

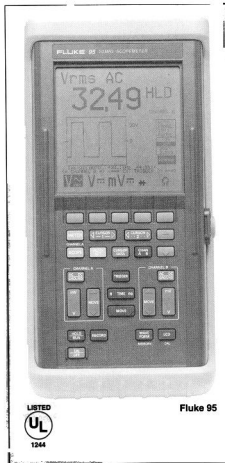
## 90 Series

Available through Distributors

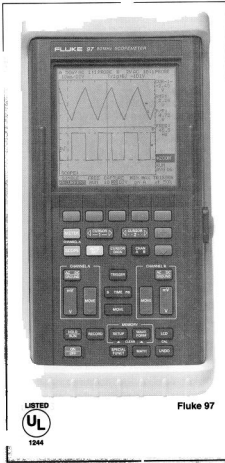
RS-232



Fluke 93



Fluke 95



Fluke 97



### Fluke 90 Series ScopeMeter® Test Tools

Scope, meter, or simultaneous meter and scope display

Dual channel 50 MHz Digital Storage Oscilloscope

25 megasamples/second, 40 nanosecond glitch capture

10 front panel setups plus 8 waveforms with setup memories

**NEW** 15 cursor measurements

3000 count Digital Multimeter with Touch Hold®

True ac or ac+dc rms measurements to 5 MHz

**NEW** Full four digit Counter

**NEW** Min Max Average recording mode with Time Stamp

Optically isolated RS-232 interface (97 only)

Rugged, sealed case weighs 1.8 kg (4 lbs) incl. battery

The ScopeMeter® test tool is the first truly integrated scope-and-multimeter that lets you see the scope waveform, or the digital meter readout, or both at the same time and from the same input. Or switch between dedicated high-performance scope and meter functions with the touch of a key.

The ScopeMeter test tools' intuitive front panel layout is simple and straight forward. Every key is clearly labeled. Five soft function keys and pop-up menus give you fast, confident control of all your options. The high resolution LCD display (backlit on model 97) is bright and crisp, presenting fully detailed waveform information, or digits large enough to see across the room.

In the scope mode AUTOSET and powerful cursor capabilities take all the work out of signal acquisition and measurements. Deep memories allow you to store and recall up to eight waveforms, and compare up to four waveforms on screen. In addition, up to 10 instrument setups can be saved for routine measurements.

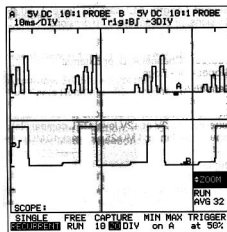
The multimeter capability gives you all the convenience features you've come to expect from Fluke – autoranging, Touch Hold®, Min Max Average recording, audible continuity, frequency counter and more. In the combined meter and scope display mode the scope trace is fully automatic, you don't have to adjust any amplitude, time, or trigger function. Just connect the signal and see both numeric and trace results.

There's even a signal generator that can produce square waves at three different frequencies, a sine wave or current and voltage ramps for testing components.

The ScopeMeter test tool is truly portable, weighing just 1.8 kg (4 lbs.) including its rechargeable battery that gives four hours of test time away from ac power. All three models are sealed against water, dust and contaminants, and shielded from EMI. All models use the same input for both scope and meter measurements enabling safe scope analysis of signals up 600V rms (with PM 891B probes). The ScopeMeter test tool is UL listed.

### Powerful DSO Performance

With dual channel 50 MHz bandwidth you can digitize and store the fastest repetitive signals. For single shots the 25 megasample per second acquisition rate gives 40 nsec resolution. At low sweep speeds, or in the roll mode the Min Max glitch capture function detects transients as short as 40 nsec. Add true 8-bit vertical resolution, a broad range of clever triggering capabilities, and a roll mode for low frequency signals and you have a comprehensive and powerful DSO.



### AUTOSET for Instant Scope Display

Just a touch of the AUTOSSET key and the ScopeMeter test tool sets its own triggering, time and amplitude scaling to give a stable display in just a second. This time saving feature makes setup on even complex signals fast and simple.

### See Signals Before and After Trigger

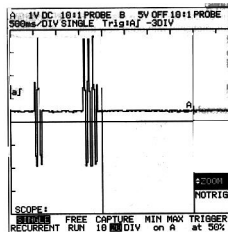
The ScopeMeter test tool lets you capture 20 divisions of information that precede to the trigger event (pre-trigger) so you can see the cause and the result. To check if a sequence runs correctly after a trigger event the post trigger capability enables delays of up to 640 divisions to be set in steps of one division.

### Zoom in on Detail

Need to see more signal detail? Then just locate the area of interest at the center of the screen and press the ZOOM softkey. Up to 1000x magnification of the signal detail is possible with automatic adjustment of sweep speed and trigger delay.

### Eliminate or Detect Noise on Signals

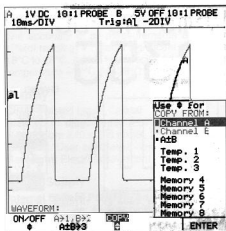
Occasionally it's difficult to see the real signal because of the noise on it. The Averaging mode averages the incoming signal over multiple acquisitions to eliminate the noise and make clearly visible the real signal.



Sometimes noise is the cause of a problem. Using Min Max glitch capture transients as short as 40 nsec are revealed. Select Record mode and all variations captured in previous acquisitions are retained on screen making it an ideal baby-sitting mode for intermittent problem solving.

### Rolling Display for Slow Signals

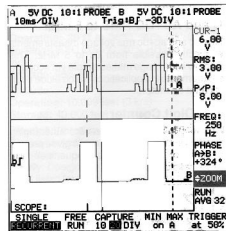
Here the display "rolls" across the screen at time base speeds as slow as 60 sec/div. Roll is like a pen recorder, directly showing what's happening now, and what occurred in the immediate past. Ideal for slow signal tracking.



### Waveform and Setup Memories

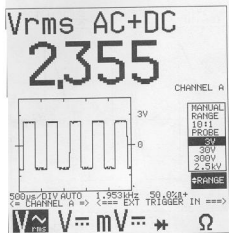
The ScopeMeter test tools 8 waveforms with setup memories store reference signals with their setup. Just recall them for fast comparative verification, or use them to store waveforms for later analysis.

The 10 additional setups recall your standard test configurations at the touch of a key. It's a lot faster than having to set them up every time.



### Cursors and Math for Processed Results

Fifteen cursor measurements give immediate readout of frequency, rise time, etc. without having to count divisions and make calculations. Math functions enable signals to be added, subtracted, inverted, multiplied, integrated or filtered to extract exactly the information you need to know.



### Multimeter Performance

Direct measurements include voltage to 250V rms ac and 300V dc in four ranges. The included safety-designed detachable 10:1 probes extend voltage measurements to 600V rms (1700V peak-to-peak) for both oscilloscope and meter modes. Resistance measurements are in seven ranges from 30 ohms to 30 megohms. All readings are displayed with more than 3000 count resolution, and autoranging is standard.

### AC and AC+DC RMS to 5 MHz

True ac and ac+dc rms voltage measurements are directly possible from dc to 5 MHz. This incredibly wide range makes simple yet accurate measurements in applications which elude even dedicated ac meters.

### Full 4 Digit Counter

With four full digit resolution the autoranging counter function in the meter mode gives precise readouts, for example, line frequencies with 0.01 Hz resolution.



### Multiple Meter Readout

Up to three parameters can be measured and displayed simultaneously. For example V ac rms plus frequency plus duty cycle give you all the relevant parameters of a P.W.M. motor drive in a single glance.

### Min Max Average Recording with Time Stamp

Hook up the ScopeMeter test tool, switch on this mode and go about your other business. When you come back, be it minutes or days later, you see the maximum, minimum, average and present reading with their respective times.

You can also switch on Min Max Alert™ which emits an audible tone every time a new Max or Min is detected, very useful when your working on something else at the same time.

### Touch Hold, Relative Mode, dB

Just like all Fluke meters the ScopeMeter test tool includes all the facilities to make meter measurements fast and efficient. Touch Hold captures a stable measurement, beeps and locks on the display until you're ready to view it – updating automatically with each new test.

The Relative Mode measures the difference between the present signal and previously measured reference.

Direct readout of dBm, dBV, dBW, and Audio Watts relative to a selected impedance is also possible.

### Shock Protection

The ScopeMeter test tool's double insulated case, rugged input measuring circuits, and safety-designed BNC input connectors and probes meet the high safety levels specified for power distribution circuits up to 600V 3 phase. This includes double insulation per UL, CSA, and International standards and surge protection up to 6 kV spikes per ANSI/IEEE C62.41.

### Hard Copy and Remote Control

Optically isolated RS-232C makes hard copy or remote control both simple and safe. (Optional cable PM 9080/001 required). Connecting to HP Thinkjet and Epson FX/LQ compatible serial printers, screen dumps, waveforms or numeric data can be hard copied.

In conjunction with a PC, meter and scope cursor measurement readout, as well as setup and waveform transfer to and from ScopeMeter is possible.

### Function Generator

The ScopeMeter test tool produces four different test signals: square wave, sine wave, voltage ramp or current ramp.

## Specifications

### Oscilloscope Specifications

#### Vertical

**Frequency Response, -3 dB:** DC to >50 MHz  
**AC Coupled:** <10 Hz direct, <1 Hz with 10:1 probe

**Rise Time:** <7 ns

**Sensitivity:** 1 mV to 100V/division (95/97 only); 5 mV to 100V/division (93 only), 200V, 500V, or 1 kV/division with 10:1 probe (all models)

**Modes:** Channel A, A inverted, B, B inverted, A+B, A-B, or Asy & Bx

**Input Impedance:** 1 MΩ, 25 pF direct; 10 MΩ with 10:1 probe

**Resolution:** 8 Bit A/D Converter

**Accuracy:** ±(2% + 1 pixel)

**Cross Talk:** <-40 dB at 50 MHz

#### Horizontal

**Modes:** Recurrent, Single Shot, Roll

#### Ranges

**Recurrent:** 10 ns to 5s/division

**Dual Channel Alternating:** 10 ns to 20 µs/division

**Dual Channel Chopped:** 50 µs to 5s/division

**Single Shot:** 100 ns to 5s/division

**Dual Channel Alternating:** 100 ns to 20 µs/division

**Dual Channel Chopped:** 50 µs to 5s/division  
**Roll (dual channel chopped):** 10s to 60s/division

**Accuracy:** ±(0.1% + 1 pixel)  
**Record Length:** 512 samples (pixels), 20.48 divisions, or 256 samples, 10 divisions

#### Trigger

**Sources:** Channel A, B, or External

**Slope:** + or - Edge

#### Sensitivity

**Channel A or B:** <0.8 division to 10 MHz; <1.5 division to 60 MHz; <4 divisions to 100 MHz

**External:** +0.2V or +2V level (TTL compatible)  
**Input Impedance:** 1 MΩ/25 pF direct; 10 MΩ with 10:1 probe

#### Digital Delay

**Time:** -20 to +640 divisions

**N-Cycle:** After 2 to 255 trigger cycles (95/97 only)

**Events:** 1 to 1023 events after external trigger (95/97 only)

#### Waveform Average

Up to 256 waveforms, 10 samples in Roll mode (95/97 only)

#### Cursors

Display up to 5 measurements from user defined portion of waveform: voltage at cursor 1, dV, dt, frequency, 1/dt (equivalent frequency), maximum, minimum, peak-to-peak, rms, average (mean), phase, rise or fall time, time from trigger to cursor, or ratio (% change) (95/97 only)

**Markers**

Automatically indicate points on waveform used for peak-to-peak, maximum peak, minimum peak, frequency, risetime, or phase measurements (95/97 only)

**Mathematics**

Add, Subtract, Multiply, Filter, Invert, or Integrate Waveforms (97 only)

**Memories**

**Waveform:** Store 8 waveforms, 20 divisions deep (front panel setups used can also be recalled) (95/97 only)

**Setup:** Store 10 additional front panel setups (97 only)

**Min Max Glitch Capture (95/97 only)**

**Time-Base Setting:**  $\geq 1 \mu\text{s}$   
**Pulse-Width Capture:** 100% probability for glitches or pulses  $>40 \text{ ns}$

**Record Mode**

Variable persistence display mode, selectable at 2, 5, 10 and 60 seconds, or infinite time

**Zoom**

Automatically selects time/division & time delay required to magnify waveform at center of display (95/97 only)

**Multimeter Specifications****DC Voltage & mV****Ranges**

**Channel A Input:** 300.0 mV, 3.000V, 30.00V, 300.0V (600V with PM 8918 10:1 probe)

**mV (External Trigger) Input:** 300.0 mV, 3.000V

**Resolution:** 0.1 mV, 1 mV, 10 mV, 100 mV and 1V

**Accuracy:**  $\pm(0.5\% + 5 \text{ counts})$

**Full Scale Reading:**  $>3000 \text{ counts}$

**Peak Voltage:** 2.5 x Full Scale, 375V on 300V range

**Normal Mode Rejection:**  $>60 \text{ dB}$  @ 50 or 60 Hz

**Common Mode Rejection:**  $>100 \text{ dB}$  @ dc, 50, 60 or 400 Hz

**AC or AC+DC True RMS Voltage**

**Ranges:** 300.0 mV, 3.000V, 30.00V, 250.0V (600V with PM 8918 10:1 probe)

**Resolution:** 0.1 mV, 1 mV, 10 mV, 100 mV and 1V

**Accuracy**

50 Hz to 60 Hz:  $\pm(1\% + 10 \text{ counts})$

20 Hz to 20 kHz:  $\pm(2\% + 15 \text{ counts})$

5 Hz to 1 MHz:  $\pm(3\% + 20 \text{ counts})$

DC to 5 MHz:  $\pm(10\% + 25 \text{ counts})$

Accuracy valid from 5% to 100% of range

**Full Scale Reading:**  $>3000 \text{ counts}$

**Peak Voltage:** 2.5 x Full Scale, 375V on 250V range

**Common Mode Rejection Ratio:**  $>60 \text{ dB}$ , dc to 60 Hz

**Resistance**

**Ranges:** 30.00 $\Omega$ , 300.0 $\Omega$ , 3.000 k $\Omega$ , 30.00 k $\Omega$ , 300.0 k $\Omega$ , 3.000 M $\Omega$ , 30.00 M $\Omega$

**Resolution:** 0.01 $\Omega$ , 0.1 $\Omega$ , 1 $\Omega$ , 10 $\Omega$ , 100 $\Omega$ , 1 k $\Omega$ , 10 k $\Omega$

**Accuracy:**  $\pm(0.5\% + 5 \text{ counts})$  30 $\Omega$   $\pm 2.5\% + 25 \text{ counts}$

**Measurement Current:** 500  $\mu\text{A}$ , 70  $\mu\text{A}$ , 7  $\mu\text{A}$ , 700 nA, 70 nA, 7 nA

**Open Circuit Voltage:**  $<4\text{V}$

**Full Scale Voltage:**  $<250 \text{ mV}$  to 3 M $\Omega$ ,  $<2\text{V}$  to 30 M $\Omega$

**Full Scale Reading:**  $>3000 \text{ counts}$

**Diode Test**

**Open Circuit Maximum Voltage:** 4V

**Full Scale Maximum Voltage:** 2.800V

**Measurement Current:** 500  $\mu\text{A}$

**Additional Multimeter Modes**

**Frequency:** 1 Hz to 5 MHz,  $\pm(0.5\% + 2 \text{ counts})$   
**Duty Cycle:** From  $<2\%$  to  $>98\%$  for signal amplitudes  $>10\%$  of the input voltage range ( $\pm 0.5\%$  for logic or pulse waveforms)

**Smoothing:** Moving average of readings for last 6 seconds

**Change Alert™:** Audible beep when reading changes  $>50 \text{ counts}$

**Relative (A):** Zeros display on present or recorded reading

**Touch Hold:** Automatically captures each new reading, beeps and locks it in the display

**%Change:** Percent change from a reference reading (95/97 only)

**%Scale:** Percent of user selected start and end readings (95/97 only)

**dBV:** (95/97 only)

**dBm:** (Selectable reference of) 50, 60, 75, 93, 110, 125, 135, 150, 250, 300, 500, 600, 800, 900, 1000 or 1200 $\Omega$  (95/97 only)

**dBW or Audio Watts:** (Selectable reference of) 1, 2, 4, 8, 16, or 50 $\Omega$  (95/97 only)

**Min Max Record:** Simultaneously displays the present, maximum, minimum, and average readings (95/97 only) and Time Stamp

**Signal Generator Specifications (97 only)**

**Sine Wave:** 1V peak-to-peak @ 976 Hz with  $<3\%$  distortion

**Source Resistance:** 400 $\Omega$

**Square Wave:** 5V peak-to-peak ( $\pm 2.5\text{V}$ ) @ 488 Hz, 976 Hz, or 1.95 kHz

**Source Resistance:** 400 $\Omega$

**Component Tester**

**Component Test:** 0 to 4 mA in 128 discrete steps, 4 seconds total

**Voltage Compliance:**  $\geq 2\text{V}$

**Voltage Mode:**  $-2\text{V}$  to  $+2\text{V}$  in 128 discrete steps, 4 seconds total

**Current Compliance:**  $\pm 1 \text{ mA}$

**General Specifications**

The accuracy of all measurements are within  $\pm 1\%$  (of reading) + (1 least significant digit) from 18°C to 28°C. Add 0.1 x (specified accuracy) for temperature  $<18^\circ\text{C}$  or  $>28^\circ\text{C}$  ambient.

**Display**

Super Twisted Liquid Crystal

**Size:** 4.7 in. diagonal (84 X 84 mm)

**Resolution:** 240 x 240 pixels, 25 pixels/division

**Contrast:** User adjustable viewing angle

**Backlight:** Electroluminescent (97 only)

**Power Supply**

**Internal Battery Pack:** NiCad, 4.8V

**Operating Time:** 4 hours typical

**Line Voltage Adapter/Battery Charger:** Standard

**Charging Time:** 16 hours typical

**Alternate Battery:** 4 alkaline C cells (user supplied, not rechargeable)

**External DC Charging Supply:** 8V to 20V dc, 5 Watts typical (user supplied using a 5 mm power plug)

**Environmental Data****Temperature**

**Operating:** 0°C to 50°C

**Storage:** -20°C to 70°C

**Humidity**

**Operating:** 20°C to 30°C, 90% RH (non-condensing); 30°C to 50°C, 70% RH (non-condensing)

**Storage:** 95% RH

**Altitude**

**Operating:** 10,000 feet (3 km)

**Storage:** 40,000 feet (12 km)

**Shock & Vibration:** Per MIL-T-28800 for class 3 Electro-Magnetic Interference; Per MIL-STD-461 to 1V/meter

**Safety:** Designed to Class II per IEC 348 and UL 1244 listed for 600V measurements on industrial power distribution circuits

**Overload Protection**

**Channel A or B Input:** 300V rms, 600V rms with PM 8918 10:1 probe

**Surge Protection:** 4 kV, 6 kV with PM 8918 10:1 probe (per IEC 664, and ANSI/IEEE C62.41 test method)

**External Trigger, Resistance, Diode Test, or DC mV Input:** 600V rms

**Maximum Voltage Isolation to Earth:** 600V rms from any terminal

**RS-232C Interface:** Optically isolated

**Full Remote Control:** Also Epson FX/LQ or HP ThinkJet compatible, print screen, waveform data points, or log meter readings (97 only) (PM 9080/001 required)

**Calibration:** All models have closed case calibration

### Mechanical Data

**Size:** 60 mm H x 130 mm W x 260 mm L (2.4 in H x 5.1 in W x 10.2 in L)

**With Holster:** 65 mm H x 140 mm W x 275 mm L (2.5 in H x 5.5 in W x 10.8 in L)

**Weight:** 1.5 kg (3.3 lbs)

**With Holster:** 1.8 kg (4.0 lbs)

### Ordering Information

### Models

**Fluke 93** 50 MHz ScopeMeter Test Tool

**Fluke 95** 50 MHz ScopeMeter Test Tool

**Fluke 97** 50 MHz ScopeMeter Test Tool

### Included with Instrument

Three-year product warranty, NiCad battery pack (PM 9086/001), line voltage adapter/battery charger (PM 8907/003), probe set (PM 8918/002), dual banana plug to female BNC adapter (PM9081/001), yellow protective holster (PM 9083/001), accessory case (C75), multimeter test lead set, probe tip to banana plug adapter, Quick Operating Guide, Operator manual, and Certificate of Calibration Practices.

### Accessory Recommendations for Measurements >42V Peak (30V RMS)

Similar to a safety-designed multimeter but unlike a conventional oscilloscope, the ScopeMeter test tool input connectors have no exposed metal and are fully insulated to protect against electrical shock. The ScopeMeter test tool COM (common) inputs (Channel A red BNC shield, Channel B grey BNC shield, and black banana jack) are connected internally via self-recovering fault protection. Any voltage on one COM input will be present on all COM connections.

**To avoid risk of electrical shock, use only the following accessories when a ScopeMeter test tool COM input is connected to >42V peak (30V rms):**

AC20, AC80, PM 8907/003, PM 8907/008, PM 8918/002, PM 8918/202, PM 9080/001, PM 9081/001, PM 9082/001, PM 9084/001, PM 9085/001, PM 9087/002, PM 9090/001, PM 9094/001, PM 9266/04 (Fluke 916015), TL20, TL75

**Other ScopeMeter test tool compatible accessories are only suitable when the ScopeMeter test tool COM input is connected to an earth ground potential or <42V peak (30V rms).**

**General Accessories** (Also see Section 7)  
 80i-410\* DC/AC Clamp-on Current Probe  
 80i-1000S AC Current Oscilloscope Probe  
 80i-1010\* DC/AC Clamp-on Current Probe  
 80i-kW\* Clamp-on Current/Power Probe  
 C75 Accessory Case  
 C95 Soft Carrying Case  
 C97 Hard Carrying Case  
 PM 8906/003 Fast Battery Charger (3 hrs)  
 PM 8907/003 Adapter/Battery Charger

### Fluke 90 Series ScopeMeter Test Tool Selection Guide

	97	95	93
Bandwidth	50 MHz Dual Channel		
Sample Rate	25 Megasamples/second		
Autoset	Automatically sets Voltage, Time & Trigger		
Multimeter Display	3 2/3 Digits (> 3000 Counts)		
True RMS Volts	AC or AC+DC up to 600V (1700V Pk-Pk)		
Resistance	30Ω to 30 MΩ		
Diode Test	Up to 2.8V		
Continuity Beeper	Yes		
Time/Division	10 ns/div to 60 sec/div		
Volts/Division	1 mV/div to 100 V/div		5 mV/div to 100 V/div
Digital Delay or Pre-Trigger	By Number of Cycles, Events, Time, or Zoom Mode		By Time
Special Multimeter Modes	Min Max Average Record with Time Stamp, Relative (zero), dBm, dBW, dBW, Audio Watts, %Scale, Frequency, %Duty Cycle, Smoothing™, Change Alert™		Frequency, %Duty Cycle, Smoothing™, Change Alert™
Oscilloscope Cursors	15 Measurements, Display 5 Simultaneously		
Glitch Capture	≥40 ns		
Waveform Processing	Average, Min Max, Record, Variable Persistence		
Waveform Memory	Store & Recall 8 Waveforms		
Set-Up Memory	Store & Recall 10 Front Panel Set-Ups		
Waveform Mathematics	Add, Subtract, Multiply, Invert, Filter or Integrate Waveforms		
Signal Generator Output	Sine wave or Square wave		
Component Tester Output	Voltage or Current Ramp		
Optically Isolated RS-232C Interface*	Full Operation by Remote Control		
Printer Output*	Serial		
Backlit Display	Electroluminescent		

\* Requires optional PM 9080/001 interface cable

PM 8907/008 Universal Adapter Charger  
 PM 9083/001 Protective Holster  
 PM 9086/001 NiCad Battery Pack  
 PM 9087/001 Automotive Lighter Plug Charging Adapter  
 PM 9094/001 Accessory Set for Probe Y8100\* DC/AC Current Probe  
 \*262XA-801 Diconix 80-column Serial Printer

**Accessories Safely Designed for Electrical or Isolated Electronic Measurements**  
 AC20 Industrial Alligator Clip  
 AC80 Hook-Style Clip  
 PM 8918/002 Probe Set (1.5m, 5 ft)  
 PM 8918/202 Probe Set (2.5m, 8 ft)  
 PM 9080/001 RS-232C Optical Interface Adapter Cable  
 PM 9081/001 Dual Banana Plug to Female BNC Adapter  
 PM 9082/001 Dual Banana Jack to Male BNC Adapter  
 PM 9084/001 Probe Industrial Alligator Clip  
 PM 9085/001 Probe Industrial Hook-Style Clip  
 PM 9090/001 Probe Pin Grabber Flexible Clip

PM 9091/001 Male BNC to Male BNC Cable Set (1.5m, 5 ft)  
 PM 9092/001 Male BNC to Male BNC Cable Set (0.5m, 1.5 ft)  
 PM 9093/001 Male BNC to Dual Female BNC Adapter  
 PM 9095/001 Single Banana Jack to Male BNC Adapter  
 PM 9266/04 Silicone Test Lead Set  
 TL20 Industrial Test Lead Set  
 TL75 Right Angle Test Lead Set  
**Accessories Designed for Non-Isolated, Grounded Electronic Measurements**  
 80J-10 Current Shunt  
 80T-150U Temperature Probe  
 PM 9001/001 Probe Set 1:1, (1.5m, 5 ft)  
 PM 9001/201 Probe Set 1:1, (2.5m, 8 ft)  
 PM 9003/001 Probe Accessory Set  
 PM 9011/001 Switchable Probe Set 1:1, 10:1 (1.5m, 5 ft)  
 PM 9100/001 Probe Set 100:1, (1.5m, 5 ft)  
 PM 9355/09n AC Current Probe