ENGLISH

User’s manual

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1. SAFETY PRECAUTIONS AND PROCEDURES

This meter has been designed in compliance with EN 61010 directive. For your own safety and to avoid damaging the instrument we suggest you follow the procedures hereby prescribed and to read carefully all the notes preceded by the symbol ⚠.

WARNING

Should you fail to keep to the prescribed instructions you could damage the instrument and/or its components or endanger your safety.

Take extreme care of the following conditions while taking measurements:
- ☞ Do not performing any measures in humid or wet environments.
- ☞ Do not use the meter in presence of explosive gas (material), combustible gas (material), steam or dust.
- ☞ Do not touch the circuit under test if no measurement is being taken.
- ☞ Do not use the instrument if it seems to be malfunctioning (i.e. if you notice deformations, breaks, leakage of substances and so on).

The herewith symbols are used:

Caution: refer to the instruction manual; an improper use may damage the instrument or its components

Danger high voltage: risk of electrical shocks

Double insulated meter

AC voltage and current

1.1 PRELIMINARY INSTRUCTIONS

- ☞ This instrument has been designed for use in environments of pollution degree 2 up to 2000m high.
- ☞ It can be used for **VOLTAGE** measurements up to 600V AC on installations with overvoltage category CAT III 600V~ between the inputs and to ground.
- ☞ Please use the standard safety precautions aimed at:
  - ✓ Protecting you against dangerous electric currents.
  - ✓ Protecting the instrument against incorrect operations.
- ☞ Do not test circuits exceeding the voltage limits.
- ☞ If possible de-energize the plant under test before connecting the instrument. Take all the safety precautions before taking actions on the plant.
- ☞ Do not perform any test under environmental conditions exceeding the limits indicated in this manual (ref. par. 10.2).
- ☞ Make sure that batteries are correctly installed.
- ☞ Only the accessories supplied with the instrument guarantee compliance with the safety standards. They must be in good conditions and must be replaced, if necessary, with identical models.

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1.2 DURING USE

Carefully read the herewith recommendations and instructions:

WARNING

- Non compliance with warnings and/or instructions may cause damage to the tester or its components or injure the operator.
- During a measurement never touch any unused terminal.

1.3 AFTER USE

☞ If you expect not to use the instrument for a long period of time remove the batteries and strictly follow the indications at paragraph 9.2.

1.4 OVERVOLTAGE CATEGORIES - DEFINITIONS

EN 61010-1 (Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements) defines what a measurement category (usually called “overvoltage category”) is. At paragraph 6.7.4: Measuring circuits it says:

(OMISSIS)

Circuits are divided into the following measurement categories:

- **Measurement category IV** is for measurements performed at the source of low voltage installations.
  Examples are electricity meters and measurements on primary overcurrent protection devices and ripple control units.
- **Measurement category III** is for measurements performed in the building installation.
  Examples are measurements on distribution boards, circuit breakers, wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and equipment for industrial use and some other equipment, for example, stationary motors with permanent connection to fixed installation.
- **Measurement category II** is for measurements performed on circuits directly connected to the low voltage installation.
  Examples are measurements on household appliances, portable tools and similar equipment.
- **Measurement category I** is for measurements performed on circuits not directly connected to MAINS.
  Examples are measurements on circuits not derived from MAINS, and specially protected (internal) MAINS-derived circuits. In the latter case, transient stresses are variable; for that reason, the norm requires that the transient withstand capability of the equipment is made known to the user.

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2 GENERAL DESCRIPTION

2.1 INTRODUCTION

Dear Customer, the instrument you have just purchased will grant you accurate and reliable measurements provided that it is used according to the present manual's instructions.

The instrument was designed to grant the user the utmost safety conditions thanks to a new concept assuring double insulation and overvoltage CAT III 600V~ between inputs and to ground.

2.2 FUNCTIONS

This manual is referred to two models: **XL423** and **XL423**. XL423 can recording a **single voltage** in single phase or three phase plant. XL424 can recording up to **3 voltages** simultaneously in single phase or three phase plant.

Where not expressly indicated the characteristics are common for both models.

The meter can monitoring a plant for a long time thanks to a sophisticated memory-managing algorithm. More exactly, the instrument uses the following sampling periods:

Measuring Interval	XL423 – Autonomy (days)	XL424 – Autonomy (days)
1s	5	1.5
6s	34	8
30s	170	42
1min	364 (*)	91
5min	1820 (*)	455 (*)

(*) Depending on batteries autonomy

The instrument starts each recording using the Measuring Interval set through PC DATALINK software (see chapter 8). Just before the event of full memory, the instrument applies the successive measuring Interval to all the memory, thus getting more free memory locations. The instrument continues the data storing according to the new sampling period.

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3 PREPARATION FOR USE

3.1 PRELIMINARY CHECKS

This instrument has been checked mechanically and electrically before shipment. All precautions have been taken to assure that the instrument reaches you in perfect condition.

However, it is advisable to carry out a rapid check in order to detect any possible damage, which might have occurred in transit.

Check the accessories contained in the packaging to make sure they are the same as reported in chapter 11.

3.2 POWER SUPPLY

The instrument is powered by two 1.5V type LR6 AA AM3 MN1500 alkaline batteries. For battery life see paragraph 10.1.2. For battery fitting operation procedure please see paragraph 9.2.

WARNING

- The meter, after fitted batteries, is always continuously ON also if STATUS and ALARM LED are OFF. Pressing of **START/STOP** key activate or disable recordings only.
- During a recording the blinking ALARM LED every 3 seconds means a low battery status.

3.3 CALIBRATION

The instrument complies with the accuracy specifications listed in this manual and such compliance is guaranteed for 12 months, afterwards the tester may need recalibration.

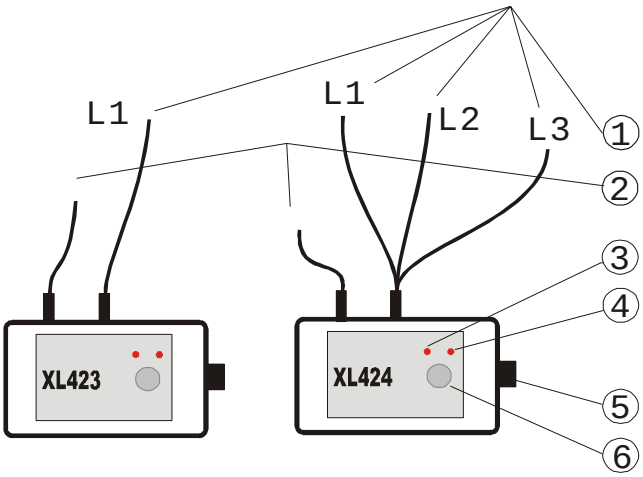
3.4 STORAGE

In order to guarantee the accuracy of the measurements, after a period of storage in extreme environmental conditions wait for the instrument to stabilize to within the listed operating conditions (see paragraph 10.2).

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4 OPERATING INSTRUCTIONS

4.1 INSTRUMENT DESCRIPTION



LEGEND:

1. Phase Voltage Inputs
2. COM input
3. “STATUS" LED
4. "ALARM" LED
5. RS232 port
6. "**START/STOP**" key

Fig. 1: Instrument description

4.2 KEYBOARD

LED “STATUS” blinks every time the **START/STOP** key is pressed.

5 INITIAL SETTINGS

5.1 DATE, TIME AND MEASURING INTERVAL

It’s possible to set measuring interval and date and time by using the management program DATALINK. This program enables to:

- Set the measuring interval
- Control data and time of the instrument’s internal clock
- Set instrument date and time.
- Check battery status

How to operate:

1. Connect the instrument to PC COM using included serial cable.
2. Run DATALINK software.
3. Choose the correct COM port with the command **Settings** → “**Port**”. Using “Autoset” command for automatic searching of serial port.
4. Choose the command **Settings** → "**Instrument’s Settings**” to setting instrument’s Date and Time of start recording and Measuring Interval selecting values 1s, 6s, 30s, 1min or 5min on “**Meas. Interv.**”.
5. Confirm with “**Send**” command.

WARNING

The instrument could keep the data stored even without batteries. The set date and time don’t get lost provided that the battery replacement takes less than 2 minutes.

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6 MEASURING PROCEDURE

6.1 USING THE INSTRUMENT IN A SINGLE PHASE PLANT

WARNING

The Instrument can be used in installation with overvoltage CAT III 600V~ between the inputs and to ground. Do not attempt to take any voltage measurements exceeding the limits indicated in this manual. Exceeding the limits could cause electrical shock or damage to the instrument.

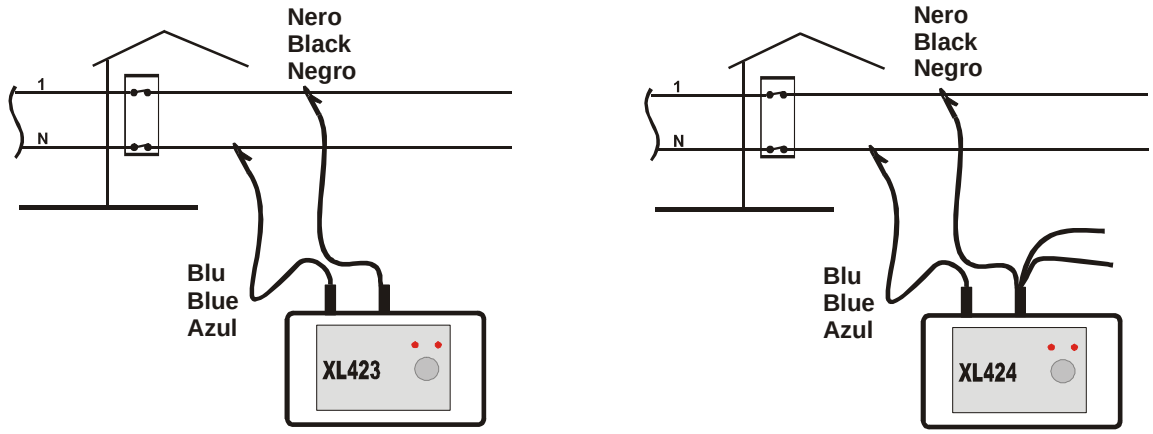


Fig. 2: Instrument's connection in Single Phase plant

WARNING

De-energize the plant under test before connecting the instrument. Take all the safety precautions before taking actions on the plant.

1. De-energize the plant under test before connecting the meter.
2. Inserting alligator clips in the safety banana test leads.
3. Connecting alligator clips in the plant as indicated in Fig. 2.
4. Re-energize the plant under test.
5. **How to start a Recording:**
   - If no recording was performed or if the recording data was already downloaded to a PC, pressing and keeping the **START/STOP** key for 3 seconds. The STATUS LED will be lighting for the same time, than will be stable lighting for 1 second and the meter will start the recording.
   - If the recording data was not already downloaded to a PC **but the operator wants to overwrite these data**, pressing and keeping the **START/STOP** key for 6 seconds. The STATUS LED will be quickly blinking during the key pressing for the same time, than the LED will be stable lighting for 1 second and the instrument will start the recording. **The old recording will be deleted and overwritten by the new one.** The meter will wait for the next minute beginning (second=00) and the STATUS LED is double blinking. After that the recording starts and the STATUS LED blinks every 3 seconds. The instrument is storing the data.

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6. **During a Recording:**
   - A STATUS LED 3 seconds blinking meaning that the recording is active and the instrument is storing the data.
   - An ALARM LED 3 seconds blinking means that the batteries are low. During a recording any RS232 communication is possible.
   - **During Recording operations RS-232 serial communications to PC is not possible**.

7. **Stop a Recording:**
   - To stop a Recording pressing **START/STOP** key and keep it pressed for 3 seconds. The STATUS LED will quickly blinks three times and the instrument will stop the recording and then stop blinking.

For more details about the blinks of STATUS and ALARM LED meaning, please refer to the chapter 7.

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6.2 USING THE INSTRUMENT IN A THREE PHASE 4-WIRES PLANT

WARNING

The Instrument can be used in installation with overvoltage CAT III 600V~ between the inputs and to ground. Do not attempt to take any voltage measurements exceeding the limits indicated in this manual. Exceeding the limits could cause electrical shock or damage to the instrument.

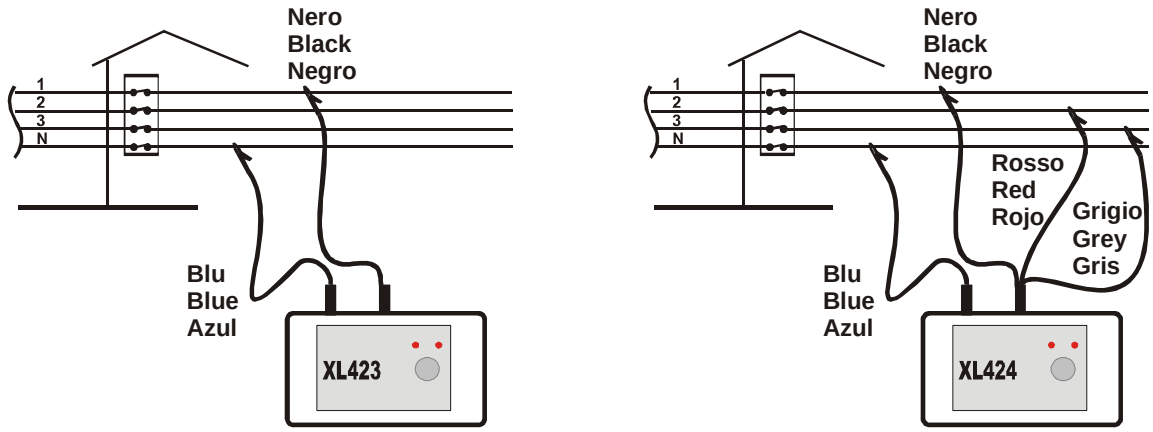


Fig. 3: Instrument's connection in Three Phase 4-wires plant

WARNING

De-energize the plant under test before connecting the instrument. Take all the safety precautions before taking actions on the plant.

1. De-energize the plant under test before connecting the meter.
2. Inserting alligator clips in the safety banana test leads.
3. Connecting alligator clips in the plant as indicated in Fig. 3.
4. Re-energize the plant under test .
5. **How to start a Recording:**
   - If no recording was performed or if the recording data was already downloaded to a PC, pressing and keeping the **START/STOP** key for 3 seconds. The STATUS LED will be lighting for the same time, than will be stable lighting for 1 second and the meter will start the recording.
   - If the recording data was not already downloaded to a PC **but the operator wants to overwrite these data**, pressing and keeping the **START/STOP** key for 6 seconds. The STATUS LED will be quickly blinking during the key pressing for the same time, than the LED will be stable lighting for 1 second and the instrument will start the recording. **The old recording will be deleted and overwritten by the new one.** The meter will wait for the next minute beginning (second=00) and the STATUS LED is double blinking. After that the recording starts and the STATUS LED blinks every 3 seconds. The instrument is storing the data.

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6. **During a Recording:**
   - A STATUS LED 3 seconds blinking meaning that the recording is active and the instrument is storing the data.
   - An ALARM LED 3 seconds blinking means that the batteries are low. During a recording any RS232 communication is possible.
   - **During Recording operations RS-232 serial communications to PC is not possible**.

7. **Stop a Recording:**
   - To stop a Recording pressing **START/STOP** key and keep it pressed for 3 seconds. The STATUS LED will quickly blinks three times and the instrument will stop the recording and then stop blinking.

For more details about the blinks of STATUS and ALARM LED meaning, please refer to the chapter 7.

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6.3 USING THE INSTRUMENT IN A THREE PHASE 3-WIRES PLANT

WARNING

The Instrument can be used in installation with overvoltage CAT III 600V~ between the inputs and to ground. Do not attempt to take any voltage measurements exceeding the limits indicated in this manual. Exceeding the limits could cause electrical shock or damage to the instrument.

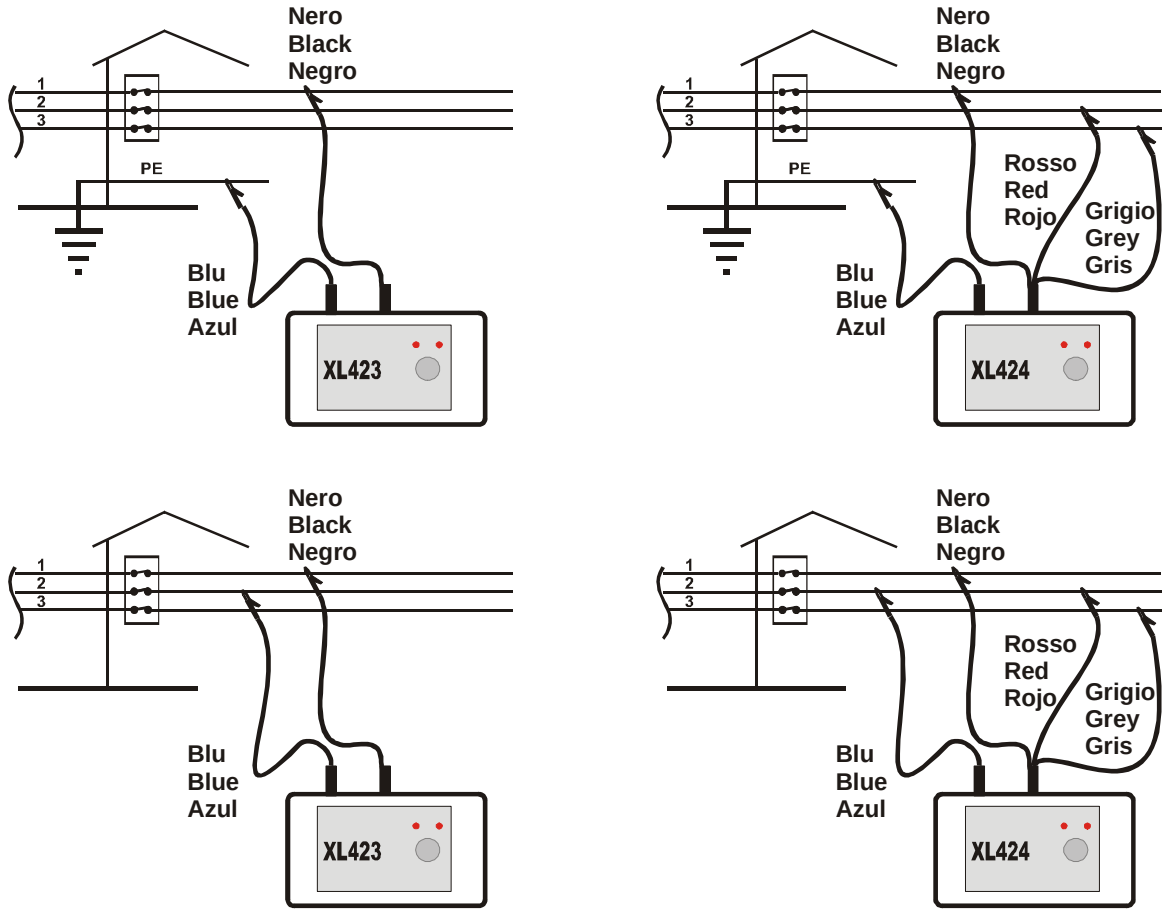


Fig. 4: Instrument's connection in Three Phase 3-wires plant – Possible cases

WARNING

De-energize the plant under test before connecting the instrument. Take all the safety precautions before taking actions on the plant.

1. De-energize the plant under test before connecting the meter.
2. Inserting alligator clips in the safety banana test leads.
3. Connecting alligator clips in the plant as indicated in Fig. 4.
4. Re-energize the plant under test.

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5. **How to start a Recording**:
   - If no recording was performed or if the recording data was already downloaded to a PC, pressing and keeping the **START/STOP** key for 3 seconds. The STATUS LED will be lighting for the same time, than will be stable lighting for 1 second and the meter will start the recording.
   - If the recording data was not already downloaded to a PC **but the operator wants to overwrite these data**, pressing and keeping the **START/STOP** key for 6 seconds. The STATUS LED will be quickly blinking during the key pressing for the same time, than the LED will be stable lighting for 1 second and the instrument will start the recording. **The old recording will be deleted and overwritten by the new one.** The meter will wait for the next minute beginning (second=00) and the STATUS LED is double blinking. After that the recording starts and the STATUS LED blinks every 3 seconds. The instrument is storing the data.

6. **During a Recording:**
   - A STATUS LED 3 seconds blinking meaning that the recording is active and the instrument is storing the data.
   - An ALARM LED 3 seconds blinking means that the batteries are low. During a recording any RS232 communication is possible.
   - **During Recording operations RS-232 serial communications to PC is not possible**.

7. **Stop a Recording:**
   - To stop a Recording pressing **START/STOP** key and keep it pressed for 3 seconds. The STATUS LED will quickly blinks three times and the instrument will stop the recording and then stop blinking.

For more details about the blinks of STATUS and ALARM LED meaning, please refer to the chapter 7.

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7 LED MESSAGES DESCRIPTION

For the STATUS and ALARM LEDs messages please refer to the following table:

LED	START/STOP Key	Light	Description
STATUS	Kept pressed 3 seconds at least	On for 1 second	Recording process correctly started. The previous recorded data was transferred to a PC
STATUS	Kept pressed 6 seconds at least	6 times blinking after 1 second on	Recording process correctly started. The previous recorded data was not transferred to a PC and were lost
STATUS	Not pressed	2 times blinking every 3 seconds	Waiting for the next minute (seconds=00)
STATUS	Not pressed	1 time blinking every 3 seconds	Recording in progress
STATUS	Pressed	3 times blinking	The recording process was stopped
ALARM	Not relevant	1 time blinking every 3 seconds	Low batteries. Stop the recording, transfer the data to a PC and replace batteries

8 CONNECTION OF INSTRUMENT TO PC

Connection of the instrument to a PC is made with a serial cable supplied with the instrument. To download data to the PC (after installation of DATALINK software) keep to the herewith procedure:

1. Connect the serial cable to the meter serial port and to a RS232 COM port of the PC.
2. Run "DATALINK" software.
3. Choose **Settings→"Port"** and select the COM port. If necessary using "Autoset" command for choosing automatically the correct COM port.

WARNING

During Recording operations RS-232 serial communications to PC is not possible.

4. Click on **Download** key to starting download procedure. A dialogue box displays the recording stored in the instrument's memory. By choosing the "**Download**" command the data transfer procedure will start.
5. At the end of the download the RECORDING application will automatically start.
6. Choose the commands **Recording Analysis →** "**Parameters**" the recording values are displayed.
7. For more details see the HELP on line by clicking the right mouse button.

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9 MAINTENANCE

9.1 GENERAL INFORMATION

This instrument is a precision instrument. Whether in use or in storage, please do not exceed the specifications to avoid any possible damage or danger during use. Do not place this meter in high temperature and/or humidity or expose to direct sunlight. For long term storing, remove the batteries to avoid leakage of battery fluid that can damage the internal components.

9.2 BATTERY REPLACEMENT

An ALARM LED 3 seconds blinking means that the batteries are low. Stop the recording and replace the batteries with a new set. The management software DATALINK allows the operator to verify the batteries status. Run the program and choose **Settings** →"**Check Battery** ".

The instrument could keep the data stored even without batteries. The set date and time don't get lost provided that the battery replacement takes less than 2 minute.

WARNING

Only experts and trained technicians should perform this operation. Remove the flexible head from the conductor under test before replacing the batteries.

1. Stop the recording (if necessary), remove the flexible heads from the conductors under test and transfer the stored data to a PC.
2. Remove the covers on the bottom side of the instrument using a screwdriver in the proper positions (1) and unscrew the 4 fixing screws (see Fig. 5).

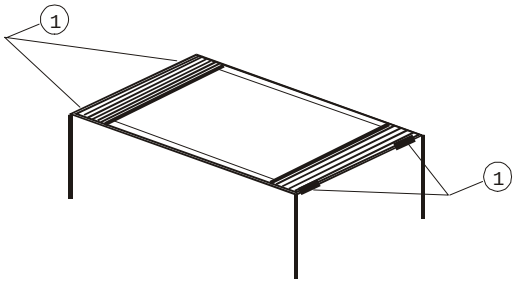


Fig. 5: Battery replacement

3. Open the box and unscrew the cover's fixing screw of the battery housing.
4. Replace the batteries with a new set of the same type (1.5V-LR6-AA-AM3-MN1500). Close the battery housing with the screw, reinsert the screws, screw them and reinsert the plastic covers. Do not throw flat batteries in the environment after use.

9.3 CLEANING

To clean the instrument, use a soft dry cloth. Never use a wet cloth, solvents or water, etc.

9.4 END OF LIFE

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

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10 TECHNICAL SPECIFICATIONS

This product conforms to the prescriptions of the European directive on low voltage 73/23/EEC (LVD) and to EMC directive 89/336/EEC, amended by 93/68/EEC.

10.1 CHARACTERISTICS

Accuracy is indicated as [% of reading]. It is referred to: 23°C ± 5°C with RH <60%.

VOLTAGE MEASURE

Range	Resolution	Accuracy
0 ÷ 600V	0.1V	±(1% rdg +2dgt)

Note: The meter will null readings lower than 2V

- Crest Factor max: 2
- Frequency (Hz): 50±6%, 60±6%
- Conversion mode: TRMS
- Bandwidth: 3200Hz
- Sampling frequency: 64 samples each 20ms
- Memory size: 1Mbyte
- Sampling period: 1s, 6s, 30s, 1min, 5min
- Serial port: RS232

10.1.1 Safety standards

- Comply with: EN 61010
- Insulation: Class 2, double reinforced insulation
- Pollution: Level 2
- Max height: 2000m
- Overvoltage category: CAT III 600V~ between inputs and to ground

10.1.2 General data

Mechanical characteristics

- Size: 120 (L) x 80 (W) x43 (D) mm
- Test leads length: about 2.6m
- Weight (including battery): about 0.5kg
- Protection index: IP65 (RS232 connector Closed)

Power supply

- Battery type: 2 batteries 1.5V LR6-AA-AM3-MN1500
- Battery life: > 6 months (with charged batteries)

10.2 ENVIRONMENTAL CONDITIONS

10.2.1 Climatic conditions

Reference temperature: 23 ± 5°C
Operating temperature: -20° ÷ 60°C
Operating humidity: up to 100% RH (RS232 connector closed)
Storage temperature: -20 ÷ 60 °C
Storage humidity: up to 100% RH

10.2.2 EMC

This instrument was designed in accordance with EMC standards in force and its compatibility has been tested in accordance EN61326 (1997) + A1 (1998) + A2 (2001).

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10.3 ACCESSORIES

Description	Code
Adhesive Velcro 50 x 70 cm	VELCRO
Set of 2 Black/Blue alligator clips (XL423 only)	KITXL423C
Set of 4 Black/Grey/Red/Blue alligator clips (XL424 only)	KITXL424C
Carrying bag	BORSA2000
Management software	DATALINK
Serial cable	C2004
Batteries	GP15AU
User's manual	YAMUM0010HT0

11 SERVICE

11.1 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 to the charge of the customer. The returning must be agreed in advance with the supplier or local distributor. A report indicating the reasons for returning and defects detected must accompany the instrument.
The manufacturer will not be responsible for any damage against persons or things.
The warranty doesn't apply to the following cases:

- Accessories and batteries (not covered by warranty).
- Improper use of the equipment or combination of the instrument with incompatible equipment.
- Damages caused by incorrect shipping procedures.
- Damages caused by repair/service trials of unauthorized people.
- Modifications to the equipment without explicit authorization of our Technical Dept.
- 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 products are patented. The logotypes are registered. We reserve the right to modify characteristics and prices as part of technological developments which might require them.

11.2 AFTER-SALE SERVICE

If the equipment doesn't work properly, before contacting our Service Dept. please test the battery condition and replace them whether necessary. If the problem persists check if your operating procedure agrees with the one described in this manual.
In the event of returning the equipment to the after-sales service or to a regional branch, the outward transport is to the charge of the customer. The returning must be agreed in advance with the supplier or local distributor. A report indicating the reasons for returning and defects detected must accompany the instrument. The manufacturer will not be responsible for any damage against persons or things.

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