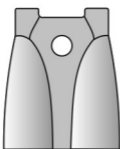


OPERATION MANUAL

VOLTAGE TESTER

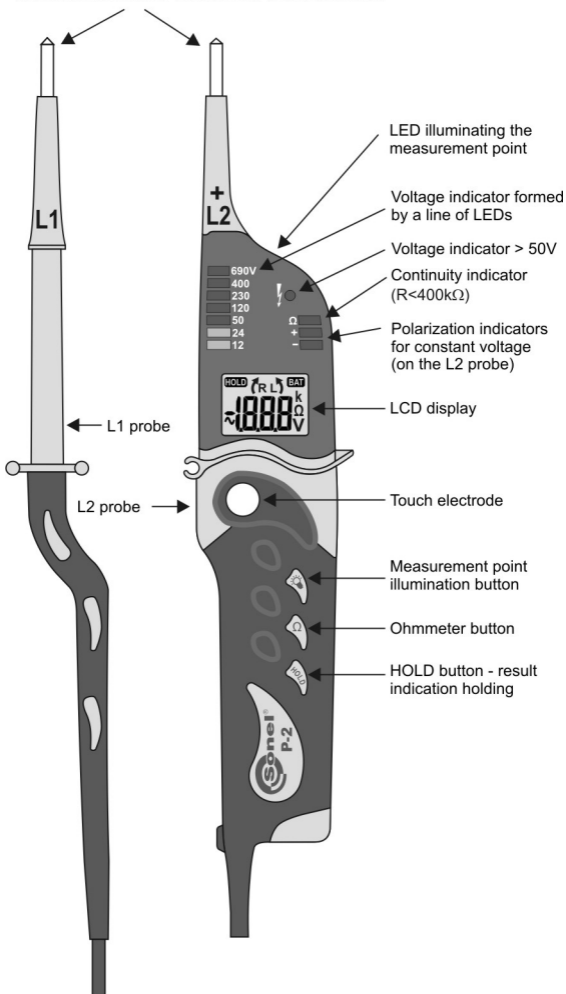
P-2

P-2



Measurement electrode protector (placed on blades of both diameters)

Electrodes of varying diameter. Unscrewing the blade causes a reduction of the diameter of the electrode.



Holding of measurement results

Correct phase order symbol

Incorrect phase order symbol

Reading field



Symbol of discharged batteries

Units of the displayed values



OPERATION MANUAL

VOLTAGE TESTER P-2



**SONEL S. A.
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Version 1.8 May 15, 2012

Principal characteristics of the device:

- Measurement of direct and alternative voltage presented on a display within the range between 1.5 and 750V with the maximum exactitude of 0.1V,
- Indication of direct and alternative voltage on the diode indicator: 12, 24, 50, 120, 230, 400, 690V,
- Indication of polarization of the direct voltage (on the diode indicator and the display),
- The diode indicator does not require a battery,
- The one-pole voltage indicator for voltages exceeding 50V,
- Measurement of resistance within the range between 0 and 1999 Ω ,
- Test of continuity of the circuit with optical and acoustic signalling,
- Function of checking the order of phases in three-phase circuits,
- Function of test of differential current switches,
- HOLD function – holding of any measurement on the display,
- Legible back-lit display,
- Illumination of the display connection point,
- Ergonomic and hermetic casing with elastomer (IP65),
- Automatically switching off display in the case of inactivity.

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Thank you for having purchased our voltage tester. The P-2 tester is a modern, high-quality measurement instrument, which is easy and safe to use. However, reading the present manual will permit you to avoid measurement errors and prevent possible problems regarding operation of the device.

Note:

The producer reserves the right to realise modifications as regards the appearance of the device, its equipment and technical data.

1 Safety

The purpose of the P-2 device is to test voltage and the continuity of connections as well as measurements of resistance. In order to guarantee the correct operation of the device and correctness of the obtained results observe the following recommendations:

- Before operation of the device starts, get yourself acquainted with the present manual and the safety rules and regulations as well as the recommendations specified by the manufacturer.
- Any other application of the device which has not been determined within the present manual may cause its damage and constitute a source of danger for the user.
- The device should be operated solely by qualified personnel who are properly authorised and certified to realise measurements in electric installations. Should the tester be operated by unauthorised persons, there is a danger of damage to the device and the user.
- The device must not be applied to the network and equipment within premises of special conditions, e.g. in a dangerous atmosphere with regard to explosion or fire.
- It is unacceptable to operate the following:
 - ⇒ A damaged meter which is completely or partially out of order,
 - ⇒ A meter with damaged cable insulation,
 - ⇒ A meter stored for an excessive period of time in disadvantageous conditions (e.g. excessive humidity). **If the meter has been transferred from a cool to a warm environment of a high level of relative humidity, do not realise measurements until the meter has been warmed up to the ambient temperature (approximately 30 minutes).**
- Do not operate a meter with an open or incorrectly closed battery (accumulator) compartment or power it from other sources than those specified in the present manual.
- Do not realise measurements for more than 30 seconds. After a 30-second measurement, the next measurement may be realised not sooner than after 240 s.
- The purpose of the signalling of limit values is solely to warn the user and not to realise a measurement.

Note:

The device may also be used during rain, however at user's own responsibility. It is recommended to use gauntlets.

2 Measurements

2.1 Control of operation of the tester

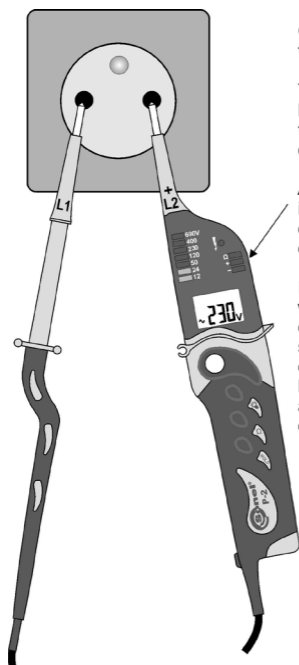
Before each use of the tester, it is necessary to control its operation:

- The voltage indicator must be tested using a known source of voltage,
- Close the measurement probes – there should be an audible acoustic signal, the LED Ω diode should be on and the symbol **CON** should appear on the display.

Remarks:

The voltage indication function is active when the batteries are discharged or without batteries. In order for the remaining functions to be active charged batteries are required.

2.2 AC or DC voltage test



Connect both probes of tester to the live object.

The voltage is indicated by the diode indicator and the precise value is shown on the LCD display.

Alternative voltage is indicated by lit „+“ and „-“, diodes and the \sim symbol on the LCD display.

For the direct voltage, when the L2 probe is connected to the „+“ source the „+“ diode is lit; otherwise the „-“ diode is lit and the symbol \ominus appears on the LCD display.

Note:

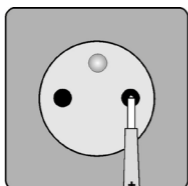
In the networks protected with an RCD switch whose nominal current is 10mA or 30mA, it is possible that the switch is activated during a measure-

ment of voltage between L and PE. In order to avoid that connect the tester between L and N and after approximately five seconds switch the probe from N to PE.


2.3 RCD operation test

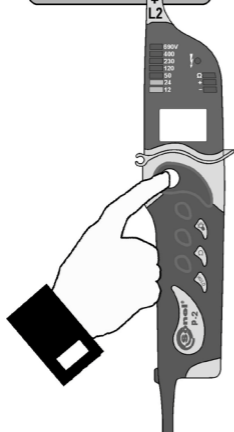
In order to check the operation of the RCD switch whose nominal current is 10mA or 30mA it is necessary to realise a voltage test directly between the L phase and the protective cable PE.

2.4 One-pole phase testing



Connect the L2 probe of the tester to the measured object. Touch the touch electrode.

If the diode  is lit it means there is a voltage exceeding 50V.



Note:

Attention!

Do not touch the electrode of the measurement probe L1 during the testing of the phase.

In the case of one-pole determination of phases for the purpose of specification of external cables, under certain circumstances it is possible that the operation of the tester will be impaired (e.g. using insulated personal protection means or in the case of an insulated work station).

One-pole phase testing may not be a sufficient means to determine whether the circuit in question is live. Do apply the two-pole voltage test.

2.5 *Circuit continuity test*

Note!
The measured object may be live.

Connect both the probes to the measured object. An acoustic signal, lit Ω diode and the symbol **CON** appearing on the display indicate continuity of the circuit ($R < 600k\Omega$).

Note:

During the measure of continuity polarization of the voltage at the L2 probe is negative.

2.6 *Measurement of resistance*

Note!
The measured object may not be live.

Press shortly the Ω button and connect both the probes to the measured object. Read the result from the LCD display.

Note:

During the measure of resistance polarization of the voltage at the L2 probe is negative.

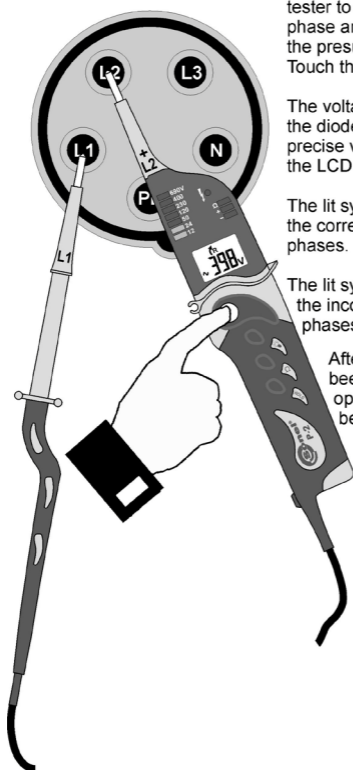
2.7 *The HOLD function*

The purpose of the present function is to hold the result of the measurement on the display. It is possible pressing the **HOLD** button. In the left upper corner the **HOLD** symbol will be visible all the time while the measuring instrument remains in this mode.

Should the operator want to return to the normal measurement mode, they must press the **HOLD** button again.

In the HOLD mode the Auto-OFF time will be extended to 30 seconds.

2.8 Phase order test



Connect the L1 probe of the tester to the presumed L1 phase and the L2 probe to the presumed L2 phase. Touch the touch electrode.

The voltage is indicated by the diode indicator and the precise value is shown on the LCD display.

The lit symbol **R** indicates the correct order of the phases.


The lit symbol **L** indicates the incorrect order of the phases.

After the probes have been swapped the opposite arrow should be on.

Note:


The order of the phases may be determined solely in a three-phase system.

2.9 Illumination of the measured point

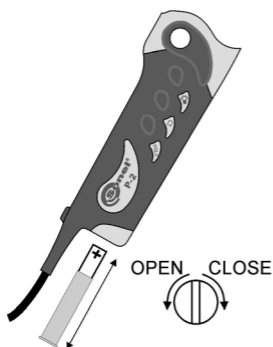
The P-2 tester offers the possibility of illumination of the measured area under difficult light conditions (e.g. in switchgears). In order to illuminate the measured point press the button marked with the symbol . At the same time the LCD display is backlit and it turns off automatically after approximately seven seconds.

The illumination may be also turned on when the tester is off, and then three lines will appear on the display.

3 Replacement of the batteries

The tester is powered by means of two 1.5V AAA batteries. A lack of acoustic signal once both the probes have been closed, too weak illumination after the button  has been pressed or the symbol **BAT** appearing on the display indicate the necessity to replace the batteries. Follow the instructions below:

- disconnect the probes from the measuring circuit
- using a tool or a coin unscrew the battery compartment anti-clockwise and remove it
- replace batteries observing the polarity
- replace the compartment and screw it clockwise



- disconnect the probes from the measuring circuit,
- using a tool or a coin unscrew the battery compartment anti-clockwise and remove it,
- replace batteries observing the polarity,
- replace the compartment and screw it clockwise.

4 Cleaning and maintenance

NOTE!

Use solely the method of maintenance specified by the manufacturer in the present manual.

The tester may be cleaned with a soft, wet flannel using all-purpose detergents. Do not use any solvents or cleansing agents which might scratch the casing (powders, pastes, etc.).

The electronic system of the tester does not require maintenance.

5 Storage

Storing the tester observe the following recommendations:

- Place protectors on the probes,
- Make sure the tester is dry,
- In the case of prolonged periods of storage remove the batteries from the tester.

6 Dismantling and utilization

Worn electric and electronic equipment must be disposed of selectively, i.e. it must not be disposed of along with waste of other kinds.

Send worn electronic equipment to a collection point in accordance with the act on worn electric and electronic equipment.

Before sending the equipment to a collection point do not dismantle any components of the equipment.

Observe local regulations regarding disposal of packages, discharged batteries and accumulators.

7 Technical data

The symbol „d.v.” in the case of determination of the fundamental uncertainty means the displayed value.

Measurement of direct voltage (on the display):

Range	Exactitude	Fundamental uncertainty
+1,5/-2,5* ...49,9V	0,1V	±(2% d.v. + 3 digits)
50...750V	1V	

* - from 6,0V for Sr. no. up to 663530

Furthermore the voltage is indicated by the diode indicator for the following values: 12, 24, 50, 120, 230, 400, 690V along with the signalling of the polarization of voltage (the diodes „+” or „-” are on). The diode indicator functions also without batteries.

Input resistance

U _{in}	R _{in}
12V, 24V, 50V	~ 6kΩ
120V	~ 20kΩ
230V	~ 70kΩ
400V	~ 150kΩ
690V	~ 240kΩ

Measurement of alternative voltage within the range between 20 and 400Hz (on the display):

Range	Exactitude	Fundamental uncertainty
1,5*...49,9V	0,1V	±(3% d.v. + 4 digits)
50...750V	1V	±(2% d.v. + 3 digits)

* - from 6,0V for Sr. no. up to 663530

Furthermore the voltage is indicated by the diode indicator for the following values: 12, 24, 50, 120, 230, 400, 690V along with the signalling of the polarization of voltage (the diodes „+” or „-” are on). The diode indicator functions also without batteries.

The frequency of the measurement voltage for the diode indicator: 15...400Hz.

Measurement of resistance:

Range	Exactitude	Fundamental uncertainty
0...1999Ω	1Ω	±(3% d.v. + 8 digits)

Other data:

- a) Kind of insulation: double, in accordance with EN 61010-1
- b) Measurement category: III 1000V (IV 600V) in accordance with EN 61010-1
- c) Protection grade for the casing in accordance with EN 60529: IP65
- d) Range of voltage measurement on the LCD display: 6...750V AC/DC
- e) Indication of voltage on the diode indicator: 12V, 24V, 50V, 120V, 230V, 400V, 690V
- f) Minimum voltage at which the indicator turns on: 6V
- g) Exactitude of voltage indications: in accordance with EN 61243-3
- h) Range of voltage frequency for the LCD display: 20...400Hz
- i) Range of voltage frequency for the diode indicator: 15...400Hz
- j) Maximum current: $I_S < 0,2A / I_S(5s) < 3,5mA$
- k) Maximum time of continuous operation: 30s
- l) Minimum break for a 30-second operation time: 240s
- m) Range of voltage for a one-pole phase indicator: 50...690V
- n) Range of frequencies for a one-pole phase indicator: 50...400Hz
- o) Range of the continuity tester: 0...600kΩ (400kΩ for Sr. no. up to 663530)
- p) Exactitude of the activation threshold for the continuity tester: ±50%
- q) Measurement current for the continuity tester: 7μA
- r) Range of voltage for a two-pole phase order indicator: 100...690V
- s) Range of frequencies for a two-pole phase order indicator: 50...60Hz
- t) Auto-OFF time: approximately 7s (30s in the HOLD mode)
- u) Display: LCD 3 1/2 digits
- v) Power supply for the measuring device: 2x1,5V size AAA/LR03 (recommended alkaline)
- w) Dimensions: approximately 240x60x30 mm
- x) Mass of the tester with batteries: approximately 0,2kg
- y) Working temperature: -10..+55°C
- z) Storage temperature: -30..+70°C

- aa) Quality standard: development, design and manufacture in accordance with ISO 9001
- bb) the product meets the EMC requirements (immunity for industrial environment) according to the following standards EN 61326-1:2006 and EN 61326-2-2:2006

8 Manufacturer

The manufacturer of the instrument who provides guarantee and post-guarantee service is:

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Note:

The device may be repaired solely by the manufacturer.



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