

**Laboratory's Scopes of Calibration**

Field of Calibration	Properties of Measured	Range	Calibration Methods
Electrical	<b>Voltage / Current / Power Calibrations Group</b>		
	DC Volt Meters / Panel Meters	<b>DCV:</b> 0-1100V	Direct measurement
	AC Volt Meters / Panel Meters	<b>DCA:</b> 0-100A	
	DC Current Meters / Panel Meters	<b>ACV:</b> Up-1100V (10Hz-1MHz)	
	AC Current Meters / Panel Meters	<b>ACA:</b> Up-50A (10Hz-30kHz)	
	DC Volt/Current Meters		
	AC Volt/Current Meters		
	Digital Panel Meters		
	Circuit Testers / Analog Testers	<b>DCV:</b> 0-1100V	Direct measurement / Direct comparison
	Electrometers / Pico Ammeters	<b>DCA:</b> 0-100A	
	Digital Multimeters (Not over 4 digit)	<b>ACV:</b> Up-1100V (10Hz-30MHz)	
	Digital Multimeters (Not over 5 digit)	<b>ACA:</b> Up-50A (10Hz-30kHz)	
	Digital Multimeters (Not over 6 digit)	<b>DCR:</b> 0-1TΩ	
	Digital Multimeters (Not over 7 digit)	<b>Frequency:</b> 1Hz-40GHz	
	Digital Multimeters (Not over 8 digit)	<b>Capacitance:</b> Up-100mF	
	Digital Multimeters (Over 8 digit) (Equivalent to <b>3458A</b> or <b>Fluke 8508A</b> )	<b>Inductance:</b> 100μH-1H	
	AC Measurement Standard ( <b>Fluke 5790A</b> )	<b>ACV:</b> Up-1100V (10Hz-30MHz)	AC-DC Difference Transfer
	AC Measurement Standard + Wideband ( <b>Fluke 5790A+WB Option</b> )		
	DC Voltage Reference Standard Cell ( <b>Fluke 732A</b> )	<b>DCV:</b> 1V, 1.018V, 10V	Comparison / Differential
	DC Voltage Reference Standard Cell ( <b>Fluke 732B</b> )	<b>DCV:</b> 1.018V, 10V	
DC Volt/Current Generators (Low accuracy)	<b>DCV:</b> 0-1000V	Manufacturer's performance verification tests	
DC Volt/Current Generators (High accuracy)	<b>DCA:</b> 0-100A		
AC Volt/Current Generators (Low accuracy)	<b>ACV:</b> Up-3V (10Hz-30MHz)		
AC Volt/Current Generators (High accuracy)	>3-220V (10Hz-1MHz)		
Multi-Calibrators	>220-1100V (10Hz-100kHz)		

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<b>Electrical</b>	Multi-Product Calibrators (Fluke 5500A, Wavetek 9100) Multi-Product Calibrators + Scope Option (Fluke 5500A, Wavetek 9100)	<b>ACA:</b> Up-50A (10Hz-10kHz) <b>DCR:</b> 0-1GΩ <b>Capacitance:</b> 1pF-100mF (20Hz-13MHz) <b>Temperature Indicator:</b> All types <b>Phase:</b> 0-360 Deg. <b>Freq:</b> 1Hz-40GHz <b>RF Power:</b> +20dBm to -100dBm <b>RF Impedance:</b> 50Ω, 75Ω, 600Ω, 1MΩ	Manufacturer's performance verification tests
	Multi-Product Calibrators (Fluke 5520A)		
	Multi-Product Calibrators + Scope Option (Fluke 5520A)		
	Multi-Function Calibrators (Fluke 5700A, 5720A, Wavetek 4800A)		
	Multi-Function Calibrators + Wideband Option (Fluke 5700A, 5720A, Wavetek 4800A)		
	Amplifier (Fluke 5725A)		
	Oscilloscope Calibrators (Fluke 5800A, Wavetek 9500)		
	Oscilloscope Calibrators (Fluke 5820A)		
	Regulated DC Power Supply (Single O/P)	<b>DCV:</b> 0-1000V	Direct measurement / Ohm's Law
	Regulated DC Power Supply (Multi O/P)	<b>DCA:</b> 0-100A	
	AC Power Supply (Single O/P)	<b>ACV:</b> Up-10kV (10Hz-100kHz)	
	AC Power Supply (Multi O/P)	<b>ACA:</b> Up-50A (10Hz-1kHz)	
	Electronic Load		
	Digital High Volt Meters	<b>DCV:</b> 0-10kV	Direct measurement / Direct comparison to high voltage standard
	Analog High Volt Meters	<b>ACV:</b> Up-10kV (50Hz-60Hz)	
	Electrostatic Volt Meters (Digital / Analog)		
	High Voltage Dividers		
	High Voltage Probe		
Withstanding Voltage Testers			
Withstanding Voltage / Insulation Testers			
Curr. Calibrator for W. Testers			

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<b>Electrical</b>	Portable Noise Checkers and Monitors	<b>DCV:</b> 0-10kV <b>ACV:</b> Up-10kV (50Hz-60Hz)	Direct measurement / Direct comparison to high voltage standard
	Impulse Noise Voltmeters		
	Damped-Oscillatory Wave Simulators		
	Fast Transient Noise Simulators		
	Electrostatic Discharge Simulators		
	Voltage Dip and Up Simulator		
	Lightning Surge Simulator		
	Electronic Volt-Meters ( $\leq 10$ MHz) (Single O/P)	<b>ACV:</b> Up-3V (10Hz-30MHz) >3-220V (10Hz-1MHz) >220-1100V (10Hz-100kHz)	Direct measurement / Direct comparison
	Electronic Volt-Meters ( $\leq 10$ MHz) (Multi O/P)		
	Wideband Electronic Volt-Meters (>10MHz)		
	AC/DC Clamp Meters (Clamp only)	<b>DCA:</b> 0-1000A <b>ACA:</b> Up-1000A (10Hz-1kHz)	Direct measurement
	AC/DC Clamp Meters (Include multi-meter)		
	Portable AC/DC Watt Meters (Analog Type)	<b>DCW:</b> 0-36kW (DCV: 0-1000V, DCA: 0-36A) <b>ACW:</b> Up-50kW (ACV: Up-1000V, ACA: Up-50A, 45Hz-65Hz, PF 0.3-1)	Direct measurement
	Digital DC Watt Meters		
	Digital AC Watt Meters		
	Digital AC/DC Watt Meters		
	DC Potentiometers	<b>DCV:</b> 0-1000V <b>DCA:</b> 0-36A	Direct measurement
	Electronic Galvanometers		
	Transducers & Volt / Current Transformers		
Pen Recorders (Less than 4 pens)	<b>DCV:</b> 0-1000V <b>DCA:</b> 0-36A	Direct measurement	
Pen Recorders (More than 4 pens)			
X-Y Recorders			
Data Loggers (only V/A/R and Temp)			
Oscillographic Recorders			
Beamcorders / Photocorders			
Industrial Recorders			

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Field of Calibration	Properties of Measured	Range	Calibration Methods
Electrical	<b>Oscilloscope and Waveform Analysis Equipment Calibrations Group</b>		
	Analog Oscilloscopes	<b>Freq. Standard:</b> 0.5MHz, 1MHz, 5MHz, 10MHz  <b>Freq. Bandwidth:</b> DC-26.5GHz  <b>Period Range:</b> 2ns-5s  <b>DCV:</b> 0-10kV  <b>ACV:</b> Up-7kV  <b>Impedance:</b> 50Ω, 75Ω, 600Ω, 1MΩ	Direct measurement / Direct comparison
	Synchrosopes / Memoryscopes		
	Digitizing Oscilloscopes		
	Sampling Oscilloscopes		
	X-Y Scopes / X-Y Monitor Scopes		
	Oscilloscopes to (High) Voltage Probe		
	Oscilloscopes to Voltage Isolators		
	Oscilloscopes to Current Probes		
	Oscilloscopes to Differential Probes		
	Oscilloscopes to Active Probes		
	Spectrum Analyzers		
	Digital Spectrum Analyzers		
	Tracking Generators		
	Dynamic Signal Analyzers		
	FFT Analyzers		
	Servo Analyzers		
	RF Field Analyzers		
	<b>Component Calibration Group (Resistance / Capacitance / Inductance)</b>		
	Eart Testers (Analog Type)	<b>DCR:</b> 0-1TΩ	Direct measurement / Direct comparison
	Eart Testers (Digital Type)		
	Low Ohm Testers		
	Ohm Meters (Analog Type)		
	Ohm Meters (Digital Type)		
	Insulation Meters (Analog Type)		
	Insulation Meters (Digital Type)		
	Super Megaohm Meters		
Wrist Strap Footwere System Testers			
Wheatstone Bridge			
Double Bridge			

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Electrical	Resistance Deviation Meters	<b>DCR:</b> 0-1T $\Omega$	Direct measurement / Direct comparison
	Resistance Ratio Testers		
	Current Shunts	<b>DCA:</b> 0-100A <b>DCR:</b> 0-1T $\Omega$ <b>DCV:</b> 0-1000V	As choose of - Volt. inter-comparison - Volt ratio-comparison - Sub-stitution - Direct measurement - Ohm's law
	Standard Resistors (Single Value)		
	Standard Resistors (Multi Values)		
	Decade Resistance Box		
	Fixed Value Resistors (Low accuracy)		
	AC Current Shunt	<b>ACA:</b> Up-20A (10Hz-30kHz)	Comparison with AC-DC difference transfer.
	Fixed Value Capacitors (Low accuracy)	<b>Capacitance:</b> 1pF-100mF (20Hz-13MHz) <b>AC Resistance:</b> 1m $\Omega$ -100k $\Omega$ (DC-13MHz)	Direct measurement / Direct comparison.
	Standard Capacitor (Single Value)		
	Standard Capacitor (Multi Values)		
	Decade Capacitors		
	4-T Standard Air Capacitors Set ( <a href="#">HP 16380A</a> )		
	4-T Standard Air Capacitors Set ( <a href="#">HP 16380C</a> )		
	Calibration L-R Standard ( <a href="#">HP 16074A</a> )		
	4-T Pair Standard Resistors Set ( <a href="#">HP 42030A</a> )		
	Fixed Value Inductors (Low accuracy)	<b>Inductance:</b> 100 $\mu$ H-10H (100Hz-10kHz)	Direct measurement / Direct comparison
	Standard Inductors (Single Value)		
Standard Inductors (Multi Values)			
Decade Inductors			
Capacitance Meters (Low accuracy)	<b>Capacitance:</b> 1pF-100mF (20Hz-13MHz) <b>Inductance:</b> 100 $\mu$ H-10H (100Hz-10kHz)	Direct measurement / Direct comparison	
Capacitance Meters (High accuracy)			
Impedance Meters / Vector Impedance Meters			
Impedance Analyzers			

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Electrical	Impedance Gain / Phase Analyzers	<b>AC Resistance:</b> 1mΩ-1MΩ (DC-13MHz)	Direct measurement / Direct comparison
	Impedance Deviation Meters / Comparators		
	Crystal Impedance Meters		
	Capacitance Bridge		
	Inductance Meters		
	Inductance Bridge		
	LCR Deviation Meters / Comparators	<b>Capacitance:</b> 1pF-100mF (20Hz-13MHz)	Direct measurement / Direct comparison
	LCR Meters / LCZ Meters		
	LCR Meters (Pocket Type)		
	Universal Bridge		
		<b>Inductance:</b> 100μH-10H (100Hz-10kHz)	
		<b>AC Resistance:</b> 1mΩ-1MΩ (DC-13MHz)	
	Diode Curve Tracers	<b>DCV:</b> 0-1000V	Direct measurement / Direct comparison
	Transistor Curve Tracers		
	Semiconductor Testers		
Semiconductor Parameter Analyzers			
Modular DC Sources / Monitors			
Ratio Testers			
Fo & Ze Meters			
	<b>DCA:</b> 0-36A		
		<b>Capacitance:</b> 1pF-100mF (20Hz-13MHz)	
			<b>Inductance:</b> 100μH-10H (100Hz-10kHz)
	<b>AC Resistance:</b> 1mΩ-1MΩ (DC-13MHz)		