FLUKE®

ScopeMeter® 120 and 190 Series

incl. 225C and 215C

Technical Data

ScopeMeter 215C, 225C and 190C Series: Speed, performance and analysis power

For demanding applications, the ScopeMeter 215C, 225C and 190C Series high-performance oscilloscopes offer specifications usually found on top-end bench instruments. With up to 200 MHz bandwidth, 2.5 GS/s real time sampling and a deep memory of 27,500 points per input, they're ideal for engineers who need the full capabilities of a high-performance scope in a handheld, battery powered instrument.

- Dual input – 200, 100 or 60 MHz bandwidth
- Up to 2.5 GS/s real time sampling per input
- Bus Health Test capability for industrial buses (225C and 215C)
- High waveform resolution of 3000 datapoints per channel
- Frequency Spectrum using FFT analysis
- Connect-and-View™ automatic triggering, a full range of manual trigger modes plus external triggering
- Digital Persistence for analyzing complex, dynamic signals like on an analog oscilloscope
- Fast display update rate for seeing dynamic behavior instantaneously
- Automatic capture and replay of 100 screens
- 27,500 points and more per input record length using ScopeRecord™ mode
- 1,000 V CAT II and 600 V CAT III safety certified
- Up to 1,000 V independently floating isolated inputs
- 5000 count DMM and paperless recorder built-in
- Four hours rechargeable NiMH battery pack

ScopeMeter 120 Series: Three-in-one simplicity

The compact ScopeMeter 120 Series is the rugged solution for industrial troubleshooting and installation applications. It's a truly integrated test tool, with oscilloscope, multimeter and "paperless" recorder in one affordable, easy-to-use instrument. Find fast answers to problems in machinery, instrumentation, control and power systems.

- A dual input 40 MHz or 20 MHz digital oscilloscope
- Two 5,000 counts true-rms digital multimeters
- Cursor measurements (Fluke 124, 125)
- A dual input TrendPlot recorder
- Connect-and-View trigger simplicity for hands-off operation
- Shielded test leads for oscilloscope, resistance, continuity and capacitance measurements
- Full bandwidth, VPS40 10:1 40 MHz probe included standard with Fluke 124, 125
- Up to seven hours battery operation
- 600 V CAT III safety certified
- Optically isolated RS-232 interface
- Rugged, compact case
- Bus Health test for industrial bus systems (Fluke 125)
- Power measurements and harmonics measurement (Fluke 125)

Oscilloscope mode

Vertical deflection

	Fluke 225C Fluke 199C	Fluke 215C Fluke 196C	Fluke 192C
Bandwidth	200 MHz	100 MHz	60 MHz
Rise time	1.7 ns	3.5 ns	5.8 ns

Bandwidth limiter: User selectable: 10 kHz, 20 MHz or off
Number of inputs: Two plus external trigger. All inputs references isolated from each other and ground.
Input coupling: AC or dc, with ground level indicator
Input sensitivity: 2 mV/div to 100 V/div
Normal/invert: On both input channels; switched separately
Variable attenuator: Variable gain on input channel A
Input voltage: 1000 V CAT II, 600 V CAT III rated—see "general specifications" for further details
Vertical resolution: 8 bit
Accuracy: ± (1.5 % of reading + 0.04 x range/div)
Input impedance: 1 MΩ ± 1 % // 15 pF ± 2 pF

	Fluke 225C Fluke 199C	Fluke 215C Fluke 196C	Fluke 192C
Maximum real-time sample rate	2.5 GS/s	1 GS/s	500 MS/s
Number of digitizers	2	2	2
Time base range	5 ns/div to 5 s/div		10 ns/div to 5 s/div

Maximum record length: 3000 points per input in Scope mode; 27,500 points per input in ScopeRecord™ roll mode (5 ms/div to 2 min/div)
Accuracy: ± (0.01 % of reading + 1 pixel)
Glitch capture: 50 nsec (5 µsec/div to 1 min/div)

Display and acquisition

Display: 144 mm full-color LCD, with backlight
Display modes: Input A, input B, dual, average, Replay
Visible screen width: 12 divisions
Waveform mathematics: A + B, A – B, A * B, all with user selectable scaling of resultant; A versus B (X – Y mode); Frequency spectrum using FFT analysis
Acquisition modes: Normal, auto, single shot, ScopeRecord™ roll, glitch capture, waveform compare, waveform compare with automatic "Pass / Fail testing", Bus Health test mode (225C and 215C only), Eyepattern Display of single ended or differential bus signal (Fluke 225C and 215C only).

Trigger and delay

Source: Input A, input B, external trigger input. All input references isolated from each other and from ground
Modes: Automatic Connect-and-View,™ free run, single shot, edge, delay, video, video line, selectable pulsewidth, dual slope, N-cycle
Connect-and-View™: Advanced automatic triggering that recognizes signal patterns, automatically sets up and continuously adjusts triggering, time base and amplitude. Automatically displays stable waveforms of complex and dynamic signals like motor drive and control signals. Can be switched off if desired.
Video triggering: NTSC, PAL, PAL+, SECAM. Includes field 1, field 2 and line select

Horizontal

Pulse width triggering: Pulse width qualified by time. Allows for triggering <t, >t, =t, ≠t, where t is selectable in minimal steps of 0.01 div. or 50 nsec.
Time delay: One full screen of pre-trigger view or up to 100 screens (= 1200 divisions) of post-trigger delay
Dual slope triggering: Triggers on both rising and falling edges alike
N-cycle triggering: Triggers on N-th occurrence of a trigger event; N to be set in the range 2 to 99

Automatic capture of 100 screens

The instrument ALWAYS memorizes the last 100 screens (no user setup required). When an anomaly occurs on screen, the REPLAY button can be pressed to review the full screen sequence over and over. Instrument can be set up for triggering on glitches or intermittent anomalies and will operate in "baby-sit" mode capturing 100 events.
Replay: Manual or continuous replay. Displays the captured 100 screens as a "live" animation, or under manual control. Each screen has date and time-stamp.
Replay storage: Up to 2 sets of 100 screens each can be saved for later recall and analysis

FFT – Frequency spectrum analysis

Shows frequency content of oscilloscope waveform using Fast Fourier Transform
Window: Automatic, Hamming, Hanning or None
Automatic window: Digitally re-samples acquired waveform to get optimum frequency resolution in FFT resultant
Vertical scale: Linear/logarithmic, in volts
Frequency axis: Logarithmic; frequency range automatically set as function of timebase range of oscilloscope

Waveform compare and pass/fail testing

Waveform compare: Provides storage and display of a reference waveform for visual comparison with newly acquired waveforms. Reference is derived from an acquired waveform and can be modified in the ScopeMeter or externally using FlukeView® Software.
Pass/Fail Testing: In waveform compare mode, the Color Scopemeter can be set up to store only matching ("Pass") or only non-matching ("Fail") acquired waveforms in the replay memory bank for further analysis.

Automatic scope measurements

V dc, V ac rms, V ac+dc, Vpeak max, Vpeak min, Vpeak to peak, A ac, A dc, A ac+dc, frequency (Hz), risetime, falltime, power factor, Watts, VA, VA reactive, phase, pulse width (pos/neg), dutycycle (pos/neg), temperature °C, temperature °F, dBV, dBm into 50 Ω and 600 Ω
Vpwm ac, Vpwm ac+dc for measurement on pulse width modulated motordrives and frequency inverters

Cursor measurements

Source: Input A, input B or the mathematical result trace (excluding A vs B curve)
Dual horizontal lines: Voltage at cursor 1 and 2, voltage between cursors
Dual vertical lines: Time between cursors, 1/T between cursors (in Hz), voltage between markers, risetime with markers, falltime with markers; Vrms between cursors, Watts between cursors
Single vertical line: Min-Max and average voltage at cursor position; frequency and rms-value of individual frequency component in FFT result

Zoom
Up to 16x horizontal zoom

Bus health test mode (Fluke 225C and 215C only)

Bus Health automatically analyzes the electrical signals on the industrial bus system to measure individual parameters and to give waveform information. Automatically compares the measurement results to preset values and present 'good', 'weak' or 'false' indicator with each parameter.
Bus types and reference standards used:
AS-i (EN50295, 166 kb/s);
CAN-bus (ISO-11898, up to 1 Mb/s);
Modbus (EIA-232 up to 115 kb/s and EIA-485 up to 10 Mb/s);
Foundation Fieldbus H1 (61158 type 1, 31.25 kb/s);
Profibus DP (EIA-485 up to 10 Mb/s) and PA (61158 type 1, 31.25 kb/s);
Ethernet [10Base2 (coaxial) and 10BaseT (UTP)], 10 Mb/s;
Ethernet 100BaseT (100 Mb/s);
RS-232 (EIA-232, up to 115 kb/s);
RS-485 (EIA-485, up to 10 Mb/s).
Measured parameters (where applicable):
Bias voltage level, signal amplitude, pulse width or baud rate, risetime, fall time, jitter, signal distortion, noise HF, noise LF, in-band noise.

Recorder mode

ScopeRecord—roll mode

Dual input waveform storage mode
Source and display: Input A, input B, dual
Memory depth: 27,500 points per input. Each point consists of Min-Max pair
Min-Max values: Min-Max values are measured at high sample rates ensuring capture and display of glitches

Time base range	5 ms/div to 1 min/div	2 min/div
Recorded timespan	6 sec to 24 hr	48 hr
Glitch capture	50 ns	250 ns
Sample rate	20 MS/s	4 MS/s
Resolution	200 µsec to 2 sec	4.8 sec

Recording modes: Single sweep, continuous roll, Start-on-Trigger (through external), Stop-on-Trigger (through external)
Stop-on-Trigger (through external): ScopeRecord mode can be stopped by an individual trigger event, or by an interruption of a repetitive trigger signal
Horizontal scale: Time from start, time of day
Zoom: Up to 100x
Memory: Up to 2 dual input ScopeRecord waveforms can be saved for later recall and analysis

TrendPlot™ recording

Single or dual input electronic paperless chart recorder. Plots, displays and stores meter and scope measurements.
Source and display: Input A, input B or DMM input
Memory depth: 18,000 points recording. Per record point a minimum, a maximum and an average value, plus a date and timestamp are recorded.
Ranges: 5 s/div to 30 min/div in normal view mode; 5 min/div to 48 hr/div in view all mode, giving overview of total record
Recorded timespan: Up to 22 days with a resolution of 1 minute
Recording mode: Continuous roll for the duration of the full recordable timespan
Measurement speed: 5 measurements per second
Horizontal scale: Time from start, time of day
Zoom: Up to 64x zoom
Memory: Up to 2 TrendPlot recordings can be saved for later recall and analysis

Cursor measurements—all recorder modes

Source: Input A, B or DMM input
Dual vertical lines: Min-Max or Average voltage. Time between cursors
Single vertical line: Min-Max or Average voltage. Absolute date and time or time from start

Meter mode

Via 4 mm banana inputs. Fully isolated from scope inputs and scope ground. The specified accuracy is valid over the temperature range 18 °C to 28 °C (65 °F to 82 °F). Add 10 % of specified accuracy for each degree C below 18 °C or above 28 °C.
Maximum resolution: 5,000 counts
Voltmeter ranges: 500 mV, 5 V, 50 V, 500 V, 1,000 V
Accuracy:
V dc ± (0.5 % + 5 counts)
V ac true rms
15 Hz to 60 Hz: ± (1 % + 10 counts)
60 Hz to 1 kHz: ± (2.5 % + 15 counts)
V ac+dc true rms
dc to 60 Hz: ± (1 % + 10 counts)
60 Hz to 1 kHz: ± (2.5 % + 15 counts)
Ohms:
Ranges: 500 Ω, 5 kΩ, 50 kΩ, 500 kΩ, 5 MΩ, 30 MΩ
Accuracy: ± (0.6 % + 5 counts)

Other meter functions

Continuity: Beeper on < 50 Ω (± 30 Ω)
Diode test: Up to 2.8 V
Amps: A dc, A ac, A ac+dc using an optional current clamp or shunt. Scaling factors: 0.1 mV/A ... 100 V/A
Temperature (°C, °F): With optional accessories. Scale factors 1 mV/°C or 1 mV/°F
Input impedance: 1 MΩ ± 1 %/10 pF ± 2 pF
Advanced meter functions: Auto/manual ranging, relative measurements (zero reference), TrendPlot recording

General specifications

Input voltage ratings

Maximum probe voltage: CAT II 1,000 V, CAT III 600 V (Maximum voltage between 10:1 probe tip (VPS210) and reference lead)
Floating voltage: CAT II 1,000V, CAT III 600 V (Maximum voltage between earth ground and any terminal (signal input or shielding))
Independently isolated inputs: CAT II 1,000 V, CAT III 600 V (Maximum voltage between any terminal of one input or probe (VPS210) and any other terminal of another input or probe (VPS210))
Maximum voltage on BNC input directly (input A or B): CAT III 300 V
Maximum voltage on meter input: CAT II 1,000 V, CAT III 600 V

Memory save and recall

Scope memories: 15 memory locations that each can contain two waveforms plus corresponding setup. With each storage action, a user specified name (20 ASCII characters long) can be assigned to the stored data, for easier reference.
Recorder memories: 2 memory locations that each can contain 100 captured dual input scope screens, or a dual input ScopeRecord (27,500 Min-Max pairs per input), or a dual input Trendplot (18,000 min-max pairs + average values)

Real-time clock

Time and date stamp for ScopeRecord, 100 captured screens and TrendPlots

Mechanical data

Size: 256 mm x 169 mm x 64 mm (10.1 in x 6.6 in x 2.5 in)
Weight: 2 kg (4.4 lbs)

Case

Design: Rugged, shock proof with integrated protective holster
Drip and dust proof: IP51 according to IEC529
Shock and vibration: Shock 30g, Vibration (sinusoidal) 3g according to MIL-PRF-28800F Class 2
Display: Bright full-color LCD with backlight
Brightness: 80 Cd/m² typ. using power adapter
Display size: 115.2 mm x 86.4 mm (4.54 in x 3.4 in); 144 mm (5.67 in) diagonal
Resolution: 320 x 240 pixels
Contrast and brightness: User adjustable, temperature compensated
Brightness: 80 cd/m² typ. using power adapter

Power

Line power: Country-specific line voltage adapter/battery charger included
Battery power: Rechargeable NiMH (installed)
Battery operating time: 4 hours
Battery charging time: 4 hours
Battery power saving functions: Auto power down with adjustable power down time. On-screen battery status indicator.

Safety

Compliance:
EN61010-1-2001, Pollution degree 2;
UL61010B, with approval;
CAN/CSA C22.2, No. 61010-1-04, with approval;
ANSI/ISA-82.02.01

Input voltage ratings

Maximum probe voltage: CAT II 1000 V/ CAT III 600 V (Maximum voltage between 10:1 probe tip [VPS200] and reference lead)
Floating voltage: CAT II 1000 V/ CAT III 600 V (Maximum voltage between earth ground and any terminal [signal input or shielding])
Independently isolated inputs:
CAT II 1000 V/ CAT III 600 V
(Maximum voltage between any terminal of one input or probe [VPS200] and any other terminal of another input or probe [VPS200])
Maximum voltage on BNC input directly (input A or B): CAT III 300 V
Maximum voltage on meter input:
CAT II 1,000 V/ CAT III 600 V

Environmental

Operating temperature: 0 °C to +50 °C
Storage temperature: -20 °C to +60 °C
Humidity:
10 °C to 30 °C: 95 % RH non condensing
30 °C to 40 °C: 75 % RH non condensing
40 °C to 50 °C: 45 % RH non condensing
Maximum operating altitude: 3,000 m (10,000 feet)
Maximum storage altitude: 12 km (40,000 feet)
Electro-Magnetic-Compatibility (EMC): EN 61326-1 for emission and immunity

Optically-isolated PC/printer interface

To printer: Supports HP Laserjet,® DeskJet, Epson FX/LQ, Seiko DPU-414 and Postscript printers via optional PAC 91
To PC: Transfer instrument settings, screen images and waveform data, compatible with FlukeView® software for Windows® via optional OC4USB or PM9080.

Warranty

Three-years, parts and labor on mainframe instrument
One-year on accessories

Accessories

Standard accessories	Fluke 215C, 225C and 190C Series
Rechargeable battery pack (installed)	BP190
Line voltage adapter/ battery charger	BC190
Voltage probes and accessories	10:1 voltage probe (VPS200, 1 red + 1 grey) including hook clip, ground lead with mini alligator clip, ground spring for probe tip
Multimeter test leads	TL75 Hard Point test lead set (1 red, 1 black)
User manual	Multi-lingual CD-ROM
215C and 225C additional accessories	
Three breakout adapters for bus systems using RJ45, DB9, and M12 connectors.	BHT190

FLUKE®

Technical specifications 120 Series

Oscilloscope mode

Vertical deflection

Bandwidth and risetime	Fluke 125, 124	Fluke 123
Bandwidth (risetime)		
• with VPS40 probes	40 MHz	20 MHz
• input A and B directly	40 MHz	20 MHz
• with STL120 Shielded Test Leads	12.5 MHz	12.5 MHz
Instrument risetime (input directly)	8.75 ns	17.5 ns

Number of inputs: two
Input coupling: AC, dc with ground level indicator
Input sensitivity: 5 mV to 500 V/div (with the included VPS40 (Fluke 125, 124) and STL120 shielded test leads measure up to 600 Vrms, CAT III)
Input voltage: 600 V CAT III. See "general specifications" for more detailed information.
Vertical resolution: 8 bit
Accuracy: ± (1 % of reading + 0.05 x range/div)
Input impedance: 1 MΩ ± 1 % // 225 pF with STL120 shielded test leads; 1 MΩ ± 1 % // 20 pF ± 3 pF with BB120; 5 MΩ ± 1 % // 15.5 pF with VPS40, 10:1 voltage probe

Horizontal

Max. sample rate (both channels simultaneously):
Fluke 125, 124: 2.5 GS/s for repetitive signals; 25 MS/s for single shot
Fluke 123: 1.25 GS/s for repetitive signals; 25 MS/s for single shot
Number of digitizers: two
Time base range: 10 ns/div to 1 min/div (Fluke 125, 124)
Maximum record length: 512 Min/Max points per input
Accuracy: ± (0.1 % of reading + 1 pixel)
Glitch detect: 40 ns

Display and acquisition

Display modes: Input A, input A and B, envelope, smooth
Acquisition modes: Normal (including glitch capture), single shot, roll

Trigger and delay

Source: Input A, input B, external via optional ITP120
Modes: Automatic Connect-and-View, Free Run, Edge, Single Shot, Video, Video Line
Connect-and-View: Advanced automatic triggering that recognizes signal patterns and automatically sets up and continuously adjusts triggering, time base and amplitude. Automatically displays stable pictures of complex and dynamic signals like motor drive and control signals
Video triggering: NTSC, PAL, PAL+, SECAM. Includes line select
Time delay: Up to 10 divisions pre-trigger view

Measurements

Vdc, Vac, Vac+dc, Vpeak max, Vpeak min, Vpeak to peak, frequency (Hz), positive pulse width, negative pulse width, positive duty cycle, negative duty cycle, Amp ac, Amp dc, Amp ac+dc, Phase, Temperature °C, Temperature °F, dBV, dBm into 50 Ω and 600 Ω. (Amps, °C or °F with optional probes)

Cursor measurements (125, 124)

Sources: Input A, Input B
Modes: Single or dual vertical cursor, dual horizontal cursor, risetime or falltime
Measurements:
Single vertical line: Average, min value, max value, time from start of recording in roll mode
Dual vertical lines: ΔV at markers, time between cursors, 1/T between cursors (in Hz)
Dual horizontal lines: High, low or ΔV – readout, risetime and falltime: transition time, 0 %-level, 100 %-level, with markers at 10 % and 90 %
Accuracy: As oscilloscope

Bus health tester (Fluke 125 only)

Bus health automatically analyzes the electrical signals on the network to give waveform data and measure individual parameters. Automatic comparison of the measurement results to the standards results in "good" or "false" indicators to be displayed per parameter.
Bus types and reference standards used:
AS-i (EN50295, 166 kb/s)®;
CAN-bus (ISO-11898, up to 1 Mb/s);
Interbus S (EIA-485, up to 10 Mb/s)®;
ControlNet (61158 type 2, 2.5 Mb/s)®;
Modbus (EIA-232, up to 115 kb/s and EIA-485, up to 10 Mb/s)®;
Foundation Fieldbus H1 (61158 type 1, 31.25 kb/s) and H2 (61158 type 1, up to 10 Mb/s);
Profibus DP (EIA-485, up to 10 Mb/s) and PA (61158 type 1, 31.25 kb/s);
Ethernet [10Base2 (coaxial) and 10BaseT (UTP)], 10 Mb/s;
RS-232 (EIA-232, up to 115 kb/s);
RS-485 (EIA-485, up to 10 Mb/s);
or user defined system
Measured parameters: Baud rate, risetime, falltime, high level, low level, distortion, amplitude and jitter, with comparison to system's standard values

Power measurements (Fluke 125 only)

Measure types: Watt, VA, VAR, Power Factor (PF)
Power configuration: Single phase or balanced 3-phase (delta-configuration) mains supply
Voltage measurement: Channel A, using STL120, voltage probe or direct input
Current measurement: Channel B, using i400s current clamp (included) or other compatible clamp
Current clamp or shunt sensitivity:
0.1/1/10/100/1000 mV/A, 10 mV/mA and 400 mV/A

Harmonics mode (Fluke 125 only)

Converts waveform information into a harmonics display (using FFT processing), which shows the relative amplitudes of the 1st up to the 33rd harmonic
Harmonics frequency range: DC to 33rd harmonic (fundamental ≤ 60 Hz); DC to 24th (fundamental ≤ 400 Hz)
Analyzed waveform: Voltage waveform (Ch.A), current waveform (Ch.B) or power (Ch.A x Ch.B), automatically generated
Display: Bargraph showing 1st up to 33rd harmonic, amplitude displayed in % relative to fundamental
Timebase setting: 5 ms/div.
Measurements: Relative amplitude of individual harmonic; THD in %r or %f

Dual input meter

The specified accuracy is valid over the temperature range 18 °C to 28 °C (64 °F to 82 °F). Add 10 % of specified accuracy for each °C below 18 °C or above 28 °C (64 °F to 82 °F)
Max. meter bandwidth: 40 MHz (Fluke 125, 124), 20 MHz (Fluke 123)

Voltage measurements

Measurement selection: V dc, V ac rms, V ac+dc rms, Vpeak max, Vpeak min, V^{pk-pk}
Ranges: 500 mV, 5 V, 50 V, 500 V, 1250 V
Full scale reading: 5,000 counts

Accuracy
V dc: ± (0.5 % + 5 counts)
V ac rms:
1 Hz to 60 Hz: ± (1 % + 10 counts)
60 Hz to 1 kHz: ± (2.5 % + 15 counts)
20 kHz to 1 MHz ± (5 % + 20 counts)
V ac+dc true-rms:
DC to 60 Hz: ± (1 % + 10 counts)
60 Hz to 1 kHz: ± (2.5 % + 15 counts)
20 kHz to 1 MHz (5 % + 20 counts)
V ac pwm:
Measures the effective output voltage of pulse-width modulated motordrives and frequency inverters (Fluke 125 only)
Vpeak:
Max peak or Min peak: 5 % of full scale
Peak-to-peak: 10 % of full scale
A ac+dc true-rms, A ac, A dc:
Current Clamp or shunt sensitivity:
0.1 mV/A, 1 mV/A, 10 mV/A, 100 mV/A, 400 mV/A, 1 V/A or 10 mV/mA.

Ohms

Ranges: 500 Ω, 5 kΩ, 50 kΩ, 500 kΩ, 5 MΩ, 30 MΩ (all models), 50.00 Ω (Fluke 125 only)
Max. resolution: 5,000 counts
Accuracy: ± (0.6 % of reading + 5 counts)

Capacitance

Ranges: 50 nF to 500 µF
Max. resolution: 5,000 counts
Accuracy: ± (2 % of reading + 10 counts)

Other meter functions

Frequency: Up to 70 MHz (Fluke 125, 124) or up to 40 MHz (Fluke 123)
Rotational speed (RPM): Revolutions per minute, based on 1, 2 or 4 or 8 pulses per 2 revolutions (Fluke 125 only)
Max. RPM reading: 50 kRPM
Continuity: Beeper on < 30 Ω
Diode test: Up to 2.8 V
Duty cycle: 2 % to 98 %, up to 30 MHz
Temperature (°C, °F): With optional accessories. Scale factors 1 mV/°C or 1 mV/°F
Number of inputs: 2
Input impedance: 1 MΩ ± 1 %/10 pF ± 2 pF
Advanced meter functions: Auto/manual ranging, TouchHold®, Relative measurements (zero reference), TrendPlot recording

Recorder mode

Trendplot recording

Dual input electronic paperless chart recorder. Plots and displays the actual, minimum, maximum and average of any measurement.
Source and display: Input A, input A and B
Range: 15 s/div to 2 days per division (automatic)
Recorded timespan: Up to 16 days with a resolution of 1.5 hours
Recording mode: Continuous with automatic vertical scaling and horizontal time compression
Measurement speed: 2.5 measurements per second maximum
Horizontal scale: Time from start

General specifications

Case

Design: Rugged, shock proof with integrated protective holster
Drip and dust proof: IP51 according to IEC529
Shock and vibration: Shock 30 g according to MIL-PRF-28800F, Class 2, par. 3.8.4.2 and 4.5.5.3.1
Shock and vibration: Vibration 3 g according to MIL-PRF-28800F, Class 2, par. 3.8.5.1 and 4.5.5.4.1

Display

Bright LCD with CCFL backlight, 60 (35) cd/m^2 with (without) power adapter
Size: 72 mm x 72 mm (2.8 in x 2.8 in)
Resolution: 240 x 240 pixels
Contrast and brightness: User adjustable, temperature compensated

Memory save and recall

20 (Fluke 125, 124) and 10 (Fluke 123) instrument screens with user set-ups and user text

Real-time clock

Time and date stamp TrendPlot recording

Power

Line power: Country-specific line voltage adapter/battery charger included
Battery power: Rechargeable Ni-MH BP120MH (installed)
Battery operating time: Up to 7 hours using BP120MH
Battery charging time: 7 hours
Battery power saving functions: Auto power down with adjustable power down time. On-screen battery power indicator

Mechanical data

Size: 50 mm x 115 mm x 232 mm (2 in x 4.5 in x 9.1 in)
Weight: 1.2 kg (2.64 lb)

Safety

Compliance:
EN61010-1-2001, Pollution degree 2;
CAN/CSA C22.2, No. 61010-1-04, including $_{C}CSA_{US}$-approval;
ANSI/ISA-82.02.01

Input voltage ratings

Maximum input voltage: CAT III 600 V
(Maximum voltage between input and reference lead)
Maximum input voltage using VPS40 Probe:
CAT III 600 V, CAT II 1000 V (Maximum voltage between probe tip input and reference lead)
Floating voltage: CAT III 600 V
(Maximum voltage between earth ground and any terminal [signal input or reference lead])
Maximum voltage between reference leads:
Instrument has common grounds connected via self recovering fault protection. For different ground potential measurements between inputs, use DP120 differential voltage probe or a Fluke 190C Series instrument.

Environmental
According to MIL-PRF-28800F, Class 2

Operating temperature: 0 °C to +50 °C
Storage temperature: -20 °C to +60 °C
Humidity: 10 °C to 30 °C, 95% RH non condensing;
30 °C to 40 °C, 75% RH non condensing;
40 °C to 50 °C, 45% RH non condensing

Maximum operating altitude: 2,000 m (6,500 ft)
4,500 m (15,000 ft) voltages ≤ 300 V
Maximum storage altitude: 12 km (40,000 ft)
Electro-Magnetic-Compatibility (EMC):
EN61326-1 for emissions and immunity

Optically isolated PC/printer interface

To printer: Supports HP Laserjet®, Deskjet®, Epson FX/LQ and postscript printers via optional PAC91
To PC: Transfer instrument settings, screen images and data, compatible with FlukeView® software for Windows® via optional OC4USB (USB) or PM9080 (RS-232) interface cable.

Warranty

Three-years (parts and labor) on main instrument
One-year on accessories

FlukeView® ScopeMeter® Software for Windows®

FlukeView ScopeMeter software helps you get more out of your ScopeMeter:

- Store instrument's screen copies on the PC, in color (with Fluke 190C-Series only) or in black and white
- Copy screen images into your reports and documentation
- Capture and store waveform data from your ScopeMeter on your PC
- Create and archive waveform references for automatic (Fluke 190C Series) or visual (Fluke 190B and 190C Series) comparison
- Includes waveform analysis, e.g. FFT spectrum analysis
- Copy waveform data into your spreadsheet for detailed analysis
- Use cursors for parameter measurement
- Extended recording of up to four user-selected measurements help you monitor and analyze slow moving signals and related events
- Logging of other readings directly into other application programs, eg., spreadsheet
- Add user text to instrument setups and send these to the instrument for operator reference and instructions
- Capture complete Replay sequence into the PC for further analysis and documentation (Fluke 190C Series)
- English, French and German versions included on a single CD-ROM

Note: Some functionality may be available with specific ScopeMeter models only

System requirements
- Pentium 90 or better
- CD-ROM drive
- Microsoft® Windows® (2000 and beyond)
- One free RS232 port or USB port
- PM9080 optically isolated RS232 adapter/cable, or:
- OC4USB optically isolated USB interface adapter/cable, available separately or included in SCC120/SCC190 kit and in ScopeMeter "S" versions

Supported instruments
Full support for Fluke 199C, 199B, 199, 196C, 196B, 196, 192B, 192, 125, 124 and 123.
Starting release V4.5, the Fluke 225C, 215C and 192C are supported.

Accessories

Standard accessories	Fluke 225C, 215C, 199C, 196C, 192C	Fluke 125, Fluke 124, Fluke 123
Rechargeable battery pack (installed)	BP190	BP120MH
Line voltage adapter/ battery charger	BC190	PM8907
Voltage probes and accessories	10:1 voltage probe (VPS210) including hook clip, ground lead with mini alligator clip, ground spring for probe tip	STL120 Shielded Test lead set; VPS40 high impedance 10:1 probe, 40 MHz (1 black, included with Fluke 125, 124); ground leads with mini alligator clips; AC120 alligator clips; BB120 BNC-to-Shielded banana adapter
Multimeter test leads	TL75 Hard Point test lead set (1 red, 1 black)	TL75 Hard Point test lead set (1 black)
Current clamp	—	i400s Current Clamp (included with Fluke 125 only)
User manual	Multi-lingual CD-ROM	Multi-lingual CD-ROM
Bus test connection support	BHT190 included with Fluke 225C and 215C, acts as break-out adaptor for DB-9, RJ-45 and M12 industrial bus connection systems	BHT190 optional, for use with Fluke 125 only

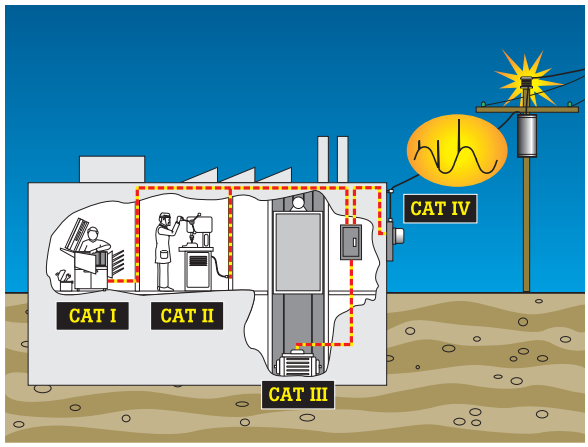
Next to the above standard accessories, Fluke offers a wide range of optional accessories like temperature probes, current clamps, high voltage probes, cables, adapters and carrying cases to further assist you in your job. See the Fluke web-site or contact your distributor for details.

SCC190 and SCC120—Software, Case, Cable kits

For user's safety, the Fluke ScopeMeters are connected to a PC or printer using an optically isolated interface cable. Software and cable can be ordered separately, or as part of a special value kit: the SCC190 or the SCC120 kit. Each of these include a protective hard shell carrying case (model depending on the ScopeMeter model) for safe and convenient storage of instrument and accessories, the FlukeView ScopeMeter Software for Windows and the OC4USB-interface cable. For those who prefer an RS-232 link, an optically isolated RS-232 cable PM9080 is available as separate item.

International safety standards

Measurement voltage category	Summary description
CAT IV	Three phase at utility connection, any outdoor conductors (under 1,000 V) • Outside and service entrance • Service drop from pole to building • Run between meter and panel • Overhead line to detached building • Underground line to well pump
CAT III	Three-phase distribution (under 1,000 V), including single phase commercial lighting and distribution panels • Feeders and short branch circuits • Distribution panel devices • Heavy appliance outlets with "short" connections to service entrance
CAT II	Single-phase receptable connected loads • Outlets and long branch circuits • All outlets at more than 10 m (30 ft) from Category III source • All outlets at more than 20 m (60 ft) from Category IV source
CAT I	Electronic • Electronic equipment • Low energy equipment with transient limiting protection



To protect your instrument and—more importantly—yourself, choose a test tool that can withstand the electrical hazards present in the environment in which you plan to use it.

EN61010 establishes international safety requirements for electrical measurement equipment. It separates the various electrical environments into installation categories based on the danger from high-voltage energy transients. To choose the right tool, the voltage rating alone does not determine the safety. It is the combination of voltage rating and installation category that determines maximum transient withstand capability of the tool. CAT III rated instruments are recommended for measurement on industrial power distribution systems.

Ordering information

Fluke 225C	Color ScopeMeter (200 MHz/2.5 GS/s) with Bus Health Test Functions
Fluke 225C/S	Color ScopeMeter (200 MHz/2.5 GS/s) with Bus Health Test + SCC190 kit
Fluke 215C	Color ScopeMeter (100 MHz/1 GS/s) with Bus Health Test Functions
Fluke 215C/S	Color ScopeMeter (100 MHz/1 GS/s) with Bus Health Test + SCC190 kit
Fluke 199C	Color ScopeMeter (200 MHz/2.5 GS/s)
Fluke 199C/S	Color ScopeMeter (200 MHz/2.5 GS/s) + SCC190 kit
Fluke 196C	Color ScopeMeter (100 MHz/1 GS/s)
Fluke 196C/S	Color ScopeMeter (100 MHz/1GS/s) + SCC190 kit
Fluke 192C	Color ScopeMeter (60 MHz/500 MS/s)
Fluke 192C/S	Color ScopeMeter (60 MHz/500 MS/s) + SCC190 kit
Fluke 125	Industrial ScopeMeter (40 MHz)
Fluke 125/S	Industrial ScopeMeter (40 MHz) + SCC120 kit
Fluke 124	Industrial ScopeMeter (40 MHz)
Fluke 124/S	Industrial ScopeMeter (40 MHz) + SCC120 kit
Fluke 123	Industrial ScopeMeter (20 MHz)
Fluke 123/S	Industrial ScopeMeter (20 MHz) + SCC120 kit
SCC190	FlukeView® Software + Cable + Case (190 Series)
SCC120	FlukeView® Software + Cable + Case (120 Series)
PM9080	Optically Isolated RS-232 adapter/cable
OC4USB	Optically Isolated USB interface cable
DP120	Differential Voltage Probe for Fluke 120 Series
BHT190	Bus Health Test break-out adapter for DB-9, RJ-45 and M12 connection systems
ITP120	Optically Isolated External Trigger Input for Fluke 120 series
SW90W	FlukeView® ScopeMeter Software for Windows®
C190	Hard Shell Carrying Case for Fluke 190 series
C120	Hard Shell Carrying Case for Fluke 120 series

SCC kit includes: Hard-shell carrying case, optically isolated USB interface cable, and FlukeView® for Windows® software.

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Selection guide

	Color ScopeMeter 215C, 225C		Color ScopeMeter 190C Series			ScopeMeter 120 Series		
	Fluke 225C	Fluke 215C	Fluke 199C	Fluke 196C	Fluke 192C	Fluke 125	Fluke 124	Fluke 123
Bandwidth	200 MHz	100 MHz	200 MHz	100 MHz	60 MHz	40 MHz	40 MHz	20 MHz
Max. real time sample rate	2.5 GS/s	1 GS/s	2.5 GS/s	1 GS/s	500 MS/s	25 MS/s	25 MS/s	25 MS/s
Max equivalent time sample rate	–					2.5 GS/s	2.5 GS/s	1.25 GS/s
Display	14.4 cm Full Color LCD					10.2 cm monochrome LCD		
Digital persistence	Yes, gives analog oscilloscope like waveform decay (user selectable)					–		
Envelope mode	Yes					Yes		
Waveform compare	Visual Reference and Automatic 'Pass / Fail' testing					–		
Max record length in Scope mode: in ScopeRecord mode:	3000 points per input channel, allowing for high time resolution signal analysis using Zoom; 27,500 points per input or more (5 ms/div...2 min/div.)					512 min/max points per input		
Number of inputs	2 plus external / DMM input, all isolated from each other and from ground					2; opt. Isolated External Trig. thru ITP120		
Number of digitizers	2					2		
Independently floating isolated inputs	Up to 1000 V between inputs, references and ground					–		
Input sensitivity	2 mV/div. ...100 V/div.					5 mV/div. 500 V/div.		
Glitch capture	Up to 3 ns using Pulse Width triggering; 50 ns peak detect at 5 µs/div. to 1 min/div.					40 ns		
Timebase range in scope mode	5 ns/div. to 2 min/div.				10 ns/div. ... 2 min/div.	10 ns/div. ...1 min/div.		20 ns/div. ... 1 min/div
Trigger types	Connect-and-View™, Free Run, Single Shot, Edge, Delay, Video Frame, Video Line, Selectable pulse width and External. Dual slope trigger and Event trigger (n-cycle)					Connect-and-ViewTM, Free Run, Single Shot, Edge, Video		
Scope measurements	7 cursor measurements, 30 automatic measurements Automatic Vrms and watts measurement on cursor limited part of waveform					As 124 + Power, VA, VAR, PF, RPM, Vpwm; THD	Cursor + 26 Automatic measurement	26 automatic measurements
Bus health test function	Signal validation and eyepattern mode for standard industry buses		–			For standard industry buses	–	
Waveform mathematics	A + B, A – B, A x B, A versus B (X-Y-mode, giving Lissajous diagrams) Frequency Spectrum (FFT)					Harmonics mode	–	
Power measurements	P (W), VA, VAR, PF					Power, VA, VAR, PF, Vpwm	–	
ScopeRecord trigger modes	Start on trigger, stop on trigger					–		
Capture last 100 screens	Automatic, with replay capability					–		
Dual input TrendPlot	Yes, with cursors and zoom					Yes, with cursors		Yes
Memory for screens/ set-ups	10 screens and set-ups; 5 more memories are made available upon registration of the ScopeMeter					20		10
Memory for recordings	Two, each can store 100 scope screens, a ScopeRecord or a TrendPlot							
True-rms multimeter	5000 counts, volts, amps, ohms, continuity, diode, temp					Dual fully featured 5000 counts DMM		
Safety certified (EN61010-1)	1000 V CAT II/600 V CAT III (instrument and included accessories)					600 V CAT III (Instrument and included accessories)		
Battery (installed)	4 hr Ni-MH (BP190)					7 hr Ni-MH (BP120MH)		
BHT190 bus health adapter set	Included		–			Optional	–	
Line power	Adapter / battery-charger included (BC190)					Adapter / Battery charger included (PM8907)		
Size	25.6 cm x 16.9 cm x 6.4 cm					23.2 cm x 11.5 cm x 5.0 cm		
Weight	2 kg					1.2 kg		
PC and printer interface	Using optional optically insulated adapter/cable OC4USB (USB) or PM9080 (RS-232)							
Warranty	Three years on main instrument, one year on the standard accessories							

Fluke. *Keeping your world up and running.®*

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