



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Wintronics, Inc.
50 Division Avenue
Millington, NJ 07946

Fulfills the requirements of

ISO/IEC 17025:2017

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: 26 April 2024

Certificate Number: AC-1656



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

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CALIBRATION

Valid to: **April 26, 2024**

Certificate Number: **AC-1656**

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|----------------------|---|--|--|
| DC Voltage - Source | Up to 220 mV 220 mV to 2.2 V (2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV | 9.1 μ V/V + 0.4 μ V 5.9 μ V/V + 0.7 μ V 4.1 μ V/V + 2.5 μ V 4.1 μ V/V + 4 μ V 5.9 μ V/V + 40 μ V 8.5 μ V/V + 0.4 mV | Fluke 5720A Multiproduct Calibrator |
| DC Voltage - Measure | Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1.1 kV | 6.2 μ V/V + 1 μ V 4.6 μ V/V + 1 μ V 4.6 μ V/V + 2 μ V 7.2 μ V/V + 30 μ V 19 μ V/V + 0.1 mV | Agilent 3458A Opt 002 Multimeter |
| DC Current - Source | Up to 220 μ A 220 μ A to 2.2 mA (2.2 to 22) mA (22 to 100) mA (100 to 220) mA 220 mA to 1A (1 to 2.2) A | 48 μ A/A + 6 nA 42 μ A/A + 7 nA 42 μ A/A + 40 nA 55 μ A/A + 0.7 μ A 65 μ A/A + 0.7 μ A 0.14 mA/A + 1.2 μ A 0.15 mA/A + 1.2 μ A | Fluke 5720A Multiproduct Calibrator |
| | (2.2 to 11) A | 7 mA/A + 0.33 mA | Fluke 5500A Multiproduct Calibrator |
| DC Current - Measure | Up to 100 μ A 100 μ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A | 23 μ A/A + 0.8 nA 23 μ A/A + 5 nA 23 μ A/A + 50 nA 41 μ A/A + 0.5 μ A 0.13 mA/A + 10 μ A | Agilent 3458A Multimeter |
| DC Current - Measure | (1 to 10) A | 0.15 mA/A | Agilent 3458A Multimeter, Fluke Y5020 Shunt |



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Electrical – DC/Low Frequency

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|---------------------|-------------------|---|--|
| AC Voltage - Source | Up to 2.2 mV | | Fluke 5720A Multiproduct Calibrator |
| | (10 to 20) Hz | 1.1 mV/V + 4 μV | |
| | (20 to 40) Hz | 0.89 mV/V + 4 μV | |
| | 40 Hz to 20 kHz | 0.91 mV/V + 4 μV | |
| | (20 to 50) kHz | 0.94 mV/V + 4 μV | |
| | (50 to 100) kHz | 1.6 mV/V + 5 μV | |
| | (100 to 300) kHz | 2.5 mV/V + 10 μV | |
| | (300 to 500) kHz | 3.6 mV/V + 20 μV | |
| | 500 kHz to 1MHz | 6.3 mV/V + 20 μV | |
| | (2.2 to 22) mV | | |
| | (10 to 20) Hz | 0.33 mV/V + 4 μV | |
| | (20 to 40) Hz | 0.21 mV/V + 4 μV | |
| | 40 Hz to 20 kHz | 0.21 mV/V + 4 μV | |
| | (20 to 50) kHz | 0.27 mV/V + 4 μV | |
| | (50 to 100) kHz | 0.55 mV/V + 5 μV | |
| | (100 to 300) kHz | 1.3 mV/V + 10 μV | |
| | (300 to 500) kHz | 1.7 mV/V + 20 μV | |
| | 500 kHz to 1MHz | 3.2 mV/V + 20 μV | |
| | (22 to 220) mV | | |
| | (10 to 20) Hz | 0.28 mV/V + 12 μV | |
| | (20 to 40) Hz | 0.12 mV/V + 7 μV | |
| | 40 Hz to 20 kHz | 99 μV/V + 7 μV | |
| | (20 to 50) kHz | 0.24 mV/V + 7 μV | |
| | (50 to 100) kHz | 0.54 mV/V + 17 μV | |
| (100 to 300) kHz | 0.95 mV/V + 20 μV | | |
| (300 to 500) kHz | 1.6 mV/V + 25 μV | | |
| 500 kHz to 1MHz | 3.2 mV/V + 45 μV | | |
| 220 mV to 2.2 V | | | |
| (10 to 20) Hz | 0.28 mV/V + 40 μV | | |
| (20 to 40) Hz | 0.11 mV/V + 15 μV | | |
| 40 Hz to 20 kHz | 59 μV/V + 8 μV | | |
| (20 to 50) kHz | 91 μV/V + 10 μV | | |
| (50 to 100) kHz | 0.13 mV/V + 30 μV | | |
| (100 to 300) kHz | 0.49 mV/V + 80 μV | | |
| (300 to 500) kHz | 1.2 mV/V + 0.2 mV | | |
| 500 kHz to 1MHz | 2 mV/V + 0.3 mV | | |



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Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|----------------------|-----------------------|---|--|
| AC Voltage - Source | (2.2 to 22) V | | Fluke 5720A Multiproduct Calibrator |
| | (10 to 20) Hz | 0.28 mV/V + 0.4 mV | |
| | (20 to 40) Hz | 0.11 mV/V + 0.15 mV | |
| | 40 Hz to 20 kHz | 59 μ V/V + 50 μ V | |
| | (20 to 50) kHz | 92 μ V/V + 0.1 mV | |
| | (50 to 100) kHz | 0.12 mV/V + 0.2 mV | |
| | (100 to 300) kHz | 0.32 mV/V + 0.6 mV | |
| | (300 to 500) kHz | 1.2 mV/V + 2 mV | |
| | 500 kHz to 1MHz | 1.7 mV/V + 3.2 mV | |
| | (22 to 220) V | | |
| | (10 to 20) Hz | 0.28 mV/V + 4 mV | |
| | (20 to 40) Hz | 0.11 mV/V + 1.5 mV | |
| | 40 Hz to 20 kHz | 67 μ V/V + 0.6 mV | |
| | (20 to 50) kHz | 96 μ V/V + 1 mV | |
| | (50 to 100) kHz | 0.18 mV/V + 2.5 mV | |
| (100 to 300) kHz | 1 mV/V + 16 mV | | |
| (300 to 500) kHz | 5.1 mV/V + 40 mV | | |
| 500 kHz to 1MHz | 8.4 mV/V + 80 mV | | |
| AC Voltage - Measure | (220 to 250) V | | Agilent 3458A Multimeter |
| | (15 to 50) Hz | 0.37 mV/V + 16 mV | |
| | 50 Hz to 1 kHz | 96 μ V/V + 3.5 mV | |
| | 250 V to 1.1 kV | | |
| | 50 Hz to 1 kHz | 96 μ V/V + 3.5 mV | |
| | (1 to 10) mV | | |
| | (1 to 40) Hz | 0.35 mV/V + 3 μ V | |
| | 40 Hz to 1 kHz | 0.25 mV/V + 1.1 μ V | |
| | (1 to 20) kHz | 0.4 mV/V + 1.1 μ V | |
| | (20 to 50) kHz | 1.2 mV/V + 1.1 μ V | |
| | (50 to 100) kHz | 6.3 mV/V + 1.1 μ V | |
| | (100 to 300) kHz | 50 mV/V + 2 μ V | |
| | (10 to 100) mV | | |
| | (1 to 40) Hz | 0.1 mV/V + 4 μ V | |
| | 40 Hz to 1 kHz | 0.1 mV/V + 2 μ V | |
| (1 to 20) kHz | 0.17 mV/V + 2 μ V | | |
| (20 to 50) kHz | 0.35 mV/V + 2 μ V | | |
| (50 to 100) kHz | 1.1 mV/V + 2 μ V | | |
| (100 to 300) kHz | 4.6 mV/V + 10 μ V | | |
| 300 kHz to 1 MHz | 13 mV/V + 10 μ V | | |
| 1MHz-2MHz | 18 mV/V + 10 μ V | | |



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Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--|-------------------|---|--|
| AC Voltage - Measure | 100 mV to 1 V | | Agilent 3458A Multimeter |
| | (1 to 40) Hz | 95 μ V/V + 40 μ V | |
| | 40 Hz to 1 kHz | 94 μ V/V + 20 μ V | |
| | (1 to 20) kHz | 0.17 mV/V + 20 μ V | |
| | (20 to 50) kHz | 0.35 mV/V + 20 μ V | |
| | (50 to 100) kHz | 0.93 mV/V + 20 μ V | |
| | (100 to 300) kHz | 3.6 mV/V + 0.1 mV | |
| | 300 kHz to 1 MHz | 12 mV/V + 0.1 mV | |
| | (1 to 2) MHz | 18 mV/V + 0.1 mV | |
| | (1 to 10) V | | |
| | (1 to 40) Hz | 95 μ V/V + 0.4 mV | |
| | 40 Hz to 1 kHz | 95 μ V/V + 0.2 mV | |
| | (1 to 20) kHz | 0.17 mV/V + 0.2 mV | |
| | (20 to 50) kHz | 0.35 mV/V + 0.2 mV | |
| | (50 to 100) kHz | 1 mV/V + 0.2 mV | |
| | (100 to 300) kHz | 4 mV/V + 1 mV | |
| | 300 kHz to 1 MHz | 12 mV/V + 1 mV | |
| | (1 to 2) MHz | 18 mV/V + 1 mV | |
| | (10 to 100) V | | |
| | (1 to 40) Hz | 0.24 mV/V + 4 mV | |
| 40 Hz to 1 kHz | 0.24 mV/V + 2 mV | | |
| (1 to 20) kHz | 0.23 mV/V + 2 mV | | |
| (20 to 50) kHz | 0.41 mV/V + 2 mV | | |
| (50 to 100) kHz | 1.4 mV/V + 2 mV | | |
| (100 to 300) kHz | 4.6 mV/V + 10 mV | | |
| 300 kHz to 1 MHz | 17 mV/V + 10 mV | | |
| (100 to 700) V | | | |
| (1 to 40) Hz | 0.47 mV/V + 40 mV | | |
| 40 Hz to 1 kHz | 0.47 mV/V + 20 mV | | |
| (1 to 20) kHz | 0.7 mV/V + 20 mV | | |
| (20 to 50) kHz | 0.14 mV/V + 20 mV | | |
| (50 to 100) kHz | 0.35 mV/V + 20 mV | | |
| Electrical Simulation of Thermocouple Indicators | Type J | | Fluke 5500A-SC600 Multiproduct Calibrator |
| | (-210 to -100) °C | 0.32 °C | |
| | (-100 to -30) °C | 0.19 °C | |
| | (-30 to 150) °C | 0.2 °C | |
| | (150 to 760) °C | 0.23 °C | |
| | (760 to 1 200) °C | 0.27 °C | |



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Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--|---------------------|---|--|
| Electrical Simulation of Thermocouple Indicators | Type K | | Fluke 5500A-SC600 Multiproduct Calibrator |
| | (-200 to -100) °C | 0.39 °C | |
| | (-100 to -25) °C | 0.22 °C | |
| | (-25 to 120) °C | 0.22 °C | |
| | (120 to 1 000) °C | 0.31 °C | |
| | (1 000 to 1 372) °C | 0.47 °C | |
| | Type T | | |
| | (-250 to -150) °C | 0.73 °C | |
| | (-150 to 0) °C | 0.28 °C | |
| | (0 to 120) °C | 0.19 °C | |
| | (120 to 400) °C | 0.18 °C | |
| | Type R | | |
| | (0 to 250) °C | 0.88 °C | |
| | (250 to 400) °C | 0.71 °C | |
| | (400 to 1 000) °C | 0.69 °C | |
| (1 000 to 1 767) °C | 0.74 °C | | |
| Type S | | | |
| (0 to 250) °C | 0.79 °C | | |
| (250 to 1 000) °C | 0.71 °C | | |
| (1 000 to 1 400) °C | 0.7 °C | | |
| (1 400 to 1 767) °C | 0.79 °C | | |
| AC Current - Source | (22 to 220) µA | | Fluke 5720A Multiproduct Calibrator |
| | (10 to 20) Hz | 0.3 mA/A + 16 nA | |
| | (20 to 40) Hz | 0.19 mA/A + 10 nA | |
| | 40 Hz to 1 kHz | 0.15 mA/A + 8 nA | |
| | (1 to 5) kHz | 0.38 mA/A + 12 nA | |
| | (5 to 10) kHz | 1.4 mA/A + 65 nA | |
| | 220 µA to 2.2 mA | | |
| | (10 to 20) Hz | 0.35 mA/A + 50 nA | |
| | (20 to 40) Hz | 0.24 mA/A + 40 nA | |
| | 40 Hz to 1 kHz | 0.17 mA/A + 40 nA | |
| | (1 to 5) kHz | 0.29 mA/A + 0.13 µA | |
| | (5 to 10) kHz | 1.5 mA/A + 0.8 µA | |
| | (2.2 to 22) mA | | |
| | (10 to 20) Hz | 0.35 mA/A + 0.5 µA | |
| | (20 to 40) Hz | 0.24 mA/A + 0.4 µA | |
| 40 Hz to 1 kHz | 0.17 mA/A + 0.4 µA | | |
| (1 to 5) kHz | 0.29 mA/A + 0.7 µA | | |
| (5 to 10) kHz | 1.5 mA/A + 6 µA | | |

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|----------------------|--|--|--|
| AC Current - Source | (22 to 220) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz | 0.35 mA/A + 5 μA 0.24 mA/A + 4 μA 0.17 mA/A + 3 μA 0.28 mA/A + 4 μA 1.5 mA/A + 12 μA | Fluke 5720A Multiproduct Calibrator |
| | 220 mA to 2.2 A 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz | 0.31 mA/A + 35 μA 0.6 mA/A + 0.1 mA 8.5 mA/A + 0.2 mA | |
| | (2.2 to 11) A (45 to 65) Hz (65 to 500) Hz 500Hz-1kHz | 0.72 mA/A + 2 mA 1.2 mA/A + 2 mA 3.8 mA/A + 2 mA | Fluke 5500A Multiproduct Calibrator |
| AC Current - Measure | (10 to 100) μA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz | 4.6 mA/A + 20 nA 1.8 mA/A + 20 nA 0.74 mA/A + 20 nA | Agilent 3458A Multimeter |
| | 100 μA to 1 mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz | 4.6 mA/A + 0.2 μA 1.7 mA/A + 0.2 μA 0.72 mA/A + 0.2 μA 0.41 mA/A + 0.2 μA 0.72 mA/A + 0.2 μA | |
| | (1 to 10) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz | 4.6 mA/A + 2 μA 1.7 mA/A + 2 μA 0.72 mA/A + 2 μA 0.4 mA/A + 2 μA 0.72 mA/A + 2 μA | |
| | (10 to 100) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz | 4.6 mA/A + 20 μA 1.7 mA/A + 20 μA 0.74 mA/A + 20 μA 0.43 mA/A + 20 μA 0.74 mA/A + 20 μA | |



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Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|----------------------------------|--|---|--|
| AC Current - Measure | 100 mA to 1 A (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz | 4.6 mA/A + 0.2 mA 1.9 mA/A + 0.2 mA 0.94 mA/A + 0.2 mA 1.2 mA/A + 0.2 mA 3.5 mA/A + 0.2 mA | Agilent 3458A Multimeter |
| Resistance - Source Fixed Values | 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 | 0.12 mΩ/Ω 0.14 mΩ/Ω 31 μΩ/Ω 33 μΩ/Ω 13 μΩ/Ω 12 μΩ/Ω 9.9 μΩ/Ω 10 μΩ/Ω 9.9 μΩ/Ω 10 μΩ/Ω 13 μΩ/Ω 13 μΩ/Ω 23 μΩ/Ω 25 μΩ/Ω 49 μΩ/Ω 0.11 mΩ/Ω 0.13 mΩ/Ω | Fluke 5720A Multiproduct Calibrator |
| Resistance - Source | Up to 11Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 to 1.1) kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 to 1.1) MΩ (1.1 to 3.3) MΩ | 0.18 mΩ/Ω + 8 mΩ 0.14 mΩ/Ω + 15 mΩ 0.11 mΩ/Ω + 15 mΩ 0.1 mΩ/Ω + 15 mΩ 0.1 mΩ/Ω + 60 mΩ 0.11 mΩ/Ω + 60 mΩ 0.11 mΩ/Ω + 0.6 Ω 0.11 mΩ/Ω + 0.6 Ω 0.13 mΩ/Ω + 6 Ω 0.14 mΩ/Ω + 6 Ω 0.17 mΩ/Ω + 55 Ω 0.17 mΩ/Ω + 55 Ω | Fluke 5500A Multiproduct Calibrator |
| Resistance - Source | (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ | 0.17 mΩ/Ω + 55 Ω 0.69 mΩ/Ω + 0.55 kΩ 1.2 mΩ/Ω + 0.55 kΩ 5.8 mΩ/Ω + 5.5 kΩ 5.8 mΩ/Ω + 17 kΩ | Fluke 5500A Multiproduct Calibrator |



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Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---|--|--|--|
| Resistance - Measure | 100 mΩ to 10 Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1MΩ (1 to 10) MΩ (10 to 100) MΩ | 17 μΩ/Ω + 50 μΩ 14 μΩ/Ω + 0.5 mΩ 12 μΩ/Ω + 0.5 mΩ 12 μΩ/Ω + 5 mΩ 12 μΩ/Ω + 50 mΩ 17 μΩ/Ω + 2 Ω 59 μΩ/Ω + 0.1 kΩ 0.59 mΩ/Ω + 1 kΩ | Agilent 3458A Multimeter |
| Electrical Simulation of RTD Indicators | 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 | 0.08 °C 0.08 °C 0.1 °C 0.12 °C 0.13 °C 0.15 °C 0.27 °C 0.08 °C 0.08 °C 0.1 °C 0.12 °C 0.12 °C 0.15 °C | Fluke 5500A-SC600 Multiproduct Calibrator |
| Capacitance - Source | (330 to 500) pF 500 pF to 1.1 nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF 330 nF 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 330 μF to 1.1 mF | 11 mF/F + 10 pF 6.5 mF/F + 10 pF 6.2 mF/F + 10 pF 5.9 mF/F + 10 pF 9.7 mF/F + 0.1 nF 3 mF/F + 0.1 nF 3.5 mF/F + 0.3 nF 3 mF/F + 1 nF 4.5 mF/F + 3 nF 4.2 mF/F + 10 nF 5.1 mF/F + 10 nF 5.9 mF/F + 0.1 μF 8.6 mF/F + 0.3 μF 13 mF/F + 0.3 μF | Fluke 5500A Multiproduct Calibrator |

Electrical – DC/Low Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--|---|--|--|
| AC Watts - Source PF=1, (45 to 65) Hz | 10.89 mW to 91.8 W 29.7 mW to 336.6 W 108.9 mW to 918 W 297 mW to 3.06 kW 990 mW to 4.59 kW 1 485 W to 11.220 kW | 3.1 mW/W 1.8 mW/W 2.9 mW/W 1.7 mW/W 2.3 mW/W 1.7 mW/W | Fluke 5500A Multiproduct Calibrator |
| Oscilloscopes DC Signal, 50 Ω DC Signal, 1 M Ω Square Wave 50 Ω , 10 Hz to 10 kHz 1 M Ω , 10 Hz to 1 kHz 1 M Ω , 1 kHz to 10 kHz Time Marker ² 50 ms to 5 s (cardinal points) Rise Time (200 to 300) ps, 10 kHz to 2 MHz (250 to 350) ps 2 MHz to 10 MHz Leveled Sine Wave 50kHz Reference Flatness Amplitude (5 mV to 5.5 V) p-p, relative to 50kHz | \pm (0 to 6.6) V \pm (0 to 130) V \pm (1 mV to 6.6 V) p-p \pm (1 mV to 130 V) p-p \pm (1 mV to 130 V) p-p 2 ns to 20 ms (cardinal points) 50 ms to 5 s (cardinal points) (200 to 300) ps, 10 kHz to 2 MHz (250 to 350) ps 2 MHz to 10 MHz (5 mV to 5.5 V) p-p 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz | 3.1 mV/V + 40 μ V 1.3 mV/V + 40 μ V 4.2 mV/V + 40 μ V 1.6 mV/V + 40 μ V 3 mV/V + 40 μ V 12 μ S/S 90 + 1 367 (t-0.05) μ s/s 0.12 ns 0.12 ns 24 mV/V + 0.3 mV 20 mV/V + 0.1 mV 25 mV/V + 0.1 mV 47 mV/V + 0.1 mV | Fluke 5500A-SC600 Multiproduct Calibrator |

Length – Dimensional Metrology

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--------------------------|------------|---|--|
| Micrometers ² | Up to 1 in | (60 + 4L) μ in | Grade 2 Gage Blocks |
| Calipers ² | Up to 6 in | (530 + 8L) μ in | |

Mass and Mass Related

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---------------------|---|---|---|
| Pressure | (0 to 100) psia/g (100 to 1 000) psia/psig | 0.009 5 psi 0.01 % of reading | DHI PPC3/A700K & DHI PPC3/A7M Pressure Controller and transducers |
| Torque Wrenches | (4 to 50) lbf·in (30 to 400) lbf·in (80 to 1000) lbf·in (20 to 250) lbf·ft | 1.2 % of reading 0.7 % of reading 0.7 % of reading 0.97 % of reading | Torque transducer CDI 2000-400-02 |

Thermodynamic

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---|----------------------|---|---|
| Temperature - Source & Measure | (0 to 100) °C | 0.01 °C | Hart 7040 Bath, 5610 Probe, 2563 Display |
| | (100 to 300) °C | 0.04 °C | Hart 6330 Bath, 5615 Probe, 2560 Display |
| Infrared Temperature - Source & Measure | (-10 to 100) °C | 0.25 °C | Heitronics TRT3.82 Infrared Thermometer & ME20.02 Blackbody or ME30 Blackbody $\lambda = (8 \text{ to } 14) \mu\text{m}$, $\epsilon = 0.9994$ |
| | (>100 to 200) °C | 0.32 °C | |
| | (>200 to 350) °C | 0.51 °C | |
| Infrared Temperature - Source & Measure | (>350 to 600) °C | 1.1 °C | Heitronics TRT3.82 Infrared Thermometers & SW11B Blackbody $\lambda = (8 \text{ to } 14) \mu\text{m}$, $\epsilon \geq 0.99$ |
| | (>600 to 1 000) °C | 1.5 °C | |
| Infrared Temperature - Source & Measure | (>350 to 1 000) °C | 1.2 °C | Heitronics CT18.04 Infrared Thermometer & SW11B Blackbody $\lambda = 1.6 \mu\text{m}$, $\epsilon \geq 0.99$ |
| Infrared Temperature - Source & Measure | (>1 000 to 1 400) °C | 2.7 °C | Heitronics CT18.04 Infrared Thermometer & Land R1500T Blackbody $\lambda = 1.6 \mu\text{m}$, $\epsilon = 0.99$ |
| | (>1 400 to 1 450) °C | 3 °C | |

Time and Frequency

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|-------------------------|----------------|---|--|
| Frequency - Measure | Up to 100 MHz | 1.6 x E ⁻⁰⁹ Hz | HP 5335A Counter, Fluke 910R Frequency Standard |
| Frequency - Source | 10 MHz | 2.8 x E ⁻¹² Hz | |
| Timers and Stop Watches | Up to 86 400 s | 0.03 s | HP 5335A Counter, Fluke 910R Frequency Standard HP 3325A Function 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:

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, t = time in seconds.
3. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1656.



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