



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Process Measurement Company

5735 Lindsay Street

Minneapolis, MN 55422

(and satellite locations as shown on the scope)

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 June 2023

Certificate Number: AC-1959



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)**

Process Measurement Company

5735 Lindsay Street
Minneapolis, MN 55422
Shaomeng Yang 763-354-9040
syang@processmeasurementco.com

CALIBRATION

Valid to: **June 26, 2023**

Certificate Number: **AC-1959**

Satellite locations in:

[Denver, CO \(AC-1959.01\)](#)

[Omaha, NE \(AC-1959.02\)](#)

[Kansas City, KS \(AC-1959.03\)](#)

Accredited Services performed at Main Site laboratory

(AC-1959)

Process Measurement Company

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source	(1 to 220) mV 220 mV to 2.2 V (2.2 to 22) V (22 to 220) V (220 to 1 100) V	9 μ V/V 6 μ V/V 5 μ V/V 5 μ V/V 8 μ V/V	Transmille 4010 Advanced Multiproduct Calibrator
DC Voltage – Measure	(1 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV	11 μ V/V 9 μ V/V 9 μ V/V 11 μ V/V 12 μ V/V	Agilent 3458A 8.5 Digit Multimeter
DC High Voltage – Measure	(12 to 120) kV	0.15 % of reading	Ross Engineering VD120 Voltage Divider, Agilent 34401A 6.5 Digit Multimeter
DC Current – Source	(1 to 220) μ A 220 μ A to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A	57 μ A/A 41 μ A/A 47 μ A/A 53 μ A/A 0.27 mA/A	Transmille 4010 Advanced Multiproduct Calibrator
DC Current – Measure	(1 to 100) μ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	27 μ A/A 24 μ A/A 25 μ A/A 42 μ A/A 13 mA/A	Agilent 3458A 8.5 Digit Multimeter
	(1 to 3) A	0.38 mA/A	Agilent 34401A 6.5 Digit Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	(1 to 10) mV		Agilent 3458A 8.5 Digit Multimeter
	(1 to 40) Hz	0.8 mV/V	
	40 Hz to 1 kHz	0.66 mV/V	
	(1 to 20) kHz	0.66 mV/V	
	(20 to 50) kHz	1.2 mV/V	
	(50 to 100) kHz	1.5mV/V	
	(100 to 300) kHz	7.2 mV/V	
	(10 to 100) mV		
	(1 to 40) Hz	0.14 mV/V	
	40 Hz to 1 kHz	0.2 mV/V	
	(1 to 20) kHz	0.2 mV/V	
	(20 to 50) kHz	0.49 mV/V	
	(50 to 100) kHz	0.82 mV/V	
	(100 to 300) kHz	1.5 mV/V	
	300 kHz to 1 MHz	4.7 mV/V	
	100 mV to 1 V		
	(1 to 40) Hz	0.36 mV/V	
	40 Hz to 1 kHz	0.08 mV/V	
	(1 to 20) kHz	0.25 mV/V	
	(20 to 50) kHz	0.17 mV/V	
	(50 to 100) kHz	0.27 mV/V	
	(100 to 300) kHz	0.84 mV/V	
	300 kHz to 1 MHz	2.9 mV/V	
	(1 to 10) V		
(1 to 40) Hz	0.87 mV/V		
40 Hz to 1 kHz	78 μ V/V		
(1 to 20) kHz	90 μ V/V		
(20 to 50) kHz	0.17 mV/V		
(50 to 100) kHz	0.22 mV/V		
(100 to 300) kHz	0.64 mV/V		
300 kHz to 1 MHz	3.1 mV/V		
(10 to 100) V			
40 Hz to 1 kHz	0.11 mV/V		
(1 to 20) kHz	69 μ V/V		
(20 to 50) kHz	0.11 mV/V		
(50 to 100) kHz	0.21 mV/V		
(100 to 700) V			
40 Hz to 1 kHz	0.14 mV/V		
AC High Voltage – Measure	(8.5 to 85) kV 60 Hz	0.6 % of reading	Ross Engineering VD120 Voltage Divider, Agilent 34401A 6.5 Digit Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source	(2.2 to 200) mV		Transmille 4010 Advanced Multiproduct Calibrator
	10 Hz to 1 kHz	38 μ V	
	(1 to 100) kHz	34 μ V	
	(100 to 500) kHz	0.31 mV	
	200 mV to 2 V		
	10 Hz to 1 kHz	45 μ V	
	(1 to 100) kHz	68 μ V	
	100 kHz to 1 MHz	0.95 mV	
	(2 to 20) V		
	10 Hz to 1 kHz	42 μ V	
	(1 to 10) kHz	55 μ V	
	(10 to 50) kHz	7.1 mV	
	(20 to 200) V		
	10 Hz to 1 kHz	5 mV	
	(1 to 40) kHz	6 mV	
	(40 to 100) kHz	16 mV	
	(200 to 1 000) V		
	10 Hz to 1 kHz	40 mV	
	(1 to 10) kHz	52 mV	
	(2.2 to 200) μ A		
	10 Hz to 1 kHz	0.17 μ A	
	(1 to 10) kHz	0.37 μ A	
	(10 to 30) kHz	0.67 μ A	
	200 μ A to 2 mA		
	10 Hz to 1 kHz	0.28 μ A	
	(1 to 10) kHz	13 μ A	
	(10 to 30) kHz	25 μ A	
	(2 to 20) mA		
	10 Hz to 1 kHz	3 μ A	
	(1 to 10) kHz	58 μ A	
(10 to 30) kHz	30 μ A		
(20 to 200) mA			
10 Hz to 1 kHz	0.35 mA		
(1 to 10) kHz	0.82 mA		
(10 to 30) kHz	1.6 mA		
200 mA to 2 A			
10 Hz to 1 kHz	2.8 mA		
(1 to 10) kHz	1.3 mA		
(10 to 30) kHz	5.4 mA		
(2 to 30) A			
10 Hz to 1 kHz	8.7 mA		
(1 to 10) kHz	8.7 mA		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source	(1 to 220) μ A		Transmille 4010 Advanced Multiproduct Calibrator
	(10 to 20) Hz	0.32 mA/A	
	(20 to 40) Hz	0.21 mA/A	
	40 Hz to 1 kHz	0.16 mA/A	
	(1 to 5) kHz	0.34 mA/A	
	(5 to 10) kHz	1.4 mA/A	
	220 μ A to 2.2 mA		
	(10 to 20) Hz	0.27 mA/A	
	(20 to 40) Hz	0.18 mA/A	
	40 Hz to 1 kHz	0.14 mA/A	
	(1 to 5) kHz	0.25 mA/A	
	(5 to 10) kHz	1.4 mA/A	
	(2.2 to 22) mA		
	(10 to 20) Hz	0.28 mA/A	
	(20 to 40) Hz	0.18 mA/A	
	40 Hz to 1 kHz	0.14 mA/A	
	(1 to 5) kHz	0.23 mA/A	
	(5 to 10) kHz	1.4 mA/A	
	(22 to 220) mA		
	(10 to 20) Hz	0.27 mA/A	
	(20 to 40) Hz	0.18 mA/A	
	40 Hz to 1 kHz	0.14 mA/A	
	(1 to 5) kHz	0.36 mA/A	
	(5 to 10) kHz	1.2 mA/A	
	220 mA to 1 A		
	40 Hz to 1 kHz	0.35 mA/A	
	(1 to 5) kHz	0.53 mA/A	
	(5 to 10) kHz	7.2 mA/A	
(1 to 2.2) A			
40 Hz to 1 kHz	0.3 mA/A		
(1 to 5) kHz	0.53 mA/A		
(5 to 10) kHz	7.2 mA/A		
(2.02 to 30) A			
(30 to 99) Hz	14 mA/A		
(45 to 99) Hz	14 mA/A		
100 Hz to 1 kHz	15 mA/A		
(1 to 5) kHz	18 mA/A		
(5 to 10) kHz	22 mA/A		
(2.2 to 11) A			
(45 to 65) Hz	7 mA/A		
(65 to 500) Hz	7 mA/A		
500 Hz to 1 kHz	8.1 mA/A		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure	(1 to 100) μ A		Agilent 3458A 8.5 Digit Multimeter
	(10 to 20) Hz	0.58 mA/A	
	(20 to 45) Hz	0.4 mA/A	
	(45 to 100) Hz	0.4 mA/A	
	100 Hz to 5 kHz	0.57 mA/A	
	100 μ A to 1 mA		
	(10 to 20) Hz	0.36 mA/A	
	(20 to 45) Hz	0.24 mA/A	
	(45 to 100) Hz	0.22 mA/A	
	100 Hz to 5 kHz	0.39 mA/A	
	(1 to 10) mA		
	(10 to 20) Hz	0.39 mA/A	
	(20 to 45) Hz	0.27 mA/A	
	(45 to 100) Hz	0.27 mA/A	
	100 Hz to 5 kHz	0.36 mA/A	
(10 to 100) mA			
(10 to 20) Hz	0.39 mA/A		
(20 to 45) Hz	0.26 mA/A		
(45 to 100) Hz	0.26 mA/A		
100 Hz to 5 kHz	0.34 mA/A		
100 mA to 1 A			
(10 to 20) Hz	0.45 mA/A		
(20 to 45) Hz	0.41 mA/A		
(45 to 100) Hz	0.41 mA/A		
100 Hz to 5 kHz	0.65 mA/A		
Resistance – Source (Simulated)	1 Ω	0.12 m Ω	Transmille 4010 Advanced Multiproduct Calibrator
	10 Ω	0.28 m Ω	
	100 Ω	1.4 m Ω	
	1 k Ω	11 m Ω	
	10 k Ω	0.11 Ω	
	100 k Ω	1.8 Ω	
	1 M Ω	0.24 k Ω	
	10 M Ω	0.48 k Ω	
	100 M Ω	13 k Ω	
Resistance – Source (Artifact)	1 G Ω	1.2 k Ω	IET SRL-1G Resistance Standard

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Measure	Up to 10 Ω (10 to 100) Ω (0.1 to 1) k Ω (1 to 10) k Ω (10 to 100) k Ω (0.1 to 1) M Ω (1 to 10) M Ω (10 to 100) M Ω	25 $\mu\Omega/\Omega$ 2.1 m Ω/Ω 14 $\mu\Omega/\Omega$ 15 $\mu\Omega/\Omega$ 1.5 m Ω/Ω 38 m Ω/Ω 1.1 k Ω/Ω 73 k Ω/Ω	Agilent 3458A 8.5 Digit Multimeter
Oscilloscopes			
DC Voltage, 50 Ω	(0 to 2.2) V	5.4 mV/V	Fluke 5500A/6 Multiproduct Calibrator
DC Voltage, 1 M Ω	(0 to 33) V	3.6 mV/V	
Square Wave Signal 50 Ω at 1 kHz	1.8 mV to 2.2 V	6 mV/V	
Square Wave Signal 1 M Ω at 1 kHz	1.8 mV to 105 V	4.8 mV/V	
Leveled Sine Wave Flatness (relative to 50 kHz)	50 kHz to 100 MHz (100 to 300) MHz	35 mV/V 27 mV/V	
Time Marker, 50 Ω	2 ns to 5 s	1.3 $\mu\text{s/s}$	
Rise/Fall Time	400 ps	170 ps	
Capacitance – Source (Simulated-Variable)	(1 to 9) μF (10 to 90) μF (100 to 900) μF (1 to 9) mF (10 to 50) mF	17 nF/ μF 13 nF/ μF 9 nF/ μF 12 $\mu\text{F/mF}$ 11 $\mu\text{F/mF}$	Transmille 4010 Advanced Multiproduct Calibrator
Capacitance – Source (Passive-Fixed)	1 nF 5 nF 10 nF 100 nF 1 μF 10 μF	4.3 pF 32 pF 47 pF 0.3 nF 3 nF 32 nF	Transmille 4010 Advanced Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure	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 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 T (-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.11 °C 0.09 °C 0.07 °C 0.08 °C 0.08 °C 0.41 °C 0.38 °C 0.38 °C 0.41 °C 0.4 °C 0.07 °C 0.07 °C 0.09 °C 0.12 °C 0.12 °C 0.45 °C 0.12 °C 0.1 °C 0.07 °C	Transmille 4010 Advanced Multiproduct Calibrator
Electrical Simulation of RTD Indicating Devices – Source	Pt 385, 100 Ω (-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 800) °C Pt 3926, 100 Ω (-200 to -80) °C (-80 to 0) °C (0 to 800) °C	0.03 °C 0.04 °C 0.04 °C 0.06 °C 0.03 °C 0.03 °C 0.06 °C	Transmille 4010 Advanced Multiproduct Calibrator

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Torque Tools	(5 to 50) lbf·in (30 to 400) lbf·in (100 to 1 000) lbf·in (20 to 250) lbf·ft (100 to 1 000) lbf·ft	1.4 % of reading 0.74 % of reading 0.56 % of reading 1 % of reading 1.3 % of reading	CDI Torque Calibrator
Pressure (Pneumatic) – Air	(-14.5 to -0.01) psi (0.01 to 300) psi	0.2 % of reading 0.1 % of reading	Heise PTE-1 w/HQS-2 Pressure Calibrator
Pressure (Pneumatic) – Nitrogen	(0.2 to 50) psig (2 to 1 000) psig	0.004 psi 0.06 psi	Ruska 2465A Gas Piston Pressure System
Pressure (Hydraulic)	(200 to 10 000) psi	0.02 % of reading	Fluke P3214-PSI Dead Weight Tester

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Measure	(-40 to -15) °C (-15 to 0) °C (0 to 50) °C (50 to 250) °C (250 to 400) °C	0.83 °C 0.04 °C 0.05 °C 0.05 °C 0.07 °C	ASL F250 Thermometer with 935-14-16 Probe

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Source	80 MHz	2 µHz/Hz	Agilent 33250A Function/Arbitrary Waveform Generator
Frequency – Measure	0.1 Hz to 350 MHz	1.1 µHz/Hz	Agilent 53220A Counter
Tachometers – Non-Contact	(1 to 100 000) rpm	0.015 % of reading	Agilent 33250A Function/Arbitrary Waveform Generator

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Accredited Services performed at satellite laboratory

(AC-1959.01)

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source	(2.2 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1 000) V	36 μ V/V 19 μ V/V 17 μ V/V 15 μ V/V 20 μ V/V	Transmille 4010 Advanced 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 kV	0.11 mV/V 16 μ V/V 65 μ V/V 71 μ V/V 66 μ V/V	Agilent 3458A 8.5 Digit Multimeter
DC High Voltage – Measure	(19 to 195) kV	0.3 % of reading	Ross Engineering VD195 Voltage Divider, Agilent 34401A 6.5 Digit Multimeter
DC Current – Source	(2.2 to 200) μ A 200 μ A to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 30) A	0.59 mA/A 20 μ A/A 75 μ A/A 75 μ A/A 0.17 mA/A 0.3 mA/A	Transmille 4010 Advanced Multiproduct Calibrator
DC Current – Measure	(0.1 to 1) μ A (1 to 10) μ A (10 to 100) μ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	1.5 mA/A 20 μ A/A 0.12 μ A/A 49 μ A/A 48 μ A/A 53 μ A/A 0.11 mA/A	Agilent 3458A 8.5 Digit Multimeter
	(1 to 3) A	0.38 mA/A	Agilent 34401A 6.5 Digit Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source	(2.2 to 200) mV		Transmille 4010 Advanced Multiproduct Calibrator
	10 Hz to 1 kHz	38 μ V	
	(1 to 100) kHz	34 μ V	
	(100 to 500) kHz	0.31 mV	
	200 mV to 2 V		
	10 Hz to 1 kHz	45 μ V	
	(1 to 100) kHz	68 μ V	
	100 kHz to 1 MHz	0.95 mV	
	(2 to 20) V		
	10 Hz to 1 kHz	42 μ V	
	(1 to 10) kHz	55 μ V	
	(10 to 50) kHz	7.1 mV	
	(20 to 200) V		
	10 Hz to 1 kHz	5 mV	
(1 to 40) kHz	6 mV		
(40 to 100) kHz	16 mV		
AC Voltage – Measure	(0.1 to 10) mV		Agilent 3458A 8.5 Digit Multimeter
	(1 to 40) Hz	0.81 mV/V	
	40 Hz to 1 kHz	0.61 mV/V	
	(1 to 20) kHz	0.61 mV/V	
	(20 to 50) kHz	0.75 mV/V	
	(50 to 100) kHz	1.3 mV/V	
	(100 to 300) kHz	2.5 mV/V	
	(10 to 100) mV		
	(1 to 40) Hz	0.47 mV/V	
	40 Hz to 1 kHz	0.19 mV/V	
	(1 to 20) kHz	0.19 mV/V	
	(20 to 50) kHz	0.34 mV/V	
	(50 to 100) kHz	0.75 mV/V	
	(100 to 300) kHz	1.3 mV/V	
	300 kHz to 1 MHz	3.8 mV/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 8.5 Digit Multimeter
	(1 to 40) Hz	0.43 mV/V	
	40 Hz to 1 kHz	69 μ V/V	
	(1 to 20) kHz	69 μ V/V	
	(20 to 50) kHz	0.12 mV/V	
	(50 to 100) kHz	0.17 mV/V	
	(100 to 300) kHz	0.59 mV/V	
	300 kHz to 1 MHz	2.37 mV/V	
	(1 to 10) V		
	(1 to 40) Hz	0.45 mV/V	
	40 Hz to 1 kHz	85 μ V/V	
	(1 to 20) kHz	84 μ V/V	
	(20 to 50) kHz	0.12 mV/V	
	(50 to 100) kHz	0.16 mV/V	
	(100 to 300) kHz	0.43 mV/V	
300 kHz to 1 MHz	2.4 mV/V		
(10 to 100) V			
(1 to 40) Hz	0.44 mV/V		
40 Hz to 1 kHz	91 μ V/V		
(1 to 20) kHz	79 μ V/V		
(20 to 50) kHz	0.14 mV/V		
(50 to 100) kHz	0.23 mV/V		
(100 to 750) V			
45 Hz to 1 kHz	0.41 mV/V		
(1 to 20) kHz	94 μ V/V		
AC High Voltage – Measure	(13 to 138) kV 60 Hz	0.62 % of reading	Ross Engineering VD195 Voltage Divider, Agilent 34401A 6.5 Digit Multimeter
AC Current – Source	(2.2 to 200) μ A		Transmille 4010 Advanced Multiproduct Calibrator
	10 Hz to 1 kHz	0.17 μ A	
	(1 to 10) kHz	0.37 μ A	
	(10 to 30) kHz	0.67 μ A	
	200 μ A to 2 mA		
	10 Hz to 1 kHz	0.28 μ A	
	(1 to 10) kHz	13 μ A	
	(10 to 30) kHz	25 μ A	
	(2 to 20) mA		
10 Hz to 1 kHz	3 μ A		
(1 to 10) kHz	58 μ A		
(10 to 30) kHz	30 μ A		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source	(20 to 200) mA		Transmille 4010 Advanced Multiproduct Calibrator
	10 Hz to 1 kHz	0.35 mA	
	(1 to 10) kHz	0.82 mA	
	(10 to 30) kHz	1.6 mA	
	200 mA to 2 A		
	10 Hz to 1 kHz	2.8 mA	
	(1 to 10) kHz	1.3 mA	
	(10 to 30) kHz	5.4 mA	
AC Current – Measure	(2 to 30) A		Agilent 3458A 8.5 Digit Multimeter
	10 Hz to 1 kHz	8.7 mA	
	(1 to 10) kHz	8.7 mA	
	(1 to 100) μ A		
	(10 to 20) Hz	0.56 mA/A	
	(20 to 45) Hz	1.3 mA/A	
	(45 to 100) Hz	1.3 mA/A	
	100 Hz to 5 kHz	0.58 mA/A	
	100 μ A to 1 mA		
	(10 to 20) Hz	0.45 mA/A	
	(20 to 45) Hz	0.59 mA/A	
	(45 to 100) Hz	0.59 mA/A	
	100 Hz to 5 kHz	1.2 mA/A	
	(1 to 10) mA		
	(10 to 20) Hz	0.46 mA/A	
	(20 to 45) Hz	0.22 mA/A	
	(45 to 100) Hz	0.21 mA/A	
	100 Hz to 5 kHz	0.33 mA/A	
	(10 to 100) mA		
	(10 to 20) Hz	0.43 mA/A	
	(20 to 45) Hz	0.21 mA/A	
	(45 to 100) Hz	0.21 mA/A	
	100 Hz to 5 kHz	0.32 mA/A	
	100 mA to 1 A		
(10 to 20) Hz	0.38 mA/A		
(20 to 45) Hz	0.37 mA/A		
(45 to 100) Hz	0.37 mA/A		
100 Hz to 5 kHz	0.66 mA/A		
(1 to 3) A	(10 to 45) Hz	2.6 mA/A	Agilent 34401A 6.5 Digit Multimeter
	45 Hz to 1 kHz	1.4 mA/A	
	(1 to 5) kHz	9 mA/A	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	
Resistance – Source (Simulated)	0.1 Ω	6 m Ω	Transmille 4010 Advanced Multiproduct Calibrator	
	1 Ω	6 m Ω		
	10 Ω	6 m Ω		
	100 Ω	7 m Ω		
	1 k Ω	23 m Ω		
	10 k Ω	0.13 Ω		
	100 k Ω	2.4 Ω		
	1 M Ω	30 Ω		
	10 M Ω	1.4 K Ω		
	100 M Ω	0.18 M Ω		
	1 G Ω	13 M Ω		
Resistance – Measure 4-wire	(0 to 1) Ω	0.12 m Ω	Agilent 3458A 8.5 Digit Multimeter	
	(1 to 10) Ω	29 m Ω		
	(10 to 100) Ω	13 m Ω		
	(0.1 to 1) k Ω	10 m Ω		
	(1 to 10) k Ω	0.1 Ω		
	(10 to 100) k Ω	0.13 Ω		
	100 k Ω to 1 M Ω	24 Ω		
	(1 to 10) M Ω	0.49 k Ω		
	(10 to 100) M Ω	14 k Ω		
	100 M Ω to 1 G Ω	0.31 M Ω		
Oscilloscopes	DC Voltage, 50 Ω	(0 to 2.2) V	4.1 mV/V	Fluke 5500A/3 Multiproduct Calibrator
	DC Voltage, 1 M Ω	(0 to 33) V	2.9 mV/V	
	Square Wave Signal 50 Ω at 1 kHz	1.8 mV to 2.2 V	4.2 mV/V	
	Square Wave Signal 1 M Ω at 1 kHz	1.8 mV to 105 V	2.8 mV/V	
	Leveled Sine Wave Flatness (relative to 50kHz)	50 kHz to 100 MHz	0.41 V/V	
		(100 to 300) MHz	0.34 V/V	
	Time Marker 50 Ω	2 ns to 5 s	1.2 μ s/s	
Rise/ Fall Time	400 ps	80 ps		
Capacitance – Source (Simulation)	400 Hz			Transmille 4010 Advanced Multiproduct Calibrator
	(1.1 to 3.3) μ F	5.7 mF/F		
	(3.3 to 11) μ F	5.2 mF/F		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Capacitance – Source (Simulated)	1 kHz		Transmille 4010 Advanced Multiproduct Calibrator
	(330 to 500) pF	40 mF/F	
	500 pF to 1.1 nF	18 mF/F	
	(1.1 to 3.3) nF	9.7 mF/F	
	(3.3 to 11) nF	7 mF/F	
	(11 to 33) nF	7 mF/F	
	(33 to 110) nF	4 mF/F	
	(110 to 330) nF	4.3 mF/F	
	330 nF to 1.1 µF	3 mF/F	
	100 Hz		
	(11 to 33) µF	6 mF/F	
	(33 to 110) µF	7.1 mF/F	
	(110 to 330) µF	9.3 mF/F	
	330 µF to 1.1 mF	13 mF/F	
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure	Type E		Transmille 4010 Advanced Multiproduct Calibrator
	(-250 to -100) °C	0.11 °C	
	(-100 to -25) °C	0.09 °C	
	(-250 to 350) °C	0.07 °C	
	(350 to 1 000) °C	0.8 °C	
	Type J		
	(-210 to -100) °C	0.41 °C	
	(-100 to -30) °C	0.38 °C	
	(-30 to 150) °C	0.38 °C	
	(150 to 760) °C	0.41 °C	
	(760 to 1 200) °C	0.4 °C	
	Type K		
	(-200 to -100) °C	0.07 °C	
	(-100 to -25) °C	0.07 °C	
	(-25 to 120) °C	0.09 °C	
	(120 to 1 000) °C	0.12 °C	
	(1 000 to 1 372) °C	0.12 °C	
	Type T		
	(-250 to -150) °C	0.45 °C	
	(-150 to 0) °C	0.12 °C	
(0 to 120) °C	0.1 °C		
(120 to 400) °C	0.07 °C		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicating Devices – Source	Pt 385, 100 Ω		Transmille 4010 Advanced Multiproduct Calibrator
	(-200 to -80) °C	0.03 °C	
	(-80 to 0) °C	0.03 °C	
	(0 to 100) °C	0.03 °C	
	(100 to 300) °C	0.04 °C	
	(300 to 400) °C	0.06 °C	
	(400 to 630) °C	0.06 °C	
	(630 to 800) °C	0.12 °C	
	Pt 3926, 100 Ω		
	(-200 to -80) °C	0.03 °C	
	(-80 to 0) °C	0.02 °C	
	(0 to 100) °C	0.03 °C	
	(100 to 300) °C	0.04 °C	
	(300 to 400) °C	0.06 °C	
(400 to 630) °C	0.08 °C		

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Torque Tools	(5 to 50) lbf·in	1.5 % of reading	CDI Torque Calibrator
	(30 to 400) lbf·in	0.74 % of reading	
	(100 to 1 000) lbf·in	0.6 % of reading	
	(20 to 250) lbf·ft	1.3 % of reading	
Pressure	(100 to 10 000) psi	0.024 % of reading	Deadweight Tester

Thermodynamic

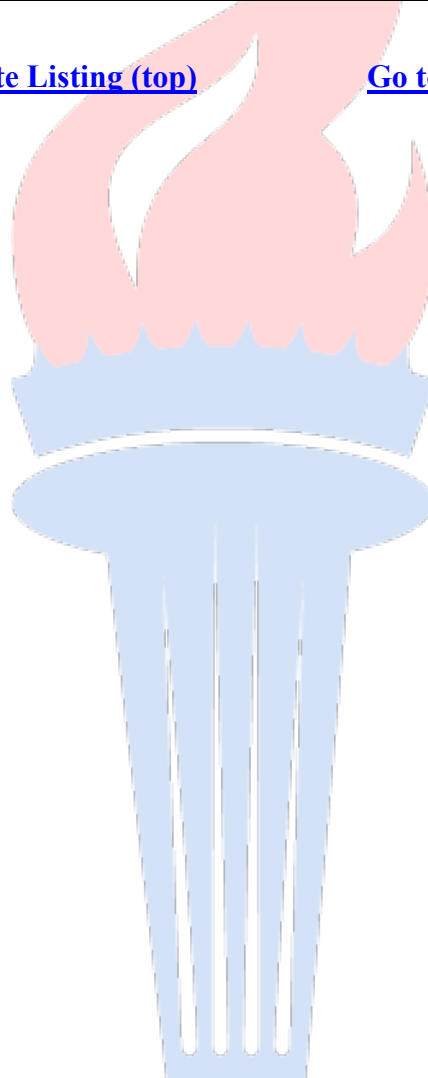
Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Measure	(-40 to 0) °C	0.24 °C	Isotech 935-14-95H Temperature System
	(0 to 30) °C	0.06 °C	
	(30 to 210) °C	0.09 °C	
	(210 to 400) °C	0.16 °C	
	400 °C	0.19 °C	

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Source	10 Hz to 10 MHz	3 μ Hz/Hz	Transmille 4010 Advanced Multiproduct Calibrator
Frequency – Measure	1 Hz to 10 MHz	0.11 mHz/Hz	Agilent 3458A 8.5 Digit Multimeter
Tachometers – Non-Contact	Up to 28 800 rpm	0.58 rpm	Comparison to Shimpo DT-2100 Standard Tachometer

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V 330 V to 1 kV	69 μ V/V 52 μ V/V 52 μ V/V 57 μ V/V 60 μ V/V	Fluke 5500A 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 kV	85 μ V/V 47 μ V/V 40 μ V/V 51 μ V/V 55 μ V/V	Agilent 34401A 8.5 Digit Multimeter
DC Current – Source	Up to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 2.2 A (2.2 to 11) A	16 μ A/A 15 μ A/A 20 μ A/A 30 μ A/A 0.71 mA/A	Fluke 5500A Multiproduct Calibrator
DC Current – Measure	Up to 10 mA (10 to 100) mA 100 mA to 1 A (1 to 3) A	70 μ A/A 0.55 mA/A 1.1 mA/A 1.5 mA/A	Agilent 34401A 8.5 Digit Multimeter
AC Voltage – Source	(1 to 33) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.11 mV/V 0.11 mV/V 1.1 mV/V 3.7 mV/V 5.3 mV/V	Fluke 5500A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source	(33 to 330) mV		Fluke 5500A Multiproduct Calibrator
	(10 to 45) Hz	50 μ V/V	
	45 Hz to 10 kHz	0.48 mV/V	
	(10 to 20) kHz	1.2 mV/V	
	(20 to 50) kHz	2 mV/V	
	(50 to 100) kHz	3.7 mV/V	
	330 mV to 3.3 V		
	(10 to 45) Hz	30 μ V/V	
	45 Hz to 10 kHz	40 μ V/V	
	(10 to 20) kHz	0.97 mV/V	
	(20 to 50) kHz	1.7 mV/V	
	(50 to 100) kHz	3.7 mV/V	
	(3.3 to 33) V		
	(20 to 45) Hz	40 μ V/V	
	45 Hz to 10 kHz	40 μ V/V	
	(10 to 20) kHz	1 mV/V	
	(20 to 100) kHz	3.7 mV/V	
	(33 to 330) V		
45 to 1 kHz	0.85 mV/V		
(1 to 10) kHz	0.7 mV/V		
(10 to 20) kHz	1.2 mV/V		
330 V to 1.02 kV			
45 to 1 kHz	60 μ V/V		
(1 to 5) kHz	2.6 mV/V		
(5 to 20) kHz	3.2 mV/V		
AC Voltage – Measure	Up to 100 mV		Agilent 34401A 6.5 Digit Multimeter
	(5 to 10) Hz	0.84 mV/V	
	10 Hz to 20 kHz	1.4 mV/V	
	(20 to 50) kHz	6.7 mV/V	
	(50 to 100) kHz	11 mV/V	
	(100 to 300) kHz	54 mV/V	
	100 mV to 1 V		
	(5 to 10) Hz	1 mV/V	
	10 Hz to 20 kHz	1 mV/V	
	(20 to 50) kHz	1 mV/V	
	(50 to 100) kHz	7 mV/V	
	(1 to 10) V		
	(5 to 10) Hz	4 mV/V	
	10 Hz to 20 kHz	4.1 mV/V	
(20 to 50) kHz	15 mV/V		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment		
AC Voltage – Measure	(10 to 100) V 45 Hz to 1 kHz (1 to 10) kHz (10 to 10) kHz	7.8 mV/V 7.9 mV/V 15 mV/V	Agilent 34401A 6.5 Digit Multimeter		
	(100 to 750) V 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	5.5 mV/V 5.5 mV/V 1.7 mV/V			
AC Current – Source	(3.3 to 33) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	2.5 mA/A 1.9 mA/A 19 mA/A 2.9 mA/A 7.6 mA/A	Fluke 5500A Multiproduct Calibrator		
	(33 to 330) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	3 mA/A 0.23 mA/A 2.5 mA/A 8.5 mA/A 7 mA/A			
	330 mA to 2.2 A 45 Hz to 1 kHz (1 to 5) kHz	2.5 mA/A 2.7 mA/A			
	220 mA to 11 A 45 to 1 kHz	15 mA/A			
	AC Current – Measure	Up to 1 A 10 Hz to 5 kHz (1 to 3) A 10 Hz to 5 kHz		1.4 mA/A 4.1 mA/A	Agilent 34401A 6.5 Digit Multimeter
		1 kHz (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF		6 mF/F 5.9 mF/F 5.9 mF/F 8 mF/F	
	Capacitance – Source (Simulated)				Fluke 5500A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Source (Simulated)	Up to 11 Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 k 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 k Ω to 1.1 M Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω	9.3 m Ω 18 m Ω 21 m Ω 36 m Ω 0.14 Ω 0.33 Ω 1.3 Ω 3.2 Ω 16 Ω 43 Ω 0.2 k Ω 0.79 k Ω 7.6 k Ω 35 k Ω 0.63 M Ω	Fluke 5500A Multiproduct Calibrator
Resistance – Measure 4 Wire	(10 to 100) Ω 100 Ω to 1 k Ω (1 to 10) k Ω (10 to 100) k Ω 100 k Ω to 1 M Ω (1 to 10) M Ω (10 to 100) M Ω	18 m Ω 0.21 m Ω 36 m Ω 0.33 Ω 0.16 k Ω 0.2 k Ω 34 k Ω	Agilent 34401A 6.5 Digit Multimeter
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure	Type E (-250 to -100) $^{\circ}\text{C}$ (-100 to -25) $^{\circ}\text{C}$ (-250 to 350) $^{\circ}\text{C}$ (350 to 650) $^{\circ}\text{C}$ (650 to 1 000) $^{\circ}\text{C}$ Type J (-210 to -100) $^{\circ}\text{C}$ (-100 to -30) $^{\circ}\text{C}$ (-30 to 150) $^{\circ}\text{C}$ (150 to 760) $^{\circ}\text{C}$ (760 to 1 200) $^{\circ}\text{C}$	0.59 $^{\circ}\text{C}$ 0.24 $^{\circ}\text{C}$ 0.2 $^{\circ}\text{C}$ 0.21 $^{\circ}\text{C}$ 0.26 $^{\circ}\text{C}$ 0.32 $^{\circ}\text{C}$ 0.2 $^{\circ}\text{C}$ 0.19 $^{\circ}\text{C}$ 0.21 $^{\circ}\text{C}$ 0.28 $^{\circ}\text{C}$	Fluke 5500A Multiproduct Calibrator

Electrical – DC/Low Frequency

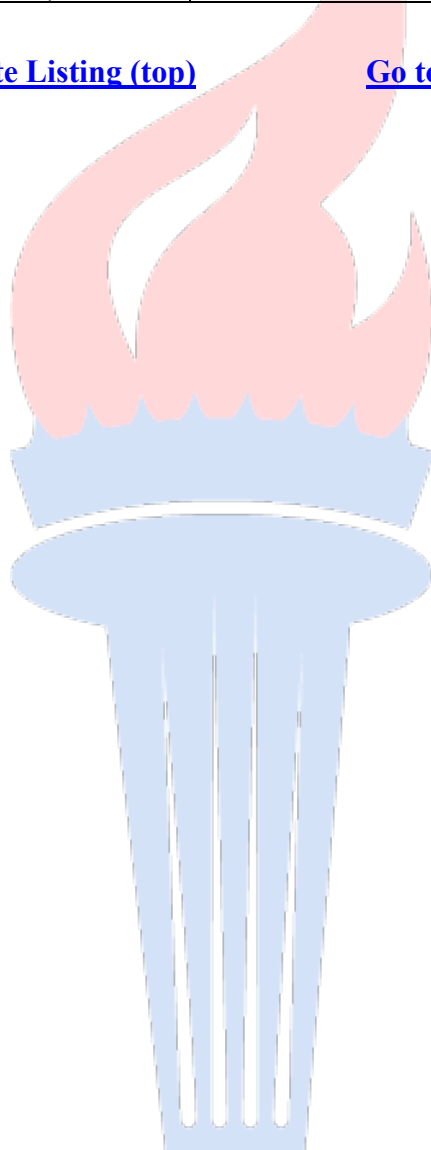
Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure	Type K (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C Type T (-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.4 °C 0.25 °C 0.2 °C 0.32 °C 0.48 °C 0.73 °C 0.31 °C 0.2 °C 0.18 °C	Fluke 5500A Multiproduct Calibrator
Electrical Simulation of RTD Indicating Devices – Source	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 Pt 3916, 100 Ω (-200 to -190) °C (-190 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.14 °C 0.14 °C 0.15 °C 0.15 °C 0.17 °C 0.17 °C 0.3 °C 0.07 °C 0.07 °C 0.09 °C 0.11 °C 0.12 °C 0.15 °C 0.29 °C 0.06 °C 0.08 °C 0.08 °C 0.09 °C 0.1 °C 0.11 °C 0.11 °C 0.27 °C	Fluke 5500A Multiproduct Calibrator

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Torque Tools	(5 to 50) lbf·in (30 to 400) lbf·in (100 to 1 000) lbf·in (20 to 250) lbf·ft (60 to 600) lbf·ft	1.5 % of reading 0.74 % of reading 0.54 % of reading 1 % of reading 1.5 % of reading	CDI Torque Calibrator

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Accredited Services performed at satellite laboratory

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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V 330 V to 1 kV	88 μ V/V 70 μ V/V 76 μ V/V 85 μ V/V 65 μ V/V	Fluke 5500A/6 Multiproduct Calibrator
DC Voltage – Measure	(1 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV	15 μ V/V 6.8 μ V/V 4.5 μ V/V 6.4 μ V/V 8.2 μ V/V	Agilent 3458A 8.5 Digit Multimeter
DC High Voltage – Measure	(5 to 30) kV	0.15 % of reading	Ross Engineering VD30 Voltage Divider, Fluke 8846A 6.5 Digit Multimeter
DC Current – Source	Up to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 2.2 A (2.2 to 11) A	0.25 mA/A 0.17 mA/A 0.2 mA/A 0.38 mA/A 2.6 mA/A	Fluke 5500A/6 Multiproduct Calibrator
DC Current – Measure	(0.1 to 1) μ A (1 to 10) μ A (10 to 100) μ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	6.9 mA/A 0.9 mA/A 0.24 mA/A 83 μ A/A 0.11 mA/A 0.13 mA/A 0.16 mA/A	Agilent 3458A 8.5 Digit Multimeter
	(1 to 3) A	1.6 mA/A	Fluke 8846A 6.5 Digit Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source	(1 to 33) mV		Fluke 5500A/6 Multiproduct Calibrator
	(10 to 45) Hz	12 mV/V	
	45 Hz to 10 kHz	9.7 mV/V	
	(10 to 20) kHz	1.1 mV/V	
	(20 to 50) kHz	3.7 mV/V	
	(50 to 100) kHz	5.3 mV/V	
	(33 to 330) mV		
	(10 to 45) Hz	4.9 mV/V	
	45 Hz to 10 kHz	1.3 mV/V	
	(10 to 20) kHz	1.2 mV/V	
	(20 to 50) kHz	2 mV/V	
	(50 to 100) kHz	3.7 mV/V	
	330 mV to 3.3 V		
	(10 to 45) Hz	1.8 mV/V	
	45 Hz to 10 kHz	0.4 mV/V	
	(10 to 20) kHz	0.97 mV/V	
	(20 to 50) kHz	1.7 mV/V	
	(50 to 100) kHz	3.7 mV/V	
	(3.3 to 33) V		
	(20 to 45) Hz	1.8 mV/V	
45 Hz to 10 kHz	0.5 mV/V		
(10 to 20) kHz	1 mV/V		
(20 to 100) kHz	3.7 mV/V		
(33 to 330) V			
45 to 1 kHz	0.61 mV/V		
(1 to 10) kHz	1 mV/V		
(10 to 20) kHz	1.2 mV/V		
330 V to 1.02 kV			
45 to 1 kHz	0.71 mV/V		
(1 to 5) kHz	2.6 mV/V		
(5 to 20) kHz	3.2 mV/V		
AC Voltage – Measure	Up to 100 mV		Agilent 3458A 8.5 Digit Multimeter
	(5 to 10) Hz	4.9 mV/V	
	10 Hz to 20 kHz	1.2 mV/V	
	(20 to 50) kHz	12 mV/V	
	(50 to 100) kHz	13 mV/V	
	(100 to 300) kHz	14 mV/V	

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 (5 to 10) Hz	4.8 mV/V	Agilent 3458A 8.5 Digit Multimeter
	10 Hz to 20 kHz (20 to 50) kHz	1.1 mV/V 2 mV/V	
	(50 to 100) kHz (1 to 10) V	7.9 mV/V	
	(5 to 10) Hz	2.1 mV/V	
	10 Hz to 20 kHz (20 to 50) kHz	0.54 mV/V 2.8 mV/V	
	(10 to 100) V		
	45 Hz to 1 kHz (1 to 10) kHz	0.7 mV/V 1.5 mV/V	
	(10 to 10) kHz	1.5 mV/V	
	(100 to 750) V		
	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	2.6 mV/V 3.1 mV/V 3.1 mV/V	
AC High Voltage – Measure	(1 to 21) kV 60 Hz	0.6 % of reading	Ross Engineering VD30 Voltage Divider, Fluke 8846A 6.5 Digit Multimeter
AC Current – Source	(3.3 to 33) mA (10 to 20) Hz	2.5 mA/A	Fluke 5500A/6 Multiproduct Calibrator
	(20 to 45) Hz	1.3 mA/A	
	45 Hz to 1 kHz (1 to 5) kHz	12 mA/A 2.4 mA/A	
	(5 to 10) kHz	7.3 mA/A	
	(33 to 330) mA (10 to 20) Hz	2.4 mA/A	
	(20 to 45) Hz	0.23 mA/A	
	45 Hz to 1 kHz (1 to 5) kHz	1.2 mA/A 2.4 mA/A	
	(5 to 10) kHz	7 mA/A	
	330 mA to 2.2 A 45 Hz to 1 kHz (1 to 5) kHz	2.5 mA/A 2.9 mA/A	
	(2.2 to 11) A (45 to 65) Hz (65 to 500) Hz	1 mA/A 1.5 mA/A	
500 Hz to 1 kHz	4.1 mA/A		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure	(1 to 100) μ A		Agilent 3458A 8.5 Digit Multimeter
	(10 to 20) Hz	1.6 mA/A	
	(20 to 45) Hz	0.52 mA/A	
	(45 to 100) Hz	0.36 mA/A	
	100 Hz to 5 kHz	0.73 mA/A	
	100 μ A to 1 mA		
	(10 to 20) Hz	0.39 mA/A	
	(20 to 45) Hz	0.23 mA/A	
	(45 to 100) Hz	0.25 mA/A	
	100 Hz to 5 kHz	0.43 mA/A	
	(1 to 10) mA		
	(10 to 20) Hz	0.43 mA/A	
	(20 to 45) Hz	0.2 mA/A	
	(45 to 100) Hz	0.21 mA/A	
	100 Hz to 5 kHz	0.33 mA/A	
(10 to 100) mA			
(10 to 20) Hz	0.45 mA/A		
(20 to 45) Hz	0.23 mA/A		
(45 to 100) Hz	0.21 mA/A		
100 Hz to 5 kHz	0.32 mA/A		
100 mA to 1 A			
(10 to 20) Hz	0.38 mA/A		
(20 to 45) Hz	0.4 mA/A		
(45 to 100) Hz	0.37 mA/A		
100 Hz to 5 kHz	0.66 mA/A		
	(1 to 3) A		Fluke 8846A 6.5 Digit Multimeter
	(10 to 45) Hz	3.1 mA/A	
	45 Hz to 1 kHz	2.3 mA/A	
	(1 to 5) kHz	9 mA/A	
Capacitance – Source (Simulated)	1 kHz		Fluke 5500A/6 Multiproduct Calibrator
	(3.3 to 11) nF	6.9 mF/F	
	(11 to 33) nF	7 mF/F	
	(33 to 110) nF	4 mF/F	
	(110 to 330) nF	4.3 mF/F	
	(0.33 to 1.1) μ F	3 mF/F	
	(1.1 to 3.3) μ F	5.7 mF/F	
	(3.3 to 11) μ F	5.2 mF/F	
	(11 to 33) μ F	6 mF/F	
	400 Hz		
(33 to 110) μ F	7.1 mF/F		
(110 to 330) μ F	9.3 mF/F		



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Capacitance – Source (Simulated)	100 Hz (0.33 to 1.1) mF	13 mF/F	Fluke 5500A/6 Multiproduct Calibrator
Resistance – Source (Simulated)	Up to 11 Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 k 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 k Ω to 1.1 M Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω	11 m Ω 22 m Ω 30 m Ω 50 m Ω 0.19 Ω 0.39 Ω 1.9 Ω 4.2 Ω 21 Ω 53 Ω 0.26 k Ω 0.64 k Ω 8.4 k Ω 39 k Ω 0.65 M Ω	Fluke 5500A/6 Multiproduct Calibrator
Resistance – Measure 4-wire	(10 to 100) Ω 100 Ω to 1 k Ω (1 to 10) k Ω (10 to 100) k Ω 100 k Ω to 1 M Ω (1 to 10) M Ω (10 to 100) M Ω	28 m Ω 0.18 Ω 1.8 Ω 20 Ω 0.24 k Ω 7.6 k Ω 12 k Ω	Agilent 3458A 8.5 Digit Multimeter
Oscilloscopes DC Voltage, 50 Ω DC Voltage, 1 M Ω Square Wave Signal 50 Ω at 1 kHz Square Wave Signal 1 M Ω at 1 kHz Leveled Sine Wave Flatness (relative to 50 kHz) Time Marker 50 Ω Rise/Fall Time	(0 to 2.2) V (0 to 33) V 1.8 mV to 2.2 V 1.8 mV to 105 V 50 kHz to 100 MHz (100 to 300) MHz 2 ns to 5 s 400 ps	4.1 mV/V 2.9 mV/V 4.2 mV/V 2.9 mV/V 42 mV/V 34 mV/V 1.2 ms/s 80 ps	Fluke 5500A/6 Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicating Devices – Source/Measure	Type E (-250 to -100) °C (-100 to -25) °C (-250 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 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 T (-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.58 °C 0.2 °C 0.18 °C 0.2 °C 0.25 °C 0.32 °C 0.2 °C 0.18 °C 0.21 °C 0.28 °C 0.39 °C 0.22 °C 0.2 °C 0.31 °C 0.47 °C 0.73 °C 0.29 °C 0.2 °C 0.18 °C	Fluke 5500A/6 Multiproduct Calibrator
Electrical Simulation of RTD Indicating Devices – Source	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	0.06 °C 0.06 °C 0.08 °C 0.11 °C 0.12 °C 0.14 °C 0.27 °C 0.06 °C 0.06 °C 0.08 °C 0.11 °C 0.12 °C 0.14 °C	Fluke 5500A/6 Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicating Devices – Source	Pt 3916, 100 Ω		Fluke 5500A/6 Multiproduct Calibrator
	(-200 to -190) °C	0.29 °C	
	(-190 to -80) °C	0.05 °C	
	(-80 to 0) °C	0.06 °C	
	(0 to 100) °C	0.07 °C	
	(100 to 260) °C	0.08 °C	
	(260 to 300) °C	0.09 °C	
	(300 to 400) °C	0.11 °C	
	(400 to 600) °C	0.12 °C	
	(600 to 630) °C	0.27 °C	
	Pt 385, 200 Ω		
	(-200 to -80) °C	0.05 °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	0.14 °C	
	(300 to 400) °C	0.15 °C	
	(400 to 600) °C	0.17 °C	
	(600 to 630) °C	0.19 °C	
	Pt 385, 500 Ω		
	(-200 to -80) °C	0.05 °C	
	(-80 to 0) °C	0.06 °C	
	(0 to 100) °C	0.06 °C	
	(100 to 260) °C	0.07 °C	
	(260 to 300) °C	0.09 °C	
	(300 to 400) °C	0.09 °C	
	(400 to 600) °C	0.11 °C	
	(600 to 630) °C	0.13 °C	
Pt 385, 1 000 Ω			
(-200 to -80) °C	0.04 °C		
(-80 to 0) °C	0.04 °C		
(0 to 100) °C	0.05 °C		
(100 to 260) °C	0.06 °C		
(260 to 300) °C	0.07 °C		
(300 to 400) °C	0.08 °C		
(400 to 600) °C	0.08 °C		
(600 to 630) °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 Indicating Devices – Source	PtNi 385, 120 Ω (Ni120)		Fluke 5500A/6 Multiproduct Calibrator
	(-80 to 0) °C	0.09 °C	
	(0 to 100) °C	0.09 °C	
	(100 to 260) °C	0.17 °C	
	Cu 427, 10 Ω		
	(-100 to 260) °C	0.35 °C	

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Torque Tools	(5 to 50) lbf·in	1.5 % of reading	CDI Torque Calibrator
	(30 to 400) lbf·in	0.78 % of reading	
	(100 to 1 000) lbf·in	0.56 % of reading	
	(20 to 250) lbf·ft	1.8 % of reading	

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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. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1959. Site specific sections are identified by city and suffix (AC-1959.xx) for convenience.



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