FLUKE Calibration

5790B
AC Measurement Standard

The easiest way to make precision ac measurements

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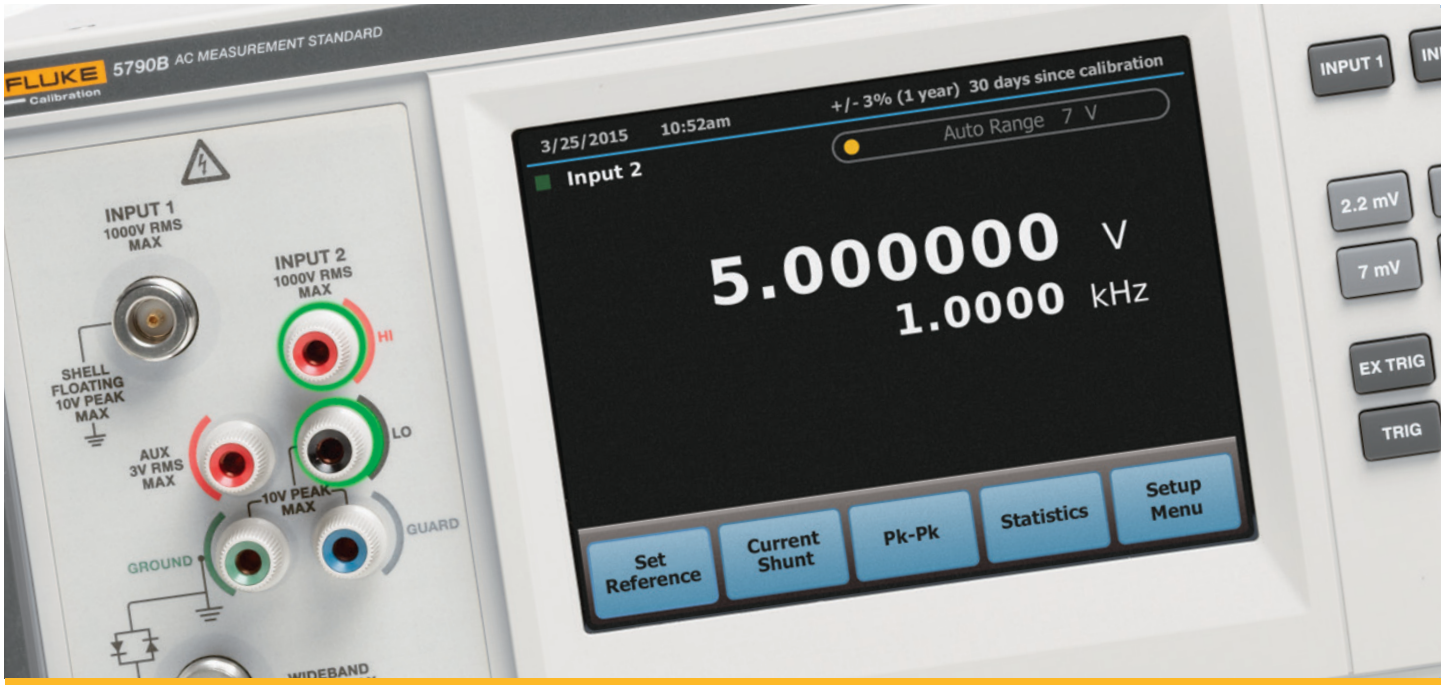

Precision ac voltage and current measurements have never been this easy

The 5790B AC Measurement Standard is a multi-purpose ac measurement and transfer standard designed for the most demanding calibration applications. It combines the accuracy you would expect from a thermal transfer standard with the ease of use of a digital multimeter. Absolute ac voltage measurement uncertainties are as low as ± 24 ppm (one year, 23 °C ± 5 °C). The 5790B is designed to meet the complete ac voltage, ac current and wideband verification requirements of the Fluke Calibration 5730A, 5720A, and 5700A Multifunction Calibrators; 5522A, 5502A, 5520A, and 5500A Multi-Product Calibrators; plus other calibrators, amplifiers like the 52120, 5725A and 5205A/5215A, and transfer standards and ac voltmeters.

The 5790B covers an alternating voltage range of 600 µV to 1000 V, and a frequency range of 10 Hz to 1 MHz. Wideband voltage options extend frequency range to 30 or 50 MHz.

The 5790B in combination with the Fluke A40B Current Shunts now allow you to make direct, absolute or relative current measurements without the need to perform any calculations.

The 5790B may be used alone as a measurement device or as a transfer standard when compared to an external dc source. In either case, the normally tedious switching and calculations are performed automatically by the 5790B, and the resulting ac/dc difference is displayed directly on the easy-to-read 6.5-inch full-color capacitive touch screen display.

The expanded 5790B wideband range extends its workload to calibrating 50 MHz reference outputs of RF power meters such as the Keysight N1914A.

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Updated features provide improvements inside and out

Since its release in 1990, the 5790A has developed an unmatched reputation of being the most precise ac measurement standard in the industry. The technology behind the 5790A and the patented Fluke RMS sensor has made it the measurement standard of choice for calibration laboratories around the world. The 5790B retains the innovative technical features of its predecessor, and adds many new capabilities and functions which expand the capable workload and reliability of the product.

Absolute and relative current measurement

The Fluke A40B series shunt resistors provide a very cost effective method to expand the 5790B's functionality to measure absolute and relative ac current to calibrate an ac current source. The 5790B's new user interface allows you to input and save current shunts to its memory. Up to 150 shunts can be stored along with the shunts' serial numbers, calibration constant values (24 ac/dc, five loading error points) and calibration dates. After the shunt information is loaded, the 5790B can be set up to take a direct absolute or relative ac current measurement within seconds by hooking up the shunt and simply selecting the appropriate shunt from the main menu. When using a current shunt, 5790B displays both the voltage and current measurements on the display along with the shunt information. Legacy Fluke A40 and A40A current shunts as well as custom shunts can be loaded and used to make relative current measurements.

Expanded wideband range (50 MHz)

The "/3" wideband input and function, with ranges of 2.2 mV to 7 V, 10 Hz to 30 MHz, is retained from the 5790A model. A new "/5" wideband option extends the bandwidth even further, to 10 Hz to 50 MHz. The expanded wideband range extends the workload of the product to calibrate precision 50 MHz power reference outputs found on most RF power meters.

Improved specifications

A direct-readout-mode graphical user interface displays specifications for measuring common non-sinusoidal waveforms plus peak-to-peak computation (assumes THD <1 %.) This allows for instantaneous information when it is needed the most. Unlike the vacuum fluorescent display on the 5790A, the new 6.5-inch capacitive touch screen display allows you to see more information on screen, reducing the need to switch between menus.

The 5790B now specifies absolute dc voltage measurement uncertainties as low as ± 24 ppm (one year, 23 °C ± 5 °C), providing more confidence in transfer measurements.

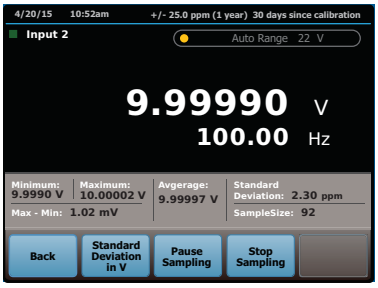
A dedicated special purpose 50 MHz, 225 mV, 50 ohm input function is available as an option for measuring RF power meter reference outputs. The option is "spot calibrated" at the end of a precision level/phase stable metrology grade cable. It calculates the measured power with a 50 ohm load.

The Fluke A40B expands the capability of the 5790B to allow you to make very precise absolute and relative current measurements. You no longer need to calculate the current value, allowing you to perform calibrations more quickly with less potential for errors.

Statistics and peak-to-peak waveform functions

Statistics showing number of samples, standard deviation, average, min and max are calculated using the displayed readings as the basis. As a benefit of the large touch screen display, the statistics data can be viewed while the main measurement is still visible on the screen.

The 5790B now does peak-to-peak waveform calculations for you. You can select one of four waveforms: sine, square, triangle, and truncated. Some of these waveforms are difficult and time consuming to calculate. The 5790B performs all the calculations for you based on the measurement, significantly reducing time and possible errors.



Left: The current shunt mode allows you to see the direct, absolute current measurement as well as the voltage measurement.

Right: The statistics screen provides valuable information when performing statistical measurements.

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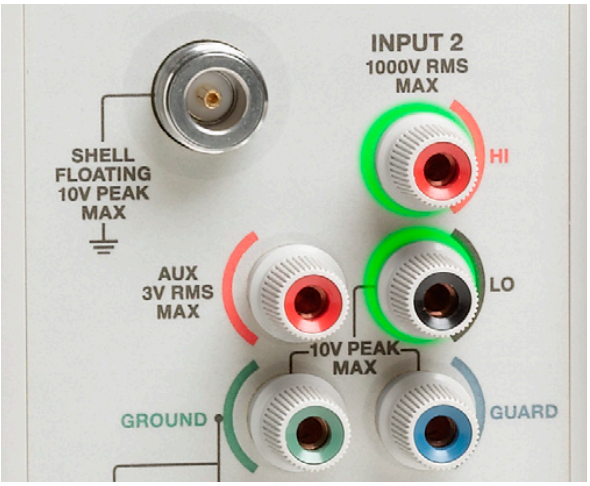


Easy-to-use graphical interface and ergonomic features

The graphical user interface features easy-to-read, easy-to-use menus, as well as access to common functions with just the touch of a finger. Quickly select the range and input using the hard keys on the front panel. A bright red status indicator for HAZARDOUS VOLTAGE is located on front panel, letting you know immediately when hazardous voltage is present at the terminals.

Like the new 5730A Multi-Product Calibrator, the front panel features Visual Connection Management™ terminals that light up to show you which terminals are active, guiding you to make the correct connections.

Precision you can depend on

The 5790B is based on the patented Fluke Solid-State Thermal RMS Sensor, which has been proven since 1979 in a variety of Fluke products like the 792A AC/DC Transfer Standard. The Fluke RMS Sensor is a true thermal converter, not an electronic converter that calculates the RMS value. Because its output voltage is 2 V rather than the 7 mV to 10 mV of traditional thermocouples, the RMS sensor exhibits excellent signal-to-noise characteristics and minimal reversal errors. With a higher output voltage, more accurate measurements can be made. And because of its small size, the RMS sensor stabilizes quickly and operates over a wide temperature range.

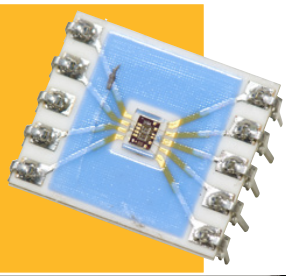
The 5790B also features hermetically sealed thin-film resistor networks to minimize ac measurement errors.

The RMS sensor and thin-film resistor networks are designed by Fluke to be rugged and reliable. Each is built to exacting standards by the Fluke Microelectronics Group to maintain quality and consistency part after part.

Versatility that keeps you productive

The variety of inputs and connection types allows you to use the one that best suits your application. There are four sets of input terminals on the 5790B, two Type-N connectors and a set of five-way binding posts. One Type-N and one set of binding posts are dedicated to the ac

The patented Fluke Solid-State RMS Sensor provides the 5790B with exceptional accuracy and stability, and fast settling time.



The 5790B is designed to meet the ac verification requirements of the Fluke 5700 Series and 5500 Series calibrators. Automation using MET/CAL® Calibration Software is fast and easy.

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FLUKE Calibration

Designed with your support requirements in mind

The 5790B AC Measurement Standard provides a self-contained calibration procedure designed to simplify periodic performance verification. The operator is prompted on what actions to take. To minimize the equipment required, the 5790B is designed to be supported by the 792A AC/DC Transfer Standard.

Traceability to national standards for the 5790B is supported through the Fluke 792A AC/DC Transfer Standard.

measurement and transfer modes. AC or dc voltages may be applied to either input connection over the 5790B's full range, allowing you to perform automated ac/dc transfer measurements. The 5790B determines automatically whether the applied voltage is ac or dc.

The second Type-N input connection supports the optional wideband mode.

The input connection is easily selected with the touch of a key on the 5790B front panel. An LED indicates which terminals are active.

Whether you are using the 5790B as a voltmeter or a transfer standard, input voltage and frequency are always indicated on the measurement display. In the transfer mode, the ac/dc or ac/ac difference is always indicated on the control display in ppm, %, volts or ratio.

The 5790B is a fully autoranging instrument and it selects the best voltage range for the measurement you are making. You may also select and lock in ranges manually. Robust 1200 V input protection is active on all voltage ranges.

Using the trigger keys, the 5790B can switch from continuous to single measurements of the input voltage, making it easy to take sample readings at predetermined intervals.

When using the 5790B in transfer mode, the reference voltage is stored, and all ac/dc or ac/ac difference measurements are made relative to it. You may also store the average of two voltages as a reference to eliminate dc reversal errors, for example.

The intuitive front panel layout of the 5790B makes manual operation fast and simple. Keys and selections are logically arranged and labeled. And messages and menus are displayed clearly on the 5790B's bright, touch screen display.

USB, GPIB/IEEE-488, Ethernet and RS-232 interfaces are included and all functions of the instruments can be controlled by a PC. The 5790B easily can be integrated into automated systems operating with MET/CAL® Calibration Software. The 5790B fully replicates the 5790A through its emulation feature, allowing you to use the 5790B with legacy 5790A MET/CAL procedures.

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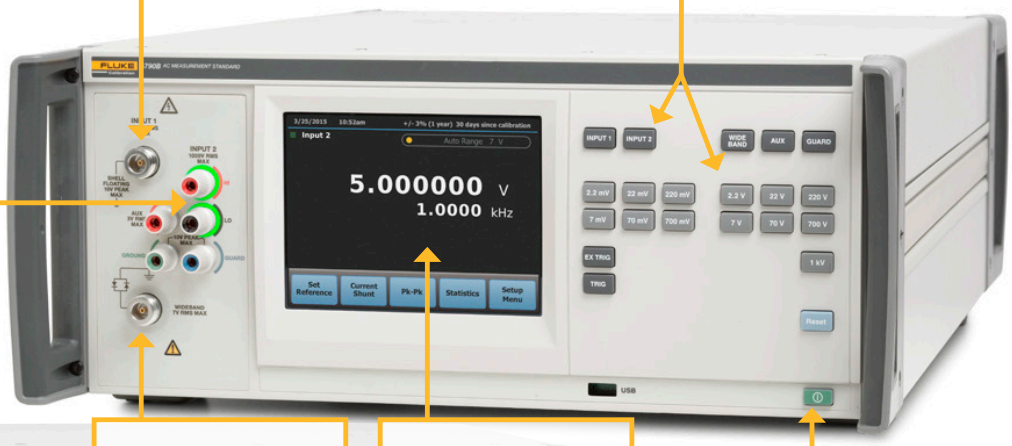
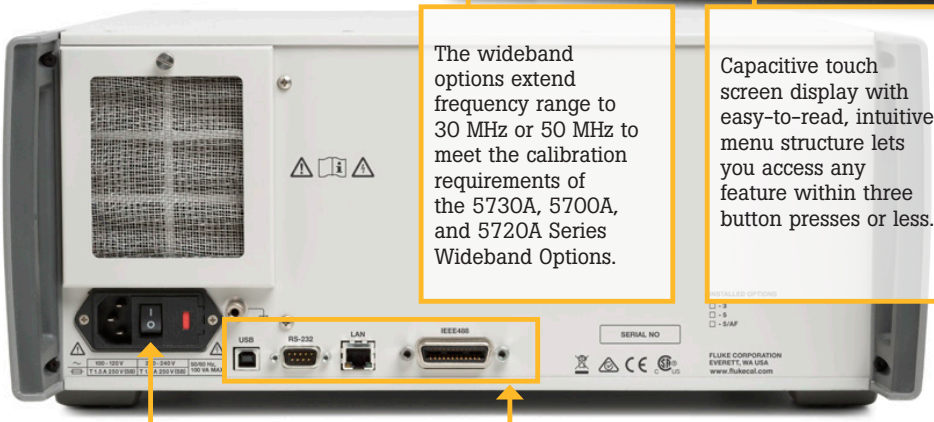
5790B overview

Inputs 1 and 2 allow you to quickly connect and measure up to 1000 V ac or dc. For maximum versatility, Input 1 is an N-Type coaxial connector and Input 2 is a standard dual-terminal binding post.

Hard keys enable you to quickly select range and change inputs.

Visual Connection Management™ terminals light up to indicate active terminals, helping you know which connection to make.





The wideband options extend frequency range to 30 MHz or 50 MHz to meet the calibration requirements of the 5730A, 5700A, and 5720A Series Wideband Options.

Capacitive touch screen display with easy-to-read, intuitive menu structure lets you access any feature within three button presses or less.

A "soft power" switch allows the product to be powered on to keep the components warmed up, but disables the functionality of the 5790B.

A new power switch automatically senses and adapts to the incoming mains power and frequency.

Ethernet, RS-232, GPIB and USB interfaces.

The A40B series shunts enable the 5790B to cost effectively calibrate an ac current source.

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Summary specifications

AC and dc voltage	Best 99 %, absolute specification: ± 24 ppm (one year, 23 °C ± 5 °C)
Inputs	Input 1: 600 µV to 1000 V (5 % over-range)
	Input 2: 600 µV to 1000 V (5 % over-range)
	Aux input: 250 mV to 500 mV
	WB input: <7 V rms wideband
Warm-up time	30 minutes
Relative humidity	Operating: 45 % to 50 °C 75 % to 45 °C 95 % to 30 °C
	Storage: <95 % non-condensing
Altitude	Operating: 3,050 meters (10,000 feet)
	Non-operating: 12,200 meters (40,000 feet)
Temperature	Operating: 0 °C to 50 °C
	Calibration: 15 °C to 35 °C
	Storage: -40 °C to 70 °C
Electromagnetic compatibility (EMC)	
International	IEC 61326-1: Controlled Electromagnetic Environment - CISPR 11: Group 1, Class A
Korea (KCC)	Class A Equipment (Industrial Broadcasting & Communication Equipment)
USA (FCC)	47 CFR 15 subpart B. This product is considered an exempt device per clause 15.103.
Surge	ANSI C62.41-1980, Category A
Reliability	MIL-T-2880D, paragraph 3.13.3
General specifications	
Dimensions	Height: 17.8 cm (7 in) standard rackmount + 1.5 cm (0.6 in)
	Width: 43.2 cm (17 in)
	Depth: 63 cm (24.8 in)
Maximum power requirements	5790B: 100 VA
Weight	5790B: 24 kg (53 lb)
	With wideband: 24.5 kg (54 lb)
Line power	50 Hz or 60 Hz; 100 V to 120 V, 220 V to 240 V 100 V, 110 V, 115 V, 120 V, 200 V, 220 V, 230 V, 240 V
Safety	Complies with UL1244 and IEC 348-1976 and IEC 1010 and CSA C22.2 No. 231 and ANSI/ISA S82
Remote interfaces	RS-232, IEEE-488
Confidence level	99 % unless otherwise specified
5790B/AF	
The 5790B/AF has enhanced absolute accuracy to ± 0.23 % of voltage (1 year after factory calibration, 23 °C ±3 °C, at 95 % confidence level) at 50 MHz and 223.61 mV, using a serialized one meter cable, characterized at that point for RF power meter 0 dBm reference output measurement. In the RF power measurement mode, the accuracy is specified to the end of the serialized cable with a curve fit for the other ranges and frequencies that is a first order correction for cable loss.	

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Ordering Information

Models

5790B	AC Measurement Standard
5790B/3	AC Measurement Standard +30 MHz Wideband Option
5790B/5	AC Measurement Standard + 50 MHz Wideband Option
5790B/AF	AC Measurement Standard + 50 MHz Wideband Option Calibrated with WB cable

Accessories

5790B/5 WB Cable	Cable, 50 ohm Wideband Cable for RF Power Measurements
A40B/Set	Complete set of A40B shunts, transit case and accessories
A40B-001MA	1 milliamp Current Shunt
A40B-010MA	10 milliamp Current Shunt
A40B-020MA	20 milliamp Current Shunt
A40B-050MA	50 milliamp Current Shunt
A40B-100mA	100 milliamp Current Shunt
A40B-200mA	200 milliamp Current Shunt
A40B-500mA	500 milliamp Current Shunt
A40B-1A	1 amp Current Shunt
A40B-2A	2 amp Current Shunt
A40B-5A	5 amp Current Shunt
A40B-10A	10 amp Current Shunt
A40B-20A	20 amp Current Shunt
A40B-50A	50 amp Current Shunt
A40B-100A	100 amp Current Shunt
A40B-LEAD/4MM	Cable N-Type Connector to Dual Terminal Plugs
A40B-LEAD/N	Cable N-Type Connector to N-Type Connector
57XX/CASE	Transit Case for 57XXA Series
Y5737	5790B and 5700A/5720A Rack Mount Kit. Includes 24 in. slides that allow for side ventilation

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Fluke Calibration provides the broadest range of calibrators and standards, software, service, support and training in electrical, temperature, pressure, RF and flow calibration.

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Fluke Calibration
PO Box 9090,
Everett, WA 98206 U.S.A.

Fluke Europe B.V.
PO Box 1186, 5602 BD
Eindhoven, The Netherlands

For more information call:
In the U.S.A. (877) 355-3225 or Fax (425) 446-5116
In Europe/M-East/Africa +31 (0) 40 2675 200 or Fax +31 (0) 40 2675 222
In Canada (800)-36-FLUKE or Fax (905) 890-6866
From other countries +1 (425) 446-5500 or Fax +1 (425) 446-5116
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