

# DEIF MVR USW

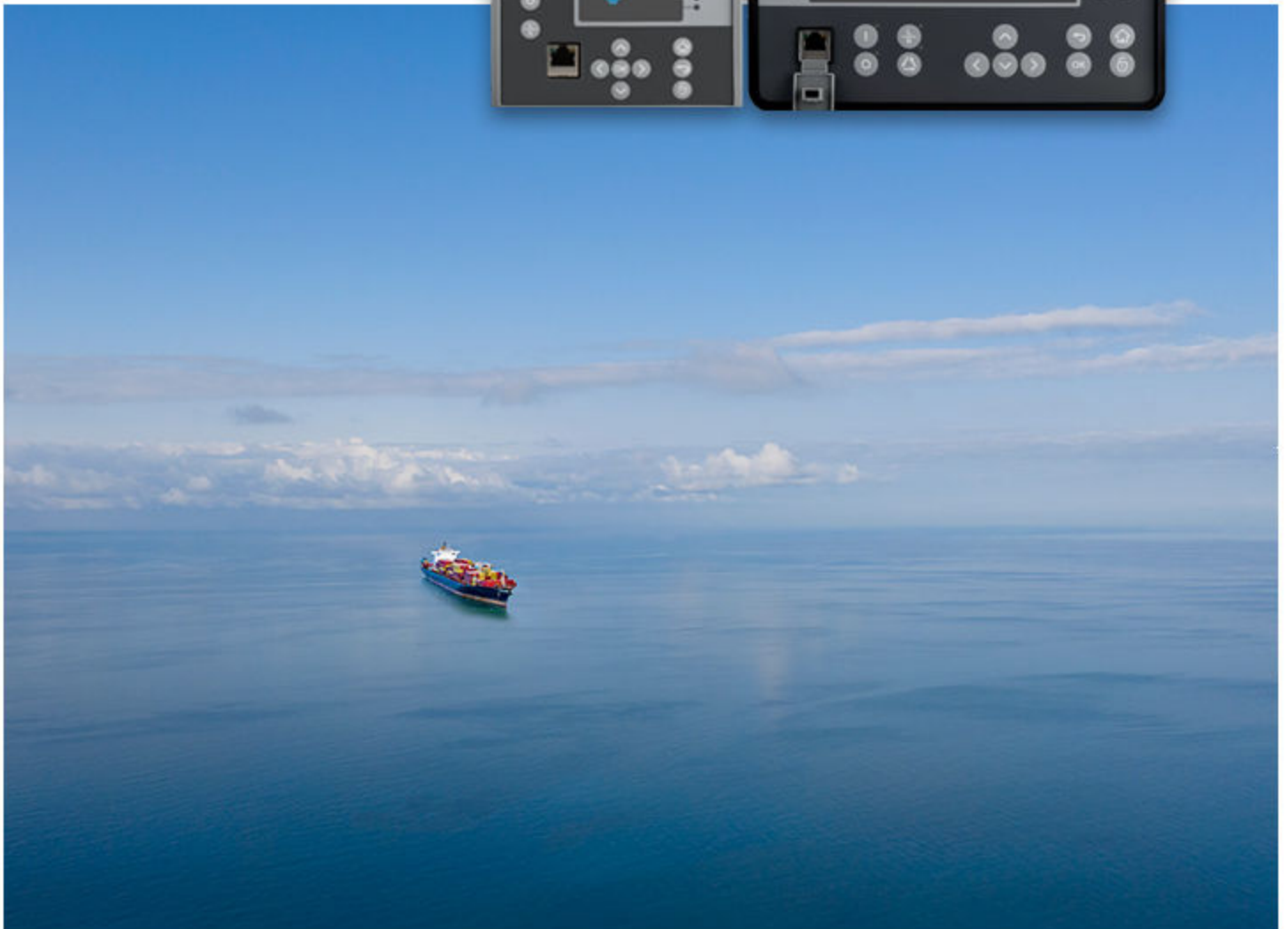
Utility software

User manual

4189341238C



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# 1. About DEIF MVR USW

## 1.1 About DEIF MVR USW

DEIF MVR USW Utility Software tool is a program used for setting and making configurations for MVR-200 series protection and control devices. The program uses a modern graphical interface to create a user-friendly configuration.

DEIF MVR USW can be used for both reading and writing configurations to MVR-200 units. The USW is also capable of reading disturbance recordings from the device. These recordings can be further evaluated by using the USW program, which is included in the DEIF MVR USW software suite.

Relay settings are stored as a single .aqs file, which includes all the user settable configurations, such as protection, measurement, communication, logics, and more. The .aqs files can be saved and stored on a hard drive, and configurations can be done both online and offline.

DEIF MVR USW can be run by any Windows 7/8/10 version. It can be downloaded free of charge from the DEIF website <https://www.deif.com/software>.

## 2. Getting started

### 2.1 Installing the DEIF MVR USW setting tool

Launch the DEIF MVR USW Offline Installer. If you do not have the installer, you can download it for free from <https://www.deif.com/software>.

Select the installer language and follow the step-by-step instructions to install the software.

**NOTE** Firewall software may detect DEIF MVR USW. Select **Allow connection** or manually include DEIF MVR USW in the list of allowed programs.

### 2.2 Updating the DEIF MVR USW setting tool

If the installed DEIF MVR USW version is too old for the firmware in the relay, it may be necessary to update the setting tool software. Find the latest firmware on <https://www.deif.com/software>

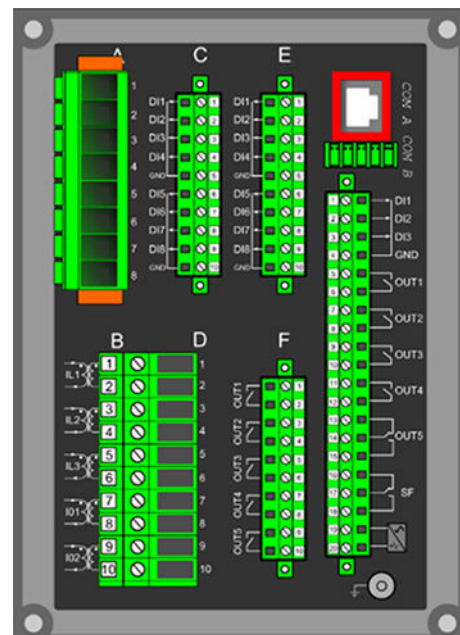
### 2.3 Connecting to a relay with DEIF MVR USW

#### 2.3.1 Relay IP addresses

MVR-200 series relays are equipped with two RJ45 ports, one in the front panel, and one in the back. Both can be used to connect the relay to DEIF MVR USW.



Front port

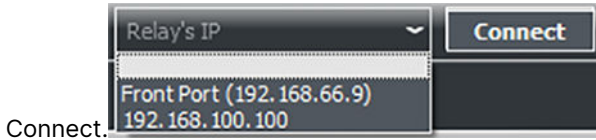


Back port

#### Front port (DHCP server)

The front port has a fixed IP address (192.168.66.9) and a built-in DHCP server capability. This means that a local PC will get the required IP address automatically from the relay. If the PC is unable to connect to the relay through the front port, change the IP address of the PC Ethernet port manually to the same area (192.168.66.x).

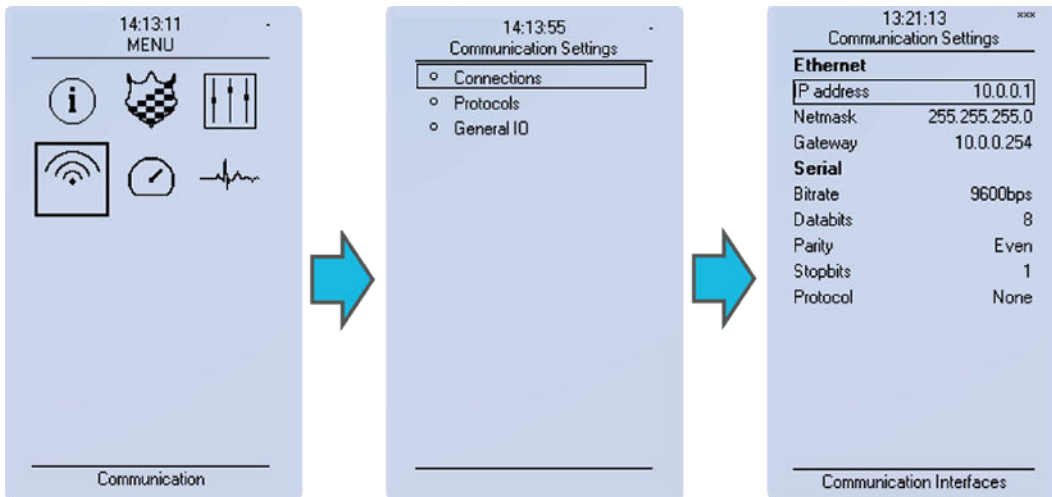
To connect to the front port, click on the drop-down menu at the middle of the main tool bar, select Front Port and press



Connect.

## Back port

The IP address of the MVR back port is set by the user and can be found by going to **Communication > Connections**. The addresses found under this tab define the rear Ethernet communication of the relay. The IP address can also be found in the routine test reports that were sent with the device.



Firmware upgrade and communication protocols only work through the back port.



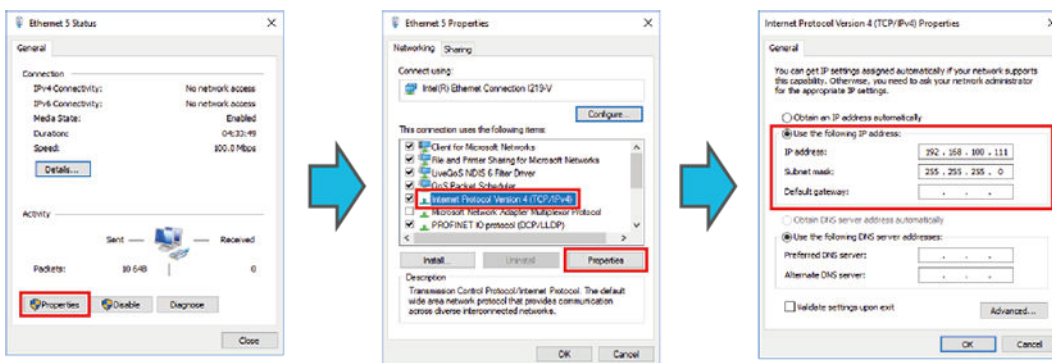
### More information

See **Updating firmware** in this document for more information about the firmware.

## 2.3.2 Setting the IP address for communication through the back port

You can set the IP addresses in the relay to match the IP address range of your PC by going to **Communication > Connections**. The addresses found under this menu define the Ethernet communication of the relay. Most important addresses are the IP address and the Gateway.

To check your IP address range, navigate to the network settings of the programming PC. In Microsoft Windows 7 and 10 it can be found through the following path:

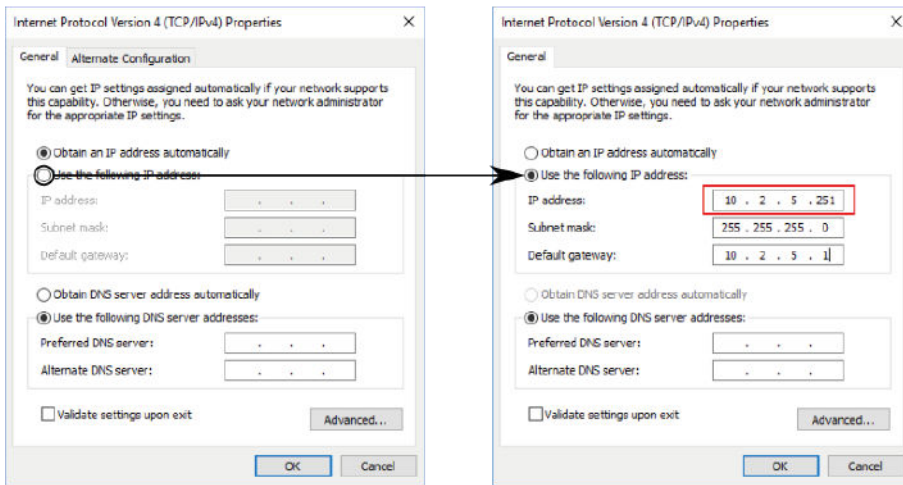


If you have a fixed IP address, it is shown here. If you are connecting through the front port, it is enough to select *Obtain an IP address automatically* in the network settings of your PC.

### 2.3.3 Direct connection

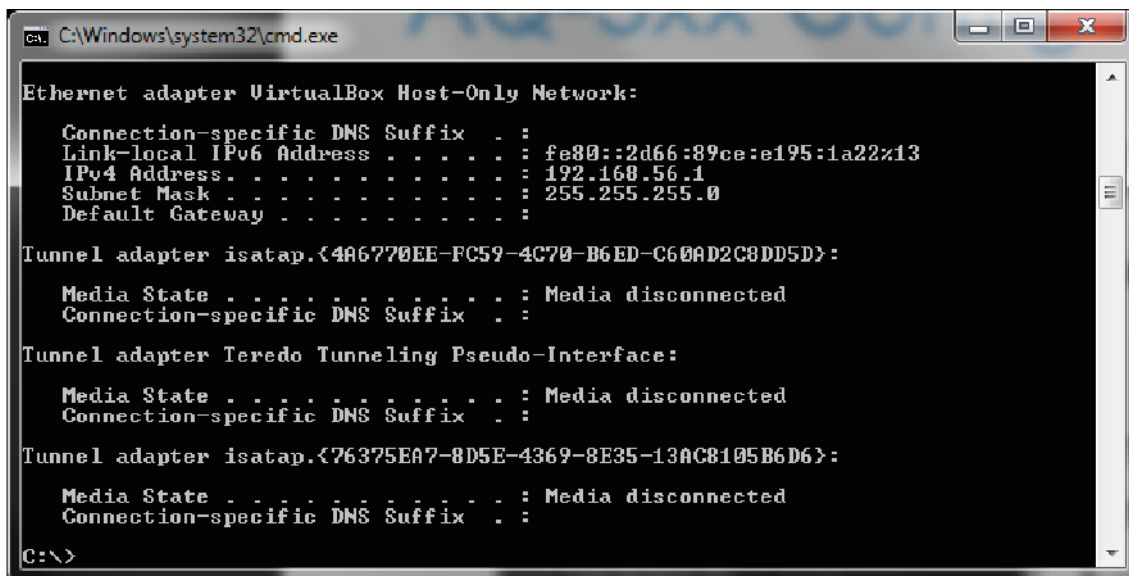
When you are connecting directly to the device without having a network connection, you need to set the IP address manually for your programming PC. It is done through network settings.

Set the PC's IP address to the same range with the relay you are connected to: it is otherwise the same but the last three digits need to be different.



### 2.3.4 Connecting relays into the same network

Open the Windows Command Prompt by typing `cmd` into the Search bar (in Windows 10: **Start > Search**, or click the magnifying glass next to Start) and open the program. In Command Prompt, type `ipconfig` and press Enter.



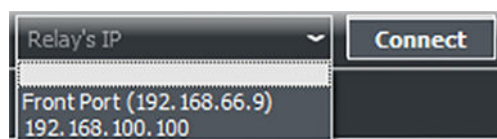
Check the IP address of your programming PC from the provided information (under IPv4 Address). In this example it is 192.168.56.1.

Select the IP address for the relay you want to connect to the network. In this example we select the address 192.168.56.2. Make sure the selected address is available: type `ping [the selected IP address]` and press Enter. When the selected IP address is confirmed to be available, set it as the new IP address for the relay in its HMI and test the connection.



## 2.3.5 Connecting through the back port

To connect to an MVR-200 series 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 relay, the red **Offline** text at the top left corner will turn into a green **Online**. When you are connected to a relay through DEIF MVR USW, the Arcteq logo will blink on the device to indicate an active connection.




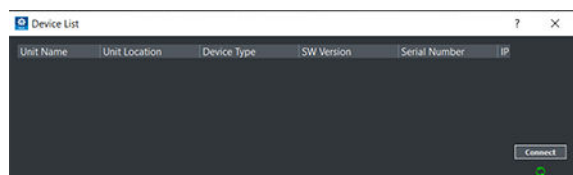
The screenshot shows a dark-themed interface. At the top, there is a dropdown menu labeled 'Relay's IP' with a downward arrow. To its right is a button labeled 'Connect'. Below the dropdown, the text 'Front Port (192.168.66.9)' is displayed, followed by the IP address '192.168.100.100'.

Only one computer can connect to a relay at a time. Attempts to connect to a relay with a second computer will not disrupt the user who connected to the relay first.

Connecting to a relay with DEIF MVR USW through the back port does not affect the SCADA connection.

## 2.3.6 Device list

Another way to connect to a device is to open the **Device list** from the **Tools** menu or by pressing F11. The resulting pop-up window shows all the available devices that are connected to the network your computer is in. Double clicking one of the devices in the list, or selecting a device and clicking the **Connect** button will close the window and connect to the selected device. If new devices are connected while the **Device list** is open, press the **Refresh** button  to make the new devices appear on the list.



- NOTE**
- Some switches and firewalls may prevent DEIF MVR USW from showing this list.
  - If you have multiple instances of the DEIF MVR USW setting tool running at the same time, the device list will not be able to list the devices in the network.

## 2.3.7 Connecting by launching DEIF MVR USW through command line

DEIF MVR USW supports connecting to a device as the USW is launched through a command line. Open the **Command** prompt and simply give the command **DEIF MVR USW.exe c- [the device's IP address]**. This will launch the USW and attempt to connect to the device with the given IP address.

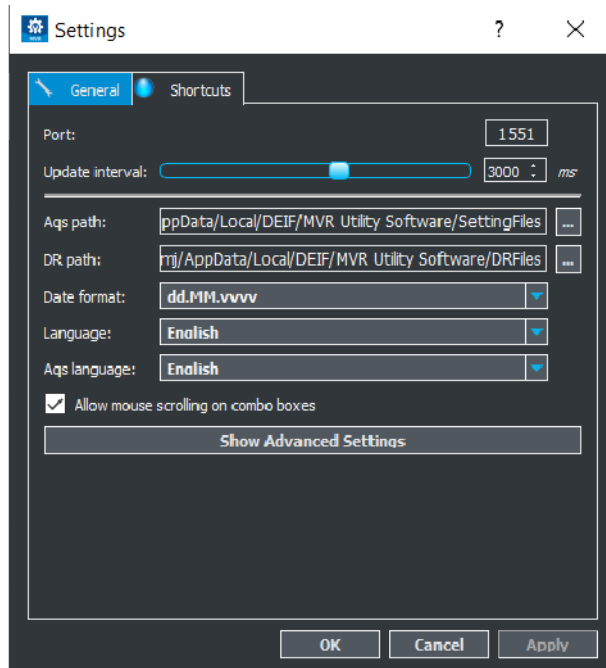
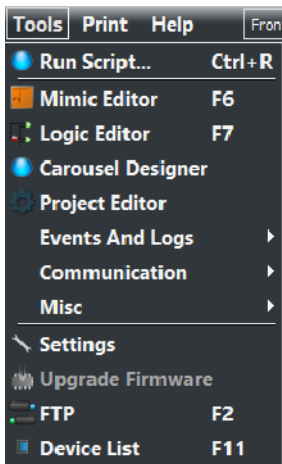
For example, if the unit's IP address is 192.168.100.100, you can connect to it when you launch DEIF MVR USW in the **Command** prompt by typing **DEIF MVR USW.exe -c 192.168.100.100**.

## 2.4 The Settings menu

### General settings

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





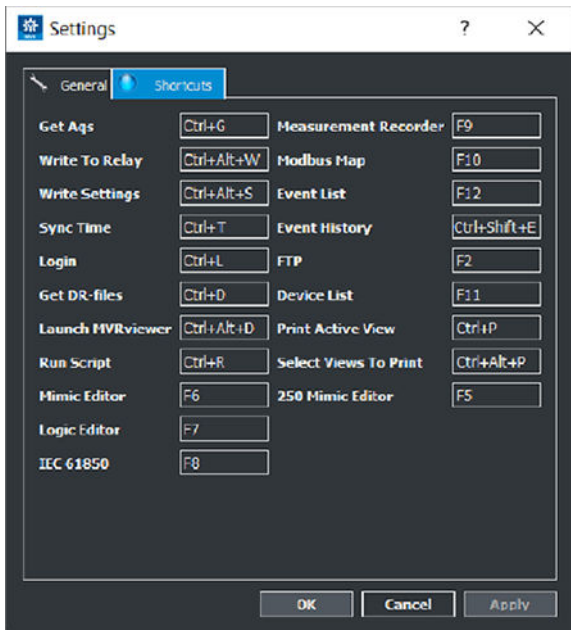
The Aqs path defines the location where the configuration files are saved when they are downloaded from the MVR-200 series device with the **Get aqs file** command. The DR path defines the location where the disturbance recordings downloaded from the MVR-200 series device are saved when the relay receives the **Get DR files** command. The **Date format** has a drop-down menu of options how to display the date.

Checking the **Allow mouse scrolling on combo boxes** check box allows the user to change the combo box value by scrolling the mouse wheel when the mouse hovers over the box.

DEIF MVR USW will use the language that was chosen in the **Language** parameter in the **General** menu.

## Shortcuts

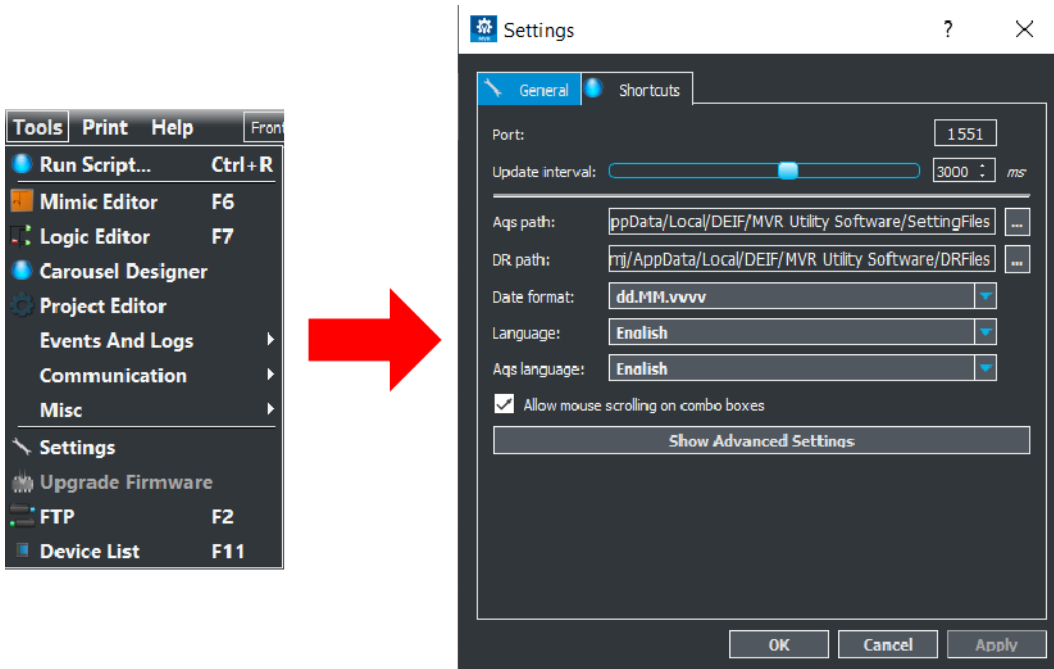
In the **Shortcuts** tab, you can edit the various menu shortcuts. By default the shortcuts are as shown in the image below.



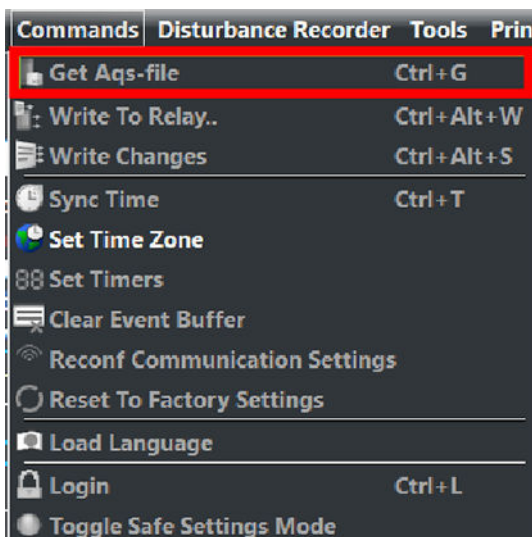
## 3. Managing .aq5 files

### 3.1 Reading .aq5 setting files from the device

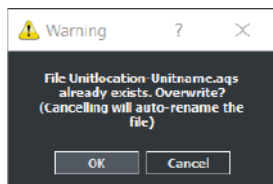
With DEIF MVR USW you can download existing .aq5 files from the relay and store them on the hard drive. To determine where the .aq5 files are saved, go to **Tools > Settings** and set the Aqs path. By default, the .aq5 files are saved to the folder *C:/Users/username/AppData/Local/DEIF/MVR Utility Software/SettingFiles*.



To download a relay settings to the DEIF MVR USW setting tool, connect to the device and go to **Commands > Get aqs-file**, or press Ctrl+G. Wait for the program to load the file. The .aq5 file is saved to the set location **Settings > General > Aqs path**.



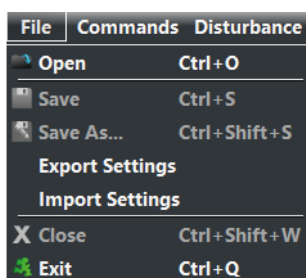
If an .aq5 file is saved to a folder that already contains a file with the same name, you have two options:



- Click **OK**: The new file replaces the old.
- Click **Cancel**: The new file is automatically renamed and both files are preserved.

## 3.2 Opening and saving .aqs files

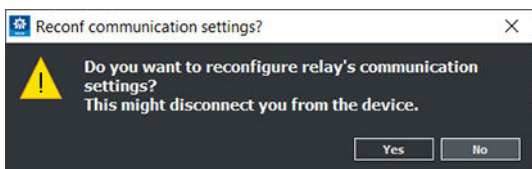
You can open an .aqs file from the PC hard drive by using the command **File > Open**. The .aqs files can be found by following the path determined in the **Settings** menu or somewhere else on the PC hard drive.



To save an .aqs file, click **File > Save** or **File > Save as**.

## 3.3 Uploading .aqs files to the device

You can upload an .aqs file that is currently open to the relay. First make sure that the connection to the device has been established, and then use the menu command **Commands > Write to relay** and select all components you want to upload. Then wait for the program to finish processing the command. If all parameters are written to the device, DEIF MVR USW needs to know whether or not the communication settings are reconfigured as well.



- Click **Yes**: The new communication settings are sent to the relay.
- Click **No**: The existing communication settings will be used.

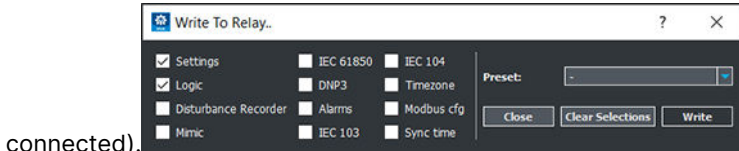
## 4. Uploading configurations

### 4.1 Change a relay configuration

There are several ways to write changes you have made to your relay configuration. The two most common ways are **Write to relay** and **Write changes**.

### 4.2 Write to relay

The following window appears when you click on the **Write to relay** command in the **Commands** menu (if a relay is



connected).

Click the check boxes to choose which parts of the configuration you want to upload:

Function	Description
Settings	Includes all parameter values (for example, protection pick-up levels, trip delay times, LED/DI/DO namings, IP settings, and more).
Logic	Includes configurations made to the matrix, the control blocks and the logic editor.
Disturbance recorder	Turns on the uploaded disturbance recorder settings.
Mimic	Uploads the mimic and the carousel designs to the relay.
IEC 61850	Uploads the .CID file currently in use at <b>Tools &gt; Communication &gt; IEC61850</b> .
DNP3	Uploads the DNP3 settings currently in use at <b>Tools &gt; Communication &gt; DNP3</b> .
Alarms	Uploads the alarms settings at <b>Tools &gt; Events and logs &gt; Set alarm events</b> .
IEC 103	Uploads the IEC103 settings currently in use at <b>Tools &gt; Communication &gt; IEC103</b> .
IEC 104	Uploads the IEC101/IEC104 settings currently in use at <b>Tools &gt; Communication &gt; IEC101/IEC104</b> .
Modbus cfg	Uploads the custom Modbus configuration setup at <b>Tools &gt; Communication &gt; Modbus map</b> .
Sync time	Syncs the relay clock to the time on the connected PC. If either serial time sync or NTP time sync is in use, these remain in use.

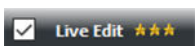
You can also use one of the presets **Configuration** or **Everything**.

### 4.3 Write changes

This window displays two values: the old value that is currently in the relay, and the new value to be written to the relay. **Write changes** writes the listed parameters.

### 4.4 Live Edit

If DEIF MVR USW setting tool is connected to the relay, you can write parameter settings to the device in real time by checking the **Live Edit** box at the top of the screen.



Live editing means that when you make changes to the parameters in DEIF MVR USW, they are immediately uploaded to the device. You can live edit text parameters, drop-down box parameters and numbered parameters.

When you activate the **Live Edit** mode, DEIF MVR USW will upload to the relay all the parameter values that are currently in use. If there are any parameters that you have changed while not in **Live Edit** mode that you wish to upload to the relay, you can do so through **Commands > Write changes** or **Commands > Write to relay**. If you have made any changes to parameters without uploading them and then activate the **Live Edit** mode, these changes are wiped and replaced by the parameter values that are currently in use in the relay.

## 5. Online Edit menus

### 5.1 Introduction and navigation

After you open an .aq5 file, some menus appear to the left side of the DEIF MVR USW window. The number of menus depends on the device type. All the settings and values that reside under these menus can also be accessed via the device's HMI display.

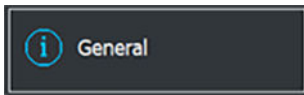
Every menu is divided into tabs which can be seen at the top of the window right below the selected menu's title. You can change the value of a drop-down menu by clicking it and selecting one of the options, or by placing the cursor on it and scrolling through the options with the mouse wheel (this feature must be enabled first at **Tools > Settings > General > Allow mouse scrolling on combo boxes**).



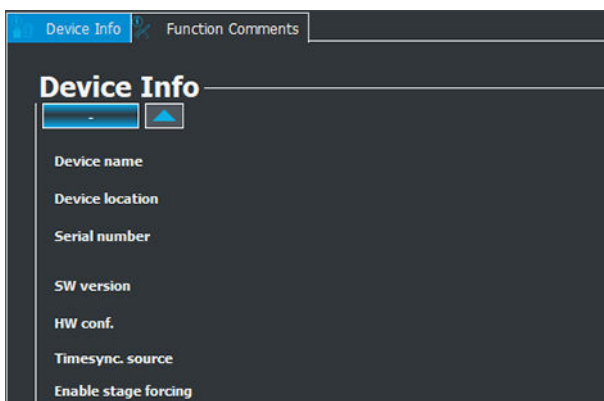
#### More information

For a complete description of protections and other functions, refer to the MVR-200 manuals at [deif.com](https://deif.com).

### 5.2 General menu



The **General** menu's **Device Info** tab consists of basic information about the relay:



Setting	Description
Device name	The unit name set by the user. This name will be included in the .aq5 configuration file name when the file is loaded from the relay.
Device location	The unit location set by the user. This name will be included in the .aq5 configuration file name when the file is loaded from the relay.
Serial number	Unique serial number for identification purposes. Does not inhibit you from loading the same file to another unit with the same hardware and software.
SW version	The software version in use.
HW conf.	The hardware configuration. Hardware and software order code of the unit.

The **Device info** tab also has some basic settings available:

Setting	Description
Time sync. source	Chooses whether the internal clock is used or whether the time is synchronized via NTP or a serial protocol (see <b>Commands menu &gt; Time settings</b> in this document).
Enable object control confirmation	When enabled, the relay asks for confirmation after a control command has been given to an object through the HMI mimic before executing the command.
System phase rotating order at the moment	Displays the system phase rotating order used at this moment. Can be either A-B-C or A-C-B.
System phase rotating order setting	Sets the system phase rotating order.
Language	Chooses the language used by the relay (see <b>Commands menu &gt; Uploading language files</b> in this document).
UTC time	Time of the relay's clock in UTC format (Coordinated Universal Time).
Clear events	Clears events recorded into relay.
LCD contrast	MVR-210 series: Adjusts the contrast of the LCD display. MVR-250 series: Adjust the display brightness from 0 to 8 (default setting: 4).
Return to default view	The time (in seconds) how long it takes for the relay to return to the default view from the mimic view. If the delay is set to 0 s (default setting), the relay will not go back to the mimic view automatically.
Reset latches	An alternative to using the Back button in the front panel of the relay.
Measurement recorder	Enables the Measurement recorder function (see <b>Tools menu &gt; Miscellaneous tools &gt; Measurement recorder</b> for detailed information about this function).
Clear active alarms	Resets the active alarms.
I/O Default object selection	Defines which object open/close status I and O button LEDs follow in the front panel of the relay.
Reset latches DI	Determines an alternative to using Back button in the front panel of the relay.

If the **Live Edit** mode is activated, you can quickly check the state of the protection stages and the status of the objects in use from the **Protection**, **Control** and **Monitor** profiles at the bottom of the **General** menu.

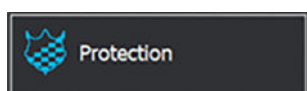
### Function comments

You can write comments for activated functions in the **Function comments** tab in the **General** menu. For example, you can write notes when your parameters were last changed.



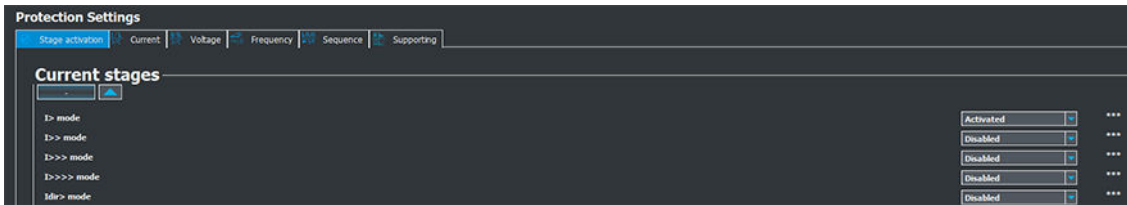
You can also write comments in the functions' own **Settings** menu.

## 5.3 Protection menu



The **Stage activation** tab is the main tab in the **Protection** menu. Here you can activate and disable protection functions.





The available protection functions in the configuration depends on the device type. After you have activated a function, its parameters and other information can be found by navigating to its tab. For example, if you activated the **I>** function (the over-current function) listed under **Current stages** in the **Stage activation** menu, you are able to access its settings from the **Current** menu. Each activated function has the following subsections or tabs.

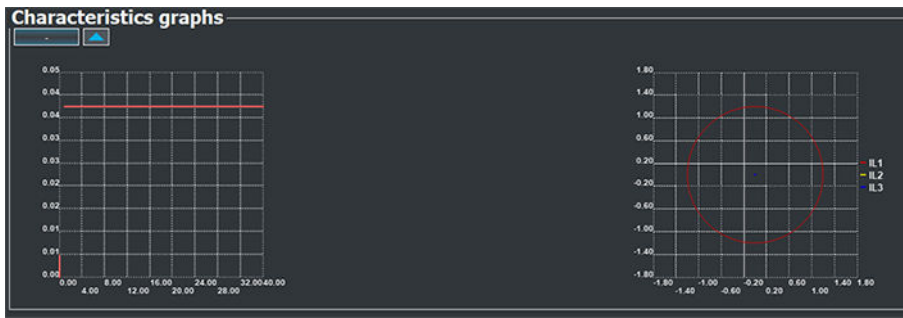
## Info tab

After a function has been activated, opening the function's menu automatically opens into the function's **Info** tab. The **Info** tab displays information related to the function such as statistics on starts and trips, measurements and the active settings.



Setting	Description
Setting control from comm bus	Some functions allow you to enable setting changes through a remote connection (SCADA).
Meas. side	If the unit has more than one current measurement card, some functions may require you to choose which card the relay supervises.
Condition	Displays the status of the function if the <b>Live Edit</b> mode is activated. Otherwise, it displays the status of the function when the .aqs file was saved.
Phases condition	Some functions display status of each phase (start and trip).
Expected operating time	Displays the expected operating time with the measured values at that time. Especially useful when testing inverse curve delays.
Time remaining to trip	Displays how much time remains to the next trip with the currently measured values.
$X_{meas}/X_{set}$ at the moment	Displays the ratio between the measured value and the set operating level at that moment. When the measured value is exactly at the operating level, a value of 1.00 is displayed for $X_{meas}/X_{set}$ .
Measured magnitude	Some functions give you the option of choosing the measured magnitude (usually this is a choice between RMS values, TRMS values and peak-to-peak values).

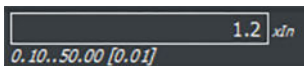
The **Characteristics graphs** section of the **Info** menu is found in most of the protection functions.



The graph gives us useful information on the settings currently in use. If the **Live Edit** mode is activated, the graph also shows us visual information of the function's status at a given moment. In the example above, the image on the left shows the time delay settings in a graph form. The image on the right shows a vector graph of the measured currents vs. the pick-up level.

## Settings tab

You can change the settings of the function in the **Settings** tab. The range of the setting for each parameter is displayed below its text box. The minimum step for the parameter is in the square brackets.



In the example, the unit of the parameter is xIn (multiplier of I nominal), the minimum setting value is 0.10, the maximum setting value is 50, the minimum step is 0.01, and the currently used setting value is 1.2 xIn.



## More information

For instructions on how to set up each individual protection function, refer to the MVR-200 manuals at [deif.com](https://deif.com).

## Registers tab

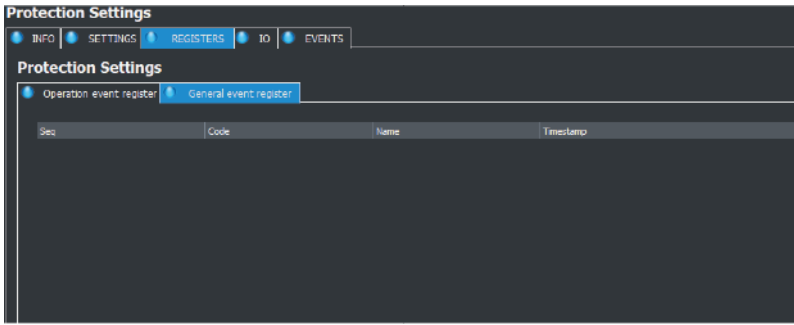
The **Registers** tab contains two views:

- **Operation event register.**
- **General event register.**

**Operation event register** displays information about the function's alarms and trips. The tab only displays the measurement values that are relevant to the actual function. Each function registers its operation into the last 12 time-stamped registers. The values recorded into registers contain information such as the time stamp, the fault type, the pre-triggering measurement value, the fault measurement value, etc. You can find a more detailed explanation of what each of the register columns records in the Designers Handbook at [deif.com](https://deif.com).

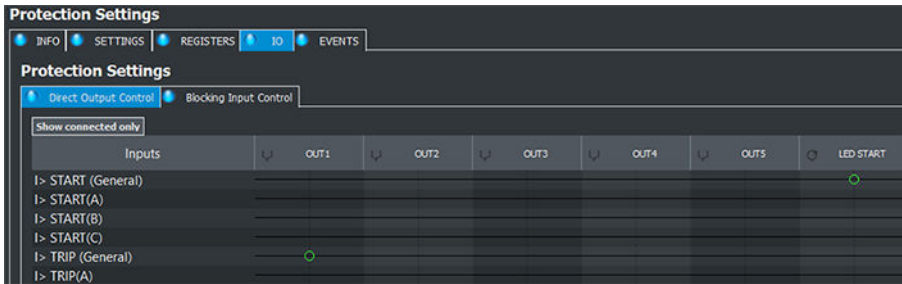
When you open an .aqc configuration that has been downloaded from the relay, DEIF MVR USW displays the registers recorded to the .aqc at the moment of download. If the **Live Edit** mode has been activated, DEIF MVR USW displays the registers in real time. To clear the registers, select **Clear** in the **Clear registers** drop-down menu that is located below the table.

**General event register** displays events recorded by the function. The relay records any event that has been activated in the Events tab. These events can be also viewed at **Tools > Events and logs > Event history**.



## I/O tab

The I/O tab is divided between the **Direct output control** tab and the **Blocking input control** tab.

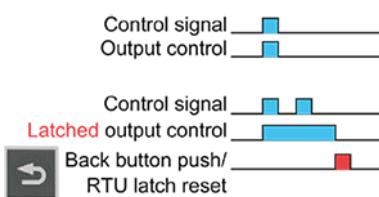


In **Direct output control** the function's output signals can be used to switch output the statuses of signals and user LEDs ON or OFF. The available output signals vary depending on the function. The matrix has two kinds of connections for output contacts:

- **Connected.**
- **Connected and latched.**

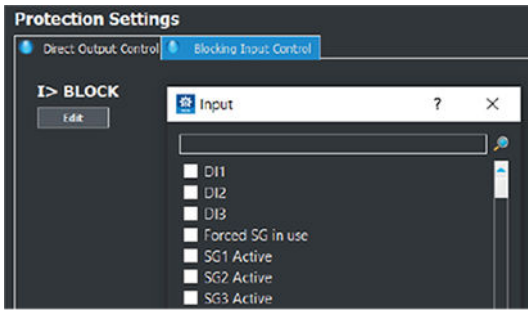
The connected output is activated or released, when the input is activated or released. Similarly, the latched connection output signal is activated when the input is activated; however, the output remains active until it is cleared manually from the device's panel by pressing the Back button. A latched signal can also be reset remote terminal unit. See the diagram below describing the difference between normal and latched signals.

Click on the crossing point of an input signal and an output signal to make a connection. Then choose **None**, **Connect**, or **Latch**.



In MVR-25x series devices you can choose the color of the LED when making the matrix connection. The available colors are *green*, *red* and *orange*. When the matrix has been configured, upload the logic with **Commands > Write to relay**.

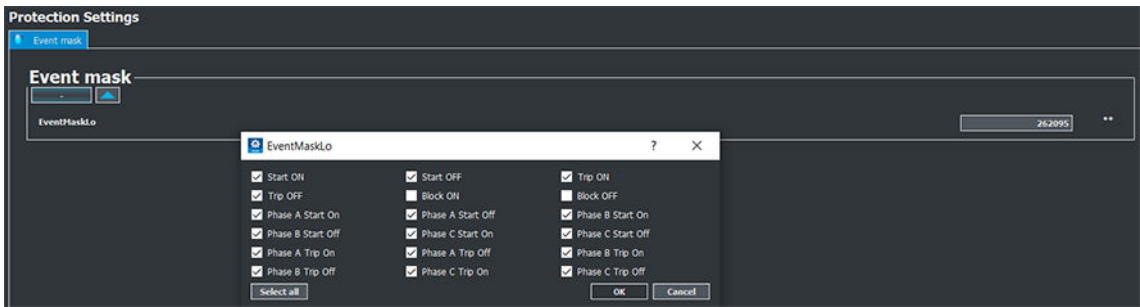
The **Blocking input control** tab is used to determine which signals block the function. By default no signals block any function. Click **Edit** at the bottom of the window to set the blocking signals of the function. A list of different signals appears.



In the example, we are setting up signals that would block the IO> (earth fault) function. The **Protection OFF** signal (a renamed, programmable control switch) is connected which means that whenever this signal is true, the IO> stage is blocked. The logic must be uploaded to the relay with **Commands > Write to relay** for the changes to take effect.

### Events tab

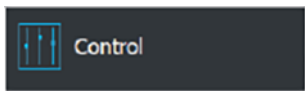
You can select which events are recorded into the **Event history** by setting the **Event mask** dialogue. To set the dialogue, click on the number box.



A pop-up window appears where you can select which event types are recorded. After this the recorded events will show up in the **Event history (Tools > Events and logs > Event history or Ctrl+Shift+E)**. The recorded events can also be checked in the HMI if the **Events** screen has been applied to the carousel (see **Tools > Carousel Designer** for more information).

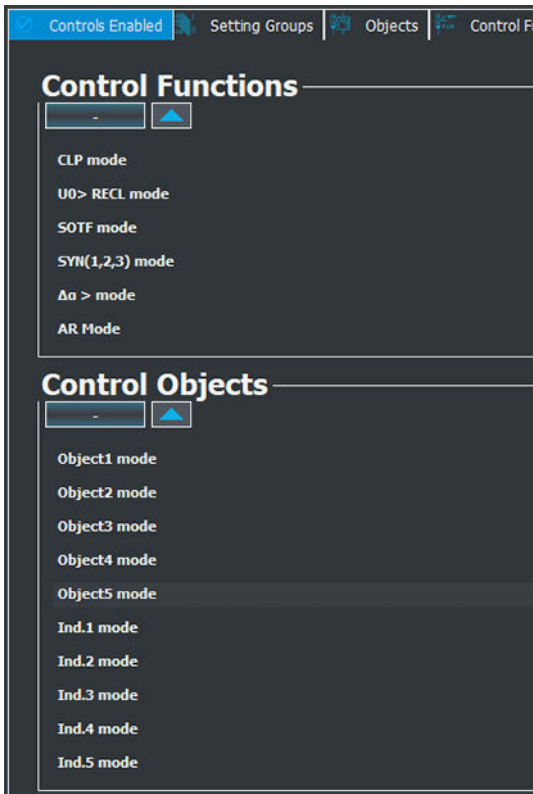
## 5.4 Control menu

### 5.4.1 Control menu



#### 5.4.2 Controls enabled

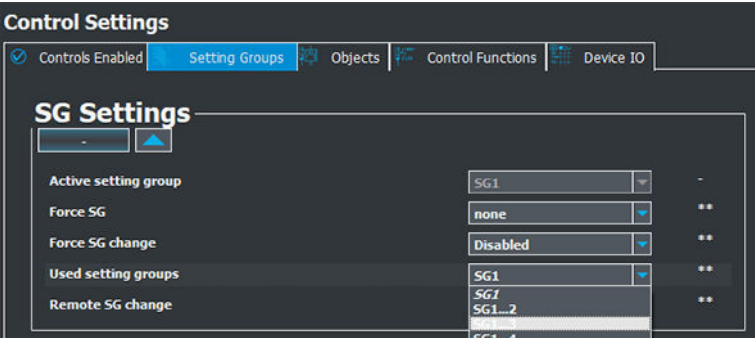
The **Controls enabled** tab is the main view of the **Control** menu, and it is used to activate and disable control functions, controllable objects and indicators. Once the functions are activated, they can be adjusted in the **Control functions** tab. Objects and indicators can be adjusted in the **Objects** tab.



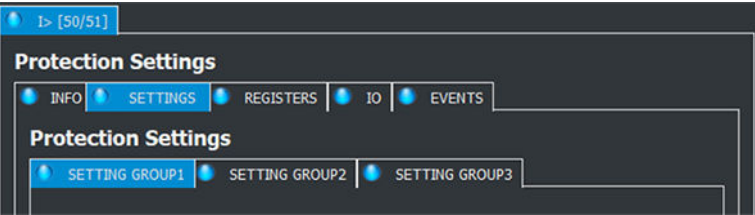
### 5.4.3 Setting groups

In the **Setting groups** tab you can set the number of setting groups used, determine which signals set the setting groups on, and force a setting group change. The **SG local select** subsection determines which digital inputs or logical signals set the setting groups on. The new setting group configuration must be uploaded to the relay with **Commands > Write to relay** for the changes to take effect.

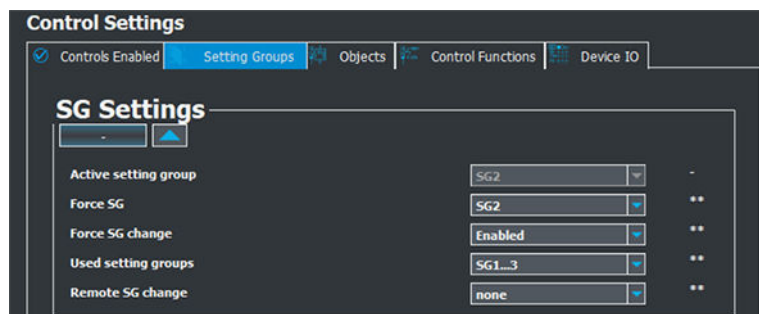
For example, let us set the **Used setting groups** from **SG1** to **SG1...3**.



Let us see what happened to the menu of a protection function (for example, **Protection > Overcurrent > Settings**). As can be seen in the image below, there are now four setting groups available. Note that when new setting groups are added, the parameter settings may not be the same as in the default **SG1**. When a new setting group has been added for the first time, it appears with the default settings.



You can bypass the setting group selection logic and force the activation of a wanted setting group. This is useful, for instance, during commissioning where the tester is not able to activate the signals which would set the desired setting group into use. In the image below, **Force SG change** has been enabled and the desired SG has been set to **SG2**.



## 5.4.4 Control functions

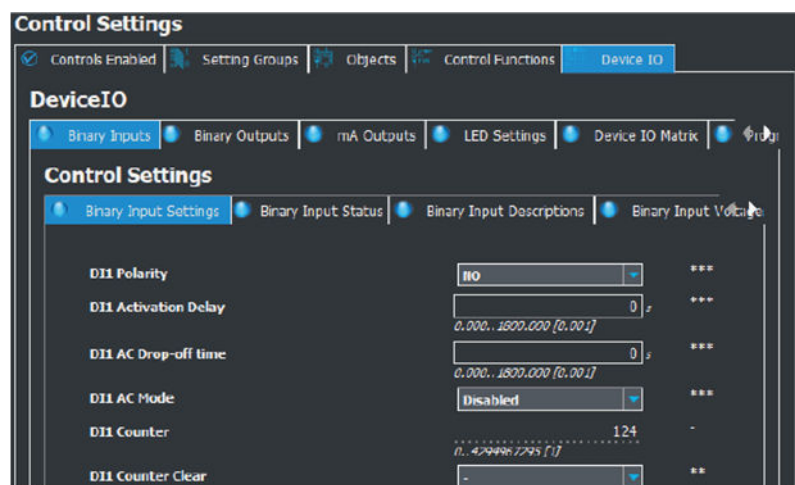
This tab is used for setting up the control functions activated in the **Controls enabled** tab. You set up control functions in the same way you set up protection functions.

## 5.4.5 Device I/O tab

### Binary input and output settings

The **Binary input settings** include the following digital input settings:

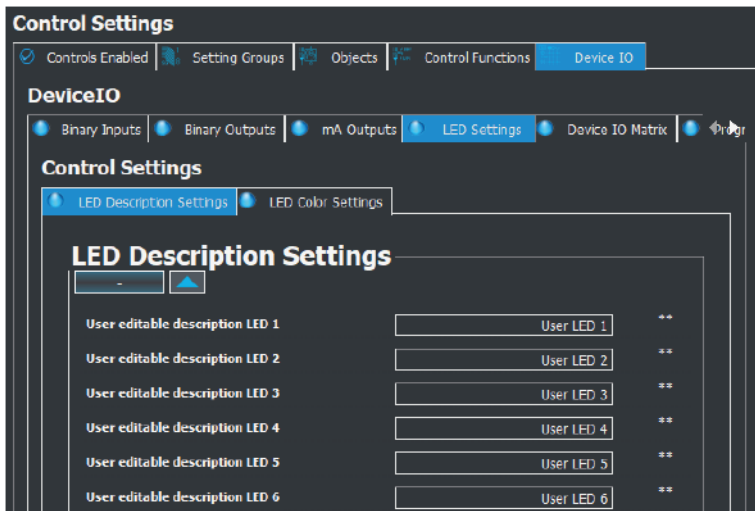
- The polarity.
- The activation and release threshold voltage levels.
- The activation and de-activation delays.
- Enables and disables the 30 millisecond delay that accounts for alternating current.



The **Binary output settings** are for setting the outputs between normally open (NO) and normally closed (NC). You can change the descriptions of both inputs and outputs; this helps you differentiate the various signals from one another when making configurations.

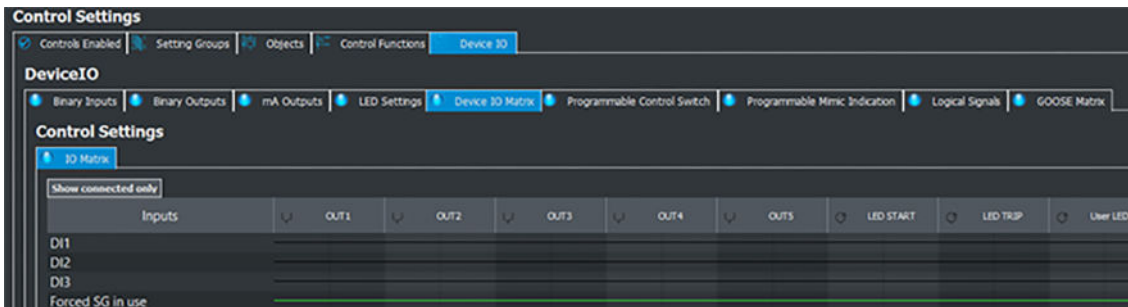
### LED settings

In the LED settings you can change the descriptions of the user LEDs. Additionally, you can set the color of the LEDs (green or yellow) when configuring MVR-210 series units. In MVR-250 series units the color of the LED is chosen when you connect signals to the LEDs in the matrix. The color priority defines which color is lit up if two or three colors are activated for the same LED.



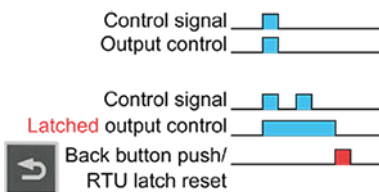
## Device I/O matrix

The **Device I/O matrix** tab displays the full I/O matrix of the device. Any I/O connections made to any of the functions can also be seen here. Additionally, whenever connections are made in the I/O matrix table, the changes can be seen in the function's I/O matrix table **Protection > [Function] I/O** tab. When the Live Edit mode is on, the status of an active signal is displayed with a green line.



When changes are made to the **Device I/O matrix**, the logic in the device is no longer up to date. The logic needs to be updated into the relay with **Commands > Write to relay** for the changes take effect. The available output signals vary depending on the device type.

The matrix has two kinds of connections for output contacts: **Connected** and **Connected and latched**. The connected output is activated or released, when the input is activated or released. Similarly, the latched connection output signal is activated when the input is activated; however, the output remains active until it is cleared manually from the device's panel by pressing the Back button. A latched signal can also be reset remote terminal unit.



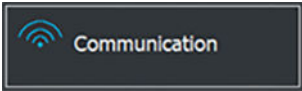
Click on the crossing point of an input signal and an output signal to make a connection. Then choose **None**, **Connect**, or **Latch**.

When configuring an MVR-21x series device LED assignments, you can set the color of the LED with **Control > Device I/O > LED settings**. In MVR-25x series devices you can choose the color of the LED when making the matrix connection. The available colors are green, red and orange. If two or more signals are attempting to activate different colors to the same LED, the displayed color depends on the priority set in **Control > Device I/O > LED settings**.



## 5.5 Communication menu

### 5.5.1 Communication menu



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

### 5.5.2 Connections

The **Connections** tab consists of the Ethernet IP address settings and the RS-485 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, and more at **Communications > Protocols**.

#### Serial COMx

In this section you can define the basic settings used by 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**.

### 5.5.3 Protocols

This tab mostly consists of communication protocol enabling, slave addresses, measurement intervals etc. Available settings depend on the communication protocol.

#### NTP

If NTP time synchronization is used, the server and client settings are defined here. To use time synchronization with NTP, the **Timesync. source** parameter in the **General** menu should be set to **External NTP**. When the device time is synchronized, the **NTP quality for events** parameter in this tab changes from **Not synchronized** to **Synchronized**.

#### IEC 61850/GOOSE

This tab is used as a starting point for configuring IEC 61850 settings. The settings include the enabling of IEC 61850 and/or GOOSE subscription, GOOSE input settings and measurement dead bands. After these have been set up, further settings can be made in the DEIF MVR USW main toolbar with **Tools > Communication > IEC 61850**.

#### Modbus/TCP

In this tab you can only enable the Modbus/TCP protocol and define the IP port for the communication. All further settings can be made in the DEIF MVR USW main toolbar with **Tools > Communication > Modbus map**.

#### Modbus/RTU

In this tab you can only set up the Modbus/RTU slave address. You can enable the Serial Modbus/RTU at **Communication > Connections**. All further settings can be made in the DEIF MVR USW main toolbar with **Communication > Modbus map**.

#### IEC 103

In this tab you can only set up the slave address and the measurement update interval. You can enable the IEC 103 protocol at **Communication > Connections**. All further settings can be made in the DEIF MVR USW main toolbar with **Tools > Communication > IEC 103**.

#### IEC 101/104

The standards IEC 60870-5-101 and IEC 60870-5-104 are closely related, as both are derived from the IEC 60870-5 standard. On the physical layer IEC 101 uses serial communication, whereas IEC 104 uses Ethernet communication. If the IEC 101 protocol is used, it can be activated at **Communication > Connections**. If the IEC 104 protocol is used, it can be activated at **Communication > Protocols > IEC 101/104**. Both IEC 101 and IEC 104 share the measurement dead band

settings and the scaling coefficients. All further settings can be made in the DEIF MVR USW main toolbar with **Tools > Communication > IEC101/IEC104 Map**.

## SPA

In this tab you can only set up the SPA address and choose whether or not time synchronization is used. You can enable SPA at **Communication > Connections**. The SPA map can be found at **Tools > Communication > SPA map** through the DEIF MVR USW main toolbar. The SPA event list can be found at **Tools > Events and logs > Event list**.

## DNP3

DNP3 is supported in both the serial mode and the TCP (Ethernet) mode. To use DNP3 in the serial mode, it must be activated at **Communication > Connections**. If DNP3 is used in the TCP mode, it must be activated at **Communication > Protocols > DNP3**. Further settings can be found at **Tools > Communication > DNP**.

## Modbus I/O

The **Modbus I/O** tab is used for RTD and mA measurements with external ADAM modules connected to the RS-485 port. Using ADAM modules requires that the Modbus I/O protocol is selected at **Communication > Connections**.

### 5.5.4 General I/O

The **General I/O** tab has 12 fault registers that can be set up to record the following signals:

- I>, I>>, I>>> and I>>>> (non-directional over-current) fault values of each phase individually
- Io>, Io>>, Io>>> and Io>>>> (non-directional earth fault) residual current values
- Id>, Id>>, Id>>> and Id>>>> (directional over-current) fault values of each phase individually
- Iod>, Iod>>, Iod>>> and Iod>>>> (directional earth fault) residual current values
- FLX (fault locator) value

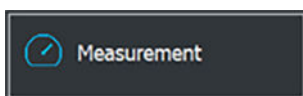
Each of these can be set to be triggered by the TRIP signal, by the START signal, or by both START and TRIP signals. These registers can be read through SCADA for fault analyzing.

### 5.5.5 Real-time signals to communication

If a measurement is not available in the communication protocol signal list, it can be added manually in this menu. There are 8 channels available in this function. The measurements are categorized under **Currents, Voltages, Powers, Impedance (ZRX) and admittance (YGB) and Others**.

For example, if the ninth harmonic of IL2 current measurement needs to be reported to SCADA, simply set the magnitude of one of the channels as **Currents** and **IL2 9.h**. After setup this function reports these measurements to SCADA.

## 5.6 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; which of them are available to use depends on the device type in use.

- 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
- Programmable stages

The tab **Measurements update** allows for the setting of the update interval of various measurements.



### More information

See the **Designer's handbook** for more information about measurements.

## CT module

The **CT module** tab is for setting up the current transformers' primary and secondary nominal currents as well as the polarities of the channels. By default, the per unit value of current-based protection functions is scaled from the current transformers' primary nominal current. The nominal current value can also be set by selecting the **Object In p.u.** option for **Scale meas. to In** and then giving a current value to **Nominal current In**.

The screenshot shows the 'Measurement' control interface with the 'Transformers' tab selected. Under 'Control', 'CT Module 1' is active. The 'Phase CT scaling' section contains the following settings:

Parameter	Value	Unit/Range	Buttons
Scale meas to In	CT nom o.u.		***
Phase CT primary	100	A	***
Phase CT secondary	5	A	***
IL1 Polarity	-		***
IL2 Polarity	-		***
IL3 Polarity	-		***
CT scaling factor P/S	20	0.001..100000.000 [0.001]	-
Ipu scaling primary	100	0.001..100000.000 [0.001]	-
Ipu scaling secondary	5	0.001..100000.000 [0.001]	-

## VT module

The **VT module** tab is used to set up the nominal values of voltage transformers. The only difference to current transformer settings is that you can choose from three different measurement modes (3LN+U4, 3LL+U4, or 2LL+U3+U4. Depending on which measurement mode is chosen, you can activate U3, U4 or both channels for residual voltage measurement or for synchro-checking. You can also activate voltage memory in this tab.

Measurement

Transformers

Frequency

AI(mA, DI volt) scaling

Current measurement

Voltage measurement

Control

CT Module 1

VT Module (4U) 1

VT Scalings

-

Voltage meas mode	3LN+U4	***
U4 mode U0 or SS	NotUsed	***
PE Voltage measurements	PE Voltages measured	-
VT primary	20000 V 1.00...1000000.00 [0.10]	***
VT secondary	100 V 0.20...400.00 [0.10]	***
U1 Polarity	-	***
U2 Polarity	-	***
U3 Polarity	-	***
VT scaling factor P/S	200 0.001...1000000.000 [0.001]	-
VT scaling factor p.u. Pri	11547.006 0.001...1000000.000 [0.001]	-
VT scaling factor p.u. Sec	57.735 0.001...1000000.000 [0.001]	-

### Frequency

In the **Frequency** tab you select the sampling mode which determines which frequency setting is used in calculations.

- **Fixed:** The calculations that need frequency are based on the value given in the **Sys. nom. f.** (the system nominal frequency) parameter; by default it is 50 Hz.
- **Tracking:** The frequency will be tracked by referencing the chosen channels in **f. Refx** (the frequency reference x).

Measurement

Transformers

Frequency

AI(mA, DI volt) scaling

Current measurement

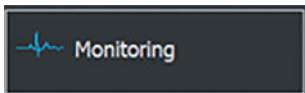
Voltage measurement

Freq. Settings

-

Smpl mode	Fixed	***
Sys.nom.f	50 Hz 7.000...75.000 [0.001]	***
Track.sys.f	49.993 Hz 5.000...75.000 [0.001]	-
Smpl.f used	50 Hz 5.000...75.000 [0.001]	-
f Ref1	CT11L1	***
f Ref2	CT11L2	***
f Ref3	CT11L3	***
f.tr qual	No track	-
f.meas in use	No track ch	-
Start behavior	St Track direct	***
Start smpl with	Use track f	***
Use nom freq until	0.1 s 0.000...1800.000 [0.005]	***

## 5.7 Monitoring menu



### Enabling and setting monitoring functions

The enabling and setting of monitoring functions is done the same way as with control functions and protection functions. The **Monitors enabled** tab lists the monitoring functions that the relay in question has and with the drop-down menu you can activate them at will. In the **Monitor functions** tab you can select a monitoring function and view its information and edit its settings.

## Disturbance recorder

The parameter settings for the disturbance recording are done in **Monitoring > Disturbance REC**. When the disturbance recorder has been configured, the Recorder Control section displays the following: the maximum number of recordings that can be recorded into the memory, the maximum length of a recording, the maximum length of a pre-trigger recording as well as the recordings currently in memory.

**Monitor Settings**

Monitors Enabled | Monitor Functions | **Disturbance REC** | Device Diagnostics

**Recorder Control**

Recorder enabled: Enabled \*\*

Recorder status: Recorder ready -

Clear record: 0 \*\*

Manual Trigger: - \*\*

Clear all records: - \*\*

Clear newest record: - \*\*

Clear oldest record: - \*\*

Max amount of recordings: 100 -

Max length of recording: 418.757 s -

Max location of pretrigger: 1 s -

Recordings in memory: 0 -

The table below presents some examples of how many recordings fit into a relay's memory with different settings.

	Example 1	Example 2	Example 3
Samples per cycle	64	64	64
Analogue channels	8	8	8
Digital channels	24	24	24
Recording length*	5 s	10 s	60 s
Total number of recordings	100	52	8

\*NOTE: The **Recording length** value must not exceed the **Max. length of recording** value.

In this example the Disturbance recorder records 64 samples per cycle from the chosen nine analogue channels (IL1, IL2, IL3, I01C, I01F, UL1, UL2, UL3, U0). It also records the state of the four chosen digital channels (I>START, I>TRIP, I>BLOCKED and Ih> START).

### Recorder Settings

Recording length	<input type="text" value="1"/> s	**
	<small>0.100...1800.000 [0.001]</small>	
Recording mode	FIFO	**
Analog channel samples	64s/c	**
Digital channel samples	5ms	**
Pre triggering time	<input type="text" value="0.5"/> s	**
	<small>0.1...15.0 [0.1]</small>	
Analog Recording CH1	UL1(2)VT1	**
Analog Recording CH2	UL2(3)VT1	**
Analog Recording CH3	UL3(1)VT1	**
Analog Recording CH4	U0(SS)VT1	**
Analog Recording CH5	IL1	**
Analog Recording CH6	IL2	**
Analog Recording CH7	IL3	**
Analog Recording CH8	I01C	**
Analog Recording CH9	I01F	**
Analog Recording CH10	I02C	**
Analog Recording CH11	I02F	**
Analog Recording CH12	none	**
Analog Recording CH13	none	**
Analog Recording CH14	none	**
Analog Recording CH15	none	**
Analog Recording CH16	none	**
Analog Recording CH17	none	**
Analog Recording CH18	none	**
Analog Recording CH19	none	**
Analog Recording CH20	none	**
Auto. get recordings	Disabled	**

**Rec.Digital Channels**

If there is a disturbance recording in the memory, you can retrieve it by clicking **Disturbance recorder** on the DEIF MVR USW main toolbar and select **Get DR file** from the drop-down menu. This loads the DR file as a .zip file to the folder you have set for disturbance recordings in **Tools > Settings**. If **Auto. get recording** has been enabled, the recordings are sent to the FTP server; from there the recordings can be loaded with SCADA.

Any disturbance recording file in COMTRADE format can be evaluated with the DEIF MVR USW software. Open the **Disturbance recorder** on the main toolbar and select **Launch MVR USW** from the drop-down menu.

When uploading disturbance recorder parameters and logic changes to the relay, you also need to write the disturbance recorder settings with **Commands > Write to relay**.

### Device diagnostics

Name	Range	Step	Default	Description
Diagnostic alarm status	0: Temp. out of range 1: Voltage out of range 2:HW configuration invalid 3: Relay output failure 4 to 9: Option card A toF alarm 10. GOOSE invalid	-	-	Displays the status of the diagnostic alarm.
Clear diagnostic alarm	0: - 1: Clear	-	0: -	Clears the diagnostic alarms.
Protection constants calculated	0: Not calculated 1: Calculated	-	-	Indicates whether or not protection constants are calculated.

Name	Range	Step	Default	Description
Internal temperature	0.0 to 200.0 °C	0.1 °C	-	Displays the internal temperature of the device.
Internal voltage (24 V/24 C max/24 V min/24 V deviation)	0.0 to 50.0 V	0.1 V	-	Displays the internal voltage of the device: the nominal, the maximum, the minimum, and the deviation.
Full system reset	0: - 1: Reset	-	0: -	Resets the whole system of an MVR-200 series device.
Protection system reset	0: - 1: Reset	-	0: -	Resets the protection system.
Reset is pending	0.0 to 60.0 s	0.1 s	-	When a full system reset or a protection system reset command has been given, a countdown start. When the countdown reaches zero, the MVR-200 series device resets.
Baseboard card revision	0 to $2^{32} - 1$	1	-	Displays the revision of baseboard card.
Baseboard card serial number	0x0 to 0xFFFFFFFF	0x1	-	Displays the serial number of the baseboard card.
CPU serial number	0x0 to 0xFFFFFFFF	0x1	-	Displays the serial number of the device's CPU. You can have up to four CPUs; the serial number of each is displayed on its own row.
Slot x card type	0: Reserved 1: Display 2: Current measurement 3: Voltage measurement 4: Digital input 5: Output relay 6: Arc 7: Communication 8: mA output 9: mA input 10: RTD input 11: Low energy analogue 12: Digital input 13: U0 measurement 14: LC Ethernet 15: RJ 45 Ethernet 16: ST Ethernet	-	0: Reserved	Displays the card type of the selected slot (A to N).
Slot x card revision	0 to $2^{32} - 1$	1	-	Displays the card revision of the selected slot (A to N).
Slot x card serial number	0x0 to 0xFFFFFFFF	0x1	-	Displays the card serial number of the selected slot (A to N).
Internal relay fault status	0: Storage error 1: Logic file missing 2: Acquisition unit error 3: Measurement config error 4: Relay hardware setup error 5: System overload error 6: Not configured yet 7: Firmware upgrade done 8: Slot supervision error 9: Software inconsistency error 10: Safe setting mode active	-	-	Displays the internal relay fault status of the device.



Name	Range	Step	Default	Description
Clear fault status	0: - 1: Clear	-	0: -	Clears the internal relay fault status.
Option card health status	0: Baseboard fault 1: Card slot A fault 2: Card slot B fault 3: Card slot C fault 4: Card slot D fault 5: Card slot E fault 6: Card slot F fault	-	-	Indicates if fault on any of the cards have been detected.
Logic state	0: Setup 1: Stopped 2: Running 3: Error	-	-	Indicates the status of logic.
Gates usage	0.0 to 100.0	0.1	-	Displays the amount of available logic gates used in percentage value.
Wires usage	0.0 to 100.0	0.1	-	Displays the amount of logic wires used in percentage value.

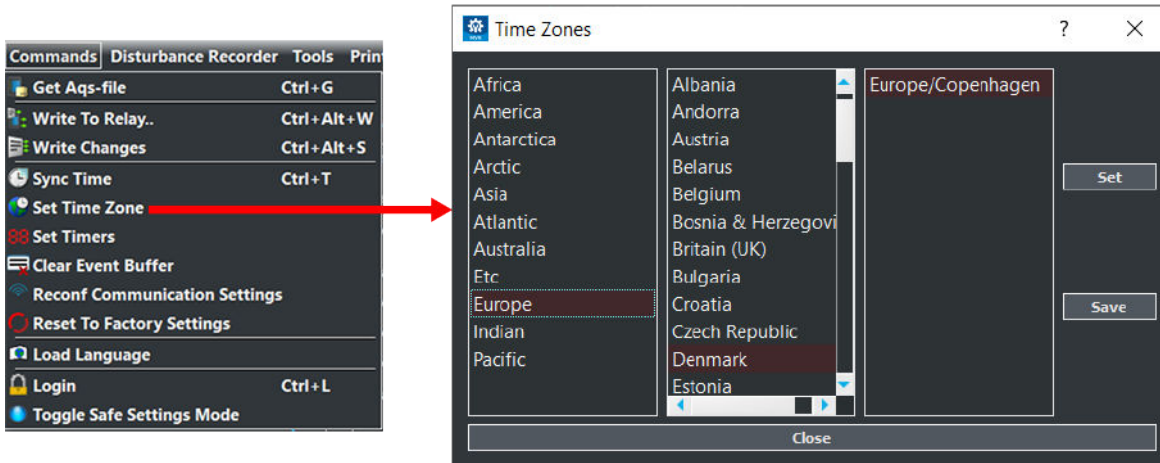
## 6. Commands menu

### 6.1 Time settings

#### Selecting time zone

You can select a time zone for the relay:

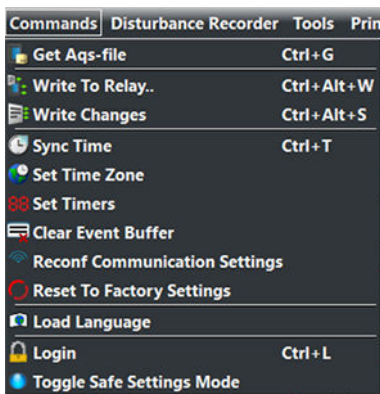
- Click **Commands** in the tool bar.
- Select **Set time zone** from the drop-down menu.



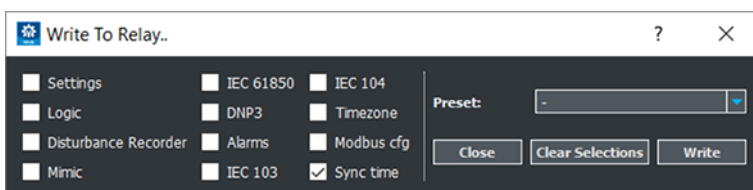
#### Synchronising time

If there is no time synchronisation source you can synchronise the relay time with the PC time:

- Click **Commands** in the tool bar.
- Select **Sync time** from the drop-down menu.



Alternatively, you can choose to synchronise the relay and PC times when you upload configurations to the relay by checking the **Sync time** box.

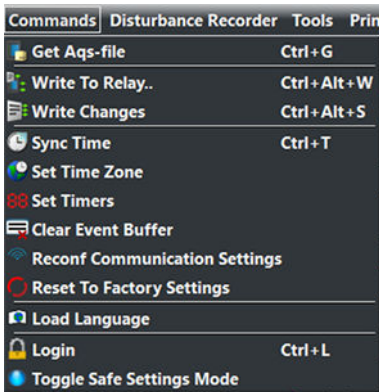


### 6.2 Uploading language files

The MVR-200 series includes five languages:

- English
- Finnish
- French
- Russian
- Spanish

However, a customized language file can be uploaded to the relay. Click **Commands** on the toolbar and select **Load language** from the drop-down menu.

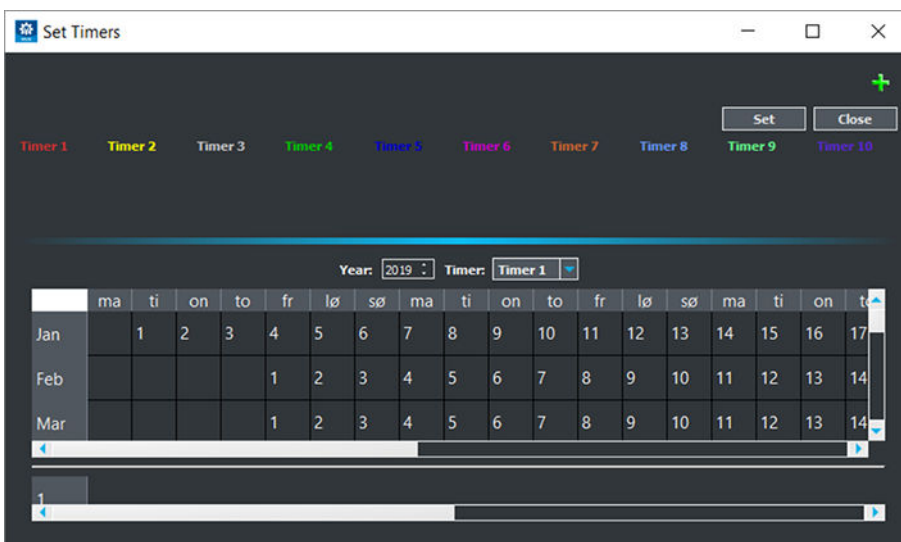



This opens a file dialogue which allows you to upload the desired language file to the relay.

## 6.3 Set timers

You can set timer signals to help control setting groups and other logic components which activate and deactivate at certain intervals.

- Click **Commands** in the toolbar
- Select **Set timers** from the drop-down menu.



Click on the  icon at the top right of the window to add a new timer configuration line. Then select one of the displayed timers, and set its state to switch to 1 or 0 at a specific time. The calendar view shows when a specific timer is on. Each timer has its own color code, which is displayed at the top of the window above the timer configuration line.

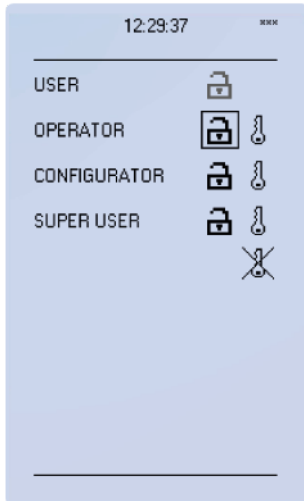
In the example, the state of the selected timer is 1 (the timer is on), when a day's box is red. The red circle marks the current day, which in this example is November 13th. Click on a day to see a more detailed division of the day below the calendar at the bottom of the window. Once the timers have been configured, you can send the configurations to the relay by clicking the **Set** button on the top right of the window. This requires an active connection to the relay.

## 6.4 User levels and passwords

There are four user levels:

- Super user = Full access, including configurations.
- Configurator = Access to all settings.
- Operator = Access to limited settings and controls.
- User = Only view access.

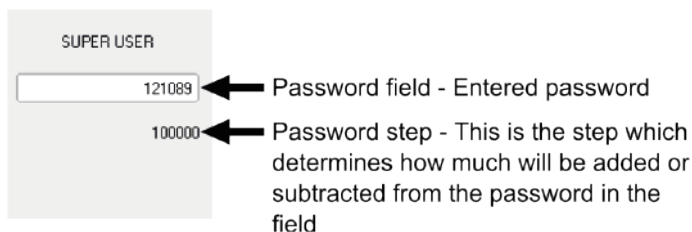
Each user level is represented by a specific lock icon in the HMI.



### Setting up user levels in your local HMI

The factory default is that all user levels are open in the device. To activate and lock various user levels:

- Push the **Lock** button in the device's HMI.
- Choose the key icon for the user level.
- Set the desired passwords for the different user levels.



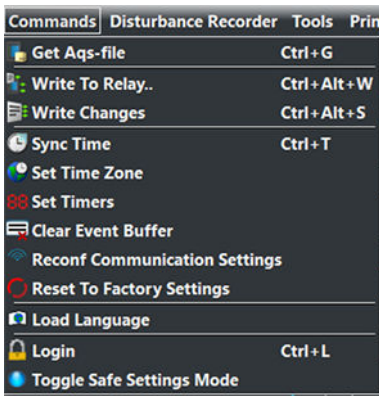
The key icon next to the user level allows you to set a new password for that level. Any user level with a password can be locked by pressing the Enter key while the lock is selected. If you need to change the password, select the key icon again and give the new password. If you want to disable password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

Unlocking and locking a user level generates a time-stamped event to the event log. A user level with a password automatically locks after 30 minutes of inactivity.

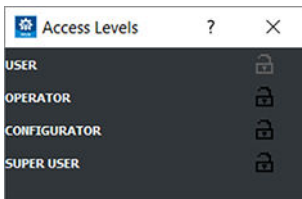
**NOTE** To change a password the user level in question must be unlocked.

### Accessing user levels in DEIF MVR USW

After you have activated the passwords, DEIF MVR USW requires your login information. Click **Commands** on the toolbar and select *Login* from the drop-down menu.

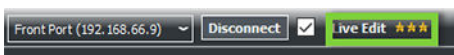


This makes the **Access levels** pop-up window appear.



Each level requires its own password to open it. When a user level is opened, an event is recorded to the relay's event history.

At the top of the DEIF MVR USW window, next to the Live Edit mode box, there are a number of yellow stars.



They indicate the active user level:

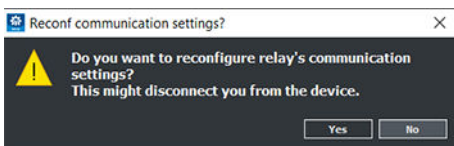
- Three yellow stars = Super user
- Two yellow stars = Configurator level
- One yellow star = Operator level
- All grey stars = User level

## 6.5 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 in the event history.

## 6.6 Reconfiguring communication settings

When you upload new communication IP settings to the relay, a prompt appears asking whether these settings will be adopted to use immediately.

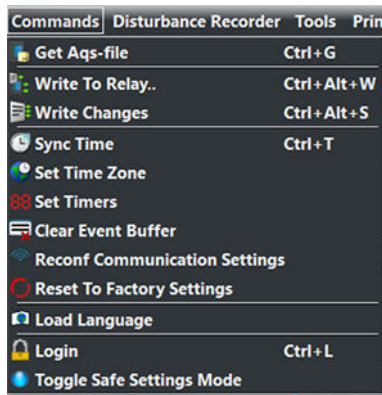


- Select **Yes**: The relay is configured with the new settings.
- Select **No**: The relay is not configured with the new settings, until you open **Commands > Reconf communication settings** and select **Yes**. If the relay is rebooted before the reconfiguration is finished, it will revert back to original IP address.

## 6.7 Safe Settings mode

You can toggle the Safe Settings mode:

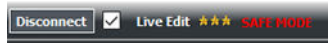
- Connect to a relay.
- Click **Commands** on the DEIF MVR USW main toolbar.
- Select **Toggle Safe Settings mode** from the drop-down menu.



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

Turning the Safe Settings mode on causes the relay to give a backup .aqc file. This backup has the current relay settings. If the new settings fail the test and you need the old setting back, you can use this backup .aqc file to retrieve them. The file also includes the event history dialogue. This dialogue can be used to see whether or not the test was successful.

When the Safe Settings mode is activated, a red SAFE MODE label appears on the main toolbar.

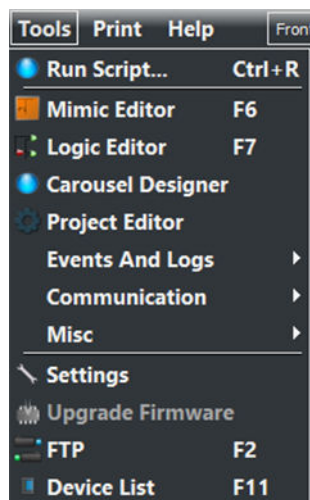


When this mode is active, the HMI display of the device displays a skull at the top of the display and of the IRF output contact; the device's ERROR LED is activated.

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

## 7. Tools menu

### 7.1 Tools menu



### 7.2 Running scripts

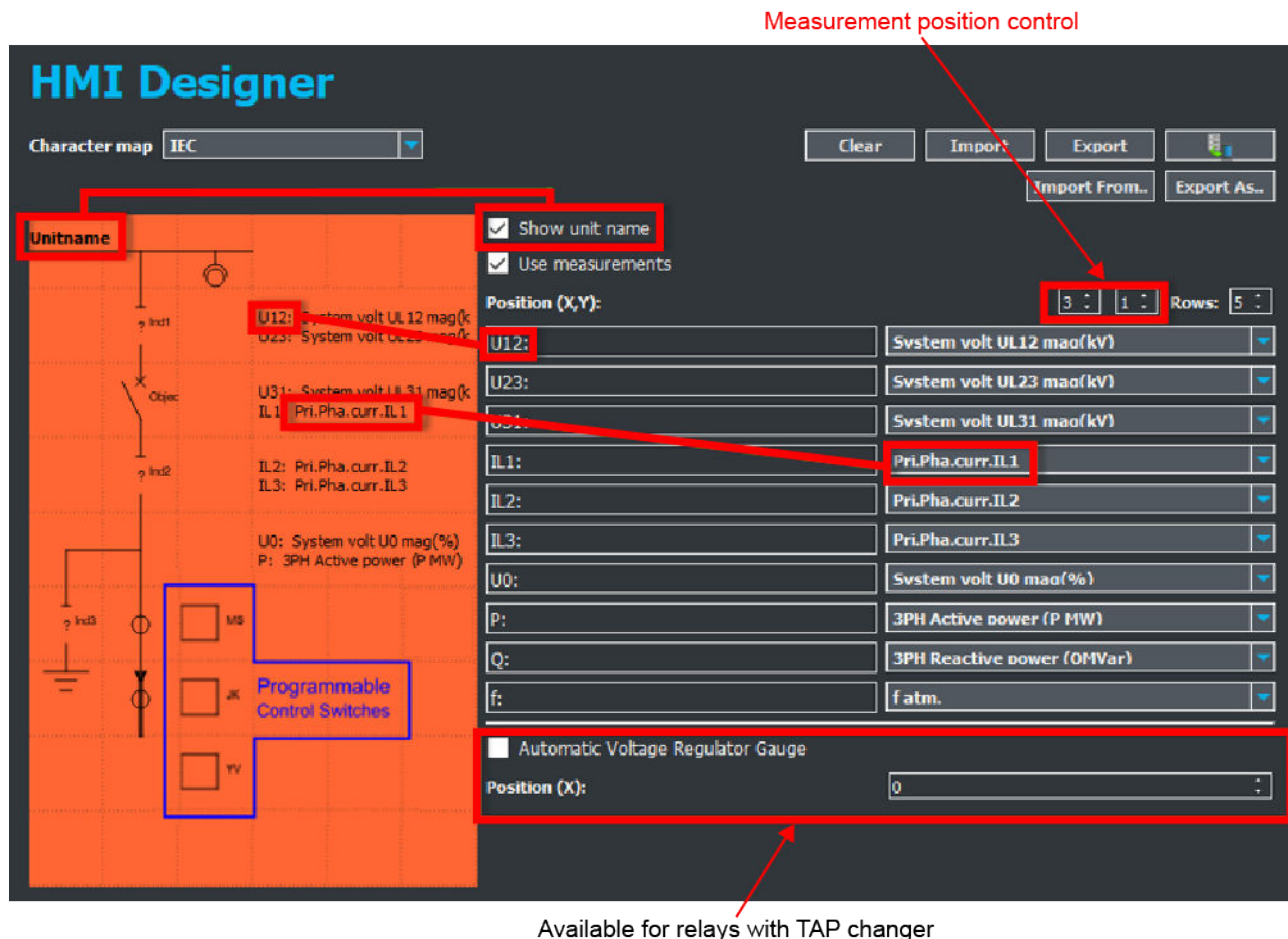
Occasionally scripts need to be run to the relays. For example, you may need to run a script when you have changed the hardware configurations after installing a new card. You can do this by clicking **Tools** on the DEIF MVR USW main toolbar and selecting **Run script** from the drop-down menu.

Disabling the firewall is recommended when running a script because the firewall may cause the script to fail. All scripts are provided by DEIF.

### 7.3 Mimic editor (MVR-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 DEIF MVR USW has for making a mimic display for the MVR-210 series units.





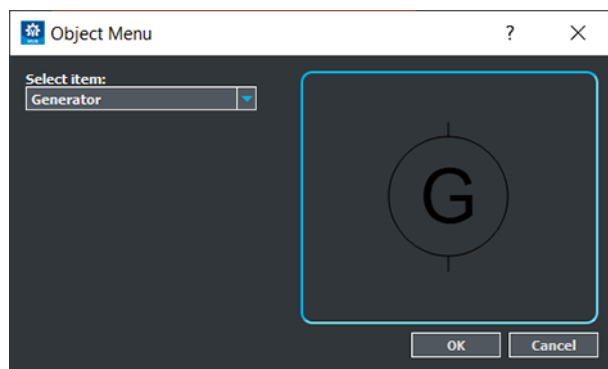
The mimic display is a 9×6 grid, which can be edited individually. The selectable items in the Mimic editor library include:

- Lines and icons for drawing purposes.
- Objects and indicators to visualize the state of 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

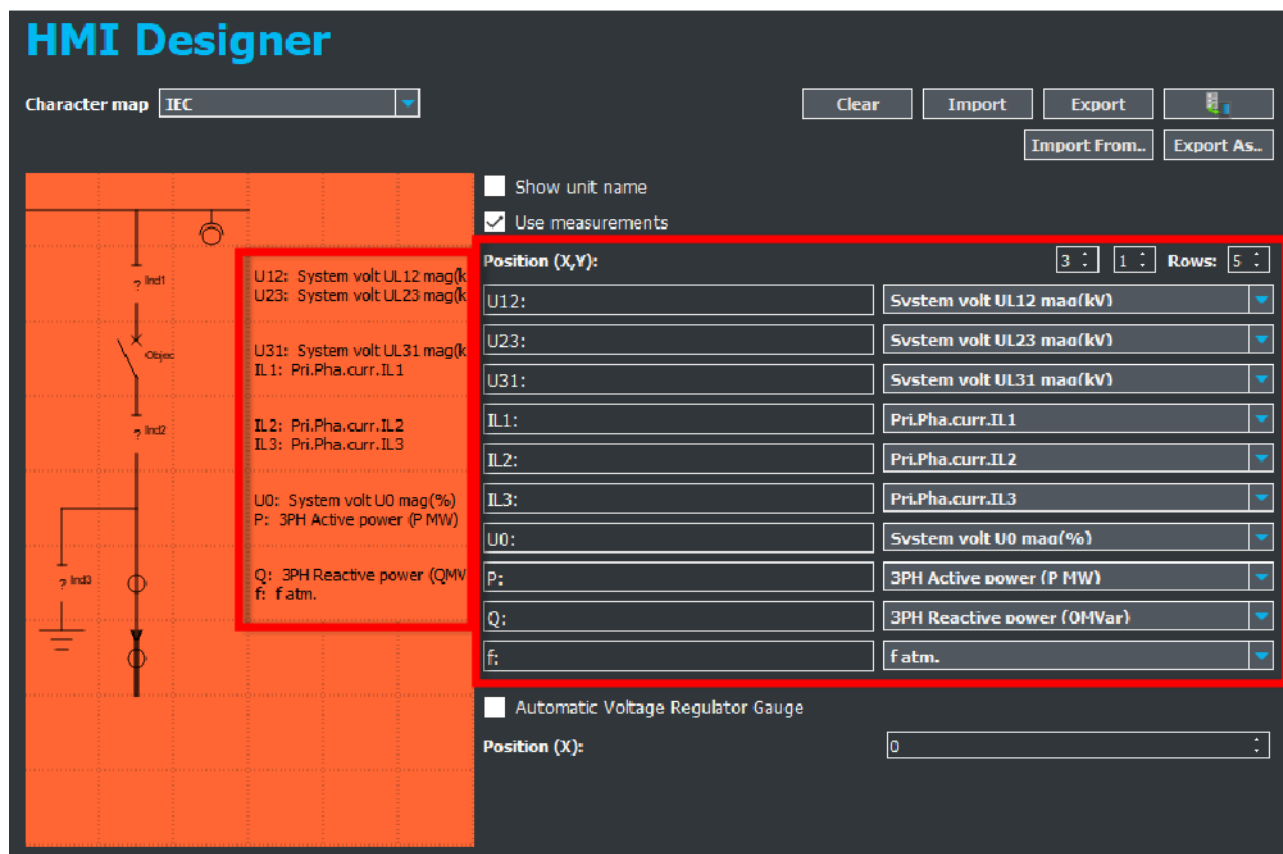
Click on one of the boxes in the grid and an **Object menu** appears. Select the item you want to use from the **Select item** drop-down menu. The frame on the right shows what the item looks like.



### Adding measurements

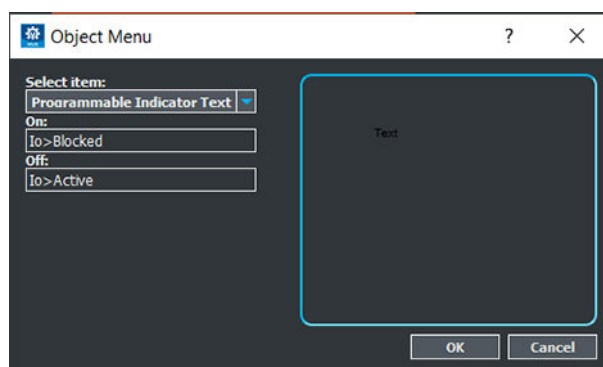
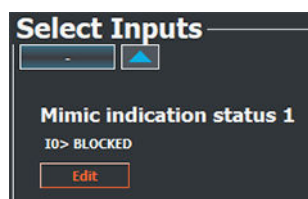
You can add measurements into the mimic by using the drop-down menus on the right side of the HMI designer. The HMI display can use up to 10 different measurements. The text boxes are used to describe what the measurements represent.

You can move the measurements by using the spin 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. Each row fits two measurements.



## Adding programmable mimic indicators

Programmable mimic indicators can display texts which indicate the status of the network. In the example, the IO> BLOCKED signal has been assigned to the 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.



## Loading the mimic to relay

If you have an active connection to a relay, click the **Send to relay** button  to send the mimic to the relay.

## Exporting the mimic

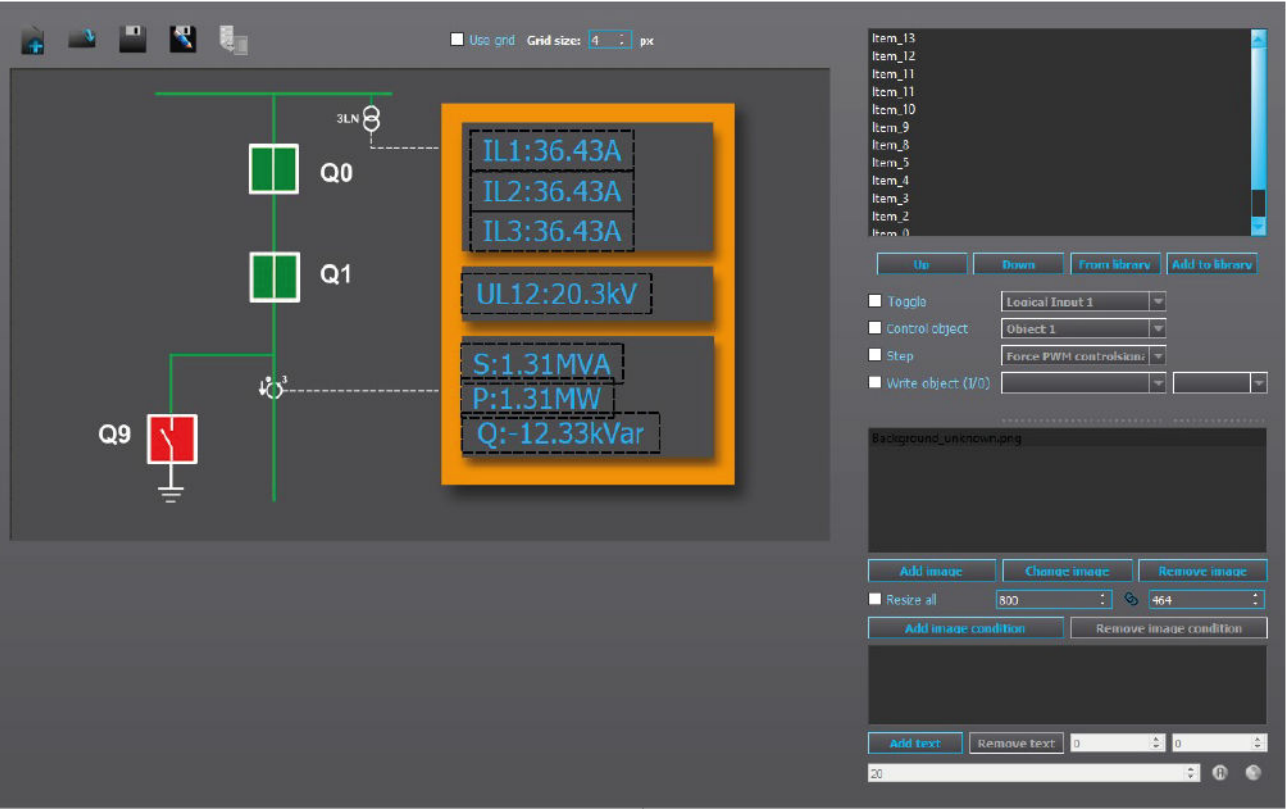
After you are finished creating the mimic, clicking the **Export** button makes it a part of the aqs configuration file you are working on. The export command is automatically executed after some functions, but not after others (such as editing the measurements text field).

**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 relays with similar custom mimics. You can also use the **Export** and **Import** buttons to copy the same mimic to other .aq5 files.

**7.4 Mimic editor (MVR-250 series)**

The Mimic editor is used to create a visualization of the protected system for the HMI. This chapter is about the tools DEIF MVR USW has for making a mimic display for MVR-250 series units. MVR-250 series devices can store up to 5 mimics.



The image and table below present the functions available to you in the Mimic editor's main toolbar.

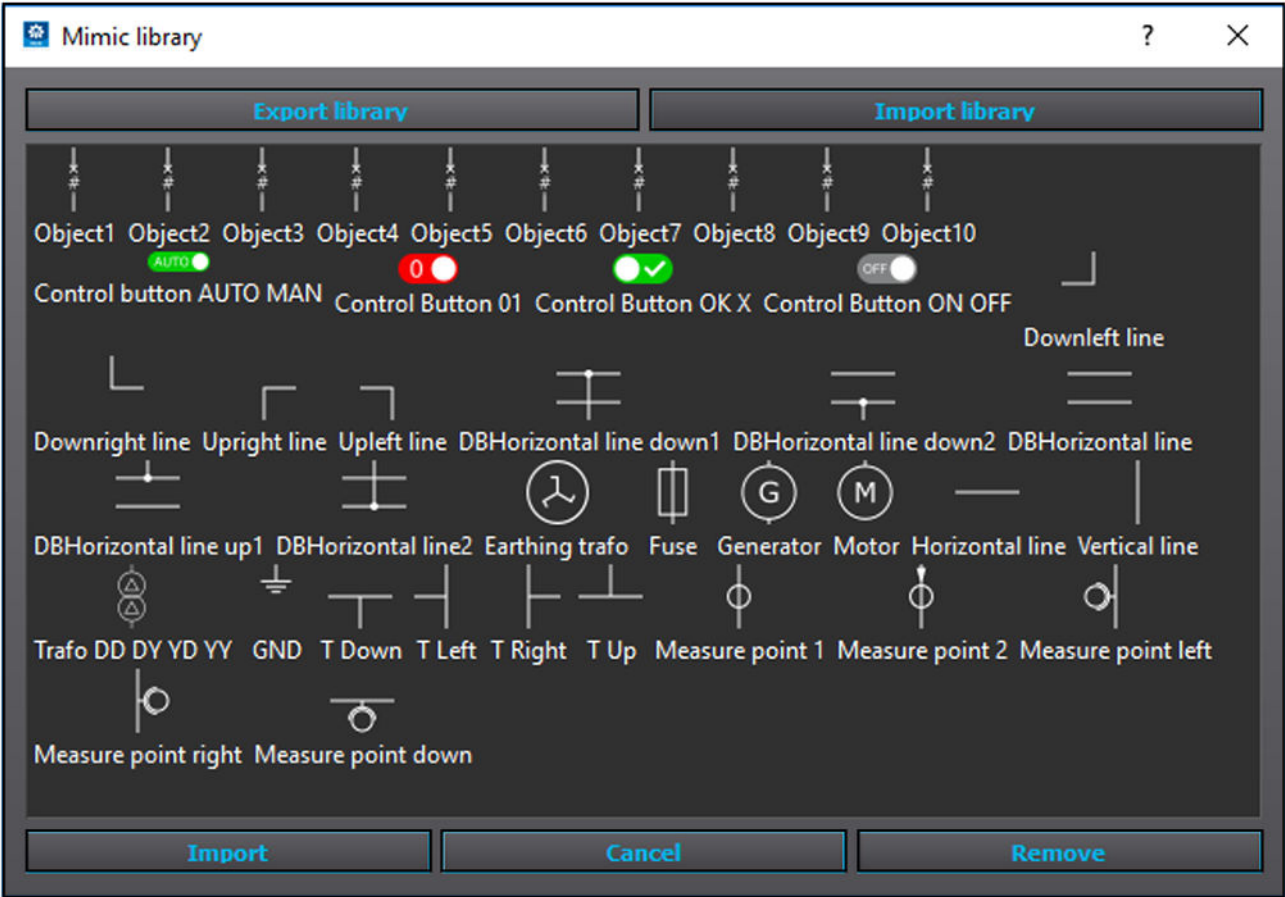


(#) Button	Description
1. Mimic drop-down menu	Chooses which of the five available mimics is being worked on.
2. New	Empties the mimic sheet.
3. Reload	Reloads a previously saved version of the mimic.
4. Save	Saves the mimic to the currently open .aq5 file.
5. Open	Opens a mimic file.
6. Save as...	Saves the mimic file as a separate file.
7. Send to relay	Sends the currently open mimic to the relay if there is a connection is to the relay.
8. Last loaded slot	Indicates the slot to which the mimic has been loaded.

(#) Button	Description
9. Use grid	If the grid is in use, items in the mimic editor move by the number of pixels defined in <b>Grid size</b> .
10. Grid size	Defines the number of pixels items move each step if <b>Use grid</b> is enabled.

Adding and removing items

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. Double-click an item to import it to the mimic, or select an item and press the **Import** button. You can resize the items and move them on the mimic grid. 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**.

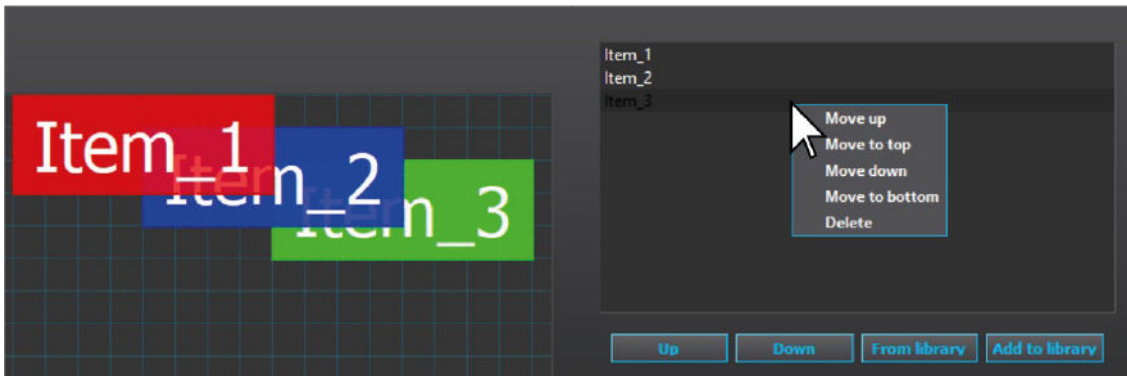


You can also remove items from the mimic: right-click on an item on the mimic and select **Remove item** from the menu that appears next to the cursor. Alternatively, you can select the to-be-deleted item from the list at the top-right window, right-click it and select **Delete** from the menu.

Item management

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. This is relevant when the Mimic editor decides which image to display in an item with multiple images.

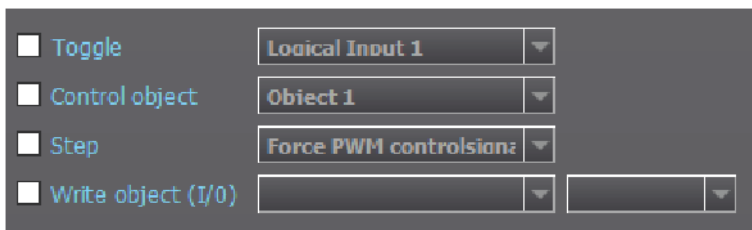
You can also rename the item by double-clicking it on the list. Right-clicking an item brings up more options for moving and deleting it.



## Function control item

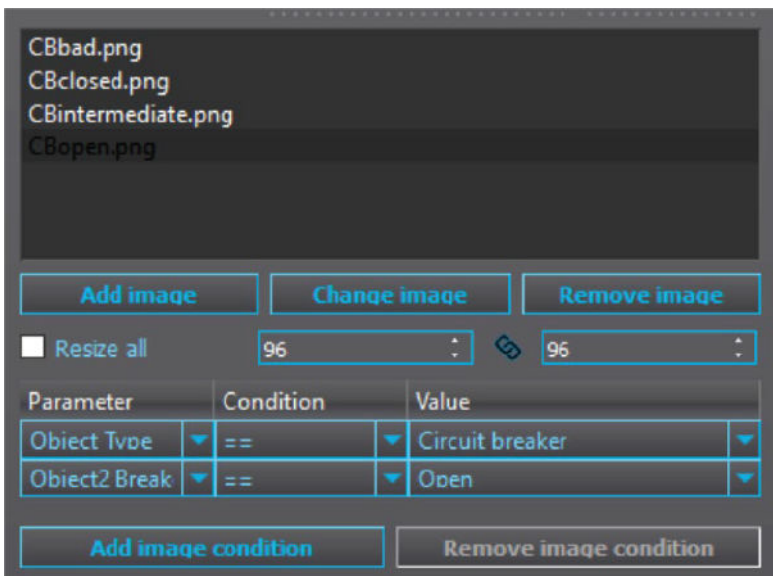
You can select between 4 function controls; only one can be selected at any one time.

- **Toggle** allows you to control logical inputs 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

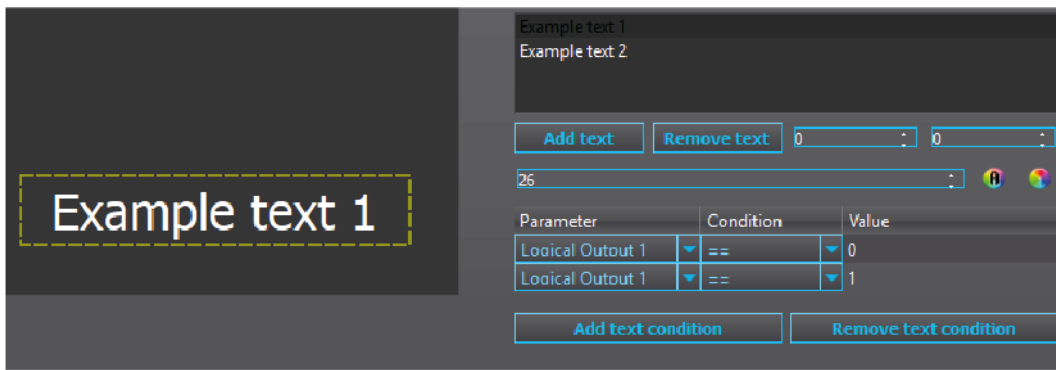
An item can contain one or more images. Each image can then be assigned with one or more visibility conditions with **Add image condition**. If no visibility condition is assigned, the image is always displayed. If two images are visible in the same item at the same time, the image that is at the top of the list is displayed. If multiple visibility conditions are applied, all conditions must be met for the image to be displayed.



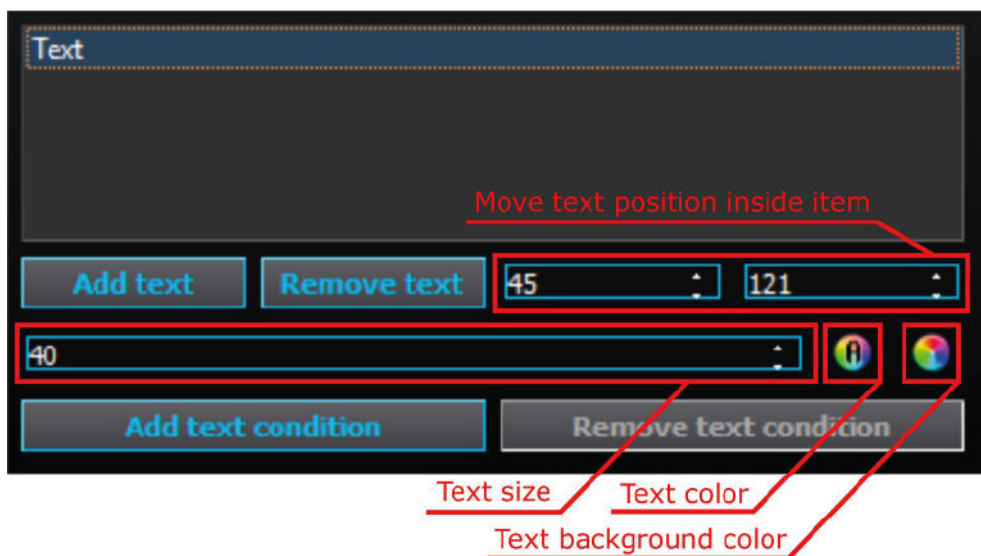
In the example, the image **CBopen.png** is visible, if the parameter **Object type** is set to **Circuit breaker** and its status (as in the parameter **Object2 Break**) is **Open**.

The **Change image** button allows you to change the image while retaining the image conditions of the image being replaced. 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.



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 text at the top of the list is displayed. If multiple visibility conditions are applied, all conditions must be met for the text to be displayed.

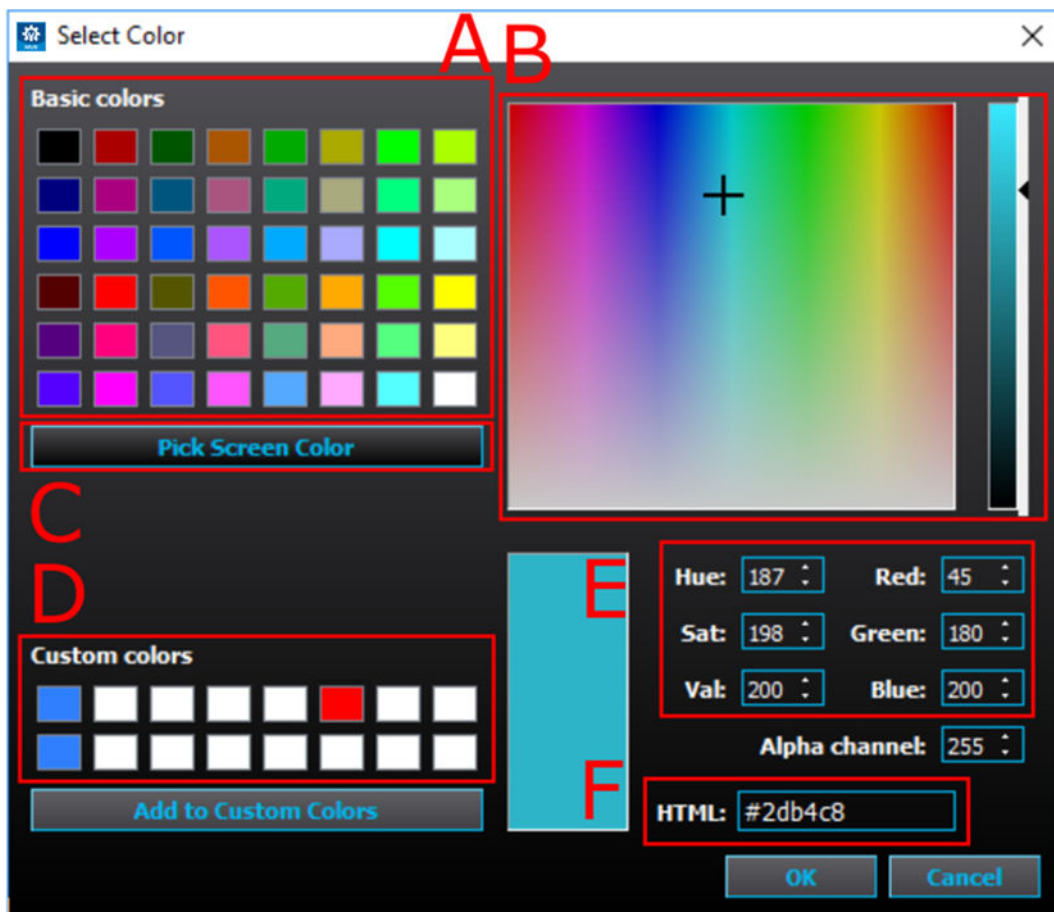


The image above shows the various text settings available in the Mimic editor. The default font size for texts added to items is 12; however, you can resize the font with the number box. You can also move the text's position inside the item with the two number boxes: the left box moves the texts horizontally,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

There are six ways to select a color for text or its background:

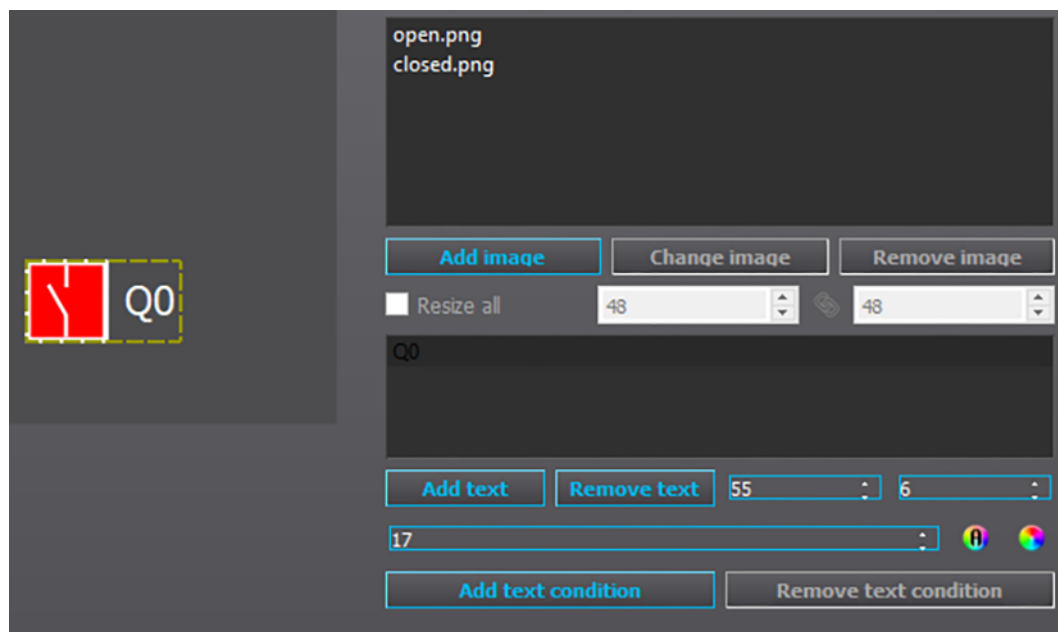
1. From the collection of basic colors.
2. From the color gradient grid and brightness slider.
3. Move the cursor to any point on the screen and click to use that specific color.
4. From the collection of saved custom colors.
5. Edit the red, green and blue integers as well as the hue, saturation and brightness individually.
6. Enter the color's HTML code.





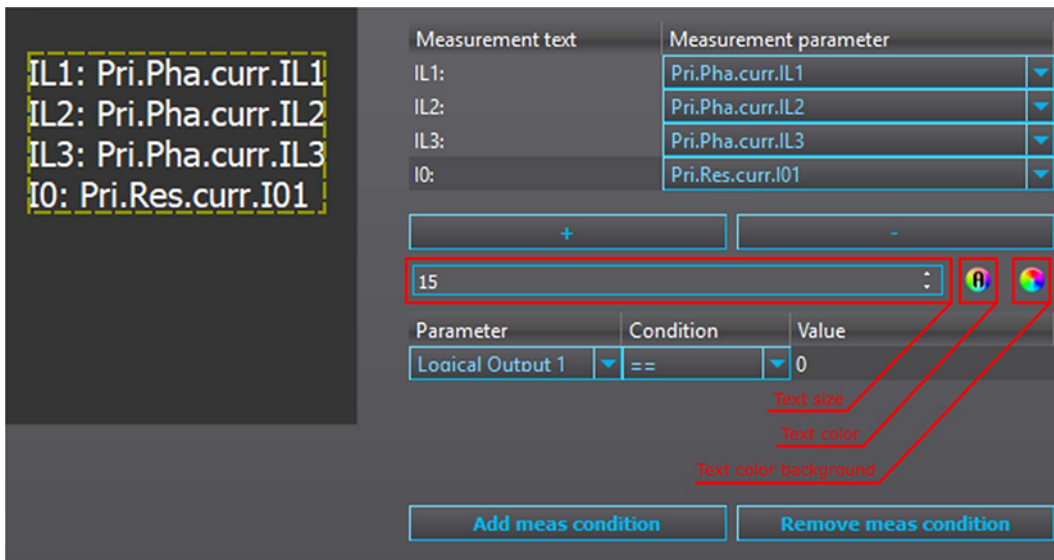
In addition to these settings, the **Alpha channel** number box sets the transparency of the text or of the text background (0 = fully transparent, 255 = fully visible).

The same item can be applied with both images and texts. For example, you can have the component's abbreviation Q0 next to the image.



### Adding measurements to the mimic view

You can add measurements by right-clicking the mimic sheet and selecting **Add measurements** from the menu that appears. The following setting selection appears on the right side of the Mimic editor window.



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. Additionally, you can change the font size, the text color, and the text's background color in the same way as in text settings. **Measurement text** is a user defined prefix for the measurement.

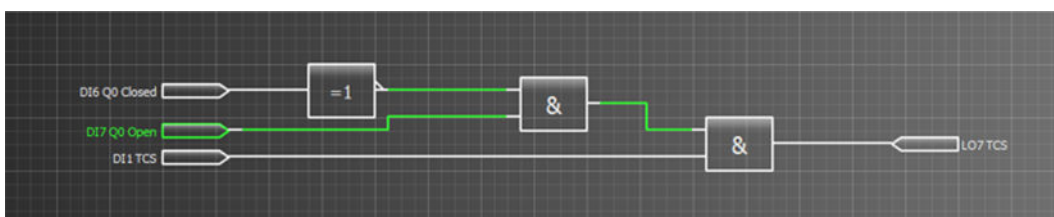
The measurement can be assigned with one or more visibility conditions. If no visibility condition is assigned, the measurement is always displayed. If multiple visibility conditions are applied, all conditions must be met for the measurement to be displayed.

## 7.5 Logic editor (MVR-210 series)

Select the Logic editor under **Tools**.

Logic editor has the tools that are most common for logic programming. The function blocks consist of the following common logic gates: AND, OR, XOR, NOR, NOT, Connect, SR latch, D flip-flop, Counter and Delay. Additionally, there is also the Latch gate which works the same way as a normal SR latch gate but it can only be reset with the Back button located in the HMI.

The image shows 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.



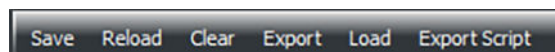
The logic is updated every 5 ms in the relay. Fast events might be not seen in the **Live Edit** mode. For reliable event activation and de-activation, analysis use of event recording and disturbance recordings is recommended instead.

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.

While very large and complex logics can be made with the logic editor, the number of logic gates and wires that can be placed 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 relay.



## Logic editor command buttons



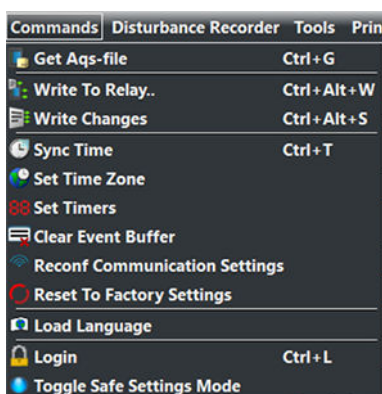
Logic editor has the following command buttons on its main toolbar:

Command button	Description
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.
Load	Opens any .aql logic file.
Export script	Saves only the script of the logic. Mostly used by DEIF personnel for troubleshooting purposes.

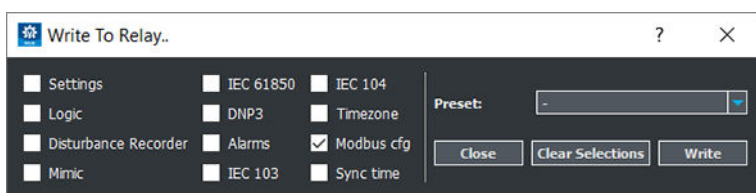
## Writing a new logic to the relay

Even in **Live edit** mode, a certain sequence has to be followed to make a new logic work:

1. Press the Logic **Save** button.
2. Go to **Commands** and select **Write to Relay**.



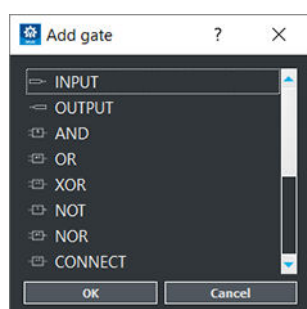
3. Write **Logic** to relay.



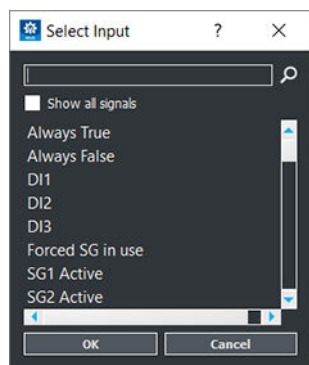
4. The new logic is now operational.

## Adding and removing logic gates, inputs and outputs

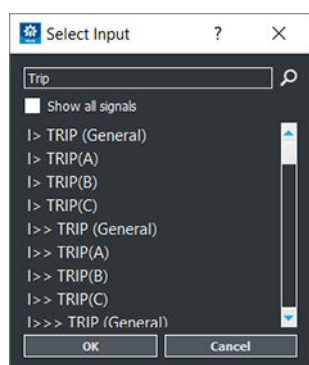
You can add a logic gate to the table by double-clicking on the table, selecting the wanted logic gate from the pop-up window, and then clicking the **OK** button or by double-clicking the selected gate.



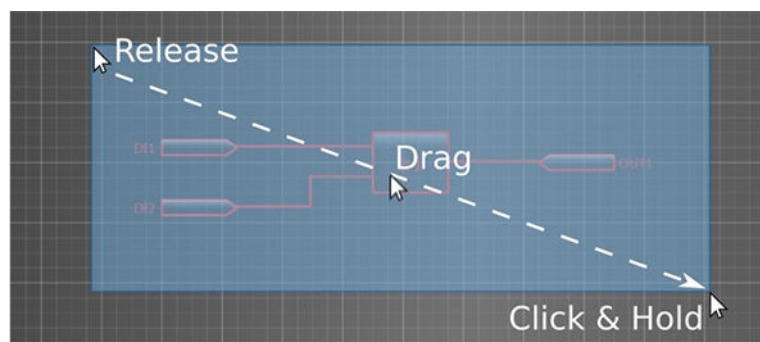
Similarly, you can add input signals and output signals by double-clicking on the table, selecting the wanted signal from the pop-up window, and then clicking the **OK** button or by double-clicking the selected signal. To choose the specific signal for your inputs and outputs, double-click the I/O symbol on the table and select the wanted signal from the pop-up window.



You can filter the signal with the search box. For example, typing **trip** to the search box lists all signals that contain the word **trip**. The editor does not differentiate between upper and lower case.

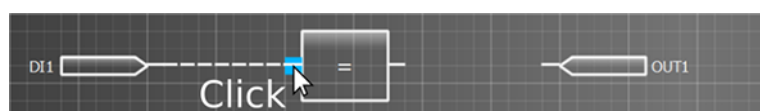
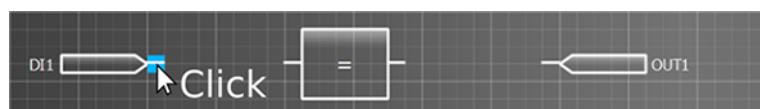


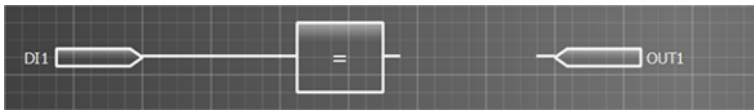
If you want to remove a gate, you can click it (making it red) and then press Delete. If there are multiple items on the logic sheet you want to delete simultaneously, paint the area with your mouse (making all components within that area red) and then press **Delete**. Painted logic can also be moved around and copied (Ctrl + C) and pasted (Ctrl + V).



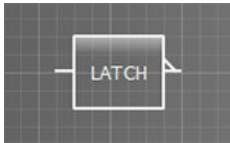
## Drawing lines

When you hover the mouse over an input or output pin, a blue box appears. Click the box, move the mouse to the destination and click on the box that appears.

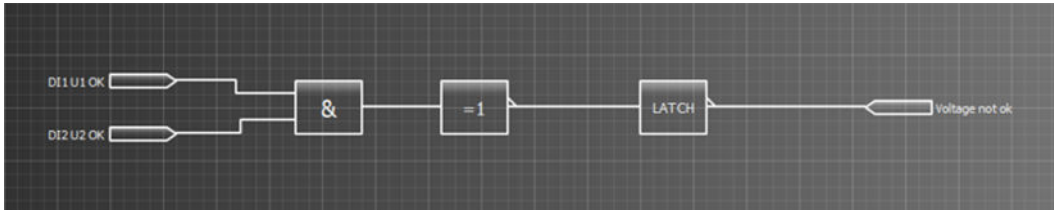




## Latch gate

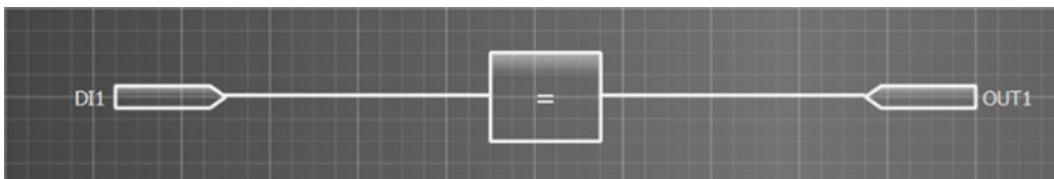


When a Latch gate receives a rising signal, its output remains active until the signal is cleared. You can clear the signal by pushing the Back button on the relay's front panel.

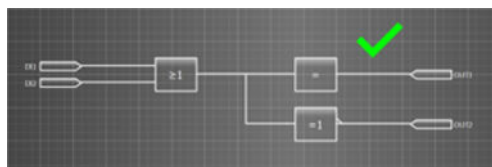
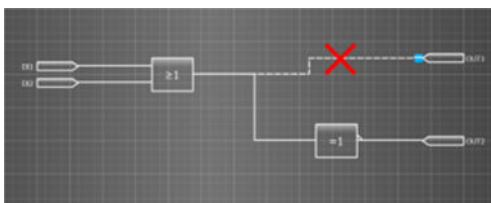


## Connect gate

The Connect gate has two applications. The first, and the simplest, application is using the gate to connect a it directly from an input to an output.



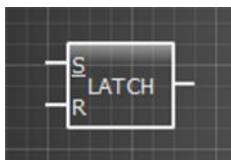
The Connect gate is also used if an output of a logic gate needs to be connected to two outputs. This is because MVR-210 series units do not support connecting the same signal to two outputs without a gate between them, and DEIF MVR USW does not let you make that kind of connections, see the image below on the left. In the image below on the right shows a correct way to connect two outputs to a logic gate.



However, you can always connect a signal to a single output without a Connect gate.

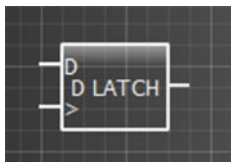


## SR latch gate



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.

## D flip-flop gate

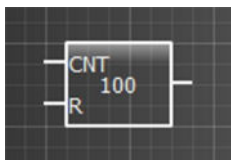


The D flip-flop gate captures the D input value every time the clock rises and then forwards the D input value to the output (Q).

The truth table of the D flip-flop gate:

Input		Output
Clock	D	Q
Rising	0	0
Rising	1	1
Non-rising	0	Q

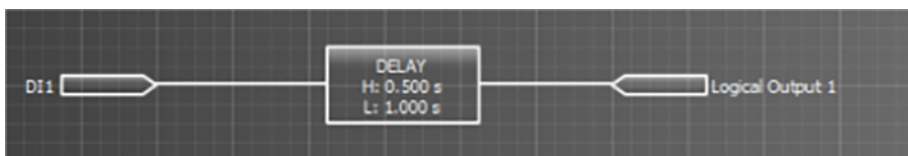
## Counter gate



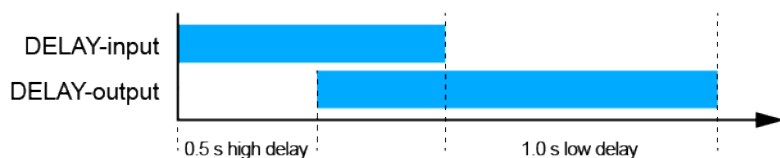
The Counter gate adds 1 to the counter value every time the value of the CNT signal goes to 1. When the counter value is equal to or higher than the trigger value, the output is set to 1. The R signal resets the counter to 0.

## Delay gate

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 relay. There can be up to sixteen Delay gates in use at any one time.

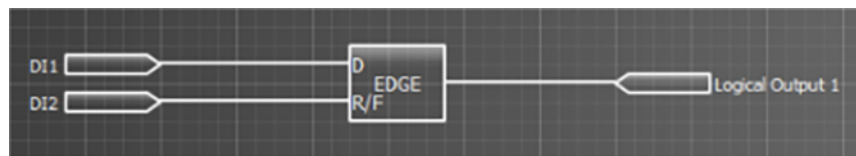


The image shows an example where the Delay gate has been used to delay the signal from the input for 1.5 seconds before it is sent to the output.

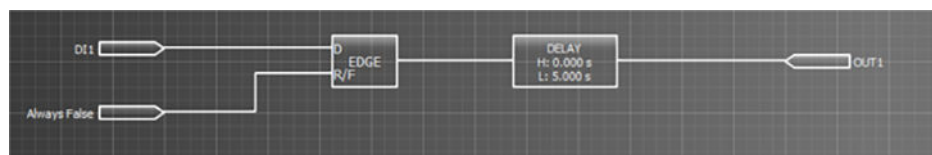


## Edge gate

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.

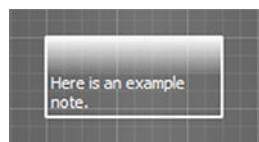


If you need a pulse longer than 5 ms, you can extend the pulse with the delay gate. In the example the Delay gate has 0 s of high delay and 5 s of low delay, resulting in a five-second pulse.



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.

## Notes

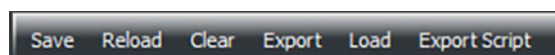


Notes can be used for describing logic programs for easier understanding. You add a note by double-clicking the editor table and selecting **Note** from the pop-up window menu. You can start writing on the note by clicking the note's bottom row. You can also edit the note later by clicking the existing text.

## 7.6 Logic editor (MVR-250 series)

Logic editor has the tools that are most common for logic programming. The function blocks consist of the following common logic gates and circuits: Input, Output, Analogue input, Analogue comparator, AND, OR, XOR, NOR, NOT, Connect, SR latch, D flip-flop, Counter, Delay, and Edge. Additionally, there is also the Latch circuit which works the same way as a normal SR latch circuit but it can only be reset with the Back button located in the HMI.

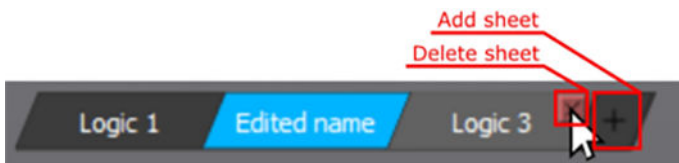
### Logic editor command buttons




Logic editor has the following command buttons on its main toolbar:

Command button	Description
Save	Saves the logic to the .aqx file that is currently open.
Reload	Loads back the logic that is in use in the .aqx 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 .aqx file. It also functions as backup save of the logic.
Load	Opens any .aql logic file.
Export script	Saves only the script of the logic. Mostly used by DEIF personnel for troubleshooting purposes.

MVR-250 series logics can be divided into multiple logic sheets. To add a new sheet, click on the **Plus** button or press Ctrl +T.



These logic sheets can be renamed by double-clicking on the name. You can remove a logic sheet by clicking on the  button in the top right corner of the sheet name box. The button only appears when the cursor is on top of it.

The logic is updated every 5 ms in the relay. Fast events might not be seen in the Live Edit mode. For reliable event activation and de-activation, analysis use of event recording and disturbance recordings is recommended instead.

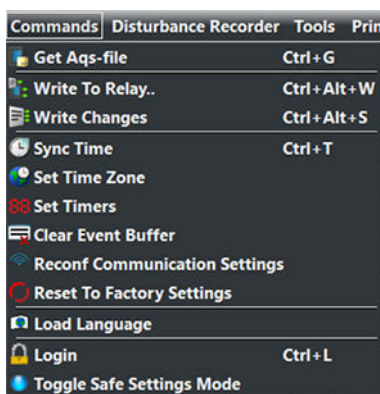
The logic must be designed from left to right. The logic gate operation to be done first must be furthest to the left on the canvas. If the order is important, make sure one is not placed right below another.

While very large and complex logics can be made with the logic editor, the number of logic gates and wires is limited. The maximum number of gates is 768, and for wires the maximum is 256. The number of wires is currently 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 relay.

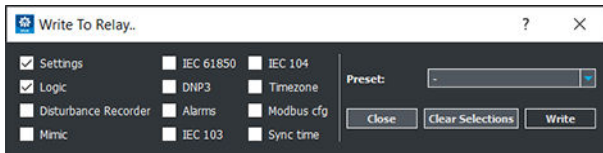
## Writing a new logic to the relay

Even in **Live Edit** mode, a certain sequence has to be followed to make a new logic work:

1. Press the Logic **Save** button.
2. Go to **Commands** and select **Write to Relay**.



3. Write **Logic** to the relay.

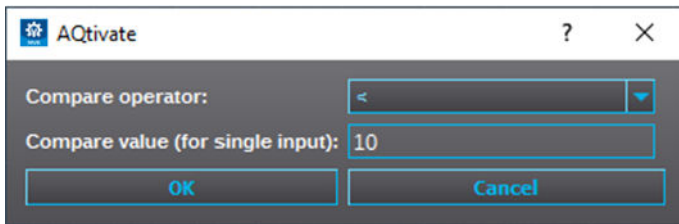


4. The new logic is now operational.

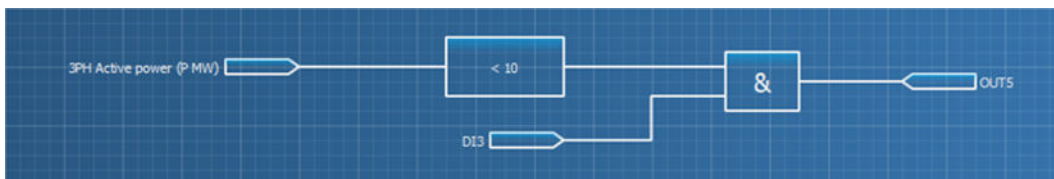
## Logic gates

MVR-250 series units have the same logic gates available as MVR-210, see **Tools menu, Logic editor (MVR-210 series)** in this document. In addition, MVR-250 series logic editor also have analogue input and comparator gates.

The analogue comparator can be used to activate or disable the gate output based on the measurement selected to the analogue input. When adding the analogue comparator to your logic, double-click on the gate to open a pop-up window, where you can select the operator mode and the comparator value.



In the example, the analogue input **3PH active power (P MW)** is connected to the analogue comparator gate, where the value has been set to **10** and the operator mode is **<**. This means that the analogue comparator output gate is active whenever the three-phase active power is under 10 MW.

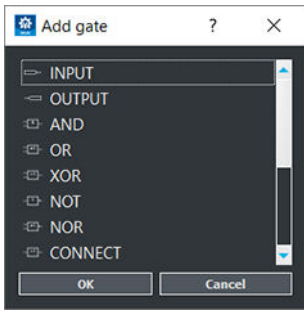


The analogue comparator gate has six different operator modes:

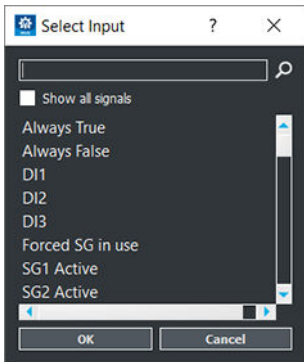
Operator	Description
==	Equal to
!=	Not equal to
<	Less than
>	Greater than
<=	Less than or equal to
>=	Greater than or equal to

## Adding inputs, outputs and logic gates

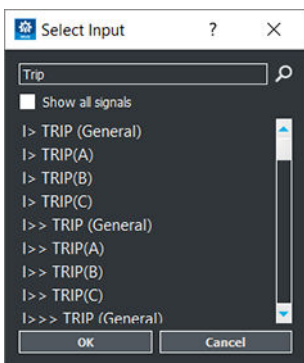
You can add a logic gate to the table by double-clicking on the table, selecting the wanted logic gate from the pop-up window, and then clicking the **OK** button or by double-clicking the selected gate.



Similarly, you can add input signals and output signals by double-clicking on the table, selecting the wanted signal from the pop-up window, and then clicking the **OK** button or by double-clicking the selected signal. To choose the specific signal for your inputs and outputs, double-click the I/O symbol on the table and select the wanted signal from the pop-up window.

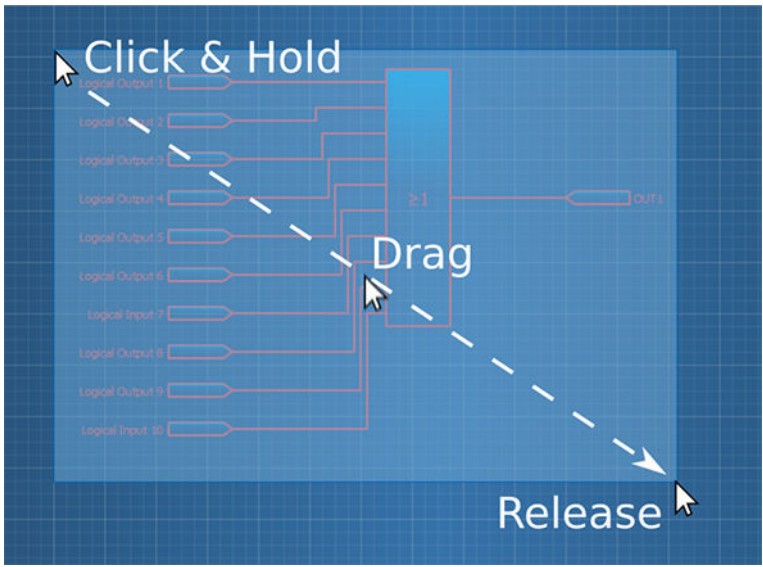


You can filter the signal with the search box. For example, typing **trip** to the search box lists all signals that contain the word **trip**. The editor does not differentiate between upper and lower case.



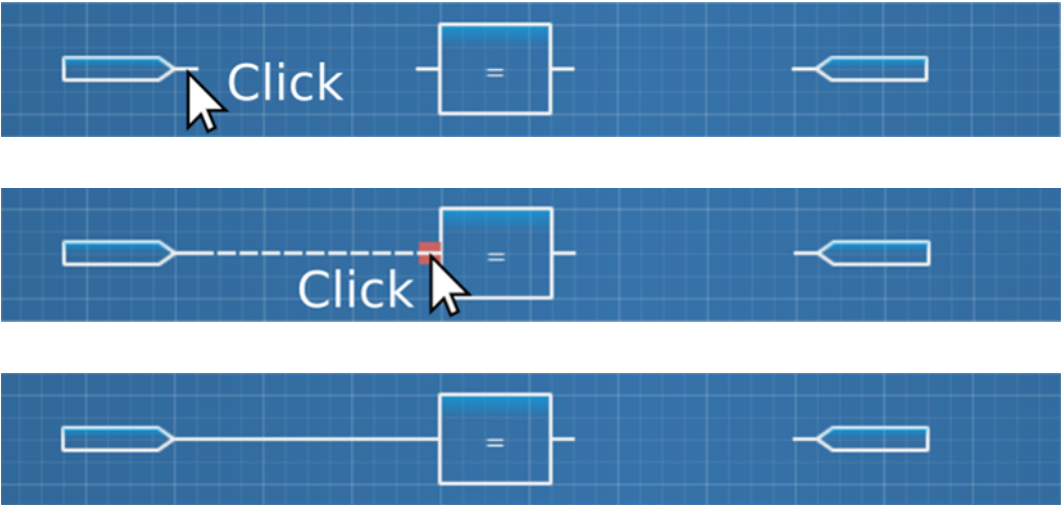
Multiple items in the logic sheet can be chosen to be edited simultaneously by painting the area with the mouse. When multiple items have been painted, you can move the selected items, delete them with the Delete key, or copy and paste them with Ctrl+C and Ctrl+V, respectively.



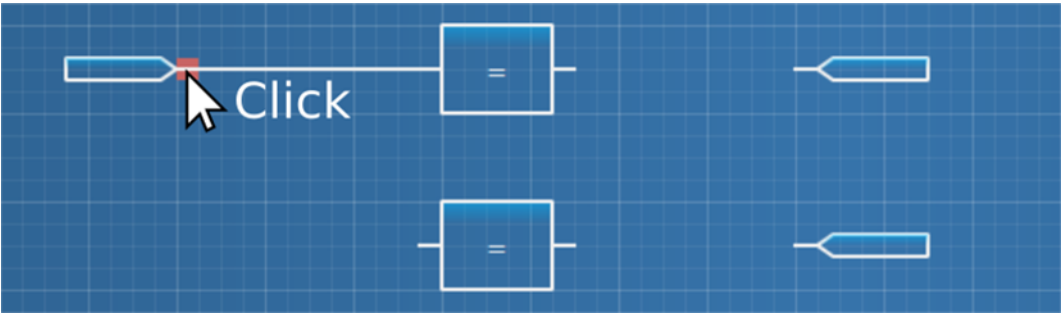


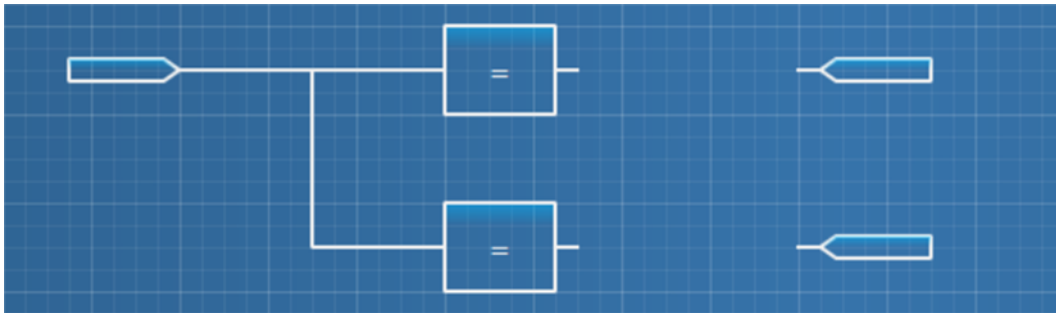
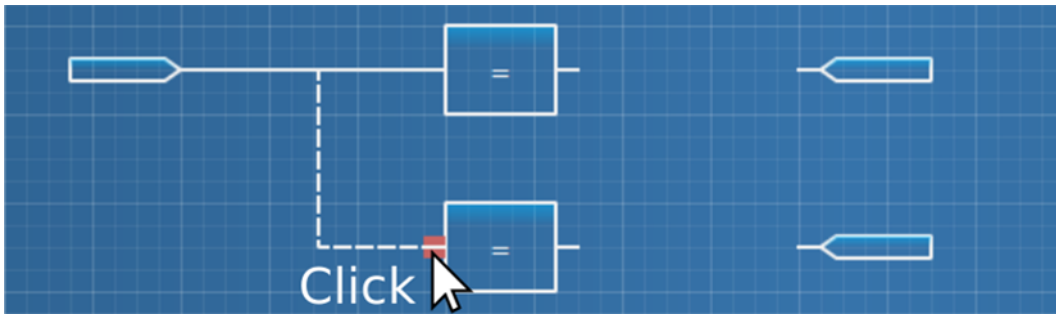
### Drawing lines

When you hover the mouse over an input or output pin, a blue box appears. Click the box, move the mouse to the destination and click on the box that appears.

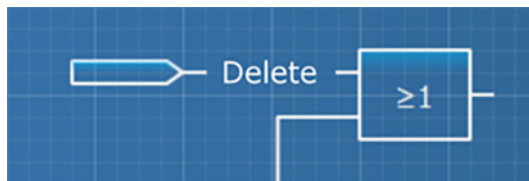


You can also connect signals to multiple destinations by repeating the previous steps:





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

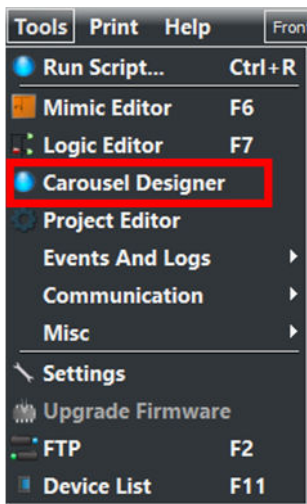



Some logic gates (such as OR gates) can take more than two inputs. This can be done by dragging a line close to the gate's inputs which makes more inputs appear. You can add up to ten inputs to a single gate.

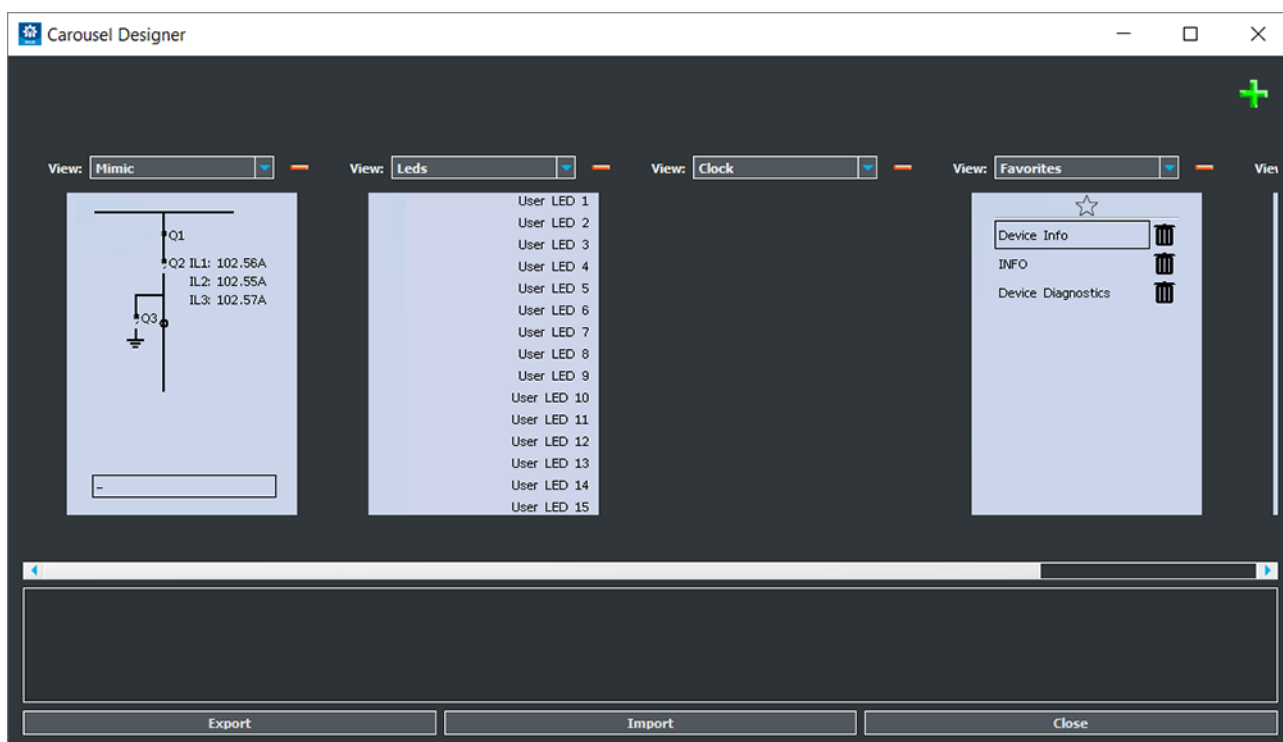


## 7.7 Carousel Designer (MVR-210 series)

The number and content of the menus shown on the HMI display can be edited in the Carousel Designer editor when an .aqs file is open.



Click on the  button to add a new view. You can select the type of the view from the drop-down menu.



Once the carousel design is done, you can export the design into the .aq5 file that is currently open by pressing the **Export** button. To save the changes, click **File > Save** in DEIF MVR USW. You can send the changes to a relay by writing the Mimic to the relay at **Commands > Write to relay**. If you have an existing saved Carousel menu, the **Import** button imports it to the currently open .aq5 file.

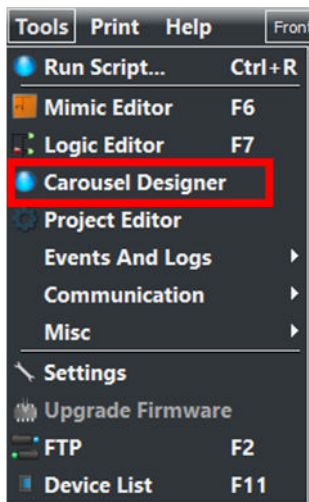
**Table 7.1** Available Carousel views


View name	Description
Mimic	Displays the unit's mimic. The mimic view image can be edited at <b>Tools &gt; Mimic editor</b> .
LEDs	Displays user defined descriptions of the LEDs.
Events	Lists all of the events recorded by the unit.
Measurements	Displays measurements up to 8 lines. You can edit which measurements are shown at <b>Tools &gt; Carousel Designer</b> .

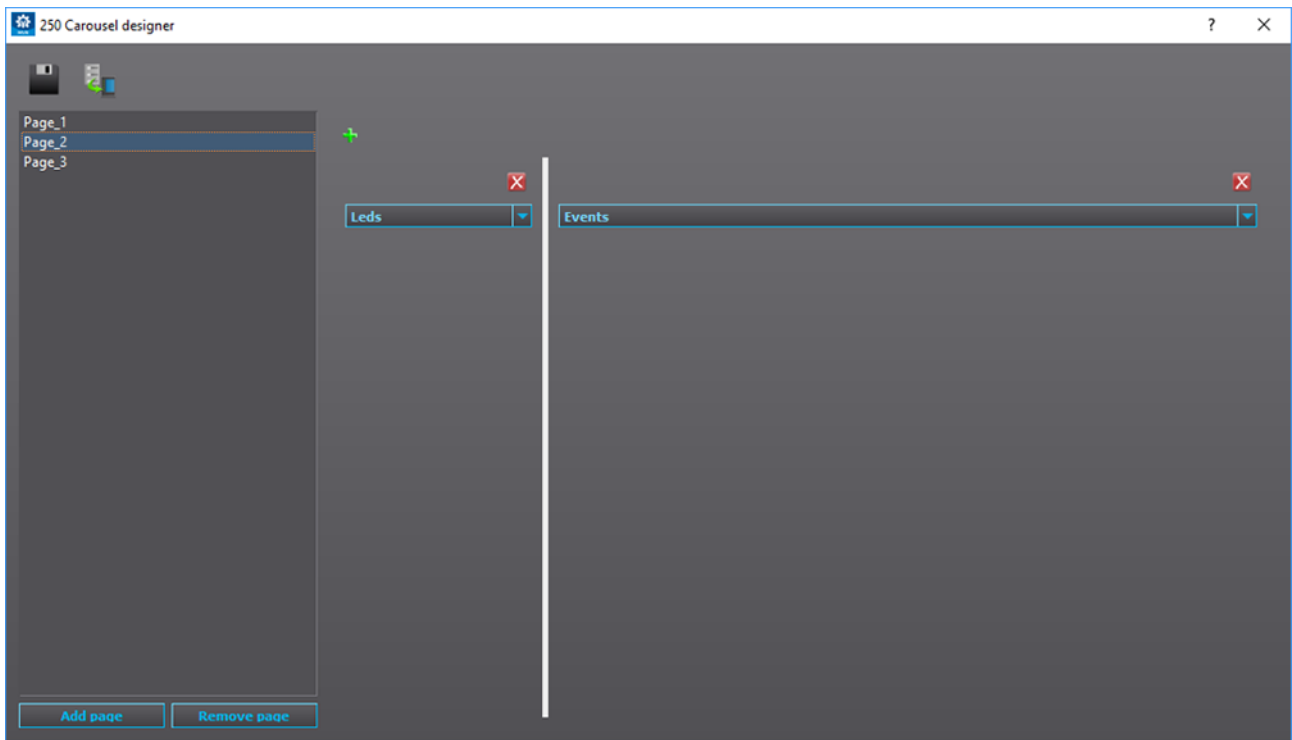
View name	Description
Favourites	Shows the setting menus favoured by the user.
Clock	Displays the unit's time and date. The time and the date can also be set here.
Fault register	Displays the fault values recorded by the VREC function (not available in all MVR-210 series device types).
Alarms	Displays the activated alarms (available only in MVR-214).



## 7.8 Carousel Designer (MVR-250 series)

The number and content of the menus shown on the HMI display can be edited in the Carousel Designer editor when an .aq5 file is open.



Click on the  button to add a new view. You can select the type of the view from the drop-down menu.

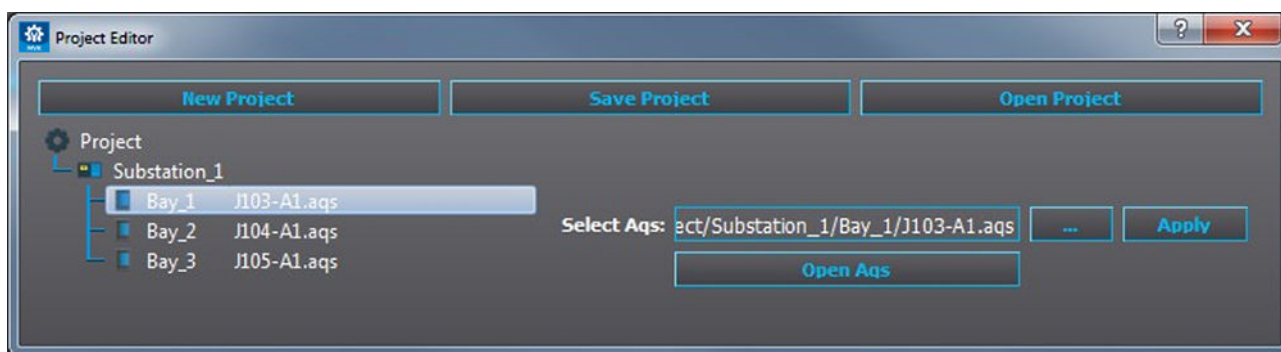


If there is more than one view on a page, the size of the view box can be changed with the thick white bar between the views. You can add and remove pages with the **Add page** and **Remove page** buttons. The order of the pages is determined by their position in the list on the left of the Carousel Designer window. Once the Carousel design is done, you can export the design to the .aqs file that is currently open by pressing the **Save** button . You can send the changes to the relay by pressing the **Send to relay** button , or by the writing Mimic to the relay at **Commands > Write to relay**.

## 7.9 Project editor

Project editor is a project management tool. You can create a new project by clicking the **New project** button, creating a node called **Project**. You can change the node name by double-clicking it.

If you right-click a node, a context menu appears. Selecting **Add substation** from this menu add 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 dialogue where you can select an .aqs file. Click the **Apply** button to assign the 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.

## 7.10 Wizard

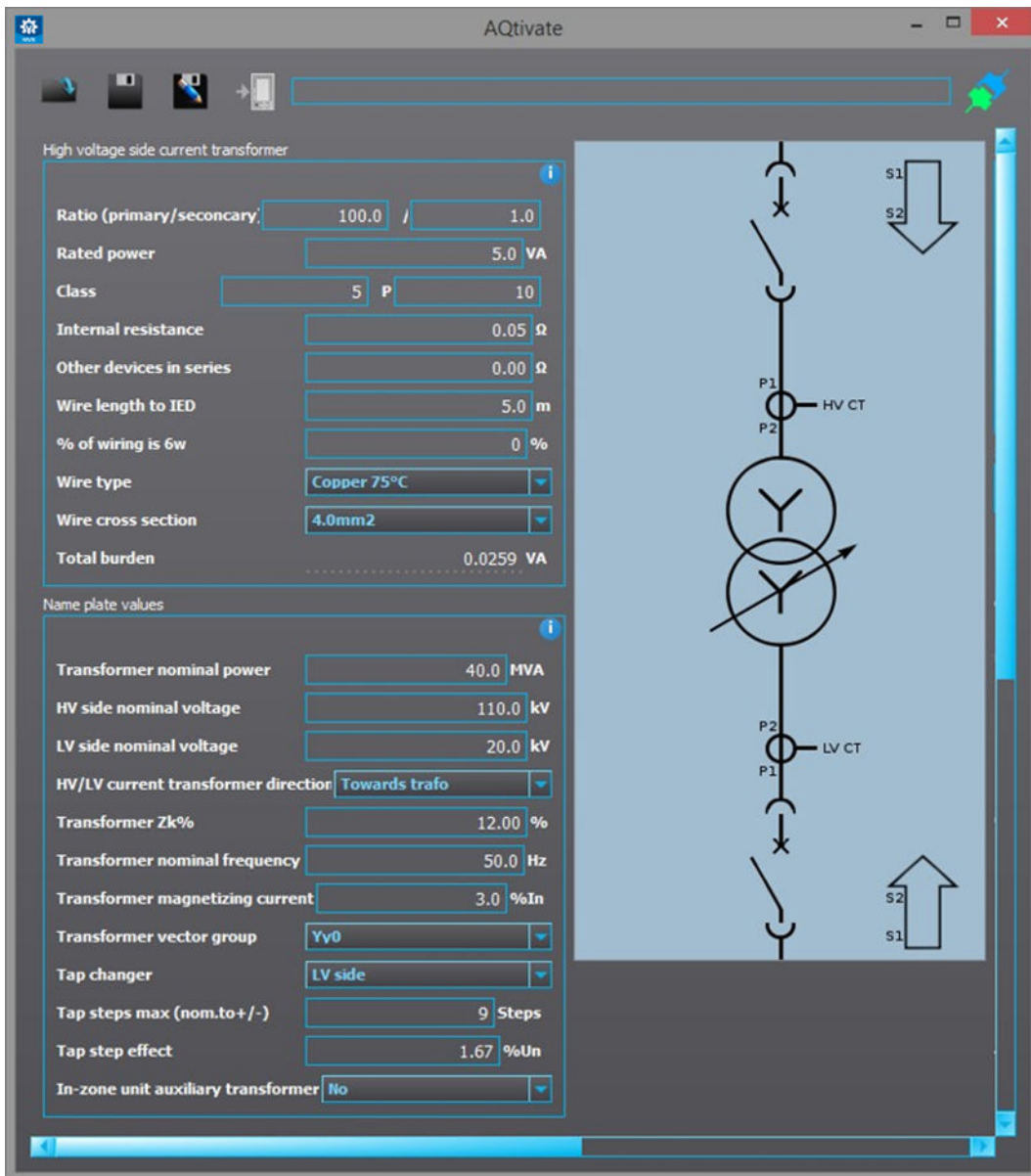
The Wizard tool is integrated in the DEIF MVR USW configuration and setting tool. Wizards can be used to generate settings to transformer protection relays.

The main benefits of the Wizards are:

- Easy to install and use (integrated in DEIF MVR USW).
- Built-in user manual.
- Easy to write differential and REF settings to a relay.
- Direct feedback from the installation.

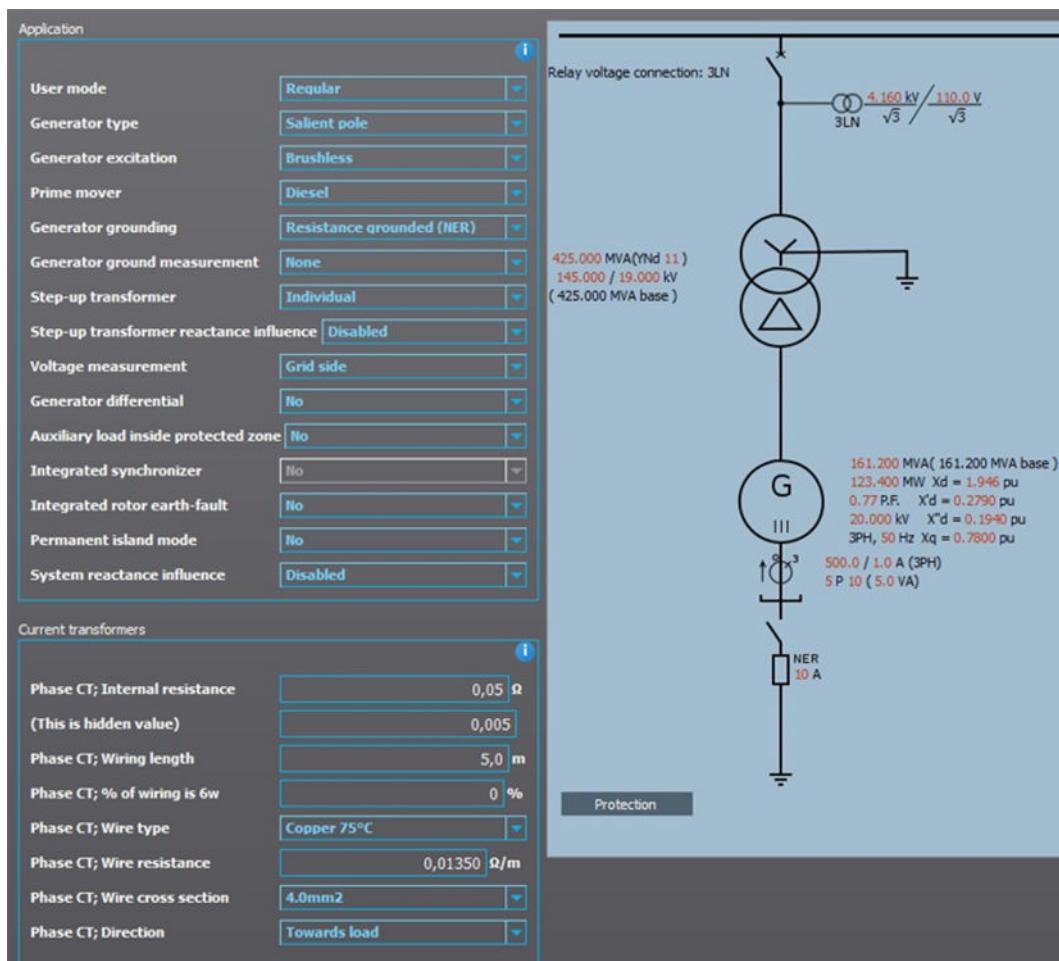
### Transformer wizard

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



## Generator wizard


The Generator wizard uses a selection of generator-related information and other settings (such as CT specification and wiring) as the basis for building suitable setting parameters to the relay.



## 7.11 Events and logs

### 7.11.1 Event history

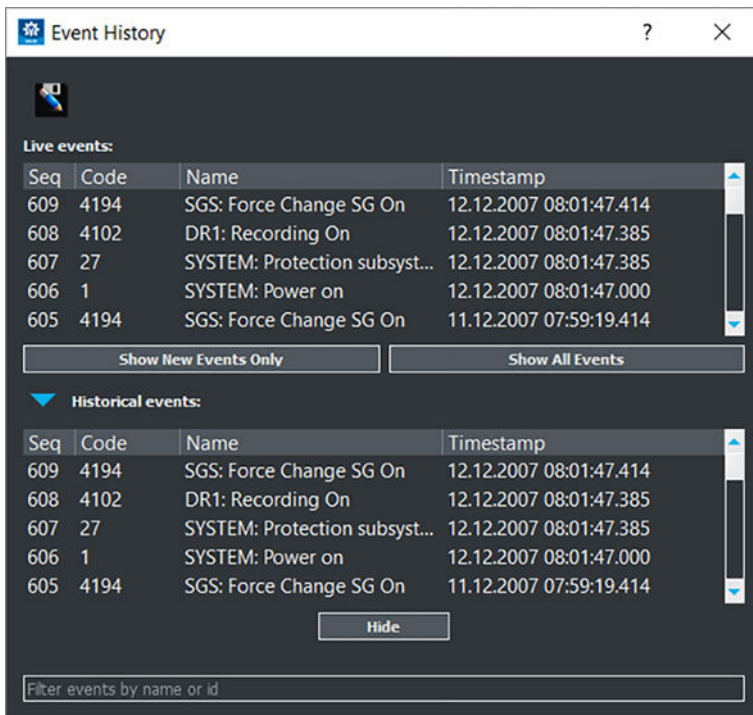
The **Event history** window displays the time-stamped events. These can for example be pick-ups, trips, or blocks. You can find more information about event masks in the selected function's **Events** tab

Event masks determine what is recorded in the event history. 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 .

When you click the **Show new events only** button, DEIF MVR USW 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.

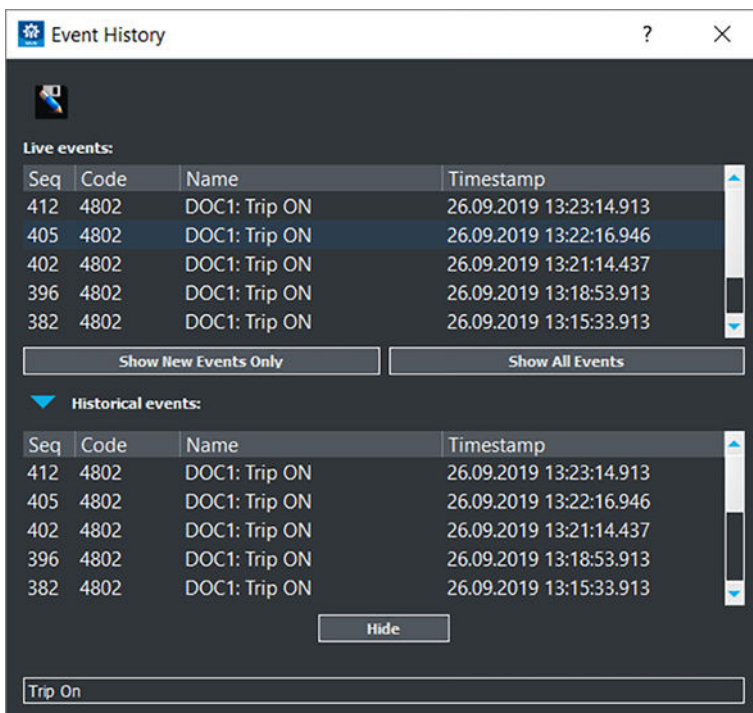
If you want to see the time difference between two events, right-click on an event and select **Add to compare [x]** from the context menu.






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. Below is an example where **TRIP ON** has been written in the text box to only display events that contain the text **TRIP ON**.

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.



## 7.11.2 Event list

You can access a list of all possible events by opening the **Event List** from the **Tools** menu. Each event has a SPA event channel. This list can also be saved as a text file by clicking the **Save** button .



Event List			
Event Code	Block Description	Event Description	SPA Event
1	SYSTEM	Power on	0E1
2	SYSTEM	RTC change	0E2
3	SYSTEM	RTC time incorr...	0E3
4	SYSTEM	NTP time sync a...	0E4
5	SYSTEM	NTP time change	0E5
6	SYSTEM	NTP time sync l...	0E6
7	SYSTEM	DblEth LinkA do...	0E7
8	SYSTEM	DblEth LinkA OK	0E8
9	SYSTEM	DblEth LinkB do...	0E9
10	SYSTEM	DblEth LinkB OK	0E10
27	SYSTEM	Protection subs...	0E50
28	SYSTEM	Storage reinitial...	0E28
29	SYSTEM	Storage reinitial...	0E29
30	SYSTEM	Event buffer cle...	0E30
31	SYSTEM	Event buffer init...	0E31
64	DIAGNOSTICS	Diagnostic Alar...	1E0

7.11.3 Configuration change log

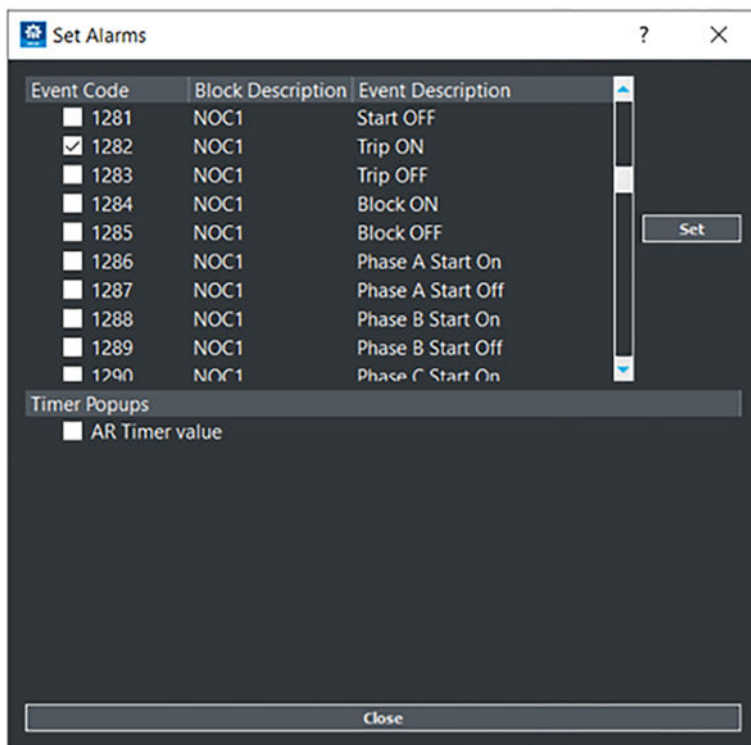
The **Configuration change log** can be used to observe parameter changes made to the relay.

## Configuration Change Log

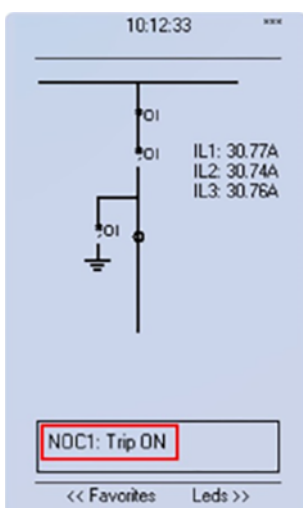
15:54:52 2007 log\_stool :Setting change: Output mode => 0  
15:52:55 2007 log\_stool :Setting change: Output mode => 1  
15:52:55 2007 log\_stool :Setting change: Output mode => 0  
15:51:56 2007 log\_stool :Setting change: Output mode => 1  
14:47:45 2007 log\_stool :Setting change: Used setting groups => 2  
12:27:23 2007 log\_stool :Setting change: l> mode => 1  
11:32:05 2007 log\_stool :Setting change: Logic counter trigglevel => 100  
11:32:05 2007 log\_stool :Setting change: Logic counter trigglevel => 100  
11:32:05 2007 log\_stool :Setting change: Logic counter trigglevel => 100  
11:32:05 2007 log\_stool :Setting change: Logic counter trigglevel => 100  
11:32:05 2007 log\_stool :Setting change: Logic counter trigglevel => 100  
11:32:05 2007 log\_stool :Setting change: Logic counter trigglevel => 100  
11:32:05 2007 log\_stool :Setting change: Logic counter trigglevel => 100  
11:32:05 2007 log\_stool :Setting change: Logic counter trigglevel => 100  
11:32:05 2007 log\_stool :Setting change: Logic counter triqglevel => 100

7.11.4 Set alarm events

Alarm events can be set by using the **Set alarms** dialogue. You can select which events cause alarms in the relay by checking the respective boxes in the **Set alarms** window and then pressing the **Set** button.



When one of the alarm events occurs, it is shown in the relay's mimic view. The newest alarm is always displayed, and it can be cleared with the HMI's Back button.



Up to 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.

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

- NOTE**
- The mimic view must be enabled in the Carousel designer.
  - The event that is to be recorded must also be activated in the event mask of the function in question.

# 7.12 Communication

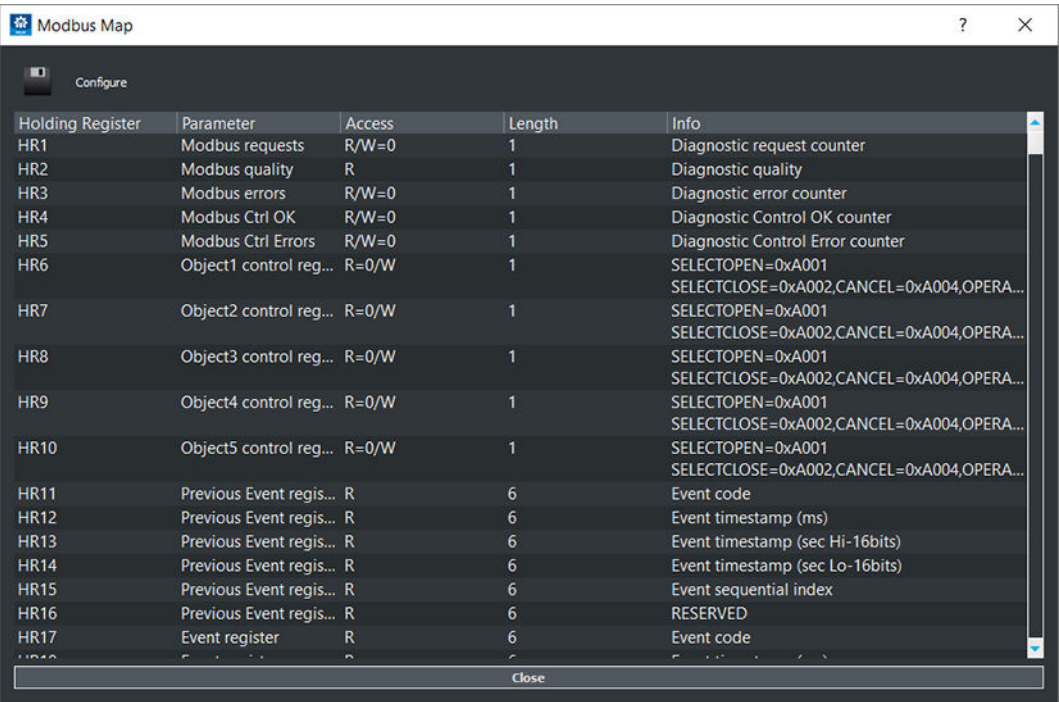
## 7.12.1 IEC 61850

This editor is used for configuring the device's IEC 61850 communication protocol. You can add, remove and edit data sets, decide which object control model to use, and edit GOOSE publishing, among other things. You can also view the current IEC 61850 setup and browse the 61850 tree to see the full list of available logical nodes.

Contact DEIF for a complete list of IEC61850 signals.

## 7.12.2 Modbus map

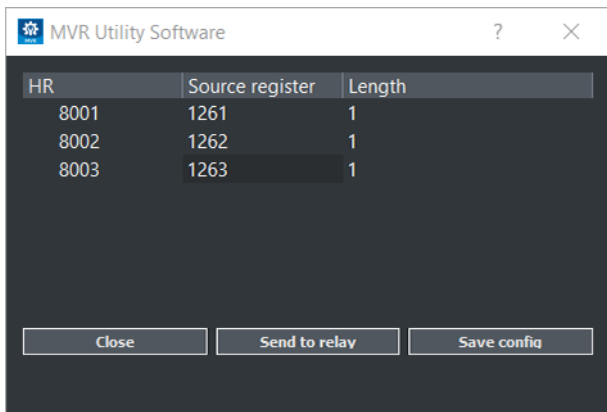
You can access Modbus information by opening the **Modbus map** dialogue from the **Tools** menu. The Modbus map can be saved as a text file by clicking the **Save** button .



Holding Register	Parameter	Access	Length	Info
HR1	Modbus requests	R/W=0	1	Diagnostic request counter
HR2	Modbus quality	R	1	Diagnostic quality
HR3	Modbus errors	R/W=0	1	Diagnostic error counter
HR4	Modbus Ctrl OK	R/W=0	1	Diagnostic Control OK counter
HR5	Modbus Ctrl Errors	R/W=0	1	Diagnostic Control Error counter
HR6	Object1 control reg...	R=0/W	1	SELECTOPEN=0xA001 SELECTCLOSE=0xA002,CANCEL=0xA004,OPERA...
HR7	Object2 control reg...	R=0/W	1	SELECTOPEN=0xA001 SELECTCLOSE=0xA002,CANCEL=0xA004,OPERA...
HR8	Object3 control reg...	R=0/W	1	SELECTOPEN=0xA001 SELECTCLOSE=0xA002,CANCEL=0xA004,OPERA...
HR9	Object4 control reg...	R=0/W	1	SELECTOPEN=0xA001 SELECTCLOSE=0xA002,CANCEL=0xA004,OPERA...
HR10	Object5 control reg...	R=0/W	1	SELECTOPEN=0xA001 SELECTCLOSE=0xA002,CANCEL=0xA004,OPERA...
HR11	Previous Event regis...	R	6	Event code
HR12	Previous Event regis...	R	6	Event timestamp (ms)
HR13	Previous Event regis...	R	6	Event timestamp (sec Hi-16bits)
HR14	Previous Event regis...	R	6	Event timestamp (sec Lo-16bits)
HR15	Previous Event regis...	R	6	Event sequential index
HR16	Previous Event regis...	R	6	RESERVED
HR17	Event register	R	6	Event code

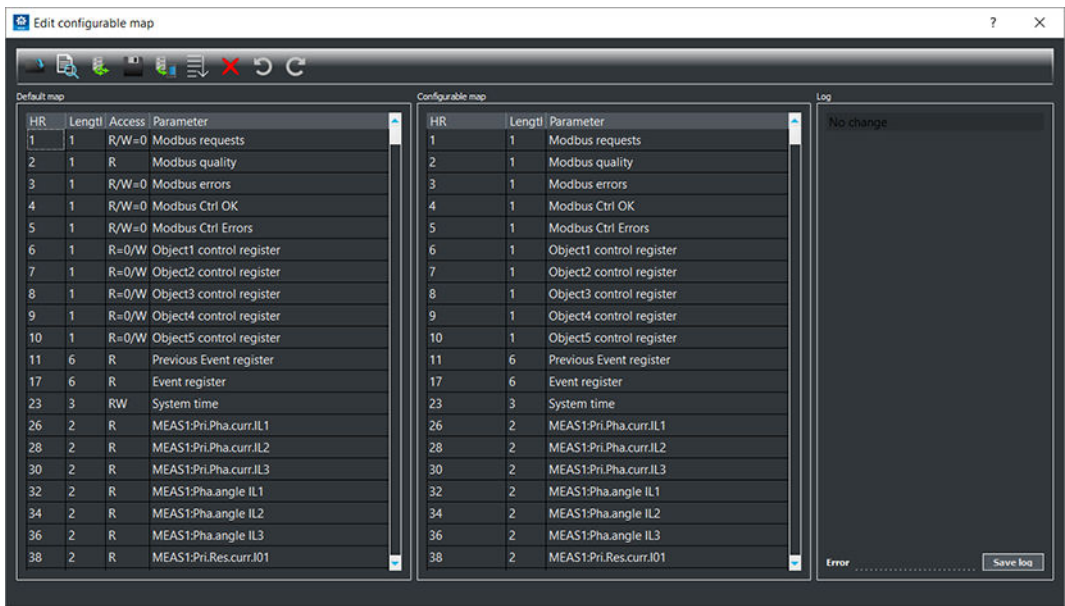
All signal holding registers in the default map are fixed, which means they cannot be edited by the user. If you need custom holding registers, you can use the Modbus configurator to change the Modbus map. The Modbus configurator can be found at **Tools > Communication > Modbus configurator**.

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 you can add a new row by right-clicking and choosing **Add**. Then you can key in the holding register you want to use in the new holding register. The holding registers that users can edit start their numbering from 8001.



### 7.12.3 Modbus configurable map

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



### Available buttons

Button	Description
	Load old configuration
	Preview
	Export to .txt
	Save to .aqs
	Send to .aqs
	Sort by HR
	Delete HR(s)
	Undo
	Redo

## 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 relay.
Configurable map	The new Modbus map that can be altered.

## Usage

The default map is not configurable 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.

## 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.

## Load old configuration

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

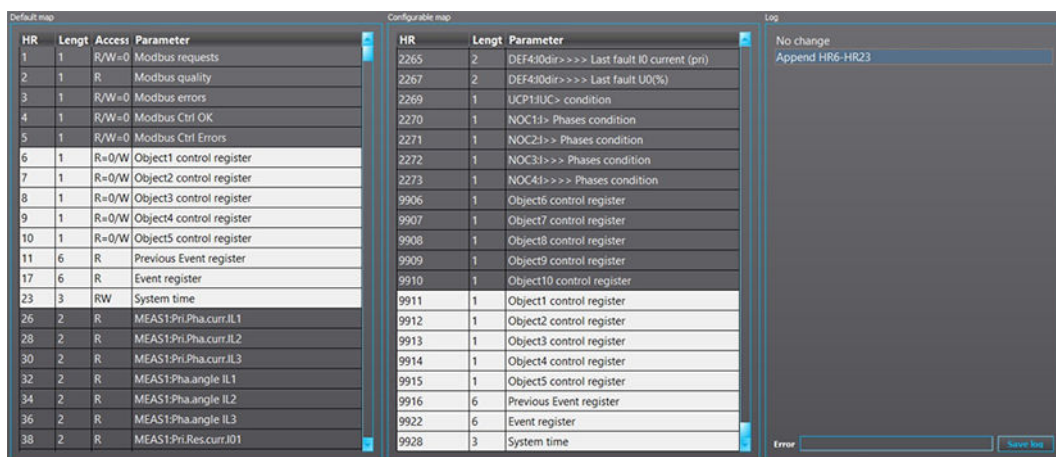
If there are configurations made by the new configuration dialogue, the configurations are loaded automatically. The loading steps are shown in the log section.

## Add data

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

- Choosing the row(s) needed to be copied in the default map.
- Drag the selected row(s).
- Drop the data onto the configurable map.

The new data is appended to the configurable map.



## Change HR

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 set the desired HR. Before the HR is changed, if there is another data at that destination, the user is notified of the conflict and given two choices:

- **Yes:** Delete the current data at the destination.
- **No:** Cancel the change.



Configurable map			Log	
HR	Length	Parameter		
2265	2	DEF430dir>>>> Last fault IO current (pri)		No change
2267	2	DEF430dir>>>> Last fault U0(%)		Append HR6-HR23
2269	1	UCP13UC> condition		Change HR9911 to HR16000
2270	1	NOC14> Phases condition		
2271	1	NOC23>> Phases condition		
2272	1	NOC33>>> Phases condition		
2273	1	NOC43>>>> Phases condition		
9906	1	Object6 control register		
9907	1	Object7 control register		
9908	1	Object8 control register		
9909	1	Object9 control register		
9910	1	Object10 control register		
16000	1	Object1 control register		
9912	1	Object2 control register		
9913	1	Object3 control register		
9914	1	Object4 control register		
9915	1	Object5 control register		
9916	6	Previous Event register		
9922	6	Event register		
9928	3	System time		

## Fill HR

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

Configurable map			Log	
HR	Length	Parameter		
2263	2	DEF430dir>>>> Last fault angle		No change
2265	2	DEF430dir>>>> Last fault IO current (pri)		Append HR6-HR23
2267	2	DEF430dir>>>> Last fault U0(%)		Change HR9911 to HR16000
2269	1	UCP13UC> condition		Delete HR16000-HR16000
2270	1	NOC14> Phases condition		Change HR9912 to HR16000
2271	1	NOC23>> Phases condition		
2272	1	NOC33>>> Phases condition		
2273	1	NOC43>>>> Phases condition		
9906	1	Object6 control register		
9907	1	Object7 control register		
9908	1	Object8 control register		
9909	1	Object9 control register		
9910	1	Object10 control register		
16000	1	Object2 control register		
9913	1	Object3 control register		
9914	1	Object4 control register		
9915	1	Object5 control register		
9916	6	Previous Event register		
9922	6	Event register		
9928	3	System time		


To fill, first you must 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.

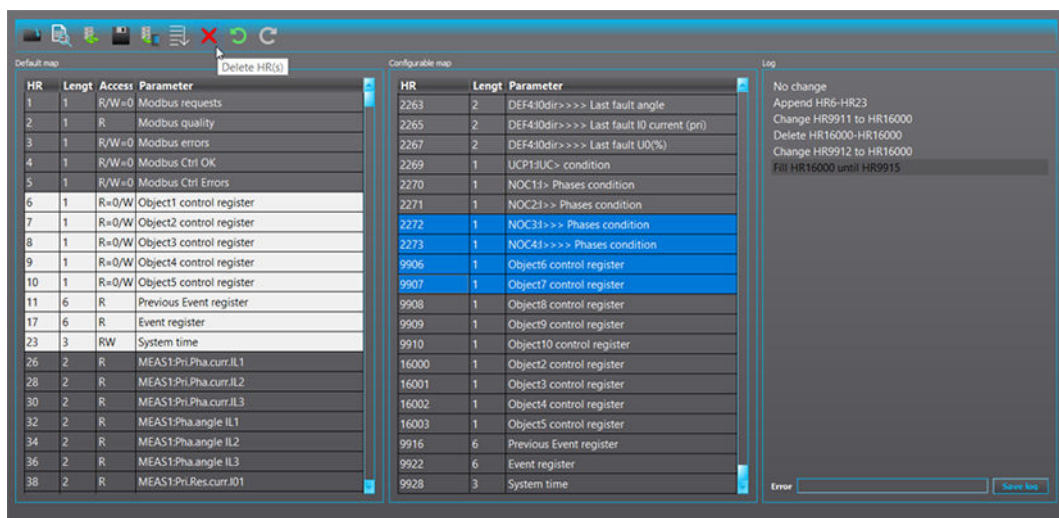
Configurable map			Log	
HR	Length	Parameter		
2263	2	DEF430dir>>>> Last fault angle		No change
2265	2	DEF430dir>>>> Last fault IO current (pri)		Append HR6-HR23
2267	2	DEF430dir>>>> Last fault U0(%)		Change HR9911 to HR16000
2269	1	UCP13UC> condition		Delete HR16000-HR16000
2270	1	NOC14> Phases condition		Change HR9912 to HR16000
2271	1	NOC23>> Phases condition		
2272	1	NOC33>>> Phases condition		
2273	1	NOC43>>>> Phases condition		
9906	1	Object6 control register		
9907	1	Object7 control register		
9908	1	Object8 control register		
9909	1	Object9 control register		
9910	1	Object10 control register		
16000	1	Object2 control register		
16001	1	Object3 control register		
16002	1	Object4 control register		
16003	1	Object5 control register		
9916	6	Previous Event register		
9922	6	Event register		
9928	3	System time		

Fill can be done in both directions, up and down.

Similar to when changing the 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.

## Delete HR

HR(s) can simply be deleted by selecting the range to delete and clicking the **Delete** icon  on the toolbar or press the Delete key on the keyboard.

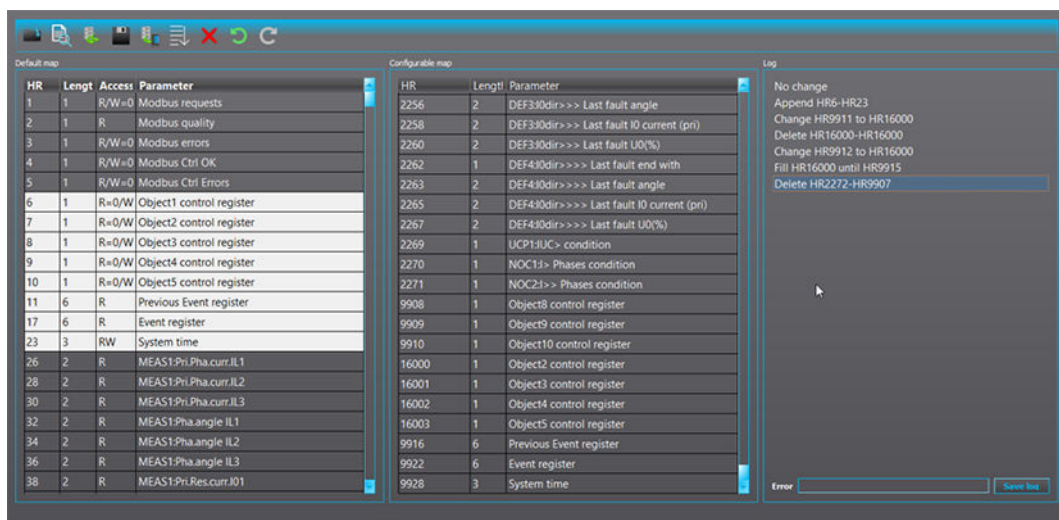


The screenshot shows the software interface with the 'Delete HR(s)' button highlighted on the toolbar. The 'Default map' and 'Configurable map' tables are visible. In the 'Default map', rows 6 through 10 are selected. The 'Log' panel on the right shows a list of actions, including 'Delete HR16000-HR16000'.

HR	Length	Access	Parameter
1	1	R/W=0	Modbus requests
2	1	R	Modbus quality
3	1	R/W=0	Modbus errors
4	1	R/W=0	Modbus Ctrl OK
5	1	R/W=0	Modbus Ctrl Errors
6	1	R=0/W	Object1 control register
7	1	R=0/W	Object2 control register
8	1	R=0/W	Object3 control register
9	1	R=0/W	Object4 control register
10	1	R=0/W	Object5 control register
11	6	R	Previous Event register
17	6	R	Event register
23	3	RW	System time
26	2	R	MEAS1-Pha.curr.IL1
28	2	R	MEAS1-Pha.curr.IL2
30	2	R	MEAS1-Pha.curr.IL3
32	2	R	MEAS1-Pha.angle.IL1
34	2	R	MEAS1-Pha.angle.IL2
36	2	R	MEAS1-Pha.angle.IL3
38	2	R	MEAS1-Pha.Res.curr.ID1

HR	Length	Parameter
2263	2	DEF430dir>>> Last fault angle
2265	2	DEF430dir>>> Last fault IO current (pri)
2267	2	DEF430dir>>> Last fault U0(%)
2269	1	UCP1IUC> condition
2270	1	NOC1> Phases condition
2271	1	NOC2> Phases condition
2272	1	NOC3> Phases condition
2273	1	NOC4> Phases condition
9906	1	Object6 control register
9907	1	Object7 control register
9908	1	Object8 control register
9909	1	Object9 control register
9910	1	Object10 control register
16000	1	Object2 control register
16001	1	Object3 control register
16002	1	Object4 control register
16003	1	Object5 control register
9916	6	Previous Event register
9922	6	Event register
9928	3	System time

The deletion applies to rows only. So, if the row order is HR5-HR10-HR7, deleting HR5-HR10 will not delete HR7.



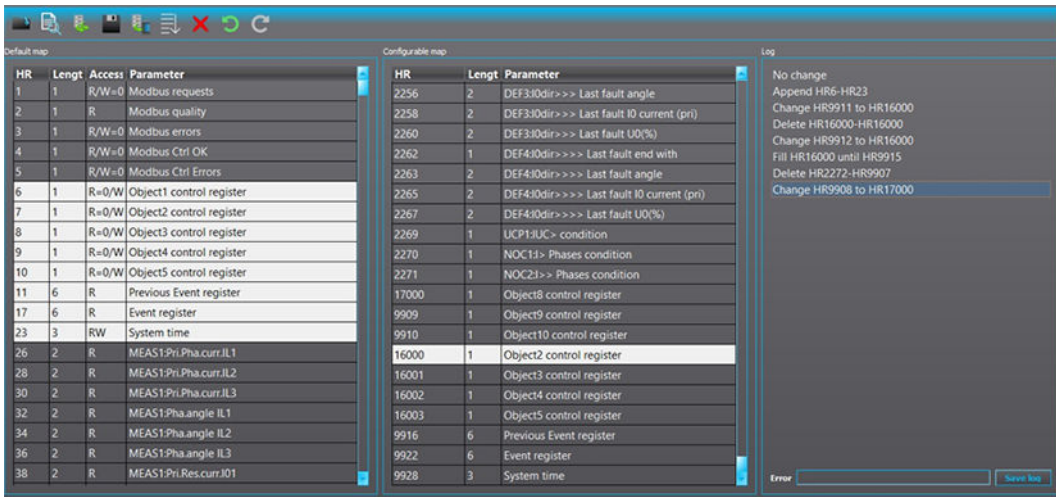
The screenshot shows the software interface with the 'Delete HR(s)' button highlighted on the toolbar. The 'Default map' and 'Configurable map' tables are visible. In the 'Default map', rows 6 through 10 are selected. The 'Log' panel on the right shows a list of actions, including 'Delete HR2272-HR9907'.

HR	Length	Access	Parameter
1	1	R/W=0	Modbus requests
2	1	R	Modbus quality
3	1	R/W=0	Modbus errors
4	1	R/W=0	Modbus Ctrl OK
5	1	R/W=0	Modbus Ctrl Errors
6	1	R=0/W	Object1 control register
7	1	R=0/W	Object2 control register
8	1	R=0/W	Object3 control register
9	1	R=0/W	Object4 control register
10	1	R=0/W	Object5 control register
11	6	R	Previous Event register
17	6	R	Event register
23	3	RW	System time
26	2	R	MEAS1-Pha.curr.IL1
28	2	R	MEAS1-Pha.curr.IL2
30	2	R	MEAS1-Pha.curr.IL3
32	2	R	MEAS1-Pha.angle.IL1
34	2	R	MEAS1-Pha.angle.IL2
36	2	R	MEAS1-Pha.angle.IL3
38	2	R	MEAS1-Pha.Res.curr.ID1

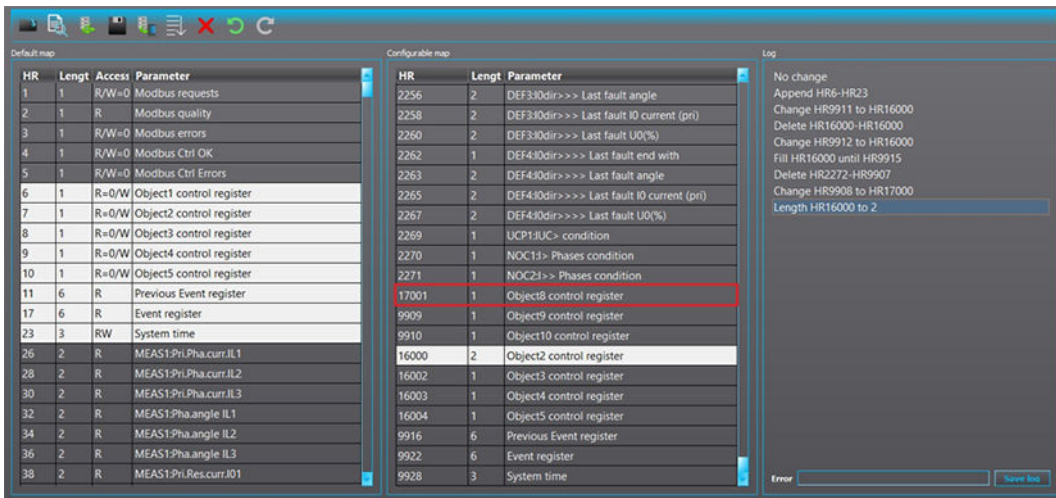
HR	Length	Parameter
2256	2	DEF330dir>>> Last fault angle
2258	2	DEF330dir>>> Last fault IO current (pri)
2260	2	DEF330dir>>> Last fault U0(%)
2262	1	DEF430dir>>> Last fault end with
2263	2	DEF430dir>>> Last fault angle
2265	2	DEF430dir>>> Last fault IO current (pri)
2267	2	DEF430dir>>> Last fault U0(%)
2269	1	UCP1IUC> condition
2270	1	NOC1> Phases condition
2271	1	NOC2> Phases condition
9908	1	Object8 control register
9909	1	Object9 control register
9910	1	Object10 control register
16000	1	Object2 control register
16001	1	Object3 control register
16002	1	Object4 control register
16003	1	Object5 control register
9916	6	Previous Event register
9922	6	Event register
9928	3	System time

## Change length

The length of 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.

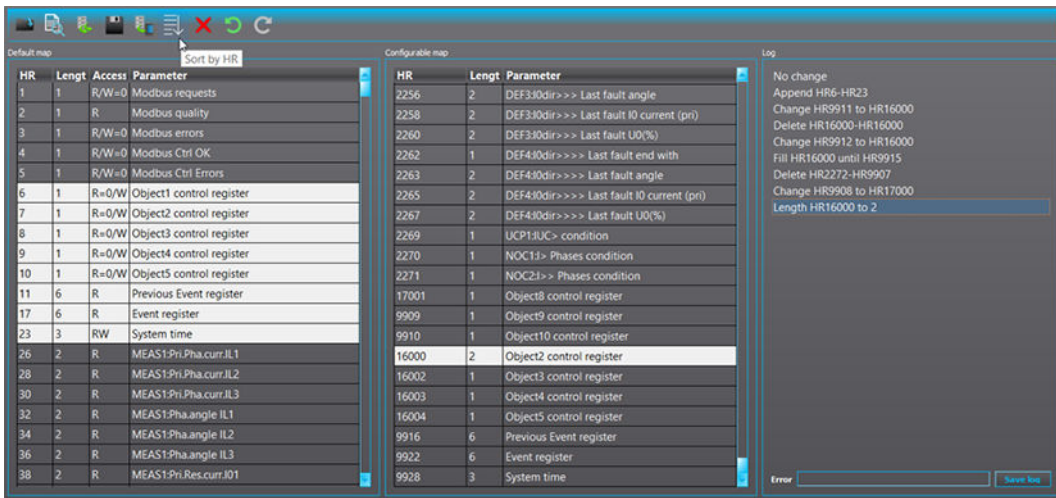


If two changes are made consecutively to a row (1 to 2 and back to 1), no log entry is created.



## Sort by HR

The configurable map can be sorted by HR using the **Sort by HR** icon  on the toolbar. If the map is already sorted, no log entry is created.






Default map				Configurable map				Log	
HR	Length	Access	Parameter	HR	Length	Parameter			
1	1	R/W=0	Modbus requests	2256	2	DEF4:I0dir>>> Last fault angle		No change Append HR6-HR23 Change HR9911 to HR16000 Delete HR16000-HR16000 Change HR9912 to HR16000 Fill HR16000 until HR9915 Delete HR2272-HR9907 Change HR9908 to HR17000 Length HR16000 to 2 Sort by HR	
2	1	R	Modbus quality	2258	2	DEF4:I0dir>>> Last fault IO current (pri)			
3	1	R/W=0	Modbus errors	2260	2	DEF4:I0dir>>> Last fault U0(%)			
4	1	R/W=0	Modbus Ctrl OK	2262	1	DEF4:I0dir>>> Last fault end with			
5	1	R/W=0	Modbus Ctrl Errors	2263	2	DEF4:I0dir>>> Last fault angle			
6	1	R=0/W	Object1 control register	2265	2	DEF4:I0dir>>> Last fault IO current (pri)			
7	1	R=0/W	Object2 control register	2267	2	DEF4:I0dir>>> Last fault U0(%)			
8	1	R=0/W	Object3 control register	2269	1	UCP1:IUC> condition			
9	1	R=0/W	Object4 control register	2270	1	NOC1:I> Phases condition			
10	1	R=0/W	Object5 control register	2271	1	NOC2:I>> Phases condition			
11	6	R	Previous Event register	9909	1	Object9 control register		Error	
17	6	R	Event register	9910	1	Object10 control register			
23	3	RW	System time	9916	6	Previous Event register			
26	2	R	MEAS1:Pha.curr.IL1	9922	6	Event register			
28	2	R	MEAS1:Pha.curr.IL2	9928	3	System time			
30	2	R	MEAS1:Pha.curr.IL3	16000	2	Object2 control register			
32	2	R	MEAS1:Pha.angle IL1	16002	1	Object3 control register			
34	2	R	MEAS1:Pha.angle IL2	16003	1	Object4 control register			
36	2	R	MEAS1:Pha.angle IL3	16004	1	Object5 control register			
38	2	R	MEAS1:Pha.res.curr.I01	17001	1	Object8 control register			

## Preview

A preview of the map can be shown by clicking the **Preview** icon  on the toolbar.

Preview configurable map				
HR	Old H	Parameter	Access	Length
1	1	Modbus requests	R/W=0	1
2	2	Modbus quality	R	1
3	3	Modbus errors	R/W=0	1
4	4	Modbus Ctrl OK	R/W=0	1
5	5	Modbus Ctrl Errors	R/W=0	1
6	6	Object1 control register	R=0/W	1
7	7	Object2 control register	R=0/W	1
8	8	Object3 control register	R=0/W	1
9	9	Object4 control register	R=0/W	1
10	10	Object5 control register	R=0/W	1
11	11	Previous Event register	R	6
17	17	Event register	R	6
23	23	System time	RW	3
26	26	MEAS1:Pha.curr.IL1	R	2
28	28	MEAS1:Pha.curr.IL2	R	2
30	30	MEAS1:Pha.curr.IL3	R	2
32	32	MEAS1:Pha.angle IL1	R	2

## Export map to text file


The preview map can be exported to a text file using the **Export** icon  on the toolbar.

1	HR	Old HR	Parameter	Access	Length
2					
3			// many lines omitted		
4					
5	2262	2262	DEF4:I0dir>>>> Last fault end with	R	1
6	2263	2263	DEF4:I0dir>>>> Last fault angle	R	2
7	2265	2265	DEF4:I0dir>>>> Last fault IO current (pri)	R	2
8	2267	2267	DEF4:I0dir>>>> Last fault U0(%)	R	2
9	2269	2269	UCP1:IUC> condition	R	1
10	2270	2270	NOC1:I> Phases condition	R	1
11	2271	2271	NOC2:I>> Phases condition	R	1
12	9909	9909	Object9 control register	R=0/W	1
13	9910	9910	Object10 control register	R=0/W	1
14	9916	11	Previous Event register	R	6
15	9922	17	Event register	R	6
16	9928	23	System time	RW	3
17	16000	7	Object2 control register	R=0/W	2
18	16002	8	Object3 control register	R=0/W	1
19	16003	9	Object4 control register	R=0/W	1
20	16004	10	Object5 control register	R=0/W	1
21	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 Control + 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:

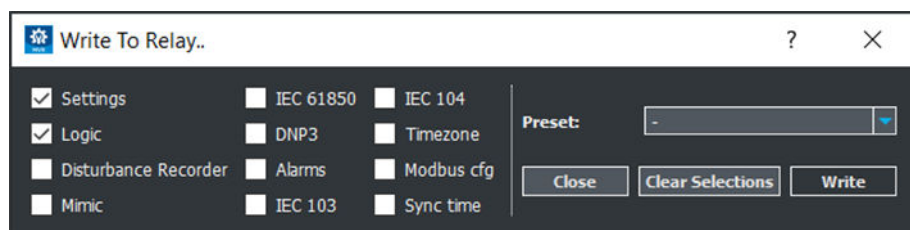
- Using the key combination Control + Y.
- Clicking on the line in the log section.
- Clicking the **Redo** icon  on the toolbar.

## Save and write to the relay

The configuration is saved to the .aqc file after you click the **Save** icon  on the toolbar.

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

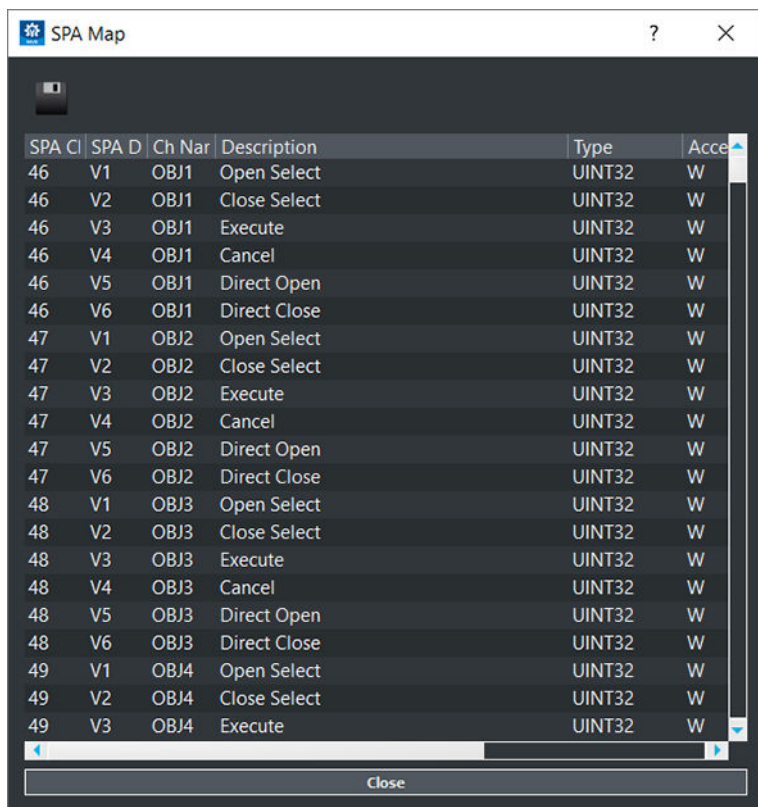
The configuration can also be sent from the DEIF MVR USW menu bar **Commands > Write To Relay**. Check the **Modbus cfg** box in the pop-up window's list and then click the **Write** button.



If no configuration file exists (for example, if the user have forgotten to save it), there can be errors sending it to the relay. After sending the configuration file, Modbus must be turned off and on again for the changes to apply.

## 7.12.4 SPA map

You can access the SPA-related information by opening the **SPA map** dialogue from the **Tools** menu. The SPA map can be saved as a text file with the **Save** button .




SPA Cl	SPA D	Ch Nar	Description	Type	Acce
46	V1	OBJ1	Open Select	UINT32	W
46	V2	OBJ1	Close Select	UINT32	W
46	V3	OBJ1	Execute	UINT32	W
46	V4	OBJ1	Cancel	UINT32	W
46	V5	OBJ1	Direct Open	UINT32	W
46	V6	OBJ1	Direct Close	UINT32	W
47	V1	OBJ2	Open Select	UINT32	W
47	V2	OBJ2	Close Select	UINT32	W
47	V3	OBJ2	Execute	UINT32	W
47	V4	OBJ2	Cancel	UINT32	W
47	V5	OBJ2	Direct Open	UINT32	W
47	V6	OBJ2	Direct Close	UINT32	W
48	V1	OBJ3	Open Select	UINT32	W
48	V2	OBJ3	Close Select	UINT32	W
48	V3	OBJ3	Execute	UINT32	W
48	V4	OBJ3	Cancel	UINT32	W
48	V5	OBJ3	Direct Open	UINT32	W
48	V6	OBJ3	Direct Close	UINT32	W
49	V1	OBJ4	Open Select	UINT32	W
49	V2	OBJ4	Close Select	UINT32	W
49	V3	OBJ4	Execute	UINT32	W

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

## 7.12.5 DNP

You can access the DNP-related information and settings by opening the **DNP** dialogue from the **Tools** menu.

When the DNP map is ready, it can be saved as a text file by clicking the **DNP map** button and then the **Save** button .

Open cfg-file   Save into aqs   Save into a file   Reload previous   Send to relay   DNP map

BI   CL   AI   CL   DBI   CL   CMD

0	DI1	1	0	Pri.Pha.curr.IL1	2	0	OBJECT1 CTRL
1	DI2	1	1	Pri.Pha.curr.IL2	2	1	OBJECT2 CTRL
2	DI3	1	2	Pri.Pha.curr.IL3	2	2	OBJECT3 CTRL
3	DI4	1	3	Pri.Res.curr.I01	2	3	OBJECT4 CTRL
4	DI5	1	4	Alg f avg	2	4	OBJECT5 CTRL
5	DI6	1	5	Pha.angle IL1	2		
6	DI7	1	6	Pha.angle IL2	2		
7	DI8	1	7	Pha.angle IL3	2		
8	DI9	1	8	Recorded fault value	2		
9	DI10	1	9	Recorded fault value	2		
10	DI11	1	10	Recorded fault value	2		
11	Local/Remote switch	1	11	Recorded fault value	2		
12	I> START	1	12	Recorded fault value	2		
13	I> TRIP	1	13	Recorded fault value	2		
14	I>> START	1	14	Recorded fault value	2		

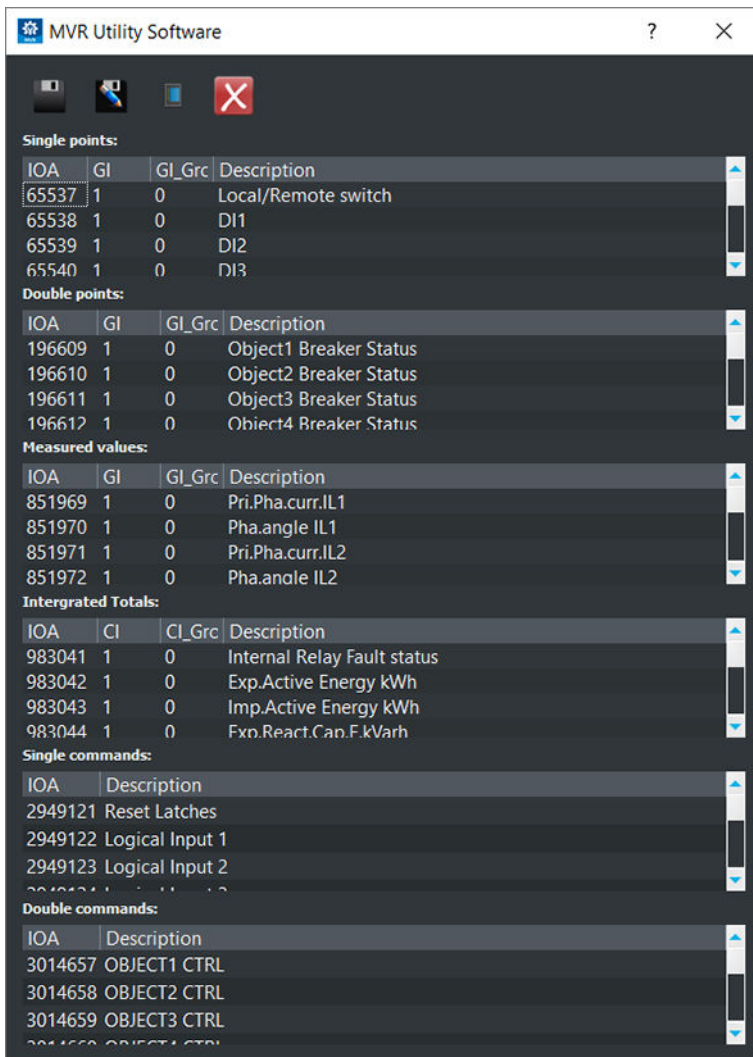
Add or remove points

## 7.12.6 IEC 103

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

## 7.12.7 IEC 101/104

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



Single points:			
IOA	GI	GI_Grc	Description
65537	1	0	Local/Remote switch
65538	1	0	DI1
65539	1	0	DI2
65540	1	0	DI3

Double points:			
IOA	GI	GI_Grc	Description
196609	1	0	Object1 Breaker Status
196610	1	0	Object2 Breaker Status
196611	1	0	Object3 Breaker Status
196612	1	0	Object4 Breaker Status

Measured values:			
IOA	GI	GI_Grc	Description
851969	1	0	Pri.Pha.curr.IL1
851970	1	0	Pha.angle IL1
851971	1	0	Pri.Pha.curr.IL2
851972	1	0	Pha.angle IL2

Integrated Totals:			
IOA	CI	CI_Grc	Description
983041	1	0	Internal Relay Fault status
983042	1	0	Exp.Active Energy kWh
983043	1	0	Imp.Active Energy kWh
983044	1	0	Exp.React.Can.F.kVarh

Single commands:	
IOA	Description
2949121	Reset Latches
2949122	Logical Input 1
2949123	Logical Input 2
2949124	Logical Input 3

Double commands:	
IOA	Description
3014657	OBJECT1 CTRL
3014658	OBJECT2 CTRL
3014659	OBJECT3 CTRL
3014660	OBJECT4 CTRL

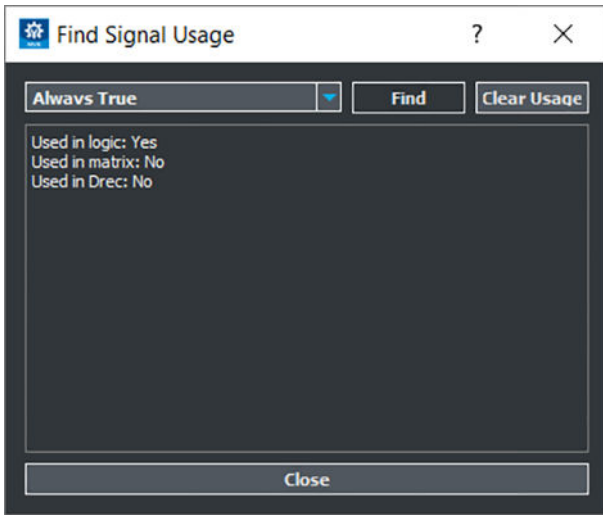
## 7.13 Miscellaneous tools

### 7.13.1 About Miscellaneous tools

These tools are typically for very specific purposes and are usually not used very often.

### 7.13.2 Find signal usage

With the **Find signal usage** tool you can see where a signal is connected in the configuration.

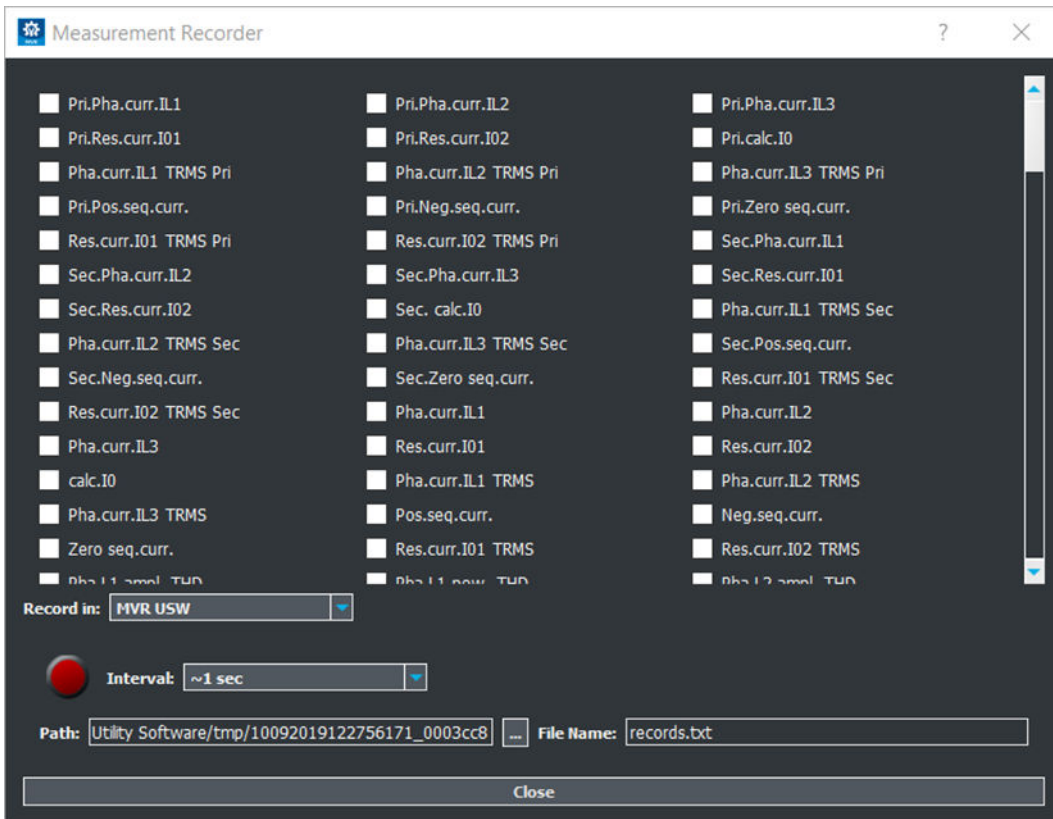


In this example, the programmable control switch **Always True** has been chosen. When the **Find** button is clicked, DEIF MVR USW displays a list of places where the chosen signal has been used. In this case the **Always True** is used in logic. DEIF MVR USW also displays whether or not the signal has been used in matrix, and in the disturbance recorder. Pressing the **Clear Usage** button erases all of the connections listed.

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

### 7.13.3 Measurement recorder

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



Activating the measurement recorder requires that there is a connection to a relay and that the Live Edit mode is enabled. The recording interval can be changed from the drop-down menu of the **Interval** box (next to the big red circle). With the **Record in** selection (located right below the check boxes) you can choose whether the measurements are recorded in DEIF MVR USW or in the relay itself. If you select **Relay**, you only need to set the recording interval (from which DEIF MVR USW

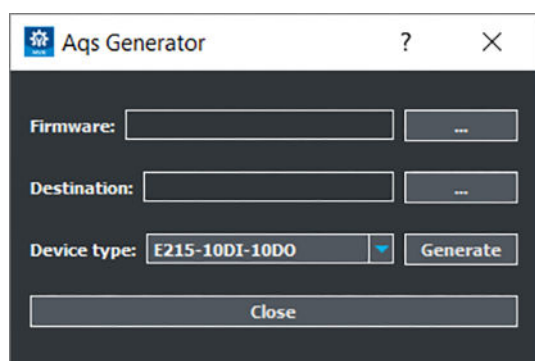
estimates the maximum recording time) and then start recording by pressing the red **Record** button. If you select **DEIF MVR USW**, both the USW and the **Live Edit** mode need to be activated.

The record file location can be changed 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.

**NOTE** Closing the **Measurement recorder** dialogue does not stop the recording!

## 7.13.4 Aqs generator

With the Aqs generator you can generate .aqs files without having a relay to download configuration files from. You only need a firmware package to generate a configuration file.



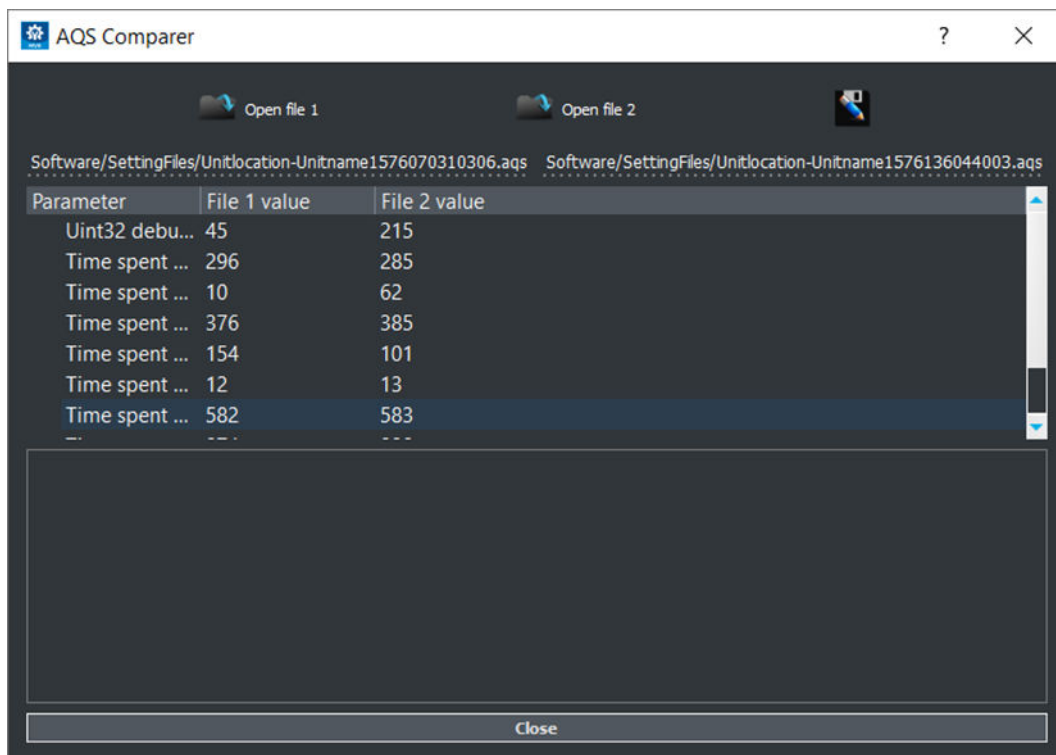
When generating a file you have to choose the firmware package, the destination (includes the name for the .aqs package) and the device type. The generated file can be used for studying and other similar purposes. It is otherwise similar to a file downloaded from a relay, except it does not have a serial number nor does it display its hardware and software configurations in the General menu. You can upload the generated configuration to any relay with the same hardware configuration.

**NOTE** The DEIF MVR USW may warn about missing mimics, logic and the disturbance recorder if these are not in the configuration.

## 7.13.5 Compare files

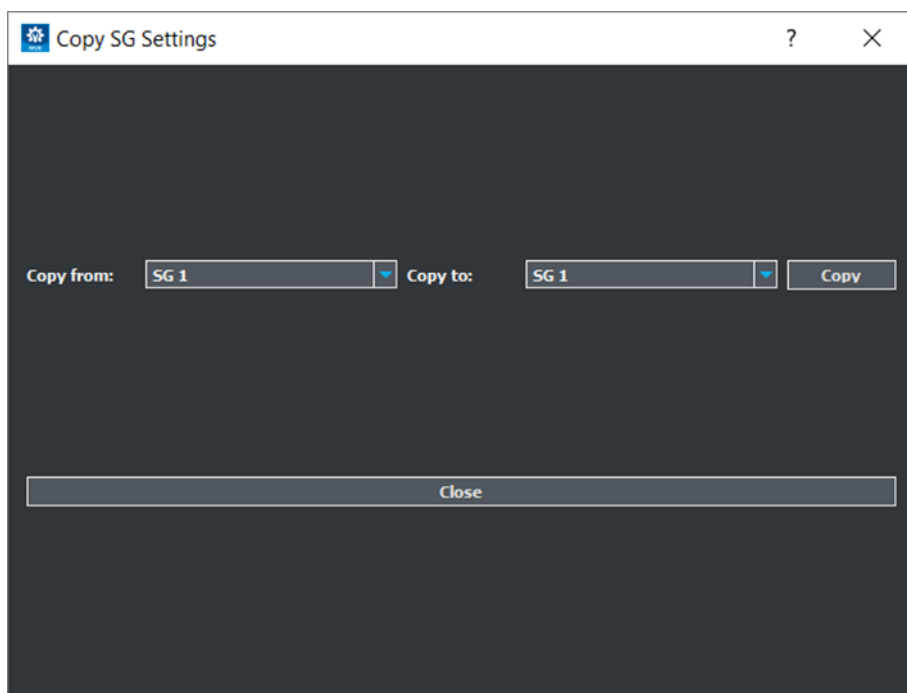
You can compare .aqs files with the **Compare files** dialogue. You can select one .aqs file for **Open file 1** and another for **Open file 2**, and DEIF MVR USW checks for differences in these two files. The basic value differences are shown in the top half of the list. The latter half shows any differences in the logic, mimic or disturbance recorder files.





### 7.13.6 Copy SG settings

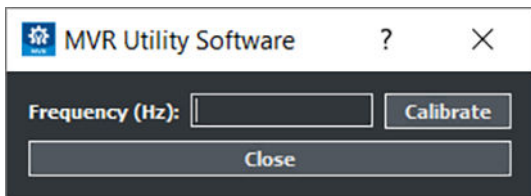
You can copy the setting group (SG) settings from one setting group to another setting group with the **Copy SG settings** dialogue. This is useful if the settings are very similar between the setting groups in use.



### 7.13.7 Calibrations

Used for manually calibrating the accuracy of the frequency measurement. MVR-200 units are always delivered with the frequency measurements calibrated.





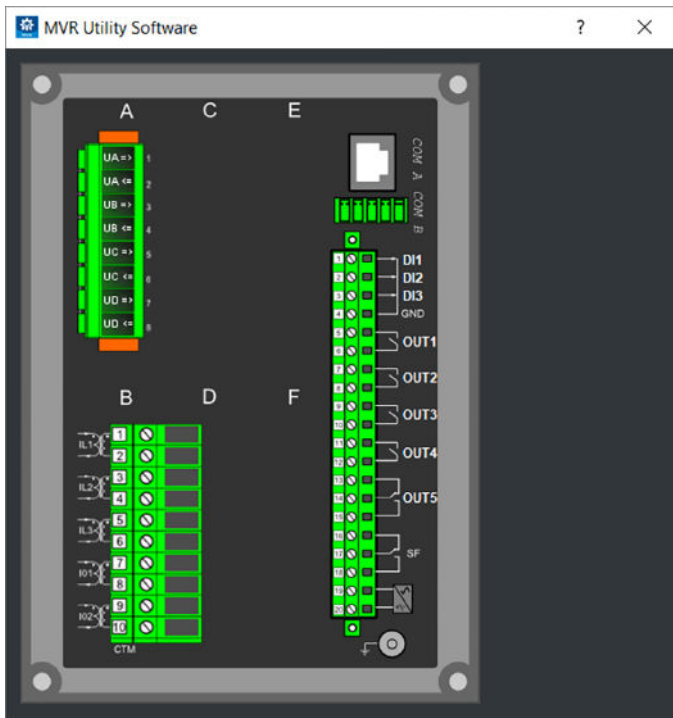
**NOTE** The calibration of the frequency measurement should only be done by a qualified person who has been instructed how to do this.

### 7.13.8 Clear matrix

Clears the matrix portion of a logic file. Affects the connections made at **Control > Device I/O > Device I/O matrix**. After clearing the matrix the changes take effect only after loading the logic at the main toolbar (**Commands > Write to relay**).

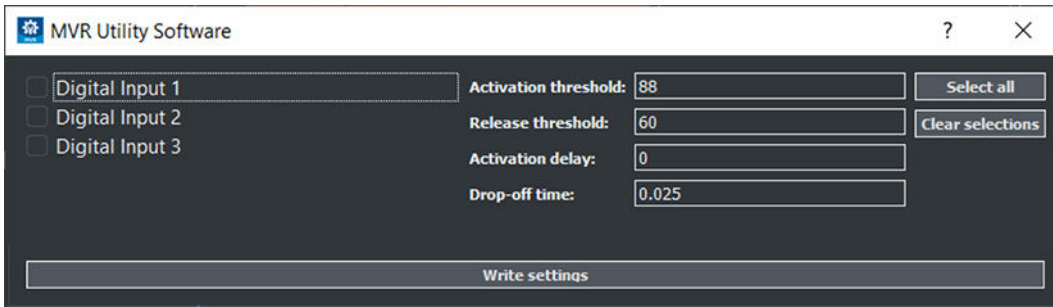
### 7.13.9 Rear panel

The **Rear panel** dialogue shows the content of the relay's back panel. What you see here depends on the .aq3 file that is currently open.



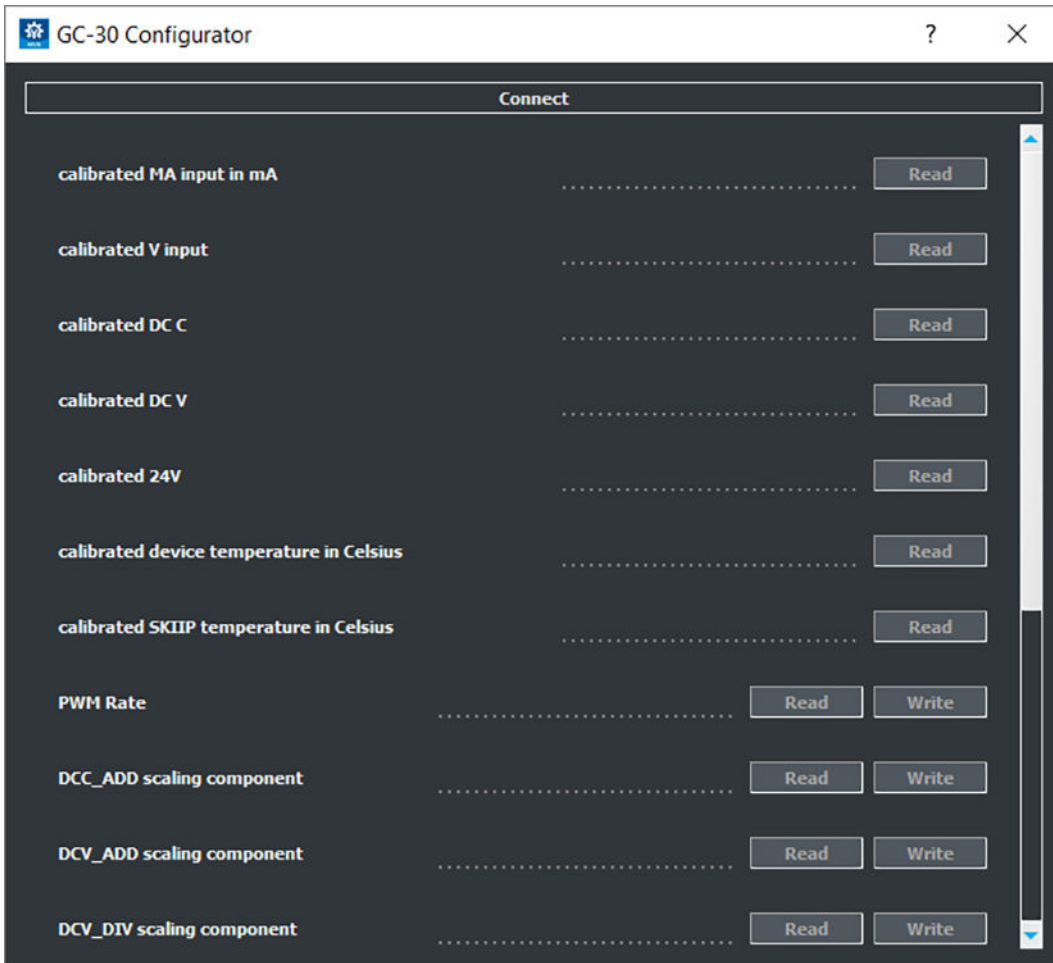
### 7.13.10 DI configurator

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



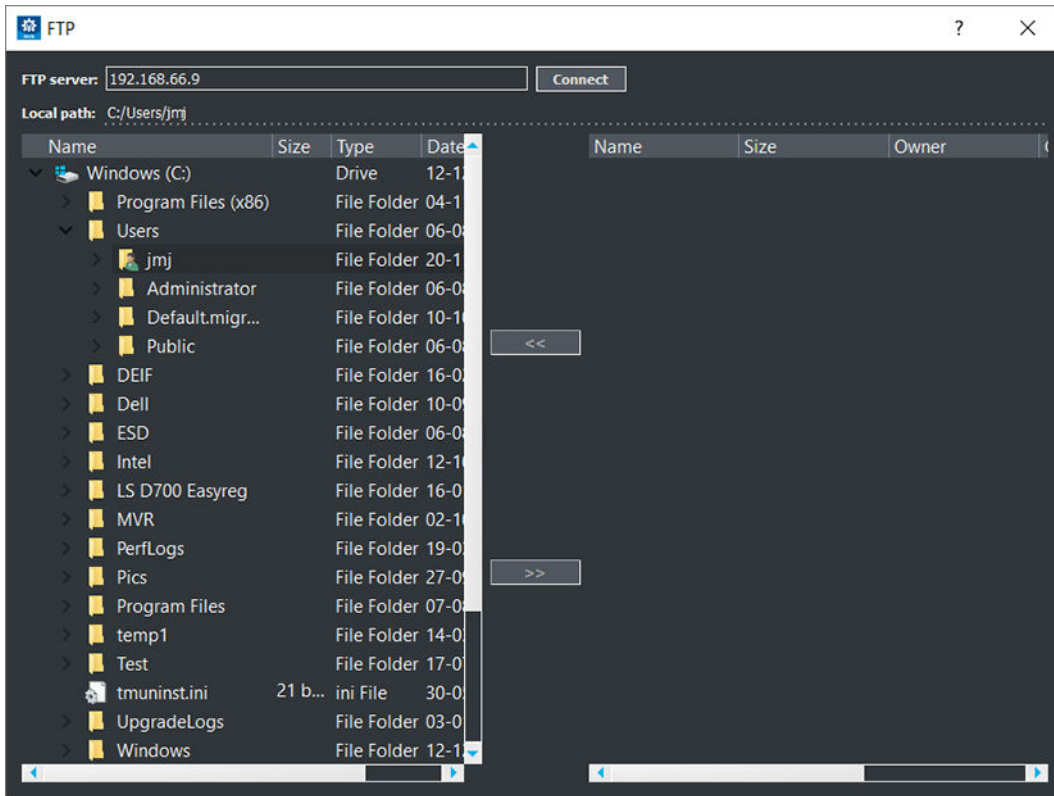
### 7.13.11 GC-30 configurator

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



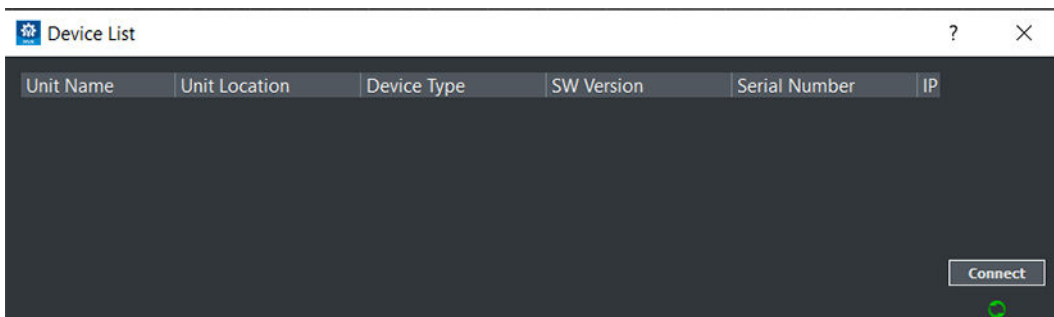
## 7.14 FTP


You can open the FTP client by selecting **Tools** from the DEIF MVR USW main toolbar and then selecting **FTP** from the drop-down menu. This opens a dialogue with two views. The one on the left list local directories. The one on the right list server directories. You can connect to the relay's FTP server by typing in the relay's IP address in the **FTP server** field and then clicking the **Connect** button.



## 7.15 Device list

The **Device list** dialogue 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. Establishing a connection closes the dialogue.



If new devices were connected to the network while viewing the device list, press the **Refresh** button  to make the new devices appear on the list.

- NOTE**
- Some switches and firewalls may prevent the DEIF MVR USW from getting this list.
  - The device list is not able to list the available devices, if more than one instance of the DEIF MVR USW is open at the same time.

## 8. Exporting and importing settings in a .txt file

### 8.1 Exporting and importing settings in a .txt file

All parameters, the matrix, and the logic settings can be exported to a single .txt file, which can be edited and imported to an .aq5 file. This can be done with **Export settings** and **Import settings** that is found in the main toolbar under **File**.

**Table 8.1** Snipping of exported setting file parameters with I> (over-current) settings

#Id	Name	Value	Unit	Min	Max	Step	Description
24029	NOC1_DT_SET_1	1.160000	s	0.000	1800.000	0.005	Definite (min) operating time delay
24030	NOC1_DT_SET_2	1.160000	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)

**Table 8.2** Snipping of exported setting file parameters with 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

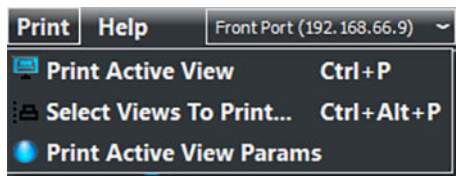
**Table 8.3** Snipping of exported setting file parameters with logic details

#Logic details	
#Gate pos x	Gate pos y
0	190
0	490
50	340
100	410
100	510
110	660
110	730
140	40
140	130
150	210
230	350
240	710

## 9. Print configuration

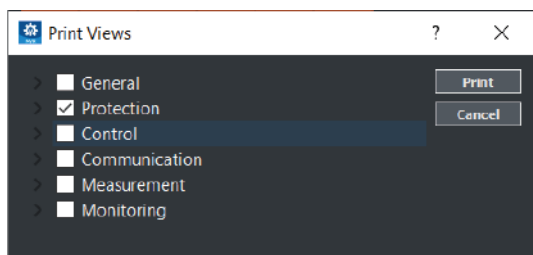
### 9.1 Print configuration

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

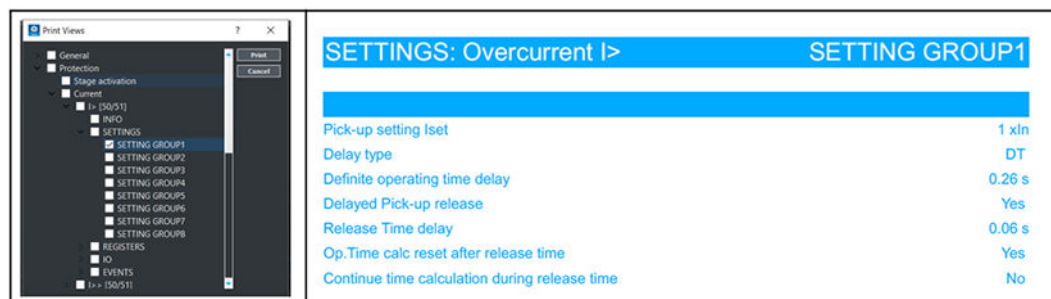


**Print active view** prints the current view as a PDF. If more than one view of the .aqc file is needed, click **Select views to print** and check the views you want printed.

The first selection shows the main menus. Check the appropriate box and click **Print**.




If you want to print a specific subsection of a menu, click on the black arrow next to the check box to expand the menu. The image below (to the left) shows an example, where only the setting view of the I> (over-current) function's first stage is printed. The image below (to the right) shows what the PDF looks like.



## 10. Viewing disturbance recordings

### 10.1 Viewing disturbance recordings

Open the view in DEIF MVR USW by clicking **Disturbance recorder** on the main toolbar and then select **Launch MVR USW**.

You can open disturbance recordings in the Utility Software by clicking the **Open folder** button  or by going to **File > Open**. The recordings are packed COMTRADE files.

A .zip file includes \*.cfg and \*.dat. MVR USW can open original packed .zip files and COMTRADE file, as both \*.cfg and \*.dat are in the same directory.