CERTIFICATE OF ACCREDITATION

ANSI National Accreditation Board

11617 Coldwater Road, Fort Wayne, IN 46845 USA

This is to certify that

Upstate Metrology

6388 Niver Rd.
Conesus, NY 14435

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

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

while demonstrating technical competence in the field of

CALIBRATION

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

AC-1215
Certificate Number

ANAB Approval

Certificate Valid Through: 02/09/2022
Version No. 009 Issued: 02/05/2020

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 National Accreditation Board

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017 AND ANSI/NCSL Z540-1-1994 (R2002)

Upstate Metrology, Inc.
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Conesus, NY 14435
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CALIBRATION

Valid to: **February 9, 2022** Certificate Number: **AC-1215**

Electrical – DC/Low Frequency[2]

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
DC Voltage – Measure [1]	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1.1 kV	0.38 µV + 0.006 2 µV/mV 2.3µV + 3.9 µV/V 0.36 µV + 5.6 µV/V 0.008 2 mV/V 0.017 mV/V	HP 3458A Opt 002 Multimeter
	(1.1 to 10) kV	610 mV + 0.004 8 mV/V	Fluke 80E High Voltage Probe, HP 3458A Multimeter
	(10 to 120) kV	0.16 % of reading	HP 3458A Opt 002 Multimeter, Ross Hi-Z Probe
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	0.6µV + 0.008 µV/mV 0.53µV + 8.3 µV/V 0.000 39 mV + 0.007 3 mV/V 0.000 52 mV + 0.007 3 mV/V 0.008 5 mV/V 0.009 7 mV/V	Fluke 5700A Series II Multiproduct Calibrator
DC Current – Measure [1]	(1 to 100) µA 100 µA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	1.5 nA + 0.021 nA/µA 0.56 nA + 30 nA/mA 0.025 µA + 30 nA/mA 0.53 µA + 0.046 µA/mA 0.015 % of reading	HP 3458A Opt 002 Multimeter, Current Shunts

Electrical – DC/Low Frequency[2]

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
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	8 nA + 0.05 nA/µA 8 nA + 50 nA/mA 0.054 µA/mA 0.065 µA/mA 0.094 mA/A	Fluke 5700A Series II Multiproduct Calibrator
	(1 to 10) A (10 to 20) A	0.38 mA/A 1.1 mA + 0.25 mA/A	Fluke 5700A Multiproduct Calibrator with Fluke 5220A Amplifier
	(20 to 100) A	0.001 1 mA/A	Valhalla 2555A Transconductance Amplifier, Current Shunt
AC Voltage – Measure [1]	(1 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 300 kHz to 1 MHz (10 to 100) mV (1 to 40) Hz 40 Hz to 1kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz 100 mV to 1 V (1 to 40) Hz 40 Hz to 1kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 8) MHz	 3.6 µV + 0.34 µV/mV 1.5 µV + 0.22 µV/mV 1.7 µV + 0.32 µV/mV 8.1 µV + 0.73 µV/mV 5.6 µV + 5.4 µV/mV 39 µV + 4.3 µV/mV 11 µV + 8.1 µV/mV 6.3 µV + 0.073 µV/mV 2.8 µV + 0.085 µV/mV 3.2 µV + 0.17 µV/mV 11 µV + 0.40 µV/mV 55 µV + 0.46 µV/mV 33 µV + 3.31 µV/mV 0.025 mV/mV 0.39 mV + 0.044 mV/mV 2.1 mV + 0.027 mV/mV 0.21 µV + 130 µV/V 0.25 µV + 110 µV/V 0.22 µV + 200 µV/V 14 µV + 38 µV/V 5.0 µV + 96 µV/V 0.32 mV + 0.44 mV/V 1.2 % of reading 4.8 % of reading	HP 3458A Opt 002 Multimeter

Electrical – DC/Low Frequency[2]

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage – Measure [1]	(1 to 10) V		HP 3458A Opt 002 Multimeter
	(1 to 40) Hz	0.014 % of reading	
	40 Hz to 1kHz	0.011 % of reading	
	(1 to 20) kHz	0.02 % of reading	
	(20 to 50) kHz	0.04 % of reading	
	(50 to 100) kHz	0.096 % of reading	
	(100 to 300) kHz	0.36 % of reading	
	300 to 1 MHz	1.2 % of reading	
	(1 to 8) MHz	4.7 % of reading	
	(10 to 100) V		
	(1 to 40) Hz	0.03 % of reading	
	40 Hz to 20 kHz	0.027 % of reading	
	(20 to 50) kHz	0.044 % of reading	
	(50 to 100) kHz	0.15 % of reading	
	100 V to 750 V		
	1 Hz to 1 kHz	0.05 % of reading	
AC Voltage – Source [1]	(2.2 to 22) mV		Fluke 5700A Series II Multiproduct Calibrator
	(10 to 20) Hz	4.4 µV + 0.58 µV/mV	
	(20 to 40) Hz	4.4 µV + 0.24 µV/mV	
	40 Hz to 20 kHz	4.4 µV + 0.13 µV/mV	
	(20 to 50) kHz	4.4 µV + 0.4 µV/mV	
	(50 to 100) kHz	7 µV + 0.85 µV/mV	
	(100 to 300) kHz	13 µV + 1.1 µV/mV	
	(300 to 500) kHz	25 µV + 1.7 µV/mV	
	500 kHz to 1 MHz	25 µV + 3.4 µV/mV	
	(22 to 220) mV		
	(10 to 20) Hz	4.1 µV + 0.59 µV/mV	
	(20 to 40) Hz	4.7 µV + 0.23 µV/mV	
	40 Hz to 20 kHz	4.7 µV + 0.12 µV/mV	
	(20 to 50) kHz	5.9 µV + 0.33 µV/mV	
	(50 to 100) kHz	5 µV + 0.94 µV/mV	
	(100 to 300) kHz	11 µV + 1.12 µV/mV	
	(300 to 500) kHz	24 µV + 1.8 µV/mV	
	500 kHz to 1 MHz	19 µV + 3.7 µV/mV	

Electrical – DC/Low Frequency[2]

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Voltage – Source [1]	220 mV to 2.2 V		Fluke 5700A Series II Multiproduct Calibrator
	(10 to 20) Hz	0.018 mV + 0.53 mV/V	
	(20 to 40) Hz	0.018 mV + 0.16 mV/V	
	40 Hz to 20 kHz	0.016 mV + 0.071 mV/V	
	(20 to 50) kHz	0.056 mV + 0.1 mV/V	
	(50 to 100) kHz	0.17 mV + 0.19 mV/V	
	(100 to 300) kHz	0.18 mV + 0.41 mV/V	
	(300 to 500) kHz	0.16 mV + 1.1 mV/V	
	500 kHz to 1 MHz	0.29 mV + 2.5 mV/V	
	(2.2 to 22) V		
	(10 to 20) Hz	0.000 016 mV + 0.54 mV/V	
	(20 to 40) Hz	0.000 049 mV + 0.17 mV/V	
	40 Hz to 20 kHz	0.000 11 mV + 0.078 mV/V	
	(20 to 50) kHz	0.000 065 mV + 0.13 mV/V	
	(50 to 100) kHz	0.039 mV + 0.26 mV/V	
	(100 to 300) kHz	0.58 mV/V	
	(300 to 500) kHz	0.001 5 V/V	
	500 kHz to 1 MHz	0.003 1 V/V	
	(22 to 220) V		
	(10 to 20) Hz	0.54 mV/V	
	(20 to 40) Hz	0.17 mV/V	
	40 Hz to 20 kHz	0.085 mV/V	
	(20 to 50) kHz	0.000 25 V/V	
	(50 to 100) kHz	0.000 57 V/V	
	(220 to 1 000) V		
	(45 Hz to 1 kHz)	0.069 mV + 0.083 mV/V	
AC Current – Source [1]	220 µA to 2.2 mA		Fluke 5700A Series II Multiproduct Calibrator
	(10 to 20) Hz	0.024µA + 0.71 µA/mA	
	(20 to 40) Hz	0.02 µA + 0.36 µA/mA	
	40 Hz to 1 kHz	0.017 µA + 0.15 µA/mA	
	(1 to 5) kHz	0.000 83 µA + 0.78 µA/mA	
	(5 to 10) kHz	0.000 33 µA + 2 µA/mA	
	(2.2 to 22) mA		
	(10 to 20) Hz	0.000 13 µA + 0.72 µA/mA	
	(20 to 40) Hz	0.000 26 µA + 0.37 µA/mA	
	40 Hz to 1 kHz	0.000 62 µA + 0.16 µA/mA	
	(1 to 5) kHz	0.000 12 µA + 0.79 µA/mA	
	(5 to 10) kHz	0.000 049 µA + 2 µA/mA	

Electrical – DC/Low Frequency[2]

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
AC Current – Source [1]	(22 to 220) mA		Fluke 5700A Series II Multiproduct Calibrator
	(10 to 20) Hz	0012 µA + 0.72 µA/mA	
	(20 to 40) Hz	0.002 3 µA + 0.37 µA/mA	
	40 Hz to 1 kHz	0.005 4 µA + 0.16 µA/mA	
	(1 to 5) kHz	0.001 1 µA + 0.78 µA/mA	
	(5 to 10) kHz	0.000 43 µA + 2 µA/mA	
	220 mA to 2.2 A		
	20 Hz to 1 kHz	0.72 mA/A	
	(1 to 5) kHz	0.79 mA/A	
	(5 to 10) kHz	0.000 93 A/A	
	(2.2 to 10) A		Fluke 5700A Series II Multiproduct Calibrator with Fluke 5220A Amplifier
	30 Hz to 5 kHz	0.001 3 A + 0.000 8 A/A	
AC Current – Measure [1]	(Up to 100) µA		HP 3458A Opt 002 Multimeter
	(10 to 20) Hz	35 nA + 4.6 nA/ µA	
	(20 to 45) Hz	35 nA + 1.7 nA/µA	
	(45 to 1 000) Hz	35 nA + 0.7 nA/µA	
	100 µA to 1 mA		
	(10 to 20) Hz	0.014 µA + 4.8 µA/mA	
	(20 to 45) Hz	0.014 µA + 2 µA/mA	
	(45 to 100) Hz	16 nA + 920 nA/mA	
	100 Hz to 5 kHz	54 nA + 540 nA/mA	
	(5 to 20) kHz	0.23 µA + 0.7 µA/mA	
	(20 to 50) kHz	4.6 µA + 4.6 µA/mA	
	(1 to 100) mA		
	(10 to 20) Hz	0.006 µA + 4.9 µA/mA	
	(20 to 45) Hz	0.015 µA + 2 µA/mA	
	(45 to 100) Hz	0.031 µA + 0.93 µA/mA	
	100 Hz to 5 kHz	0.046 µA + 0.59 µA/mA	
	(5 to 20) kHz	0.031µA + 0.93 µA/mA	
	(20 to 50) kHz	0.005 7 µA + 5.1 µA/mA	
	(50 to 100) kHz	0.002 6 µA + 8.1 µA/mA	
	(0.1 to 1) A		
	(10 to 20) Hz	0.49 % of reading	
	(20 to 45) Hz	0.21 % of reading	
	(45 to 100) Hz	0.12 % of reading	
	100 Hz to 5 kHz	0.15 % of reading	
	(5 to 20) kHz	0.4 % of reading	
	(20 to 50) kHz	1.3 % of reading	

Electrical – DC/Low Frequency[2]

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Resistance – Source [1]	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	98 µΩ 180 µΩ 280 µΩ 510 µΩ 1.7 mΩ 3.2 mΩ 13 mΩ 29 mΩ 130 mΩ 230 mΩ 1.4 Ω 2.7 Ω .022 kΩ 0.04 kΩ 0.4 kΩ 0.9 kΩ 11 kΩ	Fluke 5700A Series II Multiproduct Calibrator
Resistance – Source [1]	(1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	580 kΩ + 0.012 kΩ/ MΩ 580 kΩ + 0.13 kΩ/ MΩ 0.59 % of reading	Biddle 72-6345-1 Mega Deck Resistor
Resistance – Measure[1]	(0.001 to 100) mΩ	0.001 1 m Ω	HP 3458A Opt 002 Multimeter, Fluke 5700A Multiproduct Calibrator
Resistance – Measure[1]	100 mΩ to 10 Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1GΩ	0.057 mΩ + 0.019 mΩ/Ω 0.005 1 m Ω + 0.022 mΩ/ Ω 0.001 3 Ω + 0.012 Ω/ kΩ 0.002 Ω + 0.015 Ω/k Ω 0.001 9 % of reading 0.007 9 % of reading 0.059 % of reading 0.64 % of reading	HP 3458A Opt 002 Multimeter
Capacitance – Source[1] @ 1kHz	100 pF to 1.111 µF	0.000 045 µF + 0.000 57 µF/µF	GenRad 1423A Decade Capacitor

Electrical – DC/Low Frequency[2]

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Capacitance – Source[1]	DC and 50 Hz to 1kHz Up to 0.33 nF 0.33 nF to 32.99 nF 33 uF to 329.99 nF 0.33 uF to 3.299 uF DC and 50 Hz to 400Hz 3.3 µF to 32.99 µF DC and 50 Hz to 200 Hz 33 µF to 109.99 µF DC and 50 Hz to 100 Hz 110 µF to 1.1 mF	 0.009 9 nF + 0.005 2 nF/nF 0.009 9 nF + 0.005 2 nF/nF 0.003 5 nF/nF 0.42 F + 4.3 nF/ µF 6 nF + 4.7 nF/ µF 0.1 µF + 0.005 µF/ µF 10 µF/mF	Fluke 5500A Multiproduct Calibrator
Inductance – Source[1] @ 1kHz	100 µH, 1 kHz 100 mH, 1 kHz 1 H, 100 Hz	0.072 µH 0.025 mH 0.25 mH	GenRad 1482-B Inductor GenRad 1482-L Inductor GenRad 1482-P Inductor
Electrical Calibration of Thermocouple Indicating Devices	Type B (600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C Type C (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 316) °C Type E (-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C Type J (-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1 200) °C	 0.37 °C 0.29 °C 0.29 °C 0.31 °C 0.27 °C 0.27 °C 0.3 °C 0.43 °C 0.67 °C 0.41 °C 0.18 °C 0.17 °C 0.21 °C 0.24 °C 0.25 °C 0.18 °C 0.17 °C 0.22 °C 0.25 °C	Fluke 5500A Multiproduct Calibrator

Electrical – DC/Low Frequency[2]

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Electrical Calibration of Thermocouple Indicating Devices	Type K (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C Type L (-200 to -100) °C (-100 to 800) °C (800 to 900) °C Type N (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1 300) °C Type R (0 to 250) °C (250 to 400) °C (400 to 1 000) °C (1 000 to 1 767) °C Type S (0 to 250) °C (250 to 1 000) °C (1 000 to 1 400) °C (1 400 to 1 767) °C Type T (-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	 0.29 °C 0.19 °C 0.18 °C 0.27 °C 0.36 °C 0.34 °C 0.27 °C 0.22 °C 0.34 °C 0.21 °C 0.2 °C 0.22 °C 0.27°C 0.47 °C 0.3 °C 0.31 °C 0.36 °C 0.39 °C 0.31 °C 0.34 °C 0.4 °C 0.51 °C 0.23 °C 0.18 °C 0.2 °C	Fluke 5500A Multiproduct Calibrator

Electrical - RF/Microwave

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
RF Power - Power Meter Reference[1]	1 mW, 50 MHz	0.014 mW	HP 8902A Measuring Receiver with HP 11792A Power Sensor, Range Calibrator, Agilent 3458A
RF Absolute Power – Measure [1]	(-30 to 20) dBm 100 kHz to 4.2 GHz	0.042 dB	HP 8482A Power Sensor, HP 438A Power Meter
	(-30 to 20) dBm 10 MHz to 18 GHz	0.042 dB	HP 8481A Power Sensor, HP 438A Power Meter
RF Absolute Power – Measure [1]	(-30 to 20) dBm 50 MHz to 50 GHz	0.042 dB	Agilent 8487A Power Sensor, HP 438A Power Meter
RF Power – Source [1]	(-30 to 20) dBm 100 kHz to 20 MHz	1.1 dB	HP 3325B Signal Generator, Agilent 8487A Power Sensor, HP 438A Power Meter
	(-30 to 20) dBm 250 kHz to 3 GHz	1.1 dB	HP E4432B Signal Generator, Agilent 8487A, HP 438A Power Meter
	(-30 to 20) dBm 50 MHz to 18.6 GHz	1.1 dB	HP 8673C Signal Generator, Agilent 8487A Power Sensor, HP 438A Power Meter
	(-30 to 20) dBm 10 MHz to 40 GHz	1.1 dB	HP 83640B, Agilent 8487A Power Sensor, HP 438A Power Meter
Tuned RF Level [1]	2.5 MHz to 26.5 GHz (-22 to +10) dB (-42 to -22) dB (-50 to -42) dB (-60 to -50) dB (-72 to -60) dB (-80 to -72) dB (-92 to -80) dB (-102 to -92) dB (-110 to -102) dB (-120 to -110) dB (-127 to -120) dB	0.14 dB	HP 8902A Measuring Receiver with 11792A, 11973A, and 11722A Power Sensors

Electrical - RF/Microwave

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Distortion - Measure [1,3] Fundamental Frequency	(-110 to 20) dB 20 Hz to 20 kHz (20 to 100) kHz	 1.3 dB 2.6 dB	HP 8902A Measuring Receiver
RF Harmonic Distortion [1]	Up to 26 GHz (-60 to 10) dB	1.2 dB	HP 8590L, HP 8562A Spectrum Analyzers
Spurious Signals [1]	Up to 26 GHz (-60 to 10) dB	1.2 dB	
Amplitude Modulation [1]	Depth to 99 % Rates 50 Hz to 50 kHz Freq 150 kHz to 1.3 GHz	3.6 % Depth	HP 8902A Measuring Receiver
Frequency Modulation [1]	Freq 250 kHz to 1.3 GHz Rates 20 Hz to 100 kHz	0.14 kHz + 0.22 kHz/kHz	HP 8902A Measuring Receiver

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Gage Blocks[4]	(0.01 to 4) in	(3.9 + 2.3L) µin	Grade 1 Gage Blocks, Gage Block Comparator
	(4 to 10) in	(4.5 + 2.7L) µin	Grade 0 & 1 Gage Blocks, Long Gage Block Comparator
Height Gages [1,4]	Up to 35 in	(840 + 13L) µin	Gage Blocks, End Measuring Rods
Calipers [1,4]	Up to 35 in	(850 + 11L) µin	Gage Blocks, End Measuring Rods
Micrometers [1,4]	Up to 1 in (1 to 6) in	8.1 µin (4.6+ 1.6L) µin	Gage Blocks, End Measuring Rods
Micrometer Anvil Flatness	(0 to 100) µin	5.9 µin	Optical Flat, Monochromatic Light
Dial/Digital Indicators [1]	Up to 3 in	20 µin	Gage Blocks
Surface Plates [1,4] Overall Flatness	Up to 34 in$D$	110 µin	Planekator
	(34 to 170) in$D$	220 µin	Electronic Levels
Surface Plates [1,4] Local Area Flatness	(0 to 0.001) in	20 µin	Repeat-O-Meter

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Cylindrical OD	(0.01 to 1) in (1 to 4) in (4 to 8) in	15 µin 34 µin 74 µin	Supermicrometer, Gage Blocks
Cylindrical ID[4]	0.04 to 8 in	(7.3 + 2.3*L*) µin	Internal Comparator, Gage Blocks
Thread Plug Gages Major Diameter Pitch Diameter 4 to 80 TPI, M.24 to 4	(0.06 to 8) in (0.05 to 7.96) in	16 µin + 0.44 µin/in 100 µin	Supermicrometer, Gage Blocks, Thread Wires

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Mass	(1 to 1 000) mg 1 g (2 to 3) g 4 g (5 to 6) g 10 g (20 to 50) g	42 µg 40 µg 78 µg 0.1 mg 42 µg 78 µg 50 µg	Analytical Balances Class 1 Weights
Pressure [1]	(50 to 15 000) psi	0.006 4 psi	DHI Deadweight Pressure System
Torque Transducers	(up to 40) ozf·in (75 to 750) lbf·in (50 to 500) lbf·ft (100 to 1 000) lbf·ft	0.12 ozf·in 0.19 lbf·in 0.26 lbf·ft 0.43 lbf·ft	Weights, Butterfly Wheels, 40 in Torque Arm
Torque Wrenches, Screwdrivers and Watches[1]	(0.5 to 215) ozf·in (75 to 750) lbf·in (50 to 500) lbf·ft (100 to 1 000) lbf·ft	0.59 ozf·in + 0.003 6 ozf·in/ozf·in 0.059 lbf·in + 0.005 7 lbf·in/lbf·in 0.16 lbf·ft + 0.005 5 lbf·ft/lbf·ft 0.61 lbf·ft + 0.005 3 lbf·ft/lbf·ft	Torque Transducers
Force [1] Compression / Tension Source and Measure	(200 to 2 000) lbf (230 to 2 000) lbf (2 000 to 10 000) lbf	1.3 lbf 1.4 lbf 24 lbf	Morehouse Proving Rings

Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Humidity Source and Measure	(15 to 80) %RH	0.95 %RH + 0.19 % of reading	Rotronic, HygroPalm Luneaire Environmental Chamber
Temperature Source and Measure	-77 °C (-40 to 150) °C (-150 to 300) °C	0.094 °C 0.058 °C 0.067 °C + 0.006 9 % of reading	Dry Ice/ Alcohol Bath Ice Bath, Thermotron Chamber, Hart Scientific 5309 Bath

Time and Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Frequency – Source [1]	Fixed 10 MHz	0.006 5 µHz	HP 58503A GPS Receiver
Frequency – Source and Measure [1]	50 µHz to 500 MHz 500 MHz to 40 GHz	0.58 µHz + 0.002 6 µHz/Hz 6.6 Hz + 0.047 Hz/GHz	HP 58503A GPS Receiver, HP3325B, HP E4432A, HP 8673A Signal Generators, HP 83640B, HP 5345A, HP 5352A Counters

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. Electromagnetic uncertainties do not include possible contributions to uncertainty caused by a “best available” unit under test.
3. RF/Microwave uncertainties do not include mismatch.
4. The term (L) represents Length and (D) represents Diagonal Length, both in inches, the term (I) refers to Applied Current., The expression (Vin) signifies Applied Voltage.
5. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1215.

Vice President