Precision Measurement Lead Set 4000LEAD



A comprehensive collection of test leads and adapters is provided to cover requirements from low level DC through to high current and high resistance measurements.

The lead set is provided in a sturdy plastic carry case for safe storage and transportation

The leads and materials supplied in this measurement set have been carefully selected to minimise connection/lead errors. The safety of the leadset is ensured by the use of non-retractable shrouded connectors for the voltage test lead set removing the risk of accidental electric shocks. All current leads feature retractable shrouds for connecting to both sockets and binding posts.

The leads are stackable to allow connections to be commoned together where required, enabling fast calibration of instruments with minimal lead changes required.

Low Thermal Gold Plated Connections

The use of gold plated connectors is essential to reduce thermally generated EMFs caused by temperature differences across metal junctions (i.e. thermocouple type effects). Gold connections, which produce less than 0.2uV/°C, are used as opposed to nickel plated brass which can produce in excess of 15uV/°C. This allows typical uncertainty contributions from this type of leadset to be in the order of 0.7uV.

To learn more about Thermal EMF effects on test leads and connections, please view our YouTube video at the following link : http://youtu.be/KiYhEP6m7Pc

Low resistance 32A current leads

The leadset provided for high current measurement is manufactured using very low resistance cable and connectors. Low resistance is essential to carry current without excessive heating effects or voltage drop. As there are no errors introduced by thermal effects connectors are made from hard wearing nickel plated brass. Retractable shroud type connectors are used as there is no potential for shock.

Low noise measurements using screened leadset

For high resistance and low level AC measurements a BNC to BNC screened lead complete with BNC to 4mm adapters is provided. This lead is essential for this type of measurement where unscreened leads can cause errors by introducing unwanted line frequency (mains) pickup, 'swamping' the measured signal. For a video demonstration of the effects of noise by using incorrect leads, please watch our YouTube video demonstrating the effects of pickup and noise on incorrectly shielded leads at the following link : http://youtu.be/GH8APSv_VBw

The very high resistance of the lead supplied also avoids leakage errors caused by using inferior (leaky) test leads which can effectively shunt the value being measured (for example a leakage of only 100 GigaOhms on a measurement of 1 GigaOhm will give a 1% error). For further information regarding the effects of lead resistance on measurements, please view our YouTube video at the following link showing effects of inferior leads on high resistance measurements: http://youtu.be/ACILIvPR1s8

Flexible range of adapters, converters & terminators

For the ultimate in flexibility, a selection of adapters, converters and terminators are provided as standard to maximise the inter-connectivity of the leadset, including adapters for conversion of 4mm to spade and BNC for connecting to instruments without 4mm terminals.

Test Lead Set Specifications

Voltage Measurement Leads	1 pair of COAX leads fitted each end with low thermal 4mm unshrouded terminals. **For use up to 20V only**. Plating **Gold** Length **1m** Rating **1000VAC / 16A** Thermal Effect **0.7uV**
Voltage Measurement Adapters	
4mm plug to spade adapters 	2 pairs of low thermal (gold plated) Black & Red 4mm plug to spade adapters suitable for connection to standard resistors etc. **1000VAC rating does not apply when using these spade adapters due to electric shock hazard**
4mm safety plug to unshrouded open ended adapters 	2 pairs of low thermal (gold plated) adapters suitable for use with high voltage safety leads when connecting to instruments without safety terminals. **1000VAC rating does not apply when using these adapters due to electric shock hazard**
4mm plug to cable adapters 	2 pairs of low thermal (gold plated) adapters suitable for connecting bare-ended cables to 4mm terminals. **1000VAC rating does not apply when using these adapters due to electric shock hazard**

Recommended use of voltage measurement leads

- DC voltage measurements up to 1000V.
- Combine with low current leadset and spade adapters - ideal for 4-wire kelvin measurements.

As these are unscreened, they are not suitable for high value resistance or low AC voltage & current.

It is important to remember that the terminals of mains powered instrument may be warm, or above ambient temperature. The test leads will almost certainly be at ambient (room) temperature and connecting these leads to a mains powered instrument will cause a significant 'cold-junction'. This will require a period of time before the temperature variation stabilises between the instrument terminals and the leadset.

Current Measurement Leads 	1 pair of Black & Red leads fitted each end with 4mm retractable shroud safety terminals. Plating — Nickel plated brass Length — 1m Rating — 150VAC / 16A

Recommended use of current Measurement Lead

- AC/DC current measurements from 1mA up to 2A.

This leadset can be used at lower currents, however to reduce noise / pickup use the BNC to BNC lead. This lead is not suitable for low DC measurements due to thermal EMFs created by the contact material used.

High Current Measurement Leads	1 pair of low resistance Blue & Yellow leads fitted each end with 4mm retractable shroud safety terminals. Plating — Nickel plated brass Length — 1m Rating — 150VAC / 32A

Recommended use of current measurement Lead

- AC/DC current measurements from 2A up to 20A

This lead is not suitable for low DC measurements due to thermal EMFs created by the contact material used.

Earth Connection Lead	1 low resistance Green lead fitted each end with 4mm retractable shroud safety terminals. Plating — Nickel plated brass Length — 1m Rating — 150VAC / 32A

Recommended use of Earth Connection Lead

- Grounding external UUT's that lack a ground connection

This lead is not suitable for low DC measurements due to thermal EMFs created by the contact material used.

BNC Oscilloscope connection AC measurements / High resistance measurements 	1 coax lead fitted each end with BNC connectors Plating — Silver Length — 1m Rating — 300V AC / 0.5A

Recommended use of BNC lead

- Low AC voltage & current measurements
- High resistance (1Mohm and above)

This lead is suitable for low AC measurements due to screened connection created by the exterior core shielding. Please note thermals do not affect the accuracy of AC voltage / current measurements

BNC Adapters	
BNC to 4mm Adapter 	2 BNC to 4mm shrouded adapters are supplied to allow connection to calibrators & multimeters
BNC 50 Ohm Feed-through Adapter	A 50 Ohm terminator for use with the bandwidth (levelled) sweep function of the oscilloscope calibration option.