



App SIMATIC Performance Insight V1.17




Application Manual

Preface	1
What's new?	2
Get to know Performance Insight	3
Configuring the Performance Insight	4
Operation	5
Quality codes	6
Appendix	A

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

 DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
 WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
 CAUTION
indicates that minor personal injury can result if proper precautions are not taken.
NOTICE
indicates that property damage can result if proper precautions are not taken.


If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

 WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens Aktiengesellschaft. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of contents

1	Preface	7
1.1	Introduction.....	7
1.1.1	Function overview	7
1.1.2	Validity of the documentation	9
1.2	Legal information	9
1.2.1	Cybersecurity information.....	9
1.2.2	Note on EU General Data Protection Regulation	11
2	What's new?.....	13
3	Get to know Performance Insight.....	15
3.1	Structure of the app.....	15
3.1.1	Home page.....	15
3.1.2	My Plant	17
3.1.3	Analysis.....	19
3.1.4	Configuration.....	20
3.1.5	Settings	21
3.2	Navigation in the app.....	21
4	Configuring the Performance Insight.....	27
4.1	Adapting the app	27
4.1.1	Changing the display language and color scheme.....	27
4.1.2	Displaying usage information	29
4.1.3	Displaying the user list	30
4.1.4	Designs	31
4.2	Configuring types.....	34
4.2.1	Status mappings	34
4.2.1.1	Creating status mappings.....	34
4.2.1.2	Exporting and importing status mappings	36
4.2.2	KPI types.....	37
4.2.2.1	Introduction to KPI calculations	37
4.2.2.2	Creating a KPI type.....	40
4.2.2.3	Creating and deleting KPI instances	42
4.2.3	User-defined periods	46
4.2.4	Reason tree.....	49
4.2.4.1	Creating fault reasons in the reason tree	51
4.3	Setting parameters	51
4.3.1	Parameters in Performance Insight	51
4.3.2	Displaying a parameter list	52
4.3.3	Displaying current values of a parameter	54
4.3.4	Editing settings for variables	56
4.3.5	Editing settings for KPI instances	59
4.3.6	Saving the values of a KPI in a variable	59
4.3.7	"Activate notifications" for variables with numerical data type and KPI instances.....	60

4.3.8	"Activate notifications" for variables of the data type "Bool" and "String"	62
4.3.9	"Counter" acquisition category	63
4.3.9.1	Define the acquisition category "Counter"	63
4.3.9.2	Counting method of the "Up" counter	65
4.3.9.3	"Up & Down" counting method of the counter	66
4.3.10	Aggregation functions	66
4.3.10.1	Description of aggregation functions	66
4.3.10.2	Aggregation functions in combination with the "The value is aggregated" function:	68
5	Operation.....	75
5.1	Presenting the productivity of a plant transparently (OEE analysis).....	75
5.1.1	Overview of the overall equipment effectiveness (OEE).....	75
5.1.2	Creating an OEE dashboard.....	77
5.1.3	OEE analysis	80
5.1.3.1	Displaying the OEE dashboard.....	80
5.1.3.2	KPIs	83
5.1.3.3	Machine status	85
5.1.3.4	Showing error analysis	89
5.1.3.5	Analyzing sub assets	91
5.1.4	Deleting an OEE dashboard.....	91
5.2	Configuring a step time analysis	92
5.2.1	Overview	92
5.2.2	Defining limits	94
5.2.3	Displaying the step time analysis	97
5.2.3.1	Displaying the step time analysis	97
5.2.3.2	"Overview" view.....	98
5.2.3.3	"Analysis" view.....	101
5.3	Configuring multivariable regression	103
5.3.1	Introduction to multivariable regression	103
5.3.2	List of models for multivariable regression.....	104
5.3.3	Creating a model	106
5.3.4	Optimizing the model	111
5.3.5	Visualizing MVR on the dashboard.....	113
5.4	Evaluating the production of individual batches.....	116
5.4.1	Configuring a batch analysis.....	116
5.4.2	Displaying a batch analysis.....	118
5.4.3	Evaluating a batch analysis.....	118
5.4.4	Analyzing multiple assets	119
5.4.5	Editing the configuration.....	121
5.5	Creating user-defined dashboards.....	121
5.5.1	Creating a dashboard	121
5.5.2	Structure of the dashboards	123
5.5.3	Creating widgets.....	125
5.5.3.1	Introduction to widgets.....	125
5.5.3.2	Create a widget.....	126
5.5.3.3	Visualizing correlations (Diagram)	131
5.5.3.4	Visualizing values (Value).....	134
5.5.3.5	Visualizing machine statuses (Gantt)	135
5.5.3.6	Visualizing the violation of limit values (gauge)	137
5.5.3.7	Visualizing the distribution of consumptions or quantities (Pie chart).....	139

5.5.3.8	Visualizing the intensity of data values (Heatmap)	140
5.5.3.9	Visualizing relationships in 3D (3D bars)	142
5.5.3.10	Linking an image for presentation	143
5.5.3.11	Preview a widget	145
5.5.4	Working with widgets	145
5.5.4.1	Editing widgets	145
5.5.4.2	Copying widgets	146
5.5.4.3	Export widget data	147
5.5.5	Widget views	147
5.5.5.1	Line graph	148
5.5.5.2	Histogram	151
5.5.5.3	Regression	152
5.5.5.4	Boxplot	153
5.5.5.5	Table	155
5.5.5.6	Gantt	156
5.5.5.7	Heatmap	157
5.5.5.8	3D bar	158
5.5.6	Adapting a user-defined dashboard	158
5.5.7	Exporting and importing dashboards	159
5.6	Analyzing data	162
5.6.1	Using favorites	162
5.6.2	Finding the analysis quickly	163
5.7	Creating reports	164
5.7.1	Introduction to Reporting	164
5.7.2	Overview of the report configurations	165
5.7.3	Configuring reports	166
5.7.4	View report	171
5.7.5	Creating an ad hoc report	172
6	Quality codes	175
A	Appendix	177
A.1	Abbreviations and acronyms	177

Preface

1.1 Introduction

1.1.1 Function overview

Introduction

The App Performance Insight offers an online performance overview of machines, production lines or production sites.

- You have access to machine and plant performance data, independently of the location.
- You can use individual KPI types to calculate machine and plant performance, e.g. for overall plant efficiency or quality of the products.
- In addition to the KPI type and KPI instance application in combination, you can create a KPI instance directly at the asset without having defined a KPI type beforehand.
- In only a few steps, you create automatically generated dashboards for overall effectiveness, for multivariable regression and for step time analysis.
- Widgets allow you to visualize machine states and performance and configure flexible dashboards to monitor your plant.
- The detailed view of the widgets allows you to determine and compare production performance over different time periods. This will help you identify unused performance potential.
- You obtain valuable information for accurate decision-making in order to optimize machine availability.

Visualization



You visualize parameters and KPIs in the automatically generated or user-defined dashboards in different widgets.

Browser recommendation

You require an HTML5-capable Internet browser to run the app.

The Google Chrome and Microsoft Edge browsers are supported. Google Chrome is recommended. You should preferably use 1920x1080 resolution.

The app can run on any mobile device with an HTML5-enabled browser. Tablets are recommended.

1.1.2 Validity of the documentation

The "SIMATIC Performance Insight V1.17" documentation is valid for the "Performance Insight" app.

Note

Timeliness of the documentation

The app is continuously developed and optimized. Therefore, it is possible that the documentation for individual new features and functions does not describe the actual scope of functions.

1.2 Legal information

1.2.1 Cybersecurity information

Siemens provides products and solutions with industrial cybersecurity functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial cybersecurity concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial cybersecurity measures that may be implemented, please visit

<https://www.siemens.com/cybersecurity-industry> (<http://www.siemens.com/industrialsecurity>).

1.2 Legal information

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed under <https://new.siemens.com/cert> (<https://www.siemens.com/cert>).

1.2.2 Note on EU General Data Protection Regulation

Data protection

Siemens observes the principles of data protection, in particular the principle of data minimization (privacy by design). For the SIMATIC Performance Insight product, this means: the product processes/stores the following personal data: User name (first name and last name), email address, user role and app usage data (number of users, number of KPIs).

No private or intimate data is processed or stored.

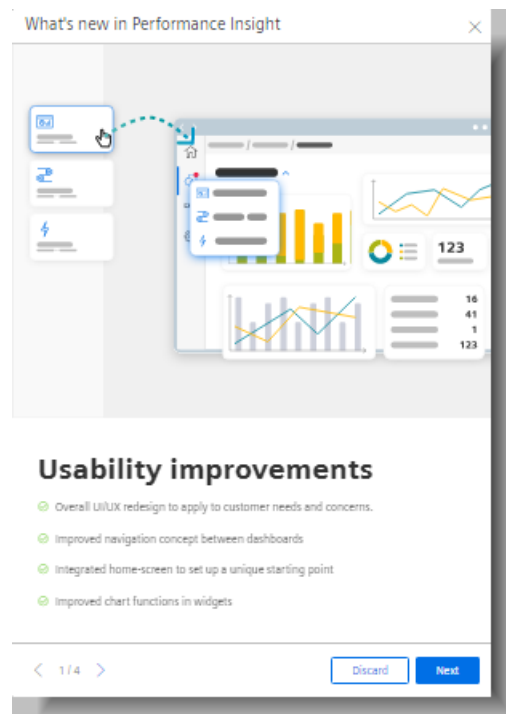
The above data are required for the login, the billing function and for the internal user administration (administrator can see the role and the status of other users). The storage of data is appropriate and limited to what is necessary, as it is essential to identify the authorized operators. The data needs to be maintained manually by you and if necessary, these can also be deleted. If you need support, please contact customer support.

The above data will not be stored anonymously or pseudonymized, because the purpose (identification of the operating personnel) cannot be achieved otherwise.

The above data is protected against loss of integrity and confidentiality by state-of-the-art security measures.

What's new?

After you open the app for the first time, you will be welcomed with the display "What's new in Performance Insight". The newly added features are presented here.



You can also call a presentation of the new features from the start page.

You can find the history of new features in all versions in the SiePortal (<https://support.industry.siemens.com/cs/ww/en/view/109779181>).

Version V1.17

Analyses at a glance

The "Analysis" view shows the dashboards for OEE analyses, batch analyses, and step time analyses at a glance.

Batch analysis for multiple assets

Batch analysis is now possible for a selection of multiple assets. This allows you to compare the data of different batches from different production lines.

More detailed usage information

The "Usage information" view shows in detail which assets are using which resources. A direct link to a resource upgrade is provided.

More units added to selection lists

- Parts per second, parts per minute, or parts per hour can be selected as units for "TheoreticalSpeed" in the OEE settings.
- Seconds and milliseconds can be selected as units for microstops.

More user friendly

The legend display in chart views of widgets is now more user friendly.

New links on the start page

Give us your feedback. You can find a direct link on the start page.

You can display the app documentation in HTML format directly from the start page.

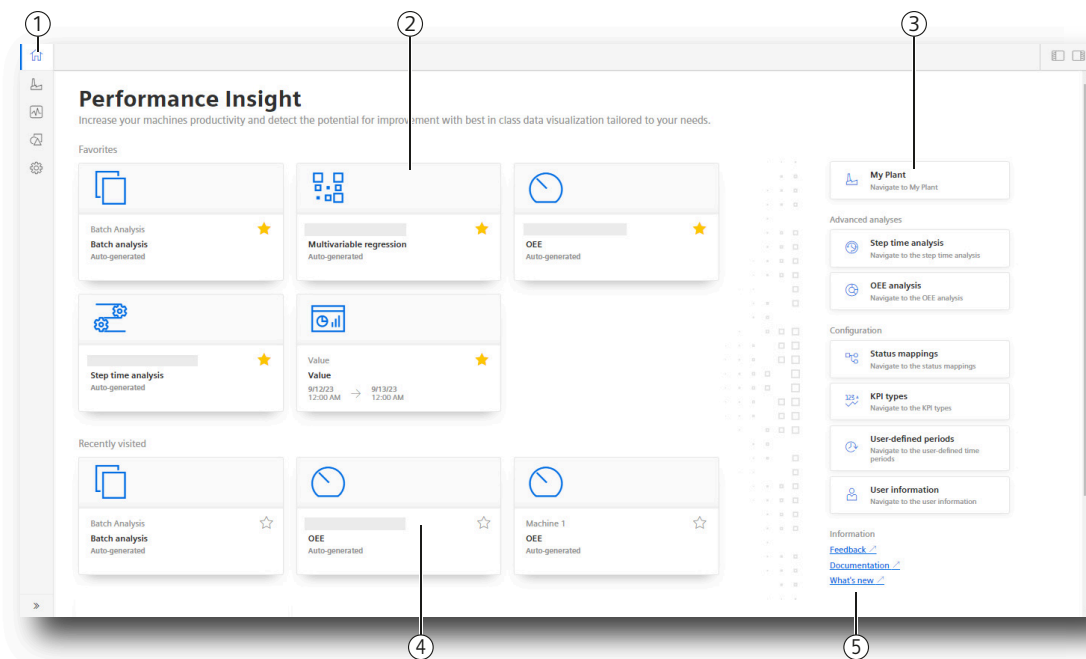
Get to know Performance Insight

3.1 Structure of the app

3.1.1 Home page

Performance Insight

After the app is started, the start page is displayed.








- ① Navigation bar
- ② Favorite dashboards
- ③ Navigation
- ④ Last visited dashboards
- ⑤
 - Feedback - Tell us what you think
 - Documentation - Display the Application Manual in HTML format.
 - What's new - link to the description of the new features

Dashboards marked as favorite ★ and the last visited dashboards are displayed. This allows quick access to the analyses relevant to the user.

3.1 Structure of the app

The start page offers access to the views of the app in the overview and in the side navigation bar:

	Home	Favorite and last visited dashboards
	My Plant (My Plant)	The My Plant (Page 17) is imported from the Asset-Manager. <ul style="list-style-type: none"> • Create dashboards for individual assets • Here you manage the dashboard configuration of the plants.
	Analysis	Overview of different analyses: <ul style="list-style-type: none"> • OEE (Page 75) • Sequence analysis (Page 92) • Batch analysis (Page 116)
	Configuration	<ul style="list-style-type: none"> • Status mappings (Page 34) • KPI types (Page 37) • User-defined periods (Page 46)
	Settings	<ul style="list-style-type: none"> • User information (Page 27) (Changing the display language and the locale) • Usage information (Information on the number of users and KPI instances, etc.) • The User list (Page 30) • Designs (Page 31)

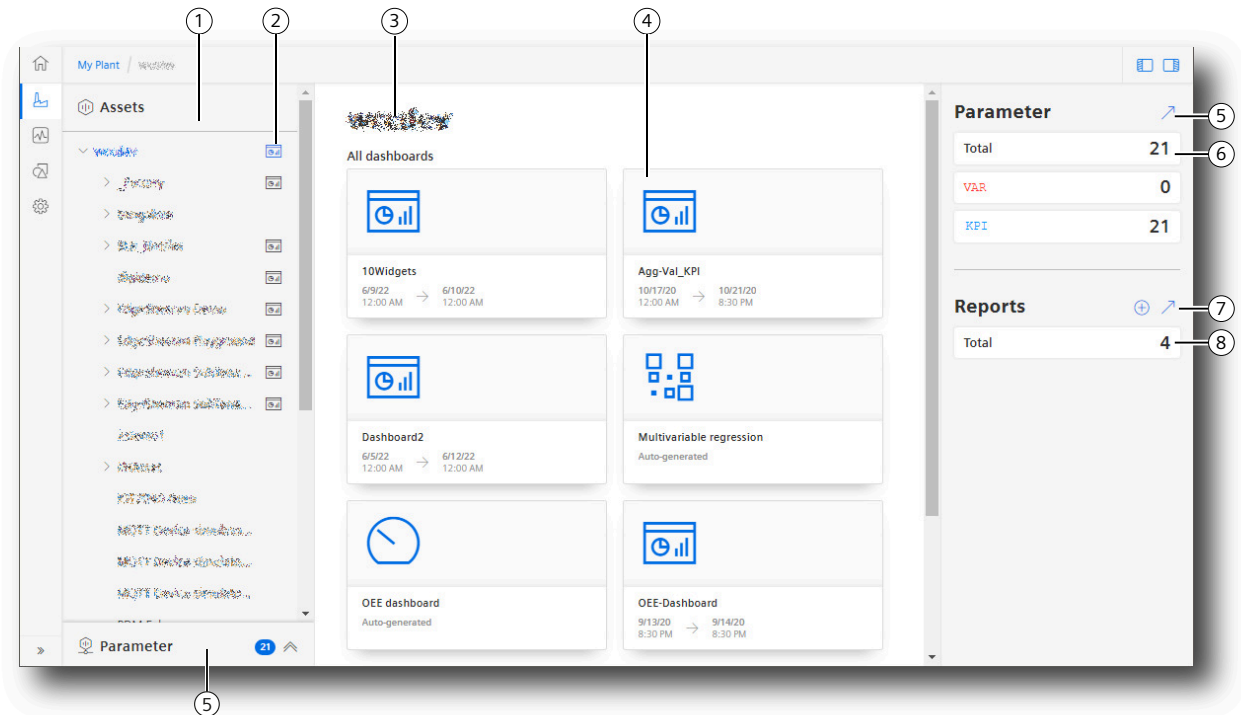
See also

Creating reports (Page 164)


3.1.2 My Plant

"My Plant" view

The "My Plant" view ("My Plant") displays the available assets.

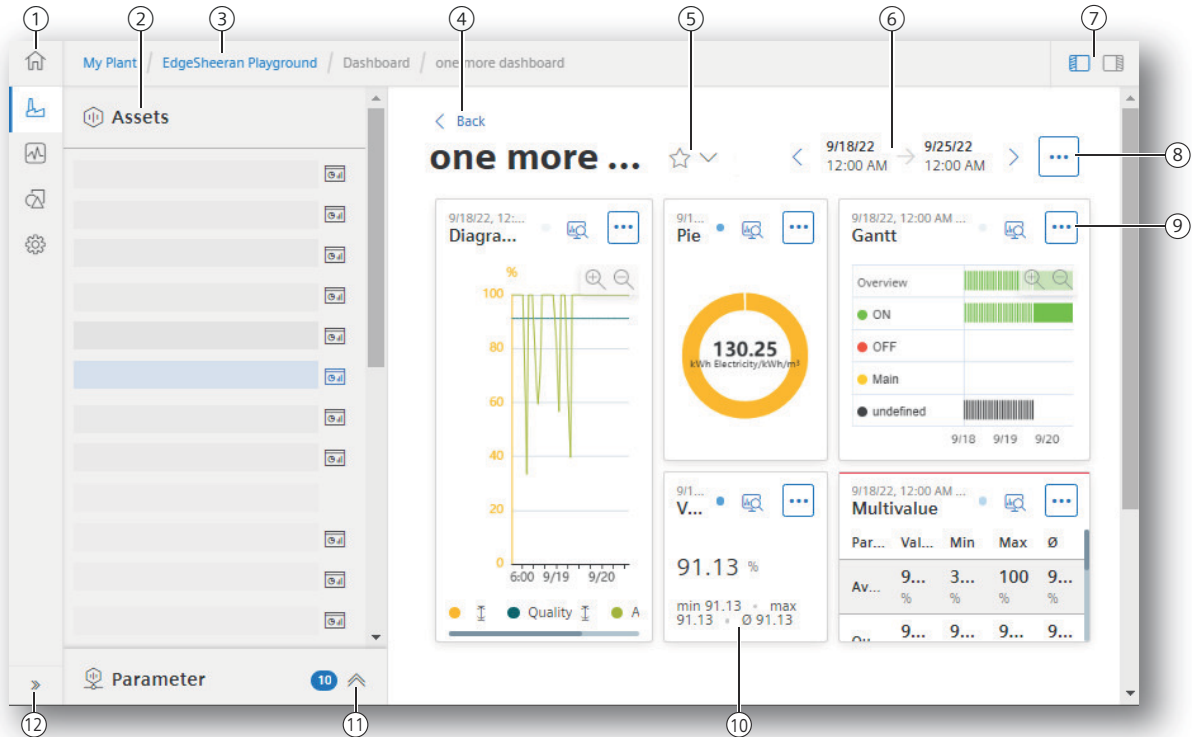


- ① Assets in the "My Plant" view ("My Plant")
- ② Number of dashboards created on the asset
- ③ Selected asset
- ④ Dashboards available at the asset
- ⑤ Open parameter list
- ⑥ Overview of the variables and KPIs available at the asset
- ⑦ Open list of report configurations
Configuring a new report
- ⑧ Number of reports configured for the asset


 Refreshes the assets display

Dashboard

The figure below shows a user-defined dashboard.



- ① Navigation bar - selection of a view
- ② Assets in the "My Plant" view ("My Plant")
- ③ Breadcrumb navigation
- ④ Navigation back
- ⑤ Marking an overview of the dashboards at the asset / dashboard as favorite
- ⑥ Displayed period, time navigation
- ⑦ Show/hide the navigation area left / right of the info panel
- ⑧ Menu button with options on the dashboard
- ⑨ Menu button with options on a widget
- ⑩ Widget
- ⑪ Show/hide parameter list
- ⑫ Show/hide texts of the navigation bar

The icon  next to an asset indicates that at least one dashboard is available at the asset.

See also


Asset Manager system manual (<https://documentation.mindsphere.io/MindSphere/apps/asset-manager/introduction.html>)

3.1.3 Analysis

Overview

The "Analysis" view offers quick access to OEE dashboards and time step analyses.

Displaying an analysis

1. Select the type of analysis.
The overview of configured dashboards is displayed.
2. To display an analysis, click  in the preview of the analysis.
- or -
Select an asset.
The analysis is displayed for the selected asset.

See also

Finding the analysis quickly (Page 163)

Evaluating the production of individual batches (Page 116)

Presenting the productivity of a plant transparently (OEE analysis) (Page 75)

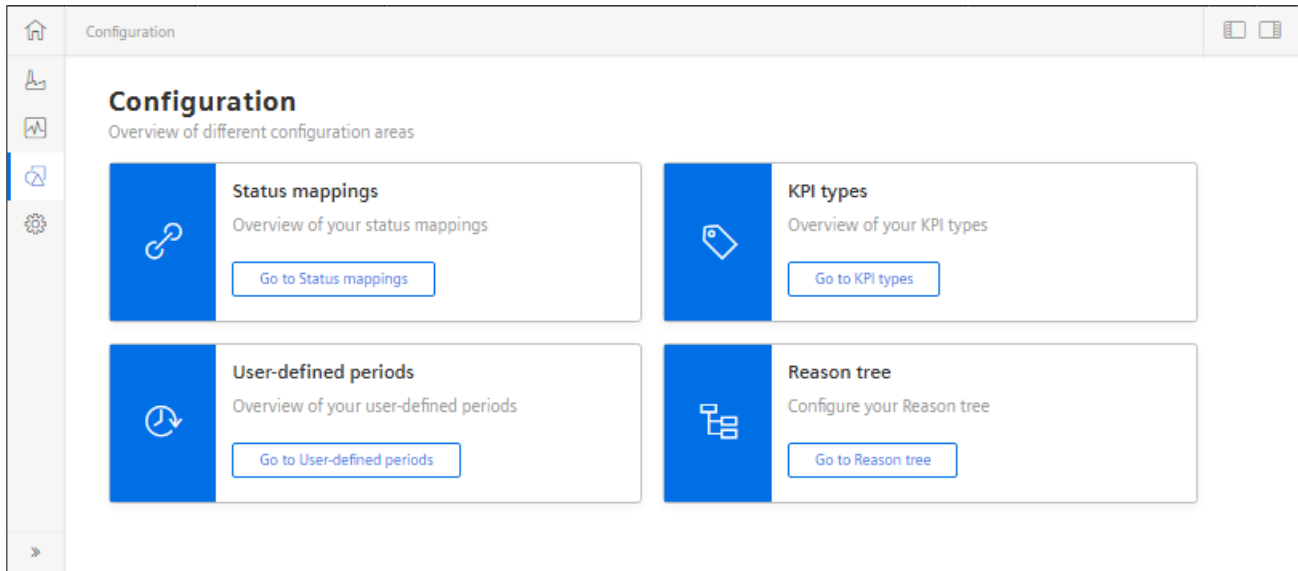
Configuring a step time analysis (Page 92)

Creating reports (Page 164)

3.1.4 Configuration

Overview

The "Configuration" view offers access to elements which are available for all assets.



See also

[Creating status mappings \(Page 34\)](#)

[User-defined periods \(Page 46\)](#)

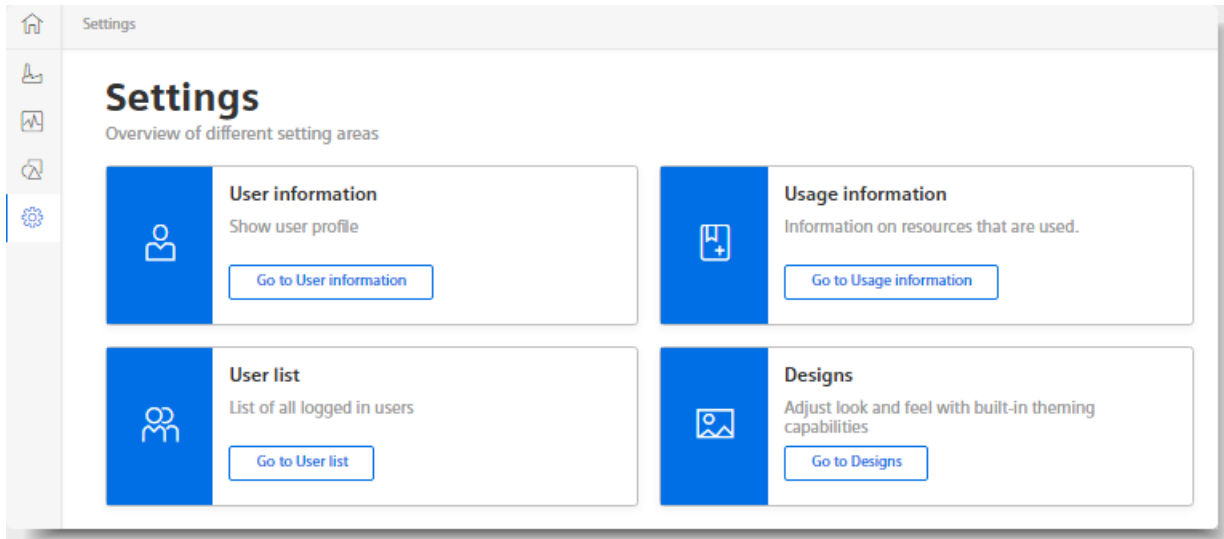
[KPI types \(Page 37\)](#)

[Reason tree \(Page 49\)](#)

3.1.5 Settings

Overview

The "Settings" view offers access to information on users and the usage of the app.



Under "User information", you select the display language and the display mode.

Under "Designs", you select a color scheme for the display.

See also



Adapting the app (Page 27)

3.2 Navigation in the app

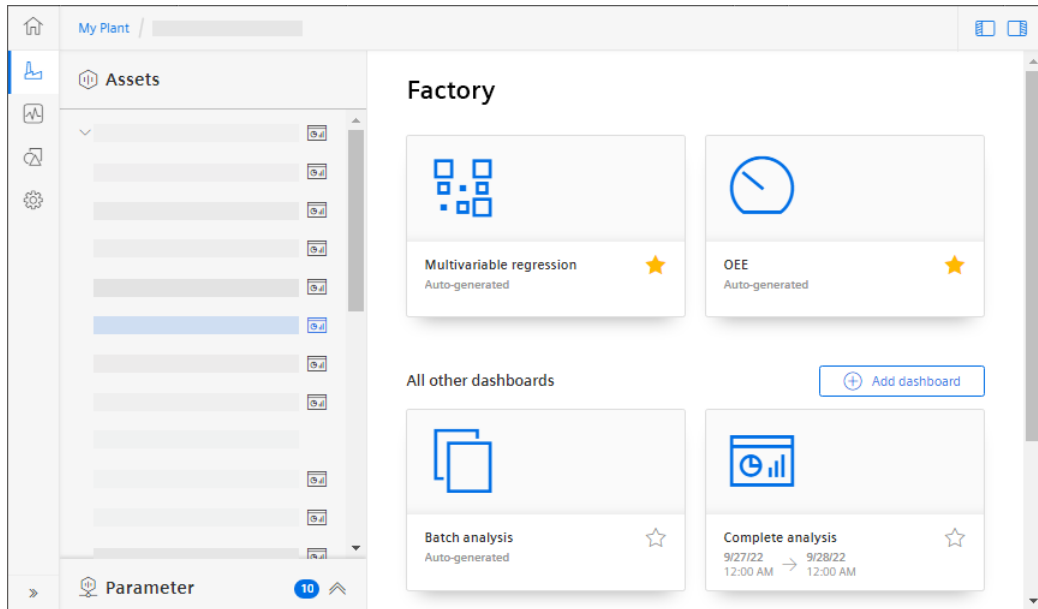
In the views of the app, there are navigation elements which lead you quickly to the visualizations, information and configurations.

Overviews

The navigation bar leads to the overview views:

	My Plant (My Plant)
	Analysis
	Configuration
	Settings

The overview views at the assets of My Plant allow quick display of the existing dashboards. Here you can create automatically generated dashboards and user-defined dashboards.



You can adapt the width of My Plant.



Breadcrumb navigation

The path that leads to the current view is displayed at the upper edge.

To access a previous view, click an individual entry.

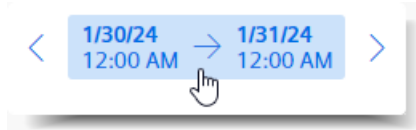


In addition, a link is displayed which returns you to the superordinate overview.



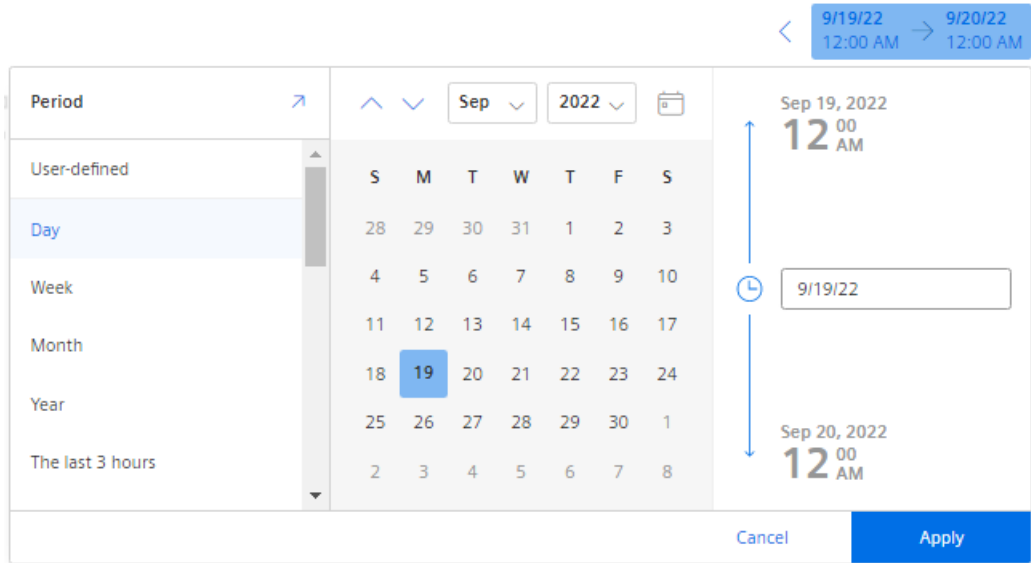
Displayed period, navigation in the time

Buttons to adjust the displayed period are available in dashboards and in the detail view of a widget.



3.2 Navigation in the app

- To move the displayed period, click < or > .
The displayed period is moved by one offset which corresponds to the duration of the period.
- To specify a period, click the displayed period.
The choice for the period and a calendar are displayed.



- To determine the duration of the displayed period, select a period from the drop-down list.

Note



Week and last 7 days

"Week" corresponds to a calendar week, beginning with the last Sunday.

"Last 7 days" corresponds to the last 7 days, irrespective of the week day.

This also applies for "Month" and "Year".

"Today" corresponds to the period which includes the current date.





- To use a user-defined period for the display, click "User-defined".
Input fields for specifying the period are displayed.
- Click  to define a new user-defined period in general.
- In the calendar, select the start date and if applicable, the end date and the time.
- Select another month or another year from the drop-down lists.
- To display the period that includes today's date "Today" once again, click .
- Click "Apply".

The displayed period for the diagram display can be limited and moved below the display.



Showing / hiding a display area

Information areas and navigation elements can be shown and hidden, as required.

	Shows the texts for the navigation bar.
	Shows the list of available parameters at the selected asset.
	Shows or hides the list of assets on the left-hand side.
	Shows or hides the information panel on the right-hand side. For example. the overview of parameters, reports, KPI types.

Direct call of a dashboard via URL

- If you view a dashboard by directly calling a URL, you can hide My Plant retentively. Add the query parameter "`?leadingRegionCollapsed=true`" to the URL of the dashboard.

Menu button

On widgets and dashboards, the relevant commands are contained in the menu of the button with 3 dots:



On automatically generated dashboards, for example:

- Editing settings
- Exporting data

At user-defined dashboards e.g.:

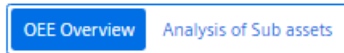
- Adding a widget
- Editing the layout of the dashboard
- Exporting a dashboard
- Editing a dashboard
- Deleting a dashboard


At widgets e.g.:

- Editing
- Deleting
- Copying
- Exporting data

Views

Dashboards offer different views.



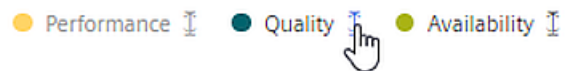
You open the detail views of a widget by clicking .

Widgets offer different detail views.



Adapting views

Parameters in visualizations can be shown or hidden.



If required, show the configured limit values.

See also

[Creating an OEE dashboard \(Page 77\)](#)

[Displaying the step time analysis \(Page 97\)](#)

Configuring the Performance Insight

4.1 Adapting the app


4.1.1 Changing the display language and color scheme

Note**User roles**

This documentation describes the app for the user role "admin".

Users to whom other roles have been assigned might have limited rights and editing options.

User information

1. To show the user profile of the logged-in user, open "Settings" > "User information".
2. Click .

Language and locale

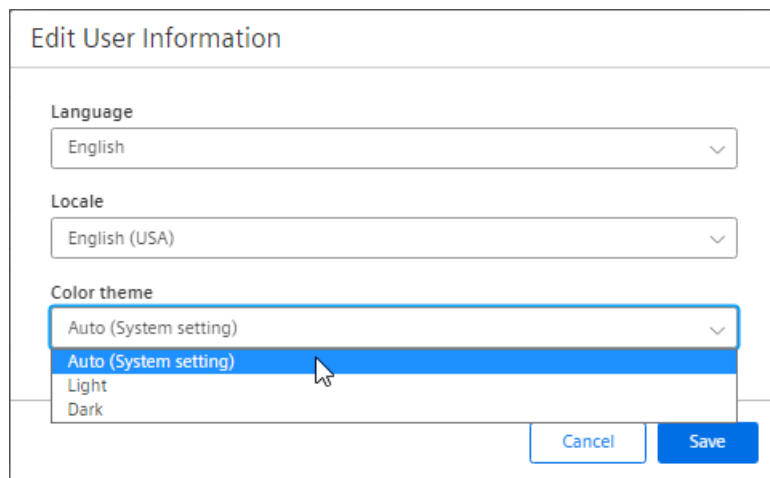
Here you can change the language and locale in which the app for the logged-in user is displayed.

The selection of the locale affects the display of numbers, such as decimal separators and dates. The locale can be selected independently of the user interface language.

Color scheme

Select your preferred color scheme for displaying the app:

- Light
- Dark
- Automatic (system setting)



The screenshot shows a dialog box titled "Edit User Information". It contains three dropdown menus: "Language" (set to "English"), "Locale" (set to "English (USA)"), and "Color theme". The "Color theme" dropdown is open, showing three options: "Auto (System setting)", "Light", and "Dark". The "Auto (System setting)" option is highlighted in blue, and a mouse cursor is pointing at it. At the bottom right of the dialog, there are two buttons: "Cancel" and "Save".

4.1.2 Displaying usage information

Usage information

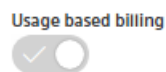
An overview of all resources in use is displayed.

The screenshot shows the 'Usage information' dashboard. At the top, there is a notification banner (1) stating 'No resource limit configured'. Below this are two main sections: 'Usage based billing' (2) and 'Resource upgrade' (3). The 'Usage based billing' section shows '91 of 185 available assets' (49%) and a toggle switch (8) to 'Enable usage based billing'. The 'Resource upgrade' section includes a 'More information' link (3). Below these is the 'Overview of all resources in use' section (7), which features a 'Download' button (4) and a table (5) with columns for ASSET, KPI, DA..., MVR, RE..., BA..., STA, and OEE. The table contains several rows of data, with a 'Go to asset' link (6) in the final column of each row.

- ① Usage based billing
- ② Resource upgrade
- ③ Link to web shop with selection of suitable upgrades
- ④ Download resource list as CSV file
- ⑤ Resource type and usage status
- ⑥ Go to asset
- ⑦ Overview of all resources in use
- ⑧ Enable usage based billing

Usage based billing

If a resource limit is configured, select here whether usage-based billing is used when the resource limit is exceeded.



4.1 Adapting the app

- Enabled: Assets can be created beyond the configured resource limit. These are billed based on usage.
- Disabled: You cannot create any additional assets when the resource limit is reached.

Resource upgrade

The "More information" link takes you to the Siemens web shop. Suitable upgrades are offered.

Overview of all resources in use

The table shows which asset is using which resources.

Resources in use can be:

- KPIs
- Dashboards
- Display of multivariable regression
- Reports
- ...

4.1.3 Displaying the user list

Procedure

To view the user list, select "Settings > User list".

Add / delete users

As an administrator, you can manage users as follows:

1. Select the settings in the overview page of the app.
2. Select the required user in the "Users" menu. The assigned roles are displayed.
3. Click "Edit direct assignment".
4. Add a user role or remove a user role and close the dialog.

You can find more information on user administration here: User management with "Settings" (<https://documentation.mindsphere.io/MindSphere/apps/settings/introduction.html>).

Release user license

To release a user license, you can registered yourself as a user from the app:

1. Select the "Settings" view.
2. You can delete their account under "User information > User account".

4.1.4 Designs

To display the "Designs" view, select "Settings > Designs".

This view offers a choice of various color schemes to display the app.

Note

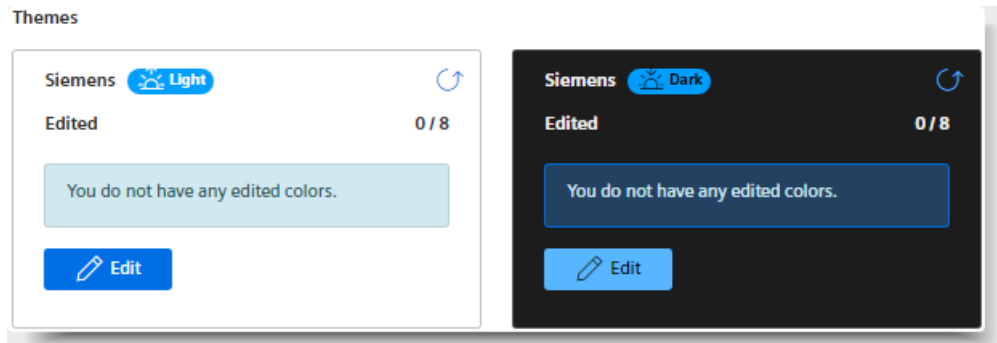
Administrator rights required

Administrator rights are required to change the design. Other users will only see the changes made.

Procedure

To customize the light and/or dark design, proceed as follows:

1. Select the topic you want to edit.



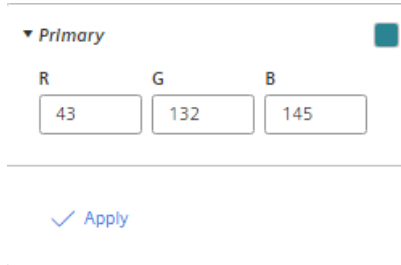
2. Click "Edit".
The following color options are displayed:

Color option	Description
Primary	Main color for the design, e.g. for buttons, menus and links
Font	Color for text elements, e.g. for labels and descriptions
Interface	Colors for the background
Success	Color for success messages
Warning	Color for warning messages
Error	Color for error messages
Info	Color for information messages
Overlay	Overlay color

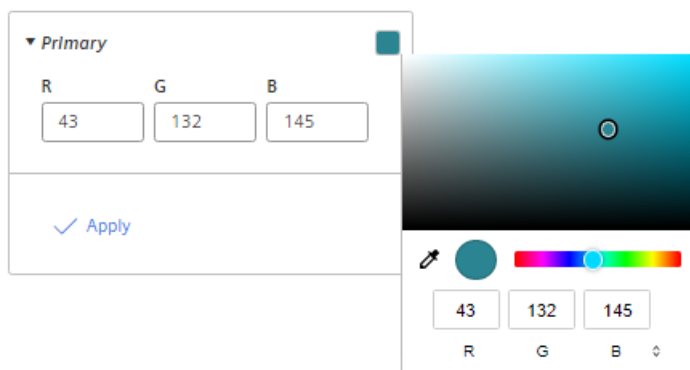
3. Click the desired color option.
The current color is displayed.

4.1 Adapting the app

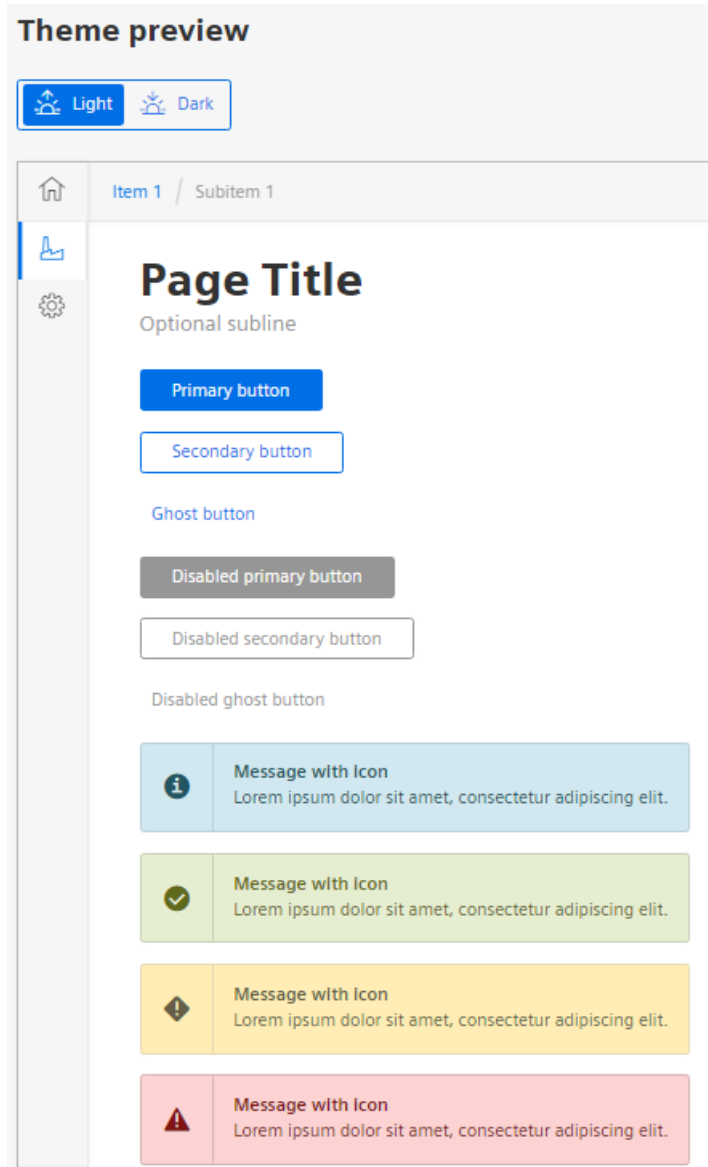
- 4. You have the following options to change the current color:
 - Enter the RGB colors of the desired color.



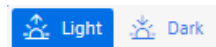
- Open a color palette by clicking on the tile with the current color. Select a new color.



- Click "Apply".
The changes made are displayed in the "Theme preview" area.




- To switch between the light and dark design for the preview, click



- To reset a selected color, click "Reset".
- When you have customized the color option as desired, click "Save".
The saved design is now visible for all users.

Restoring the default settings

1. To reset the default settings in a design, click the  icon in the corresponding design.
2. To reset the default settings in both designs, click "Delete".

4.2 Configuring types

You can create the types that you can use for all assets in the "Configuration" view:

- Status mappings (Page 34) should be used in the widget "Gantt" to visualize machine states.
- KPI types (Page 37) is to be used as a parameter in visualizations. KPI types are formed from a formula that connects operands, constants and time categories.
- User-defined periods (Page 46) make it possible to display visualizations for periods that are matched to your requirements.
- The Reason tree (Page 49) makes it possible to create individual disturbance reasons. This allows you to visualize the respective machine status in detail according to your requirements.

4.2.1 Status mappings

4.2.1.1 Creating status mappings

Description

You use status mappings in a widget of the type "Gantt" to visualize different values by colors and labels.

Status mappings are available for all assets of My Plant.

Displaying a list of status mappings

To display available status mappings and create a new status mapping, click "Status mappings" in the "Configuration" view.

The list of available status mappings is displayed.

These status mappings are available for the creation of a widget of the type "Gantt".

Creating a status mapping

To create a status mapping, follow these steps:

1. Show the list of status mappings.
2. Click "Create new status mapping".
The "Add status mapping" editor is displayed.

3. Assign a unique name and optionally a description.
4. Select the "Use time categories" check box if you want to map the status mapping in connection with the calculation of the productivity of your plant (overall effectiveness of equipment) to a KPI instance.
5. You assign a color, a label, a time category and optionally a description for each value that a variable can assume. The label is displayed in the widget for the selected machine status. If the parameter uses a value that is not defined in the "Status mapping" table, it is displayed with the status "Not defined" and the color white in the Gantt widget.

General

Name *

Description

Use time categories
Time category is used for eg: OEE calculation

Mappings

	Color *	Value *	Label *	Time Category *	Description	
⋮	● v	1	Running	Net Production Tim v	Description	🗑
⋮	● v	2	Production rejects	Net Production Tim v	Description	🗑
⋮	● v	3	Startup rejects	Net Production Tim v	Description	🗑
⋮	● v	4	Slow cycles	Unplanned Down v	Description	🗑
⋮	● v	5	Small stop	Planned Downtim v	Description	🗑
⋮	● v	6	Planned stop	Planned Downtim v	Description	🗑
⋮	● v	7	Unplanned stop	Unplanned Down v	Description	🗑

+ Add


* These fields must be filled out

Save

Cancel

You use the created status mapping in connection with the "Gantt" widget. The order of the individual status mappings is reflected in the Gantt widget as shown in the table. You can change the order by dragging the ⋮ icon.

Editing or deleting a status mapping

1. To edit an existing status mapping or delete it, click  in the list of the status mappings.
2. Select "Edit" or "Delete".

See also

User-defined periods (Page 46)


Visualizing machine statuses (Gantt) (Page 135)

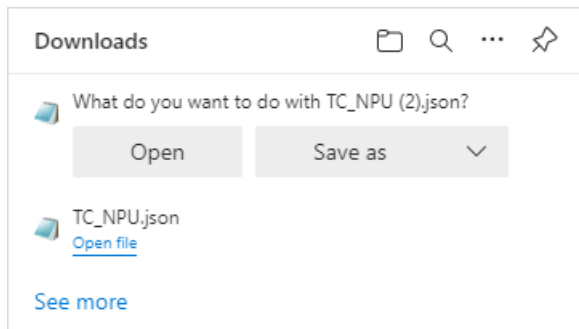
4.2.1.2 Exporting and importing status mappings

To be able to use status mappings on different devices, first export created mappings and import them into other environments.

Exporting status mappings

To export status mappings, follow these steps:

1. Select "Configuration > Status mappings" in the navigation toolbar.
The list of the status mappings is displayed.
2. Click  in an entry and select "Export" in the menu.
The "Downloads" dialog box opens.

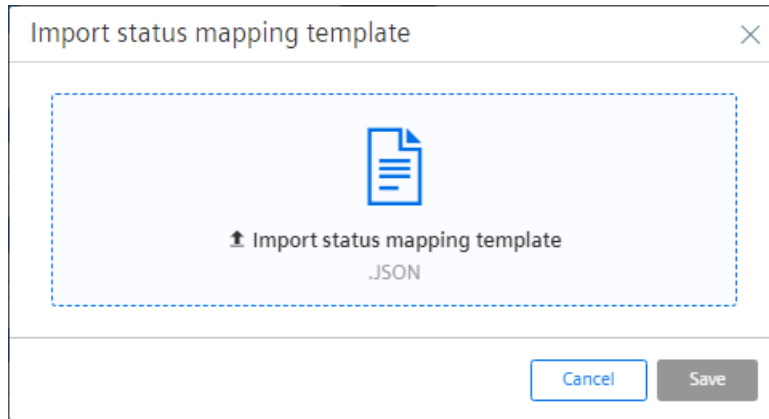


- To display the Export file in text format, click "Open".
- To save the Export file, click "Save as".
- To display more exports, click "See more".
- The toolbar in the dialog box has more options.

Importing a status mapping

To import status mappings, follow these steps:

1. Select "Configuration > Status mappings" in the navigation toolbar.
The list of the status mappings is displayed.
2. Click "Import status mapping".
The "Import status mapping template" dialog appears.



3. Click "Import status mapping template" to select a file for import.
4. Click "Save" to import the selected file.
The imported status mappings are available and can be edited and used.

4.2.2 KPI types

4.2.2.1 Introduction to KPI calculations

Description

The abbreviation KPI stands for Key Performance Indicator.

A KPI type is a formula consisting of operands, constants and operators. The definition and calculation of KPI types are plant-specific.

Example of a KPI type:

- Quality rate = Good Items / Total Items * 100

A KPI instance can be created either during the widget configuration in the "Parameter" step, or in the parameter list on the asset. The KPI instance can

- be derived from a KPI type (typed)
- or can be created typeless.

4.2 Configuring types

KPI types can be instantiated multiple times. When you make changes to the KPI type, these changes are also implemented in all KPI instances.

Note

Data in the buffer

The KPIs are saved in a cache. If values in the platform were overwritten in the past (except for the current and last hour), it may take up to one hour before you can see the data or KPIs and aggregations based on them.

Automatically created KPI instances

KPI instances are created automatically as soon as the configuration for an automatically generated dashboard, e.g. an OEE analysis, has been made on an asset.





For automatically created KPI instances, you can define limits that trigger a notification when these limits are exceeded or not reached. The green check mark in the "Notifications activated" column shows that a notification has already been configured. More information on the configuration of notifications can be found here: "Activate notifications" for variables with numerical data type and KPI instances (Page 60).

In the parameter list, you can identify the automatically created KPI instances by the blue icon.

[Back](#)

[+ Create new KPI instance](#)

Parameter

TYPE	NAME	DATA TYPE	UNIT	NOTIFICATIONS ACTIVATED
KPI 	Availability	Double	%	...
KPI 	Performance	Double	%	...
KPI 	Quality	Double	%	...
KPI 	OEE	Double	%	...

Structure of a KPI instance

The KPI instance is created as follows:

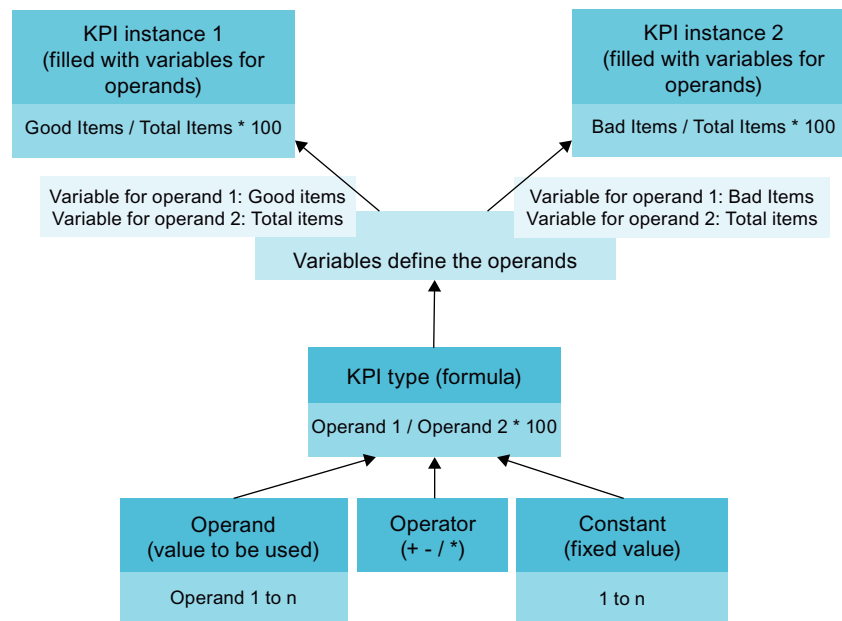
- Instantiate a KPI type including linked variables or KPI instances (typed; multiple use is possible)
- or -
Create a KPI instance directly and link it to variables or KPI instances (typeless).

Each KPI instance must be assigned to an asset, but variables from other assets can also be linked to the KPI instance.

The following figure shows the individual components that make up a KPI instance.

- Operands serve as placeholders that are later filled with actual values from the variables or KPI instances.
- Constants can only contain numerical values
- Operators

The following diagram shows the structure of the KPI type/instance concept:



Operands

Operands serve as placeholders that are later filled with actual values from the variables. They are created when creating a KPI type and defined during the instantiation of the KPI type. Operands must not contain spaces, mathematical symbols, or numbers at the beginning of the operand name. They can be moved and copied.

4.2.2.2 Creating a KPI type

Description

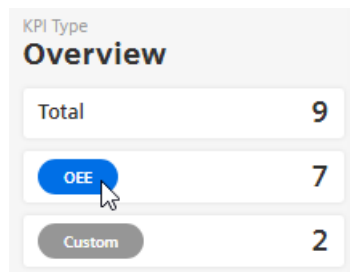
A KPI type is the template for a KPI instance which you visualize in a dashboard.

KPI types are created automatically, e.g. when an OEE dashboard is created. Independently of this, you can create your own user-defined KPI types.

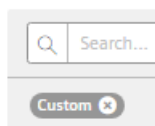
KPI instances can also be created as untyped when a widget is created.

Displaying a list of KPI types

1. To display available KPI types, click "KPI types" in the "Configuration" view.
The list of available KPI types is displayed.
KPI types are available for all assets of My Plant.
2. To display the formula for the calculation of the KPI type and further details, select the KPI type in the list.
The information on the KPI type is shown in the information panel.
3. To filter the list by a category, click the corresponding category in the overview in the information panel.



4. To delete the filter again, click the display below the search field.



Creating a KPI type

Follow these steps to create a KPI type:

1. Show the list of KPI types.
2. Click "Create new KPI type".
The "Add KPI type" editor is displayed.
3. Assign a unique name and a unit.

- To calculate the KPI type, use operands, constants, time categories and operators to compose the formula that is used in the formula editor. You can create operands and constants directly for this purpose.

Note

Time category

The time category is used for the calculation of OEE key performance indicators. You select a time category and specify whether the duration or the frequency of events is used for the calculation.

An operand is a placeholder that is later, during the creation of widgets, filled with actual parameters from the parameters or KPI instances.

General

Name *

Unit *

Formula

Formula *

+
-
÷
×
(
)
Operand
Constant
Time-Category
?

TIME-CATEGORY
TIME-CATEGORY

(

TIME-CATEGORY
Net Production Time
▼

Duration

/

TIME-CATEGORY
Available Production Time
▼

Duration

CONSTANT

)

*

100

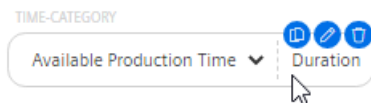
Preview: ([Net Production Time|Duration] / [Available Production Time|Duration]) * 100

* These fields must be filled out


Save

Cancel

- Move already inserted elements of the formula with drag-and-drop.
- To copy, edit or delete an element of the formula, move the mouse pointer over the element and select the corresponding icon.



Editing or deleting a KPI type

1. To edit an available KPI type or to delete it, click  in the list of KPI types.
2. Select "Edit" or "Delete".
Automatically generated KPI types (OEE) cannot be deleted in this view.

See also

Overview of the overall equipment effectiveness (OEE) (Page 75)

4.2.2.3 Creating and deleting KPI instances

KPI instances

KPI instances can be created either in the parameter list of the respective dashboard or when a widget is created. You can create the KPI instance either when creating a widget or later by editing the widget again.

You have several options to create a KPI instance:

- You create a KPI type in the configuration and instantiate it either directly in the widget or in the parameter list. (typed)
- You create a new KPI instance directly in the widget or the parameter list. (typeless)

In the preview, you can see the formula it contains and which operand is linked to which variable.

New KPI instances cause costs. The number of currently used KPI instances is displayed in the "Settings" menu under "Usage information".

If all KPI instances are occupied, order additional KPI instances or delete a KPI instance that is no longer needed.

Note

Automatically created KPI instances

Automatically generated dashboards automatically generate KPI instances. These can not be edited.

Creating KPI instances based on a KPI type (typed)

Follow these steps to create a KPI instance based on a KPI type:

1. Create a widget.
- or -
Open a widget for editing.
2. Go to the "Parameter" area
3. Click "Create a new KPI instance".
4. In the "General" area, you assign one unique KPI instance name per asset.

5. Select "On basis of a KPI type (typed)".

General

Define general settings

Define a name, the type of the KPI instance, the unit and the formula and link each operand with a parameter.

Name *

Select a KPI basis *

On basis of a KPI type (typed)
Select this option if the KPI definition is inherited from a KPI type

Without KPI type (type less)
Select this option if the KPI definition is used only once

KPI type *

Availability
▼

Choose a predefined KPI type

6. Select the desired KPI type. The preview shows the formula it contains. When you select a KPI type with time categories, you have the option of linking a status mapping and a parameter for the machine status.
7. Link all operands contained in the formula to a variable or a KPI type. If you assign a variable to the operand, you also need to select an aggregation function.

1. Formula preview

TIME-CATEGORY

(

Net Production Time

Duration
/

TIME-CATEGORY

Available Production Time

Duration
)
*

CONSTANT

100

2. Choose parameter representing your machine status

VAR

Electricity_Consumption
Energy_Filling

✕

3. Choose a status mapping that represents your time model

Machine Status
▼

8. Select a status mapping.

Creating KPI instances without KPI type (typeless)

Follow these steps to create a typeless KPI instance:

1. Create a widget.
- or -
Open a widget for editing.
2. Go to the "Parameter" area
3. Click "New KPI instance".
4. Click the "General" tab.
5. Assign a unique KPI instance name per asset.
6. Select "Without KPI type (typeless)".
7. Enter a unit.

8. Create the formula from constants, operands, time categories and operators.
If you select a time category, you also have the option of linking a status mapping and a parameter for the machine status.
9. Link all operands contained therein to a variable or a KPI type. If you assign a variable to the operand, you also need to select an aggregation function.

If you have already defined limits for the variable or KPI used, they are displayed preset in the widget. These limits can be overwritten.

Defining limits

You can define limits both for typed and for typeless KPI instances (user-based KPI instances).






To define the limits, follow these steps:

1. Go to the area "Limits".
2. Enter the limit values.

Limits

Define limits

Set limits and define whether you want to receive notifications. Note: This function is only available if the SIMATIC Notifier MindSphere app is available on your tenant.

Alert	Warning		Warning	Alert
<input style="width: 40px;" type="text" value="5"/>	<input style="width: 40px;" type="text" value="10"/>		<input style="width: 40px;" type="text" value="90"/>	<input style="width: 40px;" type="text" value="95"/>
				

Notifications

Enable alert notifications

Enable warning notifications

Notification

Calculation cycle

Note: Calculation cycle is based on UTC (Universal Time Coordinated)

3. To receive notifications when a high or low limit value is violated, enable the function "Activate notifications".
You can find additional information on the "Activate notifications" function here: "Activate notifications" for variables with numerical data type and KPI instances (Page 60)

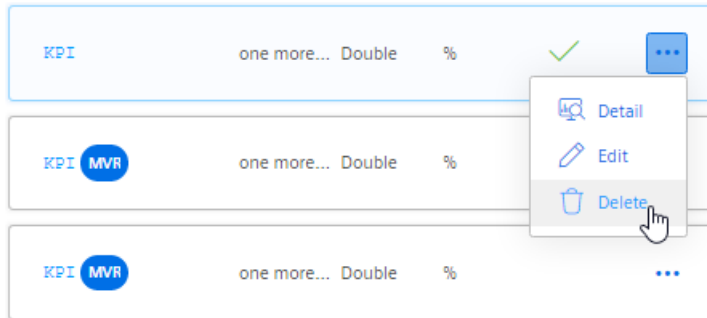
Deleting KPI instances



You can delete KPI instances from the parameter list of the asset.

Follow these steps to delete a KPI instance:

1. In "My Plant", select the asset in which the KPI instance is used.
2. Open the list of the parameters.

3. Select the KPI instance that is to be deleted.



4. Click  and select  "Delete".

Note

No Undo

The KPI instance is deleted without confirmation and can not be restored.

See also

"Activate notifications" for variables of the data type "Bool" and "String" (Page 62)

4.2.3 User-defined periods

Description

A user-defined period defines a typed period. These types are used during visualization to record and display the data values of a parameter or KPI for this period.

The app makes common periods available as "Standard". You can create your own time periods.

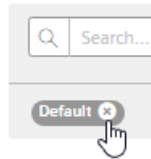
Examples of user-defined periods:

- 5 days
- Financial year
- Season (for a product)

Displaying a list of periods

1. To display available time periods and create a new time period, click "User-defined time periods" in the "Configuration" view.
The list of the existing periods is displayed.
Periods are available for all assets of My Plant.
2. To display information and a preview of the calculated time window, select the period in the list.
The information on the period is shown in the information panel.

3. To filter the list by a category, click the corresponding category in the overview in the information panel.
4. To delete the filter again, click the display below the search field.



Creating a user-defined period

To create your own period, follow these steps:

1. Show the list of periods.
2. Click "Create new user-defined time period".
The "Add user-defined time period" editor is displayed.

General

Name *

Description

Configuration

Duration *

Start time (relative to the query time) *

 / previous/later
Defines the starting point of a period relative to the current time or date. Sets the starting point in the past or future.

Offset *

Offsets the calculated period by the specified value

Minutes	Hours	Days	Weeks	Months	Years
0	0	0	0	0	0

Next period *

Starts at the beginning of the selected start time

Starts directly after the last period (e.g. shift work)

Period preview

Calculated from time: 11/17/22, 1:23 PM

↑	Previous	Nov 17, 2022 12 ⁰⁰ PM	→	Nov 17, 2022 01 ⁰⁰ PM
○	Current	Nov 17, 2022 01 ⁰⁰ PM	→	Nov 17, 2022 02 ⁰⁰ PM
↓	Next	Nov 17, 2022 02 ⁰⁰ PM	→	Nov 17, 2022 03 ⁰⁰ PM

3. Assign a unique name and optionally a description.

4. Define the time window in the "Configuration" area.
 - **Duration**
Enter a value for the duration of the period or select a value by clicking on the arrows in the input field.
Select the unit of the period: Minute, hour, day, week, month or year.
 - **Start time (relative to query time)**
Define the starting point of the period relative to the current date by specifying the unit of the distance to the current time: Minute, hour, day, week, month or year.
Specify whether the starting point is in the past or the future starting from the current date. With a negative value you specify a start time in the future, with a positive value a start time in the past.
 - **Offset**
Specify values by which the calculated period is moved.
 - **Next period**
Specify the start time of the next period.
"Starts at the beginning of the selected start time" starts the next period when the defined start time has been reached.
"Starts immediately after the last period (e.g., with shift operation)" starts the next period at the end of the previous period.
5. Click "Save".

Note**Deleting or editing a user-defined time period**

You can edit or delete user-defined periods.

Periods of the "Standard" category cannot be edited or deleted.

Result

You have defined a user-defined period that you can now use when selecting a period, for example, in a widget.

4.2.4 Reason tree

The reason tree is a structured representation of the different states in which a machine or plant can be. OEE is a tool for continuous improvement, and a crucial step towards improvement is the analysis of the reasons for downtimes of machines and plants. You can improve the performance of a plant by identifying the root causes of downtimes, such as late delivery to stations. To enable this analysis, you need a detailed catalog of fault reasons, the reason tree.

4.2 Configuring types

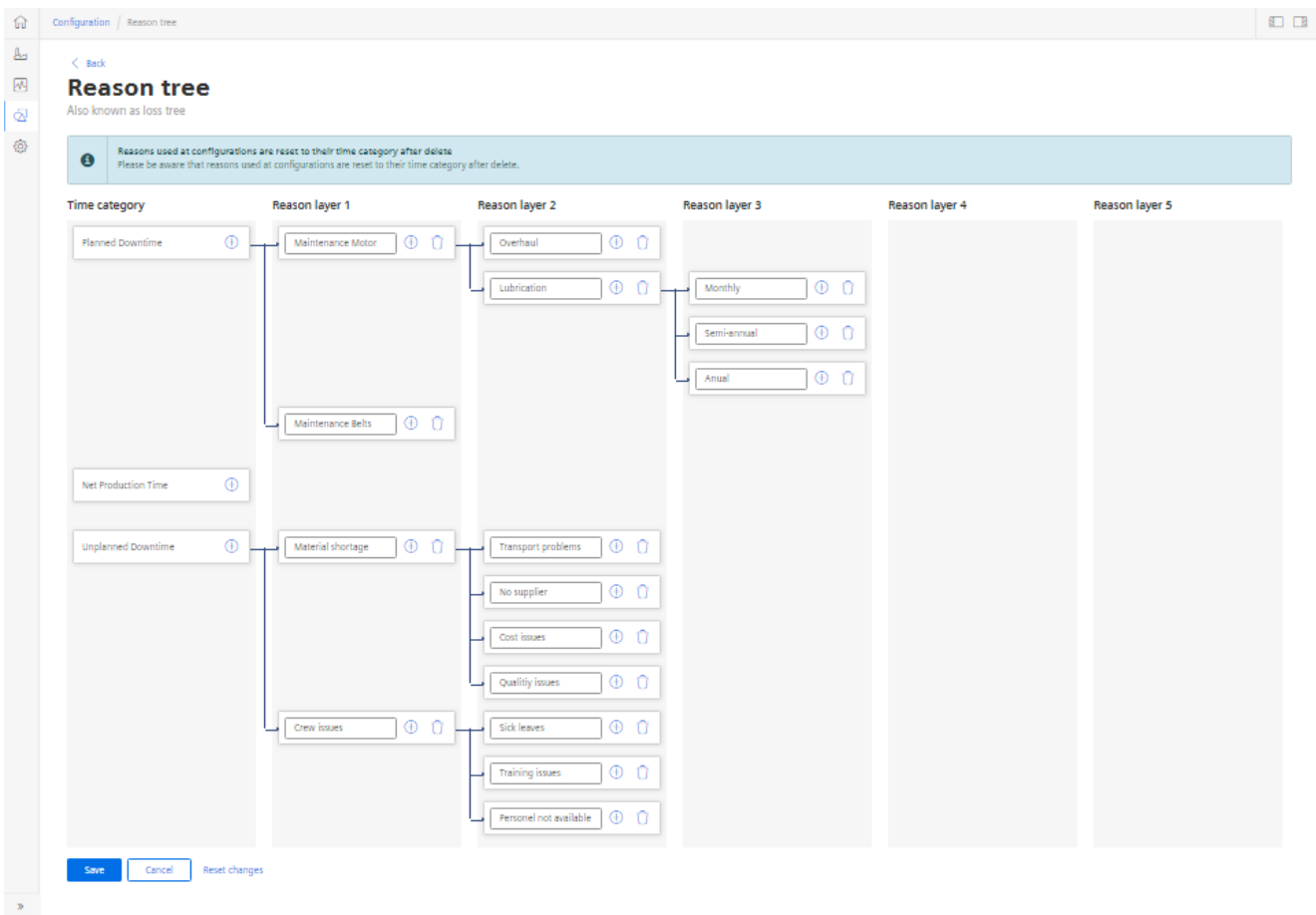
The reason tree is based on the specified time categories:

- Production time (Net Production Time)
- Planned downtime (Planned Downtime)
e.g. maintenance
- Unplanned downtime (Unplanned Downtime)
e.g. machine fault, material shortage

A fault reason (reason) corresponds to a time category.

In the reason tree you define detailed fault reasons according to your requirements and experience. Five levels of detail are available.

The reasons you have created are available when creating an OEE dashboard, when editing a status assignment, and for the formula for calculating a KPI type.






The reason tree and the created fault reasons (Reasons) apply to the entire tenant.

4.2.4.1 Creating fault reasons in the reason tree

Description

You create fault reasons (Reasons) for each of the specified time categories in the reason tree. A fault reason describes in detail the state of the machine / plant. Five levels are available.

Procedure

1. To display the reason tree, click "Reason tree" in the "Configuration" view.
2. To create a fault reason at the first level for one of the specified time categories, click  "Add" in the time category field.
3. Give the fault reason a descriptive name, such as maintenance.
4. To create another, more detailed fault reason for an already created fault reason at the next lower level, click  "Add" in the field of the already created fault reason. You can create additional fault reasons or rename them at any time.
5. To delete a fault reason, click  "Delete" in the fault reason field.

Note

If you delete a fault reason that is already used in calculations, the parent time category is used at this point.

6. To back up the reason tree, click "Save".

See also

[Creating an OEE dashboard \(Page 77\)](#)

[Creating a KPI type \(Page 40\)](#)

[Creating status mappings \(Page 34\)](#)

4.3 Setting parameters

4.3.1 Parameters in Performance Insight

Parameters are the variables available in the app and the KPIs created at the asset.

The variables that are available on each asset were transferred from the plant to the platform via the Asset Manager. In SIMATIC Performance Insight, My Plant with all existing variables is mapped on this basis.

The name, data type, and unit of each variable are transferred from the platform.

You can display the list of available parameters for each asset and define settings and limit values for individual parameters.

4.3 Setting parameters

Variables

You determine a unit and the acquisition category.

You specify the high and low limit values for which notifications are sent on violation.

The settings differ depending on the data type of the variables.

Automatically generated KPIs

General settings and the formula are displayed, but cannot be changed.

You specify the high and low limit values for which notifications are sent on violation.

User-defined KPIs

You edit the general settings and the formula.

You specify the high and low limit values for which notifications are sent on violation.

See also

Displaying a parameter list (Page 52)

4.3.2 Displaying a parameter list


Description

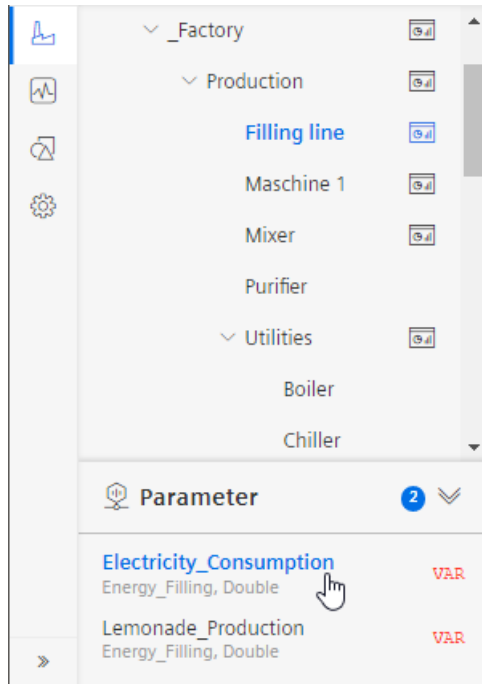
The parameter list is asset-specific.

To show details on a parameter or edit the settings for a parameter, select it in the parameter list.

Accessing values of a parameter or KPIs

To display the parameter list, proceed as follows:


1. Select an asset in My Plant (My Plant).
2. To show the parameter list below My Plant (My Plant), click the double arrow . The parameter list is displayed.

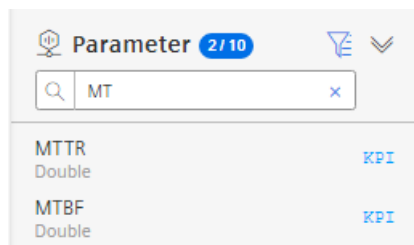


3. Click a parameter (VAR or KPI) The current values of the parameter are displayed on a diagram.


Filter parameter list

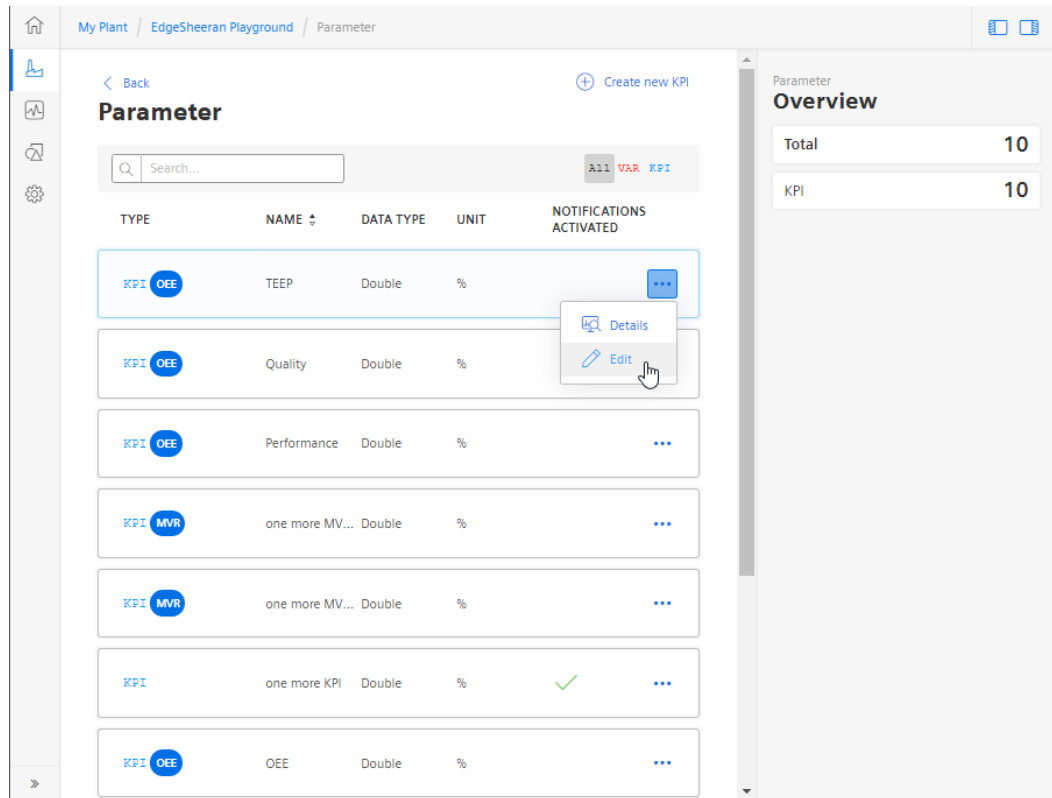
To filter the display of parameters, follow these steps:

1. Click the filter icon .
2. In the search box, type a string.
The parameters whose names contain the character string are displayed.




Editing settings

1. Select an asset in My Plant (My Plant).
2. Click  next to "Parameter" in the information panel. The parameter list is displayed.



Variables, automatically generated KPIs and user-defined KPIs are displayed.


3. To edit the settings for a parameter, click  and select "Edit". Editing differs for variables and KPIs.
4. To filter the list, click next to the search field on VAR or on KPI.

4.3.3 Displaying current values of a parameter

From the parameter list, you directly show the current values of a variable or a KPI instance. In this way, you find out whether and which values are currently available.


Procedure

To display the current values of a parameter, proceed as follows:

1. Show the parameter list.
2. Click  for the selected parameter.

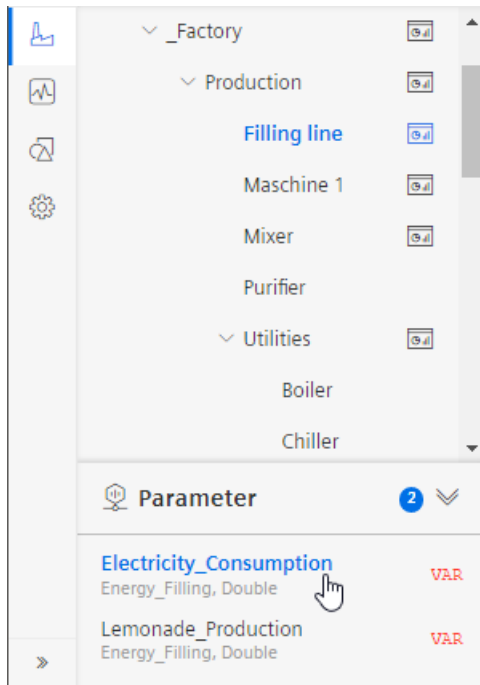
3. Select "Detail" in the drop-down menu.
The preview of the current values is displayed.



4. To display a different period, use the navigation elements.
5. To edit the settings for the variable, click in the preview on  and select "Edit".

Alternative procedure

1. Show the parameter list below the assets and click a parameter. The graphical preview of the parameter values is displayed.



See also

Navigation in the app (Page 21)

4.3.4 Editing settings for variables

Requirement

You have opened a variable for editing in the parameter list.

Description

The properties of a variable can be defined.

- Unit
You can either accept the transferred unit or specify your own unit.
- Acquisition category:
Here you determine how the value is acquired and stored. The acquisition category is linked directly to an aggregation function. As soon as you use the variable in a widget, the respective aggregation function is automatically selected:
 - Process value (ProcessValue) => aggregation function: Average
 - Power value (Power) => aggregation function: Average
 - Consumption value (Energy) => aggregation function: Sum
 - Flow value (Flow) => aggregation function: Average
 - Quantity value (Amount) => aggregation function: Sum
 - Count value (Counter) => aggregation function: Counter
When you select the acquisition category "Counter", you can define additional settings for each counter used.
Additional information on the counting method of the individual counters can be found here: "Counter" acquisition category (Page 63)
 - Status value (State)
- "The value is aggregated" function
If the value is not aggregated, the values are continuously (actual values) transferred to the platform when the value changes. The currently transferred value is valid until the next value is transferred to the platform. When the value is aggregated, the value is always valid for the last cycle, for example, 15 minutes.
You can find additional information on the aggregation functions here: Aggregation functions (Page 66)

Note

Data gaps

Data gaps occur, for example, when the connection to the network is interrupted. No data is transferred from the plant during the interruption.

When you have activated the "The value is aggregated" function and are using an acquisition category with the "Sum" aggregation function, data gaps will distort the final result.

Procedure

To extend the declaration of a variable, follow these steps:

1. In the parameter list, open a variable for editing.
2. Select the desired properties.
In addition to the acquisition category, the data type of the variable is displayed.

General

Define general settings for "Operational"

Specify an alternate unit, the acquisition category that you use to define the type of data collected, and how the value should be interpreted.

Unit

Unit from Asset Management: kWh

Acquisition category *

Counter

Type: Double

Cycle

The value is aggregated.
The value represents the end of the time range.

Counter

▼ Valid from 1/1/22, 12:00 AM 🗑

Valid from *

01/01/2022 12:00 AM
📅

Counter constant *

1

Value for the up and down counter

Counter type *

Up counter

Up & Down counter

Reset behavior

Triggered reset
The counter is reset per cycle or by an event.

Range start

Range end

Value at installation

Value at replacement

Filtering variable values

If variables are assigned values that do not reflect reality, e.g. 0 (zero) in the event of a temporary connection failure, calculations and graphical representations are displayed in a distorted manner.

Enable filtering and specify a low and high limit. Values of the variables that are outside this range are not displayed and are not included in the calculation of KPIs.

Interpolation of variable values

If data points are missing in a time series of values, you can have them replaced.

Enable replacement and choose a strategy, e.g. interpolation.

4.3.5 Editing settings for KPI instances

Requirement

You have opened a KPI instance for editing in the parameter list.

Editing an automatically generated KPI

The settings of the automatically generated KPIs (OEE, MVR) are displayed but cannot be edited in this view.

You can find information on activation of notifications in the section ""Activate notifications" for variables with numerical data type and KPI instances (Page 60)".

Editing a user-defined KPI

You can edit general settings and the formula of the KPI instance here.

You can find additional information on the settings in the section "KPI types (Page 37)".

You can find information on activation of notifications in the section ""Activate notifications" for variables with numerical data type and KPI instances (Page 60)".

4.3.6 Saving the values of a KPI in a variable

The values of a KPI can be restored to a variable. The values are available for more calculations and visualizations even in other apps.

Saving KPI values

To save the values of a KPI in a variable, proceed as follows:

1. Open a KPI from the parameter list for editing.
2. Select the corresponding option in the "Saving KPI values" tab.

3. Select the variable in which the values are saved.
- or -
Create a new variable.
4. Select a cycle.
5. Select the start time at which saving should start.
6. To end saving of the KPI values, disable the option.

Creating a new variable for saving the KPI values

When you create a new variable, observe the following:

- The variable must receive a unique name that has not yet been used.
- The variable must be assigned to an aspect.
- The variable is created in Asset Management.
- Additional costs are incurred per variable. Note that aspects can be used multiple times.

4.3.7 "Activate notifications" for variables with numerical data type and KPI instances

Requirement

You have selected a variable in the parameter list and opened it for editing.

Description

For each variable, you can define high and low limits that trigger a notification when violated. This notification is displayed in the Notifier app and sent directly to the selected mobile device.

Note

SIMATIC Notifier

The SIMATIC Notifier must be installed and running so that you can use the "Activate notifications" function.

The limits defined for the variable are applied by default in the widget as soon as the variable is used. You can adapt the limits in the widget.

Procedure

To enable the "Activate notifications" function, proceed as follows:

1. In the parameter list, open a variable for editing.
2. Go to the area "Limits".

Limits

Define limits for "Operational"

Set limits and define whether you want to receive notifications. Note: This function is only available if the SIMATIC Notifier MindSphere app is available on your tenant.

Alert	Warning		Warning	Alert
<input type="text" value="5"/>	<input type="text" value="10"/>		<input type="text" value="90"/>	<input type="text" value="95"/>

Notifications

Enable alert notifications

Enable warning notifications

Notification

Check raw data
Define whether the raw data or the aggregated data should be validated.

Calculation cycle **Aggregation**

Note: Calculation cycle is based on UTC (Universal Time Coordinated)

3. Enter the upper and lower values which trigger a warning and an alarm when violated.
4. Select the check box for corresponding notifications.

4.3 Setting parameters

5. To apply raw data, select the "Validate raw data" check box.
A fixed calculation cycle of 10 seconds is used.
6. When you use aggregated data, select the calculation cycle and the aggregation.
The calculation cycle always starts at 00:00 UTC (Universal Time Coordinated), e.g. 00:00:00; 00:15:00; etc.
The following aggregation functions are available: AUTOHOTPOT.

4.3.8 "Activate notifications" for variables of the data type "Bool" and "String"

Description

For each variable of the "Bool" or "String" data type, you can define conditions that trigger a notification. This notification is displayed in the Notifier app and sent directly to the selected mobile device.

Note

Variables of the data type "Bool" or "String"

You can activate notifications for these variables.

- You can only use a variable of the data type "String" as a parameter in a widget of the type "Value".
- You can use a variable of the data type "Bool" as a parameter in a widget or a KPI instance.

Limit values can be defined, but these limit values are not transferred to the widget.

Procedure

To enable the "Activate notifications" function, proceed as follows:

1. In the parameter list, open a variable of the data type "Bool" or "String" for editing.
2. Go to the area "Notifications".

3. Select the check box "Activate notifications".

4. Select a notification type:
 - Alert
 - Warning
5. Select "=" or "<>" as operator and enter a value:
 - For the data type "Bool": "True" or "False"
 - For the data type "String": Enter a value.
6. Click "Save".

Result

A green check mark appears in the parameter list next to the variable in the "Notifications activated" column.

4.3.9 "Counter" acquisition category

4.3.9.1 Define the acquisition category "Counter"

Requirement

Note

Only with the Energy Manager and Performance Insight apps

This variable configuration is only required if you are working with the Energy Manager and Performance Insight apps.

You have opened a variable for editing.

You have selected the recording category "Counter" in the settings of a variable.

You have added a counter.

4.3 Setting parameters

Acquisition category *
Counter ▼ Type: Double

Cycle
 The value is aggregated.
The value represents the end of the time range.

Counter

▼ Valid from 1/1/22, 12:00 AM 🗑️

Valid from *
01/01/2022 12:00 AM 📅

Counter constant *
1
Value for the up and down counter

Counter type *
 Up counter
 Up & Down counter

Reset behavior
 Triggered reset
The counter is reset per cycle or by an event.

Range start Range end

Value at Installation Value at replacement

[+ Add new definition](#)

Description

You can define properties for each counter:

- Valid from
- Counter constant (value by which the counter is counted up or down, e.g. 1 kWh.)
- Counter type
 - Up counter = The counter can only count up. As soon as a subsequent counter value is less than the current one, it is treated as an overflow and the counter is restarted.
 - Up & Down counter = The counter can count up and down, e.g. a level counter.

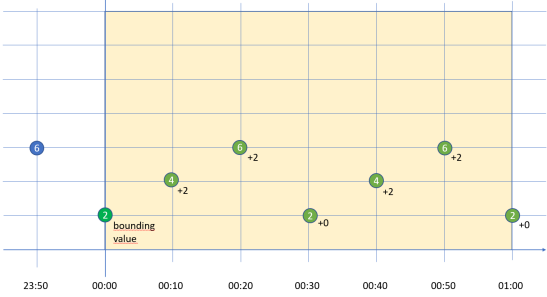
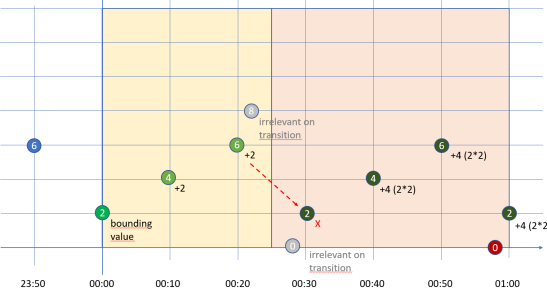
- Reset behavior (Only for an Up counter: You can specify whether the counter is reset daily or by an event, such as a defined overflow limit.)
- Start / End of the limit range
Overflow limit. If you have not activated the reset behavior, the counter is automatically reset when it reaches the specified count limit.
- Value at installation
You specify the actual value at which the counter is to start. (If the counter is not to start with the start value of the limit range.)
- Value at replacement of the counter

4.3.9.2 Counting method of the "Up" counter

Description

Only positive changes in value are recorded. The sum of the positive value changes between two points in time is output in each case. If the value remains the same between two points in time or is reduced, the value is not counted.

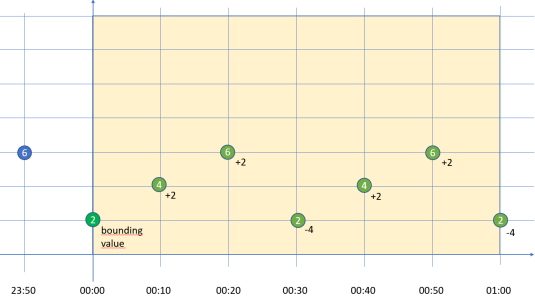
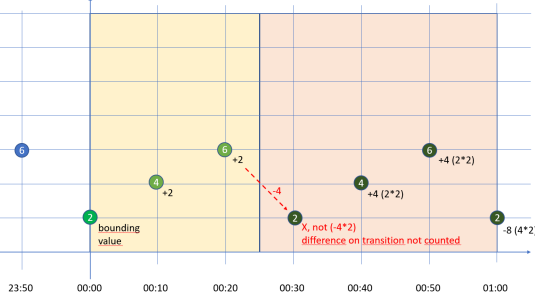
Depending on the settings you select for a counter, you will see different counter values as a result. By default, the "The value is aggregated" function is activated:

Settings	Explanation		
Start and end of the limit range is not defined. Result: $+ 2 + 2 + 0 + 2 + 2 + 0 = 8$			
When you change the counter, you can define different settings for each counter. This example shows the transition from one counter to the next: <table border="1" data-bbox="387 1517 759 1825"> <tr> <td>Counter for the year 2018 00:00 - 00:25 Counter constant: 1 End of the limit range: 8 Result: $+ 2 + 2 = 4$</td> <td>Counter for the year 2019 00:25 - 01:00 Counter constant: 2 Start of the limit range: 0 Result: $+ 4 + 4 + 0 + 4 = 12$</td> </tr> </table> Final result: $4 + 12 = 16$	Counter for the year 2018 00:00 - 00:25 Counter constant: 1 End of the limit range: 8 Result: $+ 2 + 2 = 4$	Counter for the year 2019 00:25 - 01:00 Counter constant: 2 Start of the limit range: 0 Result: $+ 4 + 4 + 0 + 4 = 12$	
Counter for the year 2018 00:00 - 00:25 Counter constant: 1 End of the limit range: 8 Result: $+ 2 + 2 = 4$	Counter for the year 2019 00:25 - 01:00 Counter constant: 2 Start of the limit range: 0 Result: $+ 4 + 4 + 0 + 4 = 12$		

4.3.9.3 "Up & Down" counting method of the counter

Description

Depending on the settings you select for a counter, you will see different counter values as a result. By default, the "The value is aggregated" function is activated. You cannot define any limit ranges for the "Up & Down" counter.

Settings	Explanation				
Result: $+ 2 + 2 - 4 + 2 + 2 - 4 = 0$					
When you change the counter, you can define different settings for each counter. This example shows the transition from one counter to the next:					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> Counter for the year 2018 00:00 - 00:25 Counter constant: 1 Result: $+ 2 + 2 = 4$ </td> <td style="width: 50%; padding: 5px;"> Counter for the year 2019 00:25 - 01:00 Counter constant: 2 Result: $+ 4 + 4 - 8 = 0$ </td> </tr> <tr> <td colspan="2" style="padding: 5px;"> Final result: $4 + 0 = 4$ </td> </tr> </table>	Counter for the year 2018 00:00 - 00:25 Counter constant: 1 Result: $+ 2 + 2 = 4$	Counter for the year 2019 00:25 - 01:00 Counter constant: 2 Result: $+ 4 + 4 - 8 = 0$	Final result: $4 + 0 = 4$		
Counter for the year 2018 00:00 - 00:25 Counter constant: 1 Result: $+ 2 + 2 = 4$	Counter for the year 2019 00:25 - 01:00 Counter constant: 2 Result: $+ 4 + 4 - 8 = 0$				
Final result: $4 + 0 = 4$					

4.3.10 Aggregation functions

4.3.10.1 Description of aggregation functions

Description

The following aggregation options are available.

Aggregation types

- **Single value aggregations**

A variable is aggregated by specifying the aggregation method and the calculation period. The result is a value that represents the values of the period for the respective aggregation. Calculation period: from[to], from exclusive, to inclusive
Example: "I want the 'sum' of 'Variable X' from '2022 to 2023' to be calculated." => 1 value is returned that represents the summed values of the year.

- **Aggregation of multiple values**

A single-value aggregation can be calculated multiple times for a specific period. The aggregation of multiple values is defined by the period and the aggregations of the individual values (consisting of calculation period and aggregation method). The result is multiple values where each value represents the values in this calculation period for the respective aggregation.

Example: "I want the 'sum' of 'Variable X' to be calculated every day 'from 2022 to 2023'." => 365 values are returned, where each value represents the summed values of one day.

- **Precalculated aggregations**

Aggregations can be scheduled to run continuously in the background. The other two aggregation types are calculated on request. This aggregation type enables calculation of aggregations on 'new-value-written'. That reduces the return time of the request and distributes the resource usage according to the written rate values, which prevents the peaks that occur with the other two aggregation types.

A precalculated aggregation is defined using an aggregation and a desired execution cycle. The result is an additional sub-variable that stores the aggregation of each cycle.

Example: "I want the 'sum' of 'Variable X' to be calculated 'every day'." => A new sub-variable is created in which a new value is stored every day that represents the summed values of the day.

Aggregation methods

Boolean values are interpreted in calculations as numeric values 0 and 1.

- **Sum**

Returns the sum of the numeric values for the calculation period.

- **Count**

Returns the number of values within the calculation period.

- **Average**

Returns the arithmetic average of numeric values for the calculation period. All values are weighted the same. The result can be a floating-point number.

- **Min**

Returns the lowest numeric value within the calculation period.

- **Max**

Returns the highest numeric value within the calculation period.

- **First**

Returns the first value within the calculation period.

- **Last**

Returns the last value within the calculation period.

4.3 Setting parameters

- **Counter**
Returns the summed value changes of numeric values within the calculation period.
With an up counter, only positive value changes are summed. Negative value changes are interpreted as a counter reset.
In the case of a down counter, positive and negative value changes are summed.
More precise settings can be made at the variable via the counter settings.
- **Step duration**
Indicates how long the variable has a value and is thus not equal to 0 (NULL).
Time that the variable actively supplies values.
- **Timer**
Returns the time during which a value was not "false" (FALSE, NULL or empty string).
- **Time weighted average**
Returns the time-weighted average of numeric values for the calculation period.
The values are weighted differently, depending on how long they have been present. The longer a value was present, the more it is weighted.
- **Standard deviation**
Returns the standard deviation of numeric values within the calculation period.
- **Variance**
Returns the variance of numeric values within the calculation period.
- **ValueChanges**
Indicates the updated value, if it has changed
- **Gantt**
Indicates how long a value was valid, for example, how long a machine was in a certain state.

4.3.10.2 Aggregation functions in combination with the "The value is aggregated" function:

Description

For each variable and thus for each aggregation function, you can activate the "The value is aggregated" function:

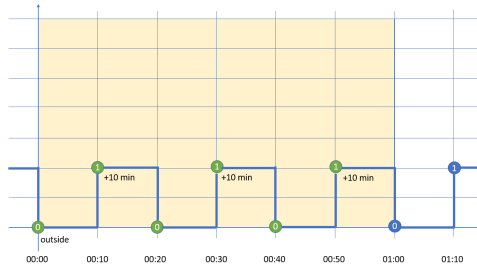
"The value is aggregated" = not activated	"The value is aggregated" = activated
If the "The value is aggregated" function is not activated, actual values are transferred to the platform every 10 minutes, for example. The respective actual value is valid for 10 minutes, until the next actual value is transferred to the platform. If the time of the last reading operation is identical to the end of the specified time period, the last value is not read.	When the "The value is aggregated" function is activated, no actual values are transferred. Instead, the value that has already been calculated or processed in the last 10 minutes is transferred to the platform. Application example: One temperature measured value is recorded in the plant per minute, and an average value of the recorded values is then transferred to the platform every 10 minutes.
Result: Different results are calculated for the same time range, depending on the initial situation of how you want to collect data. Only the values marked in green are taken into account for the calculation of the result.	

"Counter" aggregation function

"The value is aggregated" = not activated	"The value is aggregated" = activated
<p>Calculation example: The calculation period is from 00:10 to 00:50. Result: 1 + 1 + 1 + 1 = 4</p>	<p>Calculation example: The calculation period is from 00:10 to 00:50. Result: 1 + 1 + 1 + 1 = 4</p>

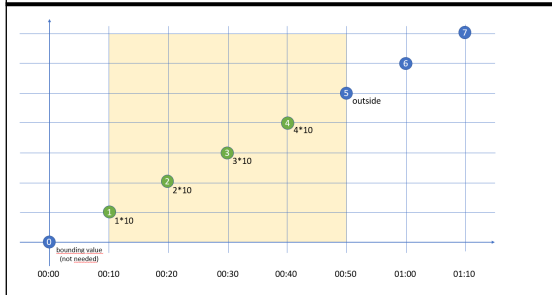
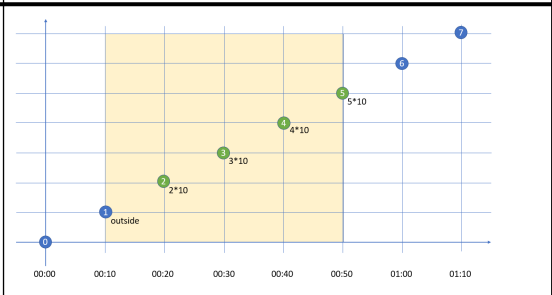
"Timer" aggregation function

The timer calculates the time period in which the variable was not "0". Unit = milliseconds.
 For the timer, the "The value is aggregated" function is always = FALSE.

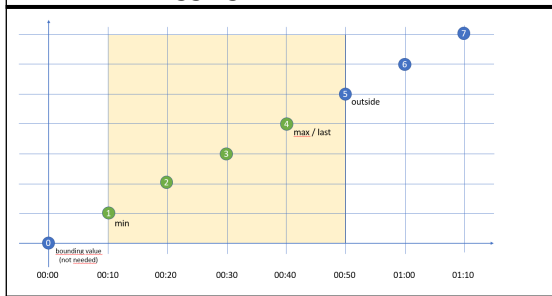
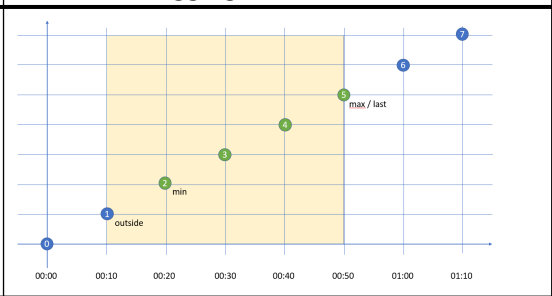


Calculation example:
 The calculation period is from 00:00 to 01:00.
 Result: 10 min + 10 min + 10 min = 30 min => 30 * 60 * 1000 ms => 1,800,000 ms

"Average" aggregation function

"The value is aggregated" = not activated	"The value is aggregated" = activated
	
<p>Calculation example: The calculation period is from 00:10 to 00:50. $(10 + 20 + 30 + 40) / 40 = 2.5$ (average value across the calculation period)</p>	<p>Calculation example: The calculation period is from 00:10 to 00:50. $(20 + 30 + 40 + 50) / 40 = 3.5$ (average value across the calculation period)</p>
<p>The aggregation function determines the weighted average depending on the time interval (every 10 minutes). If the time interval changes within a time period, e.g. from 10 minutes to 12 minutes, the values with the time interval 10 minutes are first added together, and then divided by the number of read values. The values with the time interval 12 minutes are then added together, and divided by the number of values read. The weighted average is formed from the two results of the two time intervals $(result1 + result2)/2=x$.</p>	

"Min", "Max" and "Last" aggregation functions

"The value is aggregated" = not activated	"The value is aggregated" = activated
	
<p>Calculation example: The calculation period is from 00:10 to 00:50. Min: 1 Max: 4 Load: 4</p>	<p>Calculation example: The calculation period is from 00:10 to 00:50. Min: 2 Max: 5 Load: 5</p>

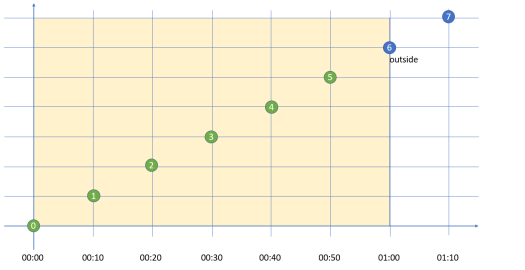
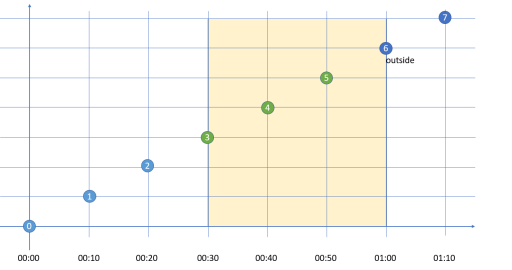
"Sum" aggregation function

"The value is aggregated" = not activated	"The value is aggregated" = activated
<p>Calculation example: The calculation period is from 00:10 to 00:50. $1 + 2 + 3 + 4 = 10$</p>	<p>Calculation example: The calculation period is from 00:10 to 00:50. $2 + 3 + 4 + 5 = 14$</p>

"AmountToFlow" aggregation function

"The value is aggregated" = not activated	"The value is aggregated" = activated
<p>Calculation example: The calculation period is from 00:00 to 01:00. Sum: $0 + 1 + 2 + 3 + 4 + 5 = 15$ AmountToFlow: Sum / time in hours = $15 / 1 = 15$</p>	<p>Calculation example: The calculation period is from 00:00 to 01:00. Sum: $1 + 2 + 3 + 4 + 5 + 6 = 21$ AmountToFlow: Sum / time in hours = $21 / 1 = 21$</p>

"EnergyToPower" aggregation function

"The value is aggregated" = not activated	"The value is aggregated" = activated
	
<p>Calculation example: The calculation period is from 00:00 to 01:00. Sum: 0 + 1 + 2 + 3 + 4 + 5 = 15 AmountToFlow: Sum / time in hours = 15 / 1 = 15</p>	<p>Calculation example: The calculation period is from 00:30 to 01:00. Sum: 3 + 4 + 5 = 12 AmountToFlow: Sum / time in hours = 12 / 0.5 = 24</p>

Example of process tags of BOOL data type

This example only applies when the "The value is aggregated" function is not activated:

- Only the values = "1" are added.
- Time intervals are only recorded when the new value = "1" (Timer).
- One value is read every 10 minutes between 10:00 a.m. and 11:00 a.m., i.e. six in total. One value is read every 12 minutes between 11:00 a.m. and 12:00 noon, i.e. five in total. Because the last reading operation takes place at 12:00 noon and the evaluation period also ends at 12:00 noon, the last value is not read. To evaluate the last value at 12:00 noon, you must set the end of the evaluation period to at least 12:01 p.m.

Time	Sum (BOOL)	INT	Timer (BOOL)	In minutes
10:00	1	1	1	+ 10
10:10	1	2	1	+ 10
10:20	1	3	1	+ 10
10:30	1	4	1	+ 10
10:40	1	1	1	+ 10
10:50	1	2	1	+ 10
11:00	0	0	0	
11:12	1	3	1	+ 12
11:24	1	4	1	+ 12
11:36	1	5	1	+ 12
11:48	1	2	1	+ 12
12:00	1	0	1	+ 12
Result	10	27		108 (1 h 48 min)
Aggregation function	Sum	Sum	Timer	Timer

Evaluation:

- The "Sum" aggregation function returns the result = 10
All values = "1" between 10:00 a.m. and 11:48 a.m. are added.
- The "Timer" aggregation function returns the result = 108 minutes (1 h 48 min)
The sum of all time intervals with the state "1" is recorded. The value "1" is read six times between 10:00 and 10:50, with 10-minute intervals between each read. This results in a sum of 60 minutes. No value is read at 11:00. The value "1" is read four times between 11:12 and 12:00. The time interval is 12 minutes each. This results in a sum of 48 minutes. The total is a sum of 108 minutes or 1 hour 48 minutes or 6,480,000 milliseconds.

Operation

5.1 Presenting the productivity of a plant transparently (OEE analysis)

5.1.1 Overview of the overall equipment effectiveness (OEE)

Description

With the key performance indicator of the overall equipment effectiveness (Overall Equipment Effectiveness OEE) you calculate the productivity of a plant or its losses.

You use the automatically generated OEE dashboard to display it transparently. The overall equipment effectiveness is a measure of the added value of a system.

The overall equipment effectiveness is defined as the product of the following three factors:

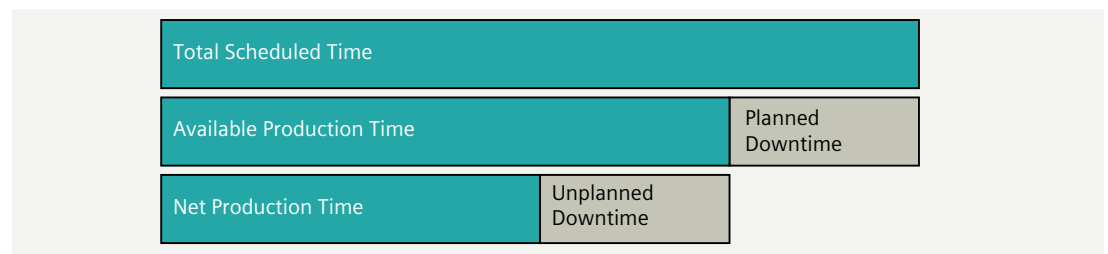
- Availability (e.g. whether there are fault times)
- Performance (e.g. whether the system is running at full load or reduced load)
- Quality (e.g. how many rejects are produced)

The range of value is between 0% and 100%.

Time model as extension of a plant status model

The time categories form the basis for the pre-defined time model. The corresponding time category can be assigned in the status mapping table. Thus, for each machine status, the time category to which the machine status belongs is defined.

In order to calculate the key performance indicators for the overall equipment effectiveness, the following time categories are available:

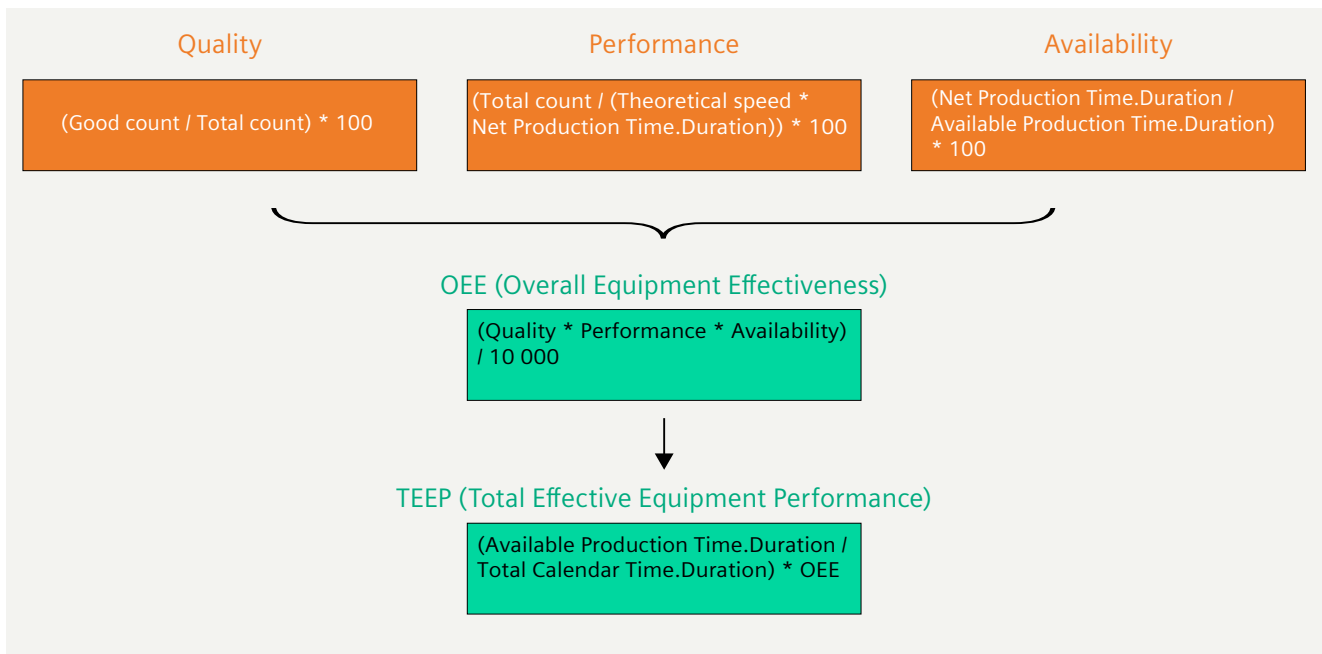


5.1 Presenting the productivity of a plant transparently (OEE analysis)

- Total Scheduled Time
The total number of hours available, for example, 1 week = 168 hours
- Available Production Time
The total number of hours available minus the planned downtimes, such as breaks => 168 hours - 21 hours = 147 hours
- Net Production Time
The number of hours available after subtracting the planned downtimes minus the unplanned downtimes, such as malfunctions => 147 - (1.5 * 7) = 136.5 hours
- Planned Downtime
Planned downtimes, for example, for maintenance
- Unplanned Downtime
Unplanned downtimes, for example, due to damage or lack of resources

OEE key performance indicators

The figure below shows the structure of the key performance indicators in order to ultimately obtain a meaningful figure for the productivity of the plant:



The predefined key performance indicators (KPI types **OEE**) are available in Performance Insight to determine the productivity of the plant. You can edit the KPI types later.

Micro-stops

The display of very short production interruptions makes the OEE analysis unclear and may skew the calculated KPIs. For example, it may be unavoidable that a machine stops for an insignificant period of time because material is not immediately available. It is usually not desirable for such micro-stops to be included in the analysis.

When configuring an OEE dashboard, you define the basis on which a micro-stop is detected:

- Transmitted from the controller via a variable
- Defined in milliseconds as fixed period

The configuration for micro-stops applies to an asset. A micro-stop threshold or a parameter can be defined per asset.

Downtimes detected as micro-stops are filtered out of the analysis and do not influence the calculation of the KPIs.

The dashboard displays how many micro-stops were detected and how long they lasted in total.

If you change the basis for the micro-stop (fixed period) in the OEE configuration, the KPIs are recalculated and updated.

5.1.2 Creating an OEE dashboard

Description

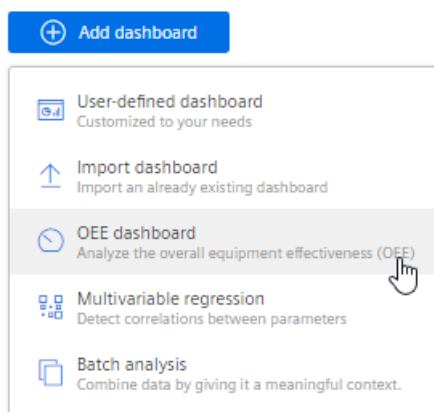
You can create an OEE dashboard for each asset. The dashboard is created automatically on the basis of the settings made by you.

With the configuration, several OEE KPIs are generated and displayed in the OEE dashboard.

Procedure

To create an OEE dashboard, follow these steps:

1. Select an asset in My Plant.
2. Click "Add dashboard".



5.1 Presenting the productivity of a plant transparently (OEE analysis)

3. Select "OEE dashboard".
The "OEE settings" view is displayed.

1. Select a parameter representing the machine status and the corresponding status assignment.

<p>Machine status variable *</p> <div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-bottom: 5px;">Find parameter</div> <p style="font-size: small; margin-top: 5px;">Variable indicating the error status</p>	<p>Status assignment *</p> <div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-bottom: 5px;">Select status mapping v</div> <p style="font-size: small; margin-top: 5px;">Representing the status mapping for your machine status</p>
---	--

2. Optional: Select a parameter representing the error status and the corresponding status assignment.

<p>Error status variable</p> <div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-bottom: 5px;">Find parameter</div> <p style="font-size: small; margin-top: 5px;">Representing the variable of your error status</p>	<p>Status assignment</p> <div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-bottom: 5px;">Select status mapping v x</div> <p style="font-size: small; margin-top: 5px;">Status assignment indicating the error status</p>
---	---

3. Optional: Configure microstops.

Configure microstops by selecting a parameter (containing the number of microstops) or by assigning a fixed value. If you assign a fixed value (in milliseconds), microstops are filtered out when displaying the machine status and when calculating OEE KPIs.

Find parameter

or

1000

ms
x

4. To continue, link each operand to a variable.

TotalCount	⇌	<div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-right: 5px;">Find parameter</div> or <div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-right: 5px;">Define static value</div> x
TheoreticalSpeed	⇌	<div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-right: 5px;">Find parameter</div> or <div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-right: 5px;">Define static value</div> <div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-right: 5px;">pcs/s</div> v x
GoodCount	⇌	<div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-right: 5px;">Find parameter</div> or <div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-right: 5px;">Define static value</div> x

4. Select a variable representing the machine status and an associated status mapping.
5. Optional, if you want the dashboard to display the error analysis:
Select a variable that represents the error status and an associated status mapping.
You assign an understandable text to a numerical error code this way.
6. Optional:
Configure micro-stops.
 - Select a parameter and an aggregation function.
 - or -
 - Enter a fixed value.
7. Link each operand to a variable.
8. Select the aggregation function for each variable.
9. Adapt the period that is displayed.
10. Click "Save".

Result

An OEE dashboard with the OEE analysis is automatically created.

In the parameter list, all KPI instances created automatically for the OEE analysis are displayed:

< Back + Create new KPI instance

Parameter

All VAR KPI

TYPE	NAME	DATA TYPE	UNIT	NOTIFICATIONS ACTIVATED
KPI OEE	Availability	Double	%	...
KPI OEE	Performance	Double	%	...
KPI OEE	Quality	Double	%	...
KPI OEE	OEE	Double	%	...

Editing OEE settings

If you have already created an OEE dashboard for an asset, you can edit the setting.

1. Select an asset in My Plant.
2. Select the OEE dashboard.
3. In the dashboard, click
4. In the drop-down menu, select "Edit dashboard".
The dashboard editor is displayed.
5. Adjust the settings and click "Save".

See also

Finding the analysis quickly (Page 163)

Aggregation functions (Page 66)

5.1.3 OEE analysis

5.1.3.1 Displaying the OEE dashboard

Description

The OEE dashboard is created automatically. An analysis is also automatically created for available sub-assets.

The OEE dashboard offers the following possibilities:

- Quick overview of KPIs and machine status
- Detail view for KPIs and machine status
- Error analysis: Overview of the most common causes of production interruptions
- Adjustable displayed period
- Exporting data
- Access to the OEE settings
- Display errors that occurred during analysis.

You cannot change the layout of the dashboard.


Note

Automatic update

If the selected period for the dashboard or one of the widgets is in the future, the dashboard automatically updates every 30 seconds.

Procedure

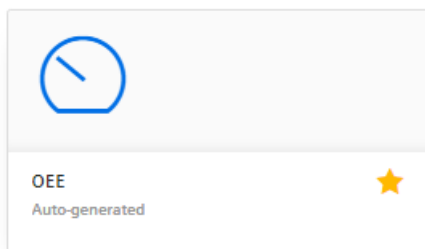
To display the OEE analysis, proceed as follows:

1. Select "Analysis > OEE" in the navigation bar.
The preview of the available OEE dashboards is displayed.
 - To find a dashboard quickly, use the search function.
 - To see the best values of a KPI quickly, use the sort function.
2. To display a dashboard, click .

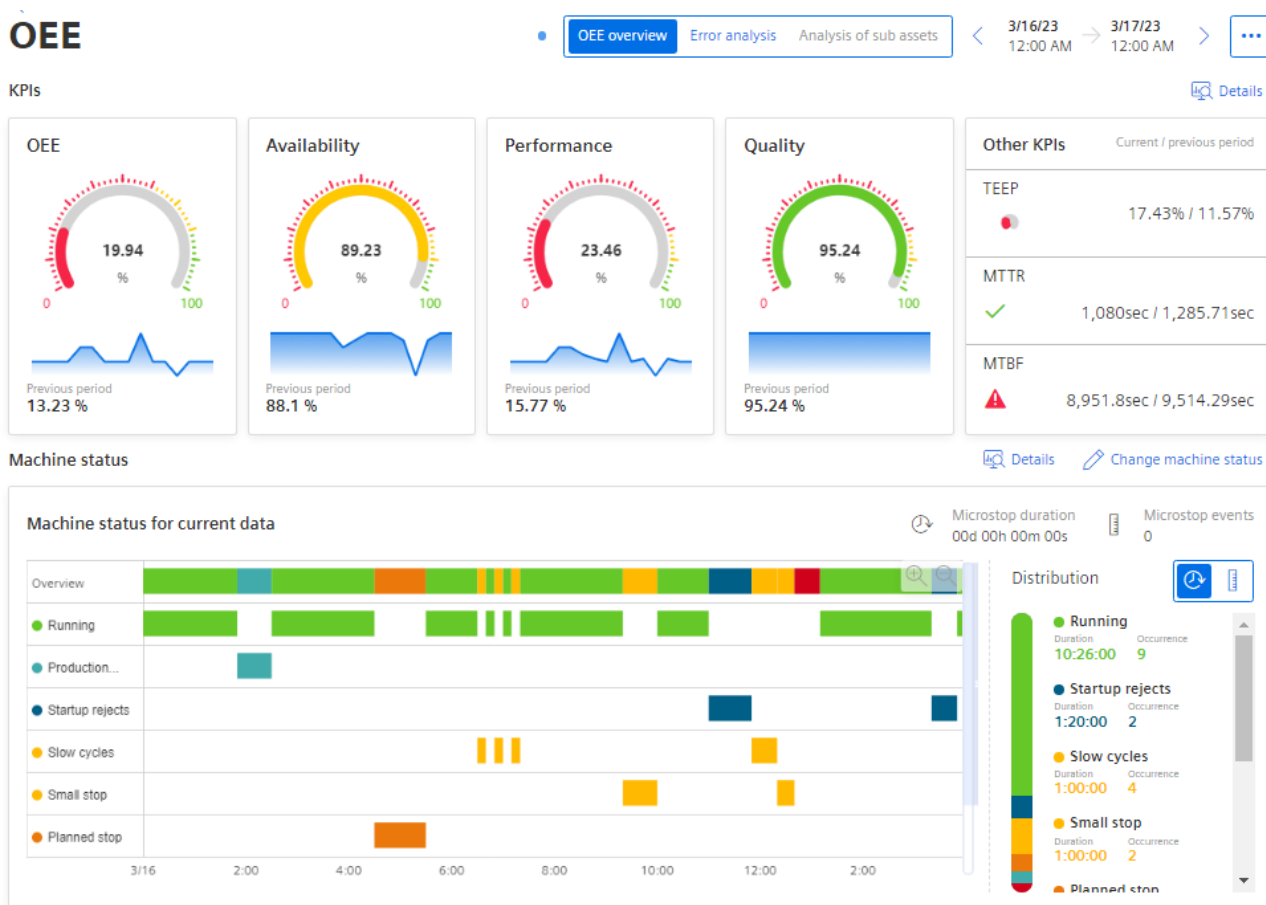
5.1 Presenting the productivity of a plant transparently (OEE analysis)

- or -

1. Select an asset in My Plant.
An overview of the dashboards available on the asset is displayed.
2. Click "OEE dashboard".



The dashboard shows the KPIs of the asset.



The colors of the pie charts indicate whether limits have been exceeded:

- Green: Value within limits
- Yellow: Value within the warning limits

5.1 Presenting the productivity of a plant transparently (OEE analysis)

- Red: Value within the alarm limits
- Blue: No limits have been specified.

The limits are pre-defined but can be adjusted for each KPI. You can find information on limits here: "Activate notifications" for variables with numerical data type and KPI instances (Page 60)


In the "Other KPIs" area, you can see the values of the TEEP, MTTR, and MTBF KPIs. As soon as limit values have been defined for the KPIs MTTR and MTBF, the symbols for warning or alarm are displayed accordingly when they are violated.

In the "Machine status for current data" view, the Gantt widget displays an overview of each machine status and a summary. Only the variables that have a value are displayed.

You can find more information on the OEE KPIs here: Overview of the overall equipment effectiveness (OEE) (Page 75).

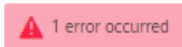
You can find more information on the detailed views of the KPIs here: KPIs (Page 83).

For more information about the detail views of the Gantt widget, see: Machine status (Page 85).

1. To visualize the interaction of the KPIs in a diagram, click "Details".
2. To change the machine status for a timestamp, click "Change machine status".
The table view (Page 87) of the machine status is displayed. Here, you have the option to change an individual status.
3. To display the settings for the OEE analysis and edit them, click .

Finding errors of the analysis

If the analysis cannot be executed fully because the configuration is faulty or no data values are available, a button is displayed indicating this.



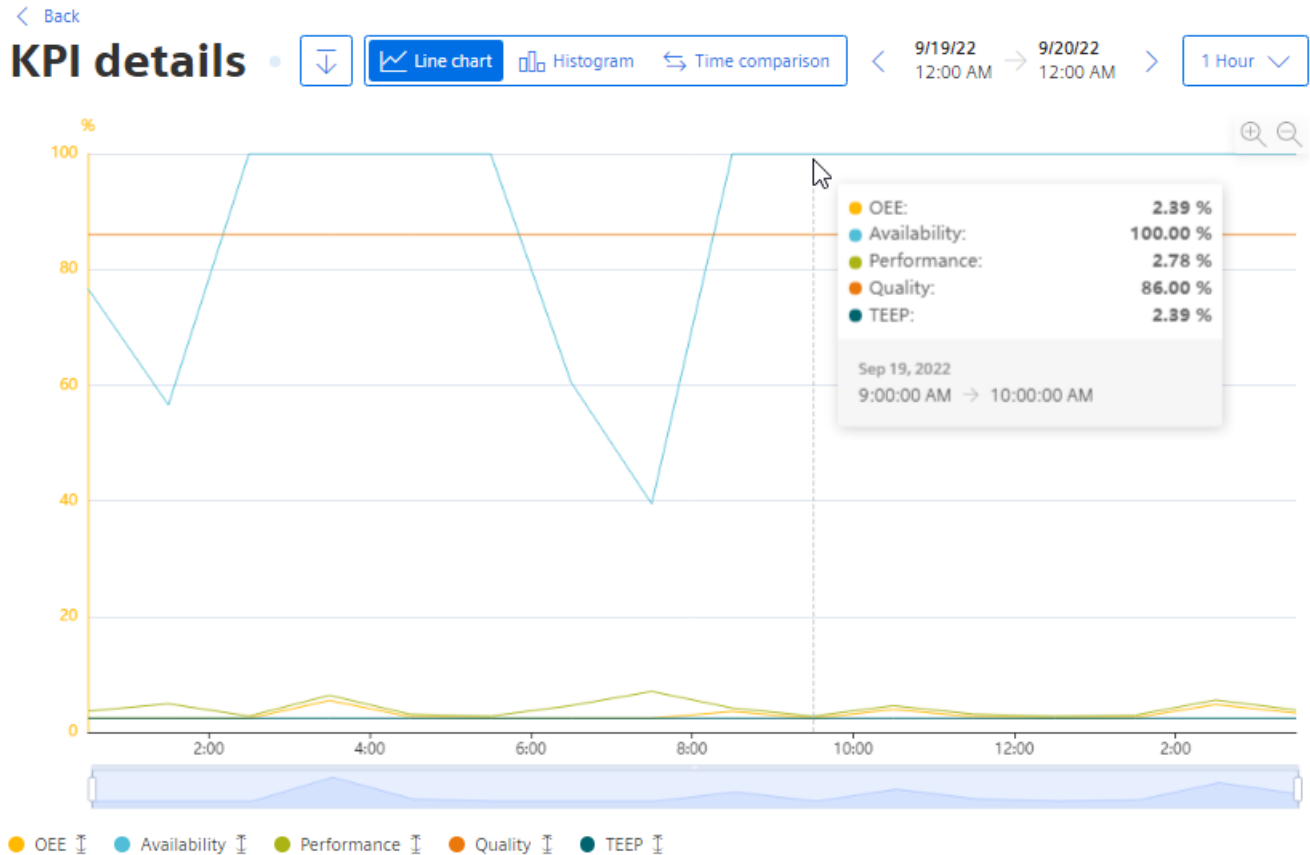
1. To view details on the errors, click the button.
The information panel on the right side lists details about the errors found.
2. To hide the display of an error, mark it as "Read".

5.1.3.2 KPIs


Detail view

Description

To open the detail view, click  in the OEE analysis.




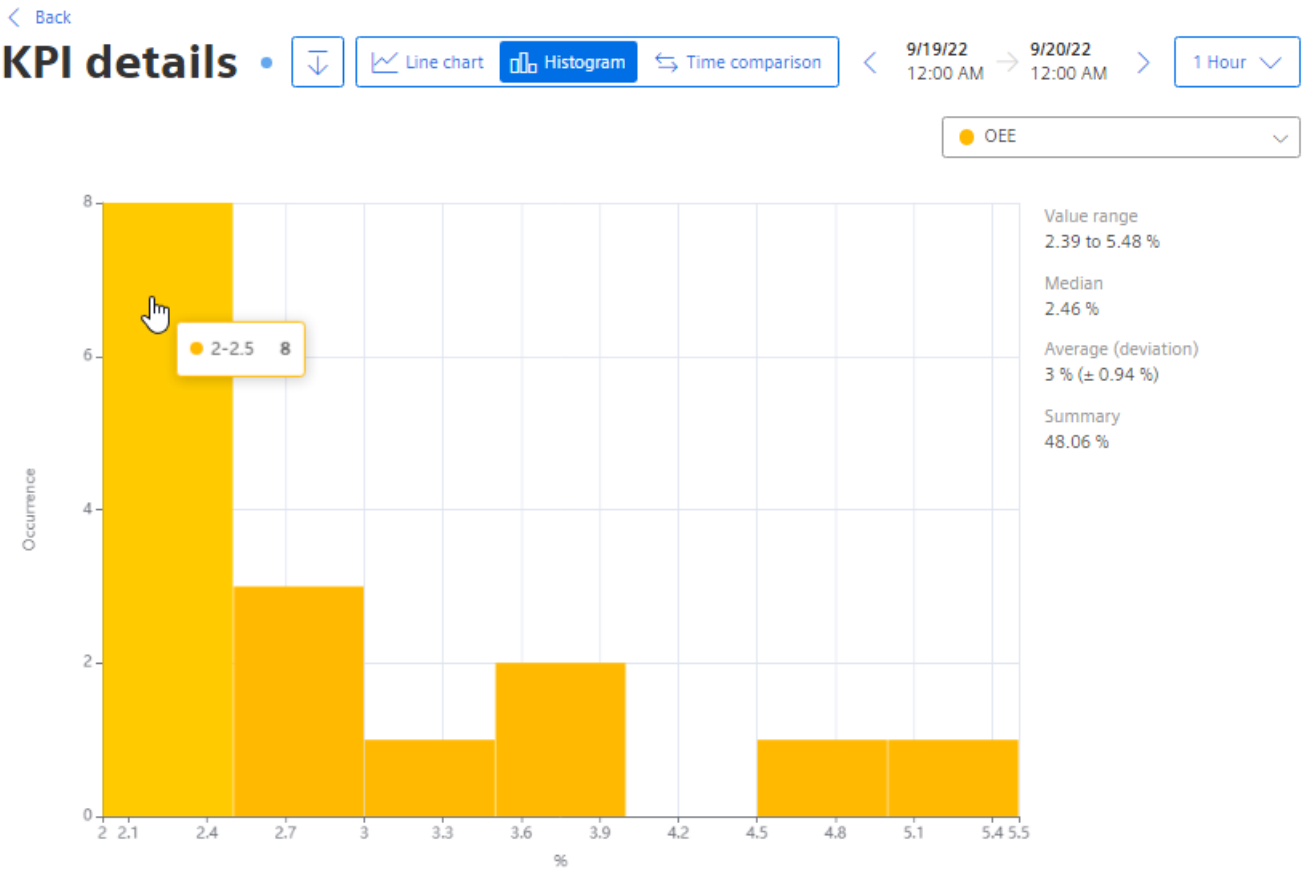
All KPIs are displayed as a diagram in the detail view.

- To show or hide a KPI, click the KPI.
The scaling of the y axis adapts automatically.
- To display detailed information as a tooltip, move the mouse pointer over the diagram.
- To show or hide the limit values for a KPI, click .
- To switch to a different view, select "Histogram (Page 84)" or "Time comparison (Page 84)".

Histogram

Description


1. Click  "Details" In the OEE analysis. The "Diagram" view is displayed.
2. Select "Histogram" as the view.
3. Select the KPI for which the histogram is displayed.



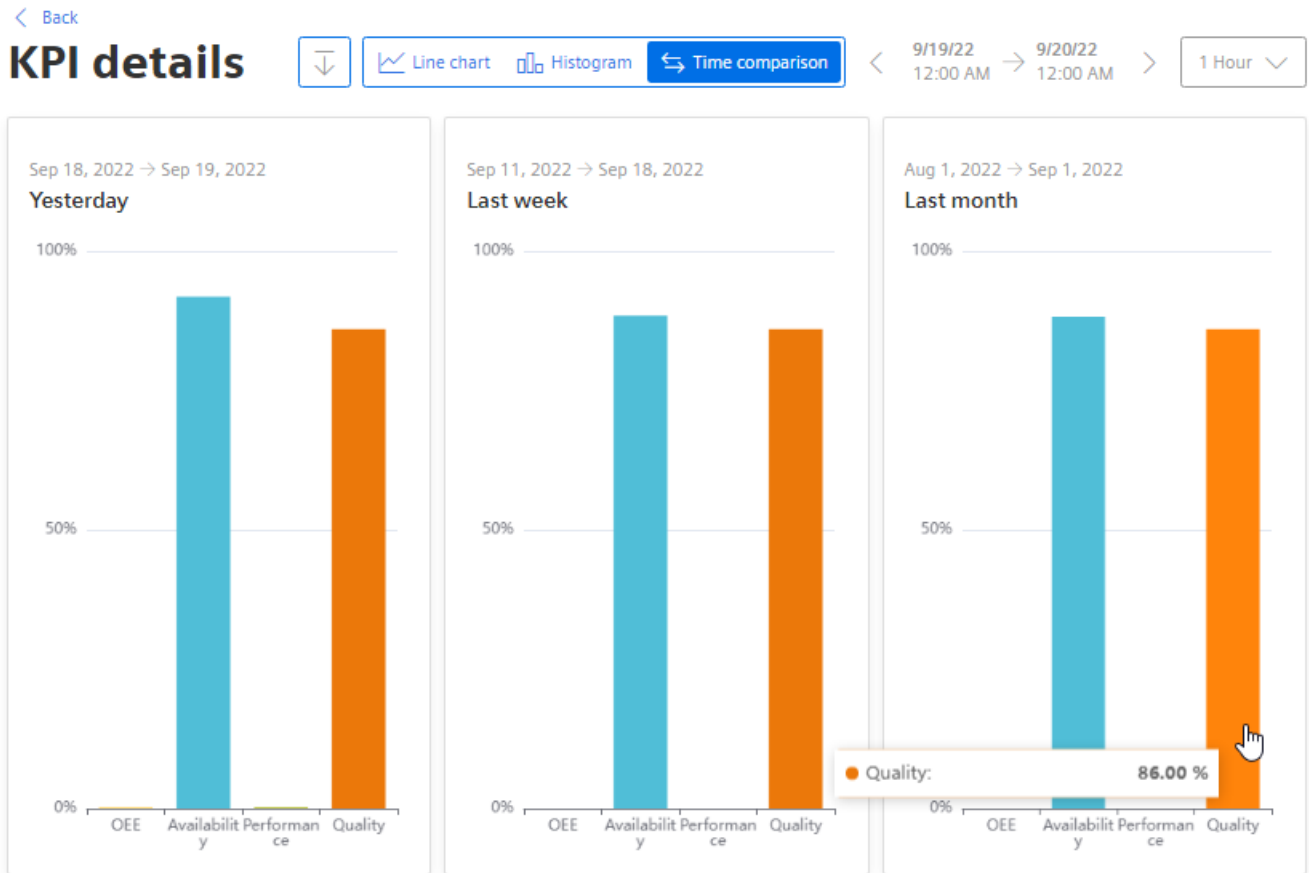
The histogram shows the history of the frequency distribution.

Time comparison

Description

1. Click  "Details" In the OEE analysis. The "Diagram" view is displayed.
2. Select "Time comparison" as the view. The KPIs OEE, Availability, Performance and Quality are displayed for different past periods as a bar graph.

5.1 Presenting the productivity of a plant transparently (OEE analysis)




To see the exact value of a KPI, move the cursor over one of the bars.

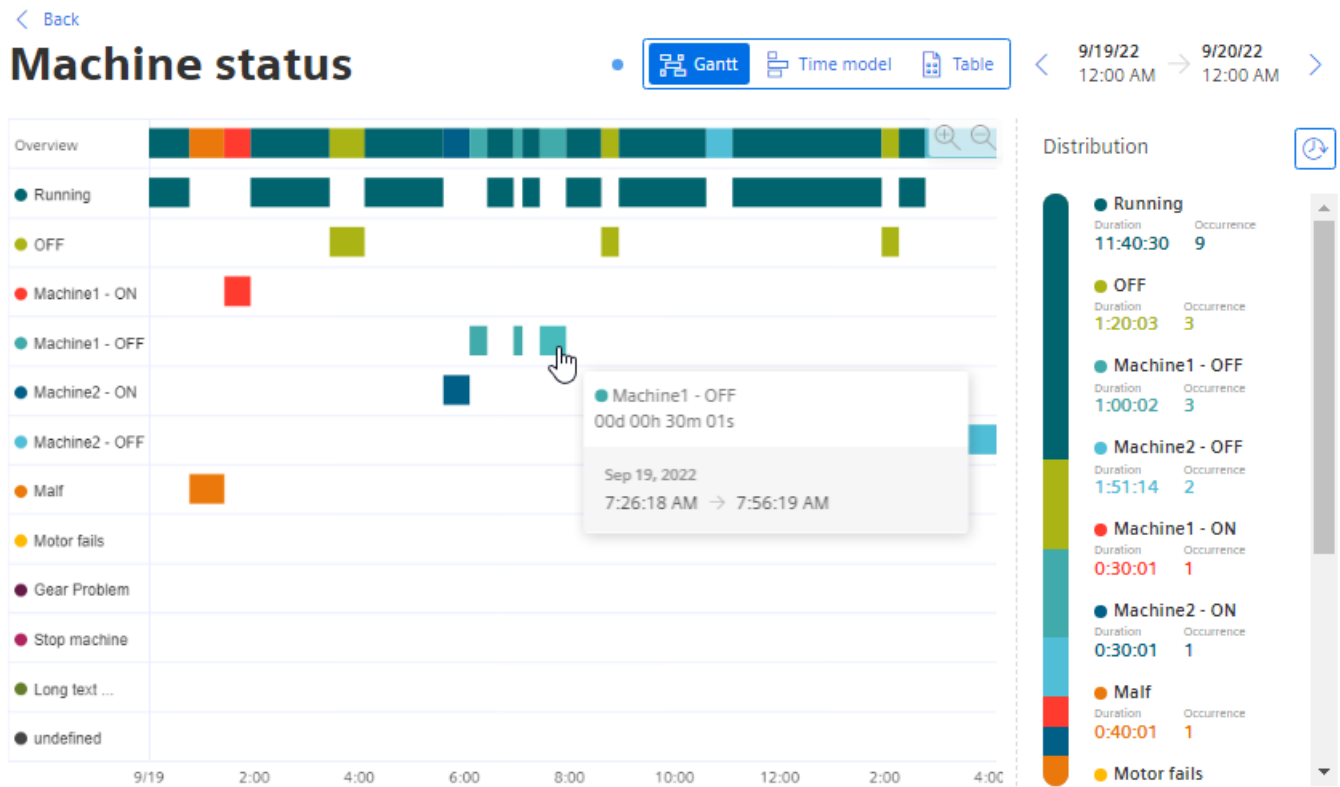
5.1.3.3 Machine status

Detail view

Description

1. Click  "Details" in the OEE analysis at the widget "Machine status". The "Gantt" view is displayed. The widget shows the status of several parameters at a glance using different color codes. For example, the status can represent the current state or the state within a specific time range.

5.1 Presenting the productivity of a plant transparently (OEE analysis)



To see the exact value of a KPI, move the cursor over one of the bars. Only the parameters that have a value are displayed.

Distribution

- shows the distribution by number of the respective machine state.
- shows the distribution by duration.

Time model

Description

- Click "Details" in the OEE analysis at the widget "Machine status". The "Gantt" view is displayed.
- Select the "Time model" view. The view shows an overview of the time categories used, such as the total calendar time, the shares of planned and unplanned downtime, etc.

5.1 Presenting the productivity of a plant transparently (OEE analysis)

[Back](#)

Machine status

Gantt
Time model
Table
< 9/19/22 12:00 AM
9/20/22 12:00 AM >


Total Calendar Time	00d 16h 12m 50s	<div style="width: 100%;"><div style="width: 100%;"></div></div> 100%
Planned Downtime	00d 02h 20m 05s	<div style="width: 14.4%;"><div style="width: 14.4%;"></div></div> 14.4%
Available Production Time	00d 13h 52m 44s	<div style="width: 85.6%;"><div style="width: 85.6%;"></div></div> 85.6%
Unplanned Downtime	00d 01h 40m 04s	<div style="width: 10.29%;"><div style="width: 10.29%;"></div></div> 10.29%
Net Production Time	00d 12h 12m 40s	<div style="width: 75.31%;"><div style="width: 75.31%;"></div></div> 75.31%
Quality Loss	00d 01h 42m 34s	<div style="width: 10.54%;"><div style="width: 10.54%;"></div></div> 10.54%
Used Production Time	00d 10h 30m 05s	<div style="width: 64.77%;"><div style="width: 64.77%;"></div></div> 64.77%

The quality loss is calculated based on the quality rate.

Example: If the net production time is 60% and the quality rate is 90%, then the quality loss is $60 * (1 - 0.9) = 5.4\%$.

Table

Description

1. Click  "Details" in the OEE analysis at the widget "Machine status".
The "Gantt" view is displayed.
2. Select the "Table" view.
The view shows a tabular overview of the machine states in the displayed period.

5.1 Presenting the productivity of a plant transparently (OEE analysis)

< Back

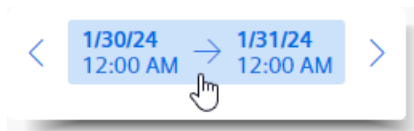
Machine status

Gantt Time model **Table** < 9/19/22 12:00 AM → 9/20/22 12:00 AM >

Search...

TIMESTAMP ↓	MANY STATUS
9/19/22, 7:56 AM	Running
9/19/22, 7:26 AM	Machine1 - OFF
9/19/22, 7:06 AM	Running
9/19/22, 6:56 AM	Machine1 - OFF
9/19/22, 6:26 AM	Running
9/19/22, 6:06 AM	Machine1 - OFF
9/19/22, 5:36 AM	Machine2 - ON
9/19/22, 4:06 AM	Running
9/19/22, 3:26 AM	OFF
9/19/22, 1:56 AM	Running
9/19/22, 1:26 AM	Machine1 - ON
9/19/22, 12:46 AM	Malfunction
9/18/22, 10:35 PM	Running

1. To display the analysis for a different time period, use the operator controls to navigate in time.



2. To filter the display, enter a string in the search field. All machine states for which a cell contains the character string are displayed. Example: They only show the machine state "Stopped".
3. To sort the table, click in a column header.

You can change a specification of the machine state by clicking on the entry.


Change machine status

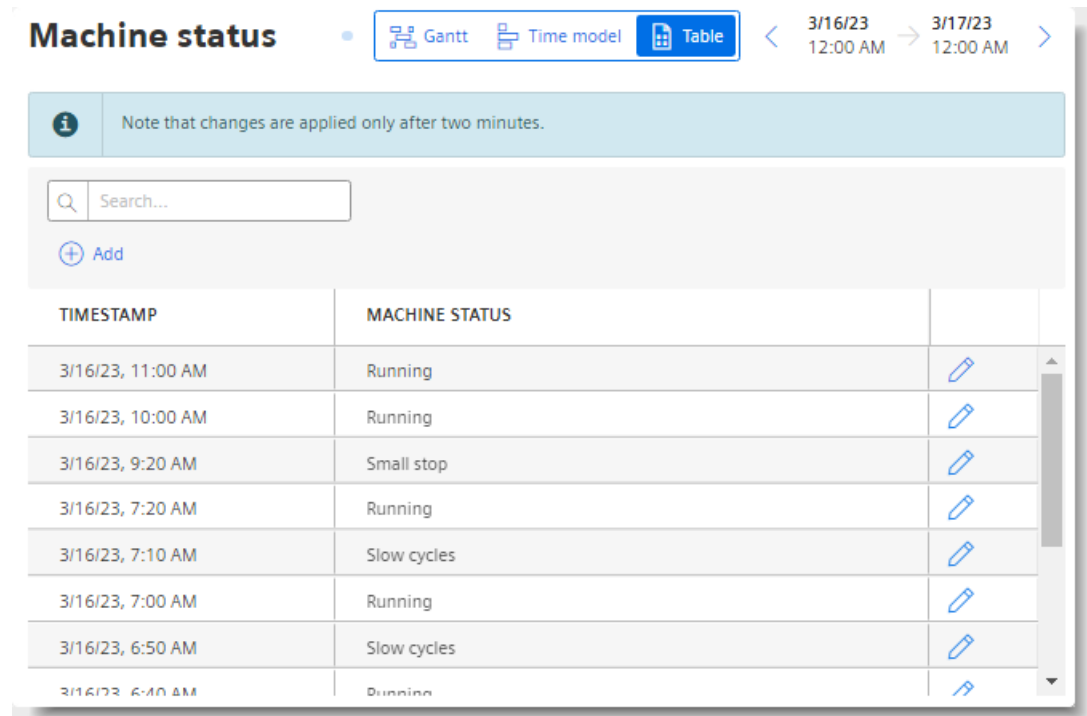
The displayed machine status can be changed. This is useful or necessary if the machine status has not been recognized correctly. This can be caused by an incorrect transfer of parameter values or a configuration that needs to be adapted.




A changed machine status is used for the correct OEE analysis.


Procedure


To change the displayed machine status, follow these steps:









1. Display an automatically generated OEE dashboard.
2. Click "Change machine status" above the Gantt chart for the machine status. The "Table" view of the machine status is displayed.
3. In the line of a machine status, click .
4. Select a machine status in the drop-down menu of the line.



Machine status •  Gantt  Time model  Table < 3/16/23 12:00 AM → 3/17/23 12:00 AM >


 Note that changes are applied only after two minutes.

 Add

TIMESTAMP	MACHINE STATUS	
3/16/23, 11:00 AM	Running	
3/16/23, 10:00 AM	Running	
3/16/23, 9:20 AM	Small stop	
3/16/23, 7:20 AM	Running	
3/16/23, 7:10 AM	Slow cycles	
3/16/23, 7:00 AM	Running	
3/16/23, 6:50 AM	Slow cycles	
3/16/23, 6:40 AM	Running	

5. To save the change, click on the three dots ().

Insert machine status

1. To insert a period in the history, click  "Add". The "Insert entry" dialog is displayed.
2. Select the time stamp and the machine status.
3. Click "Save". A new time stamp with the selected machine status is inserted.

5.1.3.4 Showing error analysis

Description

The "Error analysis" view shows the most frequently occurring errors and the error distribution.

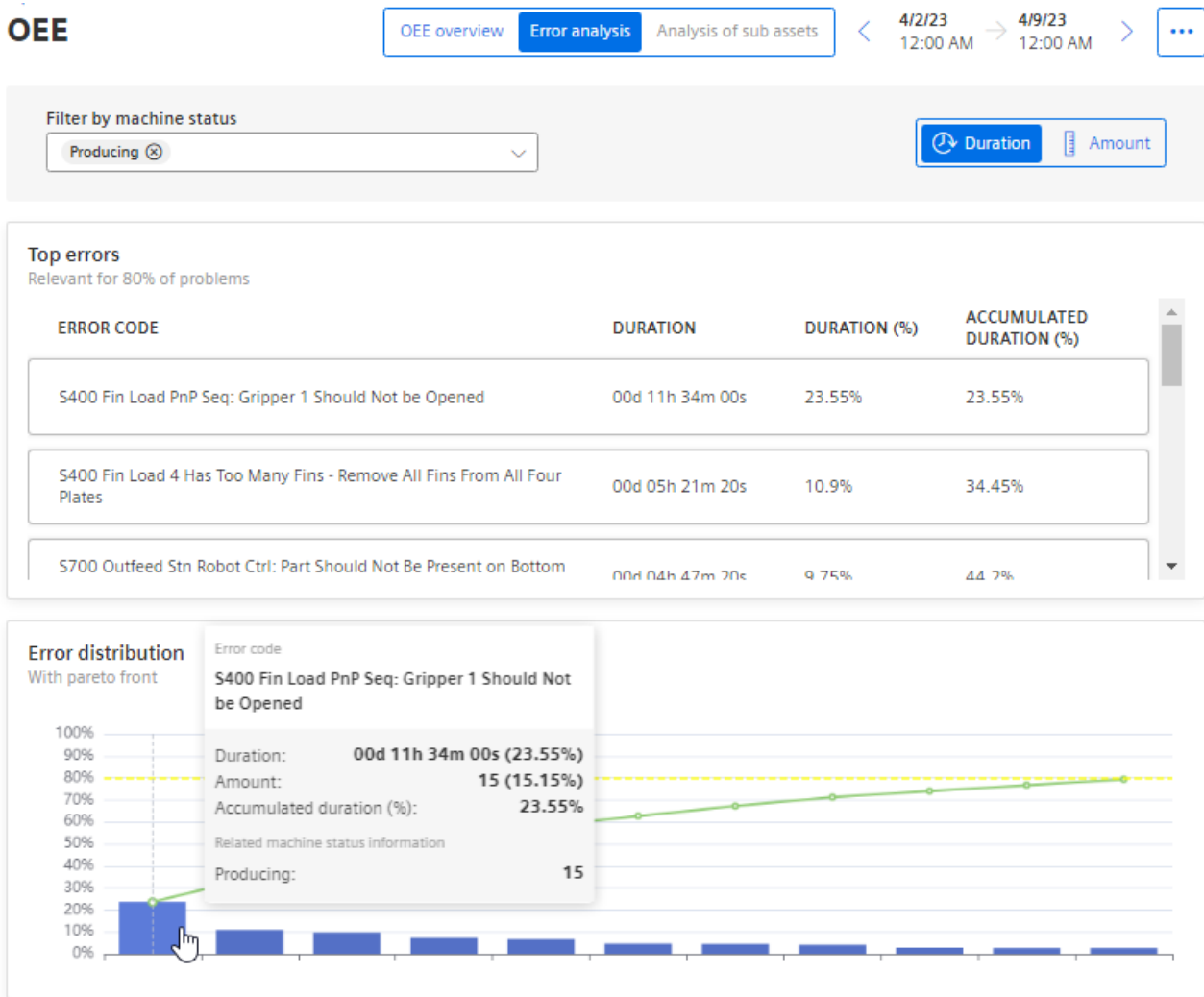
Requirement

Note

Configuration required

Error analysis is available if a variable representing the error status and an associated status mapping are selected in the optional 2nd step in the OEE settings.

Procedure



1. Select the "Error analysis" view on the OEE dashboard.
2. Click the entry for the error to view details of an error.
3. Use the filter function to filter the display according to machine status. Only the faults that occurred when the machine was in one of the selected states are displayed.

5.1.3.5 Analyzing sub assets

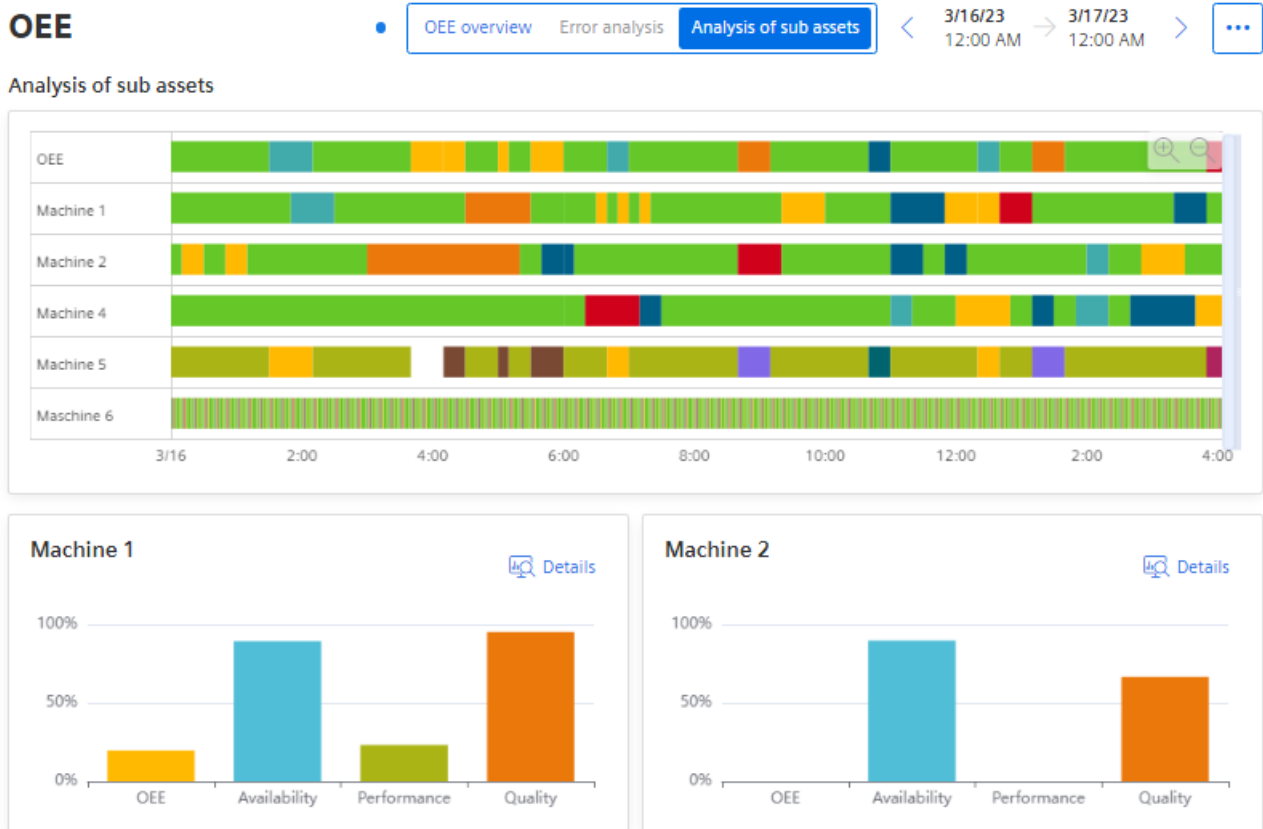
Description

The "Analysis of the sub assets" view shows all OEE KPIs of the sub assets for each asset for which an OEE configuration has already been created.

The Gantt widget shows an overview of the complete line, as well as an overview for each sub asset.

Procedure

1. On the OEE dashboard, select the "Analysis of sub assets" view.



When an OEE configuration has been created on one of the sub assets, a separate OEE analysis is displayed.

2. For more information, click in the display for the sub asset on "Details".

5.1.4 Deleting an OEE dashboard


To delete an OEE dashboard, the configuration for the dashboard must be deleted.

5.2 Configuring a step time analysis

If you delete an OEE dashboard, the automatically generated KPI instances are deleted as well.

Procedure

To delete an OEE dashboard, follow these steps:

1. Display the configuration for the OEE dashboard.
More information: [Creating an OEE dashboard \(Page 77\)](#).
2. Click  "Delete".

Result

The OEE dashboard and the configuration have been deleted.

KPIs that were automatically created along with the dashboard are deleted.

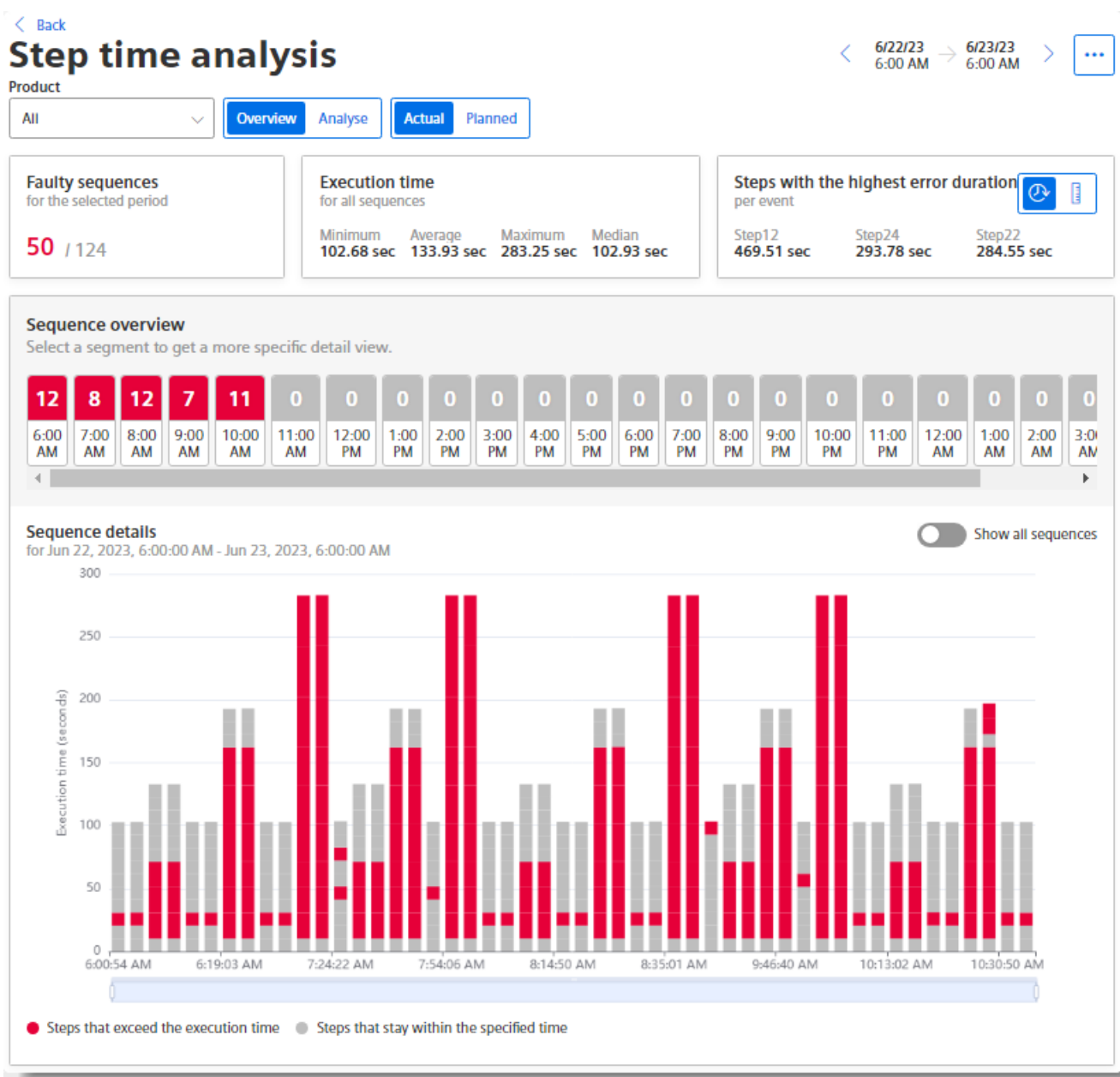
5.2 Configuring a step time analysis

5.2.1 Overview

Description

The step time analysis provides information on the duration of defined steps and the observation of limit values of individual steps and sequences. With the help of the step time analysis, you can quickly find time outliers and thus determine and visualize delays in the production chain.

A predefined dashboard for step time analysis is available. The data for the step time analysis can be taken from the controller via the Asset Manager. The asset model is defined in the Asset Manager and an asset is created for each sequence. The user can configure the sequence via predefined aspects and link the variables to the corresponding S7 variables. In addition to the variables with the information as to whether the respective step is active, a variable with the product information can be assigned.



Steps in the step time analysis

Steps are created for an asset as aspects in the Asset Manager and automatically applied in Performance Insight. For each step, you then define limits under "Step time analysis settings". If these limits are exceeded, the step is evaluated as faulty and marked red in the graphical display. This can be defined for a product or independent of the product.

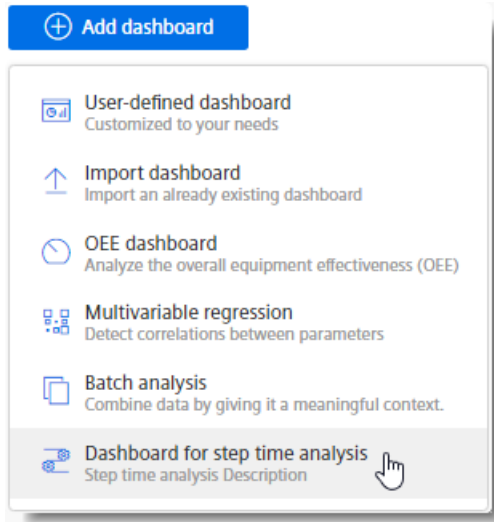
Sequences in the step time analysis

A sequence is a run through all steps.

Process flow

To use the step time analysis efficiently, follow these steps:

1. Create the respective steps for the asset in the Asset Manager.
2. Add a dashboard for the step time analysis.



Note

If steps have not yet been defined for the selected asset, a dialog with information on configuring the step time analysis is displayed. An unconfigured dashboard is created.

3. Define the limits for the created steps under "Step time analysis settings" in Performance Insight.
4. The data is displayed in the predefined dashboard.

5.2.2 Defining limits


Description

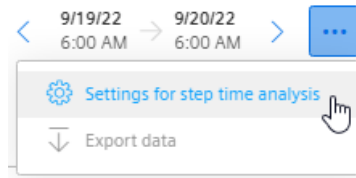
Under "Step time analysis settings", define limits for each step. When a limit is exceeded, the step is evaluated as faulty in the step time analysis and displayed as such in the dashboard.

Procedure for setting limits

You can define limits that are product-dependent. The requirement for this is that the asset in the Asset Manager has been assigned the aspect type "StepChainAnalysis_InitialStep".

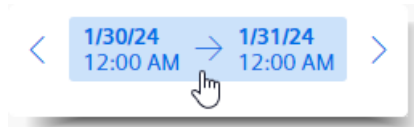
To set limits for one or more steps, follow these steps:

1. Open My Plant and select an asset. The tiles of automatically generated and user-defined dashboards for this asset are displayed.
2. Display the automatically generated dashboard for step time analysis.
3. Click .
4. Select "Settings for step time analysis".



The list of steps defined under this asset are displayed. You can configure both product-specific and product-independent steps under an asset and set limits for this purpose.

5. Under "Product", you open the drop-down menu and either select the product for whose steps you want to define the limit values, or "Unassigned" if you are editing product-neutral steps.
6. If necessary, assign a corresponding name under "Display name". The name appears after the product name or after the label "Unassigned".
7. Use the button for the period to select a period whose data is to serve as the basis for defining the limits.



8. In the "Limits" column, set the values for the planned and actual duration of the respective step. When the value is exceeded, the step is evaluated as faulty.

9. Under "Overview", you can automatically assign a limit to all steps using a mathematical function.

The screenshot shows a configuration window titled "Overview". It contains two sections: "Actual limits" (indicated by a red square) and "Planned limits" (indicated by a yellow square). Each section has a "Currently set" value (197.78 sec for actual, 197.51 sec for planned), a "Factor (%)" input field with a value of "+/- 0", a "Minimum" dropdown menu, and an "Apply to all steps" button.

To use this function, follow these steps:

- Decide whether to assign the automatic limit to the actual, planned or all step limits.
- From the drop-down menu, you select the minimum or the maximum as the initial value of the step.
- As the factor, you specify a percentage that is added to the initial value.
- Click "Apply to all steps".

A limit is calculated for selected steps on the basis of the respective limit values and entered in the corresponding column for limit values.

10. To save the changes and switch to the dashboard view, click "Save".
If you want to continue working in the same view after saving, click "Save & Continue".
To exit the view without saving, click "Cancel".

5.2.3 Displaying the step time analysis

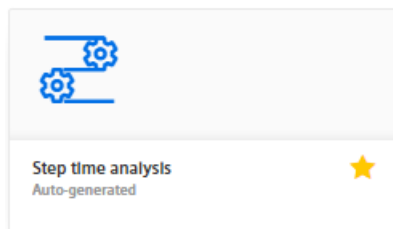
5.2.3.1 Displaying the step time analysis

Requirement

- You have created steps for the asset in the Asset-Manager.
- You have defined limits under "Step time analysis settings".

Description

When the requirements are met, the step time analysis is automatically displayed in the "Step time analysis" dashboard.



To access the "Step time analysis", proceed as follows:

1. In the navigation bar, go to "Analysis" and select "Step time analysis".
2. Select the asset for which the step time analysis is to be displayed.
3. You can switch the display of My Plant between tree and list view.



4. Set the main criteria by which the information for the step time analysis is filtered:
 - Specify the period for which the information is displayed.
 - View either the steps of the desired product or product-independent steps.
 - Decide whether the planned or actual values are to be displayed.

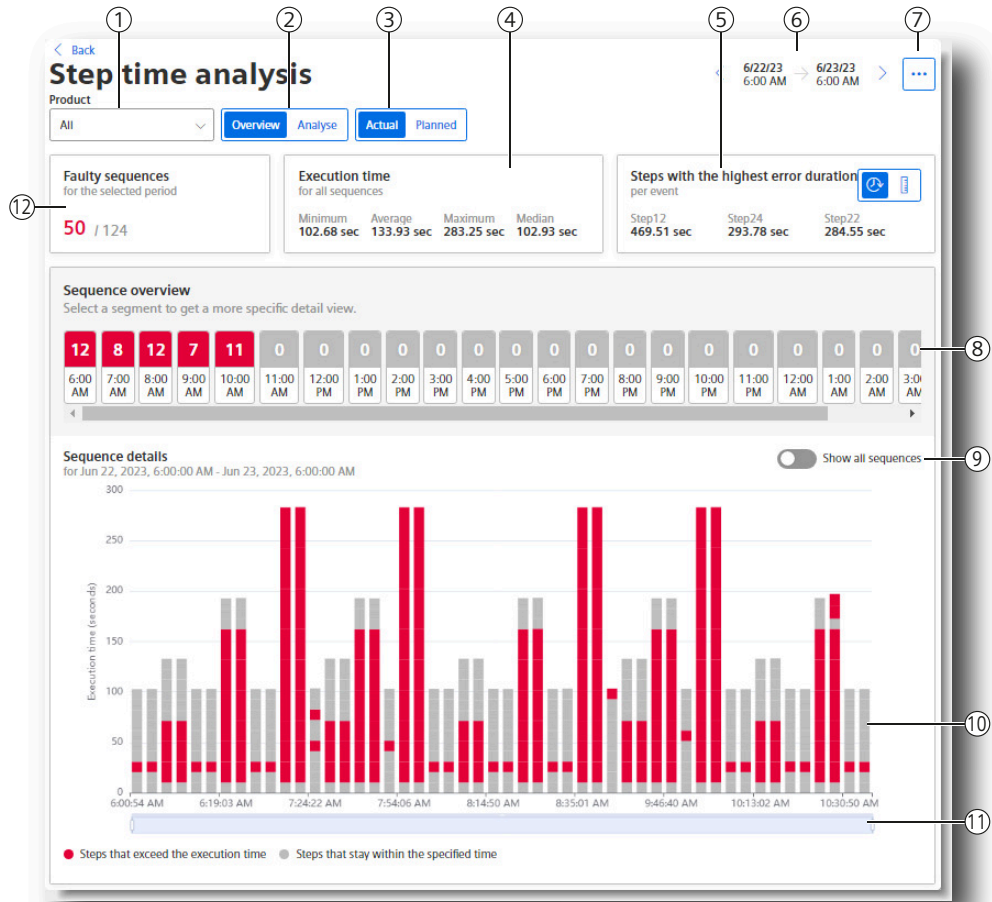
The display of the step time analysis is divided up into two analysis views:

- The "Overview (Page 98)" view, where all information on the sequences for a specified time and for the selected product is displayed.
- The "Analysis (Page 101)" view, in which the behavior of the individual steps is graphically displayed.

5.2.3.2 "Overview" view

Description

The overview is displayed in the "Step time analysis" dashboard.



- ① Selecting a product for which the step time analysis is to be displayed
- ② Switch between the "Overview" and "Analysis" views.
- ③ Switch between the views with actual or planned limit values.
- ④ Execution time for all sequences
- ⑤ Displaying the steps with the highest error rate or error duration
- ⑥ Selection of the period for which the step time analysis is displayed
- ⑦ Menu: Settings, exporting data, more analyses
- ⑧ Sequence overview: Display and selection of a specific sequence for detailed display
- ⑨ Show all sequences
- ⑩ Sequence details: Displaying all sequences and defined steps in the selected period. When selecting a single step, the Trend view of the step opens.
- ⑪ Restricting and shifting the displayed time period
- ⑫ Displaying the number of faulty sequences

The following options are available in this dashboard view:

Product selection

You decide whether to display the step time analysis for all products or a specific product. Product-independent limit definitions are also displayed and listed as "Unassigned".

Displaying the number of faulty sequences

The area ⑫ "Faulty sequences" shows the proportion of faulty sequences of the total number of sequences within the period selected under ⑥. The faulty steps are displayed in red.

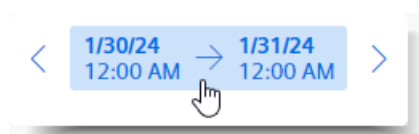
Execution time for all sequences

In the area ④ "Execution time", you can get information on the execution time of all sequences. It displays the minimum, maximum and average values in seconds, as well as the median execution time.

Selecting the analysis period

The area ⑥ facilitates specifying a display period. You can change the display period by switching to the previous or next period using the arrows.

More information is available in section Navigation in the app (Page 21).





Note

Automatic update

If the selected period for the dashboard is in the future, the dashboard automatically updates every 60 seconds.


Displaying steps with the highest error rate or error duration

In the area ⑤, you can display steps with either the highest error rate or error duration.

-  Error duration view
-  Error rate view

Sequence overview

The area ⑨ "Sequence overview" provides an overview of the sequences of the selected period. The representation varies depending on the length of the selected period. If you have selected a week as the display period, for example, 7 day segments are displayed in this area. Each segment contains the number of faulty steps and the period.

By clicking on a segment, you can see the data of the segment in the detailed view ⑩ and the display period changes to the hour display. By clicking on , you return to the view of the selected period.

5.2 Configuring a step time analysis

When you hover with the mouse pointer over a segment, you see the detailed information of the respective step as a tooltip.

Detail view

The area ⑩ is the detail view. Here, you can see a graphical representation of the data of the sequences and their steps over the selected period. Faulty steps which exceed the time limit are shown in red. Steps marked in gray are within the limits. By moving the mouse pointer over the individual steps, you can see the details for the individual sequences.

By clicking on a single step, you open the analysis view of the specific step. From there, you can click ② to return to the Overview view.

See also

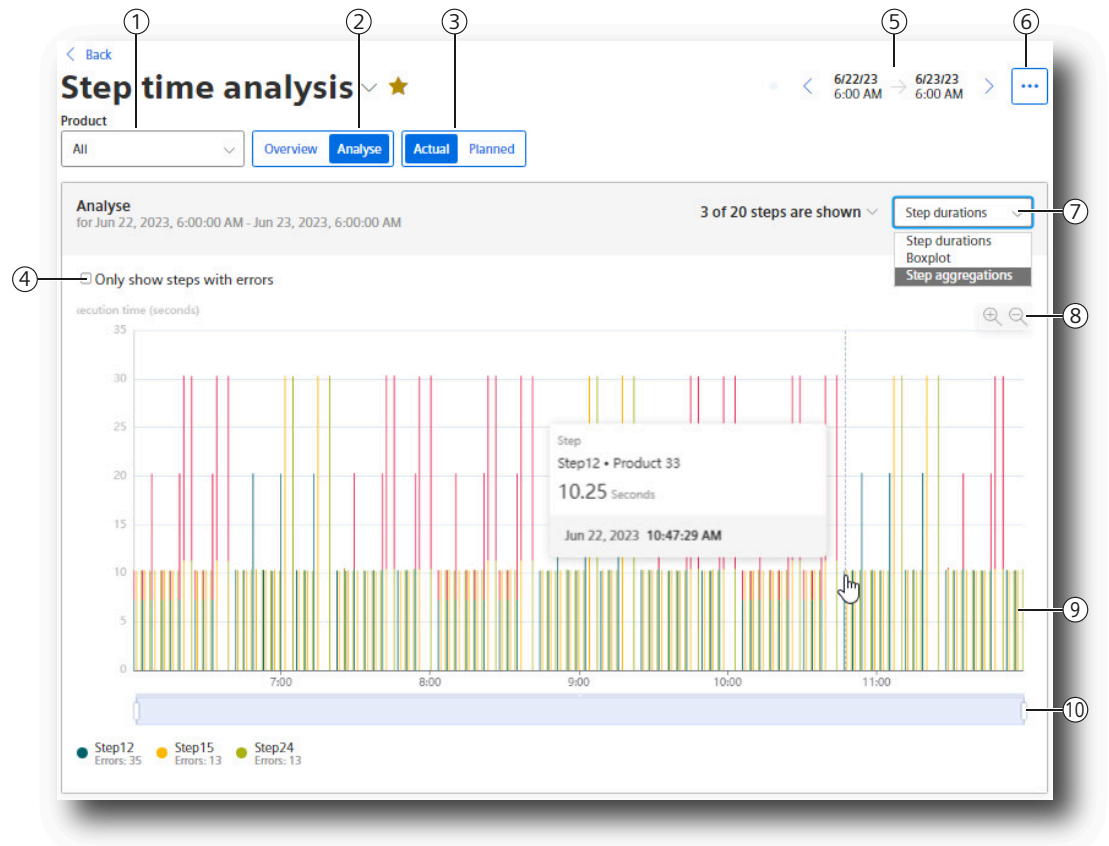
User-defined periods (Page 46)

Defining limits (Page 94)

5.2.3.3 "Analysis" view

Description

The trend view of the step time analysis provides detailed information about the behavior of individual steps within a defined period:

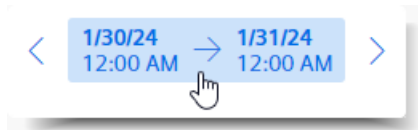


- ① Selecting a product for which the step time analysis is to be displayed
- ② Switching to the analysis view
- ③ Switch between the views with planned and actual limit values.
- ④ In "Step duration" view: "Only show steps with errors"
In "Boxplot" view: Visualization of the statistical distribution of the values.
In "Step aggregation" view: Selection of the period for which aggregation is performed.
- ⑤ Selection of the period for which the step time analysis is displayed
- ⑥ Menu: Settings, exporting data, more analyses
- ⑦ Selection of the displayed steps
Selection of displays: Step duration, boxplot, step aggregation
- ⑧ Zoom functions
- ⑨ Graphic display of the analysis
- ⑩ Restricting and shifting the displayed time period

Selecting the analysis period

In area ⑤, you can specify a display period. You can change the day of the display period by switching to the previous day or next day using the arrows.

More information is available in section Navigation in the app (Page 21).

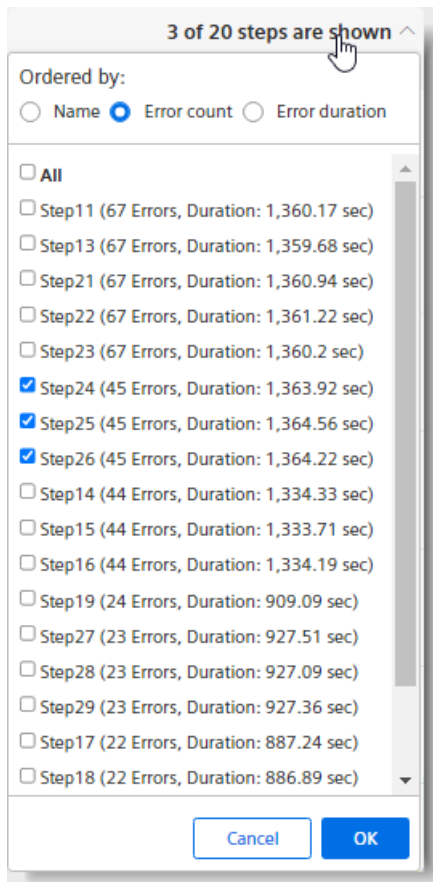


If you have defined your own period, this period is also shown.

More information is available in section User-defined periods (Page 46).

Selecting and displaying the individual steps

To select the displayed steps, click on ⑦ "Display x of y steps".



In the drop-down menu next to it, select the view.

- Step duration
- Boxplot
- Step aggregation

The analyses make it possible to identify the steps that take more time to execute and thus slow down production.

Graphic display of the analysis

The graphical detail view of selected steps over a defined period. The steps are shown in different colors.

View details for a specific step at a time by hovering over the graph with the mouse pointer at the corresponding location.

To see the analysis view for a step, click the step.

Modifying the period

The displayed period can be restricted and moved.

Note

Automatic update

If the selected time period for the dashboard or one of the widgets is in the future, the dashboard automatically updates every 60 seconds.

5.3 Configuring multivariable regression

5.3.1 Introduction to multivariable regression

Description

Multivariable regression puts a parameter (KPI, variable) in the context of other parameters and maps it as a linear regression model. This means the value of the output parameter can be determined via the input parameters and the regression model. (model result)

The energy consumption of a plant is influenced by certain factors such as ambient temperature, quantity produced and quantity filled. When the regression model and the input variables are known, you can determine the theoretical energy consumption.

In addition to the model, parameters are exported that determine the quality of the model. If an input quantity is used that has no relation to the output dimension, the correlation coefficient is 0. This means that the model is not trustworthy.

Different models can be calculated and saved for each asset and parameter. The saved models are available to the user in an automatically generated MVR dashboard. Here, the result of the model is compared with the actual value. To be able to detect the deviation, the deviation and the cumulative deviation are also displayed in addition to the model result and the actual measured values.

After the KPIs, the model result and the deviation have been created for each model, a limit can be defined by means of a standard function. The limit value determines when the user will receive a notification, for example, from the Notifier.

5.3 Configuring multivariable regression

You can create multiple models for each output parameter.

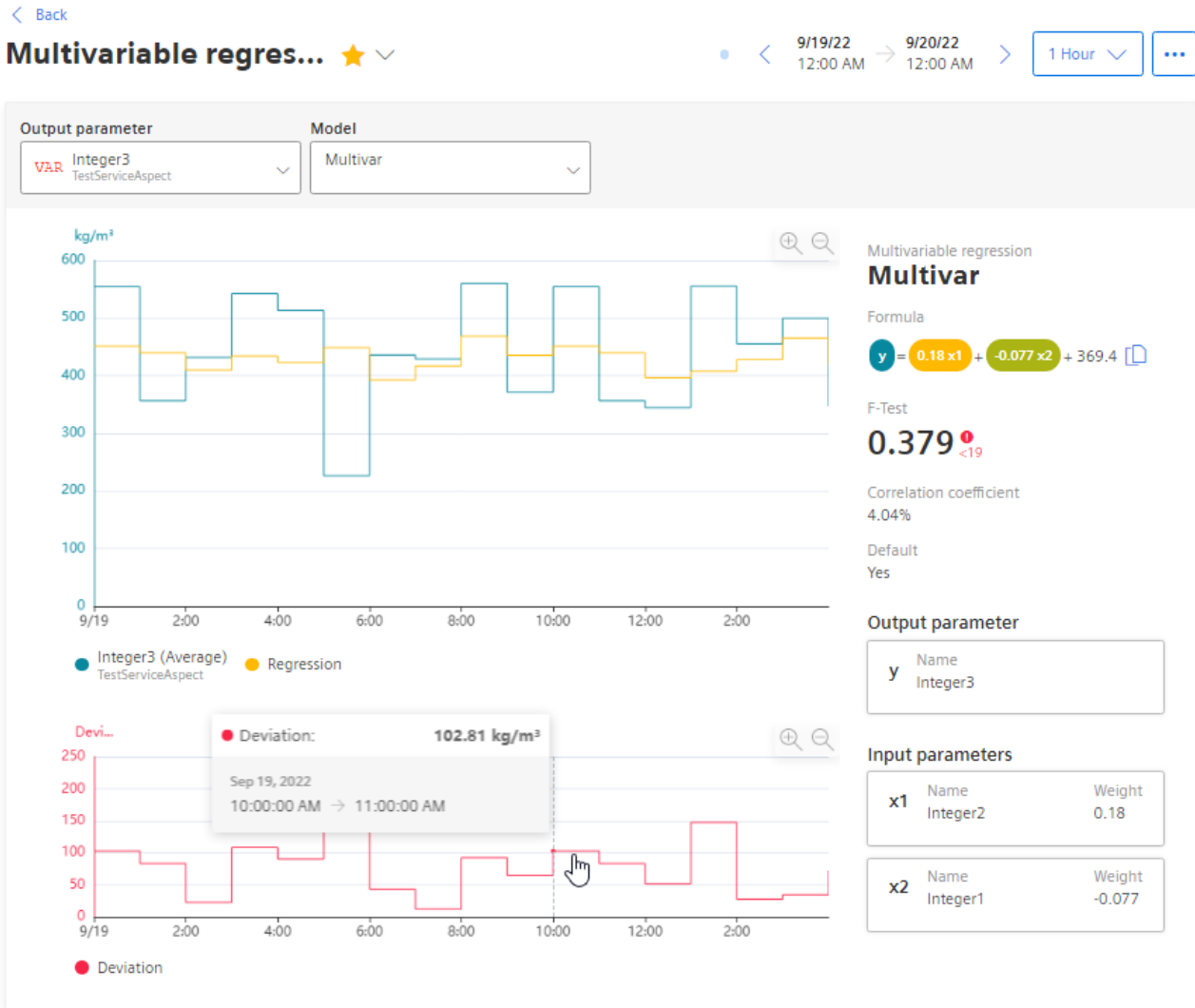
5.3.2 List of models for multivariable regression

An output parameter can be described by multiple, different models. For each output parameter, one model is selected as "Standard". The standard model is displayed when you open the MVR dashboard.

Displaying list of models

To display the models of the multivariable regression, proceed as follows:

1. Select an asset in My Plant.
The overview of the dashboards for the asset is displayed. If models have already been created, an MVR dashboard is shown in the overview.
2. Select the MVR dashboard. The standard model is displayed on the dashboard.



- To display the list of all created models, click **...** and select "Multivariable regression list".
- The overview of models available at the asset is displayed.

[← Back](#)

[+ Create new multivariable regression](#)

Multivariable regression

OEE 3 Models				
NAME	FORMULA	F-TEST	CORRELATION COEFFICIENT	DEFAULT
oee 1	$y = 0.103 x_1 + 0.427$	0.256	1.15%	...
oee 5 params	$y = 1.89 x_1 + -0.071 x_2 + -28.637 x_3 + -6.775 x_4 + 2.762 x_5 + 59.57$	348.697	92.71%	✓ ...
oee better	$y = 1.548 x_1 + 0.029 x_2 - 26.096$	19.837	21.96%	...

NAME	FORMULA	F-TEST	CORRELATION COEFFICIENT	DEFAULT
chiller 1 simple	$y = 2.915 x_1 + 1,344.208$	1,116.59	98.07%	...
chiller advanced	$y = 3.619 x_1 + -155.198 x_2 + 113.722 x_3 + 5,426.099$	743.795	96.04%	...
chiller	$y = 2.899 x_1 + 67.556 x_2 - 932.591$	1,134.668	98.06%	...

The standard model is marked with a green check mark.

- To create a new model, click **+ "Create new multivariable regression"**.
- To display the MVR dashboard, click **...** and select "Go to dashboard".

5.3 Configuring multivariable regression

- 7. To edit an existing model, click and select "Edit" .
- 8. To show details on a model, select the model.
Details are displayed in the information panel on the right.

Multivariable regression

Power Electricity

Formula

$$y = 0.264 x_1 + 47.25 x_2 - 31.447 x_3 - 1,596.738$$

F-Test

758.656 >9.277

Correlation coefficient

96.2%

Default

No

Output parameter

Name
y Power_electricity

Input parameters

x1	Name	Weight
	Chiller_power_cooling	0.264

x2	Name	Weight
	Temp_Condenser_in	47.25

x3	Name	Weight
	Temp_Condenser_out	-31.447

Set as default

[Go to Dashboard](#)

[Edit](#) [Delete](#)

5.3.3 Creating a model

Description

As soon as you have created a model, an MVR dashboard is automatically created for the asset. You can create multiple models each for different input parameters.

The available models are grouped and visualized by parameter in this dashboard.

Note**Same time stamp required for variables**

All variables in use must have synchronous time stamps for the values. The same type of aggregation must be selected for each variable to ensure synchronicity of the time stamps.

Note**Only use parameters with numerical data types**

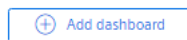
Multivariable regression is expressed through a mathematical formula. This means only variables with numerical values (Int32, Double, etc.) are permitted as parameters.

A parameter of String type can be additionally selected, for example, to designate production sections in the visualization by a descriptive name. Only the aggregation "Last" type is available for parameters of String type.

Procedure

To create a model, follow these steps:

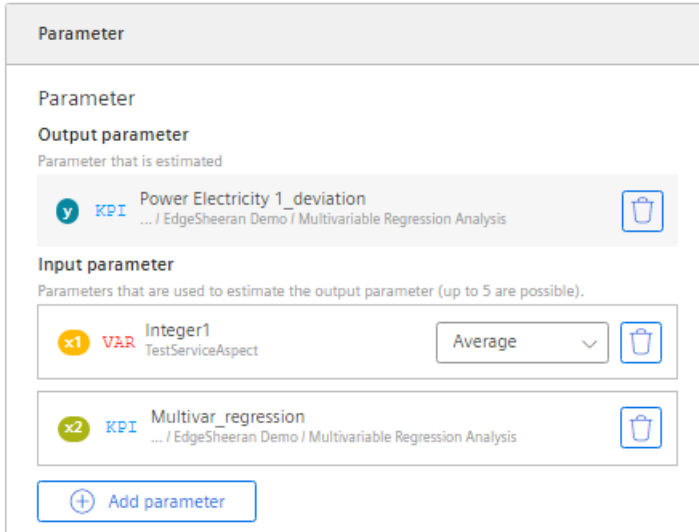
1. Select an asset in My Plant. The overview of the dashboards for the asset is displayed.
2. Click "Add dashboard". in the overview view of the asset.



3. Select "Multivariable regression".
The "Add multivariable regression" view is displayed.
4. Give the model a descriptive name.
Based on the name, you later select the model for visualization from the existing models on the MVR dashboard.
5. Optionally enter a description.

5.3 Configuring multivariable regression

- 6. Select the output parameter.
This is the parameter whose dependency is represented by the values of the input parameters.
The output parameter can be a variable or a KPI.



- 7. Select the input parameters.
You can select up to 5 input parameters. These are the parameters for which you want to show how they influence the value of the output parameter.

Note

No formula and no model without values

If no data is available for the selected analysis period, no formula can be calculated. You cannot save the model without a formula.

A warning shows the parameter for which there is no data.

Change the calculation period or select other parameters.

- 8. Select a type of aggregation for each variable.
The time stamps of the aggregated values are to be identical.

9. Define the calculation period.

Advanced data adjustments

Period

Date

Offset *

Period preview
 Calculated from time: 9/19/22, 12:00 AM

Previous	Sep 18, 2022 12 ⁰⁰ AM	→	Sep 19, 2022 12 ⁰⁰ AM
Current	Sep 19, 2022 12 ⁰⁰ AM	→	Sep 20, 2022 12 ⁰⁰ AM
Next	Sep 20, 2022 12 ⁰⁰ AM	→	Sep 21, 2022 12 ⁰⁰ AM

Interval

Interval of data for the specified period.

Spike correction (%)

Disables peak correction (can increase the calculation time).

↻ Calculate

The calculation period is applied as the default in the visualization. The user can modify the calculation period on the dashboard.

10. Select the interval at which the data is acquired.

11. To ignore outliers in the analysis, enter a value for "Peak correction".

The greater this value, the smoother the considered value chart.

Values from 1% through 100% are permitted.

If you do not specify a value, the value chart is not corrected.

12. Click "Calculate".

Note

Variables with linear dependency

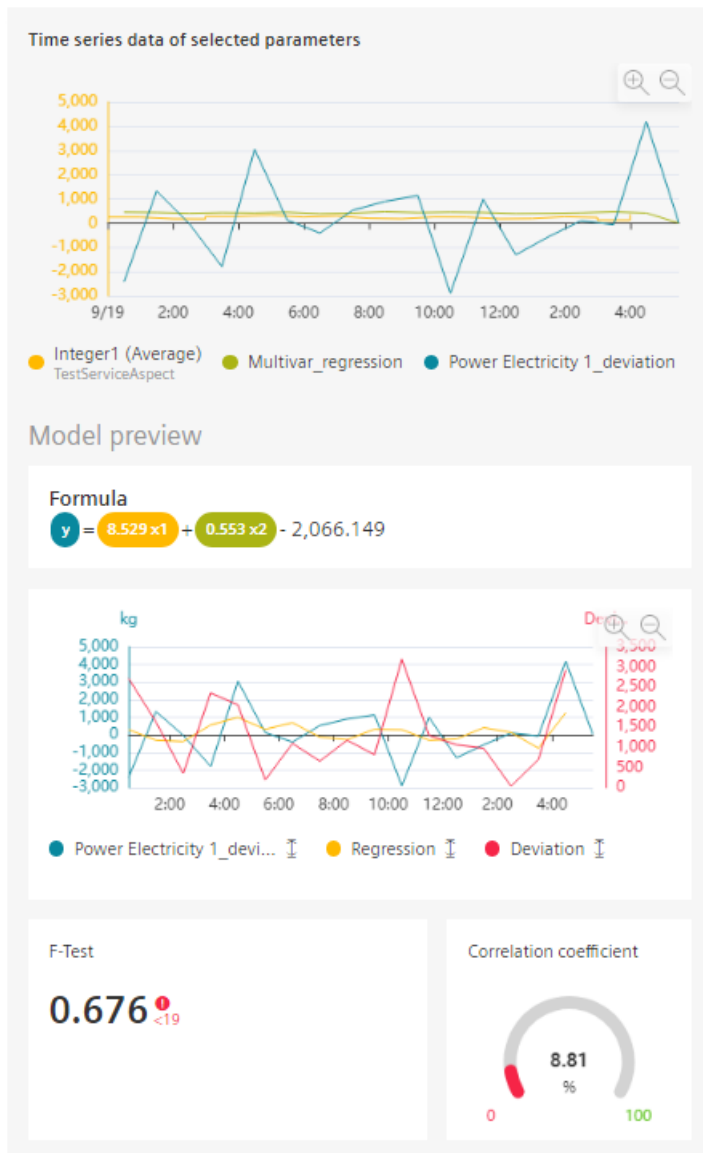
Variables are linearly dependent when the values are the same or a multiple of each other at all times.

No resources can be calculated for linearly dependent variables.

An error message is displayed when you select linearly dependent variables.

The formula that describes the interaction of the selected parameters during the selected period is calculated.

The preview of the visualization for the calculation time range is displayed.



If necessary, you can optimize the model (Page 111).

13. Confirm the creation of the two new KPI instances.

14. Save the model.

Result

You have created a model for the visualization of the multivariable regression.

After creating the first model for an asset, the MVR dashboard is created automatically.

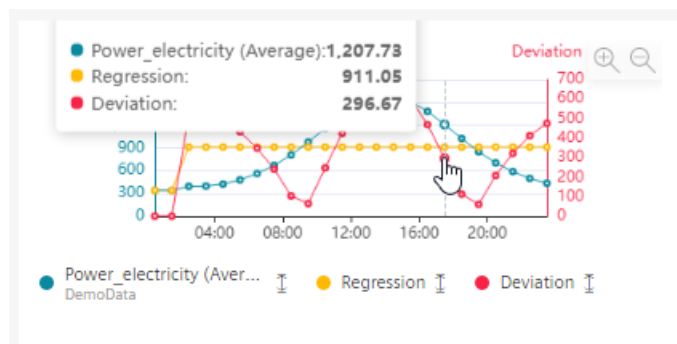
A model can be used on the MVR dashboard for any other period to analyze the parameters.

Two new KPI instances are created.

5.3.4 Optimizing the model

Description

Optimize the model before you calculate it in case of insufficient data, an inadequate calculation period or results that are not satisfactory for other reasons. You can edit a saved model.



1. To show details on a data point, move the cursor over the graphic.
2. To show or hide a parameter, click it below the preview.
3. To zoom into the area, move the mouse pointer over the area while keeping the mouse button pressed.

The following is displayed in addition to the visualization preview:

- **Formula**

Formula

$$y = -0.507 x1 + 0.16 x2 + 468.65$$

The formula describes the relationship of the output parameter y to the input parameters x1, x2, etc.

The formula cannot be edited.

- **Correlation coefficient**

The correlation coefficient is the quality measure for the model: How well does the model describe the actual data? The lower the value of the correlation coefficient, the less trustworthy the model.

The correlation coefficient can range from 0% to 100%. The higher the value, the better the model.

If the correlation coefficient is < 60%, adjust the model. Access a larger data volume or select different parameters.

- **F-test**

Indicates the significance of the model: Is the calculated model better than a random model? The greater the value of the F-test, the better the model. If the value is displayed in red, adjust the model. Select other parameters or a longer calculation period.

When you move the mouse pointer over the graphic, the details of individual data points are displayed in the tooltip.

To zoom in on the time range, move the mouse pointer above the desired area of the graphic while pressing the left mouse button.

Click on "Zoom out" to gradually show the view for a longer time range.

Click on "Reset zoom" to restore the original display.

Procedure

To optimize a model, follow these steps:

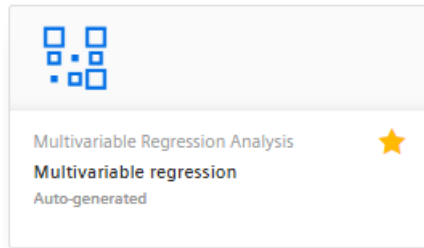
1. Use variables or KPIs as output parameters and input parameters for which data is available without gaps in the calculation time range.
2. If necessary, remove input parameters with insufficient data quality.
3. Select a calculation period during which the data quality is better.
4. Change the spike correction to mitigate the effect of extreme variable values.
5. Recalculate the formula after each change.
6. When you have achieved an acceptable result, save the model.

5.3.5 Visualizing MVR on the dashboard

Display MVR dashboard

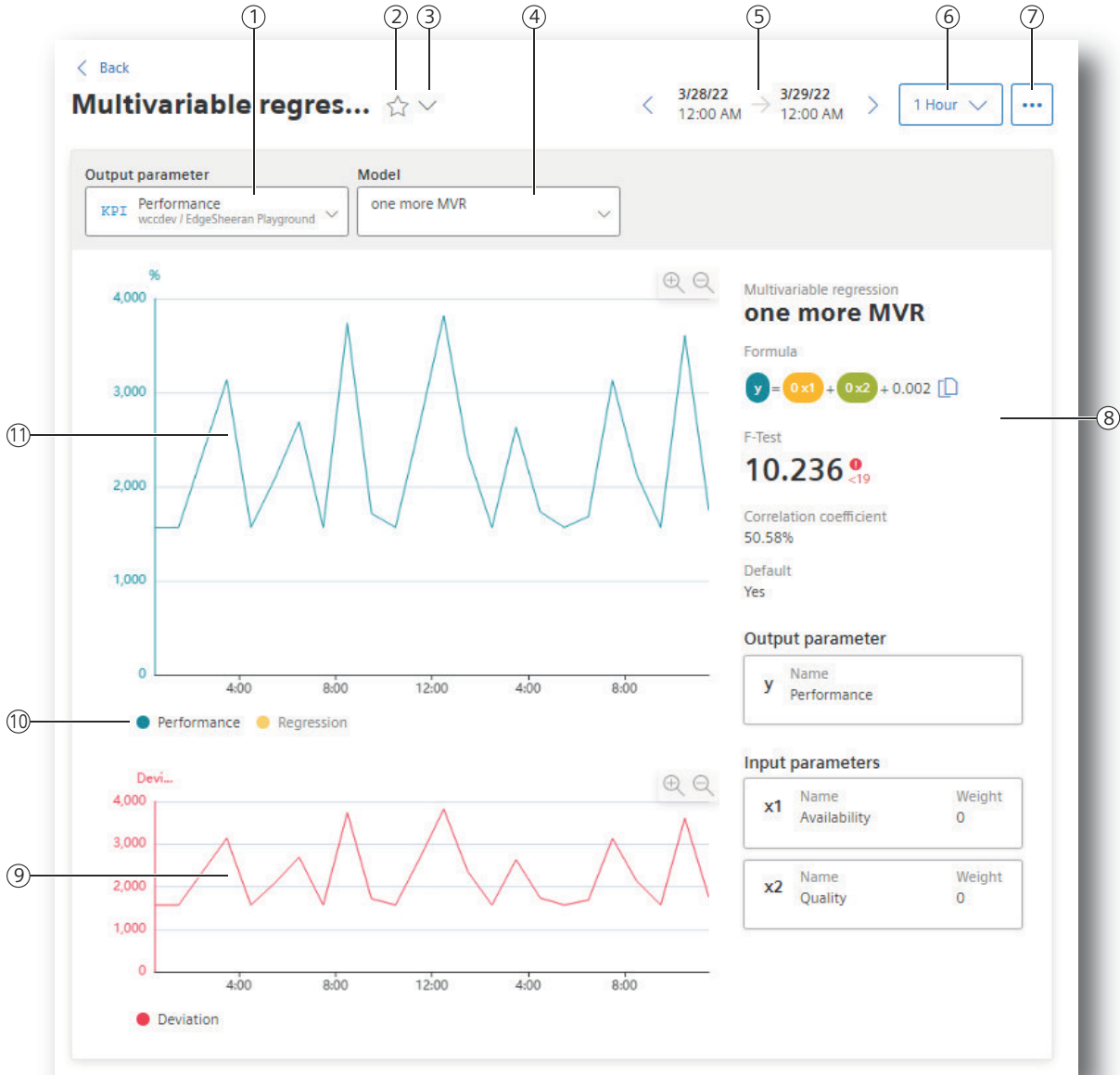
The MVR dashboard is available when at least one model has been created for the asset.

1. Select an asset in My Plant.
An overview of the dashboards available on the asset is displayed.
2. Click "Multivariable regression".



The dashboard is displayed.

Visualizing multivariable regression



- ① Selection of the output parameter
- ② Marking the dashboard as Favorite
- ③ Displaying more dashboards on the asset
- ④ Selection of a model that describes the output parameter
- ⑤ Selection of the time range for the analysis
- ⑥ Selection of the calculation interval
- ⑦ Menu: "Multivariable regression list", "Edit selected multivariable regression", "Export data"
- ⑧ Characteristics of the model: Formula, F-test, correlation coefficient
- ⑨ Graphic display of the deviation

- ⑩ Showing and hiding the individual parameters and the limit values
- ⑪ Graphic representation of the output parameter and the regression

To visualize the multivariable regression in the dashboard, follow these steps:



1. Select the output parameter.
2. Select a model that describes this parameter.
3. Select the period for which the multivariable regression is visualized.
You can apply the model to any time range in the past.
See also: User-defined periods (Page 46).
4. Select the calculation interval.
With the calculation interval you determine the granularity of the visualization. You determine, for example, whether data values of each minute or of each hour are considered.
5. Select which trends you want to show or hide.
The following trends are offered:
 - the value trend of the output parameter
 - the regression
 - the deviation of the actual values from the model (Deviation)

Dashboard features

Note

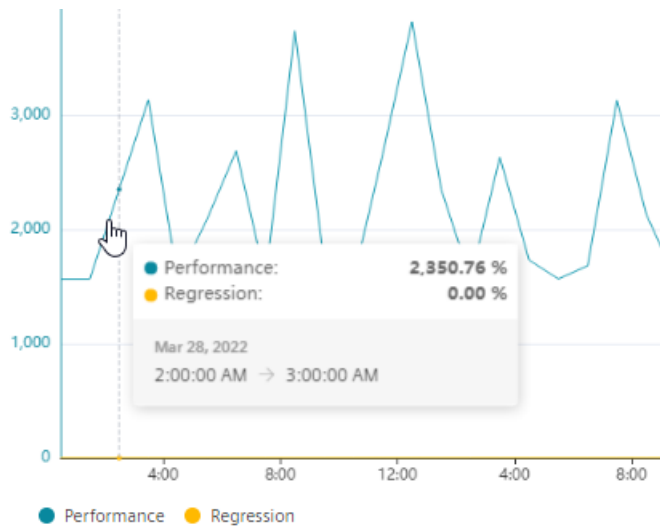
Automatic update

If the selected period for the dashboard or one of the widgets is in the future, the dashboard automatically updates every 30 seconds.

- Display of the existing models
To display the list of the existing models and potentially create a new model, click  and select "Multivariable regression list".
- Description of the model
The characteristics that describe the model are displayed:
 - Formula
 - F-test
 - Correlation coefficientYou can copy the formula to the clipboard by means of .

5.4 Evaluating the production of individual batches

- Detail view with mouseover
When you move the mouse pointer over the graphic, the details of individual data points are displayed in the tooltip.



- You can find information on adjusting the displayed area in section "Navigation in the app (Page 21)".

5.4 Evaluating the production of individual batches

Batch analysis is used to compare parameters of individual batches. Production parameters such as materials and energy are put into context. The analysis is configured in each case for one product and the produced batches.

The configuration of the batch analysis creates an automatically generated dashboard.

Results are presented as a table. Here you can use the filter and sort functions to clearly display and compare the results that are relevant to you.

5.4.1 Configuring a batch analysis

Description

For each asset, you can create a dashboard for batch analysis. The dashboard is created automatically on the basis of the settings made by you.

Procedure

To configure batch analysis, proceed as follows:

1. Select an asset in My Plant.
2. Click "Add dashboard".

3. Select "Batch analysis".
The "Batch analysis configuration" view appears.

Batch analysis configuration

You configure batch analysis here.

General

Default period *

Day

Context

Define the context of your batch analysis. At least one batch or one material must be selected.

Batch

+ Add parameter

Material

+ Add parameter

Parameters

Add up to 10 parameters to your batch analysis. At least 1 parameter must be selected.

+ Add

Using this functionality may result in additional costs as mentioned in the product sheet

[Product sheet](#)

[Usage information](#)

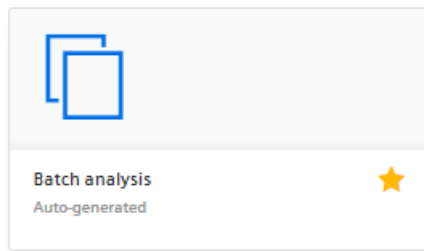
4. Select the default time period.
The periods defined under "Configuration" are available for selection.
5. Select the parameter that represents the batch.
This can be, for example, the batch number or a customer
6. Select the parameter that represents the material that will be produced.
If only one material is produced, this information can be omitted.
7. Select one or more parameters to be compared for individual batches.
The parameters can represent, for example, various cost factors (energy consumption, cost of raw materials) of production.
8. Click "Save".
An automatically generated dashboard is created and is continuously supplied with data.
The "Batch analysis" dashboard is displayed.

5.4.2 Displaying a batch analysis

Procedure

To display the "Batch analysis" dashboard, follow these steps:

1. Select My Plant in the navigation bar.
2. Select an asset.
An overview of the dashboards available on the asset is displayed.
3. Click "Batch analysis".



The dashboard is displayed.

5.4.3 Evaluating a batch analysis

Description

The table shows the values for the produced batches for the selected period:

- Batch: Number of the batch
- Material
- Start, end and duration of production of the batch
- The parameters selected in the configuration

Note

Display of the calculation process

If a comprehensive display of values is requested, e.g. for a long period, not all entries are available immediately. A progress bar at the top visualizes the process of the calculation.

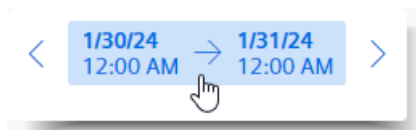
Note

Automatic update

If the selected period for the dashboard or one of the widgets is in the future, the dashboard automatically updates every 30 seconds.

Procedure

1. To display the analysis for a different time period, use the operator controls to navigate in time.



2. To filter the display, enter a string in the search field. All batches for which a cell contains the character string are displayed.
3. To sort the table, click in a column header.
4. To display individual batches or materials, enable the corresponding entries in the selection lists alongside the search field.

Example:

1. Filter the table by a batch number.
2. Sort by a parameter, e.g. energy consumption
You can see at a glance which production of a batch was the most energy-intensive.

"Diagram" graphical representation

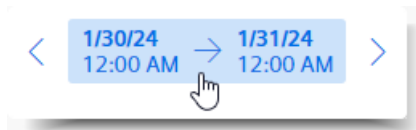
The graphical representation visualizes the time history of the individual parameters in relation to the individual batches.

5.4.4 Analyzing multiple assets

You can compare the production of multiple assets by merging and consolidating the analyses.

Procedure

1. Click "Analysis" in the navigation bar.
2. Click "Batch analysis".
3. Select the period for the analysis.



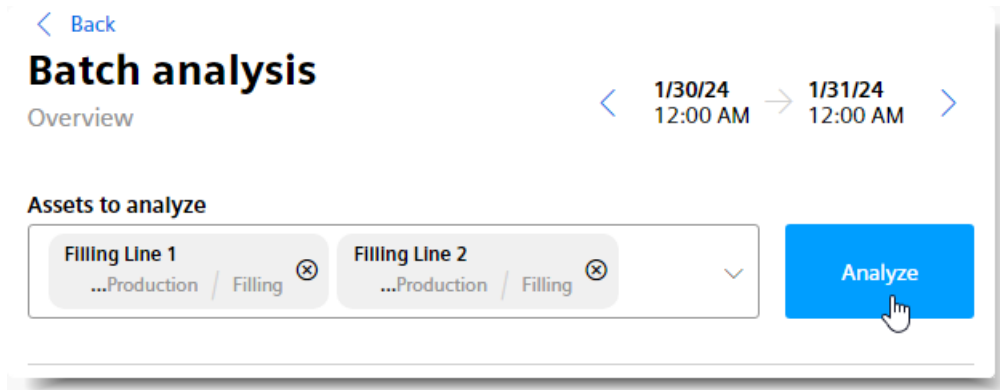
4. To display the dashboard for an asset, select the asset in My Plant.
5. To display the analysis for multiple assets, select the assets under "Assets to analyze".

Note

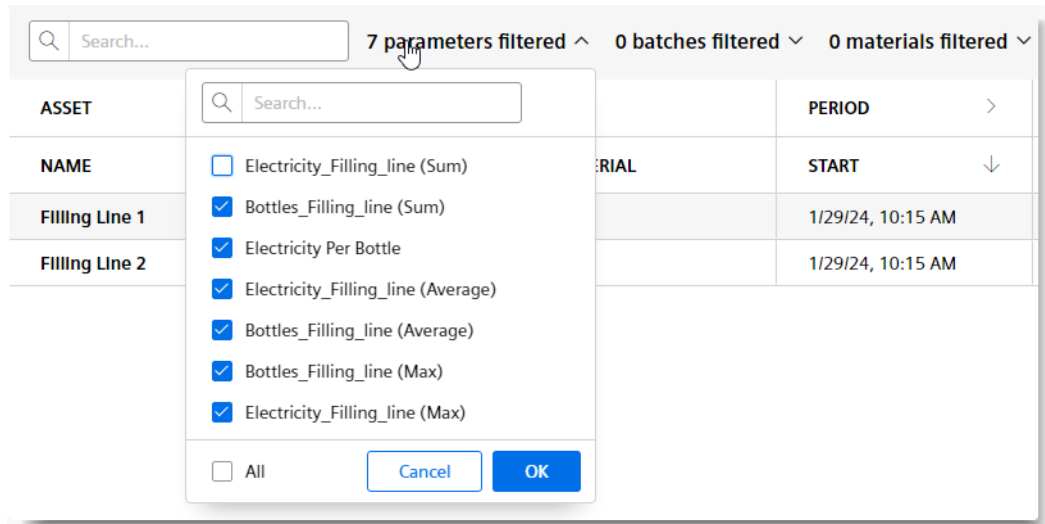
Up to 10 assets can be selected.

5.4 Evaluating the production of individual batches

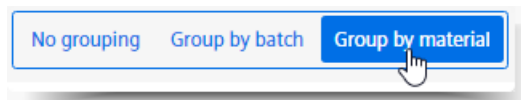
6. Click "Analyze".



7. You can filter the display by parameters, batches, and materials.



8. Group the display by batches or material.



9. To sort the display by a column, click in the column header.

10. To display more information on assets or periods, select > in the column header.

Note

Calculation of the displayed values


If the parameter basis was formed by dividing, e.g. for KPIs, the average of the values is displayed.

If the parameter represents a simple value, e.g. "filled bottles", the sum of the values is displayed.


5.4.5 Editing the configuration

Editing the configuration

To edit an existing configuration for batch analysis, follow these steps:

1. Select an asset in My Plant.
2. Display the "Batch analysis" dashboard.
3. Click  and select "Configuring batch analysis".
The configuration is displayed and can be edited.

Deleting the "Batch analysis" dashboard

1. Open the configuration of the batch analysis.
2. Click .
The batch analysis for the asset is no longer available.

5.5 Creating user-defined dashboards

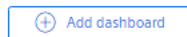
5.5.1 Creating a dashboard

In addition to the automatically generated dashboards, you can create user-defined dashboards. In the process, you choose between different widgets for data visualization. You design the dashboard according to your needs.

Procedure

To create a user-defined dashboard, follow these steps:

1. Select an asset in My Plant. The overview of the dashboards for the asset is displayed.
2. Click "Add dashboard" in the overview view.



3. Select "User-defined dashboard".
The "Add dashboard" view is displayed.

4. Enter a name for the dashboard.

[< Back](#)

Add Dashboard

Dashboard Name *

Time Range

Date
 Use current date

Offset *

* These fields must be filled out

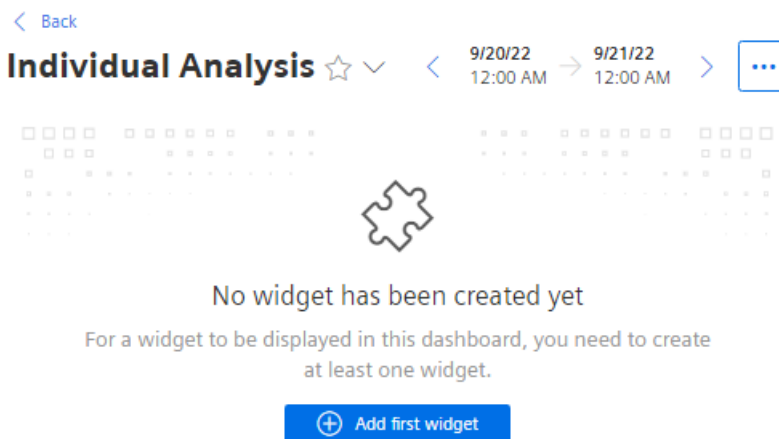
Date Range Preview

Calculated from time:
5/11/22, 3:26 PM

Previous	12 ^{AM} 00 May 10, 2022	→	12 ^{AM} 00 May 11, 2022
Current	12 ^{AM} 00 May 11, 2022	→	12 ^{AM} 00 May 12, 2022
Next	12 ^{AM} 00 May 12, 2022	→	12 ^{AM} 00 May 13, 2022

5. Select the period for which the data will be visualized on the dashboard. This period can be changed at a later date by the user.
6. To move the period, specify an "Offset".

- Click "Save".
You have created a new, empty dashboard.



- Create widgets at the dashboard.
You can find more information in the "Creating widgets (Page 125)" section.

5.5.2 Structure of the dashboards

Overview

The dashboards contain a graphical representation of variables or KPI types. Widgets are used for the graphical representation. A maximum of 5 dashboards can be created per asset object within My Plant.

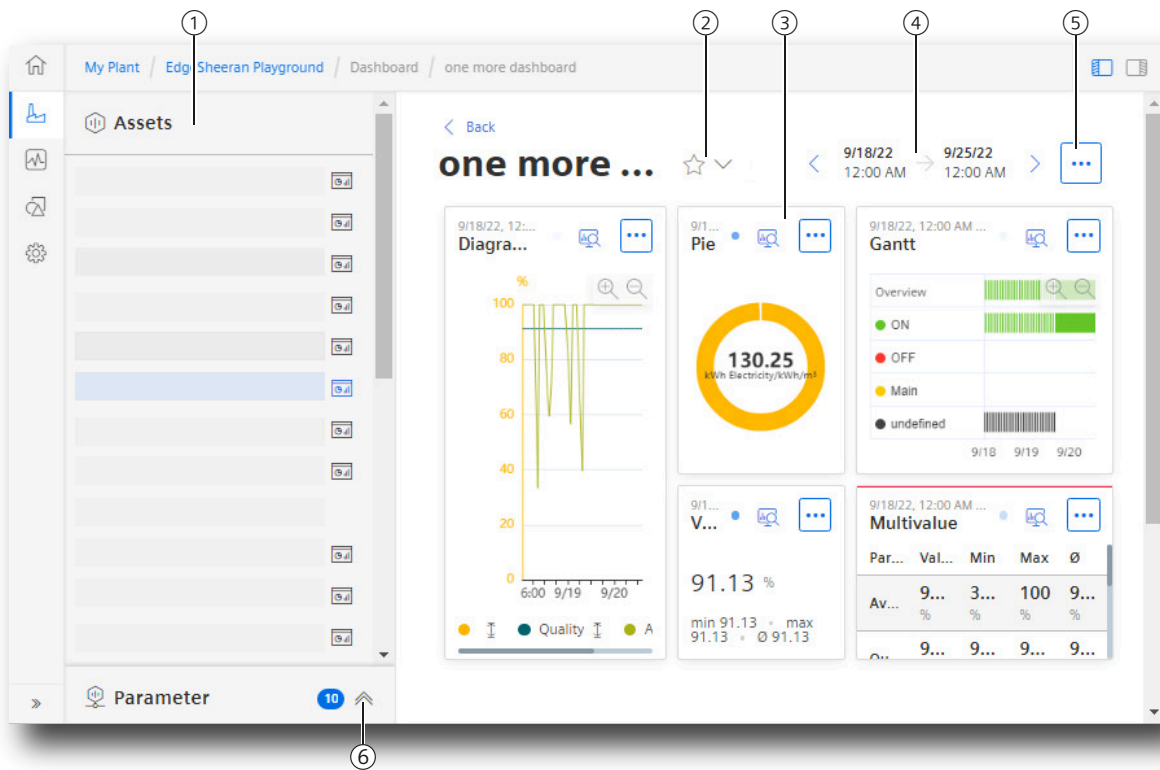
Note

Automatic update

If the selected period for the dashboard or one of the widgets is in the future, the dashboard automatically updates every 30 seconds.

The figure below shows the layout of a dashboard:

5.5 Creating user-defined dashboards











- ① My Plant
- ② Marking the menu with all dashboards of the asset / dashboard as Favorite
- ③ Widgets
Visualization of KPIs or variables
- ④ Period
- ⑤ Menu: "Add widget", "Adjust dashboard layout", "Export dashboard", "Edit dashboard", "Delete dashboard"
- ⑥ Parameter list

5.5.3 Creating widgets

5.5.3.1 Introduction to widgets

Description

The following widgets are available for data analysis:

Widget type	Description
 Diagramm	Displays the value of parameters as a chart over time. You can find more information here: Visualizing correlations (Diagram) (Page 131).
 Value	Displays the current value of one or more parameters. You can find more information here: Visualizing values (Value) (Page 134).
 Gantt	Shows you the status of a device at a glance using different color codes. For example, the status can represent the current state or the state within a specific period. This allows you to see at a glance, for example: <ul style="list-style-type: none"> • When the device started up and how long it was in the "RUN" operating state. • When it switched to the "STOP" operating state and how long it remained in this state. You can find more information here: Visualizing machine statuses (Gantt) (Page 135)
 Gauge	Shows the limits using colors. You can recognize at a glance whether or not limits are being exceeded. You can find more information here: Visualizing the violation of limit values (gauge) (Page 137)
 Pie	Shows a distribution of consumptions or quantities. Clicking on a segment highlights the segment and displays the corresponding value. You can find more information here: Visualizing the distribution of consumptions or quantities (Pie chart) (Page 139)
 Heatmap	Shows the intensity of data values. For example, you can display the energy consumption (green = low consumption; red = high consumption). You can find more information here: Visualizing the intensity of data values (Heatmap) (Page 140)
 Bar 3D	Visualization of three parameters as a 3-dimensional bar chart. You can find more information here: Visualizing relationships in 3D (3D bars) (Page 142).
 Image	Displays an image, such as a logo, on the dashboard. Suitable for presentation of dashboards on large screens. You can find more information here: Linking an image for presentation (Page 143)

5.5 Creating user-defined dashboards

In user-defined dashboards, you create widgets according to your needs, configure them, and arrange them on the dashboard.

You can edit, delete, copy and export the visualized data as a csv file for widgets that have been created once.

See also

Preview a widget (Page 145)


5.5.3.2 Create a widget

Requirement

- To visualize and calculate the data from the plant, such as production figures, machine operating times, or water consumption using KPIs, these figures must be transferred from the plant to the platform via the Asset Manager. The data structure of your plant is then automatically displayed in the app.
- At least one dashboard is created on the desired asset.

Adding a widget

To add a widget to a user-defined dashboard, follow these steps:


1. Display the dashboard
2. If no widget has been created, select "Add first widget".
3. If widgets have already been created, click  and select "Add widget".
The "Add widget" wizard is displayed.


Widget configuration


The creation of a widget takes place in 3 steps.


- Step 1: General Select the widget type


1 Allgemein ^



Diagram



Value



Gantt


Gauge


Pie


Heatmap


Bar 3D


Image

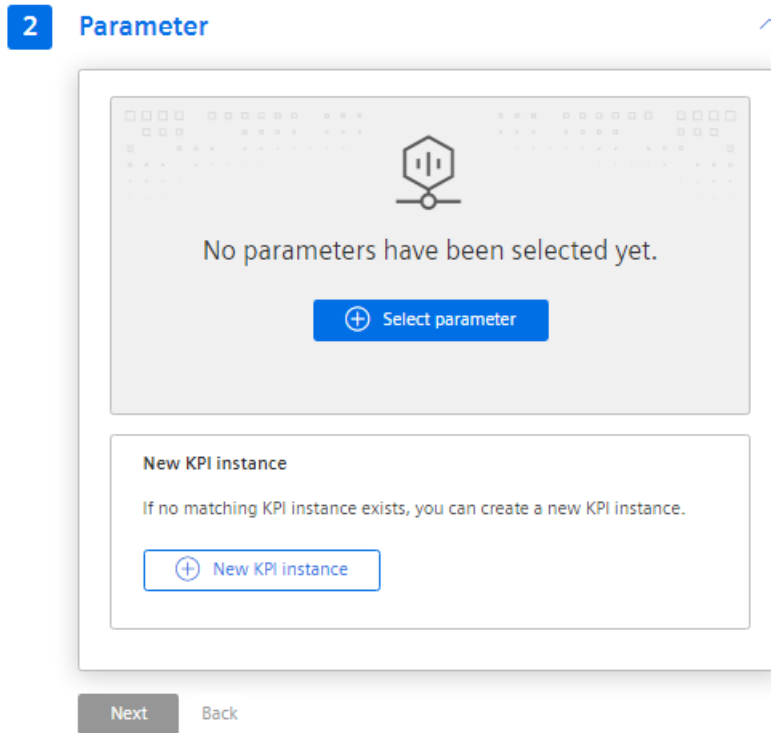
Widget-Name *

Datumseinstellungen

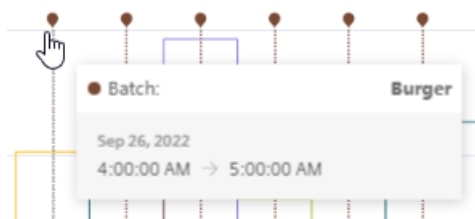
Die Datumseinstellungen aus dem Dashboard verwenden.

Weiter

- Assign a name to the widget.
 - Select whether the date settings from the dashboard are to be applied. If the widget uses date settings deviating from the dashboard, make the required specifications.
 - To apply the specifications, click "Next". Step 2 is displayed.
- Step 2: Parameters



- Select the parameters which are to be visualized in the widget.
A parameter of the STRING type can be additionally selected, for example, to give production sections in the "Diagram" detail view a descriptive name.
Only the aggregation type "Last" is available for STRING type parameters.
Example representation:



- If required, create a new KPI instance
Further information can be found in section "Editing settings for KPI instances (Page 59)".
- Step 3: Details
These settings depend on the widget type, e.g. calculation period, y axis.
- To create the widget, click "Create widget"
The widget is displayed at the dashboard.
To adjust the position and size of the widget, adjust the dashboard layout.
For more information, see the "Adapting a user-defined dashboard (Page 158)" section.

Note**Switching between the steps**

When all required specifications are available for the first time, you can switch to a step independently of the sequence and make changes.

If you change the widget type, you have to make the specifications again.

Defining date settings

With the date settings you define the time range from which the values are to be visualized. You can apply the dashboard date settings to a widget or define your own date settings for this widget.

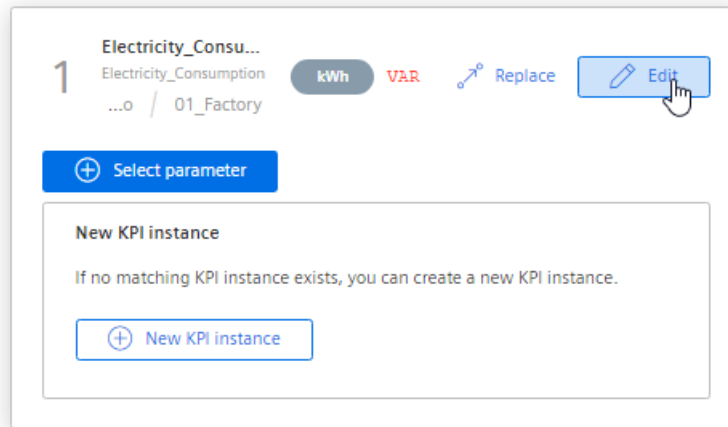
The following variants are possible:

- "Use the date settings from the dashboard" to use the time range that is defined in the dashboard.
Changes to the date settings of the dashboard are applied in all widgets of the dashboard.
- To define a specific period, disable "Use the date settings from the dashboard".
 - Period
Define the duration (e.g. week). The start and end time are given by the predefined time ranges (day, week, month, year, etc.).
 - Use current date
To enter the date and time of the start time manually, deactivate this option.
The end time is determined through the "Period".
 - Offset
Indicate the number of days, weeks, months or years by which the start time should be offset.
The start time can be either in the future or in the past.

Procedure for selection of parameters

You can select either a variable or a KPI type as parameter. You can select up to 10 parameters.

1. To replace a selected parameter with another parameter, click "Replace".
2. To make further specifications for the selected parameter, click "Edit".



- If required, enter an alternative label.
This label is displayed in the legend in the detail view instead of the asset and the aspect name of a parameter.
 - Select an aggregation for each variable.
You can find additional information on the aggregation functions here: [AUTOHOTSPOT](#)
The same parameter can be visualized in a widget with different aggregations.
 - Specify details for the visualization of the parameter:
 - Number of decimal places
 - Color
 - Type
 - Define limit values for warnings and alarms.
Limit values are displayed in the detail view as dashed lines.
If you have already defined limits for the parameter used, they are displayed preset in the widget. These limits can be overwritten.
3. In this step, you can create a new KPI instance and link the operands with the desired parameters.
You can find additional information on KPI instances here: [Introduction to KPI calculations](#) (Page 37)

Widget-specific details

You can find additional information on the details of the widgets here:

- Visualizing correlations (Diagram) (Page 131)
- Visualizing values (Value) (Page 134)
- Visualizing machine statuses (Gantt) (Page 135)
- Visualizing the violation of limit values (gauge) (Page 137)

- Visualizing the distribution of consumptions or quantities (Pie chart) (Page 139)
- Visualizing the intensity of data values (Heatmap) (Page 140)

5.5.3.3 Visualizing correlations (Diagram)

Description

The "Chart" widget displays the value of parameters as a diagram over time.

You can select a type of visualization for each parameter.

The following views are available in the detail view for the "Diagram" type:


- Line graph (Page 148)
- Histogram (Page 151)
- Regression (Page 152)
- Boxplot (Page 153)
- Table (Page 155)

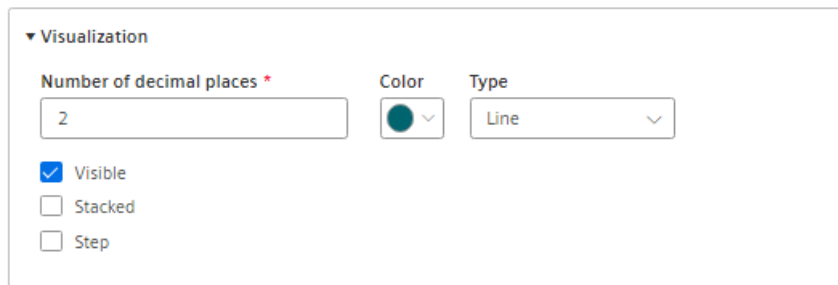
Use of variables of "String" and "Bool" type

To show more non-numeric information in the Tooltips, select string or bool-type variables. In this way, you can also visualize text for each data point, e.g. a batch number or the customer of a batch.


Procedure

To define widget-specific display options, follow these steps:

1. Create a new widget or edit the existing one.
2. In step 2, select a parameter which is visualized in the widget.
3. Click  and open the "Visualization" area.



▼ Visualization

Number of decimal places * Color  ▼ Type ▼

Visible
 Stacked
 Step

4. For variables, you specify how many decimal places are displayed.
5. Select the color for the display of the parameter.

6. Select the type of the visualization.
 - Line chart (Line)
 - Spline curve
 - Area chart (Area)
 - Bar chart (Bar)
The columns of several parameters are displayed stacked.
 - Scatter chart (Scatter)

7. Activate further options:
 - Select whether the value is to be visible.
 - With the bar chart, you can select whether the value is to be displayed stacked.
8. In step 3 "Details", you define the display of the y axes.
For KPI instances, select the calculation period.

KPI calculation period

1 Hour ▾

Y-axis

1

Name

°C

Low limit **High limit** **Scale by values** Enable scaling by values

Parameter *

Temperature ⊗ ▾

🗑 Delete

2

Name

m³

Low limit **High limit** **Scale by values** Enable scaling by values

Parameter *

Water_Consumptio... ⊗ ▾

🗑 Delete

+ New axis

A y-axis is created for every unit that is assigned to a parameter. A maximum of 5 y axes can be defined per widget.

Each parameter is automatically assigned to a y axis. However, you can also manually assign the parameters to a different y axis.

You can define a low and high limit for each y axis. This means that you can only display a section between specific values in the widget.

Alternatively, you can enable "Scale by values". When the display is zoomed, the Y-axis adapts to display the range of values present.

5.5.3.4 Visualizing values (Value)

Description

The "Value" widget displays the aggregated value of a specific period. The value is derived either from a variable with a corresponding aggregation function or from a KPI result. The values of multiple parameters can be displayed in the widget.

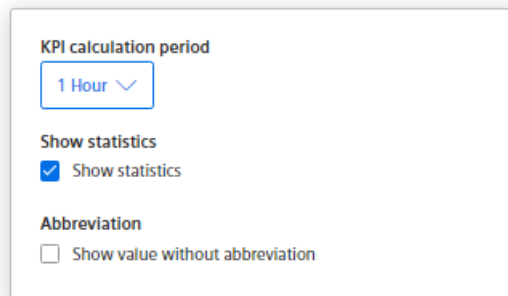
The following views are available for the "Value" type:

- Line graph (Page 148)
- Histogram (Page 151)
- Boxplot (Page 153)
- Table (Page 155)

Procedure

To define widget-specific display options, follow these steps:

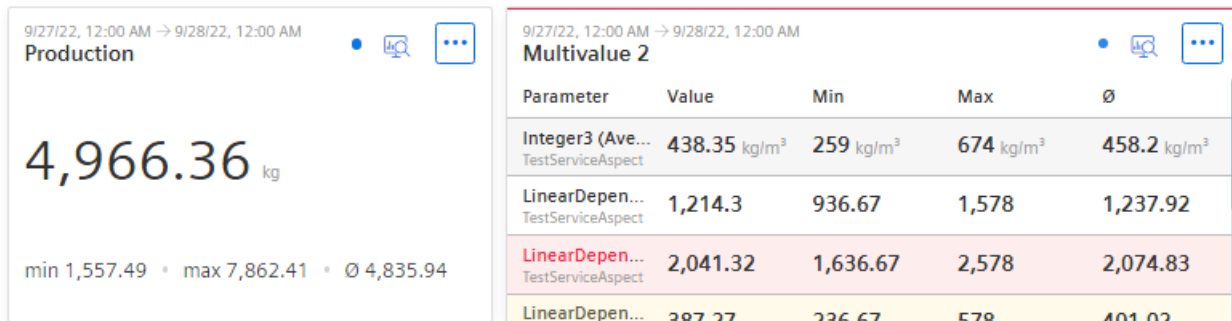
1. Create a new widget or edit the existing one.
A parameter of the String type can be additionally selected, for example, to designate production sections in the "Diagram" detail view by a descriptive name. Only the aggregation "Last" type is available for parameters of String type.
2. In step 3 "Details", you select whether the statistic is to be displayed.
To display the value with all digits and decimal places instead of the abbreviated representation of large values, select the option "Show values without abbreviation".
For KPI instances, specify the calculation period.



The screenshot shows a configuration dialog for a widget. It has three sections: 'KPI calculation period' with a dropdown menu set to '1 Hour'; 'Show statistics' with a checked checkbox; and 'Abbreviation' with an unchecked checkbox labeled 'Show value without abbreviation'.

Result

The widget displays an individual value or multiple values.



The value corresponding to the selected aggregation is displayed. In addition, the minimum, maximum and average for the selected period are displayed.

When displaying multiple values, the violation of the upper limit is visualized by colored highlighting.

Note

Values of the statistical data

The displayed statistics is calculated from the calculated values in the cycle that is specified in the widget configuration.

5.5.3.5 Visualizing machine statuses (Gantt)

Description

The "Gantt" widget shows the status of a machine at a glance, e.g. by using different color codes. The status can represent the current state or the state within a specific period.

This will help you recognize:

- When the machine started.
- How long it was in "RUN" mode.
- When it changed to "STOP" mode.
- How long it remained in this state.

In the detail view, the status indicators are displayed individually broken down.

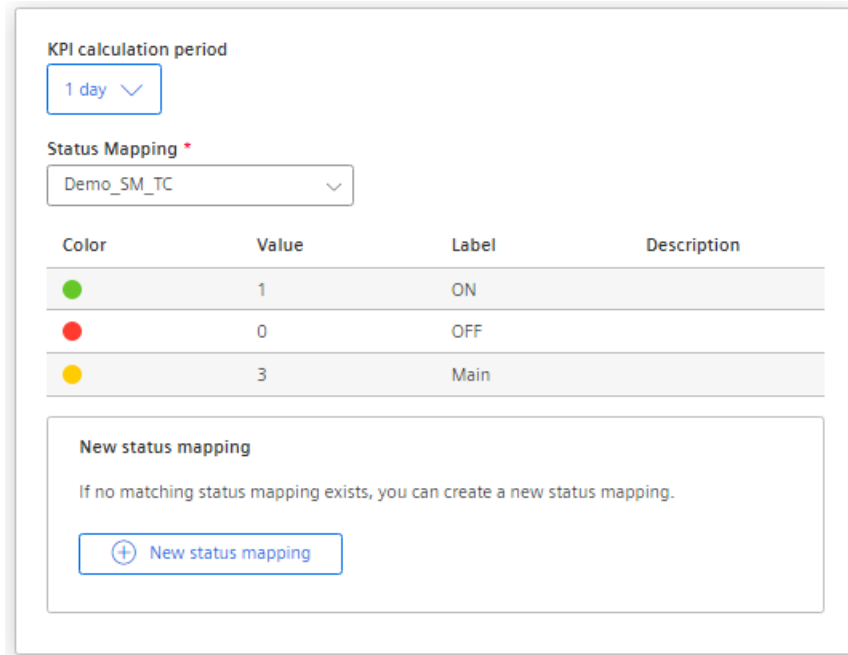
The following views are available for the "Gantt" widget:

- Gantt (Page 156)
- Table (Page 155)

Procedure

To define widget-specific display options, follow these steps:

1. Create a new widget or edit the existing one.
2. In step 3 "Details", select a status mapping from the drop-down menu. If no status mapping exists yet, you create one with "Create new status mapping". You can find information on creating a status mapping in the section "Creating status mappings (Page 34)".



The screenshot displays the configuration interface for a KPI widget. It includes a dropdown for the KPI calculation period (set to 1 day) and a dropdown for the Status Mapping (set to Demo_SM_TC). Below these is a table with columns for Color, Value, Label, and Description. The table contains three rows: a green circle for value 1 labeled ON, a red circle for value 0 labeled OFF, and a yellow circle for value 3 labeled Main. At the bottom, there is a section for creating a new status mapping with a button labeled '+ New status mapping'.

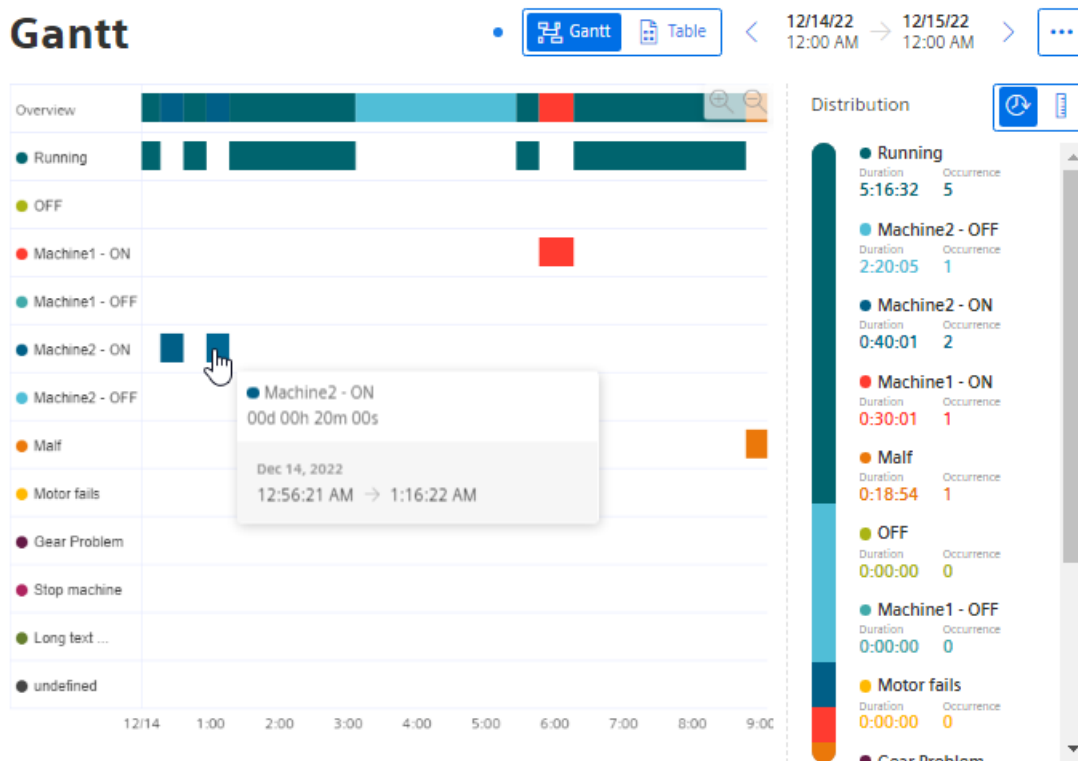
Color	Value	Label	Description
●	1	ON	
●	0	OFF	
●	3	Main	

For KPI instances, specify the calculation period.

Result

The machine status is visualized according to the status mapping.

The tooltip shows, for each machine status, when this operating state occurred.



5.5.3.6 Visualizing the violation of limit values (gauge)

Description

The gauge (Gauge) visualizes limit values through colors. The gauge helps you recognize at a glance whether or not limits are being exceeded.

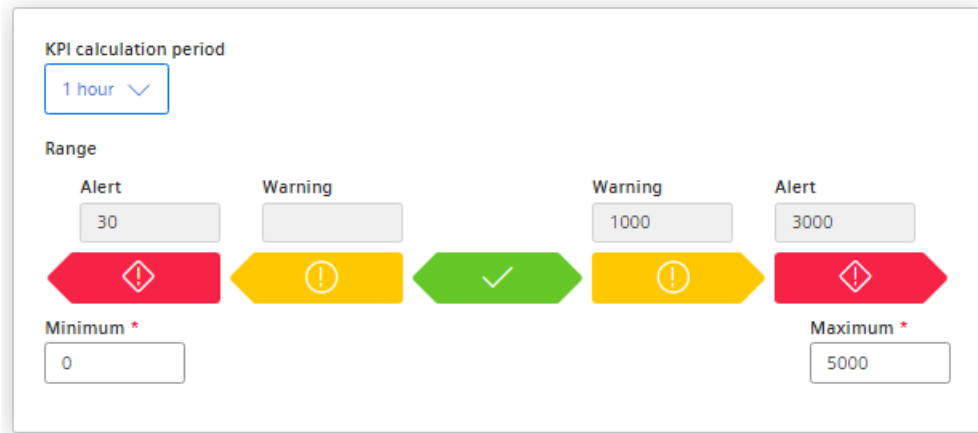
The following views are available for the gauge:

- Line graph (Page 148)
- Histogram (Page 151)
- Boxplot (Page 153)
- Table (Page 155)

Procedure

To define widget-specific display options, follow these steps:

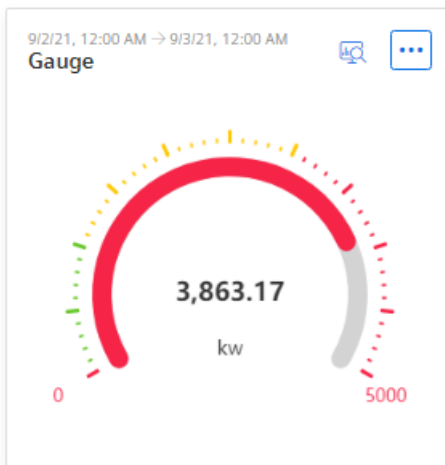
1. Create a new widget or edit the existing one.
2. In step 3 "Details", the limit values from the general display options are applied if you have already defined them there.
Specify the value with which the display of the gauge scale starts and ends.



For KPI instances, specify the calculation period.

Result

The gauge in the example shows that the limit value has been exceeded.



The detail view shows the sequence and the defined limit values.

5.5.3.7 Visualizing the distribution of consumptions or quantities (Pie chart)

Description

The "Pie" widget visualizes the distribution of consumptions or quantities. Clicking on a segment highlights the segment and displays the corresponding value.

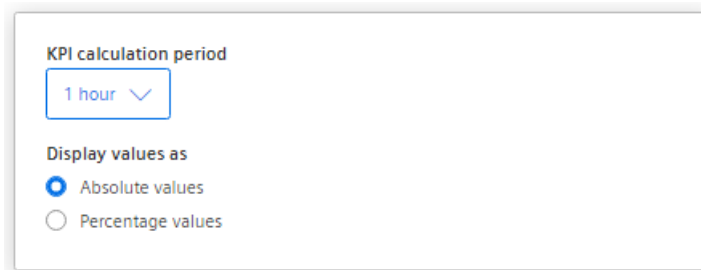
The following views are available for the pie chart:

- Line graph (Page 148)
- Histogram (Page 151)
- Regression (Page 152)
- Boxplot (Page 153)
- Table (Page 155)

Procedure

To define widget-specific display options, follow these steps:

1. Create a new widget or edit the existing one.
2. In step 3 "Details", you specify whether the values are to be displayed as absolute or percentage values.

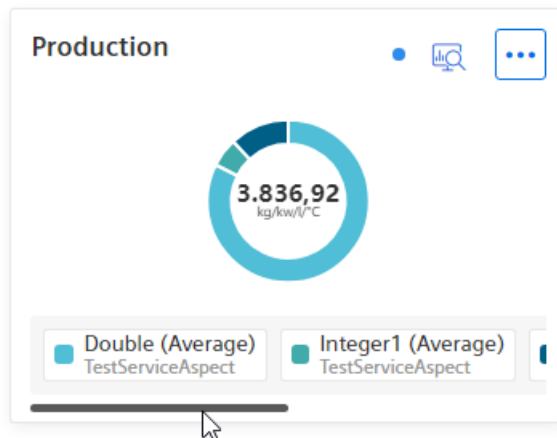


For KPI instances, specify the calculation period.

Result

The pie chart in the example shows you the percentage values of the selected parameters.

Pie ∨ ★



5.5.3.8 Visualizing the intensity of data values (Heatmap)

Description

The Heatmap widget visualizes the history of the intensity of data values. You can, for example, display the energy consumption (red = high energy consumption; green = low energy consumption), machine states or production quantities in a specific period.

The following views are available in the detail view of the Heatmap:

- Heatmap (Page 157)
- Line graph (Page 148)
- Histogram (Page 151)
- Boxplot (Page 153)
- Table (Page 155)

Procedure

To define widget-specific display options, follow these steps:

1. Create a new widget or edit the existing one.
2. In step 3 "Details", you define
 - The KPI calculation period
 - Whether the data is displayed in the day view or the week view.
 - The color in which the different intensities are to be displayed.

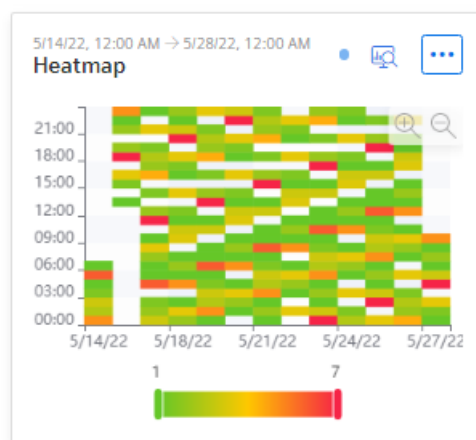
If required, specify the values for minimum and maximum of the color scaling.

The screenshot shows the configuration options for a widget. Under "KPI calculation period", a dropdown menu is set to "1 hour". Under "Display values as", the "Day view" radio button is selected. Below, there are three input fields for "Minimum", "Normal", and "Maximum" values, each with a corresponding color selection dropdown. A horizontal color scale bar is visible at the bottom, transitioning from green on the left to red on the right.

- If you do not define fixed values, the lowest and the highest measured value is used for the color scale. In case of extreme peaks, the Heatmap may return a distorted picture.

Result

The Heatmap visualizes the data values according to the assigned color scale.



Machine statuses are displayed in color in the example:

- Green: Machines running
- Yellow: Planned and unplanned maintenance

- Red: Standstill
- White: No data available or hidden

5.5.3.9 Visualizing relationships in 3D (3D bars)

Description

The widget "3D bars" visualizes the relationship of three parameters in 3 dimensions.

The following views are available in the detail view:

- 3D bar (Page 158)
- Histogram (Page 151)
- Boxplot (Page 153)
- Table (Page 155)

Procedure

To define widget-specific display options, follow these steps:

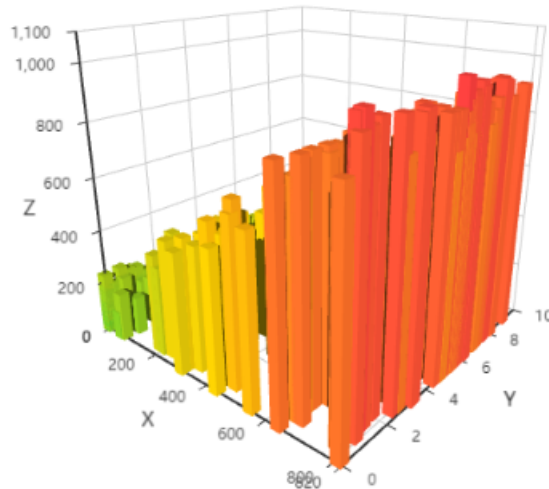
1. Create a new widget or edit an existing one.
2. In step 2 "Parameters", select exactly 3 parameters whose relationship is to be visualized.
The values of the selected parameters must be available with the same time stamp.
3. In step 3 "Details", you define the KPI calculation period.
You assign a parameter to each axis.
You assign a name for each axis and determine the low limit and high limit.
You specify the color in which the different intensities are displayed.

Result

The values are visualized in different views.

3D bar

The selected parameters are visualized in the detail view of the widget.

[Back](#)**3D**

X Filled_bottles (Aver...
Filled_bottles Y Water_Consumptio...
Water_Consumption Z Electricity_Consum...
Electricity_Consumption

- To rotate the view, hold down the mouse button and move the mouse pointer over the view.
- To zoom in the view, use the mouse wheel.

5.5.3.10 Linking an image for presentation

Description

You can use the Image widget to display an image on a dashboard.

Procedure

To define widget-specific display options, follow these steps:

1. Create a new widget or edit the existing one.
2. In step 2 "Details", upload an image file and define the display options.

2 Details

The screenshot shows a configuration window titled "Details" with a blue header. Below the header is a dashed blue box for image upload. Inside this box is a blue icon of a document with a picture, the text "Datei hochladen" with an upward arrow, and supported file formats ".PNG, .SVG, .JPG, .JPEG". Below the upload area is a section titled "Anzeigeeoptionen" with four buttons: "Passend" (checked), "Zentriert", "Gestreckt", and "Passend und zentriert". At the bottom are "Weiter" and "Zurück" buttons.

Step 3 shows a preview.

Result

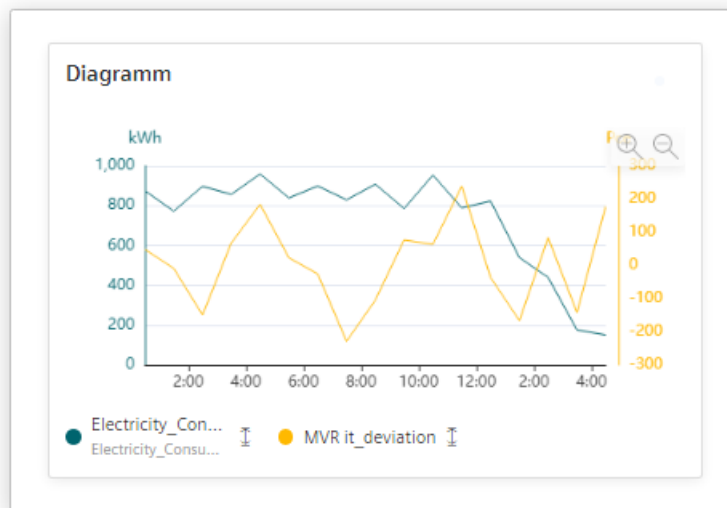
The image is displayed on the dashboard.

5.5.3.11 Preview a widget

The last step in creating a widget shows a preview.

Add widget

- 1 General ▼
- 2 Parameter ▼
- 3 Details ▼
- 4 Preview** ▲



[Back](#)

If the widget does not meet the requirements, adjust the widget before you create it. For example, add another y-axis if values are in different ranges.

5.5.4 Working with widgets


5.5.4.1 Editing widgets

Description

You can change a created widget.

Procedure

To change an existing widget, follow these steps:

1. In the widget, click .
2. In the drop-down menu, click "Edit".
The widget wizard opens.
3. You can switch freely between steps 2 and 3 and change the details. The steps differ in the settings and depend on the widget type.
4. Select the last step and click "Create widget".

Result

All changes are applied to the widget and are displayed directly.

5.5.4.2 Copying widgets

Description





You can copy a widget and paste it to another dashboard.

Note

Widgets on an automatically created dashboard cannot be copied.

Procedure

To copy a widget, do the following:

1. Click  in the widget.
2. Select "Copy"  from the drop-down menu.
The widget is copied to the clipboard and can be pasted to any user-defined dashboard.
3. Switch to the dashboard in which the widget is to be inserted.
4. Click  in the dashboard.
5. Select "Paste widget" .
The widget configuration is displayed.
6. Configure the widget.
Additional information on editing the configuration can be found in the section "Create a widget (Page 126)".
7. Click "Add widget".

Result

The copied widget is displayed in the dashboard.



5.5.4.3 Export widget data

Description

You can export the parameter data visualized in a widget as a csv file.

Procedure

To export the widget data, follow the steps below:

1. Click  in the widget or in the detail view of the widget.
2. Click  "Export widget data".

Result

A CSV file is provided in the download folder.

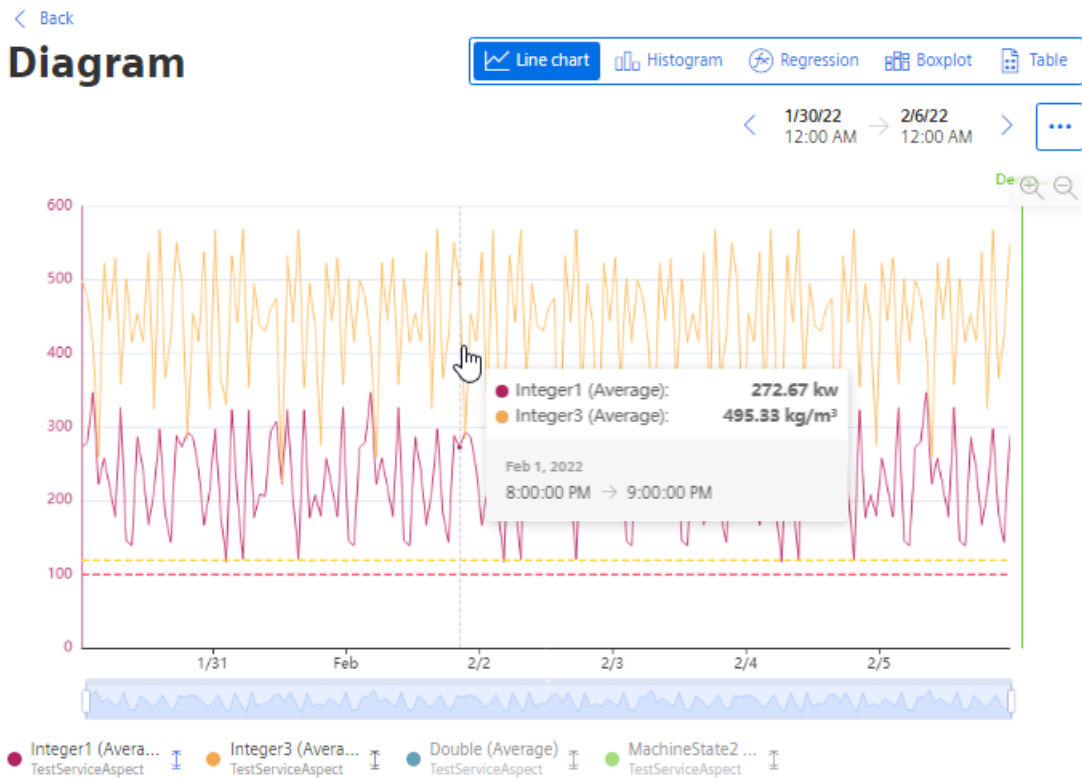
5.5.5 Widget views


Different views are available for a widget in the detail view.



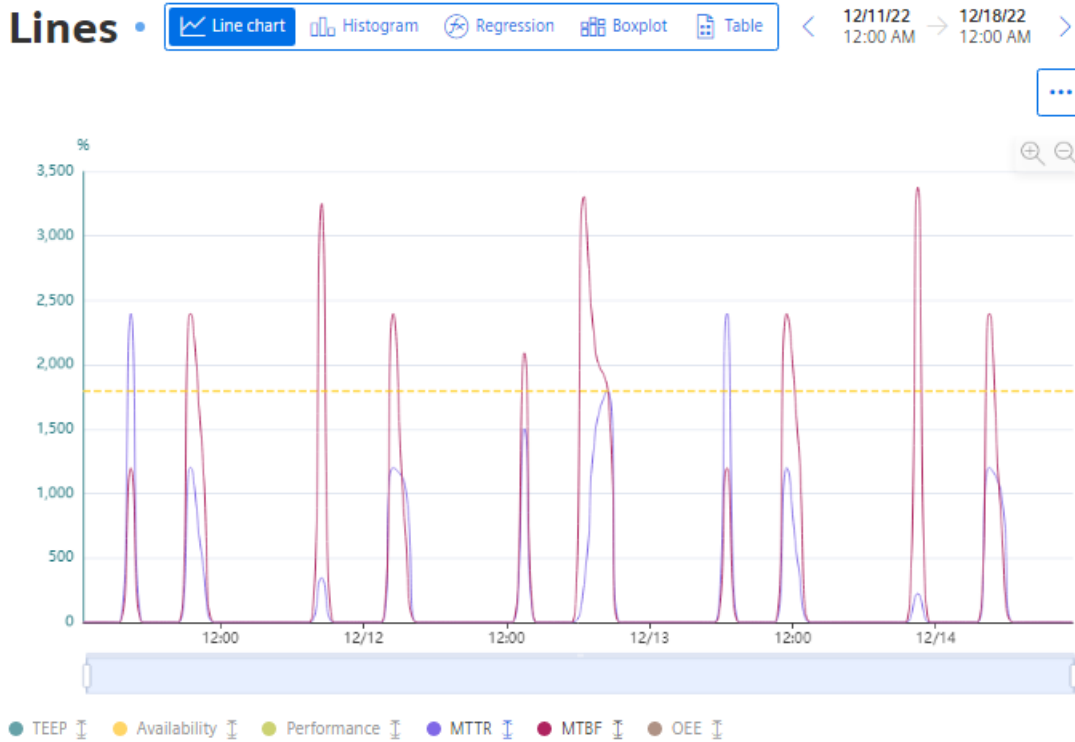
5.5.5.1 Line graph

The value gradient of the individual parameters is displayed as a line. The detail view shows the graphs of all parameters in the colors that you have defined in the display options.

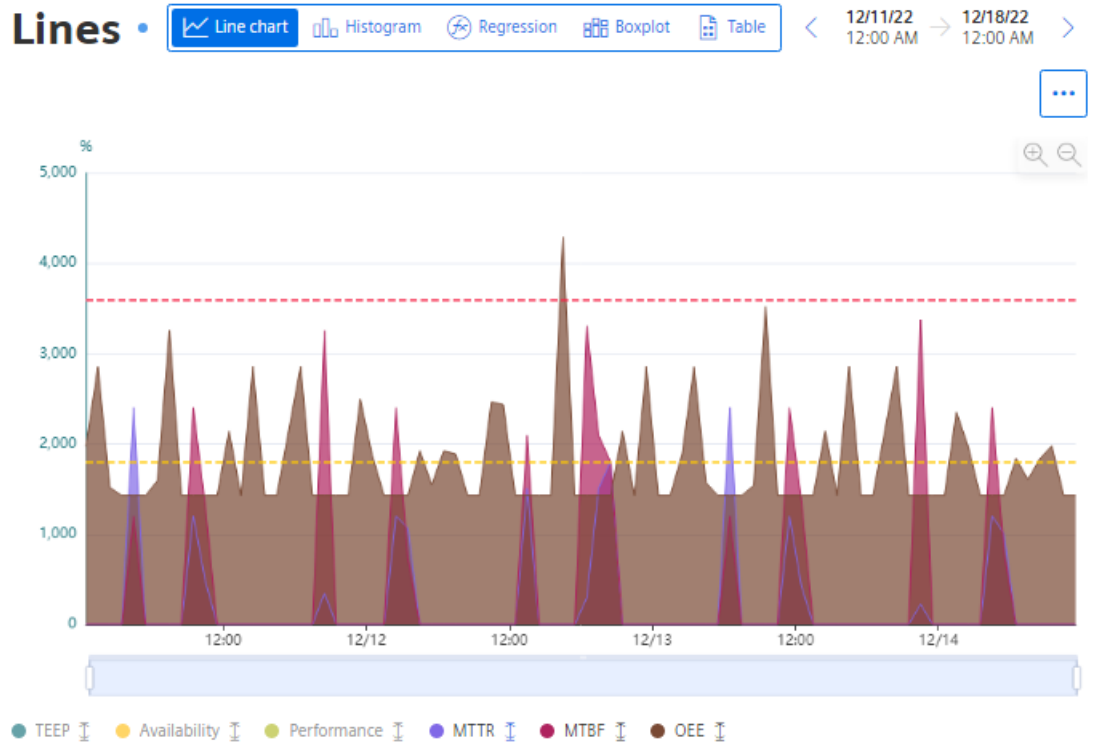


- Show/hide parameter: Click the parameter name below the display. The y-axis is automatically adjusted.
- Show/hide limit: Click  next to the parameter name
- Display details about a data point: Hover with the cursor over a data point.

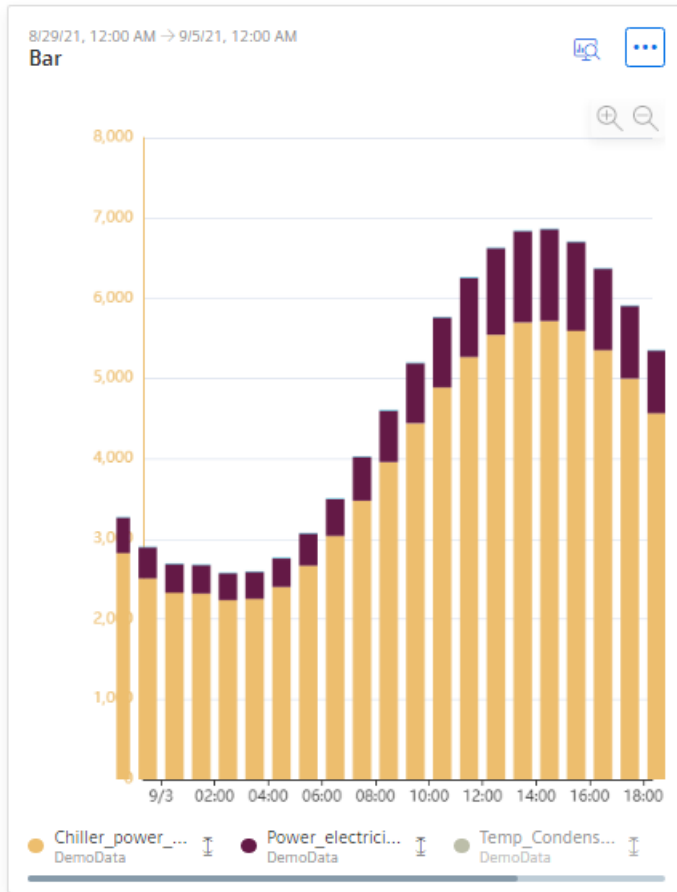
Visualization as spline curve



Visualization as area graph



Visualization as a stacked bar graph



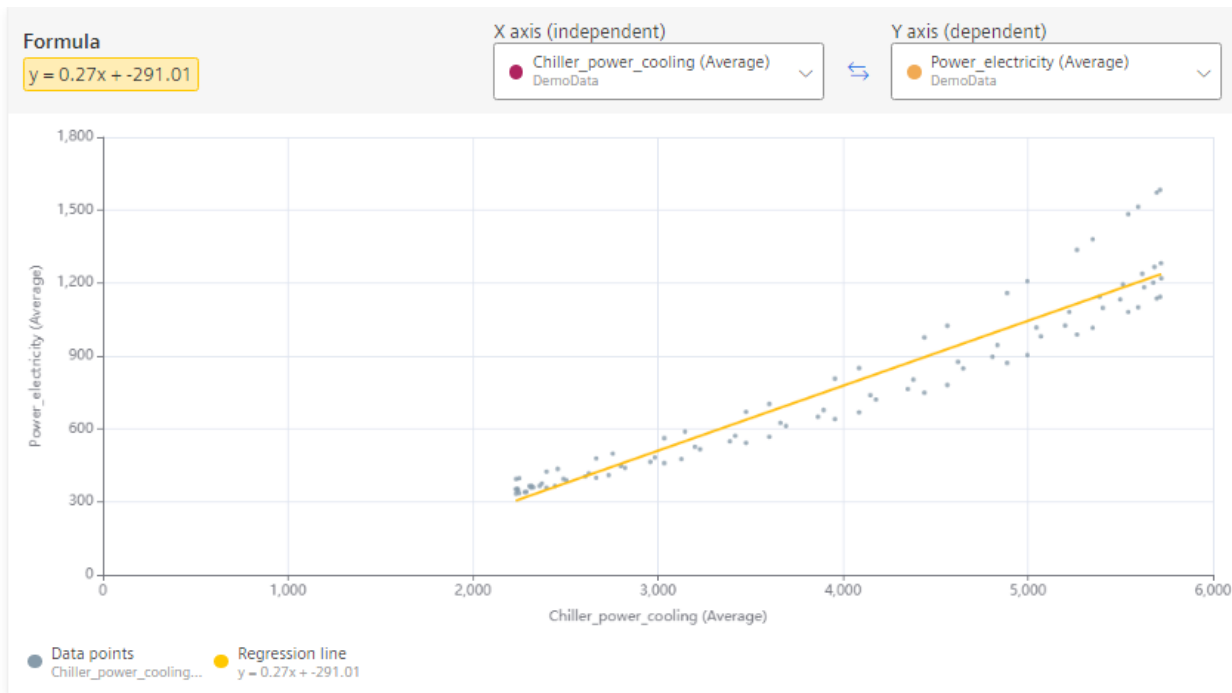
5.5.5.2 Histogram

The histogram shows the frequency distribution of a selected parameter.



5.5.5.3 Regression

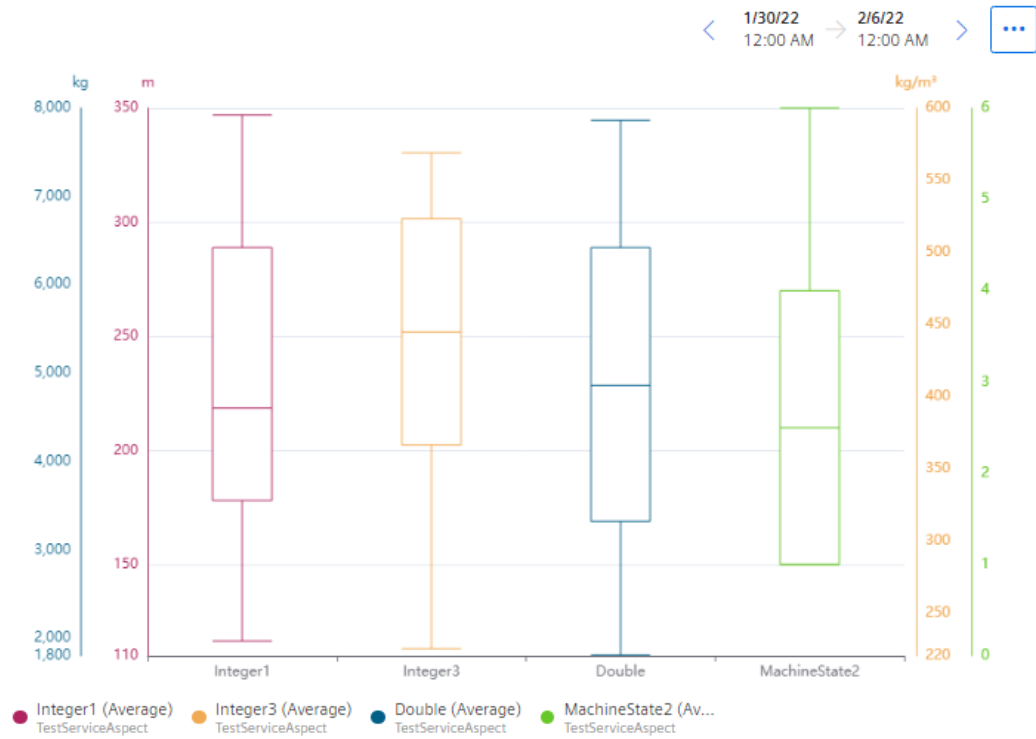
The regression analysis shows the relationship between two parameters.



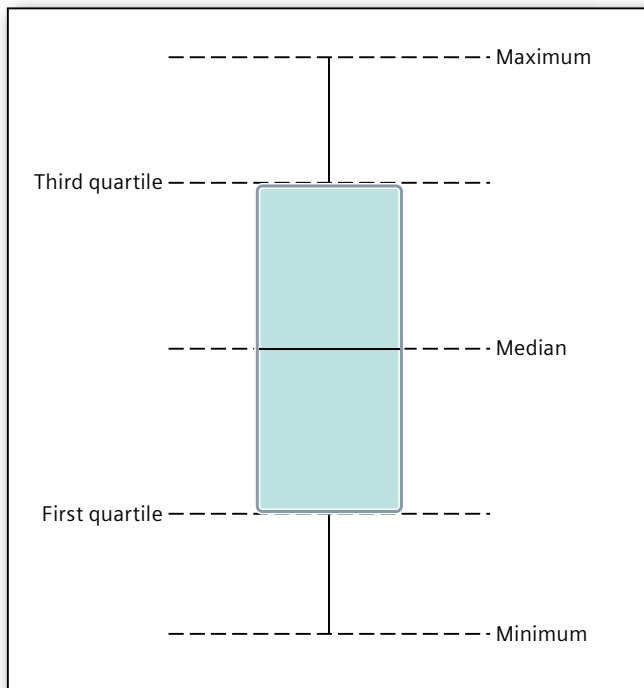
Select the parameter for the x-axis and the y-axis.

5.5.5.4 Boxplot

The boxplot display visualizes the statistical distribution of the values.



The box shows the range in which the middle 50% of the values lie. It is bounded by the upper, third and lower, first quartile.



Characteristic value	Description
Minimum	Smallest data value
First quartile	The smallest 25% of the values are less than or equal to this characteristic value
Median	The smallest 50% of the values are less than or equal to this characteristic value
Third quartile	The smallest 75% of the values are less than or equal to this characteristic value
Maximum	Largest data value

5.5.5.5 Table


The values are displayed side-by-side in a table.

< Back

3D • Bar 3D Histogram Boxplot Table < 12/1/22 12:00 AM → 1/1/23 12:00 AM > ...

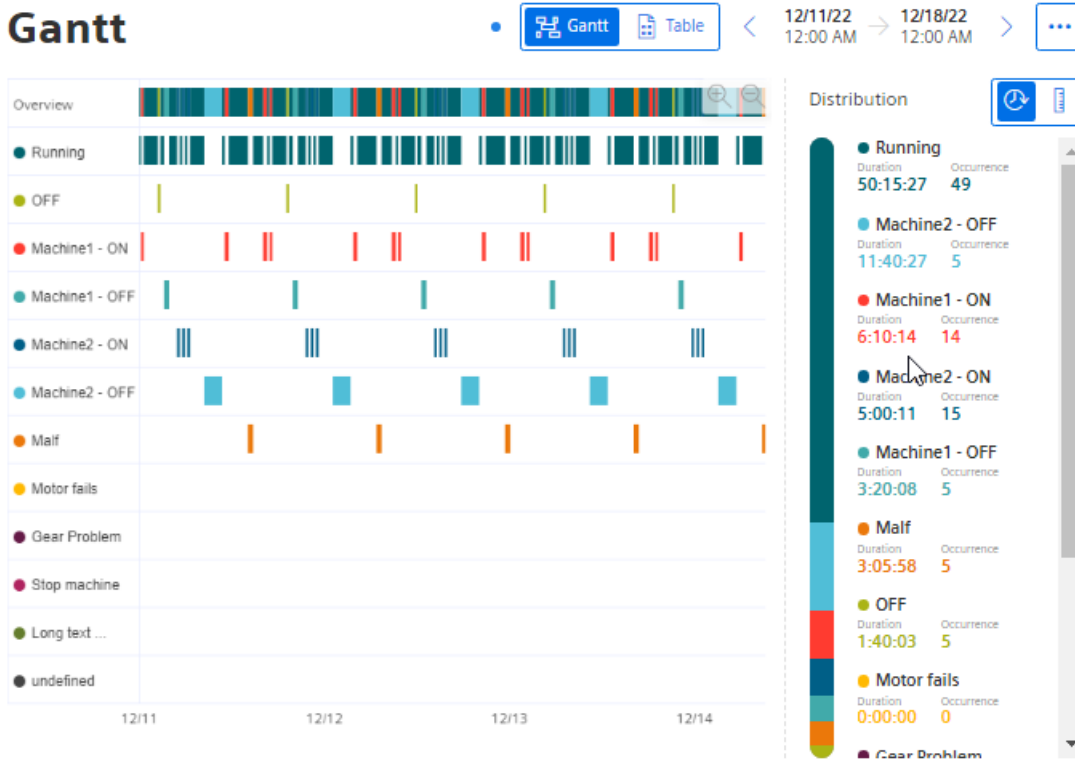
Q Search...

TIMESTAMP	FILLED_BOTTLES (A... Filled_bottles, Double, Pce	WATER_CONSUMPTION ... Water_Consumption, Double, ...	ELECTRICITY_CONSUMP... Electricity_Consumption, Dou...
12/12/22, 9:00 PM	0.00	0.00	168.77
12/12/22, 8:00 PM	0.00	0.00	121.49
12/12/22, 7:00 PM	0.00	0.00	66.78
12/12/22, 6:00 PM	0.00	0.21	17.63
12/12/22, 5:00 PM	0.00	0.00	6.84
12/12/22, 4:00 PM	0.00	0.00	46.11
12/11/22, 9:00 PM	0.00	1.21	215.12
12/11/22, 8:00 PM	0.00	1.28	124.09
12/11/22, 7:00 PM	0.00	1.19	141.30
12/11/22, 6:00 PM	0.00	1.36	33.78
12/11/22, 5:00 PM	0.00	0.34	42.55
12/11/22, 4:00 PM	0.00	0.62	145.17
12/11/22, 3:00 PM	0.00	0.36	175.74

- Sort table: Click in the column header.
- Filter table: In the search box, type a string and click .

5.5.5.6 Gantt

Machine states are displayed broken down in the detail view.

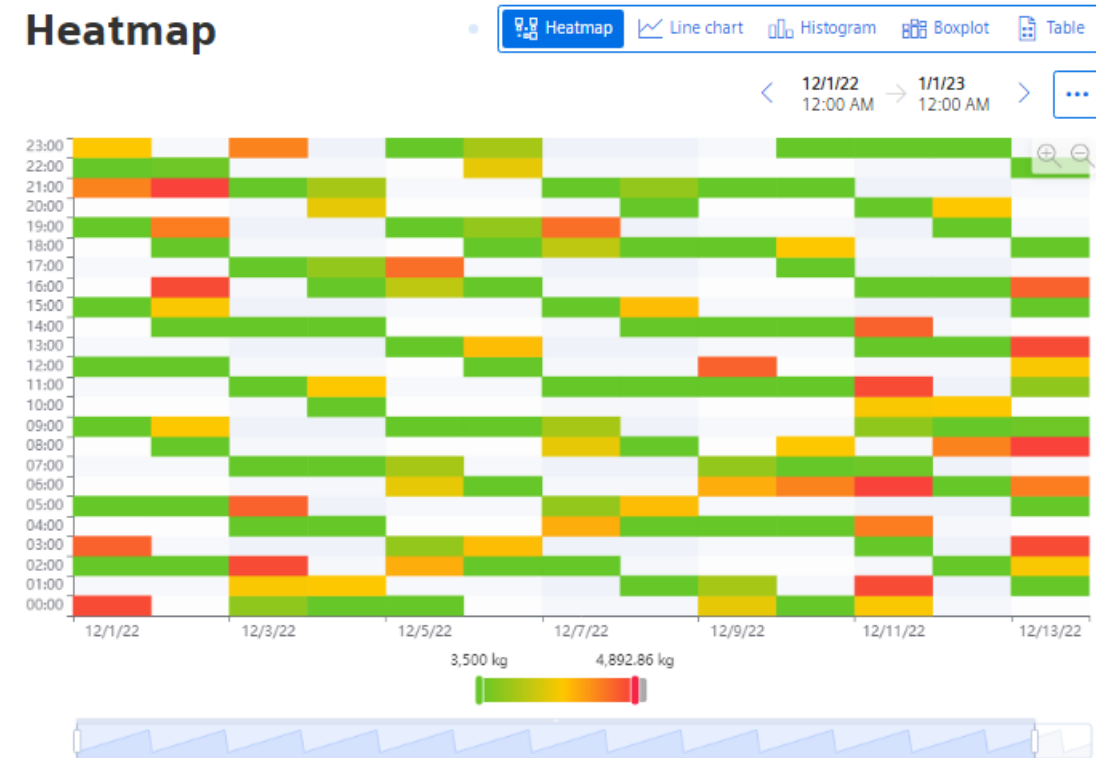


Distribution

- shows the distribution by duration.
- shows the distribution by number of the respective machine state.

5.5.5.7 Heatmap

The detail view Heatmap shows when and how often a parameter is in one of the value ranges.



- Restrict display to individual values: Use the slider below the chart.



- To adjust the displayed time range: Use the slider below the chart.



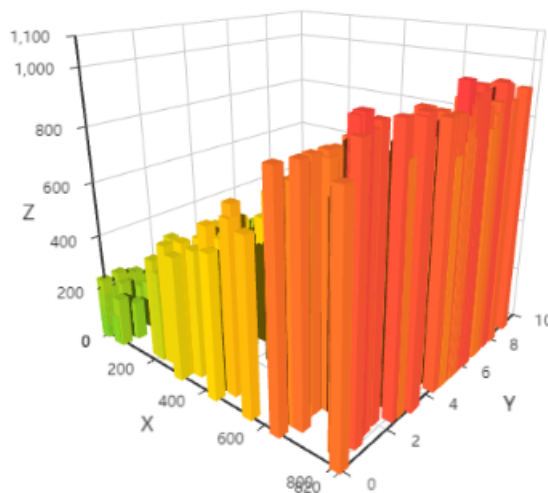
5.5.5.8 3D bar

The 3-dimensional view visualizes the relationship between three parameters.

[Back](#)

3D

Bar 3D
Histogram
Boxplot
Table
< 12/1/22 12:00 AM
1/1/23 12:00 AM >
...



X Filled_bottles (Average) Y Water_Consumption Z Electricity_Consumption

- Rotate view: While holding down the mouse button, move the cursor over the view.
- Zooming the view: Move the mouse wheel over the graphic.

5.5.6 Adapting a user-defined dashboard

Description

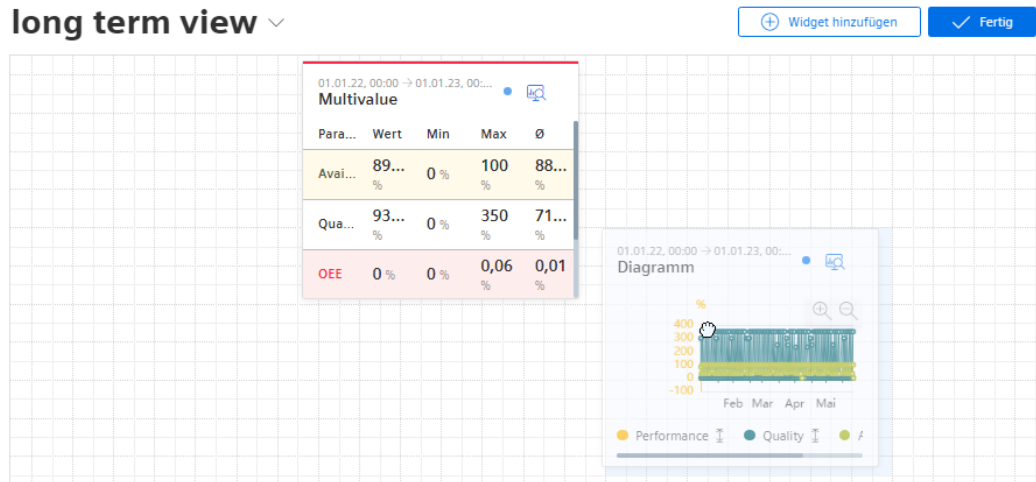
You can adjust the layout of a user-defined dashboard.

Procedure

To change the layout of a dashboard, follow these steps:

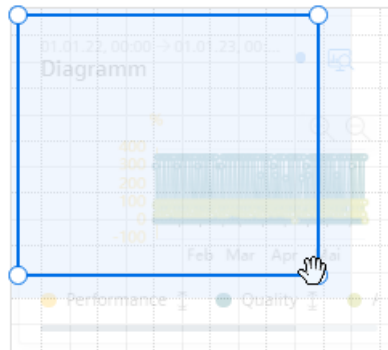
1. Click ... in the dashboard.
2. Select Adjust dashboard layout.
The dashboard is in edit mode. Grid lines are displayed in the background of the dashboard.

- To move a value, select the widget and drag it with the mouse to a different spot.



Permitted new positions for the widget are indicated through a blue shadow.

- To select the size of a widget, select the widget and drag the corner point of the marking to a new position.



- To add another widget to the dashboard, click "Add widget".
- To finish editing, click "Finish".


5.5.7 Exporting and importing dashboards

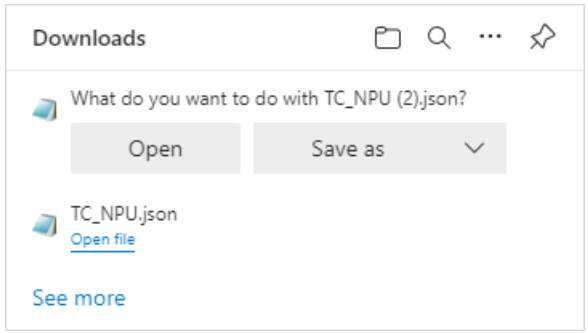
To be able to use status mappings that have been created on different devices, first export the user-defined dashboards and import them into other environments.

For a user-defined dashboard, export the dashboard in the file format JSON.

Exporting a user-defined dashboard

To export a dashboard, proceed as follows:

1. Display the dashboard.
2. Click .
3. To export a user-defined dashboard, select "Exporting a dashboard"
The "Downloads" dialog box opens.

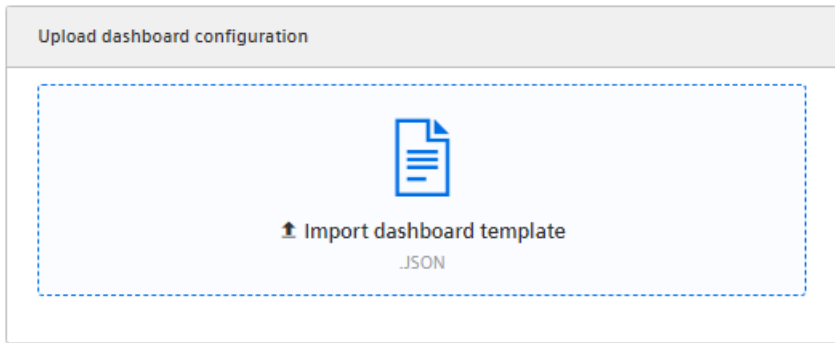


- To display the Export file in text format, click "Open".
- To save the Export file, click "Save as".
- To display more exports, click "See more".
- The toolbar in the dialog box has more options.

Importing a user-defined dashboard

To import a dashboard, proceed as follows:

1. Select an asset in the navigation toolbar in My Plant.
2. Click "Add dashboard" and select "Import dashboard".
The "Upload dashboard configuration" dialog box opens.



3. Click "Import dashboard template" to select a file for import.

- Click "Save" to import the selected file.
The configuration of the dashboard is displayed.

The screenshot shows the configuration interface for a dashboard. It is divided into two main sections: 'General' and 'Parameter'.

General Section: Contains a 'Name' field with a red asterisk indicating it is required. The text 'one more dashboard' is entered in the field.

Parameter Section: This section is split into two columns: 'Original parameter' and 'New parameter'.

- Original parameter:**
 - Quality:** A KPI parameter of type 'Double'. It is noted as 'Used in 3 widgets'. Below it are three widget options: 'Value' (Value), 'Diagramm' (Diagram), and 'Gantt' (Gantt).
 - Status:** A VAR parameter of type 'Int32'. It is noted as 'Used in 1 widget'. Below it is one widget option: 'Gantt' (Gantt).
- New parameter:** Contains a blue button with a plus sign and the text 'Select parameter'.

Since not all parameters, configurations of types, and widgets are available in the environment, adjust the configuration of the dashboard before importing.

- If the name of the dashboard is already in use on the asset, assign another name.
- Replace the parameter used in the imported configuration with a parameter that is actually present on the asset.

Status mappings and user-defined periods of the exported dashboard are also imported. Importing with erroneous data on parameters and configurations is not possible.

- Click "Import dashboard".
After a successful import, the "Go to dashboard" button is available.

Note

Maximum number of user-defined dashboards on an asset

The number of dashboards on an asset is limited to 5. No other dashboard can be imported once this number is reached.

5.6 Analyzing data

5.6.1 Using favorites

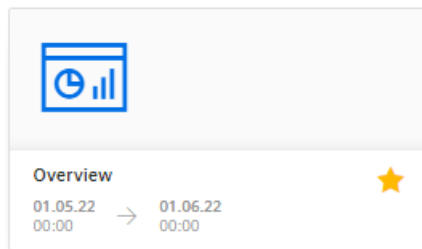
Description

To quickly get a display of the dashboards relevant for you, mark them as "Favorite".

Favorite dashboards are prominently displayed in overviews. In this manner, access to these dashboards is simplified.

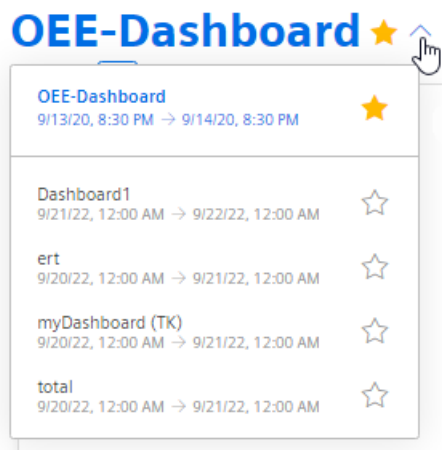
Procedure

1. To mark a dashboard as a favorite, click in the star on the dashboard.



2. To unmark it as a favorite, click the star again.

The "Favorites" function is also available in other selection lists and displays of dashboards.



5.6.2 Finding the analysis quickly

The app makes it easy for you to display analyses without time-consuming searches in the asset structure.



1. Under "Analyses" in the navigation bar, select the analysis type:

- OEE analysis
- Step time analysis
- Batch analysis

The configured dashboards are displayed.

Note

To display the analysis for multiple assets, select the assets under "Assets to analyze".

To display the dashboard for an asset, select the asset in My Plant.

2. To find a specific dashboard, use the Search field.

3. Use the sorting options to sort the dashboards by KPIs or visualization parameters.

4. Use the time navigation buttons to modify the displayed period for all displayed dashboards.

Display of assets



Displays the assets in the panel on the left



Refreshes the assets display



Shows the assets as a tree structure



Shows the assets as a flat list

Note

Grayed-out assets

Grayed-out assets in the tree structure indicate assets for which a dashboard has not yet been configured for the selected analysis.

See also

Presenting the productivity of a plant transparently (OEE analysis) (Page 75)

Configuring a step time analysis (Page 92)

Configuring multivariable regression (Page 103)

Evaluating the production of individual batches (Page 116)

Creating user-defined dashboards (Page 121)

5.7 Creating reports

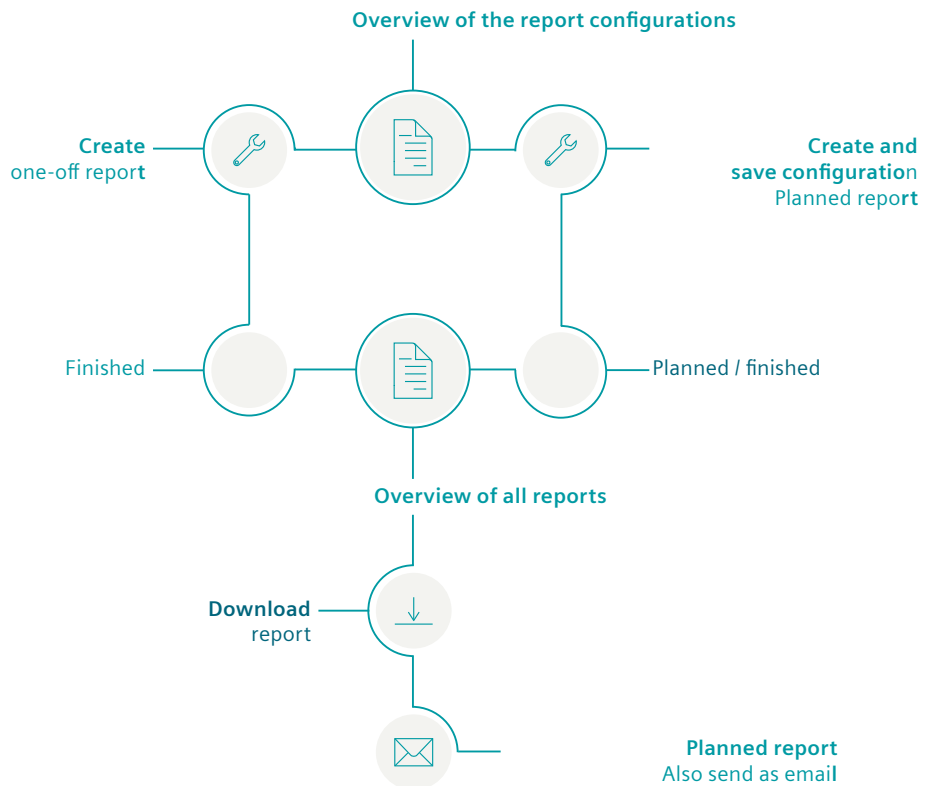
5.7.1 Introduction to Reporting

Description

Reports are a central component of the app. In addition to the visualization of KPIs and variables in the dashboards, reports are generated and sent as an email. Reports provide selected information on productivity, effectivity, machine utilization and more at regular intervals without the recipient of the reports needing to have access to the app. You can also generate a one-off immediate report whose configuration is not saved.

Reports are configured individually. Reports are generated as an Excel spreadsheet. You can use a self-designed template.

Reports can be downloaded and sent automatically via email.



Procedure

To configure and generate reports, proceed as follows:

1. Use the overview of report configurations. (Page 165)
2. Configure a report. (Page 166)
3. View generated reports and download them. (Page 171)
4. Create an ad hoc report based on an existing configuration. (Page 172)

5.7.2 Overview of the report configurations


Introduction

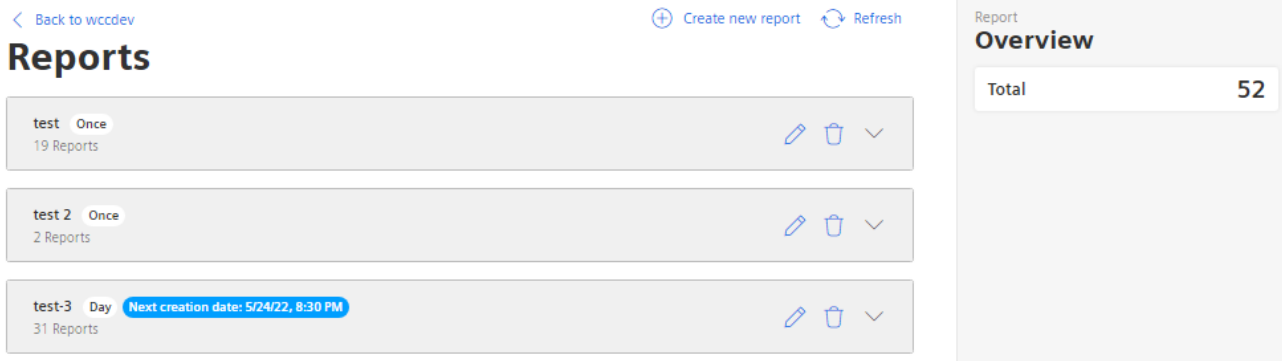
Reports are based on the configurations which are saved in the "Reports" view.

Here you manage all configurations, create new ones, edit the available ones and delete the unnecessary ones.

Procedure

To display an overview of the report configurations, follow these steps:






1. Select an asset in My Plant.
2. Click  in the information panel next to the "Reports".
The overview of configurations is displayed.



The screenshot displays the 'Reports' configuration overview. At the top left, there is a 'Back to wccdev' link. At the top right, there are 'Create new report' and 'Refresh' buttons. The main content area lists three configurations:

- test** (Once): 19 Reports. Includes edit, delete, and expand icons.
- test 2** (Once): 2 Reports. Includes edit, delete, and expand icons.
- test-3** (Day): 31 Reports. Includes a 'Next creation date: 5/24/22, 8:30 PM' badge, edit, delete, and expand icons.

On the right side, a 'Report Overview' panel shows a 'Total' of 52 reports.

3. To create a new configuration, select  "Create new report configuration".
4. To edit a configuration, select "Edit" .
5. To delete a configuration, select "Delete" .
You cannot delete a configuration if reports are already available based on it.
6. To view the reports based on a configuration, click  in the configuration display.
The view is expanded.
7. To update the view, select "Refresh" .

The information panel displays the total number of reports issued for the asset.

5.7.3 Configuring reports

Description


To create a report once or with periodic planning, define a configuration. You define the following in the configuration which is saved:

- Report interval: One-off or planned
- KPIs and variables that are reported
- Type of aggregation: Balance value or process values
- Placement of the values in a sheet of an Excel file
- Recipients of the report

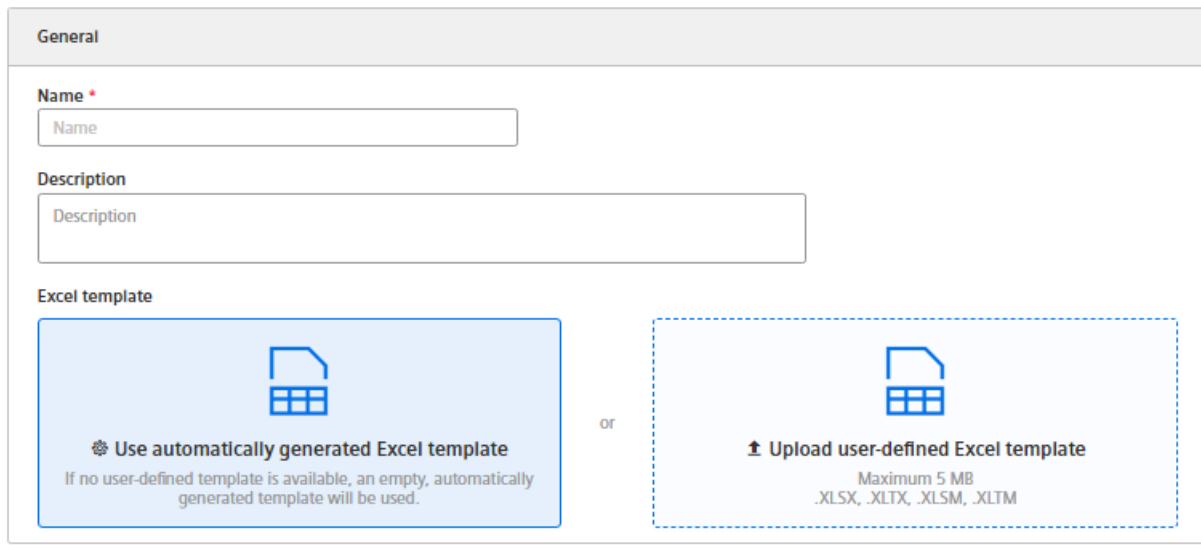
A report consists of one or multiple areas. For example, the values of a year can be shown in one area, while the daily values of the last month are shown in an additional area.

Procedure

To configure a report, follow these steps:

1. Go to My Plant and select an asset. The tiles of automatically generated and user-defined dashboards for this asset are displayed.
2. Click  in the information panel next to the "Reports".
If a configuration has already been created, the overview is displayed.
3. To define a new configuration, select "Create new report configuration".
4. The "Add report configuration" editor appears.

Add report configuration




General


Name *
Name

Description
Description

Excel template

 **Use automatically generated Excel template**
If no user-defined template is available, an empty, automatically generated template will be used.

or

 **Upload user-defined Excel template**
Maximum 5 MB
.XLSX, .XLTX, .XLSM, .XLTM

5. Enter the name of the report.
The name is shown as the subject in the sent email and in the overview of the reports.

6. Optionally enter a description for the report.
The description makes it easier to assign the report.
 7. Load an Excel file as a template for the report.
-

Note**Excel template**

An Excel file is required to create the report.

- Permitted data formats XLSX, XLTX, XLSM and XLTM
 - Minimum file size: 1 KB
 - Maximum file size: 5 MB
-

You can use either an automatically generated template or a user-defined Excel template.

Note**User-defined Excel template**

There are no further restrictions when designing the template.

When selecting the start cell within a range, ensure that elements of your template are not overwritten.

The template can, for example, contain a letter head, or recurring information on the location of the plant for each report. You can structure a template using pre-formatted, filled cells as headings.

If you do not upload a template, a blank Excel file is used as the basis for the report. You can replace the automatically generated template with your own template at any time.

5.7 Creating reports

- 8. Select the date on which you want the report generation to start. The date can lie in the past.

The screenshot shows a 'Scheduling' configuration window. It includes fields for 'Start report generation on' (set to 5/31/23), 'Time zone' (set to Europe/Berlin), 'Data interval' (set to Week), and 'Report interval' (set to Week). A 'Periodic scheduling' checkbox is checked. A blue information banner states: 'SMTP configuration is required in the SIMATIC Notifier app in order to send created reports to recipients.' Below this is a 'Recipients (0/20)' section with a text input field containing 'someone@example.com' and an 'Add recipient' button. At the bottom is a 'Preview' section with a table showing report generation dates and data periods.

Preview	Generation date	Period of contained data
Report 1	Jun 4, 2023 12:00 AM	May 28, 2023 12:00 AM → Jun 4, 2023 12:00 AM
Report 2	Jun 11, 2023 12:00 AM	Jun 4, 2023 12:00 AM → Jun 11, 2023 12:00 AM
Report 3	Jun 18, 2023 12:00 AM	Jun 11, 2023 12:00 AM → Jun 18, 2023 12:00 AM

- 9. Select a time zone. The time zone is added as an offset to the start date.
- 10. Select the "Data interval". The report is generated for the first time when the interval after the start date is reached. Example: The start date is 01/01/2022. The interval is one week. The report is generated on 7 Jan. 2022.

11. To create a configuration for a report that is generated regularly based on the selected interval, activate the "Periodic scheduling" switch.



To generate a one-off report, deactivate the switch.



12. Specify up to 20 valid email addresses for sending a periodical report by email.

Recipients (1/20)

recipient@company.org

+ Add recipient

Add the recipients who will receive the created report.

monitor@company.org

Note

One-off reports

One-off reports are not sent via email.

13. Enter the name of the first section.

Note

Creating sections

You can create up to 20 sections with different configurations. The sections can be exported in different sheets of the Excel workbook.

Section 1

Name *

Section 1

Is placed above the specified start cell.

Sheet name *

Sheet 1

When the sheet is not available, a new one is created.

Start cell *

C1

Defines the start cell for the data that is exported into the template.

The name is specified together with the report interval in the start cell of the report. The values are listed below.

14. Specify the name of the Excel workbook in which the section is exported.
If a sheet with that name does not exist in the template, it is created.
15. Enter the start cell as of which the values are exported.

Note

No check of the cell sections

There is no check as to whether the exported values will overwrite existing content.

- 16. Select whether a balance value or process values are exported in this section.
 - Balance value: Single value that results from the aggregation of the interval values.
Example: The average value for one month.
 - Process values: All values that are available during the selected interval.
Example: A value is exported for each day of a month.

List values as

<input checked="" type="radio"/>	Process values All values of the selected interval based on the selected calculation period are exported.
<input type="radio"/>	Balance value Single aggregated value for the selected period is exported.

Calculation interval

1 Hour

Defines the interval of values for the selected period.

Data alignment

<input checked="" type="radio"/>	Column(s) Data is exported vertically.
<input type="radio"/>	Row(s) Data is exported horizontally.

- 17. Only for process values, select the interval of the calculation. The interval specifies how often a process value is output within the reporting period.
Example: For the reporting period of one month, values are output every hour.
- 18. Select whether the data is arranged in columns or rows.

19. For new report configurations, add at least one parameter which is output in the area.

Parameter (2/50) *

At least one parameter must be added.

⋮	1	OEE	wccdev / EdgeSheeran Demo / OEE	KPI	🗑️
⋮	2	Availability	wccdev / EdgeSheeran Demo / OEE	KPI	🗑️

To change the sequence of the parameters, drag a parameter up or down by means of ⋮.

Note

Parameter selection

Maximum number per section: 50 parameters.

Parameters of the String type are not supported.

Note

Limited export to Excel

In a report, you can export a maximum of 500,000 cells to Excel.

20. You can add another value at any time by clicking "Add parameter".

21. To create an additional section, select "Add section".

22. To save the configuration, select "Save".

Result

- The configuration for a report has been created and saved.
- The "Reports" view is displayed.
- The periodic reports are generated as of the start date with the selected interval. The one-time reports are only created for the start date.

5.7.4 View report



Description

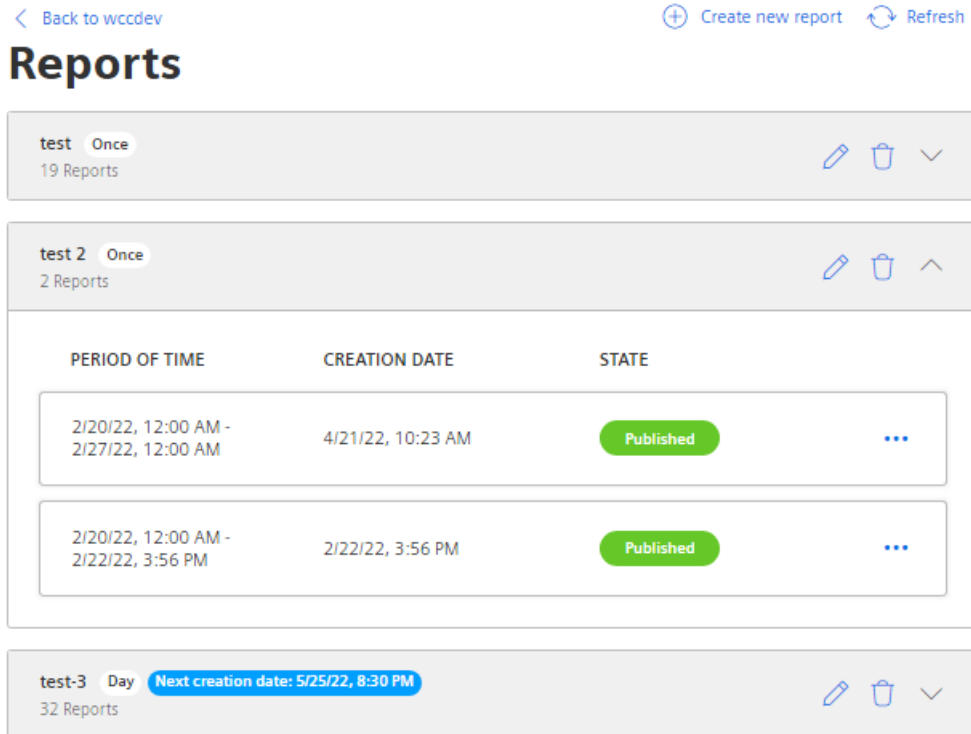
In the "Reports" view, both available and planned reports are displayed. You can see and download periodically generated and one-off reports.

If there are more than 500 reports in the app, the oldest reports are deleted.





Procedure

To display the overview of all reports, proceed as follows:

1. Select an asset in My Plant.
2. Click  in the information panel next to the "Reports".
3. The overview of configurations is displayed. Under each configuration, you find reports which were planned and created based on the configuration.
4. To view the reports based on a configuration, click  in the configuration display.



The view is expanded.

5. To download a report, click  and from the drop-down menu select "Download" .
6. To create a report again after an error has occurred, select "Refresh"  in the row of the report.
7. To delete a report, select the report and click "Delete" . This way you delete the report and not the configuration.

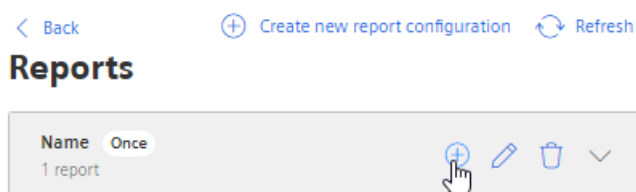
5.7.5 Creating an ad hoc report

Based on an available report configuration, a report can be created at any time. The report can be created for a past period of time.

Procedure

To create an ad hoc report based on an existing configuration, follow these steps:

1. Display the overview of configurations.
More information: View report (Page 171).
2. In a report configuration, click "Create ad-hoc report".



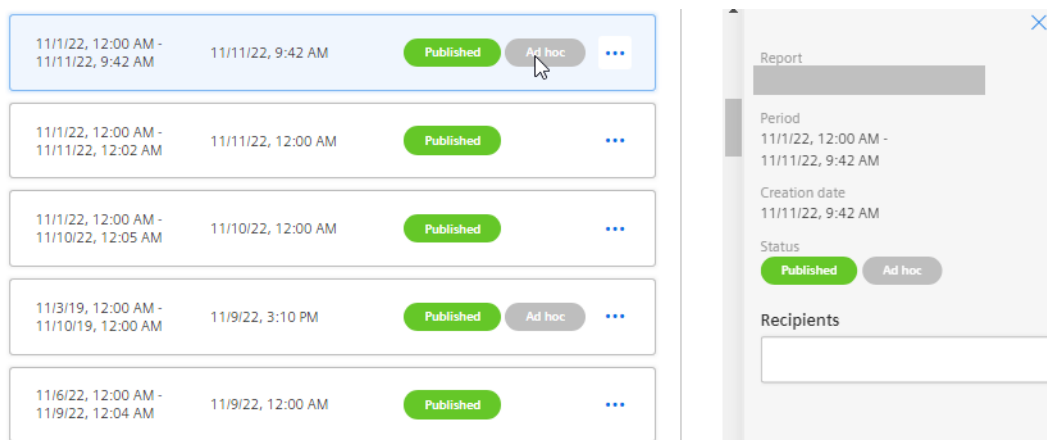
The "Create ad-hoc report" dialog is displayed.

3. Specify the start date.
The preview shows the period for which the report will be created.
4. Click "Add".

Result

A report is immediately created once based on the selected configuration.

The report appears in the list of reports and can be downloaded there.



Quality codes

Description

The quality code measures the quality of the connection from a data provider to the MindConnect element. This means that a value with quality code \neq TRUE is ignored in the app, because the quality code is not transferred to the platform. This value is not included in the aggregation, not included in the calculation of KPIs, and not included in the dashboard.

The following table is based on the OPC UA standard and shows the quality codes possible for OPC UA and S7:

Quality code (hex)	Quality code (dec)	Quality	Description
0x00000000	0	GOOD	Good quality All values could be read.
0x00BA0000	12189696	GOOD_INCOMPLETE	Good quality Values may be incomplete. A least 1 value could be read.
0x002F0000	3080192	GOOD_OVERLOAD	The sampling interval has slowed down due to resource constraints.
0x40920000	1083310080	UNCERTAIN_INITIAL_VALUE	Uncertain initial value Quality of the value is worse than usual. It might still be possible to use the value.

The quality code has the binary 8-bit structure QQSSSLL.

- Digits 1 and 2 (QQ) define the quality of the value.
- Digits 3 to 6 (SSSS) specify the sub-status of the quality.
- Digits 7 and 8 (LL) are optional and define possible limits.

Appendix

A.1 Abbreviations and acronyms

CSV	Comma separated values	File format of a text file which can be imported easily and in an uncomplicated manner into spreadsheet programs.
KPI	Key Performance Indicator	Key performance indicator
MTBF	Mean Time Between Failures	Mean time between failures
MTTR	Mean Time To Repair	Average repair time
MVR	Multivariable Regression	Description of a parameter using other parameters
OEE	Overall Equipment Effectiveness	Overall equipment effectiveness
TEEP	Total Effective Equipment Performance	Medium for the performance metrics

