



National Voluntary Laboratory Accreditation Program



CALIBRATION LABORATORIES

NVLAP LAB CODE 200995-0

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

| | |
|---|--|
| Transcat – Nashville 201 Space Park North Drive Goodlettsville, TN 37072 Mr. Jim Beckner Phone: 615-859-4807 Fax: 615-859-4848 E-mail: jbeckner@transcat.com URL: www.transcat.com | Parameter(s) of Accreditation Dimensional Electromagnetics – DC/Low Frequency Time and Frequency Mechanical Electromagnetics – RF/Microwave Thermodynamic |
| | This laboratory is compliant to ANSI/NCSL Z540-1-1994; Part 1. (NVLAP Code: 20/A01) |

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

| Measured Parameter or Device Calibrated | Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|--|---|---|---------------------------|
| DIMENSIONAL | | | |
| NVLAP Code: 20/D05 LENGTH & DIAMETER; STEP GAGES Micrometers & Calipers – Outside, Inside, Depth Field calibrations Available ^{Note 4} | 0 in to 0.05 in 0.05 in to 0.45 in 0.45 in to 1.0 in 1.0 in to 4.0 in 4.0 in to 40 in | 8 μ in 8.0 μ in/in + 6 μ in 12 μ in/in + 5 μ in 15 μ in/in + 2 μ in 15 μ in/in + 1 μ in | Comparison to Gage Blocks |
| Anvil Flatness Field calibrations Available ^{Note 4} | 0 in to 1 in | 4.4 μ in | Optical Flats |
| Anvil Parallelism Field calibrations Available ^{Note 4} | 0 in to 1 in | 7.2 μ in | Optical Parallels |
| Height Measuring Equipment Height Gages, Digital & Dial Indicators Field calibrations Available ^{Note 4} | 0 in to 0.45 in 0.45 in to 1.0 in 1.0 in to 4.0 in 4.0 in to 24 in | 2.0 μ in/in + 31 μ in 5.0 μ in/in + 30 μ in 13 μ in/in + 22 μ in 15 μ in/in + 6 μ in | Comparison to Gage Blocks |
| Length, Single Axis – Outside | 0 in to 10 in | 3 μ in/in + 13 μ in | Horizontal Comparator |

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| Measured Parameter or Device Calibrated | Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|--|---|---|------------------------------------|
| Height Measure (Height Masters, 1-2-3 Blocks, Caliper Masters, and Parallels) | 0 in to 0.50 in 0.50 in to 2.0 in 2.0 in to 4.0 in | 53 μ in 55 μ in 10 μ in/in + 41 μ in | Indirect Comparison to Gage Blocks |
| NVLAP Code: 20/D12 SURFACE TEXTURE Flatness, Straightness and Parallelism | 0 in to 18 in | 120 μ in | Gage Amplifier and Surface Plate |
| NVLAP Code: 20/D14 THREADED PLUG & RING GAGES Plug – Outer Pitch Diameter | 0 in to 6.0 in | 120 μ in | Supermicrometer with Thread Wires |
| Major Diameter | 0.05 in to 0.10 in 0.10 in to 0.45 in 0.45 in to 1.0 in 1.0 in to 6.0 in | 15 μ in 5.0 μ in/in + 14 μ in 10 μ in/in + 12 μ in 15 μ in/in + 6 μ in | Supermicrometer |

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

| Measured Parameter or Device Calibrated | Range | Frequency Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|--|---|---|--|-------------|
| ELECTROMAGNETICS – DC/LOW FREQUENCY | | | | |
| NVLAP Code 20/E02 AC RESISTORS ACI Measuring Equipment Field calibrations Available ^{Note 4} | 0 μ A to 220 μ A 0.22 mA to 2.2 mA | 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz | 0.031 % + 16 nA 0.019 % + 10 nA 0.015 % + 8 nA 0.030 % + 12 nA 0.11 % + 65 nA 0.030 % + 40 nA 0.018 % + 35 nA 0.013 % + 35 nA | Fluke 5700A |

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| Measured Parameter or Device Calibrated | Range | Frequency Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|--|--|---|---|-----------------------------|
| | | 1 kHz to 5 kHz 5 kHz to 10 kHz | 0.021 % + 110 nA 0.11 % + 650 nA | |
| | 2.2 mA to 22 mA | 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz | 0.039 % + 400 nA 0.019 % + 350 nA 0.014 % + 350 nA 0.021 % + 550 nA 0.11 % + 5 μ A | |
| | 22 mA to 220 mA | 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz | 0.033 % + 4 μ A 0.019 % + 3.5 μ A 0.014 % + 2.5 μ A 0.021 % + 3.5 μ A 0.11 % + 10 μ A | |
| | 0.22 A to 2.2 A | 20 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz | 0.027 % + 35 μ A 0.046 % + 80 μ A 0.70 % + 160 μ A | Fluke 5700A with 5725A |
| | 2.2 A to 11 A | 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz | 0.05 % + 170 μ A 0.097 % + 380 μ A 0.36 % + 750 μ A | |
| | 11 A to 20 A | 45 Hz to 1 kHz 1 kHz to 5 kHz | 0.095 % + 2 mA 2.3 % + 5 mA | Fluke 5520A |
| Extended Frequency Ranges Field calibrations Available ^{Note 4} | 29 μ A to 330 μ A 0.33 mA to 3.3 mA 3.3 mA to 33 mA 33 mA to 330 mA | 10 kHz to 30 kHz 10 kHz to 30 kHz 10 kHz to 30 kHz 10 kHz to 30 kHz | 1.2 % + 0.30 μ A 0.78 % + 0.50 μ A 0.31 % + 3.0 μ A 0.31 % + 0.16 mA | Fluke 5520A |
| Clamp-on Ammeter Toroidal Type Field calibrations Available ^{Note 4} | 20 A to 150 A 20 A to 150 A 150 A to 1000 A 150 A to 1000 A | 45 Hz to 65 Hz 65 Hz to 440 Hz 45 Hz to 65 Hz 65 Hz to 440 Hz | 0.34 % + 26 mA 0.95 % + 47 mA 0.38 % + 0.12 A 1.2 % + 0.22 A | Fluke 5520A With 5500A/Coil |

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| Measured Parameter or Device Calibrated | Range | Frequency Range | Uncertainty (<i>k</i> =2) ^{Note 3,5} | Remarks |
|---|-----------------|-----------------|--|-------------|
| Clamp-on Ammeter Non-Toroidal Type Field calibrations Available ^{Note 4} | 20 A to 150 A | 45 Hz to 65 Hz | 0.66 % + 0.25 A | |
| | 20 A to 150 A | 65 Hz to 440 Hz | 1.2 % + 0.25 A | |
| | 150 A to 1000 A | 45 Hz to 65 Hz | 0.68 % + 0.90 A | |
| | 150 A to 1000 A | 65 Hz to 440 Hz | 1.4 % + 0.92 A | |
| AC Current – Measure Field calibrations Available ^{Note 4} | 0 μA to 100 μA | 10 Hz to 20 Hz | 0.46 % + 30 nA | |
| | | 20 Hz to 45 Hz | 0.17 % + 30 nA | |
| | | 45 Hz to 100 Hz | 0.072 % + 30 nA | |
| | | 100 Hz to 1 kHz | 0.072 % + 30 nA | |
| | 100 μA to 1 mA | 10 Hz to 20 Hz | 0.46 % + 200 nA | |
| | | 20 Hz to 45 Hz | 0.17 % + 200 nA | |
| | | 45 Hz to 100 Hz | 0.071 % + 200 nA | |
| | | 100 Hz to 5 kHz | 0.038 % + 200 nA | |
| | 1 mA to 10 mA | 10 Hz to 20 Hz | 0.46 % + 2 μA | |
| | | 20 Hz to 45 Hz | 0.17 % + 2 μA | |
| | | 45 Hz to 100 Hz | 0.071 % + 2 μA | |
| | | 100 Hz to 5 kHz | 0.038 % + 2 μA | |
| | 10 mA to 100 mA | 10 Hz to 20 Hz | 0.46 % + 20 μA | |
| | | 20 Hz to 45 Hz | 0.17 % + 20 μA | |
| | | 45 Hz to 100 Hz | 0.07 % + 20 μA | |
| | | 100 Hz to 5 kHz | 0.037 % + 20 μA | |
| | 100 mA to 1 A | 10 Hz to 20 Hz | 0.46 % + 200 μA | |
| | | 20 Hz to 45 Hz | 0.19 % + 200 μA | |
| | | 45 Hz to 100 Hz | 0.097 % + 200 μA | |
| | | 100 Hz to 5 kHz | 0.12 % + 200 μA | |
| | 1 A to 3 A | 10 Hz to 5 kHz | 0.24 % + 0.10 mA | |
| | | 5 kHz to 10 kHz | 1.3 % + 0.10 mA | |
| | 3 A to 10 A | 10 Hz to 5 kHz | 0.81 % + 0.4 mA | Fluke 8846A |

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|---|------------------|---|---------------------------|
| Measured Parameter or Device Calibrated | Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
| NVLAP Code: 20/E05 | 0 Ω to 10 Ω | 18 μΩ/Ω + 50 μΩ | |
| DC RESISTANCE | 10 Ω to 100 Ω | 15 μΩ/Ω + 0.5 mΩ | |
| Measuring Equipment and Measure | 100 Ω to 1 kΩ | 12 μΩ/Ω + 0.5 mΩ | |
| Field calibrations Available Note 4 | 1 kΩ to 10 kΩ | 12 μΩ/Ω + 5 mΩ | |
| | 10 kΩ to 100 kΩ | 12 μΩ/Ω + 50 mΩ | |
| | 100 kΩ to 1 MΩ | 19 μΩ/Ω + 2 Ω | |
| | 1 MΩ to 10 MΩ | 62 μΩ/Ω + 100 Ω | |
| | 10 MΩ to 100 MΩ | 0.059 % + 1 kΩ | |
| | 100 MΩ to 1 GΩ | 0.58 % + 10 kΩ | |
| Measuring Equipment | 10 MΩ to 100 MΩ | 0.08 % | IET HRRS-B-7-100k-5kV |
| Field calibrations Available Note 4 | 100 MΩ to 1 GΩ | 0.24 % | |
| | 1 GΩ to 10 GΩ | 0.41 % | |
| | 10 GΩ to 100 GΩ | 0.84 % | |
| | 100 GΩ to 1.0 TΩ | 2.50 % | |
| DC Current – Measuring Equipment | 200 nA to 220 μA | 49 μA/A + 6.0 nA | Fluke 5700A/EP |
| Field calibrations Available Note 4 | 220 μA to 2.2 mA | 49 μA/A + 6.0 nA | |
| | 2.2 mA to 22 mA | 49 μA/A + 80 nA | |
| | 22 mA to 220 mA | 66 μA/A + 0.80 μA | |
| | 220 mA to 2.2 A | 0.015 % + 23 μA | |
| | 2.2 A to 11 A | 0.036 % + 0.37 mA | |
| | 11 A to 20.5 A | 0.082 % + 0.58 mA | |
| DC Current – Measure | 10 μA to 100 μA | 26 μA/A + 0.80 nA | Fluke 5700A/EP w/5725A |
| Field calibrations Available Note 4 | 100 μA to 1 mA | 26 μA/A + 5.0 nA | Fluke 5520A |
| | 1 mA to 10 mA | 26 μA/A + 50 nA | |
| | 10 mA to 100 mA | 48 μA/A + 0.50 μA | |
| | 100 mA to 1 A | 0.013 % + 10 μA | |
| | 1 A to 3 A | 1.4 mA/A + 50 μA | |
| | 3 A to 10 A | 4.0 mA/A + 50 μA | |
| Clamp-on Ammeter | 20 A to 150 A | 0.50 % + 0.14 A | Fluke 8846A |
| Non-Toroidal Type | 150 A to 1000 A | 0.51 % + 0.5 A | |
| Field calibrations available Note 4 | | | Fluke 5520A w/ 5500A/Coil |

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|---|---|---|--|
| Measured Parameter or Device Calibrated | Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
| NVLAP Code: 20/E06 DC VOLTAGE | | | |
| DC Voltage – Measuring Equipment | 0 to 220 mV 220 mV to 2.2 V 2.2 V to 11 V 11 V to 22 V 22 V to 220 V 220 V to 1.1 kV | 8.6 μ V/V + 0.6 μ V 6.7 μ V/V + 0.9 μ V 6.7 μ V/V + 3.1 μ V 6.6 μ V/V + 6.2 μ V 8.2 μ V/V + 78 μ V 9.8 μ V/V + 0.47 mV | Fluke 5700A |
| DC Voltage – Measure | 0 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 500 V 500 V to 800 V 800 V to 1 kV 1 kV to 2 kV 2 kV to 20 kV | 7.1 μ V/V + 0.5 μ V 5.0 μ V/V + 0.5 μ V 5.1 μ V/V + 0.5 μ V 7.6 μ V/V + 30 μ V 11 μ V/V + 100 μ V 14 μ V/V + 100 μ V 21 μ V/V + 100 μ V 0.048 % + 0.4 V 0.048 % + 4 V | Agilent 3458A opt 002 Fluke 5700A/5725A Vitrek 4600A |

| CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2} | | | | |
|---|--------------------------------------|---|---|-----------------------|
| Measured Parameter or Device Calibrated | Range | Frequency Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
| NVLAP Code: 20/E09 LF AC VOLTAGE | | | | |
| Measure Field calibrations Available ^{Note 4} | 0 mV to 10 mV 10 mV to 100 mV | 1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz | 0.039 % + 3 μ V 0.028 % + 1 μ V 0.038 % + 1 μ V 0.15 % + 1 μ V 0.59 % + 1 μ V 4.6 % + 2 μ V 0.013 % + 4 μ V 0.0094 % + 2 μ V 0.017 % + 2 μ V 0.037 % + 2 μ V | Agilent 3458A opt 002 |

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| Measured Parameter or Device Calibrated | Range | Frequency Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|---|----------------|--------------------|---|---------|
| | | 50 kHz to 100 kHz | 0.093 % + 2 μ V | |
| | | 100 kHz to 300 kHz | 0.36 % + 10 μ V | |
| | | 300 kHz to 1 MHz | 1.1 % + 10 μ V | |
| | | 1 MHz to 2 MHz | 1.7 % + 10 μ V | |
| | 100 mV to 1 V | 1 Hz to 40 Hz | 0.0098 % + 40 μ V | |
| | 100 mV to 1 V | 40 Hz to 1 kHz | 0.0094 % + 20 μ V | |
| | 100 mV to 1 V | 1 kHz to 20 kHz | 0.017 % + 20 μ V | |
| | 100 mV to 1 V | 20 kHz to 50 kHz | 0.036 % + 20 μ V | |
| | 100 mV to 1 V | 50 kHz to 100 kHz | 0.093 % + 20 μ V | |
| | 100 mV to 1 V | 100 kHz to 300 kHz | 0.35 % + 100 μ V | |
| | 100 mV to 1 V | 300 kHz to 1 MHz | 1.2 % + 100 μ V | |
| | 100 mV to 1 V | 1 MHz to 2 MHz | 1.7 % + 100 μ V | |
| | 1 V to 10 V | 1 Hz to 40 Hz | 0.0095 % + 400 μ V | |
| | 1 V to 10 V | 40 Hz to 1 kHz | 0.0095 % + 200 μ V | |
| | 1 V to 10 V | 1 kHz to 20 kHz | 0.017 % + 200 μ V | |
| | 1 V to 10 V | 20 kHz to 50 kHz | 0.036 % + 200 μ V | |
| | 1 V to 10 V | 50 kHz to 100 kHz | 0.093 % + 200 μ V | |
| | 1 V to 10 V | 100 kHz to 300 kHz | 0.35 % + 1 mV | |
| | 1 V to 10 V | 300 kHz to 1 MHz | 1.1 % + 1 mV | |
| | 1 V to 10 V | 1 MHz to 2 MHz | 1.4 % + 1 mV | |
| | 10 V to 100 V | 1 Hz to 40 Hz | 0.024 % + 4 mV | |
| | 10 V to 100 V | 40 Hz to 1 kHz | 0.024 % + 2 mV | |
| | 10 V to 100 V | 1 kHz to 20 kHz | 0.024 % + 2 mV | |
| | 10 V to 100 V | 20 kHz to 50 kHz | 0.041 % + 2 mV | |
| | 10 V to 100 V | 50 kHz to 100 kHz | 0.14 % + 2 mV | |
| | 10 V to 100 V | 100 kHz to 300 kHz | 0.46 % + 10 mV | |
| | 10 V to 100 V | 300 kHz to 1 MHz | 1.7 % + 10 mV | |
| | 100 V to 700 V | 1 Hz to 40 Hz | 0.047 % + 40 mV | |
| | 100 V to 700 V | 40 Hz to 1 kHz | 0.047 % + 20 mV | |
| | 100 V to 700 V | 1 kHz to 20 kHz | 0.071 % + 20 mV | |
| | 100 V to 700 V | 20 kHz to 50 kHz | 0.14 % + 20 mV | |
| | 100 V to 700 V | 50 kHz to 100 kHz | 0.35 % + 20 mV | |

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| Measured Parameter or Device Calibrated | Range | Frequency Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|---|-----------------|--|---|--------------|
| AC Voltage Measuring Equipment Field calibrations Available ^{Note 4} | 700 V to 2 kV | 20 Hz to 100 Hz 100 Hz to 400 Hz 20 Hz to 100 Hz | 0.098 % + 2 V 0.47 % + 4 V 0.25 % + 20 V | Vitrek 4600A |
| | 2 kV to 20 kV | | | |
| | 0 mV to 2.2 mV | 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz | 0.16 % + 4 μ V 0.10 % + 4 μ V 0.077 % + 4 μ V 0.13 % + 4 μ V 0.18 % + 6 μ V 0.33 % + 12 μ V 0.47 % + 26 μ V 0.58 % + 31 μ V | Fluke 5700A |
| | 2.2 mV to 22 mV | 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz | 0.047 % + 5 μ V 0.035 % + 5 μ V 0.016 % + 5 μ V 0.040 % + 5 μ V 0.080 % + 6 μ V 0.12 % + 12 μ V 0.16 % + 23 μ V 0.40 % + 31 μ V | |
| | 22 mV to 220 mV | 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz | 0.049 % + 12 μ V 0.020 % + 8 μ V 0.091 % + 8 μ V 0.029 % + 8 μ V 0.071 % + 23 μ V 0.087 % + 23 μ V 0.14 % + 31 μ V 0.29 % + 78 μ V | |
| | 220 mV to 2.2 V | 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz | 0.049 % + 78 μ V 0.015 % + 23 μ V 0.0068 % + 6 μ V 0.011 % + 16 μ V | |

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| Measured Parameter or Device Calibrated | Range | Frequency Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|---|---|--|---|---------------------------|
| | | 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz | 0.022 % + 62 μ V 0.039 % + 120 μ V 0.095 % + 310 μ V 0.20 % + 780 μ V | Fluke 5700A |
| | 2.2 V to 22 V | 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz | 0.049 % + 0.78 mV 0.015 % + 0.23 mV 0.0069 % + 0.05 mV 0.011 % + 0.16 mV 0.020 % + 0.2 mV 0.048 % + 1.3 mV 0.11 % + 3.9 mV 0.25 % + 7.0 mV | |
| | 22 V to 220 V | 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz | 0.048 % + 8 mV 0.015 % + 2.3 mV 0.0073 % + 0.8 mV 0.020 % + 3.1 mV 0.047 % + 8 mV 0.12 % + 85 mV 0.42 % + 85 mV 1.0 % + 170 mV | |
| | 220 V to 750 V | 30 kHz to 50 kHz 50 kHz to 100 kHz | 0.047 % + 9 mV 0.18 % + 35 mV | Fluke 5700A with 5725A |
| | 220 V to 1100 V | 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 30 kHz | 0.0094 % + 3 mV 0.013 % + 5 mV 0.047 % + 9 mV | |
| NVLAP Code 20/E10 LF CAPACITANCE Measuring Equipment Field calibrations Available^{Note 4} | 0.19 nF to 1.1 nF 1.1 nF to 3.3 nF 3.3 nF to 11 nF 11 nF to 110 nF 110 nF to 330 nF | 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 | 0.39 % + 7.8 pF 0.39 % + 7.8 pF 0.21 % + 7.8 pF 0.21 % + 78 pF 0.21 % + 0.23 nF | Fluke 5520A |

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| Measured Parameter or Device Calibrated | Range | Frequency Range | Uncertainty (<i>k</i> =2) ^{Note 3,5} | Remarks |
|--|--|--|--|-------------|
| | 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 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 6 Hz DC to 2 Hz DC to 0.6 Hz DC to 0.2 Hz | 0.21 % + 0.78 nF 0.21 % + 2.3 nF 0.20 % + 7.8 nF 0.32 % + 23 nF 0.35 % + 78 nF 0.37 % + 0.23 μF 0.37 % + 0.78 μF 0.35 % + 2.3 μF 0.35 % + 7.8 μF 0.58 % + 23 μF 0.85 % + 78 μF | Fluke 5520A |
| NVLAP Code: 20/E12 LF POWER/ENERGY Power – Measuring Equipment (for current range listed below) DC Power | | | | |
| 0.33 mA to 330 mA | 11 μW to 1.1 mW 1.1 mW to 110 mW 0.11W to 110 W 110 W to 330 W | DC DC DC DC | 0.024 % 0.027 % 0.024 % 0.018 % | Fluke 5520A |
| 0.33 A to 3 A | 11 W to 110 mW 0.11 W to 990 W 1 W to 3 kW | DC DC DC | 0.044 % 0.053 % 0.0096 % | |
| 3 A to 20.5 A | 0.099 W to 0.99 W 0.99 W to 6.8 kW 6.8 W to 20.5 kW | DC DC DC | 0.088 % 0.07 % 0.04 % | |
| AC Power ^{Note 8} (PF = 1) 3.3 mA to 9 mA | 0.11 mW to 3 mW 3 mW to 9 W | 10 Hz to 65 Hz 10 Hz to 65 Hz | 0.13 % 0.077 % | |
| 9 mA to 33 mA | 0.3 mW to 10 mW 10 mW to 33 W | 10 Hz to 65 Hz 10 Hz to 65 Hz | 0.089 % 0.077 % | |
| 33 mA to 90 mA | 1 mW to 30 mW | 10 Hz to 65 Hz | 0.071 % | |

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|---|--|---|---|-------------|
| 90 mA to 330 mA | 30 mW to 90 W 3.0 mW to 100 mW 100 mW to 300 W | 10 Hz to 65 Hz 10 Hz to 65 Hz 10 Hz to 65 Hz | 0.057 % 0.089 % 0.078 % | |
| 0.33 A to 0.9 A | 11 mW to 300 mW 300 mW to 900 W | 10 Hz to 65 Hz 10 Hz to 65 Hz | 0.071 % 0.081 % | |
| 0.9 A to 2.2 A | 30 mW to 720 mW 720 mW to 2 kW | 10 Hz to 65 Hz 10 Hz to 65 Hz | 0.089 % 0.079 % | |
| 2.2 A to 4.5 A | 80 mW to 1.4 W 1.4 W to 4.5 kW | 10 Hz to 65 Hz 10 Hz to 65 Hz | 0.088 % 0.18 % | |
| 4.5 A to 20.5 A | 150 mW to 6.7 W 6.7 W to 20 kW | 10 Hz to 65 Hz 10 Hz to 65 Hz | 0.17 % 0.17 % | |
| NVLAP Code: 20/E15 PHASE METERS Measuring Equipment Field calibrations Available ^{Note 4} | 0 ° to 179.99 ° | 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 | 0.11 ° 0.20 ° 0.40 ° 1.9 ° 3.9 ° 7.8 ° | Fluke 5520A |

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

| Measured Parameter or Device Calibrated | Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|---|--------|---|-------------------|
| TIME AND FREQUENCY | | | |
| NVLAP Code: 20/F01 FREQUENCY DISSEMINATION Source and Measure | 10 MHz | Uncertainty values of derivatives of 10 MHz will differ due to resolution, noise, and gating errors. 5.8×10^{-10} | Rubidium Standard |

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NVLAP LAB CODE 200995-0

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

| Measured Parameter or Device Calibrated | Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|--|---------------|---|--------------------|
| NVLAP Code: 20/F04 PULSE WAVEFORM Rise time (Generate) Field calibrations Available ^{Note 4} | ≤ 300 ps | 2.6 % | Fluke 5520A/SC1100 |

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

| Measured Parameter or Device Calibrated | Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|---|--|--|---|
| MECHANICAL | | | |
| NVLAP Code: 20/M08 MASS Balances & Scales (Range is 1 lb to 300 lb) Field calibrations Available ^{Note 4} | 1 lbs 2 lbs 5 lbs 10 lbs 20 lbs | 110 mg 150 mg 370 mg 740 mg 1.5 g | Actual uncertainty of any value in range is the RMS combination of the fixed values shown |
| NVLAP Code: 20/M15 TORQUE Torque - Measure Field calibrations Available ^{Note 4} | 15 ozf-in to 200 ozf-in 4 lbf-in to 250 lbf-ft 250 lbf-ft to 600 lbf-ft | 1.0 % 1.0 % 1.0 % | C.D.I. 2000-5-02 C.D.I. 2000-400-02 C.D.I. 2000-12-02 |
| ELECTROMAGNETICS – RF/MICROWAVE | | | |
| NVLAP Code: 20/R11 RF-DC VOLTAGE /CURRENT CONVERTERS Frequency Response Field calibrations available ^{Note 4} | 50 kHz to 100 MHz 100 MHz to 300 MHz 300 MHz to 600 MHz 600 MHz to 1100 MHz | 1.4 % + 78 μ V 1.8 % + 78 μ V 3.2 % + 78 μ V 4.0 % + 78 μ V | Fluke 5520A/SC1100 |

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| Measured Parameter or Device Calibrated | Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|---|--|--|--|
| THERMODYNAMIC | | | |
| NVLAP Code: 20/T03 LABORTORY THERMOMETERS Measure Field calibrations Available ^{Note 4} | -195 °C to 0 °C 0 °C to 420 °C 420 °C to 660 °C | 0.012 °C + 0.001 % 0.026 °C + 0.001 % 0.036 °C + 0.001 % | Hart 5628 w/ Black Stack Hart 5628 w/Black Stack Hart 5628 w/Black Stack |
| NVLAP Code: 20/T05 PRESSURE Measure & Measuring Equipment Gage mode | -12 psig to 0 psig 0 psig to 30 psig 30 psig to 100 psig 125 psig to 2500 psig 2500 psig to 15 000 psig | 0.0070 % 0.027 psi 0.051 psi 0.0070 % 0.024 % | Ruska 7250xi Fluke 700P05 Fluke 700P06 Ruska 7250xi Fluke E-DWT |
| Absolute Mode | 0 psia to 15 psia | 0.0019 psi | Ruska 7250xi |
| NVLAP Code: 20/T08 THERMOCOUPLES & PYROMETER INDICATORS Electrical Calibration of Thermocouple Devices Field calibrations Available ^{Note 4} | 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 Type K -200 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C | 0.29 °C 0.19 °C 0.17 °C 0.19 °C 0.25 °C 0.35 °C 0.21 °C 0.19 °C 0.28 °C 0.41 °C | Fluke 5520A |

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| Measured Parameter or Device Calibrated | Range | Uncertainty ($k=2$) ^{Note 3,5} | Remarks |
|---|--------------------|---|---------|
| Type T | -250 °C to -150 °C | 0.64 °C | |
| | -150 °C to 0 °C | 0.26 °C | |
| | 0 °C to 120 °C | 0.19 °C | |
| | 120 °C to 400 °C | 0.17 °C | |
| Type E | -250 °C to -100 °C | 0.51 °C | |
| | -100 °C to -25 °C | 0.19 °C | |
| | -25 °C to 350 °C | 0.17 °C | |
| | 350 °C to 650 °C | 0.19 °C | |
| | 650 °C to 1000 °C | 0.23 °C | |
| Type R | 0 °C to 250 °C | 0.58 °C | |
| | 250 °C to 400 °C | 0.36 °C | |
| | 400 °C to 1000 °C | 0.35 °C | |
| | 1000 °C to 1767 °C | 0.47 °C | |
| Type S | 0 °C to 250 °C | 0.48 °C | |
| | 250 °C to 1000 °C | 0.37 °C | |
| | 1000 °C to 1400 °C | 0.38 °C | |
| | 1400 °C to 1767 °C | 0.47 °C | |
| Type N | -200 °C to -100 °C | 0.41 °C | |
| | -100 °C to -25 °C | 0.24 °C | |
| | -25 °C to 120 °C | 0.22 °C | |
| | 120 °C to 410 °C | 0.21 °C | |
| | 410 °C to 1300 °C | 0.29 °C | |
| Type B | 600 °C to 800 °C | 0.45 °C | |
| | 800 °C to 1 000 °C | 0.35 °C | |
| | 1000 °C to 1550 °C | 0.32 °C | |
| | 1550 °C to 1820 °C | 0.35 °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 using a coverage factor, $k = 2$, with a level of confidence of approximately 95 %. 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: See [NIST Handbook 150](#) for further explanation of these notes.

Note 8: The uncertainties shown are for the most favorable conditions. There is an increase in uncertainty that corresponds to the laboratory's AC voltage and current uncertainties at different frequencies other than the ones shown. Power factors (PF) other than the one shown contribute to the power uncertainty. PF is related to the cosine of phase. Therefore, uncertainties track the laboratory's phase uncertainty closely at PF near one, but are magnified heavily as PF approaches zero. The lab may also report reactive power, apparent power, and power factor under this accreditation. If needed, contact laboratory for more information regarding uncertainties at frequency and power factor combinations other than the ones shown.

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