



# PERRY JOHNSON LABORATORY ACCREDITATION, INC.

## *Certificate of Accreditation*

*Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:*

### ***L.A.W. Calibration***

***2 Main Street, Suite 15-107, Biddeford, ME 04005***

*(Hereinafter called the Organization) and hereby declares that Organization is accredited in accordance with the recognized International Standard:*

### **ISO/IEC 17025:2005**

This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (as outlined by the joint ISO-ILAC-IAF Communiqué dated January 2009):

***Dimensional, Mechanical, Mass, and Electrical Calibration***  
*(As detailed in the supplement)*

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

**DRAFT**

\_\_\_\_\_  
Tracy Szerszen  
President/Operations Manager

Perry Johnson Laboratory  
Accreditation, Inc. (PJLA)  
755 W. Big Beaver, Suite 1325  
Troy, Michigan 48084

*Initial Accreditation Date:*

July 28, 2016

*Issue Date:*

July 28, 2016

*Expiration Date:*

August 31, 2018

*Accreditation No.:*

90581

*Certificate No.:*

L16-303

*The validity of this certificate is maintained through ongoing assessments based on a continuous accreditation cycle. The validity of this certificate should be confirmed through the PJLA website: [www.pjllabs.com](http://www.pjllabs.com)*



# Certificate of Accreditation: Supplement

## L.A.W. Calibration

2 Main Street, Suite 15-107, Biddeford, ME 04005  
Contact Name: Louis Waterhouse Phone: 207-229-6554

Accreditation is granted to the facility to perform the following calibrations:

### Dimensional

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Calipers <sup>FO</sup>	0.05 in to 20 in	(650.18 + 3.10 x 10 <sup>-2</sup> L) $\mu$ in	Gage Block Set Grade 0
Micrometers <sup>FO</sup>	1 in to 20 in	(43.26 + 2.42L) $\mu$ in	
Dial Indicators <sup>FO</sup>	0.01 in to 1 in	(650.25 + 2.21 x 10 <sup>-2</sup> L) $\mu$ in	
Test Indicators <sup>FO</sup>	0.001 in to 0.15 in	(71.06 + 1.3 x 10 <sup>-2</sup> L) $\mu$ in	
Height Gages <sup>FO</sup>	0.05 in to 20 in	(65.36 + 50.55L) $\mu$ in	

### Mechanical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Velocity <sup>F</sup>	2.5 m/s to 15 m/s	1 % of reading	Omega-WTM-1000
Pressure Gauge <sup>FO</sup>	1 psi to 10 000 psi	0.05 % of Full Scale	Fluke 700P31
	-14.5 psi to 15 psi	0.25 % of Full Scale	Ashcroft 2074
	1 psi to 3 000 psi	0.05 % of Full Scale	Ashcroft 2089
	0.1 psi to 100 psi	0.01 % of Full Scale	Fluke 700G06
Torque Wrench <sup>F</sup>	10 ozf·in to 100 ozf·in	0.25 % of reading	AW Torque Transducers
	5 lbf·in to 50 lbf·in	0.25 % of reading	
	50 lbf·in to 500 lbf·in	0.25 % of reading	
	250 lbf·ft to 750 lbf·ft	0.25 % of reading	
	750 lbf·ft to 2 000 lbf·ft	0.25 % of reading	

### Mass, Force, and Weighing Devices

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Scales & Balances <sup>FO</sup>	0.001 g to 100 g	0.5 mg	Standard Weights (Class 1)
	0.1 lb to 1 lb	0.01 lb	Standard Weights (Class F)
	1 lb to 1 300 lb	0.25 lb	



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### Electrical

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Equipment to Output DC Voltage <sup>FO</sup>	0.1 $\mu$ V to 330 mV	23 $\mu$ V/V + 2 $\mu$ V	Fluke 5522A
	0.33 V to 3.3 V	13 $\mu$ V/V + 4 $\mu$ V	
	3.3 V to 33.V	14 $\mu$ V/V + 35 $\mu$ V	
	30 V to 330 V	21 $\mu$ V/V + 250 $\mu$ V	
	100 V to 1 000 V	21 $\mu$ V/V + 1 800 $\mu$ V	
Equipment to Measure DC Voltage <sup>F</sup>	0.01 mV to 100 mV	1.1 $\mu$ V/V + 3 $\mu$ V	Agilent 3458A
	100 mV to 1 V	10 $\mu$ V/V + 0.3 $\mu$ V	
	1 V to 10 V	10 $\mu$ V/V + 0.05 $\mu$ V	
	10 V to 100 V	12 $\mu$ V/V + 30 $\mu$ V	
	100 V to 1 000 V	12 $\mu$ V/V + 100 $\mu$ V	
Equipment to Output DC Current <sup>FO</sup>	1 nA to 330 $\mu$ A	0.015 % of reading + 0.02 $\mu$ A	Fluke 5522A W/ 50 turn coil
	330 $\mu$ A to 3.3 mA	0.01 % of reading + 0.06 $\mu$ A	
	3.3 mA to 33 mA	0.01 % of reading + 0.4 $\mu$ A	
	33 mA to 330 mA	0.01 % of reading + 4 $\mu$ A	
	330 mA to 1.1 A	0.02 % of reading + 50 $\mu$ A	
	1.1 A to 3.3 A	0.038 % of reading + 50 $\mu$ A	
	3.3 A to 11.5 A	0.05 % of reading + 600 $\mu$ A	
	11.5 A to 20 A	0.1 % of reading + 850 $\mu$ A	
Equipment to Output DC Current (Clamp on) <sup>FO</sup>	20 A to 1 000 A	0.1 % of reading + 0.85 mA	
Equipment to Measure DC Current <sup>F</sup>	0.01 nA to 100 nA	0.35 nA/A + 0.04 nA	Agilent 3458A
	100 nA to 1 $\mu$ A	0.25 $\mu$ A/A + 0.4 $\mu$ A	
	1 $\mu$ A to 10 $\mu$ A	2.5 $\mu$ A/A + 0.05 $\mu$ A	
	10 $\mu$ A to 100 $\mu$ A	2.5 $\mu$ A/A + 0.5 $\mu$ A	
	100 $\mu$ A to 1 mA	2.5 $\mu$ A/A + 0.5 $\mu$ A	
	1 mA to 10 mA	2.5 $\mu$ A/A + 0.1 $\mu$ A	
	10 mA to 100 mA	4 $\mu$ A/A + 0.5 $\mu$ A	
	100 mA to 1 A	10 $\mu$ A/A + 1 $\mu$ A	
Equipment to Output DC Power <sup>FO</sup>	10 mW to 336 W	0.05 % of reading	Fluke 5522A
	336 W to 3 060 W	0.05 % of reading	
	2 060 W to 20.9 kW	0.1 % of reading	
Equipment to Output AC Power <sup>FO</sup>	10 mW to 336 W	0.14 % of reading	
	336 W to 3 060 W	0.14 % of reading	
	2 060 W to 20.9 kW	0.12 % of reading	



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Equipment to Output AC Current At the listed frequencies <sup>FO</sup>			Fluke 5522A
10 Hz to 20 Hz	29 $\mu$ A to 330 $\mu$ A	0.2 % of reading + 0.1 $\mu$ A	
20 Hz to 45 Hz	29 $\mu$ A to 330 $\mu$ A	0.15 % of reading + 0.1 $\mu$ A	
45 Hz to 1 kHz	29 $\mu$ A to 330 $\mu$ A	0.13 % of reading + 0.1 $\mu$ A	
1 kHz to 5 kHz	29 $\mu$ A to 330 $\mu$ A	0.2 % of reading + 0.1 $\mu$ A	
5 kHz to 10 kHz	29 $\mu$ A to 330 $\mu$ A	0.8 % of reading + 0.2 $\mu$ A	
10 kHz to 30 kHz	29 $\mu$ A to 330 $\mu$ A	1.6 % of reading + 0.4 $\mu$ A	
Equipment to Output AC Current At the listed frequencies <sup>FO</sup>			
10 Hz to 20 Hz	0.33 mA to 3.3 mA	0.2 % of reading + 0.15 $\mu$ A	
20 Hz to 45 Hz	0.33 mA to 3.3 mA	0.13 % of reading + 0.15 $\mu$ A	
45 Hz to 1 kHz	0.33 mA to 3.3 mA	0.1 % of reading + 0.15 $\mu$ A	
1 kHz to 5 kHz	0.33 mA to 3.3 mA	0.2 % of reading + 0.2 $\mu$ A	
5 kHz to 10 kHz	0.33 mA to 3.3 mA	0.5 % of reading + 0.3 $\mu$ A	
10 kHz to 30 kHz	0.33 mA to 3.3 mA	1 % of reading + 0.5 $\mu$ A	
Equipment to Output AC Current At the listed frequencies <sup>FO</sup>			
10 Hz to 20 Hz	3.3 mA to 33 mA	0.18 % of reading + 2 $\mu$ A	
20 Hz to 45 Hz	3.3 mA to 33 mA	0.09 % of reading + 2 $\mu$ A	
45 Hz to 1 kHz	3.3 mA to 33 mA	0.04 % of reading + 2 $\mu$ A	
1 kHz to 5 kHz	3.3 mA to 33 mA	0.08 % of reading + 2 $\mu$ A	
5 kHz to 10 kHz	3.3 mA to 33 mA	0.2 % of reading + 100 $\mu$ A	
10 kHz to 30 kHz	3.3 mA to 33 mA	0.4 % of reading + 4 $\mu$ A	
Equipment to Output AC Current At the listed frequencies <sup>FO</sup>			
10 Hz to 20 Hz	33 mA to 330 mA	0.18 % of reading + 20 $\mu$ A	
20 Hz to 45 Hz	33 mA to 330 mA	0.09 % of reading + 20 $\mu$ A	
45 Hz to 1 kHz	33 mA to 330 mA	0.04 % of reading + 20 $\mu$ A	
1 kHz to 5 kHz	33 mA to 330 mA	0.1 % of reading + 50 $\mu$ A	
5 kHz to 10 kHz	33 mA to 330 mA	0.2 % of reading + 100 $\mu$ A	
10 kHz to 30 kHz	33 mA to 330 mA	0.4 % of reading + 200 $\mu$ A	



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Equipment to Output AC Current At the listed frequencies <sup>FO</sup>			Fluke 5522A
10 Hz to 45 Hz	0.33 A to 1.1 A	0.18 % of reading + 100 $\mu$ A	
45 Hz to 1 kHz	0.33 A to 1.1 A	0.05 % of reading + 100 $\mu$ A	
1 kHz to 5 kHz	0.33 A to 1.1 A	0.6 % of reading + 1 000 $\mu$ A	
5 kHz to 10 kHz	0.33 A to 1.1 A	2.5 % of reading + 5 000 $\mu$ A	
Equipment to Output AC Current At the listed frequencies <sup>FO</sup>			
10 Hz to 45 Hz	1.1 A to 3 A	0.18 % of reading + 100 $\mu$ A	
45 Hz to 1 kHz	1.1 A to 3 A	0.05 % of reading + 100 $\mu$ A	
1 kHz to 5 kHz	1.1 A to 3 A	0.6 % of reading + 1 000 $\mu$ A	
5 kHz to 10 kHz	1.1 A to 3 A	2.5 % of reading + 5 000 $\mu$ A	
Equipment to Output AC Current At the listed frequencies <sup>FO</sup>			
45 Hz to 100 Hz	3 A to 11 A	0.6 % of reading + 2 000 $\mu$ A	
100 Hz to 1 kHz	3 A to 11 A	0.1 % of reading + 2 000 $\mu$ A	
1 kHz to 5 kHz	3 A to 11 A	3 % of reading + 2 000 $\mu$ A	
Equipment to Output AC Current At the listed frequencies <sup>FO</sup>			
45 Hz to 100 Hz	11 A to 20.5 A	0.12 % of reading + 5 000 $\mu$ A	
100 Hz to 1 kHz	11 A to 20.5 A	0.15 % of reading + 5 000 $\mu$ A	
1 kHz to 5 kHz	11 A to 20.5 A	3 % of reading + 5 000 $\mu$ A	
Equipment to Output AC Current At the listed frequencies <sup>FO</sup>			Fluke 5522A W/50 turn coil
45 Hz	20 A to 1 000 A	0.12 % of reading	
Equipment to Measure AC Current At the listed frequencies <sup>F</sup>			Agilent 3458A
10 Hz to 20 Hz	0.01 $\mu$ A to 100 $\mu$ A	0.4 % of reading + 0.03 $\mu$ A	
20 Hz to 45 Hz	0.01 $\mu$ A to 100 $\mu$ A	0.15 % of reading + 0.03 $\mu$ A	
45 Hz to 100 Hz	0.01 $\mu$ A to 100 $\mu$ A	0.06 % of reading + 0.03 $\mu$ A	
100 Hz to 5 kHz	0.01 $\mu$ A to 100 $\mu$ A	0.06 % of reading + 0.03 $\mu$ A	



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Equipment to Measure AC Current At the listed frequencies <sup>F</sup>			Agilent 3458A
10 Hz to 20 Hz	1 mA to 100 mA	0.4 % of reading + 0.02 $\mu$ A	
20 Hz to 45 Hz	1 mA to 100 mA	0.15 % of reading + 0.02 $\mu$ A	
45 Hz to 100 Hz	1 mA to 100 mA	0.06 % of reading + 0.02 $\mu$ A	
100 Hz to 5 kHz	1 mA to 100 mA	0.03 % of reading + 0.02 $\mu$ A	
5 kHz to 20 kHz	1 mA to 100 mA	0.06 % of reading + 0.02 $\mu$ A	
50 kHz to 100 kHz	1 mA to 100 mA	0.55 % of reading + 0.15 $\mu$ A	
Equipment to Measure AC Current At the listed frequencies <sup>F</sup>			
10 Hz to 20 Hz	100 mA to 1 A	0.4 % of reading + 0.2 mA	
20 Hz to 45 Hz	100 mA to 1 A	0.16 % of reading + 0.2 mA	
45 Hz to 100 Hz	100 mA to 1 A	0.08 % of reading + 0.2 mA	
100 Hz to 5 kHz	100 mA to 1 A	0.1 % of reading + 0.2 mA	
5 kHz to 20 kHz	100 mA to 1 A	0.3 % of reading + 0.2 mA	
20 kHz to 50 kHz	100 mA to 1 A	1 % + of reading + 0.4 mA	
Equipment to Output AC Voltage At the listed frequencies <sup>FO</sup>			OEM- Fluke 5522A
10 Hz to 45 Hz	1 mV to 33 mV	0.08 % of reading + 6 $\mu$ V	
45 Hz to 10 kHz	1 mV to 33 mV	0.15 % of reading + 6 $\mu$ V	
10 kHz to 20 kHz	1 mV to 33 mV	0.02 % of reading + 6 $\mu$ V	
20 kHz to 50 kHz	1 mV to 33 mV	0.1 % of reading + 6 $\mu$ V	
50 kHz to 100 kHz	1 mV to 33 mV	0.35 % of reading + 12 $\mu$ V	
100 kHz to 500 kHz	1 mV to 33 mV	0.8 % of reading + 50 $\mu$ V	
Equipment to Output AC Voltage At the listed frequencies <sup>FO</sup>			
10 Hz to 45 Hz	33 mV to 330 mV	0.03 % of reading + 8 $\mu$ V	
45 Hz to 10 kHz	33 mV to 330 mV	0.013 % of reading + 8 $\mu$ V	
10 kHz to 20 kHz	33 mV to 330 mV	0.015 % of reading + 8 $\mu$ V	
20 kHz to 50 kHz	33 mV to 330 mV	0.035 % of reading + 8 $\mu$ V	
50 kHz to 100 kHz	33 mV to 330 mV	0.08 % of reading + 32 $\mu$ V	
100 kHz to 500 kHz	33 mV to 330 mV	0.2 % of reading + 70 $\mu$ V	



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Equipment to Output AC Voltage At the listed frequencies <sup>FO</sup>			OEM- Fluke 5522A
10 Hz to 45 Hz	0.33 V to 3.3 V	0.03 % of reading + 50 $\mu$ V	
45 Hz to 10 kHz	0.33 V to 3.3 V	0.012 % of reading + 25 $\mu$ V	
10 kHz to 20 kHz	0.33 V to 3.3 V	0.019 % of reading + 50 $\mu$ V	
20 kHz to 50 kHz	0.33 V to 3.3 V	0.03 % of reading + 50 $\mu$ V	
50 kHz to 100 kHz	0.33 V to 3.3 V	0.07 % of reading + 125 $\mu$ V	
100 kHz to 500 kHz	0.33 V to 3.3 V	0.24 % of reading + 600 $\mu$ V	
Equipment to Output AC Voltage At the listed frequencies <sup>FO</sup>			
10 Hz to 45 Hz	3.3 V to 33 V	0.03 % of reading + 650 $\mu$ V	
45 Hz to 10 kHz	3.3 V to 33 V	0.015 % of reading + 200 $\mu$ V	
10 kHz to 20 kHz	3.3 V to 33 V	0.024 % of reading + 600 $\mu$ V	
20 kHz to 50 kHz	3.3 V to 33 V	0.035 % of reading + 600 $\mu$ V	
50 kHz to 100 kHz	3.3 V to 33 V	0.09 % of reading + 1.6 mV	
Equipment to Output AC Voltage At the listed frequencies <sup>FO</sup>			
45 Hz to 1 kHz	33 V to 330 V	0.019 % of reading + 2 mV	
1 kHz to 10 kHz	33 V to 330 V	0.02 % of reading + 6 mV	
10 kHz to 20 kHz	33 V to 330 V	0.025 % of reading + 6 mV	
20 kHz to 50 kHz	33 V to 330 V	0.03 % of reading + 6 mV	
50 kHz to 100 kHz	33 V to 330 V	0.2 % of reading + 50 mV	
Equipment to Output AC Voltage At the listed frequencies <sup>FO</sup>			
45 Hz to 1 kHz	330 V to 1 020 V	0.03 % of reading + 10 mV	
1 kHz to 5 kHz	330 V to 1 020 V	0.025 % of reading + 10 mV	
5 kHz to 10 kHz	330 V to 1 020 V	0.03 % of reading + 10 mV	
Equipment to Measure AC Voltage < 2MHz At the listed frequencies <sup>F</sup>			OEM- Agilent 3458A
1 Hz to 40 Hz	1 mV to 10 mV	0.03 % of reading + 4 $\mu$ V	
40 Hz to 1 kHz	1 mV to 10 mV	0.02 % of reading + 1.5 $\mu$ V	
1 kHz to 20 kHz	1 mV to 10 mV	0.03 % of reading + 1.5 $\mu$ V	
20 kHz to 50 kHz	1 mV to 10 mV	0.03 % of reading + 1.5 $\mu$ V	
50 kHz to 100 kHz	1 mV to 10 mV	0.5 % of reading + 1.5 $\mu$ V	
100 kHz to 300 kHz	1 mV to 10 mV	4 % of reading + 2.5 $\mu$ V	



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Equipment to Measure AC Voltage < 2MHz At the listed frequencies <sup>F</sup>			OEM- Agilent 3458A
1 Hz to 40 Hz	100 mV to 10 V	0.007 % of reading + 0.5 mV	
40 Hz to 1 kHz	100 mV to 10 V	0.007 % of reading + 0.3 mV	
1 kHz to 20 kHz	100 mV to 10 V	0.014 % of reading + 0.3 mV	
20 kHz to 50 kHz	100 mV to 10 V	0.03 % of reading + 0.3 mV	
50 kHz to 100 kHz	100 mV to 10 V	0.08 % of reading + 0.3 mV	
100 kHz to 300 kHz	100 mV to 10 V	0.3 % of reading + 1.1 mV	
300 kHz to 1 MHz	100 mV to 10 V	1 % of reading + 1.1 mV	
1 MHz to 2 MHz	100 mV to 10 V	1.5 % of reading + 1.1 mV	
Equipment to Measure AC Voltage < 2MHz At the listed frequencies <sup>F</sup>			
1 Hz to 40 Hz	10 V to 100 V	0.03 % of reading + 5 mV	
40 Hz to 1 kHz	10 V to 100 V	0.02 % of reading + 3 mV	
1 kHz to 20 kHz	10 V to 100 V	0.02 % of reading + 3 mV	
20 kHz to 50 kHz	10 V to 100 V	0.035 % of reading + 3 mV	
50 kHz to 100 kHz	10 V to 100 V	0.12 % of reading + 3 mV	
100 kHz to 300 kHz	10 V to 100 V	0.4 % of reading + 10 mV	
Equipment to Measure AC Voltage < 2MHz At the listed frequencies <sup>F</sup>			
1 Hz to 40 Hz	100 V to 1 000 V	0.04 % of reading + 4 mV	
40 Hz to 1 kHz	100 V to 1 000 V	0.04 % of reading + 4 mV	
1 kHz to 20 kHz	100 V to 1 000 V	0.06 % of reading + 2 mV	
20 kHz to 50 kHz	100 V to 1 000 V	0.12 % of reading + 2 mV	
50 kHz to 100 kHz	100 V to 1 000 V	0.3 % of reading + 3 mV	
AC/DC High Voltage Testers <sup>F</sup>	1 kV to 6 kV	1 % of Reading	Fluke 80k-6 & 80k-40
	1 kV to 40 kV	0.4 kV	
Equipment to Output Frequency <sup>FO</sup>	0.01 Hz to 2 MHz	0.25 mHz/Hz + 5 $\mu$ Hz	Fluke 5522A
Equipment to Measure Frequency <sup>F</sup>	1 Hz to 40 Hz	0.03 % of reading	Agilent 3458A
	40 Hz to 10 MHz	0.01 % of reading	





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Equipment to Measure Resistance <sup>FO</sup>	0.01 $\Omega$ to 11 $\Omega$	0.004 % of reading + 0.011 $\Omega$	Fluke 5522A SR-1 series Standard resistors
	11 $\Omega$ to 33 $\Omega$	0.003 % of reading + 0.017 $\Omega$	
	33 $\Omega$ to 110 $\Omega$	0.002 8 % of reading + 0.017 $\Omega$	
	110 $\Omega$ to 330 $\Omega$	0.002 8 % of reading + 0.022 $\Omega$	
	330 $\Omega$ to 1.1 k $\Omega$	0.002 8 % of reading + 0.022 $\Omega$	
	1.1 k $\Omega$ to 3.3 k $\Omega$	0.002 8 % of reading + 0.22 $\Omega$	
	3.3 k $\Omega$ to 11 k $\Omega$	0.002 8 % of reading + 0.12 $\Omega$	
	11 k $\Omega$ to 33 k $\Omega$	0.002 8 % of reading + 1.2 $\Omega$	
	33 k $\Omega$ to 110 k $\Omega$	0.002 8 % of reading + 1.2 $\Omega$	
	110 k $\Omega$ to 330 k $\Omega$	0.003 2 % of reading + 12 $\Omega$	
	330 k $\Omega$ to 1.1 M $\Omega$	0.003 2 % of reading + 12 $\Omega$	
	1.1 M $\Omega$ to 3.3 M $\Omega$	0.006 % of reading + 180 $\Omega$	
	3.3 M $\Omega$ to 11 M $\Omega$	0.013 % of reading + 300 $\Omega$	
	11 M $\Omega$ to 33 M $\Omega$	0.025 % of reading + 5 k $\Omega$	
	33 M $\Omega$ to 110 M $\Omega$	0.05 % of reading + 6 k $\Omega$	
110 M $\Omega$ to 330 M $\Omega$	0.3 % of reading + 0.2 M $\Omega$		
330 M $\Omega$ to 1 100 M $\Omega$	1.5 % of reading + 1 M $\Omega$		
Equipment to Measure Resistance Fixed Points <sup>FO</sup>	0.01 $\Omega$	5 $\mu\Omega$	
	0.1 $\Omega$	30 $\mu\Omega$	
	1 $\Omega$	50 $\mu\Omega$	
	10 $\Omega$	500 $\mu\Omega$	
	100 $\Omega$	5 000 $\mu\Omega$	
Equipment to Measure Resistance Fixed Points <sup>FO</sup>	1 k $\Omega$	50 M $\Omega$	
	10 k $\Omega$	500 M $\Omega$	
	100 k $\Omega$	5 000 M $\Omega$	
	1 M $\Omega$	0.5 k $\Omega$	
	10 M $\Omega$	1 k $\Omega$	
Equipment to Measure Resistance <sup>F</sup>	0.01 $\Omega$ to 10 $\Omega$	0.001 8 % of reading + 50 $\mu\Omega$	Agilent 3458A
	100 $\Omega$	0.001 5 % of reading + 500 $\mu\Omega$	
	1 k $\Omega$	0.001 3 % of reading + 0.5 $\mu\Omega$	
	10 k $\Omega$	0.001 3 % of reading + 5 $\mu\Omega$	
	100 k $\Omega$	0.001 3 % of reading + 50 $\mu\Omega$	
	1 M $\Omega$	0.001 5 % of reading + 2 $\Omega$	



# Certificate of Accreditation: Supplement

## L.A.W. Calibration

2 Main Street, Suite 15-107, Biddeford, ME 04005  
 Contact Name: Louis Waterhouse Phone: 207-229-6554

*Accreditation is granted to the facility to perform the following calibrations:*

### Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Equipment to Measure Resistance <sup>F</sup>	10 M $\Omega$	0.005 % of reading + 100 $\Omega$	Agilent 3458A
	100 M $\Omega$	0.05 % of reading + 1 k $\Omega$	
	1 G $\Omega$	0.5 % of reading + 10 k $\Omega$	
Insulation Testers <sup>F</sup>	1 k $\Omega$ to 10 T $\Omega$	1 % of reading	OEM- In-House
Capacitance Source <sup>FO</sup>	220 pF to 400 pF	0.5 % of reading + 0.2 nF	Fluke 5522A
	0.4 nF to 1.1 nF	0.5 % of reading + 0.1 nF	
	1.1 nF to 3.3 nF	0.5 % of reading + 0.1 nF	
	3.3 nF to 11 nF	0.25 % of reading + 0.2 nF	
	11 nF to 33 nF	0.25 % of reading + 0.2 nF	
	33 nF to 110 nF	0.25 % of reading + 0.2 nF	
	110 nF to 330 nF	0.25 % of reading + 0.2 nF	
	0.33 $\mu$ F to 1.1 $\mu$ F	0.25 % of reading + 0.2 nF	
	1.1 $\mu$ F to 3.3 $\mu$ F	0.25 % of reading + 4 nF	
	3.3 $\mu$ F to 11 $\mu$ F	0.25 % of reading + 0.1 nF	
	11 $\mu$ F to 33 $\mu$ F	0.45 % of reading + 35 nF	
	33 $\mu$ F to 110 $\mu$ F	0.45 % of reading + 110 nF	
	110 $\mu$ F to 330 $\mu$ F	0.45 % of reading + 310 nF	
	0.33 mF to 1.1 mF	0.45 % of reading + 1 020 nF	
	1.1 mF to 3.3 mF	0.45 % of reading + 3 020 nF	
	3.3 mF to 11 mF	0.45 % of reading + 11 $\mu$ F	
11 mF to 33 mF	0.75 % of reading + 50 $\mu$ F		
33 mF to 110 mF	1.1 % of reading + 120 $\mu$ F		



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### Electrical

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Temperature Measurement Thermocouple Type B <sup>FO</sup>	600 °C to 1 820 °C	0.44 °C	Fluke-5522A Temperature Simulation Method
Temperature Measurement Thermocouple Type C <sup>FO</sup>	0 °C to 2 316 °C	0.84 °C	
Temperature Measurement Thermocouple Type E <sup>FO</sup>	-250 °C to 1 000 °C	0.5 °C	
Temperature Measurement Thermocouple Type J <sup>FO</sup>	-210 °C to 1 200 °C	0.27 °C	
Temperature Measurement Thermocouple Type K <sup>FO</sup>	-200 °C to 1 372 °C	0.4 °C	
Temperature Measurement Thermocouple Type N <sup>FO</sup>	-200 °C to 1 300 °C	0.4 °C	
Temperature Measurement Thermocouple Type R <sup>FO</sup>	0 °C to 1 767 °C	0.57 °C	
Temperature Measurement Thermocouple Type S <sup>FO</sup>	0 °C to 1 767 °C	0.47 °C	
Temperature Measurement Thermocouple Type T <sup>FO</sup>	-250 °C to 400 °C	0.63 °C	
Temperature Measurement RTD Pt 395, 100 $\Omega$ <sup>FO</sup>	-200 °C to 800 °C	0.05 °C	
Temperature Measurement RTD Pt 3926, 100 $\Omega$ <sup>FO</sup>	-200 °C to 630 °C	0.05 °C	
Temperature Measurement RTD Pt 3916, 100 $\Omega$ <sup>FO</sup>	-200 °C to 630 °C	0.25 °C	
Temperature Measurement RTD Pt 385, 200 $\Omega$ <sup>FO</sup>	-200 °C to 630 °C	0.16 °C	
Temperature Measurement RTD Pt 385, 500 $\Omega$ <sup>FO</sup>	-200 °C to 630 °C	0.11 °C	
Temperature Measurement RTD Pt 385, 1 000 $\Omega$ <sup>FO</sup>	-200 °C to 630 °C	0.23 °C	
Temperature Measurement RTD Pt Ni 385, 120 $\Omega$ <sup>FO</sup>	-80 °C to 260 °C	0.14 °C	
Temperature Measurement RTD Cu 427, 10 $\Omega$ <sup>FO</sup>	-100 °C to 260 °C	0.3 °C	

- The CMC (Calibration and Measurement Capability) stated for calibrations included on this scope of accreditation represents the smallest measurement uncertainty attainable by the laboratory when performing a more or less routine calibration of a nearly ideal device under nearly ideal conditions. It is typically expressed at a confidence level of 95 % using a coverage factor  $k$  (usually equal to 2). The actual measurement uncertainty associated with a specific calibration performed by the laboratory will typically be larger than the CMC for the same calibration since capability and performance of the device being calibrated and the conditions related to the calibration may reasonably be expected to deviate from ideal to some degree.



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### **L.A.W. Calibration**

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*Accreditation is granted to the facility to perform the following calibrations:*

2. The laboratories range of calibration capability for all disciplines for which they are accredited is the interval from the smallest calibrated standard to the largest calibrated standard used in performing the calibration. The low end of this range must be an attainable value for which the laboratory has or has access to the standard referenced. Verification of an indicated value of zero in the absence of a standard is common practice in the procedure for many calibrations but by its definition it does not constitute calibration of zero capacity.
3. The presence of a superscript F means that the laboratory performs calibration of the indicated parameter at its fixed location. Example: Outside Micrometer<sup>F</sup> would mean that the laboratory performs this calibration at its fixed location.
4. The presence of a superscript FO means that the laboratory performs calibration of the indicated parameter both at its fixed location and onsite at customer locations. Example: Outside Micrometer<sup>FO</sup> would mean that the laboratory performs this calibration at its fixed location and onsite at customer locations.
5. Measurement uncertainties obtained for calibrations performed at customer sites can be expected to be larger than the measurement uncertainties obtained at the laboratories fixed location for similar calibrations. This is due to the effects of transportation of the standards and equipment and upon environmental conditions at the customer site which are typically not controlled as closely as at the laboratories fixed location.
6. The term L represents length in inches or millimeters as appropriate to the uncertainty statement.