METREL Medical ES Manager

Instruction manual

Version 1.1.2

METREL®

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Use the Bookmarks on the left side of the window to select or search for a topic. You can also select one of the following **Quick links** to start learning about ES Manager.

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- Getting started

Note

Please note that some parts of program can be changed without notice in new software versions, and therefore might differ from the information in this manual. If you encounter such differences, we will gladly accept your e-mail with your suggestions and include or change the necessary information in our next hotfix or update

.

2 Introduction to Metrel Medical ES Manager

2.1 What is Metrel Medical ES Manager?

Metrel Medical Electrical Safety Manager is a PC software application for management of safety of medical equipment.
It can be used in combination with new Metrel's test equipment for medical environment.
Medical ES Manager enables:

- Pre-treatment of test element structures on the PC.
- Uploading and downloading test results to/from the instrument, downloading.
- Viewing, editing, archiving of test data.
- Generating and printing test reports.
- Creating custom Auto Sequence® tests and custom inspection test.
- Carrying out measurements directly from the PC
- Connection to Metrel Cloud / Webreports

Functionality of the Metrel Medical ES Manager PC software program depends on the licence key, which is always related to the serial number of the purchased instrument.

3 End-User Licence Agreement

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4 Software Installation

4.1 System Requirements

Before installation, you should check that your system meets the following requirements:

Supported Operating Systems:

- Windows 10, 32-bit or 64-bit
- Windows 11

Installed System Memory (RAM):

- 4 GB (8 GB recommended)

Hard Disk Space:

- At least 650 MB of free space for the installation files and documentation
- Additional 280 MB (x86) or 610 MB (x64) of free space if Microsoft.NET Framework (4.0 or higher) is not previously installed
- Additional disk space (20 GB recommended) is needed for downloading and saving Medical ES Manager data files (A single Metrel Medical ES Manager data file can be up to 8 GB). Additional disk space (20 GB recommended) is needed for downloading and saving Metrel Medical ES Manager data.

4.2 Installing the software

To install the software, download the application from Metrel Download centre and start the installation by running setup.exe.
The installation wizard will guide you through the selection of language used during installation procedure, and installation folder selection (where Metrel Medical ES Manager program will be installed). The default location offered is 'C:\Program Files (x86)\Metrel\Medical MESM ' Browse for your preferred location if you want to change it.
By default the option 'Associate Metrel Medical ES Manager with .padfx file extension' is checked. Metrel Medical ES Manager will be started automatically when data structure file (*filename.padfx*) is opened from PC file manager.
Check 'Create a desktop shortcut' to add an icon for starting Metrel Medical ES Manager from the Windows desktop.
A survey of selected Metrel Medical ES Manager options is presented before the starting the installation. See *Figure 4.1*. Click Install to continue with installation or Back if you want to change settings.

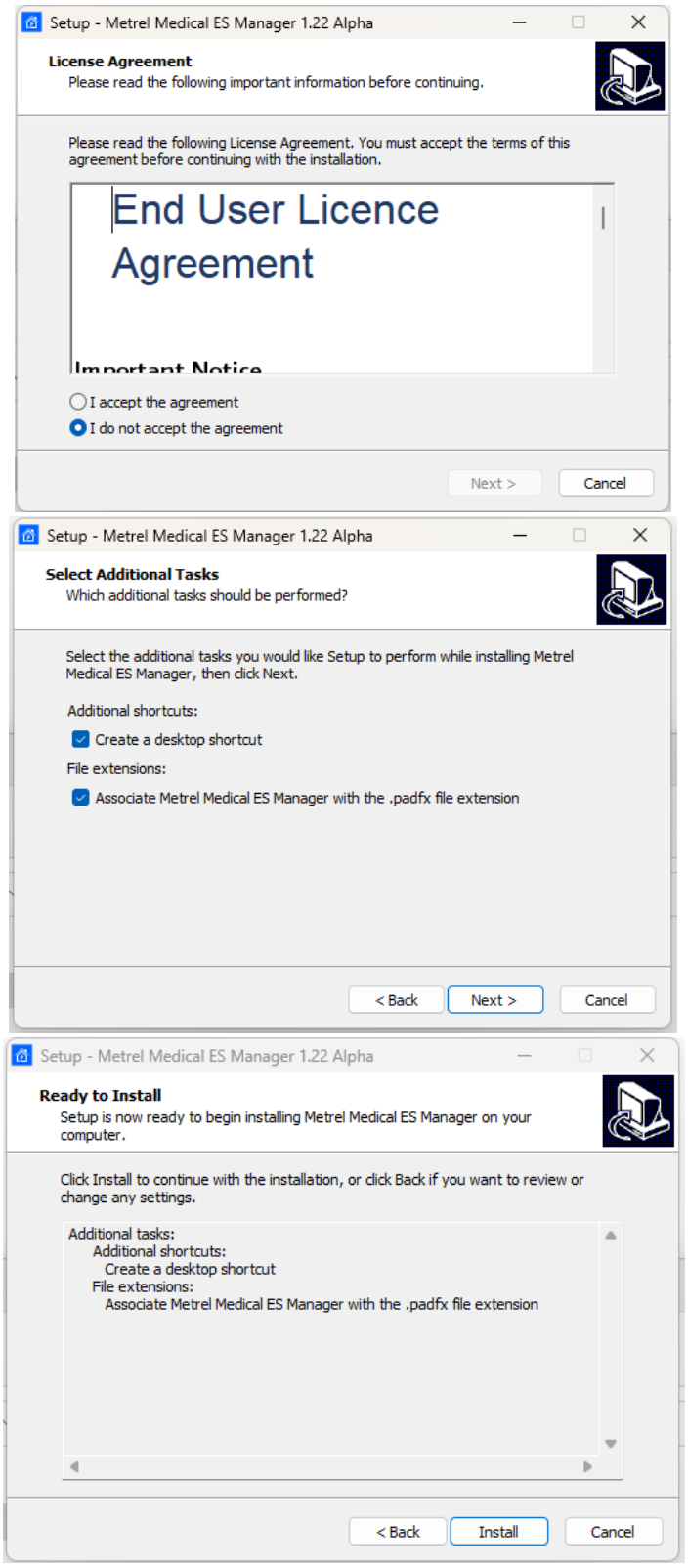


Figure 4.1: Survey of Metrel Medical ES Manager setup options

During the installation the Device driver Installer wizard is opened to guide you through measuring instrument driver installation. Select Next to proceed. Survey of installed drivers is presented on the screen, see Figure 4.2. Select Finish to switch back to Metrel Medical ES Manager Installation wizard. Option 'Launch Metrel Medical ES Manager' is checked by default. Select Finish to exit installation and start Metrel Medical ES Manager.

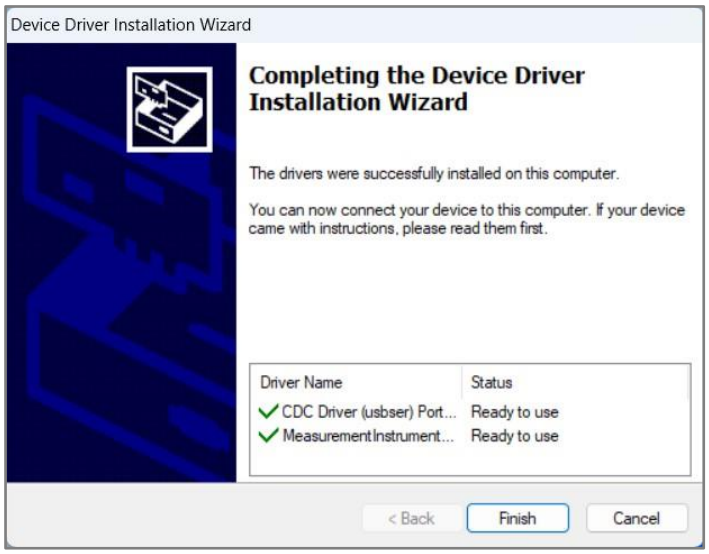


Figure 4.2: Survey of Measurement instrument driver installation

4.3 Metrel Medical ES Manager first use

When Metrel Medical ES Manager is first launched, Instrument pairing wizard (*Figure 4.3)* appears on the screen. It will guide you through automatic synchronization of licence purchased with Metrel instrument. Connect Metrel instrument to the PC and select Pair my instrument. Metrel Medical ES Manager will automatically collect instrument data.
Automatic pairing can be skipped on the first use and done manually at any later time when the instrument is connected to the PC.
During Instrument pairing, Metrel Medical ES Manager can find firmware upgrade for the connected instrument, provided the PC is connected to the internet.

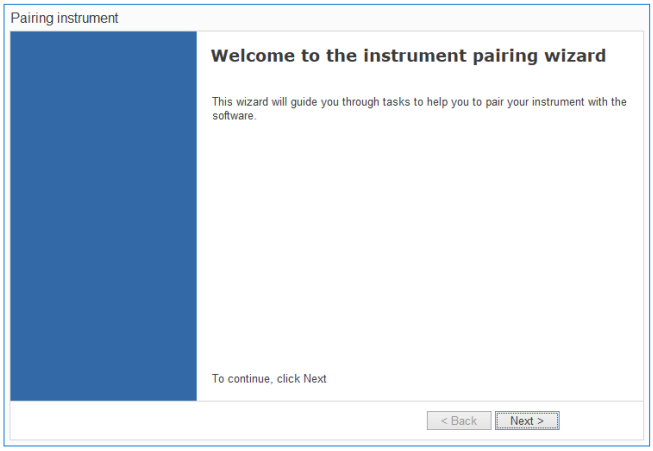


Figure 4.3: Instrument pairing wizard

4.4 Software updates

Internet connection is required for automatic detection of the latest Metrel Medical ES Manager update. When the new version of software is detected, Metrel Medical ES Manager will display a message with a link in the bottom right corner of the screen during every start-up. Click on it to download and install the latest version of Metrel Medical ES Manager software.

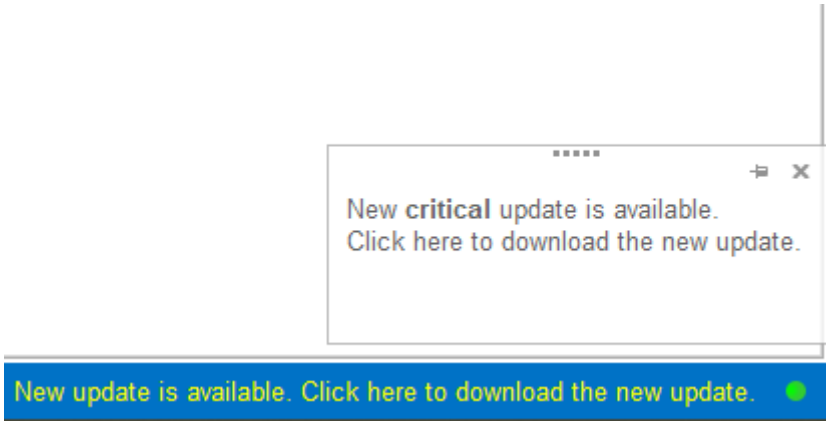


Figure 4.4: Update message and a link

Alternative access to software update is through the About screen. For details regarding the new software version (new features, bugs fixed, ...) see Release notes.

Figure 4.5: About screen

5 Getting started

5.1 Quick guides and tutorials

5.1.1 Introductory Guides

Before starting to use Metrel Medical ES Manager, here is some information about its basic features. The following sections will explain the way data is organized in Metrel Medical ES Manager, show you how to use advanced features and perform your work effectively.

- Metrel Medical ES Manager user interface Components
- Creating Data Structures
- Communication with the instruments
- Measurements
- Measurement organiser
- Printing Results
- Creating Reports
- Troubleshooting

6 User Interface Components

6.1 Introduction

After start-up, Metrel Medical ES Manager Welcome screen appears with Menu tabs (❶) on the top and Home tab active in the working area (❷). When connected to the internet, update status presented in bottom right corner (❸) is automatically checked.

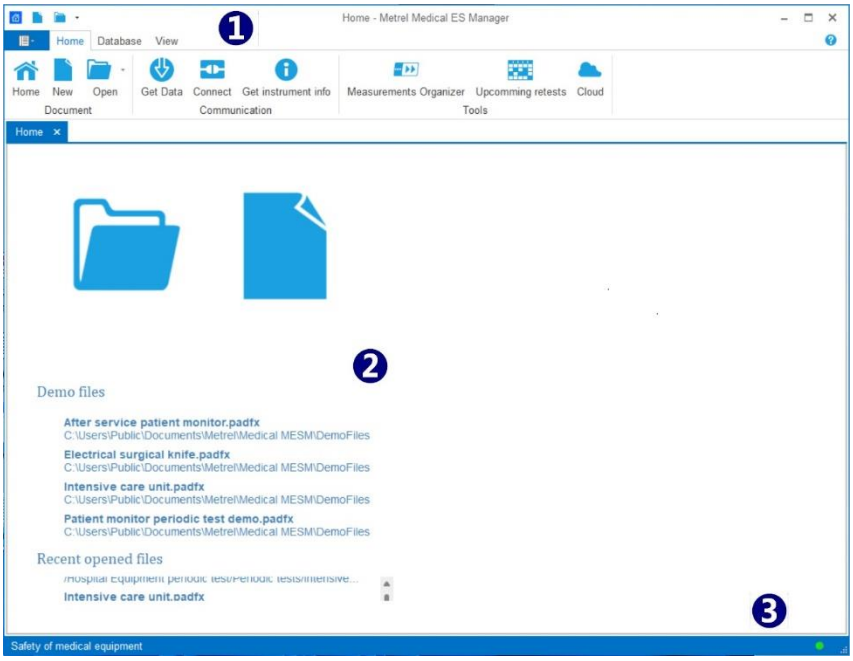


Figure 6.1: Metrel Medical ES Manager startup screen

User options available from welcome screen Home tab working area are:

-  : Open existing or start new data structure file
- **Demo Files**: Open embedded demo data structure files from the list
- **Recent opened files**: Open data file from the list

6.2 Menu Tabs

Menus are organized in tab style, see **Figure 6.2**. Each menu tab opens a subset of functions:

- **Home** tab is active by default. It provides three groups of commands: Document for managing of data files, Communication with instruments, and Tools for starting Measurement organiser.
- **Structure** tab provides Edit commands, Structure elements and Measurements to build custom element structure test database. Testing commands enable to Run tests on the connected instrument, and View of test content.
- **Database** tab provides the client contacts data organization and the structure elements' name customization.
- **View** tab provides commands for main working window appearance organization.

- **Main** menu (the leftmost) tab provides Metrel Medical ES Manager Version data and Help file. Functions include data Import, Export and merging of data files. Settings should be checked before first start.

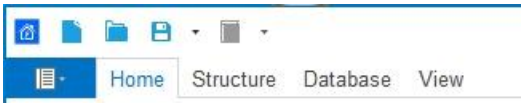


Figure 6.2: Menu tabs

6.2.1 Main tab menu functions

When Main tab is selected, drop down menu for function selection appears on the screen. Document handling functions are common with the Home tab menu, other functions are specific and can be accessed from Main tab menu only.

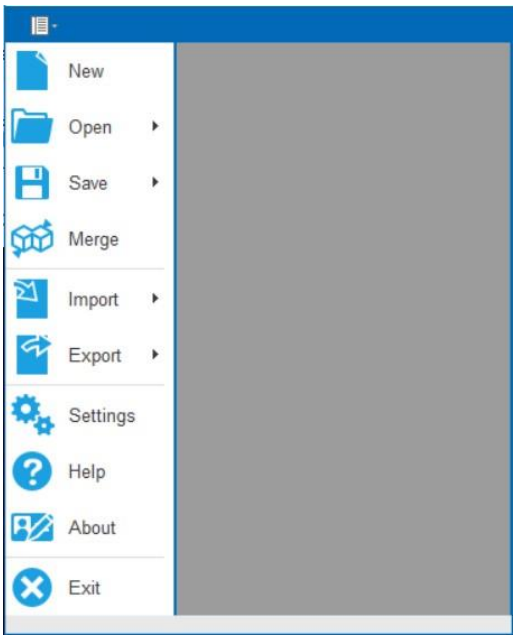


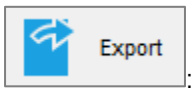
Figure 6.3: Main tab menu

Main tab menu specific functions:

- 

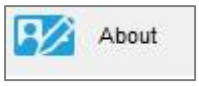
: Combines two Metrel Medical ES Manager Data structure files into single file. From Merge files menu, user can select master file and target file. All data are merged, same items contained in target file are overridden with master file items.
- 

: Support for importing data;
Options:
Import from Exel: Import data from Excel table

- 

: Support for exporting data to Excel or XML file format;
Options:
To Excel Basic PAT export: exports Structure, Test data and Appliance data to Excel table
to xml Basic PAT export: exports Structure, Test data and Appliance data to XML file.
- 

: Opens menu for setting general and global data, language and printout headers. See Chapter 6.2.1.1 Settings Menu for details.
- 

: Opens Metrel Medical ES Manager Help menu. PDF reader must be installed on PC for help file reading.
- 

: Metrel Medical ES Manager version information and Check for software updates option.
- 

: Exits application.

6.2.1.1 Settings Menu

Settings Menu functions are organized in tab style, see **Figure 6.4: Settings Tabs example**.

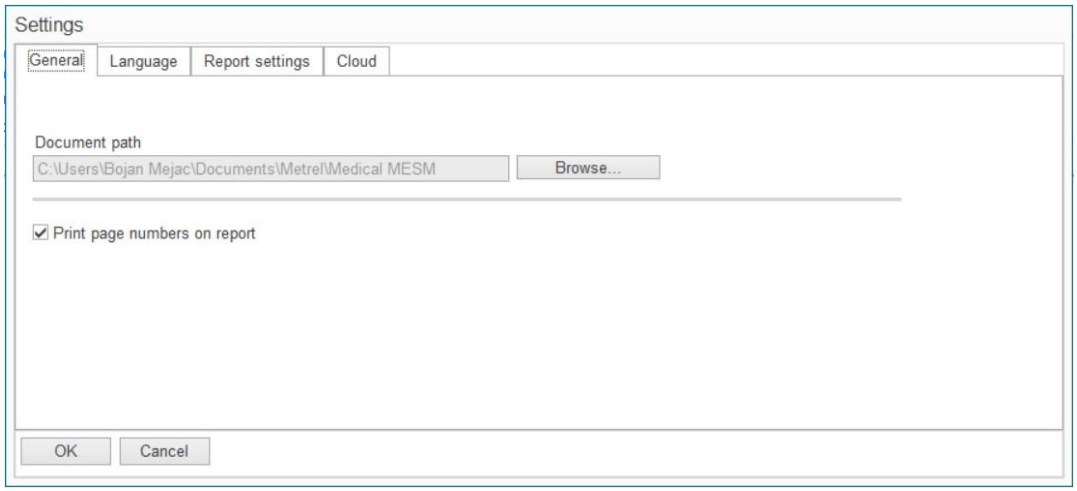


Figure 6.4: Settings Tabs example

General tab functions

Set default folder for Metrel Medical ES Manager Documents. Use browser to select existing or set new folder on PC, then confirm selection.
Default document path is offered every time the document handling functions (Save, Save as, Open) are activated. It is also default search folder when Upcoming retests tool from home tab is activated.
Options: Print page numbers on reports. Uncheck if manual page numbering is required for reports.

Language tab

: Current language is marked with blue dot in selection field. Select user language from the list. New selection will take effect after Metrel Medical ES Manager restart.

Report settings tab

User can choose a custom logo to appear on the printout of the results.

Cloud tab

For communication with Metrel Cloud, User API key should be generated in Metrel Cloud and copied into the API key field.

Option:

: Check to select Metrel Cloud as default save location.

6.2.2 Home tab functions

Function groups provided from Home tab menu are:

- Document
- Communication
- Reports
- Tools

Figure 6.5: Home tab menu

6.2.2.1 Document

- 

: Navigates to welcome screen.
- 

: Creates a new, empty Metrel Medical ES Manager document/database.
- 

: Opens an existing Metrel Medical ES Manager file from PC or Cloud.

- 

: Save the Metrel Medical ES Manager file to PC or Cloud.

6.2.2.2 Communication

Communication menu contains commands related to downloading data from / uploading data to instruments.

- 

: Gets data from instrument.
- 

: Sends data to instrument.
- 

: Opens menu window for managing transfer of group of data files between connected instrument and PC
- 

: Basic information and Firmware update status (if PC is connected to the internet) of the instrument are presented on the screen.

6.2.2.3 Reports

- 

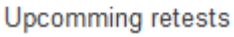
: Opens window with list of Web Report templates from Cloud. Select template and *Create report* command to open Web Report Editor application.

6.2.2.4 Tools

- 

: Opens Results report in Preview window, from which page layout could be edited before printing or exporting to pdf or image file.
- 

: Application for creating Groups of Auto Sequence® tests and Custom inspections. Refer to instrument Instruction Manual for more information on Single tests and Auto Sequence® tests creation.

- 

Opens menu window for managing Scheduled retests.
Note: Document path should be set first (see chapter 6.2.1.1 Settings Menu); Scheduled retest editor will automatically search for appliances within Data structure files saved in the set folder location.

- 

: Opens Metrel Cloud location, if User is already signed in. If not, Sign-in window is opened.

6.2.3 Structure tab functions

Structure tab provides Structure elements, Measurements and necessary editing commands to create custom tree-like structure of the test project. Structure tab Menu groups (**Figure 6.6)** are:

- Edit
- Structure
- Measurements
- Testing
- Filtering

Elements of the tree structure can be equipped with measurements to be performed on test project. When data communication is active between PC and instrument, measurements can be performed directly from the PC on the instrument with connected test object.
Test project data file can be stored on PC and uploaded to the instrument also.

Figure 6.6: Structure tab menu groups

6.2.3.1 **Edit menu group**

Basic editing command icons are provided in Edit menu group. By clicking on icon, command is executed on selected data structure element. By mouse right-clicking on data structure element, context sensitive menu appears on the screen, from which additional editing commands can be selected (**Figure 6.7.**). Depending on the node selected, different menu items which apply to that type of node will be displayed.

- 

: Copies selected data structure element together with all subtree data structure elements and associated measurements to the clipboard.

- 

: Paste data from the clipboard to the selected data structure element within existing or another data structure file. The results of measurement are not included.

Measurements are pasted as new empty measurements. Command is disabled if no data was copied or if the current selected element does not allow pasting.

- 

: Paste data from the clipboard to the selected data structure element within another data structure file. When within same file, command is executed as Paste as new; duplicates of unique elements are not allowed within same file. Command is disabled if no data was copied or if the currently selected element does not allow pasting.
- 

: Deletes the currently selected data structure element together with all subtree data structure elements and associated measurements.
- 

: Cut the currently selected data structure element together with all subtree data structure elements and associated measurements to the clipboard. Only active in the Results area.
- 

: Paste cut items from the clipboard to the selected data structure element within existing or another data structure file. Command is disabled if no data was cat or if the currently selected element does not allow pasting.

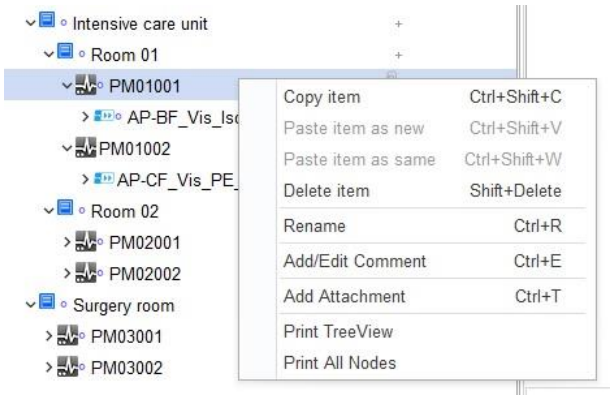


Figure 6.7: Context sensitive edit commands

6.2.3.2 Structure menu group

Menu group Structure contains structure elements for design of custom specific Data structure for each test project (**Figure 6.8**). With click on element it is inserted into the structure tree.
Structure elements are in hierarchical relationship. Parent element type (currently selected element within tree structure) define which elements can be inserted as child elements. Those elements are highlighted, and the rest of elements are dimmed. By positioning the mouse pointer to the element, its name and description are presented.

Figure 6.8: Structure elements

6.2.3.3 Measurements menu group

Measurements menu contains selection tools for adding Single tests, Auto Sequence® tests and Inspections to the structure elements.

- 

: Opens list of available single tests, select one by clicking on it name. The window with settings for the selected test will open. Set parameters and limits, then confirm. Single test is appended to the selected element within Structure tree.
- 

: Opens list of available Auto Sequence® tests (if Auto Sequence® Group file (*.atmpx) was opened before). Double-click on Auto Sequence® test to add it to the selected element within Structure tree.
Options: Browse for Auto Sequence® Group file. This menu is available by clicking on the triangle inside the button. First opens browser to navigate to the Auto Sequence® Group file default storage location; second option is to browse to alternative location.
Select Auto Sequence® Group file and confirm selection to open it. New Auto Sequence® Group file will replace existing.
Note: Only one Auto Sequence® Group file can be opened at the same time.
- 

: Opens list of standard inspections. Select one by clicking on it name. The window with settings will open. Confirm selection. Inspection is added to the selected element within Structure tree.
Note: Custom created Inspections can be created and used as measurements within Auto Sequence® test, refer to Chapter *10 Measurement Organizer* for details. Note that testing by standard IEC 60601 requires the potential inspections to be custom created.

6.2.3.4 Testing menu group

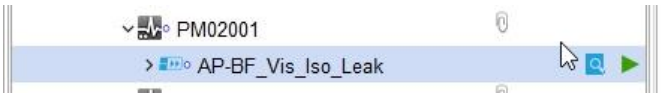
Testing commands are active when a measurement in the Data structure tree is selected. Measurement must be attached to a corresponding structure element.

- 

: Opens selected measurement in separate window for detailed overview of test flow, properties, settings, limits and detailed results if available.
- 

: Opens selected measurement in separate window to run it on the connected instrument.

- Testing menu commands are also available within Data structure tree.



6.2.3.5 Filtering menu

- 

: Opens Filter tab at the top of Results view area of the User workspace. Multiple Filter tabs can be opened simultaneously. See chapter *6.3.3.1 Results view filters* for more details.

6.2.4 Database Tab

Frequently used data can be saved to the organized tables provided in Database tab. This data can be appended to the Structure elements or to the Print results header (see Settings / Printout headers). Appearance of the Database tab menu is presented on **Figure 6.9**. Its main areas are:

- Contacts
- Structure names
- Custom Lists

Figure 6.9: Database tab – Client list in Contacts group is selected

6.2.4.1 Contacts data lists

Organized tables are provided for custom Contacts data entries (Organization, Name, Address, Telephone, email etc.), which can be added to the structure elements with simple selection from drop-down list:

- Client (element Client)
- Address of location (element Location)

Edit menu options:

- 

: Clear all data entry from selected Contacts list.

- Delete row : Delete selected row from the Contacts list

6.2.4.2 Structure Names data list

Structure names is a fixed list of elements which can be used to build custom tree-like structure of the test project (**Figure 6.10**). User can customize the name of the element under which it is presented within tree structure.

Structure Names data columns are:

- **Picture**: graphic presentation of the element
- **Default name**: Metrel Medical ES Manager Default Element name
- **Custom name**: User defined name of the element; select current Custom name and edit it.

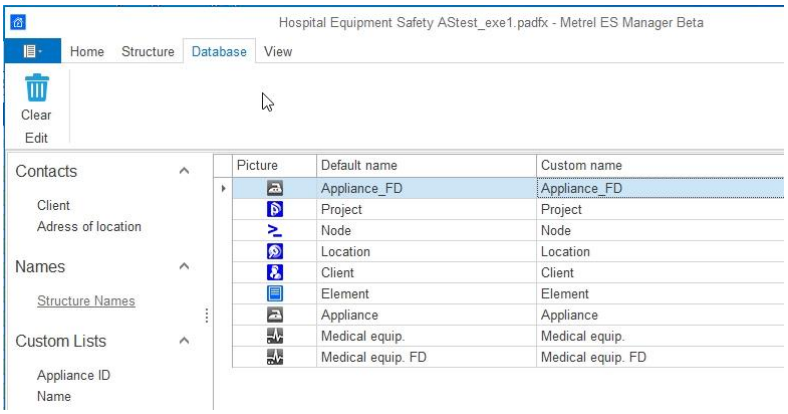


Figure 6.10: Structure Names

Edit options:

- Clear : Structure Names list is set to default state. After Warning confirmation, all Custom names are reset to default names.

Note:
Custom name is always used to present Element within tree structure when added to the location. By default, Custom name is the same as Default name of the element.

6.2.4.3 Custom Lists

Additional Custom data lists (**Figure 6.11**) are provided for entry of frequently used data of test objects, which could be appended to the structure elements presenting electrical equipment, with simple selection from drop-down list:

- **Appliance ID** (empty list by default)
- **Name**: name of electrical equipment (partially completed list by default, user can add new names)
- **Group**: name of equipment group (partially completed list by default, user can add new groups)
- **Location (Room):** name of the space location (empty list by default)

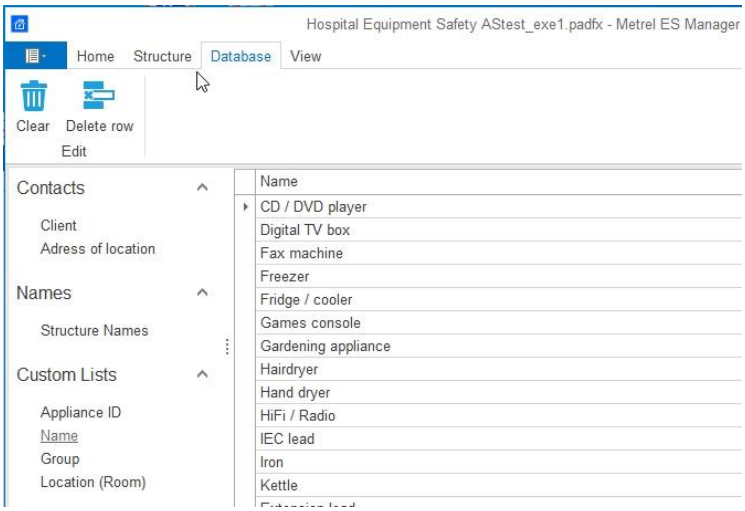


Figure 6.11: Custom list Name

Edit menu options:

- Clear : Selected list is restored to default state, custom entries are deleted.
- Delete row : Delete selected row from the list.

6.2.5 View tab

View tab provides commands (**Figure 6.12**) to control appearance of the User workspace, where detailed content of opened data structure files is presented. By default, opened Data structure files are presented in cascaded tabs. Options are:

- Tile Vertically: opened files are tiled vertically within user workspace.
- Tile Horizontally: opened files are tiled horizontally within user workspace.
- Close all documents: close all opened data structure files including the Home tab of the user workspace.
- Reset window layout: switch to default cascaded tab presentation of opened files.
- Switch windows: opens drop-down menu for selection of active data structure file.

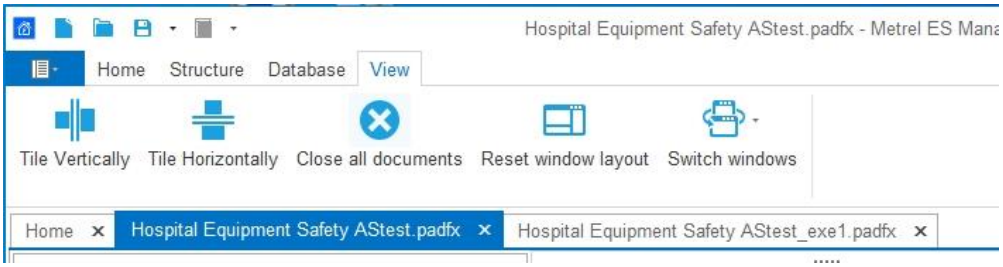


Figure 6.12: View tab options

6.3 Metrel Medical ES Manager User workspace

User workspace is presented on the **Figure 6.13** below. Multiple Data structure files can be opened at the same time. Their names are listed within document tab strip (❶), currently active data structure file tab is highlighted.
Data structure file content is presented in three main areas within User workspace, each providing special insight into the file data content, for easier navigation and data survey:

- **Tree View** window (❷)
- **Result view** area (❸),
- **Properties** window (❹)

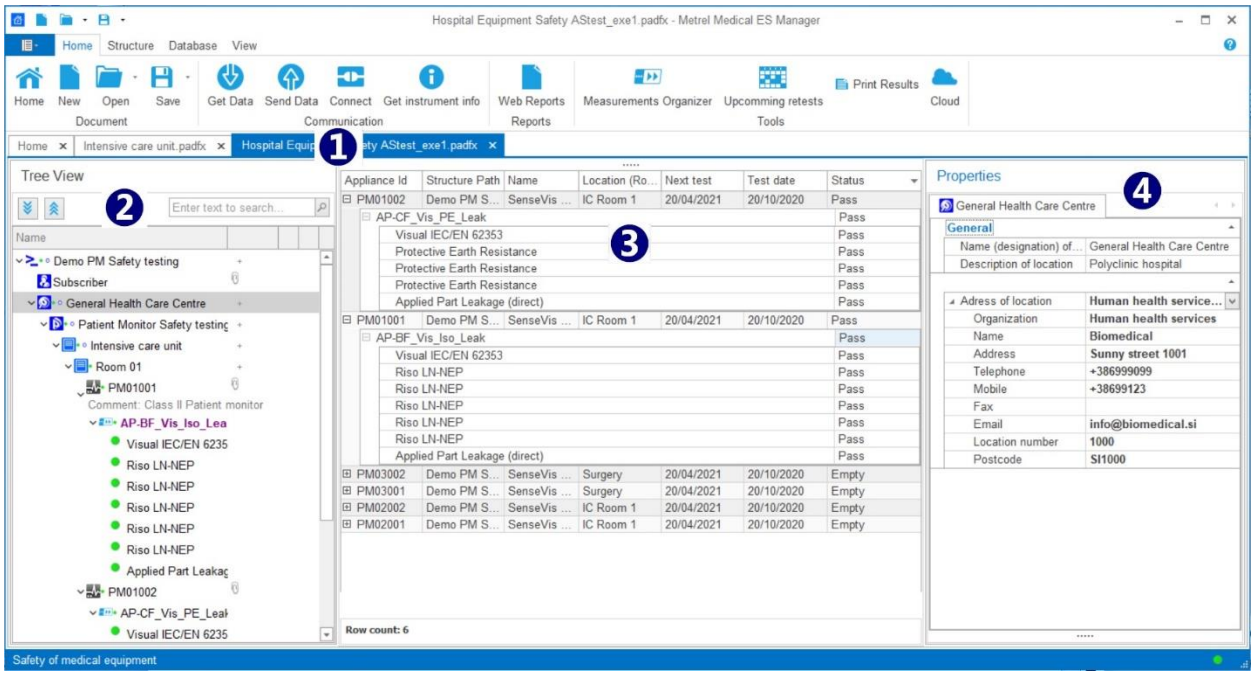
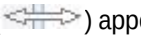


Figure 6.13: User workspace

6.3.1 User workspace management

Result view area is always in the centre of user workspace and acts as container (parent) window to which Tree View window and Properties window are appended. When data structure file is opened or downloaded from the instrument, Tree View window and Properties window will be docked on the left and right side.
User can manage appearance of workspace with:

- **Resize Tree view and Properties window width**: position mouse marker on window edge. When an arrow () appears, left click and drag it to the left or right.
- **Resize Result view columns**: position mouse marker on column on the left side edge in title bar. When an arrow () appears, left click and drag it to the left or right.

Note:
Result view area is always expanded between Tree view and Properties window.

6.3.2 Tree view options

The tree view (see **Figure 6.14**) allows you to navigate through the data structure and displays the status of the measurements performed on elements by adding measurement status symbols to element icons.

When measurement is selected, Testing commands are offered for detailed results survey or execution on the connected instrument.

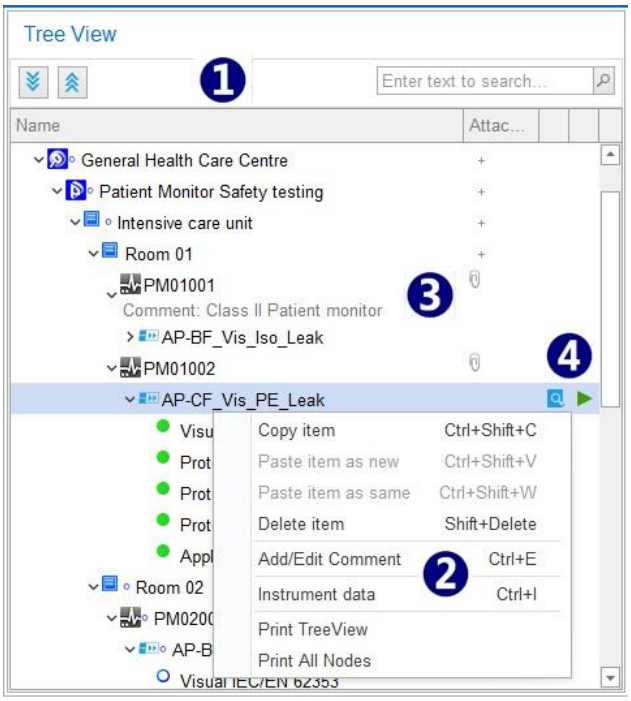
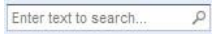


Figure 6.14: Tree View

Use buttons under the window title (❶) to navigate:

-  : Expand all nodes of the data structure.
-  : Collapse all nodes of the data structure.
- 

: Find panel to search for the text string entered to the field. All string appearances are highlighted within data structure tree.

Use triangle mark in front of the element to expand / collapse subtree nodes:

-  : Structure element subtree is collapsed: click triangle mark to expand node.
-  : Structure element subtree is expanded: click triangle mark to collapse node.

Right click on the structure element opens menu window (❷) with commands:

- **Copy, Paste as new, Paste as same, Delete, and Rename** items are functions for manipulating data structure elements and measurements.
- **Add / Edit Comment**: Write short comment which appears as a string below selected element (❸).
- **Add Attachment**: Add attachment to the selected element. Notification () appears in the attachment column of the data structure tree. Attachments can be any type of data (picture, text file, element, etc), and it can be opened, edited or removed. Click on the notification to present a list of attached elements. Attachments are not available for measurements.
  Note:
  Attachments are only stored in the data structure file and will not be sent to the instrument. In case the data structure file with attachments is sent to the instrument and then

downloaded into a new data structure file, attachments will be lost. Download the measurements into the same data structure file to keep using them.

- **Print Tree View:** opens the current Tree view (only selected nodes expanded) in Preview manager window. Preview contains all standard functions for editing printable files. It is possible to edit Header and Footer or set Background colour. It is also possible to export edited document in .pdf format.
- **Print All Nodes:** expands all nodes and opens the Tree view in Preview manager window.
- **Instrument data:** opens a window with the data of the instrument with which measurement was performed. Available for finished measurements (single tests or Auto Sequence® tests) only.

Testing commands buttons (❹) appear at the right end of selected measurement, used for:

-  View : Opens selected measurement in separate window for detailed survey of test flow, properties, settings, limits, and detailed results (if measurement is already executed).
-  Run : Opens selected measurement in separate window with commands provided to set communication port and run measurement on the connected instrument.

Structure element test status indication

Auto Sequence® and other structure elements' test status is indicated with a dot following the icon:

-  : Empty status (not yet performed) measurement is associated with element; click the triangle in front to expand branch and view content of the measurement.
-  : Performed measurement with Fail status is associated with the element; click the triangle in front to expand node and view individual test status.
-  : Performed measurement with Pass status has no special indication; click the triangle in front to expand node and view individual test status.
-  : Element without a triangle mark in front has no measurements associated.
-  : At least one measurement in the element subtree has a Fail status.
-  There are measurements with Empty status and with Fail status within element subtree.

Single test measurement status indication

Measurement status is indicated with circle in front of Single test name.

-  : Passed finished measurement with test results performed by the instrument.
-  : Failed finished measurement with test results performed by the instrument.
-  : Finished measurement with test results and no status performed by the instrument.
-  : Empty measurement without test results.

6.3.3 Results view area options

Table with extended information organized in columns is located within the Result view area (**Figure 6.15**):

- **Appliance ID**: identification of the tested appliance.
- **Structure path**: Appliance directory within the data structure tree.
- **Name**: Appliance name.
- **Location (Room)**: Appliance location
- **Next test**: Date of next test for the Appliance with set Test period.
- **Test date:** Test Date from the instrument.
- **Status:** Test status

The Appliances table is focused on the selected element within the Tree View; measurement results associated with the appliances located within the subtree structure of the selected element are listed in the table.

Interactively, when a left click is applied on the Appliances table row within the Result view area, an adequate Tree view branch is expanded, and the selected item is highlighted.

Appliance test status and appended **measurement status** is written in Status column; click on + in front of table row to expand content and survey measurement status details:

- **Pass**: Passed finished measurement with test results.
- **Fail**: Failed finished measurement with test results
- **Nothing**: Finished measurement with test results and no status.
- **Empty**: Empty measurement without test results.

Appliance Id	Structure Path	Name	Location (Room)	Next test	Test date	Status
⊟ PM01001	Demo PM Saf...	SenseVis BF50	IC Room 1	20/04/2021	20/10/2020	Pass
⊟ AP-BF_Vis_Iso_Leak						Pass
Visual IEC/EN 62353						Pass
Riso LN-NEP						Pass
Riso LN-NEP						Pass
Riso LN-NEP						Pass
Riso LN-NEP						Pass
Riso LN-NEP						Pass
Applied Part Leakage (direct)						Pass
⊟ PM01002	Demo PM Saf...	SenseVis CF80	IC Room 1	20/04/2021	20/10/2020	Pass
⊟ AP-CF_Vis_PE_Leak						Pass
Visual IEC/EN 62353						Pass
Protective Earth Resistance						Pass
Protective Earth Resistance						Pass
Protective Earth Resistance						Pass
Applied Part Leakage (direct)						Pass
⊟ PM02001	Demo PM Saf...	SenseVis BF5...	IC Room 1	20/04/2021	20/10/2020	Empty
⊟ AP-BF_Vis_Iso_Leak						Empty
Visual IEC/EN 62353						Empty
Riso LN-NEP						Empty
Applied Part Leakage (direct)						Empty
⊞ PM02002	Demo PM Saf...	SenseVis CF80	IC Room 1	20/04/2021	20/10/2020	Empty
⊞ PM03001	Demo PM Saf...	SenseVis BF5...	Surgery	20/04/2021	20/10/2020	Empty
⊟ PM03002	Demo PM Saf...	SenseVis CF80	Surgery	20/04/2021	20/10/2020	Empty
⊞ AP-CF_Vis_PE_Leak						Empty

Row count: 6

Figure 6.15: Results view area

Note:

Appliance table within Results view area present status of listed Appliances, Auto Sequence® tests, Single tests and Inspections. For detailed survey of test settings, results, sub-results, parameters, limits use Testing command View.

6.3.3.1 Results view filters

Sort filter

- Test date : Click on the column name to activate sort filter indicated with arrow.

Each Appliances table column provides a sort-by-name filter. Active sort column is marked with arrow on the left side of the column name field. Click again to reverse sort order. Sort filter can be active in only one column at the same time.

Appliance table column filter

- Name : Position mouse over column name field and click filter sign appearing on the right-up corner of the cell to activate column filter.

Each column of the Appliance table contains a filter. After filter is selected, menu with filter options appears on the screen. Select the option and close the window to activate the filter. Active column filter remains marked with the blue filter sign within name field, see **Figure 6.16** below.

Appliance Id	Structure Path	Name	Location (R...	Next test	Test date	Status
⊟ PM02002	Demo PM S...	SenseVis CF...	IC Room 1	20/04/2021	20/10/2020	Empty
⊞ AP-CF_Vis_PE_Leak						Empty
⊟ PM03002	Demo PM S...	SenseVis CF...	Surgery	20/04/2021	20/10/2020	Empty
⊞ AP-CF_Vis_PE_Leak						Empty

Figure 6.16: Results view area column filters – Name and Status are active.

More column filters can be active at the same time.
To remove column filter, select it and choose the Clear Filter command from filter settings menu.

Appliances table Custom Data filter

Custom Data filter can be active within any column of the Appliances table, with one or more filters active at the same time.

- ✓ Custom filter : Right click within Results view area to open a menu window and check Custom filter option to open Custom filter design tab at the top of Result view area (❶), see **Figure 6.17**.
- Position mouse over any field within filter tab and click to open additional filter criteria or change or delete it.
- Options available for manage designed Custom Data filter are:
  Apply filter: Filter is applied to the Appliance data table, active data filters are marked within data column name field.
  Save filter: Menu is opened to Name and save filter in Filters folder Medical MESM application.
  Load filter: Load filter from Filters folder of Medical MESM application.
  Save filter as: Menu is opened to Rename and save filter.
  New filter: Opens new filter tab with logic function relationship field by default.
- ✓ Row filter : Custom filter design is offered as a row beneath Address row of the Appliance table (❷), see **Figure 6.17**. Custom filter and Row filter are equivalent. Settings of the Custom filter are mirrored to the Row filter and vice versa.

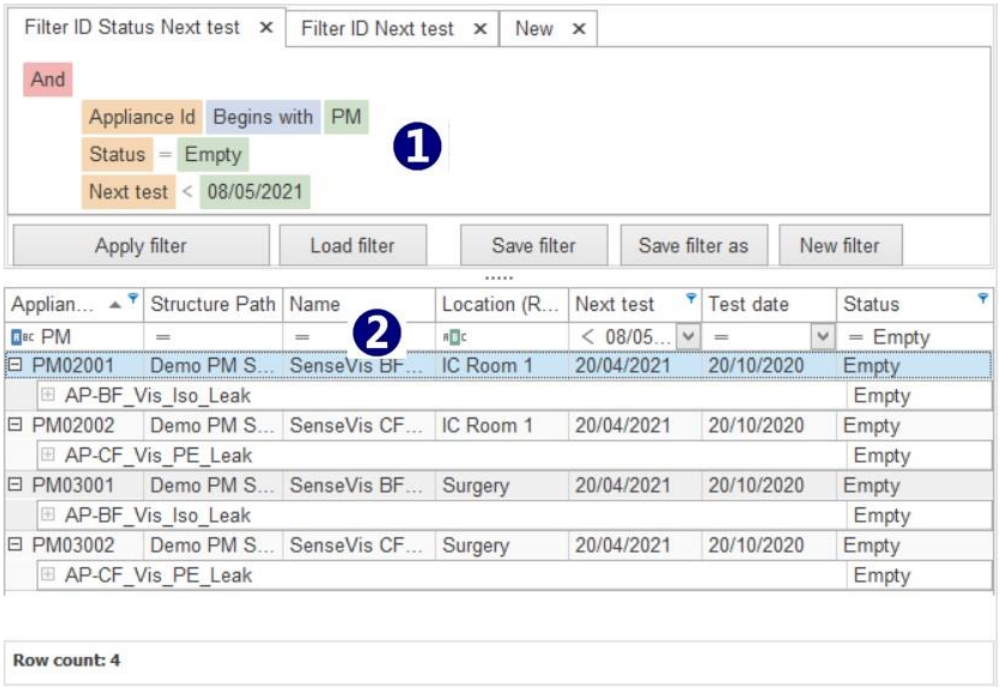


Figure 6.17: Appliance Custom data filter design options

Appliances table Find filter

- Find panel : Right click within Results view area to open a menu window and check Find panel option. Field for Find filter is opened at the top of Result view area (❶), see **Figure 6.18**.
- Filter the table to only rows that contain the chosen string (❷). Search is started when Find button is clicked.
- Appliances table is filtered to the rows containing the string. (❸). The string appearances are highlighted.
- : Click to remove Find filter string and clear entry field.

Figure 6.18: Appliance data Find filter design options

Appliances table commands

Right click within Appliances table offers a menu window from which commands can be selected:

- Clear filters : Clear all filters from Appliances table.
- Delete item : Delete selected item.
- Delete all : Delete all items from appliances table.

6.3.4 Properties window options

Properties window contains description of any element within the project data structure tree. Properties window appearance depends on the properties of the active element type.

The Properties window view in **Figure 6.19** is focused on an element selected in the Tree view.

- Selected element properties and properties of all parent elements within the data structure are presented in separate tabs in the Properties tab strip (❶). By default, selected element tab is active. Click on the parent element tab to see its properties. Use arrows at the end of the tab strip to scroll between tabs.
- List of available properties to the element is presented in the left column (❷). Click the entry field on the right side and to input the property value.
- When a drop-down list of predefined properties is available, arrow will appear at the end of entry field (❸). Click on the arrow to open drop-down menu and select property value.

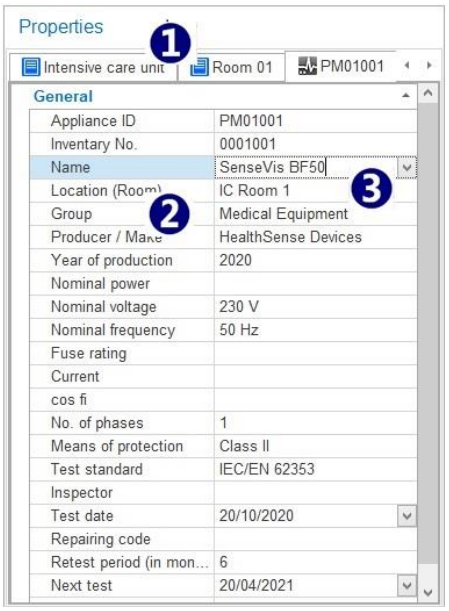


Figure 6.19: Properties window

7 Creating Data Structures

7.1 Considerations on a new test project's data structure

Metrel Medical ES Manager supports creating a tree-like data structure of a test project, with objects under test located on the tree nodes in a hierarchical relationship. Measurements can be appended to the objects before uploading the data structure file to the instrument.

Before opening a new data structure file of a test project, consider:

- **Data structure tree**: determine the data structure of the test project - test objects and their hierarchical relationship within tree-like project presentation.
- **Data lists with properties**: consider the test elements properties needed for consistent results presentation and the test report. Commonly used data can be saved to the lists in the Database tab.
- **Auto Sequence® tests**: For faster test execution, collect the tests necessary for each individual element and create an Auto Sequence® Group of tests. Auto Sequence® test can contain custom created Inspection checklists. Refer to the individual Instrument Instruction manual for details.

7.2 Creating a new data structure file for a test project

To create a new data structure file for a new test project, follow the procedure:

- Optionally, set the document path from Main tab → Settings → General.
- Select Home tab of the user workspace.
- Chose New file from Home user workspace or Home tab (or Main tab).

New data structure file *.padfx is opened, with default file name *New Document**. User Workspace area is empty, except the parent element *Node* is automatically placed into the new Tree view. This is the starting point to create the project data structure. It cannot be deleted: one *Node* must always exist in the structure tree. It can be renamed to reflect the test project subject.

Before starting to create a data structure it is recommended to:

- Rename the file using the Save as command from the Home tab menu, to reflect the test project subject.
- Open the appropriate Auto Sequence® group file containing the required project tests, if available. Only one Auto Sequence® group can be opened at the same time.

7.2.1 Creating a new data structure

Creation of a new Data structure starts from the tree view of the user workspace, see **Figure 7.1**.

- Select Structure tab menu (❶). Available elements are highlighted within Structure group menu.
- Default parent element Node is already selected within the Tree view. Click on the element in the Structure menu group to insert it into the structure tree. It appears as a new tree element (❷), hierarchically as a child element under the parent Node. To place another tree element, repeat the action.
- To add more elements and levels to the tree structure, select an element in the tree view and click on a new element from Structure menu group. It appears as a child element under the selected one. To further expand the levels, select the child element and repeat the action.

- To create another node subtree, select the parent node and repeat placing new elements as child items on the same level (❸). The parent element and its children form a subtree.
- Describe the elements added to the tree structure in the Properties window of user workspace (❹). When Name property is entered, it is automatically updated in the Tree view as well. Each element has a dedicated set of properties, which can be manually entered or selected from the embedded or user created Database lists. Describe all the properties necessary for the desired level of detail for interpreting test results and for well-defined Test Reports.
- Repeat the above actions until the desired test project data structure is finished and save the file.

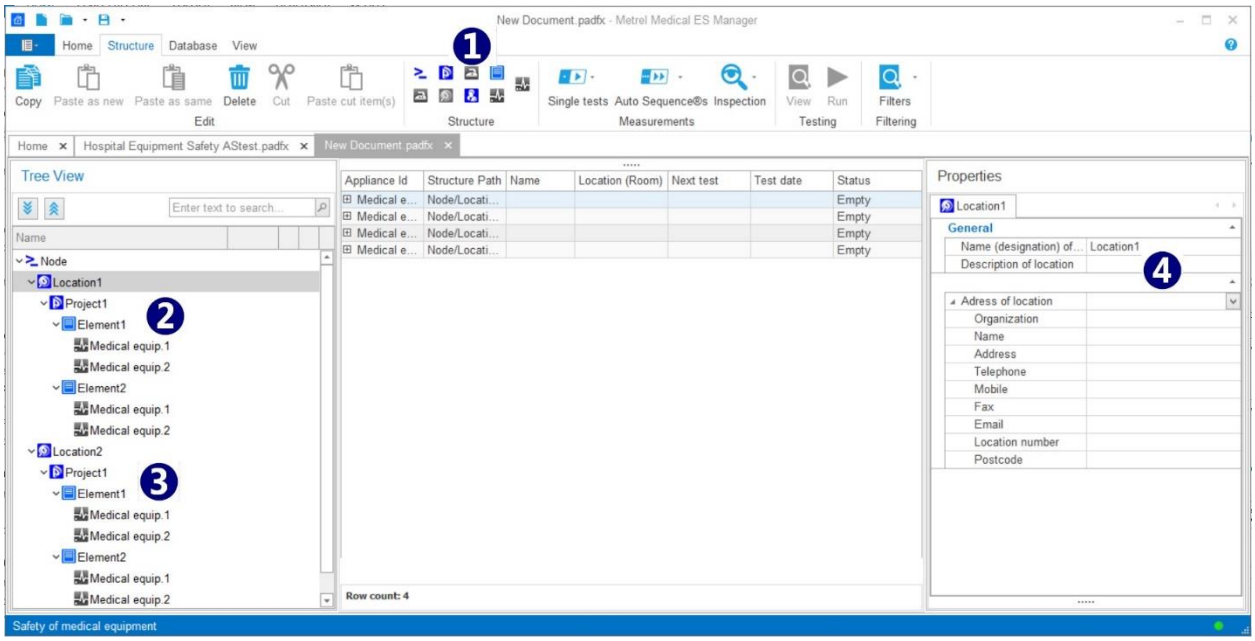


Figure 7.1: Creating a new Data structure

7.2.2 Appending measurements to the data structure elements

It is possible to prepare required measurements (Single tests, Auto Sequence® tests and Inspections) and append them to the test elements.

- The Data structure with pre-prepared measurements can be then uploaded to the instrument.
- Another option is to start measurement on the instrument directly from PC's Data structure.

7.2.2.1 Appending Single tests

- Click on icon Single tests opens a list of available Single tests, organized in groups.
- Expand single test groups and select the single test from the list by clicking on it name. Single test setting window appear on the screen, see chapter *9.1.2 Viewing or configuring the single* tests for setting detailed information.

7.2.2.2 Appending Auto Sequence® test

To append an Auto Sequence® test, the Auto Sequence® Group file that contains it should be opened first. Auto Sequence®s command from the Measurements group of Structure tab menu has two options:

- **Browse for Auto Sequence® group file**:

  - Click on the triangle Auto Sequence®s opens a menu with the command for browsing for the Auto Sequence® Group file. Select the file and confirm selection to open it. The new Auto Sequence® Group file will replace the existing one. Only one can be opened at the same time.
- **Appending the Auto Sequence® test:**

  - Click on the icon Auto Sequence®s opens a list of available Auto Sequence® tests from active Auto Sequence® Group file.
  - Expand the folders to find the requested Auto Sequence® test.
  - Double-click on the Auto Sequence® test to automatically append it to the currently selected element.
  - The set connections, parameters and limits of the Auto Sequence® test can be reviewed. Select Auto Sequence® test and click on the icon on the right side of the tree view to open survey window. See chapter ***9 Measurements*** for more information.

Procedure: **Append Inspection test** 

- Click on the icon opens a list of available standardized Inspections, organized in groups.
- Expand the Inspection group and select the Inspection from the list by clicking on it name.
- Inspection window opens with the default Empty status of inspection items.
- At the top of the tab the meta-data (date and time) can be added to the configurable inspections.
- Click OK to confirm. Inspection is appended to the selected element.

Note:
Only the standardised Inspections are available from Inspection menu list.
Custom Inspections can be created and used as measurements within the Auto Sequence® tests. Refer to Chapter ***10 Measurement Organizer*** for details.

7.3 Creating Data structure using Copy and Paste commands

If parts of the data structure are often repeated, it is possible to create large structures with measurements in a fast and simple way with the help of Copy and Paste commands.
Objects from one data structure can be copied to the structure in another file. Data structures can be copied without measurements, with appended empty measurements or with executed measurements.

Note
Each element and measurement inserted to the data structure has got an internal unique identification. Only one item with same identification can exist within same data structure. See below for more information.

Commands are available from the right-click menu on the element in the Tree view, or from Structure tab Edit menu:

- **Copy command:**

- Selected element and all elements located within the selected subtree structure are copied.
- Measurements appended to the element, empty or executed, are copied.
- Properties of each copied element are copied.

- **Paste as new:**
  - Copied element and all element located within it subtree are pasted to the new selected location.
  - Empty measurements appended to the elements are pasted and remains unchanged.
  - Executed measurements are pasted as empty measurements.
  - All pasted elements and Measurements got new internal unique identification.
  - Properties of each element are pasted and remain unchanged.
- **Paste as same:**
  - Copied element and all elements located within its subtree are pasted to the new selected location.
  - Measurements appended to the elements, empty or executed, remain unchanged.
  - All pasted elements and measurements keep the same internal unique identification.
  - Properties of each element are pasted and remain unchanged.
  - Only possible when pasting into a new file.

Note:
When Paste commands are dimmed, pasting data to the selected location is not allowed due to hierarchical relationship between the copied element and paste element, or no data was copied before.

7.3.1 Example of Copy and Paste within the same data structure file

Copy and Paste as new: a structure element with a sub-tree and either with empty measurements or without them.
Command sequence is useful to expand the data structure with the repeated common nodes, like multiple units, each containing equally equipped rooms (Figure 7.2):

- Select the node with a subtree, for example Intensive care unit (❶) and execute Copy command.
- Select the new location, for example its parent node Patient Monitor Safety testing (❷) and execute Paste as new command; repeat for each new node.
  - Paste as new was repeated twice (❸), creating two new nodes – Intensive care units.
  - All elements within pasted nodes have new unique identifications, but it names and Properties and appended measurements remains the same.
- Select each new element within new nodes and update only their properties (❹), which distinguish them from the copied node elements.

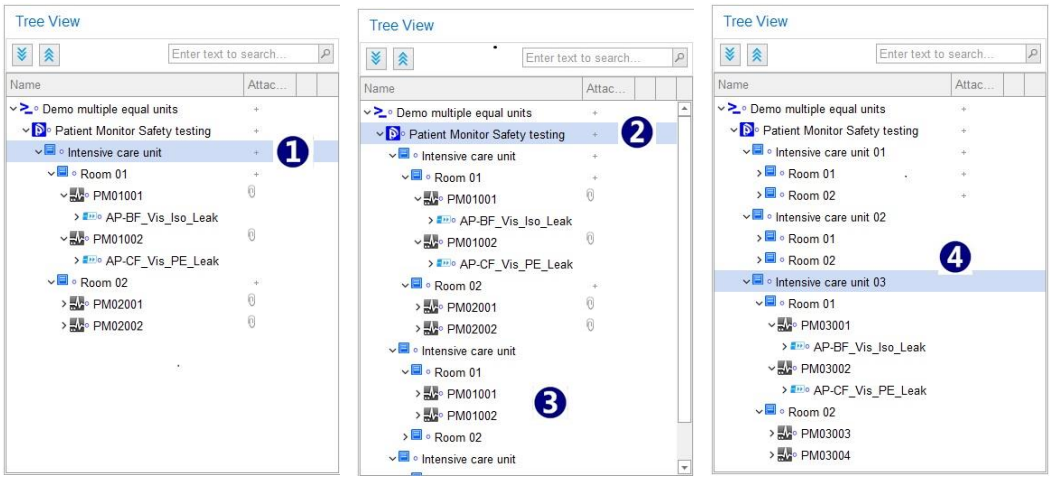


Figure 7.2: Copy and Paste as new operation within same Data structure - empty measurements appended

Copy and Paste as new: a structure element with a subtree containing finished measurements.
The command sequence creates a new data structure with the same elements with the same properties, while the measurements paste as empty. It is useful to perform the same test project again on same or another equal location (Figure 7.3):

- Select the root of the subtree containing finished measurements (❶) and execute the Copy command.
- Select a new location (the new Node in example below) (❷) and execute Paste as new command:
  - Pasted data structure tree and element properties remain the same. All elements have a new internal unique identification to distinguish them from the source elements.
  - All appended measurements are empty (❸), without results. Parameters and limits settings remain the same as they were in the copied measurements. All measurements have new internal unique identification.

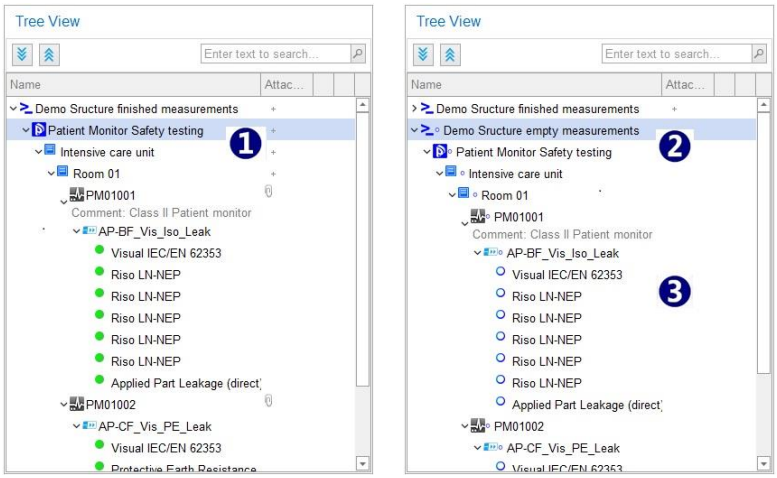


Figure 7.3: Copy and Paste as new operation within same Data structure - finished measurements with results

Copy and Paste as same:
Internal unique identification rule prevents Paste as same command execution within same data structure file. Paste as same command is executed as Paste as new in that case. An information message (**Figure 7.4**) appears on the screen.

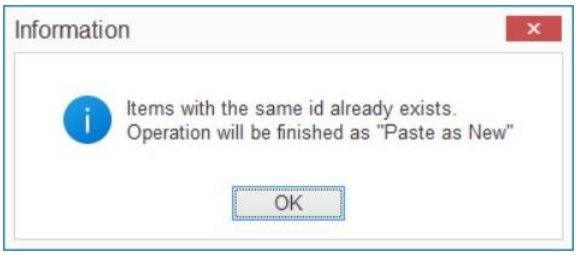


Figure 7.4: Copy and Paste as same within same data structure – information message

7.3.2 Copy and Paste between different data structure files

Source data structure file and the target data structure file should be opened at the same time.

Copy and Paste command sequence execution always begin with same procedure:

- Select source file tab to become active within user workspace.
- Select the root of the chosen subtree from the Tree View and execute the Copy command.

Paste as new:

- Select target data structure file tab to become active within user workspace.
- Select parent element in Tree view in the target data structure and execute the Paste as new command.
    - Pasted Data structure tree and elements' properties remain the same as the source. All elements have new internal unique identifications to distinguish them.
    - All appended measurements from the source file, empty or done, are pasted as empty. Parameters and limits settings remain the same as they were set in the source file. All measurements have new internal unique identification.

The difference between Copy and Paste as new between different files is only in presence of source part of the tree in the target file. For examples of use refer to the chapter **7.3.1 Example of Copy and Paste within the same** data structure file**.**

Paste as same: Source data structure elements have appended empty measurements or no measurements:

- Select target data structure file tab.
- Select the chosen parent element in the tree view and execute the paste as same command.
- Unique identifications of elements and measurements are automatically compared.
    - **Same unique identifications were found**: merge confirmation information window on **Figure 7.5** appears on the screen.
    - Click OK to complete the Paste command with data merging. Another confirmation is needed.
    - Elements and measurements keep internal unique identification.
    - Click Cancel to stop command execution. Data will not be pasted.

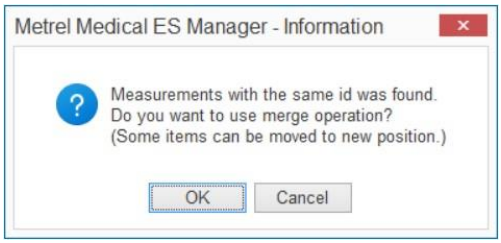


Figure 7.5: Merge confirmation information window

- **No equal unique identifications**: procedure continues with the confirmation window, **Figure 7.6.**
- Click Yes to complete the paste command. Elements and measurements keep internal unique identification.
- Click No to stop command execution, data will not be pasted.

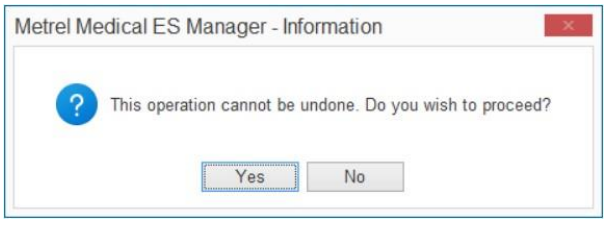


Figure 7.6: Paste as same confirmation information window

Paste as same: source data structure elements with appended finished measurements; target data structure has empty measurements, or finished measurements executed with different instruments:

- **No equal unique identifications within source and target data structures**:
  - Procedure is the same as described above.
- **Equal unique identifications within source and target data structures**:
  - Procedure starts the same as described above until merge confirmation step.

Paste as same: source data structure elements only**;** target data structure elements only:

- User is prompted to select next paste command step, **Figure 7.7**:
  - **Merge duplicates using source data**: target data structure elements with equal identification are updated with source data. The rest are pasted the same as source data.
  - **Relocate structure**: source data will be pasted to Target Data structure as additional node subtree. New elements have new internal unique identification.
- Conclude paste command with response to Information message on the screen, already described above.

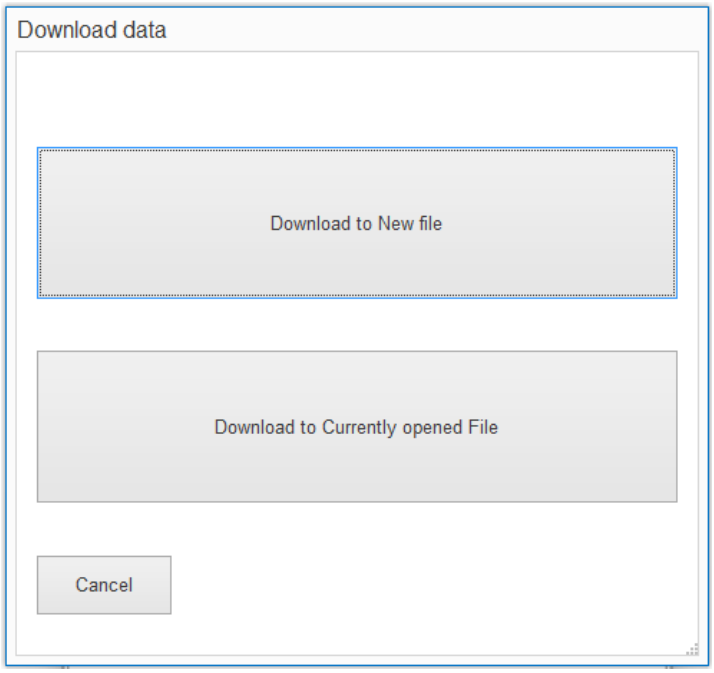


Figure 7.7: Paste as same confirmation information window

7.3.3 Example of merge functionality

We have a test project with multiple identically equipped locations (rooms) and we require a test report for the complete structure.
Complete structure and empty measurements of the test project are uploaded to multiple instruments. Each tester measures its dedicated locations only. Data from all instruments is downloaded to the same Metrel Medical ES Manager.
If the test report is created from the each individual data structure files, each will include complete structure but only the elements downloaded from the relevant instrument will contain finished measurements. This system doesn't fulfil the requirements.
Merge function enables all the downloaded data structure files from different instruments to be merged into a single file that contains the complete structure and complete measurements. Complete test project report can now be created.

Special case: Source data structure elements with appended empty measurements; target data structure elements with appended finished measurements:

- Merged data structure and elements remain the same, empty measurements are appended to the appropriate structure elements in addition to the unchanged finished measurements.

7.3.4 Example of copy and paste as same functionality

We have a test project with multiple identically equipped locations (rooms) and we require a test report for the complete structure.
Same data structure that covers only each single location with measurements is uploaded to multiple instruments. Each tester measures its dedicated location only. Data from all the instruments is downloaded to the Metrel Medical ES Manager.
If the test report is created from the each individual data structure files, will include only the each instrument's measurements and structure, which is not what is needed.
Copy and paste as same function enables data from all locations to be combined into a single document file. Complete test report can now be created.

8 Communication with the instruments

8.1 Establishing communication with instruments

Communication with instruments is established via RS-232 port or USB port.

- Click on Get Data , Send Data or Get instrument info to open a dialog box for setting the parameters of communication.
- From drop-down list select COM port to which instrument is connected.

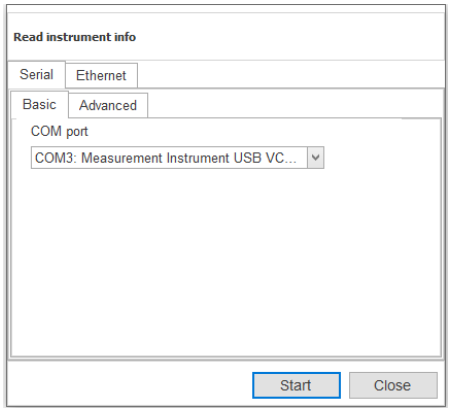


Figure 8.1: Setting communication

8.1.1 Instrument info

Basic information of the instrument (name, short name, manufacturer, type of instrument, serial number, HW version, FW version, calibration date, etc.) and firmware update status can be obtained. If no data is displayed, see the chapter *13 Troubleshooting*.

Options:

- Check for new updates: check if new FW version exists
  - Download: Download the new instrument FW version
- View release notes: open release notes related to the instrument type

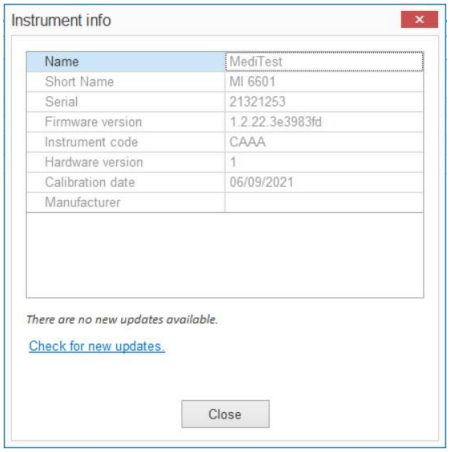


Figure 8.2: Instrument info screen options

8.1.2 Upgrading the Firmware

It is possible to upgrade the firmware on the instruments to the latest version using the Metrel Medical ES Manager. Internet connection is required. When the instrument info window notifies about an upgrade, click Download and follow the instructions. Upgrading program (Flashme) will start and guide you through the upgrade procedure.

Note

For detailed set up procedure please see the user manual of the attached instrument on your computer! User manuals can be downloaded from our Download centre [http://www.metrel.si /download-center.html].

8.2 Upload or download Project files

Upload or download of the data structure project files are located in the communication group of the Home tab menu. Single and multiple file transfer is supported.

8.2.1 Single file transfer options

Get Data: Gets data from instrument. The currently active data structure file in the instrument memory organizer is downloaded.

- If only the Home tab of the user workspace is active, the downloaded file is opened in a new user workspace tab.
- If the data structure file is already opened in the user workspace, download options selection window is opened, see **Figure 8.3**:
  - **Download to a new file**: new data structure file is opened in a new tab in the user workspace.
  - **Download to the currently opened file**: elements data with equal unique identification are merged, rest of them appear as new elements within the active data structure file.

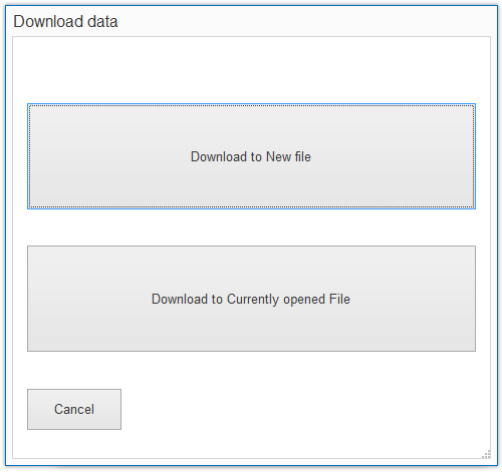


Figure 8.3: Download options selection box

- Send Data: Upload the active data structure file to the instrument.

8.2.2 Multiple file transfer options

- Connect : Open the menu window (**Figure 8.4)** for managing the transfers of multiple data structure files between the connected instrument and the PC. The window contains Transfer tab and Instrument info tabs.
- **Transfer options ar**e:
  - ❶ Serial communication port selection and the Reload command.
  - ❷ PC folder selection tool. Use the arrows to navigate the folder structure, or open the folder content where the project data structure files are saved.
  - ❸ List of the data structure files in the selected folder on the PC. Click on the square in front of the file name to select the files for upload to the instrument.
  - ❹ List of the data structure files in the instrument memory. Click on the square in front of the file name to select the files for download to the PC.
- **Command options**:
  - Upload selected Project data structure files to the instrument.
  - Download selected Project data structure files to the PC folder.
  - Delete selected — Delete selected Project data files from the instrument.
  - Connection — Select wired connection – Serial or Ethernet.
  - Port — Select the PC serial data port that the instrument is connected to.
  - Host name / IP — Enter IP address and Port number
  - Reload — Reload/refresh the data.

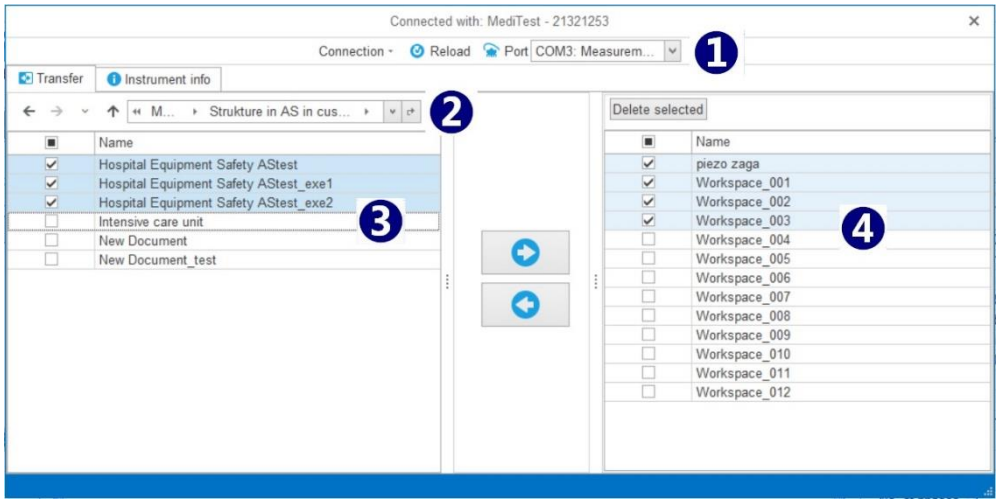


Figure 8.4: Transfer tab menu of the Connect window

- **Instrument info tab**: Instrument info list, see chapter ***8.1.1 Instrument info***.

9 Measurements

When the connection with the instrument is active, measurements can be executed from the PC using the Metrel Medical ES Manager.

9.1 Single tests

9.1.1 Single tests in the user workspace

Options:

- 

New single test: click on the Single tests icon in the measurement group of the Structure tab to open a list of available single tests. Select one by clicking on its name. It will open the configuration window for configuring, saving and/or executing the single test on the instrument.
- 

Run single test: Select the single test already added to the data structure tree and click the Run command found in the same line in the tree structure, or in the Testing menu tab. The test configuration window will open where the single test can be surveyed, reconfigured or executed on the instrument.
- 

View single test: Select the single test from the data structure tree and click the View command found in the same line in the tree structure or in the Testing menu tab. The configuration window will open. The single test can be surveyed only, reconfiguration and execution are not possible.

9.1.2 Viewing or configuring the single tests

Single test configuration window is presented on **Figure 9.1**. Its functions are:

- **Connections** are the test object settings:
  - Operating parameters.
  - Connections types.
  - Connections functions.
- **Single test:** parameters and limits settings.
- **Results:** detailed list of the single test results.
- **Summary:** summary of the results state.
- **Commands:** running the test, and the communication port survey.

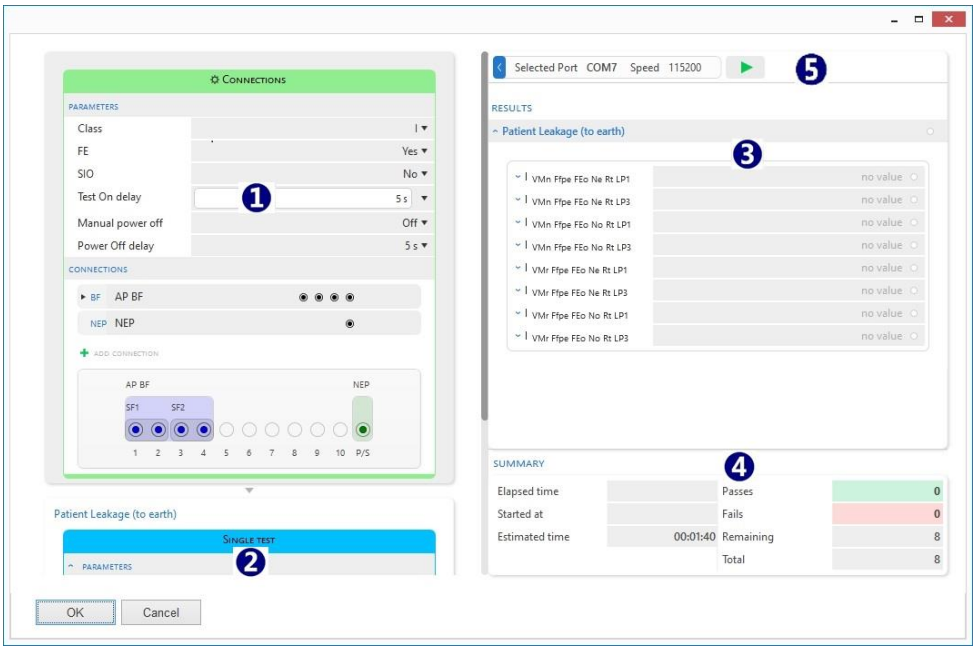


Figure 9.1: Single test configuring window

Refer to the test object's instruction manual for the Connections setting details. Refer to the test instrument's user manual for the single test settings details. After the single test configuration is finished, the options are:

- OK Save the single test to the previously selected data structure location and close the window.
- Cancel Discard changes, the single test remains unchanged.

9.1.3 Running single tests

Open the single test configuration window and set the communication port where the instrument is connected, then start the test execution using these commands (5 on the Figure 9.1):

- Open the survey of communication port setting, see the picture below.
- Selected Port COM3 Check the settings are correct.
- Start the test on the instrument.

During the test progress, data is acquired and presented in the Results and Summary areas in real time. Notifications and test flow commands are provided to the user, see **Figure 9.2**:

- 1 **Results**: Single test name is presented at the top. Individual results with statuses are presented in real time, the user can scroll through results sub window during test.
- 2 **Summary**: the test statistics are presented in real time
- 3 **Progress bar and percentage** of the single test is calculated and presented in the top right corner of the Commands area and next to the single test name.
- 4 **Notifications** of test flow appear at the bottom of Results sub window. Some of them require user action (e.g. turning the tested device on).

- 5 **Commands** for user test flow control:
  - Next step: continue with the Single test after the user action is completed.
  - Next test: immediately stop the Single test
  - Stop test: immediately stop the Single test

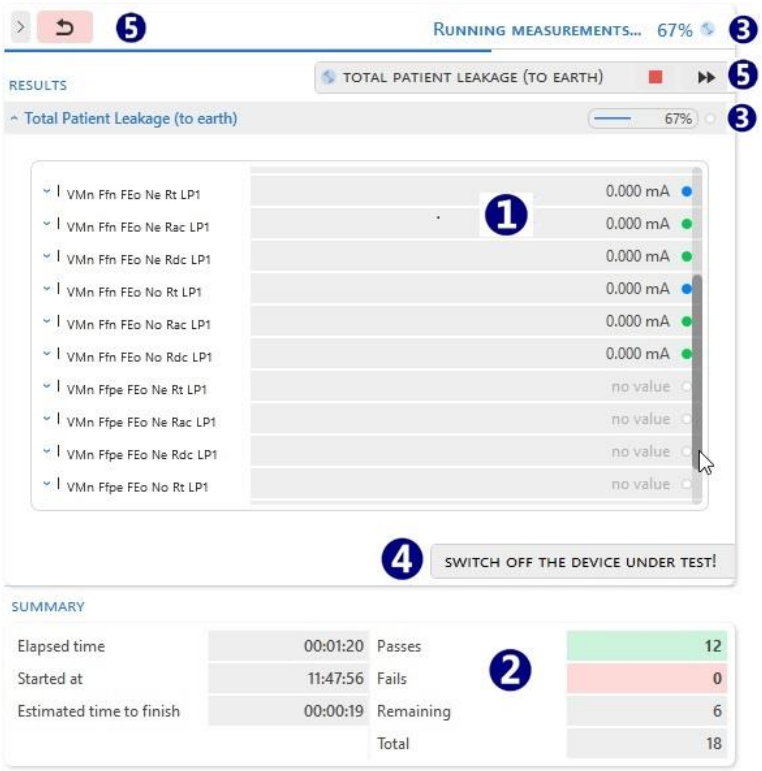


Figure 9.2: Single test progress data and notifications

Note

While the test is running, its window cannot be closed.

9.1.4 Single test results

Finished Single test screen (**Figure 9.3**) provides the following information and options:

- 1 Overall test state and status
- 2 Single test completion percentage and status
- 3 Results: single test individual results, each with status; scroll up/down to survey all.
- 4 Summary: single test statistics.
- 5 Option commands.

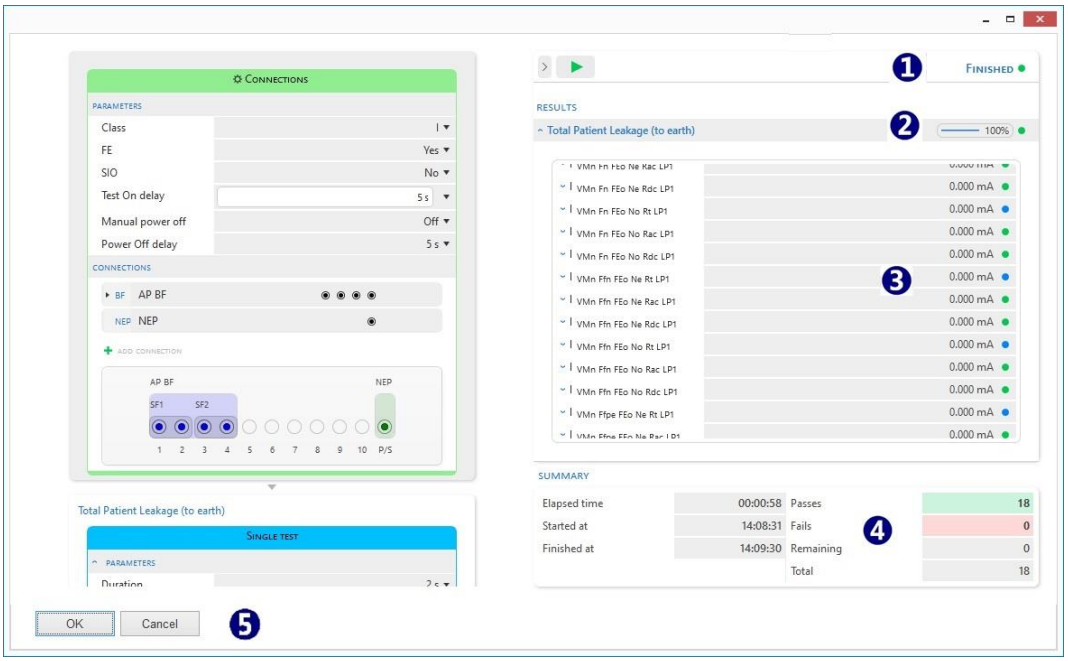


Figure 9.3: Single test results screen

Options after the single test execution is finished:

- OK Save the single test to the previously selected location in the data structure and close the window.
- Cancel Discard results; user is prompted to confirm action by selecting the option from the confirmation window, **Figure 9.4**.

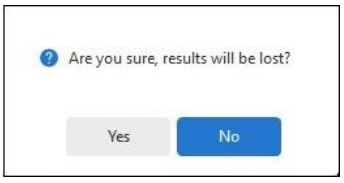


Figure 9.4: Discard single test results confirmation

Results after repeated single test

When existing finished single test is opened from data structure and executed again, it is saved at the same location as a new finished single test a after confirmation. The existing test remains unchanged.

Results after interruption

When Single test execution is interrupted with one of the available commands, the result screen (**Figure 9.3**) provides the information as it was at the moment of interruption:

- 1 The overall test state is Finished with the appropriate status information at interruption.
- 2 Single test progress percentage is less than 100 at the interruption moment.
- 3 Results: single test individual results are presented with finished status or empty status, if not yet executed at interruption.
- 4 Summary: single test statistics show the number of Passed (or Failed) individual tests and number of Remaining tests with the estimated time to finish at interruption.

9.2 Auto Sequence® tests

9.2.1 Auto Sequence® tests in the user workspace

To open the Auto Sequence® in the user workspace it must be first appended to the data structure element. Once placed in the data structure, select it to view the options:

- 

Click on the Run command in the Testing group of the Structure tab menu or in the Auto Sequence® line in the tree view. It opens the Auto Sequence® configuring window where can be surveyed, reconfigured and executed on the instrument.
- 

Click on the View command in the Testing group of the Structure tab menu or in the Auto Sequence® line in the tree view. It opens the Auto Sequence® in the user workspace. It can be surveyed only, reconfiguration and execution are not possible.

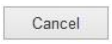
9.2.2 Viewing and configuring an Auto Sequence®

Before execution the Auto Sequence® content can be surveyed. Connections and the single tests' parameters and limits, and the flow commands, can be reconfigured before execution. Auto Sequence® configuration window is presented in **Figure 9.5**. Its functions are:

- **Properties:** Basic Auto Sequence® information
  - Select Test optimization to organise the Auto Sequence® steps into the fastest sequence.
- **Connections:** click on the field to open the test object settings menu. Setup the test object's features:
  - Operating parameters
  - Types of connections
  - Connection functions
- **List of single tests and flow commands in the Auto Sequence®:**
  - Click on the SINGLE TEST field to open the parameters and limits settings window.
  - Click on the OPERATION AFTER TEST field to open the flow command settings window.
- **Results:** List of all the results in the single tests of the Auto Sequence®.
  - Click on the test name to display the detailed individual results.
- **Summary:** summary of the results status. Individual results of all single tests are included in the count.
- **Commands:** Run test and Communication port survey.

Refer to the test object's instruction manual to correctly set up the connections. Refer to the test instrument's user manual for the Single test details and settings.
Commands at the bottom of the Auto Sequence® configuration window are:

- 

Save Auto Sequence® with the new settings to the location in the data structure and close the window.
- 

: Discard the changes, Auto Sequence® remains unchanged.

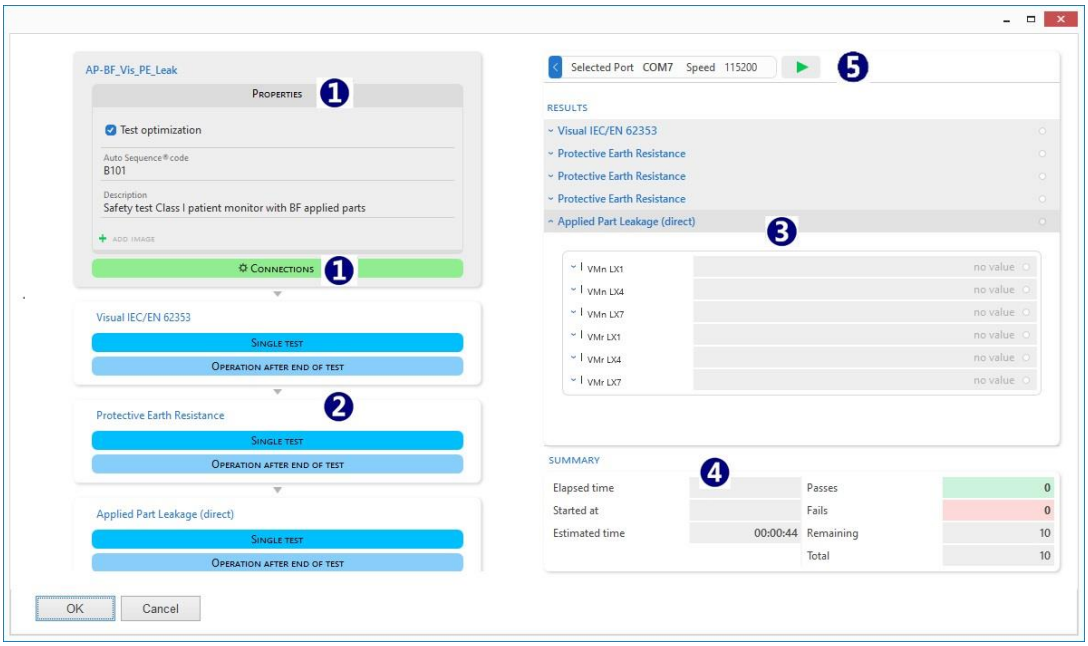


Figure 9.5: Auto Sequence® configuration window

9.2.3 Running Auto Sequences®

Auto Sequence® test configuration window must be opened with Run command and the communication port with the instrument must be set before running the Auto Sequence®.

The progress of the Auto Sequence® test during the test execution can be viewed or controlled.

- Results and statuses of the tests that already finished.
- Momentary test summary.
- The appropriate commands for controlling the execution of the Auto Sequence® test are always available. The user is notified if any action is needed.

The test results window is active during the test (scrolling up/down to view all results is possible).

Any individual Auto Sequence® test step can be removed right before starting the test.

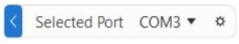
- Remove the step with the sign at the upper right corner.
- 

Undo prompt appears on the screen for short time, click on it to cancel step removal.

The parameters in the tests and the test object connections can be edited. All changes can be saved using the Save icon that appears at the first change, if Auto Sequence® Group file is opened.

-  Save icon in upper left corner, click to save changes to currently opened Auto Sequence® Group file.

Start the execution of a single test by using the commands (5 on Figure 9.5):

- Open the survey of communication port setting, see picture below.
- 

Check the settings are correct.
-  Start the test running on the instrument.

The data is acquired and displayed in the Results and Summary areas in real time during the testing. Notifications and relevant test flow commands are provided to the user, see **Figure 9.6**:

- ❶ **Results**: List of single tests contained in the running Auto Sequence® is displayed, each equipped with the progress bar and percentage and the test status information. Individual results with status are displayed in real time. Click on any single test name to expand its window and view the results during test.
  Currently running single test name is displayed in the field at the top of the Results window. It also contains the flow control commands ❺.
- ❷ **Summary**: statistics of the running test is presented in real time. All individual results of all single tests are included in the count.
- ❸ **Progress bar and percentage**: the total progress of the Auto Sequence® is calculated and displayed in the top right corner of the Commands area.
  Completion of each single test is displayed in its name row together with it status.
- ❹ **Notifications** of the Auto Sequence® test flow appear at the bottom of the Results sub window. Some require user action on test flow control.
- ❺ **Commands** for user test flow control:
  - **Next step**: continue with the next single test after the user action is completed.
  - **Next test**: immediately stop the currently running single test and jump to the next step.
  - **Stop test:** immediately stop the Auto Sequence® test.

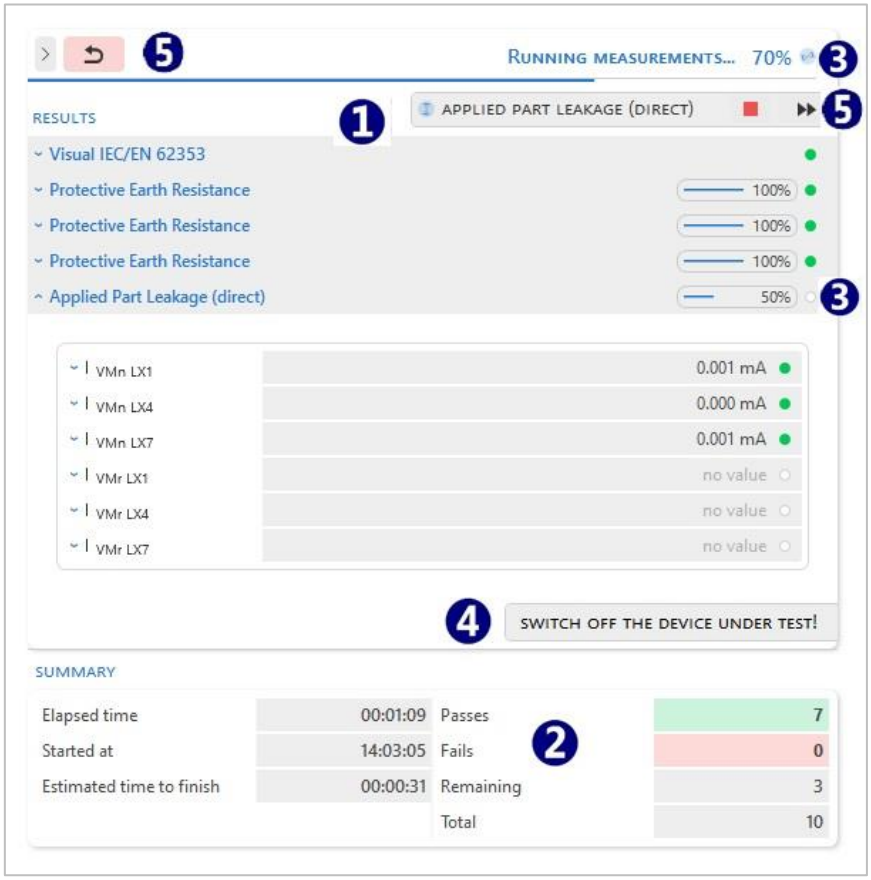


Figure 9.6: Auto Sequence® test progress data and notifications

Early interrupt

When the running single test is interrupted with the **Next test** command in an early stage, before any individual result are acquired, the user is prompted to manually select the further flow of the Auto Sequence® test, see **Figure 9.7**. Manual flow control menu appear only when all *Operation after end of test* flow commands of interrupted step are set to Manual.

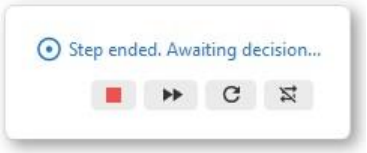


Figure 9.7: Manual Auto Sequence® flow control prompt

Optional decisions available are:

- **Stop test:** Auto Sequence® test is stopped.
- **Next step:** proceed with next Auto Sequence® test step.
- **Repeat step:** the interrupted test is repeated.
- **End loop:** exit the test loop where you have multiple steps in the measurement and proceed with the next measurement.

9.2.4 Auto Sequence results

The test screen of a finished Auto Sequence® (**Figure 9.8**) provides the following information and options:

- ❶ The overall Auto Sequence® test state and status.
- ❷ Auto Sequence® test steps' completion percentage and status.
- ❸ Results: individual results of the Auto Sequence® test steps, each with status. Click on the step name to open its individual results list and scroll up/down to survey all.
- ❹ Summary: Auto Sequence® test statistics.
- ❺ Option commands.

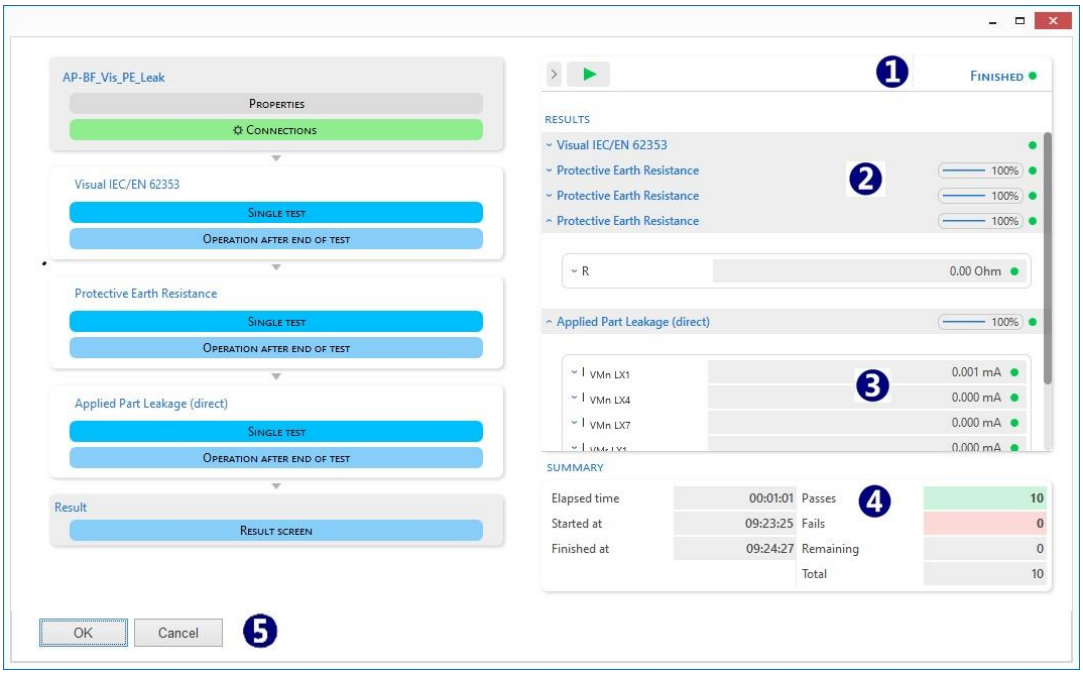


Figure 9.8: Auto Sequence® test results screen

Options after the Auto Sequence® test execution is finished:

- OK : Save the Auto Sequence® test results to the location in the data structure and close the window.
- Cancel : Discard results, the Auto Sequence® test results are not saved. The user is prompted to confirm the action by selecting the option from the confirmation window, **Figure 9.9**.

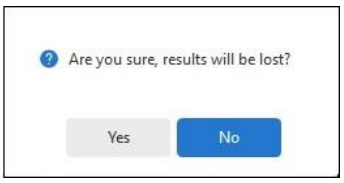


Figure 9.9: Discard Auto Sequence® test results confirmation

Retesting using Auto Sequence® tests

When the finished Auto Sequence® test is opened and executed again, the new results are saved at the same location as the previously finished Auto Sequence® test. Confirmation is necessary. Previous Auto Sequence® test results remain unchanged.

9.3 Standardized inspections

Standardized inspections can be used as single test measurements or as measurements step within an Auto Sequence® test.

9.3.1 Standardized inspection test in the user workspace

Standardized inspection test window can be opened using different methods:

- 

New Inspection test: Click on the Inspection icon in the Measurement group of Structure tab to open a list of available standardized inspection tests. Select one by clicking on its name. The inspection window opens in the user workspace. Inspection test can be saved and/or executed on PC.
- 

Run an inspection test: Select an inspection test appended to the data structure in the tree view and click the Run command in the inspection test line, or in the Testing menu tab. An opened inspection test can be executed on PC or saved.
- 

:-**Inspection test:** Select an inspection test appended to the data structure in the tree view and click on the View command within inspection test in the inspection test line, or in the Testing menu tab. An opened Inspection test can be surveyed only.

9.3.2 Executing the standardized inspection tests

Standardized inspection test window is presented on **Figure 9.10**:

- 1 Inspection test name.
- 2 Header with the inspection test overall status and status selection list on the right.
- 3 Inspection test items with status selection lists on the right.
- 4 Item status selection list. Click on the triangle to open it.
- 5 Option commands

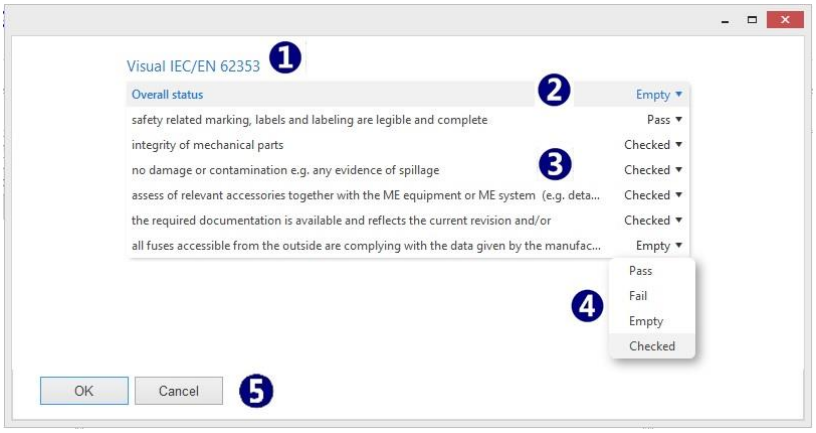


Figure 9.10: Standardized Inspection test window

Executing the standardized inspection:

- Perform each item in the inspection test and manually select the established status from the list.

- Overall status of the inspection test is set automatically, derived from the statuses of the inspection Items.
- Overall status of the Inspection test can also be set manually.
- **OK command:** confirm changes and save the inspection test results.
- **Cancel:** discard the changes and close the inspection test window. User is prompted to confirm cancelation.

Overall status automatic set rules:

- Pass: At least one Inspection item has status Pass and there are no Fail or Empty item statuses.
- Fail: At least one Inspection item has status Fail, regardless of the rest of items statuses.
- Empty: At least one Inspection item has status Empty, regardless of the rest of items statuses and there are no Fail item statuses.
- Checked: All inspection items have status Checked.

10 Measurement Organizer

Measurement Organizer is a tool for managing the user defined Auto Sequence® tests and inspections. Auto Sequence® tests can be organized into dedicated groups (*.atmpx files), saved to the PC file folder and uploaded to the instrument. A custom inspection is stored as a file with the *.indf ending.
An existing Auto Sequence® group file can be reopened or downloaded from the instrument for further editing.
The Measurements Organizer can be accessed from the Tools group menu of the Home tab.

10.1 Measurements Organizer main menu

The Measurements Organizer opens in a separate window. The Main menu tab is active by default, **Figure 10.1**. Functionality and user options are:

- ❶ **OPEN FILES:** File storage location selection:
  - Recent files
  - Computer
  - Cloud
  - Instrument
- ❷ **Navigation tool:** menu adopted to the selected file storage location.
  - **Recent files:** List of recently edited files.
  - **Computer:** browse the PC folder locations for files to open.
  - **Cloud:** browse Cloud storage for files to open.
  - **Instrument:** browse for sequences saved on the instrument. Set the communication port and select the Browse command to access the list of files saved in the instrument memory. Select a file and click Edit command to open it in the Auto Sequence® editor.
- ❸ **Create:** Auto Sequence® editor and Custom inspection editor tools.

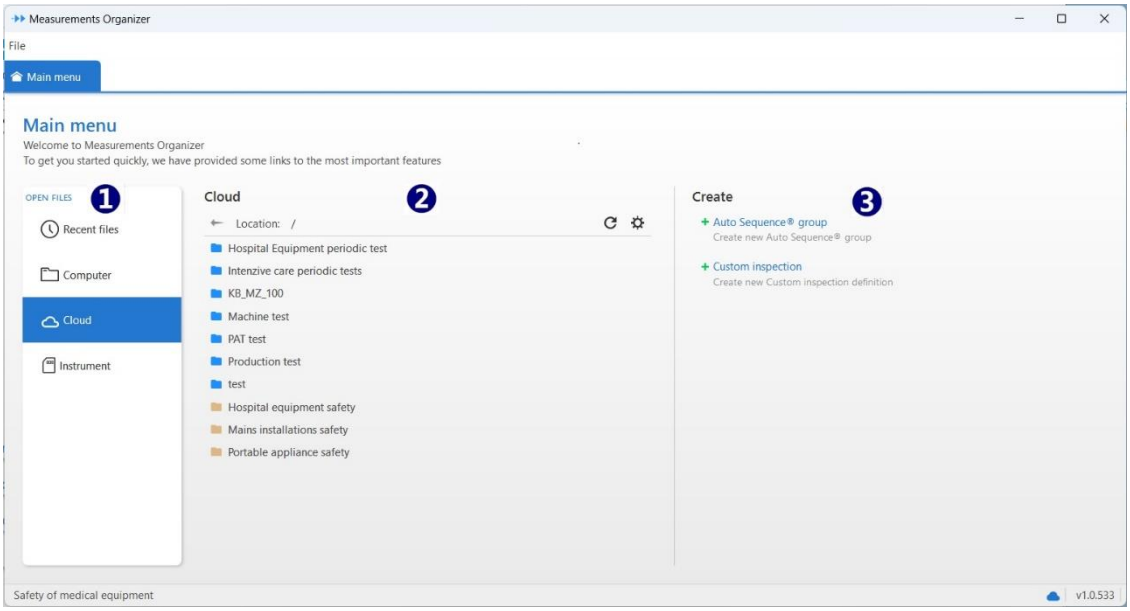


Figure 10.1: Measurement organizer Main menu tab

10.2 Auto Sequence® Editor Workspace

Select Auto Sequence® group from the Main menu tab. A new Auto Sequence® appears on the screen in an empty Editor workspace in a separate tab. All necessary tools for creating Auto Sequence® tests-are provided in the three main Editor areas, see **Figure 10.2**:

- ❶ Auto Sequence® group is displayed as a folder tree structure. By default, it only contains a single new Auto Sequence®. See **Chapter 10.2.1** for details.
- ❷ **Auto Sequence® content view:** the new Auto Sequence® template contains a header field PROPERTIES and footer field RESULT SCREEN by default. User can add single tests, inspections and flow commands to complete the Auto Sequence® test. See **Chapter 10.2.1** for details.
- ❸ Single tests tab and inspections tab. Each contains the available single tests and inspection tests organized in groups. Click on the triangle in front of the group (▼) to open the list. Click on the ✚ sign in front of the selected test to add it to the currently active Auto Sequence® test.
- ❹ Summary: the selected Auto Sequence® test statistics, estimated run time and the total count of individual tests contained in all of the single tests.
- ❺ File: access the commands for:
  - Standard file managing commands
  - **Upload**: open the communication settings window for uploading the file to the instrument.

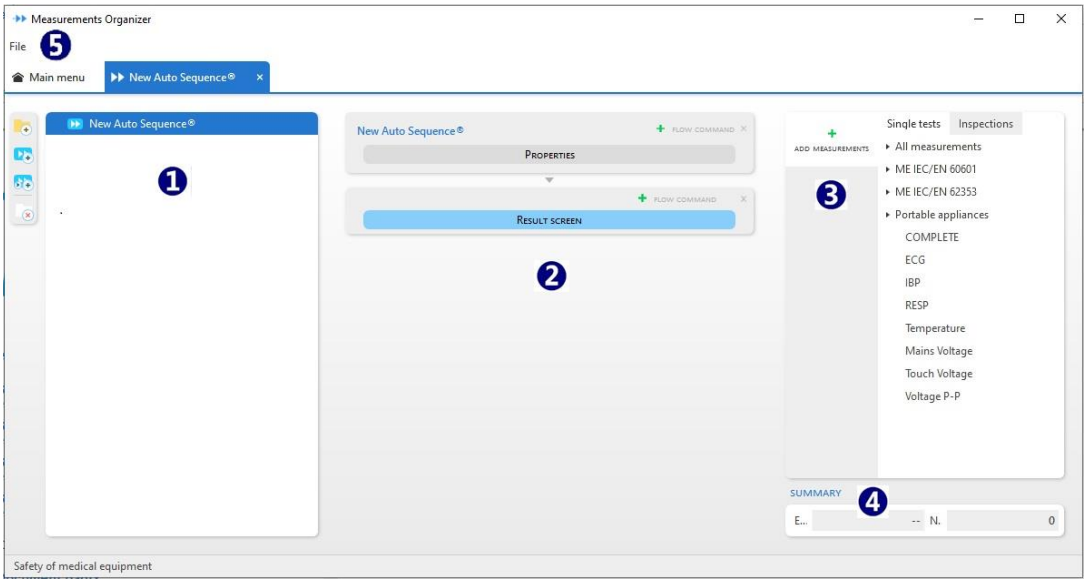


Figure 10.2: New Auto Sequence® editor start screen tab

10.2.1 Auto Sequence® group tree structure

See the image **Figure 10.3** for an example of a composed Auto Sequence® group, with elements organized into a tree structure.
The tree structure elements are folders containing Auto Sequence® tests.

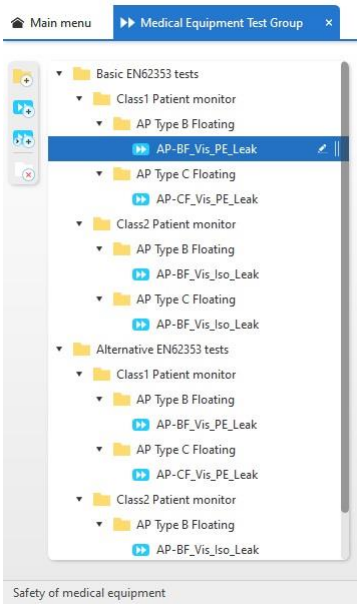


Figure 10.3: Auto Sequence® group tree structure

Commands for composing and editing an Auto Sequence® group tree structure are located at the left side, or in the line with the selected element:

- **Add new folder:** select a location in the tree structure and click to add a new subfolder
- **Add new Auto Sequence®:** select a location in the tree structure and click to add a new Auto Sequence®
- **Create shortcut:** select an Auto Sequence® and click to create its shortcut.*
- **Delete selected element(s):** click to delete the selected folder with all content or the selected Auto Sequence®.
- **Edit:** edit the element name. Confirm with click on , cancel editing with .
- **Handle:** click and drag the element to the desired location in the Auto Sequence® group tree structure. To move to the subtree locations first click on the triangle ( ) in front of the folders.

***Note:**
Auto Sequence® Shortcut is useful when same Auto Sequence® with the same settings should be located at two or more different folders in the tree structure to keep the organisation consistent. Shortcut after creation is located beside the original Auto Sequence®. Select the Auto Sequence® shortcut handle and drag it to the desired location.
When a shortcut is selected, contents of the original Auto Sequence® is displayed. All additional editing and settings changes of the original Auto Sequence® are reflected in its shortcuts too.

10.2.2 Auto Sequence® content view

The selected Auto Sequence® is presented in detail in the Content view, see **Figure 10.4**. It is the main user working area. All necessary editing fields and commands are provided to adapt the Auto Sequence® to its purpose and the object under test. An Auto Sequence® is presented as a series of mandatory and user-inserted steps. Each step is presented in a separate field:

- **Header**: mandatory beginning step that enables setting the general PROPERTIES of the Auto Sequence® and configuring CONNECTIONS of the tested equipment.
- **Measurement steps:** user-inserted single test and inspection test steps.
- **Result screen:** mandatory ending step for setting the actions at the end of the Auto Sequence® and viewing the results.

Figure 10.4: Auto Sequence® Content view

10.2.2.1 Auto Sequence® Header step options

Header step options are located in:

- Heading row
- Properties field
- Connections field

Heading row options

- AP-BF_Vis_PE_Leak Auto Sequence® name at the left side. It can be renamed in the tree structure.
- + FLOW COMMAND Add a user selectable flow command to be executed at beginning of the sequence.

Properties field setting options

Click the PROPERTIES field of the Header step to expand it and configure the options (**Figure 10.5**):

- **Test optimization is** checked as default to enable:
  - Individual medical leakage current tests will not be carried out one after another. They will be combined in a manner to achieve minimum power-ons and power-offs of the tested equipment and therefore the fastest run time.
  - The flow of the Auto Sequence® will change appropriately. Some options will become inactive to prevent any unnecessary delays and power-ons or power-off-s.

- A group of single test steps that are subjected to optimization is indicated with grey background and marked with the symbol, see **Figure 10.6**.

Note: It is recommended to have the test optimization always enabled.

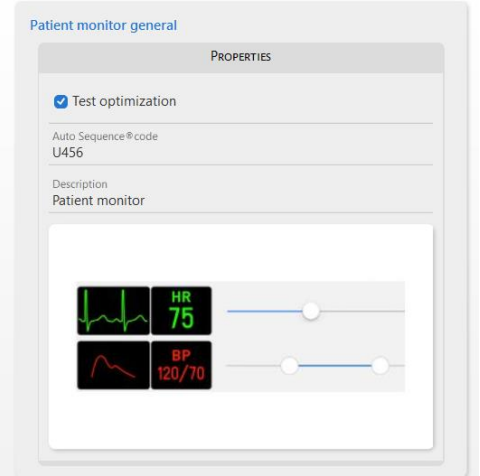


Figure 10.5: Properties field setting options with added image

- **Auto Sequence® code:** A user defined short code can be entered. The code is printed on the labels / tags and can be used as an identification of the Auto Sequence® in case of retesting.
- **Description:** A short description of the Auto Sequence® can be entered.
- **Add Image:** An image can be added.

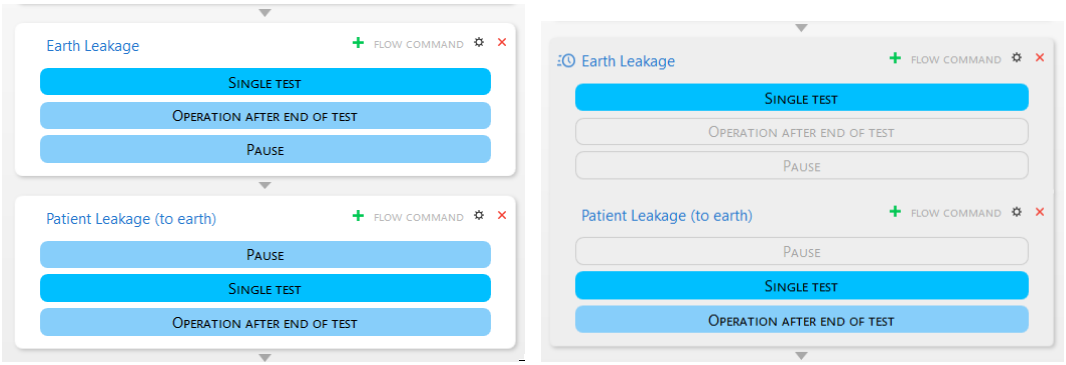


Figure 10.6: Example of non-optimized (left) and optimized (right) test steps

Connections field setting options

The Connections field appears in the Header field when the first single test is added to the Auto Sequence® template. It provides the configuration for equipment under test, **Figure 10.7**. Click to the field name to access the subfields:

- **PARAMETERS:** Consider the test object's protection class (Class), presence of functional earthing (FE), signals inputs / outputs (SIO), the time it takes for the tested equipment to switch ON / OFF. Select the appropriate parameters from the lists. Note that the Auto Sequence® will not upload to the instrument or start unless all parameters are filled in.
- **CONNECTIONS:** Consider the test object's applied parts type, their functions and number of connections in each of them. Use commands to:
  - ADD CONNECTION: Select a connection type from the drop-down menu. Each connection type is presented in a sub field.
  - Expand the added connections to view additional information and functions.

- ADD FUNCTION (only applicable to type BF): Add a connection sub-function (SF). It is displayed in the type's subfield.
- Delete connection / function: Available on mouse-over the connection.
- Handle to reorder connections / functions; available on mouse-over the subfield name. Click and drag the selected connection to its desired location.
- **Rename** connection / function: select its default name and type in the custom name.

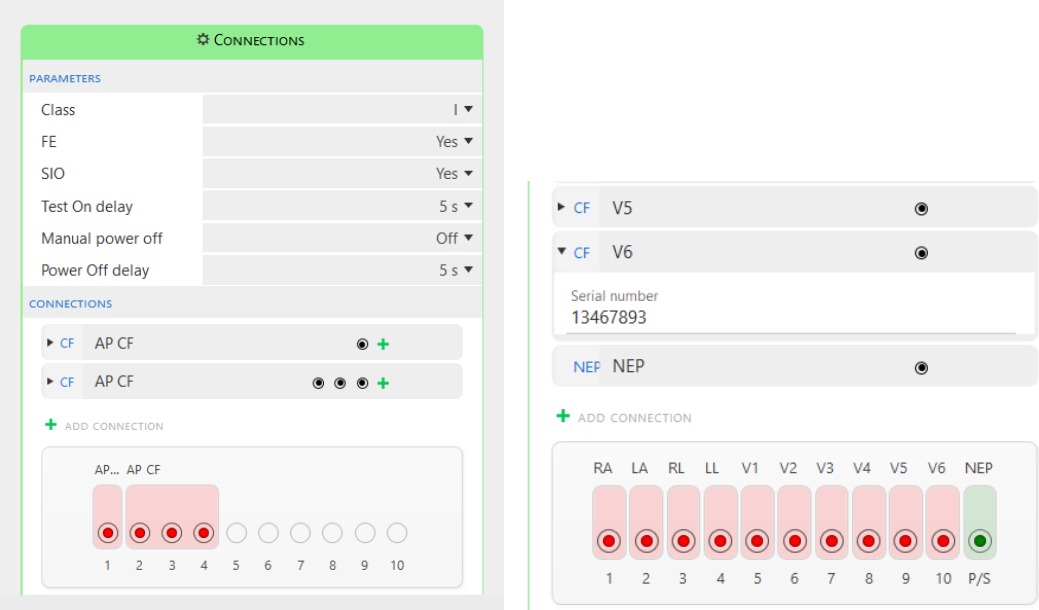


Figure 10.7: Connection setting options - default names (left) and custom names (right)

Note:
For more information about setting Connections refer to the instrument's user manual.

10.2.2.2 Auto Sequence® Measurement step

The Measurement step can be a single test measurement or an inspection test. Each is presented in a separate field where all the necessary settings and commands are provided to for adapting the measurement to it purpose in the Auto Sequence® test.
Measurement step options (**Figure 10.8**) are:

- **Header row**:
  - AP-BF_Vis_PE_Leak Single test name at the left side.
  - FLOW COMMAND Add a flow command field. See the Chapter 10.2.3 Flow commands for details.
  - Enter the Step count number to repeat the measurement more than once.
  - Remove the measurement step from the Auto Sequence® test.
- **SINGLE TEST field**: click to open single test subfields:
  - PARAMETERS: Set the single test parameters according to Auto Sequence® test requirements.
  - LIMITS: Set the test limits according to Auto Sequence® test requirements.
  - RESULTS: View the results and their details.

- **OPERATION AFTER END OF TEST field**: The user can select the action after the measurement is finished with respect to the result status.
    - Auto: The Auto Sequence automatically moves to the next step.
    - Manual: Manually confirm moving to the next step, or use other commands during the pause.

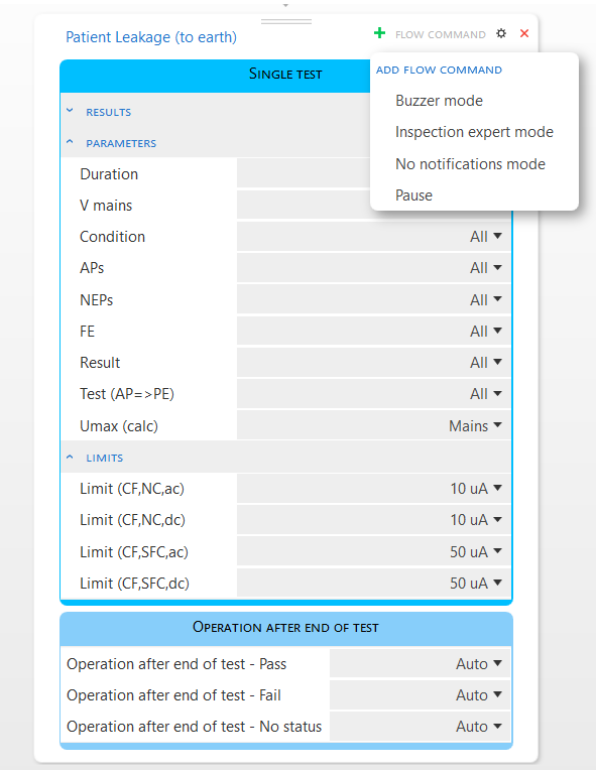


Figure 10.8: Measurement step setting options (Flow command selection field opened)

10.2.2.3 Auto Sequence® Result screen step

The Result screen is the mandatory final step of the Auto Sequence® test, **Figure 10.9**.

- FLOW COMMAND : Add flow command field, see the Chapter 10.2.3 Flow commands for details.

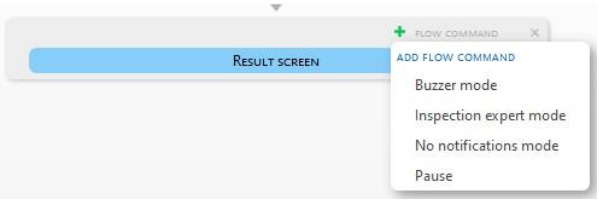


Figure 10.9: Result screen step options (Flow command selection field opened)

10.2.3 Flow commands

Flow commands are used to control the flow of measurements.

They are accessible via FLOW COMMAND , , buttons.

10.2.3.1 Number of measurement steps

Often the same measurement step must be performed on multiple points on the device under test. Set how many times a measurement step will be repeated. All steps are stored in the Auto Sequence® result as independent measurements.

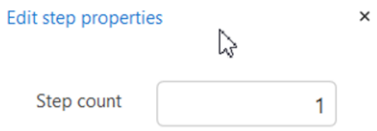


Figure 10.10: Measurement step repetition number setting

10.2.3.2 Pause

A Pause command with a text message or a picture can be inserted anywhere in the Autosequence®. Warning icon can be used alone or added to a text message. Custom text message can be entered into the field Screen Text, see **Figure 10.11: Pause setting examples**.

Parameters:

- Pause type:
  - Show text and/or warning. Enter text and add the warning icon (optional).
  - Show picture: selected picture will be shown. Image path: Browse to location.
- Duration: Number in seconds or infinite.

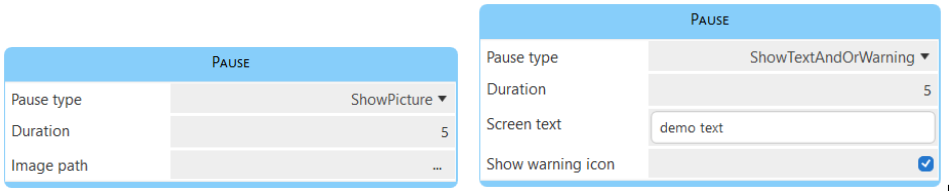


Figure 10.11: Pause setting examples

10.2.3.3 Buzzer mode

In Buzzer mode State = On, passed or failed measurement is indicated with beeps.

- Pass – double beep after the test
- Fail – long beep after the test

Beep happens right after the single test measurement is finished.

10.2.3.4 No notifications mode

No notification mode setting influence pre-test warnings presentation.

- State = On, the pre-test warnings will be skipped.
- State = Off, the pre-test warnings are presented.

10.2.3.5 Inspection Expert mode

This flow command enables automatic application of inspection tickers.

- State = On – the Visual inspection screen and Functional inspection screen within Auto Sequence® are displayed for 1 second and an overall PASS is automatically applied at the end of inspection test.
- State = Off – automatic applying of tickers is disabled.

10.2.3.6 Operation after end of test

This flow command controls the process of the Auto Sequence® in regard to the measurement results. 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 appropriate command (RUN key, external command...) to proceed.
- Auto: The test sequence automatically proceeds

10.3 Custom Inspection Editor Workspace

Create a custom inspection by choosing the Create Custom Inspection command in the Main menu of the Measurement Organiser. A new inspection with the default contents opens in the editor workspace, see **Figure 10.12**.

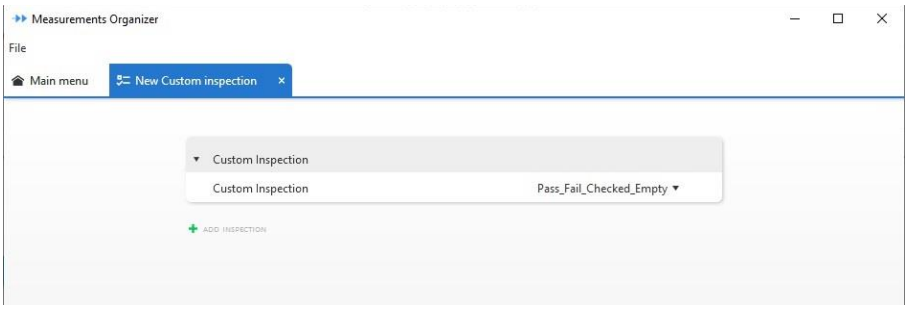


Figure 10.12: Custom inspection Editor Start screen

Use the *Save as* command from the Measurement organizer File menu (**Figure 10.13**) to rename and save the Custom inspection file to the selected location. File menu can also be used to open an existing file.

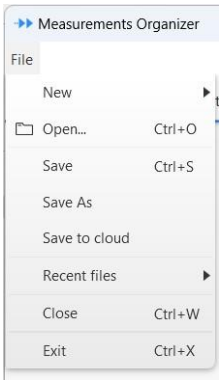


Figure 10.13: Measurement organizer File menu

Inspection field contains a Header at the top and a single inspection item as the Header child. All necessary tools are provided to configure the Custom inspection to it purpose.

Tools available within Inspection field Header are:

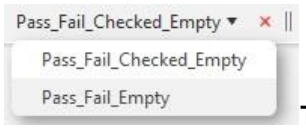
- 

Inspection name: Select it and type Custom inspection name.
-  **Add Child:** click to add an inspection item.
- **Remove:** click to remove an inspection step;
    - 

Undo prompt appears on the screen for a short time. Click on it to cancel the inspection step removal.
- **Open / Collapse** the inspection content: click on the arrow on the left of the inspection name.
- **Handle**: click handle in the middle of the header and drag it to rearrange the inspection order. The handle appears only when the file contains multiple Inspections.

Tools available in the Inspection Item row are:

- 

Item name: Select it and type in the custom item name.
-  **Add Child:** click to add a child item to the selected item. It creates a tree-like structure.
- 

Type of the item status: click on the arrow on the right side to open the item status selection options: *Pass_Fail_Checked_Empty* or *Pass_Fail_Empty.*
- **Remove:** click to remove an inspection item.
    - 

Undo prompt appears on the screen for a short time. Click on it to cancel the inspection item removal.
-  **Handle:** click and drag an item to the desired location in the Inspection field.

Tool available under the inspection field:

- 

Add Inspection: click to add an inspection. Custom created inspection file can contain multiple inspections. See **Figure 10.14**. for an example.

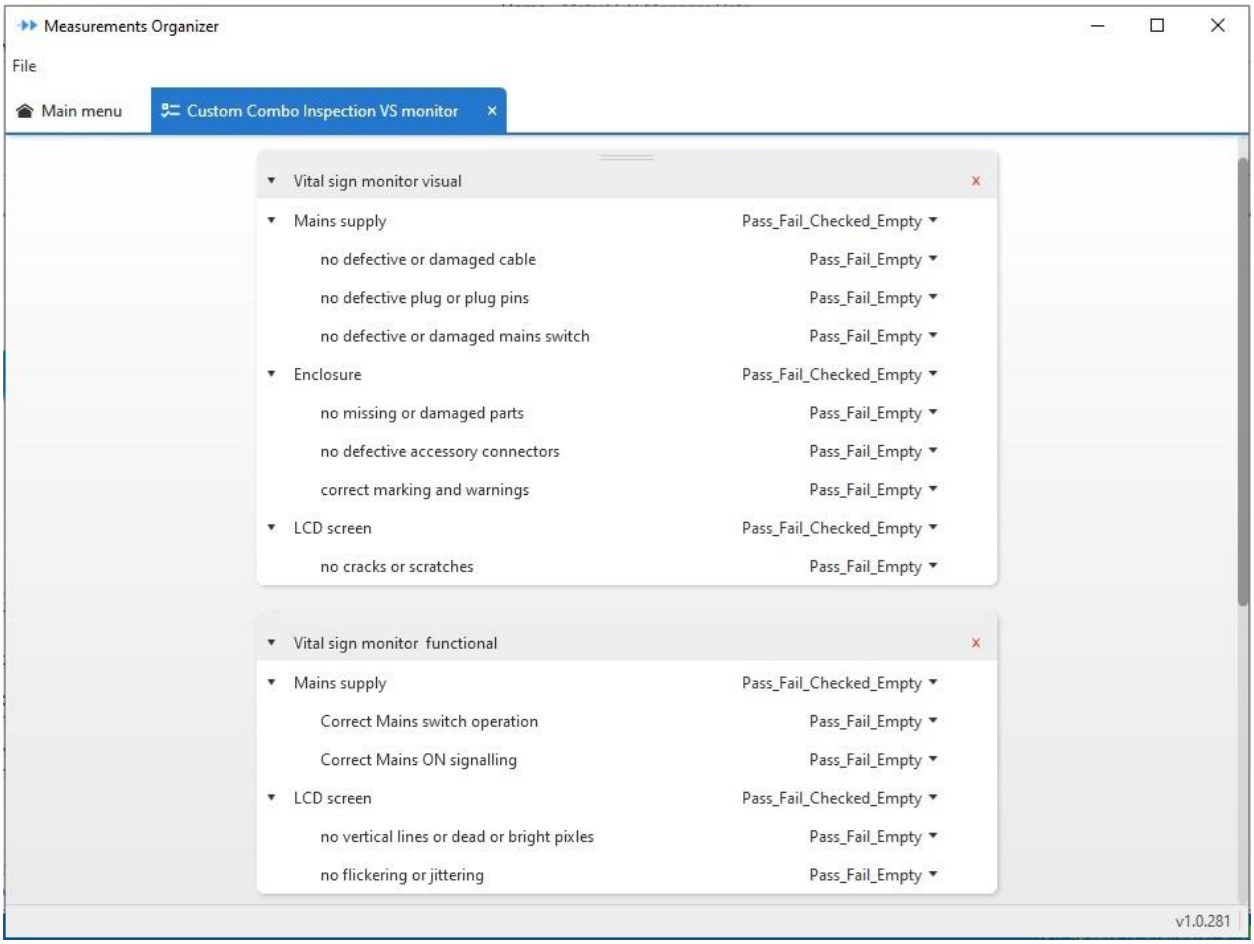


Figure 10.14: Custom Inspection file with multiple inspections Editor Workspace

Note:
Custom created inspection tests cannot be used as single test measurement appended to the test structure element. They can only be used as a step in the Autosequence® test.

11 Printing results

Metrel Medical ES Manager provides a simple print format for the test project results printout. The command Print results is located in the Tools group of the Home tab.

11.1 Printing results options

Create a header of test project results printout form:

- Open the Settings menu located in the Main tab menu.
- Select the Report settings tab.
- Printout results tab (**Figure 11.1)** header setup options are:
  - **Change logo image**: Opens the file browser to navigate to the logos' image folder. Select the image and click the Open command.
  - Click **OK** command to confirm Logo change or **Cancel** to discard changes.
  - **Clear logo image**: Delete the existing logo. Command cannot be undone.

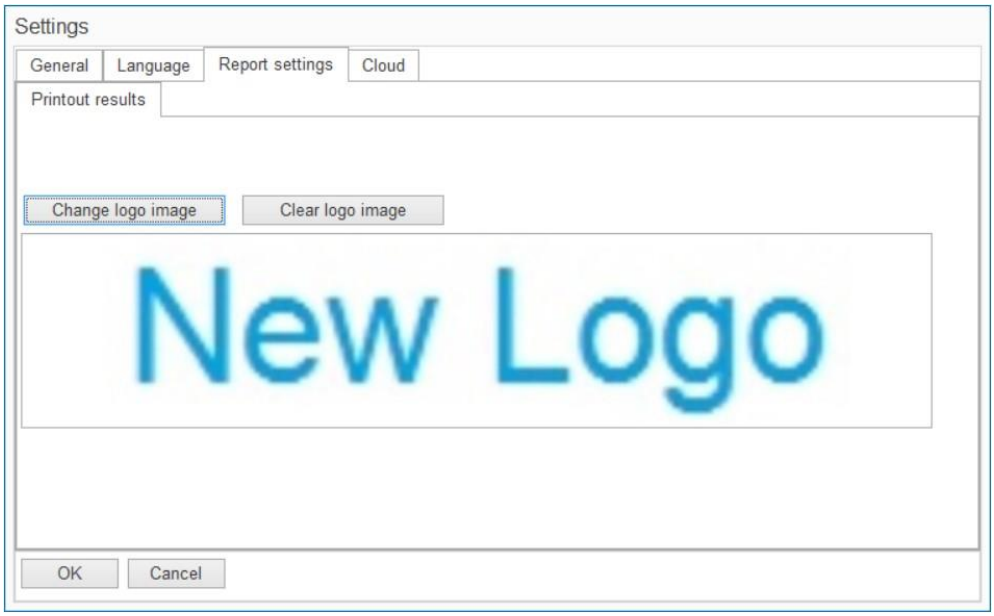


Figure 11.1: Print results Logo setup

11.2 Printing results format

Procedure to open Print format form:

- Open the test project data structure file. In the tree view select the parent object that contains all the elements whose testing results are to be printed. Select the root node to print all results. Select a single measurement to print only its results.
- Click on Print Results in the Tools group of the Home tab to open the test project results document in the Preview manager window,
- **Figure 11.2**.

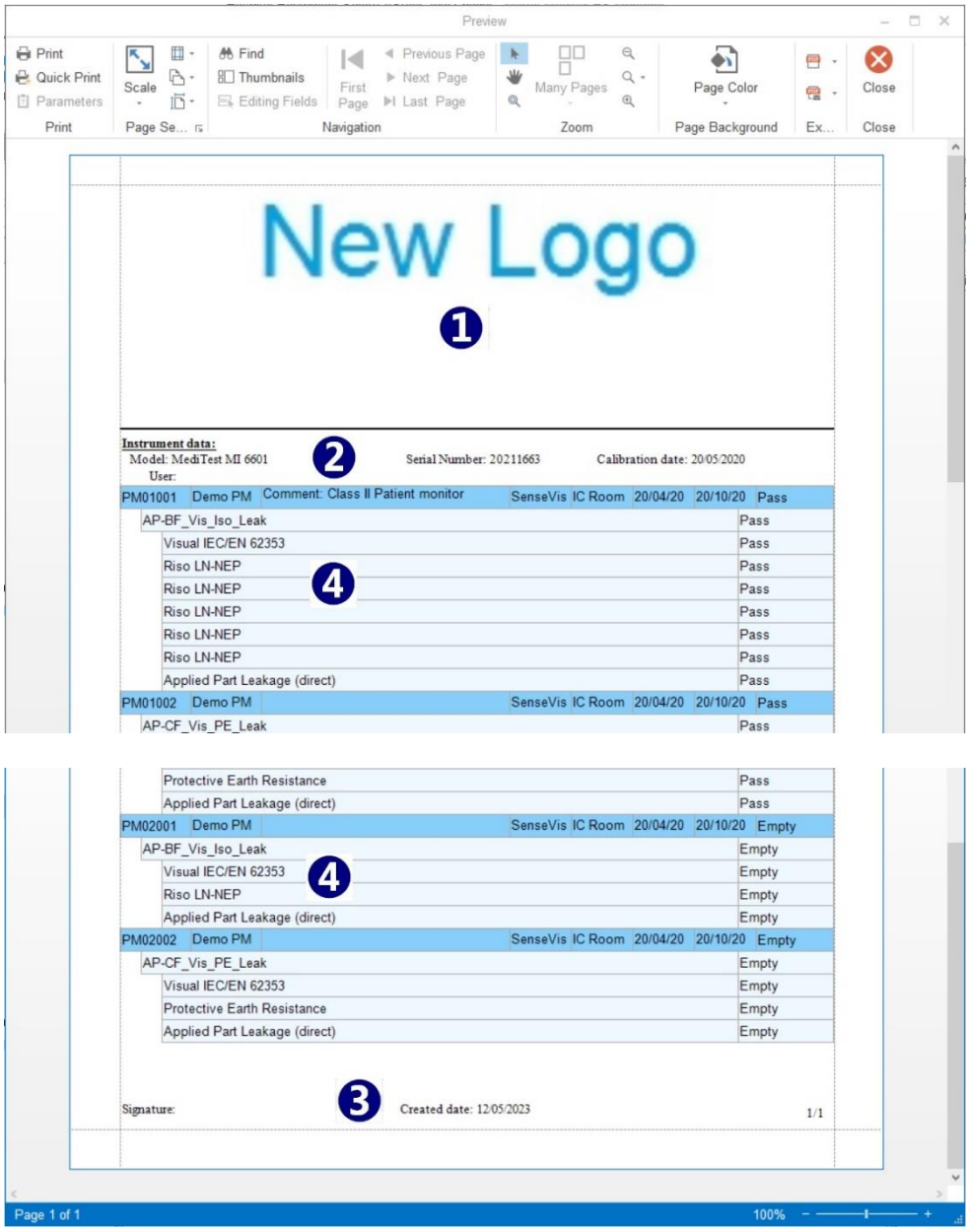


Figure 11.2: Print Results document format preview

- **Header** appears on the top of the first page:
  - Logo (❶) is set in the Report settings tab of the Settings menu.
- **Instrument data** (❷) gets set automatically when the data structure file is downloaded.
- **Footer** of the results printout (❸) appears on the bottom of each page and contains:
  - Signature field – enter by hand
  - Created date is set automatically
  - Page numbering is set automatically.
- **Measurement results** are presented in table (❹), each table starts with Appliance name, it path within data structure tree and overall status indication, followed with individual test result status.
- **Edit** the results page layout and print it using the preview manager commands.

Preview manager also provides the **Export group** with options:

- Export to PDF file: Create file to save document in PDF format.
- Export to Image file: Create file to save document in image file format (selectable from menu).
- E-Mail as PDF file: Create file in PDF format and attach it to E-Mail message.
- E-Mail as Image file: Create file in image file format and attach it to E-Mail message.

12 Creating Reports

User can create, manage and archive Reports of Test project measurements with WebReports application. The application is a part of the Metrel Ecosystem platform, using the same user repository as Metrel Cloud. Before first use, new user must first register Metrel Cloud account and then enter WebReports License key to Cloud account.
For an easy start different pre-defined report templates are offered by Metrel. They can be used as they are or be modified and used as personal templates. The tool enables to create customized reports suited to one's personal demands. New templates can be made from scratch.
WebReports templates are accessed from Metrel Medical ES Manager Home tab Reports menu:

- 

: Web Report command is active when Data structure file with appended measurements is opened.
    - **Option**: Data structure file was opened from storage location other than Cloud: browser is opened first to navigate and save Data structure file to Cloud folder.
    - **Option**: Data structure file was opened from Cloud storage:
      Report Selector window with available list of graphic Report template files is opened, see **Figure 12.1**. A convenient tool is available to search for pre-made Report template.

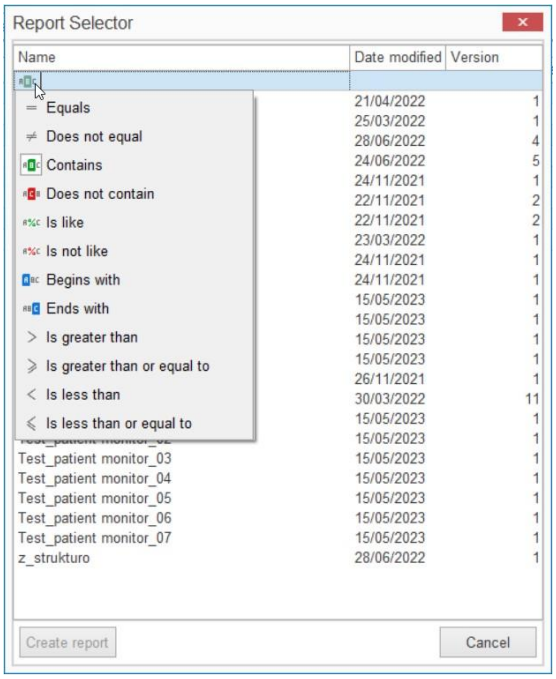
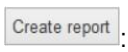


Figure 12.1: Report Selector window with Find tool opened

- 

: Select appropriate Report graphic template and confirm. WebReports editor is opened.

Refer to WebReports User Manual for details on how to create templates and edit, manage and archive reports.

13 Troubleshooting

13.1 Introduction to troubleshooting

This chapter contains information that might be helpful if you encounter problems while working with Metrel Medical ES Manager. If you don't find the help required to troubleshoot your problems, you can contact us directly. Check the Online support information for information on how to reach us.

Your comments will help us improve our product and update the manuals with any necessary information.

13.2 Instrument connection troubleshooting

Figure 13.1: Instrument connection error message

If the instrument settings are configured correctly, and the communication still does not work, please check the following:

- Make sure that the cable is not broken and that the connectors are inserted properly. If you have another device which can be connected using the same cable, consider testing the cable using that device to make sure that it works.
- Make sure that you close all other applications that might be using the port. You can also try restarting Windows to make sure that all such applications are closed.
- If none of this helps, there might be a problem with the device driver for the port you are using. You could try to reinstall or repair Metrel Medical ES Manager to make sure that your USB drivers are up to date.

13.3 Reporting problems to Metrel

This section deals with unexpected problems, errors and exceptions that may occur during usage of Metrel Medical ES Manager. If you have encountered an error while using Metrel Medical ES Manager, the best thing to do is to report this issue to our support at <metrel@metrel.si>. This will help us find a solution quickly, and provide you with an updated version, hotfix, or help you extract the data from your instrument if the issue prevents you from doing so.

13.3.1 Bug report checklist

This section contains a brief list of items which your bug report should contain. For detailed information about each step, consult the next section.

1. Regardless of the problem you are reporting, the minimum amount of information we need is:
    - A short description of the problem and, most importantly, steps needed to reproduce it;
    - Metrel Medical ES Manager log file (located in ...\Metrel\Medical MESM\logs.

14Online support information

14.1 How to get support?

14.1.1 Contact your local distributor!

Most issues can be solved by your local distributor. This support is accessible in your local language. Find the closest distributor here: https://www.metrel.si/en/locations/

14.1.2 Use the online contact form

You can also contact us using our Contact form [https://www.metrel.si/en/contact/]. That web page also contains a map describing the route to our Company's headquarters.

Appendix A Using Auto Sequence®s to test according to IEC/EN 60601

Metrel prepared the 4 Auto Sequences for testing according to IEC/EN 60601 with the intention of enabling the users to edit them to the requirements of any tested device as easily as possible.
In their default state, they contain every possible measurement mentioned in IEC/EN 60601 applicable to the tested device's protection class. The actual choice of tests depends on the manufacturer's requirements and is usually much shorter.
The following chapter deals with features of the default sequences, their editing, and the recommended workflow.

Getting started

Opening the default IEC/EN 60601 Auto Sequences group .atmpx file shows the window below.

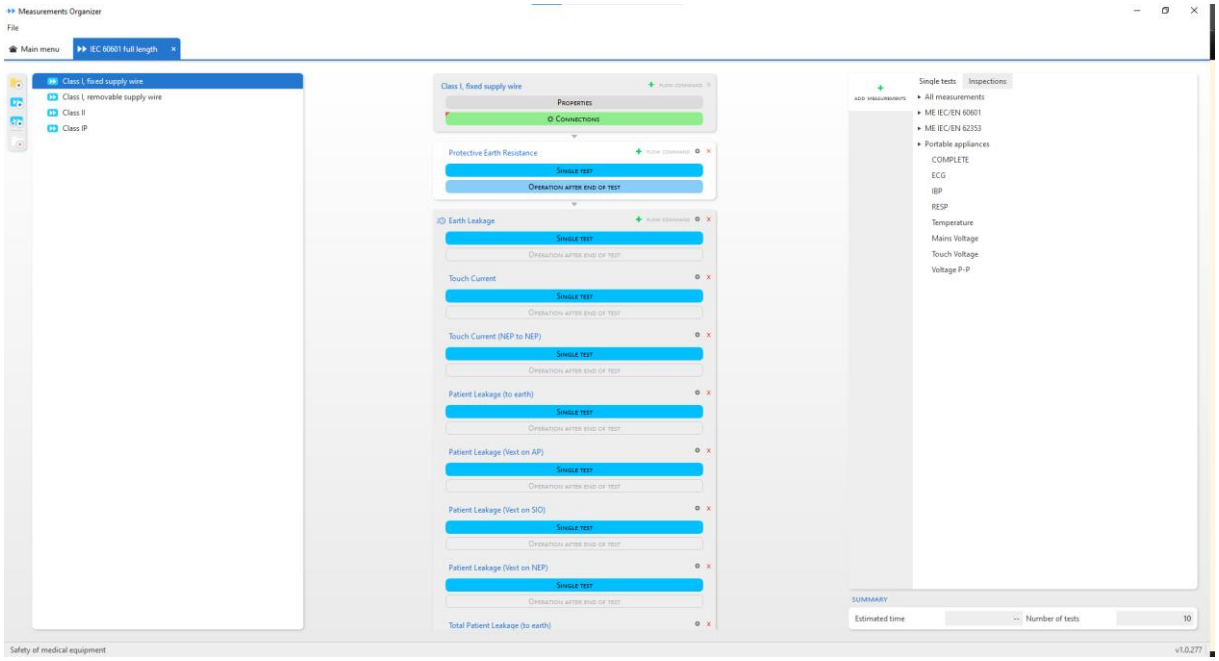


Figure 2: Open Auto Sequence Class I, fixed supply wire

The Auto Sequences in the group are collected in the list on the left. The contents of the currently open Auto Sequence are in the middle. The right column contains a list of supported measurements that can be added to the Auto Sequences.
Metrel prepared 4 Auto Sequences. The choice depends on the protection class and supply wire:

- Class I, fixed wire: contains the Protective earth measurement with test current of 25A and limit 200 mΩ. The measurement is done between any earthed conductive part and the ground contact at end of the supply cable. Uses the worst-case mains voltage to measure leakage currents. Add steps to measure additional earthed accessible parts using a probe.
- Class I, removable wire: contains Protective earth measurement with test current of 25A and limit of 100 mΩ. The measurement is done between any earthed conductive part and the inlet for cable. Uses the worst-case mains voltage to measure leakage currents. Add steps to this measurement in case of any earthed accessible parts.

- Class II: Doesn't contain the Protective earth measurement, uses the worst-case mains voltage to measure leakage currents.
- Class IP: Doesn't contain the Protective earth measurement. Uses the worst-case supply voltage to measure the leakages. Set the Umax(calc) in all leakage current parameters to the supply voltage.

The first step of the Auto Sequence lists the Properties of the tested device. They must be filled in before testing according to the tested device and connections to the MI 6601.

1. Auto Sequence name
2. Add a Flow command. See the Chapter 10.2.3 Flow commands for more information on Flow commands.
3. Test optimisation: allow MESMM to change the result sequence to minimise tested unit's resets and streamline the testing. See MESMM user manual for more information.
4. Insert the desired Auto Sequence code. The code is printed on labels / tags and can be used as identification of the Auto Sequence® in case of retesting.
5. Tested device description.
6. Add image, often used for help screens or schematics.
7. Connections between the tested unit and the instrument. MESMM will automatically setup the necessary steps and limits for the leakage current tests. Any tests that are not applicable to the selected connection configuration will be automatically skipped.
8. Set protection class of the device.
    a. Class I – protected by single layer insulation and protective earthing.
    b. Class II – Protected by double insulation.
    c. Class IP – IP stands for internally powered. Covers all devices with batteries and special chargers.
9. Set presence of FE (functional earth) and SIO (Signal Input/Output) connections.
10. Set Test on delay. We recommend measuring the time the instrument needs from pressing the On button to full functionality, plus a couple of seconds to reach the On button.
11. Set Manual power off and Power off delay. If the Manual power off is off, this is the exact time the tested device takes to shut down. If the Manual power off delay is on, add some seconds for pressing the Off button manually.
12. Connections setup. Click the plus symbol to add the connections to the MI 6601 applied parts connectors. The possible uses of these connections are applied parts (AP), earthed parts (EP) and non-earthed parts (NEP). Set them in the same way as you connect the tested device to the MI 6601.

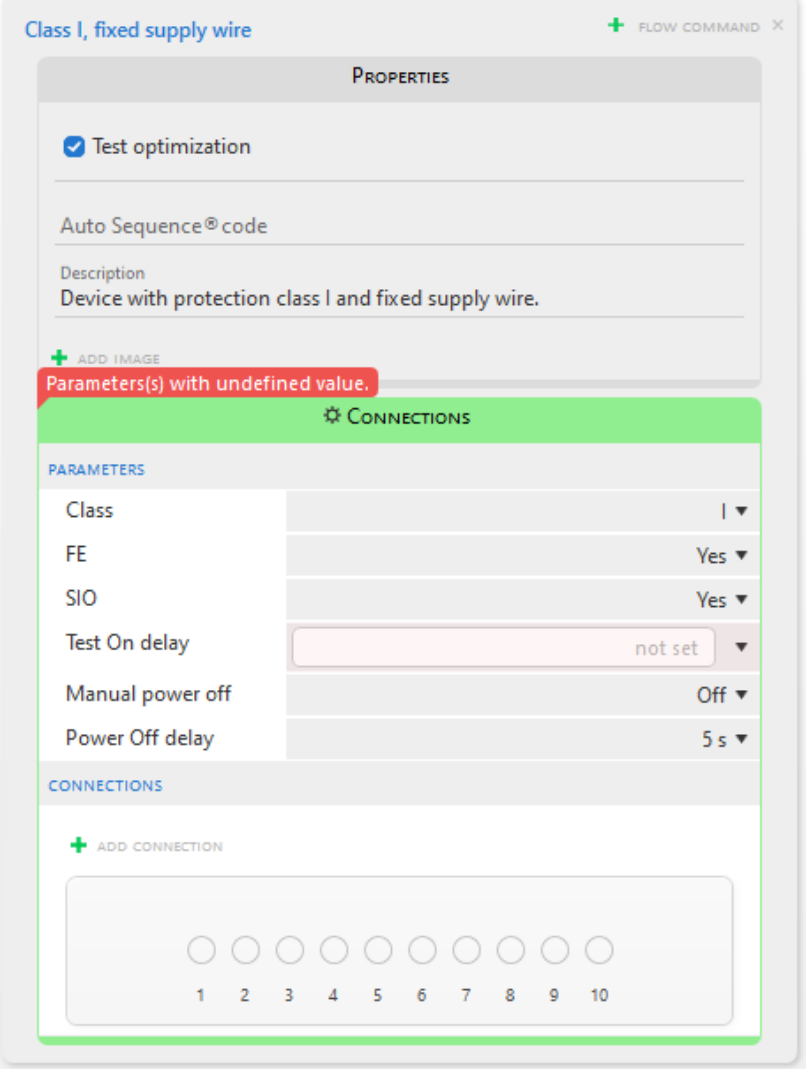


Figure 3: Connections

Measurements are automatically populated with the required results and limits. If there are no results to measure, a warning will come on. User action is necessary to skip the measurement.

Measurements and parameters

See chapter 10.2.2 Auto Sequence® content view for more details on Auto Sequence content manipulation.

The sequence is designed so that the user can easily remove the unnecessary measurements and would only need to add any in case measurements by other standards are needed.
The manufacturers typically require only some of the leakage measurements available in the sequence. The rest can be simply removed using the X symbol in the upper right-hand corner. Save the Auto Sequence under a new name. The Metrel Auto Sequences are locked and cannot be overwritten.

Next to it is the Settings button, where the number of repetitions of the same measurement can be set. For example, set it for Protective earth resistance in case there are multiple earthed parts on the housing of the tested device. Consider that it will be necessary to use a probe to connect the each of the measured points.

The default state of the parameters in the leakage current measurements is to include the largest possible number of measuring points. Duration is set to the shortest possible time, 2s.
Set the parameters as required by the tested device manufacturer. If uncertain, leave as is.

Example: patient monitor Philips MP70

The monitor has 10 connections for ECG that need to be tested, a functional earth, and an SIO connector that is grounded and therefore irrelevant for leakage current testing. The supply cable is fixed. The connectors are set into an earthed conductive board that can be covered by a lid, but the clasp is easy to detach, so we count it as accessible. There are 2 accessible screws on the back of the housing. There are no non-earthed conductive parts.

Setup of the Auto Sequence
The Auto Sequence chosen is the Class I, fixed wire. The connections window includes presence of FE, but not SIO. The applied parts can be considered a single part with 10 connections. Test on delay and power off delay were measured to 20 s and 5 s respectively.

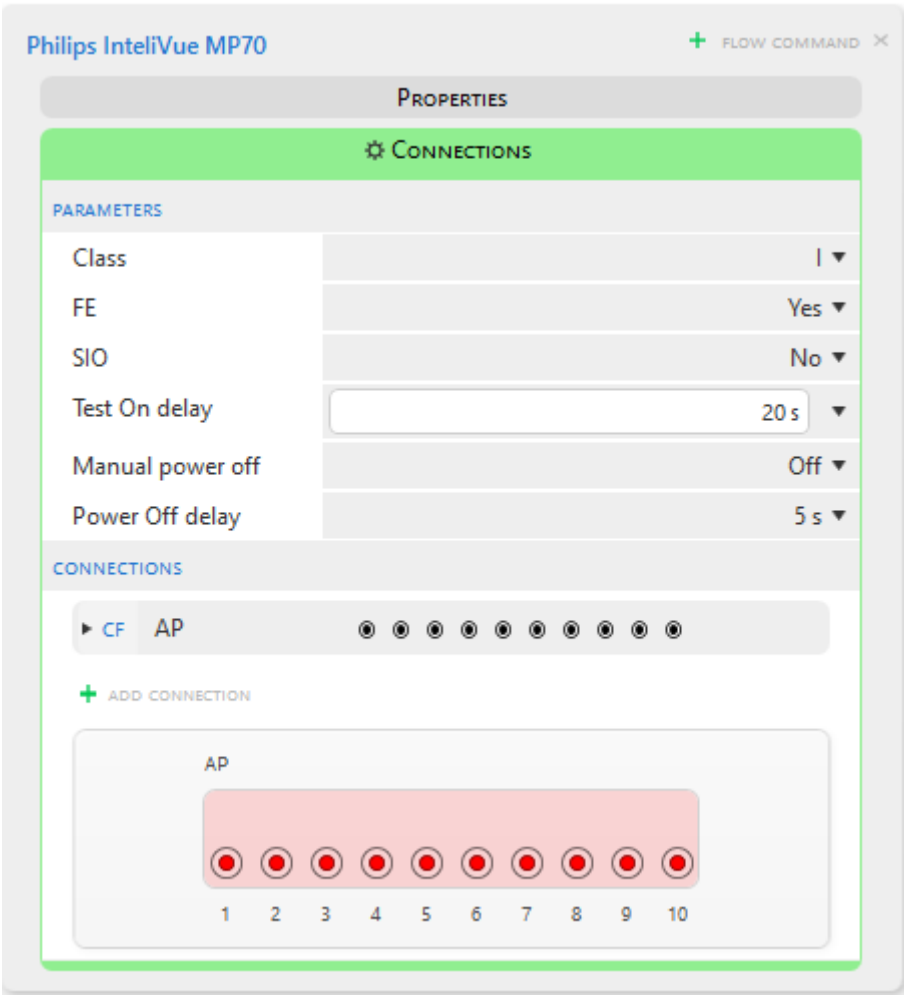


Figure 4: Example of connections for MP70

This setup is enough for a thorough testing. However, requirements are less extensive and time can be saved by shortening the measurement list.
Protective earth resistance stays, it is the most crucial test in Class I device. There are 3 measuring points, so the steps are set to 3.

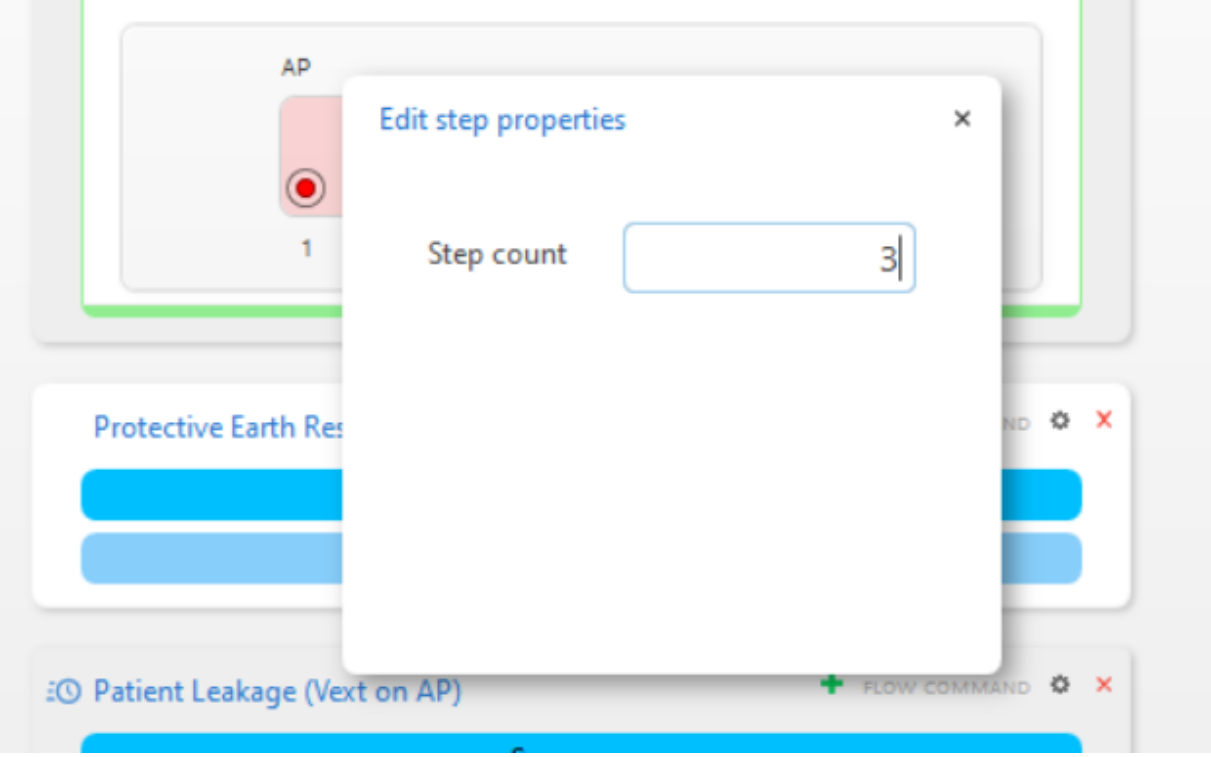
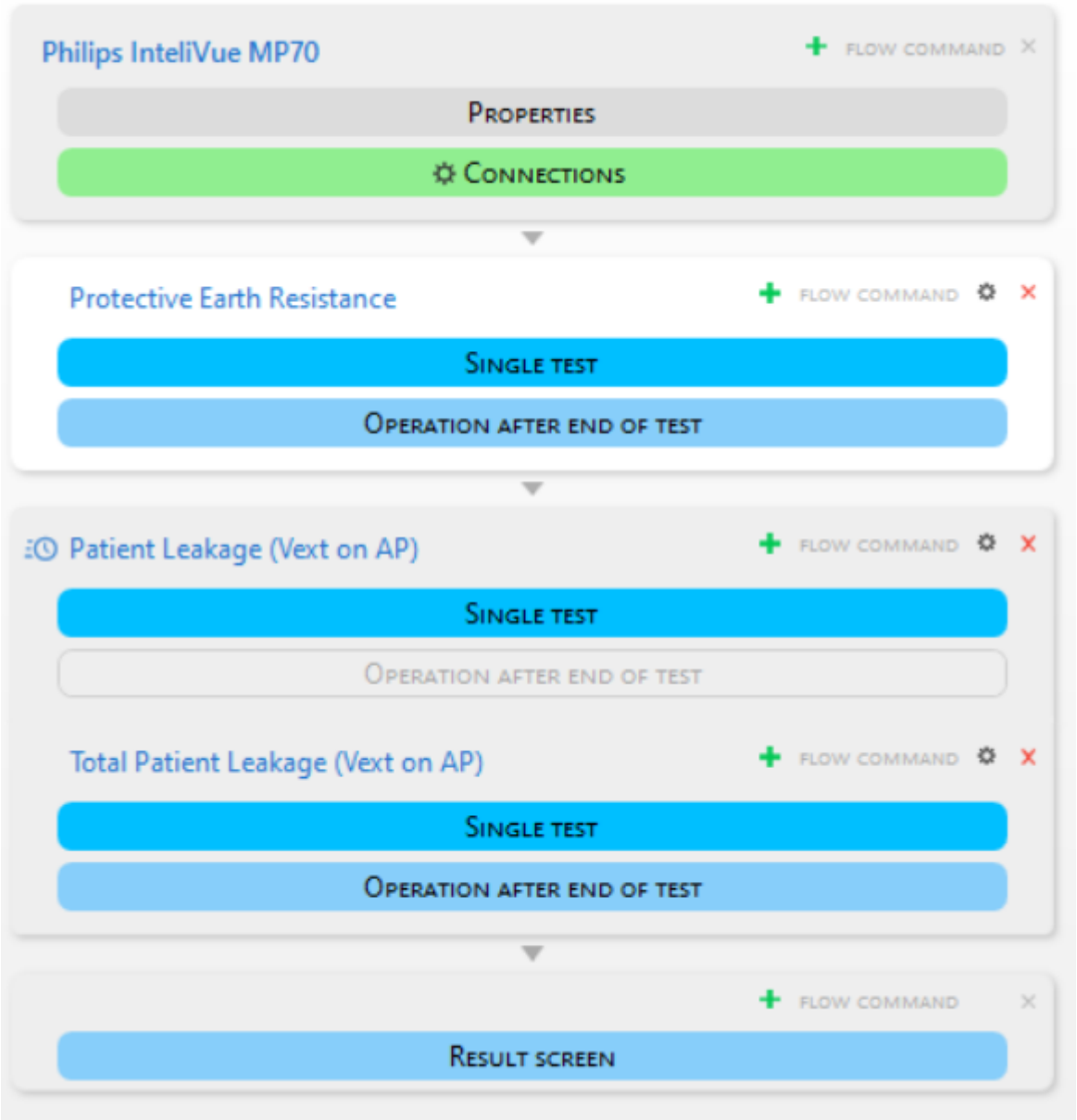


Figure 5: Inputting the step number

Earth leakage, patient leakage to earth and total patient leakage to earth are not required by the manufacturer in this case, as referenced in the Service manual. The SIO is irrelevant, and there are no NEPs, which leaves a lot of the remaining measurements empty. This is the cleaned-out sequence on Figure 5: Inputting the step number.


Philips InteliVue MP70
FLOW COMMAND
PROPERTIES
CONNECTIONS
Protective Earth Resistance
FLOW COMMAND
SINGLE TEST
OPERATION AFTER END OF TEST
Patient Leakage (Vext on AP)
FLOW COMMAND
SINGLE TEST
OPERATION AFTER END OF TEST
Total Patient Leakage (Vext on AP)
FLOW COMMAND
SINGLE TEST
OPERATION AFTER END OF TEST
FLOW COMMAND
RESULT SCREEN