



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

**Martin Calibration, LLC. dba Precision
Technical Services**

**8240 South Kyrene Road, Suite 105
Tempe, AZ 85284**

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540.3-2006 (R2013)

In the fields 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.

Jason Stine, Vice President

Expiry Date: 30 December 2026

Certificate Number: L2272



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 Z540.3-2006 (R2013)

Martin Calibration, LLC. dba Precision Technical Services

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CALIBRATION AND DIMENSIONAL MEASUREMENT

ISO/IEC 17025 Accreditation Granted: **30 December 2024**

Certificate Number: **L2272**

Certificate Expiry Date: **30 December 2026**

Electrical – DC/Low Frequency

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 kV	12 μ V/V + 0.3 μ V 10 μ V/V + 0.3 μ V 10 μ V/V + 0.5 μ V 13 μ V/V + 30 μ V 13 μ V/V + 100 μ V	Comparison to Keysight 3458A Multimeter
DC Current Measure ¹	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV	12 μ V/V + 0.3 μ V 10 μ V/V + 0.3 μ V 10 μ V/V + 0.5 μ V 13 μ V/V + 30 μ V 13 μ V/V + 100 μ V	Comparison to Keysight 3458A Multimeter
DC Voltage – Source ¹	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (330 to 1 020) V	21 μ V/V + 1 μ V 11 μ V/V + 2 μ V 13 μ V/V + 20 μ V 18 μ V/V + 150 μ V 18 μ V/V + 1.5 mV	Comparison to 5520A Multi Product Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Source ¹	Up to 330 μ A 330 μ A 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) A	151 μ A/A + 20 nA 101 μ A/A + 50 nA 101 μ A/A + 250 nA 102 μ A/A + 2.5 μ A 201 μ A/A + 40 μ A 386 μ A/A + 40 μ A 504 μ A/A + 0.5 mA 1 mA/A + 0.75 mA	Comparison to 5520A Multi Product Calibrator
AC Voltage – Source	Up 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 330 mV 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	806 μ V/V + 6 μ V 176 μ V/V + 6 μ V 220 μ V/V + 6 μ V 1 mV/V + 6 μ V 3.5 mV/V + 12 μ V 8 mV/V + 50 μ V 302 μ V/V + 8 μ V 148 μ V/V + 8 μ V 163 μ V/V + 8 μ V 353 μ V/V + 8 μ V 804 μ V/V + 32 μ V 2 mV/V + 70 μ V 302 μ V/V + 50 μ V 153 μ V/V + 60 μ V 192 μ V/V + 60 μ V 302 μ V/V + 50 μ V 703 μ V/V + 125 μ V 2.4 mV/V + 0.6 mV 302 μ V/V + 650 μ V 153 μ V/V + 600 μ V 242 μ V/V + 600 μ V 353 μ V/V + 600 μ V 903 μ V/V + 1.6 mV	Comparison to 5520A Multi Product Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source	(33 to 330) V 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	194 $\mu\text{V/V} + 2 \text{ mV}$ 204 $\mu\text{V/V} + 6 \text{ mV}$ 253 $\mu\text{V/V} + 6 \text{ mV}$ 314 $\mu\text{V/V} + 6 \text{ mV}$ 2 mV/V + 50 mV	Comparison to 5520A Multi Product Calibrator
	(330 to 1020) V 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	302 $\mu\text{V/V} + 10 \text{ mV}$ 252 $\mu\text{V/V} + 10 \text{ mV}$ 302 $\mu\text{V/V} + 10 \text{ mV}$	
AC Voltage – Measure	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	300 $\mu\text{V/V} + 3 \mu\text{V}$ 219 $\mu\text{V/V} + 1.1 \mu\text{V}$ 324 $\mu\text{V/V} + 1.1 \mu\text{V}$ 1 mV/V + 6 μV 5.1 mV/V + 1.1 μV 41 mV/V + 2 μV	Comparison to Keysight 3458A Multimeter
	(10 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 1 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	70 $\mu\text{V/V} + 4 \mu\text{V}$ 83.8 $\mu\text{V/V} + 2 \mu\text{V}$ 157 $\mu\text{V/V} + 2 \mu\text{V}$ 308 $\mu\text{V/V} + 2 \mu\text{V}$ 878 $\mu\text{V/V} + 2 \mu\text{V}$ 3.1 mV/V + 10 μV 10 mV/V + 10 μV 15 mV/V + 10 μV 70 $\mu\text{V/V} + 40 \mu\text{V}$ 80.7 $\mu\text{V/V} + 20 \mu\text{V}$ 154 $\mu\text{V/V} + 20 \mu\text{V}$ 327 $\mu\text{V/V} + 20 \mu\text{V}$ 825 $\mu\text{V/V} + 20 \mu\text{V}$ 3.1 mV/V + 0.1 mV 10 mV/V + 0.1 mV 15 mV/V + 0.1 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	(1 to 10) V		Comparison to Keysight 3458A Multimeter
	(1 to 40) Hz	77 $\mu\text{V/V} + 400 \mu\text{V}$	
	40 Hz to 1 kHz	81 $\mu\text{V/V} + 200 \mu\text{V}$	
	(1 to 20) kHz	154 $\mu\text{V/V} + 200 \mu\text{V}$	
	(20 to 50) kHz	324 $\mu\text{V/V} + 200 \mu\text{V}$	
	(50 to 100) kHz	816 $\mu\text{V/V} + 200 \mu\text{V}$	
	(100 to 300) kHz	3.1 mV/V + 1 mV	
	300 kHz to 1 MHz	10 mV/V + 1 mV	
	(1 to 2) MHz	15 mV/V + 1 mV	
	(10 to 100) V		
	(1 to 40) Hz	200 $\mu\text{V/V} + 4 \text{ mV}$	
	40 Hz to 1 kHz	205 $\mu\text{V/V} + 2 \text{ mV}$	
	(1 to 20) kHz	215 $\mu\text{V/V} + 2 \text{ mV}$	
	(20 to 50) kHz	358 $\mu\text{V/V} + 2 \text{ mV}$	
	(50 to 100) kHz	1.2 mV/V + 2 mV	
	(100 to 300) kHz	4 mV/V + 2 mV	
	300 kHz to 1 MHz	15 mV/V + 10 mV	
	(100 to 1 000) V		
	(1 to 40) Hz	400 $\mu\text{V/V} + 40 \text{ mV}$	
	40 Hz to 1 kHz	405 $\mu\text{V/V} + 20 \text{ mV}$	
	(1 to 20) kHz	600 $\mu\text{V/V} + 20 \text{ mV}$	
	(20 to 50) kHz	1.2 mV/V + 20 mV	
	(50 to 100) kHz	3 mV/V + 20 mV	
AC Current – Measure	Up to 100 μA		Comparison to Keysight 3458A Multimeter
	(10 to 20) Hz	4 mA/A + 30 nA	
	(20 to 45) Hz	1.5 mA/A + 30 nA	
	(45 to 100) Hz	605 $\mu\text{A/A} + 30 \text{ nA}$	
	100 Hz to 1 kHz	610 $\mu\text{A/A} + 30 \text{ nA}$	
	100 μA to 1 mA		
	(10 to 20) Hz	4 mA/A + 0.2 μA	
	(20 to 45) Hz	1.5 mA/A + 0.2 μA	
	(45 to 100) Hz	605 $\mu\text{A/A} + 0.2 \mu\text{A}$	
	100 Hz to 5 kHz	325 $\mu\text{A/A} + 0.2 \mu\text{A}$	
	(5 to 20) kHz	605 $\mu\text{A/A} + 0.2 \mu\text{A}$	
	(20 to 50) kHz	4 mA/A + 0.4 μA	
	(50 to 100) kHz	5.5 mA/A + 1.5 μA	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure	(1 to 10) mA		Comparison to Keysight 3458A Multimeter
	(10 to 20) Hz	4 mA/A + 2 μ A	
	(20 to 45) Hz	1.5 mA/A + 2 μ A	
	(45 to 100) Hz	605 μ A/A + 2 μ A	
	100 Hz to 5 kHz	325 μ A/A + 2 μ A	
	(5 to 20) kHz	605 μ A/A + 2 μ A	
	(20 to 50) kHz	4 mA/A + 4 μ A	
	(50 to 100) kHz	5.5 mA/A + 15 μ A	
	(10 to 100) mA		
	(10 to 20) Hz	4 mA/A + 20 μ A	
	(20 to 45) Hz	1.5 mA/A + 20 μ A	
	(45 to 100) Hz	605 μ A/A + 20 μ A	
	100 Hz to 5 kHz	325 μ A/A + 20 μ A	
	(5 to 20) kHz	605 μ A/A + 20 μ A	
	(20 to 50) kHz	4 mA/A + 40 μ A	
	(50 to 100) kHz	5.5 mA/A + 150 μ A	
	100 mA to 1 A		
	(10 to 20) Hz	4 mA/A + 0.2 mA	
	(20 to 45) Hz	1.6 mA/A + 0.2 mA	
	(45 to 100) Hz	805 μ A/A + 0.2 mA	
	100 Hz to 5 kHz	1 mA/A + 0.2 mA	
	(5 to 20) kHz	3 mA/A + 0.2 mA	
	(20 to 50) kHz	10 mA/A + 0.4 mA	
AC Current – Source	(29 to 330) μ A		Comparison to 5520A Multi Product Calibrator
	(10 to 20) Hz	2 mA/A + 0.1 μ A	
	(20 to 45) Hz	1.5 mA/A + 0.1 μ A	
	45 Hz to 1 kHz	1.3 mA/A + 0.1 μ A	
	(1 to 5) kHz	3 mA/A + 0.15 μ A	
	(5 to 10) kHz	8 mA/A + 0.2 μ A	
	(10 to 30) kHz	16 mA/A + 0.4 μ A	
	(0.33 to 3.3) mA		
	(10 to 20) Hz	2 mA/A + 0.15 μ A	
	(20 to 45) Hz	1.3 mA/A + 0.15 μ A	
	45 Hz to 1 kHz	1 mA/A + 0.15 μ A	
	(1 to 5) kHz	2 mA/A + 0.2 μ A	
	(5 to 10) kHz	5.1 mA/A + 0.3 μ A	
	(10 to 30) kHz	10 mA/A + 0.6 μ A	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source	(3.3 to 33) mA		Comparison to 5520A Multi Product Calibrator
	(10 to 20) Hz	1.8 mA/A + 2 μ A	
	(20 to 45) Hz	910 μ A/A + 2 μ A	
	45 Hz to 1 kHz	423 μ A/A + 2 μ A	
	(1 to 5) kHz	813 μ A/A + 2 μ A	
	(5 to 10) kHz	2 mA/A + 3 μ A	
	(10 to 30) kHz	4.1 mA/A + 4 μ A	
	(33 to 330) mA		
	(10 to 20) Hz	1.8 mA/A + 20 μ A	
	(20 to 45) Hz	909 μ A/A + 20 μ A	
	45 Hz to 1 kHz	417 μ A/A + 20 μ A	
	(1 to 5) kHz	1 mA/A + 50 μ A	
	(5 to 10) kHz	2 mA/A + 100 μ A	
	(10 to 30) kHz	4.1 mA/A + 200 μ A	
	(0.33 to 1.1) A		
	(10 to 45) Hz	1.8 mA/A + 100 μ A	
	45 Hz to 1 kHz	512 μ A/A + 100 μ A	
	(1 to 5) kHz	6 mA/A + 1 mA	
	(5 to 10) kHz	25 mA/A + 5 mA	
	(1.1 to 3) A		
	(10 to 45) Hz	1.8 mA/A + 100 μ A	
	45 Hz to 1 kHz	664 μ A/A + 100 μ A	
	(1 to 5) kHz	6 mA/A + 1 mA	
	(5 to 10) kHz	25 mA/A + 5 mA	
	(3 to 11) A		
	(45 to 100) Hz	1.8 mA/A + 100 μ A	
	100 Hz to 1 kHz	664 μ A/A + 100 μ A	
	(1 to 5) kHz	6 mA/A + 1 mA	
	(11 to 20.5) A		
	(45 to 100) Hz	1.2 mA/A + 5 mA	
	100 Hz to 1 kHz	1.5 mA/A + 5 mA	
	(1 to 5) kHz	30 mA/A + 5 mA	
Resistance – Source ¹	Up to 11 Ω	36 $\mu\Omega/\Omega$	Comparison to 5520A Multi Product Calibrator
	(11 to 33) Ω	26 $\mu\Omega/\Omega$	
	(33 to 110) Ω	23 $\mu\Omega/\Omega$	
	(110 to 330) Ω	23 $\mu\Omega/\Omega$	
	330 Ω to 1.1 k Ω	23 $\mu\Omega/\Omega$	
	(1.1 to 3.3) k Ω	23 $\mu\Omega/\Omega$	
	(3.3 to 11) k Ω	23 $\mu\Omega/\Omega$	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Source ¹	(11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ to 1.1 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ 330 MΩ to 1.1 GΩ	23 μΩ/Ω 24 μΩ/Ω 26 μΩ/Ω 26 μΩ/Ω 42 μΩ/Ω 110 μΩ/Ω 201 μΩ/Ω 400 μΩ/Ω 2.5 mΩ/Ω 12 mΩ/Ω	Comparison to 5520A Multi Product Calibrator
Resistance – Measure ¹	100 μΩ 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	20 μΩ/Ω + 50 μΩ 17 μΩ/Ω + 5 μΩ 15 μΩ/Ω + 500 μΩ 15 μΩ/Ω + 5 mΩ 15 μΩ/Ω + 50 mΩ 20 μΩ/Ω + 2 Ω 83 μΩ/Ω + 100 Ω 820 μΩ/Ω + 1 kΩ	Comparison to Keysight 3458A Multimeter
Capacitance – Source	10 Hz to 10 kHz (220 to 400) pF (0.4 to 1.1) nF 10 Hz to 3 kHz (1.1 to 3.3) nF 10 Hz to 1 kHz (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF (10 to 600) Hz (0.33 to 1.1) μF (10 to 300) Hz (1.1 to 3.3) μF (10 to 150) Hz (3.3 to 11) μF	6.4 mF/F + 10 pF 5.3 mF/F + 10 pF 5.1 mF/F + 10 pF 2.6 mF/F + 10 pF 2.6 mF/F + 100 pF 2.6 mF/F + 100 pF 2.6 mF/F + 300 pF 2.6 mF/F + 1 nF 2.6 mF/F + 3 nF 2.6 mF/F + 10 nF	Comparison to 5522A Multi Product Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Capacitance – Source	(10 to 120) Hz (11 to 33) μ F (10 to 80) Hz (33 to 110) μ F (0 to 50) Hz (110 to 330) μ F (0 to 20) Hz (0.33 to 1.1) mF (0 to 6) Hz (1.1 to 3.3) mF (0 to 2) Hz (3.3 to 11) mF (0 to 0.6) Hz (11 to 33) mF (0 to 0.2) Hz (33 to 110) mF	4.1 mF/F + 30 nF 4.7 mF/F + 0.1 μ F 4.6 mF/F + 0.3 μ F 4.6 mF/F + 1 μ F 4.5 mF/F + 3 μ F 4.5 mF/F + 10 μ F 7.5 mF/F + 30 μ F 11 mF/F + 100 μ F	Comparison to 5520A Multi Product Calibrator
Electrical Simulation of Thermocouple Indicating Devices – Source 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 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	0.44 °C 0.34 °C 0.3 °C 0.33 °C 0.3 °C 0.26 °C 0.31 °C 0.5 °C 0.84 °C 0.5 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C 0.27 °C 0.16 °C 0.14 °C 0.17 °C 0.23 °C	Comparison to 5520A Multi Product Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Measure ¹	Type K		Comparison to 5520A Multi Product Calibrator
	(-200 to -100) °C	0.33 °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	0.37 °C	
	(-100 to 800) °C	0.26 °C	
	(800 to 900) °C	0.17 °C	
	Type N		
	(-200 to -100) °C	0.4 °C	
	(-100 to - 25) °C	0.22 °C	
	(-25 to 120) °C	0.19 °C	
	(120 to 410) °C	0.18 °C	
	(410 to 1 300) °C	0.27 °C	
	Type R		
	(0 to 250) °C	0.57 °C	
	(250 to 400) °C	0.35 °C	
	(400 to 1 000) °C	0.33 °C	
	(1 000 to 1 767) °C	0.4 °C	
	Type S		
	(0 to 250) °C	0.47 °C	
	(250 to 400) °C	0.36 °C	
	(400 to 1 000) °C	0.37 °C	
	(1 000 to 1 767) °C	0.46 °C	
	Type T		
	(-250 to -150) °C	0.63 °C	
	(-150 to 0) °C	0.24 °C	
	(0 to 120) °C	0.16 °C	
	(120 to 400) °C	0.14 °C	
	Type U		
	(-200 to 0) °C	0.56 °C	
	(0 to 600) °C	0.27 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicators ¹	Pt 385, 100 Ω		Comparison to 5520A Multi Product Calibrator
	(-200 to -80) °C	0.05 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.07 °C	
	(100 to 300) °C	0.09 °C	
	(300 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 -80) °C	0.05 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.07 °C	
	(100 to 300) °C	0.09 °C	
	(300 to 400) °C	0.1 °C	
	(400 to 630) °C	0.12 °C	
	Pt 3916, 100 Ω		
	(-200 to -190) °C	0.25 °C	
	(-190 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.06 °C	
	(100 to 260) °C	0.07 °C	
	(260 to 300) °C	0.08 °C	
	(300 to 400) °C	0.09 °C	
	(400 to 600) °C	0.1 °C	
	(600 to 630) °C	0.23 °C	
	Pt 385, 200 Ω		
	(-200 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.04 °C	
	(0 to 100) °C	0.04 °C	
	(100 to 260) °C	0.05 °C	
	(260 to 300) °C	0.12 °C	
	(300 to 400) °C	0.13 °C	
	(400 to 600) °C	0.14 °C	
	(600 to 630) °C	0.16 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicators ¹	Pt 385, 500 Ω		Comparison to 5520A Multi Product Calibrator
	(-200 to -80) °C	0.04 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.05 °C	
	(100 to 260) °C	0.06 °C	
	(260 to 300) °C	0.08 °C	
	(300 to 400) °C	0.08 °C	
	(400 to 600) °C	0.09 °C	
	(600 to 630) °C	0.11 °C	
	Pt 385, 1 000 Ω		
	(-200 to -80) °C	0.03 °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	0.06 °C	
	(300 to 400) °C	0.07 °C	
	(400 to 600) °C	0.07 °C	
	Pt 385, 1 000 Ω		
	(600 to 630) °C	0.23 °C	
	PtNi 385, 120 Ω (Ni120)		
	(-80 to 0) °C	0.08 °C	
	(0 to 100) °C	0.08 °C	
	(100 to 260) °C	0.14 °C	
	Cu 427, 10 Ω		
	(100 to 260) °C	0.3 °C	

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Gage Blocks ²	(0.004 to 20) in	$(1.4 + 1.4L) \mu\text{in}$	Comparison to Master Blocks, ULM
External Diameters	(0.002 to 12) in	$(3 + 3L) \mu\text{in}$	Comparison to Labmaster
Internal Diameters	(0.040 to 13) in	$(3 + 3L) \mu\text{in}$	Comparison to Labmaster

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Thread Rings (Adjustable) Pitch Diameter Tactile Fit (Set to Plug)	Up to 4 in	See footnote 3	Comparison to Thread Setting Plugs
Thread Plugs ^{1,2} Pitch Diameter Major Diameter	Up to 8 in Pitch (0.2 to 5) mm Up to 8 in Pitch 90 – 4 TPI	$(87 + 1.9L) \mu\text{in}$ 43 μin	Comparison to Horizontal Measuring Machine Thread Wires
Calipers ^{1,2}	Up to 60 in	$(5+8L) \mu\text{in}$	Comparison to Gage Blocks
Outside Micrometer ^{1,2} Length Anvil Flatness	Up to 60 in (0 to 50) μin	$(5+8L) \mu\text{in}$ 4 μin	Comparison to Gage Blocks Optical Parallels
Micrometer Head Travel	Up to 4 in	$(8+4L) \mu\text{in}$	Comparison to Horizontal Measuring System-Gage Blocks
Height Measuring Devices ^{1,2}	Up to 36 in (36 to 48) in	$(45 + 2L) \mu\text{in}$ $(7 + 3L) \mu\text{in}$	Comparison to Gage Blocks
Depth Micrometers ¹	(0 to 12) in	90 μin	Comparison to Gage Blocks
Inside Micrometers ²	(0.5 to 8) in (8 to 24) in	$(6 + 1.7L) \mu\text{in}$ $(3 + 2.5L) \mu\text{in}$	Comparison to Mitutoyo LH-600D Linear Height Gage, ULM
Indicators ^{1,2}	(0.000 1 to 6) in	$(5+4L) \mu\text{in}$	Comparison to Horizontal Measuring Machine
Bore Gages ² 2-point	(0.24 to 9) in	$(4.3 + 4.7L) \mu\text{in} + 0.6R$	Comparison to Horizontal Measuring Machine
Bore Gages ² 3-point	(0.24 to 9) in	$(85 + 7L) \mu\text{in} + 0.6R$	Comparison to Cylindrical Rings
Crimp Tools ¹	(0.011 to 1.00) in	182 μin	Comparison to Crimp Height Micrometer
Crimp Tools ¹	(0.011 to 1.00) in	224 μin	Comparison to Plug Gages
Surface Roughness	Up to 118 μin (118.1 to 500) μin	0.5 $\mu\text{in} + 1\%$ of nominal 0.6 $\mu\text{in} + 1.1\%$ of nominal	Comparison to Profilometer, Master Patch
Profilometers	Up to 500 μin	0.7 $\mu\text{in} + 1.1\%$ of nominal	Comparison to Master Patch

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Length Standards	(1 to 24) in	$(3.4 + 3.5L) \mu\text{in}$	Comparison to Mitutoyo LH-600D Linear Height Gage, ULM
Feeler/Thickness Gages ²	Up to 1.0 in	8 μin	Comparison to Horizontal Measuring System
Graduated Scales	Up to 72 in	1 600 μin	Comparison to Master and Eye Lupe
Thickness Gages Dial Digital	Up to 1 in	410 $\mu\text{in} + 0.6R$ 44 $\mu\text{in} + 0.6R$	Comparison to Gage Blocks
VMMs	Linearity	$(32 + 4.1L) \mu\text{in}$	Comparison to Glass Scales
CMMs ^{1,2} Linearity Volumetric Repeatability	(0.100 to 20) in (1 to 24) in (0.5 to 2) in	$(22 + 3L) \mu\text{in}$ 66 μin 45 μin	Comparison to Gage Blocks Ball Bar CMM Sphere

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure ¹	(8.7 to 16) psia	0.002 2 psi	Comparison to Pressure Calibrator
Pressure	(-14.5 to 1 000) psig (1 000 to 3 000) psig (3 000 to 10 000) psig (10 000 to 30 000) psig	0.01 psi + 0.01 % of reading 0.1 psi + 0.01 % of reading 0.25 psi + 0.01 % of reading 35 psi	Comparison to Pressure Calibrator
Mass Flow (Gas)	(5 to 30 000) SCCM (30 000 to 50 000) SCCM	0.93 % of reading 1.2 % of reading	Comparison to Mesa Flow System Alicat Flow Cell
Torque Tools ¹	(5 to 50) lbf·in (50 to 400) lbf·in (400 to 1 000) lbf·in (80 to 250) lbf·ft (250 to 600) lbf·ft (600 to 2 000) lbf·ft	0.4 % of reading 0.4 % of reading 0.4 % of reading 0.4 % of reading 0.4 % of reading 0.4 % of reading	Comparison to Torque Tester

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Force Source and Measure	(20 to 2 000) lb	1 % of applied value	Comparison to Load Cell
Cable Tensiometers	(20 to 2 000) lb	1.3 % of applied value	Comparison to Load Cells

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Relative Humidity - Source and Measure	(10 to 65) %RH (65 to 95) %RH	1.1 %RH 1.1 %RH	Comparison to a Rotronic HF532 Indicator and Probe
Infrared Thermometers	50 °C (50 to 100) °C (100 to 200) °C (200 to 300) °C (300 to 400) °C (400 to 500) °C	0.73 °C 1.6 °C 3.2 °C 4.9 °C 6.6 °C 8.5 °C	Comparison to Blackbody Calibrator (Flat-Plate) $\lambda = (8 \text{ to } 14) \mu\text{m}$ $\varepsilon = 0.95$ (non-selectable)
Temperature Measure and Source	(-200 to 1 372) °C	1.3 °C	Comparison to Process Calibrator and Thermocouple
Temperature Measure and Source	(0 to 400) °C	0.084 °C + 0.0013 °C /°C	Comparison to Precision RTD and Readout
Temperature Uniformity Surveys	(-200 to 0) °C (0 to 1 093) °C (1 093 to 1 344) °C	1.2 °C 1.3 °C 2.1 °C	Comparison to Datalogger and Thermocouples per AMS 2750F and BAC 5621

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency - Source	(0.01 to 120) Hz 120 Hz 120 kHz 120 kHz to 2 MHz 2 MHz to 1.1 GHz	2.66 $\mu\text{Hz}/\text{Hz}$ + 5 μHz 2.51 $\mu\text{Hz}/\text{Hz}$ + 5 μHz 2.54 $\mu\text{Hz}/\text{Hz}$ + 5 μHz 2.5 $\mu\text{Hz}/\text{Hz}$	Comparison to Fluke 5520A Multiproduct Calibrator

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Time	(2 to 86 000) s/day	31 ms/day	Comparison to Helmut Klein 4500 Timometer



DIMENSIONAL MEASUREMENT

2 Dimensional

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Angle	(0.25 to 365)°	0.000 69° (12 µin/µin)	Comparison to Gage Blocks, Gage Amplifier, Sine Bar
Angle	(0.25 to 365)°	0.004°	Comparison to Coordinate Measuring Machine
Dimensional Inspection - Non-contact	(12 x 8 x 4)	(44 + 1L) µin	Comparison to Vision System
Roundness/Concentricity	Up to 150 mm	0.02 mm	Comparison to Rondcom41c Roundness Measuring Instrument
Surface Finish Analysis	Up to 118 µin (118.1 to 500) µin	0.05 µin + 1 % of nominal 0.6 µin + 1.1 % of nominal	Comparison to Profilometer, Master Patch

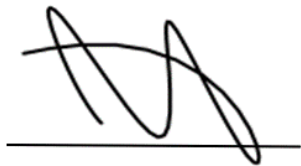
3 Dimensional

Specific Tests and / or Properties Measured	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Dimensional Inspection - contact	(16 x 18 x 14) in	(209 + 1.2L) µin	Comparison to Coordinate Measuring Machine

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. L = length in inches.
3. The tactile fit of an adjustable thread ring to a thread-setting plug is not a measurement of pitch diameter. The uncertainty for this pitch diameter setting is based on the contributors associated with the thread setting plug and environmental contributors only.



Jason Stine, Vice President