



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 2022

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, 2022**

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 $\mu\text{V/V} + 0.4 \mu\text{V}$ 5.9 $\mu\text{V/V} + 0.7 \mu\text{V}$ 4.1 $\mu\text{V/V} + 2.5 \mu\text{V}$ 4.1 $\mu\text{V/V} + 4 \mu\text{V}$ 5.9 $\mu\text{V/V} + 40 \mu\text{V}$ 8.5 $\mu\text{V/V} + 0.4 \text{mV}$	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 $\mu\text{V/V} + 1 \mu\text{V}$ 4.6 $\mu\text{V/V} + 1 \mu\text{V}$ 4.6 $\mu\text{V/V} + 2 \mu\text{V}$ 7.2 $\mu\text{V/V} + 30 \mu\text{V}$ 19 $\mu\text{V/V} + 0.1 \text{mV}$	Agilent 3458A Opt 002 Multimeter
DC Current - Source	Up to 220 μA 220 μA 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 $\mu\text{A/A} + 6 \text{nA}$ 42 $\mu\text{A/A} + 7 \text{nA}$ 42 $\mu\text{A/A} + 40 \text{nA}$ 55 $\mu\text{A/A} + 0.7 \mu\text{A}$ 65 $\mu\text{A/A} + 0.7 \mu\text{A}$ 0.14 mA/A + 1.2 μA 0.15 mA/A + 1.2 μA	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 μA 100 μA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	23 $\mu\text{A/A} + 0.8 \text{nA}$ 23 $\mu\text{A/A} + 5 \text{nA}$ 23 $\mu\text{A/A} + 50 \text{nA}$ 41 $\mu\text{A/A} + 0.5 \mu\text{A}$ 0.13 mA/A + 10 μA	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

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
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 μV/V + 50 μV	
	(20 to 50) kHz	92 μV/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 μV/V + 0.6 mV	
	(20 to 50) kHz	96 μV/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 μV/V + 3.5 mV	
	250 V to 1.1 kV		
	50 Hz to 1 kHz	96 μV/V + 3.5 mV	
	(1 to 10) mV		
	(1 to 40) Hz	0.35 mV/V + 3 μV	
	40 Hz to 1 kHz	0.25 mV/V + 1.1 μV	
	(1 to 20) kHz	0.4 mV/V + 1.1 μV	
	(20 to 50) kHz	1.2 mV/V + 1.1 μV	
(50 to 100) kHz	6.3 mV/V + 1.1 μV		
(100 to 300) kHz	50 mV/V + 2 μV		
(10 to 100) mV			
(1 to 40) Hz	0.1 mV/V + 4 μV		
40 Hz to 1 kHz	0.1 mV/V + 2 μV		
(1 to 20) kHz	0.17 mV/V + 2 μV		
(20 to 50) kHz	0.35 mV/V + 2 μV		
(50 to 100) kHz	1.1 mV/V + 2 μV		
(100 to 300) kHz	4.6 mV/V + 10 μV		
300 kHz to 1 MHz	13 mV/V + 10 μV		
1MHz-2MHz	18 mV/V + 10 μV		



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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 μ A 0.24 mA/A + 4 μ A 0.17 mA/A + 3 μ A 0.28 mA/A + 4 μ A 1.5 mA/A + 12 μ A	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 μ A 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) μ A (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 μ A 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 μ A 1.7 mA/A + 0.2 μ A 0.72 mA/A + 0.2 μ A 0.41 mA/A + 0.2 μ A 0.72 mA/A + 0.2 μ A	
	(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 μ A 1.7 mA/A + 2 μ A 0.72 mA/A + 2 μ A 0.4 mA/A + 2 μ A 0.72 mA/A + 2 μ A	
	(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 μ A 1.7 mA/A + 20 μ A 0.74 mA/A + 20 μ A 0.43 mA/A + 20 μ A 0.74 mA/A + 20 μ A	

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 330 mV to 1.02 kV	(33 to 90) mA (90 to 330) mA (330 to 900) mA 900 mA to 3 A (3 to 4.5) A (4.5 to 11) A	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, 1MΩ Square Wave 50 Ω, 10Hz to 10kHz 1 MΩ, 10 Hz to 1kHz 1 MΩ, 1 kHz to 10kHz Time Marker ² Rise Time Leveled Sine Wave 50kHz Reference Flatness Amplitude (5 mV to 5.5 V) p-p, relative to 50kHz	± (0 to 6.6) V ± (0 to 130) V ± (1 mV to 6.6 V) p-p ± (1 mV to 130 V) p-p ± (1 mV to 130 V) p-p 2 ns to 20 ms (cardinal points) 50 ms to 5 s (cardinal points) 300 ps, 10 kHz to 2 MHz 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 μV 1.3 mV/V + 40 μV 4.2 mV/V + 40 μV 1.6 mV/V + 40 μV 3 mV/V + 40 μV 12 μS/S 90 + 1 367 (t-0.05) μs/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) μin	Grade 2 Gage Blocks
Calipers ²	Up to 6 in	(530 + 8.1L) μin	

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure	Up to 9 psia/psig (9 to 1 000) psia/psig	0.008 psi 0.009 % of reading	DHI PPC3/A700K & DHI PPC3/A7M Pressure Controller and transducers
Torque Drivers	(10 to 100) ozf-in (40 to 380) ozf-in (20to 200) lbf-in	1.7 % of reading 2.6 % of reading 1.2 % of reading	Torque transducers CDI 1001-O-TTP CDI T-400-0 CDI 2002-1-TTP
Torque - Click Style	(10 to 100) ozf-in (40 to 380) ozf-in (20to 200) lbf-in (20 to 250) lbf-ft	2.1 % of reading 4.9 % of reading 0.91 % of reading 0.98 % of reading	Torque transducers CDI 1001-O-TTP CDI T-400-0 CDI 2002-1-TTP CDI ASGT-250-F
Torque Tools – Dial and Digital	(20 to 200) lbf-in (20 to 250) lbf-ft	0.66 % of reading 1.2 % of reading	Torque transducers CDI 2002-1-TTP CDI ASGT-250-F

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, 5612 Probe, 2560 Display
Infrared Temperature - Source & Measure	(-10 to 100) °C (>100 to 300) °C	0.34 °C 0.53 °C	Heitronics TRT3.82 Infrared Thermometer & ME20.02 Blackbody or ME30 Blackbody $\lambda = (8 \text{ to } 14) \mu\text{m}, \epsilon = 0.9994$
Infrared Temperature - Source & Measure	(>300 to 600) °C (>600 to 1 000) °C	1.1 °C 1.2 °C	Heitronics TRT3.82 Infrared Thermometers & SW10B Blackbody $\lambda = (8 \text{ to } 14) \mu\text{m}, \epsilon \geq 0.99$
Infrared Temperature - Source & Measure	(>350 to 1 000) °C	1.1 °C	Heitronics CT18.04 Infrared Thermometer & SW11B Blackbody $\lambda = 1.6 \mu\text{m}, \epsilon = 0.99$

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Infrared Temperature - Source & Measure	(>1 000 to 1 400) °C (>1 400 to 1 450) °C	2.7 °C 3 °C	Heitronics CT18.04 Infrared Thermometer & Land R1500T Blackbody $\lambda = 1.6 \mu\text{m}, \epsilon = 0.99$

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency - Measure	Up to 100 MHz	$1.6 \times E^{-09}$ Hz	HP 5335A Counter, Fluke 910R Frequency Standard
Frequency - Source	10 MHz	$2.8 \times E^{-12}$ Hz	
Timers and Stop Watches	Up to 24 hrs	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.



R. Douglas Leonard Jr., VP, PILR SBU