

## ► Electrical calibration

Electrical calibration refers to the process of verifying the performance of, or adjusting, any instrument that measures, sources, or tests electrical parameters. This discipline is usually referred to as dc and low frequency ac electrical metrology. Principal parameters include voltage, current, resistance, inductance, capacitance, time and frequency. Other parameters, including electrical power and phase, are also in this segment of metrology. Ratiometric comparisons of similar parameters are often performed to compare a known parameter to an unknown similar parameter.

Electrical calibration involves the use of precise devices that evaluate the performance of key properties for other devices called units under test (UUTs). Because these precise devices have thoroughly known performance characteristics compared to the UUT, performance evaluation and/or calibration adjustment of the UUT to identify or minimize errors is possible. Typically, the performance of such precision devices should be four or more times better than the UUT.

These precision devices fall into two broad categories. Electrical signal sources are often referred to as either calibrators or standards. Precision measurement devices are often classified as reference digital multimeters, measurement standards, or ratio bridges.



## Product highlights

### 5522A Multi-Product Calibrator

#### Robust, transportable wide workload coverage

The 5522A Multi-Product Calibrator addresses a wide calibration workload and comes with internal and external protection features that protect it against damage and make it easier to transport for on-site or mobile calibration. The 5522A can also be fully automated with MET/CAL® Plus Calibration Management Software. It is the ideal calibrator for metrology professionals who need to calibrate many different types of electronic equipment and want a transportable instrument that offers them a high return on investment.

The 5522A sources direct voltage and current, alternating voltage and current with multiple waveforms and harmonics, two simultaneous voltage outputs or voltage and current to simulate dc and ac power with phase control, resistance, capacitance, thermocouples and RTDs. The 5522A can also measure thermocouple temperature, and pressure using one of 29 Fluke 700 Series pressure modules. Two options add the capability to calibrate oscilloscopes, either 600 MHz or 1.1 GHz. And the 5520A-PQ Power Quality Option enables the 5522A to calibrate power quality instrumentation to the standards of the IEC and other regulatory agencies.

- Calibrates a wide variety of electrical test equipment
- Robust protection circuits prevent costly damage from operator error
- Redesigned carrying handles make the 5522A easy to transport
- Rugged carrying case with built-in handles and wheels and removable front/rear access doors for in-situ calibration in almost any environment
- Remarkably affordable



### 5080A Multi-Product Calibrator

#### Calibration solutions for your analog and digital workload

High compliance with reliable accuracy enables the 5080A to calibrate even difficult-to-calibrate analog meters, as well as a wide range of digital multimeters, clamp meters, and wattmeters. Options for calibrating oscilloscopes and megohm meters extend workload coverage even more. The 5080/CAL software enables automated calibration and is easy to learn and operate. Fluke quality and usability are built in, with robust protection circuitry, multiple language displays, and much more. Best of all, the 5080A is an excellent value that will fit your budget.

- High compliance
- Protection circuitry
- Calibrates a wide workload, including analog meters and 3.5 and 4.5 digit DMMs
- Optional 5080/CAL software for easy-to-use, automated calibration



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### DC/LF Electrical Calibrators

#### 5700A/5720A Multifunction Calibrators

Taking accuracy to a new level.

- The highest accuracy calibrator, it will support instruments of up to 8.5 digits in measurement performance
- Artifact Calibration permits the lowest cost of support and highest confidence in performance
- Optional wideband output to 30 MHz



#### 5522A Multi-Product Calibrator

Robust, transportable wide workload coverage.

- Calibrates a wide variety of electrical test equipment with more than 14 functional capabilities
- Accuracies intended to support DMMs to 6.5 digits
- Robust protection circuits prevent costly damage from operator error
- Optional oscilloscope calibration to 1100 MHz
- Easy to transport



#### 5080A High Compliance Multi-Product Calibrator

Solutions for your analog and digital workload.

- High compliance for difficult-to-calibrate instruments
- Robust protection circuits prevent costly damage from operator error
- Calibrates a wide workload, including analog meters and 3.5 and 4.5 digit DMMs
- Options for oscilloscope and megohm meter calibration



#### 5500A Multi-Product Calibrator

Solutions that match your workload and budget.

- Flexibility, accuracy and value
- Calibrates a wide variety of electrical test equipment, more than 14 categories of instrumentation including 3.5 and 4.5 digit DMMs
- Optional oscilloscope calibration



#### 9100 Universal Calibration System

A high-value multi-product calibrator.

- Calibrates over 15 different categories of general-purpose test equipment
- Options for power meter, insulation/continuity tester and oscilloscope calibration
- Semi-automated and fully automated procedure modes for maximum throughput



## Specialty Calibrators

### 6105A/6100B Electrical Power Standards

The most accurate, comprehensive and flexible sources of electrical power quality and energy signals.



- Power calibration with voltage to 1008 V and current to 21 Amps, and optionally up to 80 Amps
- Voltage and current accuracies better than 0.005 % (50 ppm)
- Programmable harmonic distortion up to 100 harmonics
- Includes other power quality testing phenomena
- Complex measurements generating a wide variety of signals

### 52120A Transconductance Amplifier

Test and calibrate, at full current range, power standards, power and energy meters, PQ analyzers, high-current clamp meters and Rogowski coils. Delivers:



- 120 A standalone
- 240 A or 360 A with parallel operation
- 3000 A or 6000 A with accessory coils
- Industry-leading amplifier accuracy:
  - 100 PPM dc – 850 Hz (used with 61XX EPS)
  - 150 PPM dc (used with dc/If calibrator)
  - 1000 PPM ac (used with dc/If calibrator)
- Frequency capability, dc to 10 kHz

### Phasor Measurement Unit Calibrator

Fast, automated, IEEE C37.118.1-compliant calibrations.

System includes:

- PMU control unit
- GPS receiver
- PMU test and calibration software
- Fluke 6135 Electrical Power Standard
- Configured server PC



Available early 2012

### 5320A Multifunction Electrical Tester Calibrator

Verify and calibrate electrical test tools with a single instrument.



- Calibrate megohm meters, earth resistance testers, ground bond testers, hipots and many more types of electrical safety testers
- Uses less bench space than custom solutions
- Built-in graphical calibration help guide
- LAN, GPIB, RS-232 interfaces for PC based automation

### 525B Temperature/Pressure Calibrator

Superior accuracy and functionality in an economical benchtop package.



- A calibrator to address process industry instrumentation
- Simulates and measures all ANSI thermocouples, as well as L and U types, and provides cold junction compensation to enable calibration of a wide variety of thermocouple instrumentation
- Direct input for storage of ITS-90 RTD constants
- RTD source uncertainties to 0.03 °C

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### Oscilloscope Calibrators

#### 9500B Oscilloscope Calibrator

The highest performance, fully automated, upgradeable oscilloscope calibration workstation.



- Full automation provides totally hands-free calibration
- Bandwidths of 600 MHz, 1000 MHz, 3200 MHz, and 6400 MHz
- A fast edge of 25 ps to address bandwidths up to 14 GHz
- Connect up to five channels simultaneously

#### 55XX Series Oscilloscope Calibration Options

Calibrate your digital and analog oscilloscopes with any of three different options.



- Leveled sine wave generator with optional bandwidths of 300 MHz, 600 MHz and 1100 MHz for verifying oscilloscope bandwidth
- DC and square wave voltage generators for calibrating voltage gain
- Horizontal time base calibration functions
- Edge source including a 300 ps fast edge with low aberrations for verifying dynamic response
- Fast edge risetime pulse generator (< 1 ns) for checking pulse response

### Precision Multimeters

#### 8508A Reference Multimeter

Reference standard accuracy and stability, in one



functionally versatile, easy-to-use solution.

- 8.5 digit resolution, exceptional linearity and low noise and stability
- Optional front/rear inputs with unique ratio measurement option
- Broad range of measurement capabilities
- 365 day stability as low as 2.7 ppm, 24-hour stability of 0.5 ppm, transfer uncertainty of 0.12 ppm

#### 8845A/8846A Precision Multimeters

Precision and versatility for bench or systems applications.



- 6.5 digit resolution
- Basic V dc accuracy of up to 0.0024 %
- Dual display

#### 8808A Digital Multimeter

Versatile multimeter for manufacturing, development and service applications.



- 5.5 digit resolution
- Basic V dc accuracy of 0.015 %
- Dual display

## Electrical Standards

### 732B/734A DC Reference and Transfer Standards

The simple way to maintain and disseminate your volt.

- A primary standard for traceability of dc voltage to better than 1 ppm
- Complete mechanical and electrical independence of each of its four standards
- Battery powered for easy shipping



### 792A AC/DC Transfer Standard

Support for your most demanding ac traceability requirements.

- A primary standard that is accurate, fast and easy to use
- Fully traceable performance with ac/dc difference to better than 10 ppm
- Nine ranges from 22 mV to 1000 V (with external range resistor)



### 5790A AC Measurement Standard

Automated ac measurement with precision that is easy to use.

- Direct ac measurements to 22 ppm, or ac/dc difference measurements to 15 ppm
- Digital voltmeter style operation that features a fully autoranging instrument that selects the best voltage range for the measurement you are making
- Robust 1200 V input protection on all voltage ranges
- Optional 30 MHz wideband measurement



### 742A Resistance Standard

High accuracy working standard for on-site resistance calibration.

- Small and rugged standard resistors with six-month stabilities to 2.5 ppm
- Open air use so no oil or air baths required
- 18 °C to 28 °C operating range
- Standard values from 1 ohm to 100 Megohms



### A40B Series Precision Current Shunts

Precision, low inductance shunts for dc and ac current metrology.

- Simplifies calibration/verification of precision calibrators and current sources
- Shunts sized for current from 1 mA to 100 A
- Usable from dc to 100 kHz
- Ultra low phase shift to support power quality instrument metrology



### A40/A40A Current Shunts

- AC current transfer measurements from 2.5 mA to 20 A
- Frequency between 5 Hz to 100 kHz
- Compatible with 792A and 5790A



### 752A Reference Divider

Setting the standard for ratio accuracy and ease of use.

- 10:1 and 100:1 divider outputs
- Output uncertainty 0.2 ppm and 0.5 ppm
- Built-in calibration bridge



### 720A Kelvin-Varley Divider

A primary standard for ratio measurements.

- 0.1 ppm resolution, seven decades
- 0.1 ppm of input absolute linearity
- Built-in self-calibration bridge



### 910/910R GPS Controlled Frequency Standard

Cesium controlled frequency standard that uses GPS technology and connectivity to provide primary standard traceability from any location.

- Unique traceability feature means no more re-calibrations
- Two high-stability models to meet your application and fit your budget
- Built-in rubidium atomic clock (910R)
- Up to 13 outputs, maximizing cost efficiency



### 908/909 Frequency References

Stable frequency references for test systems and calibration labs.

- Accurate reference "atomic clock" in automated test systems
- Affordable and very cost effective
- Designed for portability with optional carrying case

