# CE MultiTesterXA
# MI 3394
# Instruction manual

*Ver. 3.1.7, Code no.20 752 432*

**METREL**®

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# i. About the Instruction manual

‣ Version note: Ver. 3.1.6 relates to HW 3 version.
‣ This Instruction manual contains detailed information on the CE MultiTesterXA, its key features, functionalities and use.
‣ It is intended for technically qualified personnel responsible for the product and its use.
‣ Please note that LCD screenshots in this document may differ from the actual instrument screens in details due to firmware variations and modifications.

# TABLE OF CONTENTS

# 1    General description

## 1.1  Warnings and notes



⚠ Read before use

### 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 Instruction 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 Instruction manual the protection provided by the equipment may be impaired!**

- ‣ **Do not use the instrument and accessories if any damage is noticed!**

- ‣ **Regularly check the instrument and accessories for correct functioning to avoid hazard that could occur from misleading results.**

- ‣ **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 *8.2 Fuses* in this Instruction manual 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.**

‣ **C E 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.**

## 1.2  Standards applied

The CE MultiTesterXA instrument is manufactured and tested according to the following regulations, listed below.

**Electromagnetic compatibility (EMC)**

EN 61326-1          Electrical equipment for measurement, control and laboratory use - EMC requirements – Part 1: General requirements
Class B (Portable equipment used in controlled EM environments)

**Safety (LVD)**

| | |
|---|---|
| EN 61010-1 | Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements |
| EN 61010-2-030 | Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-030: Particular requirements for testing and measuring circuits |
| EN 61010-031 | Safety requirements for electrical equipment for measurement, control and laboratory use – Part 031: Safety requirements for hand-held probe assemblies for electrical measurement and test |
| EN 61557 | Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures<br>Instrument complies with all relevant parts of EN 61557 standards. |

**Functionality**

| | |
|---|---|
| EN 60335 | Household and similar electrical appliances |
| EN 60950 | Information technology equipment – Safety |
| EN 61439 | Low-voltage switchgear and controlgear assemblies |
| EN 61010 | Safety requirements for electrical equipment for measurement, control, and laboratory use |
| EN 60598 | Safety of lighting equipment |
| VDE 0701-702 | Inspection after repair, modification of electrical appliances – Periodic inspection on electrical appliances<br>General requirements for electrical safety |
| EN 50191 | Erection and operation of electrical test equipment |

# 2   Instrument set and accessories

## 2.1  Standard set of the instrument

‣ Instrument MI 3394 CE MultitesterXA
‣ Bag for accessories
‣ HV test probes 2 m, 2 pcs
‣ Continuity test lead set 2.5 m, 2 pcs
‣ Continuity test lead red 1.5 m / 2.5 mm$^2$
‣ Test lead black 2.5 m
‣ Test lead red 2.5 m
‣ Alligator clips black 3 pcs
‣ Alligator clips red 2 pcs
‣ Mains cable (2 m, wire cross-section 3 x 1.5 mm$^2$)
‣ RS232 cable
‣ USB cable
‣ Calibration Certificate
‣ Short form instruction manual
‣ CD with instruction manual (full version) and PC SW Metrel ES Manager

## 2.2  Optional accessories

See the attached sheet for a list of optional accessories that are available on request from your distributor.

# 3   Instrument description

## 3.1  Front panel
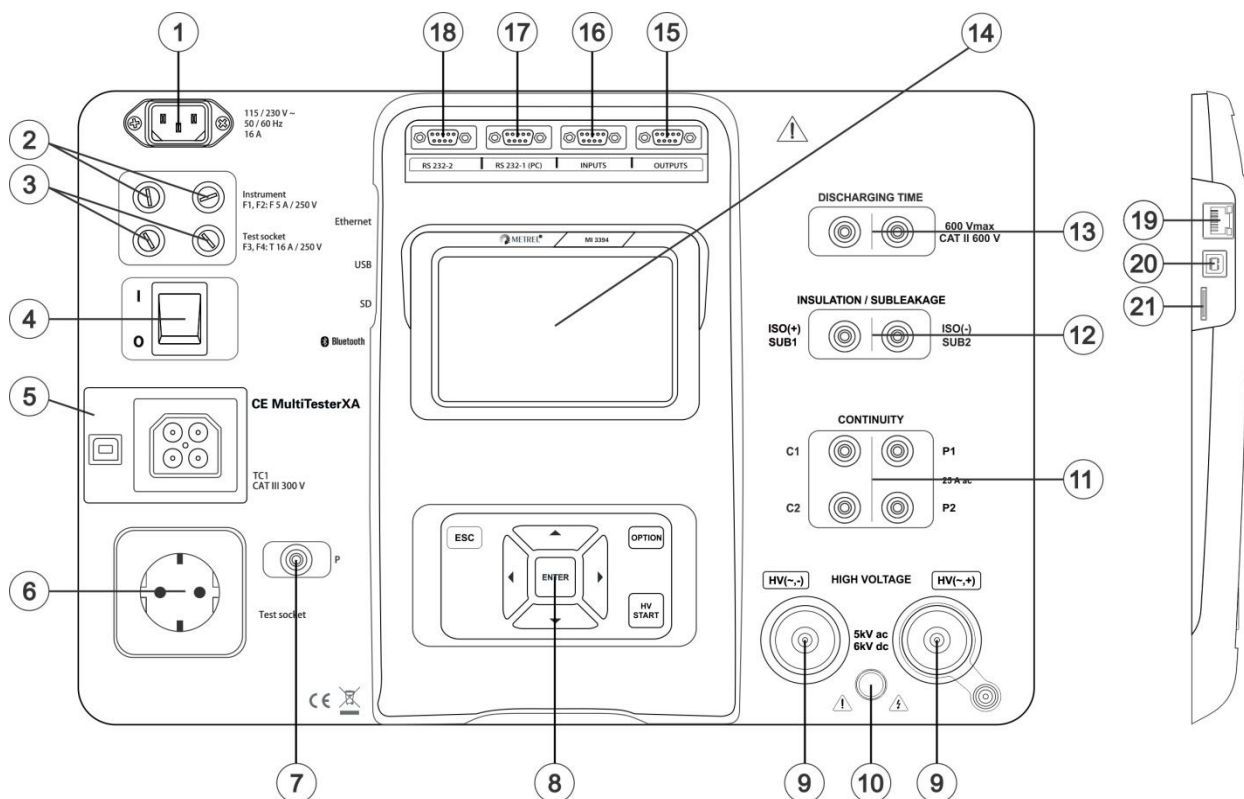


*Figure 3.1: Front panel*

| 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** |
| **20** | **USB connector** |
| **21** | **MicroSD card slot** |

# 4   Instrument operation

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

## 4.1  General meaning of keys

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

## 4.2  General meaning of touch gestures:

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

## 4.3 Safety checks

At start up and during operation the instrument performs various safety checks to ensure safety and to prevent any damage. These safety pre-tests are checking for:
‣ Correct input mains voltage
‣ Presence of input PE connection,
‣ Any external voltage against earth on mains test socket
‣ Excessive leakage currents through measuring I/Os,
‣ Too low resistance between L and N of tested device,
‣ Proper operation of safety relevant internal electronic circuits

If a safety check fails, an appropriate warning message will be displayed and safety measures will be taken. The warnings and safety measures are described in chapter 4.4 Symbols and messages.

## 4.4 Symbols and messages
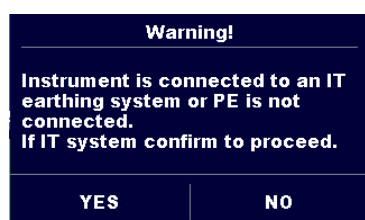
| | |
|---|---|
| **Warning!**<br><br>Instrument is connected to an IT earthing system or PE is not connected.<br>If IT system confirm to proceed.<br><br>YES \| NO | **Supply voltage warning**<br><br>Possible causes:<br><br>‣ No earth connection.<br><br>‣ Instrument is connected to an IT earthing system. Press **YES** to continue normally or **NO** to continue in a limited mode (measurements are disabled).<br><br>**Warning:**<br><br>**The instrument must be earthed properly to work safely!** |
| **Warning!**<br><br>Resistance L−N is too high(>30 kOhm). Check fuse / switch.<br>Would you like to proceed?<br><br>YES \| NO | **Resistance L-N > 30 kΩ**<br><br>In pre-test a high input resistance was measured. Possible causes:<br><br>‣ Device under test is not connected or switched on<br><br>‣ Input fuse of device under test is blown.<br><br>Select **YES** to proceed with or **NO** to cancel measurement. |
| **Warning!**<br><br>Resistance L−N is very low (<10 Ohm).<br>Would you like to proceed?<br><br>YES \| NO | **Resistance L-N < 10 Ω**<br><br>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.<br><br>Select **YES** to proceed with or **NO** to cancel measurement |

| | |
|---|---|
| **Warning!**<br><br>Resistance L−N is low (<30 Ohm).<br>Would you like to proceed?<br><br>**YES**　　　　**NO** | **Resistance L-N < 30 Ω**<br><br>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.<br><br>Select **YES** to proceed with or **NO** to cancel measurement. |
| **Improper input voltage**<br><br>Check mains voltage and PE connection!<br><br>**OK** | Warning for improper supply voltage condition. If pressing **OK** instrument will continue to work in a limited mode (measurements are disabled). |
| **Error**<br><br>External voltage on C1P1 − C2P2 is too high!<br><br>**OK** | In pre-test an external voltage between C1/P1 and C2/P2 terminals was detected. The measurement was cancelled. Press **OK** to continue. |
| **Error**<br><br>External voltage on P − PE is too high!<br><br>**OK** | In pre-test a too high external voltage was detected between P and PE terminals. The measurement was cancelled. Press **OK** to continue. |
| **Error**<br><br>External voltage on Iso+ is too high!<br><br>**OK** | In pre-test a too high external voltage was detected between ISO/SUB and PE terminals. The measurement was cancelled. Press **OK** to continue. |
| **Warning!**<br><br>Leakage is high(>3.5 mA).<br>Would you like to proceed?<br><br>**YES**　　　　**NO** | 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.<br><br>Select **YES** to proceed with or **NO** to cancel measurement. |
| **Error**<br><br>Measurment stopped because of too high leakage current.<br><br>**OK** | The measured leakage (Idiff, Ipe, Itouch) current was higher than 20 mA. Measurement was aborted. Press **OK** to continue. |

| | |
|---|---|
| **Error**<br><br>**I load is too high (>10 A)!**<br><br>**OK** | The load current exceeded the highest upper limit of 10 A for the Discharging time test. Measurement was aborted. Press **OK** to continue.<br><br>The load current continuously exceeded 10 A for more than 4 min (moving average) in Power and Leakage tests. Measurement was stopped for safety. Press **OK** to continue. |
| **Error**<br><br>**I load is too high (>16 A)!**<br><br>**OK** | The load current exceeded the highest upper limit of 16 A for the Power and Leakage tests. Measurement was aborted. Press **OK** to continue. |
| **Warning!**<br>**Instrument will restart to apply new settings.**<br><br>**OK** | Warning for restart of the instrument to set new Ethernet settings. This message appears on exit from Settings menu after changing Ethernet settings. 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). |
| $\leq \text{U}$ | Test voltage in Insulation resistance measurement is too low. |
| 110 | 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. |
| CAL ✗ | Test leads resistance in Continuity P/S - PE measurement is not compensated. |
| CAL ✓ | Test leads resistance in Continuity P/S - PE measurement is compensated. |
| ⚠ | **Warning**!<br><br>A high voltage is / will be present on the instrument output! (Withstanding test voltage, Insulation test voltage, or mains voltage). |
| ⚡ | **Warning**!<br><br>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. |
| ◀◀◀ | Expands column in control panel. |

# 4.5 Instrument main menu

From the instrument Main Menu different main operation menus can be selected.
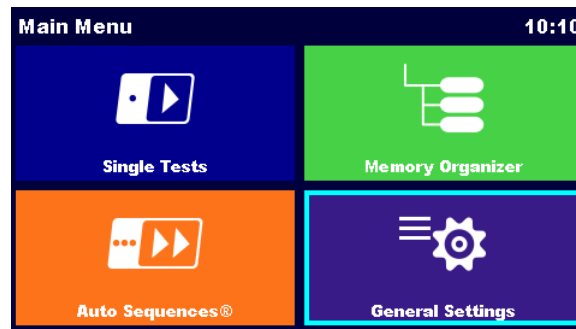


**Figure 4.1: Main menu**

Options

| | |
|---|---|
|  | **Single Tests**<br><br>Menu with single tests, see chapter 6 *Single tests.* |
|  | **Auto Sequences®**<br><br>Menu with customized test sequences, see chapter *7 Auto Sequences®.* |
|  | **Memory Organizer**<br><br>Menu for working with and documentation of test data, see chapter 5 *Memory Organizer*. |
|  | **General Settings**<br><br>Menu for setup of the instrument, see chapter *4.6 General* settings. |

# 4.6 General settings

In the General Settings menu general parameters and settings of the instrument can be viewed or set.
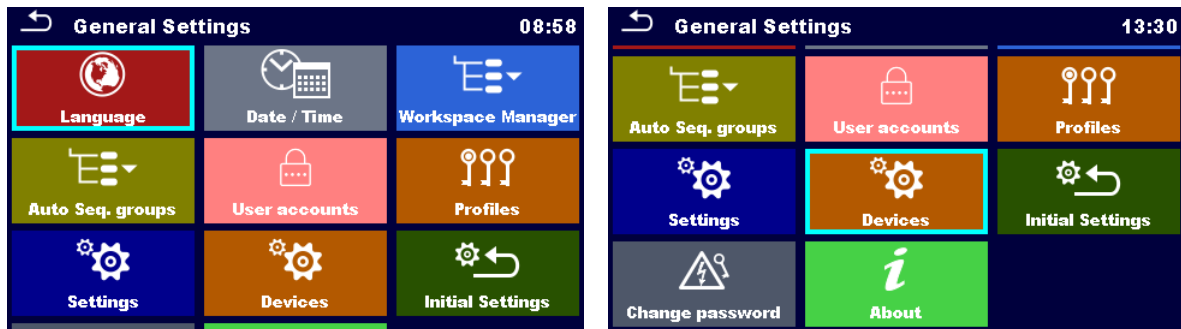


**Figure 4.2: Setup menu**

Options in General Settings menu

| | |
|---|---|
|  | **Language**<br><br>Instrument language selection |
|  | **Date / Time**<br><br>Instruments Date and time. |
|  | **Workspace Manager**<br><br>Manipulation with project files. Refer to chapter *4.8 Workspace Manager* for more information. |
|  | **Auto Sequence® groups**<br><br>Manipulation with lists of Auto Sequences®. Refer to chapter *4.9 Auto Sequence® groups* for more information. |
|  | **User accounts**<br><br>Users settings. Refer to chapter *4.6.6 User accounts* for more information. |
|  | **Profiles**<br><br>Selection of available instrument profiles. |
|  | **Settings**<br><br>Setting of different system parameters, including Ethernet settings. |
|  | **Devices**<br><br>Selection of external devices. Refer to chapter *4.6.9 Devices* for more information. |
|  | **Change password**<br><br>Changing password for enabling HV tests. |

| | **Initial Settings** |
|---|---|
| ⚙↩ Initial Settings | Factory settings. |
| *i* About | **About** Instrument info. |

### 4.6.1 Language

In this menu the language of the instrument can be set.
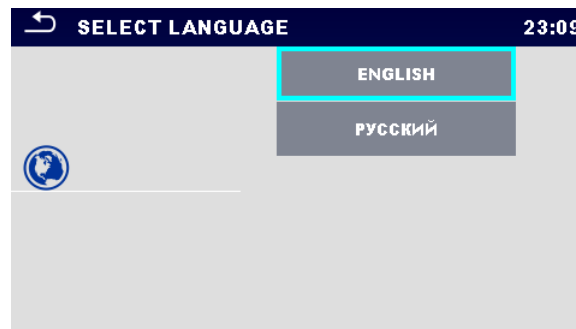


**Figure 4.3: Select language menu**

### 4.6.2 Date and time

In this menu date and time of the instrument can be set.



**Figure 4.4: Setting data and time menu**

### 4.6.3 Profiles

Refer to *Chapter 4.7 Instrument profiles* for more information.

### 4.6.4 Workspace Manager

Refer to *Chapter 4.8 Workspace Manager* for more information.

### 4.6.5 Auto Sequence® groups

Refer to *Chapter 4.9 Auto Sequence® groups* for more information.

## 4.6.6    User accounts

In this menu user accounts can be managed:
-  Setting if signing in to work with the instrument is required or not.
-  Adding and deleting new users, setting their user names and passwords.

The demand to sign in can prevent from unauthorized persons to work with the instrument.

If a user account is set and the user is signed in, the user's name will be stored in memory for each measurement.

The user accounts can be managed by the administrator. User account pasword consists of an up to 4 digit number. Individual users can change their passwords.

The administrator password consists of an up to 15 characters. Factory set administrator password is ADMIN.

If the password is forgotten the second administrator password can be used. This password always unlocks the Account manager and is delivered with the instrument.


### 4.6.6.1    Signing in

By selecting User Accounts icon in Settings menu, Sign in menu appear on the screen. Same screen appear when instrument is switched on, if Sign in is set to required, see Chapter *4.6.6.3 Managing accounts* for details.
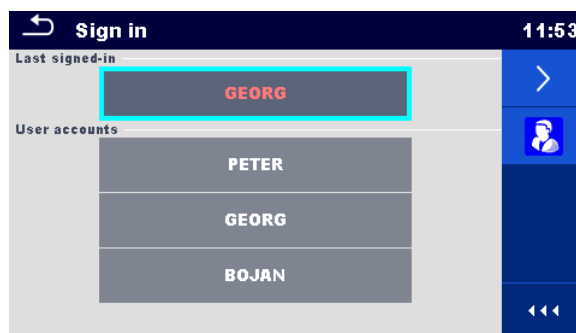
**Figure 4.5: Sign in menu**

Options

User signing in:
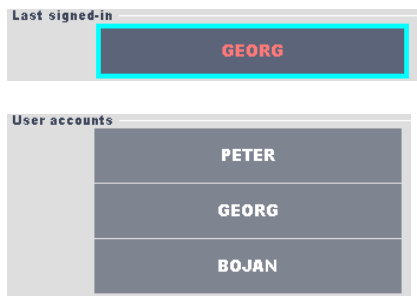
| | |
|---|---|
| Last signed-in / GEORG | Last signed in user is highlighted and displayed in the first row. |
| User accounts / PETER / GEORG / BOJAN | Another user can be selected from the User accounts list. |
| > | Enters User password entry screen. |

| | |
|---|---|
|  | Enter the User password through the on-screen numerical keyboard and confirm ⏎ . <br><br> User profile screen is opened as presented on *Figure 4.6.* |
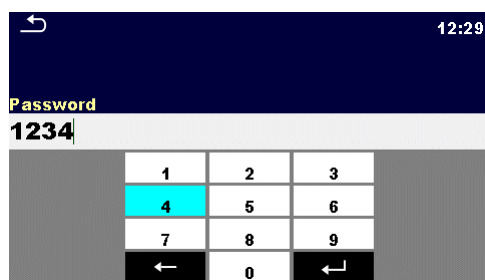
Administrator signing in:
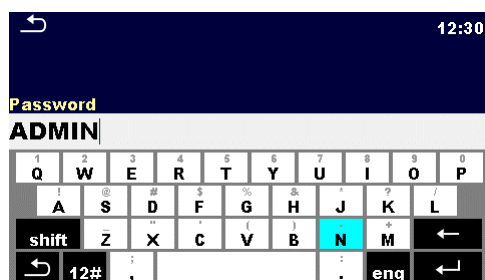
| | |
|---|---|
|  | Enters Account manager password entry screen. |

| | |
|---|---|
|  | Enter the Administrator password through on-screen keyboard and confirm ⏎ . <br><br> Account manager screen is opened as presented on *Figure 4.7.* |

## 4.6.6.2    Changing user password, signing out

After user completed Sign in procedure, User profile menu screen is presented. Same screen is presented if signed in user selects User accounts from General Settings menu.
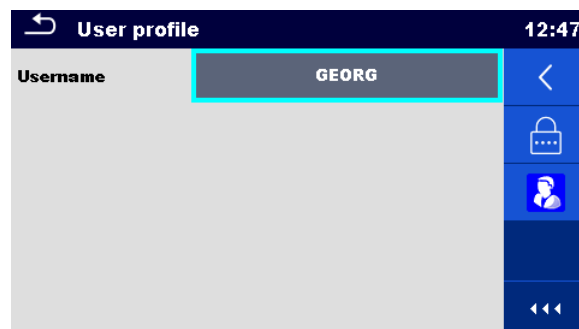


**Figure 4.6: User profile menu**

Options

| | |
|---|---|
|  | Signed in user is displayed and highlighted on the top of the screen. |

| | |
|---|---|
|  | Sign out current user. <br> Sign in screen appear, see Chapter *4.6.6.1 Signing in* for details. |

| | |
|---|---|
|  | Enters Account manager password entry screen, see Chapter *4.6.6.1 Signing in*. |

| | |
|---|---|
|  | Change User password.<br>Numerical user password entry keyboard appear on the screen. |
|  | First step: enter current user password and confirm  entry. |
|  | Wrong entry is reported by message. Confirm message, clear wrong password and repeat first step. |
|  | Second step: enter new user password and confirm  entry. Password change is confirmed with short message appearance. |

### 4.6.6.3    Managing accounts

To access Account manager menu, Administrator should be signed in, see Chapter *4.6.6.1 Signing in* for details.
Administrator can set sign in requirement, change Administrator password and edit user accounts.
Appearance of Account manager screen depends on previous settings, see *Figure 4.7* below.



**Figure 4.7: Account manager menu**

Options

| | |
|---|---|
|  | User sign in is not required. |

| | |
|---|---|
| | User sign in is required.<br>Presented setting requires sign in, when instrument is switched on. Sign in could also be set to required on every restart of instrument. |
| | Change Administrator password.<br>Alphanumerical keyboard appears on the screen. |
| | First step: enter current Administrator password and confirm ⏎ entry. |
| | Wrong entry is reported by message. Confirm message, clear wrong password and repeat first step. |
| | Second step: enter new Administrator password and confirm ⏎ entry. Password change is confirmed with short message appearance.<br><br>Account manager screen appear again. Administrator can continue to manage accounts or returns to Settings and Main menu. |
| | Edit account icon.<br>Enter Edit accounts screen, presented on *Figure 4.8*. For details see Chapter *4.6.6.4 Edit user accounts*. |
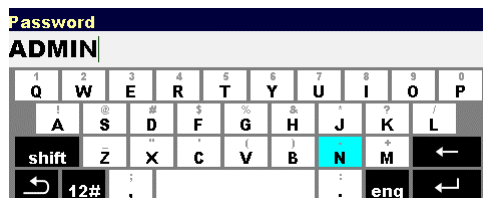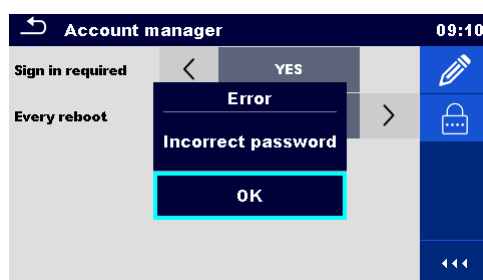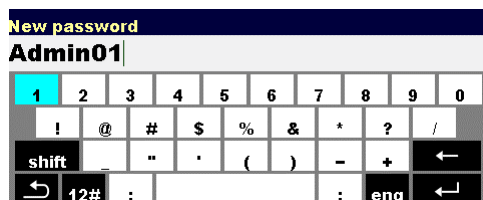
## 4.6.6.4    Edit user accounts

Administrator can add new user and set his password, change user existing password, delete user account and delete all user accounts.
Edit accounts screen is accessed by selecting Edit account icon from Account manager options screen, see Chapter *4.6.6.3 Managing accounts*.
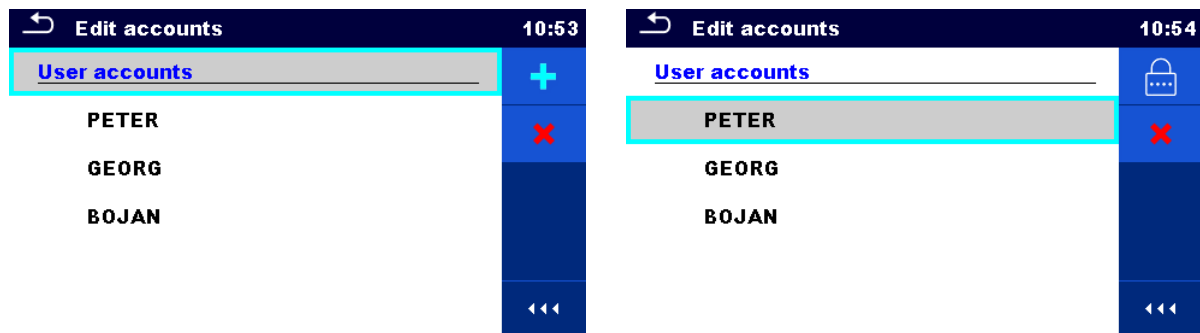
**Figure 4.8: Edit accounts screen – user list on the left, user selected on the right**

User accounts [ User accounts ] selected:

Options

| | |
|---|---|
|  | Add New user account.<br>Add New menu appear on the screen. |
|  | Add New selection options:<br><br>• Username opens onscreen alphanumerical keyboard for new user name entry<br>• Password opens onscreen numerical keyboard for new user password entry<br>• Add stores new user to User account list.<br>• Cancel interrupts procedure |
|  | New user account password must be entered; if not, warning message appears on the screen. |
|  | Delete all user accounts.<br>Warning message appears on the screen. |
|  | Warning message selection options:<br><br>• YES: confirmation of deletion, all user accounts will be deleted<br>• NO: interrupts procedure and return to Edit accounts menu |
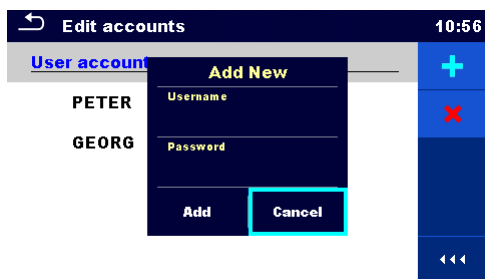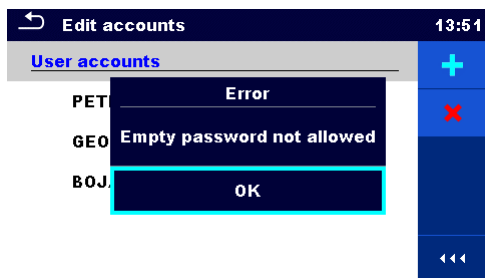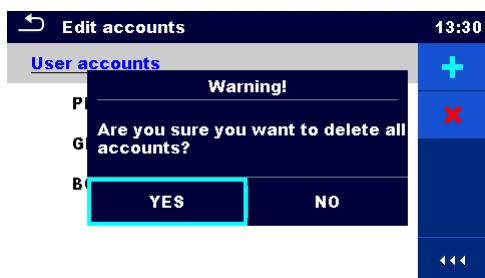
User selected (user is highlighted [ PETER ] ):

Options

| | |
|---|---|
|  | Set password<br>For selected user, password is set, numerical keyboard appears on the screen. |
|  | Enter user password and confirm [↵] entry.<br><br>Old user password is automatically overwritten without warning or confirmation. |
|  | Delete selected user account.<br>Warning message appears on the screen. |
|  | Warning message selection options:<br><br>• YES: confirmation of deletion, selected user account will be deleted<br><br>• NO: interrupts procedure and return to Edit accounts menu |
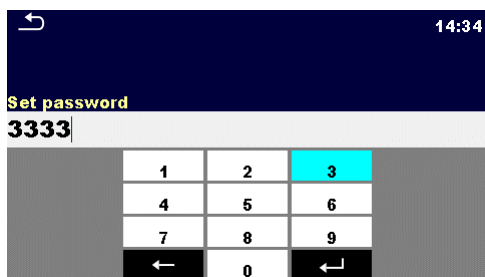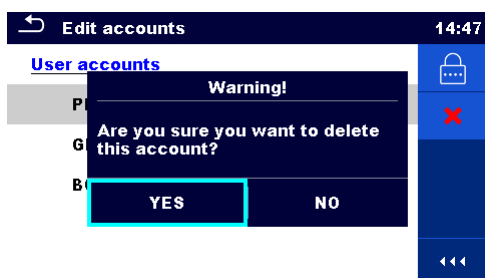
## 4.6.7    Change password for HV functions

In this menu the password to enable starting of HV functions can be set, changed or disabled.
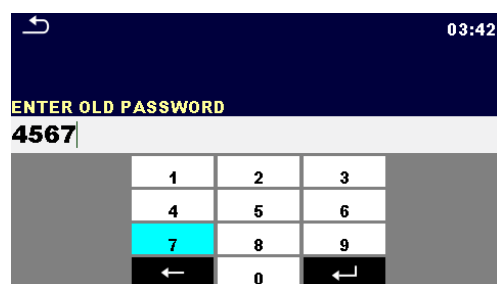


**Figure 4.9: Change password menu**

**Notes:**

‣ **Default password is 0000.**
‣ An empty entry disables the password.
‣ If password is lost, entry 4648 resets password to default.

## 4.6.8 Settings

In this menu different general parameters can be set.
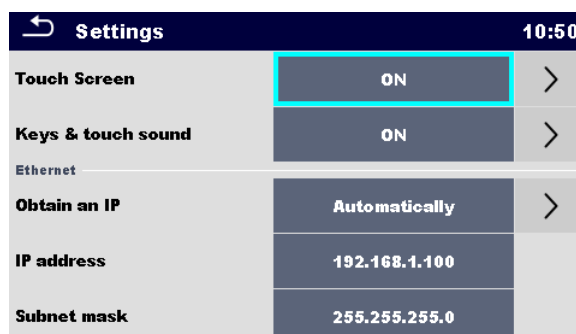
**Figure 4.10: Settings menu**

|  | **Available selection** | **Description** |
|---|---|---|
| **Touch screen** | [ON, OFF] | Enables / disables operation with touch screen. |
| **Keys & touch sound** | [ON, OFF] | Enables / disables sound on key press or touch. |
| **Obtain an IP** | [AUTOMATICALLY, MANUAL] | When the manual mode is chosen, the user must provide the correct network settings. Otherwise the instrument is automatically assigned an IP address from the local network using the DHCP protocol. |
| **IP address** | XXX.XXX.XXX.XXX | Displays the instrument's IP address. In manual mode, the user should enter the correct value. |
| **Port number** | 0 – 65535 | Selects the port number on which the instrument listens for incoming connections. The instrument communicates using UDP/IP protocol. Max. UDP packet length is 1024 bytes. |
| **Subnet mask** | XXX.XXX.XXX.XXX | In manual mode, the user should enter the correct value. |
| **Default gateway** | XXX.XXX.XXX.XXX | In manual mode, depending on the network topology, the use can enter the correct value or leave it as it is, if not needed. |
| **Preferred DNS server** | XXX.XXX.XXX.XXX | In manual mode, depending on the network topology, the use can enter the correct value or leave it as it is, if not needed. |
| **Alternate DNS server** | XXX.XXX.XXX.XXX | In manual mode, depending on the network topology, the use can enter the correct value or leave it as it is, if not needed. |
| **Host name** | MI3394_XXXXXXXX | Displays the instrument's unique name on the local network. The host name consists of the instrument's name and its serial number. |
| **MAC address** | XX:XX:XX:XX:XX:XX | Displays the instrument's MAC address. User can change the address in case of another device on the network using the same value. |

**Note:**

‣ Instrument will reset to apply new Ethernet settings (if modified).

## 4.6.9 Devices

In this menu operation with external devices is configured.
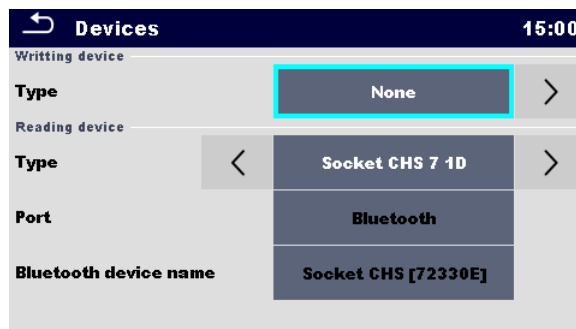


**Figure 4.11: Device settings menu**

| Writing devices | |
| --- | --- |
| Type | Sets appropriate writing device (Serial printer, Bluetooth printer). |
| Port | Sets/views communication port of selected writing device. |
| Bluetooth device name | Goes to menu for pairing with selected Bluetooth device. |
| Bluetooth dongle | Initializes Bluetooth Dongle. |
| Print labels | Selects/views label size. |
| Printed date | Selects type of code and content to be stored on selected code. |
| **Reading devices** | |
| Type | Sets appropriate reading device (QR or barcode scanner). |
| Port | Sets/views communication port of selected reading device. |
| Bluetooth device name | Goes to menu for pairing with selected Bluetooth device. |

## 4.6.10 Initial Settings

In this menu internal Bluetooth module can be initialized and the instrument settings, measurement parameters and limits can be set to initial (factory) values.
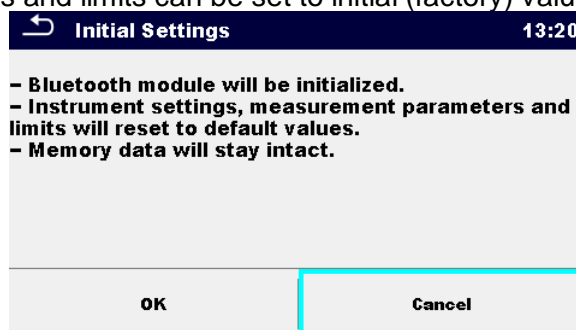


**Figure 4.12: Initial settins menu**

**Warning!**

Following customized settings will be lost when setting the instruments to initial settings:
- Measurement limits and parameters
- Global parameters and System settings in General settings menu

**Note:**

Following customized settings will stay:
- ‣ Profile settings
- ‣ Data in memory
- ‣ Password for HV functions

## 4.6.11 About

In this menu instrument data (name, serial number, version and date of calibration) can be viewed.

| | |
|---|---|
| ↰ About | 09:12 |
| Name | MI 3394 CE MultiTesterXA |
| S/N | 11111357 |
| Version | 1.1.51.1.3735 − ANAA |
| Date of calibration | 17.12.2014 |
| | (C) Metrel d.d., 2015, http://www.metrel.si |

**Figure 4.13: Instrument info screen**

# 4.7 Instrument profiles

In this menu the instrument profile can be selected from the available ones.
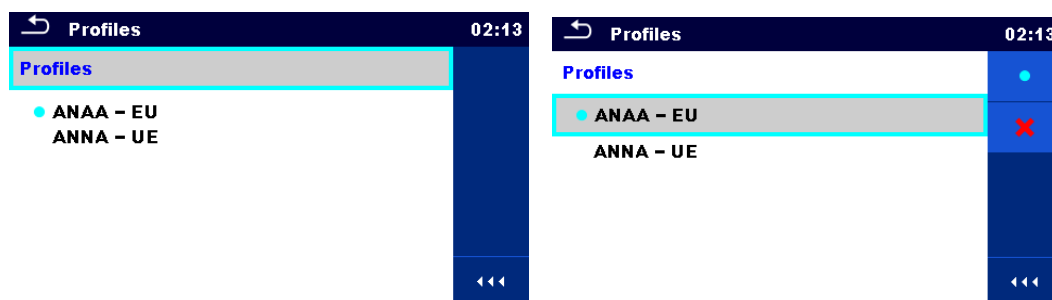
**Figure 4.14: Instrument profile menu**

The instrument uses different specific system and measuring settings in regard to the scope of work or country it is used. These specific settings are stored in instrument profiles.
By default each instrument has at least one profile activated. Proper licence keys must be obtained to add more profiles to the instruments.
If different profiles are available they can be selected in this menu.
Refer to *Appendix B - Profile Notes* for more information about functions specified by profiles.

Options

| | |
|---|---|
| ● | Loads the selected profile. The instrument will restart automatically with new profile loaded. |

| | |
|---|---|
|  | Enters option for deleting a profile. |
|  | Before deleting the selected profile user is asked for confirmation.<br><br>Loaded profiles can't be deleted. |
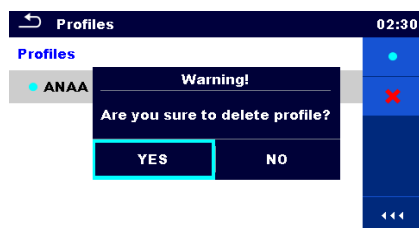
# 4.8 Workspace Manager

The Workspace Manager is intended to manage with different Workspaces and Exports stored on the microSD card.

## 4.8.1    Workspaces and Exports

The works with CE MultiTesterXA MI 3394 can be organized with help of Workspaces and Exports. Exports and Workspaces contain all relevant data (measurements, parameters, limits, structure objects) of an individual work.
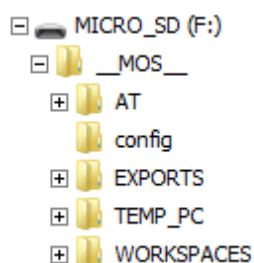


**Figure 4.15: Organization of Workspaces and Exports on microSD card**

Workspaces are stored on microSD card on directory WORKSPACES, while Exports are stored on directory EXPORTS. Exports are suitable for making backups of important works or can be used for storage of works if the removable microSD card is used as a mass storage device. To work on the instrument an Export should be imported first from the list of Exports and converted to a Workspace. To be stored as Export data a Workspace should be exported first from the list of Workspaces and converted to an Export.

## 4.8.2    Workspace Manager main menu

In Workspace manager Workspaces and Exports are displayed in two separated lists.
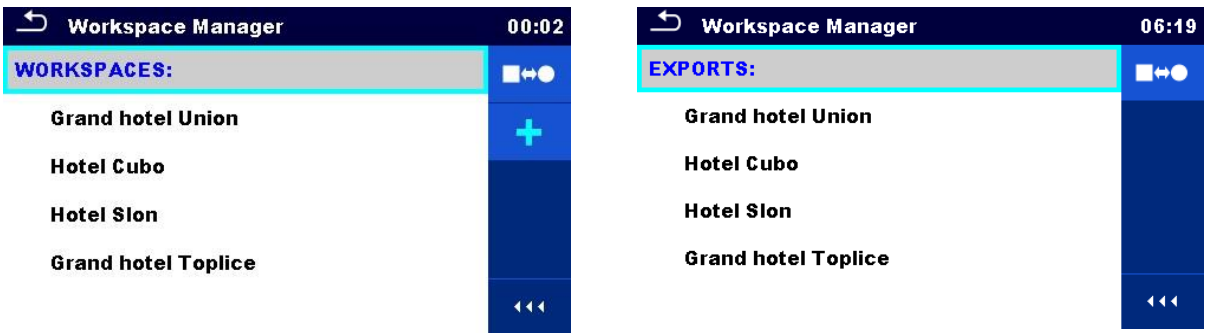
**Figure 4.16: Workspace manager main menu**

Options

| | |
|---|---|
|  | List of Workspaces. |
|  | Displays a list of Exports. |
|  | Adds a new Workspace. Refer to chapter *4.8.2.3 Adding a new Workspace* for more information. |
|  | List of Exports. |
|  | Displays a list of Workspaces. |

### 4.8.2.1   Operations with Workspaces

Only one Workspace can be opened in the instrument at the same time. The Workspace selected in the Workspace Manager will be opened in the Memory Organizer.



**Figure 4.17: Workspaces menu**

Options

| | |
|---|---|
| ● | Marks the opened Workspace in Memory Organizer.<br><br>Opens the selected Workspace in Memory Organizer.<br><br>Refer to chapters *5 Memory Organizer* and *4.8.2.4 Opening a Workspace* for more information. |
| ✖ | Deletes the selected Workspace.<br><br>Refer to chapter *4.8.2.5 Deleting a Workspace / Export* for more information. |
| ✚ | Adds a new Workspace.<br><br>Refer to chapter *4.8.2.3 Adding a new Workspace* for more information. |
| ⬇ | Exports a Workspace to an Export<br><br>Refer to chapter *4.8.2.7 Exporting a Workspace* for more information. |

## 4.8.2.2   Operations with Exports



**Figure 4.18: Workspace manager Exports menu**

Options

| | |
|---|---|
| ✖ | Deletes the selected Export.<br><br>Refer to chapter *4.8.2.5 Deleting a Workspace / Export* for more information. |
| ⬆ | Imports a new Workspace from Export.<br><br>Refer to chapter *4.8.2.6 Importing a Workspace* for more information. |

## 4.8.2.3   Adding a new Workspace

| ① | | New workspaces can be added from the Workspace manager screen. |

| ② | | Enters option for adding a new Workspace. |
| | | Keypad for entering name of a new Workspace is displayed after selecting New. |

| ③ | | After confirmation a new Workspace is added to the list of workspaces. |
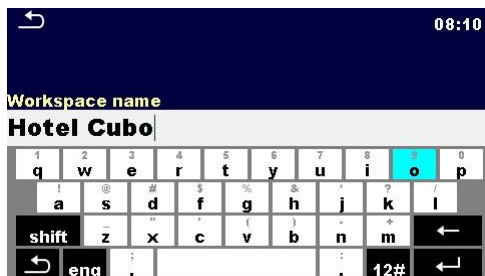
### 4.8.2.4    Opening a Workspace

| ① | | Workspace can be selected from a list in Workspace manager screen. |

| ② | | Opens a Workspace in Workspace manager. |
| | | The opened Workspace is marked with a blue dot. The previously opened Workspace will close automatically. |

### 4.8.2.5    Deleting a Workspace / Export

| | | |
|---|---|---|
| ① |  | Workspace / Export to be deleted should be selected from the list of Workspaces / Exports. |
| ② |  | Enters option for deleting a Workspace / Export.<br><br>Before deleting the selected Workspace / Export the user is asked for confirmation. |
| ③ |  | Workspace / Export is deleted from the Workspace / Export list. |
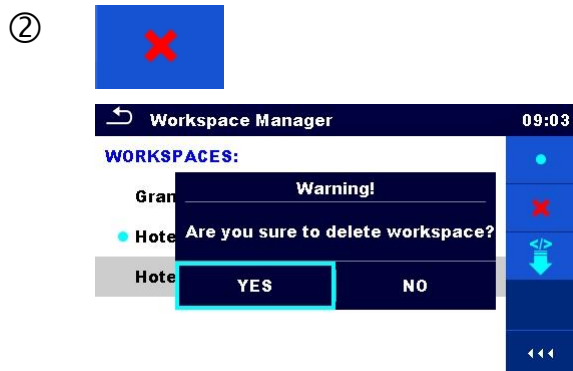
### 4.8.2.6    Importing a Workspace
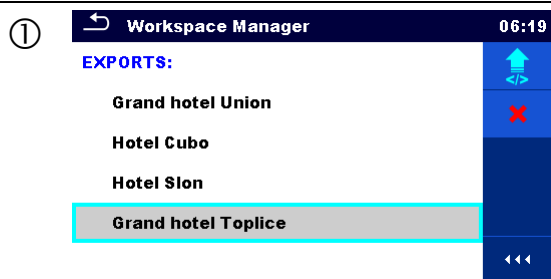
| | | |
|---|---|---|
| ① |  | Select an Export file to be imported from Workspace manager Export list. |
| ② |  | Enters option Import.<br><br>Before the import of the selected Export file the user is asked for confirmation. |

| | | |
|---|---|---|
| ③ | | The imported Export file is added to the list of Workspaces. |
| | | **Note:** |
| | | If a Workspace with the same name already exists the name of the imported Workspace will be changed (name_001, name_002, name_003, …). |
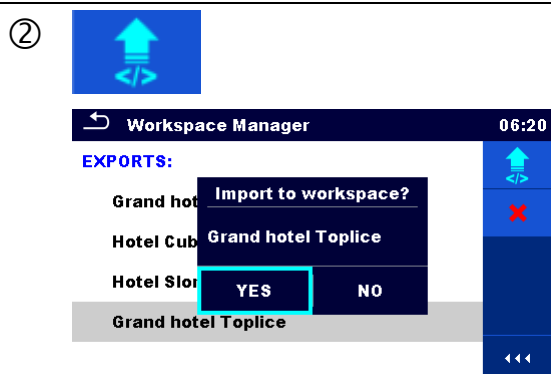
## 4.8.2.7    Exporting a Workspace

| | | |
|---|---|---|
| ① | | Select a Workspace from Workspace manager list to be exported to an Export file. |
| ② | | Enters option for Export. |
| | | Before exporting the selected Workspace the user is asked for confirmation. |
| ③ | | Workspace is exported to Export file and is added to the list of Exports. |
| | | **Note:** |
| | | If an Export file with the same name already exists the name of the Export file will be changed (name_001, name_002, name_003, …). |
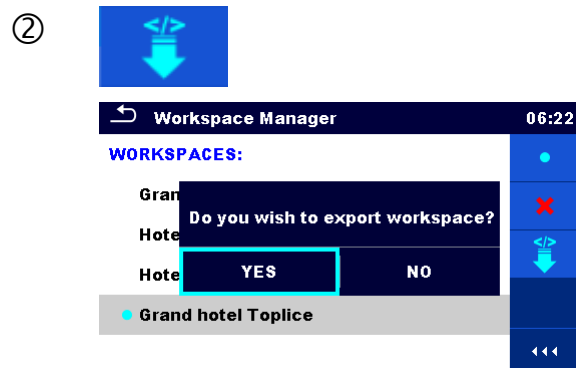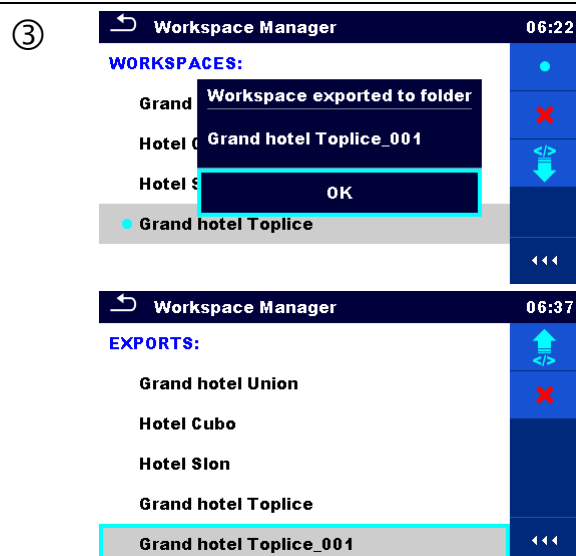
# 4.9 Auto Sequence® groups

The Auto Sequences® in CE MultiTesterXA MI 3394 are organized in Auto Sequence® groups stored in folders on the microSD memory card. Folders are located in *Root\__MOS__\AT* on the microSD card.
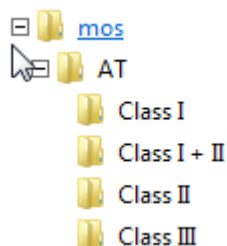


**Figure 4.19: Organization of Auto Sequence® groups on microSD card**

Each group contain similar Auto Sequences®. The Auto Sequence® groups menu is intended to manage with different Auto Sequences®.

## 4.9.1     Auto Sequence® groups menu

Auto Sequence® groups menu can be accessed from General settings menu followed by selection of Auto Sequence® groups menu.
Another option to access it is from Main Auto Sequences® menu, see chapter *7.1 Selection of Auto Sequences®*.
In this menu lists of Auto Sequence® groups are displayed. Only one group can be active in the instrument at the same time. The group selected from the Auto Sequence® groups menu will be opened whenever Auto Sequences® menu is selected from the instrument Main menu, see chapter *4.5 Instrument main menu*.
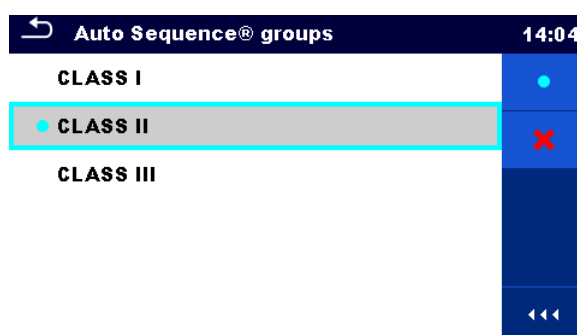


**Figure 4.20: Auto Sequence® groups menu**

### 4.9.1.1   Operations in Auto Sequence® groups menu

Options

| | |
|---|---|
| [blue dot icon] | Opens the selected group of Auto Sequences®. Previously selected group of Auto Sequences® will be closed automatically. <br><br> Refer to chapter *4.9.1.2 Selecting a group of Auto Sequences®* for more information. |
| [red X icon] | Deletes the selected list of Auto Sequences®. <br><br> Refer to chapter *0* <br><br> *Deleting a group of Auto Sequences®* for more information. |

### 4.9.1.2   Selecting a group of Auto Sequences®
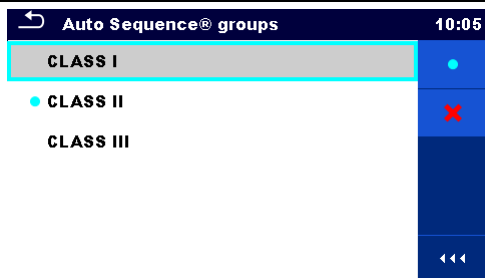
| | | |
|---|---|---|
| ① | [Screenshot: Auto Sequence® groups 10:05 — CLASS I (highlighted), CLASS II, CLASS III] | A group of Auto Sequences® should be selected first from the list of Auto Sequence® groups. |
| ② | [blue dot icon] <br><br> [Screenshot: Auto Sequence® groups 10:05 — CLASS I (highlighted, blue dot), CLASS II, CLASS III] | Enters option for selecting a highlighted group. <br><br> Selected group of Auto Sequences® is marked with a blue dot. <br><br> **Note:** <br> Previously selected group is closed automatically. |
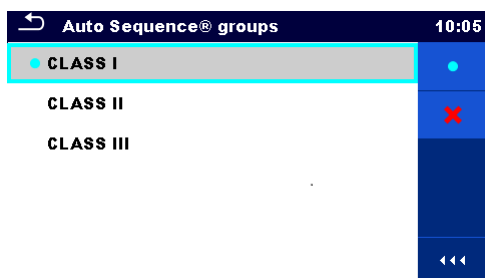
### 4.9.1.3    Deleting a group of Auto Sequences®
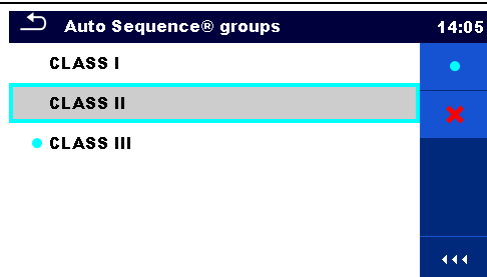
| | | |
|---|---|---|
| ① |  | A group of Auto Sequences® to be deleted should be selected first from the list of Auto Sequence® groups. |
| ② |  | Enters option for deleting the selected group.<br><br>Before deleting the selected group of Auto Sequences®, the user is asked for confirmation. |
| ③ |  | A group of Auto Sequences® is deleted.<br>**Note:**<br>Selected Auto Sequences® group (marked with blue dot) cannot be deleted, warning message appear on the screen. |
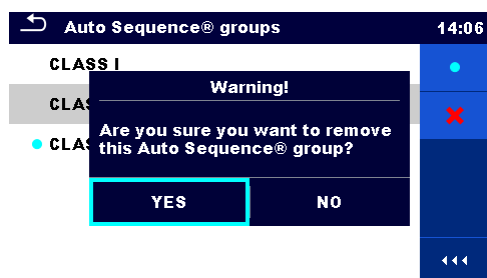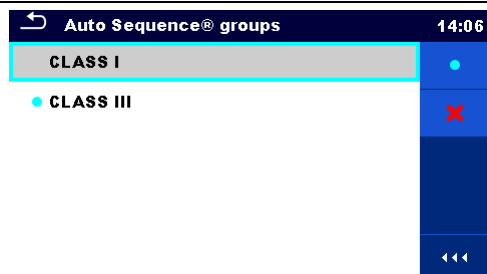
# 5   Memory Organizer

Memory Organizer is a tool for storing and working with test data.

## 5.1 Memory Organizer menu

The data is organized in a tree structure with Structure objects and Measurements. CE MultiTesterXA has a fixed three level structure. The hierarchy of Structure objects in the tree is shown on *Figure 5.1*.

*0<sup>th</sup> level*

      *1<sup>st</sup> level*

            *2<sup>nd</sup> level*

              *3<sup>rd</sup> level*

*NODE*

   *APPLIANCE FD (full description)*

      *measurement*

   *APPLIANCE (short description)*

      *measurement*

 *PROJECT*

      *APPLIANCE FD*

         *measurement*

      *APPLIANCE*

         *measurement*

 *LOCATION*

      *APPLIANCE FD*

      *measurement*

      *APPLIANCE*
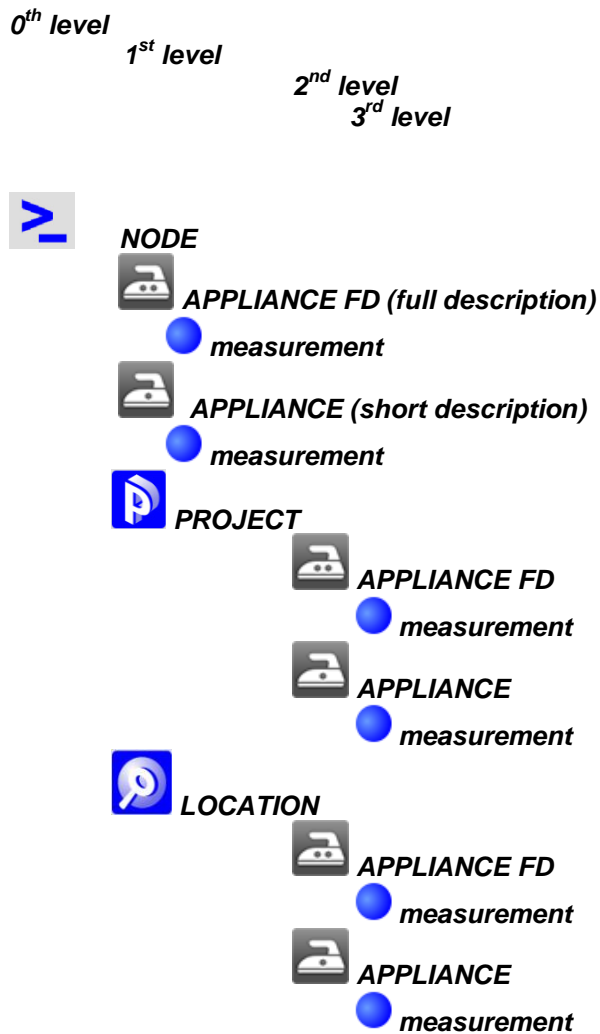
      *measurement*

**Figure 5.1: Tree structure and its hierarchy**
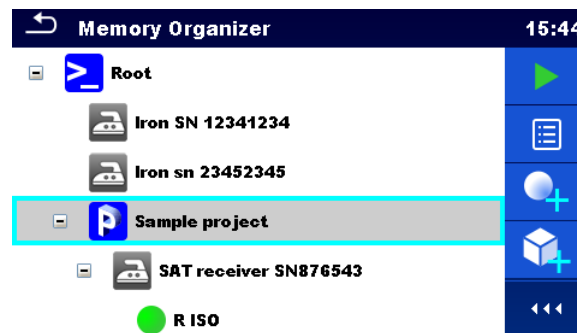
**Figure 5.2: Example of a Tree menu**

## 5.1.1    Measurement statuses

Each measurement has:
‣ a status (Pass or Fail or no status)
‣ a name
‣ results
‣ limits and parameters

A measurement can be a Single test or an Auto Sequence® test. Statuses of single tests:

‣ 🟢 passed finished single test with test results

‣ 🔴 failed finished single test with test results

‣ 🔵 finished single test with test results and no status

‣ ⭕ empty single test without test results

Overall statuses of Auto Sequence® tests:

| | |
|---|---|
| ‣ 🟢 or ✓ (green) | at least one single test in the Auto Sequence® passed and no single test failed |
| ‣ 🔴 or ✗ (red) | at least one single test in the Auto Sequence® failed |
| ‣ 🔵 or — (blue) | at least one single test in the Auto Sequence® was carried out and there were no other passed or failed single tests. |
| ‣ ⭕ or — (grey) | empty Auto Sequence® with empty single tests |

## 5.1.2    Structure Objects

Each Structure object has:
‣ an icon
‣ a name
‣ parameters

Optionally they can have:
  ‣ an indication of the status of the measurements under the Structure object
  ‣ a comment or a file attached
Structure objects supported in CE MultiTesterXA are described in *Appendix A - Structure objects in CE MultiTesterXA*.



**Figure 5.3: Structure object in tree menu**

### 5.1.2.1    Measurement status indication under the Structure object

Overall status of measurements under each structure element / sub-element can be seen without spreading tree menu. This feature is useful for quick evaluation of test status and as guidance for measurements.

Options

| | | |
|---|---|---|
|  | There are no measurement result(s) under selected structure object. Measurements should be made. | <br>**Figure 5.4: Example of status - No measurement result(s)** |
|  | One or more measurement result(s) under selected structure object has failed. Not all measurements under selected structure object have been made yet. | <br>**Figure 5.5: Example of status - Measurements not completed with fail result(s)** |
|  | All measurements under selected structure object are completed but one or more measurement result(s) has failed. | <br>**Figure 5.6: Status - Measurements completed with fail result(s)** |
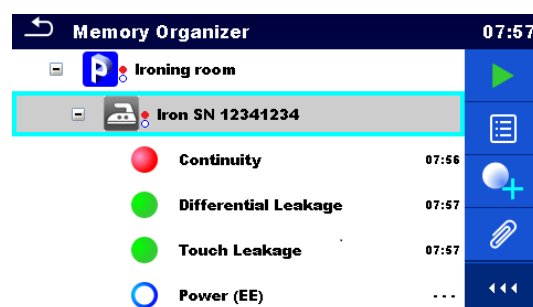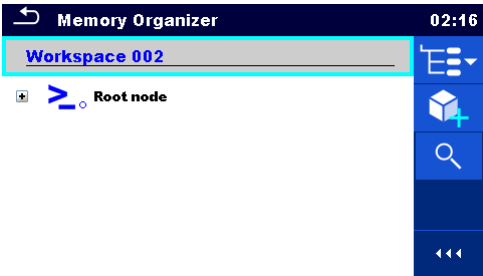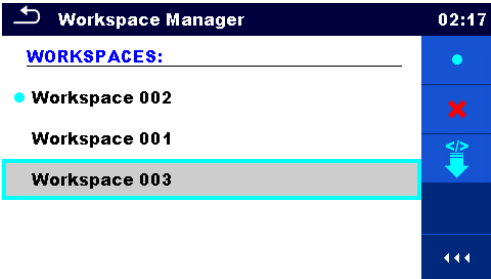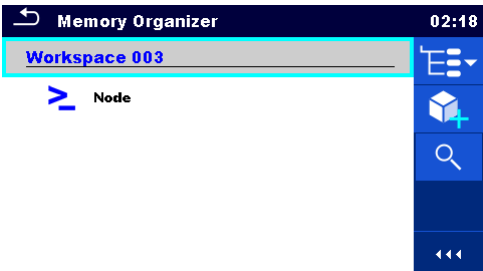
**Note:**
  ‣ There is no status indication if all measurement results under each structure element /
    sub-element have passed or if there is an empty structure element / sub-element
    (without measurements).

## 5.1.3    Selecting an active Workspace in Memory Organizer

Memory Organizer and Workspace Manager are interconnected so an active Workspace can be
selected also in the Memory Organizer menu.

**Procedure**
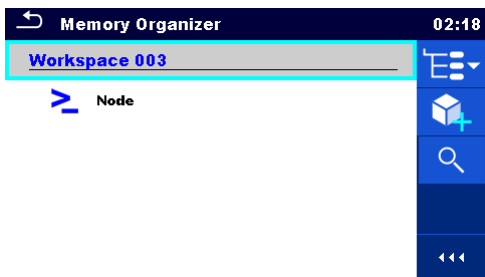
| | | |
|---|---|---|
| ① | | Press the active Workspace in Memory Organizer Menu. |
| ② | | Select List of Workspaces in Control panel. |
| ③ | | Choose desired Workspace from the list of Workspaces. |
| ④ | | Use Select button to confirm selection. |
| ⑤ | | New Workspace is selected and displayed on the screen. |

## 5.1.4     Adding Nodes in Memory Organizer

Structural Elements (Nodes) are used to ease organization of data in the Memory Organizer. One Node is a must; others are optional and can be created or deleted freely.

**Procedure**
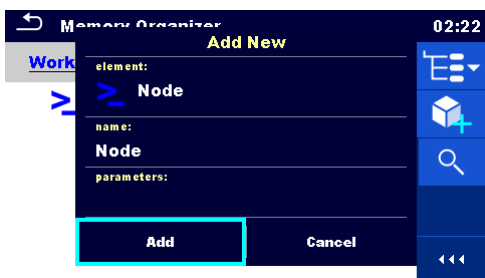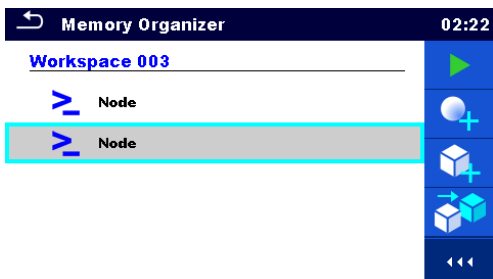
| | | |
|---|---|---|
| ① | | Press the active Workspace in Memory Organizer Menu. |
| ② | | Select Add New Structure Element in Control panel. |
| ③ | | Change name of the Node if necessary and press Add to confirm. |
| ④ | | New Structure Element (Node) will be added. |

## 5.1.5     Operations in Tree menu

In the Memory organizer different actions can be taken with help of the control panel at the right side of the display. Possible actions depend on the selected element in the organizer.

### 5.1.5.1     Operations on measurements (finished or empty measurements)

The measurement must be selected first. Operation options can be selected from the menu on the right side of the screen. Menu options are adapted to measurement status, empty, finished, finished and saved, as presented on *Figure 5.7*.
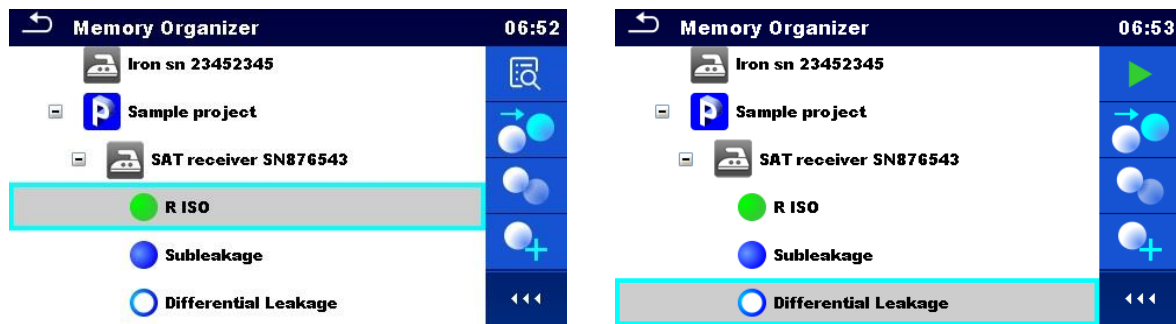
**Figure 5.7: A measurement is selected in the Tree menu**

Options

| | Views results of measurement. |
|---|---|
| | The instrument goes to the measurement memory screen. Refer to chapters *6.1.6 Single test memory* screen and *7.2.4 Auto Sequence® memory* screen for more information. |
| | Starts a new measurement. |
| | The instrument goes to the measurement start screen. Refer to chapters *6.1.3 Single test start screen* and *7.2.1 Auto Sequence® view* menu for more information. |
| | Saves a measurement. |
| | Saving of measurement on a position after the selected (empty or finished) measurement. |
| | Clones the measurement. |
| | The selected measurement can be copied as an empty measurement under the same Structure object. Refer to chapter *5.1.5.7 Clone a measurement* for more information. |
| | Copies & Paste a measurement. |
| | The selected measurement can be copied and pasted as an empty measurement to any location in structure tree. Multiple "Paste" is allowed. Refer to chapter *5.1.5.10 Copy & Paste a measurement* for more information. |
| | Adds a new measurement. |
| | The instrument goes to the Menu for adding measurements. Refer to chapter *5.1.5.5 Add a new measurement* for more information. |
| | Deletes a measurement. |
| | Selected Measurement can be deleted. User is asked for confirmation before the deleting. Refer to chapter *5.1.5.12 Delete a measurement* for more information. |

### 5.1.5.2    Operations on Structure objects

The structure object must be selected first.
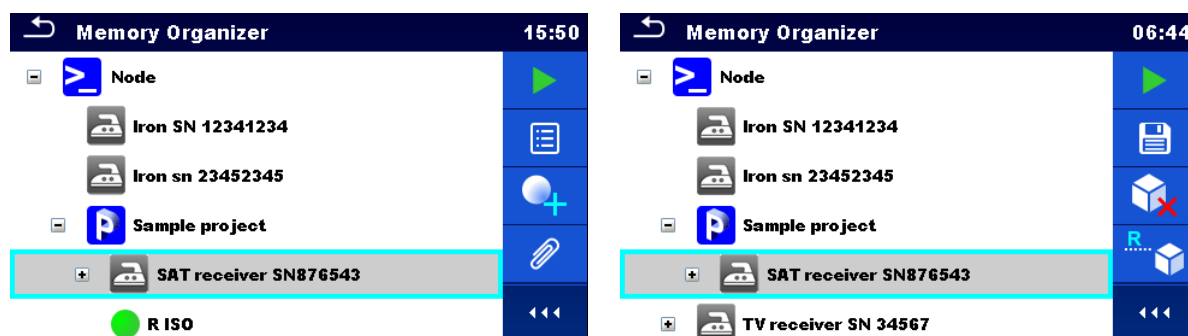


**Figure 5.8: A structure object is selected in the tree menu**

Options

| | |
|---|---|
| ▶ | Starts a new measurement. |
| | First type of measurement (Single test or Auto Sequence®) should be selected. After proper type is selected, the instrument goes to single test or Auto Sequence® selection screen. Refer to chapters *6.1 Selection of single tests* and *7.1 Selection of Auto Sequences® for more information*. |
| 💾 | Saves a measurement. |
| | Saving of measurement under the selected Structure object. |
| ☰ | View / edit parameters and attachments. |
| | Parameters and attachments of the Structure object can be viewed or edited. Refer to chapter *5.1.5.3 View / Edit parameters and attachments of a Structure object* for more information. |
| ●+ | Adds a new measurement. |
| | The instrument goes to the Menu for adding measurement into structure. Refer to chapter *5.1.5.5 Add a new measurement* for more information. |
| ▣+ | Adds a new Structure object. |
| | A new Structure object can be added. Refer to chapter *5.1.5.4 Add a new Structure Object* for more information. |
| 📎 | Attachments. |
| | Name and link of attachment is displayed. |
| ▣▶▣ | Clones a Structure object. |
| | Selected Structure object can be copied to same level in structure tree (clone). Refer to chapter *5.1.5.6 Clone a Structure object* for more information. |
| ▣▣ ▣ | Copies & Paste a Structure object. |
| | Selected Structure object can be copied and pasted to any allowed location in structure tree. Multiple "Paste" is allowed. Refer to chapter *5.1.5.8 Copy & Paste a Structure object* for more information. |

| | |
|---|---|
| | Deletes a Structure object. |
| | Selected Structure object and sub-elements can be deleted. User is asked for confirmation before the deleting. Refer to chapter *0* |
| | *Delete a Structure* object for more information. |

| | |
|---|---|
| | Renames a Structure object. |
| | Selected Structure object can be renamed via keypad. Refer to chapter *5.1.5.13 Rename a Structure object* for more information. |

### 5.1.5.3  View / Edit parameters and attachments of a Structure object

The parameters and their content are displayed in this menu. To edit the selected parameter tap on it or press Enter key to enter menu for editing parameters.

**Parameters**

-



**Figure 5.9: Example of View / Edit parameters menu**
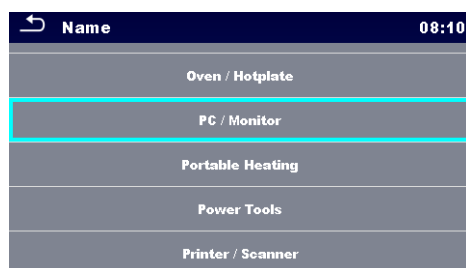


In menu for editing parameters the parameter's value can be selected from a dropdown list or entered via keypad. Refer to chapter 4 *Instrument operation* for more information about keypad operation.
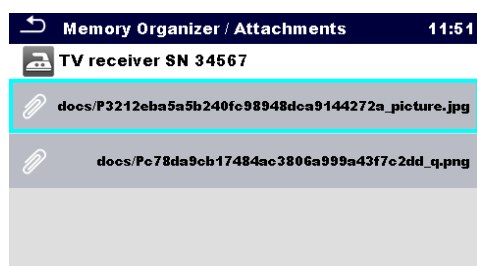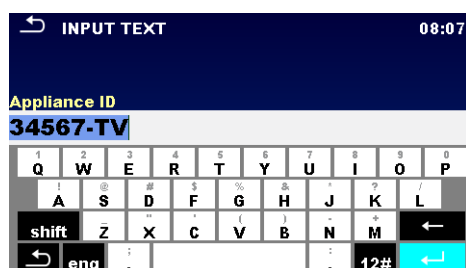
Attachments

The name of attachment can be seen. Operation with attachments is not supported in the instrument.

## 5.1.5.4    Add a new Structure Object

This menu is intended to add new structure objects in the tree menu. A new structure object can be selected and then added in the tree menu.

 **Add Structure**



**Figure 5.10: Add a new Structure Object menu**



The type of Structure object to be added can be selected from dropdown menu.

Only structure objects that can be used in the same level or next sublevel are offered.



The name of the Structure object can be edited.



Parameters of the Structure object can be edited.

| | |
|---|---|
|  | Adds the selected structure object and its parameters in the tree menu. |
|  | Returns to the tree menu without changes. |

## 5.1.5.5    Add a new measurement

In this menu new empty measurements can be set and then added in the structure tree. The type of measurement, measurement function and its parameters are first selected and then added under the selected Structure object.

 **Add Measurement**        

**Figure 5.11: Add a new measurement menu**

| | |
|---|---|
|  | Type of test can be selected from this field. Options: (Single tests, Auto Sequences®) Tap on field or press ENTER key to modify. |
|  | Last added single test measurement is offered by default. To select another measurement press Enter to open menu for selecting measurements. Refer to chapters *6.1 Selection of single tests* and *7.1* Selection |

of Auto Sequences® for more information

| | |
|---|---|
| **params & limits:**<br>**Riso, Riso-S, 50 V, Off, Off, Off, ...**<br><br>↩ **Parameters & Limits** — 06:44<br>**Type** ‹ Riso, Riso-S<br>**Uiso** 50 V ›<br>**Duration** Off ›<br>**L Limit(Riso)** Off ›<br>**H Limit(Riso)** Off › | Tap on field or press ENTER key to open menu for editing parameters of the selected measurement.<br><br>Select parameter and modify it as described earlier.<br><br>Refer to chapter *6.1.2 Setting parameters and limits of single tests* for more information. |
| **Add** | **Add a new empty measurement**.<br><br>Adds the measurement under the selected Structure object in the tree menu. |
| **Cancel** | Returns to the structure tree menu without changes. |

### 5.1.5.6 Clone a Structure object

In this menu selected structure object can be copied (cloned) to same level in the structure tree. Cloned structure object have same name as original.
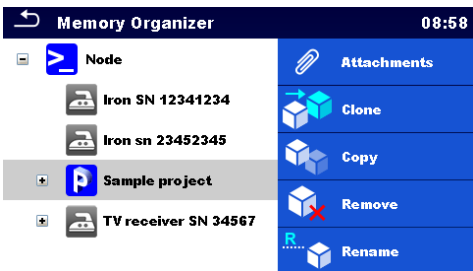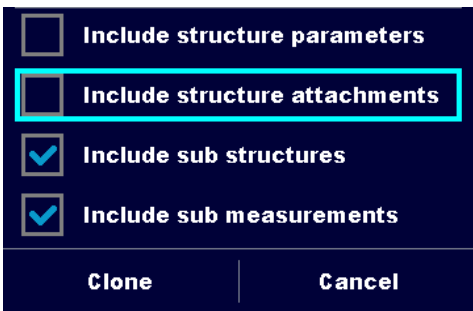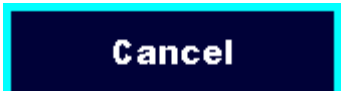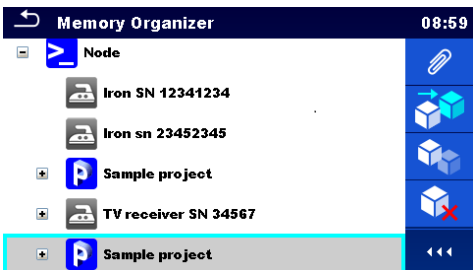
 **Clone**



☑ Include structure parameters
☑ Include structure attachments
☑ Include sub structures
☑ Include sub measurements
[ Clone ]  [ Cancel ]

**Figure 5.12: Clone Structure Object menu**

Procedure and options

| | | |
|---|---|---|
| ① |  | Select the structure object to be cloned. |
| ② |   **Clone** | Select Clone option from control panel. |
| ③ |  | The Clone Structure object menu is displayed. Sub-elements of the selected structure object can be marked or un-marked for cloning.<br><br>Refer to chapter *5.1.5.9 Cloning and Pasting sub-elements of selected structure object* for more information. |
| ④a |  | Selected structure object is copied (cloned) to same level in the structure tree. |
| ④b |  | Cloning is cancelled. No changes in the Structure tree. |
| ⑤ |  | The new structure object is displayed. |

## 5.1.5.7   Clone a measurement

By using this function a selected empty or finished measurement can be copied (cloned) as an empty measurement to the same level in the structure tree.

Procedure and options
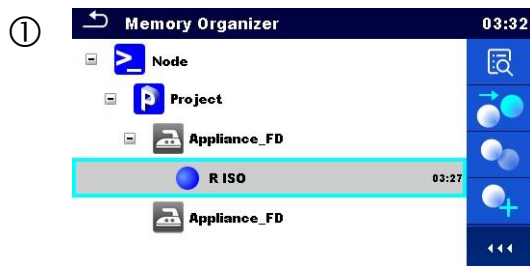
| ① | | Select the measurement to be cloned. |
|---|---|---|

| ② | **Clone** | Select Clone option from control panel. |
|---|---|---|

| ③ | | The new empty measurement is displayed. |
|---|---|---|
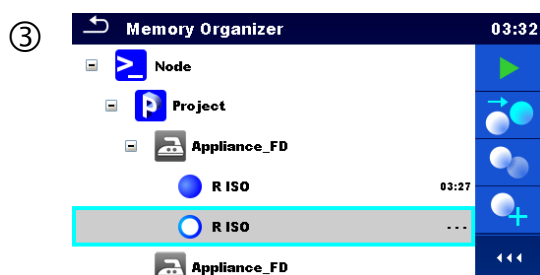
### 5.1.5.8   Copy & Paste a Structure object

In this menu selected Structure object can be copied and pasted to any allowed location in the structure tree.

Procedure and options
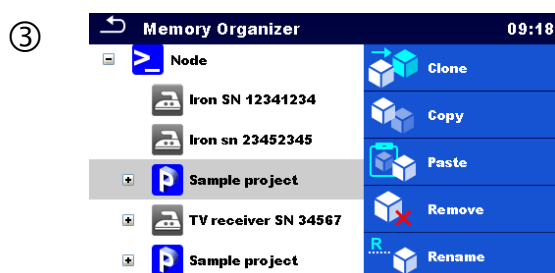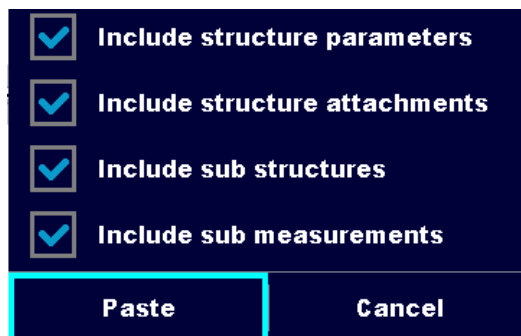
| ① | | Select the structure object to be copied. |
|---|---|---|

| ② | **Copy** | Select Copy option from control panel. |
|---|---|---|

| ③ | | Select location where structure element should be copied. |
|---|---|---|

| ④ | **Paste** | Select Paste option from control panel. |
|---|---|---|
| ⑤ | Include structure parameters<br>Include structure attachments<br>Include sub structures<br>Include sub measurements<br>**Paste**  **Cancel** | The Paste structure object menu is displayed. Before copying it can be set which sub-elements of the selected structure object will be copied too. For more details see chapter *5.1.5.9 Cloning and Pasting sub-elements of selected structure object*. |
| ⑥a | **Paste** | The selected structure object and elements are copied (pasted) to selected position in the tree structure. |
| ⑥b | **Cancel** | Returns to the tree menu without changes. |
| ⑦ | Memory Organizer 09:19<br>Node<br>Iron SN 12341234<br>Iron sn 23452345<br>Sample project<br>SAT receiver SN876543<br>TV receiver SN 34567 | The new structure object is displayed.<br>**Note:**<br>The Paste command can be executed one or more times. |
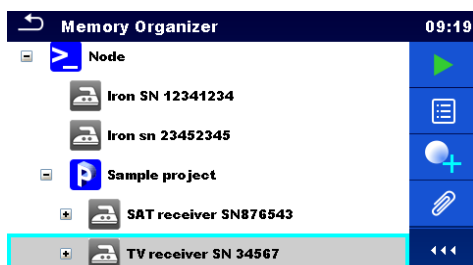
### 5.1.5.9   Cloning and Pasting sub-elements of selected structure object

When structure object is selected to be cloned, or copied & pasted, additional selection of its sub-elements is needed. The following options are available:

Options

| Include structure parameters | Parameters of selected structure object will be copied too. |
|---|---|
| Include structure attachments | Attachments of selected structure object will be copied too. |
| Include sub structures | Structure objects in sub-levels of selected structure object will be copied too. |
| Include sub measurements | Measurements in selected structure object and sub-levels will be copied too. |
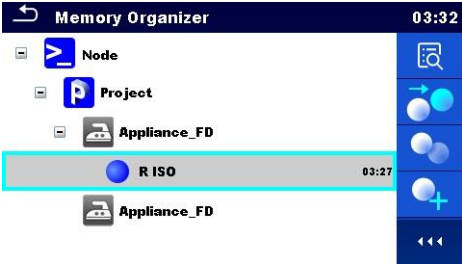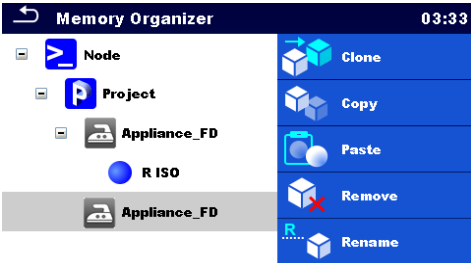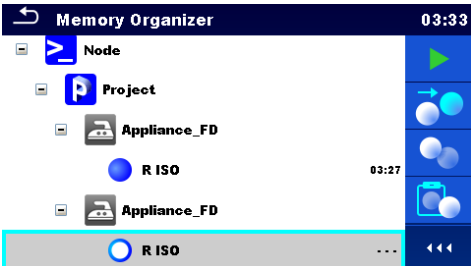
### 5.1.5.10   Copy & Paste a measurement

In this menu selected measurement can be copied to any allowed location in the structure tree.

Procedure

| | | |
|---|---|---|
| ① | | Select the structure object to be copied. |
| ② | **Copy** | Select Copy option from control panel. |
| ③ | | Select location where structure element should be copied. |
| ④ | **Paste** | Select Paste option from control panel. |
| ⑤ | | The new (empty) measurement is displayed in selected Structure object. |

### 5.1.5.11   Delete a Structure object

In this menu selected Structure object can be deleted.

Procedure

| ① |  | Select the structure object to be deleted. |
|---|---|---|
| ② |  **Delete** | Select Delete option from control panel. |
| ③ |  | A confirmation window will appear. |
| ④a |  | Selected structure object and its sub-elements are deleted. |
| ④b |  | Returns to the tree menu without changes. |

### 5.1.5.12   Delete a measurement

In this menu selected measurement can be deleted.

Procedure

| ① |  | Select a measurement to be deleted. |
|---|---|---|

| ② |  **Delete** | Select Delete option from control panel. |
|---|---|---|
| ③ |  | A confirmation window will appear. |
| ④a |  | Selected measurement is deleted. |
| ④b |  | Returns to the tree menu without changes. |

## 5.1.5.13   Rename a Structure object

In this menu selected Structure object can be renamed.

Procedure
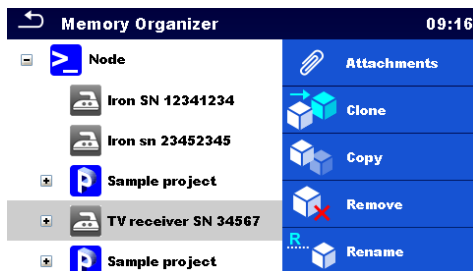
| ① |  | Select the structure object to be renamed. |
|---|---|---|
| ② |  **Rename** | Select Rename option from control panel. |
| ③ |  | Virtual keypad will appear on screen. Enter new text and confirm. |
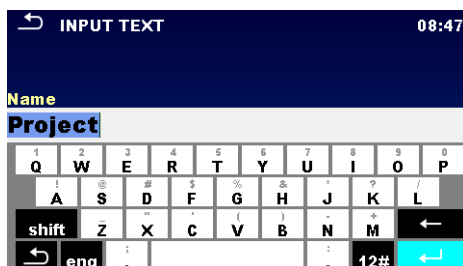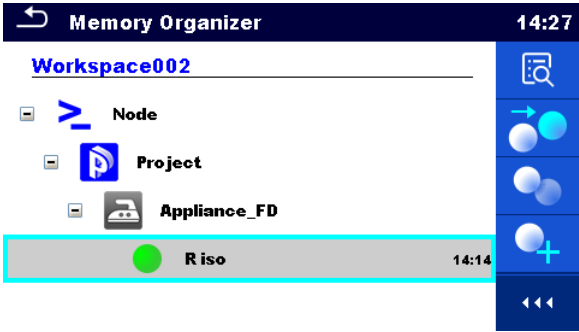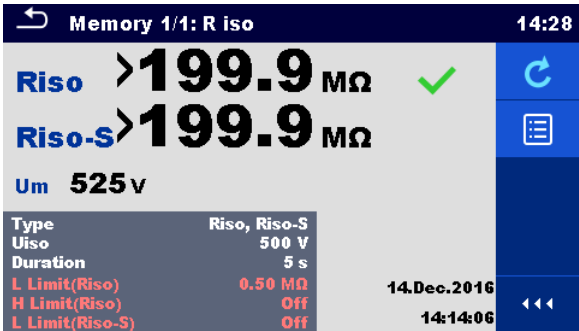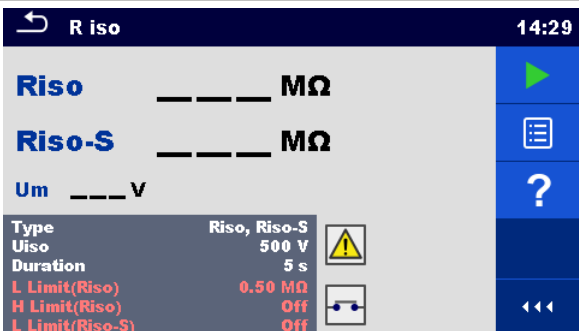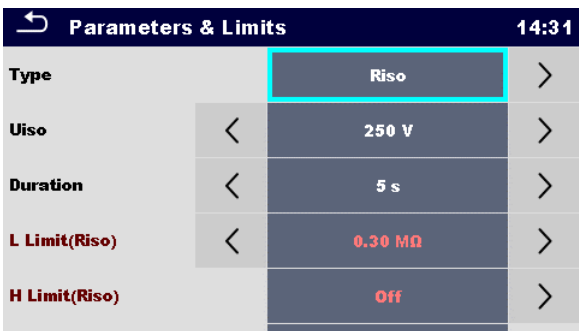
### 5.1.5.14   Recall and Retest selected measurement

Procedure

| ① | | Select the measurement to be recalled. |
|---|---|---|
| ② | | Select Recall results in Control panel. |
| ③ | | Measurement is recalled.<br>Parameters and limits can be viewed but cannot be edited. |
| ④ | | Select Retest in Control panel. |
| ⑤ | | Measurement retest starting screen is displayed. |
| ⑤a | | Parameters and limits can be viewed and edited. |
| ⑥ | | Select Run in Control panel to retest the measurement. |

| | | |
|---|---|---|
| ⑦ | [Screen: R iso 14:32, Riso >199.9 MΩ ✓, Um 263 V, Type Riso, Uiso 250 V, Duration 5 s, L Limit(Riso) 0.30 MΩ, H Limit(Riso) Off] | Results / sub-results after re-run of recalled measurement. |
| ⑧ | [Save icon] | Select Save results in Control panel. |
| | [Screen: Memory Organizer 14:33, Workspace002, Node, Project, Appliance_FD, R iso 14:14, R iso 14:32] | Retested measurement is saved under same structure object as original one. Refreshed memory structure with the new performed measurement is displayed. |
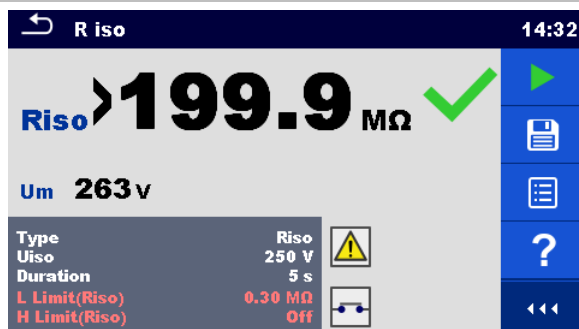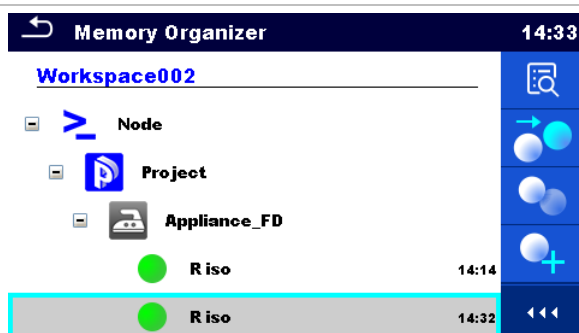
## 5.1.6    Searching in Memory Organizer

In Memory organizer it is possible to search for different structure objects and parameters.

Procedure

| | | |
|---|---|---|
| ① | [Screen: Memory Organizer 15:00, Workspace012, Node, Sample project, Living room, TV Receiver, SAT Receiver] | Search function is available from the active workspace directory line. |
| ② | [Search icon] | Select Search in control panel to open Search setup menu. |
| ③ | [Screen: Search 15:40, All, Name, Status Pass, Equipment, Equipment ID, Test date From To, Retest date From To] | The parameters that can be searched for are displayed in the Search setup menu. Name and status are referred to all structure objects. If searching by status, instrument will display all structure objects that include one or more measurements with searched status. Equipment ID, Test date, Retest date refer only to the following structure objects: Appliance, Appliance FD. |

| ③a | | The search can be narrowed by entering a text in the Name and Equipment ID fields. |
| | | Strings can be entered using the on-screen keyboard. |
| | | **Note:** |
| | | The Search function on Equipment ID is case sensitive. |

| ③b | | The search can be narrowed on base of statuses. |

| ③c | | The search can be narrowed on base of test dates / retest dates (from / to). |

| ③d | **Clear filters** | Clears all filters. Sets filters to default value. |

| ④ | **Search** | Searches through the Memory Organizer for objects according to the set filters. The results are shown in the Search results screen presented on *Figure 5.13* and *Figure 5.14.* |
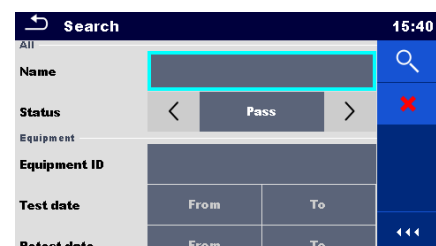
**Figure 5.13: Search results screen – Page view**

Options

| | |
|---|---|
| > | Next page. |
| < | Previous page. |

**Note:**

Search result page consist of up to 50 results.
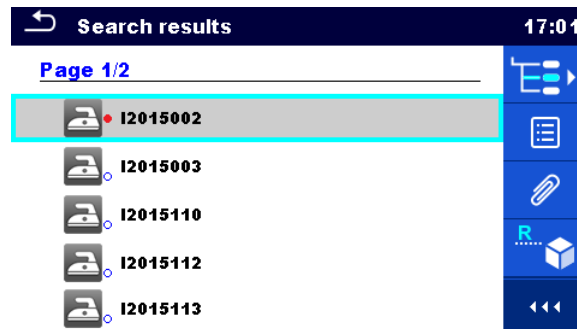


**Figure 5.14: Search results screen with structure object selected**

Options

| | |
|---|---|
| | Goes to selected location in Memory Organizer. |
| | View / edit parameters and attachments.<br>Parameters and attachments of the Structure object can be viewed or edited. Refer to *Chapter 5.1.5.3 View / Edit parameters and attachments of a Structure object* for more information. |
| | Attachments.<br>Name and link of attachment is displayed. |
| | Renames the selected Structure object.<br>Refer to *Chapter 5.1.5.13 Rename a Structure object* for more information. |

# 6   Single tests

## 6.1  Selection of single tests

Single tests can be selected in the Main single test menu or in Memory Organizer's main and submenus. In Single test main menu there are four modes for selecting single tests.

Options

|  |  |
|---|---|
|  | **All**<br><br>A single test can be selected from a list of all single tests. The single tests are always displayed in the same (default) order. |
|  | **Last used**<br><br>Last 9 made different single tests are displayed. |
|  | **Groups**<br><br>The single tests are divided into groups of similar tests. |
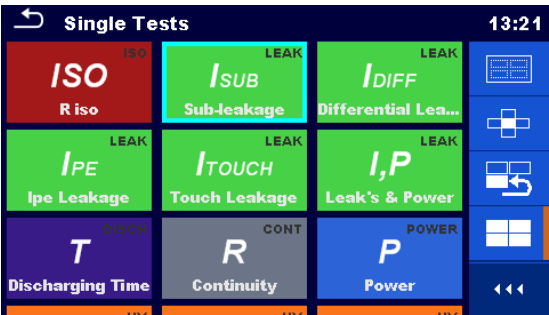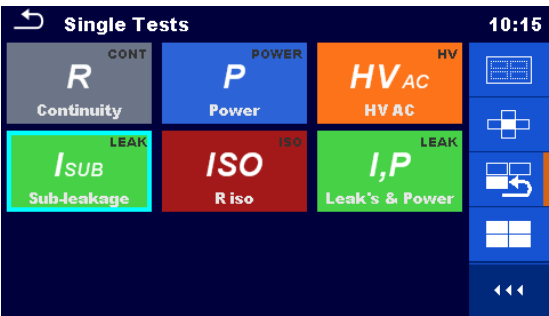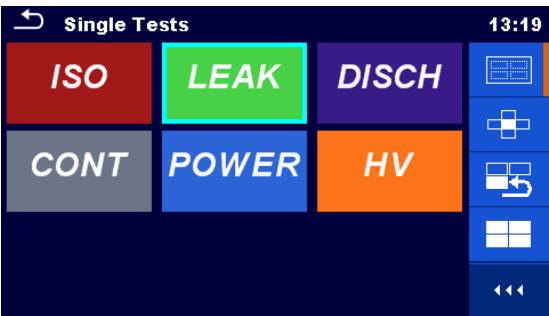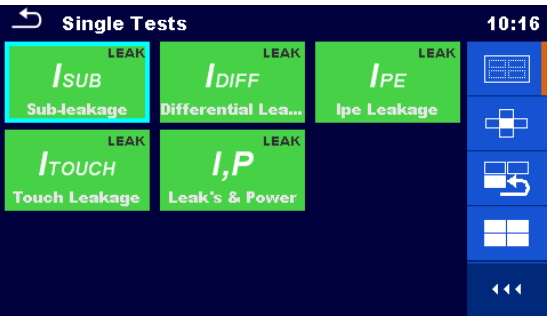
For the selected group a submenu with all single tests that belongs to the selected group is displayed.

**Cross selector**
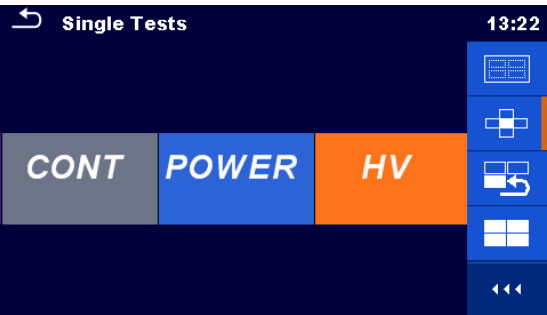
This selection mode is the fastest way for working with the keypad.
Groups of single tests are organized in a row.
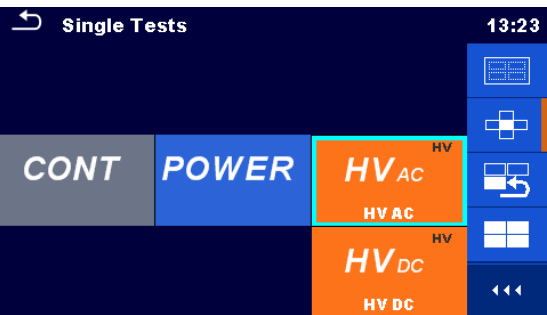
For the selected group all single tests are displayed and accessible with up/down keys.

## 6.1.1    Single test screens

In the Single test screens measuring results, sub-results, limits and parameters of the measurement are displayed. In addition on-line statuses, warnings and other information are displayed.
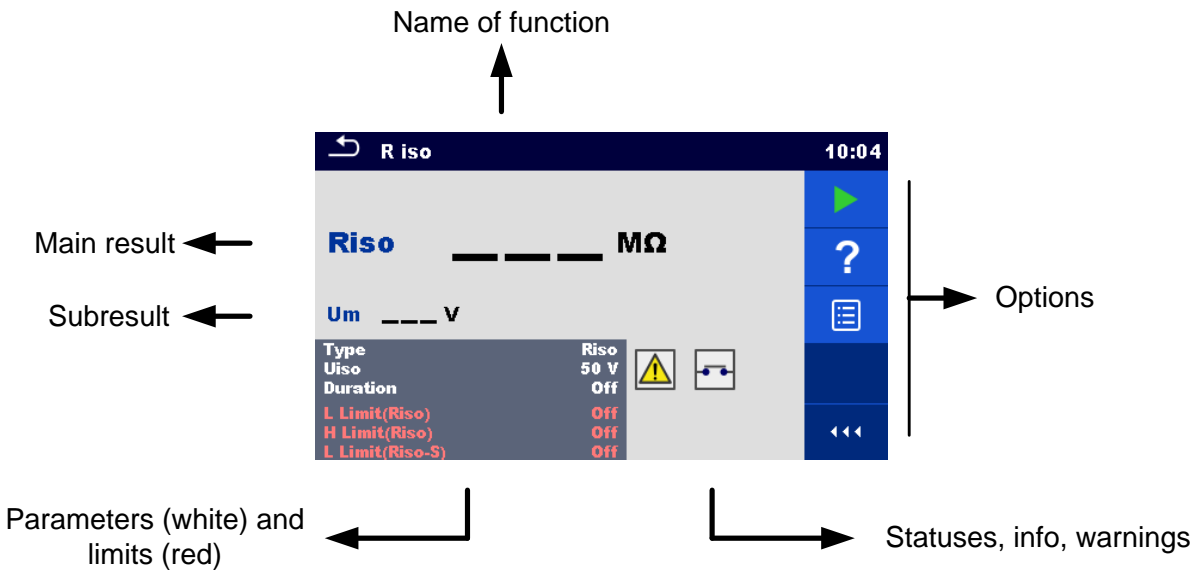


**Figure 6.1: Single test screen organisation**

## 6.1.2    Setting parameters and limits of single tests
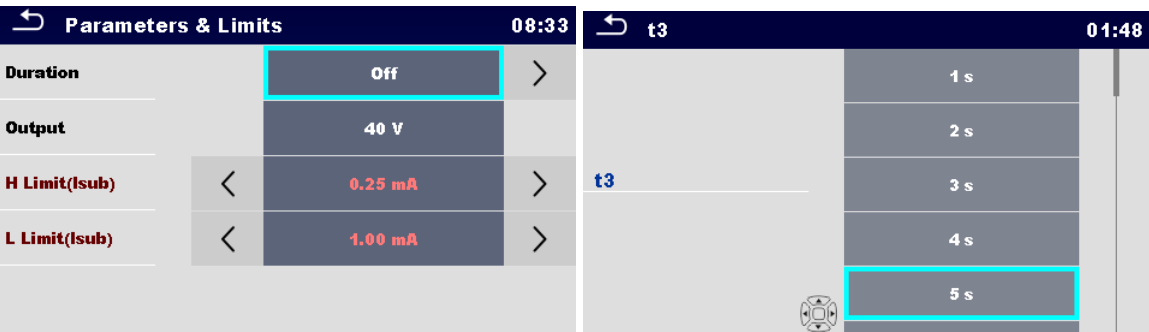


**Figure 6.2: Screens in menu for setting Single test parameters and limits**
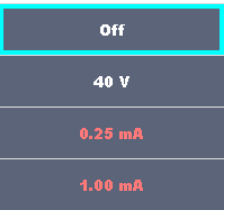
    Selects parameter (white) or limit (red).
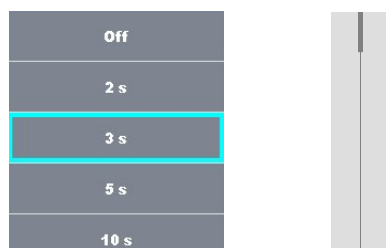
| | Selects value of parameter or limit. |
| --- | --- |
| | In case of many (multiple pages of) parameters or limits: |
| |     - The scroll bar on the right side of screen can be used |
| |     - With right / left keys it can be jumped page up / page down |
| | Some of limits can be user defined. |
| | Selects Custom and tap on it. |
| | Numeric keyboard with metric prefixes will open. |
| | Enters custom limit value and confirm ⏎ entry. |
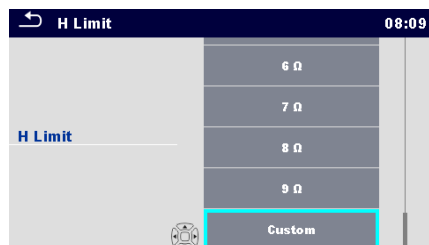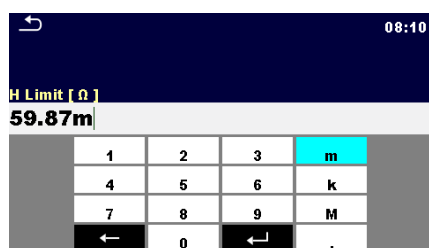
## 6.1.3    Single test start screen
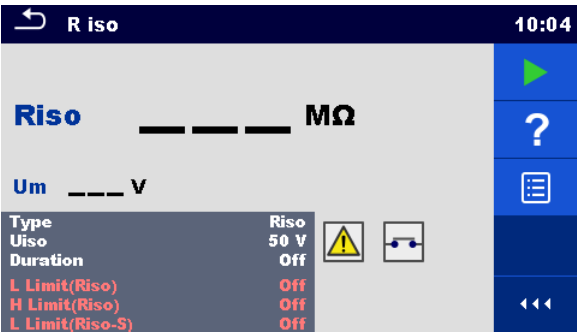


**Figure 6.3: Single test start screen**

Options (before test, screen was opened in Memory organizer or from Single test main menu)

| | |
|---|---|
|  | Starts the measurement. |
|  | Opens help screens. Refer to chapter *6.1.7 Help screens* for more information. |
|  | Opens menu for changing parameters and limits. Refer to chapter *6.1.2 Setting parameters and limits of single tests* for more information. |
|  | Enters cross selector. Refer to chapter *6.1 Selection of single tests* for more information. |
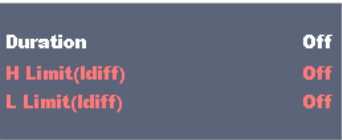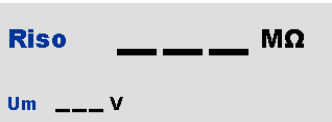
## 6.1.4 Single test screen during test
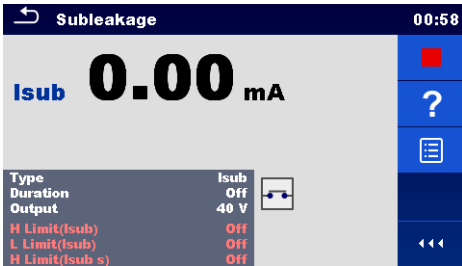


**Figure 6.4: Single test screen (during measurement)**

Options (during test)

| | |
|---|---|
| ■ | Stops the single test measurement. |
| ▶▶ | Proceeds to the next step of the measurement (if measurement consists of more steps). |
| ↰ | Aborts measurements. |

## 6.1.5 Single test result screen
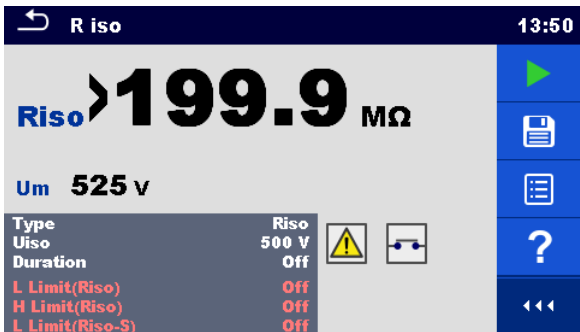


**Figure 6.5: Single test result screen**

Options (after measurement is finished)

| | |
|---|---|
| ▶ | Starts a new measurement. |

| | |
|---|---|
| 💾 | Saves the result.<br><br>A new measurement was selected and started from a Structure object in the structure tree:<br><br>  - The measurement will be saved under the selected Structure object.<br><br>A new measurement was started from the Single test main menu:<br><br>  - Saving under the last selected Structure object will be offered by default. The user can select another Structure object or create a new Structure object. By pressing the 💾 key in Memory organizer menu the measurement is saved under selected location.<br><br>An empty measurement was selected in structure tree and started:<br><br>  - The result(s) will be added to the measurement. The measurement will change its status from 'empty' to 'finished'.<br><br>An already carried out measurement was selected in structure tree, viewed and then restarted:<br><br>  - A new measurement will be saved under the selected Structure object. |
| ❓ | Opens help screens. Refer to chapter *6.1.7 Help screens* for more information. |
| ▤<br><br>👆 on | Opens screen for changing parameters and limits.<br><br>Refer to chapter *6.1.2 Setting parameters and limits of single tests* for more information. |

On the icon area for the parameters screen:

| Duration | Off |
|---|---|
| H Limit(Idiff) | Off |
| L Limit(Idiff) | Off |

| | |
|---|---|
| ▲◄►▼<br><br>👆 **long** on<br><br>Riso $>$**199.9** MΩ<br>Um **525** V | Enters cross selector. Refer to chapter *6.1 Selection of single tests* for more information. |

## 6.1.6    Single test memory screen
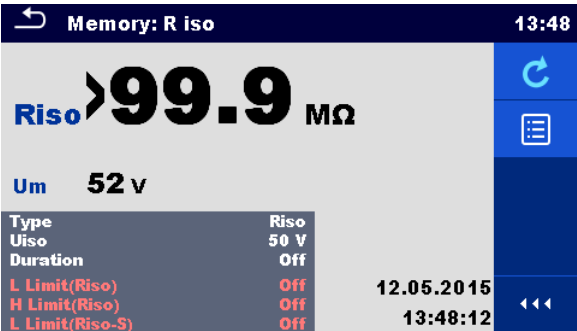


**Figure 6.6: Single test memory screen**

Options

| | | |
|---|---|---|
|  | | **Retest**<br>Enters screen with "empty" measurement. |
|  | | Opens menu for viewing parameters and limits.<br>Refer to chapter *6.1.2 Setting parameters and limits of single tests* for more information. |
|  on  | | |

## 6.1.7    Help screens

Help screens contain diagrams for proper connection of the instrument.
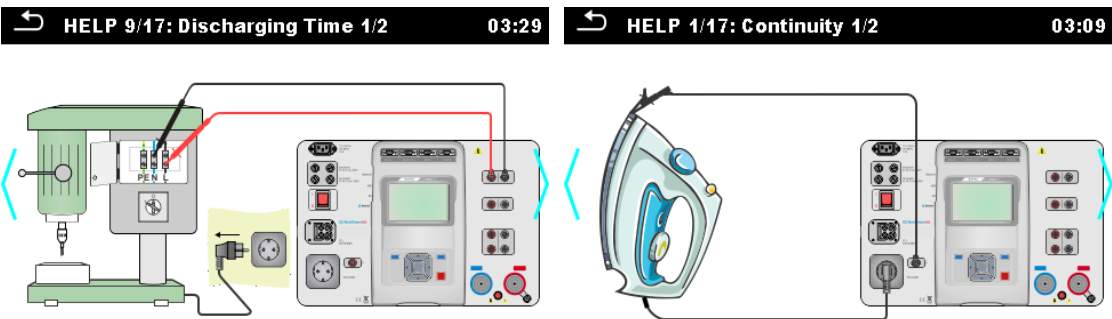


**Figure 6.7: Examples of help screens**

Options
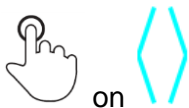
| | | |
|---|---|---|
|  on  | | Goes to previous / next help screen. |

# 6.2 Single test measurements

## 6.2.1 Continuity
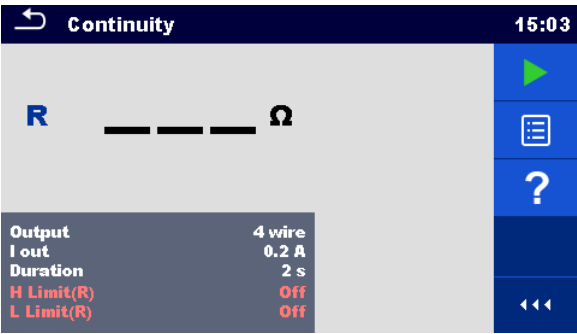


**Figure 6.8: Continuity test menu**

**Test results / sub-results**

R...............Resistance
ΔU………..Voltage drop scaled to 10 A

**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] |
| ΔU test* | Enables ΔU test [On, Off] |
| Wire section* | Wire section for ΔU test [0.5 mm$^2$…$\geq$ 6mm$^2$] |

**Test limits**

| H Limit (R) | H limit [Off, 0.01 Ω ... 9 Ω, Custom ] |
|---|---|
| L Limit (R) | L limit  [Off, 0.01 Ω ... 9 Ω, Custom ] |
| H Limit (ΔU)* | H limit [1.0 V … 5.0 V ] |

* Applicable only at test current 10 A.

**Test circuit**
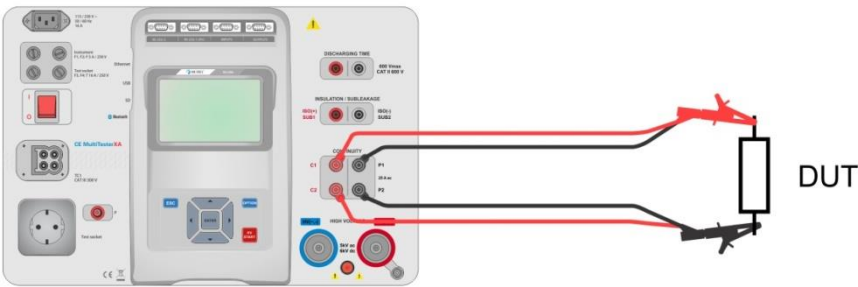


**Figure 6.9: Measurement of continuity 4-wire**
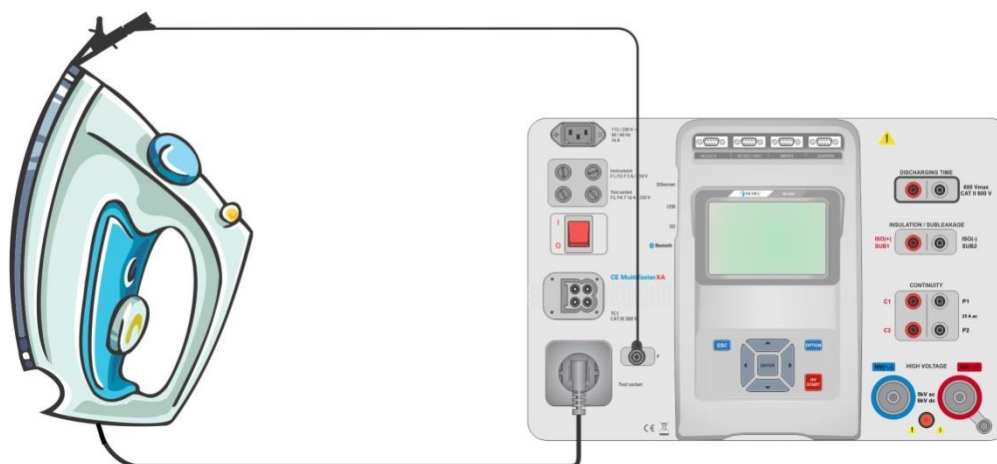
**Figure 6.10: Measurement of Continuity P/S - PE**

**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).
‣ Compensate test leads resistance (optional).
‣ Connect test leads to device under test.
‣ Start measurement.
‣ Measurement can be stopped manually or by timer.
‣ Save results (optional).
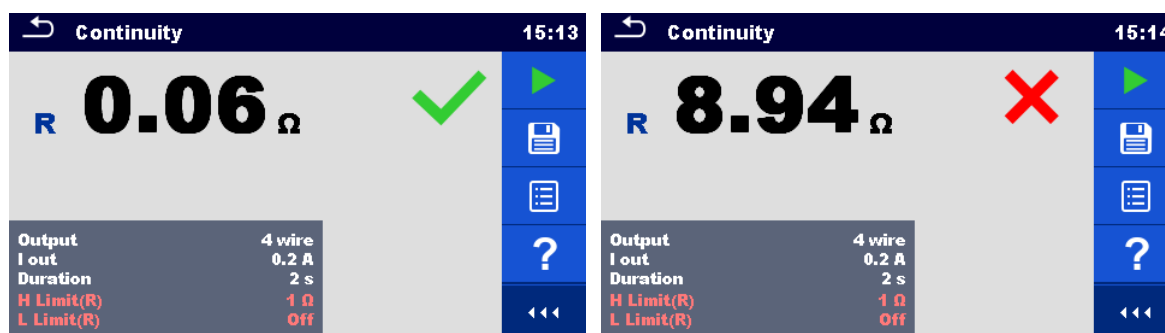


**Figure 6.11: Examples of Continuity measurement results**

### 6.2.1.1    Compensation of test leads resistance

This chapter describes how to compensate the test leads resistance in **Continuity (Output = P/S – PE)** function. Compensation can be carried out to eliminate the influence of test leads resistance and the internal resistances of the instrument on the measured resistance.

**Connection for compensating the resistance of test leads**
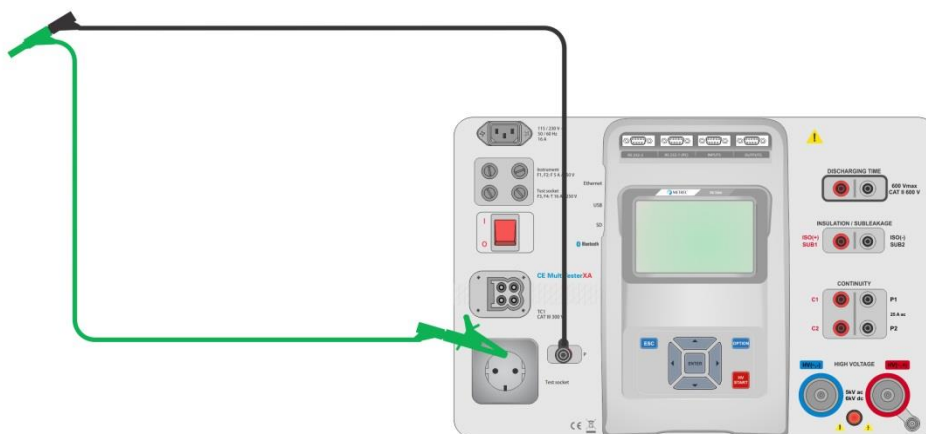
**Figure 6.12: Shorted test leads**

**Compensation of test leads resistance procedure**

‣   Select the **Continuity** function. Parameter Output must be set to P/S - PE.
‣   Connect test leads to the instrument and short the test leads together, see *Figure 6.12*.
‣   Touch the [icon] key to compensate leads resistance.
‣   Symbol [CAL✓] is displayed if the compensation was carried out successfully.
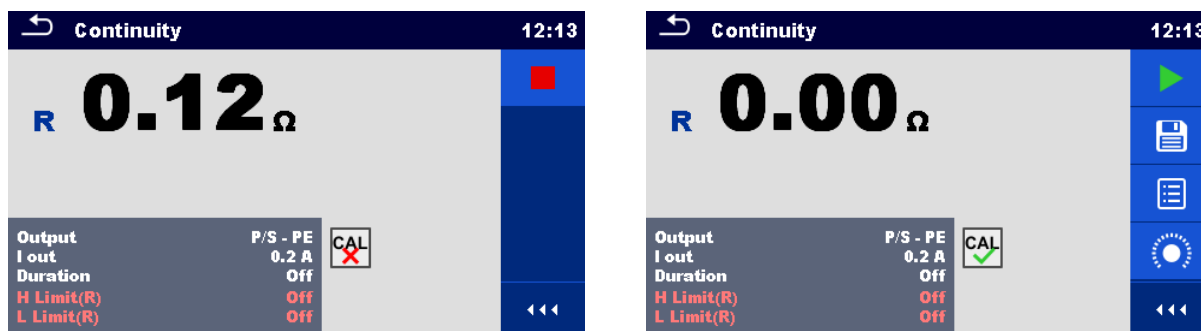


**Figure 6.13: Uncompensated and compensated result**

**Note:**
The compensation of test leads is carried out with set test current (I out).

## 6.2.2   HV AC

⚠ **IMPORTANT SAFETY NOTE**

Refer to chapter *1.1 Warnings and notes* for more information regarding safe use of the instrument.
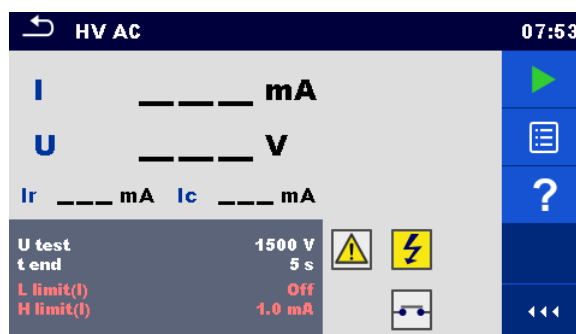
**Figure 6.14: HV AC test menu**

### 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
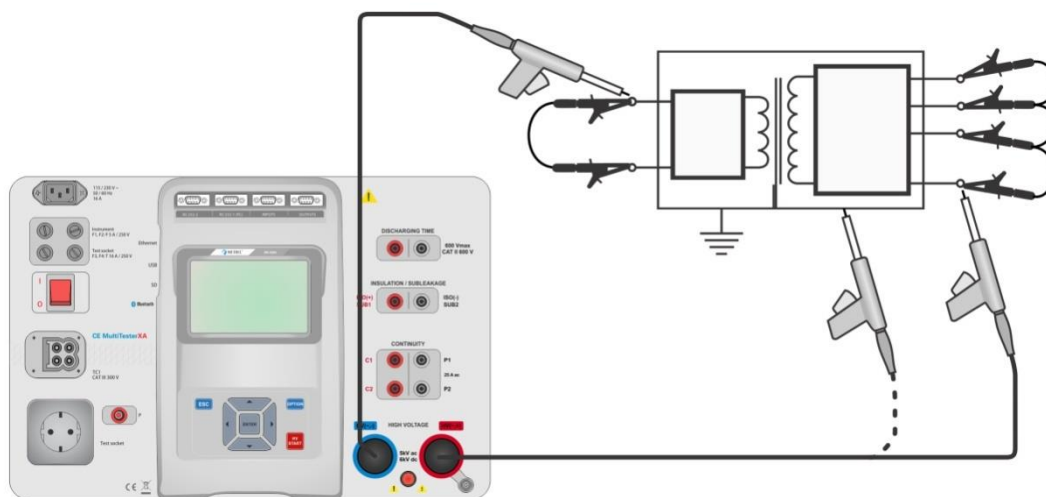


**Figure 6.15: HV AC measurement**

### 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).
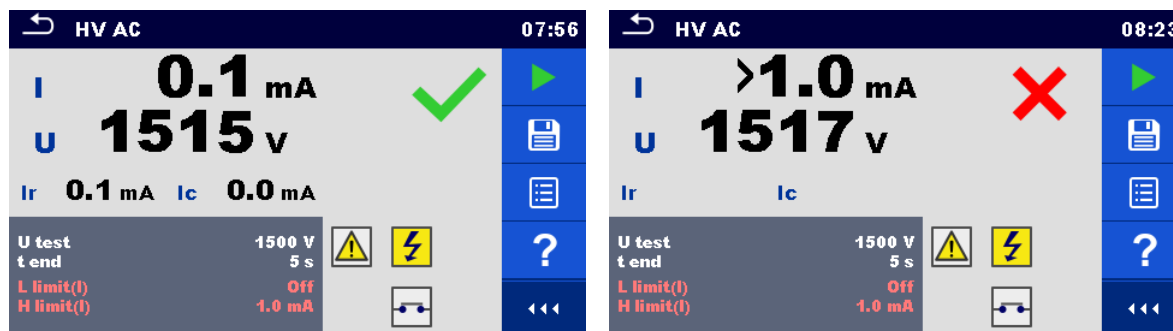


**Figure 6.16: Examples of HV AC meaasurement results**

**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. Refer to chapter *4.6.7 Change password for HV functions* for more information.

## 6.2.3    HV DC

⚠ **IMPORTANT SAFETY NOTE**

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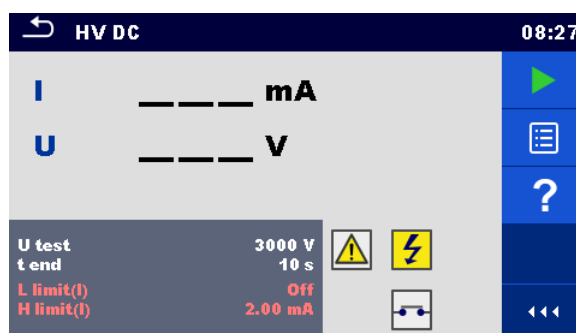


**Figure 6.17: HV DC test menu**

**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**
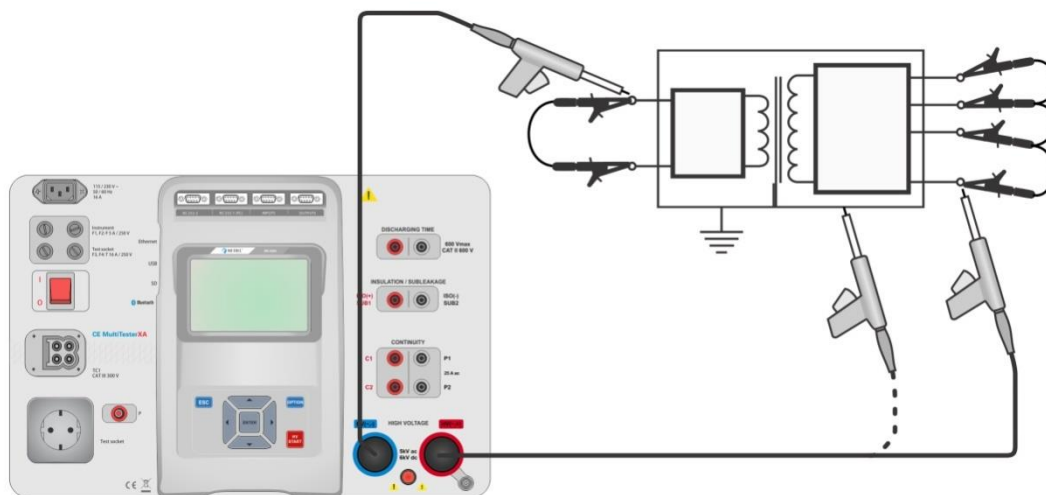


**Figure 6.18: HV DC measurement**

**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).
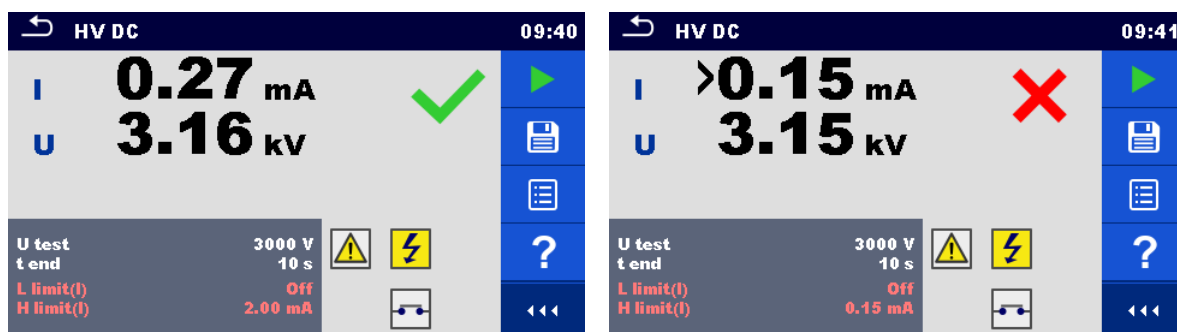


**Figure 6.19: Examples of HV DC measurement results**

**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. Refer to chapter *4.6.7 Change password for HV functions* for more information.

## 6.2.4    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 6.20.*
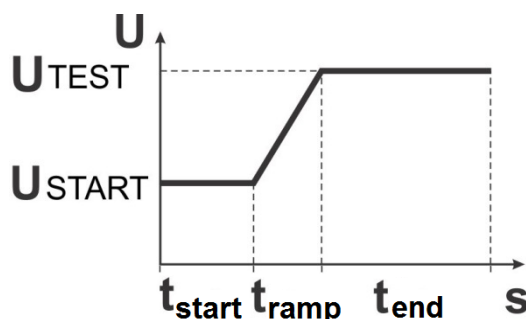


**Figure 6.20: Voltage / time diagram of the HV AC programmable test**
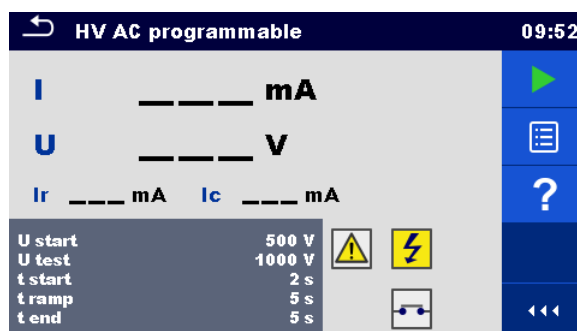


**Figure 6.21: HV AC programmable test menu**

**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**
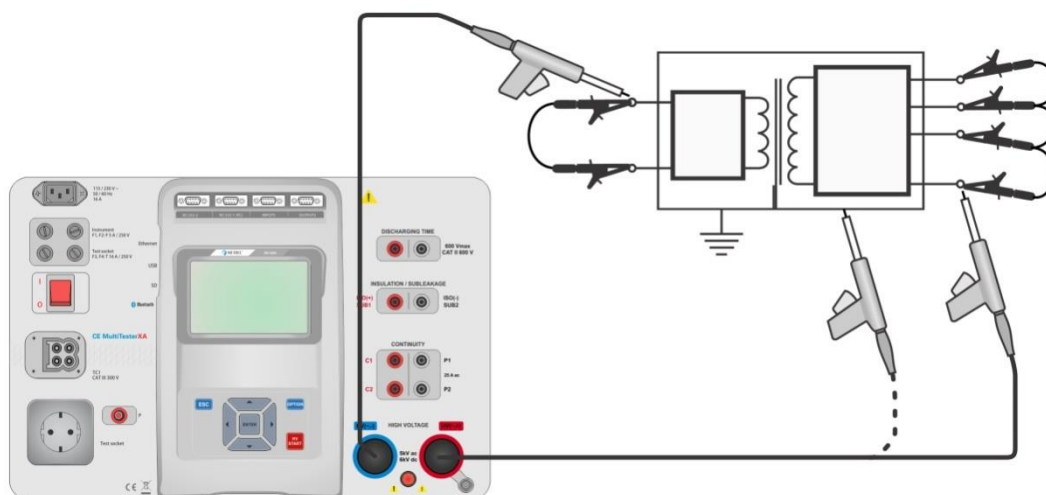


**Figure 6.22: HV AC programmable test**

**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).
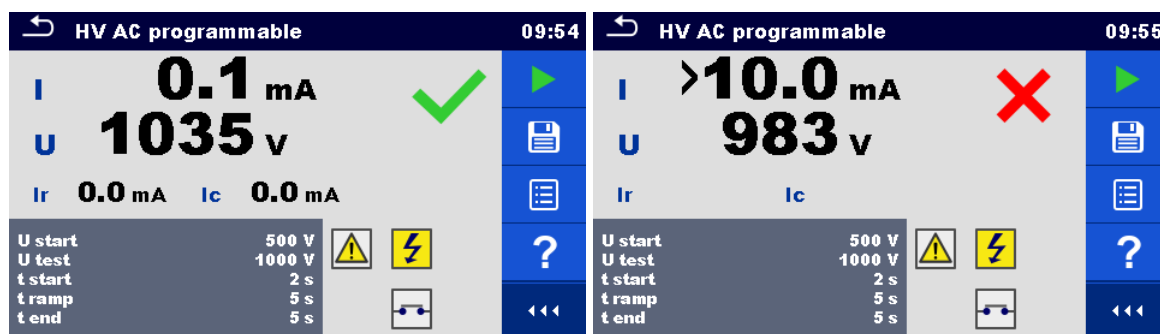


**Figure 6.23: Examples of HV AC programmable test results**

**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. Refer to chapter *4.6.7 Change password for HV functions* for more information.

## 6.2.5    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 6.24*.
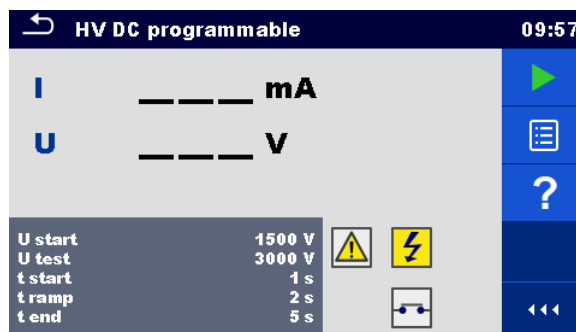
**Figure 6.24: HV DC programmable test menu**

**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**
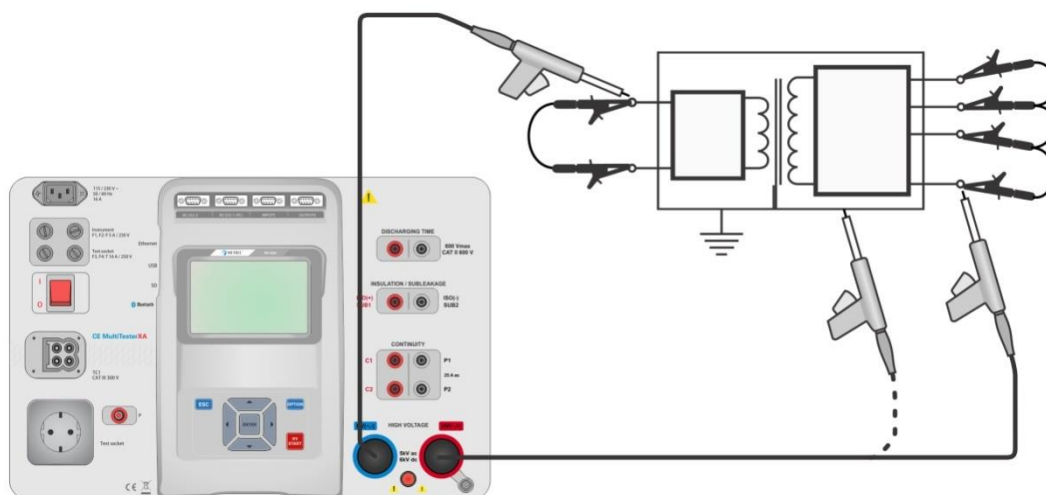


**Figure 6.25: HV DC programmable test**

**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).
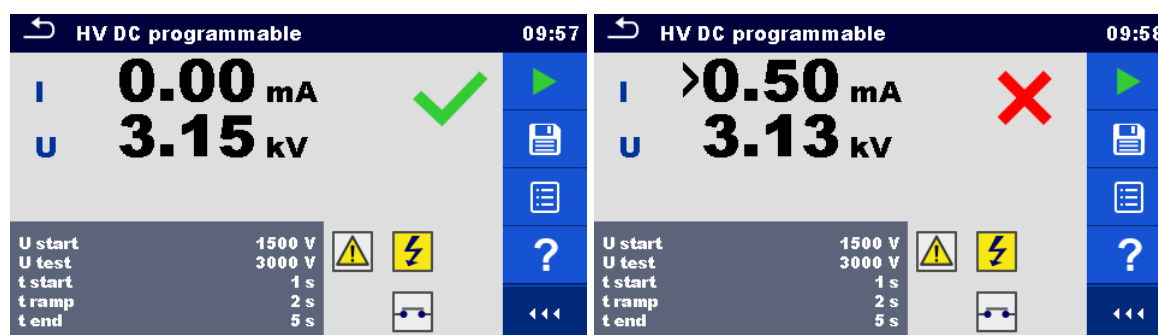


**Figure 6.26: Examples of HV DC programmable test results**

**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. Refer to chapter *4.6.7 Change password for HV functions* for more information.

## 6.2.6    Insulation resistance (Riso, Riso-S)
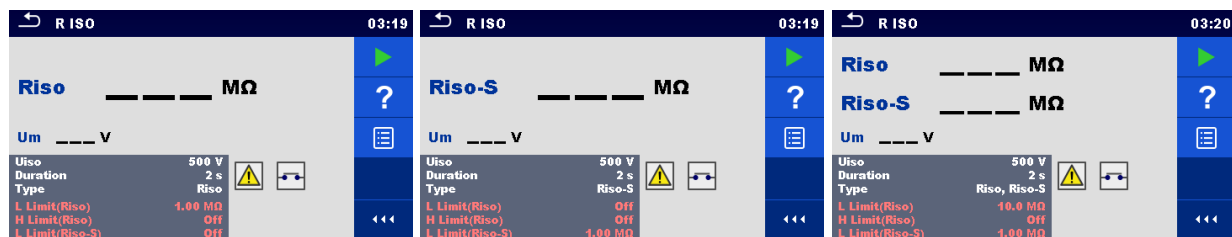


**Figure 6.27: Insulation resistance test menus**

### 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
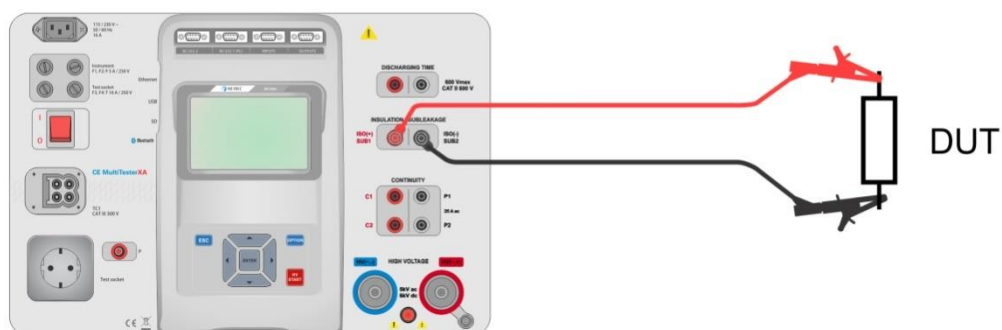


**Figure 6.28: Measurement of insulation resistance (ISO(+), ISO(-))**
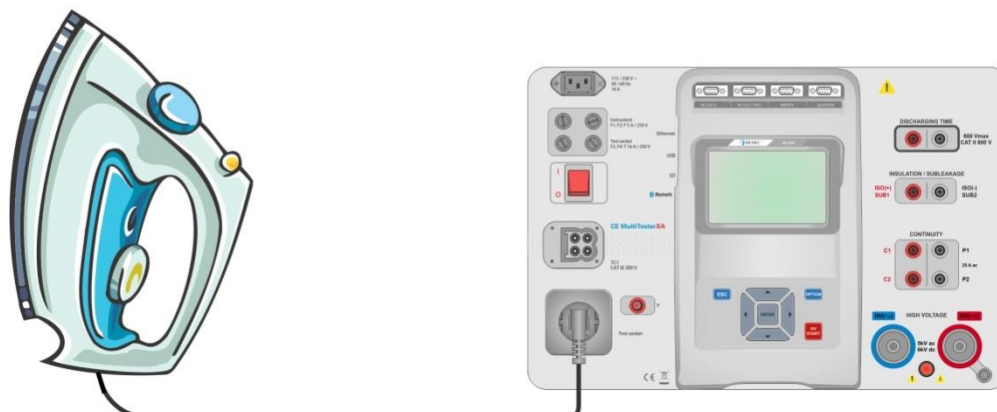
**Figure 6.29: Measurement of insulation resistance (Socket LN - PE)**
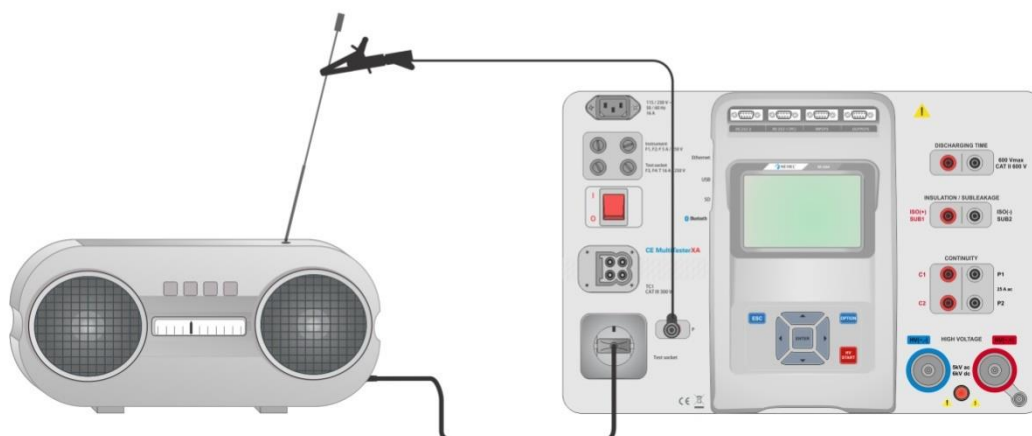


**Figure 6.30: Measurement of Riso, Riso-S (socket)**

### 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).
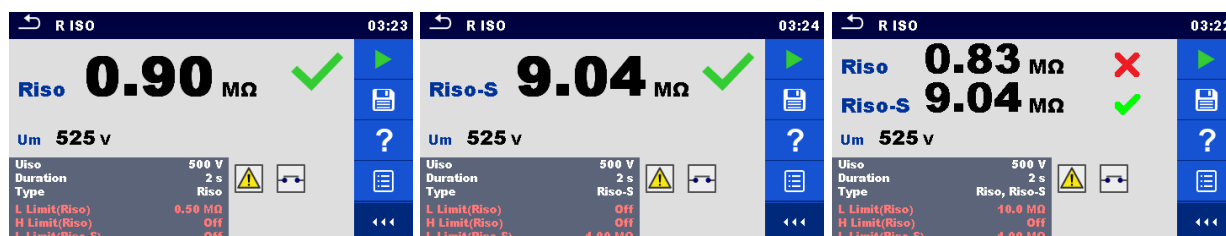
**Figure 6.31: Examples of Insulation resistance measurement results**

**Note:**

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

## 6.2.7     Sub-leakage (Isub, Isub-S)
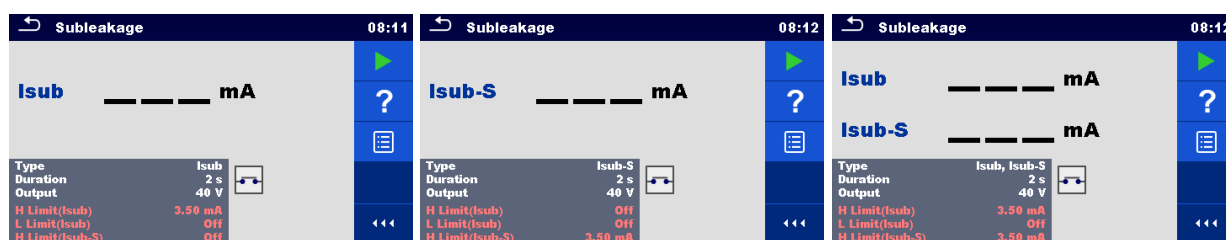


**Figure 6.32: Sub Leakage test menus**

**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, Custom ] |
|---|---|
| L Limit (Isub) | L limit [Off, 0.25 mA ... 15.0 mA, Custom ] |
| 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**
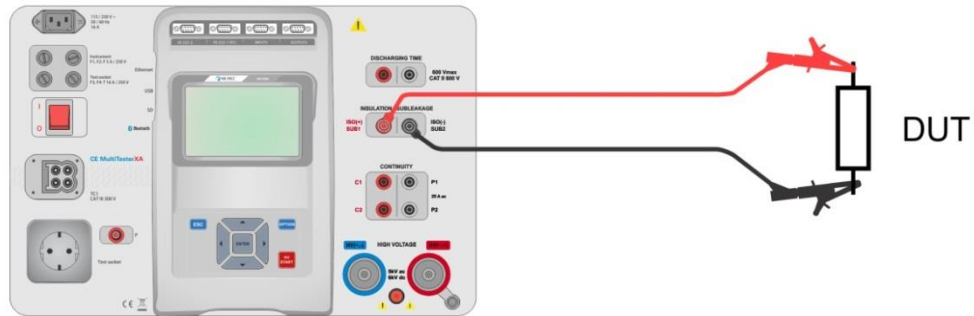


**Figure 6.33: Measurement of Sub-leakage (SUB1, SUB2)**
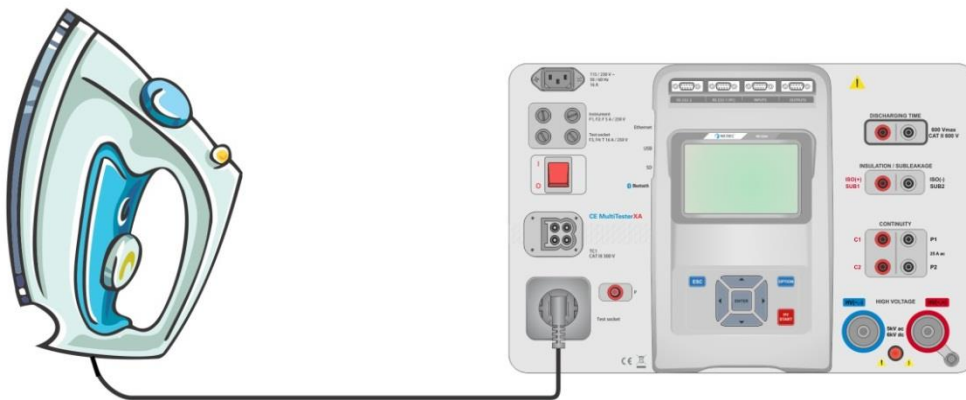


**Figure 6.34: Measurement of Sub-leakage (socket LN-PE)**
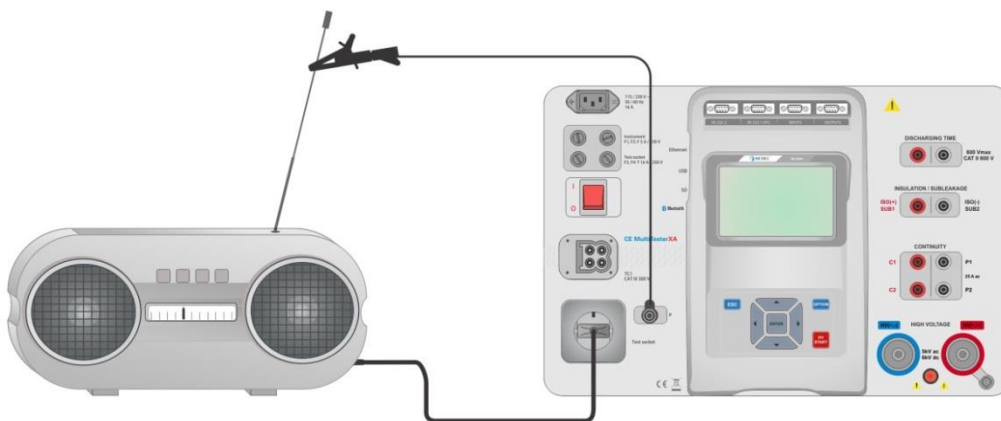


**Figure 6.35: Measurement of Sub-leakage, Sub-leakage-S (socket)**

**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).
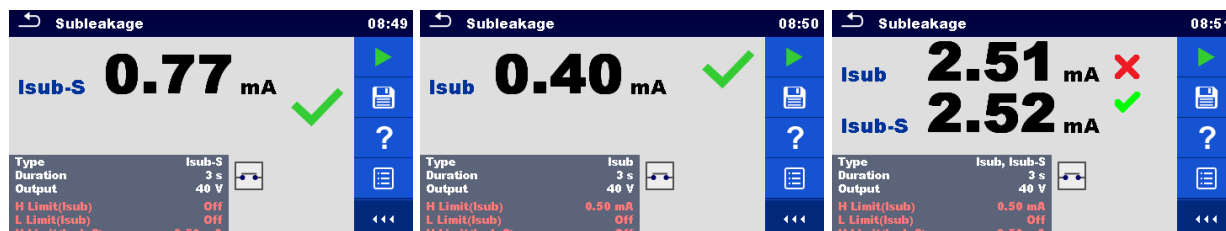
**Figure 6.36: Examples of Sub-leakage measurement results**

**Note:**

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

## 6.2.8    Differential Leakage
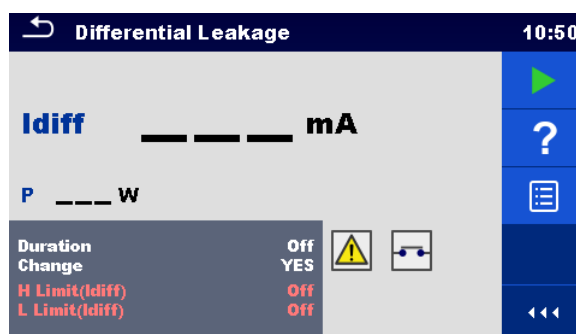
**Figure 6.37: Differential Leakage test menu**

**Test results / sub-results**

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

**Test parameters**

| Duration | Duration [Off,  2 s ... 180 s] |
|---|---|
| Change status | Change [YES, NO]<br>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, Custom ] |
|---|---|
| L Limit (Idiff) | L limit  [Off, 0.25 mA ... 15.0 mA, Custom ] |
| Output connections | [Socket L,N – PE,P/S ] |

**Test circuit**
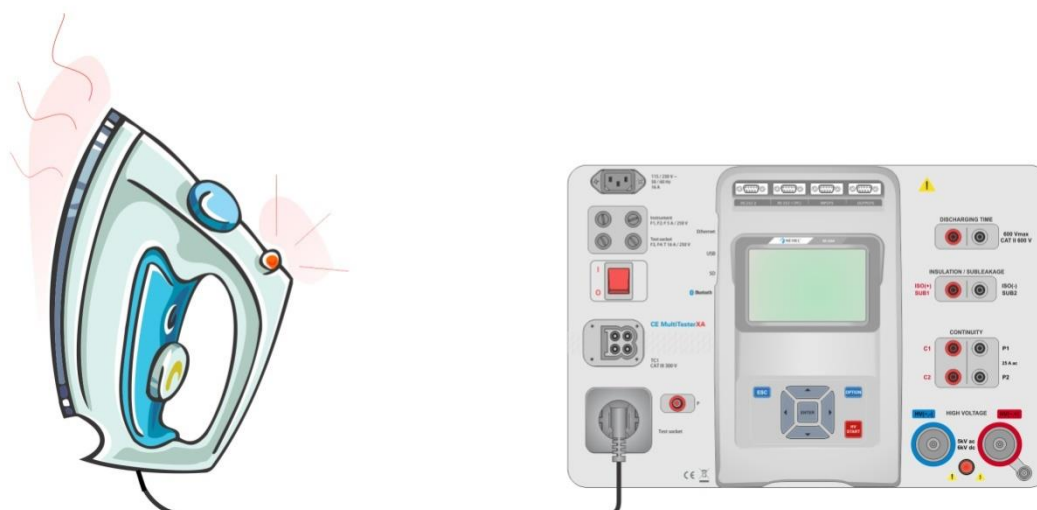


**Figure 6.38: Measurement of Differential Leakage current**

**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).
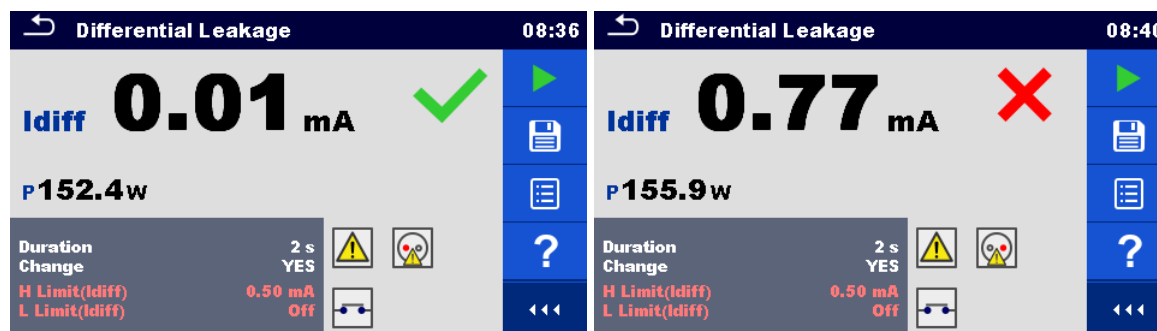


**Figure 6.39: Examples of Differential Leakage measurement results**

## 6.2.9 Ipe Leakage
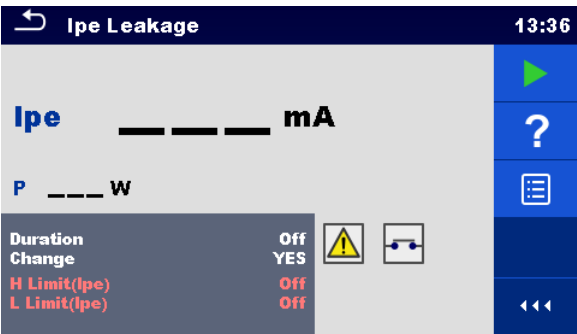


**Figure 6.40: Ipe Leakage test menu**

**Test results / sub-results**

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

**Test parameters**

| Duration | Duration [Off,  2 s ... 180 s] |
|---|---|
| Change status | Change [YES, NO]<br>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.<br>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, Custom ] |
|---|---|
| L Limit (Ipe) | L limit  [Off, 0.25 mA ... 15.0 mA, Custom ] |

**Test circuit**
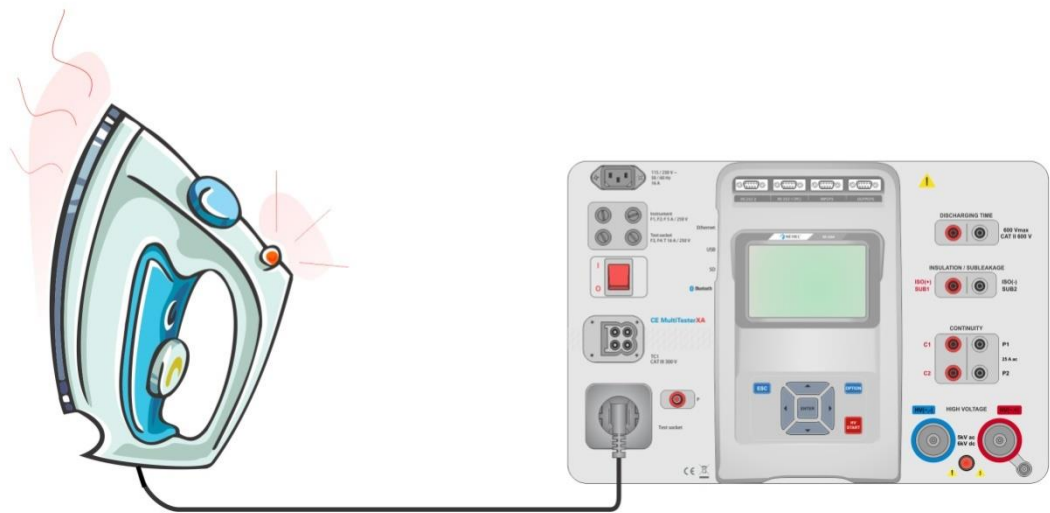


**Figure 6.41: Measurement of Ipe Leakage current**

**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).
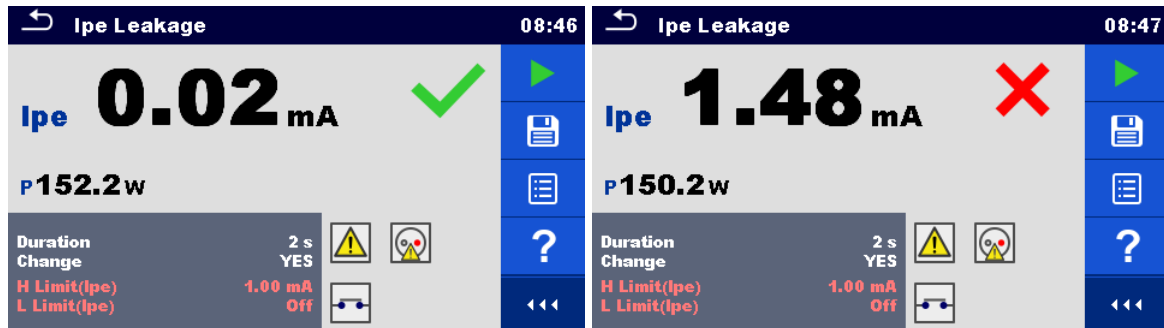


**Figure 6.42: Examples of Ipe Leakage measurement results**

## 6.2.10   Touch Leakage
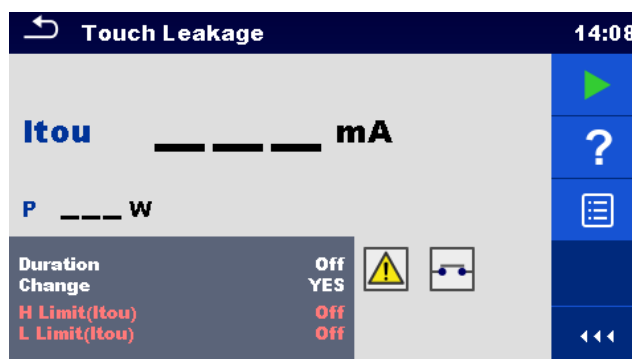


**Figure 6.43: Touch Leakage test menu**

**Test results / sub-results**

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

**Test parameters**

| Duration | Duration [Off,  2 s ... 180 s] |
|---|---|
| Change status | Change [YES, NO]<br>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.<br>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**
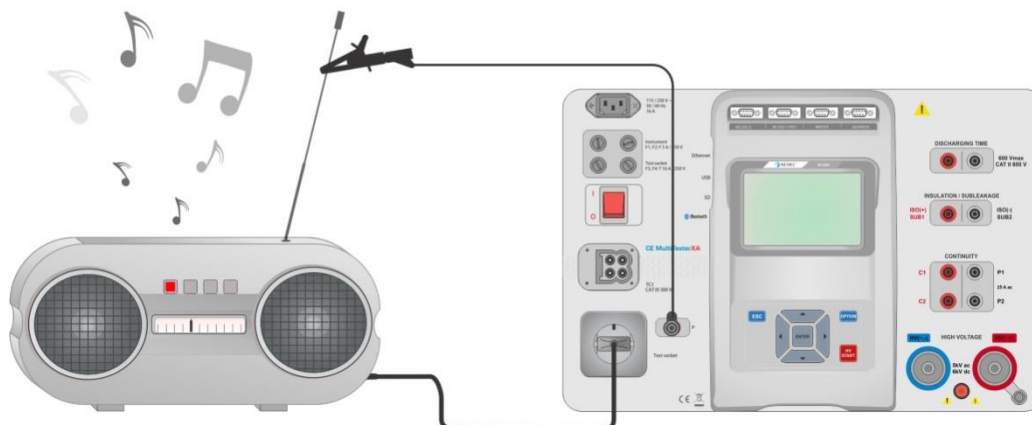


**Figure 6.44: Measurement of Touch Leakage current**

**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).
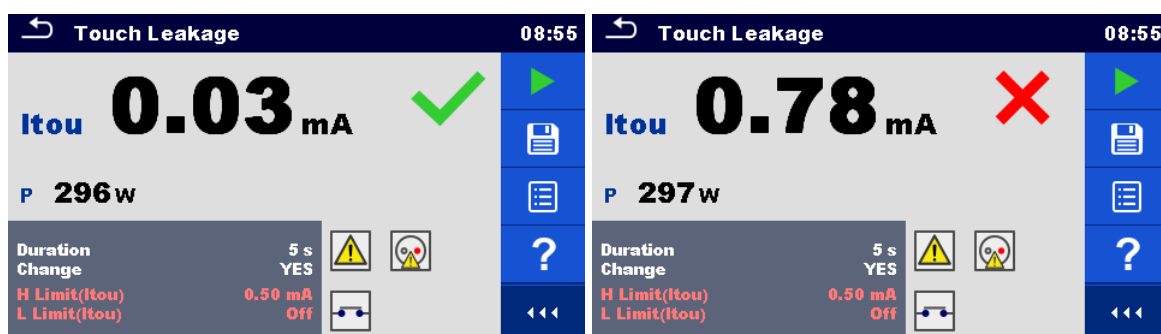


**Figure 6.45: Examples of Touch Leakage measurement results**

## 6.2.11   Power
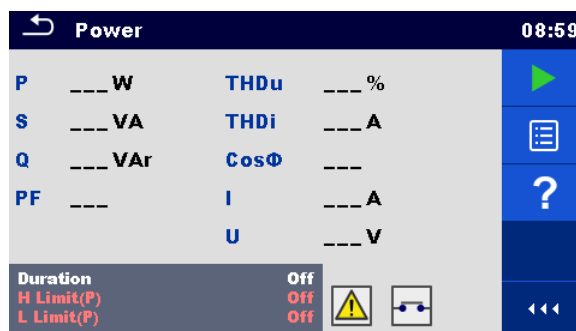


**Figure 6.46: Power measurement menu**

**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, Custom ] |
|---|---|
| L Limit (P) | L limit  [Off, 10 W ... 3.50 kW, Custom ] |

**Test circuit**
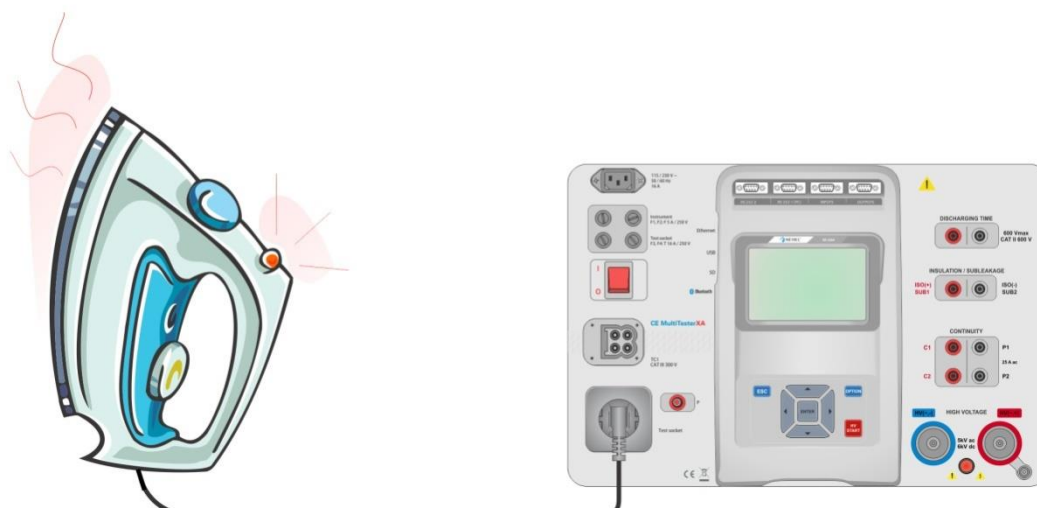


**Figure 6.47: Measurement of Power**

**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).
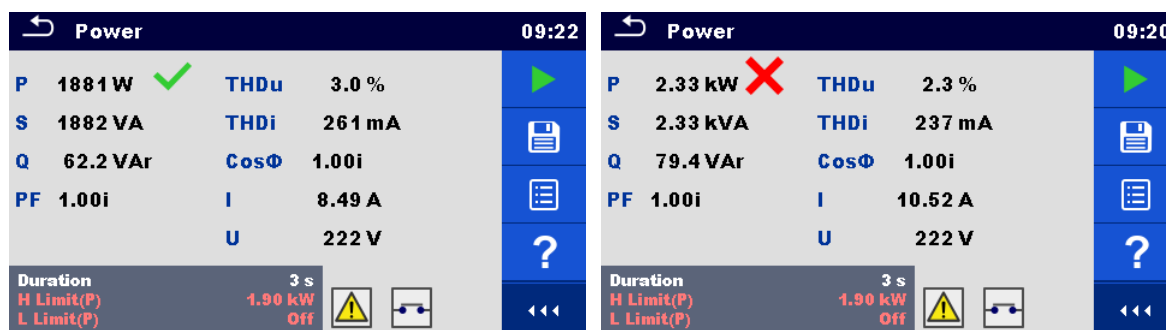


**Figure 6.48: Examples of Power measurement results**

## 6.2.12   Leak's & Power
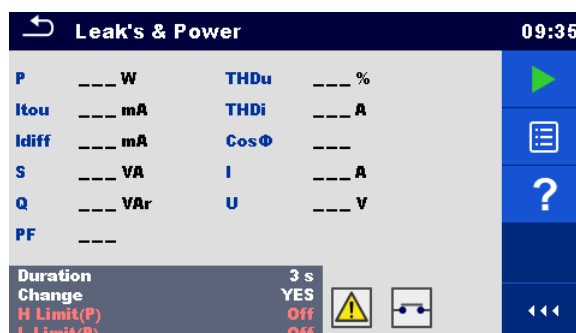


**Figure 6.49: Leak's & Power measurement menu**

**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.<br>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, Custom ] |
|---|---|
| L Limit (P) | L limit [Off, 10 W ... 3.50 kW, Custom ] |
| H Limit (Idiff) | H limit [Off, 0.25 mA ... 15.0 mA, Custom ] |
| L Limit (Idiff) | L limit [Off, 0.25 mA ... 15.0 mA, Custom ] |
| 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**
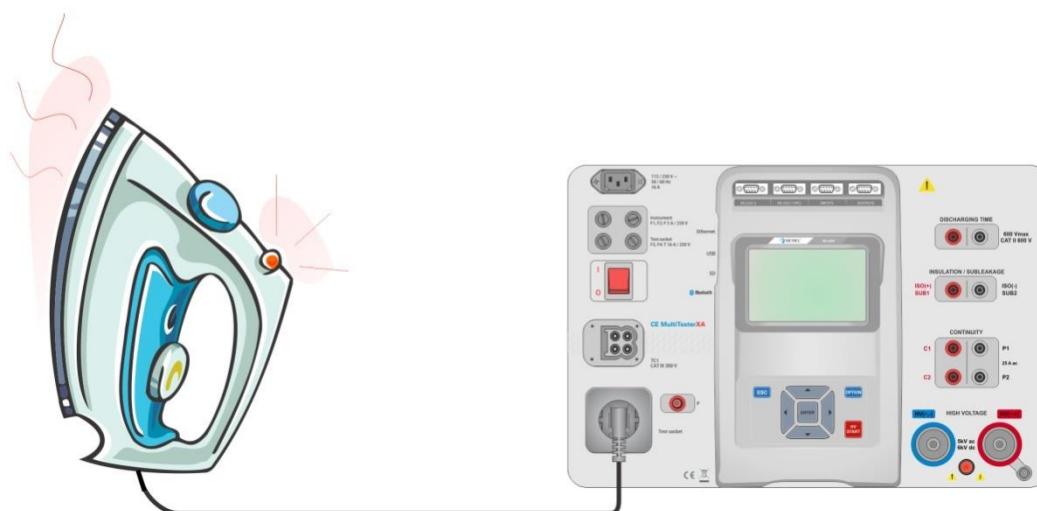


**Figure 6.50: Measurement of Leak's and Power**

**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).
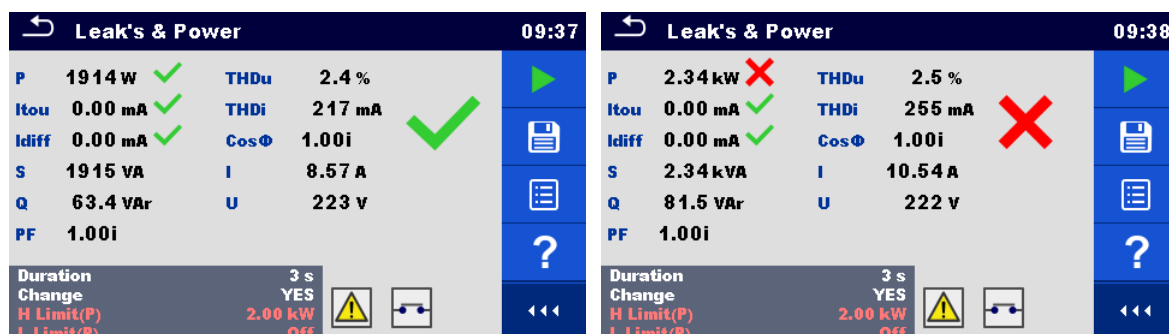
**Figure 6.51: Examples of Leak's & Power measurement results**

## 6.2.13   Discharging Time
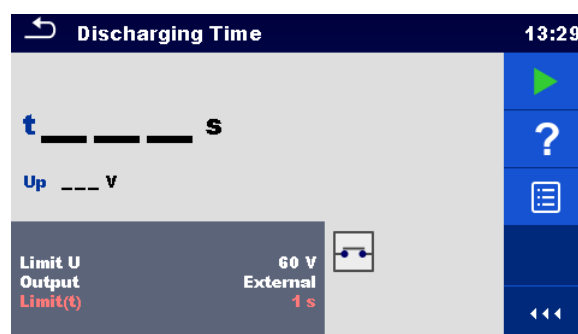


**Figure 6.52: Discharging Time test menu**

**Test results / sub-results**

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

**Test parameters**

| | |
|---|---|
| Limit voltage | Limit U [34 V, 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 10 V 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
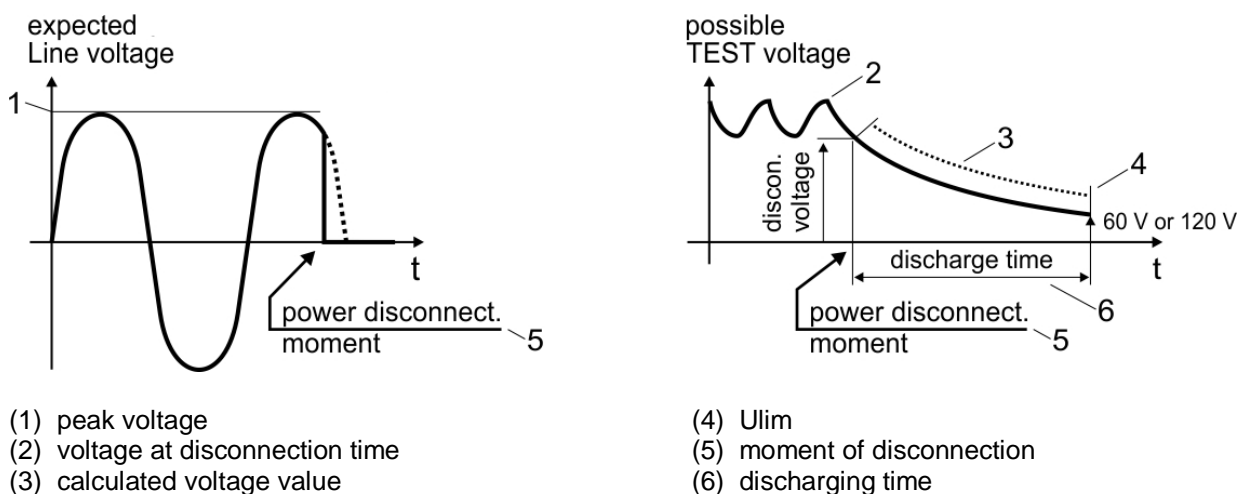
**Figure 6.53: Measuring principle (external)**

**Test circuit (Output = External)**
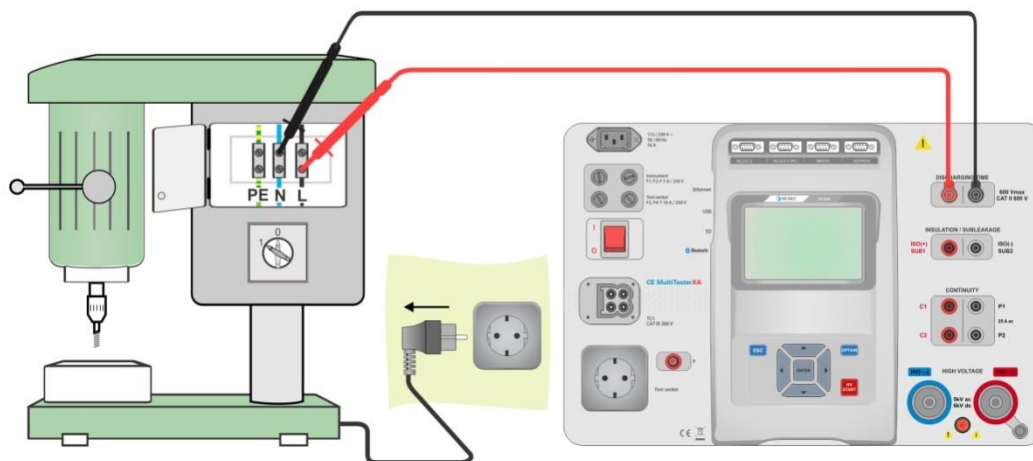


**Figure 6.54: Discharging Time test (Output = External)**

**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 6.55: 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)
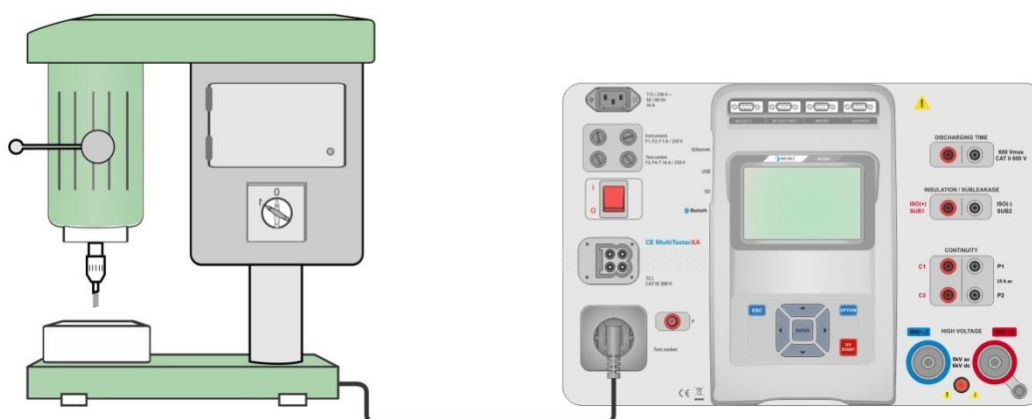


**Figure 6.56: Discharging Time test (Output = Socket)**

**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 6.57: Examples of Discharging Time measurement results (Output = Socket)**

# 7    Auto Sequences®

Preprogrammed sequences of measurements can be carried out in Auto Sequences® menu. The sequence of measurements, their parameters and flow of the sequence can be programmed. The results of an Auto Sequence® can be stored in the memory together with all related information.

Auto Sequences® can be pre-programmed on PC with the Metrel ES Manager software and uploaded to the instrument. On the instrument parameters and limits of individual single test in the Auto Sequence® can be changed / set.

## 7.1  Selection of Auto Sequences®

Required Auto Sequence® group from Auto Sequence® groups menu should be selected first. Refer to Chapter *4.9 Auto Sequence® groups* for more details.
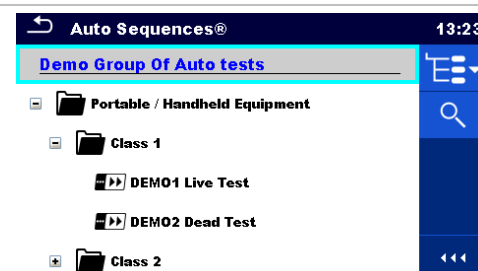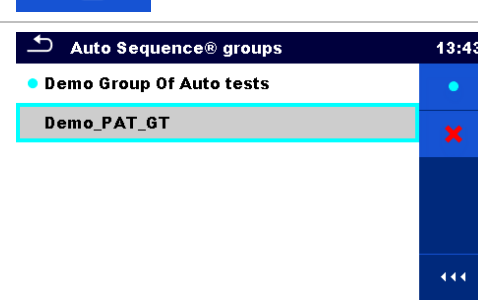
Auto Sequence® to be carried out can then be selected from the Main Auto Sequences® menu, which can be organized in structural manner with folders and sub-folders containing Auto Sequences®.

Searching by name or short code is also possible within the active Auto Sequence® group. Refer to Chapter *7.1.2 Searching in Auto Sequences® menu* for details.

### 7.1.1    Selecting an active Auto Sequence® group in Auto Sequences® menu

Auto Sequences® and Auto Sequence® group menus are interconnected so an active Auto Sequence® group can be also selected in the Auto Sequences® menu.

Procedure

| | | |
|---|---|---|
| ① |  | Select Auto Sequence® group header in Auto Sequences® menu by taping on it. |
| ② |  | Selects the Auto Seq. groups icon from Control panel. Auto Sequence® groups menu appear on the screen. |
| ③ |  | Selects desired Auto Sequence® group from available groups. |

| ④ | | Confirms a new selection. |
|---|---|---|
| ⑤ | | New Auto Sequence® group is selected and all folders, sub-folders and Auto Sequences® within that group are displayed on the screen. |
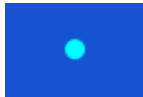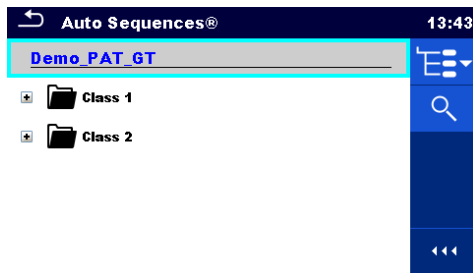
## 7.1.2    Searching in Auto Sequences® menu

In Auto Sequence® menu it is possible to search for Auto Sequences® on base of their Name or Short code.

Procedure
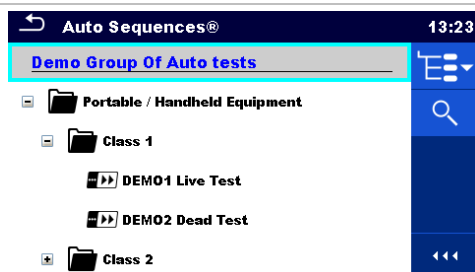
| ① | | Select Auto Sequence® group header in Auto Sequences® menu by taping on it. |
|---|---|---|
| ② | | Select Search from options menu to open Search setup menu. |
| ③ | | The parameters that can be searched for are displayed in the Search setup menu. |
| ③a | | The search can be narrowed by entering a text in the Name and Short code fields.<br><br>Strings can be entered by using the on-screen keyboard. |

| ③b |  | Clears all filters. Sets filters to default value. |
|---|---|---|
| ④ |  | Searches through the active Auto Sequence® group according to the set filters.<br><br>The results are shown in the Search results screen presented on *Figure 7.1 and Figure 7.2.* |
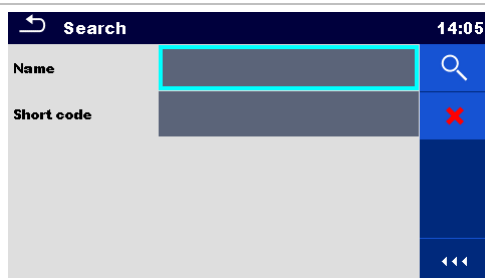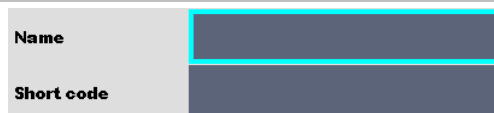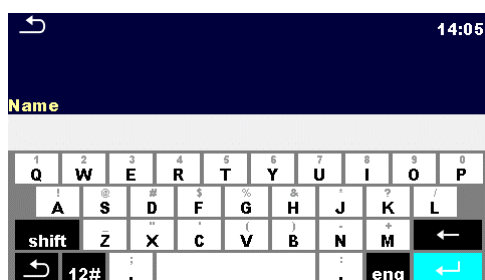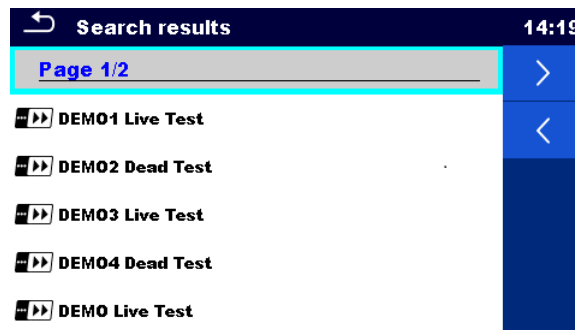


**Figure 7.1: Search results screen Page view**

Options

|  | Next page. |
|---|---|
|  | Previous page. |

**Note:**

▪ Search result page consist of up to 50 results.
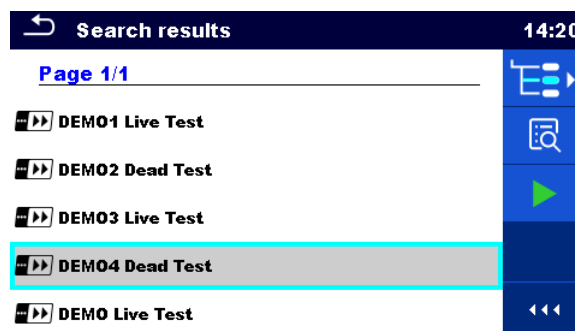


**Figure 7.2: Search results screen with Auto Sequence® selected**

Options

| | |
|---|---|
|  | Goes to location in Auto Sequences® menu. |
|  | Goes to Auto Sequence® view menu. |
|  | Starts the selected Auto Sequence®. |

## 7.1.3    Structure organization of Auto Sequence® group

The Auto Sequences® to be carried out can be selected from the active group in Main Auto Sequences® menu. This menu can be organized in a structural manner with folders, sub-folders and Auto Sequences®. Auto Sequence® in the structure can be the original Auto Sequence® or a shortcut to the original Auto Sequence®.

Auto Sequences® marked as shortcuts and the original auto Sequences® are coupled. Changing of parameters or limits in any of the coupled Auto Sequences® will influence on the original Auto Sequence® and all its shortcuts.
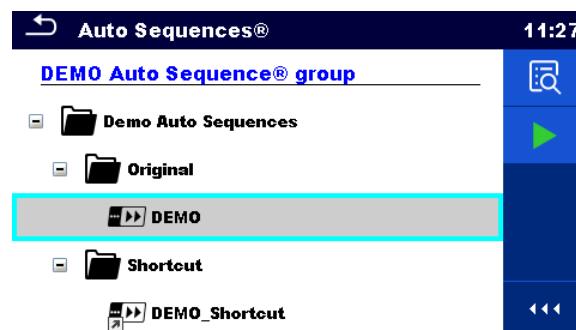


**Figure 7.3: Structure organization of Auto Sequence® group, Auto Sequence® selected**

Options

| | |
|---|---|
|  | The original Auto Sequence®. |
|  | A shortcut to the original Auto Sequence®. |
|  | Enters menu for more detail view of selected Auto Sequence®.<br><br>This option should also be used if the parameters / limits of the selected Auto Sequence® have to be changed. Refer to chapter *7.2.1 Auto Sequence® view* menu for more information. |
|  | Starts the selected Auto Sequence®.<br><br>The instrument immediately starts the Auto Sequence®. |

# 7.2 Organization of Auto Sequence® tests

An Auto Sequence® test is divided into three phases:

‣ Before starting the first test the Auto Sequence® view menu is shown (unless it was started directly from the Main Auto Sequence® menu). Parameters and limits of individual measurements can be set in this menu.
‣ During the execution phase of an Auto Sequence®, pre-programmed single tests are carried out. The sequence of single tests is controlled by pre-programmed flow commands.
‣ After the test sequence is finished the Auto Sequence® result menu is shown. Details of individual tests can be viewed and the results can be saved to Memory organizer.

## 7.2.1     Auto Sequence® view menu

In the Auto Sequence® view menu the header and the single tests of selected Auto Sequence® are displayed. The header contains Name, Short code (if set) and description of the Auto Sequence®. Before starting the Auto Sequence®, test parameters / limits of individual measurements can be changed.

### 7.2.1.1    Auto Sequence® view menu (header is selected)
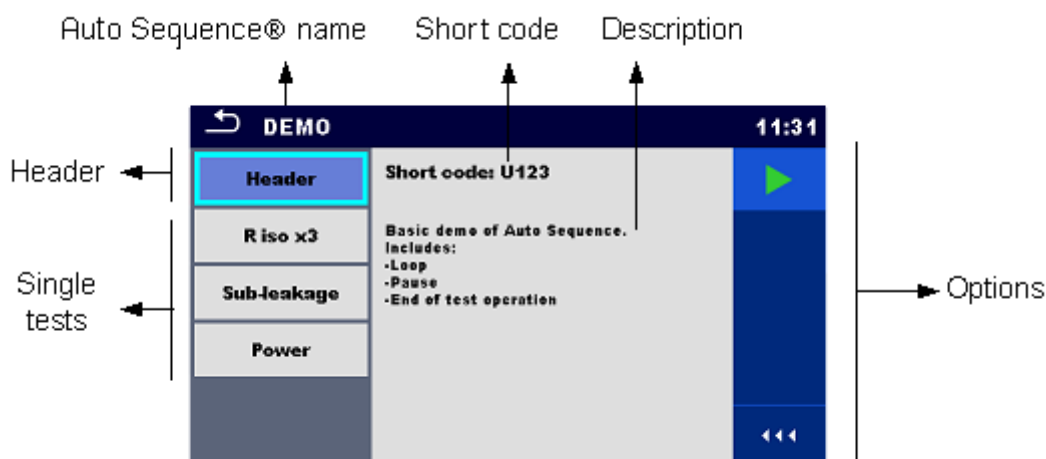


7.2.1.2

**Figure 7.4: Auto Sequence® view menu – header selected**

Options

                    Starts the Auto Sequence®.

### 7.2.1.3   Auto Sequence® view menu (measurement is selected)
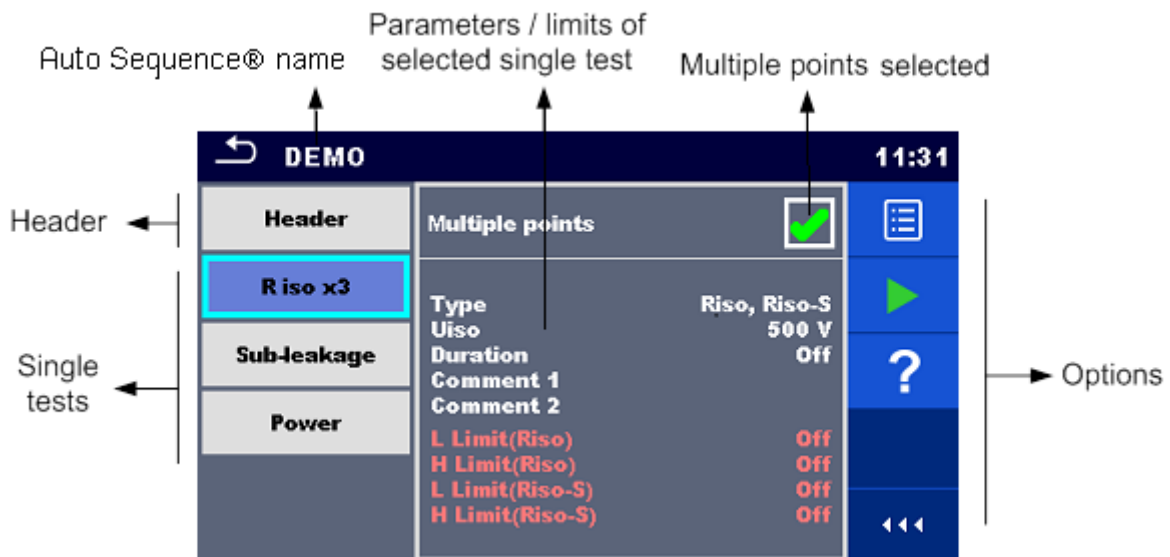


**Figure 7.5: Auto Sequence® view menu – measurement selected**

Options
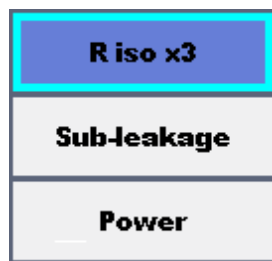
| | |
|---|---|
|  | Selects single test. |
|  | Opens menu for changing parameters and limits of selected measurements.<br><br>Refer to chapter *6.1.2 Setting parameters and limits of single tests* for more information how to change measurement parameters and limits. |
|  | Starts the selected Auto Sequence®. |
|  | Opens the Help menu of selected test. |
|  | Selects Multiple points. |

|  | Sets operation mode for multiple points. For more information see chapter *7.2.1.5 Managing multiple points*. |
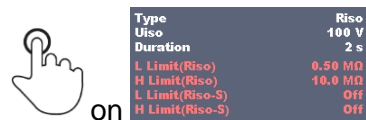


**Multiple points** ✔

### 7.2.1.4    Indication of Loops



The attached 'x3' at the end of single test name indicates that a loop of single tests is programmed. This means that the marked single test will be carried out as many times as the number behind the 'x' indicates. It is possible to exit the loop before, at the end of each individual measurement.

### 7.2.1.5    Managing multiple points

If the device under test has more than one test point for an individual single test and the selected Auto Sequence® predicts only one test point (one single test) it is possible to change the Auto Sequence® appropriately. Single tests with enabled Multiple points ticker will be executed in a continuous loop. It is possible to exit the loop anytime at the end of each individual measurement.

The Multiple points setting is valid only for the actual Auto Sequence®. If the user often tests appliances with more than one test points it is recommended to program a special Auto Sequence® with pre-programmed loops.

## 7.2.2    Step by step excecution of Auto Sequences®

While the Auto Sequence® is running it is controlled by pre-programmed flow commands. Examples of actions controlled by flow commands are:
- pauses during the test sequence
- monitoring of input pins
- control of lamps, test adapters and other external devices
- proceeding of test sequence in regard to measured results
- etc.

The actual list of flow commands is available on chapter *D.5 Description of flow commands.*
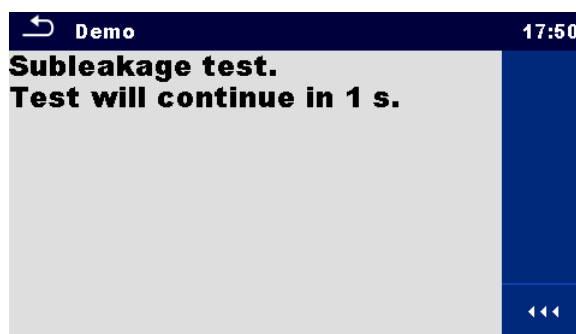
**Figure 7.6: Auto Sequence® – example of a pause with message**
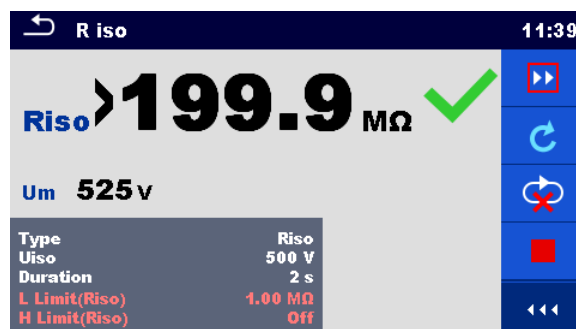


**Figure 7.7: Auto Sequence® – example of a finished measurement with options for proceeding**

Options (during execution of an Auto Sequence®)

| | |
|---|---|
| ▶▶ | Proceeds to next step in the test sequence.<br>Repeats the measurement if multiple points execution is selected.<br>Displayed result of a single test will be stored. |
| ↻ | Repeats the measurement.<br>Displayed result of a single test will not be stored. |
| ■ | Ends the Auto test and goes to Auto test result screen. Refer to chapter *7.2.3 Auto Sequence® result screen* for more information. |
| ↻✗ | Exits the loop of single tests (pre-programmed loop or multiple points execution) and proceeds to the next step in the test sequence. |

The offered options in the control panel depend on the selected single test, its result and the programmed test flow.

**Note:**

‣ During Auto Sequence® the popup Warning messages (see chapter *4.4 Symbols and messages*) are displayed only before the single test inside one Auto Sequence®. This default setting can be changed with appropriate flow command. For more information about programming Auto Sequences® refer to chapter *Appendix D - Programming of Auto Sequences® on Metrel ES* Manager.

# 7.2.3 Auto Sequence® result screen

After the Auto Sequence® is finished the Auto Sequence® result screen is displayed as presented on *Figure 7.8*. At the left side of the display the single tests and their statuses are shown. In the middle of the display the header of the Auto Sequence® is displayed and at the top the overall Auto Sequence® status is displayed. Refer to chapter *5.1.1 Measurement statuses* for more information*.*
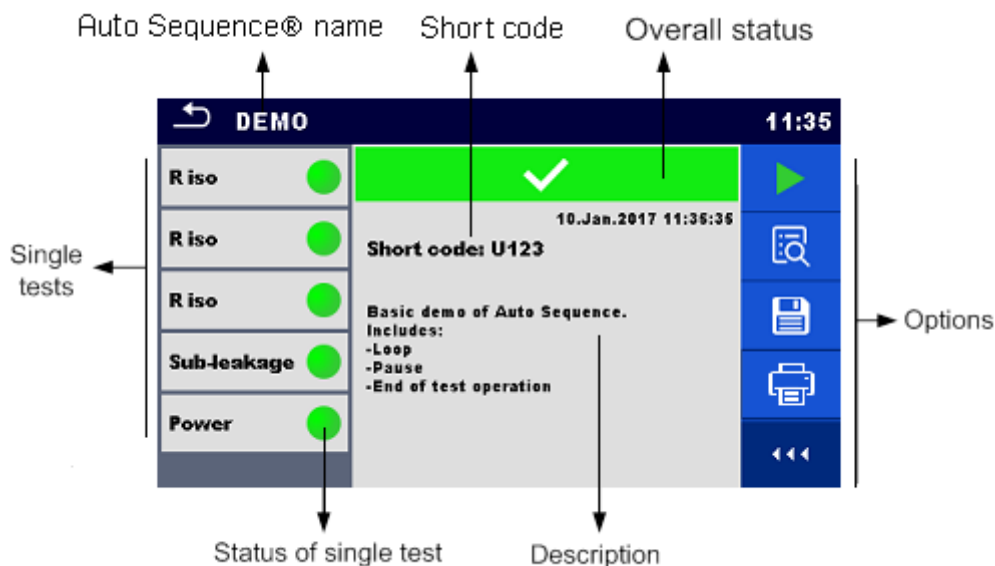


**Figure 7.8: Auto Sequence**® **result screen**

Options
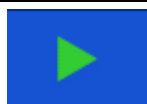
| | |
|---|---|
| ▶ | Start Test<br>Starts a new Auto Sequence®. |
| 🔍 | View results of individual measurements.<br>The instrument goes to menu for viewing details of the Auto Sequence®, see *Figure 7.9*. |
| 💾 | Saves the Auto Sequence® results.<br>A new Auto Sequence® was selected and started from a Structure object in the structure tree:<br>  ‣ The Auto Sequence® will be saved under the selected Structure object.<br>A new Auto Sequence® was started from the Auto Sequence® main menu:<br>  ‣ Saving under the last selected Structure object will be offered by default. The user can select another Structure object or create a new Structure object. By pressing 💾 in Memory organizer menu the Auto Sequence® is saved under selected location.<br>An empty measurement was selected in structure tree and started:<br>  ‣ The result(s) will be added to the Auto Sequence®. The Auto Sequence® will change its overall status from 'empty' to 'finished'. |

An already carried out Auto Sequence® was selected in structure tree, viewed  and then restarted:

‣ A new Auto Sequence® will be saved under the selected Structure object.

| | Prints label. See Chapter *4.6.9 Devices* for details how to enable and set the printer. |
|---|---|

Options (menu for viewing details of Auto Sequence® results):

| | Details of selected single test in Auto Sequence® are displayed, see *Figure 7.9*. |
|---|---|
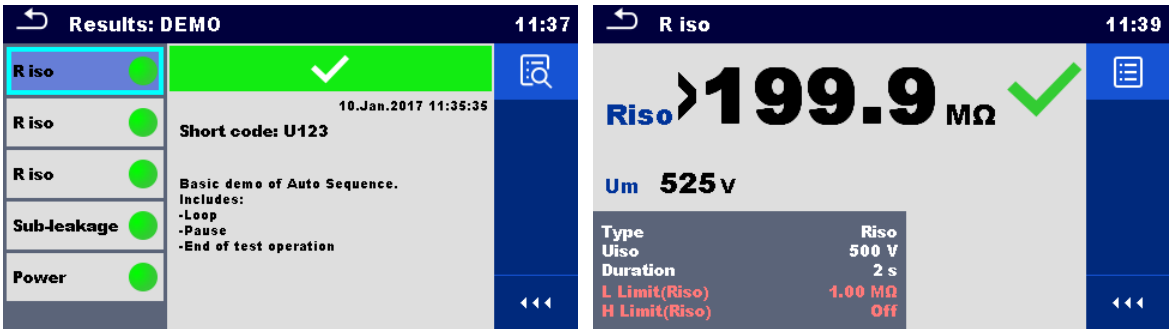


**Figure 7.9: Details in Auto Sequence® results menu screens**

## 7.2.4    Auto Sequence® memory screen

In Auto Sequence® memory screen details of the auto test can be viewed, labels can be printed and a new Auto Sequence® can be restarted.
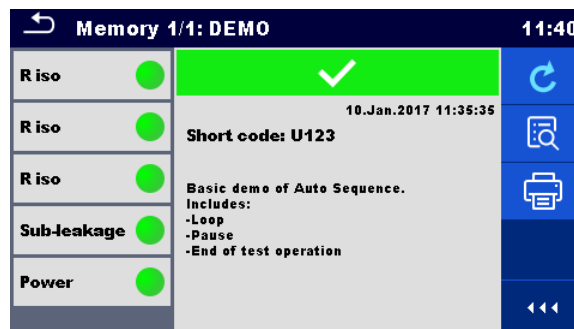
**Figure 7.10: Auto Sequence® memory screen**

Options

| | |
|---|---|
| | Retest the Auto Sequence®. <br> Enters menu for a new Auto Sequence®. |
| | Enters menu for viewing details of the Auto Sequence®. Refer to chapter *7.2.3 Auto Sequence® result* screen for more information. |
| | Prints label. <br> See Chapter *4.6.9 Devices* for details how to enable and set the printer. |

# 8   Maintenance

## 8.1 Periodic calibration

It is essential that all measuring instruments are regularly calibrated in order for the technical specification listed in this manual to be guaranteed. We recommend an annual calibration.

## 8.2 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 *3.1 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 *3.1 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.**

## 8.3 Service

For repairs under or out of warranty please contact your distributor for further information.

Unauthorized person is not allowed to open the CE MultiTesterXA instrument. There are no user replaceable parts inside the instrument.

## 8.4 Cleaning

Use a soft, slightly moistened cloth with soap water or alcohol to clean the surface of CE MultiTesterXA MI 3394 instrument. 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!

# 9   Communications

## 9.1  USB and RS232 communication with PC

The instrument automatically selects the communication mode according to detected interface. USB interface has priority.

**How to establish an USB or RS-232 link:**

> ‣ RS-232 communication: connect a PC COM port to the instrument RS232-2 connector using the RS232 serial communication cable;
> ‣ USB communication: connect a PC USB port to the instrument USB connector using the USB interface cable.
> ‣ Switch on the PC and the instrument.
> ‣ Run the *Metrel ES Manager* software.
> ‣ Select communication port.
> ‣ The PC and the instrument will automatically recognize each other.
> ‣ The instrument is prepared to communicate with the PC.

Metrel ES Manager is a PC software running on Windows 7, Windows 8, Windows 8.1 and Windows 10.

## 9.2  Bluetooth communication

The internal Bluetooth module enables easy communication via Bluetooth with PC and Android devices.

***How to configure a Bluetooth link between instrument and PC***

> ‣ Switch On the instrument.
> ‣ On PC configure a Standard Serial Port to enable communication over Bluetooth link between instrument and PC. Usually no code for pairing the devices is needed.
> ‣ Run the *Metrel ES Manager* software*.*
> ‣ Select configured communication port.
> ‣ The PC and the instrument will automatically recognize each other.
> ‣ The instrument is prepared to communicate with the PC.

***How to configure a Bluetooth link between instrument and Android device***

> ‣ Switch On the instrument.
> ‣ Some Android applications automatically carry out the setup of a Bluetooth connection. It is preferred to use this option if it exists. This option is supported by Metrel's Android applications.
> ‣ If this option is not supported by the selected Android application then configure a Bluetooth link via Android device's Bluetooth configuration tool. Usually no code for pairing the devices is needed.
> ‣ The instrument and Android device are ready to communicate.

**Notes**

‣ Sometimes there will be a demand from the PC or Android device to enter the code. Enter code 'NNNN' to correctly configure the Bluetooth link.

‣ The name of correctly configured Bluetooth device must consist of the instrument type plus serial number, eg. *MI 3394-12240429I*. If the Bluetooth module got another name, the configuration must be repeated.

‣ In case of serious troubles with the Bluetooth communication it is possible to reinitialize the internal Bluetooth module. The initialization is carried out during the Initial settings procedure. In case of a successful initialization "INITIALIZING… OK!" is displayed at the end of the procedure. See chapter *4.6.10* Initial Settings.

‣ Check if there are available Metrel Android applications for this instrument.

# 9.3 Bluetooth communication with printers and scanners

CE MultiTester XA instrument can communicate with supported Bluetooth printers and scanners. Contact Metrel or your distributor which external devices and functionalities are supported. See Chapter *4.6.9 Devices* for details how to set the external Bluetooth devices.

# 9.4 Ethernet communication

The instrument is also capable of communicating through an Ethernet port. The Ethernet communication must be fully configured in the setting menu before first use. See chapter *4.6.8 Settings* for details.

Metrel ES Manager is currently **not** supporting Ethernet communication. Contact Metrel or your distributor regarding options for using the Ethernet communication.

# 9.5 RS232 communication with other external devices

It is possible to communicate with scanners via the RS232-1 serial port and printers via the RS232-2 serial port. Contact Metrel or your distributor which external devices and functionalities are supported.

# 9.6 Connections to test adapters

## 9.6.1 Test connector TC1

The 8 pin test connector TC1 is intended for connection of external test adapters. TC1 consists of Measuring signal connector and Communication signal connector.
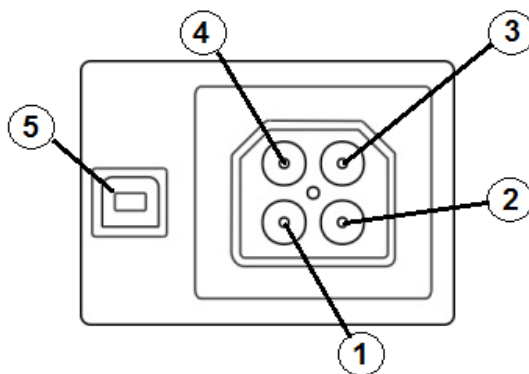


**Figure 9.1: Test connector TC1 layout**

Legend:

4 pin measuring signal connection (Safety connector)

| | |
|---|---|
| **1** | **In parallel to terminal N on mains test socket** |
| **2** | **In parallel to terminal L on mains test socket** |
| **3** | **In parallel to terminal PE on mains test socket** |
| **4** | **In parallel to terminal P/S** |

4 pin communication signal connection[1] (USB type connector)

| | |
|---|---|
| **5** | **Rx, Tx, +5V, GND** |

**Note**
  ‣ [1]Do not connect USB communication cable to 4 pin communication signal connector. It is intended only for connection to test adapters.

# 9.7  INPUTs

The DB9 connector INPUTs is intended for connection of external control signals.
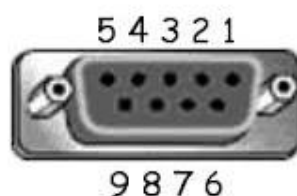


**Figure 9.2: INPUT connector - pin layout**

Legend:

| Pin | | Description | Type |
|---|---|---|---|
| 5 | EXTERNAL OK KEY mode | Input for Remote control pedal | Input low: < 1 V d.c. against earth<br>Input high: > 4.5 V d.c. against earth<br>Umax:  24 V a.c, d.c against earth |
| 6 | IN_2 | External input 2 | |
| 7 | IN_3 | External input 3 | |
| 8 | IN_4 | External input 4 | |
| 4 | IN_5 | External input 5 | |
| 9 | | GND | |
| 3 | | Instrument reset pin | |
| 1,2 | | Not supported | |

# 9.8  OUTPUTs

Via the DB9 connector OUTPUT four control signals for external devices are provided.
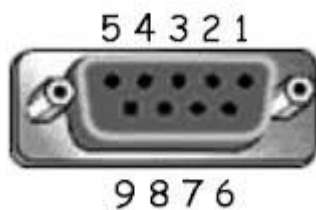
**Figure 9.3: OUTPUT connector - pin layout**

Legend:

| Pins | | | Description | Type |
|------|--|--|-------------|------|
| **4,9** |  DB9 - 4, DB9 - 9, 1.5 A | OUT_1 | Control output 1 | NO relay, Umax: 24V, Imax: 1.5 A Output low: open contact Output high: closed contact |
| **3,8** |  DB9 - 3, DB9 - 8, 1.5 A | OUT_2 | Control output 2 | |
| **2,7** |  DB9 - 2, DB9 - 7, 1.5 A | OUT_3 | Control output 3 | |
| **1,6** |  DB9 - 1, DB9 - 6, 1.5 A | OUT_4 | Control output 4 | |
| **5** | | +5 V | Supply for inputs | |

# 10 Technical specifications

## 10.1  HV AC, HV AC programmable

**Voltage a.c.**

|   | Range | Resolution | Accuracy |
|---|-------|-----------|----------|
| U | 0 V ... 1999 V | 1 V | ±(3 % of reading) |
|   | 2.00 kV ... 5.99 kV | 10 V | ±(3 % of reading) |

**Current a.c. (apparent)**

|   | Range | Resolution | Accuracy |
|---|-------|-----------|----------|
| I | 0.0 mA ... 99.9 mA | 0.1 mA | ±(3 % of reading + 3 D) |

**Current a.c.(capacitive, resistive)**

|   | Range | Resolution | Accuracy |
|---|-------|-----------|----------|
| Ir | 0.0 mA ... 99.9 mA | 0.1 mA | Indicative |
| Ic | -99.9 mA ... 99.9 mA | 0.1 mA | Indicative |

Output voltage ................................................. 100 V … 1000 V (-0/+10%),
.......................................................................... 1010 V … 5000 V (-0/+5%) floating to earth
Trip out time (if apparent current exceeds high limit).......... < 30 ms
Short circuit current ………………………………………….> 200 mA
Output power…………………………………………………….500 VAmax

Test terminals

| Function | Connections |
|----------|-------------|
| Withstanding voltage (HVAC, HVAC-P) | HV(~,+) ↔ HV(~,-) |

## 10.2  HV DC, HV DC programmable

**Voltage d.c.**

|   | Range | Resolution | Accuracy |
|---|-------|-----------|----------|
| U | 0 V ... 1999 V | 1 V | ±(3 % of reading) |
|   | 2.00 kV ... 6.99 kV | 10 V | ±(3 % of reading) |

**Current  d.c.**

|   | Range | Resolution | Accuracy |
|---|-------|-----------|----------|
| I | 0.01 mA ... 9.99 mA | 0.01 mA | ±(5 % of reading + 3 D) |

Output voltage ................................................. 100 V … 1000 V (-0/+10%),
.......................................................................... 1050 V … 6000 V (-0/+5%) floating to earth
Ripple voltage ................................................. ±3 %
Trip out time (if current exceeds high limit) ...... < 30 ms
Max. capacitive load ....................................... 2 μF

Test terminals

| Function | Connections |
|---|---|
| Withstanding voltage (HV$_{DC}$, HV$_{DC-P}$) | HV(~,+) ↔ HV(~,-) |

## 10.3  Continuity

**Continuity**

| | Range | Resolution | Accuracy |
|---|---|---|---|
| R | 0.00 Ω ... 19.99 Ω | 0.01 Ω | ±(2 % of reading + 2 D) |
| | 20.0 Ω ... 99.9 Ω | 0.1 Ω | ± 3 % of reading |
| | 100.0 Ω ... 199.9 Ω | 0.1 Ω | ± 5 % of reading |
| | 200 Ω ... 999 Ω | 1 Ω | indicative |

**Voltage drop ( Iout = 10 A)**

| | Range | Resolution | Accuracy |
|---|---|---|---|
| ΔU | 0.00 V ... 19.99 V | 0.01 V | ±(2 % of reading + 5 D) |
| | 20.0 V ... 99.9 V | 0.1 V | ± 3 % of reading |

Limit value of voltage drop versus wire cross-section:

| Wire cross-section (mm²) | Limit voltage drop (V) |
|---|---|
| 0.5 | 5.0 |
| 0.75 | 5.0 |
| 1 | 3.3 |
| 1.5 | 2.6 |
| 2.5 | 1.9 |
| 4 | 1.4 |
| ≥6 | 1.0 |

Operating range (acc. to EN 61557-4)............. 0.08 Ω ... 199.9 Ω
Test currents.................................................... 0.2A, 4A, 10A, 25A
Current source (at nominal mains voltage, use of standard accessories)
.................................................................... 0.2 A at R < 8 Ω
.................................................................... 4 A at R < 1 Ω
.................................................................... 10 A at R < 0.5 Ω
.................................................................... 25 A at R < 0.2 Ω
Open circuit voltage......................................... < 6 V a.c.
Max current lead resistance ............................ 40 Ω
Test lead compensation (P/S – PE) ................ up to 5 Ω
Test method: Continuity 4 wire ........................ Kelvin method, floating to earth
Test method: Continuity P/S – PE.................... 2 wire test, floating to earth

Test terminals

| Function | Connections |
|---|---|
| Continuity P/S – PE | P/S ↔ Mains test socket (PE), TC1 |
| Continuity 4 wire | P1/C1 ↔ P2/C2 |

## 10.4  Insulation Resistance, Insulation Resistance-S

**Insulation resistance, Insulation resistance –S  (250 V, 500 V, 1000 V)**

|  | Range | Resolution | Accuracy |
|---|---|---|---|
| Riso | 0.00 MΩ … 19.99 MΩ | 0.01 MΩ | ±(3 % of reading + 2 D) |
| Riso-S | 20.0 MΩ ... 199.9 MΩ | 0.1 MΩ | ± 10 % of reading |

**Insulation resistance, Insulation resistance –S  (50 V, 100 V)**

|  | Range | Resolution | Accuracy |
|---|---|---|---|
| Riso | 0.00 MΩ ... 19.99 MΩ | 0.01 MΩ | ±(5 % of reading + 2 D) |
| Riso-S | 20.0 MΩ ... 99.9 MΩ | 0.1 MΩ | ± 20 % of reading |

**Output voltage**

|  | Range | Resolution | Accuracy |
|---|---|---|---|
| Um | 0 V ... 1200 V | 1 V | ±(3 % of reading + 2 D) |

Operating range (acc. to EN 61557-2).........0.08 MΩ ... 199.9 MΩ
Nominal voltages Un (d.c.) ...........................50 V, 100 V, 250 V, 500 V, 1000V (- 0 %, + 10 %)
Short circuit current .....................................max. 2.0 mA

Test terminals

| Function | Connections |
|---|---|
| Insulation | Mains test socket (LN), ISO(+) ↔ Mains test socket (PE), ISO(-), TC1 |
| Insulation – S | Mains test socket (LN), ISO(+) ↔ P/S, TC1 |

## 10.5  Substitute Leakage Current, Substitute Leakage Current - S

**Substitute leakage current, Substitute leakage current - S**

|  | Range | Resolution | Accuracy |
|---|---|---|---|
| Isub Isub-S | 0.00 mA ... 19.99 mA | 10 µA | ±(5 % of reading + 3 D) |

Operating range (acc. to EN 61557-16)........... 0.12 mA ... 19.99 mA
Open circuit voltage........................................ < 50 V a.c.
Current calculated to mains supply voltage (110 V or 230 V) is displayed.

Test terminals:

| Function | Connections |
|---|---|
| Subleakage | Mains test socket (LN), SUB1 ↔ Mains test socket (PE), SUB2, TC1 |
| Subleakage – S | Mains test socket (LN), SUB1 ↔ P/S, TC1 |

# 10.6 Differential Leakage current

**Differential leakage current**

| | Range | Resolution | Accuracy |
|---|---|---|---|
| Idiff | 0.00 mA ... 19.99 mA | 0.01 mA | ±(3 % of reading + 5 D) |

**Power (active)**

| | Range | Resolution | Accuracy |
|---|---|---|---|
| P | 0.00 W…19.99 W | 0.01 W | ±(5 % of reading + 5 D) |
| | 20.0 W…199.9 W | 0.1 W | ± 5 % of reading |
| | 200 W ... 1999 W | 1 W | ± 5 % of reading |
| | 2.00 kW ... 3.70 kW | 10 W | ± 5 % of reading |

Operating range (acc. to EN 61557-16)........... 0.19 mA ... 19.99 mA
Frequency response of measuring circuit ........ complies with EN 61010 - Figure A1
Influence of load current .................................. < 0.02 mA/A

Test terminals:

| Function | Connections |
|---|---|
| Differential leakage | Mains test socket (LN), TC1 |

# 10.7 PE leakage current

**PE leakage current**

| | Range | Resolution | Accuracy |
|---|---|---|---|
| Ipe | 0.00 mA ... 19.99 mA | 0.01 mA | ±(3 % of reading + 3 D) |

**Power (active)**

| | Range | Resolution | Accuracy |
|---|---|---|---|
| P | 0.00 W…19.99 W | 0.01 W | ±(5 % of reading + 5 D) |
| | 20.0 W…199.9 W | 0.1 W | ± 5 % of reading |
| | 200 W ... 1999 W | 1 W | ± 5 % of reading |
| | 2.00 kW ... 3.70 kW | 10 W | ± 5 % of reading |

Operating range (acc. to EN 61557-16)........... 0.12 mA ... 19.99 mA
Frequency response of measuring circuit ........ complies with EN 61010 - Figure A1

Test terminals:

| Function | Connections |
|---|---|
| PE leakage | Mains test socket, TC1 |

# 10.8 Touch leakage current

**Touch leakage current**

| | Range | Resolution | Accuracy |
|---|---|---|---|
| Itou | 0.00 mA ... 19.99 mA | 0.01 mA | ±(3 % of reading + 3 D) |

**Power (active)**

|   | Range | Resolution | Accuracy |
|---|-------|------------|----------|
| P | 0.00 W…19.99 W | 0.01 W | ±(5 % of reading + 5 D) |
|   | 20.0 W…199.9 W | 0.1 W | ± 5 % of reading |
|   | 200 W ... 1999 W | 1 W | ± 5 % of reading |
|   | 2.00 kW ... 3.70 kW | 10 W | ± 5 % of reading |

Operating range (acc. to EN 61557-16)........... 0.12 mA ... 19.99 mA
Frequency response of measuring circuit ........ complies with EN 61010 - Figure A1

Output:

| Function | Connections |
|----------|-------------|
| Touch leakage | Mains test socket ↔ P/S, TC1 |

# 10.9   Power

**Power (active)**

|   | Range | Resolution | Accuracy |
|---|-------|------------|----------|
| P | 0.00 W…19.99 W | 0.01 W | ±(5 % of reading + 5 D) |
|   | 20.0 W…199.9 W | 0.1 W | ± 5 % of reading |
|   | 200 W ... 1999 W | 1 W | ± 5 % of reading |
|   | 2.00 kW ... 3.70 kW | 10 W | ± 5 % of reading |

**Power (apparent)**

|   | Range | Resolution | Accuracy |
|---|-------|------------|----------|
| S | 0.00 VA…19.99 VA | 0.01 VA | ±(5 % of reading + 10 D) |
|   | 20.0 VA…199.9 VA | 0.1 VA | ± 5 % of reading |
|   | 200 VA ... 1999 VA | 1 VA | ± 5 % of reading |
|   | 2.00 kVA...3.70 kVA | 10 VA | ± 5 % of reading |

**Power (reactive)**

|   | Range | Resolution | Accuracy |
|---|-------|------------|----------|
| Q | 0.00 VAr …19.99 VAr | 0.01 VAr | ±(5 % of reading + 10 D) |
|   | 20.0 VAr …199.9 VAr | 0.1 VAr | ± 5 % of reading |
|   | 200 VAr ... 1999 VAr | 1 VAr | ± 5 % of reading |
|   | 2.00 kVAr...3.70 kVAr | 10 VAr | ± 5 % of reading |

**Power factor**

|   | Range | Resolution | Accuracy |
|---|-------|------------|----------|
| PF | 0.00i ... 1.00i<br>0.00c ... 1.00c | 0.01 | ±(5 % of reading + 5 D) |

**Total Harmonic Distortion (voltage)**

|   | Range | Resolution | Accuracy |
|---|-------|------------|----------|
| THDU | 0.0 % ... 99.9 % | 0.1 % | ±(5 % of reading + 5 D) |

**Total Harmonic Distortion (current)**

|  | **Range** | **Resolution** | **Accuracy** |
|---|---|---|---|
| THDI | 0 mA…999 mA | 1 mA | ±(5 % of reading + 5 D) |
|  | 1.00 A ... 16.00 A | 10 mA | ±(5 % of reading) |

**Cosinus Φ**

|  | **Range** | **Resolution** | **Accuracy** |
|---|---|---|---|
| Cos Phi | 0.00i ... 1.00i<br>0.00c ... 1.00c | 0.01 | ±(5 % of reading + 5 D) |

**Voltage**

|  | **Range** | **Resolution** | **Accuracy** |
|---|---|---|---|
| U | 0.0 V ... 199.9 V | 0.1 V | ±(3 % of reading + 10 D) |
|  | 200 V ... 264 V | 1 V | ±3 % of reading |

**Current**

|  | **Range** | **Resolution** | **Accuracy** |
|---|---|---|---|
| I | 0 mA…999 mA | 1 mA | ±(3 % of reading + 5 D) |
|  | 1.00 A ... 16.00 A | 10 mA A | ± 3 % of reading |

Test terminals:

| Function | Connections |
|---|---|
| Power | Mains test socket, TC1 |

# 10.10  Leak's & Power

**Power (active)**

|  | Range | Resolution | Accuracy |
|---|---|---|---|
| P | 0.00 W…19.99 W | 0.01 W | ±(5 % of reading + 5 D) |
|  | 20.0 W…199.9 W | 0.1 W | ± 5 % of reading |
|  | 200 W ... 1999 W | 1 W | ± 5 % of reading |
|  | 2.00 kW ... 3.70 kW | 10 W | ± 5 % of reading |

**Power (apparent)**

|  | Range | Resolution | Accuracy |
|---|---|---|---|
| S | 0.00 VA…19.99 VA | 0.01 VA | ±(5 % of reading + 10 D) |
|  | 20.0 VA…199.9 VA | 0.1 VA | ± 5 % of reading |
|  | 200 VA ... 1999 VA | 1 VA | ± 5 % of reading |
|  | 2.00 kVA...3.70 kVA | 10 VA | ± 5 % of reading |

**Power (reactive)**

|  | Range | Resolution | Accuracy |
|---|---|---|---|
| Q | 0.00 VAr …19.99 VAr | 0.01 VAr | ±(5 % of reading + 10 D) |
|  | 20.0 VAr …199.9 VAr | 0.1 VAr | ± 5 % of reading |
|  | 200 VAr ... 1999 VAr | 1 VAr | ± 5 % of reading |
|  | 2.00 kVAr ... 3.70 kVAr | 10 VAr | ± 5 % of reading |

**Power factor**

|      | Range | Resolution | Accuracy |
|------|-------|------------|----------|
| PF | 0.00i ... 1.00i<br>0.00c ... 1.00c | 0.01 | ±(5 % of reading + 5 D) |

**Total Harmonic Distortion (voltage)**

|      | Range | Resolution | Accuracy |
|------|-------|------------|----------|
| THDU | 0.0 % ... 99.9 % | 0.1 % | ±(5 % of reading + 5 D) |

**Total Harmonic Distortion (current)**

|      | Range | Resolution | Accuracy |
|------|-------|------------|----------|
| THDI | 0 mA…999 mA | 1 mA | ±(5 % of reading + 5 D) |
|      | 1.00 A ... 16.00 A | 10 mA | ±(5 % of reading) |

**Cosinus Φ**

|      | Range | Resolution | Accuracy |
|------|-------|------------|----------|
| Cos Phi | 0.00i ... 1.00i<br>0.00c ... 1.00c | 0.01 | ±(5 % of reading + 5 D) |

**Voltage**

|      | Range | Resolution | Accuracy |
|------|-------|------------|----------|
| U | 0.0 V ... 199.9 V | 0.1 V | ±(3 % of reading + 10 D) |
|   | 200 V ... 264 V | 1 V | ±3 % of reading |

**Current**

|      | Range | Resolution | Accuracy |
|------|-------|------------|----------|
| I | 0 mA…999 mA | 1 mA | ±(3 % of reading + 5 D) |
|   | 1.00 A ... 16.00 A | 10 mA | ± 3 % of reading |

**Differential leakage current**

|      | Range | Resolution | Accuracy |
|------|-------|------------|----------|
| Idiff | 0.00 mA ... 19.99 mA | 0.01 mA | ±(3 % of reading + 5 D) |

Operating range (acc. to EN 61557-16)........... 0.19 mA ... 19.99 mA
Frequency response of measuring circuit ........ complies with EN 61010 - Figure A1
Influence of load current................................... < 0.02 mA/A

**Touch leakage current**

|      | Range | Resolution | Accuracy |
|------|-------|------------|----------|
| Itou | 0.00 mA ... 19.99 mA | 0.01 mA | ±(3 % of reading + 3 D) |

Operating range (acc. to EN 61557-16)........... 0.12 mA ... 19.99 mA
Frequency response of measuring circuit ........ complies with EN 61010 - Figure A1

Test terminals:

| Function | Connections |
|----------|-------------|
| Power | Mains test socket, TC1 |
| Differential leakage | Mains test socket (LN), TC1 |
| Touch leakage | Mains test socket ↔ P/S, TC1 |

# 10.11 Discharging time

**Discharging time**

|   | Range | Resolution | Accuracy |
|---|-------|------------|----------|
| t | 0.0 s ... 9.9 s | 0.1 s | $\pm$(5 % of reading + 2 D) |

**Peak voltage**

|    | Range | Resolution | Accuracy |
|----|-------|------------|----------|
| Up | 0 V ... 550 V | 1 V | $\pm$(5 % of reading + 3 D) |

Operating range (acc. to EN 61557-14)........... 0.8 s ... 9.9 s
High limits ..................................................... 1 s, 5 s
Threshold voltage ........................................... 34 V, 60 V, 120 V
Input resistance .............................................. 48 M$\Omega$
Max. load current (Output = Socket)….. .......... 10 A
Automatic disconnection at $ULN_{peak}$ if DUT (Device Under Test) is connected to mains test socket.

Test terminals

| Function | Connections |
|----------|-------------|
| Discharging time External | DISCH1 $\leftrightarrow$ DISCH2 |
| Discharging time Socket | Mains test socket (L,N), TC1 |

# 10.12  General data

**Power supply**
Supply voltage, frequency ................................ 110 V / 230 V AC, 50 Hz / 60 Hz
Supply voltage tolerance ................................. $\pm$10 %
Max. power consumption.................................. 600 W (without load on mains test socket)
Max. power consumption.................................. 4.5 kW (with load on mains test socket)
Mains supply overvoltage category .................. CAT II / 300V
Altitude .......................................................... ≤ 2000 m

**Measuring categories**
DISCH1 / DISCH2 ........................................... CAT II / 600 V
ISO(+) SUB1 / ISO(-) SUB2 ............................ CAT II / 300 V
P1, C1 / P2, C2.............................................. CAT II / 300 V
P/S ................................................................ CAT II / 300 V
TC1 ............................................................... CAT II / 300 V
Mains test socket............................................ CAT II / 300 V
Altitude .......................................................... ≤ 2000 m

**Protection classifications**
Power supply .................................................. Class I
HV output....................................................... 5 kV a.c. / 6 kV d.c., double insulation
Pollution degree.............................................. 2
Degree of protection ....................................... IP 50 (closed case)
………………………………….................... IP 40 (open case)
 ..................................................................... IP 20 (mains test socket)
Case............................................................... Shock proof plastic / portable
INPUTs .......................................................... 24 Vmax, earthed

OUTPUTs ...................................................... 24 Vmax, earthed

Display ........................................................ Colour TFT display, 4.3 inch, 480 x 272 pixels
Touch screen ................................................ Capacitive

**Communication**
Memory ........................................................ depends on microSD card size
RS232 interfaces ........................................... two DB9 ports
USB 2.0........................................................ Standard USB Type B
Bluetooth...................................................... Class 2
Ethernet ....................................................... Dynamic IP (DHCP)
                                                                                   Static IP (manual)

**I/Os**
Inputs ........................................................... DB9 connector (24 V max)
Outputs ........................................................ DB9 connector (NO relays, 24 V max, 1.5 A max)

Dimensions (w×h×d):...................................... 43.5 cm × 29.2 cm × 15.5 cm
Weight........................................................... 8.4 kg

**Reference conditions**
Reference temperature range: ........................ 15 °C ... 35 °C
Reference humidity range: .............................. 35 % ... 65 % RH

**Operation conditions**
Working temperature range:............................ 0 °C ... +40 °C
Maximum relative humidity:............................. 85 % RH (0 °C ... 40 °C), non-condensing

**Storage conditions**
Temperature range:........................................ -10 °C ... +60 °C
Maximum relative humidity:............................. 90 % RH (-10 °C ... +40 °C)
 ................................................................... 80 % RH (40 °C ... 60 °C)

Accuracies apply for 1 year in reference conditions. Temperature coefficient outside these limits is 0.2 % of measured value per °C plus 1 digit, otherwise noted.

**Fuses**
2 x T 16 A / 250 V, 32 mm × 6.3 mm / 1500 A (protection of mains test socket)
2 x T 5 A / 250 V, 20 mm × 5 mm / 1500 A (instrument protection)

# *Appendix A -* Structure objects in CE MultiTesterXA

| Icon | Default name | Description |
|------|--------------|-------------|
| | NODE | Node |
| | PROJECT | Project |
| | LOCATION | Location |
| | APPLIANCE | Appliance (short description) |
| | APPLIANCE FD | Appliance (full description) |

# *Appendix B -* Profile Notes

There are no specific profile notes for CE MultiTesterXA MI 3394.

# *Appendix C -* Default list of Auto Sequences®

**Pre-programmed DEMO Auto** Sequences®

| No. | Name | Description |
|---|---|---|
| 1 | **DEMO_1** | This Auto Sequence® is just for demonstration of manipulation of Auto Sequence® operation. |
| 2 | **DEMO_2** | This Auto Sequence® is just for demonstration of manipulation of Auto Sequence® operation. |

# *Appendix D -* Programming of Auto Sequences®on Metrel ES Manager

The Auto Sequence® Editor is a part of the Metrel ES Manager software. In Auto Sequence® Editor, Auto Sequences® can be pre-programmed and organized in groups, before uploaded to the instrument.

## D.1 Auto Sequence® Editor workspace

To enter Auto Sequence® editor's workspace, select [Auto Sequence® Editor] in Home Tab of Metrel ES Manager PC SW. Auto Sequence® editor workspace is devided in four main areas. On the left side ❶,structure of selected group of Auto Sequence® is displayed. In the middle part of the workspace ❷, the elements of the selected Auto Sequence® are shown. On the right side, list of available single tests ❸ and list of flow commands ❹ are shown.
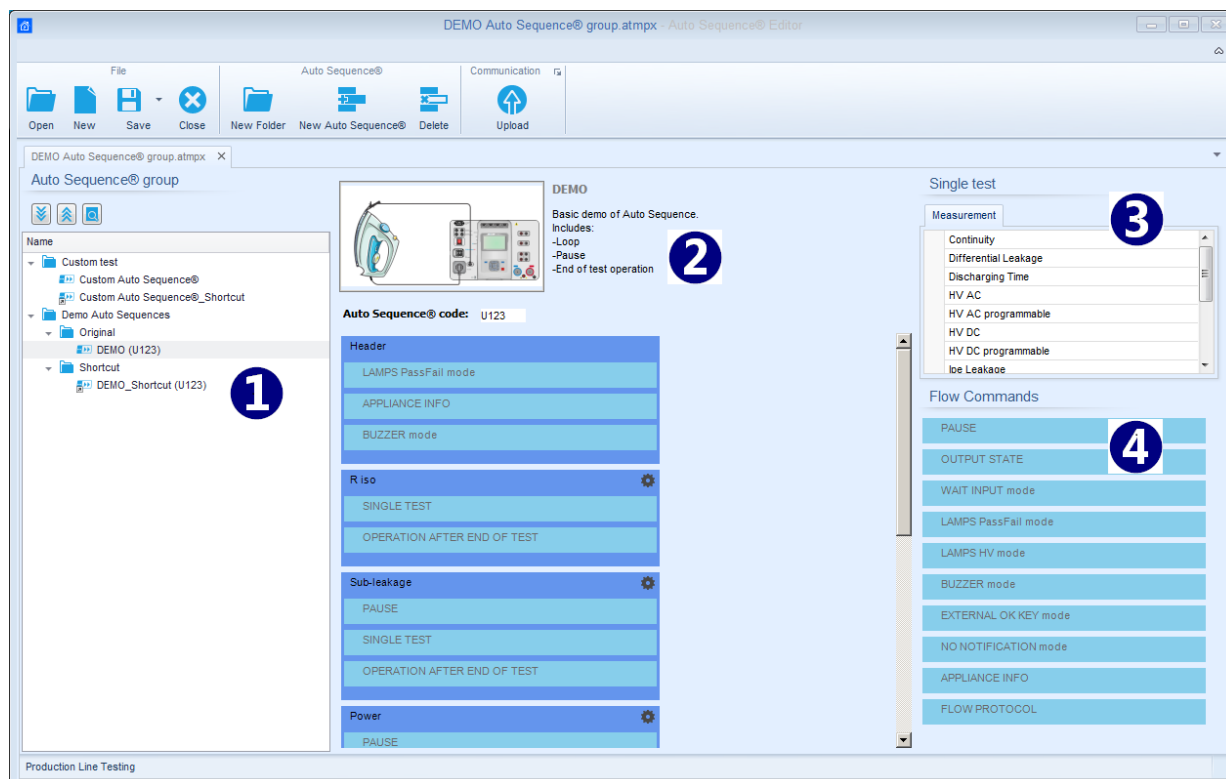


**Figure D.1: Auto Sequence® editor workspace**

An Auto Sequence® ❷ begins with Name, Description and Image, followed by the first step (Header), one or more measuring steps and ends with the last step (Result). By inserting appropriate Single tests ❸ and Flow commands ❹ and setting their parameters, arbitrary Auto Sequences® can be created.
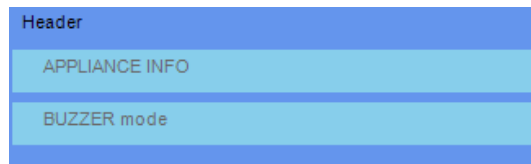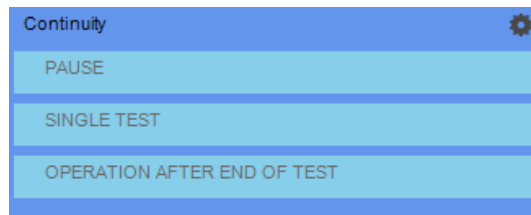
**Figure D.2: Example of an Auto Sequence®
header**



**Figure D.3: Example of a measurement step**



**Figure D.4: Example of an Auto Sequence®
result**

# D.2 Managing of Auto Sequence® groups

The Auto Sequences® can be divided into different user defined Auto Sequence® groups. Each Auto Sequence® group is stored in a file. More files can be opened simultaneously in Auto Sequence® editor.

Within Auto Sequence® Group, tree structure can be organized, with folders / subfolders containing Auto Sequences®. The three structure of currently active Auto Sequence® Group is displayed on the left side of the Auto Sequence® editor workspace, see *Figure D.5.*
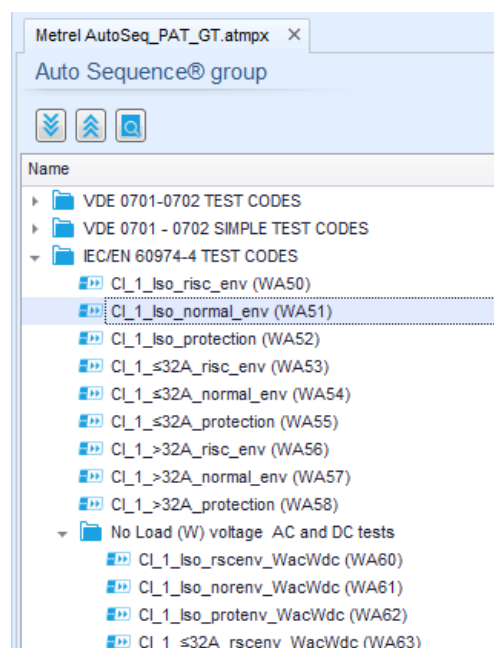


**Figure D.5: Auto Sequence® Group tree organization**

Operation options on Files and Auto Sequence® Group are available from menu bar at the top of Auto Sequence® editor workspace.

File operation options:

| | |
|---|---|
| 📂 | Opens a file (Auto Sequence® Group). |
| 💾 ▾ | Saves / Saves as the opened Auto Sequence® Group to a file. |
| 📄 | Creates a new file (Auto Sequence® Group). |
| ✖ | Closes the file (Auto Sequence® Group). |

Group of Auto Sequences® view options:

| | |
|---|---|
| ⏬ | Expand all folders / subfolders / Auto Sequences®. |
| ⏫ | Collapse all folders / subfolders / Auto Sequences®. |
| 🔍 | Toggle between Search by name within Auto Sequence® group and normal view. See chapter *D.2.2 Search within selected Auto Sequence® group* for details. |
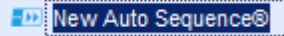
Auto Sequence® Group operation options (also available by right clicking on Folder or Auto Sequence®):

| | |
|---|---|
| 📂 | Adds a new folder / subfolder to the group. |
| ▣ | Adds a new Auto Sequence® to the group. |
| ▣ | Deletes:<br>   -   the selected Auto Sequence®<br>   -   the selected folder with all subfolders and Auto Sequences® |

Right click on the selected Auto Sequence® or Folder opens menu with additional possibilities:

| | |
|---|---|
| ✏ | **Auto Sequence®:** Edit Name, Description and Image (see *Figure D.6*).<br>**Folder:** Edit folder name |
| 📋 | **Auto Sequence®:** Copy to clipboard<br>**Folder:** Copy to clipboard including subfolders and Auto Sequences® |
| 📋 | **Auto Sequence®:** Paste it to selected location<br>**Folder:** Paste it to selected location |
| 🔳 | **Auto Sequence®:** Create shortcut to selected Auto Sequence® |

Double click on the object name allows it name edit:

| | |
|---|---|
| DOUBLE CLICK | **Auto Sequence® name:** Edit Auto Sequence® name<br>▶ New Auto Sequence® |

| | **Folder name:** Edit folder name<br>⌄ 📁 Portable / Handheld Equipment |
| --- | --- |

Drag and drop of the selected Auto Sequence® or Folder / Subfolder moves it to a new location:

| DRAG & DROP | "Drag and drop" functionality is equivalent to "cut" and "paste" in a single move.<br>➡ move to folder<br>↪ insert |
| --- | --- |

## D.2.1　Auto Sequence® Name, Description and Image editing

When EDIT function is selected on Auto Sequence®, menu for editing presented on *Figure D.6* appear on the screen. Editing options are:

**Name:** Edit or change the name of Auto Sequence®.
**Description:** Any text for additional description of Auto Sequence® can be entered.
**Image:** Image presenting Auto Sequence® measuring arrangement can be entered or deleted.

| 🔍 | Enters menu for browsing to Image location. |
| --- | --- |
| ✖ | Deletes the Image from Auto Sequence®. |
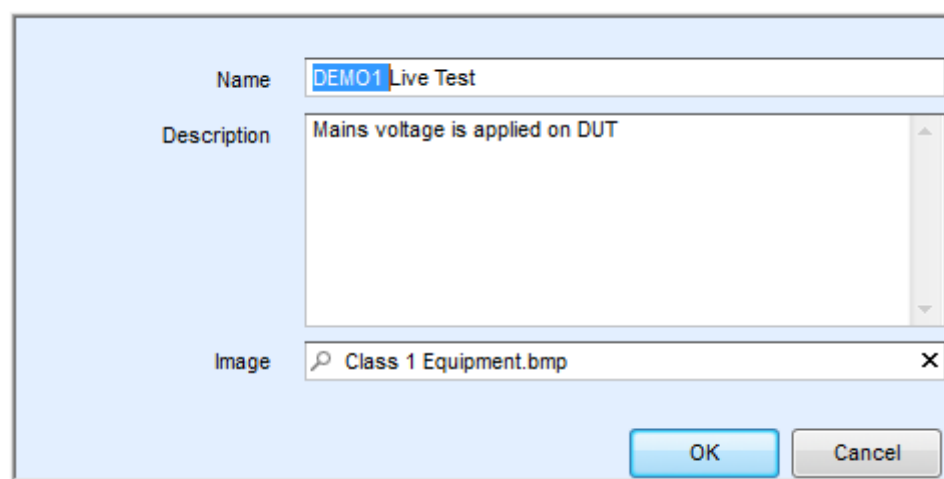


**Figure D.6: Editing the Auto Sequence® Name, Description and Image**

## D.2.2　Search within selected Auto Sequence® group

When 🔍 function is selected, Search menu as presented on *Figure D.7* appear on the screen. By entering the text into search box, found results are automatically highlighted with yellow background. Search functionality is implemented in Folders, Subfolders and Auto Sequences® of selected Auto Sequence® Group. Search functionality is case sensitive. Search text can be cleared by selecting the Clear button.
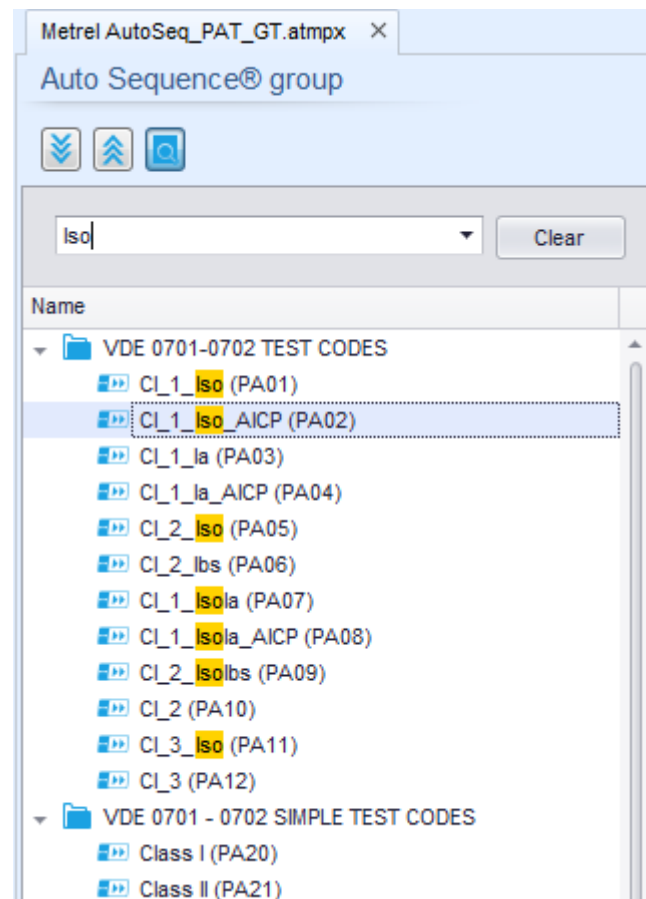
**Figure D.7: Example of Search result within Auto Sequence® group**

# D.3 Elements of an Auto Sequence®

## D.3.1    Auto Sequence® steps

There are three kinds of Auto Sequence® steps.

**Header**
The Header step is empty by default.
Flow commands can be added to the Header step.

**Measurement step**
The Measurement step contains a Single test and the Operation after end of test flow command by default. Other Flow commands can also be added to the Measurement step.

**Result**
The Result step contains the Result screen flow command by default. Other Flow commands can also be added to the Result step.

D.3.2    **Single tests**

Single tests are the same as in Metrel ES Manager Measurement menu.
Limits and parameters of the measurements can be set. Results and sub-results can't be set.

D.3.3    **Flow commands**

Flow commands are used to control the flow of measurements. Refer to chapter *D.5 Description of flow commands* for more information.

D.3.4    **Number of measurement steps**

Often the same measurement step has to be performed on multiple points on the device under test. It is possible to set how many times a Measurement step will be repeated. All carried out individual Single test results are stored in the Auto Sequence® result as if they were programmed as independent measuring steps.
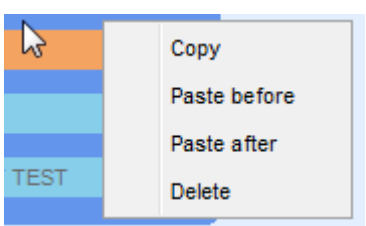
# D.4 Creating / modifying an Auto Sequence®

If creating a new Auto Sequence® from scratch, the first step (Header) and the last step (Result) are offered by default. Measurement steps are inserted by the user.

Options:

| | |
|---|---|
| Adding a measurement step | By double clicking on a Single test a new measurement step will appear as the last of measurement steps. It can also be dragged and dropped on the appropriate position in the Auto Sequence®. |
| Adding flow commands | Selected flow command can be dragged from the list of Flow commands and dropped on the appropriate place in any Auto Sequence® step. |
| Changing position of flow command within measurement step | By a click on an element and use of  ,  keys. |
| Viewing / changing parameters of flow commands or single tests. | By a double click on the element. |
| Setting number of measurement step repetitions | By setting a number in the  field. |

Right click on the selected measurement step / flow command:

| | |
|---|---|
|  | Copy – Paste before<br>A measurement step / flow command can be copied and pasted above selected location on the same or on another Auto Sequence®.<br><br>Copy – Paste after<br>A measurement step / flow command can be copied and pasted under selected location on the same or on another Auto Sequence®.<br><br>Delete<br>Deletes the selected measurement step / flow command. |

# D.5 Description of flow commands

Double click on inserted Flow Command opens menu window, where text or picture can be entered, external signalling and external commands can be activated and parameters can be set.

Flow commands Operation after end of test and Results screen are entered by default, others are user selectable from Flow Commands menu.

**Pause**

A Pause command with text message or picture can be inserted anywhere in the measuring steps. Warning icon can be set alone or added to text message. Arbitrary text message can be entered in prepared field Text of menu window.

Parameters:

| Pause type | Show text and/or warning ( ☑ check to show warning icon) Show picture ( 🔍 browse for image path) |
|------------|--------------------------------------------------------------------------------------------|
| Duration | Number in seconds, infinite (no entry) |

**Output state**

Sets outputs OUT_1, OUT_2, OUT_3, and OUT_4 on OUTPUT port.

Following settings of this command are ignored:

‣   OUT_1 and OUT_2 while Lamps HV mode is enabled.
‣   OUT_3 and OUT_4 while Lamps Pass / Fail mode is enabled.

All outputs are single normally opened relay contacts if not checked in Menu Output pins window.

Parameters:

| ☑ OUT_1 | Set closed relay contact between OUTPUT pins 4 and 9 |
|---------|------------------------------------------------------|
| ☑ OUT_2 | Set closed relay contact between OUTPUT pins 3 and 8 |
| ☑ OUT_3 | Set closed relay contact between OUTPUT pins 2 and 7 |
| ☑ OUT_4 | Set closed relay contact between OUTPUT pins 1 and 6 |

**Wait input mode**

Reads input condition on pins IN_2, IN_3, IN_4 and IN_5 on INPUT port. Input must be high to proceed with the Auto Sequence[®].

Parameters

| State | On – enables Wait input mode; set active INPUT from Input pins menu Off – disables Wait input mode |
|-------|------------------------------------------------------------------------------------------------|
| ☑ IN_2 | IN_2 reading condition on INPUT pin 6 is active |
| ☑ IN_3 | IN_3 reading condition on INPUT pin 7 is active |
| ☑ IN_4 | IN_4 reading condition on INPUT pin 8 is active |
| ☑ IN_5 | IN_5 reading condition on INPUT pin 4 is active |

**Lamps HV mode**
Drives external lamps through OUT_1 and OUT_2 outputs. Works only in HV & HV programmable functions.
- ‣ Red lamp (OUT_1) ON means that the instrument is ready for HV test. Red lamp turns on before first flow command in step that contains HV test. Red lamp turns off after end of the HV test.
- ‣ Green lamp (OUT_2) blinking means that high voltage will be applied to WITHSTANDING (HV(~+) and HV(~-)) test terminals as soon as all input conditions will be fulfilled.
- ‣ Green lamp (OUT_2) ON means that dangerous voltage is present at WITHSTANDING (HV(~+) and HV(~-)) test terminals. Green lamp turns on before the measurement and turns off after the measurement.

While Lamps HV mode command is enabled the settings of Drive output command for OUT_1 and OUT_2 is ignored.

Parameters

| State | On – enables Lamps HV mode |
|-------|-----------------------------|
|       | Off – disables Lamps HV mode |

**Lamps Pass / Fail mode**
Drives external lamps through OUT_3 and OUT_4 outputs.
During measurement the lights reflect status icon in single test.
After measurement
- ‣ Blue lamp (OUT_3) lights ON when test has passed. Lamp is lit until next step is started.
- ‣ Yellow lamp (OUT_4) lights ON when test has failed. Lamp is lit until next step is started.
- ‣ Lights turn off at the beginning of next step.

While Lamps Pass / Fail mode command is enabled the settings of Drive output command for OUT_3 and OUT_4 is ignored.

Parameters

| State | On – enables Lamps Pass / Fail mode |
|-------|--------------------------------------|
|       | Off – disables Lamps Pass / Fail mode |

**Buzzer mode**
Passed or failed measurement is indicated with beeps.
- ‣ Pass – double beep after the test
- ‣ Fail – long beep after the test

Beep happens right after single test measurement.

Parameters

| State | On – enables Buzzer mode |
|-------|---------------------------|
|       | Off – disables Buzzer mode |

**External TEST / OK key mode**
Instrument enables external TEST / OK key (OK / ENTER / TEST / HV TEST) by activating INPUT pin 5 reading condition. Functionality of the EXTERNAL OK KEY mode is the same as of the OK / ENTER / TEST / HV TEST key.

Parameters

| State | On – enables External TEST / OK key mode (INPUT pin 5 is active) |
|-------|------------------------------------------------------------------|
|       | Off – disables External TEST / OK key mode |

**No notifications mode**
Instrument skips pre-test warnings (see CE MultiTesterXA User Manual, chapter *4.4 Symbols and messages* for more information).

Parameters

| State | On – enables No notifications mode<br>Off – disables No notifications mode |
|---|---|

**Appliance info**
Instrument enables to automatically add the appliance name to the Auto Sequence®.

Parameters

| Repeat Setting | Repeat: | The same Appliance ID will be offered each time if the same Auto Sequence® is carried out successively in a loop. |
|---|---|---|
| | Increment: | A four digit number will be added to the Appliance ID and incremented each time if the same Auto Sequence® is carried out successively in a loop. |
| Appliance type | Selects the type of the appliance (Appliance, Appliance_FD) | |
| Default Appliance ID | Enter default Appliance ID | |

> **Note**
> ‣ This flow command is active only if Auto Sequence® is started from the Auto Sequences® Main menu.

**Flow Protocol**

This flow command controls commands for communication with external device for the control of the flow of Auto Sequence®.

Parameters

| Communication settings | Selects the port for communication with the external device.<br>   -   RS232(PC)<br>   -   USB | | |
|---|---|---|---|
| Flow settings | Commands for communication with external device<br>(industrial PC for example) | | |
| | ☑ Proceed | Send string:   **Proceed**<br><br>Description: If Proceed Flow setting is enabled, implementation of Auto Sequence® on instrument can be automatically controlled by external device by using **Proceed** string command. Command works in parallel with OK / ENTER / TEST / HV TEST keys and the EXTERNAL TEST / OK key mode. Proceed Flow setting is disabled by default. | |
| | ☑ End + Status | Recived strings:     **End - pass**<br>                   **End -  fail**<br>                   **End - none**<br>                   **End - empty** | |

| | | Description: Instrument sends string to external device at the end of each Measurement step. End + Status Flow setting is disabled by default. |
|---|---|---|
| | ☑ Alarm | Recived string: **Alarm** <br><br> Description: Instrument sends "Alarm" string to external device if "empty" status is detected and if both conditions - "Fail" status at the end of measurement step and flow command OPERATION AFTER END OF TEST – fail is set to "manual". Alarm Flow setting is disabled by default. |

**Operation after end of test**
This flow command controls the proceeding of the Auto Sequence® in regard to the measurement results.

Parameters

| Operation after end of test – pass – fail – no status | The operation can be individually set for the case the measurement passed, failed or ended without a status. | |
|---|---|---|
| | Manual: | The test sequence stops and waits for apropriate command (TEST key, external command...) to proceed. |
| | Auto: | The test sequence automatically proceeds. |

**Result screen**
This flow command controls the proceeding after the Auto Sequence® has ended.

Parameters

| ☑ Local Save | Auto Sequence® is stored in the momentary workspace. <br><br> A new Node with the date and time will be created. Under the Node results of the Auto Sequence® or (if Appliance info flow command is set) a new appliance and the results of the Auto Sequence® will be stored. <br><br> Up to 100 results of Auto Sequence® or appliances can be automatically stored under the same node. If more results / appliances are available, they are split to multiple nodes. <br> Local Save Flow setting is disabled by default. <br><br> **Notes** <br> ‣ This flow command is active only if Auto Sequence® is started from the Auto Sequences® Main menu (not from Memory organizer). |
|---|---|