

**MODEL 6520**

**PROGRAMMABLE DIGITAL TERAOHMMETER**

**ULTRA-HIGH RESISTANCE HIGH ACCURACY MEASUREMENT**



**6520 FEATURES**

- > Resistance Mode: range 100 kilohms to over 10,000 teraohms
- > Current Mode: range  $10^{-2}$  amps to  $10^{-13}$  amps
- > Automatic sensing of resistance range, integration time and threshold voltage
- > Surface and volume resistivity measurements with 65221 test fixture
- > Test voltages 1 to 1000 volts
- > Environmental monitoring with 65220 sensors
- > Logging, graphical display and analysis of measurements
- > Fully programmable
- > Programmable test profiles
- > Sofcal™ for on-board intelligence and front panel calibration
- > TeraCal™ Data Acquisition Software automates operation
- > SCPI compliant IEEE-488.2 and RS232C built-in as standard
- > Rear input option

**G**uildline 6520 Digital Teraohmmeter is the latest instrument of its type from Guildline Instruments. It expands the performance of the earlier models to a level never available before in a high resistance measuring instrument. The 6520 teraohmmeter offers true state-of-the-art ultra-high resistance measurement superior to bridge techniques. Through its inherently linear design of the measurement section, the 6520 achieves the highest accuracy and range commercially available today. Accuracies better than 0.0025% can be achieved when used as a transfer standard.

The 6520 teraohmmeter is fully automatic, functioning under microprocessor control and Guildline's unique Sofcal™ on-board calibration firmware. The instrument measures extremely high resistances, in excess of  $10^{16}$  ohms, or very small currents to less than  $10^{-13}$  amps. Measurement time for the instrument is 5ms to 1000 seconds and sensing of instrument resistance range, integration time and threshold voltage is fully automatic.

The 6520 utilizes Sofcal™ to configure the IEEE-488.2 and the RS232C interfaces. In addition, Sofcal™ provides supply and reference voltage diagnostics, protection resistor compensation, and standard calibration from the front panel. The calibration is simply achieved by connecting a known reference resistor to the input connectors (accessory 9336-100M) and starting the self calibration procedure. The on-board firmware also provides self test and diagnostic help features.

**The 6520 achieves the highest accuracy and range commercially available.**

Production line testing, calibration of electrometers, semiconductor testing, capacitance leakage measurement, film surface and volume resistivity measurement, and other applications (performed in the past by previous teraohmmeters) can all be applied to automatic testing by the 6520. In the current mode, the instrument can be used to measure chemical reaction rates, photo-electric effects and ionization effects.

The SCPI compliant IEEE-488.2 and RS 232C interfaces are built-in as standard, as is an external trigger input to command a measurement from an external device, process or timing mechanism.

The 6520 can be remotely controlled and automated through the IEEE-488.2 by Guildline's TeraCal™ software. TeraCal™ is a convenient Windows®-based software program, developed on the National Instruments LabVIEW™ platform that is developed specifically for metrologists. It provides easy to use controls, data storage, report generation and utilities for the performance of a variety of resistance measurements. When used with the 65221 test fixture, this includes surface and volume resistivity. When the optional 65220 environmental sensors are installed, the ambient temperature, humidity and pressure can be recorded. To run TeraCal™, a Windows 9X/NT computer with and optional National Instruments IEEE-488.2 interface card is required.

A range of calibrating resistors are available (9336, 9337), as well as other accessories for use with the 6520.

# 6520 PROGRAMMABLE DIGITAL TERAOHMMETER

## 6520 SPECIFICATIONS

### Accuracy

Range (Ohms)	Test Voltage Range	Uncertainty (±% of reading over 1 year, 23°C±2°C) *	Transfer Uncertainty (±% of reading over 4 hours, 23°C±2°C)**	Temperature Coefficient (±% of reading/°C 15°C to 21°C, 25°C to 30°C)
90k to 200k	1V	0.025	0.006	0.01
200k to 2M	1V	0.025	0.0025	0.0035
2M to 20M	1V	0.025	0.0025	0.0035
20M to 200M	1V to 10V	0.015	0.0025	0.0035
200M to 2G	1V to 100V	0.02	0.0025	0.005
2G to 20G	1V to 1000V	0.06	0.0025	0.007
20G to 200G	10V to 1000V	0.08	0.0025	0.01
200G to 2T	100V to 1000V	0.12	0.008	0.02
2T to 20T	1000V	0.35	0.05	0.03
20T to 200T	1000V	0.6	0.07	0.05
200T to 2P	1000V	2.5	0.2	0.1
2P to 20P	1000V	30	0.5	1

Range (A)	Uncertainty (±% of reading over 1 year, 23°C±2°C)	Temperature Coefficient (±% of reading/°C 15°C to 21°C 25°C to 30°C)
$10^{-3} \leq I \leq 10^{-2}$	N/A	N/A
$10^{-4} \leq I < 10^{-3}$	N/A	N/A
$10^{-5} \leq I < 10^{-4}$	N/A	N/A
$10^{-6} \leq I < 10^{-5}$	0.1	0.005
$10^{-7} \leq I < 10^{-6}$	0.1	0.005
$10^{-8} \leq I < 10^{-7}$	0.2	0.03
$10^{-9} \leq I < 10^{-8}$	0.2	0.03
$10^{-10} \leq I < 10^{-9}$	0.2	0.1
$10^{-11} \leq I < 10^{-10}$	1.0	0.1
$10^{-12} \leq I < 10^{-11}$	2.0	0.2
$10^{-13} \leq I < 10^{-12}$	10.0	1

\* Measurement uncertainty is specified in Auto mode of operation and is traceable to the SI system of units through NRCC, NIST or other National Metrology Institutes.

\*\*This is the stability of the measurements of the 6520 over the specified time period.

**Range:**  $10^5$  to  $10^{16}$  ohms or  $10^{-2}$  to  $10^{-13}$  amps selectable (default 6 digits)  
**Display Resolution:** 100 k ohms  
**Input Impedance:** 100 ohms (current shunt enabled)  
**Measurement time:** 5ms to > 1000 seconds  
**Test Voltage:** 1, 2, 5, 10, 20, 50, 100, 200, 500 & 1000 Volts (Programmable)

### Environmental Monitor:

**Temperature:** Range: -50°C to 100°C  
 Uncertainty: ±0.3% (+ sensor error) over 1 year  
**Atmospheric Pressure:** Range: 15 to 115 kPa  
 Uncertainty: ±0.3% (+ sensor error) over 1 year  
**Humidity:** Range: 0% to 100% RH  
 Uncertainty: ±0.3% (+ sensor error) over 1 year

**Interfaces:** IEEE-488.2 and RS232  
**Power Supply:** 100, 120, 220, 240 VAC  
 50/60 Hz±5%, 120 VA  
**Environment:** Operating: 15°C to 30°C  
 20% to 50% RH  
 Storage: -30°C to 70°C  
 15% to 80% RH  
 non-condensing  
**Source connector:** High Voltage BNC  
**Input Connector:** 3 lug triax  
**Exterior Dimensions:** H 89mm (3.5in)  
 add 11 mm (0.4in) to height for bench top feet  
 W 444mm (17.5in)  
 D 500mm (19.7in)  
**Weight:** 11.4 kg (25 lbs)

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## 6520 ORDERING INFORMATION

6520 Programmable Digital Teraohmmeter  
 TeraCal™ Data Acquisition software (included)  
 \*\*\* Requires a Windows 9X/NT computer with National Instruments IEEE-488.2 interface (not included)  
 SUM6520 Software User's Manual (included)  
 OM6520 Operator's Manual (included)  
 Accredited Certificate of Calibration (included)  
 Report of Calibration (extra charge)

### ACCESSORIES:

65201 Penn Airborne Adapter  
 65220 Environmental Monitor  
 65221 Surface/Volume Resistivity Test Fixture  
 65222 Large Shielded Sample Enclosure (342x228x152 mm inside)  
 65223 Small Shielded Sample Enclosure (138x112x60 mm inside)  
 65224 Zero Link  
 65225 Lead Set (includes, MHV M – Type N F, Triax M to Type N F, MHV M to MHV M, MHV M to Plug, Alligator clips Red/Blk., Triax M to Alligator, Triax M to Triax M, and Triax F to Triax F)  
 65226 Calibration Kit (includes, MHV M to Plug, 9336/100M Res. Std., 65224 Zero Link, Cal Procedure, Application Note, and Case)  
 9336-x Standard Resistor (range 10M to 100G Ω)  
 9337-x Standard Resistor (range 1T to 1P Ω)  
 SM6520 Service Manual  
 IEEE-PCI National Instruments IEEE-488.2 Interface Card for PCI slot  
 IEEE-USB National Instruments IEEE-488.2 Interface Adapter for USB  
 IEEE-PCMCIA National Instruments IEEE-488.2 Interface Card for PCMCIA  
 IEEE-2m 2 Meters Double Shielded IEEE-488.2 Interface Cable  
 IEEE-1m 1 Meter Double Shielded IEEE-488.2 Interface Cable

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