IN2203 ADVANCED INSULATION TESTER

Instruction Manual

MARTINDALE ELECTRIC

Keeping You Safe

ALWAYS READ THESE INSTRUCTIONS BEFORE PROCEEDING

Thank you for using one of our products. For safety and a full understanding of its benefits please read this manual before use. Technical support is available from +44 (0)1923 441717 and support@martindale-electric.co.uk.

CONTENTS

1. SAFETY INFORMATION

⚠ REMEMBER: SAFETY IS NO ACCIDENT

These instructions contain both information and cautions that are necessary for the correct 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.

Particular attention should be paid to the Precautions and Technical Specification.

If the equipment is used in a manner not specified by Martindale Electric, the protection provided by the equipment may be impaired.

Please keep these instructions for future reference. Updated instructions and product information are available at: www.martindale-electric.co.uk

1.1 Meaning of symbols and markings

Caution - risk of danger and refer to instructions

Caution - risk of electric shock

Equipment protected by double or reinforced insulation (Class II)

CAT II (Measurement Category II) is applicable to test and measuring equipment directly to utilisation points (socket outlets and similar points) of the low-voltage MAINS installation. For further information visit www.martindale-electric.co.uk/measurement_categories.php

CAT III (Measurement Category III) Measurement Category III is applicable to test and measuring circuits connected at the source of the building's low-voltage MAINS installation.

CAT IV (Measurement Category IV) Measurement Category IV is applicable to test and measuring circuits connected at the source of the building's low-voltage MAINS installation.

Equipment complies with relevant EU Directives

Equipment complies with relevant UK Conformity Assessed marking

End of life disposal of this equipment should be in accordance with relevant Directives

Alternating current (AC)

Earth (ground) terminal

Direct current (DC)

WARNING. Do not use in distribution systems with voltages > 1000 V.

1.2 Precautions

This product has been designed with your safety in mind, but please pay attention to the following warnings and cautions before use.

Warnings

In order to avoid the danger of electrical shock, it is important that proper safety measures are taken when working with voltages exceeding the extra low voltage (ELV) limit of 50V (25V) RMS AC or 120V (60V) DC. The values in brackets apply to restrictive voltage ranges (for example in the medical or agricultural sectors).

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

This insulation tester must only be used by a skilled and competent person who is familiar with the relevant regulations, the safety risks involved and the consequent normal safe working practices, and under the conditions and for the purposes for which it has been constructed and specified.

Before each use the insulation tester, the tester's body and cables should be examined for damage, cracks, cuts or scratches. **Do not use** if damaged in any way.

Make sure the insulation tester is dry, clean and free from dust, grease and moisture while in use to avoid the danger from electric shock due to surface leakage.

⚠ Cautions

Read all safety information carefully before attempting to operate or service the insulation tester.

Do not use the insulation tester around explosive gas, vapour, or in damp or wet environments.

Keep fingers behind the finger guards on the probes.

The circuit under test must be de-energised and isolated before connections are made except for voltage measurement.

Circuit connections must not be touched during a test.

After insulation test, capacitive circuits must be allowed to discharge before disconnecting the test leads.

To avoid damage to the instrument, do not apply signals which exceed the maximum limits shown in the technical specification tables.

Do not use the insulation tester or test leads if they look damaged.

Use extreme caution when working around bare conductors or bus bars.

Use the insulation tester only as specified in this manual; otherwise, the protection provided by the meter may be impaired.

⚠ Cautions

Caution when working with voltages above 30Vac rms, 42Vac peak, or 60Vdc. Such voltages pose a shock hazard.

Before taking resistance measurements or testing continuity, disconnect the main power supply and all loads from the circuit.

Remove all probes, test leads, and accessories before the battery door is opened.

Replace the batteries when the low battery indicator shows to prevent incorrect measurements. False readings can lead to electric shock and injury.

Replace all batteries with fresh batteries of the same manufacturer and type to prevent battery leakage.

Remove the batteries if the insulation tester is not used for an extended period of time, or if stored in temperatures above 50°C. If the batteries are not removed, battery leakage may result.

⚠ HAZARDOUS VOLTAGE WARNING

When the insulation tester detects a voltage > 30V in insulation test, > 2V in Low Ω, or a voltage > 30V during voltage measurement function, the red ⚠ LED will be on and the "⚠" symbol on the LCD will display.

2. INTRODUCTION

2.1 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.

2.2 Product description

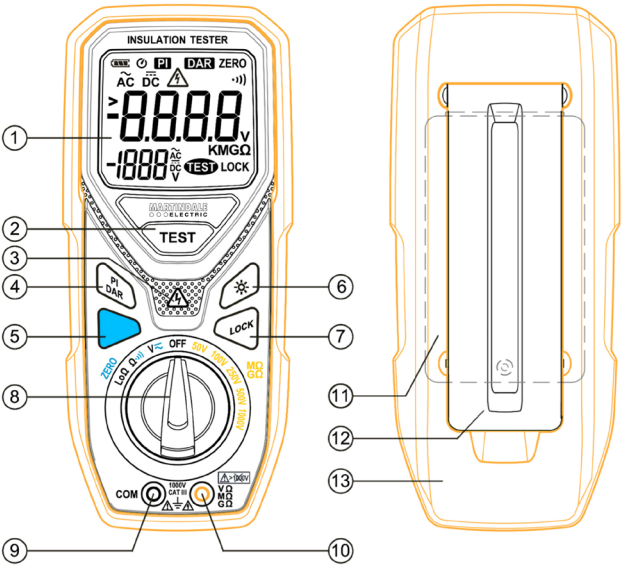
The Martindale IN2203 Advanced Insulation tester allows insulation testing of voltages up to 1000V, capable of measuring up to 20G Ohms.

2.2.1 Accessories

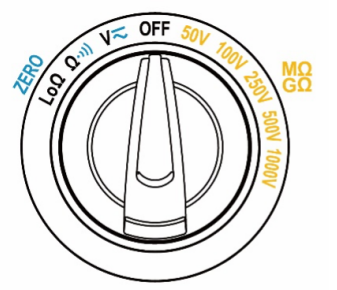
TL47 test leads, 4 x AA batteries (IEC LR6), holster, TC57 carry case, instruction manual.

2.3 Front and back panel

1. LCD display
2. TEST button
3. Warning light
4. PI / DAR function select button
5. Blue button
6. Back-light button
7. LOCK button
8. Measurement function selection switch
9. COM input terminal
10. Positive input terminal
11. Battery cabinet
12. Foldable stand
13. Holster



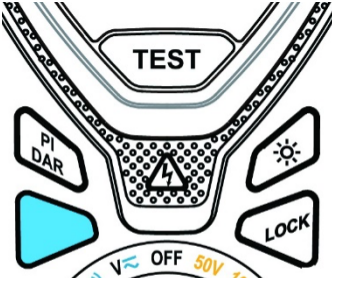
2.4 Rotary switch



Rotary switch selections:

Switch position	Measurement function
LoΩ	Measuring low resistance from 0.01 to 60.0Ω (Open voltage ≥4V, short current ≥200mA)
Ω	Measuring resistance or continuity
V	Measuring AC or DC voltage
OFF	Tester is off
50V **100V** **250V** **500V** **1000V**	Perform insulation tests with 50, 100, 250, 500, 1000 test voltage.

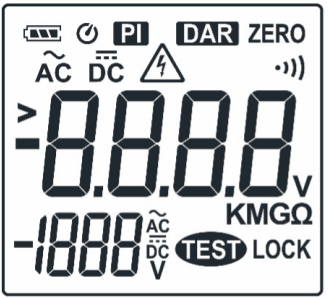
2.5 Button and indicators



Button / indicator	Description
	Configure the insulation tester for a polarisation index or dielectric absorption ratio test.
	Press the blue button to select alternate measurement functions.
	(1) Initiate an insulation test when the rotary switch is in the insulation (MΩ GΩ) position. Causes the insulation tester to source (output) a high voltage and measure insulation resistance. (2) Initiate a resistance test when the rotary switch is in the "**LoΩ**" position.

	Back-light ON / OFF (1) To turn on back-light: Press back-light button once to turn on the back-light, and it will automatically turn off after 30-seconds. Back-light always on: Press and hold back-light button for 2 seconds for an audible “beep”. This will keep the back-light on until auto power off. (2) To turn off the back-light: Press the back-light button once to turn off back-light when it is enabled under “back-light always on” or the back-light has been enabled temporarily.
	Test lock: When pressed before the TEST button, the test remains active until you press the LOCK or TEST button again to release the lock.
	Hazardous voltage warning LED will be on when: (1) >2V or >30 V (AC or DC depending on the rotary switch position) is detected on the input. (2) Insulation test is active. (3) The “batt” symbol appears on the display.

2.6 LCD display



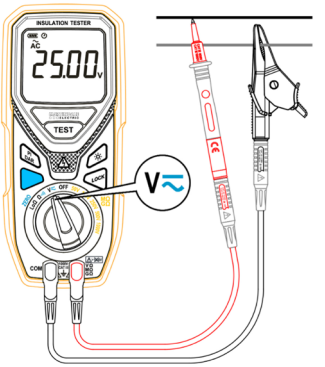
Symbol	Description
	Battery indication: The " " symbol appears when low battery. The symbol " " and message "batt" will be shown when the batteries need to be replaced.
	Auto Power OFF indication: Approx. 10 minutes. The 10-minute timer is disabled during any insulation resistance or Low resistance measurement.
PI / DAR	Polarisation index or dielectric absorption ratio test is selected.
ZERO	Lo Ω lead zero is active.
AC/DC	Alternative or Direct source indication.

	Unsafe voltage warning.
	Continuity measurement.
	Greater than symbol.
	Minus symbol.
V/Ω KΩ/MΩ/GΩ	Measuring unit indication.
	Insulation test or LoΩ resistance measurement indicator. Appears when test voltage is present.
LOCK	Indicate an insulation or LoΩ resistance test is locked on.
	Primary display.
	Secondary display.
	**Warning the fuse is bad and needs replacing, refer to pages 18-19** This will appear on the primary display when conducting a fuse test. **Please refer to page 18 for '4. TESTING THE FUSE' and page 19 for '5. REPLACING BATTERIES AND FUSE'.**

3. TAKING MEASUREMENTS

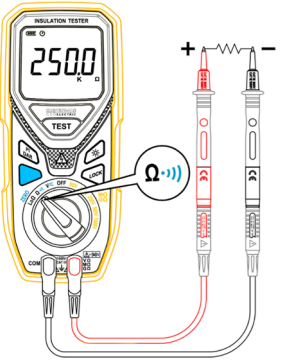
3.1 Measuring volts

Press the (blue) button to switch ACV or DCV measurement.



3.2 Measuring ohms / continuity

Press the (blue) button to switch ACV or DCV measurement.



3.3 Measuring low resistance

The circuit under test must be completely de-energised.

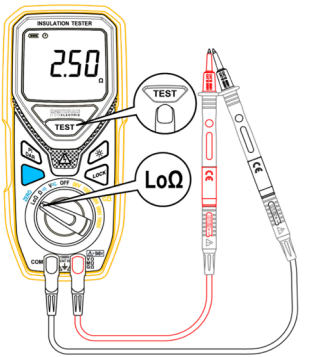
Check the fuse before testing. See ‘Testing the fuse’ (page 18) section in this manual.

Connecting the tester to an energised circuit while the test is active will blow the fuse.

(1) Connect the end of the probes together and press the (blue) button to compensate the probe resistance for ≤ 2Ω, the “ **ZERO** ” symbol will be displayed when the compensating is finished. The maximum compensation is 2Ω. The value of compensation will be kept next time you use this function.

(2) Connect the probes to the circuit to be measured. The insulation tester automatically detects if the circuit is energised. If the detected voltage is above 2V, “**>2V**” and “ ⚠ ” will appear on the LCD display. In this condition, the test is inhibited. Disconnect the insulation tester and remove power before proceeding.

(3) Push and hold the TEST button to start the test. The “TEST” symbol appears on the LCD display until you release the TEST button. The resistance reading appears on the primary display until a new test is started or a different function or range is selected. If it beeps 4 times, it means the tester has not finished the terminal voltage test. You need to start the test again.



If you press the LOCK button to enter “Lock” mode, and then press

button to start the test. The "TEST" symbol appears on the LCD display and the test voltage will continue to be applied until the LOCK or TEST button is pressed again.

When resistance is higher than the maximum measuring range, the insulation tester displays the " > " symbol and the maximum resistance for the range.

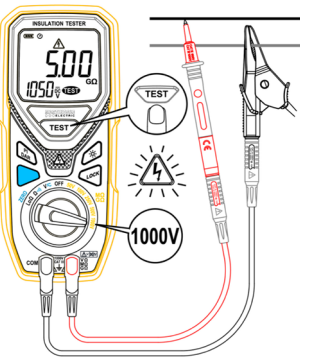
3.4 Measuring insulation resistance

The circuit under test must be completely de-energised before testing.

(1) Turn the rotary switch to the desired test voltage.

(2) Connect the probes to the circuit to be measured. The insulation tester automatically detects if the circuit is energised. If the detected voltage is above 30V, " **> 30V** " and " ⚠ " will appear on the LCD display. In this condition, the test is inhibited. Disconnect the insulation tester and remove power before proceeding.

(3) Push and hold the TEST button to start the test. The " TEST " symbol appears on the LCD display until you release the TEST button. The resistance reading appears on the primary display until a new test is started or a different function or range is selected. The secondary display shows the test voltage applied to circuit under test. If it beeps 4 times, it means the tester has not finished the terminal voltage test. You need to start the test again.



If you press the LOCK button to enter the "Lock" mode, before pressing the TEST button to start the test. The " TEST " symbol appears on the LCD display and the test voltage will be continuously applied and the voltage be shown on secondary display until another LOCK or TEST button is pressed.

3.5 Measuring PI / DAR

Polarisation Index (PI) is the ratio of the 10-minute insulation resistance to the 1-minute insulation resistance.

Dielectric Absorption Ratio (DAR) is the ratio of the 1-minute insulation resistance to the 30-second insulation resistance.

(1) Turn the rotary switch to the desired test voltage.

(2) Press the 

button to select the polarisation index or the dielectric absorption ratio.

(3) Press the 

button to start the test. During testing, the primary display shows the measured resistance, and the secondary display shows the test voltage applied to the circuit under test.

When the test is completed, the PI or DAR value is displayed on the primary display.

If either value used to calculate PI or DAR was greater than the maximum measuring range, the primary display will show " **Err** " for PI or DAR value.

Because of the time required to perform the PI and DAR tests, the use of test clips is recommended.

To interrupt a PI or DAR test before it is completed, momentarily press

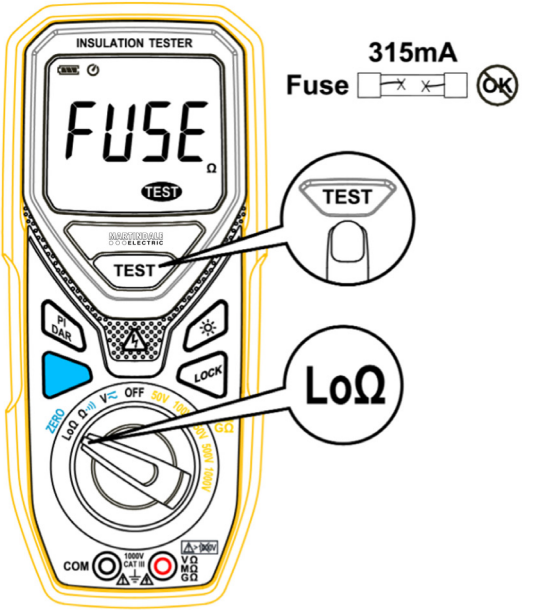
.

4. TESTING THE FUSE

To avoid electrical shock or injury, remove the test leads and any input signals before replacing the fuse.

(1) Turn the rotary switch to the LoΩ position.

(2) Press and hold TEST. If the display reading is " FUSE ", the fuse is bad and should be replaced.

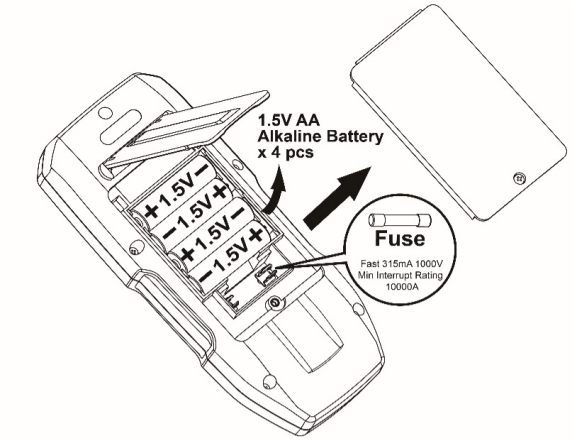


5. REPLACING BATTERIES AND FUSE

To avoid electrical shock or injury, or damage to the tester:

- **To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the battery indicator " ▭ " appears.**
- **Remove the test leads and any input signals before replacing the fuse.**
- **Use ONLY fuses with the amperage, interrupt, voltage, and speed ratings specified.**
- **Turn the rotary switch to OFF and remove the test leads from the terminals.**

Fuse rating: Fast 315mA, 1000V, Min Interrupt Rating 10000 A
Battery: 1.5V AA alkaline (NEDA 15A, IEC LR6) x 4 pcs



6 MAINTENANCE

6.1 Cleaning

PRIOR TO CLEANING, ENSURE THE IN2203 IS DISCONNECTED FROM ANY LIVE CIRCUITS AND SWITCHED OFF

If contamination is found, clean with a dry soft cloth. Do not use abrasives, abrasive solvents, or detergents which can cause damage to the unit. If a mild detergent is used, the unit should subsequently be thoroughly cleaned with a water dampened soft cloth. After cleaning, dry and allow to remain in a dry environment for 2 hours before use.

(1) Only qualified personnel should perform repairs or servicing not covered in this manual.

(2) Periodically wipe the case with a dry cloth. Do not use abrasives or solvents on these instruments.

6.2 Repair & service

There are no user serviceable parts. Return to Martindale Electric if faulty. Our service department will quote promptly to repair any fault that occurs outside the guarantee period. If the test leads become damaged they should be replaced.

The replacement test leads must have the same (or better) overvoltage category rating as the leads supplied

6.3 Storage conditions

The IN2203 should be kept in warm dry conditions away from direct sources of heat or sunlight, and in such a manner as to preserve their working life. It is strongly advised that they are not kept in a tool box where other tools may damage them.

7. 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 reasonable 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.

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.

MEASUREMENT CATEGORIES

CAT Ratings

BS EN61010-1 Installation Categories (CAT ratings) define the risks from hazardous transient impulses and potentially lethal short circuit currents on the mains supply system based on where you are working.

Voltage Ratings

Test equipment used for measuring mains circuits will have a CAT rating to show where it can be used. Each category also has a voltage rating to show the maximum safe phase to earth system voltage, normally 50V, 100V, 150V, 300V, 600V or 1000V.

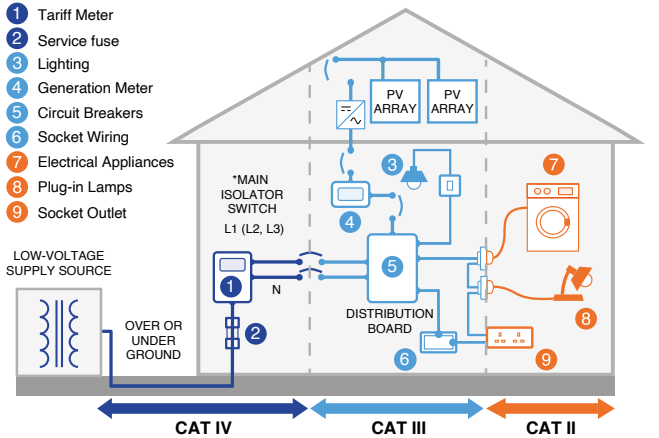
Stay safe - Match your test equipment safety rating to the installation category.

CAT II: Socket outlets and similar points of the mains installation.

CAT III: The distribution part of the building's mains installation.

CAT IV: The supply side source of the building's mains installation.

Testers, leads and accessories all need safety ratings equivalent to, or higher than the installation category and voltage rating for the location to be safe.



SPECIFICATION

Dimension: 206(L) x 90(W) x 51(H) mm

Weight: Approx. 510g (with holster and battery)

Approvals: EN61010 600V CAT IV, 1000V CAT III

AC voltage:

Range	Resolution	Accuracy
60.00V	0.01V	± 2% rdg + 5 digits (45~500 Hz)
600.0V	0.1V	
1000 V	1V	

DC voltage:

Range	Resolution	Accuracy
60.00V	0.01V	± 2% rdg + 5 digits
600.0V	0.1V	
1000 V	1V	

Resistance:

Range	Resolution	Accuracy
600.0Ω	0.1Ω	± 2% rdg + 5 digits
6.000KΩ	0.001KΩ	
60.00KΩ	0.01KΩ	
600.0KΩ	0.1KΩ	

Continuity:

Range	Resolution	Beeper
600.0Ω	0.1Ω	≤7Ω ± 1Ω

LoΩ:

Range	Resolution	Accuracy
6.00Ω	0.01Ω	± 2% rdg + 3 dgts
60.0Ω	0.1Ω	

Open circuit test voltage: > 4.0V, < 8V

Short circuit current: > 200.0 mA

Live circuit detection: Inhibit test if terminal voltage > 2V prior to initialization of test.

Insulation resistance measurement:

Range	Resolution	Accuracy
50V	300KΩ / 3.00MΩ / 30.0MΩ / 300MΩ / 1.00GΩ	± (3% rdg + 5 dgts) (30KΩ ~ 1.00GΩ)
100V	600KΩ / 6.00MΩ / 60.0MΩ / 600MΩ / 2.00GΩ	± (3% rdg + 5 dgts) (60KΩ ~ 2.00GΩ)
250V	1.50MΩ / 15.0MΩ / 150MΩ / 1.50GΩ	± (3% rdg + 5 dgts) (0.15MΩ ~ 1.50GΩ)
	5.0GΩ	± (10% rdg + 3 dgts)
500V	3.00MΩ / 30.0MΩ / 300MΩ / 3.00GΩ	± (3% rdg + 5 dgts) (0.30MΩ ~ 3.00GΩ)
	10.0GΩ	± (10% rdg +3 dgts)
1000V	6.00MΩ / 60.0MΩ / 600MΩ / 6.00GΩ	± (3% rdg + 5 dgts) (0.60MΩ ~ 6.00GΩ)
	20.0GΩ	± (10% rdg + 3 dgts)

Test voltage accuracy: 0% to +20%

Test voltage vs. Maximum resistance range:
50V / 1.00GΩ, 100V / 2.00GΩ, 250V / 5.0Ω, 500V / 10.0GΩ and 1000V / 20.0GΩ.

Test voltage vs. Minimum resistance (with test current=1mA):
50V / 50KΩ, 100V / 100KΩ, 250V / 250KΩ, 500V / 500KΩ and 1000V / 1MΩ.

Short circuit test current: 1mA (nominal)

Live circuit detection: Inhibit test if terminal voltage > 30V prior to initialization of test.

Notes

Notes

Check out what else you can get from Martindale:

- 18th Edition Testers
- Accessories
- Cable Locators
- Calibration Equipment
- Continuity Testers
- Digital Clamp Meters
- Digital Multimeters
- Electricians' Kits
- Environmental Products
- Full Calibration & Repair Service
- Fuse Finders
- Labels
- Microwave Leakage Detectors
- Multifunction Testers
- PAT Testers & Accessories
- Phase Rotation Testers
- Proving Units
- Safe Isolation Kits
- Socket Testers
- Specialist Drummond Testers
- Thermometers & Probes
- Test Leads
- Voltage Indicators

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