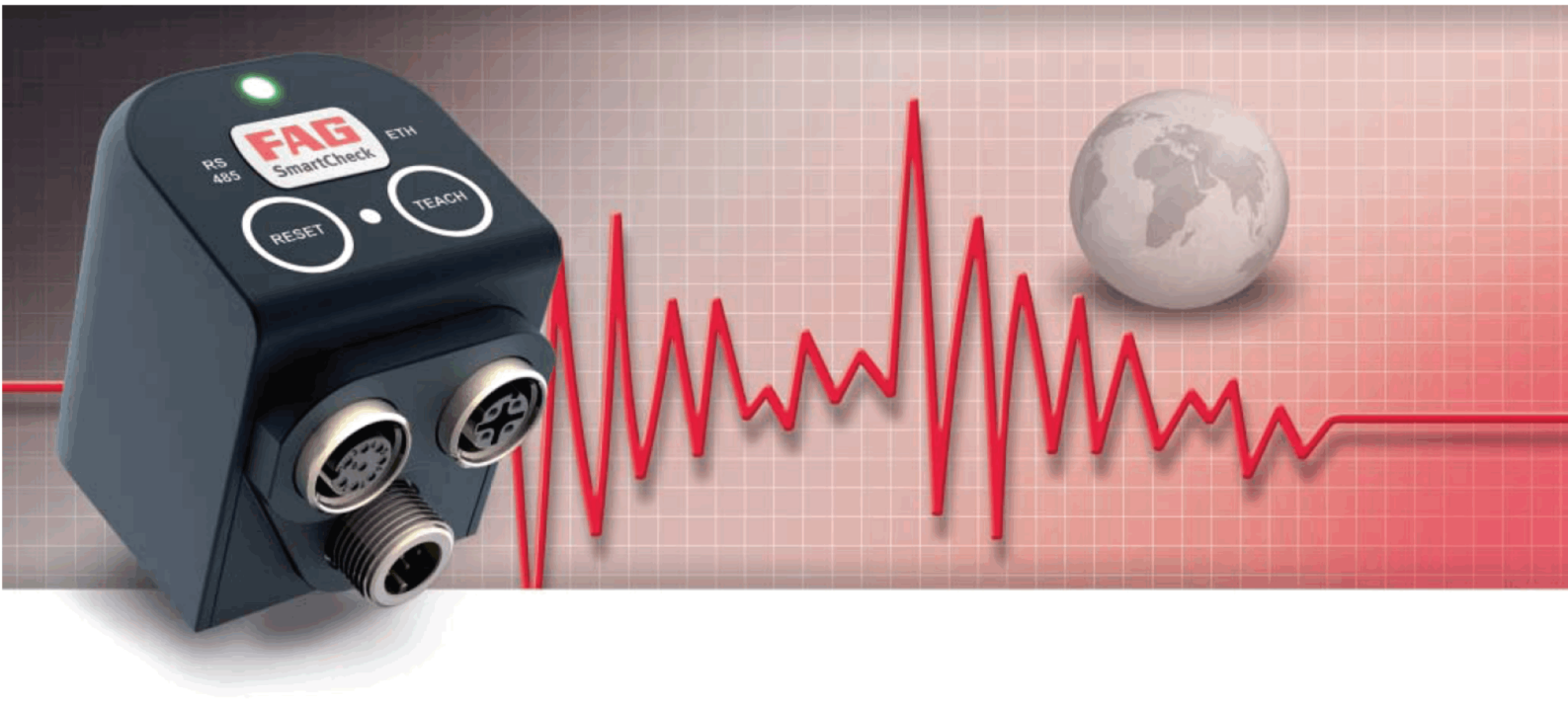
FAG



FAG SmartWeb

User manual

SCHAEFFLER

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Imprint

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Full licence conditions for the respective libraries can be found in the software's program directory.

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Contents

1 General ... 5
1.1 About this guide ... 6
2 Starting the software ... 7
3 The user interface at a glance ... 9
3.1 Updating the firmware ... 13
3.2 Select device restart ... 14
4 Device Maintenance System ... 16
4.1 Update firmware ... 17
4.2 Reset data partition ... 19
4.3 Reset firmware ... 19
4.4 Adjust system settings ... 19
4.4.1 Edit system name ... 19
4.4.2 Configure NTP server ... 20
4.4.3 Change administrator password ... 21
4.4.4 Configure IPv4 settings ... 21
4.4.5 Configure IPv6 settings ... 22
4.4.6 Replace server certificate (PEM) ... 23
4.5 Download debug log files ... 24
4.6 Open expert menu ... 25
4.6.1 Reset administrator password ... 26
4.6.2 Replace cryptographic keys ... 26
4.6.3 Clear entire system ... 28
4.6.4 Start remote access service ... 28
4.6.5 Update Maintenance System ... 29
4.7 Backup system ... 30
4.8 Restore system ... 31
4.9 Reboot system ... 33
5 Status ... 34
5.1 Creating/editing a message in the logbook ... 37
6 Measurement data ... 38
6.1 Edit alarm settings ... 42
6.2 Download measurement data ... 44
6.3 Delete measurement data ... 45
7 Live view ... 46
8 Configuration ... 49
8.1 Input configurations ... 50
8.1.1 Internal sensors ... 51
8.1.2 Analogue inputs ... 52
8.1.3 Digital input ... 55
8.1.4 Input with fixed value ... 58
8.2 Measurement jobs ... 59
8.2.1 Measurement jobs section ... 60
8.2.2 Creating/editing new measurement jobs ... 62
8.2.3 Available templates for measurement configurations ... 64
8.2.4 Triggers and conditions ... 65
8.2.4.1 Time trigger ... 66
8.2.4.2 Measurement trigger ... 67
8.2.4.3 Time condition ... 68

8.2.4.4 Measurement condition ... 69
8.2.5 Learning mode and alarm maps ... 70
8.3 Output configurations ... 76
8.3.1 Adding/editing output configurations ... 77
8.3.2 Test output configuration ... 81
8.4 Measurement trigger ... 82
8.4.1 Adding/editing measurement trigger ... 83
8.5 Measurement conditions ... 85
8.5.1 Adding/editing measurement conditions ... 87
8.6 External devices ... 88
8.6.1 External devices section ... 89
8.6.2 Adding/editing an external device ... 91
8.6.3 Adding/editing an external input ... 93
8.6.4 Creating/editing external outputs ... 94
8.6.5 Integrating an external device into the system ... 97
8.6.5.1 Mitsubishi GX Works2 software ... 98
8.7 Device ... 106
8.7.1 Device settings ... 106
8.7.2 System time settings ... 109
8.8 Bearing ... 110
8.8.1 Adding/editing bearings ... 111
8.9 Bearing manufacturer ... 113
9 User management ... 115
9.1 Adding/editing user group ... 117
9.2 Adding/editing users ... 118
10 Manufacturer/support ... 119

1 General

The FAG SmartWeb software offers you a user interface with which you can manage FAG SmartCheck. For example, you can configure inputs and outputs, use a wizard to create measurement jobs for monitoring your machine, or verify the functions of the SmartCheck device. To be able to use the SmartWeb software, the SmartCheck device must be connected to a computer.

About the FAG SmartCheck system

FAG SmartCheck is a vibration monitoring system for permanent frequency-selective monitoring. Measurement values can be captured, recorded and analysed using two integrated signals and up to three connected signals. After the analysis, the system can switch outputs and display the status using LEDs depending on user-defined alarm limits.

Inputs are available, which record additional signals, to allow the device to be integrated into a superordinate system. These signals can be used as command variables for a dependent signal analysis, e.g. to initiate time or event-controlled measurement jobs.

The FAG SmartCheck device can be used to cover a wide range of applications; the SmartCheck device can be configured to meet your own requirements using the integrated web application and FAG SmartWeb software. Multiple SmartCheck devices can be combined in a network. Regardless of the number of devices, they can be managed centrally on a PC using the FAG SmartUtility Light software. With the full version of FAG SmartUtility, you can also access the sensors directly in the FAG SmartWeb software, analyse measurement data in the SmartUtility Viewer and download configurations and install them on other devices.

With FAG SmartCheck, Schaeffler offers status monitoring that is optimised to suit your requirements.



1.1 About this guide

This guide describes how to use the FAG SmartWeb software. Read this guide carefully before using the software, and store it in a safe place.

Make sure that

- This guide is available to all users
- If the product is passed on to other users, that this guide is also passed on with it
- Additions and amendments provided by the manufacturer 119 are always attached to this guide.

Further information

This software is an integral part of the FAG SmartCheck vibration monitoring system. This system also includes the FAG SmartCheck device and the FAG SmartUtility Light software, each of which is described in its respective manual.

Optionally, instead of the FAG SmartUtility Light software, you can purchase the FAG SmartUtility software with enhanced functionality. This is also described in a separate manual.

Definitions

- Product: the FAG SmartWeb software described in this manual.
- User: person or organisation capable of putting the product into operation and using it.

Symbols used



This symbol indicates

- Helpful additional information and
- Device settings or practical tips that will help you to perform activities more efficiently.

Cross-reference symbol 6: this symbol refers to a page in the manual that provides further information. If you are reading the manual in PDF format on a screen, clicking the word to the left of the cross-reference symbol will take you straight to the section in question.

2 Starting the software

Perform a firmware update before commissioning. You can download the latest version via the SmartUtility software or from the SmartCheck microsite www.fag-smartcheck.com.

Only start the SmartWeb software after ensuring the following:

- The FAG SmartCheck device is connected to the Ethernet network.
- The FAG SmartCheck device is supplied with power.
- The FAG SmartCheck device has finished loading and starting and is in measuring mode.

Details on how to connect and start the <var styleclass="Normal">FAG SmartCheck</var> can be found in the FAG SmartCheck user documentation.

The FAG SmartWeb software can be started in two different ways:

- **Start with IP address in the browser**

The SmartCheck device is delivered with the default IP address 192.168.1.100. Enter this IP address in the address field of your browser:



Press the Enter key to start the SmartWeb software.

- **Start via the FAG SmartUtility software**

The SmartUtility software, which you can optionally purchase, can be used to search for and open SmartCheck devices with wizard support. In doing so, the SmartWeb software opens in a separate tab of your browser for each device. You will find details on this in the manual for the SmartUtility software.

Also for this option, the SmartCheck device must be connected to the Ethernet network and supplied with power.

- If you cannot adapt the IP address field on your computer to the default IP address of the <var styleclass="Hint">FAG SmartCheck</var> device, you will need to change the IP address of the FAG SmartCheck device. This is possible both with the FAG SmartUtility Light software included in the scope of delivery and with the optional FAG SmartUtility software. Details on this can be found in the respective user documentation.
- If you are using a proxy server between the browser and the internet in your company network, you will need to adjust your browser's internet settings accordingly. To do so, go to Internet Explorer and enter the address and port number of the proxy server under **Tools > Internet options**. Please contact your system administrator for more detailed information about proxy settings.
- Once the SmartWeb software is started, the system time of the SmartCheck device is compared with the computer time. The system time can be adjusted 109 if required.
- The SmartWeb software checks on a regular basis whether SmartUtility has new configurations. If so, the page is reloaded.
- If an SmartCheck device cannot be opened in the browser, clear the browser cache and try again.
- If you receive the message stating that cookies are not accepted, please allow the use of cookies or enter the IP address of the SmartCheck device as an exception.
- If you are working on a computer with several SmartCheck devices, these devices should have identical firmware versions installed. If different firmware versions are installed, this can have undesired effects within the browser.

Start message

After starting the FAG SmartWeb software, first you see the start message. This informs you of the preconfigured settings of your FAG SmartCheck device:

- **Analogue input 1:** Voltage input [0–10 V], signal "voltage [0–10 V]"
- **Analogue input 2:** Current input [0–20 mA], signal "load [0–100 %]"
- **Digital input:** Speed input, signal threshold "7 V"
- **"Machine is running" measurement condition:** Based on vibration values

- **Base measurement job**

It also informs you of important points to note when starting the SmartCheck for the first time:

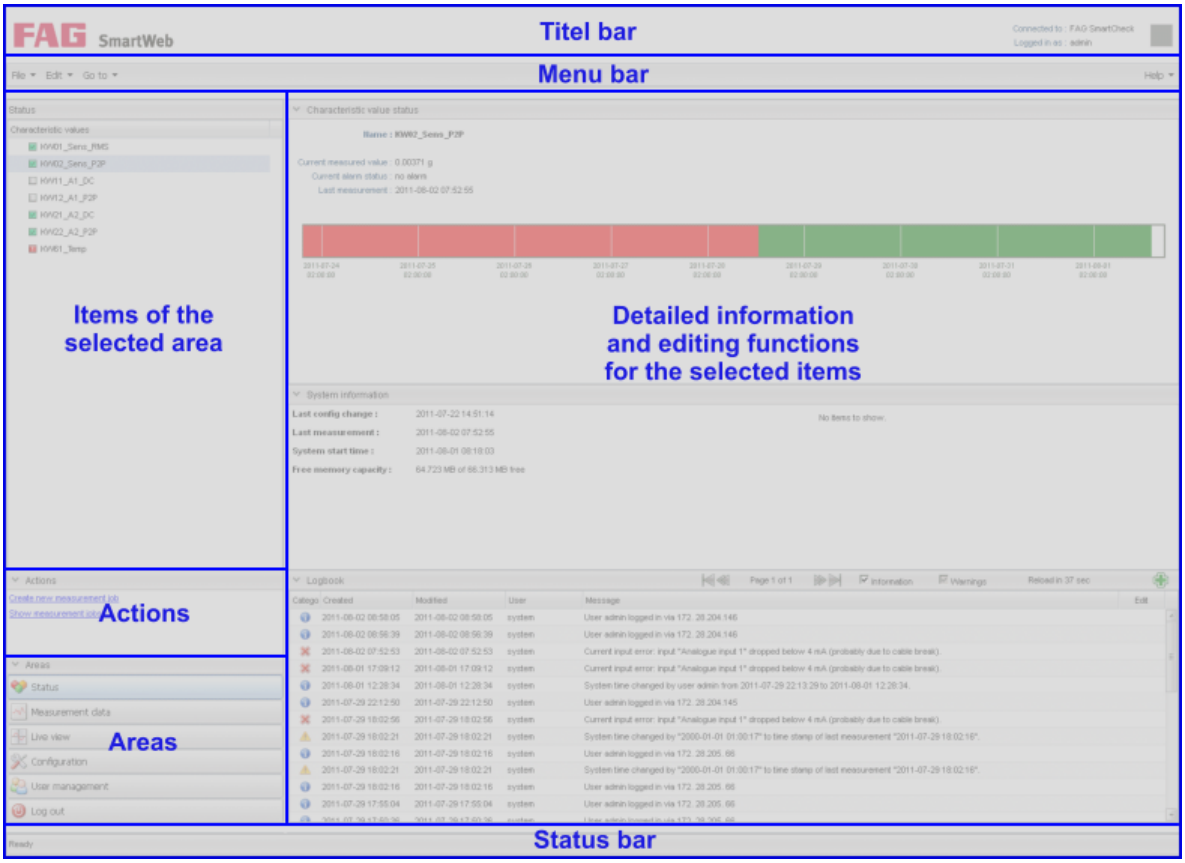
- Change the program language under **Edit > Edit program settings** 10.
- Familiarise yourself with the SmartCheck device, e.g. by opening the **Live view** 46 area and knocking or shaking to activate the vibration sensor. The measurement results are shown directly in the display.
- Change the preconfigured settings in the **Configuration** 49 area. This applies in particular for the **"Machine is running" measurement condition** 86, because this is based on vibration values, whereas the engine speed is a better criterion in many environments.
- In the area **Configuration > Measurement jobs** 59, create new measurement jobs using the wizard.

Select the option **Do not show this message again**, if you do not want the start message to appear the next time you start the software. You can change these settings at any time under **Edit > Edit program settings > Messages**.

3 The user interface at a glance

- If the browser window is closed by mistake or the connection to the SmartCheck device is interrupted, any settings that you have not yet confirmed with **OK** will be lost. Consequently, always check whether the last change you made via the user interface of the software has actually been adopted.
- If you do not make any changes for more than an hour in the SmartWeb software, you are automatically logged out.

The user interface of the FAG SmartWeb software can be divided as follows:



The user interface offers you these options:

Title bar

The following information can be found in the right-hand corner or the title bar:

Connected to: Here you will find the name of the SmartCheck device.

Logged in as: Here you will find the user name under which you are currently logged in.

: This symbol indicates which status the "Machine is running" measurement condition has identified for the machine. Under **Measurement conditions** 86, you can set the criteria for the "Machine is running" measurement condition for your machine. Depending on the status determined, the following symbol is displayed:

- : the "Machine is running" measurement condition is fulfilled: the machine is in operation.
- : the "Machine is running" measurement condition is not fulfilled: the machine is not in operation.

: If this symbol is visible, at least one characteristic value is in learning mode.

: The square symbol shows you the alarm status of the SmartCheck device; the symbol is displayed in different colours according to the status:

- **Grey:** No characteristic value has yet been measured.
- **Green:** No alarm exists.
- **Yellow:** One or several characteristic values have triggered a pre-alarm.

- **Red:** One or several characteristic values have triggered a main alarm.
- **Alternating between grey and green**: Learning mode is active for one of your measurement jobs. If a pre-alarm or main alarm is triggered during the learning process, the alarm symbol indicates the relevant alarm status without flashing, i.e. it lights up permanently in yellow or red.

Menu bar

The following options can be found in the menus:

File

- **Print page:** This command prints the current view of the SmartWeb software. Ensure that you have selected the option for page setup in your browser such that the page is reduced to fit the page size when printing.

  Find the corresponding option e.g. in Mozilla Firefox (**Shrink to fit Page Width**) and also in Windows Internet Explorer (Enable **Shrink-to-Fit**) under **File > Page Setup**.
- **Log out:** Use this command to log out of the SmartCheck device. The connection to the device is closed.

Edit

The functions available in the **Edit** menu depend on your user rights. Under certain circumstances, some functions are deactivated because you do not have the authorisations for them.

- **Change password:** This command opens the corresponding area 115 in the SmartWeb software. You can then change your password or the password of the logged-in user.
- **User management:** With each of the commands in this submenu, the corresponding area 115 in the SmartWeb software opens. You can then make your changes.
- **Device settings:** With each of the commands in this submenu, the corresponding area 106 in the SmartWeb software opens. You can then make your changes.
- **Create new measurement job:** This command starts a wizard that guides you through creating a new measurement job 62.
- **Edit program settings:** Here you can specify the following:
  - **Units:** Determine the system of units that the SmartWeb software should use. Among other things, this setting affects the dialogues in which you must select a unit.
    - With **ISO**, international units are displayed, e.g. mm/s.
    - With **US**, American units are displayed, e.g. mil/s.
    - With **All**, both international and American units are displayed, e.g. mm/s and mil/s.
  - **Language:** When possible, the SmartWeb software is automatically launched in the language that you have set for your browser. Here you can manually set the language in which the interface of the SmartWeb software is displayed.
    The following languages are available:

Language	Language	Idioma	Langue	Hànyu
German	English	Spanish	French	Chinese

  - **Messages**: The software provides you with information at various points using automatic messages. You can switch off each automatic message using the option **Do not show this message again**. Here, you can switch the automatic messages back on again for selected messages.

Measurement data

- **Open measurement data display:** Use this command to go to the **Measurement data** 38 area.
- **Download measurement data:** Use this command to open a dialogue in which you can select measurement data for download 44.
- **Delete measurement data:** Use this command to open a dialogue in which you can select measurement data for deletion 45.

Go to

With the commands in this menu, you can switch to those areas that you can also control via the buttons under **Areas**, i.e. to Status 34, Measurement data 38, Live view 46, Configuration 49 and User Management 115.

Help

- **Open Help:** Use this command to open a link to the website of the SmartCheck device. You can open the SmartWeb Help from there under Downloads.
- **Update firmware** 13**:** Use this command to open a dialogue in which you can update the firmware.
- **Select device restart** 14**:** Use this command to open a dialogue in which you can reset or restart the device. Using this dialog, you can also open the **Maintenance System** of the device or reset the data partition.
- **Version information**: Use this command to open a window with detailed information on the version of the SmartCheck device, including factory firmware, device ID and serial number.



The settings for **units**, **language**, and **messages** are stored as cookies. When you delete cookies, these settings are also deleted in the SmartWeb software. Next time the SmartWeb software starts, it will be using the pre-set units and the language set for your browser again. Automatic messages are displayed again by default.

The language setting is also influenced by the FAG SmartUtility software: If you open the SmartWeb software via the <var styleclass="Hint">SmartUtility</var> software, the language setting from the SmartUtility software is used.

Areas

These buttons take you to the different areas of the SmartWeb software. You can also log out of the SmartCheck device here:



Status: 34 Detailed information on the system and on the status of the measurement jobs and their characteristic values can be found here. You can see at a glance which characteristic values have triggered an alarm and follow the activities of the SmartCheck device in the messages of the logbook.



Measurement data: 38 The measurement data for specific characteristic values can be displayed in this area. The display includes trends, time signals and spectral data.



Live view: 46 The signals of the configured inputs can be displayed here in real time.



Configuration: 49 This area is particularly significant when setting a new SmartCheck device: This is where you create measurement jobs, configure inputs and outputs, make basic device settings, and edit the databases for bearings and bearing manufacturers.



User management: 115 Here you can create, delete and manage users and user groups, as well as change your password or the password of the user currently logged in. In addition, you will find in this area the functions for activating and deactivating user management.



Log out: Click on this button to log out of the SmartCheck device and close the SmartWeb software.

Actions

Here you will find the selected important actions, which are either possible in the current area or lead to another area as a link. For example, if you have opened the **Measurement data** area, you will find the following commands here: **Show measurement jobs**, **Download measurement data** and **Delete measurement data**.

Items of the selected area

What you see here depends on the current area. For example, if you have opened the **Configuration** area, you can select individual configuration items - such as **Measurement Jobs** or **Measurement Conditions** - here and then view information about them in the main panel of the SmartWeb software and make further edits.

Detailed information and editing functions for the selected items

If you have selected an item on the left, you will see detailed information on it in the main panel of the SmartWeb software and can make further edits. What exactly is possible depends on your particular selection.

Status bar

The status bar informs you e.g. whether your browser has already finished loading the selected new area.



You can use the separator between the overview columns on the left and the main panel on the right to adapt the interface of the SmartWeb software to suit your requirements:

- Holding down the left mouse button, drag the separator to the left or the right to alter the size of the respective surface.
- Click on the separator to hide the overview columns on the left. This enlarges the main panel to fill the full screen width. Click again on the separator to restore the view.

At many points in the interface, items are displayed in a tree structure. To see subordinate items, click on ⊞; to hide them again, click on ⊟.

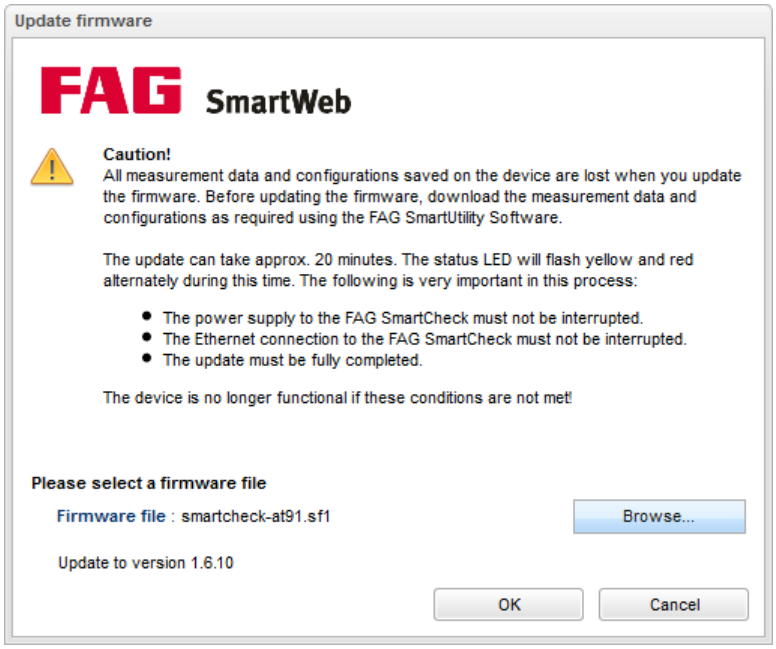
In some areas of the SmartWeb software, the information is presented in tables. You can structure tables using the following functions:

- **Columns as sort criteria:** Set any column of a table as a sort criterion by clicking in the column title. Click a second time to change the sort order, i.e. from ascending to descending or vice-versa. The current sort order is displayed by the symbols ▲ for ascending and ▼ for descending.
- **Move columns:** Move any column to another position in the table. To do this, click with the left mouse button in the column title and hold down the mouse button. Then drag the cursor to the position in the table you want the column to appear in future.

3.1 Updating the firmware

How to update the firmware

1. From the **Help** menu, select the **Update firmware option** in order to open the corresponding window:



2. Click **Search** to search for and select the firmware file.
3. Click **OK** to update the SmartCheck device with the selected firmware. Click **Cancel** to close the window without applying any changes.



- When the firmware is updated, all measurement data and configurations on the device may be lost. Before updating, save everything by downloading measurement data and, if applicable, configurations with the SmartUtility software. The taught-in alarm limits are part of the configuration and are downloaded at the same time.
- The update can take several minutes. The status LED on your SmartCheck device will flash yellow and red alternately during this time. The following is very important in this process:
  - o The power supply to the SmartCheck device must not be interrupted.
  - o The Ethernet connection to the SmartCheck device must not be interrupted.
  - o The update must be fully completed.

  The device is no longer functional if these conditions are not met!
- If a serious error occurs during a firmware update, the device is reset to the factory firmware. You can find the version of your factory firmware under **Help > Version information**.
- After you have performed the firmware update, empty the browser cache. This is necessary to ensure that the latest version of the FAG SmartWeb software is loaded in your browser.

3.2 Select device restart

To select the device restart, proceed as follows

1. From the **Help** menu, select the **Select device restart** option to open the corresponding window:



2. Select the required option from the list box:

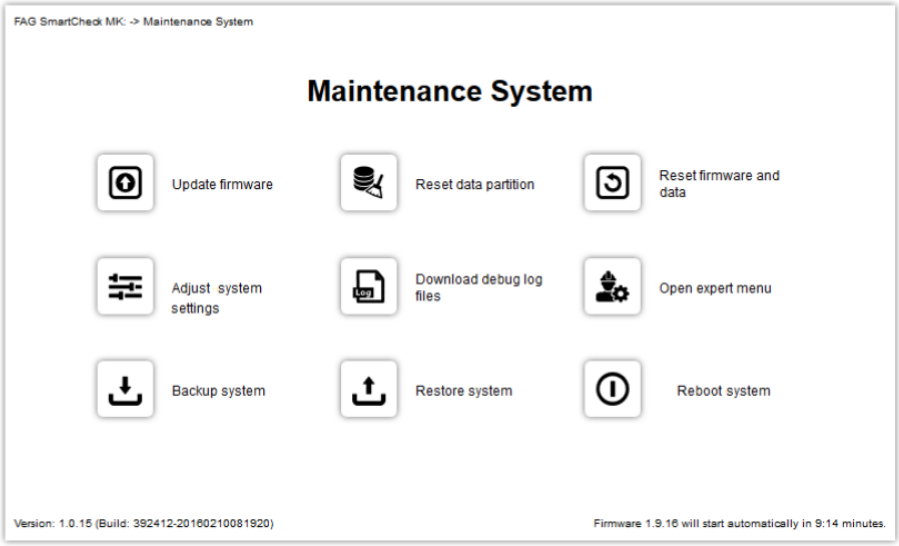
Restart device

This option restarts the SmartCheck device:

- Current measurements are interrupted.
- Existing measurement data, configurations and the firmware are retained.

Start the device's Maintenance System

You use this option to start the **Maintenance System** of the device. Here you will find extensive maintenance functions, including for firmware update, device configuration and system back-up. The Maintenance System also contains further options for restarting the device.



When User management is activated 116, a logon dialogue appears first. You can only log on to the Maintenance System as an administrator and using the administrator password.

Reset data partition

This option resets the data range:

- All existing measurement data is lost.
- Firmware and configurations, including taught-in alarm limits, are retained.

Restore factory

This option restores the SmartCheck device to the factory default setting:

default setting

- All existing measurement data is lost.
- All taught-in alarm limits are deleted.
- All configurations are lost.
- The firmware is reset to the factory default firmware.

To save measurement data, taught-in alarm limits and configurations, download the measurement data and configurations with the SmartUtility software before you restore the factory default setting. The taught-in alarm limits are part of the configuration and are downloaded at the same time.

3. Click **OK** to reset the SmartCheck device with the selected option. Click **Cancel** to close the window without applying any changes.



Once the factory default setting has been restored, the SmartCheck behaves as follows:

- The device then tries to obtain an IP address via DHCP.
- If the device does not receive an address, it reverts to address 192.168.1.100/24.

Ensure that the device is accessible and then install the latest firmware.

4 Device Maintenance System

The Maintenance System of the FAG SmartCheck device offers comprehensive maintenance functions. You can use this system, for example, to update the firmware, configure the SmartCheck device, to back up a system, or to restore a system from back-up. You can also use the latter function to duplicate devices. The Maintenance System also offers securely protected expert functions for updating the Maintenance System or for deleting the entire system on a SmartCheck device among other things.

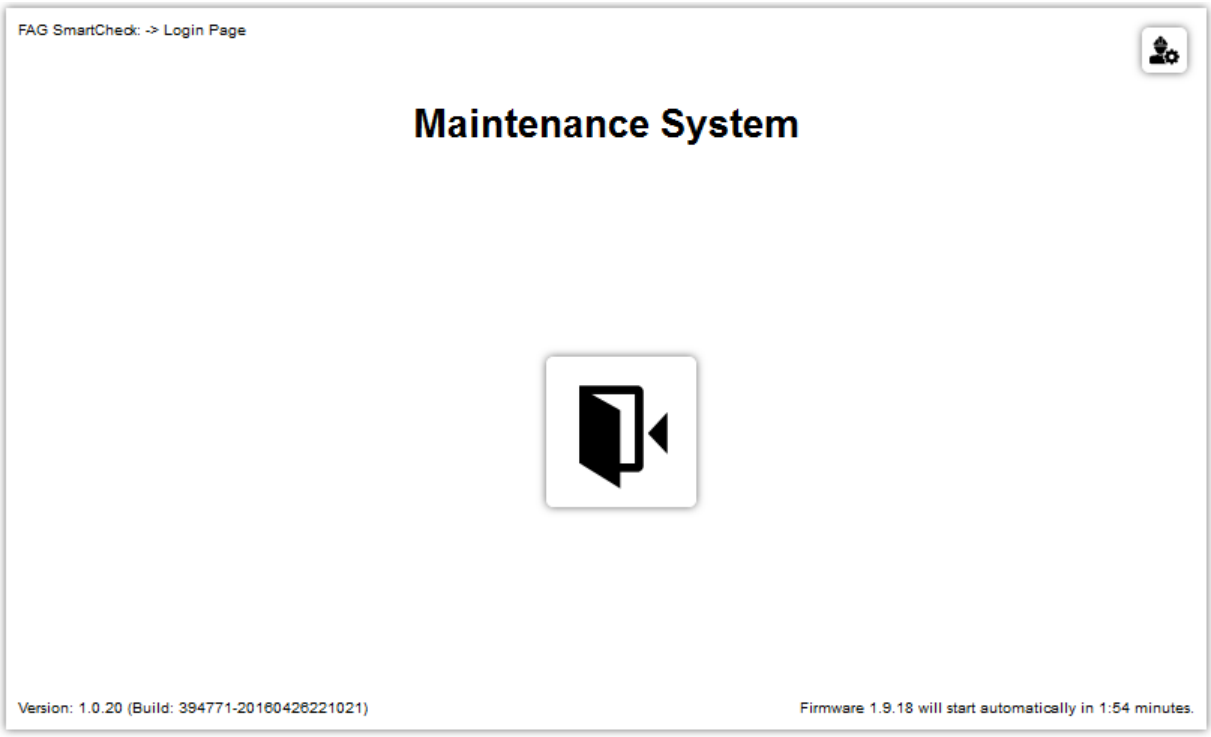
The Maintenance System is independent of the actual firmware on the device and can also be accessed via the browser, for example, if a firmware update has not run correctly.

To open the Maintenance System of the SmartCheck device, proceed as follows:

1. From the **Help** menu, select the **Select device restart** option to open the corresponding window:

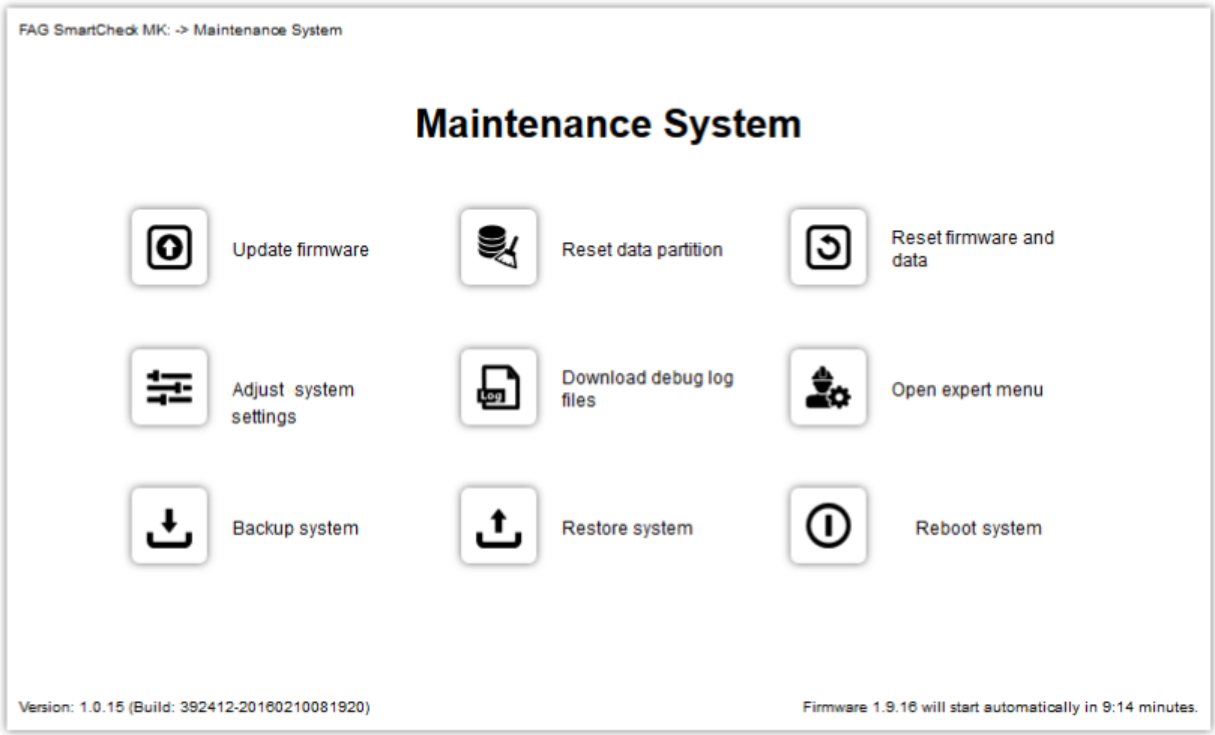


2. From the selection list, choose the option **Start the device's Maintenance System**.
3. Click on **OK**. The log-in page for the Maintenance System is displayed:



4. Click on the button **Login** to open the start page of the Maintenance System. Use the button **Expert Menu** to directly access the Expert menu 25.
   If user management is activated in the SmartCheck firmware, a log-in dialogue appears in which you are required to

log in as an administrator using the administrator password. If user management is deactivated, the start page opens directly:



5. On the start page, click on an icon to select the relevant function. Depending on the function you choose, you will then need to perform further steps or select sub-functions in a submenu. For information on the individual functions of the Maintenance System, see the following sections.

- If the Maintenance System is started, the SmartCheck device interrupts all measurements.
- If you have opened a function of the Maintenance System, the **Homepage** button is displayed at the top right. Click on this button to return to the start page of the Maintenance System.
- The Maintenance System has a timer function: if you do not make any changes for a certain period of time, the device is automatically restarted. The length of time depends on where you are in the Maintenance System:
  - Login page of the Maintenance System: restart after 2 minutes
  - Start page of the Maintenance System and all function pages: restart after 10 minutes
  - Login page of the expert menu **Expert Menu**: 60 minutes

  The remaining time until the device restarts is always displayed at the bottom right.

4.1 Update firmware

Click on the **Update firmware** button to start this function. You can update your system with a new firmware version here. This does not delete the measurement data.

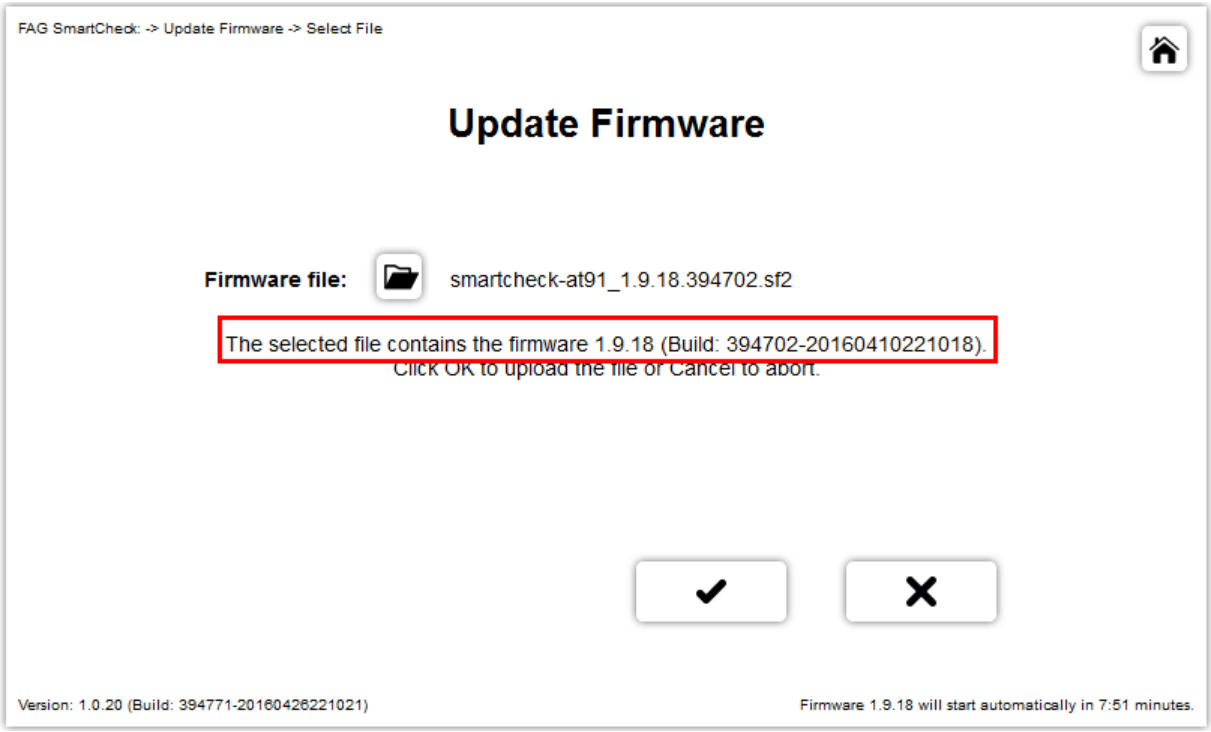
Depending on the version of your firmware, you can also use this function to downgrade to a previous firmware version. In this case, the measurement data is also deleted.

The option to downgrade is available as follows:

- Up to release 1.10.0: Downgrade to previous versions is possible
- From release 1.10.0 and above: Downgrade is only possible to 1.10.0

How to update the firmware

1. Click on the **Select file** button and search for the SF2 file containing the required firmware.
2. Open the SF2 file. The system analyses the file and informs you whether the update is possible, and if yes, which firmware will be installed:



If the selected file is not a valid firmware file, you will be informed of this too.

3. Click on the **OK** button to start the update.

- When the firmware is updated, all measurement data and, in some cases, also the configurations on the device are lost. Before updating, save everything by downloading measurement data and, if applicable, configurations with the SmartUtility software. The taught-in alarm limits are part of the configuration and are downloaded at the same time.
- The update can take several minutes. The status LED on your SmartCheck device will flash yellow and red alternately during this time. The following is very important in this process:
  - The power supply to the SmartCheck device must not be interrupted.
  - The Ethernet connection to the SmartCheck device must not be interrupted.
  - The update must be fully completed.

  The device is no longer functional if these conditions are not met!
- If a serious error occurs during a firmware update, the device is reset to the factory firmware. You can find the version of your factory firmware under Help > Version information.
- After you have performed the firmware update, empty the browser cache. This is necessary to ensure that the latest version of the FAG SmartWeb software is loaded in your browser.

4.2 Reset data partition

Click on the **Reset data partition** button to start this function. Here you can reset the data partition. This deletes all measurement data from the system. The measurement configurations are retained.

Click on **OK** to reset the data partition.

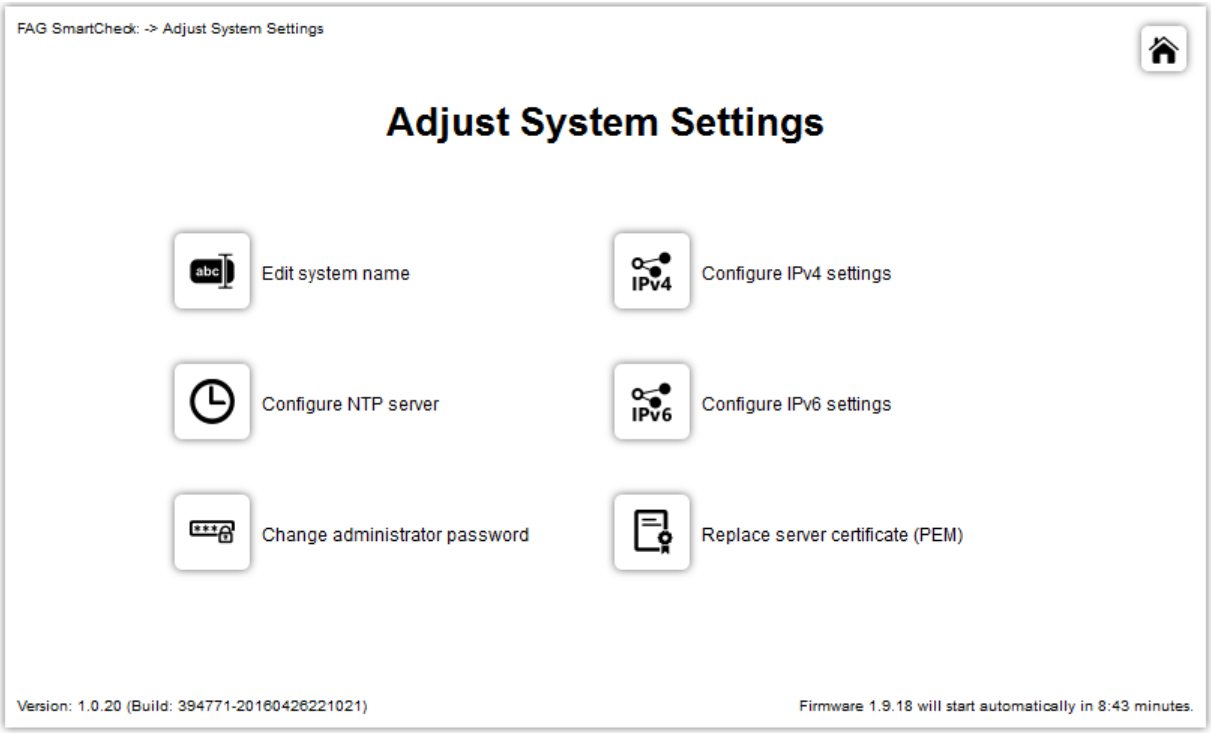
4.3 Reset firmware

Click on the **Reset firmware** button to start this function. Here you can format the data partition and restore the standard measurement configuration. This deletes all measurement configurations and data.

Click on **OK** to reset the firmware.

4.4 Adjust system settings

Click on the **Adjust system settings** button to open the menu containing the system setting functions:



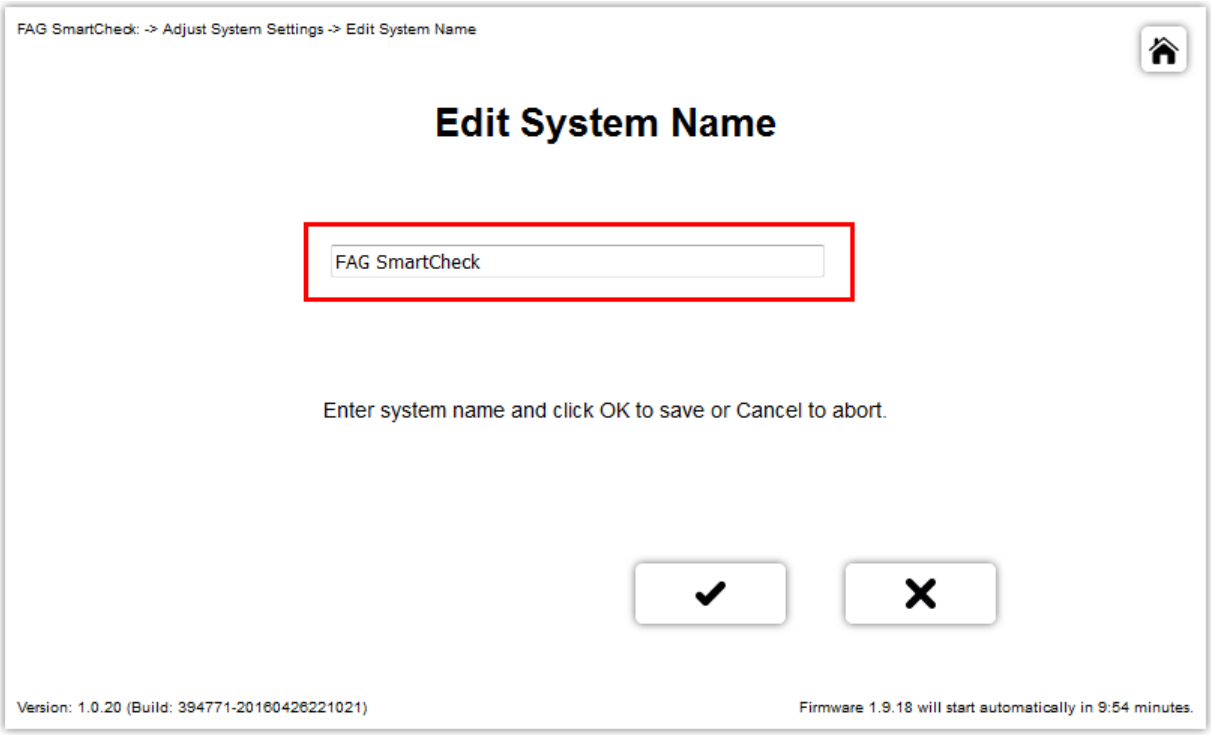
Click on one of the buttons to open the corresponding function. The following sections contain more information about the individual functions.

4.4.1 Edit system name

Click on the **Edit system name** button to start this function. Here you can define a new name for your SmartCheck device.

To edit the system name, proceed as follows:

1. In the input field, enter the new name for your SmartCheck device:



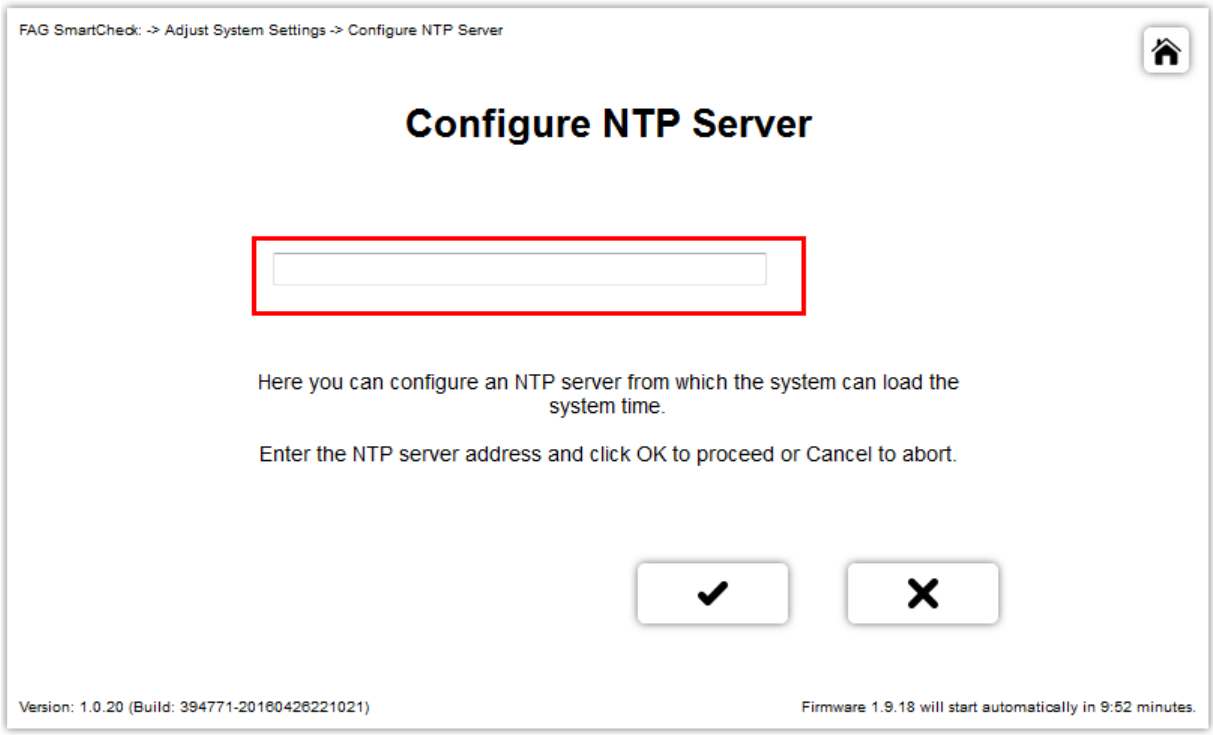
2. Click on **OK** ✔ to confirm the name.

4.4.2 Configure NTP server

Click on the **Configure NTP server** button to start this function. Here you can define an NTP server from which the SmartCheck device can obtain the system time.

To configure the NTP server, proceed as follows:

1. In the input field, enter the IP address or server name of the NTP server:



2. Click on **OK** ✔ to confirm the IP address or server name.

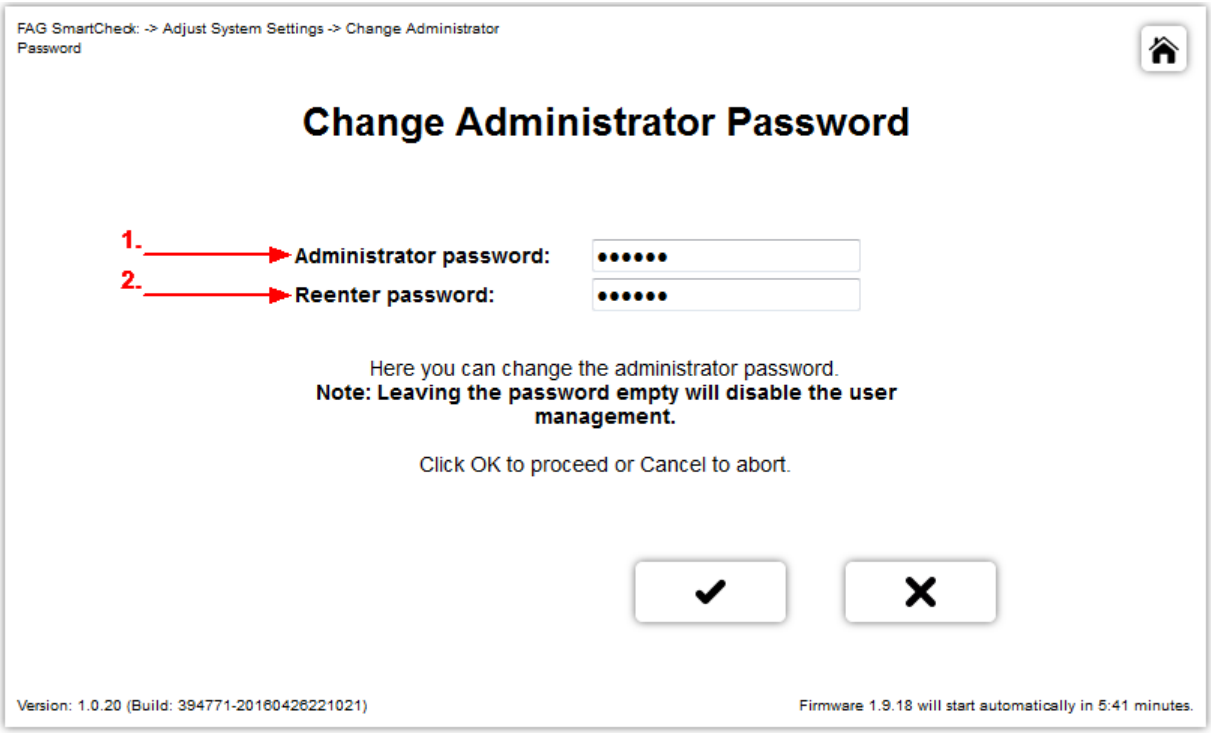
If the system time is based on an NTP server, synchronization runs constantly. For this method, therefore, the SmartCheck device must have a permanent connection to the network, and the NTP server must always be accessible.

4.4.3 Change administrator password

Click on the **Change administrator password** button to start this function. Here you can change the administrator password for user management.

To change the administrator password, proceed as follows:

1. Enter the new password in the field **Administrator password**.
2. Repeat this password in the field **Reenter password**:



3. Click on **OK** ✔ to confirm the new password.

If you enter an administrator password here, user management 115 is activated automatically on the SmartCheck device.

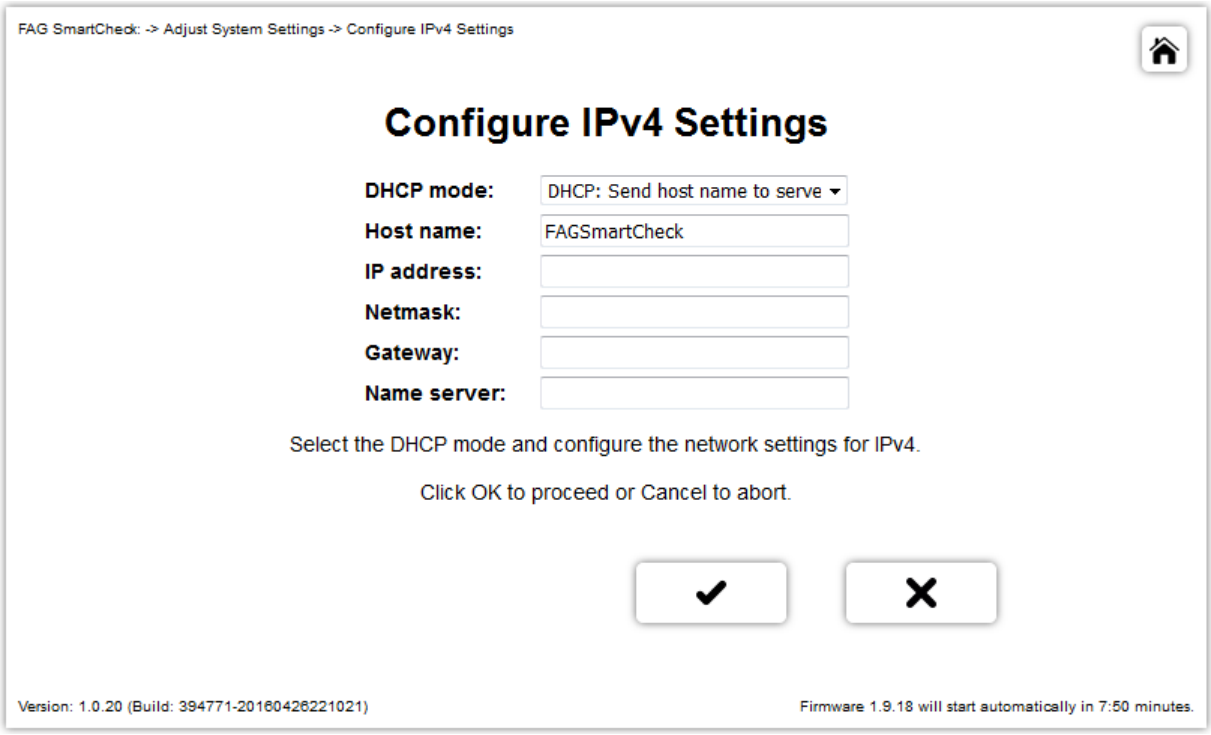
If you do not enter an administrator password here, user management is deactivated on the SmartCheck device.

4.4.4 Configure IPv4 settings

Click on the **Configure IPv4 settings** button to start this function. Here you can edit the IPv4 network settings.

To edit the IPv4 network settings, proceed as follows:

1. Select the required DHCP mode from the list **DHCP mode**:



You have the following options:

No DHCP	With this option, you can specify the IPv4 address or continue to use the default IP address of the SmartCheck device. If **No DHCP** is activated, you must also specify the other settings in this step, e.g. **IP address**, **Netmask** or **Gateway**.
DHCP: Send host name to server	With this option, the SmartCheck device automatically receives an IP address within your network. The host name is registered by the SmartCheck device in the network's DNS server.
DHCP: Load host name from server	With this option, the SmartCheck device automatically receives an IP address within your network. The host name is specified via the network's DNS server.

2. Depending on the selection for **DHCP mode**, you will need to make further entries under **Host name**, **IP address**, **Netmask**, **Gateway** , or **Name server**.
3. Click on **OK** ✔ to confirm the changes and return to the system settings menu.



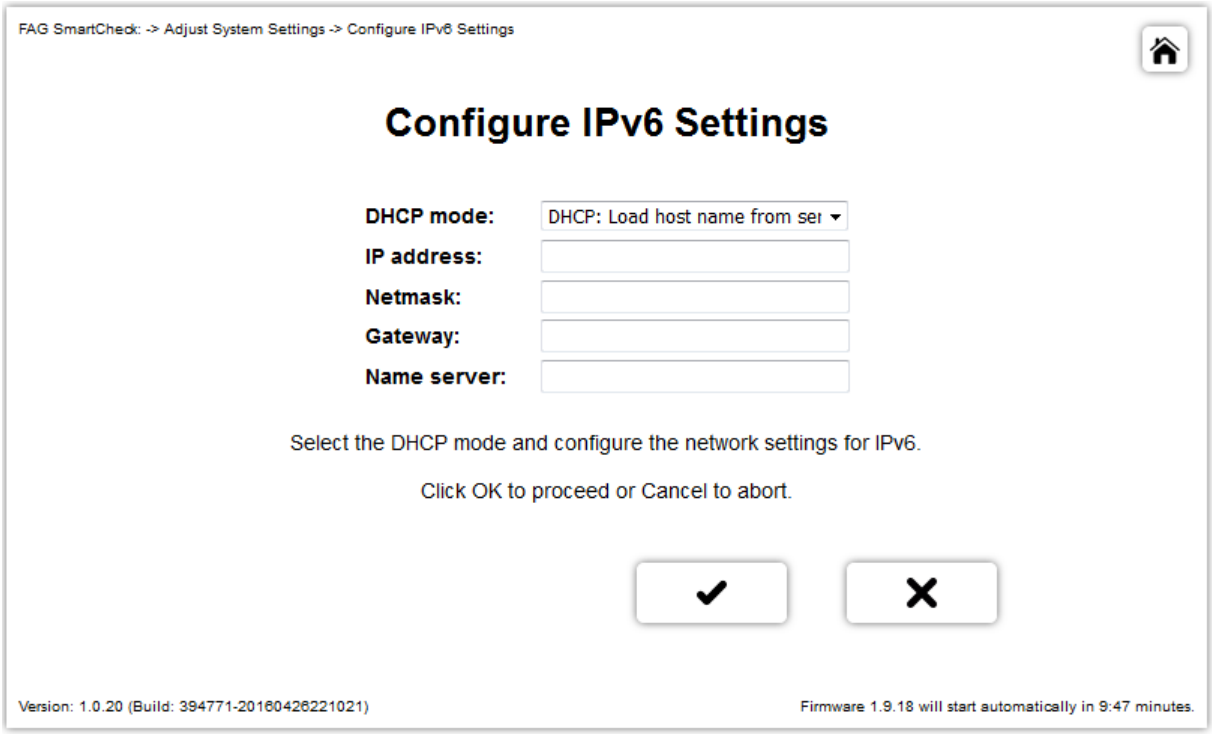
- If you change the IP address of the SmartCheckGeräts, you no longer have access to the SmartWeb software under the previous address. You must then enter the new address of the device in the browser in order to load the software and the Maintenance System again.
- If the IP address is allocated automatically via DHCP, the SmartCheck device can only be accessed via the automatically allocated IP address or using the host name (DNS). You can no longer use the default IP address.

4.4.5 Configure IPv6 settings

Click on the **Configure IPv6 settings** IPv6 button to start this function. Here you can edit the IPv6 network settings.

To edit the IPv6 network settings, proceed as follows:

1. Select the required DHCP mode from the list **DHCP mode**:



You have the following options:

No DHCP	With this option, you can specify the IPv6 address or continue to use the default IP address of the SmartCheck device. If **No DHCP** is activated, you must also specify the other settings in this step, e.g. **IP address**, **Netmask** or **Gateway**.
DHCP: Load host name from server	With this option, the SmartCheck device automatically receives an IP address within your network. The host name is specified via the network's DNS server.

2. Depending on the selection for **DHCP mode**, you will need to make further entries under **IP address**, **Netmask**, **Gateway** or **Name server**.
3. Click on **OK** to confirm the changes and return to the system settings menu.

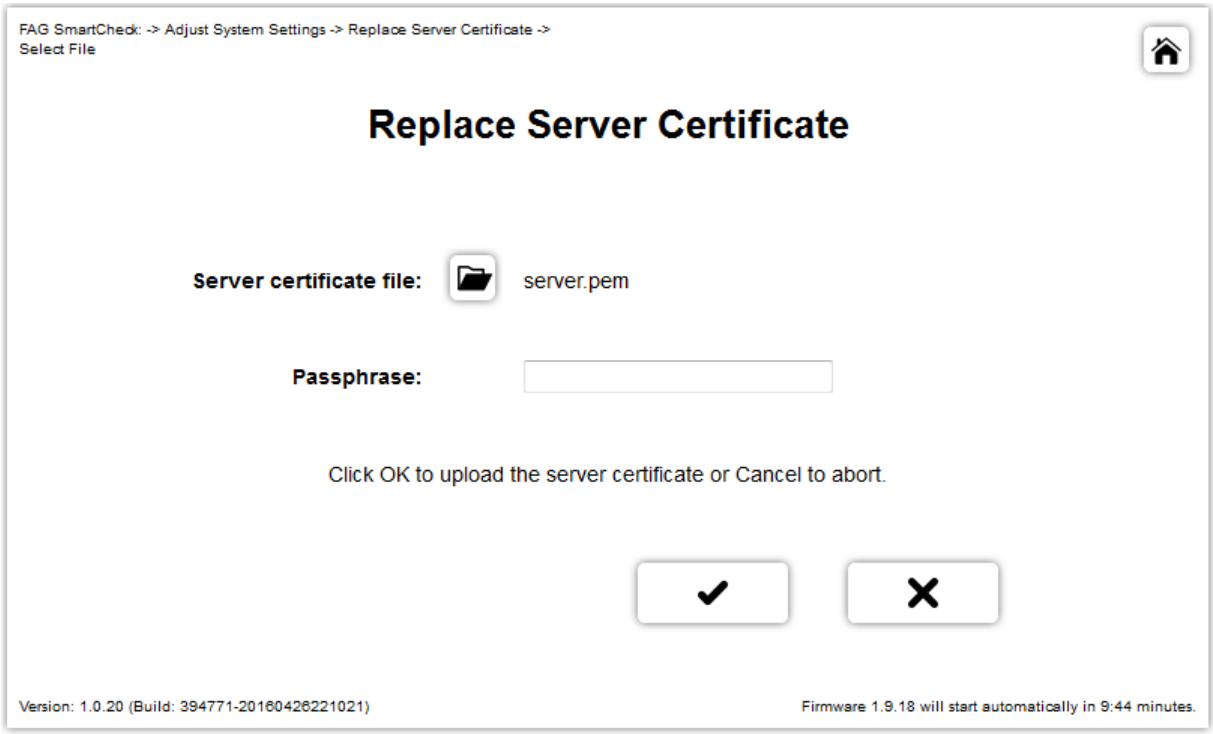
- If you change the IP address of the SmartCheckGeräts, you no longer have access to the SmartWeb software under the previous address. You must then enter the new address in the browser in order to load the software again.
- If the IP address is allocated automatically via DHCP, the SmartCheck device can only be accessed via the automatically allocated IP address or using the host name (DNS). You can no longer use the default IP address.

4.4.6 Replace server certificate (PEM)

Click on the **Replace server certificate (PEM)** button to start this function. Server certificates are used for authentication of the server by the client. Here you can replace the server certificate that is defined on the SmartCheck device with your own server certificate.

To replace the server certificate of the SmartCheck device, proceed as follows:

1. Click on the button **Server certificate file** and search for the PEM file containing the required server certificate.
2. Open the PEM file and, if necessary, enter the password for the PEM file in the field **Passphrase**:



3. Click on **OK** ✔ to upload the certificate. The system analyses the file and informs you if can install the file:



If the file does not contain a valid server certificate, you will be informed of this too.

4. Click on **OK** ✔ to install the server certificate.

4.5 Download debug log files

Click on the **Download debug log files** button to start this function. Here you can create and download an error log file. You cannot view this file yourself. You need to send it to our Support Team 119 where it can be analysed.

To download the log files, proceed as follows:

1. Click on **OK** to start the action.
2. The error log file is downloaded. A progress bar informs you of the download progress.
3. Your browser prompts you to save the file. Confirm this. You can then find the error log file *.SCLG in the standard download folder.

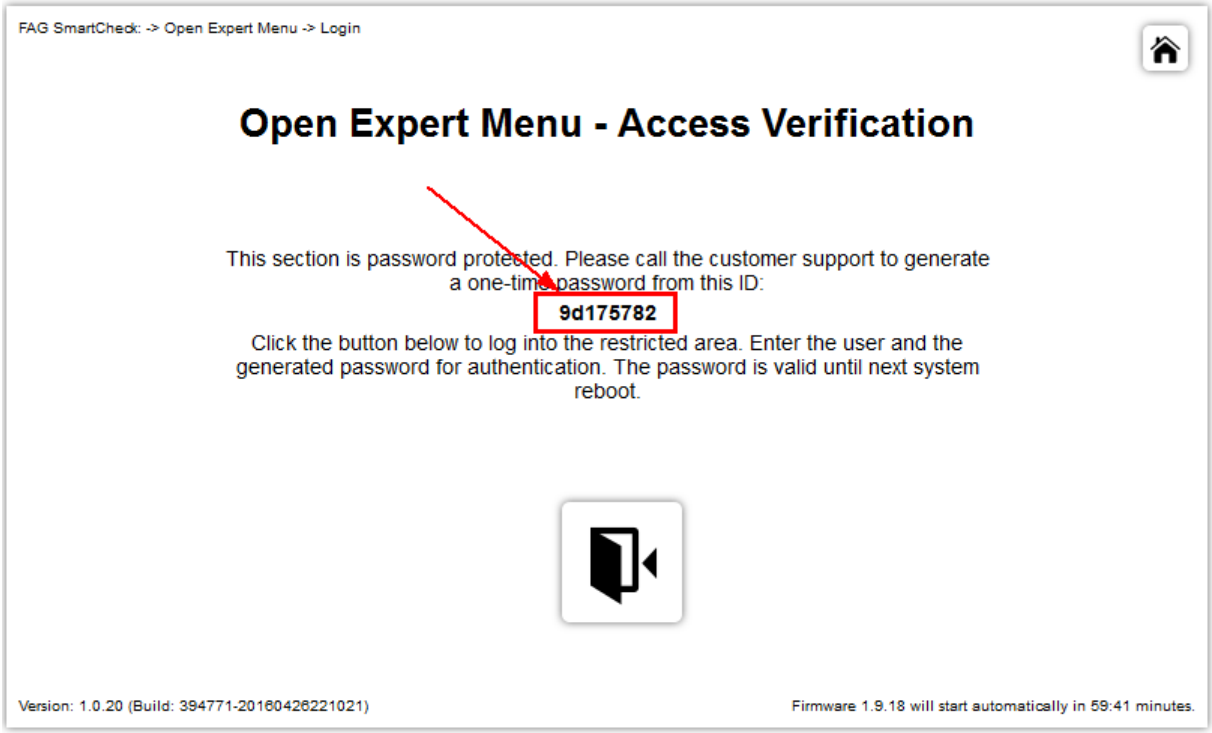
4.6 Open expert menu

Click on the **Open expert menu** button to start the secure log-in process for the expert menu.

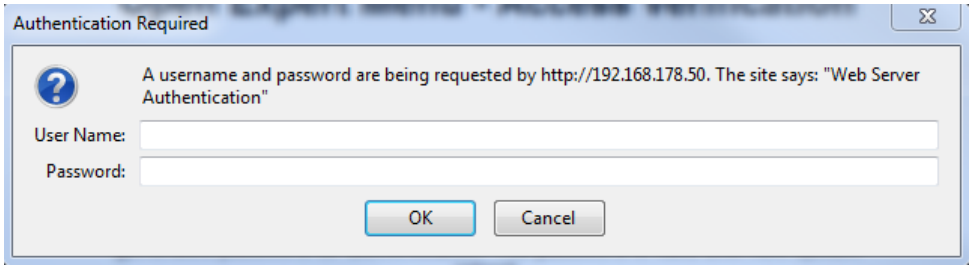
The expert menu contains functions that you can use to change the basic settings of the FAG SmartCheck device. Because these are system-critical settings, the expert menu can only be opened via the secure log-in process with a single-use password. The following section contains information about the secure log-in process.

To perform the secure log-in process, proceed as follows:

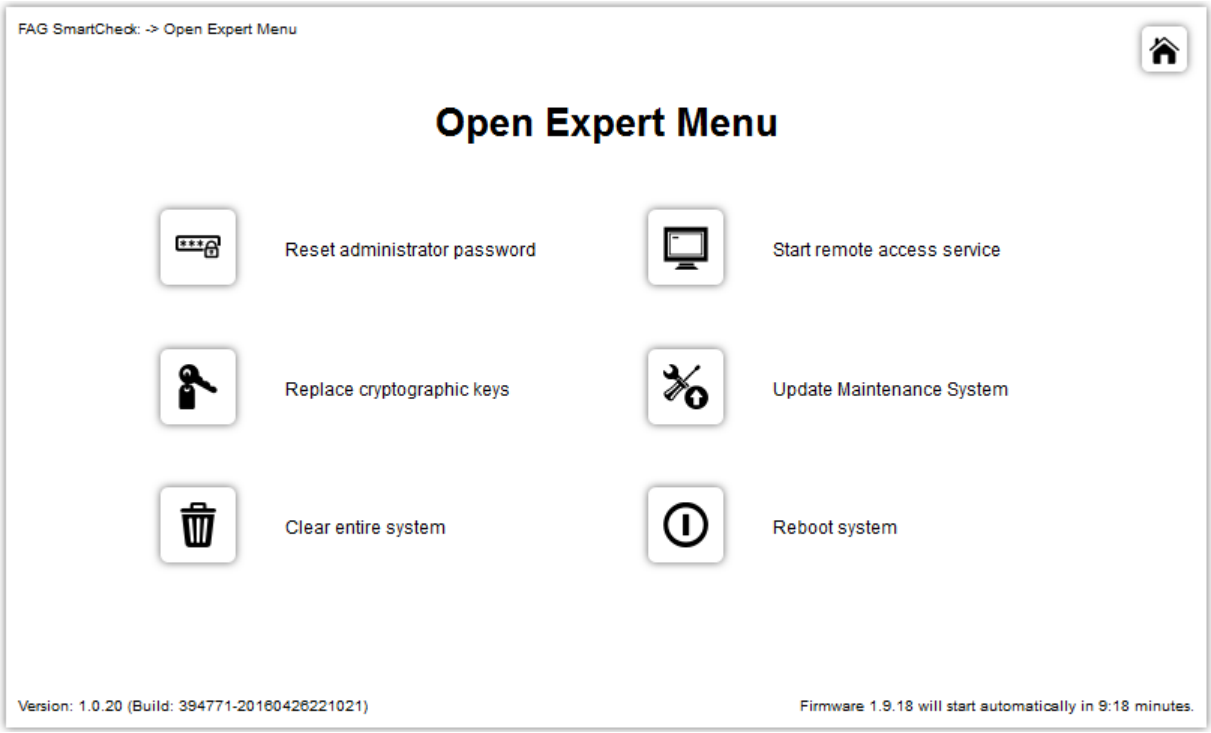
1. On the start page of the log-in process, you will find an ID. Share this ID with our support team 119, e.g. by e-mail or telephone.



2. Our support team will use this ID to generate a single-use password and will forward this to you.
3. Click on the **Login** button to open the authentication page, and enter the user name in the **User Name** field and the single-use password in the **Password** field:



4. Click on the **OK** button. The expert menu home page is displayed:



Click on one of the buttons to open the corresponding function. The following sections contain more information about the individual functions in the expert menu.

- The ID and the single-use password are only valid while you remain in the maintenance system. As soon as you restart the SmartCheck device, the ID and password are no longer valid. When you restart the maintenance system, a new ID then becomes valid, and you can use this to request a new password from support.
- On the homepage for the log-in process, you have 60 minutes to obtain the single-use password from support. During this time, if you use the button to switch to the maintenance system and from there back to the home page of the log-in process, the timer is reset to 60 minutes.

4.6.1 Reset administrator password

Click on the **Reset administrator password** button to start this function. Here you can reset the administrator password to the factory default setting. All users can then log on without a password and have administrator rights. This deactivates user management.

Click on **OK** to reset the administrator password.

Use the **Change administrator password** 21 function to change the administrator password. To find this function, choose **Adjust system settings** in the main menu of the Maintenance System.

4.6.2 Replace cryptographic keys

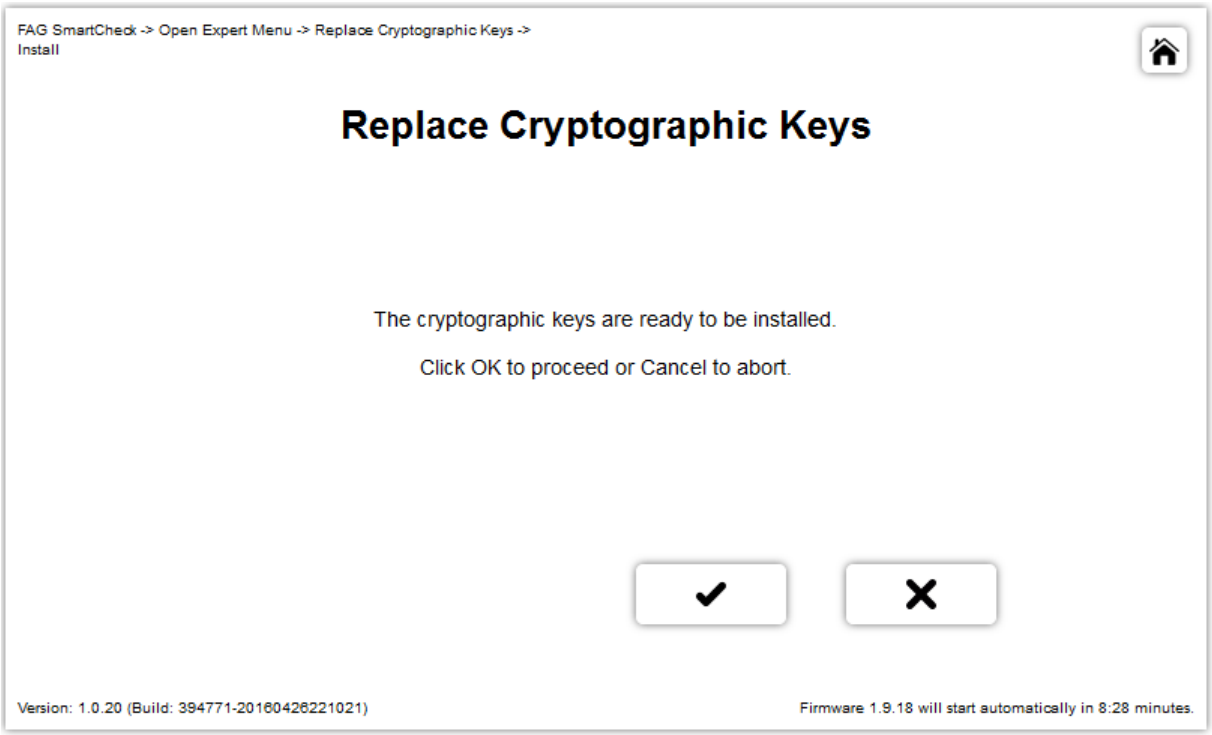
Click on the **Replace cryptographic keys** button to start this function. The cryptographic keys are used to decode firmware files (*. SF2) and back-up files (*.SCBK) and for encoding back-up and protocol files. If they have become known due to a cyber attack, they must be replaced. This ensures that no harmful software can be installed on the system.

To replace the cryptographic keys, proceed as follows:

1. Click on the button **Keystore** and search for the file containing the cryptographic keys.
2. Open the file:



3. Click on **OK** to upload the cryptographic keys. The system analyses the file and informs you if can install the file:



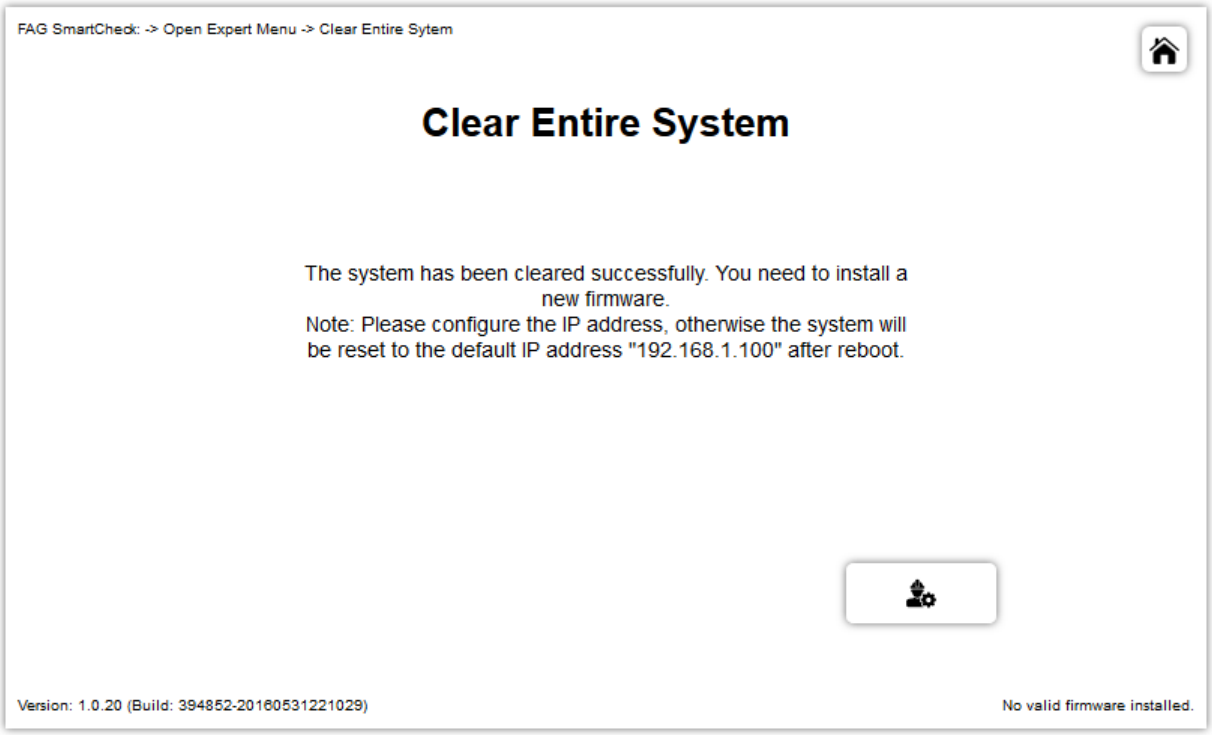
If the file does not contain any valid cryptographic keys, you will be informed of this too.

4. Click on **OK** to install the new cryptographic keys.

4.6.3 Clear entire system

Click on the **Clear entire system** button to start this function. Here you can delete the entire system including firmware, configurations and measurement data. The Maintenance System remains unaffected by this function.

1. Click on **OK** to delete the entire system. The system is deleted and you then receive the following message:



2. You must now install new firmware. You also need to reconfigure the IP address of the SmartCheck device, because it has been reset to the standard IP address by this action.

After you have used the action **Clear entire system**, no firmware is available on the SmartCheck device. You have the following options to continue working with the device:

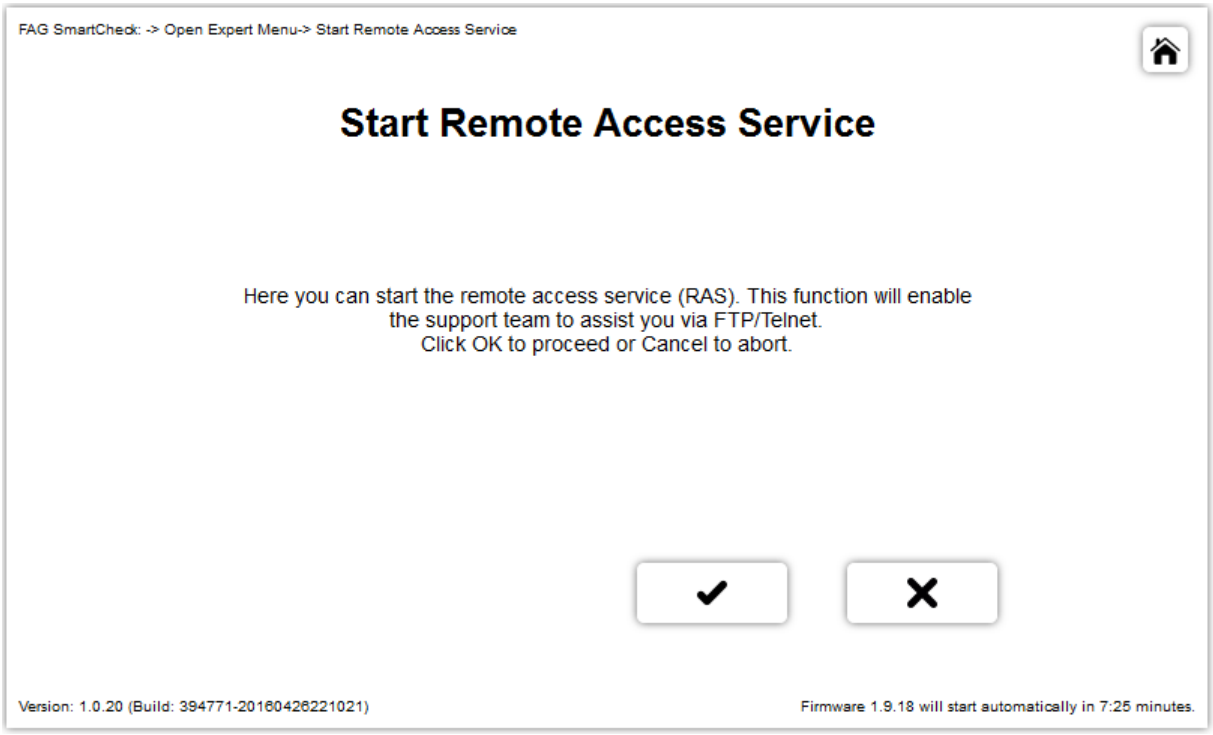
- Load a new firmware file onto the device using **Update firmware** 17.
- Choose **Restore system** 31 to load a previously created back-up file containing the entire system onto the device.

4.6.4 Start remote access service

Click on the **Start remote access service** button to start this function. Using this function, our Support Team 119 can support you via an FTP/Telnet server in the Maintenance System. As soon as you restart the SmartCheck device, the Remote Access Service (RAS) is terminated.

To start remote access via RAS, proceed as follows:

1. Click on **OK** to start remote access via RAS.
2. The system reports that RAS has started successfully:

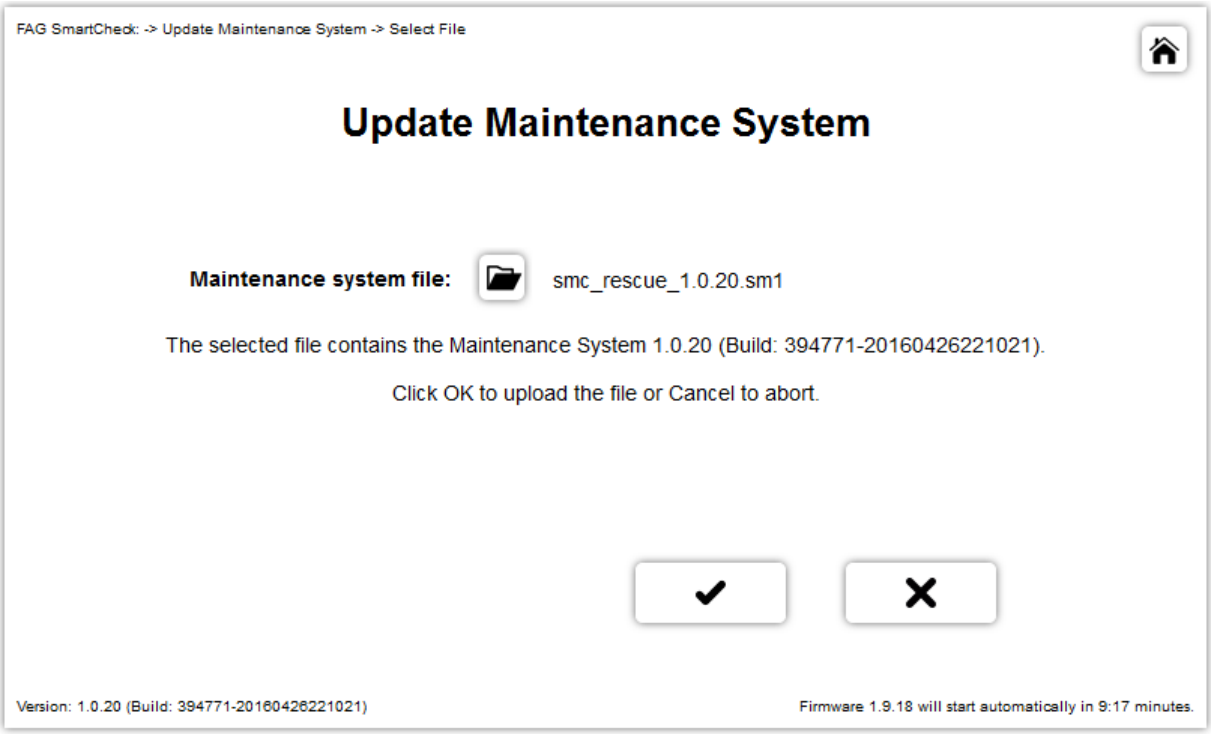


4.6.5 Update Maintenance System

Click on the **Update Maintenance System** button to start this function. Here you can upload an SM1 file to update the Maintenance System.

To update the Maintenance System, proceed as follows:

1. Click on the **Maintenance system file** button and search for the SM1 file containing the required Maintenance System.
2. Open the SM1file. The system analyses the file and informs you which version of the Maintenance System it contains:



If the selected file does not contain a Maintenance System, you will be informed of this too.

3. Click on **OK** ✔ to update the Maintenance System.

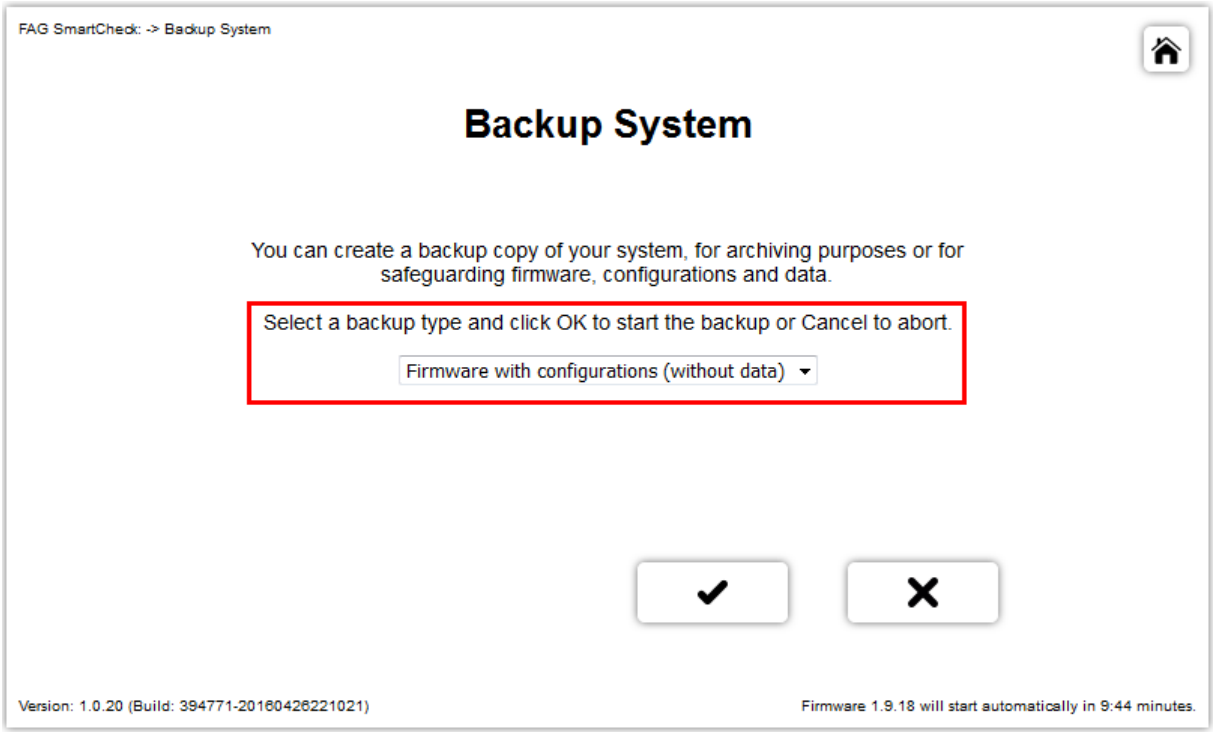
For this function, ensure a functioning power supply and an uninterrupted connection to the SmartCheck device. If problems occur during the update, send the device to our support team 119.

4.7 Backup system

Click on the **Backup system** button to start this function. Here you can create a back-up file of your system in order to save firmware, configurations and data. You can then use the **Restore system** 31 function to select and load a back-up file to restore a system, or to duplicate devices, e.g. to load configurations on multiple SmartCheck devices.

To back up your system, proceed as follows:

1. Select the required back-up type from the selection list:



You have the following options:

Firmware with configurations (without data)	You can use this option to save the firmware and the configurations of the system. The measurement data is not saved.
Firmware with configurations and data	You can use this option to save the firmware, configurations and measurement data of the system.

2. Click on **OK** ✔ to confirm the selected type of back-up and start the action.
3. The back-up file is downloaded. A progress bar informs you of the progress.
4. Your browser prompts you to save the file. Confirm this prompt. You can then find the back-up file *.SCBK in the standard download folder.

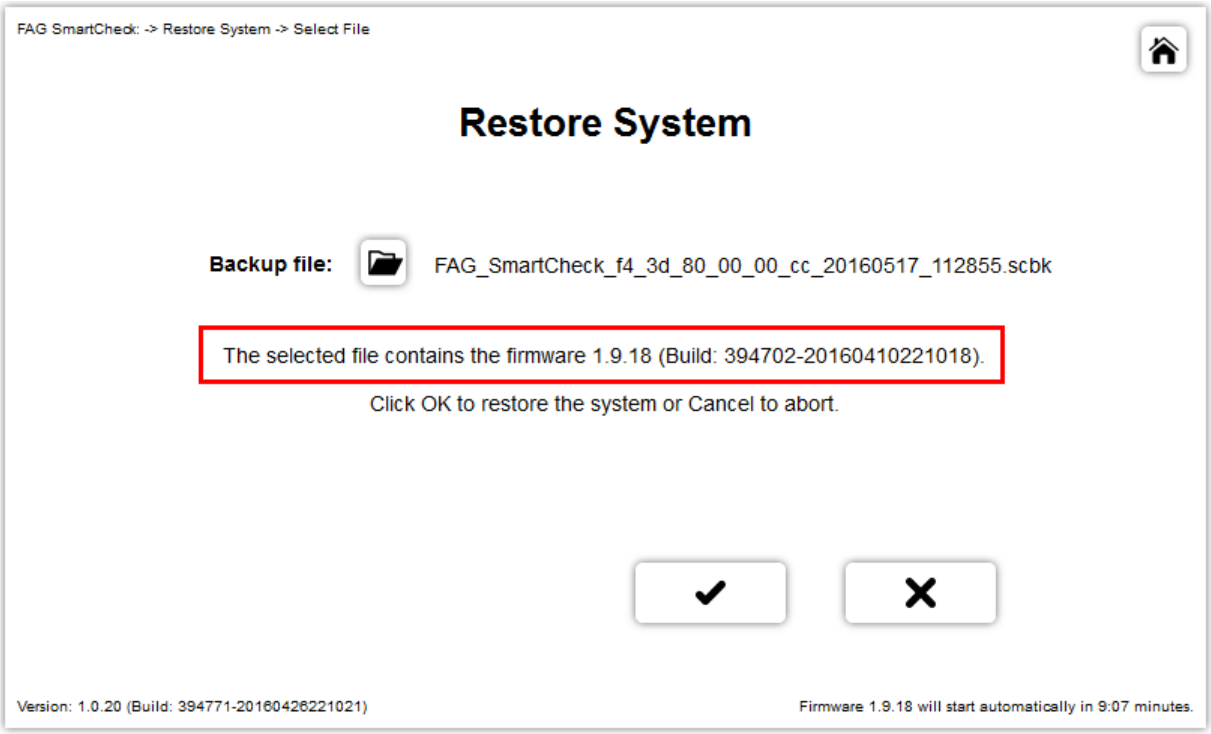
Depending on the data volume, if you use the option **Firmware with configurations and data** the file can become very large and the download therefore may take a long time. During the download, the timer function is repeatedly reset to 10 minutes and does not expire.

4.8 Restore system

Click on the button **Restore system** to start this function. Here you can select a previously created back-up file 30 to restore a system. The back-up file either contains only the firmware and configurations, or it contains the entire system (firmware, configurations, and data). A back-up file can, for example, be loaded to a new SmartCheck device that will replace a previous device. In addition, you can also use a back-up file to copy a particular system to multiple devices.

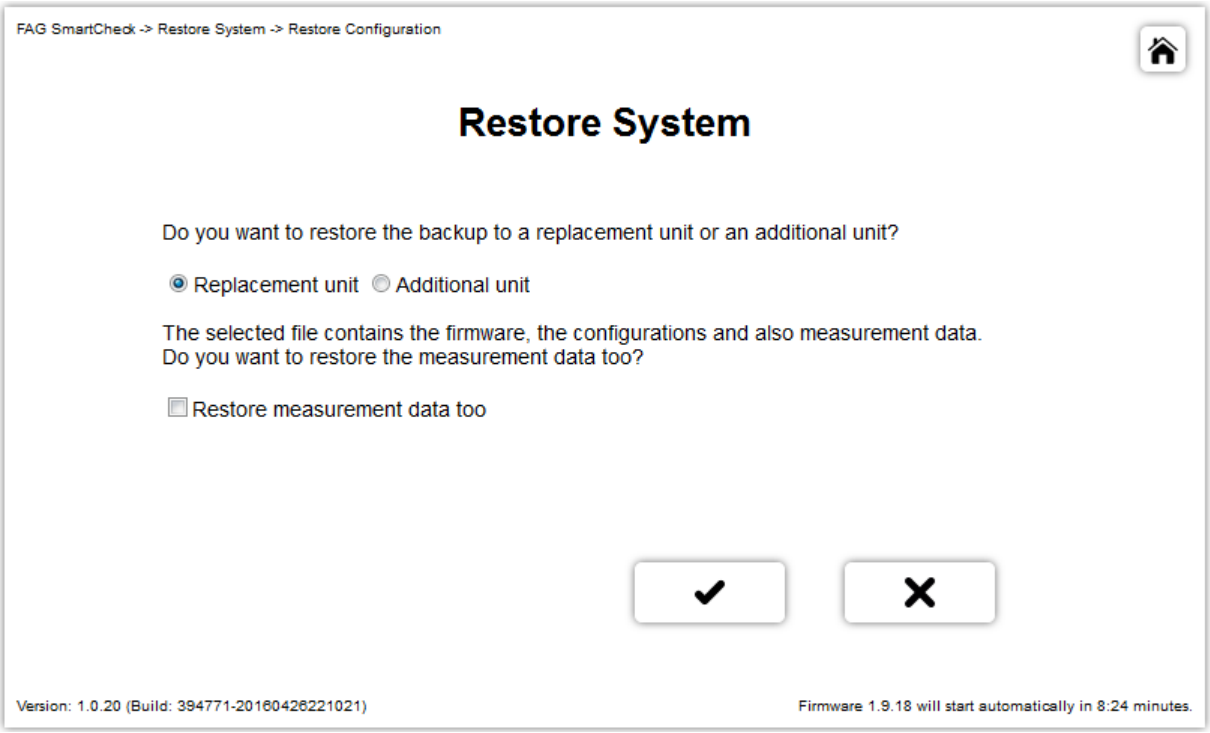
To restore the system, proceed as follows:

1. Click on the **Select file** button and search for the SCBK file containing the required system.
2. Open the SCBK file. The system analyses the file and informs you which firmware the selected file contains:



If the selected file is not a valid back-up file, you will be informed of this too.

3. Click the **OK** ✔ button. You will then be prompted to enter more precise details for restoring the system:



You have the following options:

Replacement unit	Select this option if you want to use the back-up file to load the system to a replacement unit. If the selected back-up file also contains measurement data, the option **Restore measurement data too** also appears (see below).
Additional unit	Select this option if you want to use the back-up file to copy the firmware and the configurations to other SmartCheck devices.

Restore measurement data too	This option is only displayed • if the selected back-up file also contains measurement data (in addition to the firmware and configurations) and • if you have selected the option **Replacement unit**. Select this option to also restore the measurement data of the back-up file. By default, this option is deactivated and the system is restored without measurement data.

4. Click on **OK** ✔ to confirm your selection and to start restoration of the system.



- If the **Restore System** function is cancelled after it has been started, there will no longer be any firmware on the SmartCheck device. When you start the SmartCheck device, the Maintenance System opens. You must then load new firmware onto the device, for example, using the functions **Update firmware** or **Restore system**.
- When you create a back-up file, not all content is copied. A back-up file for instance does not contain a network address. If you use **Restore system** to load a back-up file onto a new device, the network address of the new device is retained.

4.9 Reboot system

Click on the **Reboot system** ⏻ button to start this function. This function enables you to shut down and restart the system. This shortens the time until the automatic restart specified by the timer function of the Maintenance System 17.

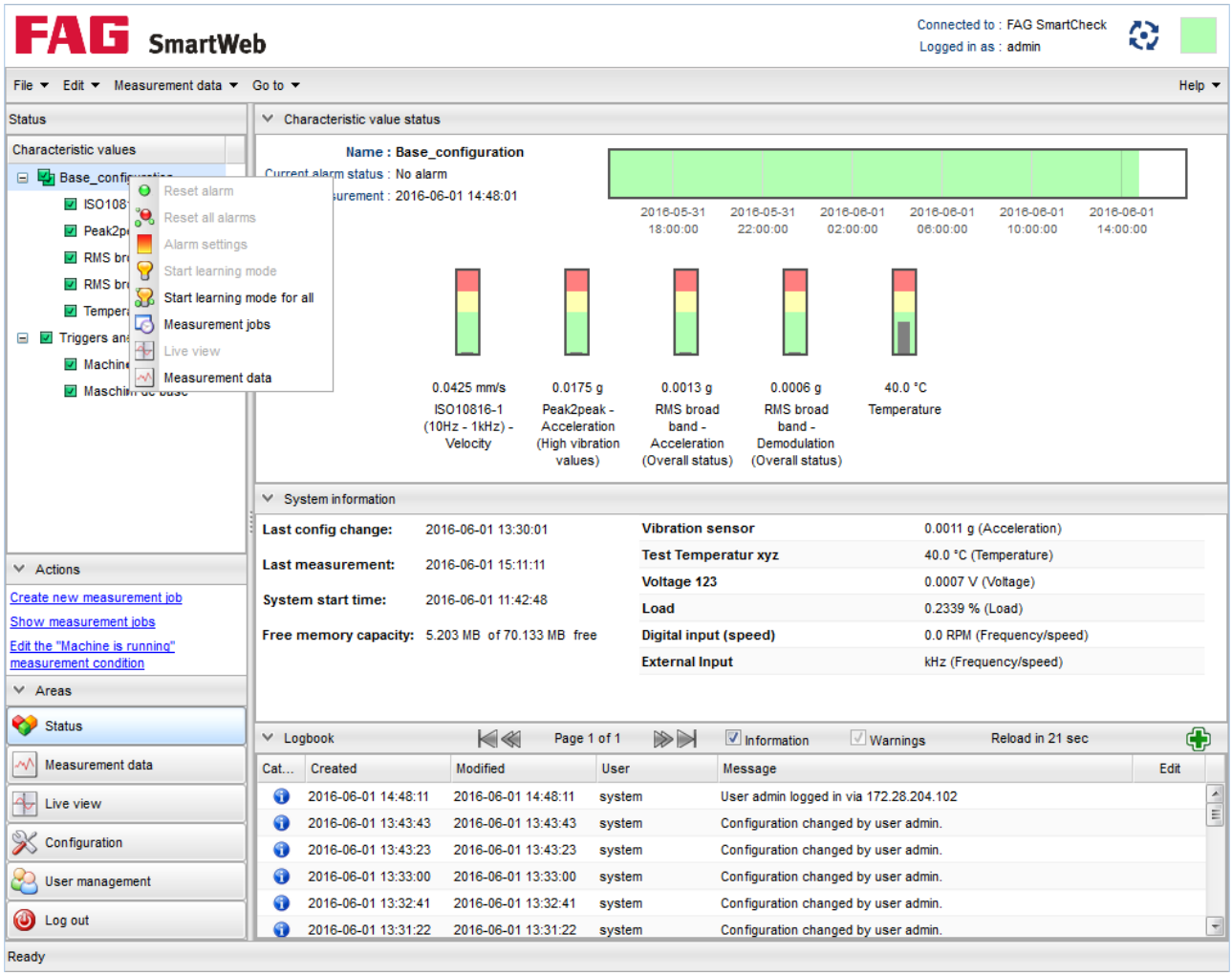
Click on **OK** ✔ to confirm the restart.



This function is available both on the start page of the Maintenance System and in the expert menu.

5 Status

Click on the **Status** button to open the corresponding area. Here you will find a general overview of the status of the SmartCheck device:



You can find the following information here:

Status and context menu

Your measurement jobs and the corresponding characteristic values are listed here. The alarm symbols show you at a glance:

- Non-critical measurement job
- Measurement job with pre-alarm
- Measurement job with main alarm
- Non-critical characteristic value
- Characteristic value with pre-alarm
- Characteristic value with main alarm
- Characteristic value without measured values
- Sensor fault

To see the status of a characteristic value in the main panel of the area, click on the desired characteristic value.

For each item in this list, you can right-click to open a context menu, where you will find the following commands:

- **Reset alarm**
  For individual characteristic values: Switch off the alarm for this characteristic value manually here. This option is required if alarms for this measurement job are not automatically reset as soon as the measured value drops below the alarm limit.

- **Reset all alarms**
  For individual measurement jobs: Manually switch off the alarms of all subordinate items here.



You can only reset alarms manually, e.g. via this context menu, if you made the corresponding setting when creating or editing a measurement job in the **Set Alarms** 64 step: under **Reset Alarms**, you must activate the **Manual** option.

- **Alarm settings** 42
  For individual characteristic values: Here you open a dialogue in which you can view and edit the alarm settings for this characteristic value.
- **Start learning mode**
  For individual characteristic values: Start the learning mode for the selected characteristic value again here. Details on the learning mode and how it works can be found here 70.
- **Start learning mode for all**
  For individual measurement jobs: Start the learning mode again for all subordinate items for which the learning mode is authorised. Details on the learning mode and how it works can be found here 70.
- **Live view**
  For individual characteristic values: Switch here to the **Live view** 46 area. There you will see in real time the signal used for the calculation of this characteristic value.
- **Measurement data**
  Switch here to the **Measurement data** 38 area. There you can display the trends and time signals of these measurement jobs/this characteristic value and carry out an initial analysis.

The commands available depend on which level in the tree structure the selected item is located and whether you have the user rights for the desired action.

Actions

In this area, you will find the menu items **Create new measurement job** 62 and **Show measurement jobs** 59. They allow you to create a new measurement job and to go straight to the detailed overview of your measurement jobs via the corresponding wizards.

If you use one of these menu items, you will then be taken automatically to the **Configuration** area.

Here you will also find the **Edit the Machine is running measurement condition** 86 menu item. This measurement condition is preconfigured on delivery of the device and should be adjusted to the requirements of your machine .

Characteristic value status

For the selected characteristic value, the name, alarm status, time of last measurement and an illustration showing the development of the characteristic value are displayed here in one view.

A further illustration shows how the characteristic value behaves in terms of the pre-alarm and main alarm:



The **grey column** symbolises the current value of the characteristic value. Depending on where it is positioned, it indicates the following:

- **Green area**: The measured value is unproblematic.
- **Yellow area**: The measured value has exceeded the threshold of the pre-alarm.
- **Red area**: The measured value has exceeded the threshold of the main alarm.

If the measured value significantly exceeds the main alarm limit, a small black triangle is displayed above the bar:



If the measured value is below the lower pre-alarm limit **Signal always greater than**, the small black triangle is displayed below the bar. The characteristic value then has a pre-alarm:



If no measured values have yet been measured, a white area is displayed.

System information

General information about the system is displayed here, e.g. when the system was started, when the configuration was last changed, when a measurement was last performed. You will also find the current values for the individual inputs here.

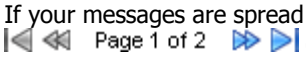
To calculate the characteristic values, the measurement triggers and the measurement conditions, the root mean square (RMS) value is calculated from a specified number of measurement values. The squaring process means that this value is always positive, even if the measurement values are smaller than zero:

Example for measurement trigger: At a measurement range of -3000 rpm to +3000 rpm, if you set a threshold of 1500 rpm with a rising edge, this threshold is triggered both when the value exceeds +1500 rpm and when it falls below -1500 rpm.

Example for measurement condition: At a measurement range of -3000 rpm to +3000 rpm, if you set a lower threshold of 1500 rpm and an upper threshold of 2000 rpm, this condition is met both when the value is between +1500 rpm and +2000 rpm and when it is between -1500 rpm and -2000 rpm.

Logbook

This table contains all messages created by the system or by users of the system, including dates on which the system was created or changed and the level of the message. You have the following options:

- **Browse messages**
  If your messages are spread over several pages, you can use the navigation elements 

of the **logbook** to skip forward and back a page or jump to the start or end of the logbook.
- **Show warnings only**
  The SmartWeb software displays all logbook entries, i.e. errors, warnings and information, by default. You can filter the results to display only **errors** and **warnings** by removing the checkmark from **Information**. If you also deactivate **Warnings**, only errors are displayed.
- **Add message**
  Click on ✚ to create a new message. You can find details on this in the **Create Message in the Logbook** 37 section.
- **Edit messages**
  You can edit messages you created yourself. To do so, click on in the **Edit** column. A window opens, in which you can change the text in the **Message** field. Confirm your change by clicking on **OK**.

The categories of the messages created automatically by the system have the following meaning:

Information refers to events in the system; this includes e.g. a user having logged on or a configuration having been changed.

Warnings are mostly references to misconfigurations, e.g. when a machine exceeds the maximum rotational speed specified in the measurement job.

Errors report system-critical problems. In this case, contact our support team 119.

5.1 Creating/editing a message in the logbook

How to create a message in the logbook

1. Click on ✚ to open the **Add message** window:



2. Select the **Category** for your message.
3. Enter the text of your message in the **Message** field.
4. Click on **OK** to save your message. The **Logbook** will now include the message.

How to edit a message in the logbook

1. In the line of the message you want to edit, click on **Edit** .
2. Make the desired specifications for **Category** and under **Message**.
3. Click on **OK** to accept your changes.

6 Measurement data

Click on the **Measurement data**  button to open the corresponding area. Here you can view the trends and time signals of characteristic values and the trends for measurement triggers and conditions, and you can carry out an initial analysis. On the left, you will find your measurement triggers and conditions, and also the measurement jobs and their characteristic values. If you select an item, you will see the associated trends and saved time signals in the main panel. As soon as you select a saved signal, the corresponding curve appears:

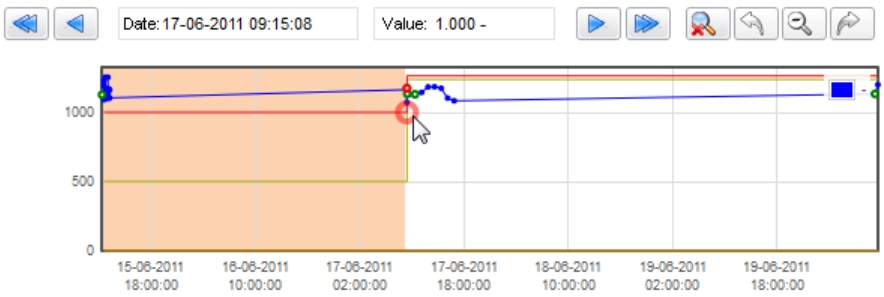


As soon as you have selected a characteristic value and a saved time signal, you will find the following information and functions here:

Trend

Under **Trend**, you will find a graph of the trend values for the selected characteristic value. On the left, you will find precise information on the characteristic value and the save period under **Name**, **Template** and **Range**.

As well as the trend (blue) and the saved time signals, the pre-alarm limits (yellow) and the main alarm limits (red) are also depicted in the graph:



How to work with the graph:

Highlighted in colour The section highlighted in colour tells you about the alarm status at a glance:

- **White:** no alarm
- **Yellow:** pre-alarm
- **Red:** alarm

If the background is **grey**, a characteristic value error has occurred.

Blue line — The blue line represents the trend.

Red line — The red line represents the main alarm limit. Changes in the line occur

- If you have changed the value for the limit
- If the system has learned a new alarm limit via Learning mode 70
- If a new status area was reached in relation to Alarm maps 72.

Yellow line — The yellow line represents the pre-alarm limit. Changes in the line occur

- If you have changed the value for the limit
- If the system has learned a new alarm limit via Learning mode 70
- If a new status area was reached in relation to Alarm maps 72.



If you place the cursor at certain places in the graph, a mark appears and you can then read the corresponding values in the **Date** and **Value** fields. You have this option:

- At the starting points of the trend and of the alarm limits
- At the end points of the trend and of the alarm limits
- At the changing points of the alarm limits
- At all measurement points of the trend (blue and green symbols).



On the blue trend line, you will find the following symbols:

- **Blue:** trend value
- **Green with white centre:** trend value with saved time signal; click on the symbol to display the time signal.
- **Red with white centre:** time signal currently displayed

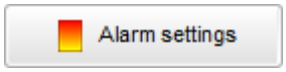
Additional options

 and

Use this button to activate/deactivate the update mode.

If the update mode is activated, the trend is reloaded every 60 seconds and new measurement values appear automatically in the trend window.

If you select in the trend window a trend range in which the last measured value no longer appears, the update mode automatically deactivates.



Click this button to open a dialogue in which you can view and edit the alarm settings for the relevant characteristic value 42.



- The trend display for measurement triggers and measurement conditions enables you to check if and when the value that you have defined as the trigger or condition has been encountered.
- If you select a time segment with very many time signals, it is possible that not all of them will be displayed. In this case, you will only see a selection; if you zoom in on the area, the "hidden" time signals will also appear.
- You can find detailed explanations on the learning mode and on alarm maps in the **Learning mode and alarm maps** 70 section.

Saved time signals

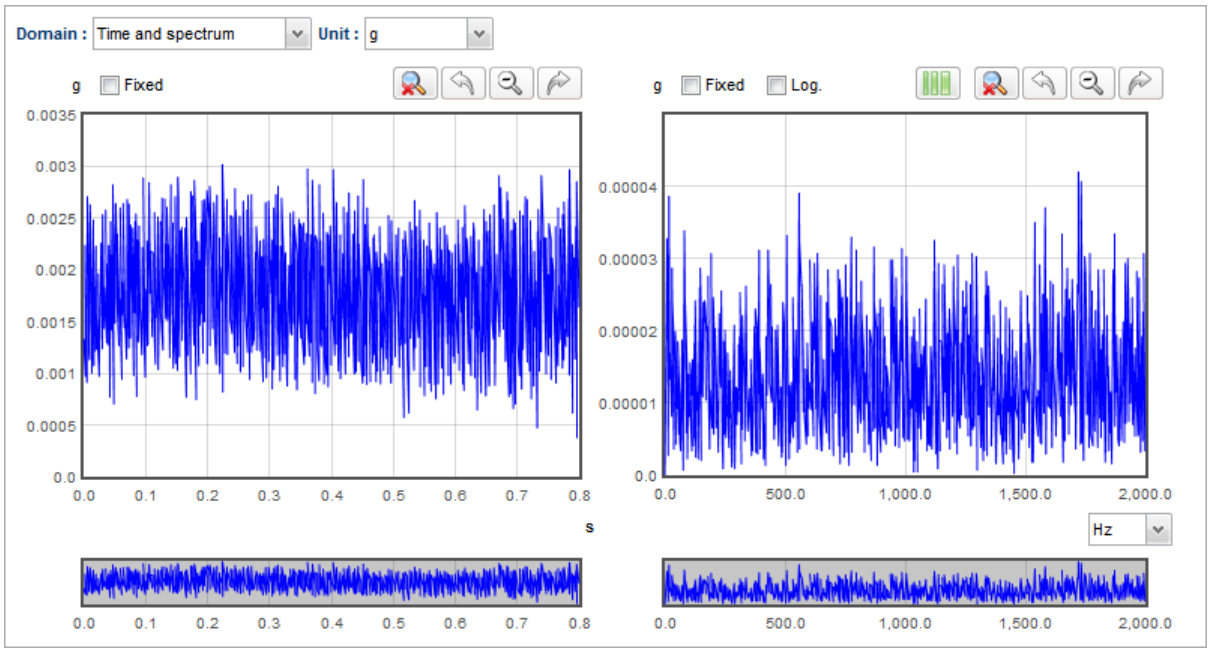
Here you will find on the left a **list of all saved time signals** of the trend segment currently displayed, each with details on the alarm status, date and value.

- Click on a time signal in the list to see details about it below the list and in the graph on the right.
- When you have selected a time signal, you can use the arrow keys to navigate up and down through the

list.

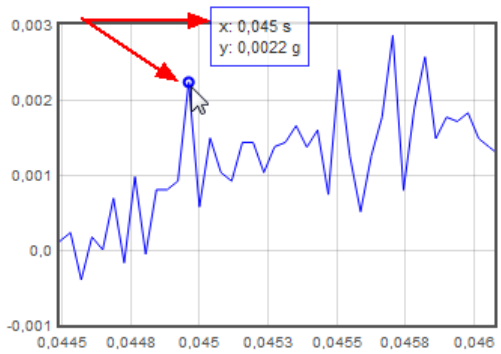
- To sort the list, click on a column header.
- If you have zoomed in on a saved time signal as described below, the zoom range also remains in place if you select a different time signal from the list.

By default, the **graphical display** on the right shows an overview of the saved time signal as a time signal and as a spectrum. Here you can also perform an initial analysis:

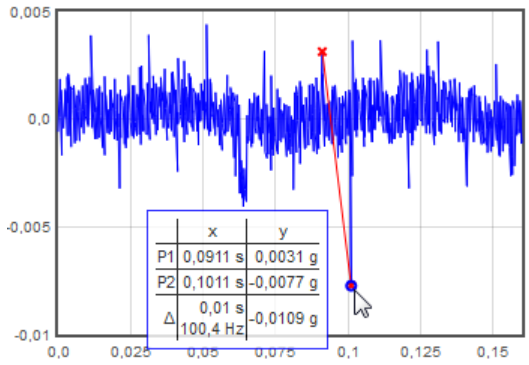


You have the following options:

- Select the **range** . This determines whether the signal is displayed only as a **time signal**, only as a **spectrum** or whether both graphics are visible.
- Activate the **Fixed** option to display the signal with fixed scaling. You can then zoom both horizontally and vertically.
- You can view the exact values for each peak; move the cursor over the peak until a blue circle appears. The values of this peak are then displayed in a small box:



- Activate a **measurement tool** by clicking on any point: when you click, a red cross appears on the point. You can then drag a red line over the graphic. The values of the points and their distance to each other can now be seen in a box next to the line:

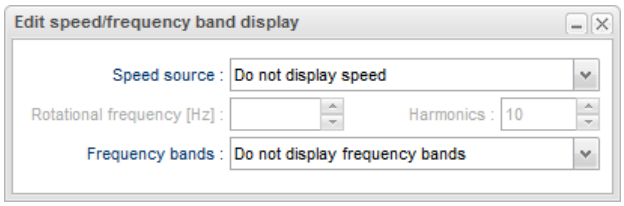


- If you zoom into a sub-area, as described below, the narrow strip beneath the main graph acts as an overview: The full area is always shown here and the zoomed area is highlighted in colour.

Additional functions in the spectrum

For the spectrum view, the following additional functions are available:

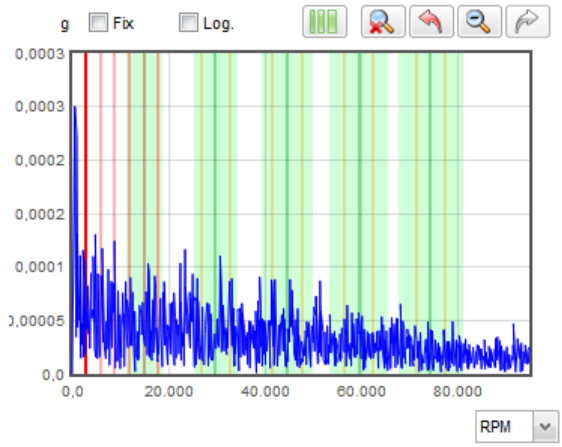
- Activate the **Log. option** above the graphic, to display the signal with a logarithmic scaling.
- Select the required unit from the selection list below the graphic.
- The button above the graphic opens the **Edit speed/frequency band display** dialogue. Here you can edit the display of speed, harmonics and frequency bands:



You have the following options:

- **Speed source**: Choose between **Do not display speed**, **Fixed speed**, and **User-defined**. The speed is displayed in dark red.
- **Rotational frequency (RPM)**: If you have selected the **User-defined** option for **speed source**, enter the required rotational frequency here. You can also enter the speed automatically: To do this, move the cursor over a peak and double click when the blue circle appears. The corresponding speed is then copied to the dialogue.
- **Harmonics**: Here you determine how many harmonics are displayed in the graphic. Harmonics are displayed in light red.
- **Frequency bands**: Choose between **Do not display frequency bands** and the frequency bands relevant for the selected characteristic value. Frequency bands are displayed in green

When you have set the speed, harmonics, and frequency bands, the spectrum might look as follows, for example:



Zoom functions in all graphs

It is possible to zoom in on all graphs: To zoom, click in the graph and draw the cursor over the area on which

you want to zoom in while holding down the left mouse button; this highlights the zoomed area in colour. You can also find details on this function here 47.

The following buttons are then available for you to work with zoomed areas:

 Switches back to the original display

 Jumps back a step in your zoom editing

 Enlarges the selected time range

 Jumps forward a step in your zoom editing

Actions

On the left under **Actions**, you will find the following menu items:

- **Show measurement jobs** 59: Use this link to jump directly to the **Measurement jobs** area. There you will find an overview of all measurement jobs, their characteristic values and the corresponding details.
- **Download measurement data:** 44 Use this command to open a dialogue in which you can select measurement data for download.
- **Delete measurement data:** 45 Use this command to open a dialogue in which you can select measurement data for deletion.



- The **Measurement data** area is only designed for an initial analysis. For a detailed analysis, you must download the data of the SmartCheck device 44. You can then analyse it more closely with the integrated SmartUtility Viewer software.
- The **details** in the **Saved time signals** section also contain information on the number of measurement values. However, the actual number of measured values displayed depends on the limitations of your browser.
  If you are using Internet Explorer, the whole time signal cannot be displayed for performance reasons. You can identify the actual number of measured values displayed under **Number of values**. Two values are displayed:

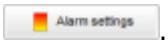
  Lower pre-alarm : 0.0 -
  Number of values : 2048/4096
  Sampling rate : 5120 Hz

  In this example, only 2048 of 4096 measured values are displayed.

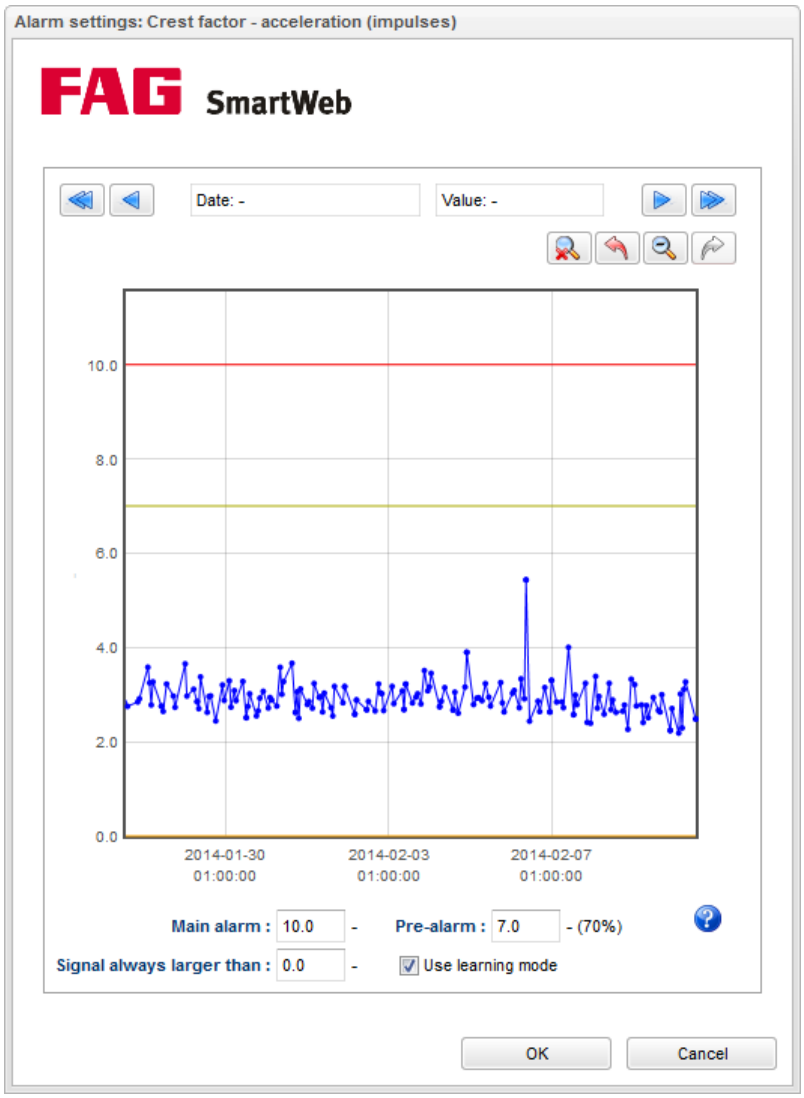
6.1 Edit alarm settings

The alarm settings for a characteristic value are initially set as part of a measurement job 64. You can then access a separate dialogue in which you can edit the alarm settings at a later point.

How to edit the alarm settings

1. In the **Measurement data** area, click 

.
2. In the **Alarm settings** window, enter the desired specifications:



You have the following options:

Buttons and graphic

- You can use the buttons above the graphic to navigate the trend and use zoom functions. More details can be found in the **Measurement data** 38 section.
- The graphic shows you the trend of the selected characteristic value. The graphic provides the same information and functions as the graphic in the **Measurement data** area. You can find details on this in the **Measurement data** 38 section.
- You can also adjust the alarm limits manually from here:
  - **Main alarm:** Click the red main alarm limit, hold down the mouse button and drag the limit to the required position. The pre-alarm limit is automatically dragged with it as soon as you go below the pre-alarm limit.
  - **Pre-alarm:** Click the yellow pre-alarm limit, hold down the mouse button and drag the limit to the required position. This does not change the main alarm limit and the pre-alarm limit cannot be dragged over the main alarm limit.

Main alarm — This is where you determine the limit at which the main alarm is triggered.

Pre-alarm — This is where you determine the limit at which the pre-alarm is triggered. Next to the absolute value is the percentage value calculated from the pre-alarm limit and main alarm limit.

Signal always larger than — Enter a value for an additional pre-alarm limit. This pre-alarm is triggered when the signal value is below the value determined here.

Use learning mode — Activate this option to use the learning mode for this characteristic value. The system can then automatically learn the alarm limits depending on the current status of the

machine. Learning mode can only commence if there is a tick here, e.g. entered via the context menu of the characteristic value in the **Status** 34 area.

You can find details on the learning mode in the **Learning mode and alarm maps** 70 section.

Move the mouse over the question mark to read additional information.

3. Click **OK** to save the new alarm settings.

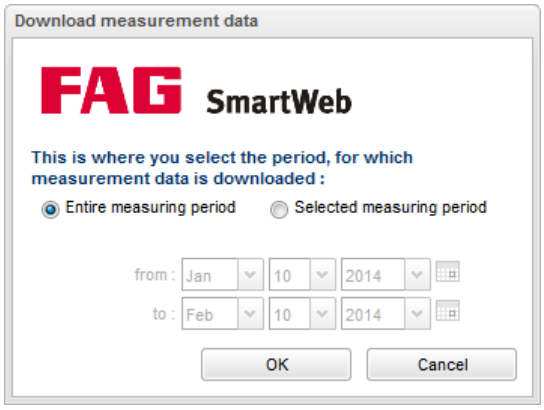
You can also edit the alarm settings for an alarm map here. In this case, you must edit the alarm settings of the individual alarm maps.

6.2 Download measurement data

The **Measurement data** area is only designed for an initial analysis. For a detailed analysis, you must download the data of the SmartCheck device. You can execute this using the FAG SmartUtility software and analyse the data directly using the integrated SmartUtility Viewer software. Alternatively, you can download the measurement data via the corresponding function in the SmartWeb software and then open it later in the SmartUtility Viewer software for analysis.

How to download the measurement data

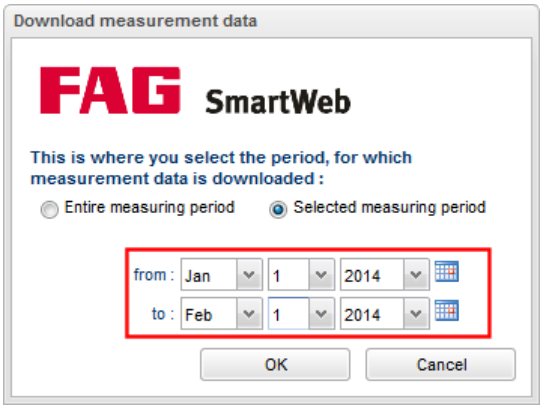
1. In the **Measurement data** area, select the **Download measurement data** action.
2. In the **Download measurement data** window, enter the desired specifications:



You have the following options:

Entire measuring period Activate this option to download all saved measurement data.

Selected measuring period If you activate this option, the calendar functions become active:



You can then use the list boxes or the calendar selection to determine the time range for which the measurement data is to be downloaded.

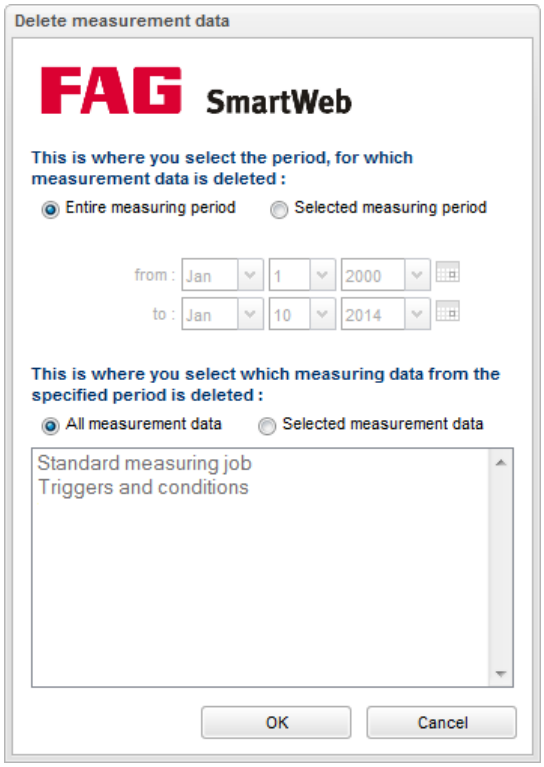
3. Click on **OK**. You must then confirm the download of the *.scd1 file to your downloads directory.
4. Once the *.scd1 file has been downloaded, you must convert the data directory in the SmartUtility software. You can then analyse the data in the Viewer software.

6.3 Delete measurement data

You can delete measurement data from your SmartCheck device. In doing so, you can define both the time range of the data to be deleted and the affected measurement jobs, measurement triggers and measurement conditions.

How to delete measurement data from the SmartCheck device

1. In the **Measurement data** area, select the **Delete measurement data** action.
2. In the **Delete measurement data** window, enter the desired specifications:



You have the following options:

Entire measuring period	Activate this option to use the entire measuring period as the basis for deleting measurement data.
Selected measuring period	If you activate this option, the calendar functions become active: you can then use the list boxes or the calendar selection to determine the period for which the measurement data must be deleted.
All measurement data	Activate this option to delete all measurement data within the time range selected above.
Selected measurement data	Activate this option to select specific measurement jobs, measurement triggers or measurement conditions from the list. Only the measurement data in this selection is then deleted for the time range selected above. How to select items from the list: • **Left-click**: selects the item. • **CTRL + left-click**: Adds the item to an existing selection. • **SHIFT + left-click**: Selects all items between the first and last selected items.

3. Click on **OK**. The measurement data corresponding to your selection is deleted.

7 Live view

Click on the **Live view** button to open the corresponding area. Here you can view the relevant signal for each input and the scaling factors 54 created for them. This allows you to check whether a valid signal is coming in, whether you have connected and configured the inputs correctly and whether the SmartCheck device is working properly. In addition, you can try out various filter settings for the vibration sensor here. You create the basis for this when creating a basic measurement job: If you activate **Expert settings** 63 in the configuration wizard, you can set filters in some measurement jobs in the corresponding step.



As soon as you have selected an input or scaling factor on the left - **Vibration sensor** in the example above - you will find the following information and functions here:

Live view settings

Various options here enable you to influence the display in the live view:

- **Signal type:** Here you can select which signal type should be displayed. If no selection is made, the raw signal is displayed.
- **Filter settings:** Here you can modify the filters that are used.
- **Measurement values:** Here you can determine how many measurement values are displayed. The x-axis display then changes accordingly. With the **Number of values**, you can specify the area in which you can work with the navigation elements and the zoom function.
- **Signal unit:** Here you have the possibility to change the signal unit. In our example above, you can change from acceleration and m/s2 to speed and mm/s or to displacement and mm.

Live view and navigation elements

To use the functions above and in the graphical display of the live view, proceed as follows:

Fixed	Activate this option to display the signal with fixed scaling. You can then zoom both horizontally and vertically.
Log.	Spectrum only:

Activate this option to display the signal with logarithmic scaling.



Use this button to open the **Edit speed/frequency band display** 41 dialogue. Here, you can edit the display of speed, harmonics, and frequency bands.

Click on the graphic

Clicking on the graphic activates a **measuring tool** 40 that you can use to determine the distance between two points on the display.

Use the navigation elements to further analyse the live view as follows:



As soon as you move the slider, the live view is stopped; you can then navigate with the slider through the last 50 measurements.



As soon as you click on **Back**, the live view is stopped and the display jumps backwards in individual steps.



If you have stopped the live view and rewound, you can jump forwards in individual steps by pressing the **Forward** button.



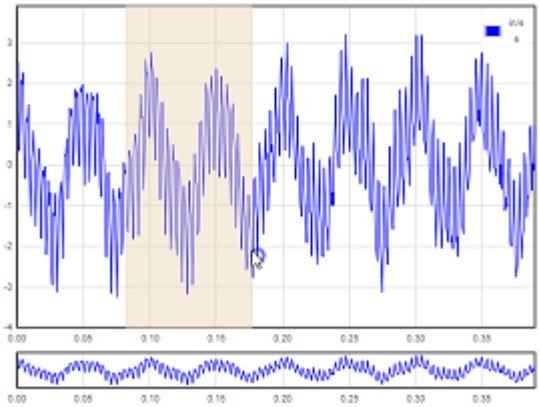
and

With these buttons, you can stop and resume the live view.

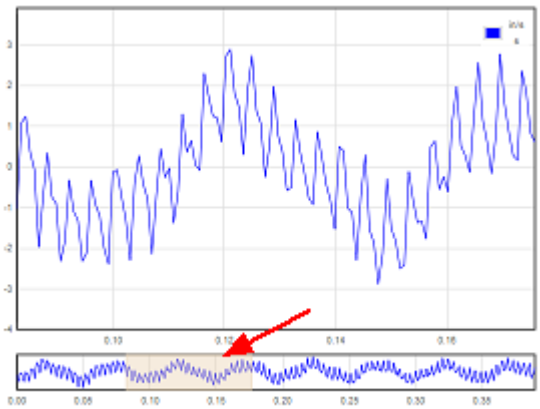
Zooming in on the live view

You can have a closer look at areas of the live view by zooming in on them:

- Click in the area you want to look at and move over the area whilst holding down the left mouse button. This highlights the zoomed area in colour:



- As soon as you release the mouse button, only the zoomed area appears in the live view. The thin strip below shows an overview of the original display area, indicating the area that has been zoomed in on:



- Further **zoom functions** 41 are available using the buttons above the graphic.

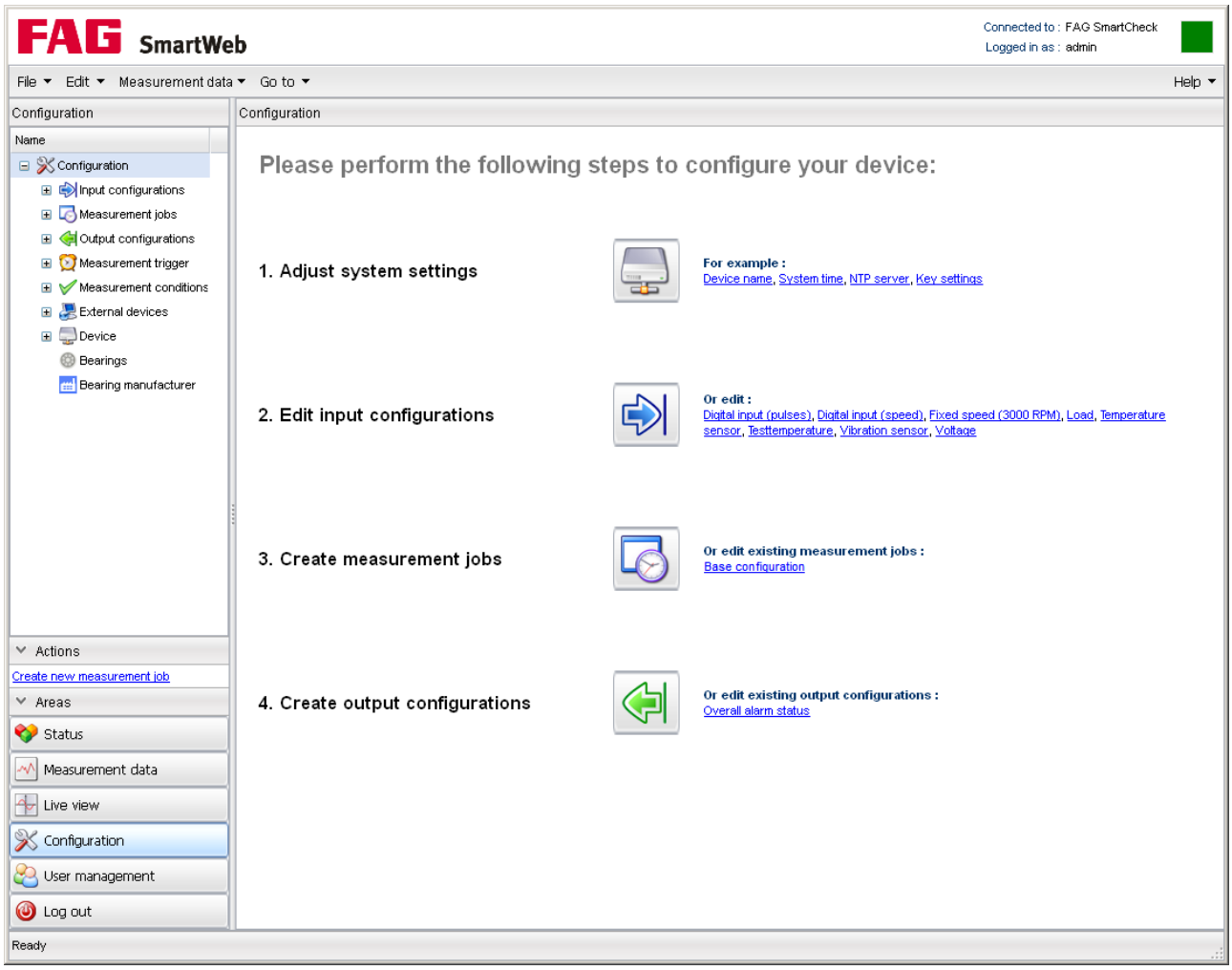
Actions

On the left under **Actions**, you will find the **Open input configurations** menu item, with which you can jump directly to the **Input configurations** 50 area to edit the selected input.

8 Configuration

Click on the **Configuration** button to open the corresponding area. In this area of the SmartWeb software, you can make basic settings for your SmartCheck device and specify measurement jobs. The **Configuration** is thus the core of your SmartCheck device: How reliably the machine monitoring is executed depends on the settings in this area.

When you use the FAG SmartCheck device for the first time, the configuration overview opens automatically when you click on the **Configuration** button:



This overview depicts what a logical work flow looks like once you have installed the SmartCheck device and established a connection to the SmartWeb software:

1. First you should set System parameters 106 such as device name and system time. These settings are not relevant as regards measurement.
2. This step relates to the Signal inputs 50. The system inputs - vibration sensor and temperature sensor - are already available with a basic configuration. However, if you would like to connect additional inputs, e.g. a speed sensor, you should configure it now. The system must know the additional inputs in order to correctly interpret the incoming current/voltage. Moreover, you can only use existing input configurations for measurement jobs (see below).
3. In the third step, create measurement jobs 59. Characteristic values are calculated via measurement jobs, which give you information about the condition of the machine. A measurement job is already present in the factory default setting of the SmartCheck device, the **Basic measurement job**. You can also edit and adapt this measurement job to your own needs. A configuration wizard is available both for the creation and editing of measurement jobs.
   In this step, you should also change the preconfigured **"Machine is running" measurement condition** 86 to the requirements of your machine.
4. If you want to connect the outputs 76 of the SmartCheck device to your controller, you must define here whether a characteristic value or an alarm status is to be output at the output.



You can open the configuration overview from every configuration area. To do so, click on the **Configuration overview** symbol in the top right.

In the expanded overview on the left, you will find all areas in which you can make settings:

Input configurations 50**:** Here you can configure the analogue and digital inputs of the SmartCheck device and additionally create scaling factors.

Measurement jobs 59**:** Here you can find an overview of your measurement jobs and the associated characteristic value configurations. You can also create, edit or delete new measurement jobs here. Different measurements are bundled in each measurement job, which are performed respectively at a certain time or in a certain order.

Output configurations 76**:** Here you configure the analogue and the digital outputs of the SmartCheck device.

Measurement trigger 82**:** Here you specify when measurements should be started. If a measurement trigger is fulfilled, the current measurement is immediately interrupted and the measurement initiated by this particular measurement trigger is started.

Measurement conditions 85**:** Here you specify the conditions under which measurements are started.

External devices 88: This is where you integrate external devices such as controllers. You can then use their data in the <var styleclass="Normal" style="font-weight:normal;">SmartCheck</var> device or transfer the alarm status for characteristic values from the SmartCheck device to an external device.

Device 106**:** In this area, you can view and partly change the main settings of the SmartCheck device. This includes e.g. the device name and the system time.

Bearings 110**:** Here you will find the bearing database, which you can expand yourself.

Bearing manufacturer 113**:** Here you will find a list of bearing manufacturers. You can add further manufacturers to this list.



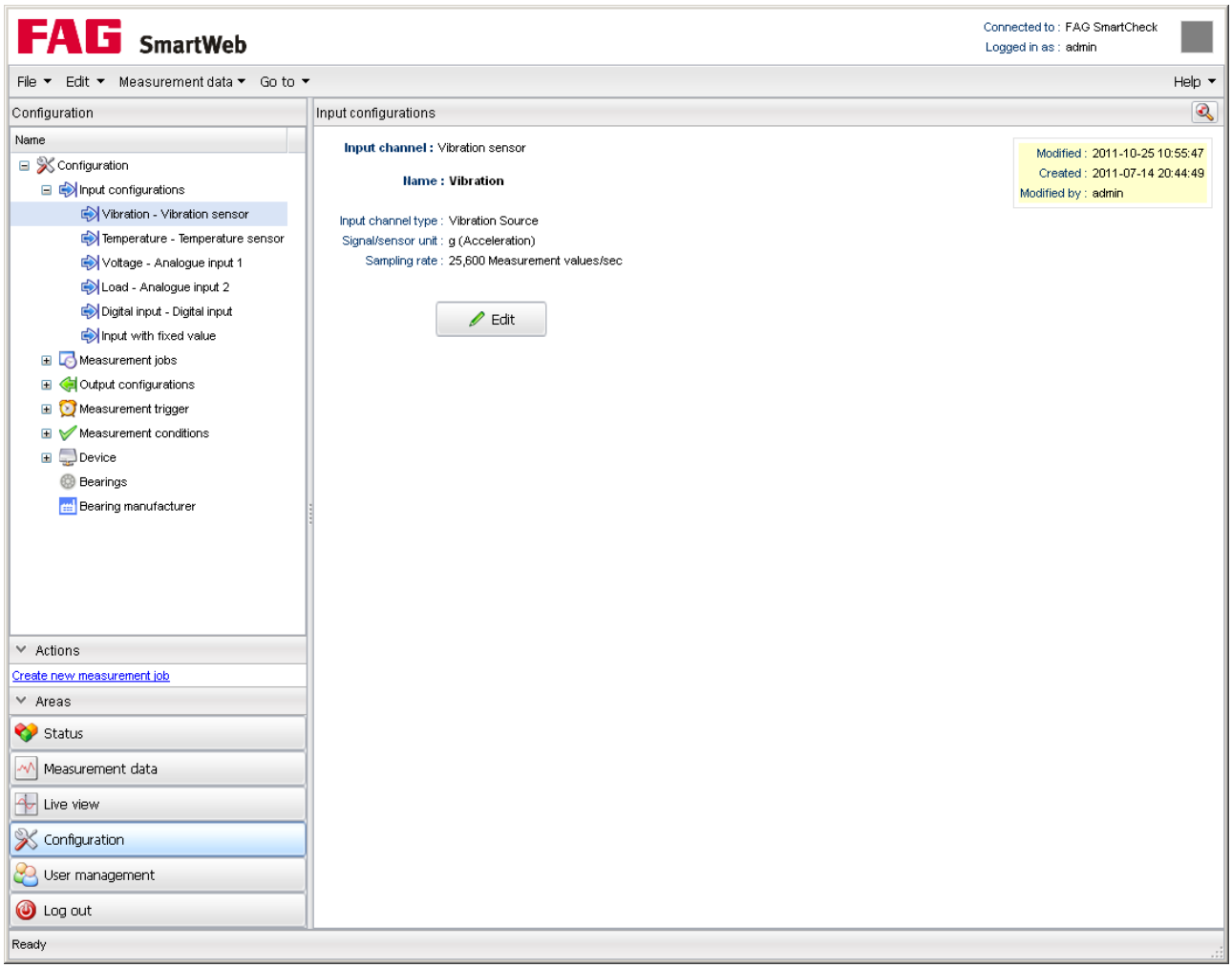
In each of these areas, under the **Actions** menu, you will find the item **Create new measurement job** 62. This menu item starts a wizard, with which you create a measurement job step by step. This task is also facilitated by virtue of measurement templates 64, which are already available in the SmartCheck device. They are automatically incorporated by the wizard and support the creation of specific measurements.

8.1 Input configurations

The FAG SmartCheck device has a vibration and temperature sensor 51, which supplies input signals directly after commissioning. In addition, you can connect a total of three further external sensors via the two analogue inputs 52 and the digital input 55 to the SmartCheck device and configure them here. You can find details on how to connect the SmartCheck device properly in the FAG SmartCheck user documentation. In the SmartWeb software, all inputs are already created in the factory default setting.

Moreover, the SmartCheck device is capable of creating fixed values 58. Here, for example, you can specify a constant speed in order to ensure the correct calculation of the characteristic values.

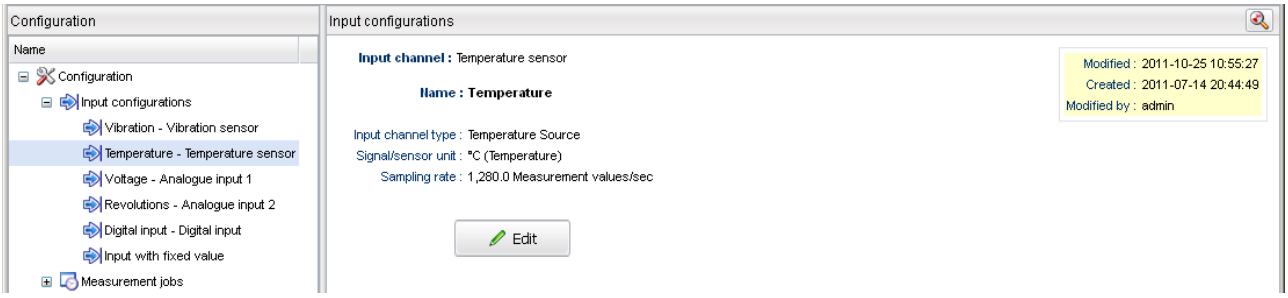
In the expanded overview on the left, you will find all inputs of the SmartCheck device. You can see details on the input currently selected along with possible editing functions in the main panel under Input configurations:



The information and functions you can access here depend on the selected input. Relevant details can be found in the following sections.

8.1.1 Internal sensors

In the factory default setting, the FAG SmartCheck device has two internal sensors: a temperature sensor and a vibration sensor. As soon as the system is properly commissioned, these two sensors supply signals and can be incorporated into a Measurement job 59. In the **Input configurations** area, you can view and partly edit the details on the corresponding inputs:

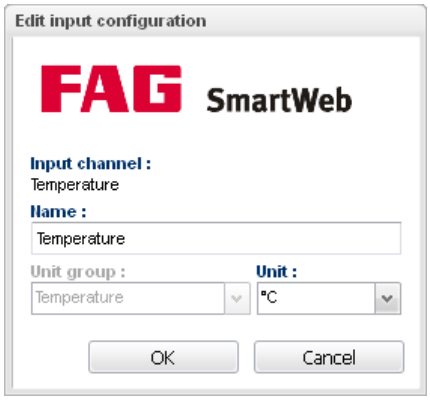


If you select the input of an internal sensor in the expanded overview, you will find the following in the main panel:

- The details on the selected input are shown on the left: Next to **Input channel**, you will find the name of the physical connection; next to Name, you will find the name you yourself gave this specific configuration.
- On the right, in the field highlighted in yellow, you will find details on the creating and changing the input.
- Click on to edit the input configuration of the internal sensor.
- Click on to open the configuration overview 49.

How to edit the input configuration of an internal sensor

1. Click on to open the **Edit input configuration** window:



You can make the following changes here:

Name — The input is listed under this name in the **Input configurations** area. Therefore, you should choose a practical name which will enable you to distinguish between several inputs.

Unit — Here you can change the unit of measurement for the sensor signal. By default, the unit of the corresponding input configuration is selected here.

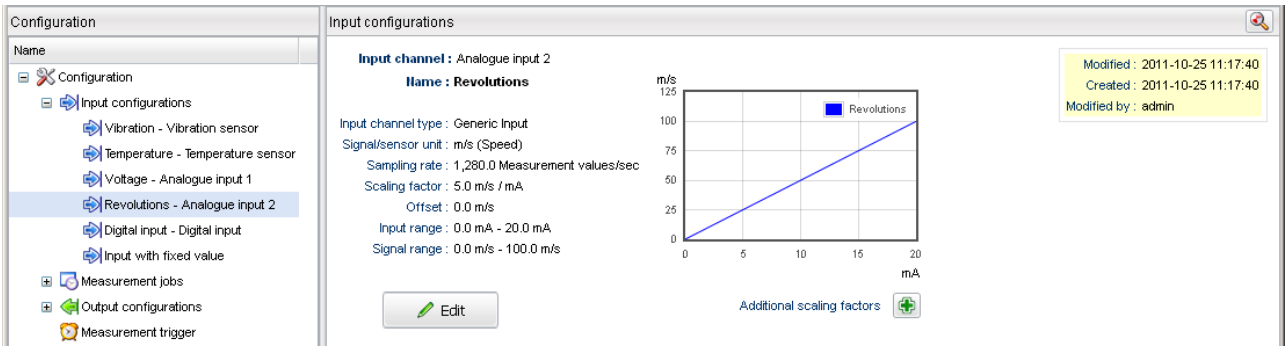
2. Click on **OK** to save your changes.

8.1.2 Analogue inputs

The SmartCheck device has two analogue inputs, which are configured as follows in the factory default setting:

- **Analogue 1**
  - Unit group: voltage
  - Signal/sensor unit: V
  - Input range: 0-10 V
- **Analogue 2**
  - Unit group: load
  - Signal/sensor unit: %
  - Input range: 0-20 mA
  - Scaling factor: 5

In the **Input configurations** area, you can view and partly edit the details on the corresponding inputs:



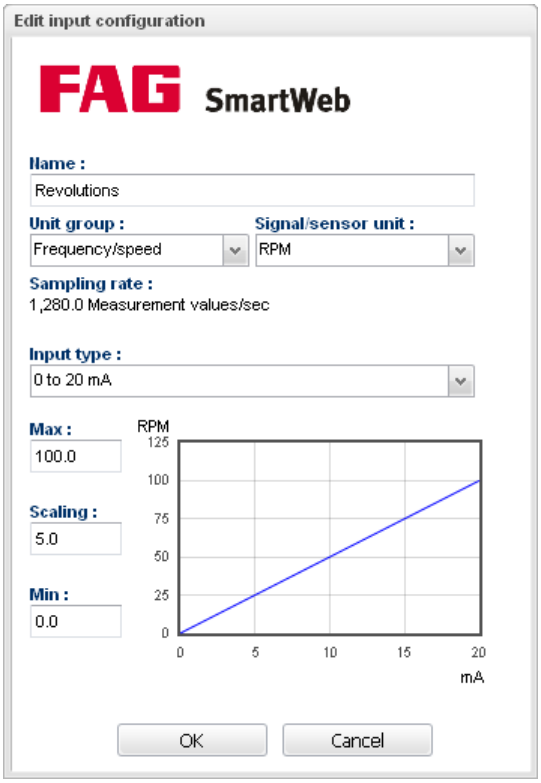
If you select an analogue input in the expanded overview, you will find the following in the main panel:

- The details on the selected input are shown on the left: next to **Input channel**, you will find the name of the physical connection; next to **Name**, you will find the name you yourself gave this specific configuration.
- Beside the details, you will find a diagram illustrating the details. If you edit the input configuration, the diagram is automatically adjusted.
- On the right, in the field highlighted in yellow, you will find details on the creating and changing the input.
- Click on to edit the input configuration of the analogue input 53.

- Click on ✚ to add additional scaling factors 54 to the input; you can also access scaling factors e.g. when creating measurement jobs 62.
- Click on to open the configuration overview 49.

How to edit an analogue input configuration

1. In the expanded overview on the left, select the analogue input you would like to edit.
2. In the main panel, click on **Edit** to open the **Edit input configuration** window:



You have the following options:

Name	Here, specify the name that the input is to appear under in the SmartWeb software.
Unit group	Here, specify which physical value is measured by the sensor you are connecting to this input, e.g. **Frequency/speed**.
Signal/sensor unit	Here, select the appropriate unit of measurement for your sensor.
Input type	Here, select the range of the voltage/current that applies for this input configuration. The SmartCheck device supports the following ranges for the analogue inputs: • 0–10 V • 0-24 V • 4-20 mA • 0-20 mA
Max, Scaling, Min	Use these settings to determine the range within which the measurement values should lie. First enter a minimum value **Min**. Then enter a maximum value **Max** or define the factor with which the incoming signal should be scaled in the **Scaling** field. Both the diagram and the values of the respective other field are then adjusted automatically.

3. Click on **OK** to save your changes.



You can also enter negative values for the **Min** and **Max** for an analogue speed input. This enables you to distinguish between different directions of rotation.

How to add a scaling factor to the input

You can add scaling factors to the analogue input, which you can access e.g. when creating a measurement job 62. Using scaling factors, you can calculate logical values for other areas from the physical value measured at one area of the component.

> **Example:** With the analogue input, you measure the speed in front of the gear. The speed behind the gear is 5 times smaller. You can create a scaling factor for this:
> 1. **Speed in front of the gear**
> 2. **Speed behind the gear** with a factor of 0.2 (1/5)

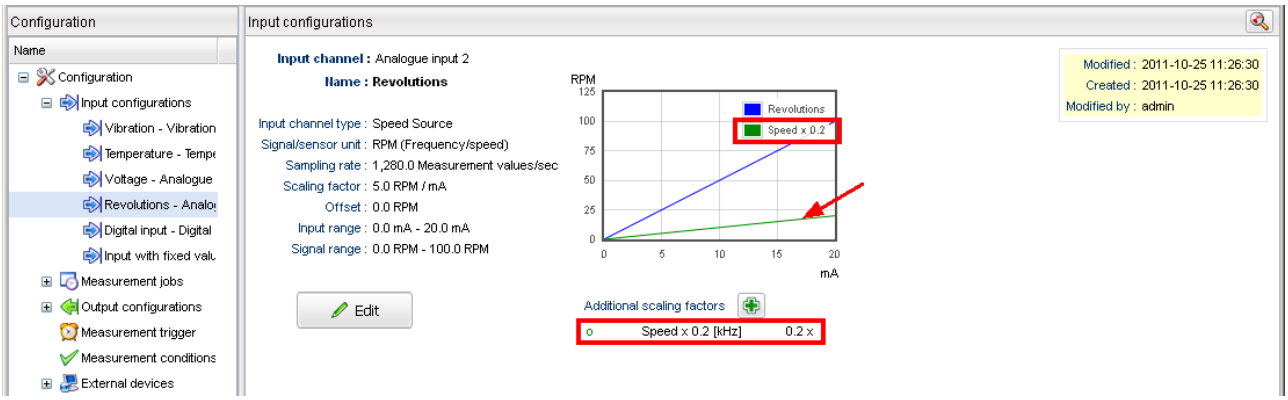
1. Click on ✚ to open the **Add scaling factor** window:



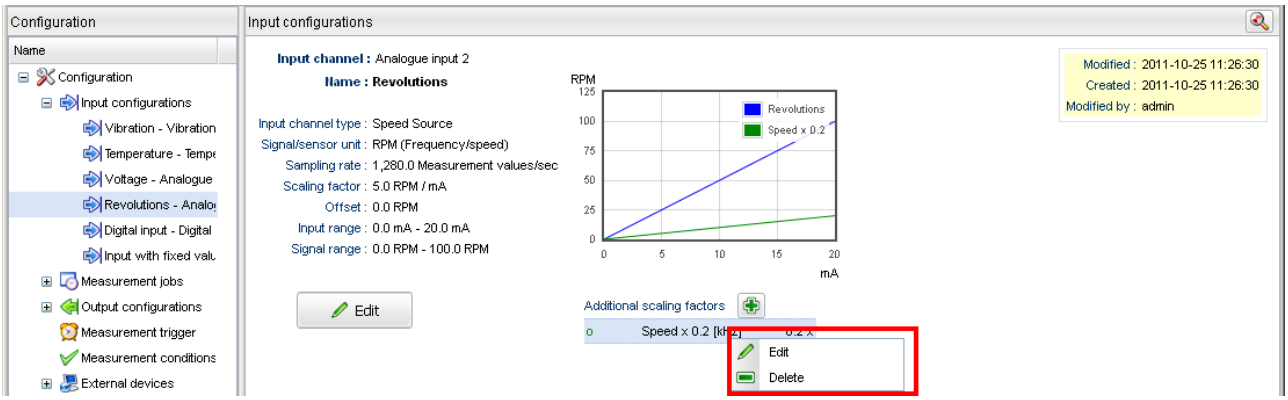
You have the following options:

Name	The scaling factor is listed under this name, along with the other inputs. Therefore, you should choose a practical name that will enable you to distinguish between the inputs.
Scaling factor	The physical input signal is multiplied by the value you enter here.
Unit	Here you can change the unit of measurement for the sensor signal. By default, the unit of the corresponding input configuration is selected here.

2. Click on **OK** to save your changes. The new scaling factor appears in the diagram and in the list of scaling factors:



3. To delete or edit the scaling factor, right-click to open the context menu and select the corresponding command here:



If you delete a scaling factor which is being used by a measurement job, the system gives you a warning message. If you delete the scaling factor, you also automatically delete the relevant measurement job.

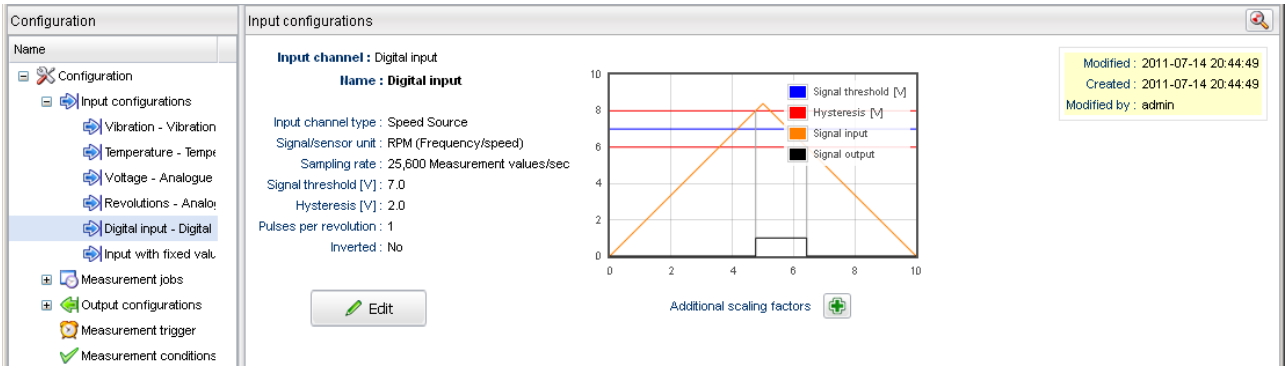
8.1.3 Digital input

The SmartCheck device possesses a digital input, which in the factory default setting is configured as follows:

- Unit group: frequency/speed
- Signal/sensor unit: RPM
- Pulse per revolution: 1
- Signal threshold: 7 V
- Hysteresis: 2 V

When selecting the dropping resistor, please note the impedance of the input signal of your digital input. Note the maximum switching current of the digital switching output of the FAG SmartCheck device (1 A/30 V) and the power of the dropping resistor.

In the **Input configurations** area, you can view and partly edit the details for the digital input:

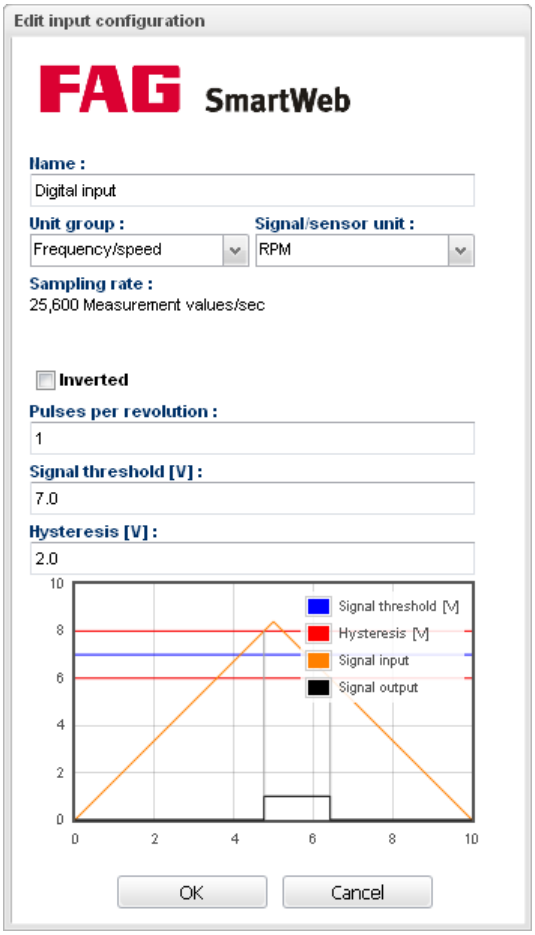


If you select the digital input in the expanded overview, you will find the following in the main panel:

- The details on the selected input are shown on the left: next to **Input channel**, you will find the name of the physical connection; next to **Name**, you will find the name you yourself gave this specific configuration.
- Beside the details, you will find a diagram illustrating the details.
- On the right, in the field highlighted in yellow, you will find details on the creating and changing the input.
- Click on to edit the input configuration of the digital input 56.
- Click on to add additional scaling factors 57 to the input; you can also access scaling factors e.g. when creating measurement jobs 62.
- Click on to open the configuration overview 49.

How to edit a digital input configuration

1. Select the digital input in the expanded overview on the left.
2. In the main panel, click on **Edit** to open the **Edit input configuration** window:



You have the following options:

Name — Here, specify the name that the input is to appear under in the SmartWeb software.

Unit group — Here you have the choice between **No unit** and **Frequency/speed**. Select the option **No unit** if you want the input to display a status such as "Machine on" or "Machine off".

Signal/sensor unit — Here you will only find a list box if you have selected **Frequency/speed** as the **Unit group**.

Inverted — Activate this option to invert the digital input signal.

Pulses per revolution — This option is only available when **Frequency/speed** is selected as the **Unit group**.

Signal threshold — Specify in volts the average input level, above or below which the digital input switches; in the diagram, the **Signal threshold** is drawn in blue.

The specified value is rounded up/down to the nearest `.0` or `.5`.

Hysteresis — With **Hysteresis**, you specify in volts the range within which the input level is permitted to drop below or rise above the **Signal threshold** without the digital input switching; in the diagram, the **Hysteresis** is drawn in red.

The **hysteresis** should be set in every case, as otherwise the signal could generate spurious pulses at the signal threshold. The poorer the signal, the higher you should set the hysteresis.

The specified value is rounded up/down to the nearest `.0` or `.5`.

Example: With a **Signal threshold** of 5 V and a **Hysteresis** of 2 V, the status of the digital

input remains unchanged between 4 V and 6 V.

Diagram

The diagram illustrates how the input reacts to your settings, in other words how the system converts real input pulses e.g. between 0 V and 12 V into digital 0 and 1; with each change, the diagram is immediately updated. The diagram in the example is interpreted as follows:

The input signal (orange) passes the hysteresis line (red) above the signal threshold (blue). The signal output (black) reacts to this and jumps from 0 to 1. As soon as the input signal undercuts the hysteresis line below the signal limit, the signal output reacts again and jumps from 1 to 0.

Example: Your sensor delivers pulses between 0 V and 12 V. In this case, set the signal threshold to 6 V and the hysteresis e.g. to 2 V.

3. Click on **OK** to save your changes.

How to add a scaling factor

You can add scaling factors to the digital input, which you can access e.g. when creating a measurement job 62. Using scaling factors, you can calculate logical values for other areas from the physical value measured at one area of the component.

Example: With the digital input, you measure the speed in front of the gear. The speed behind the gear is 5 times smaller. You can create a scaling factor for this:
1. **Speed in front of the gear**
2. **Speed behind the gear** with a factor of 0.2 (1/5)

1. Click on ✚ to open the **Add scaling factor** window:



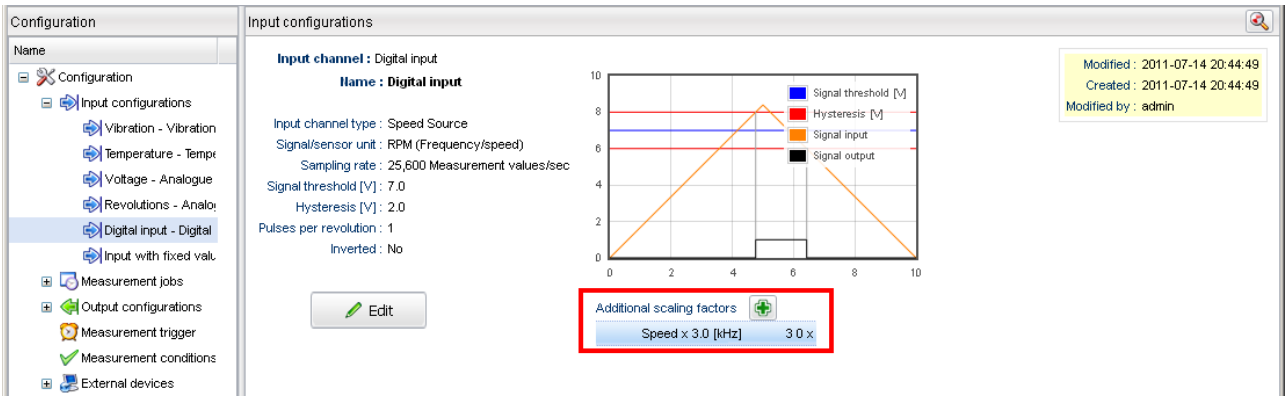
You have the following options:

Name — The scaling factor is listed under this name, along with the other inputs. Therefore, you should choose a practical name that will enable you to distinguish between the inputs.

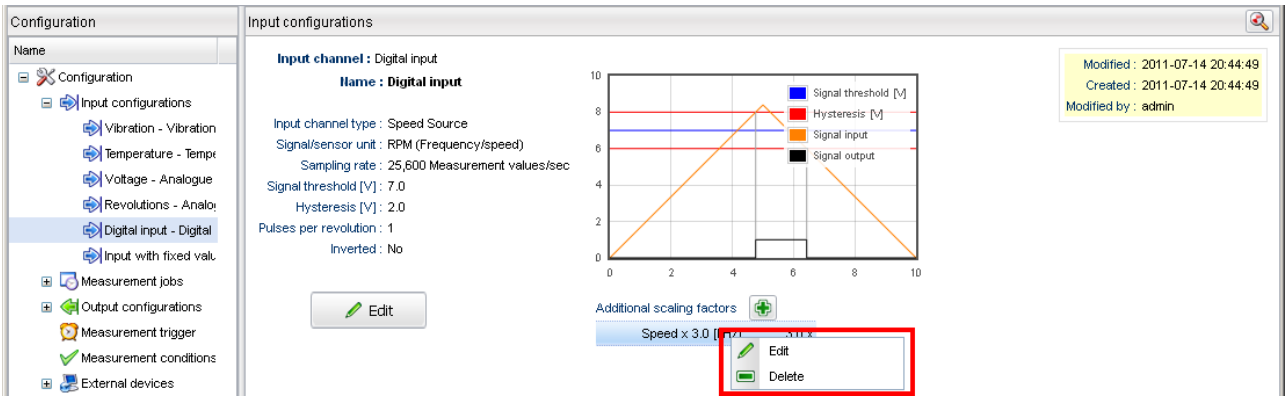
Scaling factor — The physical input signal is multiplied by the value you enter here.

Unit — Here you can change the unit of measurement for the sensor signal. By default, the unit of the corresponding input configuration is selected here.

2. Click on **OK** to save your changes. The new scaling factor appears in the list of scaling factors:



3. To delete or edit the scaling factor, right-click to open the context menu and select the corresponding command here:





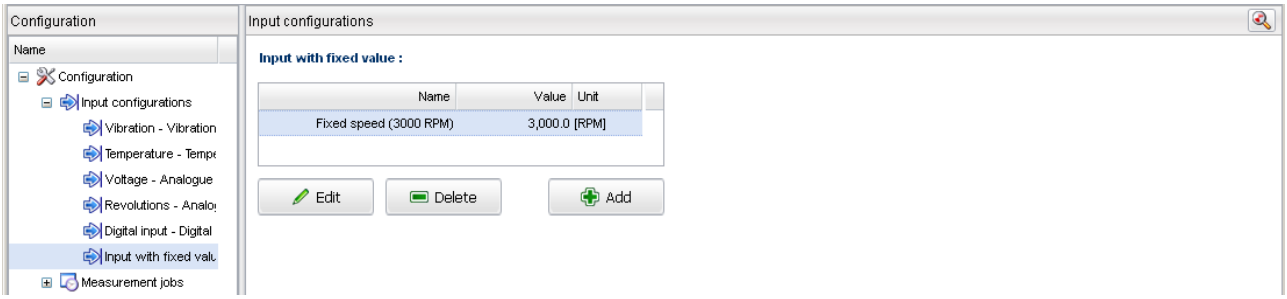
If you delete a scaling factor which is being used by a measurement job, the system gives you a warning message. If you delete the scaling factor, you also automatically delete the relevant measurement job.

8.1.4 Input with fixed value

In the SmartWeb software, you can create inputs with a fixed value, which you can access when creating measurement jobs. An input with a fixed value can be useful, for example, if the machine to be monitored runs at a constant speed. In this case, you do not have to connect a sensor; rather you can specify the speed via the fixed value. In the factory default setting, the SmartCheck device has one input with a fixed value, which is configured as follows:

- Name: constant speed
- Value: 3000
- Unit: RPM

In the **Input configurations** area, you can view and edit the details for the fixed values:



You have the following options:

- Click on **Edit** to edit the selected input with a fixed value.
- Click on **Delete** to delete the selected input with a fixed value.
- Click on **Add** to add another input with a fixed value.
- Click on to open the configuration overview 49.

How to add a new input with a fixed value

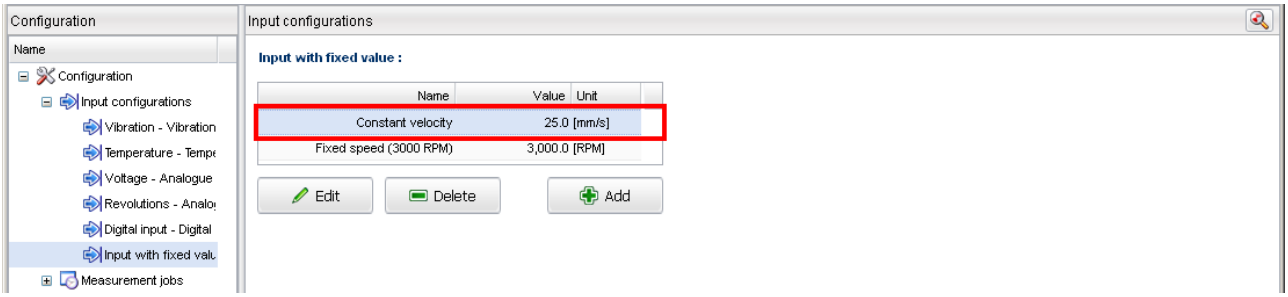
1. Click on to open the window **Add fixed value**:



You have the following options:

Name	The input with a fixed value is listed under this name, along with the other inputs. Therefore, you should choose a practical name that will enable you to distinguish between the inputs.
Value	Here you specify the fixed value.
Unit group	Here you specify which unit group the fixed value belongs to, e.g. **Torque**, **Pressure**, **Speed** or **Force**.
Unit	Here you can specify the unit of measurement for the fixed value. The selection options correspond to the selected unit group.

2. Click on **OK** to save your changes. The new input with a fixed value appears in the table:



3. To **Delete** or **Edit** the input with a fixed value, select the entry in the table and then choose the corresponding command.

8.2 Measurement jobs

To enable the FAG SmartCheck vibration monitoring system to monitor your machine and trigger alarms if appropriate, the incoming signals (vibration, temperature etc.) must be measured and characteristic values calculated. The corresponding instructions are located in what are known as measurement jobs, which you can create using the SmartWeb software.

The SmartCheck device is distinguished by the support the system gives you in the creation of these measurement jobs and especially in the calculation rules for characteristic values: You create measurement jobs exclusively with the aid of the Configuration wizard 62. In the very first step of the wizard, you select a template 64 that is suitable for your machine. According to the template you selected, e.g. the **Gear** template for the monitoring of two gears, the

SmartCheck device then automatically generates the appropriate characteristic values. In addition, a superordinate alarm characteristic value is generated for each measurement job, which summarises the alarm status of all characteristic values.

You cannot edit the characteristic values the SmartCheck device generates; you can only view them in the corresponding overview in the SmartWeb software. However, you specify a series of framework conditions for the measurement job in the configuration wizard, e.g. triggers or conditions 65, the dependency of an alarm on additional signals, or the activation of the learning mode.

Selection of the right template and correct entries in the configuration wizard is a key factor in enabling your system to perform the monitoring as required. Consequently, the following sections are to support you in these work steps. You will find here:

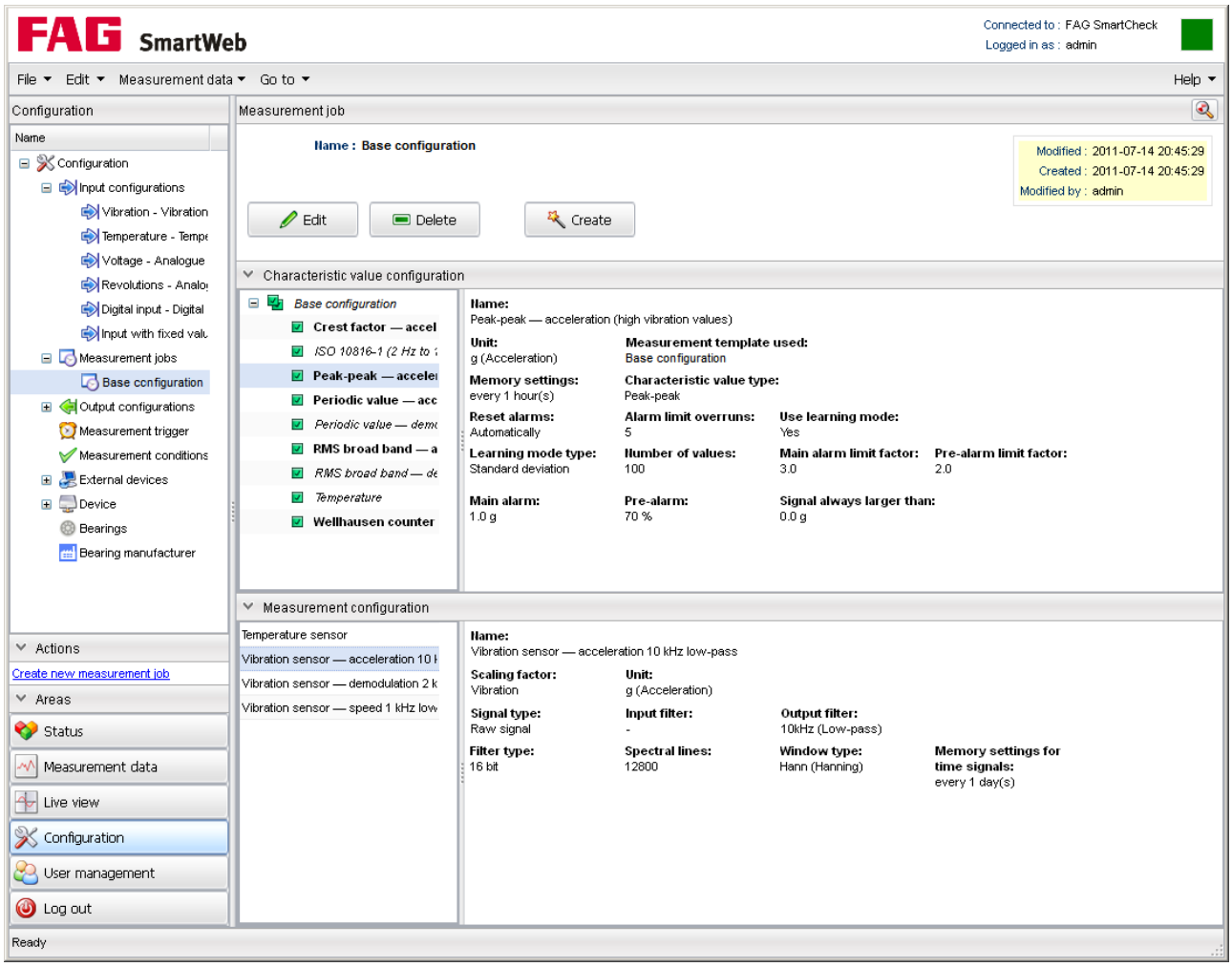
- The detailed description of the **Measurement jobs** 60 area.
- An overview of the Steps in the configuration wizard 62 that you follow to create a measurement job. This section contains a summary of each step and any additional information further to the info texts in the configuration wizard.
- An Overview of the templates 64 available to you when creating a measurement job.
- Detailed explanations of the Learning mode 70 and Alarm maps 72, two special functionalities that the SmartCheck device provides you for monitoring. Both are activated from the configuration wizard.

8.2.1 Measurement jobs section

In the **Measurement jobs** area, you will find an overview of all measurement jobs you have created for the SmartCheck device. Each measurement job includes the following components:

- **Measurement configurations:** These determine the inputs at which measurements are made and how these measurements are performed.
- **Characteristic value configurations:** These values are calculated automatically from measurement signals according to internal templates.
- **Optional component:** Triggers or conditions 65 can be added to the measurement job in order to control the execution of measurements.

You can view and partly edit all of these components and their details in the **Measurement jobs** area. In the factory default setting of the SmartCheck device, the **basic measurement job** is created:



In the expanded overview on the left, you will find all measurement conditions for the SmartCheck device. Click on a measurement job to access the following information and functions in the main panel:

- Under **Measurement job**, you will see the name of the measurement job as well as any details such as triggers or conditions used. Here you will also find a yellow box with change details and the **Edit**, **Delete** and **Create** buttons.
- Under **Characteristic value configuration** you will see the individual characteristic values that belong to the selected measurement job. If you click on one of the values, the details about it are displayed on the right. These details partly correspond to your own settings, which you made when creating the measurement job 62; the rest are added automatically by the wizard from system templates.
- Under **Measurement configuration** you will see the measurements that belong to this measurement job. If you click on one of the values, the details about it are displayed on the right. These details partly correspond to your own settings, which you made when creating the measurement job 62; the rest are added automatically by the wizard from system templates.
  Under **Characteristic value configuration**, the characteristic values that belong to the selected measurement are also automatically highlighted in bold.
- You can edit the selected measurement job 62.
- You can add new measurement jobs 62.
- You can delete the selected measurement job. To do so, click **Delete** and confirm with **OK**.
- In the top right corner, click on to open the Configuration overview 49.



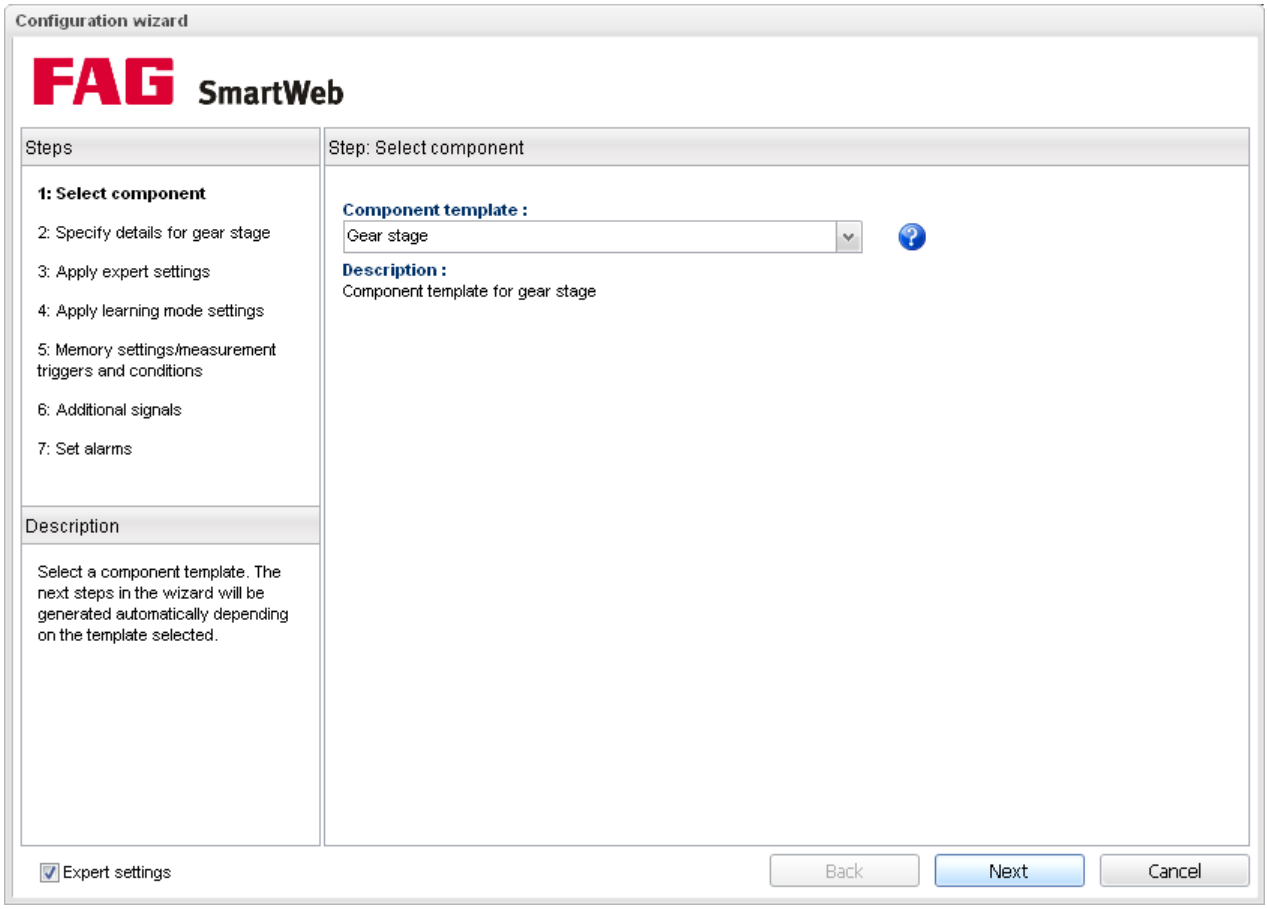
- You can find the menu item **Create new measurement job** in most work areas of the SmartWeb software on the left under **Actions**, which means that you are always able to access this main system task.
- If a characteristic value of a measurement job is used for the alarm status configuration of an external device 90, you cannot edit or delete this measurement job.

8.2.2 Creating/editing new measurement jobs

The configuration wizard opens when you want to create or edit a measurement job. This guides you step by step through the creation process. Here you only need to specify a few details, as the complex calculations of the characteristic values of a component are executed inside the system using the relevant templates 64.

To be able to use input signals for the monitoring, you must create the corresponding input configuration 50 before you start the wizard.

The configuration wizard consists of several steps, which are displayed in the left margin right from the start. How many steps you need to go through depends on which component template you choose and whether you activate the **Expert settings**:



The wizard queries additional information in the individual steps. Generally, the entries you need to or can make are already explained in the wizard. Simply move the mouse over the question mark to read the explanation.

In the following sections, you will find a summary of each individual step along with additional information that goes beyond the basic Help.

Select component

Here you choose the component you want to monitor from the predefined list. The system template 64 that is used to create the measurement configuration depends on your selection here.

Specify details about the component

Here you make detailed specifications about the selected component. Make these specifications depending on the

component, e.g. the maximum speed, the type of installation, or the number of blades or vanes. This is also where you determine the input signals on which the monitoring is to be based.

If the component is a bearing, you can select the bearing type straight from the system bearing database in this step. If it is not in the database, you can create it using the wizard.



In this step, all templates - except the **Basic configuration** and the **Default configuration** - request a **Speed signal** and the **Maximum speed**. For the speed signal, a characteristic value is automatically created. The alarm limits for this value depend on the specified **Maximum speed**. While the other characteristic values created by the wizard are listed in the last step in an overview, this characteristic value remains in the background. Consequently, you can neither change its alarm limit nor activate the Learning mode 70 for it.

The system default alarm limit, which uses this characteristic value, is calculated as follows:

- **Pre-alarm:** 1% above the specified maximum speed
- **Main alarm:** 5% above the specified maximum speed

Apply expert settings/Apply expert settings for the Wellhausen counter

These steps only become visible if you activate the **Expert settings** option on the bottom left of the wizard. Furthermore, the step **Apply expert settings for the Wellhausen counter** is only available for the **default configuration**. In both steps, you have the option of adjusting some preset values of the template for your specific measurement job, e.g. specifying the number of spectral lines or the high-pass for the demodulation.

You should only edit this step if you possess expert knowledge.



The value that you specify for **Number of spectral lines** affects the length of the recorded signals. All vibration measurements are based on this value. As such, the duration of the various measurements may vary. The duration of the longest vibration measurement determines the measurement duration for all other additional measurements:

Measuring time for vibration time signals [s] = number of lines / low-pass

Additional channels record the number of values required for the longest vibration measurement up to a maximum of 100,000 values. For an analogue input, for example, this corresponds to a measuring period of approx. 78 s.

Apply learning mode settings

This step is only visible if you activate the **Expert settings** option on the bottom left of the wizard. Here you can specify the algorithm used by the learning mode to calculate the alarm limits and the factors used to determine the main alarm and pre-alarm.



If you select the **Learning mode type**, you should note the following:

- **Standard deviation:** This process takes into account when signals vary or are not very stable, i.e. when the value for sigma, the signal variance, is high.
  Maximum values: This selection is preset and is the better method in most cases. You can select this method when the vibration values are very stable, i.e. when the value for sigma, the signal variance, is low.

You should only edit this step if you possess expert knowledge.

Save settings/triggers and conditions

Here you specify how often trends and time signals should be saved. In addition, you can determine whether the measurements should depend on Measurement triggers 82, Time triggers, Measurement conditions 85 or Time conditions.

If you have not yet created any measurement triggers or measurement conditions or the existing ones do not meet your requirements, you can create them using the wizard. You can only create time triggers and time conditions within the wizard. You can find information on this in the **Triggers and conditions** 65 section.

Additional signals

Here you can add additional input signals to the measurement configuration. This adds further trends to the characteristic value trends, which are generated automatically by the template.

The automatically created characteristic values of the additional signals can be retrieved in the characteristic value overview in the last step of the configuration wizard. There you can also change the alarm limits of these characteristic values.

Typically, it is not necessary to activate the Learning mode 70 for the additional signals; if you do want to authorise it, you can do so in the last step of the wizard.

Resetting/setting alarms

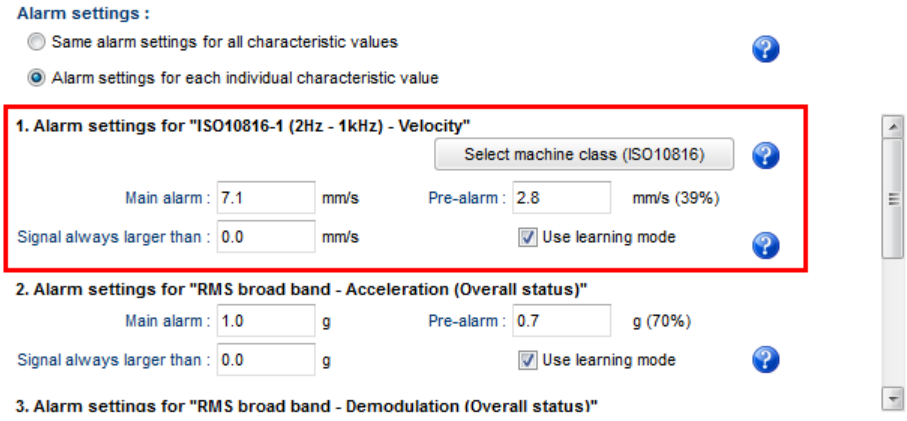
In this step, you specify:

- Whether alarms are to be reset automatically or manually, i.e. via the Context menu 34, for example.
- Whether and for which characteristic values the learning mode should always be authorised.
- Whether the learning mode calculates alarm limits contingent on measured machine parameters (alarm map 72).
- Where the limits for the main alarm and pre-alarm lie: You can specify this for all characteristic values together or for each individual characteristic value.
- How the alarms are reset: You can specify this for all characteristic values together or for each individual characteristic value.

If you activate the option **Change alarm limits in line with other signals**, you also must authorise the learning mode; otherwise, the option has no effect.

You should not use the learning mode when the measurement range is known, e.g. for temperature, pressure or load.

For characteristic values based on ISO, the limits of machine class II are preset for the alarm limits. Learning mode is activated by default and can therefore overwrite the alarm limits based on ISO, if applicable:



Here you have the following options:

- Click on **Select ISO class**. A context menu is displayed, from which you can select the required alarm limits.
- You can manually set alarm limits that deviate from the ISO recommendations.

8.2.3 Available templates for measurement configurations

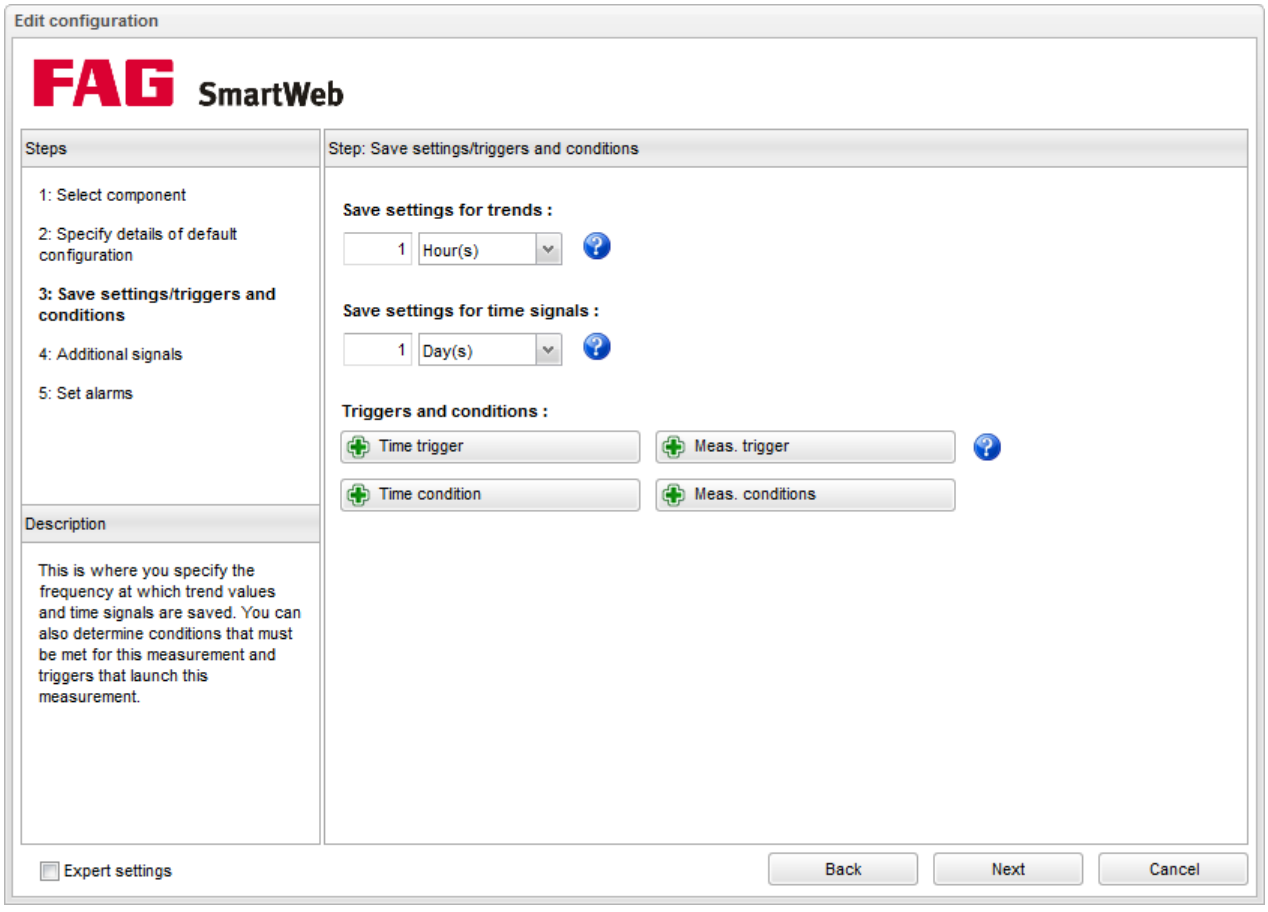
In the first step of the configuration wizard, you need to choose a template that will be used to create the measurement job for monitoring your machine. The following list gives a rough overview of which template is most suitable for which machine/monitoring scenario:

- **Basic configuration:** Use the template for broad-band measurement. It can be used for all machines, but only offers a very general monitoring.
- **Default configuration:** Use this template for broad-band measurement with several filters. It can be used for all machines, but only offers a very general monitoring.
- **Gear:** Use this template for the monitoring of two gears.
- **Journal bearing:** Use this template for the monitoring of a bearing with oil film.

- **Coupling:** Use this template for the monitoring of a jaw coupling.
- **Fan:** Use this template for the monitoring of fan blades.
- **User-defined frequency bands:** Use this template to define user-defined frequency bands, where a separate characteristic value is created for each one. You should only use this template if you possess expert knowledge.
- **Managed frequency bands:** Use this template to define managed frequency bands, where a separate characteristic value is created for each one. You should only use this template if you are an expert.
- **Pump:** Use this template for the monitoring of pump vanes.
- **Belt drive:** Use this template for the monitoring of a belt level.
- **Shaft:** Use this template for the monitoring of a shaft.
- **Roller bearing:** Use this template for the monitoring of a roller bearing.
- **Condition guard:** Use this special template for the constant monitoring of a machine pursuant to the standard ISO 10816-1.

8.2.4 Triggers and conditions

The SmartCheck device generally works through the measurement jobs in a fixed order. You can use triggers and conditions to interrupt this order. In the **Memory settings/measurement triggers and conditions** step, you can create or edit triggers and conditions:



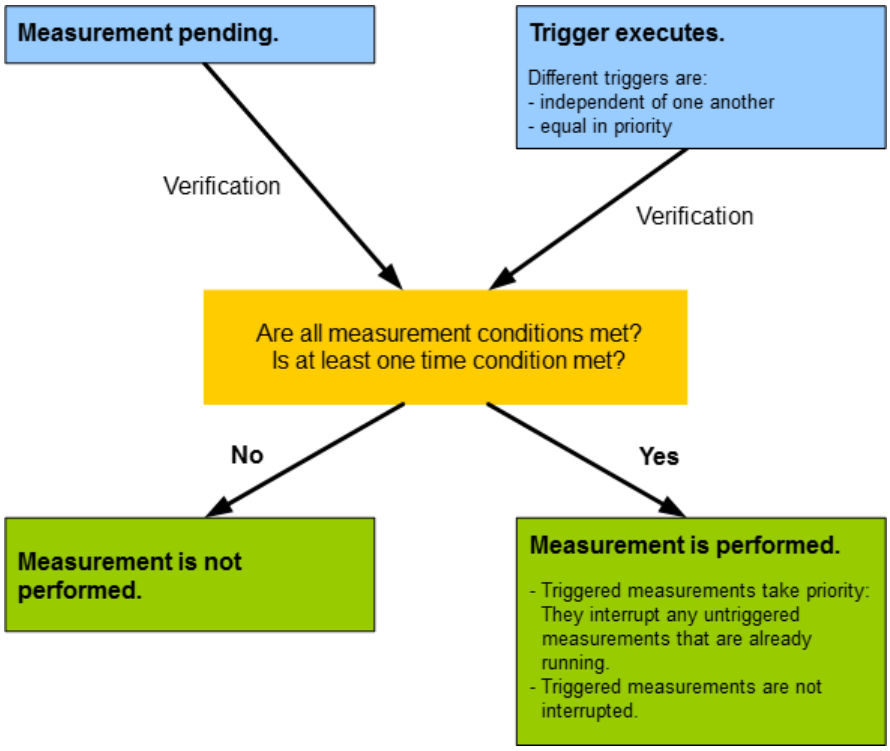
You can create the following triggers and conditions here:

- **Time trigger** 66
- **Measurement trigger** 67
- **Time condition** 68
- **Measurement condition** 69

Relevant details can be found in the following sections.

- You can also create and edit measurement triggers and measurement conditions without the wizard in the **Measurement trigger** 82 and **Measurement conditions** 85 areas. You can then select the triggers and conditions created there from a list in the wizard.
- You cannot use measurement triggers and measurement conditions for output configurations.

The diagram below provides an overview of the interaction and prioritisation of conditions and triggers:



Measurements instigated by triggers are not performed:

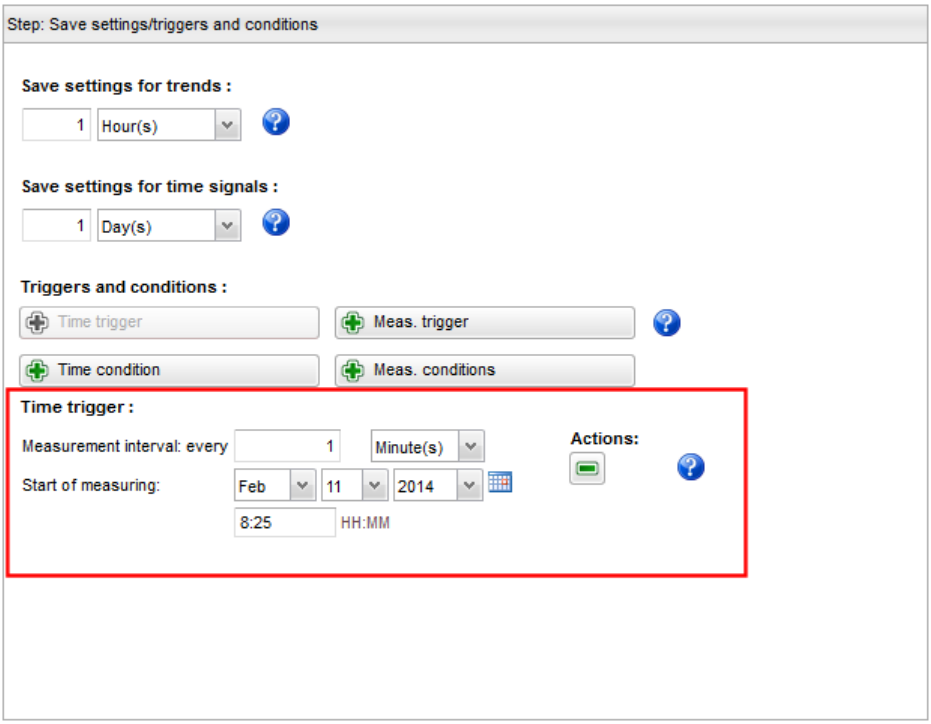
- If the conditions are not met at the trigger point.
- If a measurement instigated by a trigger is already running.

8.2.4.1 Time trigger

A time trigger allows you to specify that the measurement will take place regularly at an interval defined by you, e.g. every 5 minutes. You can only create one time trigger for each measurement job.

How to create a time trigger

1. Click the ✚ **Time trigger** button.
2. Enter the desired specifications under **Time trigger**:



You have the following options:

Measurement interval: every	Use this specification to determine the measurement interval, i.e. the time after which the measurement is to be repeated. You can specify an interval in **Minutes**, **Hours** or **Days**.
Start of measuring	Here you specify the day and time when the measurements are to start. Here you have the following options: • You can either select the start date from the list boxes or set it directly via the **calendar** . • Enter the start time in the field next to **HH:MM**.
	Click **Delete** to remove this time trigger.
	Move the mouse over the question mark to read additional information.

Time triggers ignore the shift that results from the change from summer to winter time.

Example:

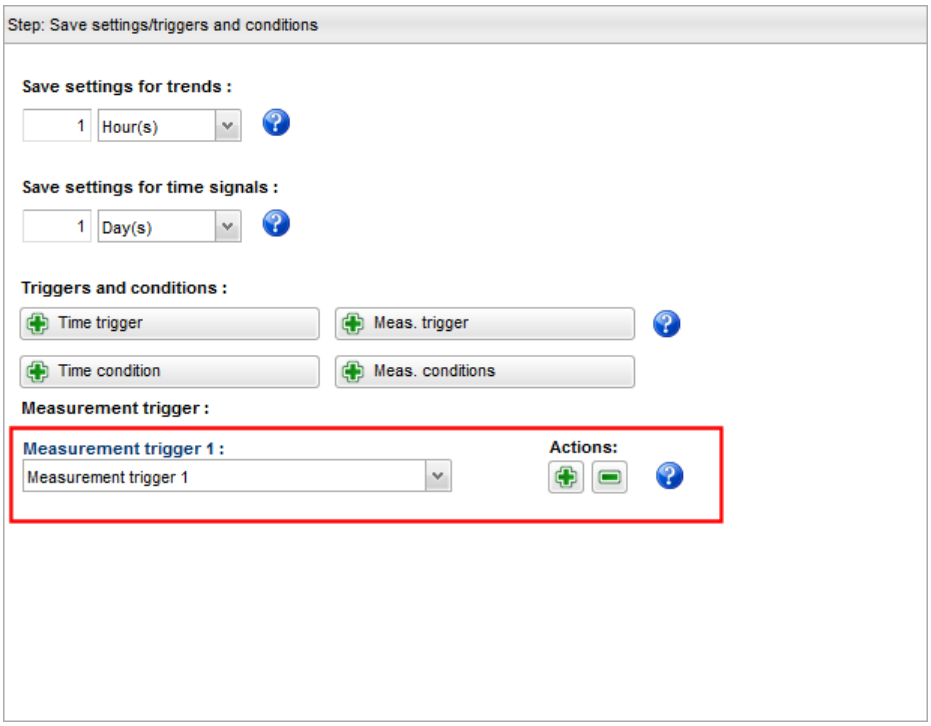
- In winter, you create a time trigger with **Start of measuring** 14:00. In summer, the start of measuring will not be until 15:00.
- In summer, you create a time trigger with **Start of measuring** 14:00. In winter, the start of measuring will be at 13:00.

8.2.4.2 Measurement trigger

You can use a measurement trigger to interrupt the order of measurements. If the trigger condition you have defined is fulfilled, the current measurement is cancelled and the measurement controlled by the measurement trigger is started.

How to create a measurement trigger

1. Click the **Measurement trigger** button.
2. Enter the desired specifications under **Measurement trigger**:



You have the following options:

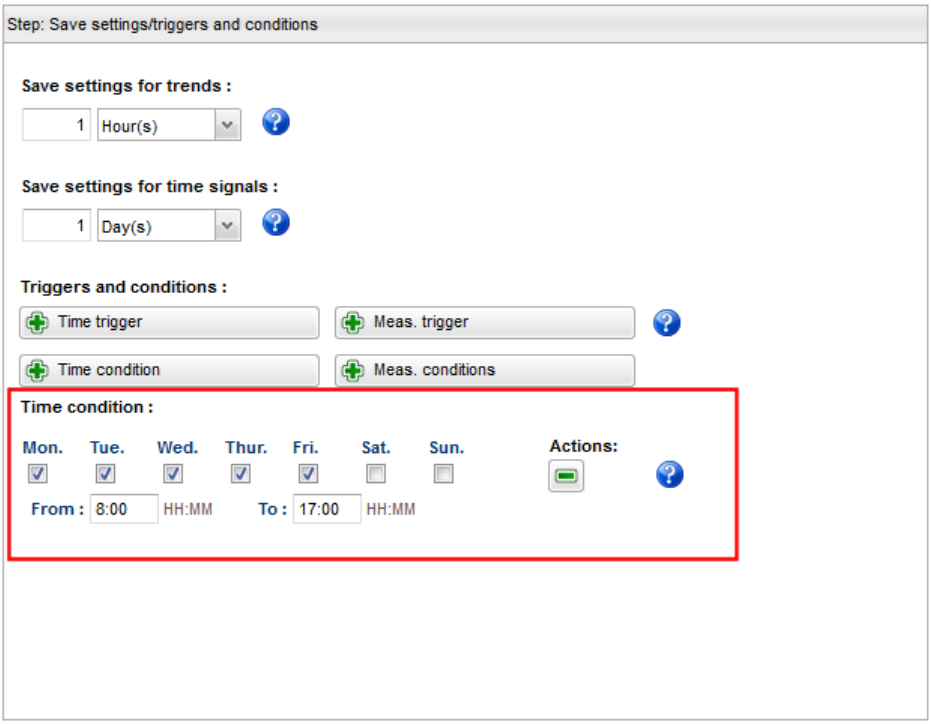
Measurement trigger (list box)	This list contains the measurement triggers that you have previously created in the **Measurement trigger** 82 area. Select the required measurement trigger from here.
✚	If you cannot find a suitable measurement trigger in the list box, click ✚ to create a new measurement trigger. The **Add measurement trigger** dialogue opens and you can enter the desired specifications here. You can find details on this in the **Adding/ editing measurement trigger** 83 section.
▬	Click **Delete** ▬ to remove this measurement trigger.
?	Move the mouse over the question mark ? to read additional information.

8.2.4.3 Time condition

You can use a time condition to ensure that measurements are only performed at a certain time.

How to create a time condition

1. Click the ✚ **Time condition** button.
2. Enter the desired specifications under **Time condition**:



You have the following options:

Mon.-Sun.	Activate here the days on which measurements are to start.
From ... To ...	Enter here the times between which the measurements are to take place. The time range that you specify here can also run from one day into the next. **Example:** You have activated **Mon** and **Tues** and enter the following as the time range: **From: 17:00 To: 8:00** The time range for measurements then begins on Monday at 17:00 and ends Tuesday morning at 8:00. After a break, measurements will resume at Tuesday 17:00 and continue until Wednesday at 8:00.
	Click **Delete** to remove this time condition.
	Move the mouse over the question mark to read additional information.

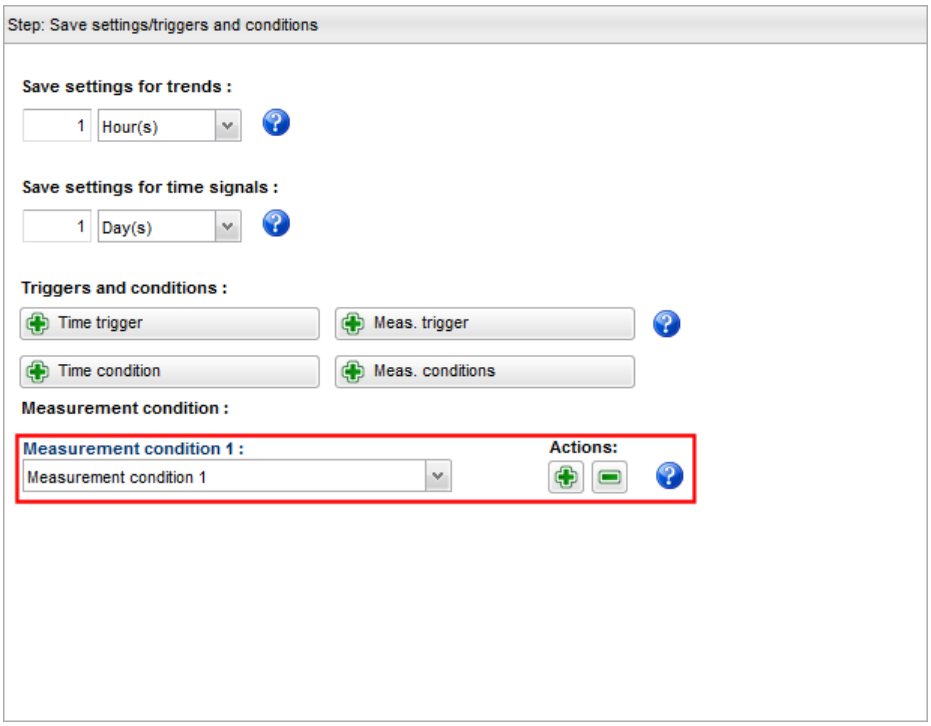
- If multiple time conditions are defined for a single measurement job, only one condition needs to be met for the measurement to be performed.
- Time conditions ignore the shift that results from the change from summer to winter time. Example:
  - In winter, you create a time condition for the period **from 14:00 to 16:00**. In summer, the time period shifts to 15:00 to 17:00.
  - In summer, you create a time condition for the period **from 14:00 to 16:00**. In winter, the time period shifts to 13:00 to 15:00.

8.2.4.4 Measurement condition

In a similar way to the time condition, the condition you define here must be met in order for a pending measurement to take place. If a measurement is pending but the measurement condition you defined is not met, the device skips this measurement and goes straight to the next one.

How to create a measurement condition

1. Click the **Measurement condition** button.
2. Enter the desired specifications under **Measurement condition**:



You have the following options:

Measurement condition (list box)	This list contains the measurement conditions that you have previously created in the **Measurement conditions** 85 area. The **Machine is running** measurement condition is preselected. This is preconfigured on the device and cannot be deleted. Select the required measurement condition from here.
✚	If you cannot find a suitable measurement condition in the list box, click ✚ to create a new measurement condition. The **Add measurement condition** dialogue opens and you can enter the desired specifications here. You can find details on this in the **Adding/editing measurement conditions** 87 section.
▬	Click **Delete** ▬ to remove this measurement condition.
?	Move the mouse over the question mark ? to read additional information.

If multiple measurement conditions are defined for a single measurement job, all conditions must be met for the measurement to be performed.

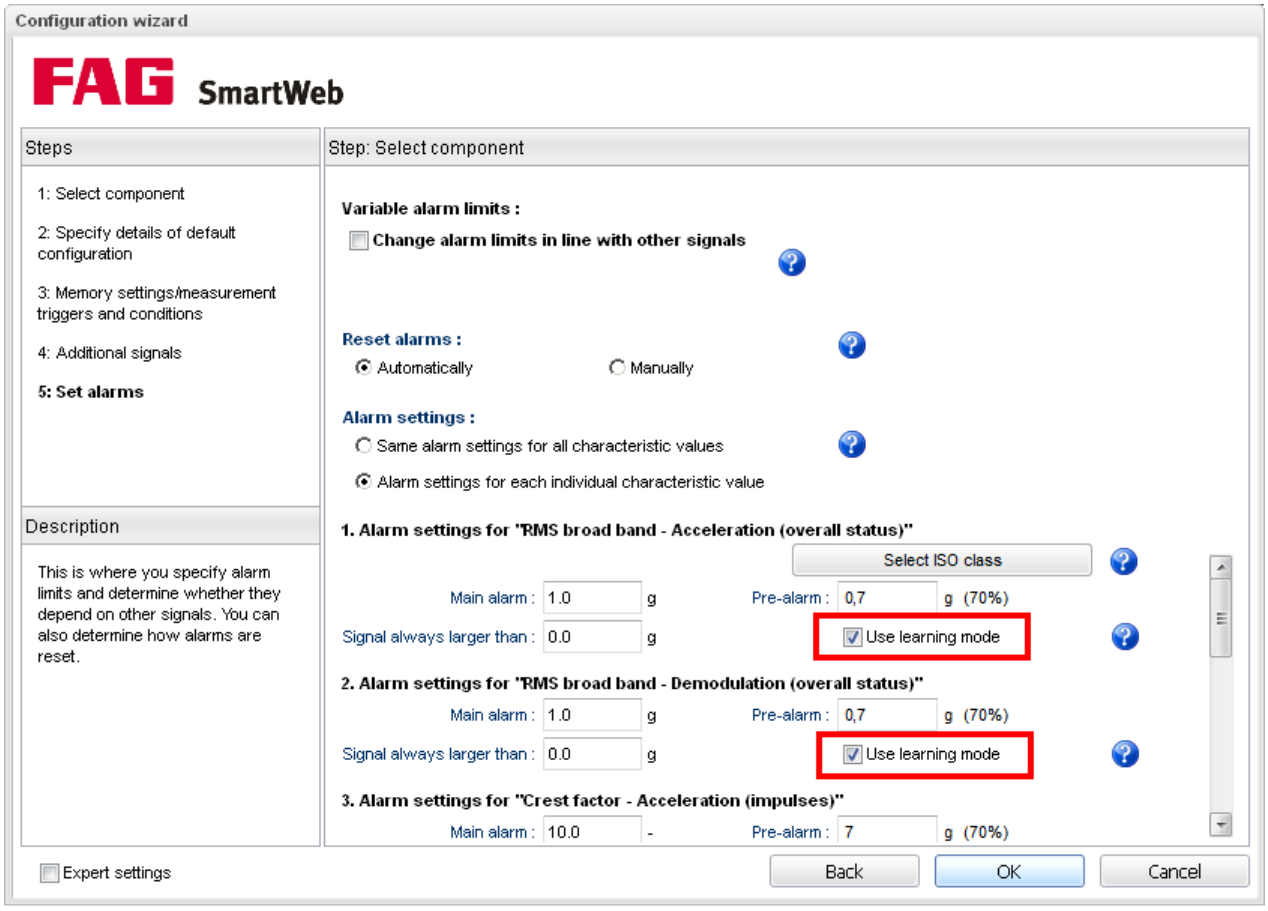
8.2.5 Learning mode and alarm maps

When you create a measurement job, the relevant characteristic values are automatically generated. The default alarm limits of the SmartCheck device initially apply to these characteristic values. If you activate the learning mode in the **Set alarms** step of the configuration wizard and then start learning mode, the SmartCheck device starts to evaluate the measurement values of the relevant characteristic values for alarm limits, which are adapted to your machine. When the learning mode is completed, the default alarm limits are replaced by the newly calculated alarm limits.

Essentially, the learning mode can be run in two different scenarios, in the simple Default setting 70 or with an Alarm map 72, i.e. dependent on one or two other signals (machine parameters). These scenarios are described in detail in the following sections. In further sections, you will be given important information on using the learning mode 74 and how to proceed during the initial setup 75 of the SmartCheck device.

Scenario 1: Learning mode in default setting

When you create a measurement job - in this example, the pre-configured **Basic configuration** - the learning mode is already activated in the **Set alarms** step for all vibration characteristic values:



When you complete the wizard with **OK**, you can then start learning mode for all characteristic values for which the learning mode was activated. You have the following options:

- Press the **TEACH** key on the SmartCheck device to start learning mode for all characteristic values for which the learning mode was activated.
- In the SmartWeb software, open the context menu for a characteristic value. Use the **Start learning mode** command to start learning mode for the selected characteristic value.
- In the SmartWeb software, open the context menu for a measurement job. Use the **Start learning mode for all** command to start learning mode for all characteristic values for the selected measurement job.

The learning process then looks like this:

- The FAG SmartCheck device records 1000 measurement values; here each measurement performed is saved in the trend - independently of the memory cycle of the trend that you specified in the **Save settings/triggers and conditions** step. The speed of this process can depend on your triggers and conditions 65.



- The default of 1000 measurement values can be changed in the configuration wizard. To do so, activate the **Expert settings** option. The **Apply learning mode settings** step appears, in which you can change the **number of values**.
- Learning mode is deactivated by default for characteristic values **ISO108161-1 (2 Hz to 1 kHz) - velocity** and **ISO108161-1 (10 Hz to 1 kHz) - velocity**.

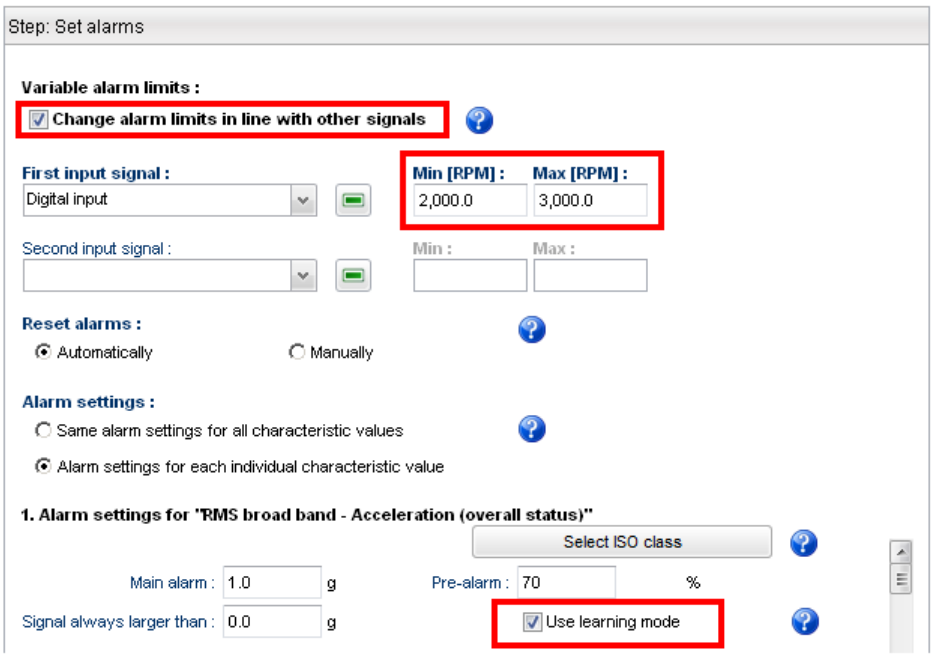
- As soon as the <var styleclass="Normal">SmartCheck</var> device has saved 1000 measurement values in the trend, a new alarm limit for the relevant characteristic value is calculated on this basis; here the SmartCheck device uses the **Maximum values** as an algorithm. In the **Learning mode settings** 63 step of the wizard, you can change/adapt this procedure.
- When the learning mode for a characteristic value is completed, a corresponding message appears in the logbook 36, which also contains the newly calculated alarm limits. You can view the alarm limits in the trend in the **Measurement data** 38 area as well.
- Once learning is complete, learning mode for this characteristic value is automatically deactivated in the measurement job. If you wish to restart learning mode at a later point, you must tick the appropriate box again in order to activate. You can do this in either the configuration wizard 62 or the **Edit alarm settings** 42 dialogue.

- During this process, the learning mode only determines main and pre-alarm limits. The value you specified for **Signal always larger than** in the **Set alarms** step is automatically adjusted if the new alarm limits overlap.

Scenario 2: Learning mode and alarm map

Alarm maps are used in connection with the learning mode if your machine is operated in different operating states each having its own alarm limits. In this case, you can run the learning mode dependent on one or two further signals (machine parameters). To do this, the SmartCheck device must be able to measure the corresponding signals via the analogue or digital input. The following example shows which specifications you must make additionally in the configuration wizard:

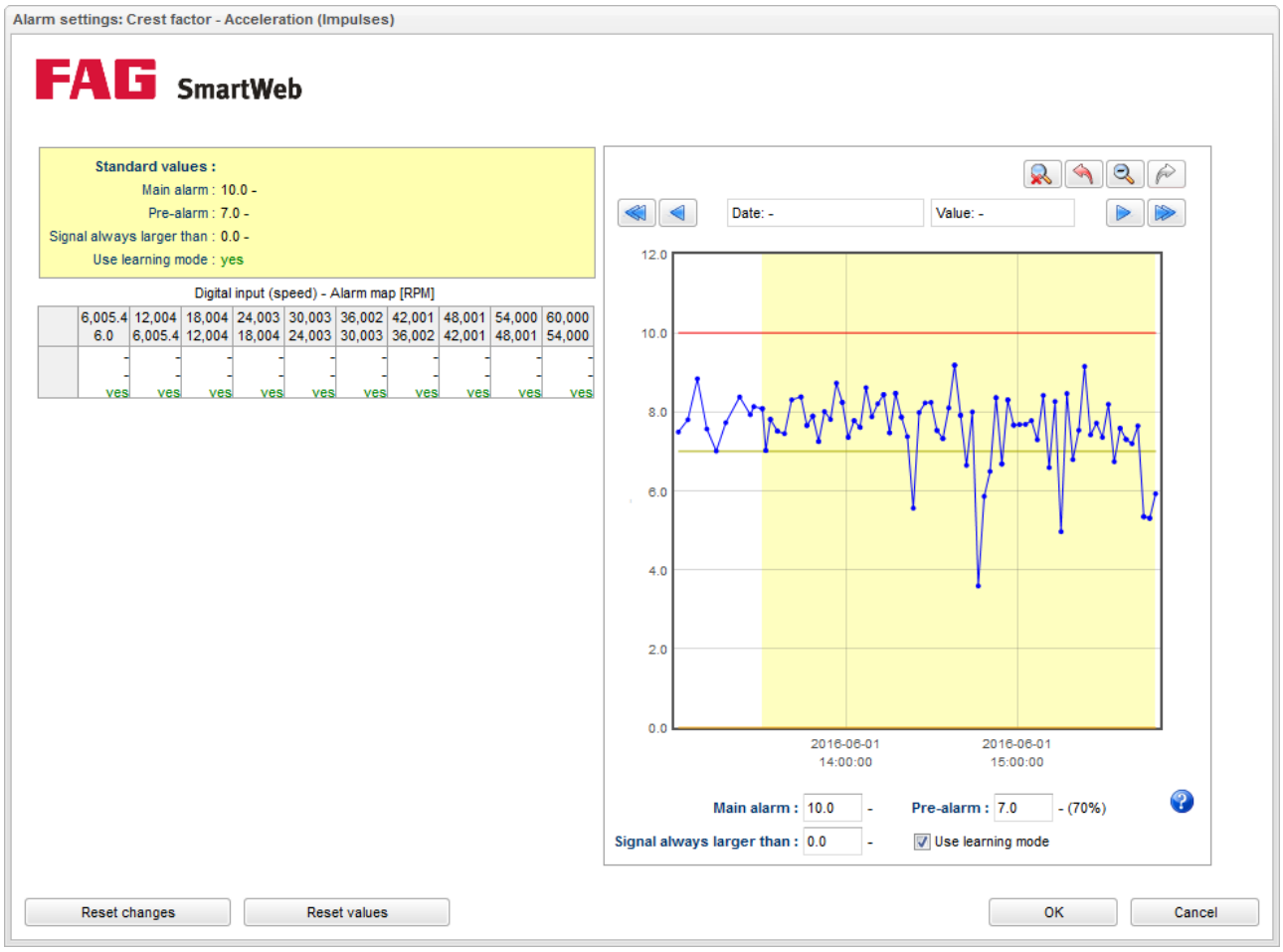
Your machine, which is operated at different speeds, has a speed range of between 2000 rpm and 3000 rpm. In order to calculate alarm limits contingent on this speed range with the learning mode, make the following entries in the **Set alarms** step of the configuration wizard:



- Activate the **Change alarm limits in line with other signals** option.
- For the input, select the speed input — in this example the digital input.
- For **Min [RPM]**, specify the value 2000.
- For **Max [RPM]**, specify the value 3000.
- Activate the learning mode for the corresponding characteristic values.

As soon as you complete the wizard with **OK**, you can start learning mode in the same way as with the Default setting 70; learning process deviations from the default setting are as follows:

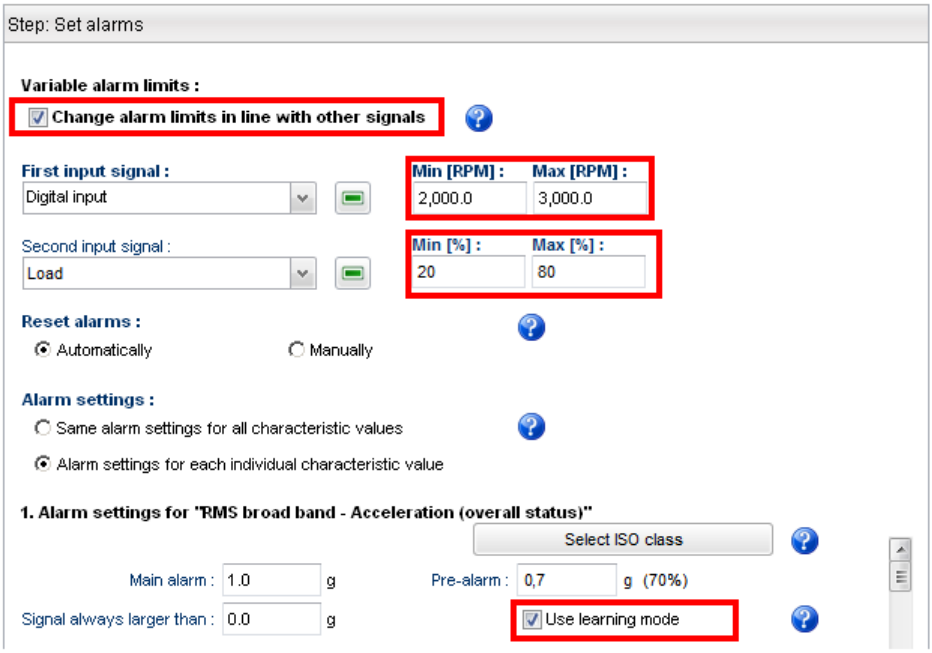
- The reference speed range of 2000 to 3000 is broken down into an alarm map with 10 fixed alarm fields:



For each of these alarm fields, the SmartCheck device takes in 1000 measurement values in order to calculate from them an alarm limit of its own for the corresponding alarm field.

- For as long as an alarm field does not yet have a new alarm limit, the default alarm limit applies for the field.
- Each alarm field is processed 42 individually, which means it is possible for the learning mode to be completed in one alarm field already, while the default alarm limits still apply in the other alarm fields.
- When the learning mode for an alarm field is completed, a corresponding message appears in the logbook 36, which also contains the newly calculated alarm limits.
- While the learning mode is running, the status LED of the SmartCheck device flashes. When running through the alarm fields in an alarm map, the LED may stop flashing briefly because the device has reached a field that is already completed. However, it will start flashing again as soon as it reaches a field for which the learning mode is not completed.

You can also use the learning mode contingent on two machine parameters. In this case, you must specify a second signal in the **Set alarms** step of the configuration wizard:



As soon as you complete the wizard with **OK**, you can start the learning mode process as described above. However, the alarm map is significantly expanded, as a matrix with 100 alarm fields is now generated, with an alarm limit calculated for each field.

- The SmartCheck device creates the characteristic value for the machine parameter(s) in the background; you cannot change their alarm limits manually: they depend on your entry for the value range.
- If a measured value lies outside the value range you have specified, the SmartCheck device uses the alarm limit of the nearest alarm field.
- After a firmware update, the checkbox for **Use learning mode** is activated for all alarm maps – regardless of whether or not the learning mode has already been completed for this map. Learning mode is not activated after the update, the control maps therefore initially remain unchanged. As soon as you activate learning mode, all control maps are learned again. In this process, they lose all previously learned values. To prevent this, proceed as follows: In the SmartWeb software, set learning mode for each individual field by selecting one or more fields and deactivating/activating the checkbox for **Use learning mode**.

General information on the learning mode

In this section, you will find useful pointers on working with the learning mode.

When is it useful/possible to use the learning mode, and when not?

- For the learning mode, the machine must be in good condition, i.e. not damaged in any way. For monitoring vibrations in accordance with ISO 10816-1, an additional requirement is that the machine vibrations should lie within the range of the ISO characteristic value. This is true of machines "that are normally considered acceptable for long-term operation" (ISO definition for the good condition of a machine).
- The learning mode can only determine optimal values if the machine is in its normal state/operation. You should not start the learning mode if your machine is currently idle or being started or stopped.

If you are not sure how to find out the normal operating state of your machine, ask your customer support representative 119.

- In general, it makes sense to use the learning mode in connection with vibration signals.
- You should not use the learning mode when the measurement range is known, e.g. for temperature, pressure or load.
- For additional signals, which you specify in the **Additional signals** step (configuration wizard), the learning mode is generally not necessary.



No alarm is output during the learning phase. An alarm is output only if learning mode is complete and the machine exhibits high vibrations. The status LED of your SmartCheck device then lights up permanently in yellow or red. This could be an indication of excessive vibrations. In this case, inspect the machine and the settings in the SmartWeb software. If necessary, contact a vibration expert or your customer support representative 119.

How do changes to the system affect the learning mode?

- In changing the value range of the signal that is used for the alarm map in the **Set alarms** step (configuration wizard), you also change the dimension of the alarm map. Therefore, upon completion of the wizard, all alarm limits that the learning mode has determined up to that point are discarded. As for a newly created measurement job, the default alarm limits are now in all alarm fields again.
- When you work with the learning mode, the SmartCheck device takes over the default alarm limits of the characteristic values at the start of the process. As soon as the learning mode has been completed once, the system will then only use the new alarm limits. If you change the default alarm limits of the characteristic value, the changes take effect immediately on the system. As such, you can also adjust the alarm limits during the learning phase.
- If you switch off the SmartCheck device, the learning mode will only be interrupted; the measurement results to date are not lost.



If you turn off the machine while the learning mode is active, the learning mode will be executed on an idle machine, which will result in incorrect measurement values and thus incorrectly calculated alarm limits too. You should therefore restart the learning mode when the machine is running again.

When should the learning mode be restarted and what happens then?

- You should always restart the learning mode when the machine parameters or the vibration behaviour have changed. This is likely in the following cases, for example:
  - After repairs
  - After structural changes to the machine
  - After changes of mechanical parameters.
- If the learning mode was already completed, the previous alarm limits will be retained after a restart until the calculation of the new alarm limits is finished.
- If the learning mode was not yet completed and is restarted, the values already measured will be discarded and all set values will need to be measured again.

How is the learning mode activated/started?

Activation

- FAG SmartWeb: Via the **Create new measurement job** or **Edit measurement job** wizard in the **Set alarms** step, or via the **Alarm settings** button under **Characteristic value configuration**

Start/Restart

- FAG SmartWeb: Via the context menu for measurement configurations and characteristic values, e.g. in the **Status** area.
- FAG SmartCheck: via the **TEACH** key. This starts the learning mode for all characteristic values of your system for which the learning mode is authorised.

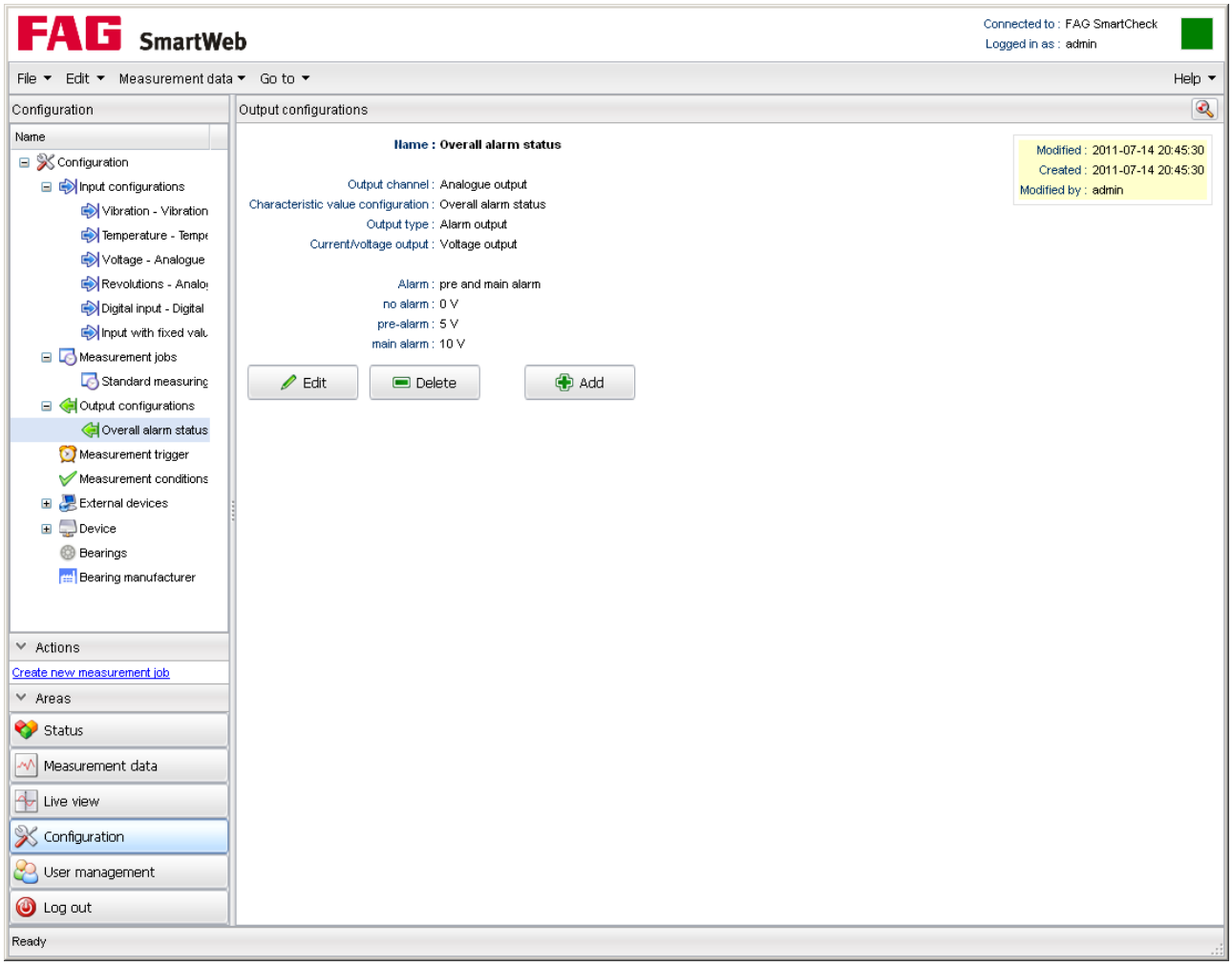
Procedure for initial set-up

For the initial set-up of the FAG SmartCheck device, proceed as follows:

1. Install the SmartCheck device and set up the connections. Details on this can be found in the FAG SmartCheck user documentation.
2. Create the desired configuration with the SmartWeb software. You can find an initial overview of the necessary steps on the start page of the **Configuration** 49 area.
3. Only start the learning mode once your machine is in a defined normal state, i.e. temperature, pressure etc. have reached normal values. Measurements outside the normal state can negatively affect the measurement result.

8.3 Output configurations

For FAG SmartCheck, you can configure 77 a total of two outputs, one analogue output and one digital output. In the **Output** configurations field, you will find an overview of all outputs of the SmartCheck device currently configured. In the factory default setting of the SmartCheck device, the analogue output is configured as **Overall alarm status**:



In the expanded overview on the left, you will find all output configurations of the SmartCheck device. Click on an output configuration to access the following information and functions in the main panel:

- The **Name** and the details on the selected output configuration are displayed on the left.
- On the right, in the field highlighted in yellow, you will find details on the creation and changing of the output configuration.
- You can edit the output configuration 77.
- You can add a new output configuration 77. The maximum amount possible is one digital and one analogue output configuration.
- You can delete the selected output configuration. To do so, click **Delete** and confirm with **OK**.
- You can test the selected output configuration 81. To do so, click on Test and define the test type. The display above the button indicates whether a test is currently active.
- In the top right corner, click on to open the Configuration overview 49.

If you reconfigure the outputs on the SmartCheck device, you have the following basic options:

Digital alarm limit 79

You can use the digital output, a pure switching output, as a two-stage alarm limit for any characteristic value configuration or for the overall alarm status. It can output whether an alarm exists or not, whereby you can determine whether it should switch as soon as the pre-alarm is triggered or only when the main alarm is reached. For this output to occur, the output must be connected to your controller.

Analogue alarm limit 78

You can use the analogue output as a three-stage alarm limit for any characteristic value configuration or for the overall alarm status. It can output whether a pre-alarm, a main alarm or no alarm exists. For this output to occur, the output must be connected to your controller.

Analogue characteristic value output 77

You can also use the analogue output to output the characteristic value for any characteristic value configuration or for the overall alarm status. The selected characteristic value, e.g. temperature, is given to the output as a voltage signal proportional to the size of the characteristic value and passed on to your controller, where the value can be interpreted.

- You cannot use triggers or measurement conditions for an output configuration
- Exact information on how to connect the outputs of the SmartCheck device with your controller can be found in the FAG SmartCheck user documentation.

8.3.1 Adding/editing output configurations

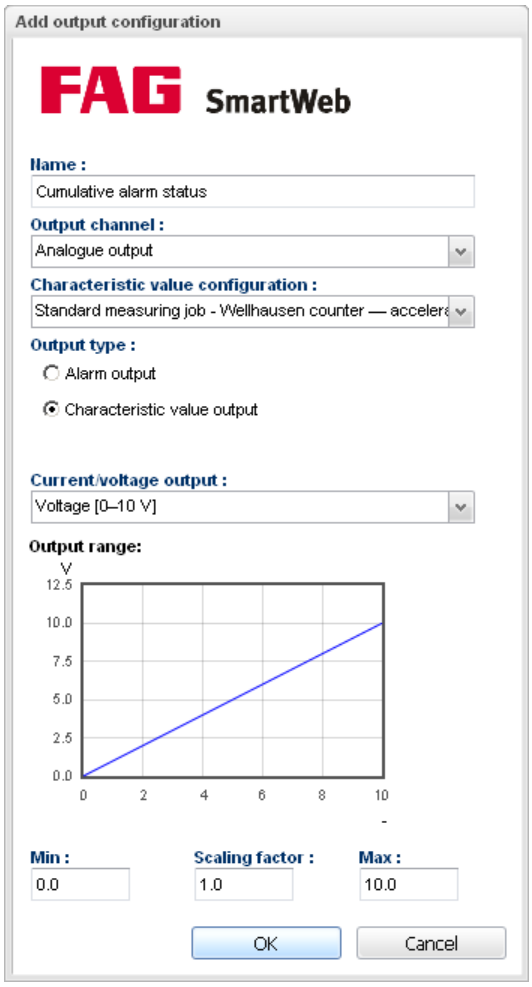
You can configure the following outputs on the SmartCheck device:

- Analogue characteristic value output 77
- Analogue alarm limit 78
- Digital alarm limit 79

You can edit 80 existing output configurations at any time.

How to create an analogue characteristic value output.

1. Under **Output configurations**, click on **Add** ✚.
2. Set the required specifications in the **Add output configuration** window:



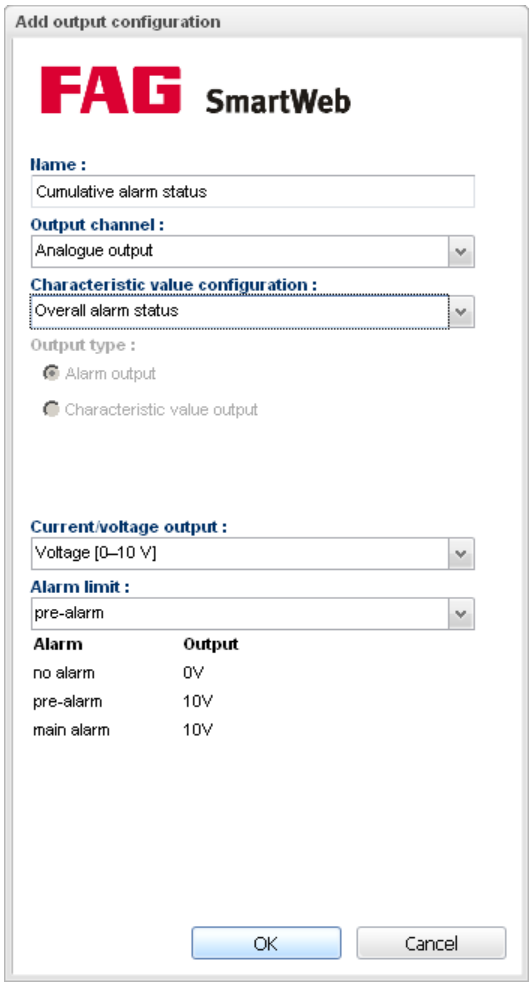
You have the following options:

Name	Here, enter the name under which the output configuration is to appear in the overview.
Output channel	From here, select the **Analogue output** option.
Characteristic value configuration	In this list, you can find the overall alarm status, all measurement jobs and the corresponding individual characteristic values of your system. For the analogue characteristic value output, you must select an individual characteristic value. You can only select measurement jobs and overall alarm status for one alarm limit.
Output type	Here, select the **Characteristic value output** option.
Current/voltage output	Here, determine the range of the voltage or current that is to apply for the analogue characteristic value output. SmartCheck supports the following ranges: • 0–10 V • 0-20 mA • 4-20 mA
Scaling factor, Min, Max	Use these settings to determine the range within which the characteristic value should lie. First enter a minimum value **Min**. Then enter a maximum value **Max** or define the factor with which the outgoing signal should be scaled in the **Scaling** field. Both the diagram and the values of the respective other field are then adjusted automatically. If the output value exceeds the maximum value **Max**, then the maximum voltage is output.

3. Click on **OK** to save the new output configuration.

How to create an analogue alarm limit

1. In the **Actions** field, click on **Add** ✚.
2. Set the required specifications in the **Add output configuration** window:



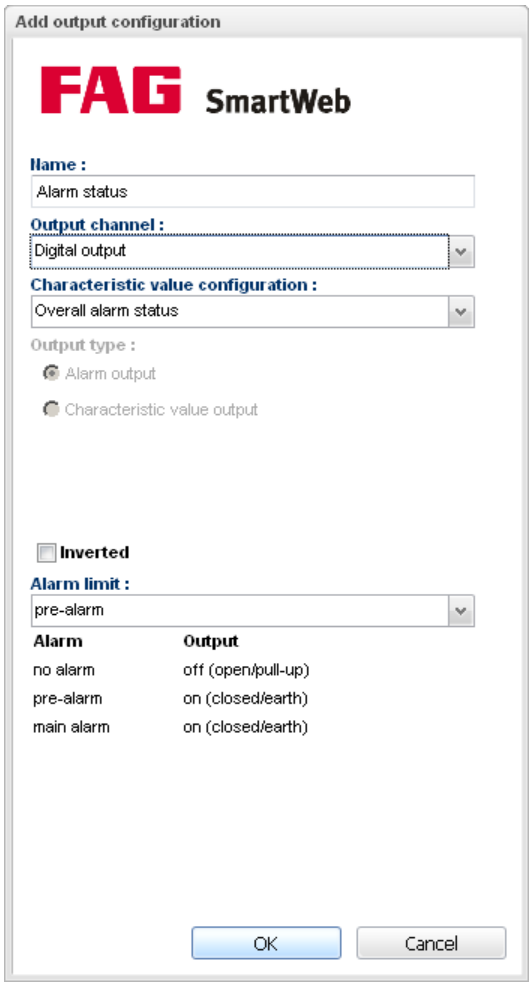
You have the following options:

Name	Here, enter the name under which the output configuration is to appear in the overview.
Output channel	From here, select the **Analogue output** option.
Characteristic value configuration	In this list you will find the overall alarm status and the individual characteristic values of all measurement jobs of your system. You can choose whether the alarm should be output for the entire system or for an individual characteristic value.
Output type	From here, select the **Alarm output** option.
Current/voltage output	Here, determine the range of the voltage or current that should apply for the analogue alarm limit. SmartCheck supports the following ranges: • 0-10 V • 0-20 mA • 4-20 mA
Alarm limit	From here, you determine whether the alarm output is to output the **pre-alarm**, the **main alarm** or the **pre and main alarms**. Below the drop-down list, you can find information on how current/voltage are distributed to the alarm statuses.

3. Click on **OK** to save the new output configuration.

How to create a digital alarm limit

1. Under **Actions**, click on **Add** ✚.
2. Set the required specifications in the **Add output configuration** window:



You have the following options:

Name	Here, enter the name under which the output configuration is to appear in the overview.
Output channel	Here, select the **Digital output** option.
Characteristic value configuration	In this list, you can find the overall alarm status, all measurement jobs and the corresponding individual characteristic values of your system. You can choose whether the alarm should be output for the entire system, a measurement job or an individual characteristic value.
Output type	This is where the **Alarm limit** option is specified.
Alarm limit	From here, you determine whether the alarm output is to output the **pre-alarm**, the **main alarm** or the **pre and main alarms**. In the list box, you can find information on how the output reacts to the alarm statuses.

3. Click on **OK** to save the new output configuration.

How to edit an output configuration

1. Select **Output configuration** in the expanded overview on the left.
2. Under **Output configurations**, click on **Edit** and set the required specifications in the **Edit output configuration** window. Here, among other things, you can also change an analogue alarm limit to a characteristic value output and vice-versa.
3. Click on **OK** to accept your changes.

8.3.2 Test output configuration

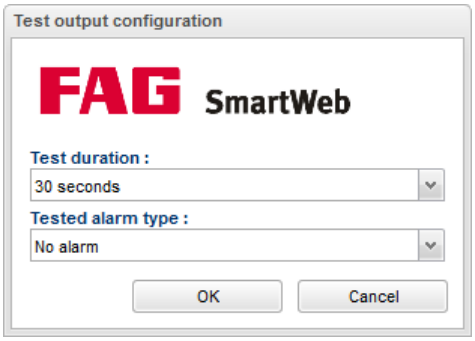
You have the option of activating a test for your output configuration and thus verifying whether your output configuration is working correctly. You can then determine whether the cabling and the connection to a controller or display are correct. If a test is already active, it is cancelled as soon as another alarm output is tested.

In the following sections, you will find details on how to test your configured alarm output 81 or your configured characteristic value output 82.

How to test a configured alarm output

1. Under **Output configurations**, click 

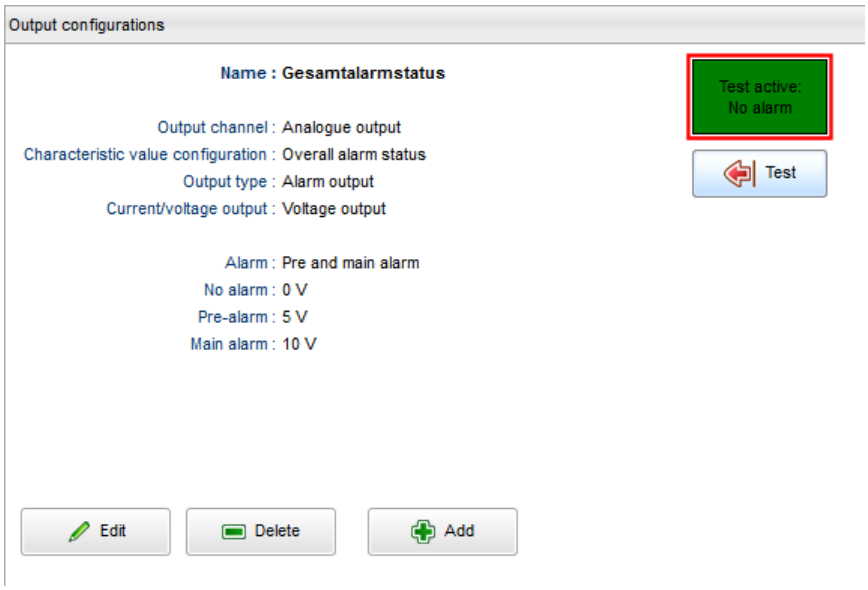
.
2. In the **Test output configuration** window, enter the desired specifications:



You have the following options:

Test duration	This is where you define the test duration.
Tested alarm type	Here you can select what the test is to simulate: • **No alarm**: the test simulates a status without an alarm. • **Pre-alarm**: the test simulates a pre-alarm. • **Main alarm**: the test simulates a main alarm.

3. Click **OK** to confirm your settings and start the test. You will then be informed that the test is active and informed on what is being tested:



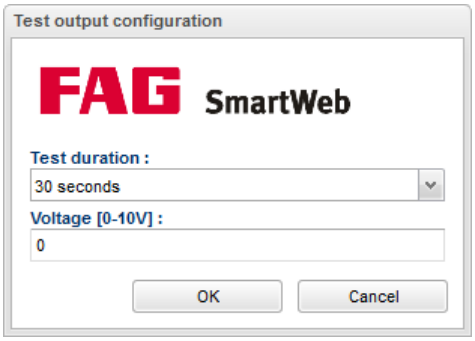
4. To cancel the test, click 

again.

How to test a configured characteristic value output

1. Under **Output configurations**, click 

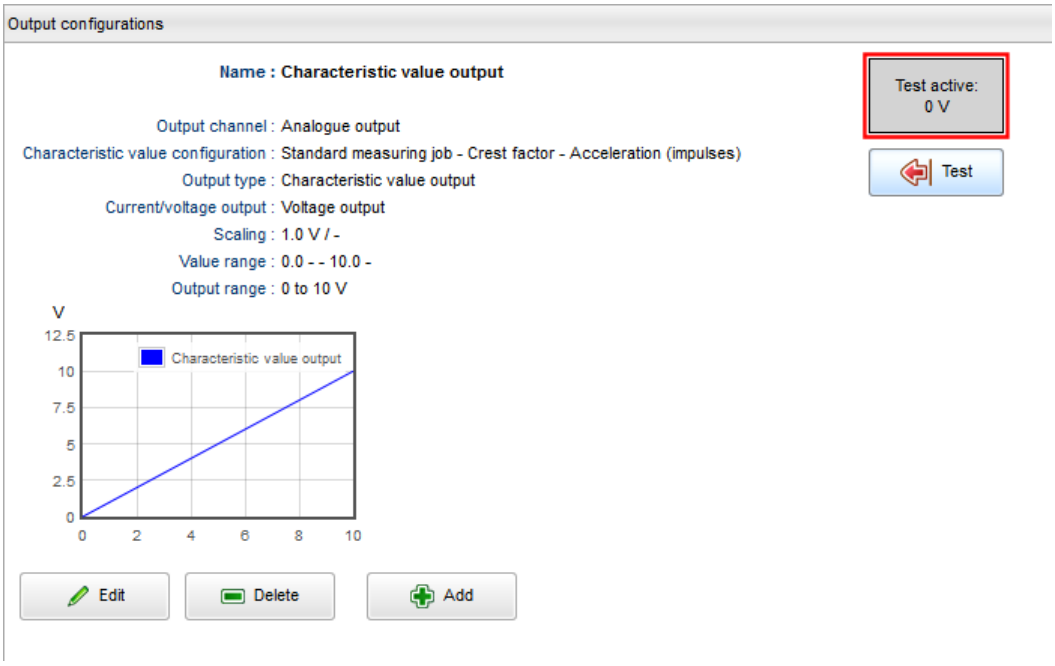
.
2. In the **Test output configuration** window, enter the desired specifications:



You have the following options:

Test duration	This is where you define the test duration.
Voltage	Here, enter the value for voltage or current that is to be tested.

3. Click **OK** to confirm your settings and start the test. You will then be informed that the test is active and informed on what is being tested:



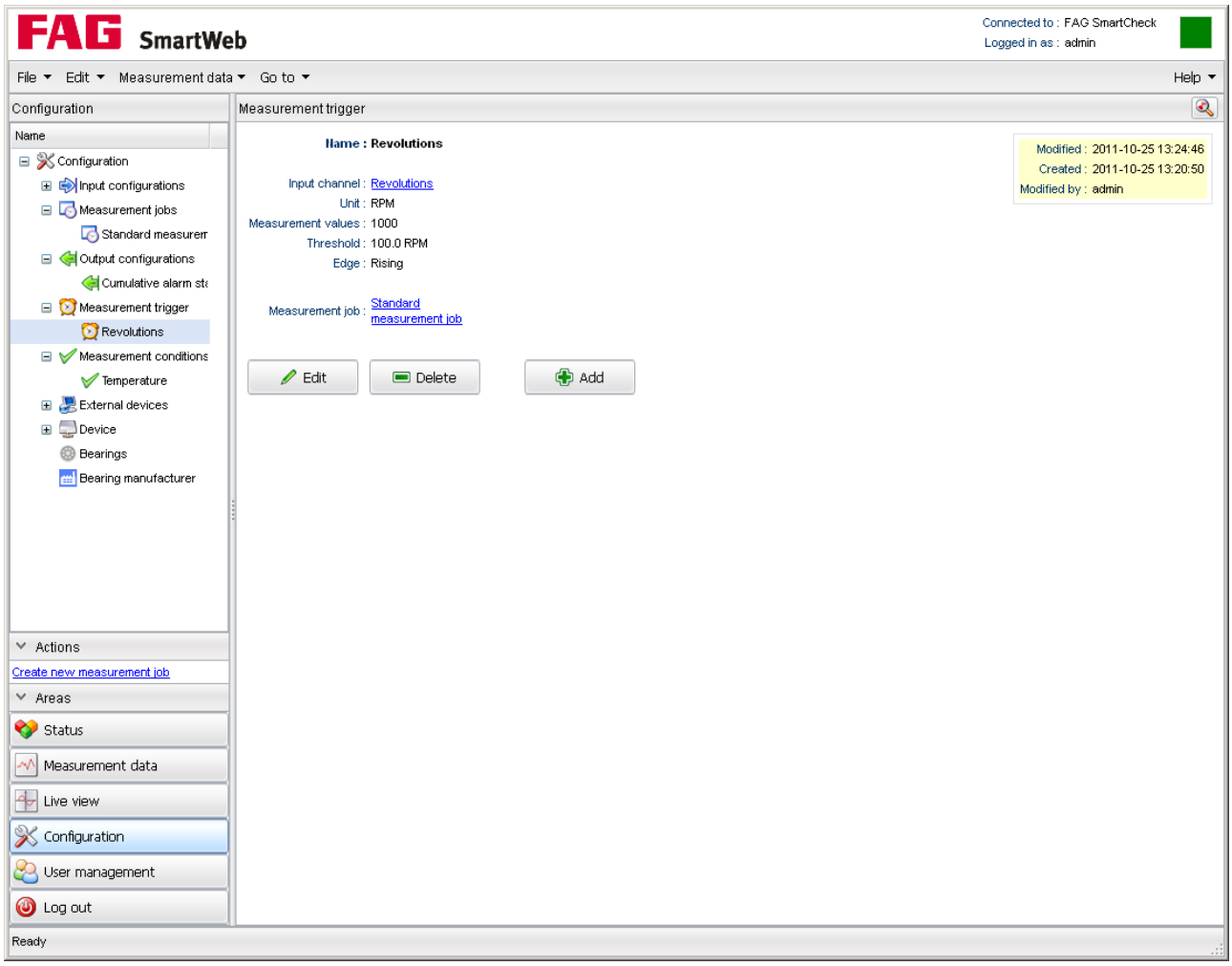
4. To cancel the test, click 

again.

8.4 Measurement trigger

The SmartCheck device generally works through the measurement jobs in a fixed order. However, you can interrupt this order using a measurement trigger. As soon as the trigger condition is fulfilled, the measurement controlled by the measurement trigger is started (after completion of the current measurement).

In the **Measurement trigger** area, you will find an overview of all measurement triggers. In the factory default setting, no measurement trigger is configured for the SmartCheck device. As soon as you have defined your own measurement triggers, they are available to you when creating measurement jobs 62.



In the expanded overview on the left, you will find all measurement triggers of the SmartCheck device. Click on a measurement trigger to access the following information and functions in the main panel:

- The **Name** and the details on the selected measurement trigger are displayed on the left.
- The entry for **Input channel** is a link that takes you straight to the corresponding input configuration.
- The entry for **Measurement job** is a link that takes you straight to the overview of the measurement job in which this measurement trigger is used.
- On the right, in the field highlighted in yellow, you will find details on creating and changing the measurement trigger.
- You can edit the measurement trigger 85.
- You can add a new measurement trigger 83.
- You can delete the selected measurement trigger. To do so, click **Delete** and confirm with **OK**.
- In the top right corner, click on to open the Configuration overview 49.



- When the condition for a measurement trigger is met, the measurement is started immediately, even if this means that an ongoing measurement is interrupted. Measurements that themselves have been started by a measurement trigger are not interrupted.
- If a measurement trigger is used in multiple measurement jobs, these jobs are executed sequentially when the trigger condition is met.

8.4.1 Adding/editing measurement trigger

You can add 83 as many measurement triggers and edit 85 as many existing measurement triggers as you like to the SmartCheck device.

How to create a measurement trigger

1. Under **Measurement trigger**, click on **Add**.

2. In the **Add measurement trigger** window, make the desired specifications:



You have the following options:

Name — Here, enter the name under which the measurement trigger is to appear in the overview. This name will also appear in the corresponding list box if you want to use the measurement trigger in a measurement job.

Input channel — Here, select the input whose signal you want to use for the measurement trigger. You will find in the list box all inputs and scaling factors 50 of your system.

Unit — This value is automatically filled for the input channel you have selected.

Calculation type — This is where you select the characteristic value most suitable for your signal. The **Offset** option is available for many application types.

Threshold — Specify here the value from which the measurement trigger should take effect: If the threshold value is exceeded or fallen below - according to the **Edge** - the SmartCheck device interrupts the current measurement and starts the measurement linked to the measurement trigger.

Measurement values — A trigger calculates its current value using the last measured number of values; enter this number here. This value is therefore used to define the number of measurement values that the calculation type configured above should calculate, and the time range over which this value is calculated. You therefore influence the speed at which a trigger reacts to changes in the input signal and the sensitivity of the trigger's reaction to signal disruptions:

- A smaller number causes a faster reaction.
- A larger number makes the trigger less sensitive to disruptions.

Example: The sample rate is 1280 values/second (e.g. for an analogue input) and you set **Measurement values** to 1280. If you have selected **Offset** as the calculation type, the calculated value corresponds to the average over one second via the input channel.

Edge — Determine here whether the **threshold** has to be exceeded or fallen below for the measurement trigger to take effect:

Falling: The measurement trigger takes effect when the threshold is fallen below.

Rising: the measurement trigger takes effect when the threshold is exceeded.

Storage period — Determine here whether you wish to store values regularly in order to monitor the measurement trigger. If values are stored regularly, you can view the trend of the measurement trigger in the **Measurement data** area and verify, for example, that the device is actually taking measurements.

You have the following options:

- **Never**: Select this option if no values are to be stored for a trend.
- **n minutes/hours/days**: Enter here the frequency at which values are to be stored

for the trend in minutes, hours or days.

A status change - i.e. the execution of the trigger - is always stored, regardless of the setting selected here.

3. Click on **OK** to save the new measurement trigger.

How to edit a measurement trigger

1. Select the measurement trigger in the expanded overview on the left.
2. Click on **Edit** and make the desired specifications in the **Edit measurement trigger** window.
3. Click on **OK** to accept your changes.



You can determine the number of **Measurement values** according to the following rough guidelines:

- A small number of measurement values allows the trigger to switch more quickly.
- A small number of measurement values reacts sensitively to short pulses.
- A large number of measurement values is preferable for restless, inconstant signals.

The **storage period** determines how frequently the trend values of the measurement trigger are saved. However, if the trigger relates to an analogue input in 4-20 mA mode, the following restriction applies:

If the value at the analogue input falls below 4 mA, this channel becomes invalid. The values of the trigger are then no longer measured or saved until the channel is valid again (i.e. the value at the input rises above 4 mA). This period is displayed with a grey background in the trend.

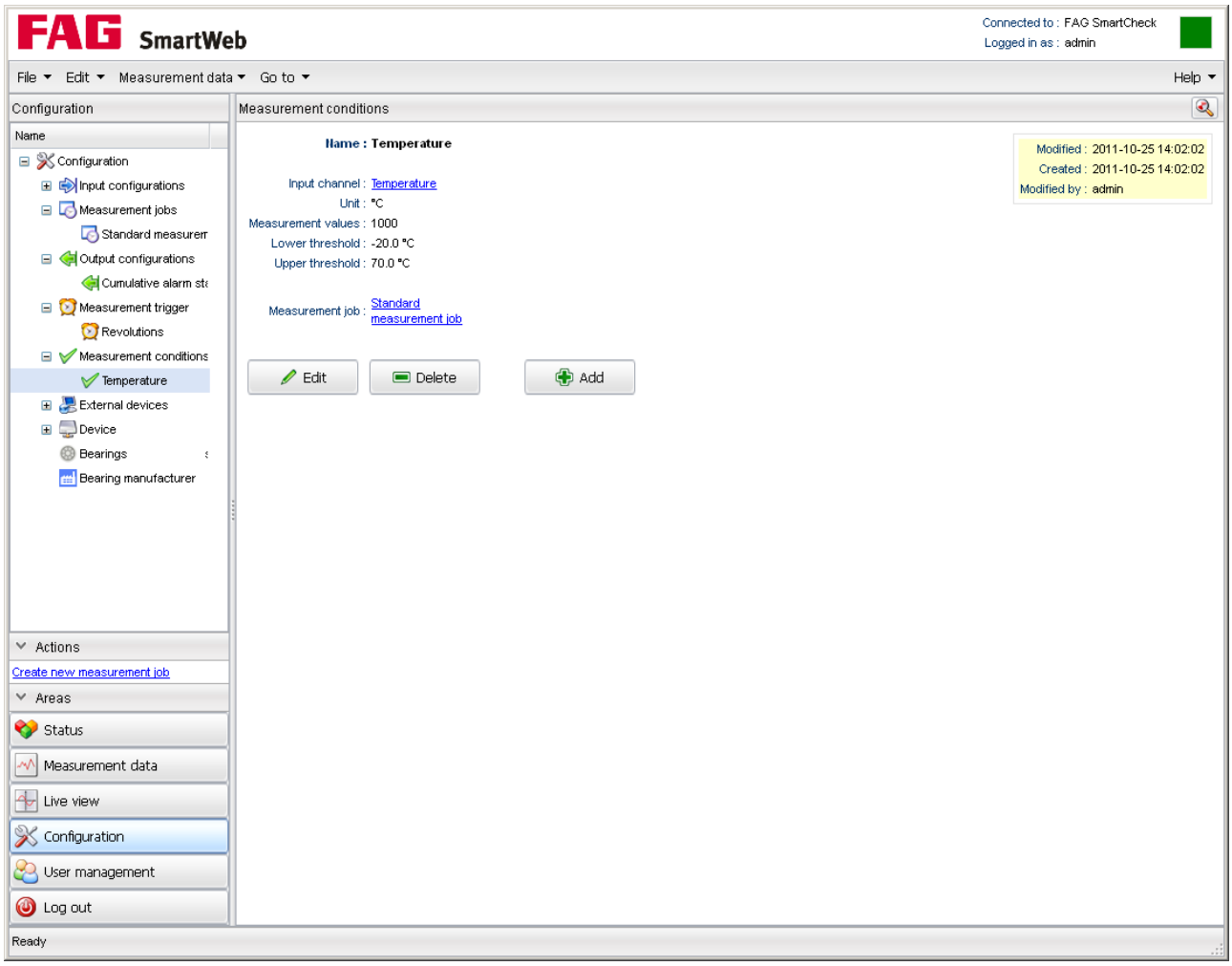
8.5 Measurement conditions

The FAG SmartCheck device generally works through the measurement jobs in a fixed order. Using a measurement condition, you can ensure that measurements are skipped: if a measurement is pending but the measurement condition you defined is not met, the device skips this measurement and goes straight to the next one.

If a measurement is pending and the measurement condition is met, the measurement is performed. However, even during a measurement, the system continually monitors whether the measurement condition is still being met. As soon as the measurement condition is no longer being met, the measurement is cancelled.

In the **Measurement conditions** area, you will find an overview of all measurement conditions. In the factory default setting for the SmartCheck device, the **Machine is running** 86 measurement condition is preconfigured.

As soon as you have defined your own measurement conditions, they will be available to you when creating measurement jobs 62.



In the expanded overview on the left, you will find all measurement conditions for the SmartCheck device. Click on a measurement condition to access the following information and functions in the main panel:

- The **Name** and the details on the selected measurement condition are displayed on the left.
- The entry for **Input channel** is a link that takes you straight to the corresponding input configuration.
- The entry for **Measurement job** is a link that takes you straight to the overview of the measurement job in which this measurement condition is used.
- On the right, in the field highlighted in yellow, you will find details on creating and changing the measurement condition.
- You can edit the measurement condition 88.
- You can add a new measurement condition 87.
- You can delete the selected measurement condition. To do so, click **Delete** and confirm with **OK**.
- In the top right corner, click on to open the Configuration overview 49.



The preconfigured **Machine is running** measurement condition is set in the basic measurement job and ensures that the measuring job is only executed when the relevant machine is actually running. You cannot delete or rename this measurement condition.

However, you should adjust this measurement condition on your machine immediately after initial operation of the FAG SmartCheck device: In the factory default setting, the fulfilment of the **Machine is running** measurement condition is based on vibration signals. Edit the measurement condition 87 so that it meets the requirements of your machine. For example, the engine speed is usually a better criterion for determining whether the machine is running.

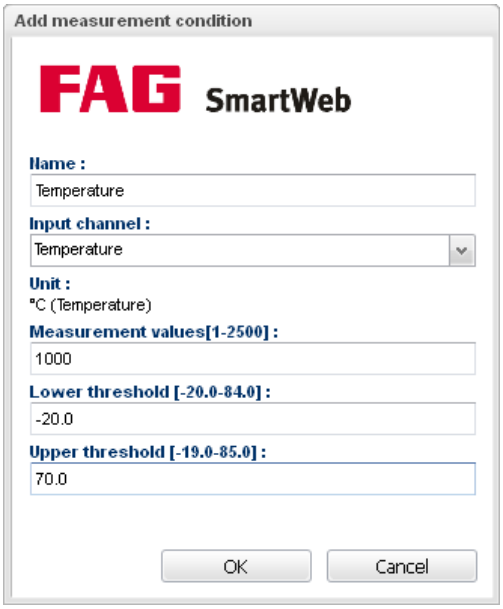
The **Machine is running** measurement condition is usually added to each newly created configuration by default. However, you can also delete it manually.

8.5.1 Adding/editing measurement conditions

On your SmartCheck device, you can add 87 as many measurement conditions and edit 88 as many existing measurement conditions as you like.

How to create a measurement condition

1. Under **Measurement conditions**, click on **Add** ✚.
2. In the **Add measurement condition** window, make the desired specifications:



You have the following options:

Name

Here, enter the name under which the measurement condition is to appear in the overview. This name will also appear in the corresponding list box, if you want to use the measurement condition in a measurement job.

Input channel

Here, select the input channel whose signal you want to use for the measurement condition. You will find in the list box all inputs and scaling factors 50 of your system.

Unit

This value is automatically filled for the input channel you have selected.

Calculation type

This is where you select the characteristic value most suitable for your signal. The **Offset** option is available for many application types.

Measurement values

A condition calculates its current value using the last measured number of values; enter this number here. This value is therefore used to define the number of measurement values that the calculation type configured above should calculate, and the time range over which this value is calculated. You therefore influence the speed at which a condition reacts to changes in the input signal and the sensitivity of the condition's reaction to signal disruptions:

- A smaller number causes a faster reaction.
- A larger number makes the condition less sensitive to disruptions.

Example: The sample rate is 1280 values/second (e.g. for an analogue input) and you set **Measurement values** to 1280. If you have selected **Offset** as the calculation type, the calculated value corresponds to the average over one second via the input channel.

Bottom threshold / Upper threshold

With these two thresholds, you determine the range within which the measurement condition counts as met; the measurement associated with this condition is then performed.

In our example, this range is between 40 and 60°C; with a value of e.g. 65°C, the measurement condition would not be met and the measurement would be skipped or cancelled.

Storage period	Determine here whether you wish to store values regularly in order to monitor the measurement condition. If values are stored regularly, you can view the trend of the measurement condition in the **Measurement data** area and verify, for example, that the device is actually taking measurements. You have the following options: • **Never**: Select this option if no values are to be stored for a trend. • **n minutes/hours/days**: Enter the frequency at which values are to be stored for the trend in minutes, hours or days here. A status change - i.e. the fulfilment of the condition - is always stored, regardless of the setting selected here.

3. Click on **OK** to save the new measurement condition.

How to edit a measurement condition

1. Select the measurement condition in the expanded overview on the left
2. Click on **Edit** and enter the desired specifications in the **Edit measurement condition** window.
3. Click on **OK** to accept your changes.



You can determine the number of **Measurement values** according to the following rough guidelines:

- A small number of measurement values allows the measurement condition to switch more quickly.
- A small number of measurement values reacts sensitively to short pulses.
- A large number of measurement values is preferable for restless, inconstant signals.

The **storage period** determines how frequently the trend values of the measurement condition are saved. However, if the measurement condition refers to an analogue input in 4-20 mA mode, the following restriction applies:

If the value at the analogue input falls below 4 mA, this channel becomes invalid. The values of the measurement condition are then no longer measured or saved until the channel is valid again (i.e. the value at the input rises above 4 mA). This period is displayed with a grey background in the trend.

8.6 External devices

Industrial plants use controllers that contain data such as process parameters; this data is extremely useful for vibration monitoring purposes. The **External devices** 89 area gives you the option of integrating this data into monitoring with the <var styleclass="Normal" style="font-size:9pt;">FAG SmartCheck</var> device, and of making data from the FAG SmartCheck device accessible to the controllers. In order to avail of this potential, the following steps must be taken:

- You must first add the controller that you would like to integrate as an external device 91. In doing so you essentially define the name of the controller and how the FAG SmartCheck device can connect with the controller via your network.

  It is also possible to configure station forwarding in the FAG SmartWeb software for accessing the remote controller in the internal controller network.
- For problem-free communication between the controller and the FAG SmartCheck device, there must be an Ethernet connection between the two. You must also configure the correct settings for the IP address, net mask and the gateway, if applicable.
- If multiple FAG SmartCheck devices are to communicate with one controller, an individual port must be reserved in the controller for each device.
- If you would like to read data from the controller, you must create one or more external inputs 93 for it. For this type of input, you can determine how often and from which controller registers the data is read, as well as the value range. You also specify the signal unit and signal value range to which the register data is to be converted.

  For each controller, you can set up as many external inputs as you wish and you can use them in the SmartWeb software in exactly the same way as you use the inputs that are found in the **Input configuration** 50 area; external inputs are available for measurement jobs 59, measurement conditions 85 and measurement triggers 82 in particular.
- If you would like to make controller data from the SmartCheck device accessible, you must create a configuration file with external outputs 94. Here, you define the update frequency and the characteristic values for which the alarm

status and/or a value is relayed, as well as the controller register to which the information is written.

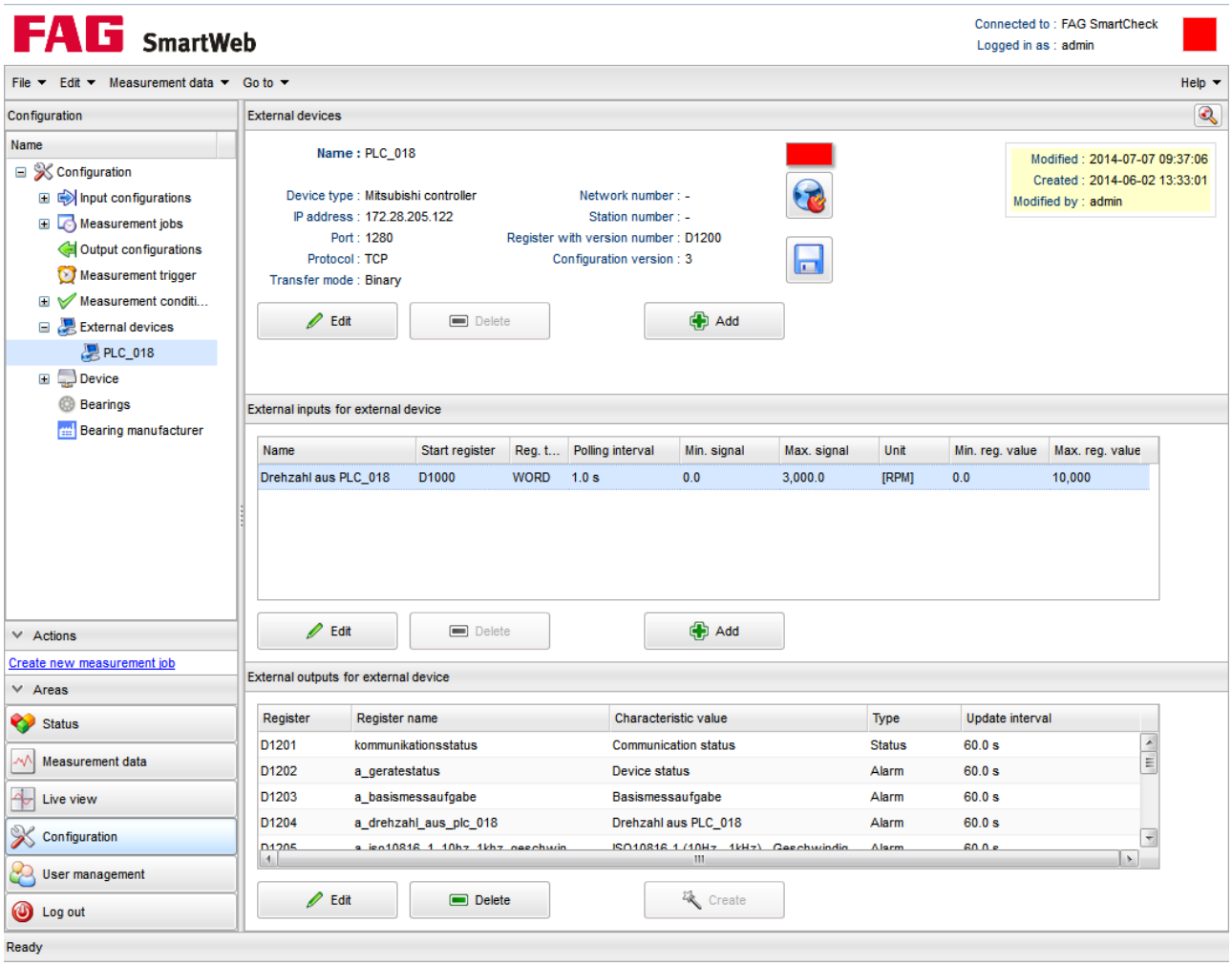
At the present time, the only external devices that you can integrate are Mitsubishi controller families that support the SLMP (3E-Frame) protocol and which are connected to the FAG SmartCheck device through an Ethernet. These are the following controller families:

- System Q
- L series
- System Q and L series via SLMP gateway

There are plans to offer support for additional external devices - you can obtain information from your customer support representative 119.

8.6.1 External devices section

In the **Configuration** section, the expanded overview on the left shows the external devices that you have created for the SmartCheck device. In the right-hand main panel, you will find basic details about the external device currently selected as well as information on its external inputs and external outputs if any have been created:



Click on an external device in order to access the following information and functions in the main panel:

External devices

Here you can find the basic information and functions for the selected external device:

- In addition to **Name**, **Device type** and **IP address**, basic settings for addressing the device can be found here. You can find the change details for the external device in the yellow box at the upper right-hand side.
- **Network number** and **Station number** are details required for station forwarding if you have defined these for the external device.

- **Register with version number** relates to the configuration file with external outputs that you have created for the device: here you can find the register into which the version of the configuration file (**Configuration version**) is written. This number functions as a safeguard 97 against unintentional overwriting of the register.
- : If you select an external device, this icon is updated; it indicates whether communication with the external device is functioning or not: a green icon indicates problem-free communication. If the icon is red, there is a communication problem. In this case you see an error message if you hover the mouse over the icon.
  To update the icon again you must click on .
- Click on to test the connection to the external device.
- Click on to download the configuration file. When you have created external outputs 88, you need this file in order to prepare the external device for the transfer of the data.
- Click on **Edit** to edit the external device. You can find details for this under **Adding/editing an external device** 92.
- Click on **Add** to add additional external devices. You can find details for this under **Adding/editing an external device** 91.
- You can delete the selected external device. To do so, click **Delete** and confirm with **OK**.
- In the top right corner, click on to open the Configuration overview 49.



An external device that you have linked to a measuring job 59 cannot be deleted. In this case, the **Delete** button is deactivated. To delete this external device, you must first delete the measuring job in which it is used.

External inputs for external device

Here you can find an overview in table form of the external inputs that you have created for the selected external device. If you select an external device, the following information and options will be displayed here:

- The table contains information on the relevant external inputs, in addition to the **Name** e.g. also the register in which the controller starts reading out the data (**Start register**), the signal value range into which the data is translated (**Min. signal** to **Max. signal**) and the register value range it covers (**Min. reg. value** to **Max. reg. value**).
- Click on **Edit** to edit the external input. For details of this, please refer to **Adding/editing an external input** 94.
- Click on **Add** to add further external inputs. For details of this, please refer to **Adding/editing an external input** 93.
- You can delete the selected external input. To do so, click **Delete** and confirm with **OK**.



An external input that you have linked to a measuring job 59 cannot be deleted. In this case, the **Delete** button is deactivated. To delete this external device, you must first delete the measuring job in which it is used.

External outputs for an external device

You can use characteristic values that are calculated in the SmartCheck device to transfer their alarm status and/or values to a controller. To do this, create a configuration file with external outputs and transfer the alarm status and/or value of characteristic values via this file to the controller.

If external outputs have already been created, you will find the following information in the **External outputs for an external device** section:

- The table indicates the characteristic values for which the alarm status and/or value (**Type**) is transferred to the external device, how often this happens (**Update interval**) and the register into which the information is written.
- Click on **Edit** to edit the external outputs with the assistance of the wizard. For more details about this, please refer to **Creating/editing external outputs** 94.
- Click on **Create** to create the external outputs with the assistance of the wizard. For more details about this, please refer to **Creating/editing external outputs** 94.
- You can delete the external outputs. To do so, click **Delete** and confirm with **OK**.

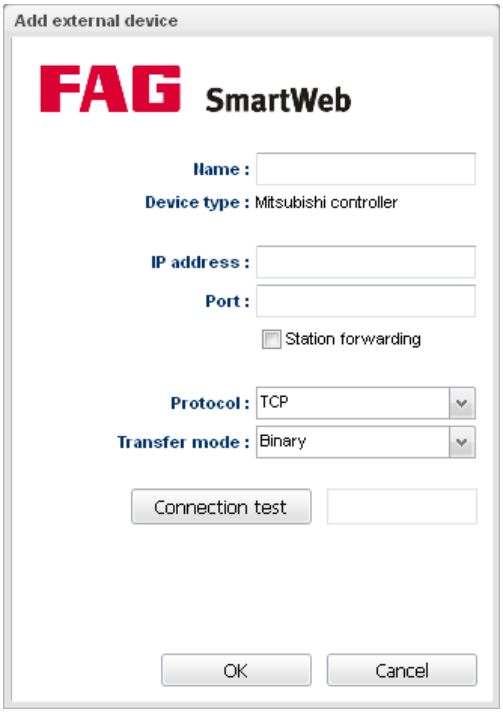
- After you have created or edited the external outputs in the SmartWeb software, you must transfer the corresponding information to your external device. For details, please refer to the section **Integrating an external device into the system** 97.
- If you want to use the FAG SmartUtility software to download a configuration from the SmartCheck device and send this to other devices, the external outputs are not included in the transfer. This prevents multiple FAG SmartCheck devices from writing to the same registers for the external controller. Please import the configuration file with the external outputs manually in this case, as described in the **Integrating an external device into the system** 97 section.

8.6.2 Adding/editing an external device

In order to be able to receive the data from an external controller as an input signal, you will need to set up the relevant controller as an external device and communicate the controller network data to the SmartCheck device.

This is how you create an external device

1. Under **External devices**, click on **Add** ✚.
2. In the **Add external device** window, enter the desired specifications:

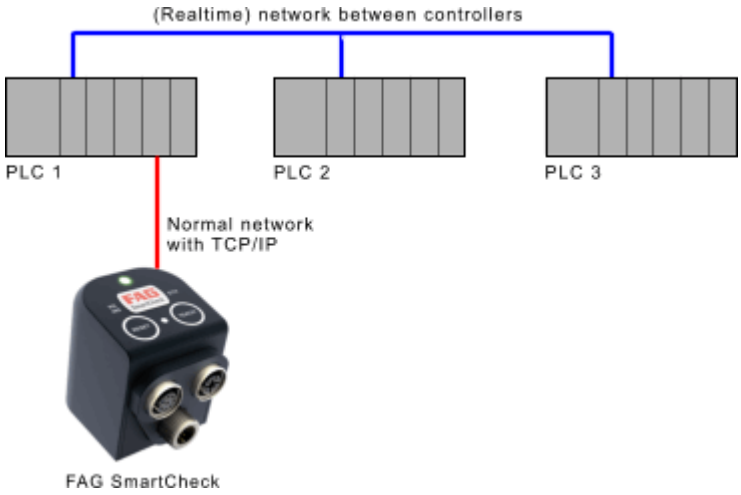


You have the following options:

Name	This is where you specify the name under which the external device is to appear in the SmartWeb software.
Device type	The external device type is displayed here.
IP address	This where you specify the IP address under which the external device in your network can be accessed.
Port	This where you specify the port via which connection with the external device is set up.
Station forwarding	Activate this field if you would like to forward the communication to another controller via the IP address specified above. In this case you must also specify the following: **Network number**: specify the network number of the remote controller here.

Station number: specify the station number of the remote controller here.

Example:
In order to access the **PLC 3** controller, specify the following:
- the IP address of **PLC 1**
- the network number and station number of **PLC 3**:



The data from the FAG SmartCheck device is then forwarded by PLC 1 to PLC 3 via the realtime network.

Protocol **Transfer mode**	This is where you specify the **Network protocol** and the **Transfer mode** for transferring data between the FAG SmartCheck device and the external device. Make sure that your selection here matches the settings in the external device.
Connection test	Click on this button to check the input connection data. If the test is successful, the box next to the button turns green; otherwise it appears in red. If you hover the mouse above the red box you will also receive a message explaining why the connection is not working.

3. Click on **OK** to save the new external device.



- For the connection between FAG SmartCheck and the external device to work, the IP addresses of the two devices must be in the same range. That means that - depending on the net mask - the first three numbers of the four-digit IP address must be identical. You can also access the external device with the FAG SmartCheck device via a gateway. If you have any questions regarding this, contact your network administrator.
- If the IP address of the external device is outside the IP range of the FAG SmartCheck device, but is accessible via a gateway, proceed as follows:

  1. Open the FAG SmartUtility software.
  2. Click on **Configure sensor(s)**.
  3. In the first step in the wizard, select the FAG SmartCheck device.
  4. In the second step in the wizard, specify the gateway for the FAG SmartCheck device.
  5. Close the Wizard with **Send**.

  You can obtain more detailed information about creating a gateway from your system administrator. For details on working with the <var styleclass="Normal-Einruecken">FAG SmartUtility</var> software, please refer to the manual for the FAG SmartUtility software.

- The combination of IP address and port must be unique. If you need more combinations - for station forwarding, for example - you must enable more ports in the external device as appropriate.

This is how you edit an external device

1. Select the external device on the left side of the pop-up overview.
2. Under **External devices** in the main panel, click on **Edit**. Enter the desired information in the window **Edit external device**.

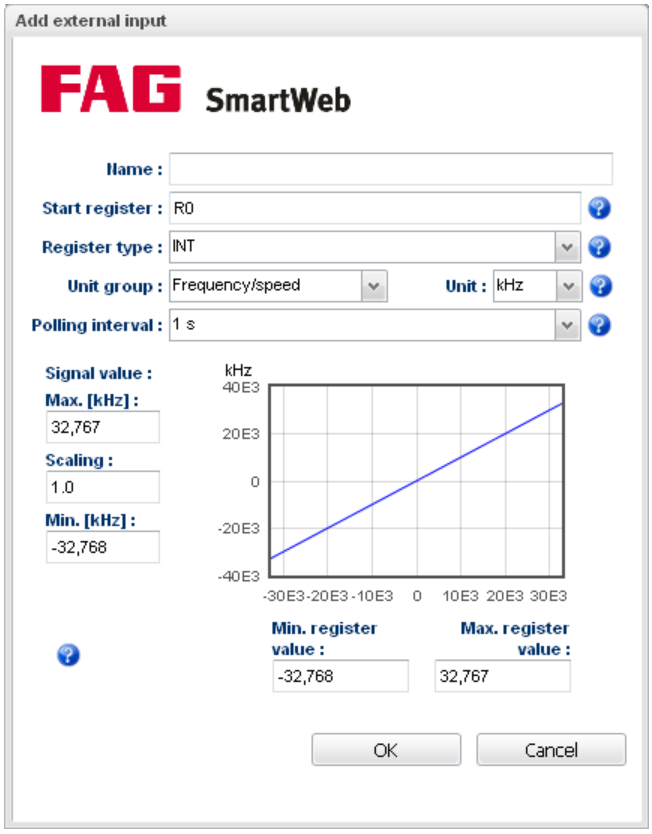
3. Click on **OK** to accept your changes.

8.6.3 Adding/editing an external input

The FAG SmartCheck device receives information on process parameters in the controller via external inputs.

This is how you create an external input

1. On the left side of the expanded overview, select the external device to which you would like to add an input.
2. Under **External inputs for an external device: [device name]**, click on **Add** ✚.
3. In the **Add external input** window, enter the desired specifications:



You have the following options:

Name

Here, specify the name under which the external input is to appear in the SmartWeb software.

Start register

Specify the register here that is to be read out. If you choose a data type under **Register type** for which two registers must be read out, **Start register** refers to the lower of the two registers. This is where the readout starts.

Register type

This is where you specify the data format to be used in the **Start register** or in the register closest to the start register. This specification defines:

- whether one register (16 bits) or two registers (32 bits) are read out and
- how large the maximum register value range can be.

The selection options available have the following formats or register value ranges:

INT	16 bit	-32,768 to 32,767
WORD	16 bit	0 to 65,535
DINT	32 bit	-2,147,483,648 to 2,147,483,647
DWORD	32 bit	0 to 4,294,967,295

	REAL	32 bit	$\pm 1.5 * 10^{-45}$ to $\pm 3.4 * 10^{38}$

Unit group and **Unit**

This is where you specify the physical value and measurement unit into which the value from the controller is to be converted.

Polling interval

This is where you specify how often the value is to be queried from the controller.

A long polling interval is sufficient for values that only change slowly e.g. the temperature. This can reduce the amount of data and the load on the controller.



The logbook message "Connection refused" indicates that the FAG SmartCheck device is attempting to connect to the external device again despite the fact that the last connection is not yet complete. You can prevent this from occurring by increasing the polling interval.

Register value

Initially, these fields are filled automatically as soon as you have selected a **Register type**. You then have the option of adjusting the **Min. register value** and/or **Max. register value** manually. This may be necessary if the register value range is smaller than the range that was set automatically.

Signal value

Use these settings to determine the range within which the measurement values should lie. First enter a minimum value **Min**. Then enter a maximum value **Max** or define the factor with which the calculated signal should be scaled in the **Scaling** field. Both the diagram and the values of the respective other field are then adjusted automatically.

4. Click on **OK** to save the new external input.

Example:

The register R100 is defined as WORD in the controller. The entire numerical range from 0 to 65,535 is limited to the range from 0 to 10,000. This range corresponds to a speed of between 0 and 3000 RPM.
Your settings are then the following:

Start register	R100
Register type	WORD
Unit group	Frequency/speed
Unit	RPM
Min. register value	0
	This value is set automatically.
Max. register value	10,000
	The number 65,535 is set automatically and you will need to adjust it manually.
Max. signal value	3000 (RPM)
Min. signal value	0 (RPM)

This is how you edit an external input

1. On the left side of the pop-up overview, select the external device the input of which you would like to edit.
2. In the table, under **External inputs for an external device: [device name]**, select the desired external input.
3. Click on **Edit** and enter the desired specifications in the **Edit external input** window.
4. Click on **OK** to accept your changes.

8.6.4 Creating/editing external outputs

CAUTION



Only create a configuration file with external outputs if you are certain that the register area to be written to is free, or that it is not being used in the controller program. Otherwise, it is possible that the FAG SmartCheck device may overwrite important data in your controller.

You can use the external outputs to define the characteristic values whose alarm status, value, and/or alarm limit is transferred to the external device. You can also determine the registers in the external device that will be written to in

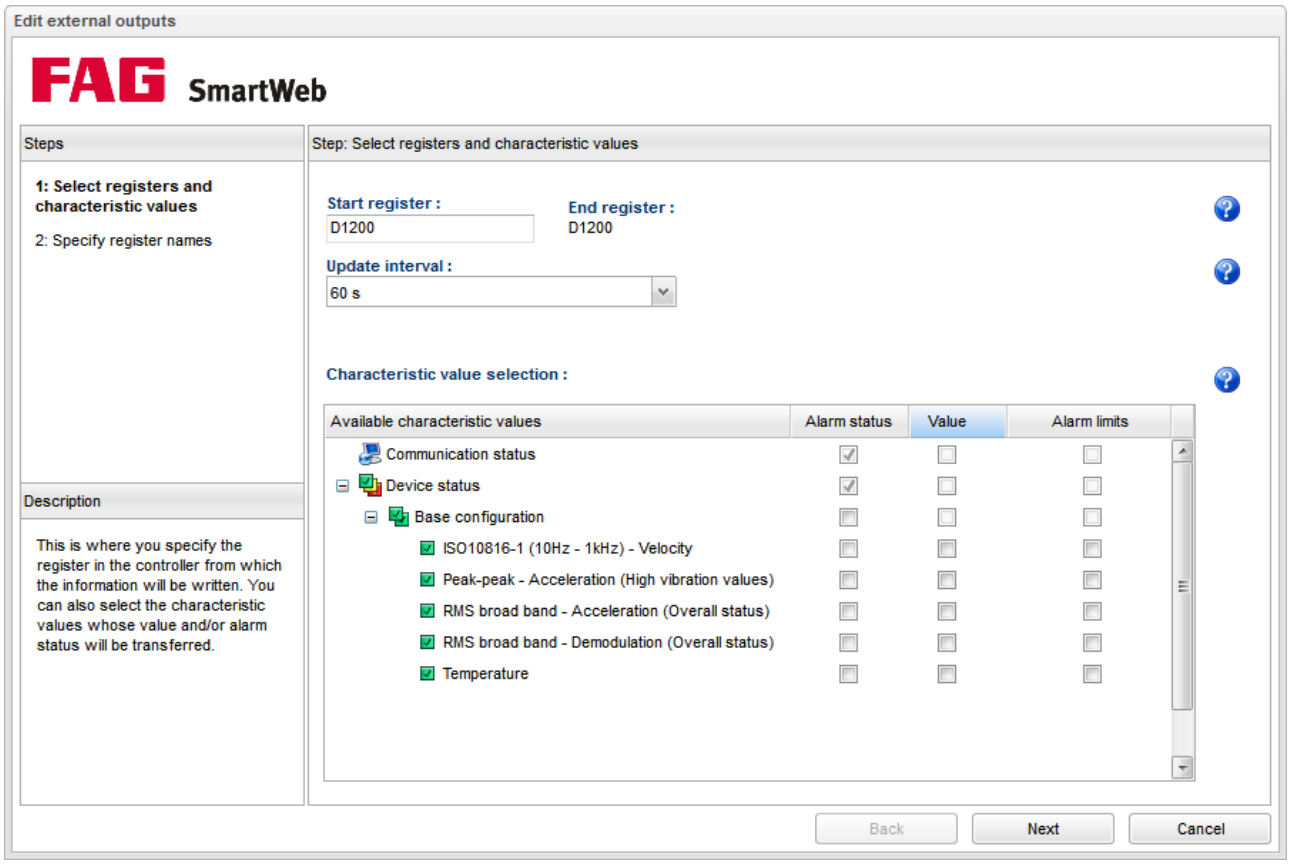
this process. In addition, you require certain information from the external outputs to prepare your controller for the writing process. You can find details in this regard in the relevant section of the chapter **Integrating an external device into the system** 97.

If you have created the configuration file with external outputs successfully and have also prepared the controller appropriately, the FAG SmartCheck device can write the following values for each characteristic value into the relevant controller register:

Value	Abbreviation	Meaning
1	**no_alarm**	Alarm status: **No alarm** - marked in green in the FAG SmartWeb software.
2	**pre_alarm**	Alarm status: **Pre-alarm** - marked in yellow in the FAG SmartWeb software.
3	**main_alarm**	Alarm status: **Main alarm** - marked in red in the FAG SmartWeb software.
4	**charval_error**	An error occurred when calculating the characteristic value; it is possible for example that no rotational speed was determined, even though this is necessary for the characteristic value.
5	**value**	Value: **Number** in IEEE 32-bit format

This is how you create the external outputs

1. Select the external device for which you would like to create the external outputs on the left side of the pop-up overview.
2. Under **External outputs for an external device: [device name]**, click on **Create** in order to open the wizard. It will guide you through the creation or editing in two steps.
3. In the first step, you must **select registers and characteristic values**:



You have the following options:

Start register	This is the point where you specify the first register of the register block in which the alarm status is to be stored. The version number of the configuration file is stored in this first register with the external outputs; the alarm statuses and/or values of the selected characteristic values are written into all subsequent registers.
Update interval	This is where you specify how often the alarm statuses and/or values are to be transferred to the controller.
Characteristic value selection	This is where you select the characteristic values whose alarm statuses and/or values are to be transferred to the controller. The characteristic values available here depend on the measurement jobs 59 that you have created.
Alarm status/alarm limits	Select here if you want to transfer the alarm status, value, and/or the alarm limit of the characteristic value to the controller for every characteristic value. You can only transfer the communication status, the device status and the overriding alarm characteristic value ("basic configuration" here, for example) as alarm statuses. You can then only select the device status if at least one other characteristic value transfers an alarm status.

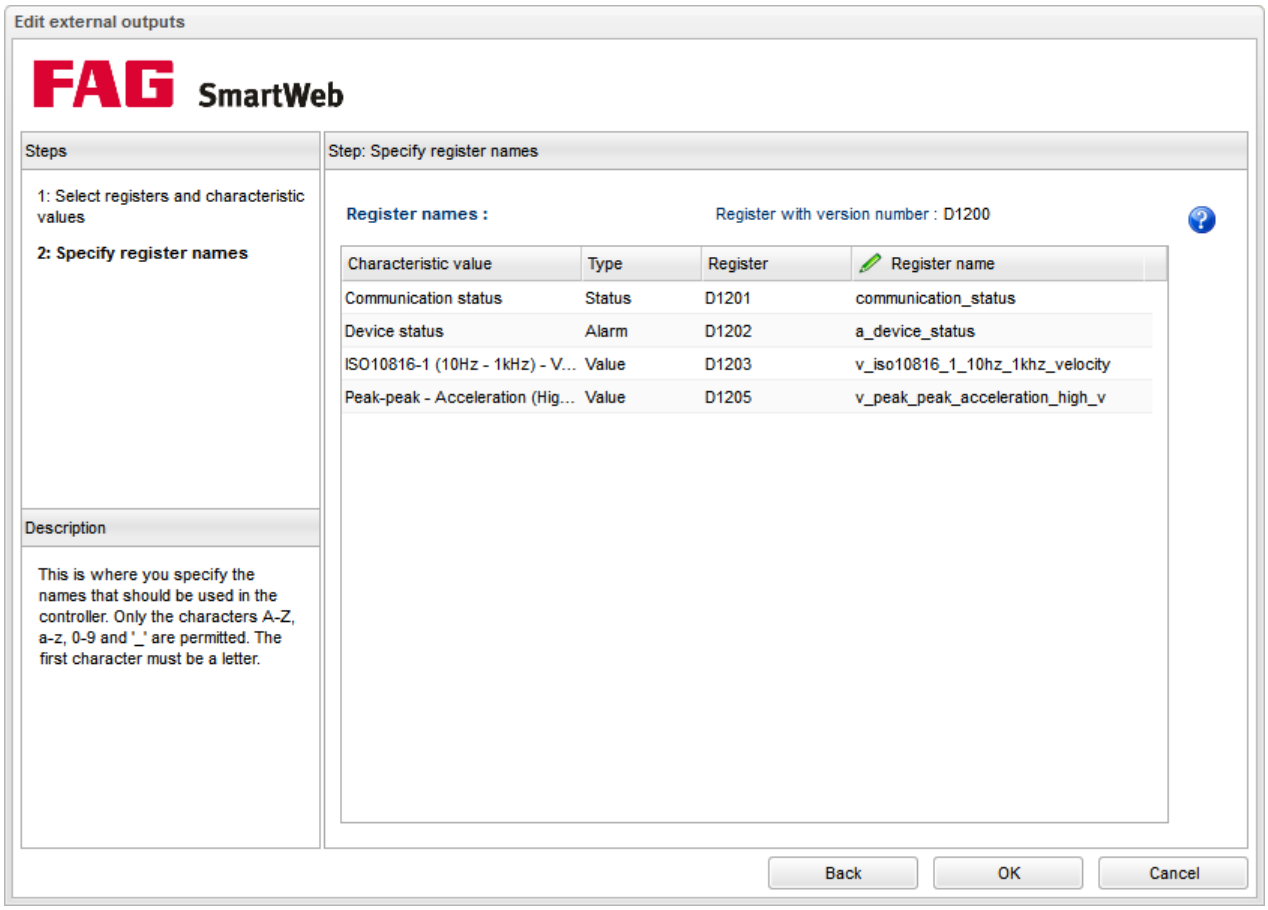


The alarm limits cannot be selected until the value and/or alarm status has been selected.



Measurement triggers and measurement conditions cannot be selected as a configuration for an external output.

4. Click on **OK** to move to the second step. This is where you **specify the register name**:



Under **Register names**, you can use the relevant register as a variable in the GX Works2 software.

As far as possible, the register names in the table are generated automatically from the characteristic value names. You can edit any name by double-clicking on the relevant line. The following naming conventions apply:

- The name must be input in ASCII format.
- A-Z, a-z, 0-9 and _ are allowed characters
- The first character must be a letter.
- The number of characters must be between 1 and 32 at most.

5. Click on **OK** to close the wizard and confirm the configuration with external outputs.
6. To guarantee problem-free communication, you must also transfer the configuration file with external outputs to your external device. In the controller's programming environment, the registers into which the FAG SmartCheck device will write the alarm status, values, and/or alarm limits is marked as 'reserved'. For details, please refer to the section **Integrating an external device into the system** 97.



- The **Register with version number** contains the current version number of the configuration file with external outputs. This information functions as a safeguard against unintentional overwriting of registers: when the configuration file has changed in such a way as to affect the configuration of the controller, the version number for the controller in question is immediately incremented. This means that the version number in the controller no longer agrees with the version number on the FAG SmartCheck device. Alarm statuses and/or values can no longer be written into the controller, and you will receive an error message.

  Only when you have transferred the new configuration file to the controller (refer to the section **Integrating an external device into the system** 97) are the alarm statuses and/or values again written into the controller.

- The characteristic value **Communication status** writes values into the controller that provide information about communication problems between the FAG SmartCheck device and the controller.

Value	Abbreviation and meaning
0	**communication_ok**: No problems
1	**error_configuration_inconsistent**: The characteristic value structure on the FAG SmartCheck device has changed, the data can no longer be written to the control system at this time. In order to do this again, the configuration file from the FAG SmartCheck device must be downloaded again and read into the controller 97.
2	**error_reading_values**: The FAG SmartCheck device cannot read one or more values from the control system, or the values are incorrect. For more information, refer to the Logbook 36.
3	**error_alarm_state_not_updated**: The FAG SmartCheck device cannot write one or more values to the control system. For more information, refer to the Logbook 36.

This is how you edit the external outputs

1. On the left side of the pop-up overview, select the external device whose external outputs you would like to edit.
2. Under **External outputs for an external device: [device name]**, click on **Edit** to open the wizard.
3. Make the desired changes with the assistance of the wizard and confirm them by clicking on **OK**.
4. To guarantee problem-free communication, you must also transfer the changed configuration file to your external device. For details, please refer to the section **Integrating an external device into the system** 97.

8.6.5 Integrating an external device into the system

In the following sections you will find a detailed example of how to integrate specific controllers as external devices into the <var styleclass="Normal">FAG SmartCheck</var> system, and the steps required in order to initiate communication between your control system and the FAG SmartCheck device. The following example is currently available:

- Mitsubishi - GX Works2 software 98

In this section, you will find detailed information regarding how to prepare your controller for communication with the FAG SmartCheck device and the settings in the FAG SmartWeb software that are required for this. Here is an overview of the necessary steps:

1. **Set up communication settings in the controller**
2. **Create external device in the FAG SmartWeb software**
3. **Create external inputs in the FAG SmartWeb software**
4. **Create external outputs in the FAG SmartWeb software**
5. **Save configuration file with external outputs in the FAG SmartWeb software**
6. **Import configuration file into GX Works2**
7. **Compile program and transfer it to the controller**

These steps are aligned with the sample specifications you will find in the **Initial situation** 98 section.

Initial situation

The following communications parameters apply to your Mitsubishi controller:

IP address of the controller	172.28.205.122
Port (Host Station Port No.)	Decimal: 1280 or hexadecimal: 0500
Network protocol	TCP (MC protocol)
Transfer mode (Communication Data Code)	Binary
Station forwarding	None

You would like to use the connection between the controller and the FAG SmartCheck device as follows:

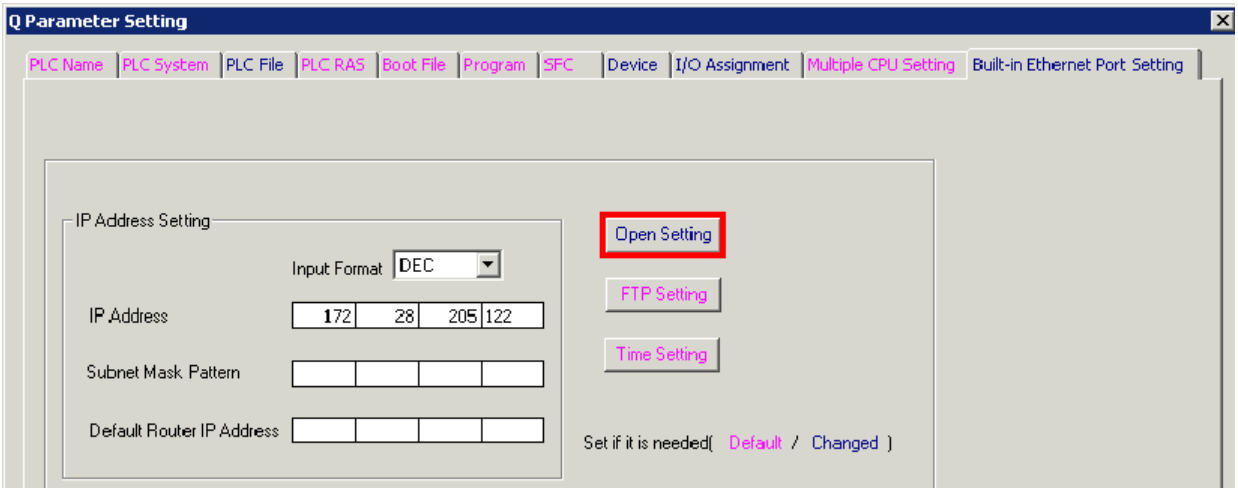
- You would like to read the rotational speed information from register D1000 of the controller. This register has the WORD register type, and a possible value range 0-10,000, which should in turn be transformed to the 0-3000 RPM signal range.
- In addition, the FAG SmartCheck device must write the alarm status of the basic configuration and the alarm status and value of the ISO characteristic value into the Mitsubishi controller registers. This writing process must begin in register D1200.

8.6.5.1 Mitsubishi GX Works2 software

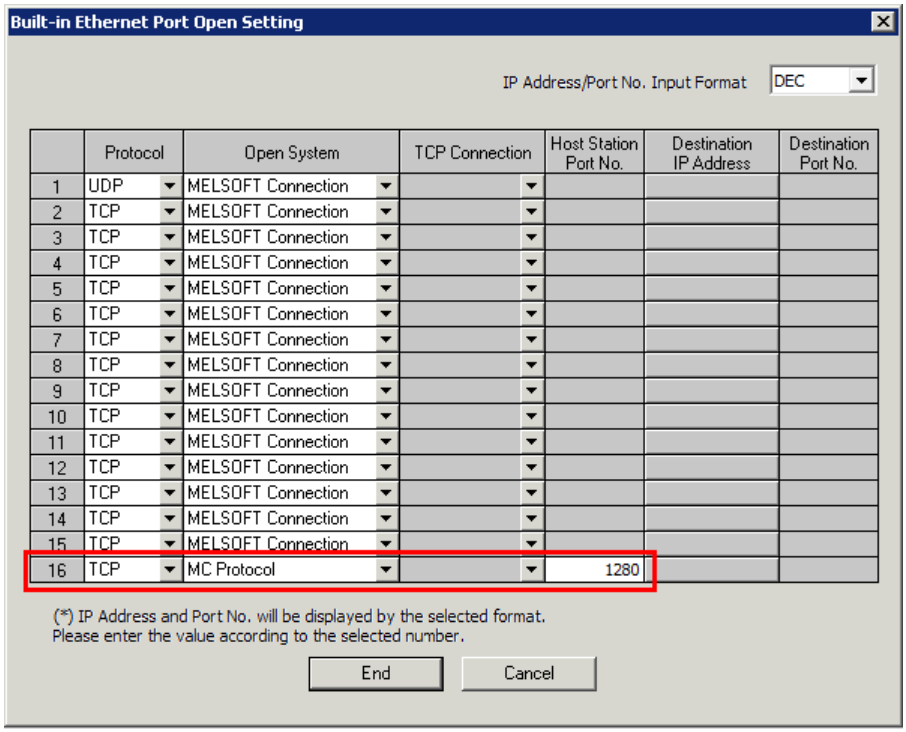
Step 1: create communication settings in the controller

First set all the parameters required for communication with the FAG SmartCheck device:

1. Start the **GX Works2** software.
2. Click on **Project > Open**.
3. Open the project that contains the program for your controller.
4. In the navigation window, double-click on **Parameter > PLC Parameter**.



5. In the **Built-in Ethernet Port Setting** tab, click on **Open Setting**.



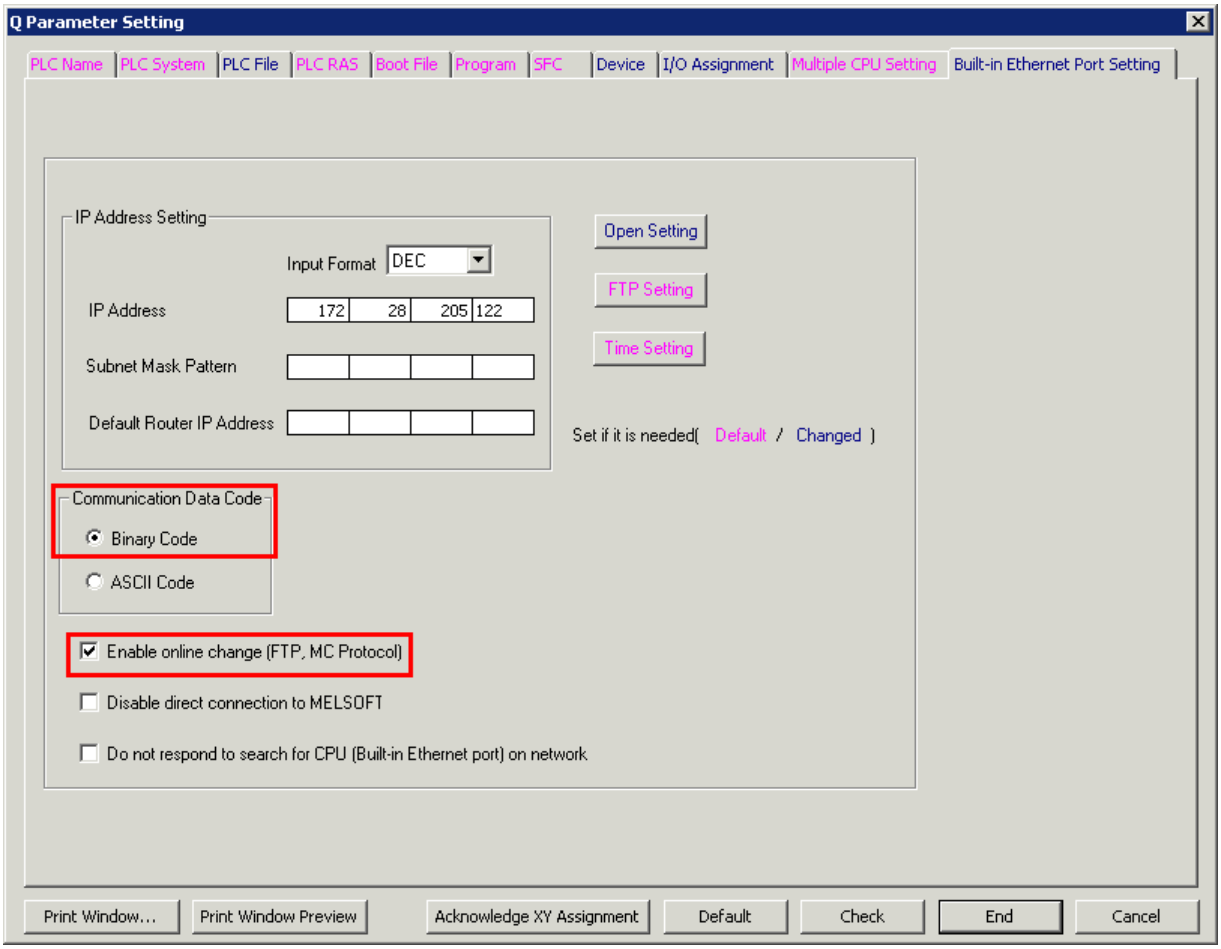
6. Enter the following settings:

Protocol TCP

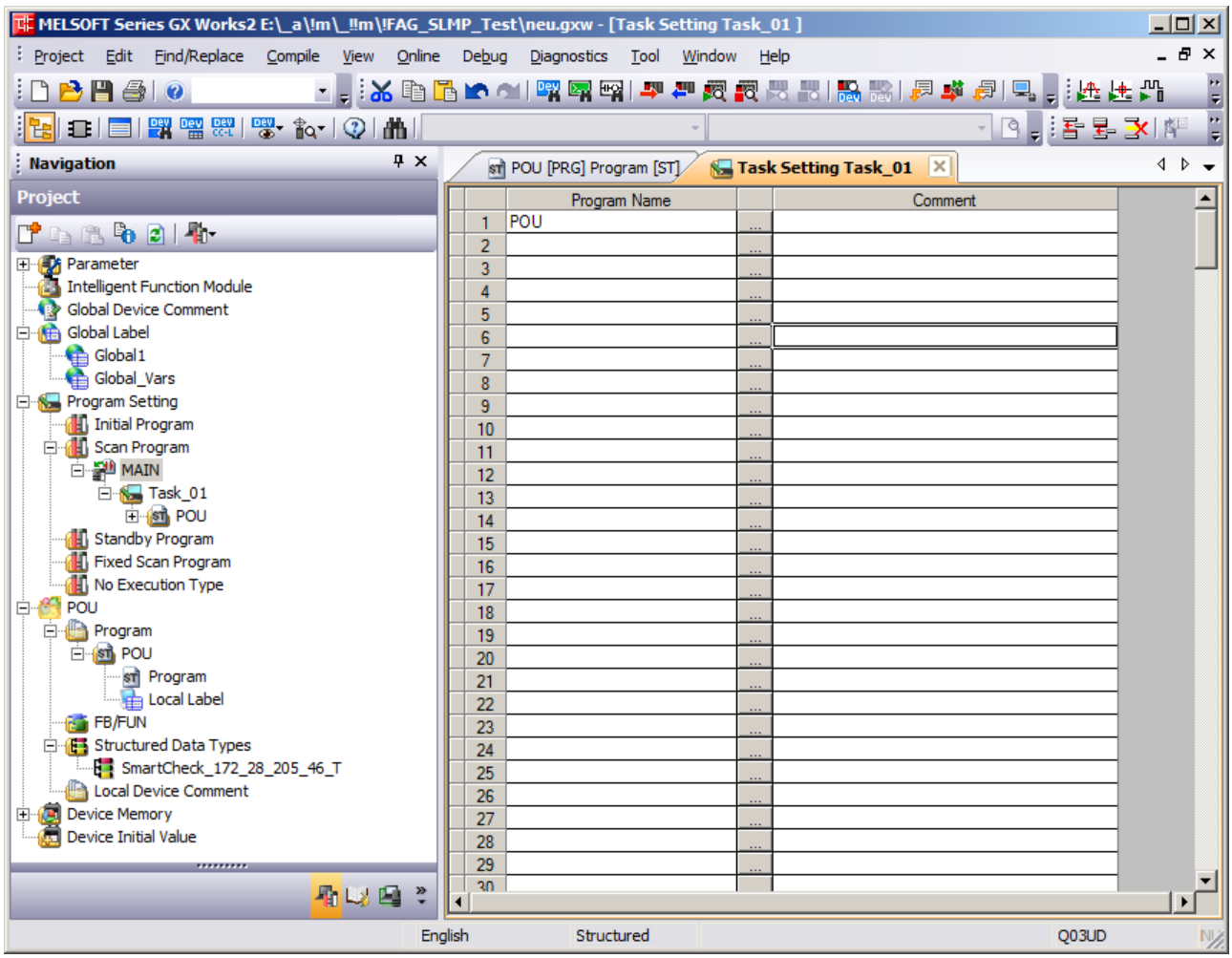
Open System MC Protocol

Host Station Port No. decimal: 1280 (corresponds to hexadecimal: 0500)

7. Click on **End** to accept the settings.



8. Under **Communication Data Code**, set the **Binary Code** transfer mode.
9. Activate **Enable online change (FTP, MC Protocol)** so that the FAG SmartCheck data can be written into the controller.
10. Click on **End**.
11. Integrate the program into the Task.



12.Compile the program by selecting **Compile > Rebuild All** in the menu.

13.Transfer the program to the controller.

Continue configuring the external device in the FAG SmartWeb software.

Step 2: create the external device in the FAG SmartWeb software

Under **External devices**, click on **Add** and enter the following setting in the **Add external device** window:



Name	PLC_018
IP address	172.28.205.122
Port	decimal: 1280 (corresponds to hexadecimal: 0500)
Protocol	TCP
Transfer mode	Binary

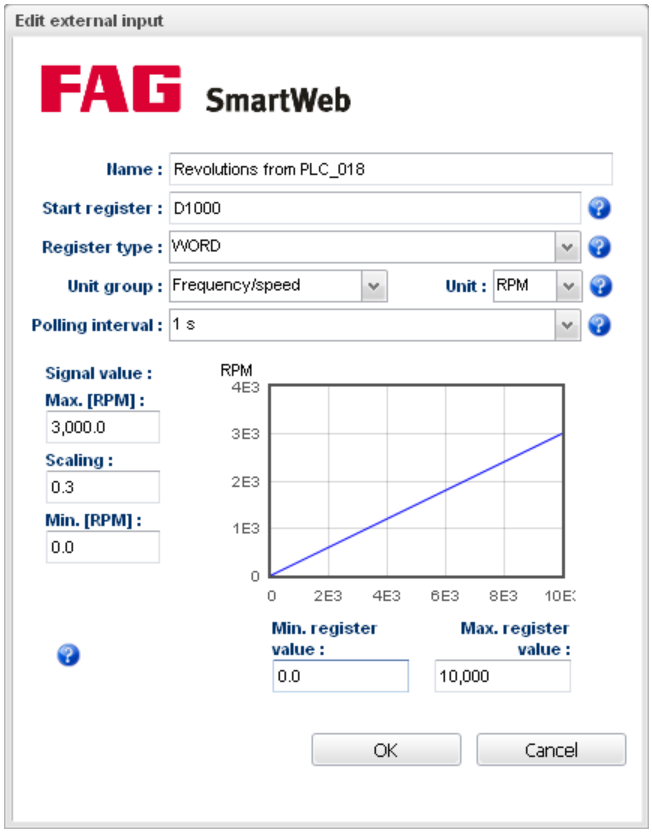
You can find additional information regarding how to create an external device in the section **Adding/editing an external device** 91.



You can click on the **Connection test** button to verify your entries: if the area next to it turns green your information is correct.

Step 3: create external inputs in the FAG SmartWeb software

Under **External inputs for an external device: PLC_018**, click on **Add** and enter the following settings in the **Add external input** window:



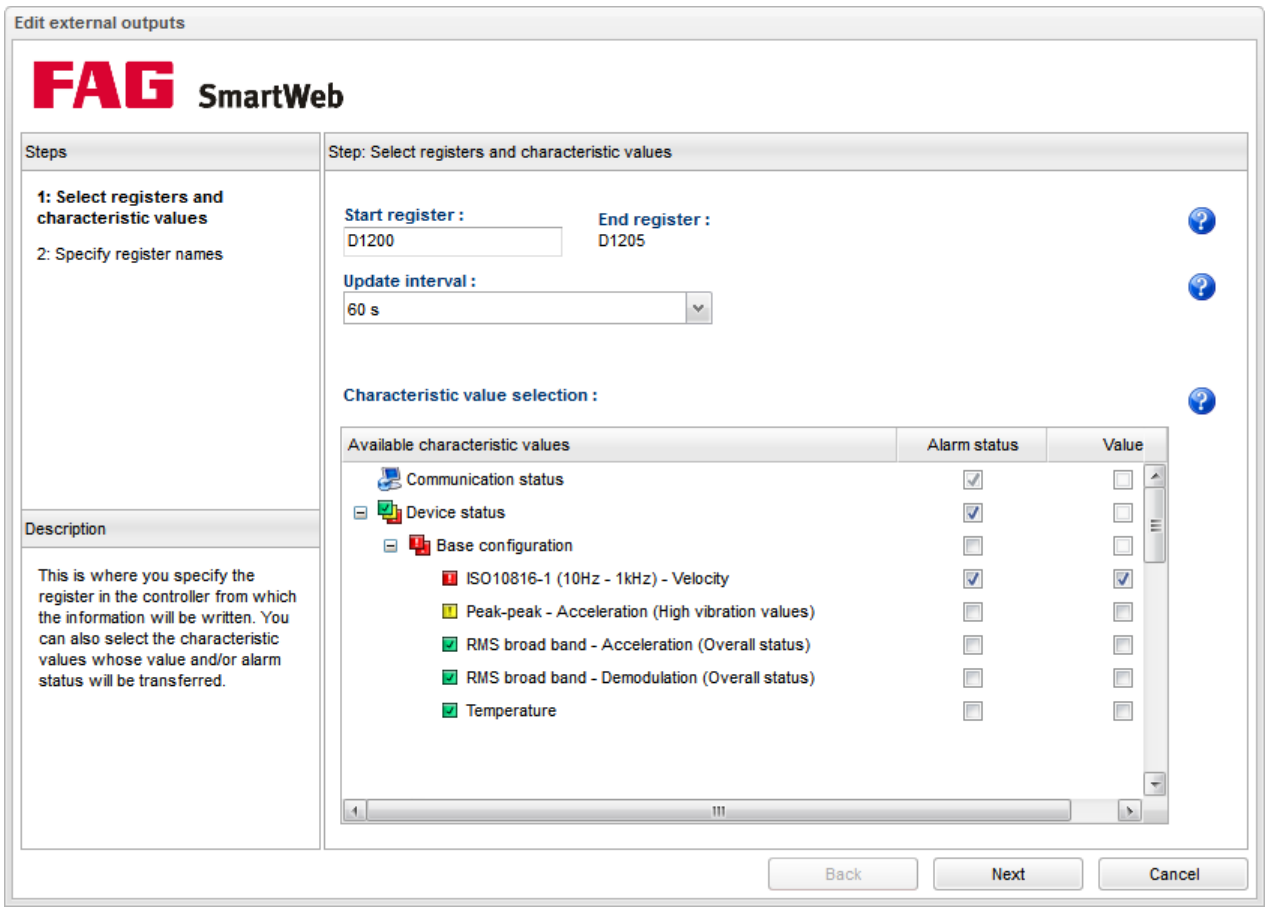
Name	Speed from PLC_018
Start register	D1000
Register type	WORD
Unit group	Frequency/speed
Unit	RPM
Register value	Change the value for **Max** to 10,000.
Signal value	For **Min**, enter the value **0** and for **Max**, enter the value **3000**.

For further information regarding how to create an external input, please refer to the section **Adding/editing an external input** 93.

- If you have created inputs in the FAG SmartWeb software, you can use the **live view** 46 to check whether data is being received by the FAG SmartCheck device.
- This input can be used exactly like an internal input for measuring jobs

Step 4: create external outputs in the FAG SmartWeb software

Under **External outputs for an external device: PLC_018**, click on **Create** and enter the following settings in the first step of the wizard:

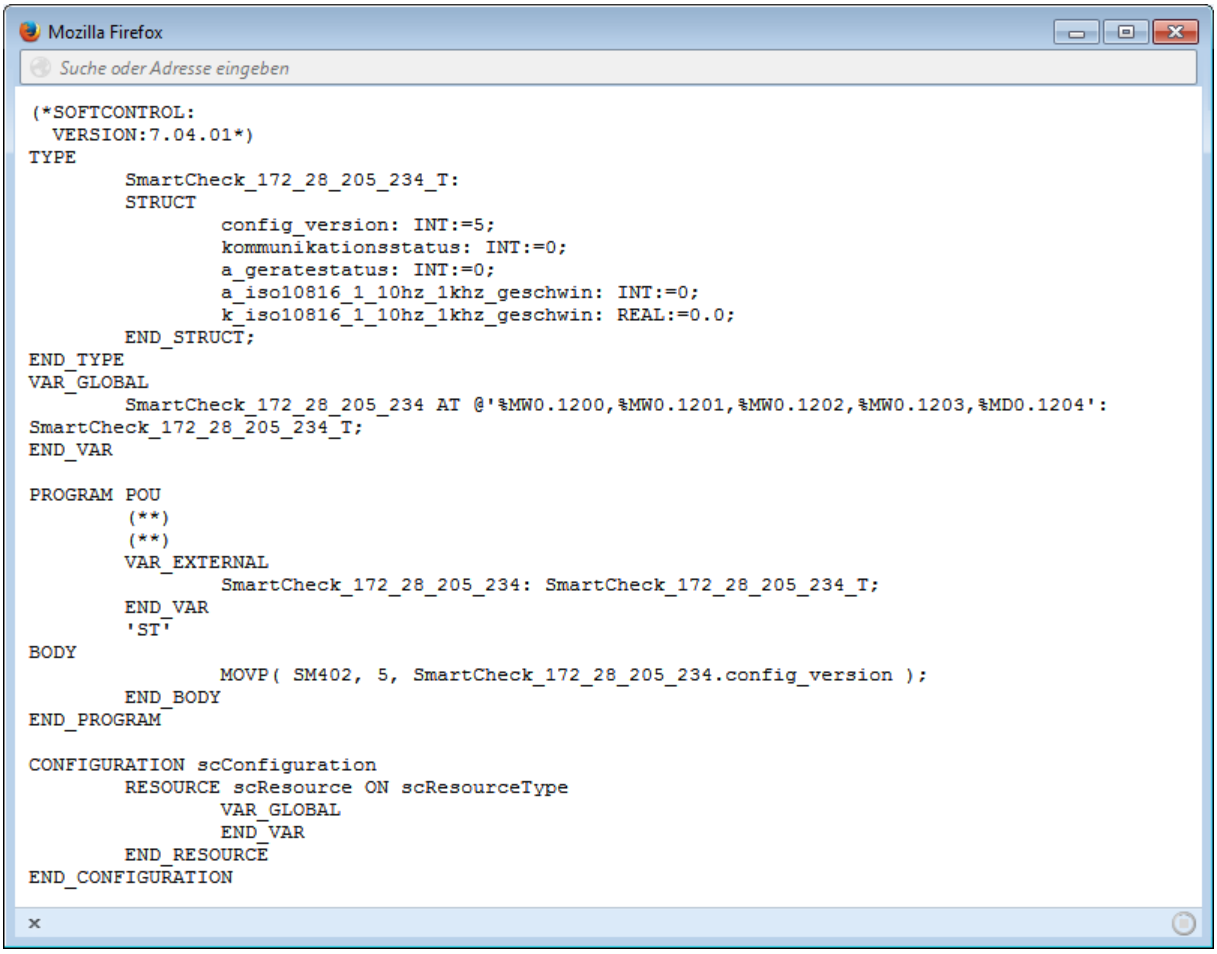


Start register	D1200
Available characteristic values	Select the alarm status for the **basic measurement job** characteristic value and the alarm status and value for the **ISO 10816-1** characteristic value. To do this, click on the box next to the characteristic value.

In the second step of the wizard, you can, if necessary, adjust the **Register names** that have been assigned automatically. You can find more information, such as how you can create a configuration with external outputs, in the **Creating/editing external outputs** 94 section.

Step 5: save configuration file with external outputs in the FAG SmartWeb software

1. In the **External devices** field, click on to open the configuration file with external outputs:



2. Select the contents of the window with **CTRL+A**, copy them to the clipboard with **CTRL+C** and insert them into an editor (e.g. Microsoft Editor) with **CTRL+V**.
3. Save the file with any name and the extension **.ASC** (example: `FAG_SmartCheck01.asc`).



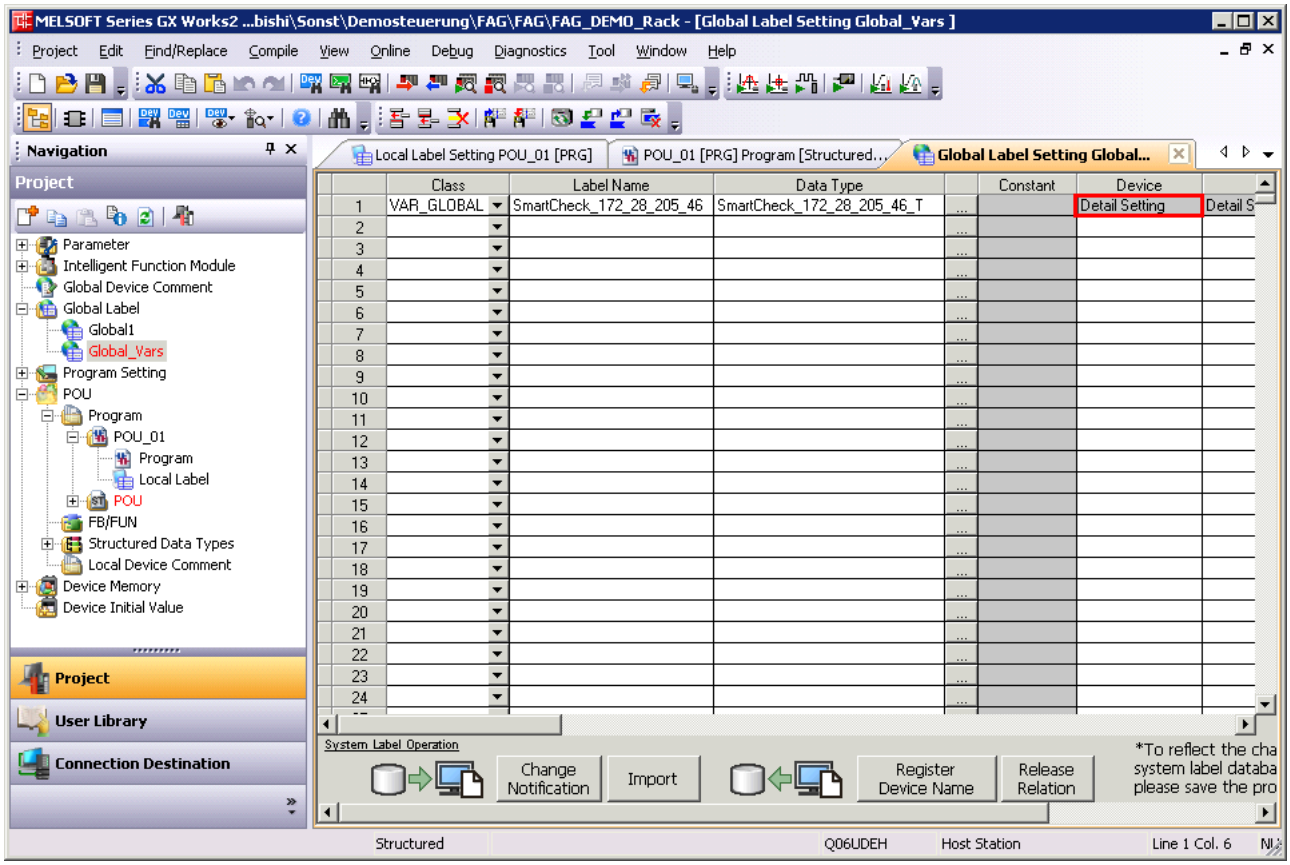
- If you use the Mozilla Firefox browser, you can save the file directly as an ASCII file with the **Save as** function.
- Please make sure that the file has the extension **.ASC** so that it can be read by the GX Works2 software.

Step 6: read the configuration file into GX Works2

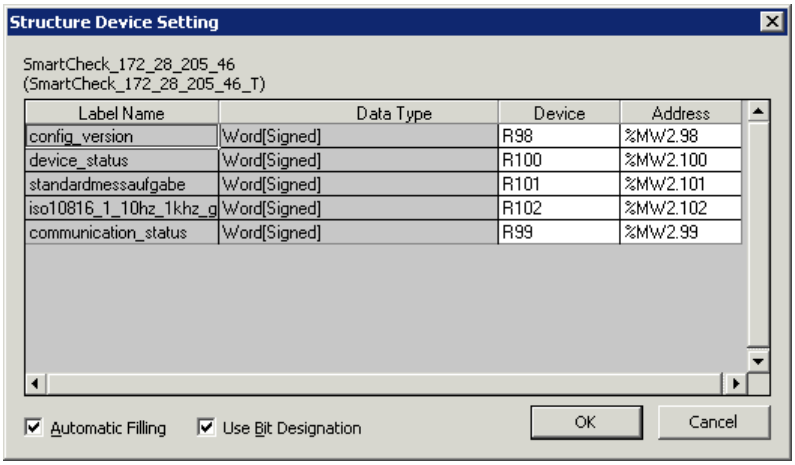


Please create a backup copy of the existing project before importing the FAG SmartCheck configuration file.

1. Click on **Project > Open Other Data > Read ASC Format File**.
2. Select the ASCII file (**.ASC**) you have just created and click on **OK**.
3. The FAG SmartCheck configuration file is read in and inserted into the tree as a new **Global Label** with the designation **Global_Vars**.



The characteristic values along with the associated registers are displayed if you click in the **Device** column on **Detail Setting**:



Step 7: compile the program and transfer it to the controller

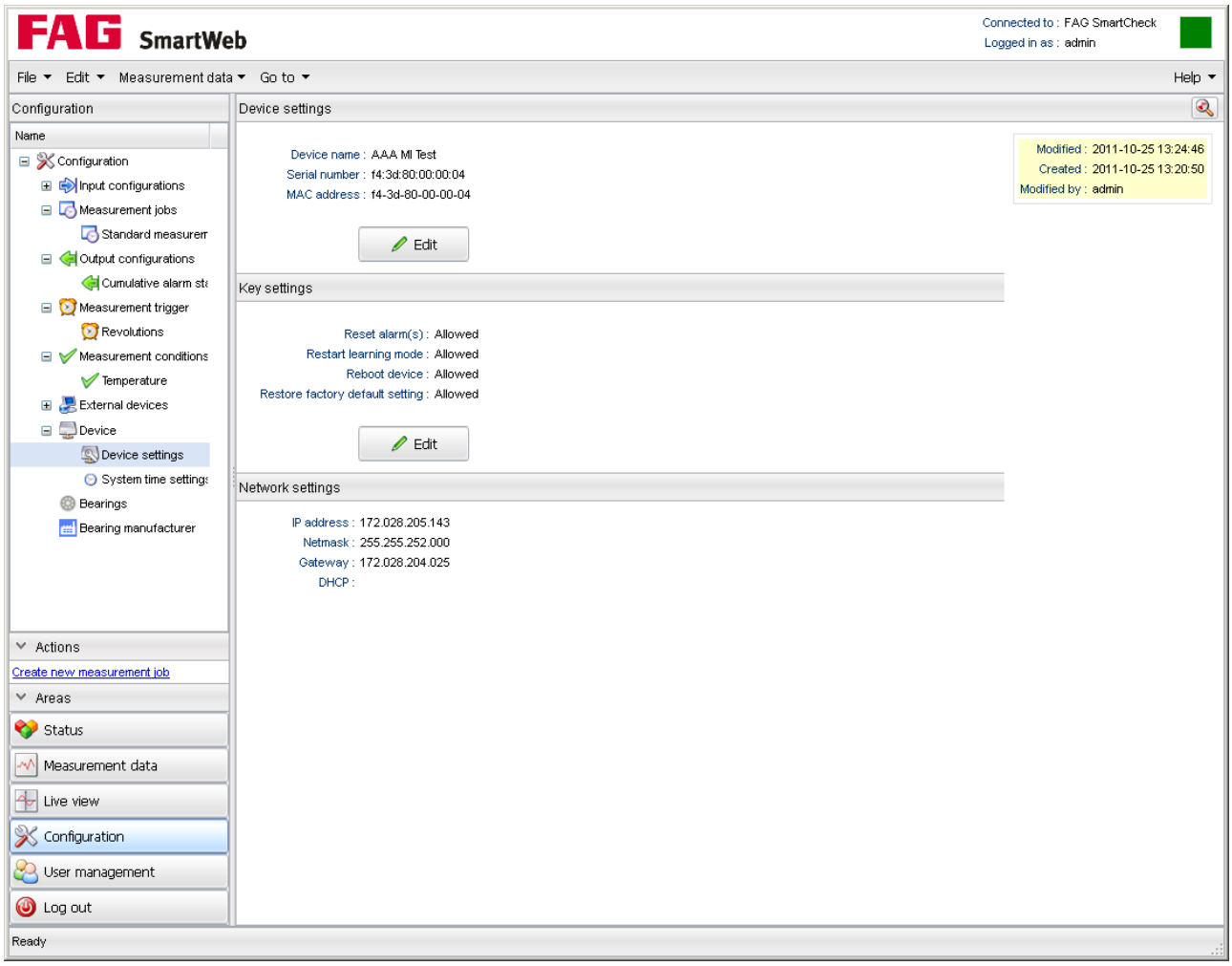
1. Compile the program by selecting **Compile > Rebuild All** in the menu.
2. Save the program and transfer it to the controller.

8.7 Device

Under **Device**, you will find the **Device settings** 106 and **System time settings** 109. Click on the desired area to view the main settings of the SmartCheck device. Some settings can also be changed here.

8.7.1 Device settings

Under **Device Settings**, details on the FAG SmartCheck device, the network, and the keys and the status LED on the device are listed:



You can find the following information here:

Device settings

The **device name**, **serial number** and **MAC address** (network address) of the SmartCheck device are listed here.

You can only change the device name; to do so, click on **Edit** and then enter a new device name.

Key/LED settings

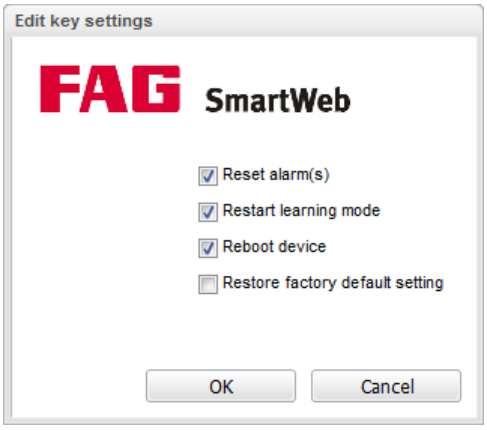
FAG SmartCheck has 2 keys and one status LED. Under **Key/LED settings**, you can specify the actions permissible with these keys. In this way, you protect the SmartCheck device against inadvertent operation. You can also specify here whether the status LED should indicated alarm statuses. As a rule, the following settings are possible:

Reset alarm(s)	This switches off all existing alarms.
Restart learning mode	This restarts the Learning mode 34; current measurement values and alarm limits are retained; only the process for determining new alarm limits is restarted.
Reboot device	This restarts the SmartCheck device, i.e. the device is shut down and booted up again.
Restore factory default setting	This resets the SmartCheck device to the factory default setting. All the settings and configurations you made are lost.
Enable status LED	This option is activated by default. If you want to deactivate this option, switch off the alarm signals of the status LED. The SmartCheck device then no longer indicates the alarm status through a red, yellow or green light. It still flashes yellow and red for instance when the firmware is updating.

The key lock is activated by default as of SmartCheck firmware version 1.4.26 to protect against inadvertent operation. You can find details on which key or key combination you have to press in each case in the FAG SmartCheck user documentation.

To change the key/LED settings, proceed as follows:

1. Click on **Edit**.
2. In the **Edit key/LED settings** window, define the permissible actions:



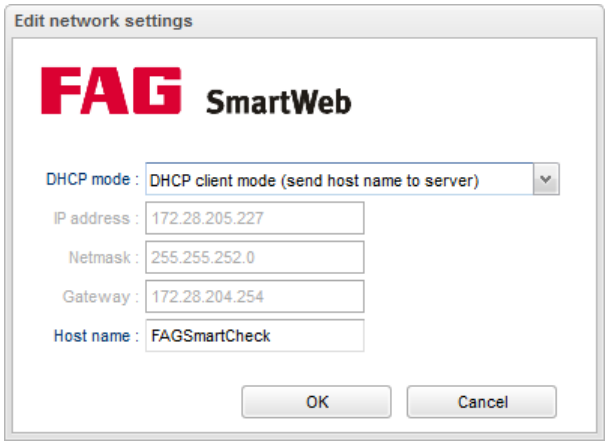
- If you deactivate a key option, the corresponding key can no longer be used for this purpose. In our example, this applies to **Restore factory default setting**.
- If you deactivate the **Enable status LED** option, the alarm status is no longer indicated on the SmartCheck device.

3. Click on **OK** to save your changes.

Network settings

The current settings for **DHCP**, **Host name, IP address**, **Gateway** and **Netmask** are listed here. To change the network settings, proceed as follows:

1. Click on **Edit**.
2. In the **Edit network settings** window, enter the desired specifications:



You have the following options:

No DHCP	With this option, you can specify the IP address or continue to use the SmartCheck device's default IP address. If **No DHCP** is activated, you must also specify the other settings in this step, e.g. **IP Address**, **Netmask** or **Gateway**.
DHCP client mode (load host name from server)	With this option, the SmartCheck device automatically receives an IP address within your network. The host name is specified via the network's DNS server (reverse DNS).
DHCP client mode	With this option, the SmartCheck device automatically receives an IP

(send host name to server)	address within your network. The host name is registered by the SmartCheck device in the network's DNS server.

3. Click on **OK** to save your changes.



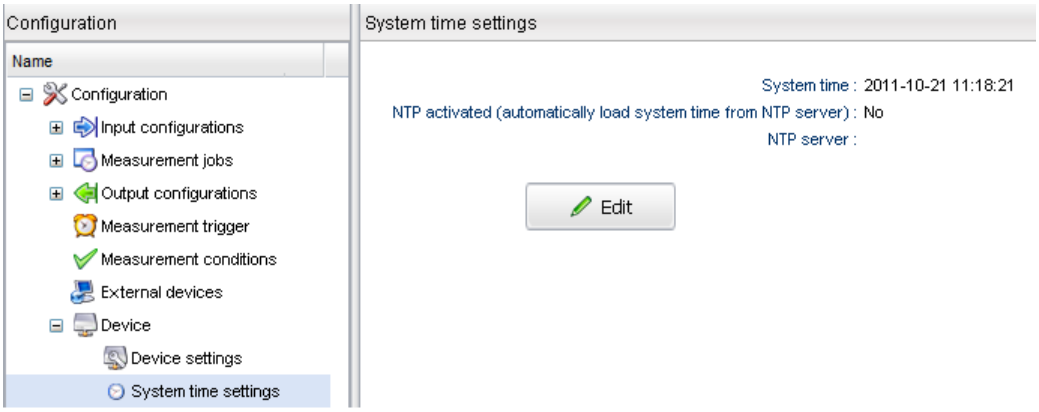
- If you change the IP address of the SmartCheckGeräts, you no longer have access to the SmartWeb software under the previous address. You must then enter the new address in the browser in order to load the software again.
- If the IP address is allocated automatically via DHCP, the SmartCheck device can only be accessed via the automatically allocated IP address. You can no longer use the default IP address.

8.7.2 System time settings



- FAG SmartCheck has an internal clock, which will be operational provided that the device is supplied with power. However, as it has no buffer battery, it becomes inoperative as soon as the power supply is interrupted – unless you have connected an external battery or power supply to the battery input.
  If you restore the interrupted power supply and you have selected **Set system time manually**, you should correct the system time, otherwise the internal clock will continue to run from the time of the last successful measurement before the power failure.
  For information on how to connect the internal clock to an external battery, refer to the user documentation FAG SmartCheck.
- If a new SmartCheck device does not have access to information on the current time, the time information is taken from the firmware.

Under **System time settings**, various details on the system time of SmartCheck are listed:



The following information and functions can be found here:

System time

Here the current date and current time of the SmartCheck device are displayed.

NTP activated

Here you can see whether the SmartCheck device loads the system time from an NTP server, i.e. a time server in the network. If so, **Yes** will be displayed here.

NTP server

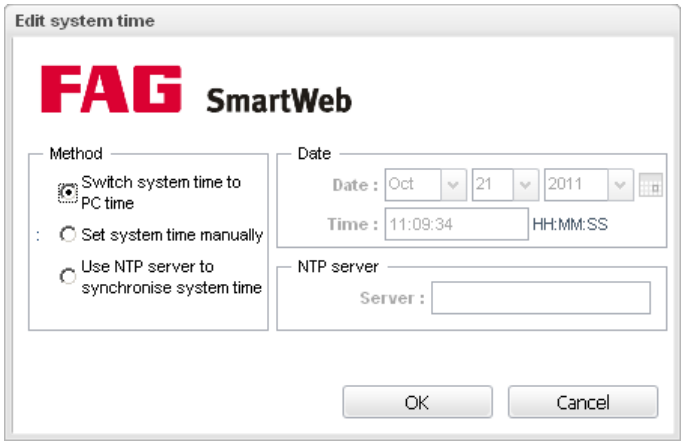
If the SmartCheck device loads the system time from an NTP server, you will see the name of the server here.

Edit button

To change the settings for system time and NTP server, proceed as follows:

1. Click on **Edit**

2. In the **Edit system time** window make the desired specifications:



Method — Here you can specify what the system time of the SmartCheck device should be based on. The time setting can have the time of the connected **PC** or that of an **NTP server** as its reference. You can also enter it **manually**.

If the system time is based on an NTP server, synchronization runs constantly. For this method, therefore, the SmartCheck device must have a permanent connection to the network, and the NTP server must always be accessible.

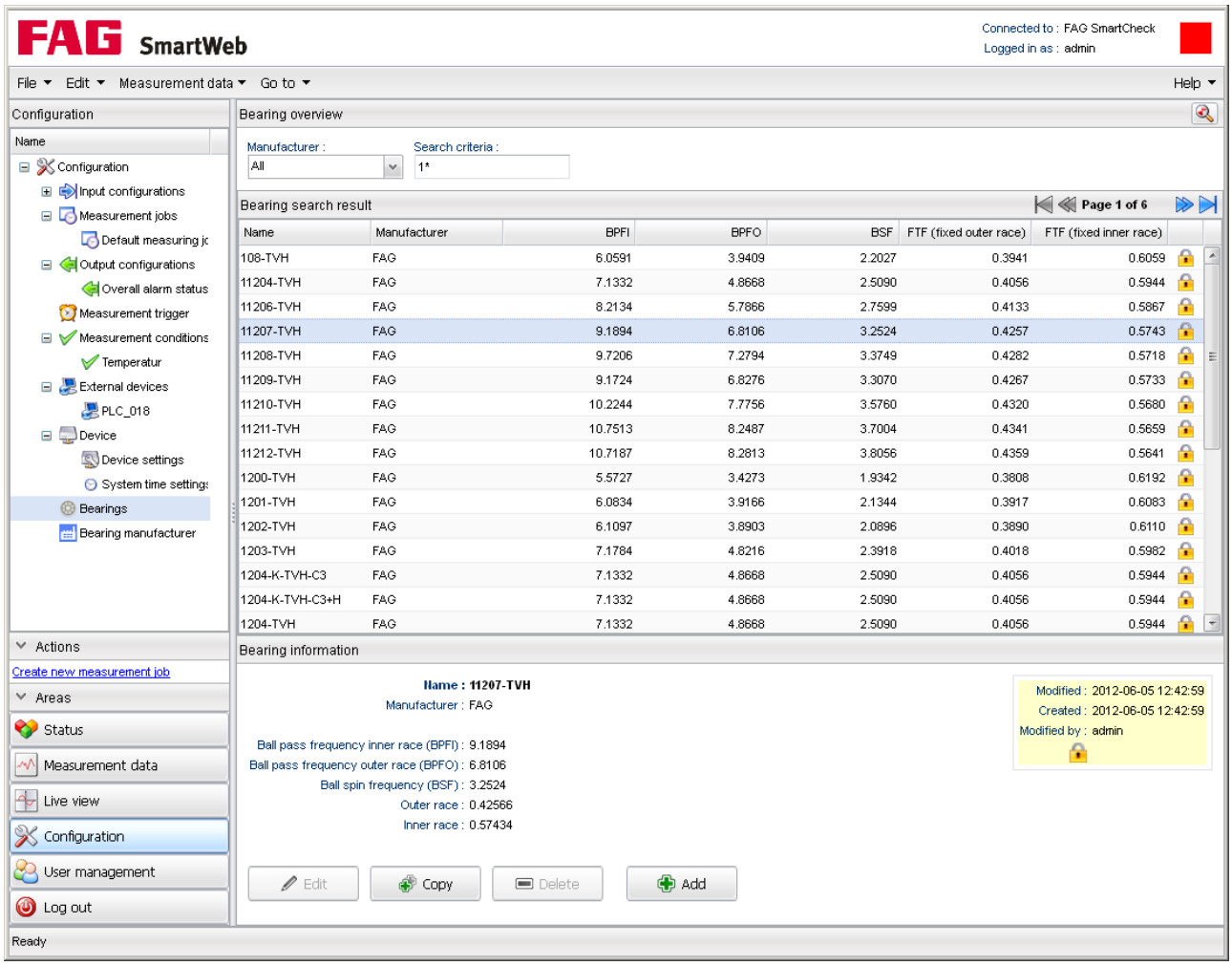
Date — Only in the case of **Set system time manually**: enter the current date and the current time here. You can either select the date from the list boxes or set it directly from the **calendar** .

NTP server — Only for **Use NTP server to synchronise system time**: specify the name of the NTP server here. using the IP address of the desired NTP server.

3. Click on **OK** to save your changes.

8.8 Bearing

FAG SmartCheck contains a comprehensive bearing database, to which you can add further bearings. These bearings are available when you create a new measurement configuration 62. In the **Bearings** area, you will find an overview with search function:



Here you will find the following information and functions to access:

- Searching for bearings by **manufacturer** is possible. You can expand the corresponding list box as much as you like in the **Bearing manufacturer** 113 area.
- You can search for bearings by name in the database. To do so, enter the name in the **Search criteria** field. Here you have the following options:
  - The placeholder * stands for any character string.
  - The placeholder ? stands for any single character.
  - Upper/Lower case is irrelevant.
- The details on the bearing currently selected are displayed under **Bearing information**. In the example, you can see the details for the first bearing in the list. In the yellow box on the right, you will find the details on the creation and changing of the selected bearing.
- You can add a new bearing 112
- You can copy and edit existing bearings 113
- You can delete copies of bearings or newly created bearings. To do this, select the relevant bearing, click on **Delete**, and choose **OK** to confirm.
  Bearings that are used in a measurement job cannot be deleted.
- In the top right corner, click on to open the Configuration overview 49.



You can neither delete nor edit the bearings from the preset database. However, you can copy a bearing from the database and then edit the copy.

8.8.1 Adding/editing bearings

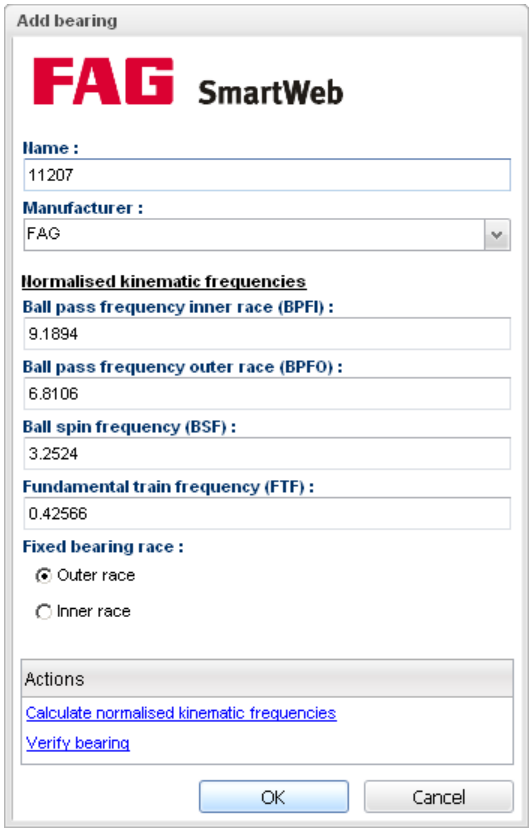
You can expand the FAG SmartCheck bearing database as much as you like. In doing so, you have two options:

- You can add new bearings 112.

- You can copy existing bearings 113, edit the copy and then save it under a new name.

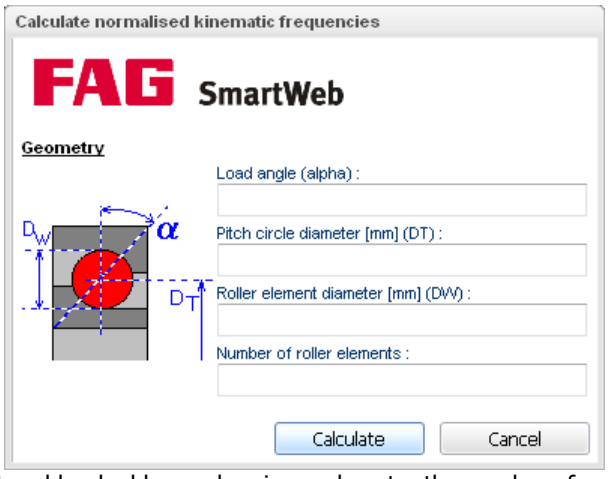
How to add a new bearing

1. Under **Bearing information**, click on **Add** ✚.
2. In the **Add bearing** window, make the desired specifications:



You have the following options:

Name	Enter the name of the bearing here. You can also find the bearing under this name if you want to select it for a measurement job.
Manufacturer	Select the manufacturer for the new bearing here. What is in this list box is determined by your selections in the **Bearing manufacturer** 113 area.
Normalised kinematic frequencies	These specifications are important for the correct calculation of bearing damage frequencies and thus for the reliable monitoring of this component. You can find the corresponding information on **BPFI**, **BPFO**, **BSF** and **FTF** in the technical data of the bearing. Alternatively, you can have the normalised kinematic frequencies calculated with the help of the program, using the geometry of the bearing (see below).
Calculate normalised kinematic frequencies	Click here to calculate normalised kinematic frequencies with the aid of the bearing geometry. In this case, you need the **load angle**, the **diameter of the pitch circle** and of the **roller element**, and the **number of roller elements**:



If you want to add a double-row bearing, only enter the number of one row in **Number of roller elements**.

Make the corresponding specifications and then click on **Calculate**. The software calculates the values for the normalised kinematic frequencies from the geometry and transfers them to the corresponding fields.

Verify bearing — Click here to check your specifications for plausibility. This check reduces the probability of you having made incorrect specifications for the normalised kinematic frequencies. Otherwise, the bearing is accepted into the database without a plausibility check.

3. Click on **OK** to add the new bearing to the database.

How to copy and edit a bearing

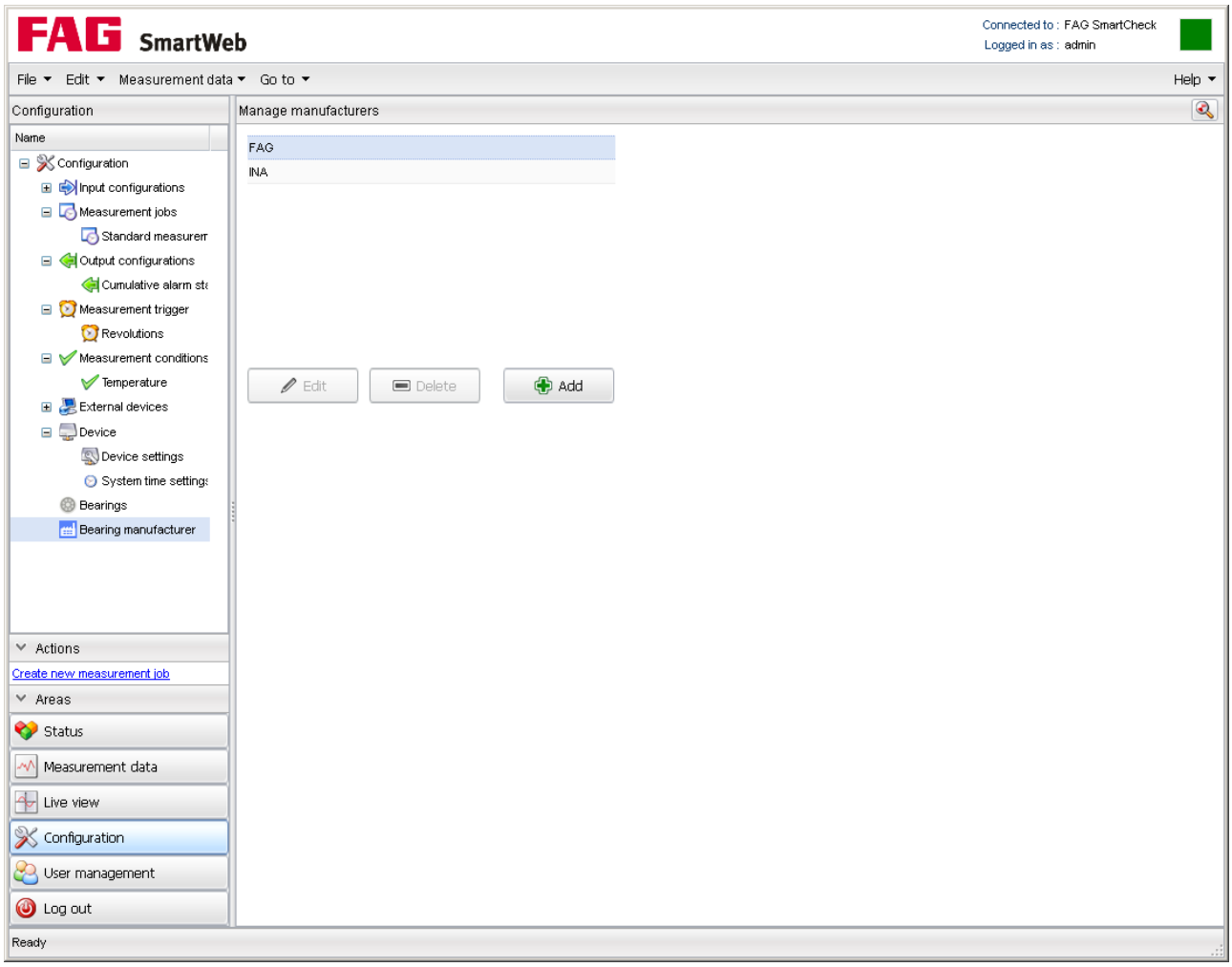
The bearing database, which is already available in the factory default setting of the FAG SmartCheck device, is write-protected; the individual bearings can be neither edited nor deleted. However, you can copy a bearing from the database and edit the copy, e.g. to create a new bearing with only minor deviations. To do this, proceed as follows:

1. Select the bearing you want to copy and edit
2. Under **Bearing information**, click on **Copy**
3. In the **Copy bearing** window, make the desired specifications. If you do not change the name here, FAG SmartCheck creates by default a bearing with the name **Copy of [name of the original bearing]**.
4. Click on **OK** to save your changes and transfer the bearing into the database.

Calculating normalised kinematic frequencies from the bearing geometry requires expert knowledge. Only with the correct specifications for angles and diameters can the values for the bearing be determined correctly and lead to a correct measurement configuration.

8.9 Bearing manufacturer

If you add a new bearing in the **Bearing** 110 area, you also have to specify the manufacturer of the bearing. You manage the manufacturers available for selection in the **Bearing manufacturer** area:



Here you have the following options:

- **Add manufacturer:** Under **Manage manufacturers**, click on **Add** ✚, enter the name of the manufacturer and confirm with **OK**.
- **Edit manufacturer:** Under **Manage manufacturers**, click on **Edit** 🖉, change the name of the manufacturer and confirm with **OK**.
- **Delete manufacturer:** Under **Manage manufacturers**, click on **Delete** ▬ and confirm with **OK**.
- In the top right corner, click on 🔍 to open the Configuration overview 49.

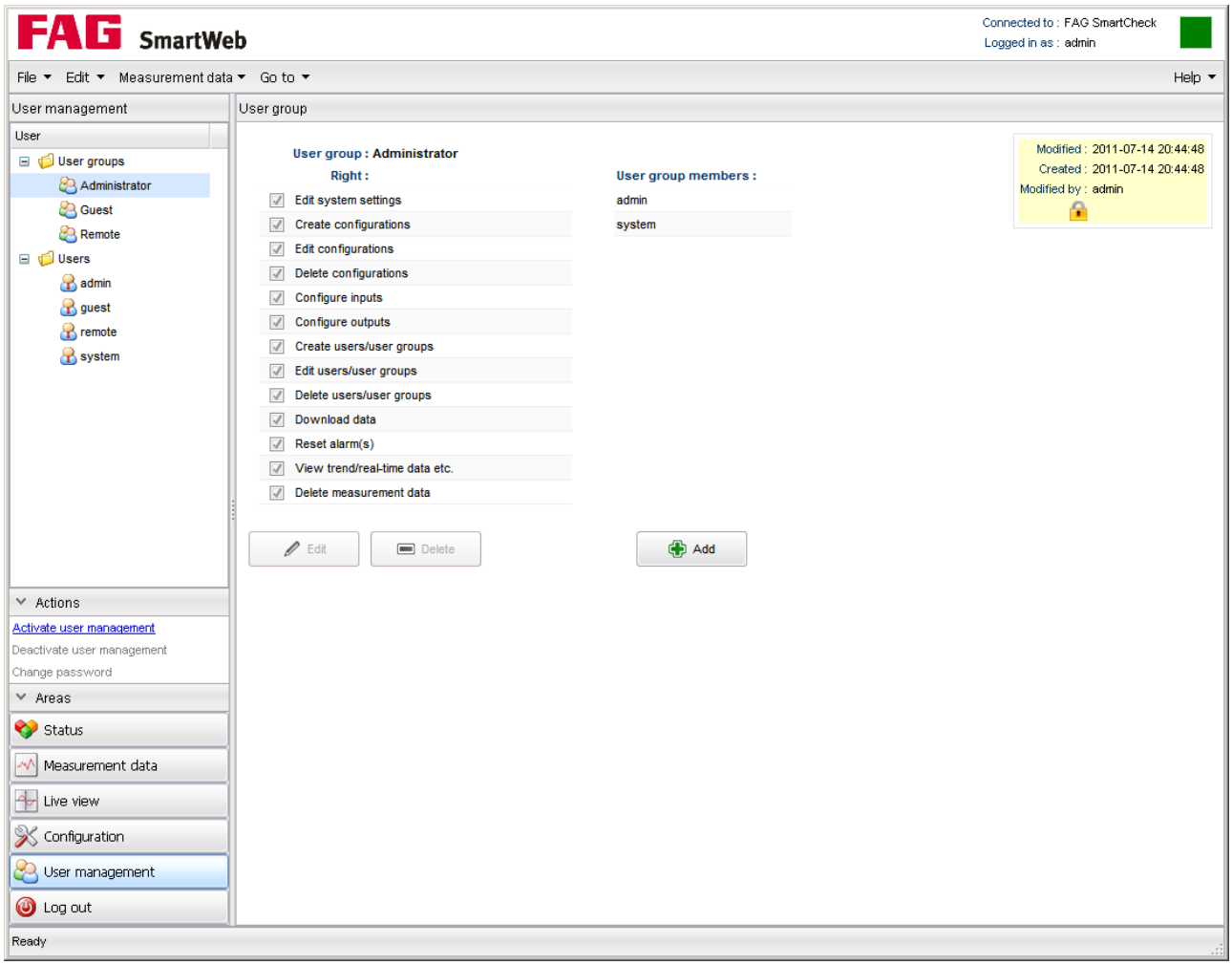


You can neither delete nor edit manufacturers that you have already used in the specifications for a bearing.

9 User management

Click on the **User management** button to open the corresponding area. Here you can change, add and delete user groups and users in the SmartWeb software. You can also activate and deactivate the user management here. On the left, you will find an overview of all user groups and users. The user currently logged in is displayed in the top right in the title bar next to **Logged in as**.

In the factory default setting, the user groups **Administrator**, **Remote** and **Guest** are created with the users **admin**, **remote** and **guest**. If you select a group or an individual user, you will see the corresponding details and rights in the main panel:



Here you have the following options:

User groups

If, as in the example, you select a user group in the expanded overview, you will find the following in the main panel:

- The name of the selected **User group** is displayed on the left.
- Below the name, you will find the list of **Rights** 116 for the selected user group. The rights activated here—i.e. the ones that are ticked—are granted to every user you create for this user group. To change the rights, click on **Edit**.
- Beside the rights, you will find the list of **Members of the user group**. This gives you a quick overview of the users who, for example, were affected by a change to the user group.
- You can add or edit a user group 117. This excludes the system user groups **Administrator** and **Remote**, which cannot be changed.
- You can delete a user group provided that it is empty, i.e. it no longer contains any users. To do so, click **Delete** and confirm with **OK**.
- On the right, in the field highlighted in yellow, you will find details on creating and changing the user group. The symbol indicates user groups that you can neither change nor delete. This includes the system user groups **Administrator** and **Remote**.

User

If you select a user in the expanded overview, you will find the following in the main panel:

- The **User ID** and the details on the selected user are displayed on the left.
- Beside the details, you will find the list of the **Rights** 116 for the selected user. The rights activated here - i.e. the ones that are ticked - are granted to the user via membership of a user group. The rights can only be changed for the whole user group.
- You can add or edit a user 118. This excludes the system users **admin** and **remote**, which cannot be changed.
- You can delete a user. To do so, click **Delete** and confirm with **OK**.
- On the right, in the field highlighted in yellow, you will find details on creating and changing the user. The symbol indicates users whom you can neither change nor delete. This includes the system users **admin** and **remote**.

Rights

When you create a user group, you can grant rights that will then apply for every user in this user group. The following rights are available:

- **Edit system settings**
  This allows the settings found under **Device settings** 106 and **System time settings** 109 to be edited by the user.
- **Create configurations**, **Edit configurations** and **Delete configurations**
  With these rights, the user can create, edit and/or delete configurations accordingly. Excluded from this right are the input and output configurations, which have their own rights (see below).
- **Configure inputs** and **Configure outputs**
  With these rights, the user can configure inputs and outputs and create scaling factors.
- **Create users/user groups**, **Edit users/user groups** and **Delete users/user groups**
  If you grant these rights, the user can execute the corresponding functions of the user management.
- **Download data**
  This right is necessary if the user wants to download and analyse data via the SmartUtility interface from the SmartCheck device.
- **Reset alarm(s)**
  This right allows the user, using the SmartWeb software, to switch off the alarms of the SmartCheck device.
- **View trend/real-time data etc.**
  This allows the user to open the **Live view** 46 and **Measurement data** 38 areas and use the corresponding functions there.
- **Delete measurement data**
  This right allows the user to **delete measurement data** 45 that is on the SmartCheck device.

Activate/Deactivate user management

By default, you can open the SmartWeb software without logging in with your user name and password. So that the software and the SmartCheck device can only be operated by authorised users, you can **Activate user management**. With activated user management, each user has to log in with user name and password. Users only have the rights granted to their user group.

To activate user management, click on the corresponding menu item, enter a new administrator password twice and then click on **OK**. You must then refresh the FAG SmartWeb software in your browser, so that the user management is active.

To deactivate user management again, click on the corresponding menu item, enter the administrator password and then click on **OK**. The administrator password is reset to the factory default setting. Now everyone can log in without user name and password and everyone has administrator rights.

Change password

This function is only available if user management is activated.

Click on **Change password**, enter your new password twice and then click on **OK**. Now you can use the new password.

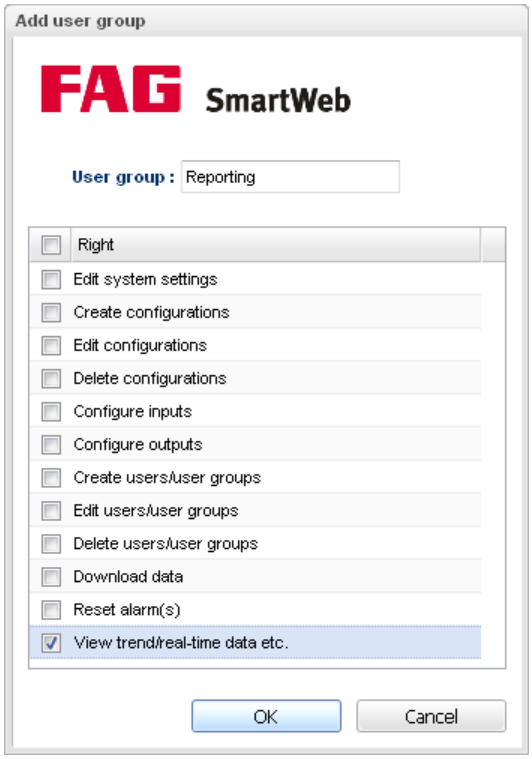
- If you are using the SmartUtility software, you can store your user name and password in the software settings. To do so, your details here must match the user name and password stored in the user management of the SmartWeb software.
- In the factory default setting, system users have the following passwords:
  - User ID **admin**: Password **admin123**
  - User ID **remote**: Password **remote123**
  - User ID **guest**: Password **guest123**

9.1 Adding/editing user group

To be able to create a user, you first need a user group. A user group consists of a name and a selection of rights 116. These rights pass automatically to every user in this group. Thus, the rights users have when using FAG SmartCheck are defined by means of the group they belong to.

How to add a user group

1. In the overview on the left, select **User groups**.
2. In the main panel, click on **Add** ✚.
3. In the window **Add user group**, make the desired specifications:



You have the following options:

User group	Here, enter the name under which the user group is to appear in the overview.
Right	Here, activate the rights that are to apply for users in this user group. You can either select each right individually or activate them all at the same time via **Right**.

4. Click on **OK** to save the new user group.

How to edit a user group

1. In the expanded overview, click on the desired user group.
2. Click on **Edit** and enter the desired specifications in the **Edit user group** window.
3. Click on **OK** to adopt your changes.

9.2 Adding/editing users

You can only add users in connection with a user group. The user group is used to define the rights 116 that the user has for FAG SmartCheck.

How to add a user

1. In the overview on the left, select **User**.
2. In the main panel, click on **Add** ✚.
3. In the **Add user** window, make the desired specifications:



You have the following options:

User ID	Here enter the user ID with which the user will log into SmartCheck in future.
Password	Enter here the password that the user will use to log into SmartCheck in future.
User group	Specify here the user group that the user is to belong to. Use the user group to determine the rights that the user will have.
Surname, first name email, phone	Specify here the contact data of the user. This information is optional.
Comment	Enter here any comment you may want to add about this user.

4. Click on **OK** to save the new user.

How to edit a user

1. In the expanded overview, click on the user.
2. Click on **Edit** and enter the desired specifications in the **Edit user** window.
3. Click on **OK** to adopt your changes.

10 Manufacturer/support

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We provide support services for the FAG SmartCheck device and related software products. A detailed description of the type and scope of the support services we provide can be found online at www.FAG-SmartCheck.com.

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