

Configuration / Operating instructions

CS Network

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2 Foreword

Dear Customer,

When using the CS Network software, you can read out our sensors directly or save a number of measured values from our data recorders in a central database. It is also possible to integrate third-party sensors, provided they have an Ethernet interface. You can then access this data from several clients and evaluate or display it via a user authorization concept. You can also send alarms and evaluations automatically by e-mail to the users via push message.

In this documentation, the configuration by a user in the user interface on a PC is described.

3 Notes

3.1 About this document

- Read this documentation carefully.
- Keep this document close at hand so you can refer to it if necessary.
- Share this document with future users of the product.

CS Instruments GmbH & Co.KG offers no guarantee in relation to the suitability for any other purpose and accepts no liability for any printing errors in this operation manual. The same applies to consequential damage in connection with the delivery, capacity or use of this software.

4 System Requirements

Hardware Server Platforms	Windows Server 2016 64bit Windows Server 2019 64bit
Virtualization platforms	Vmware, Hyper-V, virtualBox
Main memory requirement	min. 8 GB RAM – recommended 16 GB
Hard disk space	<p>min. 100 GB SSD (also depends on the measured values and log times)</p> <p>Example:</p> <p><u>Data quantity:</u> 200 measured values x 4 bytes per value = 800 bytes</p> <p><u>Log interval:</u> 5s $\hat{=}$ 17280 storage values per day (86400s per day / 5s log interval)</p> <p>Remaining storage capacity [days] = (storage capacity / data quantity) / storage values per day</p> <p>Remaining storage capacity [days] = (100,000,000,000 bytes / 800 bytes) / 17280</p> <p>Remaining storage capacity [days] = <u>7233.796 days $\hat{=}$ 19.82 years</u></p>
Processors	4 CPUvCore
Windows Clients	From Win10 64bit

For correct communication and operation of the software, the following ports in the network must be enabled:

Port 50051 is used for communication between the Windows client and the Ubuntu server via gRPC.

The server needs port 502 for communication with the devices/sensors via ModbusTCP.

Port 8800 (server - devices/sensors) is used for the broadcast for automatic device detection.

5 Opening the software for the first time

When the software is put into operation for the first time, the admin must be created. This person has all rights and is also intended for service cases.

Assign a profile name and set your host name (IP address of the server). As a user, use the following data:

User: **Admin**
Password: **2_cssoft!cs**

You can then proceed with setting up the software.

6 Project Data Set-up

In the following the set-up of a project by the user is described. After the initial set-up, all steps can be performed again, detached from all other steps.

It is important to note that a device/sensor can only be scanned in one project. A multiple scan of devices is not possible. We recommend to create only one project in a company or location, which collects the measured data of all devices/sensors over months/years. The creation of multiple projects can be replaced by the different areas within one project. This simplifies the maintenance effort and data management.

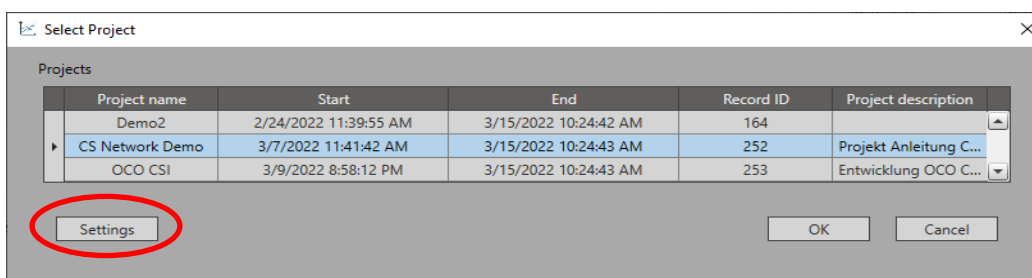
After the initial set-up of the project, you have to start the project in the project overview for the data recording to be activated.

6.1 User Registration and Profile Selection

During the initial user registration, the user must create a password for his account. The password must be between 5 and 25 characters long. The user is free to choose the characters. Each user has his own password.

The user will then choose the profile in which he works. The profile is created by the superadmin and defines the access to the server path. After that the user has access to the projects or can generate new ones.

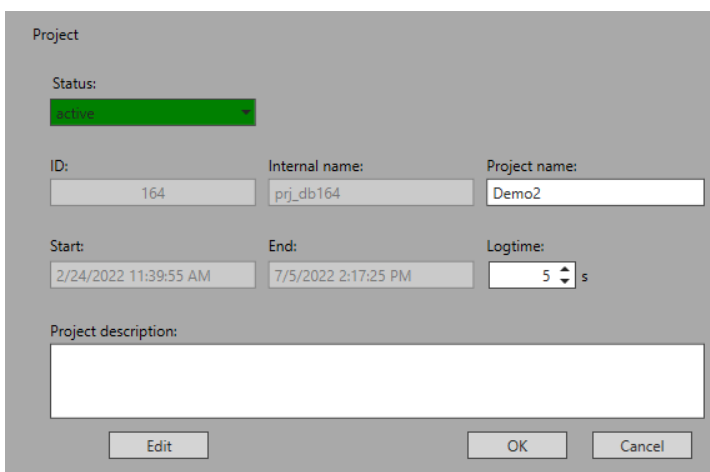
Using the "Settings" button takes the user to the configuration menu. In the configuration menu, users and projects can be created and access rights can be assigned.



6.2 Creating a New Project

In the configuration menu under "Project settings" you can change the default project. Click on the project in the navigation bar on the left and then on the "Edit" button.

Enter a project name and optionally a description to clearly identify the project.



Project

Status: Active

ID: Internal name: Project name:

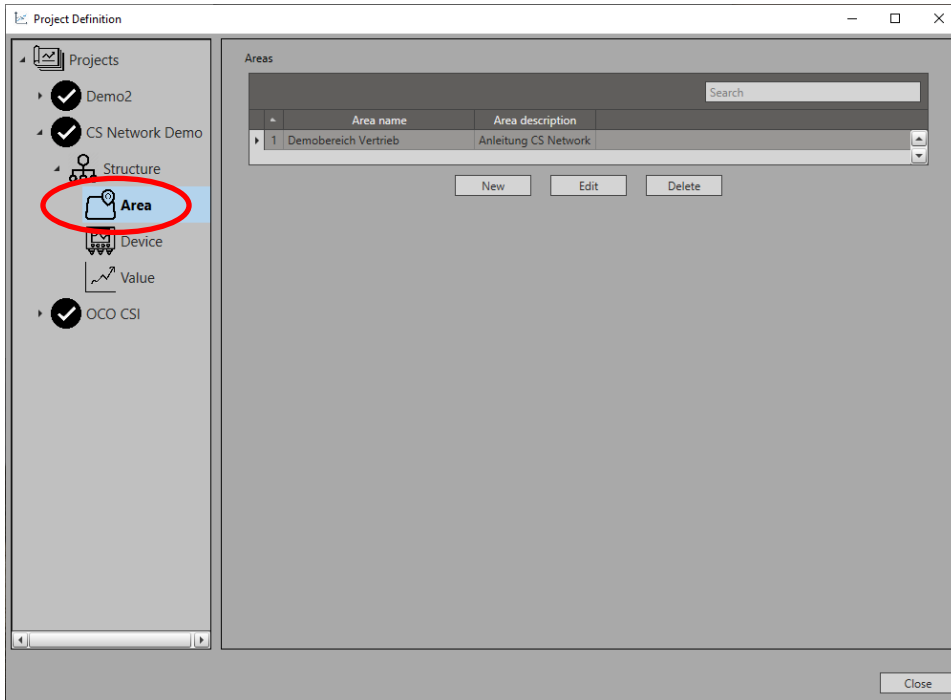
Start: End: Logtime: s

Project description:

After the project is created, it appears in the project selection list and can be started or stopped from there. For the initial set-up, the steps for setting up the areas, the devices and the measured data are still needed.

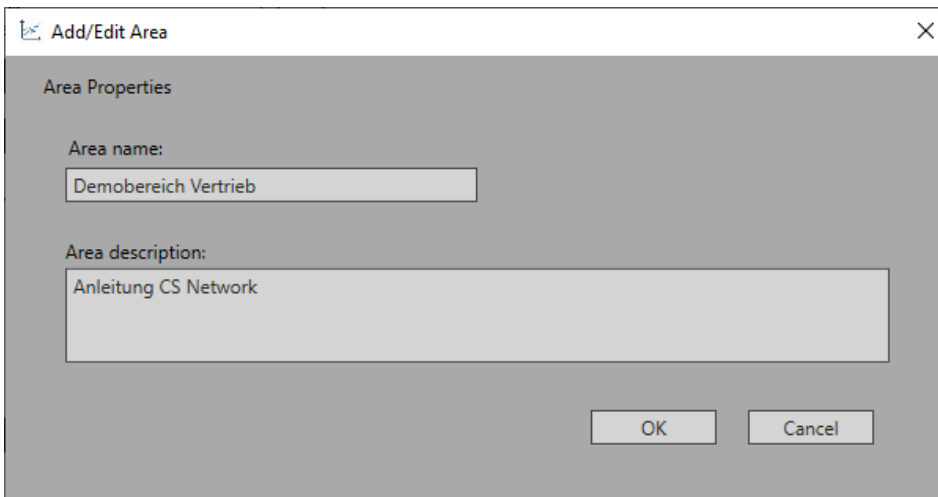
6.3 Set-up of Different Areas

The project structure can now be seen in the selection list of the “Project definition” menu.



To set up different areas, select the “Area” category. As default area the area “Area1” is displayed. You can edit this or delete it after setting up a new area.

To create a new area, select the “New” button or click “Edit” to modify an area. Then assign an area name and an optional description.



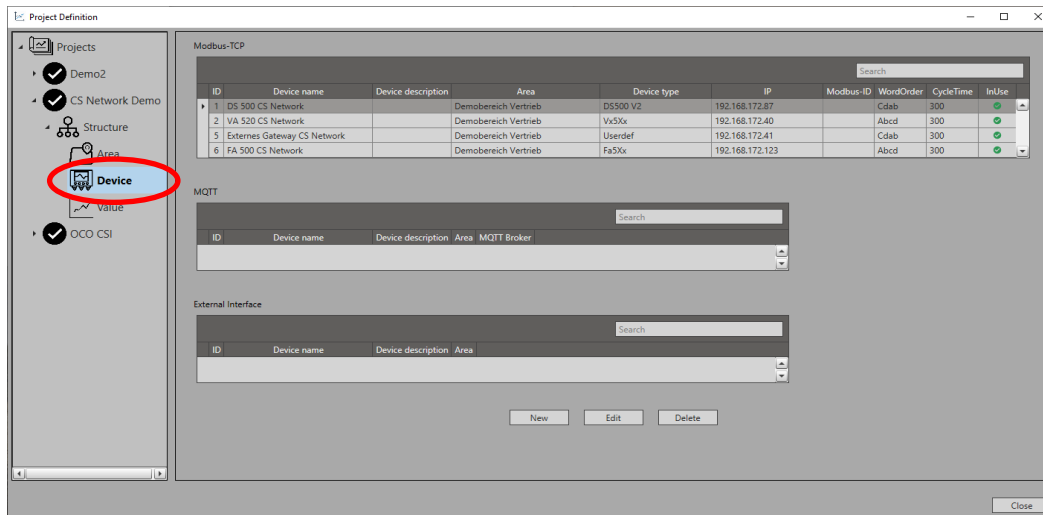
Once the area has been created, you can proceed to the next step.

7 Configuration of Devices and Measured Values

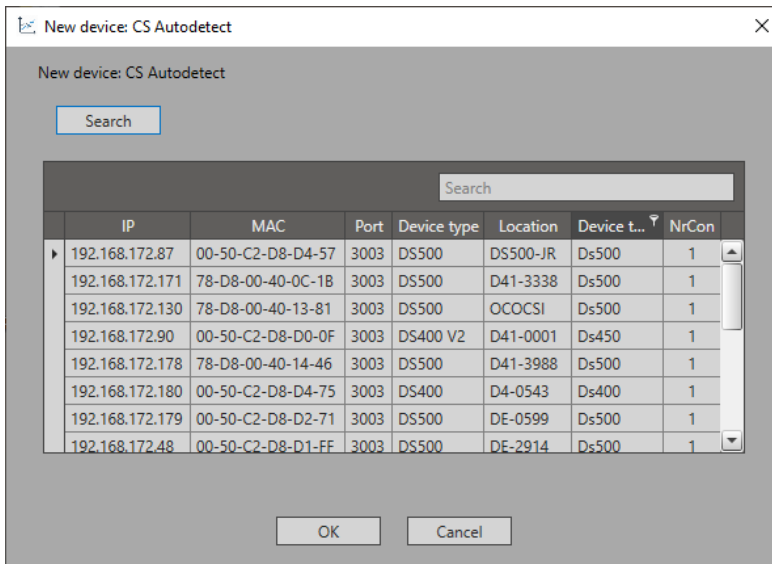
The integration of devices and their measured values into a project by the user is described below. After the initial set-up, all steps can be performed again, detached from all other steps.

7.1 CS Device Integration

The integration of sensors can be done by using the “Device” item in the project structure.

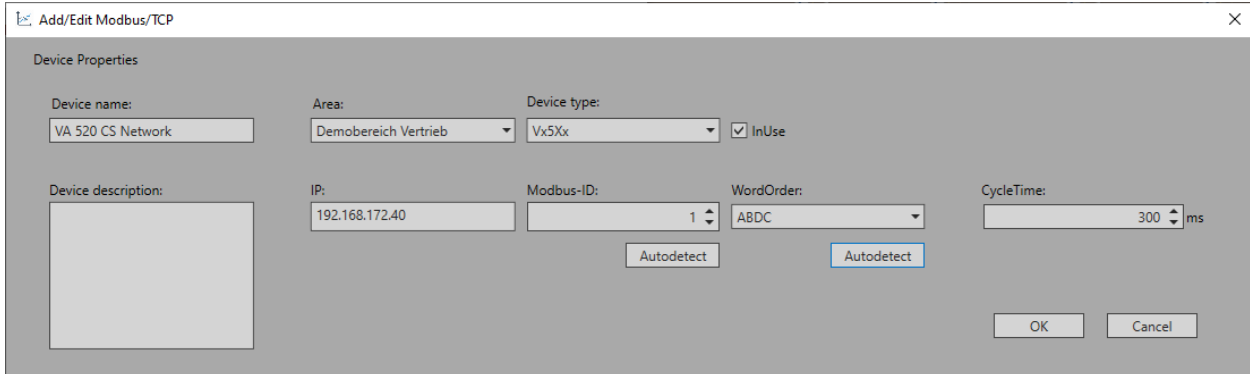


By clicking on the “New” button, the menu for selecting the sensor interface opens. For the integration of CS devices a Modbus TCP (Ethernet) interface is required. Select “Modbus/TCP” in the list of the device type and then the type “CS device or sensor”. By using the Autodetect function the CS devices can be searched for automatically in the network. To do this, click the “Search” button and then select the device to be integrated from the list.



In the next step you assign a device name and assign the device to an area. The “Use” checkbox can be checked to select if the sensor is still active (checked) or deactivated. A deactivated sensor (example: The sensor is currently not installed because it is being calibrated or is defective) is no longer queried and will therefore not cause any error messages on the server.

You may also set the Modbus ID, the word order and the cycle time. Check whether these settings correspond to your device. If you have a volume flow or dew point sensor from CS, the Modbus ID and the Wordorder can be retrieved from the sensor via the Autodetect function (“Autom. Detect” button).



The screenshot shows a dialog box titled "Add/Edit Modbus/TCP" with a close button (X) in the top right corner. The dialog is divided into several sections for configuring a device:

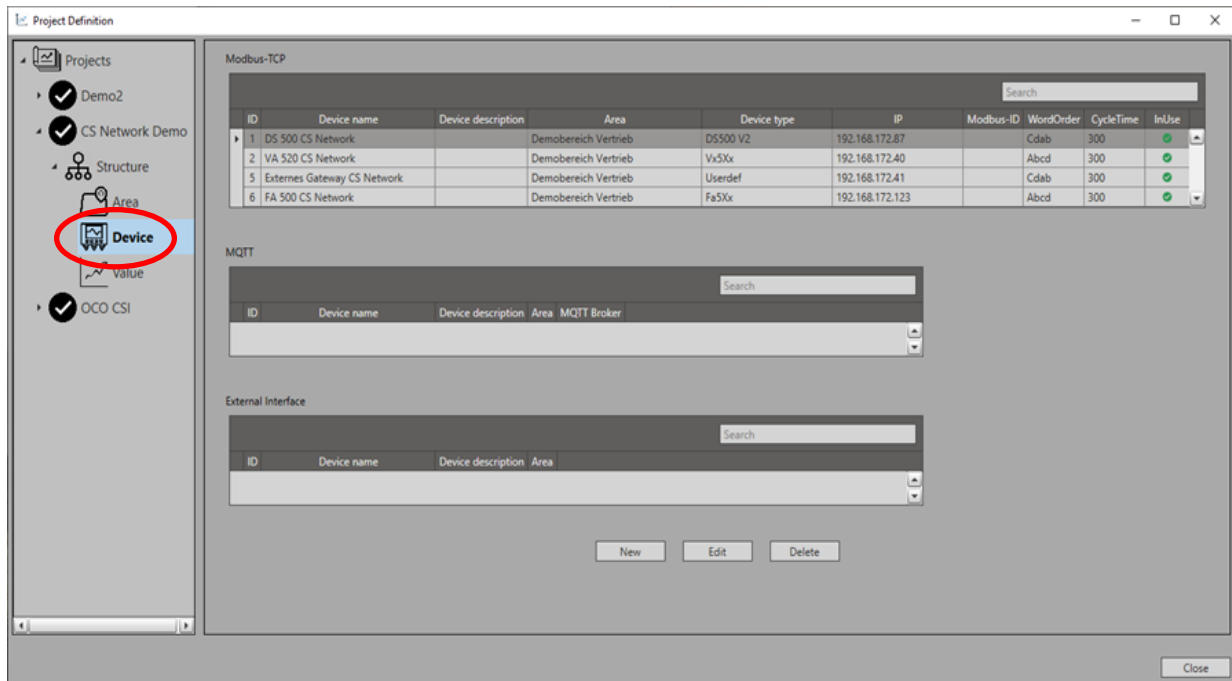
- Device name:** A text input field containing "VA 520 CS Network".
- Area:** A dropdown menu showing "Demobereich Vertrieb".
- Device type:** A dropdown menu showing "Vx5Xx".
- InUse:** A checked checkbox.
- Device description:** A large empty text area.
- IP:** A text input field containing "192.168.172.40".
- Modbus-ID:** A text input field containing "1".
- WordOrder:** A dropdown menu showing "ABDC".
- CycleTime:** A text input field containing "300" with "ms" to its right.

There are two "Autodetect" buttons: one below the Modbus-ID field and one below the WordOrder field. At the bottom right, there are "OK" and "Cancel" buttons.

If the devices are integrated, they appear in the device list. Next, the measured values that need to be recorded must be configured.

7.2 Integration of Third Party Sensors

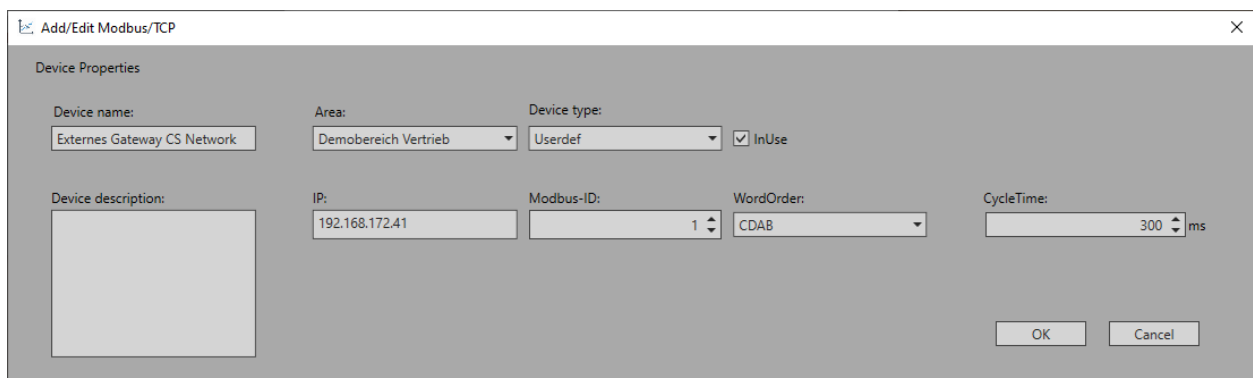
The integration of sensors can be done by using the “Device” item in the project structure.



By clicking on the “New” button, the menu for selecting the sensor interface opens. For the integration of third party sensors a Modbus TCP (Ethernet) interface is required. Select “Modbus/TCP” in the list of the device type and then the type “User definition”.

In the next step you assign a device name and assign the device to an area. The "Use" checkbox can be checked to select if the sensor is still active (checked) or deactivated. A deactivated sensor (example: The sensor is currently not installed because it is being calibrated or is defective) is no longer queried and will therefore not cause any error messages on the server.

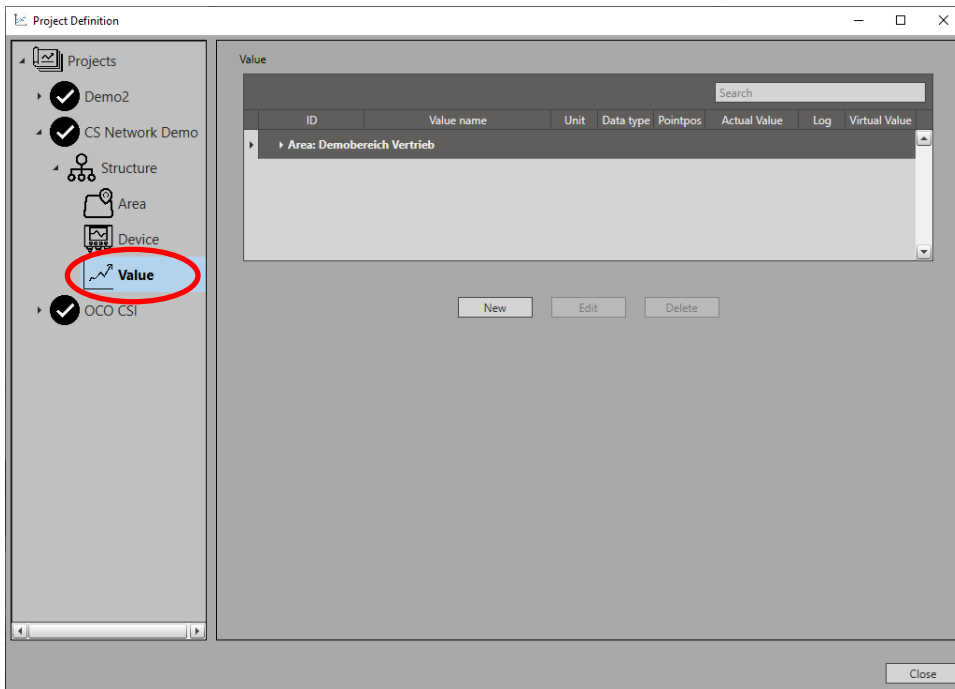
You may also set the Modbus ID, the word order and the cycle time. Check whether these settings correspond to your device.



If the devices are integrated, they appear in the device list. Next, the measured values that need to be recorded must be configured.

7.3 Configuration of Measured Values for CS Devices

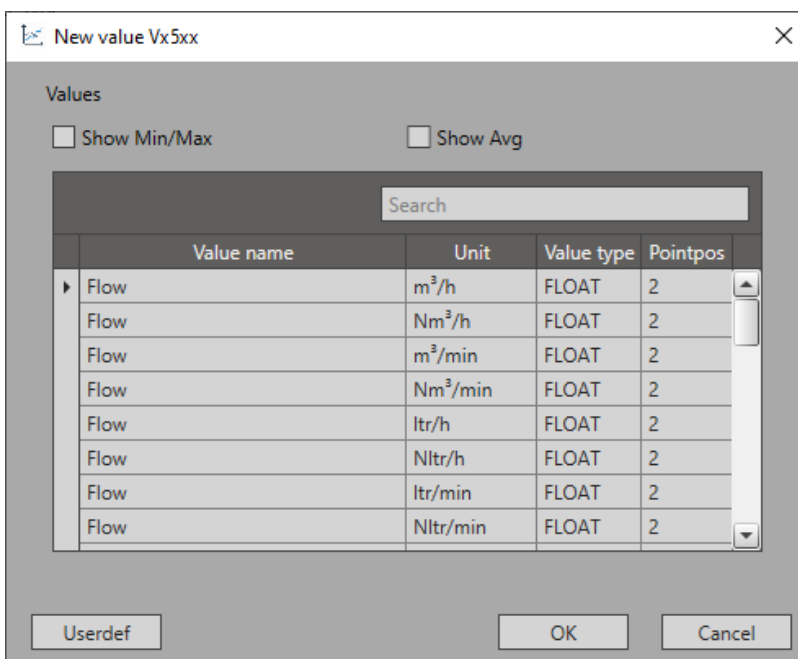
The selection of the measured values per device is done via the “Measured values” category in the project structure.



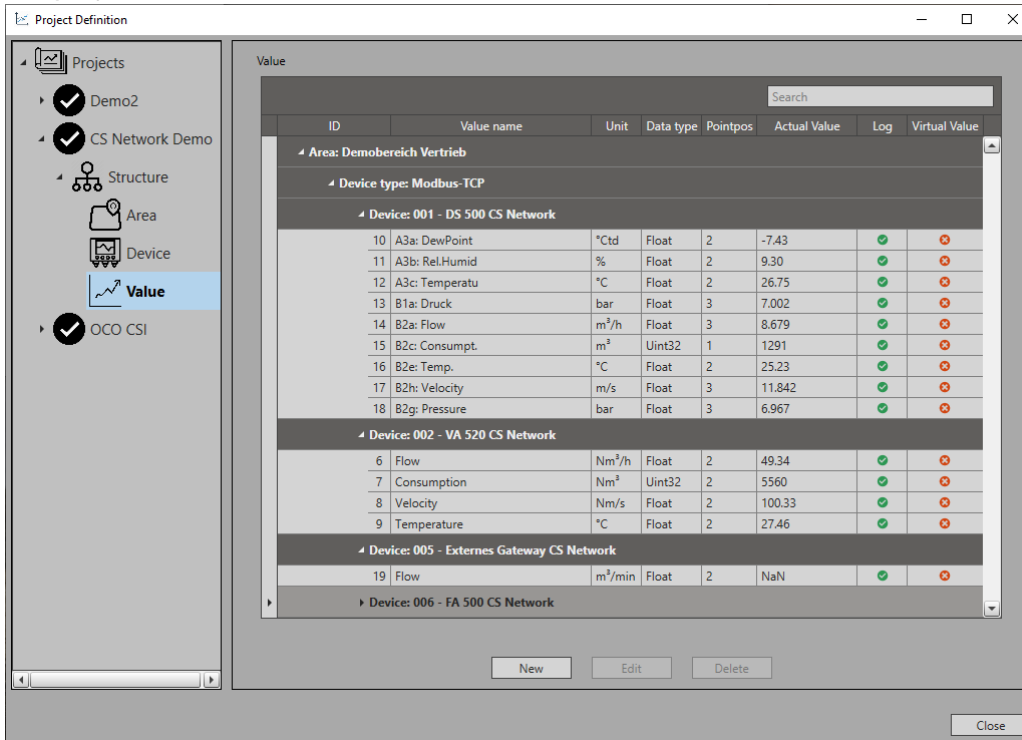
Clicking on the “New” button opens the device selection list. Select the device from which the measured values should be recorded. You can then distinguish between a device value or a virtual value.

Device values are the measured values that are measured directly by the device. A virtual value can be calculated from the device values via mathematical functions.

On CS devices, the Modbus registers and addresses as well as the data type can be accessed preconfigured. Select the corresponding measured values and click on “OK”.



Once all measured values have been integrated, they appear in the measured value list under the project structure.



The screenshot shows the 'Project Definition' window with a 'Value' table. The table is organized into sections for different devices and areas. The 'Value' section is currently selected in the left-hand navigation pane.

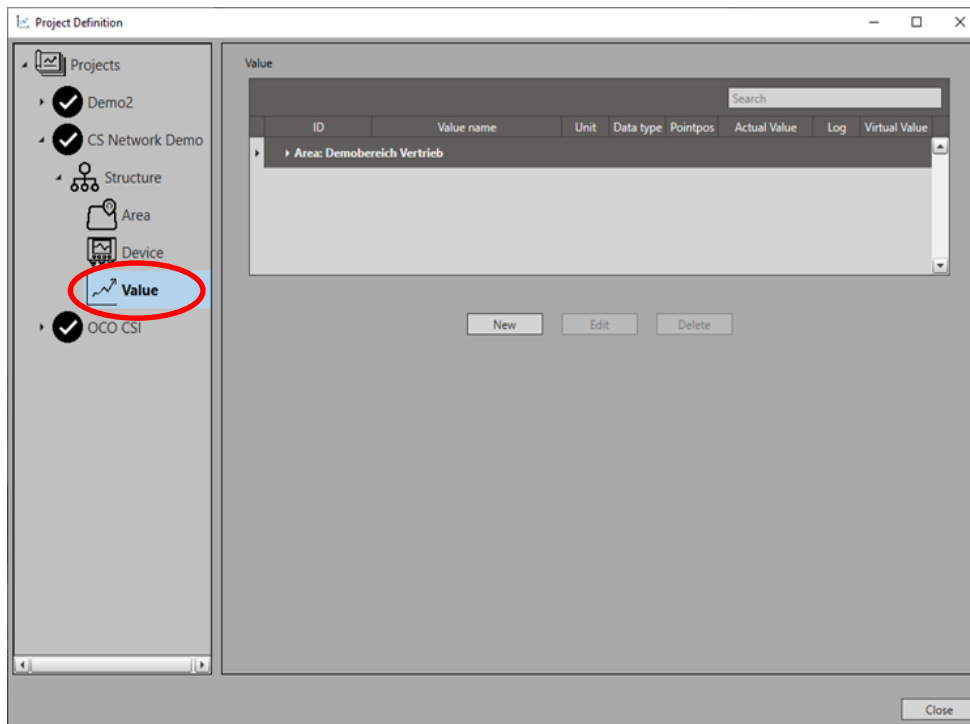
ID	Value name	Unit	Data type	Pointpos	Actual Value	Log	Virtual Value
Area: Demobereich Vertrieb							
Device type: Modbus-TCP							
Device: 001 - DS 500 CS Network							
10	A3a: DewPoint	°Ctd	Float	2	-7.43	✓	✗
11	A3b: Rel.Humid	%	Float	2	9.30	✓	✗
12	A3c: Temperatu	°C	Float	2	26.75	✓	✗
13	B1a: Druck	bar	Float	3	7.002	✓	✗
14	B2a: Flow	m³/h	Float	3	8.679	✓	✗
15	B2c: Consumpt.	m³	Uint32	1	1291	✓	✗
16	B2e: Temp.	°C	Float	2	25.23	✓	✗
17	B2h: Velocity	m/s	Float	3	11.842	✓	✗
18	B2g: Pressure	bar	Float	3	6.967	✓	✗
Device: 002 - VA 520 CS Network							
6	Flow	Nm³/h	Float	2	49.34	✓	✗
7	Consumption	Nm³	Uint32	2	5560	✓	✗
8	Velocity	Nm/s	Float	2	100.33	✓	✗
9	Temperature	°C	Float	2	27.46	✓	✗
Device: 005 - Externes Gateway CS Network							
19	Flow	m³/min	Float	2	NaN	✓	✗
Device: 006 - FA 500 CS Network							

After this step, the configuration of the devices and measured values is completed. The program is restarted.

Devices and measured values can be added, changed or deleted via the project structure.

7.4 Configuration of Measured Values for Third Party Sensors

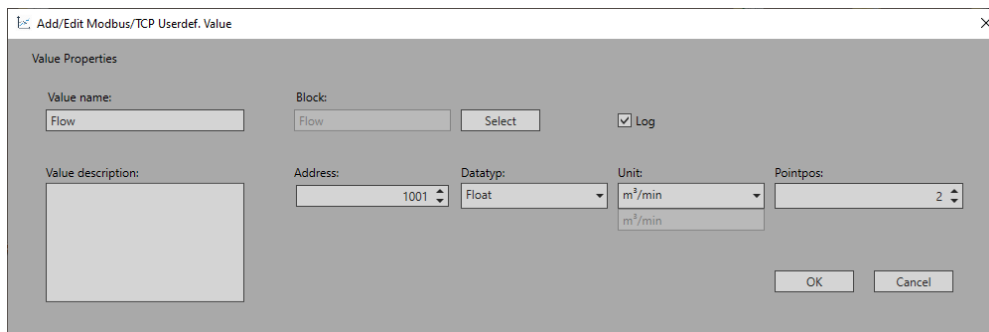
The selection of the measured values per device is done via the “Measured values” category in the project structure.



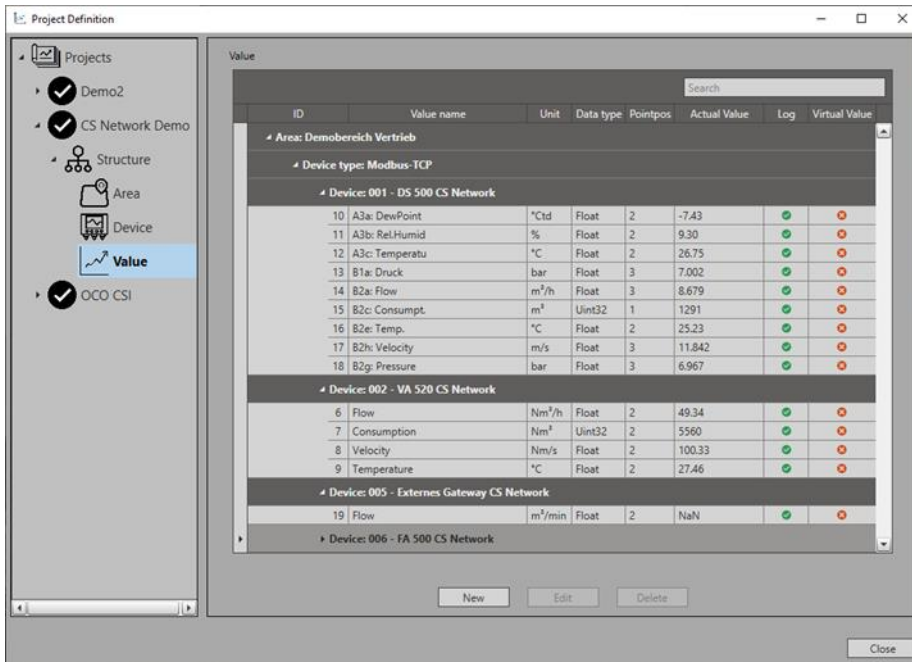
Clicking on the “New” button opens the device selection list. Select the device from which the measured values should be recorded. You can then distinguish between a device value or a virtual value.

Device values are the measured values that are measured directly by the device. A virtual value can be calculated from the device values via mathematical functions.

For third party sensors, the configuration of the measured values needs to be done manually. To do this, select the device and the measured value type and enter the Modbus addresses, the data type, the unit and the decimal places in the next step. For the selection of the Modbus addresses, a block must be set up in advance. To do this, click on the “Select” button and enter the block name, the function code, the start address and the number of subsequent addresses in the menu under “New”. By using the “Log” checkbox, you select whether the data will be recorded.



Once all measured values have been integrated, they appear in the measured value list under the project structure.




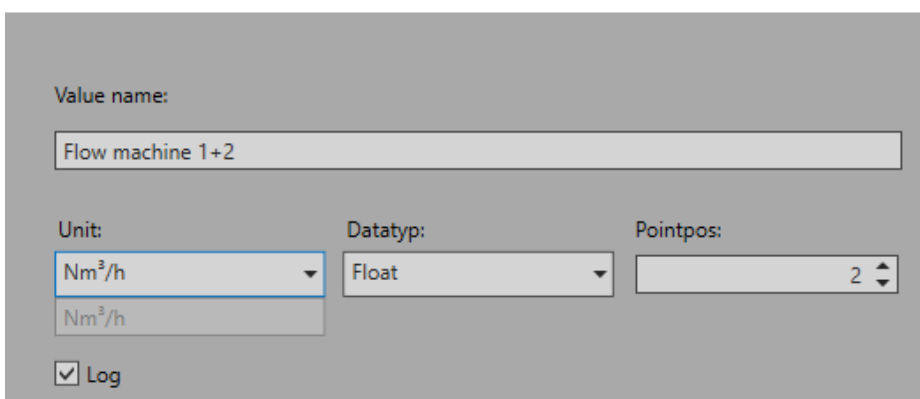
After this step, the configuration of the devices and measured values is completed. The program is restarted.

Devices and measured values can be added, changed or deleted via the project structure.

7.5 Creating Virtual Values

If you select the option virtual value at the measured value configuration, the setting window opens. Enter the basic data, such as name, unit and decimal places. Activate the checkbox “Log”, so that the virtual data are stored.

 Add/Edit Virtual Value

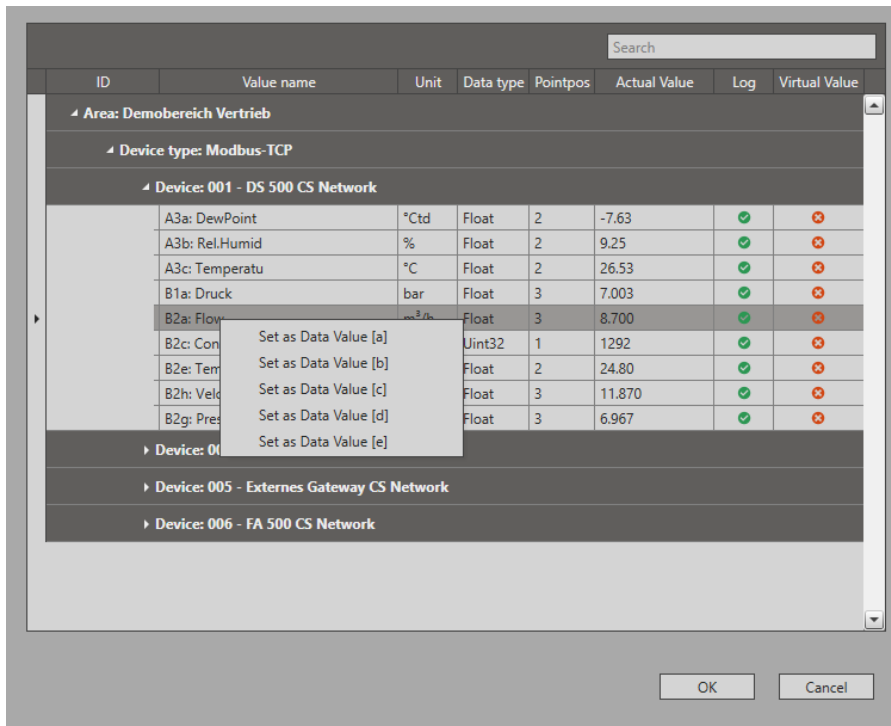


Value name:
Flow machine 1+2

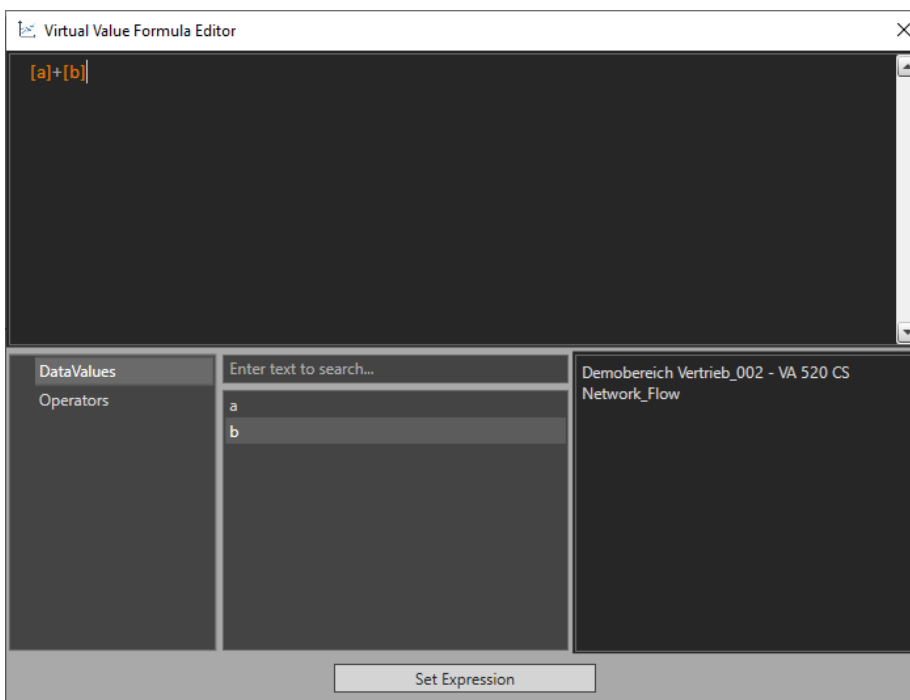
Unit: Nm³/h
Datatype: Float
Pointpos: 2

Log

Then you have to assign the unit values to the data values (a to e). To do this, right-click on the corresponding device value from the selection list and link it to a data value. It is possible to assign up to five data values.



To create a formula, use the “Create” button and the formula editor will open. There you can enter your formula and use the variables a - e for the data values. You can optionally use the DataValues and operators from the displayed table. With “Set printout” you save the formula.



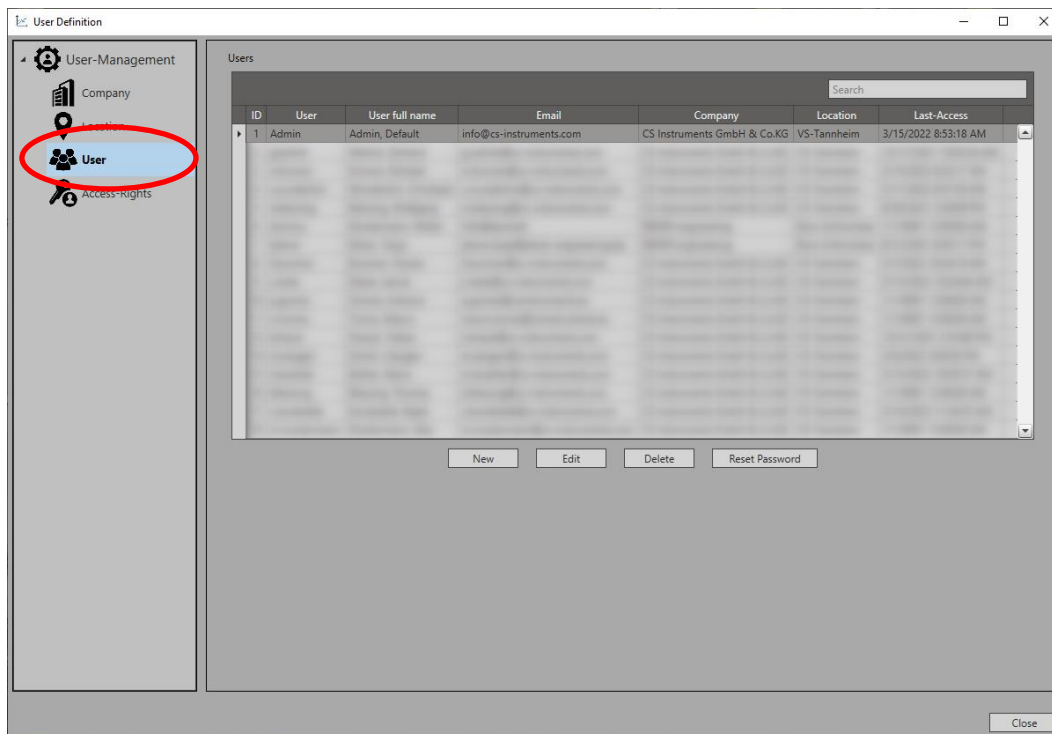
Once the virtual measured value is set up, it appears in the measured value list in the project structure.

8 Creating Users and Access Rights

The following describes the creation of users and their access rights in a project by another user. After the initial set-up, all steps can be performed again, detached from all other steps.

8.1 Creating New Users

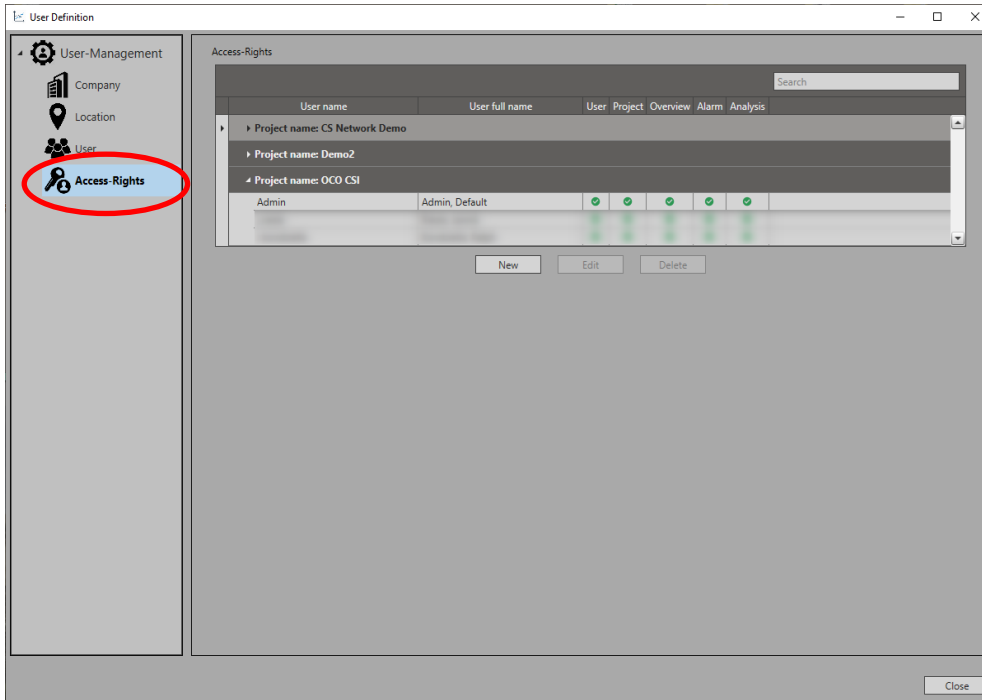
When working with the CS Network, several users can be assigned different access rights. To do this, click on the “Settings” button in the start menu after logging in and then on “User settings”. The user overview opens. Here you can create new users or edit or delete existing users.



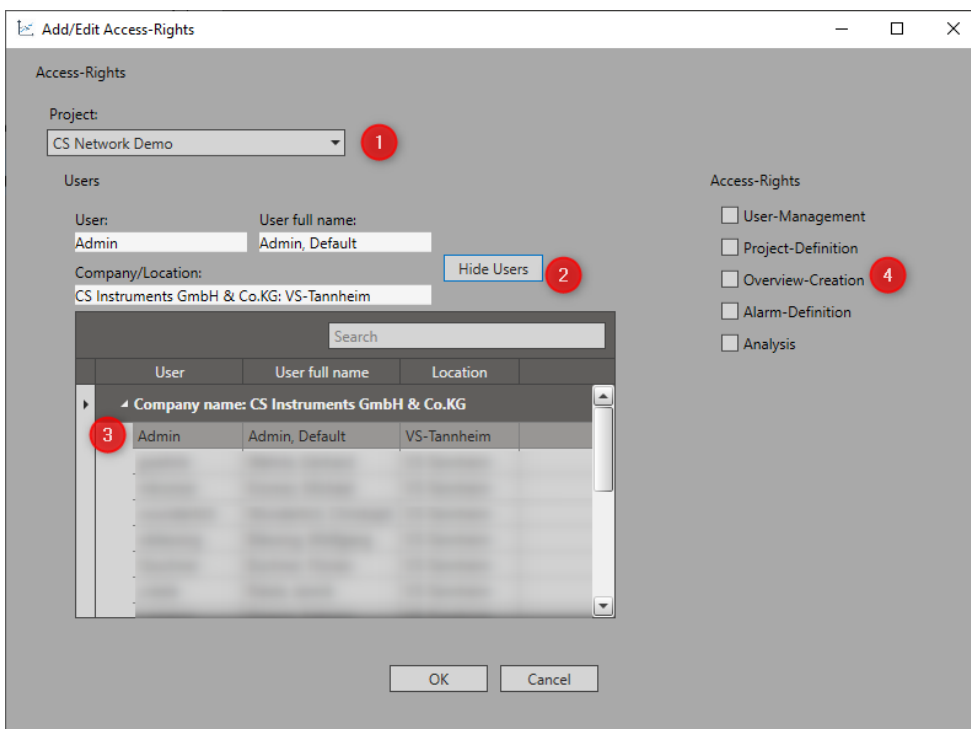
Create a new user via the “New” button, enter the data and assign it to a company/location. The user appears in the user list.

8.2 Assigning Access Rights

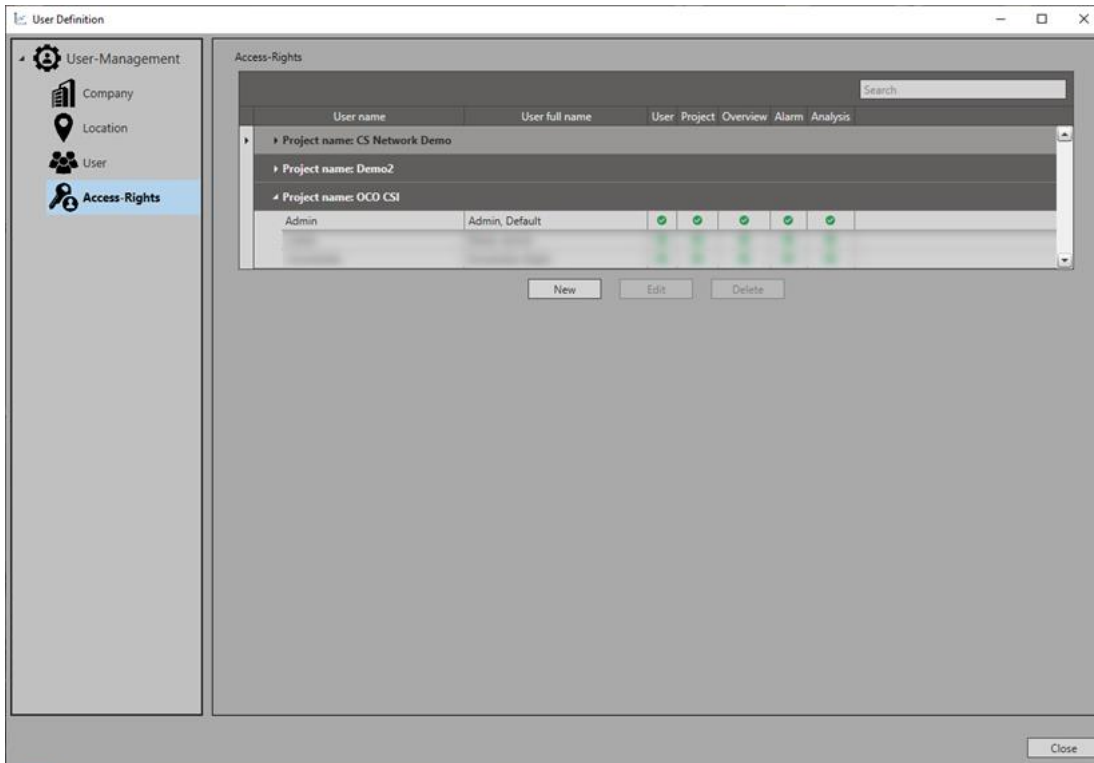
By assigning access rights, you are able to give the user read or write access to different areas. To do this, click on the “Settings” button in the start menu after logging in and then on “User settings”. The user overview opens. In the “Access rights” category, assign new rights to the users, edit or delete them.



Assign the rights to a project (1). Then select the user (2) + (3) and assign the corresponding rights (4).



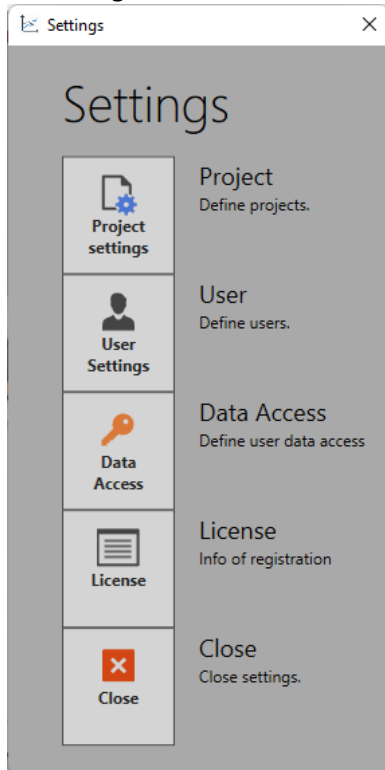
Once the rights have been assigned to the user, this user appears in the “Access rights” overview.



This enables you to individually assign access rights to different users.

8.3 Assigning data accesses

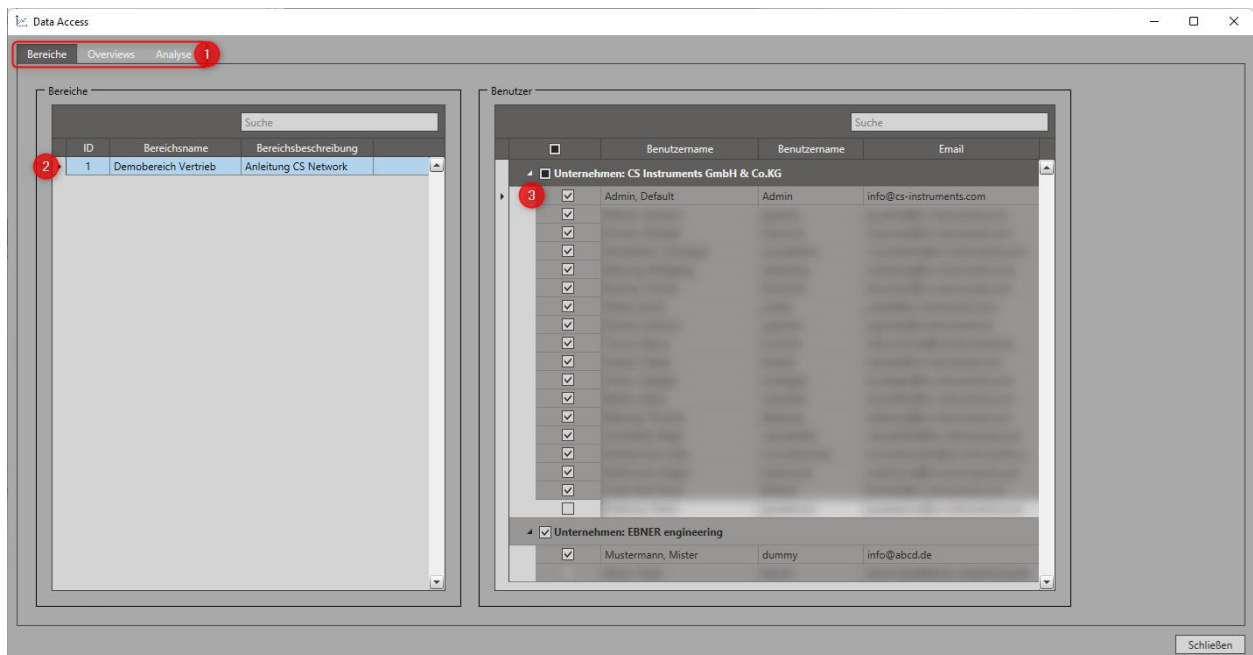
Via the category "Data access" you can control the access of users to different data. In this way, only the data assigned to each user is visible.



Data accesses refer to the modules Areas, Overviews and Analysis.

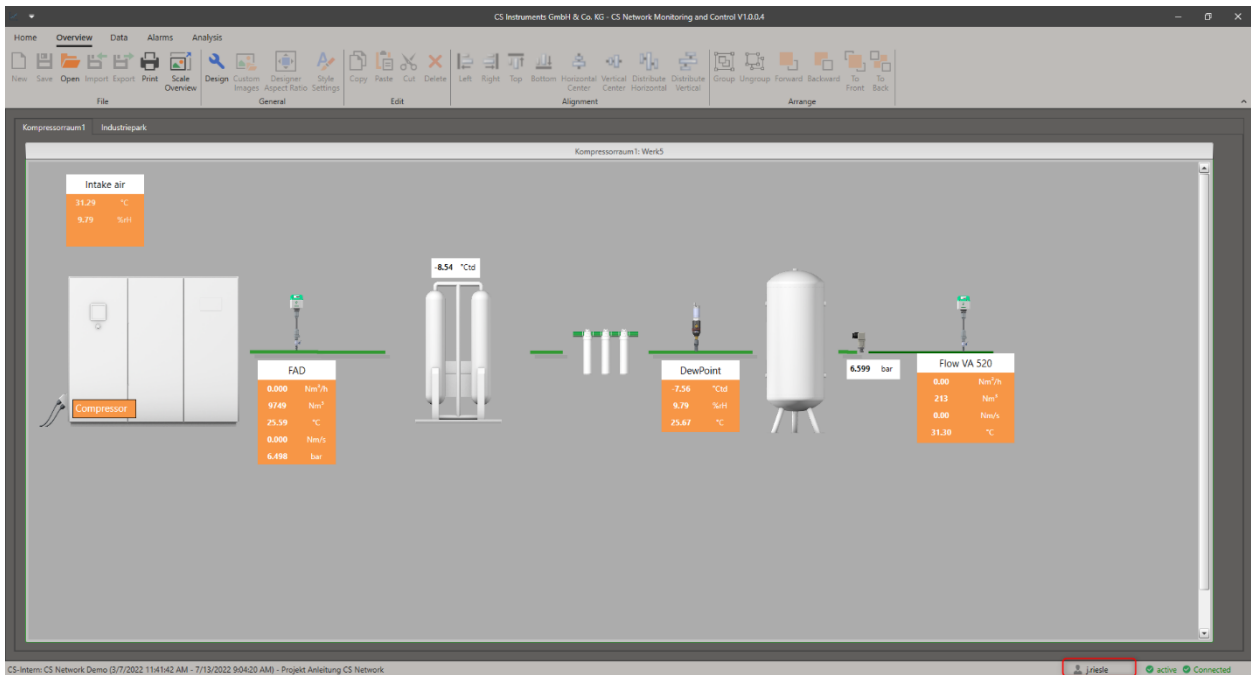
To assign access releases, proceed as follows:

First select the module and then the subcategory. Allow access via the checkbox in front of the user. If the checkbox is ticked, the user has access to the data.

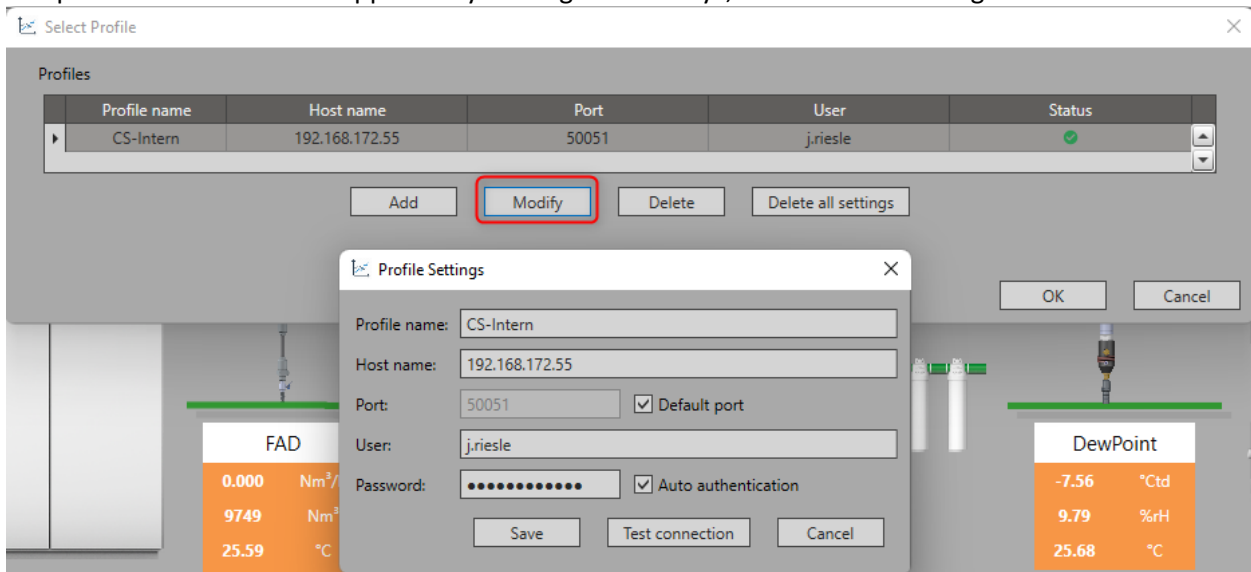


8.4 Change User

The status bar shows the user currently logged in. Click on the user to change the user.



The profile selection screen appears. By clicking on "Modify", another user can log in.

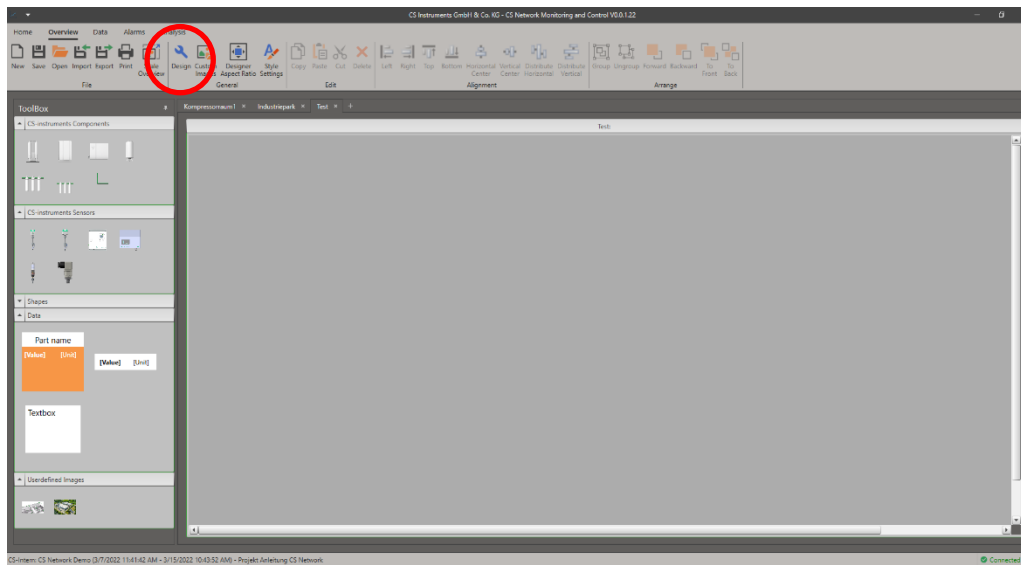


9 Overviews

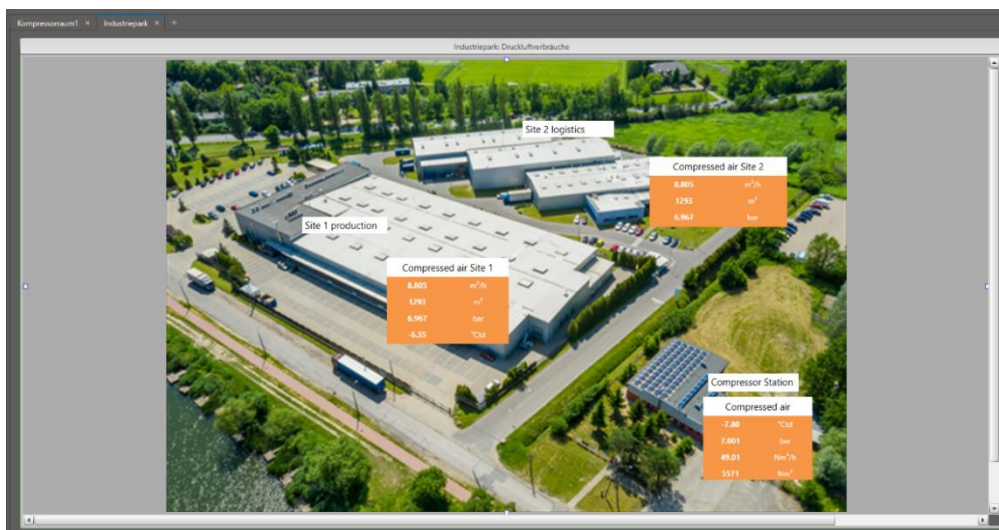
The purpose of overviews within the CS Network is the graphical display of measured values on a central dashboard. Overviews can be customized to better display or monitor areas within a project. Multiple overviews can be created within a project.

9.1 Creating Overviews

To create or edit an overview, a user must activate the “Design” icon in the quick access toolbar. By right-clicking on the overview and then using the “Settings” tab, the name and description of the overview can be changed.



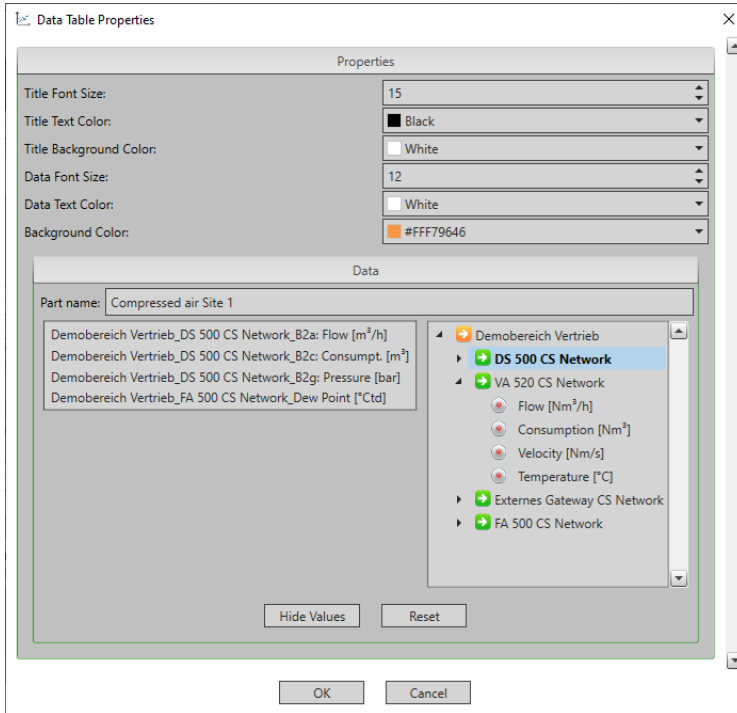
In the designer mode the ToolBox opens. Starting from there, various preconfigured components, shapes and data boxes can be inserted into the overview via drag & drop. Your individual images can be uploaded via the “User definition images” icon in the shortcut.



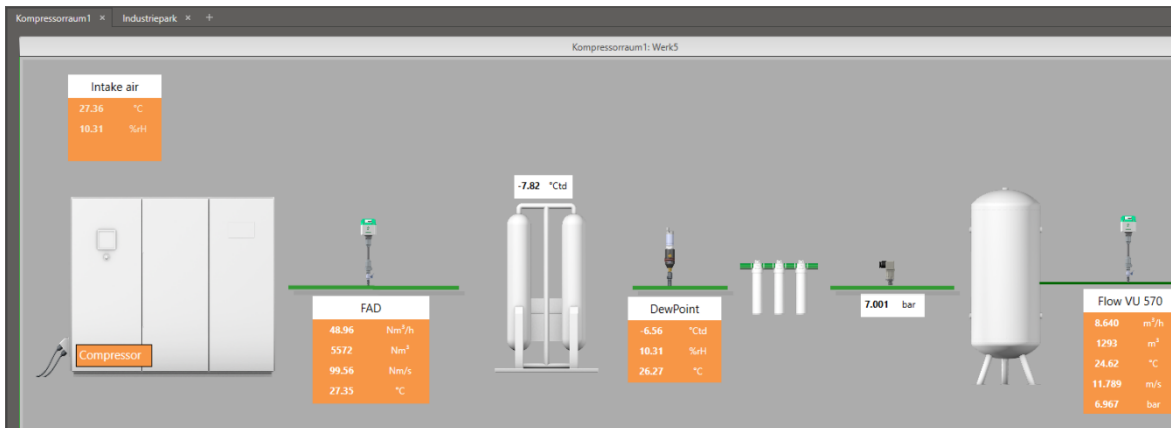
Through the “Style settings” in the quick access toolbar, the data boxes can be individually designed and predefined. User-defined images can be loaded into the software via the corresponding icon in the quick access toolbar.

9.2 Assigning Measured Values in the Overview

Drag and drop one of the data boxes into the overview and edit it via a right click and the “Settings” tab. Here you can change the colour as well as the text. Assign a name in the “Part name” field and select the corresponding measured values under “Display values” by double-clicking on the value.



The data box is now linked to the measured value and displays the measured value in the



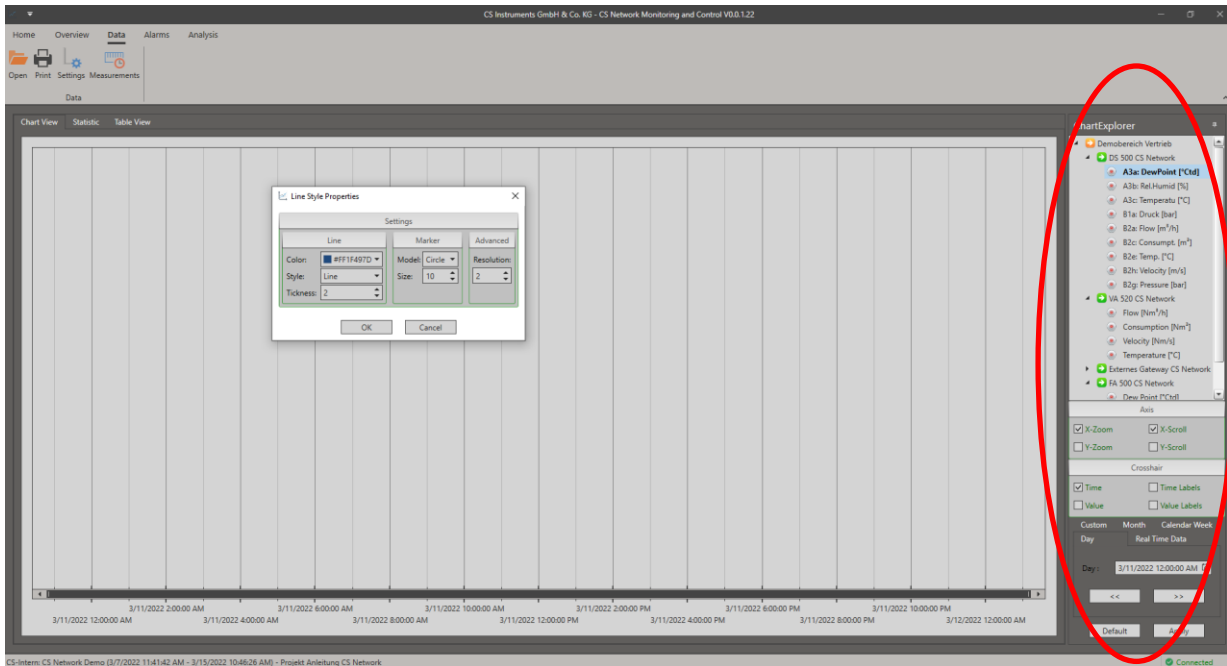
overview.

10 Data Evaluation

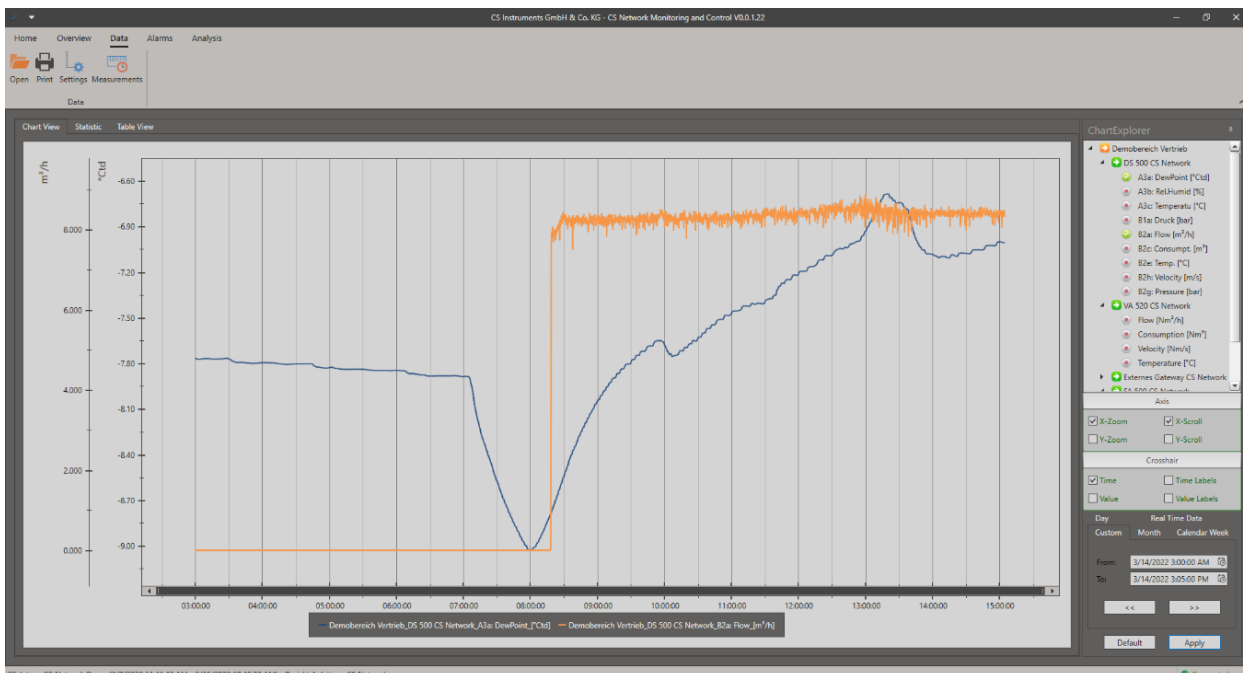
Via the shortcut “Data” you are able to evaluate data of a certain period graphically as well as in tabular form. You can also display the real-time data of the devices can be in a graphic.

10.1 Evaluation of a Specific Period

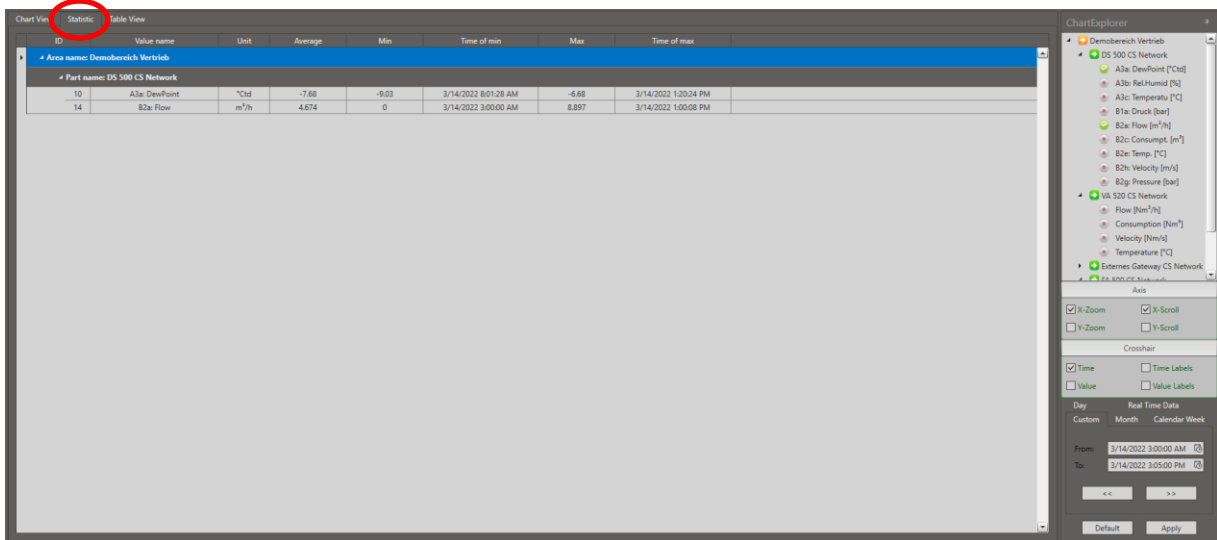
Activate the graphical evaluation in the “ChartExplorer” by double-clicking on the corresponding measured value. The settings window appears. Here you can define the display settings of the measured value curve.



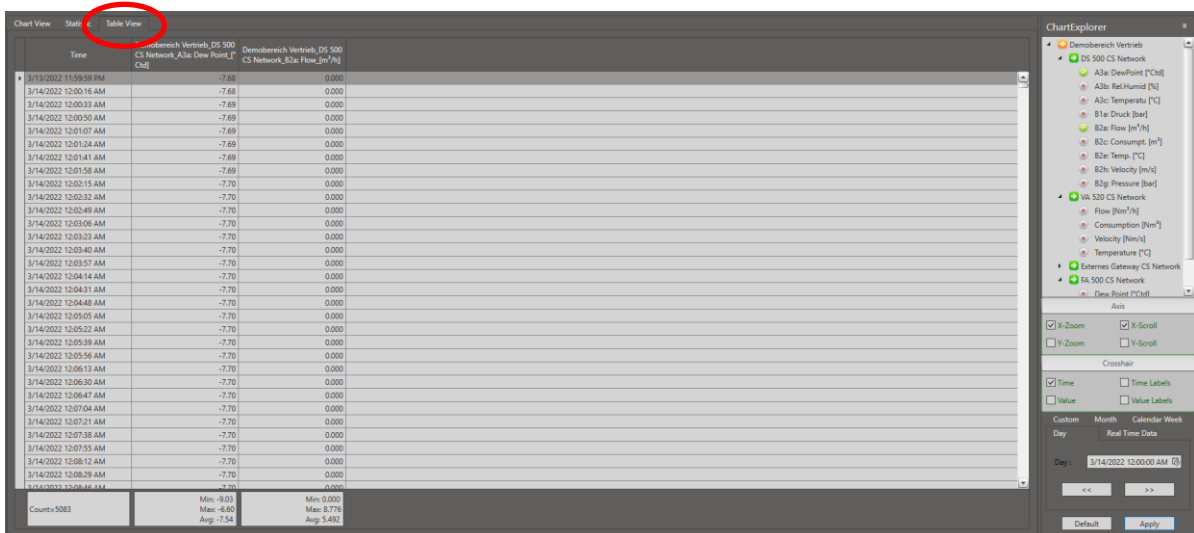
Then in the “ChartExplorer” select the period from which the data should be analysed. You can choose between a specific day, a specific calendar week, a specific month or a user-defined period. Then confirm the period by clicking the “Apply” button.



In the “Statistics” tab, the software automatically determines the statistical values for the activated measured values in the selected period.

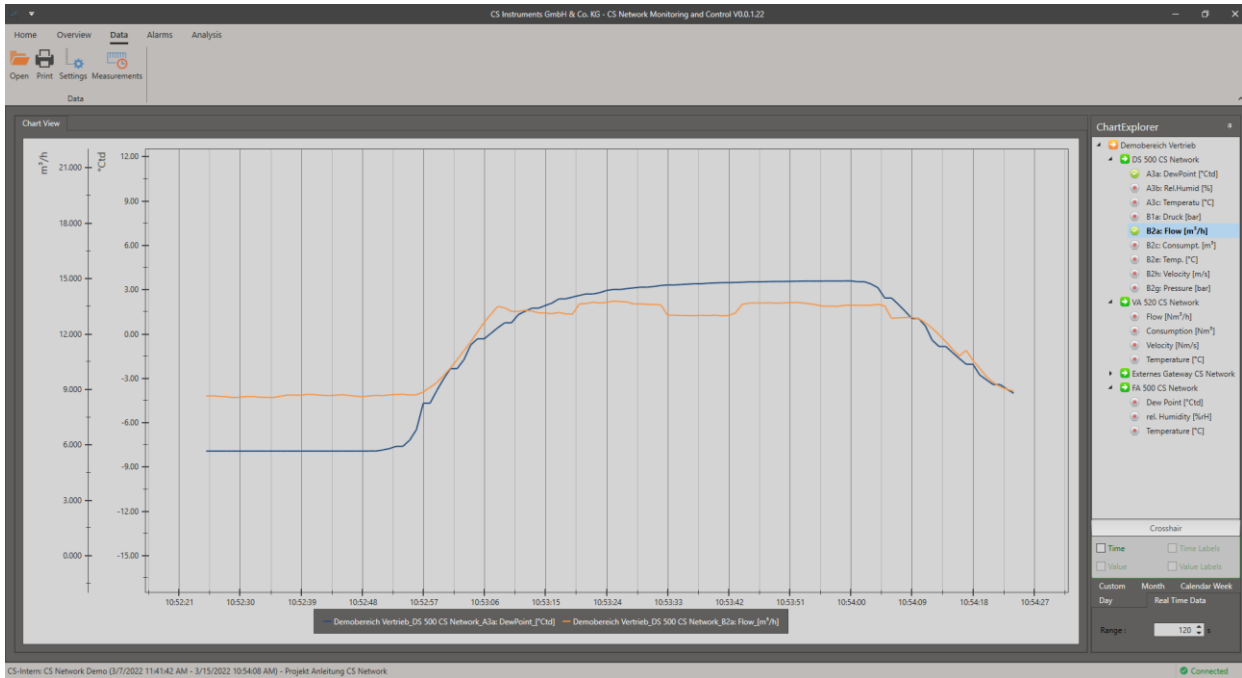


Via the “Table View” tab, the recorded raw data per activated measured value in the selected period can be viewed.



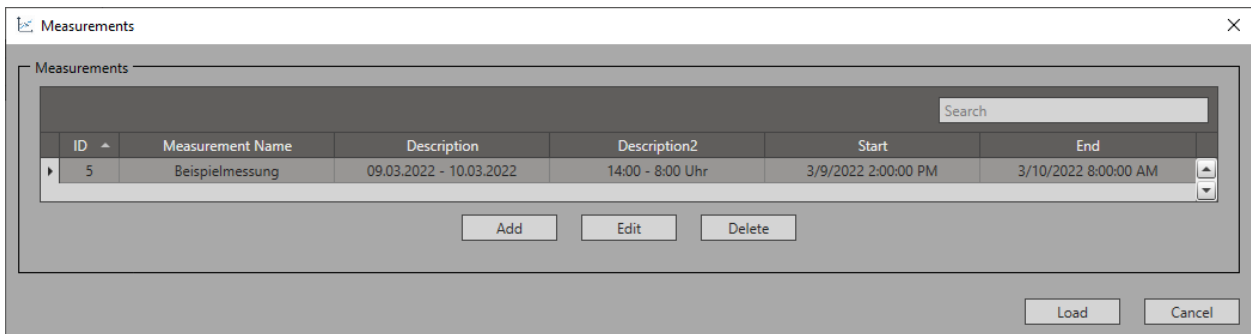
10.2 Real-Time Data

If you would like to record real-time data, activate the appropriate measured values in the “DiagramExplorer” by double-clicking and select “Real-time data” for the time period. Now you can define the scaling of the X-axis in seconds and the real-time data will be displayed graphically.



10.3 Saving Measurements

If you want to save your measurement, you can do this via the shortcut “Measurements” under the button “Add”. Give your measurement a name and optionally a more detailed description. You can then access your measurements at any time via this shortcut.



The screenshot shows the 'Measurements' dialog box. It contains a table with the following data:

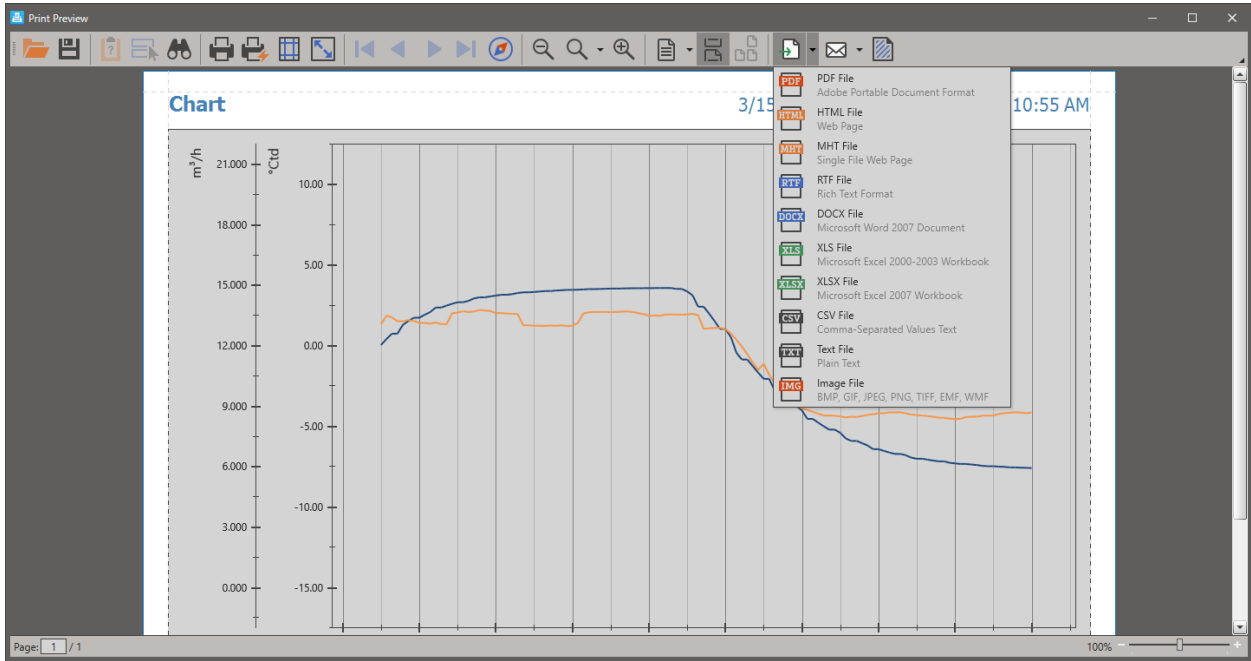
ID	Measurement Name	Description	Description2	Start	End
5	Beispielmessung	09.03.2022 - 10.03.2022	14:00 - 8:00 Uhr	3/9/2022 2:00:00 PM	3/10/2022 8:00:00 AM

Below the table are buttons for 'Add', 'Edit', 'Delete', 'Load', and 'Cancel'.

10.4 Export of Measurements

To export your measurements, statistics or raw data, click on the “Print” icon in the quick access toolbar and select the time period from which the data should be exported. If you have previously selected a user-defined period, use the “Current” category.

In the preview that opens, click on the Export icon and select the desired file type.



If you want to export the data of a real-time measurement, you have to save it in advance under “Measurements”.

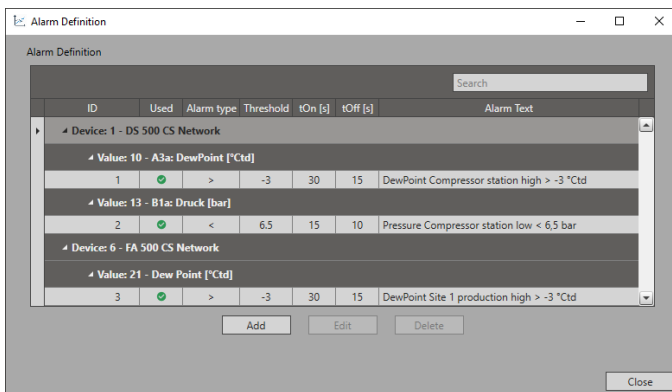
11 Alarms

Below is a description of how to create alarms and how to have individual alarm messages sent to you by e-mail.

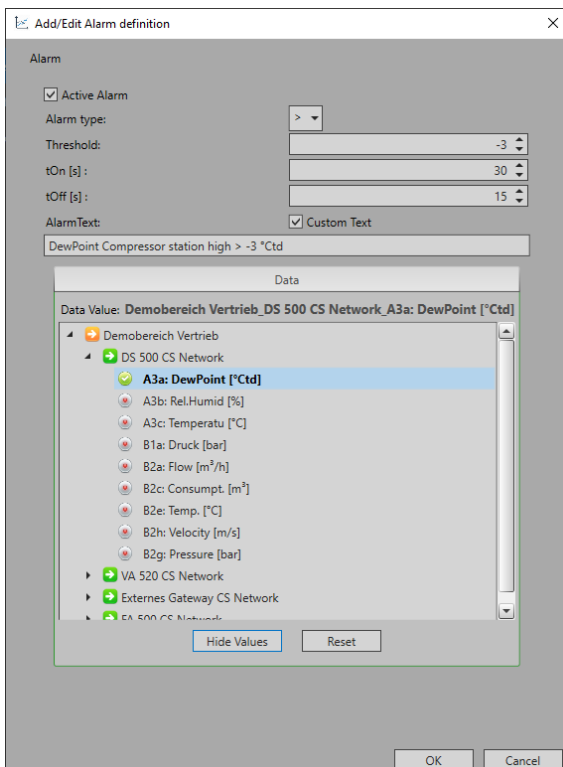
You can see the alarm messages in your overview. If an alarm is triggered, the corresponding data box turns red and an alarm message appears. Furthermore, you can see the currently pending alarms as well as a history in the quick access toolbar under the category “Alarms”.

11.1 Setting Up Alarms

Alarms can be set up in the “Home” menu and then in the “Alarm Definition” category. In the window that appears afterwards, you will find an overview of all active and inactive alarm thresholds and the corresponding message. Via “Add” you can set new alarms.

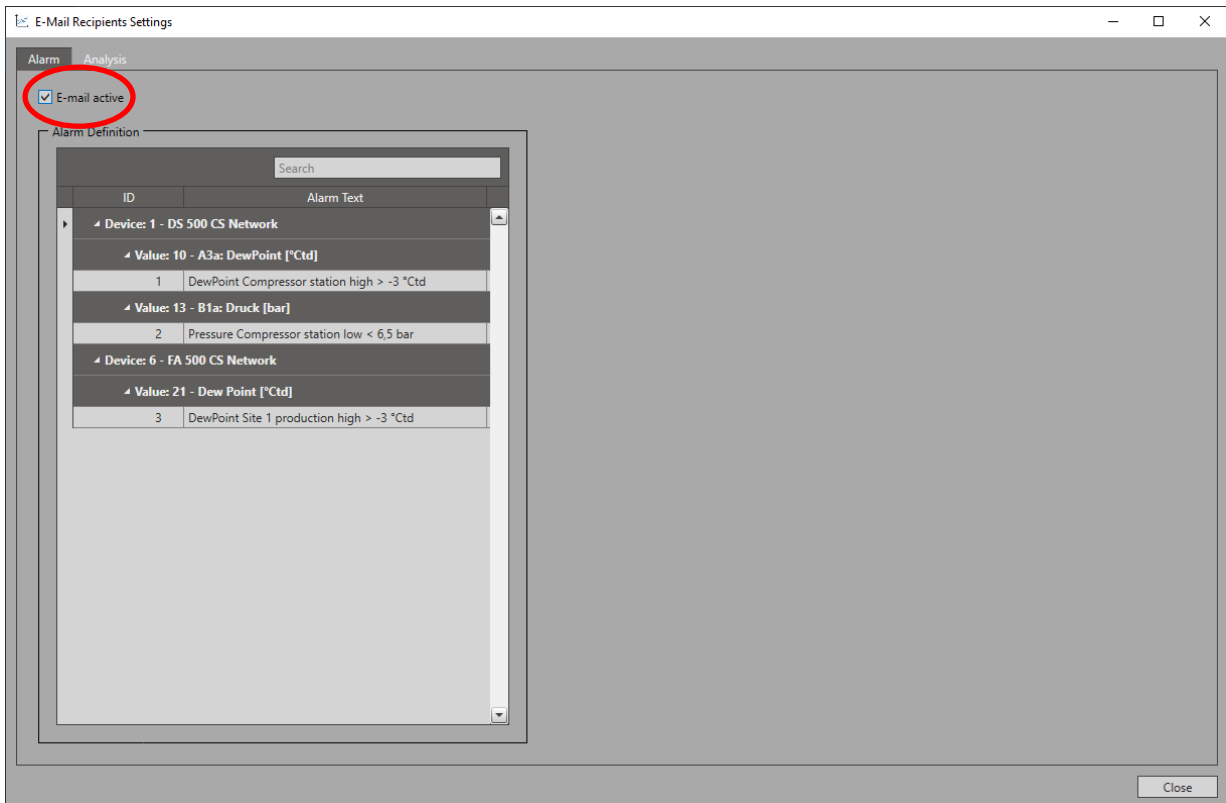


First select under “Alarm type” the condition that should apply and then under “Threshold”, the threshold value when the alarm is triggered. You can also set a delay that determines how long the threshold value must be violated before the alarm goes on (tOn) or off (tOff). Next, assign the alarm to the corresponding measured value under the “Show values” button and a predefined text will appear in the “Alarm text” field. You can edit this text by using the checkbox “User defined text”.



11.2 Setting up E-mail Dispatch for Alarms

If you not only want to see your alarm messages visually in your overviews, but also want to be notified by e-mail, you can set up automated e-mail dispatch under the Home menu in the “E-mail recipients” category in the Alarm tab. To do this, activate the “E-mail active” checkbox in the “Settings for e-mail recipients” menu.

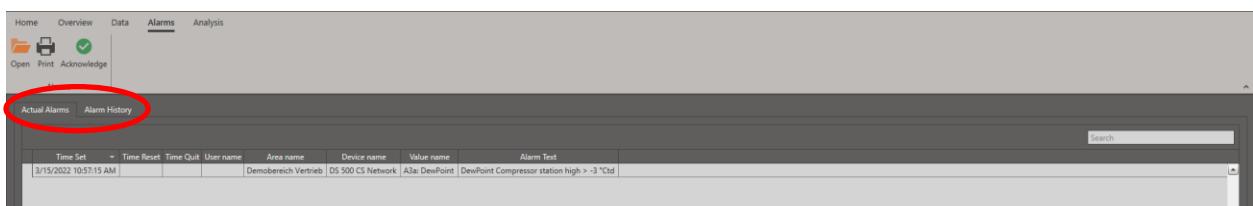


Then select the alarm message that is to be sent by e-mail. A mask opens where all users appear. Now you can activate the e-mail dispatch to the user or the entire company via the checkbox. If the notification has to be sent to a person who is not a user of the CS Network, enter the corresponding e-mail of the person under “User def”. To do this, open the “Add” tab by right-clicking in the table.

Use the “Test mail” button to test the e-mail sending.

11.3 Acknowledging Alarms

After fixing the errors that triggered the alarms, you need to acknowledge the alarm messages. To do this, select the relevant alarm message in the quick access toolbar under “Actual Alarms” and then click “Acknowledge”. The alarms are moved to the “Alarm History” and can be retrieved there at any time.



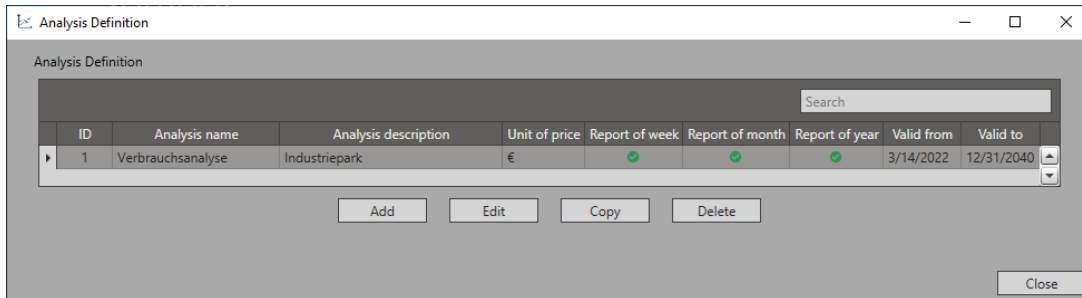
The alarm history can also be found in the “Actual Alarms” category under the “Alarm History” tab.

12 Analyses of Consumptions

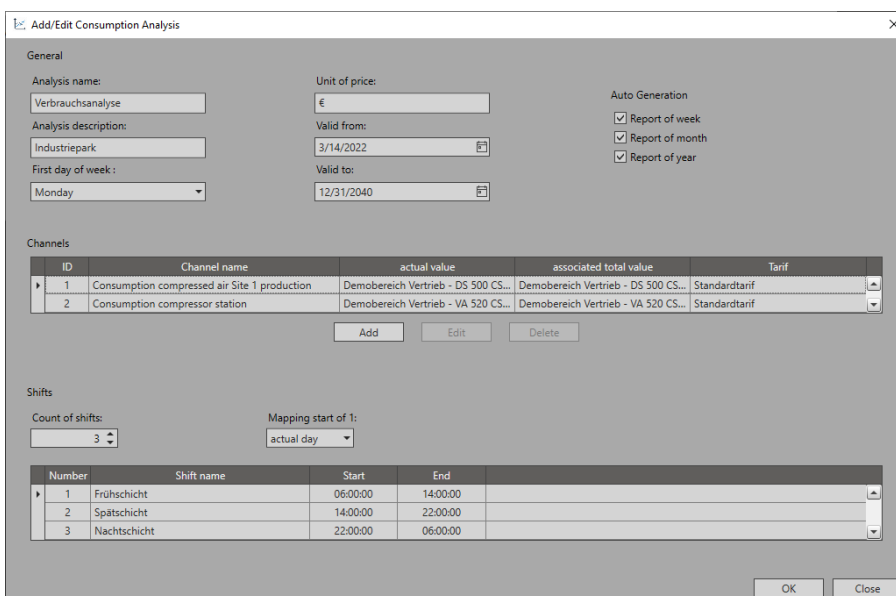
Using the CS Network, you can have automated reports issued to keep an eye on consumption at all times.

12.1 Setting up an Analysis

You create consumption analyses in the home menu in the category “Analysis Definition”. Use the “Add” button to create new analyses and there you will also find a complete overview of the analyses already created.



Then enter the data for the analysis to be created and select the report type. You can also define layers to allow you to compare them with each other.



The following report types are preset:

Weekly report:

The weekly report is sent to you daily. It lists each day cumulatively.

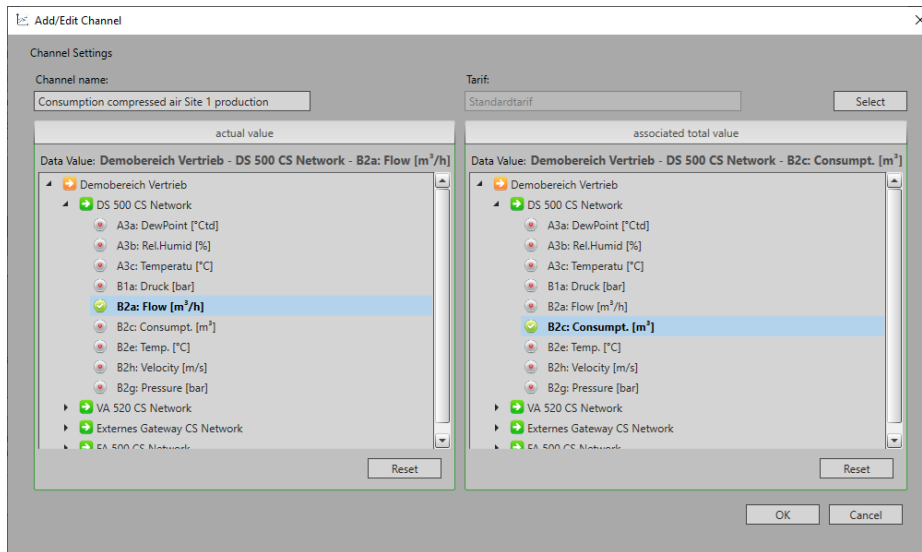
Monthly report:

The monthly report is sent to you weekly. It lists each week cumulatively.

Annual report:

The annual report is sent to you monthly. It lists each month cumulatively.

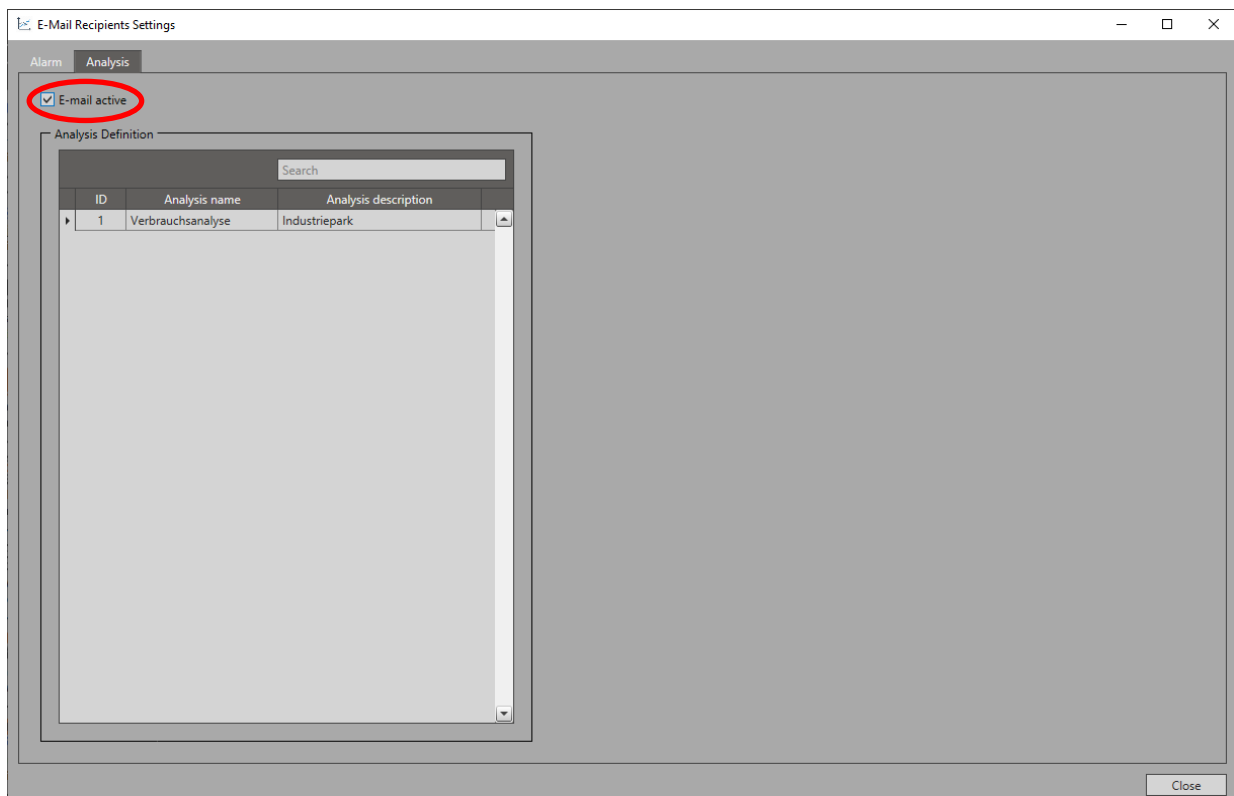
Select the corresponding measured values that need to be included in the evaluation. Here you have to select the measured value and the corresponding cumulative value.



Use the “Select” button to select a tariff to determine the price per unit. If no tariff is stored yet, you can also insert a new tariff there.

12.2 Setting up E-mail Dispatch of Analyses

Set-up the automated e-mail dispatch under the Home menu in the category “E-mail recipients” in the Analysis tab. To do this, activate the “E-mail active” checkbox in the “Settings for e-mail recipients” menu.

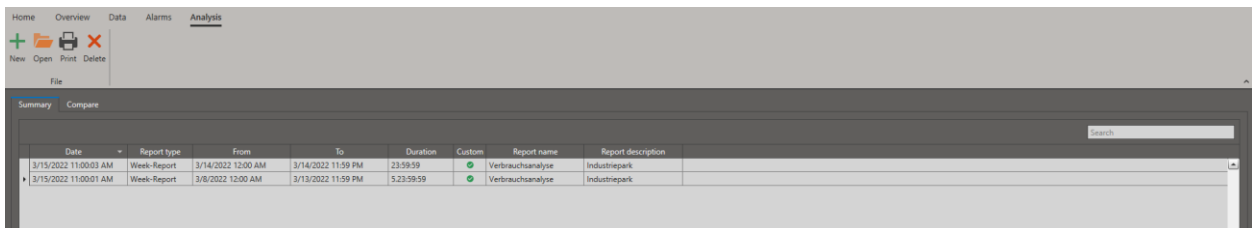


Then select the analysis that is to be sent by e-mail. A mask opens where all users appear. Now you can activate the e-mail dispatch to the user or the entire company via the checkbox. If the notification has to be sent to a person who is not a user of the CS Network, enter the corresponding e-mail of the person under “User def”. To do this, open the “Add” tab by right-clicking in the table.

Use the “Test mail” button to test the e-mail sending.

12.3 Retrieving Analyses

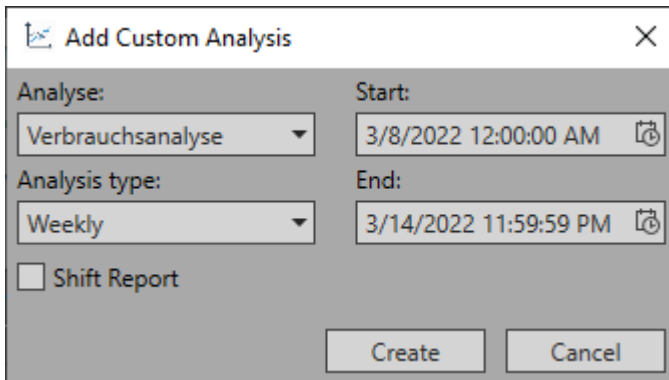
In the quick access “Analysis” under the tab “Summary” you will find all reports that have ever been generated. You can retrieve them at any time by double-clicking on them.



Date	Report type	From	To	Duration	Custom	Report name	Report description
3/15/2022 11:00:03 AM	Week-Report	3/14/2022 12:00 AM	3/14/2022 11:59 PM	23:59:59	●	Verbrauchsanalyse	Industrepark
3/15/2022 11:00:01 AM	Week-Report	3/8/2022 12:00 AM	3/13/2022 11:59 PM	5:23:59:59	●	Verbrauchsanalyse	Industrepark

12.4 Creating an analysis for an individual period

If you would like to create an analysis for an individual period, you must first set it up as described. Then you can create an analysis via the “New icon” in the quick access. To do this, select the analysis template, the time period and the analysis type. Then click on “Create” and the report will appear in your summary.



Add Custom Analysis ✕

Analyse: Verbrauchsanalyse ▼ Start: 3/8/2022 12:00:00 AM 📅

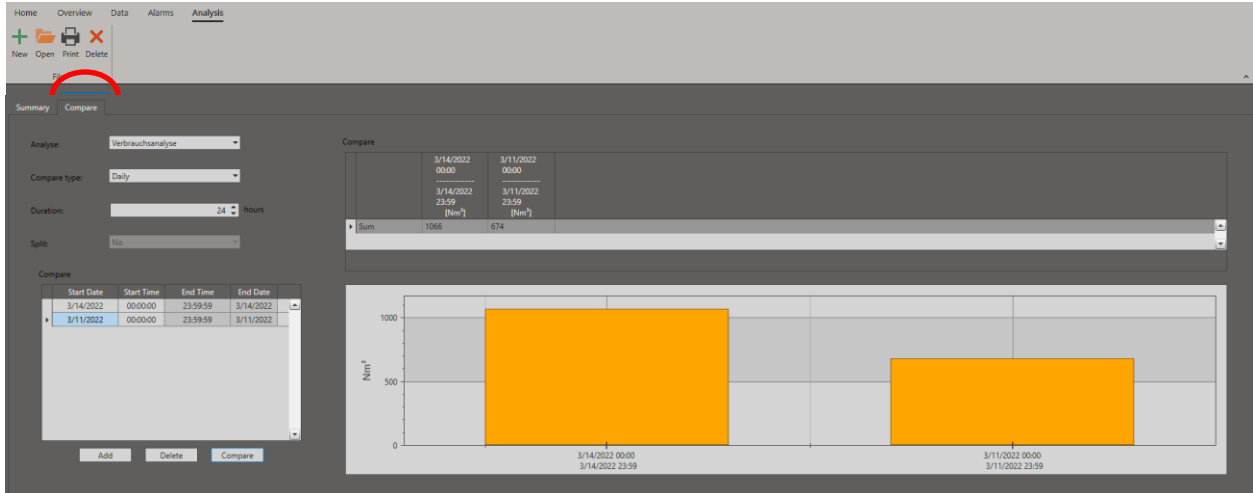
Analysis type: Weekly ▼ End: 3/14/2022 11:59:59 PM 📅

Shift Report

Create
Cancel

12.5 Comparing Analyses

To compare different time periods directly with each other, go to the “Compare” tab via the access “Analysis”. The prerequisite is that you have defined analyses beforehand, as described above.



The screenshot shows the 'Compare' configuration screen. On the left, the 'Analysis' dropdown is set to 'Verbrauchsanalyse', 'Compare type' is 'Daily', and 'Duration' is '24' hours. Below these settings is a table for defining comparison periods:

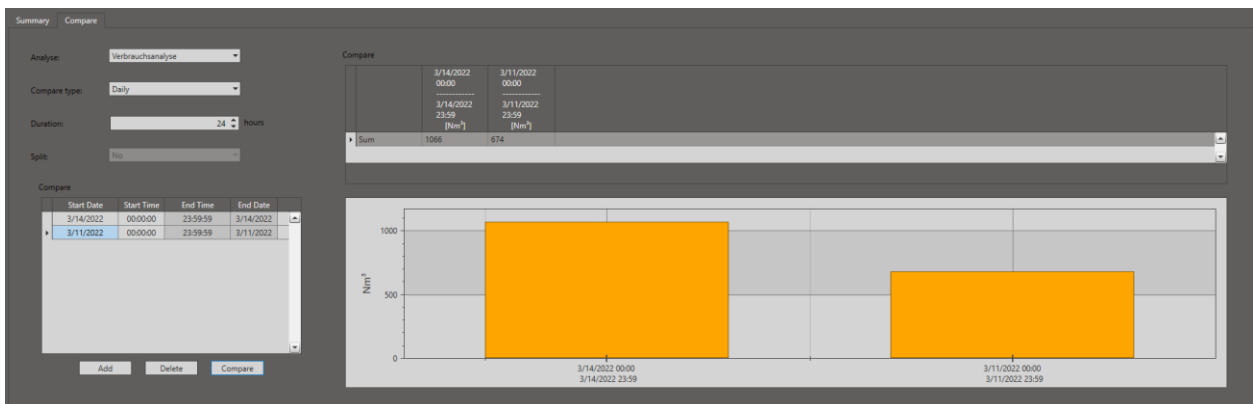
Start Date	Start Time	End Time	End Date
3/14/2022	00:00:00	23:59:59	3/14/2022
3/11/2022	00:00:00	23:59:59	3/11/2022

Below the table are 'Add', 'Delete', and 'Compare' buttons. On the right, a summary table shows the results of the comparison:

	3/14/2022 00:00:00	3/11/2022 00:00:00
Sum	1066	674

Below the table is a bar chart showing consumption in Nm³ for the two periods. The first bar (3/14/2022) reaches 1066 Nm³, and the second bar (3/11/2022) reaches 674 Nm³.

Then select the corresponding analysis, the comparison type and the duration. After that, use the “Add” button to define the comparison periods. Use the “Compare” button to start the comparison and the corresponding diagrams and statistics tables will appear.



This screenshot is identical to the one above, showing the 'Compare' configuration screen with the same settings and results.