



# CERTIFICATE OF ACCREDITATION

## The ANSI National Accreditation Board

Hereby attests that

**Process Measurement Company**  
**5735 Lindsay Street**  
**Minneapolis, MN 55422**

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](http://www.anab.org).

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 26 June 2021

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, 2021**

Certificate Number: **AC-1959**

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source	(1 to 220) mV	9 $\mu$ V/V	Fluke 5720A Multiproduct Calibrator
	220 mV to 2.2 V	6 $\mu$ V/V	
	(2.2 to 22) V	5 $\mu$ V/V	
	(22 to 220) V	5 $\mu$ V/V	
	(220 to 1 100) V	8 $\mu$ V/V	
DC Voltage – Measure	(1 to 100) mV	8.6 $\mu$ V/V	Agilent 3458A Multimeter
	100 mV to 1 V	6.8 $\mu$ V/V	
	(1 to 10) V	4.5 $\mu$ V/V	
	(10 to 100) V	6.5 $\mu$ V/V	
	100 V to 1 kV	8.2 $\mu$ V/V	Ross Engineering VD120 Voltage Divider w/ Agilent 34401A Multimeter
	(12 to 120) kV	0.15 % of reading	
DC Current – Source	(1 to 220) $\mu$ A	57 $\mu$ A/A	Fluke 5720A Multiproduct Calibrator
	220 $\mu$ A to 2.2 mA	41 $\mu$ A/A	
	(2.2 to 22) mA	47 $\mu$ A/A	
	(22 to 220) mA	53 $\mu$ A/A	
	220 mA to 2.2 A	0.27 mA/A	
DC Current – Measure	(0.5 to 1) $\mu$ A	1.5 mA/A	Agilent 3458A Multimeter
	(1 to 10) $\mu$ A	0.2 mA/A	
	(10 to 100) $\mu$ A	0.12mA/A	
	100 $\mu$ A to 1 mA	51 $\mu$ A/A	
	(1 to 10) mA	48 $\mu$ A/A	
	(10 to 100) mA	57 $\mu$ A/A	
	100 mA to 1 A	0.12 mA/A	Agilent 34401A Multimeter
(1 to 3) A	0.38 mA/A		

**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 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	4.7mV/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 $\mu$ V/V		
(1 to 20) kHz	90 $\mu$ 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		
AC Voltage – Measure	(10 to 100) V		Agilent 3458A Multimeter
	40 Hz to 1 kHz	0.11 mV/V	
	(1 to 20) kHz	69 $\mu$ 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 Voltage – Measure	(8.5 to 85) kV		Ross Engineering VD120 Voltage Divider w/ Agilent 34401A Multimeter
	60 Hz	0.6 % of reading	



ANSI National Accreditation Board

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 Multiproduct Calibrator
	10 Hz to 1 kHz	38 $\mu$ V	
	(1 to 100) kHz	34 $\mu$ V	
	(100 to 500) kHz	310 $\mu$ V	
	200 mV to 2 V		
	10 Hz to 1 kHz	45 $\mu$ V	
	(1 to 100) kHz	68 $\mu$ V	
	100 kHz to 1 MHz	950 $\mu$ V	
	(2 to 20) V		
	10 Hz to 1 kHz	42 $\mu$ V	
	(1 to 10) kHz	55 $\mu$ 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 - Source	(200 to 1 000) V		Transmille 4010 Multiproduct Calibrator
	10 Hz to 1 kHz	40 mV	
	(1 to 10) kHz	52 mV	
	(2.2 to 200) $\mu$ A		
	10 Hz to 1 kHz	0.17 $\mu$ A	
	(1 to 10) kHz	0.37 $\mu$ A	
(10 to 30) kHz	0.67 $\mu$ A		
AC Voltage - Source	200 $\mu$ A to 2 mA		Transmille 4010 Multiproduct Calibrator
	10 Hz to 1 kHz	0.28 $\mu$ A	
	(1 to 10) kHz	13 $\mu$ A	
	(10 to 30) kHz	25 $\mu$ A	

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Source	(2 to 20) mA 10 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz (20 to 200) mA 10 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz 200 mA to 2 A 10 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz (2 to 30) A 10 Hz to 1 kHz (1 to 10) kHz	3 $\mu$ A 58 $\mu$ A 30 $\mu$ A 350 $\mu$ A 0.82 mA 1.6 mA 2.8 mA 1.3 mA 5.4 mA 8.7 mA 8.7 mA	Transmille 4010 Multiproduct Calibrator
AC Current – Source	(1 to 220) $\mu$ A (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 $\mu$ A to 2.2 mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (2.2 to 22) mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (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	0.32 mA/A 0.21 mA/A 0.16 mA/A 0.34 mA/A 1.4 mA/A 0.27 mA/A 0.18 mA/A 0.14 mA/A 0.25 mA/A 1.4 mA/A 0.278 mA/A 0.18 mA/A 0.14 mA/A 0.23 mA/A 1.4 mA/A 0.27 mA/A 0.18 mA/A 0.14 mA/A 0.36 mA/A 1.2 mA/A	Fluke 5720A Multiproduct Calibrator

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source	220 mA to 1 A		Fluke 5720A Multiproduct Calibrator
	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		
AC Current – Source	(2.2 to 11) A		Fluke 5500A/6 Multiproduct Calibrator
	(45 to 65) Hz	7 mA/A	
	(65 to 500) Hz	7 mA/A	
	500 Hz to 1 kHz	8.1 mA/A	
AC Current – Measure	(1 to 100) $\mu$ A		Agilent 3458A 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 $\mu$ 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		

**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	0.45 mA/A 0.41 mA/A 0.41 mA/A 0.65 mA/A	Agilent 3458A Multimeter
Resistance – Source	1 $\Omega$ 10 $\Omega$ 100 $\Omega$ 1 k $\Omega$ 10 k $\Omega$ 100 k $\Omega$ 1 M $\Omega$ 10 M $\Omega$ 100 M $\Omega$	0.12 m $\Omega$ 0.28 m $\Omega$ 1.4 m $\Omega$ 11 m $\Omega$ 0.11 $\Omega$ 1.8 $\Omega$ 0.24 k $\Omega$ 0.48 k $\Omega$ 13 k $\Omega$	Transmille 4010 Multi Product Calibrator
Resistance – Source	1 G $\Omega$	1.2 k $\Omega$	IET SRL-1G Resistance Standard
Resistance – Measure	Up to 1 $\Omega$ (1 to 10) $\Omega$ (10 to 100) $\Omega$ 100 V to 1 k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ 100 k $\Omega$ to 1 M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$	0.15 m $\Omega$ 0.49 m $\Omega$ 13 m $\Omega$ 13 m $\Omega$ 0.13 $\Omega$ 1.5 $\Omega$ 25 $\Omega$ 0.49 k $\Omega$ 27 k $\Omega$	Agilent 3458A Multimeter

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes DC Voltage, 50 $\Omega$	(0 to 2.2) V	5.4 mV/V	Fluke 5500A/6 Multiproduct Calibrator
DC Voltage, 1 M $\Omega$	(0 to 33) V	3.6 mV/V	
Square Wave Signal 50 $\Omega$ at 1 kHz	1.8 mV to 2.2 V	6 mV/V	
Square Wave Signal 1 M $\Omega$ 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 $\Omega$	2 ns to 5 s	1.3 $\mu$ s/s	
Rise/Fall Time	400 ps	170 ps	
Capacitance – Source Simulated (Variable)	(1 to 9) $\mu$ F (10 to 90) $\mu$ F (100 to 900) $\mu$ F (1 to 9) mF (10 – 50) mF	17 nF/ $\mu$ F 13 nF/ $\mu$ F 9 nF/ $\mu$ F 12 $\mu$ F/mF 11 $\mu$ F/mF	Transmille 4010 Multi Product Calibrator
Capacitance – Source Passive (Fixed)	1 nF 5 nF 10 nF 100 nF 1 $\mu$ F 10 $\mu$ F	4.3 pF 32 pF 47 pF 300 pF 3 nF 32 nF	Transmille 4010 Multi Product Calibrator



**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicators	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	0.58 °C 0.13 °C 0.12 °C 0.19 °C 0.19 °C 0.27 °C 0.14 °C 0.12 °C 0.17 °C 0.23 °C 0.32 °C 0.19 °C 0.14 °C 0.24 °C 0.31 °C 0.7 °C 0.13 °C 0.12 °C 0.14 °C	Transmille 4010 Multi Product Calibrator
Electrical Simulation of RTD Indicators	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 Pt 3916 100 Ω (-200 to -190) °C (-190 to -80) °C (-80 to 0) °C (0 to 800) °C	0.04 °C 0.04 °C 0.04 °C 0.03 °C 0.16 °C 0.64 °C 0.64 °C 0.16 °C 0.64 °C 0.64 °C 0.64 °C	Transmille 4010 Multi Product Calibrator

### Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pipettes	(0.1 to 5) $\mu\text{L}$ (5 to 25) $\mu\text{L}$ (25 to 100) $\mu\text{L}$ (100 to 200) $\mu\text{L}$	0.2 $\mu\text{L}$ 0.31 $\mu\text{L}$ 0.72 $\mu\text{L}$ 1.4 $\mu\text{L}$	Artel PCS 3 Photometric Pipette Calibration System
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	1.3 % of reading 0.66 % of reading 0.43 % of reading 0.49 % 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) $^{\circ}\text{C}$ (-15 to 0) $^{\circ}\text{C}$ (0 to 50) $^{\circ}\text{C}$ (50 to 250) $^{\circ}\text{C}$ (250 to 400) $^{\circ}\text{C}$	0.83 $^{\circ}\text{C}$ 0.04 $^{\circ}\text{C}$ 0.05 $^{\circ}\text{C}$ 0.05 $^{\circ}\text{C}$ 0.07 $^{\circ}\text{C}$	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	10 MHz	$13 \times 10^{-9}$ Hz	Agilent 53220A Counter
Frequency – Measure	0.1 Hz to 350 MHz	1.1 $\mu\text{Hz}/\text{Hz}$	Agilent 53220A Counter
Tachometers – Non-Contact	(1 to 100 000) RPM	0.015 % of reading	Agilent 33250A Signal 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 all parameters, 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.



R. Douglas Leonard Jr., VP, PILR SBU





# CERTIFICATE OF ACCREDITATION

## The ANSI National Accreditation Board

Hereby attests that

**Process Measurement Company**  
**2475 West 2<sup>nd</sup> Avenue, Unit 34A**  
**Denver, CO 80223**

Fulfills the requirements of

**ISO/IEC 17025:2017**

and national standard

**ANSI/NCSL Z540-1-1994 (R2002)**

In the field of

**CALIBRATION**

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

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 26 June 2021

Certificate Number: AC-1959.01



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**

2475 West 2<sup>nd</sup> Avenue, Unit 34A

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**CALIBRATION**

Valid to: **June 26, 2021**

Certificate Number: **AC-1959.01**

**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	36 $\mu$ V/V	Transmille 4010 Multiproduct Calibrator
	200 mV to 2 V	19 $\mu$ V/V	
	(2 to 20) V	17 $\mu$ V/V	
	(20 to 200) V	15 $\mu$ V/V	
	(200 to 1 000) V	20 $\mu$ V/V	
DC Voltage – Measure	Up to 100 mV	0.11 mV/V	Agilent 3458A Multimeter
	100 mV to 1 V	16 $\mu$ V/V	
	(1 to 10) V	65 $\mu$ V/V	
	(10 to 100) V	71 $\mu$ V/V	
	100 V to 1 kV	66 $\mu$ V/V	
	(19 to 195) kV	0.68 % of reading	Ross Engineering VD195 Voltage Divider w/ Agilent 34401A Multimeter
DC Current – Source	(2.2 to 200) $\mu$ A	590 $\mu$ A/A	Transmille 4010 Multiproduct Calibrator
	200 $\mu$ A to 2 mA	199 $\mu$ A/A	
	(2 to 20) mA	75 $\mu$ A/A	
	(20 to 200) mA	75 $\mu$ A/A	
	200 mA to 2 A	166 $\mu$ A/A	
	(2 to 30) A	0.3 mA/A	

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Measure	(0.1 to 1) $\mu$ A (1 to 10) $\mu$ A (10 to 100) $\mu$ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	1.5 mA/A 20 $\mu$ A/A 0.12 $\mu$ A/A 49 $\mu$ A/A 48 $\mu$ A/A 53 $\mu$ A/A 0.11 mA/A	Agilent 3458A Multimeter
DC Current – Measure	(1 to 3) A	0.38 mA/A	Agilent 34401A Multimeter
AC Voltage – Source	(2.2 to 200) mV 10 Hz to 1 kHz (1 to 100) kHz (100 to 500) kHz 200 mV to 2 V 10 Hz to 1 kHz (1 to 100) kHz 100 kHz to 1 MHz (2 to 20) V 10 Hz to 1 kHz (1 to 10) kHz (10 to 50) kHz (20 to 200) V 10 Hz to 1 kHz (1 to 40) kHz (40 to 100) kHz (200 to 1 000) V 10 Hz to 1 kHz (1 to 10) kHz	38 $\mu$ V 34 $\mu$ V 310 $\mu$ V 45 $\mu$ V 68 $\mu$ V 950 $\mu$ V 42 $\mu$ V 55 $\mu$ V 7.1 mV 5 mV 6 mV 16 mV 40 mV 52 mV	Transmille 4010 Multiproduct Calibrator
AC Voltage – Measure	(0.1 to 10) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.81 mV/V 0.61 mV/V 0.61 mV/V 0.75 mV/V 1.3 mV/V 2.5 mV/V	Agilent 3458A Multimeter



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure	(10 to 100) mV		Agilent 3458A Multimeter
	(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	
	100 mV to 1 V		
	(1 to 40) Hz	0.43 mV/V	
	40 Hz to 1 kHz	69 uV/V	
	(1 to 20) kHz	69 uV/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 uV/V	
	(1 to 20) kHz	84 uV/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 uV/V		
(1 to 20) kHz	79 uV/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 μV/V		
AC Voltage – Measure	(13 to 138) kV 60 Hz	0.55 % of reading	Ross Engineering VD85 Voltage Divider w/ Agilent 34401A Multimeter



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source	(2.2 to 200) $\mu$ A		Transmille 4010 Multiproduct Calibrator
	10 Hz to 1 kHz	0.17 $\mu$ A	
	(1 to 10) kHz	0.37 $\mu$ A	
	(10 to 30) kHz	0.67 $\mu$ A	
	200 $\mu$ A to 2 mA		
	10 Hz to 1 kHz	0.28 $\mu$ A	
	(1 to 10) kHz	13 $\mu$ A	
	(10 to 30) kHz	25 $\mu$ A	
	(2 to 20) mA		
	10 Hz to 1 kHz	3 $\mu$ A	
	(1 to 10) kHz	58 $\mu$ A	
	(10 to 30) kHz	30 $\mu$ A	
	(20 to 200) mA		
	10 Hz to 1 kHz	350 $\mu$ A	
(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		
AC Current – Measure	(1 to 100) $\mu$ A		Agilent 3458A Multimeter
	(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 $\mu$ 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		



**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure	(10 to 100) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.43 mA/A 0.21 mA/A 0.21 mA/A 0.32 mA/A	Agilent 3458A Multimeter
	100 mA to 1 A (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.38 mA/A 0.37 mA/A 0.37 mA/A 0.66 mA/A	
AC Current – Measure	(1 to 3) A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	2.6 mA/A 1.4 mA/A 9 mA/A	Agilent 34401A Multimeter
Resistance – Source	0.1 $\Omega$ 1 $\Omega$ 10 $\Omega$ 100 $\Omega$ 1 k $\Omega$ 10 k $\Omega$ 100 k $\Omega$ 1 M $\Omega$ 10 M $\Omega$ 100 M $\Omega$ 1 G $\Omega$	6 m $\Omega$ 6 m $\Omega$ 6 m $\Omega$ 7 m $\Omega$ 23 m $\Omega$ 0.13 $\Omega$ 2.4 $\Omega$ 30 $\Omega$ 1.4 K $\Omega$ 0.18 M $\Omega$ 13 M $\Omega$	Transmille 4010 Multiproduct Calibrator
Resistance – Measure 4 Wire	(0 to 1) $\Omega$ (1 to 10) $\Omega$ (10 to 100) $\Omega$ (0.1 to 1) k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ 100 k $\Omega$ to 1 M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$ 100 M $\Omega$ to 1 G $\Omega$	0.12 m $\Omega$ 29 m $\Omega$ 13 m $\Omega$ 10 m $\Omega$ 0.1 $\Omega$ 0.13 $\Omega$ 24 $\Omega$ 0.49 k $\Omega$ 14 k $\Omega$ 0.31 M $\Omega$	Agilent 3458A Multimeter



ANSI National Accreditation Board

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oscilloscopes DC Voltage, 50 Ω DC Voltage, 1 MΩ	(0 to 2.2) V (0 to 33) V	4.1 mV/V 2.9 mV/V	Fluke 5500A/3 Multiproduct Calibrator
Square Wave Signal 50 Ω at 1 kHz	1.8 mV to 2.2 V	4.2 mV/V	
Square Wave Signal 1 MΩ 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 (100 to 300) MHz	0.41 V/V 0.34 V/V	
Time Marker 50 Ω	2 ns to 5 s	1.2 μs/s	
Rise/ Fall Time	400 ps	80 ps	
Capacitance – Source @ 400 Hz	(1.1 to 3.3) μF (3.3 to 11) μF	5.7 mF/F 5.2 mF/F	Fluke 5500A/3 Multiproduct Calibrator
Capacitance – Source @ 1 kHz	(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	40 mF/F 18 mF/F 9.7 mF/F 7 mF/F 7 mF/F 4 mF/F 4.3 mF/F 3 mF/F	Fluke 5500A/3 Multiproduct Calibrator
Capacitance – Source @ 100 Hz	(11 to 33) μF (33 to 110) μF (110 to 330) μF 330 μF to 1.1 mF	6 mF/F 7.1 mF/F 9.3 mF/F 13 mF/F	Fluke 5500A/3 Multiproduct Calibrator
Electrical Simulation of Thermocouple Indicators	Type E (-250 to -100) °C (-100 to -25) °C (-250 to 350) °C (350 to 650) °C (650 to 1 000) °C	0.58 °C 0.2 °C 0.18 °C 0.2 °C 0.25 °C	Fluke 5500A/3 Multiproduct Calibrator



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	
Electrical Simulation of Thermocouple Indicators	Type J		Fluke 5500A/3 Multiproduct Calibrator	
		(-210 to -100) °C		0.32 °C
		(-100 to -30) °C		0.2 °C
		(-30 to 150) °C		0.18 °C
		(150 to 760) °C		0.21 °C
		(760 to 1 200) °C		0.28 °C
	Type K			
		(-200 to -100) °C		0.39 °C
		(-100 to -25) °C		0.22 °C
		(-25 to 120) °C		0.2 °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	0.29 °C		
	(0 to 120) °C	0.2 °C		
	(120 to 400) °C	0.18 °C		
Electrical Simulation of RTD Indicators	Pt 385 100 Ω		Fluke 5500A/3 Multiproduct Calibrator	
		(-200 to -80) °C		0.06 °C
		(-80 to 0) °C		0.06 °C
		(0 to 100) °C		0.08 °C
		(100 to 300) °C		0.11 °C
		(300 to 400) °C		0.12 °C
		(400 to 630) °C		0.14 °C
		(630 to 800) °C		0.27 °C
	Pt 3926 100 Ω			
		(-200 to -80) °C		0.06 °C
		(-80 to 0) °C		0.06 °C
		(0 to 100) °C		0.08 °C
		(100 to 300) °C		0.11 °C
		(300 to 400) °C		0.12 °C
		(400 to 630) °C		0.14 °C



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicators	Pt 3916 100 $\Omega$		Fluke 5500A/3 Multiproduct Calibrator
	(-200 to -190) $^{\circ}\text{C}$	0.29 $^{\circ}\text{C}$	
	(-190 to -80) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(-80 to 0) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(0 to 100) $^{\circ}\text{C}$	0.07 $^{\circ}\text{C}$	
	(100 to 260) $^{\circ}\text{C}$	0.08 $^{\circ}\text{C}$	
	(260 to 300) $^{\circ}\text{C}$	0.09 $^{\circ}\text{C}$	
	(300 to 400) $^{\circ}\text{C}$	0.11 $^{\circ}\text{C}$	
	(400 to 600) $^{\circ}\text{C}$	0.12 $^{\circ}\text{C}$	
	(600 to 630) $^{\circ}\text{C}$	0.27 $^{\circ}\text{C}$	
	Pt 385 200 $\Omega$		
	(-200 to -80) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(-80 to 0) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(0 to 100) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(100 to 260) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(260 to 300) $^{\circ}\text{C}$	0.14 $^{\circ}\text{C}$	
	(300 to 400) $^{\circ}\text{C}$	0.15 $^{\circ}\text{C}$	
	(400 to 600) $^{\circ}\text{C}$	0.17 $^{\circ}\text{C}$	
	(600 to 630) $^{\circ}\text{C}$	0.19 $^{\circ}\text{C}$	
	Pt 385 500 $\Omega$		
	(-200 to -80) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(-80 to 0) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(0 to 100) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(100 to 260) $^{\circ}\text{C}$	0.07 $^{\circ}\text{C}$	
	(260 to 300) $^{\circ}\text{C}$	0.09 $^{\circ}\text{C}$	
	(300 to 400) $^{\circ}\text{C}$	0.09 $^{\circ}\text{C}$	
	(400 to 600) $^{\circ}\text{C}$	0.11 $^{\circ}\text{C}$	
	(600 to 630) $^{\circ}\text{C}$	0.13 $^{\circ}\text{C}$	
Pt 385 1 000 $\Omega$			
(-200 to -80) $^{\circ}\text{C}$	0.04 $^{\circ}\text{C}$		
(-80 to 0) $^{\circ}\text{C}$	0.04 $^{\circ}\text{C}$		
(0 to 100) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$		
(100 to 260) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$		
(260 to 300) $^{\circ}\text{C}$	0.07 $^{\circ}\text{C}$		
(300 to 400) $^{\circ}\text{C}$	0.08 $^{\circ}\text{C}$		
(400 to 600) $^{\circ}\text{C}$	0.08 $^{\circ}\text{C}$		
(600 to 630) $^{\circ}\text{C}$	0.27 $^{\circ}\text{C}$		

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicators	PtNi 385 120 $\Omega$ (Ni120)		Fluke 5500A/3 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 $\Omega$		
	(-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	0.69 % of reading	CDI Torque Calibrator
	(30 to 400) lbf-in	0.61 % of reading	
	(100 to 1 000) lbf-in	1.2 % of reading	
	(20 to 250) lbf-ft	0.77 % of reading	
	(60 to 600) lbf-ft	0.85 % of reading	
Pressure	(100 to 10 000) psi	0.006 9 % of reading	Deadweight Tester

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-1959.01.



R. Douglas Leonard Jr., VP, PILR SBU



# CERTIFICATE OF ACCREDITATION

## The ANSI National Accreditation Board

Hereby attests that

**Process Measurement Company**  
**4865 G Street**  
**Omaha, NE 68117**

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](http://www.anab.org).

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

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 26 June 2021

Certificate Number: AC-1959.02



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**

4865 G Street  
Omaha, NE 68117  
Carl Duncan 402-517-5012  
cduncan@processmeasurementco.com

**CALIBRATION**

Valid to: **June 26, 2021**

Certificate Number: **AC-1959.02**

**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 $\mu$ V/V 52 $\mu$ V/V 52 $\mu$ V/V 57 $\mu$ V/V 60 $\mu$ 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 $\mu$ V/V 47 $\mu$ V/V 40 $\mu$ V/V 51 $\mu$ V/V 55 $\mu$ V/V	Agilent 34401A 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	0.016 mA/A 0.015 mA/A 0.02 mA/A 0.03 mA/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	0.07 mA/A 0.55 mA/A 1.1 mA/A 1.5 mA/A	Agilent 34401A 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 (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz 330 mV to 3.3 V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (3.3 to 33) V (20 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 100) kHz (33 to 330) V 45 to 1 kHz (1 to 10) kHz (10 to 20) kHz 330 V to 1.02 kV 45 to 1 kHz (1 to 5) kHz (5 to 20) kHz	0.05 mV/V 0.48 mV/V 1.2 mV/V 2 mV/V 3.7 mV/V 0.03 mV/V 0.04 mV/V 0.97 mV/V 1.7 mV/V 3.7 mV/V 0.04 mV/V 0.04 mV/V 1 mV/V 3.7 mV/V 0.85 mV/V 0.7 mV/V 1.2 mV/V 0.06 mV/V 2.6 mV/V 3.2 mV/V	Fluke 5500A Multiproduct Calibrator
AC Voltage – Measure	Up to 100 mV (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 100 mV to 1 V (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (1 to 10) V (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz	0.84 mV/V 1.4 mV/V 6.7 mV/V 11 mV/V 54 mV/V 1 mV/V 1 mV/V 1 mV/V 7 mV/V 4 mV/V 4.1 mV/V 15 mV/V	Agilent 34401A Multimeter



**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 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 Multimeter
		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	
	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 Multimeter
		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	
	Capacitance – Source @ 1 kHz	(3.3 to 11) nF		6.0 mF/F	Fluke 5500A Multiproduct Calibrator
		(11 to 33) nF		5.9 mF/F	
(33 to 110) nF		5.9 mF/F			
(110 to 330) nF		8.0 mF/F			



ANSI National Accreditation Board

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Source	Up to 11 $\Omega$ (11 to 33) $\Omega$ (33 to 110) $\Omega$ (110 to 330) $\Omega$ 330 $\Omega$ to 1.1 k $\Omega$ (1.1 to 3.3) k $\Omega$ (3.3 to 11) k $\Omega$ (11 to 33) k $\Omega$ (33 to 110) k $\Omega$ (110 to 330) k $\Omega$ 330 k $\Omega$ to 1.1 M $\Omega$ (1.1 to 3.3) M $\Omega$ (3.3 to 11) M $\Omega$ (11 to 33) M $\Omega$ (33 to 110) M $\Omega$	9.3 m $\Omega$ 18 m $\Omega$ 21 m $\Omega$ 36 m $\Omega$ 0.14 $\Omega$ 0.33 $\Omega$ 1.3 $\Omega$ 3.2 $\Omega$ 16 $\Omega$ 43 $\Omega$ 200 $\Omega$ 790 $\Omega$ 7.6 k $\Omega$ 35 k $\Omega$ 0.63 M $\Omega$	Fluke 5500A Multiproduct Calibrator
Resistance – Measure 4 Wire	(10 to 100) $\Omega$ 100 $\Omega$ to 1 k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ 100 k $\Omega$ to 1 M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$	18 m $\Omega$ 0.21 m $\Omega$ 36 m $\Omega$ .33 $\Omega$ 0.16 k $\Omega$ 200 $\Omega$ 34 k $\Omega$	Agilent 34401A Multimeter
Electrical Simulation of Thermocouple Indicators	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



ANSI National Accreditation Board

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 Multiproduct Calibrator
	(-200 to -100) °C	0.4 °C	
	(-100 to -25) °C	0.25 °C	
	(-25 to 120) °C	0.2 °C	
	(120 to 1 000) °C	0.32 °C	
	(1 000 to 1 372) °C	0.48 °C	
	Type T		
	(-250 to -150) °C	0.73 °C	
	(-150 to 0) °C	0.31 °C	
	(0 to 120) °C	0.2 °C	
(120 to 400) °C	0.18 °C		
Electrical Simulation of RTD Indicators	Pt 385 100 Ω		Fluke 5500A Multiproduct Calibrator
	(-200 to -80) °C	0.14 °C	
	(-80 to 0) °C	0.14 °C	
	(0 to 100) °C	0.15 °C	
	(100 to 300) °C	0.15 °C	
	(300 to 400) °C	0.17 °C	
	(400 to 630) °C	0.17 °C	
	(630 to 800) °C	0.3 °C	
	Pt 3926 100 Ω		
	(-200 to -80) °C	0.07 °C	
	(-80 to 0) °C	0.07 °C	
	(0 to 100) °C	0.09 °C	
	(100 to 300) °C	0.11 °C	
	(300 to 400) °C	0.12 °C	
	(400 to 630) °C	0.15 °C	
	Pt 3916 100 Ω		
	(-200 to -190) °C	0.29 °C	
	(-190 to -80) °C	0.06 °C	
	(-80 to 0) °C	0.08 °C	
	(0 to 100) °C	0.08 °C	
	(100 to 260) °C	0.09 °C	
(260 to 300) °C	0.1 °C		
(300 to 400) °C	0.11 °C		
(400 to 600) °C	0.11 °C		
(600 to 630) °C	0.27 °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 (30 to 400) lbf-in (100 to 1 000) lbf-in (20 to 250) lbf-ft (60 to 600) lbf-ft	0.57 % of reading 0.53 % of reading 0.45 % of reading 0.6 % of reading 0.69 % of reading	CDI Torque Calibrator

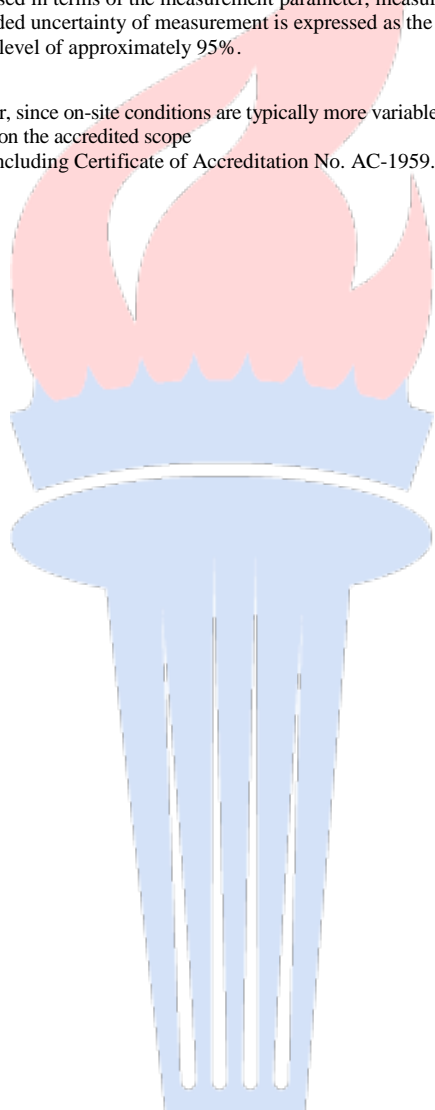
Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement 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-1959.02.



R. Douglas Leonard Jr., VP, PILR SBU





# CERTIFICATE OF ACCREDITATION

## The ANSI National Accreditation Board

Hereby attests that

**Process Measurement Company**  
**3100 South 44<sup>th</sup> Street**  
**Kansas City, KS 66106**

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](http://www.anab.org).

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

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 26 June 2021

Certificate Number: AC-1959.03



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**

3100 South 44<sup>th</sup> Street  
Kansas City, KS 66106  
Jake Gilliam 913-384-2064  
jgilliam@processmeasurementco.com

**CALIBRATION**

Valid to: **June 26, 2021**

Certificate Number: **AC-1959.03**

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source	Up to 330 mV	88 $\mu$ V/V	Fluke 5500A/6 Multiproduct Calibrator
	330 mV to 3.3 V	70 $\mu$ V/V	
	(3.3 to 33) V	76 $\mu$ V/V	
	(33 to 330) V	85 $\mu$ V/V	
	330 V to 1 kV	65 $\mu$ V/V	
DC Voltage – Measure	(1 to 100) mV	15 $\mu$ V/V	Agilent 3458A Multimeter
	100 mV to 1 V	6.8 $\mu$ V/V	
	(1 to 10) V	4.5 $\mu$ V/V	
	(10 to 100) V	6.4 $\mu$ V/V	
	100 V to 1 kV	8.2 $\mu$ V/V	Ross Engineering VD30 Voltage Divider w/ Fluke 8846A Multimeter
	(5 to 30) kV	0.15 % of reading	
DC Current – Source	Up to 3.3 mA	0.25 mA/A	Fluke 5500A/6 Multiproduct Calibrator
	(3.3 to 33) mA	0.17 mA/A	
	(33 to 330) mA	0.2 mA/A	
	330 mA to 2.2 A	0.38 mA/A	
	(2.2 to 11) A	2.6 mA/A	
DC Current – Measure	(0.1 to 1) $\mu$ A	6.9 mA/A	Agilent 3458A Multimeter
	(1 to 10) $\mu$ A	0.9 mA/A	
	(10 to 100) $\mu$ A	0.24 mA/A	
	(0.1 to 1) mA	83 $\mu$ A/A	
	(1 to 10) mA	0.11 mA/A	
	(10 to 100) mA	0.13 mA/A	
DC Current – Measure	(0.1 to 1) A	0.16 mA/A	
DC Current – Measure	(1 to 3) A	1.6 mA/A	Fluke 8846A 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 (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	12 mV/V 9.7 mV/V 1.1 mV/V 3.7 mV/V 5.3 mV/V	Fluke 5500A/6 Multiproduct Calibrator
AC Voltage – Source	(33 to 330) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz 330 mV to 3.3 V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (3.3 to 33) V (20 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 100) kHz (33 to 330) V 45 to 1 kHz (1 to 10) kHz (10 to 20) kHz 330 V to 1.02 kV 45 to 1 kHz (1 to 5) kHz (5 to 20) kHz	4.9 mV/V 1.3 mV/V 1.2 mV/V 2 mV/V 3.7 mV/V 1.8 mV/V 0.4 mV/V 0.97 mV/V 1.7 mV/V 3.7 mV/V 1.8 mV/V 0.5 mV/V 1 mV/V 3.7 mV/V 0.61 mV/V 1 mV/V 1.2 mV/V 0.71 mV/V 2.6 mV/V 3.2 mV/V	Fluke 5500A/6 Multiproduct Calibrator
AC Voltage – Measure	Up to 100 mV (5 to 10) Hz 10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	4.9 mV/V 1.2 mV/V 12 mV/V 13 mV/V 14 mV/V	Agilent 3458A Multimeter

**Electrical – DC/Low Frequency**

<b>Parameter/Equipment</b>	<b>Range</b>	<b>Expanded Uncertainty of Measurement (+/-)</b>	<b>Reference Standard, Method, and/or Equipment</b>
AC Voltage – Measure	100 mV to 1 V (5 to 10) Hz	4.8 mV/V	Agilent 3458A 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	2.6 mV/V 3.1 mV/V	
	(5 to 10) kHz	3.1 mV/V	
AC Voltage – Measure	(13 to 138) kV 60Hz	0.6 % of reading	Ross Engineering VD30 Voltage Divider w/ Fluke 8846A 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	2.5 mA/A	
	(1 to 5) kHz	2.9 mA/A	
	(2.2 to 11) A (45 to 65) Hz	1 mA/A	
	(65 to 500) Hz	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) $\mu$ A		Agilent 3458A 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 $\mu$ 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		
AC Current – Measure	(1 to 3) A		Fluke 8846A 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 @ 1 kHz	(3.3 to 11) nF	6.9 mF/F	Fluke 5500A/6 Multiproduct Calibrator
	(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) $\mu$ F	3 mF/F	
	(1.1 to 3.3) $\mu$ F	5.7 mF/F	
	(3.3 to 11) $\mu$ F	5.2 mF/F	
	(11 to 33) $\mu$ F	6 mF/F	
Capacitance – Source @ 400 Hz	(33 to 110) $\mu$ F	7.1 mF/F	Fluke 5500A/6 Multiproduct Calibrator
	(110 to 330) $\mu$ F	9.3 mF/F	
Capacitance – Source @ 100 Hz	(0.33 to 1.1) mF	13 mF/F	Fluke 5500A/6 Multiproduct Calibrator

**Electrical – DC/Low Frequency**

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



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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 E		Fluke 5500A/6 Multiproduct Calibrator	
		(-250 to -100) °C		0.58 °C
		(-100 to -25) °C		0.2 °C
		(-250 to 350) °C		0.18 °C
		(350 to 650) °C		0.2 °C
		(650 to 1 000) °C		0.25 °C
	Type J			
		(-210 to -100) °C		0.32 °C
		(-100 to -30) °C		0.2 °C
		(-30 to 150) °C		0.18 °C
		(150 to 760) °C		0.21 °C
		(760 to 1 200) °C		0.28 °C
	Type K			
		(-200 to -100) °C		0.39 °C
		(-100 to -25) °C		0.22 °C
	(-25 to 120) °C	0.2 °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	0.29 °C		
	(0 to 120) °C	0.2 °C		
	(120 to 400) °C	0.18 °C		
Electrical Simulation of RTD Indicators	Pt 385 100 Ω		Fluke 5500A/6 Multiproduct Calibrator	
		(-200 to -80) °C		0.06 °C
		(-80 to 0) °C		0.06 °C
		(0 to 100) °C		0.08 °C
		(100 to 300) °C		0.11 °C
		(300 to 400) °C		0.12 °C
		(400 to 630) °C		0.14 °C
	(630 to 800) °C	0.27 °C		

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicators	Pt 3926 100 $\Omega$		Fluke 5500A/6 Multiproduct Calibrator
	(-200 to -80) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(-80 to 0) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(0 to 100) $^{\circ}\text{C}$	0.08 $^{\circ}\text{C}$	
	(100 to 300) $^{\circ}\text{C}$	0.11 $^{\circ}\text{C}$	
	(300 to 400) $^{\circ}\text{C}$	0.12 $^{\circ}\text{C}$	
	(400 to 630) $^{\circ}\text{C}$	0.14 $^{\circ}\text{C}$	
	Pt 3916 100 $\Omega$		
	(-200 to -190) $^{\circ}\text{C}$	0.29 $^{\circ}\text{C}$	
	(-190 to -80) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(-80 to 0) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(0 to 100) $^{\circ}\text{C}$	0.07 $^{\circ}\text{C}$	
	(100 to 260) $^{\circ}\text{C}$	0.08 $^{\circ}\text{C}$	
	(260 to 300) $^{\circ}\text{C}$	0.09 $^{\circ}\text{C}$	
	(300 to 400) $^{\circ}\text{C}$	0.11 $^{\circ}\text{C}$	
	(400 to 600) $^{\circ}\text{C}$	0.12 $^{\circ}\text{C}$	
	(600 to 630) $^{\circ}\text{C}$	0.27 $^{\circ}\text{C}$	
	Pt 385 200 $\Omega$		
	(-200 to -80) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(-80 to 0) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(0 to 100) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(100 to 260) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(260 to 300) $^{\circ}\text{C}$	0.14 $^{\circ}\text{C}$	
	(300 to 400) $^{\circ}\text{C}$	0.15 $^{\circ}\text{C}$	
(400 to 600) $^{\circ}\text{C}$	0.17 $^{\circ}\text{C}$		
(600 to 630) $^{\circ}\text{C}$	0.19 $^{\circ}\text{C}$		
Pt 385 500 $\Omega$			
(-200 to -80) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$		
(-80 to 0) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$		
(0 to 100) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$		
(100 to 260) $^{\circ}\text{C}$	0.07 $^{\circ}\text{C}$		
(260 to 300) $^{\circ}\text{C}$	0.09 $^{\circ}\text{C}$		
(300 to 400) $^{\circ}\text{C}$	0.09 $^{\circ}\text{C}$		
(400 to 600) $^{\circ}\text{C}$	0.11 $^{\circ}\text{C}$		
(600 to 630) $^{\circ}\text{C}$	0.13 $^{\circ}\text{C}$		

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of RTD Indicators	Pt 385 1 000 $\Omega$		Fluke 5500A/6 Multiproduct Calibrator
	(-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	
	PtNi 385 120 $\Omega$ (Ni120)		
	(-80 to 0) °C	0.09 °C	
	(0 to 100) °C	0.09 °C	
	(100 to 260) °C	0.17 °C	
Cu 427 10 $\Omega$			
(-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	0.69 % of reading	CDI Torque Calibrator
	(30 to 400) lbf-in	0.61 % of reading	
	(100 to 1 000) lbf-in	1.2 % of reading	
	(20 to 250) lbf-ft	0.77 % of reading	
	(60 to 600) lbf-ft	0.85 % of reading	

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-1959.03.



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