

FLUKE®

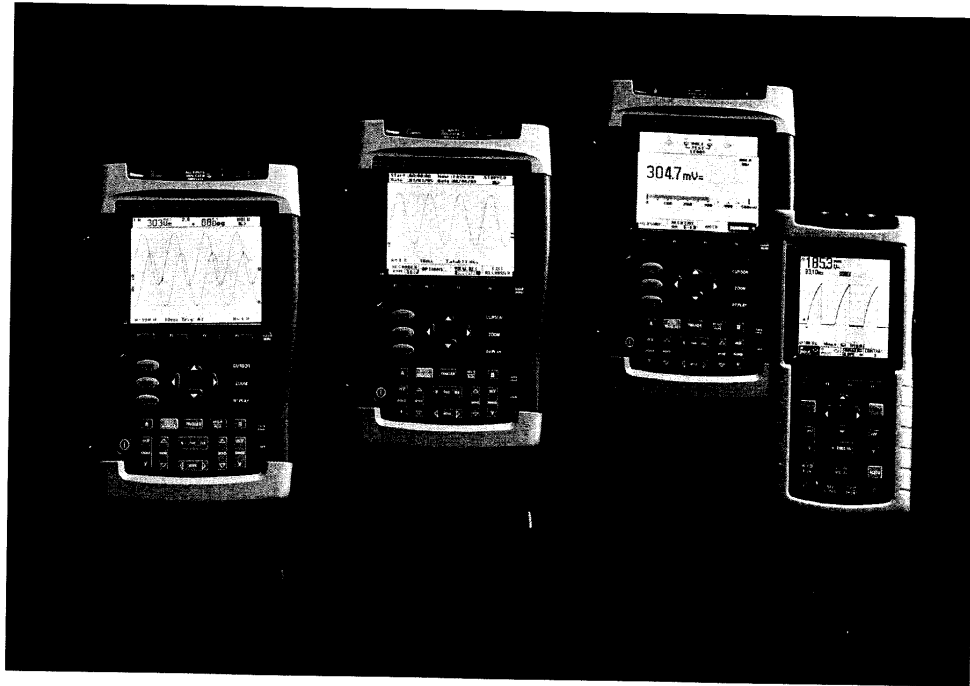
ScopeMeter® 190 Series ScopeMeter® 123

Technical Data

Connect
and
View

ISO 9001

LISTED



ScopeMeter 190 Series: Speed, performance and analysis power

For demanding applications, the ScopeMeter 190 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 - 60, 100 or 200 MHz bandwidth
- ✓ Up to 2.5 GS/s real-time sampling per input
- ✓ Connect-and-View™ automatic triggering, a full range of manual trigger modes plus external triggering
- ✓ 27,500 points per input record length using ScopeRecord™ mode
- ✓ Automatic capture and replay of 100 screens
- ✓ 24 automatic waveform measurements
- ✓ Cursors, zoom and real-time clock
- ✓ Four hours rechargeable NiMH battery pack
- ✓ 1,000V CAT II and 600V CAT III safety certified
- ✓ Up to 1,000V independently floating isolated inputs
- ✓ Includes a 5,000 counts true-rms multimeter and a TrendPlot™ paperless recorder

ScopeMeter 123: Three-in-one simplicity

The compact ScopeMeter 123 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 20 MHz digital oscilloscope
- ✓ Two 5,000 counts true-rms digital multimeters
- ✓ A dual input TrendPlot™ recorder
- ✓ Connect-and-View™ trigger simplicity for hands-off operation
- ✓ Shielded test leads for oscilloscope, resistance and continuity measurements
- ✓ Up to five hours battery operation
- ✓ 600V CAT III safety certified
- ✓ Optically isolated RS-232 interface
- ✓ Rugged compact case

Technical Specifications 190 Series

OSCILLOSCOPE MODE VERTICAL DEFLECTION

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

Bandwidth limiter
Number of inputs
Input coupling
Input sensitivity
Input voltage
Vertical resolution
Accuracy
Input impedance

User selectable 10 kHz or 20 MHz
2 plus external trigger. All isolated from each other and ground.
AC, DC with ground level indicator
5 mV/div to 100 V/div
See general specifications for maximum rating.
8 bit
 $\pm(1.5\% \text{ of reading} + 0.04 \times \text{range/div})$
 $1 \text{ M}\Omega \pm 1\% // 15 \text{ pF} \pm 2 \text{ pF}$

HORIZONTAL

	Fluke 199	Fluke 196	Fluke 192
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
Accuracy
Glitch capture

1,000 points per input
27,500 points per input in ScopeRecord™-roll mode (10 ms/div ... 2 min/div)
 $\pm (0.01\% \text{ of reading} + 1 \text{ pixel})$
50 nsec (5 μ sec/div to 1 min/div)
Faster timebases have higher sample rates than 20 MS/s.

DISPLAY AND ACQUISITION

Display modes
Acquisition modes

Input A, input B, dual, average, persistence, invert, replay
Normal, auto, single shot, ScopeRecord™, roll, glitch capture

TRIGGER AND DELAY

Source
Modes
Connect-and-View™

Input A, input B, external trigger input. All input references isolated from each other and ground.
Automatic Connect-and-View™, free run, single shot, edge, delay, video, video line, selectable pulse width
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.

Video triggering
Pulse width triggering
Time delay

NTSC, PAL, PAL+, SECAM. Includes field 1 and 2 and line select.
Pulse width qualified by time.
Allows for triggering $\langle t \rangle = t \pm t$, where t is selectable in minimal steps of 0.01 div or 50 nsec
9 divisions pre-trigger view to 1,000 divisions trigger delay.

AUTOMATIC CAPTURE OF 100 SCREENS

The instrument ALWAYS memorizes last 100 screens (no user interaction or setup required). When an anomaly occurs on screen, there's 10 seconds to press HOLD and review it. If one sets up the instrument for triggering on glitches or intermittent anomalies the unit operates in "baby-sit" mode and will capture 100 events.
Manual or continuous replay.
Displays the captured 100 screens as a "live" animation. The contents

Replay storage

AUTOMATIC SCOPE MEASUREMENTS

CURSOR MEASUREMENTS

Source
Dual horizontal lines
Dual vertical lines
Single vertical line

Input A or B
Voltage at cursor 1 and 2, voltage between cursors
Time between cursors, voltage between markers
Min-Max and Average voltage at cursor position
Up to 8x horizontal zoom

ZOOM

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 (15 °F to 33 °F). Add 10 % of specified accuracy for each degree °C below 18 °C or above 28 °C (15 °F to 33 °F).

MAXIMUM RESOLUTION 5,000 counts
VOLTMETER RANGES 500mV, 5V, 50V, 500V, 1,000V

ACCURACY

VDC $\pm (0.5\% + 5 \text{ counts})$
VAC true rms
15 Hz...60 Hz: $\pm (1\% + 10 \text{ counts})$
60 Hz...1 kHz: $\pm (2.5\% + 15 \text{ counts})$
VAC+DC true rms
DC...60 Hz: $\pm (1\% + 10 \text{ counts})$
60 Hz...1 kHz: $\pm (2.5\% + 15 \text{ counts})$

OHMS

Ranges 500 Ω , 5k Ω , 50k Ω , 500k Ω , 5M Ω , 30M Ω
Accuracy $\pm (0.6\% + 5 \text{ counts})$

OTHER METER FUNCTIONS

Continuity
Diode test
Amps
Temperature (°C, °F)
Input impedance
Advanced meter functions

Beeper on $< 30\Omega$ ($\pm 10\Omega$)
Up to 2.8V
Amp DC, Amp AC, Amp AC+DC using an optional current clamp or shunt. Scaling factors:
0.1 mV/Amp ... 100 V/Amp
With optional accessories. Scale factors 1 mV/°C or 1 mV/°F
 $1 \text{ M}\Omega \pm 1\% // 10 \text{ pF} \pm 2 \text{ pF}$
Auto/manual ranging, relative measurements (Zero reference), TrendPlot recording

RECORDER MODE

SCOPERECORD-ROLL MODE

Source and display
Memory depth
Min-Max values

Dual input waveform storage mode.
Input A, Input B, Dual
27,500 points per input. Each point consist of Min-Max pair.
Min-Max values are measured at high sample rate ensuring capture and display of glitches.

Time base range	10 ms/div ... 1 min/div	2 min/div
Recorded timespan	11 sec ... 15 hrs	30 hrs
Glitch capture	50 nsec	250 nsec
Sample rate	20 MS/s	4 MS/s
Resolution	400 μ sec ... 2 sec	4 sec

POWER

Line power

Battery power
 Battery operating time
 Battery charging time
 Battery refresh cycle

Battery power saving functions

MECHANICAL DATA

Size

Weight

SAFETY

Compliance

INPUT VOLTAGE RATINGS

Maximum input voltage
(Maximum voltage between input and reference lead)

Floating voltage
Maximum voltage between earth ground and any terminal (signal input or reference lead)

Country specific line voltage adapter/battery charger included
 Rechargeable NiCd (installed)
 Up to 5 hours
 4 hours
 8 ... 14 hours depending on remaining capacity at start of refresh cycle
 Auto power down with adjustable power down time. On screen battery power indicator

50 x 115 x 232 mm
 (2 x 4.5 x 9.1 inches)
 1.2 kg (2.5 lb.)

EN61010.1 (1993) Pollution degree 2
 UL3111-1 (1994)
 CAN/CSA-C22.2 No. 1010.1 (1992)
 ANSI/ISA S82.01 (1994)

600V CAT III
 600V CAT III

Maximum voltage between reference leads

ENVIRONMENTAL

Operating Temperature
 Storage temperature
 Humidity

Maximum operating altitude

Maximum storage altitude
 Electro-Magnetic

Compatibility

OPTICALLY ISOLATED PC/PRINTER INTERFACE

To printer

To PC

WARRANTY

Instrument has common grounds connected via self-recovering fault protection. For different ground potential measurements between inputs use DP120 differential voltage probe.

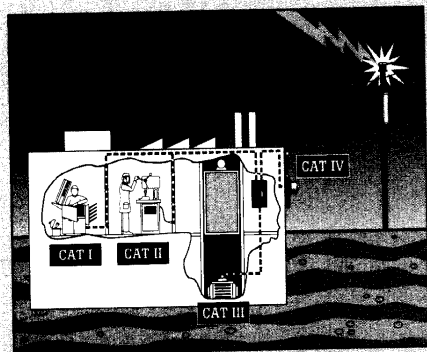
0°C to +50°C
 -20°C to +60°C
 10°C to 30°C, 95% RH non condensing
 30°C to 40°C, 75% RH non condensing
 40°C to 50°C, 45% RH non condensing

2,000m (6,500 feet)
 3,000m (10,000 feet) voltages ≤ 400V

12 km (40,000 feet)
 Emission EN50081-1
 (EN55022 and EN60555-2)
 Immunity EN50082-2
 (IEC1000-4-2, -3, -4, -5)

Supports HP Laserjet®, Deskjet®, Epson FX/LQ and postscript printers via optional PAC91
 Transfer instrument settings, screen images and data, compatible with FlukeView® software for Windows® via optional PM9080.
 3 years

International Safety Standards



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.

Overvoltage Category	Summary description
CAT IV*	Three phase at utility connection, any outdoors conductors (under 1,000V)
CAT III	Three-phase distribution (under 1,000V), including single phase commercial lighting and distribution panels
CAT II	Single-phase receptacle connected loads
CAT I	Electronic

Ordering Information

FLK-192 Fluke 192 ScopeMeter (60 MHz)
 FLK-192S Fluke 192 ScopeMeter (60 MHz) with SCC190 kit
 FLK-1963 Fluke 196 ScopeMeter (100 MHz)
 FLK-196S Fluke 196 ScopeMeter (100 MHz) with SCC190 kit
 FLK-199 Fluke 199 ScopeMeter (200 MHz)
 FLK-199S Fluke 199 ScopeMeter (200 MHz) with SCC190 kit
 SCC190 Software – Cable – Case kit for Fluke 190 Series

FLK-123
 FLK-123S
 SCC120

Fluke 123 Industrial ScopeMeter
 Fluke 123 Industrial ScopeMeter with SCC120 kit
 Software – Cable – Case kit for Fluke 123

- Fluke ScopeMeter test tools come standard with a complete accessory package including line voltage adapter, and battery pack (installed). ScopeMeter 123 includes the shielded test leads, ScopeMeter 190 Series comes with probes, probe accessories and multimeter test leads.
- SCC kit includes: Hard-shell carrying case, optically isolated RS-232 interface cable, and FlukeView® for Windows® software.

Technical Specifications ScopeMeter 123

OSCILLOSCOPE MODE

VERTICAL DEFLECTION

Bandwidth	20 MHz at inputs 20 MHz with BB120 and optional PM8918/VP190 10:1 probes 12.5 MHz with STL120 1:1 test leads
Rise Time	17.5 ns
Number of inputs	2
Input coupling	AC, DC with ground level indicator
Input sensitivity	5 mV ... 500 V/div (with included STL120 shielded test leads measure up to 600Vrms)
Vertical resolution	8 bit
Accuracy	± (2% 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

HORIZONTAL

Maximum sample rate	1.25 GS/s for repetitive signals 25 MS/s for single shot
Number of digitizers	2
Time base range	20 ns/div ... 1 min/div
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, single shot, roll, glitch capture (always on)

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	Ranges: 500mV, 5V, 50V, 500V, 1,250V Max. Resolution: 5,000 counts Accuracy: ± (0.5% + 5 counts)
VAC RMS	Ranges: 500mV, 5V, 50V, 500V, 1,250V Max. Resolution: 5,000 counts

DUAL INPUT METER

The specified accuracy is valid over the temperature range 18 °C to 28 °C (15 °F to 33 °F). Add 10 % of specified accuracy for each degree °C below 18 °C or above 28 °C (15 °F to 33 °F).

Max. meter bandwidth	20 MHz
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Accuracy	1 Hz...60 Hz: ±(1% + 10 counts) 60 Hz...1 kHz: ±(2.5% + 15 counts) 20 kHz...1 MHz (5% + 20 counts)
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VAC+DC TRUE RMS

Ranges	500mV, 5V, 50V, 500V, 1,250V
Max. Resolution	5,000 counts
Accuracy	DC ... 60 Hz: ±(1% + 10 counts) 60 Hz...1 kHz: ±(2.5% + 15 counts) 20 kHz...1 MHz (5% + 20 counts)

OHMS

Ranges	500Ω, 5kΩ, 50kΩ, 500kΩ, 5MΩ, 30MΩ
Max. Resolution	5,000 counts
Accuracy	± (0.6% of reading + 5 counts)

CAPACITANCE

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

OTHER METER FUNCTIONS

Frequency	Up to 40 MHz
Continuity	Beeper on < 30Ω
Diode test	Up to 2.8V
Amps	Amp DC, Amp AC, Amp AC+DC using an optional current clamp or shunt.
Temperature (°C, °F)	Scaling factors: 0.1 mV/Amp ... 100 V/Amp With optional accessories. Scale factors 1 mV/°C or 1 mV/°F

Number of inputs	2
Input impedance	1MΩ ± 1% // 10 pF ± 2 pF
Advanced meter functions	Auto/manual ranging TouchHold® Relative measurements (zero reference) TrendPlot recording

RECORDER MODE

TRENDPLOT™ RECORDING

Source and display Range	Dual input electronic paperless chart recorder. Plots and displays the actual, minimum, maximum and average of any measurement. Input A, Input A and B 15 s/div till 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 30g, Vibration 3g according to MIL-T28800E, Type III, Class 3, Style B

DISPLAY

Size	Bright LCD with CCFL backlight, 35/60 cd/m² without/with adapter
Resolution	72 x 72mm (2.8 x 2.8 inch)
Contrast and brightness	240 x 240 pixels User adjustable, temperature compensated
MEMORY SAVE AND RECALL	2 screens, 10 user setups

REAL-TIME CLOCK

Time and date stamp TrendPlot recording

Recording modes Single sweep, continuous roll, start on external trigger.
 Horizontal scale Time from start, time of day
 Zoom Up to 100x / +8
 Memory Up to 2 dual input ScopeRecordings can be saved for later recall and analysis.

TRENDPLOT™ RECORDING

Source and display Dual input electronic paperless chart recorder. Plots, displays and stores meter and scope measurements.
 Memory depth Input A, Input B and DMM input 13,500 points record per input. Per record point a minimum, maximum and average value, and a time and date stamp are stored.

Ranges 10 s/div to 20 min/div in normal view mode.
 10 min/div to 24 hour/div in view-all mode (overview of total record)

Recorded timespan Up to 8 days with a resolution of 1 minute

Recording mode Continuous roll
 Measurement speed 2.5 measurements per second maximum

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

GENERAL SPECIFICATIONS

CASE

Design Rugged, shock proof with integrated protective holster
 Drip and dust proof IP51 according to IEC529
 Shock and Vibration Shock 30g, Vibration 3g according to MIL 28800F type III, class 3, style B

DISPLAY

Bright LCD with CCFL backlight, 35/60 cd/m² without/with power adapter
 Size 105 x 79 mm (4.1 x 3.1 inches)
 Resolution 240 x 240 pixels
 Contrast and brightness User adjustable, temperature compensated

MEMORY SAVE AND RECALL

Scope memories 10 memory locations that each can contain two waveforms plus corresponding setup.
 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 (13,500 Min-Max pairs per input).
 Time and date stamp for ScopeRecord, 100 captured screens and Trendplots.

REAL-TIME CLOCK

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 power indicator

MECHANICAL DATA

Size 256 x 169 x 64 mm (10.1 x 6.6 x 2.5 inches)
 Weight 1.95 kg (4.3 lbs)

SAFETY

Compliance EN61010-1 (1993) Pollution degree 2
 UL 3111-1 (1994)
 CAN/CSA C22.2 No.1010.1 (1992)
 ANSI/ISA S82.01 (1994)

INPUT VOLTAGE RATINGS

Maximum probe voltage 1,000V CAT II, 600V CAT III
(Maximum voltage between 10:1 probe tip (VP190) and reference lead)
 Floating voltage 1,000V CAT II, 600V CAT III
(Maximum voltage between earth ground and any terminal (signal input or shielding))
 Independently isolated inputs 1,000V CAT II, 600V CAT III
(Maximum voltage between any terminal of one input or probe (VP190) and any other terminal of another input or probe (VP190))
 Maximum voltage on BNC input directly (input A or B) 300V CAT III
 Maximum voltage on meter input 1,000V CAT II, 600V CAT III

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 EN 61326-1 for emission and immunity

OPTICALLY ISOLATED PC/PRINTER INTERFACE

To printer Supports HP Laserjet®, Deskjet®, Epson FX/LQ 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 PM9080.
 3 years

WARRANTY

Accessories

FLUKE®

Standard accessories:	190 Series	123
Rechargeable battery pack (installed)	BP190	BP120
Line voltage adapter / battery charger	BC190	PM 8907
Two probes, red & gray	VP190-R & VP190-G	-
Two shielded test-leads, red & gray	-	STL120
Test lead, black	- (*1)	TL75
Two hook clips, black	- (*1)	HC120
Three alligator clips	- (*2)	AC120
Shielded banana to BNC adapter		BB120
Probe accessory Set, red & gray	AS190 - R/G (*2)	-
User's manual	9 language versions	13 language versions
Optional accessories and replacements: (*3)		
Safety designed oscilloscope probes		
Differential voltage probe	DP120	DP120
Optically isolated trigger probe	-	ITP120
10:1 Voltage probe red or grey	VP190-R or VP190-G (*4)	
Probe accessory set red or grey	AS190-R or AS190-G (*4)	
Probe replacement set	RS190	
Safety designed test leads		
Hard point right angle test lead set		TL75
Test lead set		TL20
Hook clips for use with TL75 & STL120		HC120
Alligator clips for use with TL75 & STL120		AC120
Pin-grabber test clips for banana plug		AC83
Large jaw alligator clips for banana plug		AC85A
Hook style clips for banana plug		AC80
Alligator clips for banana plug		AC20
Industrial test probes for banana plug		TP20
Electronic test probes for banana plug		TP80
Test probe flat blade for banana plug		TP1
Test probe 2mm for banana plug		TP2
Test probe 4mm for banana plug		TP4
Current probes		
AC/DC current probe 50mA to 100A		80i-110s (*4)
AC current probe 0.1A to 1,000A		80i-1000s (*4)
Flexible AC current probe 1A to 2,000A		i2000flex (*4)
AC current probe 1A to 3,000A		i3000s (*4)
AC current probe 1A to 200A		i200s (*4)
Current shunt 4-20mA		CS20MA
Temperature probes		
Universal temperature probe		80T-150U
Thermocouple module		80TK
Infrared temperature probe		80T-IR
Cables and adapters		
Printer adapter cable		PAC91
Optically isolated RS-232 adapter/cable		PM 9080/001 (*6)
Dual banana plug to female BNC adapter		PM 9081/001
Dual banana jack to male BNC adapter		PM 9082/001
1.5m 50Ω coaxial BNC cable		PM 9091/001
Male BNC to female BNC adapter		PM 9093/001
Protective cases		
Software cable case package	SCC190 (*5)	SCC120 (*5)
Hard carrying case	C190 (*6)	C120 (*6)
Soft carrying case	C195	C125
PC software		
FlukeView software for Windows®		SW90W/033EFG (*5)

(*1) Probe accessory VP190 set includes test leads, hook clips. (*2) The Fluke 196 and 199 include red and grey probe, accessory set AS190, with 4 heavy duty alligator clips. (*3) This is a selection of a broader range of optional accessories that support ScopeMeter products, for information on additional available accessories, contact your Fluke distributor. (*4) Connects to BNC, for connection to Fluke 123 input use BB120. (*5) Software Cable Case Package includes RS-232 cable, FlukeView software & hard carrying case. (*6) Included in SCC package.

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