USER'S MANUAL

DIGIOHMpro

ILLKO

V 1.2-EN

1. INTRODUCTION

1.1. Safety

Read this User's Manual carefully and completely and follow all instructions contained therein. Otherwise using of the instrument may be dangerous for operator, for installation under test under test or for the instrument!

Explanation of the symbols on the instruments:

Protection class (double insulation).

Danger of electric shock.

Warning concerning a point of danger!
Read User's Manual and observe all precautions!

The instrument meets the requirements of relevant European standards.

If there is reason to believe that safe operation has become impossible, put the instrument out of operation and secure it against any unintended operation. Safe operation must be presumed to be no longer possible, if:

- The instrument does not operate properly any longer. In this case, we recommend RESET as described in the Chapter 3.6.
- The instrument, cables, connectors, plugs or accessories exhibits visible damages.
- The instrument was stored under unfavourable conditions for a long period.
- The instrument was exposed to extraordinary stress caused by transport.
- The batteries / fuse compartment cover is not properly fastened by both screws.

Observe the following safety precautions:

- Make sure that the instrument, measuring cables and all other accessories are in flawless condition, e.g. no damaged insulation, no broken cables or plugs etc.
- Do not touch conductive parts of test tips, crocodiles, test cables etc., even if only one test tip, crocodile, test cable etc. is connected to installation. DANGER OF ELECTRIC SHOCK!
- Use only standard or optional accessories supplied by your distributor (see chapters 2.3 and 2.4).
- It is necessary to respect all safety regulations applicable to particular measurement.
- Do not press any key (unless otherwise stated in this manual) when connecting the instrument to the measured installation.
- Do not expose the instrument to aggressive gases, vapours, liquids and dust.

- The instrument can be used only under conditions that are specified in Technical Specification, see Chapter 5.
- If you have transferred the unit from cold to hot environment, it can cause the condensation. We recommend a short acclimatization
- If the instrument will be out of operation for a longer time (about 1 month or more), it is strongly recommended to remove the batteries. This prevents the possibility of leakage into the device. Leakage can cause serious damage or to destroy the instrument.
- The instrument contains two fairly strong magnets. Do not leave them near the equipment and items that could be damaged by the magnetic field - such as watches, credit cards with magnetic strips, etc.
- Images in this manual are illustrative and may vary slightly from the actual state.

1.2. General description of the instrument

The DIGIOHMpro is a compact instrument with patent-protected storage system of the test tips in the transport position – sharp tips are safely hidden.
High contrast bright multicolour graphic OLED display ensures excellent legibility. When measured under low light conditions it is possible to illuminate the measured object by a bright white LED light positioned on the front side of the housing.

The DIGIOHMpro can measure:
- Continuity (low resistance)
- AC/DC voltage
- Single-pole phase (live) conductor test
- Contactless indication of AC voltage
- Phase sequence test
- Distinguish deenergized conductors by means of the transmitter DIGIsort (optional accessories)

1.3. Standards applied

Measurements:	EMC:	Safety:
EN 61557-4	EN 55022, class B	EN 61010-1
	EN 61326-1	EN 61010-2-031
	EN 61000-4-2,3,4,5,6	

1.4. Ecology

Shipping case
It is made of cardboard and is recyclable. Please hand it to a collection point of secondary raw materials in accordance with local regulations.

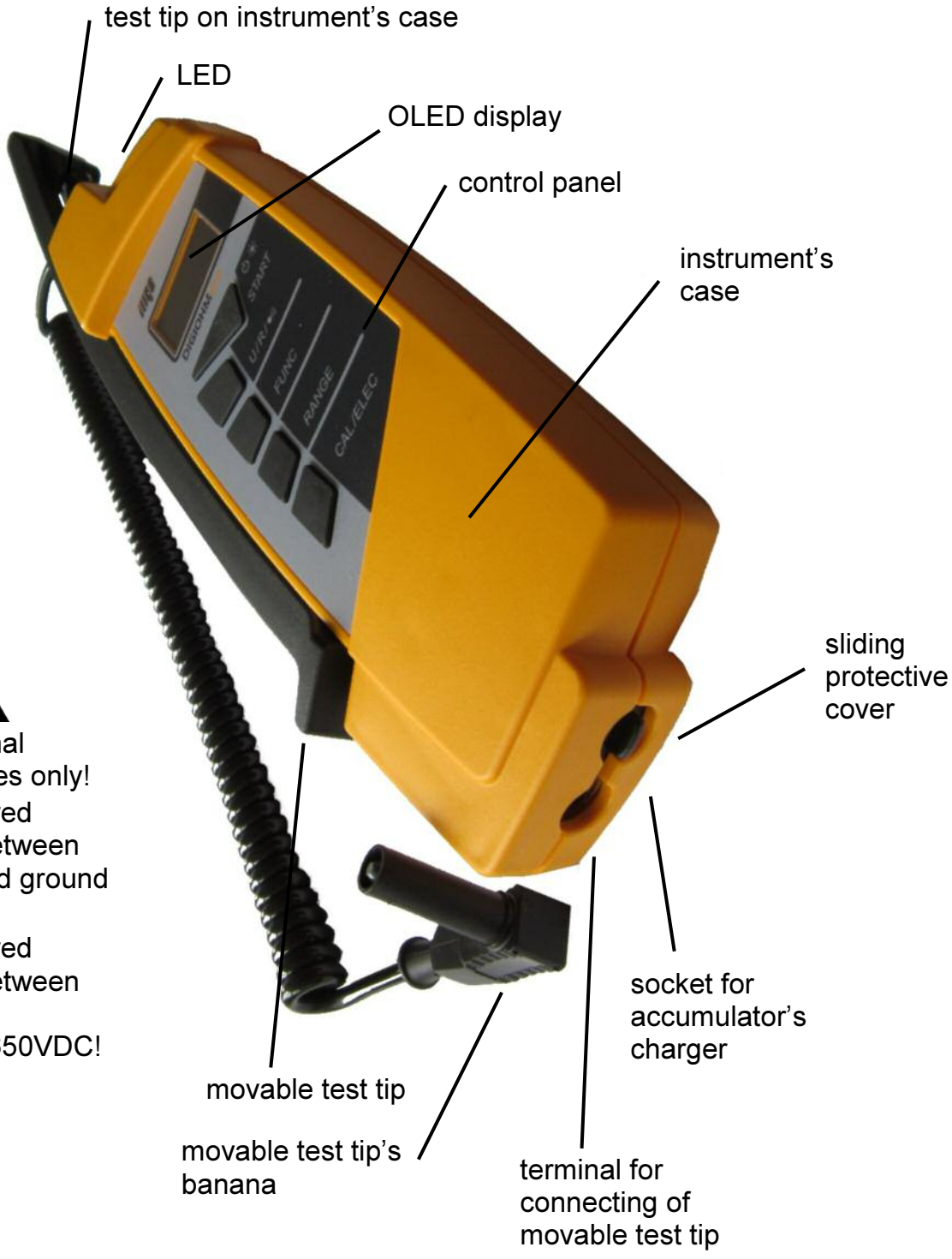
Batteries
Please dispose of used batteries in the designated locations in accordance with local regulations.

The instrument

This symbol on the product, packaging or the accompanying documentation indicates that the product should not be dispose of in municipal waste.
Please dispose of it in accordance with local regulations.

2. DESCRIPTION OF THE INSTRUMENT

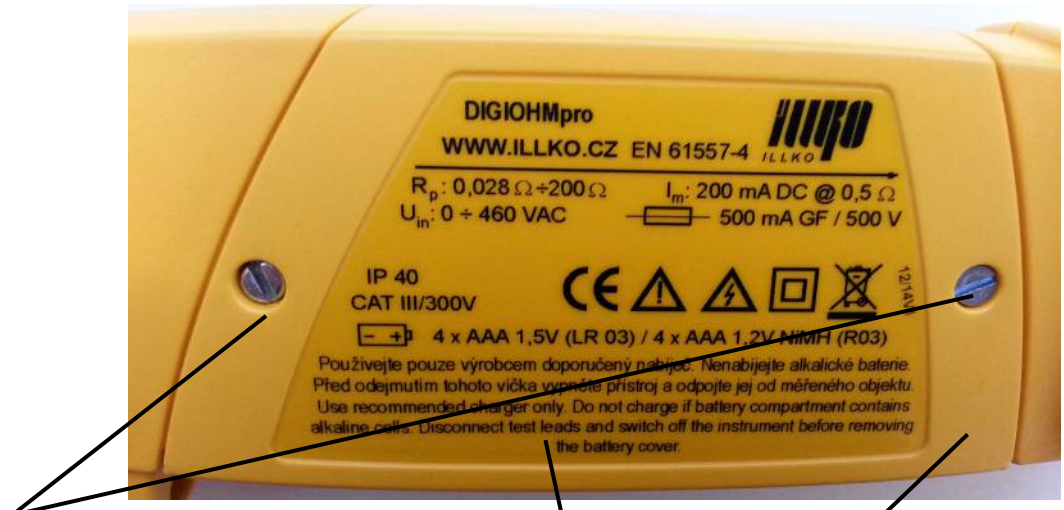
2.1. Instrument's case



- Use original accessories only!
- Max allowed voltage between test tip and ground is 300V!
- Max allowed voltage between test tips is 460VAC/650VDC!

Fig. 2.1. *Top side*

When not in use, the instrument's body and the movable test tip can slide one into another in such a way that they form a compact unit, while the sharp end of the measuring tips are safely hidden. Against accidental ejection are both parts secured by non-contact magnetic latch.



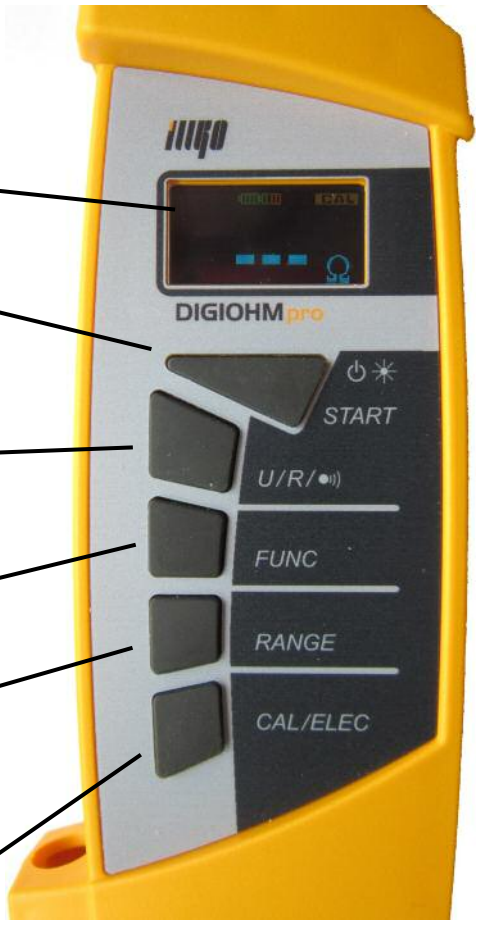
screws securing the batteries / fuse compartment cover

information label

the batteries / fuse compartment cover

Fig. 2.2. *Detail of bottom side*

2.2. Control panel and OLED display



Graphical OLED display

The **START** key. Hold it until the instrument is switched on. The instrument is turned off after two short pressing/releasing.
LED can be switched on/off by briefly pressing and releasing.

The **U/R/●›** key. It toggles between measurement of voltage, resistance and beeper functions.

The **FUNC** key. It toggles between one-pole phase, phase rotation and DIGISORT functions.

The **RANGE** key. It selects a certain range, thus disable and eventually re-enable auto-ranging on resistance measurement.

The **CAL/ELEC** key. On resistance measurement it is used for test lead resistance compensation**.**
On voltage measurement it loads measured circuit with load resistor approx. 280kΩ.

Fig. 2.3. *Control panel and OLED display*

2.3. Included in the set

DIGIOHMpro
Twisted test lead with measuring tip
Pouch
User's Manual
Calibration Certificate
Cardboard shipping case

2.4. Optional accessories

P 5050 – adapter for charging accumulators
P 5060 – set of 4 NiMH AAA accumulators
P 2011 – test lead, black, 2 m
P 3011 – test tip, black
P 4011 – crocodile clip, black
P 8060 – transmitter DIGIsort enables to distinguish deenergized conductors

Note: optional accessories P 2011 + P 3011, respectively P 2011 + P 4011 can be connected instead of twisted test lead with measuring tip.

2.5. Putting the instrument into operation

Putting the instrument into operation consists of inserting the batteries or accumulators - the procedure is described in the Chapter 4.1. of this manual.

3. MEASUREMENTS

3.1. Turning the instrument on and off, standby, auto power off

Hold the **START** key pressed until the device turns on.
The instrument is turned off after two short pressing/releasing the **START** key.
The instrument enters standby mode (reduced display brightness) after short time of inactivity (no key pressed, no voltage applied on the test tips).
From standby mode (to full display brightness), the instrument enters after pressing any key or by applying the voltage on the test tips.
Auto power off occurs when the instrument is idle (no key pressed, no voltage applied on the test tips) for about a minute.
After turning off the device can be switched on again after about 1s.

3.2. Notes and principles applicable to all measurements

- Use only charged NiMH batteries, or the quality alkaline batteries. If you see a low battery indicator or if there are other problems, for example spontaneous shutdown of the instrument, display flickers, malfunction of control keys etc., insert new fully charged NiMH batteries, or the quality alkaline batteries. See chapter 4.1 for instructions how to do it.

- If the device measures the voltage and if resistance is not measured, check the fuse, which is located under the batteries / fuse compartment cover. See chapter 4.1 for instructions how to do it.

3.3. Voltage and resistance measurement

Repeatedly press and release the **U/R/●›** key to select between the following measurement functions:

3.3.1. Function U

The “U” function is for voltage measurement.

- Voltage measurement function is selected whenever you turn on the instrument. (Repeatedly) press and release the **U/R/●›** key, if other function is selected and you need to measure voltage.
- Connect test tips to measured voltage. The measured value is displayed. The symbol "~" is displayed in the case of AC voltage. Polarity symbol is displayed in the case of DC voltage; if the positive pole is connected to the test tip on instrument’s case, it is indicated by "+", the negative pole is indicated by "-" symbol.
- The **CAL/ELEC** key activates and deactivates the "ELEC" function; if the function is activated the load resistor approx. 280kΩ is connected to measured circuit. If this feature is enabled, the display shows "ELEC".

3.3.2. Function R

The “R“ function is for continuity (low resistance) measurement.

Measurement:

- Check that there is no external voltage applied on measured resistance (see chapter 3.3.1. - function U).
- Press and release the **U/R/●›** key to select R function. Measured resistance value is displayed or "---- Ω" is displayed if measured value is > 200Ω.
- Resistance measurement is blocked in the following cases:
  - external voltage is applied on test tips
  - external voltage is on the measured resistor (caused by flowing of an external current through the measured resistor)
  - the voltage induced in the measuring wires, which are unconnected

This is indicated by 5x beeps; the symbol "Uin" is displayed, too. The instrument remains in voltage measurement function U. To switch it to R function is possible after disconnecting the voltage from the test tips.
If an external voltage appears on measure resistance during measurement, this state is indicated by the "Uin" message on display and by continuous beeping.

Test lead resistance compensation (calibration)
It is recommended to carry out test lead compensation before measurement. After test lead resistance compensation is carried out, it is automatically subtracted from all resistance measurements and thus only actual value of measured resistance is displayed.

- Short the test tips. After displayed value is stabilized, press and release the **CAL/ELEC** key. It is signalized by yellow "Cal" message.
  If the resistance value during measurement is greater than or equal to compensation value, the message "Cal" remain lit (not blinking).
  If the resistance value during measurement is lower than compensation value, the word "Cal" is blinking and it is necessary to repeat the test leads resistance compensation.
- The compensation value is permanently stored until a new compensation or cancellation of compensation is carried out. Carry out new compensation always after connecting new test wires, crocodile clips, test tips etc. to the instrument. It is not necessary to carry out new compensation after switching off the instrument or after removing and reinserting the batteries.

Cancellation of test lead resistance compensation
Press and release the **CAL/ELEC** key when test tips are either open or connected to resistance greater then 4 Ω. Compensation is cancelled. It is signalized by blue "X CAL" message.

Manual range selection

- After entering the R function measuring range is chosen automatically.
- If necessary, you can press and release the **RANGE** key to select a certain range, thus disable and eventually re-enable auto-ranging.

Important notices for resistance measurement

- **Do not connect test tips to external voltage** in the R function. Such status is indicated by beeper and the symbol "Uin", but despite it the instrument can be damaged!

- Measurement of low resistance with 200 mA current heavily loads the supply accumulators /batteries of the instrument. **Carry out resistance measurement only for necessary period of time**. If you see a low battery indicator or if there are other problems, for example spontaneous shutdown of the instrument, display flickers, malfunction of control keys etc., insert new fully charged NiMH batteries, or the quality alkaline batteries. See chapter 4.1 for instructions how to do it.

3.3.3. Function "●›)" - beeper

The „●›)“ function is intended for measurement of resistance in range 0 - 4 Ω. If measured value is between 0 - 4 Ω, it is signalized by beeper. Follow the same measuring procedure and consider the same warnings that are stated for the resistance function R (see chapter 3.3.2.).

3.4. Phase (live) conductor test, phase sequence test, DIGISORT

Repeatedly press and release the **FUNC** key to select between the following measurement functions:

3.4.1. Single-pole / contactless phase indication

This function is suitable for contactless indication of the presence of voltage on conductor / device and contact single-pole indication of the phase conductor.

- Press and release the **FUNC** key to select the phase indication function. The right side of the display briefly displays bar graph "----------" and the left side displays "X" on a blue field.
- Approaching the test tip on the instrument’s case to the conductor / device under voltage bar graph indicates the growing intensity of the electric field.
- Sensitivity can be switched in two steps by the **RANGE** key.
- Acoustic signalization can be switched on / off by the **CAL / ELEC** key
- Touching the test tip on the instrument’s case to the measured conductor with voltage ≥ 190 V / 48 ÷ 52 Hz against the earth, the "L" symbol is displayed on the left side of the display.

Important notices for proper indication of phase

- This function can only be used in TT and TN systems!
- Hold the instrument in your hand (palm) in a standard way.
- For correct function of phase indication it is necessary that the test tip is connected to the phase voltage for at least 2!
- The voltage must be ≥ 190 V / 48 ÷ 52 Hz against the earth, otherwise phase indication may not work properly!
- Verification of live-circuit shouldn't be depending on the single-pole phase test only, but on the voltage measurement (the U function)!

3.4.2. Phase sequence test

This function is intended for testing of phase sequence (rotation).

- Press and release the **FUNC** key to select the phase sequence test function. "1 - " is displayed.
- Connect the test tips between two phases. "1 - 2 " is displayed.
- After about 2 seconds, the display shows a moving symbol "1 - 2 _ _ _ 3".
- Disconnect the test tip on the instrument's case from second phase conductor and connect it immediately to third phase conductor. The display shows the phase sequence "1 - 2 - 3" or "1 - 3 - 2" and the symbol of a rotating wheel in the direction of the expected phase rotation. Displaying is finished after about 10 seconds after the test tips are disconnected from the tested mains.
- The voltage value is displayed during the test, too.

Important notices for proper indication of phase sequence

- Connect the test tips with tested conductors **thoroughly and steadily**.
- Phase voltage must be 230 ±10% / 48 ÷ 52 Hz.

3.4.3. Function DIGISORT (with DIGIsort optional transmitter only)

The „DIGISORT" function is intended for distinguishing of up to 12 deenergized conductors.

- Choose one conductor as common conductor, for example cable shielding or protective conductor.
- Ensure by voltage measurement that all conductors are disconnected from the power supply!
- On the opposite end of the bundle of conductors connect the transmitter DIGIsort. Terminal "GND" connect to dedicated common conductor, terminals 1-12 to other conductors. Turn on the power of DIGIsort.
- Select on the DIGOHMpro function "DIGISORT" by the **FUNC** key. In the upper part of the display there is displayed "DIGISORT" and in the lower part "- - -".

- Connect one test tip to the designated common conductor. Then touch with the second test tip a conductor, then another conductor etc. DIGIOHMpro always displays the number of conductor corresponding to the numbered terminal of the DIGIsort on the opposite end.

Important notices for proper function of the DIGISORT function

- The presence of voltage on the conductors is indicated by the "Uin" message on the display. In this case, immediately disconnect the transmitter DIGIsort – risk of damage!
- The length of conductor > 300 m, too high capacitance, high induced voltage etc. may cause malfunction of the DIGISORT function!

3.5. Other functions of the instrument

Illumination of measurement point with white LED
LED can be switched on/off by briefly pressing and releasing the **START** key.
Note: The test tips have to be without applied voltage.

3.6. RESET of the instrument

If the device does not operate as described in this manual, we recommend RESET: disconnect both test tips from tested object and turn off the instrument. It the proper function is not restored after turning on the instrument, than turn it off again, remove batteries (the procedure is described in chapter 4.1), wait at least 10 seconds, and then insert them into the instrument again.

If problems persist, e.g. a spontaneous shutdown of the instrument, flickering of the display, malfunction of control keys etc., insert a new fully charged NiMH batteries, or new high quality alkaline batteries.

If the instrument measures the voltage and if resistance is not measured, check the fuse, which is located under the batteries / fuse compartment cover. See chapter 4.1 for instructions how to do it.

If the instrument still does not work properly, put the instrument out of operation, remove batteries (the procedure is described in chapter 4.1), secure it against any unintended operation and contact your distributor or service.

4. MAINTENANCE

4.1. Batteries and fuse replacement

Dangerous voltage in batteries / fuse compartment!

Disconnect both test tips from tested object and turn off the instrument before removing the batteries / fuse compartment cover or before connecting jack to the socket for accumulator charger!

The instrument must not be put into operation without the batteries / fuse compartment cover properly fastened by both screws!

The instrument uses four AAA either alkaline cells or NiMH accumulators.
The batteries / accumulators are continuously monitored, see description in the Chapter 3.2. If batteries/accumulators are low, it must be replaced / charged.

4.1.1. Inserting and replacing the batteries / accumulators

Batteries/accumulators are inserted into the device by unscrewing two screws and removing the batteries / fuse compartment cover, see Fig. 2.2. Then remove old batteries/accumulators and insert new ones. Observe correct polarity:

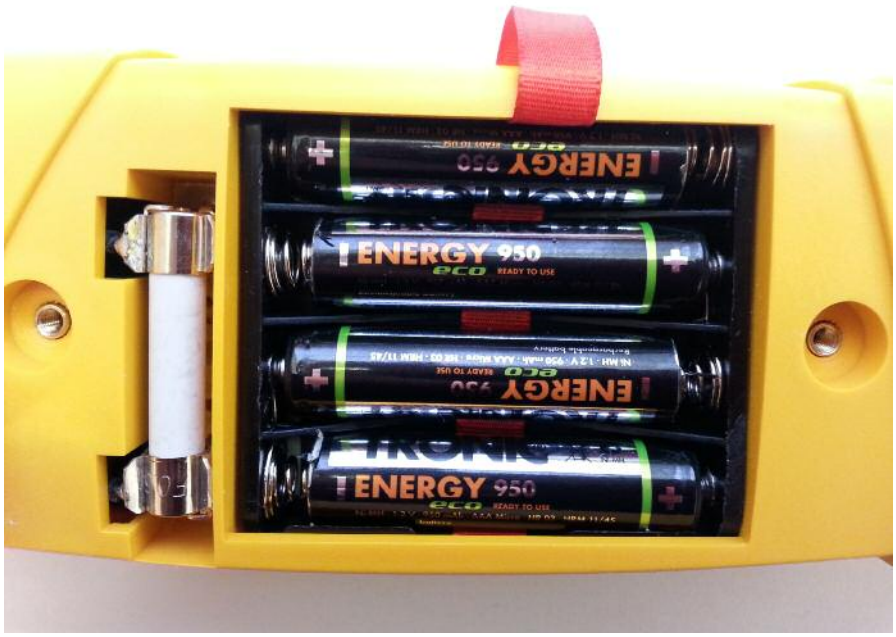


Fig. 4.1 *Correct batteries / accumulators polarity and the fuse location*

Always replace all four batteries / accumulators. Use only high-quality types.

4.1.2. Charging of accumulators

For charging of accumulators use only adapter supplied as optional accessories!

Accumulators are charged as soon as the adapter is connected to mains and to socket for accumulators charger (see Fig. 2.1). If accumulators are fully discharged, the charging takes about 6 hours (applies to batteries with a capacity of 800 mAh). Prolonged charging is not a problem; however, do not charge accumulators for more than 12 hours.

Notes:

- Do not charge alkaline cells – it may lead to explosion, leakage, etc. This can cause serious damage or destruction of instrument.
- During charging of new accumulators or ones that were unused for a longer period (few months) unpredictable chemical processes may arise. As a result, the instrument operation time can be significantly reduced. In this case, we recommend several charge (with optional charger) / discharge (normal use of the instruments) cycles.
  Another way is to use a stand-alone intelligent charger which discharge / charge each cell individually. The discharge / charge cycle is automatically executed, see instruction manual for the charger used.
  After the procedure, the capacity of the accumulators should return to normal. The above described cycle in stand-alone intelligent charger is recommended every few months to make.
- If after several cycles of the above described discharge / charge capacity of the accumulators does not return to normal, this may be due to the fact that the one or more accumulators are degraded - whereas, the built-in accumulator charger charges all cells connected in series at the same time, and even one bad (or just different) cell negatively affects the entire accumulator pack.
  It may result in uneven charging of cells, excessive heating of the cell(s) during charging etc.
  In this case, we recommend that a faulty cell is identified with an intelligent stand-alone charger, or at least comparing the voltage of each cell and then a faulty cell replace with a new one.
- The above-described effects can not be confused with a normal reduction in accumulators' capacity over time. All accumulators with a growing number of charge / discharge cycles gradually loose capacity. This is normal, depending on accumulator type, the number and parameters of the discharge / charge cycles.

4.1.3. Replacing the fuse

Replace the fuse by the same type only:
GF F0.5A/500V, breaking capacity 1500A, dimensions 32x6,3mm.
Using of another type of fuse can cause damage of the instrument and/or operator's safety can no longer be guaranteed!

For replacing the fuse unscrew two screws and remove the batteries / fuse compartment cover, see Fig. 2.2. Then remove blown fuse from the fuse holder (see Fig. 4.1) with a suitable tool (e.g. a small screwdriver) and put in its place the new fuse. Then put the batteries / fuse compartment cover back and secure it with two screws. Verify the instrument's functionality.

4.2. Cleaning

Disconnect both test tips from tested object and turn off the instrument before cleaning!
Wait until the instrument becomes totally dry before using it!

Use soft cloth, slightly moistened with lukewarm soap water for plastic case cleaning. Do not spill cleaning liquid over the instrument!
Do not use cleaning liquids based on petrol, hydrocarbons etc.!

4.3. Calibration

Measuring instruments should be regularly calibrated. We recommend interval of calibration 1 year. Furthermore we recommend carrying out calibration after each repair. Contact your local distributor for further information.

4.4. Service

Manufacturer, service:

ILLKO, s.r.o.
Masarykova 2226
678 01 Blansko
Czech Republic

tel./fax: +420 516 417 355
e-mail: illko@illko.cz
http://www.illko.cz

Contact your local distributor for further information.

Unauthorized persons are not allowed to open the instrument.
There are no replaceable components inside the instrument, except batteries and the fuse, refer to the Chapter 4.1.

5. TECHNICAL SPECIFICATION

5.1. Functions

Continuity

Operating range of use according to EN 61557-4: 0,028 Ω ÷ 200 Ω.
Test current ≥ 200 mA at R ≤ 2 Ω.

Measuring range (Ω)	Resolution (Ω)	Reference error	Operating error
0,000 ÷ 4,000	0.001	±(3 % z MH + 5 D)	±(4 % z MH + 7 D)
4,00 ÷ 20,00	0.01	±(2 % z MH + 5 D)	±(3 % z MH + 7 D)
20,0 ÷ 200,0	0,1	±(2 % z MH + 4 D)	±(3 % z MH + 6 D)

DC voltage

Measuring range (V)	Resolution (V)	Reference error	Operating error
0,000 ÷ 2,000	0.001	±(3 % z MH + 10 D)	±(4 % z MH + 12 D)
2,00 ÷ 43,00	0.01	±(2 % z MH + 5 D)	±(3 % z MH + 7 D)
43,0 ÷ 650,0	0.1	±(2 % z MH + 5 D)	±(3 % z MH + 7 D)

AC voltage (TRMS value)

Measuring range (V)	Resolution (V)	Reference error	Operating error
0,000 ÷ 2,000	0.001	±(3 % z MH + 10 D)	±(4 % z MH + 12 D)
2,00 ÷ 30,00	0.01	±(2 % z MH + 6 D)	±(3 % z MH + 8 D)
30,0 ÷ 460,0	0.1	±(2 % z MH + 6 D)	±(3 % z MH + 8 D)

Specified accuracy is valid for THD < 2 %
Frequency range 48 ÷ 52 Hz.

Notes to the parameters stated in chapter 5.1:
a) Stated accuracy of Continuity measurement is valid only if no parallel circuits are connected to measured resistance.
b) Thresholds of auto-ranging may differ from the stated values.
c) R... Reading, D... Digit.

5.2. General data

Power supply 4x AAA alkaline battery 1,5 V or NiMH accumulator 1,2 V

Over voltage class:

- protective caps of the test tips inserted CAT III 300 V
- protective cap(s) of the test tip(s) removed CAT II 300 V

Pollution degree	2
Protective class	II (double insulation)
Degree of protection	IP 40
Dimensions	about 255x70x40 mm
Weight including batteries and movable test tip	about 0,36 kg
Maximum altitude for use of the device	2000 meters
Reference conditions	ambient temperature (23 ± 2) °C relative humidity 40 ÷ 60 % (non condensing) mains voltage 230 V ± 2 % / 50 Hz ± 1 % instrument's position arbitrary
Operating conditions	ambient temperature 0 ÷ 40 °C relative humidity max. 85 % (non condensing) mains voltage 190 ÷ 260 V / 48 ÷ 52 Hz instrument's position arbitrary
Storage conditions	ambient temperature -10 ÷ +70 °C relative humidity max. 90 % (-10 ÷ 40) °C (non condensing) max. 80 % (40 ÷ 70) °C instrument's position arbitrary

Note:
The instructions for use of the instrument in this manual are current when delivered together with the instrument, but may not match the older or newer version of the instrument's firmware.
Firmware can also be updated during calibration and repair of the instrument. Updating the firmware can cause changes and / or additions to the device functions so we recommend checking the validity of the manual on www.illko.cz in relation to the firmware version.