

CALIBRATION LABORATORIES

NVLAP LAB CODE 200958-0

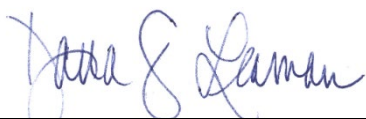
SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

<p>J&J Calibration Service Inc. 460 Main Avenue P.O. Box 63 Walcott, ND 58077-0063 Matt Shaw Phone: 423-617-9006 Fax: 701-469-2342 E-mail: mshaw@accreditedlabs.com URL: www.jjcalibration.com</p>	<p>Fields of Calibration Dimensional DC/ Low Frequency Time & Frequency Mechanical Thermodynamics</p> <p>This laboratory is compliant to ANSI/NCSL Z540-1-1994; Part 1. (20/A01)</p>
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
DIMENSIONAL			
LENGTH & DIAMETER; STEP GAGES (20/D05)			
Gage Blocks - Croblox or steel	0.050 in to 1.0 in	4 μin	Comparison to master gage Blocks using comparator stand and gage amplifier
	2.0 in to 4.0 in	2 μin + 1.5 μin/in	
Long blocks - steel	5.0 in to 10.0 in	2.5 μin + 1.5 μin/in	Comparison to master gage Blocks using universal measuring machine
	>10.0 in to 20.0 in	2.8 μin + 1.6 μin/in	
Micrometers, Outside, Inside, Depth Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	Up to 2 in >2 in to 36 in	40 μin + 0.6R 40 μin + 3 μin/in + 0.6R	Comparison to gage blocks
Calipers Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	0 in to 6 in >6 in to 60 in	81 μin + 0.6R 81 μin + 7.9 μin/in + 0.6R	Comparison to gage blocks
Indicators Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	0 in to 4 in	7.6 μin + 0.6R	Comparison to gage blocks

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
Height Gages Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	0 in to 40 in	160 μin + 1.7 μin/in + 0.6R	Comparison to gage blocks
Single Axis, Inner Dimension Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	0.10 in to 10 in	6.2 μin + 1.8 μin/in	Ring comparator and gage blocks
Single Axis, Outer Dimension Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	Up to 10 in	13 μin + 1.5 μin/in	Super Micrometer and gage blocks
Primary Lab only	< 1 in	5.1 μin	Universal measuring machine and gage blocks
MEASURING WIRES (20/D07)			
Thread Wire Sets Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	4 TPI to 80 TPI	19 μin	Gage blocks and Super Micrometer
SURFACE TEXTURE (20/D12)			
Surface Plates Field calibrations available ^{Note 4}			
Flatness, overall	Up to 225 in on diag.	45 μin	Electronic levels
Flatness, local area	Up to 12 in on diag.	32 μin	Datum gage (Repeat-o-meter)
THREADED PLUG & RING GAGES (20/D14)			
Thread Ring Gages - pitch diameter Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	> 0 in to 9 in	4.7 x 10 ⁻⁴ in	Setting plug gages
Thread Plug Gages - pitch diameter Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	> 0 in to 9 in	33 μin	Super Micrometer and thread wires

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
ELECTROMAGNETICS – DC/LOW FREQUENCY				
AC CURRENT (20/E02)				
AC Current - Generate Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	20 µA to 202 µA	10 Hz to 44 Hz	0.27 % + 0.25 µA	Transmille 3010A
		45 Hz to 999 Hz	0.085 % + 0.15 µA	
		1 kHz to 10 kHz	0.94 % + 0.25 µA	
	200 µA to 2.02 mA	10 Hz to 44 Hz	0.27 % + 0.25 µA	
		45 Hz to 999 Hz	0.073 % + 0.20 µA	
		1 kHz to 10 kHz	0.59 % + 0.30 µA	
	2 mA to 20.2 mA	10 Hz to 44 Hz	0.27 % + 3.0 µA	
45 Hz to 999 Hz		0.048 % + 2.0 µA		
1 kHz to 10 kHz		0.31 % + 3.0 µA		
20 mA to 202 mA	10 Hz to 44 Hz	0.27 % + 30 µA		
	45 Hz to 999 Hz	0.051 % + 20 µA		
	1 kHz to 10 kHz	0.59 % + 40 µA		
200 mA to 2.02 A	10 Hz to 44 Hz	0.27 % + 300 µA		
	45 Hz to 999 Hz	0.074 % + 200 µA		
	1 kHz to 10 kHz	0.59 % + 400 µA		
2 A to 30 A	30 Hz to 44 Hz	0.24 % + 3.0 mA		
	45 Hz to 99 Hz	0.10 % + 2.0 mA		
	100 Hz to 1 kHz	0.35 % + 4.0 mA		
AC Current - Measure Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	1 µA to 100 µA	10 Hz to 40 Hz	0.11 % + 15 nA	Transmille 8081
		41 Hz to 1 kHz	0.062 % + 12 nA	
		1 kHz to 10 kHz	0.15 % + 30 nA	



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Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
	101 mA to 1 A	10 Hz to 40 Hz	0.11 % + 0.15 μ A	
		41 Hz to 1 kHz	0.061 % + 0.12 μ A	
		1 kHz to 10 kHz	0.15 % + 0.30 μ A	
	1.001 mA to 10 mA	10 Hz to 40 Hz	0.11 % + 1.5 μ A	
		41 Hz to 1 kHz	0.074 % + 1.2 μ A	
		1 kHz to 10 kHz	0.15 % + 3.0 μ A	
	10.001 mA to 100 mA	10 Hz to 40 Hz	0.12 % + 0.15 μ A	
		41 Hz to 1 kHz	0.062 % + 12 μ A	
		1 kHz to 10 kHz	0.15 % + 30 μ A	
	101 mA to 1A	10 Hz to 40 Hz	0.14 % + 0.20 mA	
		41 Hz to 1 kHz	0.084 % + 0.15 mA	
		1 kHz to 10 kHz	0.16 % + 0.50 mA	
1.001 A to 10 A	10 Hz to 40 Hz	0.21 % + 4.0 mA		
	41 Hz to 1 kHz	0.15 % + 3.0 mA		
10.001 A to 30 A	10 Hz to 40 Hz	0.21 % + 12 mA		
	41 Hz to 1 kHz	0.15 % + 9.0 mA		

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
DC RESISTANCE AND CURRENT (20/E05)			
DC Current - Generate Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	1 μ A to 202 μ A	0.012 % + 10 nA	Transmille 3010A
	202 μ A to 2.02 mA	61 μ A/A + 30 nA	
	2.02 mA to 20.2 mA	61 μ A/A + 0.20 μ A	
	20.2 mA to 202 mA	73 μ A/A + 2.0 μ A	
	202 mA to 2.02 A	0.016 % + 30 μ A	
	2.02 A to 20.2 A	0.035 % + 300 μ A	
20.2 A to 30 A	0.060 % + 450 μ A		



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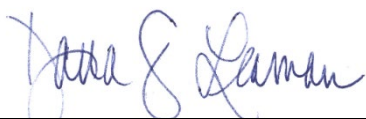
CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
Resistance - Measure Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	0.001 Ω to 1 Ω 1.001 Ω to 10 Ω 10.001 Ω to 100 Ω 100.001 Ω to 1 kΩ 1.001 Ω to 10 kΩ 10.001 kΩ to 100 kΩ 101 kΩ to 1 MΩ 1.001 MΩ to 10 MΩ 10.01 MΩ to 30 MΩ 30.01 MΩ to 270 MΩ 270.1 MΩ to 2700 MΩ	29 μΩ/Ω + 6.0 μΩ 19 μΩ/Ω + 30 μΩ 17 μΩ/Ω + 100 μΩ 15 μΩ/Ω + 800 mΩ 17 μΩ/Ω + 8.0 mΩ 18 μΩ/Ω + 800 Ω 22 μΩ/Ω + 2.0 Ω 29 μΩ/Ω + 80 Ω 0.017 % 0.016 % 0.054 %	Transmille 8081
DC VOLTAGE (20/E06)			
DC Voltage - Generate Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	0 μV to 202 mV 200 mV to 2.02 V 2 V to 20.2 V 20 V to 202 V 200 V to 1025 V	18 μV/V + 2.0 μV 11 μV/V + 2.5 μV 9.9 μV/V + 24 μV 14 μV/V + 240 μV 14 μV/V + 2.4 mV	Transmille 3010A
DC Voltage - Measure Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	0 nV to 100 mV 101 mV to 1 V 1.001 V to 10 V 10.001 V to 100 V 101 V to 1050 V	13 μV/V + 0.17 μV 7.9 μV/V + 0.60 μV 8.5 μV/V + 6.0 μV 11 μV/V + 80 μV 12 μV/V + 1.2 mV	Transmille 8081

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
LF AC VOLTAGE (20/E09)				
LF AC Voltage – Generate Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	0 mV to 202 mV	10 Hz to 44 Hz 45 Hz to 999 Hz 1 kHz to 19.999 kHz	0.098 % + 15 μV 0.025 % + 15 μV 0.033 % + 28 μV	Transmille 3010A

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
LF AC Voltage – Measure Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}		20 kHz to 99.999 kHz	0.12 % + 40 μV	
		100 kHz to 500 kHz	0.55 % + 100 μV	
	200 mV to 2.02 V	10 Hz to 44 Hz	0.066 % + 180 μV	
		45 Hz to 999 Hz	0.022 % + 120 μV	
		1 kHz to 19.999 kHz	0.032 % + 180 μV	
		20 kHz to 99.999 kHz	0.078 % + 300 μV	
		100 kHz to 500 kHz	0.42 % + 450 μV	
	2 V to 20.2 V	10 Hz to 44 Hz	0.060 % + 1.6 mV	
		45 Hz to 999 Hz	0.022 % + 1.0 mV	
		1 kHz to 19.999 kHz	0.032 % + 1.6 mV	
		20 kHz to 99.999 kHz	0.076 % + 3.0 mV	
	20 V to 202 V	30 Hz to 44 Hz	0.062 % + 20 mV	
		45 Hz to 999 Hz	0.021 % + 12 mV	
		1 kHz to 9.999 kHz	0.026 % + 16 mV	
		10 kHz to 40 kHz	0.040 % + 30 mV	
	200 V to 1020 V	30 Hz to 44 Hz	0.072 % + 200 mV	
45 Hz to 999 Hz		0.027 % + 60 mV		
1 kHz to 10 kHz		0.033 % + 120 mV		
100 nV to 100 mV	10 Hz to 40 Hz	0.097 % + 15 μV	Transmille 8081	
	41 Hz to 200 Hz	0.049 % + 9 μV		
	201 Hz to 2 kHz	0.049 % + 8 μV		
	2 kHz to 20 kHz	0.055 % + 10 μV		
	20 kHz to 100 kHz	0.16 % + 50 μV		
101 mV to 1 V	10 Hz to 40 Hz	0.071 % + 150 μV		
	40 Hz to 200 Hz	0.037 % + 60 μV		
	200 Hz to 2 kHz	0.030 % + 60 μV		
	2 kHz to 20 kHz	0.11 % + 100 μV		



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Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
	1.001 V to 10 V	20 kHz to 100 kHz	0.14 % + 500 μ V	
		100 kHz to 1 MHz	2.2 % + 25 mV	
		40 Hz to 200 Hz	0.037 % + 0.6 mV	
		200 Hz to 2 kHz	0.031 % + 0.6 mV	
		2 kHz to 20 kHz	0.11 % + 1 mV	
		20 kHz to 100 kHz	0.14 % + 5 mV	
	10.001 V to 100 V	10 Hz to 40 Hz	0.098 % + 15 mV	
		40 Hz to 200 Hz	0.044 % + 9 mV	
		200 Hz to 2 kHz	0.044 % + 7 mV	
		2 kHz to 20 kHz	0.11 % + 10 mV	
		20 kHz to 50 kHz	0.17 % + 50 mV	
	101 V to 1 kV	40 Hz to 200 Hz	0.049 % + 90 mV	
200 Hz to 2 kHz		0.062 % + 70 mV		
2 kHz to 20 kHz		0.093 % + 100 mV		

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
LF CAPACITANCE (20/E10)			
LF Capacitance - Generate	10 nF	0.32 %	Transmille 3010A
Field calibrations available ^{Note 4}	20 nF	0.32 %	
Mobile laboratory available ^{Note 7}	50 nF	0.30 %	
	100 nF	0.30 %	
	1 μ F	0.47 %	
	10 μ F	0.71 %	
LF INDUCTANCE (20/E11)			
LF Inductance - Generate	1 mH to 10 H	0.60 %	Transmille 3010A
Field calibrations available ^{Note 4}			
Mobile laboratory available ^{Note 7}			



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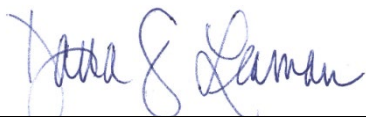
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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
TIME AND FREQUENCY			
FREQUENCY DISSEMINATION (20/F01)			
Frequency Measuring Devices Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	1 Hz to 10 MHz	1.2 μ Hz/Hz	Transmille 3010A
Frequency Source Devices Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	1 Hz to 1 MHz	2.5 μ Hz/Hz + 2 digits	Transmille 8081
MECHANICAL			
TORQUE (20/M15)			
Torque Tools Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	4 lbf-in to 50 lbf-in	0.55 %	ASME B107.300, ISO 6789-2 using torque transducers
	30 lbf-in to 400 lbf-in	0.46 %	
	80 lbf-in to 1000 lbf-in	0.32 %	
	20 lbf-ft to 250 lbf-ft	0.42 %	
	60 lbf-ft to 600 lbf-ft	0.41 %	
Torque Transducers Field calibrations available ^{Note 4} Mobile laboratory available ^{Note 7}	4 lbf-in to 50 lbf-in	0.20 %	ASME B107.300 using torque arm and weights
	30 lbf-in to 400 lbf-in	0.20 %	
	80 lbf-in to 1000 lbf-in	0.20 %	
	20 lbf-ft to 250 lbf-ft	0.20 %	
	60 lbf-ft to 600 lbf-ft	0.20 %	
WEIGHING INSTRUMENTS (20/M16)			
Class I, II	Up to 750 g	0.0042 mg/g + 0.048 mg	HB 44 with ASTM 1 weights
Class III	Up to 230 kg	150 mg/kg + 4.8 mg	HB 44 with ASTM 6 weights

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Notes 3,5}	Remarks
THERMODYNAMIC			
LABORATORY THERMOMETERS, DIGITAL AND ANALOG (20/T03)			
Temperature Temperature Source Devices (baths, calibrators)	-80 °C to 420 °C	0.022 °C	SPRT temperature probe and Transmille 8081
Temperature Measuring Devices (thermometers, probes)	0 °C to 230 °C >230 °C to 420 °C	0.032 °C + 0.6R 0.053 °C + 0.6R	SPRT temperature probe, Transmille 8081 w/temp bath
Temperature Measuring Devices Field Calibrations Available ^{Note 4} Mobile Laboratory Available ^{Note 7}	0 °C to 100 °C 100 °C to 420 °C	0.45 °C 1.3 °C	Gemini Dry well with PRT
PRESSURE (20/T05)			
Pressure – Hydraulic Pressure Measuring Devices	10 psig to 500 psig 200 psig to 10 000 psig	0.019 % 0.018 %	ASME B40.100 using deadweight tester
Pressure Measuring Devices Field Calibrations Available ^{Note 4} Mobile Laboratory Available ^{Note 7}	30 psig to 10 000 psig	0.12%	Secondary Standard Gages With Sources
END			

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Notes

Note 1: A Calibration and Measurement Capability (CMC) is a description of the best result of a calibration or measurement (result with the smallest uncertainty of measurement) that is available to the laboratory's customers under normal conditions, when performing more or less routine calibrations of nearly ideal measurement standards or instruments. The CMC is described in the laboratory's scope of accreditation by: the measurement parameter/device being calibrated, the measurement range, the uncertainty associated with that range (see note 3), and remarks on additional parameters, if applicable.

Note 2: Calibration and Measurement Capabilities are traceable to the national measurement standards of the U.S. or to the national measurement standards of other countries and are thus traceable to the internationally accepted representation of the appropriate SI (Système International) unit.

Note 3: The uncertainty associated with a measurement in a CMC is an expanded uncertainty with a level of confidence of approximately 95 %, typically using a coverage factor of $k = 2$. However, laboratories may report a coverage factor different than $k = 2$ to achieve the 95 % level of confidence. Units for the measurand and its uncertainty are to match. Exceptions to this occur when marketplace practice employs mixed units, such as when the artifact to be measured is labeled in non-SI units and the uncertainty is given in SI units (Example: 5 lb weight with uncertainty given in mg).

Note 3a: The uncertainty of a specific calibration by the laboratory may be greater than the uncertainty in the CMC due to the condition and behavior of the customer's device and specific circumstances of the calibration. The uncertainties quoted do not include possible effects on the calibrated device of transportation, long term stability, or intended use.

Note 3b: As the CMC represents the best measurement results achievable under normal conditions, the accredited calibration laboratory shall not report smaller uncertainty of measurement than that given in a CMC for calibrations or measurements covered by that CMC.

Note 3c: As described in Note 1, CMCs cover calibrations and measurements that are available to the laboratory's customers under *normal conditions*. However, the laboratory may have the capability to offer special tests, employing special conditions, which yield calibration or measurement results with lower uncertainties. Such special tests are not covered by the CMCs and are outside the laboratory's scope of accreditation. In this case, NVLAP requirements for the labeling, on calibration reports, of results outside the laboratory's scope of accreditation apply. These requirements are set out in Annex A.5 of NIST Handbook 150, Procedures and General Requirements.

Note 4: Uncertainties associated with field service calibration may be greater as they incorporate on-site environmental contributions, transportation effects, or other factors that affect the measurements. (This note applies only if marked in the body of the scope.)


Note 5: Values listed with percent (%) are percent of reading or generated value unless otherwise noted.

Note 6: NVLAP accreditation is the formal recognition of specific calibration capabilities. Neither NVLAP nor NIST guarantee the accuracy of individual calibrations made by accredited laboratories.

Note 7: The laboratory utilizes a mobile lab for most of its field service work. Please note that uncertainties listed are valid whenever the work is performed in the mobile lab. If work is done in customer facility, then note 4 will apply.

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