FLUKE®
Calibration

Fluke Calibration

Product Overview ECAL

Fluke Calibration

- World’s largest calibration focused business
- A global sales, service, and manufacturing operation
- Solutions in:
  - *Electrical (DC/LF & RF) Calibration*
  - Temperature Calibration, contact and non-contact
  - Humidity Calibration
  - Pressure & Flow Calibration
  - *Calibration Software*





Fluke Calibration global industry presence

You will find Fluke Calibration products in almost every national laboratory in the world

Fluke Calibration Centers of Excellence

Everett WA, USA
Electrical

Phoenix AZ, USA
Pressure

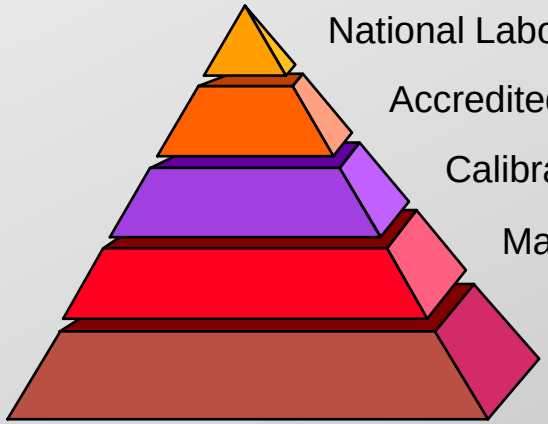
American Fork UT, USA
Temperature

Norwich, UK
Power/Energy, RF

Fluke Calibration - EMEA distributors

- Close corporation with our distributors in EMEA
- Direct sales in the UK
- Fluke offices in Eindhoven, Norwich and Dubai

Calibration by Market Segment & End User

Telecommunications Automotive Military Aerospace Chemical Pharmaceutical Process Medical Gov/Research/Education Consumer Goods Utilities Rental/Lease Equipment	 National Laboratory Accredited Laboratory Calibration Laboratory Maintenance Labs Instrumentation Metrologist or Head of Metrology Doctor of Science PhD. Research Engineer Calibration Lab Manager Asset Manager Calibration Lab Engineer Calibration Lab Technician Quality Manager
Drivers: ISO 9000, 17025, ANSI-Z540, Accreditation	

Fluke Calibration –
Electrical Calibration Products and Calibration Software

- Agenda
  - Calibrators
  - Amplifiers
  - DMM's
  - RF Calibration
  - AC Measurement standards
  - Standard Resistors
  - Software
  - Value Added Services

[Electrical calibration on Flukecal.com]

[RF Calibration on Flukecal.com]

[Calibration Software on Flukecal.com]

FLUKE®
Calibration

Electrical Calibrators

History of Electrical Calibrators

AC, DC, Multi-function, Multi-product

Fluke 760A

Fluke 5200A

Fluke 5440B

Fluke 5100A

Fluke 5500A

Datron/Wavetek 9100

Datron/Wavetek 4708

Datron/Wavetek 4808

Datron/Wavetek 9500

Fluke 5520A

Fluke 5800A/5820A

Fluke 5101B

Fluke 5320A

Fluke 5700A

Next Gen Electrical Calibrators

January 2014:

Multi-function Calibrator

5730A

March 2019:

Long-scale DMM

8588A/8558A

August 2023:

Multiproduct Calibrator with the Scope Option

August 2015:

AC Measurement Standard

5790B

January 2023:

Multiproduct Calibrator

5540A/5550A/5560A

April 2024:

Next Generation Dedicated Scope Calibrator

ECAL Products - Calibrators

FLUKE® Calibration

Precision / Dedicated

Precision: Fluke 5730A
Oscilloscopes: Fluke 9500C
Electrical Testers: 5322A

5730A Precision Calibrator

DCV Accuracy ± 3.5 µV/V
ACV Accuracy ± 42 µV/V
Ohms Accuracy ± 6.5 µΩ/Ω
DCI Accuracy ± 35 µA/A
ACI Accuracy ± 103 µA/A

9500C: Up to five channel oscilloscope calibrator

53222A Multifunction Electrical Tester Calibrator.

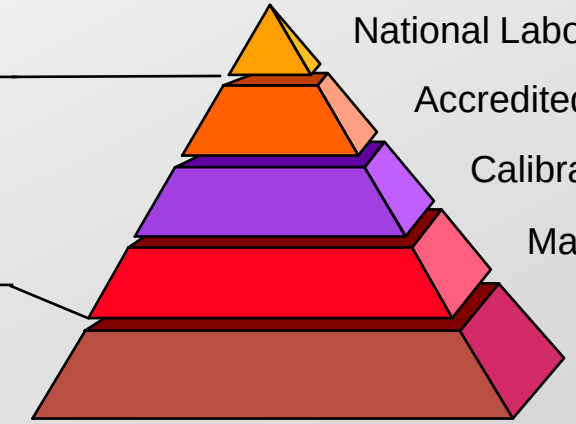
Multi-product

Fluke 7526A

Fluke 5080A
Fluke 5540A/5550A/5560A

Temperature/Pressure Calibrator

Multi-Product Performance



Technology

- Stability achieved with selected Zener diodes
- Laser trimmed hermetically sealed thin-film resistors
- High current amplifier
- Two wire compensation

Workload

- Multimeters to 8½ resolution, clamp meters, scopes, thermometers, power meters, harmonic analyzers, insulation meters

Selection guide

	Multi-Product Calibrators				Multifunction Calibrators	Oscilloscope Calibrators	Electrical Tester Calibrator	Temperature/ Pressure Calibrator
Workload	**5080A**	**5540A**	**5550A**	**5560A**	**5730A**	**9500C**	**5322A**	**7526A**
Analog/panel meters								
High burden meters								
Low burden meters							V DC and V AC	V DC, I DC and R
DMMs								
Basic dc V accuracy	100 ppm	31 ppm	11 ppm	8 ppm	4.5 ppm	n/a	1000 ppm	40 ppm
3.5 digits (typ. ± 0.3 % dc V)							V DC and V AC	V DC and V AC
4.5 digits (typ. ± 0.025 % dc V)								
5.5 digits (typ. ± 0.015 % dc V)								
6.5 digits (typ. ± 0.0030 % dc V)								
7.5 digits (typ. ± 16 ppm dc V)								
8.5 digits (typ. ± 8 ppm dc V)								
Temperature/pressure								
RTD simulate								
RTD measure								
Thermocouple simulate								
Thermocouple measure								
Pressure modules								
Oscilloscopes	1 channel				1 to 5 channels			
600 MHz		600MHz Opt	600MHz Opt	600MHz Opt		Yes		
1 GHz			1 GHZ Opt	1 GHZ Opt		Yes		
2 GHz				2 GHZ Opt		Yes		
4 GHz						Yes		
Safety testers								
Hipot								
Megohm meters	MEG opt							
Installation								
PATs								
Continuity	MEG opt							
Loop impedance								
Leakage current								
Ground bond								
RCD/GFCI								
Medical safety								
Power/energy								
Wattmeters								
Harmonic analyzers								
Flicker meters								
Phase angle meters								
Power analyzers								
Power recorders								
Secondary energy stan- dards								
Watt-hour/energy meters								
Other								
Clamp meters								
LCR meters		RC only	LRC	LRC				
Process calibrators								
Data acquisition								
Non sine waveforms								
RF millivolt meters					30 and 50 MHz WB opt			
Switch test								
24 V loop Supply								
# of calibrator functions	**8**	**11**	**11**	**11**	**5**	**11+**	**9**	**9**

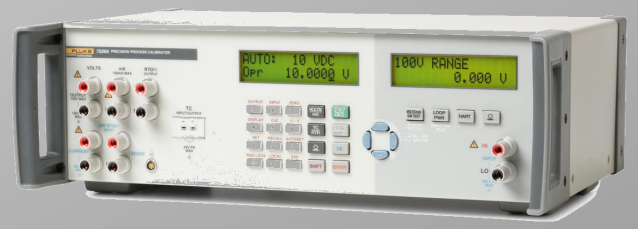
Fluke 7526A Precision Process Calibrator

Fluke 7526A Precision Process Calibrator

- The Fluke Calibration 7526A Precision Process Calibrator offers the best balance of economy and accuracy for benchtop calibration of Pressure and Temperature process instrumentation

- Incorporating an isolated measurement channel, the 7526A lets you *simultaneously source and measure* Voltage, Current or Resistance, making it easy to calibrate temperature and pressure transmitters, RTD and thermocouple readouts, pressure gauges, digital process simulators, data loggers, multimeters and more

  - Sources and measures DC Voltage, Current, Resistance, RTDs and Thermocouples
  - Measures pressure using Fluke 700, Fluke 750P or Fluke 525A-P Series Pressure Modules
  - Measures 4-20 mA DC loop current
  - Sources 24 V DC transmitter loop power supply
  - Tests pressure and thermal switches with an automated switch-test function
  - Measures thermistors up to 4 kΩ
  - Stores up to nine programmable setpoints for each input/output parameter
  - Accepts ITS-90 coefficients for accurate SPRT measurements
  - Compatible with MET/CAL Calibration Automation Software



Fluke 7526A Precision Process Calibrator – Workload Matrix

Workload	Precision Process Calibrators	 7526A
Analog/panel meters		
High burden meters		
Low burden meters		V dc, I dc & R
DMMs		
Basic dc V accuracy		40 ppm
3.5 digits (typ. ± 0.3 % dc V)		V dc & V ac
4.5 digits (typ. ± 0.025 % dc V)		
5.5 digits (typ. ± 0.015 % dc V)		
6.5 digits (typ. ± 0.0030 % dc V)		
7.5 digits (typ. ± 16 ppm dc V)		
8.5 digits (typ. ± 8 ppm dc V)		

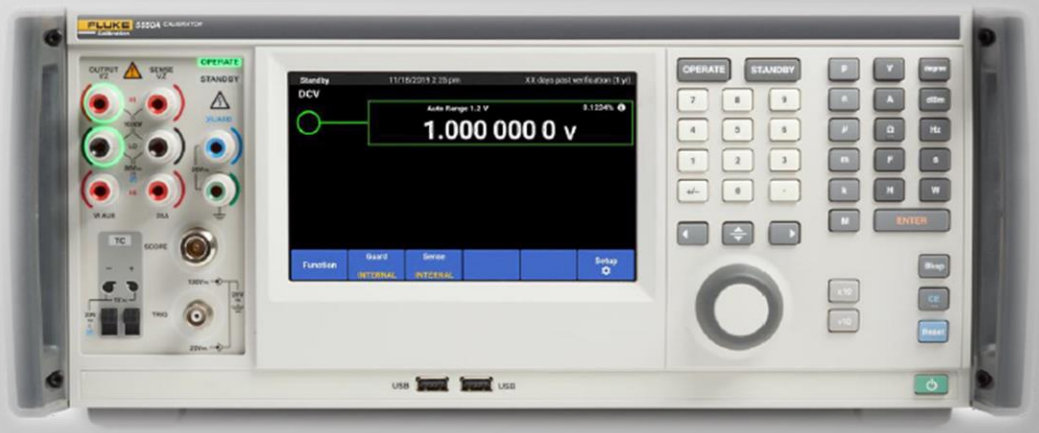
Workload	Precision Process Calibrators	 7526A
Temperature/pressure		
RTD simulate		
RTD measure		
Thermocouple simulate		
Thermocouple measure		
Pressure modules		opt
Two-wire transmitters		
Clamp meters		
LCR meters		
Process calibrators		
Data acquisition		
Non sine waveforms		
RF millivolt meters		
# of calibrator functions		9

Fluke 7526A – Everything you need in one box

- The 7526A packs a lot of capability into one box, allowing you to calibrate a wide-ranging and varied workload

- One calibrator performs all these functions:
  - Simulates and measures nine RTD and thirteen thermocouple types
  - Accurately measures pressure up to 69 MPa (10000 psi) when combined with Fluke 750P Series Pressure Modules
  - Sources and measures DC Voltage to within 0.004% of reading
  - Sources and measures DC Resistance up to 4 kΩ
  - Sources DC Current from 0 mA to 100 mA
  - Accurately measures DC Current from 0 mA to 50 mA
  - Sources 24 V DC loop power

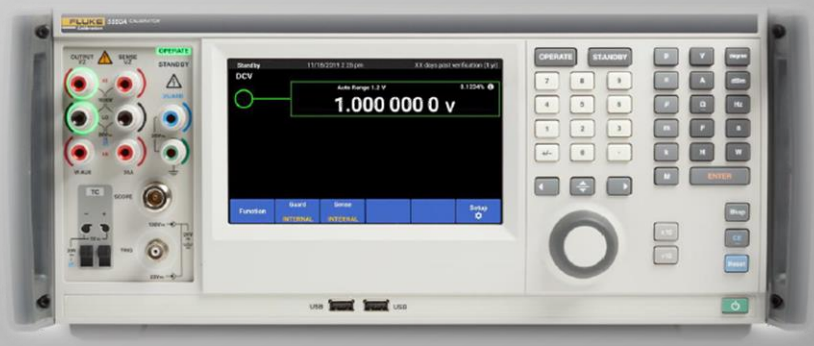
Multi-Product Calibrators
5080A and the 5540A/5550A/5560A series



Multi-Product Calibrators 5080A/55x0A

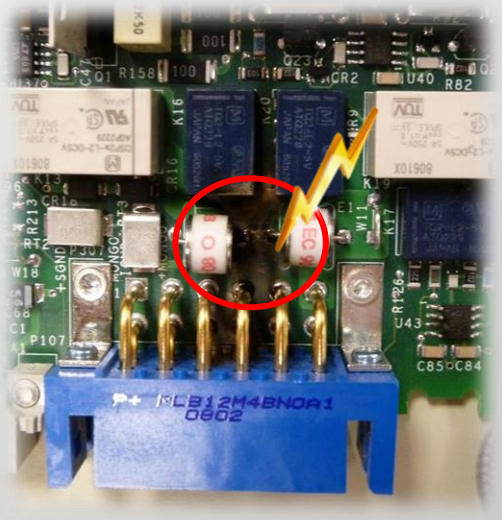
- Industry's most popular 'work horses', calibrate almost everything of the industrial calibration workload

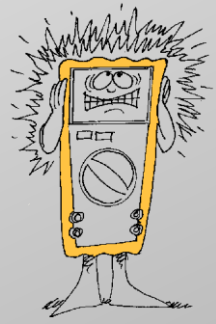
  - Multimeters (analog & digital) up to
    - 3½ Digits & High burden analog (5080A)
    - 3½/4½ Digits (5540A)
    - 4½/5½ Digits (5550A)
    - 5½/6½ Digits (5560A)
  - Data loggers
  - Process calibrators
  - Electronic thermometers
  - Power meters
  - Power harmonics analyzers
  - Counter/timers
  - X-Y/ X-t recorders
  - Panel meters
  - Optional: Oscilloscope, Insulation and Continuity
  - Etc.



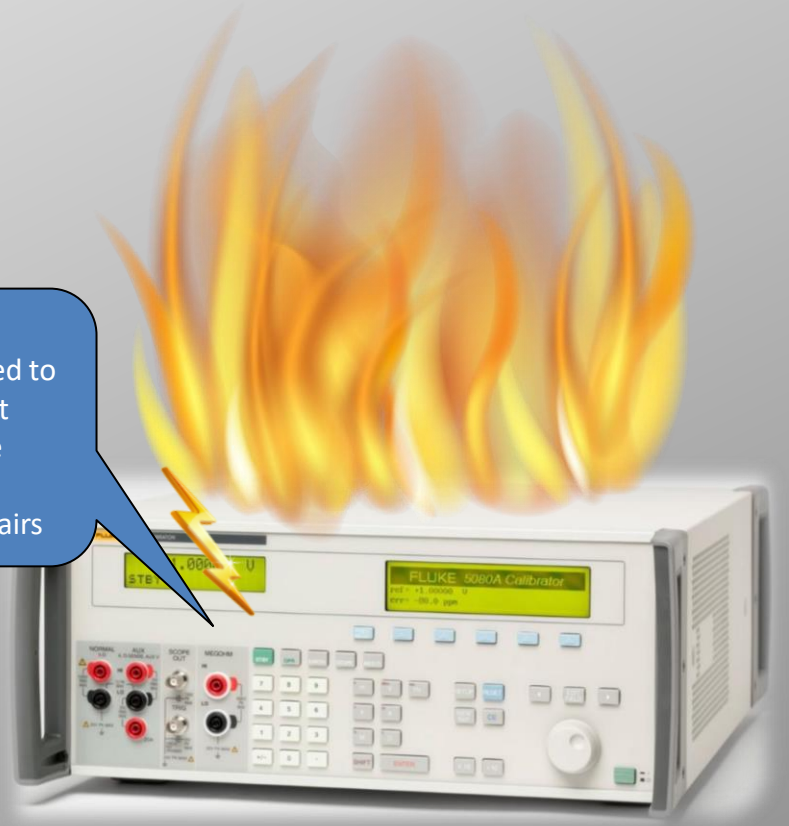
Multi-Product Calibrators – Output Protection

- Fluke Multi-product calibrator innovative protection circuitry prevents it from being damaged by reversed input voltage, leading to very expensive repairs
- “Look before you leap”
  - Under standby mode, the Calibrator will check for harmful voltage before it goes to operate
  - Under operating mode, the Calibrator immediately detects harmful voltage at output terminals and automatically goes to standby
- Resistant to mains voltage up to 300 V_{pk}





Mains voltage inadvertently applied to a calibrator's output terminals can cause extensive damage requiring costly repairs



Multi-Product Calibrators – Workload Matrix

	Multi-Product Calibrators			
				
Workload	**5080A**	**5540A**	**5550A**	**5560A**
Analog/panel meters				
High burden meters				
Low burden meters				
DMMs				
Basic dc V accuracy	100 ppm	31 ppm	11 ppm	8 ppm
3.5 digits (typ. ± 0.3 % dc V)				
4.5 digits (typ. ± 0.025 % dc V)				
5.5 digits (typ. ± 0.015 % dc V)				
6.5 digits (typ. ± 0.0030 % dc V)				
7.5 digits (typ. ± 16 ppm dc V)				
8.5 digits (typ. ± 8 ppm dc V)				

	Multi-Product Calibrators			
				
Workload	**5080A**	**5540A**	**5550A**	**5560A**
Temperature/pressure				
RTD simulate				
RTD measure				
Thermocouple simulate				
Thermocouple measure				
Pressure modules				
Oscilloscopes	1 channel			
600 MHz		600MHz Opt	600MHz Opt	600MHz Opt
1 GHz			1 GHZ Opt	1 GHZ Opt
2 GHz				2 GHZ Opt
4 GHz				
Safety testers				
Hipot				
Megohm meters	MEG opt			
Installation				
PATs				
Continuity	MEG opt			
Loop impedance				
Leakage current				
Ground bond				
RCD/GFCI				
Medical safety				

	Multi-Product Calibrators			
				
Workload	**5080A**	**5540A**	**5550A**	**5560A**
Power/energy				
Wattmeters				
Harmonic analyzers				
Flicker meters				
Phase angle meters				
Power analyzers				
Power recorders				
Secondary energy stan- dards				
Watt-hour/energy meters				
Other				
Clamp meters				
LCR meters		RC only	LRC	LRC
Process calibrators				
Data acquisition				
Non sine waveforms				
RF millivolt meters				
Switch test				
24 V loop Supply				
# of calibrator functions	**8**	**11**	**11**	**11**

Fluke 5080A Multi-Product Calibrator

Fluke 5080A - Workload Coverage

- The 5080A is a 100ppm multi-product calibrator with high compliance for analog meter calibration

- Workload
  - Analog meters
  - Panel meters
  - 3½-digit and some 4½-digit DMMs
  - Watt meters
  - Clamp meters (with Fluke 9100-200 option or 55XX/COIL)
  - Megohm meters / Insulation tester (with /MEG option)
  - Continuity testers (with /MEG option)

- Supported by MET/CAL Calibration Automation Software

Fluke 5080A - Highest Compliance

- The Fluke 5080A has the highest compliance of any calibrator in the Fluke multi-product and multi-function families, making it an ideal solution for calibrating analog and panel meters

Function	Maximum Burden or Compliance Voltage			Range
	5080A	55x0A	5730A	
DCV	600 mA	10 mA	50 mA	0 to 33 V
ACV	800 mA	10 mA	50 mA	3.3 to 33 V
DCI	50 V	7 V	10 V	0 to 33 mA
ACI	44 V*	5 V*	7 V	3.3 to 33 mA

*AC LCOMP on

Fluke 5080A - High Compliance Examples

- Calibrate low impedance Voltage meters with high current compliance
  - The Fluke 113 utility multi-meter has a low impedance function to simultaneously test for voltage or continuity
  - 55XXA trips to standby if voltage not ramped up slowly
  - 5080A can directly output up to 300 V DC and AC (45 Hz, 1 kHz)

- Calibrate analog Ampere meter with high maximum inductive load
  - The Yokogawa 2014 analog VA meter presents a high inductive load of 14 mH in the 150 mA range
  - 55XXA trips with error message “compliance exceeded” (at 60 Hz)
  - With LCOMP on, the 5080A can easily drive the 2014 V-A meter’s 150 mA range

Fluke 5080A - /MEG option

- Extend workload coverage even more
  - 5080A's /MEG option calibrates Megohm meters (Insulation testers) and Continuity testers

Specifications		
FUNCTION	RANGE	BEST UNCERTAINTY
Insulation Resistance		
Resistance	10 kΩ to 18 GΩ	0.20%
Voltage	0 to 1575 V	1%
Continuity		
Resistance	1 Ω to 5.9 kΩ (16 values)	0.1%
Current	700 mA max	

Fluke 5540A, 5550A and 5560A Multi-Product Calibrators

Fluke 5560A – High-Performance Multi-Product Calibrator

- The *Fluke 5560A "High-Performance Multi-Product Calibrator"* is the premium solution to calibrate a wide range of workload and addresses benchtop DMMs up to 6½ digits with a TUR around 4:1

- The calibrator also includes improved functionality beyond that of the Fluke 5522A predecessor, offering:

  - Improved ranging and floor specification
    - Specified on AC down to 3 Hz
  - Inductance functionality
  - 30 A current output
  - Oscilloscope option up to 2.1 GHz

- The product will offer a travel accessory option for calibration professionals who work primarily in the field, and will be supported in MET/CAL™

Fluke 5550A - Performance Multi-Product Calibrator

- The *Fluke 5550A "Performance Multi-Product Calibrator"* is a premium solution to calibrate a wide range of workload and addresses benchtop DMMs up to 5½ digits

- This calibrator is intended to replace the existing features and functionality of the Fluke 5522A Multi-Product Calibrator
  - The Fluke 5550A will offer improved ranging in comparison to the Fluke 5522A and is better aligned to the ranging of existing workload and give better TUR's when calibrating existing workload
  - It will offer a scope option of 600 MHz and 1.1 GHz

- The product will be supported in MET/CAL™

Fluke 5540A - Standard Multi-Product Calibrator

- The *Fluke 5540A "Multi-Product Calibrator"* is the solution to calibrate a wide range of workload and addresses handheld DMMs up to 4½ digits

- This calibrator is intended to replace the existing features and functionality of the Fluke 5502A Multi-Product Calibrator
  - The Fluke 5540A will offer improved ranging in comparison to the Fluke 5502A and is better aligned to the existing workload and is designed to calibrate the most difficult 4½ digit handheld DMMs on the market
  - It will offer a scope option up to 600 MHz
- The product will also be supported in MET/CAL™

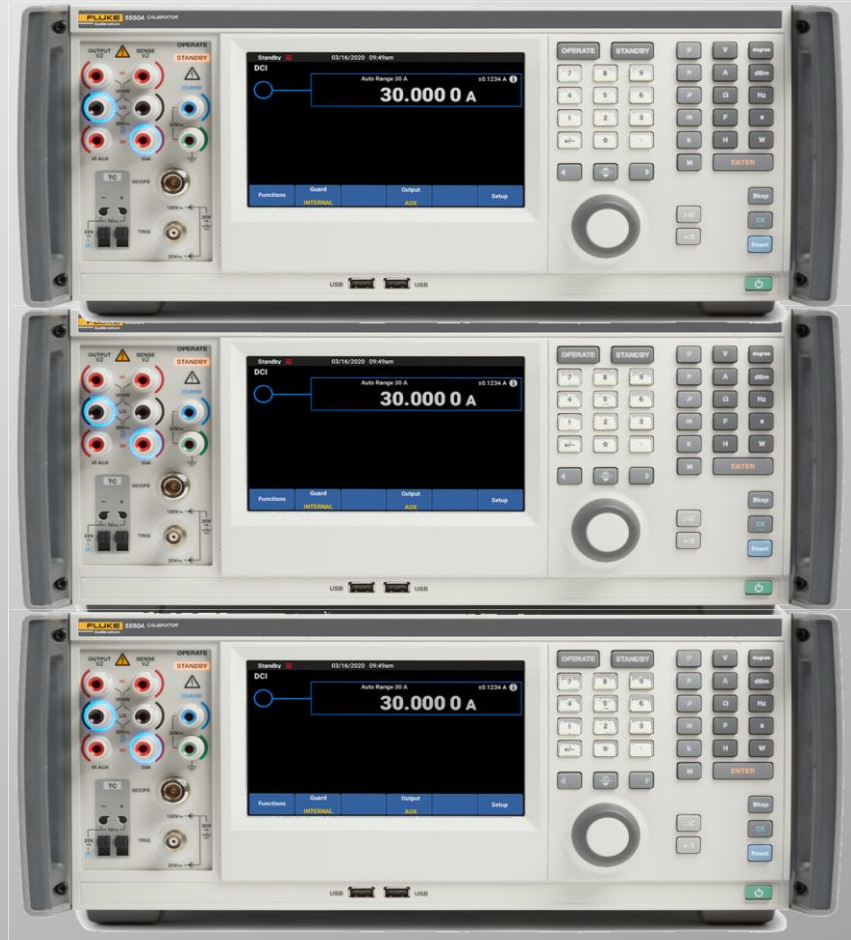
- The 5540A specifications is designed to allow the Fluke 8588A 8½ digit DMM to calibrate it without the need to send the Fluke 5540A back to Fluke for calibration, allowing maximum uptime and minimizing risk for customers (only need one additional shunt for the 30 A)

Fluke 55xxA Series – Functions and Features

- Hardware almost between identical between models
  - Same look
  - Same feel
  - Lower technician training time

- Functions, features and specifications
  - Limited to model

- Upgrade from one model to another
  - *Not* possible
- Upgrade to same model with scope option
  - Obviously possible



Features and Benefits

- Visual Connection Management™
- USB connections on the front for downloading constants and reports
- Very easy operation with large graphical display

Features and Benefits

- New Output Block Design
  - The new terminal layout marks a distinct improvement over older models
  - The 5522A, for example, has shared Sense and AUX terminals, as well as shared ground and guard, so you must change leads frequently during a multimeter calibration

On the 5560A, 5550A, and 5540A, all the terminals are dedicated, and the guard terminal is moved to the side, enabling you to connect the leads once and complete the meter calibration efficiently

The “DMM” Calibration Workload Pyramid

FLUKE® Calibration

Workload

Volume of Product in the Field

Calibrators

LS DMMS (7½ /8½ Digits)

BENCH DMMS (6½ Digits)

BENCH DMMS (5½ Digits)

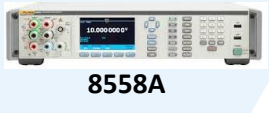
HANDHELD DMMS (4½ Digits and below)

Workload Coverage

$$$/Calibration


8588A


3458A


8558A


34470A


8846A


34465A


34461A


8845A


34450A


SDM3055


U1251B


DMM 90


87V

Multi-Function Calibrators


5730A

5560A Addressing market gap at high-end 6.5 Digit DMM Market


5560A

Multi-Product Calibrators

Claim 6.5-digit but really-5.5 digit (specsmanship and marketing)


5550A


5522A


5540A

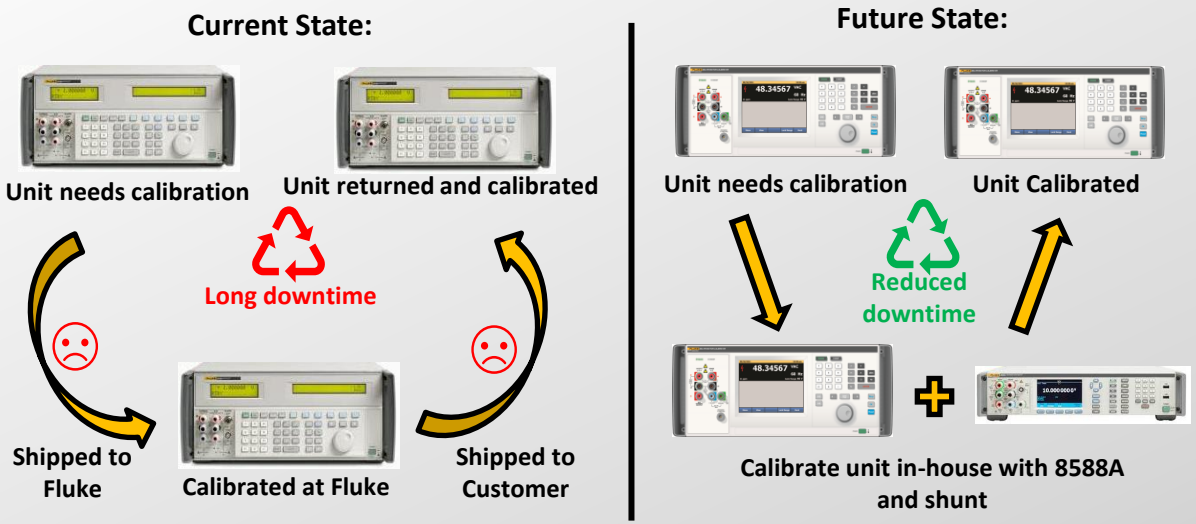

5502A

Multi-Product Calibrators Capabilities

95% Uncertainty 1 year (Range + Floor)		Fluke Multiproduct Calibrators		
				
		5560A	5550A	5540A
Standard Functions	**Range**		Best Performance	
Direct Volts	0 V to ±1020 V	6 ppm + 1 µV	9 ppm + 1.2 µV	24 ppm + 2 µV
Alternating Volts	1 mV to 1020 V; 3 Hz to 500 kHz	110 ppm + 5 µV	120 ppm + 7 µV	780 ppm + 7 µV
Direct Current	0 to ±30.2 A continuous	78 ppm + 15 nA	85 ppm + 18 nA	85 ppm + 18 nA
Alternating current	0 to ±30.2 A continuous; 3 Hz to 30 kHz	120 ppm + 5 µA	310 ppm + 12 µA	1600 ppm + 20 nA
Resistance	0 Ω to 1200 MΩ; variable	19 ppm + 1 mΩ	22 ppm + 2 mΩ	50 ppm + 1.5 mΩ
Capacitance	200 pF to 120 mF; variable	0.09% +2 pF	0.16% + 50 pF	0.19% + 50 pF
Inductance	12 uH to 12 H; variable	0.09% + 1 µH	0.16% + 1.2 µH	N/A
Temperature	ITS-90 or IPTS-68	15 TC; 10 RTD Types		
ACV ACI waveforms		Sine, Square		
Power (dual output)		30.9 kW		N/A
Oscilloscope Functions	**Range**	2 GHz, 1 GHz or 600 MHz	1 GHz or 600 MHz	600 MHz
ACV	0V to 120V; 10 Hz to 10 kHz Square Wave	0.1% 1 MΩ; 0.25% 50 Ω		
DCV	0V to 120V; 50 Ω or 1 MΩ load	0.05% 1 MΩ; 0.25% 50 Ω		
Edge	5 mV to 2.5V	< 175 pS		
Leveled Sine Flatness	5 mV to 5.5V; 50 Ω	5% 1.1GHz to 2.1 GHz	4% 600 MHz to 1.1 GHz	3% 50 kHz to 600 MHz
Marker	1 V p-p; spike, square or pulse	2.5 ppm		
Pulse	4 to 500 nS width	yes		
Resistance & Capacitance Measure	50 Ω or 1 MΩ; 5 to 50 pF	yes		
Input Overload	5 to 9 V AC or DC; 1 to 60 Sec	yes		
General Specifications				
Communication Interfaces	GPIB; Serial; Ethernet; USB TMC	yes		
Specification Interval		90d, 1yr, 2yr	90d, 1yr	1yr
Specification Confidence		99% (k=2.78) and 95% (k=1.96)		
Input/Output Terminals		5-way binding post		
Touchscreen		17.8 cm (7 in.) Graphical User Interface		
Transport Case (w/ Wheels)		Included Standard		
Coil Options/Compatability		55XXA/COIL 50 and 55XXA/COIL 10		
Reverse Power Protection		yes		

5540A The Best Solution for Handheld DMMs

Simplified Customer Calibration Workflow (Uptime)



5540A Specifications intentionally set to target handheld DMMs

- Fluke 87 was the lighthouse workload target

5540A Specifications allow simplified calibration and verification with 8588A Reference Digital Multimeter

- Need one additional shunt for the 30 A range
- Can reduce customer downtime

5550A Same Value as 5522A with “delight” factors

Simplified Workflow Improvement Summary

Current State:

Dated User Interface

Improper ranging may result in guard-banding

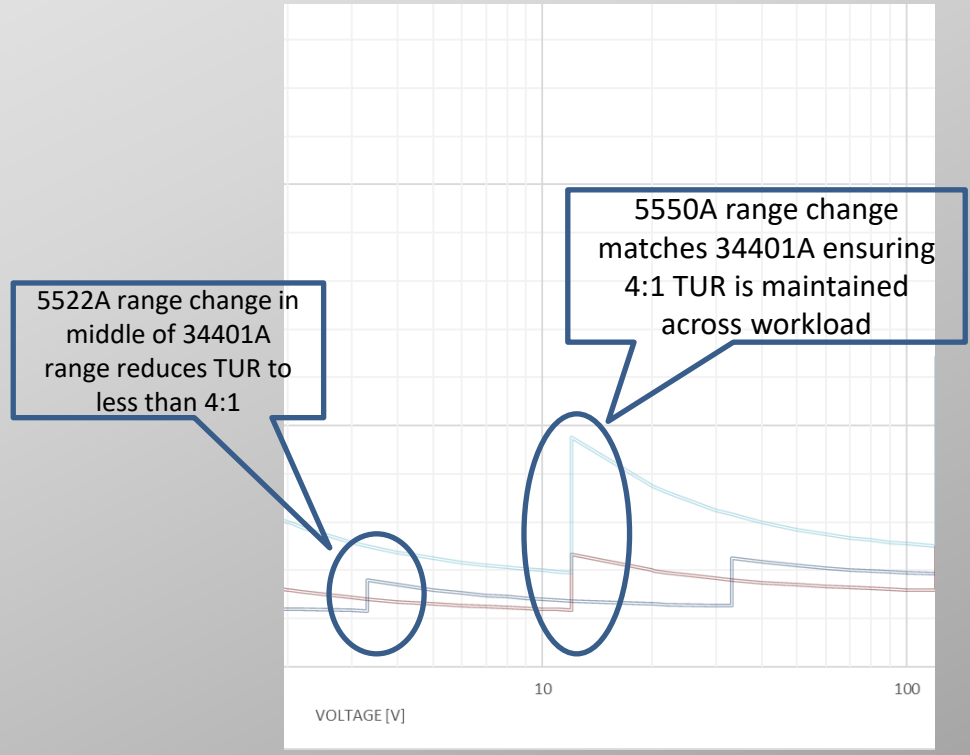
Calibrated Unit

Future State:

Modern User Interface

Ranging aligned with workload

Calibrated Unit



5550A Replaces 5522A with improvements to delight users:

- Improved graphical interface
- Visual connection terminals
- New output block improves automation
- 30 Amp Continuous

New 1.2 ranging matches common DMM workload, making easier uncertainty analysis

5560A Simplifies Bench DMM Workload

Simplified Workflow Improvement Summary

5522A:

Change Connections
Manage Multiple Standards

Manage Multiple
Uncertainties

Calibrated Unit

5560A:

Single
Product
To Manage

Uncertainties of
1 instrument

Calibrated Unit

Example 6½ digit workload

Most common 6½ digit DMMs required more than 5522A to calibrate to 4:1 TUR

- Samples of 6½ digit workload
  - Keysight 34401, 34460A, 34461A
  - Keithley DMM6500, 2100
  - Fluke 8846A/8845A

All above DMMs can be calibrated with 5560A without additional equipment and maintain 4:1 TUR

New Options Supports Next Generation of Scopes

- Three scope options increase workload coverage
  - 2 GHz
  - 1 GHz
  - 600 MHz
- Higher bandwidth, faster edge
  - Increase workload coverage
- Improved signal purity
  - Improves uncertainty
- Utilizes superior 55XXA Series User Interface
  - Faster access, less operator errors, reduced training time

	600 MHz	1 GHz	2 GHz
5560A	✓	✓	✓
5550A	✓	✓	
5540A	✓		

Everything needed to calibrate modern scopes from one place

- Enhanced capabilities verify/calibrate most important oscilloscope specifications
  - Vertical accuracy
    - DCV or ACV
  - Bandwidth
    - Levelled Sine
  - Rise-time/Aberration
    - Edge/Pulse
  - Horizontal/time base
    - Marker
  - Trigger
    - Video/Pulse
  - Input Impedance
    - Resistance & Capacitance Measurements
    - Overload

Options

- Optional accessories and software

  – Optional digital multimeter connection block/kit for ultimate convenience
  – Optional portability kit for convenient and protected transport
  – New, optional 1, 2, 10-turn coil
  – New, optional 50-turn current
  – Gold and Silver Instrument Care Plans

  – Automate with MET/CAL™ software for consistent, documented calibrations

55xxA/DMMCAL – Optional Output Block

- The 5560A is designed to allow the target benchtop DMMs to be calibrated with a minimum number of manual connection changes
  - All terminals do have a dedicated function
- The 5560A will use five-way binding posts, the binding posts will include:
  - Norm Hi
  - Norm Lo/Current Lo
  - Sense Hi
  - Sense Lo/Current Lo
  - Low Current Hi
  - High Current Hi

- The DMMCAL optional output cable combines all leads into one accessory
  - Faster Automation Performance

New Coils, 1-2-10 turns and 50 turns

- 50-turn coil
  - 20 A continuous
  - 30 A for 5 minutes
  - Duty Cycle:
    - <= 20 A continuous
    - > 20 A 50%, max 5 min.

- 1-2-10-turn coil
  - Max current
    - 300 A, 60 A and 30 A
  - No duty cycle

Highlights

- 3 Models
  - Fluke 5540A equivalent in accuracy level to Fluke 5502A, but with 30 A
  - Fluke 5550A equivalent in accuracy level to Fluke 5522A, but with 30 A and Inductance
  - Fluke 5560A sits above the Fluke 5522A and in between the Fluke 5522A and Fluke 5730A
- Range breaks at decades of 1.2 matching the most demanding workload
- Fluke 5560A gives 4:1 TUR for most 6½-digit DMM's
  - Low noise
- 30 A continuously – new coils 1-2-10 and 50 turns
  - Increasing the workload with clamp meters up to 1500 A
- Inductance (not on Fluke 5540A)
- *Frequency specified down to 3 Hz*, needed by most 6½-digit DMM's
- Faster settling time and faster response time
  - 1000 V 60 Hz, 1.12 s instead of 6.21 s
- 95% and 99% specifications
  - 90-day, 1-year and 2-year depending on model

Highlights

FLUKE® Calibration

- Easy operation with 17.8 cm (7”) color touch screen with new GUI
  - Flat menu structure – very easy operation – very little training required
  - Pop up menus for coil selection, waveforms, phase control, etc.
- *Oscilloscope calibration options up to 2.1 GHz*
  - Same easy operation
- New output block design – dedicated terminals – less lead changes
- New TC terminal block with connection to bare wires, mini plugs and normal TC plugs
- Visual Connection Management™ with green for Voltage and blue for current
- Reverse power protection, protection up to 300 V_{pk}

- GPIB, RS-232, USB and Ethernet control
- MET/CAL™ Compatible

- Complete new look and feel
- *Lead-kit and carrying case included!*

FLUKE®
Calibration

Questions?

Fluke 5730A Multi Function Calibrator

Fluke 5730A Multi Function Calibrator

- Since 1988, the 5700A family has set the standard for multifunction calibrator performance in calibration laboratories around the world

- The Fluke Calibration 5730A High Performance Multifunction Calibrator is the culmination of years of engineering development, customer research and industrial design, to bring to market the new "**Gold** standard" in electrical multifunction calibration

Fluke 5730A Multi Function Calibrator

- Product Features

  – High-Performance Multifunction Calibrator, most typically used in bench calibration applications
  – It performs the 5 basic functions still found today in high performance DMMs, but it does it better than any other electrical multifunction calibrator on the market today
    – AC and DC voltage, AC and DC current, resistance
  – It has EVERYTHING the former famous 5700A/5720A Series had:
    • Best specifications of any multi function calibrator
    • 30 MHz Wideband option
    • Artifact Calibration

    • And More……..

Fluke 5730A Multi Function Calibrator

- More Product Features

  - Improved specifications for AC Voltage, AC Current, & Resistance
  - 50 MHz Wideband option next to the 30 MHz Wideband option (option /3 or /5)
  - 6.5” / 16.25 cm VGA Touchscreen GUI in various international languages
  - Visual Connection Management™
  - Closed loop compatibility with 52120A and 5725A Amplifiers
    - But not with the 40-year-old 5220A or 5205A/5215A’s
  - Interfaces next to RS232, GPIB
    - Ethernet, and
    - 2x USB:
      - Artifact Calibration and cal-check data storage @ front
      - Bus control @ back

Fluke 5730A Multi Function Calibrator – Workload Matrix

	Multi-Product Calibrators				Multifunction Calibrators
					
Workload	**5080A**	**5540A**	**5550A**	**5560A**	**5730A**
Analog/panel meters					
High burden meters					
Low burden meters					
DMMs					
Basic dc V accuracy	100 ppm	31 ppm	11 ppm	8 ppm	4.5 ppm
3.5 digits (typ. ± 0.3 % dc V)					
4.5 digits (typ. ± 0.025 % dc V)					
5.5 digits (typ. ± 0.015 % dc V)					
6.5 digits (typ. ± 0.0030 % dc V)					
7.5 digits (typ. ± 16 ppm dc V)					
8.5 digits (typ. ± 8 ppm dc V)					

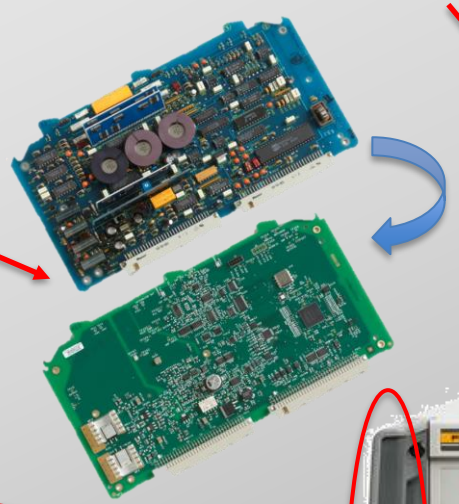
	Multi-Product Calibrators				Multifunction Calibrators
					
Workload	**5080A**	**5540A**	**5550A**	**5560A**	**5730A**
Other					
Clamp meters					
LCR meters		RC only	LRC	LRC	
Process calibrators					
Data acquisition					
Non sine waveforms					
RF millivolt meters					30 and 50 MHz WB opt
Switch test					
24 V loop Supply					
# of calibrator functions	**8**	**11**	**11**	**11**	**5**

Fluke 5730A Multi Function Calibrator

- More Product Features

  – 9 GUI Languages:
    • English, French, German, Spanish, Portuguese, Chinese (simplified), Russian, Korean, Japanese

  – New internal surface mount PCA technology



  – Ergonomic soft touch handles
    • Easy access for Spade Lug connections

  – Copper - Beryllium alloy terminals

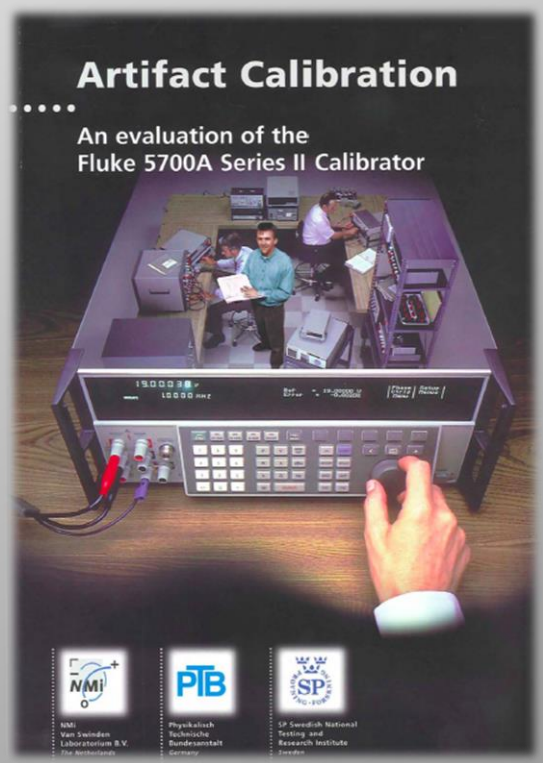
  – 5700A/5720A emulation mode
  – Supported by MET/CAL™ Calibration Automation Software

Fluke 5730A Improved Specifications and Workload

- Long-scale Digital Multimeters (DMMs) up to 8½ digits
  - Keysight/Agilent 34401A/34410A
  - Fluke Calibration 8508A/8558A/8588A
  - Keysight/Agilent 3458A
  - All other DMMs from 3½ – 8½ digits
- Clamp meters up to 6 kA
  - When paired with a Fluke Calibration 52120A transconductance amplifier and coil
- RF millivolt meters with the 30 MHz or 50 MHz Wideband AC frequency options (option /3 and /5)

Fluke 57x0A Series - Artifact Calibration

- Simplified support of the 57x0A series calibrators with complete confidence
  - Only three artifact standards: a 10 V DC reference and 1 Ω and 10 kΩ resistance references are required to calibrate all ranges and functions to full specifications
  - Front panel instructions prompt the operator to make connections and inputs each step of the way
  - The calibrator controls the process, taking only about an hour (of which 5 minutes are required for an operator) compared to several (up to 8) hours using traditional methods
  - Thousands of 57x0A calibrators in service around the world prove Artifact Calibration delivers fast, easy and inexpensive calibration along with the confidence that your instrument is performing as expected between calibrations
  - Evaluation report available on request



Fluke 5730A Options and accessories

Model Name	Description
5730A	Multifunction Calibrator
5730A/03	Multifunction Calibrator with 30 MHz Wideband AC Voltage Option
5730A/05	Multifunction Calibrator with 50 MHz Wideband AC Voltage Option
5730A/S	Multifunction Calibrator with No Front Panel USB Port

Accessory	Description
5730A-7002	Low Thermal EMF Cables with Banana Plugs
5730A-7003	Low Thermal EMF Cables with Spade Connectors
Y5737	5790B and 5700A/5720A Rack Mount Kit. Includes 24 in. slides that allow for side ventilation
Y5738	5730A Rack Ear Kit
57XX/CASE	Transit Case for 57XXA Series

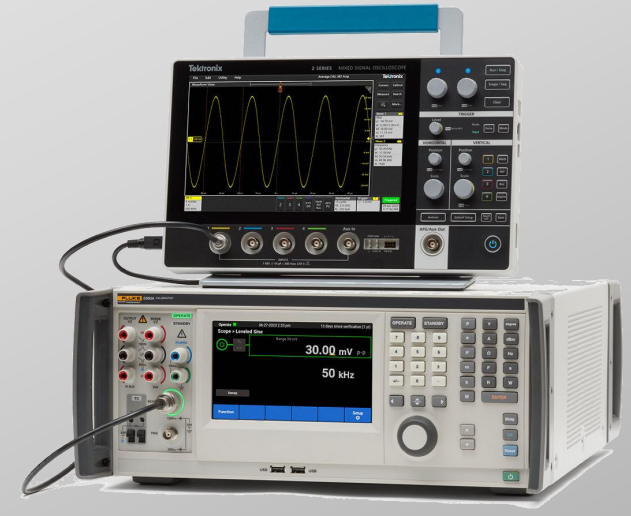
The new Fluke 9500C High-Performance Oscilloscope Calibrator

Efficient, effective, productive

The Fluke 9500C High-Performance Oscilloscope Calibrator is a dedicated modern oscilloscope calibrator designed for calibration professionals who need to cover workloads below 4 GHz accurately, reliably, and efficiently

History of Fluke Calibration Oscilloscope Calibration

Dedicated and Multi-Product solutions



Multi-Product

Dedicated

Introducing the 9500C

- Features and benefits:
  - Better accuracy
  - High signal purity
  - High bandwidth
  - 4 channels
  - Leveled sine waves up to 4 GHz

- Improvements include:
  - More robust Active Head Technology™
  - Fully automated with MET/CAL Software for hands-free operation
  - Simultaneous outputs on all channels increase tests speed and efficiency and eliminates the need for lead changes
  - Color touchscreen with an updated, easy-to-use interface
  - Updated hardware for improved reliability and serviceability

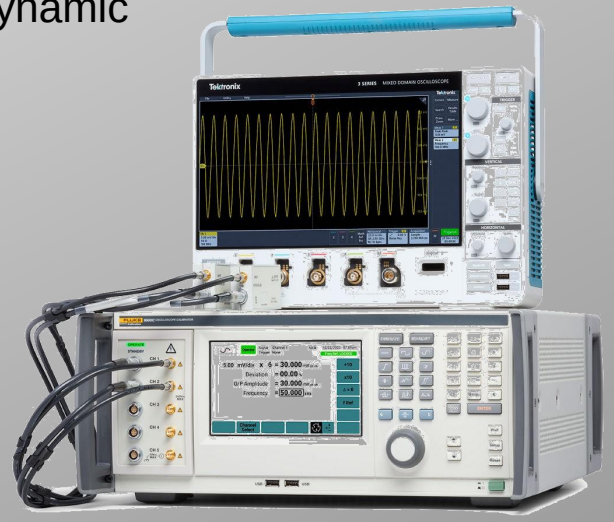
The Fluke 9500C Oscilloscope Calibrator

- Revolutionizing Oscilloscope with Superior Performance and Automation

  – Oscilloscope calibration traditionally demands extensive time, expertise, and equipment, often involving intricate operator interactions and frequent lead switching, especially for multi-channel instruments

  – Many automated systems still require significant manual input, adding to the complexity
    - Additionally, rapid advancements in oscilloscope technology necessitate continuous investment to keep pace with evolving performance standards

  – The Fluke 9500C Oscilloscope Calibration Workstation fundamentally changes this dynamic

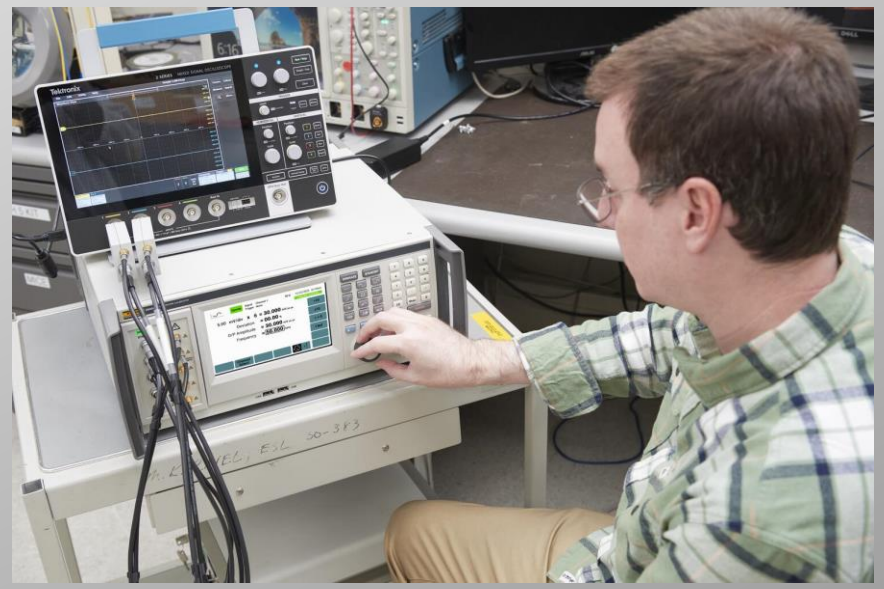


Key Advantages of the Fluke 9500C

- Full Automation
  - Achieve completely hands-free calibration for even the most sophisticated, multi-channel oscilloscopes

- Continuous Upgradeability
  - Protect your investment with a system designed to adapt to future technological advancements

- Simultaneous Multi-Channel Output
  - Eliminate the need for lead changing and complex signal multiplexing, enhancing efficiency



Key Advantages of the Fluke 9500C

- High-Performance Calibration
  - Leveled sine waves up to 4 GHz and edges as fast as 125 ps cater to the calibration needs of both current and future high-performance oscilloscopes

- Active Head Technology™
  - Generate calibration signals directly at the oscilloscope input, ensuring waveform accuracy and eliminating doubts about lead-induced aberrations

Fluke 9500C vs. Fluke 5540A/5550A/5560A




	Fluke Multiproduct Calibrators				Fluke Oscilloscope Calibrators	
		5560A	5550A	5540A		9500C with 9540C Head
Oscilloscope Functions	**Range**	**2 GHz, 1 GHz or 600 MHz**	**1 GHz or 600 MHz**	**600 MHz**	**Range**	**4 GHz**
Square Wave	1 mV to 120 V into 1 MΩ 1 mV to 6.6 V into 50Ω 10 Hz to 10 kHz		0.25% 50 Ω 0.1% 1 MΩ		40 µV to 200 Vp-p into 1 MΩ; 40 µV to 5 Vp-p into 50 Ω; 10 Hz to 100 kHz	≥ 1 mV: ± (0.1 % + 10 µV) < 1 mV: ± (1 % + 10 µV)
DCV	0V to 120V into 1 M load 0 to 6.6V Into 50 Ω load		0.05% 1 MΩ 0.25% 50 Ω		1 mV to 200 V into 1 MΩ; 1 mV to 5 V into 50 Ω	± (0.01% + 10 µV)
Edge	5 mV to 2.5V into 50Ω		< 175 ps		5 mV to 3 Vp-p into 50 Ω; 5 mV to 3 Vp-p into 50 Ω or 1 MΩ	125 ps 500 ps
Leveled Sine Flatness	5 mV to 5.5V; 50 Ω	5% 1.1GHz to 2.1 GHz 4% 600 MHz to 1.1 GHz 3% 50 kHz to 600 MHz	4% 600 MHz to 1.1 GHz 3% 50 kHz to 600 MHz	3% 50 kHz to 600 MHz	5 mV to 5 V; 50 Ω	0.1 Hz to 550 MHz - 1.5% 550 MHz to 1.1 GHz - 2% 1.1 GHz to 2.1 GHz - 3% 2.1 GHz to 4.2 GHz - 4%
Marker	500 ps to 5s		±2.5 µs/s		250 ps to 50 s	± 0.15 µs/s
Pulse	4 to 500 nS		±2 ns		1 ns to 100 ns	< ± (5% + 500 ps)
Resistance & Capacitance Measure	40 Ω to 60 Ω or 500 kΩ to 1.5 MΩ 5 to 50 pF		±0.1% ± 5% + 0.5 pF		10 Ω to 12 MΩ 1 pF to 95 pF	± 0.1 % ± (2 % + 0.25 pF)
Input Overload	1 to 60 Sec		5 V to 9 V		0.2 s to 100 s	5 V to 20 V into 50 Ω

Fluke 9500C Oscilloscope Calibrator

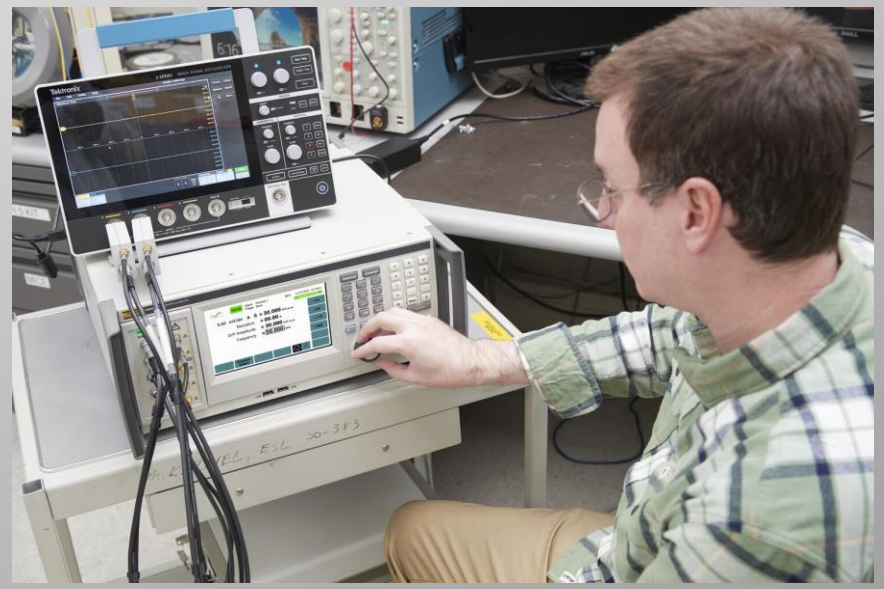
FLUKE® Calibration

OVERVIEW

The most efficient, effective, and productive scope calibrator on the market.

Your key to exceptional signal performance

- Simultaneous output
- Easily switch between 1 MΩ and 50 Ω
- Timing accuracy of ±0.25 ppm
- Increased auxiliary function capabilities
- Fully automate with MET/CAL



Fluke 9500C Oscilloscope Calibrator

9540C Active Head Technology™

OVERVIEW

The ability to completely automate your scope calibration

New Active Heads with improved performance

Control trigger and up to 4 channels simultaneously

- Precision DC up to ± 220 V
- Calibrated square waves up to 210 $V_{pk\text{-}pk}$ from 10 Hz to 100 kHz
- Leveled sinewaves from 0.1 Hz to 4 GHz

Fluke 9500C Oscilloscope Calibrator

Service and Reliability

OVERVIEW

Higher uptime, improved performance

New Active Heads, Resilient Design

Field Replaceable Components:

- BNC Adapter
- Analog Signal Cable
- Digital Control and Power Cable

Improved internal components

Fluke 9500C Oscilloscope Calibrator

Bandwidth Testing and Error Analysis

OVERVIEW

True bandwidth testing up to 4 GHz and a guide to oscilloscope calibration

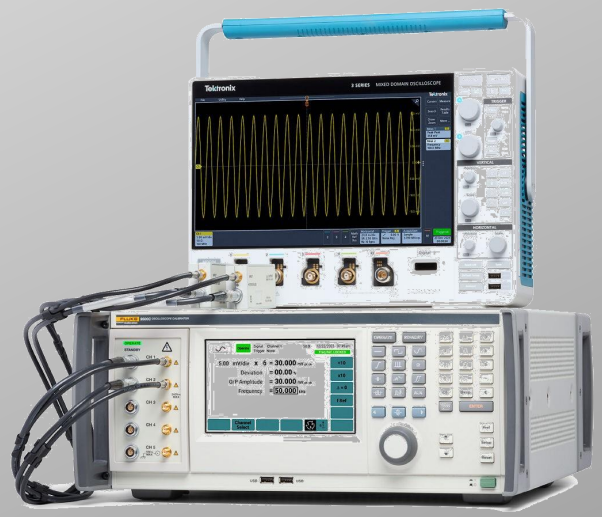
The Calibrator | Active Heads | Reliability | Use Cases

Make the best use of your machine

Improved Bandwidth and signal purity make testing more precise.

Automated switching between 50 Ω and 1 MΩ at the Active Head

Close to perfect VSWR outputs



30-40% Faster

More Reliable

Supports Up to 4 GHz

Simultaneous Output

Fully Automated

Backwards Compatible

Faster Edge

Efficient

Effective

Productive

Fluke 5322A Multifunction Electrical Tester Calibrator

Fluke 5322A Multifunction Electrical Tester Calibrator

- The Fluke Calibration 5322A Multifunction Electrical Tester Calibrator, with 5 kV voltage measurement and optional 5 kV high-resistance sourcing, can easily calibrate your entire electrical safety tester workload
- The workload ranges from
  - Older hand-cranked insulation testers
  - Current day safety testers such as
    - Insulation resistance testers
    - Hipot testers
    - RCD testers
    - Earth ground resistance testers
    - Loop/line impedance testers
    - Ground bond testers, portable
    - Appliance testers (PATs)
    - Multi-function testers

- Basically, the 5322A can simulate the applications of electrical testers with known and traceable parameters

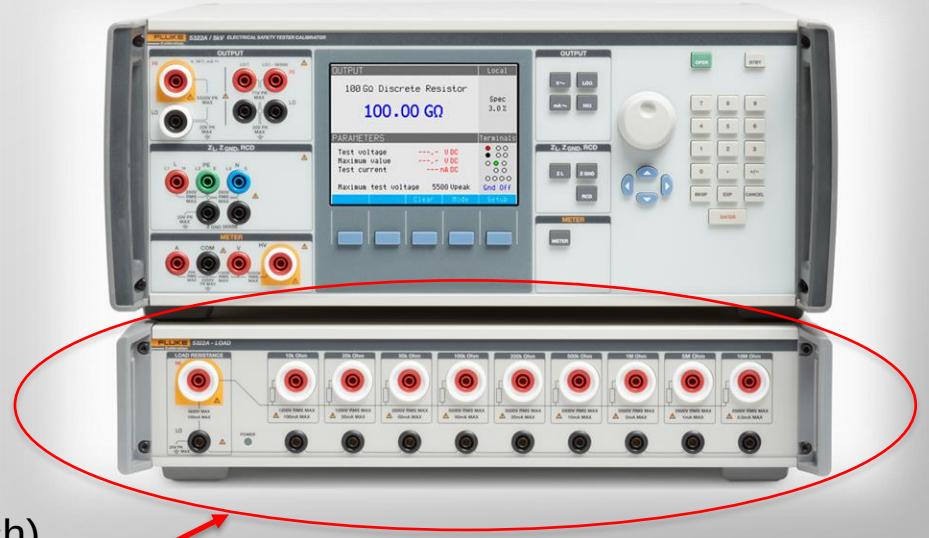
Fluke 5322A Multifunction Electrical Tester Calibrator – Workload matrix

Workload	Electrical Tester Calibrator 5322A
Analog/panel meters	
High burden meters	
Low burden meters	V dc & V ac
DMMs	
Basic dc V accuracy	0.10 %
3.5 digits (typ. ± 0.3 % dc V)	V dc & V ac
4.5 digits (typ. ± 0.025 % dc V)	
5.5 digits (typ. ± 0.015 % dc V)	
6.5 digits (typ. ± 0.0030 % dc V)	
7.5 digits (typ. ± 16 ppm dc V)	
8.5 digits (typ. ± 8 ppm dc V)	

Workload	Electrical Tester Calibrator 5322A
Safety testers	
Hipot	
Megohm meters	
Installation	
PATs	
Continuity	
Loop impedance	
Leakage current	
Ground bond	
RCD/GFCI	
Medical safety	

Fluke 5322A - Features

- Functions & Features:
  - Low resistance source (2, 3 & 4 wire)
  - High resistance source (1.5 kV standard, 5 kV optional)
  - Ground Bond resistance source (2 & 4 wire)
  - Line/Loop impedance sources
  - Leakage current source
  - RCD (RCD, MFT & PAT tester compatible)
  - AC/DC Voltage calibrator (/VLC option only)
  - Multimeter (also provides Hipot Voltage, Leakage/Trip & Timer and PAT Flash)

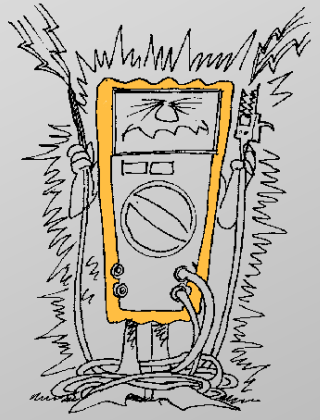


- Supported by MET/CAL™ Calibration Automation Software
  - Can emulate older 5320A on remote control

- An optional 5322A-LOAD 5 kV high resistance load option is available with 5 kV high-voltage resistors to allow direct connection to Hipots for leakage tests
  - The 5322A-LOAD is unique in that it not only supports 5 kV but has nine high-voltage resistors, ranging from 10 kΩ to 10 MΩ, that can be combined in parallel, within voltage limits, to obtain more precise results

Fluke 5322A: High-Ohms – Insulation resistance

- Optional choice of existing 1.5 kV (5322A) or 5 kV High-Voltage resistance (5322A/5) version
- Using the “High Ohms” function, the 5322A sources real resistors, 4½ digits of resolution
  - 10 kΩ to 10 GΩ continuously variable, 100 GΩ fixed (1.5 kV Version, as the 5320A)
  - 10 kΩ to 100 GΩ continuously variable (5 kV Version)
  - To 10 TΩ using the external resistance multiplier (up to 10 kV)
- During operation, the 5322A simultaneously measures the test voltage and calculates the current from the insulation tester
  - To 1575 V_{peak} (1.5 kV version)
  - To 5500 V_{peak} (5 kV version)



Fluke 5322A: Low-Ohms – Earth resistance / continuity

- Using the “Lo Ohms” function, the 5322A sources real resistors, 3½ digits of resolution
  - 10 mΩ fixed value
  - 100 mΩ to 10 kΩ
  - 2-, 3- or 4-wire
- During operation, the 5322A simultaneously measures the test current from the earth tester
  - Up to 700 mA (1000 mA for the 10 mΩ fixed value)
  - Check the “Maximum Test Current” value on the display, it differs per selected Ω-value
    - The calibrator will trip to standby if the maximum is exceeded

Fluke 5322A: Loop and Line Impedance

- Using the “Loop impedance” function (Z_L), the 5322A sources discrete resistors
  - 16 discrete values
  - 20 mΩ to 1700 Ω
  - The 5322A places the known resistor value in series with the loop or line, either in the N or PE path
- Compensation for residual impedance with the /VLC option

Fluke 5322A: RCD

- Using the “RCD” function, the 5322A simulates the perfect RCD with a calibrated timer and current meter
  - RCD trip current range
    - 3 mA to 3 A
  - RCD trip time range
    - 10 ms to 5 s
- During RCD simulation the 5322A also measures the waveform type
  - Positive and positive pulse
  - Negative and negative pulse
- Portable RCD testing function for PAT Testers

Fluke 5322A: Ground Bond

- The tester expects a calibrated Low-Ohm value which it can measure with a relatively high current
  - Currents can go up to 30 A or 40 A
  - Therefore, the Low Resistance function of the calibrator can not be used
- Using the “Z_{GND}” function, the 5322A places high current rated resistors between the N and PE terminals
  - 2 Wire: 20 mΩ – 1700 Ω
  - 4 Wire: 1 mΩ – 1700 Ω
- During operation, the 5322A also measures the test current from the DUT
  - Maximum continuous test current: 30 A
  - Maximum short-term test current: 40 A

Fluke 5322A: Leakage Current

- Using the “mA~” function, the 5322A places resistors between the HI and LO terminals and uses the voltage source from the DUT to simulate the leakage current
  - 0.1 mA to 30 mA
  - 10 µA resolution
  - 3 (or 4 with /VLC option) different measurement types
  - The 5322A can source voltage for testers without internal voltage supply (/VLC option)

Fluke 5322A: Meter Function

- Using the “METER” function, the 5322A can measure the voltage and current simultaneously
  - 1100 V AC/DC or 5 kV AC/DC, 10 kV with divider, 40 kV with 80K-40 probe
  - 30 A AC/DC
- It calculates the power, selectable in VA, VAR or W
- It also displays the phase, selectable as phase angle (in degrees) or power factor
- Inputs are now floating to cover Class II measurements with 1.5 kV common mode

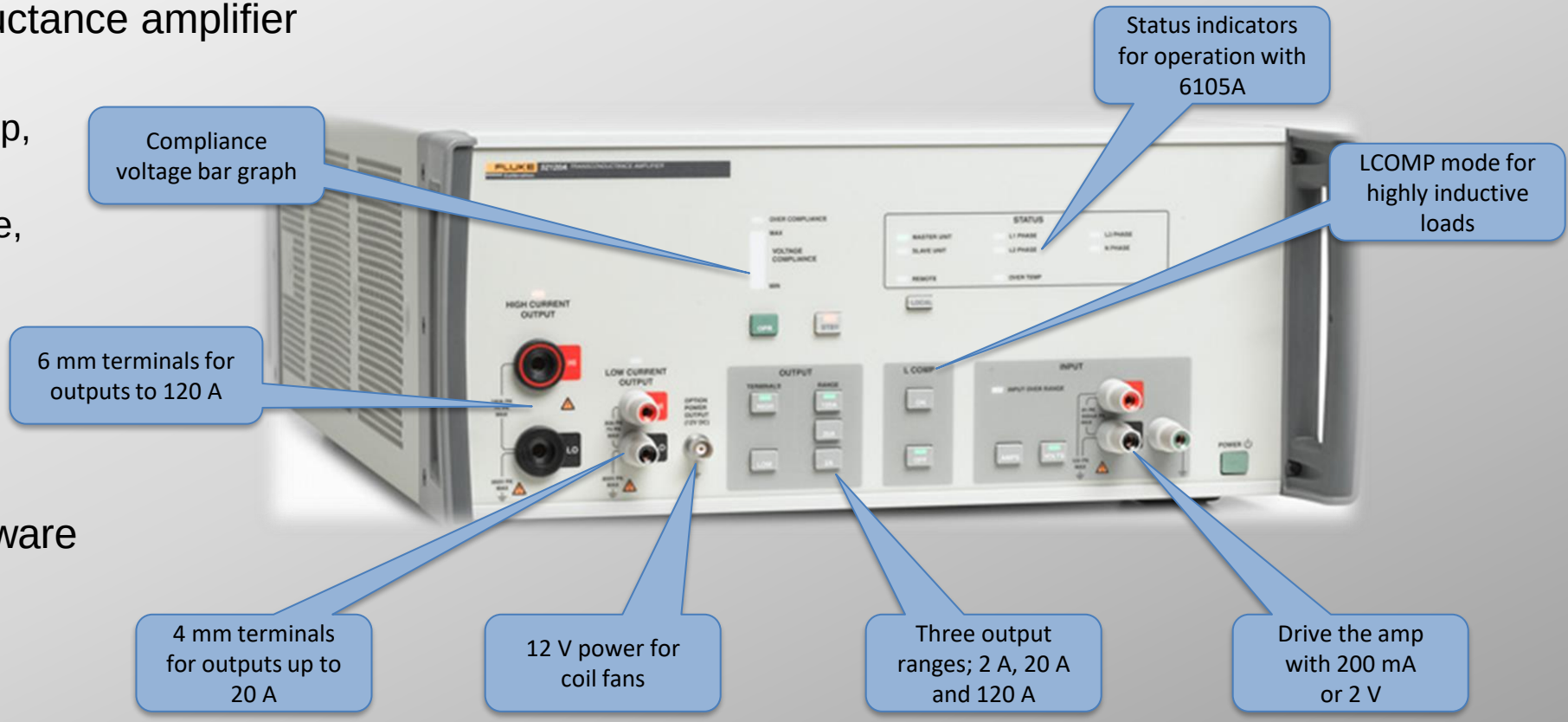
FLUKE®
Calibration

Amplifiers

Fluke 52120A 120 A Amplifier

Fluke 52120A at a glance

- Address high-current workload with 120 A amplifier
- Gain amplifier or transconductance amplifier
  - Output DC to 10 kHz
  - Parallel operation, closed-loop, to 240 A or 360 A
  - Parallel operation, standalone, to 1200 A
  - Drive accessory coils for 3000 A or 6000 A
- Supported by MET/CAL Calibration Automation Software

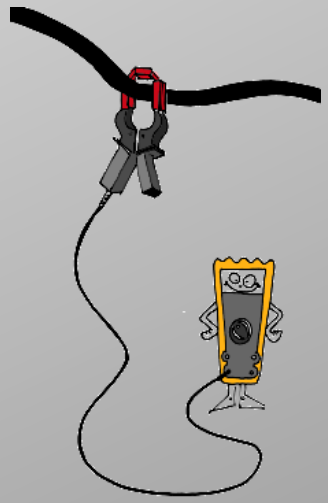


Fluke 52120A: Points of differentiation

- Best accuracy on the market
  - 140 µA/A AC (used with 6100 series Electrical Power Standard)
  - 150 µA/A DC (used with DC/LF calibrator)
  - 350 µA/A AC (used with DC/LF calibrator)
- Operational flexibility
  - Input either 200 mA or 2 V, DC and AC to 10 kHz
  - Output ranges of 2 A, 20 A, 120 A, DC and AC to 10 kHz
  - Compliance voltage of 4.5 V_{rms} or 6.4 V_{pk} to drive accessory coils
  - Drive inductive loads to 1 mH
  - Current outputs may be floated to 850 V_{pk} (600 V_{rms})
  - GPIB control for remote operation
  - Delivers full current on either 120 V or 240 V mains

Fluke 52120A: Typical high current pain points

- Primary and secondary power standards
- Power and energy meters
- Power Quality analyzers
- DMMs and analog meters
- Current shunts and probes
- Clamp meters
- Rogowski coils
- Relay / breaker test sets
- Current transformers
- Programmable DC and AC loads



Range extender 52120A/COIL3KA

- 25 turn coil
- Boosts 120 A output of 52120A to 3000 A
- Calibrate clamp meters, including
  - Fluke-376 or 381 True-rms AC/DC Clamp Meter
  - Fluke 345 Power Quality Clamp Meter

Range extender 52120A/COIL6KA

- 50 turn coil
- Boosts 120 A output of 52120A to 6000 A
- Calibrate Rogowski coil clamp meters, including
  - Fluke i2500-18 iFlex Flexible Current Probes
  - Fluke i6000s Flex-24 or -36 AC Current Probes

Fluke 5725A Amplifier

Fluke 5725A Amplifier

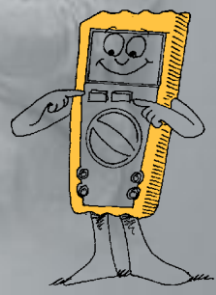
- The 5725A Amplifier enhances the 57x0A Series Multifunction Calibrators in the AC voltage, AC current, and DC current functions
- The 5725A operates under complete control of the 57x0A Series calibrators through an interface cable supplied with the 5725A
- Enhancements to 5700A/5720A/5730A AC voltage output capability provided by the 5725A:
  - Higher V-Hz product: Frequency limits at higher voltage increase to 100 kHz at 750 V, 30 kHz at 1100 V
  - Load limits are to 70 mA for frequencies above 5 kHz, and to 50 mA for frequencies less than 5 kHz
  - Capacitive load limits are increased to 1000 pF

  - AC voltage: 220 V to 1100 V_{rms} up to 70 mA @ 5 kHz to 100 kHz, 50 mA @ < 5 kHz
  - DC current: 0 A to ±11 A
  - AC current: 1 A to 11 A_{rms}, 40 Hz to 10 kHz

- Optional 5500A/COIL 50-turn and 9100-200 10- and 50-turn coil for current clamp calibration up to 550 A

FLUKE®
Calibration

Digital Multimeters



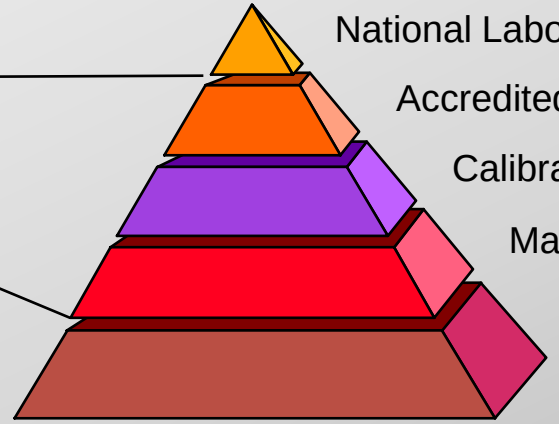
ECAL Products – Bench and Reference DMMs

Metrology Meters	Bench Top Meters
Ref. DMM Fluke 8588A 8558A for ATE applications	Fluke 8845/6A Fluke 8808A

Reference DMM

DCV Accuracy ± 2.7 / 4 µV/V
ACV Accuracy ± 64 µV/V
Ohms Accuracy ± 7.1 µΩ/Ω
DCI Accuracy ± 7.6 µA/A
ACI Accuracy ± 260 µA/A

Fluke 8808A
Basic DCV Uncertainty
0.015%



Technology

- Stability achieved with selected zener diodes
- Low noise buffer amplifiers
- Laser trimmed hermetically sealed thin-film resistors
- Linear A/D Converter
- Switched ratio Measurement

Workload

- Intercomparison/transfer device
- Power supplies
- Calibrators
- Manufacturing Automated & Bench Test
- R & D

Bench Multimeter Selection Guide

Model	Resolution	Accuracy	Application
8588A	8.5	2.7 µV/V 95% confidence level, 1 year relative accuracy	Metrology
8558A	8.5	4.0 µV/V 95% confidence level, 1 year relative accuracy	High-Speed Automation
8808A	5.5	Basic V dc accuracy of 0.015 %	Bench

Fluke 8808A – 5½ Digit Digital Multimeter

Fluke 8808A Overview

- Fluke 8808A: Multifunction meter for bench or semi automated test applications

  - 5½ Digit Resolution
  - Dual Display
  - Measures V DC/AC, I DC/AC, Ω, Freq, Continuity, Diode
  - Basic V DC accuracy of up to 0.015%
  - Min, Max, Rel, dB, dBm
  - Six dedicated buttons for direct access to instrument setups
  - 2x4-Wire Ohms measurement technique
  - Dedicated DC leakage current ranges
  - Hi/Lo limit compare for Pass/Fail testing
  - RS-232 interface
  - Fluke 45 Emulation

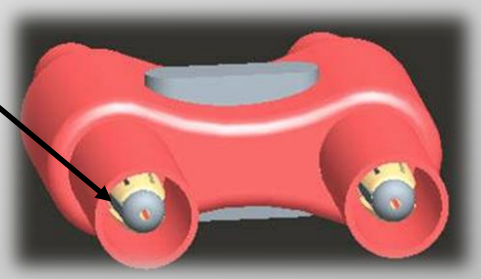
2x4-Wire Ohms Technique

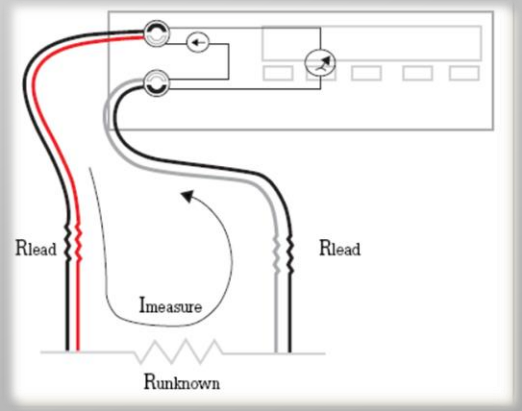
- 4 Wire measurement method is used for precision Lo-Ohms measurements, typically < 100 Ω
- Why: Eliminates including the test lead resistance in measurement, typical 0.5 Ω without 4 wire
- What does 2x4-Wire Ohms do:
  - Combines 4 wire Source & Sense leads into two test leads,
  - Simplifies connecting to the device under test, eliminating setup errors
  - Allows probing into tight or small components

Applications

- Relay contact resistance
- Coil resistance
- Terminators (Lo-Ohms)
- Connector contacts
- Reference Dividers

Patented Split Contacts provide 4 wire measurements in a single pair of test leads





Fluke 8558A/8588A Reference Multimeter

Fluke/Datron/Wavetek - Reference Multimeters – Shared history

Fluke 8502A/8506A

Datron/Wavetek 1271/1281

Fluke 8508A

Fluke 8558A/8588A

What are the 85x8A Precision Digitizing DMM Series

- Series of two 8½ digit multimeters, model 8588A and model 8558A providing choice of
  - Functionality
  - Performance
  - Affordability

- Designed for ease of use, accuracy, stability and speed

– Supported by MET/CAL Calibration Automation Software

What are the 85x8A Precision Digitizing DMM Series

- The two products share a common hardware platform differentiated by
  - Features,
  - Specifications
  - Pricing

- Jointly capable of handling the most demanding applications:

  - **8588A**: Metrologists Standards and Calibration labs

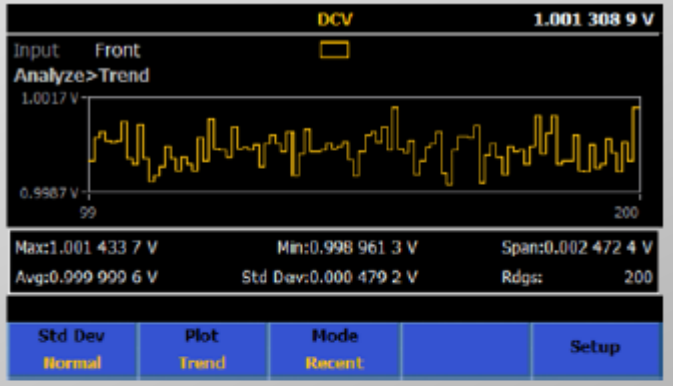
  - **8558A**: General Lab and ATE / Systems Usage, requiring a reliable ‘workhorse’ precision long scale DMM with high-speed measurement and/or digitizing capability

Fluke 85x8A Common Features

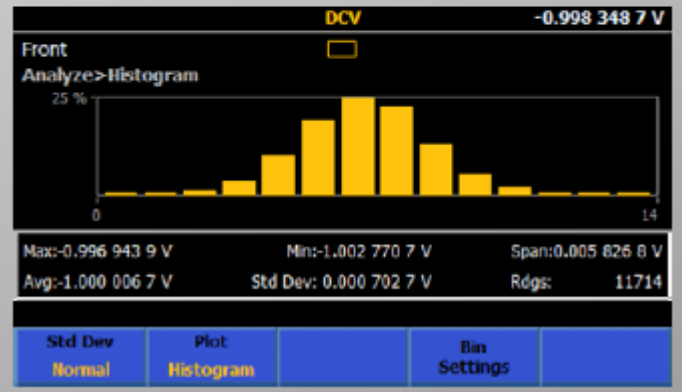
- Inherent accuracy and stability without the need for internal auto-adjustments
- Decade ranges:
  - 2.01x FS (Full Scale) on DCV, DCI, ACI & Ohms, 2.01x Pk/1.2x RMS FS on ACV
- Readings rates;
  - 1 rdg/s for low-noise 8½ digits
  - 100 ks/s at 4½ digits (16 bits)
  - Up to 5 Ms/s at 18 bits (10 MHz BW)
- Frequency and Period Measurements @ 2.5 µHz/Hz

Fluke 85x8A Common Features

- Color display with graphing, trending and statistics, intuitive user interface, multi-language
- Visual Connection Management™ with active terminal illumination
- Rear-panel input connectors, programmable front/rear-switch
- USB Ports
- Programmable trigger mechanisms
  - Manual trigger
  - External BNC Trig In and Trig Out
  - Internal or level trigger
  - Timer trigger
  - Epoch trigger
  - Line trigger
  - BUS trigger



Trend plot



Analyze>Histogram

Fluke 85x8A Common Features

- Improved front-end and ADC designs providing:
  - Reduced noise
  - Improved settling times
  - Improved linearity and reading rates
  - Faster ‘digital’ RMS AC technology
  - Two ADC technologies are employed providing aperture times from 0 ns to 10 s
    - 1st ADC for the high resolution longer aperture (integration) times
      - 100 µs to 2 s in 200 ns steps, 2 s to 10 s in 1 ms steps
    - 2nd ADC for the high-speed lower resolution short aperture times
      - 0 ns to 99.8 µs in 200 ns steps
    - For all DCV, DCI and resistance measurements this is transparent to the user, with the DMM automatically selecting the ADC based on user aperture

- High-speed high-resolution digitizing into internal memory, using the 5 Ms/s 18-bit ADC
  - Memory length is 10 Ms
  - Sampling rate to internal memory will be at up to the 5 Ms/s real-time rate
  - Sampling rate to interface bus is at 100 ks/s

Fluke 85xA Remote Control

- The Fluke 85x8A can emulate the following instruments on remote control
  - Fluke 8508A
  - HP/Agilent/Keysight 3458A

- Can be chosen from the front panel

Fluke 8588A and 8558A: Where do they differ?

FLUKE®
Calibration

Comparing the 8588A and the 8558A

	8588A	8558A
DC voltage	100 mV – 1000 V	Same
AC voltage	10 mV – 1000 V, 1 Hz – 10 MHz	Same
Resistance, LoI, HV	1 Ω - 10 GΩ	Same
DC current	10 uA – 30 A	10 uA – 2 A
AC current	10 uA – 30 A, 1 Hz to 100 kHz	10 uA – 2 A, 1 Hz to 100 kHz
Digitize V	100 mV - 1000 V, 5 MSamples/s, up to 20 MHz BW	Same
Digitize I	10 uA - 30 A, 5 MSamples/s, up to 4 MHz BW	10 uA - 2 A, 5 MSamples/s, up to 4 MHz BW
Frequency (V, I, BNC)	1 Hz to 10 MHz, 1 Hz to 100 kHz, 10 Hz to 100 MHz	Same
Temperature	PRT / Thermocouple (ext. CJC)	Same
Capacitance	1 nF – 100 mF	No
RF power	R&S NRP Series	No
Ext. dc current and ac current	A40B current shunt and other shunts	No

Fluke 8588A and 8558A: Feature Comparison

FLUKE®
Calibration

Comparing the 8588A and the 8558A

	8588A	8558A
Graphical display	Yes	Yes
Visual Connection Management®	Yes	Yes
Programmable front/rear input switching	Yes	Yes
Ratio, difference, deviation, ohms, voltage, current	Yes	Yes
External 10 MHz ref clock, 50 Ω/Hi-Z	Yes	Yes
A40B and other shunt asset management	Yes	No
GPIB 488.2, ethernet, USB TMC	Yes	Yes
SCPI command compatibility	Yes	Yes
3458A emulation, 8508A emulation	Yes	Yes
Volatile memory	15 million	Same
Level and other trigger	Yes	Yes
FFT onboard	Yes	No
Reading rates: 5 MS/s into memory, bus: 100 k readings /s at 4.5 digits, 1 rdg/s at 8.5 digits	Yes	Yes

Fluke 8588A and 8558A: Specification Comparison

FLUKE® Calibration

Comparing the 8588A and the 8558A

Function			8588A ± (µX/X of reading + µX/X of range)		8558A ± (µX/X of reading + µX/X of range)	
			95%	99%	95%	99%
DC voltage	10 V	relative	2.7 + 0.05	3.5 + 0.06	4.0 + 0.06	5.2 + 0.08
		absolute	2.8 + 0.05	3.6 + 0.06	4.1 + 0.06	5.3 + 0.08
AC voltage	10 V, 1 kHz	relative	60 + 5	77 + 6.5	80 + 10	103 + 13
		absolute	64 + 5	83 + 6.5	90 + 10	116 + 13
Resistance	10 kΩ	relative	7 + 0.5	9 + 0.6	10 + 0.6	13 + 0.7
		absolute	7.2 + 0.5	9.2 + 0.6	10.3 + 0.6	13.3 + 0.7
DC current	1 mA	relative	6.5 + 4	8.4 + 5	9 + 5	12 + 6
		absolute	7.6 + 4	10 + 5	9.8 + 5	13 + 6
AC current	1 mA, 1 kHz	relative	250 + 50	323 + 65	300 + 100	387 + 129
		absolute	260 + 50	335 + 65	310 + 100	400 + 129
Frequency	BNC, 1 kHz	relative	0.5 uHz/Hz	0.5 uHz/Hz	0.5 uHz/Hz	0.5 uHz/Hz
Temperature	PRT 100 Ω,	relative	± 5 mK	± 5 mK	± 5 mK	± 5 mK
Capacitance	1 uF	relative	400 + 100	516 + 129	N/A	N/A
		absolute	406 + 100	523 + 129	N/A	N/A

95 % & 99 % 1 year relative accuracy specification. Fluke Calibration guarantees to specification at 99 % confidence interval k=2.58.

Fluke 8588A and 8558A: DMM Accuracy vs. Measurement Speed

Application	Accuracy vs Measurement Speed				
Repair & Calibration					
Metrology					
Research & Development					
Manufacturing Test / ATE					

High <- Accuracy -> Low

Low <- Measurement Speed -> High

Fluke 8588A

Fluke 8558A

Fluke 85x8A - Accessories

Accessory	Description
Y8588	Rack Mount Kit (2U – 3.5 in)
Y8588S	Slide Rack Mount Kit
8588A-LEAD	Comprehensive Measurement Lead Kit Includes: • 1x 8588A-LEAD KIT-OSP • 1x 1 m screen 322/0.1 copper (30 Amp Rating) with 6 mm gold plated copper spade terminals • 4X 8588A-LEAD/THERMAL • 2x locking adapter 4 mm binding post to safety
8588A-SHORT	4-Way Shorting PCB
8588A-LEAD/THERMAL	Low Thermal Lead Kit
96000SNS	Additional Power Sensor
8588A/CASE	Transit Case

FLUKE®
Calibration

Standards and References

ECAL Products - Standards and References

DC Voltage Standards
732C/734B

Resistance Standards
742A

734B DC Voltage Standard

DCV stability ± 0.3 µV/V /mo

742A Resistance Standard
Ohms Accuracy ± 4 µΩ/Ω /yr

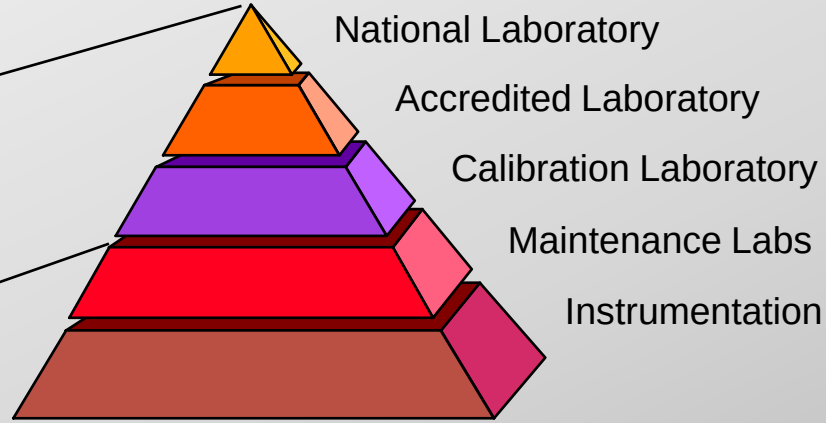
RF Calibration

AC Measurements
Fluke 5790A
A40B AC Current Shunts

9604A/96270A
4 Ghz or 27 Ghz Reference

5790B AC measurement Std
± 24 µV/V

A40B AC/DC Difference
23 µA/A @ 100kHz



Technology

- stability achieved with selected Zener diodes
- Laser trimmed hermetically sealed thin-film resistors
- Patented AC/DC RMS sensor

Workload

- Secondary / Transfer Standards
- Calibrators
- Laboratory Audit standards
- RF spectrum analyzers

Fluke 96040A and 96270A RF Reference Source

Fluke 96040A/96270A RF Reference Source – What is it and what is it for?

- RF Reference source for Spectrum Analyzer, Modulation Analyzer, Measuring Receiver, Power Meter and RF mV-Meter calibration
  - Increase speed, efficiency, accuracy, reliability, portability
  - Reduce operator skill, errors, maintenance costs, obsolescence, lead changes and connector wear
  - Reduce need for pads, filters, couplers, splitters, impedance convertors and their additional uncertainty
- Designed for calibration
  - Reduce need for characterization of general-purpose test equipment
  - User Interface design around Calibration applications
  - Reduced cost of ownership
- 96040A & 96270A
  - Precision Signal source designed for RF calibration
- Level accuracy, signal purity & dynamic range
- Supported by MET/CAL Calibration Automation Software

Fluke 96040A/96270A RF Reference Source

- The 96040A/96270A covers the majority of the Spectrum Analyzer calibration points for a relatively low investment
  - Potentially a Standalone System for workload from <4 GHz & < 27 GHz
    - Typically 60% of workload
  - Simplification of the calibration process in the sub 4 GHz region is the most efficient, because the majority of the RF calibrations are in this frequency range
  - Covers the majority of Spectrum Analyzer calibration points with high level of automation possible with MET/CAL for a reasonable price
    - Minimal lead changes, no need for attenuators and other additional measurement accessories
    - Minimal operator interference
    - No characterization during calibration process of DUT
    - Minimum chance of operator errors

Fluke 96040A/96270A - Specifications

- Amplitude range: -130 dBm to +24 dBm
- Signal purity: Harmonics <-60 dBc
- Spurii <-75 dBc
- Frequency modulation:
  - 20 Hz to 300 kHz Rate, distortion down to -80 dBc
  - Sine and External In

- Frequency range: 10 Hz to 4 GHz / 27 GHz
- Level accuracy
  - Similar to monitoring or characterising source with power meter, but available directly from the output
- Amplitude modulation:
  - 20 Hz to 220 kHz Rate, distortion down to -60 dBc
  - Sine and Triangle waveforms + External In

Fluke 96040A/96270A - Options and accessories

- Available options:

  – /75: Reference including 50 Ω and 75 Ω 4 GHz Leveling Heads
  – /LL: Low-level microwave O/P
  – /HF: HF Leveling Kit

  – /HFKIT: Power Sensor, Splitter, Metrology-grade microwave cable and APC-3.5 mm adapter

  – 96000SNS: Additional Power Sensor

  – 96000CONN: RF Interconnect Kit, Sacrificial RF Adapters, Connector torque wrenches

  – 9600FLT: 1 GHz Wide offset phase noise filter

Fluke 5790B AC Measurement Standard

Fluke 5790B AC Measurement Standard

- 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

- The 5790B is designed to meet the complete AC Voltage, AC Current and wideband verification requirements of the
  - Fluke 5730A, 5720A, or 5700A Multifunction Calibrators
  - Fluke 5560A, 5550A, 5540A, 5522A, 5502A, 5520A, or 5500A Multi-Product Calibrators
  - Transconductance amplifiers like the Fluke 52120A, 5725A or 5205A/5215A
  - Other DC/LF calibrators
  - Transfer standards and AC voltmeters
  - Replaces popular 5790A

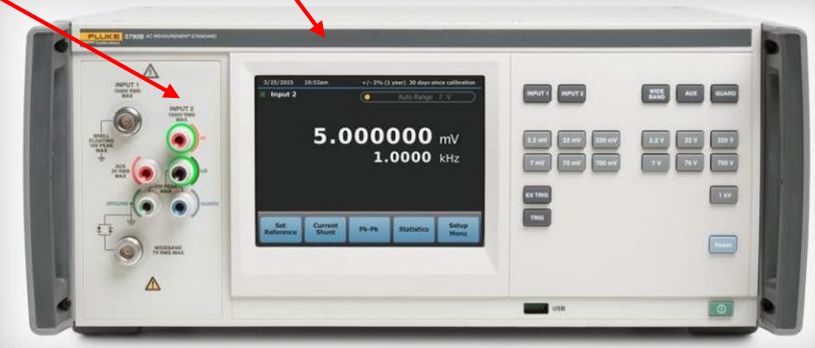
Fluke 5790B AC Measurement Standard

- 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

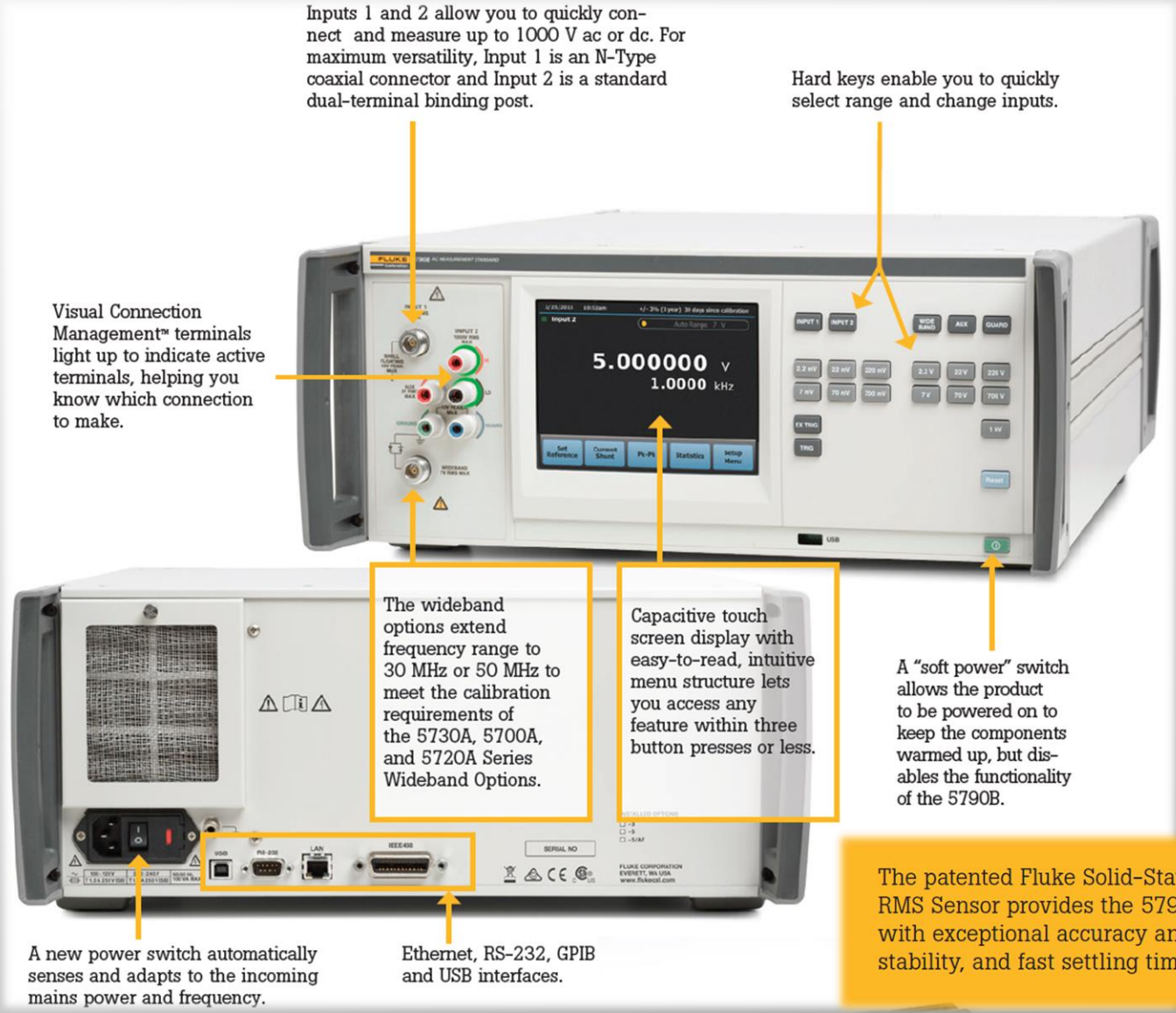
- The 5790B may be used alone as a measurement device or as a transfer standard when compared to an external DC source
  - In either case the normally tedious switching and calculations are performed automatically by the 5790B, and the resulting AC/DC difference is displayed directly on the easy-to-read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

- Visual Connection Management™ shows which terminals are in use

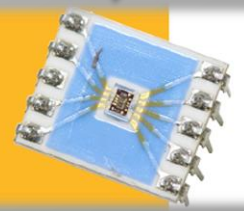
- Supported by MET/CAL™ Calibration Automation Software



Fluke 5790B AC Measurement Standard

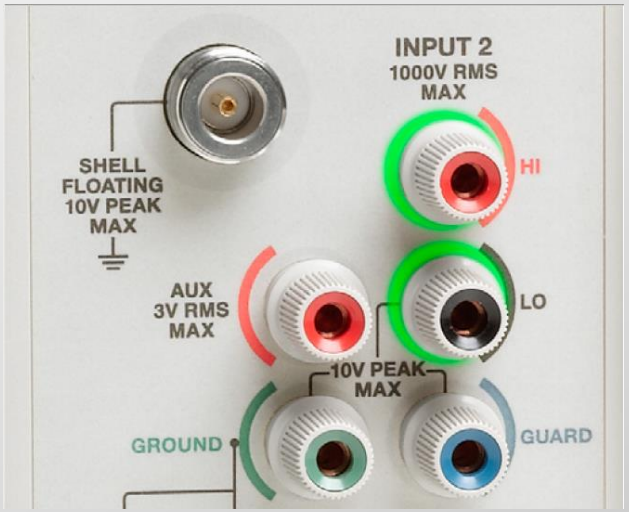


The patented Fluke Solid-State RMS Sensor provides the 5790B with exceptional accuracy and stability, and fast settling time.



Fluke 5790B AC Measurement Standard

- The 5790B covers an AC 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 MHz or 50 MHz with the /3 and /5 options
- Absolute AC Voltage measurement uncertainties are as low as ± 24 µV/V (one year, 23 °C ± 5 °C)
- A40B Shunt parameters memory storage



Fluke A40B Series Current Shunts

Fluke A40B Series Current Shunts

- Precision, low inductance shunts for DC and AC current metrology
  - Simplifies calibration/verification of precision calibrators and current sources
  - Shunts sized for currents from 1 mA to 100 A
  - Usable from DC to 100 kHz
  - 14 individual DC and AC current shunts with a 1, 2, 5 sequence over 6 decades of current
  - Simple direct measurements, making AC/DC transfers unnecessary
  - Stability typically better then ± 5.0 µΩ/Ω for one year
  - Typical angular accuracy of better than ± 0.003º at 1 kHz
  - Ideal in combination with 5790B AC Measurement Standard

Fluke A40B Series Current Shunts

FLUKE®
Calibration

Basic Electrical Specification Summary

Shunt Nominal Current	Nominal Resistance (Ohms)	Basic Specification ±µA/A, TCal ±1 °C, ≤50 % RH				
		DC	1 kHz	10 kHz	30 kHz	100 kHz
1 mA	800	20	55	75	75	150
10 mA	80	20	26	26	26	26
20 mA	40	20	26	26	26	26
50 mA	16	20	23	23	23	23
100 mA	8	20	24	24	24	24
200 mA	4	20	26	26	26	26
500 mA	1.6	21	27	27	27	28
1 A	0.8	21	27	28	28	31
2 A	0.4	21	27	30	30	48
5 A	0.16	21	31	32	40	71
10 A	0.08	26	37	60	61	92
20 A	0.04	26	43	52	70	113
50 A	0.016	32	55	80	81	144
100 A	0.008	35	65	90	98	174

Maximum AC-DC Difference

Shunt Nominal Current:	Maximum AC-DC Difference (± ppm)[1,2]	
	1 kHz	100 kHz
1 mA[3]	53	150
10 mA	20	40
20 mA	18	30
50 mA	13	16
100 mA	14	27
200 mA	17	28
500 mA	17	21
1 A	17	23
2 A	17	44
5 A	23	69
10 A	28	98
20 A	37	150
50 A	47	180
100 A	60	300

1 Specifications indicate the maximum flatness deviation from dc, and include both measured AC-DC difference and the uncertainty of measurement. They are stated at k=2, approximately 95 % confidence.
2 Includes 1-year stability of the AC-DC difference.
3 Specifications for the 1 mA current shunt are for TCal ± 1 °C.

Fluke 742A Resistance Standards

Fluke 742A Resistance Standards

- High accuracy working standards for on-site resistance calibration
  - Small and rugged resistance calibrators
  - No oil or air baths required
  - 18 °C to 28 °C operating range
  - Six-month stability to 2.5 µΩ/Ω
  - Supplied with temperature characterization

- No cumbersome oil or air baths are required

- Available in 12 different values from 1 Ω – 19 MΩ

- Their excellent temperature stability allows them to be used from 18 °C to 28 °C with typically less than 2 µΩ/Ω degradation
- Using the calibration table supplied with the standards, which lists corrections in 0.5 °C increments, this uncertainty can be reduced to near zero

Fluke 742A Resistance Standards

- 742A Resistance Standards are high accuracy working standards for precision, on-site resistance calibration

- Because 742A Resistance Standards are small and rugged, they are easy to transport
  - Care has been taken to reduce resistance changes brought about by thermal and mechanical shock
  - Retrace (permanent shift in resistance) is typically less than 2 µΩ/Ω after cycling between 0 °C and 40 °C

- The 742A-1 1 Ω and the 742A-10K 10 kΩ units are ideally suited for Artifact Calibration of 57x0A Calibrators

- The other values can be used to verify the calibration if you desire

Fluke 742A Resistance Standards

Model Name	Description
742A-1	1 Ω Resistance Standard
742A-1.9	1.9 Ω Resistance Standard
742A-10	10 Ω Resistance Standard
742A-25	25 Ω Resistance Standard
742A-100	100 Ω Resistance Standard
742A-1k	1 kΩ Resistance Standard
742A-10k	10 kΩ Resistance Standard
742A-19k	19 kΩ Resistance Standard
742A-100k	100 kΩ Resistance Standard
742A-1M	1MΩ Resistance Standard
742A-10M	10 MΩ Resistance Standard
742A-19M	19 MΩ Resistance Standard

General Specifications	
12 Values from 1Ω to 19 MΩ in x1 and x1.9	Best 1 Year Specification: ±4 ppm
Operating Temperature	18-28°C
Storage Temperature	0-40°C
Retrace Error (hysteresis)	23°C-18°C-23°C cycle: Negligible resistance shift 23°C-28°C-23°C cycle: Negligible resistance shift 23°C-0°C-23°C cycle: < 2 ppm resistance shift 23°C-40°C-23°C cycle: < 2 ppm resistance shift
Calibration Documentation	17025 accredited report of calibration included
Size	8.6 cm H x 10.5 cm W x 12.7 cm D (3.4 in H x 4.15 in W x 5 in D)
Weight	.68 kg to .91 kg (1.5 lbs. to 2 lbs.) depending on the model

Fluke 732C and 734C DC Reference Standards

Fluke 732C and 734C DC Reference Standards

- The simple way to maintain and disseminate the Volt
  - The Fluke **732C** DC Voltage Reference Standard is a RoHS compliant DC Voltage reference used to maintain the Volt in primary and secondary standards laboratories
  - The Fluke **734C** DC Voltage Reference Standard consists of four electrically and mechanically independent 732C DC Voltage Reference Standards and a rack-width enclosure
    - Individual 732C voltage standards provide 10 V, 1 V, and 0.1 V outputs and may be transported easily to remote locations while the DC reference is maintained in the laboratory
  - Two model families, Base and Select, differ in that the Select models are more stable than the Base models

Output Voltage	Stability (± µV/V)		
	30 Days	90 Days	1 Year
10 V	0.3	0.8	2.0
1 V	0.6	1.2	3.0
0.1 V	1.2	2.9	9.8

Output Voltage	Stability (± µV/V)		
	30 Days	90 Days	1 Year
10 V	0.3	0.8	1.0
1 V	0.6	1.2	2.5
0.1 V	1.2	2.9	8.0

Fluke 732C and 734C DC Reference Standards – “Hot shipments”

- Fluke Calibration offers an optional 732C and 734C DC Standard with either a Characterize calibration or Select unit, which has tighter specifications than the characterize unit, and both must ship "Hot"
  - Implying that the unit must be shipped while it is powered on
- The power duration of the 732C is approximately 72 hours, which is not sufficient to continuously power the 732C for international customers without losing its accreditation

- We offer a 732C-7001 External Battery and Charger is contained in the same enclosure as the 732C
  - When the external battery is ultimately charged and connected to a fully charged 732C, it increases the 732C battery operating time from 72 to 130 hours

- The combination with the 732C-7001 makes it suitable for all international travel durations

- All International “Hot” Shipments of 732C and 734C DC Standards will automatically include a 732C-7001 External Battery/Charger per every 732C unit ordered

FLUKE®
Calibration

Calibration Software

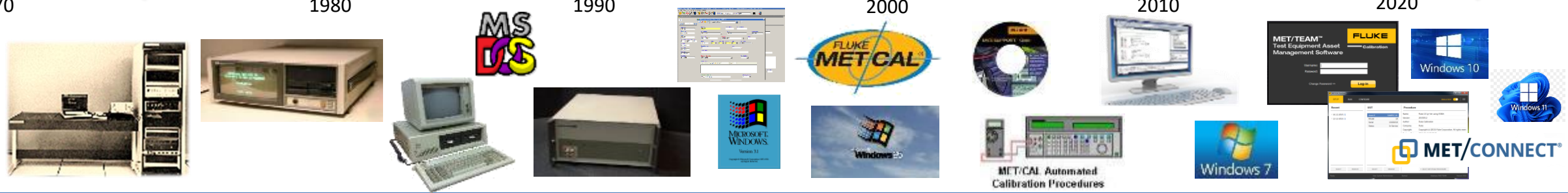
Fluke Calibration Software offering – Electrical Applications

- MET/TEAM™ Asset Management Software specially designed for in the calibration laboratory
- MET/CAL™ Calibration Automation Software
- MET/CONNECT™ to connect MET/CAL to an external LIMS

Fluke Calibration Software History

- Years and years of experience:
  - 1975: PDP11/34 Based, customer specific calibration system for Oscilloscope and other calibrations
  - 1980/84: 7405/7411 Calibration System on Fluke Controller (1722A)
  - 1989: First MET/CAL version for MS-DOS as replacement for 7411 (v1.0)
  - 1989: MET/TRACK released for MS-DOS (v1.0)
  - 1993: First Combination of MET/CAL and MET/TRACK for the 5130A: 5130/CAL
  - 1995: MET/CAL and MET/TRACK for Windows released (v4.0)
  - 1998: MET/CAL and MET/TRACK combined to one product called MET/BASE (v5.0)
  - 1999: Full 32-Bit product and ISO/IEC 17025 GUM Compliant Measurement Uncertainty Calculation (v6.0)
  - 2002: Introduction of new MET/TRACK module (MET/BASE v7.0)
  - 2002-2008: Various improvements including 64-bit OS support and International Language support
  - 2007: First MET/SUPPORT Gold Warranted Procedures released
  - 2010: Introduction of MET/CAL (MET/BASE v8.0) with complete new Editor based on MS Visual Studio
  - 2012: Introduction of MET/TEAM (v1.0) based on Microsoft SQL Server
  - 2014: Introduction of MET/TEAM (v2.0) with International language support on MET/TEAM
  - 2016: Introduction of MET/TEAM (v2.1) and MET/CAL (v9.0) (Windows 10 support) and announcement of End of Life of MET/BASE (MET/TRACK)
  - 2017: Introduction of MET/TEAM (v2.2) and MET/CAL (v9.1) with fe. automatic data importation capability and language support on MET/CAL
  - 2018: Introduction of MET/TEAM (V2.2.1) and MET/CAL (V9.1.1) with fe. automatic storage of certificates in .pdf and .xls and improved international language support
  - 2019: Latest release MET/TEAM (V2.3.0) and MET/CAL (V9.2.0) with several product and security enhancements
  - 2020/2021/2022: Introduction of MET/CONNECT to link MET/CAL with external LIMS and introduction of MET/TEAM (V3.x) with MET/CAL (V10.x)

Close to 50 years of history and experience!



Fluke MET/TEAM™ Overview

- Enterprise Calibration Asset and Lab Management System
  - Designed by metrologists for metrology
  - Browser-based (no client installation required)
  - Microsoft SQL Server
  - Built in workflow process from receiving to shipping
  - Integrated with MET/CAL Run-Time and Editor
  - Email automation through Alerting Schedules
  - Customizable and security to meet your process needs
  - Track assets as they move through the lab
  - Utilize manual templates or integrated with MET/CAL for automated calibrations
  - Track equipment usage history through Tool Assignments
  - Audit trail to support 21 CFR Part 11 compliance

Fluke MET/TEAM Overview

- Two Versions
  - MET/TEAM Express, stripped-down version for existing MET/SUPPORT Gold customers or those looking for basic asset management in support of MET/CAL
  - Full version offers more features and options (Mobile, Customer Portal, Commerce)

- 2016 Release - MET/TEAM 2.1
  - Windows Authentication Login (only in Domain)
  - Lookup Fields
  - Integration of Environmental Monitoring into Work Orders
  - Integrated MET/CAL Security – MET/CAL version 9.0
  - Editing of Result Points

- 2017/18 Release – MET/TEAM 2.2 and 2.2.1
  - Automatic Import
  - Flexible report generation in both Excel and PDF
  - Automatic storage of PDF or Excel report in the Work Order as file
  - Global Unique Identifiers added to improve support of SQL server replication

- 2019/2020/2021/2022 Release – MET/TEAM 2.3/3.0 and MET/CAL 9.2/10.x/11.x
  - Hardware support new instruments (5790B/4180/4181/5322A)
  - API for data exchange to external systems
  - Enhanced performance

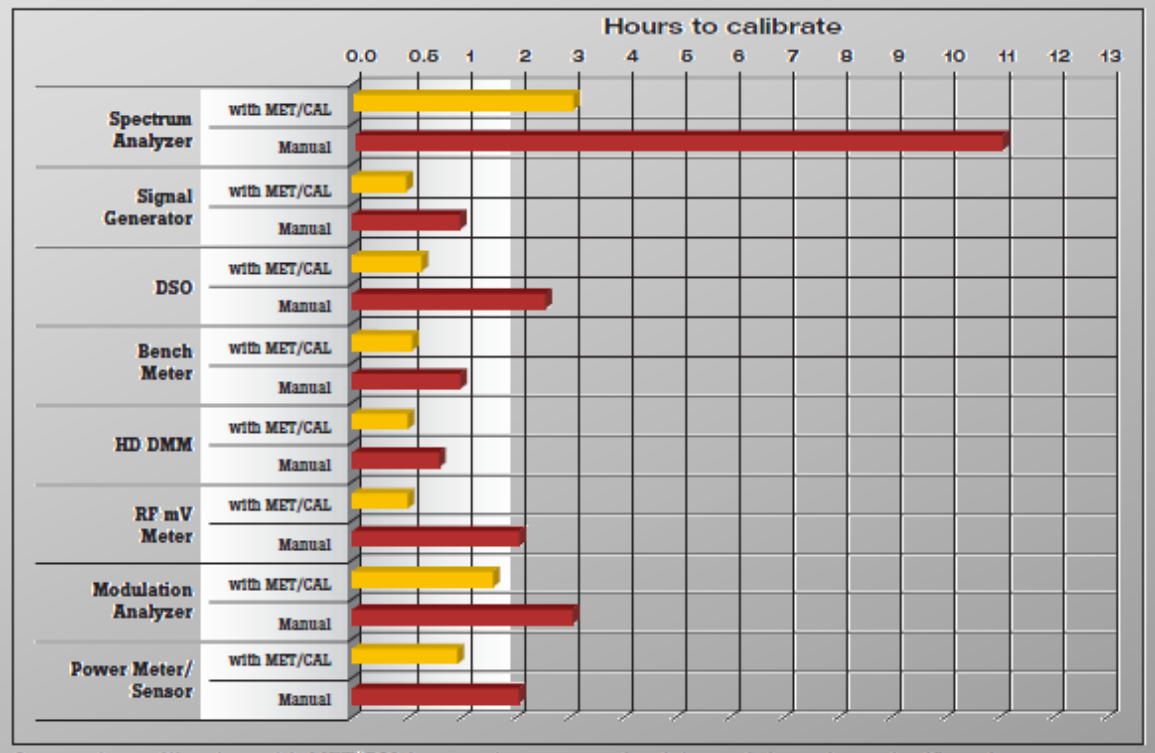
Fluke MET/CAL version 11.x

- MET/CAL is the Calibration Automation part of the MET/TEAM and MET/CAL solution for the calibration laboratory
- Seamlessly integrated with MET/TEAM or MET/TEAM Express
- Using MET/CAL Calibration Automation software can help you cut calibration time in half by fully automating your electrical and RF calibration workload and more
- Documented procedures and calibration results, plus reports, help you to comply with quality standards like ISO 9000, ANSI Z540 and ISO/IEC 17025

Fluke MET/CAL version 11.x

- Big productivity benefits with MET/CAL Calibration Automation Software
  - Automate
    - Automate calibration of a wide range of electrical, RF and other calibration standards and test equipment
    - Templates help you perform, record and report on manual calibration tests
  - Improve productivity
    - Increase workflow throughout up to 80% compared to manual approach
    - Reduce time to calibrate
      - Fe. spectrum analyzer equipment from 11 hours to 1 or 2
  - Perform controlled, consistent tests
    - Create validated calibration procedures
    - Comprehensive procedure editor based on Microsoft Visual Studio
    - Comprehensive library of thousands of automation procedures
    - Store all test parameters and traceability

Productivity improvements that extend beyond dc/lf calibration



Automating calibration with MET/CAL lets you improve productivity and throughput significantly.

MET/CONNECT™

FLUKE® Calibration

- The missing piece of your MET/CAL

- Connect MET/CAL to any existing LIMS via an API
  - Integrate MET/CAL Calibration Management Software to your workflow with MET/CONNECT
  - MET/CONNECT is the hub of a fast-growing community of mainline calibration software providers
    - These companies have partnered with Fluke Calibration to support MET/CAL automation
  - Whatever calibration management system you use, MET/CONNECT unlocks calibration and workflow automation in your lab
  - MET/CONNECT was built to bridge the connection from MET/CAL to your workflow regardless of your chosen solution
    - Integrate MET/CAL data to your existing calibration management system with MET/CONNECT's API or conveniently automate data exports as a .csv file

- Introduced in Q1/Q2 2020 v1 MET/CAL API
  - MET/CONNECT with MET/CAL
- Introduced in Q2/Q3 2020 v2 MET/TEAM API
  - MET/TEAM v3.0, additional licensing

MET/CONNECT®

FLUKE®
Calibration

Value Added Services

priority Gold
Instrument CarePlan

Silver
Instrument CarePlan

Value Added Services

- Instrument CarePlans
- MET SUPPORT Gold
- cubyt
- Training, installation and commissioning
- Technical support
- Education
- Repair and Calibration services

Instrument CarePlans

FLUKE®
Calibration

Instrument Gold CarePlan

- Guaranteed expedited service for world-class calibration and repairs
  - A Fluke Calibration Priority Gold CarePlan puts you in control of your downtime and in control of your business, with calibration and repair services that help you maximize the value of your instrument investments

- Reduce downtime by a week
  - **Annual calibration** covered with guaranteed in-house turnaround time
  - **Extended manufacturer's warranty** protects your asset for the duration of your CarePlan
  - **Pre-paid priority shipping** is provided on the return shipment (post-service) of your instrument

- Get the best performance from your instruments
  - Get **free product updates** for every product covered by a Priority Gold CarePlan

- Get peace of mind for years—save money too
  - One-, two-, three-, four- and five-year Gold CarePlans are available

Instrument Silver CarePlan

- Get your instruments covered with a Fluke Calibration extended warranty
- Get peace of mind for years—save money too
  - One-, two-, three-, four- and five-year Silver CarePlans are available

MET SUPPORT™ Gold

FLUKE®
Calibration

MET/SUPPORT™ Gold

FLUKE® Calibration

- The MET/SUPPORT Gold annual membership program provides premier support services that help you fully uncover the full power of your software and become a more productive MET/CAL and MET/TEAM software user
- With the access to technical experts, the most up-to-date software, access to a large library of warranted procedures, you have the peace of mind that your lab operations are always up and running at the highest efficiency and compliance
- Maximize your software investment over time

- Use only a few of the MET/SUPPORT Gold services and you can easily recover more than the cost or your annual membership fee

When you are installing and learning a new software application, it's nice to know that help is nearby. Fluke is committed to helping you get the most from your investment in MET/CAL and MET/TEAM Calibration Management Software. The MET/SUPPORT Gold program has been designed to provide premier support services that help you maximize your software investment over time.

MET/SUPPORT Gold

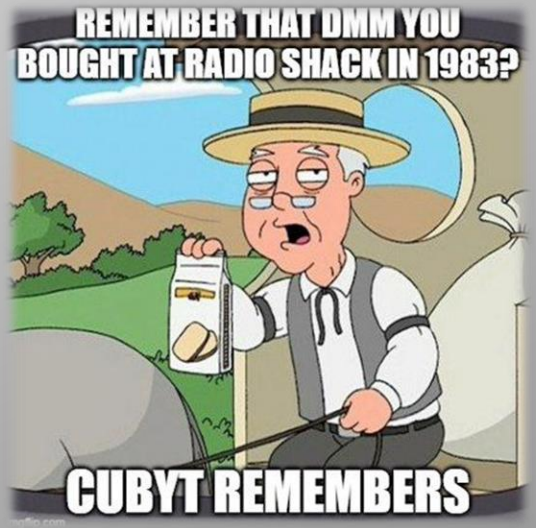
FLUKE Calibration

- MET/SUPPORT Gold services include:
  - Priority access to software support
  - Free software upgrades and updates
  - Free access to the Warranted MET/CAL Procedures Library
    - Currently 16000+ available procedures and counting
  - Free access to My MET/SUPPORT Gold member-only premium content
  - Discount on calibration software training classes
  - Discount on custom procedure development
  - Database services
  - QA/Test Server licenses for MET/TEAM, MET/CAL or MET/CONNECT
  - License transfer from legacy MET/BASE to the latest MET/TEAM Express software
  - Special MET/SUPPORT Gold only promotions

MET/SUPPORT Gold

- cubyt is the world's largest repository of calibration and metrology information
- It is powered by Fluke Calibration and currently hosts 500000+ (and counting) device profiles that include an array of helpful documents like catalogs, brochures, product specs, datasheets, etc.
  - We continue to add 30000 device profiles per month in our mission to provide actionable metrology content for all calibratable instruments on earth (3 – 4 Million DUTs)
- Also, MET SUPPORT Gold subscribers can now instantly access and download over 16000+ MET/CAL warranted procedures in cubyt

- We invite you to join the Cubyt metrology community and make your job easier
- Gain first-hand experience of the product that has been receiving rave reviews from the metrology community!
- Sign up here: https://info.cubyt.io

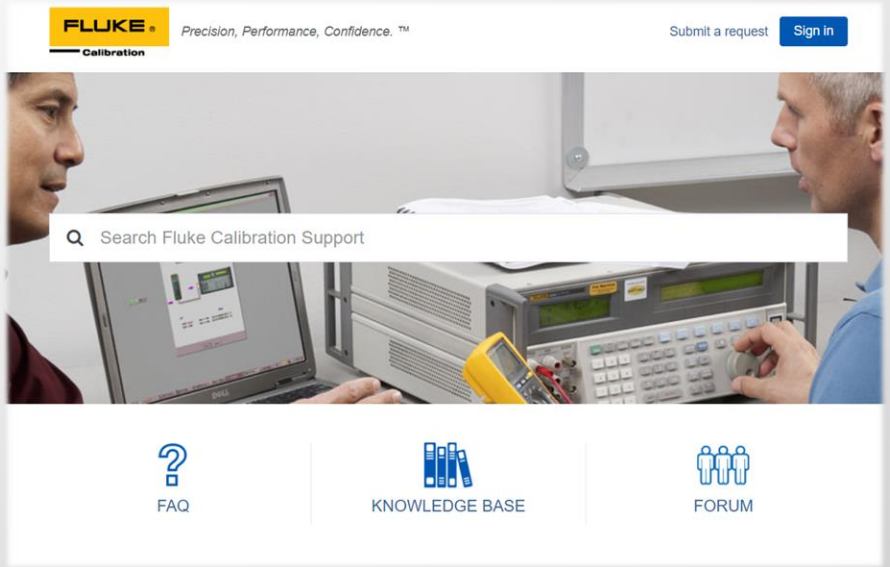


Training, installation and commissioning (CIT)

- Hardware and Software training available, on-site, on-line, Fluke office based and classroom
- Installation and commissioning services on hardware and software
- Standard packages but also custom-made training/installation services available
- Contact your local Fluke Calibration representative for more details

Technical Support

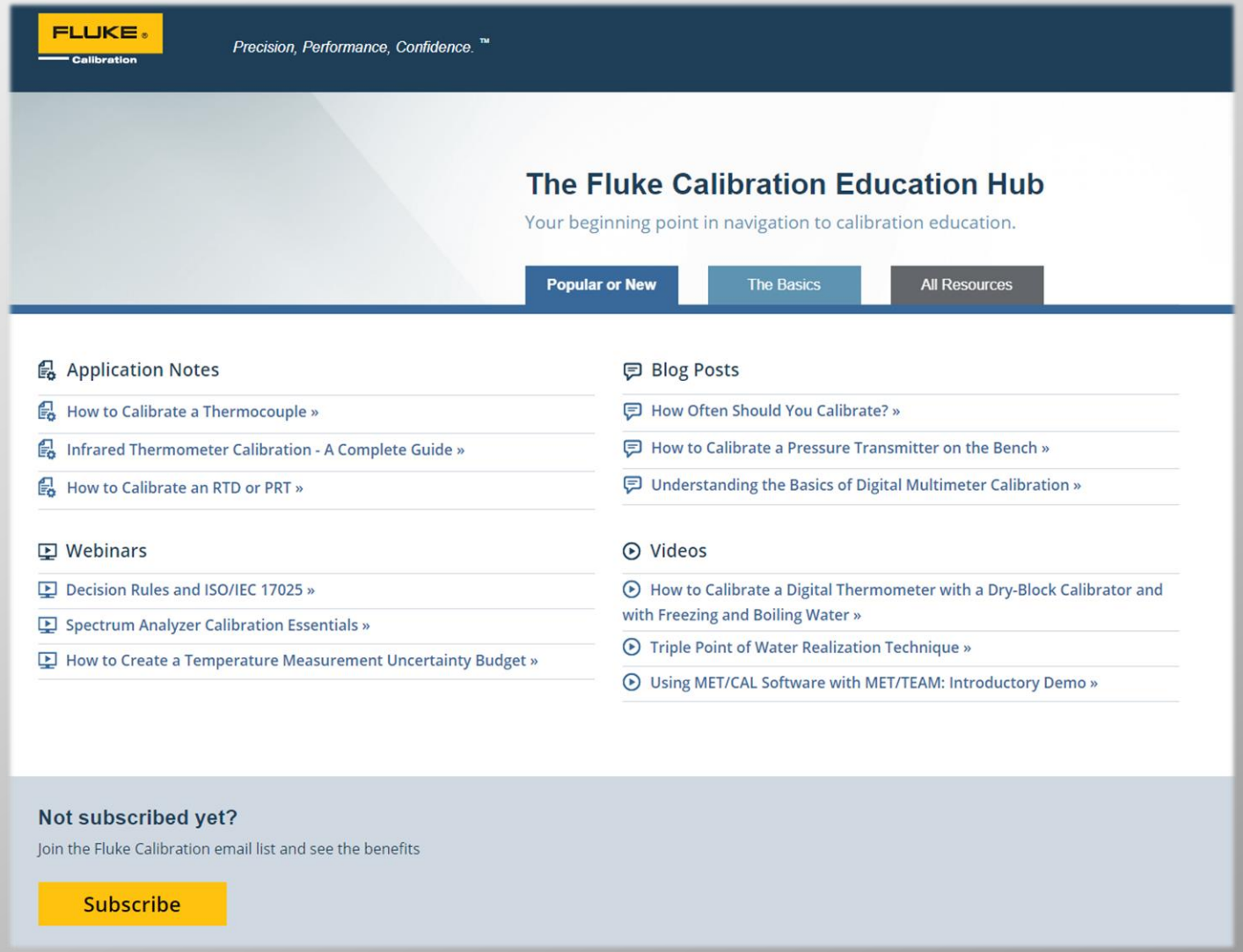
- For technical support please visit our 24/7 knowledge base at 24/7 Online Technical Support or send an e-mail to one of the following support teams:



  - softwaresupport@flukecal.com (when applicable include your MET/SUPPORT Gold Number in the subject)
  - electricalsupport@flukecal.com or rfsupport@flukecal.com for electrical calibration products
  - temperaturesupport@flukecal.com for temperature calibration products or software
  - pressuresupport@flukecal.com for pressure calibration products or software
  - flowsupport@flukecal.com for flow calibration products or software

Education

- Visit the Education Hub on Flukecal.com



Instrument Calibration and Repair services

- Fluke EMEA Service Centers in Norwich (UK), Eindhoven (NL) and Cologne (DE)
- Authorized Service Partners in most countries in EMEA
- Repair, contracts and accredited calibration services available
- On-line RMA request

DUTCH ACCREDITATION COUNCIL

DAkkS
Deutsche
Akkreditierungsstelle

UKAS
QUALITY
MANAGEMENT

FLUKE®
Calibration

Questions?

For more information please contact your local Fluke Calibration representative or visit Flukecal.com

Please note ☺


Don't call the Nobel Committee just yet:
We forgot to calibrate the instruments
before the experiment...

FLUKE®
Calibration

Fluke Calibration.

Precision, Performance, Confidence.™