ARCTEQ
PART OF ENSTO GROUP

AQtivate

Instruction manual

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1 Document information

1.1 Version 2 revision notes

Revision	2.00
Date	June 2019
Changes	• Updated the look and presentation of the manual.
Revision	**2.01**
Date	October 2019
Changes	• Content completely rewritten to improve grammar and readability. • Improved images. • Updated the AQ-210 series logic editor descriptions and images to match the new logic editor. • Added the relay communication menu descriptions. • Added the descriptions for miscellaneous tools: Calibrations, clear matrix, DI configurator, GC-30 configurator.
Revision	**2.02**
Date	June 2021
Changes	• Grammar and readability improved further. • Added the measurement bar description to the mimic editor manual. • Improved images. • Added more descriptions to many topics. • Added the Modbus Gateway tool description. • Replaced the old IEC 61850 editor description with the new IEC 61850 editor description.
Revision	**2.03**
Date	June 2022
Changes	• Improved descriptions generally in many chapters. • Improved the readability of a lot of drawings and images. • Added the HMI view-menu description. • Updated the IEC 61850 editor description. • Added the description for how to set the number of decimals for measurements in the mimic editor. • Restructured the logic editor descriptions. • Restructured the Modbus Gateway descriptions.
Revision	**2.04**
Date	May 2023
Changes	• Updated the Arcteq logo on the cover and the whole manual visually. • Added the safety information chapter and updated all notes within the document accordingly. • Added internal hyperlinks throughout the document. • Updated the Wizard chapters and added links to their complete instruction booklets.
Revision	**2.05**
Date	June 2025

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Changes	- AQ 250 frame devices support up to 64 published GOOSE signals. - AQ 250 frame devices support .box firmware files.
Revision	2.06
Date	June 2026
Changes	- New graph system. - Added more links to help with navigation. - Added configurable wait time setting to Modbus Gateway. - Added possibility to rename pages in the carousel designer. - Added OPCUA communication protocol.
Revision	2.07
Date	October 2026
Changes	- Added a note to the Audit log chapter. - Updated Mimic editor chapter. - Updated AQS generator chapter.

1.2 Version 1 revision notes

Revision	1.00
Date	12 October 2012
Changes	• *(N/A)*
Revision	1.01
Date	25 February 2013
Changes	• Added the FTP description and the time settings. • Updated the "Tools" menu and the "Print" menu descriptions. • Added the firmware upgrade. • Added the safe setting mode description.
Revision	1.02
Date	16 May 2013
Changes	• Added the front panel connection image. • Updated the device connections. • Updated the event history. • Added the alarm events. • Added the description of the ability to compare .aqs files.
Revision	1.03
Date	11 September 2014
Changes	• Added the descriptions for the following topics: AQS-generator, Signal swap, Find signal usage, Project editor, Carousel designer, Timers, IEC 61850 setting, Uploading language files, User levels, Firmware upgrade, AQviewer. • Updated the descriptions for the following topics: Mimic editor, Logic editor, Settings, Disturbance recorder.

Revision	1.04
Date	20 February 2015
Changes	• Added the instructions for adding an option card.
Revision	1.05
Date	24 April 2015
Changes	• Added the SPA and DNP protocol tools. • Added the configuration change log.
Revision	1.06
Date	12 August 2015
Changes	• Updated the following topics: Tools menu, Commands menu, Logic editor, Mimic editor. • Added the following topics: Write to relay, Trafo Wizard, Update manager.
Revision	1.07
Date	09 November 2015
Changes	• Improved and added images to many chapters. • The order of the chapters improved. • Overall revising of the look and readability of the manual. • Added hyperlinks to various webpages in relevant chapters.
Revision	1.08
Date	6 September 2016
Changes	• Further improvement on readability. • Updated some images. • Added hyperlinks to other documents.
Revision	1.09
Date	12 January 2018
Changes	• Added the AQ 250 series mimic, logic and carousel designer descriptions. • Updated the hyperlinks to fit the new Arcteq website.
Revision	1.10
Date	24 May 2018
Changes	• AQ-250 logic editor description revised.
Revision	1.11
Date	20 August 2018
Changes	• AQ-250 mimic editor description revised.
Revision	1.12
Date	10 September 2018

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Changes	• AQ-250 logic editor description additions.
Revision	1.13
Date	10 December 2018
Changes	• Added the carousel designer for AQ 250 series units. • Added the DI-configurator description. • Added the GC-30 configurator description. • Updated the AQ-250 mimic editor description. • Added the IEC-101/104 and IEC-103 map view descriptions.

1.3 Safety information

This document contains important instructions that should be saved for future use. Read the document carefully before installing, operating, servicing, or maintaining this equipment. Please read and follow all the instructions carefully to prevent accidents, injury and damage to property.

Additionally, this document may contain four (4) types of special messages to call the reader's attention to useful information as follows:



NOTICE!
"Notice" messages indicate relevant factors and conditions to the concept discussed in the text, as well as to other relevant advice.

CAUTION!
"Caution" messages indicate a potentially hazardous situation which, if not avoided, **could** result in minor or moderate personal injury, in equipment/property damage, or software corruption.



WARNING!
"Warning" messages indicate a potentially hazardous situation which, if not avoided, **could** result in death or serious personal injury as well as serious damage to equipment/property.



DANGER!
"Danger" messages indicate an imminently hazardous situation which, if not avoided, **will** result in death or serious personal injury.

These symbols are added throughout the document to ensure all users' personal safety and to avoid unintentional damage to the equipment or connected devices.

Please note that although these warnings relate to direct damage to personnel and/or equipment, it should be understood that operating damaged equipment may also lead to further, indirect damage to personnel and/or equipment. Therefore, we expect any user to fully comply with these special messages.

2 Introduction

The AQtivate software tool is used to create configurations for Arcteq AQ200 series and AQ-ONE protection and control devices. AQtivate can be used for both downloading and uploading configurations to AQ 200 and AQ-ONE devices. AQtivate is also capable of downloading disturbance recordings from the device. These recordings can be further evaluated by using the AQviewer program (included in the AQtivate installation file).

Device settings are stored as a single ".aqs" file, which includes all the user settable configurations (protection, measurement, communication, logics, etc.). Configuration can be done both online and offline. The AQ 200 and AQ-ONE devices store all settings and disturbance recordings in a permanent flash memory.

AQtivate can be run by any Windows 7/8/10/11 version. It can be downloaded free of charge from the Arcteq website (http://arcteq.com/documents-and-software/).



NOTICE!
Please note that downloading the software requires that you register to the Arcteq website. This is also free of charge.

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3 Getting started

3.1 Installing the AQtivate setting tool

First, launch the "AQtivate Offline Installer". If you do not have the AQtivate installer, you can download it for free from Arcteq's website (https://www.arcteq.com/documents-and-software/).

Next, select the installer language and follow the step-by-step instructions to install the software.

NOTICE!
Please note that some firewall softwares may detect AQtivate and prevent the installation. In this case, either select the option "Allow connection" (if one is provided) or manually set the AQtivate software to the list of whitelisted programs.

3.2 Updating the AQtivate setting tool

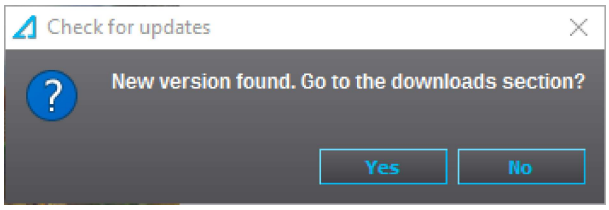
When the installed AQtivate version is too old for the firmware in the device, it may be necessary to update the setting tool software. You can check the tool's version at *Help → Check for updates*. If there is no need to update, a pop-up window appears telling you that "The current version is the newest". However, if an update is needed AQtivate will ask if you want to go to downloads section (see the figure below).

If the installed version of AQtivate is too old for the device's firmware, you may need to update the setting tool software.

To check your current version, go to *Help → Check for updates*.

- If no update is needed, a pop-up will confirm: *"The current version is the newest."*
- If an update is available, AQtivate will prompt you to visit the *Downloads* section (see figure below).

Figure. 3.2 - 1. Checking the AQtivate version.



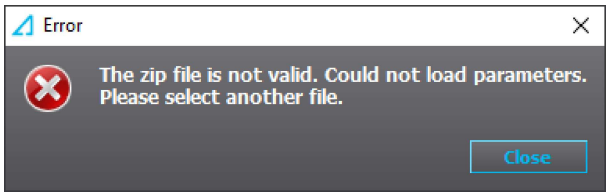
Clicking "Yes" will redirect you to the Arcteq website, where you can download the latest version of AQtivate. Please note that logging in is required to access the download.

If you don't have an account, you can create one at: arcteq.com.

A common indication that you're using an outdated version of AQtivate is an error message stating that the ZIP file is not valid (see image below). This typically means the installed version of AQtivate is incompatible with the configuration file you're trying to open.

To resolve this, check your current tool version via *Help → Check for updates*, and follow the update instructions described above.

Figure. 3.2 - 2. "Zip file is not valid" error message.



3.3 Connecting to device with AQtivate

To connect to a device, you'll need a free Ethernet port on your PC and a standard straight-through RJ-45 cable.

Before establishing the connection, ensure that your firewall and antivirus software allow AQtivate to access and use the PC's Ethernet ports without restrictions.

To successfully connect using the AQtivate setting tool, the following firewall ports must be open: 20, 21, and 1551.

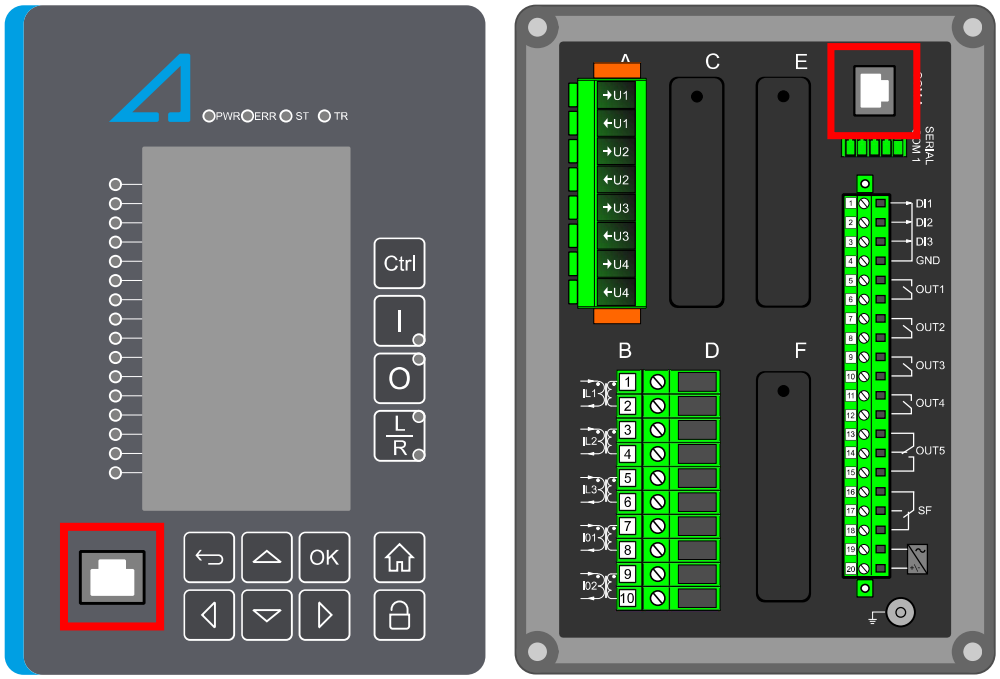
If the connection fails, please verify your firewall and antivirus settings, and refer to the troubleshooting chapters at the end of this manual

(How to allow inbound ping and Allow AQtivate through firewall) for further guidance.

3.3.1 Device IP addresses

AQ 200 series and AQ-ONE devices are equipped with two RJ-45 Ethernet ports — one located on the front panel and the other on the rear. Both ports can be used to establish a connection with AQtivate.

Figure. 3.3.1 - 3. Locations of the RJ-45 ports (left: front port; right: back port).



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Front port (DHCP server)

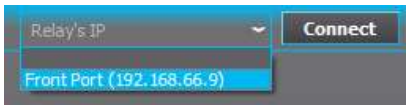
The front port of the device has a fixed IP address: 192.168.66.9, and includes a built-in DHCP server. This allows a locally connected PC to automatically receive a compatible IP address from the device.

If the PC fails to connect automatically via the front port, manually set the PC's Ethernet IP address to the same subnet (e.g. 192.168.66.x).

The front port is used for connecting to the device with AQtivate. Note that communication protocols are not supported through this port. However, in AQ 250 frame devices, the front port can also be used for upgrading the firmware.

To connect to the device's front port, open the drop-down menu in the center of the main toolbar, select "Front Port", and click the "Connect" button.

Figure. 3.3.1 - 4. Connecting to a device via its front port.



Back port

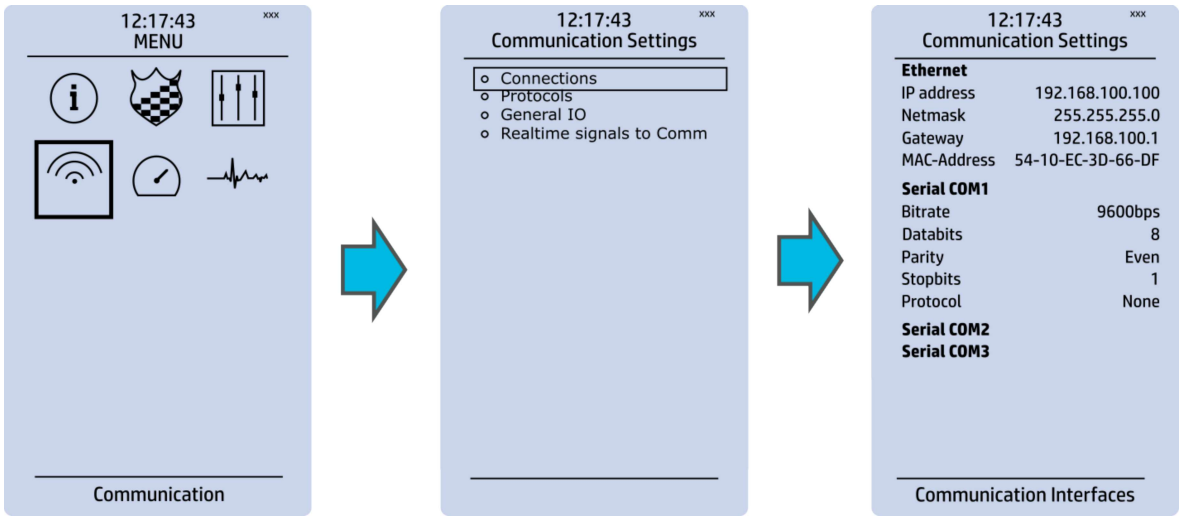
The IP address of the device's back port is set by the user and can be found by going to *Communication → Connections*. The settings found under this tab define the rear Ethernet communication of the device.

The back port can be used for AQtivate connection, firmware upgrades and communication protocols.

3.3.2 Setting the Ethernet ports IP address for communication through the back port

You can set the IP addresses in the device by going to *Communication → Connections* (see the figure below). The settings found under "Ethernet" section define the back panel Ethernet IP address.

Figure. 3.3.2 - 5. Location of the settings defining the back panel IP address.



3.3.3 Connecting through the back port

Figure. 3.3.3 - 6. Connect box at the top of AQtivate software's main view.



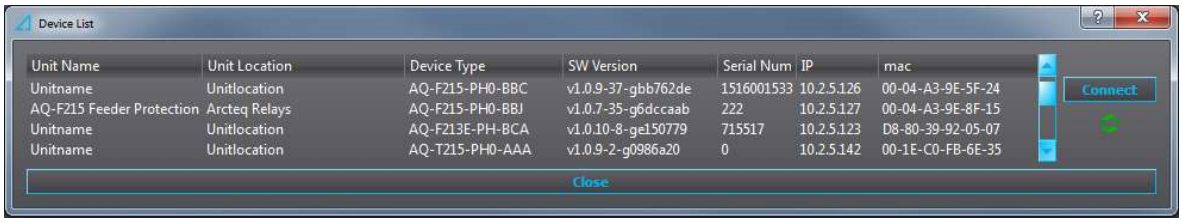
To connect to a device, type the IP address to the IP address box and then either press the Enter key or click "Connect". When you are connected to a device, the red "Offline" text at the top left corner will turn into a green "Online" text.

NOTICE!
Only one computer can connect to a device at a time. However, if a second computer attempts to connect, it will not interrupt or disconnect the user who is already connected.

NOTICE!
Connecting to a device via the back port using AQtivate does not interfere with SCADA communication.

3.3.4 Device list

Figure. 3.3.4 - 7. Device list view.



Another way to connect to a device is by opening the Device List from the Tools menu or by pressing F11. The pop-up window displays all available devices currently connected to the same network as your computer.

To connect, either double-click a device in the list or select it and click the "Connect" button.If new devices are added while the Device List is open, click the green circular "Refresh" icon (located below the Connect button) to update the list and display the newly connected devices.

NOTICE!
Some network switches and firewalls may prevent devices from appearing in the Device List.

NOTICE!
If multiple instances of the AQtivate setting tool are running simultaneously on the same computer, the Device List may fail to detect devices on the network.

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3.3.5 Connecting by launching AQtivate through a command line

When AQtivate is launched, the software allows you to connect to a device through a command line. Open Command Prompt (type "cmd" into your PC's Search tool) and simply give the command "AQtivate.exe c- [the device's IP address]". This will launch AQtivate and attempt to connect to the device with the given IP address.

For example, if the unit's IP address is 192.168.100.100, you can connect to it when you launch AQtivate in Command Prompt by typing "AQtivate.exe -c 192.168.100.100".

You can also launch AQtivate and connect to a device via the command line. To do this, open Command Prompt (type "cmd" in your PC's search bar), navigate to the AQtivate installation folder, and enter the following command:

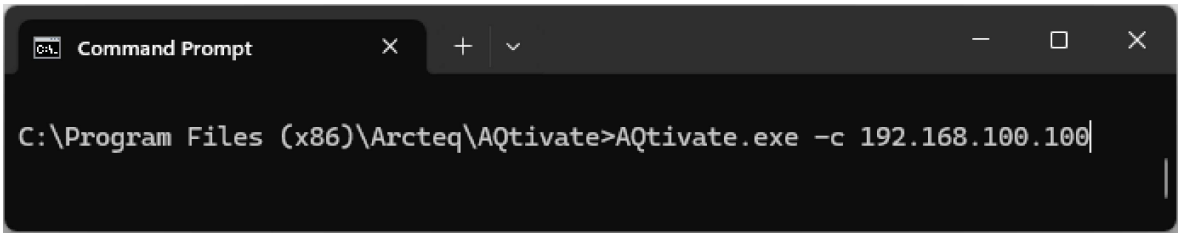
AQtivate.exe -c [device IP address]

This will launch AQtivate and attempt to connect to the specified device.

Example:To connect to a device with the IP address 192.168.100.100, type:

AQtivate.exe -c 192.168.100.100

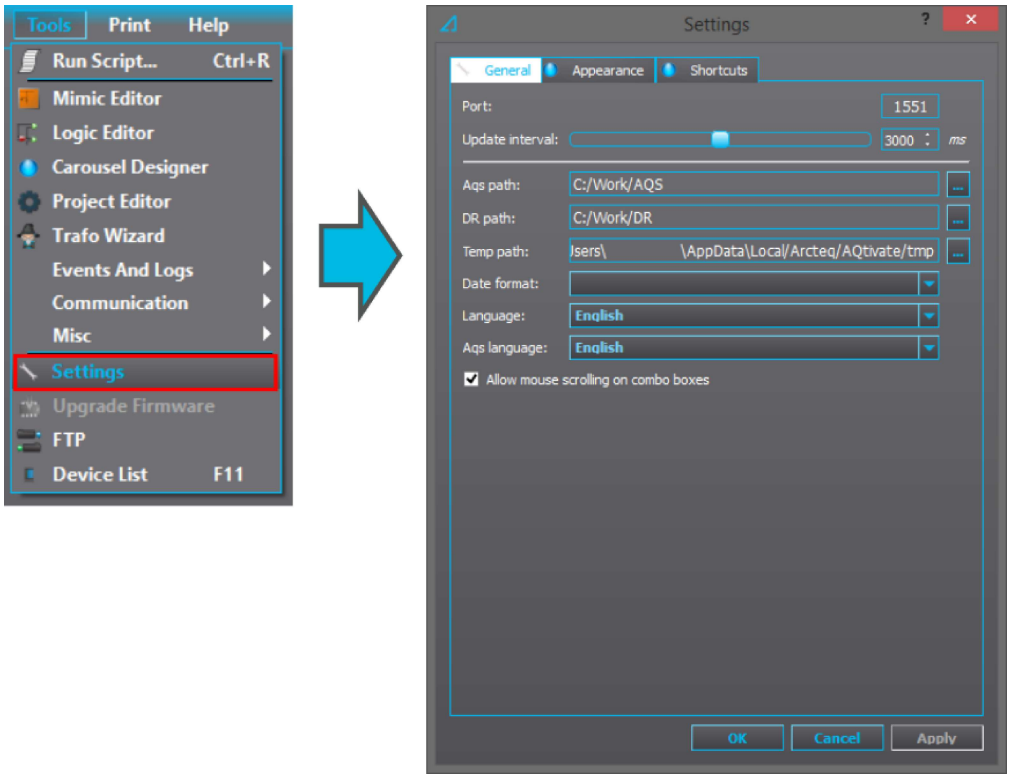
Figure. 3.3.5 - 8. The command must be executed from within the AQtivate installation folder.



3.4 Settings menu

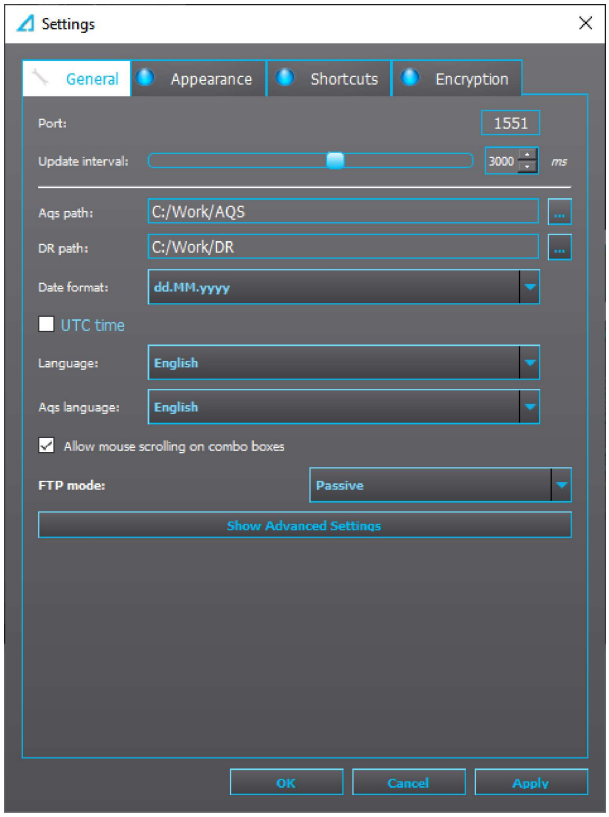
The *Settings* menu can be found at *Tools* → *Settings*.

Figure. 3.4 - 9. Location of the *Settings* menu.



3.4.1 General

Figure. 3.4.1 - 10. The "General" tab of the Settings menu.



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Port and update interval

"Port" setting defines the port used for AQtivate connection. "Update interval" defines how frequently parameters are updated in "Live Edit" mode.

AQS path and DR path

The "Aqs path" defines the location where the configuration files are saved when they are downloaded from a device with the "Get aqs file" command. The "DR path" defines the location where the disturbance recordings downloaded from the device are saved when the device receives a "Get DR files" command.

Date format and UTC time

You can select in which way the dates of recorded events are displayed by choosing one in the "Date format" drop-down menu. The menu has the following options for how to display the date:

- dd.MM.yyyy
- dd/MM/yyyy
- yyyy-MM-dd
- MM/dd/yyyy

AQtivate uses the PCs time zone when displaying timestamps of events. By checking the "UTC time" checkbox AQtivate will display UTC time of the events instead.

Language

Changing the Language setting updates the language used in AQtivate's basic menus and interface.

Changing the "AQS Language" determines the language used for menus and labels generated from the .aqs file. By default, English is used. If "Other" is selected, AQtivate will apply the language specified in the "Language" parameter found in the "General" menu.

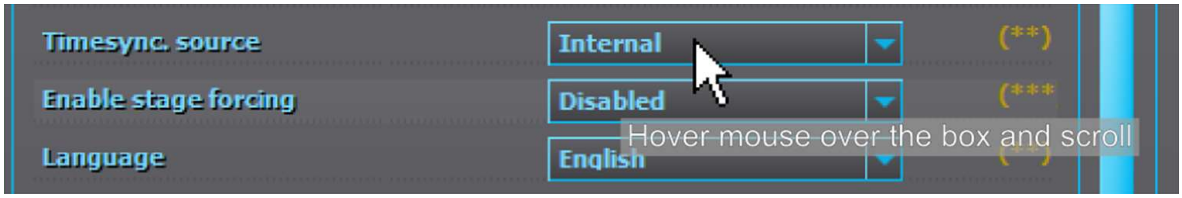
Allow mouse scrolling on combo boxes

Enabling the "Allow mouse scrolling on combo boxes" checkbox allows users to change the value of a drop-down menu by scrolling the mouse wheel while hovering over the box.

In the image below, this feature is enabled, allowing the user to scroll through all available options for the "Timesync. source" parameter.

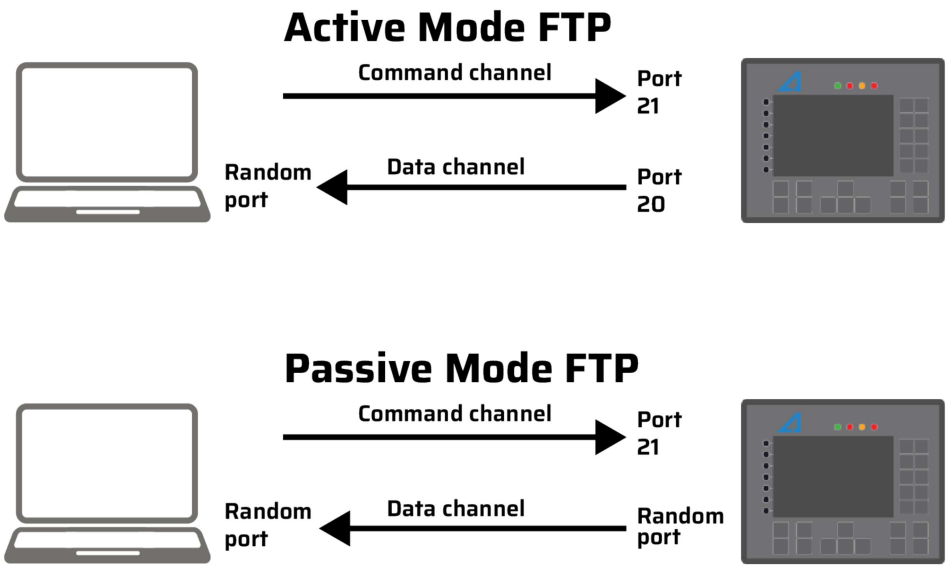
This feature is disabled by default.

Figure. 3.4.1 - 11. Example of a drop-down menu parameter when scrolling is allowed on combo boxes in the "Settings" menu.



FTP mode

Figure. 3.4.1 - 12. Active mode FTP vs passive mode FTP.



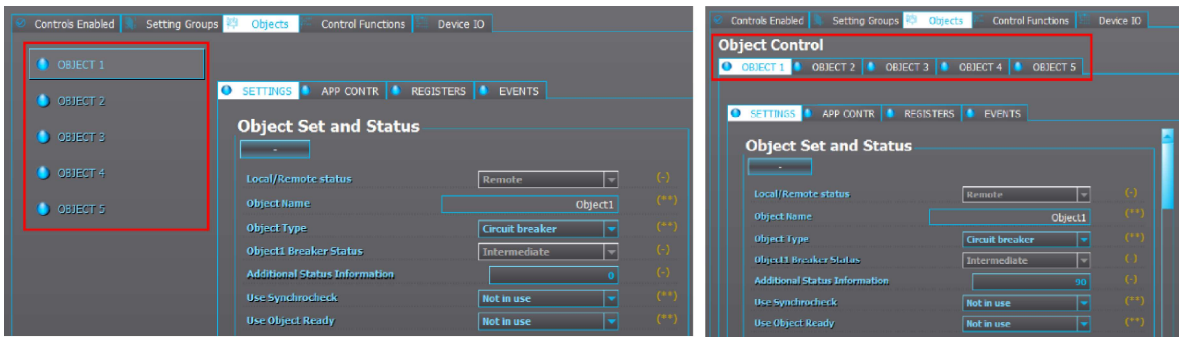
FTP mode changes the connection type between the PC and the device. Active mode uses port 20 and passive mode uses passive FTP ports 10090…10100.

3.4.2 Appearance

In the Appearance tab, you can customize the look and feel of AQtivate. Users with low-resolution laptops may encounter situations where some menus do not fit horizontally within the window.

To gain more space, enable Compressed mode. This feature converts the list of submenus into tabs, making the interface more compact and easier to navigate (see image below).

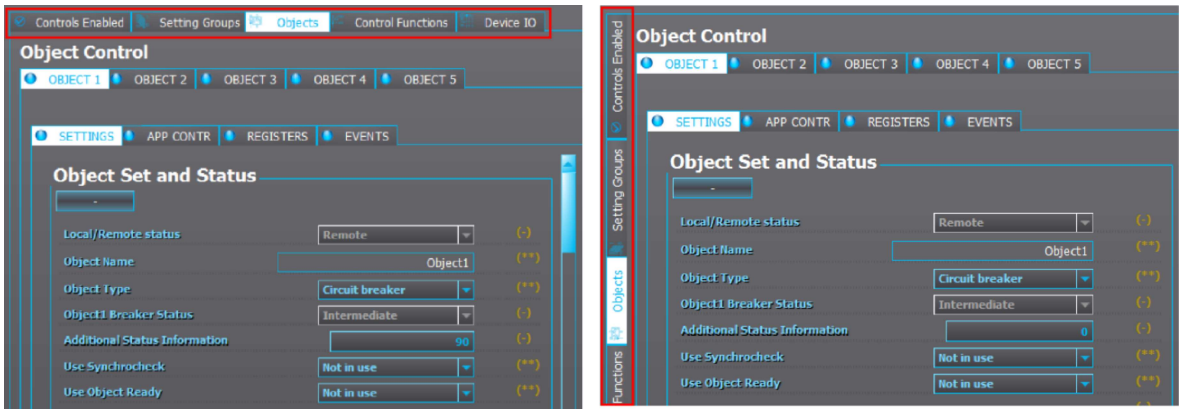
Figure. 3.4.2 - 13. Normal menus vs. compressed menus.



Choosing the *Show horizontal tabs only* mode changes vertical tabs into horizontal tabs (see the image below).

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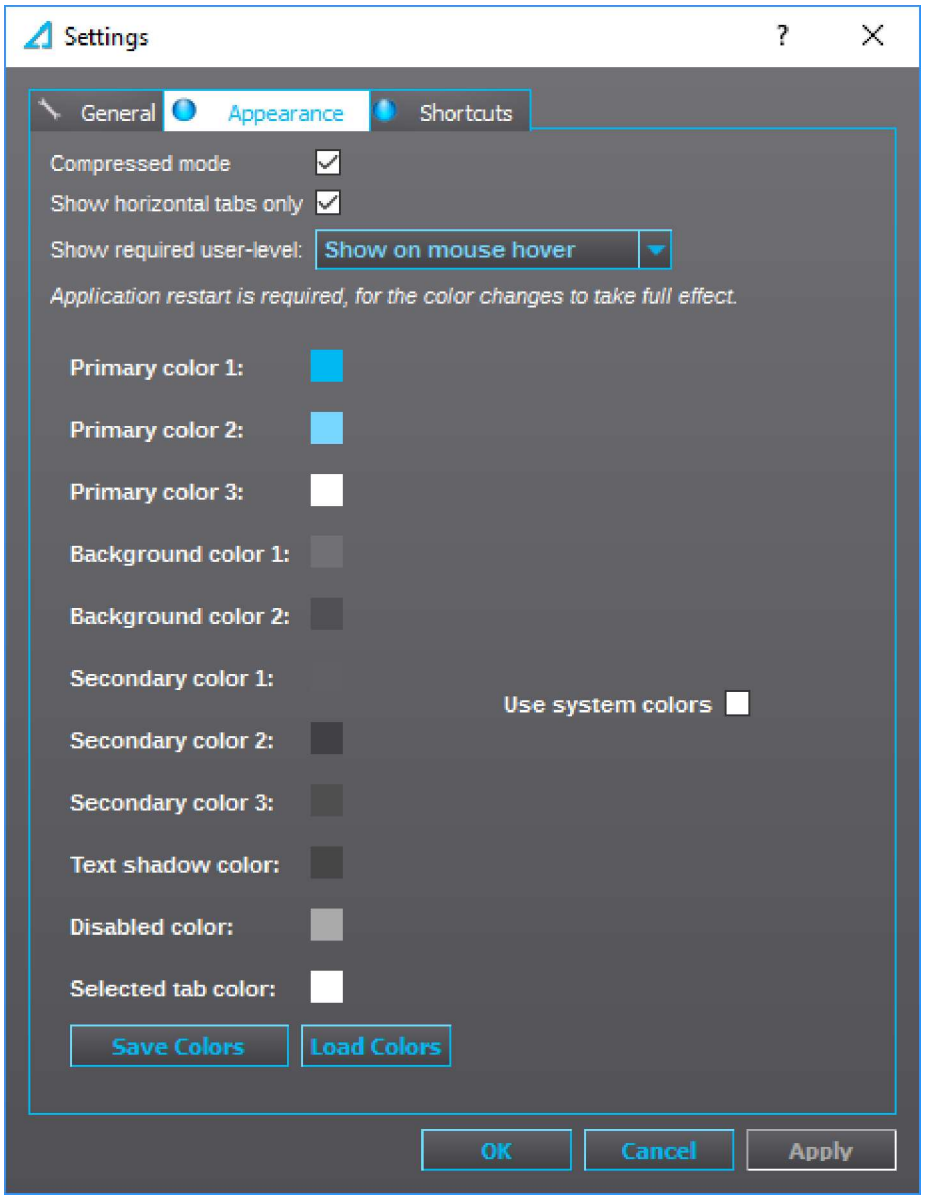
Figure. 3.4.2 - 14. Horizontal tabs vs. vertical tabs.



You can also customize AQtivate's color scheme. Colors can be selected individually, or you can choose from three predefined themes: Arcteq, Arcteq Dark, and Cool Grey.

NOTICE!
Please note that changing the appearance settings requires an application restart for the changes to take effect.

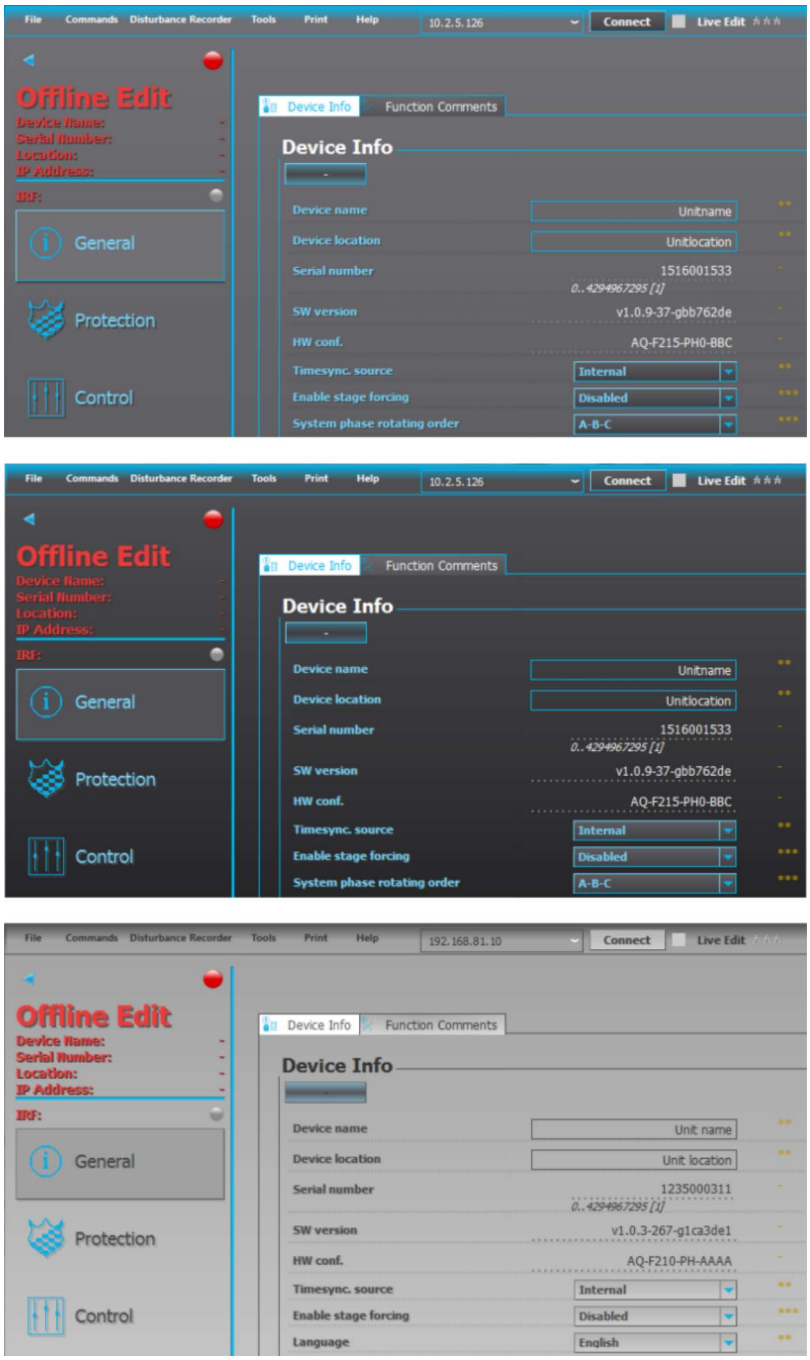
Figure. 3.4.2 - 15. Changing the software's appearance settings.



To select one of the pre-made color themes, click "Load colors" and select the scheme from the AQtivate install folder (by default the path is C:\Program Files (x86)\Arcteq\AQtivate\color_themes). The images below show what these pre-made color schemes look like.

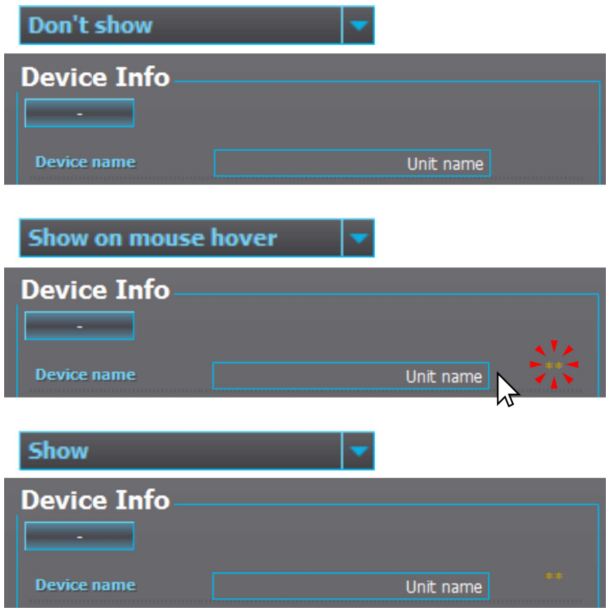
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Figure. 3.4.2 - 16. The three pre-made color schemes (top: Arcteq; middle: Arcteq Dark; bottom: Cool Gray).



In *Show the required user level* you can change how the required user level is shown by selecting from the three display options: "Don't show", "Show on mouse hover", and "Show".

Figure. 3.4.2 - 17. The three options for showing the required user level.



You can also quickly change between the color scheme of the *Appearance* tab or the Windows colors (see the image below).

Figure. 3.4.2 - 18. “Use system colors” setting ON/OFF.

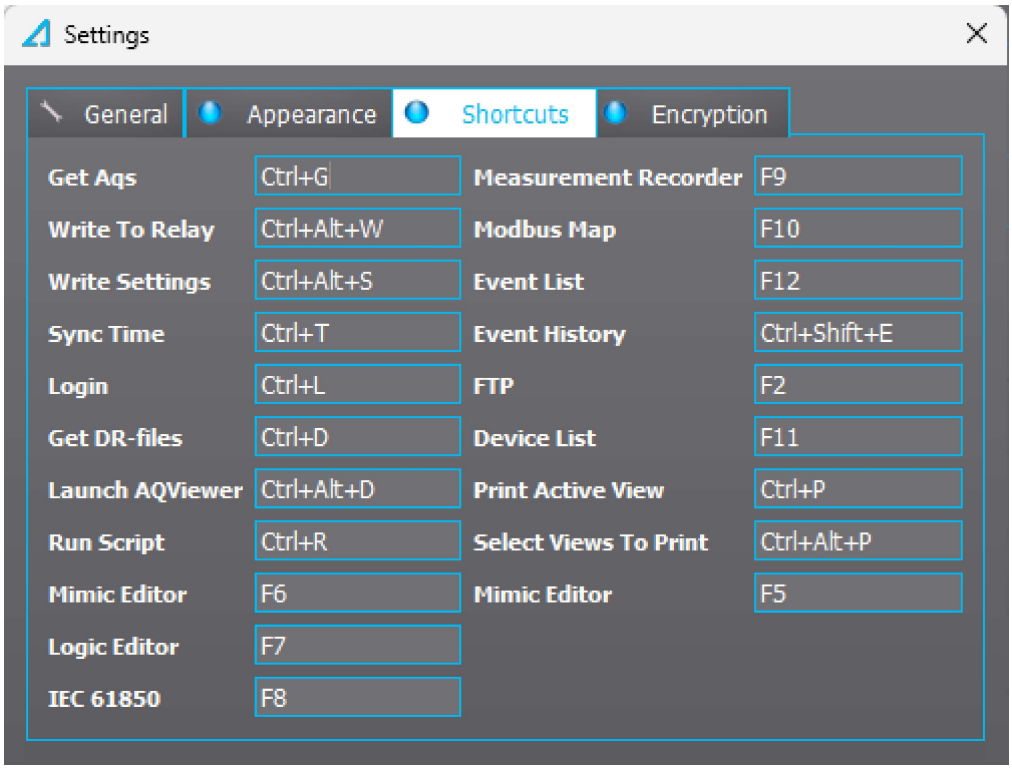


3.4.3 Shortcuts

In the *Shortcuts* tab, you can can edit the various menu shortcuts. The default shortcuts are presented in the image below.

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Figure. 3.4.3 - 19. Default shortcuts.



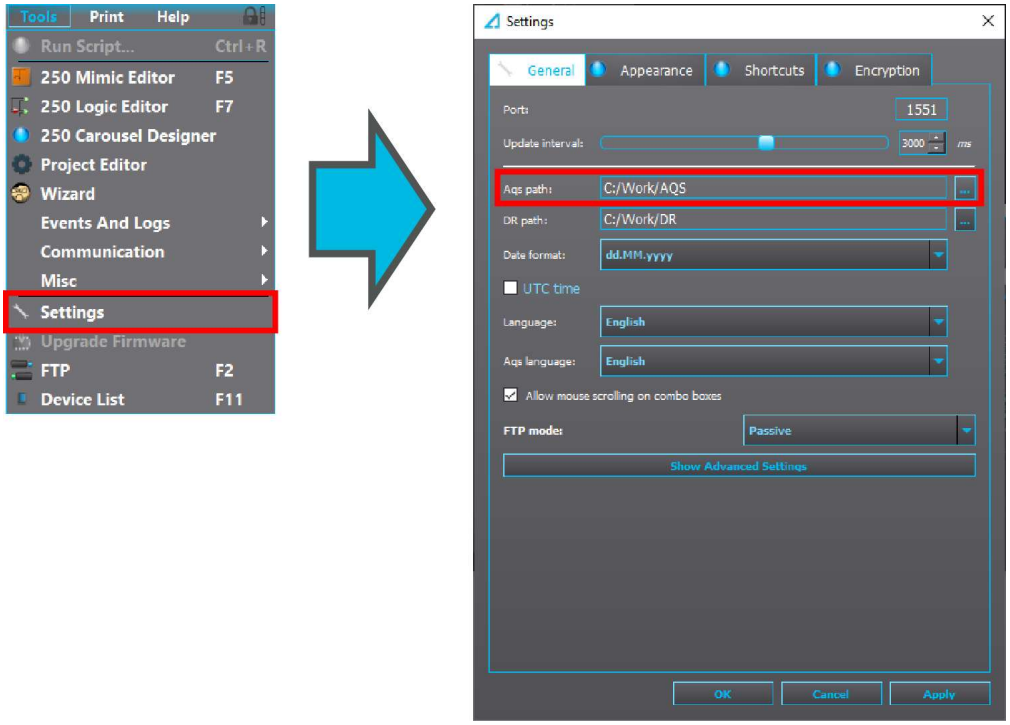
4 Managing .aqs setting files

4.1 Reading .aqs setting files from the device

With AQtivate, you can download existing .aqs files from a device and store them on your computer. The save location for these files can be configured by navigating to *Tools* → *Settings* and adjusting the *Aqs path* parameter to your preference (see image below).

By default, .aqs files are saved to the following directory: AppData\Local\Arcteq

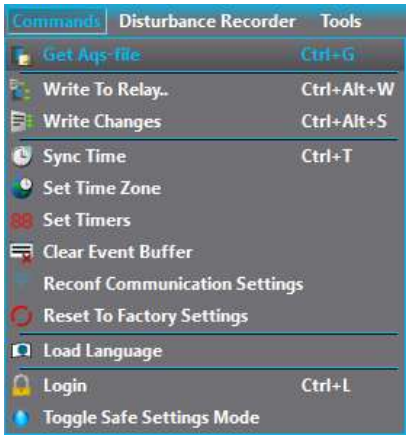
Figure. 4.1 - 20. Determining where .aqs files are saved.



To download a device's settings into the AQtivate setting tool, first connect to the device. Then, go to *Commands* → *Get AQS-file* or press *Ctrl+G*. Wait for the program to load the file. The time it takes may vary depending on the device and network speed.

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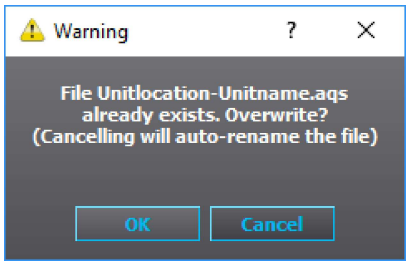
Figure. 4.1 - 21. Downloading an .aqs file.



When downloading an .aqs file, the filename will include both the device name and its location, as defined in the "General" menu. If a file with the same name already exists in the selected folder, AQtivate will prompt the user with two options:

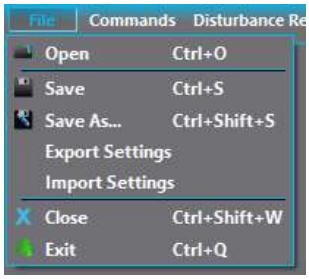
- Click "OK" to overwrite the existing file with the newly loaded one.
- Click "Cancel" to automatically rename the new file, preserving the original.

Figure. 4.1 - 22. File name contradition has occurred when saving an .aqs file.



4.2 Opening and saving .aqs files

Figure. 4.2 - 23. "File" menu for opening and saving .aqs files.



To open an .aqs file from your PC's storage, navigate to *File → Open*. Files are typically located in the folder specified in the *Settings* menu, but they may also be stored elsewhere on your hard drive.

To save an .aqs file, use one of the following commands:

- *File → Save* – Saves the current file using its existing name and location.
- *File → Save As* – Allows you to specify a new filename or location for the file.

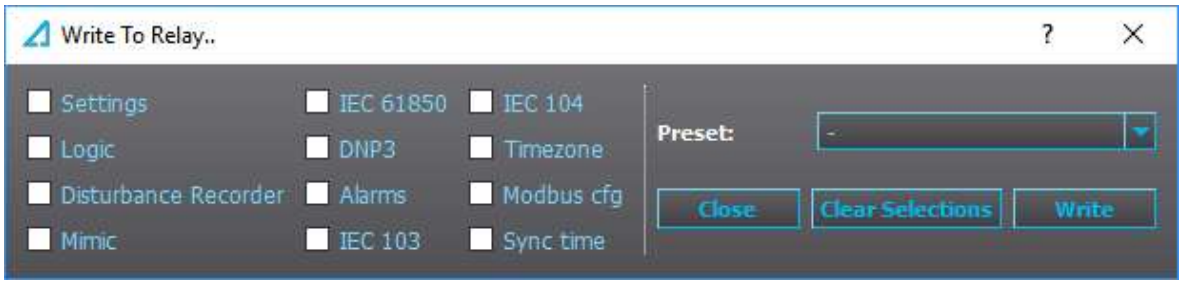
5 Uploading configurations

There are multiple ways to apply configuration changes to your device. The *Write to relay* command opens a pop-up window where you can manually select which elements to upload. The *Write changes* option automatically detects and transfers any modifications made during the current session. Alternatively, *Live Edit* allows you to send parameter updates to the device in real time, without needing to perform a full write operation.

5.1 Write to relay

The following window appears when you click on the *Write to relay* command (in *Commands* menu). In order to be able to open this window, you need to have a connection to a device.

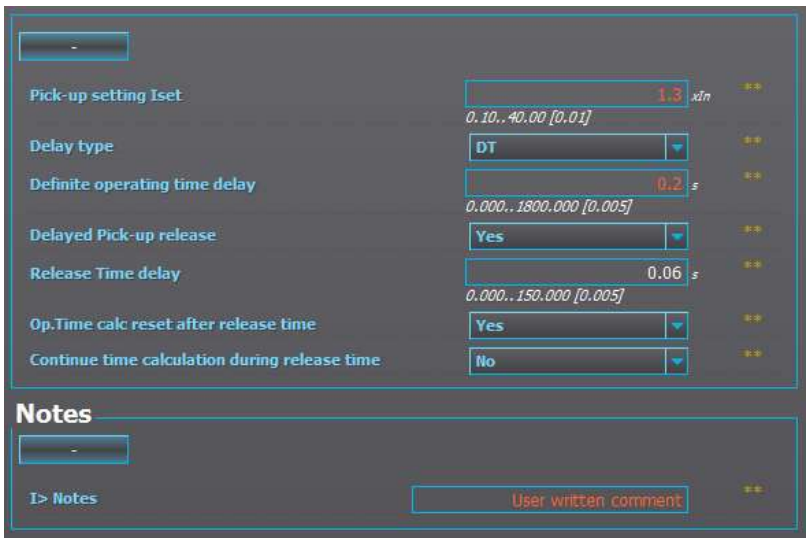
Figure. 5.1 - 24. Options when writing to a device.



By clicking the various boxes you can choose which parts of the configuration you want to upload. You can also opt to use one of the presets (*Configuration* or *Everything*). The following list explains what each of these configuration boxes does.

- Settings: Includes all parameter values. Parameter values include e.g. protection pick-up levels, trip delay times, LED/DI/DO namings, IP address settings, etc.

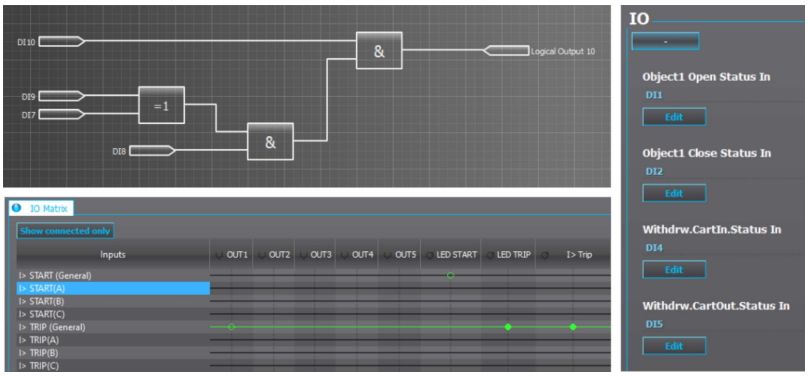
  Figure. 5.1 - 25. Contents of the "Settings" option.



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- Logic: Includes configurations made to the matrix, the control blocks and the logic editor.

Figure. 5.1 - 26. Contents of the "Logic" option.



- Disturbance recorder: Activates the uploaded disturbance recorder settings set at *Monitoring → Disturbance recorder*. Uploading disturbance recorder settings requires that logic and parameters are also uploaded.
- Mimic: Uploads the mimic and the carousel designs to the device in use at *Tools → Mimic editor* and *Tools → Carousel designer*.
- IEC61850: Uploads the .CID file currently in use at *Tools → Communication → IEC61850*.
- DNP3: Uploads the DNP3 settings currently in use at *Tools → Communication → DNP3*.
- Alarms: Uploads the alarms settings at *Tools → Events and logs → Set alarm events*.
- IEC103: Uploads the IEC103 settings currently in use at *Tools → Communication → IEC103*.
- IEC104: Uploads the IEC101/IEC104 settings currently in use at *Tools → Communication → IEC101/IEC104*.
- Modbus cfg: Uploads the custom modbus configurations set up at *Tools → Communication → Modbus configurator*.
- Sync time: Syncs the device clock to the time on the connected PC. Can be used if neither serial time sync nor NTP time sync is in use.

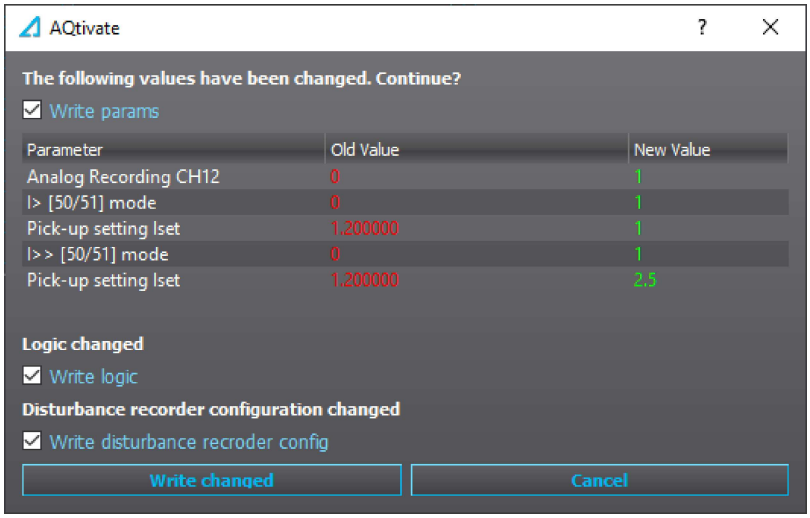
5.2 Write changes

This window displays two values for each parameter: the current value stored in the device and the new value intended to be written (see image below). When the Write changes button is clicked, AQtivate will write the listed new parameters to the device. This method serves as an alternative to using Live Edit mode or the *Commands → Write changes* function.

The tool also detects modifications made to logic settings and disturbance recorder configurations. You can control which parts of the configuration are written by activating the corresponding checkboxes.

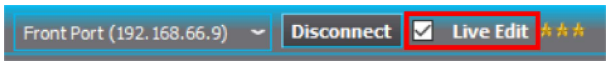
NOTICE!
The tool compares the current parameter values to those present when the configuration was first opened, or when changes were last written to the device. As a result, any modifications made in a previous session that were not uploaded will not be recognized by the *Write changes* tool, and no alert will be shown. In such cases, it is recommended to use *Commands → Write changes* to ensure all updates are properly transferred.

Figure. 5.2 - 27. "Write changes" showing both the old and the new values for each parameter.



5.3 Live Edit

Figure. 5.3 - 28. Activating the Live Edit mode.



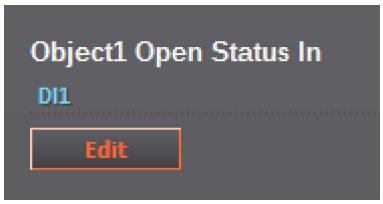
If the AQtivate setting tool is connected to a device, you can enable real-time parameter updates by checking the *Live Edit* box (see figure above). When *Live Edit* is active, any changes made to parameters within AQtivate are immediately written to the device. This feature supports live editing of text fields, dropdown selections, and numerical values (see figure below for examples of these parameter types).

Figure. 5.3 - 29. Examples of elements that can be edited live.



Certain parts of the configuration, such as the matrix editor, block input/output settings, selected I/O settings, and disturbance recorder (DR) input settings can't be edited using *Live Edit*. When changes are made to logic blocks, any unsynchronized blocks are highlighted in orange to indicate that they still need to be uploaded to the device (see figure below).

Figure. 5.3 - 30. An unsynced setting highlighted.



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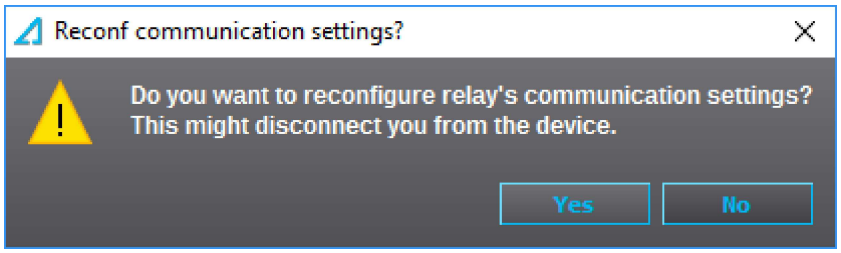
NOTICE!
When you activate the Live Edit mode, AQtivate will download all the parameter values that are currently in use in the device to the AQtivate software. If there are any parameters that you have changed in AQtivate software while not in Live Edit mode that you want to be included in the upload to the device, you can do so through *Commands → Write changes* or *Commands → Write to relay*.

NOTICE!
Remember to save any changes you have not uploaded! All these changes changes to the parameters without uploading them are wiped and replaced by the parameter values that are currently in use in the device, when you activate the Live Edit mode.

5.4 Reconfiguring communication settings

When uploading new communication IP settings to the device, a prompt will appear asking whether the new settings should be applied immediately (see image below).

Figure. 5.4 - 31. Confirmation of taking new communication IP settings into use.



If you select "Yes", the new IP settings are adopted right away.If you select "No", the settings will only take effect after you reopen the same window via *Commands → Reconf communication settings* and confirm the change by clicking "Yes".

NOTICE!
If the device is rebooted before the reconfiguration is confirmed, it will revert to its original IP address.

6 Online Edit menus

Figure. 6 - 32. View of the Online Edit menus.



6.1 Introduction and navigation

When an .aqs file is opened, a set of menus appears on the left side of the AQtivate window. The number and type of these menus depend on the connected device model. All settings and values accessible through these menus can also be viewed and modified via the device's HMI display.

Every menu is divided into tabs which can be seen at the top of the the window right below the selected menu's title. You can change how things are displayed through the *Appearance* settings (for a more detailed description, see "Appearance" under the chapter "Getting started").

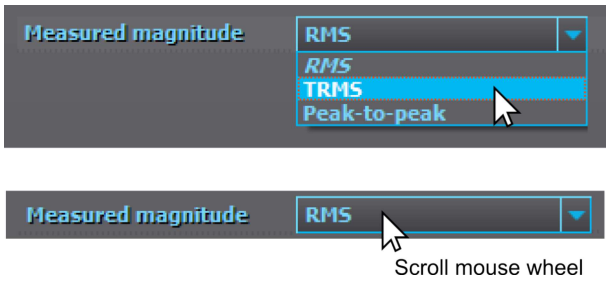
NOTICE!
This chapter is designed to help you become familiar with navigating AQtivate and setting up your device. For detailed descriptions of protection functions and other advanced features, please refer to the device-specific manuals (can be downloaded at arcteq.com/documents-and-software/).

Drop-down menu

You can change the value of a drop-down menu by clicking it and selecting one of the options, or by placing the cursor on it and scrolling through the options with the mouse wheel (please note that this feature must be enabled first at *Tools → Settings → General →* "Allow mouse scrolling on combo boxes"). These settings can be uploaded to a device with *Commands → Write to relay* or *Commands → Write changes*. However, if the Live Edit mode is active, any changes to these settings are uploaded to the device automatically.

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Figure. 6.1 - 33. Changing drop-down menu values.



Text and number setting parameters

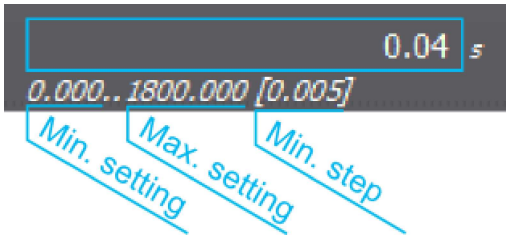
Text and number-setting parameters can be changed by clicking on the box and writing the value or text. Press the Enter key to confirm the parameter change. To cancel the change click elsewhere without pressing Enter and the parameter will return to the original value or text.

Number-setting parameters always have defined limits for the values that can be entered. The valid range for each parameter is displayed below its input field. Additionally, the minimum adjustment step is shown in square brackets.

For example, in the figure below:

- The unit of the parameter is seconds ("s").
- The minimum value is 0.000 seconds.
- The maximum value is 1800.000 seconds.
- The minimum step is [0.005] seconds.
- The currently set value is 0.040 seconds.

Figure. 6.1 - 34. Example of a number setting parameter.



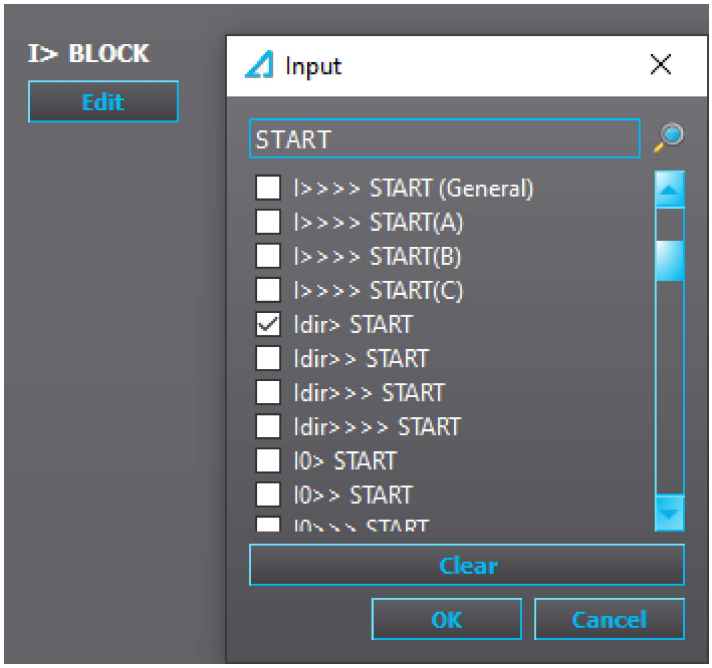
These settings can be uploaded to the device with *Commands → Write to relay* or *Commands → Write changes*. If the Live Edit mode is active, these settings are uploaded to the device automatically.

Control blocks

Control blocks control the behaviour of the device with binary signals. Click on the "Edit" button and a selection window will appear. The box at the top of the window can be used to filter the signal list to find the needed signal easier. While some control blocks allow multiple signals to be assigned to control block, some might allow only one. Use the "Clear" button to clear all selected signals. The "OK" button confirms the changes, while "Cancel" keeps the old settings.

The logic must be uploaded to the device (*Commands → Write to relay or Commands → Write changes*) for the changes made to the control blocks to take effect.

Figure. 6.1 - 35. Example of a control block.



Matrix

Matrices are used to link binary signals generated by the device to digital output contacts and LED indicators. To create a connection, click on the matrix and select the desired connection type from the list.

Signals directed to digital outputs can be configured as either "Connected" or "Latched":

- When set to "Connected", the digital output activates and deactivates in sync with the signal.
- When set to "Latched", the output activates when the signal is triggered but remains active until the user manually resets it by pressing the "Back" button on the device's front panel. For details on the front panel layout and button functions, refer to the individual device manuals.

In AQ 210 series devices, digital output signals and LEDs follow the same operational logic described earlier: they can be configured as either *Connected* or *Latched*, and their color can be set to green or yellow. LED color selection is done via *Control → Device IO → LED Settings → LED Color Settings*.

In contrast, AQ 250 series devices handle LED configuration differently. For these devices, the color of the user LED is defined at the time the signal is connected (see figure below).

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Figure. 6.1 - 36. Example of connecting signals in AQ 210 series devices.

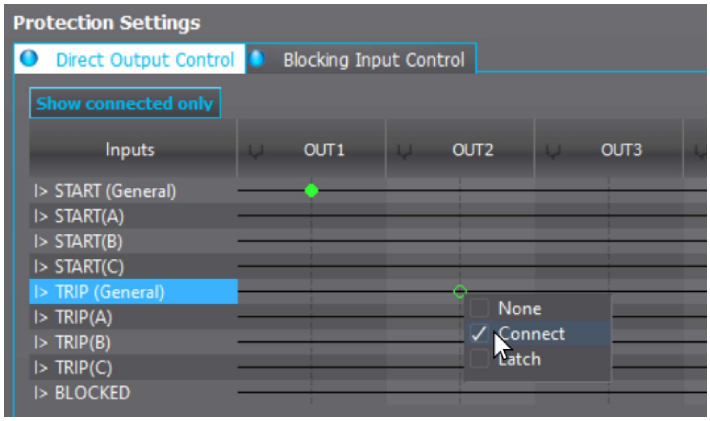
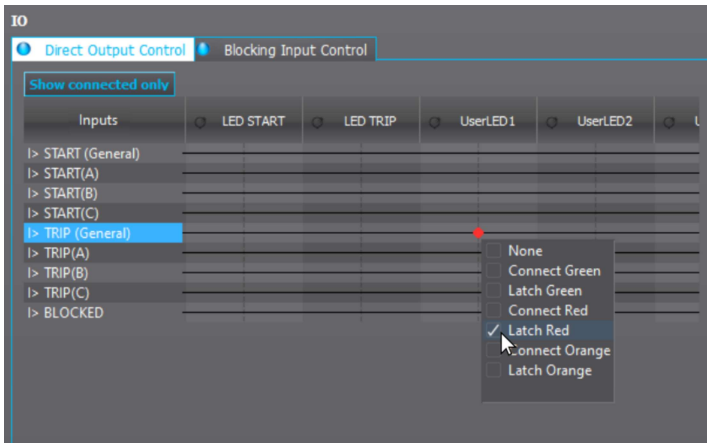


Figure. 6.1 - 37. Example of connecting signals in AQ 250 series devices.



The logic must be uploaded to the device (*Commands → Write to relay or Commands → Write changes*) for the changes made to the matrix to take effect.

6.2 General structure of functions

The AQ 200 series and AQ-ONE offer a wide range of protection, control, and monitoring functions. The specific functions available depend on the model of the device in use.

While the content of each function may vary, their structure remains consistent. Each function is organized into five main tabs:

- Info – Provides general information about the function.
- Settings – Allows configuration of function parameters.
- Registers – Displays measurement values and other information related to the recorded fault or other event.
- IO – Shows input/output mappings and status.
- Events – Enable or disable recording of events related to the function.

The following chapters introduce the purpose and basic usage of each tab. For detailed descriptions of individual functions and their parameters, please refer to the device-specific instruction manuals available at: https://www.arcteq.com/documents-and-software/

6.2.1 Stage activation

Activating protection functions

The *Stage activation* tab is the main tab in the *Protection* menu. It is used for enabling and disabling protection functions. The available protection functions depend on the specific device type.

Once a protection function is activated, its parameters and related information become accessible through its corresponding tab. For example, if you activate the I> (overcurrent) function listed under Current Stages in the Stage Activation menu, you can then view and configure its settings via Protection → Current.

Activating control functions and objects

The *Controls Enabled* tab is the main tab in the *Control* menu. It is used for activating and disabling Control functions and "Objects" used for controlling circuit breakers and disconnectors. The available control functions depend on the specific device type.

Once a control function is activated, its parameters and related settings become accessible via Control → Control Functions.

Activating monitoring functions

The *Monitors Enabled* tab is the main tab in the *Monitoring* menu. It is used for activating and disabling monitoring functions. The available monitoring functions depend on the specific device type.

Once a monitoring function is activated, its parameters and related settings become accessible via Monitoring → Monitor Functions.

6.2.2 Info tab

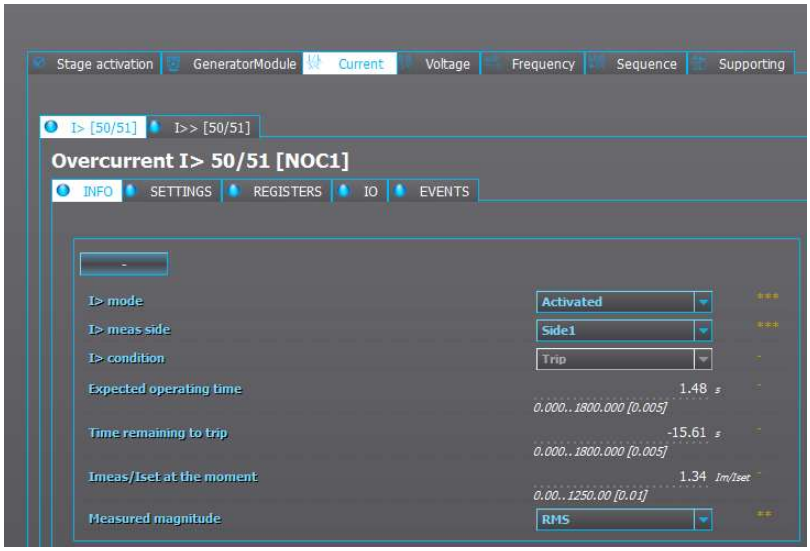
Once a function has been activated, opening its menu will automatically display the Info tab. This tab provides essential information related to the function, including:

- General settings relevant to the function
- Statistics on event activations (typically starts, trips and blocks)
- Characteristics graphs (time delay curves and measurement vectors)
- Measurement values relevant to the function
- Active setting group details

For a complete description of all parameters and configuration options, please refer to the device-specific instruction manuals, available for download at https://www.arcteq.com/documents-and-software/.

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Figure. 6.2.2 - 38. Common general settings and indicators in the Info tab



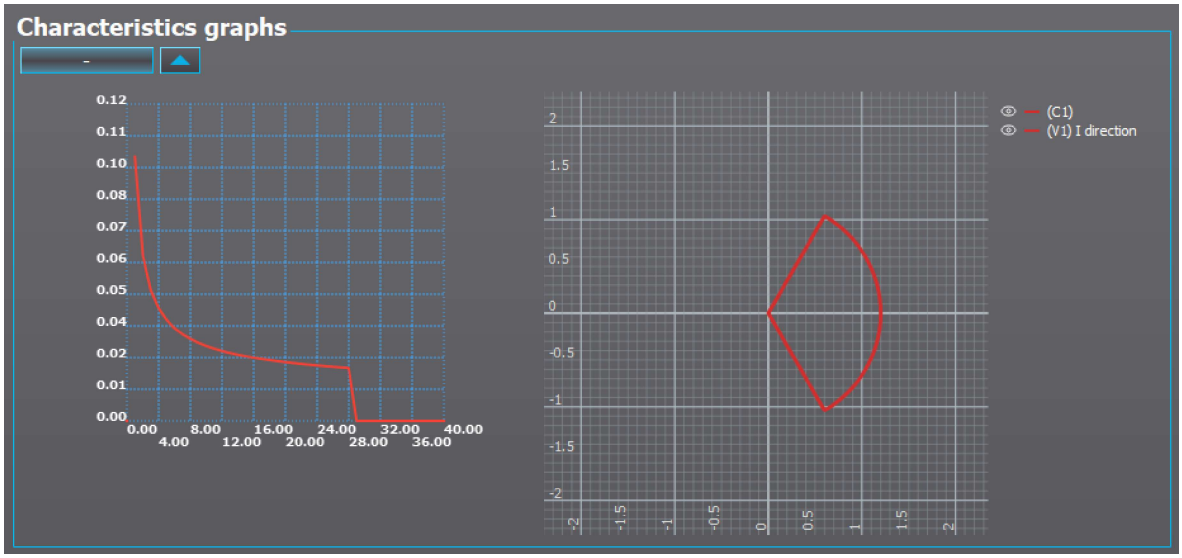
Most functions share a common set of indicators and general settings within the Info tab. However, some functions may include unique elements specific to their purpose, or omit certain fields that are typically present in others.

Below is a list of the most commonly found indicators and settings across protection, control, and monitoring functions:

- Setting control from comm bus: Enables remote setting changes via communication protocols such as SCADA, if supported by the function.
- Meas. Side: If the device includes multiple current measurement cards, this setting allows selection of the card used by the function.
- Condition: Displays the current status of the function (e.g. start, trip, blocked).
    - In Live Edit mode: shows real-time status.
    - Outside Live Edit: reflects the status at the time the .aqs file was saved.
- Phases Condition: For applicable functions, shows the status of each individual phase separately.
- Expected Operating Time: Indicates the expected operating time based on the measured values at that moment. This is especially useful when testing inverse-time delay curves.
- Time Remaining to Trip: Displays the remaining time until the next trip event, based on currently measured values.
- Xmeas/Xset at the Moment: Shows the ratio between the measured value and the configured operating level. A value of 1.00 indicates the measured value is exactly at the operating threshold.
- Measured Magnitude: Allows selection of the measurement type used by the function, typically between RMS, TRMS, or peak-to-peak values.

Characteristics graphs

Figure. 6.2.2 - 39. Characteristics graph section



Most functions include a Characteristics Graphs section, which typically features:

- A time-delay curve based on the current settings, displaying how the function's operating time varies with different measured input values.
- A vector diagram showing measurement vectors and the pick-up level used by the function

This section provides a visual representation of how the function operates under different conditions, aiding in analysis and testing.

The vector view functions automatically and requires no initial setup. However, users can manually adjust the scaling of the X and Y axes when needed. To access these options, click directly on the graph to open a pop-up window where axis settings can be modified.

Within the pop-up window, users can also choose to hide specific elements, such as individual measurement vectors and pick-up level indicators, for a cleaner display.

Customization options for the default colors are available via the Color Settings menu button.

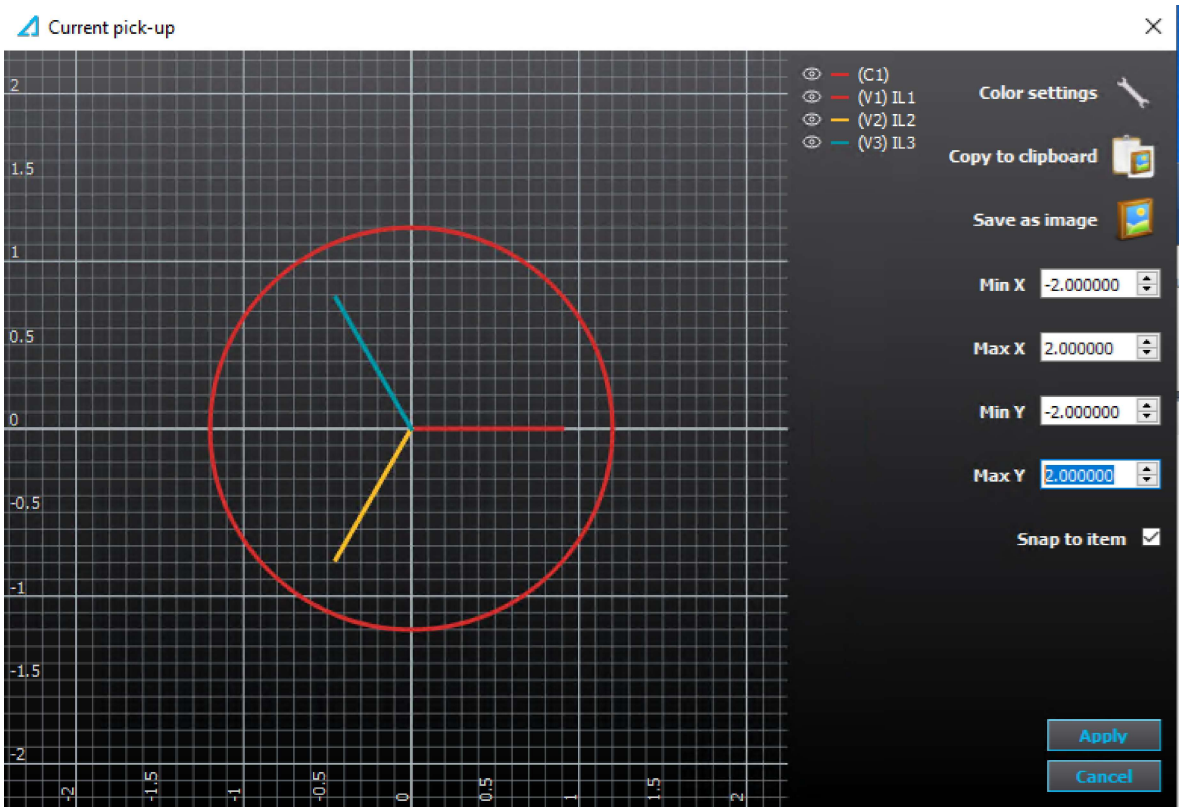
For exporting or sharing the vector view:

- Use the "Save as Image" button to save the current view as a PNG file.
- Use the "Copy to Clipboard" button to quickly paste the view into external software.

Clicking anywhere on the vector view will place a marker (dot) at the selected location and display its coordinates.

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Figure. 6.2.2 - 40. Vector graph scaling and colors can be adjusted in the pop-up window.



Statistics

Figure. 6.2.2 - 41. Statistics section of a function.



The Statistics section displays the number of activations for various events, typically including start, trip, and blocked events. The specific events shown depend on the function in use. Activation statistics can be reset using the Clear Statistics parameter.

Measurements

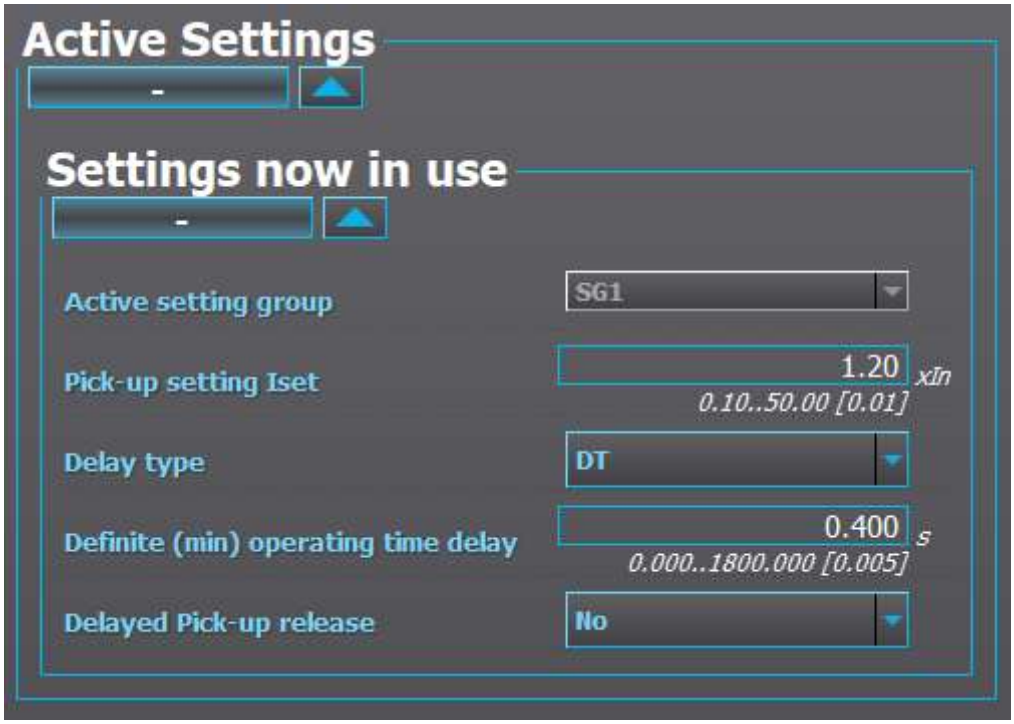
Figure. 6.2.2 - 42. Measurements section of a function.



The Measurements section displays values relevant to the selected function. These same measurements are also accessible through the main Measurements menu.

Active settings

Figure. 6.2.2 - 43. Active settings section.



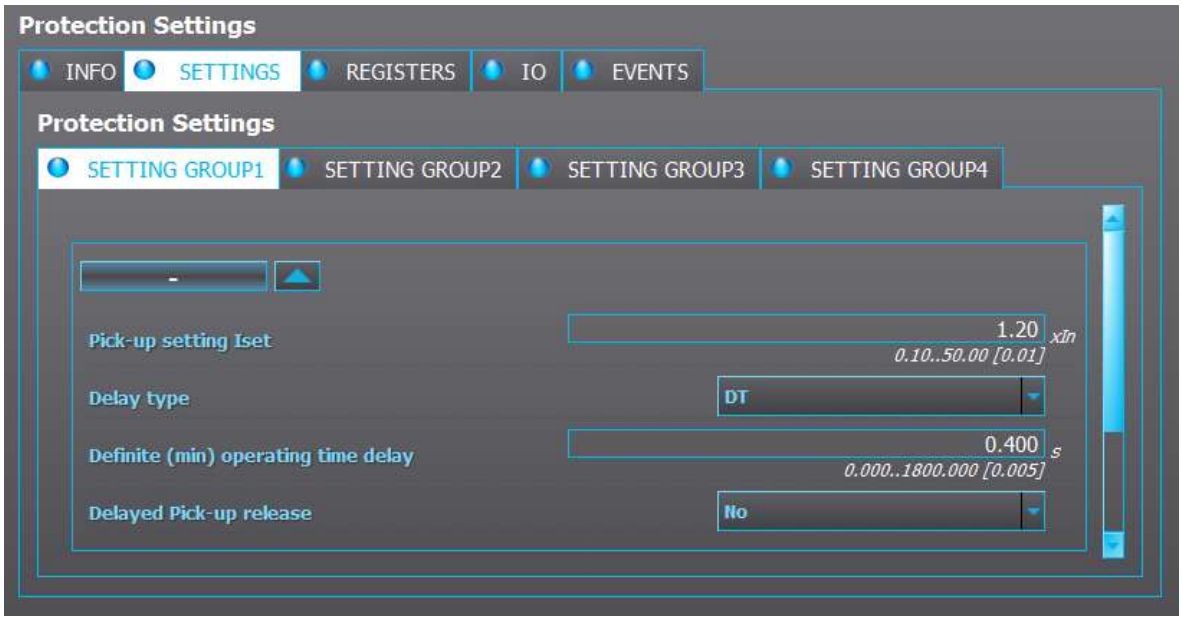
The Active Settings section displays the settings currently in use by the function.

- If only one setting group is in use, this section will always show the same parameters as those found in the Settings tab (located next to the Info tab).
- If multiple setting groups are available, the displayed parameters will reflect the currently active group.

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6.2.3 Settings tab

Figure. 6.2.3 - 44. Settings tab with four setting groups enabled.



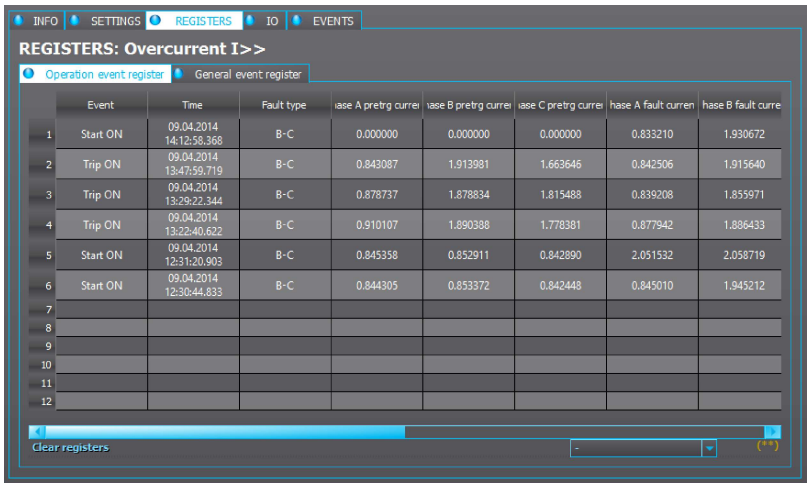
The Settings tab displays all configurable parameters for the selected function that can be modified through setting group changes.

- If only one setting group is in use, this tab will show the same parameters as those found in the Active Settings section of the Info tab.
- If multiple setting groups are configured, the Settings tab allows you to view and edit each group individually.

NOTICE!
You can find the instructions for setting up each individual protection function from the device's manual, under the section describing the protection function in question. The latest manuals can be downloaded at arcteq.com/documents-and-software/.

6.2.4 Registers tab

Figure. 6.2.4 - 45. Operation event registers in the "Registers" tab.



The Registers tab contains two views: Operation Event Register and General Event Register.

- The Operation event register displays information related to the function's alarms and trips. It shows only the measurement values relevant to the specific function.
- Each function logs its operations into the latest twelve (12) time-stamped entries. These entries include details such as the timestamp, fault type, pre-trigger measurement values, fault measurement values, and more.

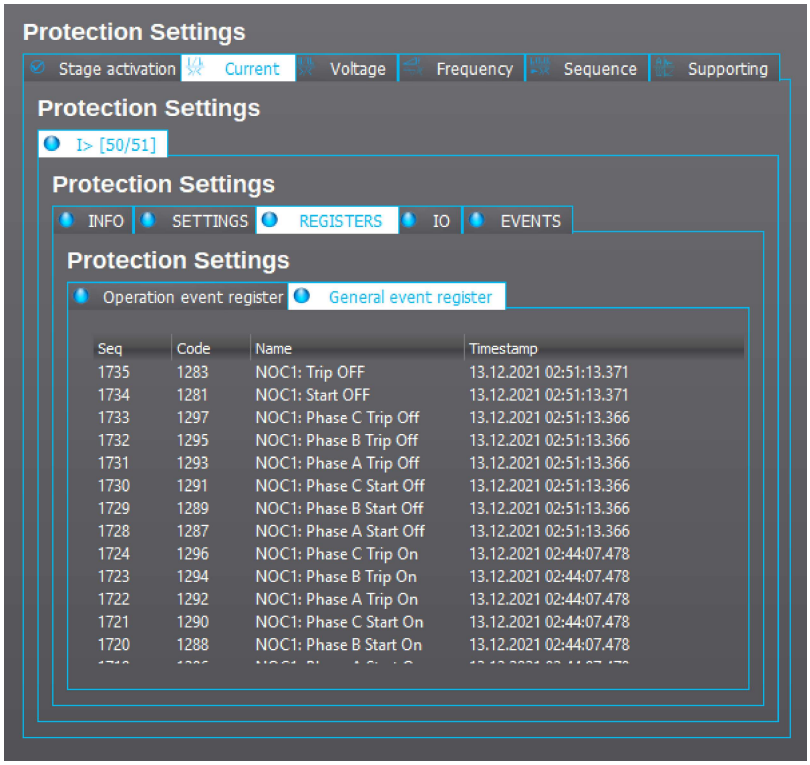
When an .aqs configuration file is opened in AQtivate, the software displays the register entries recorded at the time the file was downloaded from the device. If Live Edit mode is enabled, AQtivate updates the register data in real time.

To clear the registers, use the "Clear" option in the Clear Registers drop-down menu located below the register table.

To copy register data, select the desired cells, right-click, and choose "Copy" from the context menu.

For a detailed explanation of each register column and its contents, refer to the device manual under the corresponding protection function's chapter, in the section titled "Events and Registers." Device manuals can be downloaded from https://www.arcteq.com/documents-and-software/.

Figure. 6.2.4 - 46. General event registers in the "Registers" tab.

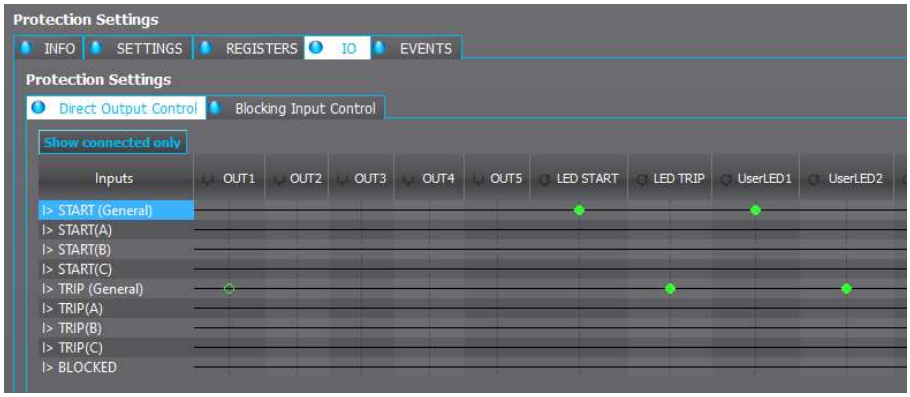


General event register displays events recorded by the function. These events correspond to those that have been enabled in the *Events* tab. In addition to viewing them within the *General event register* tab, all recorded events can also be accessed via *Tools* → *Events and Logs* → *Event History*.

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6.2.5 IO tab

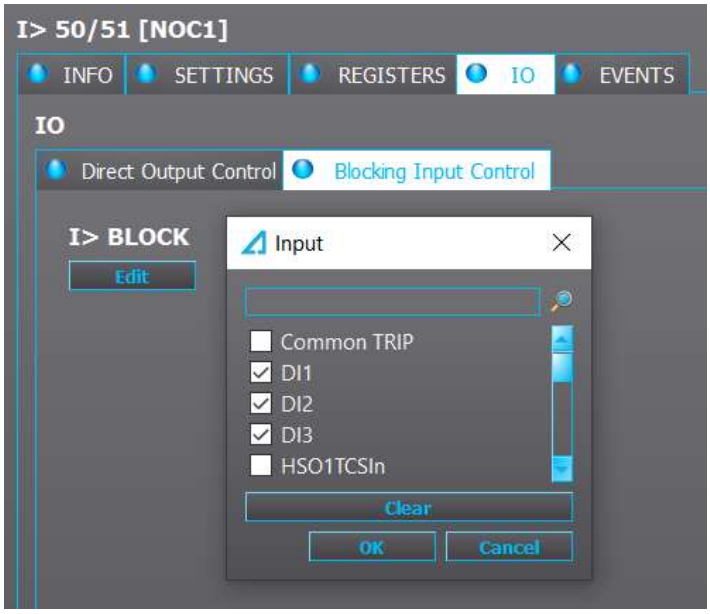
Figure. 6.2.5 - 47. Direct output controls in the "IO" tab.



The I/O tab is divided into two sections: *Direct Output Control* and *Blocking Input Control*.

In the *Direct Output Control* section, the function's output signals can be used to manually switch signal statuses and user LEDs ON or OFF. For more information on how output matrices work, refer to the Introduction and Navigation section.

Figure. 6.2.5 - 48. Blocking input controls in the "IO" tab.



The *Blocking Input Control* tab is used to define which signals can block the function's operation. By default, no signals are assigned to block any function.

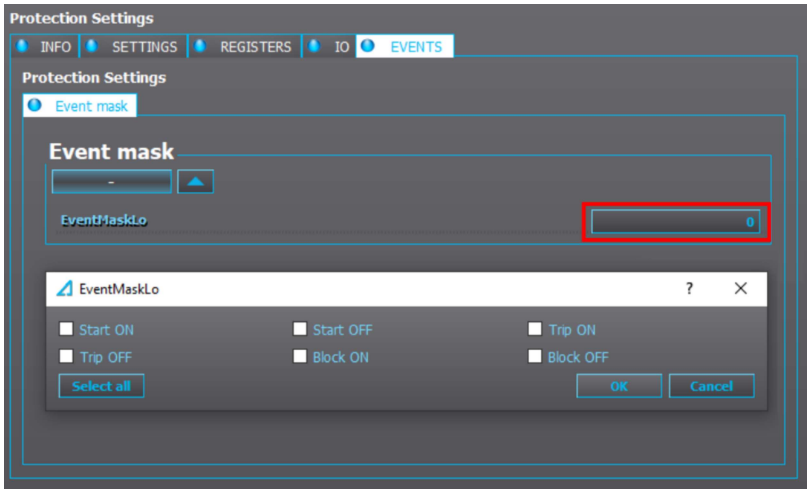
To configure blocking signals, click *Edit* at the bottom of the window. A list of available signals will appear.For example, if *Digital Inputs 1, 2,* and *3* are selected, the function (e.g., I> overcurrent stage) will be blocked whenever at least one of these signals is active.

When a fault is detected while a blocking signal is active, the protection function will generate a *BLOCKED* signal instead of a *TRIP* signal.

To apply the changes, the updated logic must be uploaded to the device via *Commands → Write to Relay*.

6.2.6 Events tab

Figure. 6.2.6 - 49. "Events" tab.



You can control which events are recorded in the *Event History* by configuring the *Event Mask*. To set the event mask, click on the number box to open a pop-up window where you can select the event types to be recorded.

Once configured, the selected events will appear in the *Event History* view, accessible via *Tools* → *Events and Logs* → *Event History* or by using the shortcut *Ctrl+Shift+E*.

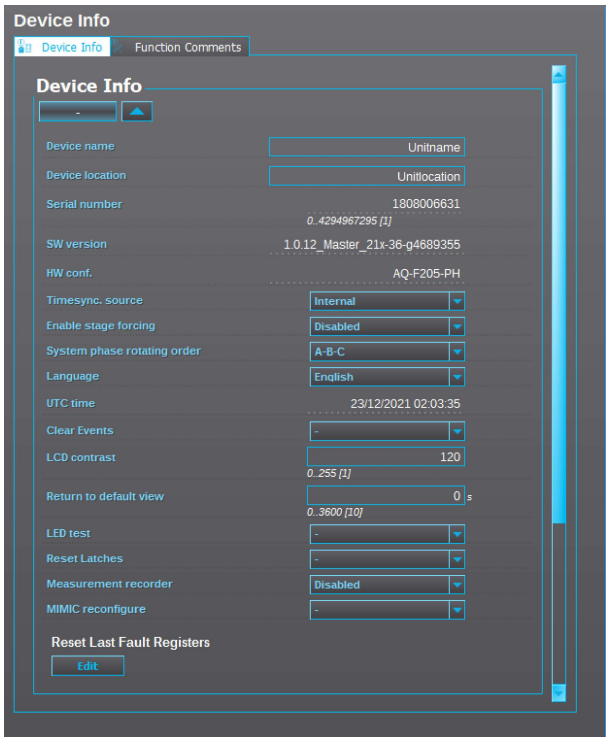
Recorded events can also be viewed on the HMI, provided the *Events* screen has been added to the carousel. For more details, see Carousel designer chapter.

6.3 General menu

The *General* menu's *Device info* tab consists of basic information about the device and general device settings.

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Figure. 6.3 - 50. "Device info" tab in the General menu.



The menu also displays the status of protection, control and monitoring functions that have been enabled. Real-time info is displayed if "Live Edit" mode is active.

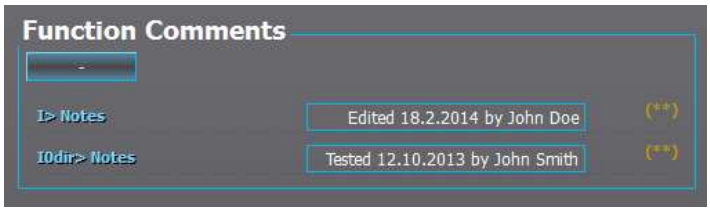
Figure. 6.3 - 51. Checking the function states in the General menu while in Live Edit mode.



For the complete descriptions of the parameters please refer to the device manuals (can be downloaded at https://www.arcteq.com/documents-and-software/).

Function comments

Figure. 6.3 - 52. Examples of function comments.



You can write comments for activated functions in the *Function comments* tab in the *General* menu. For example, you can write notes when parameters were last changed (see the figure above). You can also write comments in the functions' own *Settings* menu.

6.4 Communication menu

The *Communication* menu is used for setting up the basic settings for connecting to device with setting tool and RTUs.

6.4.1 Connections

The *Connections* tab consists of the Ethernet IP address settings and the serial communication settings, both located in the back panel.

Ethernet

The Ethernet IP address settings define what IP address the Ethernet port uses. If an Ethernet-based communication protocol is used, this IP address is used for that as well. Additionally, this section displays the device's MAC address. You can enable Ethernet-based communication protocols (such as IEC 61850, Modbus TCP, etc.) at *Communications → Protocols*.

Virtual Ethernet

The Virtual Ethernet enables the device to be connected to multiple different networks simultaneously via one physical Ethernet connection. The Virtual Ethernet has its own separate IP address and network configurations. All Ethernet-based protocol servers listen for client connections on the IP addresses of both the physical Ethernet and the Virtual Ethernet.

You can enable the Virtual Ethernet connection in the *Virtual Ethernet* section. You can also edit its IP address, netmask, and gateway there.

Serial COMx

In this section you can define the basic settings used by the serial communication ports. You can select the serial communication protocol if one is used by this port. Further communication protocol settings can be done at *Communications → Protocols*.

6.4.2 Protocols

The *Protocols* tab primarily contains settings related to communication protocols, such as enabling protocols, configuring slave addresses, and setting measurement intervals. The available options vary depending on the selected protocol.

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For detailed descriptions of each communication protocol and its parameters, please refer to the device manuals, which can be downloaded from: arcteq.com/documents-and-software/.

Communication protocols also include dedicated tools and communication map menus, accessible via *Tools → Communication*. For detailed instructions and additional information, refer to the *Tools → Communication* chapter in the documentation.

6.5 Measurement menu

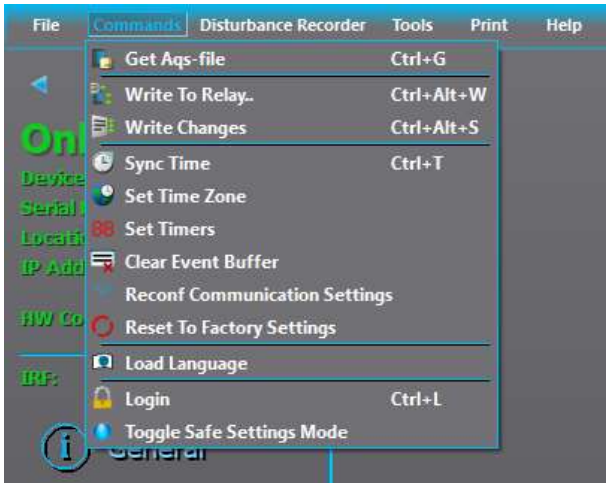
The *Measurement* menu is used for setting up current and voltage transformer scaling and for observing different measurements and phasors. The following lists all possible measurement options; the device type in use determines which of them are available:

- Transformers (CT & VT)
- Frequency
- RTD and mA inputs
- RTD
- AI (mA, DI volt) scaling
- Current measurement
- Current component measurement
- Voltage measurement
- Power and energy measurements
- Impedance calculations
- Admittance calculations
- Phasors

NOTICE!
If you wish to read a detailed and technical explanation of measurement settings and other measurements, please refer to the "Measurements" chapter of the individual device's manual (can be downloaded at arcteq.com/documents-and-software/).

7 Commands menu

Figure. 7 - 53. Commands menu on the main toolbar.



7.1 Time settings

Selecting time zone

Time synchronization with certain communication protocols require that the time zone of the device is defined. You can select the time zone for the device: click *Commands* in the toolbar and then select "Set time zone" from the drop-down menu.

The desired time zone can be selected from the following dialog (see the figure below).

Figure. 7.1 - 54. Time zone selection.



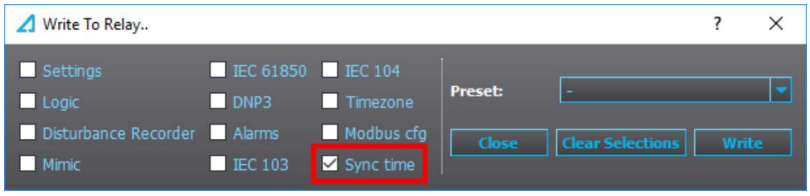
Synchronizing time

If there is no time synchronization source, you can synchronize the device time with the PC time: click *Commands* in the tooldbar, and then select "Sync time" from the drop-down menu.

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Alternatively, you can choose to synchronize the device and PC times when you upload configurations to the device by checking the box titled "Sync time" (see the figure below).

Figure. 7.1 - 55. Synchronizing device and PC times upon configuration uploading.



7.2 Uploading language files

Alternative languages can be selected from the *General* menu with the *Language* parameter. However, a customized language file can be uploaded to the device. First, click *Commands* on the toolbar and select "Load language" from the drop-down menu (see the figure below). This opens a file dialog which allows you to upload the desired language file to the device.

7.3 Set timers

You can set timer signals to help control setting groups and other logic components which activate and deactivate at certain intervals. First, click *Commands* in the toolbar and then select "Set timers" from the drop-down menu. When you click the green plus icon (+) at the top right of the window, you add a new timer configuration line. You can then select one of the displayed timers, and set its state to switch to 1 or 0 at a specific time.

Table. 7.3 - 1. Settings for a timer (Timer 1) that goes to state "1" every day at 20 o'clock and goes to "0" at 21 o'clock.

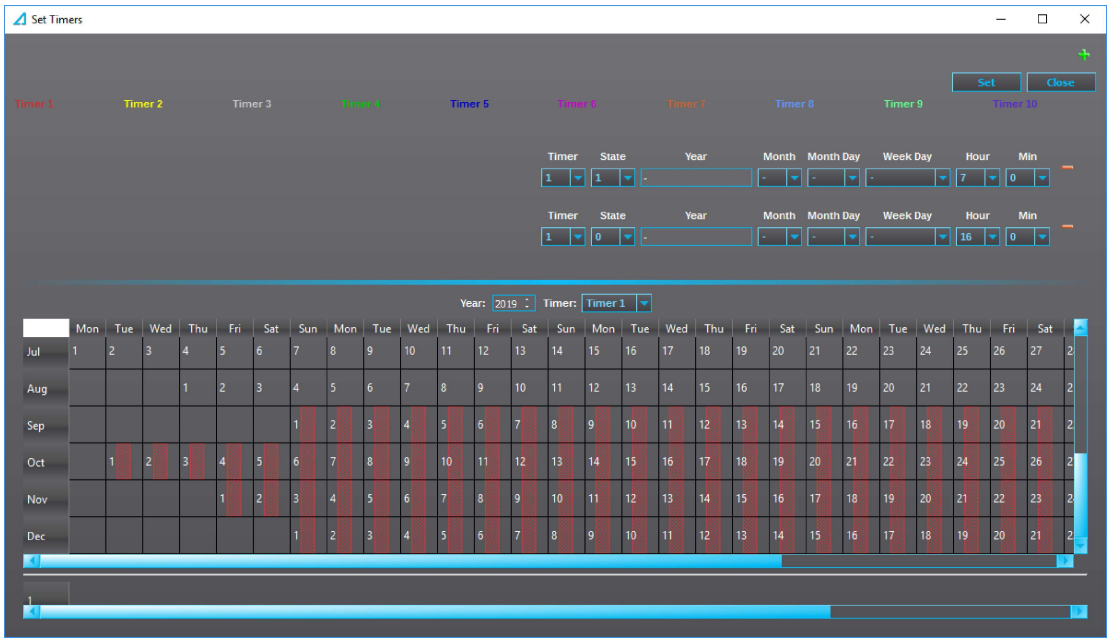
Timer	State	Year	Month Day	Week day	Hour	Min
1	1	-	-	-	20	0
1	0	-	-	-	21	0

Table. 7.3 - 2. Settings for a timer (Timer 2) that goes to state "1" every Friday evening and keeps the status until Monday morning.

Timer	State	Year	Month Day	Week day	Hour	Min
2	1	-	-	Friday	20	0
2	0	-	-	Monday	8	0

NOTICE!
Timers can only be set up when connected to a device with AQtivate.

The calendar view below the timer configuration line shows when a specific timer is on. Each timer has its own color code; the code is displayed at the top of the window above the timer configuration line. As can be seen in the example below, the state of the selected timer is 1 (as in, the timer is on) when a day's box is red. The red circle marks the current day (in this example, the date is November 13th). You can click on a day to see a more detailed division of the day below the calendar at the bottom of the window. Once the timers have been configured, you can send the configurations to the device by clicking the "Set" button on the top right of the window. This requires an active connection to the device.



7.4 User levels and their passwords

There are four (4) user levels:

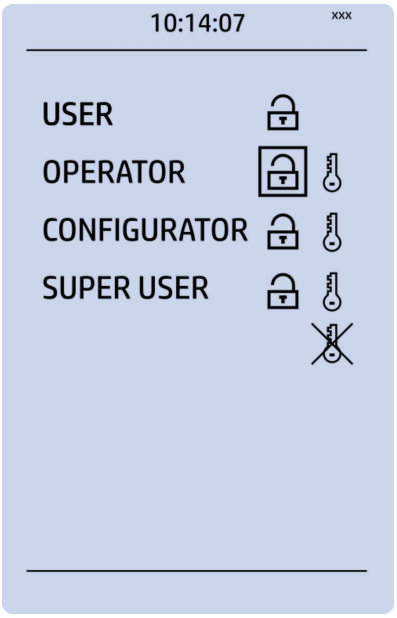
- User = can only view.
- Operator = has access to control objects.
- Configurator = has access to control objects and most settings.
- Super user = has full access.

The factory default is that no passwords are set up and all user levels are unlocked in the device. Only the device HMI can be used for setting up passwords.

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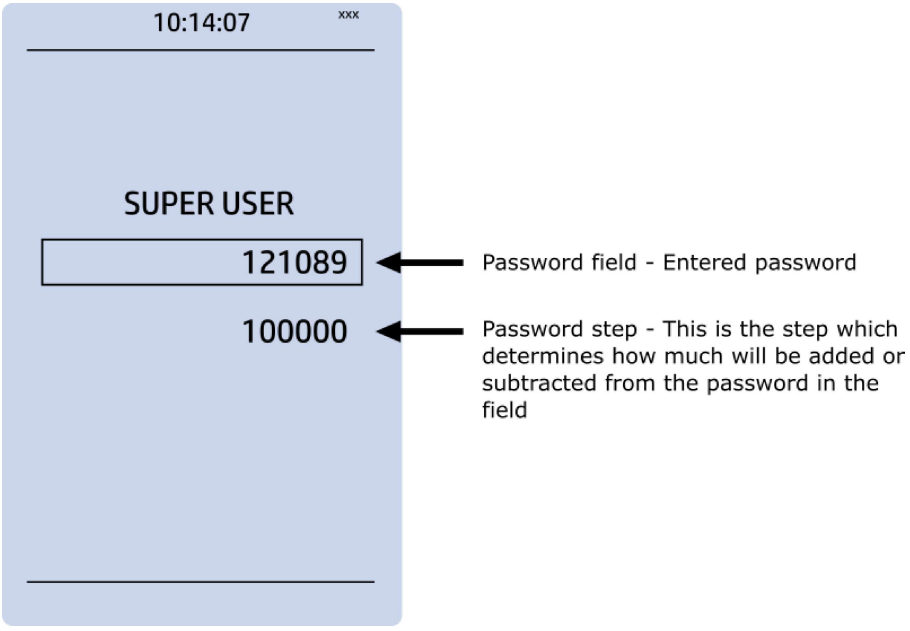
7.4.1 User levels in AQ 210 frame devices

Figure. 7.4.1 - 56. User level view.



To activate and lock user levels, push the Lock button in the device's HMI, choose the key icon for the user level, and then set the desired password (see the image below).

Figure. 7.4.1 - 57. Setting up a password for a user level in AQ 210 frame devices.



Any user level with a password can be locked by pressing the Enter key while the lock is selected. If you need to change the password, select the key icon again and give the new password. If you want to disable the password requirement for a specific user level, set the password to "0".

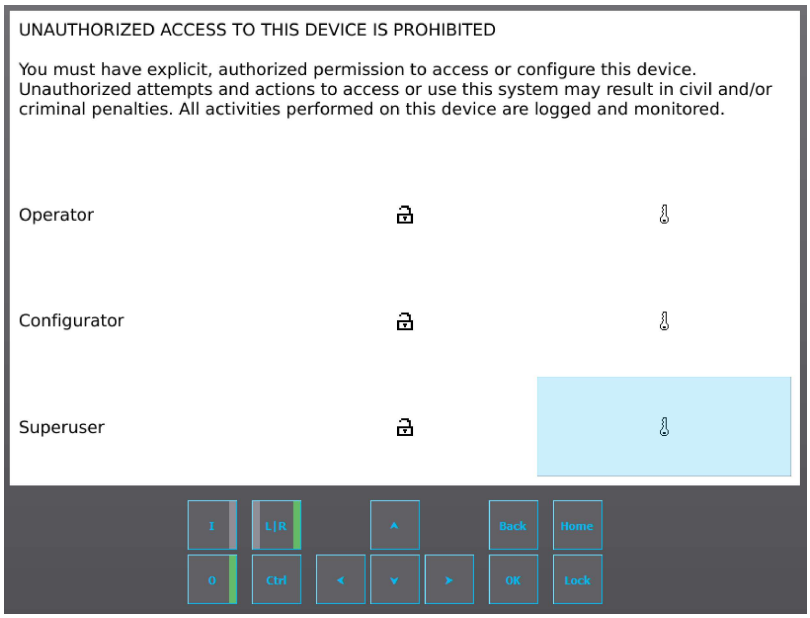
NOTICE!
In AQ 210 frame devices a user level with a password automatically logs out after 30 minutes of inactivity.

7.4.2 User levels in AQ 250 series and AQ-ONE devices

Setting up user levels in your local HMI

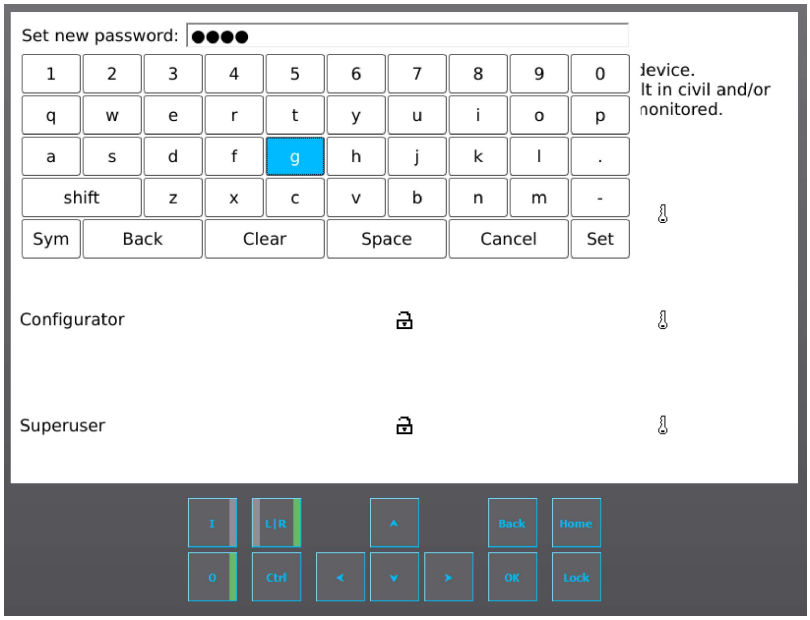
Push the Lock button in the device's HMI to access user levels.

Figure. 7.4.2 - 58. User level view in AQ 250 frame devices. Warning text can be edited with AQtivate in the login window (*Commands → Login*).



The key icon next to the user level allows you to set a new password for that user level. Any user level with a password can be locked by pressing the Enter key while the lock is selected. If you need to change the password, select the key icon again and give the new password. If you want to disable the password requirement for a specific user level, set the password to "0".

Figure. 7.4.2 - 59. Setting a new password for a user level in an AQ 250 frame device.



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In AQ 250 series devices the unlocking and locking of a user level generates a time-stamped event to the event log.

Advanced user access control settings

The following settings and indications are only available on AQ 250 frame devices. They can be found from *Monitoring → User Access Control* menu.

Table. 7.4.2 - 3. UAC settings.

Name	Range	Default	Description
Enable user group - Operator	• Enabled • Disabled	Enabled	Enables or disables "Operator" user group.
Enable user group - Configurator	• Enabled • Disabled	Enabled	Enables or disables "Configurator" user group.
Minimum password length	0…128	1	Sets the minimum character length for passwords.
Number of fail attempts before lock	0…1000	3	Sets the number of failed attempts allowed before locking the user level.
Lock period after max fail attempts	0…86400000 s	0 s	Wait time after locking a user level.
HMI session period before logout	5…86400 s	900 s	Time delay for logging out in the HMI. Timer will start the countdown when there are no front panel button presses.
Setting tool session period before logout	5…86400 s	900 s	Time delay for logging out in the setting tool. Timer will start the countdown when there are no key presses or mouse movement.

Table. 7.4.2 - 4. UAC management.

Name	Range	Default	Description
Enable UAC management	• Enabled • Disabled	Disabled	If UAC has been enabled, the function will set default passwords for the user levels, if no passwords have been set. The function will also monitor if the passwords have been expired.
Enable default passwords	• Enabled • Disabled	Disabled	If enabled, user levels will use the default passwords, if no passwords have been set. The default passwords are: • Operator: Oper17 • Configurator: Conf12 • Super user: Supr98
Password change interval - Operator	0…1000 day(s)	0 day(s)	Required interval for changing passwords. If the password hasn't been changed on time, "Password expired" parameter will change to "True", diagnostic alarm will be activated and an entry to the audit log will be added.
Password change interval - Configurator	0…1000 day(s)	0 day(s)	

Name	Range	Default	Description
Password change interval - Superuser	0…1000 day(s)	0 day(s)	
Password expired - Operator	• False • True	-	If the password hasn't been changed before the "password change interval" has expired, this parameter will change to "True"
Password expired - Configurator	• False • True	-	
Password expired - Superuser	• False • True	-	
Default password unchanged - Operator	• False • True	-	Indicates if the user level is using the default password or a user configured password.
Default password unchanged - Configurator	• False • True	-	
Default password unchanged - Superuser	• False • True	-	
Password last changed - Operator	DD/MM/YYYY HH:mm:ss	-	Timestamp of the last time the password has been changed for the user level.
Password last changed - Configurator	DD/MM/YYYY HH:mm:ss	-	
Password last changed - Superuser	DD/MM/YYYY HH:mm:ss	-	

7.4.3 Accessing user levels in AQtivate

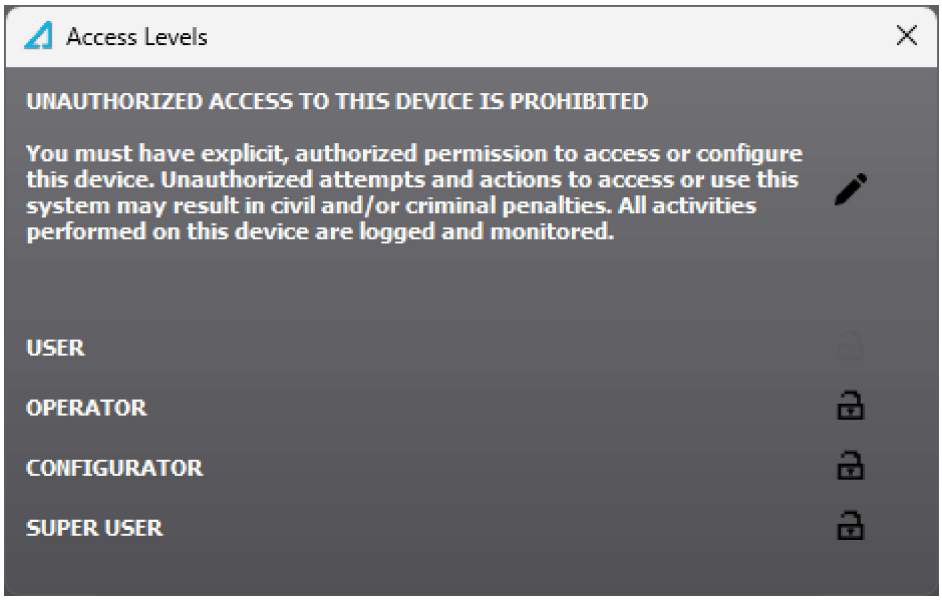
If passwords have been set up in a device, AQtivate requires logging in to open user levels. Click *Commands* on the toolbar and select "Login" from the drop-down menu. This makes the *Access Levels* pop-up window appear (see the figure below).

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Figure. 7.4.3 - 60. Access Levels window in AQ 210 frame devices.

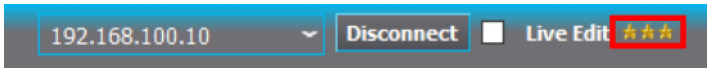


Figure. 7.4.3 - 61. Access Levels window in AQ 250 frame devices. This view can also be used for editing the warning text displayed in the user level view in the device HMI.



At the top of the AQtivate window, next to the Live Edit mode box, there are a number of yellow stars (see the figure below). They indicate the active user level. Three yellow starts represent the Super user level, two yellow stars represent the Configurator level, and one yellow star represents the Operator level. If all stars are grey, the active level is User.

Figure. 7.4.3 - 62. Stars indicating user levels.



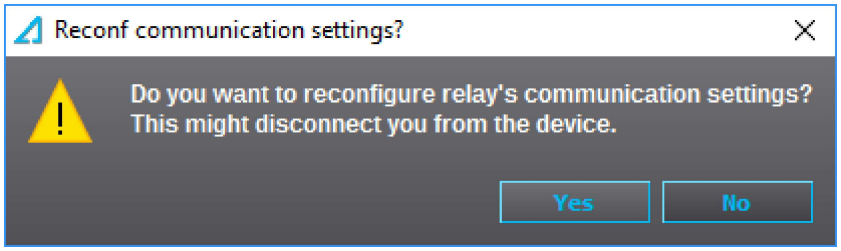
7.5 Clearing event buffer

You can clear the event history by clicking *Commands* on the toolbar and selecting "Clear Event buffer". This clears the event history and places an "Event buffer clear" marker into the event history.

7.6 Reconfiguring communication settings

When you upload new communication IP settings to the device, a prompt appears asking whether these settings will be adopted to use immediately (see the figure below).

Figure. 7.6 - 63. Communication settings adoption window.



If "Yes" is selected, the new settings are adopted right away. If "No" is selected, the new IP settings will be adopted only after you have brought up the same window through AQtivate (*Commands → Reconf communication settings)* and clicked "Yes". If device is rebooted before reconfiguration is done, device will revert back to original IP address.

7.7 Safe Settings mode

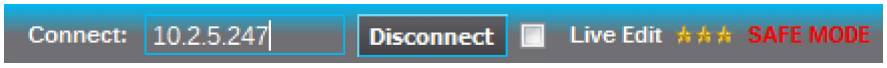
You can toggle the Safe Settings mode: connect to a device, click *Commands* on the AQtivate main toolbar, and select "Toggle Safe Settings mode" from the drop-down menu.

When in this mode, you can perform tests without causing the device to actually control any of the output contacts. Events are still triggered normally.

Turning the Safe Settings mode on causes the device to give a backup .aqs file. This backup has the current device settings. If the new settings fail the test and you need the old setting back, you can use this backup .aqs file to retrieve them. The file also includes the event history dialog.

When the Safe Settings mode is activated, a red "SAFE MODE" label appears on the main toolbar (see the figure below).

Figure. 7.7 - 64. Indicating the Safe Settings mode on the main toolbar.



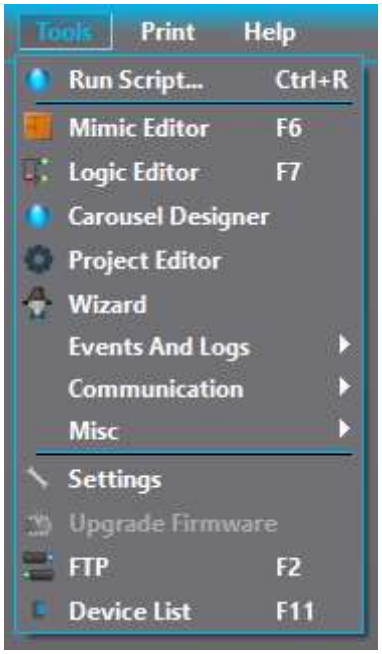
When this mode is active, the device's IRF output contact and the ERROR LED is activated. In AQ 210 frame devices a skull icon will also appear at the top of the HMI.

You can disable the Safe Settings mode by clicking *Commands → Toggle Safe Settings mode* again.

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8 Tools menu

Figure. 8 - 65. Tools menu on the main toolbar.



8.1 Running scripts

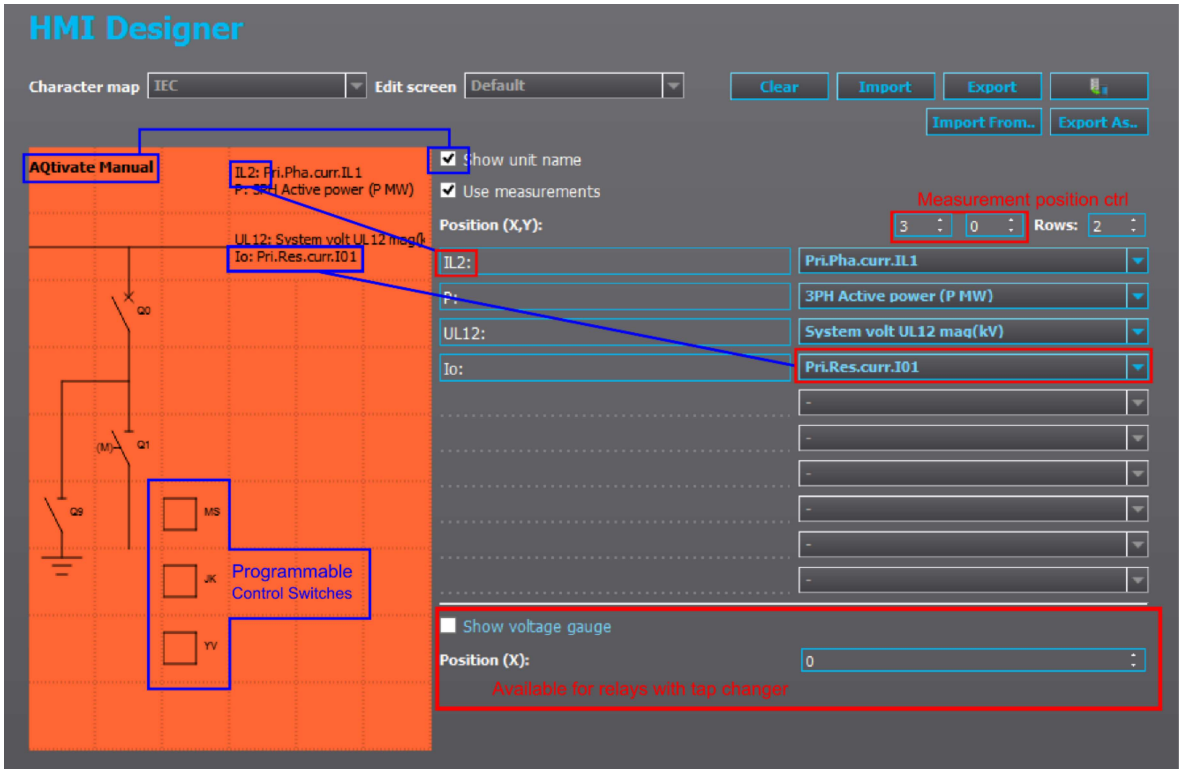
Occasionally Arcteq scripts need to be run to the devices. For example, you may need to run a script when you have changed the hardware configurations after installing a new card. You can do this by clicking *Tools* on the AQtivate main toolbar and selecting "Run script" from the drop-down menu.

All scripts are provided by Arcteq personnel.

8.2 Mimic editor (AQ 210 series)

The Mimic editor is used to create a visualization of the protected system for the HMI. In this chapter we are going to take a look at the simple tools AQtivate has for making a mimic display for AQ 210 series devices.

Figure. 8.2 - 66. AQ 210 series mimic editor.



The mimic display is a 9x6 grid. The selectable items in the Mimic editors' library include:

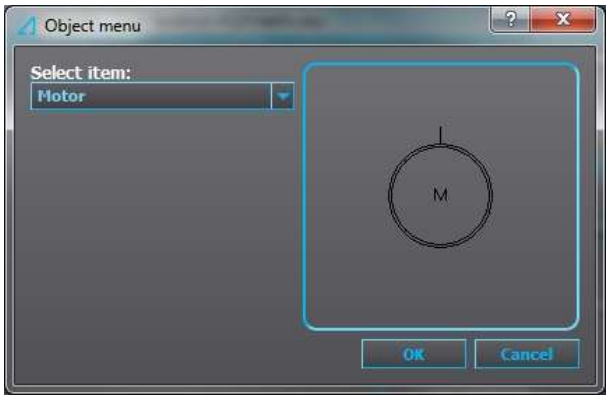
- Lines and icons for drawing purposes.
- Objects and indicators to visualize the state of circuit breakers and disconnectors (configured in the *Objects* tab of the *Control* menu).
- Programmable control switches which can control logic, setting groups, etc.

The grid can be cleared by clicking the "Clear" button.

Adding symbols and objects

Click on one of the boxes in the grid and an *Object menu* appears. Select the item you want to use from the "Select item" drop-down menu. In the figure below, the symbol within the frame on the right shows what the item looks like.

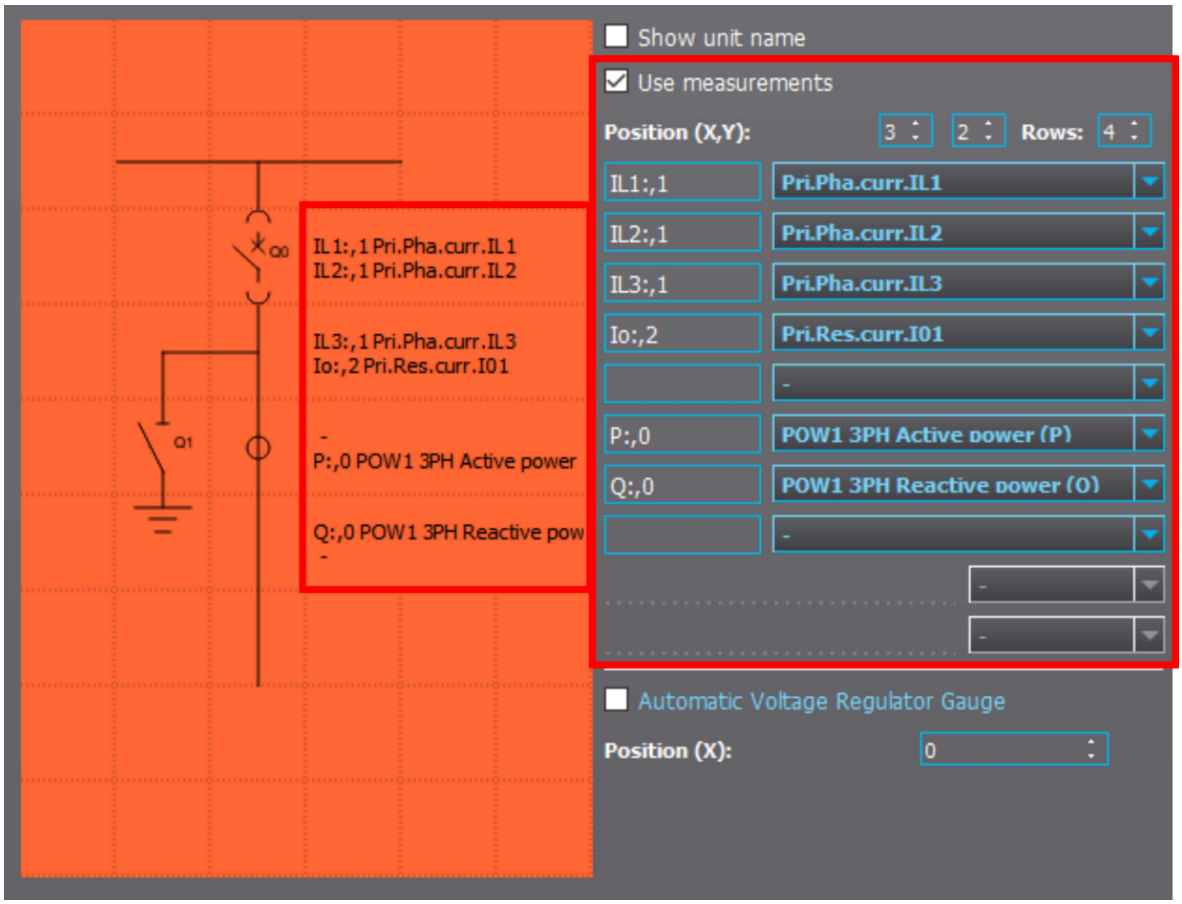
Figure. 8.2 - 67. Example of object selection in the mimic.



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Adding measurements

Figure. 8.2 - 68. Adding measurements to the mimic.



You can add measurements into the mimic by using the drop-down menus on the right side of the HMI designer (see the figure above). The HMI display can use up to ten (10) different measurements. The text boxes are used to describe what the measurements represent. If you put a comma after the text, you can customize how many decimals places are used for the value. For example, "I01:,2" gives the primary residual current with the accuracy of two decimal places.

You can change which measurement is used in which row by selecting the measurement from the drop-down boxes to the right of the "Position (X,Y)" text. Changing the number of rows also changes how many measurements can be shown in the mimic. However, each row can only fit two measurements.

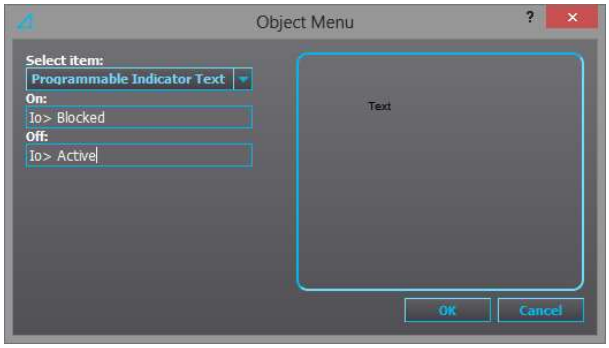
Adding programmable mimic indicators

Figure. 8.2 - 69. Example of assigning a signal to a mimic indication.



Programmable mimic indicators can display texts which indicate the status of the network. In the figure above, for example, the I0> BLOCKED signal has been assigned to Mimic indication status 1 (through *Control → Device I/O → Programmable mimic indication*). Then, you can choose a box from the Mimic editor grid and select "Programmable indicator text" from the library. Before clicking "OK" type in the texts you want displayed on the screen when the signal is on and when it is off.

Figure. 8.2 - 70. Example of assigning an indicator text to a signal.



Loading the mimic to device

Figure. 8.2 - 71. Loading your mimic into your device.



If you have an active connection to a device, click the "Send to relay" button (highlighted in the figure above) to send the mimic into the device.

Exporting the mimic

After you are finished creating the mimic, clicking the "Export" button makes it a part of the .aqs configuration file you are working on. Please note that the export command is executed automatically after certain functions, while it is not executed automatically after other functions (such as editing the measurements text field).

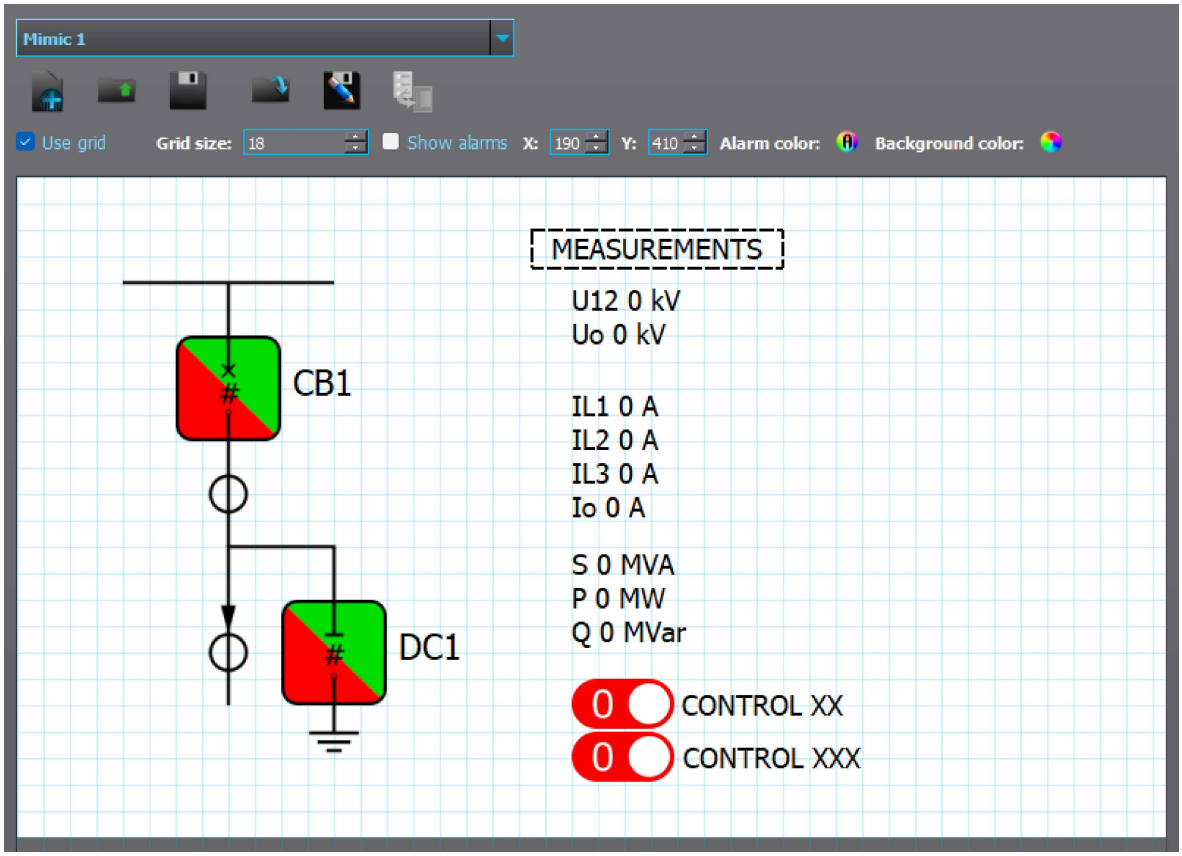
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Saving the mimic as a separate file

The mimic can be saved as a separate file by clicking the "Export As.." button. You can import a mimic from these separate files by pressing the "Import from.." button. This is a useful tool especially when there are several devices with similar custom mimics. You can also use the Export and Import buttons to copy the same mimic to other .aqs files.

8.3 Mimic editor (AQ 250 series and AQ-ONE devices)

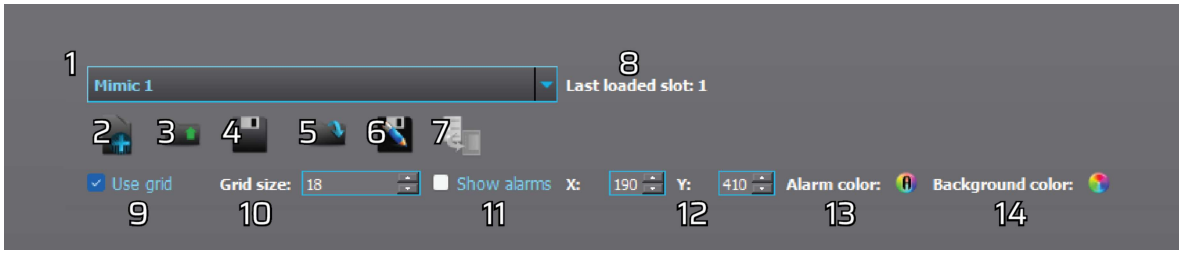
Figure. 8.3 - 72. Mimic editor of AQ 250 series devices.



The Mimic editor is used to create a visualization of the protected system for the HMI. In this chapter we are going to take a look at the tools AQtivate has for making a mimic display for AQ 250 series devices and AQ-ONE devices. Up to five (5) mimics can be stored in a device.

The figure below presents the functions available to you in the Mimic editor's main toolbar, and the table below the figure explains the function of each icon in detail.

Figure. 8.3 - 73. Mimic's main toolbar.

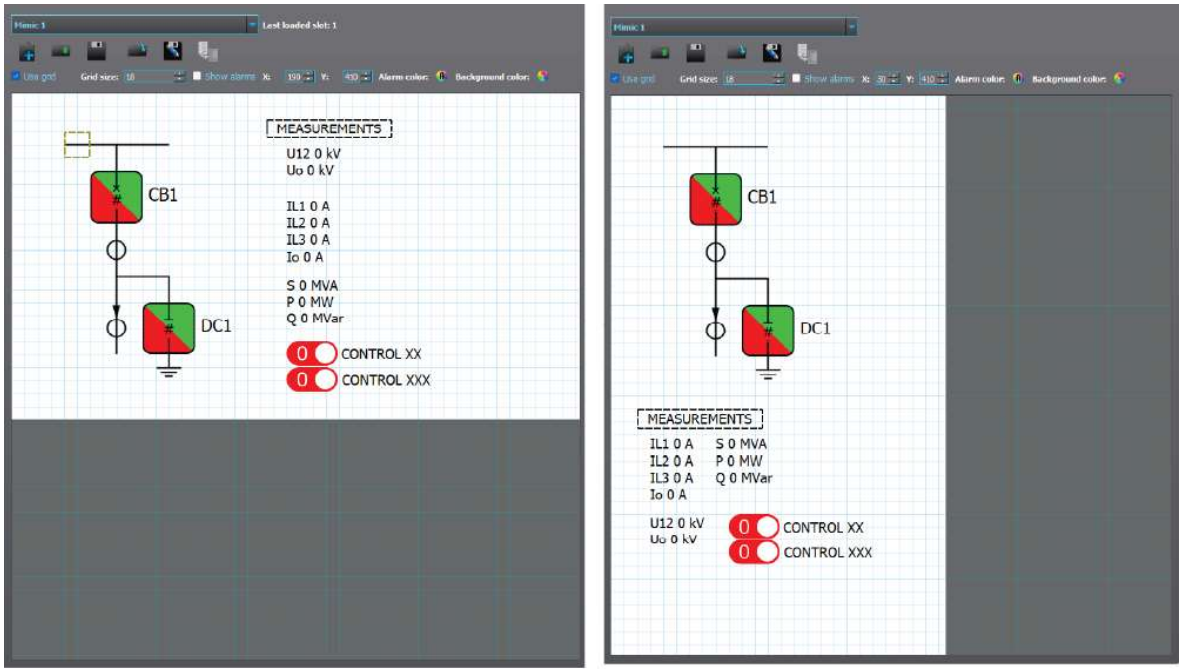


(#) Button	Description
1. Mimic drop-down menu	Chooses which of the five available mimics is being worked on.
2. New	Empties the mimic sheet.
3. Reload	Reloads a previously saved version from the mimic slot chosen with the drop-down menu (#1).
4. Save	Saves the mimic to the currently open .aqs file and to the mimic slot chosen from the drop-down menu (#1).
5. Open	Opens a mimic file.
6. Save as…	Saves the mimic file as a separate file.
7. Send to relay	Sends the currently open mimic to the device if there is a connection to the device.
8. Last loaded slot	Indicates the slot to which the mimic has been loaded.
9. Use grid	If the grid is in use, items in the mimic editor move by the number of pixels defined in "Grid size" (#10).
10. Grid size	Defines the number of pixels that items move each step when "Use grid" (#9) is enabled.
11. Show alarms	Allows the alarm box to display the latest recorded alarm. Events that are recorded to the alarm box can be defined at *Tools* → *Events and Logs* → "Set alarm events".
12. Alarm location	Moves the alarm box in the X and Y axes.
13. Alarm color	Opens a window for selecting the alarm box's background color.
14. Background color	Opens a window for selecting the mimic's background color.

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Handling display sizes

Figure. 8.3 - 74. Two available display orientations: landscape (left) and portrait (right).

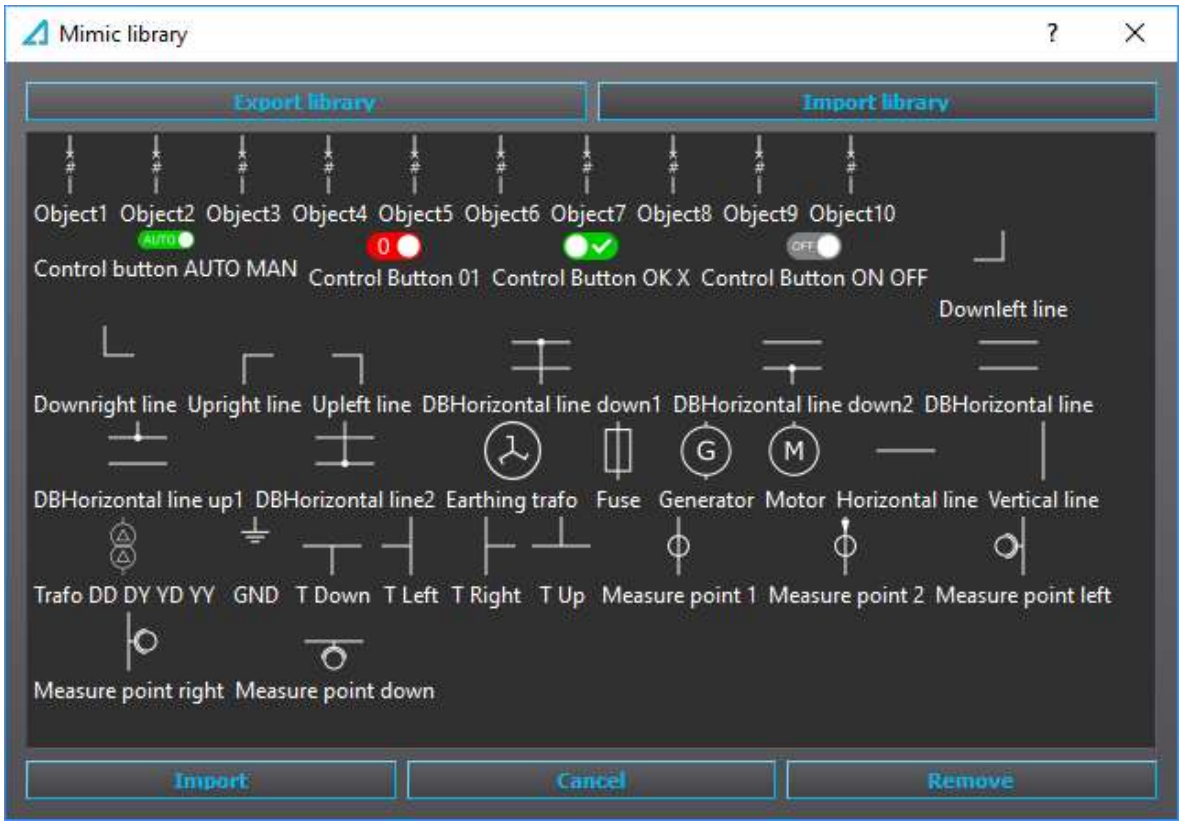


There are two display orientations available for mimic diagrams. AQ 250 series devices support the landscape orientation, while AQ-ONE supports both landscape and portrait orientations.

A mimic diagram created for one orientation can also be loaded into a configuration that uses the other orientation. However, when doing so, it is important to consider the available screen space, as the layout may require adjustment to fit the selected display orientation properly.

Adding and removing items

Figure. 8.3 - 75. Window listing items in the mimic library.



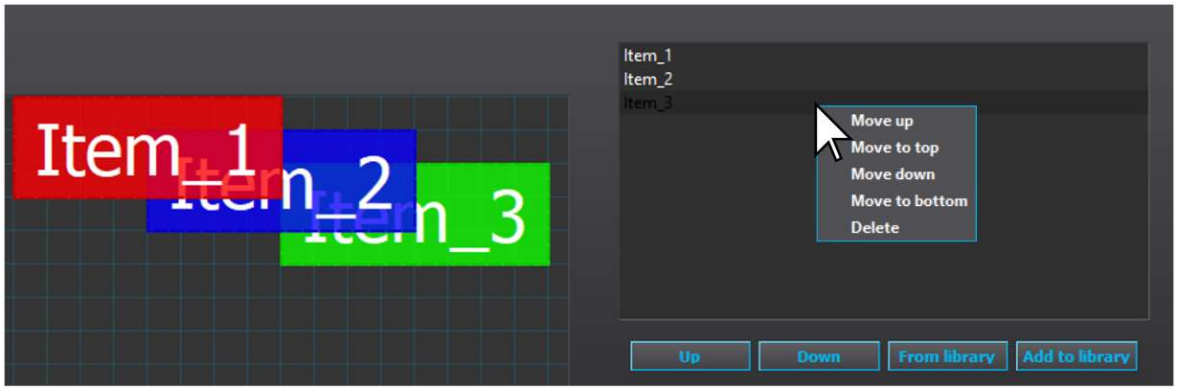
You can add items to the mimic by right-clicking somewhere on the mimic sheet and selecting "Add item" from the menu that appears. By clicking the "From library" button on the right, you get a pop-up window with the various item types that are already in the library (see the figure above). Select an item and then press the "Import" button. You can also add a selected item to a library with the item name as its title with the "Add to library" button. An item that has been added to a library can then be used again by choosing it from the list by clicking "From library".

You can also remove items from the mimic: right-click on an item on the mimic and select "Remove item" from the menu that appears next to the cursor. Alternatively, you can select the to-be-deleted item from the list at the top-right window, right-click it and select "Delete" from the menu.

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Item management

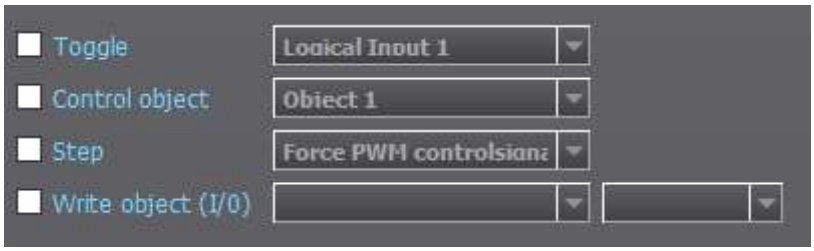
Figure. 8.3 - 76. Positioning of items in front/back of other items.



You can move an item to the front and back one step at a time with the "Up" and "Down" buttons. The item at the top of the list is in the front and the item in the bottom of the list is the furthest back. You can also rename the item by double-clicking it on the list. Right-clicking an item brings up more options for moving and deleting it.

Function control item

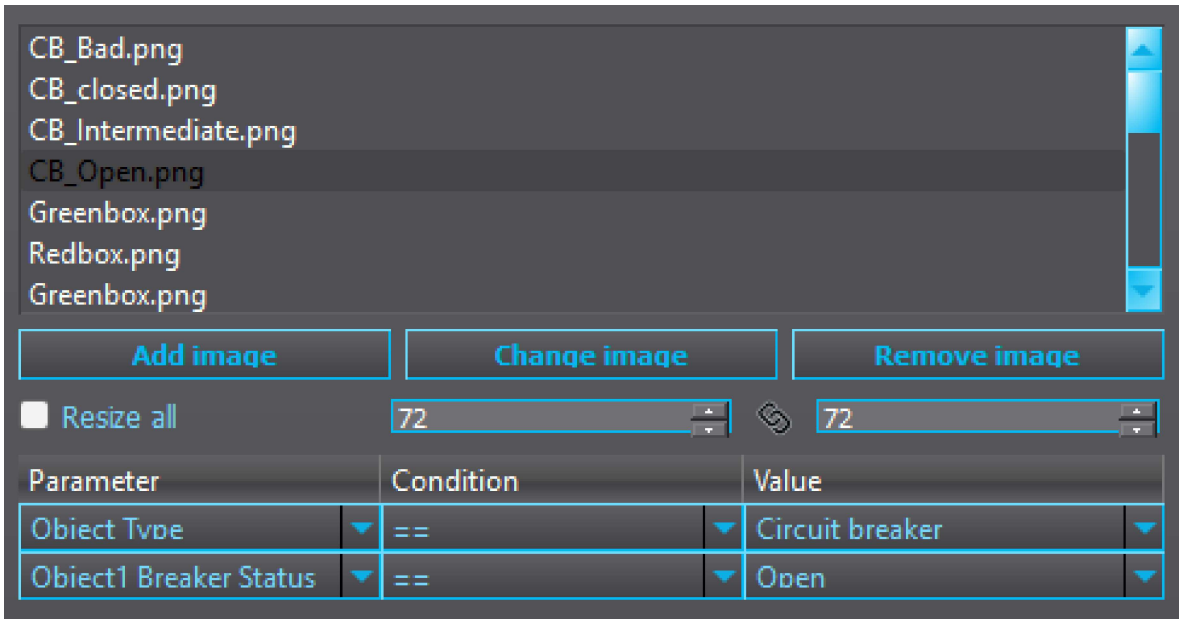
Figure. 8.3 - 77. Function controls.



You can select between four (4) function controls; only one can be selected at any one time. "Toggle" allows you to control logical inputs and programmable control switches ON (1) and OFF (0) with the selected item. "Control object" lists the available objects that can be controlled with the item. "Step" controls the functions related to Generator Commander. "Write object (I/O)" controls objects such as the voltage regulator with up and down commands.

Item images and visibility conditions

Figure. 8.3 - 78. Example of visibility conditions.



An item can contain one or more images. Each image can then be assigned with one or more visibility conditions with "Add image condition". If no visibility condition is assigned, the image is always displayed. If two images are visible in the same item at the same time, the image that is at the top of the list is displayed. If multiple visibility conditions are applied, all conditions must be met for the image to be displayed. The figure above shows an example of an item's visibility condition: the image "CBopen.png" is visible if the parameter "Object type" is set to "Circuit breaker" and its status (as in the parameter "Object2 Breaker Status") is "Open".

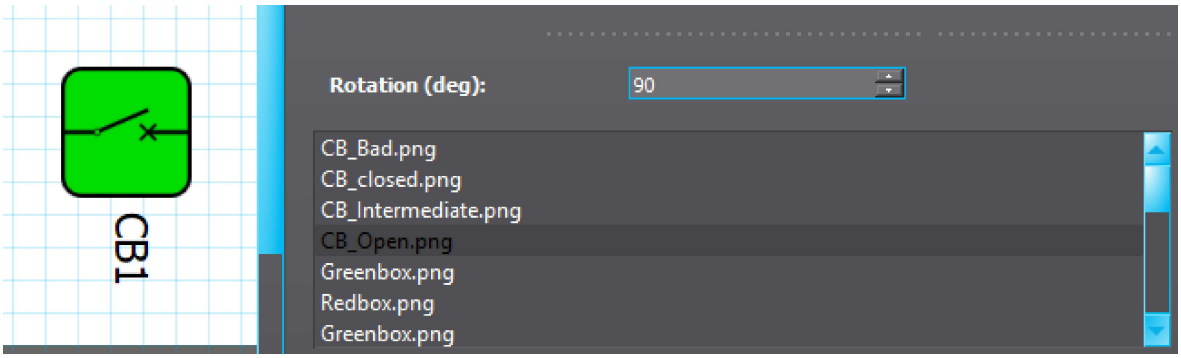
Available visibility condition signals are:

- Digital inputs
- Logical outputs
- Logical inputs
- GOOSE inputs
- Programmable control switch statuses
- Various object and indicator object statuses
- Modbus gateway signals
- etc.

The "Change image" button allows you to change the image while retaining the image conditions of the image being replaced. Please note that the new image is applied with the original resolution. You can resize it (and other images) by changing the resolution number located next to the "Resize all" button; if that button is active, you resize all the images in the item at the same time.

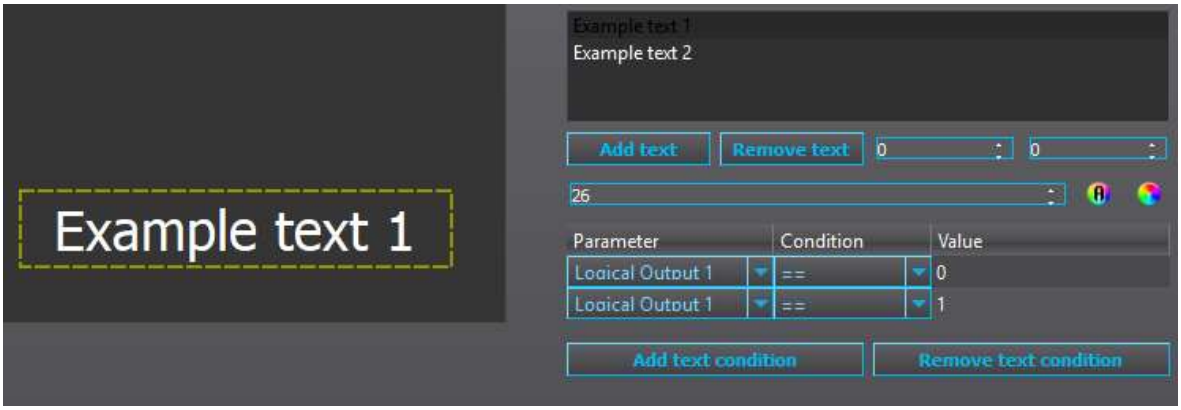
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Figure. 8.3 - 79. Item with text and images rotated 90 degrees.



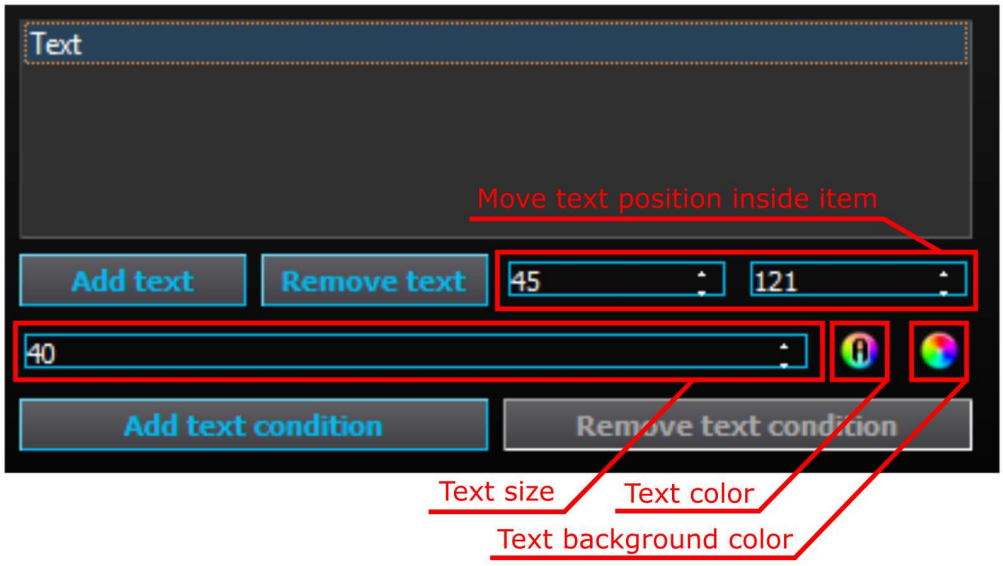
Rotation (deg) rotates the images and texts in the item. Changing this setting rotates every image and text in the item.

Figure. 8.3 - 80. Applying a visibility condition to an item text.



An item can contain one or more texts. Each text can then be assigned with one or more visibility conditions. If no visibility condition is assigned, the text is always displayed. If two texts are visible in the same item at the same time, the texts are displayed on top of each other unless the texts within the item have been moved by changing their text position numbers. If multiple visibility conditions are applied, all conditions must be met for the text to be displayed.

Figure. 8.3 - 81. Editing item texts, their appearance, and their positions.



The figure above presents the various text settings available in the Mimic editor. The default font size for texts added to items is 12 pt; however, you can resize the font with the number box. You can also move the text's position inside the item with the two number boxes (the left one moves the texts horizontally, the right one vertically). Additionally, you can add and remove text conditions with their respective buttons. You can also change the color of the text (the multicolored circle with A) and the color of the text's background (the multicolored circle).

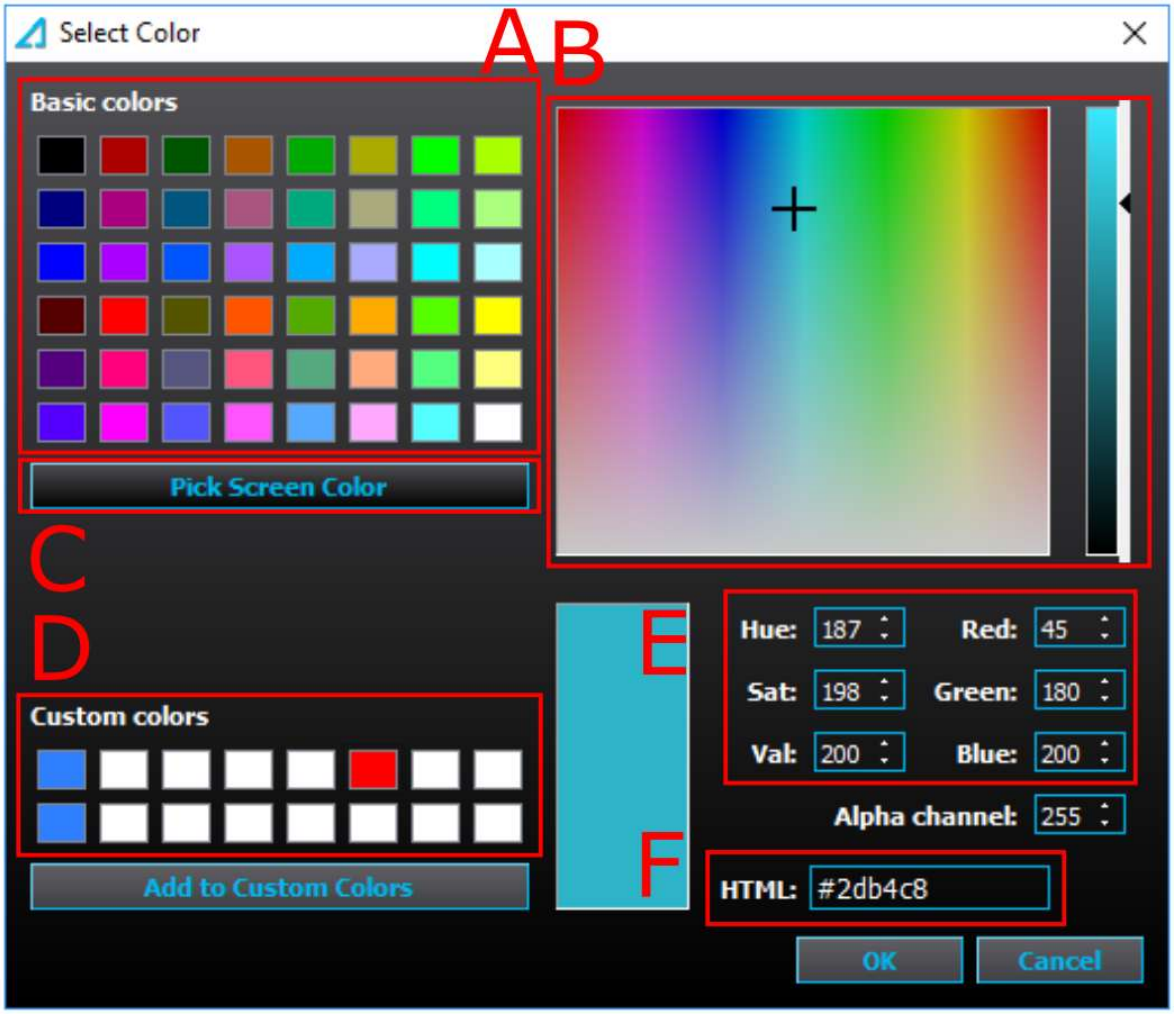
There are a total of six ways to pick a color for text or its background (see the figure below):

A) From the collection of basic colors.
B) From the color gradient grid and brightness slider.
C) Move the cursor to any point on the screen and click to use that specific color.
D) From the collection of saved custom colors.
E) Edit the red, green and blue integers as well as the hue, saturarion and brightness individually.
F) Enter the color's HTML code.

In addition to these settings, the "Alpha channel" number box sets the transparency of the text or of the text background (0 = fully transparent, 255 = fully visible).

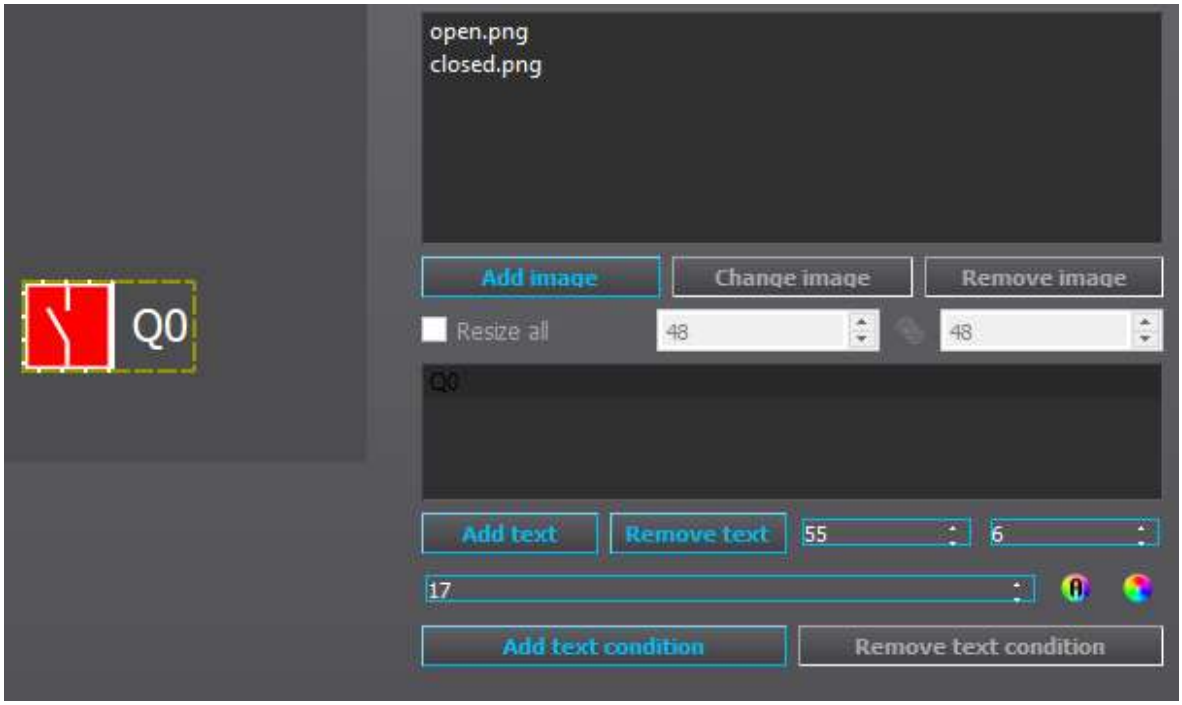
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Figure. 8.3 - 82. Six ways to set a color.



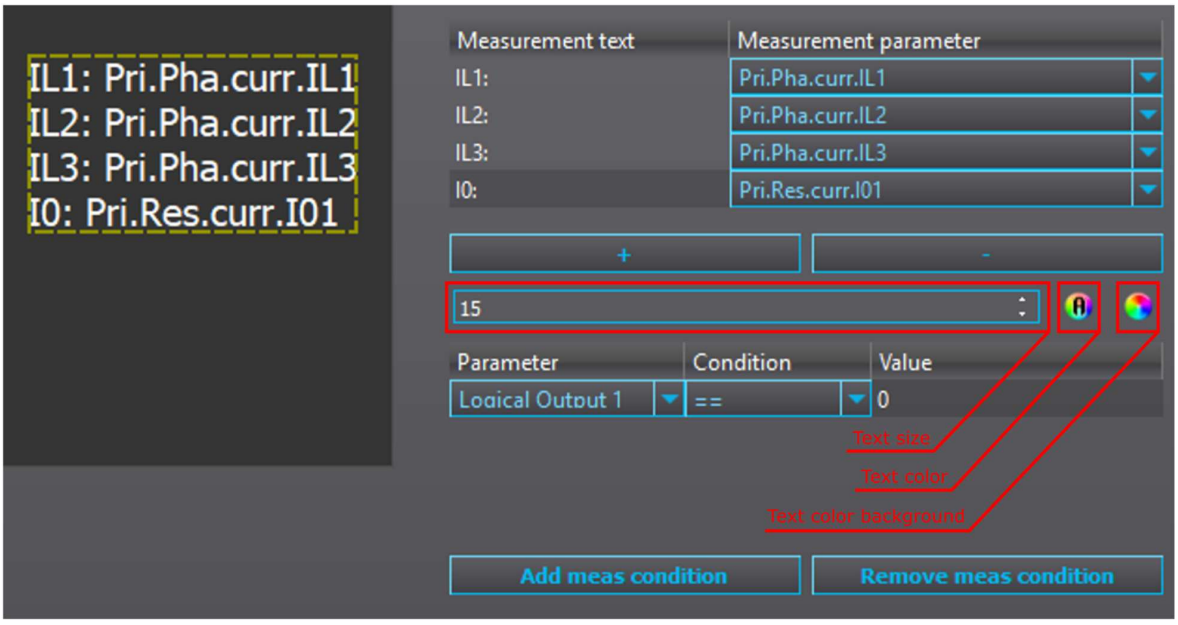
The same item can have both images and texts. For example, you can have the component's abbreviation (e.g. "Q0") next to the image as in the figure below.

Figure. 8.3 - 83. Example of an item with both image and text assigned to it.



Adding measurements to the mimic view

Figure. 8.3 - 84. Adding measurements and editing their text and appearance.



You can add measurement items to the mimic by right-clicking somewhere on the mimic sheet and selecting "Add measurement item" from the menu that appears. The plus (+) button adds a new row to the measurement item. You can add a prefix to any measurement row by right-clicking its slot below "Measurement text". From the "Measurement parameter" drop-down menus you can define which measurement is shown in the mimic. You can change the number of decimal digits displayed by adding a comma and the desired number of decimals (e.g. "IL1,1" to get only one decimal). Additionally, you can change the font size, the text color, and the text's background color in the same way as in text settings.

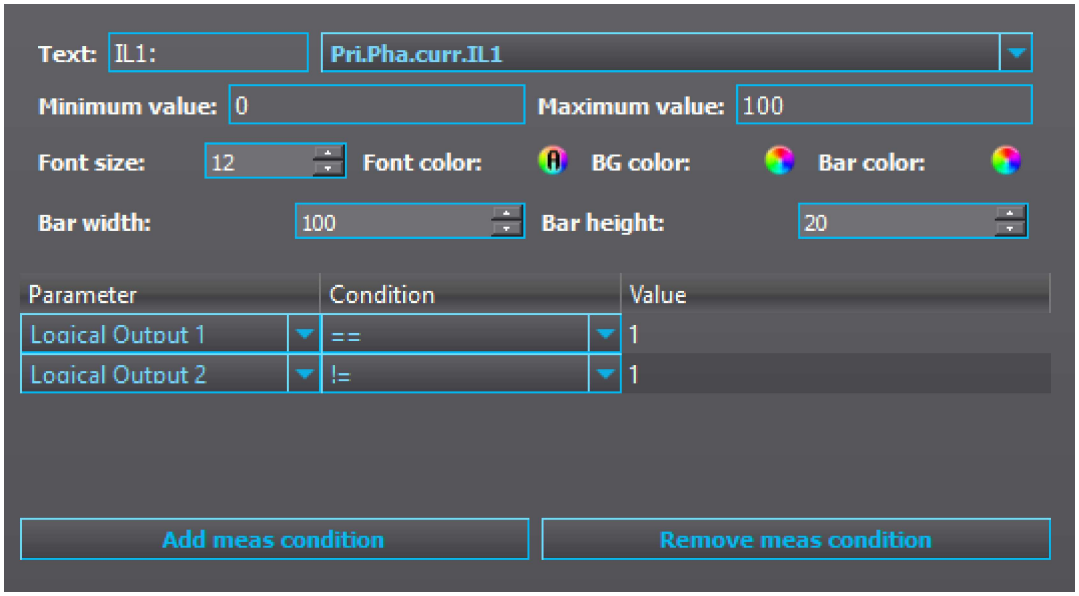
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The measurement can be assigned with one or more visibility conditions. If no visibility condition is assigned, the measurement is always displayed. If multiple visibility conditions are applied, all conditions must be met for the measurement to be displayed.

Adding a measurement bar to the mimic view

You can add measurements bars by right-clicking the mimic sheet and selecting "Add measurement bar" from the menu that appears. The following setting selection (see the figure below) appears on the right side of the Mimic editor window.

Figure. 8.3 - 85. Setting selection for a measurement bar.

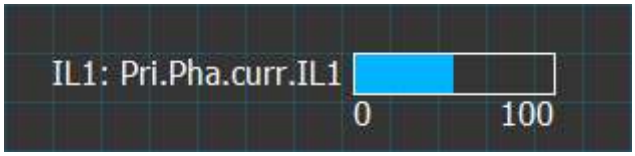


Setting	Description
Text	Defines the prefix shown before the measurement value.
Minimum value	Defines the lowest value the bar can display. If the measured value is lower than what is set here, the bar appears empty. **NOTICE!** Please note that this setting does not affect how wide the bar appears in the mimic view! Use the "Bar width" setting to change the width.
Maximum value	Defines the highest value the bar can display. If the measured value is higher than what is set here, the bar displays the highest value set. **NOTICE!** Please note that this setting does not affect how wide the bar appears in the mimic view! Use the "Bar width" setting to change the width.
Font size	Defines the font size of a user-defined prefix text and measurement value text.
Font color	Changes the color of a user-defined prefix text and measurement value text. Uses the same tools as the items in text (described previously).
BG color	Changes the color of text behind a prefix text and measurement value text. Uses the same tools as the items in text (described previously).

Setting	Description
Bar color	Changes the color of the measurement bar. Uses the same tools as the items in text (described previously).
Bar width	Changes the width of the bar. This setting is in pixels.
Bar height	Changes the height of the bar. This setting is in pixels.

The figure below shows the resulting measurement bar, when you use the settings shown in the previous figure above the table.

Figure. 8.3 - 86. Example of a measurement bar.



8.4 Logic editor

The logic editor includes the most commonly used tools for logic programming. While AQ 210 and AQ 250 series devices share a similar editor layout, there are minor differences between them. Any such differences are highlighted in this chapter for clarity.

Figure. 8.4 - 87. Main toolbar of the logic editor.



The logic editor has the following commands on its main toolbar:

- Save
  Saves the logic to the .aqs file that is currently open.
- Reload
  Loads back the logic that is in use in the .aqs file that is currently open.
- Clear
  Clears the logic sheet.
- Export
  Saves the logic as an .aql file that can then be opened in another .aqs file. It also functions as backup save of the logic.
- Export PDF
  Creates a PDF file of the logic sheet.
- Load
  Opens any .aql logic file.
- Export script
  Saves only the script of the logic. Mostly used by Arcteq personnel for troubleshooting purposes.

AQ 250 series logic can be organized across multiple logic sheets. To add a new sheet, click the plus (+) button or press Ctrl+T. Sheets can be renamed by double-clicking the name, and removed by clicking the red X that appears when hovering over the sheet name. In contrast, AQ 210 series doesn't support multiple sheets.

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IM00037

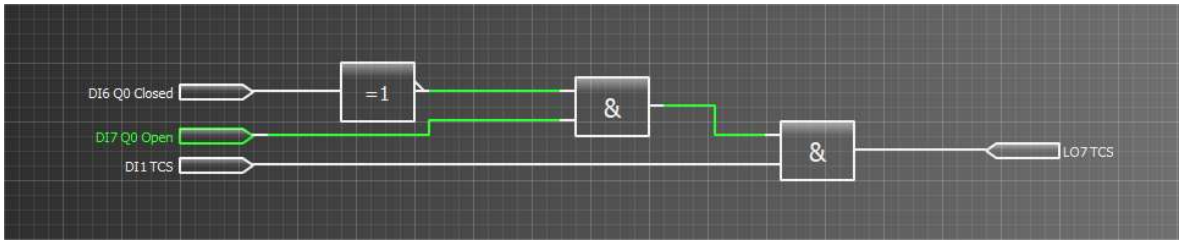
Figure. 8.4 - 88. Adding a new logic sheet.



You can navigate the logic view using the arrow keys or by scrolling vertically with the mouse wheel. For horizontal movement, hold the **Alt** key while scrolling. Alternatively, click and hold the scroll wheel to drag the view. To zoom in or out, hold the **Ctrl** key while scrolling the mouse wheel.

The figure below presents an example where the NOT and AND gates are ON (the wires are green), and the DI7 Q0 Open input is ON (the text is green). If the Live Edit mode is activated, you can observe the status of each signal in real time.

Figure. 8.4 - 89. Example with NOT and AND gates.



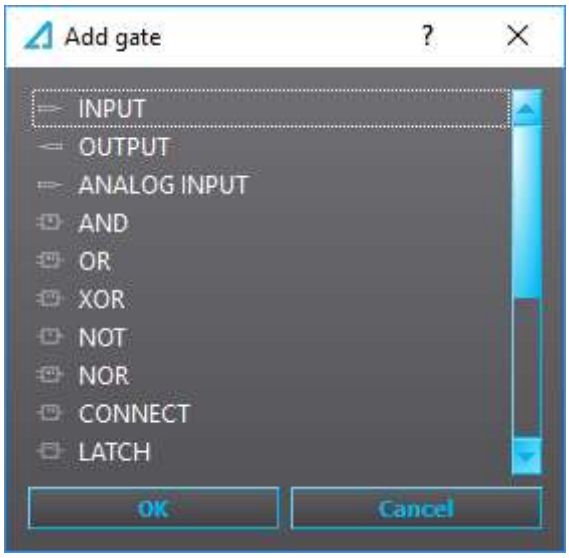
NOTICE!
Fast events might be not be seen in the Live Edit mode. To guarantee that the event activation and de-activation analysis is reliable, it is recommended to use event recording and disturbance recordings instead.

NOTICE!
The logic must be designed from left to right. The logic gate operation that must be done first must be furthest to the left on the canvas. If the order is important, make sure one is not placed right below another.

NOTICE!
While very large and complex logics can be made with the logic editor, the number of logic gates and wires that can be used is limited. The maximum number of gates is 768, and for wires the maximum is 256. The number of wires currently used is displayed as a percentage value at *Monitoring* → "Device diagnostics" in the parameters "Gates usage" and "Wires usage". These parameters will update only after the logic has been loaded to the device.

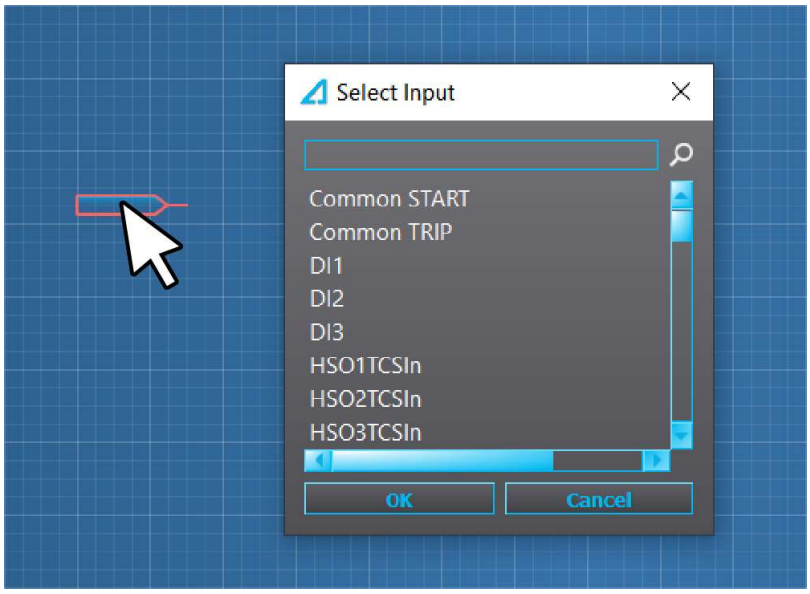
Adding inputs, outputs and logic gates

Figure. 8.4 - 90. Adding logic gates.



You can add a gate to the logic by double-clicking on the sheet, selecting the wanted gate from the pop-up window (see the figure above), and then clicking the "OK" button. To select the input or output signal, double-click an input or output on the logic sheet. Another pop-up window appears (see the figure below) and you can choose the signal from the list.

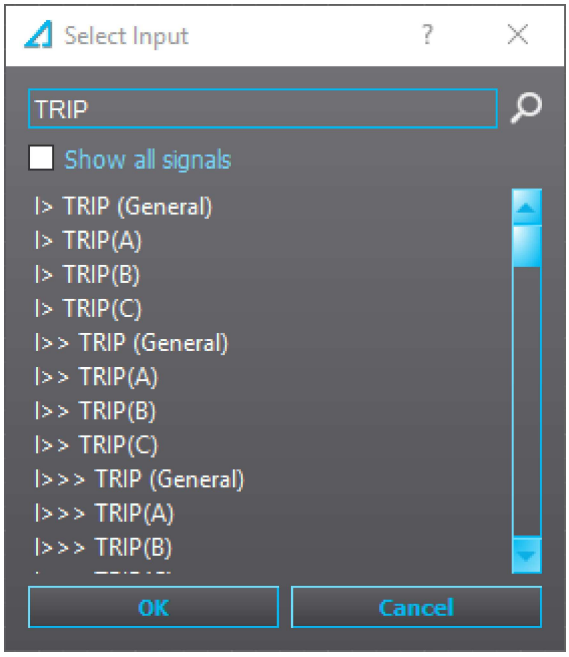
Figure. 8.4 - 91. Selecting a specific signal for a gate.



You can filter the signal list with the search box. For example, typing "trip" to the search box lists all signals that contain the word 'trip' (see the figure below).

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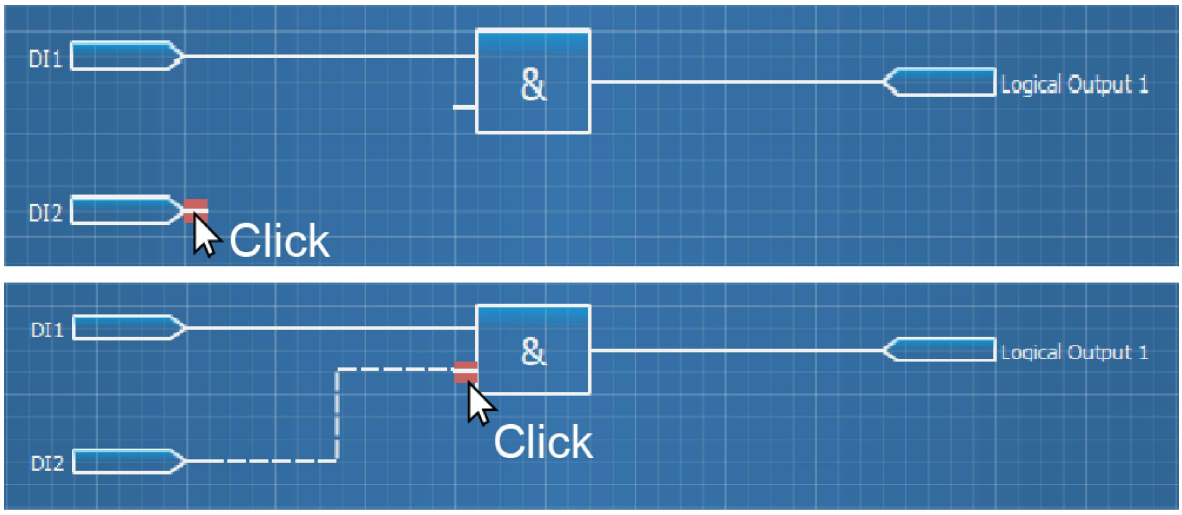
Figure. 8.4 - 92. Searching signals.



Drawing lines

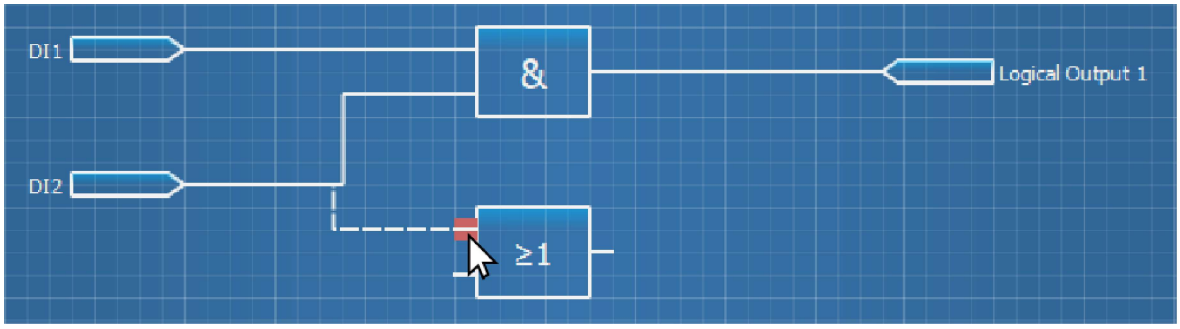
When you hover the mouse over an input or an output pin, a red box appears. Click the box, move the mouse to the destination and click on the box that appears (see the sequence in the figure below).

Figure. 8.4 - 93. Connecting signals in the logic editor.



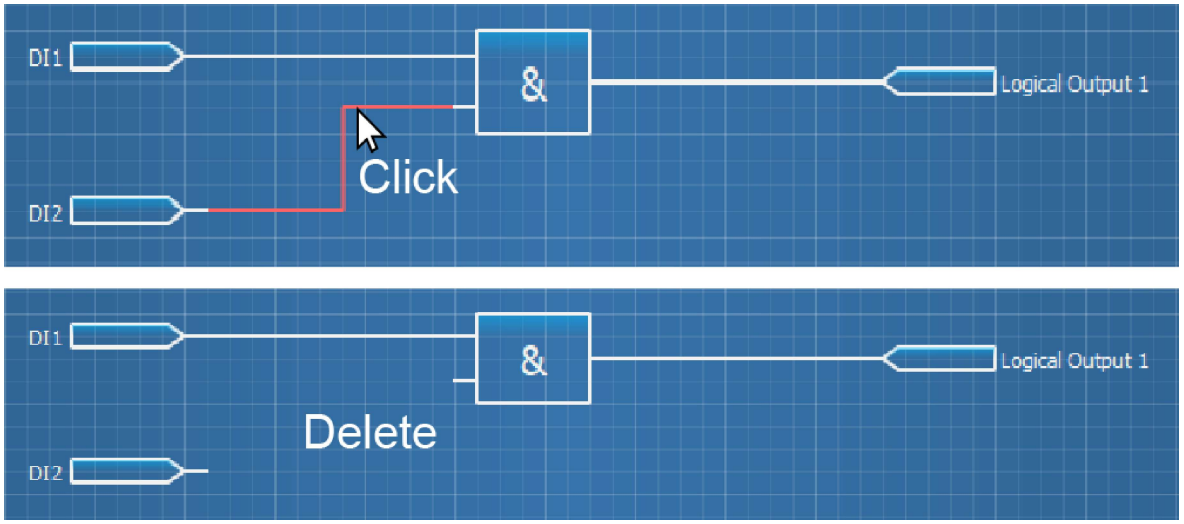
You can also connect signals to multpiple logic gate inputs by repeating the previous steps (see the figure below).

Figure. 8.4 - 94. Connecting signals to multiple destinations.



You can remove connections by clicking on the line and pressing the Delete key (see the figure below). If you want to exit the wiring mode before connecting two pins, press Esc.

Figure. 8.4 - 95. Removing a connection.



In AQ 250 series devices, certain logic gates (such as AND and OR gates) can accept more than two inputs. To add additional inputs, drag a line near the gate's input area — this will reveal extra input terminals (see figure below). You can add up to ten inputs to a single gate.

In AQ 210 series devices, AND and OR gates only support two inputs. If you need to combine more than two signals, you must chain multiple logic gates together.

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Figure. 8.4 - 96. AQ 250 series OR gate with extra inputs.

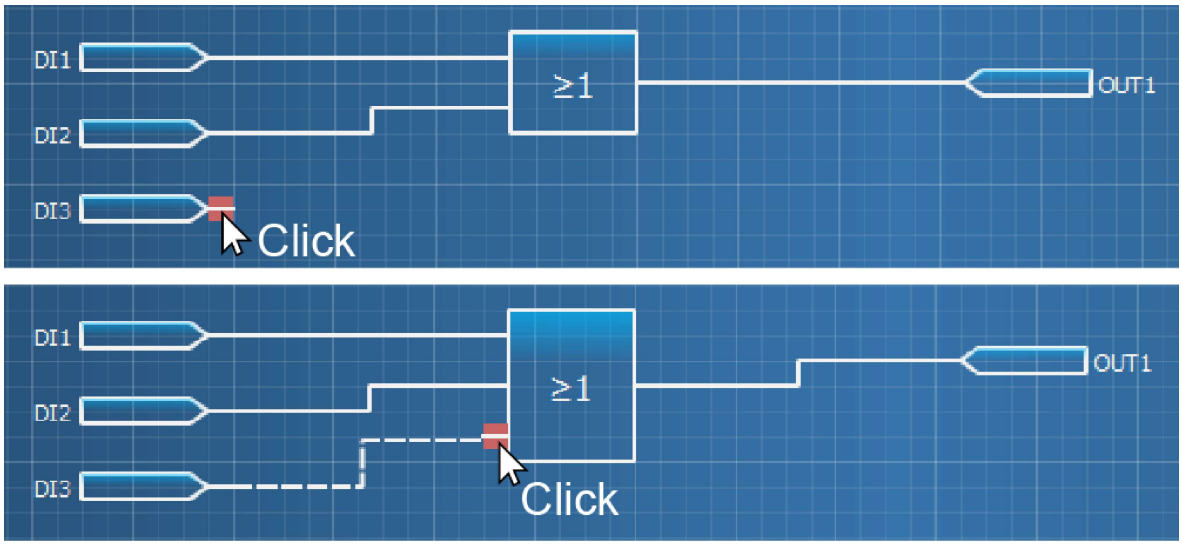
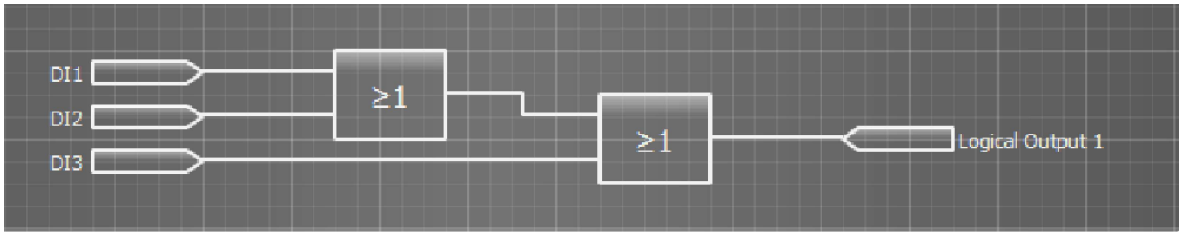


Figure. 8.4 - 97. AQ 210 series OR gate with extra inputs.



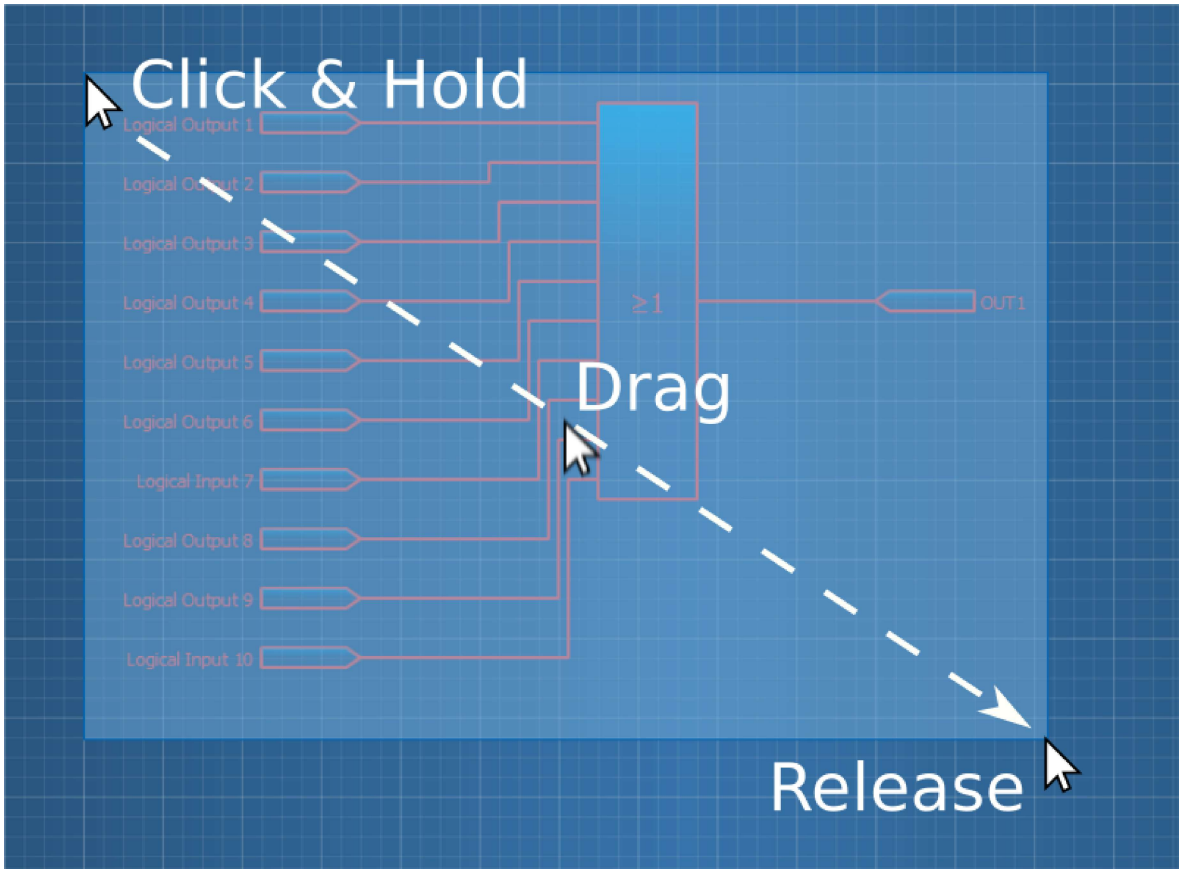
You can select multiple items in the logic sheet for simultaneous editing in two ways:

1. Drag to select: Click and hold the mouse button, then drag to “paint” over the area containing the items (see figure below).
2. Ctrl + Click: Hold Ctrl and click each object you want to include in the selection.

Once multiple items are selected, you can:

- Move them as a group.
- Delete them using the Delete key.
- Copy and paste them with Ctrl+C and Ctrl+V, respectively.

Figure. 8.4 - 98. Painting an area in the logic editor.



8.4.1 Logic gates

AQ 210 and AQ 250 series devices share a similar set of logic gates. The specific gates available for each device type are listed in the table below.

Table. 8.4.1 - 5. Availability of logic gates in AQ 210 and AQ 250 devices.

Gate name	Availability
INPUT	Both
OUTPUT	Both
CONNECT	Both
NOT	Both
AND	Both
OR	Both
XOR	Both
NOR	Both
SR latch	Both
D FLIP-FLOP	Both

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Gate name	Availability
COUNTER	Both
DELAY	Both
EDGE	Both
LATCH	Both
RS latch	AQ 250 only
ANALOG INPUT	AQ 250 only
ANALOG COMPARATOR	AQ 250 only

Input gate

Figure. 8.4.1 - 99. INPUT gate.



Input gates are used for bringing user-selected binary signals into the logic sheet. An input can be connected to multiple logic gates.

Output gate

Figure. 8.4.1 - 100. OUTPUT gate.



Output gates are used for controlling digital outputs (output relays), high-speed outputs, logical outputs, LEDs, and the Local/Remote switch. Outputs can also be used for resetting latched signals ("Reset latches") and to silence alarm buzzers in alarm annunciator devices (such as AQ-S254A).

CAUTION!
Because a logic sheet configured in the logic editor is the last part in a logic cycle, any output controlled here will dominate all other control signals elsewhere. When you have a direct connection to an output contact in the logic editor, all other connections to the same output contact will be ignored elsewhere (e.g. the matrix). If controlling the same output contact by multiple signals is desired, you can connect a logical output to an output gate and then connect the logical output in the matrix to an output contact.

CONNECT gate

Figure. 8.4.1 - 101. CONNECT gate.

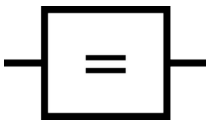
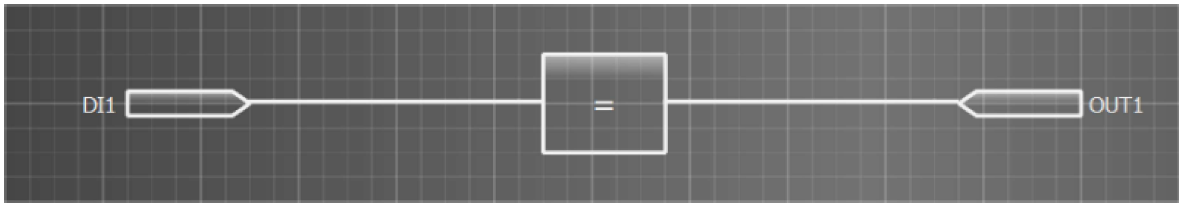
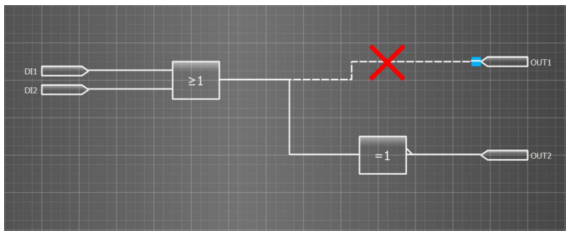


Figure. 8.4.1 - 102. Using the CONNECT gate to connect an input to an output.



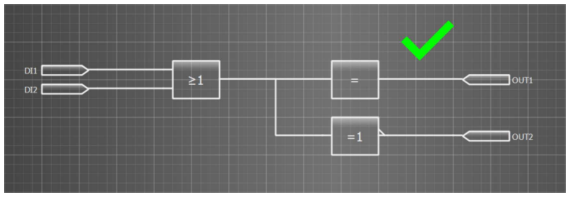
The CONNECT gate has two applications. The first, and the simplest, application is using the gate to connect a signal directly from an input to an output (as seen in the figure above). The CONNECT gate is also used if an output of a logic gate needs to be connected to two outputs when configuring an AQ 210 series device. This is because AQ 210 series devices do not support the connecting of the same signal to two outputs without a gate between them, and AQtivate does not let you make that kind of connections (see the figure below).

Figure. 8.4.1 - 103. Faulty way to connect a signal to two outputs in AQ 210 series devices.



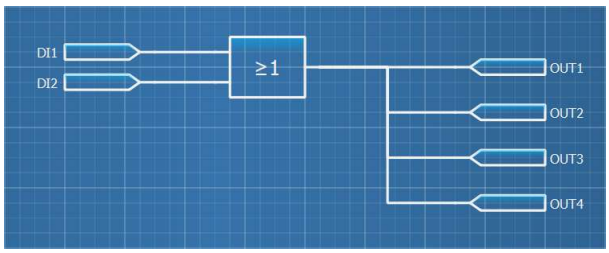
The figure below shows the correct way to connect two outputs to a logic gate.

Figure. 8.4.1 - 104. Correct way to connect a signal to two outputs in AQ 210 series devices.



Note that the above-mentioned restriction only applies to AQ 210 devices; AQ 250 series devices don't require a CONNECT gate when connecting to multiple outputs (see the figure below).

Figure. 8.4.1 - 105. Connecting a signal to two outputs in AQ 250 series devices.



However, you can always connect a single signal to a single output without a CONNECT gate (see the figure below) in AQ 210 series devices!

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Figure. 8.4.1 - 106. Connecting a signal to one output in AQ 210 series devices.

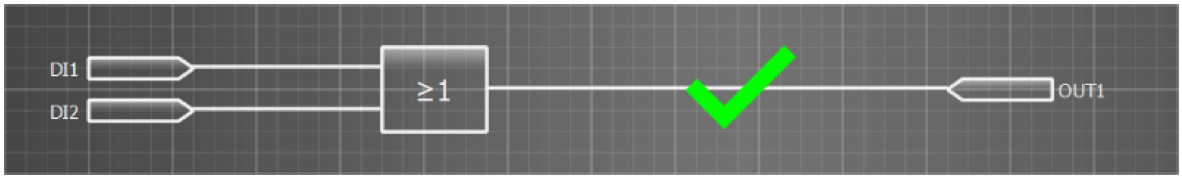
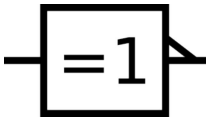


Figure. 8.4.1 - 107. The truth table of the CONNECT gate.

Input	Output
0	0
1	1

NOT gate

Figure. 8.4.1 - 108. NOT gate.



The NOT gate is a basic logic gate which inverts the input status.

Figure. 8.4.1 - 109. The truth table of the NOT gate.

Input	Output
0	1
1	0

AND gate

Figure. 8.4.1 - 110. AND gate.



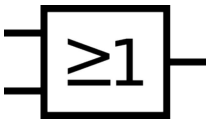
The AND gate is a basic logic gate which activates its output when all inputs are active.

Figure. 8.4.1 - 111. The truth table of the AND gate.

Input 1	Input 2	Output
0	0	0
0	1	0
1	0	0
1	1	1

OR gate

Figure. 8.4.1 - 112. OR gate.



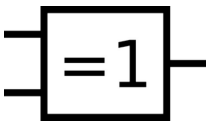
The OR gate is a basic logic gate which activates its output when at least one of the inputs is active.

Figure. 8.4.1 - 113. The truth table of the OR gate.

Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	1

XOR gate

Figure. 8.4.1 - 114. XOR gate.



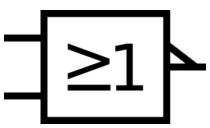
The XOR gate is a basic logic gate which activates its output when only one of the inputs is active.

Figure. 8.4.1 - 115. The truth table of the XOR gate.

Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	0

NOR gate

Figure. 8.4.1 - 116. NOR gate.



The NOR gate is a basic logic gate which activates its output when none of the inputs is active.

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Figure. 8.4.1 - 117. The truth table of the NOR gate.

Input 1	Input 2	Output
0	0	1
0	1	0
1	0	0
1	1	0

SR LATCH gate

Figure. 8.4.1 - 118. SR LATCH gate.



The SR LATCH gate sets the output value to 1, when the S value is 1. The output value remains at 1 (even if the S value goes back to 0) until the R value is set to 1. If both S and R input are 1, the output value is set to 1.

Figure. 8.4.1 - 119. The truth table of the SR LATCH gate.

S	R	Output
0	0	Previous
0	1	0
1	0	1
1	1	1

RS LATCH gate

Figure. 8.4.1 - 120. RS LATCH gate.



The RS latch gate sets the output value to 1, when the S value is 1. The output value remains at 1 (even if the S value goes back to 0) until the R value is set to 1. If both S and R input are 1, the output value is set to 0.

Figure. 8.4.1 - 121. The truth table of the RS LATCH gate.

S	R	Output
0	0	Previous
0	1	0
1	0	1
1	1	0

D FLIP-FLOP gate

Figure. 8.4.1 - 122. D FLIP-FLOP gate.



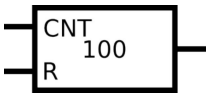
The D FLIP-FLOP gate captures the D input value every time the clock input ">" rises and then forwards the D input value to the output (Q).

Figure. 8.4.1 - 123. The truth table of the D FLIP-FLOP gate.

>	D	Output
Rising	0	0
Rising	1	1
Non-rising	0	Previous

COUNTER gate

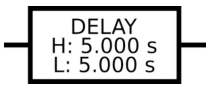
Figure. 8.4.1 - 124. COUNTER gate.



The COUNTER gate adds 1 to the counter value every time the value of the CNT signal goes to 1. When the counter value is equal to or higher than the trigger value, the output is set to 1. The R signal resets the counter to 0.

DELAY gate

Figure. 8.4.1 - 125. DELAY gate.

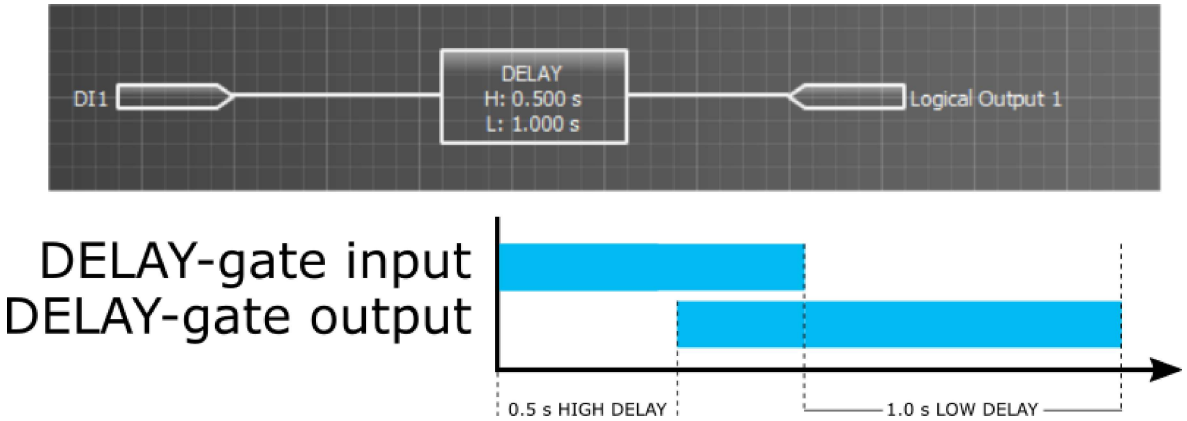


The DELAY gate is able to delay the high or low value of the output signal. When you double-click on the gate, you can set the high (H) and low (L) values (in milliseconds). After you have made the wanted changes, click "Set" and upload the settings to the device. There can be up to sixteen (16) DELAY gates in use at any one time.

The figure below displays an example where the DELAY gate has been used to delay the signal from the input for 0.5 seconds before its sent to the output. When the input signal drops, the output signal is held for one second.

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Figure. 8.4.1 - 126. Example of using the DELAY gate.



EDGE gate

Figure. 8.4.1 - 127. EDGE gate.



The EDGE gate produces a 5-ms pulse when the D input receives a rising or a falling signal, depending on the R/F input's logic. If the R/F input is active, the output generates a pulse from a rising input signal. If the R/F input is not active, the output generates a pulse from a falling edge.

Figure. 8.4.1 - 128. Example of using the EDGE gate.

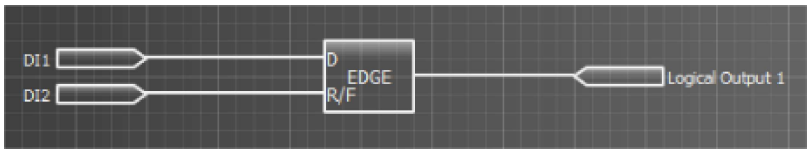
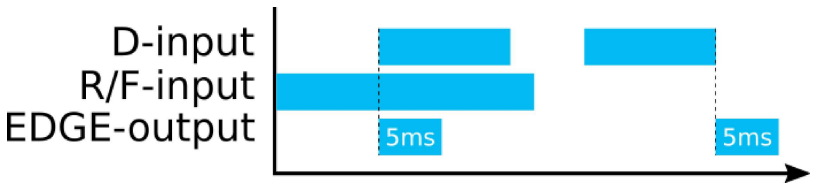
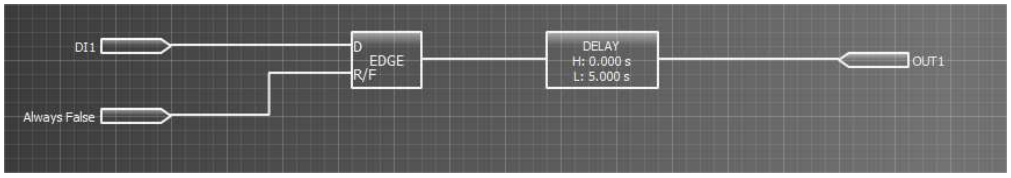


Figure. 8.4.1 - 129. Example of the activation and de-activation of the EDGE gate.



If you need a pulse longer than 5 ms, you can extend the pulse with the DELAY gate. In the figure below the DELAY gate has 0 s of high delay and 5 s of low delay, resulting in a five-second pulse.

Figure. 8.4.1 - 130. Example of using a DELAY gate to extend the EDGE pulse.



If the gate is only going to be used in the rising or falling edge mode, the easiest method to define that mode is to connect an "Always true" or an "Always false" signal to the R/F input.

Figure. 8.4.1 - 131. The truth table of the EDGE gate.

R/F	D	Output
0	0	0
0	1	0
0	0 > 1	0
0	1 > 0	5 ms pulse
1	0	0
1	1	0
1	0 > 1	0
1	1 > 0	5 ms pulse

LATCH gate

Figure. 8.4.1 - 132. LATCH gate.



When a LATCH gate receives a rising signal, its output remains active until the signal is cleared (see the figure below). You can clear the signal by pushing the **Back** button on the device's front panel.

Figure. 8.4.1 - 133. Using the LATCH gate.

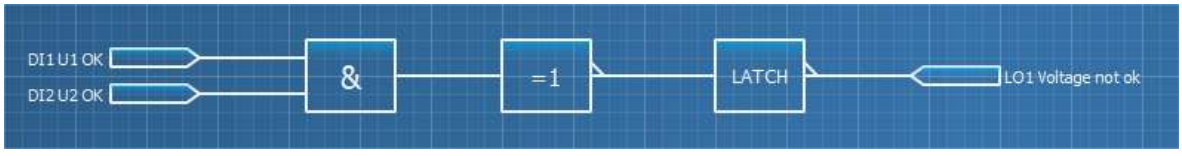


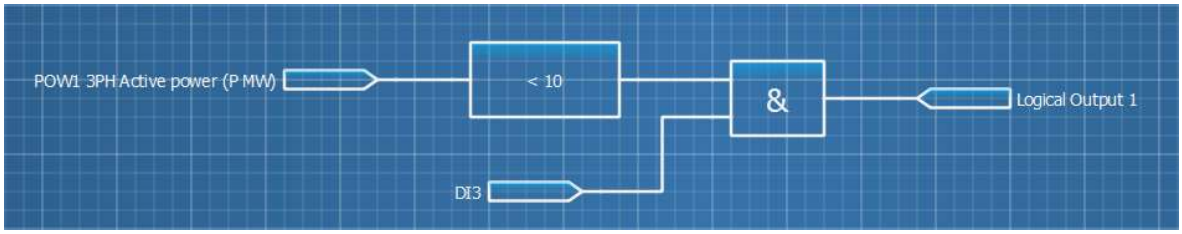
Figure. 8.4.1 - 134. The truth table of the LATCH gate.

S	Back-button	Output
0	0	Previous
0	1	0
1	0	1
1	1	1

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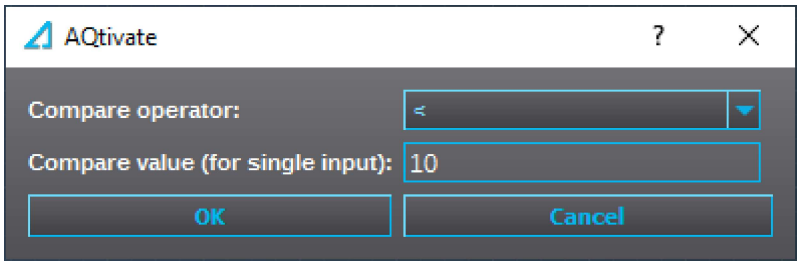
Analog input and analog comparator

Figure. 8.4.1 - 135. Logic example with an analog input and a comparator.



The analog comparator can be used to activate or disable the gate's output based on the measurement selected to the analog input. When adding an analog comparator to your logic, double-click on the gate to open a pop-up window (see the figure below), where you can select the operator mode and the comparator value. In the example above, the analog input "3PH active power (P MW)" is connected to the analog comparator gate, where the value has been set to "10" and the operator mode is "<". This means that the analog comparator output gate is active whenever the three-phase active power is under 10 MW.

Figure. 8.4.1 - 136. Analog comparator settings.



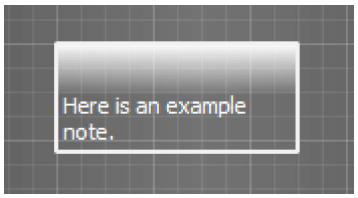
The analog comparator gate has six different operator modes, described in the table below:

Table. 8.4.1 - 6. Operator modes of the analog comparator gate.

Operator	Description
==	Equal to
!==	Not equal to
<	Less than
>	Greater than
<=	Less than or equal to
>=	Greater than or equal to

Notes

Figure. 8.4.1 - 137. Example of a note added to logic.



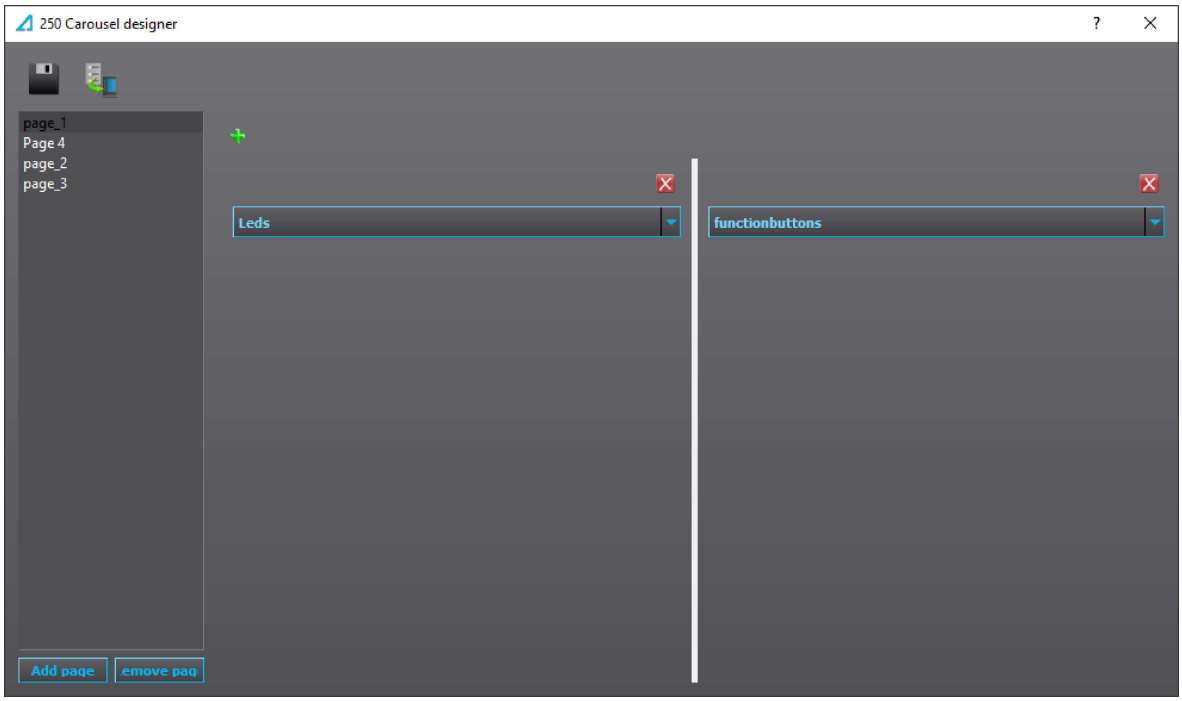
Notes can be used for describing logic programs to make them easier to understand. Notes can be added by double-clicking the editor table and selecting "Note" from the pop-up window menu. You can start writing on the note by clicking the note's bottom row. You can also edit the note later by clicking the existing text.

8.5 Carousel Designer

The number and content of menus displayed on the HMI screen can be customized using the *Carousel Designer*.

Carousel Designer (AQ 250 series and AQ-ONE)

Figure. 8.5 - 138. Carousel Designer in AQ 250 series devices and AQ-ONE devices.



Pressing the green “Plus” button adds a new view (see figure above). You can choose the view type from the drop-down menu. Each page can contain multiple views.

If a page contains multiple views, you can adjust the size of each view box using the thick white bar between them.

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Use the “Add page” and “Remove page” buttons to manage pages. To rename a page, double-click its name. The page name determines the label shown for that view in the HMI. If no custom name is set, default labels such as *Mimic*, *Events*, or *Timesettings* will be displayed.

The order of pages is defined by their arrangement in the list on the left side of the Carousel Designer window.

Once your design is complete, click the “Save” button (floppy disk icon) to export it to the currently open .aqs file.

To send the changes to the device, either click the “Send to relay” icon next to the Save button, or go to *Commands → Write to relay*.

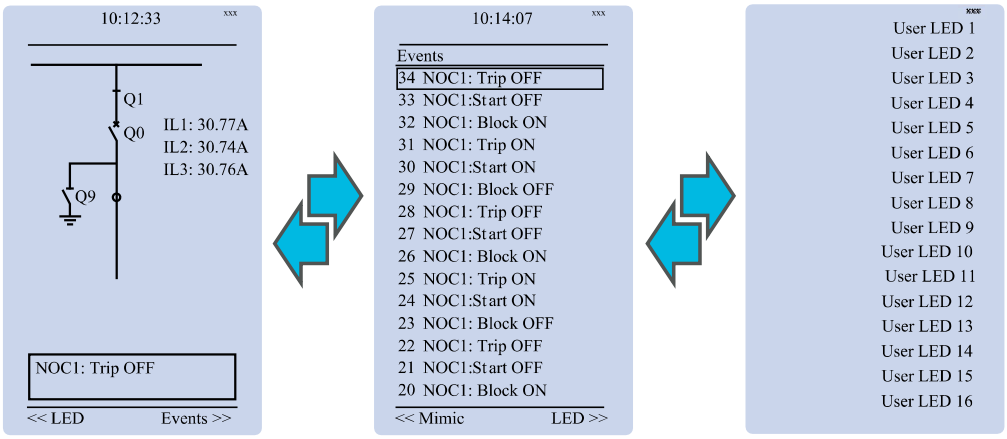
Table. 8.5 - 7. Types of carousel views available in AQ 250 series devices AQ-ONE devices.

Name	Description
Mimic (1-5)	Displays the device's mimic. The mimic view image can be edited at *Tools → Mimic editor 250*. Up to five (5) mimics are supported.
Alarms	Displays the alarm view. NOTICE! Available only in AQ-S254 and AQ-ONE devices with alarm annunciator function package. Please see the AQ-S254 instruction manual or the AQ-ONE instruction manual for more details.
LEDs	Displays the user-defined descriptions of the LEDs.
Timesettings	Displays the device's time and date. You can also set these here if it is impossible to use external time synchronization and you cannot connect to the device with the AQtivate software.
Events	Displays the name, the time, and the date of all the events recorded into the device's event history.
Measurements	Displays up to fifteen (15) user-defined measurements.
Function buttons	Displays the user-defined descriptions of the twelve (12) function buttons.
VrecRegisters	Displays values recorded by the "Measurement value recorder" function.

NOTICE!
If there is more than one view on a page to interact with, select the needed view with the left and right arrow buttons.

Carousel Designer (AQ 210 series)

Figure. 8.5 - 139. Example carousel designer configuration with mimic, events and LED view.



Clicking the green “Plus” button adds a new view. You can choose the view type from the drop-down menu. Once the design is complete, click the “Export” button to export it to the currently open .aqs file.

To save your changes, go to *File* → *Save* in AQtivate.

To send the changes to a device, write the Mimic to the device via *Commands* → *Write to relay*.

If you have a previously saved carousel menu, use the “Import” button to bring it into the currently open .aqs file.

The figure below shows an example Carousel Designer configuration. This carousel includes four views:

- A mimic view
- LED view, displays user defined descriptions of each LED
- A list of recorded events
- A list of three selected measurements

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Figure. 8.5 - 140. Example of a carousel design.



The following table lists all the types of carousel views available to you in the Designer:

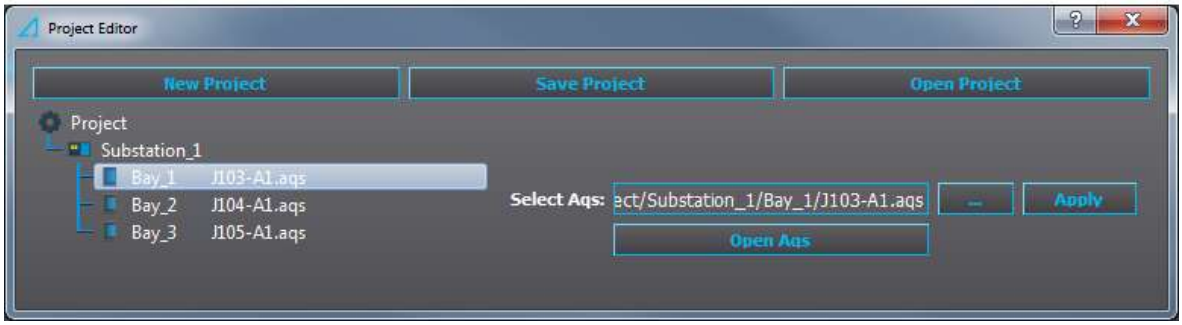
Table. 8.5 - 8. Types of carousel views available in AQ 210 series devices.

View name	Description
Mimic	Displays the device's mimic. The mimic view image can be edited at *Tools → Mimic editor*.
LEDs	Displays the user-defined descriptions of the LEDs.
Events	Lists all of the events recorded by the device.
Measurements	Displays measurements up to eight (8) lines. You can edit which measurements are shown at *Tools → Carousel Designer*.
Favorites	Shows the setting menus favorited by the user.
Clock	Displays the device's time and date. The time and the date can also be set here.
Fault register	Displays the fault values recorded by the VREC function. NOTICE! Please note that this type is not available in all AQ 210 series devices!
Alarms	Displays the activated alarms. NOTICE! Please note that this type is only available in AQ-S214!

8.6 Project editor

The Project editor is an optional project management tool. You can create a new project by clicking the "New project" button, and then creating a node called "Project". You can change the node's name by double-clicking it. Right-clicking a node will open a context menu. Selecting "Add substation" from this menu adds a substation to the node. You can add bays to a substation by right-clicking a substation node and selecting "Add bay" from the context menu. Clicking on a bay node enables the menu on the right side of the node tree view. In this menu you can assign a setting file to the selected bay. The "..." button opens a file dialog where you can select an .aqs file, and clicking the "Apply" button assigns this selected .aqs file to the selected bay. Once a setting file has been assigned, it can be opened by clicking the "Open .aqs" button. You can save a project by clicking the "Save project" button. A saved project can be opened by clicking the "Open project"button.

Figure. 8.6 - 141. Project editor.



8.7 Wizards

8.7.1 Transformer Wizard

The Transformer Wizard tool uses a selection of transformer-related information and other settings (such as CT specifications and wiring) as the basis for building suitable setting parameters to the device.

A complete Wizard manual (titled "Transformer Wizard – Instruction booklet") is available for downloading at the Arcteq website (arcteq.com/documents-and-software/ → "AQ 200 series" → "Resources").

8.7.2 Generator Wizard

The Generator Wizard tool uses a selection of generator-related information and other settings (such as application and CT data) as the basis for building suitable setting parameters to the device.

A complete Wizard manual (titled "Generator Wizard – Instruction booklet") is available for downloading at the Arcteq website (arcteq.com/documents-and-software/ → "AQ 200 series" → "Resources").

8.7.3 Motor Wizard

The Motor Wizard tool uses a selection of motor-related information and other settings (such as name plate values and system configuration) as the basis for building suitable setting parameters to the device.

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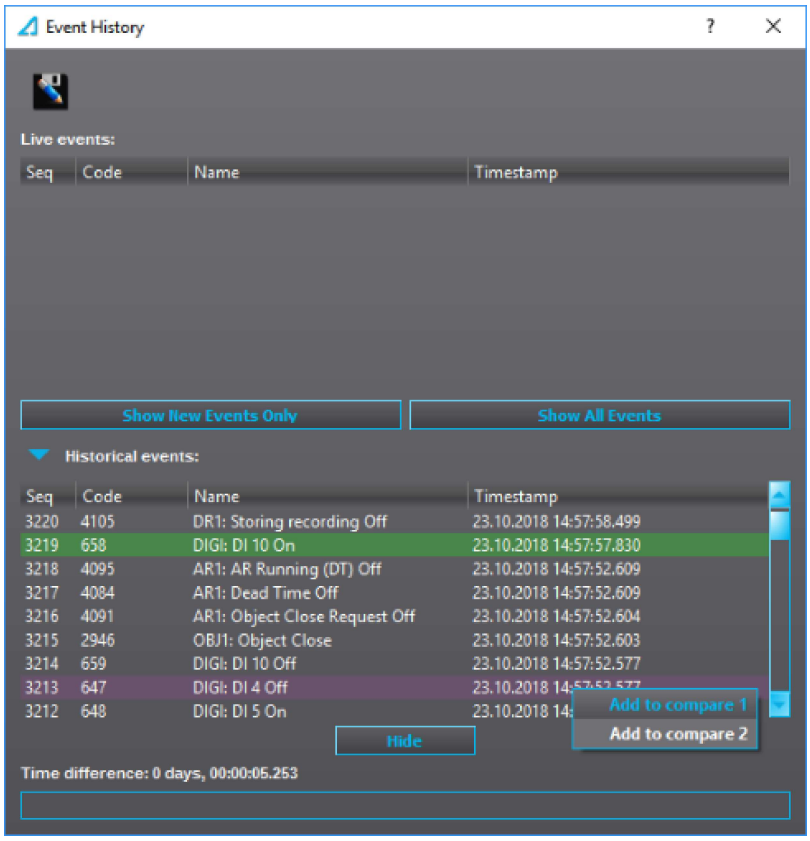
A complete Wizard manual (titled "Motor Wizard – Instruction booklet") is available for downloading on the Arcteq website (arcteq.com/documents-and-software → "AQ 200 series" → "Resources").

8.8 Events and logs

8.8.1 Event history

The "Event history" window displays the time-stamped events. Up to 15,000 events can be stored at once. When 15,000 events have been recorded, the event history will begin to remove the oldest events to make room for new events. These can be, for example, pick-ups, trips, or blocks. You can find more information about event masks in the selected function's "Events" tab. Event masks determine what is recorded into the event history, and they are configured in each function's individual settings in the *Protection*, *Control* and *Monitoring* menus. The event history can be exported as a separate text file (.txt) by clicking the "Save" button (the floppy disk icon). Event history can be copied and pasted by right clicking on an event and then "Copy all".

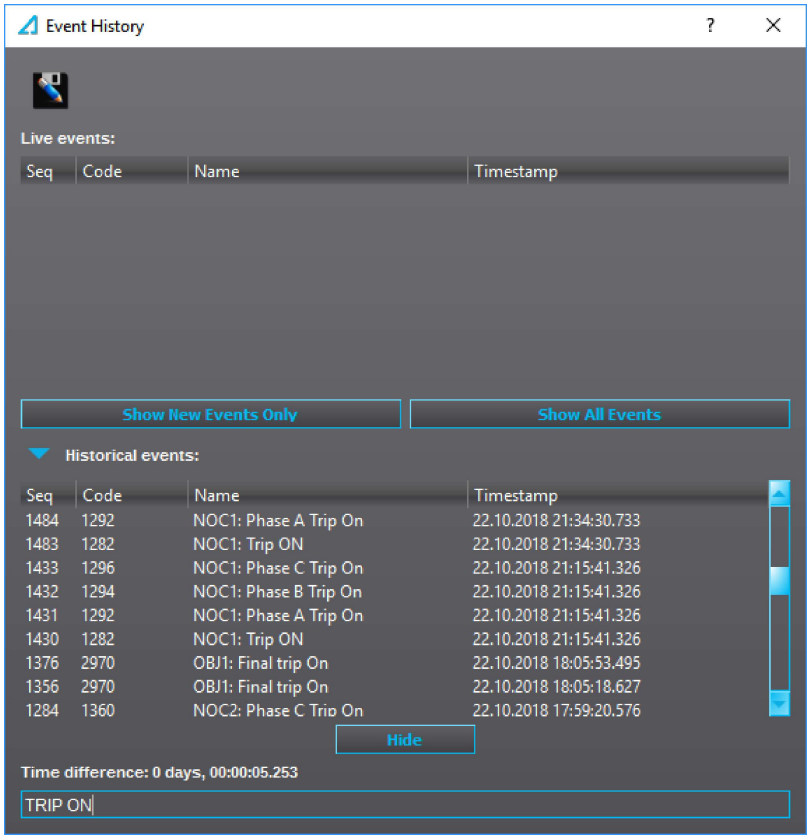
Figure. 8.8.1 - 142. Event history window.



When you click the "Show new events only" button, AQtivate shows only those events that happen from that point on. Clicking the "Show all events" button switches back to the view that shows all events. If you want to see the time difference between two events, right-click on an event and select "Add to compare [x]" from the context menu.

Event lists can also be filtered to show specific events. This filtering is done by writing in the text box at the bottom of the window. In the figure below "TRIP ON" has been written in the text box so that only events that contain the text "TRIP ON" are displayed. Please note that the tool does not differentiate between lower and upper case: writing "trip on", "Trip on" or "tRiP oN" all bring up the same events in the example.

Figure. 8.8.1 - 143. Filtering events.

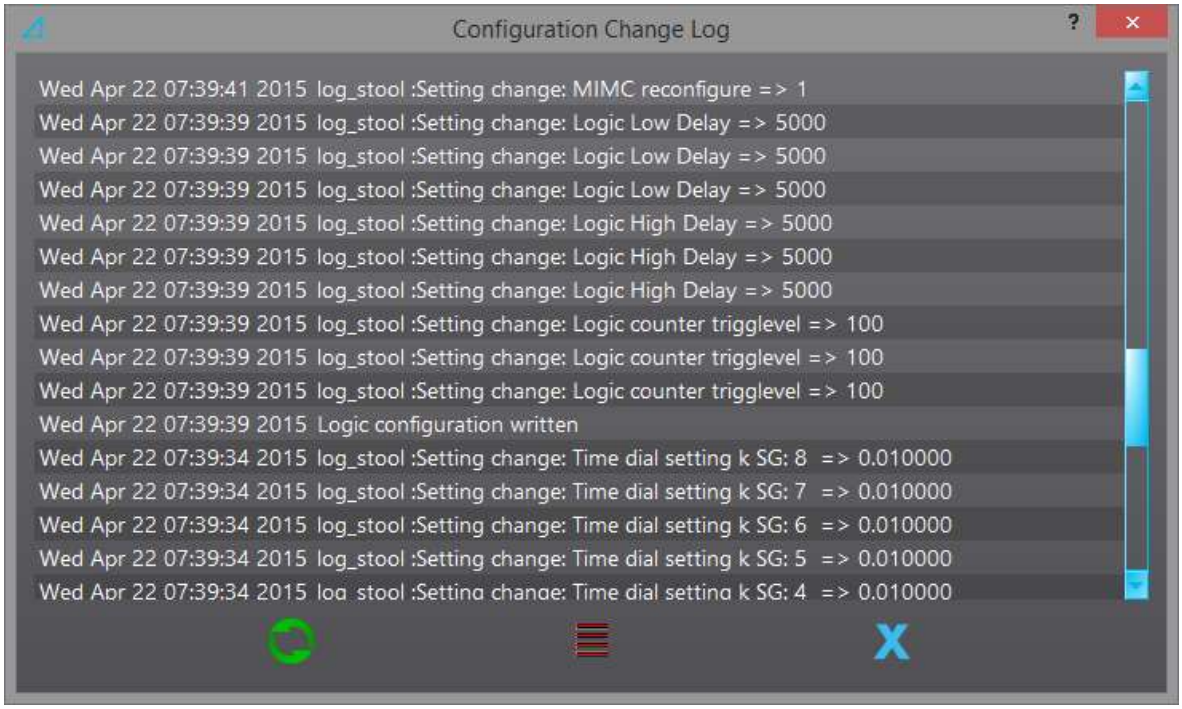


8.8.2 Configuration change log

The configuration change log can be used to observe parameter changes made to the device. The configuration change log records the parameter, the new value, and the time when the change occurred.

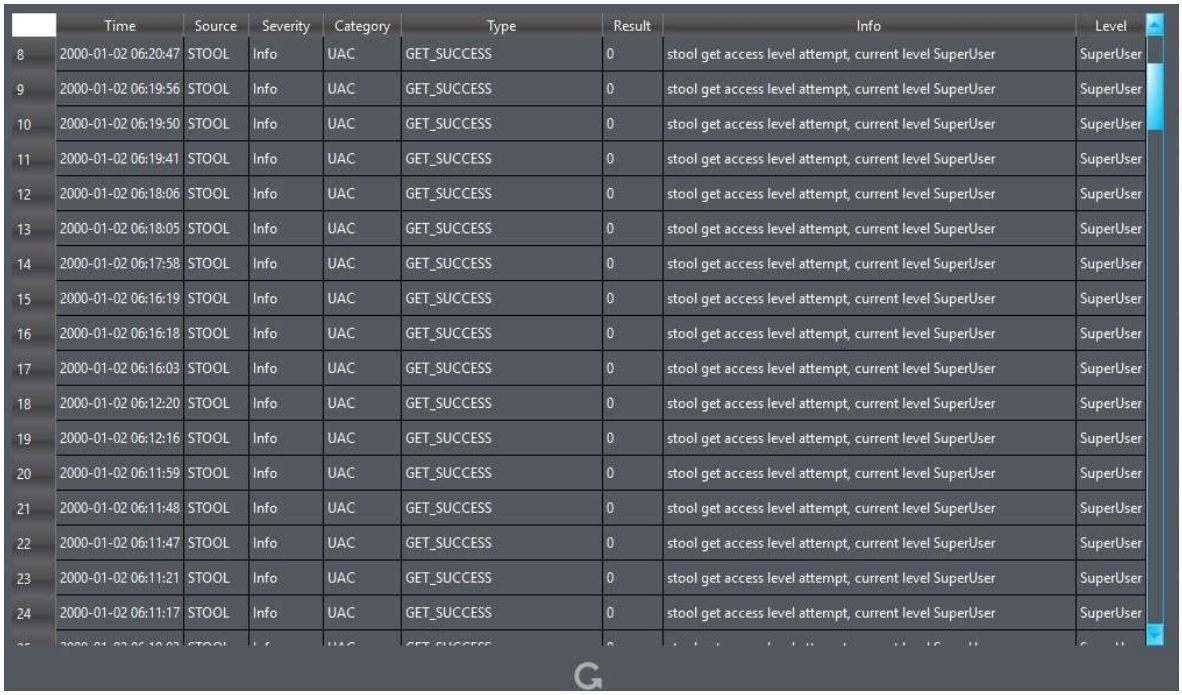
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Figure. 8.8.2 - 144. Configuration change log.



8.8.3 Audit log

Figure. 8.8.3 - 145. Audit log.



	Time	Source	Severity	Category	Type	Result	Info	Level
8	2000-01-02 06:20:47	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
9	2000-01-02 06:19:56	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
10	2000-01-02 06:19:50	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
11	2000-01-02 06:19:41	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
12	2000-01-02 06:18:06	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
13	2000-01-02 06:18:05	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
14	2000-01-02 06:17:58	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
15	2000-01-02 06:16:19	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
16	2000-01-02 06:16:18	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
17	2000-01-02 06:16:03	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
18	2000-01-02 06:12:20	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
19	2000-01-02 06:12:16	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
20	2000-01-02 06:11:59	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
21	2000-01-02 06:11:48	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
22	2000-01-02 06:11:47	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
23	2000-01-02 06:11:21	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser
24	2000-01-02 06:11:17	STOOL	Info	UAC	GET_SUCCESS	0	stool get access level attempt, current level SuperUser	SuperUser

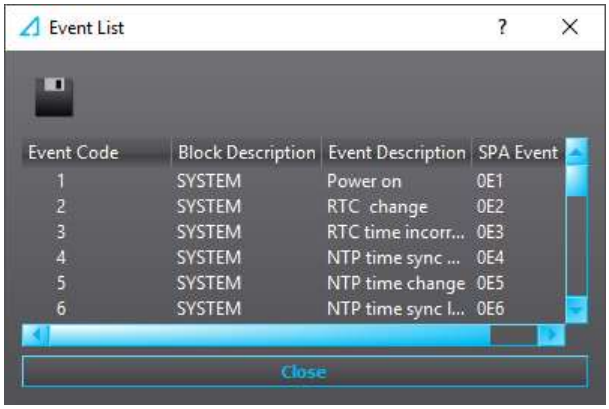
Audit log records user level logins, changes to user level settings and other user access control related events. The list can be manually refreshed with the button at the bottom of the window.

NOTICE!
Please note that events triggered by user access to the device are labeled "HMI Open" and "HMI Close". These describe the user actions of logging in and logging out, respectively.

8.8.4 Event list

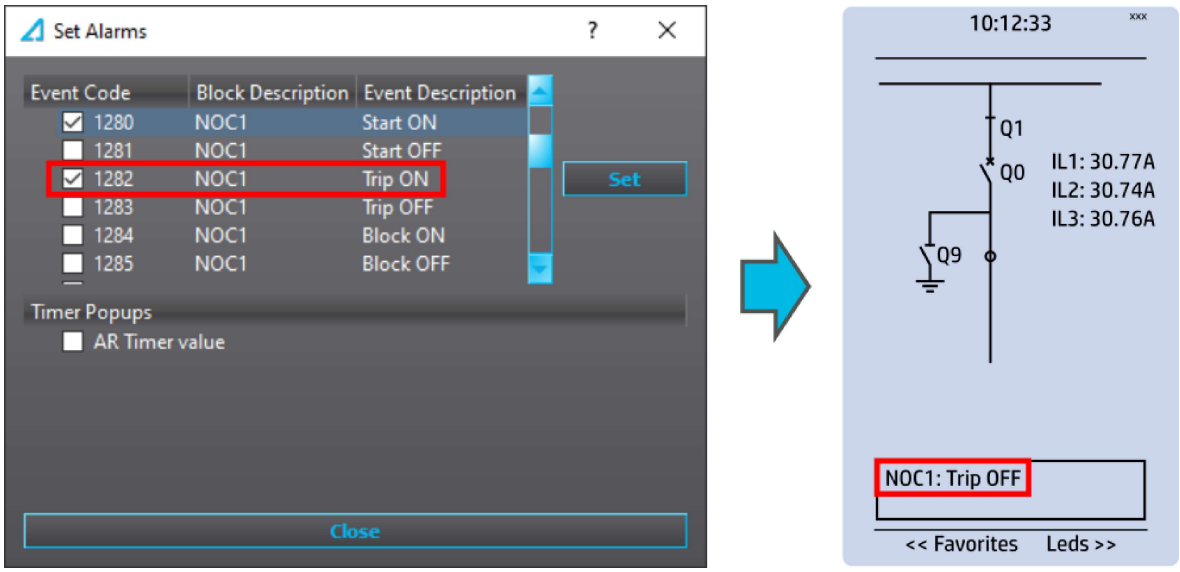
You can access a list of all possible events by opening the "Event list" from the *Tools* menu. Each event has an event code and a SPA event channel. This list can also be saved as a text file by clicking the "Save" button (the floppy disk icon).

Figure. 8.8.4 - 146. Full list of all possible events.



8.8.5 Set alarm events

Figure. 8.8.5 - 147. Setting an alarm event.



Alarm events can be set by using this dialog. You can select which events cause alarms in the device by checking their respective boxes in the "Set alarms" window and then pressing the "Set" button (see the figure above, on the left). When one of the alarm events occurs, it is shown in the device's mimic view (see the figure above, on the right). The newest alarm is always displayed, and it can be cleared with the HMI's Back button. Up to five (5) alarm events can be stored at any one time; when all five slots are full, the oldest alarm is deleted to make way for new alarms.

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NOTICE!
The mimic view must be enabled in the Carousel designer for alarm event setting to work!

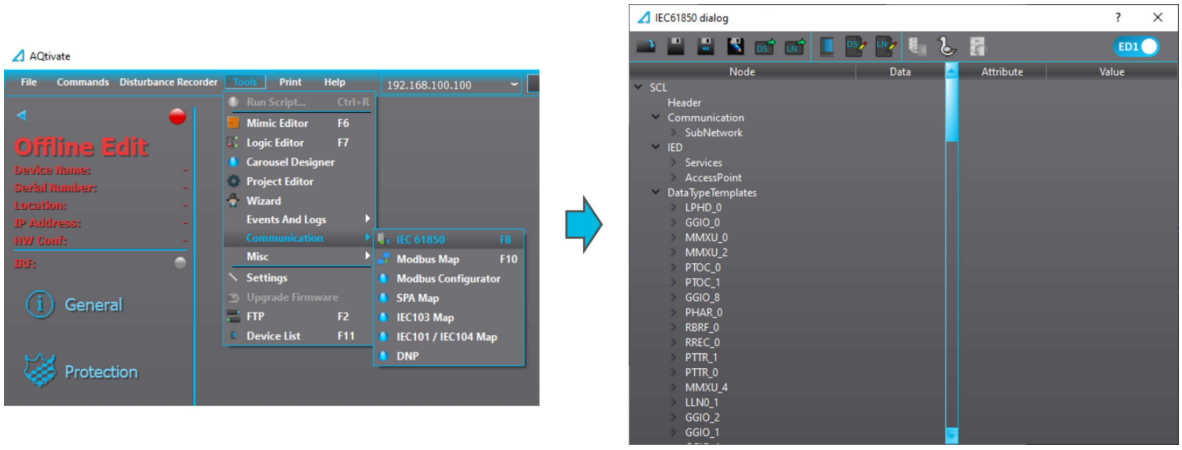
NOTICE!
If the auto-recloser is in use, checking the "AR Timer" box enables a timer that displays the remaining dead time or reset time!

NOTICE!
The event that is to be recorded has to be activated also in the event mask of the function in question!

8.9 Communication

8.9.1 IEC 61850

Figure. 8.9.1 - 148. Main view of the IEC 61850 editor.

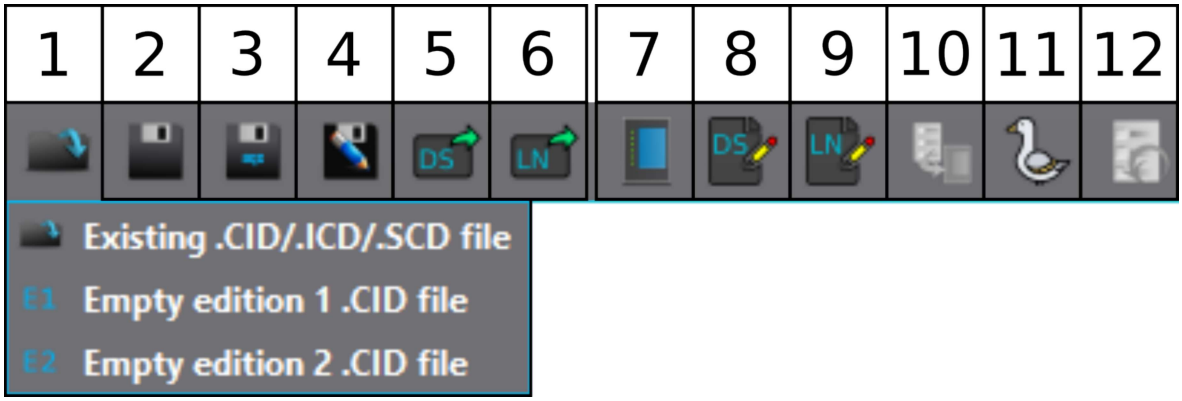


The user can enable the IEC 61850 protocol at *Communication → Protocols → IEC61850*. All AQ 210 series devices support Edition 1 of the IEC 61850 communication protocol. All AQ 250 series devices and AQ-ONE devices support both Edition 1 and Edition 2 of the IEC 61850 protocol. The following services are supported by IEC 61850 in Arcteq devices:

- Up to eight (8) data sets,
- Report Control Blocks (both buffered and unbuffered reporting),
- Control ('Direct operate with normal security', 'Select before operate with normal security, 'Direct with enhanced security' and 'Select before operate with enhanced sequrity' control sequences),
- Disturbance recording file transfer,
- GOOSE,
- Time synchronization.

IEC 61850 main toolbar

Figure. 8.9.1 - 149. Main toolbar.



The following buttons are available in the main toolbar of the IEC 61850 tool (see also the figure above):

1. Open .CID/.ICD file
   a) Open an existing .CID/.ICD/.SCD file from the PC's hard drive.
   b) Open empty Edition 1 .CID file.
   c) Open empty Edition 2 .CID file.
2. Save .CID/.ICD file
   If a .CID file was opened from the PC's hard drive, this button saves all changes to that .CID or .ICD file.
3. Save to .aqs
   Saves the .CID or .ICD file into the .aqs currently open (remember to save the .aqs file as well [*File → Save*] to keep the changes!).
4. Save .CID/.ICD as...
   Saves the .CID or .ICD file on the PC's hard drive as a separate .CID or .ICD file.
5. Export data set info
   Exports the data set information into a .txt file which can then be viewed in table format with tools such as Excel.
6. Export logical node info
   Exports the info of logical nodes currently activated into a .txt file which can then be viewed in table format with tools such as Excel.
7. Configurations
   Opens the main configurations pop-up window.
8. Edit data sets
   Opens the data set editing window.
9. Edit logical nodes
   Opens the logical node editing window. Used for enabling and disabling logical nodes.
10. Send to relay
    Sends the .CID/.ICD configurations to the device (requires a connection to the device).
11. Import GOOSE settings
    Imports GOOSE signals of another device from a .CID/.ICD file and connects them to the GOOSE inputs in this device.
12. Get default .CID/.ICD file from the device
    Retrieves the default .CID/.ICD file from the device (requires a connection to the device).

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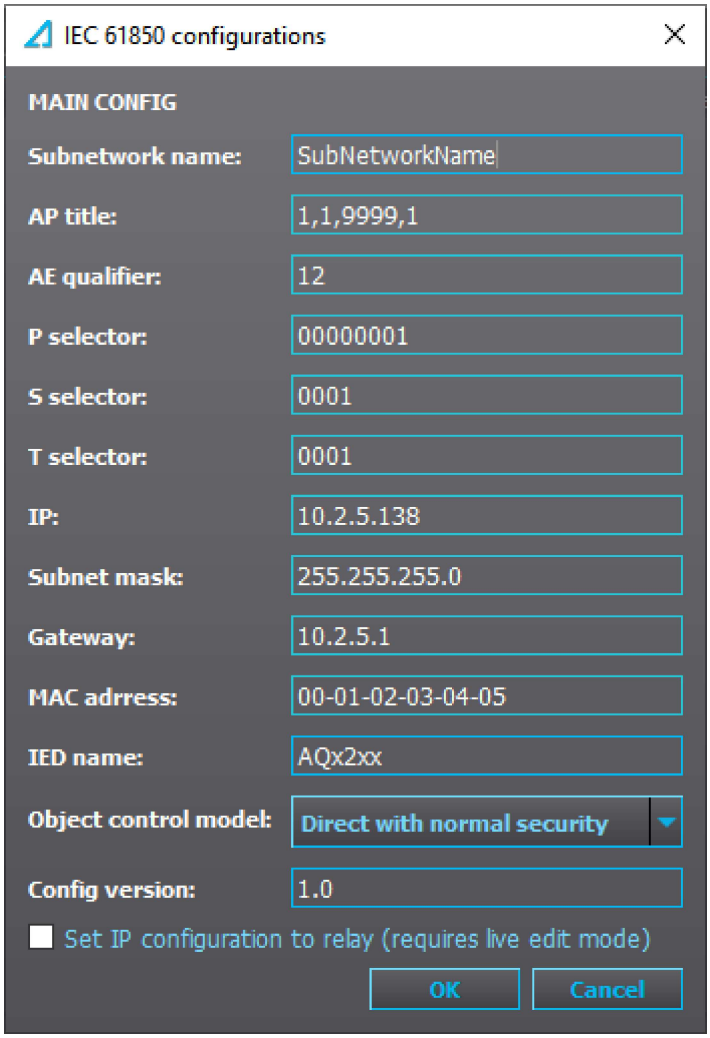
Configurations

Figure. 8.9.1 - 150. Opening the "Configurations" window.



The main configurations dialog window is opened by pressing the seventh button ("Configurations") in the main toolbar (see the figure above). The most important parameters here are the "IED name" and the "IP" settings.

Figure. 8.9.1 - 151. "Configurations" window.



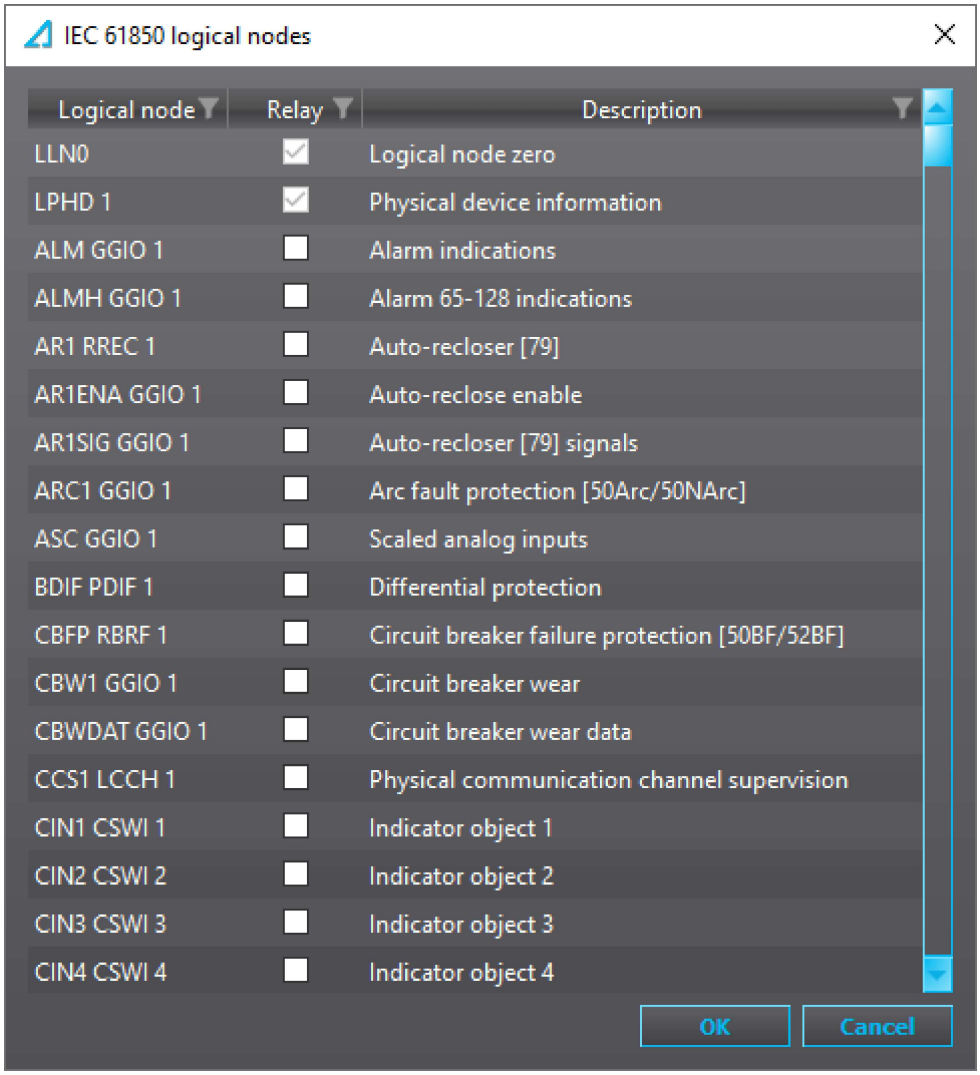
Edit logical nodes

Figure. 8.9.1 - 152. Opening the "Edit logical nodes" window.



You can open the logical node editor by pressing the ninth button on the main toolbar (see the figure above). The logical node editor is used for selecting which logical nodes are available in the data set editor. If a logical node is selected in the "Edit logical nodes" tool, it is possible to add that logical node to a data set in the "Data set editor".

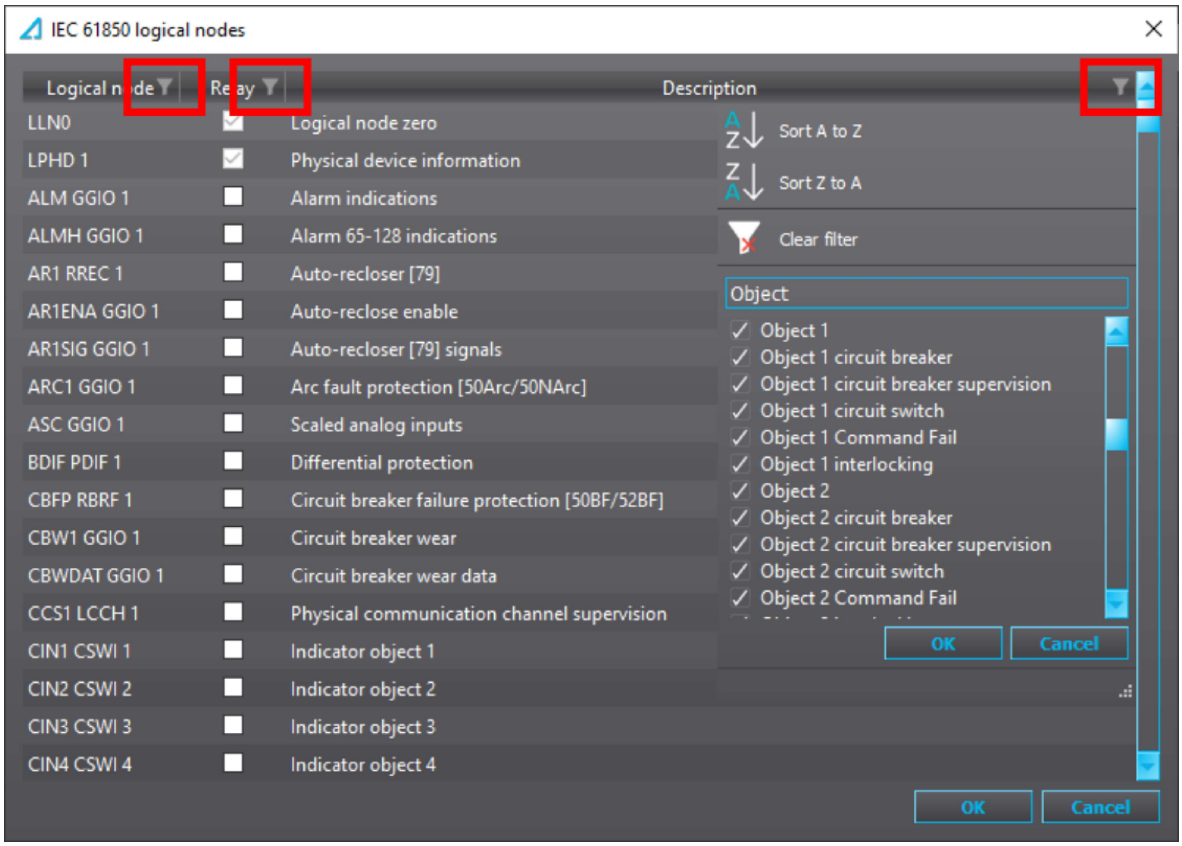
Figure. 8.9.1 - 153. "Edit logical nodes" window.



Logical node list can be filtered by right clicking any of the funnel symbols (see the figure below).

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Figure. 8.9.1 - 154. Filtering logical nodes.



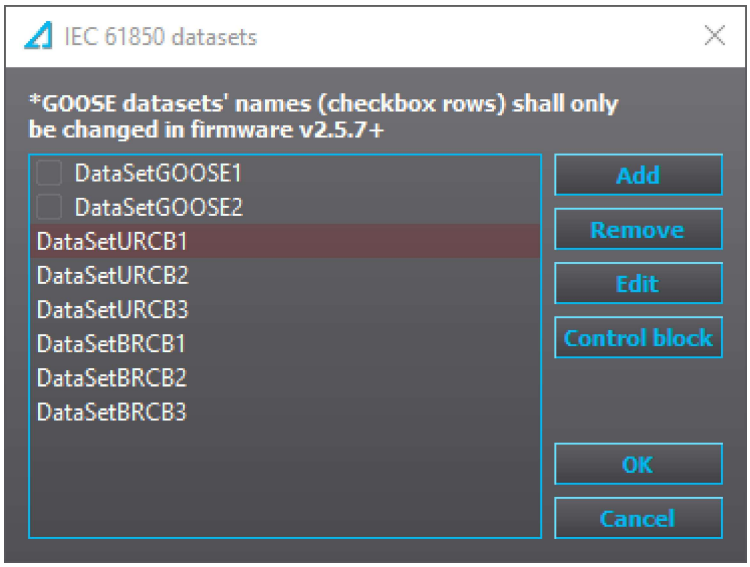
Data sets

Figure. 8.9.1 - 155. Opening the "Data set editing" window.



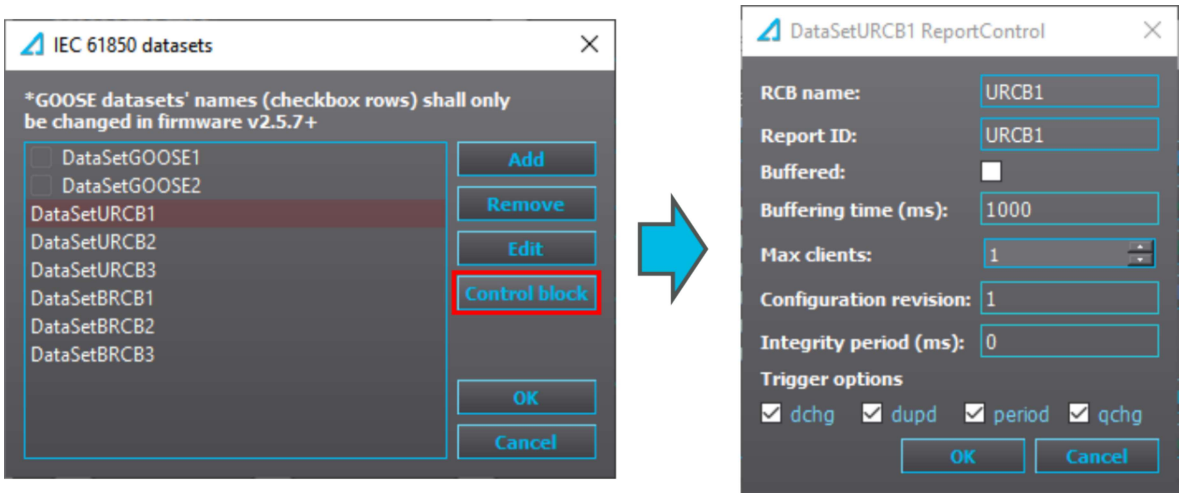
The data set editing window is opened by pressing the eighth button on the main toolbar (see the figure above).

Figure. 8.9.1 - 156. "Data set editing" window.



Data sets can be added and removed by using the "Add" and "Remove" buttons, respectively. GOOSE data sets can't be removed but they can be enabled and disabled with the checkbox. If both of the GOOSE publisher data sets are un-checked, the GOOSE publisher service is disabled (see the figure below, image on the left). Up to eight (8) data sets can be used. When a data set has been added, its report control block (RCB) settings can be set with the "Control block" button. This opens a new pop-up window (see the figure below, image on the right).

Figure. 8.9.1 - 157. Report control block settings.



In ReportControl settings you can set the name of the RCB and the Report ID, whether or not the data set is buffered, the buffering time (if the data set is buffered), the maximum number of clients that can connect to the data set at any one time, the configuration revision, as well as the integrity period. The integrity period can be used to force the data set to refresh the data set even when there has not been any changes.

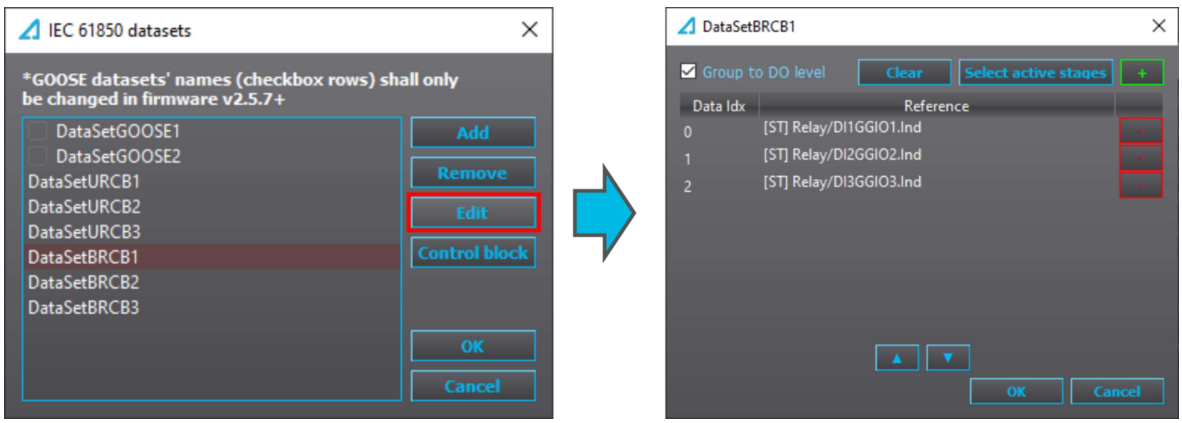
The table below lists all the RCB settings and their functions.

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Table. 8.9.1 - 9. RCB settings.

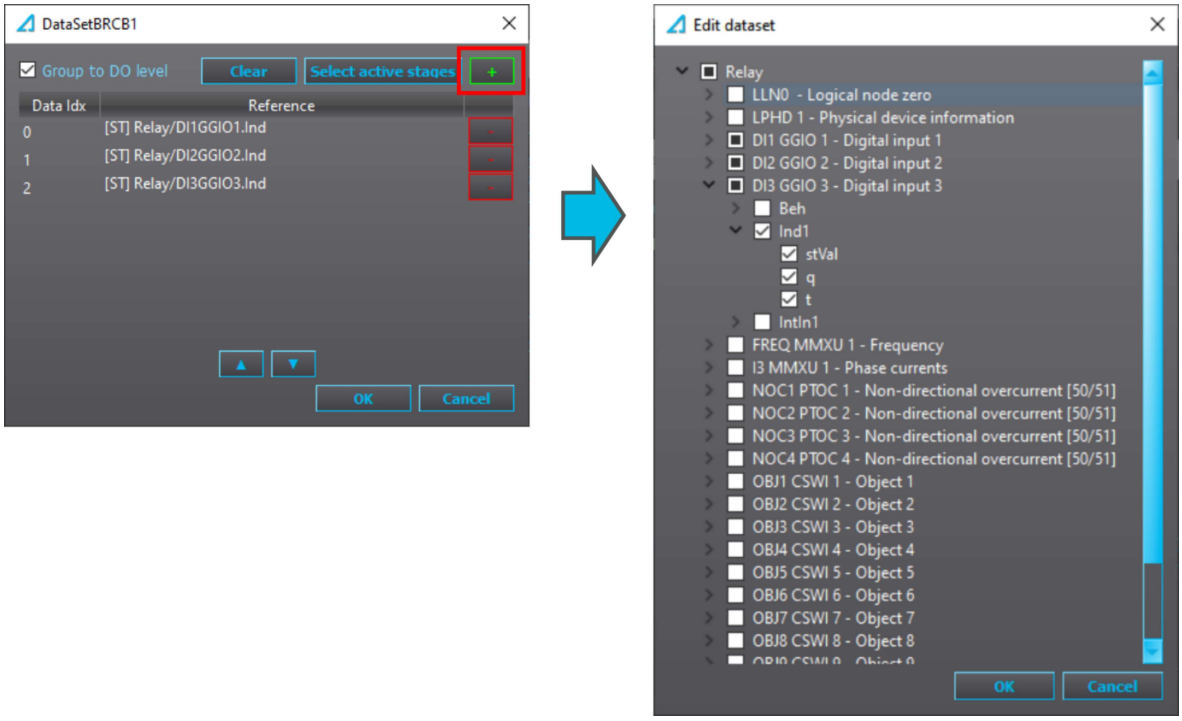
Name	Description
RCB name	Defines the Report Control Block's name. **NOTICE!** Please note that each Report Control Block has an RCB reference! The reference is built from the RCB name like this: LogicalDeviceName/ LogicalNodeName.RCBName.
Report ID	Identifies the Report Control Block. If this parameter is not set, the RCB reference will be used. The report ID ("RptId") will be sent with each report to identify the RCB responsible for the report.
Buffered	Defines whether the reporting is buffered or not. If the reporting is buffered, the reports are buffered by the device if the connection to a client(s) is lost. Reports are then sent after the client has connected again.
Buffering time (ms)	Defines how long the reports are buffered for if the data set has been set as "Buffered".
Max clients	Defines how many clients are allowed to connect to the data set.
Configuration revision	Defines the configuration revision.
Integrity period (ms)	Can be used to force the data set to refresh even when there has not been any changes.
Trigger options	Determines the default trigger options and they can be configured for the RCBs. These can, however, be changed by the client prior to enabling reporting.
dchg	Defines the trigger report on a data change event.
dupd	Defines the trigger report on a data update.
period	Defines the trigger report periodically (please refer to the "Integrity period (ms)" parameter in this table).
qchg	Defines the trigger report on a quality change event.

Figure. 8.9.1 - 158. "Data set editing" window.



All data sets can be edited (see the figure above). The data set editing dialog is opened by selecting the data set you want to edit and then clicking the "Edit" button. The editing dialog shows all the entries of the data set that are currently configured. An entry can be removed from the data set by clicking the red "-" button located at the end of the entry's row.

Figure. 8.9.1 - 159. Data selection on the data attribute level.



New entries can be added and old ones edited by clicking the green "+" button at the top right of the window (see the figure above). "Edit dataset" window lists all logical nodes that have been activated in "Edit logical nodes" window. For URCB and BRCB data sets it is recommended that the data is selected on the doName (data object) level. This way all available information (such as status, quality, and time) is always sent in the report.

Data can also be selected on daName (data attribute) level, which selects each individual piece of data. This approach may be preferred over GOOSE data sets. The nature of GOOSE communication is such that same frame is repeatedly sent. The interval between frames increases until the interval is 2 seconds, which is the keep-alive rate. If a data value in the GOOSE data set changes, the interval is reduced again. Time stamp information is not relevant in this kind of communication. In GOOSE data sets we recommend that only value and quality attributes are added.

NOTICE!
Up to 65 signals can be added to each data set!

Settings

The general setting parameters for the IEC 61850 protocol are visible both in AQtivate and in the local HMI (*Communication → Protocols → IEC61850*). The settings are described in the table below.

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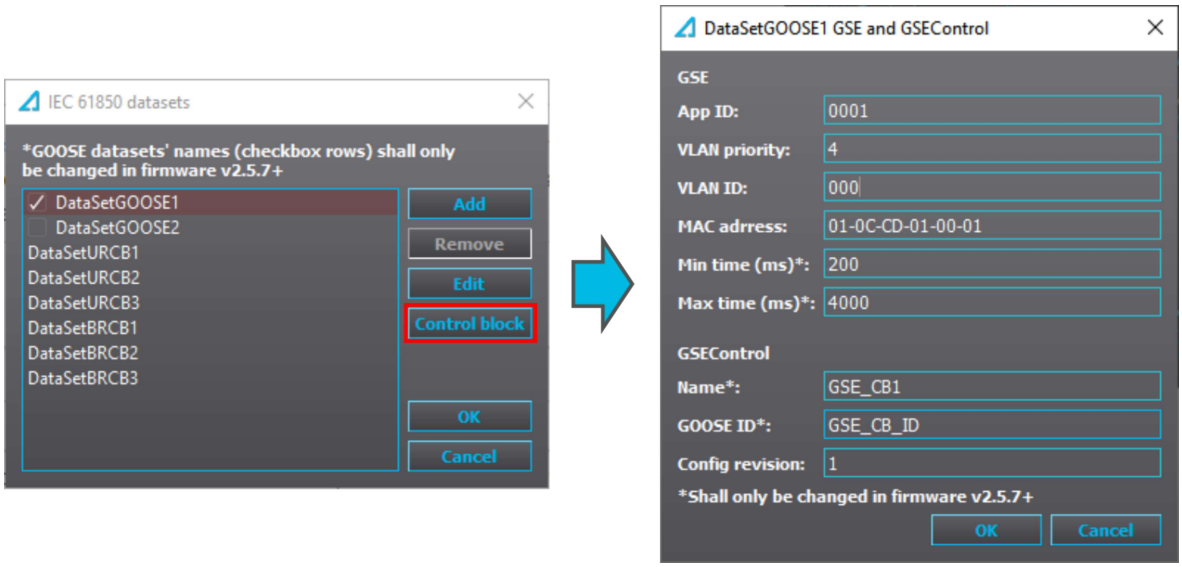
Table. 8.9.1 - 10. General settings.

Name	Range	Step	Default	Description
Enable IEC 61850	0: Disabled 1: Enabled	-	0: Disabled	Enables and disables the IEC 61850 communication protocol.
Reconfigure IEC 61850	0: - 1: Reconfigure	-	0: -	Reconfigures IEC 61850 settings.
IP port	0…65,535	1	102	Defines the IP port used by the IEC 61850 protocol. The standard (and default) port is 102.
IEC61850 edition	0: Ed1 0: Ed2	-	-	Displays the IEC 61850 edition used by the device. The edition can be chosen by loading a new .CID file at *Tools → Communication → IEC 61850* with the *Open* button.
Control Authority switch	0: Remote Control 1: Station Level Control	-	0: Remote Control	The device can be set to allow object control via IEC 61850 only from clients that are of category "Station-level control". This would mean that other remote control clients would not be allowed to control. In Remote Control mode all IEC 61850 clients of both remote and station-level control are allowed to control objects.
Ethernet port	0: All 1: COM A 2: Double ethernet card	-	0: All	Determines which ports use IEC 61850.
Configure GOOSE Subscriber from CID file allowed	0: Disabled 1: Allowed	-	0: Disabled	In edition 2 of IEC 61850 the configuration of the GOOSE subscriber is a part of the .CID file. This setting determines if it is possible to import published GOOSE settings from another device with a .CID file and set them as GOOSE inputs at *Tools → Communication → IEC 61850 → GOOSE subscriptions*.
General deadband	0.1…10.0 %	0.1 %	2 %	Determines the general data reporting deadband settings.
Active energy deadband	0.1…1000.0 kWh	0.1 kWh	2 kWh	Determines the data reporting deadband settings for this measurement.
Reactive energy deadband	0.1…1000.0 kVar	0.1 kVar	2 kVar	Determines the data reporting deadband settings for this measurement.
Active power deadband	0.1…1000.0 kW	0.1 kW	2 kW	Determines the data reporting deadband settings for this measurement.
Reactive power deadband	0.1…1000.0 kVar	0.1 kVar	2 kVar	Determines the data reporting deadband settings for this measurement.
Apparent power deadband	0.1…1000.0 kVA	0.1 kVA	2 kVA	Determines the data reporting deadband settings for this measurement.
Power factor deadband	0.01…0.99	0.01	0.05	Determines the data reporting deadband settings for this measurement.
Frequency deadband	0.01…1.00 Hz	0.01 Hz	0.1 Hz	Determines the data reporting deadband settings for this measurement.

Name	Range	Step	Default	Description
Current deadband	0.01…50.00 A	0.01 A	5 A	Determines the data reporting deadband settings for this measurement.
Residual current deadband	0.01…50.00 A	0.01 A	0.2 A	Determines the data reporting deadband settings for this measurement.
Voltage deadband	0.01…5000.00 V	0.01 V	200 V	Determines the data reporting deadband settings for this measurement.
Residual voltage deadband	0.01…5000.00 V	0.01 V	200 V	Determines the data reporting deadband settings for this measurement.
Angle measurement deadband	0.1…5.0 deg	0.1 deg	1 deg	Determines the data reporting deadband settings for this measurement.
Integration time	0…10 000 ms	1 ms	0 ms	Determines the integration time of the protocol. If this parameter is set to "0 ms", no integration time is used.
GOOSE Ethernet port	0: All 1: COM A 2: Double ethernet card	-	0: All	Determines which ports can use GOOSE communication.

For more information on the IEC 61850 communication protocol support, please refer to the conformance statement documents (MICS, PICS, PIXIT, & TICS) on Arcteq's website (www.arcteq.com/documents-and-software/→ *AQ 200 series* → *Resources*).

GOOSE publisher



There are two (2) GOOSE data sets available. By default they are both off. To activate them click on their respective checkbox (see the figure above, image on the left).

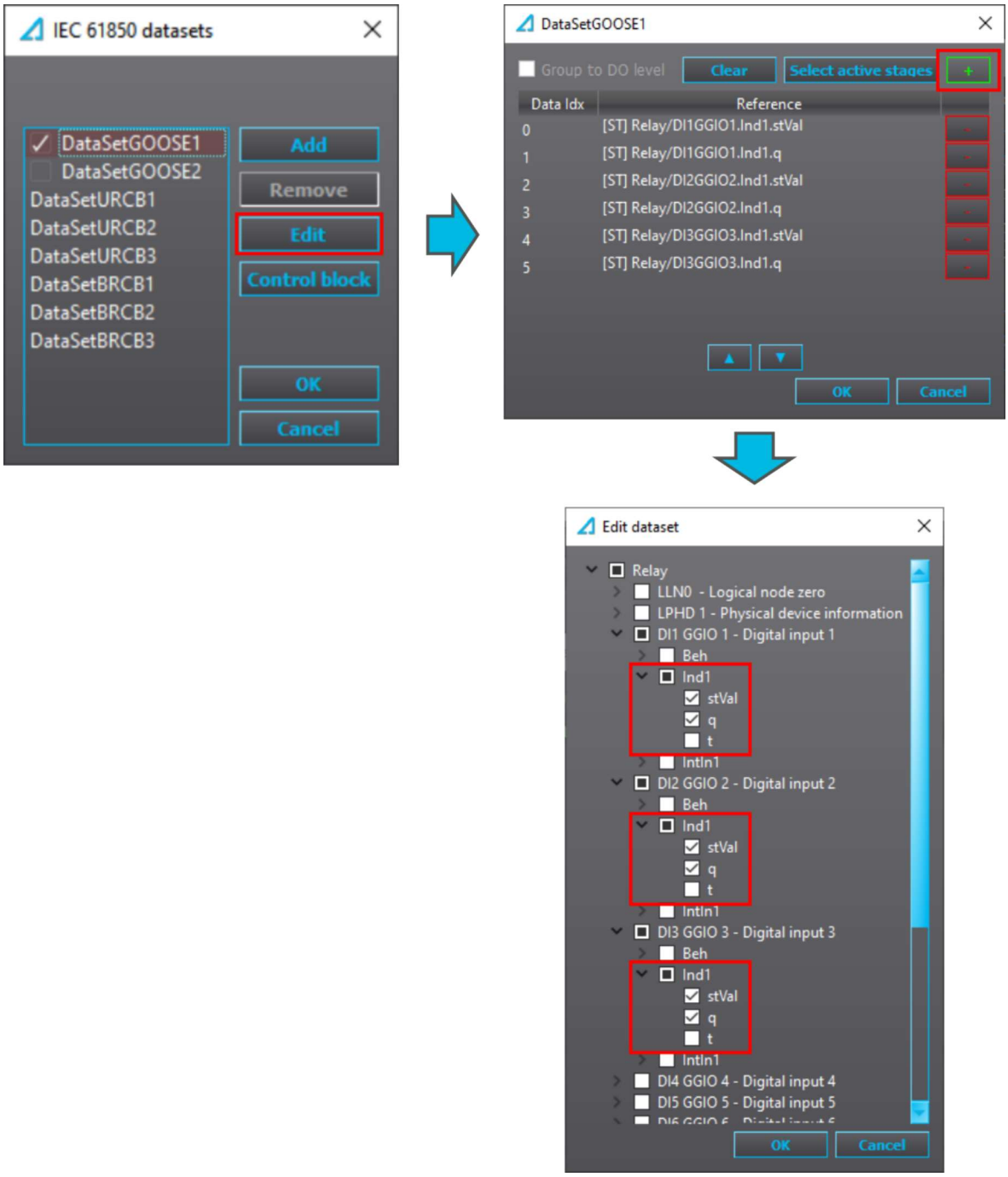
In Control block settings you can set the specific GOOSE publisher settings. The right side of the figure above shows the GOOSE control block parameters, and they are used to configure the GOOSE publisher.

The following lists all these parameters and their functions:

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- App ID
  Stands for "Application Identification". This hexadecimal parameter defines the ID of the published GOOSE data from this device. The App ID must be unique in the network, as it is used in the subscriber to identify the incoming GOOSE data frame.
- VLAN Priority and VLAN ID
  Together these parameters are used to build sub-networks in the system utilizing intelligent switches. VLAN ID is a hexidecimal number.
- MAC address
  Defines the multicast address to which the GOOSE publisher is sending its frames.
- Min time (ms) and Max time (ms)
  Defines the minimum and maximum times in milliseconds for the GOOSE publisher.
- Name and GOOSE ID
  Define the name and the unique ID for the GSE control. GOODE ID is a hexidecimal number.
- Config revision
  Stands for "Configuration revision", and can be considered to be the version number of the GOOSE dataset.

Figure. 8.9.1 - 160. Example of GOOSE publisher signal setup.



The example above is a typical setup for a GOOSE subscriber data set. GOOSE data set 1 is enabled with a checkbox. The status ("stVal") and quality ("q") of the three first digital inputs are added to the data set. Each signal then has a data index starting from zero and counting up.

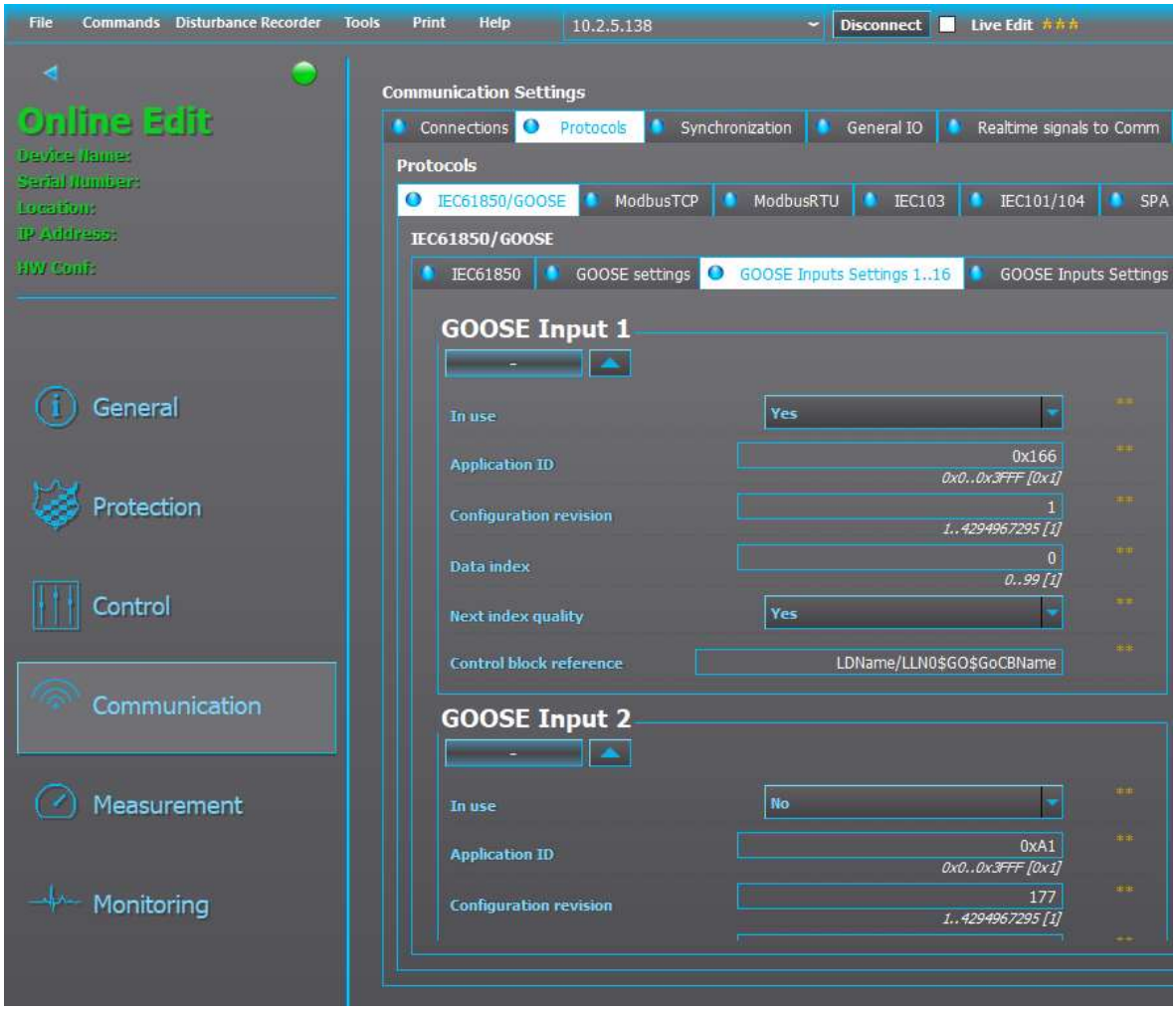
NOTICE!
Both GOOSE data sets can hold up to sixteen (16) signals each in AQ 210 devices and 64 signals each in AQ 250 devices and AQ-ONE devices.

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GOOSE subscribing

A GOOSE subscriber is enabled with the "GOOSE subscriber enable" parameter, which can be found under the *Communication → Protocols → IEC61850/GOOSE → GOOSE settings* view. There are 64 independent GOOSE inputs available in the device. For each of the inputs there are five (5) settings: "In use", "Application ID", "Configuration Revision", "Data index", "Next index quality", and "Control block reference". These settings are used to pair an input with a single data point in the published frames in the system.

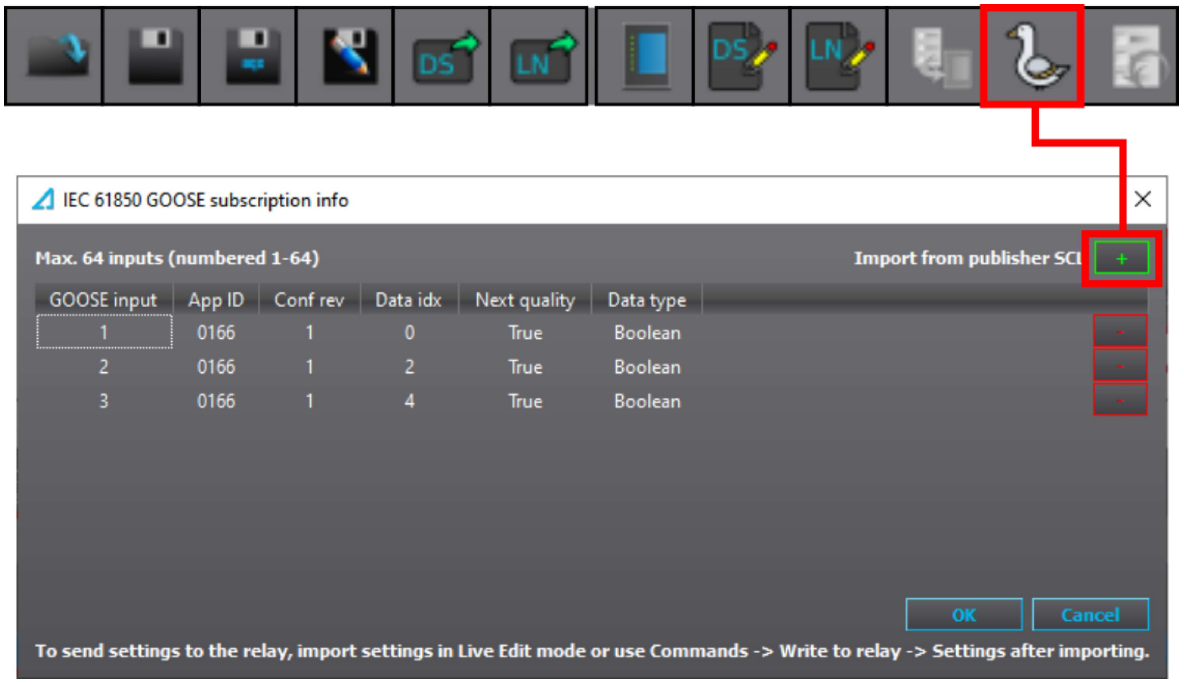
Figure. 8.9.1 - 161. Example of the GOOSE subscriber settings.



In the figure above GOOSE Input 1 has been configured to receive the DI1 input value that was configured in the previous chapter's configuration. "Next index quality" has been enabled which means that the device will assume the next DataIdx (0+1 = 1) to be of the same quality as the GOOSE signal.

In the figure above the GOOSE input was configured manually, but they can be also configured by importing a GOOSE publisher's .CID file and assigning signals to the GOOSE inputs. This can be done in the "GOOSE settings" tab in the IEC 61850 editor (see the figure below). If the Live Edit mode is activated, the settings are loaded into the device automatically. If the Live Edit mode is not active, the parameters take effect when the parameters are loaded into the device with the *Write to relay* command.

Figure. 8.9.1 - 162. Importing a GOOSE publisher's .CID file.

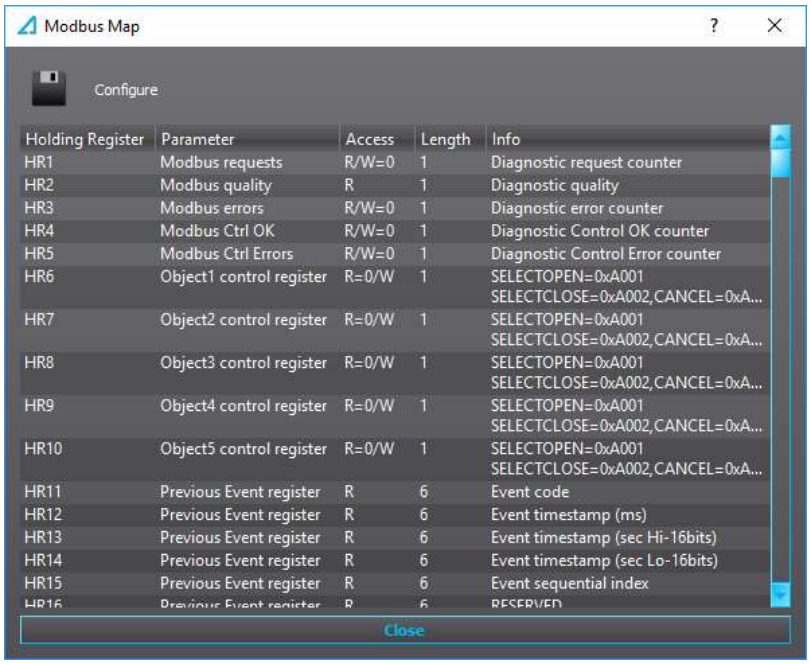


8.9.2 Modbus map

Modbus TCP can be enabled at *Communication → Protocols → Modbus TCP*. Serial Modbus can be enabled at *Communication → Connections* in the serial communication settings section.

Modbus-related information can be accessed by opening the "Modbus map" dialog (see the figure below) from *Tools → Communication*. The Modbus map can be saved as a text file (.txt) by clicking the "Save" button (the floppy disk icon).

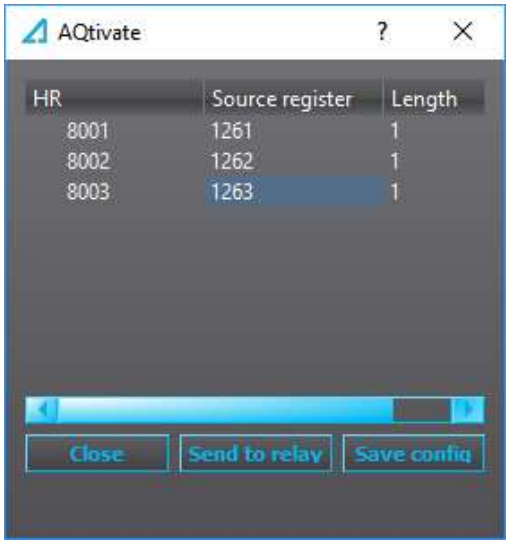
Figure. 8.9.2 - 163. "Modbus map" window.



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All signal holding registers in the default map are fixed, which means that they cannot be edited by the user. If custom holding registers are needed, the Modbus configurator can be used to change the used Modbus map. The Modbus configurator can be found at *Tools → Communication → Modbus configurator* (see the figure below). The fixed holding registers can be also reassigned to user-defined holding registers with the "Configure" button in the Modbus map window. This brings up a smaller pop-up window, where a new row can be added by right-clicking and choosing "Add". You can then choose the holding register you want to use in the new holding register. The holding registers that users can edit start their numbering from 8001.

Figure. 8.9.2 - 164. Custom holding registers.



8.9.3 Modbus configurator

This tool is used to make changes to the register map when communicating using a Modbus protocol.

Available buttons

Button	Description
	Load old configuration
	Save to .aqs
	Save as
	Preview

Button	Description
	Export to text
	Sort by HR
	Delete HR(s)
	Undo
	Redo
	Send to relay

Terms

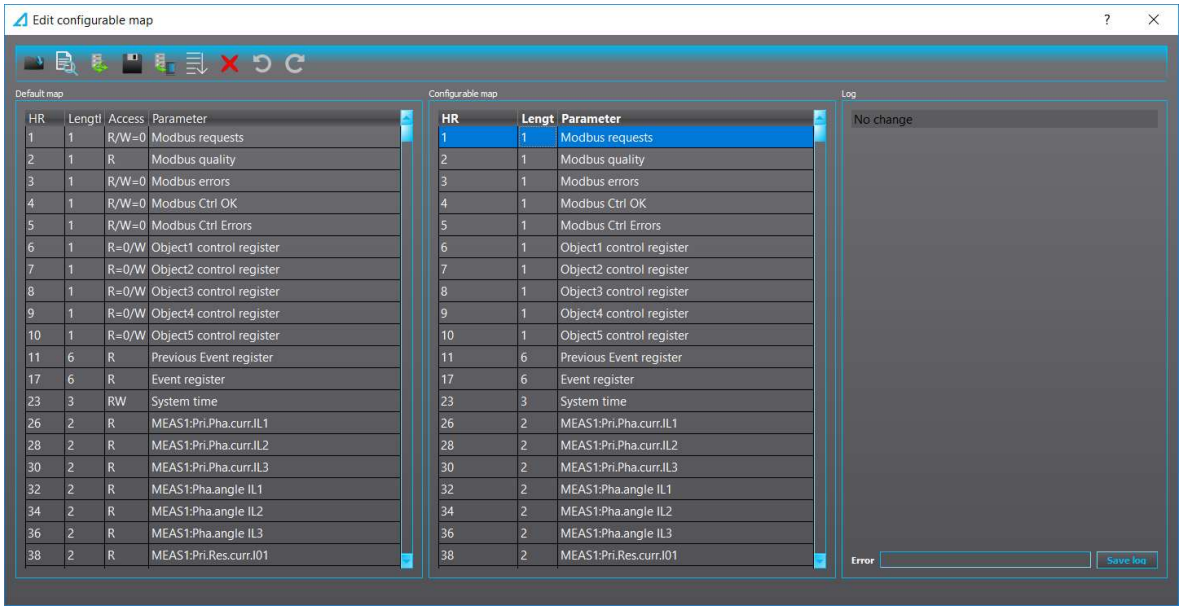
Term	Description
Holding register (HR)	An object type in Modbus, has Read-Write access, 16 bits in size.
Default map	The static Modbus map that has been used by the device.
Configurable map	The new Modbus map that can be altered.

Usage

The default map is unconfigurable while the configurable map is there for the user to change. If no configuration has been made, it will be a copy of the default map.

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Figure. 8.9.3 - 165. Editing the configurable map, based on the default map.



Limitations

The configurable map is set to only hold 10,000 rows at maximum. In each row, the sum of the values in columns "HR" and "Length" cannot exceed 65,535.

When one of the limitations is reached, the user is notified and they should undo the latest action.

Loading an old configuration

If there are configurations made by the old configuration dialog, there is a button to import it in the toolbar. The old configurations are typically imported once when the new configuration dialog is first used.

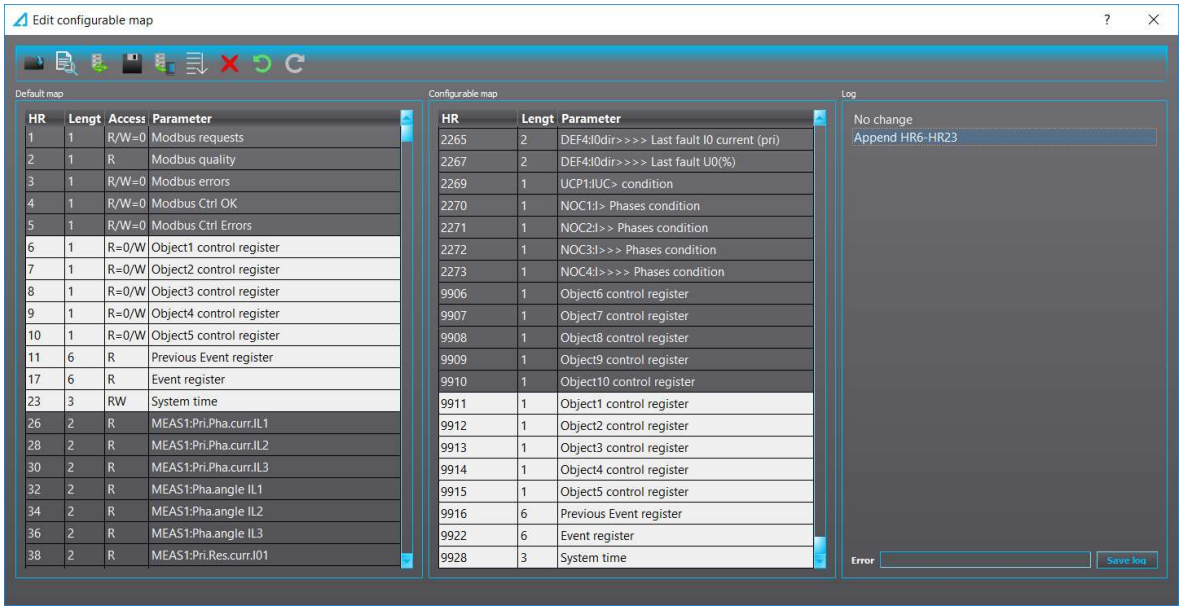
If there are configurations made by the new configuration dialog, the configurations are be loaded automatically. The loading steps are shown in the log section.

Adding data

New data can be copied from the default map to the configurable map following these steps:

1. Select the row(s) you want to copy from the default map.
2. Drag the row(s) on top of the configurable map.
3. Drop the data onto the configurable map.
4. The new data is appended to the configurable map.

Figure. 8.9.3 - 166. Copying rows from the default map to the configurable map.



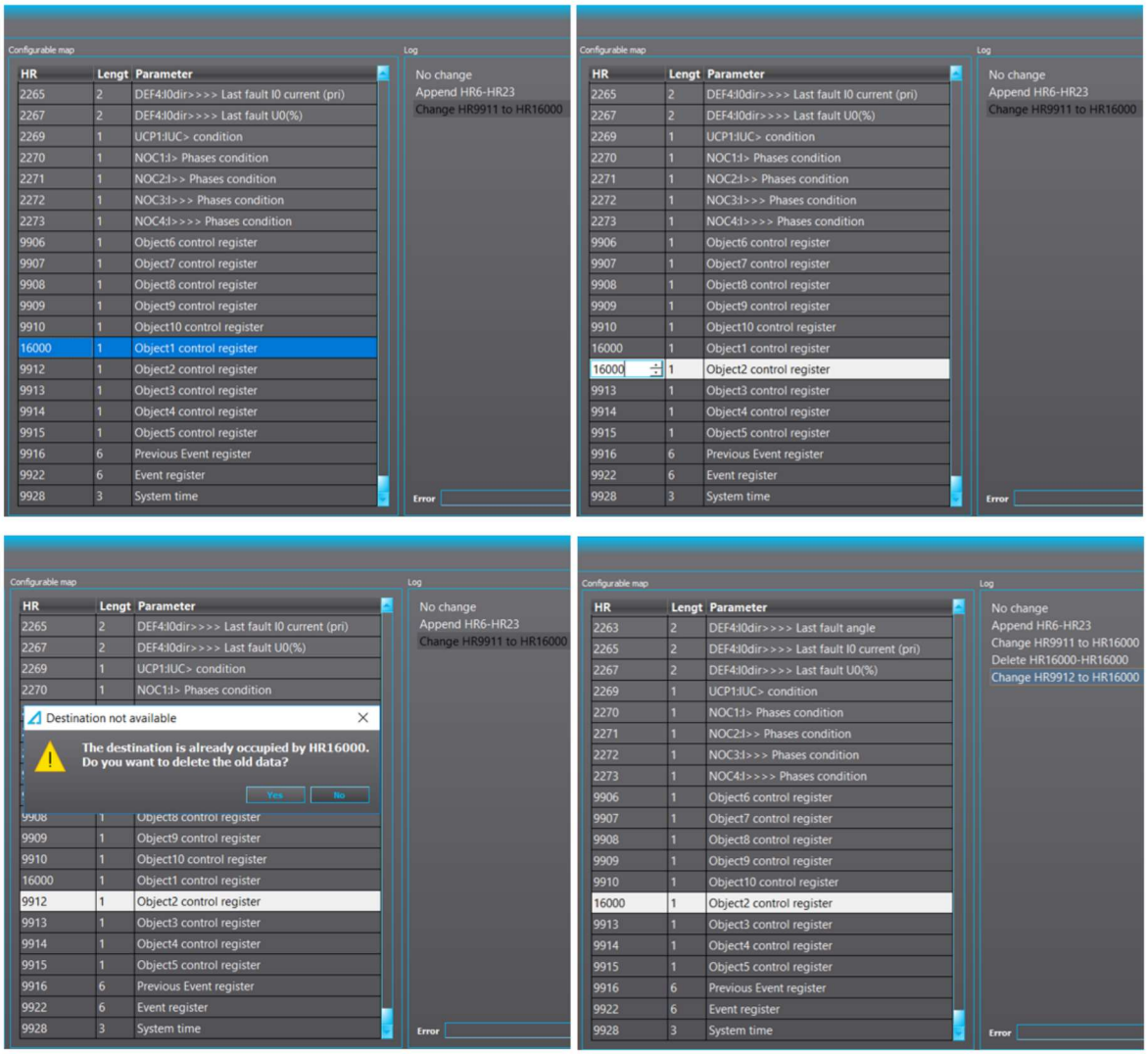
Changing a holding register

The HR can be changed by double-clicking the HR column of the wanted parameter. You can use the arrow buttons or the keyboard arrow keys to select an HR. Before the HR is changed, if there is other data at that destination, the user is notified of the conflict and given two choices:

- Delete the current data at the destination ("Yes").
- Cancel the change ("No").

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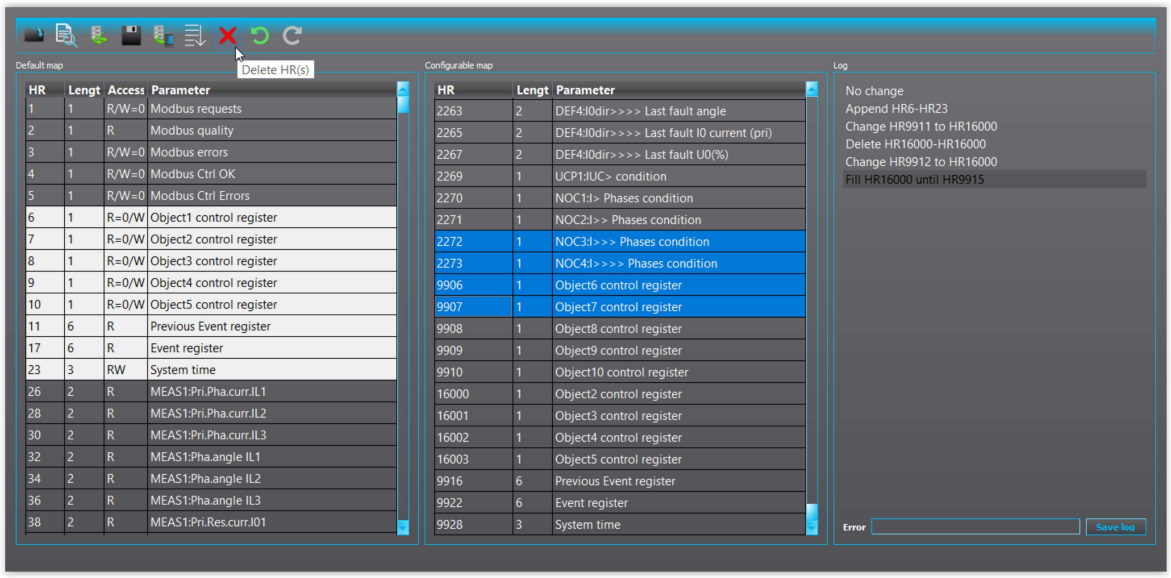
Figure. 8.9.3 - 167. Changing an HR in the Modbus configutator.



Filling a holding register

This function can be used to change all HRs of multiple consecutive parameters starting from the selected HR.

Figure. 8.9.3 - 168. Filling an HR in the Modbus configutator.



To fill a holding register you must first select a row. The cursor becomes a cross cursor when moved near the bottom line of the selection area. While on the cursor, click and drag the mouse to where you want to fill to. While dragging, a tooltip text is shown containing the resulting HR after the fill. The fill is executed after you release the mouse. Filling can be done in both directions, up and down.

Similar to when changing an HR value, if the destination of the fill is already occupied, the user is notified of the conflict and prompted to choose between deleting the occupied data or cancelling the fill.

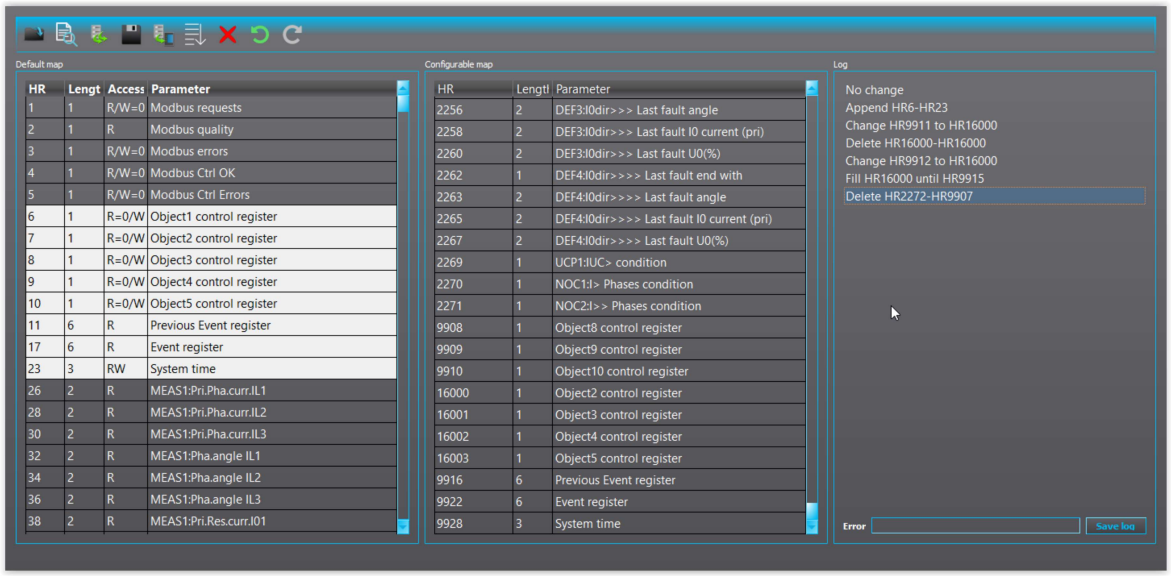
Deleting a holding register

HR(s) can simply be deleted by selecting the range to delete and clicking the "Delete" icon (the red X; see the figure below) on the toolbar or by pressing the **Delete** key on the keyboard.

NOTICE!
Please note that the deletion applies only to rows! If the row order is HR5-HR10-HR7, deleting HR5-HR10 will not delete HR7.

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Figure. 8.9.3 - 169. Deleting an HR in the Modbus configurator.

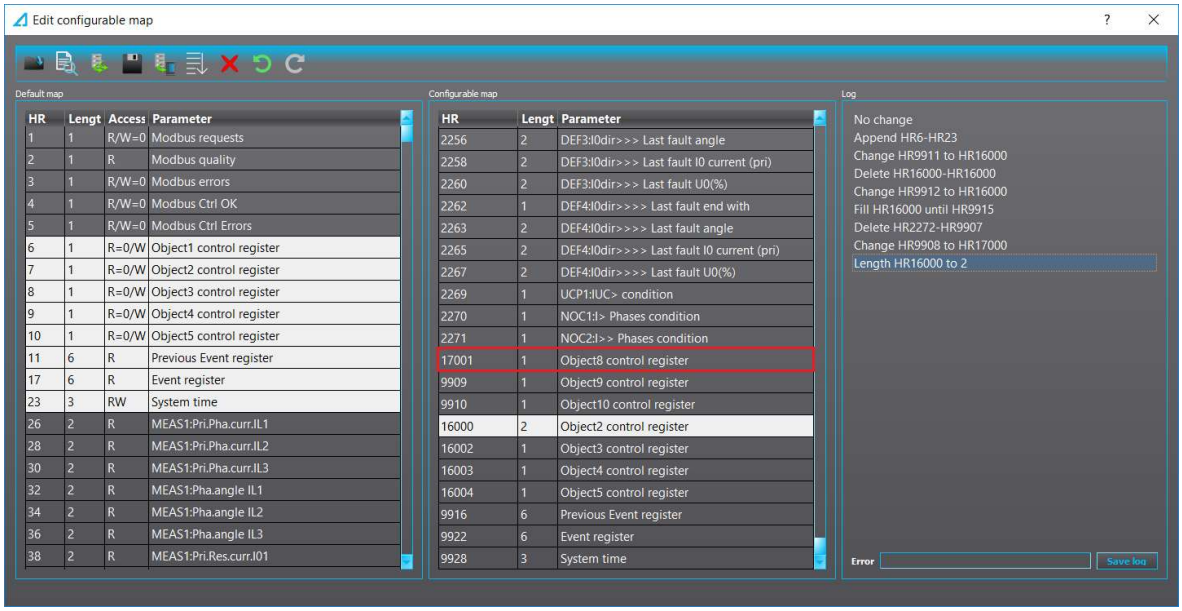


Changing the length of the data

The length of the data can be changed from "1" to "2" and vice versa. This can be done by double-clicking the row that needed to be changed in the configurable map. All the rows with HR greater than the selected row will have their HRs changed accordingly.

If two changes are made consecutively to a row (1 to 2 and back to 1), no log entry is created.

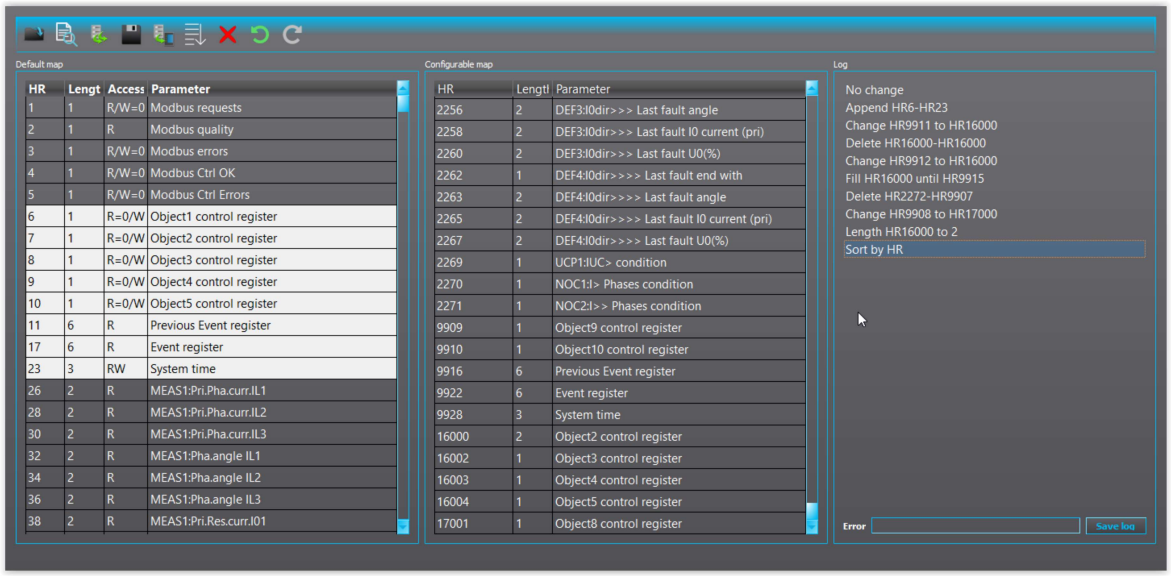
Figure. 8.9.3 - 170. Changing the data length in the Modbus configurator.



Sorting by holding registers

The configurable map can be sorted by HRs using the "Sort by HR" icon on the toolbar (see the figure below). If the map is already sorted, no log entry is created.

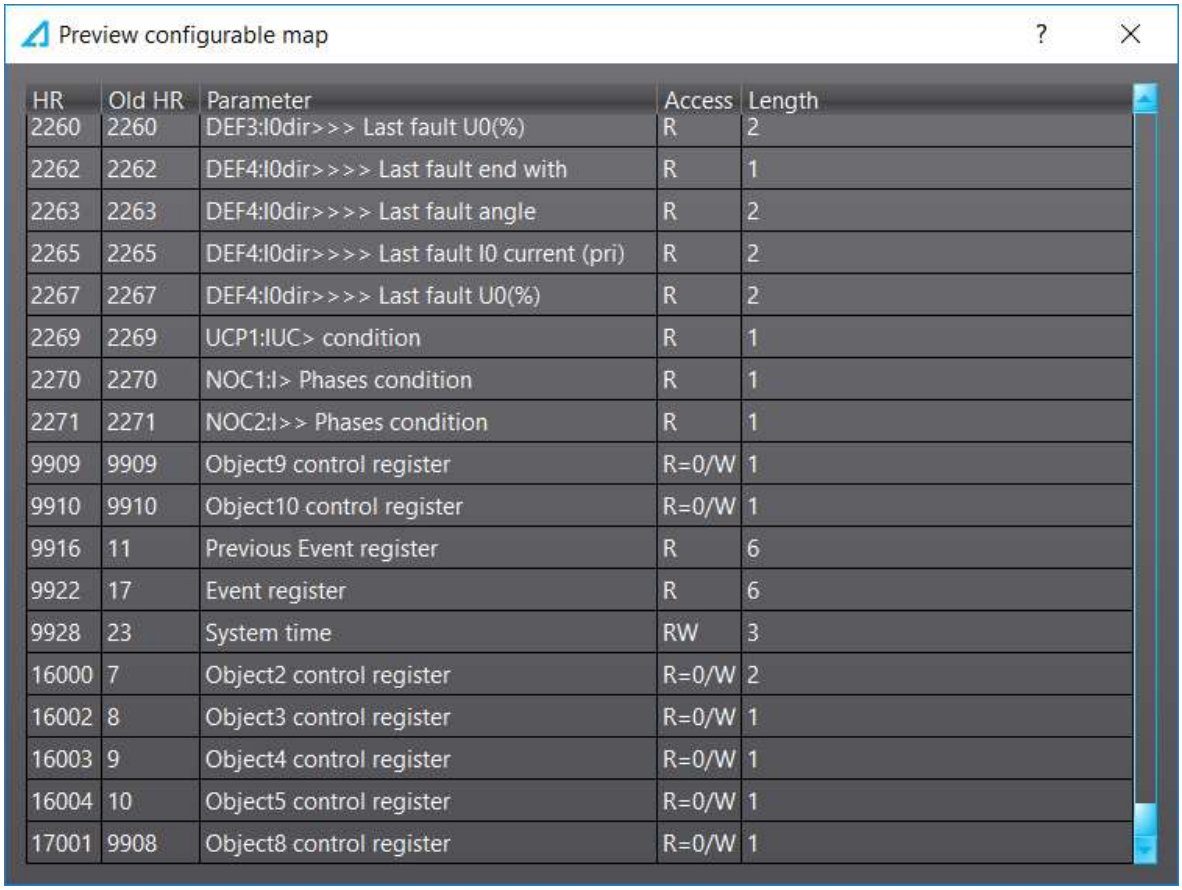
Figure. 8.9.3 - 171. Sorting by HRs in the Modbus configurator.



Previewing the map

A preview of the map can be seen by clicking the "Preview" icon on the toolbar (see the figure below).

Figure. 8.9.3 - 172. Previewing the configurable map.



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Exporting the preview map as a text file

The preview map can be exported as a text file using the "Export" icon on the toolbar (see the figure below).

Figure. 8.9.3 - 173. Example of a preview map exported as a text file.

```
HR  Old HR  Parameter   Access  Length

// many lines omitted

2262    2262    DEF4:I0dir>>>> Last fault end with  R   1
2263    2263    DEF4:I0dir>>>> Last fault angle R   2
2265    2265    DEF4:I0dir>>>> Last fault I0 current (pri)  R   2
2267    2267    DEF4:I0dir>>>> Last fault U0(%) R   2
2269    2269    UCP1:IUC> condition R   1
2270    2270    NOC1:I> Phases condition    R   1
2271    2271    NOC2:I>> Phases condition   R   1
9909    9909    Object9 control register    R=0/W   1
9910    9910    Object10 control register   R=0/W   1
9916    11  Previous Event register R   6
9922    17  Event register  R   6
9928    23  System time RW  3
16000   7   Object2 control register    R=0/W   2
16002   8   Object3 control register    R=0/W   1
16003   9   Object4 control register    R=0/W   1
16004   10  Object5 control register    R=0/W   1
17001   9908    Object8 control register    R=0/W   1
```

Undo/Redo

Changes made to the configuration map are displayed in the log section and can be undone and redone.

The Undo action can be executed in any of the following ways listed below:

- Using the key combination Ctrl + Z.
- Clicking on the line in the log section.
- Clicking the "Undo" icon on the toolbar.

The Redo action can be executed in any of the following ways listed below:

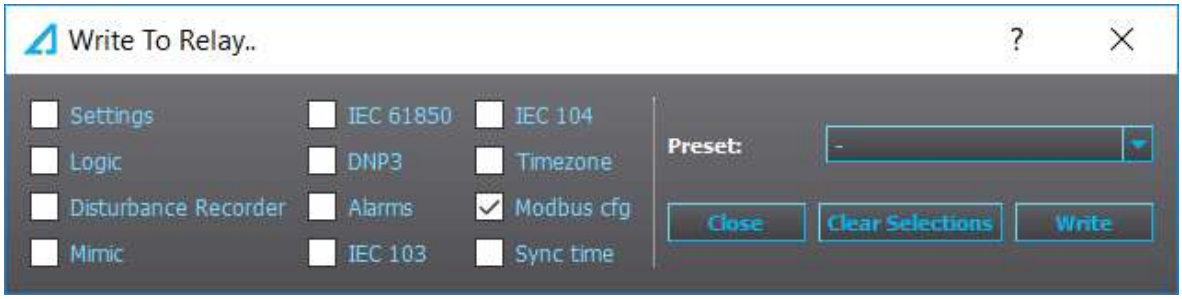
- Using the key combination Ctrl + Y.
- Clicking on the line in the log section.
- Clicking the Redo icon on the toolbar.

Save and write to the device

The configuration is saved to the .aqs file after you click the "Save" icon on the toolbar.

You can send the configuration to the device by clicking the "Send to relay" icon on the toolbar.

The configuration can also be sent from the AQtivate menu bar: choose *Commands → Write To Relay*, check the "Modbus cfg" box in the pop-up window's list and then click the "Write" button.



If no configuration file exists (e.g. the user may have forgotten to save it), there can be errors sending it to the device.

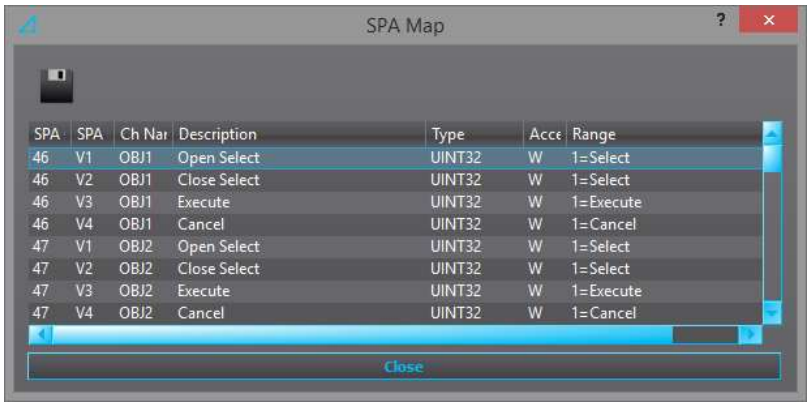
After sending the configuration file, Modbus must be turned off and on again for the changes to apply.

8.9.4 SPA map

SPA communication can be enabled at *Communication → Connections* in the serial communication setting section.

SPA-related information can be accessed by opening the "SPA map" dialog from the *Tools → Communication* menu. The SPA map can be saved as a text file with the "Save" button (the floppy disk icon).

Figure. 8.9.4 - 174. "SPA map" window.



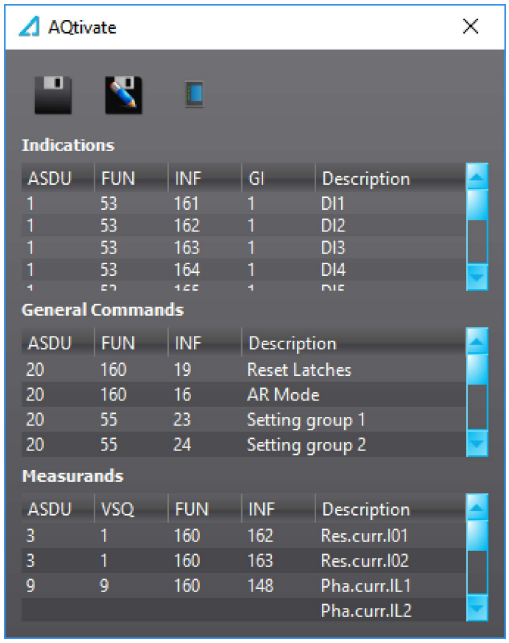
All SPA events can be found in *Tools → Events and registers → Event list*.

8.9.5 IEC 103

IEC 103 communication can be enabled at *Communication → Connections* menu in the serial communication setting section.

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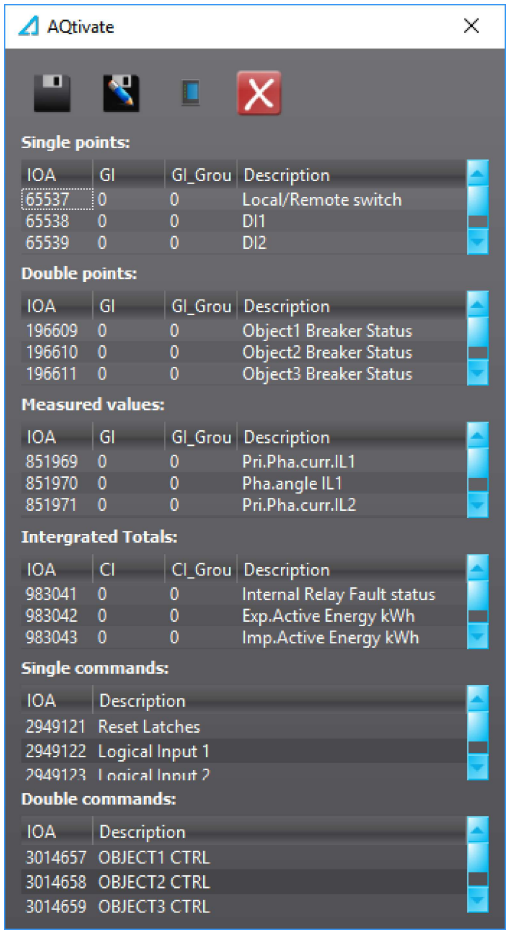
Figure. 8.9.5 - 175. IEC 103 map editor.



The IEC 103 map editor (*Tools → Communication*) lists the addresses of the various signals. The user can set the General interrogation (GI) to 0 or 1.

8.9.6 IEC 101/104

Figure. 8.9.6 - 176. 101/104 tool.



The IEC 101/104 tool (*Tools → Communication*) displays all signals available with the communication protocols. The user can define both the General interrogation (GI) and the GI groups for the signals.

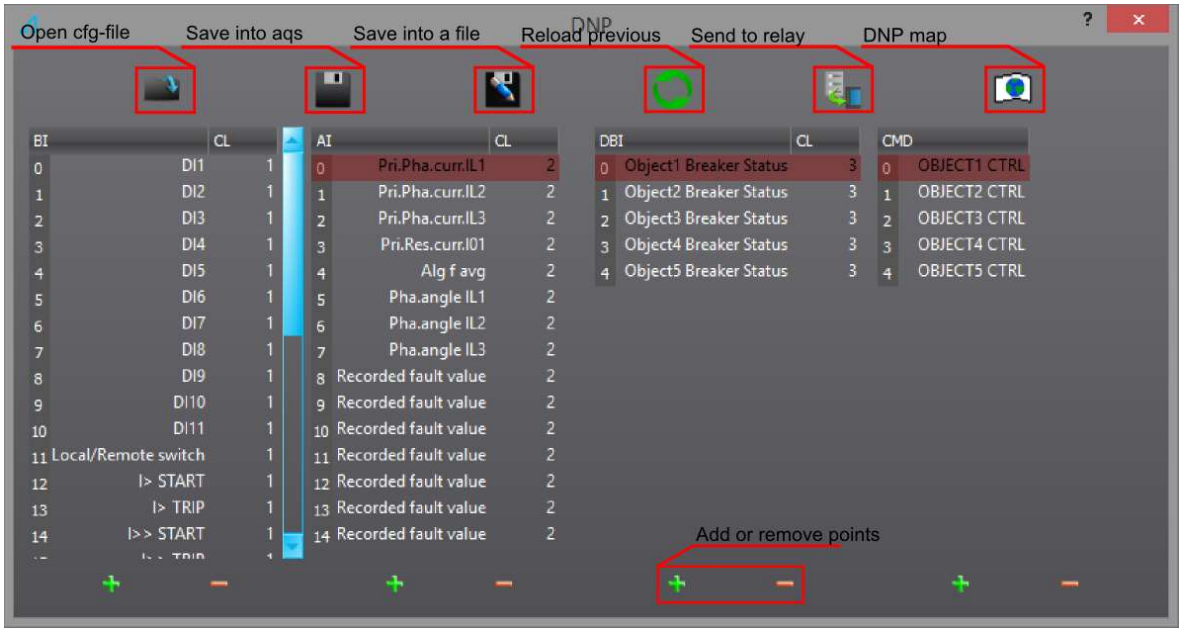
8.9.7 DNP

DNP3 TCP communication can be enabled at *Communication → Protocols → DNP3*. Serial DNP3 can be enabled at *Communication → Connections* in the serial communication setting section.

When the DNP map (*Tools → Communication → DNP*) is ready, it can be saved as a text file by clicking the "DNP map" button (the earth flag icon) and then the "Save" button (the floppy disk icon). See the figure below for further explanations of the DNP map's various icons.

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Figure. 8.9.7 - 177. "DNP map" window and its various icons explained.



8.9.8 Modbus Gateway

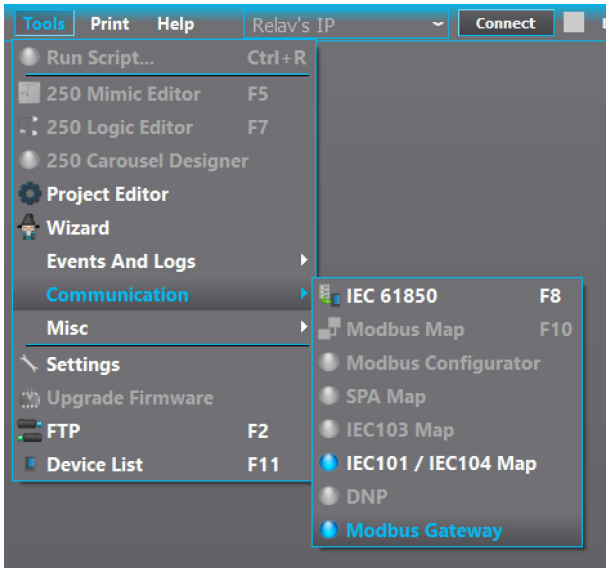
Modbus Gateway is a feature supported by all AQ 250 series devices and AQ-ONE devices. It serves as a gateway, polllng data from Modbus RTU slaves and Modbus TCP servers as well as making data of those available to IEC 61850.

For simplicity, this chapter abbreviates Modbus RTU slaves and Modbus TCP servers as "RTU slaves" and "TCP slaves", respectively. The data acquired from the slaves is called "virtual inputs".

Configure Modbus Gateway

The configuration dialog for the gateway can be opened from AQtivate's main toolbar under *Tools → Communication*.

Figure. 8.9.8 - 178. Opening Modbus Gateway.



An empty configuration is shown in the figure below.

Figure. 8.9.8 - 179. Example of an empty configuration.



The following table explains the icons on the gateway's toolbar.

Table. 8.9.8 - 11. Modbus gateway's toolbar.

Button	Description
	Open an existing configuration file (.csv).
	Save the currently open file.
	Save the configuration to the current .aqs file. NOTICE! This button is enabled only when an AQS file is open in AQtivate!
	Save the configuration as a .csv file.
	Send the configuration to the device.

Configuring the slave

A slave can be added by pressing the green plus sign ("+") at the bottom of the slave list and can be deleted using the red minus sign ("-") next to the slave's name. The maximum number of slaves is sixteen (16).

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Figure. 8.9.8 - 180. Configurations for an RTU slave and a TCP slave.

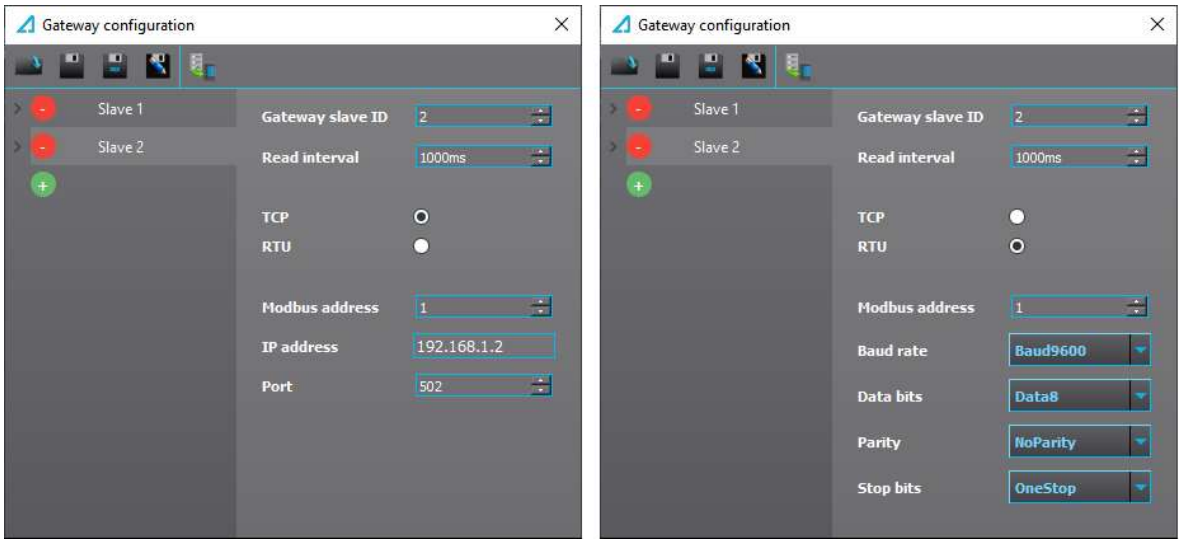


Table. 8.9.8 - 12. Common parameters.

Parameter	Range	Default	Description
Slave type	TCP RTU	RTU	Defines which slave type is used for the configuration.
Gateway slave ID	1...32	1	Defines the unique ID number for the slave in the gateway.
Modbus address	1...247	1	Defines the Modbus slave address.
Read interval	100 ms...60 000 ms	1 000 ms	Defines the polling interval.

Table. 8.9.8 - 13. RTU parameters.

Parameter	Range	Default	Description
Baud rate	Baud1200 Baud2400 Baud4800 Baud9600 Baud19200 Baud38400 Baud57600 Baud115200	Baud9600	Defines the baud rate for the RTU.
Data bits	Data8 Data7	Data8	Defines the data bits for the RTU.
Parity	NoParity EvenParity OddParity	NoParity	Defines the parity bit(s) for the RTU.
Stop bits	OneStop TwoStop	OneStop	Defines the stop bit(s) for the RTU.
Wait after send	100…10 000 µs/octet	1200 µs/ octet	The bus must switch between transmit and receive at the right moment. Use parameter (µs per byte) to tune this timing for your slave device.

Table. 8.9.8 - 14. TCP parameters.

Parameter	Range	Default	Description
IP address	0.0.0.0 ... 255.255.255.255	192.168.1.2	Defines the IP address of the slave in the TCP.
Port	0 ... 65535	502	Defines the TCP port of the slave.

Configuring virtual inputs (general)

The data acquired from the slaves are called virtual inputs, which can be categorized into the following six (6) types:

Table. 8.9.8 - 15. Five virtual input types.

Virtual input type	Underlying data type	Value range	Max. number of inputs
Virtual counter	32-bit unsigned integer	0 … 4,294,967,295	128
Virtual integer	32-bit signed integer	–2,147,483,648 ... 2,147,483,647	128
Virtual measurement	32-bit floating point value	-3.4×10^{38} ... 3.4×10^{38}	128
Virtual measurement (converted)	Scaled floating point value	-3.4×10^{38} ... 3.4×10^{38}	128
Virtual single bit	One (1) bit	0 … 1	128
Virtual double bit	Two (2) bits	0 … 3	32

You can add a virtual input to a slave by clicking the arrow next to the slave unit and then pressing the green plus sign ("+") at the bottom of the virtual input list. It can be deleted using the red minus sign ("-") next to the input's name. While the default type of the inputs is counters, you can change the type from the "Imported value type" parameter.

All virtual inputs share the following configurations presented in the table below:

Table. 8.9.8 - 16. Shared configurations.

Configuration parameter name	Value range	Default	Description
Input/holding registers	Input registers Holding registers	Holding registers	Defines which Modbus register type is to be read.
Start data address	1 … 65 535	1	Defines the first Modbus register to be read.
Imported value type	Counter Integer Measurement Measurement (converted) Single bit Double bit	Counter	Defines the type of the virtual input.

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Configuration parameter name	Value range	Default	Description
Imported value number	1 … the maximum number of the selected virtual input type	(type) 1	Defines the unique input ID for the current type in the gateway. See the maximum number of inputs for each type in the previous table ("Five virtual input types").
Description	Max. 31 characters	–	A text field that allows you to add a description of the input. NOTICE! This parameter is optional!

Configuring the virtual input types "Counter" and "Integer"

The configurations for the virtual counter and the virtual integer input types are shown in the figures below.

Figure. 8.9.8 - 181. Configuring a virtual counter input.

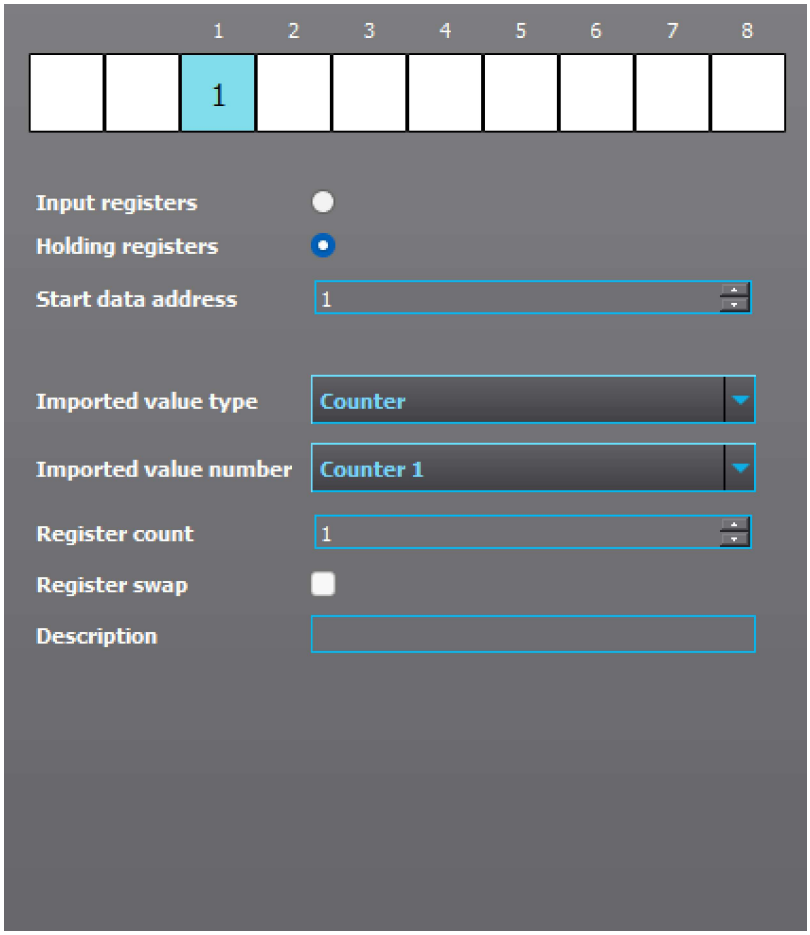
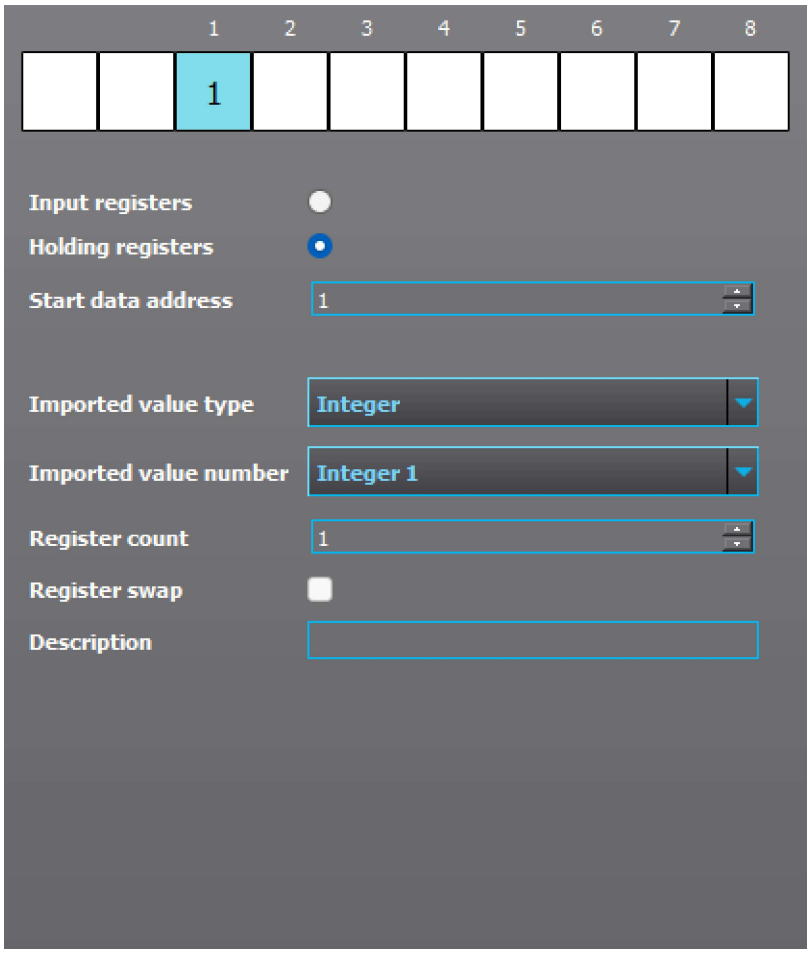


Figure. 8.9.8 - 182. Configuring a virtual integer input.



In addition to the common configuration parameters, the virtual counter and the virtual integer input types have the following configuration parameters:

Table. 8.9.8 - 17. Additional configuration parameters for the virtual counter and integer input types.

Configuration parameter name	Value range	Default	Description
Register count	1 … 2	1	Defines whether one (1) or two (2) registers will be read.
Register swap	(checkbox is empty) (checkbox is ticked)	(checkbox is empty)	Defines whether the register order is swapped or not.

NOTICE!
Please note that the *Register swap* parameter configuration is only taken into account when the option "2" has been selected for the *Register count* parameter!

- When the register swap is disabled (and the checkbox is empty), the first register is the high register.
- When the register swap is enabled (and the checkbox has been ticked), the first register is the low register.

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Configuring the virtual input types "Measurement" and "Measurement (converted)"

Modbus Gateway supports two (2) ways of storing floating point values, as presented in the following tables.

Table. 8.9.8 - 18. 32-bit floating point value stored in two consecutive 16-bit registers (no word swap).

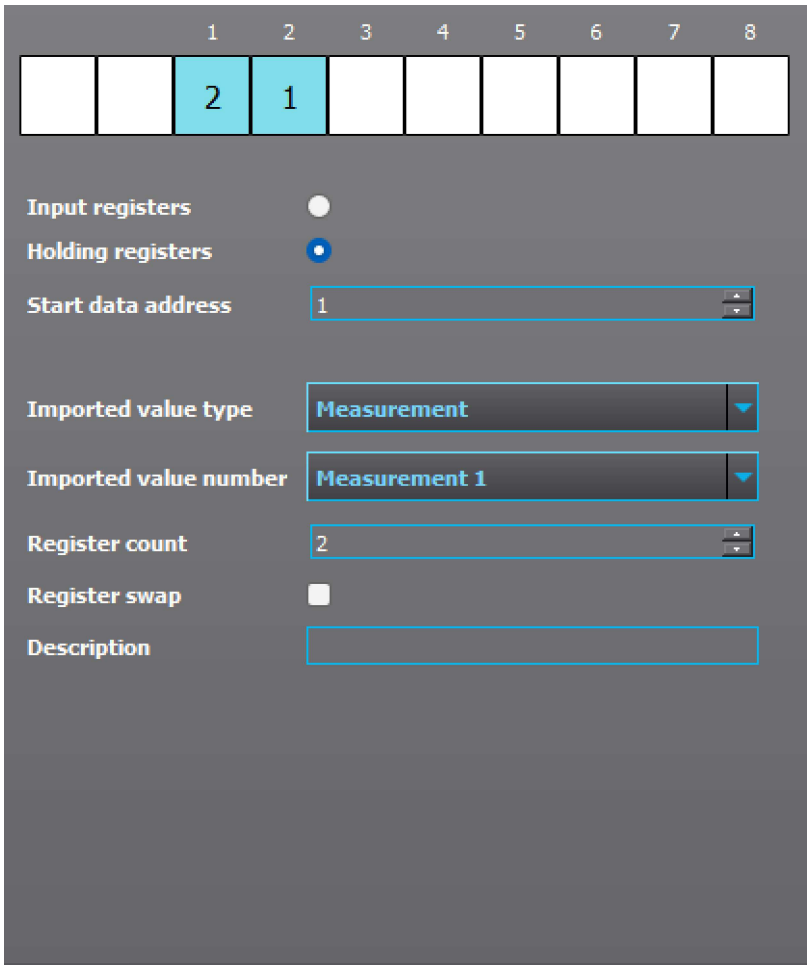
Floating point value	2.875
Hexadecimal value	0x4038 0000
1st Modbus register	0x4038
2nd Modbus register	0x0000

Table. 8.9.8 - 19. Scaled floating point value stored in 1 ... 4 consecutive register(s) as integers (no word swap, 2 registers).

Floating point value	2.875
Scaling factor	1000
Scaled value	2875
Hexadecimal value	0x0000 0B3B
1st Modbus register	0x0000
2nd Modbus register	0x0B3B

If the value is stored using the 32-bit floating point value, the input type should be configured to “Measurement”. Otherwise, the input type should be configured to “Measurement (converted)”. The configurations for both of these inputs are shown in the figures below.

Figure. 8.9.8 - 183. Configuring a virtual measurement input.



In addition to the common configuration parameters, the virtual measurement input type has the following configuration parameters:

Table. 8.9.8 - 20. Additional configuration parameters for the virtual measurement input type.

Configuration parameter name	Value range	Default	Description
Register count	–	2	Defines that two (2) registers will be read.
Register swap	(checkbox is empty) (checkbox is ticked)	(checkbox is empty)	Defines whether the register order is swapped or not.

NOTICE!
Please note that the *Register swap* parameter configuration is only taken into account when the option "2" has been selected for the *Register count* parameter!

- When the register swap is disabled (and the checkbox is empty), the first register is the high register.
- When the register swap is enabled (and the checkbox has been ticked), the first register is the low register.

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The following two (2) tables present examples where the first register is the high register (because the register swap is disabled) and where it is the low register (because the swap in enabled).

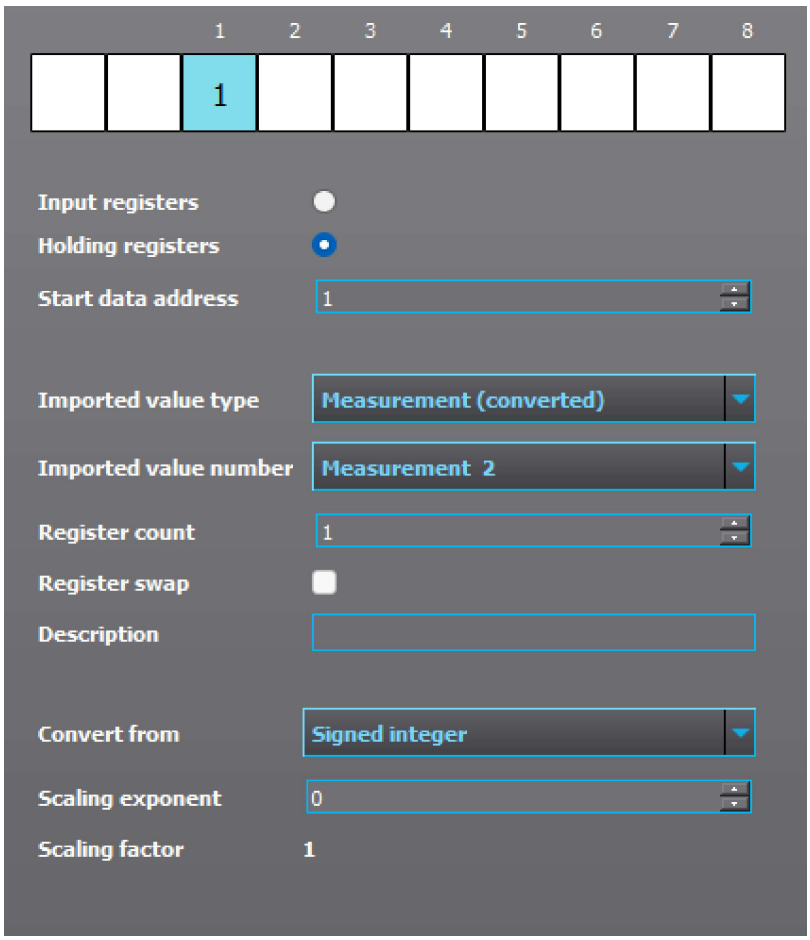
Table. 8.9.8 - 21. Example where the register swap is disabled and the first register is therefore the high register.

Floating point value	2.875
Hexadecimal value	0x4038 0000
1st Modbus register	0x4038
2nd Modbus register	0x0000

Table. 8.9.8 - 22. Example where the register swap is enabled and the first register is therefore the low register.

Floating point value	2.875
Hexadecimal value	0x4038 0000
1st Modbus register	0x0000
2nd Modbus register	0x4038

Figure. 8.9.8 - 184. Configuring a virtual measurement (converted) input.



In addition to the common configuration parameters, the virtual measurement (converted) input type has the following configuration parameters:

Table. 8.9.8 - 23. Additional configuration parameters for the virtual measurement (converted) input type.

Configuration parameter name	Value range	Default	Description
Register count	1 … 4	2	Defines that two (2) registers will be read.
Register swap	(checkbox is empty) (checkbox is ticked)	(checkbox is empty)	Defines whether the register order is swapped or not.
Convert from	Signed integer Unsigned integer	Signed integer	Defines whether the Modbus register is treated as signed or unsigned before converting it to float.
Scaling exponent	–3 … 3	0	Defines the value of the exponent in the scaling factor calculation in the following parameter.
Scaling factor	–1 000 … 1 000	–	Presents the calculated scaling factor based on the selected exponent in the previous parameter: scaling factor = $10^{\text{scaling exponent}}$

NOTICE!
Please note that the *Register swap* parameter configuration is only taken into account when the selected option for the *Register count* parameter is greater than 2 ("3" or "4")!

Table. 8.9.8 - 24. Examples for different register counts.

Register count 2 (for example, 111 – 112)	
Not swap order (high to low)	111 – 112
Swap order (high to low)	112 – 111
Register count 3 (for example, 111 – 113)	
Not swap order (high to low)	111 – 112 – 113
Swap order (high to low)	113 – 112 – 111
Register count 4 (for example, 111 – 114)	
Not swap order (high to low)	111 – 112 – 113 – 114
Swap order (high to low)	112 – 111 – 114 – 113

Configuring the virtual input types "Single bit" and "Double bit"

The configurations for the virtual single bit and the virtual double bit input types are shown in the figures below.

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Figure. 8.9.8 - 185. Configuring a virtual single bit input.

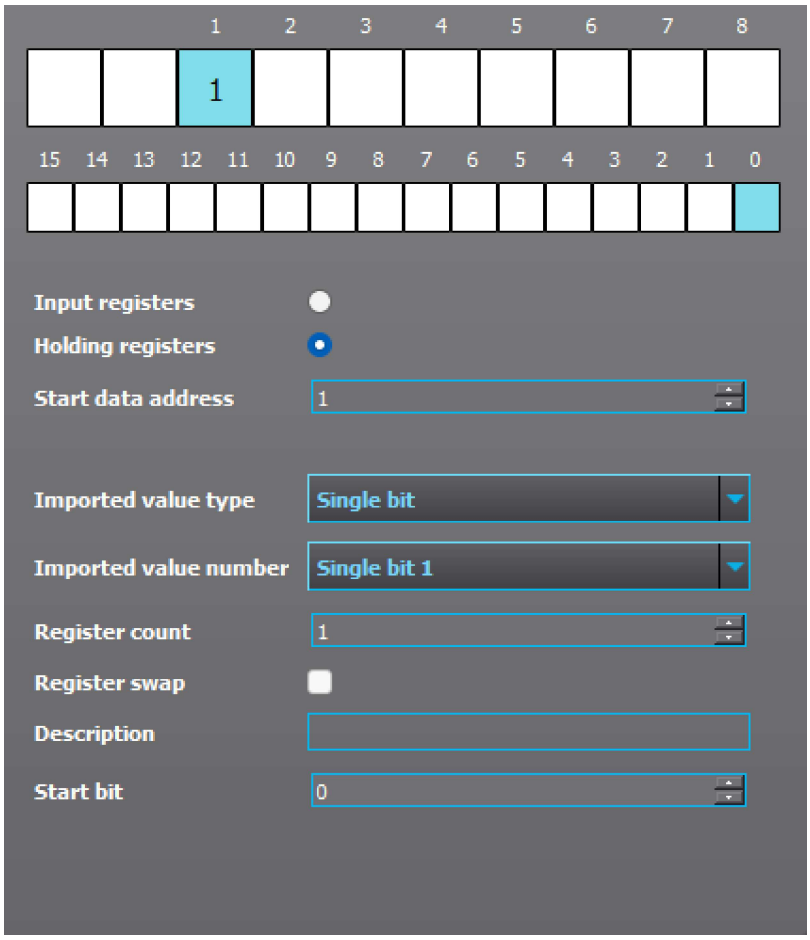
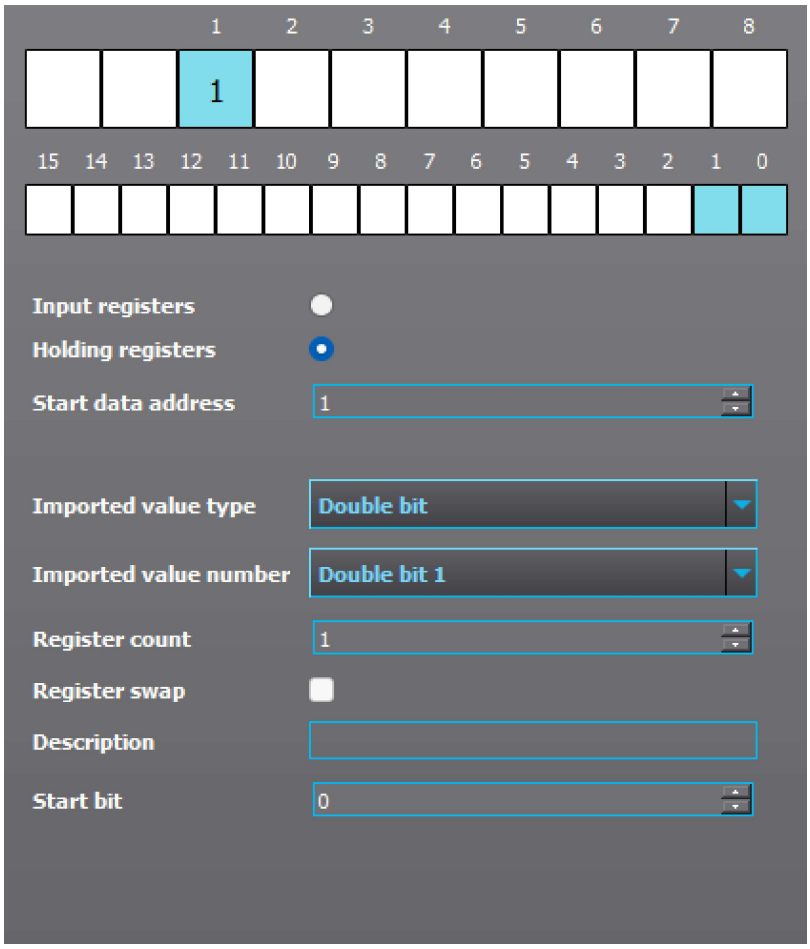


Figure. 8.9.8 - 186. Configuring a virtual double bit input.



In addition to the common configuration parameters, the virtual single bit and double bit input types have the following configuration parameters:

Table. 8.9.8 - 25. Additional configuration parameters for the single bit and double bit input types.

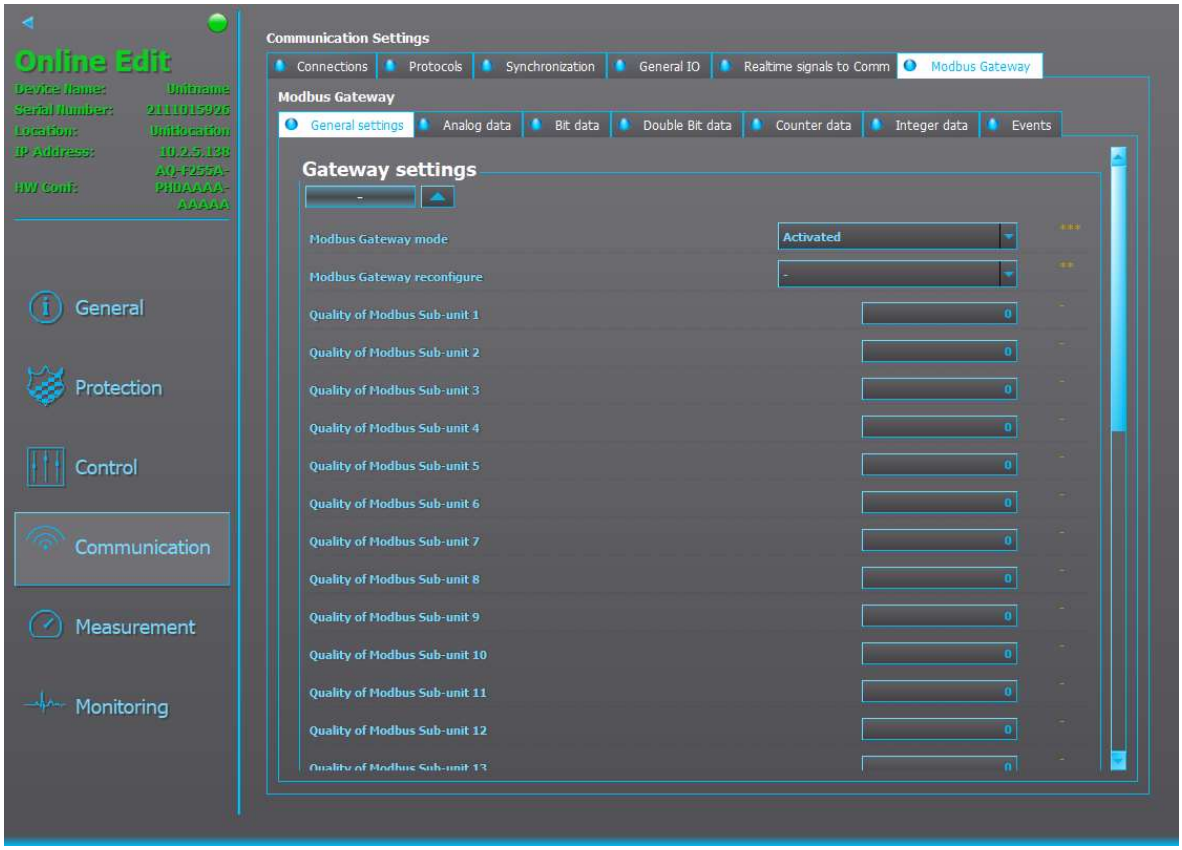
Configuration parameter name	Value range	Default	Description
Register count	1 … 4	2	Defines that two (2) registers will be read.
Register swap	(checkbox is empty) (checkbox is ticked)	(checkbox is empty)	Defines whether the register order is swapped or not.
Start bit	0 … 15 **(Single bit only!)** 0 … 14 **(Double bit only!)**	0 **(both)**	Defines the first bit in the register to be taken into account.

Running Modbus Gateway

After saving the configuration file and sending it to the device, the gateway can be enabled at *Communication → Modbus Gateway → General settings*.

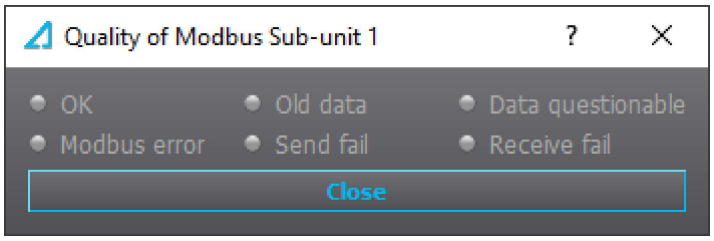
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Figure. 8.9.8 - 187. Enabling the configured gateway.



In the "General settings" tab you can also see the quality of the slaves. Please note that this requires that you are in the Live Edit mode (see the Live Editchapter for details on how to enable this mode). The acquired data can be seen in the corresponding tab divided according to the virtual input types.

Figure. 8.9.8 - 188. Checking the quality of Modbus sub-units.



Getting data from the IEC 61850 protocol

In the IEC 61850 communication protocol the acquired data is stored in six (6) logical nodes that correspond to the six (6) virtual input types.

Table. 8.9.8 - 26. Logical node data categorized according to the virtual input types.

Virtual input type	Logical node prefix	Logical node class	Logical node instance
Virtual counter	GWCNT	GGIO	1
Virtual integer	GWINT	GGIO	1

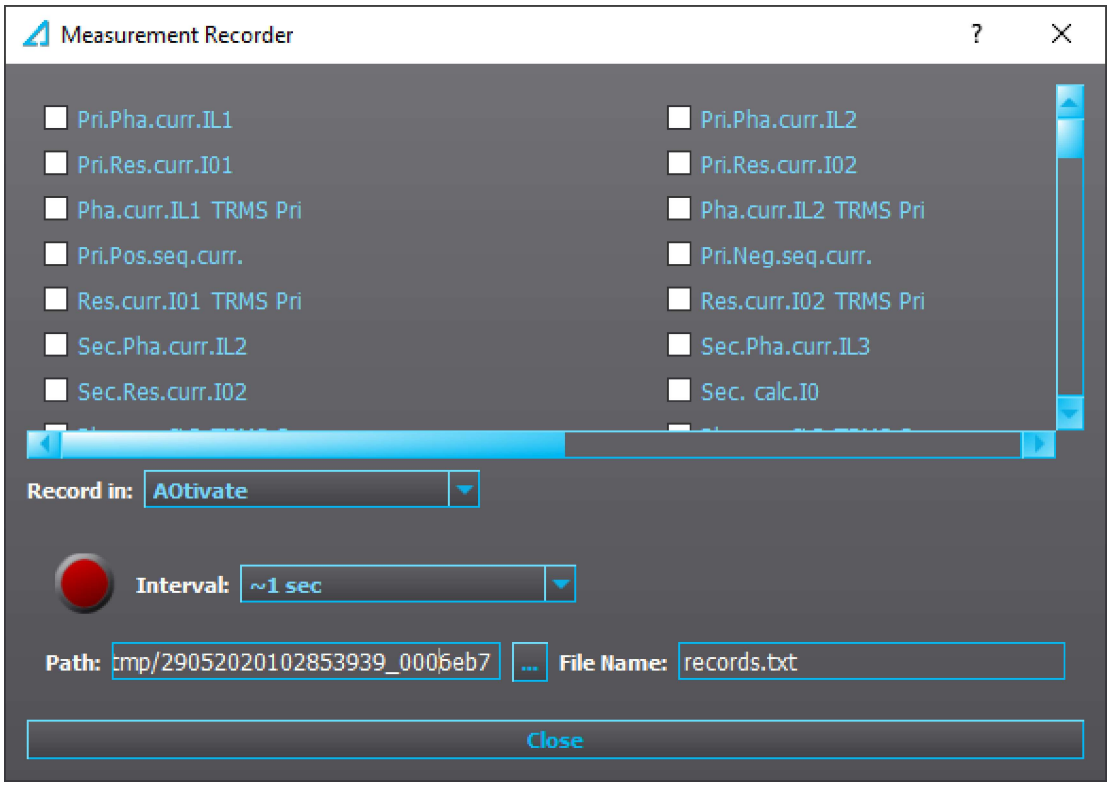
Virtual input type	Logical node prefix	Logical node class	Logical node instance
Virtual measurement	GWMEAS	GGIO	1
Virtual measurement (converted)	GWMEASC	GGIO	1
Virtual single bit	GWBIT	GGIO	1
Virtual double bit	GWDBIT	GGIO	1

8.10 Miscellaneous tools

NOTICE!
This chapter describes various miscellaneous tools that are not used often. These tools are usually designed for a very specific purpose.

8.10.1 Measurement recorder

Figure. 8.10.1 - 189. Measurement recorder window.



Specific measurements can be recorded as a text file by using the *Measurement recorder* tool. In the "Measurement recorder" dialog window, you can select the measurements you want to be recorded by checking their respective check boxes.

NOTICE!
Please note that activating the measurement recorder requires that there is a connection to a device and that the Live Edit mode is enabled (see the Live Edit chapter for more information)

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The recording interval can be changed from the drop-down menu of the "Interval" box (next to the big red circle; if Live Edit mode is not on, the circle is gray).

With the "Record in" selection (located right below the check boxes) you can choose whether the measurements are recorded in AQtivate or in the device itself. If you select "Relay", you only need to set the recording interval (from which AQtivate estimates the maximum recording time) and then start recording by pressing the red "Record" button.

You can change the record file location by editing the "Path" field. You can also change the file name in the "File name" field.

Recording starts when you hit the red "Record" button. You can stop the recording by hitting the blue "Stop" button.

CAUTION!
Closing the "Measurement recorder" dialog window does not stop the recording!

8.10.2 Clear matrix

The *Clear matrix* tool does what the name suggests: it clears the matrix portion of a logic file.

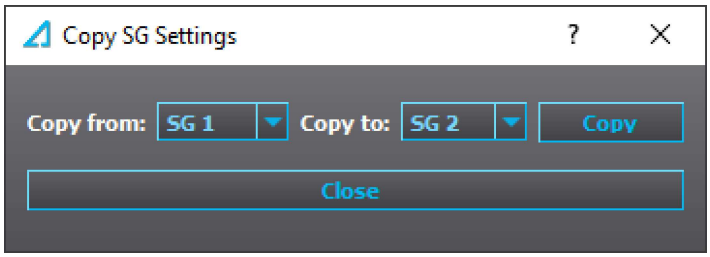
NOTICE!
Please note that this process affects the connections made to the device I/O matrix (*Control → Device I/O → Device I/O matrix*). After clearing the matrix you must load the logic at the main toolbar (*Commands → Write to relay*) for the changes to take effect.

8.10.3 Copy SG settings

You can copy the setting group (SG) settings from one setting group to another with the *Copy SG settings* tool. This is useful if the settings are very similar between two or more setting groups you are using.

As you can see in the figure below of the tool's dialog window, you only need to select which SG you are copying from and then select which SG you want to copy them to.

Figure. 8.10.3 - 190. Dialog window for the *Copy SG Settings* tool.



8.10.4 Aqs generator

With the *Aqs generator* tool you can generate .aqs files without having a device to download configuration files from. You only need a firmware package to generate a configuration file. When generating a file you have to choose the firmware package, the destination for the file (includes the name for the .aqs package).

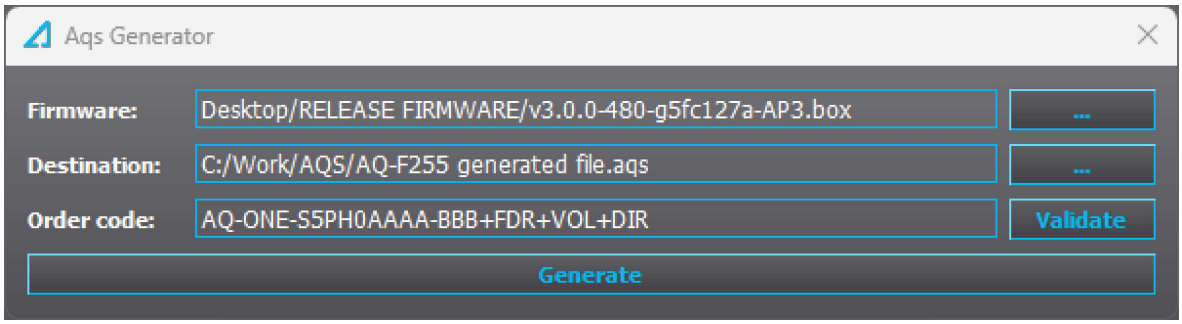
Generating AQ 250 series and AQ-ONE AQS files

To generate an AQS file for an AQ 250 series or AQ-ONE device, first select the firmware file. If you do not already have a firmware file, it can be downloaded from the Arcteq Documents and Software page.

Next, select the destination folder and specify a name for the AQS file to be generated. Then enter the device order code. If you do not yet have an order code, one can be generated using the Arcteq Product Configurator.

After entering the order code, click Validate. If the order code is valid, the Generate button becomes available and can be used to generate the AQS file.

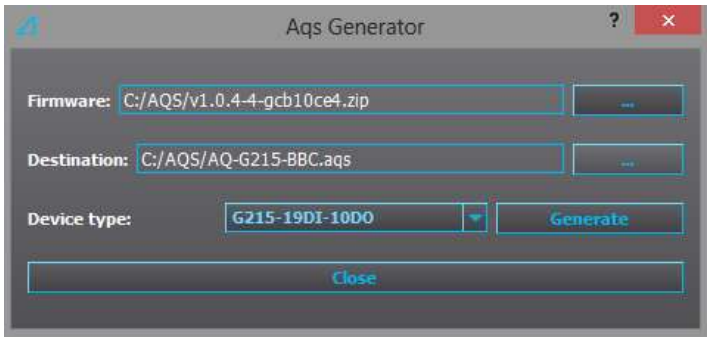
Figure. 8.10.4 - 191. Example of generating an .aqs file.



Generating AQ 210 series AQS files

See the figure below for an example of generating an .aqs file for an AQ-G215 device.

Figure. 8.10.4 - 192. Example of generating an .aqs file.



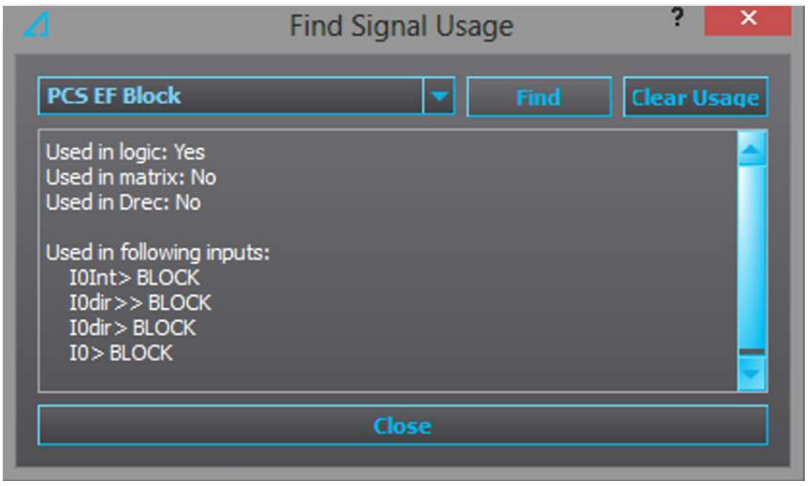
A configuration file generated for AQ 210 series device is otherwise similar to a file downloaded from a device, except it does not have a serial number nor does it display its hardware and software configurations in the *General* menu. You can upload the generated configuration to any device with the same hardware configuration. Please note that AQtivate may warn about missing mimics, logic and disturbance recorder if these are not in the configuration.

NOTICE!
When selecting the device type, you can only choose a hardware configuration with digital inputs ("DI") , digital outputs ("DO"), and/or an arc protection card. Other types of option cards are not supported by the Aqs generator!

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8.10.5 Find signal usage

Figure. 8.10.5 - 193. Example of finding signal connections.



With the help of the *Find signal usage* tool you can see where a signal has been connected to in the configuration.

In the example figure above, the programmable control switch "PCS EF Block" has been chosen. When the "Find" button is clicked, AQtivate displays a list of places where the chosen signal has been used. In this case this PCS button can block four earth fault functions: "I0int> BLOCK", "I0dir>> BLOCK", "I0dir> BLOCK", and "I0> BLOCK". Additionally, AQtivate displays whether or not the signal has been used in logic ("Used in logic:"), matrix ("Used in matrix:"), and the disturbance recorder ("Used in Drec:").

Pressing the "Clear usage" button erases all of the listed connections. Please note that the new logic must be written into the device to use any changes made to the listed connections!

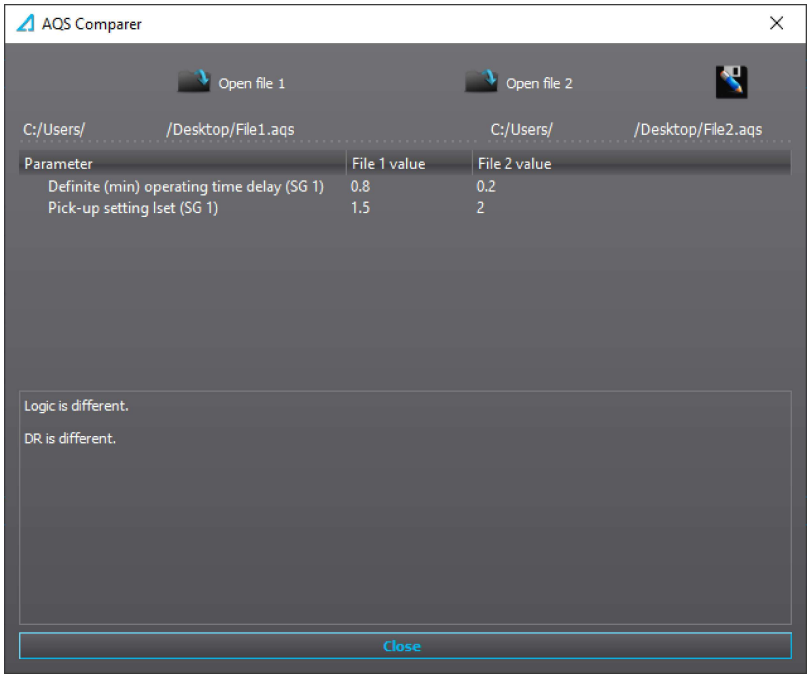
CAUTION!
When you clear a signal that has been used in a logic, you are advised to check that the logic is still intact!

8.10.6 Compare files

You can compare .aqs files with the *Compare files* tool.

At the top of the tool's dialog window, select one .aqs file with the "Open file 1" button and another with the "Open file 2" button. AQtivate will then check the two files for differences. The basic value differences are shown in the top half of the list, while the latter half shows if there are any differences in the logic, mimic or disturbance recorder files.

Figure. 8.10.6 - 194. Comparing .aqs files.



8.10.7 Rear panel

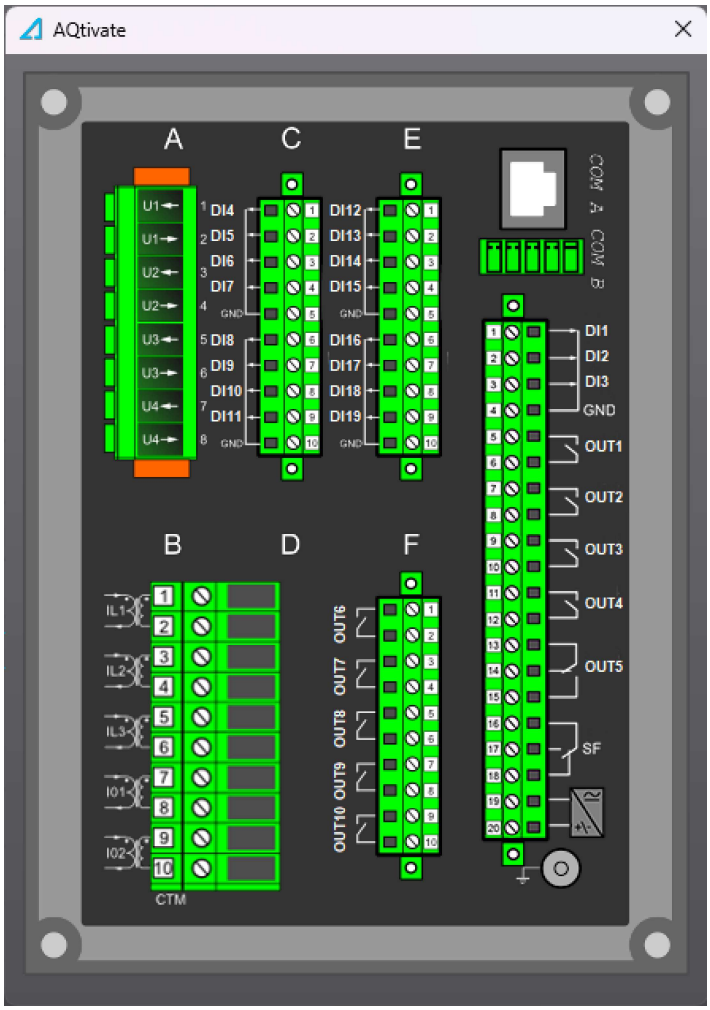
The *Rear Panel* tool opens a dialog window that displays the layout of the device's back panel. The specific image shown depends on the .aqs file that is open at the time the tool is launched.

The example below illustrates the dialog window for an .aqs file configured for an *AQ-x215* device. In this case, the device includes three additional option cards (2 × DI8 and 1 × DO5), along with the default cards: *CPU, voltage measurement*, and *current measurement.*

In addition to showing the installed card types, the view also indicates the correct terminal types—whether standard, ring-lug, or spring cage—used in the device.

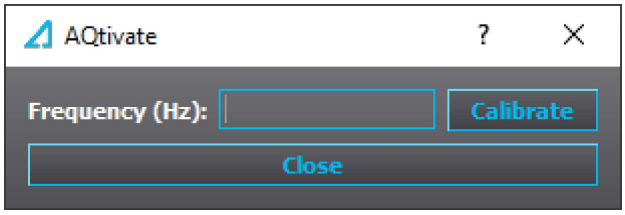
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Figure. 8.10.7 - 195. Example of the *Rear panel* tool for an AQ-x215 device.



8.10.8 Calibrations

Figure. 8.10.8 - 196. Dialog window for the *Calibrations* tool.



The *Calibrations* tool is used to calibrate the accuracy of the frequency measurement manually.

WARNING!
Please note that all AQ 200 and AQ-ONE devices are always delivered with the frequency measurements calibrated! Any calibration of the frequency measurement should only be done by a qualified person who has been instructed how to do this!

8.10.9 GC-30 configurator

The *GC-30 configurator* tool is used in Generator and Motor Commander applications to read values from and to write values to the excitation unit, GC-30.

While all values listed in the tool's dialog window can be read, only eight (8) of them can also be written to the unit (see the table below).

Table. 8.10.9 - 27. Values in the GC-30 Configurator tool.

Value name	Can be read	Can be written
Calibrated MA input in mA	X	
Calibrated V input	X	
Calibrated DC C	X	
Calibrated DC V	X	
Calibrated 24 V	X	
Calibrated device temperature in Celsius	X	
Calibrated SKIIP temperature in Celsius	X	
PMW rate	X	X
DCC_ADD scaling component	X	X
DCV_ADD scaling component	X	X
DCV_DIV scaling component	X	X
GOOSE application ID	X	X
GOOSE conf rev	X	X
GOOSE publ. VLAN_PRIO	X	X
GOOSE publ. VLAN_ID	X	X
Mac hi	X	
Mac lo	X	
Firmware hash	X	

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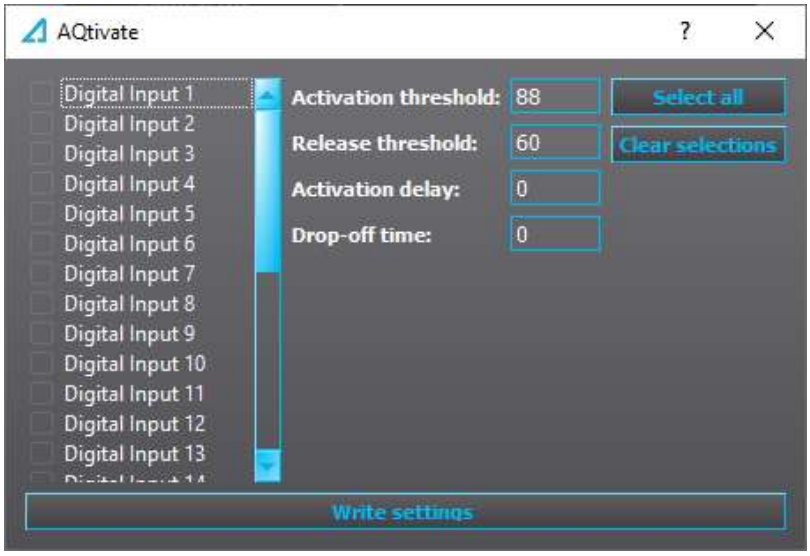
Figure. 8.10.9 - 197. Dialog window for the *GC-30 configurator* tool.



8.10.10 DI configurator

With the *DI configurator* tool you can adjust the input activation, as well as release thresholds and delay times for activation and release. You can adjust multiple or all inputs at once, which lets you avoid typing the same setting to each input individually.

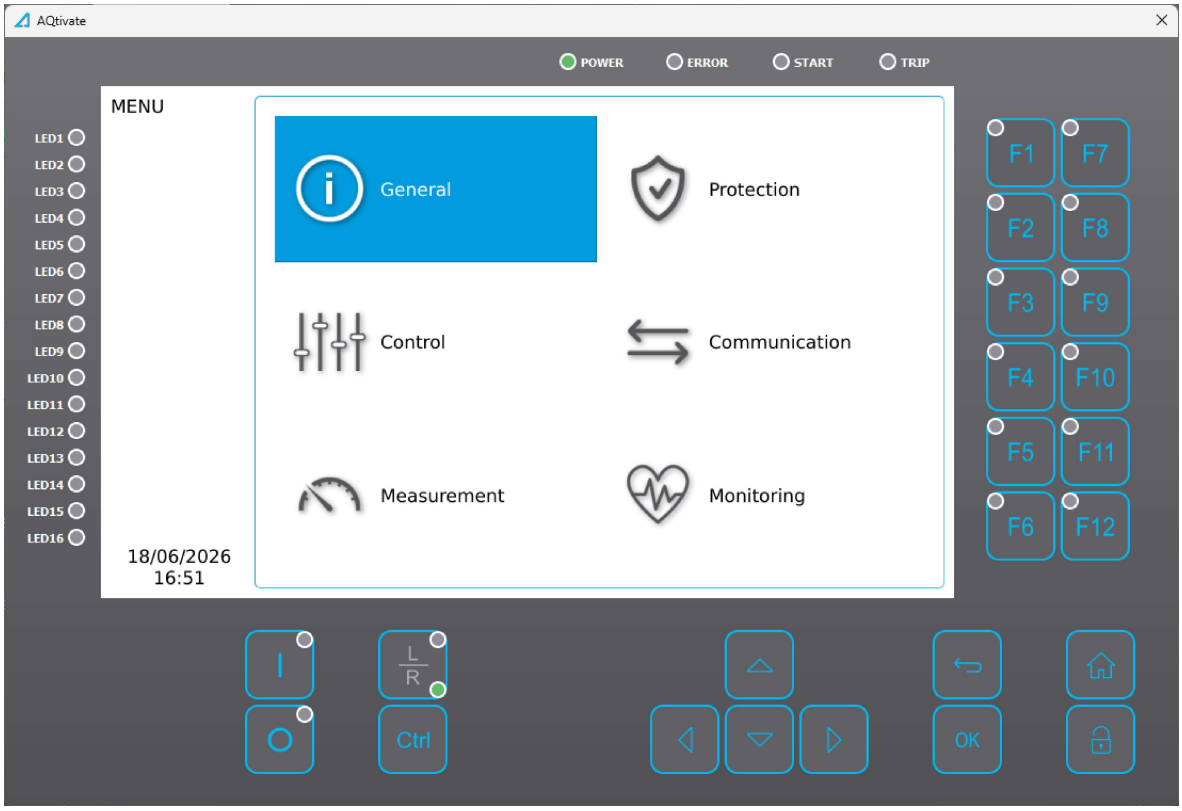
Figure. 8.10.10 - 198. Dialog window for the *DI configurator* tool.



8.10.11 HMI view

When connected to an AQ 250 series device or an AQ-ONE device, the HMI View tool can be used to view the device display and the current status of the device LEDs. If the "Enable HMI View Buttons" parameter is enabled in the device settings (*Communication → Connections*), all physical push buttons on the device can be operated remotely through this view, with the exception of the Local/Remote (L/R) button.

Figure. 8.10.11 - 199. HMI view.



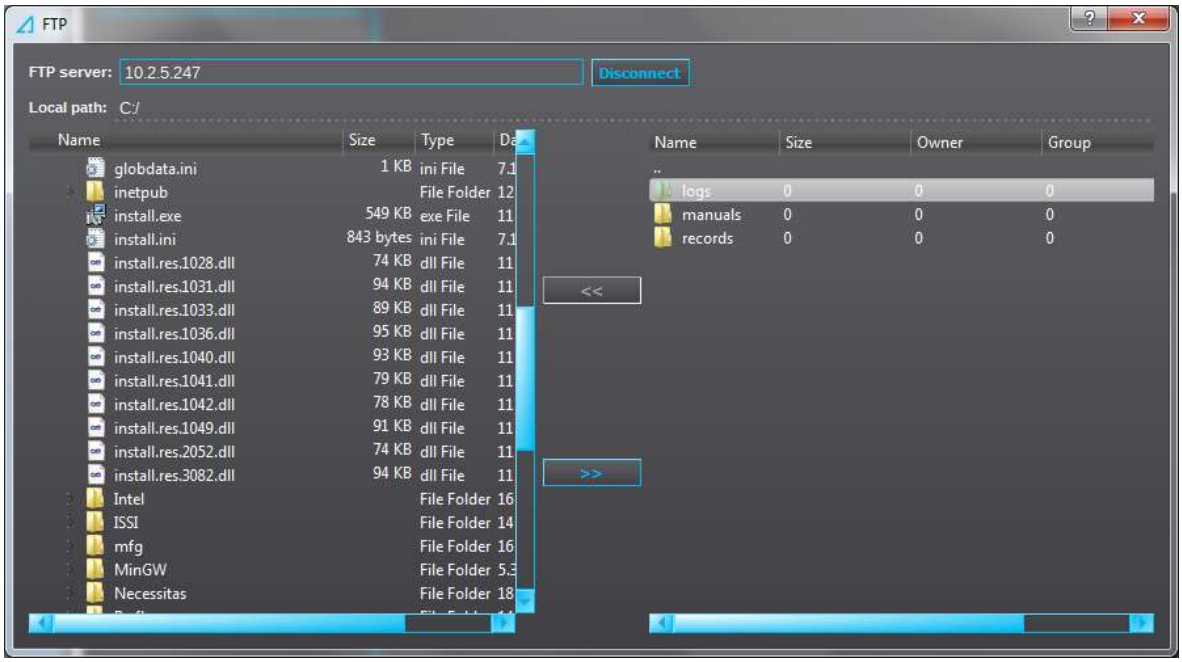
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8.11 FTP

You can open the FTP client from the *Tools* menu (*Tools* → "FTP") located in AQtivate's main toolbar. You can also open this dialog window by pressing the shortcut key F2.

The dialog window contains two views. The one on the left lists the local directories, while the one on the right lists server directories. You can connect to the device's FTP server by typing in the device's IP address in the "FTP server" field and then clicking the "Connect" button (see the figure below).

Figure. 8.11 - 200. Dialog window for the *FTP* tool.



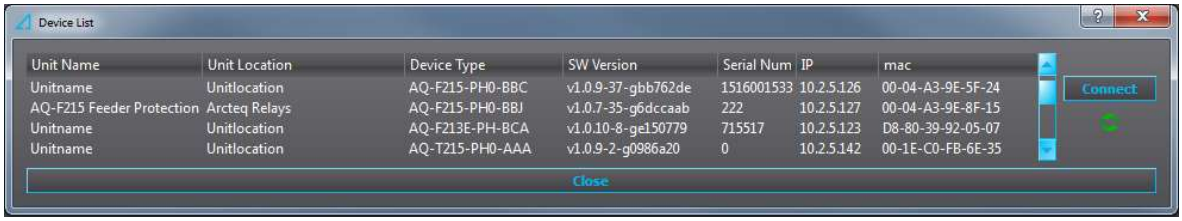
You can upload files to the server by selecting a file from one of the local directories and then pressing the ">>" button. To download a file, select a file from one of the server directories and then press the "<<" button. The file is then downloaded to the current selected local directory, which can be seen in the "Local path" field.

8.12 Device list

You can open the ***Device list*** tool from the *Tools* menu (*Tools* → "Device List") located in AQtivate's main toolbar. You can also open this dialog window by pressing the shortcut key F11.

The tool's dialog window lists all the available devices connected to the same network as your computer. You can connect to the selected device by double-clicking it on the list, or by selecting the device from the list and then clicking the "Connect" button. If new devices were connected to the network while viewing the device list, press the "Refresh" button (the green arrows icon) to make the new devices appear on the list.

Figure. 8.12 - 201. Dialog window for the *Device list* tool.



NOTICE!
Some switches and firewalls may prevent AQtivate from getting this list.

NOTICE!
Establishing a connection closes the dialog window.

NOTICE!
The device list is not able to list the available devices, if more than one instance of AQtivate is open at the same time.

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9 Exporting and importing settings in a .txt file

You can export all parameters as well as the matrix and logic settings into a single .txt file. It can then be edited in Excel or other spreadsheet software and imported back into an .aqs file. You can do this with "Export settings" and "Import settings" that can be found under the *File* menu in AQtivate's main toolbar.

The table below presents an example snippet of an exported setting file parameters with I> (overcurrent protection) settings. The values in the "Values" column are editable!

Table. 9 - 28. Example snippet of exported I> settings.

#Id	Name	Value	Unit	Min	Max	Step	Description
24029	NOC1_DT_SET_1	1.160 000	s	0.000	1800.000	0.005	Definite (min) operating time delay
24030	NOC1_DT_SET_2	1.160 000	s	0.000	1800.000	0.005	Definite (min) operating time delay
24031	NOC1_DT_SET_3	1.160000	s	0.000	1800.000	0.005	Definite (min) operating time delay
24032	NOC1_DT_SET_4	0.040000	s	0.000	1800.000	0.005	Definite (min) operating time delay
24033	NOC1_DT_SET_5	0.040000	s	0.000	1800.000	0.005	Definite (min) operating time delay
24034	NOC1_DT_SET_6	0.040000	s	0.000	1800.000	0.005	Definite (min) operating time delay
24035	NOC1_DT_SET_7	0.040000	s	0.000	1800.000	0.005	Definite (min) operating time delay
24036	NOC1_DT_SET_8	0.040000	s	0.000	1800.000	0.005	Definite (min) operating time delay
24037	NOC1_DT_SET_P	0.040000	s	0.000	1800.000	0.005	Definite (min) operating time delay
24038	NOC1_EVENTMASKHI	0		0	4,29E+09	1	EventMaskHi
24039	NOC1_EVENTMASKLO	262095		0	4,29E+09	1	EventMaskLo
24041	NOC1_HARMBLK_1	0		0	1	1	Inrush Harmonic Blocking (Internal Only Trip)
24042	NOC1_HARMBLK_2	0		0	1	1	Inrush Harmonic Blocking (Internal Only Trip)
24043	NOC1_HARMBLK_3	0		0	1	1	Inrush Harmonic Blocking (Internal Only Trip)
24044	NOC1_HARMBLK_4	0		0	1	1	Inrush Harmonic Blocking (Internal Only Trip)
24045	NOC1_HARMBLK_5	0		0	1	1	Inrush Harmonic Blocking (Internal Only Trip)

24046	NOC1_HARMBLK_6	0		0	1	1	Inrush Harmonic Blocking (Internal Only Trip)
24047	NOC1_HARMBLK_7	0		0	1	1	Inrush Harmonic Blocking (Internal Only Trip)
24048	NOC1_HARMBLK_8	0		0	1	1	Inrush Harmonic Blocking (Internal Only Trip)

The table below presents an example snippet of an exported setting file parameters with matrix, logic, and block connections.

Table. 9 - 29. Example snippet of exported settings for matrix, logic and block connections.

#Logic		
#Output	Type	Input1
#Matrix script:		
RELE_T1	CONNECT	OBJ1_OPENSIGNAL
RELE_T2	CONNECT	OBJ1_CLOSESIGNAL
RELE_T1	CONNECT	NOC1_TRIP
RELE_T1	CONNECT	NOC2_TRIP
RELE_T9	CONNECT	CBF1_CBFPACT
RELE_T8	CONNECT	CBF1_CBFPACT
RELE_T10	CONNECT	OV1_TRIP
LED_START	CONNECT	OV1_START
LED_TRIP	LATCH	OV1_TRIP
LED_TRIP	LATCH	CBF1_CBFPACT
LED_TRIP	LATCH	NOC1_TRIP

The table below presents an example snippet of an exported setting file parameters with logic details.

Table. 9 - 30. Example snippet of exported settings for logic details.

#Logic details	
#Gate pos x	Gate pos y
0	190
0	490
50	340
100	410
100	510

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110	660
110	730
140	40
140	130
150	210
230	350
240	710

10 Print menu

Figure. 10 - 202. Options in the Print menu.



You can print out .aqs configurations as PDF files with the *Print* menu.

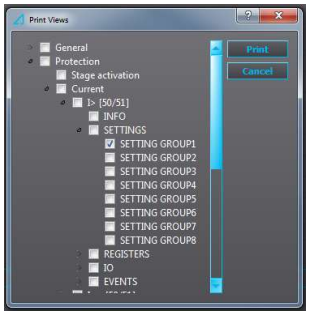
"Print active view" (or use the shortcut Ctrl + P) prints out the view that is currently open as a PDF. However, if you need more than one view of the .aqs file, you can click "Select views to print" (or use the shortcut Ctrl + Alt + P) and pick which views you want printed out. Please note that the first selection only shows the main menus. If you need to print everything under a main menu, check its box (see the figure below) and click "Print".

Figure. 10 - 203. Dialog window for the "Select views to print".



If you do not need entire menus but rather one or more specific subsections within the menus, you can expand them by clicking the gray arrow next to the check boxes. The figure below presents an example where the user wants to print only the setting view of the I> (overcurrent) function's first stage.

Figure. 10 - 204. Example print for I>.



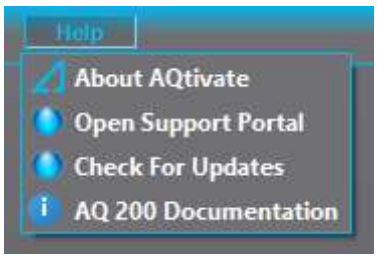
The figure below shows what that the previous example of the I> function's first stage print looks like in its PDF form.

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Figure. 10 - 205. Example PDF print for I>.

SETTINGS: Overcurrent I>	SETTING GROUP1
Pick-up setting Iset	1 xIn
Delay type	DT
Definite operating time delay	0.26 s
Delayed Pick-up release	Yes
Release Time delay	0.06 s
Op.Time calc reset after release time	Yes
Continue time calculation during release time	No

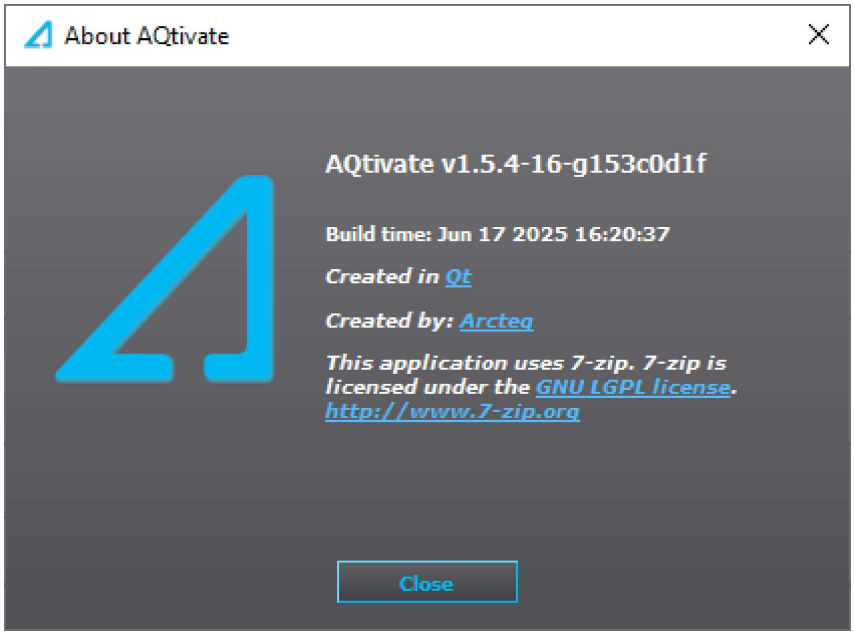
11 Help menu



Help menu has the following options available:

- About AQtivate: Lists software version and the build time of the version (see image below).
- Open Support Portal: Direct link to the support portal (https://www.arcteq.com/support/)
- Check for Updates: Checks if the currently installed version is the newest.
- AQ 200 Documentation: Direct link to the AQ 200 series documentation (https://www.arcteq.com/documents-and-software/#aq-200-series)

Figure. 11 - 206. About AQtivate window.



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12 Updating firmware

The process of updating the firmware begins by checking that you have the firmware file available to continue with the update. The firmware file is always labelled in a specific style and looks something like this: v1.0.1-97-g14e806f. AQ 210 frame devices use .zip files and AQ 250 devices and AQ-ONE devices use .box files.

CAUTION!
Please note that while the AQ 210 frame firmware file appears to be a .zip file, DO NOT UNZIP it before updating, as the AQtivate setting and configuration tool does this automatically when it is required!

Connecting to a device

Next, connect to the device. See "Connecting to device with AQtivate" chapter for more information.

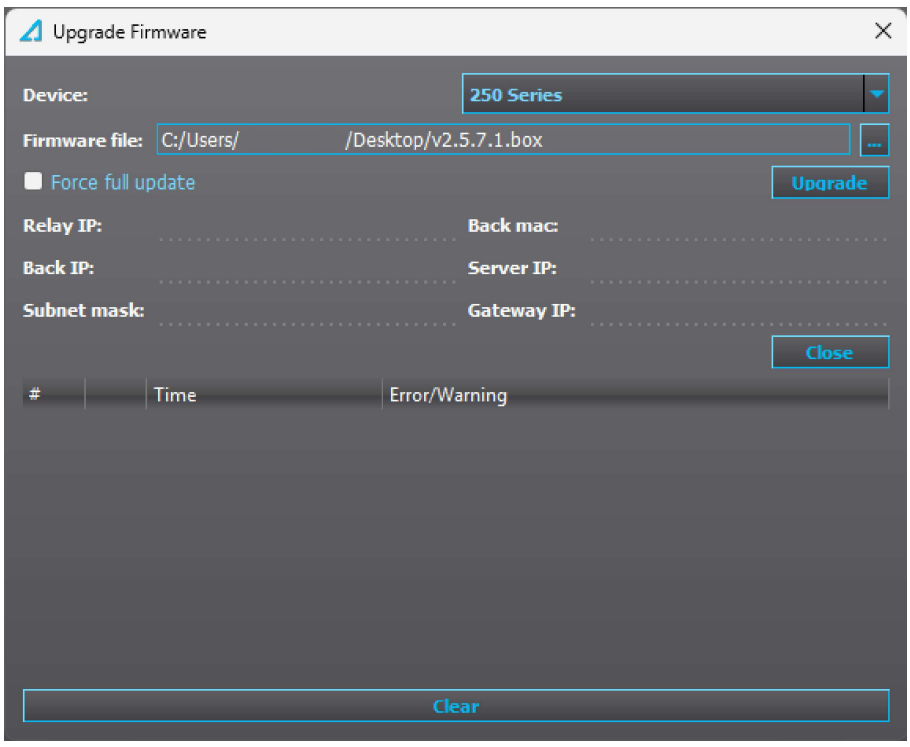
AQ 210 frame devices can only be updated from the device's back Ethernet port. AQ 250 devices and AQ-ONE devices can be updated from both the front Ethernet port and the back Ethernet port.

Updating the firmware

Next, select "Upgrade firmware" from the *Tools* menu. This opens an update window (see the figure below).

NOTICE!
You can only update the firmware when when you have no .aqs configuration file open! If an .aqs file is open, you can close it at *File → Close.*

Figure. 12 - 207. Dialog window for firmware update.



Add the new firmware package into the "Firmware file" field by locating it with the "..." button at the top right. Select the firmware file and click "Open". Once you click the "Upgrade" button, AQtivate begins to update the firmware. You can follow its progress in the pop-up window's loading bar (see the figure below).

"Force full update" option forces a complete system update, even if a faster incremental system update is available. Only available for AQ 250 devices and AQ-ONE devices.

Figure. 12 - 208. Pop-up window to follow the progress of the firmware update process.



While AQtivate and the device work on the firmware update, the device will reboot several times and show a black and/or distorted display; this is normal. At some point AQtivate will also inform you that the connection was closed; this is also normal. During the firmware update the window's info tags are filled with the information from the device being updated (see the figure below). When upgrading AQ 250 devices and AQ-ONE devices, a pop-up window will appear informing that the device has accepted the update. You can choose to wait for the process to complete or close the window.

Figure. 12 - 209. Pop-up window informing that the device has accepted the update (AQ 250 devices and AQ-ONE only).

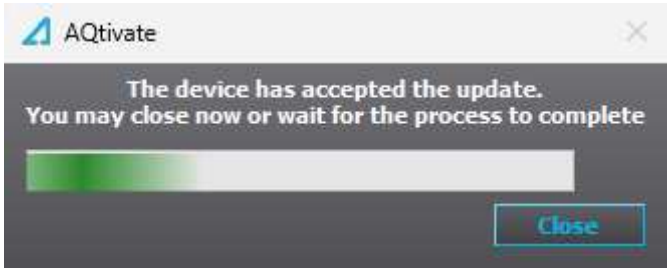
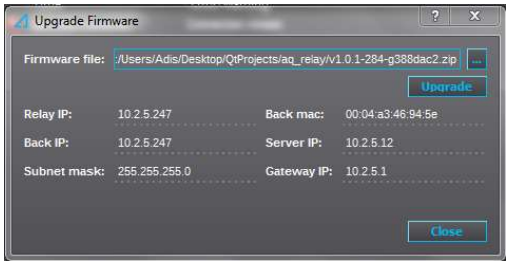


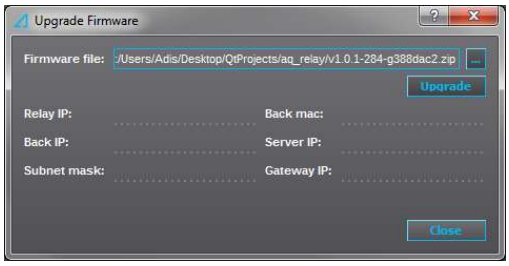
Figure. 12 - 210. Information tags during the firmware upgrade process.



When the update process is finished, the window's tags go blank once again (see the figure below).

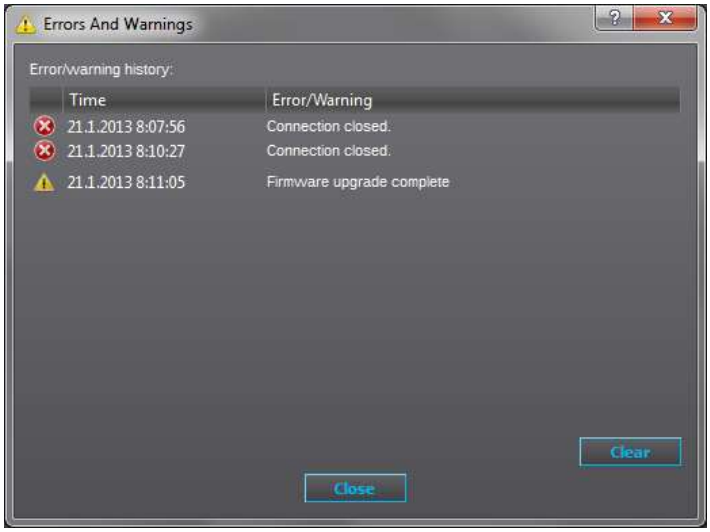
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Figure. 12 - 211. Upgrade process finished.



The "Errors and Warnings" window shows when the firmware update is complete ("Firmware upgrade complete") (see the figure below).

Figure. 12 - 212. Errors and warnings window.



After the update is finished, the device's display should be back to looking normal.

CAUTION!
The last reboot of the device may take longer than what AQtivate estimates, so please be patient and give the device approximately one (1) minute to restart!

Troubleshooting the update process

Sometimes the firmware update does not succeed. When this happens, you get a "Firmware upgrade failed" message instead of the normal "Firmware upgrade complete" message. The most common cause for update failures is that an anti-virus or a firewall software interferes with the update process. In order to avoid this, we recommend disabling any anti-virus and firewall softwares for the duration of the update process. VPN softwares can also cause trouble with the firmware update, so we recommend disabling them as well.

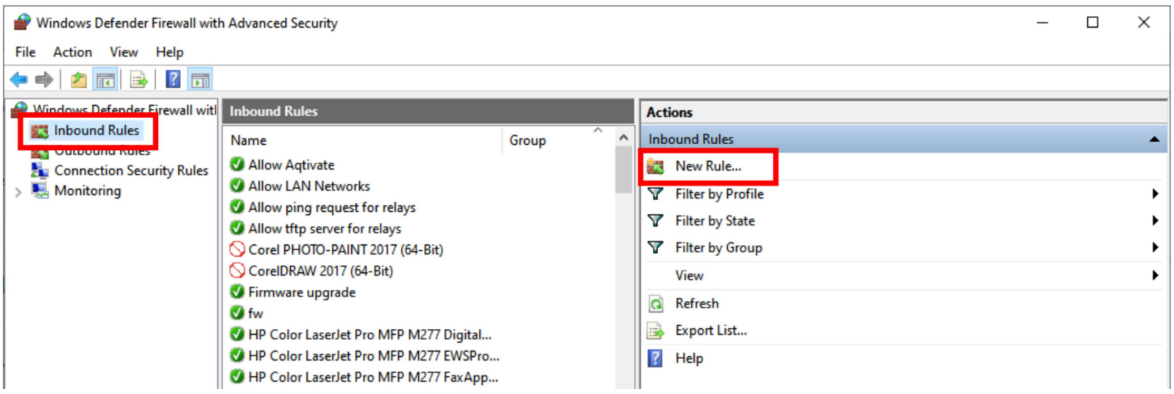
12.1 Troubleshooting firmware upgrade

Under some conditions the firmware is not able to get through. Most of the time the issue is firewall or anti-virus related. The following chapters describe some methods to get through these issues.

12.2 How to allow inbound ping

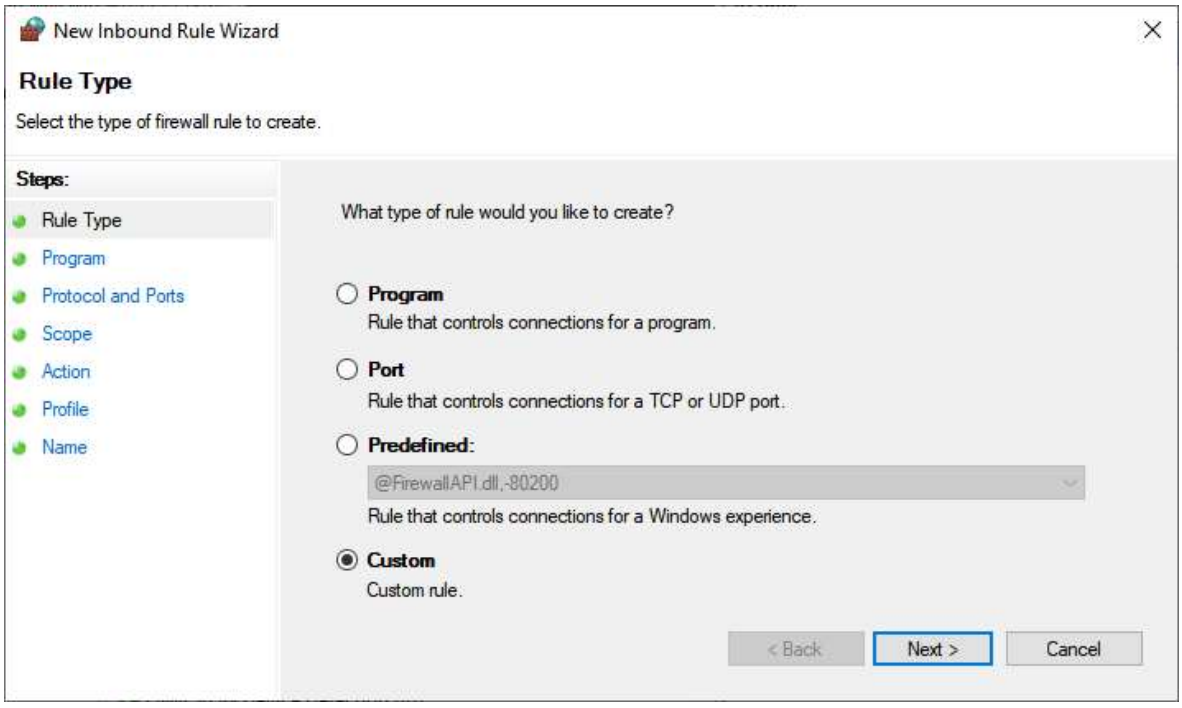
The first step is to search for the "Windows Firewall with Advanced Security" with Windows Search. Begin adding a new rule: select "New Rule..." in the "Actions" pane (see the figure below). This opens the "New Inbound Rule Wizard" dialog window.

Figure. 12.2 - 213. Adding a new rule.



In the second step you need to define the new rule as a custom rule. Select the "Custom" option and press **Next** (see the figure below).

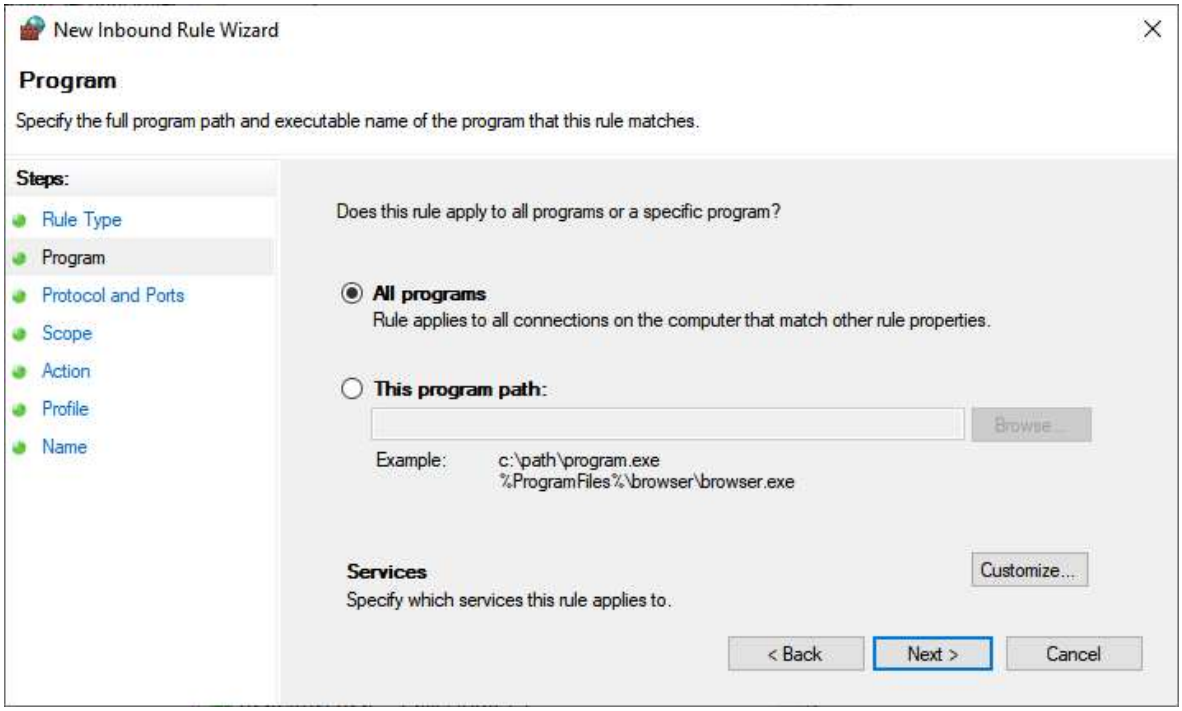
Figure. 12.2 - 214. Defining the new rule as a custom rule.



In the third step you need to make sure that your new rule applies to all connections you make with your PC as long as they match other rule properties. Select the "All programs" option and press **Next** (see the figure below).

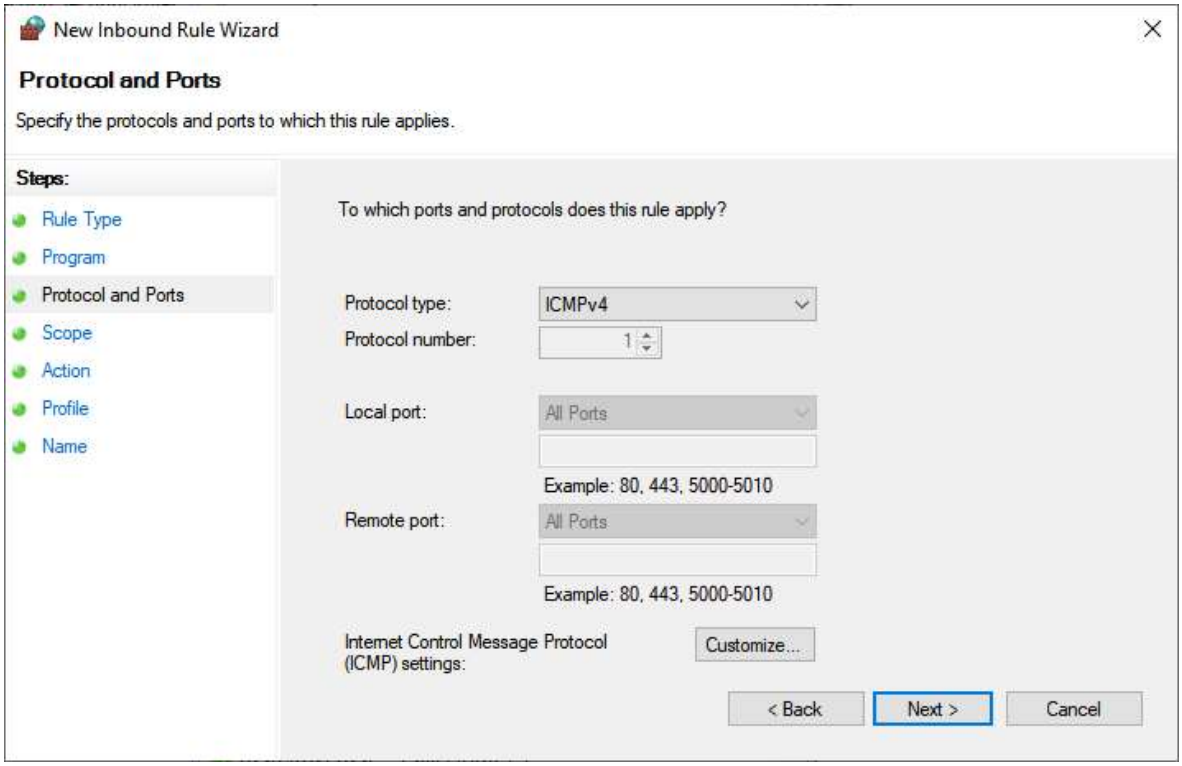
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Figure. 12.2 - 215. Applying the new rule to all connections.



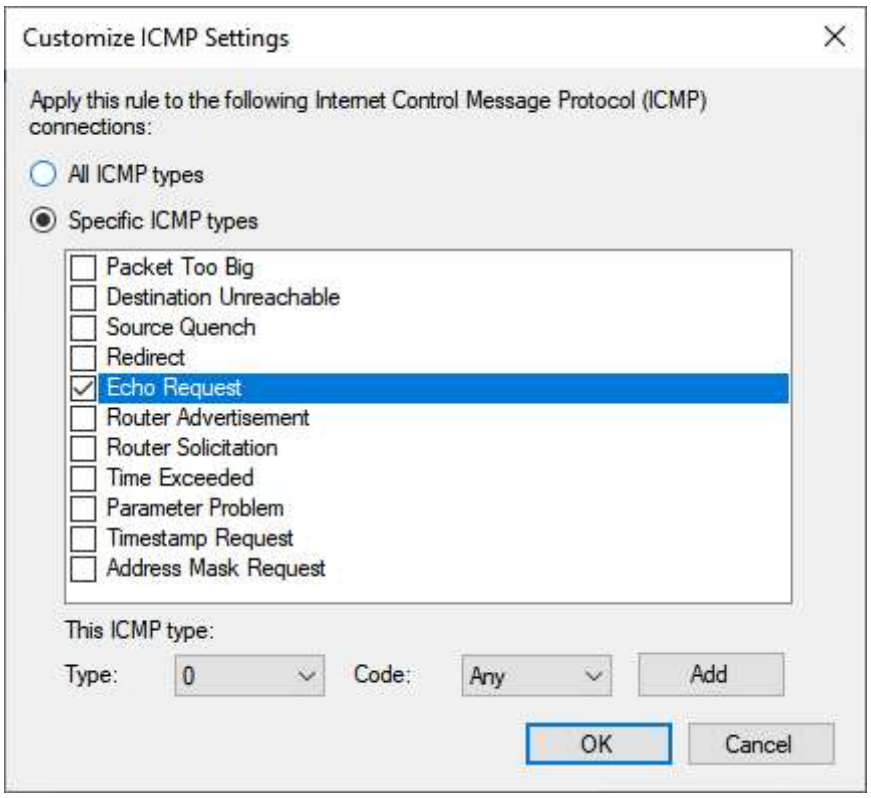
The fourth step is to specify the protocols and ports to which your new rule applies. Select the "ICMPv4" option from the "Protocol type" drop-down list and then press the Customize button (see the figure below).

Figure. 12.2 - 216. Specifying the protocols and ports.



In the fifth step you face the "Customize ICMP Settings" window where you define the ICMP (Internet Control Message Protocol) types to which your new rule will apply. Select the "Specific ICMP types" option and then make sure that the "Echo Request" checkbox is ticked. Press **OK** (see the figure below), and upon returning to the "New Inbound Rule Wizard" window (see the previous figure) click **Next**.

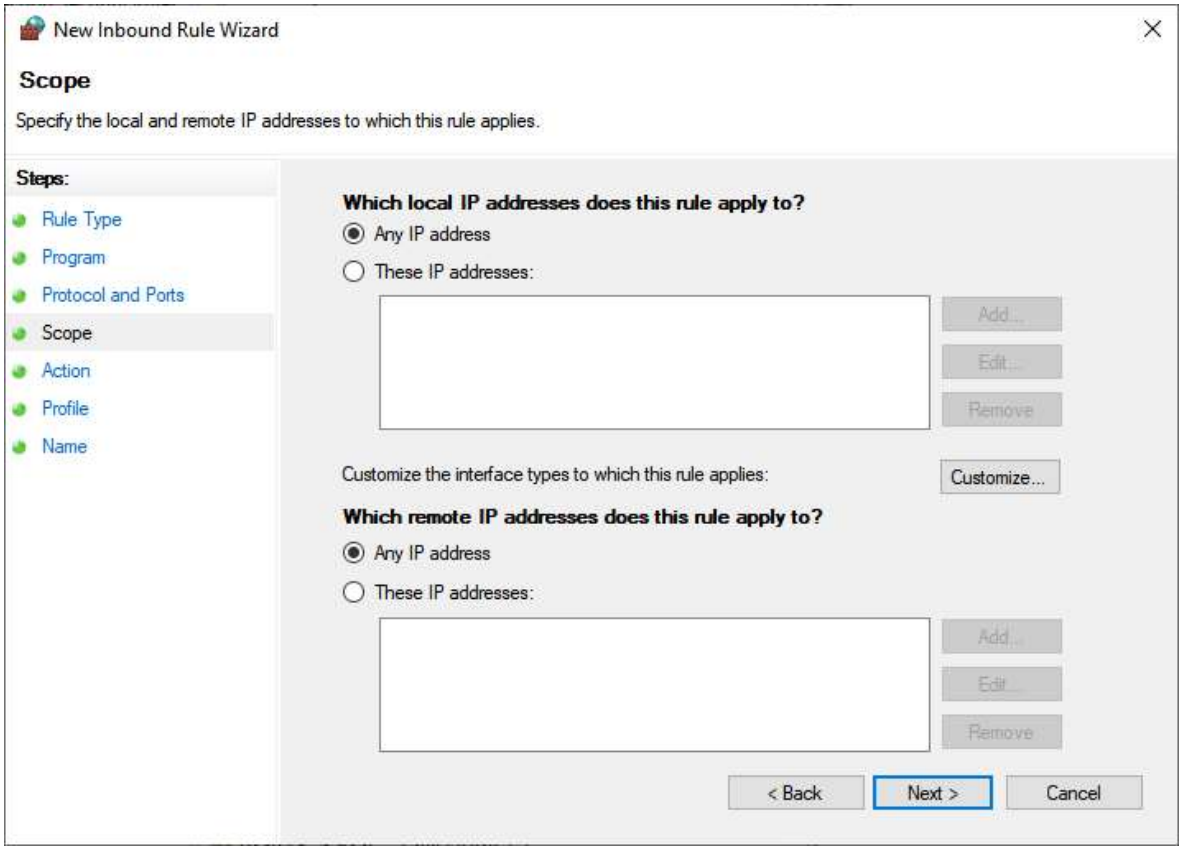
Figure. 12.2 - 217. Customizing the rule's ICMP settings.



In the sixth step you need to specify the local and remote IP addresses to which the rule applies. Select either of the two options in the "Which local IP addresses does this rule Apply to?" and "Which Remote IP addresses does this rule Apply to?" sections. If you select the "These IP addresses" option, you will need to specify the IP addresses you want to allow. Once all the necessary settings are done, press the **Next** button (see the figure below).

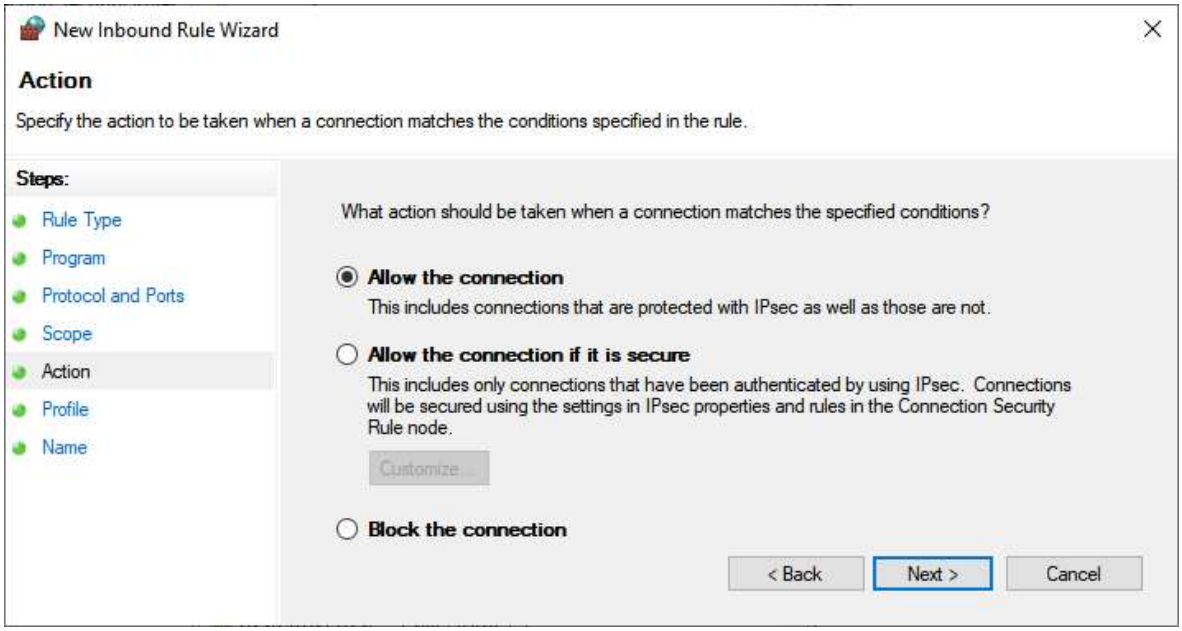
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Figure. 12.2 - 218. Specifying the IP addresses.



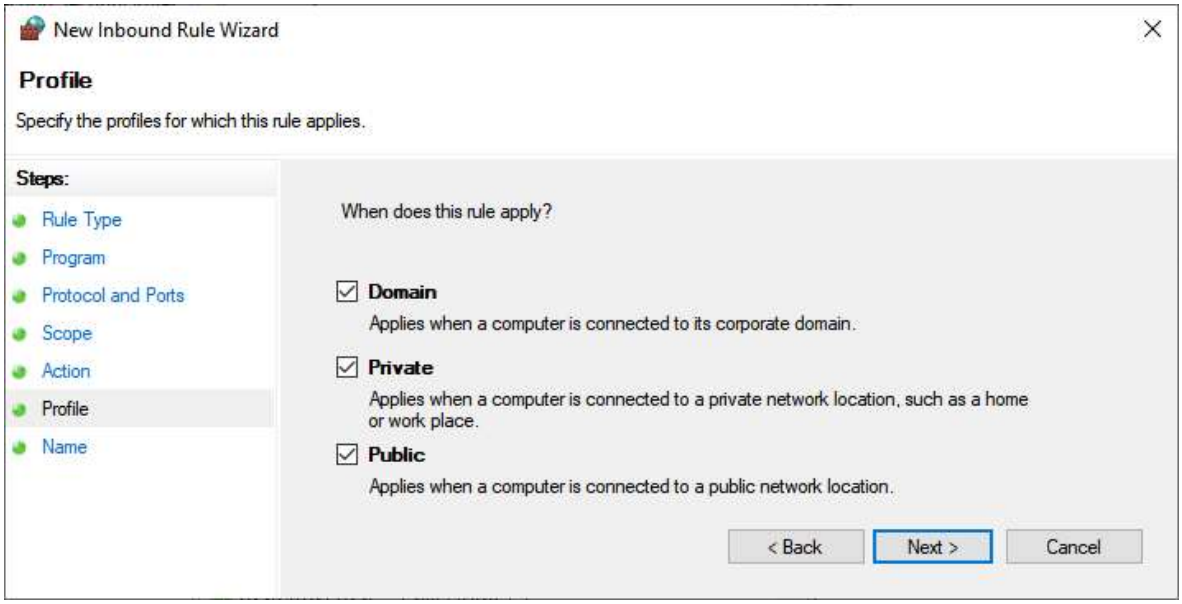
The seventh step in this process is to specify the action that will be taken when a connection matches the conditions you have specified for your new rule. Select the "Allow the Connection" option so that the rule includes all connections regardless of whether they are protected with IPsec or not. Finish the step by pressing Next (see the figure below).

Figure. 12.2 - 219. Specifying actions.



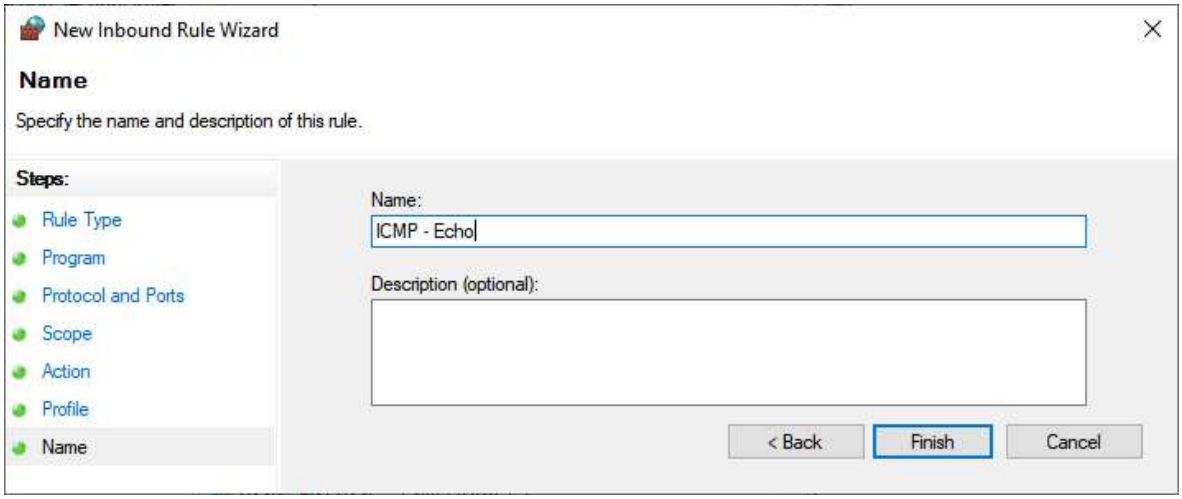
In the eighth step you need to specify the profiles for which your new rule applies to. Select one or more profile names ("Domain", "Private", and/or "Public") to which you want this rule to apply, and then press **Next** (see the figure below).

Figure. 12.2 - 220. Specifying the profiles.



Finally, you need to give your new rule a name, and also a description if you want to. Type the name of the rule in the "Name" text field. You can also optionally give it a description in the "Description (optional)" text box. When you are done, press **Finish** to complete the "New Inbound Rule Wizard" (see the figure below).

Figure. 12.2 - 221. Giving the new rule a name and a description.

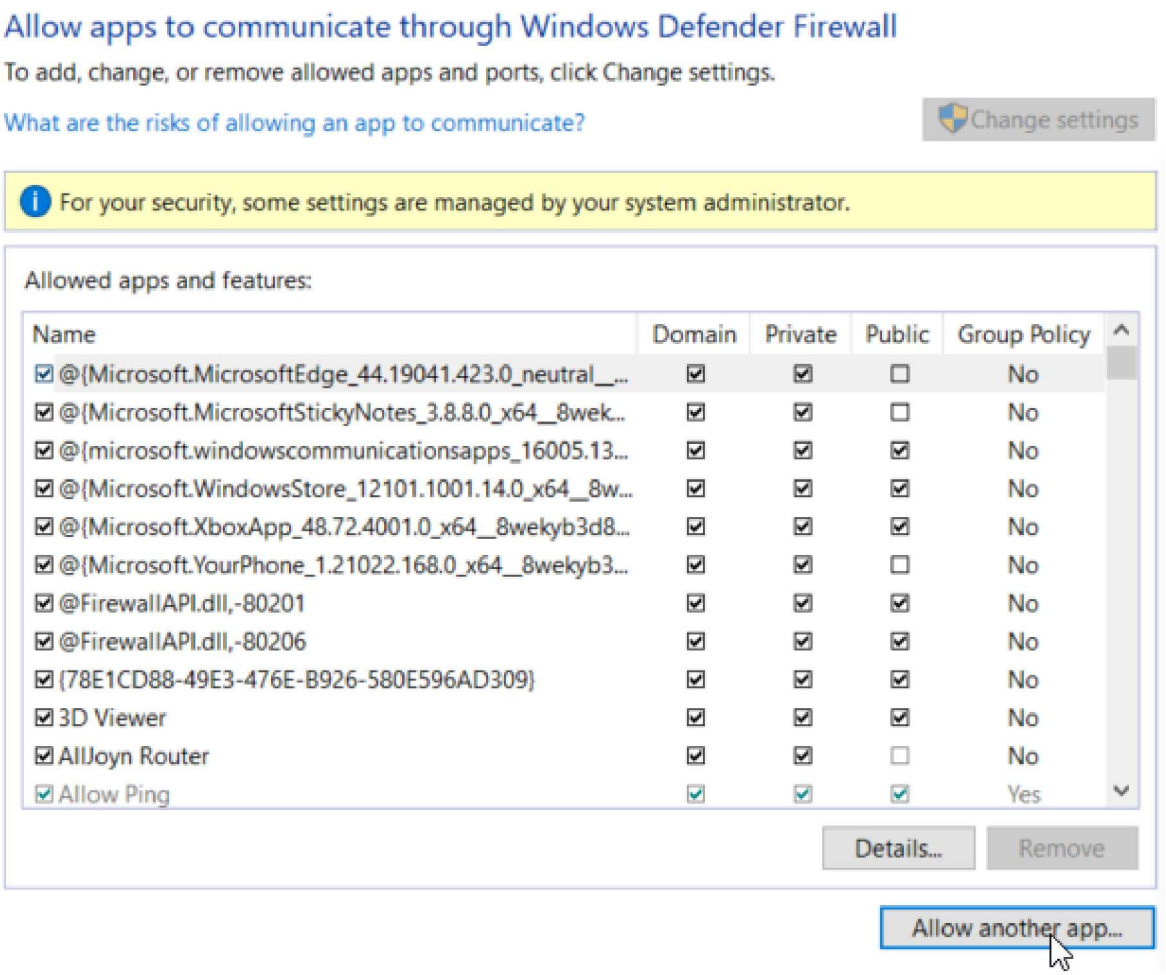


12.3 Allow AQtivate through firewall

In order to allow your firewall software accept AQtivate's firmware upgrade, you need to search for "Allow and app through Windows Firewall" with Windows Search. Press the **Allow another app** button and then select "AQtivate.exe" (see the figure below). AQtivate is installed by default to C:\Program Files (x86)\Arcteq\Aqtivate\AQtivate.exe.

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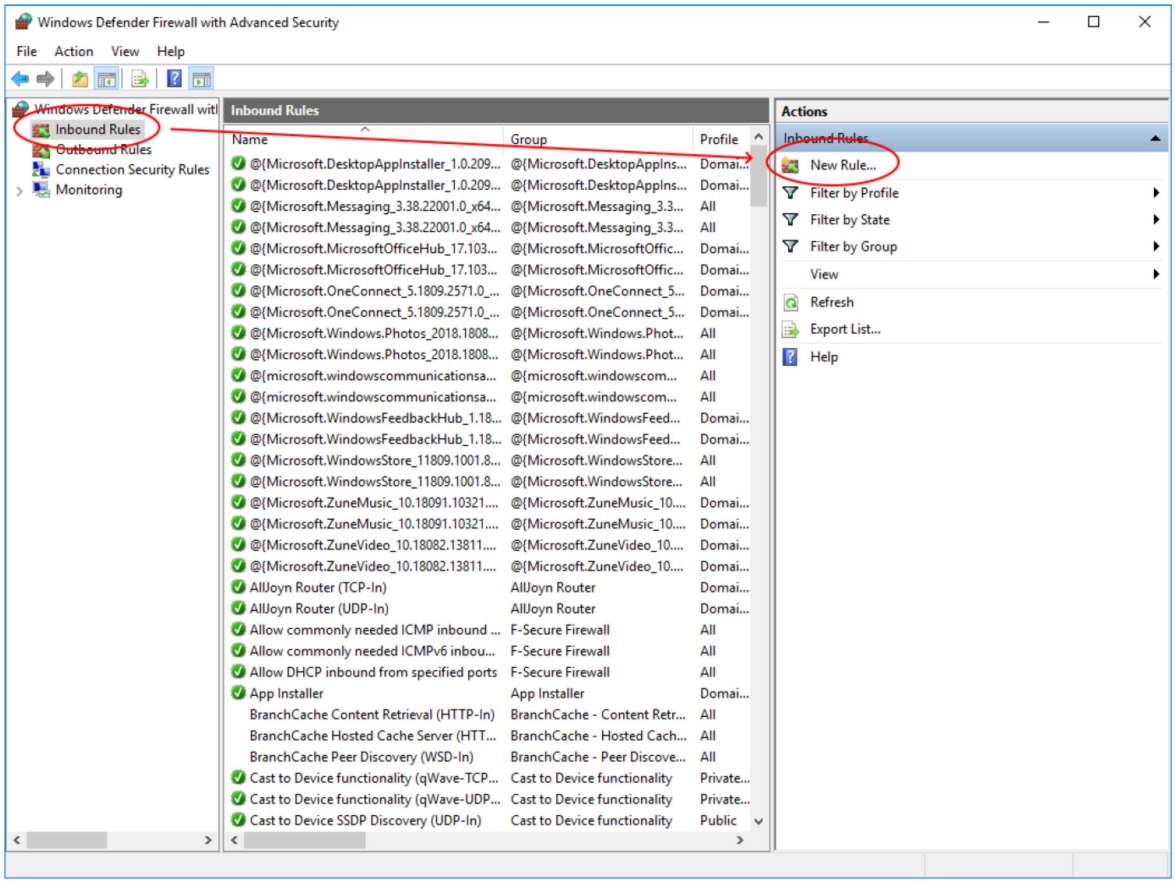
Figure. 12.3 - 222. Whitelisting AQtivate in your firewall software.



12.4 Add TFTP rule to firewall

You can also add a trivial file transfer protocol (TFTP) rule to your firewall software. Begin the process by search for "Windows Defender Firewall with Advanced Security" with Windows Search. Add new rule by selecting "New Rule..." in the "Actions" pane (see the figure below).

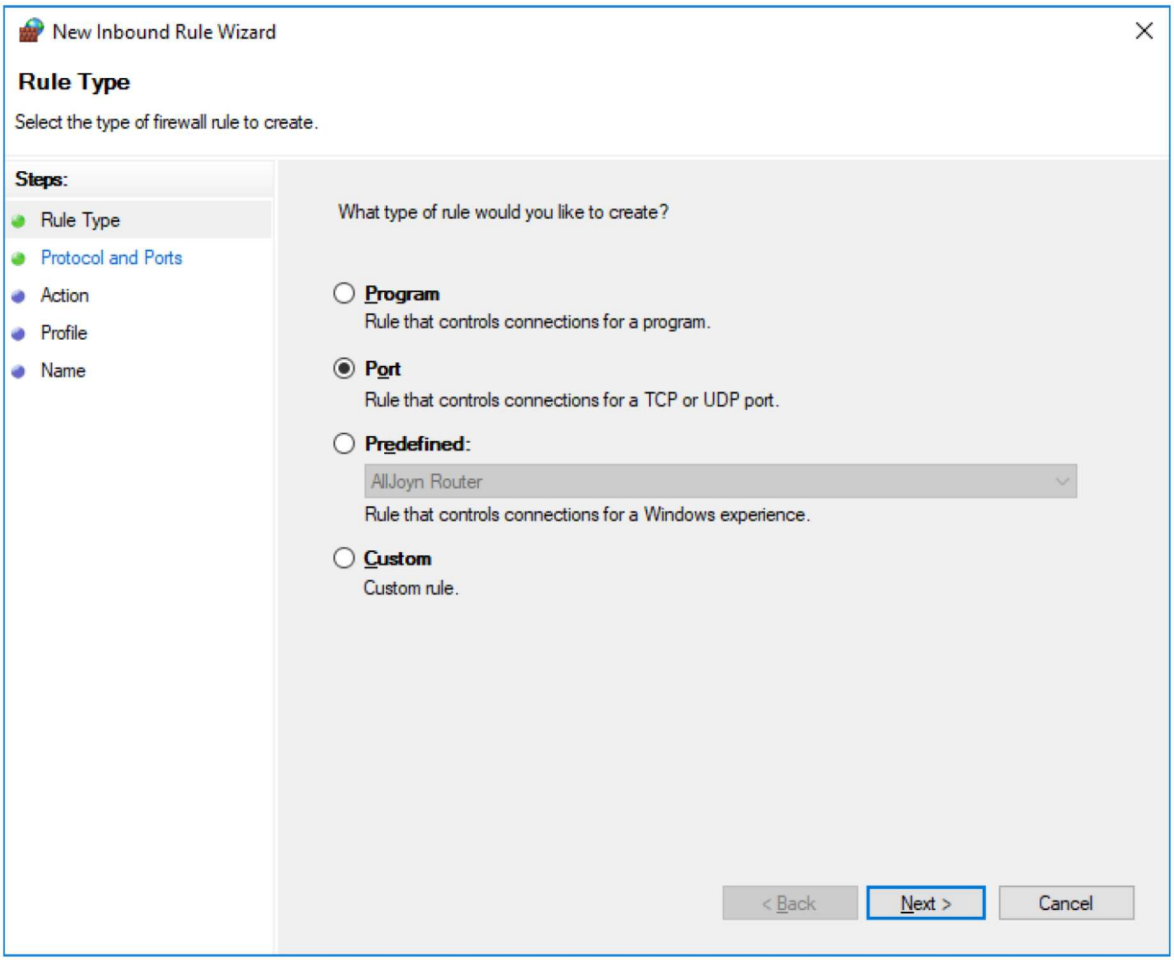
Figure. 12.4 - 223. Adding a new TFTP rule.



The second step in the process is to select the type of firewall rule you want to create. Select the "Port" option and press **Next** (see the figure below).

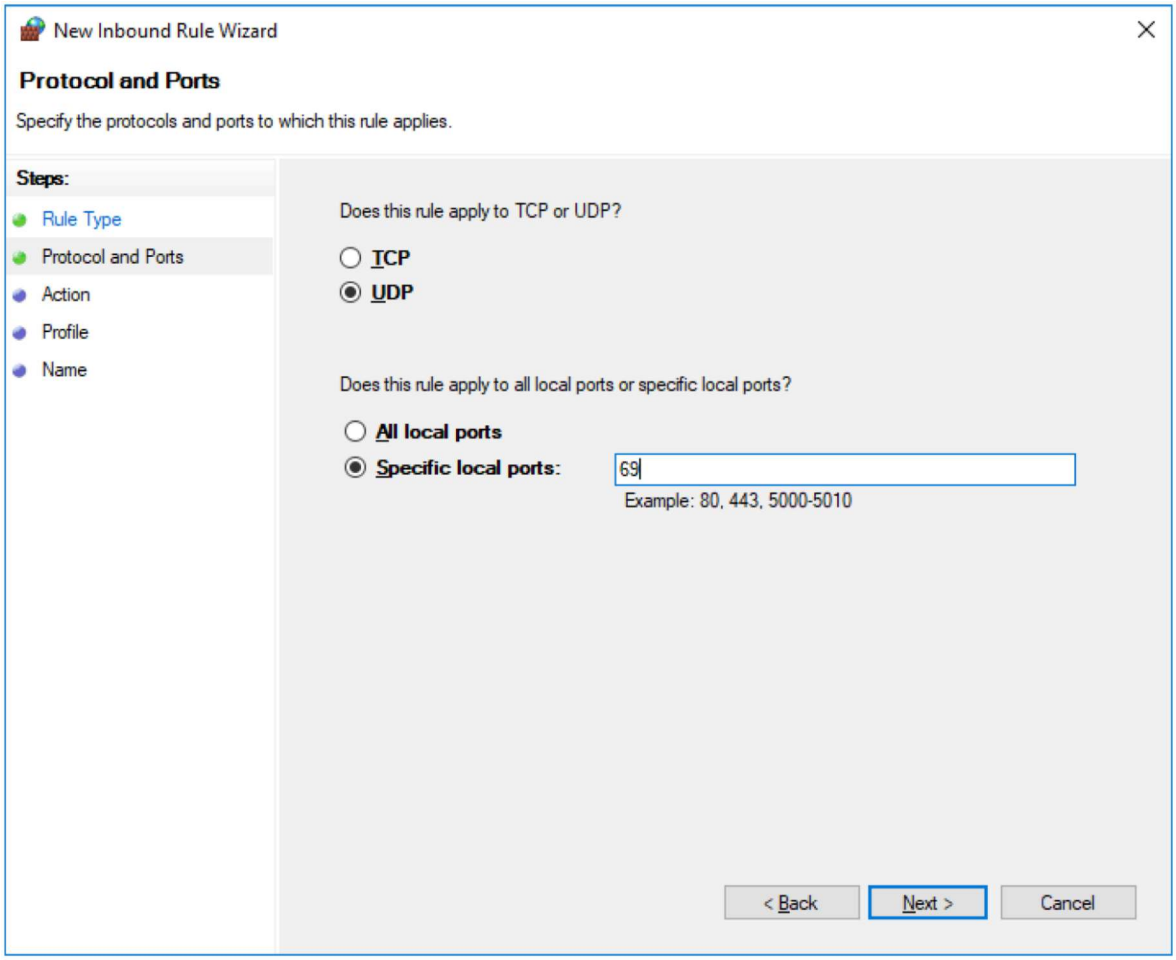
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Figure. 12.4 - 224. Selecting the firewall rule type.



In the third step you need to specify the protocols and ports to which your new rule applies. Select the "UDP" option and set the "Specific local ports" to "69". Press **Next** (see the figure below).

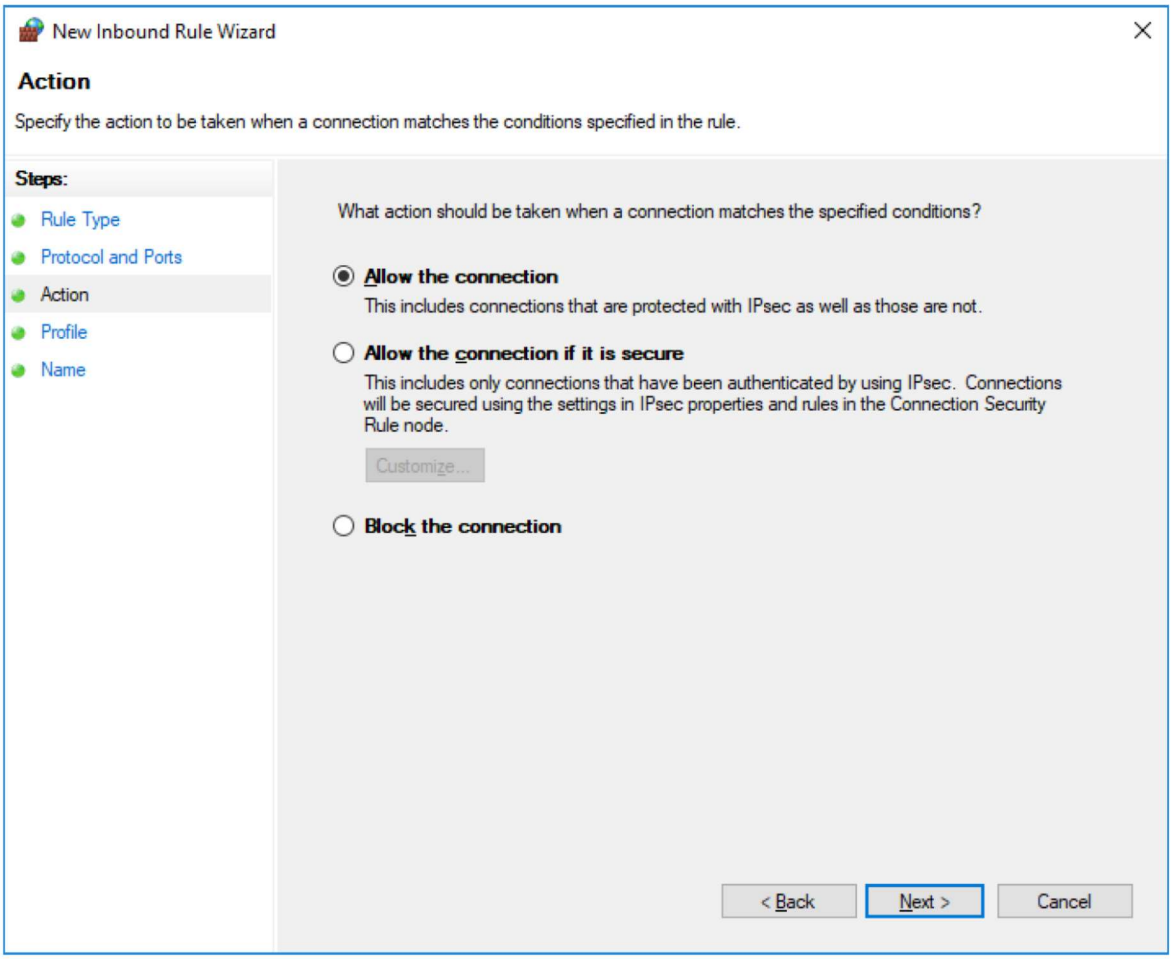
Figure. 12.4 - 225. Specifying the protocols and ports to the new TFTP rule.



In the fourth step you need to specify the action that will be taken when a connection matches the conditions you have set for your new TFTP rule. Select the "Allow the connection" option and press **Next** (see the figure below).

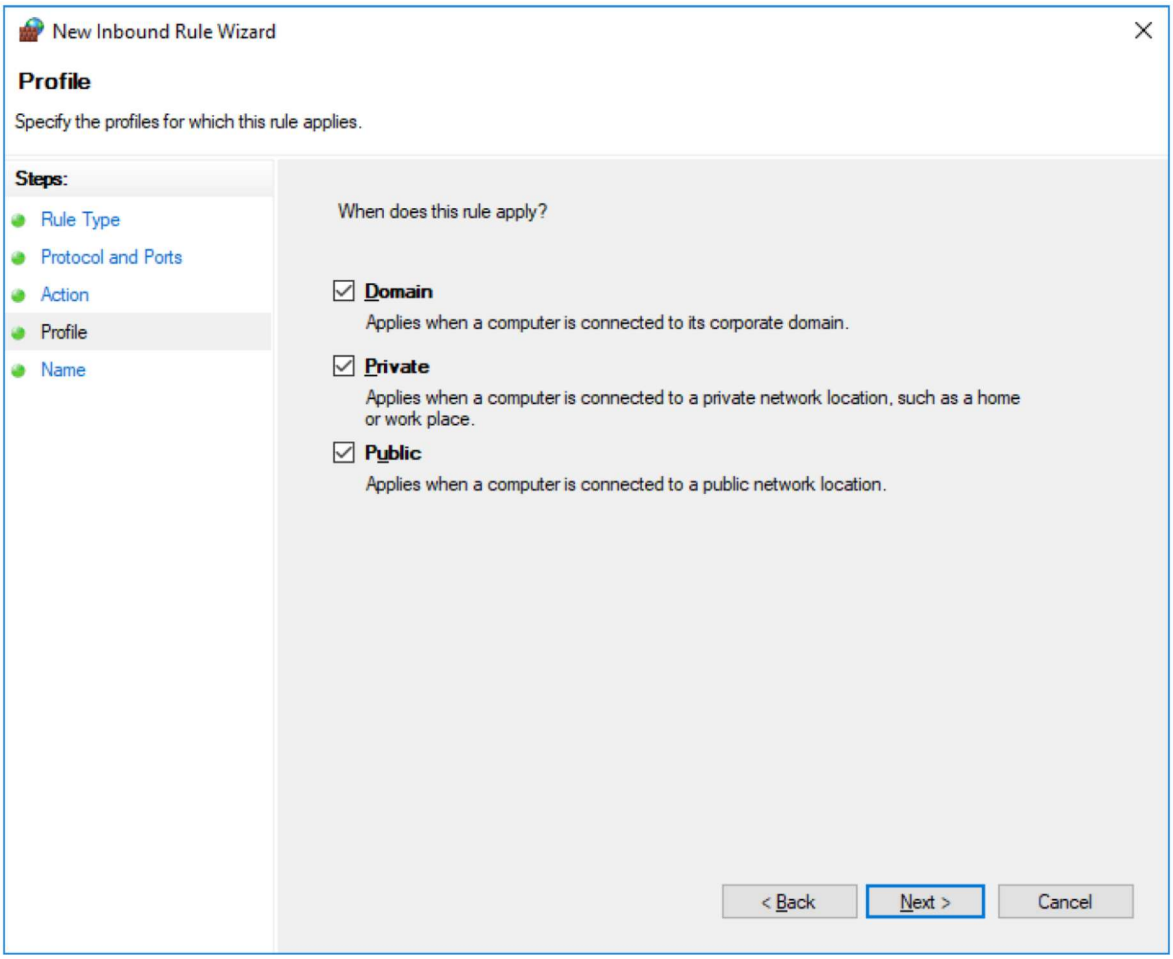
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Figure. 12.4 - 226. Specifying actions.



The fifth step is to specify the profiles to which your new TFTP rule applies. Select the profile(s) you want your rule to apply to: "Domain", "Private" and/or "Public". Then, press **Next** (see the figure below).

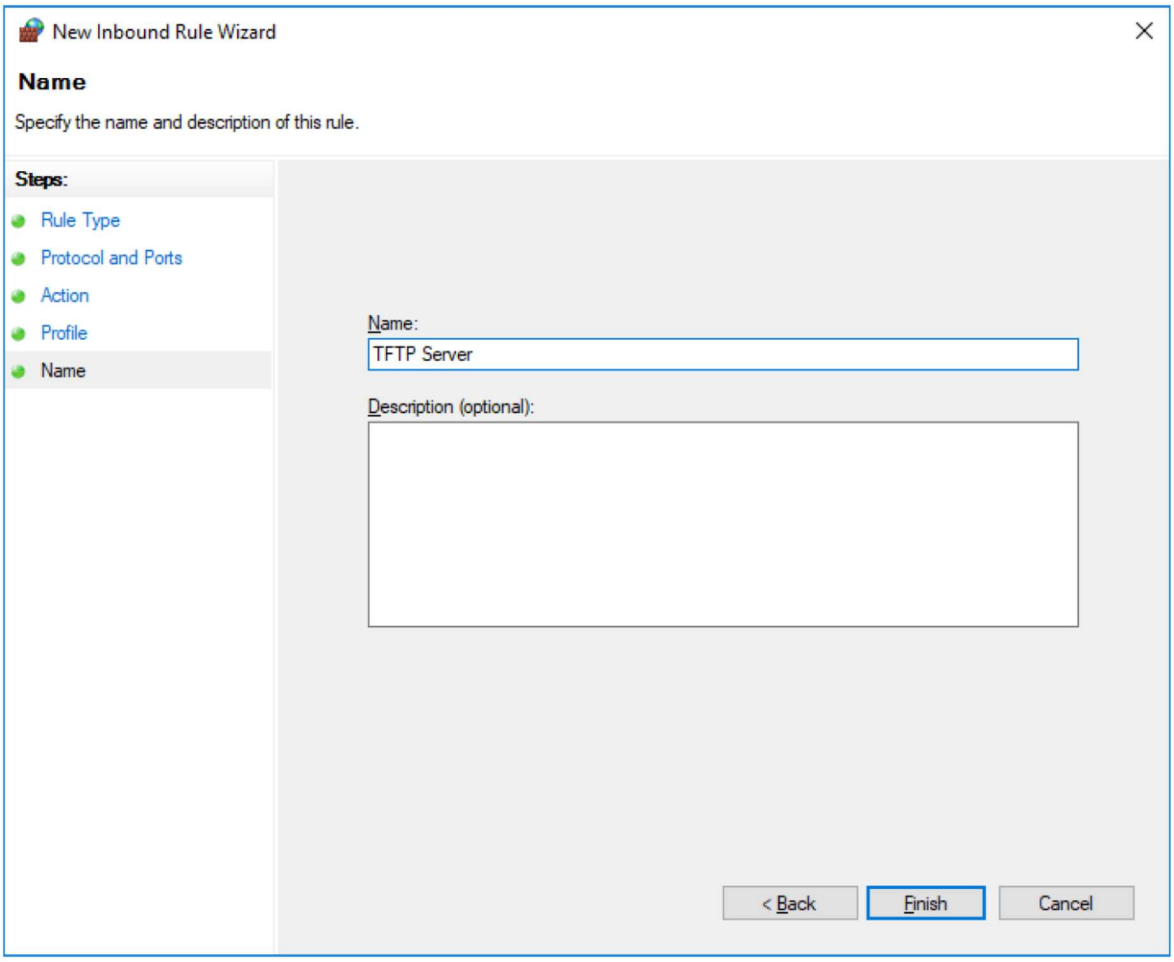
Figure. 12.4 - 227. Specifying profiles.



Finally, you need to give your new TFTP rule a name, and also a description if you want to. Type the name of the rule in the "Name" text field. You can also optionally give it a description in the "Description (optional)" text box. When you are done, press Finish to complete the "New Inbound Rule Wizard" (see the figure below).

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Figure. 12.4 - 228. Giving the new TFTP rule a name and a description.



13 Viewing disturbance recordings with AQviewer

Open the AQviewer software by clicking the *Disturbance recorder* menu on AQtivate's main toolbar and then select "Launch AQviewer" (or use the shortcut Ctrl + Alt + D).

You can open disturbance recordings in AQviewer by clicking the "Open" icon (the leftmost icon on the main toolbar, numbered 1 in the figure below) or by going to *File → Open*. Recordings are packed COMTRADE files. A .zip file includes *.cfg and *.dat. AQviewer can open original packed .zip files and COMTRADE files, as both *.cfg and *.dat are in the same directory.

Figure. 13 - 229. Main toolbar icons in AQviewer.

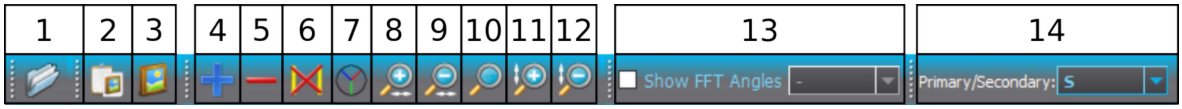


Table. 13 - 31. Main toolbar icon descriptions.

#	Name	Description
1	Open	Open a recording.
2	Copy to clipboard	Copy a screenshot to clipboard.
3	Save screenshot	Save a screenshot as a .png file.
4	Add plotter	Add a plotter (see the description later in this chapter).
5	Remove plotter	Remove added plotters.
6	Remove all cursors	Removes all added cursors (see the description later in the chapter).
7	Show vectors	Opens vector menu (see the description later in the chapter).
8	Zoom in	Zooms the plotter in horizontally.
9	Zoom out	Zooms the plotter out horizontally.
10	Zoom reset	Resets the zoom.
11	Vertical zoom in	Zooms the plotter in vertically.
12	Vertical zoom out	Zooms the plotter out vertically.
13	Show FFT Angles	Shows the FFT angles. When this tool is enabled you can choose the channel with a drop-down box.
14	Primary/ Secondary	Choose which values are shown in the plotter(s): secondary, primary, or per-unit values.

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Plotters

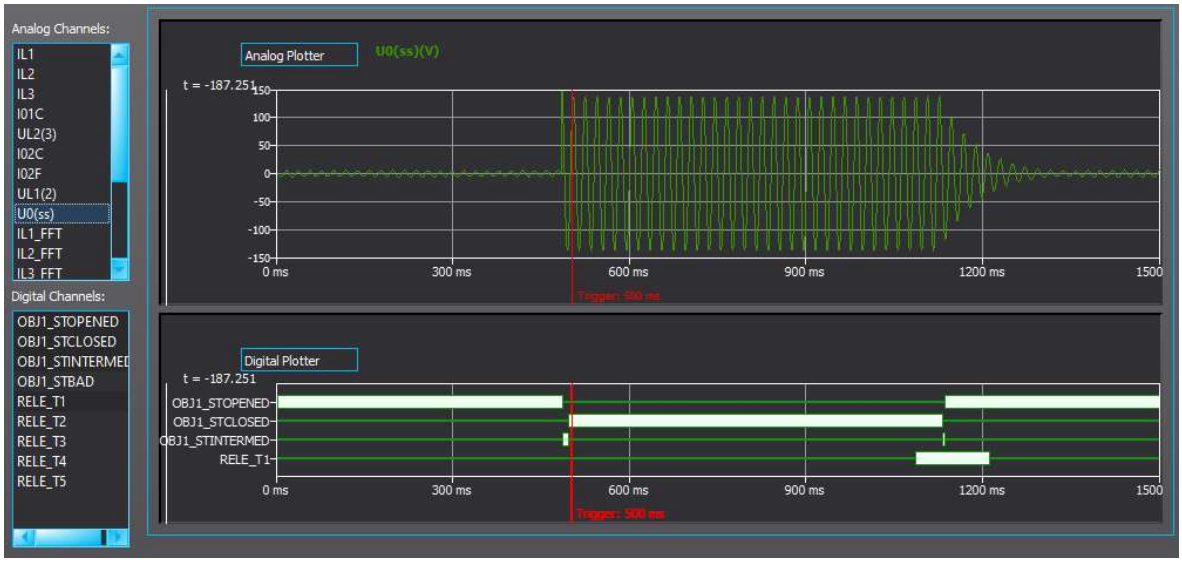
Figure. 13 - 230. Plotters in AQviewer.



By default, the plotter is empty. You can select the measured signals from the list titled "Analog Channels" (see the figure above, top left) to move them to the plotter. In the example above the residual current I02F has been selected.

You can add another plotter by clicking on the "Add plotter" button (the blue plus icon highlighted in the top-left part of the figure above). In this example the neutral voltage U0 has been selected and moved to the right in the "Add graph" window (see the top-right part of the figure above). The plotter can be given a name in the "Graph name" text box. Confirm the plotter by pressing the OK button. The name of the plotter can be changed by double-clicking on the plotter name. You can also remove a plotter by clicking the red minus icon (to the right of the blue plus icon mentioned before).

Figure. 13 - 231. Digital signal statuses in AQviewer's plotters.



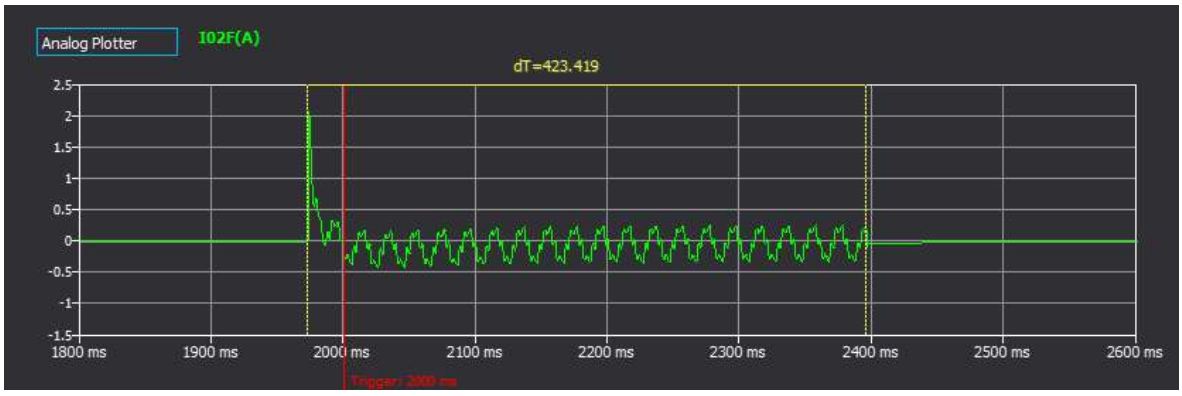
Digital signal statuses are shown at the bottom of the window (see the figure above). All signals which have activations during the recording are selected automatically when the recording is opened.
Any recorded signals can be activated or disabled from the "Digital Channels" list (the bottom-left part of the figure above).

You can zoom in and out by going on top of any plotter, holding down the left mouse button and moving the mouse to create the area you want to zoom in. You can also use the "Zoom" buttons (the magnifying glass icons). You can reset the zooming by pressing the "Zoom reset" (the magnifying glass in the middle).

NOTICE!
You can zoom the amplitude of individual plotters by holding down the **Shift** button and scrolling the mouse wheel. You can also zoom the time by holding down the **Ctrl** button and scrolling the mouse wheel.

Cursors and vectors

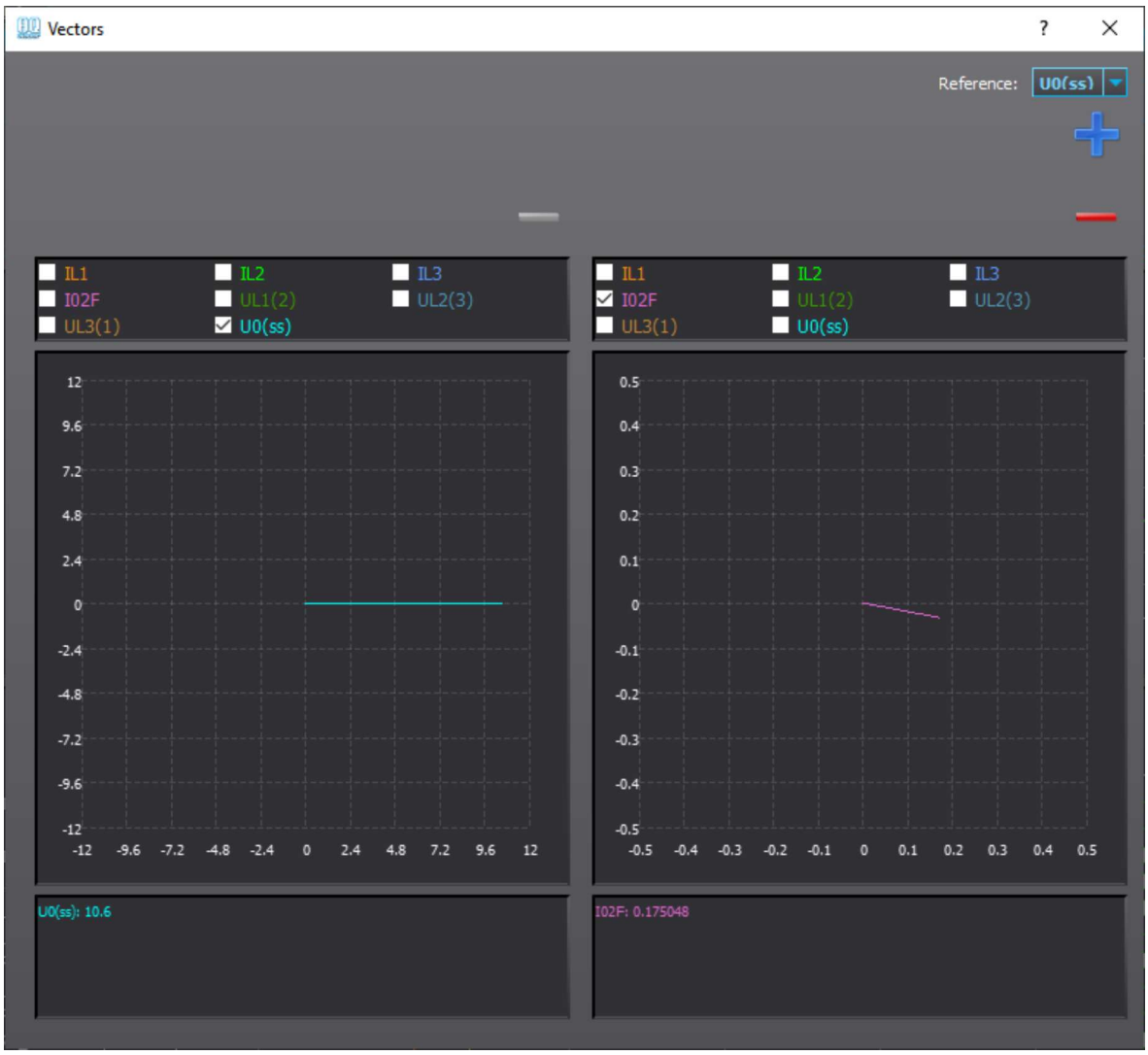
Figure. 13 - 232. Cursors in AQviewer.



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You can add cursors to plotters by double-clicking the left mouse button while on top of any plotter. If you add two (2) cursors, the software will show the time difference between the cursors. In the figure above, one cursor has been set to the beginning of a fault and another to the end of the fault. The time difference ("dT") between the two points is 423 ms. You can add up to five (5) cursors at the same time. You can remove all cursors by pressing the "Remove cursors" icon in the main toolbar.

Figure. 13 - 233. Vector is AQviewer.



If a cursor has been set to a plotter, you can check the vectors at that point in time. The "Reference" drop-down box defines which channel is set as the reference angle. Click the plus and minus icons on the main toolbar to add and remove vector diagrams.

14 Adding an option card

When you want to add a new option card, you must also run a script to the device to update the device's hardware configuration and the menu structure. To start this process, contact Arcteq's technical support (https://support.arcteq.com/portal/home) and list the following details in the support ticket:

- the device's serial number ("Serial number"),
- the software version ("SW version"),
- the hardware configuration in use at the moment ("HW conf."),
- which option card is being added to the device.

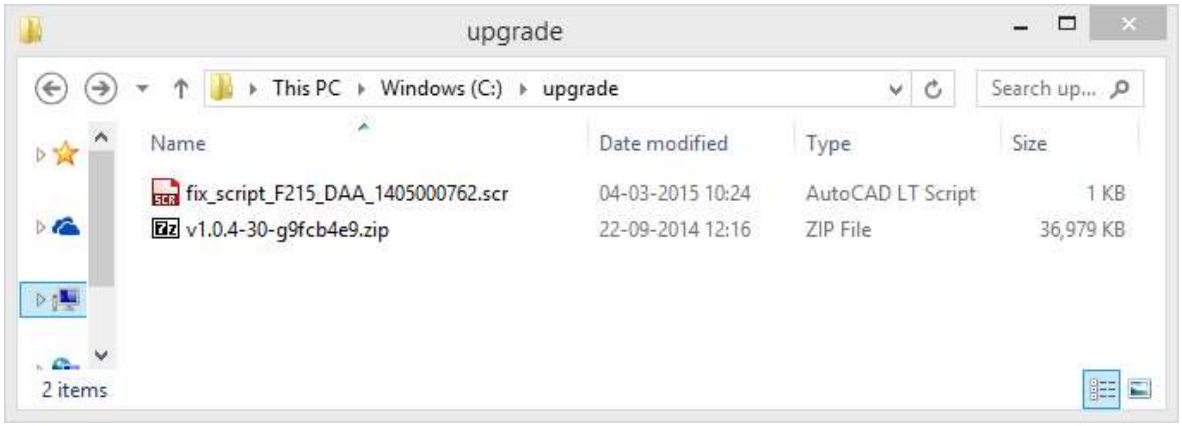
You can find all this information in the device's *General* menu, either from AQtivate or from the device's HMI (see the figure below).

Figure. 14 - 234. Accessing all the relevant device information in the device HMI.



Once Arcteq's technical support has received all the necessary information, they will send you a firmware package that matches the software version as well as a script in a compressed (.zip) folder. The script and the firmware should be placed into a folder with nothingelse than these files. See the figure below for an example of this. Note how the firmware package is still compressed while the script is not!

Figure. 14 - 235. Example of an upgrade folder with only the script and the firmware files.



Next, connect to the device and run the script from *Tools → Run script*. When the script has finished running, the device restarts automatically.

NOTICE!
If the "Error" light is on, go to *Monitoring → Device diagnostics → Clear fault status → Clear*. Please note that the Live Edit mode must be activated when you do this via AQtivate!

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