HEIDENHAIN

HEIDENHAIN StateMonitor

User's Manual

English (en)
12/2023

Fundamentals

About this manual

This manual is for StateMonitor Version 1.6.x.

Would you like any changes, or have you found any errors?

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 StateMonitor software.

StateMonitor contains components that are subject to copyrights held by znt Zentren für Neue Technologien GmbH, Lena-Christ-Straße 2, 82031 Grünwald, Germany. They are protected worldwide by copyright. Any unauthorized reproduction, use, or distribution of the components or parts thereof is not permitted and is subject to prosecution by criminal and civil law.

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

Further information: "Info submenu", Page 233

Contents

1

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 important 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 manufacturer or other supplier.

1.1 Intended use

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

The intended purpose is to centrally evaluate machine data in order to facilitate quick troubleshooting and to be able to use capacities more effectively.

Compliance with the proper and intended use of StateMonitor 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

Access rights

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

Within StateMonitor, 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 StateMonitor to be used, the end devices such as smartphones and tablets must be logged into the server as clients.

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

Further information: "User administration submenu", Page 180

Sending notifications

Prerequisites:

- Enable TCP Ports 19000 to 19034 and 28001 in the Firewall
- Connection to an SMTP server

Further information: "Requirements", Page 24

If, on account of IT security reasons, your IT department does not permit the integration of the notification function (**Messenger**), then StateMonitor will not be able to send automatic notifications to users by e-mail.

In the **Messenger** menu, you can configure the events that trigger a notification and assign them to a notification profile.

Further information: "Messenger menu", Page 112

NOTICE

Caution: Data may be lost!

If you add too many notifications to the selection, the recipient's e-mail inbox may overflow. Further e-mails will then no longer be delivered.

- Create a separate mailbox for StateMonitor
- Select notifications very carefully

NOTICE

Caution: Data may be lost!

If StateMonitor sends too many notifications to recipients, then the e-mail provider may regard these notifications as spam. In this case, the recipient will no longer receive the notifications in his inbox.

- Select notifications very carefully

1.3 Network connection security

Network connection of your controls should only be performed by IT specialists.

The control can have two network interfaces. Each network interface has its own IP address.

If two network interfaces exist, HEIDENHAIN controls preassign them as follows:

- X26 for integration into the local corporate network (connection to StateMonitor)
- X116 for the machine's internal use only

Refer to your machine manual.

The machine tool builder may define a different assignment of network interfaces than that predefined by HEIDENHAIN.

NOTICE

Caution: Malfunction!

If you change the IP address of the machine's internal interface, then you interrupt the communication to other machine components and cause the control to malfunction.

- Do not change the settings for the machine's internally used interface

2

Installation

2.1 Requirements

Machine controls

You can use StateMonitor with the following HEIDENHAIN controls:

Control	As of software version
iTNC 530	34049x-03
TNC 620	34056x-01
TNC 128	771841-01
TNC 320	340551-03
TNC 640	34059x-01
TNC7	81762x-16
CNC PILOT 620	688945-01
CNC PILOT 640	68894x-01
MANUAL Plus 620	548328-05
Mill Plus IT	53895x-03, 73738x-01
Grind Plus IT	510060-04
Grind Plus 640	73502x-01

Depending on your software option, you can integrate other controls into StateMonitor using the following interfaces:

Interface	As of specification version
Modbus	Connect/Read
OPC UA	1.02.x
MTConnect	1.2
FOCAS	CNC control series 0i[1], Model B/C/D/F CNC control series 15i (except turning) CNC control series 16i, 18i, 21i, 30i[1], Model A/B

[1] Full functionality, restricted for all others; for details see "FOCAS parameters", Page 280

Further information: "Machines submenu", Page 184

In order to use StateMonitor, the following prerequisites must be met:

- The machine controls must be integrated in the local company network

  Further information: "Network integration", Page 242
- Option 18 (HEIDENHAIN DNC interface) must be enabled on the HEIDENHAIN control

  Further information: "Activating option 18", Page 245

  or
- The corresponding option must be enabled on other controls

Hardware

For StateMonitor, you need a PC or server that meets the following minimum requirements:

- Dual core processor
- USB interface or network USB hub (dongle for full version)
- 4 GB RAM and 10 GB of hard disk space for the StateMonitor application (basic version for five machine controls)

For each further machine control, you additionally need:

- 0.25 GB RAM
- 2 GB hard disk space

Thus, if you want to connect 15 machine controls, for example, the PC or server requires 30 GB of hard disk space and 6.5 GB of RAM for StateMonitor.

If you want to connect 20 machine controls or more, HEIDENHAIN recommends that you use a PC or server with quad core processor.

Software

A Windows operating system (Windows 10 or higher, or Windows Server 2019) is required for running StateMonitor.

For communication, the following Firewall settings are required:

- Enable TCP ports 19000 to 19034 for communication with the machine controls
- Enable TCP port 28001 for communication with a PC, tablet, or smartphone

Have an IT specialist configure the firewall to enable the required TCP ports.

SMTP server

To use the **Messenger** notification function in StateMonitor, you must connect to an SMTP server acting as the e-mail output server. Contact your e-mail provider for the details needed to access the SMTP server.

Create a separate e-mail address for StateMonitor

Further information: "Messenger settings submenu", Page 205

2.2 Installation

Downloading the installer

To install StateMonitor, you need to download the installer from the HEIDENHAIN website (**www.heidenhain.de**).

- Download the current version from: **www.heidenhain.com**
- Navigate to the Download folder of your web browser
- Unpack the downloaded file with the extension in a temporary storage folder

> The **Install StateMonitor.exe** installer is unpacked and available in the temporary folder.

StateMonitor is dongle-protected. The dongle and the installation instructions will be sent to you by mail.

Further information: "Licensing", Page

Installing StateMonitor under Microsoft Windows

During the installation, both the StateMonitor application and the PostgreSQL database will be installed on the PC or server.

In order to perform the installation, you need to log in to Microsoft Windows as an administrator.

Proceed as follows in order to install StateMonitor:

- Double-click the **Install StateMonitor.exe** installer to start the installation

> The Setup Wizard opens.

- Select the setup language.
- Follow the setup wizard instructions.
- Accept the license conditions.
- Click the **Finish** button to complete the installation process.

> StateMonitor has been installed successfully.

The following desktop icons are created during installation:

- Activate Trial License
- StateMonitor ControlCenter
- StateMonitor website

Changing, repairing, and uninstalling StateMonitor

When you start the **Install StateMonitor.exe** installer file again, you are given the following possibilities:

- **Change**

  If you want to change the installed program functions, select **Change**.
- **Repair**

  Select **Repair** if StateMonitor is not working properly due to installation errors.
- **Remove**

  If you want to uninstall StateMonitor, select **Remove**.

2.3 File structures

The installation includes the following components:

- StateMonitor (application)
- ControlCenter
- HEIDENHAIN DNC
- WIBU CodeMeter
- OpenJDK (Java)
- PostgreSQL (database)

The installed files are structured as follows if the default settings are used:

- Installation folder ..\<Program Files>\HEIDENHAIN\StateMonitor
  - Application
- Work directory ..\<ProgramData>\HEIDENHAIN\StateMonitor
  - Database
  - Machine images
  - Log files

Access to the files depends on the configuration of the access rights on the PC or server.

2.4 Uninstalling

Uninstalling StateMonitor

To uninstall StateMonitor:

- ▶ Double-click the **StateMonitor.exe** installer in the "sm" subfolder to start it
- > The Setup Wizard opens.
- ▶ Click the **Remove** button
- ▶ Follow the uninstaller instructions
- > StateMonitor is uninstalled.

2.5 Licensing

License models

StateMonitor supports the following license models:

- Demo version (without dongle)

  You can evaluate StateMonitor as a demo version for free for a limited period. The demo version is fully-featured, i.e. it includes the software's full range of functions, but it is limited to five machines.

  The trial period starts on installation of the software. If you want to continue using StateMonitor after the trial period has expired, then you must purchase the software as a full version. Purchasing the licensed version converts the demo version into the full version.

  > - The demo version cannot be activated on a virtual server.
  > - The demo version cannot be activated remotely via a terminal server. Activation must be performed locally on the terminal server.
  > - All data collected during the trial period are retained for use in the full version.

- Full version based on a single license

  A full, single-license version is available with a dongle or a soft license.

  Five machines are automatically activated in the full version. A software option allows you to add more machines in sets of five.

  > To use a single license, you'll need a valid Software Maintenance and Support license. The release date of an installed single-license version must be before the expiration date of the Software Maintenance and Support license.

  > If StateMonitor is installed based on a single license on a virtual server by using a dongle, then the dongle must be integrated over a suitable USB server or network USB hub.

- Full version based on a rental license

  A rental license provides the same features as a single license, but it is available only as a soft license and therefore does not need a dongle. For its period of validity, the rental license always includes a corresponding Software Maintenance and Support license.

A license for the demo version is created during installation of StateMonitor. This license can be managed in the WIBU CodeMeter Control Center.

Software options

The StateMonitor functionality can be extended using additional software options.

You can purchase licenses for software options from your HEIDENHAIN sales representative. You will receive a license key that activates the software option.

Software options

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You can purchase licenses for software options from your HEIDENHAIN sales representative. You will receive a license key that activates the software option.

The full version and the options will run only on a PC or server equipped with a USB port for the dongle.

If StateMonitor is installed based on a single license on a virtual server by using a dongle, then the dongle must be integrated over a suitable USB server or network USB hub.

Activation

Activating a demo version

To activate the demo version on the PC or server on which it is installled:

- ▶ Double-click the **Activate StateMonitor** icon on the desktop
- > The WIBU CodeMeter Control Center opens.
- > The WIBU CodeMeter Control Center updates the import.
- ▶ Click the **OK** button
- > The demo version is now activated.
- ▶ Close the WIBU CodeMeter Control Center

The demo version of StateMonitor can only be activated once. If you click the **Activate StateMonitor** icon again, an error message will be displayed.

Activating a full version with a dongle

To activate the full version with a dongle on the PC or server on which it is installed:

- Connect the USB dongle to an available USB port of the PC or server
- On the PC or server, click the link provided in the maintenance ticket received by e-mail and follow the instructions on the web portal
- Restart StateMonitor

> The full version of StateMonitor is now activated.

If StateMonitor is installed based on a single license on a virtual server by using a dongle, then the dongle must be integrated over a suitable USB server or network USB hub.

Activating a full version with a soft license

To activate the full, soft-license version on the PC or server on which it is installed:

- On the PC or server, click the link provided in the maintenance ticket received by e-mail and follow the instructions on the web portal
- Restart StateMonitor

> The full version of StateMonitor is now activated.

If the PC or server has no Internet access, you can also activate a soft license offline.
To do this, click the link provided in the maintenance ticket on a PC with Internet connection and follow the instructions in the web portal for file-based license transmission.

2.6 Starting and ending

Starting the software

To start StateMonitor on the PC or server on which it is installed:

- ▶ Click the ControlCenter icon in the status bar
- > The ControlCenter window opens.

  Further information: "ControlCenter", Page 35

- ▶ Click the **Start** button
- > StateMonitor starts.

- ▶ Wait until the **Running** status appears on the screen

You have to start StateMonitor on the PC or server in order to access StateMonitor from other PCs, tablets, or smartphones.

If you also want to open the StateMonitor application on the PC or server on which StateMonitor is installed:

- ▶ Double-click the **StateMonitor Website** icon on the desktop
- > StateMonitor opens in the default web browser.

Opening the client application on a PC, tablet, or smartphone

To open the StateMonitor client application on a PC, tablet, or smartphone:

- ▶ Open a web browser, e.g. Google Chrome or Mozilla Firefox
- ▶ In the address line, enter:
  https://**Servername**:28001
  - The prefix varies depending on whether the connection to the server is encrypted (https) or not encrypted (http)
  - In place of **Servername**, enter the hostname or the IP address of the PC or server on which StateMonitor is installed
- ▶ Press the **Enter** key
- > StateMonitor opens.

If you open StateMonitor in an older browser, then content may be missing or incorrectly displayed.

Add the address to your favorites or bookmarks in your web browser in order to access StateMonitor quickly in future.

Exiting the software

To exit StateMonitor on the PC or server:

- ▶ Log off via the **Logout** menu

- ▶ Click the ControlCenter icon in the status bar
- > The ControlCenter window opens.

- ▶ Click the **Shutdown** button
- > StateMonitor stops.
- > All clients are disconnected from the server.

- ▶ Wait until the **Stopped** status appears on the screen

NOTICE

Caution: Possible loss of data!

If you exit StateMonitor on the server while users are still accessing StateMonitor from other PCs, tablets, or smartphones, the connection between the clients and the server is interrupted immediately. Any input that the users have not yet saved in StateMonitor will be lost.

- ▶ Before exiting the software, make sure that all users have logged off

Closing the client application

To close the StateMonitor client application:

- Log off via the **Logout** menu

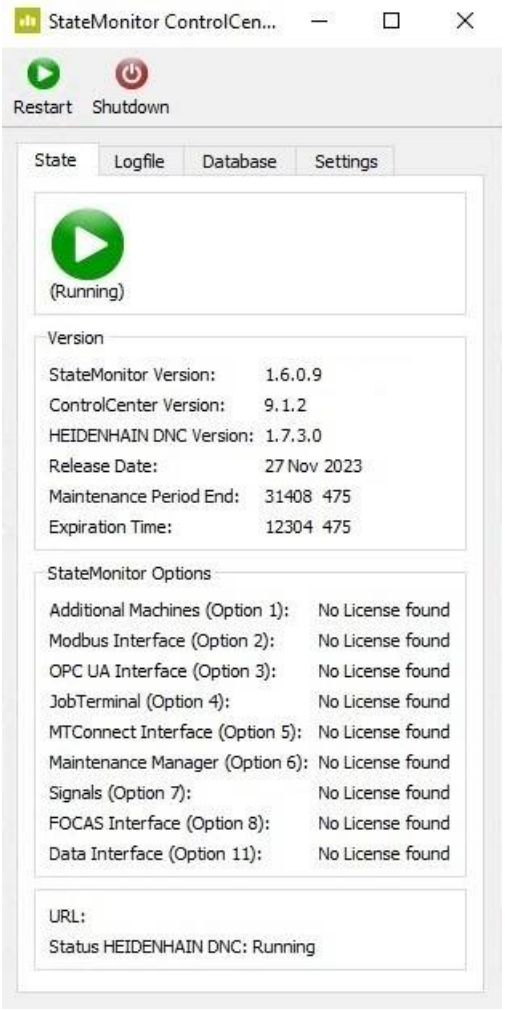
- Close the web browser window

When you exit StateMonitor, the missing period of time receives the status **UNDEF**. When you restart StateMonitor and collect a new machine status, then the current machine status is displayed.

2.7 ControlCenter

During the installation of StateMonitor, ControlCenter is automatically installed as well and is indicated in the task bar by the StateMonitor icon.

- ▶ Click the ControlCenter icon
- > The ControlCenter window opens.



ControlCenter provides the following functions and information:

- Starting and exiting of StateMonitor
- Display of the state of StateMonitor (**State** tab)
- Settings for the log files (**Logfile** tab)
- Settings for the database (**Database** tab)
- Settings for ControlCenter (**Settings** tab)

Starting StateMonitor

To start StateMonitor:

- ▶ Click the **Start** button
- > StateMonitor starts.

- ▶ Wait until the **Running** status appears on the screen

Exiting StateMonitor

To exit StateMonitor:

- ▶ Click the **Shutdown** button
- > StateMonitor stops.
- > All clients are disconnected from the server.

- ▶ Wait until the **Stopped** status appears on the screen

NOTICE

Caution: Possible loss of data!

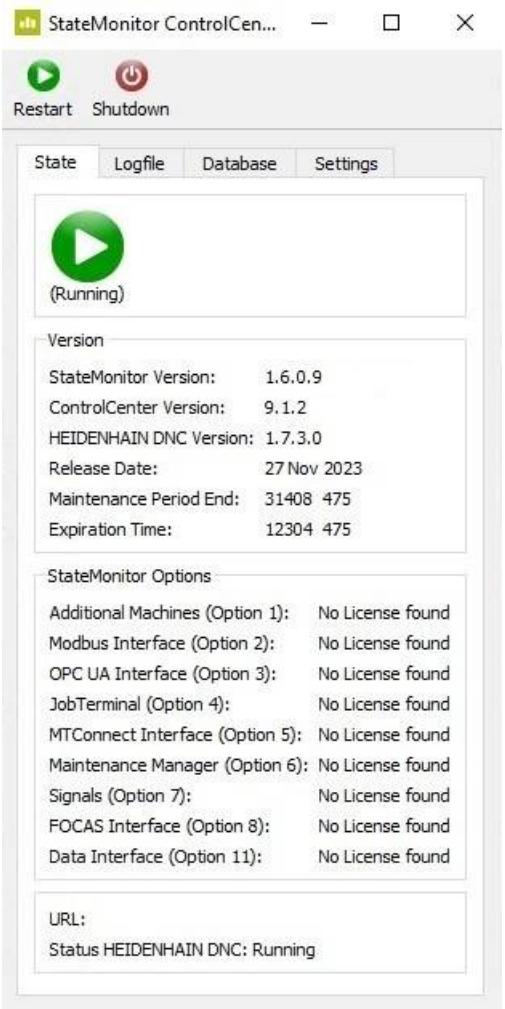
If you exit StateMonitor on the server while users are still accessing StateMonitor from other PCs, tablets, or smartphones, the connection between the clients and the server is interrupted immediately. Any input that the users have not yet saved in StateMonitor will be lost.

- ▶ Before exiting the software, make sure that all users have logged off

State tab

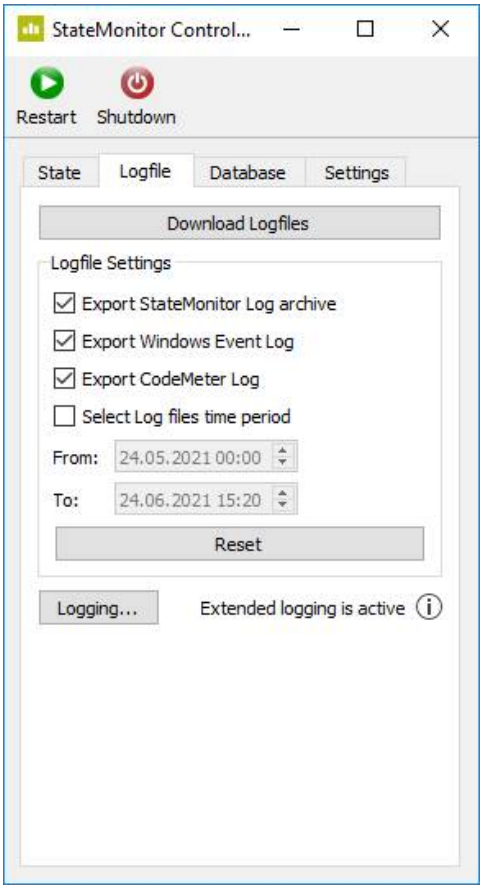
In the **State** tab, you will find the following information:

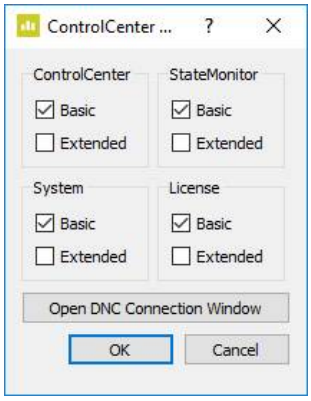
Element	Description
	Information about the state of the application Possible states: ■ Starting ■ Running ■ Stopping ■ Stopped
Version	Version information about StateMonitor, ControlCenter and HEIDENHAIN DNC (machine control); in addition: the release date and the end of the maintenance period for the current version and, for rental licenses, also the remaining usage period
StateMonitor options	Overview of enabled software options; for trial licenses, the remaining usage period is also indicated **Further information:** "Extending the functionality with software options", Page 52



Logfile tab

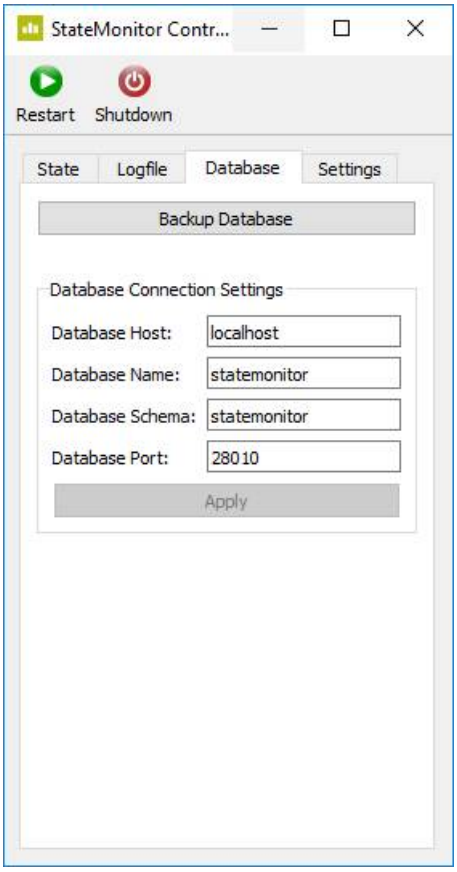
In the **Logfile** tab, you will find the following functions and settings:



Element	Description
Download Logfiles	Downloading of the current StateMonitor log file as a ZIP file
Logfile Settings	Logfile options: ■ **Export StateMonitor Log archive** Archived log files are exported as well; this may significantly enlarge the log file ■ **Export Windows Event Log** Additional Export of the Windows Event Log with entries from HEIDENHAIN DNC and StateMonitor ■ **Export CodeMeter Log** Additional export of the WIBU CodeMeter Log with entries regarding the license containers ■ **Select Log files time period** Selection of the time period for the log file ■ **Reset** Resetting of the options to default values
Logging	■ Size adjustment of the ControlCenter log file  ■ **Open DNC Connection Window** Opens the **DNC Connection** dialog (can be accessed only by users with the Administrator role)

Database tab

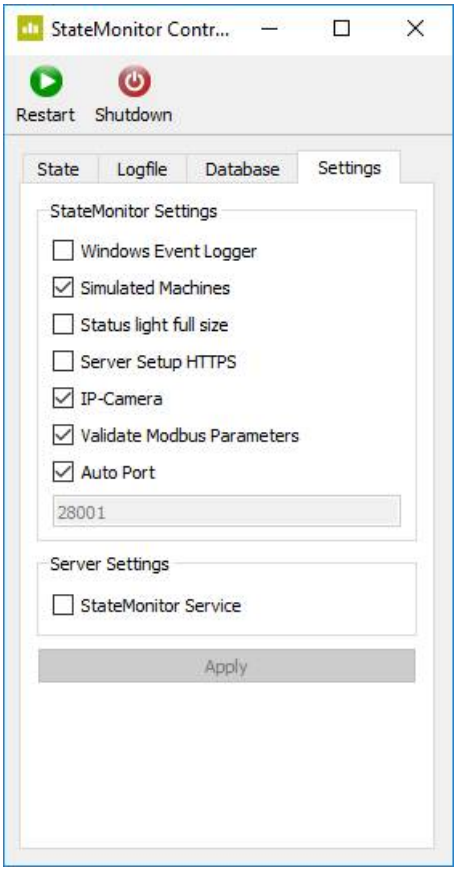
In the **Database** tab, you will find the following functions and settings:



Element	Description
Backup Database	Backup of the current StateMonitor database (including the machine images and PDF documents)
Database Connection Settings	Options for the connection to the database: ■ **Database Host** Host computer with database server (default: “localhost”) ■ **Database Name** Name of the database (default: "statemonitor") ■ **Database Schema** Database scheme (default: "statemonitor") ■ **Database Port** Datenbase port (default: "28010") If the database server is run on a different computer from that of StateMonitor, then the database TCP port must be enabled in the firewall. ■ **Apply** Application of the options

Settings tab

In the **Settings** tab, you will find the following settings:



Element	Description
StateMonitor Settings	Options of the application: ■ **Windows Event Logger** Additional logging of StateMonitor data in the Windows Event Log ■ **Simulated Machines** Use of simulated machines in StateMonitor ■ **Status light full size** Display of the machine statuses as background colors in machine park / button view ■ **Server Setup HTTPS** If StateMonitor is run via HTTPS, then a keystore with a valid certificate must be defined ■ **IP-Camera** ■ Access to IP cameras on machines ■ **Validate Modbus Parameters** ■ Validation of the parameters when adding a machine with Modbus interface ■ **Auto Port** Port for the application in the browser (default: "28001")
Server Settings	Running StateMonitor as a Windows service To register StateMonitor as a Windows service: ▶ Start ControlCenter with administrator rights ▶ Stop StateMonitor ▶ Click the **StateMonitor Service** option ▶ Click the **Apply** button

3

General Usage Information

3.1 Target group

The purpose of StateMonitor is to centrally evaluate machine data in order to use machine capacities more effectively.

The intended target groups of StateMonitor are:

- Machine operators (e.g. for operation of multiple machines, on-call duty, weekend operation)
- Employees in the foreman's office and in production planning
- Maintenance and servicing staff
- Controllers and management

3.2 Opening and closing

Opening the client application on a PC, tablet, or smartphone

To open the StateMonitor client application on a PC, tablet, or smartphone:

- Open a web browser, e.g. Google Chrome or Mozilla Firefox
- In the address line, enter:
  https://**Servername**:28001
  - The prefix varies depending on whether the connection to the server is encrypted (https) or not encrypted (http)
  - In place of **Servername**, enter the hostname or the IP address of the PC or server on which StateMonitor is installed
- Press the **Enter** key

> StateMonitor opens.

If you open StateMonitor in an older browser, then content may be missing or incorrectly displayed.

Add the address to your favorites or bookmarks in your web browser in order to access StateMonitor quickly in future.

Opening the client application on the control

> In order to operate StateMonitor without a touchscreen, you will need a mouse or a touchpad.

To open the client application of StateMonitor on a HEIDENHAIN control:

- ▶ Move the cursor to the bottom of the control screen
- > The HEROS task bar is displayed.
- ▶ Click the Diadur icon
- ▶ Select the **Web Browser** menu item
- > The saved browser is opened.
- ▶ In the address line, enter: https://**Servername**:28001
  - The prefix varies depending on whether the connection to the server is encrypted (https) or not encrypted (http)
  - In place of **Servername**, enter the hostname or the IP address of the PC or server on which StateMonitor is installed
- > StateMonitor appears on the screen.
- ▶ Set the display to full screen
- > With the screen switchover key, you can switch between the control screen and StateMonitor.

> To ensure communication between StateMonitor and the control through a firewall, you must enable the TCP-Port 28001 in the firewall.

Closing the client application

To close the StateMonitor client application:

- ▶ Log off via the **Logout** menu
- ▶ Close the browser window

3.3 Login / Logout

Login

If you are logging in for the first time after installing StateMonitor, and you have not yet defined any users, then you must first create a user.

Further information: "Password", Page 46

Logout

Before exiting StateMonitor, the users have to log off.

To log off:

- ▶ Log off via the **Logout** menu
- > The empty login window will be displayed.

3.4 Password

You must create an initial password when you log on for the first time after the installation.

To create an initial password:

- Open the login window
- Follow the instructions

StateMonitor displays the logged-in user as the **default administrator**.

NOTICE

Caution: Possible loss of data!

The password created in StateMonitor can be reset only by a user with administrator rights.

- Observe your company's current rules regarding passwords.

3.5 General settings

Display

StateMonitor is a web application that you can use on various devices such as PCs, tablets, and smartphones.

The display is automatically adapted to the respective terminal.

Language

The global language setting can only be changed by a user with the Administrator role.

Further information: "Advanced submenu", Page 229

In the **User settings** submenu, every user can set the language individually without affecting the global language setting.

Further information: "Change language settings for user", Page 179

Time zone

Based on the time zone, StateMonitor determines the valid time for the machine data display.

The correct time zone must therefore be set on the server on which StateMonitor is installed.

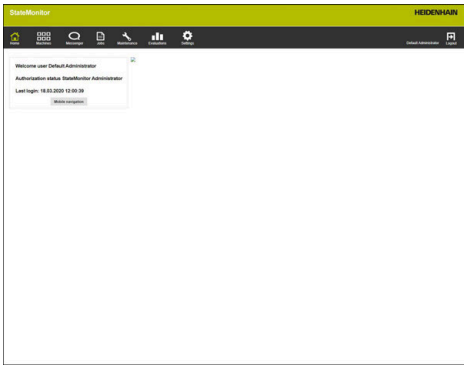
The correct time must also be set on the machine so that StateMonitor can correctly process and display the times.

3.6 Overview of the menus

The availability of the individual menus and submenus depends on:

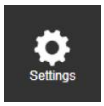
- the activated options
- the role of the corresponding user

Further information: "Roles", Page 180



In StateMonitor, the following menus and submenus are available:

Icon	Menus and submenus
Home	**Home**
Machines	**Machines** ■ **Tile view** ■ **Status overview** ■ **Day view** ■ **Overview of program run-times**
Messenger	**Messenger** ■ **Event configurator** ■ **Notification profiles** ■ **Notifications** ■ **Message groups**
Jobs	**Jobs** (software option) ■ **Create job** ■ **Assign job** ■ **Adjust machining sequence**
Maintenance	**Maintenance** (software option) ■ **Tile view** ■ **Status overview**
Evaluations	**Evaluations** ■ **Machine statuses** ■ **Key figures** ■ **Program run times** ■ **Machine alarms** ■ **Job times** (software option) ■ **Tool usage times** ■ **Signals** (software option) ■ **Maintenances** (software option) ■ **Time filter**

Icon	Menus and submenus
	**Settings** ■ **User settings** ■ **User administration** ■ **Machines** ■ **Add groups** ■ **Machine mapping** ■ **Statuses** (software option) ■ **Messenger settings** ■ **File backup** ■ **External reporting DB** ■ **Advanced** ■ **Info**

3.7 Functions in tables and charts

In tables and charts, various functions are available. These depend on the submenu you have opened.

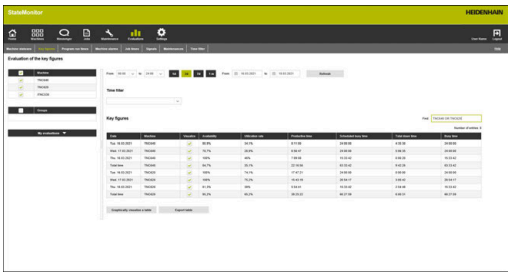
Finding text in tables

Using the **Find:** input field, you can search the table for the desired character string. To do this:

- ▶ Enter the search term in the **Find:** input field
- > The table only displays the rows containing the search term.

The search term can contain letters, numbers, and special characters.

You can gate multiple search terms using `AND`, `OR`, and `NOT`.



Gate		Description	Example
AND	"And" operation	The table displays all of the rows containing both of the search terms.	TNC 640 **AND** 100.0 %
OR	"Or" operation	The table displays all of the rows containing either one of the search terms.	TNC 640 **OR** iTNC 530
NOT	"Not" operation	The table displays all of the rows that do not contain the search term.	**NOT** iTNC 530

When gates are combined, the entries are processed in the following order: **NOT ... AND ... OR ...**.
When parentheses (not supported by StateMonitor) are used, this order would correspond to `[(NOT ... ) AND ...] OR ...`

Sorting table entries

You can sort the table entries by column. Proceed as follows:

- ▶ Click the header of the column in question
- > StateMonitor sorts the table entries in descending order based on this column.

> Every time you click the header of a table column, StateMonitor switches between ascending and descending order.

Adjusting the column width

- ▶ To adjust the column width, drag the separation line with the mouse to the desired position.

Showing the chart related to a table

In many cases, you can display a chart in addition to the table view to represent the table data graphically.

- ▶ Click the chart symbol or the **Graphically visualize a table** button
- > StateMonitor shows a chart below the table.
- ▶ To display details on a point, bar, or section (if available), click the corresponding item.
- ▶ Adjust the display using the checkboxes or drop-down list boxes (if available)

Saving table or chart data as CSV files

In many cases, it is possible to save the data from a table or chart as a CSV file. You can import the CSV file e.g. into Microsoft Excel and further process it there.

- Click the **Export table** button
- Select the desired location
- Click the **Save** button

3.8 Extending the functionality with software options

The StateMonitor functionality can be extended using additional software options.

You can purchase licenses for software options from your HEIDENHAIN sales representative. You will receive a license key that activates the software option.

The following software options are available:

Option	Extended functionality	ID
1	Five additional machines	1220884-01
2	Modbus Interface	1268670-01
3	OPC UA Interface	1268673-01
4	JobTerminal	1268674-01
5	MTConnect Interface	1268675-01
6	MaintenanceManager	1308520-01
7	5 Signals	1308521-01
8	FOCAS Interface	1385356-01
11	Data Interface	1367514-01

Further information: "Software Options and Licenses", Page 235

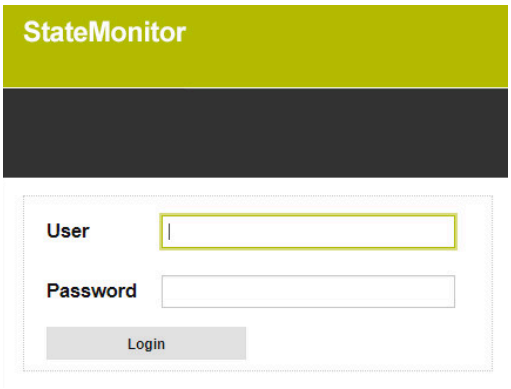
4

Home Menu

4.1 Home menu

Enter your user name and password in the **Home** menu.

Further information: "Login / Logout ", Page 55



If a user is logged on, then StateMonitor displays the **authorization status** of the logged-on user as well as the time of the last login.

> After logon, you can display a previously defined start page or the QuickEdit view.

Further information: "Create user", Page 182

Company-specific start page

If you want to display your company logo or another image file in the **Home** menu, you can define one or more image files to be displayed:

To display a specific image file:

- Copy the respective image file (e.g., `home.jpg`) to the desired directory (e.g., `/homeImage`)
- In the file `[installation folder]\config \properties\application.properties` in the `AppConfig.HomeViewImage` entry, define the path of the image file (e.g., `/homeImage/home.jpg`)

> StateMonitor displays the defined image in the **Home** menu

To display multiple image files as a sequence of images:

- Copy the respective image files to the desired directory (e.g., `/homeImage`)
- In the file `[installation folder]\config \properties\application.properties` in the `AppConfig.HomeViewImage` entry, define the path of the directory containing the image files (e.g., `/homeImage`)

> StateMonitor displays the images contained in the defined folder as a consecutive sequence of images, with each image being displayed for 20 seconds

4.2 Login / Logout

Login

If you are logging in for the first time after installing StateMonitor, and you have not yet defined any users, then you must first create a user.

Automatic login

Users with the Viewer role can use a special URL to log in from the web browser.

- ▶ Open a web browser (e.g., Google Chrome or Mozilla Firefox)
- ▶ In the address line, enter: https://**Servername**:28001/jh-tnc-sm-app/operator#!login/**Username**/**Password**
  - The prefix varies depending on whether the connection to the server is encrypted (https) or not encrypted (http)
  - In place of **Servername**, enter the hostname or the IP address of the PC or server on which StateMonitor is installed
  - In the **Username** and **Password** fields, enter your user name and your password.
- ▶ Press the **Enter** key
- > StateMonitor opens without displaying the login window.

Saving access data in the address line is possible only for users with the **Viewer** role.

Add the address to your favorites or bookmarks in your web browser in order to access StateMonitor quickly in future.

Logout

Before exiting StateMonitor, the users have to log off.

To log off:

- ▶ Log off via the **Logout** menu
- > The empty login window will be displayed.

5

Machines menu

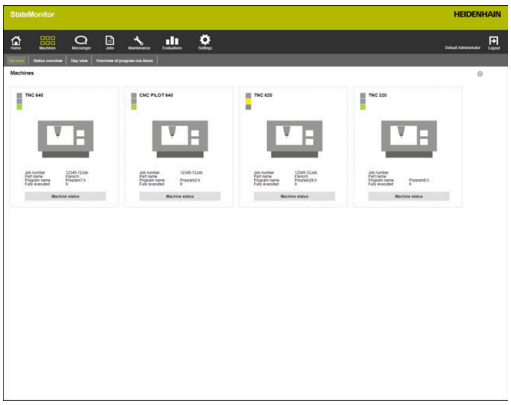
5.1 Machines menu

In the **Machines** menu, StateMonitor displays all of the machines that have been set up and activated in the **Settings** menu.

Further information: "Machines submenu", Page 184

The **Machines** menu contains the following submenus:

- **Tile view**
- **Status overview**
- **Daily view**
- **Overview of program run-times**

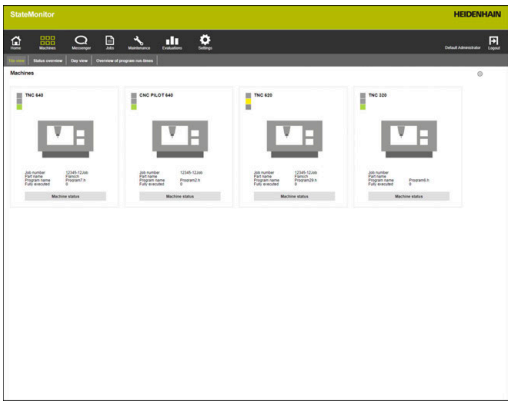


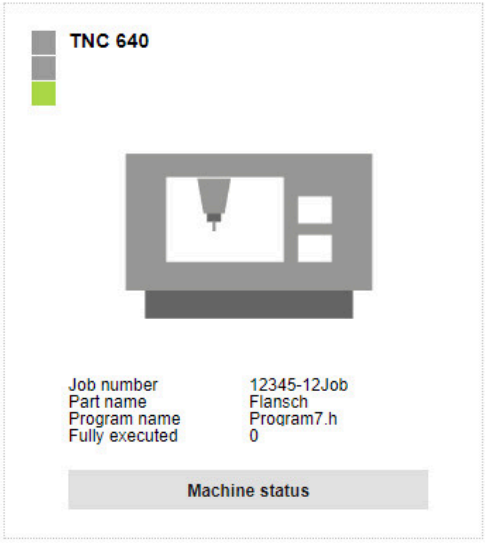
5.2 Tile view submenu

In the **Tile view** submenu, StateMonitor depicts every activated machine as a status card.

The status card contains the following information:

Information	Meaning
Machine image	If you upload an image of the machine when adding it, then StateMonitor will show the image here
Status light	Current machine status
Job number	Number of the job being currently machined (software option)
Part name	Name of the currently finished workpiece (software option)
Program name	Name of the NC program currently loaded in **Program Run, Full Sequence** or **Program Run, Single Block** mode
Fully executed	Number of complete program runs





Status light

The colors of the status light have the following meanings:

Color	Meaning
Gray 	The machine is not switched on or not connected
Red 	The machine is not ready for operation
Yellow 	The machine is ready for operation, but not productive
Dark green/ Light green 	The machine is productive Dark green = **Productive (feed rate/rapid OVR >= 100 %)** Light green = **Productive (feed rate/rapid OVR < 100 %)**

Further information: "Customizing the configuration of the default OVR", Page 202

Filtering status cards

Each user can customize the filtering of the status cards. To do this:

- ▶ Click the gear symbol
- > The **User-specific view of existing machinery** window that provides filter criteria for selection is displayed. The filter criteria encompass machines and machine groups.
- ▶ To limit the view to certain machines or machine groups, select the respective checkboxes
- > StateMonitor shows the selected machines.

If no checkbox has been selected, then StateMonitor will display all of the machines that are assigned to the user (default setting).

Customizing the view of the status cards

If more status cards are shown than can be displayed in a window, the user can split the **Tile view** up into several views by using the Slide function. To do this:

- ▶ Click the gear icon
- > The **User-specific view of existing machinery** window is displayed.
- ▶ To customize the view, select the following options or the checkboxes in front of them:
  - **Number of machines shown per slide**
  - **Automatic switching of the slides** activates the Slide Show function
  - **Display time in seconds**
- > StateMonitor displays the view in the Slide Show function.

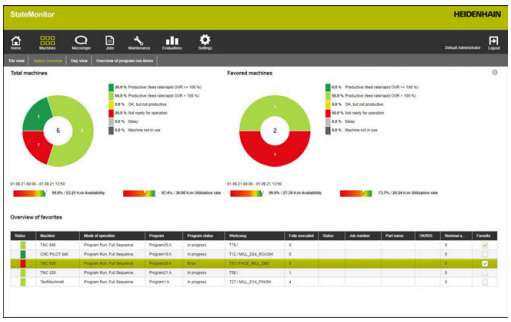
If the Slide Show function is active, special control elements are shown at the bottom of the screen that allow you to manually control the slide show.

5.3 Status overview submenu

In the **Status overview** submenu, StateMonitor graphically displays the machine statuses in doughnut charts.

In doing so, StateMonitor differentiates between:

- **Total machines**
- **Favored machines**



Total machines

The **Total machines** doughnut chart summarizes the machine statuses of all of the activated machines in the machine park. In addition, StateMonitor displays the calculated **Availability** and **Utilization rate** key figures as the average of all activated machines in the machine park.

Favored machines

The **Favored machines** doughnut chart contains only the machine statuses of machines that have been marked as **Favorite** in the **Overview of favorites**.

Overview of favorites

The **Overview of favorites** table lists all of the activated machines in the machine park and contains the following information:

- Current **Status** of the machine
- **Machine tool** (machine designation)
- Current **Mode of operation** of the machine
- The **Program** currently loaded on the machine
- **Program status**
- Active **Tool** (including tool number and tool name) in the tool spindle
- Number of programs that have been **Fully executed**
- **Status** of the current job
- **Job number**
- **Part name**
- **OK/R/S**: returned quantities of Actual quantity (OK), Rework (R), and Scrap (S)
- **Nominal amount**
- Designation as **Favorite**

5.4 Day view submenu

In the **Day view** submenu, you can graphically display the machine statuses of the current day for each machine.

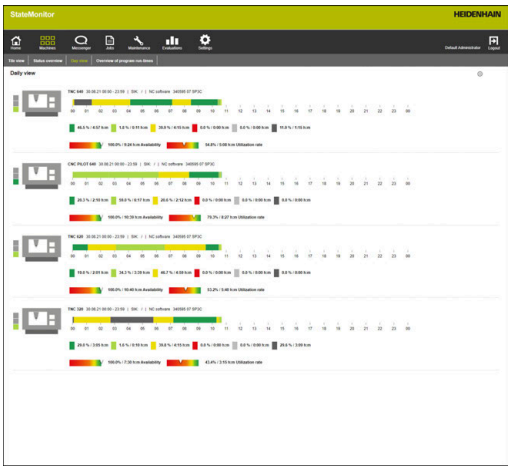
Furthermore, the **Availability** and **Utilization rate** key figures are shown for each machine.

Further information: "Key figures submenu", Page 162

The machine status bar results from the machine status.

A blue line above a section of the machine status bar indicates that the section contains additional information.

Further information: "Saving additional information", Page 81



Showing detailed information

You can show detailed information for each section of the machine status bar. For this purpose:

- ▶ Click a section of the machine status bar
- > StateMonitor displays a window containing detailed information about the machine status and any comments.

Defining the observation period for the machine status bars

By default, the machine status bars show the period from 00:00 to 24:00 hrs. Each user can set this observation period individually. The maximum length of the observation period is 24 hours.

To adjust the observation period:

- ▶ Click the gear symbol
- > The **User-specific adaptation of machine statuses** window opens.
- ▶ In the **From:** field, select or enter the desired time
- ▶ In the **to:** field, select or enter the desired time
- ▶ Click the **Save** button
- > The machine status bars display the selected period.

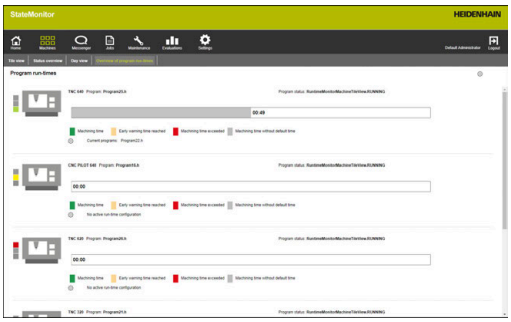
Customizing the view of the machine status bars

If more machine status bars are shown than can be displayed in a window, the user can split the **Day view** up into several views by using the Slide function. To do this:

- ▶ Click the gear icon
- > The **User-specific view of existing machinery** window is displayed.
- ▶ To customize the view, select the following options or the checkboxes in front of them:
  - **Number of machines shown per slide**
  - **Automatic switching of the slides** activates the Slide Show function
  - **Display time in seconds**
- > StateMonitor displays the view in the Slide Show function.

If the Slide Show function is active, special control elements are shown at the bottom of the screen that allow you to manually control the slide show.

5.5 Overview of program run-times submenu



In the **Overview of program run-times** submenu, StateMonitor displays a status card with the currently active NC program and its progress for every machine.

To customize the display of the program run times:

- ▶ On the desired status card, click the gear icon that is shown at left below the status bar
- > StateMonitor displays the **Program run-time configuration** window.
- ▶ To use an NC program that has already been recorded, enter the corresponding search criteria in the **Search the captured machining times** pull-down menu:
  - Time period
    - Time from ... to ...
    - Number of days (counting back from the current day)
      - 1 day
      - 3 days
      - 7 days
    - Date from ... to ...
  - **Machine**
  - **Program**
- ▶ If a program that you would like to use has been found, click the corresponding time information.
- > The time information is added to the **Configure program run-time** pull-down menu as **Machining time**.
- ▶ In the **Configure program run-time** pull-down menu, select the program name in the drop-down list or enter the program name including the path
- ▶ Select the desired recording method in the **Machining time for monitoring** drop-down list
  - **Define fixed time**
  - **Default time from FN38 function**

    Further information: "Defining default times", Page 108
- ▶ In the **Early warning time** field, enter the desired reminder time prior to the start of the program
- ▶ Click the **Save configuration** button
- > StateMonitor displays the configuration in the list.

In addition, you can use the **Notifications** function to be informed about when the early warning time and/or the machining time of all active programs have/has been reached.

The **Notifications** function is always effective for all active program run-time configurations.

To customize the notifications:

- On one of the status cards, click the gear icon that is shown at left below the status bar
- > StateMonitor displays the **Program run-time configuration** window.
- In the **Notification** pull-down menu, select the checkboxes of the desired time periods
  - **Early warning time reached**
  - **Specified machining time reached**
- To activate the notification, select the **Active** checkbox
- Select the desired user and the corresponding notification profile in the **User name** and **Notification profiles** drop-down lists
- Click the button
- > StateMonitor displays the notification in the list.

Further information: "Messenger menu", Page 112

Filtering status cards

Each user can customize the filtering of the status cards. To do this, proceed as follows:

- Click the gear symbol
- > The **User-specific view of existing machinery** window that provides filter criteria for selection is displayed. The filter criteria encompass machines and machine groups.
- To limit the view to certain machines or machine groups, select the respective checkboxes
- > StateMonitor shows the selected machines.

If no checkbox has been selected, then StateMonitor will display all of the machines that are assigned to the user (default setting).

Customizing the view of the status cards

If more status cards are shown than can be displayed in a window, the user can split the **Tile view** up into several views by using the Slide function. To do this, proceed as follows:

- ▶ Click the gear icon
- > The **User-specific view of existing machinery** window is displayed.
- ▶ To customize the view, select the following options or the checkboxes in front of them:
  - **Number of machines shown per slide**
  - **Automatic switching of the slides** activates the Slide Show function
  - **Display time in seconds**
- > StateMonitor displays the view in the Slide Show function.

If the Slide Show function is active, special control elements are shown at the bottom of the screen that allow you to manually control the slide show.

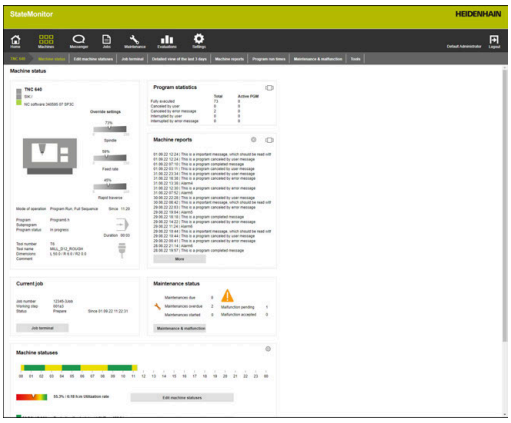
5.6 Overview of machine statuses

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
Dark green **Productive (feed rate/ rapid OVR >= 100 %)**	 **Program Run, Full Sequence**	**In progress**	≥ 100 %
Light green **Productive (feed rate/ rapid OVR < 100 %)**	 **Program Run, Full Sequence**	**In progress**	< 100 %
	 **Program Run, Single Block**	**In progress**	> 0 %
Yellow **OK, but not productive**	 **Program Run, Full Sequence**	**In progress**	= 0 %
	 **Program Run, Full Sequence**	■ **Selected** ■ **Stopped** ■ **Interrupted** ■ **Finished** ■ **Error** ■ **No program selected**	Any
	 **Program Run, Single Block**		
	 **Manual Operation**		Any
	 **Electronic Handwheel**		
	 **Positioning with Manual Data Input**		

Machine status	Mode of operation	Program status	Override settings
Red **Not ready for operation**	 **Program Run, Full Sequence**  **Program Run, Single Block**	**Error**	Any
Light gray **Not defined**	The **Not defined** status is displayed when StateMonitor has not been started and is therefore unable to determine the status.		
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.		
Dark gray **Machine not in use**	The **Machine not in use** status may be due to one of the following causes: ■ The machine is switched off ■ StateMonitor cannot establish a connection to the machine ■ StateMonitor is temporarily shut down		

5.7 Machine status



The **Machine status** view shows the following information:

- **Machine name**
  - **Machine status light**
  - **SIK** number and control of the machine
  - **NC software** version of the control
  - **Override settings**
  - **Mode of operation**, **Program**, **Subprogram**, and **Program status** that are currently active on the machine
  - **Program status** with **starting time** and **Duration** of the current program
  - **Tool number**, **Tool name**, **Dimensions**, and **Comment** for the current tool
- **Current job** (software option)
  - **Job number** and **Working step**
  - **Status** of the current job, including the **starting time**
- **Active messenger status**
- **Program statistics**
- **Signal status**
- **Machine reports**
- **Maintenance status** (software option)
- **Machine statuses**
  - **Machine status bar** (resulting from the **Machine status**)
  - **Utilization rate**

To open the **Machine status** view:

- ▶ Switch to the **Machines** menu
- ▶ Click the **Machine status** button of the desired machine
- > StateMonitor opens the **Machine status** view.

From the **Machine status** view, you can access additional submenus:

- **Edit machine statuses**
  Further information: "Edit machine statuses submenu", Page 79
- **Job terminal** (software option)
  Further information: "Job terminal submenu (software option)", Page 84
- **Detailed view of the last 3 days**
  Further information: "Detailed view of the last 3 days submenu", Page 91
- **Machine alarms**
  Further information: "Machine alarms submenu", Page 92
- **Program run times**
  Further information: "Program run times submenu", Page 95
- **Maintenance & malfunction**
  Further information: "Maintenance & malfunction submenu (software option)", Page 97

Live image

In the **Machine status** submenu, you can call the live image of the camera.

Precondition: An IP camera is configured for the machine.

Further information: "Edit machine", Page 190

For this purpose:

- ▶ Click the camera symbol next to the machine name
- > The live image is shown in a new tab of the browser.

Override settings

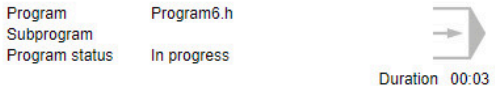
StateMonitor graphically displays the **Override settings** for the **Spindle** (speed), the **Feed rate**, and the **Rapid traverse** as percentages.

The display corresponds to the actual potentiometer setting on the control, regardless of the current operating mode.

If rapid traverse and feed rate are on the same potentiometer on your machine, StateMonitor shows the same values for both **Override settings**.

Tool information

StateMonitor displays a schematic tool icon and information about the tool that is currently being used.



> This function is only available for machines that are connected via the HEIDENHAIN DNC interface.

Mode of operation

StateMonitor displays the **Mode of operation** that is currently selected on the machine.

Only the machine operating modes and the associated symbols are displayed. StateMonitor does not show the programming modes of operation.

Machine operating modes

Symbol	Mode of operation
	**Manual Operation**
	**Electronic Handwheel**
	**Positioning with Manual Data Input** (MDI)
	**Program Run, Single Block**
	**Program Run, Full Sequence**

Program status

The Program status provides information about the current status of the NC program that is being run on the machine.

The following program statuses can occur:

Program status	Meaning
In progress	The machine is executing an NC program.
No program selected	The machine is not in an operating mode that executes NC programs.
Inactive	The current **Mode of operation** on the machine is **Program Run, Full Sequence**, or **Program Run, Single Block**. ■ No NC program has currently been started or ■ Program run was interrupted by an error or ■ The operator stopped the program run with an **INTERNAL STOP**
Error	The execution of the current NC program was interrupted due to an error. The **Error** status is shown until it is acknowledged on the machine. Then the status switches to **Inactive**.
Selected	The current **Mode of operation** on the machine is **Program Run, Full Sequence**, or **Program Run, Single Block**. The operator has selected a program but not started yet.
Stopped	■ The current **Mode of operation** on the machine is **Program Run, Single Block**, and the operator has not yet started the next NC block ■ Program run was stopped by an **M0** command in the NC program
Interrupted	The operator interrupted the program run with **NC Stop**.
Finished	The current NC program has been executed until the end. An **M30** or **M2** command finished the program.

When the machine is switched off, no **Program status** is displayed.

Current job (software option)

Under **Current job**, StateMonitor displays information on the job that is currently being executed on the respective machine.

Requirements:

- The job has been set up
- The job has been assigned to the machine
- The job is currently being executed

To start the execution of the jobs:

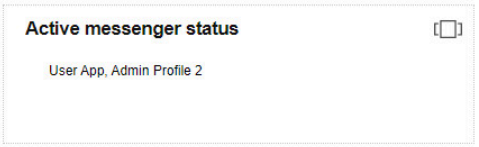
▶ Click the **Job terminal** button

> The **Jobs** submenu is displayed.
Further information: "Job terminal submenu (software option)", Page 84

Active messenger status

Under **Active messenger status**, StateMonitor shows the active **Notifications**.

Further information: "Notifications submenu", Page 120



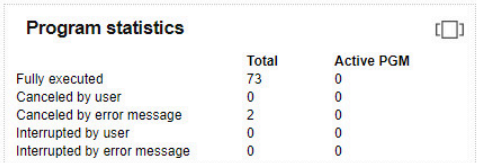
▶ If the **Active messenger status** area is not shown, then click the slider icon in the **Program statistics** area

> Instead of showing the **Program statistics** area, StateMonitor shows the **Active messenger status** area.

Program statistics

Under **Program statistics**, StateMonitor records the number of fully executed and aborted NC programs.

- If the **Program statistics** area is not visible, then click the slider icon in the **Active messenger status** area
- > Instead of showing the **Active messenger status** area, StateMonitor shows the **Program statistics** area.



The following is counted:

- All programs (**Total**)
- The current program (**Active PGM**)

StateMonitor distinguishes the following cases:

Dialog	Meaning
Fully executed	Number of fully executed programs
Canceled by user	Number of programs canceled by the user
Canceled by error message	Number of programs that were canceled due to an error message
Interrupted by user	Number of programs interrupted by the user
Interrupted by error message	Number of programs that were interrupted due to an error message

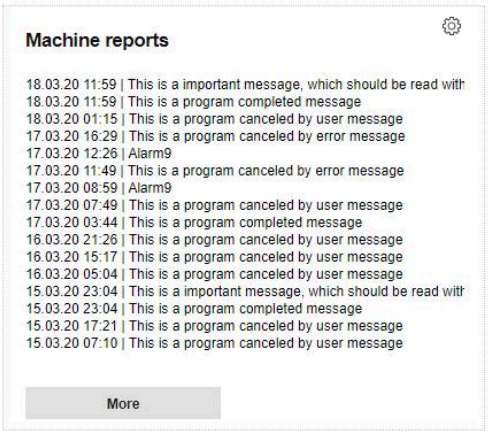
Machine reports

In the **Machine reports** area, StateMonitor shows the last machine messages.

- ▶ If the **Machine reports** area is not shown, then click the slider icon in the **Signal status** area
- > Instead of showing the **Signal status** area, StateMonitor shows the **Machine reports** area.

Each user can define individually which messages are to be displayed under **Machine reports**. For this purpose, proceed as follows:

- ▶ Click the gear icon
- > A filter selection window opens. The filter criteria encompass error classes, error groups, and information.
  Further information: "Machine alarms submenu", Page 92
- ▶ To add a filter criterion to the selection, select the respective checkbox
- ▶ Click the **Save** button
- > Under **Machine reports**, StateMonitor will only show the messages that match the selected filter criteria.
- > Filtering only applies to the **Machine reports** section in the **Machine status** submenu.



To view further machine messages:

- ▶ Click the **More** button
- > The **Machine reports** submenu is displayed.
  Further information: "Machine alarms submenu", Page 92

Signal status (software option)

In the **Signal status** area, StateMonitor shows the status of the machine's currently recorded signals.

- ▶ If the **Signal status** area is not visible, then click the slider icon in the **Machine reports** area
- > Instead of showing the **Machine reports** area, StateMonitor shows the **Signal status** area.

Each user can define individually which signals are to be displayed under **Signal status**. To do this:

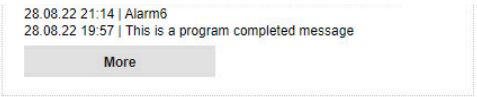
- ▶ Click the gear icon
- > A window with the defined signals is displayed. **Further information:** "Defining control signals", Page 188
- ▶ To display a signal, select the checkbox in front of it
- ▶ Click the **Save** button
- > Only the selected signals are displayed in the **Signal status** area.

Maintenance status (software option)

In the **Maintenance status** area, StateMonitor shows the machine's current maintenance status.

To see details or to report malfunctions:

- ▶ Click the **Maintenance & malfunction** button
- > The **Maintenance & malfunction** submenu is displayed. **Further information:** "Maintenance & malfunction submenu (software option)", Page 97



Machine statuses

Under **Machine statuses**, StateMonitor shows the machine status bar of the current day as well as the machine's current **Utilization rate**.

Setting the observation period

By default, the machine status bar shows the period from 00:00 to 24:00 hrs. Each user can set this period individually. The maximum length of the observation period is 24 hours.

To adjust the observation period:

- ▶ Click the gear icon
- > The **User-specific adaptation of machine statuses** window opens.
- ▶ In the **From:** field, select or enter the desired time
- ▶ In the **to:** field, select or enter the desired time
- ▶ Or, after selection of the **Show statuses of the last** option, select the desired time period
- ▶ Click the **Save** button
- > The machine status bar will now display the selected period.

Adjusting the observation period also affects the **Edit machine statuses** and **Detailed view of the last 3 days** submenus. You can adjust the observation period there, too.

Detail view

To see the **Detailed view of the last 3 days**:

- ▶ Click the **Show the machine status of recent days** button
- > The **Detailed view of the last 3 days** submenu is displayed.
  Further information: "Detailed view of the last 3 days submenu", Page 91

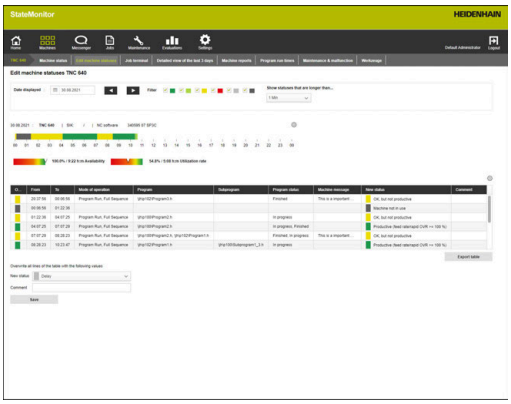
Editing machine statuses

To replace certain machine statuses with others and to specify them more precisely, switch to the **Edit machine statuses** submenu:

- ▶ Click the **Edit machine statuses** button
- > The **Edit machine statuses** submenu is displayed.
  Further information: "Edit machine statuses submenu", Page 79

5.8 Edit machine statuses submenu

Displaying machine statuses



In the **Edit machine statuses** submenu, StateMonitor shows the machine statuses of the current day in a machine status bar and lists them in chronological order in a table.

To select a day for which StateMonitor should display the machine statuses:

- At **Date displayed**, click the calendar icon
- Select the desired date
- Alternatively, enter the desired date in the **Date displayed** field

- Alternatively, you can browse through the days in reverse

- Or you can browse through the days in a forward direction

The available time for the machine statuses depends on the user's role. These settings are defined in the `[installation folder]\config\properties\application.properties` file in the following entries and can be changed:

```
AppConfig.
MaxDaysMachineStateEditingUser=0
AppConfig.
MaxDaysMachineStateEditingUserPlus=5
AppConfig.
MaxDaysMachineStateEditingAdmin=365
```

You can filter the table entries according to:

- The machine status colors (**Filter**)
- The duration of the individual machine statuses (**Show statuses that are longer than...**)

Further information: "Functions in tables and charts", Page 50

Replacing and specifying machine statuses

In the **Edit machine statuses** submenu, you can replace machine statuses with other ones and specify them more precisely.

> Additional specifications for machine statuses can be defined in the **Settings** menu.
>
> **Further information:** "Statuses submenu", Page 200

To change a machine status:

- Switch to the **Machines** menu
- Click the **Machine status** button of the desired machine
- Select the **Edit machine statuses** submenu
- In the table, click the row of the desired machine status
- In the **New status** drop-down list below the table, select the desired status
- Enter a comment in the **Comment** field as needed
- Click the **Save** button
- > The machine status is changed in the machine status bar.

FN38 messages from HEIDENHAIN controls or messages from other controls (provided that the correct syntax is used) can be used to edit machine statuses in StateMonitor from within the NC program.

Further information: "Editing machine statuses", Page 107

In the default configuration, statuses can only be reduced to a lower level. The table below shows which original machine statuses can be replaced by which specifications:

Original status			New status (specification)
	Dark green	**Productive (feed rate/rapid OVR >= 100 %)**	Dark green, light green, yellow, red, or light gray
	Light green	**Productive (feed rate/rapid OVR < 100 %)**	Dark green, light green, yellow, red, or light gray
	Yellow	**OK, but not productive**	Yellow, red, light gray, or dark gray
	Red	**Not ready for operation**	Red or dark gray
	Dark gray	**Machine not in use**	Dark or light gray

You can increase machine statuses to a higher level (i.e., "improve" them) only if the option for the corresponding user role is set in the **Statuses** submenu of the **Settings** menu.

Further information: "Customizing the configuration of machine status changes", Page 203

The light-gray **Delay** status does not originally come from the machine and is therefore not an original status. The light-gray status can replace a yellow original status or a dark-gray original status and specify it more precisely.

Example:
If a machine is switched off for maintenance work (dark-gray bar), then you can subsequently set this status in StateMonitor to Delay (light-gray bar).

Customizing columns

To customize the display of the columns:

- ▶ Click the gear icon
- > The **Show/Hide columns in the table** window opens.
- ▶ To remove a column from the selection, clear the checkbox in front of it
- ▶ Click the **Save** button
- > The table shows the selected columns.

Saving additional information

A blue line above a section of the machine status bar indicates that the status has been replaced or contains additional information.

To save additional information:

- ▶ Switch to the **Machines** menu
- ▶ Click the **Machine status** button of the desired machine
- ▶ Select the **Edit machine statuses** submenu
- ▶ In the table, click the row of the desired machine status
- ▶ Enter additional information in the **Comment** field below the table
- ▶ Click the **Save** button
- > StateMonitor displays a blue line above the section in the machine status bar.

If you click on a section with a blue line, StateMonitor displays a pop-up window with the inserted comment and any information regarding changed or specified machine statuses.

Editing machine statuses

You can manually edit individual machine statuses in the machine status bar at a later time. To do so, you “divide” the time entry of a machine status into two mutually independent parts that you then designate with a relevant machine status.

This gives you the option of subdividing monitored time periods to reflect the actual machine occupation for the calculation of key figures (see "Key figures submenu", Page 162).

> For defining planned downtimes (e.g., shift change or breaks) see "Time filter submenu", Page 174.

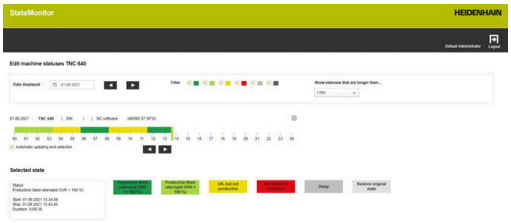
To edit a machine status:

- Switch to the **Machines** menu
- Click the **Machine status** button of the desired machine
- Select the **Edit machine statuses** submenu
- In the table, click the row of the desired section
- In the field next to the **Split status** button, enter the desired cutting point in the **hh:mm** format

  > If a machine status extends over several days, you must additionally indicate the day on which you want the division to take place.

- Click the **Split status** button
- > The section is divided, with the end of the first part corresponding to the beginning of the second part of the entered cutting point.
- Select the desired status in the selection field of the desired section
- Click the **Save the lines** button

Configuring machine statuses with QuickEdit



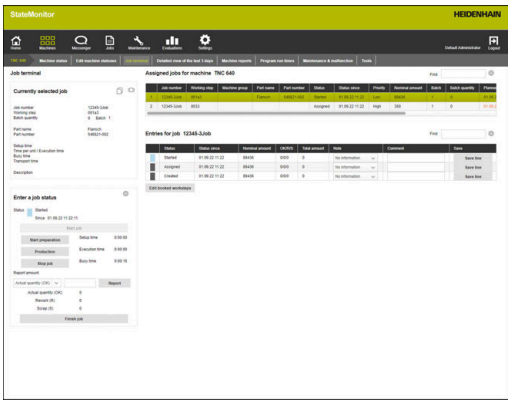
If you want to access StateMonitor from tablets or smartphones, you can also configure the machine statuses in the QuickEdit view. QuickEdit is optimized for operation with a touch panel and provides the required functions.

The QuickEdit view is only accessible via a special link and is shown as a page without navigation in the menu; the currently active status has already been selected for editing.

- In the address line, enter: https://**Servername**:28001/jh-tnc-sm-app/operator#!status/**Machine ID**/**quickedit**
  - The prefix varies depending on whether the connection to the server is encrypted (https) or not encrypted (http)
  - In place of **Servername**, enter the hostname or the IP address of the PC or server on which StateMonitor is installed
  - In place of **Machine ID**, enter your machine address in StateMonitor

> In order to speed up opening of the QuickEdit view of a machine, you can define the link as a start page.
>
> **Further information:** "Create user", Page 182

5.9 Job terminal submenu (software option)



In the **Job terminal** submenu, the operator can enter the job status during machining at the machine. The operator can edit the entries at a later time.

In the following tables, StateMonitor shows the uncompleted jobs for the machine:

- **Assigned jobs for machine** table:
  This table contains all of the jobs that are assigned to the machine. The jobs are shown in their defined machining sequence. The operator can select and start the jobs in the table.
- **Assigned jobs for machine groups** table:
  This table contains all of the jobs that are assigned to a machine group to which the machine belongs. The jobs are shown in their defined machining sequence. The operator can transfer the jobs to the **Assigned jobs for machine** table and then start them. These jobs are then no longer visible for the other machines in the machine group.

> If no uncompleted jobs are available for machine groups, then StateMonitor hides the **Assigned jobs for machine groups** table.

The creation and assignment of jobs is performed in the **Jobs** menu. There, you can also change the order of job execution.

Further information: "Jobs menu (software option)", Page 128

Specified machining times and numbers of parts will be included in the job evaluation.

Further information: "Job times submenu (software option)", Page 167

FN38 messages from HEIDENHAIN controls or messages from other controls (provided that the correct syntax is used) can be used to edit jobs in StateMonitor from within the NC program.

Further information: "FN38: Job functions", Page 133

The preset deadline is color-coded in the table. The color indicates whether the deadline is met:

- **Green**: Deadline is more than 24 hours ahead
- **Orange**: Deadline will be reached in less than 24 hours
- **Red**: Deadline has been exceeded

Adjusting the default times for working steps

You can assign additional default times (e.g., setup time, unit time or transport time) to a working step as needed. You can also distribute a working step across various batches.
Based on the default times and the batch quantity, the execution time and the busy time are calculated as follows:

- Execution time = unit time x batch quantity
  (If there is only one batch, then the batch quantity corresponds to the target quantity)
- Busy time = Setup time + Execution time

To edit the limit value for the representation of the default times in the table:

- ▶ In the **Enter a job status** section, click the gear icon
- > StateMonitor displays the **Extended job functions** window.
- ▶ In the **Limit value in percent** drop-down list, select the desired limit value for the color intensity
- ▶ Click the **Save the limit value** button
- > The limit value is applied to the representation

Entering the job status

To enter the job status and to record machining times:

- Switch to the **Machines** menu
- Click the **Machine status** button of the desired machine
- Select the **Job terminal** submenu
- Click the desired job in the **Assigned jobs for machine** table
- > The job information will be displayed in the **Currently selected job** section.
- In the **Enter a job status** section, click the **Start job** button
- > Time recording will start.
- Successively click the buttons that correspond to the respective job status at the machine.
- > StateMonitor records the times for each job status.
- To finish or abort execution, click the **Stop job** button
- > This terminates time recording.
- > If desired, you can restart the job.
- To report the actual quantity of parts, select **Actual quantity (OK)** in the drop-down list box
- Enter the quantity in the input field of the manufactured parts
- Click the **Report** button
- To report the amount of scrap, select **Scrap (S)** in the drop-down list box
- Enter the number of scrap parts in the input field
- Click the **Report** button
- To report the number of rework parts, select **Rework (R)** in the drop-down list box
- Enter the number of parts to be reworked in the input field
- Click the **Report** button
- > The quantities are saved in the job.
- To complete the job, click the **Finish job** button
- > The job is no longer displayed in the job terminal.
- > The recorded times and quantities can be viewed in the **Evaluations** menu.

Further information: "Evaluations menu", Page 158

Transferring a job from a machine group

To assign a job from the machine group to the machine:

- ▶ Click the desired job in the **Assigned jobs for machine groups** table
- ▶ In the **Table position for assignment** drop-down list box, select the desired position
- ▶ Click the **Assign working step to the machine** button
- > The job appears in the **Assigned jobs for machine** table at the selected position, and it can be started.

Transferring the job back to the machine group

Requirement: the job has not been started yet.
To transfer a job back to the machine group:

- ▶ Click the desired job in the **Assigned jobs for machine** table

- ▶ In the **Enter a job status** section, click the gear icon
- > StateMonitor displays the **Extended job functions** window.
- ▶ Select the desired position under **Transfer selected working step back to the machine group** in the **Table position for back transfer** drop-down list box
- ▶ Click the **Transfer working step back** button
- ▶ The job appears in the **Assigned jobs for machine groups** table at the selected position and can be adopted by any machine from the group.

Retrieving the last completed job

To retrieve the last completed job:

- ▶ In the **Enter a job status** section, click the gear icon
- > StateMonitor displays the **Extended job functions** window.
- ▶ Select the desired position under **Retrieve most recently ended job in the job list** in the **Table position for back transfer** drop-down list box
- ▶ Click the **Rescind last completed job** button
- > The job appears in the **Assigned jobs for machine** table at the selected position.
- > The job is again available for entries.

Editing entries

To edit entries:

- Retrieve the last completed job
- Or click the desired job in the **Assigned jobs for machine** table
> The job information will be displayed in the **Currently selected job** section.
> The **Entries for job** table opens.
- If necessary, restart the job
- If necessary, report a different amount
- In the **Entries for job** table, click the desired row
- If necessary, select a note (specification of the job status)

> Additional specifications for job statuses can be defined in the **Settings** menu.
>
> **Further information:** "Statuses submenu", Page 200

- If necessary, enter a comment
- Click the **Save the row** button
- To complete the job, click the **Finish job** button

Editing working steps of entries

The working steps of entries can retroactively be edited as follows:

- Divide the recorded status time
- Adjust the recorded status time
- Assign a different status, or enter a new status if an entry is missing

To divide the recorded status times:

- ▶ Click the desired job in the **Assigned jobs for machine** table
- > The job information will be displayed in the **Currently selected job** section.
- > The **Entries for job** table opens.
- ▶ Click the **Edit booked worksteps** button
- ▶ In the overview, click the row of the desired working step
- ▶ In the field next to the **Divide status** button, enter the desired cutting point in the **hh:mm** format
- ▶ Click the **Divide status** button
- > The working step is divided, with the end of the first part and the beginning of the second part corresponding to the entered cutting point.

To adjust recorded status times:

- ▶ Click the **Edit booked worksteps** button
- ▶ In the overview, click the row of the desired working step
- ▶ Click the **Adjust status time** button
- ▶ Enter the new start and end times for the working step
- > The working step is adjusted.

> The times must be selected such that no other working step is overwritten.

- ▶ Click the **Save the lines** button

To assign a different or new status:

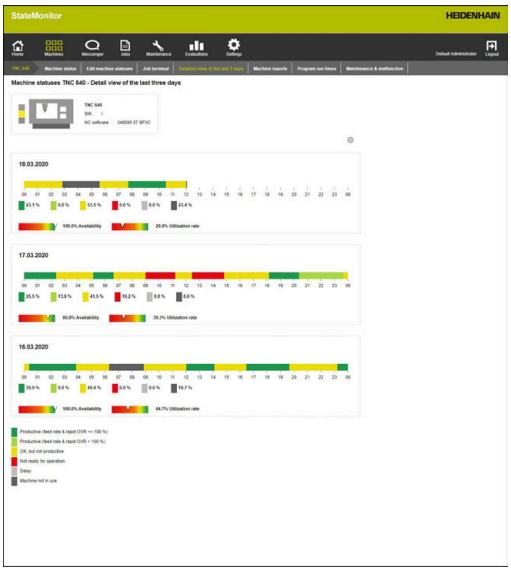
- Click the **Edit booked worksteps** button
- In the overview, click the row of the desired working step
- Click the **Change status** button
- Select the desired status in the drop-down list
- Click the **Save the lines** button

5.10 Detailed view of the last 3 days submenu

The **Detailed view of the last 3 days** submenu contains the following information:

- The machine status bars of the past three days
- **Availability** of the machine during the past three days
- **Utilization rate** of the machine during the past three days

Further information: "Key figures submenu", Page 162



Setting the observation period for the machine status bar

By default, the machine status bar shows the observation period from 00:00 hrs. to 24:00 hrs. Each user can set this period individually.

Further information: "Setting the observation period", Page 78

5.11 Machine alarms submenu

In the **Machine alarms** submenu, StateMonitor lists the **Machine reports**.

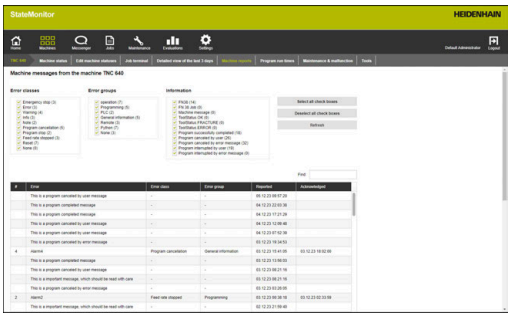
The error messages on the control are divided into **Error classes** and **Error groups**:

- **Error classes** indicate the cause of the error message.
- **Error groups** provide information on the origin of the error messages.

On HEIDENHAIN controls, users can generate their own messages in the NC program using the **FN38** special function.

Further information: "FN38: Send messages", Page 124

StateMonitor displays these messages as **Information**.



Filtering messages

To find certain messages more quickly, you can filter by **Error classes**, **Error groups**, and **Information**.

In the filter selection, StateMonitor displays the occurring **Error classes**, **Error groups**, and **Information**.

You can filter by the following **Error classes**:

- **Emergency stop**
- **Failure description**
- **Warning**
- **Info**
- **Note**
- **Program cancellation**
- **Program stop**
- **Feed rate stopped**
- **Reset**
- **None**

The **None** error class contains all error messages that do not belong to any other error class.

You can filter by the following **Error groups**:

- **operation**
- **Programming**
- **PLC**
- **General information**
- **Remote**
- **Python**
- **None**

The **None** error group contains all error messages that do not belong to any other error group.

Filtering by **Information**:

- **FN38**
- **FN 38 Job**
- **Machine messages**
- **Tool checking: Successful**
- **Tool checking: Breakage**
- **Program successfully completed**
- **Program canceled by user**
- **Program canceled by error message**
- **Program interrupted by user**
- **Program interrupted by error message**

To filter the machine messages:

▶ Select the checkboxes of the desired filter criteria

▶ Click the **Refresh** button

> The table is updated and contains all of the machine messages that correspond to the selected filter criteria.

Further information: "Functions in tables and charts", Page 50

Exporting and importing messages

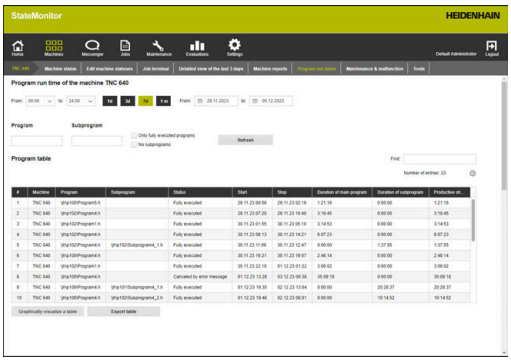
> This function is only accessible to users with the Administrator role.

In the **Machine alarms** submenu, the **Import of machine messages** table lists all machine messages recorded so far.

Click the **Export** button to export this table as an XML file.

Using the **Import** button, you can then import this XML file into another StateMonitor or for another machine. This allows you to use the imported machine messages to define notifications, even though these messages have not yet occurred on the new machine.

5.12 Program run times submenu



In the **Program run times** submenu, StateMonitor chronologically lists, in a **Program table**, all of the NC programs that were started on the machine during the selected time period.

The following options are available for delimiting the time frame:

- Time from ... to ...
- Number of days (counting back from the current day)
  - 1 day
  - 3 days
  - 7 days
- Date from ... to ...

The search function within the table (**Find:** input field) searches the **Program**, **Subprogram**, and **Status** columns.

Further information: "Functions in tables and charts", Page 50

Graphical visualization

In addition to the **Program table**, the following charts are available:

- **Accumulated run-times** chart
  Sum of the run-times listed in the table
- **Program run time of the machine {0}** chart
  Total evaluation of all programs listed in the table
- **Program analysis** chart
  Detailed evaluation of a single program

Accumulated run-times chart

The chart depicts the accumulated run-times separately for main program and subprogram, as well as for productive and non-productive time.

The **Accumulated run-times** chart is always displayed and automatically updated.

Program run time of the machine {0} chart

This chart shows the program run times and the average override settings of all programs listed in the table.

- ▶ To display the chart, click the **Graphically visualize a table** button below the table

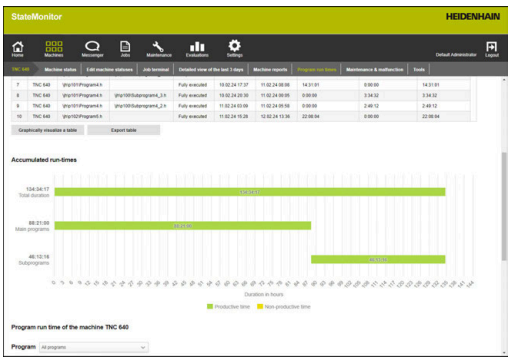
The chart includes the following information:

- Each vertical line in the grid represents a program
- The value on the horizontal axis represents the program number in the table
- The green data point visualizes the run-time of the program (value on the **Program run time** axis)
- The other data points represent the average override settings of the program for **Spindle**, **Rapid trav**, and **Feed rate** (values on the **Average override over the program run time** axis)

- ▶ To display detailed information on a program, hover the mouse over the desired data point
- > The chart values, program status, and a percentage evaluation of the machine statuses are displayed in a pop-up window.
- ▶ To filter the chart on a program, select that program in the dropdown field
- > The chart will then only display the values of the selected program.

Further information: "Showing the chart related to a table", Page 50

Program analysis chart



This chart shows the average override settings and machine statuses during the program run time.

To view the chart:

- ▶ Click the **Graphically visualize a table** button below the table
- > The **Program run time of the machine {0}** chart is displayed.
- ▶ Click any data point on the vertical line of the program
- > The **Program analysis** chart is displayed.

The chart includes the following information:

- The horizontal axis shows the program run time
- The vertical axis shows the override setting
- The lines visualize the override settings for **Spindle**, **Rapid trav**, and **Feed rate** at the respective point in time
- The **FMAX** status bar visualizes **feed rate** and **rapid traverse (FMAX)** during the program run time
- The machine status bar shows the machine statuses during the program run time

The **FMAX** status bar is only displayed if you allow access to the PLC.

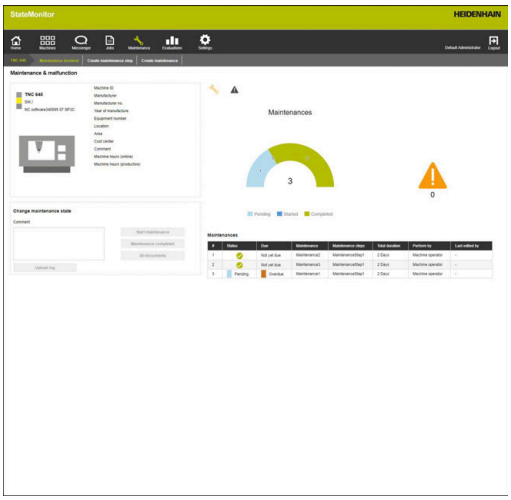
Further information: "Parameters for HEIDENHAIN controls", Page 249

5.13 Maintenance & malfunction submenu (software option)

In the **Maintenance & malfunction** submenu, you can see the current maintenance status of the machine, as well as accept and document maintenance jobs or report occurring malfunctions.

The **Maintenance & malfunction** submenu encompasses the following views.

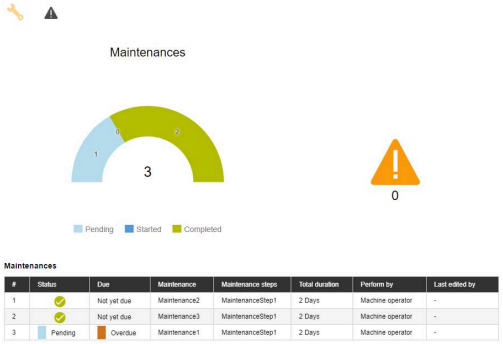
Symbol	View
	**Maintenances**
	**Malfunctions**



Maintenances view

The **Maintenances** view encompasses the following items:

- **Maintenances** doughnut chart
  Further information: "Maintenances doughnut chart", Page 143
- **Malfunctions** warning symbol:
  Under the warning symbol, StateMonitor shows the number of the unresolved malfunctions.
- **Maintenances** table
  Further information: "Maintenances table", Page 145



If you select a maintenance event in the **Maintenances** table, then StateMonitor also displays the **Entries for maintenance: {0}** table. The **Entries for maintenance: {0}** table chronologically lists the entered statuses of the selected maintenance event.

The **Entries for maintenance: {0}** table contains the following information:

- **Status**: Current status of the maintenance job
- **Status since**: Date of the last entry
- **Comment**: Comment from the user
- **User**: The user who made the last entry

> The creation and assignment of maintenance jobs is performed in the **Maintenance** menu.
>
> **Further information:** "Maintenance menu (software option)", Page 140

Malfunctions view

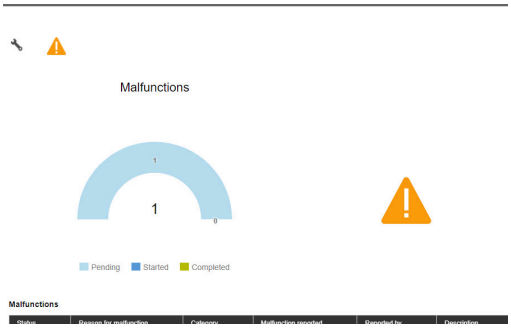
The **Malfunctions** view encompasses the following items:

- **Malfunctions** doughnut chart
  Further information: "Malfunctions doughnut chart", Page 143
- **Malfunctions** warning symbol
- **Malfunctions** table
  Further information: "Malfunctions table", Page 145

If you select a malfunction in the **Malfunctions** table, then StateMonitor also shows the **Entries for malfunction {0}** table. The **Entries for malfunction {0}** table chronologically lists the entered statuses of the selected malfunction.

The **Entries for malfunction {0}** table contains the following information:

- **Status**: Current status of the malfunction
- **Status since**: Date of the last entry
- **Comment**: Comment of the user
- **User**: The user who made the last entry



Malfunctions are reported in the **Machines** menu.

Further information: "Maintenance & malfunction submenu (software option)", Page 97

Accepting maintenance events

> Entries cannot be edited at a later time. It is possible to upload a log at a later time.

To accept a maintenance event and record maintenance times:

- ▶ Switch to the **Maintenance** menu
- ▶ Select the desired machine in the **Tile view of maintenance** submenu
- ▶ Click the desired maintenance job in the **Maintenances** table
- ▶ Call linked documents as needed
  Further information: "Displaying linked documents", Page 100
- > The information about the maintenance job appears in the **Maintenance: {0}** section.
- ▶ In the **Change maintenance** section, click the **Start maintenance** button
- > Time recording will start.
- ▶ Once the maintenance tasks on the machine are completed, enter a comment as needed
- ▶ Click the **Maintenance completed** button
- > This terminates time recording.
- > The new maintenance status appears in the **Maintenances** table.
- ▶ Upload a log as needed

> If a maintenance event is not pending yet, you can manually enable this maintenance event by clicking the **Accept maintenance event early** button.
> This function is accessible only to users with the **Administrator Maintenance Manager** role.

Uploading logs

Prerequisite: the log is available as a PDF file.
To upload a log:

- ▶ In the **Change maintenance** section, click the **Upload file** button
- > StateMonitor displays the **Upload file for maintenance: {0}** window.
- ▶ Enter a document name in the **File name** field
- ▶ Click the **Upload file** button
- ▶ Select the file in Windows Explorer
- ▶ Click **Open**
- ▶ Close the window
- > The log is loaded and linked to the selected maintenance job.

Displaying linked documents

To display linked documents:

- To show all of the documents that are linked to a maintenance job, click the **All files** button
- > StateMonitor displays the **All files of the maintenance: {0}** window containing the following documents:
  - **Maintenance documents**
  - **Documents of all maintenance steps**
  - **Maintenance protocols**
- To open a document, click in the **pdf** button in the pertinent row
- > StateMonitor opens the document in a new browser tab.

Reporting malfunctions

Prerequisite: at least one malfunction reason (specification) is defined in the **Settings** menu.
To report a malfunction:

- To switch to the **Malfunctions** view, click the warning symbol
- Click the large warning symbol in the **Malfunctions** view
- > StateMonitor displays the **Report malfunction** button.
- Click the **Report malfunction** button
- > StateMonitor displays the **Report malfunction** window.
- Select **Reason for malfunction**

In the drop-down menu, options are available that were defined in the **Settings** menu.

Further information: "Statuses submenu", Page 200

- If necessary, enter a comment
- Click the **Report malfunction** button
- > The malfunction appears in the **Malfunctions** table.

Further information: "Statuses submenu", Page 200

Accepting malfunctions

> Entries cannot be edited at a later time. It is possible to upload a log at a later time.

To accept a malfunction and record times:

- Switch to the **Maintenance** menu
- Select the desired machine in the **Tile view of maintenance** submenu

- To switch to the **Malfunctions** view, click the warning symbol
- In the **Malfunctions** table, click the desired malfunction
- StateMonitor displays the **Entries for malfunction {0}** table.
- In the **Change malfunction state** section, click the **Accept malfunction** button
- Time recording will start.
- Once the malfunction has been resolved on the machine, enter a comment as needed
- Click the **Malfunction fixed** button
- This terminates time recording.
- The new status appears in the **Malfunctions** table.
- Upload a log as needed

> You can upload the log in the **Change malfunction state** section. The procedure corresponds to uploading a file to a maintenance event.
>
> **Further information:** "Uploading logs", Page 99

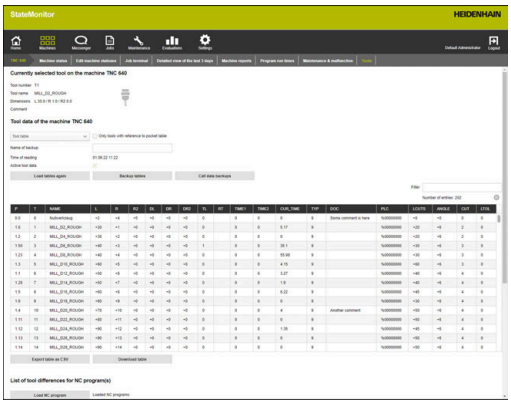
Displaying a log

- To show linked logs, click the **Show log** button
- StateMonitor displays the **Logs of the malfunction: {0}** window.
- To open a log, click the **pdf** button in the pertinent row
- StateMonitor opens the log in a new browser tab.

> Entered times appear in the **Maintenance** and **Evaluations** menus.

5.14 Tools submenu

In the **Tools** submenu, you can view the tool data of the machine and save them in StateMonitor, as well as export tool tables from StateMonitor.



> This function is only available for machines that are connected via the HEIDENHAIN DNC interface.

The **Tools** submenu contains the following information:

- **Currently selected tool on the machine {0}**
  A schematic tool icon and information about the tool that is currently being used
- **Tool data of the machine {0}**
  Tool table with filtering and editing functions
- **List of tool differences for NC program(s)**
  Information on the difference between the available and the required tools for an uploaded NC program

Filtering columns

Each user can customize the filtering of the tool table columns. To do this:

- ▶ Click the gear icon
- > The **Show/Hide columns in the table** window with the columns available for selection opens.
- ▶ To limit the view to certain columns, select the checkboxes in front of them
- > StateMonitor displays the selected columns.

> If no checkbox has been selected, then StateMonitor shows all columns of the tool table (default setting).

Displaying tool data

In the **Tool data of the machine {0}** area, you can view the desired tool data.

To customize the tool table:

- ▶ Switch to the **Settings** menu
- ▶ Select the **Tools** submenu
- ▶ In the drop-down list, select the desired table type:
  - **Tool table**
    List of all tools defined on the machine
  - **Pocket table**
    List of all tools defined in the tool magazine
- ▶ To show only the tools that are currently available on the machine, select the **Only tools with reference to pocket table** checkbox
- > StateMonitor displays the tool table with the selected options.

> You can also export the customized tool table to a CSV file.
> **Further information:** "Export table as CSV", Page 105

Manually uploading the tool table

When you open the **Tools** submenu, the most recently uploaded status of the tool table is shown. When a new machine is connected, this status will initially be uploaded from the machine control.

To refresh the view in StateMonitor after making changes to the tool table, click the **Load tables again** button in the **Tools** submenu.

Backing up the tool table

You can save the tool table that has been uploaded from the machine control in StateMonitor as a backup file.
You are allowed to create various backup versions and upload individual backup versions to StateMonitor again or delete them.

To back up the uploaded tool table:

- Switch to the **Settings** menu
- Select the **Tools** submenu
- Enter a unique name in the **Name of backup** field
- Click the **Save** button

> StateMonitor saves the backup version of the tool table.

To upload a backup version to StateMonitor:

- Switch to the **Settings** menu
- Select the **Tools** submenu
- Click the **Call data backups** button

> StateMonitor displays the **Tool-data backups** window.

- Select the desired backup version and click the **Load data backup** button

> StateMonitor loads the selected backup version and displays the tool table.

To delete a backup version from StateMonitor:

- Switch to the **Settings** menu
- Select the **Tools** submenu
- Click the **Call data backups** button

> StateMonitor displays the **Tool-data backups** window.

- Select the desired backup version and click the **Delete data backup** button

> StateMonitor deletes the selected backup version.

Downloading the tool table

The tool table that has been uploaded from the machine control to StateMonitor can be downloaded in the original format.

To download the tool table:

- Switch to the **Settings** menu
- Select the **Tools** submenu
- Select the desired table type in the drop-down list in the **Tool data of the machine {0}** area
- Click the **Download table** button
- Select the storage location
- Click the **Save** button

> StateMonitor saves the tool table to the selected location.

List of tool differences for NC program(s)

StateMonitor uses this function to identify the tools being used based on an uploaded NC program. StateMonitor compares this list with the table under **Tool data of the machine {0}** and then generates a list of the tools that are still missing.

When selecting tools in the tool difference list, these tools are shown in the selected tool table.

To generate a tool difference list:

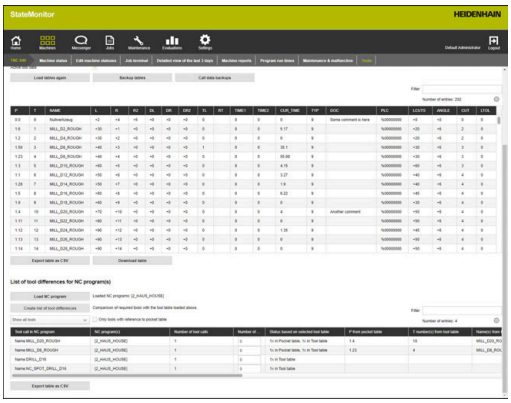
- Switch to the **Settings** menu
- Select the **Tools** submenu
- In the **List of tool differences for NC program(s)** area, click the **Load NC program** button

> StateMonitor displays the **Upload NC programs** window.

- Click the **Load NC program** button
- Select an *.h file or ISO file in Windows Explorer
- Click the **Close, and parse NC programs** button
- Click the **Create list of tool differences** button

> The tool difference list is created

- If necessary, select a filter from the drop-down list via the **Create list of tool differences** button



Export table as CSV

This function exports the table that has previously been edited and filtered in the **Tools** submenu to a CSV file. This allows you to import the tool data or the tool difference list into a spreadsheet and further process it.

To export the tool table or the tool difference list:

- Switch to the **Settings** menu
- Select the **Tools** submenu
- Edit and/or filter the table being displayed
- Click the **Export table as CSV** button
- Select the storage location
- Click the **Save** button

> StateMonitor saves the table to the selected location.

5.15 FN38: Machine functions

FN38 control function

With HEIDENHAIN controls, the **FN38** control function can be used to edit machine statuses in StateMonitor from within the NC program.

FN38 can be used with the following HEIDENHAIN controls:

Control	As of software version
iTNC 530	34049x-03, 60642x-01
TNC 620	81760x-01
TNC 128	771841-02
TNC 320	771851-02
TNC 640	34059x-05
TNC7	81762x-16
CNC PILOT 640[1)]	68894x-05
MANUAL Plus 620[1)]	54843x-05

1) These controls offer the G function G491 instead of the **FN38** Klartext commands for the transfer of messages via DNC.

- To be able to use the **FN38** function, you need to enter the code number 555343 for enabling special functions for Q parameter programming.
- The length of **FN38** messages is limited to 63 characters in the control. If this is not long enough for the command, you need to use string parameters. Multiple string parameters with a total length of 63 characters can then be combined in an **FN38** message.
- The TNC with software version 34059x-07 and later allows you to program **FN38** without entering a code number.
- StateMonitor can also interpret messages from other controls, such as **FN38** messages, provided that these messages use the correct syntax.

Programming

To program the **FN38** control function:

Q

- Press the **Q** key at the control

DIVERSE FUNCTION

- Press the **DIVERSE FUNCTION** soft key

FN38 SEND

- Press the **FN38 SEND** soft key
- The control writes the line
  `FN38: SEND /"`
- Write the desired machine status
  Example:
  `FN 38: SEND /"NEW_STATE:STANDBY"`

Editing machine statuses

Using the following **FN38** commands, you can edit the machine statuses as well as the corresponding specifications in StateMonitor:

Color coding		Syntax	Explanation
	Dark green	`"NEW_STATE:PRODUCTIVE"`	The machine is productive (feed rate / rapid OVR ≥ 100%)
	Light green	`"NEW_STATE:PRODUCTIVE_MIN"`	The machine is productive (feed rate / rapid OVR < 100%)
	Yellow	`"NEW_STATE:IDLE"`	The machine is ready for operation, but not productive
	Red	`"NEW_STATE:INOPERABLE"`	The machine is not ready for operation
	Light gray	`"NEW_STATE:STANDBY"`	Machine is in the **Delay** status
		`"NEW_STATE:CUTSTATE"`	Subdivide the current machine status, see "Editing machine statuses", Page 82
		`"NEW_STATE:RESUME"`	Restore the original status without editing

You can increase machine statuses to a higher level (i.e., "improve" them) only if the option for the corresponding user role is set in the **Statuses** submenu of the **Settings** menu.

Further information: "Customizing the configuration of machine status changes", Page 203

Application example

Goal:
To divide and reassign the machine status

BEGIN PGM FN38NEWSTATETEST MM	Program started, PRODUCTIVE machine status
:	
FN 38: SEND /"NEW_STATE:IDLE"	New machine status generated in StateMonitor (PRODUCTIVE -> IDLE)
M-Funktion	M function executed
FN 38: SEND /"NEW_STATE:CUTSTATE"	Original status (PRODUCTIVE) is divided in StateMonitor, meaning that a new status is generated (PRODUCTIVE -> IDLE)
FN 38: SEND /"NEW_STATE:RESUME"	Original status restored in StateMonitor (IDLE -> PRODUCTIVE)
FN 38: SEND /"NEW_STATE:IDLE_100 "	Specification with the **Number** 100 of the IDLE machine status in StateMonitor is generated
FN 38: SEND /"NEW_STATE:IDLE_SETUP "	Specification with **Name** SETUP of the IDLE machine status in StateMonitor is generated

When you enter the command text for **FN38**, you must pay attention to capitalization.

Defining default times

As an alternative to the definition via StateMonitor, you can also define the default time in the overview of the program run-time using an **FN38** message from the control.

The **Default time from FN38 function** option also requires you to first enter a fixed machining time because the machining time is not yet known at program start. StateMonitor needs this time information in order to start generating the time bar. Once the corresponding **FN38** message has been received, the time bar will be updated.

The **FN38** message must have the following syntax:

```
FN 38: SEND /"RUNTIME_timeMIN:timeSEC"
```

Application example

Goal:
To enter a default time of 10 minutes and 20 seconds

FN 38: SEND /"RUNTIME_10MIN:20SEC"	Definition of the time interval

When you enter the command text for **FN38**, you must pay attention to capitalization.

5.16 FN38: Evaluating the TD110 breakage detector

FN38 control function

With HEIDENHAIN controls, the control function **FN38** can be used to evaluate messages from the HEIDENHAIN TD110 breakage detector in StateMonitor.

FN38 can be used with the following HEIDENHAIN controls:

Control	As of software version
iTNC 530	34049x-03, 60642x-01
TNC 620	81760x-01
TNC 128	771841-02
TNC 320	771851-02
TNC 640	34059x-05
TNC7	81762x-16
CNC PILOT 640[1)]	68894x-05
MANUAL Plus 620[1)]	54843x-05

[1)] These controls offer the G function G491 instead of the **FN38** Klartext commands for the transfer of messages via DNC.

- To be able to use the **FN38** function, you need to enter the code number 555343 for enabling special functions for Q parameter programming.
- The length of **FN38** messages is limited to 63 characters in the control. If this is not long enough for the command, you need to use string parameters. Multiple string parameters with a total length of 63 characters can then be combined in an **FN38** message.
- The TNC with software version 34059x-07 and later allows you to program **FN38** without entering a code number.
- StateMonitor can also interpret messages from other controls, such as **FN38** messages, provided that these messages use the correct syntax.

Breakage detector

Using an **FN38** message, the TD110 breakage detector returns tool inspection information to StateMonitor for display in the machine messages in the **Machines** menu and the **Evaluations** menu.

Further information: "Machine alarms submenu", Page 92
Further information: "Machine reports submenu", Page 166

The information returned by the breakage detector consists of the tool number and the inspection result. The following response messages are supported:

Message	Meaning	Comment
`0`	Tool OK	
`-1`	Tool broken	
`-4`	Tool diameter not suitable	Fault
`-5`	Tool length not suitable	Fault

Application example

Goal:
Response from TD110 for inspection of tool 5

TD110_TOOL:5_RESULT:-4	The diameter of tool 5 is not suitable

6

Messenger Menu

6.1 Messenger menu

In the **Messenger** menu, you can define which users are to be notified at what times and for which machine messages.

The **Messenger** menu contains the following submenus:

- **Messenger overview**
- **Event configurator**
- **Notification profiles**
- **Notifications**
- **Message groups**

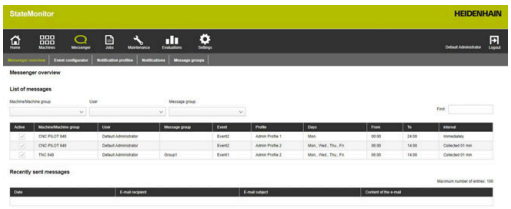
Proceed in the following sequence:

- In the **Notification profiles** submenu, create a notification profile.
  (Who needs to be notified and when?)
  Further information: "Notification profiles submenu", Page 118
- In the **Event configurator** submenu, configure the events.
  (For which machine messages should someone be notified?)
  Further information: "Event configurator submenu", Page 114
- In the **Notifications** submenu, assign the defined events and notification profiles to each other.
  (Which event triggers which notification profile?)
  Further information: "Notifications submenu", Page 120
- In the **Message groups** submenu, you can combine the created notifications in notification groups as needed and then use them as a filter criterion for customizing the view.
  Further information: "Message groups submenu", Page 122

The role of the user determines which submenus and functions StateMonitor displays.

Further information: "User administration submenu", Page 180

6.2 Messenger overview submenu



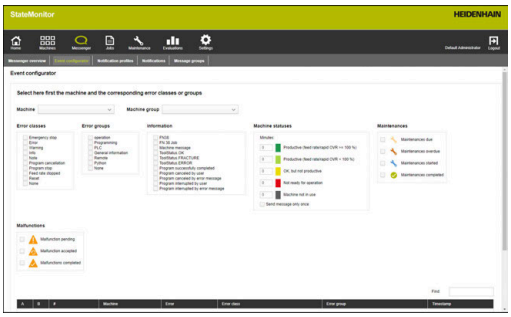
In the **Messenger overview** submenu, StateMonitor shows the current notifications and the most recently sent notifications.

You can filter the table entries according to:

- **Machine/Machine group**
- **User**
- **Message group**

Further information: "Functions in tables and charts", Page 50

6.3 Event configurator submenu



An event is a circumstance that can occur on the machine, such as:

- Warning message
- Machine stop with error message
- Servicing message / maintenance message
- Alarm

StateMonitor directly detects the messages occurring on the control and lists them in the **Machine status** view in the **Machines** menu.

The messages on the control are classified into **Error classes** and **Error groups**. When configuring the events, you can add entire **Error classes** or **Error groups** to the selection.

In addition, **Information** and **Machine statuses** or messages about **Maintenances** or **Malfunctions** can be part of the selection for an event. In the process, the **Information** is either generated in the NC program on the HEIDENHAIN controls (**FN38**) or by StateMonitor from the information provided by the control.

Error classes

On the control, the error messages are assigned to the following **Error classes**:

- **Emergency stop**
- **Failure description**
- **Warning**
- **Info**
- **Note**
- **Program cancellation**
- **Program stop**
- **Feed rate stopped**
- **Reset**
- **None**

The **None** error class contains all error messages that do not belong to any other error class.

Error groups

Error groups provide information on the origin of the error messages.

The controls distinguish between the following **Error groups**:

- **operation**
- **Programming**
- **PLC**
- **General information**
- **Remote**
- **Python**
- **None**

The **None** error group contains all error messages that do not belong to any other error group.

Information

The following options are available under **Information**:

- **FN38**

  On the HEIDENHAIN controls, you can generate notifications by means of the **FN38** special function via the NC program. StateMonitor can receive these notifications and send them by e-mail to the user
- **FN 38 Job**

  On the HEIDENHAIN controls, you can report a job status by means of the **FN38** special function via the NC program. StateMonitor can evaluate this status
- **Machine message**

  Here, StateMonitor collects the machine messages from non-HEIDENHAIN controls
- **Program successfully completed**

  StateMonitor generates this notification when the control reads a **PGM END**, **M2**, or **M30** program end
- **Program canceled by user**

  StateMonitor generates this notification when the operator aborts the program with **INTERNAL STOP** or **EMERGENCY STOP**
- **Program canceled by error message**

  StateMonitor generates this notification whenever an error message interrupts the program run.
- **Program interrupted by user**

  StateMonitor generates this notification when the operator aborts the program with **INTERNAL STOP**
- **Program interrupted by error message**

  StateMonitor generates this notification when an error message interrupts the running program

Refer to your machine manual!

The information sent by the control depends on the configurable settings of the machine.

Machine statuses

Under **Machine statuses**, you can define the period after which StateMonitor will trigger an event. You can assign a specific value (in minutes) to each machine status.

Maintenances (software option)

Under **Maintenances**, you can define the status of a maintenance event at which StateMonitor will trigger an event.

StateMonitor differentiates between the following statuses:

- **Maintenances due**
- **Maintenances overdue**
- **Maintenances started**
- **Maintenances completed**

Malfunctions (software option)

Under **Malfunctions**, you can define the status of a malfunction at which StateMonitor will trigger an event.

StateMonitor differentiates between the following statuses:

- **Malfunction pending**
- **Malfunction accepted**
- **Malfunctions completed**

Individual messages

Add existing machine messages to the selection for the event by selecting them in the table.

Further information: "Functions in tables and charts", Page 50

Creating an event

Be very careful when choosing the messages that are supposed to trigger an event.

NOTICE

Caution: Data may be lost!

If you add too many notifications to the selection, the recipient's e-mail inbox may overflow. Further e-mails will then no longer be delivered.

- Create a separate mailbox for StateMonitor
- Select notifications very carefully

NOTICE

Caution: Data may be lost!

If StateMonitor sends too many notifications to recipients, then the e-mail provider may regard these notifications as spam. In this case, the recipient will no longer receive the notifications in his inbox.

- Select notifications very carefully

To create an event:

- Switch to the **Messenger** menu
- Select the **Event configurator** submenu
- Select the **Machine**, for which you would like to create the event
- Select the messages that should trigger the event
- Enter an appropriate name in **This event under the name...**
- Click the **Save** button

By means of the selection list you define the machine messages that lead to a notification.

The table contains the columns A and B:

- **A = Automatic selection through classes groups**
- **B = Selection differing from the automatic one**

Column A in the selection list shows whether the error messages trigger an event through automatic selection via the **Error classes** or **Error groups**.

StateMonitor, ticks the box in Column A once you have selected the corresponding error class or error group.

In column B, you can specifically deselect individual messages that are included in the selection through the **Error classes** and **Error groups**.

However, you can also select individual messages in column B if not all of the messages that belong to this error class or group are to trigger the event.

StateMonitor lists all of the added events in a further table.

To view the content of existing events:

- ▶ Click the event in the table
- > StateMonitor loads the selection of messages to the view.

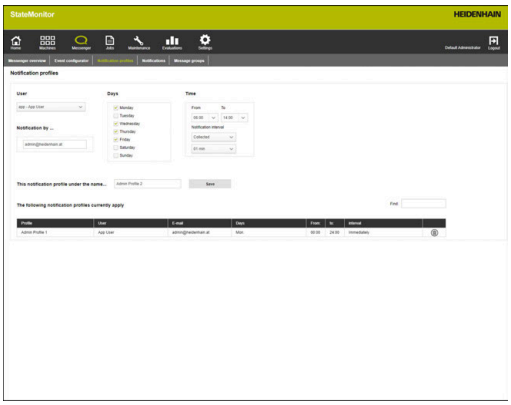
Deleting an event

To delete an event:

- ▶ Switch to the **Messenger** menu
- ▶ Select the **Event configurator** submenu
- ▶ Select the **Machine** for which you would like to delete the event

- ▶ Click the recycle bin icon in the table
- > StateMonitor deletes the event and removes it from the table.

6.4 Notification profiles submenu



In the **Notification profiles** submenu, you can assign notification information to a defined user and store this information as a notification profile.

A notification profile contains the following information:

- A reference to the **User**
- Transmission information for sending the e-mail (**Notification by ...**)
- Transmission time frame (**Days**, **Time**)
- **Notification interval**

All defined users are listed in the **User** drop-down list.

The notifications are sent by e-mail. Some e-mail providers also offer the option of forwarding e-mails as instant messages.

Interval notifications

For the transmission period, you enter the following:

- The weekdays on which StateMonitor notifies the user
- The time span in which StateMonitor sends the notification to the user

Possible notification intervals:

- **Immediately**
- **Once a day**
- **Collected** (interval of 1 min to 60 min selectable)

Creating Notification profiles

You can create multiple **Notification profiles** for a user (e.g., one profile for the time that the employee is present and one profile for the employee's on-call duty times).

To create a notification profile for a user:

- ▶ Switch to the **Messenger** menu
- ▶ Select the **Notification profiles** submenu
- ▶ Select the user for whom you would like to create the **Notification profiles**
- ▶ Enter the desired e-mail address
- ▶ Select the days of the week on which the user is to be notified
- ▶ Select the time from ... to ...
- ▶ Select the desired **Notification interval**
- ▶ Select a name for the notification profile
- ▶ Click the **Save** button
- > StateMonitor saves the notification profile and lists it in the table.

Finding Notification profiles

In the table, StateMonitor lists all profiles for the user selected above.

The **Find:** input field allows you to specifically look for notification profiles. All columns of the selection list will be searched.

Further information: "Functions in tables and charts", Page 50

Changing Notification profiles

To change an existing notification profile:

- Switch to the **Messenger** menu
- Select the **Notification profiles** submenu
- Select the user for whom you would like to create the **Notification profiles**
- Select the notification profile in the table
- > StateMonitor loads the entered data into the view.
- Make the desired changes
- Click the **Save** button
- > StateMonitor saves the changed notification profile.

Deleting Notification profiles

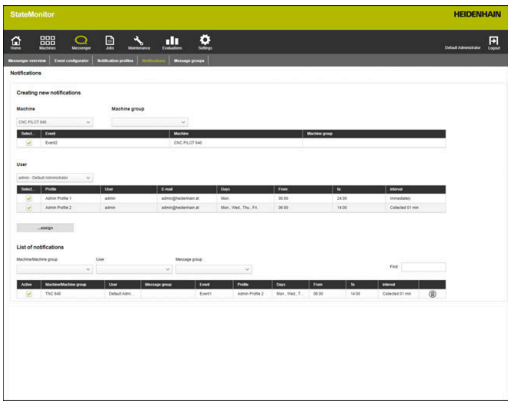
To delete a notification profile:

- Switch to the **Messenger** menu
- Select the **Notification profiles** submenu
- Select the **User** for whom you would like to create the **Notification profiles**

- Click the recycle bin icon in the table
- > StateMonitor removes the notification profile from the table.

6.5 Notifications submenu

In the **Notifications** submenu, you can define which events lead to which notifications. Here, you can create, activate, or delete notifications.



Creating a notification

You can create a new notification by assigning an event to a notification profile.

To create a notification:

- Switch to the **Messenger** menu
- Select the **Notifications** submenu
- Under **Machine**, select the desired machine
- A table that contains the events available for this machine is displayed.
- Tick the desired events.
- Select the desired user under **User**
- A table that contains the notification profiles available for this user is displayed.
- Tick the desired notification profiles.
- Click the **...assign** button
- StateMonitor adds a row containing the new notification to the **List of notifications**.

With HEIDENHAIN controls, the **FN38** control function can generate messages that are processed as notifications in StateMonitor.

StateMonitor can also interpret messages from other controls, such as **FN38** messages, provided that these messages use the correct syntax.

Further information: "FN38: Send messages", Page 124

Activating notifications

To activate a notification in the list, select the checkbox of the **Active** column.

StateMonitor will only send notifications after this function has been activated.

Deleting notifications

Proceed as follows to delete a notification from the list:

- Switch to the **Messenger** menu
- Select the **Notifications** submenu

- Click the recycle bin icon in the table

> StateMonitor removes the selected notification from the table.

Further information: "Functions in tables and charts", Page 50

6.6 Message groups submenu

This function is only accessible to users with the Administrator role.

In the **Message groups** submenu, you can combine notifications in notification groups. You can use a notification group in the **Messenger overview** or **Notifications** submenu as a filter criterion in order to customize the view.

To create a new notification group:

- Switch to the **Messenger** menu
- Select the **Message groups** submenu
- Enter the name of the notification group in the **Group name** field
- Click the **Create a group** button

> The new notification group is created.

Editing Message groups

To add a notification to an existing notification group:

- Switch to the **Messenger** menu
- Select the **Message groups** submenu
- In the drop-down list under the **Group name** field, select the notification group to be edited.
- Select the desired notification in the **Notifications** table
- Click the **Assign message** button

> StateMonitor saves the changed notification group.

> StateMonitor adds a row containing the assigned notification to the **Assigned messages** table.

To delete a notification from an existing notification group:

- Switch to the **Messenger** menu
- Select the **Message groups** submenu
- In the drop-down list under the **Group name** field, select the notification group to be edited.
- Select the desired notification in the **Assigned messages** table
- Click the **Cancel assignment** button

> StateMonitor saves the changed notification group.

> StateMonitor adds a row with the corresponding assignment to the **Notifications** table.

Deleting Message groups

If you want to delete a notification group, you first have to cancel all assignments for this group.

To delete an existing notification group:

- Switch to the **Messenger** menu
- Select the **Message groups** submenu
- In the drop-down list under the **Group name** field, select the notification group to be deleted.
- Click the **Delete** button

> StateMonitor deletes the selected notification group.

6.7 FN38: Send messages

FN38 control function

With HEIDENHAIN controls, the **FN38** control function can generate messages that are processed as notifications in StateMonitor.

FN38 can be used with the following HEIDENHAIN controls:

Control	As of software version
iTNC 530	34049x-03, 60642x-01
TNC 620	81760x-01
TNC 128	771841-02
TNC 320	771851-02
TNC 640	34059x-05
TNC7	81762x-16
CNC PILOT 640[1)]	68894x-05
MANUAL Plus 620[1)]	54843x-05

1) These controls offer the G function G491 instead of the **FN38** Klartext commands for the transfer of messages via DNC.

- To be able to use the **FN38** function, you need to enter the code number 555343 for enabling special functions for Q parameter programming.
- The length of **FN38** messages is limited to 63 characters in the control. If this is not long enough for the command, you need to use string parameters. Multiple string parameters with a total length of 63 characters can then be combined in an **FN38** message.
- The TNC with software version 34059x-07 and later allows you to program **FN38** without entering a code number.
- StateMonitor can also interpret messages from other controls, such as **FN38** messages, provided that these messages use the correct syntax.

Programming

To program the **FN38** control function:

- Press the **Q** key at the control

- Press the **DIVERSE FUNCTION** soft key

- Press the **FN38 SEND** soft key
- The control writes the line FN38: SEND /".
- Write the text to be sent with output formats for variables
  Example:

```
FN 38: SEND /"measured diameter: %
+3f"/+Q153
```

The number of formatting instructions has to correspond to the number of formatted values.

Further information: The Klartext programming User's Manual of the corresponding control

Output format

You can define the output format of numerical values by means of a formatting operator.

The formatting descriptions are introduced with a percentage sign, followed by the letter **f** to indicate floating point numbers in decimal notation.

You can add further information between the percentage sign and the code letter.

- A plus sign after the percentage sign means that numerical values are always output with their algebraic sign
- The period and a number define the number of decimal places to be displayed

The following table gives some syntax examples of the output formats of variables:

Output formats	Meaning
`%f`	Output of a floating point number in original format
`%.0f`	Output of a floating point number without decimal places
`%.1f`	Output of a floating point number with one decimal place
`%+.2f`	Output of a floating point number with algebraic sign and two decimal places

Application example

Goal:
The quantity is increased by one every time a program is run through (parts counter)

Q1 = Q1 + 1	Parts counter
Q2 = 1000	Total quantity
Q3 = 0815	Job
FN 38: SEND/"Number of Parts: %.0f von %.0f Order: %.0f" /+Q1/+Q2/+Q3	Sending messages

When you enter the command text for **FN38**, you must pay attention to capitalization.

7

Jobs Menu

7.1 Jobs menu (software option)

Recording and evaluation of jobs is an additional function that is not included in the standard software functionality.

Further information: "Software options and licenses", Page 236

With StateMonitor, you can record and evaluate the execution of production jobs. To this end, you create new jobs in the **Jobs** menu and assign them to a machine or machine group.

The **Jobs** menu contains the following submenus:

- **Create job**
- **Assign job**
- **Adjust machining sequence**

Assigned jobs are displayed in the **Job terminal** submenu of the machine. The operator can enter machining times for a job and report the number of parts produced.

Further information: "Job terminal submenu (software option)", Page 84

For entering machining times, the operator can use the predefined job statuses. Job statuses can be specified in greater detail in the **Settings** menu.

Further information: "Statuses submenu", Page 200

Specified machining times and numbers of parts will be included in the job evaluation.

Further information: "Job times submenu (software option)", Page 167

In addition, StateMonitor can import job data from an external database via an additional interface.

Further information: "External reporting DB submenu", Page 213

The role of the user determines which submenus and functions StateMonitor displays.

Further information: "User administration submenu", Page 180

With HEIDENHAIN controls, the **FN38** control function can be used to edit job functions in StateMonitor from within the NC program.

Further information: "FN38: Job functions", Page 133

7.2 Create job submenu (software option)

In the **Create job** submenu, you can do the following:

- Create new jobs
- Change jobs
- Delete jobs
- Distribute jobs over several batches
- Export jobs as a CSV file
- Import jobs from a CSV file

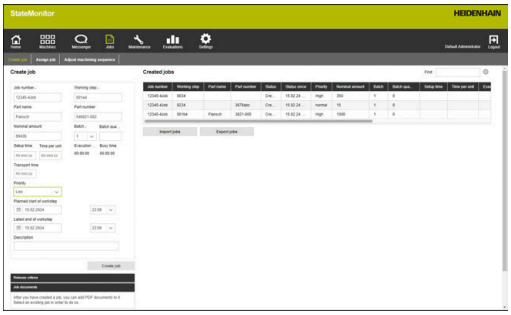
You can also specify the following additional elements for each job:

- Job documents in PDF format, containing additional information
- Release criteria to be fulfilled before the start of the job
  Further information: "Release criteria for jobs", Page 201

Creating a new job

To create a new job:

- ▶ Switch to the **Jobs** menu
- ▶ Select the **Create job** submenu
- ▶ Enter the job number in the **Job number** field
- ▶ Enter the working step in the **Working step** field
- ▶ Enter other information on the job, if required
- ▶ Click the **Create job** button
- > The job is displayed in the **Created jobs** table.
- > You can assign the new job to a machine or machine group.
  Further information: "Assign job submenu (software option)", Page 131



To quickly create multiple working steps for a job:

- ▶ Add a job in the manner described
- ▶ Select the job in the **Created jobs** table
- > The data entered for the job is copied to the **Create job** section.
- ▶ Adapt the information, such as the work step
- ▶ Click the **Create job** button
- > The new working step is added.

Changing a job

Prerequisite: The job has not been assigned to any machine.

To change a job:

- ▶ In the **Created jobs** table, click the job to be changed
- > The data entered for the job is copied to the **Create job** section.
- ▶ Change the data as required
- ▶ Click the **Change job** button
- > The changes are applied.

Deleting a job

Prerequisite: The job has not been assigned to any machine.

To delete a job:

- In the **Created jobs** table, click the job to be deleted
- Click the **Delete job** button

> The job is deleted from the table.

Distributing a job over several batches

To distribute a job over several batches:

- In the **Created jobs** table, click the job to be changed.

> The data entered for the job is copied to the **Create job** section.

- In the **Batch** drop-down list, select a new batch number
- Enter the desired value in the **Batch quantity** field
- Click the **Create job** button

> A job with the available information and the new batch number is created.

Exporting jobs

You can export the jobs in the **Created jobs** table to a CSV file.

> If you filter the table, then StateMonitor will export only those jobs corresponding to the filter.

To export the jobs:

- Filter the **Created jobs** table as needed
  Further information: "Functions in tables and charts", Page 50
- Click the **Export jobs** button
- Select the storage location
- Click the **Save** button

> StateMonitor saves the table as a CSV file.

Importing jobs

From a CSV file, you can import jobs to the **Created jobs** table.

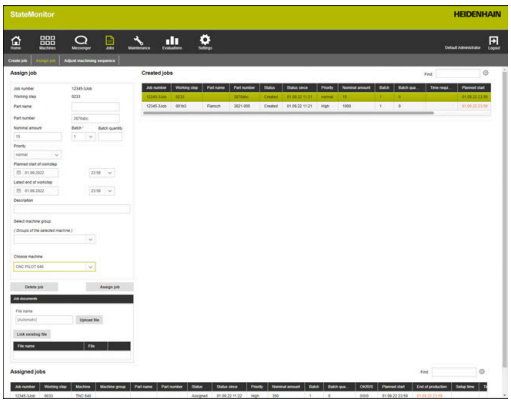
In order to import jobs:

- Click the **Import jobs** button
- Select file
- Click the **Open** button

> StateMonitor imports the data from the CSV file to the **Created jobs** table.

7.3 Assign job submenu (software option)

Assign job



You can assign a job to a machine or machine group, thereby releasing it for machining. Subsequently, the job appears in the **Job terminal** of the corresponding machines. Jobs that you assign to a machine group can be taken by any machine in the machine group.

For this purpose:

- Switch to the **Jobs** menu
- Select the **Assign job** submenu
- Select the job in the **Created jobs** table
- Make a selection in at least one of the following selection fields:
  - **Select machine group**
  - **Choose machine**
- Enter other job-relevant information, if required
- Click the **Assign job** button

> The job is displayed in the **Assigned jobs** table.

> You can start machining this job.
Further information: "Job terminal submenu (software option)", Page 84

Changing a job assignment

Prerequisite: the job has not yet been started in the **Job terminal**.

To assign an assigned job to another machine or machine group:

- Switch to the **Jobs** menu
- Select the **Assign job** submenu
- Select the job in the **Assigned jobs** table
- Make the changes
- Click the **Assign job** button

> The assignment is changed.

Deleting a job

Prerequisite: The job has not been assigned to any machine.

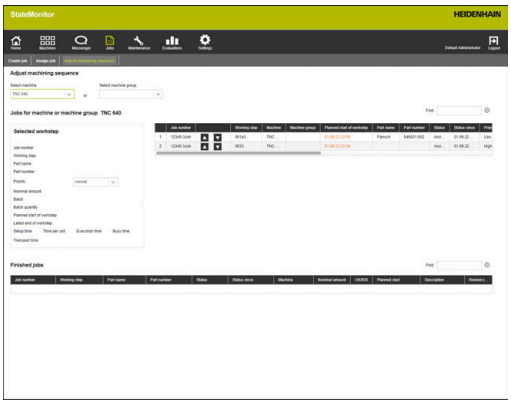
To delete a job:

- In the **Created jobs** table, click the job to be deleted
- Click the **Delete job** button

> The job is deleted from the table.

7.4 Adjust machining sequence submenu (software option)

In the job terminal of each machine, StateMonitor lists the assigned jobs in chronological order. You can change this order manually. For this purpose:



- Switch to the **Jobs** menu
- Select the **Adjust machining sequence** submenu
- In the selection fields, select the machine or machine group for which you would like to adapt the machining sequence
- > The **Jobs for machine or machine group** table shows all of the jobs that are assigned to the selected machine or machine group.
- Use the mouse to drag each job to the desired position
- > The jobs are listed in the defined order in the **Job terminal** submenu.
  Further information: "Job terminal submenu (software option)", Page 84

7.5 FN38: Job functions

FN38 control function

With HEIDENHAIN controls, the **FN38** control function can be used to edit job functions in StateMonitor from within the NC program.

FN38 can be used with the following HEIDENHAIN controls:

Control	As of software version
iTNC 530	34049x-03, 60642x-01
TNC 620	81760x-01
TNC 128	771841-02
TNC 320	771851-02
TNC 640	34059x-05
TNC7	81762x-16
CNC PILOT 640[1)]	68894x-05
MANUAL Plus 620[1)]	54843x-05

1) These controls offer the G function G491 instead of the **FN38** Klartext commands for the transfer of messages via DNC.

- To be able to use the **FN38** function, you need to enter the code number 555343 for enabling special functions for Q parameter programming.
- The length of **FN38** messages is limited to 63 characters in the control. If this is not long enough for the command, you need to use string parameters. Multiple string parameters with a total length of 63 characters can then be combined in an **FN38** message.
- The TNC with software version 34059x-07 and later allows you to program **FN38** without entering a code number.
- StateMonitor can also interpret messages from other controls, such as **FN38** messages, provided that these messages use the correct syntax.

Creating jobs

As an alternative to creation via StateMonitor you can create a job on the control using an **FN38** message.

The **FN38** message must have the following syntax:

```
FN 38: SEND /"JOB:jobnumber_STEP:workingstep_CREATE"
```

The parameters `JOB:jobnumber` and `STEP:workingstep` must be entered; the following parameters can optionally be used as needed:

- `LOT:lot number` for the batch number
- `ITEMNAME:partname` for the part name
- `ITEMID:partnumber` for the part number
- `TARGETQ:nominalquantity` for the nominal number of parts

> If no lot number is specified, StateMonitor by default uses the value "Lot 1."

Prerequisites:

- The control is able to send **FN38** messages
  Further information: "FN38: Send messages", Page 124

Application example

Goal:
Job with job number 1234 and working step 1

FN 38: SEND /"JOB:1234_STEP:1_CREATE"	**Create job**

Goal:
Job with job number 1234, working step 1, lot number 1, part name ID567A, part number 890, and nominal quantity 15

FN 38: SEND /"JOB:1234_STEP:1_LOT:1_CREATE _ITEMNAME:ID567A_ITEMID:890 _TARGETQ:15	**Create job**

> When you enter the command text for **FN38**, you must pay attention to capitalization.

Program example

Goal:
To use string parameters

DECLARE STRING QS1 = "CREATE"	Assign string parameters
DECLARE STRING QS2 = "123456"	QS2 string variable for job number
DECLARE STRING QS3 = "1"	QS3 string variable for working step
DECLARE STRING QS4 = "Holder"	QS4 string variable for part name
DECLARE STRING QS5 = "13314-01"	QS5 string variable for part number
DECLARE STRING QS6 = "100"	QS6 string variable for quantity to be produced
QS10 = "JOB:" || QS2 || "_STEP:" || QS3 || "_" || QS1 || "_ITEMNAME:" || QS4 || "_ITEMID:" || QS5 || "_TARGETQ:" || QS6	Chain-link string variables
FN 38: SEND / QS10	Send result parameters via FN38

Starting jobs

As an alternative to using StateMonitor, you can use an **FN38** message to start jobs in the control.

The **FN38** message must have the following syntax:

```
FN 38: SEND /"JOB:START_NEXT"
```

This message starts the first job in the list of the jobs assigned to this machine. If there is already another job running, it will be interrupted.
If the first job in the list of jobs assigned to this machine is already running, then this message will not lead to any changes.

Prerequisites:

- The control is able to send **FN38** messages
  Further information: "FN38: Send messages", Page 124
- The job has been set up
- The job has been assigned to the machine

Entering the job status

Using **FN38** messages, you can report a job status to StateMonitor.

The **FN38** message must have the following syntax:

```
FN 38: SEND /"JOB:jobnumber_STEP:workingstep_LOT:lotnumber_status"
```

Prerequisites:

- The control is able to send **FN38** messages
  Further information: "FN38: Send messages", Page 124
- The job has been set up
- The job has been assigned to the machine

Application example

Goal:
Job with job number 1234, working step 1234 and lot number 2

FN 38: SEND /"JOB:1234_STEP:1_LOT:2_START"	**Start job**
FN 38: SEND /"JOB:1234_STEP:1_LOT:2_PREPARATION"	**Start preparation**
FN 38: SEND /"JOB:1234_STEP:1_LOT:2_PRODUCTION"	**Production**
FN 38: SEND /"JOB:1234_STEP:1_LOT:2_STOP"	**Stop job**
FN 38: SEND /"JOB:1234_STEP:1_LOT:2_FINISH"	**Finish job**

When you enter the command text for **FN38**, you must pay attention to capitalization.

Reporting quantities

- If you enter an incremental value, the quantity is incremented by the value you specify.
- If you enter an absolute value, the old value is overwritten by the new one.

The **FN38** message must have the following syntax:

```
FN 38: SEND /"JOB:jobnumber_STEP:workingstep_LOT:lotnumber_category_quantity"
```

Prerequisites:

- The control is able to send **FN38** messages
  Further information: "FN38: Send messages", Page 124
- The job has been set up
- The job has been assigned to the machine
- The job is currently being executed

Application example

Goal:
Job with job number 1234, working step 1 and lot number 2;
additionally provided information of actual quantity 23, scrap parts 12, and rework parts 15, and incremental entries

FN 38: SEND /"JOB:1234_STEP:1_LOT:2_OK_A:23"	**Actual quantity (OK)** (absolute value)
FN 38: SEND /"JOB:1234_STEP:1_LOT:2_OK_I:1"	**Actual quantity (OK)** incremental value
FN 38: SEND /"JOB:1234_STEP:1_LOT:2_S_A:12"	**Scrap (S)** (absolute value)
FN 38: SEND /"JOB:1234_STEP:1_LOT:2_S_I:1"	**Scrap (S)** incremental value
FN 38: SEND /"JOB:1234_STEP:1_LOT:2_R_A:15"	**Rework (R)** (absolute value)
FN 38: SEND /"JOB:1234_STEP:1_LOT:2_R_I:1"	**Rework (R)** incremental value

When you enter the command text for **FN38**, you must pay attention to capitalization.

Entering the current job step

Using **FN38** messages, you can book a current job step in StateMonitor.

The **FN38** message must have the following syntax:

```
FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_LOT:CURRENT_status"
```

The `LOT:CURRENT` information is optional and can also be omitted.

Prerequisites:

- The control is able to send **FN38** messages
  Further information: "FN38: Send messages", Page 124
- The job has been set up
- The job has been assigned to the machine

Application example

Goal:
Booking the current job step

FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_PREPARATION"	**Start preparation**
FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_PRODUCTION"	**Production**
FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_STOP"	**Stop job**
FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_FINISH"	**Finish job**

When you enter the command text for **FN38**, you must pay attention to capitalization.

Reporting the current quantities

Using **FN38** messages, you can interrogate the quantities of the current job in StateMonitor.

The **FN38** message must have the following syntax:

```
FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_LOT:CURRENT"
```

Prerequisites:

- The control is able to send **FN38** messages
  Further information: "FN38: Send messages", Page 124
- The job has been set up
- The job has been assigned to the machine
- The job is currently being executed

Application example

Goal:
Current job; additionally provided information of actual quantity 23, scrap parts 12, and rework parts 15, and incremental entries

FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_LOT:CURRENT _OK_A:23"	**Actual quantity (OK)** absolute
FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_LOT:CURRENT _OK_I:1"	**Actual quantity (OK)** Incremental
FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_LOT:CURRENT _S_A:12"	**Scrap (S)** absolute value
FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_LOT:CURRENT _S_I:1"	**Scrap (S)** incremental value
FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_LOT:CURRENT _R_A:15"	**Rework (R)** absolute value
FN 38: SEND /"JOB:CURRENT_STEP:CURRENT_LOT:CURRENT _R_I:1"	**Rework (R)** incremental value

When you enter the command text for **FN38**, you must pay attention to capitalization.

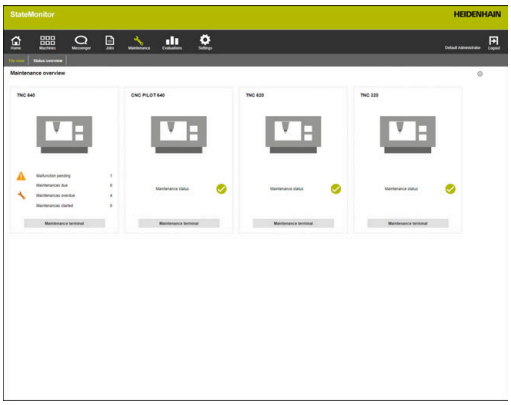
8

Maintenance Menu

8.1 Maintenance menu (software option)

The recording and documenting of maintenance events is an auxiliary function and is not included in the software's standard range of functions.

Further information: "Software options and licenses", Page 236



With StateMonitor, you can create, document, and analyze maintenance events. In order to do so, create maintenance jobs for individual machines in the **Maintenance** menu.

The **Maintenance** menu contains the following submenus:

- **Tile view**
  - **Maintenance terminal**
  - **Create maintenance step**
  - **Create maintenance**
- **Status overview**

In the **Maintenance** menu, all of the machines are shown that have been created and activated in the **Settings** menu.

Further information: "Machines submenu", Page 184

Active maintenance jobs appear in the **Machines** menu in the status view of the machine. In the **Maintenance & malfunction** submenu, the operator can accept and document maintenance jobs.

Further information: "Maintenance & malfunction submenu (software option)", Page 97

You can analyze completed maintenance events for individual machines in the **Evaluations** menu.

Further information: "Maintenances submenu (software option)", Page 173

The role of the user determines which submenus and functions StateMonitor displays.

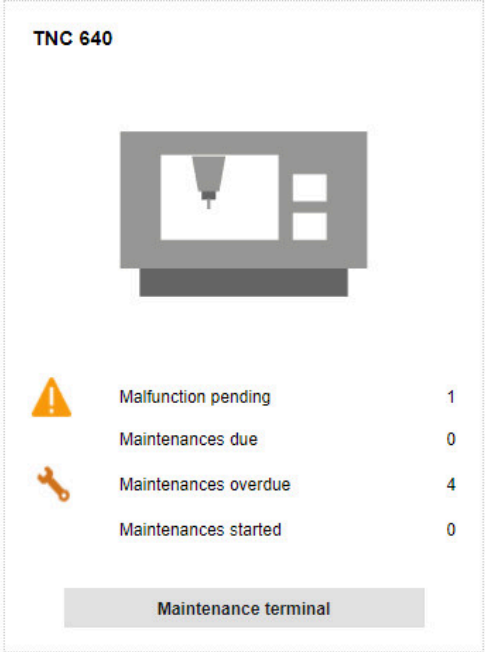
Further information: "User administration submenu", Page 180

8.2 Tile view submenu (software option)

In the **Tile view** submenu, StateMonitor depicts every activated machine as a status card.

The status card contains the following information:

Information	Meaning
Machine image	If, in the **Settings** menu, you have saved an image for the machine, StateMonitor will display the image here
Maintenance status	Current maintenance status of the machine



Symbols

The following symbols indicate the maintenance status:

Symbol	Meaning
Green 	No maintenance event is due
Light orange	At least one maintenance event is due
Dark orange 	At least one maintenance event is overdue
Light blue 	At least one maintenance event is accepted
	At least one malfunction is pending

Filtering the Tile view

Each user can individually adapt the view. For this purpose:

- ▶ Click the gear symbol
- > A filter selection window opens. The filter criteria encompass machines and machine groups.
- ▶ To limit the view to certain machines or machine groups, select the respective checkbox
- > StateMonitor displays the selected machine.

If no checkbox has been selected, then StateMonitor shows all of the machines that are assigned to the user (standard setting).

8.3 Status overview submenu (software option)

In the **Status overview** submenu, StateMonitor displays an overview of the maintenance event statuses and due dates of all activated machines.

You can choose from among the following graph views:

- **Doughnut charts**: show the quantity and status of the maintenance events and malfunctions
- **Time-axis chart**: show the due dates of the planned maintenance events

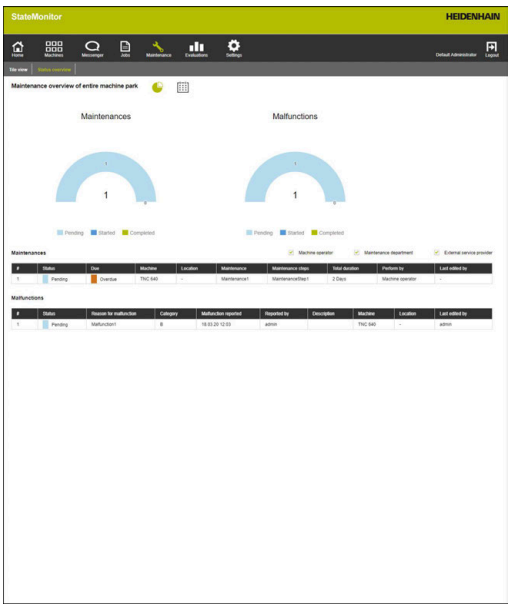
Maintenances doughnut chart

The **Maintenances** doughnut chart depicts the quantity and statuses of all active maintenance events.

StateMonitor differentiates between the following statuses:

- **Pending**: Maintenance events with the status **due** or **overdue**
- **Started**: All accepted maintenance events
- **Completed**: All completed maintenance events from the current day

- To call the doughnut chart, click the pie chart symbol



Malfunctions doughnut chart

The **Malfunctions** doughnut chart shows the quantity and statuses of the reported malfunctions.

StateMonitor differentiates between the following statuses:

- **Pending**: All of the reported malfunctions
- **Started**: All accepted malfunctions
- **Completed**: Completed malfunctions from the current day

- To call the doughnut chart, click the pie chart symbol

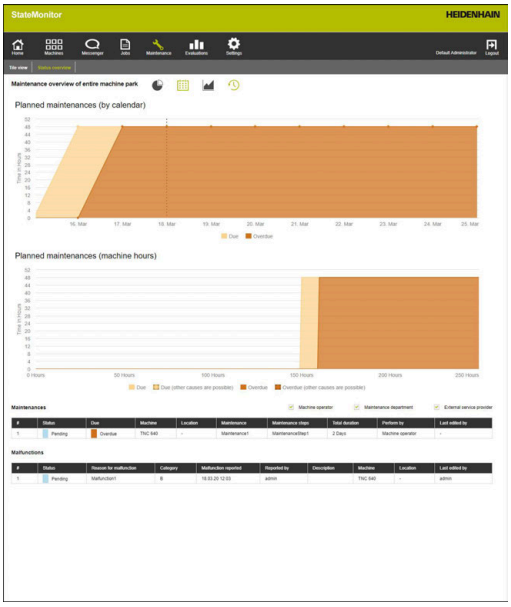
Planned maintenances (by calendar) time-axis chart

The **Planned maintenances (by calendar)** time-axis chart shows the due dates of all active maintenance jobs based on an interval of time.

StateMonitor differentiates between the following statuses:

- **Due**
- **Overdue**

- To call the **Planned maintenances (by calendar)** time-axis chart, click the calendar icon



In addition to the **Planned maintenances (by calendar)** time-axis chart, you also can show the following time-axis charts.

Planned maintenances (productive machine hours) time-axis chart

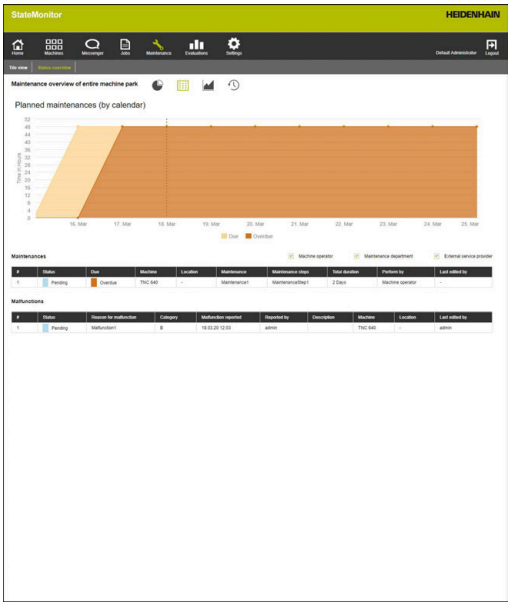
The **Planned maintenances (productive machine hours)** time-axis chart shows the due dates of all active maintenance jobs based on the number of productive machine hours.

StateMonitor differentiates between the following statuses:

- **Due**
- **Due (other causes are possible)***
- **Overdue**
- **Overdue (other causes are possible)***

* Further due dates are defined for the maintenance event.

Further information: "Create maintenance", Page 153



- To show or hide the **Planned maintenances (machine hours)** time-axis chart, click the chart icon

Planned maintenances (machine hours) time-axis chart

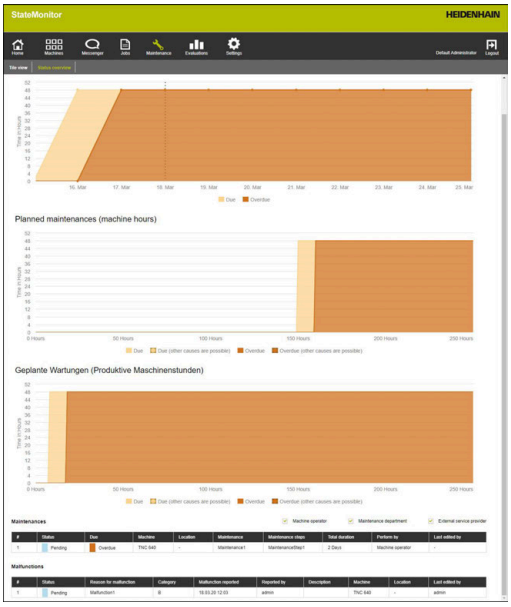
The **Planned maintenances (machine hours)** time-axis chart shows the due dates of all active maintenance jobs based on the number of online machine hours.

StateMonitor differentiates between the following statuses:

- **Due**
- **Due (other causes are possible)***
- **Overdue**
- **Overdue (other causes are possible)***

* Further due dates are defined for the maintenance event.

Further information: "Create maintenance", Page 153



- To show or hide the **Planned maintenances (machine hours)** time-axis chart, click the clock icon

Maintenances table

The **Maintenances** table lists all of the pending, accepted, and completed maintenance events and contains the following information:

- **Status**: Current status of the maintenance event
- **Due**: Due date of the maintenance event
- **Machine tool**: Machine designation
- **Location**: Location of the machine
- **Maintenance**: Name of the maintenance job
- **Maintenance steps**: Name of the maintenance steps encompassed by the maintenance job
- **Total duration**: Duration of all the maintenance steps added together
- **Perform by**: Responsible roles defined when the maintenance steps were created
- **Last edited by**: Name of the user who entered the last status

Malfunctions table

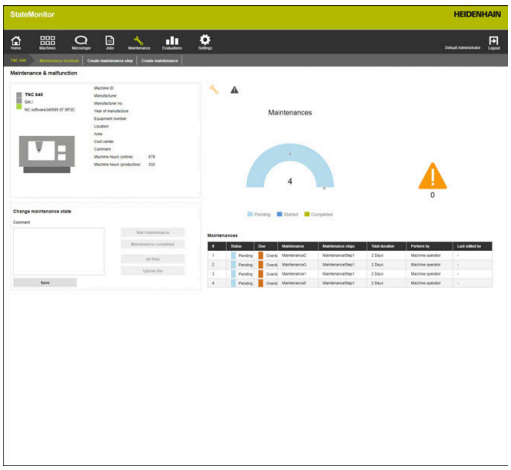
The **Malfunctions** table lists all of the pending and accepted malfunctions and contains the following information:

- **Status**: Current status of the malfunction
- **Reason for malfunction**: Reason for malfunction that is selected by the user when reporting the malfunction
- **Category**: Category of the malfunction to which the selected reason for the malfunction belongs
- **Malfunction reported**: Time at which the malfunction was reported
- **Reported by**: Name of the user who reported the malfunction
- **Description**: Comment from the user
- **Machine tool**: Machine designation
- **Location**: Location of the machine
- **Last edited by**: Name of the user who entered the last status

8.4 Maintenance terminal submenu (software option)

In the **Maintenance terminal** submenu, you can see the current maintenance status of the machine, as well as accept and document maintenance jobs during execution on the machine. You can subsequently upload a log.

The **Maintenance terminal** submenu contains the following views.



Symbol	View
	Maintenances
	Malfunctions

- To switch between the views, click the respective symbol

The **Maintenance terminal** submenu shows the current machine status and the machine's master data.

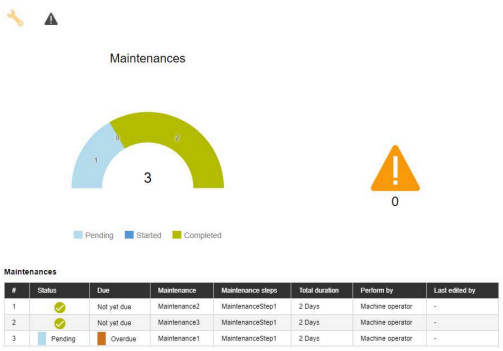
Further information: "Overview of machine statuses", Page 68

Further information: "Edit machine", Page 190 (master data of the machine)

To report a malfunction, switch to the **Machines** menu.

Further information: "Maintenance & malfunction submenu (software option)", Page 97

Maintenances view



The **Maintenances** view encompasses the following items:

- **Maintenances** doughnut chart
  Further information: "Maintenances doughnut chart", Page 143
- **Malfunctions** warning symbol:
  Under the warning symbol, StateMonitor shows the number of the unresolved malfunctions.
- **Maintenances** table
  Further information: "Maintenances table", Page 145

If you select a maintenance event in the **Maintenances** table, then StateMonitor also displays the **Entries for maintenance: {0}** table. The **Entries for maintenance: {0}** table chronologically lists the entered statuses of the selected maintenance event.

The **Entries for maintenance: {0}** table contains the following information:

- **Status**: Current status of the maintenance job
- **Status since**: Date of the last entry
- **Comment**: Comment from the user
- **User**: The user who made the last entry

> The creation and assignment of maintenance jobs is performed in the **Maintenance** menu.
>
> **Further information:** "Maintenance menu (software option)", Page 140

Malfunctions view

The **Malfunctions** view encompasses the following items:

- **Malfunctions** doughnut chart
  Further information: "Malfunctions doughnut chart", Page 143
- **Malfunctions** warning symbol
- **Malfunctions** table
  Further information: "Malfunctions table", Page 145

If you select a malfunction in the **Malfunctions** table, then StateMonitor also shows the **Entries for malfunction {0}** table. The **Entries for malfunction {0}** table chronologically lists the entered statuses of the selected malfunction.

The **Entries for malfunction {0}** table contains the following information:

- **Status**: Current status of the malfunction
- **Status since**: Date of the last entry
- **Comment**: Comment of the user
- **User**: The user who made the last entry

> Malfunctions are reported in the **Machines** menu.
>
> **Further information:** "Maintenance & malfunction submenu (software option)", Page 97

Accepting maintenance events

Entries cannot be edited at a later time. It is possible to upload a log at a later time.

To accept a maintenance event and record maintenance times:

- Switch to the **Maintenance** menu
- Select the desired machine in the **Tile view of maintenance** submenu
- Click the desired maintenance job in the **Maintenances** table
- Call linked documents as needed
  Further information: "Displaying linked documents", Page 100
- > The information about the maintenance job appears in the **Maintenance: {0}** section.
- In the **Change maintenance** section, click the **Start maintenance** button
- > Time recording will start.
- Once the maintenance tasks on the machine are completed, enter a comment as needed
- Click the **Maintenance completed** button
- > This terminates time recording.
- > The new maintenance status appears in the **Maintenances** table.
- Upload a log as needed

If a maintenance event is not pending yet, you can manually enable this maintenance event by clicking the **Accept maintenance event early** button.
This function is accessible only to users with the **Administrator Maintenance Manager** role.

Uploading logs

Prerequisite: the log is available as a PDF file.
To upload a log:

- In the **Change maintenance** section, click the **Upload file** button
- > StateMonitor displays the **Upload file for maintenance: {0}** window.
- Enter a document name in the **File name** field
- Click the **Upload file** button
- Select the file in Windows Explorer
- Click **Open**
- Close the window
- > The log is loaded and linked to the selected maintenance job.

Displaying linked documents

To display linked documents:

- To show all of the documents that are linked to a maintenance job, click the **All files** button

> StateMonitor displays the **All files of the maintenance: {0}** window containing the following documents:
  - **Maintenance documents**
  - **Documents of all maintenance steps**
  - **Maintenance protocols**

- To open a document, click in the **pdf** button in the pertinent row

> StateMonitor opens the document in a new browser tab.

Accepting malfunctions

> Entries cannot be edited at a later time. It is possible to upload a log at a later time.

To accept a malfunction and record times:

- Switch to the **Maintenance** menu
- Select the desired machine in the **Tile view of maintenance** submenu

- To switch to the **Malfunctions** view, click the warning symbol
- In the **Malfunctions** table, click the desired malfunction

> StateMonitor displays the **Entries for malfunction {0}** table.

- In the **Change malfunction state** section, click the **Accept malfunction** button

> Time recording will start.

- Once the malfunction has been resolved on the machine, enter a comment as needed
- Click the **Malfunction fixed** button

> This terminates time recording.

> The new status appears in the **Malfunctions** table.

- Upload a log as needed

> You can upload the log in the **Change malfunction state** section. The procedure corresponds to uploading a file to a maintenance event.
>
> **Further information:** "Uploading logs", Page 99

Displaying a log

- To show linked logs, click the **Show log** button

> StateMonitor displays the **Logs of the malfunction: {0}** window.

- To open a log, click the **pdf** button in the pertinent row

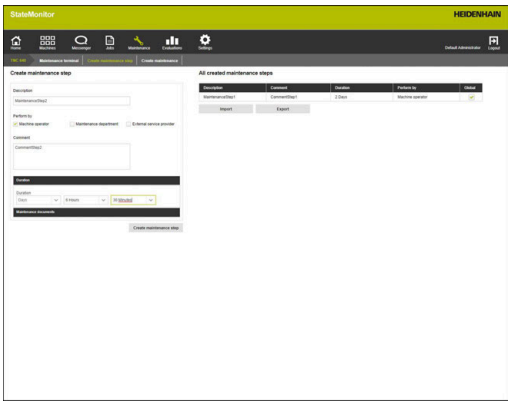
> StateMonitor opens the log in a new browser tab.

> Entered times appear in the **Maintenance** and **Evaluations** menus.

8.5 Create maintenance step submenu (software option)

In the **Create maintenance step** submenu, you can:

- Create maintenance steps from which you can subsequently generate maintenance jobs
- Change maintenance steps
- Delete maintenance steps
- Export maintenance steps as an XML file
- Import maintenance steps from an XML file



Create maintenance step

To create a maintenance step:

- ▶ Switch to the **Maintenance** menu
- ▶ Select the desired machine in the **Tile view of maintenance** submenu
- ▶ Select the **Create maintenance step** submenu
- ▶ Enter a designation in the **Description** field
- ▶ Select the responsible role under **Perform by** (multiple selections are possible)
- ▶ Enter any additional information as needed in the **Comment** field
- ▶ Enter the duration of the maintenance step as needed in the **Duration** pull-down menu
- ▶ Click the **Create maintenance step** button
- > The maintenance step appears in the **All created maintenance steps** table.
- > You can use the new maintenance step for the creation of maintenance jobs.
  Further information: "Create maintenance submenu (software option)", Page 153

If you tick the box in the **Global** column, then the maintenance step is available for all of the machines. If you untick the box, then the maintenance step is available only for the selected machine.

Uploading a document to a maintenance step

To upload documents to a maintenance step:

- ▶ In the **All created maintenance steps** table, click the maintenance step that you would like to change
- > The job information is transferred to the **Create maintenance step** section.
- ▶ Select **Maintenance documents** in the pull-down menu
- ▶ Enter a document name in the **File name** field
- ▶ Click **Upload file**
- ▶ Select the file in Windows Explorer
- ▶ Click **Open**
- ▶ Close the window
- > The document is uploaded and linked with the selected maintenance step.

Linking an existing document with a maintenance step

To link uploaded documents with a maintenance step:

- ▶ In the **All created maintenance steps** table, click the maintenance step that you would like to change
- > The selected maintenance step is highlighted in green in the table.
- > The job information is transferred to the **Create maintenance step** section.
- ▶ Select **Maintenance documents** in the pull-down menu
- ▶ Click the **Link existing file** button
- > StateMonitor displays the available files.
- ▶ Select the desired file
- ▶ Click the **Link document** button
- > The document is linked with the selected maintenance step.

Deleting a document linkage

To delete the linkage between a maintenance step and a document:

- ▶ Click the maintenance step in the **All created maintenance steps** table
- > The selected maintenance step is highlighted in green in the table.
- > The job information is transferred to the **Create maintenance step** section.
- ▶ Select **Maintenance documents** in the pull-down menu
- ▶ Click the recycle bin symbol next to the desired document
- ▶ Click the **Yes** button in the dialog box
- > StateMonitor deletes the linkage.

Changing a maintenance step

To change a maintenance step:

- In the **All created maintenance steps** table, click the maintenance step that you would like to change
- > The selected maintenance step is highlighted in green in the table.
- > The maintenance step information is transferred to the **Create maintenance step** section.
- Change the information
- Click the **Save maintenance step** button
- > The changes are applied.

Deleting a maintenance step

> When you delete a maintenance step, StateMonitor removes the maintenance step, even from all of the maintenance jobs.
> Maintenance jobs containing only the affected maintenance step are deleted as well.

To delete a maintenance step:

- In the **All created maintenance steps** table, click the maintenance step you would like to delete
- > The selected maintenance step is highlighted in green in the table.
- Click the **Delete maintenance step** button
- > If the maintenance step is used in maintenance jobs, then StateMonitor displays a list of the maintenance jobs.
- To delete the maintenance step, click the **Yes** button
- > The maintenance step is deleted from the table.

Exporting maintenance steps

You can export the maintenance steps in the **All created maintenance steps** table to an XML file.

To export the maintenance steps:

- Click the **Export** button
- Select the storage location
- Click the **Save** button
- > StateMonitor saves the data from the table as an XML file.

Importing maintenance steps

You can import maintenance steps from an XML file into the **All created maintenance steps** table.

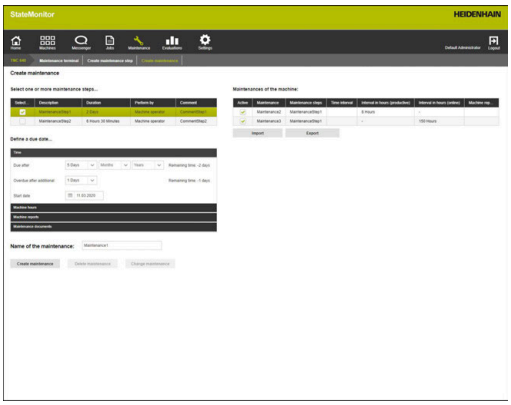
To import maintenance steps:

- Click the **Import** button
- Select file
- Click the **Open** button
- > StateMonitor imports the data from the XML file into the **All created maintenance steps** table.

8.6 Create maintenance submenu (software option)

In the **Create maintenance** submenu, you can:

- Create maintenance jobs for the selected machine
- Change maintenance jobs
- Delete maintenance jobs



Create maintenance

For a maintenance event, you will need to define at least one due date.

The due date may be based on:

- A point in time
- A certain number of machine hours
- The occurrence of machine messages

> If you define multiple due dates, StateMonitor displays the maintenance as due as soon as the earliest condition occurs.

To create a maintenance event:

- Switch to the **Maintenance** menu
- Select the desired machine in the **Tile view of maintenance** submenu
- Select the **Create maintenance** submenu
- In the **Select one or more maintenance steps...** table, select the checkboxes of the maintenance steps that the maintenance job is to contain
- Define the due date as follows

To define the due date based on an interval of time:

- Select **Time** in the pull-down menu
- Select the number of days, months, or years after which the maintenance event is due
- Select the number of post-due-time days after which the maintenance event becomes overdue
- At **Start date**, click the calendar icon
- Select the desired date
- Alternatively, enter the desired number or the desired date

To define the due date based on machine hours:

- ▶ Select **Machine hours** in the pull-down menu
- > StateMonitor displays the current number of machine hours:
  - Productive machine hours (sum of the machine hours based on the recorded dark-green and light-green machine states)
  - Online machine hours (sum of the machine hours based on the recorded dark-green, light-green, yellow, and red machine statuses)

  Further information: "Statuses submenu", Page 200
- ▶ In the **Due after** field, enter the respective number of machine hours after which the maintenance is due
- ▶ In the **Overdue after additional** field, enter the respective number of post-due-time machine hours after which the maintenance event becomes overdue
- ▶ In the **Start hour counter at machine hour** field, overwrite the current number of machine hours as needed (e.g., enter the value "0" in order to have the machine hours counter start at "0")

To define the due date based on machine messages:

- ▶ Select **Machine reports** in the pull-down menu
- ▶ In the **Due** and **Overdue** columns, select the machine messages that are to trigger the respective status
- ▶ Enter a designation in the **Name of the maintenance:** field
- ▶ Click the **Create maintenance** button
- > The maintenance event appears in the **Maintenances of the machine: {0}** table.
- > The maintenance event is active.
- > The maintenance event appears in the **Maintenance terminal** submenu of the machine.
  Further information: "Maintenance terminal submenu (software option)", Page 146

If you select the checkbox in the **Active** column, then the maintenance event appears in the **Maintenance terminal** submenu of the selected machine.

How to quickly and easily create multiple maintenance jobs:

- ▶ Create a maintenance job as described
- ▶ Select the maintenance job in the **All created maintenance steps** table
- > The maintenance job information is transferred to the **Create maintenance** section.
- ▶ Change the information
- ▶ Click the **Create maintenance** button
- > The new maintenance step is added.

Changing a maintenance step

To change a maintenance step:

- ▶ In the **Maintenances of the machine: {0}** table, click the maintenance step that you would like to change
- > The selected maintenance step is highlighted in green in the table.
- > The maintenance step information is transferred to the **Create maintenance** section.
- ▶ Change the information
- ▶ Click the **Change maintenance** button
- > The changes are applied.

Uploading a document, linking it with a maintenance event, or deleting a linkage

> The procedure for uploading documents and linking them to a maintenance event, or the method for deleting document linkages, are identical to the procedure in the **Create maintenance step** submenu.
>
> **Further information:** "Create maintenance step submenu (software option)", Page 150

Deleting a maintenance step

To delete a maintenance step:

- ▶ In the **Maintenances of the machine: {0}** table, click the maintenance step that you would like to delete
- > The selected maintenance step is highlighted in green in the table.
- ▶ Click the **Delete maintenance** button
- ▶ Click the **Yes** button in the dialog box
- > The maintenance step is deleted from the table.

9

Evaluations Menu

9.1 Evaluations menu

In the **Evaluations** menu, StateMonitor displays data obtained from the machines in tables and charts.

The **Evaluations** menu contains the following submenus:

- **Machine statuses**
- **Key figures**
- **Program run times**
- **Machine reports**
- **Job times** (software option)
- **Tool usage times**
- **Signals** (software option)
- **Energy monitoring** (software option)
- **Maintenances** (software option)
- **Time filter**

In the **Machine statuses** submenu, StateMonitor displays the machine statuses in chronological order in machine status bars and calculates the **Availability** and **Utilization rate** values.

In the **Key figures**, **Program run times**, **Machine reports**, **Tool usage times**, and **Signals** submenus, StateMonitor lists the corresponding data in tables.

In the optional **Job times** submenu, StateMonitor lists the machining times and workpiece quantities that have been entered for the individual jobs. If a cost rate is stored for the machine, then StateMonitor also displays the costs per job and working step here. StateMonitor also uses the cost rate information in the optional **Energy monitoring** submenu that itemizes the energy costs.

In the optional **Maintenances** submenu, StateMonitor lists the recorded data on performed maintenance events and resolved malfunctions per machine.

In the **Time filter** submenu, you can limit the evaluation to certain periods of time.

The role of the user determines which submenus and functions StateMonitor displays.

Further information: "User administration submenu", Page 180

Saving Evaluations

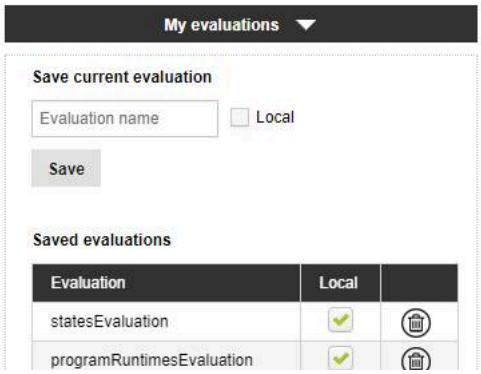
In all of the submenus, with the exception of **Time filter**, you can save the current evaluation under **My evaluations**.

If you select the **Local** checkbox, then this evaluation can be viewed only with your login information. Other users will not see this evaluation.

If you do not select the **Local** checkbox, then the evaluation can be viewed by all users with **Authorization status StateMonitor User plus** or **Administrator**.

To save your evaluation:

- ▶ Click **My evaluations**
- ▶ Enter the **Evaluation name**
- ▶ Select the **Local** checkbox as needed
- ▶ Click the **Save** button
- > StateMonitor saves the current evaluation and enters it in the **Saved evaluations** table.



Loading saved evaluations

Proceed as follows if you have already saved evaluations:

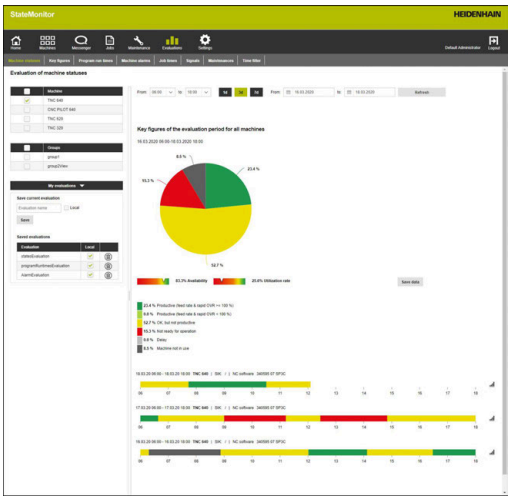
- ▶ Select the saved evaluations under **My evaluations**
- > StateMonitor loads the selected data from the saved evaluation into the view.

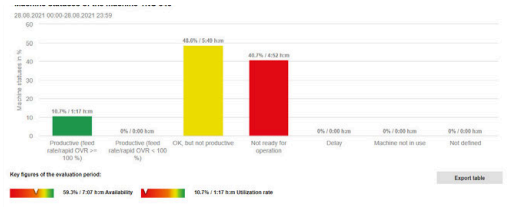
9.2 Machine statuses submenu

In the **Machine statuses** submenu, you can perform an evaluation of machine statuses.

The following formats are available for evaluation:

- **Key figures of the evaluation period for all machines** chart with the **Availability** and **Utilization rate** bar graphs
  Further information: "Key figures submenu", Page 162
- Additional graph with the specifications of a selected machine status
- Machine status bars for each machine and day
- Bar graph for every machine status bar





To display the machine statuses for a certain period of time:

- ▶ Switch to the **Evaluations** menu
- ▶ Select the **Machine statuses** submenu
- ▶ Select the desired machines (select the checkboxes of the machine names)
- ▶ Or select groups (select the checkboxes of the group names)
- ▶ Select a time (**from ... to ...**)
- ▶ Select the number of days (counting back from the current day)
- ▶ Or select a date (**from ... to ...**)
- ▶ Or select a **Time filter** (if available)
  Further information: "Time filter submenu", Page 174
- ▶ Click the **Refresh** button
- > StateMonitor displays the machine statuses for the selected period.

Key figures of the evaluation period for all machines chart

This chart shows, as percentages, all of the machine statuses of the selected machines within the selected period.

You can show an additional chart that lists the specifications of a machine status. For this purpose, proceed as follows:

- ▶ Click the desired machine status in the first chart
- > StateMonitor displays the additional chart with the specifications for the machine status.

Further information: "Statuses submenu", Page 200

Showing detailed information

You can show detailed information for each section of the machine status bar. For this purpose, proceed as follows:

- ▶ Click a section of the machine status bar
- > StateMonitor displays a window containing detailed information about the machine status and any comments.

Showing the bar chart

For each machine status bar, a bar chart is available. The bar chart is grouped by key figures and indicates the percentage of the respective machine statuses.

To show a bar chart:

- ▶ Click the chart icon next to the machine status bar.
- > The bar chart is displayed.
- > If an additional machine status specification exists, StateMonitor highlights that bar in bold. **Further information:** "Replacing and specifying machine statuses", Page 80
- ▶ To display the specifications (subcategories), click the bar
- > The specifications are displayed as separate bars.

Further information: "Functions in tables and charts", Page 50

Saving the evaluation

You can save the current evaluation under **My evaluations**

Further information: "Saving Evaluations", Page 159

9.3 Key figures submenu

In the **Key figures** submenu, you can evaluate the key figures for selected machines. For a defined period, StateMonitor calculates the **Availability** and **Utilization rate** values based on the incoming machine statuses.

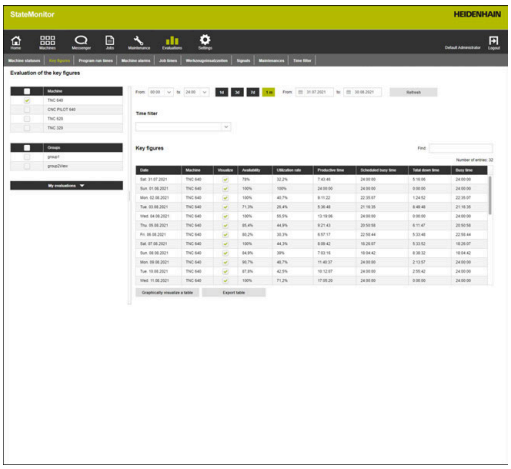
Further information: "Availability", Page 163

Further information: "Utilization rate", Page 164

Displaying key figures

To evaluate the key figures for selected machines:

- Switch to the **Evaluations** menu
- Select the **Key figures** submenu
- Select the desired machines (select the checkboxes of the machine names)
- Or select groups (select the checkboxes of the group names)
- Select a time (**from ... to ...**)
- Select the number of days (counting back from the current day)
- Or select a date (**from ... to ...**)
- Or select a **Time filter** (if available)
  Further information: "Time filter submenu", Page 174
- Click the **Refresh** button
- > For the selected machines and in the selected period, StateMonitor displays the following key figures in the table:
  - **Availability**
  - **Utilization rate**
  - **Productive time**
  - **Scheduled busy time**
  - **Busy time**
  - **Total down time**



Further information: "Functions in tables and charts", Page 50

Graphically visualize a table

For each selected machine, StateMonitor displays the key figures in a separate graphic.

Saving the evaluation

You can save the current evaluation under **My evaluations**

Further information: "Saving Evaluations", Page 159

Availability

The availability of the machine is calculated from the ratio of the main usage time relative to the scheduled busy time.

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

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

		Total time
–		Time during which the machine is not operated
–		Delay
–		Time during which the machine is not ready for operation
=		Main usage time

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

		Total time
–		Time during which the machine is not operated
=		Scheduled busy time (= time during which the machine is operated)

If, within the period under consideration, StateMonitor was not active at some point, this non-recorded interval is assigned the **UNDEF** status in StateMonitor and is displayed as a white segment in the status bar.

These **UNDEF** periods are not taken into account in the availability calculation. The calculated parameters thus refer only to the time periods during which StateMonitor was active.

Utilization rate

The utilization rate basically is the ratio of the actually attainable value of a reference value relative to the maximum possible value of this reference value.

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

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

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

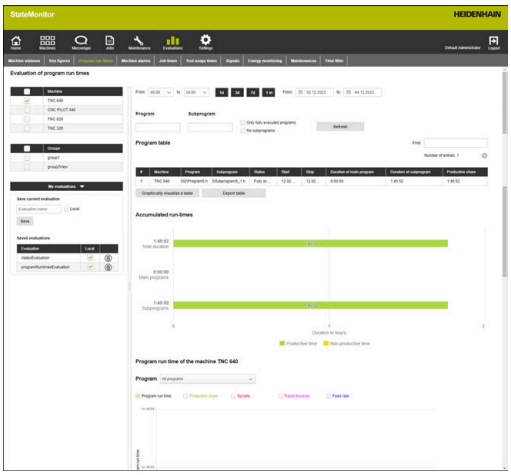
	Total period under consideration	
–	Delay	
–	Time during which the machine is not operated	
=	Busy time	

Thus, the utilization rate is as follows:

$$\text{Utilization rate} = \frac{\text{Productive time} + \text{Delay}}{\text{Total period under consideration} - \text{Time during which the machine is not operated} - \text{Delay}}$$

> The value for Productive time may deviate from the program run time. Program run time will only be counted as productive time if the override values are at least 1%.

9.4 Program run times submenu



In the **Program run times** submenu, you can evaluate the run-times of the NC programs of selected machines.

To evaluate the **Program run times**:

- Switch to the **Evaluations** menu
- Select the **Program run times** submenu
- Select the desired machines (tick the machine names)
- Alternatively, select groups (tick the boxes in front of group names)
- Select a time (**from ... to ...**)
- Select the number of days (counting back from the current day)
- Alternatively, select a date (**from ... to ...**)
- Alternatively, select a **Time filter** (if available)
  Further information: "Time filter submenu", Page 174
- You can additionally filter by the following program parameters as needed:
  - **Program**
  - **Subprogram**
  - **Only fully executed programs**
  - **No subprograms**
- Click the **Refresh** button
- > In the table, StateMonitor lists the programs that ran in the selected period.

Graphically visualize a table

In terms of their functionality, the program table and its graphical visualizations are equivalent to the **Program run times** submenu in the **Machines** menu under **Machine status**.

Further information: "Program run times submenu", Page 95

In contrast to the **Machines** menu, the **Evaluations** menu allows you to visualize and compare the charts of multiple machines at the same time. StateMonitor lists all of the charts one below the other.

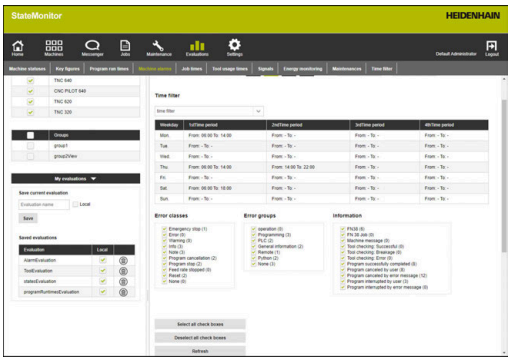
Saving the evaluation

You can save the current evaluation under **My evaluations**

Further information: "Saving Evaluations", Page 159

9.5 Machine reports submenu

In the **Machine reports** submenu, you can list certain messages in a defined period for selected machines.



To list **Machine reports**:

- Switch to the **Evaluations** menu
- Select the **Machine reports** submenu
- Select the desired machines (tick the machine names)
- Alternatively, select groups (tick the boxes in front of group names)
- Select a time (**from ... to ...**)
- Select the number of days (counting back from the current day)
- Alternatively, select a date (**from ... to ...**)
- Alternatively, select a **Time filter** (if available)
  Further information: "Time filter submenu", Page 174
- Select **Error classes**, **Error groups**, **Information**
- Click the **Refresh** button
- > In a table, StateMonitor lists all of the machine messages that occurred within the selected period on the selected machine and that belong to the selected **Error classes**, **Error groups**, or **Information**.
- To show bar graphs for the table, click the **Graphically visualize a table** button
- > StateMonitor visualizes the data from the table in a bar graph for each machine.

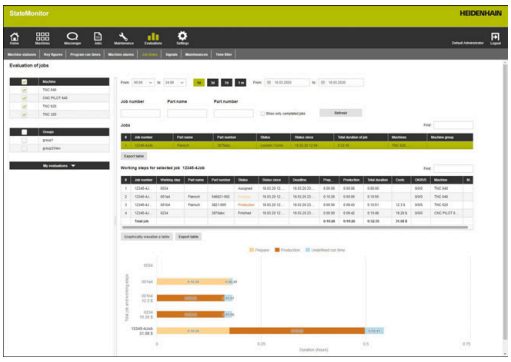
Further information: "Functions in tables and charts", Page 50

Saving the evaluation

You can save the current evaluation under **My evaluations**

Further information: "Saving Evaluations", Page 159

9.6 Job times submenu (software option)



In the **Job times** submenu, you can evaluate recorded data related to your production jobs.

The following formats are available for evaluation:

- The **Jobs** table lists all jobs corresponding to the search criteria with their total duration
- The **Working steps for selected job** table contains all working steps for the selected job as well as the associated durations, the actual parts and scrap counts for produced parts, and the machine on which the step was performed
- The bar chart visualizes the following durations for each working step: preparation time, production time and undefined run time
- The **Entries for working step** table contains detailed information on each job status that occurred in the selected working step

If hourly rates are saved for the selected machines in the settings, then StateMonitor also shows the costs per job and working step here.

To evaluate the recorded data:

- Switch to the **Evaluations** menu
- Select the **Job times** submenu
- Select the desired machines (tick the machine names)
- Alternatively, select groups (tick the boxes in front of group names)
- Select a time (**from ... to ...**)
- Select the number of days (counting back from the current day)
- Alternatively, select a date (**from ... to ...**)
- Alternatively, select a **Time filter** (if available)
  Further information: "Time filter submenu", Page 174
- If required, enter the **Job number**, **Part name**, or **Part number** in the Find field.
- To restrict the search to fully completed jobs, select the **Show only completed jobs** checkbox
- Click the **Refresh** button
- > In the table, StateMonitor lists all of the jobs that correspond to the search criteria.
- Click a job in the **Jobs** table
- > The **Working steps for selected job** table is displayed.
- Click a working step in the **Working steps for selected job** table
- > The **Entries for working step** table opens.
- To show a bar chart for the **Working steps for selected job** table, click the **Graphically visualize a table** button

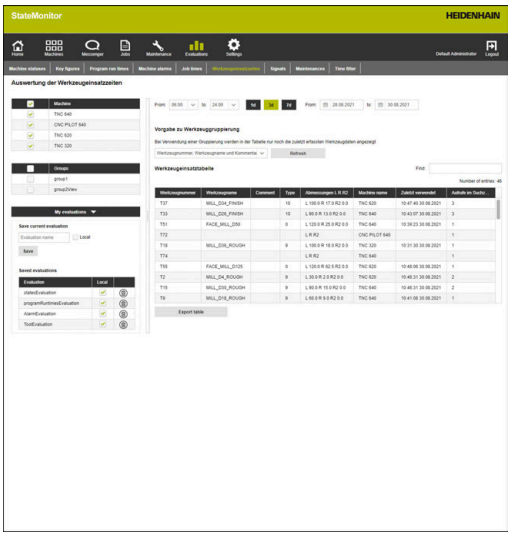
Further information: "Functions in tables and charts", Page 50

Saving the evaluation

You can save the current evaluation under **My evaluations**

Further information: "Saving Evaluations", Page 159

9.7 Tool usage times submenu



In the **Tool usage times** submenu, you can evaluate the tool usage data for the selected machines.

For this purpose, StateMonitor records the tool data of the respectively active tool when it is inserted in the tool spindle and when it is removed.

To evaluate **Tool usage times**:

- Switch to the **Evaluations** menu
- Select the **Tool usage times** submenu
- Select the desired machines (select the checkbox in front of the machine names)
- Alternatively, select groups (select the checkboxes in front of the group name)
- Select a time (**from ... to ...**)
- Select the number of days (counting back from the current day)
- Alternatively, select a date (**from ... to ...**)
- Alternatively, select a **Time filter** (if available)
  Further information: "Time filter submenu", Page 174
- Select the desired group in the **Default tool grouping** field:
  - **Tool number**
  - **Tool name**
  - **Comment**
  - **Tool number and tool name**
  - **Tool number and comment**
  - **Tool number, tool name, and comment**
- Click the **Refresh** button
- > In the **Tool-usage table**, StateMonitor lists the tool groups that were being used during the selected period.
- In the table, click the row containing the desired tool
- > StateMonitor shows all of the recorded data records in the **Usage of selected tool** table.
- To show a bar graph for the **Usage of selected tool** table, click the **Graphically visualize a table** button

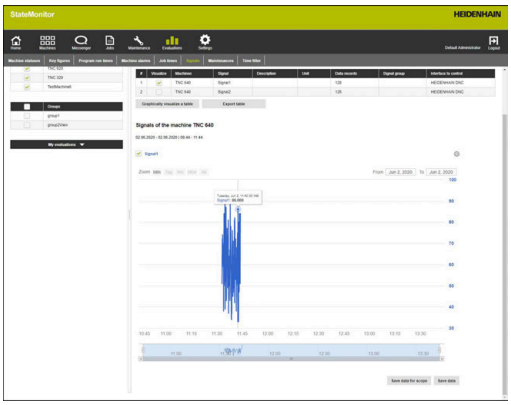
Further information: "Functions in tables and charts", Page 50

Saving the evaluation

You can save the current evaluation under **My evaluations**

Further information: "Saving Evaluations", Page 159

9.8 Signals submenu (software option)



The **Signals** submenu allows you to evaluate machine signals.

Prerequisite: the affected signals are configured in StateMonitor.

Further information: "Defining control signals", Page 188

To evaluate signals:

- Switch to the **Evaluations** menu
- Select the **Signals** submenu
- Select the desired machines (tick the boxes in front of machine names)
- Alternatively, select groups (tick the boxes in front of group names)
- Select a time from ... to ...
- Select the number of days (counting back from the current day)
- Alternatively, select a date from ... to ...
- Click the **Refresh** button

> In a table, StateMonitor lists the signals that occurred during the selected period.

Further information: "Functions in tables and charts", Page 50

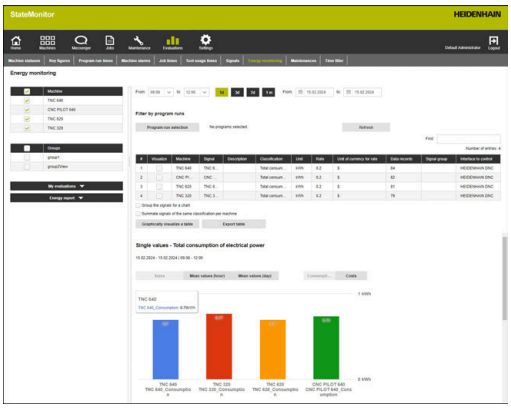
Saving the evaluation

You can save the current evaluation under **My evaluations**

Further information: "Saving Evaluations", Page 159

9.9 Energy monitoring submenu

In the **Energy monitoring** submenu, you can display the energy consumption within a defined period for selected machines.
To filter the information about energy consumption, you can use the **Program-run selection** function to limit the evaluation period to single program runs.



To evaluate the recorded energy consumption:

- Switch to the **Evaluations** menu
- Select the **Energy monitoring** submenu
- Select the desired machines (select the checkboxes of the machine names)
- Or select groups (select the checkboxes of the group names)
- Select a time (**from ... to ...**)
- Select the number of days (counting back from the current day)
- Or select a date (**from ... to ...**)
- Select the desired program runs in the **Program-run selection** pop-up window as needed
- Click the **Refresh** button

> StateMonitor lists all signals in the table that are classified as energy signals and match the search criteria.

- Select the desired signals; select the corresponding options below the table to summate signals of the same classification per machine
- To show a bar and/or line chart corresponding to the selection, click the **Graphically visualize a table** button

> To simplify evaluation, you can choose between various types of charts.

Saving the evaluation

You can save the current evaluation under **My evaluations**

Further information: "Saving Evaluations", Page 159

Creating an Energy report

The recorded information about energy consumption can be used to automatically create an energy report for notification by e-mail.

All defined users are listed in the **User** drop-down list box.

Possible notification intervals:

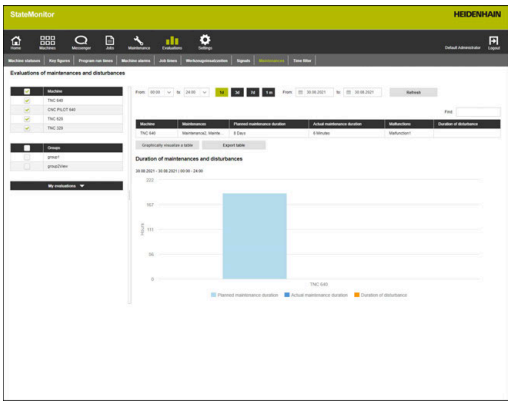
- **Daily**
- **Weekly**
- **Monthly**
- **Yearly**
- **User-defined**

> In order to use this function, an SMTP server must be configured for StateMonitor.
>
> "Messenger settings submenu"

To define an energy report for a user:

- ▶ Switch to the **Evaluations** menu
- ▶ Select the **Energy monitoring** submenu
- ▶ Select the desired user on the **Energy report** tab
- ▶ Enter the desired e-mail address as needed
- ▶ Select a value for **Interval**
- ▶ Click the **Save** button
- > StateMonitor saves the energy report and lists it in the table.

9.10 Maintenances submenu (software option)



In the **Maintenances** submenu, you can evaluate the recorded data on performed maintenance events and resolved malfunctions.

The following formats are available for evaluation:

- The table lists the performed maintenance events and resolved malfunctions that correspond to the search criteria
- The **Duration of maintenances and disturbances** chart visualizes, for each machine, the planned and actual duration of a maintenance event and the duration of a malfunction

To evaluate the recorded data:

- ▶ Switch to the **Evaluations** menu
- ▶ Select the **Maintenances** submenu
- ▶ Select the desired machines (tick the boxes in front of machine names)
- ▶ Alternatively, select groups (tick the boxes in front of group names)
- ▶ Select a time from ... to ...
- ▶ Select the number of days (counting back from the current day)
- ▶ Alternatively, select a date from ... to ...
- ▶ Click the **Refresh** button
- > In a table, StateMonitor lists all of the maintenance events and malfunctions that correspond to the search criteria.
- ▶ To show the graph, click the desired entry in the table
- ▶ Click the **Graphically visualize a table** button
- > StateMonitor shows the **Duration of maintenances and disturbances** chart.

Further information: "Functions in tables and charts", Page 50

Saving the evaluation

You can save the current evaluation under **My evaluations**

Further information: "Saving Evaluations", Page 159

9.11 Time filter submenu

In the **Time filter** submenu, you can define the periods during which the recorded data are to be considered for the evaluation. This makes it possible to exclude planned downtimes (e.g., shift changes or breaks) when calculating the key figures (see "Key figures submenu", Page 162).

In the **Time filter** submenu, you can:

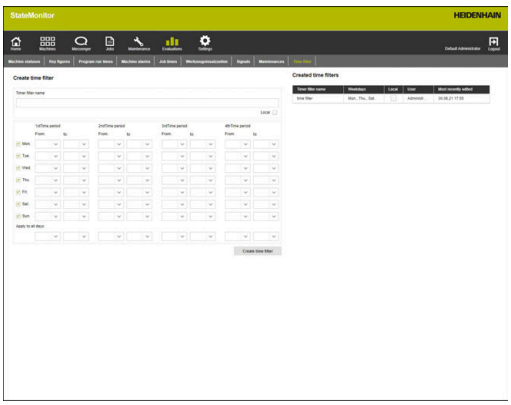
- Create time filters
- Change time filters
- Delete time filters

Create time filters

For each day of the week, you can define up to four periods during which the recorded data are to be considered. You can define these periods separately for every weekday or for the entire week (drop-down list boxes under **Apply to all days:**).

If you select the **Local** checkbox, then this time filter can be viewed only with your login information. Other users will not be able to see this time filter.

If you do not select the **Local** checkbox, then the time filter can be viewed by all users with **Authorization status StateMonitor User plus** or **Administrator**.



To create a new time filter:

- ▶ Switch to the **Evaluations** menu
- ▶ Select the **Time filter** submenu
- ▶ Enter the name of the time filter in the **Timer filter name** field
- ▶ Select the **Local** checkbox as needed
- ▶ Define up to four periods per weekday with the **From: ... to: ...** selection fields
- ▶ Alternatively, define up to four periods for the entire week in the **Apply to all days:** drop-down list boxes
- ▶ Click the **Add time filter** button
- > The time filter appears in the **Created time filters** table.

StateMonitor offers only complete hours in the **from ... to ...** selection field. To change the minute values, you can edit the offered values directly in the input field.

Changing time filters

To change a time filter:

- ▶ In the **Created time filters** table, click the time filter that you would like to change
- > The time filter's data are transferred to the **Add time filter** section.
- ▶ Change the information
- ▶ Click the **Save time filter** button
- > The changes are applied.

Deleting time filters

To delete a time filter:

- In the **Created time filters** table, click the time filter that you would like to delete
- Click the **Delete time filter** button

> The time filter is deleted from the table.

10

Settings Menu

10.1 Settings menu

The **Settings** menu contains the following submenus:

- **User settings**
- **User administration**
- **Machines**
- **Signal broker**
- **Add groups**
- **Machine mapping**
- **Statuses**
- **Messenger settings**
- **File backup**
- **External reporting DB**
- **Advanced**
- **Info**

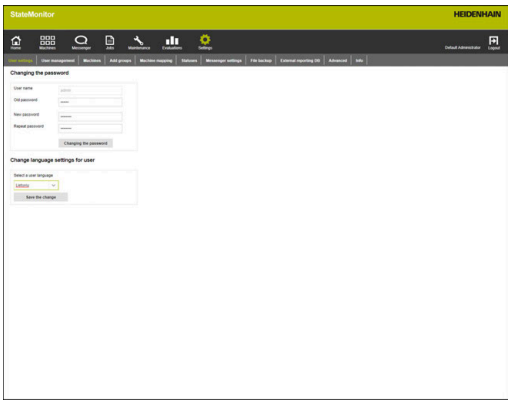
The role of the user determines which submenus and functions StateMonitor displays.

Further information: "User administration submenu", Page 180

10.2 User settings submenu

Changing the password

Every user can change his or her user password at any time.



To change your user password:

- Switch to the **Settings** menu
- Select the **User settings** submenu
- > Your user name is shown in the **User name** field.
- Enter your current password in the **Old password** field
- Enter your new password in the **New password** field
- Re-enter your new password in the **Repeat password** field
- Click the **Changing the password** button
- > StateMonitor changes the password.

Forgot your password?

If user has lost his or her password, the administrator can reset it.

Further information: "Resetting passwords", Page 183

Change language settings for user

Each user can individually set the language in StateMonitor. The language settings of all the other users remain unaffected by this setting.

To set the language setting for users:

- Switch to the **Settings** menu
- Select the **User settings** submenu
- Select the user language
- Click the **Save the change** button
- > StateMonitor changes the user language.

The language settings of all the other users remain unaffected by this setting.

You can change the system language in the **Advanced** submenu. The system language applies to all users in whose **User settings** the **System language** setting is selected.

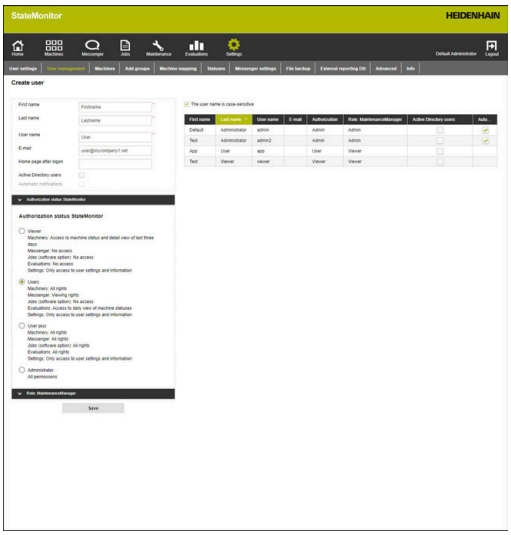
Further information: "Changing the system language", Page 229

10.3 User administration submenu

Roles

The users of StateMonitor have different access rights and editing rights based on their roles.

You can assign the following roles to the users:



Permission status for StateMonitor

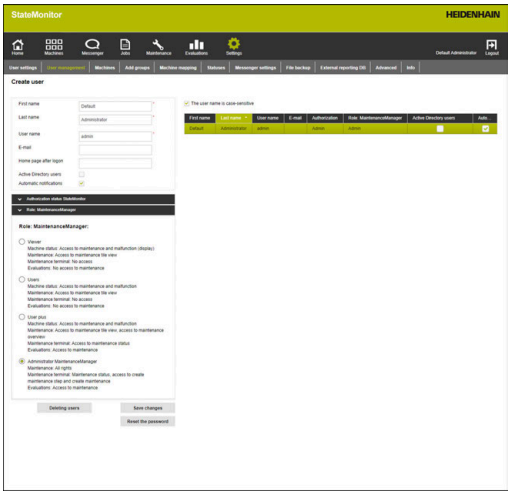
	Menu	Authorization
Viewer	**Machines**	No editing rights Only access to **Machine status**, **Job terminal** (software option), and **Detailed view of the last 3 days**
	Messenger	No access
	Jobs (software option)	No access
	Evaluations	No access
	Settings	Only access to **User settings** and **Info**
Users	**Machines**	All rights
	Messenger	No editing rights
	Jobs (software option)	No access
	Evaluations	Only access to **Day view** of the machine statuses
	Settings	Only access to **User settings** and **Info**
User plus	**Machines**	All rights
	Messenger	All rights
	Jobs (software option)	All rights
	Evaluations	All rights
	Settings	Only access to **User settings** and **Info**
Administrator	All menus	All rights

- The **Automatic notifications** function allows you to notify users with the Administrator role by e-mail when connection problems occur at one or more active machines.
- Only users with the Administrator role can enter, change, or delete user data.

MaintenanceManager authorization status (software option)

	Menu/submenu	Authorization
Viewer	**Machines**	No editing rights Access to **Maintenance & malfunction**
	Maintenance	Access to **Tile view**
	Maintenance terminal	No access
	Evaluations	No access
Users	**Machines**	Access to **Maintenance & malfunction**
	Maintenance	Access to **Tile view**
	Maintenance terminal	Access to **Maintenance status**
	Evaluations	No access
User plus	**Machines**	Access to **Maintenance & malfunction**
	Maintenance	Access to **Tile view** and **Status overview**
	Maintenance terminal	Access to **Maintenance status**
	Evaluations	Access to **Maintenance**
Administrator MaintenanceManager	All menus	All authorizations in the **Maintenance** area

Create user



> By clearing the option **The user name is case-sensitive**, you can deactivate the uppercase/lowercase check for user names.

To create a user in StateMonitor:

- Switch to the **Settings** menu
- Enter the following data in the **User administration** submenu:
  - **First name**
  - **Last name**
  - **User name**
  - **E-mail**
- Select the desired option in the **Authorization status StateMonitor** pull-down menu
- Deactivate the **Automatic notifications** option for users with the Administrator role by mouse click as needed
- Additionally select the desired option in the **Role: MaintenanceManager** pull-down menu as needed
- Enter the URL of the desired page or QuickEdit view in the **Home page after logon** field as needed
- Select the **Active Directory users** checkbox as needed
  Further information: "Active Directory settings", Page 231
- Click the **Save** button

> StateMonitor shows the created user in the user list.

> StateMonitor sends the user the password by e-mail.

Every user can change his or her password at any time.
Further information: "User settings submenu", Page 179

Both the **User name** and the **Password** are required for **Login**.
Further information: "Home menu", Page 54

Users receive notifications at their stated e-mail address, as specified in the **Messenger** menu.
Further information: "Messenger Menu", Page 111

> If the machine assignment is active, then no machines are initially assigned to the new user. You can perform the assignment in the **Machine mapping** submenu.
>
> **Further information:** "Machine mapping submenu", Page 199

Editing user data

To change user data later:

- Switch to the **Settings** menu
- Select the **User** submenu
- In the list of users, select the user whose data you want to edit
- > StateMonitor highlights the user and loads the data into the input fields.
- Make the changes
- Click the **Save changes** button
- > StateMonitor transfers the edited data to the user list.

Deleting users

To delete a user in StateMonitor:

- Switch to the **Settings** menu
- Select the **User** submenu
- In the user list, select the user whom you would like to delete
- > StateMonitor highlights the user and loads the data into the input fields.
- Click the **Deleting users** button
- > StateMonitor removes the user from the list.

Resetting passwords

If a user has forgotten his or her password, then only a user with administrator role can reset the user's password.

Proceed as follows to reset a password:

- Switch to the **Settings** menu
- Select the **User** submenu
- In the list of users, select the user whose password you want to reset
- > StateMonitor highlights the user and loads the data into the input fields.
- Click the **Reset the password** button
- > StateMonitor resets the password and sends an e-mail with the new password to the affected user.
- > The user is able to change the password.

If there is no saved e-mail address, then the password appears in a pull-down window and must be communicated to the user in some other way.

10.4 Machines submenu

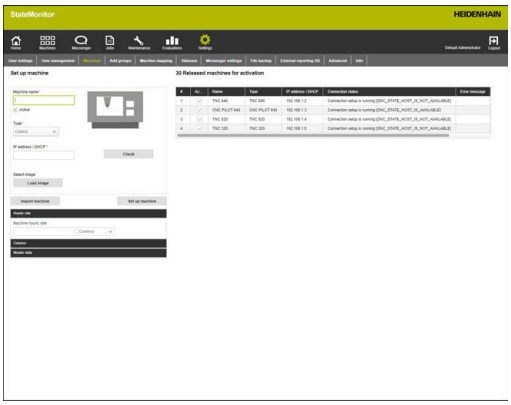
In the **Machines** submenu, you can create new machines and edit existing machines.

> This function is only accessible to users with the Administrator role.

Create machine

Creating new machines

To create a new machine in StateMonitor:



- Switch to the **Settings** menu
- Select the **Machines** submenu
- Enter the name of the machine in the **Machine name** field
- Select the **Type** (of control)
- For **IP address / DHCP**, enter the IP address (eth0) or the host name of the machine; for OPC UA, enter the value for **Endpoint URL**
- Click the **Check** button
- > StateMonitor checks the network connection to the machine.
  Further information: "Testing the network connection", Page 185
- If you have a picture of your machine, click the **Load image** button
- Select the image file in Windows Explorer
- > StateMonitor loads the selected image into the view.
- Depending on the selection in the **Type** field, make the necessary settings in the pull-down menus
  Further information: "Machine parameters", Page 191
- Click the **Set up machine** button
- > The machine is saved in the machine list.
- > The machine is now shown in the **Machines** menu.

Testing the network connection

> If the network connection test is not successful, the following error message will be displayed:
>
> "**Invalid IP address**"

If the network connection could not be established, check the following:

- Has the machine's IP address been entered correctly?
- Is the server or PC on which StateMonitor is installed connected with the local corporate network?
- Is the machine connected to the local company network?

Further information: "Network Integration", Page 241

Once a network connection has been established between the machine and StateMonitor, the control transmits the **SIK** number and the software version of the **NC software** to StateMonitor.

With HEIDENHAIN controls, StateMonitor enters the **SIK** number and the software version of the **NC software** into the corresponding columns of the overview table.

Details on the Connection status column

In the **Connection status** column of the machine list, StateMonitor displays the current connection status for each machine.

The following connection statuses may be displayed:

Connection status	Cause
Connected	Machine is connected with StateMonitor
Connection setup is running	Connection setup is running
No connection. Activation is required.	Connection interrupted After three lost connections within five minutes, no new attempt will be made to establish a connection (network is not stable)
Connection separated	No connection between machine and StateMonitor Machine was deactivated in StateMonitor

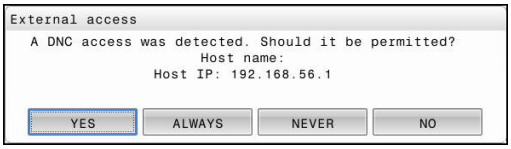
Following the connection status, StateMonitor shows the associated DNC status message in brackets.

The following DNC status messages may be displayed:

DNC status message	Meaning	Cause
DNC STATE NOT INITIALIZED	Machine is in the start status Machine has not yet been initialized	Connection has not yet been established
DNC STATE HOST IS NOT AVAILABLE	Machine cannot be reached via PING	Machine is switched off or disconnected from the network
DNC STATE HOST IS AVAILABLE	Machine can be reached via PING	Machine is starting, NC is starting, DNC is already available
DNC STATE DNC IS AVAILABLE	DNC is available	Machine is starting, NC and DNC have not yet been started
DNC STATE WAITING PERMISSION	Waiting for permission	Client is waiting for permission for **External access**
DNC STATE MACHINE IS BOOTED	Machine has booted NC software is loaded; PLC is not yet compiled	Machine has booted and is waiting for acknowledgement of the power interruption with **CE**
DNC STATE MACHINE IS INITIALIZING	Machine is being initialized	PLC is being compiled
DNC STATE MACHINE IS AVAILABLE	Machine is fully booted and ready	Machine is ready, all DNC functions are available
DNC STATE MACHINE IS SHUTTING DOWN	Machine is shutting down	Machine shutdown has been initiated
DNC STATE DNC IS STOPPED	Machine is shutting down, DNC has stopped	DNC has been ended as part of shutting down
DNC STATE HOST IS STOPPED	Machine has shut down	Connection has been lost Machine has shut down and is no longer available
DNC STATE NO PERMISSION	No permission	**External access** is blocked (MOD function) Permission request for **External access** was denied Permission request for **External access** is pending but has not been acknowledged

Troubleshooting connecting problems

If three lost connections occur within five minutes, this is an indication that the network is unstable. In this case, no further connection attempts will be made. StateMonitor displays the connection status
No connection. Activation is required.



To initiate the establishment of a new connection:

- Deactivate the machine
- Click the **Save machine** button
- Reactivate the machine
- Click the **Save machine** button

> StateMonitor retries to establish the connection.

If a client sends a permission request for **External access**, then the window shown to the right appears on the control.

Details on the Error message column

In the **Error message** column of the machine list, StateMonitor displays a DNC error message when there are connection problems.

The following DNC error messages may be displayed:

DNC error message	Meaning	Cause
DNC_E_DNC_PROHIBITED	DNC blocked	**External access** is blocked (MOD function) Permission request for **External access** was denied
DNC_E_FAIL	DNC failure	Firewall is blocked
DNC_E_OPTION_NOT_AVAILABLE	DNC option is not available	Option 18, HEIDENHAIN DNC, is not available
DNC_E_NOT_POS_NOW	DNC is presently not possible	Currently, DNC connections cannot be established (e.g. if the machine is shutting down)
DNC32_E_NOT_CONN	No connection to the machine	Machine is switched off or not connected to the network
TIMEOUT	Timeout in the network	StateMonitor sent a request, but the controls is not responding (check connection)

Defining control signals

Most of the machine parameters depend on the selected type (see "Machine Parameters", Page 247). The evaluation of the control signals in the **Signals** tab is largely identical for all types, however.

In the enhanced definition table (**Create** button), you can map the control signals to status parameters.

You can use the following parameters for the configuration of the signals:

Parameter	Explanation	HEIDENHAIN	ModBus	OPC UA	MTConnect
General information					
Name	Unique name	✓	✓	✓	✓
Description	Additional information	✓	✓	✓	✓
Group	Name of a group of signals	✓	✓	✓	✓
Klassifizierung	Classification of machine signals for energy evaluation Possible values: ■ **Total consumption of electrical power** ■ **Momentary electrical power consumption** ■ **Total consumption of compressed air** ■ **Momentary compressed air consumption** ■ **Total consumption of process water** ■ **Momentary process water consumption**	✓	✓	✓	✓
Costs of energy rate **Currency of energy rate**	Cost information only if the **Total consumption of electrical power**, **Total consumption of compressed air**, or **Total consumption of process water** option is selected for **Klassifizierung**	✓	✓	✓	✓
Connection					
Source	Information about whether the signal comes directly from the machine or is configured via the signal broker Possible values: ■ **Machine** ■ **Signal broker**	✓	✓	✓	✓
Address type	Address space in which the memory address is located Possible values: ■ **COIL_OUTPUT** ■ **DIGITAL_INPUT** ■ **HOLDING_REGISTER** ■ **ANALOG_INPUT**		✓		

Parameter	Explanation	HEIDENHAIN	ModBus	OPC UA	MTConnect
Modbus data type	Data type Possible values: ■ **BIT** ■ **BYTE** ■ **INT_16** ■ **INT_32** ■ **FLOAT_32** ■ **FLOAT_64**		✓		
Address type	Address space in which the memory address is located Possible values: ■ **Numerical** ■ **String** ■ **Guid** ■ **Opaque**			✓	
Namespace	Definition of personal name space			✓	
Address	Path to the signal that is to be recorded	✓	✓	✓	✓
	For HEIDENHAIN controls, the default path syntax always starts with the `\PLC\...` string Example: `\PLC\memory\api3\channel\0\pp_ChnFeedOverride` for feed rate To ensure that you enter the correct path for your machine control, you may need to ask the machine manufacturer for the syntax used.				
Data type	Data type Possible values: ■ **Number (number)** ■ **Text (string)** ■ **Boolean value (0 or 1)**			✓	✓
Polling interval	Interval for polling Possible values: **1 second** to **1 hour**	✓	✓	✓	✓
Subscription	Activates subscription to OPC UA signals			✓	
Subscription sampling interval (in ms)	Interval for updating OPC UA signals (default 15 ms)			✓	
Factor	Conversion factor for signal value	✓	✓	✓	✓
Decimal places	Number of decimal places used	✓	✓	✓	✓
Threshold value	A threshold value above which the new signal value is transferred to the database	✓	✓	✓	✓

Parameter	Explanation	HEIDENHAIN	ModBus	OPC UA	MTConnect
Display					
Text before the value	Specification of a prefix	✓	✓	✓	✓
Text after the value (physical unit)	Specification of the physical unit of the signal value	✓	✓	✓	✓
Min. display	Minimum display value for the chart in the **Machine status** view	✓	✓	✓	✓
Max. display	Maximum display value for the chart in the **Machine status** view	✓	✓	✓	✓
Reference range min	Minimum reference range for the chart in the **Machine status** view	✓	✓	✓	✓
Reference range max	Maximum reference range for the chart in the **Machine status** view	✓	✓	✓	✓
Boolean reference value	Reference value; only if the **Boolean value (0 or 1)** option has been selected for **Data type**			✓	✓
Display in machine view	Activates the display in the **Machine status** view "Machine status"	✓	✓	✓	✓

The **Check the signals** button allows you to call the current value of the selected signal.

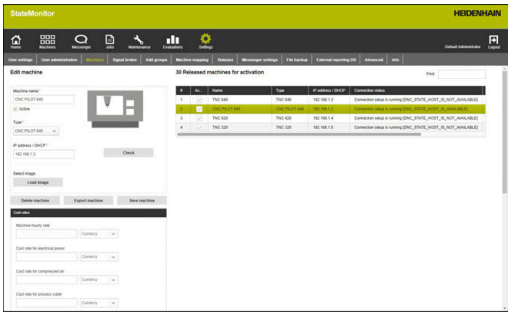
The **Export** button allows you to save the configured signal parameters to an XML file.

The **Import** button allows you to create new signals in StateMonitor by importing the signal parameters from an XML file. The previously configured signals remain unaffected by this.

Edit machine

To edit the data of an existing machine in StateMonitor:

- ▶ Switch to the **Settings** menu
- ▶ Select the **Machines** submenu
- ▶ Select the machine in the machine list
- > StateMonitor loads the data into the input fields.
- > StateMonitor displays the available machine parameters in the tabs in the pull-down menu.
- ▶ Change the data
- ▶ Click the **Save machine** button
- > StateMonitor saves the machine with the edited data.



Machine parameters

Depending on the machine model and the control, the following parameter groups are available in the pull-down menus:

Parameter	Explanation	HEIDENHAIN	Modbus	OPC UA	MTConnect	FOCAS
Cost rates	Specification of the costs incurred (with currency) ■ **Hourly rate** Labor costs ■ **Cost rate for electrical power** ■ **Cost rate for compressed air** ■ **Cost rate for process water** Consumption costs These values are used to calculate the costs per job and working step in the optional **Energy monitoring** submenu **Further information:** "Energy monitoring submenu", Page 171	✓	✓	✓	✓	✓
Camera	IP address of a camera whose live image is displayed in the **Machine status** submenu	✓	✓	✓	✓	✓
Master data	Administrative information about the machine	✓	✓	✓	✓	✓
Override acquisition (optional)	Only for HEIDENHAIN iTNC 530 control **Further information:** "Settings for Override acquisition (only with iTNC 530)", Page 253	✓				
Simulation properties (optional)	Only for **Simulation** type: ■ **Number of days** Past period for which the simulation data are generated ■ **Statuses per day** The number of the status changes for the generated simulation data ■ **Seed for random numbers** Starting value for random number generator ■ **Generate fake data when saving** This option is effective only during creation of the simulation ■ **Continually generate new data** Default setting for continuously new simulation data ■ **Mean status time in seconds** Recommended value for random generator for generating machine statuses					
Connection settings	Parameter depends on the machine model	✓	✓	✓	✓	✓
Security settings	Parameter for authentication	✓		✓		
Signals (optional)	Definition of signals for access to PLC variables	✓	✓	✓	✓	

Parameter	Explanation	HEIDENHAIN	Modbus	OPC UA	MTConnect	FOCAS
Status parameters for mapping (optional)	Definition of assignments to other controls **Further information:** "Mapping status parameters to other controls", Page 258		✓	✓	✓	✓
Editing tools, Mapping (optional)	Definition of assignments to tool parameters **Further information:** "Status parameters for mapping pull-down menu", Page				✓	
Signal alarms (optional)	Definition of alarms based on recorded signals	✓		✓	✓	
Machine messages (optional)	Definition of messages based on recorded signals **Further information:** "Mapping status parameters to other controls", Page 258			✓	✓	

Defining tool parameters

The following information is required for the mapping of the machining tools:

- **Data type**

  Defines, among other things, how the value comparison will be performed. StateMonitor distinguishes between the following parameters:

  - Value parameter of **Text (string)** data type
  - Value parameter of **Number (number)** data type
  - Boolean parameter of **Boolean value (0 or 1)** data type
  - Calculated parameter of **Calculated value** data type

  > For mapping, you can use calculated values to compile complex queries for parameters and formed constants.
  >
  > **Further information:** "Formation of your own constants using the calculated values", Page 268

- **DataItemId**

  States, as a reference, the ID attribute for the data values to be called.

- **Value**

  Comparison values are necessary for the signals that flow directly into the status model of the control. Exceptions to this are numerical values such as override settings or texts, such as the program name, that do not need to be compared.

Deleting machines

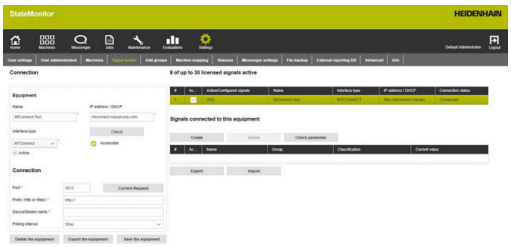
To delete a machine in StateMonitor:

- Switch to the **Settings** menu
- Select the **Machines** submenu
- Select the machine in the machine list
- Click the **Delete machine** button

> StateMonitor deletes the selected machine from the list.

> The machine is no longer shown in the **Machines** menu.

10.5 Signal broker submenu



In the **Signal broker** submenu, you configure the processing of sensor data for energy monitoring in StateMonitor. These sensor data are not supplied directly from the machine controls, but from additional equipment (such as a WAGO box) that transmits the corresponding signals.

For configuration, you first need to define the equipment and the interface being used for signal transmission. Then you can connect the available signals as needed.

Creating new equipment

To create new equipment in StateMonitor:

- Switch to the **Settings** menu
- Select the **Signal broker** submenu
- Enter the name of the equipment in the **Name** field
- Select the **Type** (of control)
- Under **IP address / DHCP**, enter the IP address (eth0) or the host name of the equipment
- Click the **Check** button

> If the **Modbus** interface type is selected, you must specify any desired data point in **Connection parameters** before checking the connection.

> StateMonitor tests the network connection to the equipment
Further information: "Testing the network connection", Page 185

- Depending on the selection in the **Type** field, enter the necessary settings for the equipment
- Click the **Save the equipment** button

> StateMonitor displays the new equipment in the list

Interface parameters

You can use the following parameters to configure the equipment:

Parameter	Explanation	OPC UA	Modbus	MTConnect
Connection				
Default Namespace	Definition of personal name space	✓		
Port	Number of the network port over which the MTConnect service of the control can be reached.		✓	✓
Prefix (http or https)	Defines whether or not the control provides encrypted machine data			✓
DeviceStream name	Unique identifier used to the find correct machine data among the XML files.			✓
Polling interval	Interval for polling Possible values: **1 second** to **4**	✓	✓	✓
Security settings		✓		
Security Mode	Selection of authentication method, depending on the server.	✓		
User **Password**	Manual input of the authentication data	✓		
Endpoint Validation	Verification of the endpoint; deactivate only if connection problems occur	✓		
User certificate	If you use an authentication, then you must also select an application certificate. **Further information:** "Managing certificates (only for OPC UA)", Page 230	✓		
Connection parameters			✓	
Address type	Address space in which the memory address is located Possible values: ■ **ANALOG_INPUT** ■ **COIL_OUTPUT** ■ **DIGITAL_INPUT** ■ **HOLDING_REGISTER**		✓	
Data type	Value format Possible values: ■ **BIT** ■ **BYTE** ■ **INT_16** ■ **INT_32** ■ **FLOAT_32** ■ **FLOAT_64**		✓	
Address	Location in the selected memory area from which the value is to be read		✓	

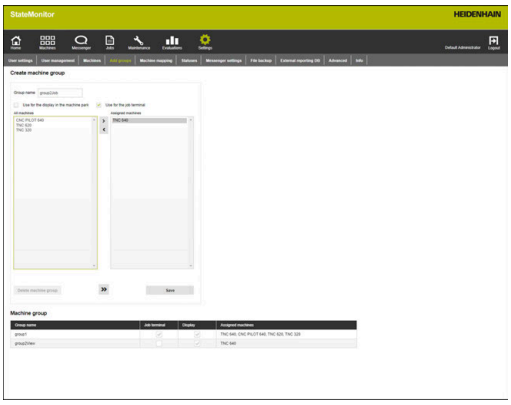
Connecting the equipment signal

To connect the signal from the equipment in StateMonitor:

- ▶ Switch to the **Settings** menu
- ▶ Select the **Signal broker** submenu
- ▶ Select the respective equipment in the list
- ▶ Click the **Create** button
- > StateMonitor opens the **Configure signal** pop-up window
- ▶ Depending on the selection in the **Type** field, enter the necessary parameters for the equipment
  Further information: "Defining control signals", Page 188
- ▶ Click the **Create** button
- > StateMonitor displays the new signal in the list

10.6 Add groups submenu

Creating a machine group



> This function is only accessible to users with the Administrator role.

Machines can be collected into machine groups. You can use a machine group in the **Machines** menu as a filter criterion in order to adapt the view. You can also assign jobs to a machine group. The jobs then appear in the **Job terminal** of each machine of the machine group and can be accepted and machined by each of these machines.

To create a new group:

- Switch to the **Settings** menu
- Select the **Add groups** submenu
- Enter the name of the machine group into the **Group name** field
- Under **All machines**, select the machines that you would like to add to the machine group
- Or, for multiple selections, press the Ctrl key, and select the machines

- Click the **right arrow** button

> StateMonitor adds the machines to the new machine group and enters them under **Assigned machines**.

To remove machines from the machine group:

- Under **Assigned machines**, select the machines that you would like to remove

- Click the **left arrow** button

> StateMonitor moves the selected machines back under **All machines**.

To add all of the machines to the machine group:

- Click the **right arrow** button

> StateMonitor enters all of the machines under **Assigned machines**.

To select the intended use:

- If the machine group in the **Machines** menu is to be available as a filter criterion, then select the **Use for the display in the machine park** checkbox
- If the machine group is to be available in the menus for assigning and executing jobs, then select the **Use for the job terminal** checkbox

> At least one intended use must be selected in order for you to be able to save the machine group.

- Click the **Save** button

> StateMonitor adds the new machine group to the **Machine group** list.

Editing a machine group

To edit a machine group:

- Switch to the **Settings** menu
- Select the **Add groups** submenu
- In the **Machine group** list, select the machine group that you would like to edit

> StateMonitor highlights the machine group and loads the data into the input fields.

- Make the changes
- Click the **Save changes** button

> StateMonitor transfers the changed data to the **Machine group** list.

Deleting a machine group

> The deletion of a machine group does not have any effect on the machine data in the **Machines** submenu. Only the grouping is deleted.

To delete a machine group:

- Switch to the **Settings** menu
- Select the **Add groups** submenu
- In the **Machine group** list, select the machine group that you would like to delete

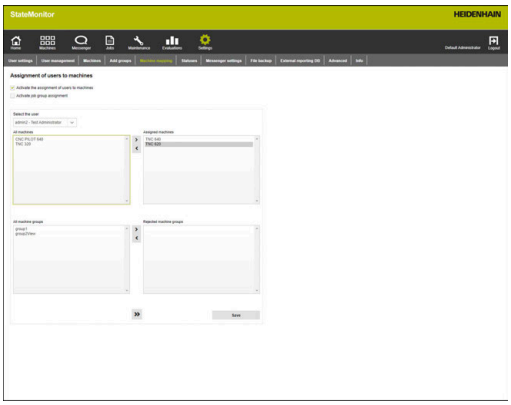
> StateMonitor highlights the machine group and loads the data into the input fields.

- Click the **Delete machine group** button

> StateMonitor removes the machine group from the **Machine group** list.

10.7 Machine mapping submenu

In the **Machine mapping** submenu, you can assign the machines to the individual users, who can access these machines in the **Machines**, **Messenger**, and **Evaluations** menus.



> This function is only accessible to users with the Administrator role.

To assign selected machines to a user:

- Switch to the **Settings** menu
- Select the **Machine mapping** submenu
- Select the **Activate the assignment of users to machines** checkbox

> If the box next to **Activate the assignment of users to machines** is not ticked, then every user sees all of the activated machines.

- In the drop-down list box, select **Select the user**
- Under **All machines** and/or under **All machine groups**, select the machines and machine groups that you would like to assign to the user
- Or, for multiple selections, press the Ctrl key, and select the machines.

- Click the **right arrow** button

> StateMonitor assigns the machines and/or machine groups to the selected user and enters them under **Assigned machines** or **Rejected machine groups**.

- Click the **Save** button

To remove an assignment:

- Select the assigned machine or machine group
- Click the **left arrow** button

> StateMonitor moves the selected machine or machine group back under **All machines** or **All machine groups.**

- Click the **Save** button

To assign all of the machine to one user:

- Click the **double right arrow** button

> StateMonitor moves all of the machines under **Assigned machines**.

- Click the **Save** button

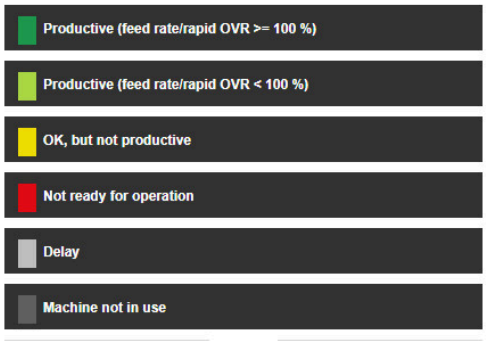
10.8 Statuses submenu

In the **Statuses** submenu, you can add specifications that more closely describe a status. The specifications are available for selection in the **Machines** menu, allowing you to describe a machine status, a job status, or a malfunction.

Further information: "Edit machine statuses submenu", Page 79

Further information: "Job terminal submenu (software option)", Page 84

Further information: "Reporting malfunctions", Page 100



Machine statuses

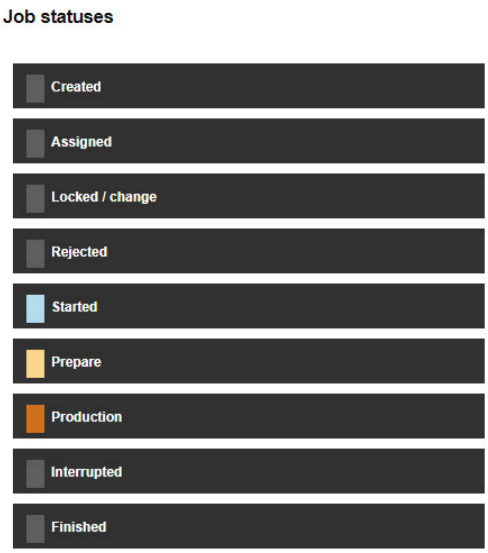
You can more precisely describe the following machine statuses by adding specifications:

Color coding		Status	Explanation
	Dark green	**Productive (feed rate/rapid OVR >= 100 %)**	The machine is productive. The potentiometers for feed rate and rapid traverse are set to 100% or more.
	Light green	**Productive (feed rate/rapid OVR < 100 %)**	The machine is productive. The potentiometers for feed rate and rapid traverse are set to less than 100%.
	Yellow	**OK, but not productive**	The machine is ready for operation, but not productive
	Red	**Not ready for operation**	■ The machine is not ready for operation ■ An emergency stop was triggered ■ Error messages are pending
	Light gray	**Delay**	Can replace a yellow or dark gray machine status and specify it more precisely
	Dark gray	**Machine not in use**	The machine is switched off

Job statuses (software option)

You can more precisely describe the following job statuses by adding specifications:

- **Created**
- **Assigned**
- **Locked / change**
- **Rejected**
- **Started**
- **Prepare**
- **Production**
- **Interrupted**
- **Finished**



Release criteria for jobs

In the **Release criteria for jobs** section, you can define conditions to be fulfilled for a job to be started. Defined release criteria that are set to **Active** can be selected when a new job is created.

Further information: "Create job submenu (software option)", Page 129

The following symbols shown in the **Job terminal** submenu indicate that the criteria have been checked:

- Green check mark: All release criteria are fulfilled
- Orange triangle: Release criteria are not fulfilled

If you click one of the symbols, a pop-up window opens, showing the release criteria for this job. By setting a check mark, you can set the release criteria to **Fulfilled** as needed.

To add a release criterion:

- ▶ Switch to the **Settings** menu
- ▶ Select the **Statuses** submenu
- ▶ In the **Release criteria for jobs** section, click **Create**
- > StateMonitor opens a pop-up window.
- ▶ Enter a name and number for the release criterion. The combination of name and number must be unique.
- ▶ Click the **Save** button
- > StateMonitor displays the new release criterion in the list and sets it to the **Active** status.
- > The release criterion is available for selection in the **Jobs** menu.

Reasons for disturbance (software option)

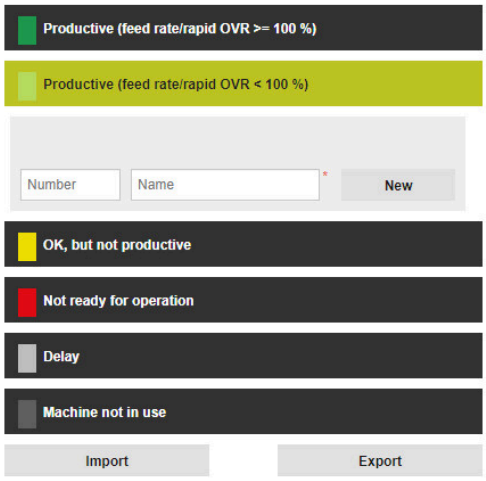
Specifications added in the **Reasons for disturbance** section are subsequently available for selection as reasons for malfunctions for the reporting of malfunctions. You can use the available categories in order to group specifications.

In order to be able to report malfunctions in StateMonitor, at least one specification (reason for malfunction) must be added in the **Reasons for disturbance** section.

Adding specifications

To add a specification:

- Switch to the **Settings** menu
- Select the **Statuses** submenu
- Click the desired status or category
- > StateMonitor opens the input field.
- Enter a name for the specification; for machine statuses you can also enter a unique number
- Click the **New** button
- > StateMonitor shows the new specification in a list above the input window.
- > The specification is available for selection in the **Machines** menu.



Changing the sequence of the specifications

By clicking the arrow symbol, you can change the sequence of the specifications.

- Click the up arrow
- > StateMonitor moves the specification one place up in the list.

- Click the down arrow
- > StateMonitor moves the specification one place down in the list.

Deleting specifications

To delete a specification:

- Click the recycle bin icon
- > StateMonitor deletes the specification from the list.

Exporting and importing machine statuses

In the **Statuses** submenu, you can export the machine statuses with their specifications as a CSV file by using the **Export** button.

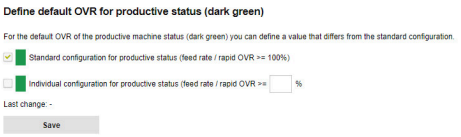
You can then import this CSV file to another StateMonitor by using the **Import** button, in order to use the defined machine statuses again.

Customizing the configuration of the default OVR

To help you adapt StateMonitor to customer-specific scenarios, you can customize the configuration of the default OVR for the Productive machine status (transition between the display of light green and dark green).

To customize the default OVR:

- In the **Define default OVR for productive status (dark green)** area, select the **Individual configuration for productive status (feed rate / rapid OVR >=** option
- Enter the new recommended value for the Productive machine status in the input field
- Click the **Save** button



Customizing the configuration of machine status changes

To help you adapt StateMonitor to customer-specific scenarios, you can customize the configuration of the machine status changes as follows:

- Changing machine statuses based on defined user groups

  Rescind change limitations for machine statuses allows you to define who is permitted to change which machines statuses without restrictions, regardless of the standard behavior of StateMonitor.
- Automatically changing machine statuses

  Use **Automatic machine status changes** to define conditions that change a machine status. This may be a time interval, but also the occurrence of a specific machine alarm, a signal alarm or a machine message. Except in the time interval, you can also define the specific trigger and whether the current status will be changed upon detection of the trigger or whether the entire status will be changed retroactively.

  Thus you can define that, for example, after the machine status has been yellow (**OK, but not productive**) for two hours, the machine status will automatically change to gray (**Delay**).

Further information: "Edit machine statuses submenu", Page 79

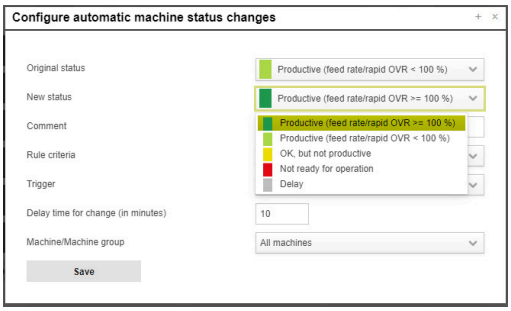
To define user groups for machine status changes:

- In the **Rescind change limitations for machine statuses** area, select the desired user role
- Select the type of machine status changes to which the change is to apply
- Click the **Save** button

To define automated machine status changes:

- ▶ In the **Automatic machine status changes** area, click the **Create** button
- > StateMonitor opens the **Configure automatic machine status changes** window.
- ▶ Select the initial status and the final status in the **Original status** and **New status** drop-down lists
- ▶ Select the desired trigger in the **Rule criteria** drop-down list

  The following rule criteria are available:
  - **Time**
  - **Machine alarm**
  - **Signal alarm**
  - **Machine message**
- ▶ Select further parameters, depending on the selected trigger
- ▶ Select the desired machine or machine group
- ▶ Select the desired time for the status change in the **Point in time for editing** drop-down list
- ▶ Click the **Save** button
- > The defined machine status change is displayed in the table and the checkbox in the **Active** column is selected.

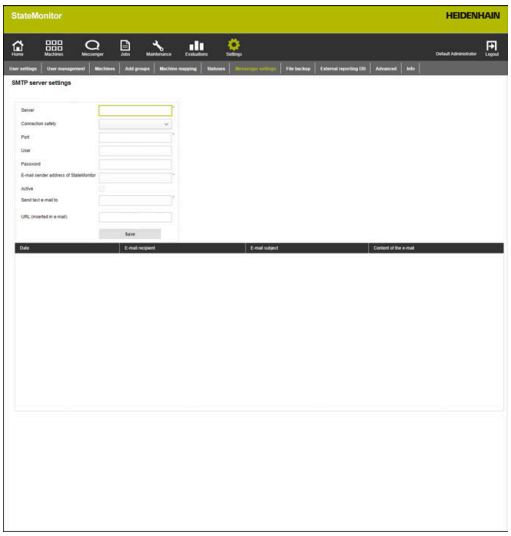


To delete an automated machine status change:

- ▶ Click the recycle bin icon
- > StateMonitor deletes the machine status change from the table.

10.9 Messenger settings submenu

In the **Messenger settings** submenu, enter the connection data for the e-mail server that sends the notifications from StateMonitor to the user.



The following constraints apply to the connection to the SMTP server:

- SMTP servers that require the authentication protocol OAuth 1.0 or OAuth 2.0 are not supported.
- The SMTP server must support 8-bit ASCII encoding. This also applies to all SMTP servers that forward the e-mail until the target server is reached.

Prerequisite: e-mail server

To specify **Messenger settings**:

- ▶ Switch to the **Settings** menu
- ▶ Select the **Messenger settings** submenu
- ▶ Specify the connection parameters
- ▶ Click the **Save** button
- > StateMonitor saves the configuration of the connection to the SMTP server.
- > StateMonitor sends a test e-mail to the entered e-mail address.
- ▶ Confirm receiving the test e-mail
- > StateMonitor activates the configuration.

The following parameters are available:

Parameter	Explanation
Server	Server name of the e-mail server
Connection safety	Type of encryption to be used for the communication, depends on the default setting made by the e-mail provider: ■ **None**: Communication is not encrypted ■ **STARTTLS**: The communication starts in an unencrypted state until the e-mail server suggests transport encryption. Only then, an encrypted communication will be established ■ **SSL/TLS**: The communication is encrypted end-to-end
Port	SMTP port for communication; depends on the selected **Connection safety**: ■ 25 for **None** ■ 587 for **STARTTLS** ■ 465 for **SSL/TLS**
User	User name of the SMTP user If necessary, ask your e-mail provider
Password	Password of the SMTP user If necessary, ask your e-mail provider
E-mail sender address of StateMonitor	E-mail address that StateMonitor uses for sending
Active	Status of the configuration
Send test e-mail to	E-mail address to which StateMonitor sends a test e-mail
URL (inserted in e-mail)	The defined URL is added to sent e-mails in order to allow a user to call the StateMonitor login screen directly from the e-mail, for example.

HEIDENHAIN recommends the use of an encrypted connection in order to protect the transferred data.
Consult an IT specialist if you are unsure.

10.10 File backup submenu

By default, StateMonitor continuously saves all data until the memory is full. A corresponding message will then be sent to the administrator.

> Irrespective of the automatic saving processes, HEIDENHAIN recommends running a daily data backup on the server or PC. In this way, you can prevent serious loss of data in the event of malfunctions.

Export data

Using this function, you can export the recorded machine data to a CSV file. This allows you to import the machine data into a spreadsheet and further process it.

> The machine data exported with this function cannot be imported back into StateMonitor. For restoring machine data based on a backup, see "Manually restoring the database", Page 212.

To perform a data export:

- Switch to the **Settings** menu
- Select the **File backup** submenu
- In the **Export data** field, click the **Export CSV files** button
- Select the storage location
- Click the **Save** button

> StateMonitor saves the backup file in the selected location for saving.

The backup file is a ZIP file containing the following CSV files:

- **MachineDate.csv**
- **MachineStateHistory.csv**

Download log files

If you consult the HEIDENHAIN Service department, you may require the log file of StateMonitor.

To download the log file:

- Switch to the **Settings** menu
- Select the **File backup** submenu
- In the **Download log files** window, click the **Generate log file** button
  > The log file is generated.
- Click the **Download log file** button in the field
- Select the storage location
- Click the **Save** button
  > StateMonitor saves the log file in the selected location for saving.

Regular database backup

StateMonitor can independently create a backup of the database. The following functions are available:

- **Automatic backup of database** with manual entry of the interval and the path of the backup file
- Optional **Automatic creation of database backups when shutting down** for automatically creating a backup during shutdown

To have StateMonitor regularly create an automatic backup of the database:

- ▶ Switch to the **Settings** menu
- ▶ Select the **File backup** submenu
- ▶ In the **Automatic backup of database** field in the **Path for saving the backup** input field, enter the desired path where StateMonitor should save the backup (e.g., a server drive: **C:\ProgramData\HEIDENHAIN\StateMonitor \backup**)
- ▶ Select **Time of day for saving the backup** in the drop-down list (e.g., 22:00 hrs.)
- ▶ Under **Days**, select the desired days (e.g., Monday to Friday)
- ▶ Click the **Generating** button
- > StateMonitor displays the created backup in the list
- > StateMonitor backs up the data every workday at 22:00 hrs. and stores the data in the specified path.

To have StateMonitor automatically create a backup during shutdown:

- ▶ Switch to the **Settings** menu
- ▶ Select the **File backup** submenu
- ▶ In the **Automatic creation of database backups when shutting down** field, select the corresponding option
- ▶ Editing the number of automatic backups: In the input field in the **Maximum number of database backups** field, enter the desired number of backups to be saved (e.g., 3).
- ▶ Click the **Save** button
- > During shutdown, StateMonitor then creates a backup of the data in the specified path based on the parameters defined.

Deleting database backups

To periodically free up memory space, you can define how long backup data will be stored. The following functions are available:

- **Automatic deletion of database backups**
  Once the specified number has been reached, creating a new backup will delete the oldest backup
- **Automatic creation of database backups when shutting down**
  The default value is five backups, but the value can be adjusted

You can also define for how long StateMonitor will save the recorded machine data.
The **Automatic deletion of historical data** function deletes the corresponding database content when the specified period has passed.

NOTICE

Caution: Data may be lost!

If you have not backed up these data elsewhere, the recorded machine data will be lost irretrievably after expiration of the specified period.

If you enter a value of 0, then no backup data will be deleted.

To configure the deletion of data:

- ▶ Switch to the **Settings** menu
- ▶ Select the **File backup** submenu
- ▶ Deletion after a certain number of backups: In the input field in the **Automatic deletion of database backups** field, enter the desired number of backups to be saved (e.g., 10)
- ▶ Editing the number of automatic backups: In the input field in the **Automatic creation of database backups when shutting down** field, enter the desired number of backups to be saved (e.g., 3)
- ▶ Deletion of machine data after a certain period: In the **Automatic deletion of historical data** field, enter the desired number of days that will be saved (e.g., 365 (1 year)) in the input field
- ▶ Click the **Save** button
- > StateMonitor deletes all data based on the defined parameters.

Export/Import modeling data of machines

When you install StateMonitor with an empty database for the first time, you can use the machine data and user data of an already existing instance of the software. For this purpose, you can export the modeling data of an already existing instance and import these data into the new instance of StateMonitor.

To export the modeling data:

- Switch to the **Settings** menu
- Select the **File backup** submenu
- In the **Export/Import modeling data of machines** field, click the **Export machines** button
- Select the storage location
- Click the **Save** button

> StateMonitor saves the backup file in the selected location for saving.

The backup file is a ZIP file containing the following CSV files:

- **ConfigData.csv**
- **Machine.csv**
- **ModelingData.csv**
- **User.csv**

To reimport the modeling data, click the **Import machines** button, and select the ZIP file.

Manually restoring the database

If the database of StateMonitor is damaged, then you must manually reinstall the database. To do so, you must delete the damaged database and create a new database with the backup data.

Make sure that you have shut down StateMonitor.

To manually restore the database:

- Under C:\ProgramData\HEIDENHAIN\StateMonitor\dat\backups, unpack the archive with the desired date
- Copy the uploads folder from the unpacked archive to the C:\ProgramData\HEIDENHAIN\StateMonitor\dat folder, overwriting the already existing uploads folder if applicable
- Start the pgAdmin4 program via the shortcut in the Start menu
- For connecting with the PostgreSQL server at the PostgreSQL 11 entry, double-click, and enter the password of the instance of StateMonitor
- > The database of StateMonitor is shown in the directory tree of the PostgreSQL server under Databases > statemonitor.
- In the context menu of the statemonitor entry, select and confirm the Delete/Drop command
- > The damaged database is deleted.
- In the context menu of the Databases entry, select the Create > Database command
- In the Database input field, enter the statemonitor value and, in the Owner selection field, select the statemonitor entry
- > The new database is created.
- In the context menu of the statemonitor entry, select the Restore command
- In the Filename input field with the ... button, navigate to the unpacked archive
- Select the PostgreSQL.backup file, and apply it with the Select button
- Click the Restore button
- The saved data are imported into the new database
- Restart StateMonitor as needed.

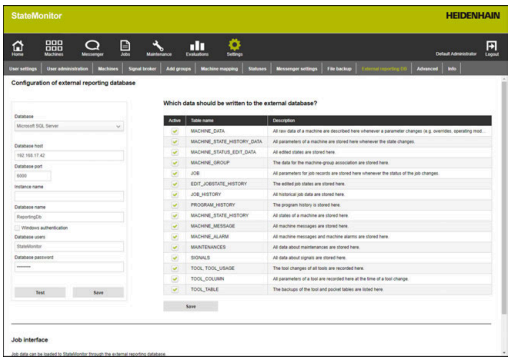
NOTICE

Caution: Data may be lost!

If you have not created a backup of the database, and you delete the current database in the C:\ProgramData\HEIDENHAIN \StateMonitor\dat folder, then all previous data up to now, including the machine data, user data, etc., will be lost.

- Back up the database regularly

10.11 External reporting DB submenu



Through the connection of an external reporting DB (database), StateMonitor can make recorded data available to other systems.

StateMonitor supports the following database systems:

- Microsoft SQL Server
- PostgreSQL
- MySQL
- Oracle Database

> StateMonitor will not export history data from the StateMonitor database to the external database.

In this manner, you can use the data recorded by StateMonitor for the following purposes:

- Correlation with data from ERP and MES systems
- Providing recorded data for the determination of OEE key figures
- Visualization of machine statuses in proprietary software

> This function is only accessible to users with the Administrator role.

Requirement: Server with supported database system

To connect to an external database:

- ▶ Switch to the **Settings** menu
- ▶ Select the **External reporting DB** submenu
- ▶ In the **Database** drop-down list box, select the database system being used
- ▶ Enter the connection parameters depending on the database system to be used
- ▶ Click the **Test** button to test the connection to the external database
- ▶ Select the desired data in the **Which data should be written to the external database?** table
- ▶ Click the **Save** button
- > StateMonitor saves the configuration for connecting to the external database.

When connecting to the database for the first time, StateMonitor will create all tables in the external database. The respective tables will then be filled with the data you have selected.

Further information: "Table overview", Page 216

Parameters for Microsoft SQL Server

If you select Microsoft SQL Server as your database system, the following parameters are available:

Parameter	Explanation
Database host	IP address or domain name of the database server
Database port	Port-Number, 0 to 65536 Input not necessarily required
Instance name	Individual entry
Database name	Individual entry
Windows authentication	Activate/deactivate
Database users	Entry is required only if **Windows authentication** is deactivated or if StateMonitor is configured as a Windows service
Database password	

Parameters for PostgreSQL

If you select PostgreSQL as the database system, then the following parameters are available:

Parameter	Explanation
Database host	IP address or domain name of the database server
Database port	Port-Number, 0 to 65536 Input not necessarily required
Database name	Individual entry
Database schema	Individual entry
Database users	Configurable user in PostgreSQL
Database password	Password for the configurable user in PostgreSQL

Job interface option

StateMonitor can import job data from an external database via an additional interface.

The following requirements must be fulfilled for this function to be performed:

- The interface cannot be activated until an external reporting database has been configured and connected.
- The software option 11, Data Interface, must be available per licensed machine.

When the interface is active, StateMonitor checks every 30 minutes by default whether the `JOB_IMPORT_V2` table contains new entries and then attempts to load these entries.

> The polling interval can be changed in the `[installation folder]\config\properties \application.properties` file in the property `AppConfig.JobImportDataPollingInterval` (possible values: 01 second, 05 seconds, 15 seconds, 30 seconds, 01 minute, 05 minutes, 15 minutes, 30 minutes, 01 hour).

The data collected in StateMonitor are provided in the tables `JOB_V2`, `EDIT_JOBSTATE_HISTORY_V2`, and `JOB_HISTORY_V2`.

Table overview

The external reporting database has the following tables:

Table	Function
DATABASECHANGELOG	Migration for external reporting database
USERS_V2	Mapping of the internal user ID to the login name Details see "Table structure for USERS_V2", Page 217
EDIT_JOBSTATE_HISTORY_V2	Free-text comments for job statuses Details see "Table structure for EDIT_JOBSTATE_HISTORY_V2", Page 218
JOB_V2	Job data Details see "Table structure for JOB_V2", Page 218
JOB_IMPORT_V2	Imported job data Details see "Table structure for JOB_IMPORT_V2", Page 219
JOB_HISTORY_V2	Job data that were changed during the respective entry Details see "Table structure for JOB_HISTORY_V2", Page 220
MACHINE_V2	Mapping of the machine name to the ID Details see "Table structure for MACHINE_V2", Page 220
MACHINE_GROUP_V2	Mapping of the machine group ID to the name shown to the user Details see "Table structure for MACHINE_GROUP_V2", Page 220
MACHINE_ALARM_V2	Confirmable messages of machine Details see "Table structure for MACHINE_ALARM_V2", Page 221
MACHINE_DATA_V2	Machine data Details see "Table structure and parameters for MACHINE_DATA_V2", Page 222
MACHINE_ID_MAPPING_V2	Mapping of machine IDs to StateMonitor (for version < 1.3) Details see "Table structure for MACHINE_ID_MAPPING_V2", Page 223
MACHINE_MESSAGE_V2	Non-confirmable messages of the machine, generated by StateMonitor and FN 38 Details see "Table structure for MACHINE_MESSAGE_V2", Page 223
MACHINE_STATE_HISTORY_DATA_V2	Machine data at the time of the status change (status light), structure like MACHINE_DATA_V2 Details see "Table structure and parameters for MACHINE_DATA_V2", Page 222
MACHINE_STATE_HISTORY_V2	Status of the machine (status light) Details see "Table structure for MACHINE_STATE_HISTORY_V2", Page 223
MAINTENANCE_EXECUTION_V2	Active maintenance events Details see "Table structure for MAINTENANCE_EXECUTION_V2", Page 223
MAINTENANCE_V2	Maintenance configuration Details see "Table structure for MAINTENANCE_V2", Page 224
MAPPING_MAINTENANCE_PROCESS_STEP_V2	Mapping of PROCESS_STEP_ID to MAINTENANCE_ID Details see "Table structure for MAPPING_MAINTENANCE_PROCESS_STEP_V2", Page 224

Table	Function
PROCESS_STEP_V2	Maintenance step configuration Details see "Table structure for PROCESS_STEP_V2", Page 224
PROGRAM_HISTORY_V2	History of the program execution Details see "Table structure for PROGRAM_HISTORY_V2", Page 225
SIGNAL_CONFIGURATION_V2	Signal configuration Details see "Table structure for SIGNAL_CONFIGURATION_V2", Page 225
SIGNAL_DATA_V2	Signal data Details see "Table structure for SIGNAL_DATA_V2", Page 225
MACHINE_STATUS_EDIT_DATA	Edited statuses Details see "Table structure for MACHINE_STATUS_EDIT_DATA", Page 226
TOOL_V2	Mapping of the internal tool ID to the tool name and the tool number of the tool table For details, see "Table structure for TOOL_V2", Page 227
TOOL_COLUMN_V2	Parameters identified for each tool ID For details, see "Table structure for TOOL_COLUMN_V2", Page 227
TOOL_TABLE_V2	Information (path, table version, type, time stamp, name, status) on the file backups of the tool table For details, see "Table structure for TOOL_TABLE_V2", Page 227
TOOL_USAGE_V2	Information on every tool usage; the time of the tool change and the internal tool ID of the insertion and removal is recorded For details, see "Table structure for TOOL_USAGE_V2", Page 228

Table structures

The tables of the external reporting database exhibit different structures that are described in the following.

Table structure for USERS_V2

Column	Value
ID	Internal ID of the user
LOGIN	Login name of the user
DELETED	Boolean value indicating whether the user was deleted

In order to use the USERS_V2 table, add the entry `AppConfig.AuxDbUsersActivated=true` in the `[installation folder]\config\properties\application.properties` file.

Table structure for EDIT_JOBSTATE_HISTORY_V2

Column	Value
ID	ID
JOB_ID	Reference to ID column in JOB_V2 table
NOTE	Explanatory text
COMMENT	Comment
ITEMID	ID number
USER_ID	Reference to ID column in USERS_V2 table
TIMESTAMP	Timestamp

Table structure for JOB_V2

Column	Value
ID	ID
NUMBER	Job number
WORKSTEP	Working step
ITEMNAME	Part name
ITEMID	ID number
DESCRIPTION	Description of the job
TARGETQUANTITY	Target quantity
OKQUANTITY	Actual quantity
SCRAP	Scrap quantity
REWORK	Rework quantity
APPOINTMENT	Deadline
TIMESTAMP	Timestamp of the starting time in the DD.MM.YY hh:mm:ss format
PRIORITY	Priority of the job Values: EXTREM_HIGH, HIGH, NORMAL, LOW, EXTREM_LOW
STATE	Status of the job Values: CREATED, ASSIGNED, EDIT, RETURNED, STARTED, MOUNT, IN_PROGRESS, STOPPED, FINISHED
MACHINE_ID	Reference to ID column in MACHINE_V2 table
DELETED	Boolean value indicating whether the job was deleted
JOBMANAGER_JOB_ID	ID of the job from a non-HEIDENHAIN system
JOBMANAGER_WORKSTEP_ID	Not used
BATCH	Batch number
BATCHQUANTITY	Target batch quantity
ENDDATE	Target end date
MOUNTTIME	Target setup time
PARTTIME	Target part time
TRANSPORTTIME	Target transport time

Table structure for JOB_IMPORT_V2

Column	Value
JOBMANAGER_JOB_ID	ID of the job from a non-HEIDENHAIN system
PROVISION_TIMESTAMP	Provision timestamp in the DD.MM.YY hh:mm:ss format
PROVISION_TYPE	Type of entry Values: import for creating a new job update for changing an existing job
STATEMONITOR_ID	ID of the StateMonitor into which the job was imported
IMPORT_TIMESTAMP	Timestamp of the execution in the DD.MM.YY hh:mm:ss format
IMPORT_STATUS	Status of the import Values: true = successful false = faulty
IMPORT_MESSAGE	Error message if IMPORT_STATUS = false; otherwise: empty
NUMBER	Job number
WORKSTEP	Working step
BATCH	Batch number
ITEMNAME	Part name
ITEMID	Part number
DESCRIPTION	Description of the job
TARGETQUANTITY	Target quantity
BATCHQUANTITY	Target batch quantity
APPOINTMENT	Deadline in the DD.MM.YY hh:mm:ss format
ENDDATE	Target end date in the DD.MM.YY hh:mm:ss format
PRIORITY	Priority of the job Values: EXTREM_HIGH, HIGH, NORMAL, LOW, EXTREM_LOW
MACHINE_ID	Reference to ID column in MACHINE_V2 table
MACHINEGROUP_ID	Reference to ID column in MACHINE_GROUP_V2 table
MOUNTTIME	Target setup time
PARTTIME	Target part time
TRANSPORTTIME	Target transport time
SEEN	Boolean value; if it is set to TRUE, then StateMonitor has processed the entry

Table structure for JOB_HISTORY_V2

Column	Value
JOB_ID	Reference to ID column in JOB_V2 table
JOB_EDIT_SUBSTATE_ID	Reference to ID column in EDIT_JOBSTATE_HISTORY_V2 table
NOTE	Explanatory text
COMMENT	Comment
USER_ID	Reference to ID column in USERS_V2 table
TIMESTAMP	Timestamp
STATE	Status of the job Values: CREATED, ASSIGNED, EDIT, RETURNED, STARTED, MOUNT, IN_PROGRESS, STOPPED, FINISHED
OKQUANTITY	Actual quantity
SCRAP	Scrap quantity
REWORK	Rework quantity

Table structure for MACHINE_V2

Column	Value
ID	ID
NAME	Name of the machine
DELETED	Values: 1 (deleted) or 0 (not deleted)

Table structure for MACHINE_GROUP_V2

Column	Value
NAME	Name of the machine group ID
DISPLAY_ID	Internal ID for use in a display context
JOB_TERMINAL_ID	Internal ID for use in a job context

Table structure for MACHINE_ALARM_V2

Column	Value
`ID`	ID
`MACHINE_ID`	Reference to `ID` column in `MACHINE_V2` table
`IS_SET`	Replaced by `TIMESTAMPCLEARED`
`NUMBER`	Error number in raw format
`NUMBER_AUX`	Error number displayed as on the control
`CHANNEL`	Channel on the control
`ERROR_GROUP`	Error group Values: `DNC_EG_NONE, DNC_EG_OPERATING, DNC_EG_PROGRAMING, DNC_EG_PLC, DNC_EG_GENERAL, DNC_EG_REMOTE, DNC_EG_PYTHON`
`ERROR_CLASS`	Error group Values: `DNC_EC_NONE, DNC_EC_WARNING, DNC_EC_FEEDHOLD, DNC_EC_PROGRAMHOLD, DNC_EC_PROGRAMABORT, DNC_EC_EMERGENCY_STOP, DNC_EC_RESET, DNC_EC_INFO, DNC_EC_ERROR, DNC_EC_NOTE`
`DESCRIPTION`	Error description
`TIMESTAMP`	Timestamp when an error occurs
`TIMESTAMPCLEARED`	Timestamp when the error is acknowledged

Table structure and parameters for MACHINE_DATA_V2

Column	Parameter	Value
`ID`		ID
`MACHINE_ID`		Reference to `ID` column in `MACHINE_V2` table
`PARAMETER_NAME`		Machine parameters with values from the column `PARAMETER_VALUE`:
	`Connected`	`1` (connected) or `0` (disconnected)
	`ExecutionMode`	Execution Values: `DNC_EXEC_MANUAL, DNC_EXEC_MDI, DNC_EXEC_RPF, DNC_EXEC_SINGLESTEP, DNC_EXEC_AUTOMATIC, DNC_EXEC_OTHER, DNC_EXEC_HANDWHEEL`
	`FMax`	`1` (rapid traverse active) or `0` (feed rate active)
	`OverrideFeed`	Feed rate override
	`OverrideRapid`	Rapid traverse override
	`OverrideSpeed`	Spindle override
	`Program`	Path name, program name
	`ProgramCompleted`	Total number of successfully completed programs
	`ProgramCompleted CurPgm`	Number of successfully completed programs of the type `Program`
	`ProgramInterrupted Error`	Total number of programs ended by errors
	`ProgramInterrupted ErrorCurPgm`	Total number of programs ended by errors, belonging to the type `Program`
	`ProgramInterrupted User`	Total number of programs ended by the operator
	`ProgramInterrupted UserCurPgm`	Total number of programs ended by the operator, belonging to the type `Program`
	`ProgramStatus`	Program status Values: `DNC_PRG_STS_IDLE, DNC_PRG_STS_RUNNING, DNC_PRG_STS_STOPPED, DNC_PRG_STS_INTERRUPTED, DNC_PRG_STS_FINISHED, DNC_PRG_STS_ERROR, DNC_PRG_STS_NOT_SELECTED`
	`ProgramEvent`	Events in the program status Values: `DNC_PRG_EVT_STARTED, DNC_PRG_EVT_STOPPED, DNC_PRG_EVT_FINISHED, DNC_PRG_EVT_CANCELED, DNC_PRG_EVT_INTERRUPTED, DNC_PRG_EVT_COMPLETED, DNC_PRG_EVT_ERROR, DNC_PRG_EVT_ERROR_CLEARED, DNC_PRG_EVT_SELECTED, DNC_PRG_EVT_SELECT_CLEARED`
	`ProgramStatusPrevious`	Value as with the parameter `Program_Status`
	`SubProgram`	List of subprograms, separated by commas
`TIMESTAMP`		Timestamp

Table structure for MACHINE_ID_MAPPING_V2

Column	Value
OLD_ID	Machine ID for StateMonitor versions < 1.3
NEW_ID	Machine ID for StateMonitor versions ≥ 1.3

Table structure for MACHINE_MESSAGE_V2

Column	Value
ID	ID
MACHINE_ID	Reference to ID column in MACHINE_V2 table
MESSAGE_TYPE	Type of message Value: PRG_COMPLETED, PRG_CANCELED_BY_USER, PRG_CANCELED_BY_ERROR, FN38
MESSAGE	Free text of the message
TIMESTAMP	Timestamp

Table structure for MACHINE_STATE_HISTORY_V2

Column	Value
ID	ID
MACHINE_ID	Reference to ID column in MACHINE_V2 table
STATE	Status of the machine Values: PRODUCTIVE, PRODUCTIVE_MIN, IDLE, INOPERABLE, STANDBY, DOWN, UNDEF
COMMENT	Comment on the separation of the status through JobTerminal (status transition in the JobTerminal)
TIMESTAMP	Timestamp

Table structure for MAINTENANCE_EXECUTION_V2

Column	Value
ID	ID
MAINTENANCE_STATUS	Maintenance status Values: PENDING, ACCEPTED, DONE
DUE_DATE	Due date of active maintenance events Values: UNDUE, DUE, OVERDUE
COMMENT	Comment
TRIGGERED_BY	Trigger for triggering the maintenance event Value: TIME, PRODUCTIVE HOURS, ONLINEHOURS, MACHINEALARM
CURRENT_ONLINE_HOURS	Current online machine hours
CURRENT_PRODUCTIVE_HOURS	Current productive machine hours
TIMESTAMP	Timestamp
MACHINE_ID	Reference to ID column in MACHINE_V2 table
MAINTENANCE_ID	Reference to ID column in MAINTENANCE_V2 table
USER_ID	User who performed the maintenance status change
MACHINE_ALARM_ID	Reference to ID column in MACHINE_ALARM_V2 table

Table structure for MAINTENANCE_V2

Column	Value
ID	ID
NAME	Name of the maintenance event
INTERVAL_TIME	Time after which (in ms) due
OVERDUE_TIME	Overdue after INTERVAL_TIME in ms
START_DATE_TIME	Starting time in ms
INTERVAL_PRODUCTIVE_HOURS	Productive machine hours (in ms) after which due
OVERDUE_PRODUCTIVE_HOURS	Overdue after INTERVAL_PRODUCTIVE_HOURS in ms
START_PRODUCTIVE_HOURS	Starting time (in ms) of the productive machine hours
INTERVAL_ONLINE_HOURS	Online machine hours (in ms) after which due
OVERDUE_ONLINE_HOURS	Overdue after INTERVAL_ONLINE_HOURS in ms
START_ONLINE_HOURS	Starting time (in ms) of the online machine hours
MACHINE_ID	Reference to ID column in MACHINE_V2 table
TIMESTAMP	Timestamp

Table structure for MAPPING_MAINTENANCE_PROCESS_STEP_V2

Column	Value
MAINTENANCE_ID	Reference to ID column in MAINTENANCE_V2 table
PROCESS_STEP_ID	Reference to ID column in PROCESS_STEP_V2 table
SET	Timestamp for assignment of PROCESS_STEP_ID to MAINTENANCE_ID
DELETED	Deleted maintenance steps

Table structure for PROCESS_STEP_V2

Column	Value
ID	ID
NAME	Name of the maintenance step
DURATION	Duration in ms
COMMENT	Comment
EXECUTED_BY_OPERATOR	Execution by machine operator (0 or 1)
EXECUTED_BY_EXTERNAL	Execution by external service provider (0 or 1)
EXECUTED_BY_MAINTENANCE	Execution by maintenance technician (0 or 1)
TIMESTAMP	Timestamp

Table structure for PROGRAM_HISTORY_V2

Column	Value
ID	ID
MACHINE_ID	Reference to ID column in MACHINE_V2 table
PARENT_ID	ID of the parent program
PROGRAM	Program name
PROGRAM_START	Program start
PROGRAM_END	End of program
PROGRAM_STATE	State in which the program was ended Values: RUNNING, COMPLETED, ERROR, INTERRUPTED, STOPPED, INVALID

Table structure for SIGNAL_CONFIGURATION_V2

Column	Value
ID	ID
MACHINE_ID	Reference to ID column in MACHINE_V2 table
NAME	Signal name
ACTIVE	Status (0 or 1)
POLLINGINTERVAL	Interval for polling Values: SECOND_1, SECOND_5, SECOND_15, SECOND_30, MINUTE_1, MINUTE_5, MINUTE_15, MINUTE_30, HOUR_1
PRETEXT	Text before the value
POSTTEXT	Text after the value
FACTOR	Conversion factor for signal value
DECIMALS	Decimal places used
SIGNAL_GROUP	Signal group
THRESHOLD	Threshold value
DATATYPE	Data type

Table structure for SIGNAL_DATA_V2

Column	Value
ID	ID
SIGNAL_CONFIGURATION_ID	Reference to ID column in SIGNAL_CONFIGURATION_V2 table
MACHINE_ID	Reference to ID column in MACHINE_V2 table
NAME	Signal name
TIMESTAMP	Timestamp
STRINGVALUE	Recorded value
BOOLEANVALUE	Recorded value
NUMBERVALUE	Recorded value

Table structure for MACHINE_STATUS_EDIT_DATA

Column	Value
ID	ID
COMMENT	Comment
MACHINE_ID	Reference to ID column in MACHINE_V2 table
HISTORY_ENTRY_ID	Reference to ID column in MACHINE_STATE_HISTORY_V2 table
MAINSTATE	New status
SUBMAINSTATE	Name of a substatus that may have been assigned
TIMESTAMP	Timestamp
EDITUSER	User who performed the change
SUBSTATENUMBER	Index of a substatus that may have been assigned

The following tables TOOL_V2, TOOL_COLUMN_V2, TOOL_TABLE_V2 and TOOL_USAGE_V2 can be interconnected via the tool ID for individual evaluations with SQL queries.

Table structure for TOOL_V2

Column	Value
ID	ID of the tool
NAME	Tool name from the tool table
TOOL_NUMBER	Tool number from the tool table

Table structure for TOOL_COLUMN_V2

Column	Value
ID	ID
TOOL_ID	Reference to ID column in the TOOL_V2 table
NAME	Name of the parameter from the tool table
VALUE	Value of the parameter at the moment of saving

Table structure for TOOL_TABLE_V2

Column	Value
ID	ID
MACHINE_ID	Reference to ID column in MACHINE_V2 table
NAME	User-defined name of the backup
FILE	File path on the StateMonitor server
TYPE	Type of tool table Values: MILLING, POSITION, TURNING
TIMESTAMP	Time stamp of the performance of the backup

The specified paths are valid exclusively on the StateMonitor server and only after a manual backup; for details, see "Backing up the tool table", Page 103.

Table structure for TOOL_USAGE_V2

Column	Value
`ID`	ID
`MACHINE_ID`	Reference to `ID` column in `MACHINE_V2` table
`TOOL_IN`	Reference to `ID` column in the `TOOL_V2` table for gating with the tool parameters from the `TOOL_COLUMN_V2` table at the time of insertion
`TOOL_OUT`	Reference to `ID` column in the `TOOL_V2` table for gating with the tool parameters from the `TOOL_COLUMN_V2` table at the time of removal
`STARTTIME`	Time stamp at the time of tool insertion into the spindle
`ENDTIME`	Time stamp at the time of tool removal from the spindle

In order to optimize the memory needed, you can store only the updated columns.
For this purpose, add the entry
`AppConfig.Toolusage.OnlyStoreUpdatedColumns =true`
in the `[installation folder]\config\properties\application.properties` file.

10.12 Advanced submenu

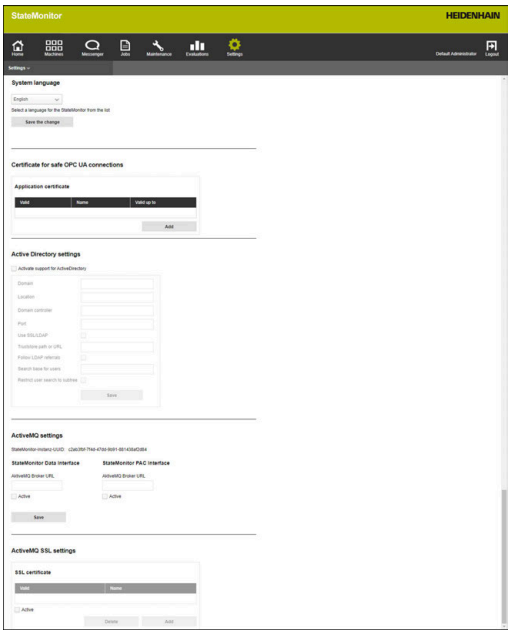
In the **Advanced** submenu, you can define advanced settings for StateMonitor.

> This function is only accessible to users with the Administrator role.

Changing the system language

To change the system language in StateMonitor:

- Switch to the **Settings** menu
- Select the **Advanced** submenu
- In the **System language** section, select the desired language in the list
- Click the **Save the change** button



> Notes:
>
> - The software does not need to be restarted when the system language is changed in StateMonitor
> - In the **User settings** submenu, every user can set the language individually without affecting the global system language setting
> - The language setting in the **User settings** submenu overrides the global system language setting
> - For newly created users, the user language setting is the same as the system language setting until he or she selects a different language

Managing certificates (only for OPC UA)

If you use an authentication for OPC UA, then you must also specify an appropriate application certificate in the **Certificate for safe OPC UA connections** section.

An application certificate can be used as follows:

- In order to use an existing application certificate, you first need to separately generate a certificate and a private key and then import them into StateMonitor. StateMonitor will then generate the corresponding public key.
- In order to use a new application certificate, enter a name and a password in StateMonitor. StateMonitor will then generate a corresponding public key along with a certificate and a private key.

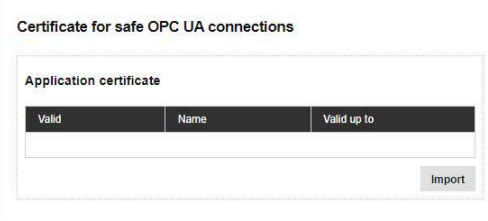
To use an application certificate:

- Switch to the **Settings** menu
- Select the **Advanced** submenu
- In the **Certificate for safe OPC UA connections** section, click the **Import** button
- > The **Import application certificate** window opens.
- Enter an internal name in the **Certificate name (internal)** field
- To use an existing application certificate, select the corresponding certificate file (*.der) and the private-key file (*perm/*.key) in Windows Explorer and drag them to the marked field
- Click the **Import certificate** button
- To use a new application certificate, enter a new password in the **Password for private key** field
- Click the **Generate certificate** button
- > StateMonitor displays the application certificate in the list.

Once the application certificate is available, you can use the **Download Public Key** button to export the public key from StateMonitor and use the public key for the OPC UA server to be connected.

Active Directory settings

StateMonitor also supports user logon via Active Directory, thus allowing mixed mode.



> It is advisable to create a minimum of one user with the Administrator role locally in StateMonitor. This ensures that StateMonitor continues to be accessible even if problems occur with the Active Directory server.

To use Active Directory in StateMonitor:

- Switch to the **Settings** menu
- Select the **Advanced** submenu
- In the **Active Directory settings** section, select the **Activate support for ActiveDirectory** checkbox
- In the input fields, enter the settings for the Active Directory being used
- Click the **Save** button

> The settings for the Active Directory should be made by an IT specialist.

ActiveMQ settings (software option)

StateMonitor supports the functionality of ActiveMQ for connection to other networks. For identification in the ActiveMQ Broker, the unique identifier (UUID) of the StateMonitor instance is additionally shown.

> The support for ActiveMQ is an additional function that requires option 11 Data Interface to be enabled. Option 11 must be licensed for each enabled machine.
>
> **Further information:** "Software options and licenses", Page 236

To activate ActiveMQ in StateMonitor:

- Switch to the **Settings** menu
- Select the **Advanced** submenu
- In the **ActiveMQ settings** section, enter the URL of the corresponding AMQ Broker into the **AktiveMQ Broker URL** field
- Select the **Active** checkbox
- Click the **Save** button

ActiveMQ SSL settings (software option)

Connections via ActiveMQ can be encrypted using SSL. This requires that the corresponding certificates be stored in StateMonitor.

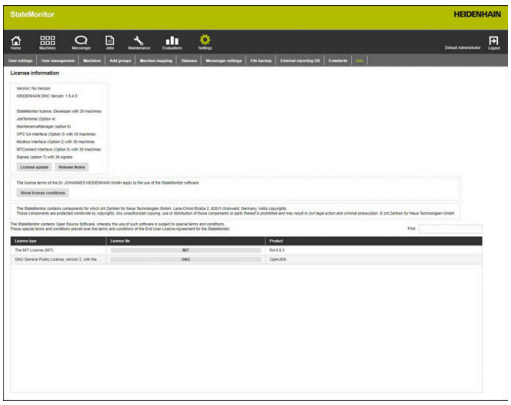
The details on how to generate the certificates needed can be found at
https://activemq.apache.org/how-do-i-use-ssl

- The support for ActiveMQ is an additional function that requires option 11, Data Interface, to be activated. Option 11 must be licensed for each activated machine.
- By default, StateMonitor verifies that the host name of the certificates matches the broker URL. If they do not match, a connection will not be set up. The suffix `?verifyHostName=false` must therefore be added to the broker URL.
  Example: `ssl://localhost:61617?verifyHostName=false`

To activate the SSL settings for ActiveMQ in StateMonitor:

- Switch to the **Settings** menu
- Select the **Advanced** submenu
- In the **ActiveMQ SSL settings** section, select the **Active** checkbox
- Click the **Add** button
- In the pop-up window, import a keystore file and a truststore file with the respective certificates and enter the appropriate passwords

10.13 Info submenu



The **Info** submenu contains the **License information** and legal notes related to the software.

StateMonitor displays the following information:

- StateMonitor version
- HEIDENHAIN DNC version
- StateMonitor serial number
- StateMonitor license
- Enabled software options
- Date of last maintenance (with activated software option 6)
- Release Notes
- License conditions
- Table with Open Source license notes
  Further information: "Functions in tables and charts", Page 50

To access the **Info** submenu:

- Switch to the **Settings** menu
- Select the **Info** submenu

11

Software Options and Licenses

11.1 Software options and licenses

The StateMonitor functionality can be extended using additional software options.

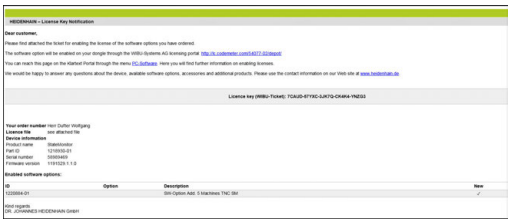
You can purchase licenses for software options from your HEIDENHAIN sales representative. You will receive a license key that activates the software option.

The following software options are available:

Option	Extended functionality	ID
1	Five additional machines	1220884-01
2	Modbus Interface	1268670-01
3	OPC UA Interface	1268673-01
4	JobTerminal	1268674-01
5	MTConnect Interface	1268675-01
6	MaintenanceManager	1308520-01
7	5 Signals	1308521-01
8	FOCAS Interface	1385356-01
11	Data Interface	1367514-01

11.2 Requesting a license

You can obtain licenses for software options from HEIDENHAIN after providing your StateMonitor serial number. The StateMonitor serial number is located in the **Info** submenu and on the StateMonitor dongle.



To access the **Info** submenu:

- Switch to the **Settings** menu
- Select the **Info** submenu

> An overview appears

> The program version and serial number are displayed

- Contact a HEIDENHAIN service agency and submit the displayed serial number in order to request a license for the product

11.3 Enabling the license

In order to use the license, it must be enabled on your dongle.

The procedure depends on your configuration:

- Online: The server or PC where the StateMonitor application is installed has Internet access:
  You can directly enable your dongle-protected license.
  Further information: "Enabling the license (online)", Page 238
- Offline: The server or PC where the StateMonitor application is installed has no Internet access:
  You first need to generate a request file and copy it to a PC with Internet access. Using this request file, you can then generate an update file to enable your license. The update file generated for this license must then be transferred to the server or PC where the StateMonitor application is installed so that you can enable your license there.
  Further information: "Enabling the license (Offline)", Page 239

Enabling the license (online)

To enable the license on your dongle (online procedure):

- ▶ Open the following URL on the server or PC where StateMonitor is installed:
  lc.codemeter.com/54077-02/depot
  or
- ▶ Click the **License update** button
- > The StateMonitor license portal is displayed.
- ▶ Copy the license key (WIBU ticket) from the e-mail to the WIBU Ticket field
- ▶ Click the Next button
- > The License overview page opens.
- ▶ Click the Enable license button
- > The Available licenses page opens.
- ▶ Click the **Activate Selected Licenses Now** button and follow the instructions on the page
- > The license requested via the WIBU ticket is enabled on your dongle.

Enabling the license (Offline)

To generate a license request file:

- ▶ Open CodeMeter Control Center on the server or PC where StateMonitor is installed
- ▶ Click the **License update** button
- > The CmFAS wizard opens.
- ▶ Click the Generate license request option and then **Next**
- ▶ Click the Extend existing license option and then **Next**
- ▶ Click the DR. JOHANNES HEIDENHAIN GmbH option and then **Next**
- ▶ Enter the desired file name and its path and then click **Apply**
- > The license request file is created at the specified location.
- ▶ Transfer the license request file to a PC with Internet access (e.g. using a USB stick)

To generate a license update file:

- ▶ Open the following URL: **lc.codemeter.com/54077-02/depot**
- > The StateMonitor license portal is displayed.
- ▶ Copy the license key (WIBU ticket) from the e-mail to the WIBU Ticket field
- ▶ Click the **Next** button
- > The License overview page opens.
- ▶ Click the **Enable license** button
- ▶ Click the **Offline license transfer** button and follow the instructions on the page
- > Your license update file is created.
- ▶ Transfer the license update file to the server or PC where StateMonitor is installed (e.g. using a USB stick)

To activate the license update file:

- ▶ Open CodeMeter Control Center on the server or PC where StateMonitor is installed
- ▶ Click the **License update** button
- > The CmFAS wizard opens.
- ▶ Click the Import license update option and then **Next**
- ▶ Specify the file name including its path and then click **Apply**
- > The license update file is imported.
- > The license requested via the WIBU ticket is enabled on your dongle.

12

Network Integration

12.1 Network integration

StateMonitor can only be used if the machine controls have been integrated into the network.

Standard HEIDENHAIN controls are equipped with an Ethernet card. This enables you to connect the controls to your network as clients.

The configuration for integration into the network should be performed by a specialists.

For more information about integrating a machine into a network, please refer to the documentation for your control.

Network integration via DHCP

In large networks, clients are usually connected to the network via DHCP.

DHCP stands for **D**ynamic **H**ost **C**onfiguration **P**rotocol.

DHCP is a communication protocol or Internet protocol used by servers to assign the network configuration to clients. The clients automatically obtain IP addresses and other parameters from a DHCP server.

A client is a terminal device that requests services from a server via a network.

A network with more clients than available IP addresses can, by using the DHCP connection, manage with fewer IP addresses, since not all clients are logged-on at the same time. This prevents IP addresses from being blocked by clients that are not logged on. The available IP addresses are assigned dynamically to the clients logged on to the network.

With the iTNC 530 controls, the connection via DHCP is an FCL-2 function.

Network integration using fixed IP addresses

If the IP addresses are not obtained dynamically from a DHCP server, fixed IP addresses within a subnet must be entered into the interface configuration of the controls.

For the iTNC 530 with software versions **prior to** 34049x-05:

If you change the IP address of the TNC, the control will restart automatically.

12.2 SIK menu

The SIK (**S**ystem **I**dentification **K**ey) contains the NC software license for enabling control loops and software options.

The SIK number provides the control with a unique identification.

NOTICE

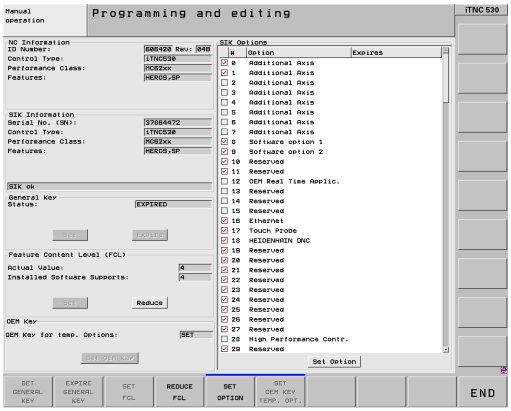
Risk of improper operation in the SIK menu

Machine malfunctions can occur to the point of machine standstill

- Before calling the SIK menu, ensure that the machine is not currently in use
- You may need to restart the machine's control after enabling an option

Procedure on iTNC 530

- Select the **Programming and Editing** operating mode



MOD

- Press the **MOD** key
- Enter the code number **SIK**

ENT

- Press the **ENT** key
- The TNC displays the SIK menu on the screen.

If the checkbox of option 18 is selected, the HEIDENHAIN DNC interface is enabled on your control.

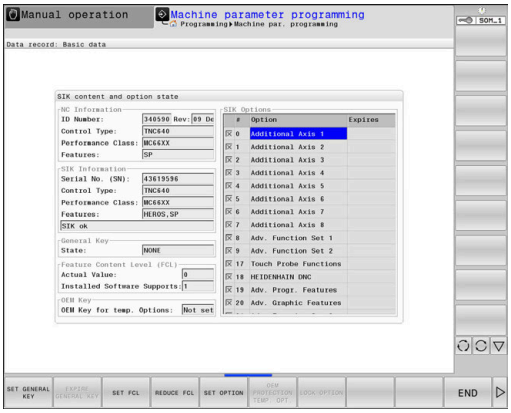
If the checkbox of option 18 is not selected, you have to activate option 18.

Further information: "Activating option 18", Page 245

In order to enable an option, you will need the SIK number of your control. The SIK number is located in the SIK menu under SIK information in the **SIK Information, Serial No.** field **(SN)**.

Procedure on TNC 640/TNC 620/TNC 320/TNC 128

- Select the **Programming** operating mode



MOD

- Press the **MOD** key
- Enter the code number **SIK**

ENT

- Press the **ENT** key
- The TNC displays the SIK menu on the screen.

If the checkbox of option 18 is selected, the HEIDENHAIN DNC interface is enabled on your control.

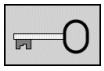
If the checkbox of option 18 is not selected, you have to activate option 18.

Further information: "Activating option 18", Page 245

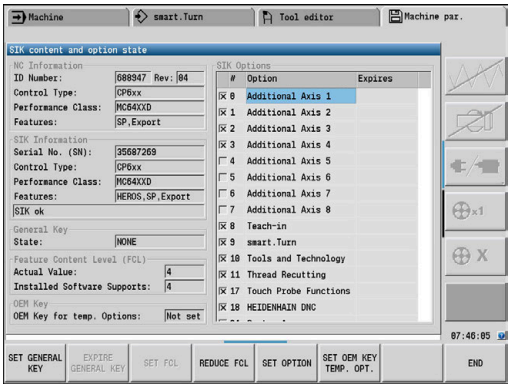
To enable an option, you need the SIK number of your control. You can find the SIK number in the **Serial No. (SN)** field under "SIK Information" in the SIK menu.

Procedure on CNC PILOT 640 /MANUAL Plus 620

- Select the **Organi- zation** operating mode



- Press the Key soft key
- Enter the code number **SIK**
- Confirm with **OK**
- > The control switches to the Machine par. programming submode and displays the SIK menu.



If the checkbox of option 18 is selected, the HEIDENHAIN DNC interface is enabled on your control.

If the checkbox of option 18 is not selected, you have to activate option 18.

Further information: "Activating option 18", Page 245

To enable an option, you need the SIK number of your control. You can find the SIK number in the **Serial No. (SN)** field under "SIK Information" in the SIK menu.

Procedure on TNC7

- Call the **Settings** application

- Select the **Machine settings** group

- Select the **SIK** menu item
- Confirm with **OK**
- > The control displays the SIK menu.
- > In the **Software Options** area, the control shows all available software options.

If the checkbox of option 18 is selected, the HEIDENHAIN DNC interface is enabled on your control.

If the checkbox of option 18 is not selected, you have to activate option 18.

Further information: "Activating option 18", Page 245

In order to enable an option, you will need the SIK number of your control. The SIK number is located in the SIK menu under **SIK Information** in the **Serial Number** field.

12.3 Activating option 18

Option 18 is available on HEIDENHAIN controls as of the following software versions:

Control	As of software version
iTNC 530	34049x-01
iTNC 530 HSCI	60642x-01
TNC 640 HSCI	34059x-01
TNC 620 HSCI	34056x-01 / 73498x-01
TNC 320	34055x-01 / 771851-01
TNC 128	771841-01
TNC7	81762x-16
CNC PILOT 640	68894x-01

Option 18 enables the HEIDENHAIN DNC interface.

DNC stands for **D**istributed **N**umerical **C**ontrol. It is used for integrating computer-controlled machine tools (CNC machines) into a computer network.

Activation for a 90-day trial period

To activate option 18 for a 90-day trial period:

- Write down the SIK number of the control
  Further information: "SIK menu", Page 243
- Contacting HEIDENHAIN Service:
  - By e-mail at this address: **service.nc-pgm@heidenhain.de**
  - Or by phone under the number: +49 8669 31-3103

> Indicate your SIK number. You will then receive the required code number for activating the desired option for a 90-day trial period.

- Individual options can be activated free of charge one time for a trial period of 90 days. After this trial period, activation is subject to a charge.
- A free-of-charge activation of option 18 on a trial basis is possible for the iTNC 530 beginning with software version 34049x-04.

Paid activation (unlimited)

To purchase option 18 and activate it for unlimited use:

- Contacting HEIDENHAIN:
  - Per e-mail to: **info@heidenhain.de**
  - Or via the contact form on the homepage: **www.heidenhain.de**
  - Or via the HEIDENHAIN Klartext Portal: **www.klartext-portal.de**
- Provide the following mandatory information:
  - The SIK number of your control
  - Your contact details
  - Your phone number in case we need to contact you

> The department responsible will promptly get in touch with you.

> You will receive a five-digit activation code

Procedure on iTNC 530/TNC 640/TNC 620/TNC 320/ TNC 128/CNC PILOT 640

If you have received the activation code, then proceed as follows:

- Open the SIK menu
  Further information: "SIK menu", Page 243
- Place the cursor on option 18

SET OPTION

- Press the **SET OPTION** soft key

> A pop-up window for entering the activation code appears.

- Enter the activation code
- Confirm with OK

> Option 18 is then activated on the control and in the SIK menu.

- Restart the control if required

Procedure on TNC7

If you have received the activation code, then proceed as follows:

- Open the SIK menu
  Further information: "SIK menu", Page 243
- Navigate to the **Software Options** area
- Place the cursor on option 18
- Select the **Set** button

> A pop-up window for entering the activation code appears.

- Enter the activation code
- Confirm with OK.

> Option 18 is then activated on the control and is shown in the SIK menu as **Enabled**.

- Restart the control if required

13

Machine Parameters

13.1 Control-specific machine parameters

StateMonitor supports both the connection of HEIDENHAIN controls and of non-HEIDENHAIN controls.

When creating a new machine in StateMonitor, make sure to set the machine parameters required for the connection. The available parameters vary depending on the machine model and the control.

Further information: "Machine parameters", Page 191

13.2 Parameters for HEIDENHAIN controls

Machine controls

You can use StateMonitor with the following HEIDENHAIN controls:

Control	As of software version
iTNC 530	34049x-03
TNC 620	34056x-01
TNC 128	771841-01
TNC 320	340551-03
TNC 640	34059x-01
TNC7	81762x-16
CNC PILOT 620	688945-01
CNC PILOT 640	68894x-01
MANUAL Plus 620	548328-05
Mill Plus IT	53895x-03, 73738x-01
Grind Plus IT	510060-04
Grind Plus 640	73502x-01

In order to use StateMonitor, the following prerequisites must be met:

- The machine controls must be integrated in the local company network
  Further information: "Network integration", Page 242
- Option 18 (HEIDENHAIN DNC interface) must be enabled on the HEIDENHAIN control
  Further information: "Activating option 18", Page 245

Connection settings pull-down menu

In the definition table, you can define settings for the **PLC password** for HEIDENHAIN controls.
The PLC password is required for access to PLC information: If you permit access to the PLC, StateMonitor reads the status of the rapid traverse override and differentiates between NC blocks with feed rate and NC blocks with rapid traverse.

> If you allow PLC access, the **Program analysis** chart will include the **FMAX** status bar.
> **Further information:** "Program analysis chart", Page 96

> With the goal of recording additional machine data,StateMonitor has only read access to the PLC.

Option	Meaning
PLC Standard	The PLC is protected by the standard **PLC password**. Access occurs automatically.
No PLC	No access to the PLC. > If the machine manufacturer uses a PLC password of the day, then select **No PLC**. StateMonitor cannot then record any additional PLC information.
OEM PLC	The machine manufacturer has assigned his own PLC password (not with the iTNC 530). If applicable, request it from the machine manufacturer and enter it into the input field.

PLC Standard or OEM PLC option

If you select the **PLC Standard** or the **OEM PLC** option, then, for the display of the machine statuses for the current block, StateMonitor differentiates between the following options:

- NC block with feed rate
- NC block with rapid traverse

NC block with feed rate is active

If an NC block with feed rate is active, then the display of the machine status is independent of the rapid-traverse override setting.

StateMonitor displays a yellow machine status when the feed rate override is = 0 %. The machine status becomes light green if the feed-rate override > 0 % and < 100 %. The machine status is dark green when the feed rate override is at ≥ 100 %.

Rapid-traverse override FMAX	Feed-rate override F = 0%	Feed-rate override 0% < F < 100%	Feed-rate override F ≥ 100%
FMAX = 0%	Machine status: Yellow	Machine status: Light green	Machine status: Dark green
0% < FMAX < 100%	Machine status: Yellow	Machine status: Light green	Machine status: Dark green
FMAX ≥ 100%	Machine status: Yellow	Machine status: Light green	Machine status: Dark green

NC block with rapid traverse is active

If an NC block with rapid traverse is active, then the display of the machine status is independent of the override setting of the feed rate.

StateMonitor displays a yellow machine status when the rapid traverse override is = 0 %. The machine status becomes light green if the rapid-traverse override > 0 % and < 100 %. If the rapid-traverse override = ≥ 100 %, then the machine status becomes dark green.

Rapid-traverse override FMAX	**Feed-rate override F = 0%**	**Feed-rate override 0% < F < 100%**	**Feed-rate override F ≥ 100%**
FMAX = 0%	Machine status: Yellow	Machine status: Yellow	Machine status: Yellow
0% < FMAX < 100%	Machine status: Light green	Machine status: Light green	Machine status: Light green
FMAX ≥ 100%	Machine status: Dark green	Machine status: Dark green	Machine status: Dark green

To help you adapt StateMonitor to customer-specific scenarios, you can customize the configuration of the default OVR for the Productive machine status (transition between the display of light green and dark green).

Further information: "Customizing the configuration of the default OVR", Page 202

No PLC option

If you select the **No PLC** option, then StateMonitor displays the machine statuses as follows:

- The machine status is yellow if the feed-rate override in **Program Run, Full Sequence** operating mode = 0%
- The machine status is light green if the feed-rate override > 0%
- The machine status is dark green if the overrides for feed rate and rapid traverse are ≥ 100%.

Example:
An NC block with **FMAX** is active, the override for rapid traverse = 0%, and the override for feed rate > 0%. The machine is then at standstill, but StateMonitor nevertheless displays a green machine status because the rapid traverse override setting is not recorded.

The table below shows which combinations of feed-rate override and rapid-traverse override lead to which machine status:

Rapid-traverse override FMAX	Feed-rate override F = 0%	Feed-rate override 0% < F < 100%	Feed-rate override F ≥ 100%
FMAX = 0%	Machine status: Yellow	Machine status: Light green	Machine status: Light green
0% < FMAX < 100%	Machine status: Yellow	Machine status: Light green	Machine status: Light green
FMAX ≥ 100%	Machine status: Yellow	Machine status: Light green	Machine status: Dark green

Settings for Override acquisition (only with iTNC 530)

If you select the control iTNC 530 under **Type**, the following **Override acquisition** options are available under **Machine-specific settings**:

Option	Meaning
Standard HEIDENHAIN DNC	Select as default when creating a machine for the first time
Import of PLC words	Select only when the **Override settings** of the machine are incorrectly displayed in StateMonitor

Security settings pull-down menu

The configuration in the **Security settings** pull-down menu is optional and can be performed only if the user administration function is supported by the following HEIDENHAIN controls:

- TNC 128
- TNC 320
- TNC 620
- TNC 640
- TNC7
- CNC PILOT 620
- CNC PILOT 640
- MANUAL Plus 620
- Grind Plus 640

If you use an authentication for HEIDENHAIN controls, you first need to generate a key pair in StateMonitor.

The IP address and the remote user (e.g., `oem`) that has been created in the machine control are required for the generation of the key pair. After the new key pair has been generated, it is stored in StateMonitor.

To generate a key pair:

- ▶ In the **Security settings** pull-down menu, click the **Generate key** button
- > StateMonitor opens the **Generate SSH key** window.
- ▶ Enter an internal name in the **Key name (internal)** field
- ▶ In the **Remote username** field, enter the name of the appropriately authorized remote user.
- ▶ Enter the password for the key pair in the **Password** field
- ▶ Click the **Generate key** button
- > StateMonitor generates the new key pair.

The `oem` user has access permission. However, this permission grants more rights than required for the access of StateMonitor to the control. It is therefore advisable to create a specific user with only the absolutely required permissions.
The `NC.DataAccessOEMRead` right must be assigned to this user. The `PLC.DataAccessOEM` role or the `PLC.DataAccessOEMRead` role includes this right.

In order to create a user with the appropriate permissions in the machine control, you need to consult your OEM because your OEM must enable these roles.

After generation, you need to export the public key (*.pub) of your new key pair from StateMonitor and import it into the respective machine control.

To export the public key:

> In the **Key** drop-down list, select the key pair of the respective machine.
- Click the **Download Public Key** button
- Select the storage location
- Click the **Save** button

> StateMonitor saves the public key to the selected location.
- Import the public key into the respective machine control

	Please refer to the documentation supplied by the control or machine manufacturer.

Since more than one key may have been stored in StateMonitor, an encrypted connection requires that you select the key pair that has been created for the respective machine.

To select a key pair:

- To activate the encryption, select the **Activate SSH encryption** checkbox in the **Security settings** pull-down menu

> In the **Key** drop-down list, select the key pair of the respective machine.

> StateMonitor will encrypt the communication using the specified key pair.

Signal alarms pull-down menu

You can configure signal alarms for the signals that you evaluate in StateMonitor. To do so, you can define conditions for the comparison of the signal value with a comparison value. If a condition is met, then StateMonitor displays a signal alarm in the **Messenger** menu.

You can use the following parameters for the configuration of the signal alarms:

Parameter	Mandatory field	Explanation
#	✓	Alarm number
Name	✓	Unique name
Error group		Possible values: ■ **None** ■ **operation** ■ **Programming** ■ **PLC** ■ **General information** ■ **Remote** ■ **Python**
Error class		Possible values: ■ **None** ■ **Warning** ■ **Feed rate stopped** ■ **Program stop** ■ **Program cancellation** ■ **Emergency stop** ■ **Reset** ■ **Info** ■ **Failure description** ■ **Note**
Link to signal	✓	Selection of the signal
Description		Additional information
Data type		Data type of the signal Possible values: ■ **Number (number)** ■ **Text (string)** ■ **Boolean value (0 or 1)**

Parameter	Mandatory field	Explanation
Operator		Selection of the operator for the comparison of a signal value and a comparison value (based on the selection in the **Data type** field) Possible values: ■ **EQUALS**: Signal value is equivalent to comparison value ■ **CONTAINS**: Signal value contains comparison value ■ **STARTSWITH**: Signal value begins with comparison value ■ **LESSTHAN**: Signal value is less than comparison value ■ **LESSTHANEQUAL**: Signal value is less than or equal to comparison value ■ **MORETHAN**: Signal value is greater than comparison value ■ **MORETHANEQUAL**: Signal value is greater than or equal to comparison value
Value		Comparison value
Create test notification		If this option is activated, then State-Monitor generates a test machine message when the machine alarm is saved

Using the **Check parameter** button, you can call the current value of the selected signal and start the comparison.

The **Export** button allows you to save the configured signal alarms to an XML file.

The **Import** button allows you to create new signal alarms in StateMonitor by importing the parameters from an XML file. The previously configured signal alarms remain unaffected by this.

13.3 Mapping status parameters to other controls

When connecting a different control, you need to manually assign the control signals to each machine status. To do this, StateMonitor uses a definition table that assigns the respective machine status to the specifice control signals.

The signal parameters evaluated by StateMonitor are identical for all non-HEIDENHAIN controls. From the transferred signal parameters, StateMonitor creates a status model for the respective machine.

Despite the open standards of Modbus, OPC UA, and MTConnect, there numerous differences between the supported controls.
For the necessary information regarding addresses, comparison values, and data types, please refer to the documentation of the control or machine manufacturer.

When creating a new machine, make sure to set up this definition table with the corresponding parameters in the **Status parameters for mapping** pull-down menu.

Basic signal parameters for the status model

Signal parameters	Meaning
Program running (PGM STARTED / PGM RUNNING)	Program has been started or is running
Program interrupted by error (ERROR)	An error occurred or is pending. If no **Program interrupted by user (PGM CANCELED)** is defined, **Program interrupted by error (ERROR)** will terminate the current program. This triggers the **Interrupted by error message** counter and generates a notification
Program successfully completed (PGM COMPLETED / END PGM)	Program execution has been completed successfully. This triggers the **Fully executed** program counter and generates a notification

These three signal parameters must always be defined in order to support basic functionality such as the status lights and a basic machine status bar.

Additional signal parameters for the status model

Signal parameters	Meaning
Machine online	Machine is online
Program stopped (PGM STOPPED)	Program execution has been interrupted, but the program remains active and can be resumed
Program interrupted by user (PGM CANCELED)	Program execution has been aborted, the program cannot be resumed. This triggers the program counter and generates the **Program canceled by user** notification
Error acknowledged (ERROR CLEARED)	An error triggered with **Program interrupted by error (ERROR)** has been acknowledged again. The program status changes to **Interrupted**. The program can be resumed with **Program running (PGM STARTED / PGM RUNNING)** or aborted with **Program interrupted by user (PGM CANCELED)**
Rapid traverse override setting in % (0 to 100)	Value in %
Feed rate override setting in % (0 to 150)	Value in %
Spindle override setting in % (0 to 150)	Value in %
Rapid traverse (FMAX) active	This value specifies whether, for status determination in a running program, the rapid-traverse override (FMAX = false) or the feed rate (FMAX = true) is evaluated
Operating mode: Automatic	This value is evaluated in the detail view only
Operating mode: Manual	This value is evaluated in the detail view only
Operating mode: Handwheel	This value is evaluated in the detail view only
Program name or number	This value can be evaluated in the program run times view. When changing to another program and restarting, the program counters for the current program will be reset to 0. If this parameter is not active, the default value will be "Program".

Validation

Once you have saved the definition table in the **Status parameters for mapping** tab by clicking the **Set up machine** button, the entries will be validated. This ensures that no typos etc. invalidate the assignment.

An error message will be displayed in the following cases:

- An address entry is missing (Boolean parameters and value parameters)
- Boolean parameters
  - Two Boolean values have the same address
  - Two signal parameters have the same data type, the same address, and the same value
- Value parameters
  - A signal parameter with a **Text (string)** data type or **Number (number)** data type does not have any value
  - Two signal parameters have the same address

13.4 Modbus parameters

Connection settings pull-down menu

In the definition table, you can define the following connection settings for Modbus:

- **Port**

  Number of the network port over which the Modbus control can be reached.

  > Please refer to the documentation supplied by the control or machine manufacturer.

- **SIK:**

  Manual input

- **NC software:**

  Manual input

- **Polling interval**

  Internal for polling

Status parameters for mapping pull-down menu

For general information about the status parameters, see "Mapping status parameters to other controls", Page 258.

In the expanded definition table (**Editing** button), you can map the control signals to status parameters.

The following information is required for the mapping of the status parameters:

- **Address type**

  Indicates the control's address space in which the memory address is located.

  > For the **COIL_OUTPUT** address type and **DIGITAL_INPUT** address type, Boolean values (0, 1) are usually entered under **Value**.

- **Data type**

  Indicates the value's format and thus also how many bits are to be read and processed.

- **Address**

  Indicates which location in the selected memory area of the value is to be read.

  > When counting the address, StateMonitor starts counting from 1 instead of from 0. If, for example, the address "4000" contains the data, then the address "4001" must be specified in StateMonitor.

- **Value**

  Comparison values are necessary for the signals that flow directly into the status model of the control. Exceptions to this are numerical values such as override settings or texts, such as the program name, that do not need to be compared.

Editing the prioritization

In the **Status parameters for mapping** window of the expanded definition table (**Editing** button), you can edit the prioritization of the received program statuses and operating modes.

Prioritization will be considered only if more than one status parameter is pending. The defined prioritization determines which of the status parameters will have priority and will be taken into account in this case.

To edit prioritization:

- ▶ Click the **Change priorities** button
- > StateMonitor opens the **Prioritization for status parameter mapping** window.
- ▶ In the drop-down list, select the status parameters for **Mode of operation** or **Program status**
- ▶ Enter the priority of the desired parameter in the respective field in the **Priority** column (values: 0 to 9)
- ▶ Close the window
- > The edited priorities are applied.

Signal alarms pull-down menu

You can configure signal alarms for the signals that you evaluate in StateMonitor. To do so, you can define conditions for the comparison of the signal value with a comparison value. If a condition is met, then StateMonitor displays a signal alarm in the **Messenger** menu.

You can use the following parameters for the configuration of the signal alarms:

Parameter	Mandatory field	Explanation
#	✓	Alarm number
Name	✓	Unique name
Error group		Possible values: ■ **None** ■ **operation** ■ **Programming** ■ **PLC** ■ **General information** ■ **Remote** ■ **Python**

Parameter	Mandatory field	Explanation
Error class		Possible values: ■ **None** ■ **Warning** ■ **Feed rate stopped** ■ **Program stop** ■ **Program cancellation** ■ **Emergency stop** ■ **Reset** ■ **Info** ■ **Failure description** ■ **Note**
Link to signal	✓	Selection of the signal
Description		Additional information
Data type		Data type of the signal Possible values: ■ **Number (number)** ■ **Text (string)** ■ **Boolean value (0 or 1)**
Operator		Selection of the operator for the comparison of a signal value and a comparison value (based on the selection in the **Data type** field) Possible values: ■ **EQUALS**: Signal value is equivalent to comparison value ■ **CONTAINS**: Signal value contains comparison value ■ **STARTSWITH**: Signal value begins with comparison value ■ **LESSTHAN**: Signal value is less than comparison value ■ **LESSTHANEQUAL**: Signal value is less than or equal to comparison value ■ **MORETHAN**: Signal value is greater than comparison value ■ **MORETHANEQUAL**: Signal value is greater than or equal to comparison value
Value		Comparison value
Create test notification		If this option is activated, then State-Monitor generates a test machine message when the machine alarm is saved

Using the **Check parameter** button, you can call the current value of the selected signal and start the comparison.

The **Export** button allows you to save the configured signal alarms to an XML file.

The **Import** button allows you to create new signal alarms in StateMonitor by importing the parameters from an XML file. The previously configured signal alarms remain unaffected by this.

13.5 Example of connecting a control via Modbus

Reading out of the signals

With Modbus, StateMonitor is able to read out the signals directly at the control's input terminals. A voltage between 0 V and 10 V is usually measured at the analog inputs. For override values, the control must convert the voltage to a numerical value between 0 and 150. The result of this conversion can be read out from an address in the marker memory.

The following signals are present at the input terminals:

Input terminal assignment

Type	Address	Meaning
Digital input	1	Machine is running
Digital input	2	Task interrupted by an error
Digital input	3	Task successfully completed
Digital input	4	Machine stopped
Analog input	23	Feed rate potentiometer
Analog input	25	Spindle potentiometer

Addresses in flag memory

Type	Address	Meaning
Feed-rate override	42	Converted value for feed-rate override
Spindle override	43	Converted value for spindle override

Status model

The following table shows a status model for a control connected via Modbus.

Parameter	Address type	Data type	Address	Value
Program running (PGM STARTED / PGM RUNNING)	DIGITAL_INPUT	BIT	1	1
Program interrupted by error (ERROR)	DIGITAL_INPUT	BIT	2	1
Program successfully completed (PGM COMPLETED / END PGM)	DIGITAL_INPUT	BIT	3	1
Program stopped (PGM STOPPED)	DIGITAL_INPUT	BIT	4	1
Feed rate override setting in % (0 to 150)	HOLDING_REGISTER	INT_16	42	
Spindle override setting in % (0 to 150)	HOLDING_REGISTER	INT_16	43	

13.6 OPC UA parameters

Connection settings pull-down menu

In the definition table, you can define the following connection settings for OPC UA:

- **Default Namespace**
  Defines the default namespace to be used for the address
- **SIK:**
  Manual input
- **NC software:**
  Manual input
- **Polling interval**
  Interval for polling

Security settings pull-down menu

In the definition table, you can define the following connection settings for OPC UA:

- **Security Mode**
  Selection of authentication method, depending on the server.

  > If you use an authentication, then you must also select an application certificate.
  > **Further information:** "Managing certificates (only for OPC UA)", Page 230

- **User**
  Manual input of the authentication data
- **Password**
  Manual input of the authentication data
- **Endpoint Validation**
  Verification of the endpoint; deactivate only if connection problems occur

Status parameters for mapping pull-down menu

For general information about the status parameters, see "Mapping status parameters to other controls", Page 258.

In the expanded definition table (**Editing** button), you can map the control signals to status parameters.

The following information is required for the mapping of the status parameters:

- **BrowseType**

  Specifies the method being used for accessing the respective OPC UA parameter. StateMonitor distinguishes between the following methods:
  - Unique ID with **IdType**
  - Defined path with **BrowsePath**
  - Unique ID with **NodeIdRef**, which is entered in combination with the namespace
- **Parameter name space**

  For each signal parameter, you can define your own namespace. If no parameter-specific value is entered, then, for the namespace, StateMonitor uses the value under **Default Namespace**.
- **Address type**

  Indicates the control's address space in which the memory address is located.
- **Address**

  Indicates the location in the selected memory area from which the value is to be read.
  - If the **BrowsePath** option of **BrowseType** is selected, then you can use the **Configure** button to define the path to the memory area level by level. You need to make sure that the value of the **Namespace** parameter matches the value of the preceding **BrowseName** parameter in each case.
  - If the **NodeIdRef** option of **BrowseType** is selected, the address must be entered with the syntax `ns='NamespaceIndex';'IdentifierType'='Identifier'.` If the type of identifier is a number, an `i` is used; for a string, an `s` is used.

    Examples: `ns=2;i=3432` or `ns=5;s=Int16DataItem`
- **Data type**

  Defines, among other things, how the value comparison will be performed. StateMonitor distinguishes between the following parameters:
  - Value parameter of **Text (string)** data type
  - Value parameter of **Number (number)** data type
  - Boolean parameter of **Boolean value (0 or 1)** data type
  - Calculated parameter of **Calculated value** data type

  > For mapping, you can use calculated values to compile complex queries for parameters and formed constants.
  >
  > **Further information:** "Formation of your own constants using the calculated values", Page 268
- **Value**

  Comparison values are necessary for the signals that flow directly into the status model of the control. Exceptions to this are numerical values such as override settings or texts, such as the program name, that do not need to be compared.

Formation of your own constants using the calculated values

In the **Status parameters for mapping** window in the expanded definition table (**Editing** button), you can use calculated values to define your own constants and compile complex queries.

StateMonitor supports the following types of values:

- **Constant**
  Definition of a constant value for a calculation. You can use a constant for threshold values or comparisons.
- **Term**
  A logic operation combining **Constant** value types and/or control-specific values types, resulting in a new value of a potentially different data type.
  Possible logic operations are **PLUS**, **MINUS**, **TIMES**, **DIVIDEBY**, **AND**, **OR**, **EQUALS**, **CONTAINS**, **STARTSWITH**, and **LESSTHAN**
- Control-specific value types

> For assignment in the definition table, a calculated **Term** must be a term of the **Boolean** data type to ensure that a TRUE or FALSE query can be used. If the calculated **Term** permits a different result, then the result must be simplified to the **Boolean** data type by processing it in another **Term**.

To define **Constant** value types or control-specific value types:

- ▶ Click the **New calculated value** button
- > StateMonitor opens the **Configure value** window.
- ▶ Specify the name of the new value
- ▶ Select the desired value type in the drop-down list
- ▶ Enter the parameters needed for the desired value type
- ▶ Click the **Create** button
- > The new value is added to the value table.

To define calculated values of the **Term** value type:

- ▶ Click the **New calculated value** button
- > StateMonitor opens the **Configure value** window.
- ▶ Specify the name of the new value
- ▶ Select the **Term** value type in the drop-down list
- ▶ Select the desired logic operation in the **Values of operation** drop-down list
- ▶ Select the desired operands for the operation in the list
- ▶ Click the **Create** button
- > The new value is added to the value table.

To use calculated values in the definition table:

- Select **Calculated value** in the **Data type** drop-down list in the row containing the desired parameter
- Select the desired calculated value in the **Address** drop-down list
- Click the **Close window and apply values** button

Editing the prioritization

In the **Status parameters for mapping** window of the expanded definition table (**Editing** button), you can edit the prioritization of the received program statuses and operating modes.

Prioritization will be considered only if more than one status parameter is pending. The defined prioritization determines which of the status parameters will have priority and will be taken into account in this case.

To edit prioritization:

- Click the **Change priorities** button
- > StateMonitor opens the **Prioritization for status parameter mapping** window.
- In the drop-down list, select the status parameters for **Mode of operation** or **Program status**
- Enter the priority of the desired parameter in the respective field in the **Priority** column (values: 0 to 9)
- Close the window
- > The edited priorities are applied.

Signal alarms pull-down menu

You can configure signal alarms for the signals that you evaluate in StateMonitor. To do so, you can define conditions for the comparison of the signal value with a comparison value. If a condition is met, then StateMonitor displays a signal alarm in the **Messenger** menu.

You can use the following parameters for the configuration of the signal alarms:

Parameter	Mandatory field	Explanation
#	✓	Alarm number
Name	✓	Unique name
Error group		Possible values: ■ **None** ■ **operation** ■ **Programming** ■ **PLC** ■ **General information** ■ **Remote** ■ **Python**

Parameter	Mandatory field	Explanation
Error class		Possible values: ■ **None** ■ **Warning** ■ **Feed rate stopped** ■ **Program stop** ■ **Program cancellation** ■ **Emergency stop** ■ **Reset** ■ **Info** ■ **Failure description** ■ **Note**
Link to signal	✓	Selection of the signal
Description		Additional information
Data type		Data type of the signal Possible values: ■ **Number (number)** ■ **Text (string)** ■ **Boolean value (0 or 1)**
Operator		Selection of the operator for the comparison of a signal value and a comparison value (based on the selection in the **Data type** field) Possible values: ■ **EQUALS**: Signal value is equivalent to comparison value ■ **CONTAINS**: Signal value contains comparison value ■ **STARTSWITH**: Signal value begins with comparison value ■ **LESSTHAN**: Signal value is less than comparison value ■ **LESSTHANEQUAL**: Signal value is less than or equal to comparison value ■ **MORETHAN**: Signal value is greater than comparison value ■ **MORETHANEQUAL**: Signal value is greater than or equal to comparison value
Value		Comparison value
Create test notification		If this option is activated, then State-Monitor generates a test machine message when the machine alarm is saved

Using the **Check parameter** button, you can call the current value of the selected signal and start the comparison.

The **Export** button allows you to save the configured signal alarms to an XML file.

The **Import** button allows you to create new signal alarms in StateMonitor by importing the parameters from an XML file. The previously configured signal alarms remain unaffected by this.

Machine reports pull-down menu

The **Machine reports** allow you to define the point at which machine messages are to be read out and recorded.

With OPC UA, you can also subscribe to machine signals.

- Under **Value subscriptions**, you can subscribe to changes of an OPC UA node value. If values have been changed, a machine message is displayed. With OPC UA, an address can even refer to an entire list (array) of messages. In this case, you need to define a separate machine message for each message of this list. To specify the address, you need to enclose each of the arrays to be read out within square brackets and append it to the address name.

  Example of address: `VSTR_OPCMsgTexts`**[2]**
- Under **Machine event subscriptions**, you can subscribe to a machine event that will then be displayed as a machine message. This includes a default event with the following parameters that subscribes to all events of the OPC UA server.
  - **Name**: Opcuaserver
  - **BrowseType**: **IdType**
  - **Address**: 2253
  - **Namespace**: http://opcfoundation.org/ua/
  - **Address type**: **Numerical**

  Alternatively, you can also configure your own events, stating all parameters; thus, you always subscribe to the configured node and all subordinate nodes.

13.7 MTConnect parameters

Connection settings pull-down menu

In the definition table, you can define the following connection settings for MTConnect:

- **Port**

  Number of the network port over which the MTConnect service of the control can be reached.

  > Please refer to the documentation supplied by the control or machine manufacturer.

- **Prefix (http or https)**

  Defines whether the control provides encrypted machine data or not. For an encrypted connection, enter the value “https”.

- **DeviceStream name**

  Unique identifier used to the find correct machine data among the XML files. With MTConnect, you can transmit information for multiple machines in a single request. Therefore, a unique identifier is required for distinction.

  > StateMonitor with version 1.2 and later supports MT Connect schemas.

- **SIK:**

  Manual input

- **NC software:**

  Manual input

- **Polling interval**

  Interval for polling

After entering the data for **IP address / DHCP**, **Port**, and **Prefix (http or https)**, you can test the connection by clicking the **Current-Request** button.

If the connection parameters are correct, then StateMonitor opens a new tab in the browser with the XML data that are reported by MTConnect.

Status parameters for mapping pull-down menu

For general information about the status parameters, see "Mapping status parameters to other controls", Page 258.

In the expanded definition table (**Editing** button), you can map the control signals to status parameters.

The following information is required for the mapping of the status parameters:

- **Data type**

  Defines, among other things, how the value comparison will be performed. StateMonitor distinguishes between the following parameters:

  - Value parameter of **Text (string)** data type
  - Value parameter of **Number (number)** data type
  - Boolean parameter of **Boolean value (0 or 1)** data type
  - Calculated parameter of **Calculated value** data type

  > For mapping, you can use calculated values to compile complex queries for parameters and formed constants.
  >
  > **Further information:** "Formation of your own constants using the calculated values", Page 268

- **DataItemId**

  States, as a reference, the ID attribute for the data values to be called.

- **Value**

  Comparison values are necessary for the signals that flow directly into the status model of the control. Exceptions to this are numerical values such as override settings or texts, such as the program name, that do not need to be compared.

Formation of your own constants using the calculated values

In the **Status parameters for mapping** window in the expanded definition table (**Editing** button), you can use calculated values to define your own constants and compile complex queries.

StateMonitor supports the following types of values:

- **Constant**
  Definition of a constant value for a calculation. You can use a constant for threshold values or comparisons.
- **Term**
  A logic operation combining **Constant** value types and/or control-specific values types, resulting in a new value of a potentially different data type.
  Possible logic operations are **PLUS**, **MINUS**, **TIMES**, **DIVIDEBY**, **AND**, **OR**, **EQUALS**, **CONTAINS**, **STARTSWITH**, and **LESSTHAN**
- Control-specific value types

> For assignment in the definition table, a calculated **Term** must be a term of the **Boolean** data type to ensure that a TRUE or FALSE query can be used. If the calculated **Term** permits a different result, then the result must be simplified to the **Boolean** data type by processing it in another **Term**.

To define **Constant** value types or control-specific value types:

- ▶ Click the **New calculated value** button
- > StateMonitor opens the **Configure value** window.
- ▶ Specify the name of the new value
- ▶ Select the desired value type in the drop-down list
- ▶ Enter the parameters needed for the desired value type
- ▶ Click the **Create** button
- > The new value is added to the value table.

To define calculated values of the **Term** value type:

- ▶ Click the **New calculated value** button
- > StateMonitor opens the **Configure value** window.
- ▶ Specify the name of the new value
- ▶ Select the **Term** value type in the drop-down list
- ▶ Select the desired logic operation in the **Values of operation** drop-down list
- ▶ Select the desired operands for the operation in the list
- ▶ Click the **Create** button
- > The new value is added to the value table.

To use calculated values in the definition table:

- Select **Calculated value** in the **Data type** drop-down list in the row containing the desired parameter
- Select the desired calculated value in the **DataItemId** drop-down list
- Click the **Close window and apply values** button

Editing the prioritization

In the **Status parameters for mapping** window of the expanded definition table (**Editing** button), you can edit the prioritization of the received program statuses and operating modes.

Prioritization will be considered only if more than one status parameter is pending. The defined prioritization determines which of the status parameters will have priority and will be taken into account in this case.

To edit prioritization:

- Click the **Change priorities** button
- > StateMonitor opens the **Prioritization for status parameter mapping** window.
- In the drop-down list, select the status parameters for **Mode of operation** or **Program status**
- Enter the priority of the desired parameter in the respective field in the **Priority** column (values: 0 to 9)
- Close the window
- > The edited priorities are applied.

Editing tools, Mapping pull-down menu

In the expanded definition table (**Editing** button), you can map the tool life-cycle data data to status parameters.

The following information is required for the mapping of the editing tools:

- **Source**

  Defines where the DataItemId is read. StateMonitor distinguishes the following source options:
  - Capturing value parameters from an event **Event**
  - Capturing value parameters from an asset **Asset**
- **DataItemId**

  States, as a reference, the ID attribute for the data values to be called.
- **Current value**

> Using the **Create parameter** button, you can define your own parameters.
> These parameters will then be loaded into the database, but they will not be displayed in StateMonitor.

Signal alarms pull-down menu

You can configure signal alarms for the signals that you evaluate in StateMonitor. To do so, you can define conditions for the comparison of the signal value with a comparison value. If a condition is met, then StateMonitor displays a signal alarm in the **Messenger** menu.

You can use the following parameters for the configuration of the signal alarms:

Parameter	Mandatory field	Explanation
#	✓	Alarm number
Name	✓	Unique name
Error group		Possible values: ■ **None** ■ **operation** ■ **Programming** ■ **PLC** ■ **General information** ■ **Remote** ■ **Python**
Error class		Possible values: ■ **None** ■ **Warning** ■ **Feed rate stopped** ■ **Program stop** ■ **Program cancellation** ■ **Emergency stop** ■ **Reset** ■ **Info** ■ **Failure description** ■ **Note**
Link to signal	✓	Selection of the signal
Description		Additional information
Data type		Data type of the signal Possible values: ■ **Number (number)** ■ **Text (string)** ■ **Boolean value (0 or 1)**

Parameter	Mandatory field	Explanation
Operator		Selection of the operator for the comparison of a signal value and a comparison value (based on the selection in the **Data type** field) Possible values: ■ **EQUALS**: Signal value is equivalent to comparison value ■ **CONTAINS**: Signal value contains comparison value ■ **STARTSWITH**: Signal value begins with comparison value ■ **LESSTHAN**: Signal value is less than comparison value ■ **LESSTHANEQUAL**: Signal value is less than or equal to comparison value ■ **MORETHAN**: Signal value is greater than comparison value ■ **MORETHANEQUAL**: Signal value is greater than or equal to comparison value
Value		Comparison value
Create test notification		If this option is activated, then State-Monitor generates a test machine message when the machine alarm is saved

Using the **Check parameter** button, you can call the current value of the selected signal and start the comparison.

The **Export** button allows you to save the configured signal alarms to an XML file.

The **Import** button allows you to create new signal alarms in StateMonitor by importing the parameters from an XML file. The previously configured signal alarms remain unaffected by this.

Machine reports pull-down menu

The **Machine reports** allow you to define the point at which machine messages are to be read out and recorded.

In the expanded definition table (**Create** button), you can map the corresponding address to the machine messages.

13.8 Example for connecting a control via MTConnect

Provision of the machine parameters

For testing, the company MAZAK offers to provide a server that can be used to test MTConnect connections to a machine. For more information, please refer to http://mtconnect.mazakcorp.com. Based on this test server, the provision of machine parameters for MTConnect is shown.

Under the test server URL, there are two relevant addresses:

- Assignment of MTConnect data types to addresses: http://mtconnect.mazakcorp.com:5611/probe
- Current values in the control: http://mtconnect.mazakcorp.com:5611/current

To map status information, MTConnect uses the `EVENT` data type that is subdivided into further subtypes. The `EXECUTION` subtype maps the program execution status, the operating modes are included in the `CONTROLLER_MODE` subtype. By default, certain values are predefined for both types.

Values for the `EXECUTION` subtype (program execution):

- `READY`
- `ACTIVE`
- `INTERRUPTED`
- `FEED_HOLD`
- `STOPPED`
- `OPTIONAL_STOP`
- `PROGRAM_STOPPED`
- `PROGRAM_COMPLETED`

Values for the `CONTROLLER_MODE` subtype (operating modes):

- `AUTOMATIC`
- `MANUAL`
- `MANUAL_DATA_INPUT`
- `SEMI_AUTOMATIC`
- `EDIT`

In the XML file available at http://mtconnect.mazakcorp.com:5611/probe, you can find out how the addresses of these types are defined on the control.

By searching for the string "execution" in the XML file, you can find the following variable definition:

```
<DataItem category="EVENT" id="exec" name="execution" type="EXECUTION"/>
```

This defines a variable of the `EXECUTION` type with the address `exec`. The operating modes are defined here as follows:

```
<DataItem category="EVENT" id="mode" name="mode" type="CONTROLLER_MODE"/>
```

This information can be used to derive the status model. The parameters for the program name and the override setting can be found in the same way. For the program name, the `PROGRAM` data type has been defined.

When searching for "program" in the XML file, you will find two definitions of this data type:

```
<DataItem category="EVENT" id="pgm" name="program" type="PROGRAM"/>
<DataItem category="EVENT" id="spgm" name="subprogram" subType="x:SUB" type="PROGRAM"/>
```

From the name, you can see that in the first case, the definition refers to the actual program name and in the second case, to the name of the subprogram. In this example, the parameter with the ID `pgm` is used.

For the feed rate potentiometers, the `PATH_FEEDRATE_OVERRIDE` data type with the `RAPID` and `PROGRAMMED` subtypes is defined for rapid traverse and feed rate. For spindle override, the `ROTARY_VELOCITY_OVERRIDE` data type is used.

Identifiers for machine data

MTConnect allows you to transmit information for multiple machines in a single request. For this reason, a unique machine data identifier is required.

The corresponding values can be found in the XML data that is accessible as follows:

- By clicking the **Current-Request** button after having specified the **IP address / DHCP**, **Port**, and **Prefix (http or https)**
- By entering the following address directly in the address line of your browser: http://**IP address / DHCP**:**Port**\current

If the connection parameters are correct, then StateMonitor opens a new tab in the browser with the XML data that are reported by MTConnect.

By searching for "DeviceStream", you will find an entry similar to the following:

```
<DeviceStream name="CUT" uuid="002">
```

The `name` attribute of the `DeviceStream` item indicates which machine will be queried on theMTConnect server.

Status model

The following table shows a status model for a control connected via MTConnect.

Parameter	Data type	Address	Value
Program running (PGM STARTED / PGM RUNNING)	Text	exec	ACTIVE
Program interrupted by error (ERROR)	Text	exec	INTERRUPTED
Program successfully completed (PGM COMPLETED / END PGM)	Text	exec	PROGRAM_COMPLETED
Program stopped (PGM STOPPED)	Text	exec	PROGRAM_STOPPED
Program interrupted by user (PGM CANCELED)	Text	exec	OPTIONAL_STOP
Rapid traverse override setting in % (0 to 100)	Number	pfr	
Feed rate override setting in % (0 to 150)	Number	pfo	
Spindle override setting in % (0 to 150)	Number	sovr	
Operating mode: Automatic	Text	mode	AUTOMATIC
Operating mode: Manual	Text	mode	MANUAL
Program name or number	Text	pgm	

13.9 FOCAS parameters

For the use of FOCAS you need access to the control via Ethernet (TCP). StateMonitor uses the following methods to determine the status:

- `statinfo` method (for the status)
  CNC control series 0i, Model B/C/D/F
  CNC control series 15i (except turning)
  CNC control series 16i, 18i, 21i, 30i, Model A/B
- `rdpmcrng` method (for overrides)
  CNC control series 0i, Model B/C/D/F
  CNC control series 15i (except turning)
  CNC control series 16i, 18i, 21i, 30i, Model A/B
- `exeprgname` method (for the program name)
  CNC control series 0i, Model D/F
  CNC control series 30i, Model A/B

Connection settings pull-down menu

In the definition table, you can define the following connection settings for FOCAS:

- **Port**
  Number of the network port over which the FOCAS service of the control can be reached.

  
  Please refer to the documentation supplied by the control or machine manufacturer.

- **SIK:**
  Manual input
- **NC software:**
  Manual input
- **Polling interval**
  Interval for polling

Status parameters for mapping pull-down menu

For general information about the status parameters, see "Mapping status parameters to other controls", Page 258.

In the expanded definition table (**Editing** button), you can map the control signals to status parameters.

The following information is required for the mapping of the status parameters:

- **Address type**
  Indicates the number of the PNC address.
  0: G (Signal to PNC -> CNC)
- **Data type**
  Indicates the characteristics of a variable. The following values are possible:
  - `BYTE`
  - `WORD`
  - `LONG`
  - `REAL`
  - `LREAL`
- **Start address**, **End address**
  States the PNC start address and the PNC end address
- **Address length**
  Specifies the address length.
- **Comparison value for operating mode**
  States the operating modes and is possible only for operating modes. The following values are possible:
  - 0: MDI
  - 1: Memory (default)
  - 3: Edit
  - 4: Handle (default)
  - 5: Jog (default)
  - 6: Teach in Jog
  - 7: Teach in Handle
  - 8: INC Feed
  - 9: Reference
  - 10: Remote
- **Current value**

14

Help, Tips and Tricks

14.1 User's Manual in StateMonitor

You can call the PDF file with the StateMonitor User's Manual by selecting **Help** in the menu bar.

The User's Manual is available in various languages. The current version can be downloaded from **www.heidenhain.com**.

To update the User's manual:

- Download the current version in the desired language from **www.heidenhain.com**
- Rename the downloaded PDF file in **StateMonitorHelpFile_xx.pdf** with **xx** as a place placeholder for the ISO language abbreviation (e.g., **1228892-01-A-04_it.pdf** in **StateMonitorHelpFile_it.pdf**)
- Move the PDF file in the installation folder of StateMonitor to the Documentation folder
- If applicable, replace the already existing file with the new file

> The current User's Manual is available in the desired language under **Help**.

14.2 Special cases

On some controls, certain software versions may lead to special cases or conditions.

Control	Software version	Special feature	Solution
iTNC 530	All	The execution of a program line in MDI mode is registered as **Productive**. This behavior is not compatible with NCK controls, such as the TNC 620 or TNC 640 because these do not transfer program executions in MDI mode as **Productive**. The behavior of the iTNC 530 can be adapted to the NCK controls by means of a property in the `application.properties` file.	▶ For this purpose, add the following entry in the `[installation folder]\config\properties\application.properties` file: `AppConfig.DisableDataForTncInMDI=true` ▶ To apply the change, restart StateMonitor
iTNC 530	340492-06 340492-07	The override settings of the machine are not transmitted in detail to StateMonitor. StateMonitor always shows the **Productive** machine status in light green, no matter whether the feed-rate override is larger than or equal to 100% or less.	▶ Select the checkbox for the **Import of PLC words** option in the **Settings** menu, **Machines** submenu, **Machine-specific settings**
TNC 620	340560-01 to 340560-04	The operating modes are not displayed correctly in StateMonitor	▶ Update the control software to version 340560-05

14.3 Any questions?

If you have any questions on the installation or operation of StateMonitor:

- First read the Installation Instructions and User's Manual for the software
- Contact the HEIDENHAIN NC programming helpline:
  - Per e-mail at: **service.nc-pgm@heidenhain.de**
  - By phone at: +49 8669 31-3103

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