# User Guide for the openMDM® Application

# Eclipse mdmbl project

Version 5.3.0M1-SNAPSHOT, 2024-05-17: {build-revision}

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# **Document History**

Author	Date	Versio n	Affects SW Version	Description
Peak Solution GmbH	21.04.2021	0.52	5.2.0Mx	Initial version

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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.

**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.

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

# 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:

openMDM5 Web Administration	Menu Bar		Language	English 🗸 About Đ Logout (Demo)		
Navigator Default -	Details MDM Search	QuickViewer X/Y-ChartViewer	Files	Data area with tabs		
<ul> <li>MDM-NVH</li> <li>MDMCRASH</li> </ul>	Search filter Standard NVH Enter search text	Source	H V	Result type Versuche V Search		
Navigator	Advanced search       Results     Standard ~       Image: Constraint of the search     Test N       No records found.     Image: Constraint of the search					
	Shopping basket Stand	dard ▼ + @ ₽	▶ 10 ♥	Ø 0 v 0 6 6 5 >		

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.

# 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*.

# **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.

Username	
Password	
	Login

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.

# 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

# C

Refresh

To refresh the actually selected element.

# ବ୍ତ

# Copy link

To copy the link of actually selected element.

### ]\_



### **Shopping Basket**

To add the selection to the *Shopping Basket*.



### 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.



### Link and unlink

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

# 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.

### h

### 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.

# 8

# 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.

۲

### 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.

### 8

### Measurements

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

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* 

# 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.

openMDM5 Web Administra	ation					Languag	e English	<ul> <li>✓ About</li> </ul>	➡ Logout (Demo)		
Navigator	Default 👻	Details	MDM Search	QuickViewer	X/Y-ChartViewer	Files					
III MDM-NVH     IIII MDMCRASH		Search f	ilter	S	Source	ource Criteria Result type					
		Standard	NVH	~	MDM-NVH, MDMCRA	sh 🗸	Versuc	he	~		
		Enter s	earch text Fu	ll text search (wi	ith operators)				Search		
		C Adv		+ 🕜 🖪	×	Advance	ed search (o	deactivated)			
		Result	S Standard -	+ 6		Results 0 🖉 🔚 🗸					
			Test Na	me ≑							
		No records found.									
					1	₩ 10 ₩					
		Shopping	basket Standa	ard • •	Shop	pping basket		© ∨ 💿			

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

• 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.

Details	MD	M Search	QuickViewer X/Y-0	ChartViewer	Files									
			Search filter			Source			Result type					
	Standard NVH V MDM-NVH, MDMCRASH V Versuche								~	$\sim$				
PBN_UNECE_*											Search	)		
	Advanced search + 2 B × + represents an AND operator - negates a single term													
Resul	ts	Standard NVH	Resultlist - +	* at the e	es a set of t end of a sea	terms into a phrase irch term describes a pre	fix search					2 7 7		
		Test Nar	ne ≑	(and)de ~Nafter	escribe the a word des	operator preference cribes the edit distance (	(fuzziness)		ıi	cle_category ≑	testsite N	testsite Name 🌩		
	8	PBN_UN	ECE_R51_20140314170907	~N after If one of	a phrase de the special	escribes the word distan symbols is to be include	ce d in a search, they mus	t be esca	ped with \.	ansport	testsite			
	8	PBN_UN	ECE_R51_20140213130501	-					•					
Shoppin	Shopping basket Standard NVH Resultitist * (*) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2													

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.

Enter search text	Selected search a	ttributes		
	Global			
MDM-NVH MDMCRASH	Test	Name		
	MDM-NVH			
	vehicle	vehicle_type		××
	vehicle	vehicle_category	^	××
	engine	type	^	

Figure 7. Select attributes in View Editor

In the Advanced Search you can see the selected attributes:

openMDM5 Web Administration	Language English 🗸 About 🕫 Logout (	(Demo)
Navigator Default -	Details MDM Search QuickViewer X/Y-ChartViewer Files	
G MDM-NVH     G MDMCRASH	Search filter     Source     Result type       Standard NVH     Versuche	~
	Enter search text Se	arch
	Advanced search + C E ×	~
	Global search attributes	
	Test Name = Wert	×
	Search attributes from MDM-NVH	
	vehicle vehicle_type = • Wert	×
	vehicle_category = • Wert	×
	engine type = • Wert	×
	Results Standard - + C E X 0 7	~
	Test Name 🌩	
	No records found.	
	H ≪ 1 → H 10 ∨	
	Shopping basket Standard • + C E	] >

*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. 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.

Navigator default 💌	Details	MDM	Search	QuickViewer	X/Y-0	ChartViewer	Files								
Important     Important	Search f	<b>ilter</b> I NVH			~	Source MDM-NVH ~			Result type						
Generation of the second contents      Generation of the second contents      Generation of the second content of the second co	pbn							Button for full	text	and advanced sea	rch	Search			
Engine Noise Measurements     Im PBN Measurements     Im PBN Measurements     Im PBN UNFCE PS1 20190703160224	Adv	Advanced search     +     (C)     (C)													
SVN Measurements	Globa	Global search attributes													
	vehicl	е		vehicle_type		= *	Cabri	o 🗙 Hatchback 🗙 Lir	nousi	ne 🗙		×			
Gille Engine Noise 20210318	vehicl	е		vehicle_category		like 👻 🔭 🗶		×							
PBN Measurements	engin	e		type		= 🕶 Wert				×					
SVN Measurements	Test			Name		= •				×					
	Result	Stan	dard NVH	Resultlist 👻 📕	ttist - C					2 🖉 🔚 🗸					
			Test Na	ame ≑	TestS	itep Name 🌲		vehicle vehicle_type \$	vel vel	nicle nicle_category 🌲	testsite Name 🌻				
	BN_UNECE_R51_ 703160224			UNECE_R51_20190 60224		UNECE_R51_Ri 0	ght_	Cabrio	Pas	senger transport	testsite				
		PBN_UNECE_R51_20190           703161723					PBN_UNECE_R51_Right_ Acc_50			usine Passenger transport testsite					
						М	ا ا	▶ H 10 ¥							

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*.

enMDM5 Web Adm								La	anguage English	✓ About •	🖲 Logoi	ut (Den		
avigator Default 🔻	Details ME	DM Search	QuickViewer	X/Y-	ChartViewer	Files								
MDM-NVH MDMCRASH	Search filter				Source				Result type					
	Standard NVH			$\checkmark$	MDM-NVH	1		~	✓ Versuche					
	pbn*													
	Advance	Advanced search + C E × Global search attributes												
	vehicle	ch attribute	vehicle_type		= •	Cabrio	× Limousine × hatch	back	×			×		
	vehicle		vehicle_category		like 👻	* x								
	engine type = - Wert				×									
	Test Name = • Wert						×							
	Results Standard NVH Resultlist - + C + X			1 🖉		] 🗸								
		Test Na	ime ≑	TestS	tep Name 🗧	÷	vehicle vehicle_type 🗢	veh veh	icle icle_category 🌲	testsite Na	ame 🌲			
	~ a ,	PBN_UN 1313050	NECE_R51_201402	PBN_I c_50	UNECE_R51_L	.eft_Ac	Limousine	Pass	senger transport	testsite	testsite			
					1	< < 1	▶ H 10 ¥							
	Shopping basket Standard - + 🗷 🖭 💌							•						
		Test Nam	e ≑											
	<b>x</b>	PBN_UNEC	E_R51_2014021313	0501		_								
					1	• • •	▶ H 10 ¥							

Figure 10. Add result to Shopping Basket

# 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.

Sho	pping	baske	t Standard - C E X	♥ @ ► ► ♥
			Test Name 🌩	
		×	PBN_UNECE_R51_20190703161723	
	۲	×	PBN_UNECE_R51_20190703161723	
	-	×	PBN_UNECE_R51_20190703160224	
	₥	×	PBN_UNECE_R51_20190703160224	
	ß	×	PBN_UNECE_R51_20190703160224	
			H 4 1 F H 10 V	

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 <b>content</b> of the selected objects in the shopping basket using as ATFx file.
0 V 0 E E	You can download the <b>data</b> of the selected objects in the shopping basket using in the selected data format (e.g. ATFx).

# 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.

	Enter search text	Selected attribute	s				Result typ
		Test	Name		~	×	Versuo
	MDMCRASH	TestStep	Name	^	~	×	
	Channel     Channel	vehicle	vehicle type	^	~	×	
	<ul> <li>ChannelGroup</li> <li>customer</li> </ul>	vehicle	vehicle category	^	~	×	
☑ Advanced sear	<ul> <li>laboratory</li> </ul>	testsite	Name	^		×	
Global search att	LocalColumn						
Test	Measurement						
	Pool						
Search attributes	Project     Id						
bearen attribute.	MimeType						
vehicle	Name						
vehicle	project_data						
	▶ Test						
engine	test_definition						
	Test_object TestEquipment						
Results Standa	<ul> <li>TestSequence</li> </ul>						
Standa	TestStep						
	TplTest						ehicle veh
	TplTestStep						
	UnitUnderTest						assenger t
	MDM-NVH						assenger t
- · · · · · · · · · · · · · · · · · · ·							loods carri
				🖌 🗸	oly char	nges	loods carri
				_	_	_	soous cam
			K 4 1 🕨	▶ 10	$\sim$		

Figure 12. View Editor

You can search for elements via the search field:

# Search field editor



Figure 13. View Editor search

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

# 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.

Navigator default 🝷	Details MDM Search QuickViewe	X/Y-ChartViewer Files		
MDMCRASH     MDM-NVH     ADM-NVH     ADM-2DV	General Unit under test Test seque	nce Test equipment Sensors		
M PMV ZPV      M PMV Model P      M PMV Summit				<ul> <li>✓</li> </ul>
Engine Noise Measurements	Name	Ordered	Measured	
<ul> <li>PBN Measurements</li> <li>PBN_UNECE_R51_20190703161723</li> <li>PBN_UNECE_R51_Left_Acc_50</li> <li>PBN_UNECE_R51_Left_Steady_50</li> <li>PBN_UNECE_R51_Right_Acc_50</li> <li>Channel</li> <li>Channel</li> <li>PBN_UNECE_R51_Right_Steady_50</li> <li>SVN Measurements</li> </ul>	<pre>     testsite     track_id     track     residual_voids_content         sound_absorption_coefficient         texture_depth         surface_homogeneity         last_check_texture_depth     v test_conduction         tested_vehicle_side         v_test         PMR         PMR         PMR         last_check_texture_depth         surface_homogeneity         last_check_texture_depth         visestepth         visestepthics         viseste</pre>	PBN Area 51 7.8 0.087 2.7 homogenous 07/03/2019 16:20 Left 50 95.0	% mm km/h	

Figure 15. Test sequence tab in the Details

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

# 8.1. Parametersets

Details	MDM Search	QuickViewer	X/Y-ChartViewer	Files	User Preferences				
General Unit under test Test sequence Test equipment Sensors Parametersets									
Test Set	t 1 (Version: 1) 🕜	Û							♥ 🖉 🕒
	Parameter				Value		Unit		
Î	TEST PARAM 1			test					
TEST PARAM 2 true									
Test Set	t 2 (Version: 1)	Ê							<b>~</b> /
	Parameter				Value		Unit		
Û	TEST PARAM 3	1			2022/08/30				
Shopping	Shopping basket MTUStandard • C • • • • • • • • • • • • • • • • •								

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.

Add parameter	×
Name	Test
Data type	Integer × V
Value	20
Unit	% × ~
	✓ Save 🗙 Cancel

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.

# 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).

Navigator default 🔹	Details MDM Search QuickViewer X/Y-ChartViewer Files	
►   MDMCRASH  MDM-NVH	Chart Table T I I - I I Component bar	
PMV 2PV	CHANNEL01 [Pa] CHANNEL02 [Pa] CHANNEL02 [Pa]	
PMV Model P	Channelsroup 800	
👻 🏫 PMV Summit	Filter T	
Engine Noise Measurements	600	
PBN Measurements	✓ Channel	
PBN_UNECE_R51_201907031		
PBN_UNECE_R51_Left_Acc_	400	
PBN_UNECE_RST_LET_Stea	Data display	
	Selection panel 200	
	🖄 Y-Channel 🗸	
CHANNEL01		
CHANNEL02	Hiter T	
CHANNEL03	✓ CHANNEL01 -200	
CHANNEL04		
CHANNEL05	CHANNEL02	
CHANNEL06	✓ CHANNEL03 -400 0 500 1000 1500 2000 2500 300	00
CHANNEL07	CHANNELO4 S.S.S	
CHANNEL08		
CHANNEL09	CHANNELOS	
V Zavis	CHANNELOG	
PBN UNECE R51 Right Ste		
SVN Measurements		
	🔯 X-Channel 🔉	
	✓ Options	
	from 1 🗘 to 3001 🗘 step size 30 🗘 preview values 🗸	
	🔊 Reset 🖌 Apply	

*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 pagenavigation 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.

Icons	Description
T	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.
4	For hide the data points in the data lines.
<	For mark the data points in the data lines.
Ŀ.	For group measurement Y channels at the graph.
Ĩ	For ungroup measurement Y channels at the graph.
1	Settings for width of data line or data line tension.
	Includes 3 different options to add Items to the shopping basket.

Icons	Description
Measurm	Channel Group : adds selected channel group to the shopping basket.
ent : adds	
only the	
measure	
ment 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.

🖄 X-Kanal	>				
V Options					
from 1	to 4990	step size 49		preview values 📈	
1 ()			4991	600	
				<b>D</b> Reset	<ul> <li>Apply</li> </ul>
Unit-list	DB Einheiten (Global) 🔻				
Shopping basket sch_vie	ew • 🖉 🕒			· · · ·	

Figure 20. Options

# 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.

openMDM5 Web Administration						Language Engli	ish 💙 About 🔊 Logout (sa)	
Navigator	default 🝷 Details	MDM Search	QuickViewer	X/Y-ChartViewer	Files			
👻 🎯 MDM	Files at	tached to: SVN_UNE	CER51				0 0 0 ×	
<ul> <li></li></ul>	Filena	me ≑	Descrip	otion 🗢	Туре 🜲	Si	ize 🗢	
APMV Summit     BN Measurement	testFile	01.txt	testFile	01.txt	text/plain	0	В	
✓ I SVN Measurements ✓ I SVN LUNECEDE1	testFile	02.txt	testFile	testFile02.txt f		0	0 B	
▼ <sup>(2)</sup> SVN_UNECER51	testFile	03.txt	testFile	D3.txt	text/plain	0	В	
Measurement0								
	Shoppir	g basket 🛛 👻	+	<b>x</b>		2	0 × 0 <b>b b b</b>	

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.

# **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*.

openMDM5 Web Administration			Datasource CRASHDEMO 🗸 Language Engl	ish 🗸 About 🔿 Logout (MdmUser)			
Navigator Default 🔻	Details MDM Search	h QuickViewer X/Y-Chart	Viewer Files User Preferences				
<ul> <li>▽</li></ul>	Unit-list	01 Force MdmUser (CRASHDEMO)	· Default	~			
▷ A CHEVROLET TRAVERSE ▷ A FORD ESCORT	Source	Phys. Dimension	Channel Name	Unit			
▷ A FORD F150 SUPERCREW ▷ A HONDA ODYSSEY	MDMCRASH	energy	^16NECKUP0000MO[XYZ]P\$	j 🗶			
D 🟠 INTERN D 🟠 TOYOTA C-HR D 🟠 VOLKSWAGEN ATLAS				+ Add new			
	Channel filters	Common List 2022-03-01 (Global)	- 🗈 🗈 🛍 Default 🗹	*			
	Source	Channel Name					
	Global	HEAD.+XP\$		×			
	Global	Global CHST.+XP\$					
				+ Add new			
	My Formulas			~			
	Display Name	Formula					
	ABSERI U*I [W]	\${ABSERI\d+C} * \${ABSER	\d+V}	₿ ×			
	NECK UP+LOW Pythago	abs(\${NECKUP} * \${NECKI	.0}) ^ 0.5	₿ ×			
				+ Add new			
	Shopping basket Sta	andard_hhe_2021-06-25 🔻		• • • • • • • • • • •			

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  $\rightarrow$  Channel Name  $\rightarrow$  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.

# 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:

- 16SPINUP0000ACXP
- 16SPINUP0000ACYP
- 16SPINUP0000ACZP
- 16NECKUP0000ACXP
- 16NECKUP0000ACYP
- 16NECKUP0000ACZP

#### **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.

#### 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:

- 16SPINUP0000ACXP
- 16SPINUP0000ACYP
- 16SPINUP0000ACZP

Match all Channel Names ending with "0000ACZP" :

0000ACZP\$

E.g.: This would match:

- 16CHST00000ACZP
- 16HEADCG000ACZP
- 16SPINUP0000ACZP
- 16SPINLO0000ACZP
- 16NECKUP0000ACZP
- 16NECKLO0000ACZP

#### 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.

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.

	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 "L0", ending with "P" (Lower Body region sensor data):

L00000..[XY]P\$

E.g.: This would match:

- 16NECKL00000F0XP
- 16NECKL00000F0YP
- 16NECKL00000MOXP
- 16NECKL00000MOYP
- 16SPINL00000ACXP
- 16SPINL00000ACYP
- 16STRNL00000ACXP

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

#### E.g.: This would match:

- 16CHST00000ACXP
- 16CHST00000ACZP
- 16CHST00000DSXP
- 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

# 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*:

![](_page_39_Figure_10.jpeg)

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.

# 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:

Formula definition		×
Display Name	NECK UP+LOW Pythagoras	
Formula	abs(\${NECKUP} * \${NECKLO}) ^ 0.5	
Syntax Hint: The formula takes a Channel-I '\${Channel-Reg-Expr}': e.g.: '\${Current} * \${Voltage}' Would search for the 1st Chan and search for the 1st Channel Then it will calculate the power of the matched measurement	Name Regular Expression Pattern inside place holders anel-Name containing 'Current' (e.g. 'Battery Current'), I-Name containing 'Voltage' (e.g. 'USB Voltage Min'). r 'P = I * U' [W = A * V]; values.	
	✓ Ok 🗶 Cance	el

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.

# **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.

Module	Scope System Source User			
Preferences	Key	Value		
External Systems	tableview.view.Standard NVH Vehicle	("columns":{{"hidden":false, "type":"Test", "name":"Name"}.{"hidden":false, "type":"TestStep", "nam	ø	×
	tableview.view.Test + Teststep	("columns":{{"hidden":false, "type":"Test", "name":"Name"},{"hidden":false, "type":"TestStep", "nam	ß	×
	filter.nodes.Market Search (all domains)	("conditions":{["type":"project_data", "attribute":"market", "operator":0, "value":{"Asia"}, "valueTyp	ø	×
	filter.nodes.search.filter.no-filter-selected	("conditions":[],"name":"search.filter.no-filter-selected","environments":["CRASHDEMO","NVHD	ß	×
	filter.nodes.Standard NVH	("conditions":{["type":"vehicle","attribute":"vehicle_type","operator":0,"value":[],"valueType":"stri	ø	×
	tableview.view.Project+Test+Teststep	{"columns":{{"hidden":false,"type":"Project","name":"Name"},{"hidden":false,"type":"Test","name	ß	×
	tableview.view.Standard NVH Resultlist	("columns":{{"hidden":false, "type":"Test", "name":"Name"},{"hidden":false, "type":"TestStep", "nam	8	×
	tableview.view.Test+Teststep	("columns":{{"hidden":false,"type":"Test","name":"Name"},{"hidden":false,"type":"TestStep","nam	œ	×

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.

+ Add preference

# 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.".

	×Preferences Editor
Key:	
nodeprovider.example	
Scope:	
SYSTEM	
Value:	
< <u>Json</u> Definition>	
*Cancel	<b>▲</b> Save

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.

ame				Description					
TFX_Import_NVHDEMO				ATFX Import fo	r NVHDEMO				
									+
system attributes			MDM attributes						
Name	Description		Component type		Component name		Attribute name		
\$\{silencer\]\{(.+)\}fibre_type		×	Unit under test	~	vehicle	~	mass_in_running_order	~	×
\$\[silencer\]\{(.+)\}manufacturer		×						<b>+</b> A	dd new
\$\[silencer\]\{(.+)\}model		×							
\$\{silencer\}\{(.+)\}type		×							
\$\[tyre\]\{(.+)\}manufacturer		×							
\$\[tyre\]\((.+)\}manufacturer           \$\[tyre\]\((.+)\]size		×							
5\(tyre\)\(L+)\)manufacturer           5\(tyre\)\(L+)\)size           5\(tyre\)\(L+)\)tread_depth		× × ×							
\$\[\tyre\\\(.+\)\manufacturer           \$\[\tyre\\\(.+\)\size           \$\[\tyre\\\(.+\)\read_depth           \$\[\tyre\\\(.+\)\read_depth           \$\[\tyre\\\(.+\)\read_depth           \$\[\tyre\\\(.+\)\read_depth		× × × ×							
[\$\[\yre\]\((.+)\)manufacturer       [\$\[\yre\]\((.+)\)size       [\$\[\yre\]\((.+)\)tread_depth       [\$\[\yre\]\((.+)\)tread_depth       [[PBN_test_conduction]PMR       [PBN_test_conduction]accelerated		x x x x x							
S\[tyre\]\(L+)\]manufacturer       S\[tyre\]\(L+)\]size       S\[tyre\]\(L+)\]size       S\[tyre\]\(L+)\]tread_depth       [PBN_test_conduction]PMR       [PBN_test_conduction]Accelerated       [PBN_test_conduction]tested_vehil		× × × × × ×							
St[tyrel]t(L+1)tymanufacturer       St[tyrel]t(L+1)tysize       St[tyrel]t(L+1)tyread_depth       St[tyrel]t(L+1)tyread_depth       (IPBN_test_conduction]PMR       (IPBN_test_conduction]accelerated       (IPBN_test_conduction]tested_vehil       (IPBN_test_conduction]tyrest		× × × × × ×							

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

# 12.4. Functional Rights

# 12.4.1. General Information

Functional rights can be granted to users via a system scoped preference. The rights configuration is highly customizable. It accepts conditions based on logical expressions. The expressions may refer to dynamic context data at runtime. The conditions may also refer to structural user profile data. The user profile includes data source scoped user details and roles as well as application scoped user details and roles (from security context on web server or synchronized by identity provider).

In case no preference is defined functional rights are granted to all users.

In case preference is corrupted edit rights are granted for application scoped admin role only.

The default configuration containing all functional right keys and a description of each right can be found in the web client under /assets/rights\_config.default.json.

# 12.4.2. The Preference

The preferences key is rights\_config.

The preferences value must be a valid json object of the form:

```
{
   "default": boolean,
   "functionalRights": {
      "KEY": {
         "condition": string,
         "description": string
      },
      ...
   }
}
```

The KEY is a placeholder for the key of the functional right. The key is case sensitive. The key may contain .. In that case the json structure expects a nested object.

The default field is a fallback for all functional rights that are referenced in the Mdm5-WebApplication but not explicitly specified in this preference.

The condition field holds the actual condition to evaluated whether the functional right is granted. See following section for further details.

The description field is optional and for documentation use only.

#### **Condition Syntax**

Conditions may include data references provided as:

- string literals: 'a' (defines the string a; string literals are case sensitive).
- string literal arrays: ('a', 'b', 'c') (defines an array containing the strings a, b and c). However, string literal lists must not be nested.
- dynamic context data: **\${test}** (evaluates to the value of the variable with the name **test**).
- application scoped user data: username (evaluates to the value of the property with the name username of the user details provided on web server). Nested properties are supported by chaining field names separated by ..
- data source scoped user data: sourceName.username (evaluates to the value of the property with the name username of the user details provided in data source with name sourceName). Nested properties are supported by chaining field names separated by ..

Condition expression syntax is developed to handle variables holding values of types string and string[] only. However, referencing other data will not result in an error but may cause unexpected outcome.

Conditions may include operators for strings and string arrays, resp.:

- equals: == (compares two strings for equality, eg \${a}=='a'. Should a variable refer to an string array only the array references is respected.)
- not equals: != (compares two strings for inequality, eg \${a}!='b' Should a variable refer to an string array only the array references is respected.)

includes: IN (is case sensitive; checks if left side is included in right side, eg \${a} IN ('a', 'b').
 Should either side not be an array it will be wrapped in one.)

Conditions may include logical operators for strings:

- and: 88 (connects two boolean expressions with a logical and, eg. \${a}=='a' 88 \${b}!='c').
- or: || (connects two boolean expressions with a logical and, eg. \${a}=='a' || \${b}!='c').
- negation: ! (negates the following boolean expression , eg !\${a}=='b' is equal to \${a}!='b').

Conditions may include parenthesis and blanks:

- parenthesis are a part of the string literal arrays syntax.
- parenthesis may be used to override operator precedence ( eg. negates !(\${a}=='a' && \${b} IN ('a', 'b'))).
- parenthesis may be used around boolean expressions for better readability ( eg. negates  $!(\{a\}=='a')$  is same as  $!\{\{a\}=='a'\}$ .
- parenthesis must not be used around data expressions (eg. negates (\${a})=='a' and 'a' IN 'a', 'b' are invalid).
- blanks must not be used within operators (eg. = = and I N are invalid).
- blanks must not be used in opening tag of context data reference (eg. \$ {a} is invalid).
- blanks may be used with in parenthesis and curly brackets (eg.  ${ a } and ( 'a'!='b' ) are valid).$
- blanks may be used between any kind of expression or operator (eg: 'a' != 'b' or 'a' IN ('a', 'b') is valid).
- blanks in string literals are considered to be part of the string ('a' is not equal to 'a ').

Valid values

```
{
  "default": false,
  "functionalRights": {
    "administration": {
      "messgroessen": {
        "show": {
          "condition": "MDMNVH.roles IN ('Admin', 'MDMSystemAdministrator') &&
MDMNVH.department==${department}",
          "description": "If true, the preference menu entry is visible."
        }
      },
      "units": {
        "show": {
          "condition": "'Admin' IN roles "
          "description": "Units are visible for application role 'Admin' only."
        }
      },
    },
    "modules": {
      "berechnungsauftrag": {
        "show": {
          "condition": "${department} != MDMNVH.department || username == 'John Doe'"
        }
      }
    }
  }
}
```

# 12.4.3. Administration component

The available functional rights are available in a tree table. For the leaf nodes a condition can be specified and a description is shown explaining the scope of the functional right.

✓ Ø openMDM5 Web ×	+				- 🗆 ×
$\leftrightarrow$ $\rightarrow$ C (i) localhost:18080/org.	eclipse.mdm.nucleus/administration	n/rights-config		ලා 🛧	• • •
openMDM5 Web Administration	Datasource TEST	✓ Language English	✓ Timezone Europe	e/Berlin 🗸 About	[→ Logout (sa)
Preferences	Functional	rights			
Functional Rights	✓ Functional right allow	ed by default			Save
External Systems	Кеу	Condition		Description	
External Systems	> administration				
Units	> scheduler				
	✓ mdm-modules				
Quantities	✓ details				
Value list	show	true		Manages general visibil access to the details mo	ity of and odule.
	> context				
	> general				
	> parameter-sets				
	> sensors				
	> file-explorer				
	> mdm-search				
	> quick-viewer				
	> recent-changes				
	> user-prefs				
	> xy-chart-viewer				
	Help on condition syntax				+

Figure 29. Functional rights