User Guide for the openMDM® Application

Eclipse mdmbl project

Version 5.2.0, 2024-04-30: {build-revision}

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Document History

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1. Introduction

1.1. General

The openMDM Application is an open source software platform for measured data management systems. In compliance with the ASAM ODS standard, this platform enables an ecosystem currently consisting of automotive companies to build in-house application as well as application vendors building commercial and open source solutions tools and systems.

The openMDM Application can serve many ASAM ODS compliant servers in parallel for data ingest, data exploration, test management, user and access management and more. Security mechanisms at data and functional level protect the stored information against unauthorized access.

In summary, it implements an industry standard platform for tools and products for ODS compliant products and tool chains.

The development of the platform and concepts is driven by the openMDM Eclipse Working Group. The source code, documentaton and concepts are part of the open source Eclipse mdmbl project published under the business friendly Eclipse Public License 2.0 (EPL-2.0).

1.2. Features

The openMDM Application can be used to manage test and measurement data for a broad variety of domains. The openMDM web client offers a web based graphical user interface, that offers the following features:

- navigate through data structures
- search and retrieve of test and measurement data
- inspect data (*Detail Viewer*)
- collect data for further processing (*Shopping Basket*)
- visualize data (*Chart Viewer*)
- upload / download files, update, preview or delete existing files

With extended administration rights, a user can:

- configure preferences
- configure external systems

Refer to this chapter.

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NOTE	This document includes screenshots of the openMDM Demo Application which is provided by the Eclipse openMDM Working Group. Please be aware that different domain specific openMDM applications have different data models and so different meta and measurement data.

NOTE	The test and measurement data are usually imported by server processes and stored in an standardized ASAM ODS data source. The way of storing the data is not part of this user manual.

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2. The openMDM Web Client

2.1. Structure

The openMDM web client the graphical user interface for the openMDM application. If you start the client, you get the following view:

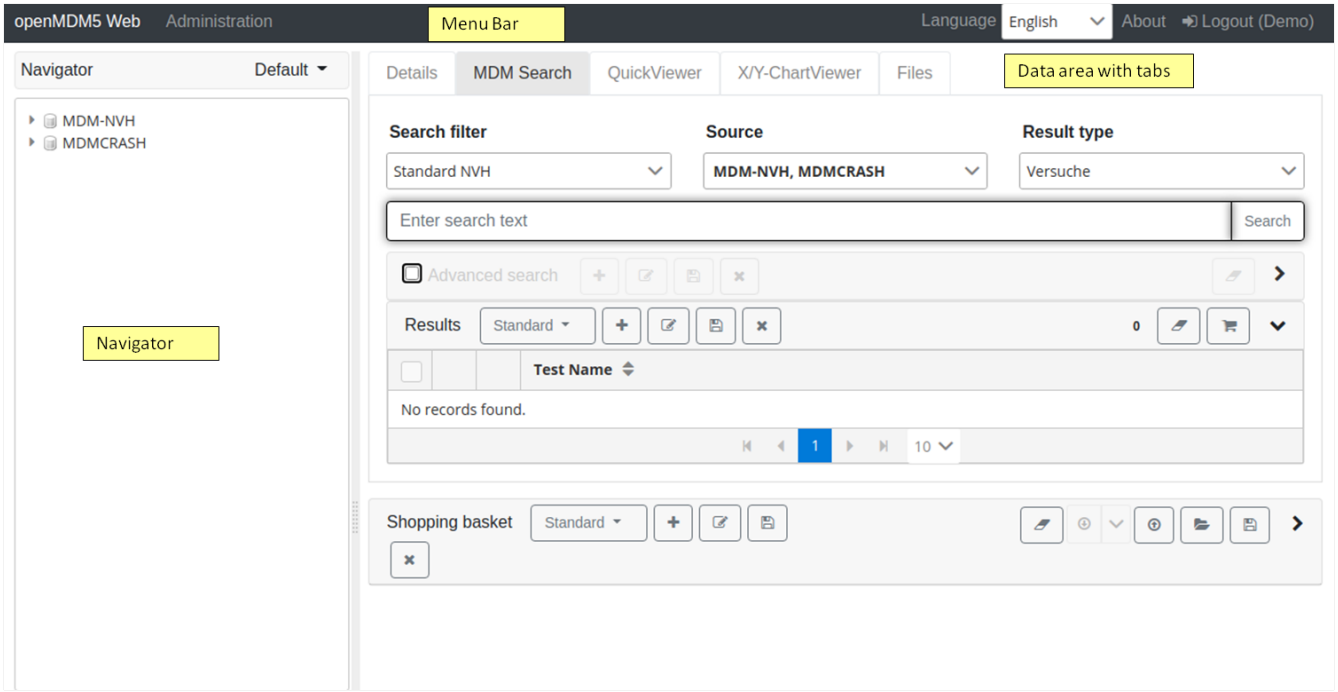

Figure 1. openMDM web client

Elements:

- *Menu bar*: Menus for language In this section general, About and Login / Logout, see this section. There is also the Administration menu, see this section.
- *Navigator*: Navigation in the openMDM data structures (e.g. project, pool, test, teststep, etc.), see this section.
- Data Area:
  In this area all data related functions can be found. These functions are divided into five tabs:
  a. *Details*: The Metadata for a selected node in the Navigator are shown, see this section.
  b. *MDM Search*: Different kinds of search are available like full text search, advanced search (attribute based), defining search filters and a result view, see this section.
  c. *Qick Viewer*: A simple X/Y ChartViewer to visualize the data of a measurement, see this section.
  d. *X/Y ChartViewer*: A more sophisticated viewer that can represent the data of a measurement in different views, see this section.
  e. *Files*: Upload new files and/or download, update, preview or delete existing files, see this section.

NOTE	The openMDM5 main elements are written in *italic font* in this document.

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2.2. Roles

For the web client three different roles for users are available:

- *DescriptiveDataAuthor*: users in this role can view, edit and update data. We denote users in this role just as *user*.
- *Admin*: additional rights for configuring / customize the web client for all users. See here.
- *Guest*: restricted to read only.

NOTE	When we talk about admin / administration in this document, we mean users in the *Admin* role. There are further configuration options, that can be only done on server side, we refer to this as *system administration*.

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3. General Functions and Common Controls

In this section general functions from the *Menu Bar* are described, also common control elements and buttons that are used.

3.1. Login

A user name and password are required to log in to the openMDM Application. The user name and password is the same as for the related ASAM ODS user. Please ask your administrator when you aren't able to connect to the system.

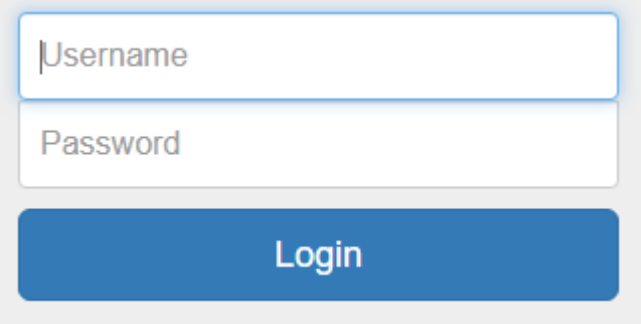

Figure 2. openMDM5 login

After successful login, the start page of the openMDM5 Web Client appears.

NOTE	It is possible to include single-sign-on functionality to the openMDM5 application. Please ask your administrator for this feature.

3.2. Logout

Logging out will end all of your ASAM ODS user sessions / connections.

3.3. Timezone

Select a timezone in which the data will be shown. Works in detail view and X/Y Chart Viewer. There are all timezones from the whole world available. Time in search is converted from user selected timezone to respective timezone in which datasource is working with.

Additional options are: - Date Type defines if dates are printed absolute, relative or both. * Absolute: e.g. 05.07.2023, 17:21:23 * Relative: e.g. 3 years ago * Both: e.g. 3 years ago at 07/05/2023, 05:21:23 PM - If ISO Date is selected, the dates are formatted according to ISO 8601. Otherwise dates are formatted depending on the selected locale. Has no effect if `Relative` is selected.

3.4. Datasources

Select one or more datasources to work with. Furthermore you can specify to which datasources the client should connect to after login, by clicking the `Default datasources` button.

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3.5. Language

Select a language for text and labels. Currently available languages are English and German (Deutsch). New languages can be defined and added by the system administration.

3.6. About

All necessary legal information for the open source software is listed, this includes: Trademarks, Copyright, Declared Project Licenses, Source Code location, Third-party Content and Cryptography.

3.7. Control elements

Hide element

To hide the associated element.

Open element

To open / show the associated element.

3.8. Buttons

Refresh

To refresh the actually selected element.

Copy link

To copy the link of actually selected element.

Shopping Basket

To add the selection to the *Shopping Basket*.

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Edit

To edit the associated attributes.

Save

To save the associated changed/edited component. It can be a view or a filter or the *Shopping Basket*.

Delete

To delete selected or associated component.

Clear

To reset changed/edited components (search conditions), or clear components (search results, *Shopping Basket*).

Download and download with options

To download the selected component. Some components have many options for download.

Upload

To upload the selected component (file, *Shopping Basket*).

Open

To open the associated component.

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Link and unlink

To link or unlink the selected component to the associated component.

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4. Navigation

4.1. Overview Data Structure

The test and measurement data are stored in a hierarchical structure and visualized in the *Navigator*. The top level element(s) in the tree show the "environments", the data belong to. In every environment, It starts with the top level element "project" and you can drill down to a "test" element and its "measurement" elements by drilling deeper in the storage hierarchy.

In this section the different levels of the test data storage and navigation will be described. The standard navigation panel uses and provides the structure of the data as stored in the ASAM ODS data source. Alternatively you can choose different navigation structures by using the *NodeProvider*.

Environment

The top level element(s) in the tree show the data source(s), the data belong to.

Project

The top level of the data is the "project" level. It’s the highest grouping criteria for test data.

Pool

The second level for grouping and characterize test data is the "pool" or "subproject level". It’s used to categorized and group the tests in a project.

Test

The third level is the highest level with test data. A test belongs to a pool and it includes beside test data the so called teststeps.

Teststep

The fourth level is the teststep level. Usually a teststep is defined for a limited number of measurements. A teststep belongs to a test and it includes beside teststep data the measurement data.

Measurements

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The lowest level of the test data is the measurement level. It includes imported measurement data for a teststep. A measurement belongs to a teststep.

4.2. Navigator

The *Navigator* offers the possibility to browse the openMDM data sets. It a tree, which shows the openMDM data structure. The view of data structure in the *Navigator* is configurable and determined by the chosen Node Provider configuration. The openMDM Client provides a default configuration for the standard openMDM view. This shows the metadata from the connected ODS database in the following hierarchy:

- Project (e.g PMV 2PV or PMV Model P)
- Pool (e.g Engine Noise Measurements or PBN Measurements)
- Test (e.g PBN_UNECE_R51_20190703160224)
- Teststep (e.g PBN_UNECE_R51_Left_Acc_70)
- Measurement (e.g Channel)

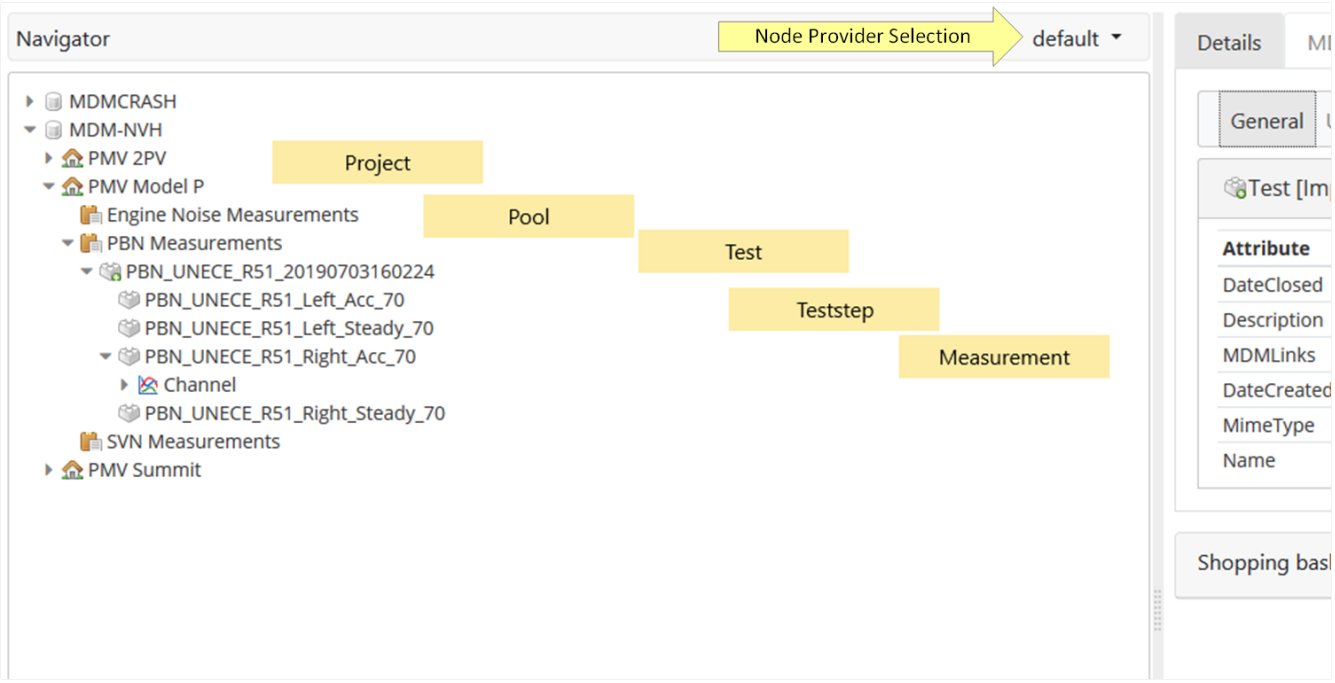

Figure 3. Hierarchical levels in the Navigator

In this screenshot the Node Provider "default" is selected.

With the right mouse button (context menu,) you can invoke a menu that offers you a choice of different functions depending on the current context.

- Refresh: Newly arrived information for the currently selected data object is shown in the navigation tree and in selected view in the right pane of the openMDM web client .
- Refresh all: Regardless of the current data object, all the newly arrived information is shown in the tree.
- Copy link: Copy the REST URL for the currently selected data object.
- Add to *Shopping Basket*: Storage of the currently selected data object (multiple selection

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possible) in the *Shopping Basket*.

- Create Project/Pool/Test/TestStep/Measurement. Keep in mind that currently there is no possibility to enter values for mandatory context attributes. Thus you cannot create TestSteps or Measurements with mandatory attributes.

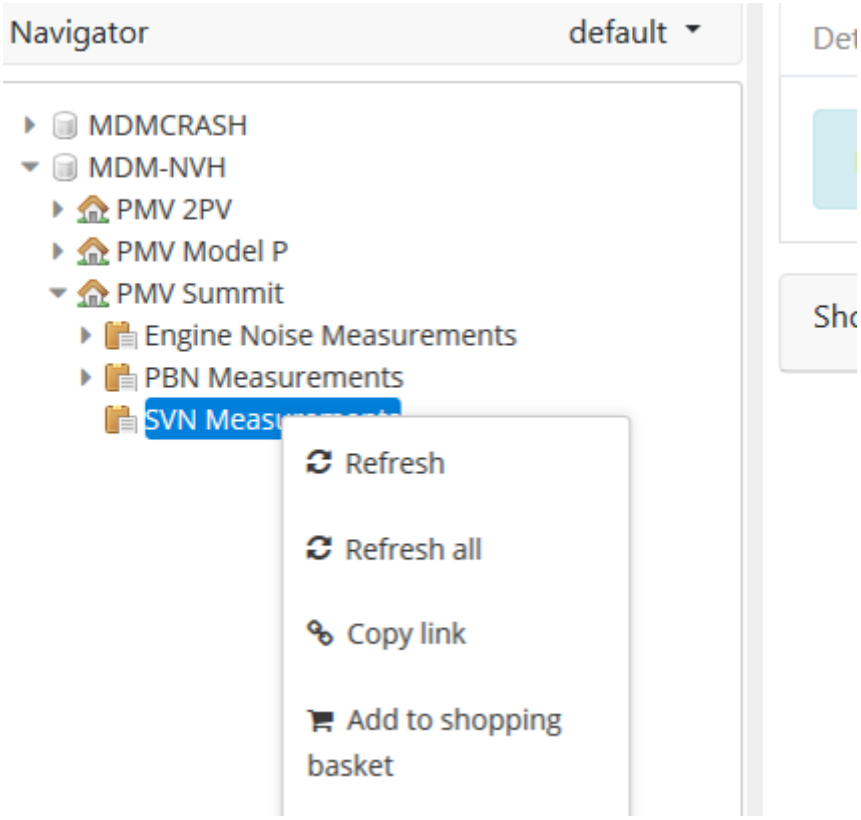

Figure 4. Context menu in the Navigator

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5. Search

In the second tab in the right pane of the openMDM web client is the *MDM Search*. The *MDM Search* consists of three areas:

- Full Text Search: search for a (sub) string in the metadata. Can be combined with the advanced search.
- Advanced search: Search using multiple attributes. Named search filters can be created and updated for reuse or be deleted .
- Criteria: select search filter, source and result type for a search.
- Results: show search results in a result view.

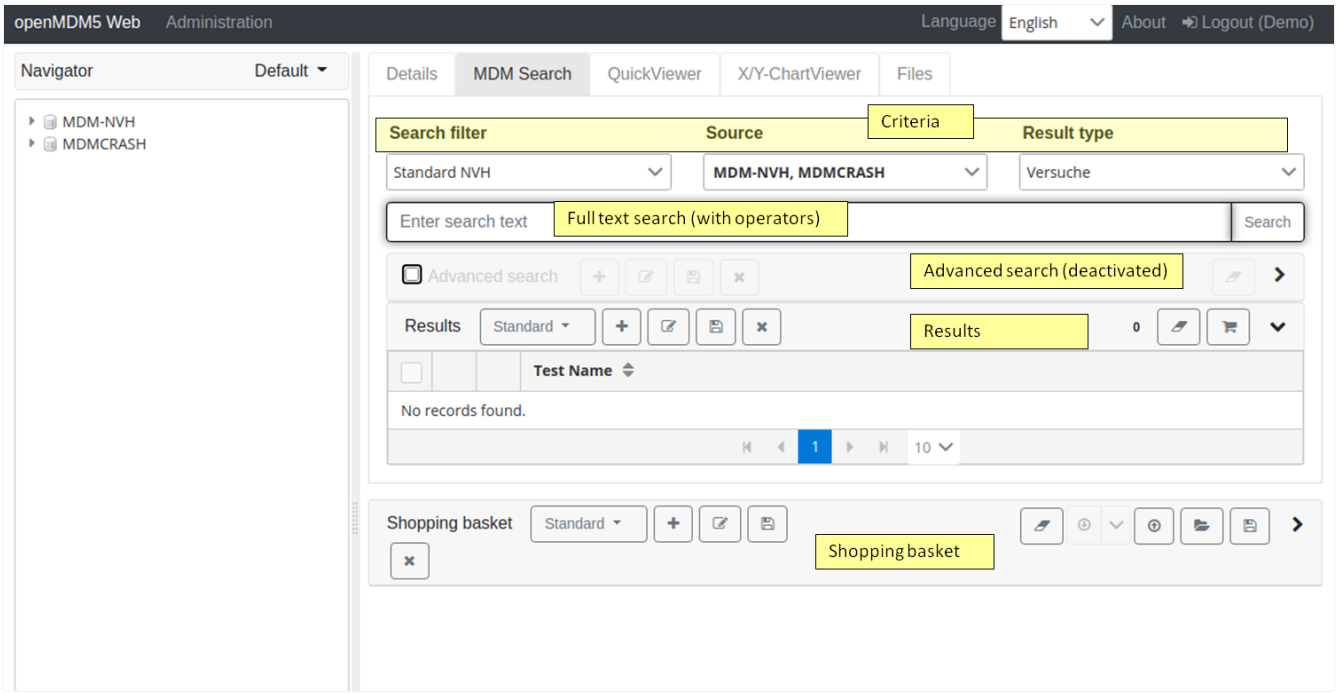

Figure 5. MDM Search

5.1. Defining the scope of a search via Criteria selection

With the criteria selection you can define the scope of your search by different options:

Search filter (for Advanced Search only): Select a named search filter. A search filter definition contains search attributes and can be reused. If a filter is selected then its search attributes are available in the Advanced Search area.

Source: If you have multiple data sources, you can select one or more the search will be executed on. A multiple selection of environments is possible.

Result type: You can select the result type. The following types are available:

- Test
- Teststep

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- Measurement

NOTE	When choosing a teststep or measurement as result type you should configure accordingly teststep or measurement specific attributes in your result list.

5.2. Full Text Search

The full text search (like Google text search) in one text field. You can search for a (sub) string or text in the metadata. The criteria "Source" and "Result type" define the scope of the search.

You can define a more sophisticated search using the available operators. These operators are described as tool tip text in the search text field.

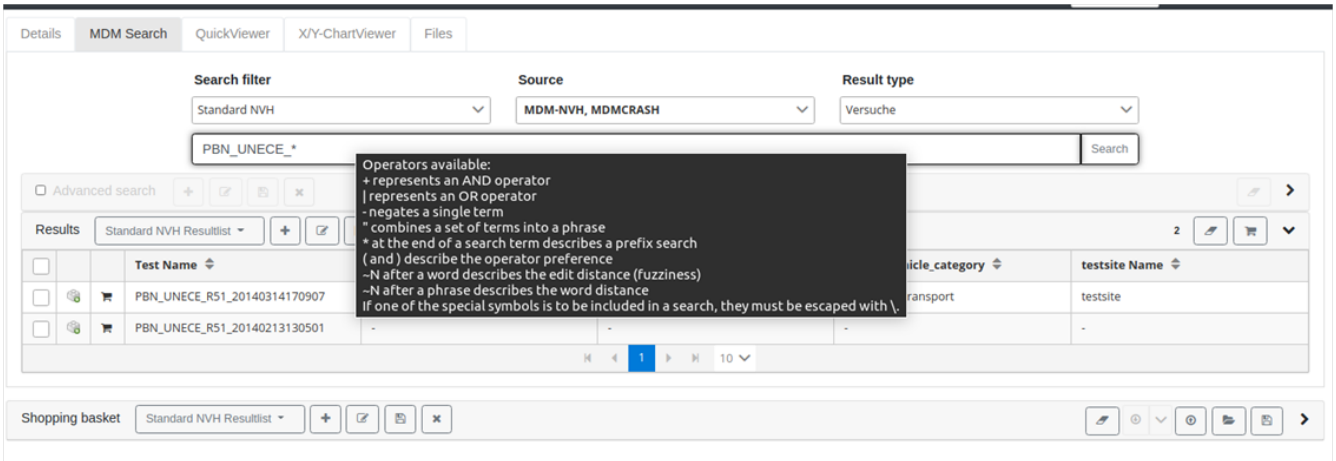

*Figure 6. Search with * operator*

The full text search can be executed stand alone or in combination with the advances search, depending on the check box *Advanced Search* inactivated or activated.

5.3. Advanced Search (Attribute Based Search)

For the Advanced Search activate the *Advanced Search* check box and expand the Advanced Search area.

IMPORTANT	The button "Search" on the right hand side of the Full Text Search starts all types to searches, even if the text filed is empty.

5.3.1. Define an attribute based search

Create a new filter and select your attributes by opening the View Editor via this button.

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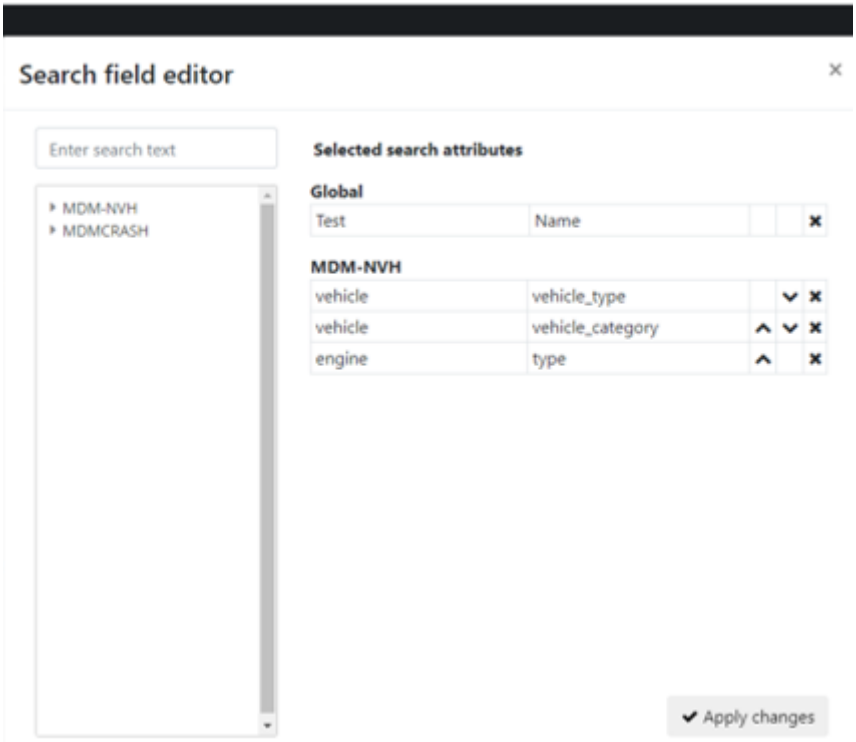

Figure 7. Select attributes in View Editor

In the Advanced Search you can see the selected attributes:

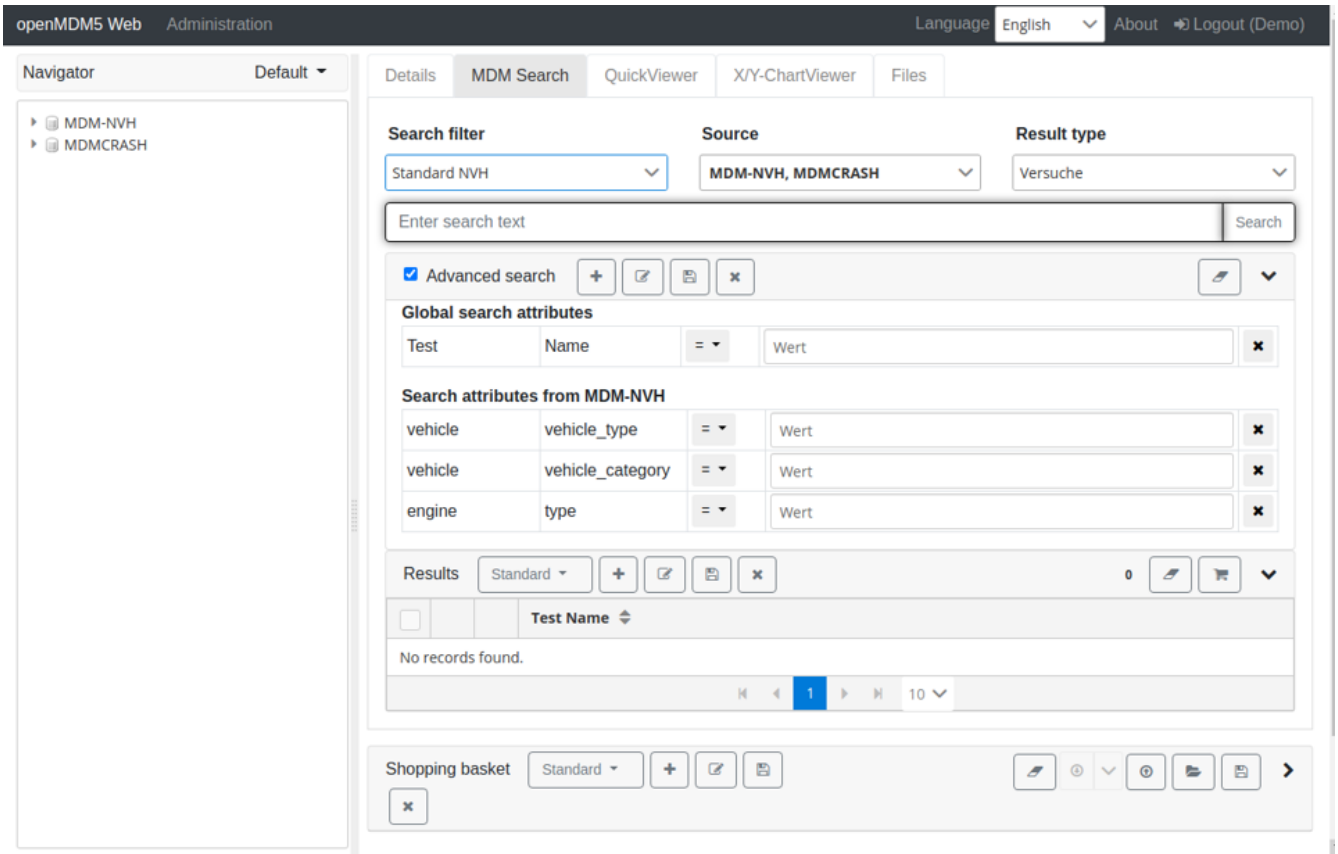

Figure 8. Attributes in the Advanced Search

If you select an attribute which is part of all selected environments (see Source) then the attribute is an so called global search attribute. The search with a global attribute is executed in all environments.

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If you select an attribute which isn’t part of all selected environments then the attribute is an environment specific attribute and the search is executed in the related environments only.

The Advanced Search area contains the following elements (in each row):

- **Attributes**: These first two columns contain the names of the data object and the object attribute.
- **Operators**: Operators for the attribute and their search criteria can be set in this column. The operators should be self-explanatory.
- **Value**: Search values are entered here.
- **Remove Button**: This button remove the selected row form the advanced search.

5.3.2. Use, create, update or delete an existing filter

- **Create a new filter**:
  Define attributes. For reuse you can save and name the search filter using the *Save search filter* button. You can assign a new name or override an existing filter by choosing the dedicated filter name.
- **Use an existing filter**:
  Select a Search Filter in the *Search Filter* drop down box. Activate the Advanced Search check box.
- **Update an existing filter**:
  Select a Search Filter in the *Search Filter* drop down box. Make your changes by opening the View Editor with the *Edit search filter* button. You can assign a new name or override an existing filter by choosing the dedicated filter name. Then use the *Save view* button. You can assign a new name or override an existing filter by choosing the dedicated filter name.
- **Delete an existing filter:**
  Select a Search Filter in the *Search Filter* drop down box. Use the *Delete search filter* button.

5.3.3. Do the search

For the advanced search you have:

- to fill the values for the defined attributed
- to define the operator (=, < , > , like)
- optionally: fill the search text field
- to define your data source(s)
- to choose the result type

Use the button "Search" on the right hand side of the Full Text Search.

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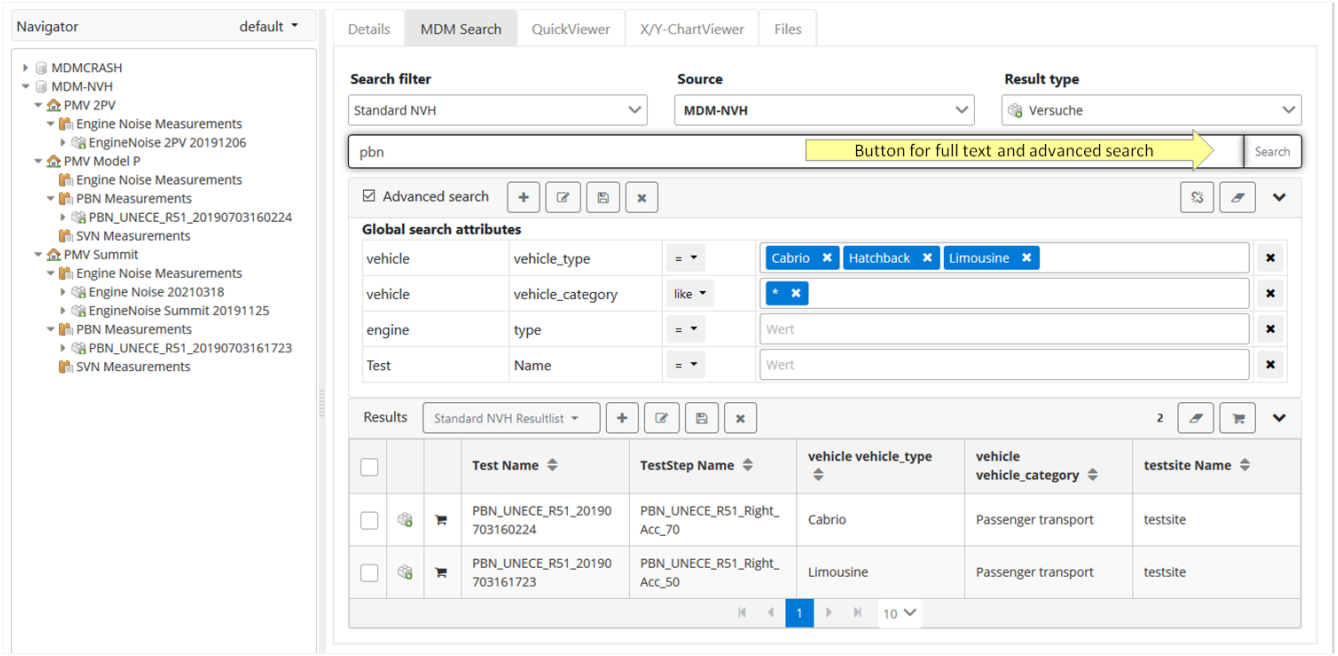

Figure 9. MDM Search

IMPORTANT	Don't forget to reset the filter criteria, if you want to execute a new (different) search.

5.4. Search Result

Using the buttons in the upper left area of the result area, you can select an existing result-view, create a new view or edit, save and delete existing views with View Editor.

Using the buttons in the upper right result area, you can clear the search results or add selected search results to the *Shopping Basket*.

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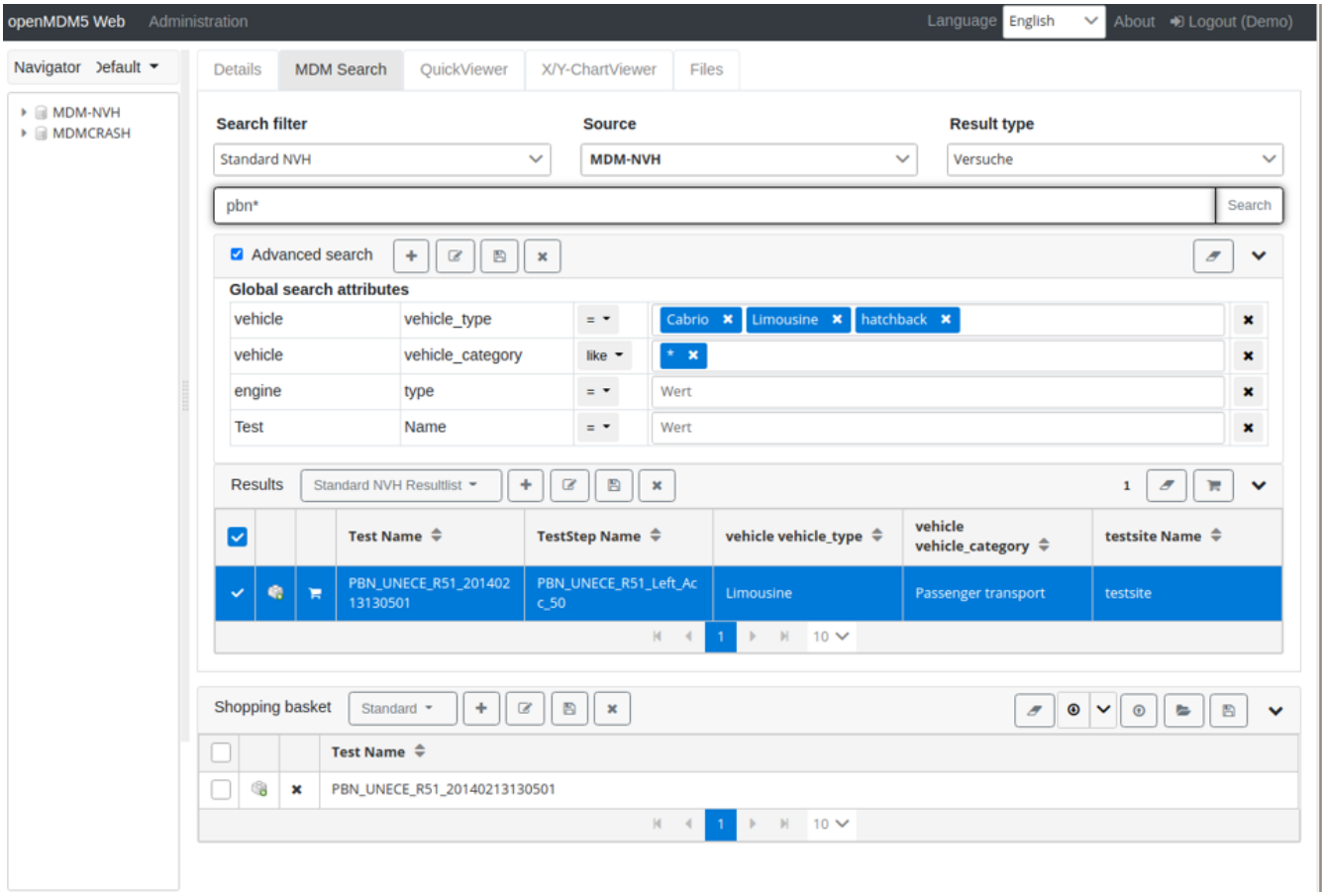

Figure 10. Add result to Shopping Basket

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6. Shopping Basket

Store data objects such as projects, pools, tests, teststeps, measurements etc. for further processing.

6.1. Collect data in the Shopping Basket

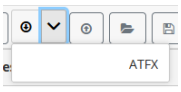
The *Shopping Basket* is located in the lower left area of the openMDM web client. It is a container for data objects. Any data objects can be selected in the *Navigator* (multiple selection is possible) and placed per context menu in the *Shopping Basket*, to use them as selection for further processing with other openMDM components.

Figure 11. Storage of data in the Shopping Basket

Using the buttons in the upper left area of the area, you can create new views, edit existing views with the View Editor, save edited views or delete existing views. The procedure is similar to that described here.

6.2. Exporting data from the Shopping Basket (ATFX)

Using the buttons in the upper right area of the view, you can clear, download, upload, open or save data of the *Shopping Basket*.

Icons	Description
	You can download **content** of the selected objects in the shopping basket using as ATFx file.
	You can download the **data** of the selected objects in the shopping basket using in the selected data format (e.g. ATFx).

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7. View editor

```
Notiz BMW: Diese Funktionalität muss evtl. im Client vereinfacht werden (verständlich
für einen Anfänger).
```

With this editor you can create new search filters, edit existing search filters, create new views for search results or *Shopping Basket* and edit existing views for search results or *Shopping Basket*.

With click on the one of this buttons starts the View Editor dialog.

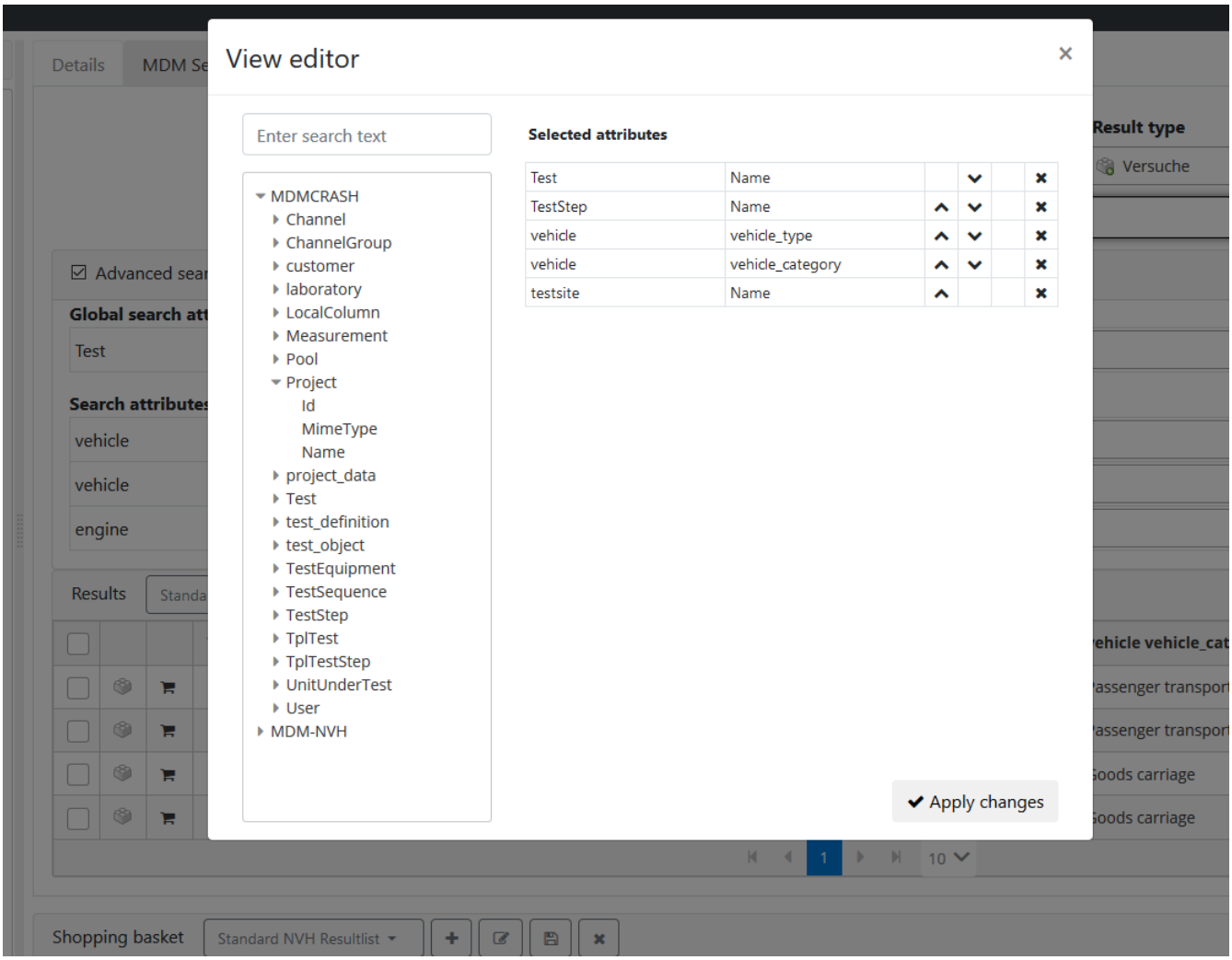

Figure 12. View Editor

You can search for elements via the search field:

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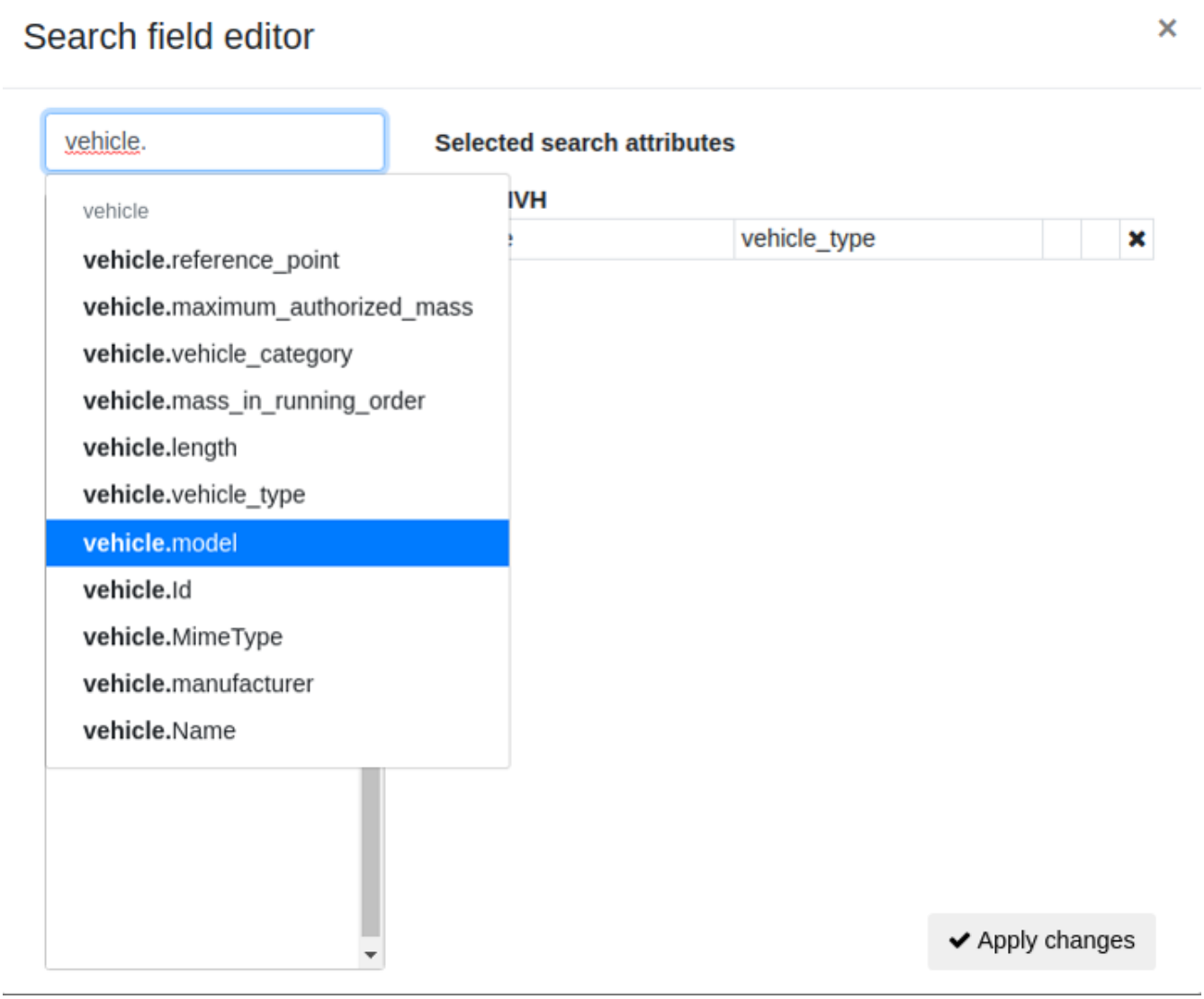

Figure 13. View Editor search

The procedure is always similar, see as e.g. here.

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8. View data (Detail Viewer)

In the first tab in the right pane of the openMDM web client is the *Details*. It responds to the selection within the *Navigator*. The component *Details* has 5 tabs.

- General
- Unit Under Test
- Test Sequence
- Test Equipment
- Sensors
- Parametersets

```
Notiz (BMW): bzgl. Bulletpoints:
Sollten wir in der GUI evtl. intuitiver gestalten (weil ein Anwender vielleicht
nichts von UUT, TS, TE weiß)
```

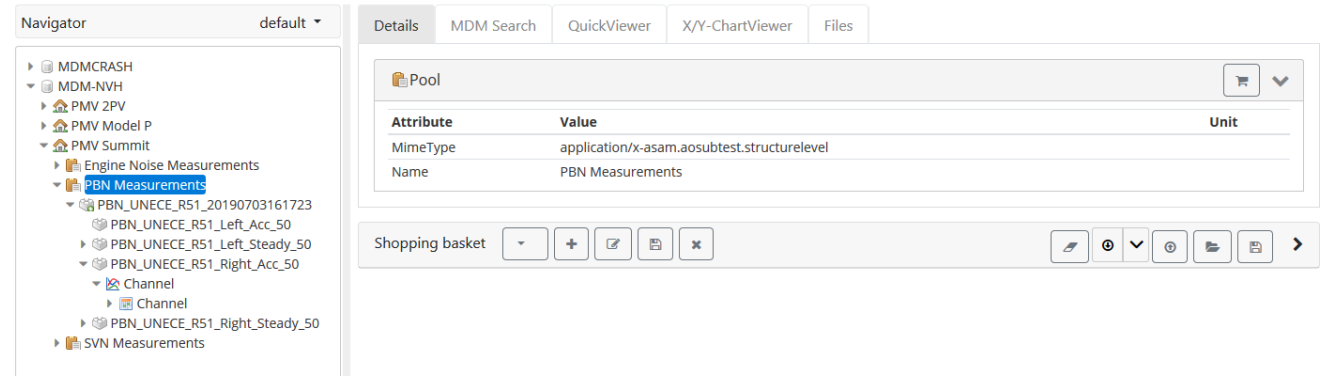

Figure 14. Metadata in the Details

The first tab is called the General. It shows the attributes (= metadata) of the currently selected data object in the *Navigator*. If selected data object in the *Navigator* isn't a Test or a Teststep or a Measurement then shows only the metadata without any tab.

If selected data object in the *Navigator* is a Test or a Teststep or a Measurement then all 5 tabs are visible.

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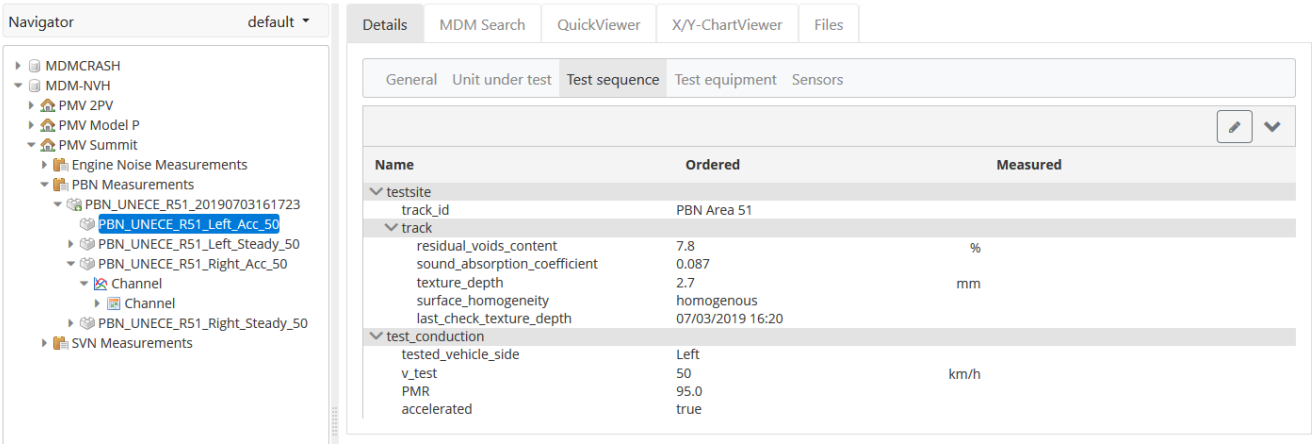

Figure 15. Test sequence tab in the Details

In next 4 tabs you can edit the single attribute values.

8.1. Parametersets

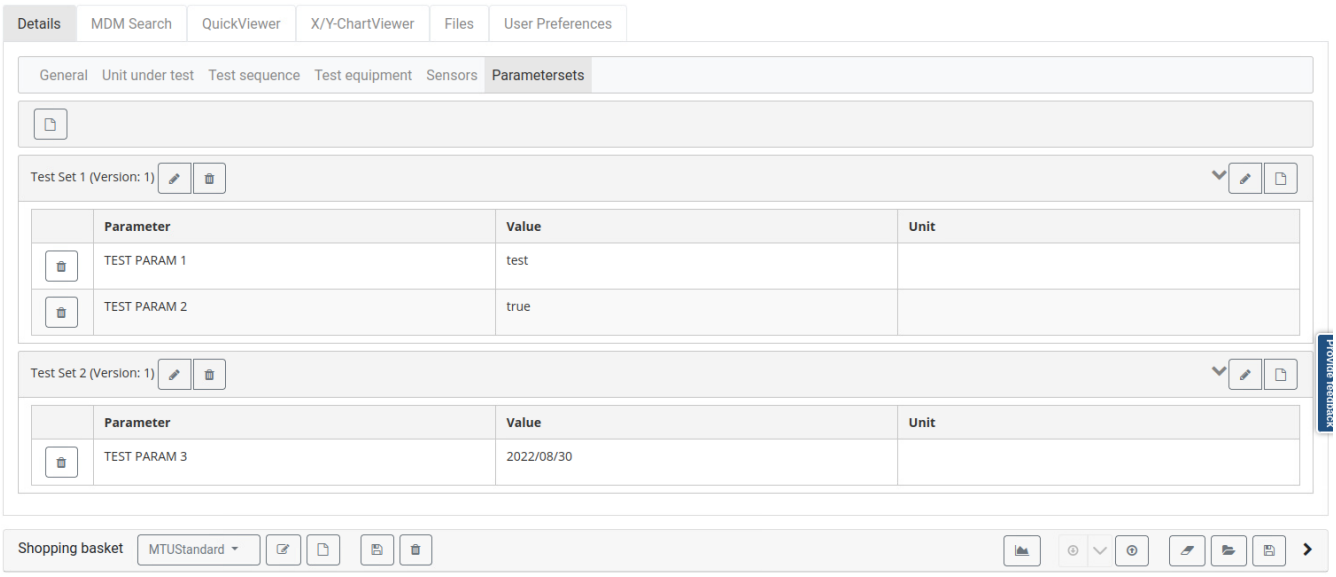

Figure 16. Parametersets overview

This tab gives the user possibility to create, remove and edit parameter sets (editing is done in the same way as in previous windows).

8.1.1. Create parameter set

To create parameter set please click add button and give it name.

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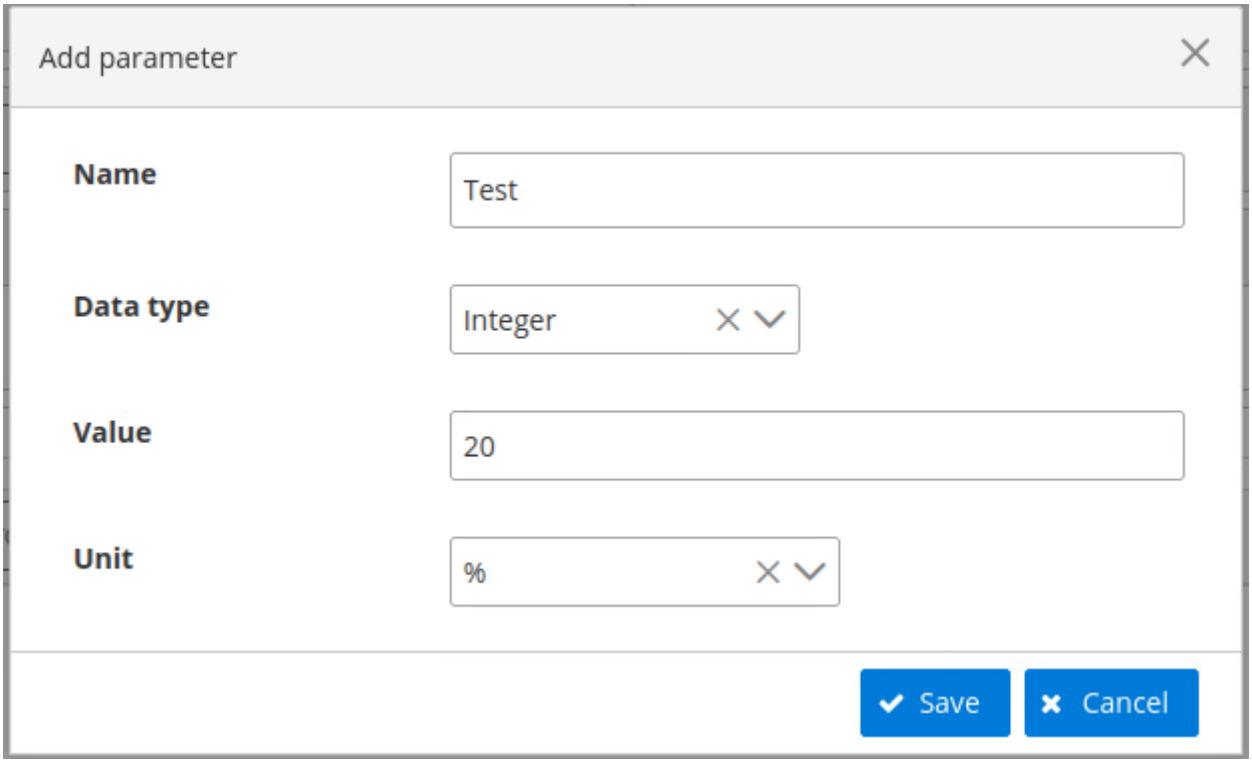

Figure 17. Create parameter in set

The next step is to create parameter in sets. User can give the name, specify the type and the value. In case of integer and double type can also specify the unit.

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9. Visualize data

9.1. Quick Viewer

The component *Quick Viewer* is a simpler version of *X/Y Chart Viewer* with the possibility to switch between graphically or tabular view of channel values.

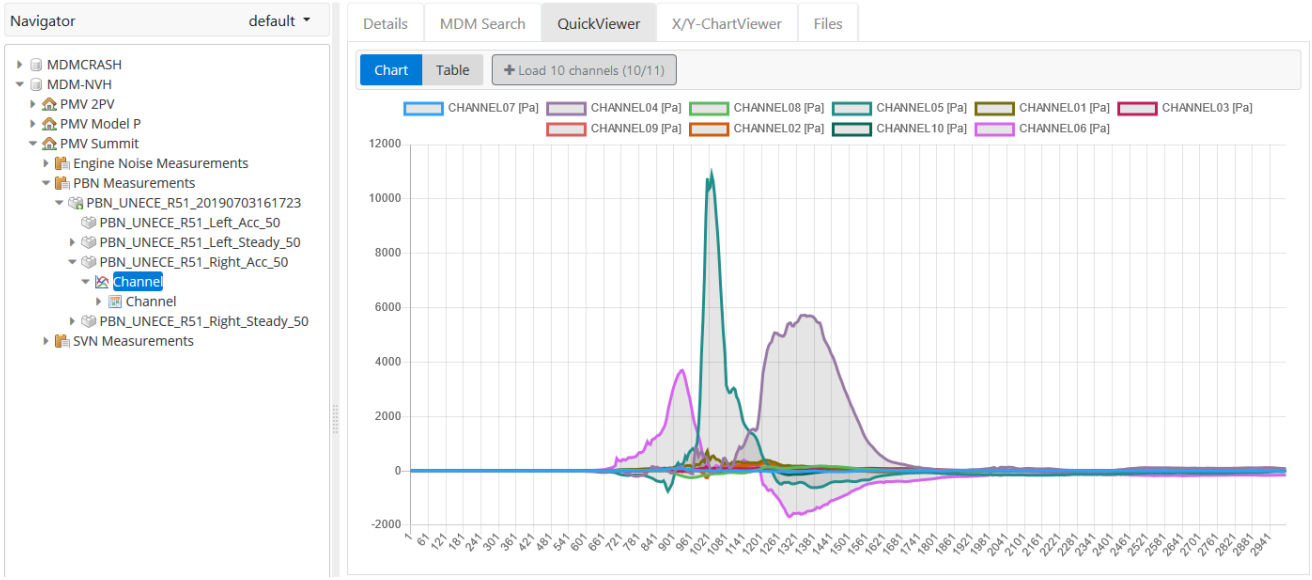

Figure 18. Quick Viewer

9.2. X/Y Chart Viewer

The *X/Y Chart Viewer* represents the data of measurements in different views. This includes the graphical and tabular view of channel values.

You can view one or more ChannelGroups, these are shown in the ChannelGroup selection panel. Each channel of a channel group has an associated axis type. If the axis type of a channel is y-axis, this channel is listed in the Y-Channel selection panel. If the type is x-axis, it is listed in the X-Channel selection panel. If the type is x/y-axis, it is listed in both, the Y-Channel and the X-Channel selection panel.

The following figure shows the general structure of the *X/Y Chart Viewer* on the basis of example data (= Channel).

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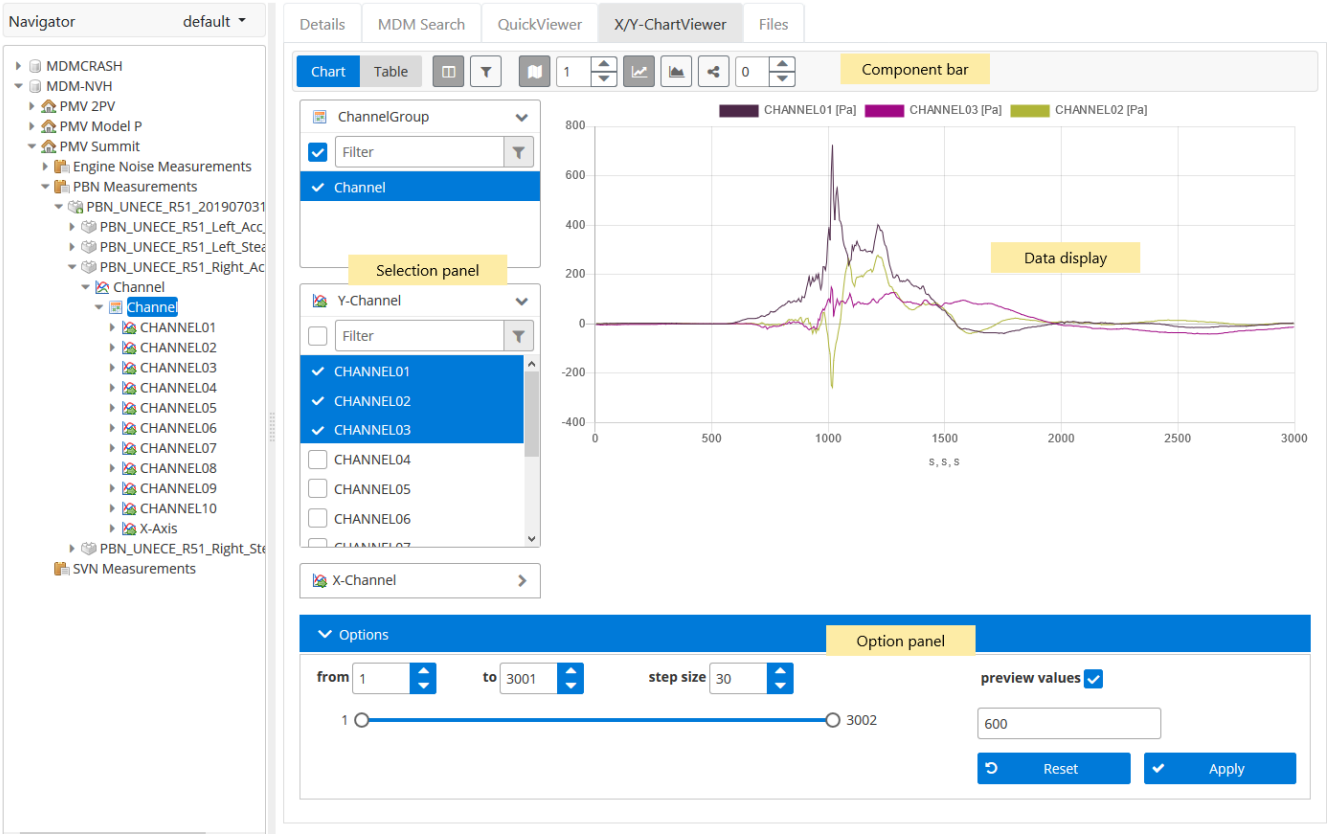

Figure 19. Structure of the X/Y Chart Viewer

9.2.1. Component bar

Different push buttons are located here to control the display in the upper right pane of the dialog (e.g. chart, data table, legend, decimal points, etc.)

9.2.2. Chart

By the selection of this button starts graphically view of channel values. All another functionalities of Component bar, Selection panel and Option panel are considered for this view.

Table

By the selection of this button starts tabular view of channel values. This view has only the page-navigation and the selection for number of lines.

Icons	Description
	For hide the Selection panel. It's possible if the Selection panel is visible.
	For show the Selection panel. It's possible if the Selection panel is not visible.
	For filter channel options by axis-type.

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Icons	Description
	For provide all channel options.
	For hide the chart legends of graphical representation of data.
	For show the chart legends of graphical representation of data.
	For hide the data as graphical representation.
	For show the data as graphical representation.
	For fill the area underneath the graph.
	For clear the area underneath the graph.
	For hide the data points in the data lines.
	For mark the data points in the data lines.
	For group measurement Y channels at the graph.
	For ungroup measurement Y channels at the graph.
	Settings for width of data line or data line tension.
	Includes 3 different options to add Items to the shopping basket.

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Icons	Description
Measurment : adds only the measurement to the shopping basket.	Channel Group : adds selected channel group to the shopping basket.

9.2.3. Selection panel

This panel is used to select the channels to be displayed. It consists of three areas. Channel-filtering with regular expressions is possible for the Channel Group and Y-Channel.

Channel Group

The upper area contains all currently available measurements to the data object selected in the *Navigator*.

Y-Channel

The middle area contains all of the channels that can be used as Y-axis, as well as its display unit. A multiple selection of Y-axes is possible.

X-Channel

The area below contains all the available X-axis of the measurement. As X-axis you can only select one channel.

9.2.4. Data display

In this dialog area, the selected channels are displayed. This can be done either graphically or in tabular form. A right-click menu provides additional functions.

9.2.5. Option panel

At this panel different options for displayed channels can be set. For example, the size of X-axis, the step size or whether and how many preview channels should be displayed.

As well special user settings/preferences can be chosen here. For example selecting unit lists, channel filters or virtual channel calculations. The user preferences are directly assigned to the displayed graphic in *X/Y Chart Viewer*.

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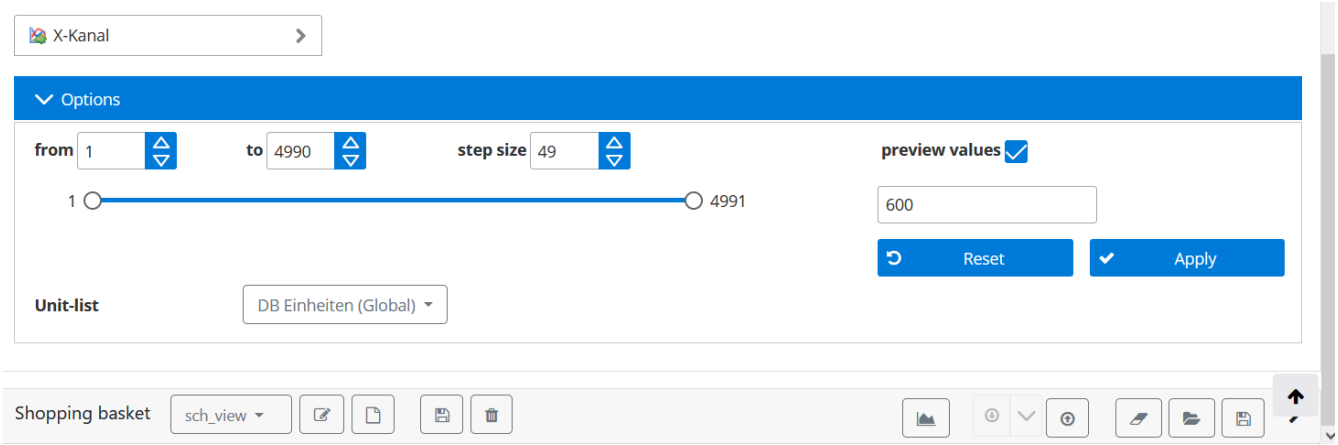

Figure 20. Options

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10. Export / Import data

10.1. Attach external files

You can attach external files (such as drawings, descriptions, evaluations, etc.) to the data objects in the hierarchy levels test, test step and measurements. This is done via the tab *Files* of the openMDM Web Client. The view File attachments appears as an tab in the right pane of the openMDM web client.

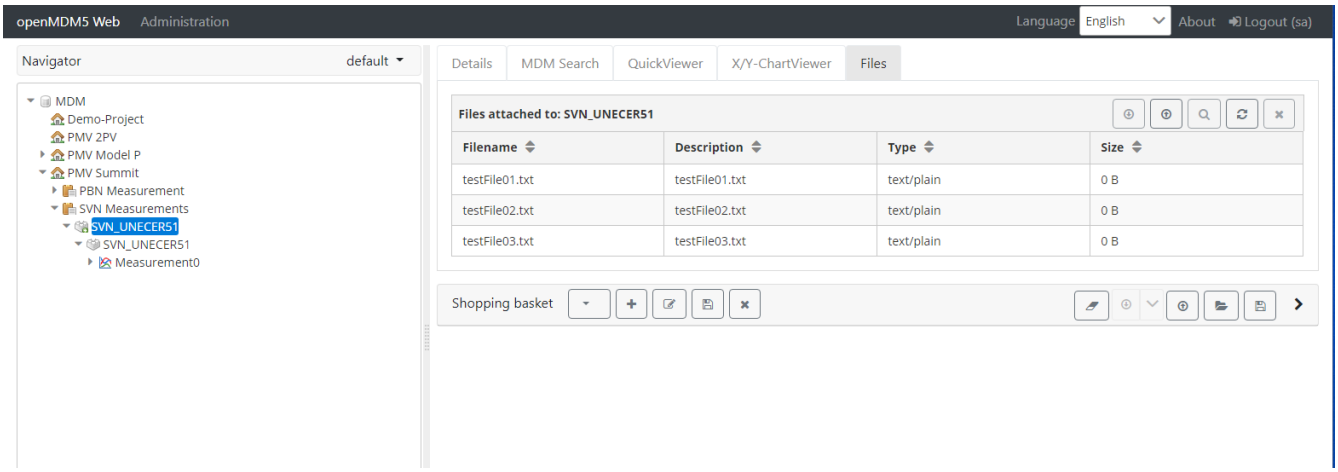

Figure 21. File attachments

Using the buttons in the upper right area of the view, you can upload new files and/or download, update, preview or delete existing files.

10.2. Shopping basket

Data results collected in the Shopping Basket can be :downloaded, e.g. as ATFX. These files can be also uploaded. The data can be saved in the application with a specific named and opened again. Result entries can be cleared. See here.

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11. User Preferences

11.1. Manage Unit Lists

The User can manage a set of unit lists, where he/she can define an individual preferred unit for each combination of Physical Dimension and a Channel Name. These presets can be chosen later inside the *X/Y-Chart Viewer*.

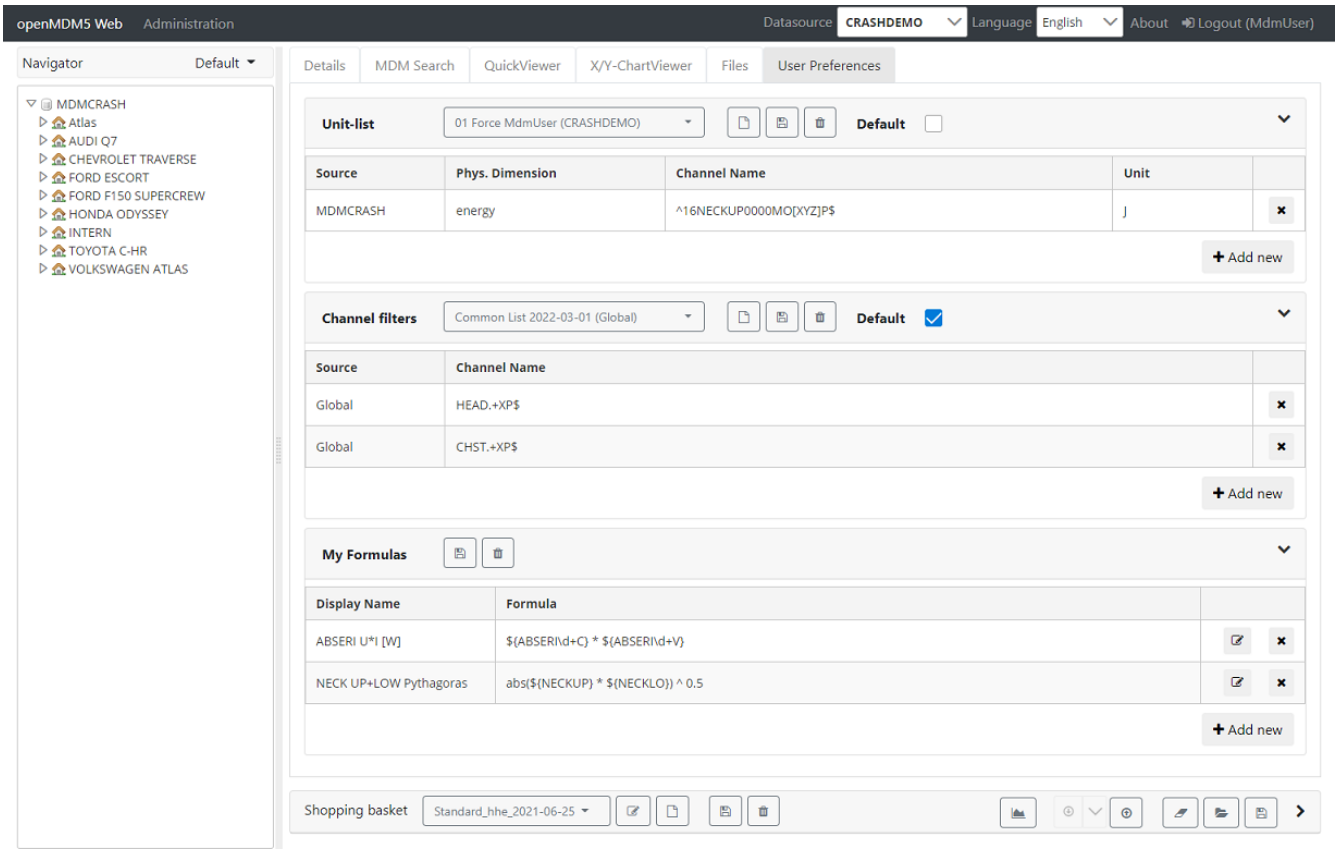

Figure 22. User Preferences

The Administrator can copy the content of an existing preference from some user's **USER SCOPE** into the *Preference Administration* **SYSTEM SCOPE** with the key `"user-prefs.unit-prefs"`. This kind of preset will then be available for all users.

11.1.1. Handling of Unit List sets

- For each set of definitions a display name can be defined.
- A definition set can be defined for all data sources, or for one specific data source.
- A definition set contains at least one Physical Dimension → Channel Name → Unit mapping.
- One of the definition sets can be marked as default.

11.1.2. Channel Name

The Channel Name can be **exactly** the Channel's name as displayed in the Navigation Tree, or a **Regular Expression Pattern** for a Channel Name.

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11.1.3. Writing a Channel Name Regular Expression pattern

Regular expressions are patterns used to match character combinations in strings. They have certain syntax/certain rules of its own, here an introduction:

Simple Patterns

Simple patterns are constructed of characters for which you want to find a direct match. For example, the pattern `UP0000AC` matches character combinations in strings only when the exact sequence `"UP0000AC"` occurs, meaning where this substring is contained at **any** place in the Channel Name.

```
UP0000AC
```

E.g.: This would match:

- 16SPIN`UP0000AC`XP
- 16SPIN`UP0000AC`YP
- 16SPIN`UP0000AC`ZP
- 16NECK`UP0000AC`XP
- 16NECK`UP0000AC`YP
- 16NECK`UP0000AC`ZP

Special Characters

When the search for a match requires something more than a direct match, such as finding one or more `"0"` 's, or finding white space, or find Channels `"beginning with"`, or `"ending with"`, you can include special characters in the pattern.

```
UP0+ACX
```

Then the use of:

- Anchors
- Quantifiers
- and Character Classes

might be necessary.

Anchors

Anchors tell if the pattern matches at the left or right boundary of a Channel Name, thus enables us to specify, if the pattern shall match for Channel Names beginning with, or ending with that text pattern.

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Syntax Definition:

```
^ -- match relative to the beginning of the text (start with)
$ -- match relative to the ending of the text (ends with)
```

Examples:

Match `empty` Channel Names (no text between start an end):

```
^$
```

Match all Channel Names starting with `"16SPINUP0000AC"` :

```
^16SPINUP0000AC
```

E.g.: This would match:

- `16SPINUP0000AC`XP
- `16SPINUP0000AC`YP
- `16SPINUP0000AC`ZP

Match all Channel Names ending with `"0000ACZP"` :

```
0000ACZP$
```

E.g.: This would match:

- 16CHST00`0000ACZP`
- 16HEADCG`0000ACZP`
- 16SPINUP`0000ACZP`
- 16SPINLO`0000ACZP`
- 16NECKUP`0000ACZP`
- 16NECKLO`0000ACZP`

Quantifiers

Syntax Definition:

x can be any Character or Character Class. The quantifier **must follow** a character, place holder, or Character Class.

IMPORTANT	A *Regular Expression Pattern* **cannot start** with a quantifier.

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E.g.: `*SOME thing` or `?SOME thing` are invalid expressions.

```
x{n}    -- occurs exactly n times
x{n,}   -- occurs at least n times
x{n,m}  -- occurs at least n times, not more than m times
?       -- occurs never or exactly 1 time (same as x{0,1})
*       -- occurs never or unlimited times (same as x{0,})
+       -- occurs at least 1 time or unlimited times (same as x{1,})
```

Examples:

Match Channel Names containing `"P"` followed by anything or followed by `"0"` :

```
P0*
```

E.g.: This would match:

- 16SPINUP0000ACZP
- 16SPINLO0000ACZP
- 16NECKUP0000ACZP
- 16NECKLO0000ACZP

Match Channel Names containing `"P0"` followed by anything or followed by `"0"` :

```
P0+
```

E.g.: This would match:

- 16SINUP0000ACZP
- 16SINUP0815ACZP
- 16NECKUP0000ACZP

Character Classes

Syntax Definition:

A list of characters or Character Classes enclosed between `[` and `]` ; when enclosed between `[^` and `]` then this means all characters that are listed are **excluded** . The `-` sign (reserved character) has special meaning, this is to define a `range` of characters. Reserved characters can be `escaped` via `\` backslash.

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```
.          -- any character (ONE character place holder)
[XYZ]      -- one of the characters 'X', 'Y' or 'Z'
[.]        -- the character '.'
\.         -- the character '.'
[0-9]      -- same as [0123456789], match one digit
[a-z]      -- lower-case ASCII letters, match one lower-case ASCII letter
[A-Z]      -- upper-case ASCII letters, match one upper-case ASCII letter
[^0-9]     -- same as [^0123456789], match if character is NOT a digit
[^a-z]     -- no lower-case ASCII letter
[^A-Z]     -- no upper-case ASCII letter
\d         -- short form for [0-9] (a digit)
\D         -- short form for [^0-9], [^\d] (not a digit)
\w         -- word character: short form for [A-Za-z0-9_]
\W         -- not a word: short form for [^A-Za-z0-9_], [^\w]
\s         -- any blank space character
\S         -- any none blank space character
[\w\-]     -- word character including '-'
```

Examples:

Match Channel Names that match exactly `"16SPINUP0000ACXP"` or `"16SPINUP0000ACYP"` :

```
^16SPINUP0000AC[XY]P$
```

E.g.: This would match:

- 16SPINUP0000ACXP
- 16SPINUP0000ACYP

Match X / Y Channel Names for `"LO"`, ending with `"P"` (Lower Body region sensor data):

```
LO0000..[XY]P$
```

E.g.: This would match:

- 16NECKLO0000FOXP
- 16NECKLO0000FOYP
- 16NECKLO0000MOXP
- 16NECKLO0000MOYP
- 16SPINLO0000ACXP
- 16SPINLO0000ACYP
- 16STRNLO0000ACXP

Match X / Z Channel Names for acceleration or deceleration, with 6 digits before:

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```
\d{6}[AD][CS][XZ]
```

E.g.: This would match:

- 16CHST000000ACXP
- 16CHST000000ACZP
- 16CHST000000DSXP
- 16CHST020406ACZP
- 16CHST503010DSXP

External references

Everything that goes beyond our introduction you can find on-line; e.g.:

- regular-expressions.info
- regex101.com
- regexr.com

11.2. Manage Channel Lists

The User can manage a set of channel-list, where he/she can define an individual pre-selected set of channels. These presets can be chosen later inside the *X/Y-Chart Viewer's* option panel. All Y-Channels inside the *X/Y-Chart Viewer* where **any *Channel Name (Regular Expression patterns)*** match, will be preselected:

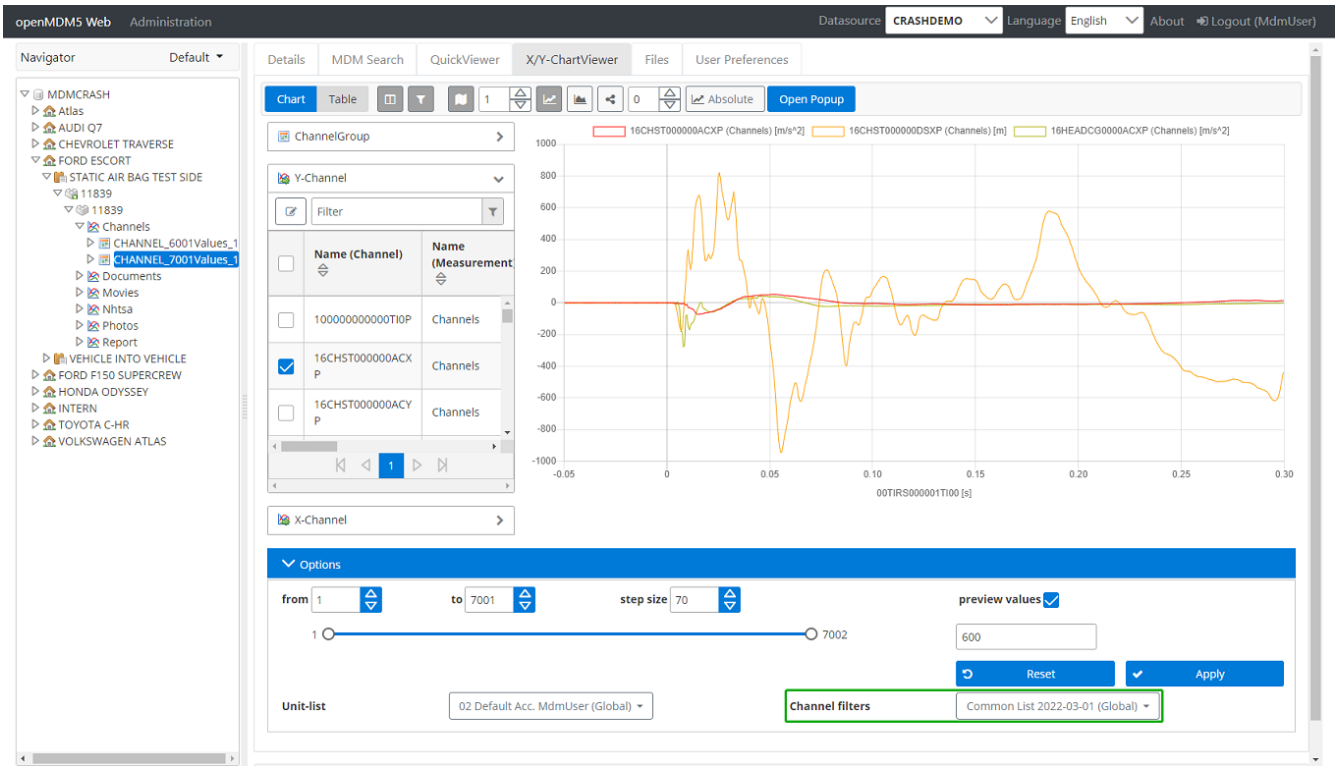

Figure 23. Channel List in X/Y-Chart Viewer

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11.2.1. Handling of Channel List sets

- For each set of definitions an unique display name must be defined.
- A definition set can be defined for all data sources, or for one specific data source.
- A definition set contains at least one *Channel Name (Regular Expression pattern)*.
- One of the definition sets can be marked as default.

11.2.2. Channel Name

The Channel Name can be **exactly** the Channel's name as displayed in the Navigation Tree, or a **Regular Expression Pattern** for a Channel Name. For writing a *Channel Name Regular Expression pattern* see here.

11.3. Manage Formulas

The User can manage a set of formulas, where he/she can define a rule on how certain Channel measurement values will be calculated. Each formula has an unique (display) name and a formula expression, that contains both: The calculation and the *Channel Name (Regular Expression pattern)* wrapped inside a placeholder expression `${}`.

All defined formulas where **all *Channel Name (Regular Expression patterns)*** match, will be available inside the *X/Y-Chart Viewer*:

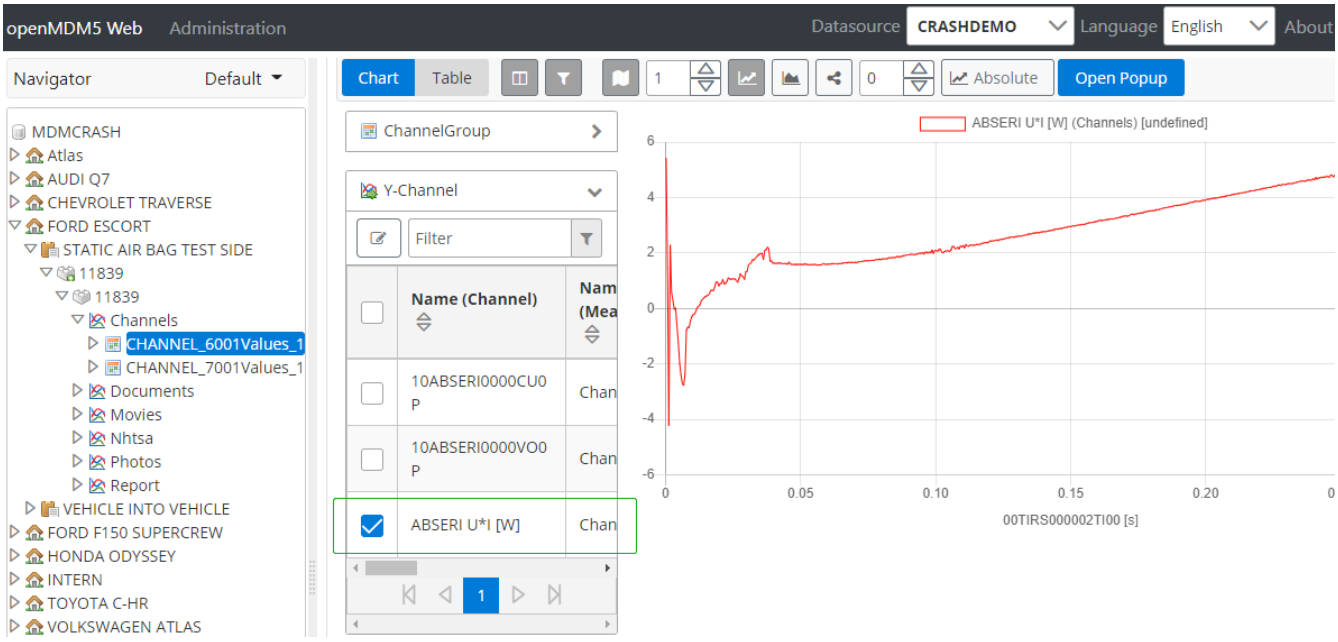

Figure 24. Formula in X/Y-Chart Viewer

e.g.: `${Current} * ${Voltage}`

Would search for the 1st Channel-Name containing 'Current' (e.g. 'Battery Current'), and search for the 1st Channel-Name containing 'Voltage' (e.g. 'USB Voltage Min').

Then it will calculate the power 'P = I * U' [W = A * V]; of the matched measurement values.

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11.3.1. Channel Name

The Channel Name can be **exactly** the Channel's name as displayed in the Navigation Tree, or a **Regular Expression Pattern** for a Channel Name. For writing a *Channel Name Regular Expression pattern* see here.

11.3.2. Formula

When adding a new formula, or editing an existing formula:

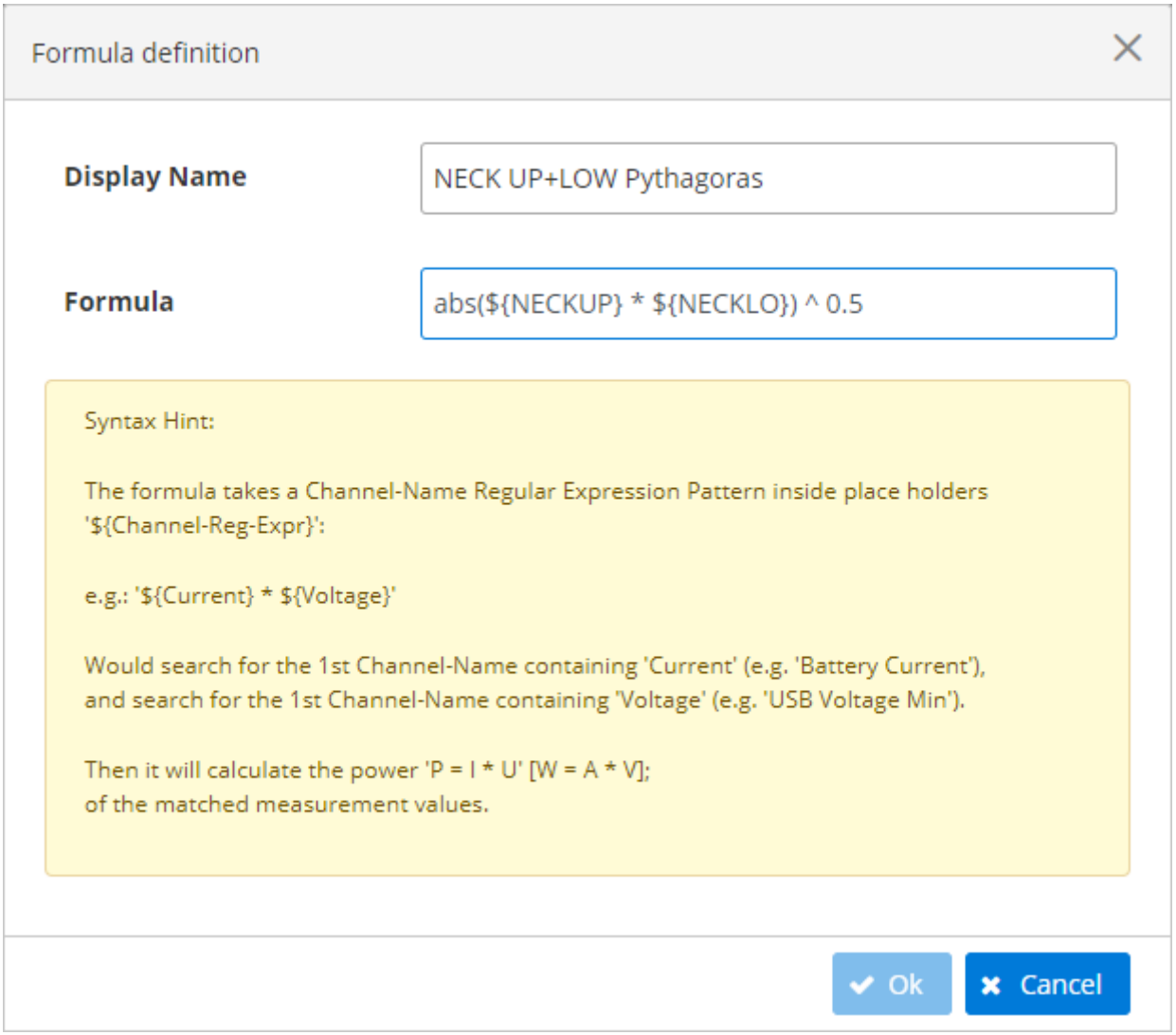

Figure 25. Formula Input

The formula input is **not** permanently validated, only under following conditions:

- *Display Name* is filled and valid
- `Tabulator` or `Enter` key was pressed, when inside the *Display Name* field.
- `Tabulator` or `Enter` key was pressed, when inside the *Formula* field.
- keys other than `Space`, `+`, `-`, `*`, `/`, `^`, were pressed, when inside the *Formula* field.

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12. Administrator Functions

An overview on the advanced functions for the administrator are described here. The functions are available in the Administrator tab.

NOTE	These functions are expert functions and very technical. For a deeper dive, we recommend the following technical documentation: * Installation and Setup Guide for the openMDM Application * Readme file of the Eclipse mdmbl project

To get the administration rights, your user has the be assigned to the administrator role, please ask your system administrator.

12.1. Configure preferences

The component *Preferences* includes the following scopes:

- **System:** preferences that are valid system wide
- **Source:** preferences are valid for the dedicated data source (environment)
- **User:** user specific preferences. Preferences are e.g. search filters a user has defined, they are stored automatically.

A preference is a pair of a unique key and a value. The key is composed of a prefix defining the purpose of the preference followed by an arbitrary but unique identifier string. It is recommended to choose the identifier the same as the preferences "name" field, in case there is one. The value holds the preference's data in a JSON string. More information.

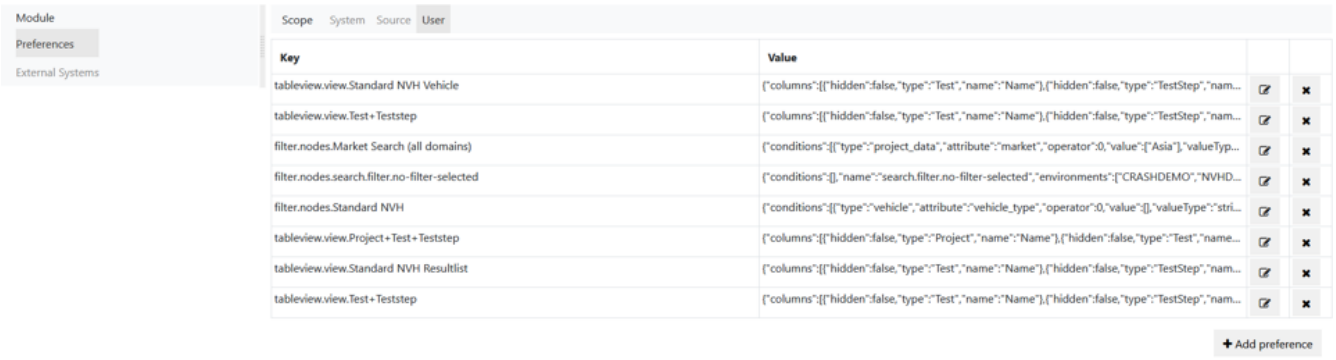

Figure 26. Preferences (User)

In the screenshot you can see the "filter.nodes.Standard NVH" key, this row describes the search filter that was defined here.

12.2. Add a Node Provider

To add a Node Provider configuration, a system preference has to be added to the configuration. The configuration must be located in the system scope and the key must be prefixed with "nodeprovider.".

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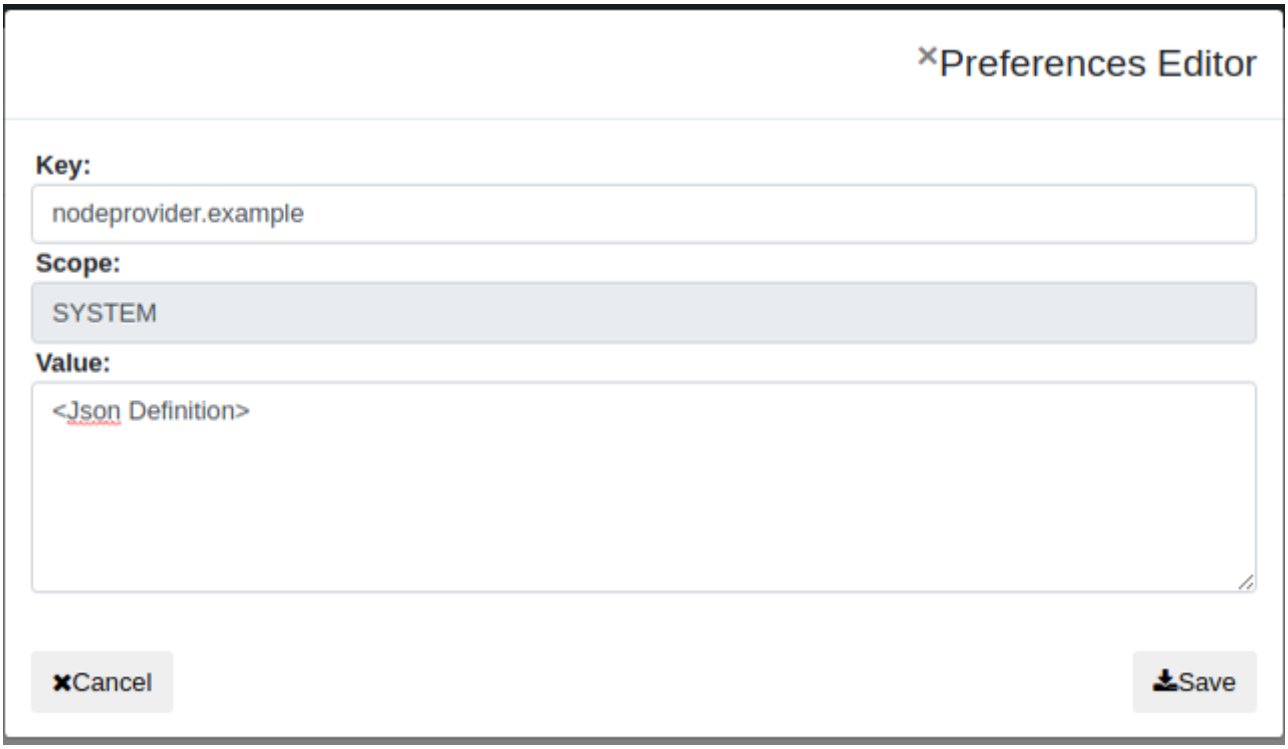

Figure 27. Add a Node Provider

More information.

12.3. Configure external systems

The component *External Systems* includes environment specific mapping information between an external system and the openMDM system attributes. You can import data from other data sources (e.g. ATFX files, csv files, xml files, ODS Server,...) that are not compliant to the openMDM5 application model, by defining a mapping of the metadata included in the source to the openMDM5 model. The openMDM5 application import function has to support the specific data source format.

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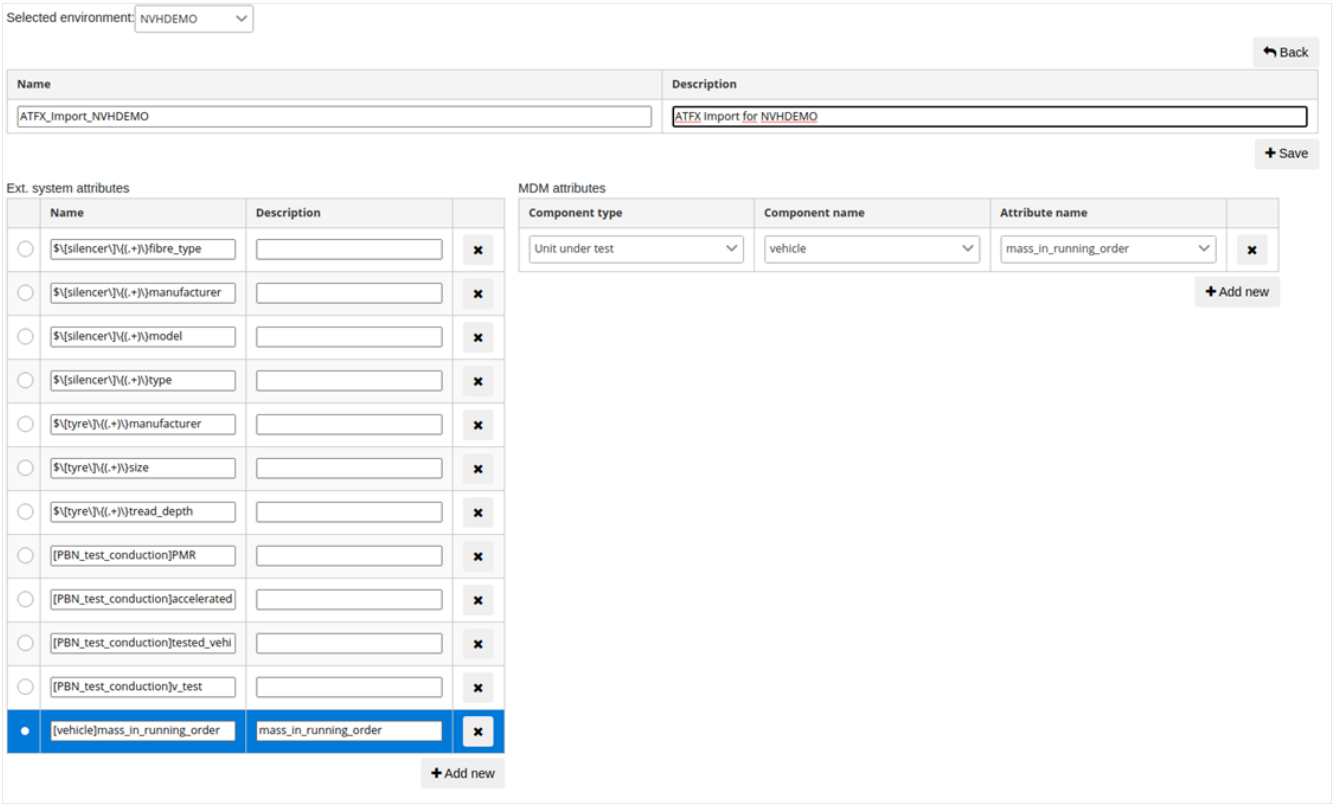

Figure 28. External Systems (ATFx importer mapping in NVHdemo environment)

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