.5 mV/V + 20 μ V 1.3 mV/V + 20 μ V 4 mV/V + 100 μ V 12 mV/V + 100 μ V 18 mV/V + 100 μ V 0.2 mV/V + 4 mV 0.2 mV/V + 2 mV 0.2 mV/V + 2 mV 0.5 mV/V + 2 mV 1.1 mV/V + 2 mV 4 mV/V + 10 mV 16 mV/V + 10 mV 21 mV/V + 10 mV	Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	10 V to 100 V		Multimeter
	(1 to 40) Hz	0.3 mV/V + 4 mV	
	40 Hz to 1 kHz	0.3 mV/V + 2 mV	
	(1 to 20) kHz	0.3 mV/V + 2 mV	
	(20 to 50) kHz	0.5 mV/V + 2 mV	
	(50 to 100) kHz	1.4 mV/V + 2 mV	
	(100 to 300) kHz	4.8 mV/V + 10 mV	
	300 kHz to 1 MHz	21 mV/V + 10 mV	
	100 V to 1000 V		
	(1 to 40) Hz	0.6 mV/V + 40 mV	
	40 Hz to 1 kHz	0.7 mV/V + 40 mV	
	(1 to 20) kHz	1 mV/V + 20 mV	
	(20 to 50) kHz	1.6 mV/V + 20 mV	
	(50 to 100) kHz	4 mV/V + 20 mV	
AC Current – Source ¹	(9 to 220) μ A		Multiproduct Calibrator
	(10 to 20) Hz	0.8 mA/A + 16 nA	
	(20 to 40) Hz	0.8 mA/A + 10 nA	
	40 Hz to 1 kHz	0.8 mA/A + 8 nA	
	(1 to 5) kHz	0.8 mA/A + 12 nA	
	(5 to 10) kHz	1.5 mA/A + 65 nA	
	220 μ A to 2.2 mA		
	(10 to 20) Hz	0.8 mA/A + 40 nA	
	(20 to 40) Hz	0.8 mA/A + 35 nA	
	40 Hz to 1 kHz	0.8 mA/A + 35 nA	
	(1 to 5) kHz	0.8 mA/A + 0.11 μ A	
	(5 to 10) kHz	1.5 mA/A + 0.65 μ A	
	(2.2 to 22) mA		
	(10 to 20) Hz	0.8 mA/A + 0.4 μ A	
	(20 to 40) Hz	0.8 mA/A + 0.35 μ A	
	40 Hz to 1 kHz	0.8 mA/A + 0.35 μ A	
	(1 to 5) kHz	0.8 mA/A + 0.55 μ A	
	(5 to 10) kHz	1.5 mA/A + 5 μ A	
	(22 to 220) mA		
	(10 to 20) Hz	0.7 mA/A + 4 μ A	
	(20 to 40) Hz	0.6 mA/A + 3.5 μ A	
	40 Hz to 1 kHz	0.6 mA/A + 2.5 μ A	
	(1 to 5) kHz	0.65 mA/A + 3.5 μ A	
	(5 to 10) kHz	1.5 mA/A + 10 μ A	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source ¹	220 mA to 2.2 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.7 mA/A + 35 μ A 0.8 mA/A + 80 μ A 8 mA/A + 0.16 mA	Multiproduct Calibrator
AC Current – Source ¹	(2.2 to 11) A 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (11 to 20.5) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.6 mA/A + 0.17 mA 1.2 mA/A + 0.38 mA 4.2 mA/A + 0.75 mA 1.4 mA/A + 5 mA 1.7 mA/A + 5 mA 34 mA/A + 5 mA	Multiproduct Calibrator and Amplifier
AC High Current – Source ¹ Toroidal-type Clamps	(10 to 16.5) A (45 to 65) Hz (65 to 440) Hz (16.5 to 150) A (45 to 65) Hz (65 to 440) Hz (150 to 1 000) A (45 to 65) Hz (65 to 440) Hz	0.35 % of reading + 0.005 A 1 % of reading + 0.004 A 0.35 % of reading + 0.03 A 1 % of reading + 0.03 A 0.4 % of reading + 0.1 A 1 % of reading + 0.2 A	Multi-function Calibrator and Fluke Coil
AC High Current – Source ¹ Other Types of Clamps	(10 to 16.5) A (45 to 65) Hz (65 to 440) Hz (16.5 to 150) A (45 to 65) Hz (65 to 440) Hz (150 to 1 000) A (45 to 65) Hz (65 to 440) Hz	0.7 % of reading + 0.03 A 1.2 % of reading + 0.03 A 0.7 % of reading + 0.25 A 1.2 % of reading + 0.25 A 0.7 % of reading + 0.9 A 1.2 % of reading + 0.9 A	Multi-function Calibrator and Fluke Coil
AC Current – Measure ¹	(5 to 100) μ A (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	7 mA/A + 0.03 μ A 3 mA/A + 0.03 μ A 1 mA/A + 0.03 μ A 1 mA/A + 0.03 μ A	Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure ¹	100 μ A to 1 mA		Multimeter
	(10 to 20) Hz	5 mA/A + 0.2 μ A	
	(20 to 45) Hz	2 mA/A + 0.2 μ A	
	(45 to 100) Hz	1 mA/A + 0.2 μ A	
	100 Hz to 5 kHz	1 mA/A + 0.2 μ A	
	(5 to 20) kHz	1 mA/A + 0.2 μ A	
	(20 to 50) kHz	5 mA/A + 0.4 μ A	
	(50 to 100) kHz	7 mA/A + 1.5 μ A	
	(1 to 10) mA		
	(10 to 20) Hz	5 mA/A + 2 μ A	
	(20 to 45) Hz	2 mA/A + 2 μ A	
	(45 to 100) Hz	1 mA/A + 2 μ A	
	100 Hz to 5 kHz	1 mA/A + 2 μ A	
	(5 to 20) kHz	1 mA/A + 2 μ A	
	(20 to 50) kHz	5 mA/A + 4 μ A	
	(50 to 100) kHz	7 mA/A + 15 μ A	
	(10 to 100) mA		
	(10 to 20) Hz	7 mA/A + 20 μ A	
	(20 to 45) Hz	2.5 mA/A + 20 μ A	
	(45 to 100) Hz	1 mA/A + 20 μ A	
	100 Hz to 5 kHz	1 mA/A + 20 μ A	
	(5 to 20) kHz	1 mA/A + 20 μ A	
	(20 to 50) kHz	5 mA/A + 40 μ A	
	(50 to 100) kHz	7 mA/A + 150 μ A	
	100 mA to 1 A		
	(10 to 20) Hz	5 mA/A + 0.2 mA	
	(20 to 45) Hz	2 mA/A + 0.2 mA	
	(45 to 100) Hz	1 mA/A + 0.2 mA	
	100 Hz to 5 kHz	1.5 mA/A + 0.2 mA	
	(5 to 20) kHz	4 mA/A + 0.2 mA	
	(20 to 50) kHz	15 mA/A + 0.4 mA	
	(1 to 10) A		
	(10 to 40) Hz	150 μ A/A	
	40 Hz to 1 kHz	120 μ A/A	
	(1 to 20) kHz	205 μ A/A	
	(20 to 50) kHz	390 μ A/A	
	(50 to 100) kHz	950 μ A/A	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure ¹	(10 to 20) A		Multimeter and Current Shunt
	(10 to 40) Hz	160 μ A/A	
	40 Hz to 1 kHz	130 μ A/A	
	(1 to 3) kHz	230 μ A/A	
	(3 to 10) kHz	205 μ A/A	
	(10 to 20) kHz	215 μ A/A	
	(20 to 50) kHz	400 μ A/A	
	(50 to 100) kHz	950 μ A/A	
	(20 to 100) A		
	(10 to 40) Hz	170 μ A/A	
	40 Hz to 1 kHz	150 μ A/A	
	(1 to 10) kHz	230 μ A/A	
	(10 to 20) kHz	240 μ A/A	
	(20 to 30) kHz	400 μ A/A	
	(30 to 50) kHz	440 μ A/A	
	(50 to 100) kHz	970 μ A/A	
Oscilloscopes ³			Fluke 9500B Oscilloscope calibrator with 9530 active heads
DC Signal	1 mV to 200 V, 50 Ω	0.05 % of reading + 30 μ V	
	1 mV to 50 V, 1 M Ω	0.06 % of reading + 30 μ V	
Square Wave	40 μ V to <1 mV _{pk-pk}	1.5 % of reading + 15 μ V	
	1 mV to 200 V _{pk-pk}	0.15 % of reading + 15 μ V	
Leveled Sine Wave	50 kHz Reference Amplitude		
	5 mV to 5 V	2.5 % of reading	
	5 mV to 3 V	3.5 % of reading	
	5 mV to 2 V	4.5 % of reading	
Edge Transition	(10 Hz to 2 MHz rate)		
	500 ps	40 ps	
	(10 Hz to 2 MHz rate)		
Timing Marker Functions	150 ps	30 ps	
Pulse Width	9.0091 ns to <83 μ s	0.5 x 10 ⁻⁰⁶ of reading	
	$\geq$ 83 μ s to 55 s	4 x 10 ⁻⁰⁶ of reading	
	(1 to 100) ns	6 % of reading + 300 ps	

Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Amplitude Modulation – Measure ¹ Rate: (0.05 to 10) kHz Rate: (0.05 to 50) kHz Rate: (0.05 to 10) kHz	(>0 to 99) % Depth (0.15 to 10) MHz (0.01 to 1.3) GHz (1.3 to 26.5) GHz	1.2 % Depth 1.1 % Depth 2.1 % Depth	Measuring Receiver
Amplitude Modulation – Source ¹ (11 to 13.5) MHz (11 to 13.5) MHz	Rate: 50 Hz to 100 kHz Depths: 5 % to 95 % Rate: 50 Hz to 100 kHz Depths: 95 % to 99 %	0.3 % Depth <i>0.6 % Depth</i>	AM/FM Test Source
Frequency Modulation – Measure ¹ Rate: (0.02 to 10) kHz Rate: (0.05 to 100) kHz	≤ 40 kHz peak (0.25 to 10) MHz ≤ 400 kHz peak (0.25 to 10) MHz (0.01 to 26.5) GHz	3 % Deviation 1.5 % Deviation 1.5 % Deviation	Measuring Receiver
Frequency Modulation – Source ¹ 11 MHz to 432 MHz	Rate: <100 kHz to 200 kHz Dev.: ≤ 12.5 kHz peak Dev.: ≤ 100 kHz peak Dev.: ≤ 400 kHz peak	2.5 % Modulation 0.5 % Modulation 0.3 % Modulation	AM/FM Test Source
RF Power Sensors – Calibration Factors ⁴	0 dBm 100 kHz 200 kHz to 4.6 GHz (4.6 to 7) GHz (7 to 14) GHz (14 to 17.75) GHz (17.75 to 18) GHz	1.7 % 1.6 % 1.7 % 1.8 % 1.9 % 2 %	Comparison to Power Sensor
RF Power – Measure ¹	(0 to -10) dB (-30 to -10) dB (-50 to -30) dB (-70 to -50) dB (-110 to -70) dB (-120 to -110) dB	0.3 dB 0.35 dB 0.4 dB 0.5 dB 0.6 dB 0.7 dB	Measuring Receiver
Distortion – Measure ¹ 20 Hz to 20 kHz (20 to 100) kHz	(0 to 99.9) dB (50 to 500) kHz (50 to 500) kHz	1.3 dB 2.4 dB	Audio Analyzer
Harmonic Measurements ¹ 3 Hz to 26.5 GHz	(-90 to 0.01) dB	1.4 dB	Spectrum Analyzer

Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Phase Modulation – Measure ¹ 100 kHz to 6.6 GHz 100 kHz to 6.6 GHz (6.6 to 13.2) GHz (6.6 to 13.2) GHz (13.2 to 26.5) GHz (13.2 to 26.5) GHz	Rate: 20 Hz to 200 kHz Deviation: > 0.7 Rad Deviation: > 0.3 Rad Rate: 20 Hz to 200 kHz Deviation: > 2 Rad Deviation: > 0.6 Rad Rate: 20 Hz to 200 kHz Deviation: > 4 Rad Deviation: > 1.2 Rad	0.246 Rad 0.094 Rad 0.07 Rad 0.035 Rad 0.14 Rad 0.059 Rad	Measuring Receiver
Phase Noise for Signal Sources Offset Frequency ≤ 100 kHz ≤ 1 MHz ≤ 40 MHz	(0 to 10) dB	3 dB 4 dB 5 dB	Phase Noise System

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Calipers ^{1,2}	Up to 24 in	$(285 + 0.3L) \mu\text{in}$	Gage Blocks
Height Gages ^{1,2}	Up to 48 in	$(72 + 1.2L) \mu\text{in}$	Gage Blocks
Micrometers ^{1,2}	Up to 24 in	$(570 + 0.55L) \mu\text{in}$	Gage Blocks
Indicators ¹ – Resolution: 20 μin 50 μin 100 μin	Up to 4 in	$(70 + 0.45L) \mu\text{in}$ $(75 + 0.45L) \mu\text{in}$ $(90 + 0.35L) \mu\text{in}$	Gage Blocks
Gage Blocks ²	Up to 4 in	$(6.5 + 2.5L) \mu\text{in}$	Universal Length Measuring Machine, Gage Blocks
Rigid Rules & Tape Measures	Up to 70 in	0.03 in	Gage Blocks
Master Levels Length (<6 in to 18) in	(0 to 500) arc-sec/div	1.6 arc-sec/div	Angle Generator

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Surface Plates ¹ Overall Flatness Local Area Flatness	(6 to 120) in diagonal (0 to 0.001) in	30 μ in 81 μ in	Laser Interferometer Repeat-o-meter

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Scales and Balances ^{1,3}	Up to 400 g 400 g to 40 kg	(1.2 + 0.002W) mg (6.5 + 6.5W) mg	Standard Weights
Mass	(1 to 200) mg (200 to 500) mg 500 mg to 10 g (10 to 20) g (20 to 50) g (50 to 100) g (100 to 500) g 500 g to 1 kg (1 to 2) kg (2 to 5) kg (5 to 10) kg (10 to 20) kg	0.02 mg 0.35 mg 0.06 mg 0.1 mg 0.2 mg 0.35 mg 0.8 mg 3.5 mg 7 mg 20 mg 45 mg 70 mg	Weights and Balances
Torque Tools ¹	(5 to 400) in·oz (10 to 1 000) in·lb (10 to 1 000) ft·lb	0.4% of reading 0.4% of reading 0.4% of reading	Torque Calibrator
Torque Testers ¹	(5 to 400) in·oz (10 to 1 000) in·lb (10 to 1 000) ft·lb	0.12 % of reading 0.12 % of reading 0.12 % of reading	Torque Wheel, Torque Standard, Calibration Arms and Weights
Pressure Instruments ¹	(0 to 30) Psi (30 to 300) psi (300 to 1 000) psi (1 000 to 3 000) psi (3 000 to 10 000) psi	0.25 Psi 0.3 psi 0.7 psi 2 psi 10 psi	Test Gauges
Force – Compression and Tension	(200 to 60 000) lbf	3 % of reading	Load Cell

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature Measure ¹	(-200 to 660) °C	0.035 °C	Comparison to Platinum Resistance Thermometers
Temperature – Measuring Equipment ¹	(-10 to 350) °C	0.7 °C	Comparison to Platinum Resistance Thermometers, Thermal baths / blocks
Relative Humidity Measuring Equipment ¹	(10 to 95) %RH	0.65 %RH	Humidity Generator
Infrared Thermometers ¹	(-15 to 0) °C (0 to 100) °C (100 to 350) °C (350 to 500) °C	0.71 °C 1 °C 2 °C 2.6 °C	Black Body Calibrator $\lambda = (8 \text{ to } 14) \mu\text{m}$, $\varepsilon = 0.95$

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Measure ¹	10 Hz to 26.5 GHz	$6 \times 10^{-11} f + 10 \mu\text{Hz}$	GPS, Frequency Receiver and Counter
Frequency – Measure ¹ Fixed Point	10 MHz	$6 \times 10^{-11} \text{ Hz/Hz}$	GPS and Frequency Receiver
Frequency - Source ¹	0.01 Hz to 20 GHz	$6 \times 10^{-11} f + 10 \mu\text{Hz}$	GPS, Frequency Receiver and Signal Generator

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:

- 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
- L = nominal length of the gage block(s) used, R = ratio of the larger voltage divided by the smaller voltage.
- The CMC for scales and balances are highly dependent upon the resolution of the unit under test. The uncertainty 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.
- Unitless linear measure.
- This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2861.



Jason Stine, Vice President