

<u>Parameter/ Equipment</u>	<u>Range</u>	<u>Best Uncertainty</u>	<u>Comments</u>
<u>Dimensional</u>			
Boregages, Hole Micrometers	(0 - 6) in.	(300 + 5L) μin.	Gage Blocks, Micrometer Standards
Calipers- Dial Digital & Vernier	(0-80) in.	(300 + 5L) μin.	Gage Blocks, Micrometer Standards
Cylindrical Plug Gauges	.010 in to 12 in.	(20 + 3D) μin.	Gage Blocks, Zeiss Measuring Machine.
Cylindrical Ring Gauges	.025 in to 12 in.	(27 + 3D) μin.	Gage Blocks, Zeiss Measuring Machine.
Depth Micrometers	(0-12) in.	(40 + 10L) μin.	Gage Blocks, Depth Masters
Gage Blocks	Up to 1 in. Over 1 in.	(5 μin.) (5 + 1.2L) μin.	Gage Block Comparator, Gage Blocks
Height Gages	(0-40) in.	(150 + 3L) μin.	Gage Blocks
Indicators - Dial, Digital	(0-.1) in. (0.1- 4.00) in.	(90 μin.) (160 μin.)	Mahr 832 Indicator Calibrator
Indicators - Test	(0-.1) in.	(90 μin.)	Mahr 832 Indicator Calibrator
Length Standards (Micrometer Standards)	Up to 1 in. 1 to 60" in.	(14 μin.) (20 + 4L) μin.	Gage Blocks, Zeiss Measuring Machine.
Micrometers (OD)	(0-1) in. (1-12) in. (12-24) in. (24-80) in.	(23 μin.) (23 μin. + 10L) μin. (23 μin. + 16L) μin. (23 μin. + 28L) μin.	Gage Blocks, Micrometer Standards

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Micrometers (ID)	(1.5-80) in.	(102 + 1.2L) μin.	Gage Blocks, Zeiss Measuring Machine.
Optical Parallels	0 - 2 in.	5 μin.	Gage Block Comparator, Gage Blocks
Profilometer	2 μin. to 300 μin.	4 μin.	Comparison to Master Roughness Standard
Surface Plate	All Sizes	(57 + 2D) μin.	Measured Using Repeat-O-Meter
Steel Scale	Up to 72 in.	.0015" in.	Measured Using Linear Calibrator
Steel Square	Up to 48 in.	7 μin/in.	Measured Using Contracer
Thread Plug Gages	up to 10 in.	(60 μin. + 3D) μin.	Thread Measuring Wires, Zeiss Measuring Machine, Contracer
Thread Ring Gages	up to 10 in.	(82 μin. + 3D) μin.	Setting Plug Gages, Zeiss Measuring Machine, Contracer
Thread Measuring Wires	.004 in to 1in.	(21 + 2D) μin.	Gage Blocks, Zeiss Measuring Machine.

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<u>Mechanical</u>			
Durometers Type A,B,C,D,DO,O,OO	0 to 100 Duros	0.25 Duros	Verification Per ASTM D2240
Indirect Verification of Hardness testers	HRB -Low -Medium -High HRC -Low -Medium -High	0.75 HRB 0.75 HRB .068 HRB 0.46 HRC 0.48 HRC 0.46 HRC	Indirect Comparison to Test Blocks Per: ASTM E18.
Mass	1 mg to 210 g. (210 to 300) g. (300 to 5000) g. (5 to 30) kg.	.29 mg 0.5 mg 31mg 2 g	Class 1 Weights, Class F Weights, Balances.
Pressure	0 - 2000 inH2O. -29 to 0 inHg. 0 to 200 psi 200 to 20000 psi	.0007 inH2O. .01 inHg. .015% .025%	Digital Pressure Standard, Deadweight Testers, Pressure Transducers
Tachometer	1 to 25000 RPM	0.07% i.v.	Comparison to Tachometer Calibrator
Torque	0 to 1000 in/lbs 0 to 1000 ft/lbs	0.3 % 0.15%	Transducer Type Calibrator
<u>Thermodynamic</u>			
Temperature - IR	50 C to 1000 C	1.1 C	CI Systems IR Calibrator
Temperature	0 C to 1000 C	.08 C	Comparison Performed using Dry Block Calibrator, PRT, Precision Thermometer

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<u>Electrical DC/Low Freq.</u>			
DC Voltage Source	0 mV to 220 mV 220 mV to 2.2 V 2.2 V to 11 V 11 V to 22 V 22 V to 220V 220 V to 1100 V	11.9 $\mu\text{V/V} + 0.4 \mu\text{V}$ 5.8 $\mu\text{V/V} + 0.7 \mu\text{V}$ 4.2 $\mu\text{V/V} + 2.5 \mu\text{V}$ 4.1 $\mu\text{V/V} + 4 \mu\text{V}$ 5.8 $\mu\text{V/V} + 40 \mu\text{V}$ 7.6 $\mu\text{V/V} + 400 \mu\text{V}$	Comparisons performed with a multifunction calibrator.
DC Current Source	0 μA to 220 μA 220 μA to 2.2 mA 2.2 mA to 22 mA 22 mA to 220 mA 220 mA to 2.2 A 2.2 A to 11 A 11 A to 20.5 A	118.0 $\mu\text{A/A} + 6 \text{ nA}$ 41.6 $\mu\text{A/A} + 7 \text{ nA}$ 40.7 $\mu\text{A/A} + 40 \text{ nA}$ 52.2 $\mu\text{A/A} + 0.7 \mu\text{A}$ 92.8 $\mu\text{A/A} + 12 \mu\text{A}$ 582 $\mu\text{A/A} + 500 \mu\text{A}$ 1211 $\mu\text{A/A} + 750 \mu\text{A}$	Comparisons performed with a multifunction calibrator.
AC Voltage Source 0 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 100kHz to 300kHz 300kHz to 500kHz 500 kHz to 1 MHz	2351 $\mu\text{V/V} + 4 \mu\text{V}$ 2337 $\mu\text{V/V} + 4 \mu\text{V}$ 2170 $\mu\text{V/V} + 4 \mu\text{V}$ 2181 $\mu\text{V/V} + 4 \mu\text{V}$ 2244 $\mu\text{V/V} + 5 \mu\text{V}$ 2484 $\mu\text{V/V} + 10 \mu\text{V}$ 2705 $\mu\text{V/V} + 20 \mu\text{V}$ 3798 $\mu\text{V/V} + 20 \mu\text{V}$	Comparisons performed with a multifunction calibrator.
2.2 mV to 22mV	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 100kHz to 300kHz 300kHz to 500kHz 500 kHz to 1 MHz	611.7 $\mu\text{V/V} + 4 \mu\text{V}$ 555.2 $\mu\text{V/V} + 4 \mu\text{V}$ 360.8 $\mu\text{V/V} + 4 \mu\text{V}$ 418.3 $\mu\text{V/V} + 4 \mu\text{V}$ 694.1 $\mu\text{V/V} + 5 \mu\text{V}$ 1293 $\mu\text{V/V} + 10 \mu\text{V}$ 1678 $\mu\text{V/V} + 20 \mu\text{V}$ 3351 $\mu\text{V/V} + 20 \mu\text{V}$	

<u>Parameter/ Equipment</u>	<u>Range</u>	<u>Best Uncertainty</u>	<u>Comments</u>
<p>AC Current Source 0 to 220 μA</p> <p>220 μA to 2.2 mA</p>	<p>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</p> <p>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</p>	<p>298.7 μA/A + 16 nA 200.2 μA/A + 10 nA 155.7 μA/A + 8 nA 331.0 μA/A + 12 nA 1286 μA/A + 65 nA</p> <p>312.6 μA/A + 40 nA 220.3 μA/A + 35 nA 152.6 μA/A + 35 nA 239.7 μA/A + 110 nA 1273 μA/A + 650 nA</p>	<p>Comparisons performed with a multifunction calibrator.</p>
<p>AC Current Source 2.2 mA to 22 mA</p> <p>22 mA to 220 mA</p>	<p>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</p> <p>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</p>	<p>319.1 μA/A + 400 nA 229.4 μA/A + 350 nA 151.4 μA/A + 350 nA 238.9 μA/A + 550 nA 1273 μA/A + 5000 nA</p> <p>298.8 μA/A + 4.0 μA 200.2 μA/A + 3.5 μA 153.1 μA/A + 2.5 μA 239.9 μA/A + 3.5 μA 1273 μA/A + 10 μA</p>	<p>Comparisons performed with a multifunction calibrator.</p>
<p>AC Current Source 220 mA to 2.2 A</p> <p>2.2 mA to 3 A</p> <p>3 A to 11 A</p>	<p>20 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz</p> <p>10 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz</p> <p>45 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to 5 kHz</p> <p>45 Hz to 100 Hz 100 Hz to 1 kHz kHz to 5 kHz</p>	<p>308.5 μA/A + 35 μA 524.5 μA/A + 80 μA 8087 μA/A + 160 μA</p> <p>2097 μA/A + 100 μA 746.1 μA/A + 100 μA 6938 μA/A + 1000 μA 28.9 mA/A + 5000 μA</p> <p>738.1 μA/A + 2000 μA 1177 μA/A + 2000 μA 34.6 mA/A + 2000 μA</p> <p>1407 μA/A + 5000 μA 1744 μA/A + 5000 μA 34.6 mA/A + 5000 μA</p>	<p>Comparisons performed with a multifunction calibrator.</p>

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Resistance Source	0 Ω 1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	113.2 μΩ 113.2 μΩ 211.5 μΩ 268.8 μΩ 510.4 μΩ 1355 μΩ 2568 μΩ 11.1 mΩ 21.0 mΩ 110.8 mΩ 209.6 mΩ 1279 mΩ 2672 mΩ 24.2 Ω 48.0 Ω 472.7 Ω 1113 Ω 22.9 kΩ	Comparisons performed with a multifunction calibrator.
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 1000V 1k V to 10 kV 10k V to 100 kV	7.8 μV/V + 0.8 μV 5.7 μV/V + 0.8 μV 5.6 μV/V + 1.0 μV 7.9 μV/V + 80 μV 7.9 μV/V + 150 μV 0.06 kV 0.6 kV	Comparisons performed with a 8.5 digit Multimeter and kv Probe
AC Voltage Measure 0 to 10 mV 10 mV to 100 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 100kHz to 300kHz 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 100kHz to 300kHz 300kHz to 500kHz 500 kHz to 1 MHz	462.5 μV/V + 13 μV 348.2 μV/V + 11.1 μV 463.2 μV/V + 11.1 μV 1271 μV/V + 11.1 μV 5890 μV/V + 11.1 μV 46.3 μV/V + 12 μV 140.0 μV/V + 4.5 μV 142.5 μV/V + 2.5 μV 221.9 μV/V + 2.5 μV 406.7 μV/V + 2.5 μV 984.4 μV/V + 2.5 μV 3525 μV/V + 10.5 μV 11.6 mV/V + 10.5 μV 17.4 mV/V + 10.5 μV	Comparisons performed with a 8.5 digit Multimeter

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DC Current Measure	0 to 100 nA 100 nA to 1 μ A 1 μ A to 10 μ A 10 μ A to 100 μ A 100 μ A to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 10 A	47.9 μ A/A + 65 pA 35.1 μ A/A + 65 pA 35.1 μ A/A + 150 pA 35.1 μ A/A + 1.3 nA 35.0 μ A/A + 10 nA 35.8 μ A/A + 100nA 14.4 μ A/A + 1 μ A 140 μ A/A + 20 μ A 2394 μ A/A + 700 μ A	Comparisons performed with an 8.5 digit meter.
AC Current Measure 0 to 100 μ A 100 μ A to 1mA	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 100 Hz 100 Hz to 5 kHz 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 100 Hz 100 kHz to 5 kHz 5 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	4750 μ A/A + 30 nA 1890 μ A/A + 30 nA 827.1 μ A/A + 30 nA 827.1 μ A/A + 30 nA 4844 μ A/A + 200 nA 1890 μ A/A + 200 nA 827.1 μ A/A + 200 nA 472.6 μ A/A + 200 nA 827.1 μ A/A + 200 nA 4844 μ A/A + 400 nA 6616 μ A/A + 1500 nA	Comparisons performed with an 8.5 digit meter.
AC Current Measure 1 mA to 10 mA 10 mA to 100 mA	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 100 Hz 100 kHz to 5 kHz 5 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 100 Hz 100 kHz to 5 kHz 5 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	4844 μ A/A + 2 μ A 1890 μ A/A + 2 μ A 827.1 μ A/A + 2 μ A 472.6 μ A/A + 2 μ A 827.1 μ A/A + 2 μ A 4844 μ A/A + 4 μ A 6616 μ A/A + 15 μ A 4844 μ A/A + 20 μ A 1890 μ A/A + 20 μ A 827.1 μ A/A + 20 μ A 472.6 μ A/A + 20 μ A 472.6 μ A/A + 20 μ A 4844 μ A/A + 40 μ A 6616 μ A/A + 150 μ A	Comparisons performed with an 8.5 digit meter.

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AC Current Measure 100 mA to 1 A 1 A to 10 A	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 100 Hz 100 kHz to 5 kHz 5 kHz to 20 kHz 20 kHz to 50 kHz 20 Hz to 50 Hz 50 Hz to 2 kHz	4.8 mA/A + 200 μ A 2.0 mA/A + 200 μ A 1.1 mA/A + 200 μ A 1.3 mA/A + 200 μ A 3.7 mA/A + 200 μ A 11.8 mA/A + 400 μ A 231.1 mA/A + 10 mA 36.7 mA/A + 10 mA	Comparisons performed with an 8.5 digit meter.
Resistance Measure	0 to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 k Ω 1 k Ω to 10 k Ω 10 k Ω to 100 k Ω 100 k Ω to 1 M Ω 1 M Ω to 10 M Ω 10 M Ω to 100 M Ω 100 M Ω to 1 G Ω	24.0 $\mu\Omega/\Omega$ + 100 $\mu\Omega$ 20.2 $\mu\Omega/\Omega$ + 1000 $\mu\Omega$ 17.5 $\mu\Omega/\Omega$ + 1 m Ω 17.4 $\mu\Omega/\Omega$ + 10 m Ω 17.5 $\mu\Omega/\Omega$ + 100 m Ω 23.4 $\mu\Omega/\Omega$ + 7 m Ω 87.1 $\mu\Omega/\Omega$ + 200 m Ω 723.4 $\mu\Omega/\Omega$ + 2000 m Ω 7217 $\mu\Omega/\Omega$ + 20 k Ω	Comparisons performed with an 8.5 digit meter.
Frequency - Measure	10 Hz to 1 Ghz	2.7 X 10-8 Hz	Measurement made using electronic counter.