CE MultiTesterXA
MI 3394
Quick Guide

Ver. 1.1.2, Code no. 20 752 431

METREL®

Distributor:

Manufacturer:

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CE Mark on your equipment certifies that it meets European Union requirements for EMC, LVD, ROHS regulations

Note:
This document is not a supplement to the Instruction manual.

TABLE OF CONTENTS

1 General description

1.1 Warnings and notes

1.1.1 Safety warnings

In order to reach high level of operator safety while carrying out various measurements using the CE MultiTesterXA instrument, as well as to keep the test equipment undamaged, it is necessary to consider the following general warnings:

- **Read this user manual carefully, otherwise use of the instrument may be dangerous for the operator, for the instrument or for the equipment under test!**
- **Consider warning markings on the instrument!**
- **If the test equipment is used in manner not specified in this user manual the protection provided by the equipment may be impaired!**
- **Do not use the instrument and accessories if any damage is noticed!**
- **Consider all generally known precautions in order to avoid risk of electric shock while dealing with hazardous voltages!**
- **Use only standard or optional test accessories supplied by your distributor!**
- **Only test adapters provided or approved by Metrel should be connected to TC1 (test and communication) connectors.**
- **Use only earthed mains outlets to supply the instrument!**
- **In case a fuse has blown refer to chapter *5.1 Fuses* to replace it!**
- **Instrument servicing and calibration is allowed to be carried out only by a competent authorized person!**

1.1.2 Warnings related to safety of measurement functions

1.1.2.1 HV AC, HV DC, HV AC programmable, HV DC programmable

- **A dangerous voltage up to 5 kV_{AC} or 6 kV_{DC} is applied to the HV instrument outputs during the test. Therefore special safety consideration must be taken when performing this test!**

- **Only a skilled person familiar with hazardous voltages can perform this measurement!**
- **DO NOT perform this test if any damage or abnormality (test leads, instrument) is noted!**
- **Never touch exposed probe tip, connections equipment under test or any other energized part during the measurements. Make sure that NOBODY can contact them either!**
- **DO NOT touch any part of test probe in front of the barrier (keep your fingers behind the finger guards on the probe) – possible danger of electric shock!**
- **It is a good practice to use lowest possible trip-out current.**

1.1.2.2 Diff. Leakage, Ipe Leakage, Touch Leakage, Power, Leak's & Power

- **It is advisable not to run tested devices with load currents above 10 A for more than 15 minutes. Load currents higher than 10 A can result in high temperatures of On/Off switch and fuse holders!**

1.1.3 Markings on the instrument

-  **Read the Instruction manual with special care to safety operation«. The symbol requires an action!**
-  **Dangerous high voltage is present on terminals during the test. Consider all precautions in order to avoid risk of electric shock.**
-  **Mark on your equipment certifies that it meets European Union requirements for EMC, LVD, and ROHS regulations.**
-  **This equipment should be recycled as electronic waste.**

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2 Instrument description

2.1 Front panel

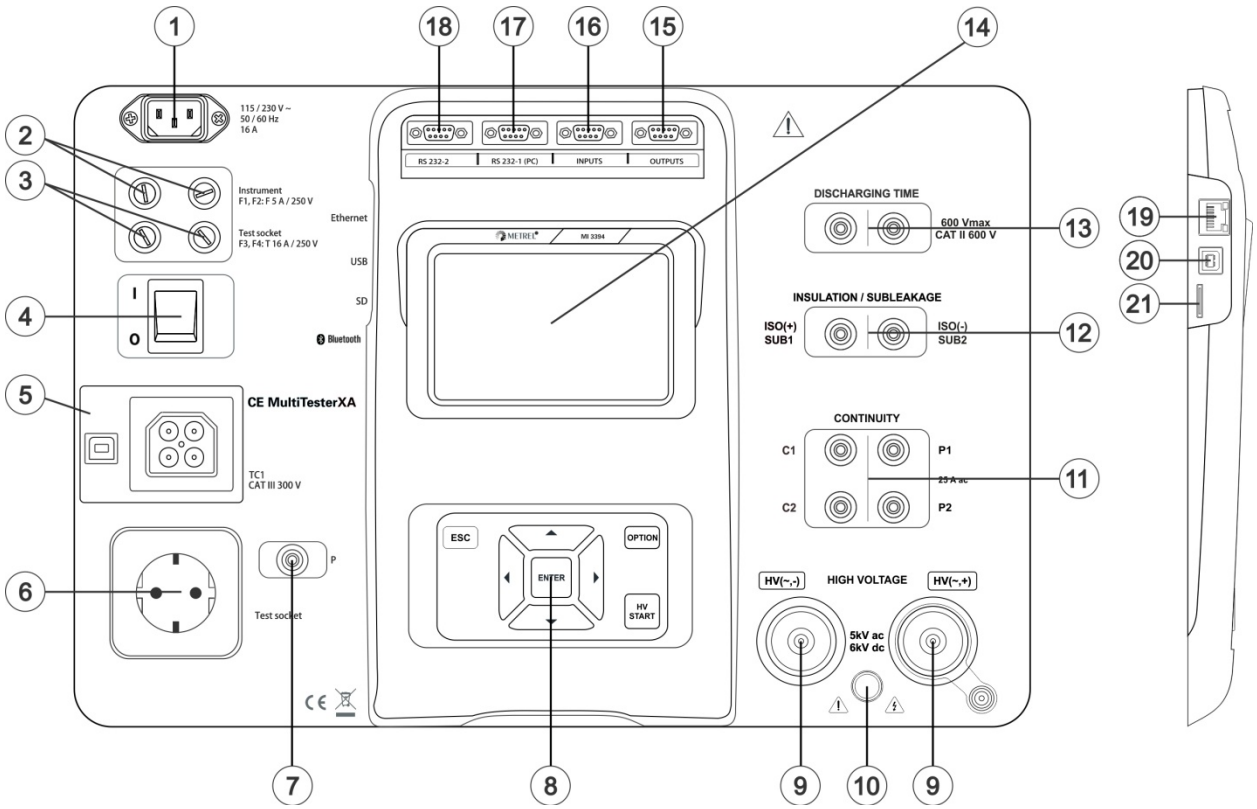


Figure 2.1: Front panel

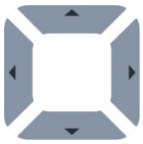
1	**Mains supply connector**
2	**F1, F2 fuses (F 5 A / 250 V)**
3	**F3, F4 fuses (T 16 A / 250 V)**
4	**On / Off switch**
5	**Test connections TC1 for external test adapters**
6	**Mains test socket**
7	**P/S (probe) connector**
8	**Keypad**
9	**HV output connectors**
10	**HV output warning lamp**
11	**Continuity connectors**
12	**Insulation / Subleakage connectors**
13	**Discharging time connectors**
14	**Colour TFT display with touch screen**
15	**Control outputs**
16	**Control inputs**
17	**Multipurpose RS232-1 port**

18	**Multipurpose RS232-2 port**
19	**Ethernet connector** (not yet functional in this model)
20	**USB connector**
21	**MicroSD card slot**

3 Instrument operation

The CE MultiTesterXA can be manipulated via a keypad or touch screen.

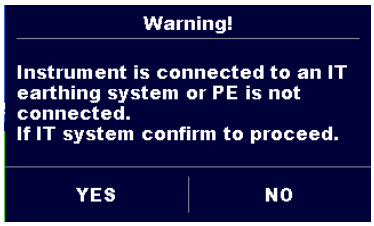
3.1 General meaning of keys

	Cursor keys are used to: - select appropriate option
	Enter key is used to: - confirm selected option - start and stop measurements
	Escape key is used to: - return to previous menu without changes - abort measurements
	Option key is used to: - expand column in control panel - show detailed view of options
	HV Test key is used to: - start and stop HV tests

3.2 General meaning of touch gestures:

	Tap (briefly touch surface with fingertip) is used to: - select appropriate option - confirm selected option - start and stop measurements
	Swipe (press, move, lift) up/ down is used to: - scroll content in same level - navigate between views in same level
 **long**	Long press (touch surface with fingertip for at least 1 s) is used to: - select additional keys (virtual keyboard) - enter cross selector from single test screens
	Tap Escape icon is used to: - return to previous menu without changes; - abort measurements

3.3 Symbols and messages



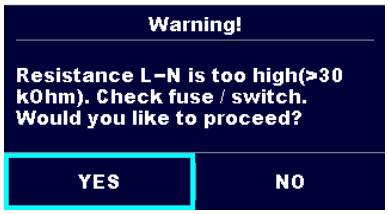
Supply voltage warning

Possible causes:

- No earth connection.
- Instrument is connected to an IT earthing system. Press YES to continue normally or NO to continue in a limited mode (measurements are disabled).

Warning:

The instrument must be earthed properly to work safely!

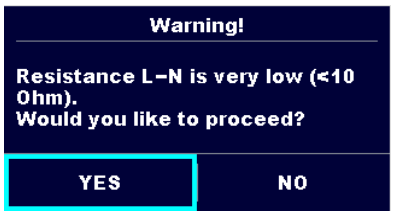


Resistance L-N > 30 kΩ

In pre-test a high input resistance was measured.
Possible causes:

- Device under test is not connected or switched on
- Input fuse of device under test is blown.

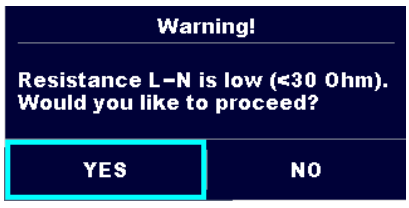
Select **YES** to proceed with or **NO** to cancel measurement.



Resistance L-N < 10 Ω

In pre-test a very low resistance of the device under test supply input was measured. This can result in a high current after applying power to the device under test. If the too high current is only of short duration (caused by a short inrush current) the test can be performed otherwise not.

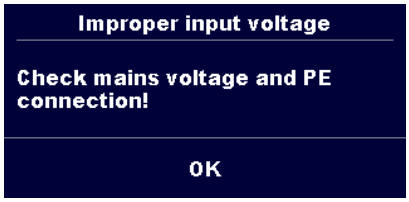
Select **YES** to proceed with or **NO** to cancel measurement



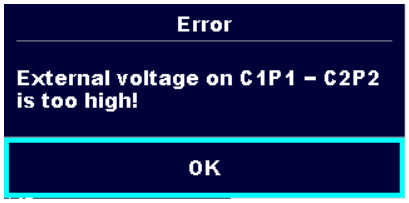
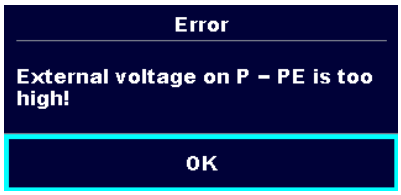
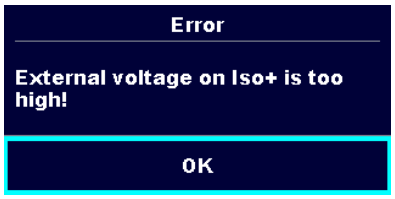
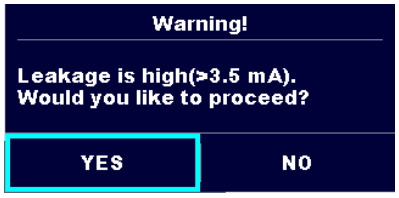
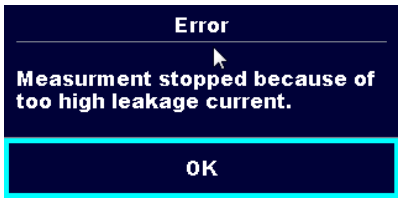
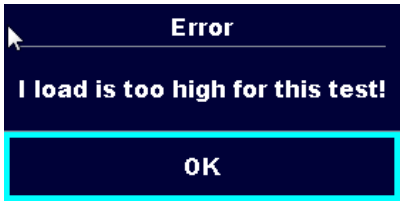
Resistance L-N < 30 Ω

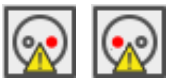
In pre-test a low input resistance of the device under test was measured. This can result in a high current after applying power to the device. If the high current is only of short duration (caused by a short inrush current) the test can be performed, otherwise not.

Select **YES** to proceed with or **NO** to cancel measurement.



Warning for improper supply voltage condition. If pressing OK instrument will continue to work in a limited mode (measurements are disabled).

	In pre-test an external voltage between C1/P1 and C2/P2 terminals was detected. The measurement was cancelled. Press OK to continue.
	In pre-test a too high external voltage was detected between P and PE terminals. The measurement was cancelled. Press OK to continue.
	In pre-test a too high external voltage was detected between ISO/SUB and PE terminals. The measurement was cancelled. Press OK to continue.
	In pre-test a possible high leakage current was detected. It is likely that a dangerous leakage current (higher than 3.5 mA) will flow after applying power to the device under test. Select **YES** to proceed with or **NO** to cancel measurement.
	The measured leakage (Idiff, Ipe, Itouch) current was higher than 20 mA. Measurement was aborted. Press OK to continue.
	The load current exceeded the highest upper limit of 10 A for the Discharging time test. Press OK to continue.
	The instrument is overheated. The measurement can't be carried out until the icon disappears. Press OK to continue.
	The device under test should be switched on (to ensure that the complete circuit is tested).
	Test voltage in Insulation resistance measurement is too low.

	Measurement result is scaled to 110 V.
	Red dot indicates phase of measurement where higher leakage was measured. Applicable only if phase reversal is enabled during the measurement.
	**Warning**! A high voltage is / will be present on the instrument output! (Withstanding test voltage, Insulation test voltage, or mains voltage).
	**Warning**! A very high and dangerous voltage is / will be present on the instrument output! (Withstanding test voltage).
	Test passed.
	Test failed.
	Conditions on the input terminals allow starting the measurement; consider other displayed warnings and messages.
	Conditions on the input terminals do not allow starting the measurement, consider displayed warnings and messages.
	Proceeds to next measurement step
	Stop the measurement.

4 Single tests

4.1 Single test measurements

4.1.1 Continuity

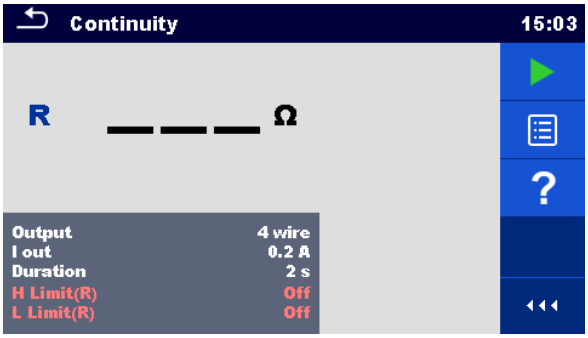


Figure 4.1: Continuity test menu

Test results / sub-results

R ..... Resistance

Test parameters

Output connections	Output [4-wire, P-PE]
Test current	I out [0.2 A, 4 A, 10 A, 25 A]
Duration	Duration [Off, 2 s ... 180 s]

Test limits

H Limit (R)	H limit [Off, 0.01 Ω ... 9 Ω]
L Limit (R)	L limit [Off, 0.01 Ω ... 9 Ω]

Test circuit

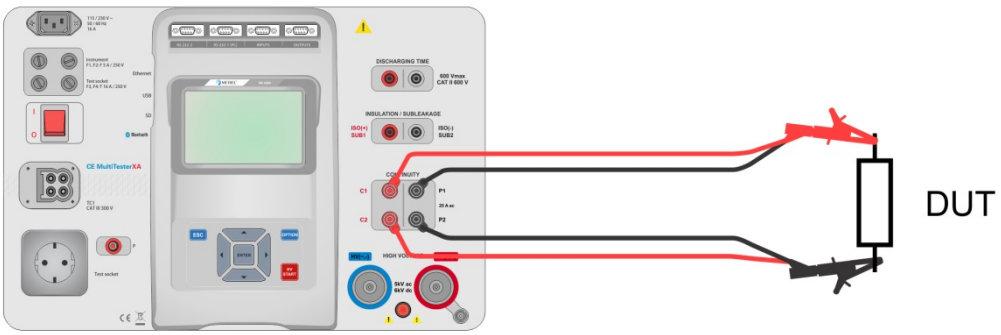


Figure 4.2: Measurement of continuity 4-wire

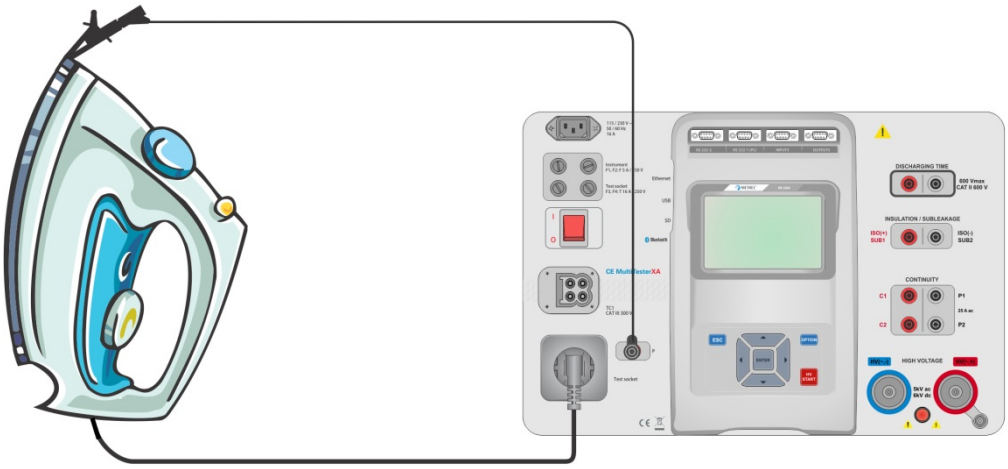


Figure 4.3: Measurement of Continuity P/S - PE

Continuity measurement procedure

- Select the **Continuity** function.
- Set test parameters / limits.
- Connect test leads to C1, P1, P2 and C2 terminals on the instrument (4 wire), or connect test lead to P/S terminal (2 wire measurement P/S – PE).
- Connect test leads to device under test.
- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

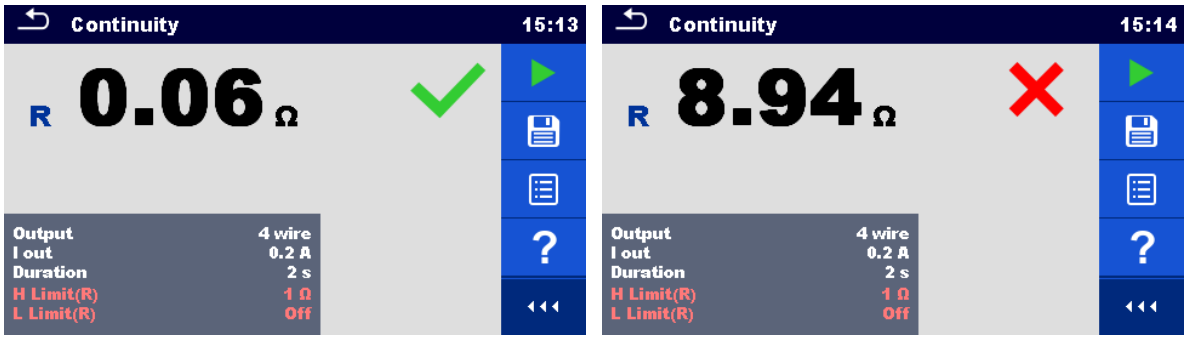


Figure 4.4: Examples of Continuity measurement results

4.1.2 HV AC

⚠ IMPORTANT SAFETY NOTE

Refer to chapter *1.1 Warnings and notes* for more information regarding safe use of the instrument.

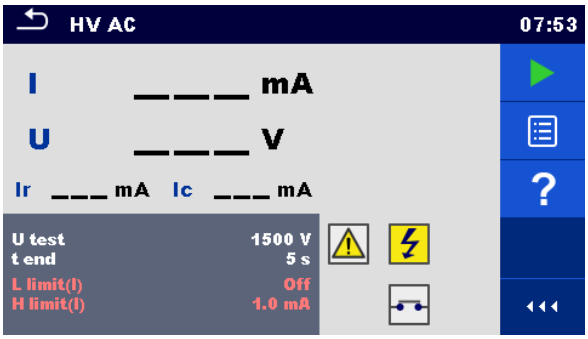


Figure 4.5: HV AC test menu

Test results / sub-results

I.....test current
U .....measured a.c. test voltage
Ir .....resistive portion of test current
Ic.....capacitive portion of test current

Test parameters

AC test voltage	U test [100 V ... 5000 V in steps of 10 V]
Duration	t end [Off, 1 s ... 120 s]

Test limits

High limit (I)	H limit [0.5 mA ... 100 mA]
Low limit (I)	L limit [Off, 0.5 mA ... 100 mA]

Test circuit

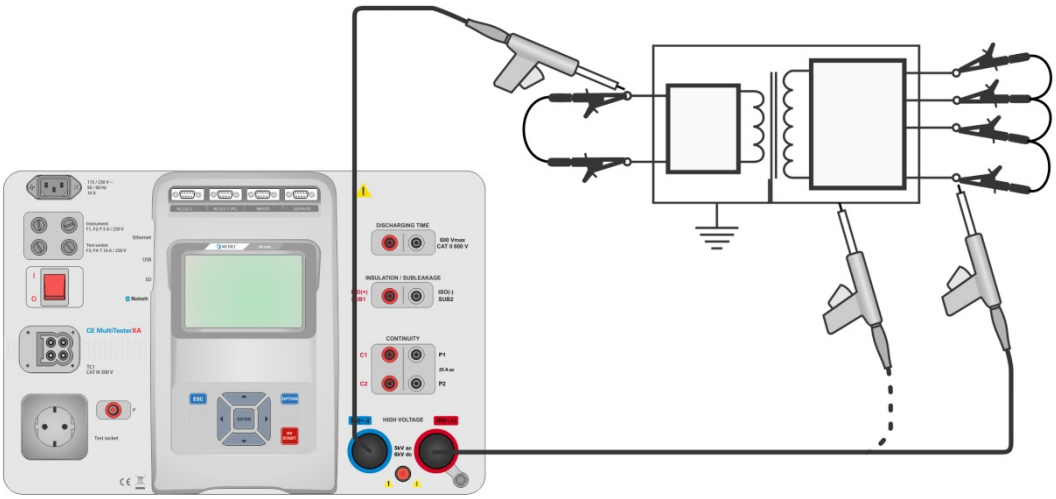


Figure 4.6: HV AC measurement

HV AC measurement procedure

- Select the **HV AC** function.
- Set test parameters / limits.
- Connect HV test leads to HV(~,+) and HV(~,-) terminals on the instrument.
- Connect HV test leads to device under test.

- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

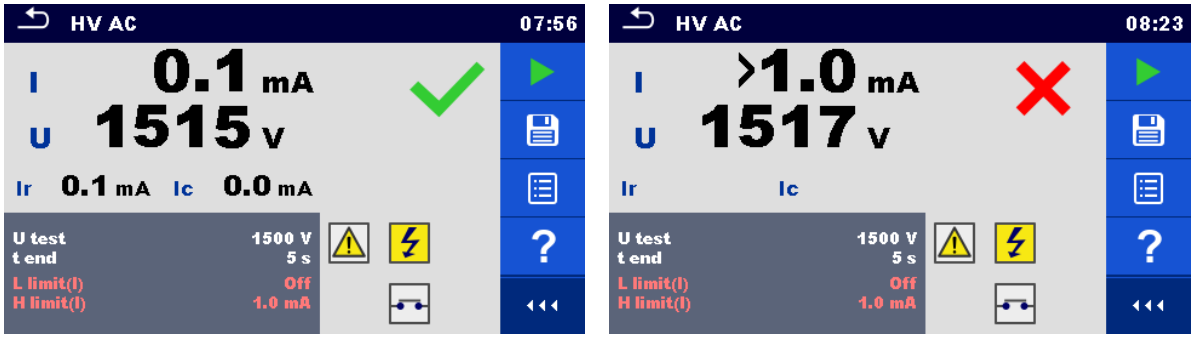


Figure 4.7: Examples of HV AC meaasurement results

Note:

- First HV measurement after power on the instrument (if password protection is enabled) or first HV measurement after enabling or changing password require entering password for enabling HV test.

4.1.3 HV DC

IMPORTANT SAFETY NOTE

Refer to chapter *1.1 Warnings and notes* for more information regarding safe use of the instrument.

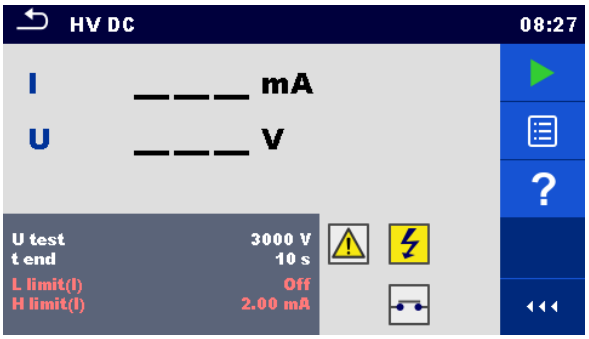


Figure 4.8: HV DC test menu

Test results / sub-results

U .....measured test voltage
I.....test current

Test parameters

DC test voltage	U test [500 V ... 6000 V in steps of 50 V]
Duration	t end [Off, 1 s ... 120 s]

Test limits

High limit (I)	H limit [0.05 mA ... 10.0 mA]
Low limit (I)	L limit [Off, 0.05 mA ... 10.0 mA]

Test circuit

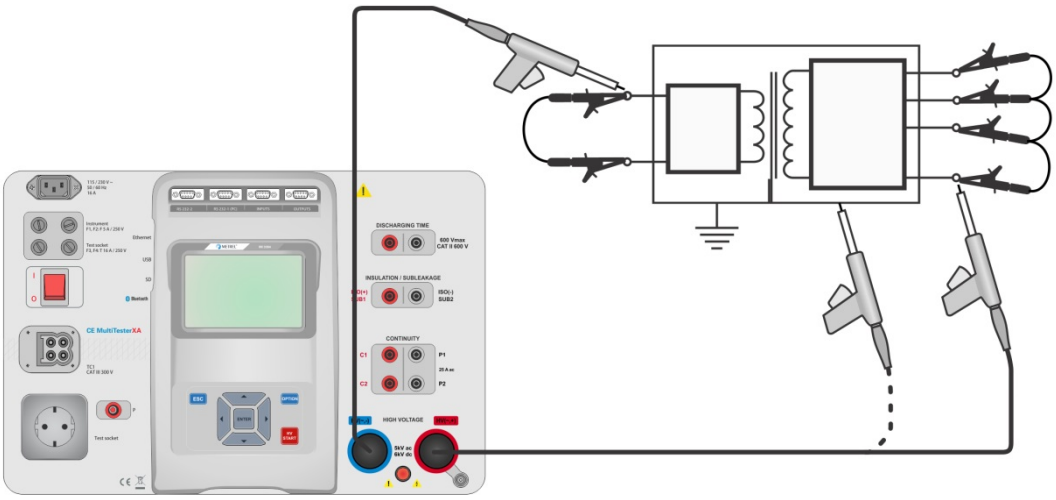


Figure 4.9: HV DC measurement

HV DC measurement procedure

- Select the **HV DC** function.
- Set test parameters / limits.
- Connect HV test leads to HV(~,+) and HV(~,-) terminals on the instrument.
- Connect HV test leads to device under test.
- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

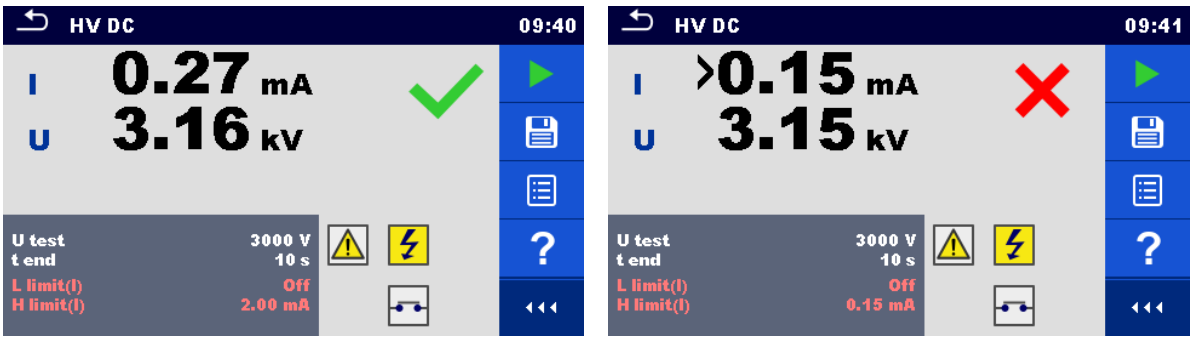


Figure 4.10: Examples of HV DC measurement results

Note:

- First HV measurement after power on the instrument (if password protection is enabled) or first HV measurement after enabling or changing password require entering password for enabling HV test.

4.1.4 HV AC programmable

IMPORTANT SAFETY NOTE

Refer to chapter *1.1 Warnings and notes* for more information regarding safe use of the instrument.

In the HV AC programmable test the time dependency of high voltage can be set according to diagram on *Figure 4.11.*

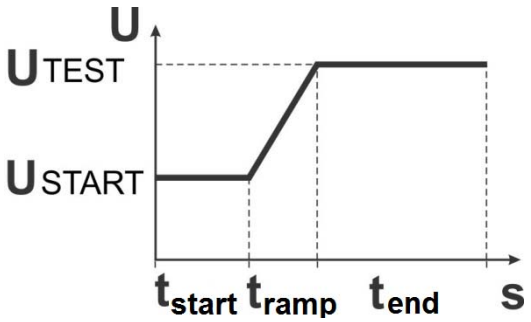


Figure 4.11: Voltage / time diagram of the HV AC programmable test

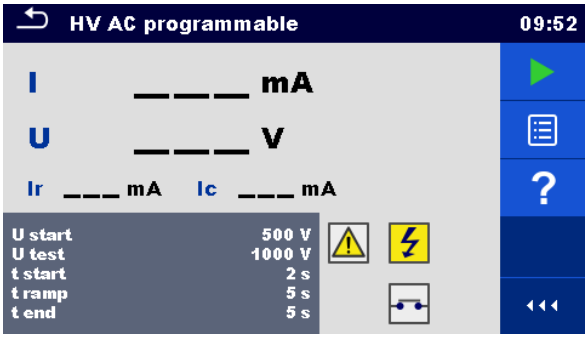


Figure 4.12: HV AC programmable test menu

Test results / sub-results

I.....test current
U .....measured test voltage
Ir .....resistive portion of test current
Ic.....capacitive portion of test current

Test parameters

Starting AC test voltage	U start [100 V ... 5000 V in steps of 10 V]
AC test voltage	U test [100 V ... 5000 V in steps of 10 V]
Duration of starting voltage	t start [1 s ... 120 s]
Duration of ramp	t ramp [2 s ... 60 s]
Duration of test voltage	t end [Off, 1 s ... 120 s]

Test limits

High limit (I)	H limit [0.5 mA ... 100 mA]
Low limit (I)	L limit [Off, 0.5 mA ... 100 mA]

Test circuit

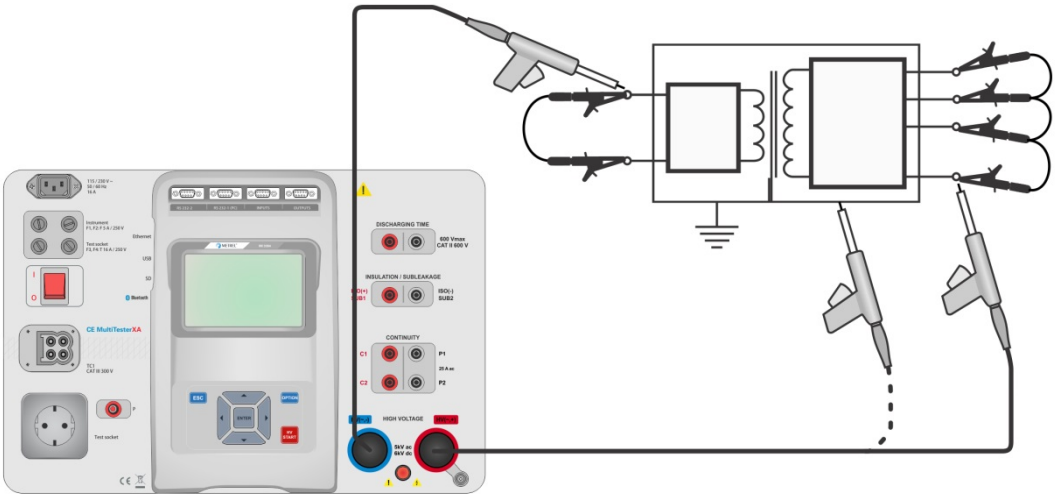


Figure 4.13: HV AC programmable test

HV AC programmable test procedure

- Select the **HV AC programmable** function.
- Set test parameters / limits.
- Connect HV test leads to HV(~,+) and HV(~,-) terminals on the instrument.
- Connect HV test leads to device under test.
- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

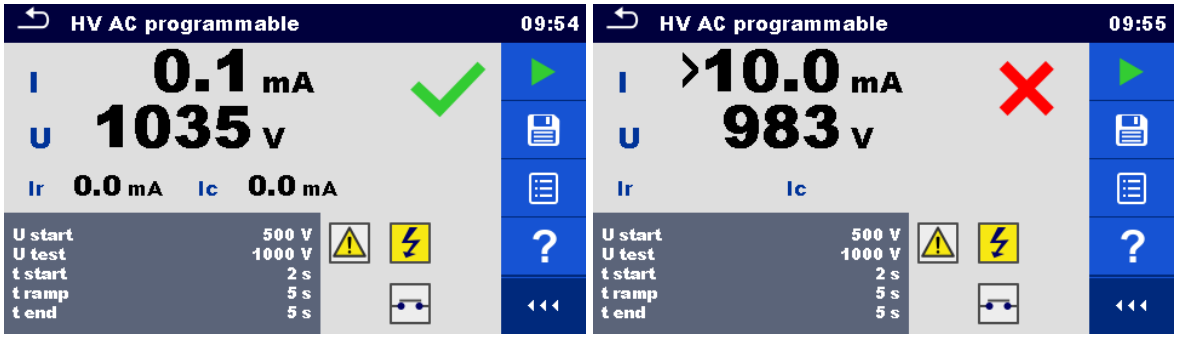


Figure 4.14: Examples of HV AC programmable test results

Note:

- First HV measurement after power on the instrument (if password protection is enabled) or first HV measurement after enabling or changing password require entering password for enabling HV test.

4.1.5 HV DC programmable

IMPORTANT SAFETY NOTE

Refer to chapter *1.1 Warnings and notes* for more information regarding safe use of the instrument.

In the HV DC programmable test the time dependency of high voltage can be set according to diagram on *Figure 4.11*.

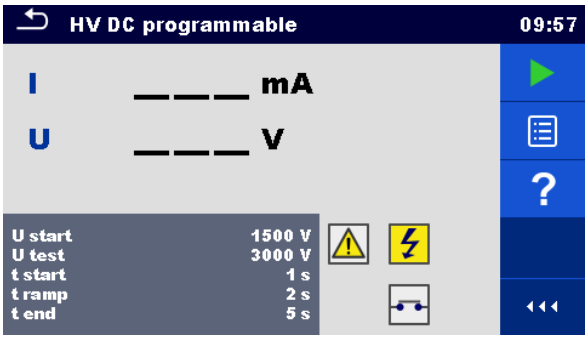


Figure 4.15: HV DC programmable test menu

Test results / sub-results

U .....measured test voltage
I.....test current
Ic.....capacitive portion of test current
Ir .....resistive portion of test current

Test parameters

Starting DC test voltage	U start [500 V ... 6000 V in steps of 50 V]
DC test voltage	U test [500 V ... 6000 V in steps of 50 V]
Duration of starting voltage	t start [1 s ... 120 s]
Duration of ramp	t ramp [2 s ... 60 s]
Duration of test voltage	t end [Off, 1 s ... 120 s]

Test limits

High limit (I)	H limit [0.05 mA ... 10.0 mA]
Low limit (I)	L limit [Off, 0.05 mA ... 10.0 mA]

Test circuit

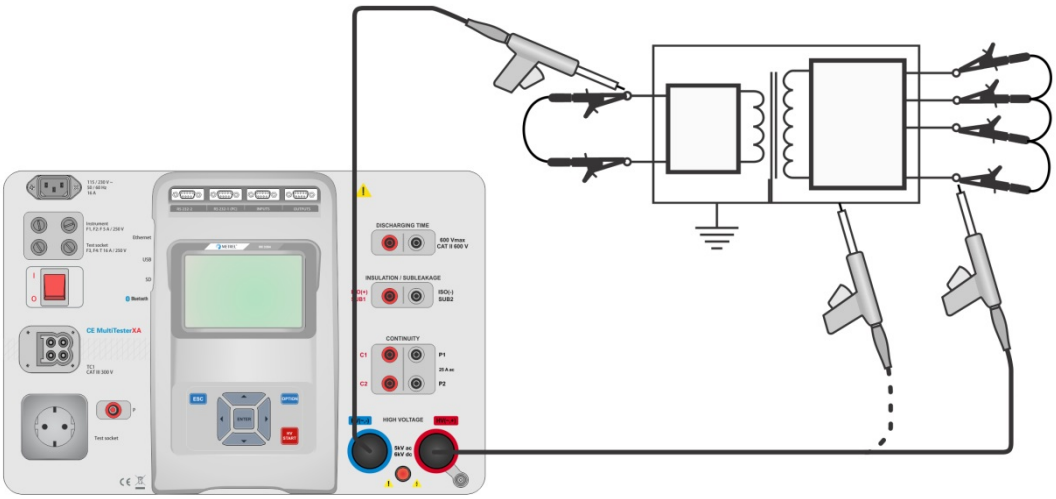


Figure 4.16: HV DC programmable test

HV DC programmable test procedure

- Select the **HV DC programmable** function.
- Set test parameters / limits.
- Connect HV test leads to HV(~,+) and HV(~,-) terminals on the instrument.
- Connect HV test leads to device under test.
- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

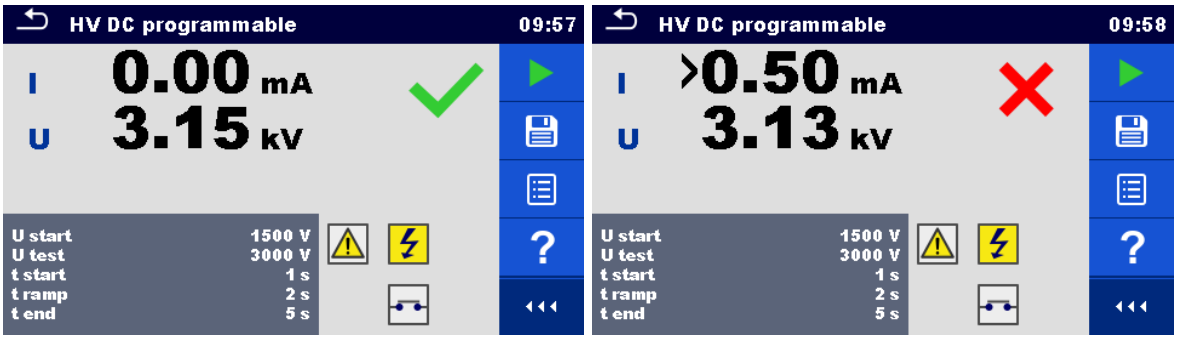


Figure 4.17: Examples of HV DC programmable test results

Note:

- First HV measurement after power on the instrument (if password protection is enabled) or first HV measurement after enabling or changing password require entering password for enabling HV test.

4.1.6 Insulation resistance (Riso, Riso-S)

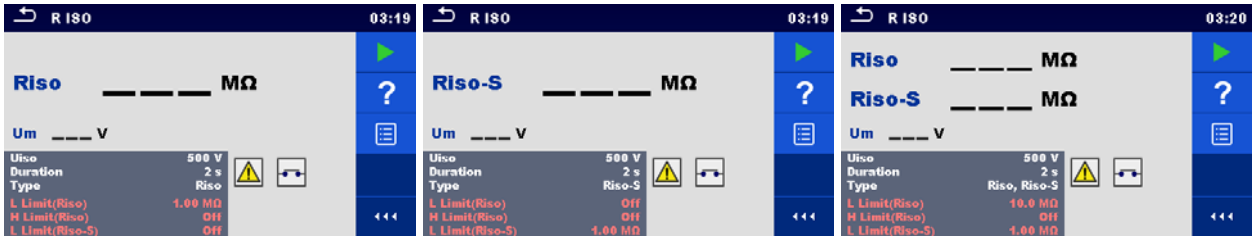


Figure 4.18: Insulation resistance test menus

Test results / sub-results

Riso ..... Insulation resistance
Riso-S ..... Insulation resistance-S
Um ..... Test voltage

Test parameters

Nominal test voltage	Uiso [50 V, 100 V, 250 V, 500 V, 1000 V]
Duration	Duration [Off, 2 s ... 180 s]
Type of test	Type [Riso, Riso-S, (Riso, Riso-S)]
Output connections (Riso)	[ISO(+), ISO(-), Socket LN-PE, Socket LN-P/S]
Output connections (Riso-S)	[Socket LN-P/S]

Test limits

H Limit (Riso)	H limit [Off, 0.10 MΩ ... 10.0 MΩ]
L Limit (Riso)	L limit [Off, 0.10 MΩ ... 10.0 MΩ]
H Limit (Riso-S)	H limit [Off, 0.10 MΩ ... 10.0 MΩ]
L Limit (Riso-S)	L limit [Off, 0.10 MΩ ... 10.0 MΩ]

Test circuits

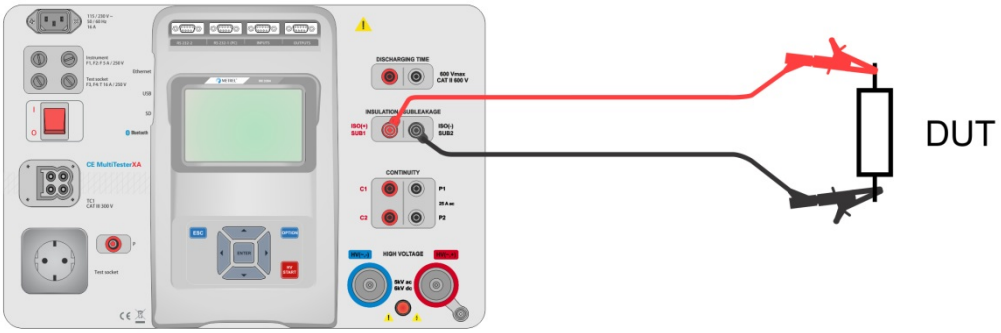


Figure 4.19: Measurement of insulation resistance (ISO(+), ISO(-))

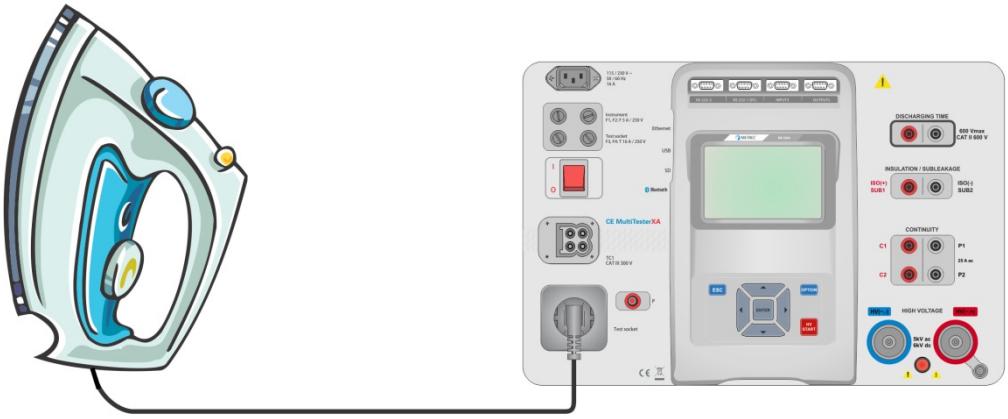


Figure 4.20: Measurement of insulation resistance (Socket LN - PE)

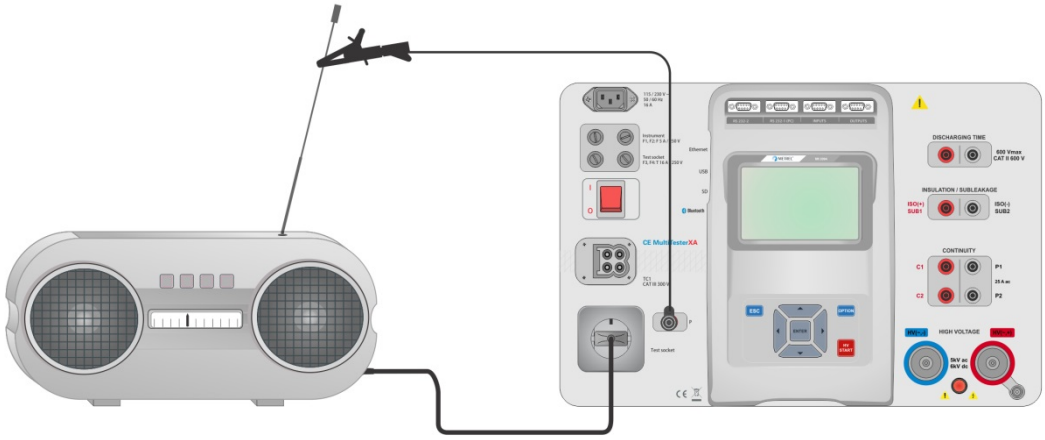


Figure 4.21: Measurement of Riso, Riso-S (socket)

RISO measurement procedure

- Select the **Riso** function.
- Set test parameters / limits.
- Connect test leads to ISO(+), ISO(-) terminals on the instrument, then connect test leads to device under test, or
- Connect device to mains test socket. For Riso-S test, additionally connect test lead to P/S terminal on instrument, and then connect test lead to device.
- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

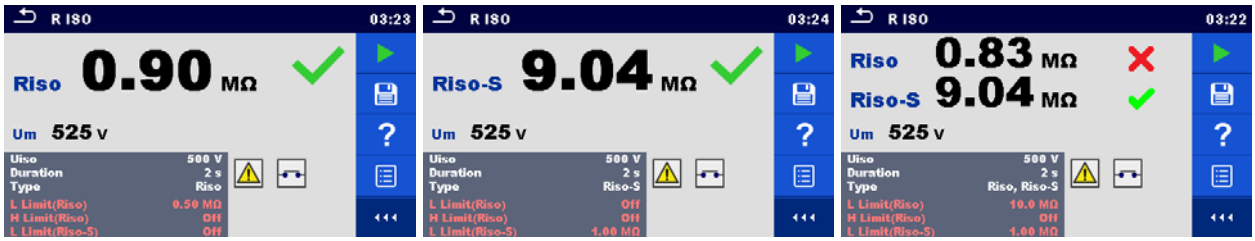


Figure 4.22: Examples of Insulation resistance measurement results

Note:

- When P/S probe is connected during the Riso measurement, then the current through it is also considered.

4.1.7 Sub-leakage (Isub, Isub-S)

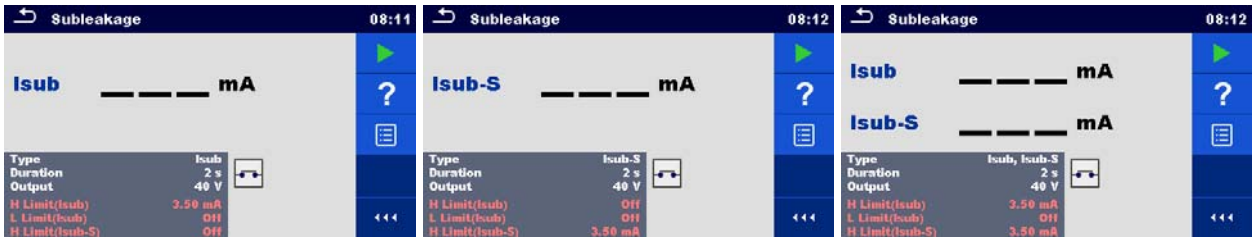


Figure 4.23: Sub Leakage test menus

Test results / sub-results

Isub ..... Sub-leakage current
Isub-S ..... Sub-leakage current-S

Test parameters

Type of test	Type [Isub, Isub-S, (Isub, Isub-S)]
Output voltage	Output [40 Vac]
Duration	Duration [Off, 2 s ... 180 s]
Output connections (Isub)	[SUB1, SUB2, Socket LN-PE, Socket LN-P/S]
Output connections (Isub-S)	[Socket LN-P/S]

Test limits

H Limit (Isub)	H limit [Off, 0.25 mA ... 15.0 mA]
L Limit (Isub)	L limit [Off, 0.25 mA ... 15.0 mA]
H Limit (Isub-S)	H limit [Off, 0.25 mA ... 15.0 mA]
L Limit (Isub-S)	L limit [Off, 0.25 mA ... 15.0 mA]

Test circuits

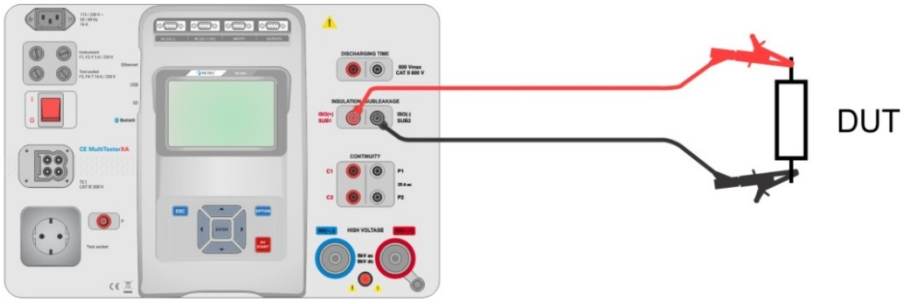


Figure 4.24: Measurement of Sub-leakage (SUB1, SUB2)

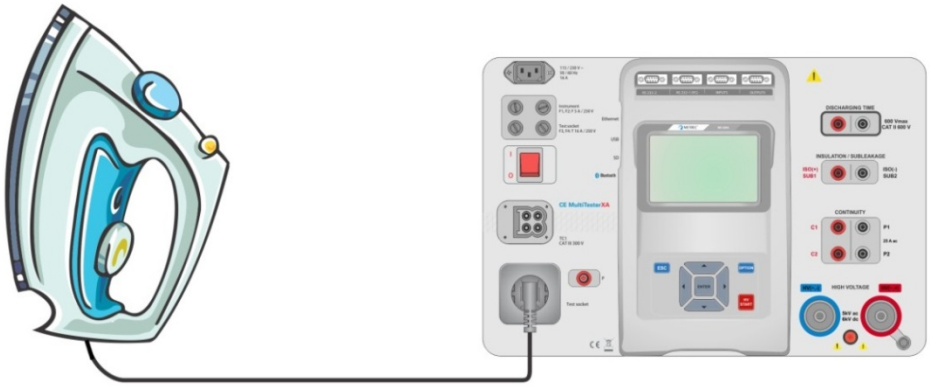


Figure 4.25: Measurement of Sub-leakage (socket LN-PE)

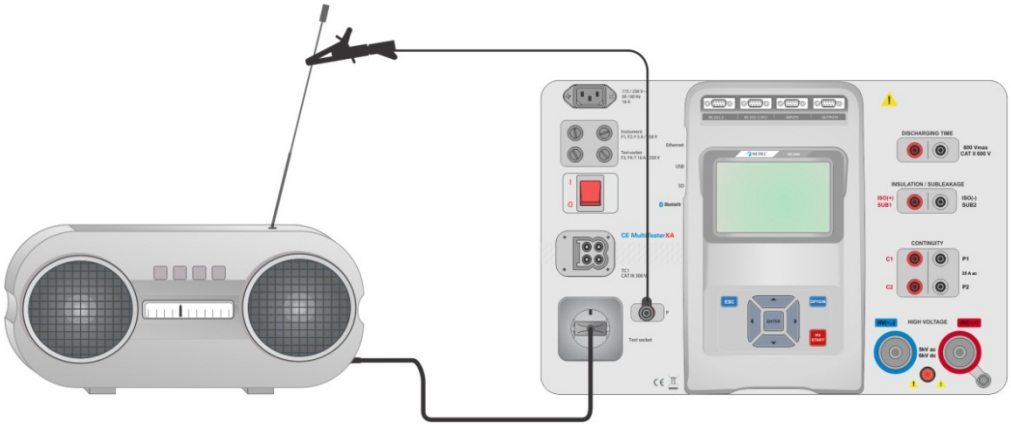


Figure 4.26: Measurement of Sub-leakage, Sub-leakage-S (socket)

Sub-leakage measurement procedure

- Select the **Sub-leakage** function.
- Set test parameters / limits.
- Connect test leads to SUB1,SUB2 terminals on the instrument, then connect test leads to device under test, or
- Connect device under test to mains test socket. For Isub-S test, additionally connect test lead to P/S terminal on the instrument, and then connect test lead to a device.
- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

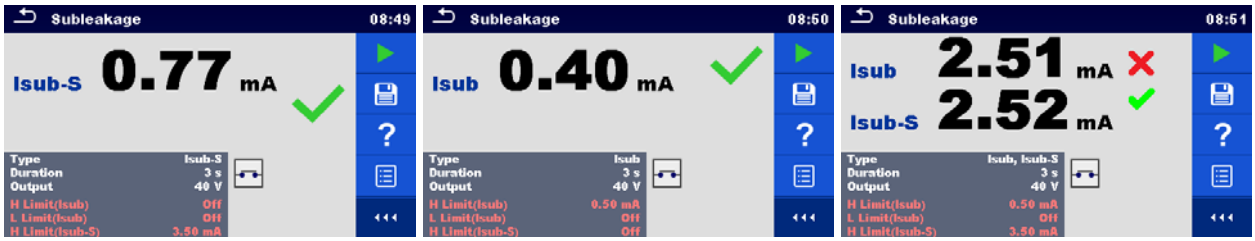


Figure 4.27: Examples of Sub-leakage measurement results

Note:

- When P/S probe is connected during the Sub-leakage measurement, then the current through it is also considered.

4.1.8 Differential Leakage

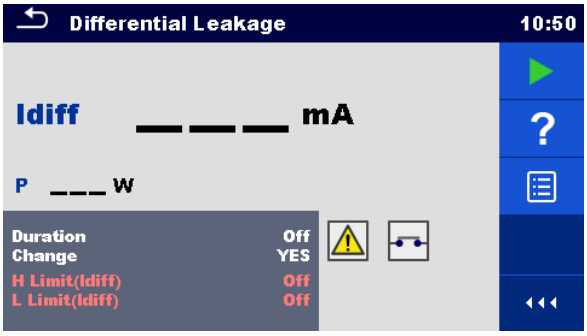


Figure 4.28: Differential Leakage test menu

Test results / sub-results

Idiff.....Differential Leakage current
P .....Power

Test parameters

Duration	Duration [Off, 2 s ... 180 s]
Change status	Change [YES, NO] YES: The instrument measures leakage current in two sequential steps with 5 s delay in between. The phase voltage is firstly applied to the right live output of the mains test socket and secondly to the left live output of the mains test socket.

	NO: The phase voltage is applied only to the right live output of the mains test socket.

Test limits

H Limit (Idiff)	H limit [Off, 0.25 mA ... 15.0 mA]
L Limit (Idiff)	L limit [Off, 0.25 mA ... 15.0 mA]
Output connections	[Socket L,N – PE,P/S]

Test circuit

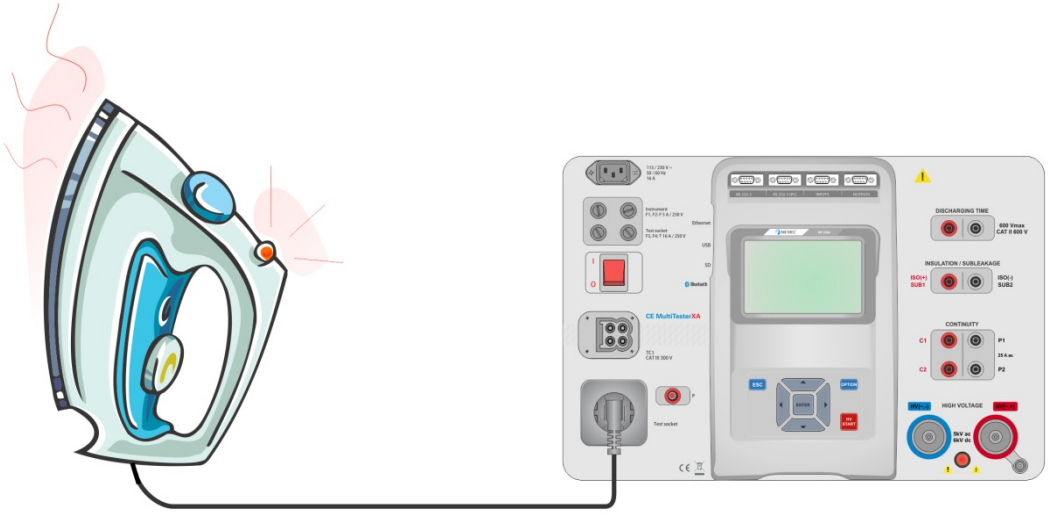


Figure 4.29: Measurement of Differential Leakage current

Differential Leakage measurement procedure

- Select the **Differential Leakage** function.
- Set test parameters / limits.
- Connect device under test to mains test socket and optionally to P/S terminal.
- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

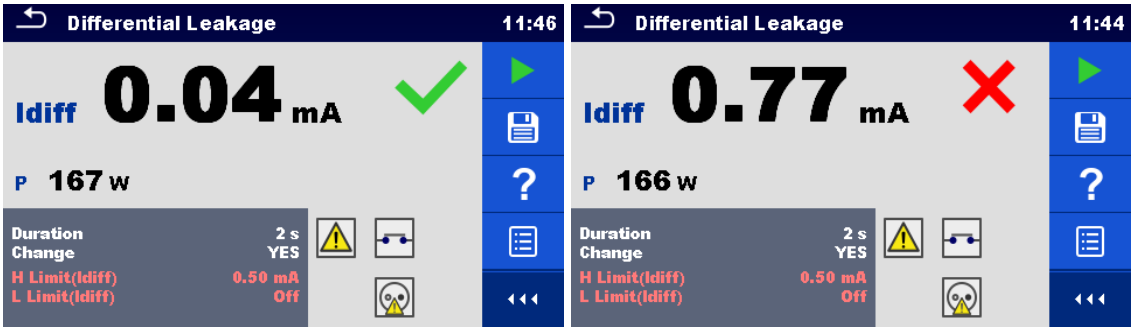


Figure 4.30: Examples of Differential Leakage measurement results

4.1.9 Ipe Leakage

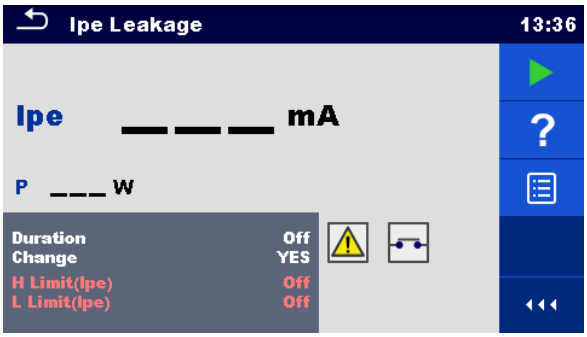


Figure 4.31: Ipe Leakage test menu

Test results / sub-results

Ipe..... PE current
P ..... Power

Test parameters

Duration	Duration [Off, 2 s ... 180 s]
Change status	Change [YES, NO] YES: The instrument measures leakage current in two sequential steps with 5 s delay in between. The phase voltage is firstly applied to the right live output of the mains test socket and secondly to the left live output of the mains test socket. NO: The phase voltage is applied only to the right live output of the mains test socket.
Output connections	[Socket L,N – PE]

Test limits

H Limit (Ipe)	H limit [Off, 0.25 mA ... 15.0 mA]
L Limit (Ipe)	L limit [Off, 0.25 mA ... 15.0 mA]

Test circuit

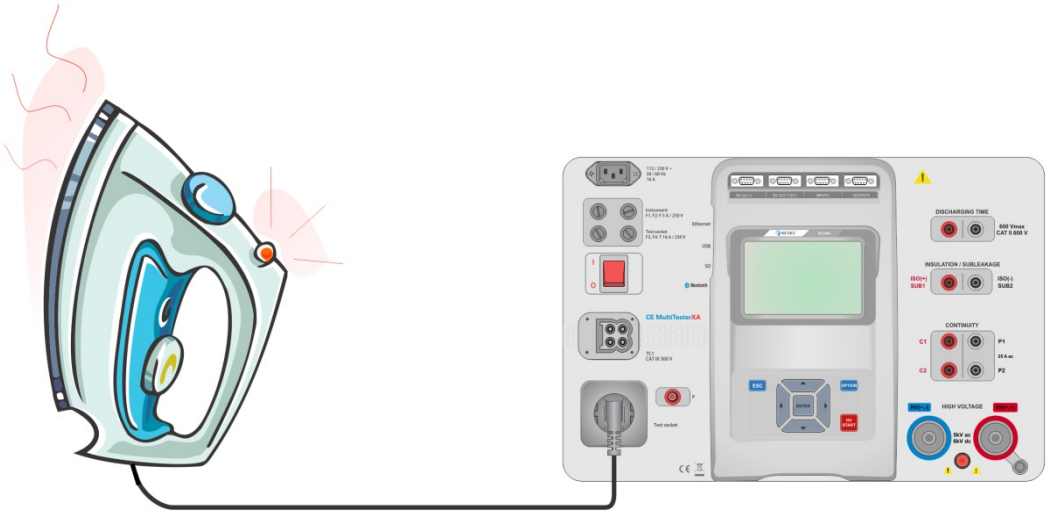


Figure 4.32: Measurement of Ipe Leakage current

Ipe Leakage measurement procedure

- Select the **Ipe Leakage** function.
- Set test parameters / limits.
- Connect device under test to mains test socket.
- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

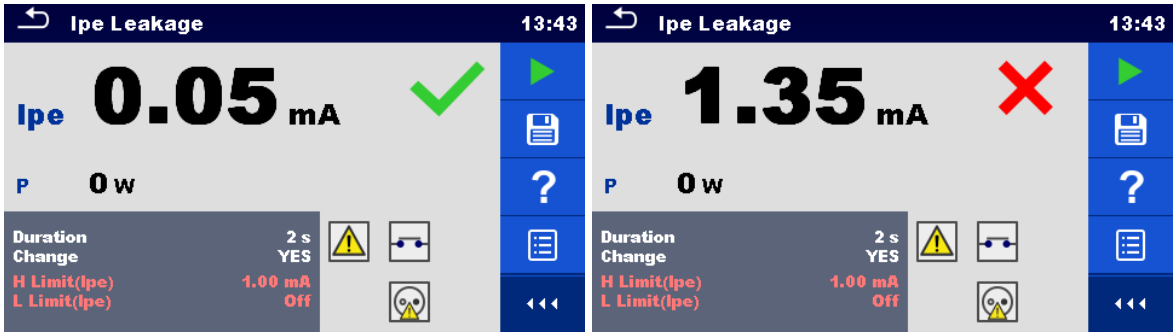


Figure 4.33: Examples of Ipe Leakage measurement results

4.1.10 Touch Leakage

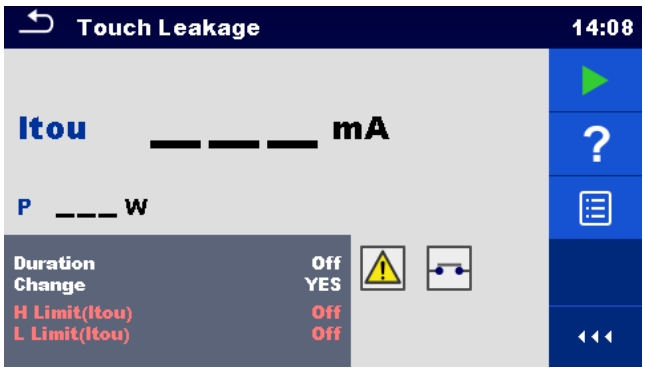


Figure 4.34: Touch Leakage test menu

Test results / sub-results

Itou.....Touch Leakage current
P .....Power

Test parameters

Duration	Duration [Off, 2 s ... 180 s]
Change status	Change [YES, NO] YES: The instrument measures leakage current in two sequential steps with 5 s delay in between. The phase voltage is firstly applied to the right live output of the mains test socket and secondly to the left live output of the mains test socket. NO: The phase voltage is applied only to the right live output of the mains test socket.
Output connections	[Socket L,N – PE,P/S]

Test limits

H Limit (Itou)	H limit [Off, 0.25 mA ... 15.0 mA]
L Limit (Itou)	L limit [Off, 0.25 mA ... 15.0 mA]

Test circuit

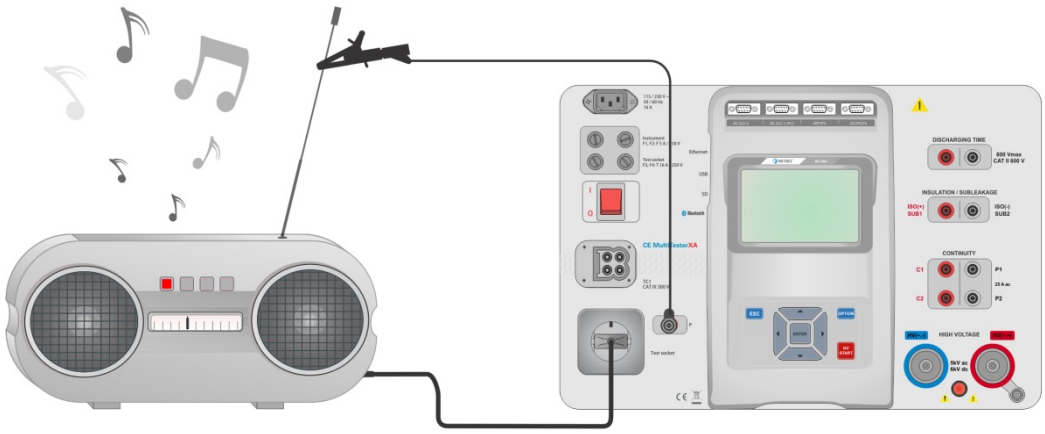


Figure 4.35: Measurement of Touch Leakage current

Touch Leakage measurement procedure

- Select the **Touch Leakage** function.
- Set test parameters / limits.
- Connect device under test to mains test socket. Connect test lead to P/S terminal on the instrument and on device under test.
- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

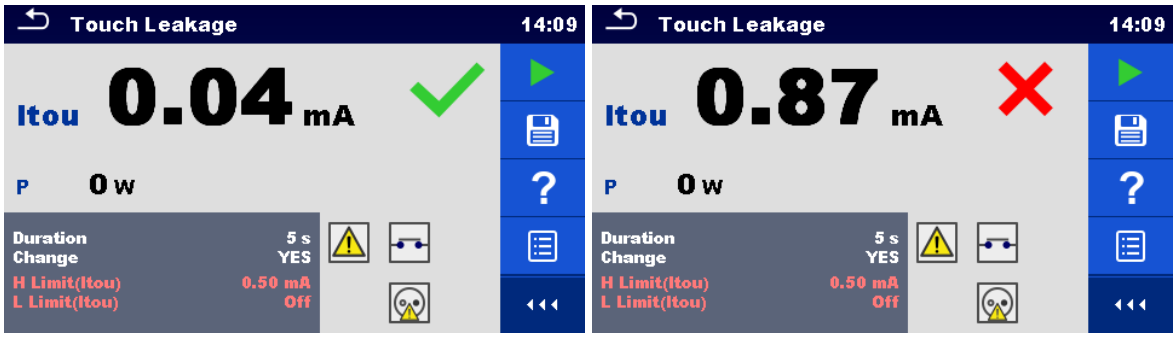


Figure 4.36: Examples of Touch Leakage measurement results

4.1.11 Power

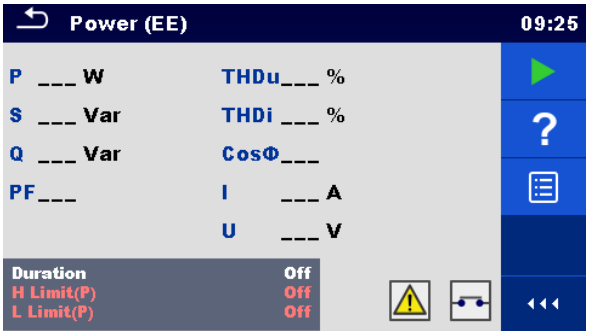


Figure 4.37: Power measurement menu

Test results / sub-results

P ..... Active power
S ..... Apparent power
Q ..... Reactive power
PF ..... Power factor
THDu ..... Total harmonic distortion – voltage
THDi ..... Total harmonic distortion – current
Cos Φ ..... cosinus Φ
I ..... Load current
U ..... Voltage

Test parameters

Duration	Duration [Off, 2 s ... 180 s]
Output connections	[Socket L–N]

Test limits

H Limit (P)	H limit [Off, 10 W ... 3.50 kW]
L Limit (P)	L limit [Off, 10 W ... 3.50 kW]

Test circuit

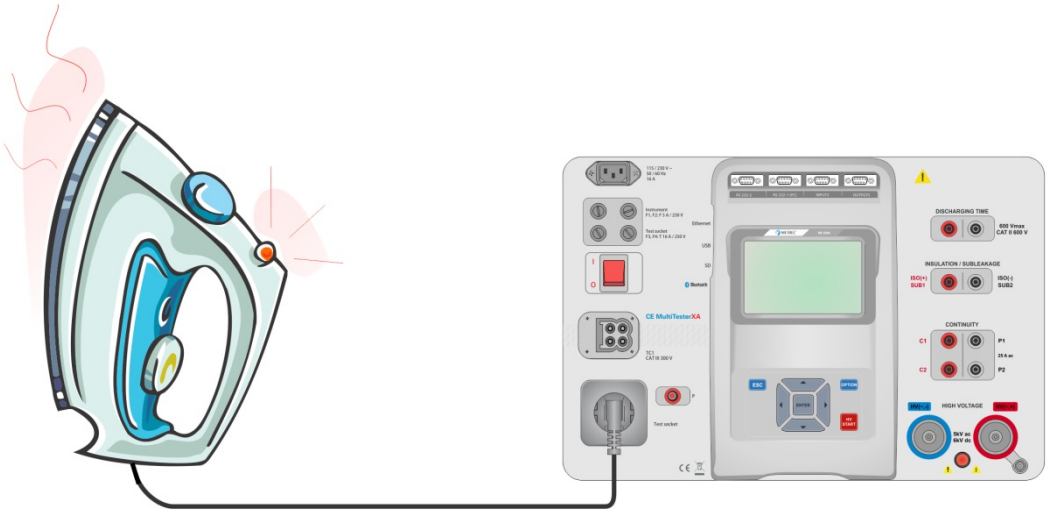


Figure 4.38: Measurement of Power

Power measurement procedure

- Select the **Power** function.
- Set test parameters / limits.
- Connect device under test to mains test socket.
- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

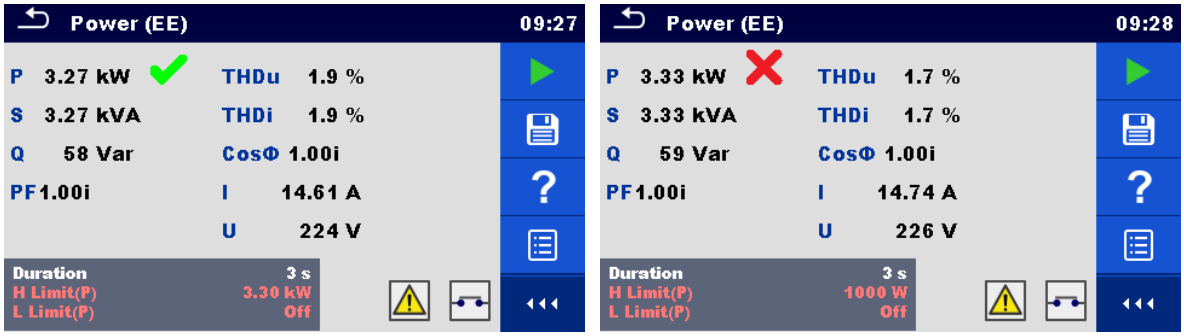


Figure 4.39: Examples of Power measurement results

4.1.12 Leak's & Power

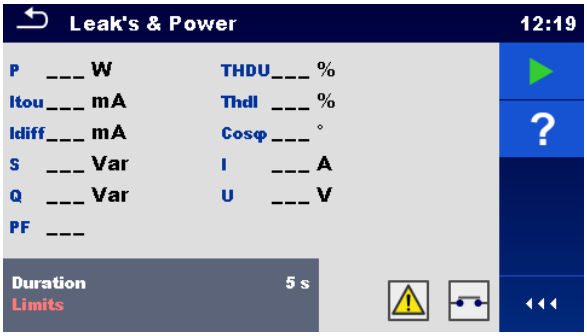


Figure 4.40: Leak's & Power measurement menu

Test results / sub-results

P .....Active power
Itou.....Touch Leakage current
Idiff.....Differential Leakage current
S .....Apparent power
Q.....Reactive power
PF .....Power factor
THDu .....Total harmonic distortion – voltage
THDi .....Total harmonic distortion – current
Cos Φ .....cosinus Φ
I.....Load current
U .....Voltage

Test parameters

Duration	Duration [Off, 2 s ... 180 s]
Change status	Change [YES, NO]

	YES: The instrument measures leakage current in two sequential steps with 5 s delay in between. The phase voltage is firstly applied to the right live output of the mains test socket and secondly to the left live output of the mains test socket. NO: The phase voltage is applied only to the right live output of the mains test socket.
Output connections	[Socket L–N, Socket L,N – PE,P]

Test limits

H Limit (P)	H limit [Off, 10 W ... 3.50 kW]
L Limit (P)	L limit [Off, 10 W ... 3.50 kW]
H Limit (Idiff)	H limit [Off, 0.25 mA ... 15.0 mA]
L Limit (Idiff)	L limit [Off, 0.25 mA ... 15.0 mA]
H Limit (Itou)	H limit [Off, 0.25 mA ... 15.0 mA]
L Limit (Itou)	L limit [Off, 0.25 mA ... 15.0 mA]

Test circuit

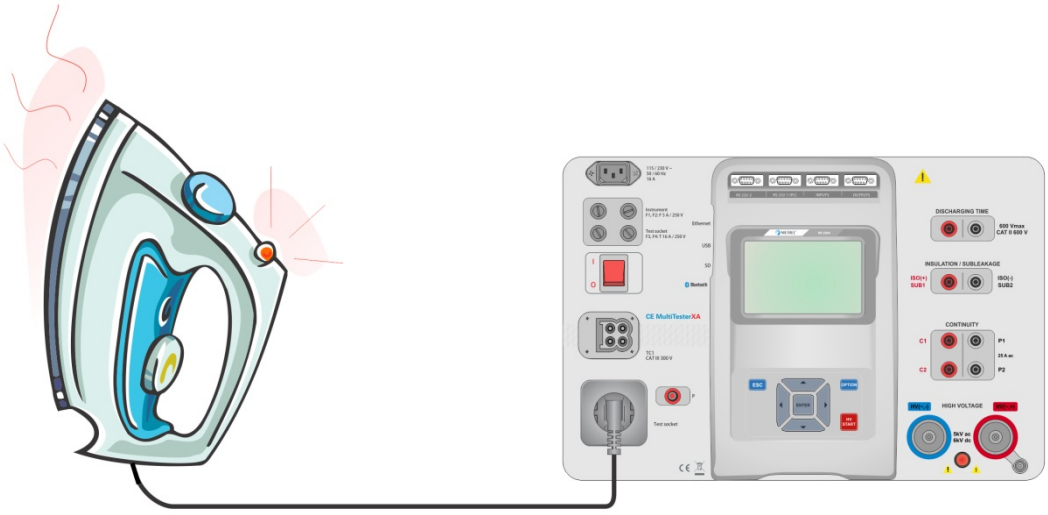


Figure 4.41: Measurement of Leak's and Power

Leak's & Power measurement procedure

- Select the **Leak's & Power** function.
- Set test parameters / limits.
- Connect device under test to mains test socket and optionally to P/S terminal.
- Start measurement.
- Measurement can be stopped manually or by timer.
- Save results (optional).

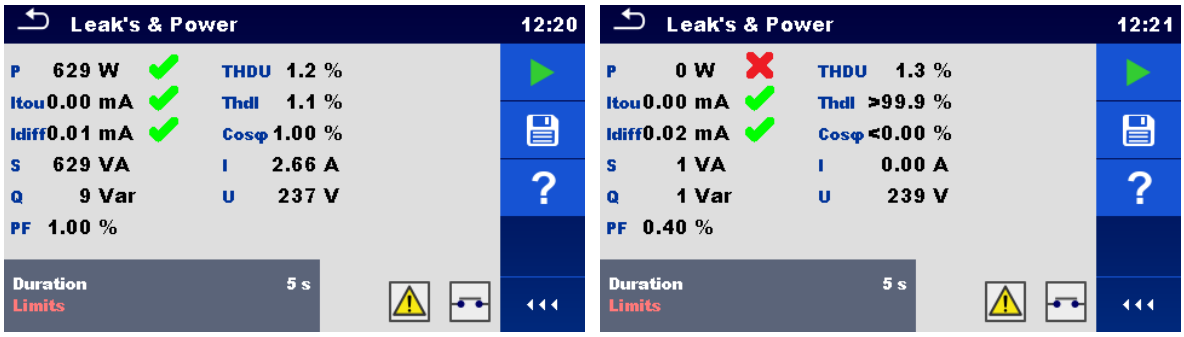


Figure 4.42: Examples of Leak's & Power measurement results

4.1.13 Discharging Time

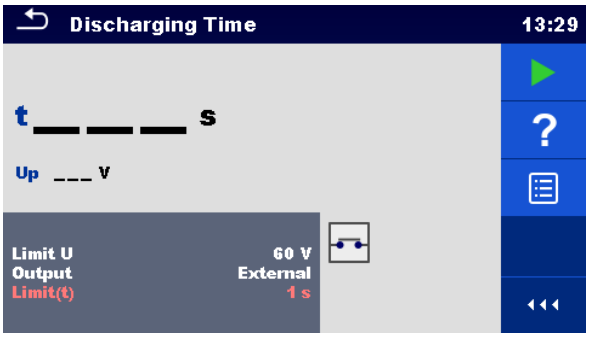


Figure 4.43: Discharging Time test menu

Test results / sub-results

t.....Discharging time
Up.....Peak voltage of supply during the test

Test parameters

Limit voltage	Limit U [60 V, 120 V]
Output connections	Output [External, Socket]
Test mode	Mode [Manual, Auto]
Delay time for AUTO mode	Delay [2 s ... 30 s]

Test limits

Discharging time limit	Limit(t) [1 s, 5 s]

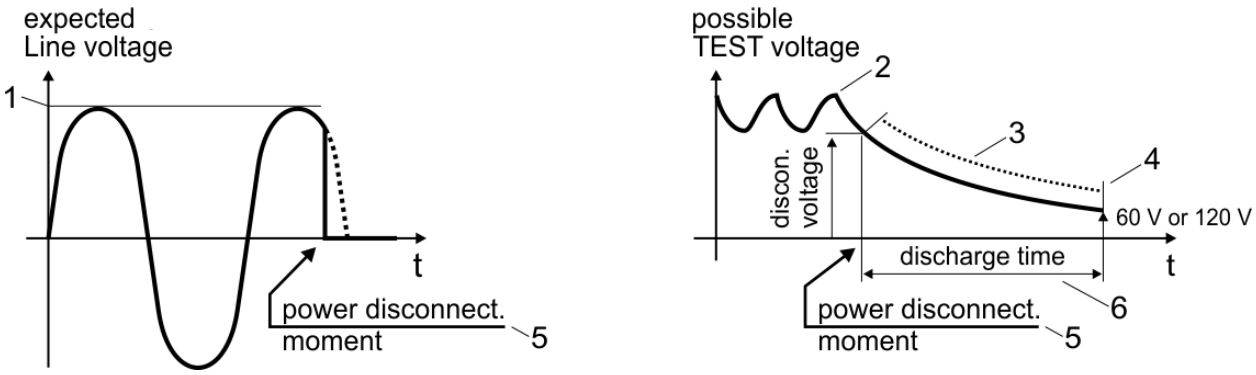
Measuring principle (Output = External)

The measuring principle of the Discharging time function is as following:

Phase ① The device under test is connected to supply voltage via an external socket. The instrument monitors the voltage (on supply or internal connections) and internally stores the peak voltage value.

Phase ② The device under test is disconnected from the supply and the voltage at the test terminals starts to fall. Once the rms voltage falls for 10V the instrument starts the timer.

Phase ③ After the voltage drops below an internally calculated voltage value the timer is stopped. The instrument re-calculates the measured time to a value as it would be if the disconnection occurred at the maximum voltage value.



(1) peak voltage
(2) voltage at disconnection time
(3) calculated voltage value
(4) Ulim
(5) moment of disconnection
(6) discharging time

Figure 4.44: Measuring principle (external)

Test circuit (Output = External)

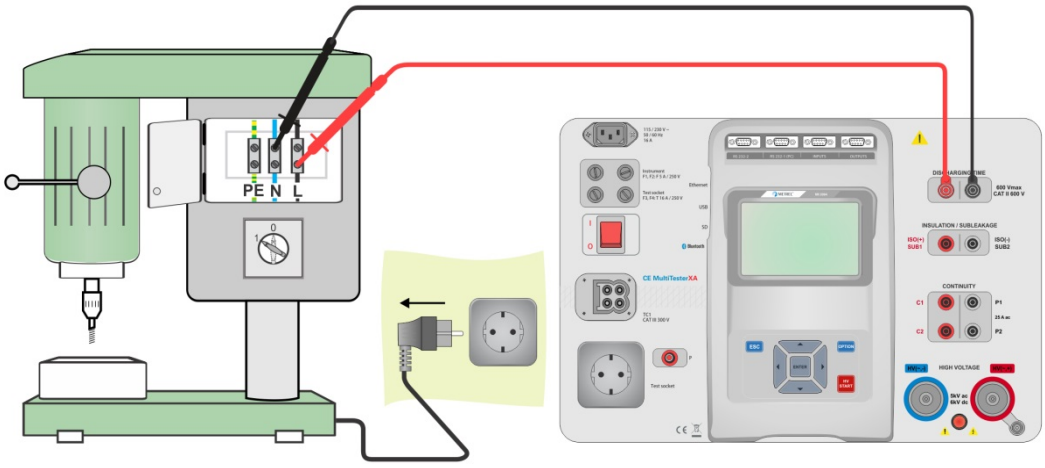


Figure 4.45: Discharging Time test (Output = External)

Discharging Time test procedure (Output = External)

- Select the **Discharging Time** function.
- Set test parameters / limits.
- Connect test leads to the DISCHARGING TIME terminals on the instrument and on the device under test.
- Connect device under test to the mains supply and Switch it ON.
- Start measurement.
- Measurement is stopped manually by disconnecting device under test mains supply.
- Save results (optional).

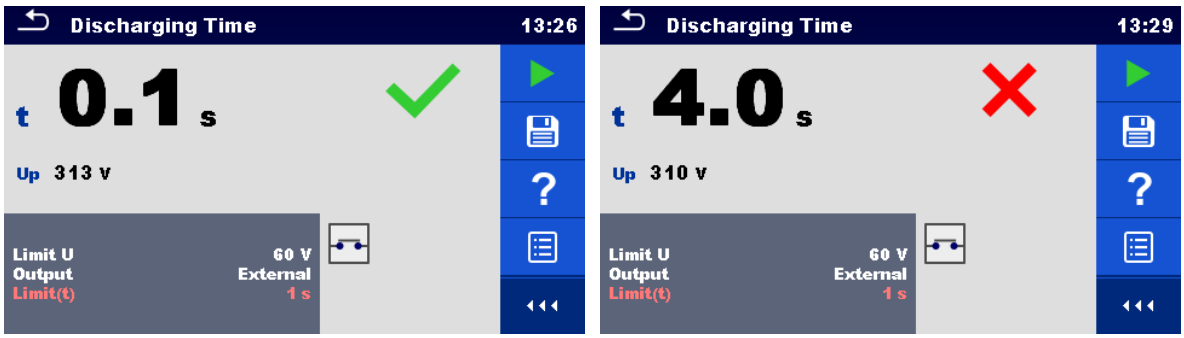


Figure 4.46: Examples of Discharging Time measurement results (Output = External)

Measuring principle (Output = Socket)

The measuring principle of the Discharging time function is as following:

Phase ① The DEVICE UNDER TEST is connected to the mains test socket.The instrument monitors the mains voltage and internally stores the peak voltage value.

Phase ② The instrument disconnects the DEVICE UNDER TEST from the supply and the voltage at the supply connections starts to fall. Disconnection moment is always at peak voltage.

Phase ③ After the voltage drops below the limit value the timer is stopped.

Test circuit (Output = Socket)

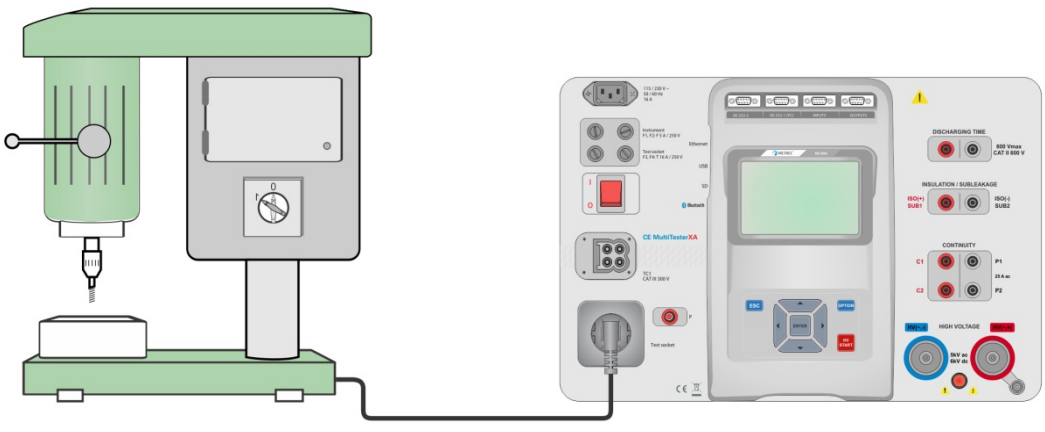


Figure 4.47: Discharging Time test (Output = Socket)

Discharging Time test procedure (Output = Socket)

- Select the **Discharging Time** function.
- Set test parameters / limits.
- Connect the device under test to the mains test socket on the instrument.
- Start measurement.
- Measurement can be stopped manually or automatically.
- Save results (optional).

Figure 4.48: Examples of Discharging Time measurement results (Output = Socket)

5 Maintenance

5.1 Fuses

There are four fuses on the front panel:

F1, F2: F 5 A / 250 V / (20 × 5) mm / 1500 A: intended for instrument protection.
For position of fuses refer to chapter *2.1 Front panel*.

F3, F4: T 16 A / 250 V / (32 × 6,3) mm / 1500 A: protection against over-currents through mains test socket.
For position of fuses refer to chapter *2.1 Front panel*.

Warnings!

- **Switch off the instrument and disconnect all test accessories and mains cord before replacing the fuses or opening the instrument.**
- **Replace blown fuses only with the same types defined in this document.**

5.2 Warranty & Repairs

Any potentially defective items should be returned to Metrel accompanied by information regarding the faults that was incurred. It is recommended that any defective equipment is sent back to Metrel via the Partner Distributor from which the product was purchased.
All defective products will be replaced or repaired within policy period. For these items, a full refund will only be issued if a sufficient replacement is not available. Any shipping / return-shipping costs are not refundable.
Metrel shall not be held liable for any loss or damage resulting from the use or performance of the products. In no event shall Metrel be liable to the customer or its customers for any special, indirect, incidental, exemplary or punitive damages resulting from loss of use, interruption of business or loss of profits, even if Metrel has been advised of the possibility of such damages.
If the customer's unit is out of warranty but needs repairs, a quote for repair will be provided via the Partner Distributor through which the instrument was sent in.

Notes

- Any unauthorized repair or calibration of the instrument will infringe the product's warranty.
- All sales are subject to Metrel Standard Terms and Conditions. Metrel reserves the right to change the conditions at any time. Any typographical, clerical or other error or omission in any sales literature, quotation, price list, acceptance of offer, invoice or other documentation or information issued by Metrel shall be subject to correction without any liability on the part of the customer.
- Specifications and designs of goods are subject to change by Metrel at any time without notice to the customer. Metrel reserves the right to make any changes in the specification of goods which are required to conform with any applicable statutory or EC requirements or, where goods are to be supplied to Metrel specification, which do not materially affect their quality or performance.
- If a condition was found to be invalid or void it would not affect the overall validity of the remainder of the conditions;
- Metrel are excluded from liability for any delays or failure to comply, where the reason is beyond Metrel control;

- No order which has been accepted by Metrel may be cancelled by the customer except with the agreement in writing of Metrel and on terms that the customer shall indemnify Metrel in full against all loss (including loss of profit), costs (including the cost of all labour and materials used), damages, charges and expenses incurred by Metrel as a result of cancellation. The minimum charge for such cancellation will be 25 % of the total value of the goods ordered.