



CALIBRATION LABORATORIES

NVLAP LAB CODE 201065-0

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty <small>Note 3,5</small>	Remarks
ELECTROMAGNETICS – DC/LOW FREQUENCY				
AC RESISTANCE and CURRENT (20/E02)				
AC Current Source	5 mA to 10.0 mA > 10.0 mA to 27.5 mA	60 Hz 60 Hz	0.019 mA 0.091 mA	Keithley 6221 & Fluke 8846A
	29 µA to < 330 µA	10 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 10 kHz to 30 kHz	0.15 % + 0.09 µA 0.097 % + 0.078 µA 0.23 % + 0.12 µA 0.62 % + 0.16 µA 1.2 % + 0.39 µA	Fluke 5522A
	0.33 mA to < 3.3 mA	10 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 10 kHz to 30 kHz	0.15 % + 0.24 µA 0.077 % + 0.12 µA 0.16 % + 0.06 µA 0.39 % + 0.14 µA 0.78 % + 0.42 µA	
	3.3 mA to < 33 mA	10 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 10 kHz to 30 kHz	0.14 % + 1.4 µA 0.031 % + 1.6 µA 0.062 % + 1.6 µA 0.16 % + 1.3 µA 0.31 % + 3.1 µA	
	33 mA to < 330 mA	10 Hz to 45 Hz 45 Hz to 1 kHz	0.14 % + 0.014 mA 0.031 % + 0.016 mA	

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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	0.33 A to < 1.1 A	1 kHz to 5 kHz	0.078 % + 0.037 mA	
		5 kHz to 10 kHz	0.15 % + 0.090 mA	
		10 kHz to 30 kHz	0.31 % + 0.16 mA	
	1.1 A to < 3 A	10 Hz to 45 Hz	0.14 % + 0.070 mA	
		45 Hz to 1 kHz	0.039 % + 0.074 mA	
		1 kHz to 5 kHz	0.46 % + 0.79 mA	
		5 kHz to 10 kHz	1.9 % + 4.0 mA	
	3 A to < 11 A	10 Hz to 45 Hz	0.14 % + 0.050 mA	
		45 Hz to 1 kHz	0.047 % + 0.080 mA	
		1 kHz to 5 kHz	0.47 % + 0.73 mA	
	11 A to 20.5 A	5 kHz to 10 kHz	1.9 % + 4.5 mA	
		45 Hz to 100 Hz	0.047 % + 0.0015 A	
100 Hz to 1 kHz		0.077 % + 0.0016 A		
10 A to < 16.5 A	45 Hz to 100 Hz	1 kHz to 5 kHz	2.3 % + 0.0023 A	
		45 Hz to 65 Hz	0.64 % + 0.035 A	
	65 Hz to 440 Hz	1.1 % + 0.040 A		
	16.5 A to < 150 A	45 Hz to 65 Hz	0.64 % + 0.33 A	
		65 Hz to 440 Hz	1.1 % + 0.33 A	
	150 A to < 1025 A	45 Hz to 65 Hz	0.64 % + 1.1 A	
Current Clamp Toroidal	10 A to < 16.5 A	65 Hz to 440 Hz	1.1 % + 1.4 A	
		45 Hz to 65 Hz	0.32 % + 0.0035 A	
	65 Hz to 440 Hz	0.9 % + 0.0035 A		
	16.5 A to < 150 A	45 Hz to 65 Hz	0.32 % + 0.031 A	
		65 Hz to 100 Hz	0.90 % + 0.031 A	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
AC Current Measure	150 A to <1025 A	45 Hz to 65 Hz 100 Hz to 440 Hz	0.32% + 0.11 A 0.90% + 0.31 A	Fluke 8846A and Agilent 34330A
	> 100 mA to 1 A	10 Hz to 1 kHz	0.13 % + 46 mA	
	> 1 A to 10 A	10 Hz to 1 kHz	0.19 % + 44 mA	
	> 10 A to 30 A	10 Hz to 1 kHz	0.30 % + 32 mA	Fluke 8846A
	0.1 µA to 100 µA	3 Hz to 10 Hz	0.12 % + 0.075 µA	
		10 Hz to 5 kHz	0.17 % + 0.070 µA	
		5 kHz to 10 kHz	0.40 % + 0.81 µA	
	> 0.1 mA to 1 mA	3 Hz to 10 Hz	1.2 % + 0.35 µA	
		10 Hz to 5 kHz	0.11 % + 0.47 µA	
		5 kHz to 10 kHz	0.23 % + 0.0029 mA	
	> 1 mA to 10 mA	3 Hz to 10 Hz	1.2 % + 0.011 mA	
		10 Hz to 5 kHz	0.17 % + 0.0070 mA	
		5 kHz to 10 kHz	0.40 % + 0.081 mA	
	>10 mA to 100 mA	3 Hz to 10 Hz	1.1 % + 0.080 mA	
		10 Hz to 5 kHz	0.11 % + 0.047 mA	
5 kHz to 10 kHz		0.23 % + 0.29 mA		
>100 mA to 400 mA	3 Hz to 10 Hz	1.1 % + 0.65 mA		
	10 Hz to 5 kHz	0.11 % + 0.48 mA		
	5 kHz to 10 kHz	0.23 % + 3.3 mA		
> 0.4 A to 1 A	3 Hz to 10 Hz	1.1 % + 0.80 mA		
	10 Hz to 5 kHz	0.11 % + 0.47 mA		
	5 kHz to 10 kHz	0.40 % + 0.0081 A		
> 1 A to 3 A	3 Hz to 10 Hz	1.2 % + 0.0035 A		
	10 Hz to 5 kHz	0.17 % + 0.0022 A		
	5 kHz to 10 kHz	0.40 % + 0.024 A		
> 3 A to 10 A	3 Hz to 10 Hz	1.2 % + 0.011 A		
	10 Hz to 5 kHz	0.17 % + 0.0070 A		
	5 kHz to 10 kHz	0.40 % + 0.081 A		

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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 ^{Note 11}	0.0 mA to 7.0 A	510 kHz Nominal	0.58 % + 3.0 nA	Pearson Current Transformer

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	10 MΩ to 1 GΩ (10 MΩ Increments)	0.36 %	Decade Resistor
Variable Resistance – Source	0.1 Ω to 1 MΩ (0.1 Ω Increments)	0.012 % + 0.0023 Ω	Fluke 5522A
	0 Ω to < 11 Ω	0.0031 % + 0.78 mΩ	
	11 Ω to < 33 Ω	0.0023 % + 0.0011 Ω	
	33 to < 110 Ω	0.0022 % + 0.0011 Ω	
	110 to < 330 Ω	0.0022 % + 0.0015 Ω	
	330 Ω to < 1.1 kΩ	0.0021 % + 0.0018 Ω	
	1.1 kΩ to < 3.3 kΩ	0.0022 % + 0.014 Ω	
	3.3 kΩ to < 11 kΩ	0.0022 % + 0.012 Ω	
	11 kΩ to < 33 kΩ	0.0022 % + 0.14 Ω	
	33 kΩ to < 110 kΩ	0.0022 % + 0.13 Ω	
	110 kΩ to < 330 kΩ	0.0025 % + 0.0015 kΩ	
	330 kΩ to < 1.1 MΩ	0.0025 % + 0.0015 kΩ	
	1.1 MΩ to < 3.3 MΩ	0.0046 % + 0.024 kΩ	
	3.3 MΩ to < 11 MΩ	0.01 % + 0.040 kΩ	
	11 MΩ to < 33 MΩ	0.019 % + 0.0020 MΩ	
33 MΩ to < 110 MΩ	0.039 % + 0.0020 MΩ		
Resistance Measure	110 MΩ to < 330 MΩ	0.23 % + 0.080 MΩ	Keithley 2700
	330 MΩ to < 1.1 GΩ	1.2 % + 0.19 MΩ	
	0 Ω to 100 Ω	0.012 % + 0.0022 Ω	
	> 100 Ω to 1 kΩ	0.012 % + 0.0055 Ω	
	> 1 kΩ to 10 kΩ	0.012 % + 0.055 Ω	

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
Resistive Simulation of Temperature Probes ^{Note 7}	> 10 kΩ to 100 kΩ	0.012 % + 0.0011 kΩ	Fluke 8846A Resistive Decade Box/ Fluke 8846A
	> 100 kΩ to 1 MΩ	0.012 % + 0.011 kΩ	
	> 1 MΩ to 10 MΩ	0.046 % + 0.13 kΩ	
	> 10 MΩ to 100 MΩ	0.93 % + 0.0090 MΩ	
	> 100 MΩ to 1 GΩ	2.3 % + 0.15 MΩ	
YSI 400	20 °C to < 32 °C (2.814 kΩ to < 1.667 kΩ)	0.020 % - 0.0015 °C (0.0095 % + 0.095 Ω)	Fluke 8846A
	32 °C to 44 °C (1.667 kΩ to 1.023 kΩ)	0.029% - 0.0046 °C (0.0095 % + 0.095 Ω)	
YSI 700T1	20 °C to 44 °C (7.496 kΩ to 2.726 kΩ)	0.015 % - 0.00095 °C (0.0095 % + 0.096 Ω)	
YSI 700T2	20 °C to < 33 °C (37.30 kΩ to < 21.43 kΩ)	0.017 % - 0.0011 °C (0.0095 % + 0.95 Ω)	
	33 °C to 44 °C (21.43 kΩ to 13.80 kΩ)	0.024 % - 0.0034 °C (0.0095 % + 0.95 Ω)	
Resistive Simulation of Cardiac Output at: ^{Note 8} 0 °C and 2 °C Injectate	2.5 L/min (14.50 kΩ)	0.0041 L/min (2.3 Ω)	
	3.0 L/min (14.47 kΩ)	0.013 L/min (2.3 Ω)	
	5.0 L/min (14.350 kΩ)	0.080 L/min (2.3 Ω)	
	7.0 L/min (14.395 kΩ)	0.055 L/min (2.3 Ω)	
	10.0 L/min (14.2448 kΩ)	0.14 L/min (2.3 Ω)	
	24 °C and 20 °C Injectate	2.5 L/min (14.30 kΩ)	0.043 L/min (2.3 Ω)
		3.0 L/min (14.50 kΩ)	0.089 L/min (2.3 Ω)
		5.0 L/min (14.2235 kΩ)	0.11 L/min (2.3 Ω)
		7.0 L/min (14.50 kΩ)	0.14 L/min (2.3 Ω)
		10.0 L/min (14.1414 kΩ)	0.17 L/min (2.3 Ω)
DC Current Source	0.0 μA to < 330 μA	0.012 % + 0.014 μA	Fluke 5522A
	0.33 mA to < 3.3 mA	0.0077 % + 0.039 μA	
	3.3 mA to < 33 mA	0.0077 % + 0.19 μA	

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
Current Clamp Non-Toroidal	33 mA to < 330 mA 0.33 A to < 1.1 A 1.1 A to < 3 A 3.0 A to < 11 A 11 A to 20.5 A	0.0077 % + 0.0019 mA 0.015 % + 0.032 mA 0.030 % + 0.016 mA 0.039 % + 0.39 mA 0.077 % + 0.58 mA	Fluke 5522A Coil
	10 A to < 16.5 A 16.5 A to < 150 A 55 A to < 1025 A	0.57 % + 0.025 A 0.56 % + 0.19 mA 0.56 % + 0.65 A	
DC Current Measure	0 µA to 100 µA	0.058 % + 0.029 µA	Fluke 8846A
	> 0.1 mA to 1.0 mA	0.058 % + 0.058 µA	
	> 1.0 mA to 10.0 mA	0.058 % + 0.0023 mA	
	> 10 mA to 100 mA	0.058 % + 0.0058 mA	
	> 100 mA to 400 mA	0.058 % + 0.023 mA	
	> 0.4 A to 1.0 A	0.058 % + 0.23 mA	
	> 1.0 A to 3.0 A > 3.0 A to 10 A	0.12 % + 0.64 mA 0.17 % + 0.0011 A	
DC VOLTAGE (20/E06)			
DC Voltage Measure	0 mV to 100 mV	0.0034 % + 0.0041 mV	Keithley 2700 Fluke 8846A
	> 0.1 V to 1.0 V	0.0029 % + 0.0080 mV	
	> 1.0 V to 10.0 V	0.0028 % + 0.058 mV	
	> 10 V to 100 V	0.0044 % + 0.65 mV	
	> 100 V to 1000 V	0.0047 % + 0.012 V	
Electrical Simulation of Blood Pressure ^{Note 9}	-10 mmHg to 400 mmHg (-0.5 mV to 20 mV)	0.066 mmHg to 0.080 mmHg (0.0033 mV to 0.0040 mV)	Conversion Factor is 20 mmHg/mV at 10 VDC Exciter Voltage
DC Voltage Source	0 mV to < 330 mV	0.0016 % + 0.66 µV	Fluke 5522A
	0.33 V to < 3.3 V	0.00085 % + 0.0016 mV	
	3.3 V to < 33 V	0.00092 % + 0.016 mV	
	33 to < 330 V	0.0014 % + 0.11 mV	
	330 to 1020 V	0.0014 % + 1.2 mV	

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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	0.061 % + 0.0047 mV	Fluke 5522A
		45 Hz to 10 kHz	0.011 % + 0.0049 mV	
		10 kHz to 20 kHz	0.015 % + 0.0048 mV	
		20 kHz to 50 kHz	0.077 % + 0.0048 mV	
		50 kHz to 100 kHz	0.27 % + 0.0094 mV	
		100 kHz to 500 kHz	0.62 % + 0.039 mV	
	33 mV to < 330 mV	10 Hz to 45 Hz	0.023 % + 0.0066 mV	
		45 Hz to 10 kHz	0.011 % + 0.0064 mV	
		10 kHz to 20 kHz	0.012 % + 0.0065 mV	
		20 kHz to 50 kHz	0.027 % + 0.0064 mV	
		50 kHz to 100 kHz	0.062 % + 0.025 mV	
		100 kHz to 500 kHz	0.16 % + 0.046 mV	
	0.33 V to < 3.3 V	10 Hz to 45 Hz	0.023 % + 0.046 mV	
		45 Hz to 10 kHz	0.012 % + 0.038 mV	
		10 kHz to 20 kHz	0.015 % + 0.045 mV	
		20 kHz to 50 kHz	0.023 % + 0.040 mV	
		50 kHz to 100 kHz	0.054 % + 0.097 mV	
		100 kHz to 500 kHz	0.18 % + 0.61 mV	
	3.3 V to < 33 V	10 Hz to 45 Hz	0.023 % + 0.56 mV	
		45 Hz to 10 kHz	0.012 % + 0.45 mV	
10 kHz to 20 kHz		0.019 % + 0.40 mV		
20 kHz to 50 kHz		0.027 % + 0.46 mV		
50 kHz to 100 kHz		0.030 % + 0.0013 V		
33 to < 330 V	45 Hz to 1 kHz	0.015 % + 0.90 mV		
	1 kHz to 10 kHz	0.015 % + 0.0060 V		
	10 kHz to 20 kHz	0.020 % + 0.0034 V		
	20 kHz to 50 kHz	0.023 % + 0.0047 V		
	50 kHz to 100 kHz	0.16 % + 0.026 V		
330 to 1020 V	45 Hz to 1 kHz	0.033 % + 0.0086 V		
	1 kHz to 5 kHz	0.019 % + 0.011 V		

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Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty ^{Note 3,5}	Remarks
AC Voltage - Measure		5 kHz to 10 kHz	0.023 % + 0.011 V	
	5.0 mV	60 Hz	0.038 mV	Keithley 2700
	0.0 mV to < 0.1 V	3 Hz to 5 Hz	1.1 % + 0.080 mV	Fluke 8846A
		5 Hz to 10 Hz	0.40 % + 0.047 mV	
		10 Hz to 20 kHz	0.069 % + 0.048 mV	
		20 kHz to 50 kHz	0.14 % + 0.058 mV	
		50 kHz to 100 kHz	0.69 % + 0.095 mV	
	0.1 V to < 1.0 V	100 kHz to 300 kHz	4.6 % + 0.55 mV	
		3 Hz to 5 Hz	1.2 % + 0.25 mV	
		5 Hz to 10 Hz	0.040 % + 0.35 mV	
		10 Hz to 20 kHz	0.069 % + 0.35 mV	
		20 kHz to 50 kHz	0.14 % + 0.58 mV	
	1.0 V to < 10 V	50 kHz to 100 kHz	0.69 % + 0.95 mV	
		100 kHz to 300 kHz	4.6 % + 0.0055 V	
		3 Hz to 5 Hz	1.2 % + 0.0025 V	
	10 V to < 100 V	5 Hz to 10 Hz	0.40 % + 0.0035 V	
10 Hz to 20 kHz		0.069 % + 0.0035 V		
20 kHz to 50 kHz		0.14 % + 0.0058 V		
100 V to < 1000 V	50 kHz to 100 kHz	0.69 % + 0.0095 V		
	100 kHz to 300 kHz	4.6 % + 0.055 V		
	3 Hz to 5 Hz	1.2 % + 0.025 V		
	5 Hz to 10 Hz	0.40 % + 0.035 V		
	10 Hz to 20 kHz	0.069 % + 0.035 V		
	20 kHz to 50 kHz	0.14 % + 0.058 V		
	50 kHz to 100 kHz	0.69 % + 0.095 V		
	100 kHz to 300 kHz	4.6 % + 0.54 V		
	3 Hz to 5 Hz	1.1 % + 0.75 V		
	5 Hz to 10 Hz	0.40 % + 0.26 V		
	10 Hz to 20 kHz	0.069 % + 0.26 V		

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		20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz	0.14 % + 0.43 V 0.69 % + 0.70 V 4.6 % + 6.0 V	
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 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	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 10 Hz to 150 Hz 10 Hz to 120 Hz 10 Hz to 80 Hz DC to 50 Hz DC to 20 Hz DC to 2 Hz DC to 6 Hz DC to 0.6 Hz DC to 0.2 Hz	0.39 % + 7.8 pF 0.39 % + 0.0079 nF 0.39 % + 0.0078 nF 0.19 % + 0.0078 nF 0.19 % + 0.078 nF 0.19 % + 0.080 nF 0.19 % + 0.24 nF 0.19 % + 0.80 nF 0.19 % + 0.0024 μF 0.19 % + 0.008 μF 0.31 % + 0.023 μF 0.35 % + 0.078 μF 0.35 % + 0.23 μF 0.35 % + 0.00078 mF 0.35 % + 0.0023 mF 0.35 % + 0.0078 mF 0.58 % + 0.024 mF 0.85 % + 0.078 mF	Fluke 5522A
LF POWER/ENERGY (20/E12)				
AC Power Measurement ^{Note 11}	1 W to 500 W	510 kHz	1.1 % + 0.57 mW/W	Power dissipation in load resistance
AC Power Source				Fluke 5522A
1 mA	1.0 μW to 1.02 W	45 Hz to 10 kHz	0.027 %	
10 mA	10 μW to 10.2 W	45 Hz to 10 kHz	0.026 %	
100 mA	100 μW to 102 W	45 Hz to 10 kHz	0.026 %	
330 mA to 500 mA	330 μW to 510 W	45 Hz to 10 kHz	0.035 %	
0.5 A to 1.1 A	500 μW to 1122 W	45 Hz to 10 kHz	0.031 %	
1.1 A to 3.0 A	1.1 mW to 3060 W	45 Hz to 10 kHz	0.040 %	
3.0 A to 5.0 A	3.0 mW to 5100 W	45 Hz to 10 kHz	0.057 %	

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5.0 A to 11 A 11 A to 20.5 A	5.0 mW to 1122 W 11 µW to 20910 W	45 Hz to 10 kHz 45 Hz to 10 kHz	0.052 % 0.086 %	Fluke 5522A
1 mA	1.0 µW to 1.02 W	10 kHz to 50 kHz	0.038 % + 1.5 nW	
10 mA	10 µW to 10.2 W	10 kHz to 50 kHz	0.037 % + 10 nW	
100 mA	100 µW to 102 W	10 kHz to 50 kHz	0.037 % + 0.10 µW	
330 mA to 500 mA	330 µW to 510 W	10 kHz to 50 kHz	0.042 % + 0.80 µW	
0.5 A to 1.1 A	500 µW to 1122 W	10 kHz to 50 kHz	0.041 % + 1.0 µW	
1.1 A to 3.0 A	1.1 mW to 3060 W	10 kHz to 50 kHz	0.046 % + 3.0 µW	
3.0 A to 5.0 A	3.0 mW to 5100 W	10 kHz to 50 kHz	0.063 % + 3.4 µW	
5.0 A to 11 A	5.0 mW to 1122 W	10 kHz to 50 kHz	0.056 % + 11 µW	
11 A to 20.5 A	11 µW to 20910 W	10 kHz to 50 kHz	0.089 % + 6.0 µW	

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 75 J > 75 J to 360 J	0.034 % + 0.33 J 0.49 % - 0.11 J	Fluke 7000DP Gold
Watt-Hour Meters (50 Hz or 60 Hz)	1 Wh to 60 kWh	0.36 %	Fluke 5522A/ Agilent 53131A
DC Power Source			Fluke 5522A
1 mA	1.0 µW to 1.02 W	0.029 %	
10 mA	10 µW to 10.2 W	0.0098 % + 1.5 nW	
100 mA	100 µW to 102 W	0.0098 % + 15 nW	
330 mA to 500 mA	330 µW to 510 W	0.025 %	
0.5 A to 1.1 A	500 µW to 1122 W	0.022 %	
1.1 A to 3.0 A	1.1 mW to 3060 W	0.032 %	
3.0 A to 5.0 A	3.0 mW to 5100 W	0.052 %	
5.0 A to 11 A	5.0 mW to 1122 W	0.047 %	
11 A to 20.5 A	11 µW to 20910 W	0.083 %	

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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	0.14° 0.23° 0.41° 2.0° 4.0° 7.8°	Fluke 5522A

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	60 Hz 200 Hz 30 Hz to 225 MHz	0.035 Hz 0.12 Hz 0.00061 %	190M-4 53131A
Simulation of Heart Rate (beat per minute) ^{Note 10}	0.1 Hz to 6.0 Hz (6 BPM to 360 BPM)	0.029 mHz (0.0017 BPM)	60 BPM/Hz
Simulation of Respiration Rate ^{Note 10} (respirations per minute)	0.1 Hz to 1.67 Hz (6 to 100 Resp/Min)	0.0080 mHz (0.00048 Resp/min)	60 Res/min per Hz
Frequency – Source	0.01 Hz to 2 MHz 50 kHz to 600 MHz	0.00019 % + 0.0087 mHz 0.00019 % + 0.038 mHz/Hz	Fluke 5522A Fluke 5522A / SC600
Revolution – Source	0.6 RPM to 100000 RPM	0.00019 % + 0.00025 RPM	Fluke 5522A
Time Markers	2 ns to 20 ms 50 ms to 5 s	0.00019 % 0.078 %	Fluke 5522A / SC600

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
STOPWATCHES & TIMERS (20/F05)			
Stopwatches & Timers	1 s to 24 hour	0.037 s	NIST SP 960-12 Counter/Generator Method
MECHANICAL			
FLOW RATE (20/M05)			
Gas Flow – Source	0 SLM to < 0.5 SLM 0.5 SLM to < 5 SLM 5 SLM to < 25 SLM 25 to 100 SLM	0.0012 SLM 0.012 SLM 0.14 SLM 0.58 SLM	DHI Molbloc
Liquid Flow – Source	0.0 mL to 5.0 mL/h 5.0 mL to 25 mL/h 25 mL to 1000 mL/h	0.0065% + 43 µL/h 0.00011% + 21 µL/h 0.00011% + 25 µL/h	HARVARD PUMP
ACOUSTIC (20/M10)			
Sound Level Meters	94 dB, 1 kHz 114 dB, 1 kHz	0.69 dB 0.74 dB	Testo Sound Calibrator
VOLUME and DENSITY (20/M12)			
Volume	10 µL to 81 mL 81 mL to 220 mL 220 mL to 300 mL 300 mL to 360 mL 360 mL to 420 mL 420 mL to 480 mL 480 mL to 540 mL 540 mL to 610 mL 610 mL to 3.0 L 3.0 L to 6.0 L	0.00011 % + 9.9 nL 0.00011 % + 26 nL 0.14 mL 0.15 mL 0.17 mL 0.18 mL 0.19 mL 0.21 mL 0.0037 % + 0.14 mL 0.0056 % + 0.082 mL	Gravimetric Method
WEIGHING INSTRUMENTS (20/M16)			
Balance / Scale Calibration Field calibrations Available ^{Note 4}	1 mg 5 mg 20 mg	0.017 mg 0.017 mg 0.025 mg	OIML Class F1 Mass Pieces

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty <small>Note 3,5</small>	Remarks
Temperature – RTD	0 °C	0.010 °C	
	> 0 °C to 125 °C	0.033 °C	
	> 125 °C to 150 °C	0.014 °C	
	> 150 °C to 225 °C	0.023 °C	
	> 225 °C to 300 °C	0.021 °C	
	> 300 °C to 425 °C	0.024 °C	
Temperature – Thermocouples J and K type	-30 °C to < 0 °C	0.022 °C	
	0 °C	0.014 °C	
	> 0 °C to 125 °C	0.037 °C	
	> 125 °C to 150 °C	0.022 °C	
	> 150 °C to 225 °C	0.031 °C	
	> 225 °C to 300 °C	0.032 °C	
Temperature – Measure	-30 °C to < 0 °C	0.47 °C	Fluke 5626 w/ 1586A
	0 °C	0.34 °C	
	> 0 °C to 150 °C	0.39 °C	
	> 150 °C to 225 °C	0.42 °C	
	> 225 °C to 300 °C	0.45 °C	
	> 300 °C to 425 °C	0.49 °C	
Temperature	- 196 °C to 0 °C	0.00096 % + 0.0084 °C	Environmental Chamber
	0 °C	0.0071 % °C	
	> 0 °C to 157 °C	0.0021 % °C + 0.0084 °C	
	> 157 °C to 232 °C	0.0023 % °C + 0.0087 °C	
	> 232 °C to 300 °C	0.0022 % °C + 0.0099 °C	
	> 300 °C to 420 °C	0.0027 % °C + 0.0085 °C	
Vacuum – Measure	-775.7 mmHg to < -103 mmHg	0.38 mmHg	Mensor Vacuum Sensor

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks	
Gage Pressure – Measure Field calibrations Available ^{Note 4}	-103 mmHg to < -52 mmHg	0.024 mmHg	Mensor Pressure Sensor	
	-52 mmHg to < 0 mmHg	0.012 mmHg		
	0 mmHg to 52 mmHg	0.012 mmHg		
	> 52 mmHg to 103 mmHg	0.024 mmHg		
	> 103 mmHg to 517 mmHg	0.059 mmHg		
	> 10 psi to 15 psi	0.0017 psi		
	> 15 psi to 50 psi	0.0074 psi		
	> 50 psi to 75 psi	0.010 psi		
	> 75 psi to 100 psi	0.013 psi		
	> 100 psi to 150 psi	0.019 psi		
Gauge Pressure/Vacuum – Source	150 psi to 5000 psi	2.9 psi	700G30	
	0 mmHg to 517.15 mmHg	0.15 mmHg	Heise HQS-2	
	> 10 psi to 30 psi	0.0086 psi		
	> 30 psi to 100 psi	0.029 psi		
	0 mmHg to 22 mmHg	0.015 mmHg	Heise HQS-1	
	> 22 mmHg to 110 mmHg	0.076 mmHg		
	Absolute Pressure	-2 psi to -1 psi	0.00046 psi	Mensor Pressure Controller
		-1 psi to 1 psi	0.00023 psi	
		1 psi to 10 psi	0.0012 psi	
		10 psi to 15 psi	0.0017 psi	
15 psi to 50 psi		0.0075 psi		
50 psi to 75 psi		0.010 psi		
75 psi to 100 psi		0.013 psi		
100 psi to 150 psi		0.019 psi		
1 psia to 8 psia		0.0076 psia	Mensor Pressure Controller	
8 psia to 12 psia		0.0013 psia		
12 psia to 25 psia	0.0021 psia			
25 psia to 60 psia	0.0076 psia			
60 psia to 85 psia	0.010 psia			
85 psia to 110 psia	0.013 psia			

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

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty ^{Note 3,5}	Remarks
Barometric Pressure	110 psia to 160 psia	0.019 psia	Mensor Barometer
	8 psia to 17 psia	0.012 %	
TEMPERATURE INDICATORS (20/T08)			
Electrical Simulation of Thermocouples Type J	-210 °C to -100 °C	0.19 °C	Fluke 5522A
	-100 °C to -30 °C	0.17 °C	
	-30 °C to 150 °C	0.16 °C	
	150 °C to 760 °C	0.18 °C	
	760 °C to 1200 °C	0.21 °C	
Type K	-200 °C to -100 °C	0.28 °C	
	-100 °C to -25 °C	0.18 °C	
	-25 °C to 120 °C	0.17 °C	
	120 °C to 1000 °C	0.23 °C	
	1000 °C to 1372 °C	0.33 °C	
Type T	-250 °C to -150 °C	0.50 °C	
	-150 °C to 0 °C	0.22 °C	
	0 °C to 120 °C	0.17 °C	
	120 °C to 400 °C	0.16 °C	
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.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.

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.

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.

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Notes

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 beat 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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