

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

Guildline 6520 Digital Teraohmmeter is the latest instrument of its type from Guildline Instruments. It expands the range and 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, integrator linearity check 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.

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6520 SPECIFICATIONS

Accuracy

Range (Ohms)	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)
10 ⁵ ≤ R ≤ 10 ⁶	0.025	0.006	0.01
10 ⁶ < R ≤ 10 ⁷	0.025	0.0025	0.0035
10 ⁷ < R ≤ 10 ⁸	0.015	0.0025	0.0035
10 ⁸ < R ≤ 10 ⁹	0.02	0.0025	0.005
10 ⁹ < R ≤ 10 ¹⁰	0.06	0.0025	0.007
10 ¹⁰ < R ≤ 10 ¹¹	0.08	0.0025	0.01
10 ¹¹ < R ≤ 10 ¹²	0.1	0.008	0.02
10 ¹² < R ≤ 10 ¹³	0.2	0.05	0.03
10 ¹³ < R ≤ 10 ¹⁴	0.3	0.07	0.05
10 ¹⁴ < R ≤ 10 ¹⁵	1.0	0.2	0.1
10 ¹⁵ < R ≤ 10 ¹⁶	5.0	0.5	1.0

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 ≤ I ≤ 10 ⁻²	N/A	N/A
10 ⁻⁴ ≤ I < 10 ⁻³	N/A	N/A
10 ⁻⁵ ≤ I < 10 ⁻⁴	N/A	N/A
10 ⁻⁶ ≤ I < 10 ⁻⁵	0.1	0.005
10 ⁻⁷ ≤ I < 10 ⁻⁶	0.1	0.005
10 ⁻⁸ ≤ I < 10 ⁻⁷	0.2	0.03
10 ⁻⁹ ≤ I < 10 ⁻⁸	0.2	0.03
10 ⁻¹⁰ ≤ I < 10 ⁻⁹	0.2	0.1
10 ⁻¹¹ ≤ I < 10 ⁻¹⁰	1.0	0.1
10 ⁻¹² ≤ I < 10 ⁻¹¹	2.0	0.2
10 ⁻¹³ ≤ I < 10 ⁻¹²	10.0	1

* 6520 operating in Auto mode to 1T ohms and with a soak time of 5 seconds or more above 1T ohms

Does not include instabilities of the test resistance (e.g. dielectric effects, voltage coefficients)

**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
Display Resolution:	selectable (default 6 digits)
Input Impedance:	100 k ohms 100 ohms (current mode)
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%, 50 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)
TM6520	Technical Manual (included) 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)
9336-100M	Standard Resistor
9336-x	Standard Resistor (range 10M to 100G Ω)
9337-x	Standard Resistor (range 1T to 1P Ω)
6675A-01A	National Instruments IEEE-488.2 Interface Card for PC PCI slot
6675A-02A	2 Meters Double Shielded IEEE-488.2 Interface Cable
6675A-02B	1 Meter Double Shielded IEEE-488.2 Interface Cable

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