ENGLISH

User’s manual

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CONTENTS:

1. SAFETY PRECAUTIONS AND PROCEDURES

This apparatus conforms to safety standard EN 61010-1, relating to electronic measuring instruments.
For your own safety and that of the apparatus, you must follow the procedures described in this instruction manual and especially read all the notes preceded by the symbol ⚠ carefully.

Take extreme care for the following conditions when measuring:
- Do not measure voltage, current under humid or wet environment.
- Do not operate the meter under the environment with explosive gas (material), combustible gas (material), steam or filled with dust.
- Keep you insulated from the object waiting for measuring.
- Do not contact any exposed metal (conductive) parts such as end of test lead, socket, fixing object, circuit, etc.
- If any unusual condition of testing end (metal part) and attachment of the meter such as breakage, deformation, fracture, foreign substance, no display, etc., do not conduct any measuring.
- Measuring voltage over 20V.
- When measuring AC power supply, it might cause human body electricity conduction.

The followings symbols are used:


Caution: Refer to the instruction manual. Incorrect use may damage the apparatus or its components.


Danger high voltage: risk of electric shock.


Meter double insulated.


DC voltage or current.


AC voltage or current.

1.1. PRELIMINARY

- This apparatus has been designed for use in an environment of pollution degree 2.
- It can be used for **VOLTAGE** measurements on installations of surge voltage category II (equipment supplied by fixed systems)up to 300 volts.
- You must comply with the usual safety regulations aimed at:
  - ♦ Protecting you against the dangerous electric current.
  - ♦ Protecting the instrument against an incorrect operation.
- Only the leads supplied with the instrument guarantee compliance with the safety standard. They must be in a good condition and they must be replaced, if necessary with an identical model.
- Do not test or connect to any circuit with voltage or current exceeding the specified overload protection.

- Check if the battery is installed correctly.
- Prior to connecting the test probes to the installation, check that the function selector is positioned on the required measurement.
- Check if the analog display and the range indicator show the same as the function desired.

1.2. DURING USE

Read the recommendation which follow and the instruction in this manual:

WARNING

Non compliance with the warnings and/or the instructions for use may damage the apparatus and/or its components or injure the operator.

- When measuring voltage ensure that the instrument is not switched to a current or resistance range. Always ensure that the correct terminals are used for the type of measurements to be made.
- When changing range, first disconnect the test leads from the circuit under test in order to avoid any accident.
- When the apparatus is connected to the measuring circuits, never touch an unused terminal.
- When measuring resistor, please do not add any voltage. Though there is a protection circuit, excessive voltage will still cause malfunction.
- When measuring current ensure that the circuit is powered off before opening it in order to connect test leads.
- Extreme care should be taken when using the instrument in conjunction with a current transformer connected to the terminals. High voltage may be produced at the terminals if an open circuit occurs.
- This meter is not available for AC current measurements or non-sine wave AC voltage.
- To prevent mechanical damage of analog pointer coil do not submit the instrument to vibration or shock.

1.3. AFTER USE

- Once the measurements are completed, turn the rotary switch to OFF.
- If the instruments is not be used for a long period, remove the battery.

2. GENERAL DESCRIPTION

Dear customer, we thank you for your patronage. The multimeter you have just purchased will grant you accurate and reliable measurements provided that it is used according to the present manual's instructions.
The apparatus can perform the following measurement:

- DC values of the voltage (V_{DC}).
- AC values of the voltage (V_{AC}) without DC components.
- DC values of the voltage (V_{DC}) without AC components.
- DC values of the current (I_{DC}) without AC components.
- Resistance values.
- Battery test.
- Decibel values.

Each of these parameters can be selected by means of an 16-position rotary switch, including an OFF position.

3. PREPARATION FOR USE

3.1. INITIAL

All the equipment has been checked mechanically and electrically prior to shipment.
Every care has been taken to ensure that the instrument reaches you undamaged.
However, it is wise to carry out a rapid check in order to detect any possible damage which might have been caused during transport. Should this be the case, immediately enter the usual claims with courier.
Check the packaging contained according to packaging list reported in paragraph 5.3.1. In case of discrepancies contact the dealer.
In the event of re-shipment of the equipment please follow the instructions reported in paragraph 6.

3.2. SUPPLY VOLTAGE

The instrument is battery supplied; it use a single battery model UM3 single 1,5V AA size IEC LR6 included in packaging. The battery is involved in Ω measurement only and grant autonomy is about 10 hours of continuos work.

3.3. CALIBRATION

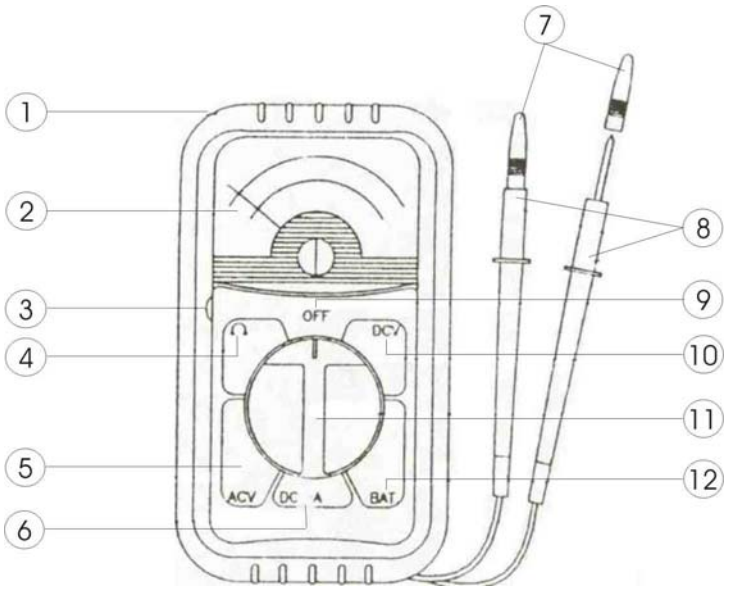
The instrument fulfils the technical characteristics listed in this manual. The performance of the specifications are guaranteed for one year.

3.4. STORAGE

In order to guarantee the accuracy of the measurements, after a period of storage in extreme environment condition, wait for the time necessary so that the apparatus returns to normal measuring conditions (see environments specifications paragraph 5.2.1).

4. OPERATING INSTRUCTIONS

4.1. INSTRUMENT DESCRIPTION



LEGEND:
1. Case with protective holster.
2. Analog display.
3. Resistance zero adjustment knob.
4. Resistance range.
5. AC voltage range.
6. DC Current range.
7. Pin cover.
8. Attachable test leads with probes.
9. DC voltage range.
10. Rotary switch.
11. Battery test.

Fig. 1: Instrument description.

4.2. MEASUREMENT DESCRIPTION

4.2.1. DC Voltage measurement

WARNING

Maximum input for DC voltage is 500V ⎓. Do not attempt to take any voltage measurement that exceeds the limits. Exceeding the limits could cause electrical shock and damage the multimeter.

1. Select a proper range for DC voltage (2.5, 25, 250 or 500 DC V).
2. If the voltage range is not known beforehand, set the range switch to the highest range and work down.
3. Insert the two long ends of test leads to the desired circuit, then reading will be displayed in the corresponding black scale.

4.2.2. AC Voltage measurement

WARNING

Maximum input for AC voltage is 500V ∿. Do not attempt to take any voltage measurement that exceeds the limits. Exceeding the limits could cause electrical shock and damage the multimeter.

1. Select a proper range for AC voltage (25, 250 or 500 DC V).
2. If the voltage range is not known beforehand, set the range switch to the highest range and work down.
3. Insert the two long ends of test leads to the desired circuit, then reading will be displayed in the corresponding red scale.

4.2.3. DC Current measurement

WARNING

Make sure that circuit under test is powered off before open it to insert test leads. Do not attempt to take any current measurements in circuits power with more than 240 V.

1. Power off the circuit under test.
2. Select a proper range for DC current (1, 10, 100 mA).
3. If the current range is not known beforehand, set the range switch to the highest range and work down.
4. Insert the two test leads in series with the load in which the current is to be measured.
5. Power on the circuit under test.
6. The reading will be displayed in the corresponding black scale.
7. If the analog pointer doesn't move during current measuring control the fuse inside the multimeter and replace it if necessary (ref. Paragraph 4.3.3).

4.2.4. Resistance measurement

WARNING

Before taking any in circuit resistance measurement, remove power from the circuit being tested and discharge all the capacitors.

1. Select a proper range for Resistance (10, 100, 1000 Ω).
2. Short the two probes together and adjust the "0 Ω ADJ" knob to set the pointer at zero position on the right side of the analog display.
3. If the pointer can't reach zero position replace the battery with a new one and repeat step 2 again.
4. Insert the two long ends of test leads to the desired circuit, then reading will be displayed in the green scale.
5. As measuring resistance, any voltage existing in circuit is not allowed. If a capacitor is installed, it must be discharged before test.

4.2.5. Decibel measurement

WARNING

Maximum input for AC/DC voltage is 500V.
Do not attempt to take any voltage measurement that exceeds the limits.
Exceeding the limits could cause electrical shock and damage the multimeter. Disconnect test leads from the circuit under test prior to select a different range.

1. Select a proper range for AC voltage (25, 250 or 500 DC V) according with the following table:

dB Range (dB)	0 - 30	20 -50	26 –56
AC Range (V)	25	250	500
Correction Factor (db)	0	20	26

2. If the dB range is not known beforehand, set the range switch to the highest range and work down.
3. Insert the two long ends of test leads to the desired circuit.
4. The reading will be displayed in the corresponding red scale. The measured dB will get from the following formula:

dB = dB (read on dB scale) + Correction Factor

Note: for absolute dB measurements, circuit impedance must be 600 Ω, 0db = 1mW dissipated in a 600Ω load.
For the signal with DC component, connect a capacitor with capacity > 0.1F between test probes and circuit under test.

4.2.6. Battery check for 1.5 V and 9.0V

WARNING

Maximum input for DC voltage is 10V. Do not attempt to take any voltage measurement that exceeds the limits. Exceeding the limits could cause electrical shock and damage the multimeter.

1. Select a proper range for Battery check (1.5, 9.0 V).
2. Insert the two long ends of test leads to the battery under test, then reading will be displayed in the “BATT” scale. (“RED” color for bad, “GREEN” color for good).

4.3. PREVENTIVE MAINTENANCE

4.3.1. General information

1. This multimeter is a precision instrument. Whether in use or in storage, please do not exceed the specification requirements to avoid any possible damage or danger during use.
2. Do not place this meter in high temperature or humidity or expose to direct sunlight.
3. Be sure to turn the meter off after use. For long time storage, remove the battery to avoid leakage of battery liquid that would damage the interior parts.
4. To prevent mechanical damage of analog pointer coil do not submit the instrument to vibration or shock.

4.3.2. Battery replacement

When the pointer doesn't reach the 0Ω even adjusting the "0Ω ADJ" knob replace battery.

WARNING

Before attempting battery removal disconnect test leads from any energised circuits to avoid electrical shock.

1. Set range switch to OFF position.
2. Disconnect the test leads from the circuit under test.
3. Remove the protective case, the screws from the battery cover, and detach the battery covers from the bottom cover.
4. Remove the battery and replace it with a new one of the same type (UM3 single 1.5Volt AA size battery, IEC LR6) observing the proper polarity from the diagram inside the battery compartment.
5. Replace the battery cover, screws and protective case.

4.3.3. Fuse replacement

WARNING

Before attempting fuse removal disconnect test leads from any energised circuits to avoid electrical shock.

1. Set range switch to OFF position.
2. Disconnect the test leads from the circuit under test.
3. Remove the protective case, the screws from the battery cover, and detach the battery covers from the bottom cover.
4. Remove the battery, the screws inside the battery compartment and the screw placed in the case bottom.
5. Replace the fuse with a new one only with identical type and rating (500mA/250V).
6. Replace case, battery cover, screws and protective case.

4.3.4. Cleaning

For cleaning the instrument use a soft dry cloth. Never use a wet cloth, solvents or water, etc.

4.3.5. End of life

Caution: this symbol indicates that equipment and its accessories shall be subject to a separate collection and correct disposal.

5. TECHNICAL SPECIFICATIONS

5.1. CHARACTERISTICS

Accuracy is indicated as ± [% of reading].
It is referred to the following reference conditions: 23°C ± 5°C with RH <75%.

5.1.1. DC Voltage

Range	Sensitivity	Accuracy
2.5V	2kΩ/V	± (5% of full scale)
25V	2kΩ/V	± (5% of full scale)
250V	2kΩ/V	± (5% of full scale)
500V	2kΩ/V	± (5% of full scale)

Meter resistance: 2kΩ/V

5.1.2. AC Voltage

Range	Sensitivity	Accuracy
25V	2kΩ/V	± (5% of full scale)
250V	2kΩ/V	± (5% of full scale)
500V	2kΩ/V	± (5% of full scale)

Meter resistance: 2kΩ/V

5.1.3. AC Current

Range	Accuracy
1mA	± (5% of full scale)
10mA	± (5% of full scale)
100mA	± (5% of full scale)

5.1.4. Resistance

Range	Accuracy
R x 10Ω	± (5% of full scale)
R x 100Ω	± (5% of full scale)
R x 1KΩ	± (5% of full scale)

5.1.5. Battery Test

Range	Test current	Accuracy
1.5V	100mA	± (10% of full scale)
9.0V	10mA	± (10% of full scale)

5.1.6. Safety

Comply with:	EN 61010-1.
Insulation:	Class 2, double reinforced insulation.
Pollution:	Level 2.
For inside use, max height:	2000m.
Over voltage:	CAT II 300V.

5.1.7. General data

Mechanical characteristics

Size:	80 (W) x 145(H) x 45(D)mm.
Weight (including battery, holster and test leads):	about 250g.

Supply

Battery type:	UM3 single 1.5Volt AA size battery, IEC LR6.
Battery life (only for Ω measurement):	About 10 hours of continuos work.
Fuse:	5 x 20mm 500mA/250V Fast Acting.

Display

Display Type:	Analog display.

5.2. ENVIRONMENTAL CONDITIONS

5.2.1. Climatic conditions

Reference temperature:	23 ± 1°C
Operating and storage temperature:	5 ÷ 40°C
Operating and storage humidity:	<75% RH

This product conforms to the prescriptions of the European directive on low voltage 2006/95/EEC (LVD) and to EMC directive 2004/108/EEC

5.3. ACCESSORIES

5.3.1. Standard accessories

The accessories contained inside the packaging are the following:

- Instrument.
- Test leads.
- Instruction manual.
- Holster.
- Battery.

6. SERVICE

6.1. WARRANTY CONDITIONS

This equipment is guaranteed against any material fault or manufacturer's defect, in accordance with the general conditions of sale. During the warranty period (one year), faulty parts may be replaced, with the manufacturer reserving the right to decide either to repair or replace the product.

In the event of returning the equipment to the after-sales service or to a regional branch, the outward transport is payable by the customer. The delivery must be agreed in advance with consignee.
For delivery indicate by means a note enclosed with the equipment, as clear as possible, the reasons for returning it use only the original packing.
Any damaging caused by shipment using NOT original packaging will be charged in any case to the consignor.
The manufacturer will not be responsible for any damage against persons or things.

The warranty doesn't apply to the following cases:

- Accessories and battery aren't include in warranty.
- Repairs following unsuitable use of the equipment or by combining the latter with incompatible equipment.
- Repairs resulting from a not correct shipping.
- Repairs resulting from servicing carried out by a person not approved by the company.
- Modifications to the equipment without explicit authorisation from our technical departments.
- Adaptation to a particular application not provided for by the definition of the equipment or by the instruction manual.

The contents of this manual may not be reproduced in any form whatsoever without our agreement.

Our product are patented. The logotypes are registered. We reserve the right to modify characteristics and prices as part of technological developments which might require them.

6.2. SERVICE

If the equipment shouldn't work correctly, before contacting the SERVICE, test the battery condition, the test leads, etc., and change them if necessary.
If the equipment still doesn't work check if your operating procedure agrees with the latter described in this manual.

In the event of returning the equipment it must be re-sent to the after-sales service (at address or to a regional branch), the outward transport is payable by the customer. The delivery must be agreed in advance with consignee.
For delivery indicate by means a note enclosed with the equipment, as clear as possible, the reasons for returning it use only the original packing.
Any damage caused by delivery with NO original packaging will be charged in any case to the consignor.