EWIKON

smart CONTROL

The assistance system for the
injection moulding production

Software manual

EWIKON 11/2021

Content

1. General remarks

NOTE!

Improper use of the unit may result in severe personal injury and considerable material damage! You must carefully read this software manual and familiarise yourself with the safety installations before installing, commissioning or maintaining the unit. Do not use the unit without having received appropriate training.

1.1 Information on this software manual

The smart CONTROL assistance system for the injection moulding production can be fully integrated into the networked injection moulding process and enables the permanent recording, logging and analysis of all relevant process data around the hot runner system and the injection moulding production cell. Communication with the machine, peripherals and higher-level software systems takes place via the OPC UA communication protocol or the REST API interface.
The smart CONTROL manual was created for the correct handling of the browser-based software. It explains the display interface of the individual operating elements and shows analysis and configuration options.

1.2 Manufacturer

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1.3 Formal information on the software manual

Person in charge of documentation: Henning Becker

Version:	2.0
Printing date:	08/02/2022
Language:	English (Original operating manual: German)
Valid for update:	EWIKON smart CONTROL V0.83.0

1.4 Spare parts

The use of non-OEM spare parts can lead to risks. Only use original parts or parts approved by EWIKON Heißkanalsysteme GmbH. Work on electrical components may only be carried out by EWIKON qualified personnel.

1.5 Limitation of liability

All information and instructions given in this manual have been compiled in consideration of the applicable standards and regulations, state of the art as well as our know-how and experience.

EWIKON does not assume liability for any damage caused by:

- Non-observance of this manual
- Improper use
- Use of unskilled staff
- Unauthorised retrofitting or technical modifications
- Use of non-approved spare parts

EWIKON also assumes no liability for consequential damages or production losses caused by faulty transmission or misinterpretation of data due to software malfunctions or errors in the processing of incoming or outgoing signals.

The technical service provided verbally, in writing or on the basis of tests represents our best knowledge but is not binding and does not release you from carrying out additional tests on the products supplied by us regarding their suitability for the intended use.

We guarantee the perfect quality of our products in accordance with our general terms and conditions of sale and payment as well as the extended warranty conditions.

These are available on our homepage **www.ewikon.com**.

The statutory provisions prevailing at the time of conclusion of the contract shall apply.

We reserve the right of technical alterations to develop our products and enhance their performance properties.

1.6 Warranty terms

For warranty conditions of cold and hot runner systems and components please refer to the terms and conditions of EWIKON.

1.7 Standards and directives

The EWIKON smart CONTROL assistance system for the injection moulding production conforms to the following European directives:

- 2014/35/EU Low Voltage Directive
- 2014/30/EU EMC Directive
- EN 60204-1:2007-06 Safety of machinery -
  Electrical equipment of machines - Part 1: General requirements

1.8 Glossary of symbols

The following table explains the symbols that are frequently found on the smart CONTROL interface and always offer the same function.

Symbol	Description
	Main menu
	Update lists and charts
	Make settings
	Undoing changes that have not yet been saved
	Save changes
	Add new elements
	Delete elements
	Edit sections or elements
	Start direct download of data
	Start direct upload of data
	Archive data
	Change of sequences
	Close window

Symbol	Description
	Send e-mail
	Configure conditions for actions
	Check conditions for actions
	Show additional information
	Show details
	View log files
	Selection of the zone temperature
	Zone power selection
	Change password
	Alarm message
	Filter records
	Active or inactive switching of functions

Chart 1: Glossary of symbols

1.9 Explanation of terms

In the following, terms are explained which are frequently used in the smart CONTROL interface:

Term	Description
Action	The action is a digital action that is performed after configured conditions are met. These include counters, status changes or tags.
Aktuator	An actuator sends out signals that start an action (e.g. a digital signal that switches a lamp on or off).
Condition	The fulfilment (or non-fulfilment) of conditions determines whether an action can take place. For example, a counter is only executed once the configured conditions are met.
Dashboard	The dashboard is the overview monitor of the smart CONTROL unit, which clearly shows important information about the system performance at a glance. From the dashboard, detailed information can be called up at further levels.
Devices	A device is an OPC UA-capable device (server) that is integrated via the network.
Nodes	As soon as an OPC UA-capable device is integrated, parameters can be accessed via nodes. The node contains the properties and attributes that can be processed and displayed.
Data nodes	As soon as an OPC UA-capable device is integrated, features and attributes can be accessed via nodes. The specific values are made available in subordinate data nodes. Values can be not only numbers but also texts. Data nodes can be listed in subfolders.
Power	EWIKON controllers are operated in pulse mode as standard (pulse width modulation). The power indicates the switching values of the respective zone. The output is the ratio of the switch-on and switch-off time of the respective control zone of the hot runner system in [%]. Example 25 % = 1 time unit on / 3 time units off (1/4)
Material	The material is the resin that is processed with the selected injection mould. Further components can be entered (example: 2-component injection mould).

Chart 2: Explanation of terms

2. Initial start-up

2.1 Connection of smart CONTROL

Power supply and digital / analogue inputs and outputs

A supply voltage of 24 V is required for the operation of smart CONTROL. The power supply can be provided via the injection moulding machine or a separate power supply unit. In addition to the supply voltage, digital input and output signals as well as analogue input signals can also be recorded. In the standard version, this is done via a 12-pin signal connection.

The power is fed in via the signal cable (EWIKON item no. 60070.026) - the assignment is listed in the following chart („Chart 3: Contact assignment of the 12-pole signal connection“).

Contact	Description	Use
1 / black 1	DigiIn 1 (+24 V)	Digital input 1
2 / black 2	DigiIn 2 (+24 V)	Digital input 2
3 / black 3	DigiIn 3 (+24 V)	Digital input 3
4 / black 4	DigiIn 4 (+24 V)	Digital input 4
5 / black 5	DigiOut 1 (+24 V)	Digital output 1
6 / black 6	DigiOut 2 (+24 V)	Digital output 2
7 / black 7	AnaIn (0 - 10 V)	Analogue input
8 / black 8	AnaGND	Analogue input
9 / black 9	+ 24 V DC	Operating voltage +24 V for smart CONTROL
10 / black 10	GND	Operating voltage GND for smart CONTROL
11 / black 11	free	free
12 / gn / ge	PE	Protective conductor

Chart 3: Contact assignment of the 12-pole signal connection

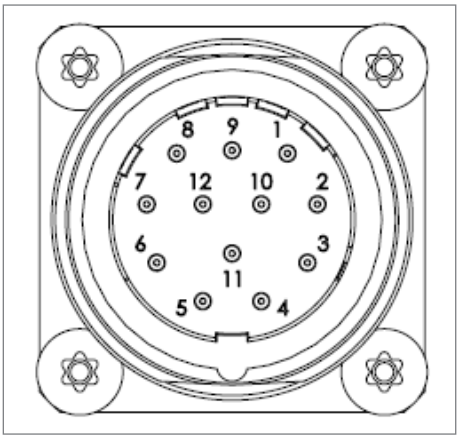


Figure 1: 12-pole signal connection

Network ports

Figure 2: Network ports

1. Company network

2. smartDevices network (OPC UA devices, etc.)

3. smartDevices network (OPC UA devices, etc.)

The smart CONTROL unit has three different networks and therefore three different IP addresses. The following networks are available:

WLAN network (via USB WLAN dongle)	192.168.137.1 (not changeable DHCP server)
Network interface 1 for company network	192.168.200.1 (freely configurable)
Network interface 2+3 for devices	192.168.201.1 (not freely configurable)

The USB ports can be used as desired.

Network port 1:
Integration into the company network for configuration via the smart CONTROL web interface.
The user is responsible for the setup.

Network port 2 + port 3:
Integration of devices, actuators and sensors using bus coupler OPC UA for smart devices.
Devices must be addressed. For this purpose, the following IP addresses are available for customer devices for free address assignment: 192.168.201.100 to 192.168.201.119.

2.2 System requirements

HTML5--enabled browser:	Microsoft Edge / Google Chrome / Mozilla Firefox / Apple Safari
Required connection:	WLAN network (setup); LAN (standard mode)

2.3 Set up a connection

The smart CONTROL unit can be connected via WLAN or network cable. For a smooth setup, we recommend to follow the procedure below.

Tip: For the first start-up, we recommend a connection via WLAN. For subsequent permanent operation, the connection should be established with a network cable.

2.3.1 Connection via WLAN

1. Switch on the WLAN on the input device (laptop, tablet or smartphone)
2. Search for the smart CONTROL unit in the WLAN network (SSID: see smart CONTROL type plate)
3. Connect to the smart CONTROL unit using the WLAN access. The password must be changed after the first access (see chapter „6.11.4 SoftAP (WLAN Hotspot)“)
4. Open an HTML5-capable browser (example: Microsoft Edge) and enter the IP address (192.168.200.1) in the address line
5. The login page of the smart CONTROL unit is displayed

2.3.2 Connection via network cable

1. Plug the network cable into port 1 of the smart CONTROL unit and into the end device (PC, tablet, laptop)
2. Set an IP address for the network adapter of the end device (standard network) Example: 192.168.200.100
3. Open an HTML5-capable web browser (example: Microsoft Edge) and enter the IP address of the smart CONTROL unit in the address line. (192.168.200.1)
4. The login page of the smart CONTROL unit is displayed

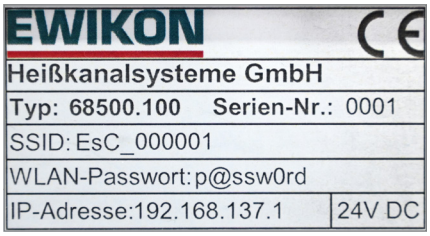


Figure 3: smart CONTROL Type plate

2.4 Login

For the first login, the following username and password must be entered:

Username: admin

Password: admin

In addition, the language selection for the entire web interface can already be made here.

EWIKON recommends changing the password after the first login. The intended users should be created and the user roles assigned (see chapter „6.10 User“). The access data for the first login should no longer be used for normal operation so that user activities can be correctly assigned in log files.

Figure 4: Login window of the smart CONTROL unit

2.5 Menu bar

In the menu bar, the language of the web interface can be changed, alarm messages can be viewed and the user menu can be opened.

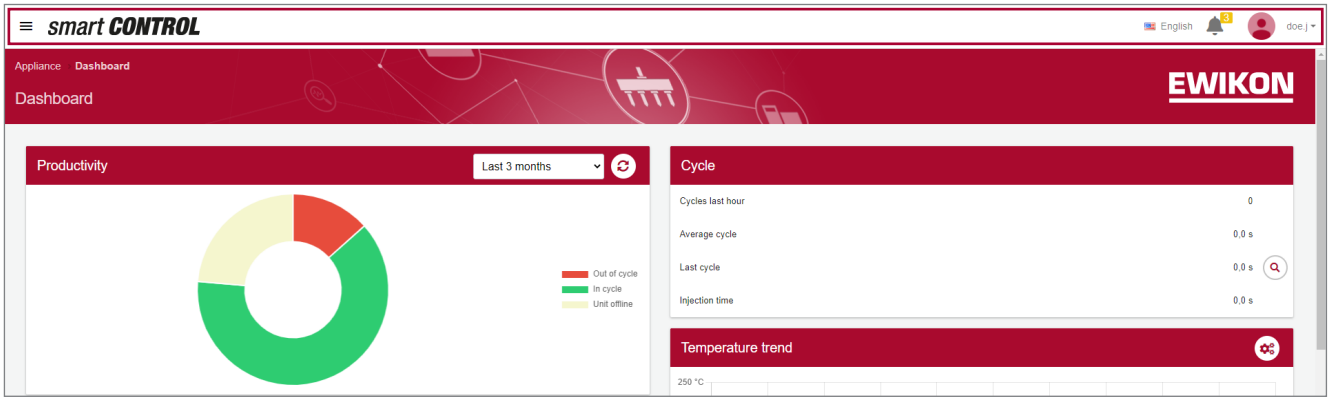


Figure 5: smart CONTROL menu bar

After logging in, the dashboard is automatically displayed (see chapter „4.1 Dashboard“).

The main menu is opened via the hamburger menu (☰).

2.5.1 Language choice

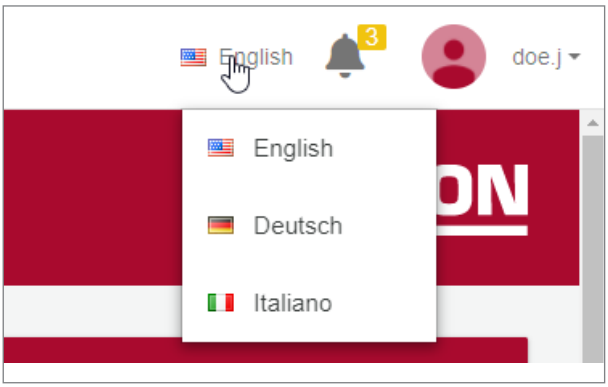


Figure 6: smart CONTROL Language choice

The language can be chosen by clicking on one of the available languages in the menu bar.

The default language of the web browser is taken into account. If this is not included in the available language selection, English is automatically used as the default language.

2.5.2 User menu

In the higher-level user menu, the settings for the logged-in user can be changed. In addition, it is possible to select device actions.

Attention! Depending on the user role, not all submenu items are displayed. Contact the administrator of the smart CONTROL unit (see chapter „6.10 User“ and „6.10.1 User roles“).

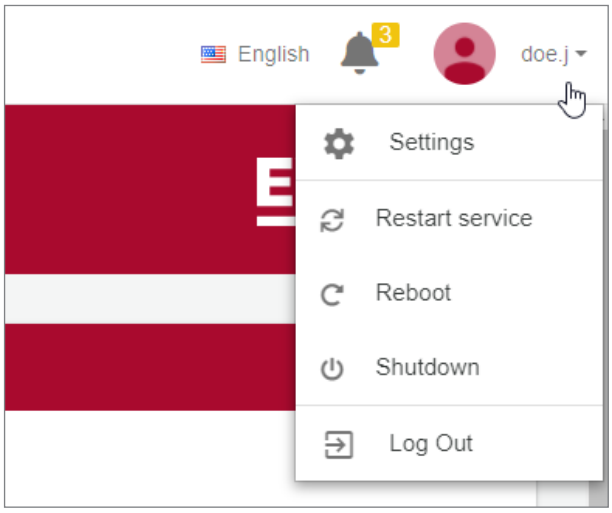


Figure 7: smart CONTROL user menu

Settings:
Changing user settings of the logged-in user.

Restart service:
Restarts the software.

Reboot:
Restarts the device (hardware).

Shutdown:
Shuts down the device (hardware).

Log Out:
Logs out the logged-in user. The login window is then displayed automatically.

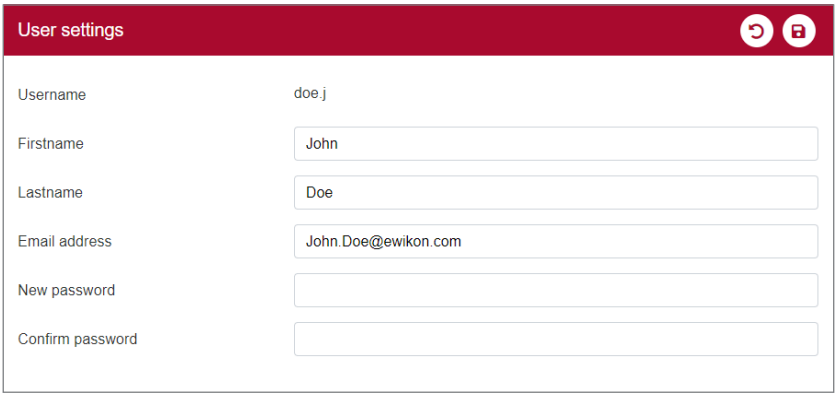


Figure 8: smart CONTROL user settings

Click on the button to delete the entries.

Click on the button to save the entries.

Tip: In this menu, only the user settings of the logged-in user can be edited.

As an administrator, all users and their permissions can be viewed and edited as described in chapter „6.10 User“.

3. Quick start | „FAQ“

3.1 Connection of an OPC UA-capable device / an OPC UA-capable machine with smart CONTROL

1. Connect an OPC UA-capable device (e.g. an injection moulding machine) to smart CONTROL via a shared network or directly via network cable (see chapter „2.1 Connection of smart CONTROL“).
2. Select "Register | Configuration → OPC UA → Devices" in the menu.

Figure 9: Devices - Selection "New device"

3. Add a new device by clicking the button ⊕.
4. After all fields have been filled in, the information must be saved with SAVE.

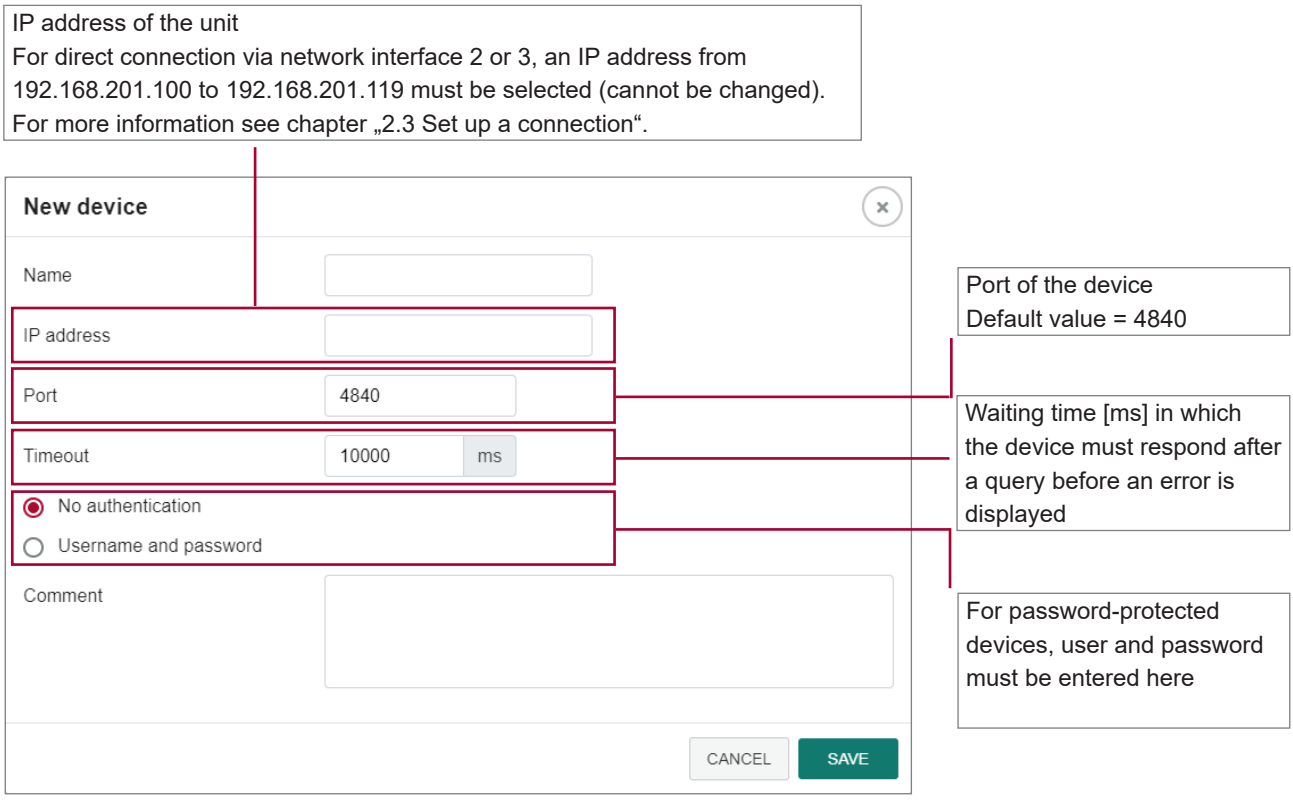


Figure 10: Window "New device"

5. The connection to the unit can be checked by "Browse Node" 🔍. In the node, available information and data from the device are provided.

Figure 11: Browse nodes

3.2 Recording of signals from an OPC UA-capable device / an OPC UA-capable machine with smart CONTROL

Signals can be recorded by an OPC UA-capable device or an OPC UA-capable machine.

Before signals can be read, smart CONTROL must be connected to the device or machine (see chapter „3.1 Connection of an OPC UA-capable device / an OPC UA-capable machine with smart CONTROL“ or „6.3.2 Devices“).

1. In the "Configuration" area of the main menu, select the menu item "OPC UA" / sub-item "Sensors".
2. Create a new sensor.
3. Select a suitable name and choose the sensor type (for a description of the sensor types, see the table).
4. Select the OPC UA-capable device or machine and link the sensor to the matching data nodes.
   Note: Contact the unit / machine manufacturer for the description of the specific data nodes.
5. Save the entries.
6. Now various settings and actions can be generated based on the digital signal (see chapter „6.8.2 Actions“).

Sensor type	Description
Digital	A digital signal can only have two positions (on/off or 1/0). With this simple signal, actions with status requests of conditions can be entered.
Analog trend	This sensor type can be used to record fast value changes of a numeric OPC UA data node during a cycle. The recorded data can be called up in the cycle details as a chart and value table. In addition, the data can be used in own charts in the "Monitoring" area / "Charts" menu item.
Analog value	This sensor type can be used to record individual values of a numeric OPC UA data node. Depending on the cycle, the value can be saved regularly, at an interval or a combination of both. The recorded data can be displayed in the cycle details. In addition, the data can be used in own charts in the "Monitoring" area / " Charts" menu item.
Text	Instead of further processing of analogue or digital values, a text is requested from an registered device (e.g. error text, alarm or status).

Chart 4: Sensor types

3.3 Recording temperatures and heating power with smart CONTROL

Before temperatures/power can be recorded, an OPC UA-capable device (control unit or injection moulding machine) must be connected to smart CONTROL (see chapter „3.1 Connection of an OPC UA-capable device / an OPC UA-capable machine with smart CONTROL“ or chapter „6.3.2 Devices“).

1. In the "Configuration" area of the main menu, select the menu item "Temperature zones".
2. IIn the element "Edit zones" the active zones are maintained. Select the zone by clicking on the button or add a new zone by clicking on the button in which temperatures/power should be added.
   Note: The integration of temperatures (and heating power) is always done under the menu item "Temperature zones" in the "Configuration" area.

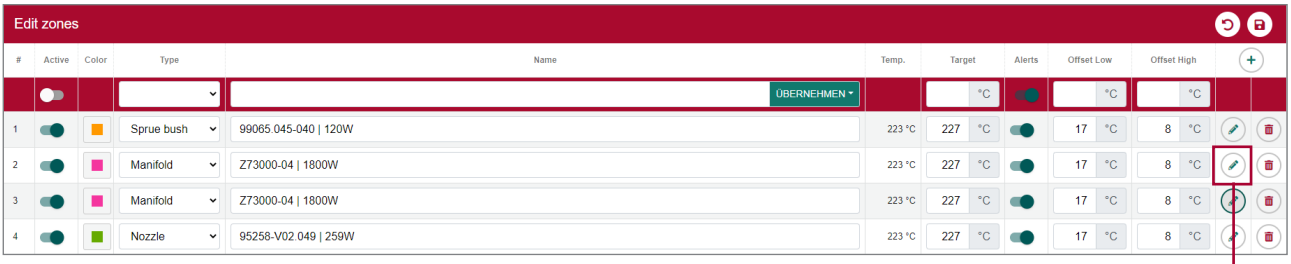


Figure 12: Element „Edit zones”

3. In the "Edit Zone" window, click on the "OPC UA" tab and select the device that provides the data (see chapter „6.3.2.1 Data structure device nodes“).

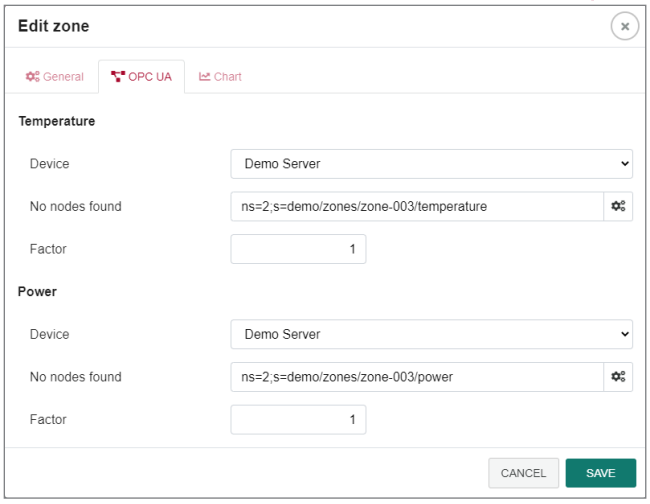


Figure 13: Window "Edit zone”

3.4 Recording of digital signals with smart CONTROL

In the standard version, digital signals from non-OPC UA-capable devices are received via a 12-pin signal cable (EWIKON item no. 60070.026) and transmitted to the module box. The module box forwards the signal to smart CONTROL via OPC UA.

Connection via the 12-pin signal cable:

1. Check the compatibility of the sensor.
2. Connect the data cable of the sensor according to the wiring plan (see chapter „2.1 Connection of smart CONTROL“).

Contact	Description	Use
1 / black 1	DigiIn 1 (+24 V)	Digital input 1
2 / black 2	DigiIn 2 (+24 V)	Digital input 2
3 / black 3	DigiIn 3 (+24 V)	Digital input 3
4 / black 4	DigiIn 4 (+24 V)	Digital input 4
5 / black 5	DigiOut 1 (+24 V)	Digital output 1
6 / black 6	DigiOut 2 (+24 V)	Digital output 2
7 / black 7	AnaIn (0 - 10 V)	Analogue input
8 / black 8	AnaGND	Analogue input
9 / black 9	+ 24 V DC	Power supply voltage +24 V for smart CONTROL
10 / black 10	GND	Power supply voltage GND for smart CONTROL
11 / black 11	free	free
12 / gn / ge	PE	Protective earth

Chart 5: Contact layout of the 12-pole signal plug

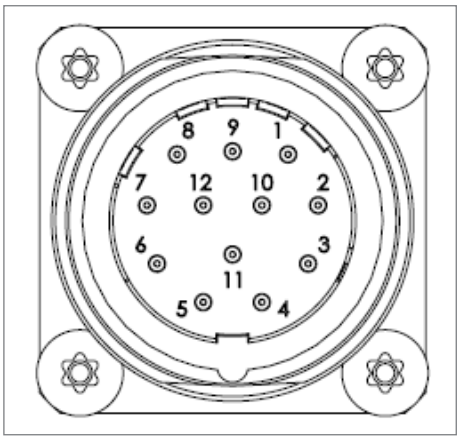


Figure 14: 12-pole signal plug

3. Now the sensor is accessible via the recording module of the smart CONTROL Module Basis-Set (I/O set).
4. Select the connected sensor in the smart CONTROL web interface ("Configuration" area / "OPC UA" menu item / "Sensors" subitem) and select "Manage sensors" by clicking on the button (see chapter „6.3.3 Sensors“).

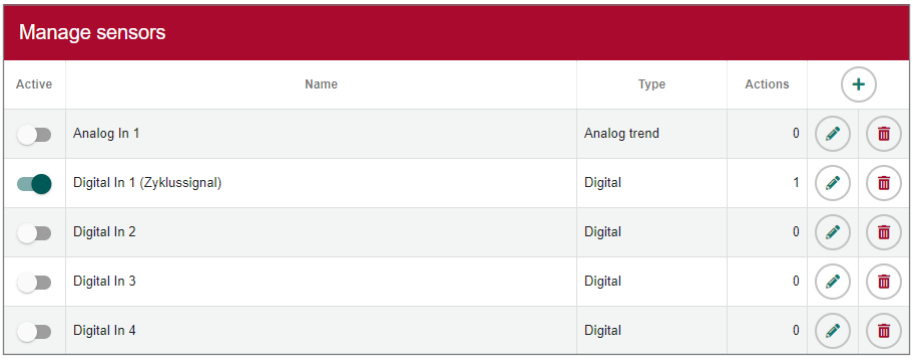


Figure 15: Element „Manage sensors”

5. Name the sensor and select the device incl. data node.
6. Actions can then be added to the sensor (see chapter „6.8.2 Actions“). The digital input "Digital In 1" is usually already set up at the factory for the recording of the cycle signal.

Depending on the equipment, various interfaces can be used by smart CONTROL. The number and type of interfaces can be taken from the wiring schedule (see chapter„6.9 Documents“).

3.5 Recording of analogue signals with smart CONTROL

Analogue signals from OPC UA-capable devices are received using the 12-pin signal cable. (EWIKON item no. 60070.026).

Connection via the 12-pin signal cable:

1. Check the compatibility of the sensor.
2. Connect the data cables of the sensor according to the wiring plan (see chapter „2.1 Connection of smart CONTROL“).

Contact	Description	Use
1 / black 1	DigiIn 1 (+24 V)	Digital input 1
2 / black 2	DigiIn 2 (+24 V)	Digital input 2
3 / black 3	DigiIn 3 (+24 V)	Digital input 3
4 / black 4	DigiIn 4 (+24 V)	Digital input 4
5 / black 5	DigiOut 1 (+24 V)	Digital output 1
6 / black 6	DigiOut 2 (+24 V)	Digital output 2
7 / black 7	AnaIn (0 - 10 V)	Analogue input
8 / black 8	AnaGND	Analogue input
9 / black 9	+ 24 V DC	Power supply voltage +24 V for smart CONTROL
10 / black 10	GND	Power supply voltage GND for smart CONTROL
11 / black 11	free	free
12 / gn / ge	PE	Protective earth

Chart 6: Contact layout of the 12-pole signal plug

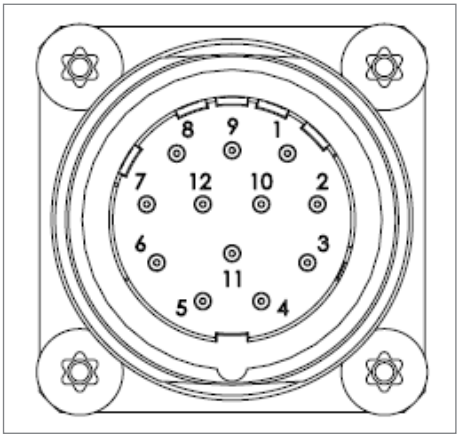


Figure 16: 12-pole signal plug

3. Now the sensor is accessible via the registration module of the smart CONTROL Module Basis-Set. (I/O set).
4. Select the connected sensor in the smart CONTROL web interface ("Configuration" area / "OPC UA" menu item / "Sensors" subitem) and select "Manage sensors" by clicking on the button (see chapter „6.3.3 Sensors“).

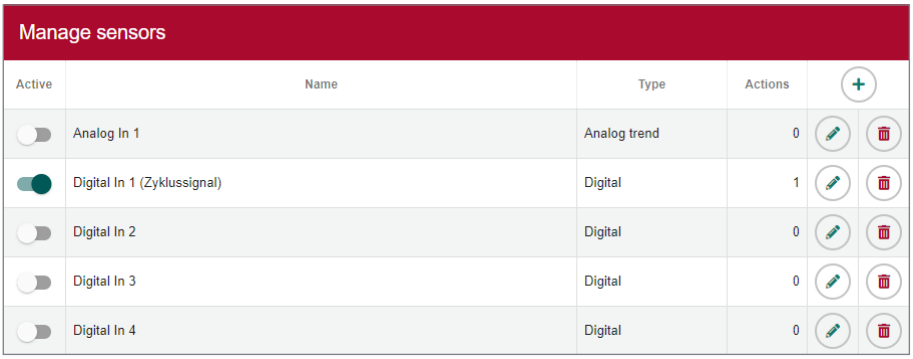


Figure 17: Element „Manage sensors”

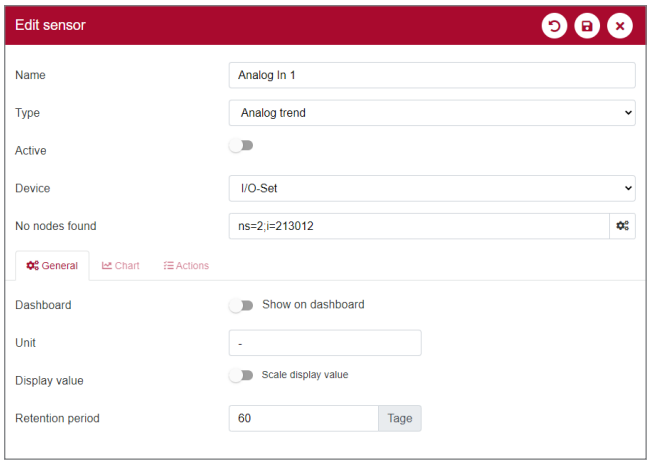


Figure 18: Window „Edit sensor"

Sensor type	Description
Analog trend	This sensor type can be used to log fast value changes of a numeric OPC UA data node during a cycle. The recorded data can be displayed in the cycle details as a chart and value table. In addition, the data can be used in own charts in the "Monitoring" area / "Charts" menu item.
Analog value	This sensor type can be used to log individual values of a numeric OPC UA data node. Depending on the cycle, the value can be saved regularly, at an interval or a combination of both. The recorded data can be displayed in the cycle details. In addition, the data can be used in own charts in the "Monitoring" area / "Charts" menu item.

Chart 7: Sensor types (extract)

5. Name the sensor and select the device incl. data node (see chapter „6.3.2.1 Data structure device nodes").
6. Actions can then be added to the sensor (see chapter „6.8.2 Actions").

Depending on the equipment, various interfaces can be connected to smart CONTROL. The number and type of interfaces can be taken from the wiring plan (see chapter „6.9 Documents").

3.6 Setup of smart CONTROL as OPC UA server

It is possible to let smart CONTROL act as an OPC UA server in order to provide data for other devices.

As soon as the function is activated, smart CONTROL can not only read data but also provide it for other devices.

1. Select the menu item „OPC UA“ / sub-item „Server“ in the „Configuration“ area of the main menu.
2. Enable the server.
3. Compare the port with the devices that should access smart CONTROL.
4. Specify whether smart CONTROL can only be accessed with a user login.
5. Save the entry.

OPC UA-capable devices can then access smart CONTROL and process its data.

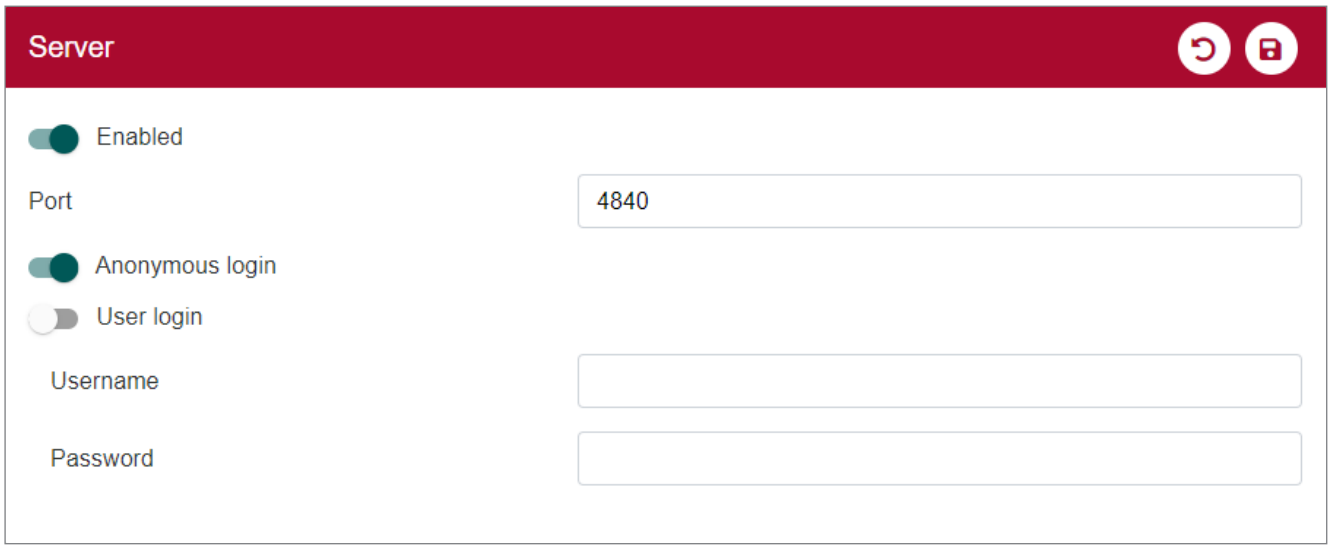


Figure 19: Menu item „OPC UA” / sub item „Server”

3.7 Renaming and grouping of temperature zones

Data analysis can be facilitated by grouping and renaming temperature zones. The assignment of uniform colours simplifies the reading of diagrams.

1. Select the menu item „Temperature zones“ in the „Configuration“ area of the main menu.
2. In the „Edit zones“ element, the grouping and display of the temperature zones can be edited.

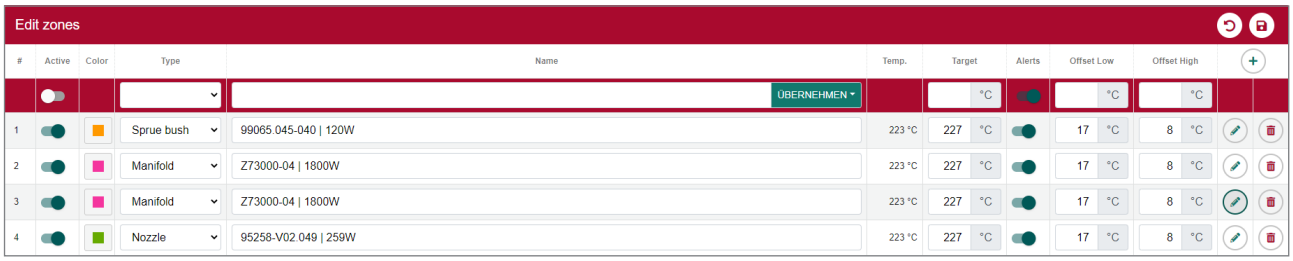


Figure 20: Menu item „Temperature zones” / element „Edit zones”

3. Different colours can be assigned to each temperature zone. It is possible to assign a colour to each zone or zone group.
4. The name can be defined as in the example or renamed according to your own wishes. In the edit line (top line) all temperature zones can be changed at once.
5. Once the zones are grouped and have a colour assigned, filtering in diagrams is simplified

3.8 Creating production segments

Production segments are used to divide an injection moulding production into corresponding production sections over time.

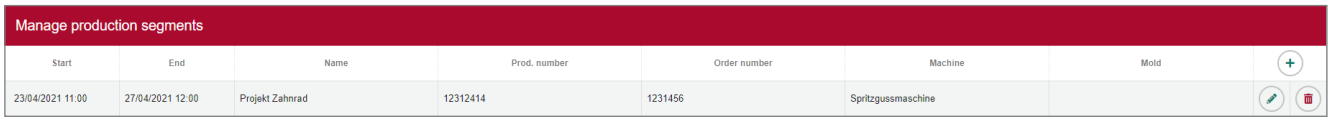


Figure 21: Element „Manage production segments"

1. Select the menu item „Production" in the „Configuration" area of the main menu.
2. New segments can be created in the table „Manage production segments".
   Existing segments can be adapted or deleted.
3. For a new segment, enter the information in the fields. Once a mould has been added, it can be selected from the drop-down menu. To add a mould, see chapter „6.4 Moulds".

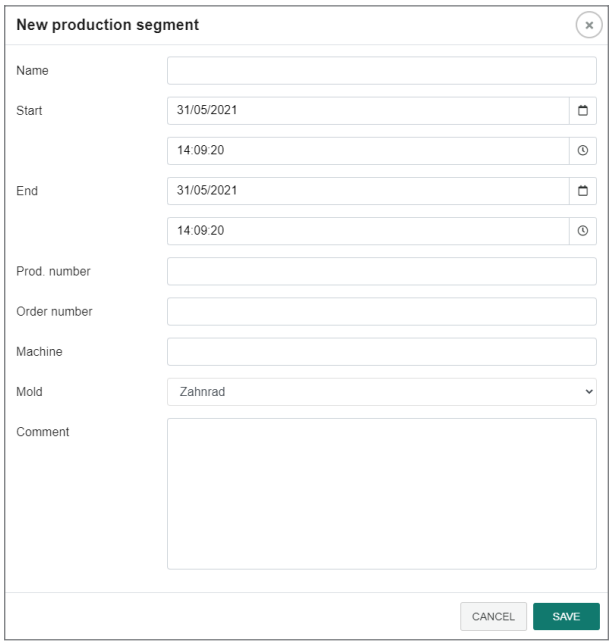


Figure 22: Window „New production segment"

4. Production segments can be selected in the menu items „5.2 Cycles" und „5.3 Productivity" for a time-based limitation.

3.9 Tagging of cycles

Cycles can be tagged according to freely configurable conditions. These tags can be viewed in the cycle overview. Cycles can be filtered according to tags. Before a cycle can be tagged, a tag must first be created.

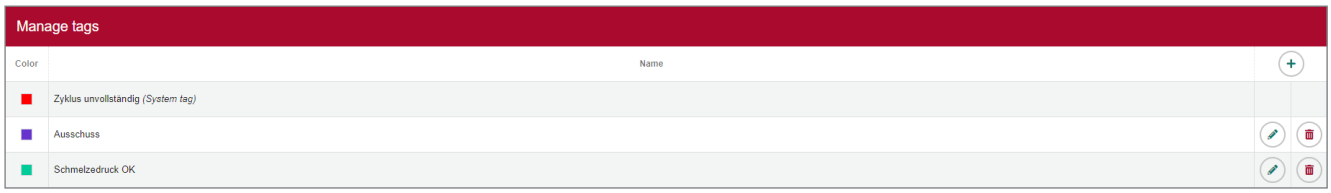


Figure 23: Menu item „Tags" / Element „Manage tags"

1. Select the menu item „Tags" in the „Configuration" area of the main menu.
2. Create a new tag by clicking on the button ⊕ .
3. The window „New tag" opens, in which a name can be assigned, a description can be entered and a colour can be assigned.
4. The definition of conditions for a tagging of a cycle is done in the area „Configuration" / menu item „OPC UA" / sub item „Sensors".
5. Select an existing sensor or create a new sensor (see chapter „6.3.3 Sensors"). Click on the button ✎ to open the „Edit sensor" window.
6. In the „Actions" tab, the action „Mark cycle" can be created by clicking on the button „Create new action".

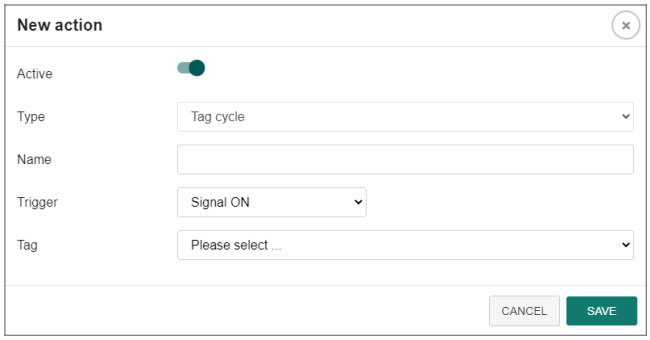


Figure 24: Window „New action"

7. Select the action type „Tag cycle" and assign a name. Only created tags can be selected as a tag (see chapter „6.7 Tags").
8. Additional conditions can be set up (see chapter „6.3.3.10 Define condition types").
9. Subsequently, the tags can be viewed under „5.2 Cycles". The tags are also saved under „Cycle details" and listed in the master process data (see chapter „4.1.2 Cycle").

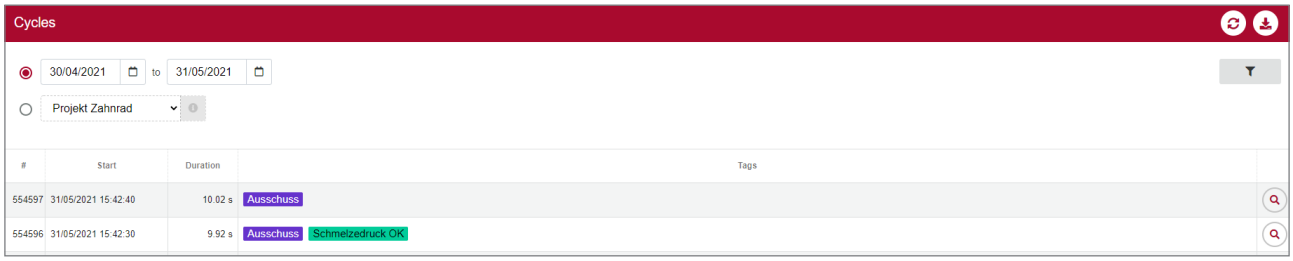


Figure 25: Menu item „Cycles"

3.10 Creating a counter

With the help of actions, other counters can be generated independently of the total counter. These can be used for the number of good parts or shot numbers, but also for other intervals.

To be able to trigger a counter, it must first be created.

1. Select the menu item „Counter“ in the „Configuration“ section of the main menu.
2. Click on the button ⊕ to create a new counter. The window „New counter“ opens in which the attributes of the counter such as name and value are defined.

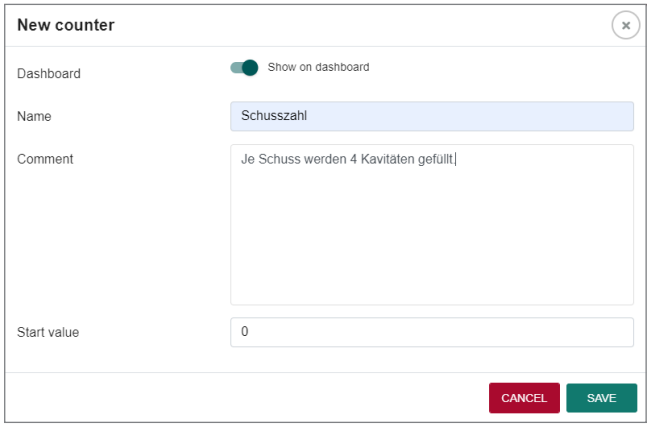


Figure 26: Window „New counter”

3. In the area „Configuration“ / menu item „OPC UA“ / sub item „Sensors“ a sensor can be edited. To do this, a suitable OPC UA-capable sensor must be selected and an action must be created. A new action can be added in the „Actions“ tab. If required, additional conditions for triggering the counter can be defined.

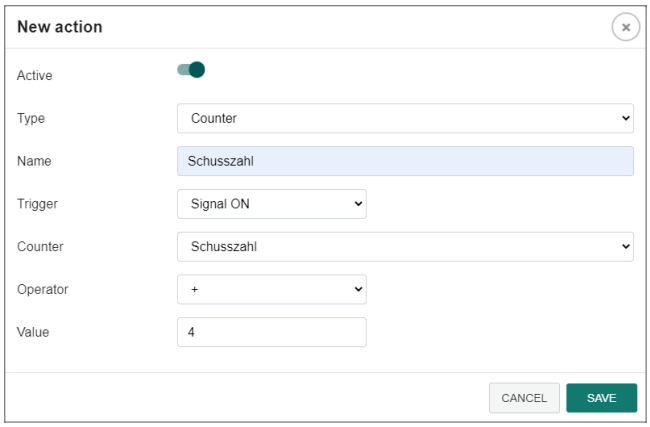


Figure 27: Window „New action”

4. The counter can be viewed on the dashboard as well as in the menu item „Counter“.

3.11 Creating alarms

With the „Alarms“ function, deviations in the running process can be detected and communicated. By defining actions with the corresponding conditions, the limits of the process parameters can be precisely defined and queried.

In order to set up an alarm, an action type (e.g. counters, actuators, tags) must be entered (see chapter „6.3.2 Devices“ and the following).

1. Select the menu item „Alarms“ in the „Configuration“ area of the main menu.
2. Create a new alarm by adding a new action by clicking on the button ⊕.
3. Alarms can also be sent by e-mail. For this, the e-mail server must be configured (see Chapter „6.11.3 Email Server“).

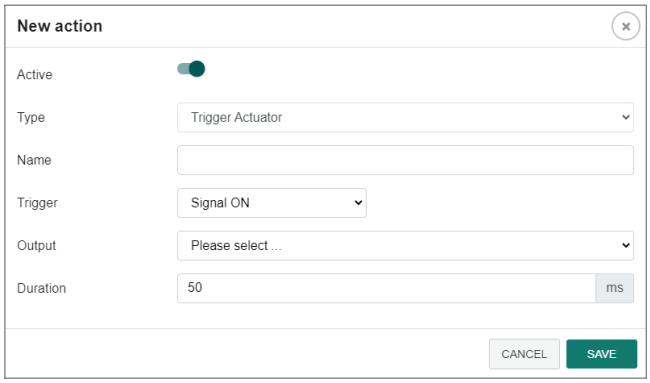


Figure 28: Window „New action”

4. After saving, the condition must be created by clicking on the button ⊕.

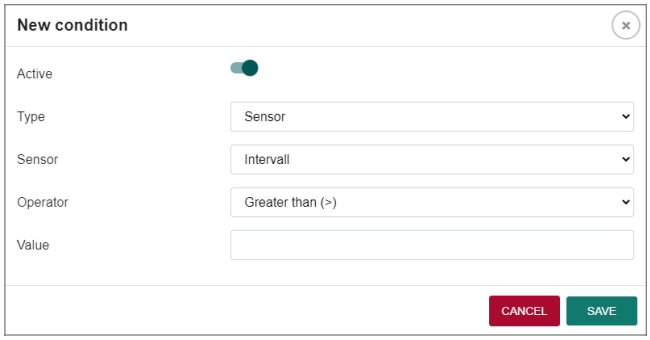


Figure 29: Window „New condition”

3.12 Saving of master process data

As soon as the injection moulding process is reliable and the cycles are completed without any irregularities, it may be useful to save the master process data for this cycle. The master process data is all data that is recorded by smart CONTROL within a cycle. These are saved in a separate file in smart CONTROL. This can be helpful if the data is to be saved for a validated injection moulding process.

1. Select the menu item „Dashboard“ in the „Overview“ area of the main menu.
2. Select „Show cycle details“ in the „Cycle“ window.

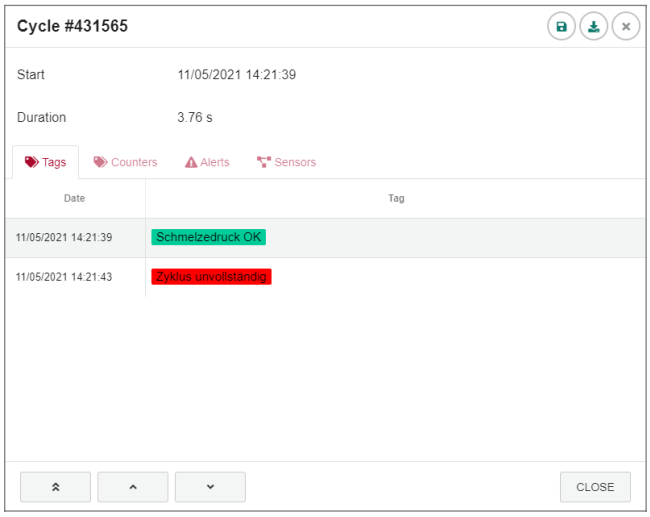


Figure 30: Window „Cycle details”

The data can be saved directly in smart CONTROL by clicking on the button or downloaded as a Microsoft® Excel® file by clicking on the button .

3. Once the data has been saved as a document, the saved documents can be viewed and edited under „6.9 Documents“.

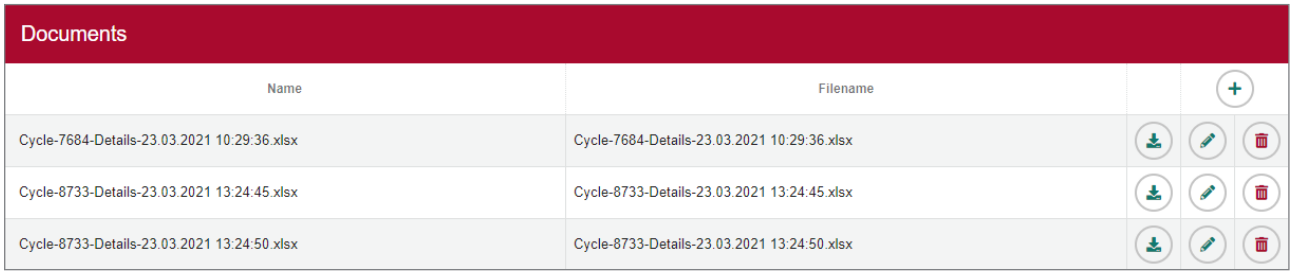


Figure 31: Element „Documents”

Tip: By clicking on the button , further documents can be uploaded and saved. This gives every smart CONTROL user access to the documents.

4. Display options | „Appliance“ area

4.1 Dashboard

In the menu item "Dashboard", all recorded data is clearly displayed in real time. This makes it possible to detect deviations or faults in the process as quickly as possible and to counteract them.

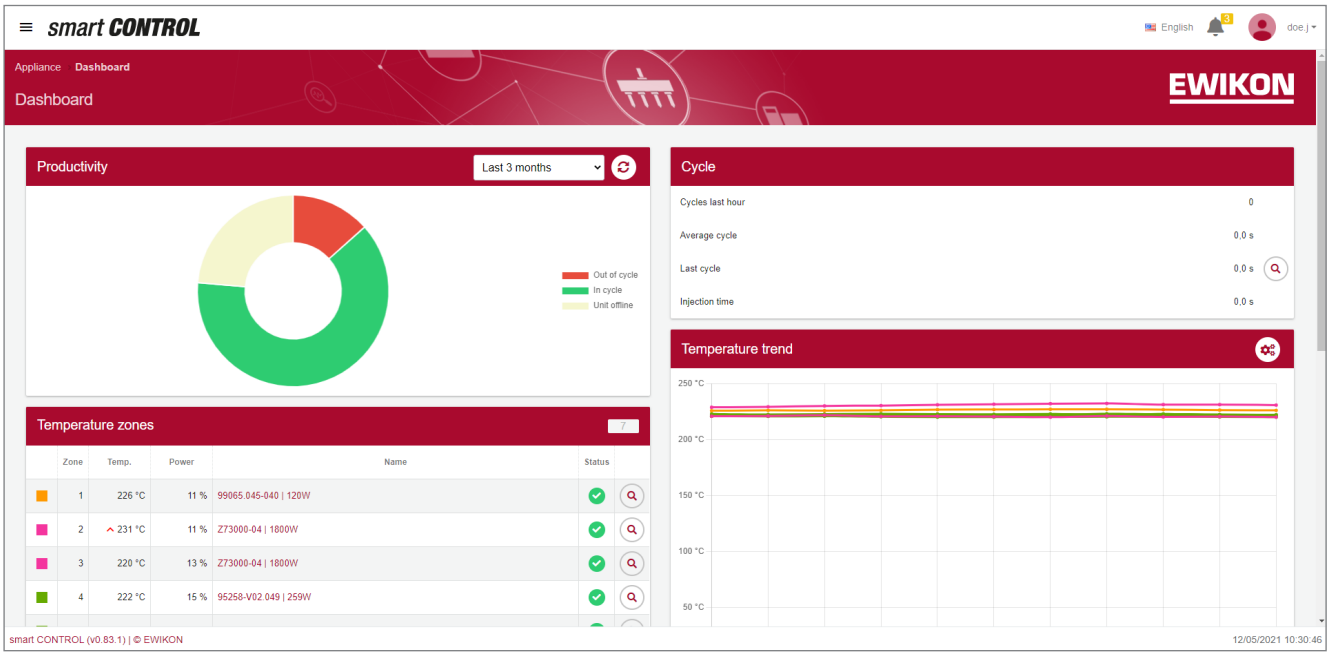


Figure 32: Menu item "Dashboard"

4.1.1 Productivity

The "Productivity" element shows information about the cycle activity for the set period.

A time period can be selected via the drop-down menu. After selecting the period, the display is automatically updated.

The pie chart is divided into three sectors:

Out of cycle	If no next cycle signal is received after a certain time, which can be set with the "Cycle timeout" (see chapter „4.2.3 Moulds“ and chapter „Manage moulds“), the smart CONTROL displays the status "Not in cycle". The time between the cycle signals is longer than the set cycle timeout..
In cycle	The injection moulding cycle is within the preset limit in automatic mode. (Cycle timeout see chapter „4.2.3 Moulds“ and chapter „Manage moulds“).
Unit offline	smart CONTROL is not connected to the mains and is offline. No data is recorded during this time.

Tip: When moving the mouse cursor over the sections of the diagram, the percentage share is displayed!

4.1.2 Cycle

The "Cycle" element provides information about current cycle values. The number of cycles of the last hour, the last cycle time and the average cycle time are displayed. The current injection time of the last cycle is displayed. By clicking on the button , further details of the last cycle can be called up.

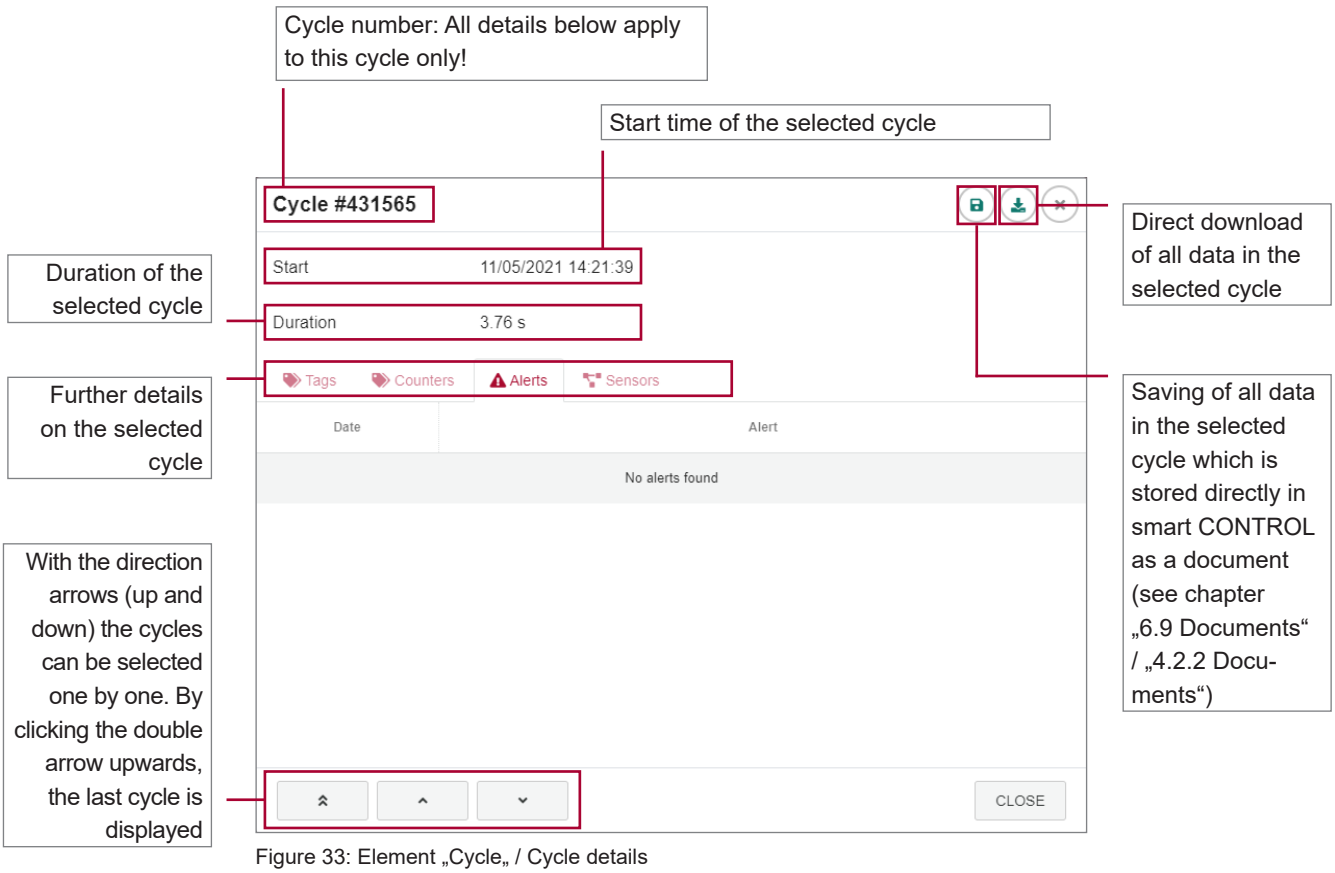


Figure 33: Element „Cycle„ / Cycle details

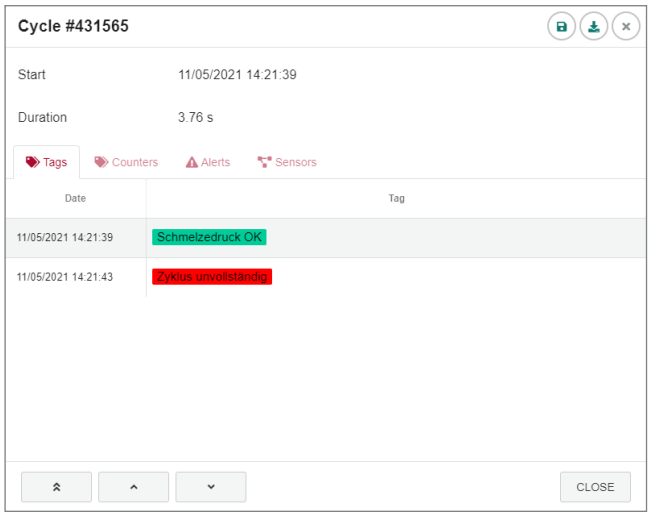


Figure 34: Cycle details - tab „Tags“

In the „ Tags“ tab, the set tags of the selected cycle can be viewed. The tags are managed in the „Configuration“ area / menu item „6.7 Tags“.

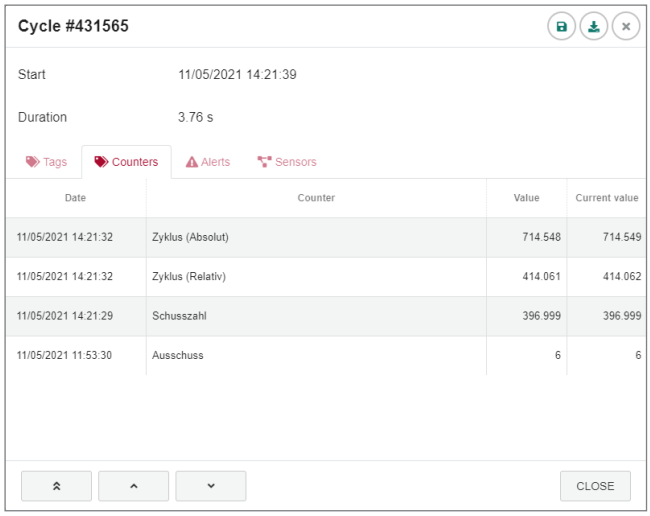


Figure 35: Cycle details - tab „Counters“

All counter readings at the time of the corresponding cycle are displayed in the „Counters“ tab. Counters can be added in the „Configuration“ area / menu item „6.6 Counter“.

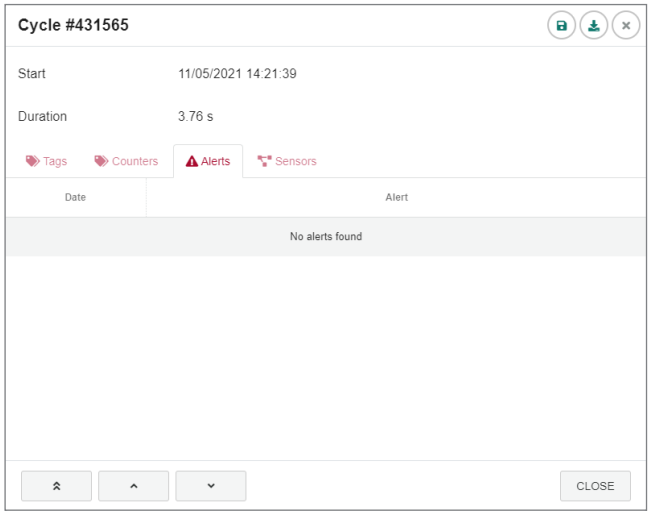


Figure 36: Cycle details - tab „Alerts“

As soon as an alarm has been triggered in the selected cycle, it is listed in the „Alarms“ tab. Alarms can be set in the „Configuration“ area / menu item „5.5 Alerts“.

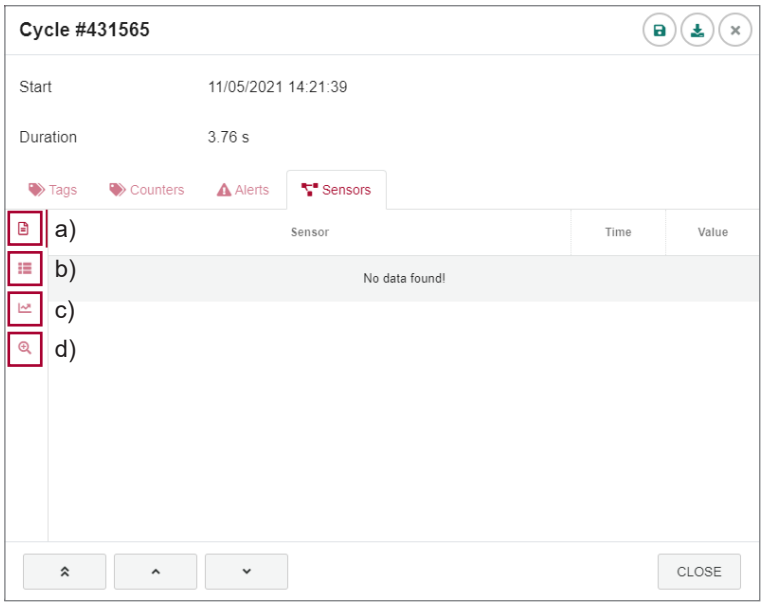
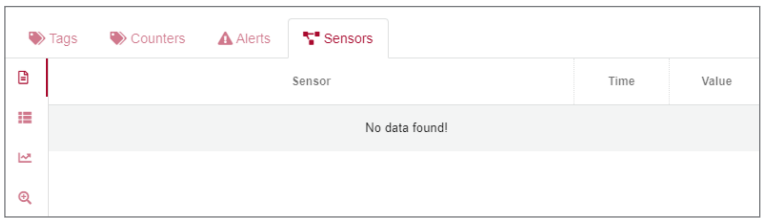


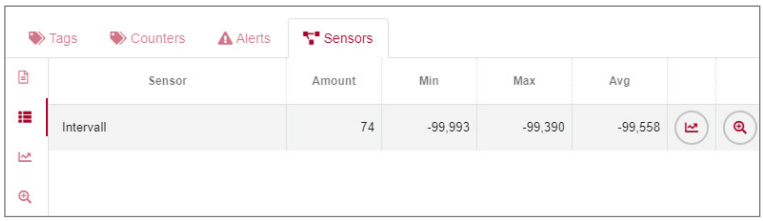
Figure 37: Cycle details - tab „Sensors“

If sensors have been added for documentation, the recorded data of the selected cycle are shown in the Sensors tab. The collected data is displayed in four subtabs according to the sensor type. Sensors can be maintained in the area „Configuration“ / menu item „OPC UA“ / subitem „6.3.3 Sensors“.



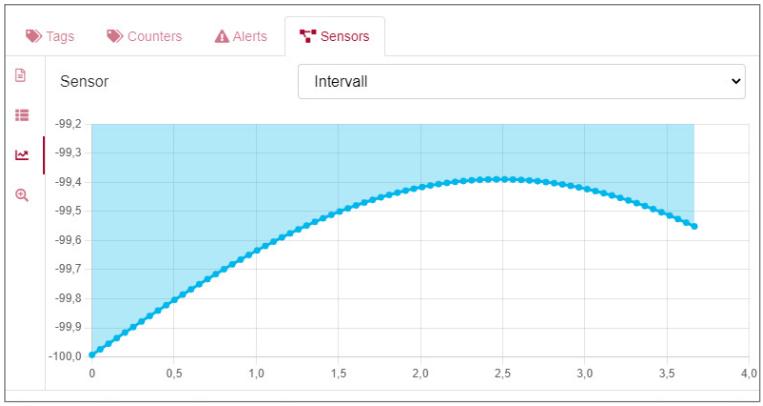
a) Analog value overview

Display of individual values recorded per cycle



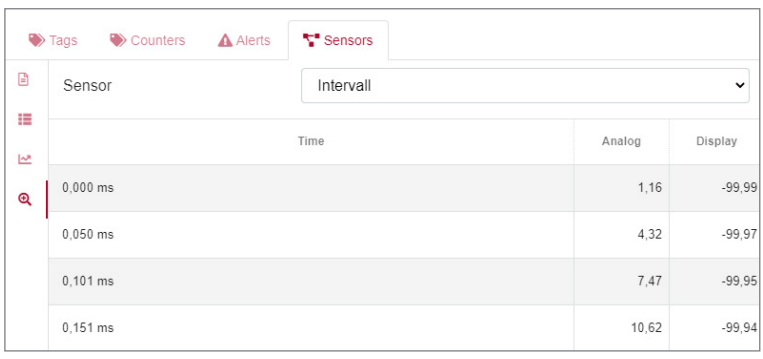
b) Analog Trend Overview

View min, max and average values of data graphs within a cycle



c) Analog Trend Diagram

Display of data graphs within a cycle



d) Analog trend chart

View of the individual data points for the data graphs in b) and c)

4.1.3 Temperature zones

The „Temperature zones“ element shows the current temperatures as well as the status of the monitored zones. Active changes in temperature are indicated by red or blue arrows. The status of each zone is displayed.

Clicking on a zone automatically shows the „Zone information“ element (see chapter „5.4 Temperature zones“) with the specifications of the zone. Details of alarm messages in the status can be called up by clicking on the corresponding button .

Tip: Naming the zones makes it easier to assign them in the active injection moulding process!

4.1.4 Temperature trend

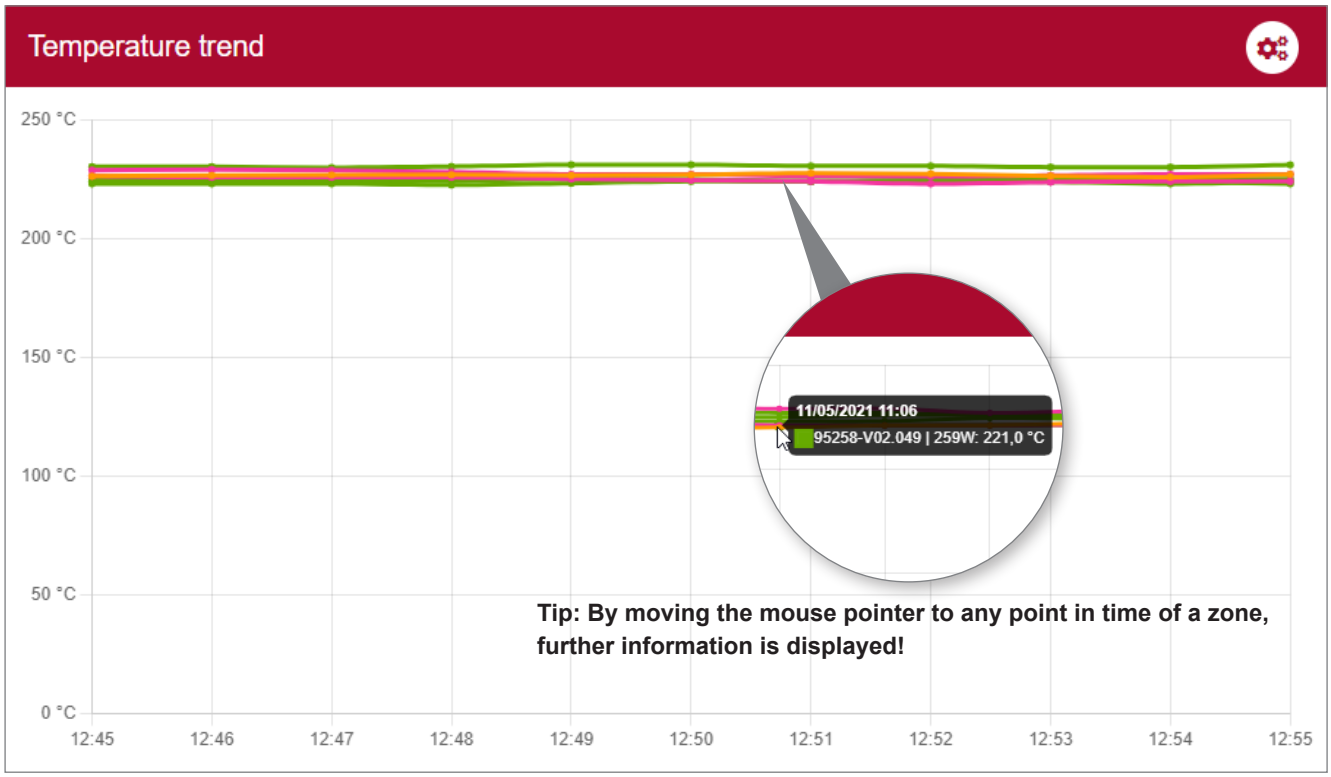


Figure 38: Element „Temperature trend"

The element „Temperature trend“ shows the temperature trend of the individual zones. The temperature is shown on the vertical axis and the time on the horizontal axis. By clicking on the button, the diagram settings are displayed. Here the time period displayed and the visibility of the zones can be selected.

To make sure that the chart curves are displayed correctly, the individual zones must be assigned to the zone types. This setting can be made in the „Configuration“ area / „Temperature zones“ menu item (see chapter „6.2 Temperature zones“).

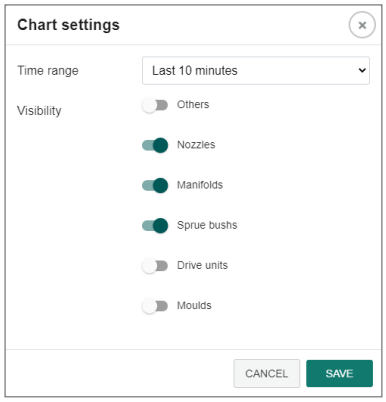


Figure 39: Chart settings

4.1.5 Counter

The „Counter“ element gives an overview of the counters that have been created.

The „Counter absolute“ is an internal counter that counts the total number of cycles recorded with smart CONTROL during the entire recording time. This counter cannot be reset.

The „Counter relative“ is a counter which counts the number of cycles recorded. In contrast to the „Counter absolute“, this counter can be reset to zero in the „Configuration“ area / „Counter“ menu item.

Process-specific counters can be set up. For more information on setting up counters, see chapter „6.6 Counter“.

4.1.6 Power trend

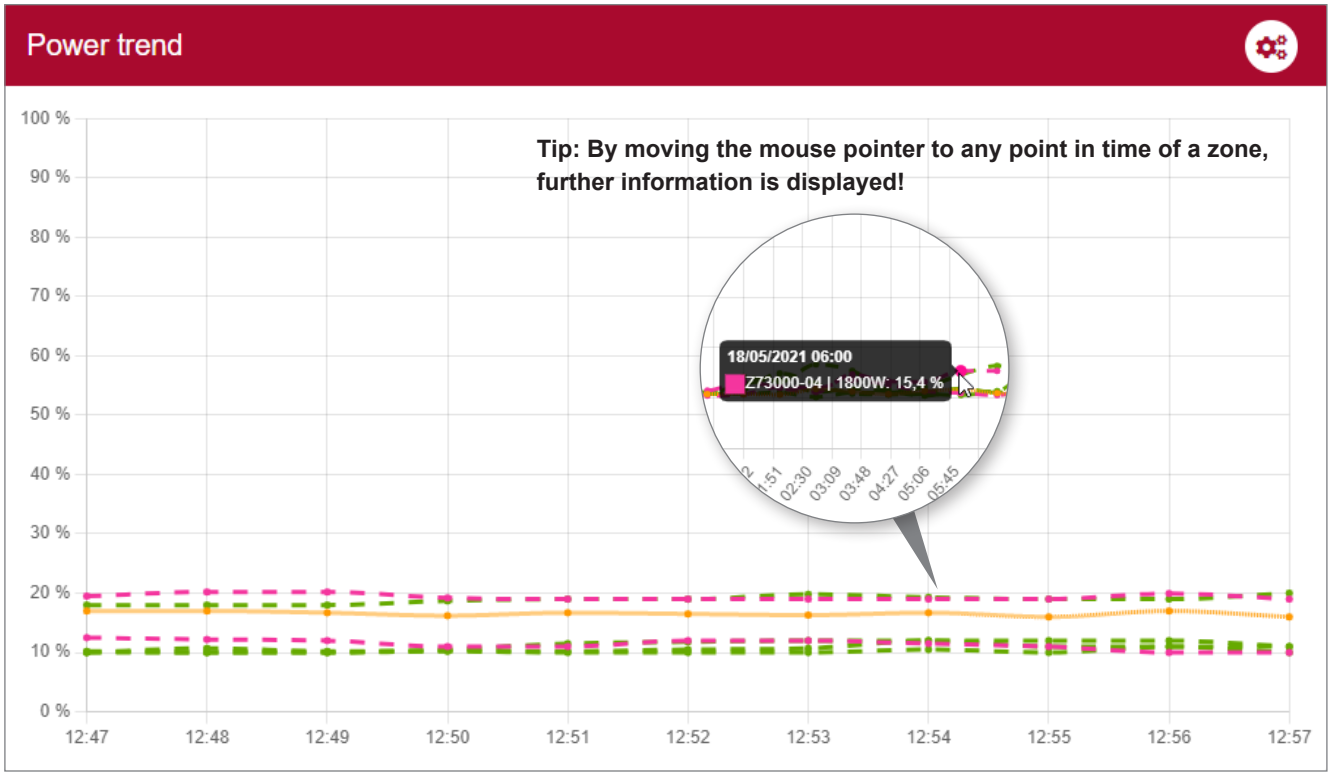


Figure 40: Element „Power trend"

The element „Power trend“ shows the power of the individual zones. The vertical axis shows the performance in percent and the horizontal axis shows the time. By clicking on the button, the diagram settings are displayed. Here, the time period displayed and the visibility of the zones can be selected.

To make sure that the diagram curves are displayed correctly, the individual zones must be assigned to the zone types. This setting can be made in the „Configuration“ area / „Temperature zones“ menu item (see chapter „6.2 Temperature zones“).

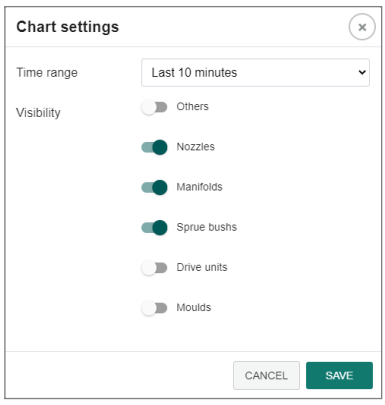


Figure 41: Chart settings

4.1.7 Sensors

The „Sensors“ element gives an overview of created sensors with their value. Sensors can be created and maintained in the area „Configuration“ / menu item „OPC UA“ / sub item „6.3.3 Sensors“.

4.2 System information

In the menu item „System information“, important order information, such as order number or project title, as well as the technical data of the injection moulding application, such as processing temperatures and cycle times, are displayed at a glance. Furthermore, all documents or files provided can be downloaded here.

4.2.1 System information

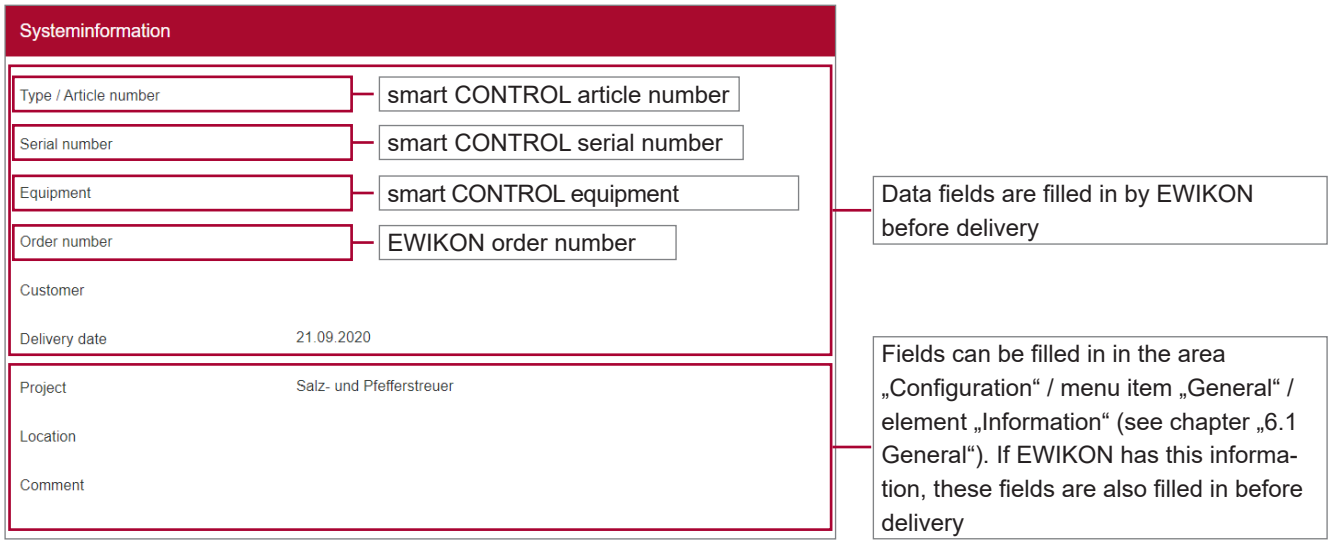


Figure 42: Element „System information”

Tip: For queries, support or spare parts orders, please have the above information available. This will enable a quick processing.

4.2.2 Documents

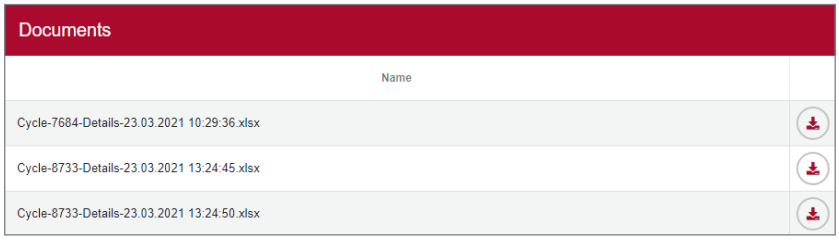


Figure 43: Element „Documents“

The „Documents“ element gives an overview of the documents available for the hotrunner. The saved cycle details can be downloaded here (see chapter „4.1.2 Cycle“).

In the „Configuration“ area / menu item „Documents“ (see Chapter „6.9 Documents“), documents can be uploaded, edited or deleted.

4.2.3 Moulds

The details of the active mould are displayed in the „Mould“ element. A mould must be created first in the „Configuration“ area / „Mould“ menu item (see chapter „6.4 Moulds“).

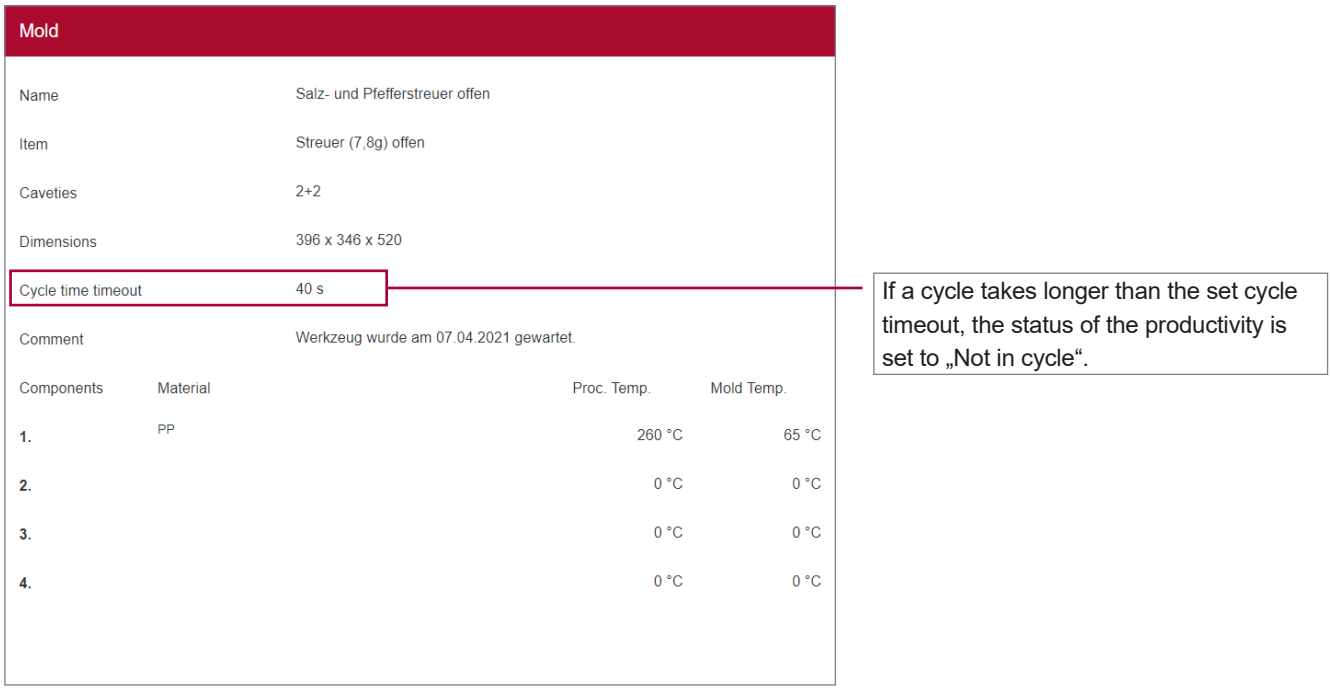


Figure 44: Element „Mould“

4.3 Virtual Assistance

The Virtual Assistance provides assistance in operating the EWIKON hot runner systems.

Further information is available in the operating manual. The current operating manuals for EWIKON hot runner systems can be downloaded from our homepage www.ewikon.com in the „Service“ area / „Download“ menu item.

5. Analysis function | „Monitoring“ area

The „Monitoring“ area contains the analysis functions of smart CONTROL. The menu items are briefly explained below.

Menu item	Description
Charts	Creation and viewing of charts. The display period can be defined. Charts simplify the search for anomalies and irregularities in the collected data.
Cycles	Listing of all stored cycles with start time, duration and markings. For each cycle, all relevant data can be displayed.
Productivity	Time-based analysis of productivity. The display period can be defined.
Temperature zones	By selecting individual zones, detailed zone information, the temperature and power trends are shown as graphs, as well as a list of current alerts.
Alerts	Listing of all current, past and stored alerts.
Analysis hot runner	Analysis of hot runner-specific data, such as temperature and power within defined time periods. The respective cycles and alerts of the time periods are displayed.
Calendar	Presentation of production segments, alerts and cycles in a monthly view calendar.
Virtual Rheology	Live calculation of the melt flow in the hot runner system (optional).

Chart 8: “Monitoring” area

5.1 Charts

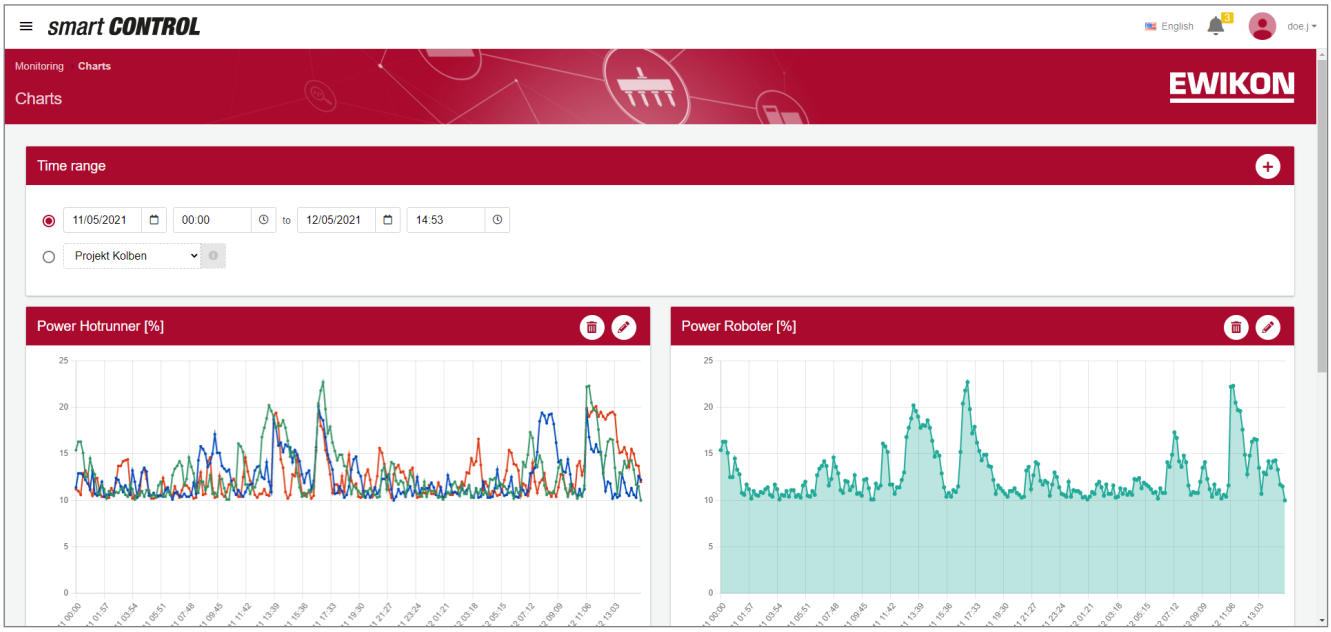


Figure 45: Menu item „Charts“

In the menu item „ Charts“, any number of charts can be individually created and displayed. For this, the signals of e.g. sensors and zones can be used which are available as OPC UA nodes (see chapter „6.3 OPC UA“).

5.1.1 Time period

Figure 46: Element „Time period“

For better comparability of the charts with each other, a superordinate analysis period can be set. If a specific period is selected, all charts are refreshed to this setting.

Tip: If production segments have been created, they can be chosen as time limits to simplify the analysis (see chapter „6.5 Production“).

5.1.2 Creating charts

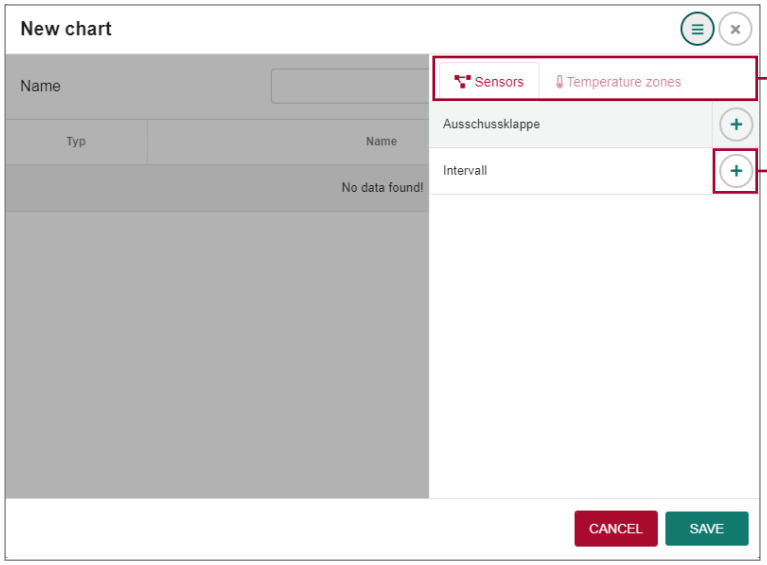


Figure 47: Window „New chart" - Tab „Sensors"

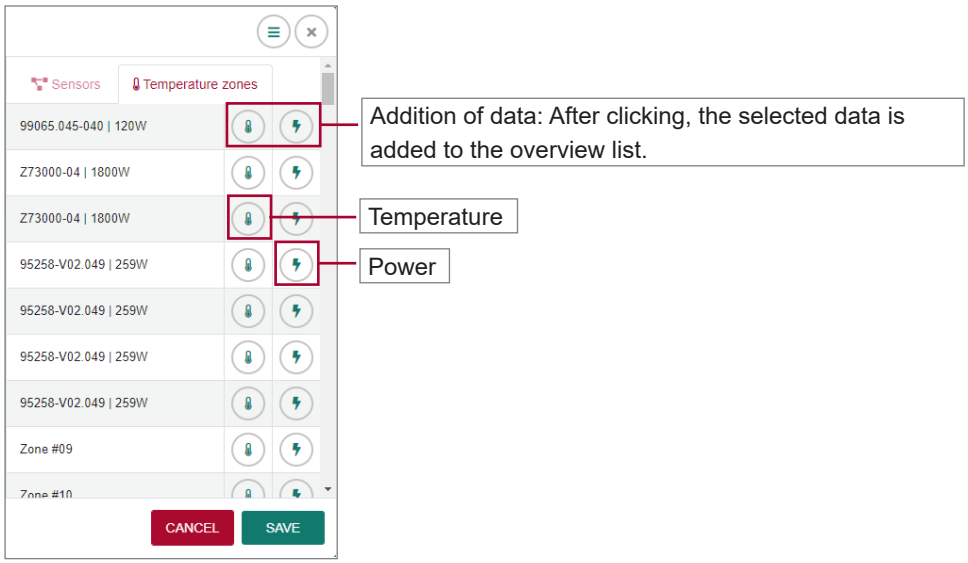


Figure 48: Window „New chart" - Tab „Temperature zones"

After selecting and saving the data, the chart is created. It appears at the last position in the overview window of the menu item Charts.

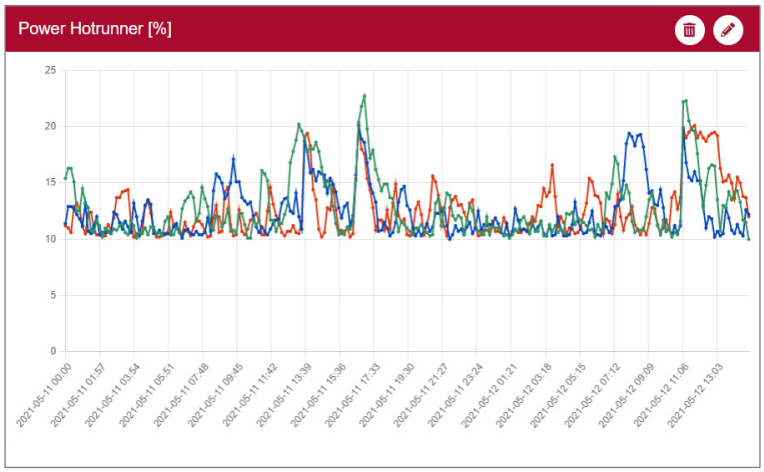


Figure 49: Edit chart

The appearance of the charts can be customised as required. Clicking the button opens a window in which colour, curve type and curve intensity can be selected and further settings can be made.

If a chart is no longer needed, it can be deleted by clicking on the button.

5.2 Cycles

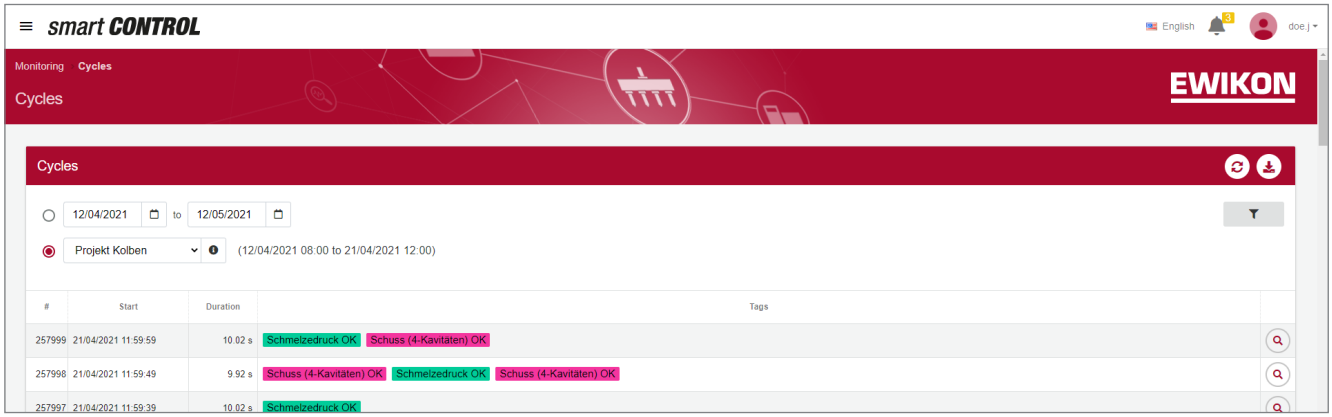


Figure 50: Menu item „Cycles„

In the menu item „Cycles“, each individual cycle is recorded and saved with date, start time and duration. To get quick results, the cycles can be limited using the filter function.

By clicking on the button, the recorded cycles can be downloaded as a Microsoft® Excel® file.

Tip: Inserting tags (see chapter „6.7 Tags“) makes analysing easier!

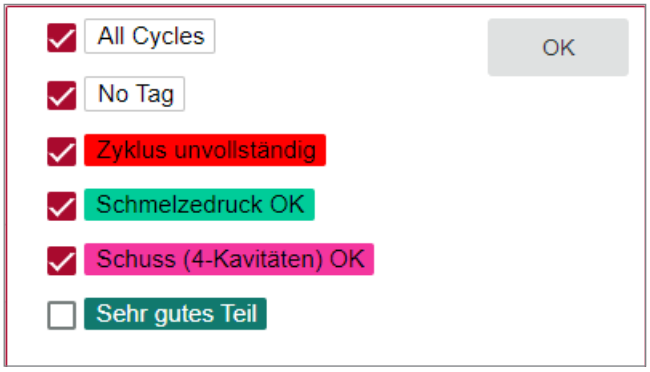


Figure 51: Menu item „Cycles„ - Filter

The filter can be used to limit the search according to preset tags (see chapter „6.7 Tags“). The selection of the selected criteria is made via the filter symbol and is confirmed by clicking on the „OK“ button.

By clicking on the button , detailed information on the selected cycle can be displayed (see chapter „4.1.2 Cycle“).

5.3 Productivity

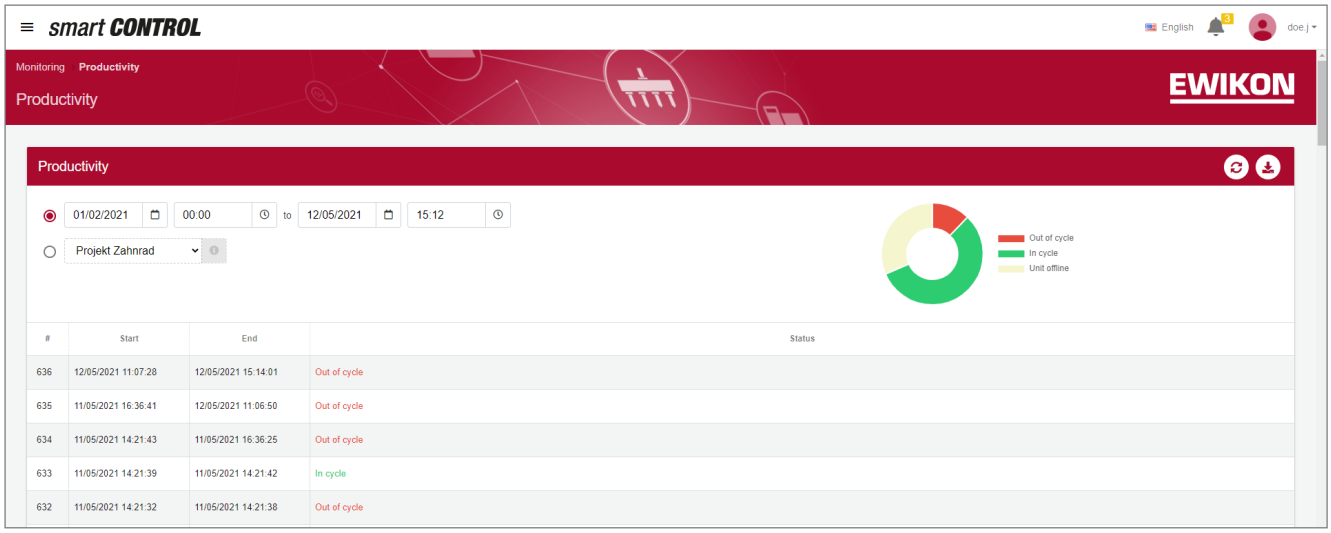


Figure 52: Menu item „Produktivity„

In the menu item „Productivity“, cycle activities can be filtered and evaluated by date or production section. This gives an overview of the process and any downtimes. In the table, the individual cycle times are shown with their activity.

In the chart, the current status of the cycle can be viewed. By moving the mouse pointer over the sections of the diagram, the percentage is shown. The circle chart is divided into three sectors:

Out of cycle	If no next cycle signal is received after a certain time, which can be set with the „Cycle timeout“ (see chapter „4.2.3 Moulds“ and chapter „Manage moulds“) , the smart CONTROL displays the status „Out of cycle“. The time between the cycle signals is longer than the set cycle timeout.
In Cycle	The injection moulding cycle is within the preset limit in the automatic mode (for cycle timeout see chapter „4.2.3 Moulds“ and chapter „Manage moulds“).
Unit offline	smart CONTROL is not connected to the mains and is offline. No data is recorded during this time.

By clicking on the button, the recorded cycles can be downloaded as a Microsoft ® Excel ® file.

5.4 Temperature zones

5.4.1 Zone information

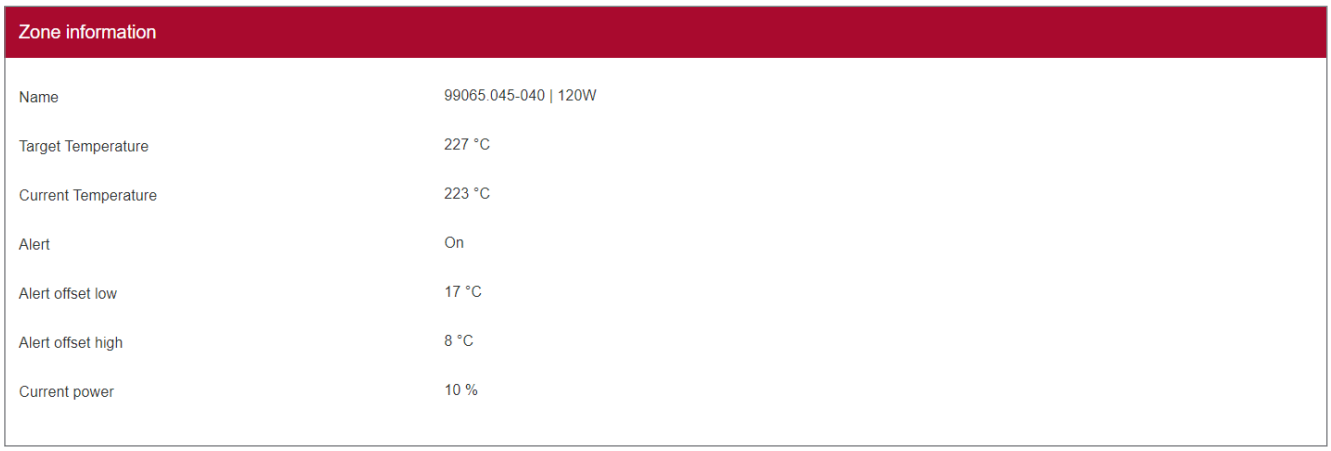


Figure 53: Element „Zone information„

Clicking on the menu item „Temperature zones“ opens a drop-down menu in which the desired zone can be selected. The „Zone Information“ item then displays the specifications of the respective zone as well as the temperature tolerances and the associated alert status.

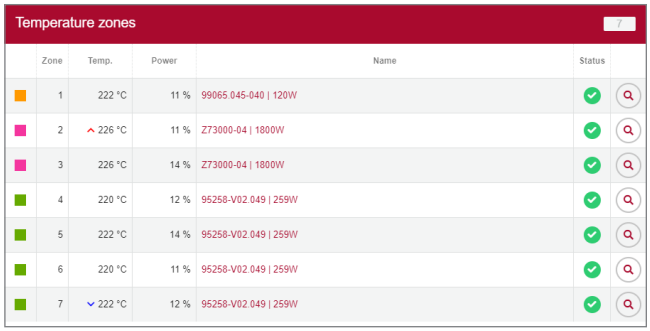


Figure 54: Temperature zones

Tip: Naming the zones makes it easier to assign them in the active injection moulding process! The „Zone information“ element is also displayed by clicking on the desired zone in the „Temperatures“ element of the Dashboard (see chapter „4.1 Dashboard“).

5.4.2 Temperature development

The element „Temperature trend“ shows the temperature trend of the selected zone. The vertical axes represent the temperature (°C) and the power (%). The horizontal axis shows the time. The time period to be displayed can be set via the drop-down menu.

By clicking on the diagram legend (temperature or power), the respective curve can be set to active or inactive. By mouseover over the desired node point in the chart, the exact value is displayed.

5.4.3 Current alerts

Alerts that have occurred (e.g. set temperature limits exceeded or not reached) for the respective zone are displayed in the „Current alerts“ element. There, for each alert message, the start and end time (start / end) as well as an info text with the reason for the alert (message) are displayed.

5.5 Alerts

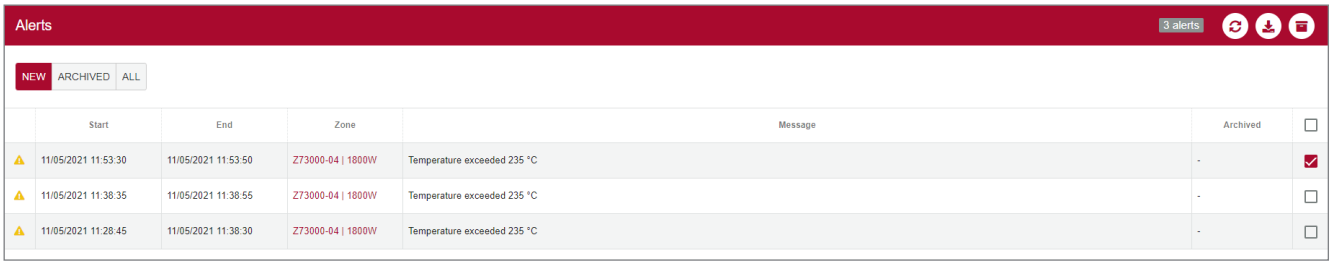


Figure 55: Menu item „Alerts„

Alert messages that have occurred are documented and archived in the menu item „Alerts“. Here it is possible to display new, archived or all alarm messages.

New alerts can be archived via the button . Thus, they are only displayed under the item „ARCHIVED“.

To archive alerts, they must first be selected via the corresponding checkbox. By clicking the higher-level checkbox, all alerts are selected. Before archiving the selected alerts, remarks (e.g. causes or reasons for this alert) can be noted in the text field of the pop-up window.

Tip: By clicking on the displayed zone in the „Alerts“ element, the „Zone information“ element for the respective zone is displayed in the „Zones“ menu item (see chapter „5.4 Temperature zones“).

5.6 Analysis hot runner

In the menu item „Analysis hot runner“, measured data such as temperature, power, cycles and alerts are displayed in the selected display period. The columns Temperature and Power show the respective maximum and minimum measured values. The respective average is formed from all the measured data of a time period. The completed cycles and the triggered alerts per period are displayed.

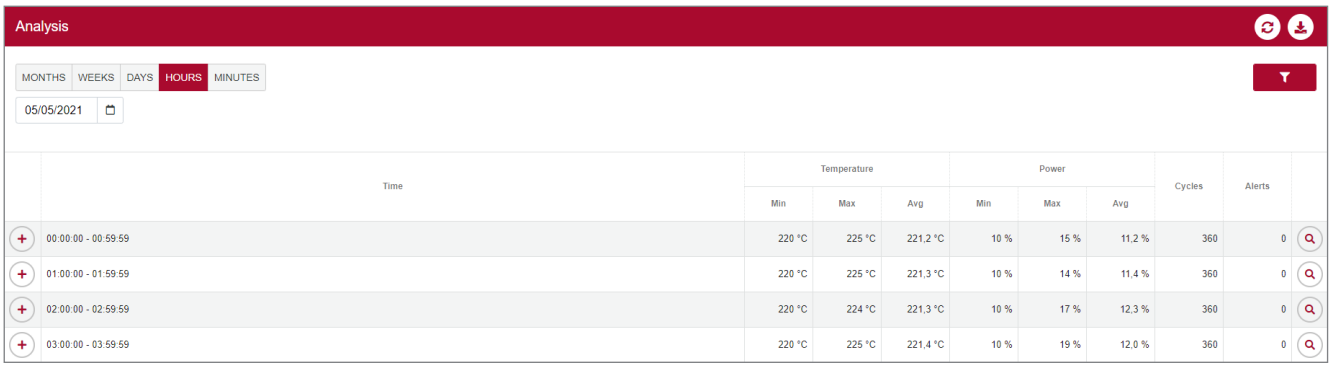


Figure 56: Menu item „Analysis hot runner“

- **Limiting the time period**
  The period for which the measurement data is to be viewed can be determined. There are five different setting options for the period: „MONTHS“, „WEEKS“, „DAYS“, „HOURS“ and „MINUTES“.
- **To filter the zone selection**
  The filter makes it possible to select the needed control zones. It is possible to select individual zones, but also types such as nozzles or manifolds..
- **Show control zones**
  To display the control zones of the limited period, click on the plus button in front of the desired line. The zone information is now displayed here.

Click on the button to refresh the recorded data. Click on the button to download the recorded cycles as a Microsoft® Excel® file.

Tip: To specify a time period more precisely, use the button on the right-hand edge of the desired line.

5.7 Calendar

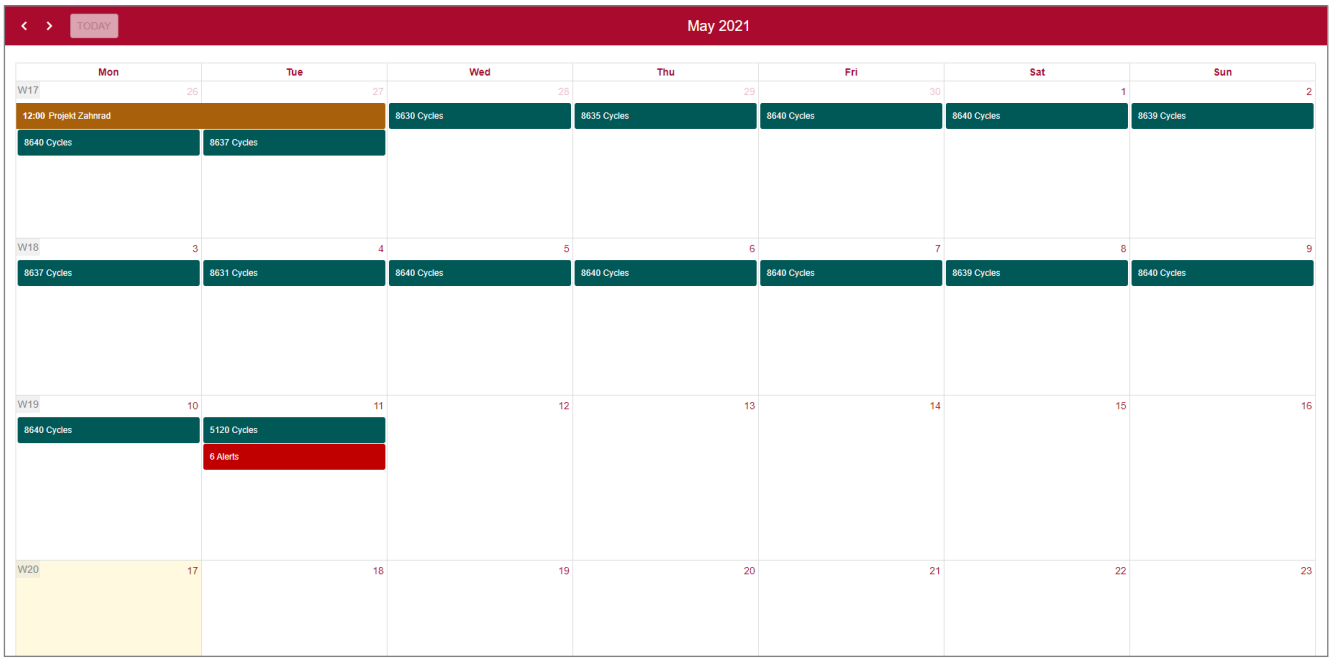


Figure 57: Menu item „Calendar"

In the menu item „Calendar", alert signals, the number of cycles and production segments are displayed by day. Clicking on a calendar entry shows further information in a pop-up window.

The arrows allow scrolling in the calendar. The current day is highlighted in yellow in the calendar. The TODAY button takes you back to the current day at any time.

By clicking on the button , detailed information on the selected cycle can be displayed (compare chapter „4.1.2 Cycle").

5.8 Virtual Rheology (optional function)

In the „Virtual Rheology" tab, the live data of the mould can be called up directly. For this purpose, the necessary basic data and basic parameters for the hot runner are maintained directly by EWIKON. These form the basis for calculating the wall shear rates and the resulting residence times.

Certain requirements must be fulfilled for the use of Virtual Rheology:

Connection to the injection moulding machine for the process parameters via OPC UA

- Output of the target injection volume flow or
- Output of the injection volume flow over time or
- Output of the injection time, the metering volume and the switching volume

Connection to the injection moulding machine for the process parameters via analogue sensor

- Output of the target injection volume flow or
- Output of the injection volume flow over time

No connection to the injection moulding machine for the process parameters

- Manual input of the injection volume flow rate
  (No live simulation - changes to injection moulding process parameters are not included in the calculation)

5.8.1 Parameters

If possible, the initial setting of the parameters is carried out by EWIKON. The material data and the melt flow channel layout of the hot runner are stored specifically for the respective application.

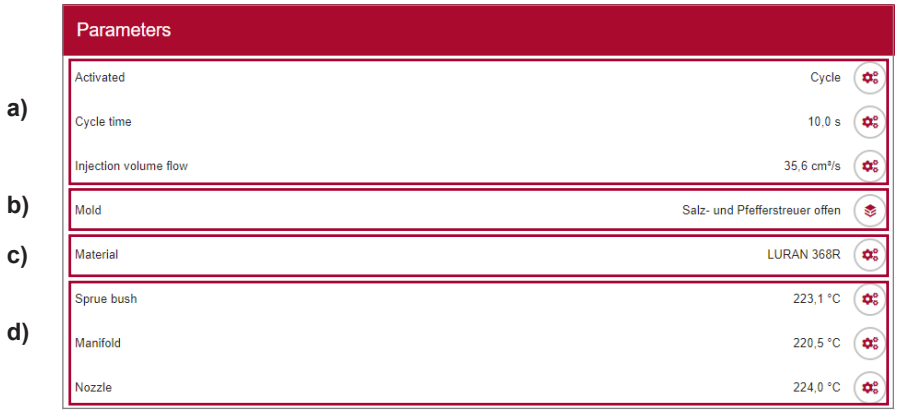


Figure 58: Element „Parameters"

a) For the calculation in Virtual Rheology, the injection volume flow is required. There are two possibilities to determine this value. A selection of the two options can be made in the „Source" line (Button „Settings" - tab „General").

Option 1: „Shot/dosing volume"
The injection time, the dosing volume and the switchover volume are obtained via the injection moulding machine.
Dosing volume: The volume of melt that remains in the front of the screw after the dosing process (without screw retraction).
Switchover volume: The volume of melt that remains in the front of the screw before the holding pressure phase.

Option 2: „Injection flow rate"
The injection volume flow is obtained directly via the injection moulding machine.

Different sources can be given for the individual values:
Value: A value can be entered directly. Attention: Changes of the machine parameters are not taken into account!
Analogue sensor: A value recorded via a sensor is taken.
Last cycle (only for cycle and injection time): The value recorded in the last cycle is taken.

b) Moulds are maintained in the „Configuration" area / menu item „6.4 Moulds". Here the geometry file must be uploaded and the active mould must be selected.

c) The temperature dependence of the shear rate calculation is displayed via the cross-WLF approach. The necessary material data can be entered here.

d) Selection of the temperatures that are used as a basis for the calculation for the individual zones. If more than one is selected, the arithmetic mean of all selected zones is calculated.

If a new mould has been created (see chapter „6.4 Moulds"), the necessary parameters for Virtual Rheology can be provided directly in a file by EWIKON. The file is uploaded in the „Configuration" area / „Tools" menu item.

Attention! The information value of simulation results is limited!

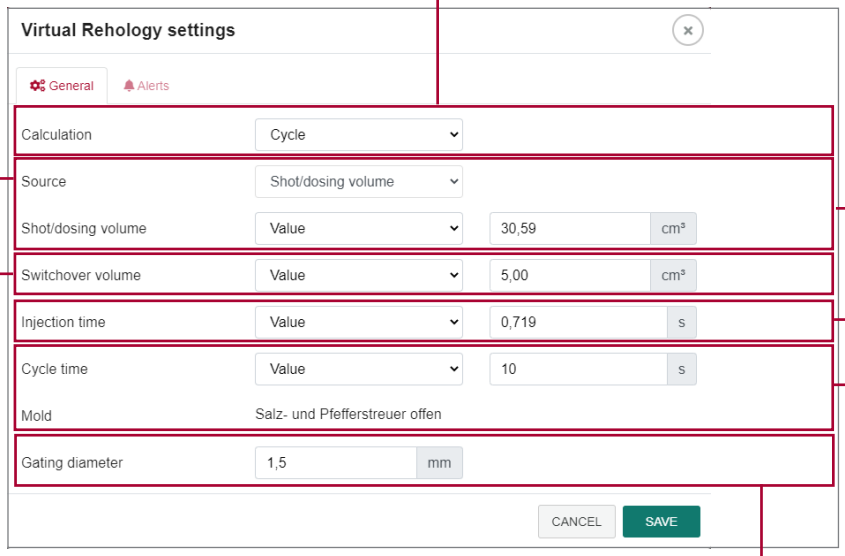
The calculations carried out are based on common, partly simplified assumptions for the expected operating conditions. Therefore, the simulation necessarily contains only an approach to the conditions in the real case of use.

Simulation results must therefore not be used as a basis for the design of safety-relevant parts!

Rather, it remains the sole responsibility of the user to check the EWIKON products for their suitability for the intended processes and purposes and to ensure the design of safety-relevant parts according to the state of the art by carrying out their own tests. EWIKON accepts no liability in this respect and refers to the regulations in the EWIKON GTC, available at www.ewikon.com.

For the calculation, the melt volume flow in the hot runner system is required. The shot/dosing volume (in combination with the melt volume and the injection time) or directly the injection volume flow can be selected as the source for this.

The calculation can be made either for each cycle or within a freely selectable interval. The interval is a minimum of 10 s.



Switchover volume from injection to holding pressure phase

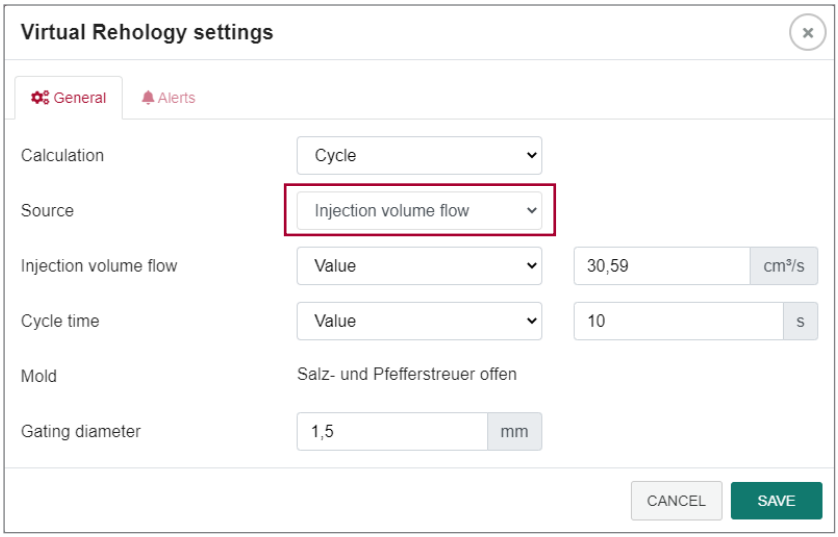
Melt volume metered by the injection moulding machine.

Duration of the injection

Duration of the complete cycle (incl. holding pressure phase and cooling phase)

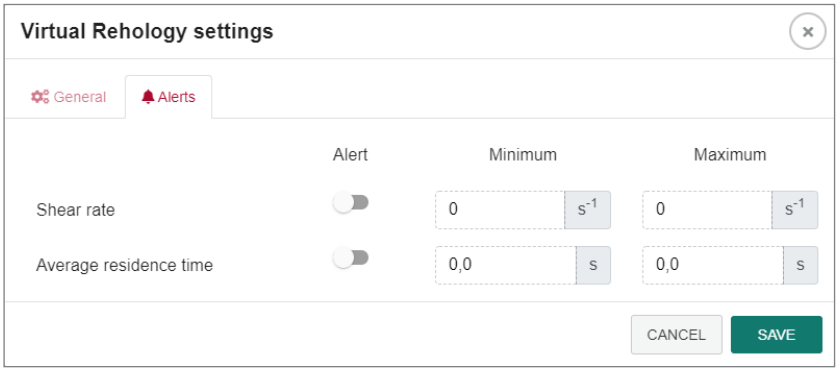
Existing gating diameter

Figure 59: Virtual Rheology settings



If „Injection volume flow“ is selected as the source, the parameters to be entered change accordingly.

Figure 60: Virtual Rheology settings - Injection volume flow



In the „Alerts“ tab, alerts can be activated that trigger at a certain minimum or maximum value of shear rate or residence time.

Figure 61: Virtual Rheology settings - tab „Alerts”

5.8.2 Live Data

In the element „Live data“, the shear rates are displayed visually and can thus be analysed quickly. The upper table lists the minimum, maximum and average shear rates as well as the average residence time. These data can be downloaded as a Microsoft® Excel® file by clicking on the button.

In the chart, the individual calculated areas are marked in colour (see legend). This allows a quick overview of which shear rates occur at which point within the hot runner. On mouseover, the individual value of a bar is displayed.

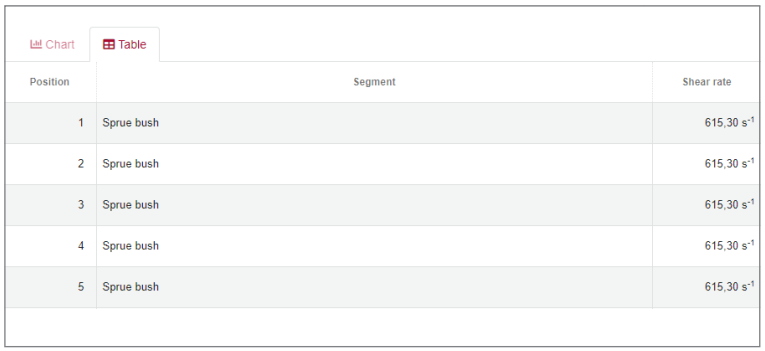


Figure 62: Element „Live data„ / tab „Table”

The data of the chart can alternatively be displayed in a table. Switching is done by clicking on the corresponding tab.

5.8.3 History

In the element „History“ the determined shear rates and the residence time for the selected period are displayed. The desired period can be selected via the drop-down list.

The vertical axes represent the shear rates (s-1) and the residence time (s). The horizontal axis shows the time. By clicking on the diagram legend (shear rate and residence time), the respective curve can be shown or hidden. By mouseover over the desired node in the diagram, the exact value is displayed.

6. Configuration │„Configuration“ area

smart CONTROL can be configurated under the tab „Configuration“. To give an overview, the menu items are briefly explained below:

Menu item	Description
General	Maintenance of technical data, language and time.
Temperature zones	Configuration of the individual zones. Technical, but also graphical setting options are available for this purpose.
OPC UA	Creation and maintenance of OPC UA-capable devices, sensors and actuators.
Moulds	Mould management with integration of Virtual Rheology data.
Production	Creation and maintenance of production segments.
Counters	Counter management and set up.
Tags	Manage and set up tags that mark a cycle in the running process according to freely configurable conditions (example: temperature limit exceeded).
Alerts	Creation of alerts that are triggered by actions. Maintenance of recipient e-mail addresses to which alerts should be sent.
Documents	Contains saved cycle details or project-related files that can be downloaded via direct download. Own documents can be uploaded.
Users	Listing of all created users. Creation of new users with assignment of user roles.
Network	Settings for integrating smart CONTROL into a network.
API Access	API interface settings

Chart 9: „Configuration” area

6.1 General

6.1.1 Information

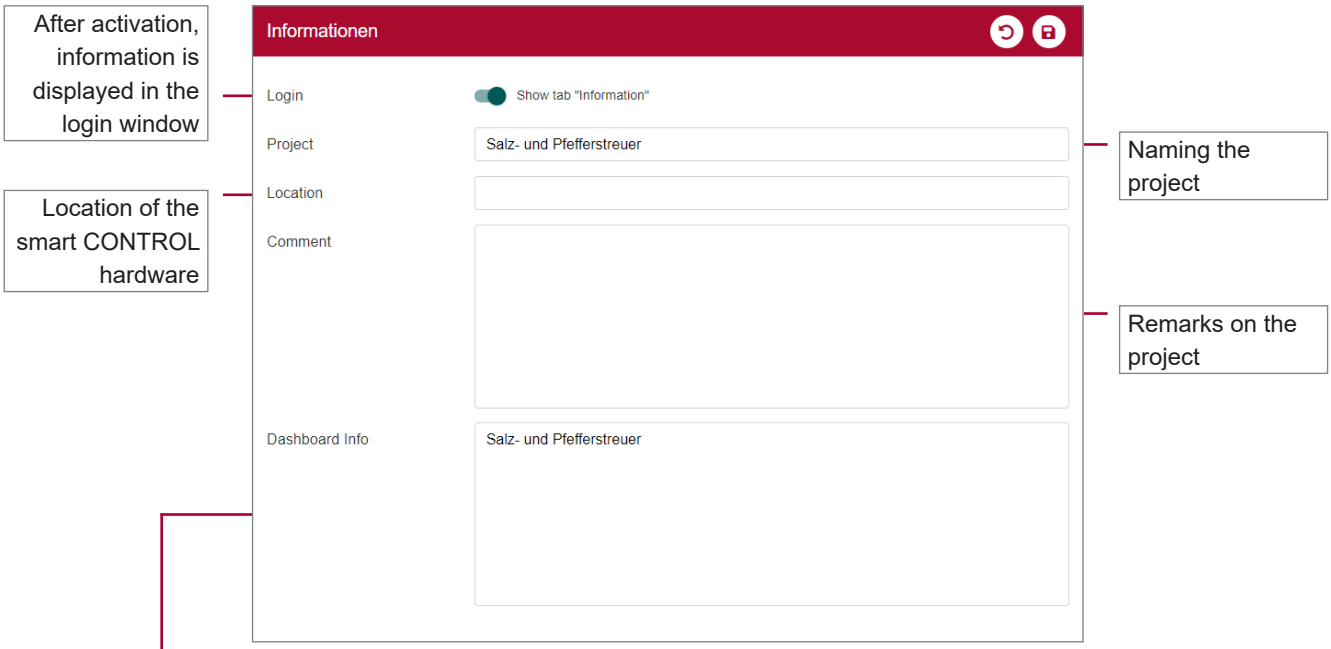


Figure 63: Menu item „General" / Element „Information"

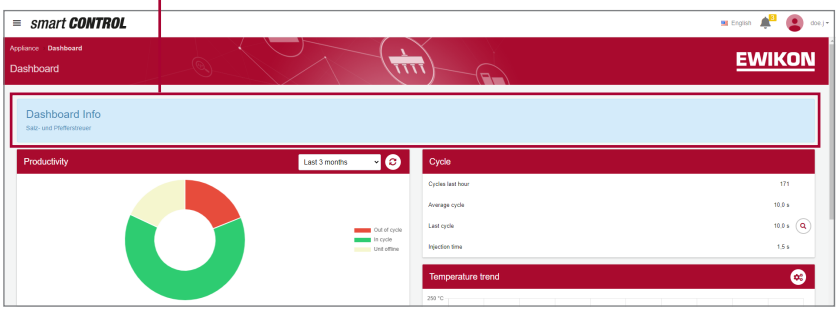


Figure 64: Dashboard Info

In the element „Technical data", mould-specific information can be defined.

As soon as a dashboard information is added, it is displayed on top of the dashboard. However, it is possible to change the parameters at any time.

Click on the button to delete the entries.

Click on the button to save the entries.

6.1.2 Culture

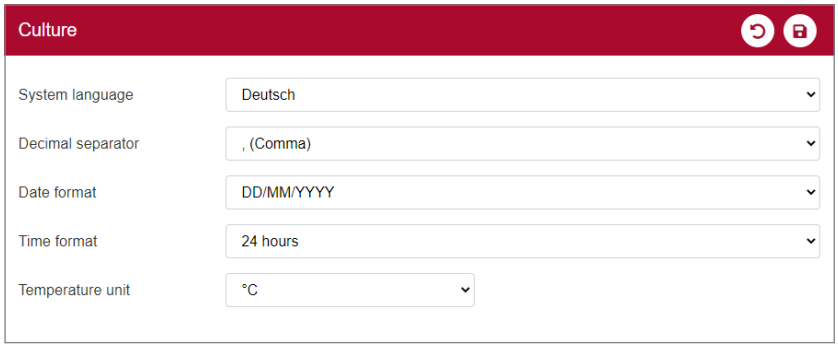


Figure 65: Element „Culture“

In the „Culture“ element, country-specific settings such as system language and temperature unit can be made. The desired settings are selected via the drop-down menu. The set system language applies to emails and the system counters.

Click on the button to delete the entries.

Click on the button to save the entries.

6.1.3 Clock

Figure 66: Element „Clock“

In the „Clock“ element, the time zone, date and time can be set.

Click on the button to delete the entries.

Click on the button to save the entries.

6.2 Temperature zones

The settings made in the higher-level action line (first line) are adopted for all control zones. In addition to zone and alert activation („Active“ / „Alerts“), it is possible to assign common values for setpoint temperature („Target“) and lower and upper limits („Offset low“ / „Offset high“) to all control zones. Click on the button to delete the entries. Click on the button to save the entries.

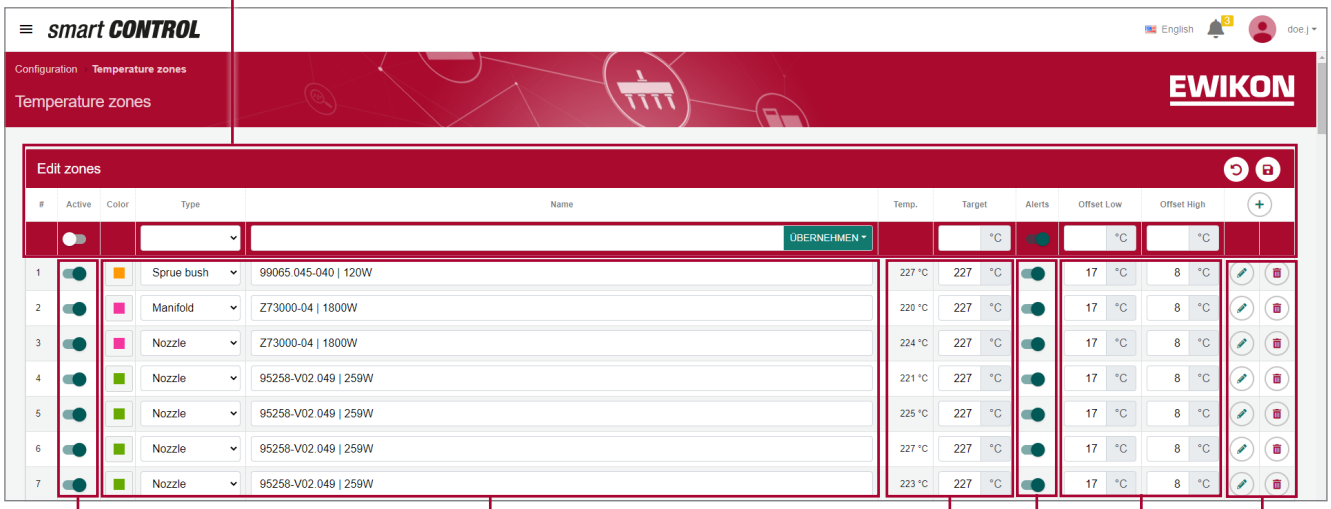


Figure 67: Menu item „Temperature zones

Switch zone active or inactive

Determine zone colour, zone type and zone name to simplify analyses of lists or charts

Display of the current temperature and setting of the target temperature

Set alerts active or inactive. Once the alert has been set to inactive, no alerts are triggered or documented for this zone.

Input of the offset values of the individual zones. If these variances from the target value are exceeded or not reached, an alert is triggered.

Edit or delete a zone. A new window opens for editing. A zone can be added by clicking on the button .

Tip: Grouping the individual zones simplifies the analysis, as it is possible to filter by groups.

6.2.1 Integration of the zone values / Edit zone

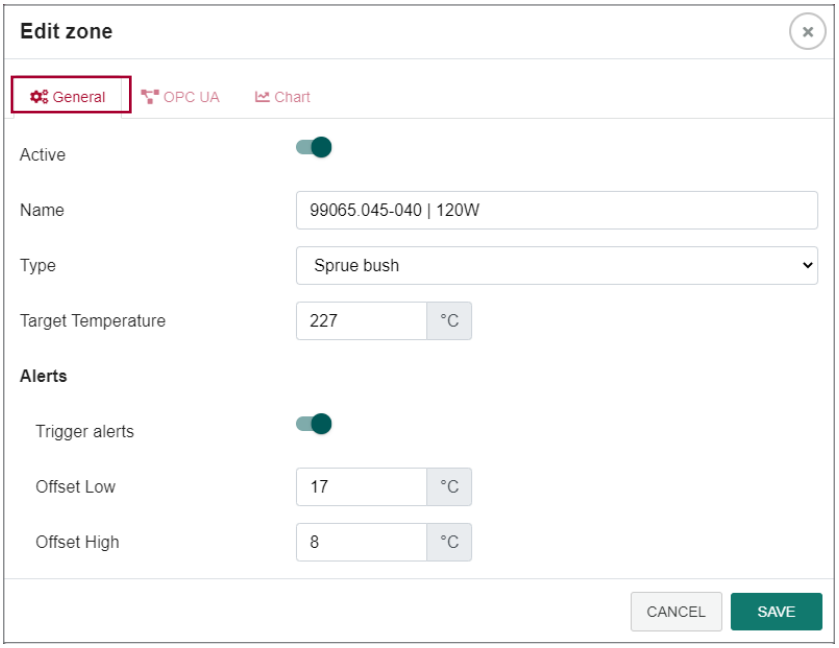


Figure 68: Window „Edit zone“ - tab „General”

In the „General“ tab of the editing window, the same changes can be made as in the zone overview.

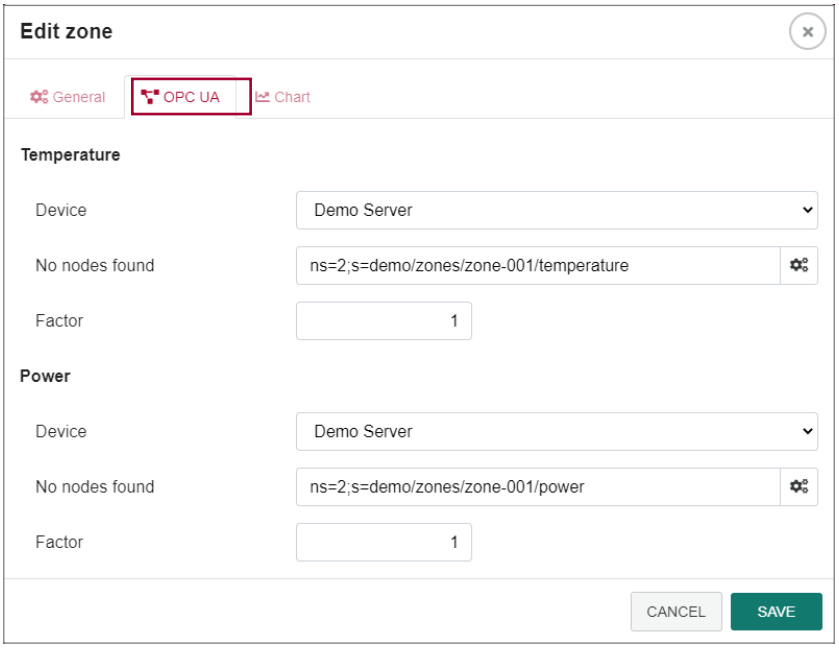


Figure 69: Window „Edit zone” - tab „OPC UA“

In the „OPC UA“ tab, the data source (data node) for temperature and power of the corresponding zone is defined.

In order to access devices, sensors or actuators via OPC UA, they must be created and integrated into the network (see chapter „6.11 Network“ and chapter „6.3 OPC UA“).

A created device can be selected via the drop-down list. The appropriate data node is selected via „Nodes“.

If a data node is selected that does not reflect the display value (temperature in °C, power in %), a conversion factor (factor) must be entered. For some modules, flow coefficients are provided as a value and not as a display value for technical reasons.

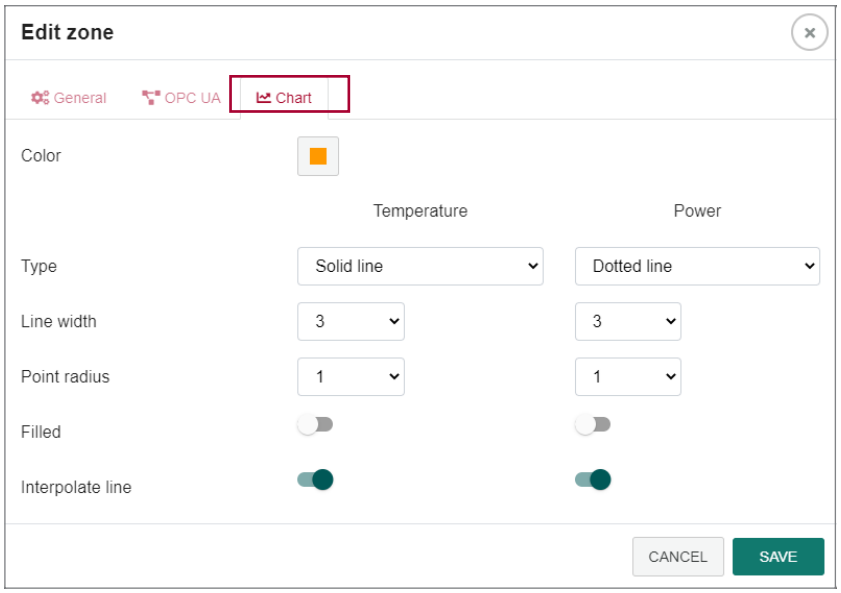


Figure 70: Window „Edit zone" - tab „Chart"

In the „ Chart „ tab, adjustments can be made to the chart representation of the selected zone.

These settings apply exclusively to the representation of the respective zone (see chapter „5.4.2 Temperature development").

6.3 OPC UA

OPC UA = Open Platform Communications Unified Architecture

With OPC UA, a platform-independent data exchange between devices and systems can be realised.

Brief overview OPC UA:

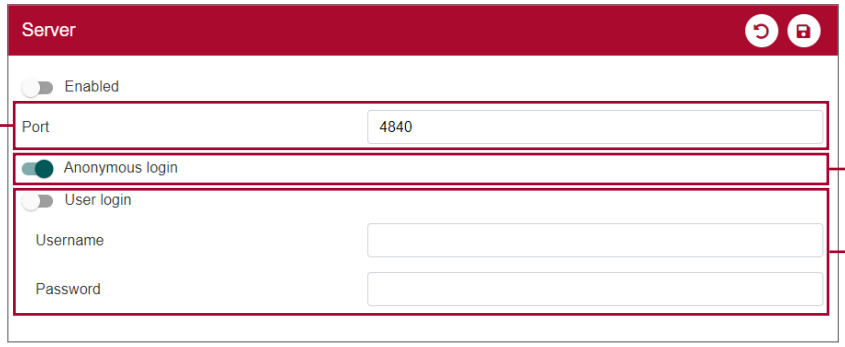
- Collection of specifications through which communication between machines is internationally standardised
- Specification of the data transport, the interfaces, the safety mechanisms and the semantic structure of the data
- Transmitted machine data can be, for example, measured values, sensor data, control variables or control instructions. The basic precondition for M2M communication is an IP-based network.

The sub items **Server, Devices, Sensors** and **Actuators** describe how the various input parameters can be managed and processed.

Sub item	Description
Server	Provides the option of enabling smart CONTROL to act as an OPC UA server in order to provide data.
Devices	OPC UA-capable devices that act as servers can be added here. This makes data available for processing in data nodes. This also includes modules for receiving analogue, digital and temperature signals.
Sensors	Sensors are data nodes provided by a device that are used to read out the data.
Actuators	Actuators are data nodes provided by smart CONTROL that are used to trigger actions.

Chart 10: Sub items of the menu OPC UA

6.3.1 Server



Port on which the OPC UA Server can be reached. Port 4840 can be used as the standard port

Anonymous login enables unprotected access to smart CONTROL

When accessing smart CONTROL, these login data are requested

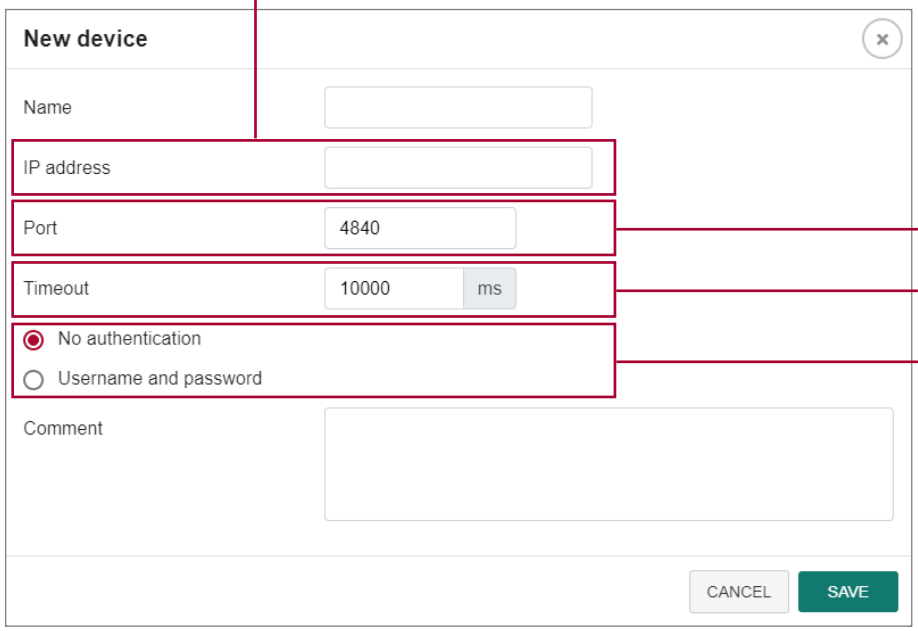
Figure 71: Menu item „OPC UA„ / sub item „Server"

6.3.2 Devices

Figure 72: Menu item „OPC UA" / sub item „Devices"

In order to be able to use devices for data requests within smart CONTROL, they must be created beforehand.
A new device can be created via the button ⊕.

IP address of the device
For direct connection via network interface 2 or 3, an IP address from 192.168.201.100 to 192.168.201.119 must be selected (cannot be changed).
For more information see chapter „2.3 Set up a connection".



Port of the device
Default value = 4840

Waiting time [ms] in which the device must respond after a query before an error is displayed

For password-protected devices, user and password must be entered here

Figure 73: Window „New device"

To enable smart CONTROL to communicate reliably with OPC UA-capable devices, the following network settings are required for these devices:

IP-Address: 192.168.201.100 bis 192.168.201.119

Net mask: 255.255.255.0

Gateway: 192.168.201.1

Tip: It is advantageous to activate the NTP (Network Time Protocol) and set 192.168.201.1 as TimeServer01. This synchronises the clocks of the connected devices with smart CONTROL.

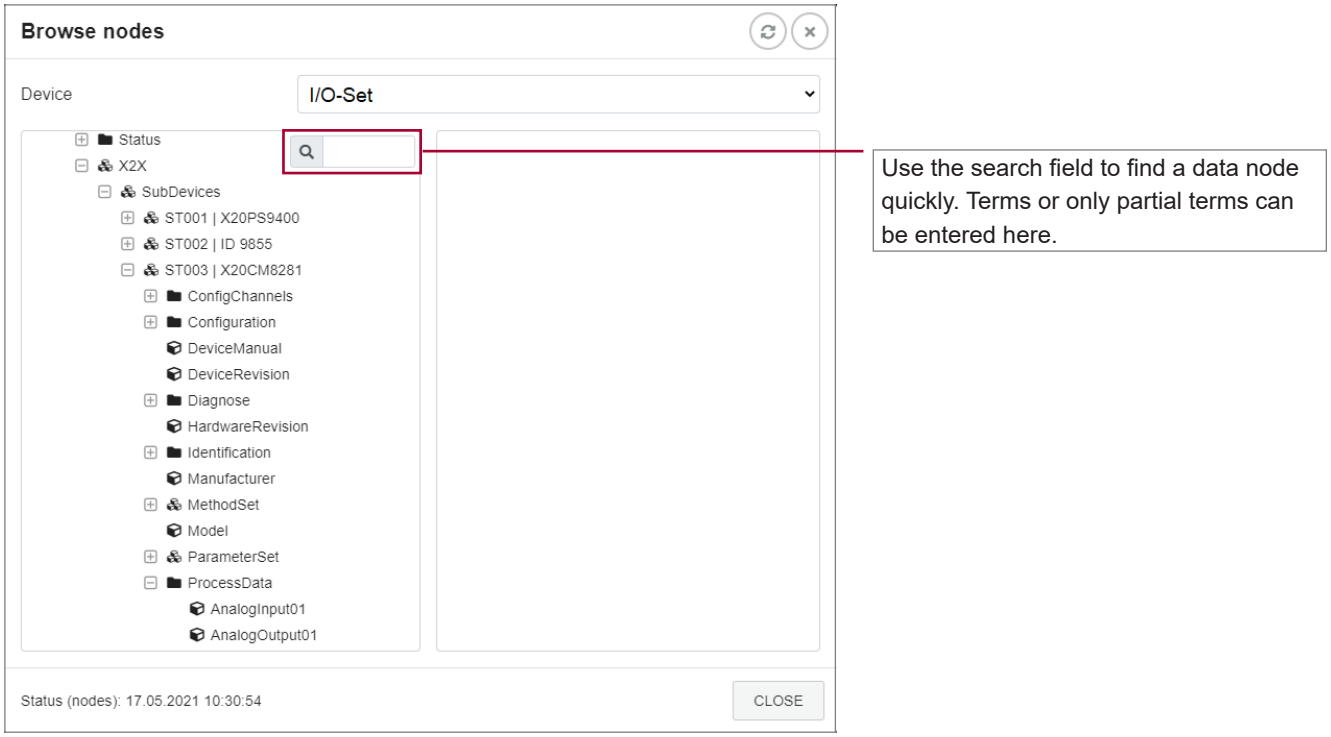


Figure 74: Sub item „Devices" / Browse nodes

6.3.2.1 Data structure device nodes

68500.200 **smart CONTROL Module Basis Set**

- 68500.112 Data collection module 4 x Dig.IN, 2 x Dig.OUT, 1 x Ana.IN
- 68500.113 Data collection module 6 x Temperature (Type J)

In the standard system, the nodes of the smart CONTROL I/O set can be found under the following path:

- DeviceSet
  - X20BC008U (Bus Controller)
    - X2X
      - SubDevices
        - (ST001 | X20PS9400)
        - (ST002 | ID 9855)
        - (ST003 | X20CM8281 (Data collection module 4 x Dig.IN, 2 x Dig.OUT, 1 x Ana.IN)
          - ProcessData
            - AnalogInput01
            - AnalogInput02
            - DigitalInput01
            - DigitalInput02
            - DigitalInput03
            - DigitalInput04
            - DigitalOutput01
            - DigitalOutput01
        - ST004 | X20AT6402 (Data collection module 6 x Temperature (Type J)
          - ProcessData
            - Temperature01
            - Temperature02
            - Temperature03
            - Temperature04
            - Temperature05
            - Temperature06

6.3.3 Sensors

In the menu item „Sensors“, created sensors are listed and new sensors can be added.

The following table describes the selectable sensor types:

Sensor type	Description
Digital	A digital signal can only reflect two positions (on/off or 1/0). With this simple signal, actions with status requests of conditions can be entered.
Analog trend	This sensor type can be used to record fast value changes of a numeric OPC UA data node during a cycle. The recorded data can be called up in the cycle details as a chart and value table. In addition, the data can be used in own charts in the „Monitoring“ area / „Charts“ menu item.
Analog value	This sensor type can be used to record single values of a numeric OPC UA data node. The value can be saved depending on the cycle, regularly at an interval or a combination of both. The recorded data can be called up in the cycle details. In addition, the data can be used in own charts in the „Monitoring“ area / „Charts“ menu item.
Text	Instead of further processing of analogue or digital values, a text is requested from an entered device (e.g. error text, alert or status).

Chart 11: Sensor types

6.3.3.1 Manage sensors

In the sensor manager, new sensors can be created and edited, and actions and conditions can be defined.

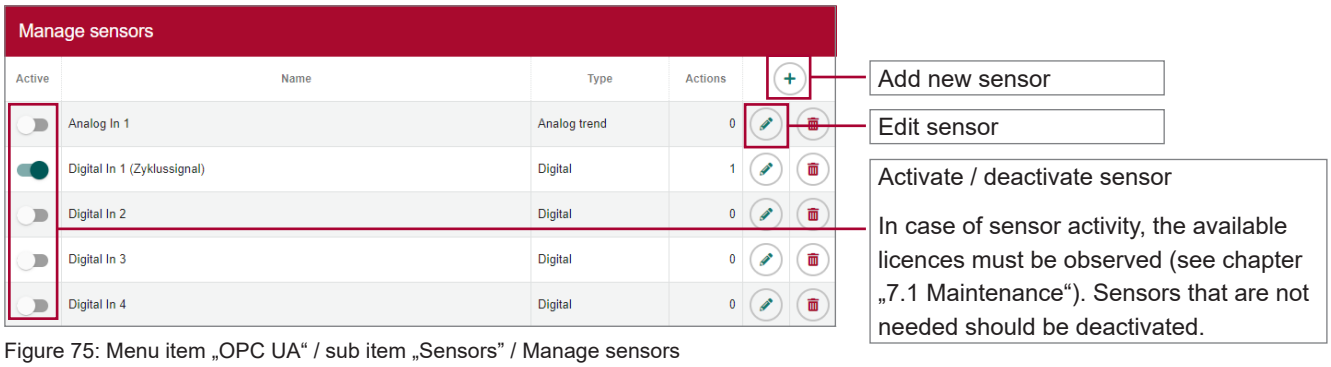


Figure 75: Menu item „OPC UA“ / sub item „Sensors” / Manage sensors

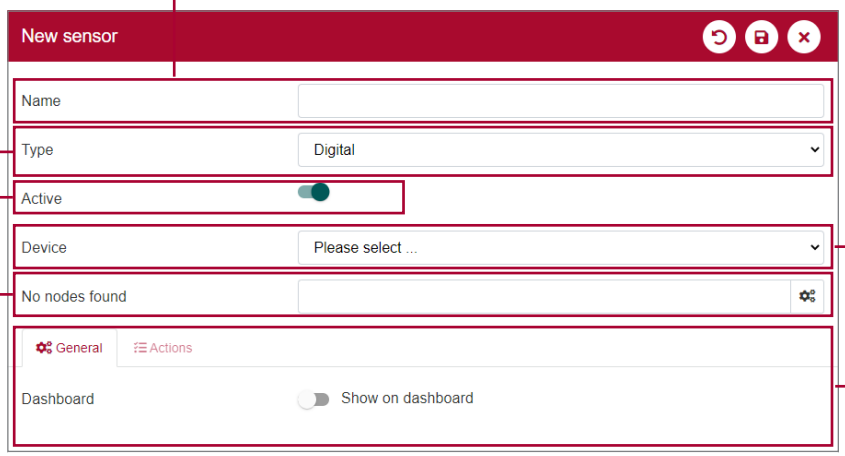
6.3.3.2 Create new sensors / edit sensors

Selecting sensor type

For each sensor type, the further setting options are described on the following pages.

Name of the new sensor

If a sensor is active, the corresponding data is permanently saved. If a sensor is inactive, no data is recorded and saved.



Selection of a created device that provides the sensor data.

For the installation of the devices, see chapter „6.3.2 Devices“.

Settings depending on the sensor type

Figure 76: Menu item „OPC UA“ / sub item „Sensors” / New sensor

Selecting the data node that contains the sensor data (see chapter „6.3.2.1 Data structure device nodes“).

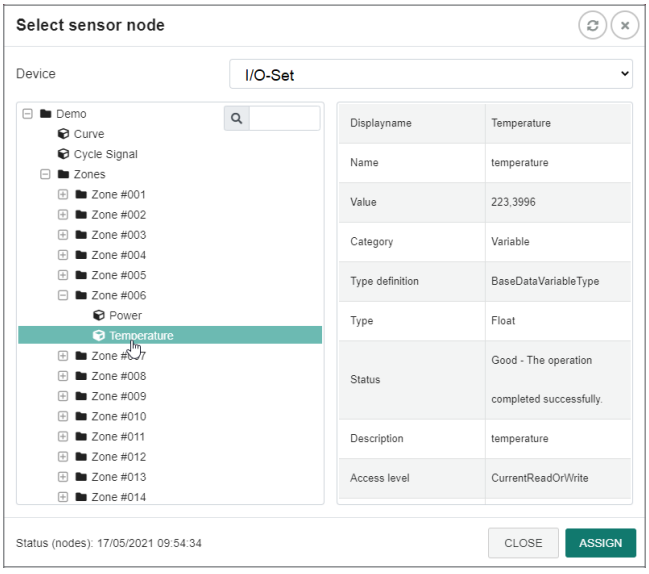
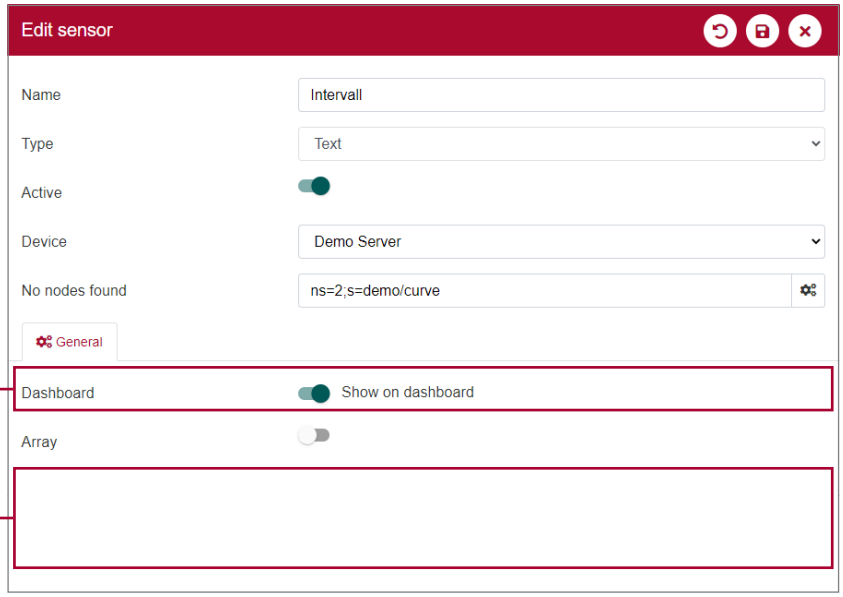


Figure 77: Select sensor node

6.3.3.3 Sensor type Text

Tab General



Activate the dashboard view of the sensor (see chapter „4.1.7 Sensors“).

If the value of the sensor is a list of texts (array), this data can be read in via the option Array.

The indices and separators control how which texts of the list are selected. Indices indicate the line of the list. Separators separate the stored texts.

New sensor - Sensor type „Text”

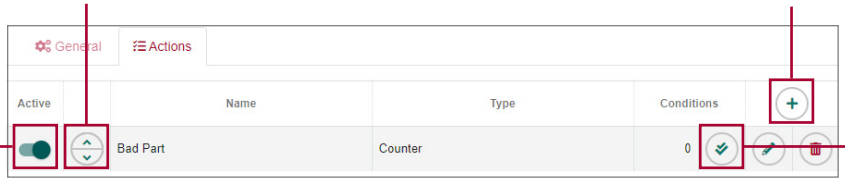
6.3.3.4 Sensor type Digital

Tab Actions

For each sensor, actions can be defined that trigger according to certain conditions.

Changing the order of action

See chapter „6.8.2 Actions“



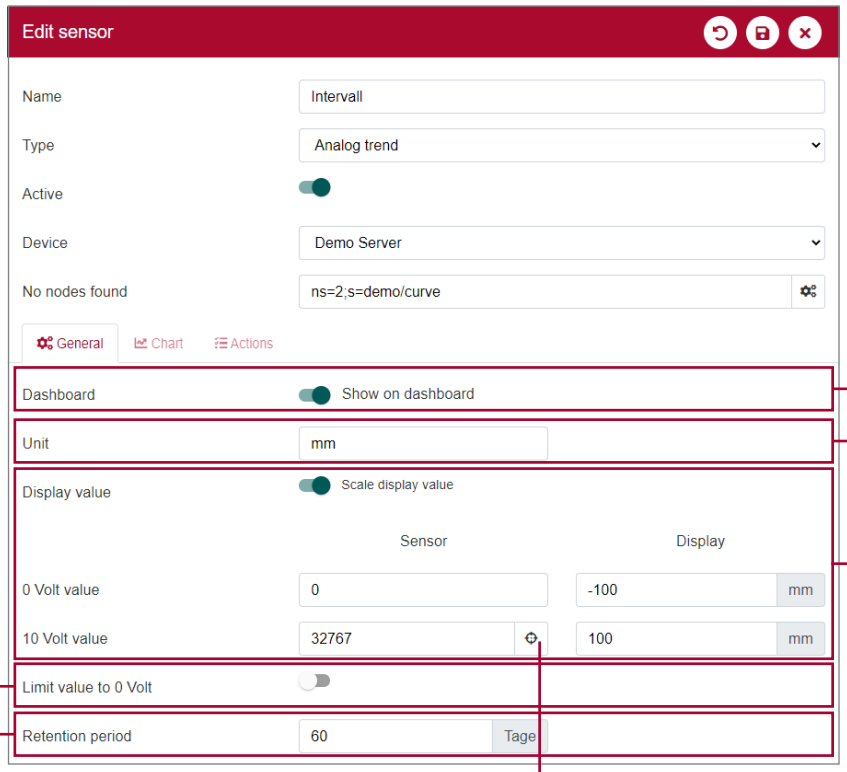
Activate / deactivate action

See chapter „6.3.3.10 Define condition types“

Figure 78: New sensor - Sensor type Digital - Tab „Actions”

6.3.3.5 Sensor type Analogue trend

Tab General



Activate the dashboard view of the sensor (see chapter „4.1.7 Sensors“).

Unit of the output values

Enter the display values for 0 V or 10 V according to the unit specified above. Information on this can be obtained from the sensor manufacturer.

Sensors can output negative voltages depending on the application. The limitation to 0 V prevents a negative display value.

The storage period of the measurement data can be a maximum of 60 days.

Request of the highest measuring step of the sensor at a voltage of 10 V.

Figure 79: New sensor - Sensor type „Analog trend”

For the sensor type „Analog trend“, the charts can be formatted, actions created and assigned (see chapter „6.3.3.7 Tab Chart for sensor types „Analogue trend“ and „Analogue value““ and chapter „4.1.2 Cycle“).

6.3.3.6 Sensor type Analogue value

Tab General

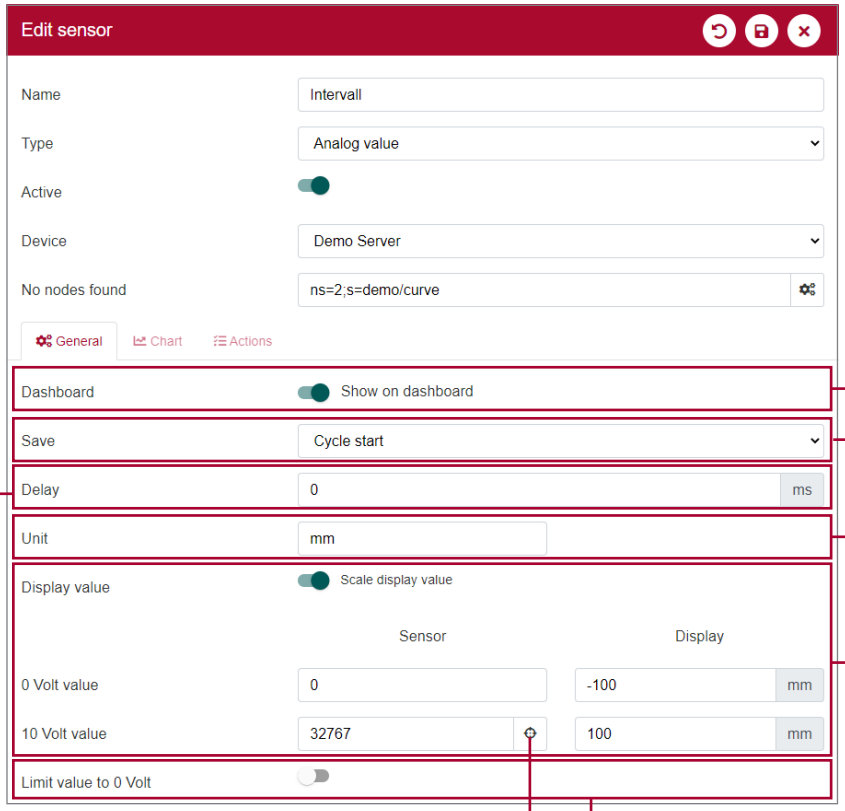


Figure 80: New sensor - sensor type „Analogue value"

Activate the dashboard view of the sensor

Time at which the analogue value should be recorded

Unit of the output values

Enter the display values for 0 V or 10 V according to the unit specified above. Information on this are available from the sensor manufacturer.

The analogue value can be recorded with a delay [ms]. This is useful for sensors that display output values correctly only after a short delay.

Request of the highest measured value of the sensor at a voltage of 10 V.

Sensors can display negative values, depending on the application. The limitation to 0 V prevents a negative display value.

6.3.3.7 Tab Chart for sensor types „Analogue trend" and „Analogue value"

The measured value development of the sensor types „Analogue value" and „Analogue trend" can be displayed with the help of a chart. The settings for the charts can be made directly in the „Edit Sensor" editing window in the „Chart" tab (see chapter „6.3.3.5 Sensor type Analogue trend" and chapter „6.3.3.6 Sensor type Analogue value").

The chart can be viewed directly in the cycle window (see chapter „4.1.2 Cycle").

The example shows the settings above. After the entry, the settings must be saved in the „Edit Sensor" window.

6.3.3.8 Tab Actions for sensor types „Analogue trend“ and „Analogue value“

For analogue sensors, different actions can be selected. To select the actions, the trigger must be defined.

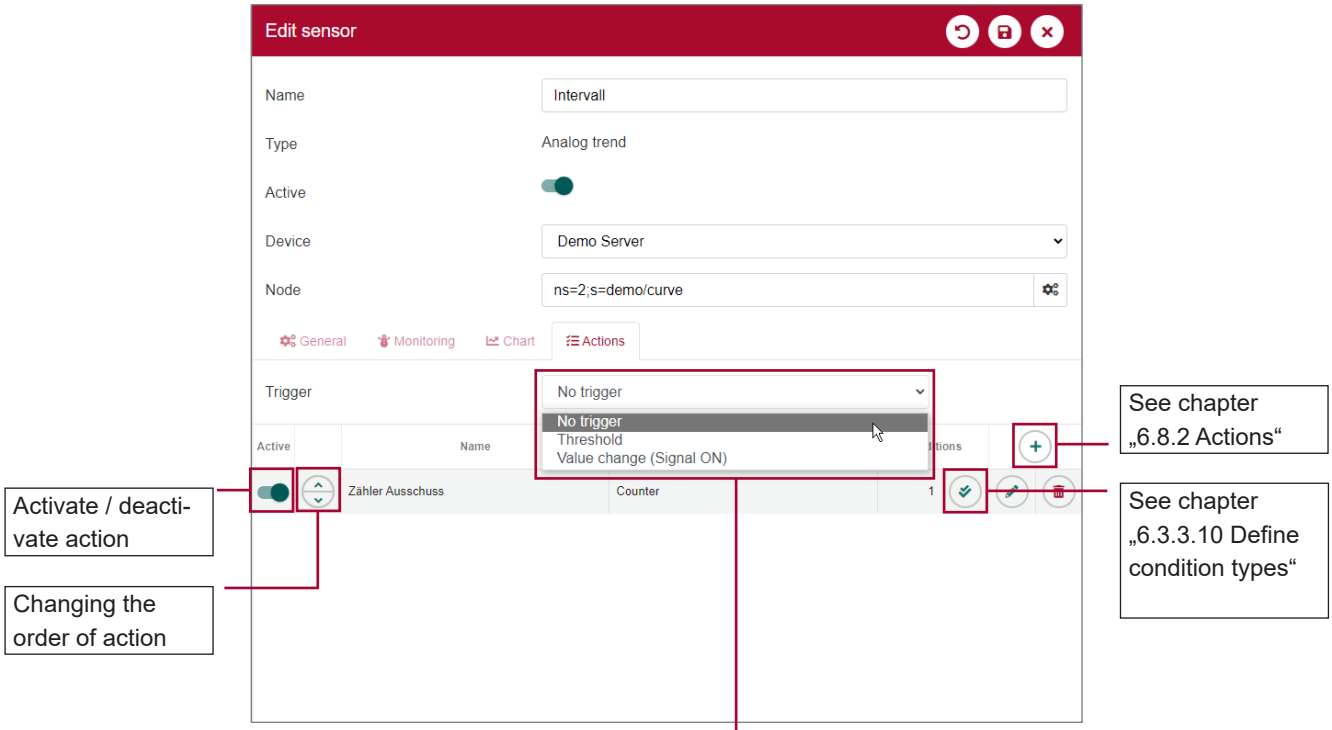


Figure 81: Window „Edit sensor”

No trigger = The actions are not triggered. (No matter what value is reached)

trashold = Triggering on exceeding/falling below the threshold value. Fall below = signal OFF | Exceedance = signal ON

Value change = As soon as the sensor detects a change in value, the actions are triggered.

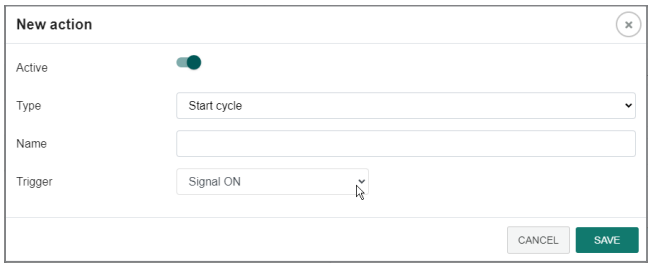


Figure 82: Window „New action”

IMPORTANT: When changing the value (signal ON), the trigger of the actions must also be set to signal ON.

6.3.3.9 Define action types

Action type	Description
Start cycle	The cycle (injection cycle) is restarted (new data set).
Injection end	Defines the end of the injection process of the current cycle.
Tag cycle	The cycle is marked with a fixed text.
Counter	The counter is triggered with the help of an operator and a value.
Trigger actuator	Signal addresses an actuator. This actuator triggers a consumer (lamp, signal horn), for example.
Send e-mail	An e-mail is sent according to the customer‘s settings.
Trigger alert	An alert is triggered.
Change sensor status	The status of a sensor can be addressed according to conditions.

Chart 12: Action types

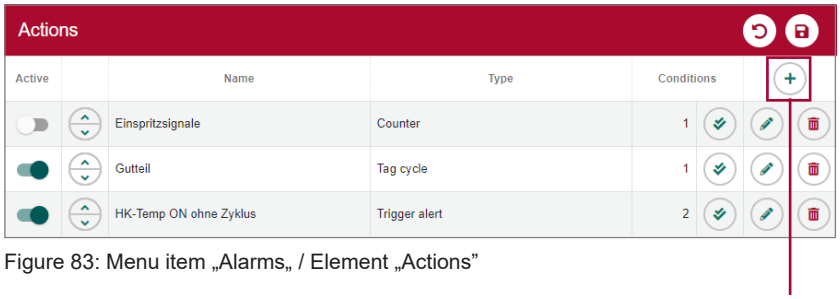


Figure 83: Menu item „Alarms„ / Element „Actions”

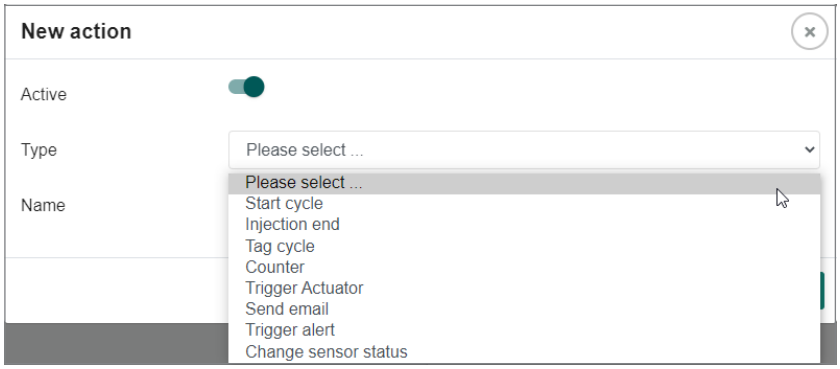


Figure 84: Menu item „Alarms„ / Element „Actions” - New action

The required action type can be selected via a drop down list. In order to be able to save the action, a name with at least three characters must be entered. This name should be chosen carefully so that the action remains clearly recognisable.

Action type	Description
Start cycle	For the action types „Start cycle“ and „ Injection end“, a unique name should be defined for the selected action.
Injection end	
Tag cycle	In order to connect the action type „ Tag cycle“ in a suitable way, a suitable tag must be set up beforehand in the area „Configuration“ - chapter „6.7 Tags“. **Tip: It can be useful for the marker and action to have the same name.**
Counter	For the action type „Counter“, after selecting the suitable counter (see chapter „6.6 Counter“) the appropriate setting values operator and value have to be entered. The following options are available for the operator: + Increases the value of the counter - Decreases the value of the counter = Sets the value of the counter The value indicates when the counter should trigger an action.
Trigger actuator	With the action type „ Trigger actuator“, a desired output can be triggered for a certain period of time. After a name is given, an output (actuator) can be selected using the drop down menu. For information on maintaining the actuators, see chapter „6.3.4 Actuators“. The duration defines how long the actuator should be triggered.
Send e-mail	The action type „Send e-mail“ enables messages to be sent to the stored alert e-mail address or to addresses in the recipient list. Before an e-mail can be sent, the sender‘s e-mail address must be maintained (see chapter „6.11.3 Email Server“). After a name has been given to the action, the subject and message can be entered. This message is then sent to the recipient when the action is triggered.
Trigger alert	For the action type „Trigger alert“, the output type can be selected after entering the name. If the output type „Text“ is selected, an individual text can be entered. With the output type „Sensor“, the entered sensor text is used. For both types, the corresponding texts are listed in the „Monitoring“ area / menu item „Alert“ if the conditions are fulfilled.
Change sensor status	With the action type „Change sensor status“, the status of the sensor (active or inactive) can be changed. After the name has been given, a sensor can be selected. To be able to select the suitable sensor, it must be entered first (see chapter „6.3.3 Sensors“). The action can be set active  or inactive.

Chart 13: Action types

6.3.3.10 Define condition types

To be able to trigger actions, conditions are set for starting an action. Various conditions can be maintained with the help of already created **sensors, counters, temperatures (per zone) and outputs (per zone)**. This can be used, for example, to define conditions (number of shots) which, being reached, indicate the need for maintenance.

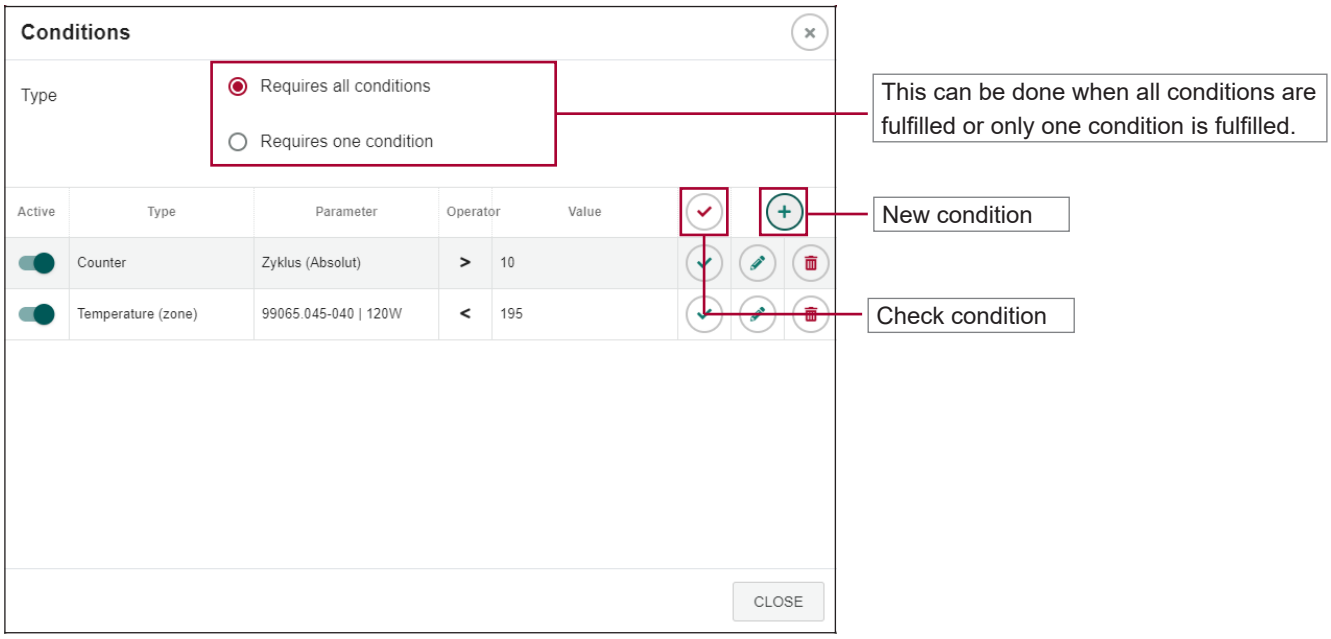


Figure 85: Menu item „Alerts / Element „Actions" / Conditions

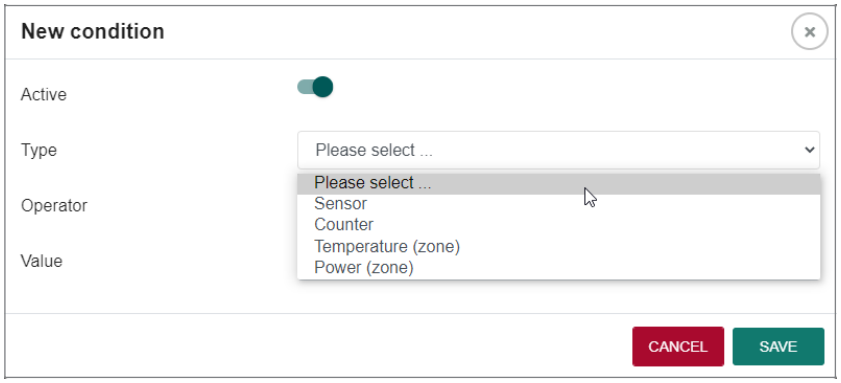


Figure 86: Menu item „Alerts" / Element „Actions" / New condition / Type

After selecting the condition type, the sensors, counters or zone properties that have already been entered can be selected.

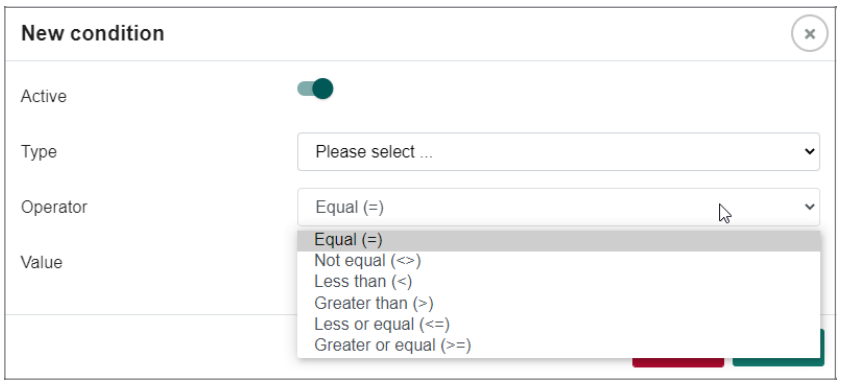


Figure 87: Menu item „Alerts" / Element „Actions" / New condition / Operator

For the selection of the operator, various criteria are available for the value request (depending on the condition type).

The value to be requested for the selected operator must then be entered.

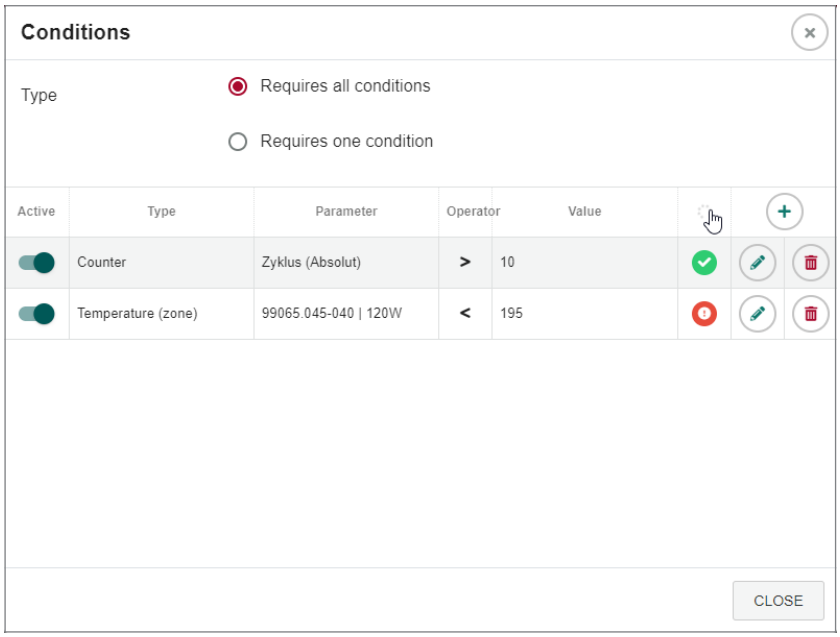
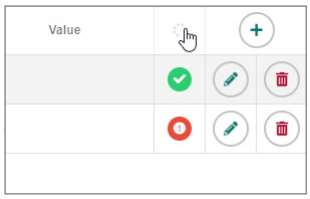


Figure 90: Menu item „Alerts" / Element „Actions" / Conditions

Now the question type can be selected. This determines whether all conditions must be fulfilled or only one condition must be fulfilled.

The entered conditions can be checked with the help of a short query. This shows whether the condition is fulfilled at this point in time or not.

Either all conditions can be checked at the same time or an individual check can be made.



By clicking on the checkmark of the individual rows or directly in the table headline, the check is carried out.

6.3.4 Actuators

Figure 88: Menu item „OPC UA" / sub item „Actuators" / Element „Manage actuators"

New actuators can be created with the button ⊕. Existing sensors can be edited by clicking on button ✎ or deleted by clicking on button 🗑.

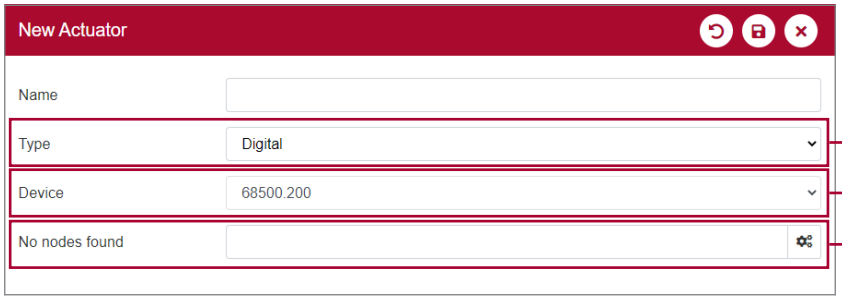


Figure 89: New actuator

Type selection of the actuator.

Selection of the device that controls the actuator.

Selection of the node to which the digital signal value is sent out.

Before an actuator can be triggered, it must be connected to an action. To create an action see chapter „6.8.2 Actions".

6.4 Moulds

Figure 91: Menu item „Moulds”

In the menu item „Moulds“, moulds can be created and managed. This is particularly helpful if smart CONTROL is used for different moulds.

If the licence for „Virtual Rheology“ is available, the geometry data of the corresponding mould must be stored here. The geometry data of EWIKON hot runner systems are available from EWIKON on request.

Manage moulds

In the „Manage moulds“ element, new moulds can be added, edited or deleted. Furthermore, the geometry data belonging to the respective mould are uploaded here for the „Virtual Rheology“ function.

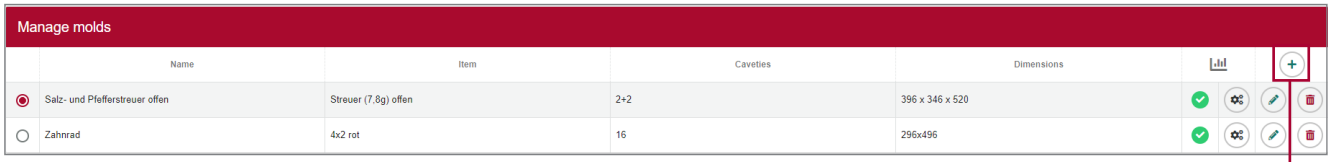


Figure 92: Menu item „Moulds” / Element „Manage moulds”

New moulds can be created with the ⊕ button. A window opens in which general information can be entered. The materials to be processed are entered under the „Material“ tab. Up to four components can be entered.

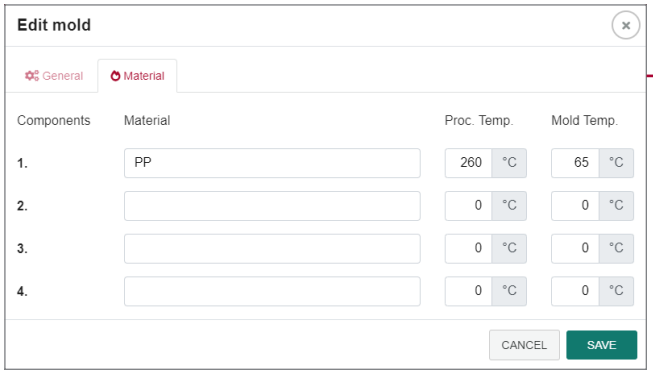


Figure 94: Edit mould - Tab „Material“

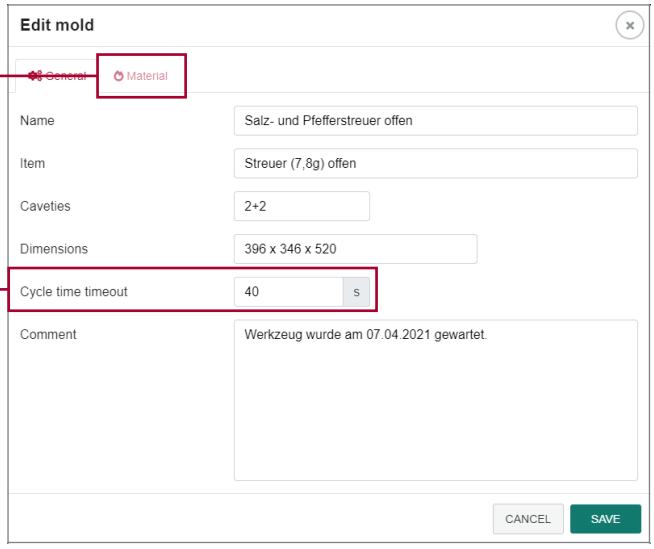


Figure 93: Edit mould - Tab „General”

If a cycle takes longer than the set cycle timeout, the status of the production is set to „Not in cycle“.

6.5 Production

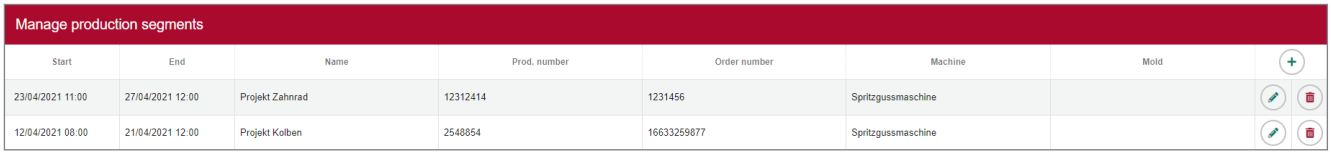


Figure 95: Element „ Manage production segments”

Individual production segments can be created in the menu item „Production“. By entering the production start and the necessary information for each order, it is possible to track when and in which order orders were carried out with the injection mould. In addition, the production segments at other analysis points can be used to limit the time period.

Edit production segments

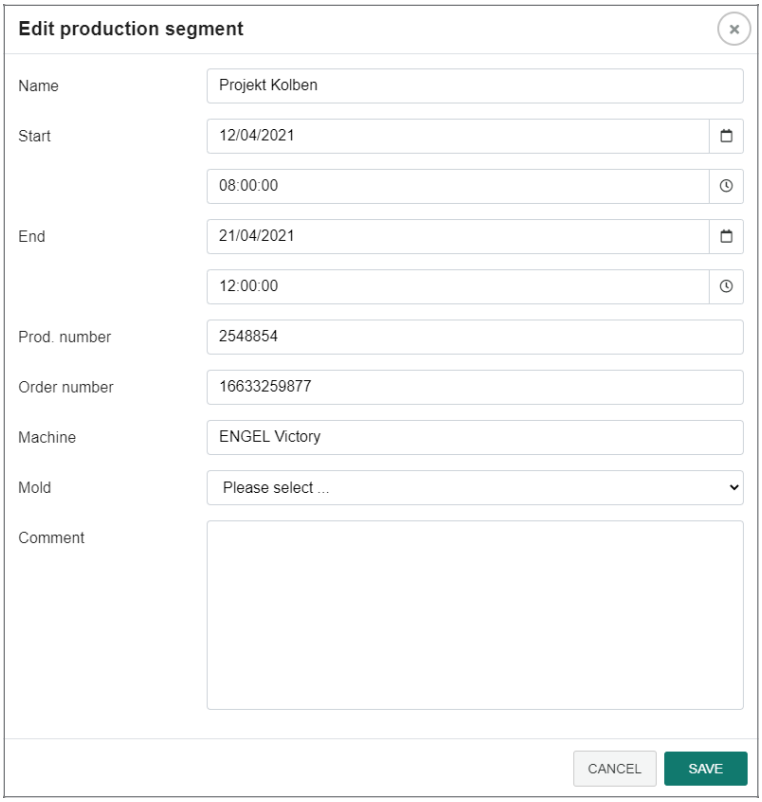


Figure 96: Display Edit production segment

Click on the button ⊕ to create a new production segment.

Click on the button ✎ to edit an existing production segment.

In both cases, an input window opens in which the order information can be entered. Click on „SAVE“ to save the entries.

Tip: The division into production segments makes it easier to analyse the measured data (see chapter „5.2 Cycles“ and chapter „5.6 Analysis hot runner“).

6.6 Counter

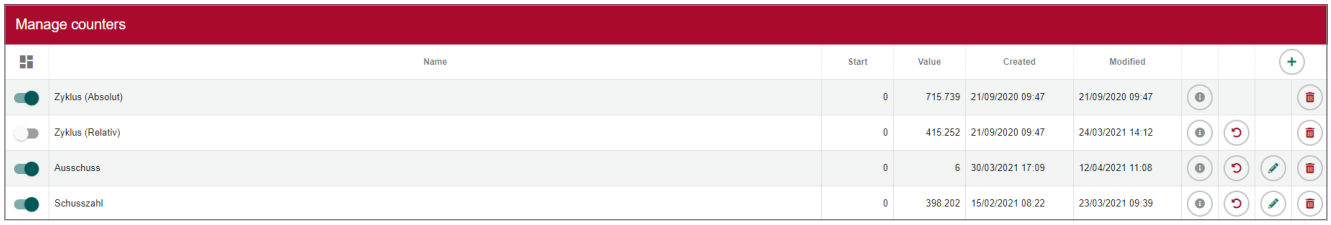


Figure 97: Menu item „Counter“

In the menu item „Counter“, counters can be generated as desired. The „Counter absolute“ is an internal counter that counts the total number of cycles that were recorded with smart CONTROL during the entire recording time. This counter cannot be reset. The „Counter relative“ counts the number of recorded cycles. In difference to the „Counter absolute“, this counter can be reset to zero in the area „Configuration“ / menu item „Counter“.

Counters can be used to count produced parts or waste, for example.

Counters can be reset by clicking on the button . A new counter can be created by clicking on the button .

Important: Only counters are created here. The actual counting is done via actions of sensors that have to be created separately in the menu item „OPC UA“ / subitem „Sensors“ (see chapter „6.3.3 Sensors“).

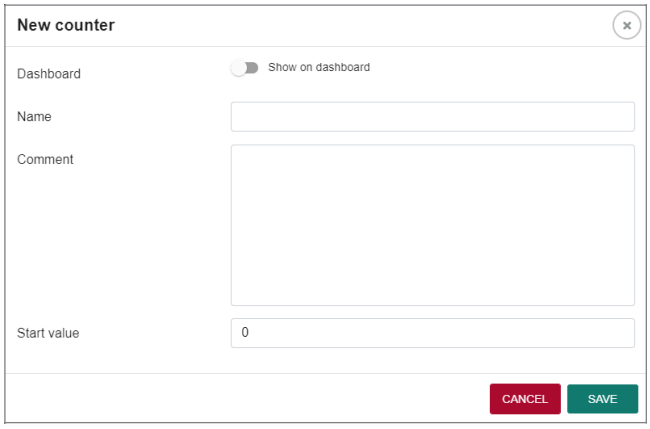


Figure 98: Menu item „Counter“ / Function „New counter“

In the window „New counter“ the name of the counter, a description and the start value of the counter can be defined. The start value is the number from which the counter starts counting up. The default value is 0.

The entries are saved by clicking on the „SAVE“ button.

Own counters can also be edited after they have been created by clicking on the button .

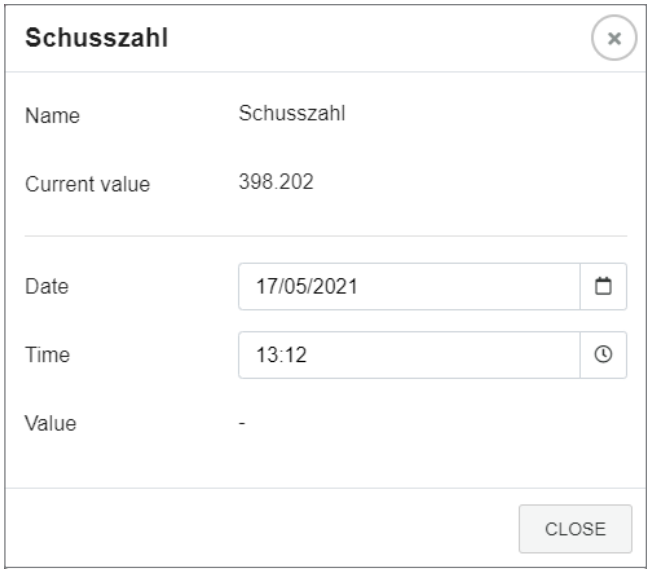


Figure 99: Window „Counter info“

With the help of button , a quick check of the counter can be made at a certain point in time. Select the date and time for this. The result is then displayed in the „Value“ line.

Tip: If the counter is activated , it is also displayed on the dashboard (see chapter„4.1 Dashboard“).

6.7 Tags

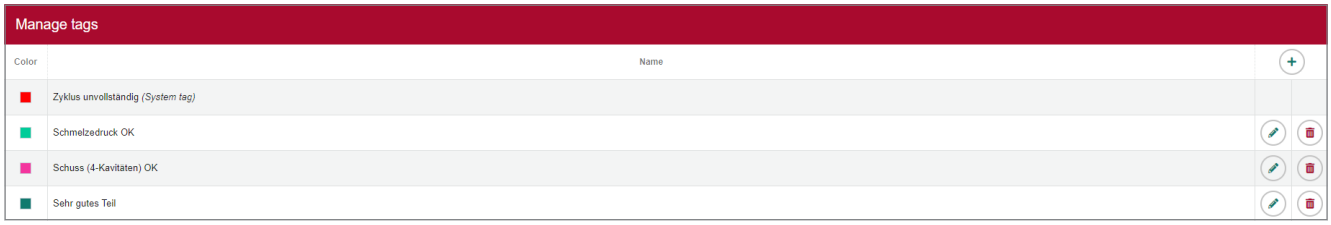


Figure 100: Menu item „Tags“

Tags can be very helpful to mark a cycle automatically in the process. The point at which a cycle should be marked is controlled via a sensor action (see chapter „6.8.2 Actions“).

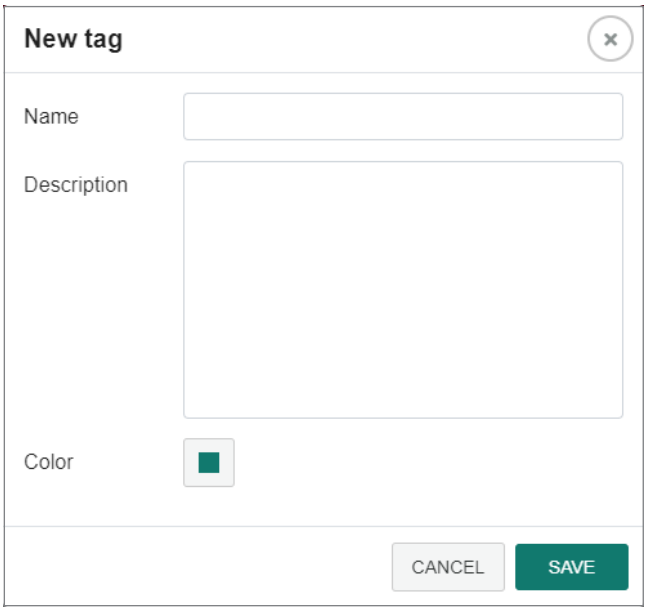


Figure 101: Menu item „Tags“ / Window „New tags“

Click on the button ⊕ to create a new tag.

Click on the button ✎ to edit a tag.

The input window „New tag“ or „Edit tag“ opens in which the name of the tag and a message to be displayed can be added. Any colour can be selected.

Click „SAVE“ to save the entries.

6.8 Alerts

Alerts are triggered when defined limits for temperatures, power zones or sensors are exceeded or not reached. Alerts are displayed in the menu bar, but can also be sent to email addresses and trigger further actions.

6.8.1 Email

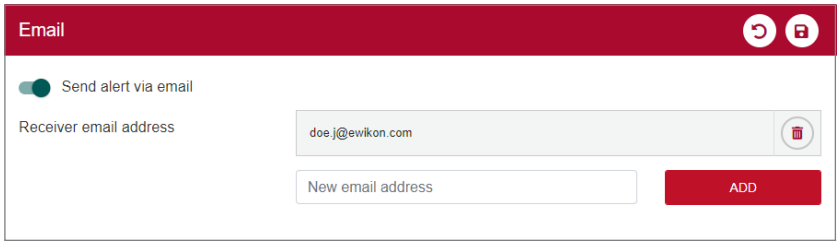


Figure 102: Menu item „Alerts“ / Element „Email”

The e-mail addresses to which alert messages should be sent are defined in the element „ Email“. Each email address is confirmed by clicking „ADD“.

Click on button to delete the entries.

Click on button to save the entries.

In menu item „6.11.3 Email Server“ , a test email can be sent to the recipients generated here.

6.8.2 Actions

In the element „Actions“, own actions are created which are carried out when an alert occurs. For the execution of the individual actions, additional conditions can be defined (see chapter „6.3.3.9 Define action types“ and chapter „6.3.3.10 Define condition types“).

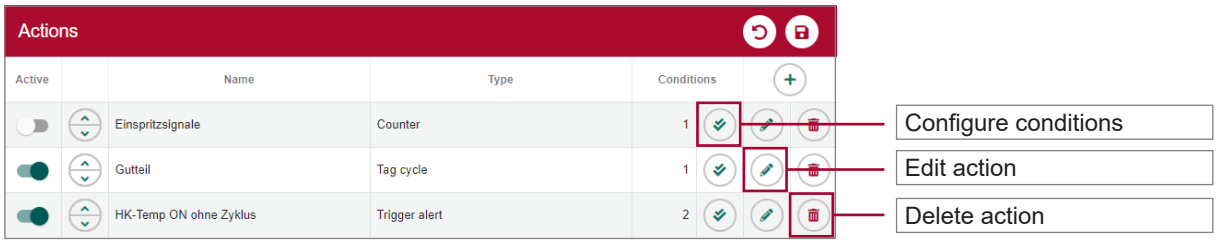


Figure 103: Menu item „Alerts“ / Element „Actions”

6.9 Documents

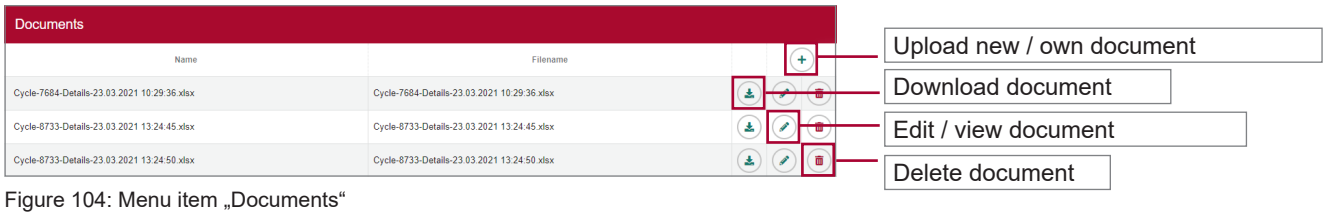


Figure 104: Menu item „Documents“

In the menu item „Documents“, saved documents can be seen and downloaded directly. Your own documents for individual use can be uploaded here.

6.10 User

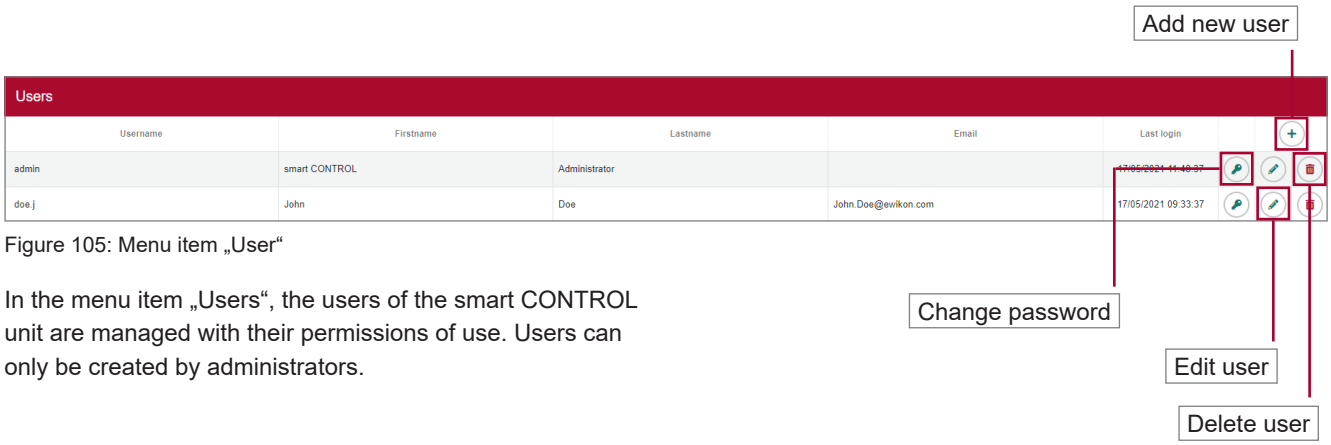


Figure 105: Menu item „User“

In the menu item „Users“, the users of the smart CONTROL unit are managed with their permissions of use. Users can only be created by administrators.

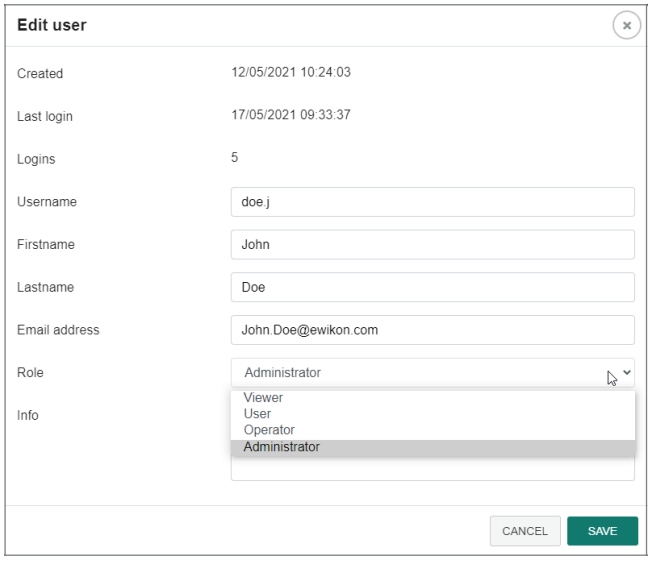


Figure 106: Menu item „Users“ / Function „New user“ / „Edit user“

After the user data have been entered, the user role can be selected. For more information on user roles, see chapter „6.10.1 User roles“.

6.10.1 User roles

When creating new users, a suitable user role should be selected. This determines how far the user can see and make use of the smart CONTROL interface.

The following table lists all user roles and their permissions.

		User roles / permissions				
		Menu item	User role			
			Viewer	User	Operator	Administrator
User menu		Settings	●	●	●	●
		Restart service			●	●
		Restart			●	●
		Shut down				●
		Log out	●	●	●	●
Main menu	Appliance	Dashboard	●	●	●	●
		System Information	●	●	●	●
		Virtual Assistance	●	●	●	●
	Monitoring	Charts	●	●	●	●
		Cycles	●	●	●	●
		Productivity	●	●	●	●
		Temperature zones	●	●	●	●
		Alerts	●	●	●	●
		Analysis hot runner	●	●	●	●
		Calendar	●	●	●	●
		Virtual Rheology	●	●	●	●
	Configuration	General		●	●	●
		Temperature zones		●	●	●
		OPC UA			●	●
		Moulds		●	●	●
		Production		●	●	●
		Counters		●	●	●
		Tags		●	●	●
		Alerts		●	●	●
		Documents		●	●	●
		Users				●
		Network			●	●
		API Access		●	●	●
	Service	Maintenance				●
		Logs				●
		Info	●	●	●	●

Chart 14: User roles

6.11 Network

In the menu item „Network“, settings for the integration of smart CONTROL into networks can be made. The setting options are explained below. The involvement of the IT department is recommended.

6.11.1 Web access

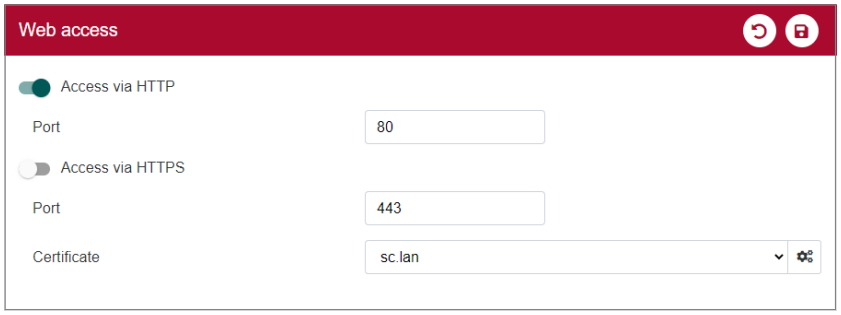


Figure 107: Menu item „Network” / Element „Web access”

In the element „Web access“, the access to the web interface is configured.

It is possible to set access via the network protocols HTTP and HTTPS and to define individual network ports.

Via the certificate settings, the SSL certificates can be managed. New certificates can be added by clicking on the button.

To add a new certificate, it must already exist.

Alternatively, a self-signed certificate can be created (see Figure 110).

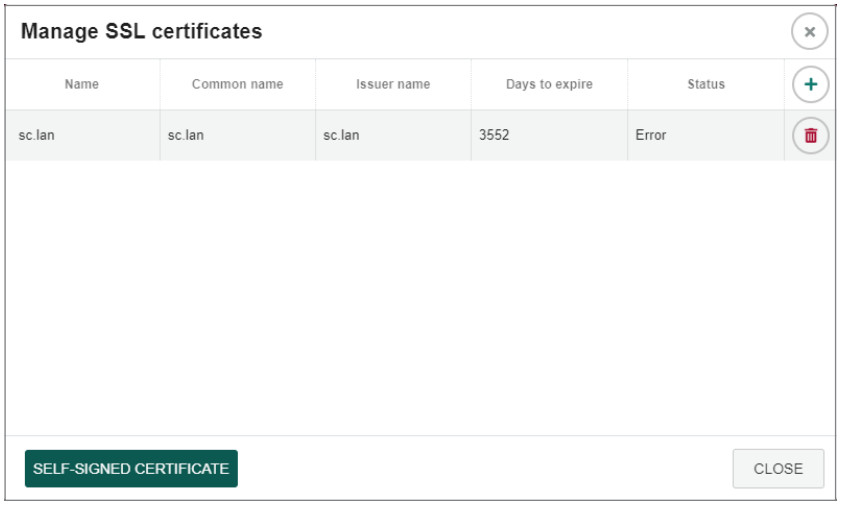


Figure 108: Menu item „Network” / Element „Web access” / Manage SSL certificates

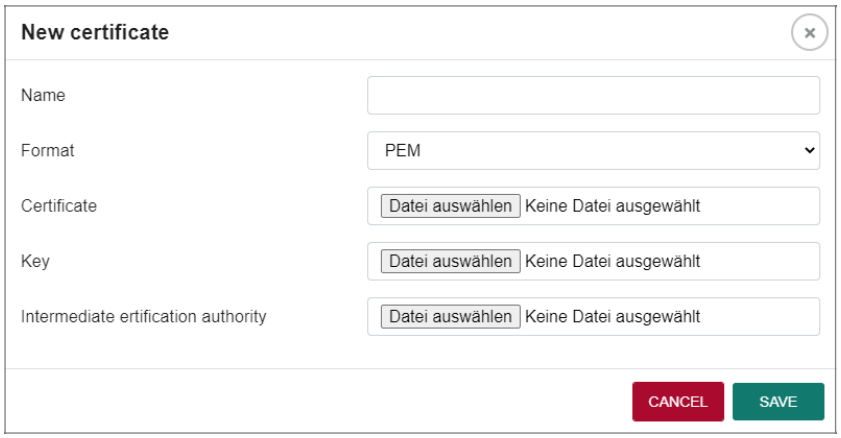


Figure 109: Menu item „Network” / Element „Web access” / New certificate

In the window „New certificate“, the certificate name and the format of the certificate can be selected. The necessary files such as certificate, key and intermediate certification authority can be uploaded.

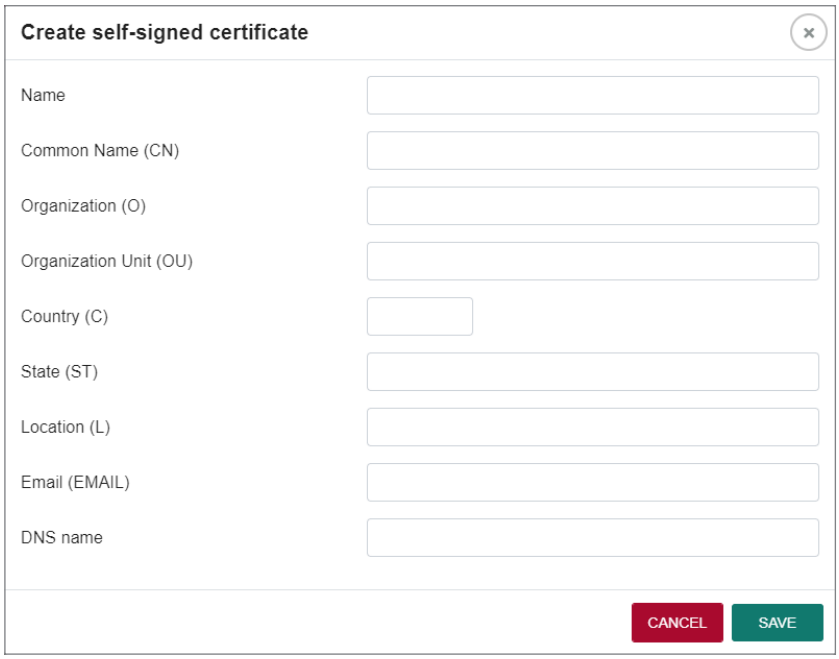


Figure 110: Menu item „Network" / Element „Web access" / Self-signed certificate

After entering the data, they are saved by clicking on the SAVE button.

6.11.2 Ethernet

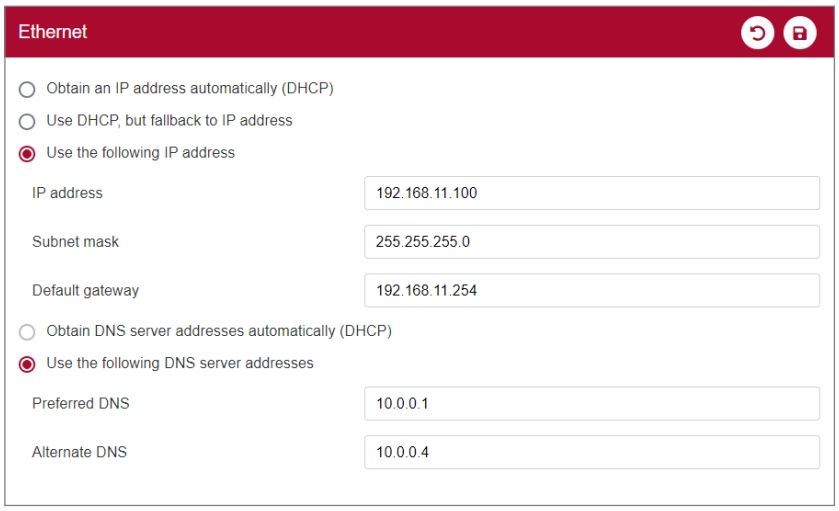


Figure 111: Menu item „Network" / Element „Ethernet"

As standard, the IP address comes automatically from a DHCP server. If there is no DHCP server in the network, the static IP address **192.168.200.1** is used.

If the network does not use a DHCP server, the IP address can be configured statically. A valid IP address can be requested from the network administrator.

Click on the button to delete the entries.

Click on the button to save the entries.

6.11.3 Email Server

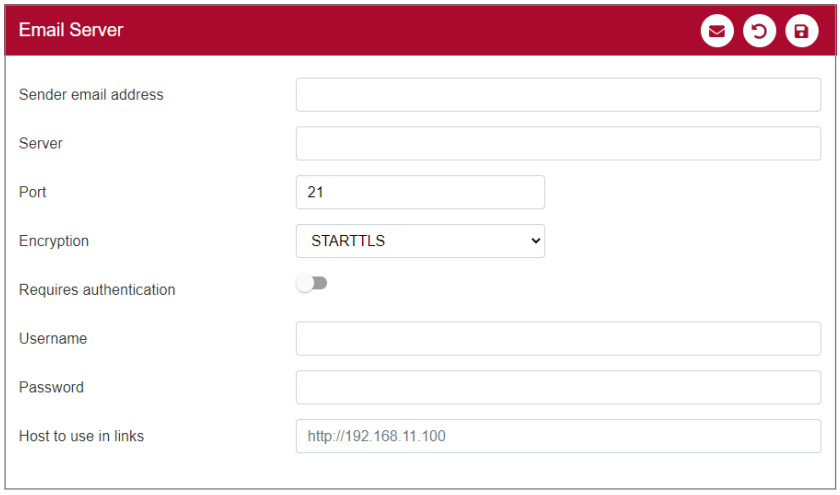


Figure 112: Menu item „Network" / Element „Email Server"

An email address for the sender and the connection data to the email server must be configured so that smart CONTROL can send emails to users.

In addition, the host name for links in e-mails can be specified, e.g. if another address should be used instead of the IP address of the smart CONTROL.

By clicking on the button , a test email can be sent after entering a recipient email address (see Figure 113).

Click on the button to delete the entries.

Click on the button to save the entries.

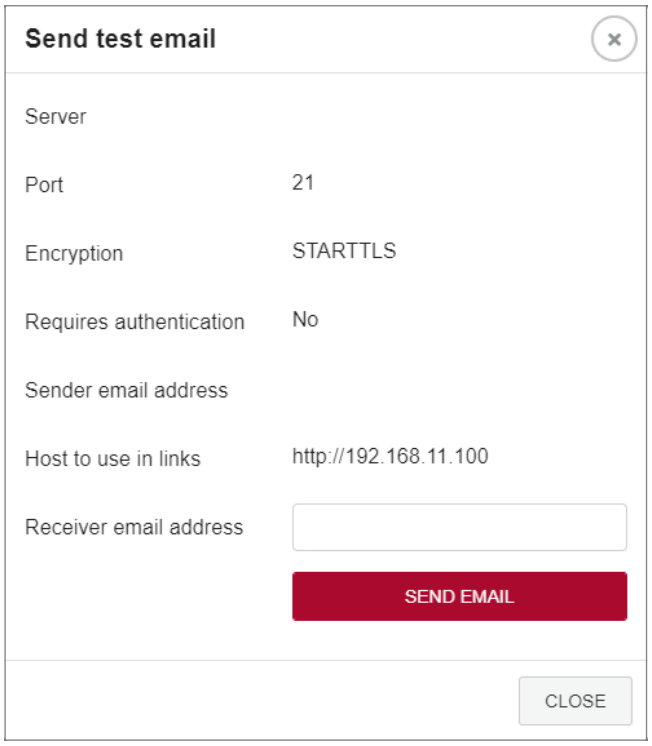


Figure 113: Menu item „Network" / Element „Email server" / Function „Send test email"

6.11.4 SoftAP (WLAN Hotspot)

EWIKON strongly recommends to change the password after the first login if you want to continue accessing via WLAN.

Click on the button to delete the entries.

Click on the button to save the entries.

6.12 API Access

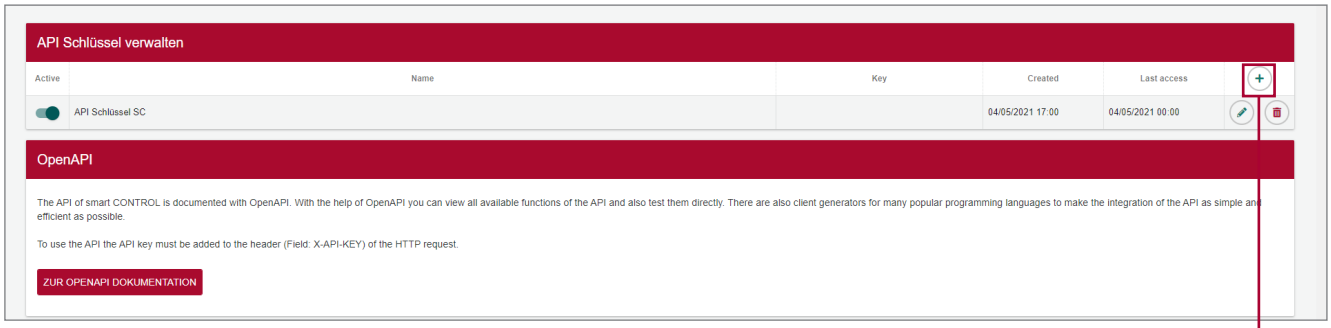


Figure 114: Menu item „API Access”

API is a defined programming interface that communicates from a software system to other programmes.

6.12.1 Manage API keys

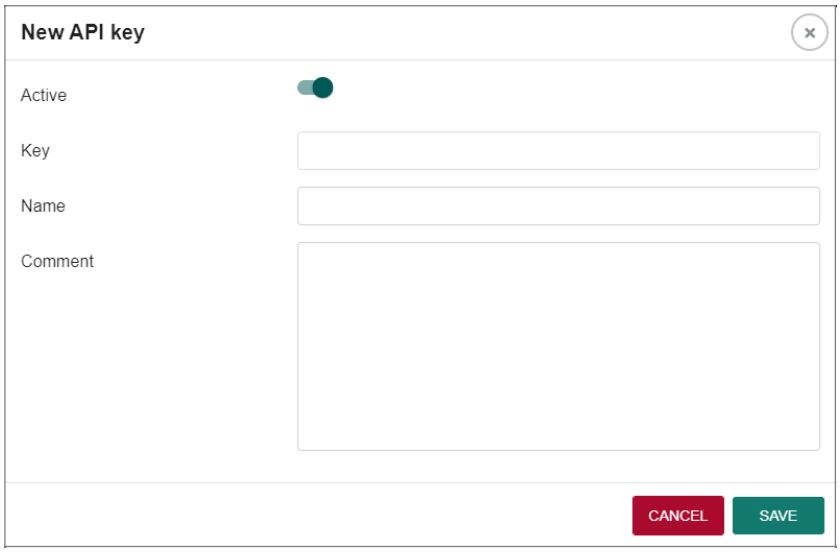


Figure 115: Menu item „API access” / Function „New API key“

To access the API interface, an API key must be created.

More information on this is available in the documentation, which can be opened via the button „TO OPEN API DOCUMENTATION“.

The key is generated automatically, but can also be changed. A name must be entered, optionally a description can be added.

7. Maintenance | Area „Service“

7.1 Maintenance

7.1.1 System update

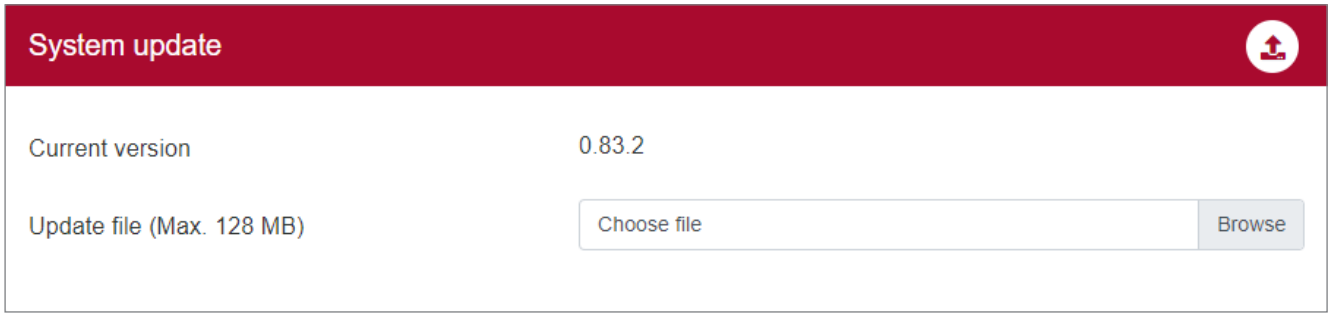


Figure 116: Menu item „Maintenance” / Element „System update„

To keep the software of smart CONTROL up to date, system updates can be installed. For this purpose, the file provided by EWIKON is uploaded in the menu Maintenance - Element „System Update“ and the update is carried out.

7.1.2 Manage licenses

The available licensed functions of smart CONTROL can be found in the element „ Manage licenses“.

Additional licenses are available on request and are provided in steps of ten. Virtual Rheology is optional and can be activated with the help of a license.

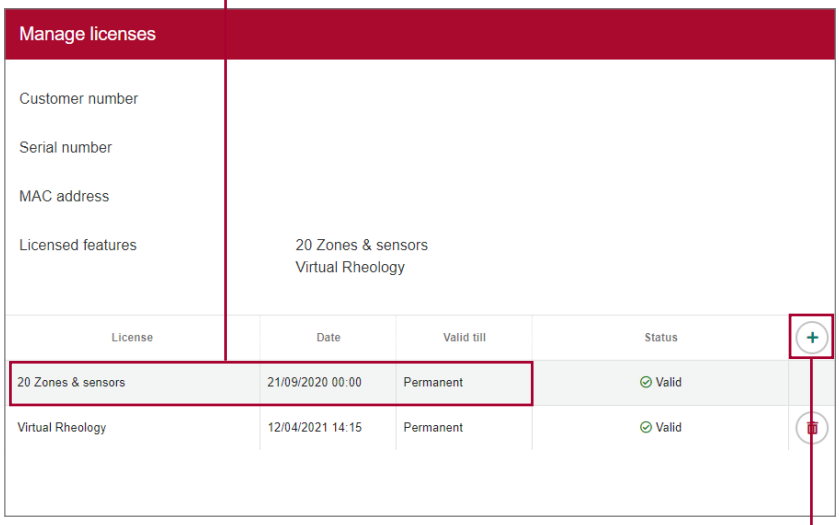


Figure 117: Menu item „Maintenance” / Element „Manage licenses“

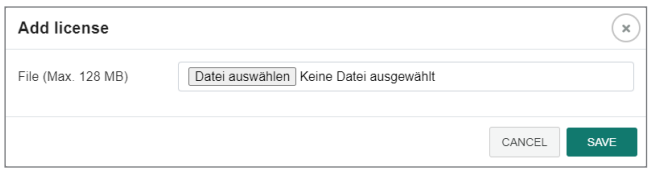


Figure 118: Window „Add license”

After another licence has been purchased, the licence file received from EWIKON can be uploaded and saved. It is then displayed in the overview.

7.2 Logs

Log entries can be viewed at any time. The data is summarised daily and saved in a list. The log files can be viewed in the browser by clicking on the button or downloaded directly as a file (.log) by clicking on the button .

It is not possible to delete or edit them manually, so that a complete list is available at all times for maintenance work.

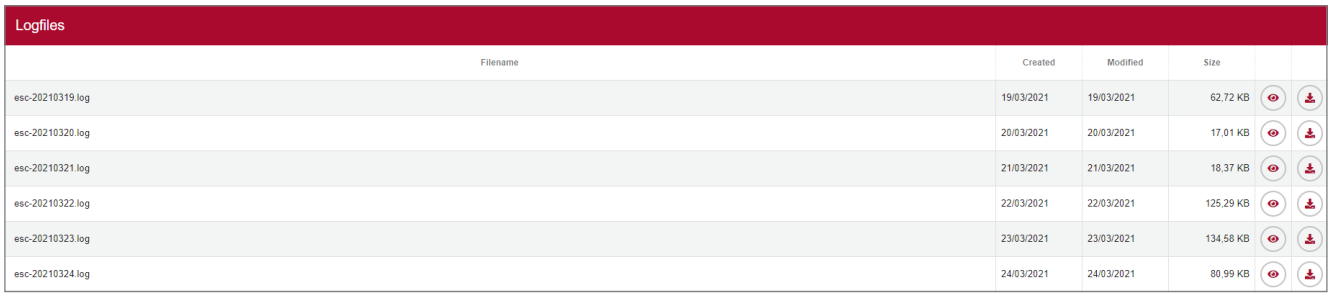


Figure 120: Menu item „Logs“ / Element „Logfiles”

7.3 Info

The menu item „Info“ contains contact information and support information.

Figure 119: Menu item „Info” / Element „Info“

7.3.1 Remote support

To be able to offer quick support in case of questions or problems, it is possible to carry out remote maintenance via Remote Desktop.

EWIKON does not directly access your smart CONTROL unit and the related settings / measurement data.

After release, access is exclusively via screen sharing with the end device.

- Open smart CONTROL in the browser
- Contact EWIKON customer service
- The connection with the customer service is made via a programme which supports screen sharing (MS Teams, Team-Viewer etc.)

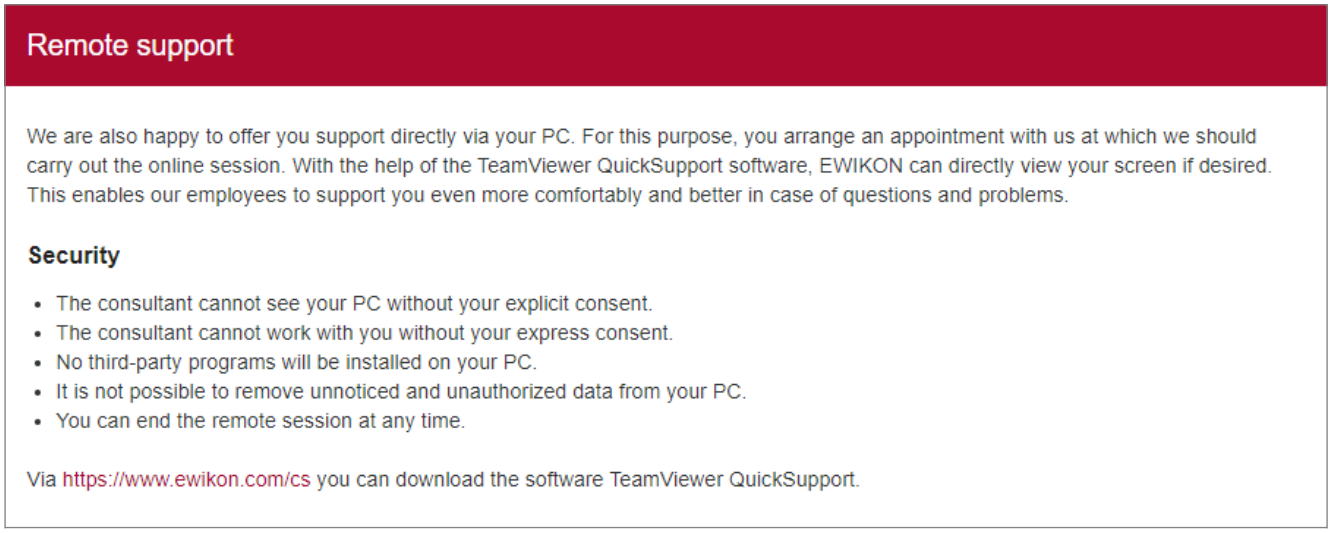


Figure 121: Menu item „Info” / Element „Remote support„

EC - Declaration of Conformity

EWIKON

We hereby confirm that the product described below in the design and construction type as supplied conforms to the essential protection requirements of the following European Directives

2014/35/EU „Low Voltage Directive„

and

2014/30/EU „EMC Directive„

with respect to its design type. This requires that the product is used for its intended purpose and that the assembly and operating instructions are observed.

Alterations made to the product will void the declaration of conformity.

Manufacturer:
EWIKON Heißkanalsysteme GmbH
Siegener Straße 35
D – 35066 Frankenberg
Tel.: +49 6451 / 501-0

Product: **smart CONTROL**
The assistance system for the injection moulding production

Type: **68500.100** ; smart CONTROL

Applied harmonised standards:

EN 60204-1:2007-06 Safety of machinery - Electrical equipment of machines - Part 1: General requirements

Note: It is necessary to use original connecting cables outside the device to meet the requirements!

Frankenberg, 08/02/2022

Dr. Stefan Eimeke, Managing Director

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EWIKON