

ScopeMeter® 190 Series ScopeMeter® 123

Technical Data

**Connect
and
View**



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	User selectable 10 kHz or 20 MHz
Number of inputs	2 plus external trigger. All isolated from each other and ground.
Input coupling	AC, DC with ground level indicator
Input sensitivity	5 mV/div to 100 V/div
Input voltage	See general specifications for maximum rating.
Vertical resolution	8 bit
Accuracy	±(1.5% of reading + 0.04 x range/div)
Input impedance	1 MΩ ± 1% // 15 pF ± 2 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	1,000 points per input 27,500 points per input in ScopeRecord™-roll mode (10 ms/div ... 2 min/div)
Accuracy	± (0.01% of reading + 1 pixel)
Glitch capture	50 nsec (5 μsec/div to 1 min/div) Faster timebases have higher sample rates than 20 MS/s.

DISPLAY AND ACQUISITION

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

TRIGGER AND DELAY

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

Video triggering	NTSC, PAL, PAL+, SECAM. Includes field 1 and 2 and line select.
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	9 divisions pre-trigger view to 1,000 divisions trigger delay.

AUTOMATIC CAPTURE OF 100 SCREENS

Replay	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
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Replay storage

AUTOMATIC SCOPE MEASUREMENTS

can also be viewed by manually scrolling backwards and forwards "screen by screen".
Up to 2 sets of 100 screens can be saved for later recall and analysis.
VDC, VAC rms, 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, power factor, watts, VA, VA reactive, phase, temperature °C, temperature °F, dBV, dBm into 50Ω and 600Ω

CURSORS MEASUREMENTS

Source	Input A or B
Dual horizontal lines	Voltage at cursor 1 and 2, voltage between cursors
Dual vertical lines	Time between cursors, voltage between markers
Single vertical line	Min-Max and Average voltage at cursor position

ZOOM
Up to 8x horizontal 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	± (0.5 % + 5 counts)
VAC true rms	
15 Hz...60 Hz:	± (1 % + 10 counts)
60 Hz...1 kHz:	± (2.5 % + 15 counts)
VAC+DC true rms	
DC...60 Hz:	± (1 % + 10 counts)
60 Hz...1 kHz:	± (2.5 % + 15 counts)

OHMS

Ranges	500Ω, 5kΩ, 50kΩ, 500kΩ, 5MΩ, 30MΩ
Accuracy	± (0.6 % + 5 counts)

OTHER METER FUNCTIONS

Continuity	Beeper on < 30Ω (± 10Ω)
Diode test	Up to 2.8V
Amps	Amp DC, Amp AC, Amp AC+DC using an optional current clamp or shunt. Scaling factors: 0.1 mV/Amp ... 100 V/Amp
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

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 consist of Min-Max pair.
Min-Max values	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 μsec ... 2 sec	4 sec

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).

REAL-TIME CLOCK

Time and date stamp for ScopeRecord, 100 captured screens and Trendplots.

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.

WARRANTY

3 years

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

MEASUREMENTS

	Up to 10 divisions pre-trigger view
	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 50Ω and 600Ω. (Amps, °C or °F with optional probes)

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
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

Accuracy

1 Hz...60 Hz:	±(1% + 10 counts)
60 Hz...1 kHz:	±(2.5% + 15 counts)
20 kHz...1 MHz:	(5% + 20 counts)

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.

Scaling factors:
0.1 mV/Amp ... 100 V/Amp
With optional accessories. Scale factors 1 mV/°C or 1 mV/°F

Temperature (°C, °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

	Dual input electronic paperless chart recorder. Plots and displays the actual, minimum, maximum and average of any measurement.
Source and display Range	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
	2 screens, 10 user setups

MEMORY SAVE

AND RECALL

REAL-TIME CLOCK

Time and date stamp TrendPlot recording

POWER

Line power
 Battery power
 Battery operating time
 Battery charging time
 Battery refresh cycle

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

Battery power saving functions

MECHANICAL DATA

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

SAFETY

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

INPUT VOLTAGE RATINGS

Maximum input voltage
(Maximum voltage between input and reference lead)
 600V CAT III
 Floating voltage
 600V CAT III
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.

ENVIRONMENTAL

Operating Temperature
 Storage Temperature
 Humidity
 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

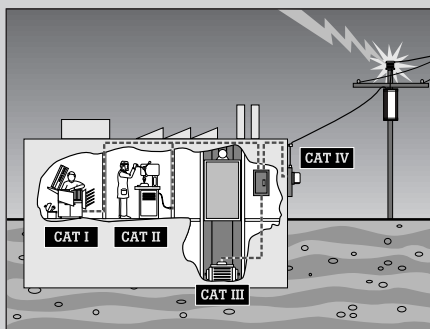
Maximum operating altitude
 2,000m (6,500 feet)
 3,000m (10,000 feet) voltages ≤ 400V

Maximum storage altitude
 Electro-Magnetic
 Compatibility
 12 km (40,000 feet)
 Emission EN50081-1
 (EN55022 and EN60555-2)
 Immunity EN50082-2
 (IEC1000-4-2, -3, -4, -5)

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 PM9080.
WARRANTY
 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-123	Fluke 123 Industrial ScopeMeter
FLK-192S	Fluke 192 ScopeMeter (60 MHz) with SCC190 kit	FLK-123S	Fluke 123 Industrial ScopeMeter with SCC120 kit
FLK-1963	Fluke 196 ScopeMeter (100 MHz)	SCC120	Software – Cable – Case kit for Fluke 123
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		

- 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.

Accessories

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)		
<i>Safety designed oscilloscope probes</i>		
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	
<i>Safety designed test leads</i>		
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
<i>Current probes</i>		
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
<i>Temperature probes</i>		
Universal temperature probe		80T-150U
Thermocouple module		80TK
Infrared temperature probe		80T-IR
<i>Cables and adapters</i>		
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
<i>Protective cases</i>		
Software cable case package	SCC190 (*5)	SCC120 (*5)
Hard carrying case	C190 (*6)	C120 (*6)
Soft carrying case	C195	C125
<i>PC software</i>		
FlukeView software for Windows®	SW90W/O33EFG (*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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