

Fundamentals

About this manual

These Operating Instructions are for PlantMonitor Version 1.0.

Have you found any errors or would you like to suggest changes?

We continuously strive to improve our documentation for you. Please help us by sending your suggestions to the following e-mail address:

tnc-userdoc@heidenhain.de

Symbols and fonts used for marking text

In these instructions the following symbols and fonts are used for marking text:

Format	Meaning
▶ ...	Identifies an action Example: ▶ Click the STORE button
> ...	Identifies the result of an action Example: > StateMonitor lists all defined users in a table.
■ ...	Identifies an item of a list Example: Error groups: ■ Machining ■ Programming ■ PLC ■ General information
Bold	Identifies ■ Menus ■ Tabs ■ Screen buttons ■ Functions Example: ▶ Switch to the Settings menu

Legal information

The license terms of DR. JOHANNES HEIDENHAIN GmbH apply to the use of the PlantMonitor software.

PlantMonitor contains open-source software that is subject to special terms of use. The terms of use have priority over the license terms applicable to PlantMonitor.

To obtain this information within PlantMonitor:



- ▶ Switch to the **Settings** menu
- ▶ Select the **PlantMonitor information** submenu
- > The license information will be displayed

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**Safety and data
protection**

Notes in this documentation

Safety precautions

Comply with all safety precautions indicated in these instructions and in your machine tool builder's documentation!

Precautionary statements warn of hazards in handling software and devices and provide information on their prevention. They are classified according to the severity of the danger, and are divided into the following groups:

DANGER

Danger indicates hazards for persons. If you do not follow the avoidance instructions, the hazard **will result in death or severe injury**.

WARNING

Warning indicates hazards for persons. If you do not follow the avoidance instructions, the hazard **could result in death or serious injury**.

CAUTION

Caution indicates hazards for persons. If you do not follow the avoidance instructions, the hazard **could result in minor or moderate injury**.

NOTICE

Notice indicates danger to material or data. If you do not follow the avoidance instructions, the hazard **could result in property damage**.

Informational notes

Observe the informational notes provided in these instructions to ensure reliable and efficient operation of the software. In these instructions, you will find the following informational notes:



The information symbol indicates a **tip**.
A tip provides additional or supplementary information.



The gear symbol indicates that the function described **depends on the machine**, e.g.

- Your machine must feature a certain software or hardware option
- The behavior of the functions depends on the configurable machine settings



The book symbol represents a **cross reference** to external documentation, e.g. the documentation of your machine tool builder or other supplier.

1.1 Intended use

The PlantMonitor software may be used only in accordance with its proper and intended purpose.

The proper and intended purpose is the evaluation of production data in order to enable transparent manufacturing processes, allowing the information gained to be used for optimization of the manufacturing processes, quick troubleshooting, and a more efficient use of capacities.

Compliance with the proper and intended use of PlantMonitor is the sole responsibility of the company using it.

Personal data and communication channels are subject to data protection. They must not be used for any other purposes or disclosed to third parties.

1.2 Data security and access rights

Access to the data in PlantMonitor is available only to those with access to the server or PC on which PlantMonitor is installed.

Within PlantMonitor, data usage can be limited by means of different rights. Only users with administrator rights have access to all the data.

NOTICE

Caution: unwanted data transfer is possible!

If the log files need to be transmitted for service purposes or for another reason, the contracting party will be able to view user data contained therein.

In this case, it is your responsibility to ensure that all required data protection provisions have been made at your company.

In order for PlantMonitor to be used, the end devices such as smartphones and tablets must be logged into the server as clients.

Because PlantMonitor is a local client-server web application, no additional software or app must be installed on the respective end devices.

Further information: "User roles", Page 22

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Dashboards



2.1 Overview



On a dashboard, PlantMonitor displays tiles representing the analyses and monitoring tasks you have created. Depending on your application and your specific manufacturing conditions, you can create any number of dashboards for your evaluations.

2.2 Creating tiles

To create new tiles for your analyses and monitoring tasks:

- After creating and saving a new dashboard, select the **Add tile** button that opens a wizard
-  On the dashboard, select the  button that opens a wizard
- Assign existing analyses and monitoring tasks to a dashboard in the **Advanced settings** area

2.3 Tile display options

The menu for the monitoring task tiles allows you to define the display size in the column grid of the dashboard:

- **Small**
- **2 columns**
- **3 columns**

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Analyses

3.1 Overview



In an analysis, PlantMonitor displays the machine data obtained from the StateMonitor applications in tables and charts.

The following key figures are available for analyses:

- **Availability**
- **Productivity**
- **Mean Time Between Failures**
- **Utilization rate**

You can select the required machine data and time period for each analysis and personalize its display.

3.2 Key figures

When selecting the analyses, you can choose various key figures. For the specified time period, PlantMonitor will then calculate these key figures from the respective machine statuses.

Availability

The availability of a machine is calculated from the proportion of main usage time to planned busy time.

$$\text{Availability} = \frac{\text{Main usage time}}{\text{Planned busy time}}$$

The *main usage time* is the total time minus the total down time. The main usage time is calculated as follows:

$$\begin{array}{rcl}
 & \text{Total time} & \\
 - & \text{Time during which the machine is not in use} & \\
 - & \text{Delay} & \\
 - & \text{Time during which the machine is not ready for operation} & \\
 \hline
 = & \text{Main usage time} &
 \end{array}$$

The *planned busy time* is the total time minus the time during which the machine is switched off. The planned busy time is calculated as follows:

Productivity

The productivity is the productivity progress over the selected time period.

Mean Time Between Failures (MTBF)

The Mean Time Between Failures (MTBF) is the mean operating time interval between two successive failures. The MTBF is calculated from the proportion of total operating time to number of failures.

$$\text{MTBF} = \frac{\text{Total operating time}}{\text{Number of failures}}$$

Utilization rate

In respect of the machine utilization, the utilization rate is the proportion of productive time to machine busy time.

$$\text{Utilization rate} = \frac{\text{Productive time} + \text{Delay}}{\text{Busy time}}$$

The *busy time* is the total time minus the delay time and minus the time during which the machine is not in use.

$$\begin{aligned} & \text{Total observation period} \\ - & \text{Delay} \\ - & \text{Time during which the machine is not in use} \\ \hline = & \text{Busy time} \end{aligned}$$



The productive time may differ from the program run time. Program run time will not be counted as productive time until the override values are at least 1%.



3.3 Analysis parameters

PlantMonitor uses the following parameters for analyses:

Parameter	Explanation
Plant	Selection of available plants
StateMonitor	Selection of the StateMonitor applications available for every plant
Machines	Selection of the machine defined for each selected StateMonitor application
Time period	Selection of time period for the analysis

3.4 Analysis display options


The following parameters allow you to personalize the display of analyses:


Parameter	Explanation
Display	Selection of display unit <ul style="list-style-type: none"> ■ Percent Unit: % ■ Time Unit: h (hour)
Reference value	Selection of one or more fixed reference values that will be shown in the chart
	Representation of machine data as a pie chart
	Representation of machine data as a bar chart

3.5 Notifications

PlantMonitor uses notifications to inform you by e-mail when limit values are exceeded or certain statuses are reached.

A menu item provided in the **Advanced settings** area allows you to define notifications.



Unread notifications are shown on the  icon in the header bar.

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Monitoring tasks

4.1 Overview



In a monitoring task, PlantMonitor graphically displays the machine data obtained from the StateMonitor applications for the day you have selected.

You can select the required machine data for each monitoring task and personalize the display.

4.2 Monitoring task parameters

PlantMonitor uses the following parameters for monitoring tasks:

Parameter	Explanation
Plant	Selection of available plants
StateMonitor	Selection of the StateMonitor applications available for every plant
Machines	Selection of the machine defined for each selected StateMonitor application
Date	Selection of the date of the day on which the monitoring task should be performed

4.3 Machine status

PlantMonitor uses color values to display the machine status in the monitoring tasks.

The following overview shows the machine statuses triggered by the combinations of active **Mode of operation**, **Program status**, and **Override settings**.

Machine status	Mode of operation		Program status	Override settings
<div></div> Dark green Productive (feed rate/ rapid OVR >= 100 %)	<div></div>	Program Run, Full Sequence	In progress	≥ 100%
<div></div> Light green Productive (feed rate/ rapid OVR < 100 %)	<div></div>	Program Run, Full Sequence	In progress	< 100%
	<div></div>	Program Run, Single Block	In progress	> 0%
<div></div> Yellow OK, but not productive	<div></div>	Program Run, Full Sequence	In progress	= 0%
	<div></div>	Program Run, Full Sequence	<div><div></div> Selected</div> <div><div></div> Stopped</div> <div><div></div> Interrupted</div> <div><div></div> Finished</div> <div><div></div> Error</div> <div><div></div> No program selected</div>	Any
	<div></div>	Program Run, Single Block		
	<div></div>	Manual Opera- tion		
	<div></div>	Electronic Handwheel		
	<div></div>	Positioning with Manual Data Input		
<div></div> Red Not ready for opera- tion	<div></div>	Program Run, Full Sequence	Error	Any
	<div></div>	Program Run, Single Block		
<div></div> Light gray Delay	The Delay status is not generated directly by the machine. Users can store the Delay status instead of a yellow or dark gray status.			
<div></div> Dark gray Machine not in use	<div><div></div> The machine is switched off or</div> <div><div></div> StateMonitor cannot set up a connection to the machine or</div> <div><div></div> StateMonitor is temporarily shut down</div>			

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Settings

5.1 User roles

PlantMonitor supports the following user roles:


Role	Area	Function	Rights	Comment
Superadmin	PlantMonitor, strapi	All functions	All rights	Full access (created during installation)
Viewer	PlantMonitor	Dashboards	Read-only	Read-only access to dashboards
Analyst	PlantMonitor	Dashboards, analyses, monitoring tasks	Read-only/write	Default user with the permission to create, edit, and delete all analyses
AdminPlantMonitor	PlantMonitor	All functions	Read-only/write	Administration within Plant-Monitor
System configurer	strapi	All functions	Read-only/write	Administration of background system (see "Administration via strapi", Page 24)
PlatformAdmin	strapi	All functions	Read-only/write	Same permissions as system configurer



All user roles can be combined with each other.

5.2 Notification rules

In addition to defining analyses and monitoring tasks, you can also define notifications. PlantMonitor uses notifications to inform you by e-mail when limit values are exceeded or certain statuses are reached.

Parameter	Explanation
Title	Unique designation
Category	<ul style="list-style-type: none"> ■ Limit value ■ System
Notification for	Selection of object in PlantMonitor <ul style="list-style-type: none"> ■ For Limit value category: selection of an analysis ■ For System category: selection of StateMonitor applications
Notification type	Importance of notification <ul style="list-style-type: none"> ■ Critical ■ Very important ■ Important ■ Information <div>  For the Critical type, a message will additionally be displayed on the screen. </div>
Notification will be sent if	Definition of the event that triggers the notification <ul style="list-style-type: none"> ■ For Limit value category: specification of a limit value and a relational operator ■ For System category: selection of a connection error
Time and date of notification	Default value: Immediately

5.3 Password requirements

The password for PlantMonitor must be a minimum of eight characters long and contain at least one of the following characters:

- Uppercase letter
- Lowercase letter
- Numeric character
- Special character

5.4 Administration via strapi

Users with the superadmin or system configurator role are able to configure special PlantMonitor settings in a special web interface.

To access the strapi web interface:



- ▶ Click the icon at top left of the PlantMonitor home page



- ▶ Click the icon under **App & platform configuration**
- ▶ Log in as superadmin or system configurator

The following functions are relevant to the operation of PlantMonitor:

Function	Explanation
Machine Groups	Machine group assignment (adopted from StateMonitor application)
Machines	Machines (adopted from StateMonitor application)
Plants	List of the plants available in PlantMonitor
StateMonitors	Adding, editing, and deleting connections to StateMonitor applications
User Dashboards	List of the dashboards created in PlantMonitor
Users	Adding, editing, and deleting users

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