

SECURITEST

Instruction Manual

ACT Meters Limited

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1. INTRODUCTION

Congratulations on your purchase of the **Securitest 61557** test instrument and its accessories, produced by METREL d.d. We are delighted to be able to offer highly professional test equipment, for carrying out total testing of electrical installations in buildings. The equipment was designed and produced from the extensive knowledge and experience acquired through many years of dealing with electrical installation test equipment.

1.1. General Description

The Securitest 61557 is a highly professional, multifunctional, portable test instrument, intended for carrying out measurements, according to European standard **EN 61557** and **BS7671**, as well as various other tests and measurements.

The instrument is supplied with all accessories, necessary for carrying out the tests. It is stored in a soft carrying bag, together with all the accessories.

All of the electronic parts of the Securitest 61557 are produced in SMD technology, which requires practically no service intervention. A wide, custom designed display with backlight allows easy to read main results as well as a wide range of subresults, parameters and messages. Operation is simple and clear and the user does not need any special training (except to read this Instruction Manual) to operate the instrument.

1.2. Warnings

In order to reach a high level of operator safety, while carrying out various measurements and tests using the Securitest 61557, as well as ensuring that the test equipment remains undamaged, it is necessary to consider the following general warnings:

- If the test equipment is used in manner not specified in this Instruction Manual, the protection provided by the equipment may be impaired!
- Do not use the instrument and accessories if any damage is noticed!
- In case of a blown fuse, follow the instructions in this Instruction Manual to replace it!
- Service intervention or calibration procedures should only be carried out by a competent, authorised person!
- Consider all generally known precautions, in order to avoid the risk of an electric shock, while dealing with hazardous voltages!
- Use only standard or optional test cables supplied by your dealer!

1.3. List of parameters measured by the Securitest 61557

Parameter	Function switch position	Description
Insulation Resistance Ri	RISO	Test voltage: 50 to 1000V in step of 10V
Continuity R of protection conductors	R 200 mA	Test current: 200 mA d.c. -Single measurement - Auto polarity reverse
Continuity Rx	R 200 mA	Test current < 7 mA -Continuous measurement
Fuse/Fault/Conductor locator	LOCATOR	In combination with hand-held indicator - Line voltage loading or imposing of test signal Max. test current: 2.5A
Fault Loop Resistance RL-PE	RLOOP, ISC UL-PE	
Fault Loop Prospective Short-circuit Current Ipsc	RLOOP, ISC UL-PE	Calculation: $I_{psc} = UN1,05 \cdot RL-PE$
Voltage UL-PE	RLOOP, ISC UL-PE	0,264 V
Line Resistance RL-N	RLINE, ISC UL-N	Max. test current: 2.5A
Line Prospective Short-circuit Current Ipsc	RLINE, ISC UL-N	Calculation: $I_{psc} = UN1,06 \cdot RL-N$
Voltage UL-N	RLINE, ISC UL-N	0,264 V
Phase rotation	phase rotation	
RCD - Contact Voltage Uc	Uc, RL	Without test rod No trip out RCD
RCD - Fault Loop Resistance	RL (external source)	Uc, RL-Without test rod -No trip out RCD
RCD - Trip out Time tN	tN	At 0.5IN, IN and 5IN
RCD - Tripping Current I	I, t	Rising current (0.2 - 1.1)IN
RCD - Trip out Time t at Tripping Current I	I, t	
RCD - Automatic test	RCAUTO	Contact voltage meas. - Trip out time measurement at 0.5IN, IN and 5IN (both test curr. start phases)
Varistor Overvoltage Device -Breakdown Voltage Ub	varistor TEST	Rising test voltage 0 - 1000 V d.c.

1.4. Standards applied

The Securitest 61557 is designed to comply with 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 ResistancePart 2
- Loop Resistance.....Part 3
- Resistance of earth connection and equipotential bondingPart 4
- Residual Current Devices (RCD) in TT and TN systems.....Part 6
- Phase SequencePart 7

2. INSTRUMENT DESCRIPTION

2.1. Front panel

- 1 **ON/OFF key**, to switch the instrument ON or OFF. Auto OFF will occur automatically 10 minutes after last strike of any key or function switch rotation.
- 2 **Light key**, to turn ON or OFF display backlight. Auto OFF will automatically occur 20 seconds after last strike of any key or function switch rotation.
- 3 **START key**, to start any measurement.
- 4 **CLR key**, to erase stored results.
- 5 **DISPLAY key**, to:
 - Check last actual test voltage (**Rins** position), after finishing the measurement.
 - Switch between Continuity of protection conductors and General Continuity functions (**R 200mA** position).
 - Check lower subresult in Continuity of protection conductors function, when main test result is displayed (**R 200mA** position).
 - Switch between Voltage and Frequency measurement (**Rline, Ipsc UL-N or Rloop, Ipsc UI-pe** position), before **START** key is pressed.
 - Check Prospective Short-circuit Current **Ipsc** (**Rline, Ipsc UL-N or Rloop, Ipsc UI-pe** position), when main test result is displayed.
 - Check Fault Loop Resistance value and set Limit Contact Voltage (**Uc, RI** position), when result **Uc** is displayed.
 - Check Contact Voltage and set Limit Contact voltage (**tN** position), when result **IN** is displayed.
 - Check Contact Voltage, Trip out Time at tripping current and set Limit Contact Voltage (**I, t** position), when result **I** is displayed.
- 6 **Function switch**, to select appropriate parameter to be tested.
- 7 **CAL key**, to compensate resistance of test leads in **R 200mA** function.
- 8 **key**, to reduce settable parameter value.
- 9 **key**, to increase settable parameter value.
- 10 **SELECT key**, to select set function parameters as follows:
 - Insulation Resistance (Nominal test voltage and Low limit value of test result).
 - Continuity of protection conductors (High and Low limit value of test result).
 - Contact Voltage (Nominal differential current, RCD type and Limit contact voltage).
 - Trip out Time (Nominal differential current, Multiplier of Nominal differential current and RCD type).

 - Tripping current (Nominal differential current).
 - AUTO RCD test (Nominal differential current and RCD type).
 - Varistor breakdown voltage (High and Low limit value of test result).

2.2 Connector panel

- Use original test leads only!
- Maximum voltage allowed between test terminals and ground is 300V!
- Maximum voltage allowed between test terminals is 500V!

2.3. Under side

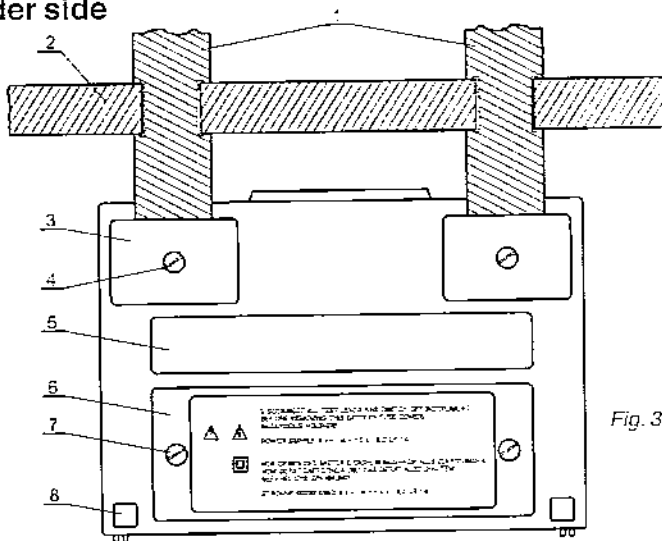


Fig. 3. Under side

Legend:

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

2.4. Ways of carrying the instrument

As the Securitest 61557 is supplied with two carrying belts (neck and back), various possibilities of carrying the instrument are available. The operator can choose appropriate one on basis of his operation, see the following examples:

Neck carrying strap used only!

Neck and back carrying strap used!

Back carrying belt used only!

3. MEASUREMENT INSTRUCTIONS

3.1. Insulation resistance

There are various instances where insulation resistance should be measured, in order to assure safety against electric shock. Below is listed 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.

Warnings!

- **Make sure tested object is de-energised (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 whilst 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. Reducing voltage will be displayed - do not disconnect test leads until the voltage drops below 50V or carefully discharge the tested object manually!**

How to carry out the measurement

Step 1

- Connect test cable to Securitest 61557.
- Set function switch to Riso position, the following menu will be displayed:

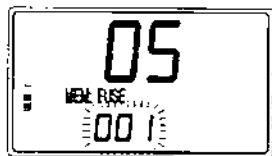


Fig. 4. Insulation Resistance initial menu

Step 2

- Set Nominal Test Voltage.

How to set the Test Voltage

- Press the **SELECT** key and release it, to enter "Test voltage adjustment mode", the following menu will be displayed:

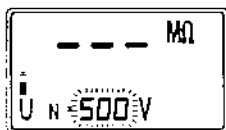


Fig. 5. Test voltage adjustment menu and the Table of available nominal test voltages

- Use the arrow keys, to set required Nominal test voltage. Individual strike will increase/decrease the voltage by one step, while continuous pressure will increase/decrease it continuously (the value will stop for a while, when reaching standard values such as 100, 250 or 500 V, enabling the operator to press the 'Start' key which registers the new voltage).

Step 3

- Set **Low Limit Insulation Resistance Value**. Test results will be compared with the set limit value and, if lower, they will be marked with "!" symbol.

How to set the Low Limit Value

- Press the **SELECT** key after setting Nominal test voltage, to enter "Low Limit Value adjustment menu", see the figure below:
Last set Low limit value is flashing.



Fig. 6. Low Limit Value adjustment menu and the Table of available limit values

- Use the arrow keys, to set required Low Limit Value. Individual strike will increase/decrease the value for one step, while continuous pressure will increase/decrease it continuously. If test results are not to be compared with the Low Limit Value then press the **CLR** key, no will be displayed instead of set value.
- Press the **SELECT** key again after setting limit value, to return to "Insulation Resistance initial menu".

Step 4

- Connect test cable to object to be tested in accordance with the figure below:

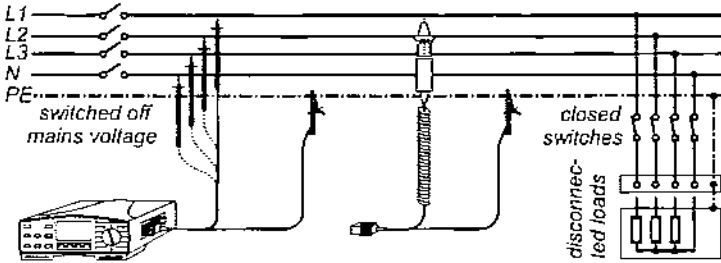


Fig. 7. Connection of Universal test cable (left side) and Tip Commander (right side)

Step 5

- Press the **START** key and keep it pressed until result is stabilized, then release the key. Last result will stay displayed.

Notes!

- In case of external voltage higher than 29 V a.c./d.c. being present between test terminals, the Insulation Resistance measurement will not be carried out after pressing START key, but the voltage will be displayed, marked with "!" symbol! Beep warning sound will also be activated.
- 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 M message will be displayed (UN 250 V) or >200 M (UN 250 V)!
- Positive pole of test voltage is attached to red test lead (Universal test cable) or to commander test tip (Tip Commander)!
- bat message, displayed during or after completion of the measurement, means that batteries are too weak to guarantee a correct result. Replace the batteries.

3.2. Continuity of protection conductors

Continuity of protection 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.

Warning!

- Make sure tested object is de-energised (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 Securitest 61557.
- Set function switch to **R 200mA** position, the following menu will be displayed:

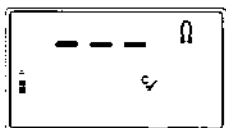


Fig. 8. Continuity of protection conductors initial menu

Step 2

- Set **High Limit Resistance Value**. test results will be compared with the set limit value and, if higher, they will be marked with "!" symbol.

How to set the High Limit Value

- Press the **SELECT** key, to enter "High Limit adjustment menu". see the figure below.



Fig. 9. High Limit adjustment menu and the table of available high limit values

- Use the arrow keys, to set required High Limit Value. Individual strike will increase/decrease the value for one step, while continuous pressure will increase/decrease it continuously. If test results are not to be compared with High Limit Value then press the **CLR** key, **no** will be displayed instead of set value.

Step 3

- Set **Low Limit Resistance Value**. Test results will be compared with the set limit value and, if lower, they will be marked with "L" symbol.

How to set the Low Limit Value

- Press the **SELECT** key after setting **High Limit Value**, to enter "Low Limit adjustment menu", see the figure below.

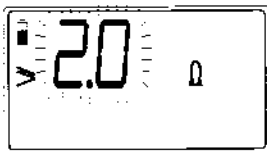


Fig. 10. Low Limit adjustment menu and the Table of available low limit values

- Use the arrow keys, to set required **Low Limit Value**. Individual strike will increase decrease the value for one step, while continuous pressure will increase decrease it continuously. If test results are not to be compared with **Low Limit Value**, then press the **CLR** key, no will be displayed instead of set value.
- Press the **SELECT** key again after setting the limit value, to return to "Continuity initial menu".

Step 4

- **Compensation for test lead resistance** (if they have not been compensated previously or, if the compensated test leads have been exchanged).

How to carry out the compensation

- Short test leads, see the figure below.

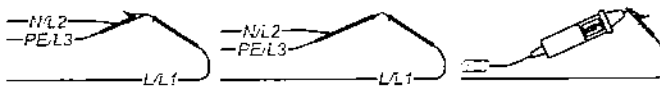


Fig. 11. Shorted test leads

- Press the **START** key and release it, in order to carry out regular measurement, result (close to 0) will be displayed.
- Press the **CAL** key and release it, displayed result will alter to 0,00 and C mark will appear, indicating the compensation was successfully accomplished. Test instrument is now ready to be used.

In order to cancel the compensation, follow the procedure described in this step with open test leads. C mark will disappear after completion of the procedure indicating that the compensation has been cancelled.

Compensation set up in this function will be also be in operation in **CONTINUITY** function.

Step 5

- Connect test leads to object to be tested in accordance with the figures below.

MPEC Mains Potential
Equizing Collector

PCC Protection Conductor
Collector

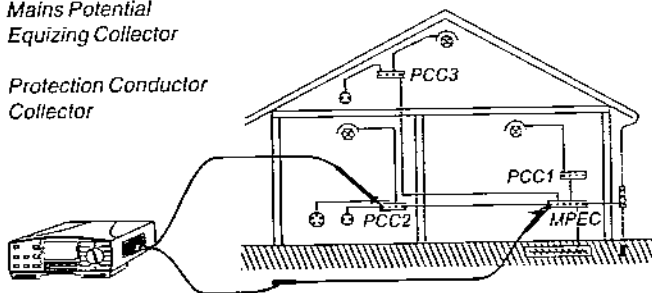


Fig. 12. Connection of Universal test cable and extra test lead

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). The higher of the two results is displayed. The result, if within set Low and High limit values, will activate the bleeper.
- Check lower subresult by pressing the **DISPLAY** key.

Notes!

In case of external voltage higher than 9 V a.c./d.c. being present between the test terminals, the Continuity measurement will not be carried out after pressing **START** key, but the voltage will be displayed, marked with "!" symbol! Beep warning sound will also be activated.

- If resistance value higher than 5 (measured with un-compensated instrument) is displayed, compensation will not be carried out after pressing **CAL** key, also, any previously set up compensation will be cancelled (C mark will disappear)!
- If test result is out of measurement range (open test leads), >1999 message will be displayed!
- bat message, displayed during or after finishing the measurement, means that the batteries are too weak to guarantee correct result. Replace the batteries.

3.3. Continuity

The function is intended to be used when arranging terminal to terminal connections, maintaining and/or repairing electric equipment, carrying out auxiliary measurements etc. The function operates continuously and acts as an ordinary multi-meter with low test current.

Warning!

- Make sure tested object is de-energized (mains voltage disconnected), before starting the measurement! If test tips are connected to mains voltage whilst the test is running, fuse M 0,315A/250V (placed 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 Securitest 61557.

Set function switch to **R 200mA** position and press the **DISPLAY** key, to enter "General Continuity" initial menu.

Step 2

- Press the **START** key and release it. Measurement starts to run and the results are continuously displayed.

Step 3

- Connect test leads to object to be tested in accordance with the figures below and follow displayed result or sound information (result is accompanied with beep, beep, ... sound signal, if displayed value is lower than 20).

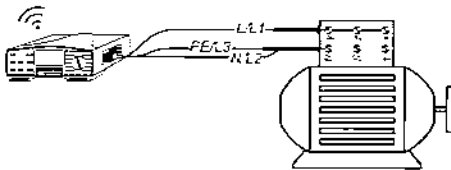


Fig. 15. Connection of Universal test cable

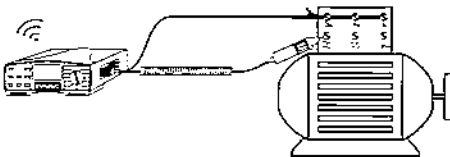


Fig. 16. Connection of Tip Commander

- Press the **START** key again after finishing the measurement, last result will stay displayed.

Notes!

- In case of external voltage higher than 9 V a.c./d.c. being present between test terminals, the Continuity measurement will not start after pressing START key, but the voltage will be displayed, marked with "!" symbol! Beep warning sound will also be activated.
- If test result is out of measurement range (open test leads), >1999 message will be displayed!
- Positive pole of test voltage is attached to red test lead (Universal test cable) or to commander test lip (Tip Commander)!
- Compensation of test leads, set up in Continuity of Protection Conductors function, will also be valid in this function.
- bat message, displayed during or after finishing the measurement, means, batteries are too weak to guarantee correct result. Replace the batteries.

3.4. RCD - Contact Voltage and Fault Loop Resistance

Both parameters are measured simultaneously without causing trip out of RCD.

How to carry out the measurement

Step 1

- Connect test cable (Plug commander or Universal test cable) to Securitest 61557.
- Set function switch to Uc, RL position. "Contact voltage initial menu" will be displayed, see the figure below.

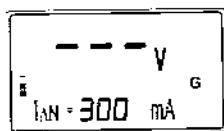


Fig. 17. Contact Voltage initial menu

Step 2

- Select **Nominal differential current in** as follows:
- Press the **SELECT** key, previously set **Nominal differential current** starts to flash.
- Select appropriate value using the arrow keys. The following values are available to be selected: 10, 30, 100, 300, 500 or 1000 mA.

Step 3

- Select **Type of tested RCD** as follows:
- Press the **SELECT** key after setting **Nominal differential current**, previously set type starts to flash.

- Select appropriate type using the arrows keys. Standard (General) type (G is displayed) or Selective type (S is displayed) can be selected.

Step 4

- Select **Limit Contact Voltage** value U_{lim} as follows:
- Press the **SELECT** key after setting RCD type, previously set Limit Contact Voltage starts to flash.
- Select appropriate value using the arrow keys. 50 or 25 V can be selected.
- Press the **SELECT** key again after selecting the Limit Contact Voltage, to enter "Contact Voltage initial menu".

Step 5

- Connect test cable to object to be tested (mains outlet or other test terminals), in accordance with the figures below.

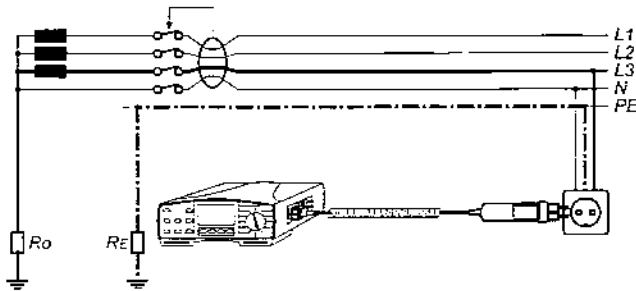


Fig. 18. Connection of Plug commander

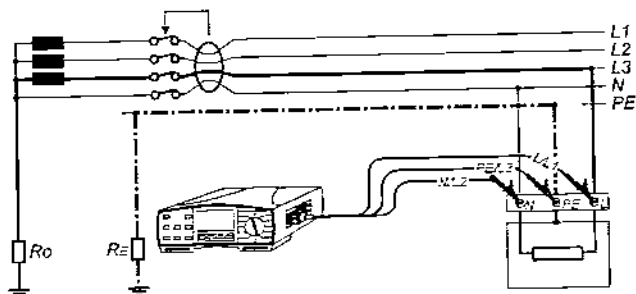


Fig. 19. Connection of Universal test cable

Step 6

- Press the **START** key and release it. Measurement will be carried out and result (U_c at IN - standard RCD or U_c at 2IN - selective RCD) will be displayed afterwards.
- Check Fault Loop Resistance and set Limit Contact voltage using the **DISPLAY** key.

Notes!

- RCD type, Limit Contact Voltage and Nominal differential current set in this function, will be used in other RCD functions!
- Potential current, flowing to PE protection conductor, caused by faulty appliances or capacitive connection between L and PE terminals, will have an influence on the test result. Disconnect such loads, before measurement is started!
- Specified accuracy of U_c measurement is valid only, if earthing system connected to PE terminal is free of interfering voltages!
- bat message, displayed during or after finishing the measurement, means that the batteries are too weak to guarantee correct result. Replace the batteries.

3.5. RCD - Trip Out Time

In order to assure safe conditions, RCD device must trip out within a certain time, in case of faults being present 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

* If I_n 30 mA, test current of 0,25 A is used instead of $5I_n$.

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

How to carry out the measurement

Step 1

- Connect test cable (Plug commander or Universal test cable) to Securitest 61557.
- Set function switch to TN position, "Trip out Time initial menu" will be displayed, see the figure below.

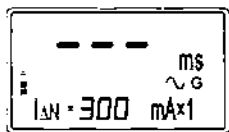


Fig. 20. Contact Voltage initial menu

Step 2

- Select Nominal differential current I_n as follows:
- Press the **SELECT** key, previously set Nominal differential current starts to flash.
- Select appropriate value using the arrow keys. The following values are available to be selected: 10, 30, 100, 300, 500 or 1000 mA.

Step 3

- Select Multiplier of Nominal differential current as follows:
- Press the **SELECT** key after setting Nominal differential current, previously set Multiplier starts to flash.
- Select appropriate value, using the arrow keys. The following values are available to be selected: x1.2, x1, x2, x5. The value x5 is not available, if Nominal current $I_n = 1000$ mA.

Step 4

- Select Type of tested RCD as follows:
- Press the **SELECT** key after setting the Multiplier, previously set type starts to flash.
- Select appropriate type using the arrow keys. Standard (General) type (**G** is displayed) or Selective type (**S** is displayed) can be selected.

Step 5

- Connect test cable to object to be tested (mains outlet or other test terminals), in accordance with figure 18. (Plug commander) or figure 19. (Universal test cable).

Step 6

Press the **START** key and release it. Measurement will be carried out and result displayed afterwards (Trip out time at set differential current).

Double click to **START** key will change positive start polarity of test current to negative one, see the figure below.

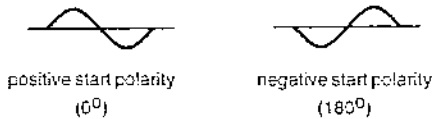


Fig. 21. Positive and negative start polarity of test current

- Check Contact Voltage at set Nominal differential current (Standard RCD type) or at double Nominal differential current (Selective RCD type) and set Limit Contact voltage, using the **DISPLAY** key.

Notes!

- RCD type, set in this function, will be used in other RCD functions (Contact Voltage and Auto RCD test)!
- RCD type and Nominal differential current set in this function will be used in other RCD functions!
- For safety reasons the Trip out Time measurement will only be carried out if Contact voltage at nominal differential current is lower than set limit value!
- Potential current, flowing to PE protection conductor, caused by faulty appliances or capacitive connection between L and PE terminals, will have an influence on test result. Disconnect such loads, before measurement is started!
- Specified accuracy of tested parameters is valid only if earthing system connected to PE terminal is free of interfering voltages!
- **bat** message, displayed during or after finishing the measurement, means that the batteries are too weak to guarantee correct result. Replace the batteries.

3.6. RCD - Tripping Current

How to carry out the measurement

Step 1

- Connect test cable (Plug commander or Universal test cable) to Securitest 61557.
- Set function switch to RCD AUTO position, "Auto RCD test initial menu" will be displayed, see the figure above.

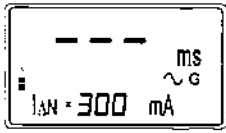


Fig. 22. Auto RCD test initial menu

Step 2

- Select **Nominal differential current I_n** as follows:
- Press the **SELECT** key, previously set **Nominal differential current** starts to flash.
- Select appropriate value using the arrow keys. The following values are available to be selected: 10, 30, 100, 300, 500 or 1000 mA.

Step 3

- **Connect test cable** to object to be tested (mains outlet or other test terminals), in accordance with figure 18. (Plug commander) or figure 19. (Universal test cable).

Step 4

Press the **START** key and release it. Measurement will be carried out and result displayed afterwards (Tripping current).

Double click to **START** key will change positive start polarity of test current to negative one, see the figure 21.

- Check **Contact Voltage at Tripping current**, **Trip out Time at Tripping Current** and set **Limit Contact voltage**, using the **DISPLAY** key.

Notes!

- **Nominal differential current**, set in this function, will be used in other RCD functions (**Contact Voltage**, **Trip out Time** and **Auto RCD test**)!
- **Limit Contact Voltage U_{lim}** can be set in **Contact voltage** function only!

- For safety reason Tripping Current measurement will only be carried out if Contact voltage at nominal differential current is lower than set limit value!
- Potential current, flowing to PE protection conductor, caused by faulty appliances or capacitive connection between L and PE terminals, will influence on test result. Disconnect such loads, before measurement is started!
- Specified accuracy of tested parameters is valid only if the earthing system connected to PE terminal is free of interfering voltages!
- **bat** message, displayed during or after finishing the measurement, means that the batteries are too weak to guarantee correct result. Replace the batteries.

3.7. RCD - Automatic Test

The purpose of the function is to carry out a complete test of an RCD and the measurement of all associated parameters (Contact Voltage, 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 then the individual parameter test is to be used for further investigation.

How to carry out the automatic test

Step 1

- Connect test cable (Plug commander or Universal test cable) to Securitest 61557.
- Set function switch to RCDAUTO position. "Auto function initial menu" will be displayed, see the figure below.

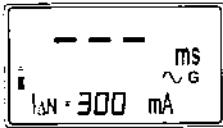


Fig. 23. Auto function initial menu

Step 2

- Select Nominal differential current $I_{\Delta N}$ as follows:
- Press the **SELECT** key, previously set Nominal differential current starts to flash.
- Select appropriate value using the arrow keys. The following values are available to be selected: 10, 30, 100, 300 or 500 mA.

Step 3

- Select Type of tested RCD as follows:
- Press the **SELECT** key after setting Nominal differential current, last set type starts to flash.
- Select appropriate type using the arrow keys. Standard (General) type (G is displayed) or Selective type (S is displayed) can be selected.

The following procedure is valid for Standard RCD type, see additional information about the procedure for Selective one on page 34.

Step 4

- Connect test cable to object to be tested (mains outlet or other test terminals), in accordance with figure 18. (Plug commander) or figure 19. (Universal test cable).

Step 5

Press the START key and release it. Measurement will start to run, partial results will be displayed as follows:

1st test

Trip out time measurement, using test current $I_{test} = I_n 2$, at positive start polarity of test current (0°). Tested RCD should not trip, the following display message will appear for a short time:



Fig. 24. First test is running

After successful completion of the first test (RCD does not trip) the second test will automatically commence.

2nd test

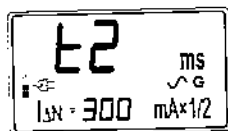


Fig. 25. Second test is running

Trip out time measurement, using test current $I_{test} = I_n 2$, at negative start polarity of test current (180°). Tested RCD should not trip, the above display message will appear for a short time.

After successful completion of the second test (RCD does not trip) the third test will automatically commence.

3rd test

Trip out time measurement, using test current $I_{test} = I_n$, at positive start polarity of test current (0°). The display message, presented on left side of the following figure, will appear for a short period.

On successful completion of the third test (RCD trips within allowed time period) the rcd message will be displayed informing the operator to reset the RCD, see the figure below (right side).

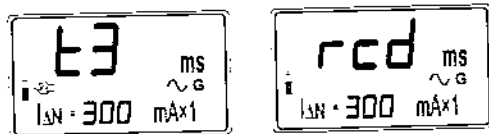


Fig. 26. Third test is running (left figure) and rcd message, displayed after tripping out RCD (right figure)

After resetting RCD, fourth test will follow automatically.

4th test

Trip out time measurement, using test current $I_{test} = I_n$, at negative start polarity of test current (180°). The display message, presented on left side of the following figure, will appear for a short time. On successful completion of the fourth test (RCD trips within allowed time period) the rcd message will be displayed, informing the operator to reset the RCD, see the figure below (right side).

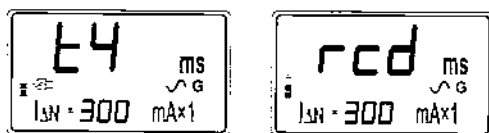


Fig. 27. Fourth test is running (left figure) and rcd message, displayed after tripping out RCD (right figure)

After resetting RCD, fifth test will follow automatically.

5th test

Trip out time measurement, using test current $I_{test} = 5I_n$, at positive start polarity of test current (0°). The display message, presented on left side of the following figure, will appear for a short time. On successful completion of the fifth test (RCD trips within allowed time period) the rcd message will be displayed informing the operator to reset the RCD, see the figure below (right side).

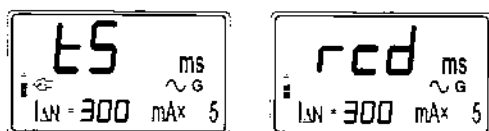


Fig. 28. Fifth test is running (left figure) and rcd message, displayed after tripping out RCD (right figure)

After resetting RCD, sixth test will follow automatically.

6th test

Trip out time measurement, using test current $I_{test} = 5I_n$, at negative start polarity of test current (180°). The display message, presented on left side of the following figure, will appear for a short time. On successful completion of the sixth test (RCD trips within allowed time period) the result of the sixth test will be displayed, see the figure below (right side).

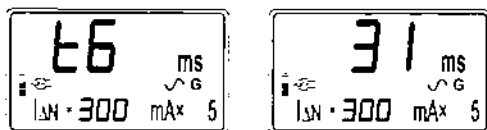


Fig. 29. Sixth test is running (left figure) and result of the sixth test (right figure)

- Check subresults (Trip out Times) separately for each step from 1st up to 6th as well as Contact Voltage at set Nominal differential current (Standard RCD type) or at double Nominal differential current (Selective RCD type), using the DISPLAY key.

If trip out time in any step is out of allowed range (see table 1.), automatic test will be stopped and the appropriate message will be displayed (>xxx / <xxx ms), where xxx means limit value according to table 1.

If RCD trips during Contact voltage measurement (some leakage current is already flowing to PE conductor or tested RCD is too sensitive), rcd message will flash off and on.

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 done. As the Selective type of RCD (delayed trip out) operates on basis of integration of fault current, it is necessary to allow it to stabilise before Trip out Time measurement is carried out, otherwise the test is not relevant. That is why 30s of waiting time is involved in some steps namely: Step 3, Step 4, Step 5 and Step 6. The waiting time is presented on display as countdown from 30 to 0.

Notes!

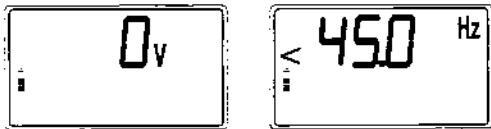
- Limit Contact Voltage U_{lim} can be set in Contact voltage function only!
- RCD type and Nominal differential current set in this function, will be used in other RCD functions!
- For safety reasons the Automatic RCD test will only be carried out if the Contact voltage at nominal differential current is lower than set limit value!
- Potential current, flowing to PE protection conductor, caused by faulty appliances or capacitive connection between L and PE terminals, will have an influence on test result. Disconnect such loads, before measurement is started!
- Specified accuracy of tested parameters is valid only if earthing system connected to PE terminal is free of interfering voltages!
- **bat** message, displayed during or after finishing the measurement, means that the batteries are too weak to guarantee correct result. Replace the batteries.

3.8. Fault Loop Resistance and Prospective Short-circuit Current

How to carry out the measurement

Step 1

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



- Set function switch to RLOOP, I_{sc} UL-PE position, L-PE voltage measurement will start to run, see the figure above:

Fig. 30. L-PE voltage and frequency measurement

- Check Frequency of mains voltage, pressing the DISPLAY key, see the figure above.

Step 2

- Connect test cable to the object to be tested (mains outlet or other test terminals), in accordance with the figures below.

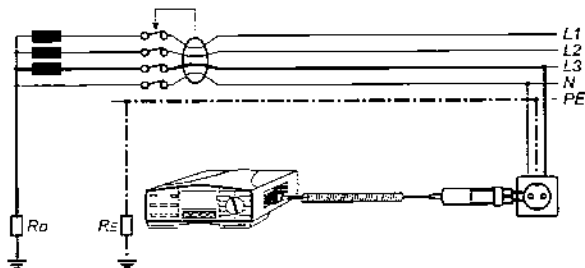


Fig. 31. Connection of Plug commander

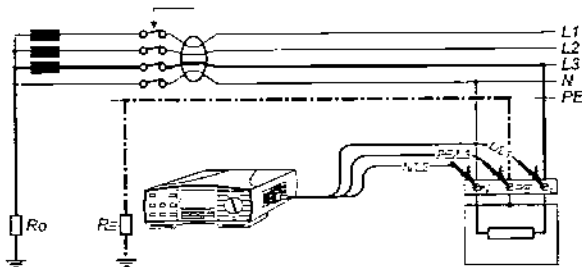


Fig. 32. Connection of Universal test cable

Step 3

- Press the **START** key and release it. Measurement will be carried out and result displayed afterwards.
- Check calculated **Prospective Short-circuit Current**, pressing the **DISPLAY** key.

The current is calculated as follows: $I_{psc} = U_n 1,06 / R_{L-PE}$

Where:

U_n 115 V (100 V UL-PE 160 V)
 230 V (160 V UL-PE 264 V)

- If RCD trips during Contact voltage measurement, a flashing **rcd** message will be displayed.

Notes!

- Nominal input voltage range is 100 to 264 V, if input voltage is out of the range, the voltage value marked with "!" symbol will be displayed after pressing **START** key. Warning sound signal will also be activated.
- If **L** and **PE** or **L** and **N** terminals are crossed on any live socket under test then the instrument will display the appropriate fault message (**L – N** or **PE**), a "!" symbol will be displayed and the warning signal will be activated. The instrument will not allow you to proceed any further with the test and the fault must be immediately rectified!
- If test result is out of display range, **>2 k** message will be displayed!
- Specified accuracy of tested parameters is valid only, if mains voltage is stable during the measurement!
- **bat** message, displayed during or after finishing the measurement, means that the batteries are too weak to guarantee correct result. Replace the batteries.

3.9. Line Resistance and Prospective Short-circuit Current

How to carry out the measurement

Step 1

- Connect test cable (Plug commander or Universal test cable) to Securitest 61557.
- Set function switch to RLINE, I_{sc} UL-N position, L-N voltage measurement will start to run, see the figure above;

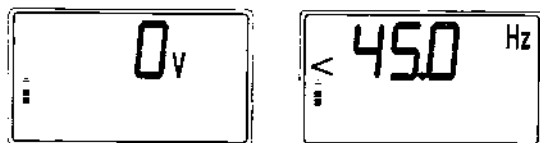


Fig. 33. L-N voltage and frequency measurement

- Check Frequency of mains voltage, pressing the **DISPLAY** key, see the figure above.

Step 2

- Connect test cable to object to be tested (mains outlet or other test terminals), in accordance with figure 31. or 32.

Step 3

- Press the **START** key and release it. Measurement will be carried out and result displayed afterwards.
- Check calculated Prospective Short-circuit Current, pressing the **DISPLAY** key.

The current is calculated as follows: $I_{psc} = Un_{1,06} / R_{L-N}$

Where:

Un 115 V (100 V UL-N 160 V)

230 V (160 V UL-N 264 V)

Notes!

- Nominal input voltage range is 100 to 264 V, if input voltage is out of the range, the voltage value marked with "!" symbol will be displayed after pressing START key. Warning sound signal will also be activated.
- If test result is out of display range, >2 k message will be displayed!

- Specified accuracy of tested parameters is valid only, if mains voltage is stable during the measurement!
- bat message, displayed during or after finishing the measurement, means that the batteries are too weak to guarantee correct result. Replace the batteries.

3.10. Phase Rotation

How to carry out the measurement

Step 1

- Connect test cable (Three phase cable or Universal test cable) to Securitest 61557.
- Set function switch to phase rotation position, "Phase rotation menu" will be displayed, see the figure below.



Fig. 34. Phase rotation initial menu

Step 2

- Connect test cable to the object to be tested (three-phase mains outlet or other test terminals), according to the figure below.



Fig. 35. Connection of Universal test cable and Three phase cable

Step 3

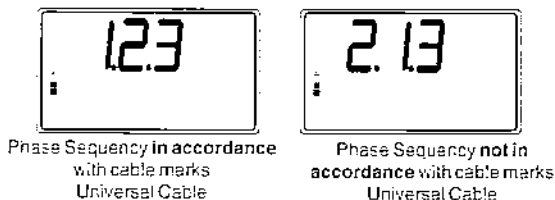


Fig. 36. Phase rotation test result

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

Notes!

- Nominal input voltage range is 100 V 440 V.
- If there are mains voltages present at test tips, but they do not correspond to three phase system (for example two test tips are connected correctly to two phases, while the third one is connected to neutral terminal), 1.1.1 message will be displayed.
- **bat** message, displayed during or after finishing the measurement, means that the batteries are too weak to guarantee correct result. Replace the batteries.

3.11. Varistor Overvoltage Protection Devices

How to carry out the Breakdown voltage measurement

Step 1

- Connect Universal test cable to Securitest 61557.
- Set function switch to **varistor TEST** pos., the following menu will be displayed:

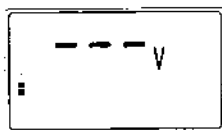


Fig. 37. Varistor Test initial menu

Step 2

- Set **High Limit Breakdown Varistor Voltage**. The test results will be compared with the set limit value and, if higher, they will be marked with "!" symbol.

How to set the High Limit Value

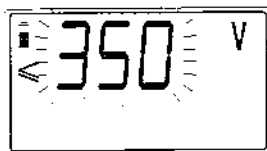


Fig. 38. High limit value adjustment menu and the table of available limit values

- Press the **SELECT** key, to enter "High Limit Value adjustment mode", the display above will appear:
- Use the arrow keys, to set required High Limit Value. Individual strike will increase/decrease the value by one step, while continuous pressure will increase/decrease it continuously. If test results are not to be compared with High Limit Value then press the CLR key, no will be displayed instead of set value.

Step 3

- Set **Low Limit Breakdown Varistor Voltage**. The test results will be compared with the set limit value and, if lower, they will be marked with "!" symbol.

How to set the Low Limit Value

- Press the **SELECT** key after setting the High Limit Value, to enter "Low Limit Value adjustment mode", the following menu will be displayed:



Fig. 39. Low limit value adjustment menu and the table of available limit values

- Use the arrow keys, to set required Low Limit Value. Individual strike will increase/decrease the value by one step, while continuous pressure will increase/decrease it continuously. If test results are not to be compared with Low Limit Value then press the CLR key, no will be displayed instead of set value.
- Press the **SELECT** key again after setting the limit values, to return to "Varistor Test initial menu".

Step 4

- Connect Universal test cable to tested Varistor Overvoltage Protection Device, according to the figure above.

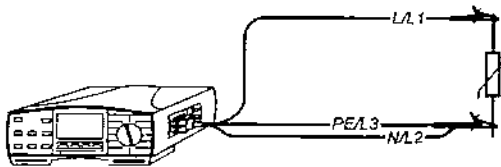


Fig. 40. Connection of Universal test cable

Step 5

- Press the **START** key and release it. Test voltage starts to rise (500 V/s) and as soon as varistor's threshold current reaches the value of 1 mA (Breakdown Voltage is defined at that current), the voltage will be displayed. Generator will stop to generate test voltage.

Notes!

- To ensure that the test results are not influenced by connected loads, the Overvoltage Protection Device must be removed from installation before testing it.
- If the Overvoltage 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.
- **bat** message, displayed during or after finishing the measurement, means that the batteries are too weak to guarantee correct result. Replace the batteries.

4.1. Reset of the instrument

If any malfunction is noticed when operating the Securitest1557, it is advisable that a RESET of the instrument is carried out. In this case all settable parameters will be set to their initial values, see the table below.

How to reset the instrument

- Switch OFF the instrument.
- Press the RS232 key and keep it pressed while switching ON the instrument. rES message will be displayed for a short time, meaning RESET function has been completed.

Parameter	Function	Initial value
Compensation of test leads	R200mA	cancelled
High limit value	R200mA	10,0
Low limit value	R200mA	0,0
Nominal differential current	All RCD functions	10 mA
Type of RCD	All RCD functions	G (general)
Limit Contact voltage	All RCD functions	50 V
Multiplyer of Nominal differential current	tN	x ½
High limit of Breakdown voltage	varistor TEST	500 V
Low limit of Breakdown voltage	varistor TEST	100 V
Test voltage	R ISO	50 V
Low limit of Insulation Resistance	R ISO	1 M

Table 2. Initial values of settable parameters

5. MAINTENANCE



5.1. Batteries



Battery condition is constantly displayed, see the battery condition mark in the left side of display. Fully dark battery mark indicates full-capacity batteries. Observe the battery condition even when carrying out measurements. Results obtained with low battery voltage (the results may be incorrect) will be marked with bat mark after completion of the measurement.

Replace all four batteries, when the battery mark is empty in static mode (no measurement is running) or when the battery mark falls to empty frame just temporarily, while a measurement is running!

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).

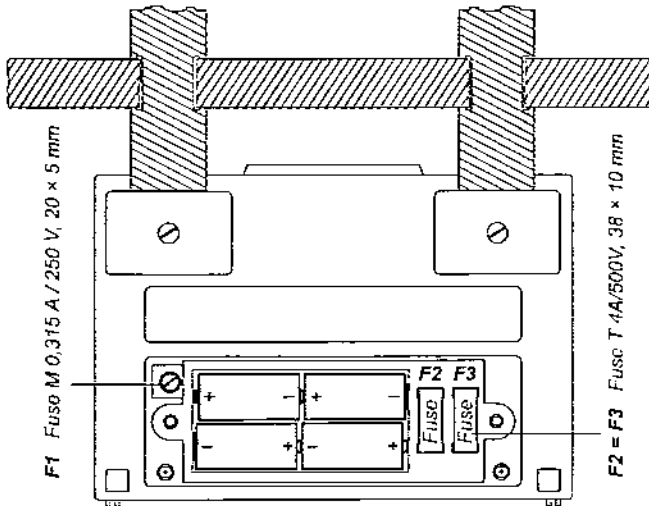


Fig. 49. Correct polarity of inserted batteries

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

Notes!

- Insert batteries correctly, otherwise test instrument will not operate and batteries may be discharged, see figure 49. for correct battery polarity.

In order to retain setup data, follow the next procedure, when replacing the batteries:

- Switch OFF the instrument.
- Replace the batteries within one minute.
- Switch ON the instrument, Clr message will not be displayed, indicating stored data has not been erased.

5.2. Fuses

There are three fuses under battery compartment cover (see the figure 49.).

- **F1 = M 0,315A/250V**, 20 x 5 mm (It protects internal circuitry of the test instrument, if test tips are connected to mains voltage during Continuity of protection conductors or Continuity measurement by mistake).
- **F2 = F3 = T 4A/500V**, 38 x 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 message is flashing after pressing the **START** key in all RCD functions as well as in RLINE, Ipsc and RLOOP, Ipsc function.
- >1999 Ω message is displayed in R200 mA functions, in spite of shorted test leads.
- >200 M Ω or >1000 M Ω 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 FuS message is displayed in R200 mA functions.

Warning!

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

5.3. Cleaning

Use soft cloth, slightly moistened with soap water or alcohol, to clean the surface of Securitest 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:
ACT Meters Limited
Church Rd.
Rainford
St. Helens
WA11 8HB

Tel: 01744 886660 fax: 01744 886661

Unauthorised person is not allowed to open the Securitest 61557. There are no user replacable components inside the instrument, except the fuse, 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 M, if Tip Commander is used.

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

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 voltage50 1000Vd.c. in steps of 10V

Current capability of test generator

(at Utest. > UN)>1mA

Short-circuit test current<3 mA

Automatic discharge of tested object.....yes

Continuity of protection 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 voltage4 - 7 Vd.c.

Short-circuit test current> 200 mA

Compensation of test leads (up to 5)yes
 Sound signalyes
 Automatic polarity exchangeyes
 Measurement modesingle measurement

Continuity

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

Open-terminal test voltage4 - 7 Vd.c.
 Short-circuit test current< 7 mA
 Sound signalyes
 Measurement modecontinuous measurement

RCD - general data

Nominal differential

currents10, 30, 100, 300, 500, 1000 mA

Accuracy of actual differential currents:

-0 / +0,1I; I = 1N, 2IN, 5IN

-0.1IN / +0; I = 0,5IN

Accuracy of actual diff. currents(-0 / +0,1)IN

Test current shapesine wave

Test current start at0° or 180°

RCD typeStandard or Selective

RCD - Contact Voltage Uc

Meas. range Uc(10 100)V

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

*The accuracy is valid if:

Mains voltage is stable during the meas.

PE terminal is free of interfering voltage

Measurement principle without aux. probe

Test current < 0.5 IN

Limit contact voltage 25 or 50 V

The Contact Voltage is calculated to 1N (standard type)

or to 2IN (selective type).

RCD - Fault Loop Resistance RL

Display range	Resolution	Accuracy
RL (Ω)	(Ω)	
0.00 – 19.99	0.01	Consider acc. of
20.0 – 199.9	0.1	Uc and $I_{\Delta N}$
200 – 1999	1	RL = U _c / I Δ N
2.00k – 10.00k	0.01k	

Calculation..... RL = U_c / I Δ N
 Measurement principle..... without auxiliary probe
 Test current..... < 0.5 I Δ N

RCD - Trip out time

Test current..... 0.5 I Δ N, I Δ N, 2 I Δ N, 5 I Δ N
 (multiplier 5 is not available, if I Δ N = 1000mA)

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

Display range	Resolution	Accuracy
t (ms) G type	(ms)	
0 – 300 (1.2I Δ N, I Δ N)	1	
0 – 150 (2I Δ N)	1	3ms
0 – 40 (5I Δ N)	1	

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

Display range	Resolution	Accuracy
t (ms) S type	(ms)	
0 – 500 (1.2I Δ N, I Δ N)	1	
0 – 200 (2I Δ N)	1	3ms
0 – 150 (5I Δ N)	1	

RCD - Tripping current

Meas. range I Δ(0.2 – 1.1) I Δ N

Display range	Resolution	Accuracy
I Δ		
0.2I Δ N – 1.1I Δ N	0.05I Δ N	0.1I Δ N

Meas. range t Δ(10 – 300)ms

Display range	Resolution	Accuracy
t Δ (ms)	(ms)	
0 – 300	1	±3ms

Meas. range U_{ci}.....(10 – 100)V

Display range	Resolution	Accuracy*
U _{ci} (V)	(V)	
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 stable during the meas.

PE terminal is free of interfering voltage

U_{ci} voltage is calculated to Tripping current I Δ .

Fault Loop Resistance and Prospective Short-circuit Current

Meas. range RL-PE(0,20 1999) Ω

Display range	Resolution	Accuracy
RL-PE, (Ω)	(Ω)	
0.00 – 19.99	0.01	
20.0 – 199.9	0,1	(5% of r. + 5D)
200 – 1999	1	

Resolution	Display range	Accuracy
Ipsc (A)	(A)	
0.06 – 19.99	0,01	Consider
20.0 – 199,9	0,1	accuracy
200 – 1999	1	of RL-PE
2.00k – 19,99k	10	
20.0k – 24.4k	100	

Ipsc calculation:Ipsc = UN1,06 / RL-PE

UN = 115 V; (100 V UL-PE 160 V)

UN = 230 V; (160 V UL-PE 264 V)

Max. test current (at 230 V)2.5 A

Nominal voltage range100 – 264V / 45 - 65 Hz

Line Resistance and Prospective short-circuit current

Meas. range RL-N.....(0,20 – 1999)Ω

Display range	Resolution (Ω)	Accuracy
RL-N, (Ω)	(Ω)	
0.00 – 19.99	0.01	±(5% of r. + 5D)
20.0 – 199.9	0,1	
200 – 1999	1	

Display range	Resolution	Accuracy
Ipsc (A)	(A)	
0.06 – 19.99	0.01	Consider
20.0 – 199.9	0,1	accuracy
200 – 1999	1	of RL-N
2.00k – 19,99k	10	
20.0k – 24.4k	100	

Ipsc calculation:Ipsc = UN 1.06 / RL-N

UN = 115 V; (100 V UL-N 160 V)

UN = 230 V; (160 V UL-N 264 V)

Max. test current (at 230 V)2.5 A

Nominal voltage range100 264V / 45 - 65 Hz

Phase rotation

Nominal mains voltage range 100 – 440V

Result displayed1.2.3 or 2.1.3

Voltage

Display range	Resolution	Accuracy
U (V)	(V)	
0 – 264	1	$\pm(2\% \text{ of r.} + 2D)$

Nominal frequency range 45 - 65 Hz

Varistor Overvoltage Protection Devices (Breakdown voltage)

Display range	Resolution	Accuracy
U (V)	(V)	
0 – 1000	1	$(5\% \text{ of r.} + 10V)$

Measurement principle d.c. voltage ramp

Test voltage slope 500 V/s

Threshold amps 1 mA

6.2. General characteristics

Power supply	6Vd.c. (4 x 1.5V battery IEC LR14)
Automatic comparison of test result with set high and low limit value	yes
Visual and sound warnings	yes
Dimensions (w x h x d)	26,5 x 11 x 18,5 cm
Weight (without accessories, with batteries)	1,8 kg
Display	LCD with backlight
Protection classification	double insulation
Overvoltage cat.	CATIII 300V or CATII 600V
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

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