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# IN2101 / IN2102 INSULATION TESTER

## INSTRUCTION MANUAL



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## For user notes

**GENERAL SAFETY INFORMATION:** Always read before proceeding.

### Warning

These instructions contain both information and warnings that are necessary for the safe operation and maintenance of this product. It is recommended that you read the instructions carefully and ensure that the contents are fully understood. Failure to understand and to comply with the warnings and instructions can result in serious injury, damage or even death.

In order to avoid the danger of electrical shock, it is important that proper safety measures are taken when working with voltages exceeding 30V AC RMS, 42V AC peak or 60V DC.









This product must only be used by a competent person capable of interpreting the results under the conditions and for the purposes for which it has been constructed. Particular attention should be paid to the Warnings, Precautions and Technical Specifications. Always check the unit is in good working order before use and that there are no signs of damage to it. Do not use if damaged.

Where applicable other safety measures such as use of protective gloves, goggles etc. should be employed.

Please keep these instructions for future reference. Updated instructions and product information are available at: [www.martindale-electric.co.uk/instruct](http://www.martindale-electric.co.uk/instruct)

**REMEMBER: SAFETY IS NO ACCIDENT**

### MEANING OF SYMBOLS:

-  equipment complies with relevant EU Directives
-  alternating current (ac)
-  earth (ground) terminal
-  direct current
-  equipment protected by double or reinforced insulation (Class II)
-  caution - risk of danger & refer to instructions
-  caution - risk of electric shock
-  end of life disposal of this equipment should be in accordance with relevant EU Directives

For user notes

Thank you for buying one of our products. For safety and full understanding of its benefits please read this manual before use. Technical support is available from 01923 441717 and support@martindale-electric.co.uk.

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## 1. INTRODUCTION

This manual contains information and warnings which must be followed to ensure safe operation of the IN2101/2.

### WARNING

**READ "SAFETY INFORMATION" BEFORE USING THIS METER**

### 1.1 Inspection

Examine the shipping carton for any sign of damage. Inspect the unit and any accessories for damage. If there is any damage then consult your distributor immediately.

You should have the following items:

1. IN2101 or IN2102
2. TL47A lead set
3. Instruction manual
4. Protective carry case with strap
5. Six LR6 alkaline batteries
6. Spare fuse (located in battery compartment)

### 1.2 Description

The IN2101/2 Digital Insulation and Continuity Tester is designed to perform testing in accordance with international standards, including BS7671. Insulation testing can be undertaken at 500V DC (IN2101) or 250/500/1000V DC (IN2102). The tester is powered by six 1.5V alkaline batteries type LR6. To install or replace batteries refer to section 3.1

### k $\Omega$ test

Range	Resolution	Accuracy
1999k $\Omega$	0.1 $\Omega$ <999.9 $\Omega$ 1 $\Omega$ >1000 $\Omega$	$\pm$ (3% rdgs +5d)

Auto-Discharge: when TEST button released

### Insulation test (IN2101)

Voltage	Range	Resolution	Accuracy
500V	4/40/400/ 1000M $\Omega$	1k $\Omega$ /10k $\Omega$ /100k $\Omega$ / 1M $\Omega$	$\pm$ (3% rdgs +5d)

Short circuit current: <1.5mA

Auto-Discharge: when TEST button released

Buzzer disable option: yes

### Insulation test (IN2102)

Voltage	Range	Resolution	Accuracy
250V 500V 1000V	4/40/400/1000M $\Omega$ 4/40/400/4000M $\Omega$ 4/40/400/5000M $\Omega$	1k $\Omega$ /10k $\Omega$ /100k $\Omega$ /1M $\Omega$	$\pm$ (3% rdgs +5d)

Short circuit current: <1.5mA

Auto-Discharge: when TEST button released

Buzzer disable option: yes

Safety: Complies with BS EN 61010 and BS EN 61557 (16th Edition)

Overvoltage Category: CAT III 600V, Pollution Degree 2.

Altitude: Up to 2000M

Protection: IP44

Not for use in wet conditions.

Operating Environment: 0°C to 40°C at < 70% relative humidity

Storage Temperature: -20°C to 60°C, 0 to 80% R.H. with batteries removed from tester.

Dimensions: 90 x 210 x 54mm

### Voltage test

Voltage warning: >30V

Range	Resolution	Accuracy
600V AC/DC	1V	±(3% rdgs +5d)

### Continuity test

Range	Resolution	Accuracy
40Ω	0.01Ω	±(3% rdgs +5d)

Short circuit current:>200mA

Auto-Discharge: when TEST button released

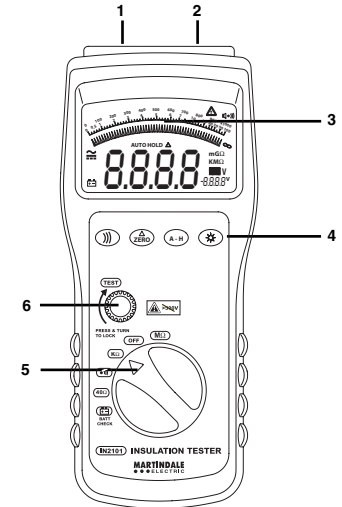
●))) test

Range	Resolution	Accuracy
999.9Ω	0.1Ω	±(3% rdgs +5d)

Auto-Discharge: when TEST button released

Buzzer: <30Ω

Buzzer disable option: yes



### 1. VΩ - Input Terminal

This is the positive terminal for voltage and resistance measurements. Connection is made to it using the red test lead.

### 2. COM - Common Terminal

This is the negative (Ground) terminal. Connection is made to it using the black test lead.

### 3. Display

### 4. Soft keys

### 5. Rotary switch

Selects the desired range.

### 6. TEST button

Used to perform all tests apart from voltage measurement.

## 2. PRODUCT SPECIFIC SAFETY INFORMATION

Safety: Complies with BS EN 61010 and BS EN 61557.  
Overvoltage Category: CAT III 600V, Pollution Degree 2.

This tester has been designed with your safety in mind, however, no design can completely protect against incorrect use.

- Do not touch exposed wiring, connections or other live parts of an electrical circuit.
- When using this tester to monitor high voltages, turn off the power before connecting the tester.
- If in doubt check the circuit first before touching it.
- Do not use cracked or broken test leads.
- Do not use in wet conditions.

### Note: Capacitance Discharge

On completion of an insulation test, the tester should remain connected to the circuit under test for a short period after releasing the **TEST** button. The **TEST** button if latched must be released. This discharges any capacitance via the tester. Before disconnecting the tester ensure indicated voltage is zero.

#### WARNING

**THIS TESTER SHOULD ONLY BE USED BY A COMPETENT AND SUITABLY TRAINED PERSON.**

**REMEMBER - SAFETY IS NO ACCIDENT!**

### Warning

Before use check the unit for cracks or any other damage. Make sure the unit is free from dust, grease and moisture. Also check any associated leads and accessories for damage. Do not use if damaged.

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Specification  
IN2101 & IN2102  
Insulation Tester



### General:

Digital Display: 5000 count

Overrange: OL is displayed

Analogue Bargraph: 51 segment

Low battery indication: the  symbol is displayed when the battery voltage drops below the operating level.

Measurement rate: 2.5 times per second, nominal.

Backlight

Auto Zero & Autohold

Auto Power Off: 5 minutes

APO (Auto Power Off) disable option

Since some jurisdictions do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any part of any provision of this warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision or other part of that provision.

Nothing in this statement reduces your statutory rights.

### 3. OPERATION

#### 3.1 Installing or Replacing Batteries

**WARNING**

When the meter shows the "  " sign the batteries must be replaced to maintain correct operation. Follow the procedure below.

1. Disconnect the test leads from any live source, turn the rotary switch to OFF and remove the test leads from the input terminals.
2. Remove the battery cover using a Phillips screwdriver.
3. Install six LR6s (alkaline) batteries.
4. Replace the battery cover.

#### 3.2 REPLACING FUSES

The condition of the fuse can be checked as follows:

Unplug the test leads.

Select continuity (**K $\Omega$** , or **●**), or **40 $\Omega$** ), press the **TEST** button. If the fuse is defective the display will read **FUSE Err**. The fuse is located in the battery compartment and is used to protect the tester if the leads are connected to a live circuit when the continuity/resistance ranges are selected.

Switch the tester off and release the **TEST** button. Remove the battery cover using a Phillips screwdriver and carefully remove the failed fuse from the metal clips, fit the correct replacement and re-fit cover.


**DO NOT OPERATE THE TESTER WITH THE BATTERY COVER REMOVED.**

### 3.3 How it Works


#### VOLTAGE MEASUREMENTS

Ensure the **TEST** button is released.

Insert the red test lead in **V $\Omega$** , and the black lead in **COM**. Connect the red and black leads across the circuit to be measured - the measured voltage will be displayed.

When a voltage higher than 30V is detected, the buzzer sounds and the high voltage indicator () will blink in the upper-right corner of the display.

#### ZERO KEY

When measuring low resistances, using the ) and **40 $\Omega$**  ranges, compensation for the resistance of the test leads is needed: Set rotary switch to desired low resistance range, short test leads by holding them together or, if using croc clips, clipping them together. Press and hold / latch the **TEST** button, the resistance of the leads will be displayed, then press the **ZERO** soft key to carry out the compensation; a triangle is shown in the middle of the display. Press the **ZERO** soft key again to remove the compensation.

#### CONTINUITY MEASUREMENT

##### Ensure circuit is not live by taking a voltage measurement

Set rotary switch to **40 $\Omega$**  range. Insert red test lead in **V $\Omega$** , and black lead in **COM**. Connect the red and black leads to the circuit to be measured and press the **TEST** button. The measured resistance will be displayed. If **OL** is displayed this indicates the resistance being measured is greater than the continuity range of

### 4.4 Storage Conditions

The instrument should be kept in warm dry conditions away from direct sources of heat or sunlight, and in such a manner as to preserve the working life of the unit. It is strongly advised that the unit is not kept in a tool box where other tools may damage it.

### 5. WARRANTY AND LIMITATION OF LIABILITY

This Martindale product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is 2 years and begins on the date of receipt by the end user. This warranty extends only to the original buyer or end-user customer, and does not apply to fuses, disposable batteries, test leads or to any product which, in Martindale's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation, handling or storage.

Martindale authorised resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Martindale.

Martindale's warranty obligation is limited, at Martindale's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to Martindale within the warranty period.

This warranty is the buyer's sole and exclusive remedy and is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. Martindale shall not be liable for any special, indirect, incidental or consequential damages or losses, including loss of data, arising from any cause or theory.



## 4. MAINTENANCE

### 4.1 Calibration

To maintain the integrity of measurements made using your instrument, Martindale Electric recommends that it is returned at least once a year to an approved Calibration Laboratory for recalibration and certification.

Martindale Electric is pleased to offer you this service. Please contact our Service Department for details.

E: service@martindale-electric.co.uk

T: 01923 650660

### 4.2 Cleaning

The unit may be cleaned using a soft dry cloth. Do not use moisture, abrasives, solvents, or detergents, which can be conductive.

### 4.3 Repair & Service

There are no user serviceable parts in this unit other than those that may be described in section 3. Return to Martindale Electric if faulty. Our service department will quote promptly to repair any fault that occurs outside the guarantee period.

Before the unit is returned, please ensure that you have checked the:

- batteries
- fuses
- leads

the tester.

### RESISTANCE MEASUREMENT WITH BUZZER

#### Ensure circuit is not live by taking a voltage measurement

Set rotary switch to **●)))** range. Insert red test lead in **VΩ** and black lead in **COM**. Connect the red and black leads to the circuit to be measured and press the **TEST** button. The measured resistance will be displayed, and if the resistance is below 30Ω, the buzzer will sound. If **OL** is displayed this indicates the resistance being measured is greater than the resistance range of the tester. The buzzer can be toggled off and on by pressing the **)))** key.

### RESISTANCE MEASUREMENT

#### Ensure circuit is not live by taking a voltage measurement

Set rotary switch to **KΩ** range. Insert red test lead in **VΩ**, and black lead in **COM**. Connect the red and black leads to the circuit to be measured and press the **TEST** button. The measured resistance will be displayed. If **OL** is displayed this means the resistance being measured is greater than the resistance range of the tester.

### INSULATION RESISTANCE MEASUREMENT (MΩ)

For safety reasons, please adhere to the following procedure for Insulation Resistance Measurement: Ensure that the **TEST** button is unlatched and is released. Turn the rotary switch to select the voltage to be applied - 500V DC (IN2101) or 250V, 500V or 1000V DC (IN2102). Insert red test lead in **VΩ**, and black lead in **COM**. Connect the black and red test leads to the circuit to be measured.

**Note:** If a voltage higher than 30V is present on the circuit under test, the buzzer sounds and the high voltage indicator (**⚠**) blinks in the upper-right corner of the display. In this event, remove the test leads from the circuit under test and proceed with caution to investigate the source of the voltage on the circuit under test.

Press the **TEST** button to apply the test voltage. This button can be turned clockwise while pressed to latch it. Allow several seconds for the reading to stabilise. The test voltage is shown in the lower-right corner of the display.


**Note:** On completion of an insulation test the **TEST** button, if latched, has to be manually released to discharge the circuit under test. In the interest of safety the user should be aware of this.

If **OL** is displayed this means that the resistance being measured is greater than the measuring range of the tester.

When a low resistance is measured, the test voltage drops; if it drops to lower than 80V, a blinking indication of **0000** is displayed.

The buzzer can be toggled off and on by pressing the **)))** key.

### **BATT CHECK**

Set rotary switch to **BATT CHECK** range. Press the **TEST** button, the display shows the battery voltage as a % and as a voltage. When the battery voltage is lower than 6.6V, the symbol "  " appears and the batteries should be replaced (see 3.1 page 4).

### **A-H** (Auto-Hold) key

Press the **A-H** key to enable or disable the auto-hold function whilst performing a test. When enabled, **AUTO HOLD** is shown in the middle of the display with **HOLD** blinking. With auto-hold enabled the **HOLD** stops blinking and the buzzer sounds when a stable measurement occurs. After the **TEST** button is released the measured value is displayed and **HOLD** resumes blinking. Press the **A-H** key to delete the value held on the display.

### **APO** (Auto Power Off)

Press and hold the **)))** key for >2 seconds to enable/disable the Auto Power Off function. The APO will turn the tester off after 5 minutes.



### **Back Light** key

Press this key to turn the back light on or off.