

Machine Monitor for MindSphere

Application Manual




Legal information	1
What's new in Machine Monitor	2
Introduction	3
Structure of the app	4
User profile	5
Filter, search and tags	6
Creating Maintenance Rule templates	7
Configuring Assets for maintenance monitoring	8
Monitoring dashboards	9
Registering maintenance in the logbook	10
View event log	11

Valid for:
Machine Monitor V2.4.0

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 AG. 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	Legal information.....	5
1.1	Security information.....	5
1.2	Note regarding the general data protection regulation.....	5
2	What's new in Machine Monitor.....	6
2.1	What's new in Machine Monitor V2.4.0?.....	6
2.2	What's new in Machine Monitor V2.3.0?.....	6
3	Introduction.....	7
3.1	Function overview.....	7
4	Structure of the app.....	8
5	User profile.....	10
5.1	User information.....	10
5.2	Tenants and subtenants.....	11
5.2.1	User roles as tenant.....	11
5.2.2	Additional user roles for registering performed maintenance	11
5.2.3	User roles as subtenant.....	12
5.2.4	Adding/deleting users (as Tenant Administrator).....	12
5.3	Usage information.....	12
6	Filter, search and tags.....	13
6.1	Filter and search.....	13
6.2	Using tags.....	13
7	Creating Maintenance Rule templates.....	15
7.1	Introduction to Maintenance Rules.....	15
7.2	Creating rules for maintenance intervals ("interval based").....	16
7.3	Creating rules for condition monitoring ("Parameter limits").....	17
7.4	Instructions and documents.....	18
7.5	Creating Maintenance Rule collections.....	19
7.6	Exporting and importing configurations.....	19

8	Configuring Assets for maintenance monitoring.....	21
8.1	Introduction to Asset configuration.....	21
8.2	Assigning new Maintenance Rules to an Asset.....	21
8.2.1	Rule selection and basic configuration.....	21
8.2.2	Connect maintenance triggers to Asset variables.....	23
8.2.3	Aggregation functions.....	23
8.2.4	Trend model and calculation period.....	24
8.2.5	Connect reference parameter to Asset variable.....	25
8.2.6	Expose Maintenance Rule status to variables.....	25
8.3	Activating assigned Maintenance Rules.....	26
8.4	General settings.....	26
8.4.1	Authorized roles for maintenance.....	26
8.4.2	Notifications.....	27
8.4.3	Expose Asset status to variables.....	27
8.5	Resetting maintenance intervals.....	28
8.6	Deleting rule assignments.....	28
9	Monitoring dashboards.....	29
9.1	Introduction to monitoring dashboards.....	29
9.2	Overview for single Assets.....	29
9.3	Overview for hierarchical Assets.....	30
9.4	Detail view.....	30
10	Registering maintenance in the logbook.....	31
10.1	Introduction to the maintenance logbook.....	31
10.2	Creating entries for performed maintenance jobs.....	31
10.3	Registering unplanned maintenance.....	32
10.4	Maintenance logbook (single Asset).....	33
10.5	Maintenance logbook (hierarchical Asset).....	33
11	View event log.....	34
11.1	Introduction to the event log.....	34
11.2	Detail view.....	34

Legal information

1.1 Security information

Siemens provides products and solutions with industrial security 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 security 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 security measures that may be implemented, please visit (<https://www.siemens.com/industrialsecurity>).

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 customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed visit (<https://www.siemens.com/industrialsecurity>).

1.2 Note regarding the general data protection regulation

Siemens observes the principles of data protection, in particular the principle of data minimization (privacy by design). For the Machine Monitor product, this means that the product processes / stores the following personal data: User name (first name and last name), email address, user role.

No data of privacy or intimacy is processed or stored.

The above data is required for the login, the billing function and for the internal user administration. The username and email address are saved when creating or editing Maintenance Rules and Maintenance Rule collections, as well as when registering maintenance jobs in the maintenance logbook.

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 can also be deleted if necessary. 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 in Machine Monitor

2.1 What's new in Machine Monitor V2.4.0?

All important new features in Machine Monitor are summarized here. You can find more details on individual topics in the documentation.

Better display in the "Configuration" module

The tabular displays in the "Configuration" module have been improved. This affects the display of the maintenance rules, maintenance rule collections, instructions and documents.

2.2 What's new in Machine Monitor V2.3.0?

All important new features in Machine Monitor are summarized here. You can find more details on individual topics in the documentation.

Boolean parameter support for interval-based maintenance rules

Interval-based maintenance rules can be created with Boolean parameters. This function allows you to create maintenance rules based on aggregated counter values. The function is available for interval-based maintenance rules on the "Edit maintenance rule" page.

"Usage information" page updated

For users with a subscription as of V2.3.0, the "Usage information" page has been updated. The page now displays the number of Assets that are being monitored. You get a better overview of the number of Assets included in your subscription.

Introduction

3.1 Function overview

Introduction

The MindSphere app Machine Monitor provides transparency of the maintenance status of your connected machines. The tracking of maintenance intervals based on actual machine usage enables an optimized prediction of due dates and planning of service assignments.

- You have access to maintenance data of your whole Asset structure worldwide
- You can set up and manage Maintenance Rule templates, as well as the Maintenance Rule assignments for each Asset
- You can monitor the maintenance status of all Assets in a cascaded overview
- Inspect the progress of each maintenance interval in a detail view
- The built-in trend prediction and due date calculation allows you to optimize your maintenance schedule.
- You can be notified about due maintenance jobs via email or via Notifier app
- You can register performed maintenance jobs in the maintenance logbook
- You can track the maintenance history of each machine in its maintenance logbook.

Browser recommendation

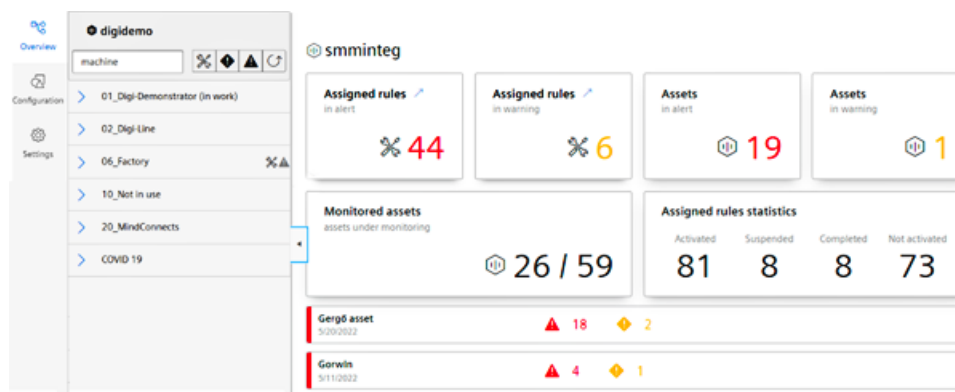
You require an HTML5-capable Internet browser to run the app. The Google Chrome, Mozilla Firefox and Microsoft Edge browsers are supported (current and most recent version). Google Chrome is recommended. You should preferably use 1920x1080 resolution.

Internet Explorer is no longer supported as of version 11.

In general, the app can run on any mobile device with an HTML5-enabled browser. Tablets are recommended.







Structure of the app

The Machine Monitor app has the following modules:



	<p>Overview</p>	<p>Allows you to set up a maintenance monitoring configuration for any Asset in your MindSphere account. The Asset list is imported from the Asset Manager.</p> <p>You can find more information on the Asset Manager here: Asset Manager System Manual (Asset Manager (mindsphere.io) (https://documentation.mindsphere.io/resources/html/asset-manager/en-US/index.html)).</p> <p>You can monitor the status and progress of the maintenance intervals of all your Assets with an active configuration on automatically generated dashboards. You can register and review performed maintenance jobs in the maintenance logbook for each Asset.</p>
	<p>Configuration</p>	<p>In the configuration module, you can manage Maintenance Rules, group Maintenance Rules into Maintenance Rule collections as well as create and manage instructions and documents relevant to the Maintenance Rules.</p>
	<p>Settings</p>	<p>In the settings, you can:</p> <ul style="list-style-type: none"> • Manage the "User information", e.g. the locale and the user roles • Check the "Usage information", e.g. the number of Assets for maintenance monitoring

The following symbols may appear:

	Bold wrench symbol in Asset list	The Asset has at least one activated Maintenance Rule assignment.
	Alert symbol in overview	A monitored Maintenance Rule for this Asset is overdue or has reached the alert status.
	Warning symbol in overview	One monitored Maintenance Rule for this Asset is overdue or has reached the warning status.
	Regular wrench symbol in Asset list	At least one child Asset has an active Maintenance Rule configuration.
	Gray alert symbol in the overview	At least one child Asset is overdue or has reached the alert status.
	Gray warning symbol in overview	At least one child Asset is overdue or has reached the warning status.

User profile

5.1 User information

Here, you can see your user information and set both the user interface language and the locale of the app. The selection of the locale has an effect on all numbers, such as decimal separators, for example, and dates in the overview dashboards and detail views in the app, as well as the maintenance logbook, and can be selected regardless of the user interface language.

5.2 Tenants and subtenants

5.2.1 User roles as tenant

If you are logged in as a tenant user or administrator in MindSphere, you have the following options, depending on your configured application rights:

Activity	Application user	Application administrator
Create, edit, duplicate, and delete Maintenance Rules	-	X
Create, edit, duplicate, and delete Maintenance Rule collections	-	X
Create, edit, link, unlink and delete instructions	-	X
Upload, update and delete documents	-	X
Display Maintenance Rules, instructions, and Maintenance Rule collections	X	X
Download documents	X	X
Assign Maintenance Rules to Assets	-	X
Edit and delete Maintenance Rule assignments	-	X
Edit dashboard settings	-	X
Display dashboards in overview module	X	X
Display detail views for assigned Maintenance Rules	X	X
Display maintenance logbook entries	X	X
Display Asset configuration	-	X
Display usage information page	-	X
Register maintenance jobs in the maintenance logbook	-	X
Edit and delete maintenance logbook entries	-	X

NOTE

General information on tenants and subtenants

A tenant is the digital representation of a real company in MindSphere. A tenant includes users, data, Assets, locations and other properties.

You can also create and manage subtenants in a tenant. The subtenants form a self-contained subarea so that users of this subtenant can only access the contents of this area.

Assets can also be shared by one tenant with another tenant (cross tenancy).

You can find more information on this topic in the documentation for MindSphere Settings.

5.2.2 Additional user roles for registering performed maintenance

For any user with the role "application user", you can assign additional roles to enable the following activities:

- Register maintenance jobs in the maintenance logbook
- Edit and delete maintenance logbook entries

There are three roles available for this purpose:

- Maintenance Manufacturer
- Maintenance Operator
- Maintenance 3rd party

Users with these additional roles can make entries into the maintenance log (see section Introduction to Asset configuration [\(Page 21\)](#)) for those Assets that are enabled for these additional roles (see section Authorized roles for maintenance [\(Page 26\)](#)).

5.2.3 User roles as subtenant

If you are logged in as a subtenant user in MindSphere, you have the same options as a tenant user or administrator, depending on your configured application rights (see above). The difference lies in the visibility of the Assets, as you only have access to the Assets of your subtenant.

5.2.4 Adding/deleting users (as Tenant Administrator)

As tenant administrator, you can manage the "Machine Monitor" roles in the MindSphere settings as follows:

1. Open the MindSphere settings in the overview page of the MindSphere applications.
2. Select the required user in the "Users" menu. The assigned roles are displayed.
3. Click "Edit direct assignments".
4. Add or remove any of the following roles and close the dialog:
 - For "application administrator":
"machinemonitor (mdsp:simapps) **admin**"
 - For "application user":
"machinemonitor (mdsp:simapps) **user**"
 - For "Maintenance manufacturer":
"machinemonitor (mdsp:simapps) **maintenancemanufacturer**"
 - For "Maintenance operator":
"machinemonitor (mdsp:simapps) **maintenanceoperator**"
 - For "Maintenance 3rd party":
"machinemonitor (mdsp:simapps) **maintenancethirdparty**"

5.3 Usage information

In the usage information, you can view the number of Assets that are configured for maintenance monitoring. Three Assets for maintenance monitoring are included in the basic package.

Filter, search and tags

6.1 Filter and search

Filters help you to find specific entries. The following table shows you in which menus you can filter according to which criteria:

	Asset overview	Maintenance logbook	Event log	"Assign maintenance rules" dialog	Export configuration
Asset	X	X	X		
Period		X	X		
Entry type		X			
Component identifier	X	X	X		
Maintenance Rule	X	X	X		
Entered by		X			
Rule type	X			X	X
Warning and alarm status	X				
Free text search	X	X		X	X
Trigger			X		
Type of event			X		
Status			X		

Alternatively, you can use the free text search. All selected filter criteria and tags are combined with AND logic to further narrow down your search results.

You can search for tags in the following menus:

- Maintenance Rules
- Maintenance Rule collections
- Assign Maintenance Rule
- Instructions and documents
- Export configurations

6.2 Using tags

You can assign tags to the following entries to distinguish entries with the same name.

- Maintenance Rules
- Maintenance Rule collections
- Instructions and documents

You can assign a maximum of 10 tags to an entry. Tags must consist of at least 2 characters and can be up to 50 characters long.

6.2 Using tags

Assign tags

You can assign a tag either when creating or editing an entry. Use the "Tags" field for this purpose.

1. Enter a tag name in the "Tags" field or select a tag from a list of already created tags.
2. Confirm the selection by clicking the "+" icon.

Remove tags

1. To remove a tag, open the "Edit" menu by clicking "...".
2. Remove the tag by clicking the "x" icon next to the tag name.
3. Save your changes to apply them.

Search for tags

1. To search for tags, click on the "Tags" button.
2. Select one or more tags from the tag list.
If the tag list is too long, you can filter the tag list by entering the tag name.
3. Confirm your selection.

Creating Maintenance Rule templates

7.1 Introduction to Maintenance Rules

Maintenance Rules are the template for monitoring your Assets. You can create and edit your Maintenance Rules in a step-by-step configuration wizard and link related instructions and documents.

The Maintenance Rule configuration itself does not include the assignment to an Asset, or the connection to any Asset variable. However, you can assign Maintenance Rules to an Asset (see section Assigning new Maintenance Rules to an Asset [\(Page 21\)](#)).

When a Maintenance Rule is created, you as tenant user can set the visibility of the Maintenance Rule for subtenants. You can select between the following options:

- Only visible for tenant users
- Only visible for selected subtenants
- Visible for all subtenants

Maintenance Rules created by subtenant users are only visible in the subtenant and tenant. After activating an assigned Maintenance Rule, you only have limited options to edit the original Maintenance Rule.

Starting the configuration wizard

1. Select the "Configuration" module and navigate to "Maintenance Rules".

< Configuration

Maintenance Rules

Maintenance Rules can be assigned to Assets. To do that, select an Asset in the Overview module and go to Asset Configuration > Maintenance Rule assignment.

Filters Search Sort: Last edit: Newest->Oldest [+ New Maintenance Rule](#)

Maintenance rule	Last edit	Actions
Drive belt - check for wear Assignment(s): 0 Owner: Tenant	4/11/2023, 3:35:06 PM by Admin Edge	
Pump flow temperature Assignment(s): 0 Owner: Tenant	4/11/2023, 3:04:20 PM by Admin Edge	

< 1 > 1 / 1 Items per page 10

7.2 Creating rules for maintenance intervals ("interval based")

This menu contains information on all Maintenance Rules that have already been created:

- Maintenance Rule name
- Last change and who made this change
- "Owner" of the Maintenance Rule
- Number of assignments

When you click on the number of assignments, the overview of all Assets to which this Maintenance Rule was assigned is shown.

- Action: You can edit, duplicate or delete maintenance rules here.

2. Click "New Maintenance Rule" to start the configuration wizard.

7.2 Creating rules for maintenance intervals ("interval based")

Maintenance Rules of the type "interval based" are useful to monitor the maintenance due date depending on the machine utilization.

The Maintenance Rule is defined by an interval, or an interval series. Intervals can have two types of maintenance triggers:

- **Time:**
Regular calendar dates, for example maintenance every 2 months
- **Usage:**
Metering data from the machine which represents the continuous use of the machine.
Examples:
 - "Operating time" (e.g. every 300 h)
 - "Mileage of the axis" (e.g. after 500 km)
 - "Number of cycles" (e.g. after 10000 cycles)

Procedure

1. Assign a unique name that represents the monitoring use case.
2. Select the users for whom the Maintenance Rule should be visible.
You can find more information on this in the section Tenants and subtenants ([Page 10](#)).
3. Select the Maintenance Rule type "Intervals".
Proceed with "Continue".
4. Define one or multiple maintenance triggers for your rule.
 - A maintenance trigger can be metering data for your machine ("Usage" type), or a time criterion ("Time" type), for example.
 - Provide representative names for each maintenance trigger (e.g. "Runtime" or "Mileage x axis").
 - Specify a corresponding unit (e.g. "h" or "km").
 - Proceed with "Continue".

5. Define the intervals in chronological order and specify instructions and limits for each interval
 - Select the repetition pattern of the interval series. You can click on the thumbnail image to visualize the repeat pattern in a larger size.
 - Optional: Enable reference parameter for limit configuration. This option allows you to configure different limit values depending on the current value of the reference parameter.
Example: Define "Machine speed" as reference parameter. Now you can define shorter maintenance intervals, for example, if your machine is operated at higher speeds.
 - Specify the due and overdue limits for each previously defined maintenance trigger. If you have activated the "reference parameters" option, you can now add reference parameter value ranges for each maintenance trigger as required and specify different limit values for each value range.
 - Optional: Link relevant instructions for the due maintenance. You can select from previously created instructions (click on "Link instruction"), or you can create a new instruction (click on "Create new instruction"). Unlinked instructions will remain accessible from the "Instructions and documents" page (see section Instructions and documents [\(Page 18\)](#)).
 - Set the number of interval repetitions. This option is disabled if you have selected the repetition pattern "Repeat last interval infinitely".
 - Add another interval, if required. You can specify the limits and instructions for each interval separately. If you have more than one interval defined, you can reorder intervals, or delete intervals.
 - Proceed with "Continue".
6. Link any relevant documents to your Maintenance Rule by selecting an uploaded document or uploading a new document.
7. Finish your Maintenance Rule configuration.

7.3 Creating rules for condition monitoring ("Parameter limits")

Maintenance Rules of the "Parameter limits" type are useful to monitor the due maintenance status depending on the current state of the machine.

Maintenance triggers can be process values, for example, based on sensor data and can be monitored for high limits and low limits.

Procedure

1. Assign a unique name that represents the monitoring use case.
2. Select the users for whom the Maintenance Rule should be visible.
You can find more information on this in the section Tenants and subtenants [\(Page 10\)](#).
3. Select the Maintenance Rule type "Parameter values".
Proceed with "Continue".

4. Define one or multiple maintenance triggers for your rule.
 - A maintenance trigger can be any number type process value (select type "Number"), or a TRUE/FALSE value (select type "Boolean").
 - Enter representative names for each maintenance trigger (e.g. "Temperature" or "Overpressure valve") and provide the corresponding unit (only for type "Number", e.g. "°C").
 - Proceed with "Continue".
5. Define the limits for each maintenance trigger.
 - For number type maintenance triggers, you can specify high limits only, low limits only, or both. Specify the range limits for the visualization widget (low limit range, high limit range).
For Boolean type maintenance triggers, assign a severity level (info/warning/alert) to either TRUE or FALSE state.
 - Optional: Link relevant instructions for the due maintenance for each severity level. You can select from previously created instructions (click on "Link instruction"), or you can create a new instruction (click on "Create new instruction"). Unlinked instructions will remain accessible from the "Instructions and documents" page (see section [Instructions and documents \(Page 18\)](#)).
 - Proceed with "Continue".
6. Link any relevant documents to your Maintenance Rule by selecting an uploaded document or uploading a new document.
7. Finish your Maintenance Rule configuration.

7.4 Instructions and documents

You can link helpful additional information and step-by-step instructions for maintenance jobs to be performed to your Maintenance Rules under "Instructions and documents". You can view, edit, duplicate, or delete previously created instructions.

Creating and editing instructions

You have two options to create new instructions:

- Click "New instruction" on the "Instructions and documents" page.
- Click "Create new instruction" in the wizard for Maintenance Rules in step 3, "Limits and instructions".

Any instruction that is created from within the Maintenance Rule wizard will also appear on the list and can be edited later. Instructions that are linked to at least one Maintenance Rule cannot be deleted.

NOTE

Editing instructions that are already linked

If an instruction is already in use, i.e. linked to a Maintenance Rule, edit it with caution. Your changes are immediately displayed at each point of use on each Asset where the Maintenance Rule has been activated.

Uploading and updating documents

You have two options to upload new documents:

- Click "Upload new document" on the "Instructions and documents" page
- Click "Upload new document" in the wizard for Maintenance Rules in step 4, "Documents".

Any document that is uploaded from within the Maintenance Rule wizard will also appear on the list and can be updated or deleted later. Documents that are linked to at least one Maintenance Rule cannot be deleted.

NOTE

Sporadic error when uploading duplicate files

When you upload a new document and select the same file from your computer that you have uploaded previously, the file upload may sporadically fail. In this case, please try again or use the previously uploaded document to link to your Maintenance Rules.

7.5 Creating Maintenance Rule collections

Maintenance Rule collections serve the purpose of organizing Maintenance Rules for various machine types. You can create, modify, duplicate, or delete Maintenance Rule collections.

Procedure

1. Select the "Configuration" module and navigate to "Maintenance Rule collections".
2. Click "New Maintenance Rule collection".
3. Provide a meaningful name, e.g. the designation of your machine series.
4. To add Maintenance Rules to your collection, click "Select Maintenance Rule".
You can add the same rule multiple times. This is useful, if you have multiple components in your machine, which require the same maintenance interval.
5. Enter component names for each added Maintenance Rule.
These entries are adopted when you assign the complete collection to an Asset (see section Rule selection and basic configuration [\(Page 21\)](#)).
6. Finish your configuration by clicking "Save".

7.6 Exporting and importing configurations

You can export your Maintenance Rule templates completely or partially and save them on a separate data storage medium.

You can use previously saved export files to import your Maintenance Rule templates again. Use case: You can use it to create backups of your configurations or, for example, to make Maintenance Rule templates available for other Machine Monitor installations.

Export configuration

1. Navigate to "Configuration" > "Export configuration".
2. Select the desired Maintenance Rule collections or individual Maintenance Rules.
3. Click "Export" to create an export file.

The generated export file also contains all instructions and documents which are linked to your selected Maintenance Rules.

Instructions and documents cannot be exported separately.

In the "Downloads" tab, the generated export file is available for local saving. As soon as you have downloaded the export file, it is deleted from the "Downloads" tab.

Import configuration

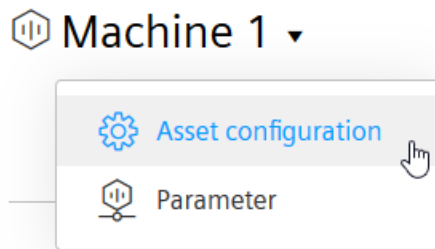
1. Navigate to "Configuration" > "Import configuration".
2. Select a previously exported configuration to import it.
Once you have selected a file, Machine Monitor performs a check to examine the validity and compatibility of the file for import.
You will then be shown which of the contained data can be imported.
In case of data conflicts, the configuration items in question are not imported. A data conflict occurs if a configuration item with the same name already exists in your Machine Monitor installation (Maintenance Rule, or Maintenance Rule collection, or instruction or document with the same name).
3. Complete the process by clicking on "Execute import".

Configuring Assets for maintenance monitoring

8.1 Introduction to Asset configuration

To active maintenance monitoring for an Asset, select your desired Asset in the Overview module, navigate to the Asset configuration, and open the "Maintenance Rule assignment" page.

Click the Asset name in the header and select "Asset configuration".



On the "Maintenance Rule assignment" page, you can

- Make Asset-specific settings for due date calculation (see section Trend model and calculation period [\(Page 24\)](#)).
- Enable additional user roles for entries in the maintenance logbook (see section Authorized roles for maintenance [\(Page 26\)](#)).
- Activate notifications (see section Notifications [\(Page 26\)](#)).
- Select and activate Maintenance Rules for live monitoring (see sections Assigning new Maintenance Rules to an Asset [\(Page 21\)](#) and Activating assigned Maintenance Rules [\(Page 26\)](#)).
- Reset maintenance intervals and delete rule assignments (see sections Resetting maintenance intervals [\(Page 28\)](#) and Deleting rule assignments [\(Page 28\)](#)).
- Write the maintenance status to Asset variables (see sections Expose Maintenance Rule status to variables [\(Page 25\)](#) and Expose Asset status to variables [\(Page 27\)](#)).

8.2 Assigning new Maintenance Rules to an Asset

8.2.1 Rule selection and basic configuration

You can select previously created Maintenance Rules and assign them to their Asset.

1. Click "Assign Maintenance Rules" in the Asset configuration.
2. Select your Maintenance Rules for assignment. You can select either from the flat list, or from your Maintenance Rule collections. To find your desired rules, you can use the search and filter inputs.
3. You can select multiple Maintenance Rules.

4. If you select from a Maintenance Rule collection, you can also deselect individual rules from within the collection.
5. Finish your selection and click on "Assign".

Copy Rule assignments from another Asset

As an alternative to selecting Maintenance Rules directly, you can also copy the Maintenance Rule assignments of an Asset that has already been configured. The "Copy from Asset" button is available if you have not yet assigned any Maintenance Rules.

1. Click "Copy from Asset" in the Asset configuration.
2. Select the source Asset to copy from to set up the current Asset.
3. You can specify the default start date and time for maintenance intervals in the dialog.
4. You can specify whether to include rules that are not activated on the source Asset.
5. Finish your selection and click on "Copy".

NOTE

When copying rules, note that you can only use source assets that are visible for the target asset.

You can find more information on this in section Tenants and subtenants [\(Page 10\)](#).

Completing the configuration

For each assigned Maintenance Rule, a collapsible configuration container is created where you can complete the configuration and activate the monitoring.

1. Label the affected machine component. If you have selected the Maintenance Rule from a collection, the component identifier will be adopted accordingly.
The component identifiers are especially useful if the same Maintenance Rule is assigned multiple times for one Asset.
Example: A "lubrication interval" for "ball screw A" and for "ball screw B".
2. For "interval-based" Maintenance Rules: Specify the date and time for the "Interval start". Define from which point in time (up to 30 days retrospectively) the maintenance interval should be calculated. This setting is preset by the "Default interval start" value.
3. For "condition-based" Maintenance Rules: Select the "Calculation period". Define the calculation time range for the aggregation of the process data.
Accepted units and values:
 - Minute(s): Integer value between 1-43200
 - Hour(s): Integer value between 1-720
 - Day(s): Integer value between 1-30
4. Connect all maintenance triggers to the corresponding Asset variables (see section Connect maintenance triggers to Asset variables [\(Page 23\)](#)).
5. Select aggregation function for reading out the values of the linked parameters (see section Aggregation functions [\(Page 23\)](#)).
6. If necessary, adjust the trend model and calculation period for projection of the maintenance due date (only for "interval-based" Maintenance Rules, see section Trend model and calculation period [\(Page 24\)](#)).

7. If required, connect the reference parameter to the corresponding Asset variable (see section Connect reference parameter to Asset variable [\(Page 25\)](#)).
8. Optional: Write Maintenance Rule status information to Asset variables (see section Expose Maintenance Rule status to variables [\(Page 25\)](#)).
9. Finally, you can activate the Maintenance Rule (see section Activating assigned Maintenance Rules [\(Page 26\)](#)).

8.2.2 Connect maintenance triggers to Asset variables

Each maintenance trigger that is based on a process value must be linked to an Asset parameter.

NOTE

This description only applies to Maintenance Rules of the types "Intervals" and "Parameter limits".

Procedure

1. Click "Select parameter".
The parameter selection dialog opens.
2. Select the desired parameters and confirm the selection.
You can also navigate to a different Asset if the desired parameter is not located on the current Asset.
3. Save the changes.

NOTE

Available parameters for selection

Only those parameters are visible to which the maintenance trigger can be connected. You can also review the available parameters of your selected Asset. To navigate to the "Parameters" page, click on the Asset name in the header, and then select "Parameters".

8.2.3 Aggregation functions

NOTE

This description only applies to Maintenance Rules of the types "Intervals" and "Parameter limits".

You can use an aggregation function to select which value to output for a variable.

- Output the last read value with "Last".
- Use the other functions to gather summary information from the read values, for example, the sum of all read values.

For connected Asset parameters, the following aggregation functions are available:

Function	Meaning
None	No aggregation (same as "last").
Counters	The sum of the positive value changes between two points in time is output in each case. Additional parameter "Counter start value": <ul style="list-style-type: none"> You can specify a counter start value at interval start. Default value is "0". Only numeric input is allowed: Greater or equal "0"
Sum	Adds all read values within the calculation period.
Last	Outputs the last read value.
Timer	The Timer calculates the time interval in which the variable was not 0. Additional parameter "Timer unit": <ul style="list-style-type: none"> You can select the appropriate time unit that fits to the interval limit value configuration of your maintenance trigger. Possible options: <ul style="list-style-type: none"> Seconds Minutes Hours Days (24 hours)
Minimum (Not available for "interval-based" rules)	Outputs the smallest read value within the calculation period.
Maximum (Not available for "interval-based" rules)	Outputs the largest read value within the calculation period.
Average value (Not available for "interval-based" rules)	Calculates the time-weighted average value of the read values within the calculation period.

8.2.4 Trend model and calculation period

NOTE

This description only applies to Maintenance Rules of the "Intervals" type.

Machine Monitor can extrapolate the upcoming maintenance due date based on the previous machine usage. You can set the parameters for projection for each maintenance trigger separately.

Available extrapolation methods:

- Linear extrapolation
- Polynomial extrapolation

You can specify a reference time period for the extrapolation training data.

NOTE

Availability of training data

If there is no data available for the entire training period, the extrapolation calculation will not be performed.

8.2.5 Connect reference parameter to Asset variable

An additional reference parameter can be defined for Maintenance Rules of the "Intervals" type. Depending on the current process value of the reference parameter, different limit values can be applicable for the intervals, according to the Maintenance Rule configuration. Example: A shorter maintenance interval can be defined if the machine is operated at a higher speed.

If a reference parameter has been defined for the assigned Maintenance Rule, it must be linked to the appropriate Asset variable.

1. Click "Select parameter" in the "Connection to the reference parameter" section of the configuration container.
The parameter selection dialog opens.
2. Select the desired parameters and confirm the selection.
You can also navigate to a different Asset if the desired parameter is not located on the current Asset.
3. Save the changes.

NOTE

Available parameters for selection

You can only select parameters that are compatible with the reference parameter and can be connected.

You can also review the available parameters of your selected Asset. To navigate to the "Parameters" page, click on the Asset name in the header, and then select "Parameters".

8.2.6 Expose Maintenance Rule status to variables

You can expose the Maintenance Rule status information by writing the information to Asset variables. This information is then indirectly available to any other application that has access to the variable household of your Asset.

To do this, activate the option "Write to Asset variables". Then click on "Select parameter" for either "Maintenance Rule status" or "Due date" and select a variable that should be written to. The variable must be of type "String".

8.4 General settings

The "Maintenance Rule status" can assume the following values:

- **OK:**
Maintenance Rule status is OK / not due.
- **WARNING:**
Maintenance Rule is due or has reached the "Warning" status.
- **ALERT:**
Maintenance Rule is overdue or has reached the "Alert" status.

The "Due date" (only for "interval-based" Maintenance Rules) is stored as UTC time in the Epoch Unix Timestamp format.

8.3 Activating assigned Maintenance Rules

Once you have completed the configuration of the assigned Maintenance Rules, you can activate them for live monitoring.

1. Click the "..." button of an assigned Maintenance Rule for this.
2. Select the "Activate" option.
3. To confirm the dialog, click "Activate".

NOTE

Usage pricing

Please note the fees and conditions listed in the product sheet (https://sie.ag/MindSphere-ProductSheet_MachineMonitor) and specific terms.

You can review the total usage on the "Usage information" page in the "Settings" module.

8.4 General settings

8.4.1 Authorized roles for maintenance

You can assign additional roles to authorize the following activities:

- Register maintenance jobs in the maintenance logbook for this Asset
- Edit and delete maintenance logbook entries for this Asset

The following roles are available (multiple selection is possible):

- Maintenance Manufacturer
- Maintenance Operator
- Maintenance 3rd party

These additional roles are optional and can be used to extend the capabilities of an application user who does not have application administrator rights.

These additional roles must be assigned to the corresponding users via the user management of your MindSphere tenant (see section Tenants and subtenants ([Page 10](#))).

You can find this setting in the "Authorized roles for maintenance" section under "Asset configuration" > "General settings".

8.4.2 Notifications

Setting up notifications

You can enable notifications for the Asset to be automatically informed about due maintenance intervals. You can find the notification settings in the "Settings for notifications" menu under "Asset configuration" > "General settings".

Available notification channels:

- **SIMATIC Notifier app:**
No further configuration required. You can proceed to manage your notification settings in the Notifier app. Click here for more information on the use of SIMATIC Notifier. (<https://documentation.mindsphere.io/resources/html/notifier/en-US/index.html>)
- **Email:**
You can select the email recipients (multiple selection) from the list of all MindSphere users whose application rights are configured to use Machine Monitor.

NOTE

SIMATIC NOTIFIER

The SIMATIC Notifier app must also be installed and running so that you can enable notifications for this notification channel.

Editing notification messages

You can edit the generated default notification messages for every assigned Maintenance Rule. Navigate to the notification settings in the rule assignment menu of a Maintenance Rule and select "Notifications".

By default, notifications are enabled for all severity levels:

- Information (soon due)
- Warning (due)
- Alert (overdue)

You can selectively disable notifications for individual severity levels.

The dynamic part of the notification text is generated by default from the linked instructions for the Maintenance Rule.

You can edit this text and reset it to the default text at any time.

8.4.3 Expose Asset status to variables

You can expose the Asset maintenance status by writing the current Asset status information to a variable. This information is then indirectly available to any other application that has access to the variable household of your Asset.

To do this, activate the option "Write to Asset variables", click on "Select parameter" and select a variable that should be written to. The variable must be of type "String".

8.6 Deleting rule assignments

The Asset status can assume the following values:

- **OK:**
All Maintenance Rules of this Asset are OK / not due.
- **WARNING:**
At least one Maintenance Rule of this Asset is due or has reached the "Warning" status.
- **ALERT:**
At least one Maintenance Rule of this Asset is overdue or has reached the "Alert" status.

8.5 Resetting maintenance intervals

You can reset "interval-based" Maintenance Rules that are assigned for an Asset. This functionality is useful, for example, if a machine was run in test mode and is to be reset to factory settings for delivery. This use case also occurs when machine components are replaced, and the associated Maintenance Rules must be reset to the initial state.

You can reset either individual intervals or all intervals in the Asset configuration.

- You reset individual intervals with the "..." button of the respective Maintenance Rule.
- You reset all intervals with the "..." button of the "Rule assignments" menu.

You will be shown a confirmation dialog where you must specify a new interval start date. If there are parameters with counter aggregation configured in the intervals which are to be reset, you will additionally be offered the option to reset the "counter start values" to 0 as well.

8.6 Deleting rule assignments

You can delete individual assigned Maintenance Rules or delete all assigned Maintenance Rules.

A corresponding entry is made in the maintenance logbook and the usage information is updated accordingly.

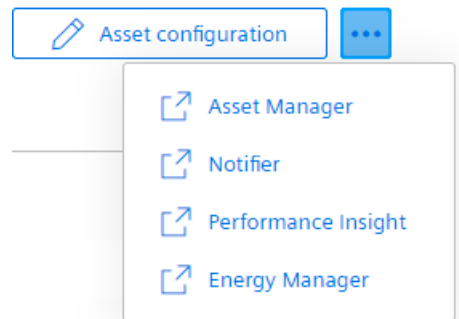
Monitoring dashboards

9.1 Introduction to monitoring dashboards

You can monitor the progress and maintenance status of your Assets on automatically generated dashboards.

Navigate to other apps

You can switch to the view for your selected Asset in another app with one click. To do this, open the "..." menu and click "Asset Manager" or "Performance Insight", for example.



Filtering and finding

You can filter the entries by various criteria to find specific entries:

- Rule type (intervals and parameter limits)
- Warning and alert status, also in a specific period
- Asset
- Component identifier
- Maintenance Rule

Alternatively, you can use the free text search. All selected filter criteria are combined with AND logic to further narrow down your search results.

9.2 Overview for single Assets

The "Current status" dashboard tab visualizes the current status of all assigned Maintenance Rules of the selected Asset in distinct, separate status cards.

If there are no Maintenance Rules assigned to the Asset, both the "Current status" dashboard tab and the "Maintenance logbook" dashboard tab display an empty screen including a note on how to proceed with the setup.

9.3 Overview for hierarchical Assets

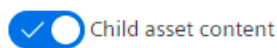
Enable visibility of entries for child Assets

You can display the current status cards of the assigned Maintenance Rules also on the dashboard of the parent Asset.

This way you can get a better overview of the maintenance status, for example, for a whole production line with multiple machines (Sub-Assets).

Also, the maintenance logbook of a parent Asset will display the logbook entries of all Sub-Assets (see section Maintenance logbook (hierarchical Asset) [\(Page 33\)](#)).

Visibility of entries for child assets is disabled by default. To enable this setting, select the parent Asset of your choice and activate the "Child asset content" option.



Display of status cards

You can sort the display of status cards across all Sub-Assets by severity or alphabetically. You can also group the status cards by Asset.

9.4 Detail view

The detail view visualizes the current status of the Maintenance Rule in full detail and displays the instructions associated with the Maintenance Rule, as well as the linked documents.

You can get to the "Details" page by clicking on the status card. The "Details" page displays the following information in separate containers:

- Overall current status and widgets to visualize each maintenance trigger
- Instructions
- Documents
- Register maintenance in maintenance logbook

Detail view for "interval-based" Maintenance Rules

You can see in detail which parameter triggered the maintenance due date. You can see which interval or interval repetition is currently active.

If a reference parameter has been defined for the Maintenance Rule, the associated current process value is displayed here.

Detail view for "Parameter limit" Maintenance Rules

You can track the current observed value for each parameter and see which parameter is responsible for the due maintenance.

Registering maintenance in the logbook

10.1 Introduction to the maintenance logbook

The maintenance logbook dashboard tab displays previous actions in a tabular view. You can register conducted maintenance jobs in the maintenance logbook for each Asset, and you can track the history of machine maintenance of each Asset.

Entries in the maintenance logbook

The following types of entries are available:

Type	Meaning
Rule activated	Automatically entered upon Maintenance Rule activation.
Rule deleted from Asset	Automatically entered upon Maintenance Rule deletion.
Maintenance job	Entered by the user. Contains the details of a registered maintenance task that is related to a Maintenance Rule.
Intervals reset	Automatically entered upon Maintenance Rule reset.
Unplanned maintenance	Entered by the user. Contains the description of maintenance tasks that are not linked to a Maintenance Rule.

10.2 Creating entries for performed maintenance jobs

You can register a maintenance activity that is related to any of the configured Maintenance Rules.

Procedure

1. To open the form, click on the "Register maintenance" button in the detail view.
2. Specify the date and time when the maintenance job was carried out.
3. Check the checklist with the completed instructions and set the corresponding check marks
4. Check the current values of the maintenance triggers:
 - If a process value is available within the last 7 days, then the respective field in the "Actual values" will be filled with the last available value at the date and time when the maintenance job was performed.
 - If no measured process value is available for the last 7 days: The process value must be entered manually.
5. Optional: Upload additional documents, if available (pictures, checklist, etc.).
6. Optional: Write a comment about the conducted work.
7. Save the entry.

Authorized roles

Registering performed maintenance is available for the following roles:

- Application administrators:
- Depending on the Asset configuration:
 - Maintenance Manufacturer
 - Maintenance Operator
 - Maintenance 3rd party

Effects on Maintenance Rules of the "Intervals" type

Registering a maintenance job will trigger the following effects for the current status:

- Overall status of maintenance interval changes to "Not due".
- Progress bars for each maintenance trigger are reset
- Depending on repetition pattern of the interval series:
 - Interval repetition counter is increased (+1)
 - The next interval is started

10.3 Registering unplanned maintenance

You can register a maintenance activity that is not related to any of the configured Maintenance Rules.

Procedure

1. Navigate to the "Maintenance logbook" tab of the concerned Asset and click on "+ Unplanned maintenance".
2. Specify the date and time when the maintenance job was carried out.
3. Optional: Upload additional documents, if available (pictures, checklist, etc.).
4. Optional: Write a comment about the conducted work.
5. Save the entry.

Authorized roles

Registering performed maintenance is available for the following roles:

- Application administrators
- Depending on the Asset configuration:
 - Maintenance Manufacturer
 - Maintenance Operator
 - Maintenance 3rd party

10.4 Maintenance logbook (single Asset)

You can track the service history of your selected Asset in the maintenance logbook. All entries in the logbook are recorded in chronological order and displayed in a table.

Any user can view the logbook entries. Editing and deleting logbook entries of type "Maintenance job" and "Unplanned maintenance" is available for the following roles:

- Application administrators
- Depending on the Asset configuration:
 - Maintenance Manufacturer
 - Maintenance Operator
 - Maintenance 3rd party

Filtering and finding

You can filter the entries by various criteria to find specific entries:

- Asset
- Period
- Entry type
- Component identifier
- Maintenance Rule
- Entered by

Alternatively, you can use the free text search. All selected filter criteria are combined with AND logic to further narrow down your search results.

Export

All entries of the maintenance logbook can be exported, so the data can be used for further processing with third party software.

Click on the "Export" button in the "Maintenance logbook" dashboard of your Asset. If filter options have been set, then also the export data is filtered according to the applied filters. The data is exported to a CSV file.

10.5 Maintenance logbook (hierarchical Asset)

If you have enabled the "Child asset content" option in the maintenance log settings (see section Overview for hierarchical Assets [\(Page 29\)](#)), the maintenance logbook of the selected Asset will also show the entries of all sub-assets.

The maintenance logbook will then have an additional column to specify the Asset. Also, there is an additional filter option to filter for Assets.

View event log

11.1 Introduction to the event log

The event log is available to track entries. You can find the event log menu in the Asset overview

You will receive the following information in the event log:

- Status change of a Maintenance Rule: OK, information, alarm and warning
- Status change of a trigger: OK, information, alarm and warning
- Limit violations: Alarm and warning
- Notifier notifications: Created and closed notifications
- E-mail notifications: Sent e-mails

A maximum of 5000 entries per Maintenance Rule are saved in the event log. Older entries are deleted when 5000 entries are reached. In addition, entries older than one year are deleted.

Exporting an event log

To save an event log permanently, you can export it.

1. Click the event log menu in the Asset overview.
2. Use the filters and/or search to find a specific event log.

NOTE

If you do not apply a filter and/or search, all currently available event logs will be downloaded.

3. Click "Export".
4. Click "CSV" or "JSON" in the menu.
The event log is downloaded and saved in the selected file format.

11.2 Detail view

The detail view of the event log always contains general information and, if available, trigger information. Trigger information is only available for trigger status changes.

General information

Here you can find information about:

- Entry type
- Entry date
- Asset
- Component name
- Maintenance Rule

Trigger information

Here you can find information about:

- Severity
- Previous severity
- Trigger type
- Trigger name
- Actual value
- Total value
- "Due from" limit
- "Due since" limit