Eurotest 61557

MI 2086

User Manual

Version 4.2, Code no. 20 750 719

METREL®

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CE Mark on your equipment certifies that this equipment meets the requirements of the EU (European Union) concerning safety and interference causing equipment regulations.

1. Introduction

Congratulations on your purchase of the **Eurotest 61557** test instrument and it's accessories, produced by METREL d.d. We are glad, to be able to offer high professional test equipment, for carrying out absolute inspection of electric installations in buildings as well as Earth Resistances. The equipment was designed and produced on basis of rich experiences, acquired through more-years long period of dealing with electric installation test equipment.

1.1. General description

The Eurotest 61557 is high professional, multifunctional, portable test instrument, intended for carrying out all measurements, according to **European standard EN 61557**, as well as various other tests and measurements.

The instrument is equipped with all accessories, necessary for comfortable carrying out the tests. It is kept in a soft carrying bag, together with all the enclosed accessories.

Electronic part of the Eurotest 61557 is produced in SMD technology, which demands practically no service interventions. Wide matrix display with backlight offers easy to read main results as well as wide range of subresults, parameters and messages. Operation is simple and clear; operator does not need any special training (except to read this Instruction Manual) to operate the instrument.

In order, the operator to be familiar enough with measurements in general, it is advisable to read the enclosed handbook **Measurements on electric installations in theory and practice**.

Built in a **unique system** for storing test results is important feature of the Eurotest 61557. Professional PC SW enables simple transfer of test results and other parameters in both directions between the test instrument and PC, as well as automatic forming of final protocols. That way, complete measurement procedure can be reasonably quick and thus, the operator competitive to other operators, who need to create the protocols manually.

1.2. Warnings

In order to reach high operator's safety, while carrying out various measurements and tests using the Eurotest 61557, as well as to keep the test equipment undamaged, it is necessary to consider the following general warnings:

- **If the test equipment is used in manner not specified in this InstructionManual, the protection provided by the equipment may be impaired!**

- **Do not use the instrument and accessories, if any damage is noticed!**
- **In case of blown any fuse, follow the instructions in this Instruction Manual, to replace it!**
- **Service intervention or calibration procedure is allowed to be carried out only by a competent, authorised person!**
- **Consider all generally known precautions, in order to avoid risk of electric shock, while dealing with electric installations!**
- **Use only standard or optional test cables, supplied by your distributor!**

1.3. List of parameters measurable by the Eurotest 61557

Parameter	Function switch position	Description
Earth Resistance R_E (classic four-lead method)	R,ρ EARTH	- Four test terminals - Two test rods
Earth Resistance R_E (classic four-lead method + one test clamp)	R,ρ EARTH	- Four test terminals - Two test rods - One test clamp
Earth Resistance R_E (two test clamps)	R,ρ EARTH	- Two test clamps
Earth Resistivity ρ	R,ρ EARTH	- Four test terminals - Four test rods
Continuity R of protective conductors	R ±200 mA CONTINUITY	- Test current > 200 mAd.c. - Single measurement - Auto polarity reverse
Continuity Rx	R ±200 mA CONTINUITY	- Test current < 7 mA - Continuous measurement
Insulation Resistance Ri	R_{ISO}	- Test voltages: 50,100,250,500,1000 V
Illumination	SENSOR	
Varistor Breakdown Voltage Ub	TEST	- Test voltage 0 ÷ 1000 V - Threshold current 1 mA
Leakage Current I_L	CURRENT	- Test clamp
Load Current I	CURRENT	- Test clamp
Voltage and Current Harmonics up to 21-th	HARMONICS	- One phase system - Test clamp (current har.) - Test tips (voltage har.)
Power P, Q, P_A, cosφ	POWER ENERGY	- One-phase system - Current clamp
Energy W	POWER ENERGY	- One-phase system - Current clamp
Installation tracing	phase rotation / LOCATOR	- In combination with hand-held indicator - Line voltage loading or imposing of test signal

Phase rotation	phase rotation / LOCATOR	
RCD - Contact Voltage Uc	RCD	- With or without test rod
RCD - Trip out Time t	RCD	
RCD - Tripping Current	RCD	
RCD - Earth Resistance R_E (external source)	RCD	- Test rod - No trip out RCD
RCD - Fault Loop Res. R_L	RCD	- No trip out RCD

Line Impedance Z_{L-N}, Z_{L-L}	Z_{LINE}	- Between L and N or L and L
Line Prospective Short-circuit Current Ipsc	Z_{LINE}	- Between L and N or L and L
Fault Loop Impedance Z_{L-PE}	Z_{LOOP}	- Between L and PE
Fault Loop Prospective Short-circuit Current Ipsc	Z_{LOOP}	- Between L and PE
Contact Voltage at Prospective Short-circuit Current Uc/Ipsc	Z_{LOOP}	- Test probe - With aux. test probe
N-PE Loop Resistance R_{N-PE}	$R_{LOOP\ N-PE}$	- No trip out RCD - Internal source
Fault Loop Prospective Short-circuit Current Ipsc (without tripping out RCD)	$R_{LOOP\ N-PE}$	- Between L and PE - No trip out RCD

1.4. Standards applied

The Eurotest 61557 is designed according to European safety standard
- ♦ EN 61010 - 1

EMC (noise and immunity) according to European standards
- ♦ EN 50081 – 1
- ♦ EN 50082 – 1

Measurements according to European standard EN 61557:
- ♦ Insulation Resistance ..... Part 2
- ♦ Loop Impedance ..... Part 3
- ♦ Resistance of earth connection and equipotential bonding ..... Part 4
- ♦ Earth Resistance ..... Part 5
- ♦ Residual Current Devices (RCD) in TT and TN systems..... Part 6
- ♦ Phase Sequence ..... Part 7

Illumination measurement accroding to standard DIN 5032 .....…….Part 7

2. Instrument description

2.1. Front panel

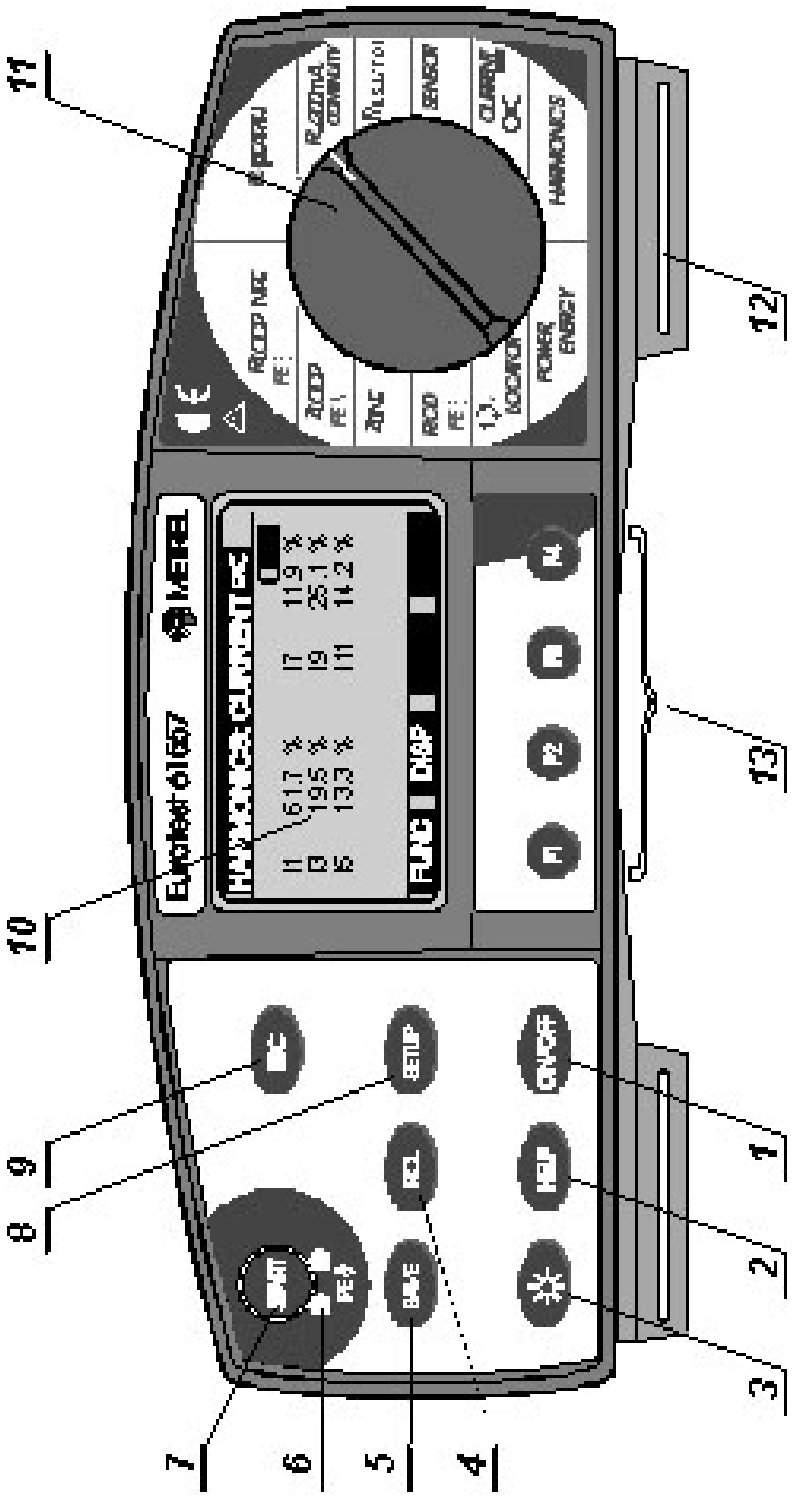


Fig. 1. *Front panel*

Legend:

1 **ON/OFF key**, to switch ON or OFF the instrument. Auto OFF will occur automatically 10 minutes after last strike to any key or function switchrotation.

2 **HELP key**, to display help menu (connection of test leads and other data).

3 **Light key**, to turn ON or OFF display backlight. Auto OFF will occur automatically 20 seconds after last strike to any key or function switch rotation.

4 **RCL key**, to recall stored results.

5 **SAVE key**, to store test results.

6 **PE touching electrode**, to test PE terminal (presence of phase voltage by mistake).

7 **START key**, to start any measurement.

8 **SETUP** key to:
- Set display contrast.
- Set Time and Date.
- Set communication parameters.
- Erase all memory locations.

9 **ESC key**, to escape any started procedure (storing/recalling test results, erasing memory locations etc.).

10 **Matrix LCD** with backlight.

11 **Function switch**, to select appropriate parameter to be tested. Even two or more parameters can be tested at the same position.

12 **Belt slot**, to fix carrying belt.

13 **Function keys**, to set/select various parameters in each function. Function of a certain key in each function is marked on display.

2.2 Connector panel

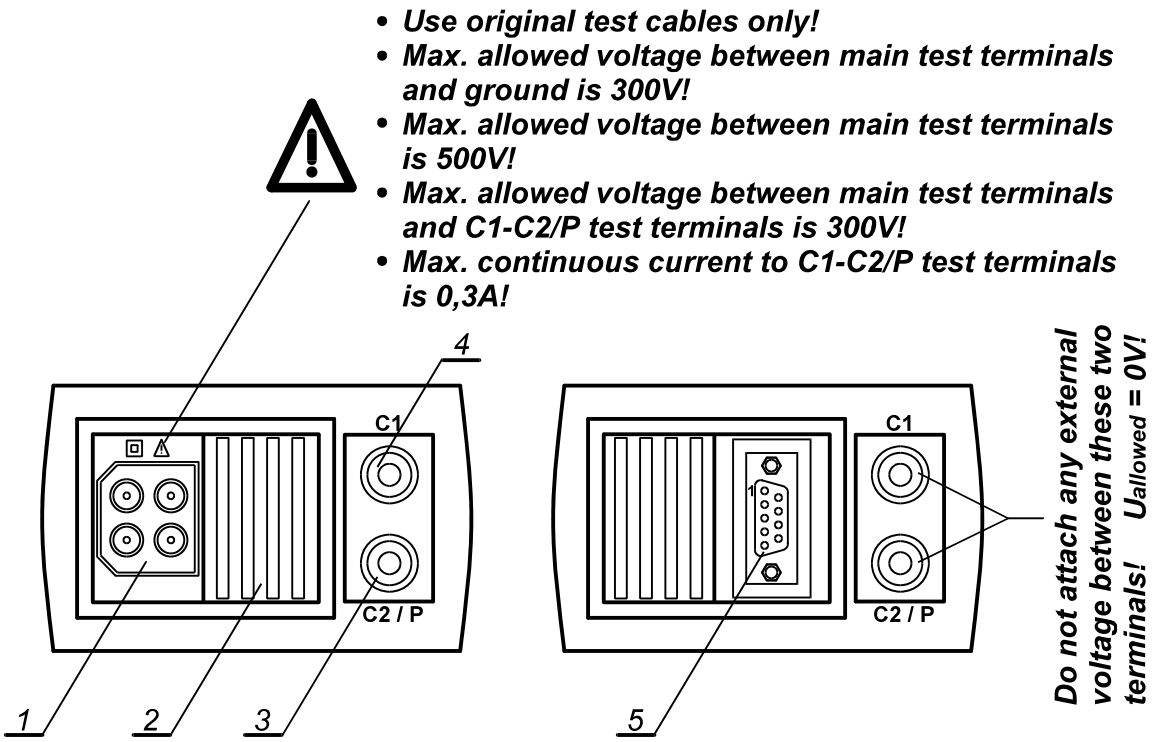


Fig. 2. *Connector panel*

Legend:

1 Main test connector
2 Protective connector cover (protects simultaneous connection of test and RS232 cable)
3 Clamp/Probe (C2/P) test terminal
4 Clamp (C1) test terminal
5 RS 232 connector (to connect Eurotest 61557 to PC)

2.3. Bottom side

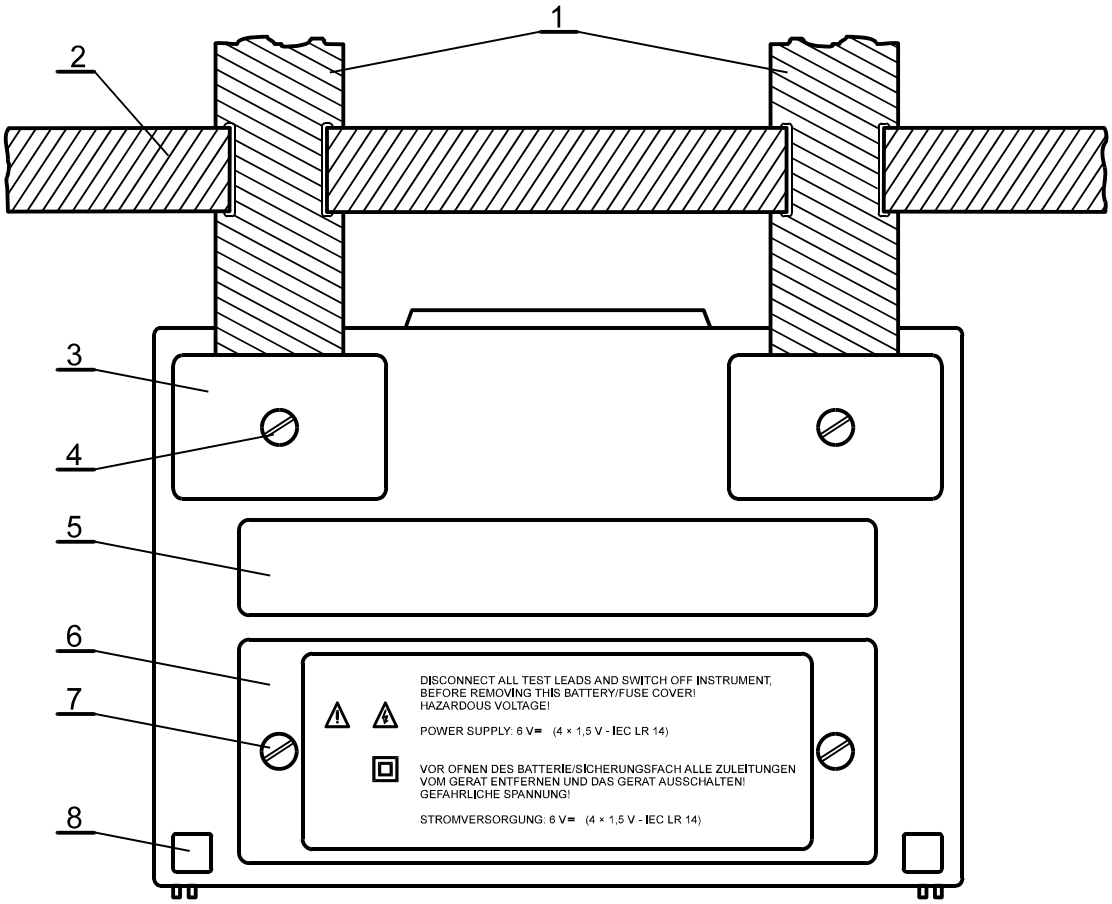


Fig. 3. *Bottom side*

Legend:

1 Nylon strip (it serves the operator to carry the instrument hung on his neck).
2 Auxiliary nylon strip (it serves the operator to fix the instrument along his body).
3 Plastic cover (it fixes nylon strip to the instrument). There is a screw under the cover, which is to be unscrewed, when opening the instrument for service or calibration purpose.
4 Screw (unscrew it, to remove carrying strip or to open the instrument).
5 Label with measurement ranges.
6 Battery/fuse compartment cover.
7 Screw (unscrew it to replace batteries or blown fuse.
8 Rubber foot.

2.4. Standard accessories

See attached sheet, to compare received set of accessories with listed one.

2.5. Optional accessories

See attached sheet, to check the list of possible optional accessories, which may be supplied upon request.

2.6. Ways of carrying the instrument

The instrument is hung around operator's neck only - quick placing and displacing.

The instrument is hung around operator's neck and fixed to his body with back belt - stable position.

The instrument can be used even placed in soft carrying bag - test cable connected to the instrument throught the side aperture.

The instrument is fixed to operator's body with back belt only - it can be simply moved from side to front position for measurement purpose and back again.

2.7. Accessories required for specific measurement

The table below presents accessories (standard or optional) required for specific measurement. The accessories marked as **optional** may also be **standard** ones in some set configurations; Please see attached list of standard accessories for your set configuration or contact your dealer for further information.

FUNCTION	REQUIRED ACCESSORIES
Insulation Resistance	- Universal Test Cable or Tip Commander (Option – Order No. **A 1002**)
Continuity of Protective Conductor	- Universal Test Cable or Tip Commander (Option – Order No. **A 1002**)
Continuity	- Universal Test Cable or Tip Commander (Option – Order No. **A 1002**)
Earth Resistance (Four-terminal method)	- Earth Test Set – 20 m (Option – Order No. **S 2001**) or Earth Test Set – 50 m (Option – Order No. **S 2002**)
Earth Resistance (Four-terminal method + clamp)	- Earth Test Set – 20 m (Option – Order No. **S 2001**) or Earth Test Set – 50 m (Option – Order No. **S 2002**) - Low-range Current Clamp (Option – Order No. **A 1018**)
Earth Resistance (Two-clamp method)	- Universal Test Cable - Low-range Current Clamp (Option – Order No. **A 1018**) - Standard-range Current Clamp (Option – Order No. **A 1019**)
Specific Earth Resistance	- Earth Test Set – 20 m (Option – Order No. **S 2001**) or Earth Test Set – 50 m (Option – Order No. **S 2002**)
Fault Loop Impedance, Ipsc	- Universal Test Cable or Plug Commander (Option – Order No. **A 1001**)
Line Impedance, Ipsc	- Universal Test Cable or Plug Commander (Option – Order No. **A 1001**)
Contact Voltage at Ipsc (SEV 3569)	- Universal Test Cable - Probe Test Lead 4m (Option – Order No. **A 1012**)
RCD – Contact Voltage at $I_{\Delta N}$	- Universal Test Cable or Plug Commander (Option – Order No. **A 1001**)
RCD – Trip-out Time	
RCD – Trip-out Current	
RCD – Fault Loop Resistance	
RCD – Earth Resistance	
RCD – Automatic Test	
Phase Rotation	- Universal Test Cable or Three-phase Cable (Option – Order No. **A 1110**) or Three-phase Adapter (Option – Order No. **A 1111**)
Fuse, Fault, Conductor Tracing	- Universal Test Cable - Fuse / Fault / Conductor Locator (Option – Order No. **A 1005**)
Power, Cosφ, Energy	- Universal Test Cable - Low-range Current Clamp (Option – Order No. **A 1018**) or Standard-range Current Clamp (Option – Order No. **A 1019**)
Harmonics	
True RMS Current	
Varistor Overvoltage Device – Breakdown Voltage	- Universal Test Cable
Illumination	- LUXmeter probe type B (Option – Order No. **A 1102**) - LUXmeter probe type C (Option – Order No. **A 1119**)

3. Measurement instructions

3.1. Insulation resistance

There are different objects, where insulation resistance is to be measured, in order to assure safety against electric shock. Let's list a few examples:

- Insulation resistance between installation conductors (all combinations).
- Insulation resistance of non-conductive rooms (walls and floors).
- Insulation resistance of ground cables.
- Resistance of semiconductive (antistatic) floors.

For additional general information concerning Insulation resistance measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

Warnings!

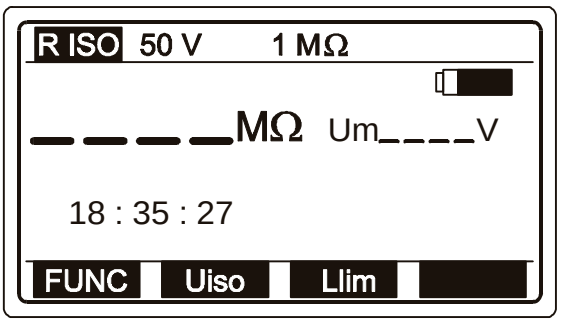
- Make sure, tested object to be deenergised (mains voltage disconnected) before starting the measurement!
- When measuring Insulation Resistance between conductors, all loads must be disconnected and all switches closed!
- Do not touch tested object while testing it, risk of electric shock!
- Do not connect test terminals to external voltage higher than 600 V a.c. or d.c., in order not to damage the test instrument!
- In case of capacitive test object (capacitive compensation of reactive power, long tested cable etc.), automatic discharge of the object may not be done immediately after finishing the measurement. Falling voltage will be displayed in that case – do not disconnect test leads until the voltage drops below 50 V or discharge the tested object manually!

How to carry out the measurement?

Step 1

♦ Connect test cable (Universal test cable or Tip commander) to Eurotest 61557.

♦ Set function switch to **RISO** position, the following menu will be displayed:



50 V .....Latest set nominal test voltage.
1 MΩ.....Latest set low limit insulation resistance value.
Um .....Actual test voltage.
18 : 35 : 27...Real time clock.

Fig. 4. *Insulation resistance initial menu*

Step 2

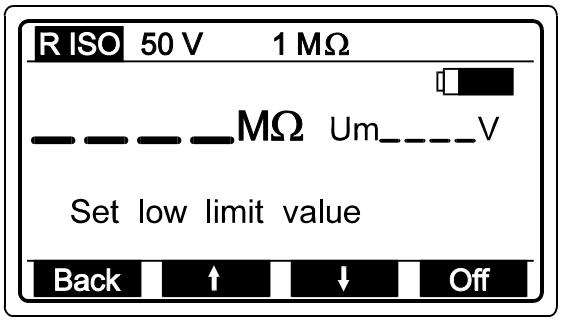
- Select **Test voltage** by using the **Uiso** (F2) key. The voltage can be set to 50, 100, 250, 500 or 1000 V and it is currently displayed on top display line.

Step 3

- Set **Low limit insulation resistance value**. Later will test results be compared with the set limit value and, if lower, they will be equipped with "**!**" mark and **Result under limit** message.

How to set the Low limit value?

- Press the **Llim** (F3) key, to enter "Limit value adjustment menu"; see the figure below:



Range (MΩ)	Step (MΩ)
0,01 – 0,25	0,01
0,25 – 1	0,05
1 – 10	1
10 – 200	10

Fig. 5. *Limit value adjustment menu and table of settable limit values*

- Value between 0,00 MΩ and 200 MΩ, according to above table, may be set by using the ↑ (F2) and ↓ (F3) keys. If test result is not to be compared with set limit value at all, then press the **Off** (F4) key. Set limit value (displayed on top display line) will be substituted with ∗ **MΩ** mark. The **Off** key will alter to **On**, enabling the operator to turn the limit value ON again and vice versa.

- Press the **Back** (F1) key, after setting limit value, to return to "Insulation Resistance initial menu" (see the figure 4.).

Step 4

- **Connect test cable** to tested object, according to the figure below (press the **HELP** key for basic connection information).

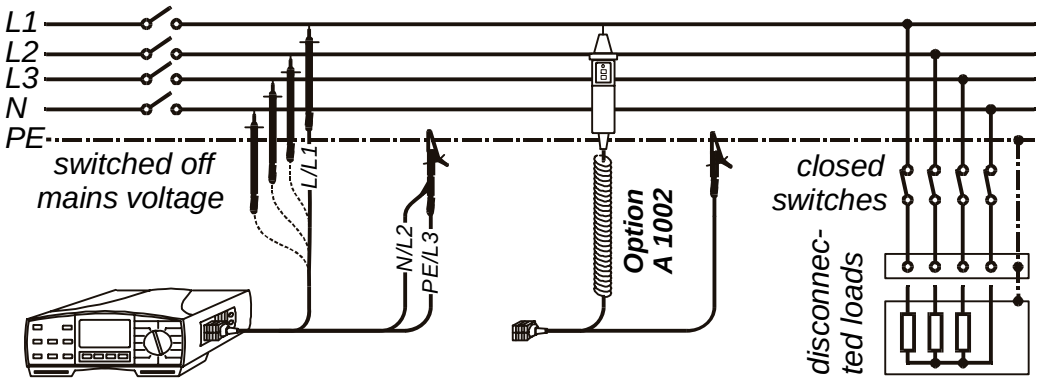


Fig. 6. *Connection of Universal Test Cable and optional Tip Commander (Order No.* ***A 1002****)*

Step 5

- Press the **START** key and keep it pressed, until result is stabilised, then release the key. Test result is displayed; see an example of the result on figure below.

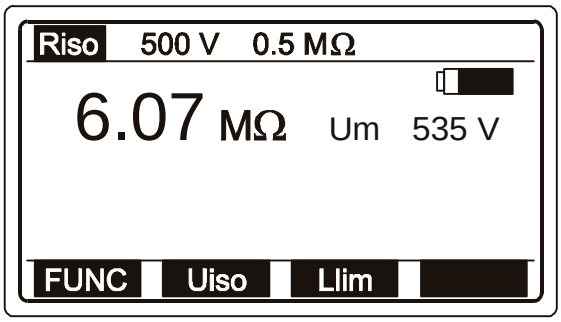


Fig. 7. *Example of Insulation resistance test result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- In case of present voltage higher than 30 V a.c./d.c. between test terminals, the insulation resistance measurement will not be carried out after pressing **START** key, but the voltage will be displayed, equipped with "**!**" mark and **Input voltage > 30 V** message! Beep warning sound will be affected too.
- Tested object is discharged automatically after finishing the measurement, actual voltage is displayed during discharging, until the voltage drops below 30 V!
- If test result is out of measurement range (open test leads or good isolation), **>1000 MΩ** message will be displayed (test voltage is set to 250,500 or 1000 V) or **>200 MΩ** message (test voltage is set to 50 or 100 V)!
- Positive pole of test voltage is attached to L/L1 test terminal (Universal test cable) or to commander test tip (Tip commander)!

3.2. Varistor Over-voltage Protection Devices

For general information concerning the measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

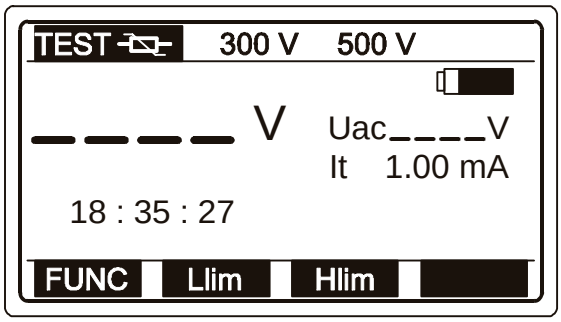
How to carry out the Breakdown voltage test?

Step 1

- Connect Universal test cable to Eurotest 61557.

Note!

Set function switch to **Riso** position and press the **FUNC** (F1), the following menu will be displayed.



Uac = Ubreakdown / 1,6

It ..... Varistor's treshold current.

Fig. 8. *Varistor test initial menu*

Meaning of the Uac voltage:

Protection devices intended for a.c. network are usually dimensioned approx. 20% of nominal mains voltage above peak value of the nominal mains voltage.

Example:
Nominal mains voltage Un = 230V
Upeak = 230V·1,41 = 324V
Ubreakdown = (Upeak + 0,2·Un) ≅ Un·1,6 = 368V

Uac voltage may be directly compared with the voltage declared on tested protection device.

Step 2

- Set **Low limit Breakdown voltage**. Later will test results be compared with the set limit value and, if lower, they will be equipped with "**!**" mark and **Result out of limits** message.

How to set the Low limit value?

- Press the **Llim** (F2) key, to enter Limit value adjustment mode, the following menu will be displayed:

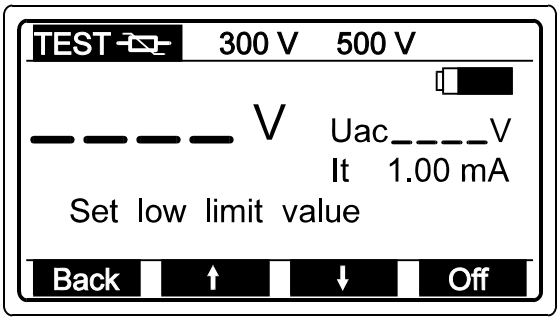


Fig. 9. *Limit adjustment menu*

- Value between 0 and 1000 V in steps of 5 V may be selected by using the ↑ (F2) and ↓ (F3) keys. If test result is not to be compared with set limit value at all, then press the **Off** (F4) key. Set limit value (displayed on top display line) will be substituted with ∗**V** mark. The **Off** key will alter to **On**, enabling the operator to turn the limit value ON again and vice versa.
- Press the **Back** (F1) key after setting the limit value, to return to Varistor test initial menu.

Step 3

- Set **High limit Breakdown voltage**. Later will test results be compared with the set limit value and, if higher, they will be equipped with "**!**" mark and **Result out of limits** message.

How to set the High limit value?

- Press the **Hlim** (F3) key, to enter Limit value adjustment mode.
- Value between 0 and 1000 V in steps of 5 V may be selected by using the ↑ (F2) and ↓ (F3) keys. If test result is not to be compared with set limit value at all, then press the **Off** (F4) key. Set limit value (displayed on top display line) will be substituted with ∗**V** mark. The **Off** key will alter to **On**, enabling the operator to turn the limit value ON again and vice versa.
- Press the **Back** (F1) key after setting the limit value, to return to Varistor test initial menu.

Step 4

- **Connect test leads** to tested varistor over-voltage protection device, according to the figure below (press the **HELP** key for basic connection information).

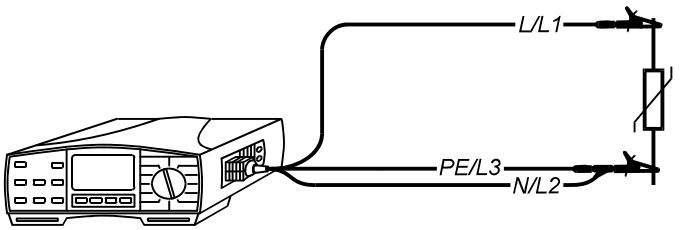


Fig. 10. *Connection of tested device*

Step 5

- Press the **START** key and release it. Test voltage starts to rise (500 V/s) and as soon as varistor's forward current reaches the value of 1 mA (breakdown voltage is defined at that current), test voltage will be displayed. Generator will stop to generate test voltage. See an example of test result on the figure below.

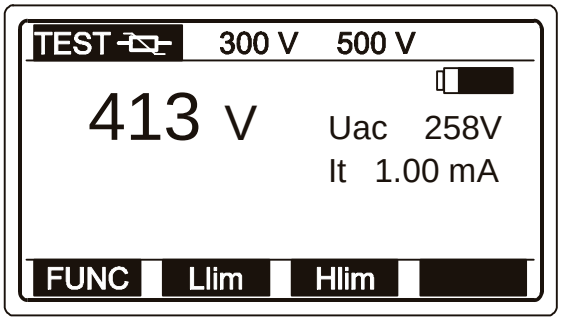


Fig. 11. *Breakdown voltage displayed*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- In order test result not to be influenced by connected loads, tested Over-voltage Device must be removed from installation, before testing it.

If the Over-voltage Protection Device to be tested cannot be removed from installation (permanent connection), make sure to disconnect all other elements connected to installation, which may influence the test result.

3.3. Continuity of Protective Conductors

Continuity of protective conductors is to be measured, before mains voltage is connected to tested installation (new or adapted installations). Max. allowed resistance value depends on power of connected loads, used installation system (TN, TT) etc.
For additional general information concerning Continuity measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

Warning!

- **Make sure, tested object to be deenergised (mains voltage disconnected) before starting the measurement!**

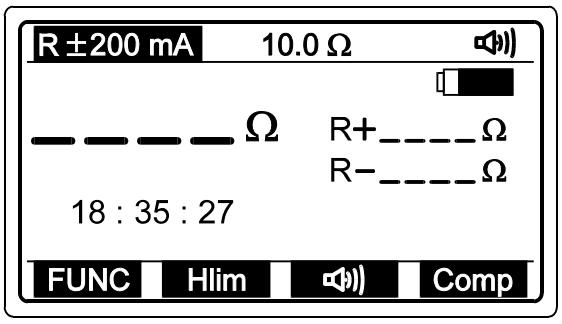
How to carry out the measurement?

Step 1

♦ Connect test cable (Universal test cable or Tip commander) to Eurotest 61557.

♦ Set function switch to **R±200mA / CONTINUITY** position, “Continuity of protective conductors” or “Continuity” menu will be displayed.

Select **Continuity of protective conductors** function by using the **FUNC** (F1) key. The function is selected, when **R ± 200 mA** is displayed; see the figure below.



10.0 Ω....Latest set high resistance value.
R+.....Partial result (blue test lead connected to **positive** terminal of test voltage).
R- .....Partial result (blue test lead connected to **negative** terminal of test voltage).

Fig. 12. *Continuity initial menu*

Step 2

♦ Set **buzzer mode** by using the **buzzer** (F3) key. The buzzer can be set to active mode (**buzzer** sign present on top display line) or passive mode (**buzzer** sign not present on top display line). In case of active buzzer, each displayed result, lower than set High limit value (good result), will be accompanied with approx. 2s long sound signal.

Step 3

- Set **High limit resistance value**. Later will test results be compared with the set limit value and, if higher, they will be equipped with "**!**" mark and **Result over limit** message, while, if lower, they will be accompanied with sound signal (in case of active buzzer only).

How to set the High limit value?

- Press the **Hlim** (F2) key, to enter "Limit value adjustment menu"; see the figure below.

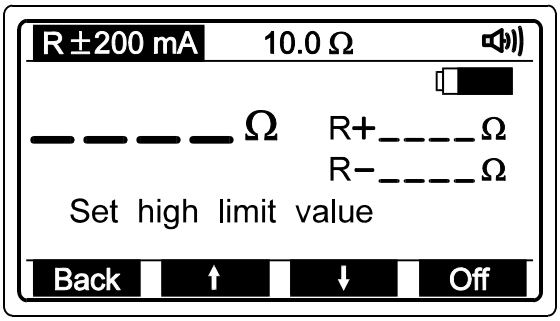


Fig. 13. *Limit value adjustment menu*

- Value between 0,1 Ω and 20,0 Ω in steps of 0,1 Ω may be selected by using the ↑ (F2) and ↓ (F3) keys. If test result is not to be compared with set limit value at all, then press the **Off** (F4) key. Set limit value (displayed on top display line) will be substituted with ∗ Ω mark. The **Off** key will alter to **On**, enabling the operator to turn the limit value ON again and vice versa.
- Press the **Back** (F1) key, after setting limit value, to return to "Continuity of protective conductors initial menu" (see the figure 8.).

Step 4

- **Compensate test leads** (if they have not been compensated yet or, if already compensated test leads have been exchanged).

How to carry out the compensation?

- Short test leads; see the figure below.

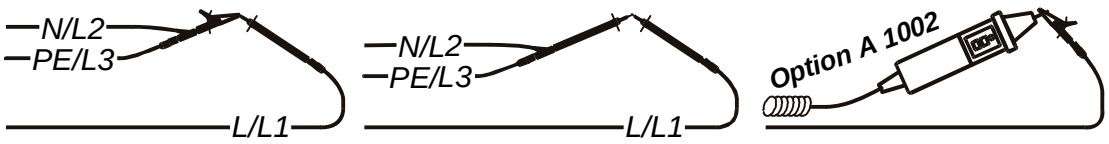


Fig. 14. *Shorted test leads*

- Press the **START** key and release it, in order to carry out regular measurement.

- Press the **Comp** (F4) key and release it, **Compensating t. leads** message will appear for a while, then displayed result will alter to 0,00 Ω and **Co** mark will appear on top display line, indicating the compensation was successfully accomplished. Test instrument is thus ready to be used.

In order to annul potential compensation, follow the procedure, described in this step at open test leads. **Co** mark will disappear after finishing the procedure, indicating the compensation has been annulled.
Compensation, effected in this function, will be considered in **CONTINUITY** function too.

Step 5

- **Connect test cable** to tested object according to the figures below (press the **HELP** key for basic connection information).

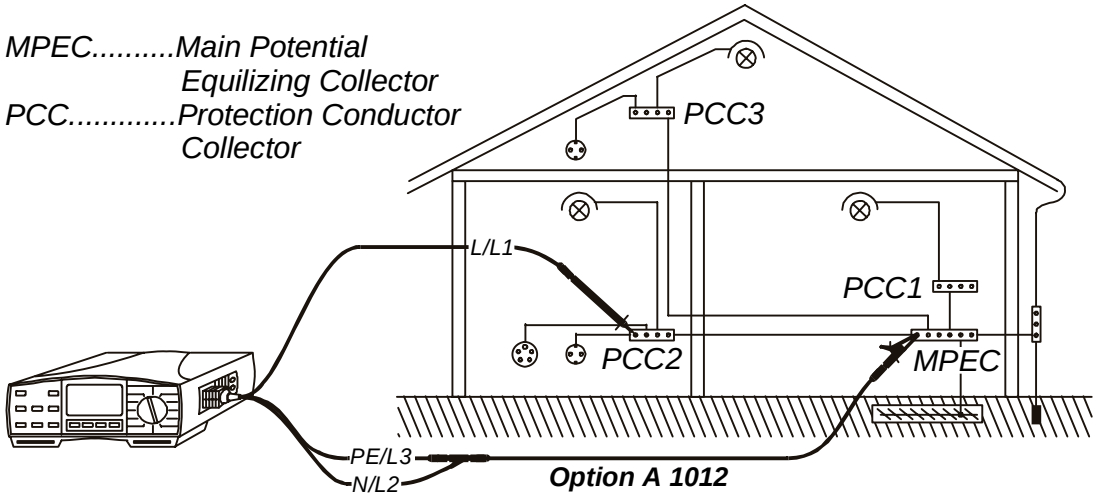


Fig. 15. *Connection of Universal Test Cable and optional Probe Test Lead (Order No.* ***A 1012****)*

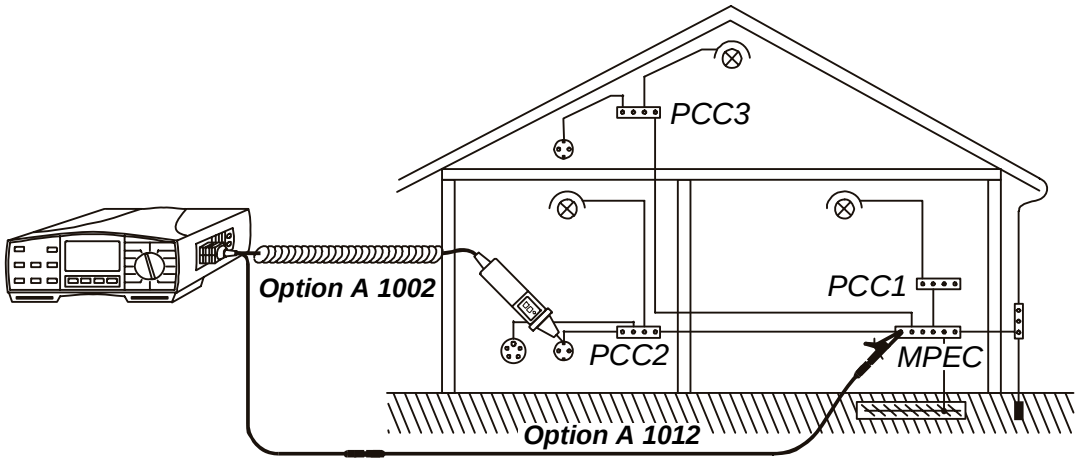
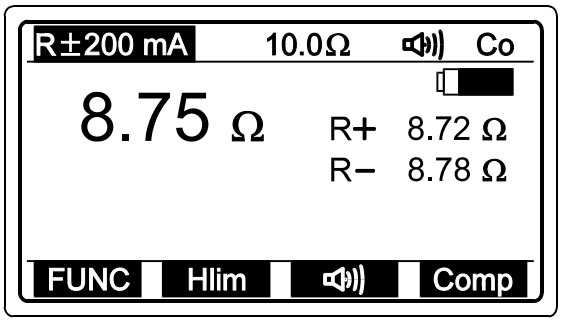


Fig. 16. *Connection of optional Tip Commander (Order No.* ***A 1002****) and optional Probe Test Lead (Order No.* ***A 1012****)*

Step 6

- Press the **START** key and release it. Measurement will be carried out and result displayed afterwards. Each measurement is accomplished in two steps (polarity is reversed between the two steps automatically). See an example of displayed test result on figure below.



Co..... Resistance of test leads has already been compensated.

Main result is equal to the **average** value between the highest and lowest partial ones!

Fig. 17. *Example of Continuity test result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- In case of present external voltage higher than 10 V a.c./d.c. between test terminals, the continuity measurement will not be carried out after pressing **START** key, but the voltage will be displayed, equipped with "**!**" mark and **Input voltage > 10 V** message! Beep warning sound will be affected too.

- If resistance value higher than 5 Ω (measured with not compensated instrument) is displayed, compensation will not be carried out after pressing **Comp** key, but potential, already effected compensation will be neglected and **Wire resistance > 5 Ω** message will be displayed!

- If test result is out of measurement range (open test leads), **>2000 Ω** message will be displayed!

3.4. Continuity

The function is intended to be used especially when arranging terminal-to-terminal connections, maintaining and repairing electric equipment, carrying out auxiliary measurements etc. In general the function serves as ordinary Ω-meter.

For additional information concerning general Continuity measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

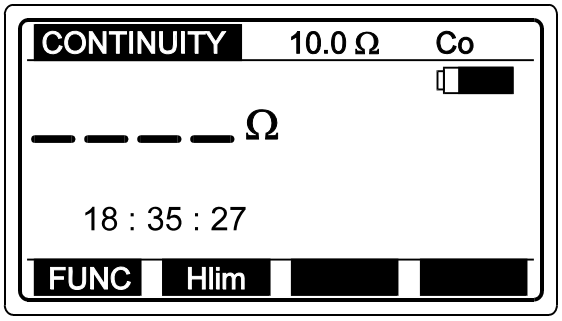
Warning!

- **Make sure, tested object to be deenergised (mains voltage disconnected) before starting the measurement! If test tips are connected to mains voltage during the measurement is running, fuse M 0,315A/250V (placed in vertical plastic cylinder under battery cover) will blow (see the chapter 5.2. Fuses).**

How to carry out the measurement?

Step 1

- Connect test cable (Universal test cable or Tip commander) to Eurotest 61557.
- Set function switch to **R±200mA / CONTINUITY** position, “Continuity of protective conductors” or “Resistance” menu will be displayed.
- Select **Resistance** function by using the **FUNC** (F1) key. General Continuity function is selected, when **CONTINUITY** is displayed; see the figure below.



10.0 Ω....Latest set high limit value.
Co.....Resistance of test leads has already been compensated in R±200mA function.

Fig. 18. *Continuity initial menu*

Step 2

- Set **High limit resistance value**. Later will test results be compared with the set limit value and, if lower, they will be equipped with bip sound signal while if higher, sound signal will not be present.

How to set the high limit value?

- Press the **Hlim** (F2) key, to enter “Limit value adjustment menu”; see the figure below:

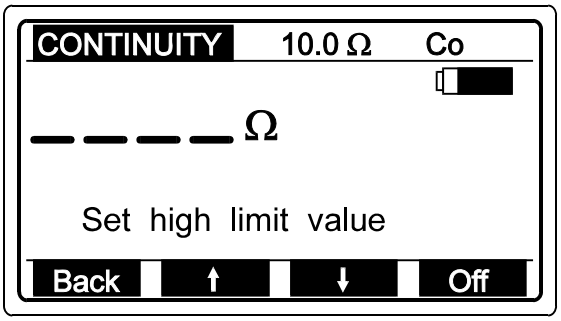


Fig. 19. *Limit adjustment menu*

- Value between 0,1 Ω and 20,0 Ω in steps of 0,1Ω may be set by using the ↑ (F2) and ↓ (F3) keys. If test result is not to be compared with set limit value at all, then press the **Off** (F4) key. Set limit value (displayed on top display line) will be substituted with **∗Ω** mark. The **Off** key will alter to **On**, enabling the operator to turn the limit value ON again and vice versa.

- Press the **Back** (F1) key after setting limit value, to return to “Continuity initial menu” (see the figure 14.).

Step 3

- Press the **START** key and release it. Measurement starts to run (continuous measurement), results are currently displayed.

Step 4

- **Connect test cable** to tested object according to the figures below and follow displayed result or sound information (press the **HELP** key for basic connection information).

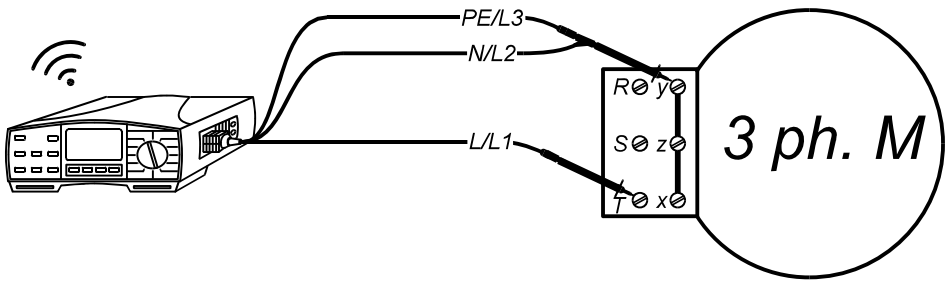


Fig. 20. *Connection of Universal Test Cable*

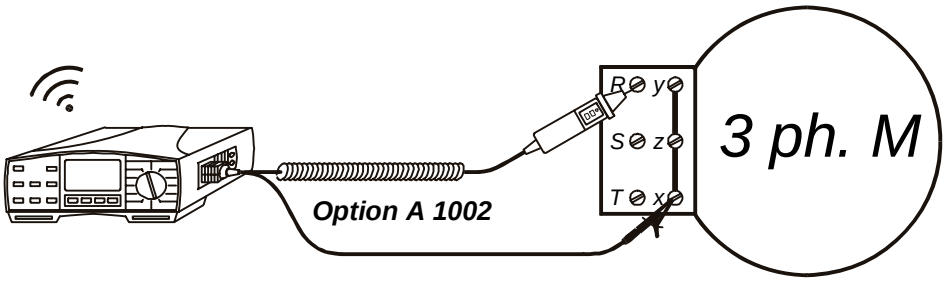
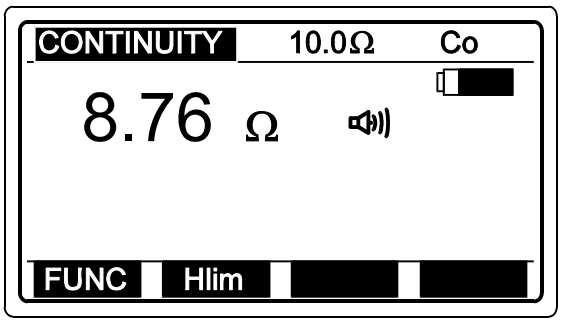


Fig. 21. *Connection of optional Tip Commander (Order No.* ***A 1002****)*

- Press the **START** key again, to stop the measurement. Last current result will be displayed; see an example of displayed test result on figure below.



..... Displayed result is equiped with buzzer sign in case, if it is lower than set high limit value.

Fig. 22. *Example of Resistance test result*

- The result cannot be stored (it is just auxiliary test result).

Notes!

- In case of present voltage higher than 10 V a.c./d.c. between test terminals, the continuity measurement will not start after pressing **START** key, but the voltage will be displayed, equipped with "**!**" mark and **Input voltage > 10 V** message! Beep warning sound will be affected too.

- If test result is out of measurement range (open test leads), **>2000 Ω** message will be displayed!

- Positive pole of test voltage is attached to L/L1 test terminal (Universal test cable) or to commander test tip (Tip commander)!

- Compensation of test leads, affected in Continuity of Protective Conductors function, will be considered in this function too.

3.5. Earth Resistance (internal generator)

The Eurotest 61557 test instrument is able to carry out Earth Resistance measurement using tree different methods. The appropriate one is to be selected by the operator on basis of concrete earthing system to be tested.

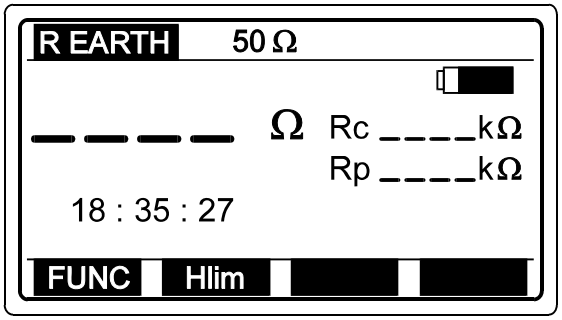
For additional general information concerning Earth Resistance measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out Earth Resistance measurement using standard four-lead test method?

Step 1

- Set function switch to ρ **RE** position, “Earth Resistance” or “Earth Resistivity” menu will be displayed.

- Select **Earth Resistance function (standard four-lead method)** by using the **FUNC** (F1) key. Earth Resistance function (standard four-lead method) is selected, when **R EARTH** is displayed; see the figure below.



Rc... Resistance of current probe.
Rp... Resistance of potential probe.

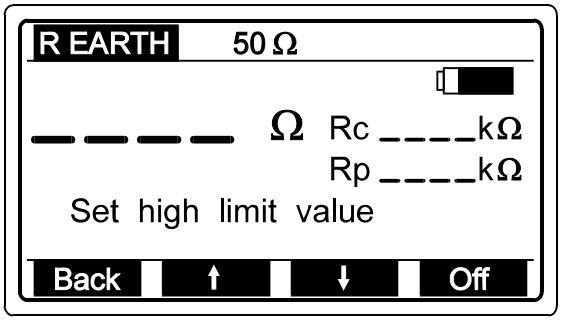
Fig. 23. *Earth Resistance initial menu*

Step 2

- Set **High limit Earth Resistance value**. Later will test results be compared with the set limit value and, if higher, they will be equipped with “**!**” mark and **Result over limit** message.

How to set the high limit value?

- Press the **Hlim** (F2) key, to enter “Limit value adjustment mode”, the following menu will be displayed:



Range / discrete value (Ω)	Step (Ω)
1 – 100	1
166, 250, 500, 833, 1666, 2500, 5000	/

Fig. 24. *Limit adjustment menu and table of presettable limit values*

- Value between 1 Ω and 5000 Ω, according to the table above may be selected by using the ↑ (F2) and ↓ (F3) keys. If test result is not to be compared with set limit value at all, then press the **Off** (F4) key. Set limit value (displayed on top display line) will be substituted with ***Ω** mark. The **Off** key will alter to **On**, enabling the operator to turn the limit value ON again and vice versa.

- Press the **Back** (F1) key after setting limit value, to return to "Earth Resistance initial menu" (see the figure 19.).

Step 3

- **Connect test leads** to the instrument and to tested object according to the figures below (press the **HELP** key for basic connection information).

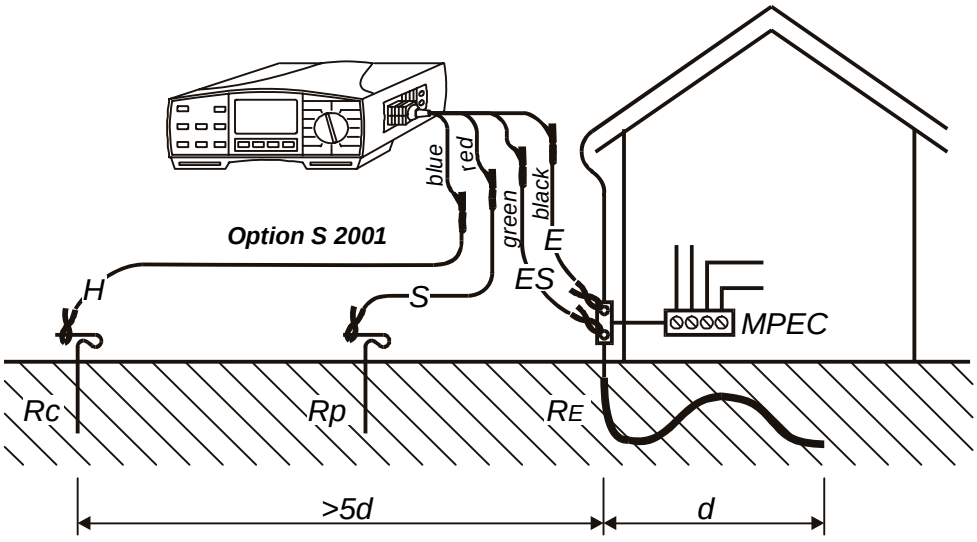


Fig. 25. *Connection of optional Earth Test Set – 20 m (Order No.* ***S 2001****)*

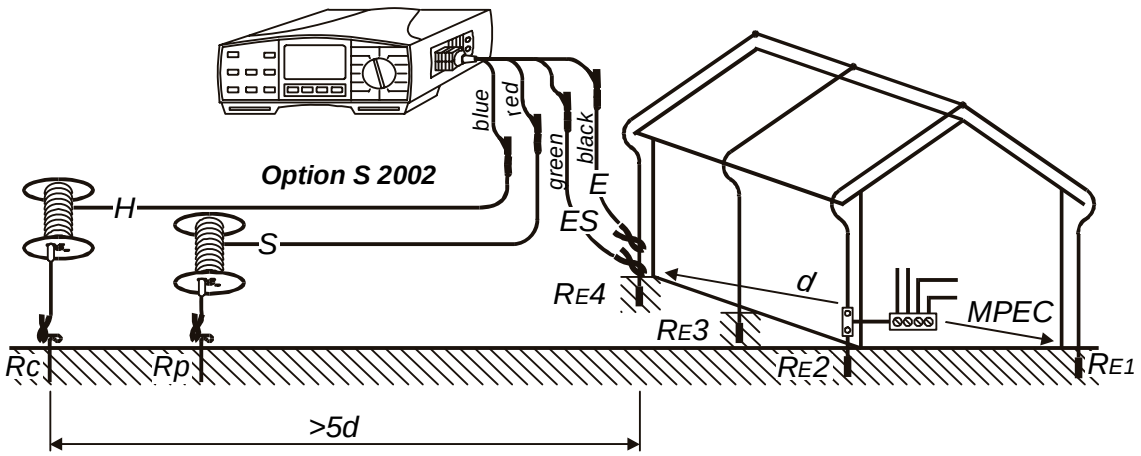
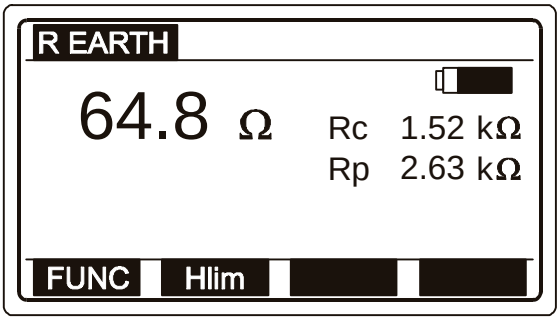


Fig. 26. *Connection of optional Earth Test Set – 50 m (Order No.* ***S 2002****)*

Step 4

- Press the **START** key and keep it pressed, until result is stabilised, then release the key. Test result is displayed; see an example of the result on figure below.



Both resistances, Rc and Rp are measured and displayed continuously.

Fig. 27. *Example of Earth Resistance test result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

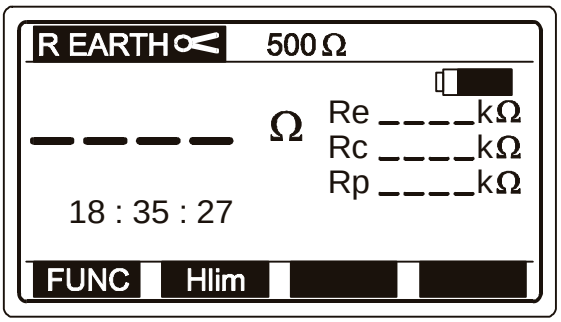
Notes!

- In case of present external voltage higher than 20 V a.c./d.c. between H and E or ES and S test terminals, the Earth Resistance measurement will not be carried out after pressing **START** key, but the voltage will be displayed, equipped with "**!**" mark and **Input voltage > 20 V** message! Beep warning sound will be affected too!
- If resistance of current or potential probe is too high (>(4 k Ω + 100 RE) or >50 kΩ, whichever is lower), test result will be equipped with "**!**" mark and **Pote. spike Rp > xxx Ω** / **Curr. spike Rc > xxx Ω** message. The value xxx is currently calculated (for each displayed result) on basis of displayed result!
- If test result is out of measurement range (open test leads), **>20 k Ω** message will be displayed!

How to carry out Earth Resistance measurement using standard four-lead test method in combination with test clamp?

Step 1

- Set function switch to ρ **RE** position, “Earth Resistance” or “Earth Resistivity” menu will be displayed.
- Select **Earth Resistance function (standard four-lead method in combination with test clamp)** by using the **FUNC** (F1) key. Earth Resistance function (standard four-lead method in combination with test clamp) is selected when **R EARTH clamp** is displayed; see the figure below.



Re... Total Earth Resistance (clamp current not considered).
Rc... Resistance of current probe.
Rp... Resistance of potential probe.

Fig. 28. *Earth Resistance initial menu*

Step 2

- Set **High limit Earth Resistance value**; follow Step 2 on page 21. Total resistance (not partial) will be compared with set Limit value.

Step 3

- **Connect test leads** and **test clamp** to the instrument and to tested object, according to the figure below (press the **HELP** key for basic connection inf.).

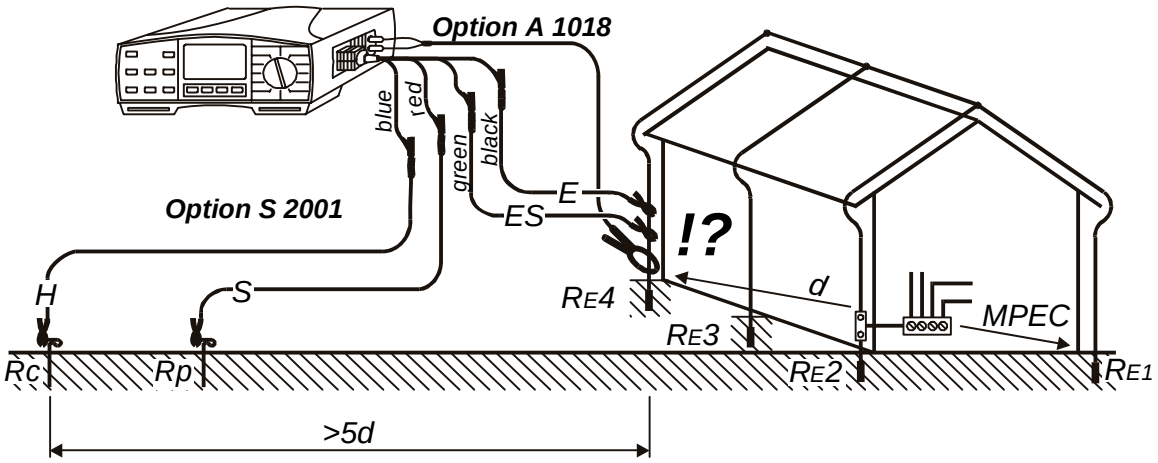


Fig. 29. *Connection of optional Earth Test Set – 20 m (Order No.* ***S 2001****) and optional Low-range Current Clamp (Order No.* ***A 1018****)*

!? ..... Make sure to connect test clamp under the E test terminal, otherwise parallel resistance of all other electrodes (R_E1 up to R_E3) will be measured!

Step 4

♦ Press the **START** key and keep it pressed, until result is stabilised, then release the key. Test result is displayed; see an example of the result on figure below.

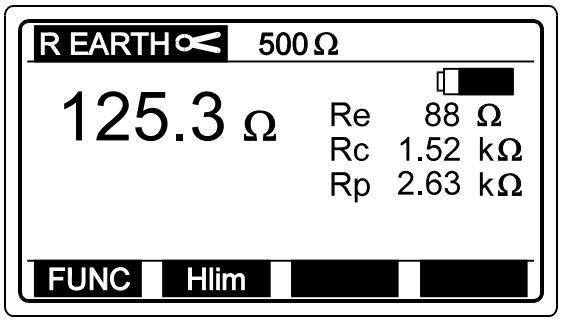


Fig. 30. *Example of Earth Resistance test result*

♦ Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

♦ In case of present external voltage higher than 20 V a.c./d.c. between H and E or ES and S test terminals, the Earth Resistance measurement will not be carried out after pressing **START** key, but the voltage will be displayed, equipped with "**!**" mark and **Input voltage > 20 V** message! Beep warning sound will be affected!

♦ If resistance of current or potential probe is too high (>(4 k Ω + 100 R_E) or >50 kΩ, whichever is lower), test result will be equipped with "**!**" mark and **Pote. spike Rp > xxx Ω** / **Curr. spike Rc > xxx Ω** message. The value xxx is currently calculated (for each displayed result) on basis of displayed result!

♦ If test result is out of measurement range (open test leads), **>20 k Ω** message will be displayed!

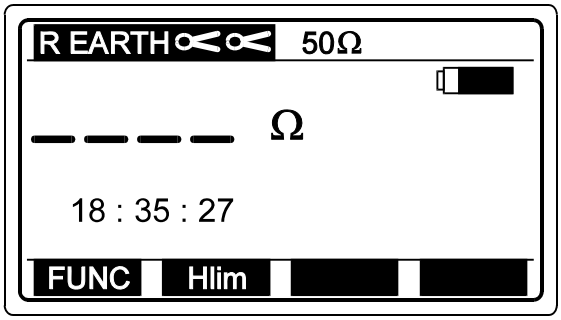
♦ If the current measured with clamp is lower than 0,5 mA, **Clamp current < 0,5 mA** message will be displayed, indicating test result may not be correct (the result is still correct, if **Rtot./Rpart. < 100**).

♦ In case of present current noise higher than 3 A in clamp loop, **Noise current > 3 A** message will be displayed, indicating test result may not be correct!

How to carry out Earth Resistance measurement using two test clamps?

Step 1

- Set function switch to ρ **RE** position, “Earth Resistance” or “Earth Resistivity” menu will be displayed.
- Select **Earth Resistance function using two test clamps** by using the **FUNC** (F1) key. Earth Resistance using two-clamp method is selected when **R EARTH two clamps** is displayed; see the figure below.



50 Ω ... Latest set high limit value.

Fig. 31. *Earth Resistance initial menu*

Step 2

- Set **High limit Earth Resistance value**; follow Step 2 on page 21.
  The limit value can be set to 1 up to 100 Ω in steps of 1 Ω.

Step 3

- **Connect test clamps** to the instrument and to tested object according to the figure below (press the **HELP** key for basic connection information).

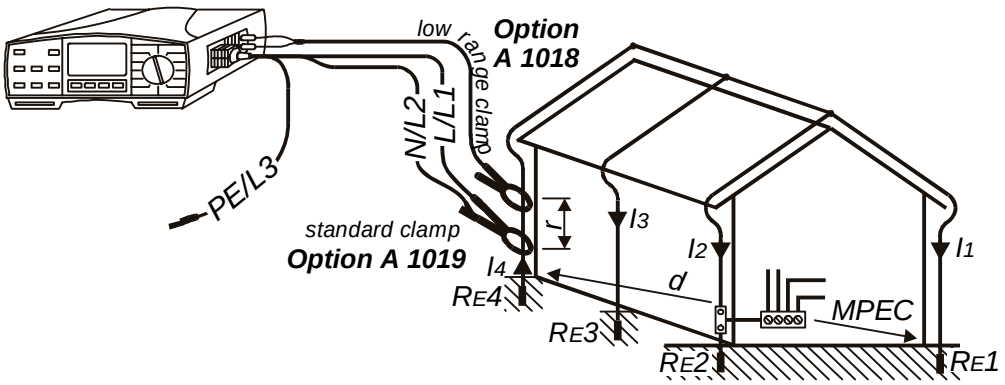


Fig. 32. *Connection of optional Standard-range Current Clamp (Order No.* ***A 1019****) using Universal Test Cable and opt. Low-range Current Clamp (Order No.* ***A 1018****)*

Step 4

- Press the **START** key and release it. The measurement starts to run (continuous measurement). Test results are currently displayed.

- Press the **START** key again after finishing the measurement, last result will stay displayed; see an example of the result on the figure below.

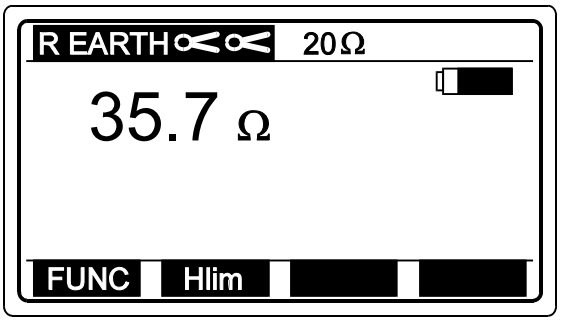


Fig. 33. *Example of Earth Resistance test result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- If test result is out of measurement range (open test leads), **>99,9 Ω** message will be displayed!

- In case of present noise current higher than 3 A, **Noise current > 3 A** message will be present, indicating test result may not be correct!

3.6. Specific Earth Resistance

It is advisable to measure Earth Resistivity, when calculating parameters of earthing system (required length and surface of earth electrodes, most appropriate depth of installing earthing system etc.) in order to reach more accurate calculations.

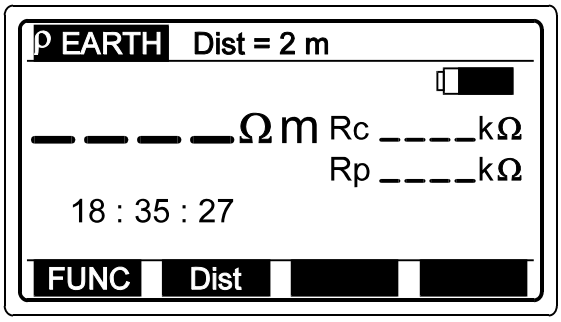
For additional general information concerning Earth Resistivity measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out the measurement?

Step 1

- Set function switch to ρ **RE** position, “Earth Resistance” or “Earth Resistivity” menu will be displayed.

- Select **Earth Resistivity function** by using the **FUNC** (F1) key. Earth Resistivity function is selected, when ρ **EARTH** is displayed; see the figure below.



Rc... Resistance of current probe.
Rp... Resistance of potential probe.

Fig. 34. *Earth Resistivity initial menu*

Step 2

- Set **distance “a”** between test rods. Set distance must be the same as it will be used later during the measurement (test rods must be dispositioned from each other at the set distance).

How to set the distance?

- Press the **DIST** (F2) key, to enter “Distance value adjustment mode”, the following menu will be displayed:

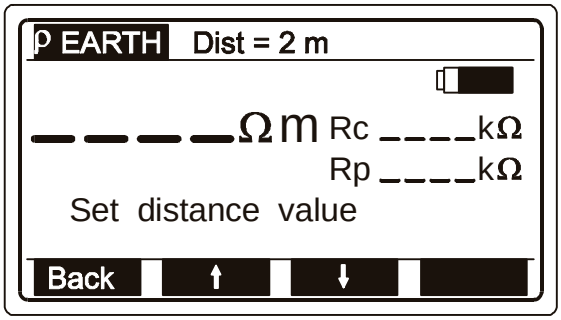


Fig. 35. *Distance value adjustment menu*

- Value between 1m and 30 m in steps of 1 m may be selected by using the **DIST** (F2) key. The value is currently displayed on top display line.

- Press the **Back** (F1) key after setting the distance value, to return to "Earth Resistivity initial menu" (see the figure 30.).

Step 3

- **Connect test leads** to the instrument and to test probes according to the figure below (press the **HELP** key for basic connection information).

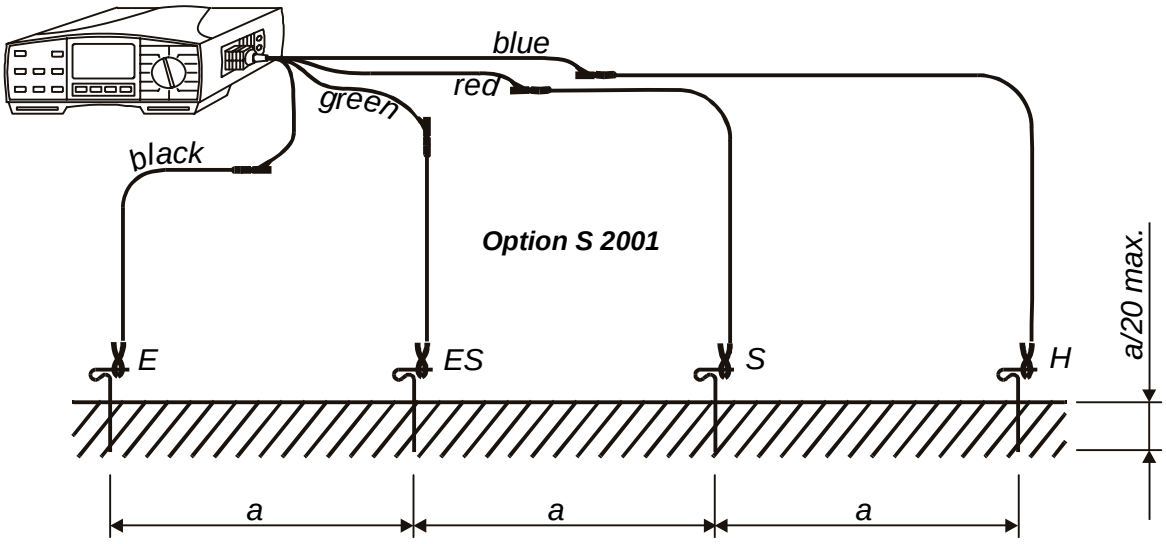


Fig. 36. *Connection of optional Earth Test Set – 20 m (Order No.* ***S 2001****)*

Step 4

- Press the **START** key and keep it pressed, until result is stabilised, then release the key. Test result is displayed; see an example of the result on figure below.

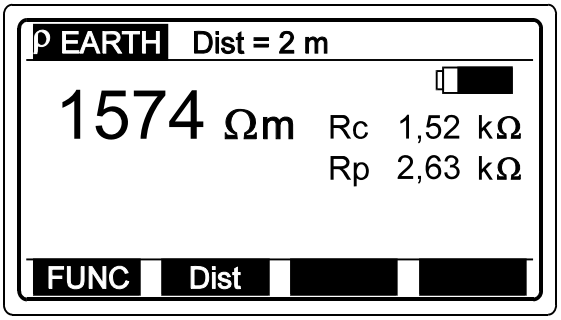


Fig. 37. *Example of Earth Resistivity test result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- In case of present voltage higher than 20 V a.c./d.c. between H and E test terminals, the Earth Resistivity measurement will not be carried out after pressing **START** key, but the voltage will be displayed, equipped with "**!**" mark and **Input voltage > 20 V** message! Beep warning sound will be affected too!

- If resistance of current or potential probe is too high (>(4 k Ω + 100 R_E) or >50 kΩ, whichever is lower), test result will be equipped with "**!**" mark and **Pote. spike Rp > xxx Ω** / **Curr. spike Rc > xxx Ω** message. The value xxx is currently calculated (for each displayed result) on basis of displayed result!

- If test result is out of measurement range (open test leads), **>2000 k Ωm** message will be displayed!

3.7. PE terminal test

While carrying out measurements, which require presence of mains voltage (RLOOP, ZLOOP or RCD parameters), the Eurotest 61557 automatically tests presence of phase voltage on PE protection terminal. The test is actual to be done on all mains outlets (one-phase as well as three-phase) on new or adapted installations, where phase and protective conductors might be reversed by mistake. Such a situation could be highly dangerous.

For additional general information concerning the PE terminal test, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

When is the test automatically done?

The test is automatically done always, when operator's finger touches PE test probe, located close to the **START** key (see position 6 on the figure 1). Function switch must be in RLOOP, ZLOOP or RCD position.

Step 1

- Connect appropriate test cable (Plug commander or Universal test cable) to Eurotest 61557.

- Set function switch to **RLOOP**, **ZLOOP** or **RCD** position. In these positions only will PE terminal be tested.

Step 2

- **Connect test cable** to mains one-phase or three-phase outlet or other object to be tested, according to the figures below.

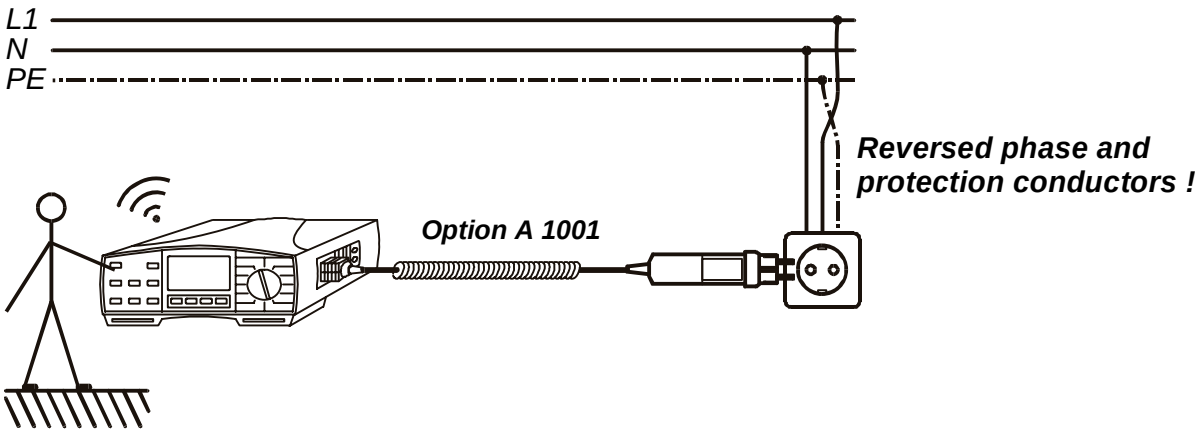


Fig. 38. *Connection of optional Plug Commander (Order No **A 1001**) to mains outlet with reversed L and PE conductors*

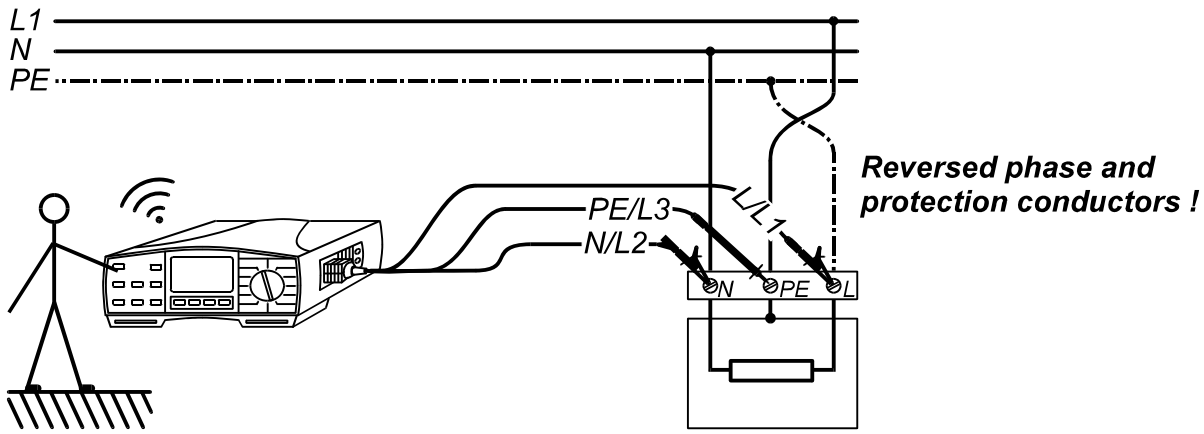


Fig. 39. *Connection of Universal Test Cable to load connection terminals with reversed L and PE conductors*

Step 3

- Touch PE test probe (operator touches it automatically, when pressing the **START** key, in order to carry out a measurement). If PE terminal is connected to phase voltage, warning message **Dangerous PE voltage** will appear on display, continuous bip bip…. sound signal will be present and no measurement will be done, after pressing START key.

Warning!

- **If phase voltage is detected on tested PE terminal, stop all the measurements immediately and take care the fault to be eliminated, before proceeding any activity!**

Note!

- Make sure to stand on non-isolated floor, while carrying out the test, otherwise test result may be wrong!

3.8. RCD - Contact Voltage and Earth / Fault Loop Resistance

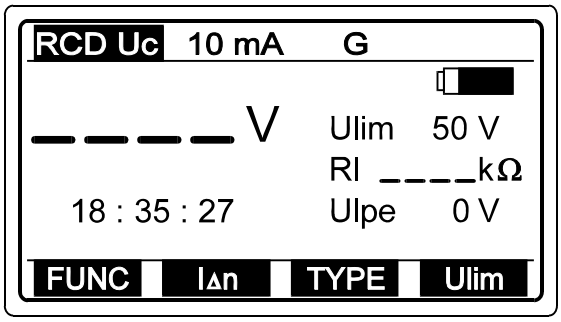
Both parameters are measured simultaneously without causing trip-out involved RCD. Select Fault Loop Resistance (Rs) function for better accuracy of Fault Loop Resistance result.

For additional general information concerning Contact Voltage / Earth Resistance measurement (mains test voltage), refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out the Contact Voltage measurement?

Step 1

- Connect test cable (Plug commander or Universal test cable) to Eurotest 61557.
- Set function switch to **RCD** position, one of RCD initial menus will be displayed.
- Select **Contact Voltage function** by using the **FUNC** (F1) key. The function is selected when **RCD Uc** is displayed; see the figure below.



Ulim .... Set limit Contact Voltage.
Rl..... Fault loop resistance (subresult).
Ulpe.... Mains voltage between phase L and protective PE conductors.

Fig. 40. *Contact Voltage initial menu*

Step 2

- Select **Limit Contact Voltage value Ulim** by using the **Ulim** (F4) key. The voltage can be set to either 25 or 50 V and it is currently displayed. Later will test results be compared with the set limit value and if higher, they will be equipped with "**!**" mark as well as with **Voltage Uc/IΔn > Ulim** (standard type is selected) or with **Voltage Uc/2IΔn > Ulim** (selective type is selected) message.

Step 3

- Select **Nominal differential current IΔn** by using the **IΔn** (F2) key. The current can be set to 10, 30, 100, 300, 500 or 1000* mA and it is currently displayed on top display line.

* 650 mA on some versions

Step 4

♦ Select **Type of involved RCD** by using the **TYPE** (F3) key. The following types can be selected:

G General, AC or A	**S** Selective, AC or A	**G** General pulsed, A	**S** Selective pulsed, A

Selection is displayed on the top line.

Step 5

♦ **Connect test cable** to tested object (mains outlet or other test terminals), according to one of the figures below (press the **HELP** key for basic connection information).

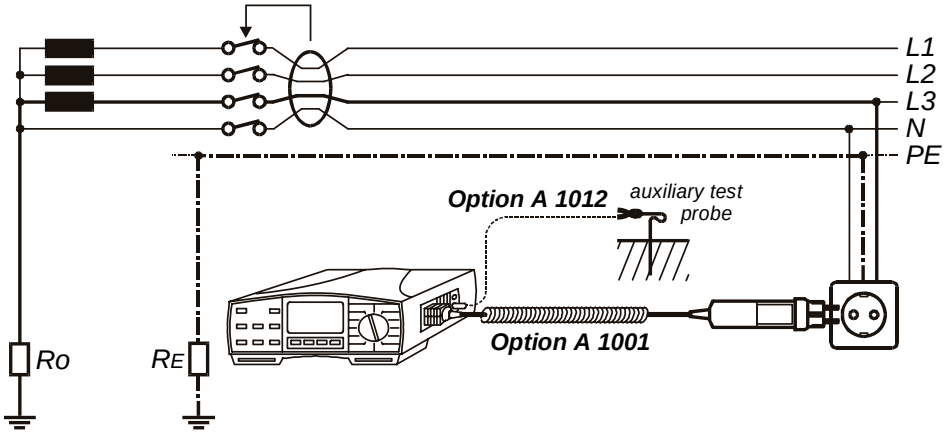


Fig. 41. *Connection of optional Plug Commander (Order No.* ***A 1001****), measurement with or without auxiliary test probe connected via optional Probe Test Lead (Order No.* ***A 1012****)*

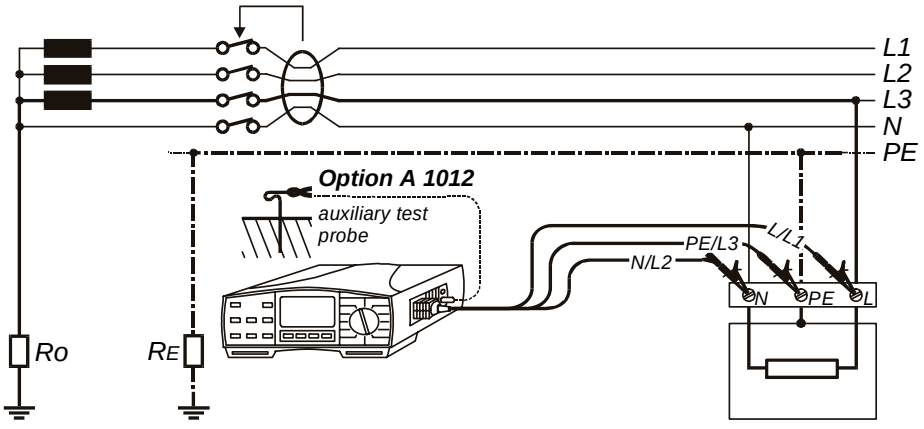
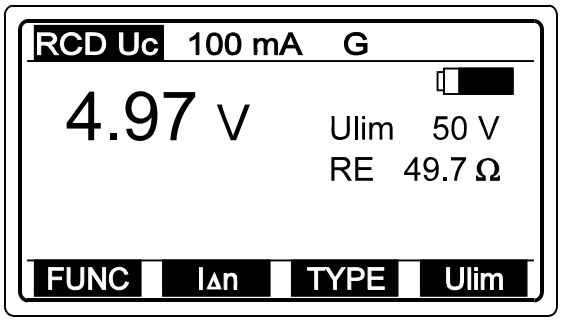


Fig. 42. *Connection of Universal Test Cable, measurement with or without auxiliary test probe connected via optional Probe Test Lead (Order No.* ***A 1012****)*

The instrument will automatically recognise potentially connected auxiliary test probe and on that basis will measure either Earth Resistance (auxiliary test probe is used) or Fault Loop resistance (auxiliary test probe is not used).

Step 6

- Press the **START** key and release it. Measurement will be carried out and result displayed afterwards. See an example of the result on the figure below.



RE (Earth Resistance) is displayed meaning auxiliary test probe has been used. In that case Uc is measured with respect to auxiliary test probe (real ground).
If RL (Loop Resistance) is displayed meaning auxiliary test probe has not been used, then Contact Voltage is measured with respect to phase terminal.

Fig. 43. *Example of Contact Voltage test result and Earth / Fault Loop Resistance subresult*

Measured Contact voltage is scaled to Nominal differential current (Standard RCD) or to double Nominal differential current (Selective RCD) and multiplied by 1,05 (because of safety reason) and then displayed.
Displayed resistance RE/Rl is calculated as Uc (displayed) / IΔn.

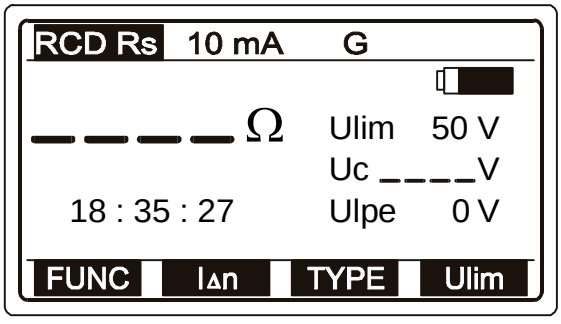
- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

How to measure the Earth / Loop Resistance?

For more accurate Earth / Loop Resistance result (in comparison with RE/RL subresult in Contact Voltage function) the following procedure is advised to be carried out:

Step 1

- Connect test cable (Plug commander or Universal test cable) to Eurotest 61557.
- Set function switch to **RCD** position, one of RCD initial menus will be displayed.
- Select **Earth / Loop Resistance function** by using the **FUNC** (F1) key. The function is selected when **RCD Rs** is displayed; see the figure below.



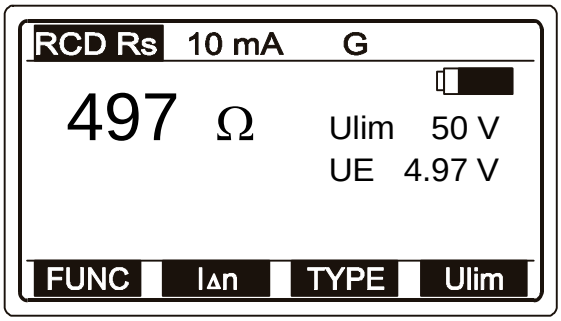
Ulim .... Set limit Contact Voltage.
Uc ..... Measured Contact Voltage (subresult).
Ulpe .... Mains voltage between phase L and protective PE conductors.

Fig. 44. *Earth / Loop Resistance initial menu*

Step 2 up to Step 5 refer to Contact Voltage function.

Step 6

- Press the **START** key and release it (if there are only L and PE terminals connected to the instrument then press the START key twice successively). Wait for the measurement to be carried out and result displayed afterwards. The measurement may last longer (up to 1 min approx.) in order accurate result to be achieved. See an example of the result on the figure below.



UE is displayed meaning auxiliary test probe has been used. In that case Uc is measured with respect to auxiliary test probe (real ground) and present Rs result is equal to Earth Resistance value.
If Uc value is displayed meaning auxiliary test probe has not been used, then Contact Voltage is measured with respect to phase terminal.

Fig. 45. *Example of Earth / Loop Resistance test result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- Nominal input voltage range is 100 ÷ 264 V, if voltage is out of the range, "**!**" mark and **Voltage Ulpe < 100 V** / **Voltage Ulpe > 264** message will be displayed after pressing the **START** key. Warning sound signal will be affected too.
- Limit Contact Voltage Ulim can be set in **Contact Voltage** or **Earth / Loop Resistance** function only!
- RCD type (S or G) and Nominal differential current once set, will be offered in all other RCD functions (wherever actual)!
- Current, flowing to PE protective conductor, caused by faulty appliances or capacitive connection between L and PE terminals will influence the test result. Disconnect such appliances before measurement!
- **Valid for GB version of the Eurotest 61557**: If N/L2 and L/L1 test leads are connected reversed way (Universal test cable) or terminals on tested wall plug are reversed, **L-N crossed** message marked with "**!**" symbol will be displayed and no measurement will be carried out after pressing the START key.

Valid for other versions of the Eurotest 61557: The instrument will exchange L and N terminals automatically if N/L2 and L/L1 test leads are connected reversed way (Universal test cable) or Plug Commander is turned around or terminals on tested wall outlet are reversed.

The note is valid for all mains socket measurements!

- Specified accuracy of Uc or Rs measurement is valid only if earthing system connected to PE terminal is free of interfering voltages!

3.9. RCD – Trip-Out Time

In order to assure safe conditions, RCD device must trip out within a certain time, in case of present fault on connected electric appliance. See allowed trip out time ranges in the following table.

Type of RCD protection switch	I∆n	2I∆n	5I∆n*	Remark
Standard	0,3 s	0,15 s	0,04 s	max. allowed trip-out time
Selective	0,5 s	0,2 s	0,15 s	max. allowed trip-out time
	0,13 s	0,06 s	0,05 s	min. allowed trip-out time

Table 1. *Allowed trip out times according to EN 61009 standard*

For additional general information concerning the measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

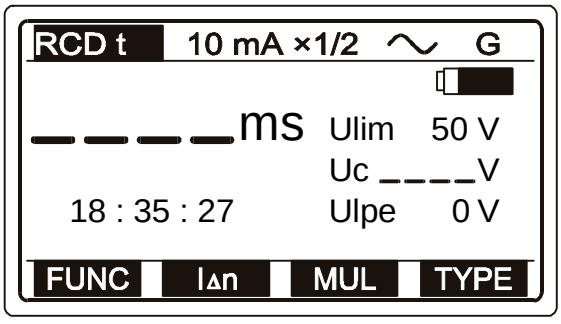
How to carry out the measurement?

Step 1

- Follow **Step 1**, described under paragraph **3.7. Contact Voltage**, except selecting RCD function; see the next step.

Step 2

- Select **Trip out time function** by using the **FUNC** (F1) key. Trip-out time function is selected when **RCD t** is displayed; see the figure below.



Ulim .... Latest set limit Contact Voltage.
Uc..... Contact Voltage at nominal current (standard type of RCD) or at double nominal current (selective type of RCD).
Ulpe.... Mains voltage between phase L and protective PE conductors.

Fig. 46. *Trip out time function initial menu*

Step 3

♦ Select **Nominal differential current I∆n** by using the **I∆n** (F2) key. The current can be set to 10, 30, 100, 300, 500 or 1000* mA and it is currently displayed on top display line.

Step 4

♦ Select **Multiplier of nominal differential current** by using the **MUL** (F3) key. The multiplier defines test current value, for example I∆n = 100 mA, multiplier = 5, then test current Itest = 500 mA. The multiplier can be ½, 1, 2 or 5 and it is currently displayed on top display line. Value × 5 is not available, if I∆n = 1000 mA is selected. In case of selected test for RCD A type (see *step 5*), the value x 2 is not available for I∆n = 1000* mA and the value x 5 is not available for I∆n = 300 mA, 500 mA, and 1000* mA.

* 650 mA on some versions

Step 5

♦ Select **Type of tested RCD and start polarity of test current** by using the **TYPE** (F4) key. The following possibilities can be selected:

G General, AC or A	**G** General, AC or A	**S** Selective, AC or A	**S** Selective, AC or A
G General pulsed, A	**G** General pulsed, A	**S** Selective pulsed, A	**S** Selective pulsed, A

Selection is displayed on the top line.

positive start polarity (0°) *negative start polarity (180°)*

Fig. 47. *Start polarity of test current*

Step 6

♦ **Connect test cable to tested object.** Follow **Step 5** described under paragraph **3.7. Contact Voltage**.

Step 7

♦ Press the **START** key and release it. Measurement will be carried out and result displayed afterwards. See an example of the result on the figure below.

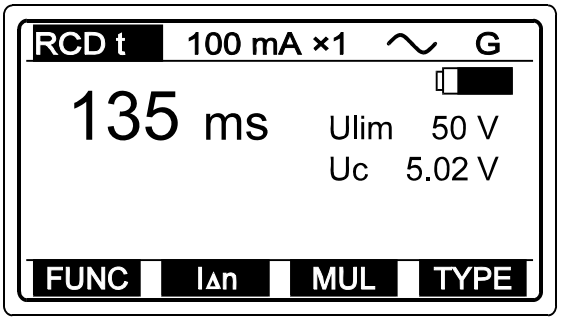


Fig. 48. *Example of Trip out time test result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Test of Selective RCD
For safety reason, Contact voltage measurement is carried out (regardless of RCD type) before Trip out Time measurement is realised. As the Selective type of RCD (delayed trip out) operates on basis of integration of fault current, it is necessary to relax it, before Trip out Time measurement is carried out, otherwise the test is not relevant. That is why waiting time of 30s is involved before Trip out Time measurement. The waiting time is presented on display as countdown from 30 to 0.

Notes!
- Nominal input voltage range is 100 ÷ 264 V, if voltage is out of the range, "**!**" mark and **Voltage Ulpe < 100 V** / **Voltage Ulpe > 264** message will be displayed after pressing **START** key. Warning sound signal will be effected too.

- Limit Contact Voltage Ulim can be set in **Contact voltage** function only!

- RCD type (S or G) and Nominal differential current, set in any RCD function, will be offered in all other RCD functions (wherever actual)!

- For safety reason will Trip out Time measurement be carried out only, if Contact voltage at nominal differential current is lower than set Limit Contact voltage.

- Current, flowing to PE protective conductor, caused by faulty appliances or capacitive connection between L and PE terminals, will influence the test result. Disconnect such appliances, before measurement is started!

- Specified accuracy of Uc measurement is valid only, if earthing system connected to PE terminal is free of interfering voltages!

3.10. RCD – Trip-Out Current

For general information concerning Tripping current measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

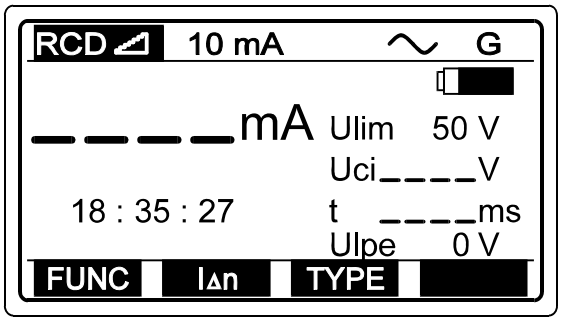
How to carry out the measurement?

Step 1

- Follow **Step 1,** described under paragraph **3.7. Contact Voltage**, except selecting RCD function; see the next step.

Step 2

- Select **Tripping current function** by using the **FUNC** (F1) key. Tripping current function is selected when **RCD rising current** is displayed; see the figure below.



Ulim..... Latest set limit Contact Voltage.
Uci..... Contact Voltage at tripping current I_Δ.
t..... Trip out time at tripping current I_Δ.
Ulpe .... Mains voltage between phase L and protective PE conductors.

Fig. 49. *Tripping current function initial menu*

Step 3

- Select **Nominal differential current I_Δn** by using the **I_Δn** (F2) key. The current can be set to 10, 30, 100, 300, 500 or 1000* mA and it is currently displayed on top display line.

* 650 mA on some versions.

Step 4

- Select **Type and Start polarity of test current** by using the **TYPE** (F3) key. The following possibilities can be selected:

G General, AC or A	**G** General, AC or A	**G** General pulsed, A	**G** General pulsed, A

Selection is displayed on the top line.

Step 5

- **Connect test cable to tested object.** Follow **Step 5** described under paragraph **3.7. Contact Voltage**.

Step 6

- Press the **START** key and release it. Wait for the measurement to be accomplished (stepping up current is displayed during measurement), final result will be displayed afterwards. See an example of the result on figure below.

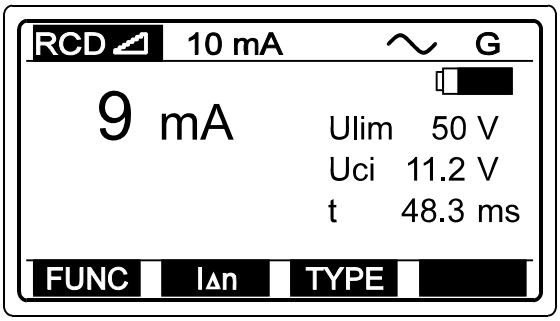


Fig. 50. *Example of Tripping current test result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- Nominal input voltage range is 100 ÷ 264 V, if voltage is out of the range, "**!**" mark and **Voltage Ulpe < 100 V** / **Voltage Ulpe > 264** message will be displayed after pressing **START** key. Warning sound signal will be effected too.

- Limit Contact Voltage Ulim can be set in **Contact voltage** function only!

- Nominal differential current, set in any RCD function, will be offered in all other functions!

- For safety reason will Trip out Time measurement be carried out only, if Contact voltage at nominal differential current is lower than set Limit Contact voltage.

- Current, flowing to PE protective conductor, caused by faulty appliances or capacitive connection between L and PE terminals, will influence the test result. Disconnect such appliances, before measurement is started!

- Specified accuracy of Uc measurement is valid only, if earthing system connected to PE terminal is free of interfering voltages!

3.11. RCD – Automatic Test

Purpose of the function is to carry out complete test of RCD and measurement of belonging parameters (Contact Voltage, Earth / Fault loop resistance and Trip out time at different fault currents) in one set of automatic tests, led by the instrument. If any false parameter is noticed during this automatic test, individual parameter test is to be used for further investigation.

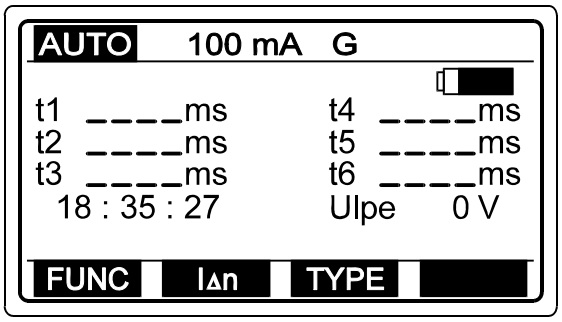
How to carry out the automatic measurement?

Step 1

- Follow **Step 1**, described under paragraph **3.7. RCD - Contact Voltage**, except selecting RCD function; see the next step.

Step 2

- Select **Automatic test function** by using the **FUNC** (F1) key. Automatic test function is selected when **AUTO** is displayed; see the figure below.



t1 to t6 ...Trip out time of each partial test.
Ulpe.....Mains voltage between phase (L) and protective (PE) terminals.

Fig. 51. *Auto function initial menu*

Step 3

- Select **Nominal differential current IΔn** by using the **IΔn** (F2) key. The current can be set to 10, 30, 100, 300 or 500 mA and it is currently displayed on top display line.

Step 5

- Select **Type of tested RCD** by using the **TYPE** (F3) key. The following types can be selected:

G General, AC or A	**S** Selective, AC or A	**G** General pulsed, A	**S** Selective pulsed, A

Selection is displayed on the top line.

Step 6

- **Connect test cable** to tested object**.** Follow **Step 5** described under paragraph **3.7. RCD - Contact Voltage**.

Step 7

- Press the **START** key and release it. Measurement will start to run, partial tests will be followed by partial results as follows: The next presentation is valid for standard type of RCD.

1st test

Trip out time test, using test current Itest = I∆n/2, at positive start polarity of test current (0°). Tested RCD should not trip, the following result will appear after a while:

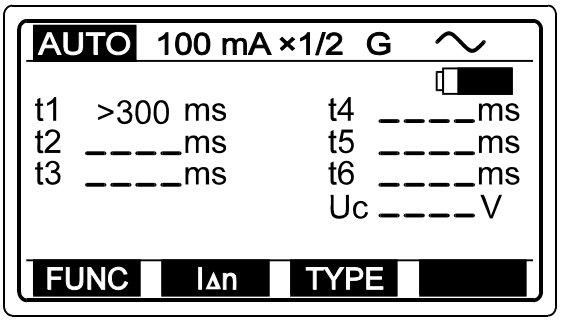


Fig. 52. *Example of the first partial result*

Successfully ended first test (no trip-out of RCD) will automatically be followed by the second one.

2nd test

Trip out time test, using test current Itest = I∆n/2, at negative start polarity of test current (180°). Tested RCD should not trip, the following result will appear after a while:

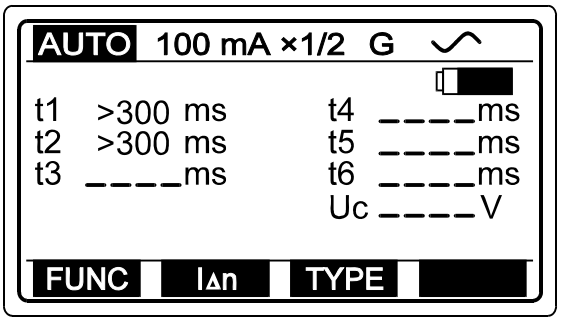


Fig. 53. *Example of the second partial result*

Successfully ended second test (no trip-out of RCD) will automatically be followed by the third one.

3rd test

Trip out time test, using test current Itest = I∆n, at positive start polarity of test current (0°). Tested RCD should trip, the following result will appear after a while:

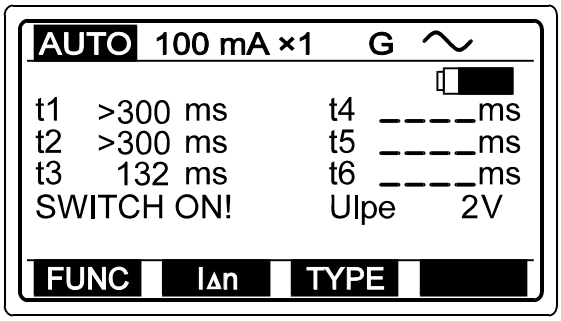


Fig. 54. *Example of the third partial result*

Reswitch RCD, fourth test will follow automatically.

4th test
Trip out time test, using test current Itest = I∆n, at negative start polarity of test current (180°). Tested RCD should trip, the following result will appear after a while:

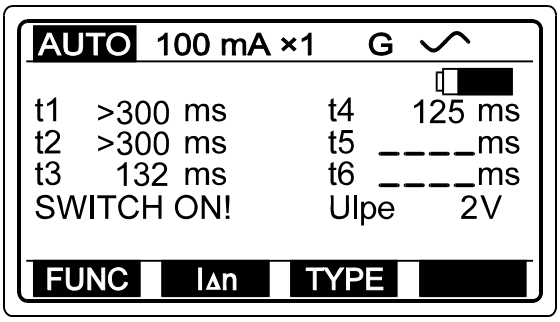


Fig. 55. *Example of the fourth partial result*

Reswitch RCD, fifth test will follow automatically.

5th test
Trip out time test, using test current Itest = 5I∆n, at positive start polarity of test current (0°). Tested RCD should trip; the following result will appear after a while:

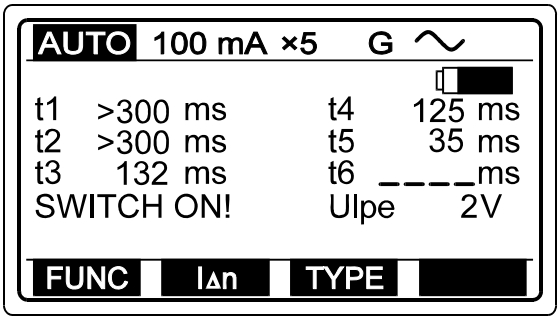
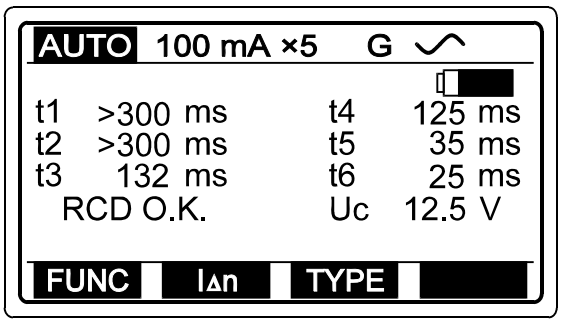


Fig. 56. *Example of the fifth partial result*

Reswitch RCD, sixth test will follow automatically.

6th test
Trip out test, using test current Itest = 5I∆n, at negative start polarity of test current (180°). Tested RCD should trip, the following final result will appear after a while:



RCD O.K. mark indicates that all partial results are within Limit values.

Uc ..... Contact voltage at IΔn (standard RCD) or at 2IΔn (selective type).

Fig. 57. *Example of the sixth partial result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

If trip out time in any step is out of allowed range (see the table 1), automatic test will be stopped and **Time out of limit** message will be displayed.
If RCD trips during Contact voltage measurement (some leakage current is already flowing to PE conductor or tested RCD is too sensitive), **RCD tripped out** message will be displayed.

Test of Selective RCD
For safety reason, Contact voltage measurement is carried out in each step (regardless of RCD type) before Trip out Time measurement is realised. As the Selective type of RCD (delayed trip out) operates on bases of integration of fault current, it is necessary to relax it, before Trip out Time measurement is carried out, otherwise the test is not relevant. That is why waiting time of 30s is involved in some tests namely: Test 3, Test 4, Test 5 and Test 6. The waiting time is presented on display as **Wait** message and countdown from 30 to 0.

Notes!
- Nominal input voltage range is 100 ÷ 264 V, if voltage is out of the range, "**!**" mark and **Voltage Ulpe < 100 V** / **Voltage Ulpe > 264** message will be displayed after pressing **START** key. Warning sound signal will be effected too.
- Limit Contact Voltage Ulim can be set in **Contact voltage** function only!
- RCD type (S or G) and Nominal differential current and its type, set in any RCD function, will be offered in all other RCD functions (wherever actual)!
- Auto test is finished with t4 test in case of testing the RCD type A with rated residual currents of IΔn = 300 mA, 500 mA, and 1000* mA. Auto test result passes in this case if t1 to t4 results pass.
- For safety reason will Trip out Time measurement be carried out only, if Contact voltage at nominal differential current is lower than set Limit Contact voltage.
- Current, flowing to PE protective conductor, caused by faulty appliances or capacitive connection between L and PE terminals, will influence the test result. Disconnect such appliances before measurement is started!
- Specified accuracy of Uc measurement is valid only, if earthing system connected to PE terminal is free of interfering voltages!

* 650 mA on some versions

3.12 Fault Loop Impedance and Prospective Short-circuit Current

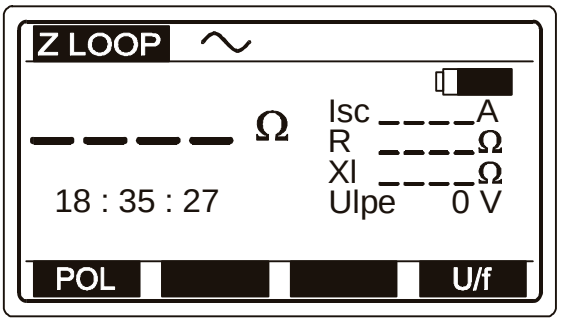
For general information concerning the measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out the measurement?

Step 1

♦ Connect test cable (Plug commander or Universal test cable) to Eurotest 61557.

♦ Set function switch to **ZLOOP** position, the following menu will be displayed:



Isc..... Prospective short-circuit current.
R..... Resistive part of impedance.
Xl..... Inductive part of impedance.
Ulpe.. Mains voltage between phase (L) and protective (PE) terminals.

Fig. 58. *Fault loop impedance initial menu*

Note!
To change the displayed parameter value between Ulpe (mains voltage between phase (L) and protective (PE) terminals) and mains frequency f, press the **U/f** (F4) key.

Step 2

♦ Select **Test Current Start Polarity** by using the **POL** (F1) key. The polarity can be either positive or negative (see the figure 43). Selected polarity is currently displayed on top display line.

Why to select the polarity?

If RCD device protects tested loop, it may happen the device to trip out during the test, disabling the test to be accomplished. Some of RCD devices are sensitive to one polarity only. As the test current, in fault loop impedance measurement, flows only within a half of a period, trip out of RCD may be avoided, selecting appropriate polarity.

Step 3

♦ **Connect test cable** to tested object (mains outlet or other test terminals), according to the figures below (press the **HELP** key for basic connection information).

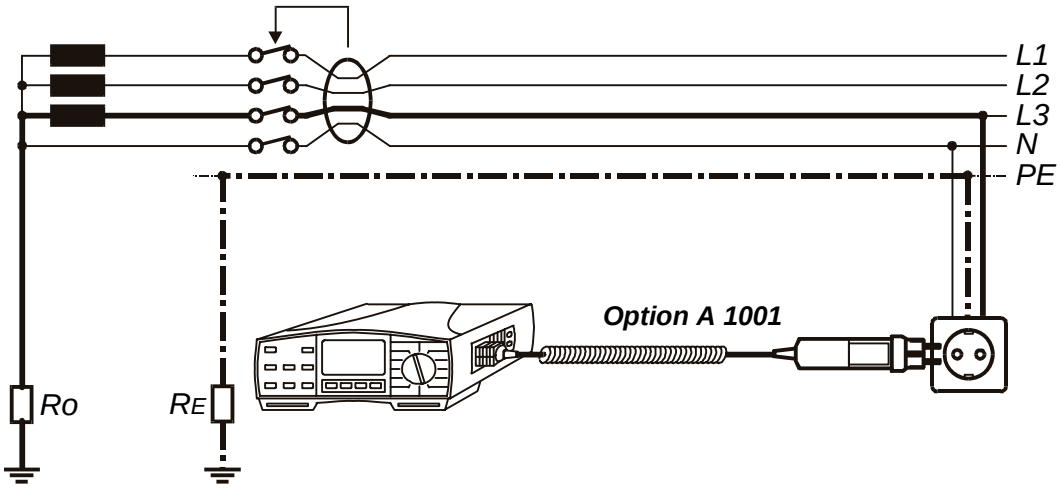


Fig. 59. *Connection of optional Plug Commander (Order No.* ***A 1001****)*

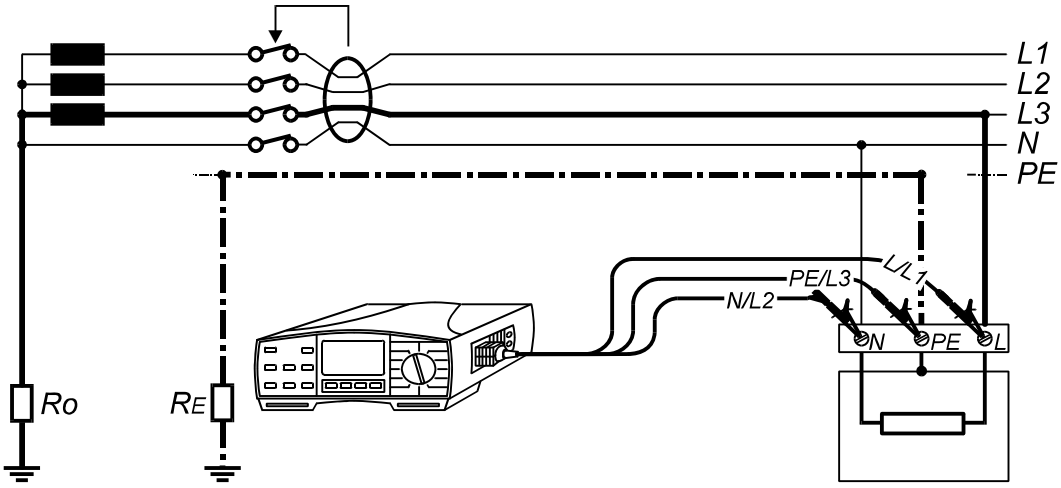
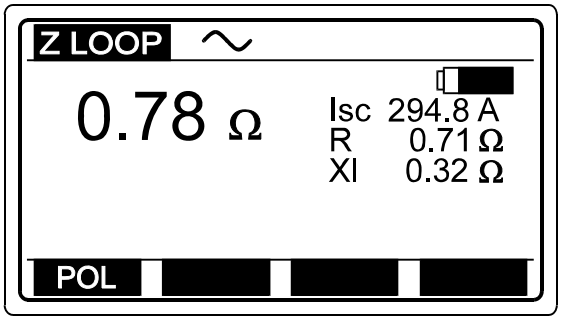


Fig. 60. *Connection of Universal Test Cable*

Step 4

♦ Press the **START** key and release it. Measurement will be carried out and result displayed afterwards. See an example of the result on the figure below.



Ipsc (Isc marked on display) **=**
= Un ·1,06 / ZLOOP

Un..... 115V (100 V ≤ Uinp < 160 V)
230V (160 V ≤ Uinp ≤ 264 V)

Fig. 61. *Example of Loop Impedance / Prospective Short-circuit Current result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- Nominal input voltage range is 100 ÷ 264 V, if voltage is out of the range, "**!**" mark and **Voltage Ulpe < 100 V** / **Voltage Ulpe > 264** message will be displayed after pressing **START** key. Warning sound signal will be effected too.

- In case of too hot instrument **Overheated** message will be displayed – wait and try again later!

- The instrument will exchange L and N terminals automatically, if N/L2 and L/L1 test leads (Universal test cable) are connected reversed way or terminals on tested wall plug are reversed or Plug commander is turned around!

- If test result is out of measurement range, **>2 k Ω** message will be displayed!

- Specified accuracy of test parameters is valid only, if mains voltage is stabile during the measurement!

3.13. Contact Voltage at Prospective Short-circuit Current

For general information concerning the measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out the measurement?

All the operation is equal to the one for Loop Impedance / Prospective Short-circuit Current measurement, while connection of test leads must be realised according to the figure 58.

Step 1

- Connect Universal test cable to main test connector and auxiliary test lead to C2/P test terminal of the Eurotest 61557.

- Set function switch to **ZLOOP** position, the menu according to the figure 54. will be displayed.

Step 2

- Select **Start polarity of test current;** see Step 2 on page 46.

Step 3

Connect test cable to tested object, according to the figure below (press the **HELP** key for basic connection information).

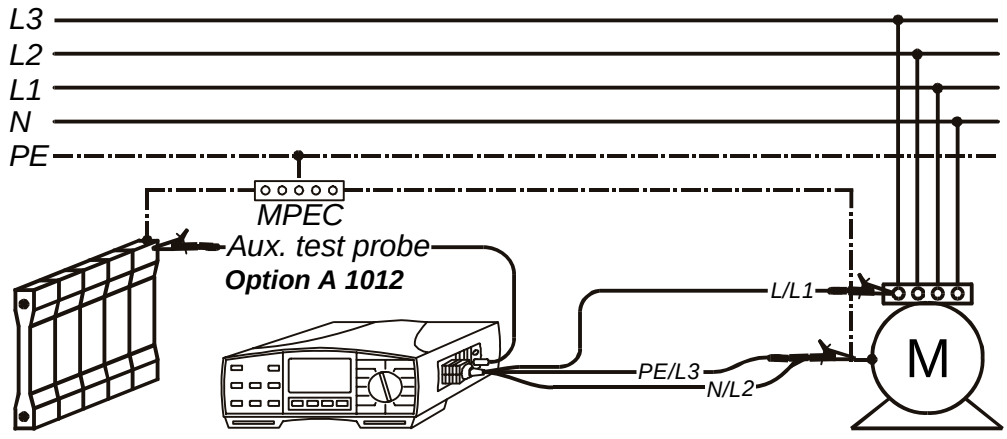
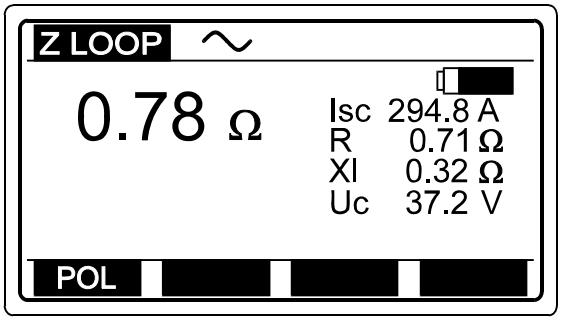


Fig. 62. *Connection of Universal Test Cable and auxiliary test probe via optional Probe Test Lead (Order No.* ***A 1012****)*

Step 4

- Press the **START** key and release it. The Eurotest 61557 will automatically recognise connection of auxiliary test probe, measurement will be carried out and result displayed afterwards. See an example of the result on the figure below.



Uc..... Contact Voltage scaled to Prospective Short-circuit Current.

Fig. 63. *Example of Contact Voltage at short-circuit current result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- Nominal voltage range is 100 ÷ 264 V, if voltage is out of the range, "**!**" mark and **Voltage Ulpe < 100 V** / **Voltage Ulpe > 264** message will be displayed after pressing **START** key. Warning sound signal will be effected too.

- In case of too hot instrument **Overheated** message will be displayed – wait and try again later!

- The instrument will exchange L and N terminals automatically, if N/L2 and L/L1 test leads (Universal test cable) are connected reversed way or terminals on tested wall plug are reversed or Plug commander is turned around!

- Specified accuracy of test parameters is valid only, if mains voltage is stabile during the measurement!

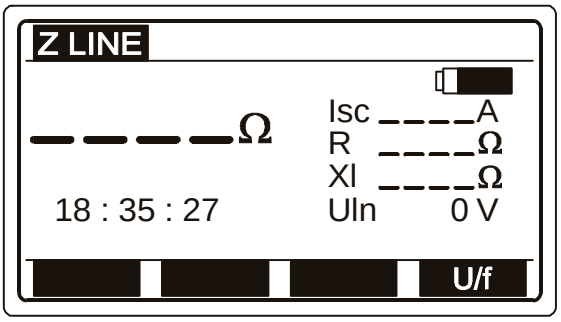
3.14. Line Impedance and Prospective Short-circuit Current

For general information concerning the measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out the measurement?

Step 1

- Connect test cable (Plug commander or Universal test cable) to Eurotest 61557.
- Set function switch to **ZLINE** position, the following menu will be displayed:



Isc ... Prospective chort-circuit current.
R ..... Resistive part of impedance.
XL ... Inductive part of impedance.
Uln .. Mains voltage between the phase (L) and neutral (N) terminals.

Fig. 64. *Line impedance initial menu*

Note!
To change the displayed parameter value between Uln (mains voltage between phase (L) and neutral (N) terminals) and mains frequency f, press the **U/f** (F4) key.

Step 2

- **Connect test cable** to tested object (mains outlet or other test terminals), according to the figures below (press the **HELP** key for basic connection information).

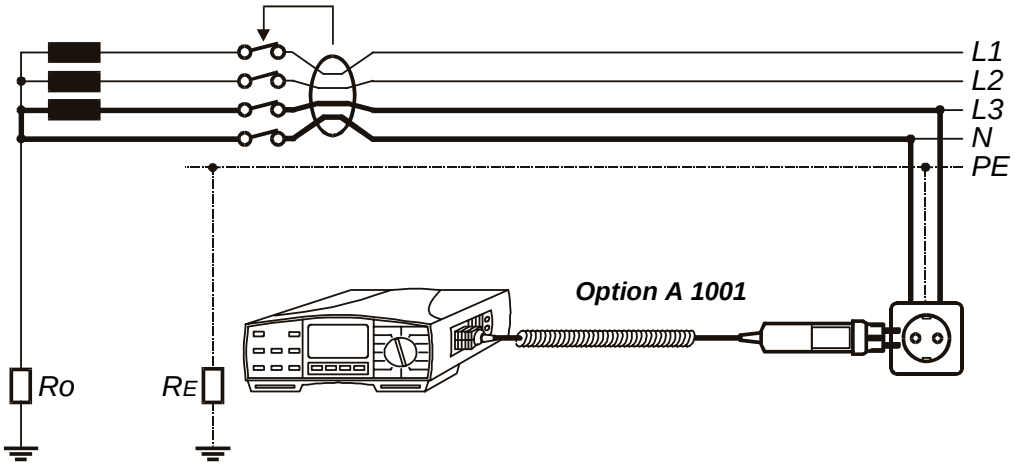


Fig. 65. *Connection of optional Plug Commander (Order No.* ***A 1001****)*

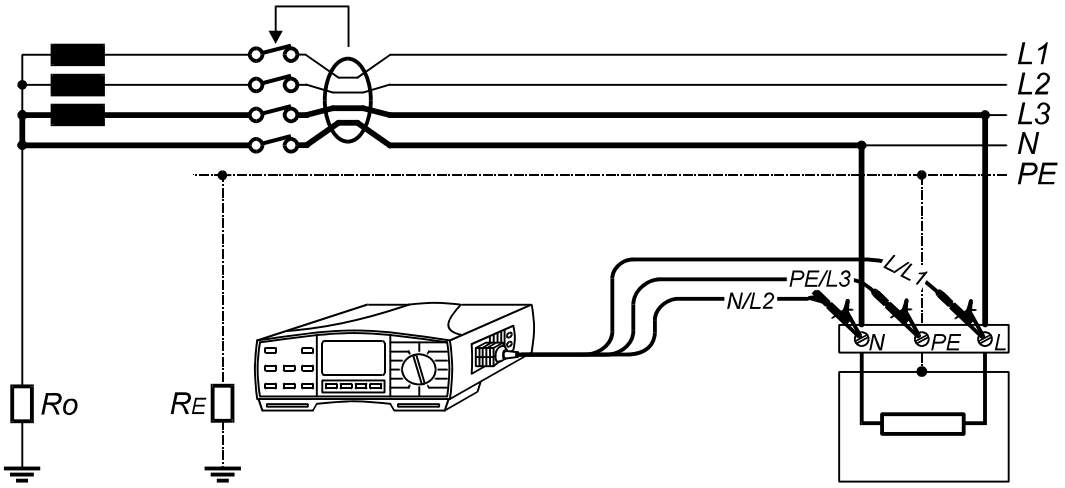
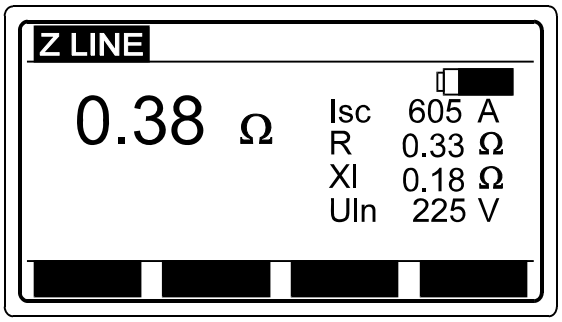


Fig. 66. *Connection of Universal Test Cable*

Step 3

- Press the **START** key and release it. Measurement will be carried out and result displayed afterwards. See an example of the result on the figure below.



Ipsc (Isc marked on display) **=**
= Un ·1,06 / ZLINE

Un..... 115 V (100 V ≤ Uinp < 160 V)
230 V (160 V ≤ Uinp ≤ 315 V)
400 V (315 V < Uinp ≤ 440 V)

Fig. 67. *Example of Line Impedance / Prospective Short-circuit Current result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- Nominal voltage range is 100 ÷ 440 V, if input voltage is out of the range, "**!**" mark and **Voltage Uln < 100 V** / **Voltage Uln > 440 V** message will be displayed after pressing **START** key. Warning sound signal will be effected too.
- In case of too hot instrument **Overheated** message will be displayed – wait and try again later!
- If test result is out of measurement range, **>2 k Ω** message will be displayed!
- Specified accuracy of test parameters is valid only, if mains voltage is stabile during the measurement!

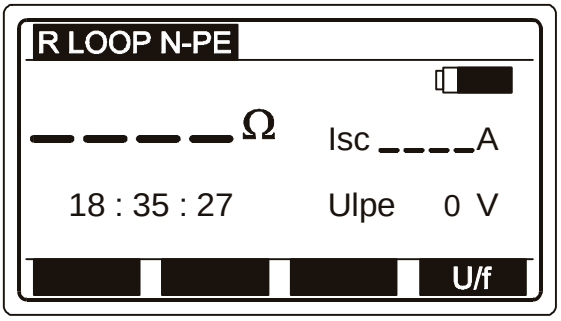
3.15. N-PE Loop Resistance and Prospective Short-circuit Current

For general information concerning the measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out the measurement?

Step 1

- Connect test cable (Plug commander or Universal test cable) to Eurotest 61557.
- Set function switch to **RLOOP N-PE** position, the following menu will be displayed:



Isc .....Prospective short-circuit current in fault loop, between phase and protective terminals.
Ulpe...Mains voltage between phase (L) and protective (PE) terminals.

Fig. 68. *N-PE Loop Resistance / Prospective Short-circuit Current initial menu*

Note!
To change the displayed parameter value between Ulpe (mains voltage between phase (L) and protective (PE) terminals) and mains frequency f, press the **U/f** (F4) key.

Step 2

- **Connect test cable** to tested object (mains outlet or other test terminals), according to the figures below (press the **HELP** key for basic connection information).

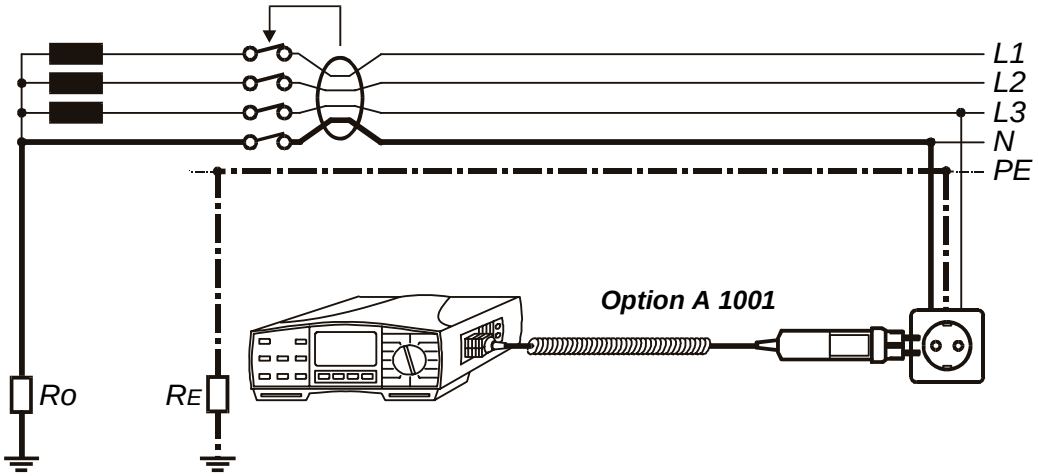


Fig. 69. *Connection of optional Plug Commander (Order No.* ***A 1001****)*

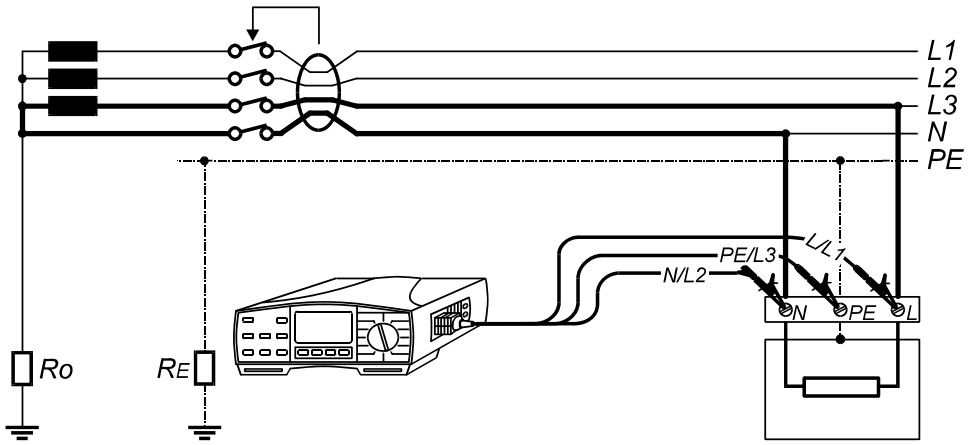
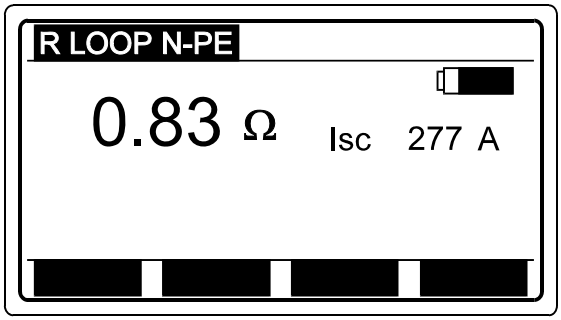


Fig. 70. *Connection of Universal Test Cable*

Step 3

- Press the **START** key and release it, the measurement will be carried out and result displayed afterwards; see an example of the result on the figure below.



Ipsc (Isc marked on display) **=**
= Un ·1,06 / RLOOP N-PE

Un..... 115 V (100 V ≤ Uinp < 160 V)
230 V (160 V ≤ Uinp ≤ 264 V)

Fig. 71. *Example of N-PE Loop Resistance / Prospective Short-circuit Current test result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- Nominal input voltage range is 100 ÷ 264 V, if voltage is out of the range, "**!**" mark and **Voltage Ulpe < 100 V** / **Voltage Ulpe > 264 V** message will be displayed after pressing **START** key. Warning sound signal will be effected too.
- The instrument will exchange L and N terminals automatically, if N/L2 and L/L1 test leads (Universal test cable) are connected reversed way or terminals on tested wall plug are reversed or Plug commander is turned around!
- Even the method uses internal test voltage, phase voltage is required to be present between L/L1 and PE/L3 test leads, for instrument's protection reason namely, phase and neutral conductors at tested outlet may be reversed. Also Prospective short-circuit current is calculated on basis of the voltage.
- Earth Resistance internal generator is used, to carry out the measurement (safety a.c. test voltage).
- If test result is out of measurement range, **>2 k Ω** message will be displayed!

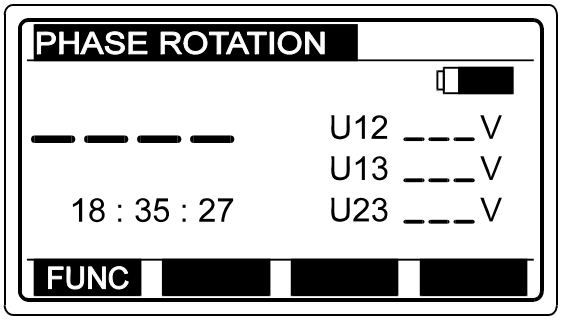
3.16. Phase rotation

For general information concerning the test, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out the measurement?

Step 1

- Connect test cable (Three phase cable or Universal test cable) to Eurotest 61557.
- Set function switch to **phase rotation / LOCATOR** position, “Phase rotation” or “Installation tracing” menu will be displayed.
- Select **Phase rotation function** by using the **FUNC** (F1) key.



U12..... Mains voltage between phases L1 and L2.
U13..... Mains voltage between phases L1 and L3.
U23..... Mains voltage between phases L2 and L3.

Fig. 72. *Phase rotation initial menu*

Step 2

- **Connect test cable** to tested object (three-phase mains outlet or other test terminals), according to the figure below (press the **HELP** key for basic connection information).

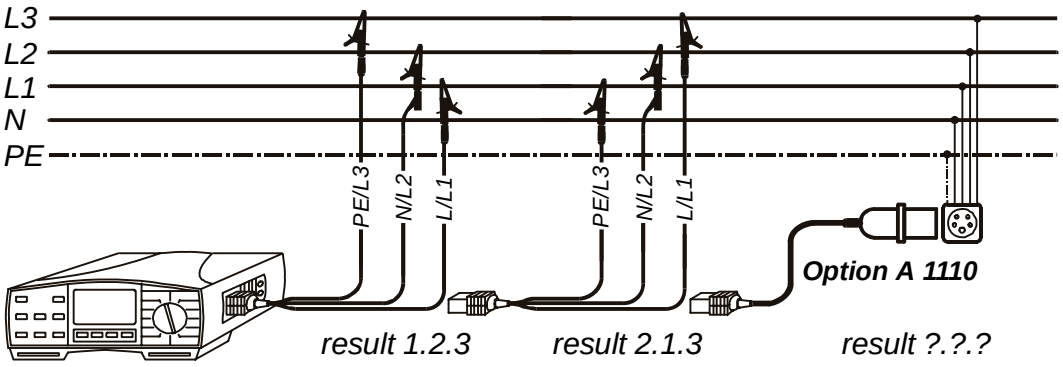
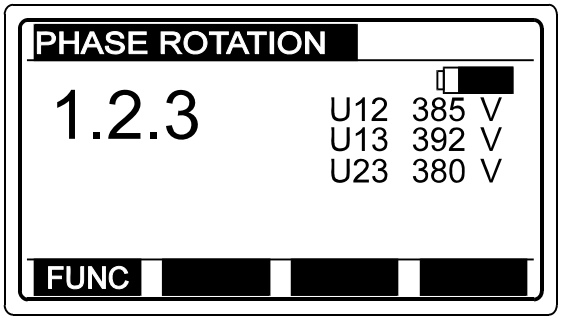


Fig. 73. *Connection of Universal Test Cable and optional Three-phase Cable (Order No.* ***A 1110****)*

Step 3

♦ Press the **START** key and release it. Measurement starts to run (continuous measurement), result is currently displayed; see an example of the result on the figure below.



1.2.3 Phase rotation at tested object is in accordance with test leads' marks (figure 67. left connection).

2.1.3 Phase rotation at tested object not is in accordance with test leads' marks (fig. 67. middle connection).

– **.** – **.** – No three-phase system present.

Fig. 74. *Test result*

♦ Press the **START** key again, to stop the measurement. Last result will stay displayed.

♦ Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Note!

♦ Nominal input voltage range is 100 V ÷ 440 V.

3.17. Current

For general information concerning the measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out the measurement?

Step 1

- Connect 1A/1mA test clamp (green one) to Eurotest 61557; see the figure 72.
- Set function switch to **CURRENT clamp** position, “Current” or “Peak current” menu will be displayed.
- Select **Current function** by using the **FUNC** (F1) key.

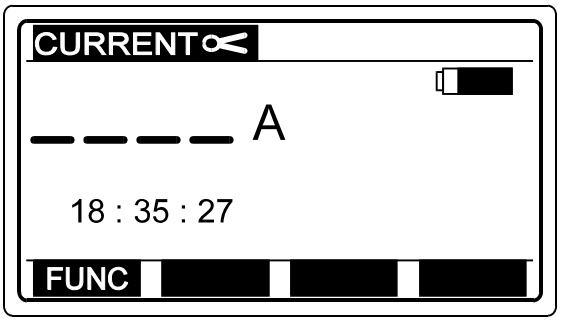


Fig. 75. *CURRENT function initial menu*

Step 2

- **Connect test clamp** to tested object according to the figure below (press the **HELP** key for basic connection information).

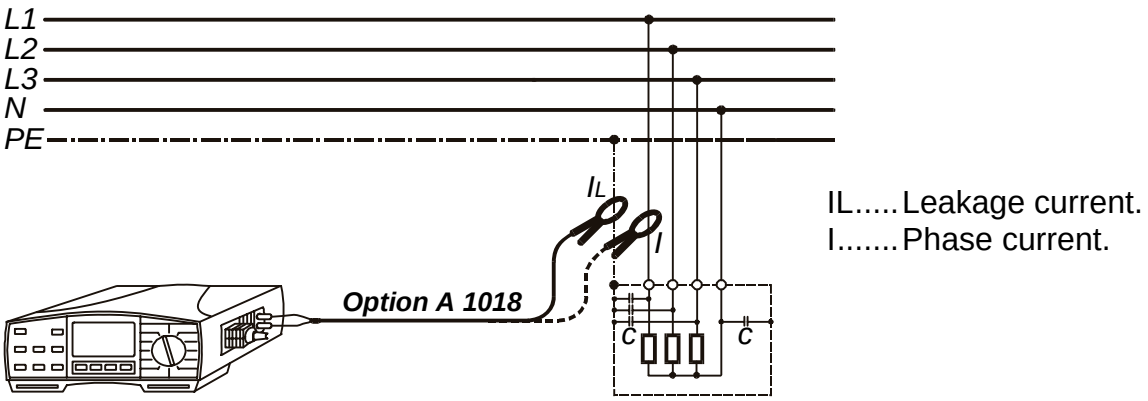


Fig. 76. *Connection of optional Low-range Current Clamp (Order No.* ***A 1018****)*

Step 3

- Press the **START** key and release it. Measurement starts to run (continuous measurement), result is currently displayed.
- Press the **START** key again after finishing the current measurement. Last current result will stay displayed; see an example of the result on the figure below.

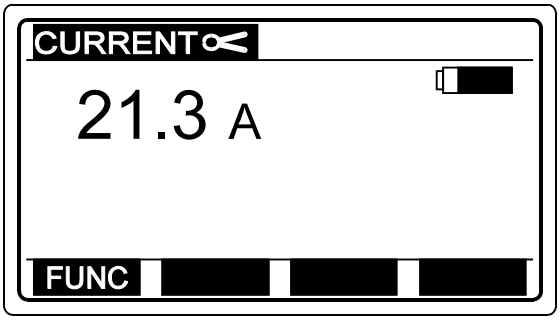


Fig. 77. *Current measurement result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Note!

- Use test clamp supplied by Metrel or other with similar characteristics (Current/Current, 1000:1, appropriate measurement range, consider error of test clamp at final result)!

How to carry out the measurement of Maximal peak current value?

If **maximal peak current value** is to be measured, it can be done selecting the Peak current function. The function is actual, when testing for example motor's start up current; see the figure below.

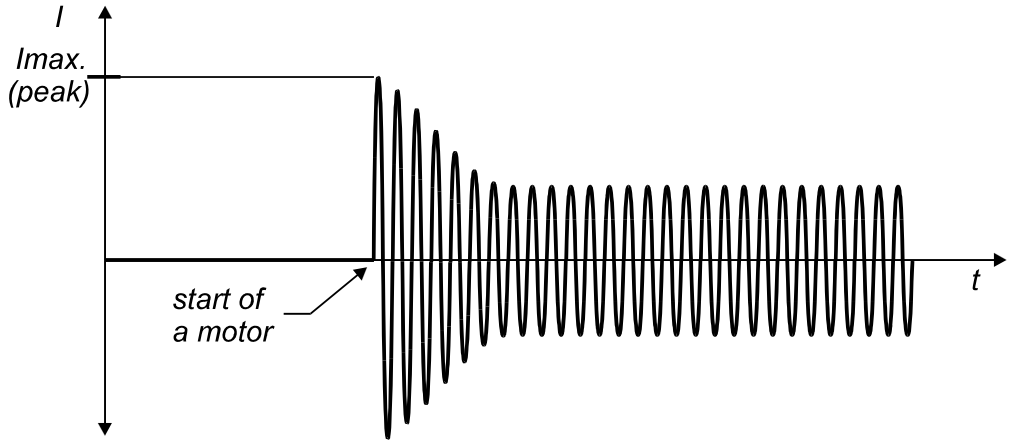


Fig. 78. *Motor's start up current*

The measurement can be done as follows:

Step 1

- Follow Step 1, described on page 58 except selecting Current function; see the next step.

Step 2

Select **Peak Current function** by using the **FUNC** (F1) key.

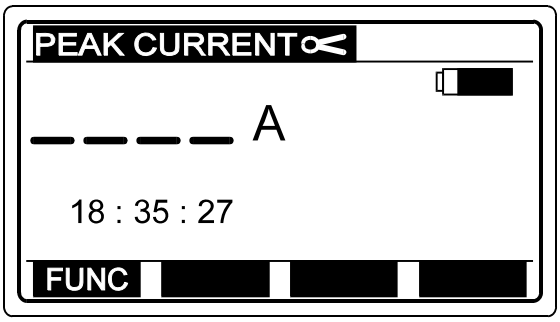


Fig. 79. *Maximal Peak Current function initial menu*

Step 3

- **Connect test clamp** to tested object; follow Step 2 on page 58.

Step 4

- Press the **START** key and release it. Measurement starts to run (continuous measurement) **maximal peak value** is currently displayed. As soon as measured value is higher than previous maximal value displayed, the displayed value will be exchanged with the new one.
- Press the **START** key again, to stop the measurement. Last result will stay 4

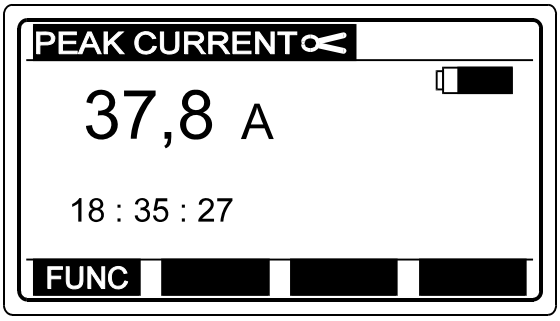


Fig. 80. *Maximal Peak Current value displayed*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Note!

- Use test clamp supplied by Metrel or other with similar characteristics (Current/Current, 1000:1, appropriate measurement range, consider error of test clamp at final result)!

3.18. Illumination

How to carry out the illumination measurement?

Step 1

- Connect LUXmeter probe to Eurotest 61557.
- Set function switch to **SENSOR** position, the following menu will be displayed.

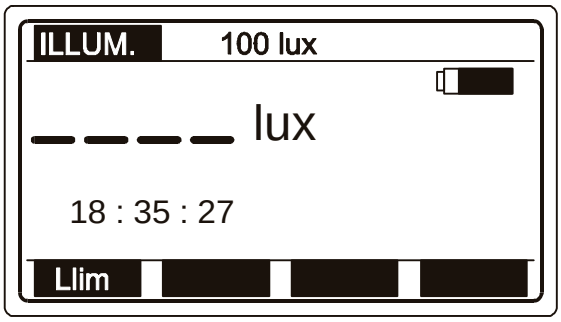


Fig. 81. *Illumination measurement initial menu*

Step 2

- **Set Low limit Illumination value**. Later will measured results be compared with the set limit value and, if lower, they will be equipped with "!" mark and Result out of limits message.

How to set the Low limit value?

- Press the **Llim** (F1) key, to enter Limit value adjustment mode, the following menu will be displayed:

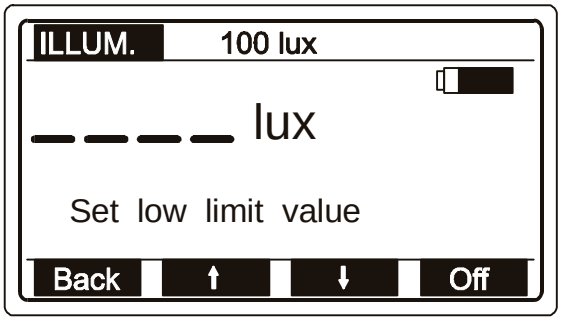


Fig. 82. *Limit adjustment menu*

- Value between 0.1 lux and 20 klux in steps of 0.1 lux, 1 lux, 10 lux, 100 lux and 1 klux may be selected by using the (F2) and (F3) keys. If test result is not to be compared with set limit value at all, then press the **Off** (F4) key. Set limit value (displayed on top display line) will be substituted with ***lux** mark. The **Off** key will alter to **On**, enabling the operator to turn the limit value ON again and vice versa.

Press the **Back** (F1) key after setting the limit value, to return to illumination measurement initial menu.

Step 3

- Turn on the **LUXmeter** probe pressing ON/OFF key. Green lamp should light. Position LUXmeter probe parallel to the surface to be evaluated (press the HELP key for basic connection information).

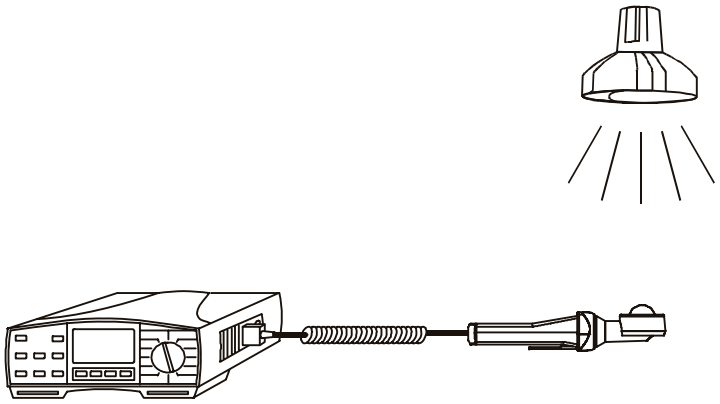


Fig. 83. *LUXmeter probe positioning*

Step 4

Press the START key and release it. Instrument will start measuring illumination. Press the START key to stop the measurement. Last measured result will be shown on display. See an example of test result on the figure below.

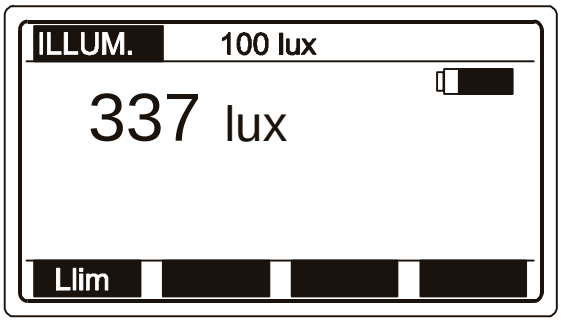


Fig. 84. *Illumination value displayed*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- In order measured value not to be influenced by shadows and nonuniform surface illumination one has to be careful when positioning LUXmeter probe.

3.19. Tracing of electric installation

There are two possible manners to trace installation by using the Eurotest 61557 namely:

- Eurotest 61557 loads installation under mains voltage in a pulsed manner. In that case, hand-held indicator follows electro-magnetic field, generated around the loaded conductor.
- The Eurotest 61557 imposes it's own test signal to voltage-free installation. In that case, hand-held indicator follows radiated signal around connected conductor.

For additional general information concerning the operation, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

Let's see the procedure.

Step 1

- Connect test cable (Universal test cable or Plug commander) to Eurotest 61557.
- Set function switch to **phase rotation / LOCATOR** position, "Phase rotation" or "Insulation tracing" menu will be displayed.
- Select **Installation tracing function** by using the **FUNC** (F1) key. Installation tracing function is selected when **LOCATOR** is displayed; see the figure below.

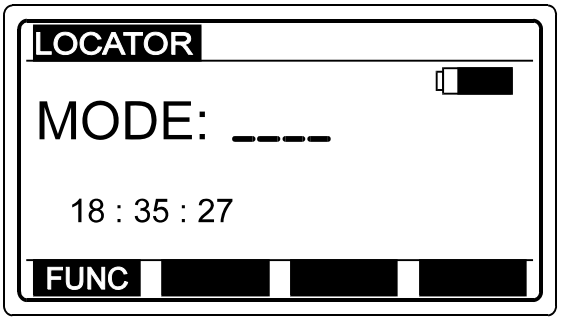


Fig. 85. *Installation tracing initial menu*

Step 2

- **Connect test cable** to tested object, according to the figure below (press the **HELP** key for basic connection information).

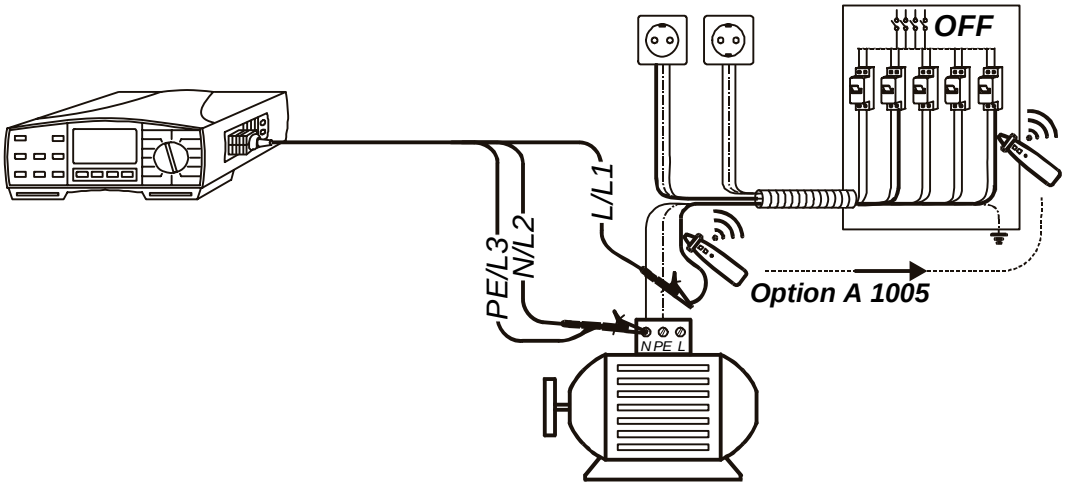


Fig. 86. *Connection of Universal Test Cable to a voltage-free conductor*

Traced conductor shall be disconnected from load (motor), enabling the test signal to spread along phase conductor.

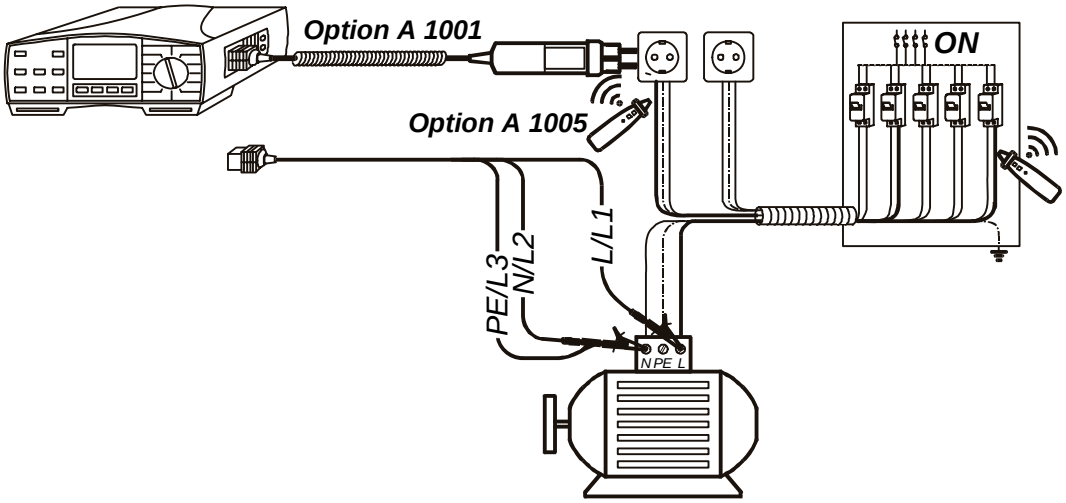


Fig. 87. *Connection of Universal Test Cable or optional Plug Commander (Order No.* ***A 1001****) to energised installation*

Step 3

- Press the **START** key and release it. Signal generating starts to run (continuous function). The Eurotest 61557 will recognise automatically, whether there is a free-voltage or energised installation. On that basis will instrument start to impose it's own signal (free-voltage installation) or to load mains voltage (mains voltage present). The following message will be displayed:

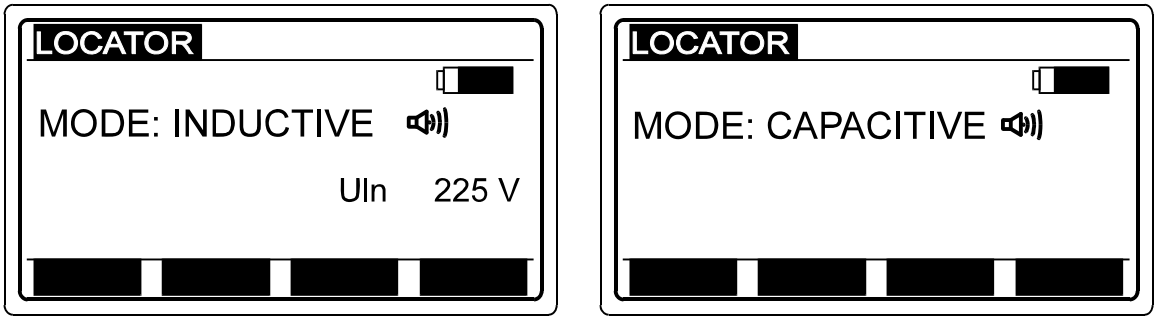


Fig. 88. *Display menu, while tracing function is running - installation under mains voltage (left figure) and voltage-free installation (right figure)*

Step 4

- Set the same test signal-receiving mode on hand-held indicator, as written on display of the instrument (see the figure above).

- Press the **START** key on hand-held indicator and keep it pressed, while tracing test signal.

Note!

- When dealing with complex installations (long conductors or more current loops connected in parallel), it is advisable to disconnect for the measurement not actual parts of installation. In the opposite case will test signal be spread all over the installation and thus selective test will be unsuccessful.

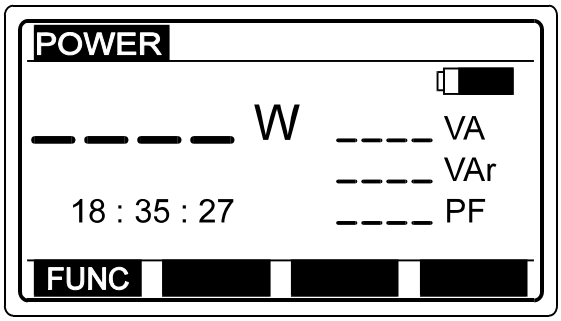
3.20. Power

For general information concerning the measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out the measurement?

Step 1

- Connect 1A/1mA test clamp and Universal test cable to Eurotest 61557; see the figure 90.
- Set function switch to **POWER/ENERGY** position, “Power” or “Energy” menu will be displayed.
- Select **Power function** by using the **FUNC** (F1) key.



W.....Active power
VA .....Apparent power.
Var .....Reactive power.
PF .....Power Factor.

Fig. 89. *POWER function initial menu*

Step 2

- **Connect current test clamp** and **voltage test leads** to tested object, according to the figure below (press the **HELP** key for basic connection information).

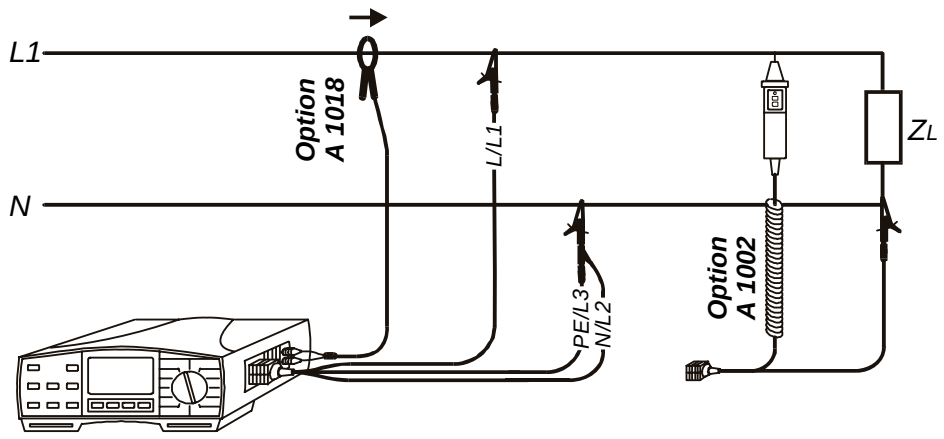


Fig. 90. *Connection of optional Low-range Current Clamp (Order No.* ***A 1018****) in combination with Universal Test Cable or opt. Tip Commander (Order No.* ***A 1002****)*

Step 3

♦ Press the **START** key and release it. Measurement starts to run (continuous measurement), result is currently displayed.

♦ Press the **START** key again after finishing the measurement, last current result will stay displayed; see an example of the result on figure below.

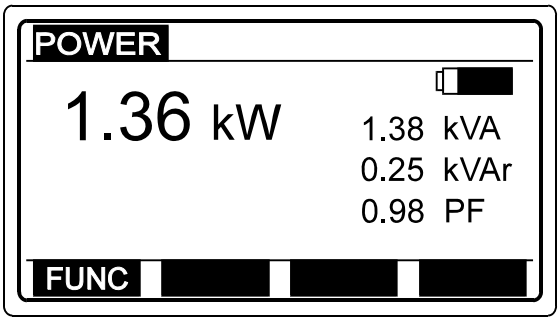


Fig. 91. *Power measurement result*

♦ Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

♦ Take care, to connect voltage test tips and current clamp correctly (polarity and direction of test clamp – arrow on test clamp should be oriented towards connected load), otherwise result will be negative!

♦ Nominal input voltage range is 10 ÷ 440 V.

♦ Nominal current range is 10 mA ÷ 200 A.

3.21. Energy

For general information concerning the measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out the measurement?

Step 1

- Follow Step 1, described under the paragraph **3. 19. Power**, except selecting measurement function; see the next step.

Step 2

- Select **Energy function** by using the **FUNC** (F1) key.

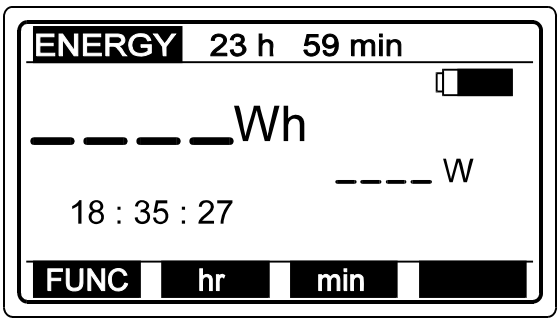


Fig. 92. *Energy function initial menu*

Step 3

- Set **Time period** by using the **hr** (F2) key to set hours and the **min** (F3) key to set minutes. Hours can be set to 0 up to 24 and minutes to 0 up to 59.

Step 4

- **Connect current test clamp** and **voltage test leads** to tested object, according to the figure 86. (press the **HELP** key for basic connection information).

Step 5

- Press the **START** key and release it. Measurement starts to run (continuous measurement), result is currently refreshed (each 2 s). The measurement will run, until set time period is elapsed. After elapsing set time, measurement will stop automatically and final result will stay displayed; see the figure below.

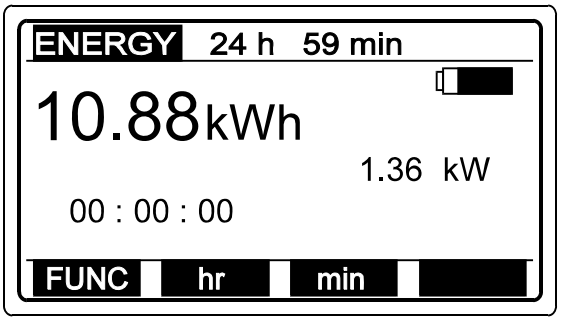


Fig. 93. *Example of final energy result*

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- Take care, to connect voltage test tips and current clamp correctly (polarity and direction of test clamp – arrow on test clamp should be oriented towards connected load), otherwise result will be negative!
- Nominal input voltage range is 10 ÷ 440 V.
- Nominal current range is 10 mA ÷ 200 A.
- Make sure inserted batteries are in good enough condition to support the energy measurement, especially long-term one. The batteries shall be absolutely new for 25 h long measurement!
- Take care to be near the instrument on elapsing measurement time, in order to read displayed result and store it if needed for further analysis, otherwise the instrument will be automatically switched off after 10 min and result will thus be lost!

3.22. Harmonics

For general information concerning Harmonics measurement, refer to enclosed handbook **Measurements on electric installations in practice and theory**.

How to carry out the measurement?

Step 1

- Connect 1A/1mA test clamp to Eurotest 61557; see the figure 91. (only if current harmonics are to be measured).
- Connect appropriate test cable (Universal test cable or Plug commander) to Eurotest 61557; see the figure 91. (only if voltage harmonics are to be measured).
- Set function switch to **HARMONICS** position, ”Voltage” or “Current” harmonics menu will be displayed, as follows:

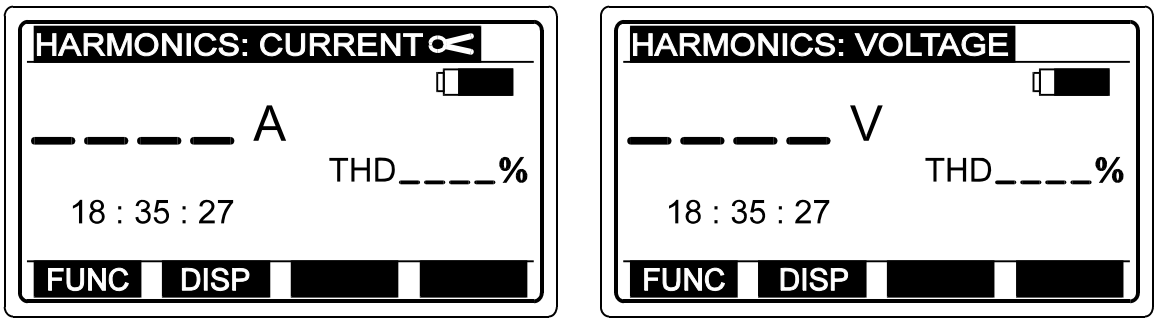


Fig. 94. *Current Harmonics initial menu (left side) and Voltage Harmonics menu (right side)*

- Select **Voltage** or **Current harmonics** by using the **FUNC** (F1) key.

Step 2

- Connect **Current test clamp** (current analysis) and/or **Voltage test cable** (voltage analysis) to tested object according to the figure below (press the **HELP** key for basic connection information).

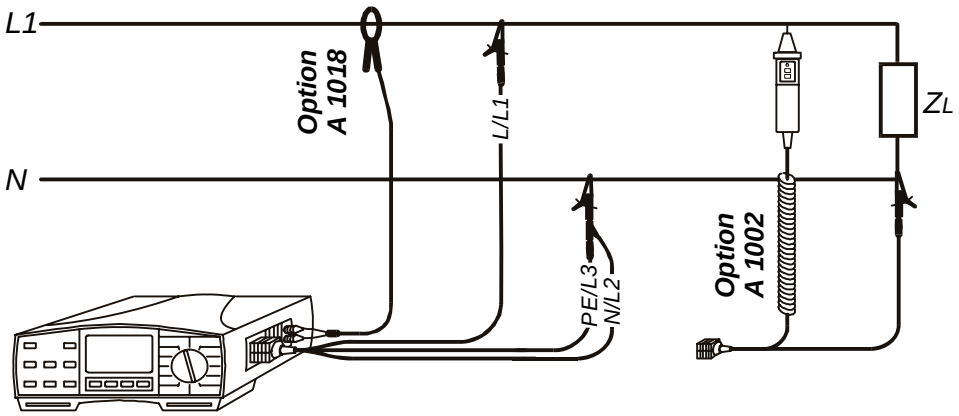


Fig. 95. *Connection of optional Low-range Current Clamp (Order No.* ***A 1018****) in combination with Universal Test Cable or opt. Tip Commander (Order No.* ***A 1002****)*

Step 3

- Press the **START** key and release it. Measurement starts to run (continuous measurement), result is currently displayed. Total harmonic distortion (THD) can be displayed or values of individual harmonic components. Select result mode by using the **DISP** (F2) key; see the following figures.

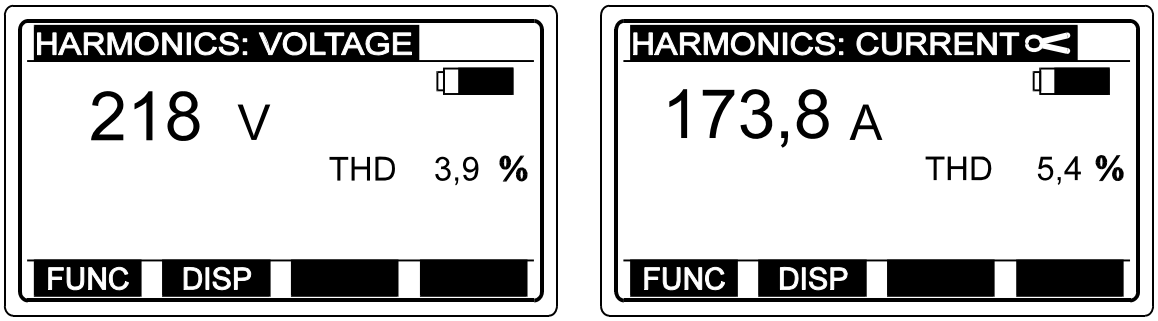


Fig. 96. *Example of displayed result (THD and effective value of tested Voltage / Current)*

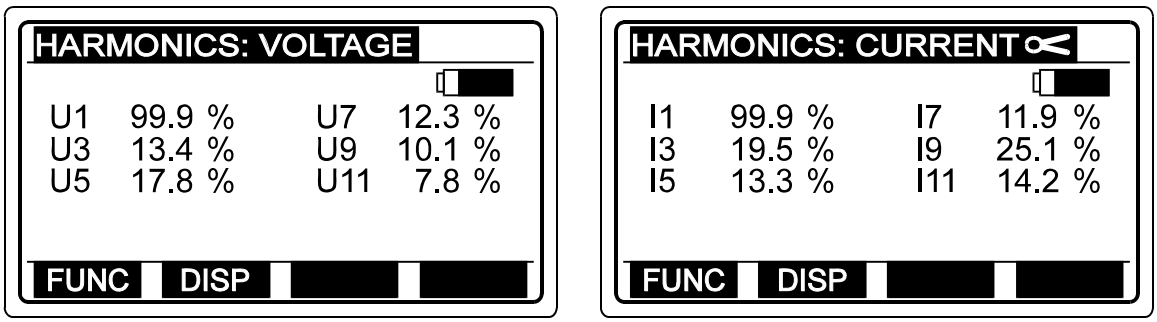


Fig. 97. *Example of displayed result (individual harmonics from 1-st up to 11-th component)*

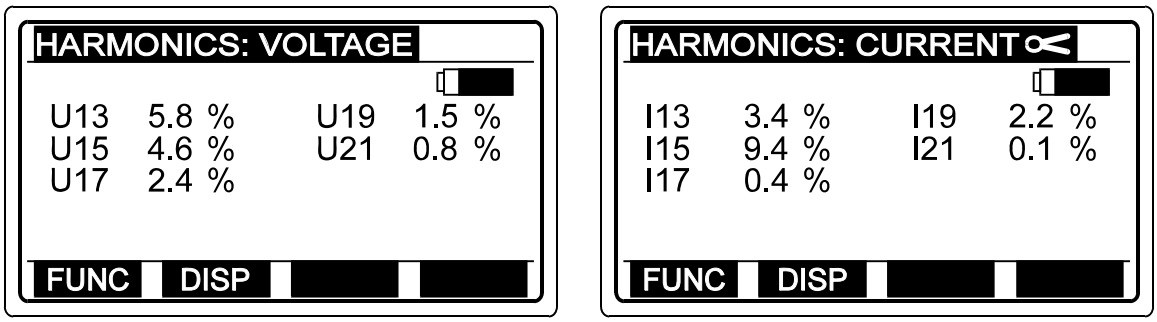


Fig. 98. *Example of displayed result (individual harmonics from 13-th up to 21-th component)*

- Press the **START** key again, to stop the measurement. Last current result will stay displayed.

- Store displayed result for documentation purpose; see instructions how to store it in chapter **4.3. Storing test results**.

Notes!

- Nominal input voltage range is 10 ÷ 440 V.

- Nominal current range is 10 mA ÷ 200 A.

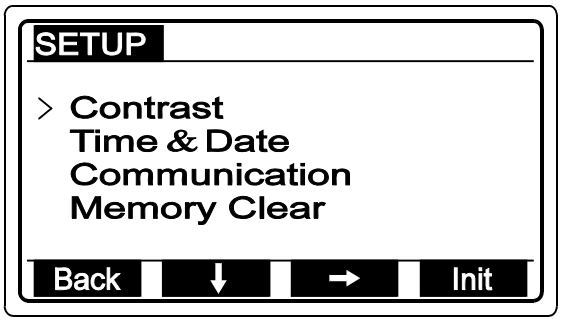
4. Other operations

4.1. Set-up functions

The following actions can be done in the Set-up menu:

- Display contrast adjustment (within 0 and 100 %)
- Real time & Date setting
- Communication parameter – Baud rate selection (2400, 4800, 9600 or 19200)
- Erasing of all stored results

Press the **SETUP** key in order to enter Set-up menu; see the figure below.



The **Init** key is production and service key only intended for inserting initial constants.

Do not use the key!

Fig. 99. *Set-up menu*

How to adjust display contrast?

- Set cursor to **Contrast** line using the ↓ (F2) key.
- Press the → (F3) key in order to enter Contrast adjustment menu.
- Adjust appropriate contrast by using the ↑ (F2) and ↓ (F3) keys.
- Press the **Back** (F1) key in order to exit Contrast adjustment menu.

How to set real time and Date?

- Set cursor to **Time & Date** line using the ↓ (F2) key.
- Press the → (F3) key in order to enter Time and Date setting menu.
- Set current Time and Date by using the ↑ (F2) and ↓ (F3) keys, move cursor under figures using the → (F4) key.
- Press the **Back** (F1) key in order to exit Time and Date setting menu.

Displayed time is not running, set time starts to run on pressing the **Back** (F1) key.

How to set Communication Baud Rate?

- Set cursor to **Communication** line using the ↓ (F2) key.
- Press the → (F3) key in order to enter Communication menu.
- Set Baud Rate using the ↑ (F2) and ↓ (F3) keys.
- Press the **Back** (F1) key in order to exit Communication menu.

How to erase all stored results?

See the instructions in chapter **4.5. Erasing stored test results** under “How to erase all stored results?”

4.2. Creating Installation structure on PC

In order to assure clear information on which measurement place certain stored result belongs to, memory locations can be organised and named in accordance with actual measured installation and its individual parts. The organisation is called **Installation structure** and may be created by a measurer either directly on the Eurotest 61557 simultaneously with storing test results, or prepared in advance by means of PC with installed PC SW Euro Link. The Installation structure created on PC is then transferred to the Eurotest 61557. Transferred structure may be later freely adapted directly through instrument's keyboard, if needed.

Read the chapter **6. TECHNOLOGY OF CARRYING OUT MEASUREMENTS USING TEST EQUIPMENT PRODUCED BY METREL d.d.** in enclosed booklet **MEASUREMENTS ON ELECTRIC INSTALLATIONS in theory and practice**, in order to understand the meaning of Installation structure.

Producer of the Eurotest 61557 have already installed **Basic installation structure,** intended for further extension by means of instrument's keyboard. The Basic installation structure is presented on the figure below.

OBJECT1
- **BLOCK1**
  - **FUSE1**
  - **RCD1**
- **LIGHTNING SYSTEM1**
  - **ELECTRODE1**
  - **CONNECTION1**
- **MPE1**
  - **CONNECTION1**
  - **EARTHING1**

Fig. 100. *Basic installation structure already installed by the producer*

How to create Installation structure on PC

Step 1

Install enclosed PC SW **Euro Link – Lite** to your PC (printing out final protocols and test reports is possible using the **Euro Link – Pro** version only).

Step 2

Create the Installation structure on basis of actual installation plan (use HELP menu). PC SW Euro Link will interactively lead the operator through the procedure of creating installation structure. Measurements required to be done at a certain measurement place can be attached to appropriate parts of created structure. Thus will the measurer be able to verify anytime during carrying out
measurements, which measurements and where are still required to be carried out.
Let's see the set of measurements, which can be attached to a certain measurement place:

Meas. place (second level)	**Meas. place** (third level)	**Measurement dividing**	**Description**	**Function at the Eurotest 61557**
BLOCK	FUSE	R_{PE}	Connections between PCC* and PE terminals	$R_{\pm 200mA}$
		R_{APE}	Connections of additional equalizing	$R_{\pm 200mA}$
		ISO_{L}	Insulation resistance between phase conductors	Riso
		ISO_{PE}	Insulation resistance between phase and protective conductors	Riso
		ISO_{IT}	Insulation resistance between primary and secundary of power transformer	Riso
			Fault loop impedance between phase and protective conductors	Z_{LOOP}
			Line impedance between phase conductors or phase and neutral conductors	Z_{LINE}
			Contact voltage at active accessible conductive parts	RCD Uc
	RCD		Trip out time at $I_{\Delta N}$	RCD t
			Tripping current	RCD I
LIGHTNING SYSTEM	ELECTRODE	$EARTH_{ABOVE}$	Connections between earthing electrodes realized above ground	R_{EARTH} (two wire system) R_{EARTH} (two clamp system)
		$EARTH_{UNDER}$	Connections between earthing electrodes realized under ground	R_{EARTH} (two wire system) R_{EARTH} (two clamp system)
		EARTH	Earth resistance of earthing electrode	R_{EARTH}

	CONNECTION		Connections between lightning system and other objects (water installation etc.)	R±200mA
MPE	CONNECTION		Connections between MPEC* and other objects (PCC*, water installation etc.)	R±200mA
			Insulation resistance between e.g. local and main gas installation	Riso
	EARTHING		Earth resistance of earthing electrode	REARTH

PCC* Protective Conductor Collector, MPEC* Main Potential Equalizing Collector

Table 2. *List of the measurements, that can be attached to a certain meas. place*

Step 3

Connect the Eurotest 61557 to PC via enclosed RS 232 cable and transfer created structure to the Eurotest 61557.
Now the Eurotest 61557 is ready for carrying out measurements and storing test results into prepared installation structure.

4.3. Storing test results

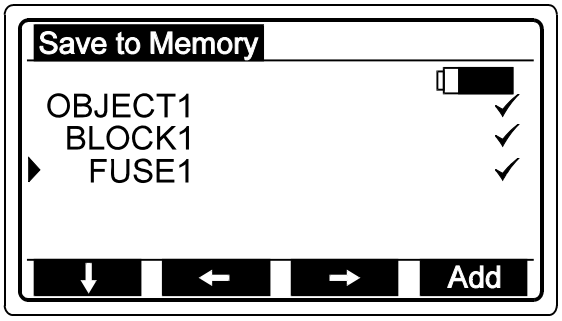
All test results can be stored except the U L-PE or U L-N voltage (in RLOOP N-PE, ZLOOP, ZLINE and RCD functions) as well as Continuity.

How to store test result?

Once test result is displayed, the following procedure is to be used.

Step 1

♦ Press the **SAVE** key, last used part of installation structure will be offered; see the figure below.



✓ .... All measurements attached (by means of PC SW only) to the measurement place are already carried out and results stored. Measurer can thus verify any time which measurements have not been done yet and where.

Note! The ✓ mark is automatically attached to any added new item by means of instrument's keyboard.

Fig. 101. *Example of latest used part of installation structure, offered for storing the test result*

Step 2

- Set cursor to the top line using the ↓ (F1) key and select appropriate measurement **Object** using the ← (F2) and → (F3) keys. The object may be selected among the ones created on PC and transferred to the test instrument or added by means of instrument's keyboard. New object can be added pressing the **add** (F4) key.

- Set cursor to the second line using the ↓ (F1) key and select appropriate measurement **Block, Lightning system or MPEC** using the ← (F2) and → (F3) keys. The item may be selected among the ones created on PC and transferred to the test instrument or added by means of instrument's keyboard. New item can be added pressing the **add** (F4) key.

- Set cursor to the third line using the ↓ (F1) key and select appropriate measurement **Fuse** or **RCD** (»Block« has been selected on the second line), **Electrode** or **Connection** (»Lightning system« has been selected on the second line) or **Connection** or **Earthing** (»MPEC« has been selected on the second line) by using the ← (F2) and → (F3) keys. The item may be selected among the ones

created on PC and transferred to the test instrument or already added by means of instrument's keyboard. New item can be added pressing the **add** (F4) key.

If no structure has been transferred to Eurotest 61557 from PC, then appropriate one can be created using the **add** key. The Eurotest 61557 will offer only standard names in this case, which cannot be renamed through instrument's keyboard. This can be done later on PC after transferring stored results back to PC again for final protocol purpose.

In case R±200mA, Riso or REARTH result is to be stored, additional addressing is offered; see the Table 2. in column »Measurement dividing«. Set cursor to the fourth line in that case and select appropriate measurement using the ← (F2) and → (F3) keys.

Step 3

- Press the **SAVE** key again to confirm storing. Result is thus stored, display will return to function menu again.

Notes!

- Each result can be stored only once.

- In case the measurer does not care installation structure, then all results can be stored to the same location simply double clicking to the SAVE key.

- All potential subresults and function parameters will be stored together with main result too.

- Already started storing procedure can be interrupted pressing the **ESC** key.

- Installation structure once installed to the Eurotest 61557 (either by PC or through instrument's keyboard) cannot be erased any longer, except when performing erasing of all stored results in SETUP menu. Only basic structure (installed by the producer of test instrument; see the figure 96) will stay installed.

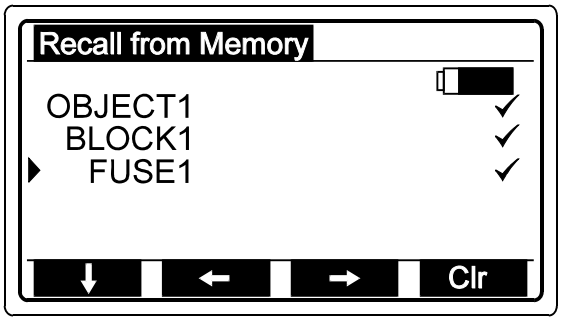
- **Out of memory** message will be displayed in case all memory locations are occupied.

4.4. Recalling stored test results

Each stored result may be recalled (displayed) again by using the following procedure:

Step 1

- Press the **RCL** key, last used part of installation structure will be offered; see the figure below.



✓ .... All measurements attached (by means of PC SW only) to the measurement place are already carried out and results stored. Measurer can thus verify any time which measurements have not been done yet and where.

Note! The ✓ mark is automatically attached to any added new item by means of instrument's keyboard.

Fig. 102. *Example of latest used part of installation structure, offered for recalling stored test result*

Step 2

- Set appropriate measurement place inside installed structure, follow **Step 2** in chapter **4.3. Storing test results**

Step 3

- Press the **RCL** key again to confirm recalling. Last stored result under selected measurement place will be displayed; see an example below:

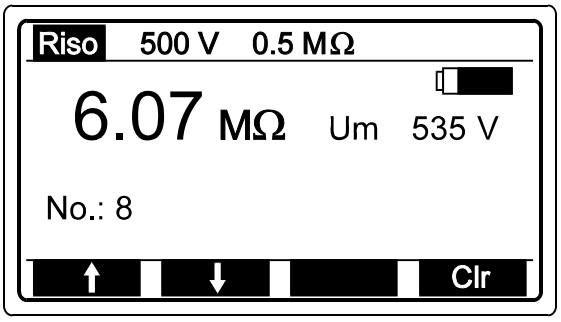


Fig. 103. *Example of recalled last stored test result*

Step 4

♦ Use the ↑ (F1) and ↓ (F2) keys to recall other results stored under the same measurement place.

Notes!

♦ All potential subresults and function parameters will be recalled too.

♦ The recalling procedure can be interrupted pressing the **ESC** key.

4.5. Erasing stored test results

There are three ways to erase stored test results namely:

♦ Individual stored result is to be erased.
♦ Results stored under the same structure item like Object, Block/Lightning system/MPEC, Fuse/RCD, Electrode/Connection, Connection/Earthing are to be erased.
♦ All stored results are to be erased.

How to erase individual stored result?

Step 1

♦ Recall stored test result to be erased, follow the procedure described in chapter **4.3. Recalling stored test results**.

Step 2

♦ Press the **Clr** (F4) key to erase displayed test result. Result stored before already erased one will be displayed and thus offered to be erased.

How to erase results stored under the same structure item?

Step 1

- Press the **RCL** key, last used part of installation structure will be offered; see the figure 96.

Step 2

- Use the ↓ (F1) key to set cursor to appropriate line of installation structure as well as ← (F2) and → (F3) keys to select appropriate structure address.

Step 3

- Press the **Clr** (F4) key in order to erase all results stored under selected structure address. **Wait …** message will be displayed until all results are erased.

How to erase all stored results?

Step 1

- Press the **SETUP** key to enter Set-up menu.

Step 2

- Set cursor to **Memory Clear** line using the ↓ (F2) key, then press the → (F3) key to enter Memory Clear menu.

Step 3

- Press the **Clr** (F4) key to erase all stored results, **Wait…** will be displayed until all results are erased, then Set-up menu will be displayed again.

Notes!

- All belonging subresults and function parameters will be erased together with main results too.

- Installation structure installed to the Eurotest 61557 (either by PC or through instrument's keyboard) will be erased together with results too. Only basic structure (installed by the producer of test instrument; see the figure 96) will stay installed.

- Entered erasing procedure can be interrupted pressing the **ESC** key.

4.6. Reset of the instrument

If any malfunction is noticed when dealing with the Eurotest 61557, **RESET** function is advised to be effected. In that case all settable parameters will be set to their initial values; see the table below. Stored results will not be erased.

How to reset the instrument?

- Switch OFF the instrument.
- Press the **F1** key and keep it pressed, while switching ON the instrument. **Hard Reset** message will be displayed for a while meaning RESET function has been completed and then initial function menu of selected function will be displayed. All settable parameters will be set to their initial values; see the table below.

Parameter	Function	Initial value
Compensation of test leads	R±200mA	Annulled
High limit value	R±200mA	no limit
Buzzer	R±200mA	on
High limit value	CONTINUITY	no limit
Test voltage	R ISO	50 V
Low limit value	R ISO	no limit
High limit value of Breakdown voltage	varistor TEST	no limit
Low limit value of Breakdown voltage	varistor TEST	no limit
Low limit value of illumination	SENSOR	no limit
Time interval “hr”	ENERGY	1hr
Time interval “min”	ENERGY	1min
Nominal differential current	All RCD functions	10 mA
Type of RCD	RCD Uc/RE, t∆N, AUTO	G (general), AC
Limit Contact voltage	All RCD functions	50 V
Multiplier of Nominal differential current	RCD t∆N	× ½
Test current start polarity	RCD t∆N, I∆N	positive (0°)
Test current polarity	ZLOOP	positive
High limit value of Earth Resistance	REARTH, REARTH (clamp) REARTH (two clamps)	no limit
Distance “a”	ρ EARTH	2m
Contrast	Set-up	approx. 50%
Baud Rate	Set-up	9600 Baud
Memory locations		no effect

Table 3. *Initial values of settable parameters*

5. Maintenance

5.1. Batteries

- Disconnect test cable and switch off the instrument, before removing battery compartment cover!
- Hazardous voltage under the battery compartment cover!

Battery condition is currently displayed; see the battery condition mark in the right upper corner of display. Fully dark battery frame presents full-capacity batteries. Follow the battery condition even during carrying out measurements. Results obtained with low battery voltage (the results may be incorrect) will be marked with **Low battery during m.** warning, after finishing the measurement.

Replace all four batteries, when the battery frame is empty in static mode (no measurement is running) or when the battery mark trips to empty frame just temporarily, while a measurement is running (result marked with "Low battery during m." message)!

Nominal power supply voltage is 6 Vd.c. Use four 1,5 V alkaline batteries, type IEC LR14 (dimensions: diameter = 26 mm, height = 50 mm).

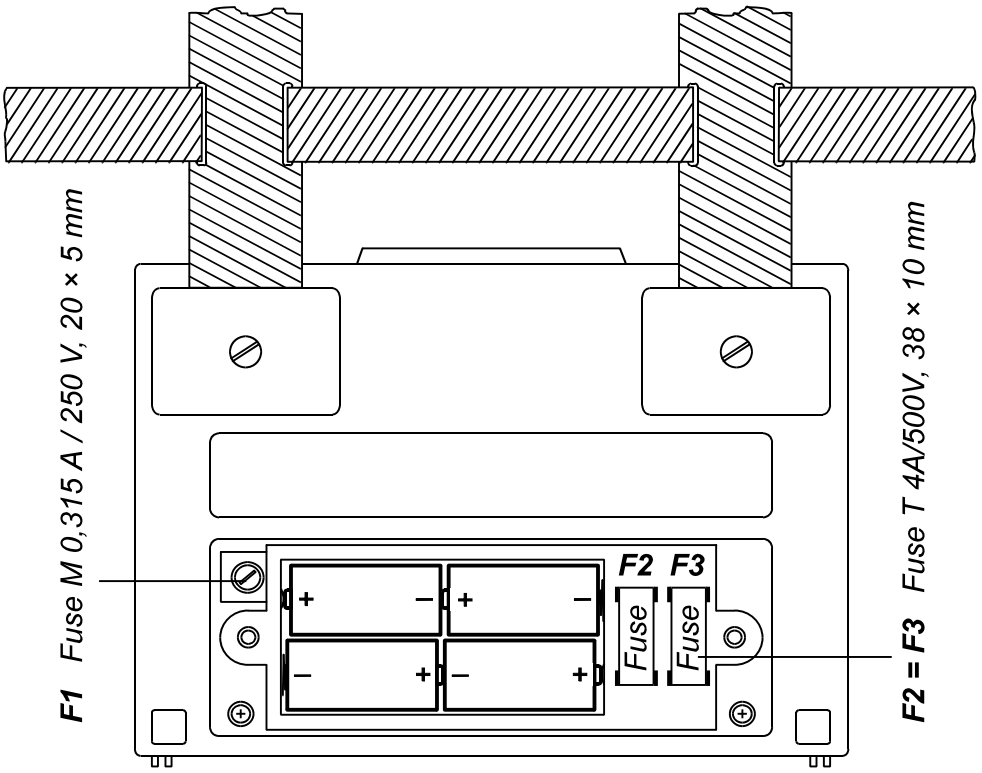


Fig. 104. *Correct polarity of inserted batteries*

One set of full-capacity batteries can supply the instrument approx. 50 hours at the ratio measurement / pause = 5s / 25s

Commander and Locator batteries:
Red lamp ON means low battery condition. Unscrew two screws on backside of the device in order to remove battery cover. Use 9V battery type 6 LR 61!

LUXmeter batteries:

Blinking green lamp means low battery condition. Unscrew two screws on backside of the device in order to remove battery cover. Use 9V battery type 6 LR 61

Notes!

- Insert batteries correctly, otherwise test instrument will not operate and batteries may be discharged; see the figure above for correct battery polarity!

- **Low battery** message, displayed during or after finishing the measurement means, batteries are too weak to guarantee correct result. Replace the batteries.

5.2. Fuses

There are three fuses under battery compartment cover (see the figure 100.).

- **F1** = **M 0,315A/250V**, 20 × 5 mm (It protects internal circuitry of the test instrument, if test tips are connected to mains voltage during R±200 mA or CONTINUITY measurement by mistake).
- **F2** = **F3** = **T 4A/500V**, 38 × 10 mm, Breaking capacity 10kA/500V, type FLQ4, produced by Littelfuse (General fuse on input of measurement terminals L/L1 and N/L2).

Check the fuses F2 and F3, if one of the following malfunctions is noticed:

- **RCD tripped out** message is displayed after pressing the **START** key in all RCD functions as well as in ZLINE and ZLOOP functions.
- **>1999Ω** message is displayed in R±200 mA / CONTINUITY functions in spite of shorted test leads.
- **>200 MΩ** or **>1000 MΩ** message is displayed in R ISO function in spite of shorted test leads.
- **>1000 V** message is displayed in varistor TEST function in spite of shorted test leads.

Check the fuse F1, if **Replace FUSE M315mA** message is displayed in R±200 mA / CONTINUITY functions.

Warning!

- **Replace blown fuse with original one only, otherwise the instrument may be damaged and/or operator's safety impaired!**

5.3. Cleaning

Use soft patch, slightly moistened with soap water or alcohol, to clean the surface of Eurotest 61557 and leave the instrument to dry totally, before using it.

Notes!

- Do not use liquids based on petrol or hydrocarbons!
- Do not spill cleaning liquid over the instrument!

5.4. Periodic calibration

It is essential, that all measurement instruments are regularly calibrated. For occasional daily use, we recommend an annual calibration to be carried out. When the instrument is used continuously every day, we recommend that calibration is carried out every sixth months.

5.5. Service

Repairs under or out of warranty time: Please contact your distributor for further information.

Distributor's address:

Producer's address:

METREL d.d.
Ljubljanska 77
SI-1354 Horjul

Tel.: +386 1 75 58 200
Fax.: +386 1 75 49 226
E-mail: metrel@metrel.si
http://www.metrel.si

Unauthorised person is not allowed to open the Eurotest 61557. There are no user replaceable components inside the instrument, except three fuses, refer to paragraph **5.2. Fuses**.

6. Technical specification

6.1. Functions

Insulation resistance

Meas. range Riso (Un ≥ 250V) .. (0.008 ÷ 1000)MΩ

Display range Riso (MΩ) Un ≥ 250V	Resolution (MΩ)	Accuracy*
0.000 ÷ 1.999	0.001	±(2% of r. + 2D)
2.00 ÷ 19.99	0.01	
20.0 ÷ 199.9	0.1	
200 ÷ 1000	1	±(10% of r.)

*Specified accuracy is valid if **Universal test cable** is used, while it is valid up to 200 MΩ if **Tip Commander** is used.

Meas. range Riso (Un < 250V) . (0.012 ÷ 199.9)MΩ

Display range Riso (MΩ) Un < 250V	Resolution (MΩ)	Accuracy
0.000 ÷ 1.999	0.001	±(5% of r. + 3D)
2.00 ÷ 19.99	0.01	
20.0 ÷ 199.9	0.1	

Display range Test voltage (V)	Resolution (V)	Accuracy
0 ÷ 1200	1	±(2% of r. + 3D)

Nom. test voltage ..... 50, 100, 250, 500, 1000Vd.c.
Current capability of test generator
(at Utest. > UN) ..... >1mA
Short-circuit test current ..... <3 mA
Automatic discharge of tested object ..... yes

Continuity of Protective Conductors

Meas. range R..... (0.08 ÷ 1999)Ω

Display range R (Ω)	Resolution (Ω)	Accuracy
0.00 ÷ 19.99	0.01	±(2% of r. + 2D)
20.0 ÷ 199.9	0.1	±(3% of r.)
200 ÷ 1999	1	

Open-terminal test voltage ..... 4 - 7 Vd.c.
Short-circuit test current ..... > 200 mA
Compensation of test leads (up to 5 Ω) ..... yes
Sound signal ..... yes
Automatic polarity exchange ..... yes
Measurement mode ..... single measurement

Continuity

Display range R (Ω)	Resolution (Ω)	Accuracy
0.0 ÷ 199.9	0.1	±(3% of r. + 3D)
200 ÷ 2000	1	

Open-terminal test voltage.....4 - 7 Vd.c.
Short-circuit test current.....< 7 mA
Sound signal ..... yes
Measurement mode..... continuous measurement

Earth Resistance, four-lead method

Meas. range RE .....(0.11 ÷ 19.99k)Ω

Display range (Ω)	Resolution (Ω)	Accuracy
0.00 ÷ 19.99	0.01	±(2% of r. + 3D)
20.0 ÷ 199.9	0.1	
200 ÷ 1999	1	
2.00k ÷ 19.99k	10	±(5% of r.)

Additional spike resistance error
at Rc max. or Rp max. ..... ±(3% of r. + 10D)
Rc max.....(4kΩ + 100RE) or 50kΩ (lower value)
Rc = Rc1 +Rc2 (Earth Resistivity)
Rp max.....(4kΩ + 100RE) or 50kΩ (lower value)
Rp = Rp1 +Rp2 (Earth Resistivity)
Additional error
at 10 V voltage noise (50 Hz) ..... ±(5% of r. +10D)
Open-terminal test voltage.....40 Va.c.
Test voltage shape .....sine wave
Test voltage frequency .....125 Hz
Short-circuit test current.....< 20 mA
Automatic test of current and
potential test probe resistance..... yes
Automatic test of voltage noise..... yes

Earth Resistance using one clamp in combination with four-lead method

All technical data listed under four-lead method are valid, additional ones are listed below:

Additional error at 3A/50Hz noise current (valid at max. ratio Rtot/Rpart = ½) ..... ±(10% of r. + 10D)
Additional error
of resistance ratio .....Rpartial/Rtotal · 1%
Rpartial = resistance measured with clamp
Rtotal = resistance of total earthig system

Indication in case of low clamp current .... < 0.5 mA
Automatic test of noise current ..... yes
Additional clamp error is to be considered.

Earth Resistance using two clamps

Meas. range R_E..... (0.08 ÷ 100)Ω

Display range R_E (Ω)	Resolution (Ω)	Accuracy*
0.00 ÷ 19.99	0.01	±(10% of r. +2D)
20.0 ÷ 100.0	0.1	±(20% of r.)

*..... distance between test clamps >25 cm

Additional error at 3A/50Hz
noise current .....±(10% of r. + 10D)
Automatic test of noise current ..... yes
Additional clamp error is to be considered.

Specific Earth Resistance (resistivity)

All technical data listed under four-lead method are valid, except display range table; see adapted one below.

Display range ρ (Ωm)	Resolution (Ωm)	Accuracy
0.00 ÷ 19.99	0.01	Consider accuracy of R_E measurement $\rho = 2\pi a R_E$
20.0 ÷ 199.9	0.1	
200 ÷ 1999	1	
2.00k ÷ 19.99k	10	
20.0k ÷ 199.9k	0.1k	
200k ÷ 2000k	1k	

Distance between test rods .....1 up to 30 m

RCD – General data

Nominal differential currents: 10, 30, 100, 300, 500, 1000 mA
Accuracy of actual differential currents:
$-0 / +0.1 \cdot I_\Delta$; $I_\Delta = I_{\Delta N}$, $2 \cdot I_{\Delta N}$, $5 \cdot I_{\Delta N}$ $-0.1 \cdot I_{\Delta N} / +0$; $I_\Delta = 0.5 \cdot I_{\Delta N}$
Test current shape .....sine wave, pulsed
Test current start at.....0° or 180°
RCD type..... Standard or Selective
Nominal input voltage.....230/115V/ 45 - 65 Hz

RCD test current selection (r.m.s. value calculated to 20ms) according to IEC 61009:

	IΔN × 1/2		IΔN × 1		IΔN × 2		IΔN × 5		RCD IΔ	
IΔN (mA)	AC	A	AC	A	AC	A	AC	A	AC	A
10	5	3.5	10	20	20	40	50	100	✓	✓
30	15	10.5	30	42	60	84	150	212	✓	✓
100	50	35	100	141	200	282	500	707	✓	✓
300	150	105	300	424	600	848	1500	n.a.	✓	✓
500	250	175	500	707	1000	1410	2500	n.a.	✓	✓
1000*	500	350	1000	1410	2000	n.a.	n.a.	n.a.	✓	✓
650*	325	227	650	919	1300	n.a.	n.a.	n.a.	✓	✓

* 650 mA instead of 1000 mA in some versions
n.a. ..... not applicable
AC type .....sine wave test current
A type…….....pulsed current

RCD – Contact Voltage Uc

Meas. range Uc.....(10 ÷ 100)V

Display range Uc (V)	Resolution (V)	Accuracy*
0.00 ÷ 9.99	0.01	(-0 / + 10)% of r. ± 0.2V
10.0 ÷ 100.0	0.1	(-0 / + 10)% of r.

*The accuracy is valid if:
Mains voltage is stabile during the meas.
PE terminal is free of interfering voltages

Measurement principle... with or without aux. probe
Test current .....< 0.5 $I_{\Delta N}$
Limit contact voltage ..... 25 or 50 V
The Contact Voltage is calculated to $I_{\Delta N}$ (standard type) or to $2I_{\Delta N}$ (selective type).

RCD – Earth (Fault Loop) Resistance (RCD Rs function)

Display range R_E (R_L) (Ω)	Resolution (Ω)	Accuracy
0.00 ÷ 19.99	0.01	±(5% of r. + 0.05V/ $I_{\Delta N}$ + 0.2Ω)
20.0 ÷ 199.9	0.1	
200 ÷ 1999	1	
2.00k ÷ 10.00k	0.01k	

Calculation ..... R_E (R_L) = Uc / $I_{\Delta N}$
Measurement principle.....with auxiliary probe (R_E)
without auxiliary probe (R_L)
Test current .....< 0.5 $I_{\Delta N}$

RCD – Trip out time

Test current ..... 0.5 $I_{\Delta N}$, $I_{\Delta N}$, 2 $I_{\Delta N}$, 5 $I_{\Delta N}$
(multiplier 5 is not available if $I_{\Delta N}$ = 1000mA)

Meas. range t (G type) ....(0ms ÷ upper disp. value)

Display range t (ms) G type	Resolution (ms)	Accuracy
0 ÷ 300 (1/2$I_{\Delta N}$, $I_{\Delta N}$)	1	±3ms
0 ÷ 150 (2$I_{\Delta N}$)	1	
0 ÷ 40 (5$I_{\Delta N}$)	1	

Meas. range t (S type).....(0ms ÷ upper disp. value)

Display range t (ms) S type	Resolution (ms)	Accuracy
0 ÷ 500 (1/2$I_{\Delta N}$, $I_{\Delta N}$)	1	±3ms
0 ÷ 200 (2$I_{\Delta N}$)	1	
0 ÷ 150 (5$I_{\Delta N}$)	1	

RCD – Tripping current

Meas. range I_Δ: (0.2 ÷ 1.1) $I_{\Delta N}$ – sine wave current

Display range I_Δ	Resolution	Accuracy
0.2$I_{\Delta N}$ ÷ 1.1$I_{\Delta N}$	0.05$I_{\Delta N}$	±0.1$I_{\Delta N}$

Meas. range $I\Delta$: (0.2 ÷ 1.5) $I\Delta N$ – pulsed current

Display range $I\Delta$	Resolution	Accuracy
0.2$I\Delta N$ ÷ 1.5$I\Delta N$	0.05$I\Delta N$	±0.1$I\Delta N$

Meas. range t_Δ ..... (0 ÷ 300)ms

Display range t_Δ (ms)	Resolution (ms)	Accuracy
0 ÷ 300	1	±3ms

Meas. range Uci .....(10 ÷ 100)V

Display range Uci (V)	Resolution (V)	Accuracy*
0.00 ÷ 9.99	0.01	(0 ÷ 10)% of r. ± 0.2V
10.0 ÷ 100.0	0.1	(0 ÷ 10)% of r.

*The accuracy is valid if:
Mains voltage is stabile during the meas.
PE terminal is free of interfering voltages
Uci voltage is calculated to Tripping current I_Δ

Fault Loop Impedance and Prospective Short-circuit Current

Meas. range $Z_{L\text{-}PE}$, R, Xl .....(0.11 ÷ 1999)Ω

Display range $Z_{L\text{-}PE}$, R, Xl (Ω)	Resolution (Ω)	Accuracy
0.00 ÷ 19.99	0.01	±(2% of r. + 3D)
20.0 ÷ 199.9	0.1	
200 ÷ 2000	1	

Display range Ipsc (A)	Resolution (A)	Accuracy
0.06 ÷ 19.99	0.01	Consider accuracy of $Z_{L\text{-}PE}$
20.0 ÷ 199.9	0.1	
200 ÷ 1999	1	
2.00k ÷ 19.99k	10	
20.0k ÷ 24.4k	100	

Ipsc calculation: .....Ipsc = U_N·1.06 / $Z_{L\text{-}PE}$
U_N = 115 V; (100 V ≤ Uinp < 160 V)
U_N = 230 V; (160 V ≤ Uinp ≤ 264 V)
Max. test current (at 230 V) ..... 23 A (10ms)
Nominal input voltage .....115/230V, 45 - 65 Hz

Contact Voltage at Short-circuit Current

Display range Uc (V)	Resolution (V)	Accuracy
0.00 ÷ 9.99	0.01	±(3% of r. + 0.02Ω · Ipsc)
10.0 ÷ 99.9	0.1	
100 ÷ 264	1	

Max. test current (at 230 V) .....23 A
Nominal input voltage .....115/230V, 45 - 65 Hz

Line Impedance and Prospective Short-circuit current

Meas. range $Z_{L\text{-}N(L)}$, R, Xl.....(0.11 ÷ 1999)Ω

Display range $Z_{L\text{-}N(L)}$, R, Xl (Ω)	Resolution (Ω)	Accuracy
0.00 ÷ 19.99	0.01	±(2% of r. + 3D)
20.0 ÷ 199.9	0.1	
200 ÷ 2000	1	

Display range Ipsc (A)	Resolution (A)	Accuracy
0.06 ÷ 19.99	0.01	Consider acc. of $Z_{L-N(L)}$
20.0 ÷ 199.9	0.1	
200 ÷ 1999	1	
2.00k ÷ 19.99k	10	
20.0k ÷ 42.4k	100	

Ipsc calculation:..... $Ipsc = U_N \cdot 1.06 / Z_{L-N(L)}$
U_N = 115 V; (100 V ≤ Uinp < 160 V)
U_N = 230 V; (160 V ≤ Uinp ≤ 315 V)
U_N = 400 V; (315 V < Uinp ≤ 440 V)
Max. test current (at 400 V)..... 40 A (10ms)
Nominal input voltage.....115/230/400V, 45 – 65 Hz

Resistance of N-PE Loop and Prospective Short-circuit Current

Meas. range R_{N-PE}..... (0.11 ÷ 1999)Ω

Display range R_{N-PE} (Ω)	Resolution (Ω)	Accuracy
0.00 ÷ 19.99	0.01	±(2% of r. + 3D)
20.0 ÷ 199.9	0.1	
200 ÷ 1999	1	

Display range Ipsc (A)	Resolution (A)	Accuracy
0.06 ÷ 19.99	0.01	Consider acc. of R_{L-PE}
20.0 ÷ 199.9	0.1	
200 ÷ 1999	1	
2.00k ÷ 19.99k	10	
20.0k ÷ 24.4k	100	

Ipsc calculation:..... $Ipsc = U_N \cdot 1.06 / R_{LOOP\ N-PE}$
U_N = 115 V; (100 V ≤ U_{L-PE} < 160 V)
U_N = 230 V; (160 V ≤ U_{L-PE} ≤ 264 V)
Technical data for generator see under **Earth Resistance, four-lead method.**

Phase rotation

Nominal mains voltage range ..... 100 ÷ 440V
Result displayed..... 1.2.3 or 2.1.3

Voltage (except in harmonic function)

Display range U (V)	Resolution (V)	Accuracy
0 ÷ 440	1	±(2% of r. + 2D)

Nominal frequency range..... d.c., 45 – 65 Hz

Current (True RMS)

Display range I (A)	Resolution (A)	Accuracy
0.0m ÷ 99.9m	0.1m	±(5% of r. + 3D)
100m ÷ 999m	1m	±(5% of r.)
1.00 ÷ 9.99	0.01	
10.0 ÷ 99.9	0.1	
100 ÷ 200	1	

Input resistance ..... 10Ω/1Wmax.
Measurement principle ..... current clamp 1A/1mA
Nominal frequency.....50/60 Hz
Additional clamp error is to be considered.

Peak Current

Display range I (A)	Resolution (A)	Accuracy
5 ÷ 280	1	±(5% of r.)

Sampling rate..... 2 measurements / ms
Measurement principle ..... current clamp
Nominal frequency.....50/60 Hz
Additional clamp error is to be considered.

Varistor Over-voltage Protection Devices (Breakdown voltage)

Display range U (V)	Resolution (V)	Accuracy
0 ÷ 1000	1	±(5% of r. + 10V)

Measurement principle ..... d.c.voltage ramp
Test voltage slope.....500 V/s
Threshold current.....1 mA

Illumination (LUX meter type B)

Display range E (Lux)	Resolution (Lux)	Accuracy
0.00 ÷ 19.99	0.01	±(5 % of r. + 2D)
20.0 ÷ 199.9	0.1	
200 ÷ 1999	1	
2.00 ÷ 19.99 k	10	

Measurement principle .....
..... silicion photodiode with V(λ) filter
Spectral response error .....
.....less than 3.8 % according to CIE curve
Cosine error.....
. less than 2.5 % up to an incident angle of +/- 85 degress
Overall accuracy match to DIN 5032 Class B standard

Illumination (LUX meter type C)

Display range E (Lux)	Resolution (Lux)	Accuracy
0.0 ÷ 19.99	0.01	±(10 % of r. + 3D)
20.0 ÷ 199.9	0.1	
200 ÷ 1999	1	
2.00 ÷ 19.99 k	10	

Measurement principle..... silicion photodiode
Cosine error .....
.less than 3.0 % up to an incident angle of +/- 85 degress
Overall accuracy ..... match to DIN 5032 Class C standard

Fault/Fuse/Conductor locator

Principle..... Line loading or Imposing of test signal

Loading (mains voltage range 30÷264V/45÷65Hz):
Is < 1A pulsed
fs = 3600 Hz
Imposing (voltage free installation):
Us < 7V pulsed
fs = 3600 Hz
Isc < 50mA pulsed

Power

Display range (W/VAr/VA)	Resolution (W/VAr/VA)	Accuracy*
0.00 ÷ 9.99	0.01	±(7% of r. + 1D)
10.0 ÷ 99.9	0.1	
100 ÷ 999	1	
1.00k ÷ 9.99k	0.01k	
10.0k ÷ 88.0k	0.1k	

*(U: 10 ÷ 440V, I: 10mA ÷ 200A)

Principle.....one-phase, clamp current
Power type ..... W, VAr, VA
Nominal input voltage.....400/230/115 V / 50/60 Hz
Display range (PF) .....0.00 – 1.00
Additional clamp error is to be considered.

Energy

Display range W (Wh)	Resolution (Wh)	Accuracy
0.000 ÷ 1.999	0.001	±(7% of r. + 1D)
2.00 ÷ 19.99	0.01	
20.0 ÷ 199.9	0.1	
200 ÷ 1999	1	
2.00k ÷ 19.99k	0.01k	
20.0k ÷ 199.9k	0.1k	
200k ÷ 1999k	1k	

Calculation ..... $W = \sum P \cdot \Delta t$
Time interval ..... presettable 1min up to 25 hr
Nominal input voltage ..... 400/230/115V / 50/60 Hz

Harmonic Analysis (voltage and current)

Voltage measurement (True RMS):

Display range U (V)	Resolution (V)	Accuracy
10 ÷ 440	1	±(5% of r. + 3D)

Current measurement (True RMS):

Display range I (A)	Resolution (A)	Accuracy
10.0m ÷ 99.9m	0.1m	±(5% of r. + 3D)
100m ÷ 999m	1m	±(5% of r.)
1.00 ÷ 9.99	0.01	
10.0 ÷ 99.9	0.1	
100 ÷ 200	1	

Display range THD (%)	Resolution (%)	Accuracy
0.0 ÷ 100.0	0.1	±(5% of r. + 5D)

Display range Harmonics up to 21-th (%)	Resolution (%)	Accuracy
0.0 ÷ 100.0	0.1	±(5% of r. + 5D)

Display of result ..... in % of total effective value
Nominal frequency .....50/60 Hz
Clamp error is to be considered additionally.

6.2. General characteristics

Power supply....6Vd.c. (4 × 1.5V battery IEC LR14)
Automatic comparation of test result with set high and low limit value..... yes
Visual and sound warnings..... yes
Dimensions (w × h × d) .....26.5 × 11 × 18.5 cm
Weight (without accessories, with batteries)..2.1 kg
Display.... matrix LCD with backlight, 128 × 64 dots
Memories .....approx.3000 measurements
Computer connection.....RS 232

Protection classification..... double insulation
Over-voltage cat. . .CATIII / 300 V or CAT II /600 V
Pollution degree 2
Degree of protection..... IP 44
Working temp. range.....0 ÷ 40 °C
Nominal (reference) temp. range .....10 ÷ 30 °C
Max. humidity .....85 % RH (0 ÷ 40°C)
Nominal (reference) hum. range ..... 40 ÷ 60 % RH
Auto power off ..... yes