

# High Speed Milliohm Resistance Meter



- 20 mΩ to 23 MΩ wide resistance range
- 10 ms measurement time
- 0.03% accuracy
- 1 μΩ resolution
- Automatic thermal and electromagnetic noise rejection
- Programmable reference currents
- GPIB, RS-232C and RS-422 compatibility (Model: 1740/GPIB)



Finally a resistance meter that doesn't force the choice between accuracy and speed. The 1740 milliohm resistance meter is based on TEGAM's industry proven microhmeter platform for superior resistance measurement. Accuracy at high speed delivers more throughput with better yield. This improves your product quality and profitability.

### It's Fast

The 1740 accelerates the high speed production line. In the Fast Mode the 1740 can set-up, zero-out thermal errors, acquire data and make its first reading in less than 12 milliseconds with an accuracy of up to 0.05%! Subsequent readings are provided every 10 milliseconds at a true rate of 100 readings per second!

The 1740 provides speed and accuracy while automatically rejecting thermal and line noise. Patented circuitry eliminates thermal and electromagnetic measurement errors caused by contact between device handlers and the device-under-test. The 1740 rejects DC and AC noise offsets while maintaining its high speed test performance.

### It's High Powered

The 1740's power is in the user's ability to quickly configure it through a selection of standard setup menus. With the 1740 you select your measurement mode, (Resistance, Ohms Comparator or Percentage Comparator), and measurement ranges, (from 20 mΩ to 20 MΩ). You have your choice of reference currents and triggering methods. You can also configure delay times, settling times and automatic thermal and noise rejection. If you don't need all this flexibility, just hit the AUTO RANGE button and enjoy the ride!

### It's Easy to Operate

The 1740 is the state-of-the-art programmable ohmmeter that operates via front-panel or over the bus. Clearly labeled multifunction keys provide front panel control of range selection, reading modes, delays, triggers and measurement HOLD. Clear menu driven options provide easy setup for more sophisticated operation, too! The Front panel includes a manual TRIGGER and HOLD function and HI/GO/LO indicators for the open collector TTL output.

### It's Easy to Integrate

The 1740 is unbelievably easy to program. The 1740/GPIB contains a full complement of interfaces including IEEE-488, RS-232C and RS-422. To maximize your programming efficiency, each of these interfaces is operated using the same programming command set and front panel indicators to provide continuous status of all operations.

### It's Easy to Calibrate

Front panel calibration makes it easy to maintain the 1740 traceability right on the product floor and in less time than it takes to reload a resistor reel.

### It's Ready for Any Job

The 1740 provides the speed and accuracy desired for automated production test requirements as well as bench top quality control and inspection applications. Not only is the 1740 perfect for high speed production test of low resistance electronic components, but the low current capability and "TRUE-SPEED" performance make the 1740 excellent for dry circuit testing of switches, relays and connector contacts without disturbing the device's contact surfaces. 1740 fits most resistor, wire, fuse, thermistor and trimmer testing applications.

**Table 1: Full Scale Voltage and Maximum Lead Resistance as a Function of Reference Current**

RANGE	RESOLUTION	REFERENCE CURRENT (AVAILABLE SELECTION)						
		100 mA	10 mA	1 mA	100 µA	10 µA	1 µA	100 nA
20 mΩ	1 µΩ	2 mV						
200 mΩ	10 µΩ	20 mV						
2 Ω	100 µΩ	200 mV	20 mV					
20 Ω	1 mΩ		200 mV	20 mV				
200 Ω	10 mΩ		2 V	200 mV	20 mV			
2 kΩ	100 mΩ			2 V	200 mV			
20 kΩ	1 Ω				2 V	200 mV		
200 kΩ	10 Ω					2 V		
2 MΩ	100 Ω						2 V	
20 MΩ	1 kΩ							2 V
<b>MAX. LEAD RESISTANCE:</b>		<b>5 Ω</b>	<b>50 Ω</b>	<b>100 Ω</b>	<b>100 Ω</b>	<b>100 Ω</b>	<b>100 Ω</b>	<b>100 Ω</b>

**TABLE 2**  
Delayed Mode Accuracy (In terms of FULL SCALE VOLTAGE)

FULL SCALE VOLTAGE	(±) ACCURACY (18-28°C, 1 yr.)
2 mV	0.02 % RDG + 5 COUNTS
20 mV	0.02 % RDG + 4 COUNTS
200 mV	0.02 % RDG + 2 COUNTS
2 V	0.02 % RDG + 2 COUNTS
2 V (2 MΩ & 20 MΩ ranges)	0.04 % RDG + 2 COUNTS

**TABLE 3**  
Temperature Coefficients (In terms of FULL SCALE VOLTAGE)

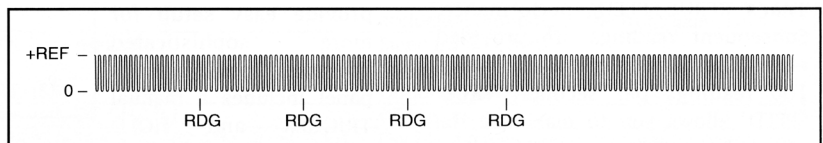
FULL SCALE VOLTAGE	(±) TEMPERATURE COEFFICIENT (0-18 °C and 28-50 °C)
2 mV	0.004 % RDG + 1 COUNT
20 mV	0.004 % RDG + 0.5 COUNTS
200 mV	0.002 % RDG + 0.1 COUNTS
2 V	0.002 % RDG + 0.1 COUNTS
2 V (2 MΩ & 20 MΩ ranges)	0.008 % RDG + 0.5 COUNTS

**FASTMODE ACCURACY** is ± (0.05 % + 5 COUNTS)

**REFERENCE CURRENT MODES:**

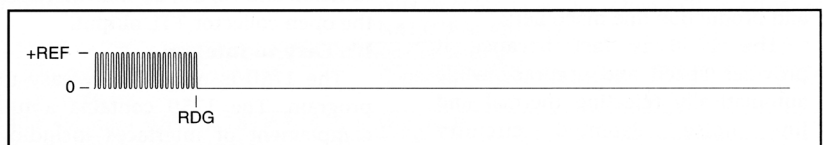
**Fast Continuous:**

Pulsing reference current (+REF/0), with automatic thermal and noise rejection.



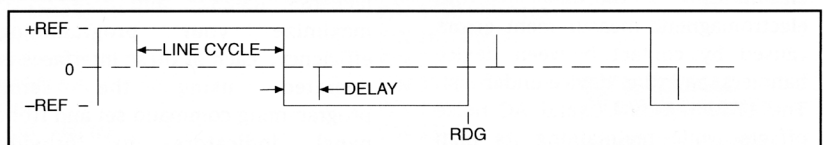
**Fast One-Shot:**

Triggered single cycle of Fast Continuous Mode.



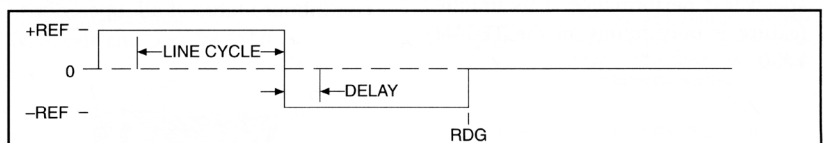
**Delayed Continuous:**

Alternating reference current (+REF/-REF) with programmable settling time for reference current and line-cycle digitization.



**Delayed One-Shot:**

Triggered single cycle of Delayed Continuous Mode.



**TABLE 4: Measurement Times**

RANGE	FAST MODE v. FULL SCALE VOLTAGE				DELAYED MODE v. FULL SCALE VOLTAGE			
	2 mV	20 mV	200 mV	2 V	2 mV	20 mV	200 mV	2 V
20 mΩ					D	D		
200 mΩ						D	D	
2 Ω			F			D	D	
20 Ω			F			D	D	
200 Ω			F	F		D	D	D
2 kΩ			F	F			D	D
20 kΩ				F			D	D
200 kΩ								D
2 MΩ								D
20 MΩ								D

**NOTES:**

1. Fast Mode available on range and full scale voltage combinations shown, (F).
2. Delayed Mode available on combinations shown, (D).
3. Delayed Mode Measurement Times = 2 x (Line Period + Programmed Delay + 1.7 ms Processing Time). e.g. 60 Hz line frequency and 10 ms delay, Time = 55.0 ms.
4. Delays are programmable from 1 ms to 250 ms in 1 ms increments.

**MISCELLANEOUS**

**Display Modes**

Resistance, Ohms Comparator, % Comparator (Autoranging available in Resistance Mode)

**Digital Interfaces**

-TRIGGER IN and READING DONE via BNC connectors (standard)  
 -IEEE-488.1, RS-232C, RS-422 (optional) (Model 1740/GPIB)

**Display**

4-1/2 digit alpha numeric readout, 2x16 characters, backlit LCD

**Measurement Method**

4 - terminal connection to the Device-Under-Test, (DUT)

**Input Connector**

Heavy duty LEMO type for interface integrity and long life

**Input Protection**

± 15 V continuous

**Overload Current**

Delay Mode: 100 % overshoot, < 25 μs  
 Fast Mode: 200 % overshoot, < 30 μs

**Noise Rejection**

60 dB typical at line frequency

**Environmental**

Operating: 0 °C to +50 °C, < 80 % RH;  
 Storage: -35 °C to +60 °C, < 90 % RH

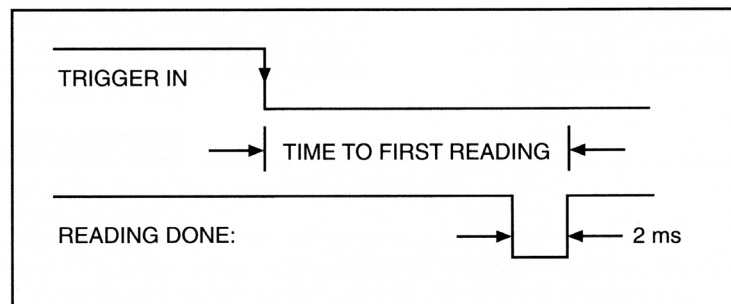
**Conformity**

CE Class A: EN 55022, EN 61000-3-2, EN 61000-3-3

**TABLE 5: Reading Rates**

	MEASUREMENT TIMES	READING RATE	TIME TO FIRST READING
<b>FAST MODE</b>	10 ms	100 rdg/s	12 ms
<b>DELAYED MODE</b>			
Delay = 1 ms	36 ms	27 rdg/s	38 ms
Delay = 5 ms	45 ms	22 rdg/s	47 ms
Delay = 10 ms	55 ms	18 rdg/s	57 ms

**Time to First Reading:**



**Power Requirement**

<100 VA, 108-132 VAC or 216-264 VAC, at 50/60 Hz

**Dimensions**

13.3 cm x 21.7 cm x 33.0 cm  
 (5.2 x 8.5 x 13.0 in) H X W X D

**Weight**

4.2 kg (9 lb. 4 oz)

**Calibration**

Full front panel calibration requires no internal adjustments and can be easily achieved on the production floor.

**Accessories****Included Accessories**

<b>Manual CD</b>	P/N 1740-840
<b>Power Cord</b>	P/N 161006600

<b>Kelvin Klip Set</b>	P/N 17501
<b>or Spade Lug Adapter</b>	P/N 17502

**Optional Accessories**

<b>Kelvin Klip Set</b>	P/N 17501
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Kelvin Klips allow you to make solid four-terminal connections to leaded components. This set is provided as a standard accessory with the 1740 and is particularly useful for hand testing resistors. Four-terminal measurement techniques allow precision measurements by avoiding the effects of lead resistance. Gold-plated, hardened beryllium-copper jaws ensure low contact resistance, low thermal emf to copper, high corrosion resistance and long life.

<b>Spade Lug Adapter</b>	P/N 17502
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Instead of clips, this cable has spade lugs for connection to binding posts and peripheral equipment.

<b>Sorting Fixture</b>	P/N 17503
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Sorting Fixture holds components for test while providing four-terminal connection. Its holding clips rotate 90 degrees to accommodate axial and radial leaded components alike. Holders may also be adjusted from 0.75" (1.90 cm) to 3.0" (7.62 cm) apart allowing use of the fixture with many component sizes and configurations. Terminal contact pressure is also adjustable. Pressure may be reduced for easy insertion of components with small gauge leads. Contacts are gold-plated beryllium-copper.

<b>Kelvin Probes</b>	P/N 17504
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Kelvin probes allow the measurement of surface resistance. Each probe has two spring loaded pins spaced 1/8" apart. Pins are replaceable. Pin replacement kit is P/N KP-100. It comes with 4 replacement pins.

<b>Male LEMO Connector and Strain Relief</b>	P/N 17505
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Male LEMO Connector and Strain Relief is an optional accessory that allows you to interface your existing handlers or probe sets to the new 1740 Resistance Measuring System.

**Accessories**
**Optional Accessories (cont.)**
**Large Kelvin Klip Set**


P/N 17507

Provides a solid 4-terminal connection to large components that cannot be measured with conventional Kelvin Klips. It is robust in construction ensuring a firm grip. Very useful for connection with large bolts, cables, plates etc.

**Chip Tweezers**


P/N 17510

The tweezers make solid connections to chip components in manual sorting applications. Capacity of jaws is 12.7 mm (0.5 in). The tweezers include a 5 ft cable. Contact tips are replaceable.

**Chip Tweezer Replacement Kit**


P/N 47422

Tweezer tips are intended to last 100,000 to 500,000 operations. This kit includes 12 replacement tips, 2 screws and 1 wrench.

**Z540 Compliant Calibration  
with Certificate and Data**

P/N OPT-Z540