FLUKE ®

Oscilloscopes for field applications

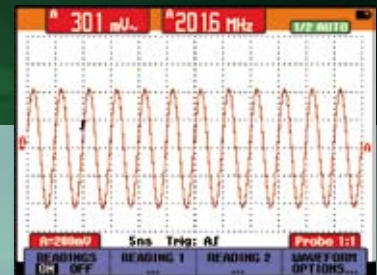## ScopeMeter® 120 and 190C Series

- **Choice of bandwidth: 20 to 200 MHz models**

- **Up to 2.5 GS/s real-time sampling**

- **Easy to use with Connect-and-View triggering**

- **Up to 7 hours battery operating time**

ScopeMeter® 190C Series: Speed, performance and analysis power

High sampling rates give you the required resolution for detailed signal analysis.

For the more demanding applications, the ScopeMeter 190C Series high-performance oscilloscopes offers 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 oscilloscope 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
- High resolution color display
- Connect-and-View™ automatic triggering and a full range of manual trigger modes
- Digital Persistence mode for analyzing complex dynamic waveforms like on an analog scope
- Fast display update rate for seeing dynamic behavior instantaneously
- Automatic capture and replay of 100 screens
- 27,500 points per input record length using ScopeRecord™ mode
- TrendPlot™ paperless chart recorder for trend analysis up to 22 days
- Up to 1000 V independently floating isolated inputs
- Waveform reference for visual comparisons and automatic pass/fail testing of waveforms
- V_{pwm} function for motor drive and frequency inverter applications
- 1000 V CAT II and 600 V CAT III safety certified
- Rechargeable Ni-MH battery pack

See what's really happening

With a maximum real-time sampling rate of 2.5 GS/s per input, you can see what really happens, with 400 ps resolution. Both inputs have their own digitizer, so you can simultaneously acquire two waveforms and analyze them with the highest resolution and detail.
If an anomaly flashes by on the screen, just press the Replay button to see it again. And thanks to the wider screen, you will always see a 12 divisions time window giving a far better overview of what's happening both before and after the trigger event!
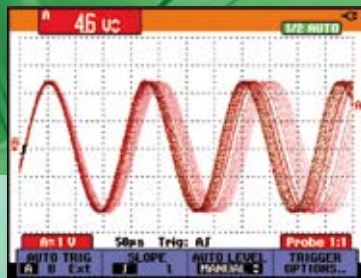
Digital Persistence mode gives analog scope-like display of complex and modulated signals.
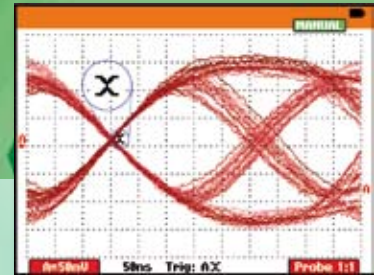
Dual-slope triggering used to capture the eye-pattern on a digital datastream.

See dynamic signal behavior instantaneously

The Digital Persistence mode helps to find anomalies and to analyze complex dynamic signals by showing the waveforms amplitude distribution over time.

Digital Persistence uses multiple intensity levels and user selectable decay times – it's as if you're looking at the display of an analog, real time oscilloscope!

The fast display update rate that's standard on all models reveals signal changes instantaneously, useful for instance when making adjustments to a system under test.

Advanced trigger modes

The ScopeMeter 190C Series greatly simplifies triggering with Connect-and-View™ automatic triggering. Two new modes – "n-cycle triggering" and "dual-slope triggering" - have been added to the Fluke 190C Series to help you isolate the phenomena of interest. N-cycle triggering ensures you get a stable live image of a signal, for example, in-frequency dividers and clocked (synchronous) digital systems, or to synchronize on bursts of pulses. Dual-slope triggering enables the oscilloscopes to trigger on both rising and falling edges alike. This means that any edge in the signal will act as a trigger event and initiate a new waveform acquisition, a most useful capability when making eye-patterns from digital datastreams, or in conjunction with single-shot phenomena. However, manual triggering is sometimes required. Manual modes include edge, delay, video and pulse width triggering. A fully-isolated external trigger input is included for troubleshooting time relationships between two input signals synchronized to a third signal.
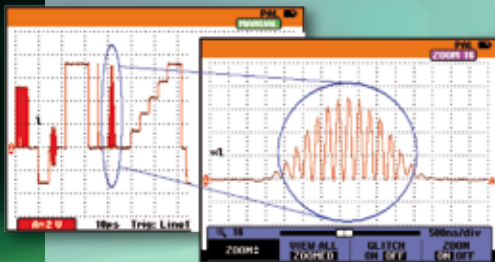

Thanks to the deeper memory, very small parts of the waveform can be studied in full detail using 'zoom'.

Deeper waveform acquisition memory

The waveform memory of all oscilloscopes in the 190C Series has been enlarged to allow as many as 3000 samples per channel to be acquired. You can use the ZOOM function to find tiny details in a long waveform, for example, the color burst in a video signal or a single impulse in a complex data-stream. All models also allow the high-resolution waveforms to be transferred to a PC for later detailed analysis using FlukeView ScopeMeter software.

## Easier identification of traces, everywhere

The full-color display makes identification of individual waveforms easier, particularly when displaying large amplitude or multiple overlapping waveforms on screen. On-screen color labels, measurements and warnings are clearly linked to specific waveforms.
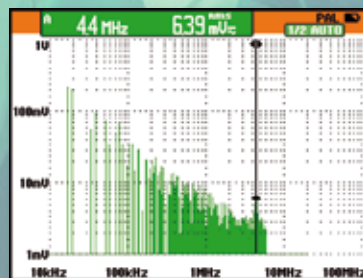

Frequency Spectrum shows an overview of frequencies contained in a signal.

Frequency Spectrum Analysis

All 190C Color ScopeMeter models now include Frequency Spectrum Analysis functionality based on Fast Fourier Transformation (FFT) analysis as a standard feature. This enables you to identify the individual frequency components contained in a signal. The spectrum analysis function is also handy for revealing the effects of vibration, signal interference or crosstalk. An automatic window function assures optimal windowing, although you may manually select your preferred time window.
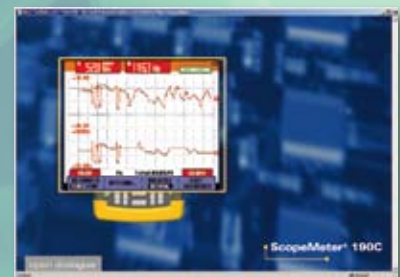
Take an on-line demonstration of the ScopeMeter Series, go to **www.fluke.com** *or* **www.fluke.co.uk**
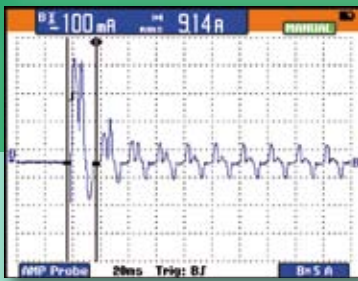
The inrush current is measured on the part of the waveform enclosed by the cursors.

Cursor-limited automatic measurement

ScopeMeter 190C features 30 automatic measurements, cursors, zoom and real-time clock. Now automatic power and Vrms-measurements can be performed on a specific, user identified portion of the waveform using the cursors of the Fluke 190C to define the time-window of interest. In this way, the ScopeMeter 190C measures the power within a specified time span, or the rms-value of a voltage during a dedicated period of time.
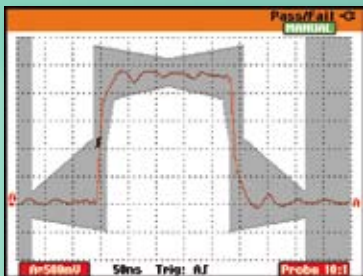
Pass/Fail testing of actual signal against a reference template

Waveform Pass/Fail Testing

"Waveform reference" allows an acquired trace to be stored and designated "reference trace" for visual comparisons, or it can be used as the reference for automatic "Pass/Fail" testing.
Up to 100 individually matching ("Pass") or non-matching ("Fail") waveforms can be stored in the replay memory, allowing you to monitor your system's behavior over a long period of time, without the need for you to attend!

Automatic capture and replay of 100 screens

Scope users know how frustrating it is to see a one-time anomaly flash by never to be seen again. Not with the ScopeMeter 190C Series! Now you can look back in time with a touch of the replay button. In normal use, the instrument continuously memorizes the last 100 screens. Each time a new screen is acquired, the oldest is discarded. At any moment, you can "freeze" the last 100 screens and scroll through picture-by-picture or replay as a "live" animation. Cursors can be used for further analysis. You can even use the advanced trigger capabilities to capture up to 100 specific events. Two sets of 100 captured screens with individual time stamps can be stored for later recall or download to a PC.

Use the 27,500 points memory of ScopeRecord and zoom in for maximum detail.

Deep memory for high-resolution ScopeRecord™

The ScopeRecord memory stores 27,500 points per input or more, for high resolution recording of events up to 48 hours, and captures fast intermittents and glitches as short as 50 ns. This continuous roll mode, for example, stores events like motion profiles, UPS, power supply and motor startups.
All models also have a "Stop-on-Trigger" in the ScopeRecord mode. This allows the ScopeMeter to store waveform data until the instrument is triggered or until a repetitive trigger signal is interrupted.

This way, the instrument will, for example, automatically recognize a power failure and store the waveform data preceding it. And with 100 x zoom, you can look at the smallest details, like individual power cycles. Two of these 27,500 point recordings can be stored for later analysis.

Measure from mV to kV – fully isolated and safely!

The ScopeMeter 190C series has three independently floating isolated inputs. While conventional oscilloscopes can only make measurements referenced to the line power ground, measurements on each of the Fluke ScopeMeter 190 series inputs can be referenced to a different "low" level. This enables measurements in mixed circuits having different ground references, and also eliminates the risk of accidental ground short circuits. All inputs are safety certified for measurements in 1000 V CAT II and 600 V CAT III environments. And the standard probes cover a wide application range from mV to kV, making the 190C ScopeMeter ideal for micro electronics to electrical applications.

Many more new functions

• Variable gain on channel A helps you compare signals on the two inputs.

• The Vpwm measurement is for measuring the effective rms output voltage of variable speed motor drives and frequency inverters.

• The high-sensitivity setting of 2 mV/div allows for measurements on low-level signals, that are hard to make with the average oscilloscope.

• For use on medical imaging equipment and on high-resolution video systems, an optional configuration is available for the Fluke 190C Series that supports measurement of current over time (mAs), triggering on high-resolution video systems (up to 2800 lines) and more.

ScopeMeter® 120 and 190C Series – all this power in your hand

FlukeView for Windows® helps you get more out of your ScopeMeter® by:

- **Documenting** – transfer waveforms, screens and measurement data from the ScopeMeter to a PC. Print or import the data into your report.

- **Adding user text to individual ScopeMeter settings** – providing guidance to the operator when recalling a set-up.

- **Archiving** – create a library of waveforms with your comments for easy reference and comparison. Store complete Replay cycles for analysis of waveform changes. Store complete memory content of the ScopeMeter on your PC for back-up purposes.

- **Waveform Compare** – store reference waveforms, add operator instructions, and send both to the ScopeMeter for waveform comparison and "Pass/Fail" testing.

- **Analysis** – use cursors, perform spectrum analysis or export data to other analysis programs.

ScopeMeter test tools are connected to a PC via an optically isolated interface cable. Software and cable come as separate items or as part of a special value kit. This kit also includes a protective hard shell carrying case for safe and convenient storage of the instrument and its accessories.
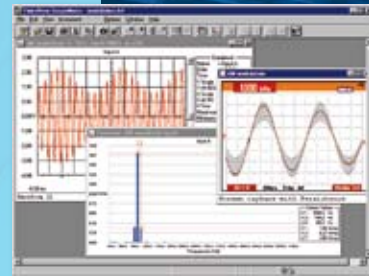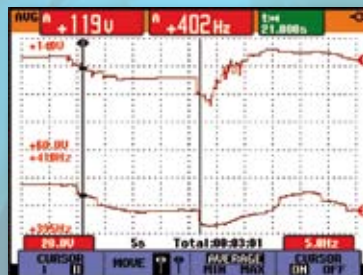
ScopeMeter Special Value Kit
FlukeView Software and the optically-isolated interface cable are available separately or together as part of the special value SCC-Kit. This kit contains:
- FlukeView software (SW90W)
- Optically-isolated interface cable for USB (OC4USB)
- Protective hard-shell carrying case (C190 or C120)

The SCC-kit can be ordered separately, or with the main instrument by adding "/S" to the main instrument type number, e.g., Fluke 199C/S (see Ordering Information on back cover for more details).
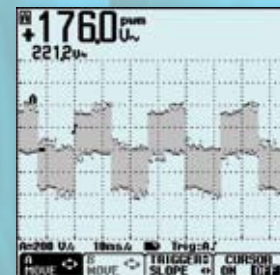
Cursors and zoom function help you to analyze the captured TrendPlot.

V_{pwm} *measures effective voltage on motor drive and frequency inverter outputs.*

SCC120 Kit

SCC190 Kit

Use TrendPlot™ to help find intermittents, fast
The toughest faults to find are those that happen only once in a while – intermittents. They can be caused by bad connections, dust, dirt, corrosion or simply broken wiring or connectors. Other factors, like line outages and sags or the starting and stopping of a motor, can also cause a machine to stop. You may not be around to see it, your Fluke ScopeMeter will. In this "paperless recorder" mode, you can plot the minimum and maximum peak values and average over time up to 16 days.

The two inputs can plot any combination of volts, amps, temperature, frequency and phase – with time and date stamp – to help lead you to the cause of those faults quickly.

V_{pwm} measurement
When working with variable speed motor drives or frequency inverters, the output voltages have high and constant amplitudes, yet the pulse width varies to control the motor current. The V_{pwm} measurement is optimized to give you a reading of the voltage exactly as the motor perceives it.

ScopeMeter® 120 Series: Three-in-one simplicity

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

- Dual–input 40 MHz or 20 MHz digital oscilloscope
- Two 5,000 counts true–RMS digital multimeters
- Automatic measurements
- A dual–input TrendPlot™ recorder
- Connect–and–View™ trigger simplicity for hands–off operation
- Shielded test leads for oscilloscope, resistance and continuity measurements
- 10:1 voltage probe included with Fluke 124 and 125 for high frequency measurements
- Up to 7 hours battery operation
- 600 V CAT III safety certified
- Optically–isolated interface for PC connection
- Rugged, compact case
- New Fluke 125 gives bus health and power measurements

In today's complex systems, a meter measurement just doesn't give enough detail to determine the cause of a fault. Signal anomalies, dropouts and glitches that might cause a machine to go down are best displayed with an oscilloscope. The ScopeMeter 120 Series meets today's need of simultaneously measuring and checking waveforms. The unique Connect–and–View™ triggering automatically displays stable waveforms of virtually any signal. It really is as easy as 1–2–3!

Floating measurements, safety certified

While conventional oscilloscopes can only make measurements referenced to power line ground, the Fluke 120 Series makes floating measurements so there's no risk of an accidental ground short circuit when making a connection.

The Fluke ScopeMeter 120 Series test tools and the included shielded test leads are safety certified for measurements on 600 V CAT III industrial power systems. Using the VPS40 probe, measurements up to 1000 V CAT II are fully supported. Via the optically isolated interface, the ScopeMeter 120 can be safely connected to a printer for direct print-out or to a PC for later analysis and documentation using FlukeView® Software.
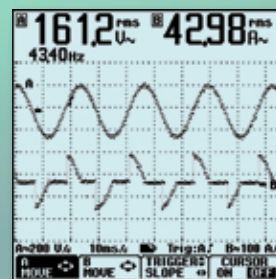
Dual-input measurement shows both meter reading and waveform at the same time.

One test lead measures all

High frequency waveform, meter, capacitance and resistance measurements as well as continuity checks are all covered by the shielded test leads. No time wasted finding or swapping leads. The included accessories allow hook–up at test objects of every dimension.

New Fluke 125
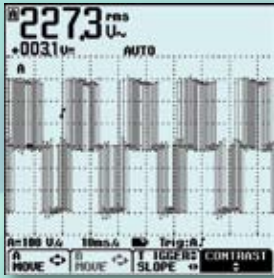
Connect-and-View captures even the most complex motor drive signals.

Connect and View

Connect and View™ triggering for an instant, stable display

Scope users know how difficult triggering can be. Incorrect settings show unstable and sometimes incorrect results.
The unique Connect–and–View function recognizes signal patterns and automatically sets up correct triggering. It provides a stable, reliable and repeatable display of virtually any signal, including motor drive and control signals, without touching a button. Signal changes are instantly recognized and settings adjusted for a stable display. Benefit from the speed and convenience when measuring a number of test–points in quick succession.

Battery powered mobility

Up to seven hours of battery operation frees you from mains outlets for true on–the–move working. The handheld format and the weight of just 1.2 kg make the instrument easy to carry and to fit comfortably in your hand. The rugged and drip proof case assures long life and reliable operation in the harshest industrial environments.

Check the starting capacitor of a motor with the ScopeMeter 120 Series.

Bus Health mode allows for an analysis of the signal quality on industrial network, comparing measured signals to the standards' signal requirements.

Fluke 125 is the ScopeMeter of choice for the maintenance engineer who deals with industrial machinery and the industrial network connecting his machinery the like.
The Fluke 125 has all the functionality of the 124 plus it comes with the following extensions:

• **Bus Health mode** gives a clear "Good" / "Bad" indication for the electrical signals on industrial buses and networks, such as CAN-bus, Profi-bus, RS-232 and many more. The Fluke 125 validates the quality of the electrical signals as soon as any electrical signals are passed along the network. It checks the signal levels and speed, transition times and distortion, and compares these to the appropriate standards to help you find errors like improper cable connections and terminators. It helps you find the source of error in case communication comes to a halt. All the commonly found industrial network types are supported!

• **Power Measurements** for single phase and balanced 3-phase systems. The Fluke 125 can directly present you the Total Power (Watts), Apparent Power (VA), Reactive Power (VAR) and the Power Factor (PF), over a wide range of applied frequencies, including those seen with motor drives and inverters. As a result, you are able to easily see the effects on the various power measurements during start-up or under changing operational conditions. A current clamp is included as a standard.

• **Harmonics mode** graphically displays harmonics up to the 33rd harmonic to assist in fault-finding, e.g. with large non-linear loads.

• **RPM and Hz reading** for use with electrical and combustion engines.

• **Vac pwm** for use on motor drive outputs, reading the true output voltage experienced by the motor itself.

• **Low impedance measurements** giving a 0.01 ohms resolution for motor windings and the like.

See the Technical Datasheet for more details on the Fluke 125.

120 and 190C Series ScopeMeter® Test Tools

	Color ScopeMeters With Bus Health Test		Color ScopeMeter 190C Series			ScopeMeter 120 Series		
	Fluke 225C	Fluke 215C	Fluke 199C	Fluke 196C	Fluke192C	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		
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 Persistance	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:	3000 points per input channel, allowing for high time resolution signal analysis using Zoom					512 min/max points per input		
... In ScopeRecord mode:	27,500 points per input or more (5 ms/div...2 min/div.)							
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-View™, 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	--	
Scope-Record 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)	3.5 hr Ni-MH (BP190)					7 hr Ni-MH (BP120MH)		
BHT190 Bus Health adapterset	Included		--			optional	--	
Line power	Adapter / battery-charger included (BC190)					Adapter / Battery charger included (PM8907)		
Size (cm)	25.6 x 16.9 x 6.4 cm					23.2 x 11.5 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	3 years on main instrument, 1 year on the standard accessories							

Max. input voltage 1000V CAT II with VPS40, 40 MHz, 10:1 Voltage Probe (standard included with Fluke 125 and Fluke 124)

Detailed technical specifications and optional accessories can be found in the technical datasheet and on the Fluke web site.

Further details about the Fluke 225C and 215C are presented in a dedicated document.

Ordering-Information

Fluke 199C	Color ScopeMeter (200 MHz / 2.5 GS/s)
Fluke 199C/S	Color ScopeMeter (200 MHz / 2.5 GS/s) + SCC190
Fluke 196C	Color ScopeMeter (100 MHz / 1 GS/s)
Fluke 196C/S	Color ScopeMeter (100 MHz / 1 GS/s) + SCC190
Fluke 192C	Color ScopeMeter (60 MHz / 500 MS/s)
Fluke 192C/S	Color ScopeMeter (60 MHz / 500 MS/s) + SCC190
Fluke 125	Industrial ScopeMeter (40 MHz, with Bus Health)
Fluke 125/S	Industrial ScopeMeter (40 MHz, Bus Health) + 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)
OC4USB	Optically-isolated USB-interface cable
PM9080	Optically-isolated RS-232 adapter/cable
SW90W	FlukeView® ScopeMeter Software for Windows®

- ScopeMeter test tools come standard with a complete accessory package including line voltage adapter and battery pack (installed). ScopeMeter 190C Series comes with probes, probe accessories and multimeter test leads.
- Optional accessories ordering information can be found in the technical datasheet or on the Fluke web site.