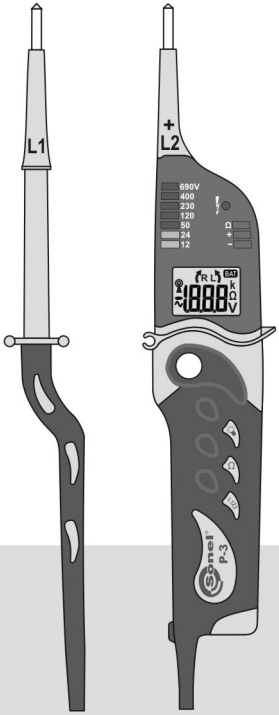
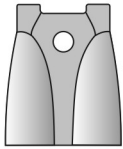


OPERATION MANUAL

VOLTAGE TESTER

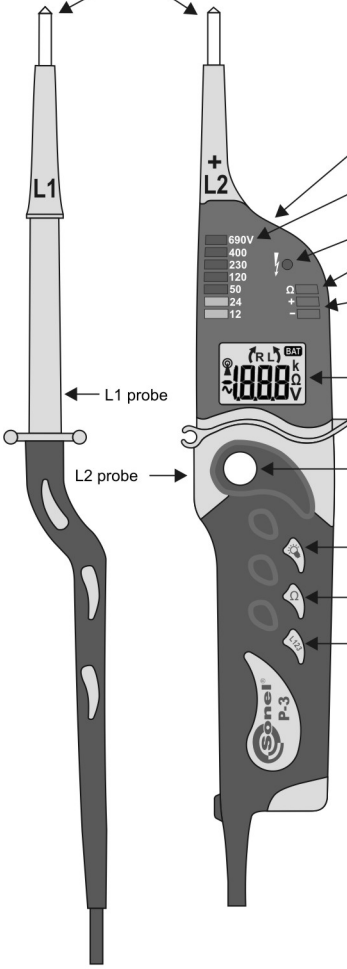
P-3

P-3



Measurement electrode protection
(placed on points of both diameters)

Variable diameter electrodes. The electrode diameter may be diminished by twisting off the point.



LED diode which illuminates the measurement point

Voltage indicator constituted by a LED diodes bar

Voltage indicator >50V

Continuity indicator (R<400kΩ)

Constant voltage polarization indicators (on the L2 probe)

LCD

L1 probe

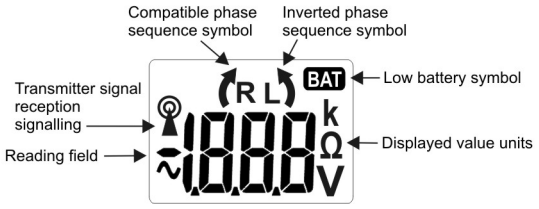
L2 probe

Touch electrode

Measurement point illumination button

Ohmeter button

Phasing function button.



OPERATING MANUAL

VOLTAGE TESTER P-3

CE

SONEL S. A.
ul. Wokulskiego 11
58-100 Świdnica

Version 1.6 May 22, 2012

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We appreciate your having purchased our voltage tester. The P-3 tester is a modern high-quality, simple and safe device. However it is recommended to get acquainted with the present manual in order to avoid measuring errors and prevent possible problems related to operation of the meter.

Note:
The producer reserves the right to modify the appearance, equipment and technical data of the device.

1 Safety

The P-3 meter has been devised for the purpose of voltage and circuit continuity testing, measurement of resistance and indication of the phase spin direction and phase identification. In order to guarantee proper operation and adequacy of the results the following recommendations must be observed:

- Before you proceed to operate the meter, acquaint yourself thoroughly with the present manual and observe the safety regulations and specifications determined by the producer.
- Any other application than those specified in the present manual may result in a damage to the device and constitute a source of danger for the user.
- The device must be operated solely by appropriately qualified personnel with relevant certificates that entitle them to realise measurements of electric installation. Operation of the meter realised by unauthorised personnel may result in damage to the device and constitute a source of danger for the user.
- The instrument must not be used for mains and in premises of special conditions, e.g. in a dangerous environment regarding the possibility of explosion and 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 compartment or power it from other sources than those specified in the present manual.
- Voltage measurements must not last longer than 30s. Having concluded a 30-second measurement, the following measurement may be performed not sooner than after 240s.
- Limit value signalling is solely provided as warning for the operator and not for the purpose of measurement.

Note:
The device can be used in rainy conditions, however at user's own responsibility. It is recommended to use gauntlets.

2 Measurements

2.1 Tester operation control

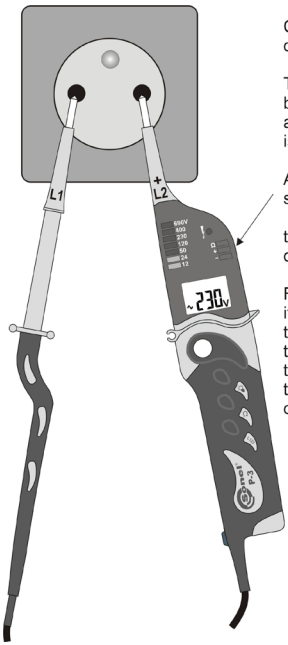
Before each operation of the tester, its functioning must be checked:

- Test the voltage indicator using a known voltage source,
- Short-circuit the measurement probes – there should be a sound signal, the LED diode **Ω** should be lit and there should be the [ON] legend in the display.

Notes:

The voltage indication function is active whether the batteries are charged or not. Other functions require charged batteries.

2.2 AC or DC voltage test



Connect both probes of the tester to a live object

The voltage is indicated by the LED diode bar, and the accurate value is indicated on the LCD.

Alternating voltage is signalled by the "+" and "-" diodes and the symbol "∿" displayed on the LCD.

For the constant voltage, if the L2 probe is connected to "+" of the source, then the "+" diode is on, otherwise the "-" diode is on and the symbol "⁃" appears on the LCD.

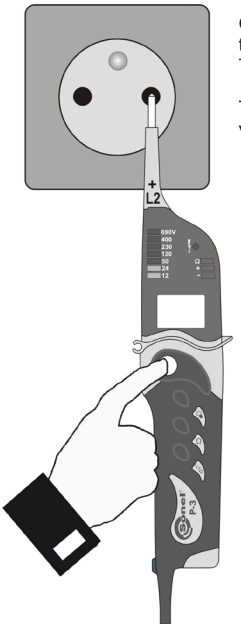
Notes:

In mains protected with an RCD switch, whose nominal current is 10mA or 30mA, the switch may be activated during a voltage measurement between L and PE. In order to avoid that connect the tester between L and N and after approximately 5s switch the probe over 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, perform a voltage test directly between the L phase and the PE protective conductor.

2.4 Single-pole phase testing



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

The diode (!) being on idicates voltage exceeding 50V.

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

Notes:

During single-pole phase testing for the purpose of identification of external conductors, under certain circumstances the functioning of the tester may be impaired (e.g. if insulated individual protective means are used or is the working station is insulated).

Single-pole phase testing may not be sufficient to determine whether the circuit is live. Perform two-pole voltage test.

2.5 Circuit continuity test

Note!
The tested object must not be live.

Connect both probes to the tested object. A sound signal, diode **Ω** on, and the [ON legend indicate continuity of the circuit (R<600kΩ).

Notes:

During the circuit continuity measurement, the voltage polarization at the L2 probe is negative!

2.6 Measurement of resistance

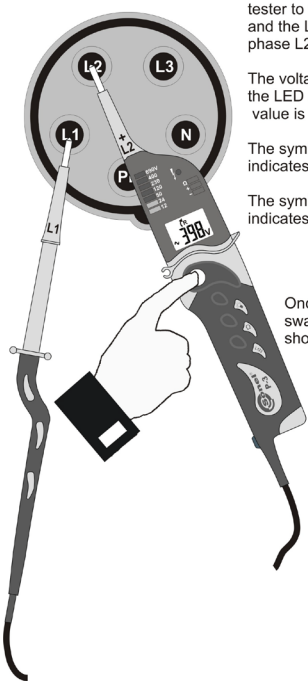
Note!
The tested object must not be live.

Press the **Ω** button for a short while and connect both probes to the tested object. Read the result from the LCD.

Notes:

During the resistance measurement, the voltage polarization at the L2 probe is negative!

2.7 Phase sequence test



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

The voltage is indicated by the LED diode bar, and the accurate value is indicated on the LCD.

The symbol ( ) being ON indicates compatible phase order.

The symbol ( ) being ON indicates inverted phase order.

Once the probes have been swapped, the opossite arrow shoud go ON.

Notes:

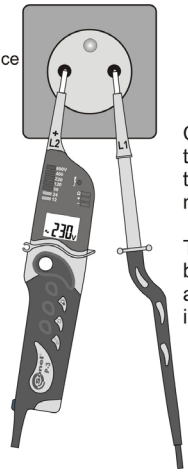
The phase sequence may solely be determined in a three-phase system. Contact of the touch electrode during measurement in a single-phase system gives a random result.

2.8 Phasing

The phasing function facilitates comparison of voltage phases in two distant point of the installation.

2.8.1 Without transmitter

The reference point.



Connect the tester to the socket; probes to be connected in any manner.

The voltage is indicated by the LED diode bar, and the accurate value is indicated on the LCD.

Press the L123 button and hold it until the Ω diode goes on.

The 123 symbol is displayed.

Touch the touch electrode for approximately 1-2 seconds.

When the internal generator is synchronised with the phase, the tester emits a triple sound signal and the symbol L-1 is displayed, and then…

...the time in [s] from the moment of synchronisation is displayed. The Ω diode blinks with an increasing frequency.

Point at which the phase is determined.

Transfer the tester as soon as possible to the tested socket and connect it to any probe configuration.

Touch the touch electrode for approximately 1-2 seconds.

The **L1** symbol on the display indicates the phase in both sockets is the same.
The **L2** symbol on the display indicates the phase in the second socket anticipates the phase in the first socket.
The **L3** symbol on the display indicates the phase in the second socket is delayed with regard to the phase in the first socket .

Additional information displayed by the meter

bnd	Touch again the touch electrode. It is displayed if the previous contact was too short.

Notes:

- Correct phasing is possible after no more than 15s from the sound signal. Afterwards horizontal lines are displayed.
- If before 6s from the moment of synchronisation the tester is not disconnected from voltage, synchronization commences anew.
- When phase is indicated in another socket and its symbol is displayed, precise synchronization of the P-3 receiver commences automatically. Thus phasing between distant sockets is possible, if there are other sockets in between.
- If the tester is disconnected from voltage before synchronization has concluded, the Err symbol is displayed.

2.8.2 With transmitter

The transmitter mated with the P-3 tester is a part of auxiliary equipment.

The new LKN-710P transmitter is not factory-dedicated to any P-3 indicator, and therefore before phasing may commence, it is required to perform the so called mating (point 2.8.2.1). The transmitter during a given period may work with solely one P-3 indicator. Repeated mating is required in case another P-3 indicator is to be used.

If the transmitter and indicator mating has not been performed, go on to point 2.8.2.1 of the manual.

If both devices were mated before go on to point 2.8.2.2.

2.8.2.1 Mating

1. Connect the LKN-710P transmitter cables to the source of alternating voltage 24...230V. After the connection has been performed, the red diode should blink signalling its operation in the conductor tracking mode (along with the LKO-710 received by SONEL S.A.).

2. Then, press the OUTPUT POWER MODE button twice, until the diode turns greed (continuous light).

> **Note :**
> **Green light signal indicated operation of the transmitter in the P-3 mode.**

3. Press fleetingly the **L123** button on the P-3 display. The following message should be displayed  and after a short while the symbol L - -.

4. Then hold the **L123** button until the message PAr is displayed.

5. Keep the OUTPUT POWER MODE button of the LKN-710P transmitter until the green diode stops blinking.

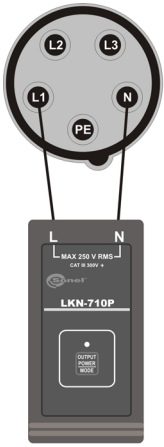
6. Now the transmitter is synchronized with the P-3 indicator. The process of synchronization lasts up to 30 seconds. The symbol may blink during synchronization.

7. Correct mating of the transmitter with the indicator is signalled as follows:

- The message PAr is replaced by L - -, while the symbol is displayed continuously,
- The green diode of the transmitter blinks faster than at the moment of mating, signalling transmission of phasing signal.

From that moment on both devices are ready for work in tandem.

2.8.2.2 Correct work of the P-3 indicator with the LKN-710P transmitter



Connect the N cable of the transmitter to the N socket and the L cable to one of the phases, which will be treated as L1 (nominally). Once connected, the diode should pulsate in red indicating operation of the transmitter.

Press twice the POWER/MODE button, in order to switch the transmitter into the P-3 mode. At that moment the diode should emit continuous green light.

Connect the L1 probe of the tester to the N socket, and the L2 probe to the L phase.

The voltage is indicated by the LED diode bar, and the accurate value is indicated on the LCD.

Press fleetingly the **L123** button.

The **123** symbol is displayed. After a while, the L - - a symbol symbol is displayed and the symbol pulsates indicating an attempt to find the transmitter.

Once the transmitter has been found, the symbol is displayed constantly.

Once the tester has detected the signal at the terminals is in phase with the signal generated by the trasmitter, the **L-1** symbol is displayed.
If there is a time shift of the generated signal and the measured phase, then the **L-2** or **L-3** symbol will be displayed.

Notes:

If during the phase indication (L-1, L-2 or L-3) the symbol starts to blink and the is displayed, it means there are problems, which may be related to:
- excessive distance between the transmitter and the P-3 indicator,
- transmission interference, which is not related to distance. In such a case, the problem will be solved automatically in no more than 10-20 seconds.

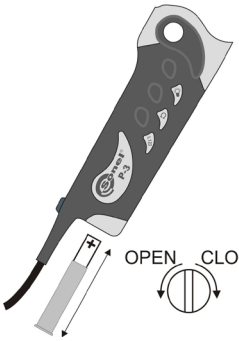
The symbol, which appears when the symbol is displayed continuously means:
- no voltage at the P-3 indicator measurement terminals,
- incorrect connection of the LKN-710P transmitter or the P-3 indicator.

2.9 Lighting of the measured point

The P-3 tester may light the measured area under difficult lighting conditions (e.g. in switchgears). In order to light the measured point, press the following button: . The LCD is backlit simultaneously.

3 Battery replacement

The tester is powered from two 1.5V AAA batteries. A lack of sound signal after the probes have been short-circuited or dim light after the button has been pressed, or the symbol **BAT** indicate the need to replace the batteries. In order to do so, perform the following actions:



- disconnect the probes from the measured object,
- using a tool or a coin, unscrew the battery compartment anticlockwise and remove it,
- replace batteries observing their polarity,
- place the battery compartment in its place and turn it clockwise.

4 Cleaning and maintenance

NOTE!
Use solely the maintenance techniques specified by the manufacturer in the present operating manual.

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

The electronic system of the meter does not require maintenance.

5 Storage

In the case of storage of the device, the following recommendations must be observed:

- Place protection on the probes,
- Make sure the tester is dry.
- Should the tester be stored for a prolonged period of time, the batteries will be removed.

6 Dismantling and utilization

Worn-out electric and electronic equipment should be gathered selectively, i.e. it must not be placed with waste of another kind.

Worn-out electronic equipment should be sent to a collection point in accordance with the law of worn-out electric and electronic equipment.

Before the equipment is sent to a collection point, do not dismantle any elements.

Observe the local regulations concerning disposal of packages, worn-out batteries and accumulators.

7 Technical data

The abbreviation „i.v." in the basic uncertainty definition means the indicated value.

Constant voltage measurement (on the display):

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

* - from 6,0V for Sr. no. up to 681793

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

Input resistance

Uin	Rin
12V, 24V, 50V	~ 6kΩ
120V	~ 20kΩ
230V	~ 70kΩ
400V	~ 150kΩ
690V	~ 240kΩ

Alternating voltage measurement within the range between 20 and 400Hz (on the display):

Range	Resolution	Basic uncertainty
1,5*...49,9V	0,1V	±(3% i.v. + 4 digits)
50...750V	1V	±(2% i.v. + 3 digits)

* - from 6,0V for Sr. no. up to 681793

Additionally the voltage is indicated by the diode bar for the following values: 12, 24, 50, 120, 230, 400, 690V along with the signalling of alternating voltage (diodes „+" and „-" are lit simultaneously).

The diode indicator functions also without batteries.

The measurement voltage frequency for the diode bar: 15…400Hz.

Resistance measurement:

Range	Resolution	Basic uncertainty
0...1999Ω	1Ω	±(3% i.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) Casing protection grade in accordance with EN 60529: IP65, with an open battery compartment: IP10
d) Voltage measurement range on the LCD: 6…750V AC/DC
e) Voltage indication for the diode bar: 12V, 24V, 50V, 120V, 230V, 400V, 690V
f) Minimum indicator activation voltage: 6V
g) Accuracy of voltage indications: in accordance with EN 61243-3
h) Voltage frequency range for the LCD: 20…400Hz
i) Voltage frequency range for the diode bar: 15…400Hz
j) Maximum current: I_S<0,2A/I_S(5s)<3,5mA
k) Maximum period of continuous operation: 30s
l) Minimum interruption of operation after 30 seconds of work: 240s
m) Voltage range for a single-pole phase indicator: 50…690V
n) Frequency range for a single-pole phase indicator: 50…400Hz
o) Continuity tester range: 0…600kΩ (400kΩ for Sr. no. up to 681793)
p) Accuracy of the continuity tester activation threshold: ±50%
q) Continuity tester measurement current: 7μA
r) Voltage range for two-pole phase sequence indicator: 100…690V
s) Frequency range for two-pole phase sequence indicator: 50…60Hz
t) Time to automatic turn-off (Auto-OFF): approximately 7s during phasing approximately 30s
u) Display: LCD 3 1/2 digits
v) Tester power supply: 2x1,5V AAA/LR03 (alkaline batteries are recommended)
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: design and production 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

Transmitter data:

a) Kind of insulation: double, in accordance with PN-EN 61010-1
b) Measurement category: III 300V in accordance with PN-EN 61010-1
c) Casing protection grade in accordance with PN-EN 60529: IP40
d) Voltage range: 24…250V AC

e) Voltage frequency range: 45…65Hz
f) Dimensions: approximately 128 x 66 x 28 mm
g) mass: approximately 0,25kg

8 Manufacturer

The manufacturer of the device, which also provides guarantee and post-guarantee service is the following company:

SONEL S.A.
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58-100 Świdnica
Poland
tel. +48 74 858 38 60
fax +48 74 858 38 09
E-mail: export@sonel.pl
Web page: www.sonel.pl

Note:
Service repairs may be realised solely by the manufacturer.

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