



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

McCune's Instruments, Inc.
108 North Lee Street
Spokane, WA 99202

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

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.

A handwritten signature in black ink, appearing to read 'R. Douglas Leonard Jr.', is positioned above a horizontal line.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 12 May 2023

Certificate Number: AC-2048



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)**

McCune's Instruments, Inc.
108 North Lee Street
Spokane, WA 99202
Mike McCune Phone: 509-534-7774

CALIBRATION

Valid to: **May 12, 2023**

Certificate Number: **AC-2048**

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---|---------------------|---|--|
| Thermocouple mV Simulation ^{1,3} | Type B | | Fluke 5520A Multi Product Calibrator |
| | (600 to 800) °C | 0.44 °C | |
| | (800 to 1 000) °C | 0.34 °C | |
| | (1 000 to 1 550) °C | 0.3 °C | |
| | (1 550 to 1 820) °C | 0.33 °C | |
| | Type C | | |
| | (0 to 150) °C | 0.3 °C | |
| | (150 to 650) °C | 0.26 °C | |
| | (650 to 1 000) °C | 0.31 °C | |
| | (1 000 to 1 800) °C | 0.5 °C | |
| | (1 800 to 2 316) °C | 0.84 °C | |
| | Type E | | |
| | (-250 to -100) °C | 0.5 °C | |
| | (-100 to -25) °C | 0.16 °C | |
| | (-25 to 350) °C | 0.14 °C | |
| | (350 to 650) °C | 0.16 °C | |
| | (650 to 1 000) °C | 0.21 °C | |
| | Type J | | |
| (-210 to -100) °C | 0.27 °C | | |
| (-100 to -30) °C | 0.16 °C | | |
| (-30 to 150) °C | 0.14 °C | | |
| (150 to 760) °C | 0.17 °C | | |
| (760 to 1 200) °C | 0.23 °C | | |

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---|---|--|--|
| Thermocouple mV Simulation ^{1,3} | 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 | 0.33 °C 0.18 °C 0.16 °C 0.26 °C 0.4 °C 0.37 °C 0.26 °C 0.17 °C 0.4 °C 0.22 °C 0.19 °C 0.18 °C 0.27 °C 0.57 °C 0.35 °C 0.33 °C 0.4 °C 0.47 °C 0.36 °C 0.37 °C 0.46 °C 0.63 °C 0.24 °C 0.16 °C 0.14 °C | Fluke 5520A Multi Product Calibrator |
| DC Voltage Generate ^{1,3} | (0 to 329.999) mV (0.33 to 3.2999) V (3.3 to 32.999) V (33 to 329.999) V (100 to 1 000) V | 20 μV/V + 1 μV 11 μV/V + 2 μV 12 μV/V + 20 μV 18 μV/V + 150 μV 18 μV/V + 1.5mV | Fluke 5520A Multi Product Calibrator |
| DC Voltage Measure ^{1,3} | Up to 202 mV 200 mV to 2.02 V (2 to 20.2) V (20 to 202) V (200 to 1 050) V | 7.5 μV/V + 0.4 μV 4 μV/V + 0.6 μV 4 μV/V + 1 μV 6.5 μV/V + 61 μV 6.7 μV/V + 0.53 mV | Multimeter |



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|------------------------------------|---|--|--|
| DC Voltage Measure ^{1,3} | Up to 20 kV (20 to 70) kV | 0.26 % of reading + 2 V 0.55 % of reading | High Voltage Meter |
| AC Voltage Generate ^{1,3} | (1 to 32.999) 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 | 800 μV/V + 6 μV 150 μV/V + 6 μV 200 μV/V + 6 μV 0.1% of reading + 6 μV 0.35 % of reading + 12 μV 0.8 % of reading + 50 μV | Fluke 5520A Multi Product Calibrator |
| AC Voltage Generate ^{1,3} | (33 to 329.999) 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 0.33 to 3.299 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 32.999) V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (33 to 329.999) V 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (330 to 1 020) V 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz | 300 μV/V + 8 μV 145 μV/V + 8 μV 160 μV/V + 8 μV 350 μV/V + 8 μV 800 μV/V + 32 μV 0.2 % of reading + 70 μV 300 μV/V + 50 μV 150 μV/V + 60 μV 190 μV/V + 60 μV 300 μV/V + 50 μV 700 μV/V + 125 μV 0.24 % of reading + 600 μV 300 μV/V + 650 μV 150 μV/V + 600 μV 240 μV/V + 600 μV 350 μV/V + 600 μV 900 μV/V + 1.6 mV 190 μV/V + 2 mV 200 μV/V + 6 mV 250 μV/V + 6 mV 300 μV/V + 6 mV 0.2 % of reading + 50 mV 300 μV/V + 10 mV 250 μV/V + 10 mV 300 μV/V + 10 mV | Fluke 5520A Multi Product Calibrator |



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|-----------------------------------|--|---|--|
| AC Voltage Measure ^{1,3} | Up to 12mV | | Multimeter |
| | 1 Hz to 2 kHz | 290 $\mu\text{V/V}$ + 1.3 μV | |
| | (2 to 10) kHz | 370 $\mu\text{V/V}$ + 1.3 μV | |
| | (10 to 30) kHz | 380 $\mu\text{V/V}$ + 1.3 μV | |
| | (30 to 100) kHz | 0.3 % + 1.3 μV | |
| | (100 to 300) kHz | 1 % of reading + 4.8 mV | |
| | 300 kHz to 1MHz | 2 % of reading + 4.8 mV | |
| | (12 to 121) mV | | |
| | 1 Hz to 2 kHz | 88 $\mu\text{V/V}$ + 0.61 μV | |
| | (2 to 10) kHz | 130 $\mu\text{V/V}$ + 0.61 μV | |
| | (10 to 30) kHz | 230 $\mu\text{V/V}$ + 1.2 μV | |
| | (30 to 100) kHz | 530 $\mu\text{V/V}$ + 6 μV | |
| | (100 to 300) kHz | 0.21 % of reading + 36 μV | |
| | 300 kHz to 1 MHz | 1.1 % of reading + 0.12 mV | |
| | (1 to 2) MHz | 1.5 % of reading + 0.6 mV | |
| | (2 to 4) MHz | 4.1 % of reading + 1.2 mV | |
| | (4 to 8) MHz | 8.4 % of reading + 1.2 mV | |
| | (8 to 10) MHz | 16 % of reading + 1.2 mV | |
| | 120 mV to 1.212 V | | |
| | 1 Hz to 2 kHz | 76 $\mu\text{V/V}$ + 6 μV | |
| | (2 to 10) kHz | 122 $\mu\text{V/V}$ + 6 μV | |
| | (10 to 30) kHz | 230 $\mu\text{V/V}$ + 12 μV | |
| | (30 to 100) kHz | 530 $\mu\text{V/V}$ + 61 μV | |
| | (100 to 300) kHz | 0.21 % of reading + 0.36 mV | |
| | 300 kHz to 1 MHz | 1 % of reading + 1.2 mV | |
| | (1 to 2) MHz | 1.5 % of reading + 6.1 mV | |
| | (2 to 4) MHz | 4 % of reading + 1.2 mV | |
| | (4 to 8) MHz | 8.2 % of reading + 1.2 mV | |
| (8 to 10) MHz | 15 % of reading + 1.2 mV | | |
| (1.2 to 12.12) V | | | |
| 1 Hz to 2 kHz | 76 $\mu\text{V/V}$ + 61 μV | | |
| (2 to 10) kHz | 122 $\mu\text{V/V}$ + 61 μV | | |
| (10 to 30) kHz | 230 $\mu\text{V/V}$ + .12 mV | | |
| (30 to 100) kHz | 530 $\mu\text{V/V}$ + .61 mV | | |
| (100 to 300) kHz | 0.21 % of reading + 3.6 mV | | |
| 300 kHz to 1 MHz | 1 % of reading + 12 mV | | |
| (1 to 2) MHz | 1.5% of reading + 61 mV | | |
| (2 to 4) MHz | 4 % of reading + 0.12 V | | |
| (4 to 8) MHz | 8.2 % of reading + 0.12 V | | |
| (8 to 10) MHz | 15 % of reading + 0.12 V | | |

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---|--|--|---|
| AC Voltage Measure ^{1,3} | (12 to 121.2) V 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz | 90 μ V/V + 0.6 mV 110 μ V/V + 0.6 mV 230 μ V/V + 1.2 mV 510 μ V/V + 6mV 0.37% + 60 mV 1.1% + 0.6V | Multimeter |
| | (120 to 1 050) V 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz | 110 μ V/V + 0.026 V 110 μ V/V + 0.026 V 230 μ V/V + 0.026 V 590 μ V/V + 0.1 V | |
| AC Voltage Measure ^{1,3} | (1 to 20) kV (50 to 60) Hz | 0.7 % of reading + 16V 1.4 % of reading | Vitretek High Voltage Meter |
| | (20 to 50) kV (50 to 60) Hz | | |
| DC Current Generate ^{1,3} | (0 to 329.999) μ A | 150 μ A/A + 0.02 μ A | Fluke 5520A Multi Product Calibrator |
| | (0 to 3.299) mA | 100 μ A/A + 0.05 μ A | |
| | (0 to 32.999) mA | 100 μ A/A + 0.25 μ A | |
| | (0 to 329.999) mA | 100 μ A/A + 2.5 μ A | |
| | (0 to 1.099) A | 200 μ A/A + 40 μ A | |
| DC Current Generate ^{1,3} 20A Range | (1.1 to 2.99999) A | 380 μ A/A + 40 μ A | Fluke 5520A Multi Product Calibrator |
| | (0 to 10.999) A (11 to 20.5) A | 500 μ A/A + 500 μ A 0.1% of reading + 750 μ A | |
| DC Current Generate ^{1,3} | (20 to 150) A | 0.26 % of reading + 16 mA | Fluke 5520A Multi Product Calibrator and Coil |
| | (150 to 550) A | 0.26 % of reading + 56 mA | |
| | (550 to 1 000) A | 0.27 % of reading + 63 mA | |
| DC Current Measure ^{1,3} | Up to 20.2 μ A | 27 μ A/A + 0.81 nA | Multimeter |
| | (20 to 202) μ A | 9.8 μ A/A + 0.8 nA | |
| | 200 μ A to 2.02 mA | 9.2 μ A/A + 8.1 nA | |
| | (2 to 20.2) mA | 14 μ A/A + 0.08 μ A | |
| | (20 to 202) mA | 57 μ A/A + 2 μ A | |
| | 200 mA to 2.02 A | 132 μ A/A + 0.2 mA | |
| | (2 to 20.2) A | 234 μ A/A + 0.8 mA | |
| | (20 to 30.2) A | 551 μ A/A + 4.4 mA | |
| DC Current Measure ^{1,3} | (2 to 20) A | 0.11 mA/A + 0.04 mA | Current Shunt and Multimeter |



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Electrical – DC/Low Frequency

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|------------------------------------|--------------------------------|---|--|
| AC Current Generate ^{1,3} | (29 to 329.99) μ A | | Fluke 5520A Multi Product Calibrator |
| | (10 to 20) Hz | 0.2 % of reading + 0.1 μ A | |
| | (20 to 45) Hz | 0.15 % of reading + 0.1 μ A | |
| | 45 Hz to 1 kHz | 0.125% of reading + 0.1 μ A | |
| | (1 to 5) kHz | 0.3 % of reading + 0.15 μ A | |
| | (5 to 10) kHz | 0.8 % of reading + 0.2 μ A | |
| | (10 to 30) kHz | 1.6 % of reading + 0.4 μ A | |
| | (0.33 to 3.299) mA | | |
| | (10 to 20) Hz | 0.2 % of reading + 0.15 μ A | |
| | (20 to 45) Hz | 0.125 % of reading + 0.15 μ A | |
| | 45 Hz to 1 kHz | 0.1 % of reading + 0.15 μ A | |
| | (1 to 5) kHz | 0.2 % of reading + 0.2 μ A | |
| | (5 to 10) kHz | 0.5 % of reading + 0.3 μ A | |
| | (10 to 30) kHz | 1% of reading + 0.6 μ A | |
| | (3.3 to 32.999) mA | | |
| | (10 to 20) Hz | 0.18 % of reading + 2 μ A | |
| | (20 to 45) Hz | 0.09 % of reading + 2 μ A | |
| | 45 Hz to 1 kHz | 0.04 % of reading + 2 μ A | |
| | (1 to 5) kHz | 0.08 % of reading + 2 μ A | |
| | (5 to 10) kHz | 0.2 % of reading + 3 μ A | |
| | (10 to 30) kHz | 0.4 % of reading + 4 μ A | |
| | (33 to 329.99) mA | | |
| | (10 to 20) Hz | 0.18 % of reading + 20 μ A | |
| | (20 to 45) Hz | 0.09 % of reading + 20 μ A | |
| 45 Hz to 1 kHz | 0.04 % of reading + 20 μ A | | |
| (1 to 5) kHz | 0.1 % of reading + 50 μ A | | |
| (5 to 10) kHz | 0.2 % of reading + 100 μ A | | |
| (10 to 30) kHz | 0.4 % of reading + 200 μ A | | |
| (0.3 to 1.0999) A | | | |
| (10 to 45) Hz | 0.18 % of reading + 0.1 mA | | |
| 45 Hz to 1 kHz | 0.05 % of reading + 0.1 mA | | |
| (1 to 5) kHz | 0.6 % of reading + 1 mA | | |
| (5 to 10) kHz | 2.5 % of reading + 5 mA | | |
| (1.1 to 2.999) A | | | |
| (10 to 45) Hz | 0.18 % of reading + 0.1 mA | | |
| 45 Hz to 1 kHz | 0.06 % of reading + 0.1 mA | | |
| (1 to 5) kHz | 0.6 % of reading + 1 mA | | |
| (5 to 10) kHz | 2.5 % of reading + 5 mA | | |

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|------------------------------------|--|--|---|
| AC Current Generate ^{1,3} | (3 to 10.999) A (45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz (11 to 20.5) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz | 0.06 % of reading + 2 mA 0.1 % of reading + 2 mA 3 % of reading + 2 mA 0.12 % of reading + 5 mA 0.15 % of reading + 5 mA 3 % of reading + 5 mA | Fluke 5520A Multi Product Calibrator |
| AC Current Generate ^{1,3} | (20 to 150) A (45 to 65) Hz (65 to 440) Hz (150 to 1 000) A (45 to 65) Hz (65 to 440) Hz | 0.31 % of reading + 10 mA 0.85 % of reading + 57 mA 0.31 % of reading + 135 mA 1.27 % of reading + 112 mA | Fluke 5520A Multi Product Calibrator and Coil |
| AC Current Measure ^{1,3} | Up to 20.2 μ A 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (20 to 202) μ A 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz 200 μ A to 2.02 mA 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (2 to 20.2) mA 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz 4050 μ A/A + 2 μ A (20 to 202) mA 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz 740 μ A/A + 10 μ A 200 mA to 2.02 A 1 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz | 2 mA/A + 5 nA 2 mA/A + 5 nA 2 mA/A + 5 nA 280 μ A/A + 0.01 μ A 530 μ A/A + 0.01 μ A 740 μ A/A + 0.01 μ A 4 mA/A + 0.02 μ A 280 μ A/A + 0.1 μ A 530 μ A/A + 0.1 μ A 740 μ A/A + 0.1 μ A 4 mA/A + 0.2 μ A 280 μ A/A + 1 μ A 530 μ A/A + 1 μ A 740 μ A/A + 1 μ A 4050 μ A/A + 2 μ A 280 μ A/A + 10 μ A 520 μ A/A + 10 μ A 740 μ A/A + 10 μ A 300 μ A/A + 0.2 mA 550 μ A/A + 0.2 mA 790 μ A/A + 0.2 mA | Multimeter |

Electrical – DC/Low Frequency

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|------------------------------------|---|--|--|
| AC Current Measure ^{1,3} | (2 to 20.2) A 10 Hz to 2 kHz (2 to 10) kHz (20 to 30.2) A 1 Hz to 2 kHz (2 to 10) kHz | 840 μ A/A + 1 mA 840 μ A/A + 1 mA 840 μ A/A + 12 mA 1.2 mA/A + 12 mA | Multimeter |
| AC Current Measure ^{1,3} | (2 to 20) A 10 Hz to 2 kHz | 0.04 % of reading + 0.6 mA | Current Shunt and Multimeter |
| Resistance Generate ^{1,3} | (0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (330 to 1 100) Ω (1.1 to 3.3) k Ω (3.3 to 11) k Ω (11 to 33) k Ω (33 to 110) k Ω (110 to 330) k Ω (330 to 1 100) k Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω (110 to 330) M Ω (330 to 1 100) M Ω | 40 $\mu\Omega/\Omega$ + 0.001 Ω 30 $\mu\Omega/\Omega$ + 0.001 5 Ω 28 $\mu\Omega/\Omega$ + 0.001 4 Ω 28 $\mu\Omega/\Omega$ + 0.002 Ω 28 $\mu\Omega/\Omega$ + 0.002 Ω 28 $\mu\Omega/\Omega$ + 0.02 Ω 28 $\mu\Omega/\Omega$ + 0.02 Ω 28 $\mu\Omega/\Omega$ + 0.2 Ω 28 $\mu\Omega/\Omega$ + 0.2 Ω 32 $\mu\Omega/\Omega$ + 2 Ω 32 $\mu\Omega/\Omega$ + 2 Ω 60 $\mu\Omega/\Omega$ + 30 Ω 130 $\mu\Omega/\Omega$ + 50 Ω 250 $\mu\Omega/\Omega$ + 2.5 k Ω 500 $\mu\Omega/\Omega$ + 3 k Ω 3 m Ω/Ω + 100 k Ω 15 m Ω/Ω + 500 k Ω | Fluke 5520A Multi Product Calibrator |
| Resistance Measure ^{1,3} | Up to 2.02 Ω (2 to 20.2) Ω (20 to 202) Ω 200 Ω to 2.02 k Ω (2 to 20.2) k Ω 20 to 202 k Ω 200 k Ω to 2.02 M Ω (2 to 20.2) M Ω (20 to 202) M Ω 200 M Ω to 2.02 G Ω (2 to 20.2) G Ω | 17 $\mu\Omega/\Omega$ + 8 $\mu\Omega$ 10 $\mu\Omega/\Omega$ + 28 $\mu\Omega$ 9.2 $\mu\Omega/\Omega$ + 101 $\mu\Omega$ 9.1 $\mu\Omega/\Omega$ + 1 m Ω 9.2 $\mu\Omega/\Omega$ + 10 m Ω 9.3 $\mu\Omega/\Omega$ + 0.1 Ω 11 $\mu\Omega/\Omega$ + 2 Ω 17 $\mu\Omega/\Omega$ + 20 Ω 68 $\mu\Omega/\Omega$ + 200 Ω 230 $\mu\Omega/\Omega$ + 2 k Ω 1.3 m Ω/Ω + 20 k Ω | Multimeter |

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--|-------------------|---|--|
| RTD Resistance Simulation ^{1,3} | Pt 385, 100 Ω | | Fluke 5520A Multi Product Calibrator |
| | (-200 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 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 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 | | |
| Pt 385, 500 Ω | | | |
| (-200 to -80) °C | 0.04 °C | | |
| (-80 to 100) °C | 0.05 °C | | |
| (100 to 260) °C | 0.06 °C | | |
| (260 to 400) °C | 0.08 °C | | |
| (400 to 600) °C | 0.09 °C | | |
| (600 to 630) °C | 0.11 °C | | |



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|---|--|---|--|
| RTD Resistance Simulation ^{1,3} | Pt 385, 1 000 Ω (-200 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 600) °C (600 to 630) °C Cu 427, 10 Ω (-100 to 260) °C PtNi 385, 120 Ω (-80 to 100) °C (100 to 260) °C | 0.03 °C 0.04 °C 0.05 °C 0.06 °C 0.07 °C 0.23 °C 0.3 °C 0.08 °C 0.14 °C | Fluke 5520A Multi Product Calibrator |
| Capacitance Generate ^{1,3} | (0.19 to 3.299) nF (3.3 to 10.999) nF (11 to 109.999) nF (110 to 329.999) nF 330 nF to 1.099 μF (1.1 to 3.299) μF (3.3 to 10.999) μF (11 to 32.999) μF (33 to 109.999) μF (110 to 329.999) μF 330 nF to 1.099 mF (1.1 to 3.299) mF (3.3 to 10.999) mF (11 to 32.999) mF (33 to 110) mF | 0.5 % of reading + 0.01 nF 0.25 % of reading + 0.01 nF 0.25 % of reading + 0.1 nF 0.25 % of reading + 0.3 nF 0.25 % of reading + 1 nF 0.25 % of reading + 3 nF 0.25 % of reading + 10 nF 0.4 % of reading + 30 nF 0.45 % of reading + 100 nF 0.45 % of reading + 300 nF 0.45 % of reading + 1 μF 0.45 % of reading + 3 μF 0.45 % of reading + 10 μF 0.75 % of reading + 30 μF 1.1 % of reading + 100 μF | Fluke 5520A Multi Product Calibrator |
| Capacitance ¹ measure | Up to 2.02 nF (1.8 to 20.2) nF (18 to 202) nF (0.18 to 2.02) μF (1.8 to 20.2) μF (18 to 202) μF (0.18 to 2.02) mF (1.8 to 20.2) mF (18 to 202) mF | 1840 μF/F + 0.002 nF 808 μF/F + 0.004 nF 488 μF/F + 0.02 nF 414 μF/F + 0.2 nF 418 μF/F + 2 nF 613 μF/F + 20 nF 615 μF/F + 0.2 μF 713 μF/F + 2μF 713 μF/F + 20 μF | Multimeter |
| Oscilloscopes ^{1,3} Vertical Gain 50Ω Load 1MΩ Load | 1 mV to 6.6 V 1 mV to 130 V | 0.25 % of reading + 40 μV 0.1 % of reading + 40 μV | Fluke 5520A Multi Product Calibrator |

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---|--|--|--|
| Oscilloscopes ^{1,3} Bandwidth | 5 mV to 5.5 V 50 kHz Reference (50 kHz to 100 MHz) (100 to 300) MHz (300 to 600) MHz | 2% of reading + 40 μV 3.5 % of reading + 300 μV 4 % of reading + 300 μV 6 % of reading + 300 μV | Fluke 5520A Multi Product Calibrator |
| Oscilloscopes ^{1,3} Bandwidth | 5 mV to 3.5 V 600 MHz to 1.1 GHz | 7 % of reading + 300 mV | |
| Oscilloscopes ^{1,2,3} Time Base | 50 ms to 5 s 20 ms to 2 ns | (25 + 1 000 <i>t</i>) ms/s 2.5 μs | |

Length – Dimensional Metrology

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--|------------------------------------|--|---|
| Calipers ² | (0 to 24) in | (339 + 2 <i>L</i>) μin | Gage Blocks |
| Micrometers ² | (0 to 24) in | (43 + 6 <i>L</i>) μin | Gage Blocks |
| Plug Gages | (0 to 1) in | 55 μin | Laser Micrometer |
| Length | (0.1 to 5) in (5 to 40) in | (2.2 + 0.82 <i>L</i>) μin (0.57 + 1.1 <i>L</i>) μin | Universal Length Machine Gage Blocks |
| Thread Plugs Major Diameter Pitch Diameter | Up to 10 in Up to 10 in | (28 + 3.1 <i>D</i>) μin (59 + 2.2 <i>D</i>) μin | Universal Length Machine Gage Blocks Thread Wires |
| Ring Gages | Up to 10 in | (15 + 1 <i>D</i>) μin | Universal Length Machine Master Rings |
| Height Gages ² | (0 to 24) in | (64 + 5.6 <i>L</i>) μin | Gage Blocks |
| Angle Blocks ² | (0 to 18) in | (66 + 1.7 <i>L</i>) μin | Square Comparator |
| Indicators ² | (0 to 0.4) in (0 to 4) in | 13 μin + 0.6 <i>R</i> (34 + 3 <i>L</i>) μin | Gage Blocks |
| Surface Plates ^{1,2} Overall Flatness Local Area Flatness | To 161 in <i>DL</i> ± 1 000 μin | 29 μin + 1 μin/in 25 μin | Electronic Level System Repeat-O-Meter |

Mass and Mass Related

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|-------------------------|--|--|--|
| Pressure ² | (0 to 30) psi (10 to 10 000) psi | 0.048 % of reading + 0.005 psi 0.008 % of reading + 0.6R | Pressure Calibrator |
| Vacuum | (0 to 30) inHg | 0.25 % of reading + 0.005 psi | Pressure Calibrator |
| Torque | (4 to 50) lbf·in (30 to 400) lbf·in (80 to 1 000) lbf·in (20 to 250) lbf·ft (60 to 600) lbf·ft | 0.3 % of reading 0.4 % of reading 0.36 % of reading 0.7 % of reading 0.43 % of reading | Torque Calibrator |
| Torque | (4 to 50) lbf·in (30 to 400) lbf·in (400 to 1 000) lbf·in (50 to 250) lbf·ft (250 to 600) lbf·ft | 0.04 % of reading 0.05 % of reading 0.03 % of reading 0.02 % of reading 0.02 % of reading | Torque Arm and Masses |
| Scales ^{1,2,4} | (0 to 300) g (>0 to 5 000) g (0 to 50) lb (50 to 100) lb (100 to 500) lb (500 to 1 250) lb | 0.18 mg 0.002 % of reading 260 mg 0.01 % of reading 0.05 % of reading 0.05 % of reading | Class 1 Masses Class F Masses |

Thermodynamic

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|----------------------------------|---|---|--|
| Humidity Measure ¹ | (0 to 90) % RH (90 to 100) % RH | 1.3 % RH 1.9 % RH | Vaisala Humidity and Temperature Meter |
| Temperature Measure ¹ | (-100 to 0) °C (0 to 400) °C (<400 to 660) °C | 0.017 °C 0.036 °C 0.057 °C | Comparison to PRT |
| Temperature source ¹ | (-30 to 100) °C (<100 to 200) °C (<200 to 300) °C (<300 to 420) °C (<420 to 650) °C | 0.031 °C 0.044 °C 0.056 °C 0.068 °C 0.13 °C | Microbath / Drywell Monitored with PRT |

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, DL = diagonal length in inches, t = time in seconds, R = resolution of the unit under test.
3. Uncertainties for Electromagnetic – DC/Low Frequency do not include contributions from a “best existing” unit under test and as such, reported uncertainties will always be larger than those expressed on the scope of accreditation.
4. The uncertainties for scales and balances are highly dependent upon the resolution of the unit under test. The uncertainties presented here do not include the resolution of a unit under test. The resolution will be included in the reported measurement uncertainty at the time of calibration.
5. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2048



R. Douglas Leonard Jr., VP, PILR SBU

