

CALIBRATION LABORATORIES

NVLAP LAB CODE 201065-0

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

<p>SET Y GAD SAS METROLOGY LABORATORY CARRERA 48 # 101A - 69 Bogotá, Colombia Mr. Steven Mesa Phone: 57 1 6019156316 E-mail: steven.mesa@setgad.com</p>	<p>Fields of Calibration Electromagnetics – DC/Low Frequency Time and Frequency Mechanical Electromagnetics – RF/Microwave Thermodynamic</p>
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
ELECTROMAGNETICS – DC/LOW FREQUENCY				
AC RESISTANCE and CURRENT (20/E02)				
AC Current Source	5 mA to 10.0 mA	60 Hz	0.018 mA	Keithley 6221 & Fluke 8846A
	> 10.0 mA to 30.0 mA	60 Hz	0.092 mA	
	33 µA to < 330 µA	10 Hz to 45 Hz	0.16 % + 78 nA	Fluke 5522A
		45 Hz to 1 kHz	0.097 % + 78 nA	
1 kHz to 5 kHz		0.23 % + 0.12 µA		
5 kHz to 10 kHz		0.62 % + 0.16 µA		
10 kHz to 30 kHz		1.2 % + 0.31 µA		
0.33 mA to < 3.3 mA	10 Hz to 45 Hz	0.16 % + 0.12 µA		
	45 Hz to 1 kHz	0.078 % + 0.12 µA		
	1 kHz to 5 kHz	0.16 % + 0.16 µA		
	5 kHz to 10 kHz	0.39 % + 0.23 µA		
	10 kHz to 30 kHz	0.78 % + 0.47 µA		
3.3 mA to < 33 mA	10 Hz to 45 Hz	0.14 % + 1.6 µA		
	45 Hz to 1 kHz	0.031 % + 1.6 µA		
	1 kHz to 5 kHz	0.062 % + 1.6 µA		
	5 kHz to 10 kHz	0.16 % + 2.3 µA		
	10 kHz to 30 kHz	0.31 % + 3.1 µA		

2025-12-15 through 2026-12-31

Effective dates



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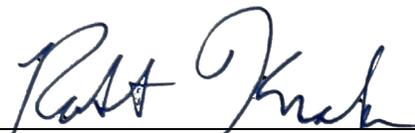
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	33 mA to < 330 mA	10 Hz to 45 Hz	0.14 % + 16 µA	Fluke 5730A
		45 Hz to 1 kHz	0.031 % + 16 µA	
		1 kHz to 5 kHz	0.078 % + 39 µA	
		5 kHz to 10 kHz	0.16 % + 78 µA	
		10 kHz to 30 kHz	0.31 % + 0.16 mA	
	0.33 A to < 1.1 A	10 Hz to 45 Hz	0.14 % + 78 µA	
		45 Hz to 1 kHz	0.039 % + 78 µA	
		1 kHz to 5 kHz	0.47 % + 0.78 mA	
		5 kHz to 10 kHz	1.9 % + 3.9 mA	
	1.1 A to < 3 A	10 Hz to 45 Hz	0.14 % + 78 µA	
		45 Hz to 1 kHz	0.047 % + 78 µA	
		1 kHz to 5 kHz	0.47 % + 0.78 mA	
		5 kHz to 10 kHz	1.9 % + 3.9 mA	
	3 A to < 11 A	45 Hz to 100 Hz	0.047 % + 1.6 mA	
		100 Hz to 1 kHz	0.078 % + 1.6 mA	
		1 kHz to 5 kHz	2.3 % + 1.6 mA	
	11 A to 20.5 A	45 Hz to 100 Hz	0.093 % + 3.9 mA	
		100 Hz to 1 kHz	0.12 % + 3.9 mA	
		1 kHz to 5 kHz	2.3 % + 3.9 mA	
	9 µA to < 220 µA	10 Hz to 20 Hz	0.022 % + 16 nA	
		20 Hz to 40 Hz	0.014 % + 9.3 nA	
40 Hz to 1 kHz		91 µA/A + 7.8 nA		
1 kHz to 5 kHz		0.025 % + 12 nA		
5 kHz to 10 kHz		0.085 % + 62 nA		
0.22 mA to < 2.2 mA	10 Hz to 20 Hz	0.022 % + 39 nA		
	20 Hz to 40 Hz	0.014 % + 31 nA		
	40 Hz to 1 kHz	91 µA/A + 31 nA		
	1 kHz to 5 kHz	0.017 % + 0.10 µA		
	5 kHz to 10 kHz	0.085 % + 0.62 µA		

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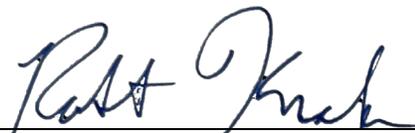
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
Closed Clamp Non-Toroidal	2.2 mA to < 22 mA	10 Hz to 20 Hz	0.022 % + 0.39 μ A	
		20 Hz to 40 Hz	0.014 % + 0.31 μ A	
		40 Hz to 1 kHz	91 μ A/A + 0.31 μ A	
		1 kHz to 5 kHz	0.017 % + 0.54 μ A	
		5 kHz to 10 kHz	0.085 % + 4.7 μ A	
	22 mA to < 220 mA	10 Hz to 20 Hz	0.022 % + 3.9 μ A	
		20 Hz to 40 Hz	0.014 % + 3.1 μ A	
40 Hz to 1 kHz		91 μ A/A + 2.3 μ A		
1 kHz to 5 kHz		0.017 % + 3.1 μ A		
5 kHz to 10 kHz		0.085 % + 9.3 μ A		
0.22 A to 2.2 A	20 Hz to 1 kHz	1 kHz to 5 kHz	0.022 % + 31 μ A	
		5 kHz to 10 kHz	0.036 % + 78 μ A	
			0.054 % + 0.16 mA	
2.2 A to 11 A	40 Hz to 1 kHz	1 kHz to 5 kHz	0.031 % + 0.13 mA	Fluke 5730A/5725A
		5 kHz to 10 kHz	0.066 % + 0.29 mA	
			0.26 % + 0.58 mA	
0.22 A to < 2.0 A	10 Hz to 850 Hz	0.85 kHz to 6 kHz	85 μ A/A + 47 μ A	Fluke 5730A/52120A
		6 kHz to 10 kHz	0.040 % + 78 μ A	
			1.6 % + 62 mA	
2.0 A to < 20 A	10 Hz to 850 Hz	0.85 kHz to 6 kHz	85 μ A/A + 0.47 mA	
		6 kHz to 10 kHz	0.040 % + 0.78 mA	
			2.3 % + 93 mA	
20 A to 120 A	10 Hz to 850 Hz	0.85 kHz to 6 kHz	85 μ A/A + 2.8 mA	
		6 kHz to 10 kHz	0.040 % + 4.7 mA	
			3.1 % + 0.70 A	
Closed Clamp Non-Toroidal	0.33 mA to < 3.3 mA	45 Hz to 65 Hz	0.65 % + 0.10 μ A	Fluke 5730A/5522A and 5500A Coil
		65 Hz to 440 Hz	0.78 % + 84 nA	

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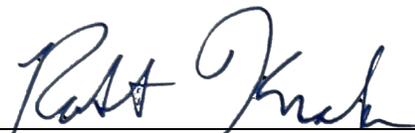
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
Current Clamp Toroidal	3.3 mA to < 33 mA	45 Hz to 65 Hz 65 Hz to 440 Hz	0.43 % + 1.4 μ A 0.77 % + 0.82 μ A	Fluke 52120A/COIL 5730A/52120A and 6KA Fluke 5730A/5522A and 5500A Coil
	33 mA to < 330 mA	45 Hz to 65 Hz 65 Hz to 440 Hz	0.43 % + 14 μ A 0.77 % + 8.2 μ A	
	0.33 A to < 1.1 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.43 % + 0.15 mA 0.77 % + 89 μ A	
	1.1 A to < 3.0 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.44 % + 56 μ A 0.78 % + 32 μ A	
	3.0 A to < 11 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.43 % + 1.8 mA 0.77 % + 1.1 mA	
	11 A to < 20.0 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.44 % + 1.5 mA 0.78 % + 1.0 mA	
	20.0 A to < 150 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.43 % + 0.20 A 0.77 % + 0.20 A	
	150 A to 1025 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.43 % + 0.83 A 0.78 % + 0.82 A	
	0 A to 6000 A	10 Hz to 1 kHz 1 kHz to 3 kHz	0.61 % + 0.87 A 0.68 % + 1.1 A	
	0 A to 1250 A	3 kHz to 6 kHz	1.2 % + 1.1 A	
	0 A to 650 A	6 kHz to 10 kHz	3.8 % + 0.57 A	
0.33 mA to < 3.3 mA	45 Hz to 65 Hz 65 Hz to 440 Hz	0.22 % + 0.25 μ A 0.61 % + 0.11 μ A		

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Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
AC Current Measure ^{note 4}	3.3 mA to < 33 mA	45 Hz to 65 Hz 65 Hz to 440 Hz	0.21 % + 2.5 μA 0.61 % + 1.0 μA	
	33 mA to < 330 mA	45 Hz to 65 Hz 65 Hz to 440 Hz	0.21 % + 25 μA 0.61 % + 10 μA	
	0.33 A to < 1.1 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.20 % + 0.27 mA 0.61 % + 0.11 mA	
	1.1 A to < 3.0 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.22 % + 0.11 mA 0.61 % + 40 μA	
	3.0 A to < 11 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.20 % + 3.1 mA 0.61 % + 1.4 mA	
	11 A to < 20.0 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.23 % + 2.8 mA 0.62 % + 1.3 mA	
	20.0 A to < 150 A	45 Hz to 65 Hz 65 Hz to 100 Hz	0.21 % + 45 mA 0.61 % + 34 mA	
	150 A to 1025 A	45 Hz to 65 Hz 100 Hz to 440 Hz	0.20 % + 0.42 A 0.61 % + 0.30 A	
	0 A to 6000 A	10 Hz to 1 kHz 1 kHz to 3 kHz	0.61 % + 0.87 A 0.68 % + 1.1 A	Fluke 52120A/COIL 5730A/52120A and 6KA
	0 A to 1250 A	3 kHz to 6 kHz	1.2 % + 1.1 A	
	0 A to 650 A	6 kHz to 10 kHz	3.8 % + 0.57 A	
	0.1 A to 1 A > 1 A to 10 A > 10 A to 30 A	10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz	0.44 % + 22 mA 0.44 % + 22 mA 0.44 % + 22 mA	Fluke 8846A and Agilent 34330A

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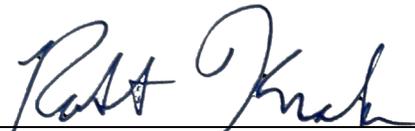
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks	
	0.1 μ A to 10 μ A	1 Hz to 2 kHz 2 Hz to 10 kHz 10 kHz to 30 kHz	0.20 % + 2.5 nA 0.20 % + 2.5 nA 0.20 % + 2.5 nA	Fluke 8588A	
	> 10 μ A to 100 μ A	1 Hz to 2 kHz 2 Hz to 10 kHz 10 kHz to 30 kHz 30 kHz to 100 kHz	0.026 % + 5.0 nA 0.051 % + 5.0 nA 0.072 % + 5.0 nA 0.40 % + 10 nA		
	> 0.1 mA to 1 mA	1 Hz to 2 kHz 2 Hz to 10 kHz 10 kHz to 30 kHz 30 kHz to 100 kHz	0.026 % + 50 nA 0.051 % + 50 nA 0.072 % + 50 nA 0.40 % + 0.10 μ A		
	> 1 mA to 10 mA	1 Hz to 2 kHz 2 Hz to 10 kHz 10 kHz to 30 kHz 30 kHz to 100 kHz	0.026 % + 0.50 μ A 0.051 % + 0.50 μ A 0.072 % + 0.50 μ A 0.40 % + 1.0 μ A		
	>10 mA to 100 mA	1 Hz to 2 kHz 2 Hz to 10 kHz 10 kHz to 30 kHz	0.026 % + 5.0 μ A 0.050 % + 5.0 μ A 0.070 % + 5.0 μ A		
	> 0.1 A to 1 A	1 Hz to 2 kHz 2 Hz to 10 kHz 10 kHz to 30 kHz	0.026 % + 0.10 mA 0.051 % + 0.10 mA 0.071 % + 0.10 mA		
	> 1 A to 10 A	1 Hz to 2 kHz 2 Hz to 10 kHz	0.080 % + 0.50 mA 0.080 % + 0.50 mA		
	> 10 A to 30 A	1 Hz to 2 kHz 2 Hz to 10 kHz	0.080 % + 12 mA 0.12 % + 12 mA		
	> 10 A to 30 A	5 Hz to 10 Hz 10 Hz to 1 kHz	0.28 % + 68 mA 0.28 % + 68 mA		Fluke 8846A, Agilent 34330A

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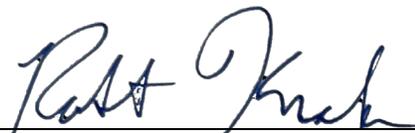
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	10 μ A to 1 mA	10 Hz to 20 Hz	0.017 %	Fluke 8588A and Fluke A40B
		20 Hz to 40 Hz	82 μ A/A + 0.10 nA	
		40 Hz to 55 Hz	67 μ A/A	
		55 Hz to 400 Hz	67 μ A/A	
		0.4 kHz to 1 kHz	67 μ A/A	
		1 kHz to 10 kHz	84 μ A/A	
		10 kHz to 20 kHz	86 μ A/A	
		20 kHz to 30 kHz	91 μ A/A	
		30 kHz to 50 kHz	0.016 %	
		50 kHz to 70 kHz	0.016 % + 0.35 nA	
		70 kHz to 100 kHz	0.016 % + 0.35 nA	
	1 mA to 10 mA	10 Hz to 20 Hz	0.016 % + 8.5 nA	
		20 Hz to 40 Hz	57 μ A/A + 15 nA	
		40 Hz to 55 Hz	33 μ A/A + 7.8 nA	
		55 Hz to 400 Hz	33 μ A/A + 7.8 nA	
		0.4 kHz to 1 kHz	33 μ A/A + 7.8 nA	
		1 kHz to 10 kHz	33 μ A/A + 7.8 nA	
		10 kHz to 20 kHz	33 μ A/A + 7.8 nA	
		20 kHz to 30 kHz	44 μ A/A + 17 nA	
		30 kHz to 50 kHz	45 μ A/A + 16 nA	
		50 kHz to 70 kHz	56 μ A/A + 72 nA	
		70 kHz to 100 kHz	57 μ A/A + 72 nA	
	10 mA to 20 mA	10 Hz to 20 Hz	0.015 % + 0.15 μ A	
		20 Hz to 40 Hz	51 μ A/A + 0.14 μ A	
		40 Hz to 55 Hz	29 μ A/A + 86 nA	
		55 Hz to 400 Hz	29 μ A/A + 86 nA	
		0.4 kHz to 1 kHz	29 μ A/A + 86 nA	
		1 kHz to 10 kHz	30 μ A/A + 86 nA	
		10 kHz to 20 kHz	30 μ A/A + 85 nA	
		20 kHz to 30 kHz	43 μ A/A + 62 nA	
		30 kHz to 50 kHz	43 μ A/A + 61 nA	
		50 kHz to 70 kHz	57 μ A/A + 0.11 μ A	
		70 kHz to 100 kHz	57 μ A/A + 0.11 μ A	

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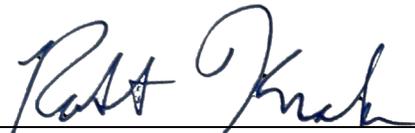
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Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	20 mA to 50 mA	10 Hz to 20 Hz	0.015 % + 0.26 μ A	
		20 Hz to 40 Hz	52 μ A/A + 0.24 μ A	
		40 Hz to 55 Hz	28 μ A/A + 0.15 μ A	
		55 Hz to 400 Hz	28 μ A/A + 0.15 μ A	
		0.4 kHz to 1 kHz	28 μ A/A + 0.15 μ A	
		1 kHz to 10 kHz	29 μ A/A + 0.15 μ A	
		10 kHz to 20 kHz	29 μ A/A + 0.15 μ A	
		20 kHz to 30 kHz	42 μ A/A + 0.11 μ A	
		30 kHz to 50 kHz	42 μ A/A + 0.11 μ A	
		50 kHz to 70 kHz	57 μ A/A + 0.19 μ A	
	70 kHz to 100 kHz	58 μ A/A + 0.19 μ A		
	50 mA to 100 mA	10 Hz to 20 Hz	0.015 % + 0.77 μ A	
		20 Hz to 40 Hz	50 μ A/A + 0.70 μ A	
		40 Hz to 55 Hz	27 μ A/A + 0.45 μ A	
		55 Hz to 400 Hz	27 μ A/A + 0.45 μ A	
		0.4 kHz to 1 kHz	27 μ A/A + 0.45 μ A	
		1 kHz to 10 kHz	27 μ A/A + 0.45 μ A	
		10 kHz to 20 kHz	28 μ A/A + 0.44 μ A	
		20 kHz to 30 kHz	41 μ A/A + 0.32 μ A	
		30 kHz to 50 kHz	43 μ A/A + 0.31 μ A	
		50 kHz to 70 kHz	57 μ A/A + 0.55 μ A	
	70 kHz to 100 kHz	57 μ A/A + 0.55 μ A		
	100 mA to 200 mA	10 Hz to 20 Hz	0.015 % + 1.5 μ A	
		20 Hz to 40 Hz	52 μ A/A + 1.4 μ A	
		40 Hz to 55 Hz	30 μ A/A + 0.85 μ A	
		55 Hz to 400 Hz	30 μ A/A + 0.85 μ A	
		0.4 kHz to 1 kHz	30 μ A/A + 0.85 μ A	
		1 kHz to 10 kHz	30 μ A/A + 0.85 μ A	
		10 kHz to 20 kHz	30 μ A/A + 0.84 μ A	
		20 kHz to 30 kHz	43 μ A/A + 0.61 μ A	
30 kHz to 50 kHz		44 μ A/A + 0.61 μ A		
50 kHz to 70 kHz		57 μ A/A + 1.1 μ A		
70 kHz to 100 kHz	57 μ A/A + 1.1 μ A			

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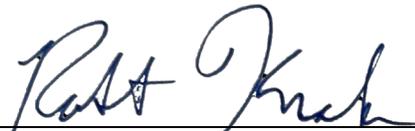
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Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	200 mA to 500 mA	10 Hz to 20 Hz	0.015 % + 2.5 μ A	
		20 Hz to 40 Hz	54 μ A/A + 2.3 μ A	
		40 Hz to 55 Hz	31 μ A/A + 1.4 μ A	
		55 Hz to 400 Hz	31 μ A/A + 1.4 μ A	
		0.4 kHz to 1 kHz	31 μ A/A + 1.4 μ A	
		1 kHz to 10 kHz	31 μ A/A + 1.4 μ A	
		10 kHz to 20 kHz	32 μ A/A + 1.4 μ A	
		20 kHz to 30 kHz	44 μ A/A + 1.0 μ A	
		30 kHz to 50 kHz	45 μ A/A + 1.0 μ A	
		50 kHz to 70 kHz	59 μ A/A + 1.8 μ A	
		70 kHz to 100 kHz	59 μ A/A + 1.8 μ A	
	0.5 A to 1 A	10 Hz to 20 Hz	0.015 % + 11 μ A	
		20 Hz to 40 Hz	49 μ A/A + 11 μ A	
		40 Hz to 55 Hz	27 μ A/A + 8.0 μ A	
		55 Hz to 400 Hz	27 μ A/A + 8.0 μ A	
		0.4 kHz to 1 kHz	27 μ A/A + 8.0 μ A	
		1 kHz to 10 kHz	28 μ A/A + 7.8 μ A	
		10 kHz to 20 kHz	29 μ A/A + 7.7 μ A	
		20 kHz to 30 kHz	40 μ A/A + 7.5 μ A	
		30 kHz to 50 kHz	43 μ A/A + 7.2 μ A	
		50 kHz to 70 kHz	54 μ A/A + 11 μ A	
		70 kHz to 100 kHz	55 μ A/A + 11 μ A	
	1 A to 2 A	10 Hz to 20 Hz	0.015 % + 22 μ A	
		20 Hz to 40 Hz	49 μ A/A + 21 μ A	
		40 Hz to 55 Hz	27 μ A/A + 16 μ A	
		55 Hz to 400 Hz	27 μ A/A + 16 μ A	
		0.4 kHz to 1 kHz	27 μ A/A + 16 μ A	
		1 kHz to 10 kHz	30 μ A/A + 15 μ A	
		10 kHz to 20 kHz	31 μ A/A + 15 μ A	
		20 kHz to 30 kHz	42 μ A/A + 15 μ A	
		30 kHz to 50 kHz	58 μ A/A + 12 μ A	
		50 kHz to 70 kHz	67 μ A/A + 19 μ A	
		70 kHz to 100 kHz	68 μ A/A + 18 μ A	

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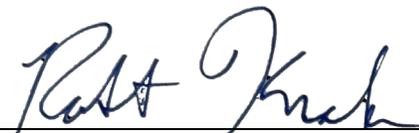
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Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks	
	2 A to 5 A	10 Hz to 20 Hz	0.015 % + 40 μ A		
		20 Hz to 40 Hz	55 μ A/A + 38 μ A		
		40 Hz to 55 Hz	34 μ A/A + 29 μ A		
		55 Hz to 400 Hz	34 μ A/A + 29 μ A		
		0.4 kHz to 1 kHz	34 μ A/A + 29 μ A		
		1 kHz to 10 kHz	36 μ A/A + 29 μ A		
		10 kHz to 20 kHz	43 μ A/A + 25 μ A		
		20 kHz to 30 kHz	52 μ A/A + 27 μ A		
		30 kHz to 50 kHz	82 μ A/A + 28 μ A		
		50 kHz to 70 kHz	89 μ A/A + 30 μ A		
		70 kHz to 100 kHz	90 μ A/A + 29 μ A		
		5 A to 10 A	10 Hz to 20 Hz		0.015 % + 0.11 mA
			20 Hz to 40 Hz		58 μ A/A + 94 μ A
			40 Hz to 55 Hz		42 μ A/A + 61 μ A
	55 Hz to 400 Hz		42 μ A/A + 61 μ A		
	0.4 kHz to 1 kHz		42 μ A/A + 61 μ A		
	1 kHz to 10 kHz		63 μ A/A + 45 μ A		
	10 kHz to 20 kHz		68 μ A/A + 42 μ A		
	20 kHz to 30 kHz		74 μ A/A + 48 μ A		
	30 kHz to 50 kHz		0.011 % + 32 μ A		
	50 kHz to 70 kHz		0.012 % + 59 μ A		
	70 kHz to 100 kHz		0.013 % + 55 μ A		
	10 A to 20 A		10 Hz to 20 Hz		0.015 % + 0.21 mA
			20 Hz to 40 Hz		64 μ A/A + 0.18 mA
			40 Hz to 55 Hz		50 μ A/A + 0.11 mA
		55 Hz to 400 Hz	50 μ A/A + 0.11 mA		
		0.4 kHz to 1 kHz	50 μ A/A + 0.11 mA		
		1 kHz to 10 kHz	58 μ A/A + 96 μ A		
		10 kHz to 20 kHz	77 μ A/A + 75 μ A		
		20 kHz to 30 kHz	82 μ A/A + 87 μ A		
30 kHz to 50 kHz		0.014 % + 54 μ A			
50 kHz to 70 kHz		0.014 % + 0.10 mA			
70 kHz to 100 kHz		0.016 % + 92 μ A			

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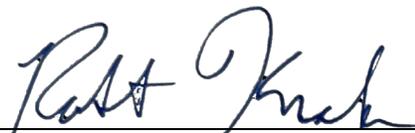
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks	
AC Current Measure <small>Note 11</small>	20 A to 50 A	10 Hz to 20 Hz	0.016 % + 0.38 mA	Pearson Current Monitor	
		20 Hz to 40 Hz	76 µA/A + 0.30 mA		
		40 Hz to 55 Hz	63 µA/A + 0.19 mA		
		55 Hz to 400 Hz	63 µA/A + 0.19 mA		
		0.4 kHz to 1 kHz	63 µA/A + 0.19 mA		
		1 kHz to 10 kHz	86 µA/A + 0.14 mA		
		10 kHz to 20 kHz	97 µA/A + 0.13 mA		
		20 kHz to 30 kHz	0.010 % + 0.15 mA		
		30 kHz to 50 kHz	0.018 % + 89 µA		
		50 kHz to 70 kHz	0.018 % + 0.16 mA		
		70 kHz to 100 kHz	0.021 % + 0.14 mA		
		50 A to 100 A	10 Hz to 20 Hz		0.016 % + 1.0 mA
			20 Hz to 40 Hz		86 µA/A + 0.70 mA
	40 Hz to 55 Hz		76 µA/A + 0.38 mA		
	55 Hz to 400 Hz		76 µA/A + 0.38 mA		
	0.4 kHz to 1 kHz		76 µA/A + 0.38 mA		
	1 kHz to 10 kHz		98 µA/A + 0.30 mA		
	10 kHz to 20 kHz		0.013 % + 0.24 mA		
	20 kHz to 30 kHz		0.013 % + 0.29 mA		
	0.1 mA to 300 mA 300 mA to 3.0 A 3.0 A to 7.0 A	@ 510 kHz Nominal	0.58 % - 77 µA		
		@ 510 kHz Nominal	0.59 % - 0.27 mA		
@ 510 kHz Nominal		0.64 % - 4.2 mA			

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks	
DC RESISTANCE and CURRENT (20/E05)				
Resistance – Source	0.1 Ω to 1 Ω	0.011 % + 2.4 mΩ	Decade Resistors	
	1 Ω to 10 Ω	0.036 % + 2.1 mΩ		
	10 Ω to 100 Ω	0.048 % + 1.4 mΩ		
	100 Ω to 1 kΩ	0.047 % + 6.7 mΩ		
	1 kΩ to 10 kΩ	0.047 % + 67 mΩ		
	10 kΩ to 100 kΩ	0.047 % + 0.67 Ω		
	100 kΩ to 1 MΩ (0.1 Ω Increments)	0.054 % + 1.1 Ω		
	10 MΩ to 100 MΩ	0.29 % - 7.4 Ω		
	100 MΩ to 1 GΩ	0.29 % + 11 kΩ		
	1 GΩ to 10 GΩ (10 MΩ Increments)	0.55 % - 5.0 MΩ		
	1 Ω	0.49 μΩ		IET LABS - SRL
	10 Ω	3.5 μΩ		
	25 Ω	6.0 μΩ		
	100 Ω	28 μΩ		
	200 Ω	50 μΩ		
400 Ω	0.10 mΩ			
1 kΩ	5.8 mΩ			
10 kΩ	6.3 mΩ			
100 kΩ	49 mΩ			
1 MΩ	5.8 Ω			
10 MΩ	12 Ω			
100 MΩ	1.2 kΩ			
1 GΩ	26 kΩ			
10 GΩ	0.51 MΩ			
0.0 Ω	4.0 μΩ	Fluke 5730A		
1.0 Ω	74 μΩ			
1.9 Ω	0.14 mΩ			
10 Ω	0.19 mΩ			
19 Ω	0.37 mΩ			

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
Variable Resistance – Source	100 Ω	0.85 mΩ	Fluke 5522A
	190 Ω	1.6 mΩ	
	1.0 kΩ	5.6 mΩ	
	1.9 kΩ	11 mΩ	
	10 kΩ	54 mΩ	
	19 kΩ	0.10 Ω	
	100 kΩ	0.62 Ω	
	190 kΩ	1.5 Ω	
	1.0 MΩ	11 Ω	
	1.9 MΩ	25 Ω	
	10 MΩ	0.29 kΩ	
	19 MΩ	0.69 kΩ	
	100 MΩ	8.5 kΩ	
	0 Ω to < 11 Ω	31 μΩ/Ω + 0.78 mΩ	
	11 Ω to < 33 Ω	23 μΩ/Ω + 1.2 mΩ	
	33 to < 110 Ω	22 μΩ/Ω + 1.1 mΩ	
	110 to < 330 Ω	22 μΩ/Ω + 1.6 mΩ	
	330 Ω to < 1.1 kΩ	22 μΩ/Ω + 1.6 mΩ	
	1.1 kΩ to < 3.3 kΩ	22 μΩ/Ω + 16 mΩ	
	3.3 kΩ to < 11 kΩ	22 μΩ/Ω + 16 mΩ	
	11 kΩ to < 33 kΩ	22 μΩ/Ω + 0.16 Ω	
	33 kΩ to < 110 kΩ	22 μΩ/Ω + 0.16 Ω	
	110 kΩ to < 330 kΩ	25 μΩ/Ω + 1.6 Ω	
	330 kΩ to < 1.1 MΩ	25 μΩ/Ω + 1.6 Ω	
	1.1 MΩ to < 3.3 MΩ	47 μΩ/Ω + 23 Ω	
	3.3 MΩ to < 11 MΩ	0.010 % + 39 Ω	
	11 MΩ to < 33 MΩ	0.019 % + 1.9 kΩ	
	33 MΩ to < 110 MΩ	0.039 % + 2.3 kΩ	
110 MΩ to < 330 MΩ	0.23 % + 78 kΩ		
330 MΩ to 1.1 GΩ	1.2 % + 0.39 MΩ		

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks	
Resistance Measure ^{Note 4}	0 Ω to 1.0 Ω	11 μΩ/Ω + 4.0 μΩ	Fluke 8588A	
	> 1.0 Ω to 10 Ω	7.7 μΩ/Ω + 14 μΩ		
	> 10 Ω to 100 Ω	7.1 μΩ/Ω + 47 μΩ		
	> 100 Ω to 1 kΩ	7.1 μΩ/Ω + 0.47 mΩ		
	> 1 kΩ to 10 kΩ	7.1 μΩ/Ω + 4.7 mΩ		
	> 10 kΩ to 100 kΩ	7.3 μΩ/Ω + 47 mΩ		
	> 100 kΩ to 1 MΩ	8.2 μΩ/Ω + 1.0 Ω		
	> 1 MΩ to 10 MΩ	11 μΩ/Ω + 0.10 kΩ		
	> 10 MΩ to 100 MΩ	39 μΩ/Ω + 10 kΩ		
	> 100 MΩ to 1 GΩ	0.051 % + 1.0 MΩ		
	> 1 MΩ to 10 MΩ	15 μΩ/Ω + 10 Ω	Fluke 8588A - HV	
	> 10 MΩ to 100 MΩ	60 μΩ/Ω + 1.0 kΩ		
	> 100 MΩ to 1 GΩ	0.015 % + 0.10 MΩ		
	> 1 GΩ to 10 GΩ	0.052 % + 10 MΩ		
Resistive Simulation of Temperature Probes ^{Note 7} YSI 400	20 °C to 44 °C (2.814 kΩ to 1.023 kΩ)	0.0077 % + 0.0034 °C 0.0077 % + 78 mΩ	Fluke 8846A	
	YSI 700T1	20 °C to 44 °C (7.496 kΩ to 2.726 kΩ)		0.0078 % + 0.0013 °C (0.0078 % + 78 mΩ)
	YSI 700T2	20 °C to 44 °C (37.30 kΩ to 13.80 kΩ)		0.0078 % + 0.0025 °C (0.0078 % + 0.78 Ω)
Resistive Simulation of Cardiac Output at: ^{Note 8} 0 °C and 2 °C Injectate	2.5 L/min (14.50 kΩ)	0.0033 L/min (1.9 Ω)	Fluke 8846A	
	3.0 L/min (14.47 kΩ)	0.0039 L/min (1.9 Ω)		
	5.0 L/min (14.350 kΩ)	0.0066 L/min (1.9 Ω)		
	7.0 L/min (14.395 kΩ)	0.0092 L/min (1.9 Ω)		
	10.0 L/min (14.2448 kΩ)	0.013 L/min (1.9 Ω)		

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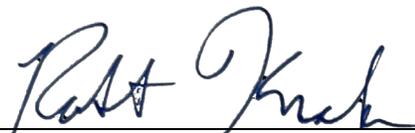
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks	
24 °C and 20 °C Injectate	2.5 L/min (14.30 kΩ) 3.0 L/min (14.50 kΩ) 5.0 L/min (14.2235 kΩ) 7.0 L/min (14.50 kΩ) 10.0 L/min (14.1414 kΩ)	0.0025 L/min (3.7 Ω) 0.0029 L/min (3.7 Ω) 0.0049 L/min (3.7 Ω) 0.0069 L/min (3.7 Ω) 0.0098 L/min (3.7 Ω)		
DC Current Source	0.0 µA to < 330 µA	0.012 % + 16 nA	Fluke 5522A	
	0.33 mA to < 3.3 mA	77 µA/A + 39 nA		
	3.3 mA to < 33 mA	77 µA/A + 0.20 µA		
	33 mA to < 330 mA	77 µA/A + 2.0 µA		
	0.33 A to < 1.1 A	0.015 % + 31 µA		
	1.1 A to < 3 A	0.029 % + 31 µA		
	3.0 A to < 11 A	0.039 % + 0.39 mA		
	11 A to 20.5 A	0.078 % + 0.58 mA		
	0.0 µA to < 220 µA	33 µA/A + 5.4 nA		Fluke 5730A
	0.22 mA to < 2.2 mA	27 µA/A + 6.2 nA		
2.2 mA to < 22 mA	27 µA/A + 39 nA			
22 mA to < 100 mA	35 µA/A + 0.62 µA			
100 mA to < 220 mA	35 µA/A + 0.62 µA			
Current Clamp Non-Toroidal	0.22 A to < 1.0 A	54 µA/A + 12 µA	Fluke 5730A/5725A Fluke 5730A/52120A	
	1.0 A to 2.2 A	54 µA/A + 12 µA		
	2.2 A to 11 A	0.026 % + 0.37 mA		
	0.22 A to < 2.0 A	0.012 % + 0.16 mA		
	2.0 A to < 20 A	0.012 % + 1.6 mA		
	20 A to 100 A	0.012 % + 9.3 mA		
	0.33 mA to < 3.3 mA	0.39 % + 0.16 µA		Fluke 5730A/5522A and 5500A Coil
3.3 mA to < 33 mA	0.38 % + 1.6 µA			
33 mA to < 330 mA	0.38 % + 16 µA			
0.33 A to < 1.1 A	0.38 % + 0.17 mA			
1.1 A to < 3.0 A	0.39 % + 63 µA			
3.0 A to < 11.0 A	0.38 % + 2.1 mA			

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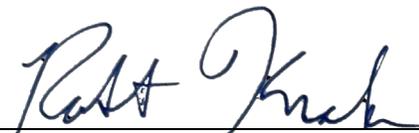
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks	
Current Clamp Toroidal	11.0 A to < 20.0 A	0.40 % + 1.9 mA		
	20.0 A to < 150 A	0.36 % + 0.21 A		
	150 A to 1025 A	0.39 % + 0.60 A		
		0 A to 5000 A	0.60 % + 0.79 A	Fluke 5730A/52120A and 52120A/COIL 6KA
		0.33 mA to < 3.3 mA	0.38 % + 0.14 µA	Fluke 5730A/5522A and 5500A Coil
		3.3 mA to < 33 mA	0.38 % + 1.4 µA	
		33 mA to < 330 mA	0.38 % + 14 µA	
		0.33 A to < 1.1 A	0.38 % + 0.16 mA	
		1.1 A to < 3.0 A	0.39 % + 56 µA	
		3.0 A to < 11.0 A	0.38 % + 1.7 mA	
	11.0 A to < 20.0 A	0.39 % + 0.71 mA		
DC Current Measure ^{note 4}	20.0 A to < 150 A	0.39 % + 0.12 A	Fluke 5730A/52120A and 52120A/COIL 6KA	
	150 A to 1025 A	0.38 % + 0.57 A		
	0 A to 5000 A	0.60 % + 0.79 A		
		> 10.0 A to 30 A	0.37 % - 6.8 mA	Fluke 8846A, Agilent 34330A
		0.1 µA to < 220 µA	3.9 µA/A + 0.78 nA	Fluke 8588A and IET SRL
		0.22 mA to < 2.2 mA	3.1 µA/A + 6.8 nA	
		2.2 mA to < 22 mA	3.9 µA/A + 39 nA	Fluke 8588A
		22 mA to < 100 mA	6.1 µA/A + 0.26 µA	
		0 µA to 10 µA	24 µA/A + 0.40 nA	
		> 10 µA to 100 µA	8.5 µA/A + 0.39 nA	
	> 0.1 mA to 1.0 mA	7.8 µA/A + 3.9 nA		
	> 1.0 mA to 10.0 mA	8.5 µA/A + 39 nA		
	> 10 mA to 100 mA	33 µA/A + 1.0 µA		
	> 0.1 A to 1.0 A	0.010 % + 0.10 mA		
	> 1.0 A to 10 A	0.017 % + 0.40 mA		
	> 10 A to 30 A	0.049 % + 4.4 mA		

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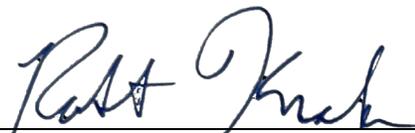
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	10 μ A to 1 mA > 1 mA to 10 mA > 10 mA to 20 mA > 20 mA to 50 mA > 50 mA to 100 mA > 100 mA to 200 mA > 200 mA to 500 mA > 0.5 A to 1 A > 1 A to 2 A > 2 A to 5 A > 5 A to 10 A > 10 A to 20 A > 20 A to 50 A > 50 A to 100 A	3.2 μ A/A + 63 nA 15 μ A/A + 57 nA 18 μ A/A + 55 nA 18 μ A/A + 97 nA 18 μ A/A + 0.22 μ A 18 μ A/A + 0.43 μ A 19 μ A/A + 0.88 μ A 4.8 μ A/A + 62 μ A 8.6 μ A/A + 60 μ A 14 μ A/A + 59 μ A 22 μ A/A + 59 μ A 23 μ A/A + 93 μ A 29 μ A/A + 0.19 mA 33 μ A/A + 0.33 mA	Fluke 5790B and Fluke A40B
DC VOLTAGE (20/E06)			
DC Voltage Measure ^{note 4}	> 1 kV to 10 kV > 10 kV to 40 kV 0 mV to 100 mV > 0.1 V to 1.0 V > 1.0 V to 10.0 V > 10 V to 100 V > 100 V to 1000 V	1.6 % 0.78 % + 3.5 μ V 4.7 μ V/V + 0.25 μ V 2.8 μ V/V + 0.33 μ V 2.8 μ V/V + 0.52 μ V 4.1 μ V/V + 30 μ V 4.3 μ V/V + 0.51 mV	Fluke 8846A and Fluke 80K-40 Fluke 8588A
Electrical Simulation of Blood Pressure ^{Note 9}	-10 mmHg to 400 mmHg (-0.5 mV to 20 mV)	0.057 % + 0.054 mmHg (0.057 % + 2.7 μ V)	Conversion Factor is 20 mmHg/mV at 10 VDC Exciter Voltage (Power Supply & Voltage Meter)
DC Voltage Source	0 mV to < 330 mV 0.33 V to < 3.3 V 3.3 V to < 33 V 33 V to < 330 V 330 V to 1020 V	15 μ V/V + 0.79 μ V 8.5 μ V/V + 1.6 μ V 9.3 μ V/V + 16 μ V 14 μ V/V + 0.12 mV 14 μ V/V + 1.2 mV	Fluke 5522A

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

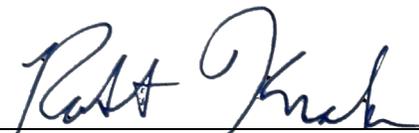
Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	0 mV to < 220 mV 0.22 V to < 2.2 V 2.2 V to < 11 V 11 V to < 22 V 22 V to < 220 V 220 V to 1100 V	5.4 $\mu\text{V}/\text{V}$ + 0.39 μV 3.1 $\mu\text{V}/\text{V}$ + 0.62 μV 2.3 $\mu\text{V}/\text{V}$ + 2.3 μV 2.3 $\mu\text{V}/\text{V}$ + 3.9 μV 3.1 $\mu\text{V}/\text{V}$ + 39 μV 4.7 $\mu\text{V}/\text{V}$ + 0.39 mV	Fluke 5730A

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

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
LF AC VOLTAGE (20/E09)				
AC Voltage – Source	0 mV to < 33 mV	10 Hz to 45 Hz 45 Hz to 10 kHz 10 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 500 kHz	0.062 % + 4.7 μV 0.012 % + 4.7 μV 0.016 % + 4.7 μV 0.078 % + 4.7 μV 0.27 % + 9.3 μV 0.62 % + 39 μV	Fluke 5522A
	33 mV to < 330 mV	10 Hz to 45 Hz 45 Hz to 10 kHz 10 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 500 kHz	0.023 % + 6.2 μV 0.011 % + 6.2 μV 0.012 % + 6.2 μV 0.027 % + 6.2 μV 0.062 % + 25 μV 0.16 % + 54 μV	
	0.33 V to < 3.3 V	10 Hz to 45 Hz 45 Hz to 10 kHz 10 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 500 kHz	0.023 % + 39 μV 0.012 % + 47 μV 0.015 % + 47 μV 0.023 % + 39 μV 0.054 % + 97 μV 0.19 % + 0.47 mV	

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

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	3.3 V to < 33 V	10 Hz to 45 Hz	0.023 % + 0.50 mV	Fluke 5730A
		45 Hz to 10 kHz	0.012 % + 0.47 mV	
		10 kHz to 20 kHz	0.019 % + 0.47 mV	
		20 kHz to 50 kHz	0.027 % + 0.47 mV	
		50 kHz to 100 kHz	0.070 % + 1.2 mV	
	33 V to < 330 V	45 Hz to 1 kHz	0.015 % + 1.6 mV	
		1 kHz to 10 kHz	0.016 % + 4.7 mV	
		10 kHz to 20 kHz	0.019 % + 4.7 mV	
		20 kHz to 50 kHz	0.023 % + 4.7 mV	
		50 kHz to 100 kHz	0.16 % + 39 mV	
	330 V to 1020 V	45 Hz to 1 kHz	0.023 % + 7.8 mV	
		1 kHz to 5 kHz	0.019 % + 7.8 mV	
		5 kHz to 10 kHz	0.023 % + 7.8 mV	
	0.22 mV to < 2.2 mV	10 Hz to 20 Hz	0.021 % + 3.9 μV	
		20 Hz to 40 Hz	81 μV/V + 3.9 μV	
		40 Hz to 20 kHz	70 μV/V + 3.9 μV	
		20 kHz to 50 kHz	0.018 % + 3.9 μV	
		50 kHz to 100 kHz	0.042 % + 4.7 μV	
		100 kHz to 300 kHz	0.093 % + 9.3 μV	
		300 kHz to 500 kHz	0.12 % + 19 μV	
500 kHz to 1 MHz		0.24 % + 19 μV		
2.2 mV to < 22 mV	10 Hz to 20 Hz	0.021 % + 3.9 μV		
	20 Hz to 40 Hz	81 μV/V + 3.9 μV		
	40 Hz to 20 kHz	70 μV/V + 3.9 μV		
	20 kHz to 50 kHz	0.018 % + 3.9 μV		
	50 kHz to 100 kHz	0.042 % + 4.7 μV		
	100 kHz to 300 kHz	0.093 % + 9.3 μV		
	300 kHz to 500 kHz	0.12 % + 19 μV		
	500 kHz to 1 MHz	0.24 % + 19 μV		

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

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	22 V to < 220 mV	10 Hz to 20 Hz	0.021 % + 12 μV	
		20 Hz to 40 Hz	81 μV/V + 6.2 μV	
		40 Hz to 20 kHz	51 μV/V + 6.2 μV	
		20 kHz to 50 kHz	0.011 % + 6.2 μV	
		50 kHz to 100 kHz	0.029 % + 16 μV	
		100 kHz to 300 kHz	0.054 % + 19 μV	
		300 kHz to 500 kHz	0.12 % + 23 μV	
		500 kHz to 1 MHz	0.22 % + 47 μV	
	0.22 V to < 2.2 V	10 Hz to 20 Hz	0.021 % + 39 μV	
		20 Hz to 40 Hz	78 μV/V + 16 μV	
		40 Hz to 20 kHz	36 μV/V + 7.8 μV	
		20 kHz to 50 kHz	60 μV/V + 9.3 μV	
		50 kHz to 100 kHz	75 μV/V + 31 μV	
		100 kHz to 300 kHz	0.029 % + 78 μV	
		300 kHz to 500 kHz	0.085 % + 0.19 mV	
		500 kHz to 1 MHz	0.14 % + 0.31 mV	
2.2 V to < 22 V	10 Hz to 20 Hz	0.021 % + 0.39 mV		
	20 Hz to 40 Hz	78 μV/V + 0.16 mV		
	40 Hz to 20 kHz	36 μV/V + 54 μV		
	20 kHz to 50 kHz	60 μV/V + 93 μV		
	50 kHz to 100 kHz	75 μV/V + 0.19 mV		
	100 kHz to 300 kHz	0.022 % + 0.62 mV		
	300 kHz to 500 kHz	0.085 % + 1.9 mV		
	500 kHz to 1 MHz	0.12 % + 3.1 mV		
22 V to < 220 V	10 Hz to 20 Hz	0.021 % + 3.9 mV		
	20 Hz to 40 Hz	78 μV/V + 1.6 mV		
	40 Hz to 20 kHz	47 μV/V + 0.54 mV		
	20 kHz to 50 kHz	74 μV/V + 0.93 mV		
	50 kHz to 100 kHz	0.013 % + 2.3 mV		
	100 kHz to 300 kHz	0.078 % + 16 mV		
	300 kHz to 500 kHz	0.40 % + 39 mV		

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Effective dates



For the National Voluntary Laboratory Accreditation Program

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CALIBRATION LABORATORIES

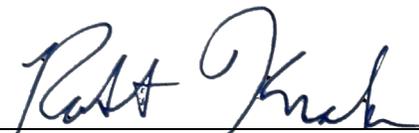
NVLAP LAB CODE 201065-0

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

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks		
AC Voltage - Measure ^{note 4}	220 V to 1100 V	500 kHz to 1 MHz	0.70 % + 78 mV	Fluke 5730A/5725A Fluke 8846A and Fluke 80K-40 Fluke 8588A		
		15 Hz to 50 Hz 50 Hz to 1 kHz	0.025 % + 16 mV 58 µV/V + 3.1 mV			
	220 V to 750 V	30 kHz to 50 kHz 50 kHz to 100 kHz	0.028 % + 8.5 mV 0.10 % + 35 mV			
		220 V to 1100 V	40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 30 kHz		62 µV/V + 3.1 mV 97 µV/V + 4.7 mV 0.028 % + 8.5 mV	
	> 1 kV to 10 kV 10 kV to 40 kV		50/60 Hz 50/60 Hz		3.9 % + 3.6 µV 3.9 % + 2.9 µV	
			> 1.0 mV to 10 mV		1 Hz to 2 kHz 2 kHz to 10 kHz 10 kHz to 30 kHz 30 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz	0.025 % + 1.1 µV 0.033 % + 1.1 µV 0.034 % + 1.1 µV 0.30 % + 0.78 µV 1.0 % + 3.9 µV 2.0 % + 3.9 µV
	> 10 V to 100 mV	1 Hz to 2 kHz 2 kHz to 10 kHz 10 kHz to 30 kHz 30 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz			68 µV/V + 0.50 µV 0.011 % + 0.50 µV 0.021 % + 1.0 µV 0.051 % + 5.0 µV 0.20 % + 31 µV 1.0 % + 0.10 mV	
		> 0.1 V to 1.0 V			1 Hz to 2 kHz 2 kHz to 10 kHz 10 kHz to 30 kHz 30 kHz to 100 kHz 100 kHz to 300 kHz	64 µV/V + 5.0 µV 0.011 % + 5.0 µV 0.021 % + 10 µV 0.051 % + 50 µV 0.20 % + 0.31 mV

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

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	> 1.0 V to 10 V	300 kHz to 1 MHz	0.10 % + 1.0 mV	
		1 Hz to 2 kHz	64 μ V/V + 50 μ V	
		2 kHz to 10 kHz	0.011 % + 50 μ V	
		10 kHz to 30 kHz	0.021 % + 0.10 mV	
		30 kHz to 100 kHz	0.051 % + 0.50 mV	
		100 kHz to 300 kHz	0.20 % + 3.1 mV	
	> 10 V to 100 V	300 kHz to 1 MHz	0.10 % + 10 mV	
		1 Hz to 2 kHz	70 μ V/V + 0.50 mV	
		2 kHz to 10 kHz	90 μ V/V + 0.50 mV	
		10 kHz to 30 kHz	0.021 % + 1.0 mV	
		30 kHz to 100 kHz	0.051 % + 5.0 mV	
	> 100 V to 1000 V	100 kHz to 300 kHz	0.35 % + 47 mV	
		300 kHz to 1 MHz	1.0 % + 0.50 V	
		1 Hz to 2 kHz	90 μ V/V + 25 mV	
		2 kHz to 10 kHz	90 μ V/V + 25 mV	
0.1 mV to 2.2 mV	10 kHz to 30 kHz	0.021 % + 25 mV		
	30 kHz to 100 kHz	0.051 % + 0.10 V		
	10 Hz to 20 Hz	0.13 % + 1.0 μ V		
	20 Hz to 40 Hz	0.057 % + 1.0 μ V		
	40 Hz to 20 kHz	0.033 % + 1.0 μ V		
	20 kHz to 50 kHz	0.063 % + 1.6 μ V		
	50 kHz to 100 kHz	0.093 % + 1.9 μ V		
	100 kHz to 300 kHz	1.8 % + 3.1 μ V		
> 2.2 mV to 7 mV	300 kHz to 500 kHz	1.9 % + 6.2 μ V		
	500 kHz to 1 MHz	2.7 % + 6.2 μ V		
	10 Hz to 20 Hz	0.066 % + 1.0 μ V		
	20 Hz to 40 Hz	0.029 % + 1.0 μ V		
	40 Hz to 20 kHz	0.016 % + 1.0 μ V		
	20 kHz to 50 kHz	0.031 % + 1.6 μ V		

Fluke 5790B

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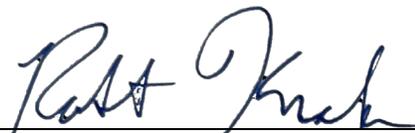
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	> 7 mV to 22 mV	50 kHz to 100 kHz	0.047 % + 1.9 μV	
		100 kHz to 300 kHz	0.093 % + 3.1 μV	
		300 kHz to 500 kHz	0.10 % + 6.2 μV	
		500 kHz to 1 MHz	0.18 % + 6.2 μV	
	> 22 mV to 70 mV	10 Hz to 20 Hz	0.022 % + 1.0 μV	
		20 Hz to 40 Hz	0.015 % + 1.0 μV	
		40 Hz to 20 kHz	85 μV/V + 1.0 μV	
		20 kHz to 50 kHz	0.016 % + 1.6 μV	
		50 kHz to 100 kHz	0.024 % + 1.9 μV	
		100 kHz to 300 kHz	0.063 % + 3.1 μV	
		300 kHz to 500 kHz	0.069 % + 6.2 μV	
		500 kHz to 1 MHz	0.13 % + 6.2 μV	
> 70 mV to 220 mV	10 Hz to 20 Hz	0.019 % + 1.2 μV		
	20 Hz to 40 Hz	93 μV/V + 1.2 μV		
	40 Hz to 20 kHz	50 μV/V + 1.2 μV		
	20 kHz to 50 kHz	0.010 % + 1.6 μV		
	50 kHz to 100 kHz	0.020 % + 1.9 μV		
	100 kHz to 300 kHz	0.040 % + 3.1 μV		
	300 kHz to 500 kHz	0.052 % + 6.2 μV		
	500 kHz to 1 MHz	0.085 % + 6.2 μV		
> 220 mV to 700 mV	10 Hz to 20 Hz	0.016 % + 1.2 μV		
	20 Hz to 40 Hz	59 μV/V + 1.2 μV		

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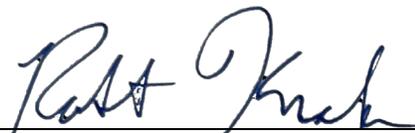
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	> 700 mV to 2.2 V	40 Hz to 20 kHz	26 μ V/V + 1.2 μ V	
		20 kHz to 50 kHz	40 μ V/V + 1.6 μ V	
		50 kHz to 100 kHz	61 μ V/V + 1.9 μ V	
		100 kHz to 300 kHz	0.014 % + 3.1 μ V	
		300 kHz to 500 kHz	0.023 % + 6.2 μ V	
		500 kHz to 1 MHz	0.074 % + 6.2 μ V	
		10 Hz to 20 Hz	0.016 %	
	20 Hz to 40 Hz	51 μ V/V		
	40 Hz to 20 kHz	19 μ V/V		
	20 kHz to 50 kHz	36 μ V/V		
	50 kHz to 100 kHz	55 μ V/V		
	100 kHz to 300 kHz	0.012 %		
	300 kHz to 500 kHz	0.020 %		
	500 kHz to 1 MHz	0.070 %		
	> 2.2 V to 7 V	10 Hz to 20 Hz	0.016 %	
		20 Hz to 40 Hz	52 μ V/V	
		40 Hz to 20 kHz	19 μ V/V	
		20 kHz to 50 kHz	37 μ V/V	
		50 kHz to 100 kHz	63 μ V/V	
		100 kHz to 300 kHz	0.015 %	
		300 kHz to 500 kHz	0.031 %	
500 kHz to 1 MHz	0.093 %			
> 7 V to 22 V	10 Hz to 20 Hz	0.016 %		
	20 Hz to 40 Hz	52 μ V/V		
	40 Hz to 20 kHz	21 μ V/V		
	20 kHz to 50 kHz	37 μ V/V		
	50 kHz to 100 kHz	63 μ V/V		
	100 kHz to 300 kHz	0.015 %		
	300 kHz to 500 kHz	0.031 %		
500 kHz to 1 MHz	0.093 %			

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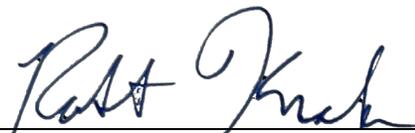
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	> 22 V to 70 V	10 Hz to 20 Hz	0.016 %	
		20 Hz to 40 Hz	53 μ V/V	
		40 Hz to 20 kHz	25 μ V/V	
		20 kHz to 50 kHz	44 μ V/V	
		50 kHz to 100 kHz	73 μ V/V	
		100 kHz to 300 kHz	0.016 %	
		300 kHz to 500 kHz	0.032 %	
		500 kHz to 1 MHz	0.093 %	
	> 70 V to 220 V	10 Hz to 20 Hz	0.016 %	
		20 Hz to 40 Hz	53 μ V/V	
		40 Hz to 20 kHz	24 μ V/V	
		20 kHz to 50 kHz	53 μ V/V	
		50 kHz to 100 kHz	76 μ V/V	
		100 kHz to 300 kHz	0.016 %	
	> 220 V to 700 V	300 kHz to 500 kHz	0.039 %	
		10 Hz to 20 Hz	0.016 %	
		20 Hz to 40 Hz	77 μ V/V + 0.13 μ V	
		40 Hz to 20 kHz	32 μ V/V + 0.31 μ V	
		20 kHz to 50 kHz	0.010 %	
	> 700 V to 1000 V	50 kHz to 100 kHz	0.039 %	
10 Hz to 20 Hz		0.016 %		
20 Hz to 40 Hz		77 μ V/V		
40 Hz to 20 kHz		29 μ V/V + 0.14 μ V		
0.1 mV to 2.2 mV	20 kHz to 50 kHz	0.010 %		
	50 kHz to 100 kHz	0.039 %		
	10 Hz to 30 Hz	0.47 % + 1.2 μ V		
	30 Hz to 120 Hz	0.47 % + 1.2 μ V		
	120 Hz to 1.2 kHz	0.47 % + 1.2 μ V		
		1.2 kHz to 120 kHz	0.47 % + 1.2 μ V	
		120 kHz to 500 kHz	0.46 % + 1.4 μ V	

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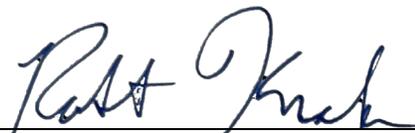
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	> 2.2 mV to 7 mV	500 kHz to 1.2 MHz	0.46 % + 1.4 μV	
		1.2 MHz to 2 MHz	0.46 % + 1.4 μV	
		2 MHz to 10 MHz	0.48 % + 1.4 μV	
		10 MHz to 20 MHz	0.52 % + 1.4 μV	
		20 MHz to 30 MHz	0.71 % + 1.9 μV	
		30 MHz to 50 MHz	0.90 % + 1.9 μV	
		10 Hz to 30 Hz	0.39 % + 5.4 μV	
	30 Hz to 120 Hz	0.39 % + 5.4 μV		
	120 Hz to 1.2 kHz	0.39 % + 5.4 μV		
	1.2 kHz to 120 kHz	0.39 % + 5.4 μV		
	120 kHz to 500 kHz	0.39 % + 5.5 μV		
	500 kHz to 1.2 MHz	0.39 % + 5.5 μV		
	1.2 MHz to 2 MHz	0.39 % + 5.5 μV		
	2 MHz to 10 MHz	0.41 % + 5.4 μV		
	10 MHz to 20 MHz	0.45 % + 5.2 μV		
	20 MHz to 30 MHz	0.48 % + 5.1 μV		
	30 MHz to 50 MHz	0.54 % + 4.8 μV		
	> 7 mV to 22 mV	10 Hz to 30 Hz	0.40 % + 9.9 μV	
		30 Hz to 120 Hz	0.39 % + 10 μV	
		120 Hz to 1.2 kHz	0.39 % + 10 μV	
		1.2 kHz to 120 kHz	0.39 % + 10 μV	
	120 kHz to 500 kHz	0.39 % + 10 μV		
	500 kHz to 1.2 MHz	0.39 % + 10 μV		
	1.2 MHz to 2 MHz	0.39 % + 10 μV		
	2 MHz to 10 MHz	0.40 % + 9.9 μV		
	10 MHz to 20 MHz	0.41 % + 9.7 μV		
	20 MHz to 30 MHz	0.48 % + 8.7 μV		
	30 MHz to 50 MHz	0.60 % + 7.2 μV		
> 22 mV to 70 mV	10 Hz to 30 Hz	0.40 % + 23 μV		
	30 Hz to 120 Hz	0.39 % + 23 μV		
	120 Hz to 1.2 kHz	0.39 % + 23 μV		

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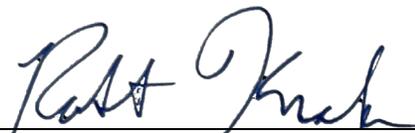
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	> 70 mV to 220 mV	1.2 kHz to 120 kHz	0.39 % + 23 μV	
		120 kHz to 500 kHz	0.39 % + 23 μV	
		500 kHz to 1.2 MHz	0.39 % + 23 μV	
		1.2 MHz to 2 MHz	0.39 % + 23 μV	
		2 MHz to 10 MHz	0.40 % + 23 μV	
		10 MHz to 20 MHz	0.40 % + 23 μV	
		20 MHz to 30 MHz	0.47 % + 20 μV	
		30 MHz to 50 MHz	0.60 % + 16 μV	
		> 220 mV to 700 mV	10 Hz to 30 Hz	
	30 Hz to 120 Hz		0.31 % + 62 μV	
	120 Hz to 1.2 kHz		0.31 % + 62 μV	
	1.2 kHz to 120 kHz		0.31 % + 62 μV	
	120 kHz to 500 kHz		0.31 % + 62 μV	
	500 kHz to 1.2 MHz		0.31 % + 62 μV	
	1.2 MHz to 2 MHz		0.31 % + 62 μV	
	2 MHz to 10 MHz		0.32 % + 61 μV	
	10 MHz to 20 MHz		0.33 % + 59 μV	
	20 MHz to 30 MHz		0.41 % + 50 μV	
	30 MHz to 50 MHz		0.56 % + 38 μV	
	> 220 mV to 700 mV	10 Hz to 30 Hz	0.32 % + 0.23 mV	
		30 Hz to 120 Hz	0.31 % + 0.23 mV	
		120 Hz to 1.2 kHz	0.31 % + 0.23 mV	
		1.2 kHz to 120 kHz	0.31 % + 0.23 mV	
		120 kHz to 500 kHz	0.31 % + 0.23 mV	
		500 kHz to 1.2 MHz	0.31 % + 0.23 mV	
		1.2 MHz to 2 MHz	0.31 % + 0.23 mV	
		2 MHz to 10 MHz	0.32 % + 0.23 mV	
10 MHz to 20 MHz		0.33 % + 0.22 mV		
20 MHz to 30 MHz		0.41 % + 0.19 mV		
30 MHz to 50 MHz		0.56 % + 0.15 mV		

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

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	> 700 mV to 2.2 V	10 Hz to 30 Hz 30 Hz to 120 Hz 120 Hz to 1.2 kHz 1.2 kHz to 120 kHz 120 kHz to 500 kHz 500 kHz to 1.2 MHz 1.2 MHz to 2 MHz 2 MHz to 10 MHz 10 MHz to 20 MHz 20 MHz to 30 MHz 30 MHz to 50 MHz	0.28 % + 0.30 mV 0.27 % + 0.31 mV 0.28 % + 0.30 mV 0.30 % + 0.29 mV 0.38 % + 0.23 mV 0.54 % + 0.17 mV	
	> 2.2 V to 7 V	10 Hz to 30 Hz 30 Hz to 120 Hz 120 Hz to 1.2 kHz 1.2 kHz to 120 kHz 120 kHz to 500 kHz 500 kHz to 1.2 MHz 1.2 MHz to 2 MHz 2 MHz to 10 MHz 10 MHz to 20 MHz 20 MHz to 30 MHz 30 MHz to 50 MHz	0.28 % + 0.60 mV 0.27 % + 0.62 mV 0.28 % + 0.60 mV 0.30 % + 0.58 mV 0.38 % + 0.45 mV 0.54 % + 0.33 mV	
LF CAPACITANCE (20/E10)				
Capacitance – Source	220 pF to < 400 pF 0.4 nF to < 1.1 nF 1.1 nF to < 3.3 nF 3.3 nF to < 11 nF 11 nF to < 33 nF 33 nF to < 110 nF 110 nF to < 330 nF 0.33 µF to < 1.1 µF 1.1 µF to < 3.3 µF	10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 600 Hz 10 Hz to 300 Hz	0.39 % + 7.8 pF 0.39 % + 7.8 pF 0.39 % + 7.8 pF 0.19 % + 7.8 pF 0.19 % + 7.8 pF 0.19 % + 7.8 pF 0.19 % + 23 pF 0.19 % + 0.78 nF 0.19 % + 2.3 nF	Fluke 5522A

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

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
Capacitance – Source	3.3 μ F to < 11 μ F	10 Hz to 150 Hz	0.19 % + 7.8 nF	IET Decade
	11 μ F to < 33 μ F	10 Hz to 120 Hz	0.31 % + 23 nF	
	33 μ F to < 110 μ F	10 Hz to 80 Hz	0.35 % + 78 nF	
	110 μ F to < 330 μ F	DC to 50 Hz	0.35 % + 0.23 μ F	
	0.33 mF to < 1.1 mF	DC to 20 Hz	0.35 % + 0.78 μ F	
	1.1 mF to < 3.3 mF	DC to 2 Hz	0.35 % + 2.3 μ F	
	3.3 mF to < 11 mF	DC to 6 Hz	0.35 % + 7.8 μ F	
	11 mF to < 33 mF	DC to 0.6 Hz	0.58 % + 23 μ F	
	33 mF to 110 mF	DC to 0.2 Hz	0.85 % + 78 μ F	
	Capacitance – Measure	50 pF to < 100 pF	100 Hz to 1 kHz	
100 pF to < 1000 pF		100 Hz to 1 kHz	0.018 % + 59 fF	
1 nF to < 10 nF		100 Hz to 1 kHz	0.019 % + 0.42 pF	
10 nF to < 100 nF		100 Hz to 1 kHz	0.019 % + 4.3 pF	
100 nF to < 1000 nF		100 Hz to 1 kHz	0.019 % + 43 pF	
Capacitance – Measure	0.1 nF to 1.0 nF	10 Hz to 10 kHz	0.10 % + 1.0 pF	IET 1689
	> 1.0 nF to 10 nF	10 Hz to 1 kHz	0.061 % + 2.0 pF	
	> 10 nF to 100 nF	10 Hz to 1 kHz	0.041 % + 10 pF	
	> 0.1 μ F to 1.0 μ F	10 Hz to 600 Hz	0.041 % + 0.10 nF	
	> 1.0 μ F to 10 μ F	10 Hz to 150 Hz	0.041 % + 1.0 nF	
	> 10 μ F to 100 μ F	10 Hz to 80 Hz	0.060 % + 10 nF	
	> 0.1 mF to 1.0 mF	DC to 20 Hz	0.061 % + 0.10 μ F	
	> 1.0 mF to 10 mF	DC to 6 Hz	0.070 % + 1.0 μ F	
	> 10 mF to 100 mF	DC to 0.2 Hz	0.070 % + 10 μ F	
	0.001 pF to 400 pF	12 Hz to 1 kHz	0.012 % + 46 fF	
400 pF to 10 nF	12 Hz to 100 Hz 100 Hz to 1 kHz	0.10 % + 0.41 fF 0.046 % + 0.11 fF		

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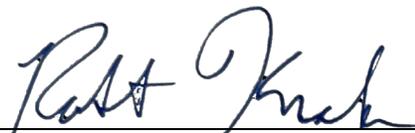
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	10 nF to 400 nF	12 Hz to 100 Hz 100 Hz to 1 kHz	0.10 % + 0.22 fF 0.046 % + 0.51 fF	
	400 nF to 25 µF	12 Hz to 100 Hz 100 Hz to 1 kHz	0.10 % + 1.2 pF 0.046 % + 0.13 pF	
	25 µF to 100 µF	12 Hz to 100 Hz 100 Hz to 1 kHz	0.47 % - 92 nF 0.18 % - 35 nF	
	100 µF to 1 mF	12 Hz to 100 Hz 100 Hz to 1 kHz	0.012 % + 1.5 µF 0.012 % + 0.55 µF	
	1 mF to 10 mF	12 Hz to 100 Hz 100 Hz to 1 kHz	0.098 % + 0.62 µF 0.044 % + 0.23 µF	
	10 mF to 100 mF	12 Hz to 100 Hz 100 Hz to 1 kHz	0.41 % - 31 µF 0.16 % - 12 µF	
	200 µF	DC 54 µA	0.046 %	Charge technique using DC current source and sampling DMM
	300 µF	DC 80 µA	0.046 %	
	330 µF	DC 90 µA	0.046 %	
	700 µF	DC 180 µA	0.046 %	
	1 mF	DC 90.0 µA	0.046 %	
	1.09 mF	DC 270.0 µA	0.046 %	
	1.1 mF	DC 270.0 µA	0.046 %	
	1.21 mF	DC 219.9 µA	0.046 %	
	2 mF	DC 540.0 µA	0.046 %	
	3 mF	DC 800.0 µA	0.046 %	
	3.3 mF	DC 900.0 µA	0.046 %	
	10 mF	DC 2.1999 mA	0.046 %	
	10.9 mF	DC 2.7 mA	0.046 %	

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

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	12.1 mF 20 mF 30 mF 33 mF 100 mF 110 mF	DC 5.5 mA DC 5.4 mA DC 8.0 mA DC 9.0 mA DC 45 mA DC 27 mA	0.046 % 0.046 % 0.046 % 0.046 % 0.046 % 0.046 %	
LF INDUCTANCE (20/E11)				
Inductance – Measure	15 µH 100 µH 121 µH 1 mH 1.21 mH 2 mH 3 mH 5 mH 10 mH 12 mH 121 mH 1 H 1.21 H 10 H 12.1 H 12.1 H 100 H 100 H	1 kHz 1 kHz 1 kHz 1 kHz 110 Hz 110 Hz 110 Hz 110 Hz 110 Hz 110 Hz 12 Hz 12 Hz 12 Hz 12 Hz 100 Hz 12 Hz 100 Hz 12 Hz	61 nH 81 nH 86 nH 0.29 µH 2.1 µH 2.5 µH 3.0 µH 3.9 µH 6.2 µH 7.1 µH 0.13 mH 1.0 mH 1.2 mH 8.1 mH 5.7 mH 9.8 mH 48 mH 81 mH	IET 1689
LF POWER/ENERGY (20/E12)				
AC Power Measurement ^{Note 11}	1 W to 500 W	@ 510 kHz	0.39 %	Power dissipation in load resistance

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For the National Voluntary Laboratory Accreditation Program

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CALIBRATION LABORATORIES

NVLAP LAB CODE 201065-0

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

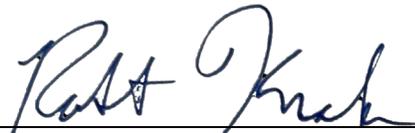
Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
AC Power Measurement <small>Note 4, 11</small>	1 W to 400 W	@ 510 kHz	0.88 % + 0.83 W	Fluke QA-ES
AC Power – Source	0.01 mW to 20 kW (3.3 mA to 20 A; 3 mV to 1000 V)	@ 45 Hz to 100 Hz	0.14 %	Fluke 5522A
	66 W to 1000 kW (2 A to 1000 A; 0.333 V to 1020 V)	@ 45 Hz to 100 Hz	0.63 % + 0.69 W	Fluke 5522A/ 5500A/Coil
	33 W to 6000 kW (100 A to 6000.0 A; 0.33 V to 1000 V)	@ 45 Hz to 100 Hz	0.90 % + 10 W	Fluke 5522A/ 5730A/52120A and 52120A/COIL 6KA

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
LF POWER/ENERGY (20/E12)			
LF Energy	0.1 J to 360 J	0.28 % + 0.080 J	Fluke 7000DP Gold
LF Energy ^{Note 4}	10 J to 360 J	0.21 % + 0.57 J	Fluke 7000DP
Energy (Watt-Hour) 50 Hz to 60 Hz	1 Wh to 3.63 Wh 3.63 Wh to 60 kWh	0.15 % + 50 mWh 0.24 % + 3.1 Wh	Fluke 5522A, Stopwatch
DC Power Source	0.01 mW to 20 kW (3.3 mA to 20 A; 3 mV to 1000 V)	0.080 %	Fluke 5522A
	6.6 W to 100 kW (20 A to 100.0 A; 0.333 V to 1000 V)	0.099 % + 0.27 kW	Fluke 5522A/ 5500A/Coil

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	33 W to 5000 kW (100 A to 5000 A; 0.333 V to 1000 V)	0.90 % + 60 W	Fluke 5522A/ 5730A/52120A and 52120A/COIL 6KA
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
LF PHASE (20/E15)				
Phase – Source 0.65 V to 330 V	0 ° to 180 °	10 Hz to 65 Hz 65 Hz to 500 Hz 500 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 10 kHz to 30 kHz	0.079 ° 0.19 ° 0.39 ° 1.9 ° 3.9 ° 7.8 °	Fluke 5522A
Phase – Measure	0 ° to 360 °	5 Hz to 2 kHz 2 kHz to 5 kHz 5 kHz to 10 kHz 10 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 1 MHz	0.015 ° 0.067 ° 0.067 ° 0.067 ° 0.067 ° 0.046 °	Clarke Hess 6000A

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
TIME & FREQUENCY			
FREQUENCY DISSEMINATION (20/F01)			
Frequency – Measure	0.1 Hz to 100 Hz 100 Hz to 12 GHz	0.17 µHz/Hz 0.16 µHz/Hz	Agilent 53131A and GPS system
Simulation of Heart Rate (beat per minute) ^{Note 10}	0.1 Hz to 6.0 Hz (6 BPM to 360 BPM)	0.37 mHz (0.022 BPM)	60 BPM/Hz
Simulation of Heart Rate (beat per minute) ^{Note 4, 10}	0.1 Hz to 6.0 Hz (6 BPM to 360 BPM)	9.8 mHz (0.58 BPM)	FLUKE ProSim

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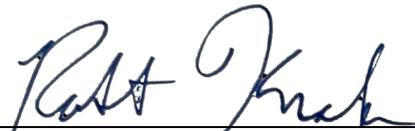
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
Simulation of Respiration Rate ^{Note 10} (respirations per minute)	0.1 Hz to 2.0 Hz (6 to 120 Resp/Min)	0.37 mHz (0.022 Resp/min)	60 Res/min per Hz
Simulation of Respiration Rate ^{Note 4, 10} (respirations per minute)	0.1 Hz to 2.0 Hz (6 to 120 Resp/Min)	9.8 mHz (0.58 Resp/min)	FLUKE ProSim
Frequency – Source	0.01 Hz to 1.0 kHz >1.0 kHz to 1.0 MHz >1 MHz to 600 MHz	0.16 µHz/Hz 0.18 µHz/Hz 0.18 µHz/Hz	Fluke 5522A Fluke 5522A / SC600
Optical Speed – Source	0.6 RPM to 100000 RPM	0.00014 % + 0.058 RPM	Fluke 5522A, Pacman
Optical Speed – Measure	0.6 RPM to 100000 RPM	0.00050 % + 0.082 RPM	Optical Tachometer
STOPWATCHES & TIMERS (20/F05)			
Stopwatches & Timers	1 s to 24 hour 1 s to 7 d	0.037 s 0.069 s	NIST SP 960-12 Counter/Generator Method
MECHANICAL			
FLOW RATE (20/M05)			
Volume Flow	0 > SLM to < 5 SLM 5 SLM to 100 SLM	0.11 % + 0.060 mSLM 0.20 % + 1.1 mSLM	DHI Molbloc
Air Velocity	0.05 m/s to < 4.0 m/s 4.0 m/s to < 8.0 m/s 8.0 m/s to < 12 m/s 12 m/s to < 16 m/s 16 m/s to 20 m/s	0.070 m/sec 0.081 m/sec 0.13 m/sec 0.24 m/sec 0.25 m/sec	TESTO 435-2
Liquid Flow – Source	0.0 mL to 5.0 mL/h 5.0 mL to 25 mL/h 25 mL to 1000 mL/h	0.061 % + 9.3 µL/h 0.15 % + 5.0 µL/h 0.16 % + 1.1 µL/h	HARVARD PUMP

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
MASS DETERMINATION (20/M08)			
Metric	1 mg	6.6 µg	OIML Class E2
	2 mg	6.6 µg	
	5 mg	6.6 µg	
	10 mg	8.3 µg	
	20 mg	10 µg	
	50 mg	13 µg	
	100 mg	16 µg	
	200 mg	20 µg	
	500 mg	26 µg	
	1 g	33 µg	
	2 g	40 µg	
	5 g	53 µg	
	10 g	66 µg	
	20 g	83 µg	
	50 g	0.10 mg	
	100 g	0.16 mg	
	200 g	0.33 mg	
	500 g	0.83 mg	
	1 kg	1.6 mg	
	2 kg	3.3 mg	
	5 mg to 12 kg	0.00053 % + 0.2 mg	OIML Class F1
	5 kg	26 mg	
	10 kg	53 mg	
	20 kg	0.10 g	
ACOUSTIC (20/M10)			
Sound Level Meters	94 dB, 1 kHz 114 dB, 1 kHz	1.1 dB 0.86 dB	Center 326 Sound Level Calibrator
VOLUME and DENSITY (20/M12)			
Volume	1.0 µL to 10 µL 10 µL to 100 µL 0.1 mL to 1.0 mL	6.8 nL 7.3 nL 26 nL	Gravimetric Method

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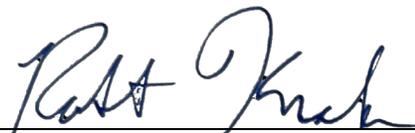
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
Volume – Gas Flow Analyzers	1.0 mL to 10 mL	27 µL	Syringe
	10 mL to 100 mL	67 µL	
	100 mL to 1.0 L	6.3 µL/L + 28 µL	
	1.0 L to 6.0 L	1.6 µL/L + 27 µL	
	20 µL to 100 mL	0.059 % + 20 µL	
	100 mL to 1000 mL	0.082 % + 15 µL	
	1000 mL to 3000 mL	0.096 % - 0.12 mL	
WEIGHING INSTRUMENTS (20/M16)			
Balance / Scale Calibration Field calibrations Available <small>Note 4</small>	0.0 g to 6.1 g	0.00060 %	OIML Class E2 Mass
	0.0 to 21 g	0.00020 %	
	0.0 to 300 g	0.000074 %	
	0.0 g to 1000 g	0.00021 %	OIML Class F1 Mass
	0.0 g to 10 kg	0.0018 %	OIML Class M1 Mass
	0.0 g to 30 kg	0.0012 %	
	0.0 g to 100 kg	0.0084 %	
	0.0 g to 250 kg	0.0068 %	
	0.0 g to 500 kg	0.0084 %	
THERMODYNAMIC			
HUMIDITY (20/T02)			
Relative Humidity	10 % RH to < 80 % RH	0.81 % RH	Environmental Chamber
	> 80 % RH to 90 % RH	0.86 % RH	
THERMOMETERS, DIGITAL and ANALOG (20/T03)			
Temperature – Source ^{Note 4}	-80 °C to < -40.0 °C	0.0052 °C	Fluke 5628 w/ 1586A and precision baths and Dry Block
	-40 °C to < -20.0 °C	0.0043 °C	
	-20 °C to < 0.0 °C	0.0040 °C	
	0.0 °C	0.0040 °C	
	> 0.0 °C to 50 °C	0.0054 °C	
	> 50 °C to 100 °C	0.0072 °C	
	> 100 °C to 150 °C	0.0088 °C	
	> 150 °C to 200 °C	0.0092 °C	
	> 200 °C to 250 °C	0.0091 °C	

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
Temperature –Measure ^{Note 4}	> 250 °C to 300 °C	0.0099 °C	Fluke 5698 w/ 1595A and precision baths and Dry Block
	> 300 °C to 400 °C	0.014 °C	
	> 400 °C to 600 °C	0.013 °C	
	> 600 °C to 660.323 °C	0.017 °C	
	-80 °C to < -60.0 °C	0.0043 °C	
	-60 °C to < -40.0 °C	0.0033 °C	
	-40 °C to < -20.0 °C	0.0032 °C	
	-20 °C to ≤ 0.0 °C	0.0030 °C	
	0.0 °C	0.0029 °C	
	> 0.0 °C to 50 °C	0.0032 °C	
	> 50 °C to 100 °C	0.0053 °C	
	> 100 °C to 150 °C	0.0064 °C	
	> 150 °C to 200 °C	0.0064 °C	
	> 200 °C to 250 °C	0.0066 °C	
	> 250 °C to 300 °C	0.0072 °C	
	> 300 °C to 400 °C	0.0097 °C	
	> 400 °C to 500 °C	0.0099 °C	
> 500 °C to 600 °C	0.0099 °C		
> 600 °C to 660.323 °C	0.013 °C		
Temperature	-196 °C to < 0 °C	0.0079 °C	Fluke 5628 w/ 1586A
	0.0 °C to 50 °C	0.0079 °C	
	> 150 °C to 300 °C	0.0093 °C	
	> 300 °C to 600 °C	0.012 °C	
	> 600 °C to 660 °C	0.015 °C	
Temperature	2 °C to < 10 °C	0.064 °C	Environmental Chamber
	10 °C to 40 °C	0.055 °C	
	> 40 °C to 50 °C	0.072 °C	
IR Temperature	-20 °C to 0 °C	0.99 °C	Fluke 1586A and black plate
	> 0 °C to 100 °C	0.45 % + 0.65 °C	
	> 100 °C to 500 °C	0.96 %	

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
RESISTANCE THERMOMETRY (20/T07)			
Calibration by Fixed Point	0.01 °C	0.0011 °C (1.1 mK)	Fluke 5901D-Q
Calibration by Comparison	-80 °C to < -38.83 °C -38.83 °C to < 0.01 °C > 0.01 °C to 29.76 °C > 29.76 °C to 156.60 °C > 156.60 °C to 231.93 °C > 231.93 °C to 419.53 °C > 419.53 °C to < 660.32 °C	0.0040 °C 0.0030 °C 0.0032 °C 0.0049 °C 0.0045 °C 0.0097 °C 0.010 °C	Fluke 5698 w/ 1595A and precision baths and Dry Block
PRESSURE (20/T05)			
Vacuum – Measure Field Calibrations Available <small>Note 4</small>	-15 psi to < 0 psi -2 psi to < -1 psi -1 psi to < 0 psi -10 psi to < 0 psi	-0.0043 % - 0.000022 psi -0.0012 % + 0.0000056 psi -0.00051 % + 0.000012 psi -0.0016 % + 0.00039 psi	Mensor Vacuum Sensor Fluke 2700G
Gage Pressure – Measure Field Calibrations Available <small>Note 4</small>	0 psi to 1 psi > 1 psi to 2 psi > 2 psi to 10 psi > 10 psi to 15 psi > 15 psi to 50 psi > 50 psi to 75 psi > 75 psi to 100 psi > 100 psi to 150 psi 0 psi to 15 psi 0 psi to 30 psi 0 psi to 300 psi 0 psi to 500 psi 0 psi to 5000 psi 0 psi to 10000 psi 0 psi to 10 psi 0 psi to 100 psi	0.00067 % + 0.000012 psi 0.0012 % + 0.0000071 psi 0.0012 % + 0.000041 psi 0.0013 % + 0.000036 psi 0.0016 % - 0.000014 psi 0.00088 % + 0.00035 psi 0.0019 % - 0.00024 psi 0.0013 % + 0.00036 psi 0.0038 % + 0.00039 psi 0.00027 % + 0.00092 psi 0.011 % - 0.0021 psi 0.0017 % + 0.027 psi 0.0021 % + 0.057 psi 0.0053 % + 0.33 psi 0.0010 psi 0.010 psi	Mensor Pressure Controller Fluke 2700G Heise HQS-2

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
	-3 inH2O to 3 inH2O 0 inH2O to 300 inH2O -30 cmH2O to 30 cmH2O -150 mmHg to 150 cmH2O	0.00042 inH2O 0.010 inH2O 0.0013 cmH2O 0.0059 cmH2O	Heise HQS-1
	-14.5 psi to 0 psi 0 psi to 14.5 psi 0 psi to 2000 psi 0 psi to 500 psi 0 psi to 10000 psi	0.0040 % 0.0031 % 0.00344 % 0.00374 % 0.0034 %	Fluke DWT P3000 Series
Absolute Pressure	0.10 psia to 8 psia 8 psia to 9 psia 9 psia to 12 psia 12 psia to 20 psia 20 psia to 25 psia 25 psia to 60 psia 60 psia to 85 psia 85 psia to 110 psia 110 psia to 160 psia	0.00027 psia 0.00026 psia 0.00026 psia 0.00031 psia 0.00034 psia 0.00083 psia 0.0010 psia 0.0016 psia 0.0023 psia	Mensor Pressure Controller
Barometric Pressure	7 psia to 12 psia 12 psia to 17 psia	0.00027 psia 0.00028 psia	Mensor Barometer
END			

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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: Simulation of YSI thermistor probe's output at specified temperature points. This is a resistive measurement, temperature values provided at physiological values for the customer's convenience.

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Note 8: Simulation of Baxter Edwards, 93a-131-7f type catheter, Abbott and Utah catheters at selected liters per minute (L/min) values at two injectate temperature levels. This is a resistive measurement, L/min values provided at physiological values for the customer's convenience.

Note 9: Simulation of a transducer output using the expected conversion factor of 20 mmHg per mV at an exciter voltage of 10 VDC. Although this is an electrical measurement in mV, the mmHg values are shown for the convenience of the customer at physiological values. The uncertainty is given in a range that relates nearly linear to the range shown in the range column.

Note 10: This is a simple conversion to physiological values for the convenience of the customer. Many of the devices calibrated by the lab indicate heart rate per minute (Lat/min) and respirations per minute (Resp/min). It should be noted that Lat/min stands for "latido por minuto" which is the Spanish translation of beat per minute.

Note 11: Measurement associated with measurement of electrosurgical analyzers only.

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