



Time Electronics
Calibration, Test and Measurement

User Manual

5069 InsCal Insulation Tester Calibrator

Version 2.3
7/24

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This also applies to any schematics, drawings and diagrams contained herein.

This manual provides operating and safety instructions for the Time Electronics product.

To ensure correct operation and safety, please follow the instructions in this manual.

Time Electronics reserves the right to change the contents, specifications and other information contained in this manual without notice.

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1 General Description



This precision instrument is an insulation meter tester and calibrator in one, specifically designed to test and calibrate insulation test sets and megohm meters with varying ranges.

It consists of a high precision resistance box, a voltmeter and a milliamp meter.

It is constructed from very high insulation materials, including its case, and is fully isolated from any external circuits including the mains supply.

All of the rotary selector switches are manufactured by Time Electronics, using special high voltage low leakage wafers; the contacts are self-cleaning. This feature means they should require no maintenance.

The three functions, Voltage Measure, Current Measure, and Source Resistance are selected and used separately.

Maximum voltage is dependent upon humidity levels. Below 50% relative humidity is recommended.

2 Supplied Items

5069 InsCal Insulation Tester Calibration System



Accessories in the box:

Wallet



10 kV lead



5 kV Lead Set



Battery charger



3 Specifications

3.1 Technical Specification

Insulation Resistance

Resistance Range/Values	Voltage Coeff.	Accuracy	Maximum Voltage
3x spot values: 100 kΩ, 200 kΩ, 500 kΩ	–	1 %	500 V
3x spot values: 1 MΩ, 2 MΩ, 5 MΩ	–	1 %	2 kV
9 x 10 MΩ	< 2 ppm/V	1 %	10 MΩ: 2 kV*, 20 MΩ: 4 kV* 30 MΩ to 90 MΩ: 6 kV*
9 x 100 MΩ	< 2 ppm/V	1 %	6 kV
9 x 1 GΩ	< 5 ppm/V	1 %	6 kV
10 x 10 GΩ	<= 0.5 ppm/V	5 %	10 kV

*Max. voltage shown applies to models built after 2024. Prior to this the max. voltage is 1 kV per step to 6 kV max. All resistors have a temperature coefficient of 250 ppm.

Switches are a purpose-built design, with break-before-make, silver plated, self-cleaning contacts.

NOTE: The maximum voltage applied must be limited to the rating of the lowest decade being used. For example, if 10 GΩ and 100 MΩ decades are used, the maximum applied voltage will be limited to 6 kV.

Volt-Meter

Low Range 0 to 1.999 kV, resolution 1 V; 1% of full-scale reading.

High Range 0 to 10.0 kV, resolution 10 V; 1% of full-scale reading.

At 10 kV the humidity limit should be below 50%.

Terminal impedance ... 1 GΩ

Milli-Amp Meter

Low Range 0 to 2 mA; 1% of full-scale reading.

High Range 0 to 20 mA; 1% of full-scale reading.

Terminal impedance ... 447 Ω (this includes the discharge resistor for short circuit test).

3.2 General Specification

Environmental Operating temperature 20 to 26 °C. Humidity below 50%.

Power Internal battery, 6 V re-chargeable NiMH, >150hrs between charges.

Dimensions/Weight W 406 x H 175 x D 330mm / 4.4 kg.

Supplied with Safety connection leads with bare ends to allow custom probes (10 kV rated), 4 mm 5 kV test lead set, wallet to carry test leads and mains battery charger (230 V 50 Hz).

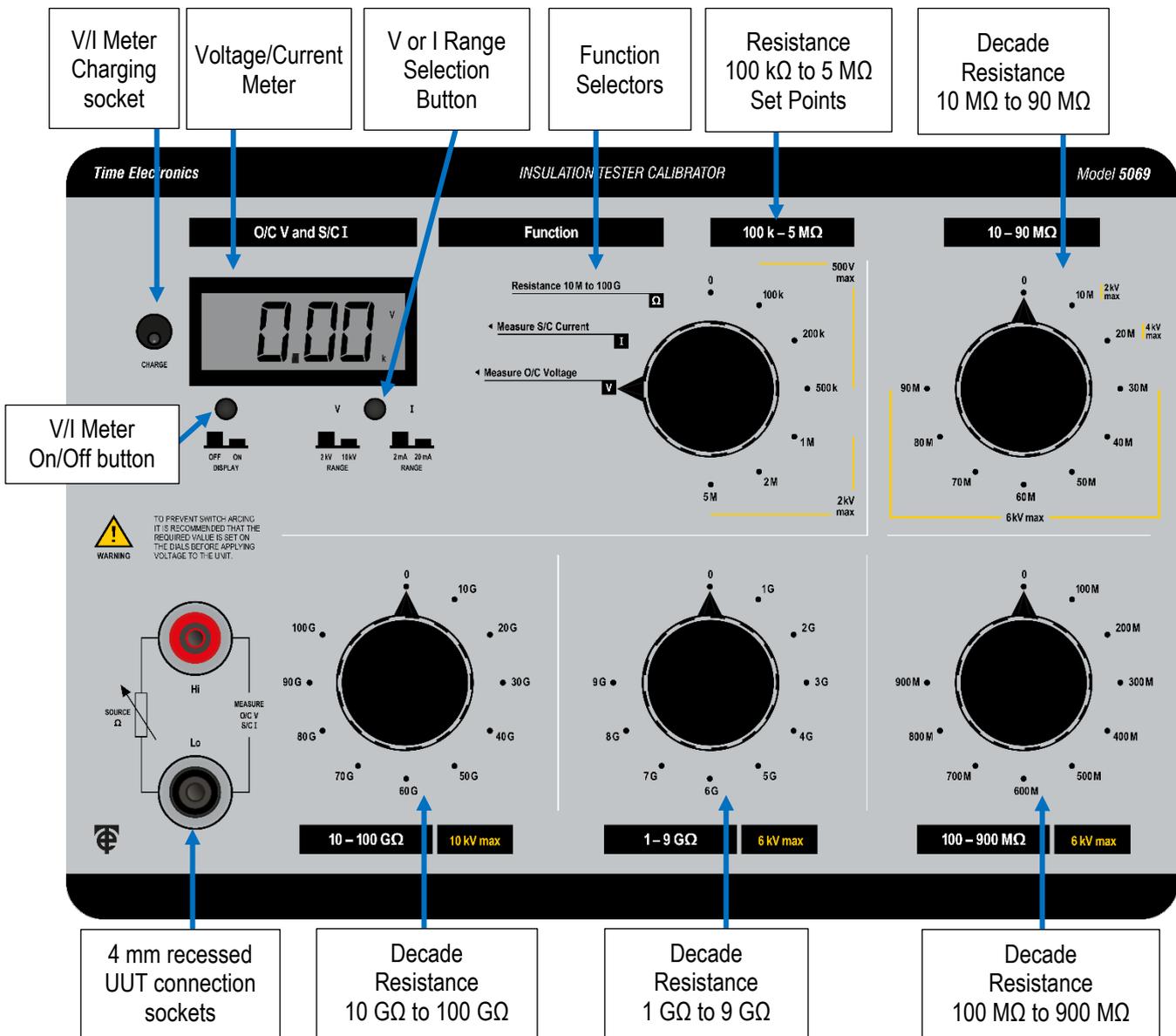
3.3 Ordering Information

5069 Insulation Tester Calibrator (InsCal)

C189 Traceable calibration certificate (Factory)

C112 Accredited calibration certificate (ISO 17025)

4 Controls



4.1 Descriptions of Controls

- **On/Off Button:** To power the voltage/current meter on or off.
- **Charging Socket.** A socket to recharge the 5069 voltage/current meter.
- **Voltage/Current Meter:** Displays the O/C voltage or S/C current when used.
- **V or I Range Selection Button:** Select the range to use for the V or I measure function.
- **Function Selectors:** Use to select the required function.
- **Resistance 100 kΩ to 5 MΩ Set Points:** Spot resistance values used individually.
- **Decades Resistance Ranges:** Rotate knobs to set required resistance values.
- **4 mm Recessed Sockets:** Used to connect the 5069 to the insulation tester (UUT).

5 Operation

5.1 Operational Guidelines

Notes:

1. UUT: stands for Unit Under Test (i.e. the insulation tester or the megohm meter).
2. Wherever possible use the manufacturer of the UUT's supplied test leads.



The 5069 can measure test voltages generated by a UUT up to 10 kV.

Be aware that the test voltage for high resistance measurements is dangerous and can cause electric shock!



Always remove the battery charger leads from both the 5069 and the UUT before starting the calibration setup.



Use only the measuring leads supplied with the UUT or those supplied with the 5069. When checking high resistance values the leads may pick up electrical interference, which can cause a disturbance to the readings obtained. Some manufacturers fit a guard connection for use with dedicated leads, this will stabilise the readings.



It is not recommended to operate the resistance decade switches while a test is made. This will not automatically do any damage but may cause arcing and create transients which could give false readings on the UUT display due to the fact that the switch is break-before-make between each resistor. This will ensure that contact arc is suppressed with high relative humidity.



Avoid opening the 5069 case lid in the rain or in steamy conditions for the moisture will impair the readings.



Observe safety at all times and if possible, carry out the tests in a low humidity environment.

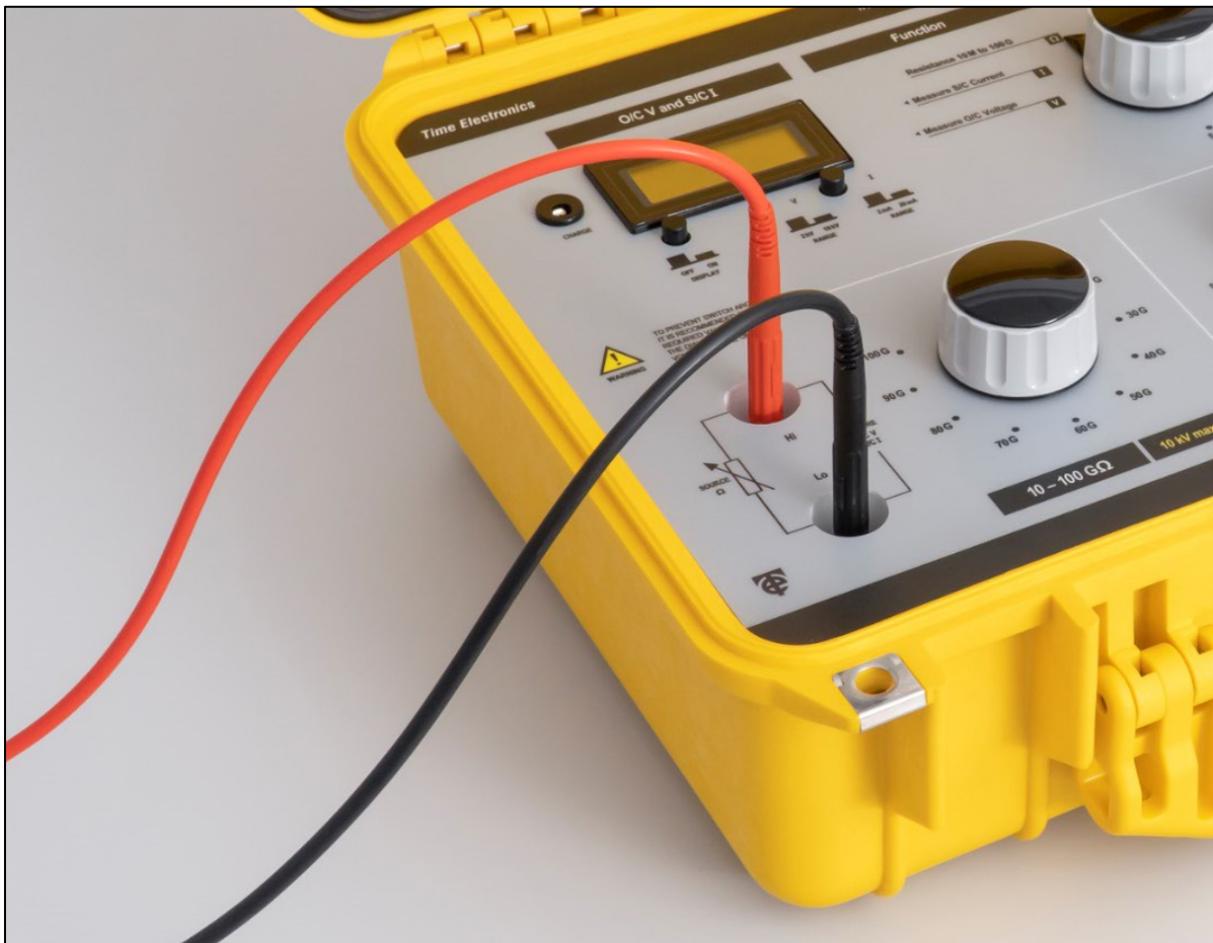
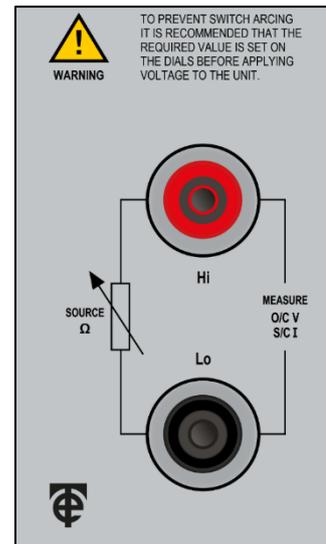
Note: Insulation testers will vary, and the controls may be different than those referenced in this manual. However, the testing principles should still apply.

5.2 Typical Operation Procedure

5.2.1 Initial Setup

- 1) Check the battery on both 5069 V/I Meter and Insulation Tester. Make sure their batteries are fully charged.
- 2) Complete the setup procedure for the insulation tester (UUT).
- 3) Connect the selected test leads to the 4 mm recessed sockets of the 5069.

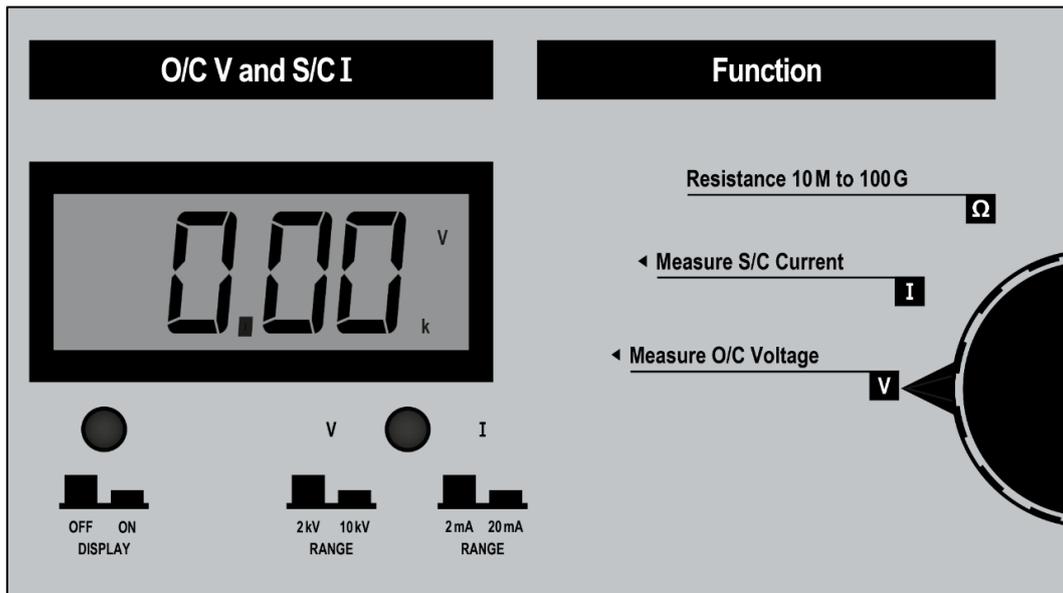
NOTE: If the UUT's own test leads are available, use them as first choice.



5.2.2 Voltage Measurement

The 5069 voltmeter will display the voltage output from the insulation tester. Perform the following procedure to measure the voltage.

- 1) Adjust the pointer at zero on the UUT (Analogue meter display, if required).
- 2) On the 5069, select the O/C VOLTS function using the rotator knob.

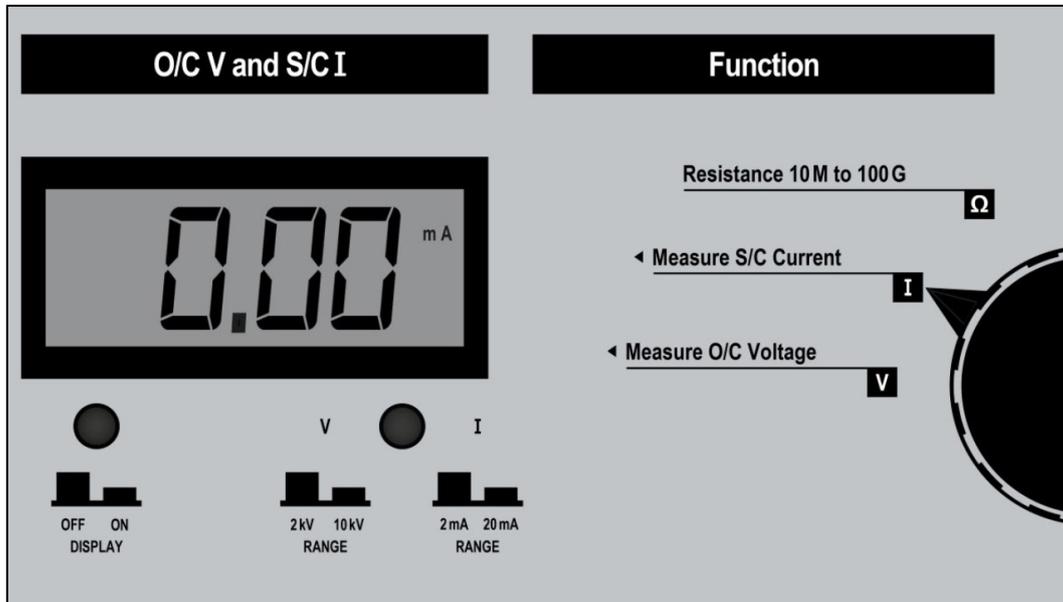


- 3) Using 'Range Selection Button' under the display, choose the required voltage range: 2 kV or 10 kV.
- 4) Using the selected high voltage test leads, connect the 5069 to the UUT, observing their polarities.
- 5) Select voltage range on UUT, and press the test button.
- 6) When the reading has stabilised, record the O/C voltage reading on the 5069 voltmeter.

5.2.3 Current Measurement

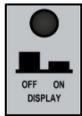
The 5069 current meter will display the equivalent current output of the Insulation tester. Perform the following procedure to measure the current.

- 1) On the 5069, select the S/C CURRENT function using the rotator knob.



- 2) Using 'Range Selection Button' under the display, choose the required current range: 2 mA or 20 mA.
- 3) Press the test button on the UUT, and record the current reading on the 5069 display. Ensure the output of the UUT is turned off after test.
- 4) Return the 5069 setting to O/C Voltage, and repeat the Voltage Measurement procedure above (5.2.2). This is to check the voltage has recovered. Switch off the output from the UUT.

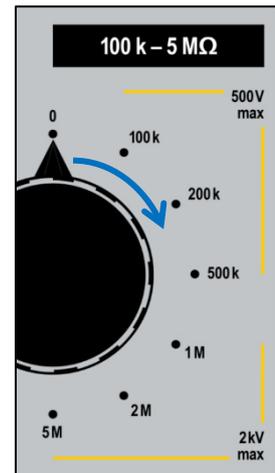
5.2.4 Insulation Resistance Verification



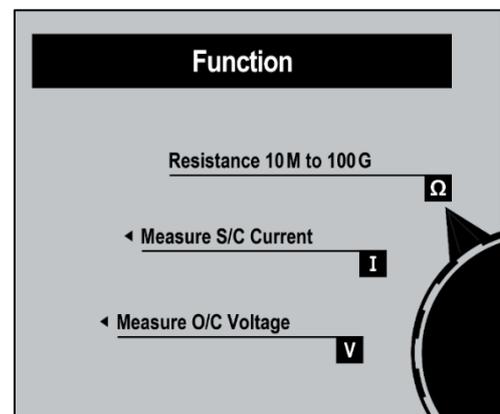
Note: The O/C V and S/C I display can be turned off when using the resistance function to conserve battery life.

- 1) If using the 100 k Ω to 5 M Ω set points, select the required resistance.

Ensure that the voltage set on the UUT does not exceed this voltage rating shown on the panel.



- 2) If using the decades, select the **RESISTANCE** function using the rotator knob.

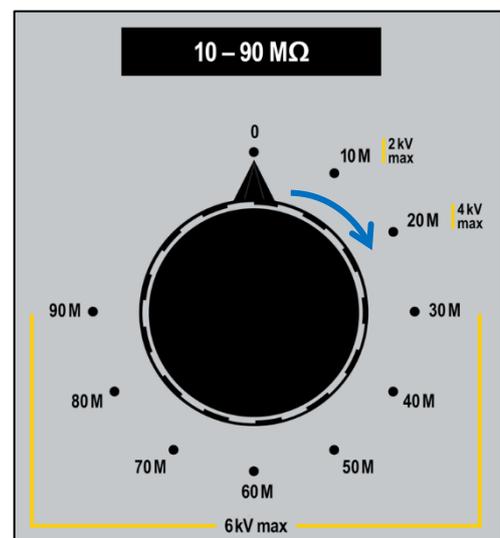


- 3) Then set the decade resistance knobs to the value required.

Note the allowed voltage of the resistance ranges as shown on the 5069 panel.

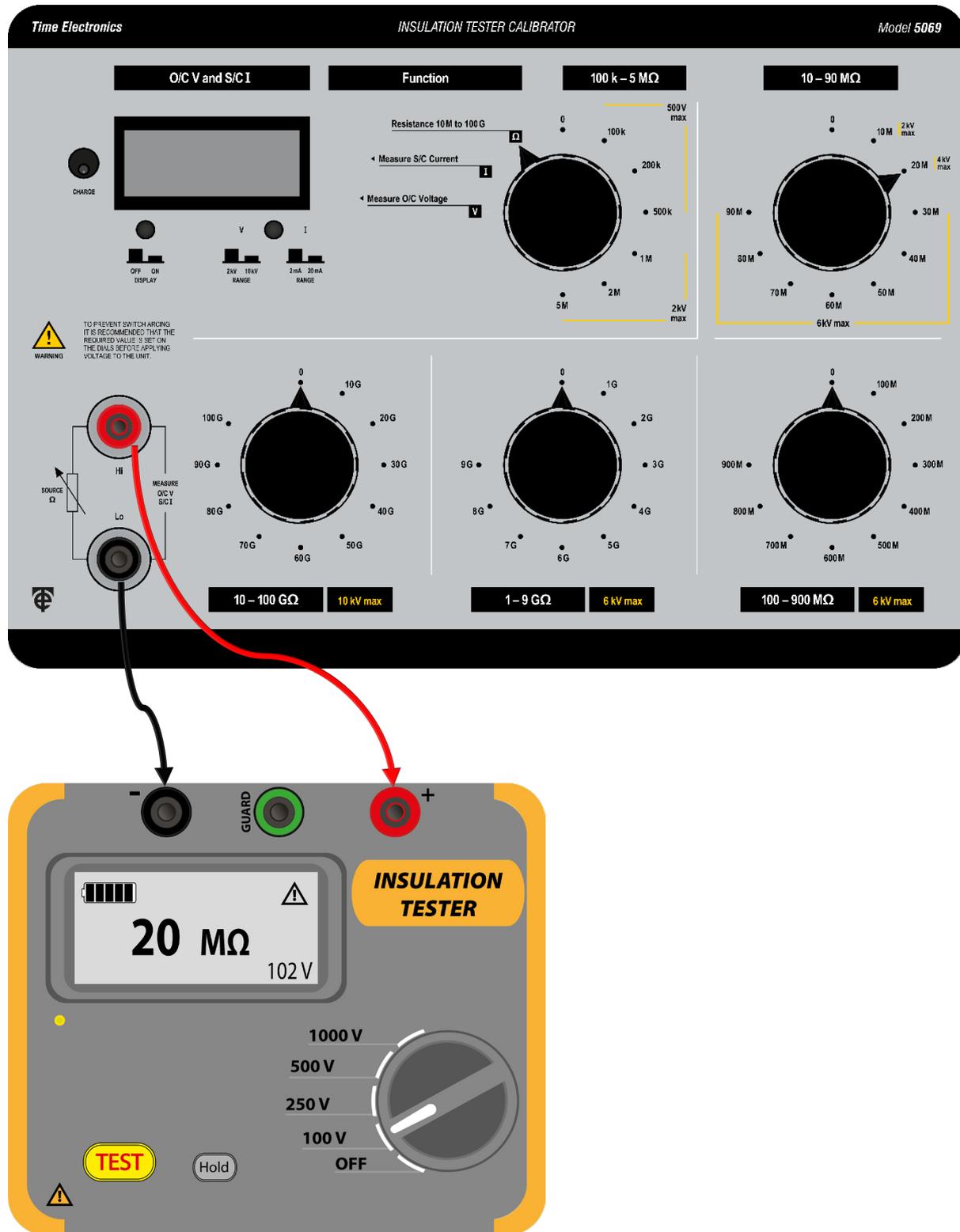
When using multiple decades, the maximum voltage is that of the lowest decade.

Ensure that the voltage set on the UUT does not exceed this voltage rating.



- 4) Press the test button on the UUT.
Note that on the higher resistance ranges, due to the very low currents present, the display on the UUT may fluctuate and take time to settle, please follow any precautions given by the tester manufacturer.
- 5) Proceed and record all test results, noting the allowed errors of the 5069 and also for that of the UUT.

5.2.5 Example Connection Diagram



6 Warranty and Servicing

Warranty

The Time Electronics products carry a one-year manufacturer's warranty as standard.

Time Electronics products are designed and manufactured to the highest standards and specifications to assure the quality and performance required by all sectors of industry. Time Electronics products are fully guaranteed against faulty materials and workmanship.

Should this product be found to be defective, please contact us using the below details. Inform us of the product type, serial number, and details of any fault and/or the service required. Please retain the supplier invoice as proof of purchase.

This warranty does not apply to defects resulting from action of the user such as misuse, operation outside of specification, improper maintenance or repair, or unauthorized modification. Time Electronics' total liability is limited to repair or replacement of the product. Note that if Time Electronics determine that the fault on a returned product has been caused by the user, we will contact the customer before proceeding with any repair.

Calibration and Repair Services

Time Electronics offers repair and calibration services for all the products we make and sell. Routine maintenance by the manufacturer ensures optimal performance and condition of the product. Periodic traceable or accredited calibration is available.

Contacting Time Electronics

Online:

Please visit **www.timeelectronics.com** and select Support Request from the Contact links. From this page you will be able to send information to the Time Electronics service team who will help and support you.

By phone:

+44 (0) 1732 355993

By email:

mail@timeelectronics.co.uk

Returning Instruments

Prior to returning your product please contact Time Electronics. We will issue a return merchandise authorization (RMA) number that is to accompany the goods returning. Further instructions will also be issued prior to shipment. When returning instruments, please ensure that they have been adequately packed, preferably in the original packing supplied. **Time Electronics Ltd will not accept responsibility for units returned damaged.** Please ensure that all units have details of the service required and all relevant paperwork.

Send the instrument, shipping charges paid to:

Time Electronics Ltd

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Tonbridge, Kent, TN9 1RA.
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Disposal of your old equipment



1. When this crossed-out wheeled bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC.
2. All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities.
3. The correct disposal of your old appliance will help prevent potential negative consequences for the environment and human health.
4. For more detailed information about disposal of your old appliance, please contact your city office, waste disposal service or return to Time Electronics.