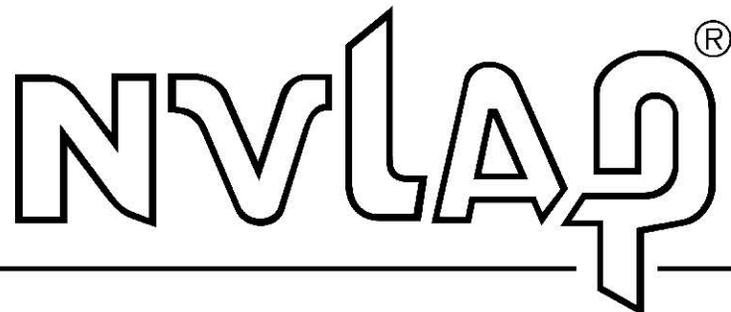


United States Department of Commerce  
National Institute of Standards and Technology



**Certificate of Accreditation to ISO/IEC 17025:2005**

NVLAP LAB CODE: 200904-0

**Masy BioServices**  
Pepperell, MA

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:*

**Calibration Laboratories**

*This laboratory 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 (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2017-03-13 through 2018-03-31

*Effective Dates*



A handwritten signature in blue ink, reading "Dana S. Haman", is written over a horizontal line.

*For the National Voluntary Laboratory Accreditation Program*



**CALIBRATION LABORATORIES**

**NVLAP LAB CODE 200904-0**

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005**

<p><b>Masy BioServices</b> 27 Lomar Park Drive Pepperell, MA 01463-1486 Mr. Keith Kelly Phone: 978-433-6279 Fax: 978-433-0442 E-mail: <a href="mailto:keith.kelly@masy.com">keith.kelly@masy.com</a> URL: <a href="http://www.masy.com">http://www.masy.com</a></p>	<p><b>Fields of Calibration</b> Electromagnetics – DC/Low Frequency Time &amp; Frequency Mechanical RF &amp; Microwave Electromagnetics Thermodynamic</p>
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**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty <sup>Note 3</sup>	Remarks
<b>ELECTROMAGNETICS – DC/LOW FREQUENCY</b>				
<b>AC RESISTANCE and CURRENT (20/E02)</b>				
AC Current – Source and Measure	29 µA to 330 µA	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 1 kHz to 5 kHz	21 nA/µA + 100 nA 6.6 nA/µA + 100 nA 4.1 nA/µA + 100 nA 5.5 nA/µA + 150 nA	Fluke 5522A with Fluke 8508A
	0.33 mA to 3.3 mA	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 1000 Hz 1 kHz to 5 kHz 5 kHz to 10 kHz 10 kHz to 30 kHz	1.4 µA/mA + 0.15 µA 1.5 µA/mA + 0.15 µA 1.6 µA/mA + 0.2 µA 1.6 µA/mA + 0.2 µA 1.8 µA/mA + 0.3 µA 2.5 µA/mA + 0.6 µA	
	3.3 mA to 33.3 mA	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 1000 Hz 1 kHz to 5 kHz 5 kHz to 10 kHz 10 kHz to 30 kHz	1.6 µA/mA + 2 µA 1.6 µA/mA + 2 µA 1.6 µA/mA + 2 µA 1.6 µA/mA + 2 µA 1.8 µA/mA + 3 µA 1.0 µA/mA + 4 µA	
	33.3 mA to 330 mA	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 1000 Hz	1.5 µA/mA + 20 µA 1.5 µA/mA + 20 µA 1.5 µA/mA + 20 µA	

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**CALIBRATION LABORATORIES**

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**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty <sup>Note 3</sup>	Remarks
AC Current – Measure	0.33 A to 1 A	1 kHz to 5 kHz	2.2 $\mu$ A/mA + 50 $\mu$ A	HP 3458A w/Opt. 002
		5 kHz to 10 kHz	3.4 $\mu$ A/mA + 100 $\mu$ A	
		10 kHz to 30 kHz	5.8 $\mu$ A/mA + 200 $\mu$ A	
	100 $\mu$ A 1 mA 10 mA 100 mA 1 A	10 Hz to 20 Hz	5.9 mA/A + 0.10 mA	
		20 Hz to 45 Hz	1.5 mA/A + 0.10 mA	
		45 Hz to 1000 Hz	1.7 mA/A + 1.0 mA	
		1 kHz to 5 kHz	3.8 mA/A + 5.0 mA	
		5 kHz to 10 kHz	13 mA/A + 5.0 mA	
		10 kHz to 30 kHz	14 mA/A + 5.0 mA	
		1 kHz	6.2 $\mu$ A	
1 kHz	26 $\mu$ A			
1 kHz	27 $\mu$ A			
1 kHz	55 $\mu$ A			
1 kHz	1.4 mA			

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Note 3</sup>	Remarks
<b>DC RESISTANCE and CURRENT (20/E05)</b>			
DC Resistance – Source and Measure	0 $\Omega$ to 11 $\Omega$ 11 $\Omega$ to 33 $\Omega$ 33 $\Omega$ to 110 $\Omega$ 110 $\Omega$ to 330 $\Omega$ 0.33 k $\Omega$ to 1.1 k $\Omega$ 1.1 k $\Omega$ to 3.3 k $\Omega$ 3.3 k $\Omega$ to 11 k $\Omega$ 11 k $\Omega$ to 33 k $\Omega$ 33 k $\Omega$ to 110 k $\Omega$ 110 k $\Omega$ to 330 k $\Omega$ 0.33 M $\Omega$ to 1.1 M $\Omega$	0.12 m $\Omega$ / $\Omega$ + 1 m $\Omega$ 0.042 m $\Omega$ / $\Omega$ + 1.5 m $\Omega$ 0.022 m $\Omega$ / $\Omega$ + 1.4 m $\Omega$ 0.014 m $\Omega$ / $\Omega$ + 2 m $\Omega$ 57 m $\Omega$ /k $\Omega$ + 2 m $\Omega$ 22 m $\Omega$ /k $\Omega$ + 20 m $\Omega$ 57 m $\Omega$ /k $\Omega$ + 20 m $\Omega$ 22 m $\Omega$ /k $\Omega$ + 200 m $\Omega$ 11 m $\Omega$ /k $\Omega$ + 200 m $\Omega$ 0.31 $\Omega$ /k $\Omega$ + 2 $\Omega$ 52 k $\Omega$ /M $\Omega$ + 0.002 k $\Omega$	Fluke 5522A and Fluke 8508A

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**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Note 3</sup>	Remarks
Resistance - Source	1.1 MΩ to 3.3 MΩ	18 kΩ/MΩ + 0.030 kΩ	MI 9331 Air Resistor
	3.3 MΩ to 11 MΩ	5.3 kΩ/MΩ + 0.050 kΩ	
	11 MΩ to 33 MΩ	18 kΩ/MΩ + 2.5 kΩ	
	33 MΩ to 110 MΩ	5.3 kΩ/MΩ + 3.0 kΩ	
	110 MΩ to 330 MΩ	5.0 kΩ/MΩ + 100 kΩ	
	330 MΩ to 1100 MΩ	10 kΩ/MΩ + 500 kΩ	
	1 Ω	6.1 μΩ	
10 Ω	60 μΩ		
25 Ω	0.15 mΩ		
50 Ω	0.30 mΩ		
75 Ω	0.45 mΩ		
100 Ω	0.60 mΩ		
200 Ω	1.2 mΩ		
400 Ω	2.4 mΩ		
4 kΩ	24 mΩ		
10 kΩ	60 mΩ		
40 kΩ	0.24 Ω		
100 kΩ	0.61 Ω		
300 kΩ	1.9 Ω		
500 kΩ	3.2 Ω		
DC Current – Source	0 μA to 330 μA	0.066 nA/μA + 20 nA	Fluke 5522A and Fluke 8508A
	0 mA to 3.30 mA	0.034 μA/mA + 0.05 μA	
	0 mA to 33 mA	0.062 μA/mA + 0.25 μA	
	0 A to 1 A	210 μA/A + 40 μA	
	1 A to 3 A	510 μA/A + 40 μA	
	0 A to 11 A	430 μA/A + 500 μA	
	11 A to 20 A	510 μA/A + 750 μA	
DC Current - Measure	0 μA to 200 μA	0.015 nA/μA + 0.4 nA	Fluke 8508A
	0.20 mA to 2 mA	15 nA/mA + 4.0 nA	
	2 mA to 20 mA	17 nA/mA + 40 nA	
	20 mA to 200 mA	0.056 μA/mA + 0.8 μA	
	0.20 A to 2 A	210 μA/A + 16 μA	
	2 A to 20 A	460 μA/A + 400 μA	

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**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Note 3</sup>	Remarks
<b>DC VOLTAGE (20/E06)</b>			
DC Voltage Source and Measure	10 V	49 $\mu$ V	Fluke 732B and Fluke 8508A
DC Voltage - Source and Measure	0 mV to 330 mV	0.0066 $\mu$ V/mV + 1.0 $\mu$ V	Fluke 5522A and Fluke 8508A
	0.33 V to 3.3 V	4.8 $\mu$ V/V + 2.0 $\mu$ V	
	3.3 V to 33 V	6.3 $\mu$ V/V + 20 $\mu$ V	
	33 V to 330 V	7.8 $\mu$ V/V + 150 $\mu$ V	
	100 V to 1020 V	0.018 mV/V + 1.5 mV	
DC Voltage - Source Field calibrations available <sup>Note 4</sup>	0 mV to 100 mV	0.014 $\mu$ V/mV + 2.7 $\mu$ V	Krohn-Hite 523
	0.1 V to 1 V	13 $\mu$ V/V + 3.8 $\mu$ V	
	1 V to 10 V	13 $\mu$ V/V + 23 $\mu$ V	
DC Voltage - Measure	0 mV to 200 mV	0.006 $\mu$ V/mV + 0.10 $\mu$ V	Fluke 8508A
	0.2 V to 2 V	4.4 $\mu$ V/V + 0.4 $\mu$ V	
	2 V to 20 V	4.4 $\mu$ V/V + 4 $\mu$ V	
	20 V to 200 V	6.6 $\mu$ V/V + 40 $\mu$ V	
	200 V to 1000 V	6.6 $\mu$ V/V + 500 $\mu$ V	

**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty <sup>Note 3</sup>	Remarks
<b>AC VOLTAGE (20/E09)</b>				
AC Voltage – Source and Measure	1 mV to 33 mV	10 Hz to 45 Hz	0.39 $\mu$ V/mV + 6 $\mu$ V	Fluke 5522A and Agilent 3458A
		0.045 kHz to 10 kHz	0.32 $\mu$ V/mV + 6 $\mu$ V	
		10 kHz to 20 kHz	0.39 $\mu$ V/mV + 6 $\mu$ V	
		20 kHz to 50 kHz	0.39 $\mu$ V/mV + 6 $\mu$ V	
		50 kHz to 100 kHz	1.1 $\mu$ V/mV + 12 $\mu$ V	
		100 kHz to 500 kHz	12 $\mu$ V/mV + 50 $\mu$ V	
	33 mV to 330 mV	10 Hz to 45 Hz	0.19 $\mu$ V/mV + 8 $\mu$ V	

*John S. Laman*

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty <sup>Note 3</sup>	Remarks
AC Voltage - Measure	0.33 V to 3.3 V	0.045 kHz to 10 kHz	0.20 $\mu$ V/mV + 8 $\mu$ V	HP 3458A w/Opt-002
		10 kHz to 20 kHz	0.20 $\mu$ V/mV + 8 $\mu$ V	
		20 kHz to 50 kHz	0.36 $\mu$ V/mV + 8 $\mu$ V	
		50 kHz to 100 kHz	0.86 $\mu$ V/mV + 32 $\mu$ V	
		100 kHz to 500 kHz	12 $\mu$ V/mV + 70 $\mu$ V	
	3.3 V to 33 V	10 Hz to 45 Hz	340 $\mu$ V/V + 50 $\mu$ V	
		0.045 kHz to 10 kHz	270 $\mu$ V/V + 60 $\mu$ V	
		10 kHz to 20 kHz	340 $\mu$ V/V + 60 $\mu$ V	
		20 kHz to 50 kHz	740 $\mu$ V/V + 60 $\mu$ V	
		50 kHz to 100 kHz	1.2 mV/V + 0.13 mV	
	33 V to 330 V	100 kHz to 500 kHz	10 mV/V + 0.60 mV	
		10 Hz to 45 Hz	340 $\mu$ V/V + 650 $\mu$ V	
		0.045 kHz to 10 kHz	310 $\mu$ V/V + 600 $\mu$ V	
		10 kHz to 20 kHz	400 $\mu$ V/V + 600 $\mu$ V	
		20 kHz to 50 kHz	400 $\mu$ V/V + 600 $\mu$ V	
	330 V to 1020 V	50 kHz to 100 kHz	2.4 mV/V + 1.6 mV	
		45 Hz to 1000 Hz	0.49 mV/V + 2 mV	
		1 kHz to 10 kHz	0.68 mV/V + 6 mV	
		10 kHz to 20 kHz	0.49 mV/V + 6 mV	
		20 kHz to 50 kHz	1.4 mV/V + 6 mV	
1 mV to 10 mV	50 kHz to 100 kHz	3.2 mV/V + 50 mV		
	45 Hz to 1000 Hz	0.44 mV/V + 10 mV		
	1 kHz to 5 kHz	0.64 mV/V + 10 mV		
	5 kHz to 10 kHz	0.64 mV/V + 10 mV		
	1 Hz to 40 Hz	0.35 $\mu$ V/mV + 3 $\mu$ V		
	40 Hz to 1000 Hz	0.23 $\mu$ V/mV + 1.1 $\mu$ V		
	1 kHz to 20 kHz	0.35 $\mu$ V/mV + 1.1 $\mu$ V		
	20 kHz to 50 kHz	1.2 $\mu$ V/mV + 1.1 $\mu$ V		
	50 kHz to 100 kHz	5.8 $\mu$ V/mV + 1.1 $\mu$ V		
	100 kHz to 300 kHz	46 $\mu$ V/mV + 2 $\mu$ V		

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty <sup>Note 3</sup>	Remarks	
	10 mV to 100 mV	0.30 MHz to 1 MHz	14 $\mu$ V/mV + 5 $\mu$ V		
		1 MHz to 4 MHz	81 $\mu$ V/mV + 7 $\mu$ V		
		1 Hz to 40 Hz	0.081 $\mu$ V/mV + 4 $\mu$ V		
		40 Hz to 1000 Hz	0.081 $\mu$ V/mV + 2 $\mu$ V		
		1 kHz to 20 kHz	0.16 $\mu$ V/mV + 2 $\mu$ V		
		20 kHz to 50 kHz	0.35 $\mu$ V/mV + 2 $\mu$ V		
		50 kHz to 100 kHz	0.92 $\mu$ V/mV + 2 $\mu$ V		
		100 kHz to 300 kHz	3.5 $\mu$ V/mV + 10 $\mu$ V		
		0.30 MHz to 1 MHz	12 $\mu$ V/mV + 10 $\mu$ V		
		1 MHz to 4 MHz	46 $\mu$ V/mV + 70 $\mu$ V		
		4 MHz to 8 MHz	46 $\mu$ V/mV + 80 $\mu$ V		
		8 MHz to 10 MHz	170 $\mu$ V/mV + 100 $\mu$ V		
	0.1 V to 1 V	1 Hz to 40 Hz	81 $\mu$ V/V + 40 $\mu$ V		
		40 Hz to 1000 Hz	81 $\mu$ V/V + 20 $\mu$ V		
		1 kHz to 20 kHz	160 $\mu$ V/V + 20 $\mu$ V		
		20 kHz to 50 kHz	350 $\mu$ V/V + 20 $\mu$ V		
		50 kHz to 100 kHz	920 $\mu$ V/V + 20 $\mu$ V		
		100 kHz to 300 kHz	3.5 mV/V + 0.10 mV		
		0.30 MHz to 1 MHz	12 mV/V + 0.10 mV		
		1 MHz to 4 MHz	46 mV/V + 0.70 mV		
		4 MHz to 8 MHz	46 mV/V + 0.80 mV		
		8 MHz to 10 MHz	170 mV/V + 1.0 mV		
		1 V to 10 V	1 Hz to 40 Hz		81 $\mu$ V/V + 400 $\mu$ V
			40 Hz to 1000 Hz		81 $\mu$ V/V + 200 $\mu$ V
1 kHz to 20 kHz	160 $\mu$ V/V + 200 $\mu$ V				
20 kHz to 50 kHz	350 $\mu$ V/V + 200 $\mu$ V				
50 kHz to 100 kHz	920 $\mu$ V/V + 200 $\mu$ V				
100 kHz to 300 kHz	3.5 mV/V + 1.0 mV				
0.30 MHz to 1 MHz	12 m V/V + 1.0 mV				
1 MHz to 4 MHz	46 m V/V + 7.0 mV				
4 MHz to 8 MHz	46 m V/V + 8.0 mV				
8 MHz to 10 MHz	170 mV/V + 10 mV				

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty <sup>Note 3</sup>	Remarks
	10 V to 100 V	1 Hz to 40 Hz 0.040 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 0.30 MHz to 1 MHz	0.23 mV/V + 4 mV 0.23 mV/V + 2 mV 0.40 mV/V + 2 mV 1.4 mV/V + 2 mV 4.6 mV/V + 10 mV 17 mV/V + 10 mV	
	1000 V	1 Hz to 40 Hz 40 Hz to 1000 Hz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	0.46 mV/V + 40 mV 0.46 mV/V + 20 mV 0.69 mV/V + 20 mV 1.4 mV/V + 20 mV 3.5 mV/V + 100 mV	
<b>LF CAPACITANCE (20/E10)</b>				
Capacitance – Source	220 pF to 400 pF 0.4 nF to 3.3 nF 3.3 nF to 110 nF 110 nF to 330 nF 0.33 μF to 1.1 μF 1.1 μF to 3.3 μF 3.3 μF to 11 μF 11 μF to 33 μF 33 μF to 110 μF 110 μF to 330 μF 0.33 mF to 1.1 mF 1.1 mF to 3.3 mF 3.3 mF to 11 mF 11 mF to 33 mF 33 mF to 110 mF	1 kHz 1 kHz 1 kHz 1 kHz 100 Hz 100 Hz 100 Hz 100 Hz 50 Hz 50 Hz DC DC DC DC DC	0.5 % + 10 pF 0.5 % + 0.01 nF 0.5 % + 0.01 nF 0.25 % + 0.03 nF 0.25 % + 0.001 μF 0.25 % + 0.003 μF 0.25 % + 0.010 μF 0.40 % + 0.030 μF 0.45 % + 0.10 μF 0.45 % + 0.30 μF 0.45 % + 0.001 mF 0.45 % + 0.003 mF 0.45 % + 0.010 mF 0.75 % + 0.030 mF 1.1 % + 0.10 mF	Fluke 5522A

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**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Notes 3,5</sup>	Remarks
<b>TIME &amp; FREQUENCY</b>			
<b>FREQUENCY DISSEMINATION (20/F01)</b>			
Frequency-Generate	5 MHz & 10 MHz	0.01 Hz	Fluke Model 909 Rubidium Frequency Standard
Frequency-Measure	1 Hz to 225 MHz	0.01 Hz	Agilent 53132A Frequency Counter
Frequency-Generate	1 kHz to 2 MHz 1 kHz to 2 MHz	2.5E-06 Hz/Hz + 5 µHz 1.1E-06 Hz/Hz + 5 µHz	Fluke 5522A (Ref Clock set to Ext.)
Frequency-Generate	50 kHz to 119.99 kHz 120 kHz to 200 MHz	13 Hz 120 Hz	Fluke 5080A w/ scope option
Time Markers	20 ns to 20 ms 50 ms to 5 s	4.4E-06 ms/ms 0.75 %	Fluke 5080A w/ scope option
<b>PULSE CHARACTERISTICS (20/F04)</b>			
Rise Time	900 Hz to 1.1 MHz	1 ns	Fluke 5080A w/ scope option
<b>STOPWATCHES &amp; TIMERS (20/F05)</b>			
Time – Measure	Up to 300 sec/month	0.02 sec/day	Weishi Q 6000
<b>MECHANICAL</b>			
<b>MASS DETERMINATION (20/M08)</b>			
Metric	30 kg 25 kg 20 kg 10 kg 5 kg 2 kg 1 kg 500 g 200 g 100 g 50 g	5.8 mg 4.9 mg 4.4 mg 1.6 mg 0.79 mg 0.34 mg 0.20 mg 79 µg 37 µg 17 µg 12 µg	Echelon II

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Notes 3,5</sup>	Remarks
	20 g 10 g 5 g 2 g 1 g 500 mg 200 mg 100 mg 50 mg 20 mg 10 mg 5 mg 2 mg 1 mg	9.4 µg 7.6 µg 6.3 µg 5.7 µg 3.2 µg 2.8 µg 2.2 µg 1.7 µg 1.4 µg 1.3 µg 1.1 µg 0.9 µg 0.9 µg 0.9 µg	
<b>RF &amp; MICROWAVE ELECTROMAGNETICS</b>			
<b>RF POWER (20/R17)</b>			
Oscilloscope Bandwidth (50 kHz Reference)	50 kHz to 100 MHz 100 MHz to 200 MHz	1.8 % 2.3 %	Fluke 5080A w/ scope option
<b>THERMODYNAMIC</b>			
<b>HUMIDITY (20/T02)</b>			
Humidity – Generate (0 °C to 35 °C) (35 °C to 50 °C) (35 °C to 50 °C)	10 % RH to 95 % RH 10 % RH to 74 % RH 74 % RH to 95 % RH	0.5 % RH 0.5 % RH 0.6 % RH	Thunder Scientific 2500
<b>LABORATORY THERMOMETERS (20/T03)</b>			
Temperature Measure Field calibrations available <sup>Note 4</sup>	-196 °C -95 °C to -40 °C -40 °C to 100 °C 100 °C to 250 °C 250 °C to 400 °C	0.014 °C 0.059 °C 0.052 °C 0.053 °C 0.055 °C	LN2 9190A LTR-40 HTR HTR
Temperature – Source	0 °C to 70 °C	0.00045 °C/°C + 0.021 °C	Thunder Scientific 2500

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**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Notes 3,5</sup>	Remarks
<b>PRESSURE (20/T05)</b>			
Barometric Pressure (Pneumatic) – Generate & Measure	70 kPa to 110 kPa	0.18 Pa/kPa + 0.23 Pa	Fluke RPM4 A200Kp/BA100Ks (Measure only)
Absolute Pressure (Pneumatic) – Generate & Measure	0.7 kPa to 6785 kPa	0.091 Pa/kPa + 7.0 Pa	Ruska 7250xi Fluke RPM4 A200Kp/BA100Ks (Measure only)
	0.7 kPa to 200 kPa	0.23 Pa/kPa + 0.31 Pa	
Gage Pressure (Pneumatic) – Generate & Measure	-99.3 kPa to 6785 kPa	0.091 Pa/kPa + 7.0 Pa	Ruska 7250xi Fluke RPM4 A200Kp /BA100Ks (Measure only)
	0 kPa to 200 kPa	0.16 Pa/kPa + 0.23 Pa	
Differential Pressure (Pneumatic) – Generate & Measure	0 kPa to 15 kPa	34 mPa/kPa + 9.4 mPa	DHI FPG 8601
Absolute Pressure (Pneumatic) – Generate & Measure	0 kPa to 15 kPa	34 mPa/kPa + 12 mPa	DHI FPG 8601
	14 kPa to 700 kPa	8.2 mPa/kPa + 120 mPa	DHI PG7601 w/20 kPa/kg piston
	140 kPa to 7000 kPa	10 mPa/kPa + 120 mPa	DHI PG7601 w/200 kPa/kg piston
Gage Pressure (Pneumatic) – Generate & Measure	0 kPa to 15 kPa	31 mPa/kPa + 7.1 mPa	DHI FPG 8601
	14 kPa to 700 kPa -100.0 kPa to 0 kPa	8.2 mPa/kPa + 120 mPa 8.2 mPa/kPa + 120 mPa	DHI PG7601 with 20 kPa/kg piston

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**CALIBRATION LABORATORIES**

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**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2**

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <small>Notes 3,5</small>	Remarks
	140 kPa to 7000 kPa	10 mPa/kPa + 120 mPa	DHI PG7601 with 200 kPa/kg piston
<b>RESISTANCE THERMOMETRY (20/T07)</b>			
SPRT calibration by Fixed Point Cells	-189.3442 °C	1.5 mK	Argon Triple Point Cell (ArTP)
	-38.8344 °C	1.7 mK	Mercury Triple Point Cell (HgTP)
	0.010 °C	0.70 mK	Water Triple Point Cell (H <sub>2</sub> O TP)
	29.7646 °C	6.9 mK	Gallium Melting Point Cell (GaMP)
	156.5985 °C	1.6 mK	Indium Freezing Point Cell (InFP)
	231.928 °C	1.7 mK	Tin Freezing Point Cell (SnFP)
	419.527 °C	2.1 mK	Zinc Freezing Point Cell (ZnFP)
High Quality PRT calibration by comparison to SPRT	-196 °C	2.6 mK	
	-80 °C	2.3 mK	
	-39 °C	2.3 mK	
	0.01 °C	1.6 mK	
	30 °C	2.7 mK	
	157 °C	3.4 mK	
	232 °C	3.9 mK	
	420 °C	5.3 mK	
	660 °C	13 mK	
PRT calibration by comparison to High Quality PRT	-196 °C	3.4 mK	Super-thermometer II
	-85 °C to 0 °C	3.5 mK	
	0 °C to 30 °C	0.051 mK/K + 2.8 mK	
	30 °C to 157 °C	0.013 mK/K + 4.0 mK	

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**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Notes 3,5</sup>	Remarks
	157 °C to 420 °C	0.018 mK/K + 3.2 mK	
<b>TEMPERATURE INDICATORS (20/T08)</b>			
Thermocouple Simulation			Fluke 5522A
Type B	600 °C to 800 °C 800 °C to 1000 °C 1000 °C to 1550 °C 1550 °C to 1820 °C	0.69 °C 0.52 °C 0.52 °C 0.53 °C	
Type C	0 °C to 150 °C 150 °C to 650 °C 650 °C to 1000 °C 1000 °C to 1800 °C 1800 °C to 2316 °C	0.46 °C 0.49 °C 0.79 °C 0.85 °C 1.3 °C	
Type E	-250 °C to -100 °C -100 °C to -25 °C -25 °C to 350 °C 350 °C to 650 °C 650 °C to 1000 °C	0.78 °C 0.25 °C 0.25 °C 0.26 °C 0.33 °C	
Type J	-210 °C to -100 °C -100 °C to -30 °C -30 °C to 150 °C 150 °C to 760 °C 760 °C to 1200 °C	0.42 °C 0.25 °C 0.27 °C 0.30 °C 0.38 °C	
Type K	-210 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C	0.52 °C 0.29 °C 0.40 °C 0.43 °C 0.72 °C	
Type L (J Din)	-200 °C to -100 °C	0.58 °C	

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Notes 3,5</sup>	Remarks
Type N	-100 °C to 800 °C	0.40 °C	
	800 °C to 900 °C	0.32 °C	
	-200 °C to -100 °C	0.62 °C	
	-100 °C to -25 °C	0.35 °C	
	-25 °C to 120 °C	0.31 °C	
120 °C to 410 °C	0.29 °C		
410 °C to 1300 °C	0.43 °C		
Type R	0 °C to 250 °C	0.88 °C	
	250 °C to 400 °C	0.54 °C	
	400 °C to 1000 °C	0.52 °C	
	1000 °C to 1767 °C	0.63 °C	
Type S	0 °C to 250 °C	0.72 °C	
	250 °C to 1000 °C	0.58 °C	
	1000 °C to 1400 °C	0.59 °C	
	1400 °C to 1767 °C	0.73 °C	
Type T	-250 °C to -150 °C	0.98 °C	
	-150 °C to 0 °C	0.38 °C	
	0 °C to 120 °C	0.25 °C	
	120 °C to 400 °C	0.23 °C	
Type U (T Din)	-200 °C to 0 °C	0.86 °C	
	0 °C to 600 °C	0.43 °C	
RTD Simulation Pt 385, 100 Ω	-200 °C to -80 °C	0.068 °C	
	-80 °C to 0 °C	0.068 °C	
	0 °C to 100 °C	0.081 °C	
	100 °C to 300 °C	0.099 °C	
	300 °C to 400 °C	0.11 °C	
	400 °C to 630 °C	0.21 °C	
	630 °C to 660 °C	0.21 °C	

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**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <sup>Notes 3,5</sup>	Remarks
Pt 3926, 100 Ω	-200 °C to -80 °C	0.039 °C	
	-80 °C to 0 °C	0.055 °C	
	0 °C to 100 °C	0.071 °C	
	100 °C to 300 °C	0.079 °C	
	300 °C to 400 °C	0.094 °C	
	400 °C to 630 °C	0.094 °C	
Pt 3916, 100 Ω	-200 °C to -80 °C	0.19 °C	
	-80 °C to 0 °C	0.047 °C	
	0 °C to 100 °C	0.055 °C	
	100 °C to 260 °C	0.063 °C	
	260 °C to 300 °C	0.071 °C	
	300 °C to 400 °C	0.079 °C	
	400 °C to 600 °C	0.18 °C	
600 °C to 630 °C	0.18 °C		
Pt 385, 200 Ω	-200 °C to -80 °C	0.059 °C	
	-80 °C to 0 °C	0.059 °C	
	0 °C to 100 °C	0.068 °C	
	100 °C to 260 °C	0.12 °C	
	260 °C to 300 °C	0.13 °C	
	300 °C to 400 °C	0.14 °C	
	400 °C to 600 °C	0.16 °C	
600 °C to 630 °C	0.16 °C		
Pt 385, 500 Ω	-200 °C to -80 °C	0.068 °C	
	-80 °C to 0 °C	0.068 °C	
	0 °C to 100 °C	0.073 °C	
	100 °C to 260 °C	0.090 °C	
	260 °C to 300 °C	0.090 °C	
	300 °C to 400 °C	0.099 °C	
	400 °C to 600 °C	0.12 °C	
600 °C to 630 °C	0.12 °C		
Pt 385, 1000 Ω	-200 °C to -80 °C	0.051 °C	
	-80 °C to 0 °C	0.059 °C	

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**CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) <sup>Notes 1,2</sup>**

<b>Measured Parameter or Device Calibrated</b>	<b>Range</b>	<b>Expanded Uncertainty <sup>Notes 3,5</sup></b>	<b>Remarks</b>
	0 °C to 100 °C	0.068 °C	
	100 °C to 260 °C	0.073 °C	
	260 °C to 300 °C	0.057 °C	
	300 °C to 400 °C	0.057 °C	
	400 °C to 600 °C	0.18 °C	
	600 °C to 630 °C	0.18 °C	
<b>END</b>			

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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.1.h. 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.

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