Utility software Release 3

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1 Introduction

This is the Help documentation for the PC Utility software Parus.

The purpose of the PC Utility software is to offer general tools used for

- Setup/commissioning of devices
- Supervision (read-out) of data from a device

In the following chapters the different tools/modules in the PC Utility software are briefly discussed.

2 What is new

The new features in version 3.41.0 are

New features:
- Support for general purpose PID's
- Support for CIO 116, CIO 208 and CIO 308
- Running mode on device page for selected products

Changes:
- Improved export to PDF functionality.
- Serial number made mandatory, in the option key generator.

Corrections:
- Voltmeter on device page corrected
- Buttons misplaced in tree view
- AGC 100 Counter & Identifiers issue corrected
- Various corrections to N option software
- Improved stability

The new features in version 3.40.0 are

New features:
- Support of translation tree.
- Support for Windows 8 - language selection.
- Support for 1/10000 in units.

Changes:
- CAN line names - use of primary and secondary instead of A and B.
- Grey out of button for 'activate plant configuration', if only single unit application.

Corrections:
- Russian language causes PDF export to fail.
- Parameter texts on shared channels updated correctly.
- Missing connect icon in emulation mode.
- Digital status page not updated correctly.
- TB missing in USW 3.39.0 application supervision.
- Missing 'edit notification' in list view, after parameter change in tree view.
- Translation issues for CGC 400, AGC 100 products.

The new features in version 3.39.0 are

New features:
- Support of Qc1103.
- Support for firmware download to webarm hardware with new flashes mounted.
- Support for configuration of NTP in webarm from ver. 2.40.0.

Changes:
- Possibility to change Log info scaling factor.
- Change of bit mask when writing inhibit configuration to device.

Corrections:
- Access level update
- Russian language support
- USW 3.38 usw files not recognized by Windows.

The new features in version 3.38.0 are

New features:
- Update boot SW (Standard ML2 ver. 3 products)

Corrections:
- USW 3.37.0 freezes when connecting to PPM unit

The new features in version 3.37.0 are

New features:

Changes:
- Scaling in Trending - Default setup and possibility to choose alternative

The new features in version 3.36.0 are

General:
- Parameters: Faster communication over USB when a parameter popup is open

The following applies only for the QC 4002 Mk.II v. 4 controllers with firmware version >= 4.40.0

- Firmware upgrade: Can be done over a tcp-ip connection if the N-option has at least firmware version 2.20 and if the boot code version is 1.03 or higher
- Communication: faster communication over tcp-ip if the N-option has at least firmware version 2.20
- Communication: Set the network parameters like IP address in a dedicated popup if the N-option has at least firmware version 2.20
- Logs: support of up to 500 alarm and event log lines
- Views: presentation of the view items in a tree structure
- Identifiers: display of boot code version and N-option firmware version
- Identifiers: display of production data like serial number, order number and production date

The new features in version 3.35.0 are

General:

- Project Properties: Store user defined comments as part of usw file
- Project Properties: Display the firmware version from which the different components inside the usw file originates
- Alarms: Double-click an alarm and open the corresponding parameter
- Parameters: Alarm status is updated while a parameter popup is open
- Parameters: Simultaneous display of multiple parameter popups
- Parameters: Export/import of the list of favorite parameters
- Parameters: Inhibits column added to the list view

The following applies only for the QC 4002 Mk.II v. 4 controllers with firmware version >= 4.20.0

- Parameters: Favorite and Modified-Parameter filters work in tree-view as well
- Parameters: Reloading of dependent parameters
- Parameters: For selected parameters the Output A & B values are shown in the tree-view mode

The new features in version 3.34.0 are

General:
Install script updated: a) shows EULA b) displays the USB installation popups sequentially
- Connecting to device is more intuitive
- Supervision: Display of all available electrical data for all controllers in the application
- Supervision: Save a screen copy to a graphical file
- Alarms: Display of current alarms and alarm history
- Alarms: Acknowledge of alarms individually
- Chinese localization

The following applies only for the QC 4002 Mk.II v. 4 controllers with firmware version >= 4.20.0

- Supervision: Plant Settings popup added for easy access to parameters often changed after commissioning
- Parameters: Ability to see all parameters in a tree-like structure

The new features in version 3.33.0 are

General:
- M-Logic: No lines are shown initially. When lines are loaded, the M-Logic data are adjusted to the width of the window
- Bug related to Batch Write of Modbus Configurator data is fixed
- Bug related to the sampling frequency is fixed
- Negative values for the power (during e.g. Mains Power Export mode) can be displayed by the power meter in the Device page

The following applies only for the QC 4002 Mk.II v. 4 controllers with firmware version >= 4.20.0

- Supervision: Display of redundant setups

- Supervision: Connectivity Check supports redundant setups
- Supervision: Color Scheme editor extended with colors used for redundant setups
- Supervision: Display of names assigned to mains, breakers and engines
- Application Configuration: Ability to create redundant setups
- Identifiers: Configuration of redundant setups
- Identifiers: Assign names to mains, breakers and engines
- Parameters: Indication of parameters that were changed since commissioning
- Logs: Ability to reset all logs in the device
- Permissions: Added settings for the access level to reset logs and to reset of the modified-parameter information

The new features in version 3.32 are

- Supervision: connect symbols show to which controller the PC Utility software is connected.
- Supervision: texts assigned to digital inputs are shown in Emulation
- Supervision: printout of Genset data and Engine data is supported
- Application configuration: The applications are presented in tabs.
- Application configuration: Separate buttons for activation and broadcasting of applications
- General: customization of e.g. column width in Parameters and Translations pages
- General: execution of commands at the Windows command prompt is supported
- General: automatic adjustment of the baud rate supported by controller
- Batch write: improved writing of Translations where empty languages are skipped
- Parameters: support of favorites; parameters can be tagged as favorites and a favorite filtering can be applied
- Parameters: the access level can easily be changed for a range of parameters.
- Parameters: which columns to show and the sequence of columns can be customized.
- M-Logic: only "Enabled" lines are shown in the printout
- Counters, Identifiers: printouts of data is possible

The new features in version 3.31 are

- Modbus Configurator: setup the configurable Modbus memory area
- Permissions: configure the access level for read/write of the configurable memory area
- Permissions: show only those parameters that can be changed at a given access level
- Settings: chose custom logo to be shown on printouts
- Settings: configure notification sounds (alarms, batch operation result)
- Application configuration: Indication of ongoing broadcasting process
- Supervision: indication of ongoing broadcasting process
- Batch read/write: the configurable Modbus memory area can be read/written as part of the batch jobs.

The new features in version 3.30 are

- Counters: read-out of various counter values from the controller
- Identifiers: read-out of various ids used by the controller
- Dynamic M-Logic evaluation: the values of the M-Logic lines are evaluated on-the-fly
- AOP and M-Logic lines in use: get an overview of where different types of events are used in the M-Logic lines

- Batch read: allow the reading of logs as well
- Backup/Restore: features to backup a controller and to restore it
- Views: display of all views at the same time
- Translations: prompt for selection of which language to set active after writing of translations
- Settings: language of the PC Utility software can be changed to russian
- Settings: setting for automatic reconnection after flashing
- Settings: setting for a time offset when synchronising the time of the PC with the controller
- Settings: allow extended scanning for COM ports
- Emulation: emulate the behaviour of a device
- Deep dive: navigate between the upper and lower levels of option G7 based plant
- Permissions: control which access levels can do what
- Engine data: read-out of engine data retrieved over e.g. J1939.

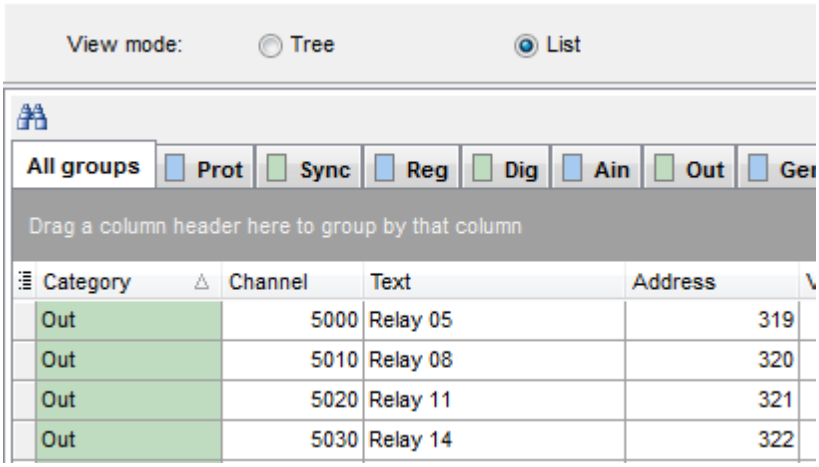
3 Features

3.1 Parameters

The Parameters page is used to set up the parameters for the device. For all devices the parameters can be displayed in a list, and for some devices there is an additional way to see the parameters namely in a tree-like structure. The parameter view modes are therefore

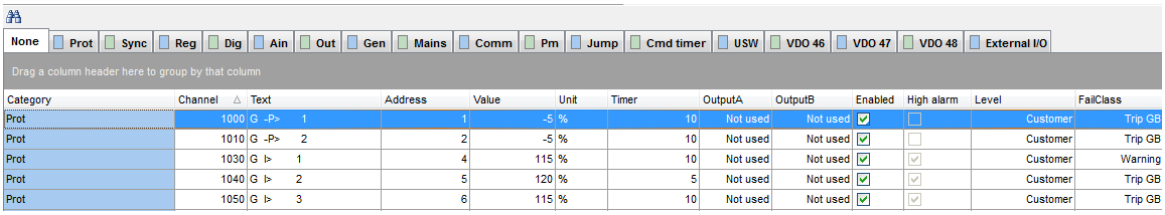
a) List view: supported by all devices
b) Tree view: supported by some devices and some belonging firmwares.

For those devices, that supports both view modes, the user can easily switch between the two in the top of the device page. Furthermore, the user can select a parameter in one view mode, and then, when switching to another view mode, the same parameter will be in focus in the other view mode.



3.1.1 List view

The set of parameters are divided in groups like Protections, Digital input/output etc. These groups are shown in separate tabs in the Parameters page.



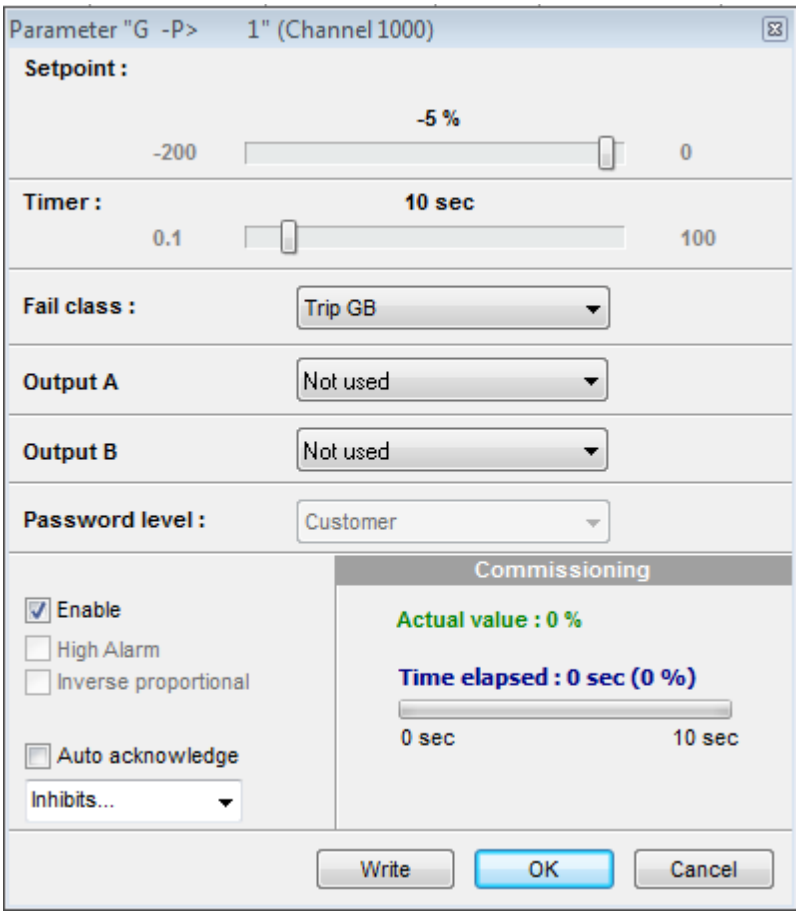
The captions of the tabs are explained in the following table

Tab caption	Full Title	Description
None	None	Tab that contains all parameters in all tabs
Prot	Protection	Parameters to set up e.g. the thresholds of when to trigger alarms
Sync	Synchronisation	All parameters that are related to synchronising and breaker failure alarms
Reg	Regulator	The type of regulation and the values of each individual controller is set up in this tab
Dig	Digit inputs	When the digital inputs are used for alarms the alarm settings are set up here.
Ain	Analogue inputs	All settings corresponding to the analogue inputs are set up here, including alarms for the aux. supply
Out	Outputs	Setup of the analogue regulator and transducer outputs plus the settings of the relay and transistor outputs
Gen	General	Nominal and basic settings are adjusted here. Most used auxiliary functions are also grouped here
Mains	Mains	Settings concerning import/export settings to the grid plus mains failure settings
Comm	Communication	ID numbers, comm failure alarms and J1939/Engine comm settings are placed in this tab
PM	Power Management	This tab includes settings for the power management system
Jump	Jump	Various settings not grouped in another tab
Cmd timer	Command timer	Make time adjustments for the cmd timers here. Complete the setup in M-Logic when the timers are setup
USW	Utility software	This tab includes settings that can only be set up using the PC utility software
VDO		Selection of VDO type and setup of user-defined VDO curve. For some products this tab will be named RMI
External I/O	External input/ output	Setting concerning external (e.g. Beckhoff) in/outputs are made here

Note that the list of tabs differ from product to product. Furthermore, it is worth noting that some parameters might not be relevant for a given setup. The "man-with-glasses" toggle button (shown below) in the menu bar is used to exclude parameters that are not relevant for the hardware

configuration of the device. Beyond this, there might be parameters that are either not relevant for the current setup or parameters that are mutually exclusive.

By double-clicking somewhere in a given row on the Parameter page, the settings for that particular parameter is opened in a popup like below.

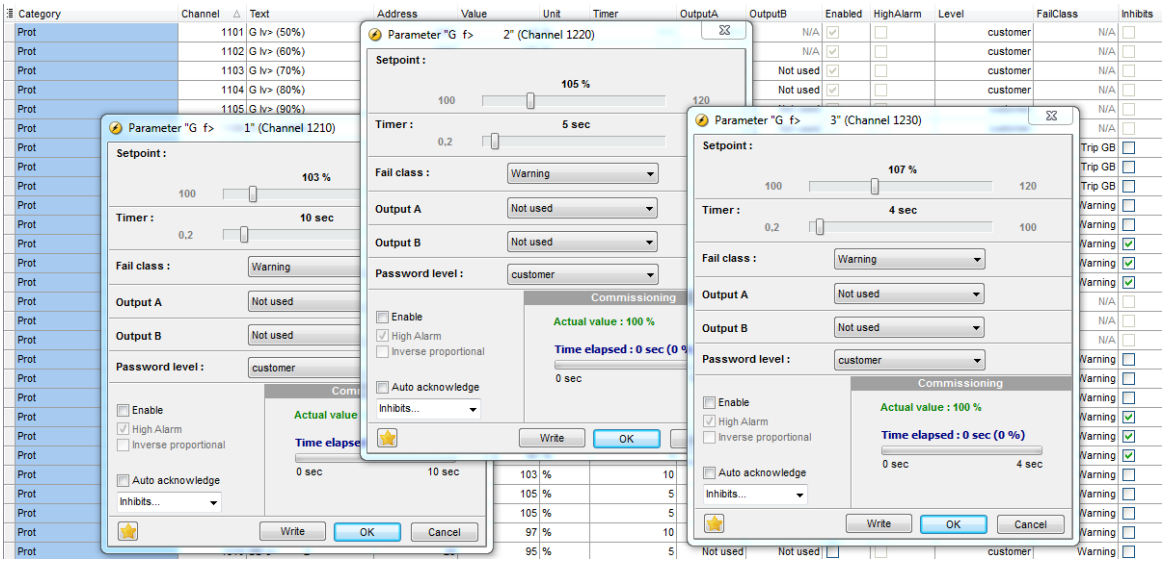


The fields in the popup are explained in the following table

Field	Description
Setpoint	The alarm setpoint as a percentage of the nominal values. The value can be entered using the keyboard of the pc by clicking the numerical value itself.
Timer	The timer setting is the time that must expire from the alarm level is reached until the alarm occurs.
Fail class	When the alarm occurs, the unit will react depending on the selected fail class. Select the required fail class from the drop-down list. The list might contain items like Block, Warning, Trip GB, Shutdown, Safety stop.
Output A/B	Select which terminal to activate in the case of an alarm. A

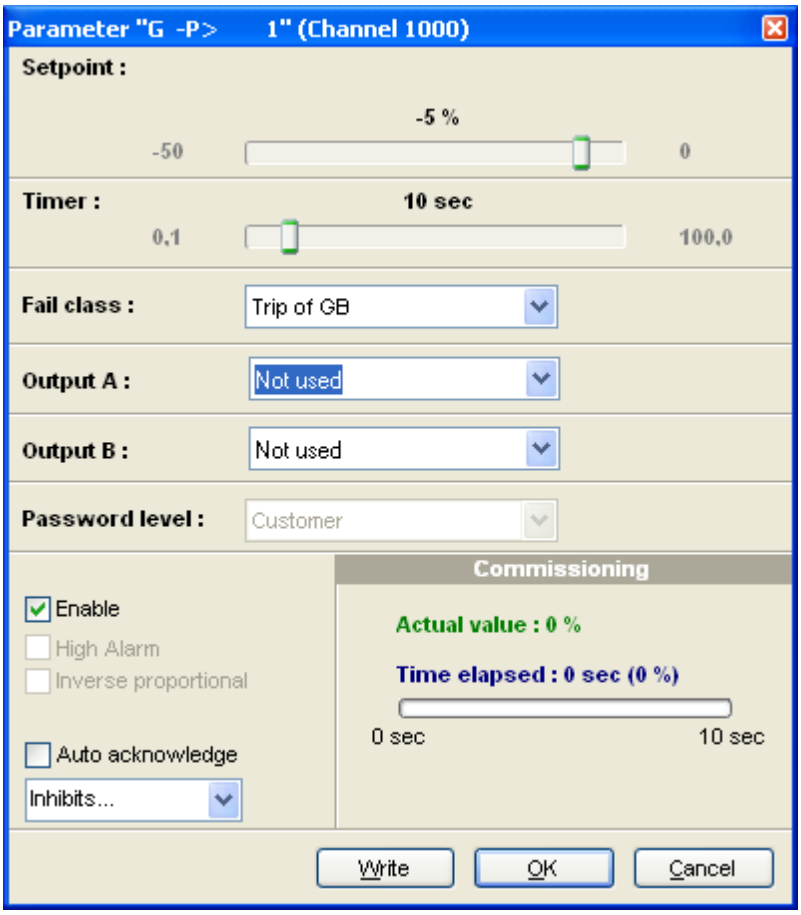
Field	Description
	terminal number can be chosen, but there is also a "limit" among the items in the dropdown list. Limit is used to make the alarm useable as an input event in M-Logic.
Password level	Select which password level that is needed to modify this parameter. Can not be edited if the user has lower privileges. The number of levels are device-dependent, but in most most cases there are 4 levels: none, customer, service and master. The password level can also be edited directly in the password level column without opening the popup of each individual alarm.
Enable	To enable/disable the alarm function.
High alarm	Used to indicate whether the alarm is fired when the value exceeds or goes below the setpoint for a given time. If checked, the alarm is fired when the value is exceeded.
Inverse proportional	Defines whether the 4-20 mA transducer signal is proportional or inverse.
Auto acknowledge	If this option is set, the alarm is automatically acknowledged if the value goes below the setpoint (in case of a high alarm).
Inhibits	Used to express exceptions to when an alarm must be fired. The inhibit functionality is explained in more detail below.
Commissioning	When connected to the device, the Actual Value inside Commissioning shows the current value relative to the setpoint. The Time elapsed shows the time the value is above the setpoint. These values are used during commisioning to study the behaviour of a genset and to put the setpoint values appropriate for the genset. The commisioning section is mainly relevant for Protections.

Several popups corresponding to different parameters can be open at the same time allowing the user to get an better overview of the detailed settings of the parameters.



Inhibit of alarms

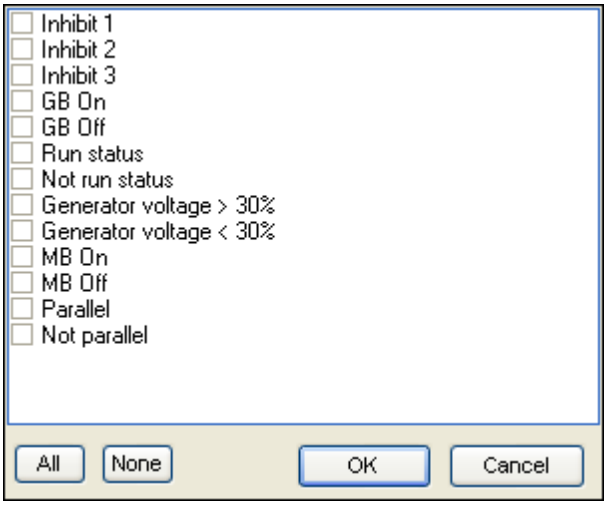
In order to select when the alarms are to be active, a configurable inhibit setting for every alarm has been made. The inhibit functionality is only available via the PC utility software. For every alarm, there is a drop-down window where it is possible to select which signals that have to be present in order to inhibit the alarm.



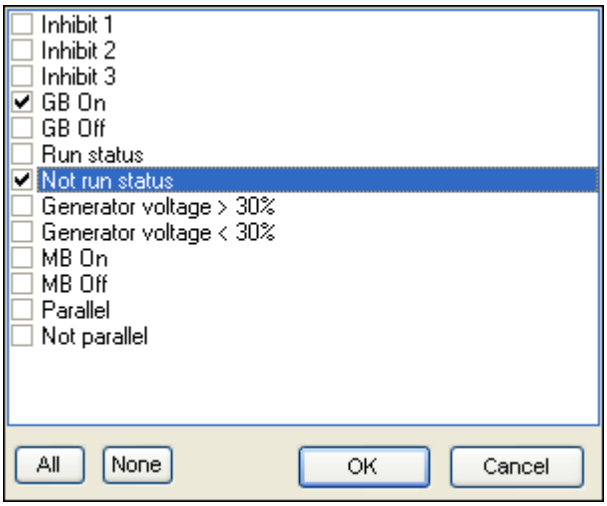
Selections for alarm inhibit:

Function	Description
Inhibit 1	M-Logic outputs: conditions are programmed in M-Logic
Inhibit 2	
Inhibit 3	
GB ON (TB ON)	The generator breaker (GB) is closed (TB= tie breaker)
GB OFF (TB ON)	The generator breaker is opened
Run status	Running detected and the timer in menu 6160 expired
Not run status	Running not detected and the timer in menu 6160 not expired
Generator voltage > 30%	Generator voltage is above 30% of nominal
Generator voltage < 30%	Generator voltage is below 30% of nominal
MB ON	The mains breaker is closed
MB OFF	The mains breaker is opened
Parallel	Both GB (TB) and MB are closed

Not parallel	Either GB (TB) and MB are closed, but not both



Inhibit of the alarm is active as long as one of the selected inhibit functions are active.

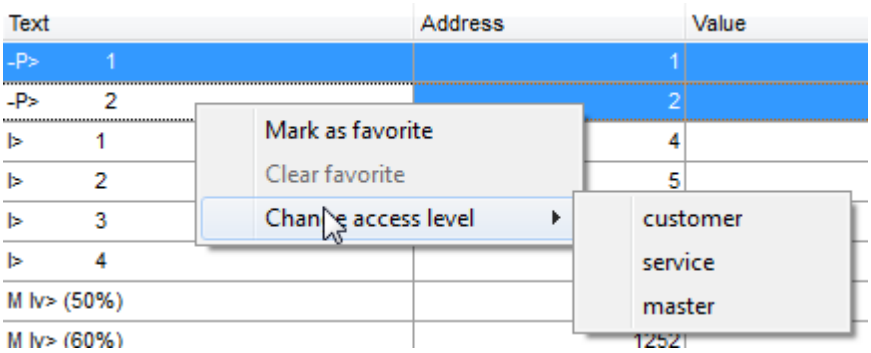


In this example, inhibit is set to *Not run status* and *GB ON*. Here, the alarm will be active when the generator has started. When the generator has been synchronised to the busbar, the alarm will be disabled again.

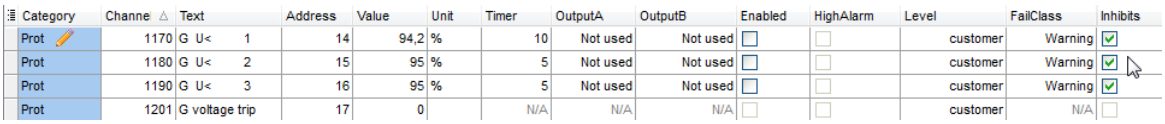
- The inhibit LED on the unit and on the display will activate when one of the inhibit functions are active.
- Function inputs such as running feedback, remote start or access lock are never inhibited. Only alarm inputs can be inhibited.
- If an alarm is configured to activate a limit relay, the relay will activate despite that the inhibit input is ON.
- The bus tie breaker unit has no running detection that can be configured, so the only inhibit functions are the binary input and the position of the bus tie breaker and the voltage on bus A (< 30%/> 30%).

Change access level for multiple parameters

The access level can be changed for multiple parameters by selecting a range of parameters in the table and open the "right-click" menu where the "Change access level" can be found.

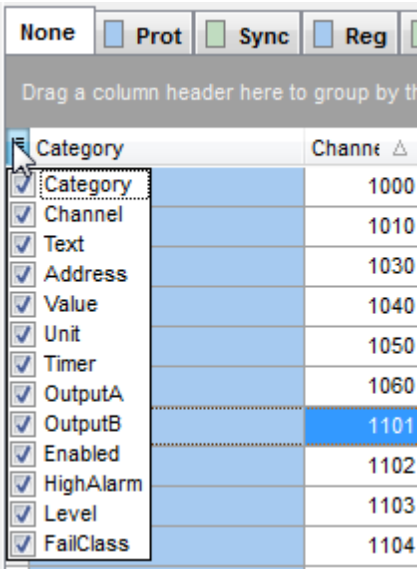


Inhibit column: An overview of which parameters has an inhibit configured can be achieved from the parameter list. A column with the title Inhibits shows where an inhibit has been configured. The inhibit is shown to the most right below (this position can be changed: see later)



Change the layout of the Parameter table

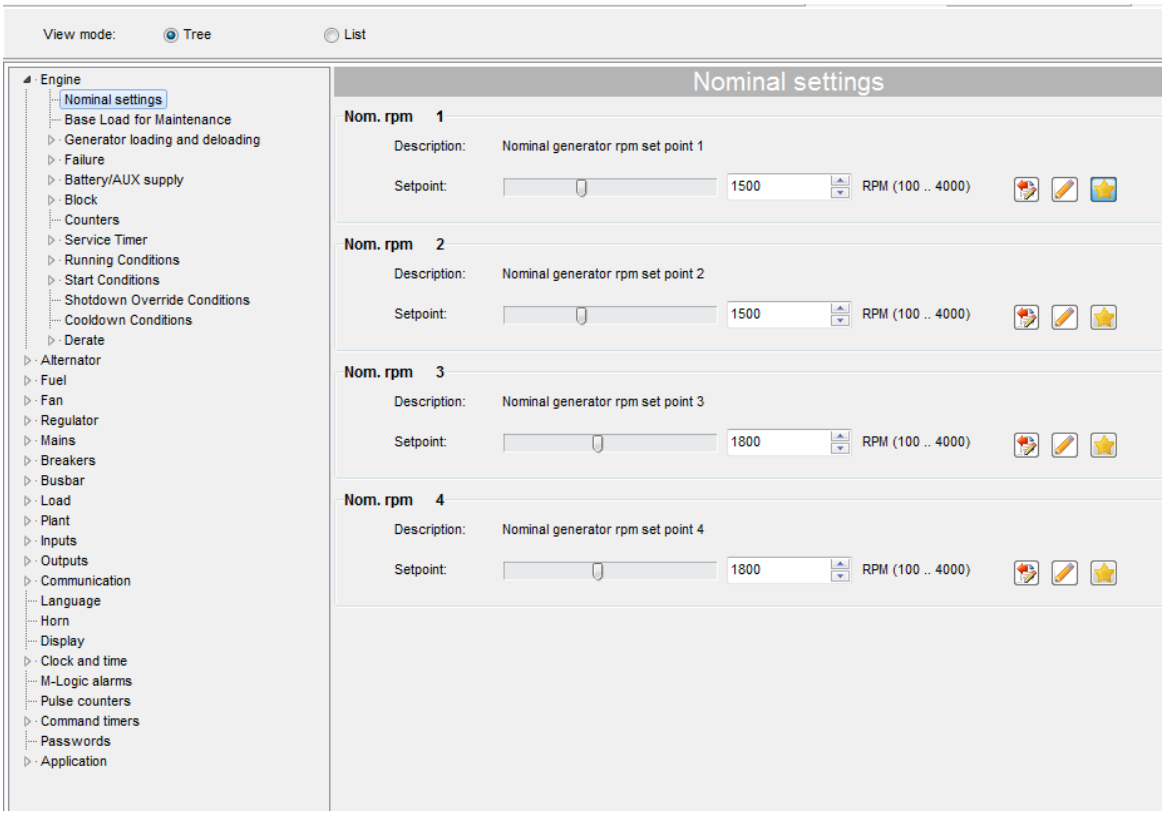
The sequence of columns as well as which columns to show, can be tailored by clicking the upper left corner of the Parameter table:



If the check mark is removed in the list, the given column will no longer be shown in the Parameters table. The sequence of the columns (from left of right) can be changed by "drag-drop" of the items in the list shown in the screenshot above.

3.1.2 Tree view

The parameters are displayed in a tree-like structure. To the left the tree is shown and to the right the parameters for the selected branch is shown.



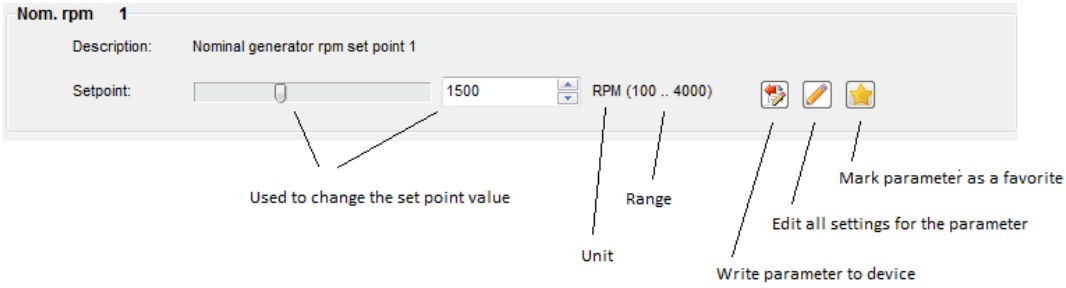
For each parameter only the most important settings are shown. These are

a) the Enable flag
b) the description
c) the set point
d) the timer value
e) the fail class

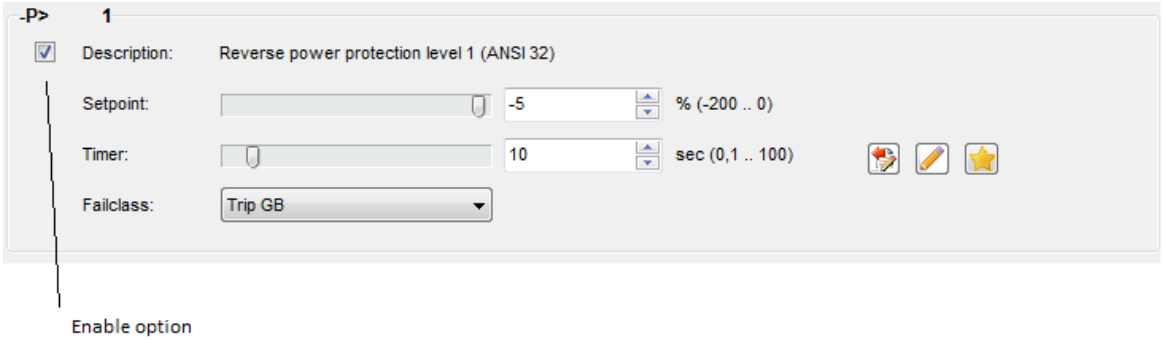
For a given parameter only those of these settings, that is defined for the parameter, are shown. For a few parameter the
Ouput A and Ouput B settings are essential and these are then also shown.

In order to see and modify all the settings for a given parameter, the "Edit all settings for the parameter" can be pressed. This will open a popup identical to the popup opened in list view mode when double-clicking a parameter.

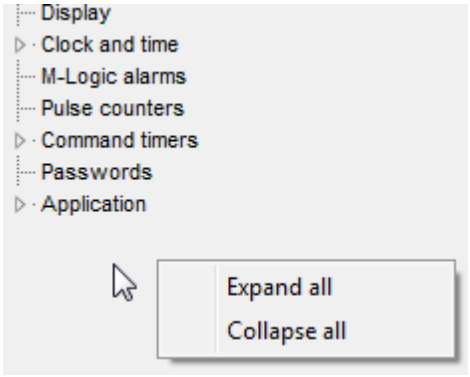
The fields displayed for a parameter are as follows



Some parameters have all five settings listed above



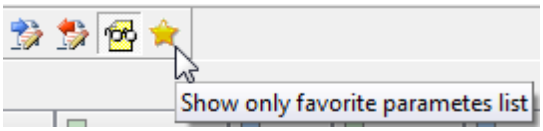
All branches of the tree can be expanded or collapsed by right-clicking anywhere in the tree



3.1.3 Favorites

Favorites

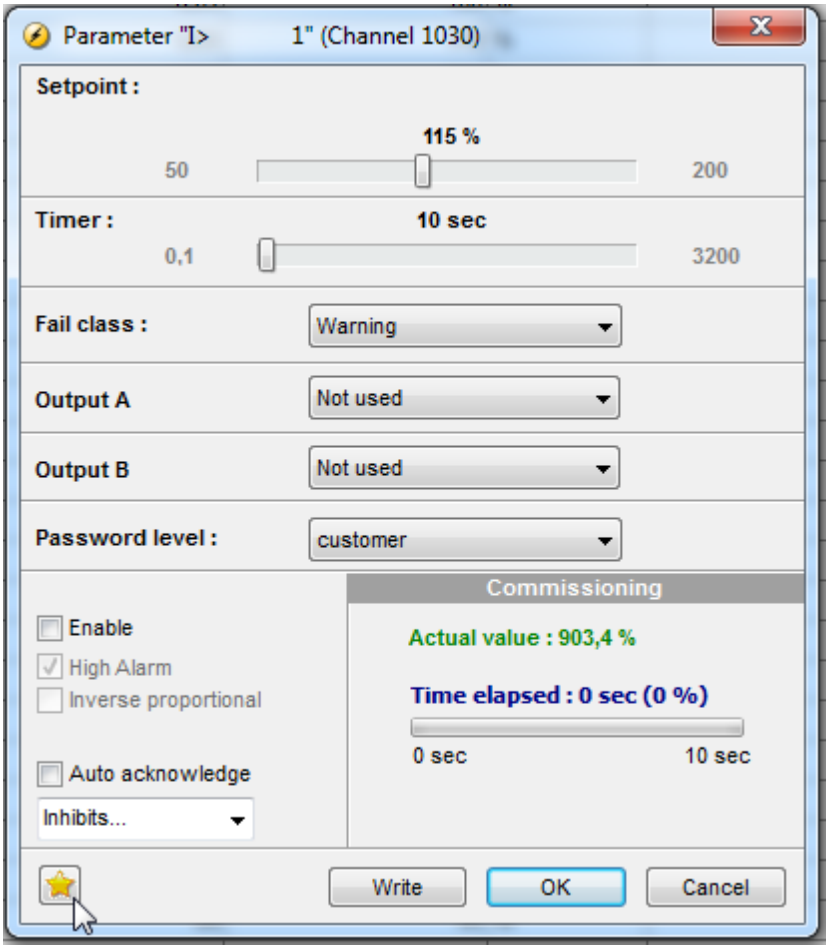
Any parameter can be marked as a favorite. When a parameter is marked as a favorite, it will be shown when the favorite filter in the top menu bar is active. The favorite filter button contains the star symbol as shown below



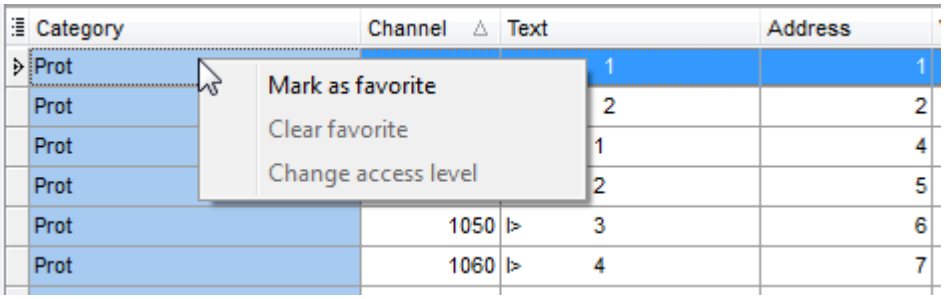
The favorites can be used to mark those parameters, which are especially interesting for the user. When pressing the favorite filter button only the favorite parameters are shown in the tabs in the Parameters page. The favorite settings will apply across devices and device types; so one parameter that is marked as favorite for one controller, will also be marked as a favorite parameter for other controllers (if the parameter is relevant for the controller).

The process of marking a parameter as a favorite can be done in two ways: a) in the popup showing the details of the parameter or b) in the parameter list directly.

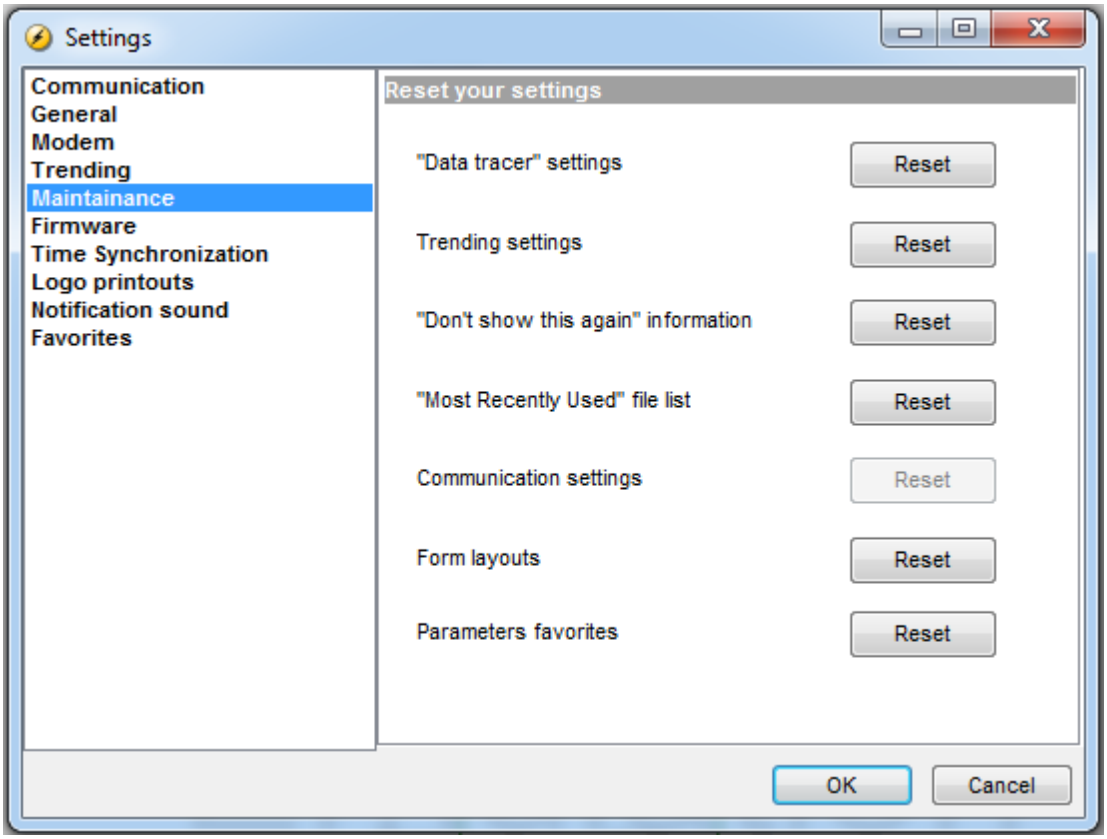
Parameter popup where a favorite toggle button is located in the lower right corner:



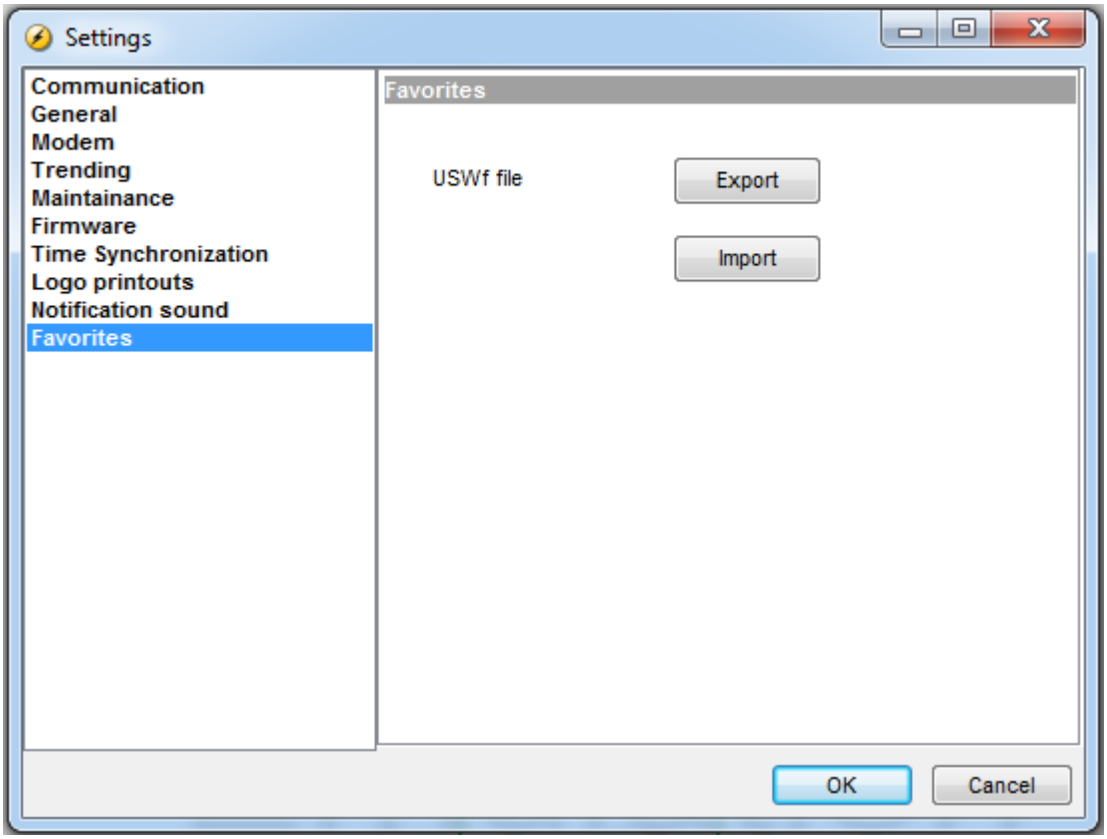
Alternatively, one or more parameters can be marked in the Parameter table (by means of the standard way of marking multiple items in Windows) and then a right-click with the mouse leads to a context menu where "Mark as favorite" can be chosen



A list of favorites can be cleared in the "right-button" menu as shown above. To clear the entire list of favorites, the user has to go to the Settings Popup

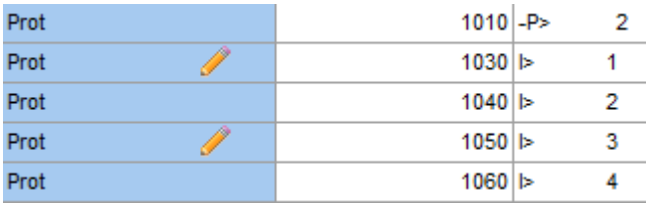


The list of favorites can be shared among users. A file containing the favorites can be exported from the Settings popup to a file with the extension "uswf". This file can be imported by other users. This will of courses overwrite the favorite settings defined previously.

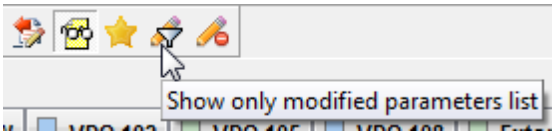


3.1.4 Modified-parameters

If some parameters has been changed since commissioning the Utility software will indicate that with the pencil icon as shown below. The change of a given parameter might have happened using the display buttons or the Utility Software and is registered by the controller.



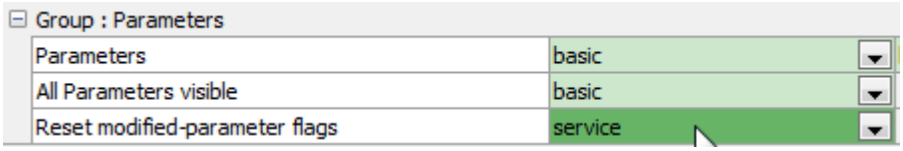
In the top menu bar is a filter button so only modified-parameters are shown



Users with a high access level can reset the modified-parameter flags so all pencil icons are cleared from the parameter list. This is done by pressing the "reset modified-parameter flags" button shown below. This could be one of the final commissioning steps performed by service personnel. If the users at lower access levels, which can not reset the modified-parameter flags, do change any of the

parameters, this is revealed by the presence of the pencil icon in the parameter page.

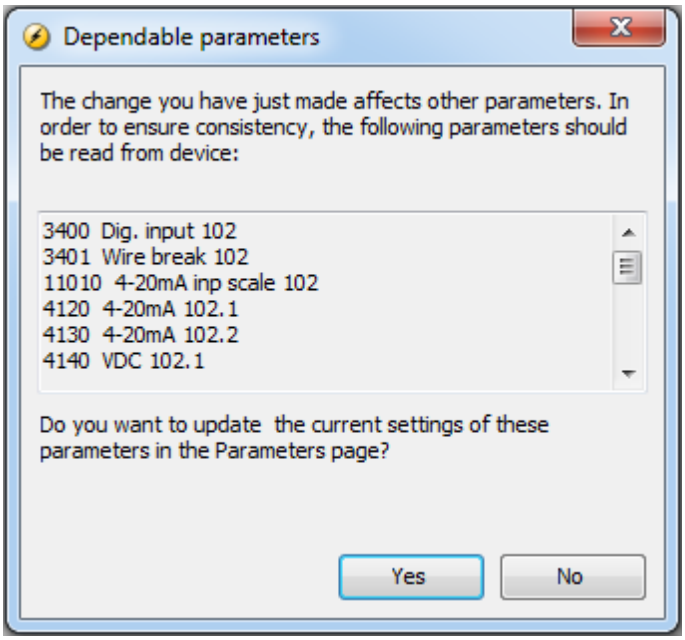
The user level required to perform the reset of all the modified-parameter flags is controlled by a permission setting in the Permissions popup - see below. Per default this is set to Service.



The modified-parameters are only available for selected controllers.

3.1.5 Dependable parameters

The visibility of some parameters depend on a second parameter. This means that if one parameter is changed by the user, then other parameters might become visible and some become hidden. Which parameters to display are always ruled by the controller. When Dependable Parameters is supported by a controller and the user changes a parameter on which other depend a popup is shown like below:



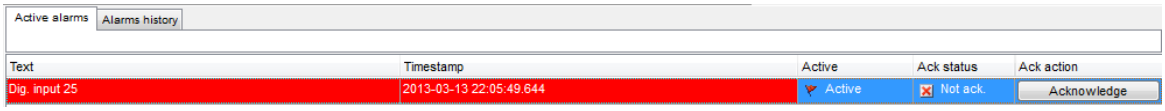
In the popup is a shown a list of those parameters that will be re-read from the controller if the user chooses "Yes". Note that the list is a complete list of dependable parameters and as only a subset of these will make sense in a given situation, only some of these parameters will finally be shown in the list- or tree view. Nevertheless, if "yes" is chosen, the user can be sure that the parameter list is updated and he therefore don't need to think about re-reading of parameters as previously.

3.2 Alarms

On the Alarms page two groups of alarms lists are shown. It is

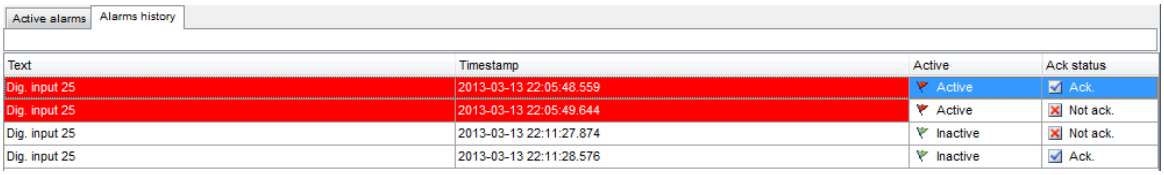
a) the active alarms
b) the alarm history

These lists are each shown in a tab on the Alarms page



The active alarms can be acknowledged individually by clicking the acknowledge button to the right on the alarm line.
The list of active alarms is shown at the bottom of all pages (e.g. the Parameter page).

The alarm history contains the list of alarms seen by the PC Utility software since it was started



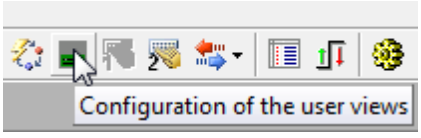
To each alarm belongs a parameter defining the conditions under which the alarm should be triggered. This parameter can be opened by double-clicking an alarm in the lists of alarms. Note that a given parameter can only be opened (and eventually changed) if the current access level is equal to or higher than that set for the parameter.

3.3 Views

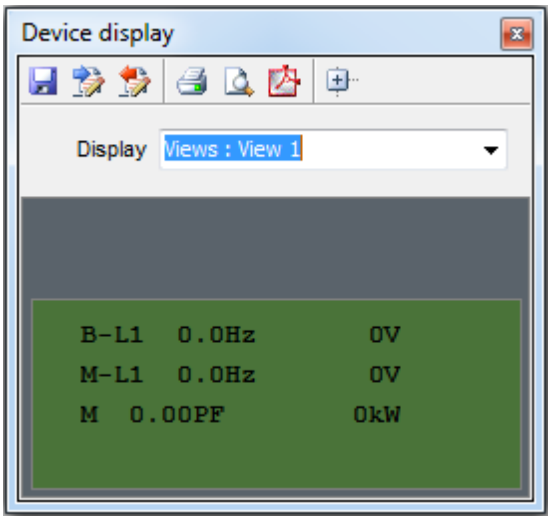
Views are used on the device to have easy and fast access to selected data. A view consists of a number of lines (typically 3) and a small number columns in which data can be displayed. The number of such views depends on the device type and firmware version. There are typically either 15 or 20 Views. The operator can, using buttons on the device, cycle through the views.

Some devices have 3 sets of views denoted V1, V2 and V3 respectively. Only V1 is edited from the PC utility software.

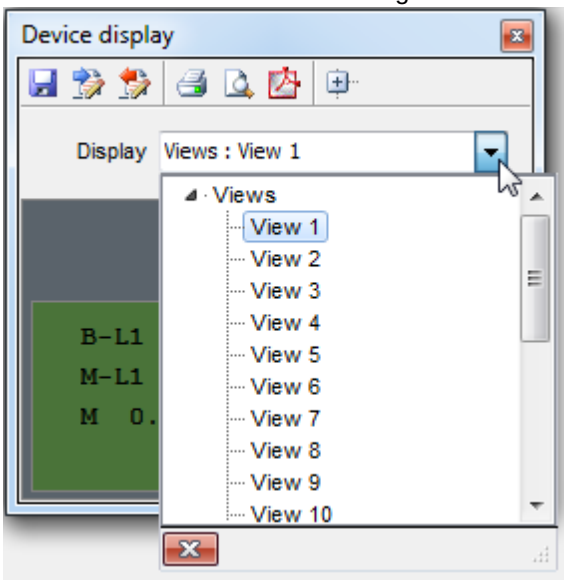
View window configuration
The individual view windows need to be configured through the PC utility software in the dialogue box illustrated below.
Use the "Configuration of the user views" button to open the configuration popup.



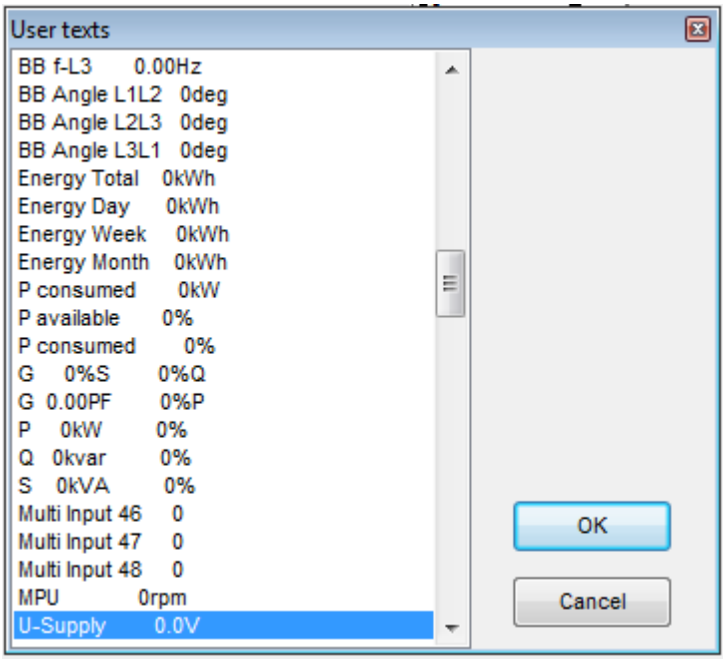
the Views popup:



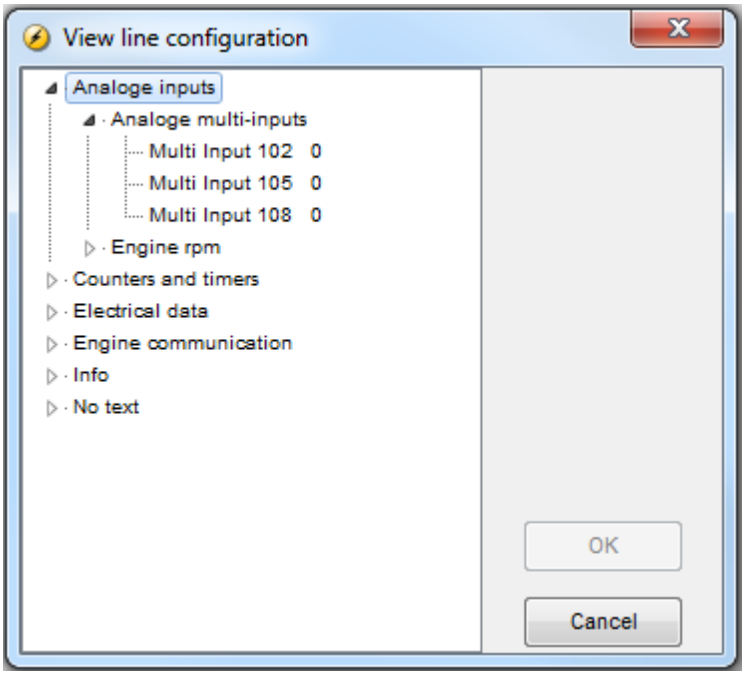
Select the view window to be configured.



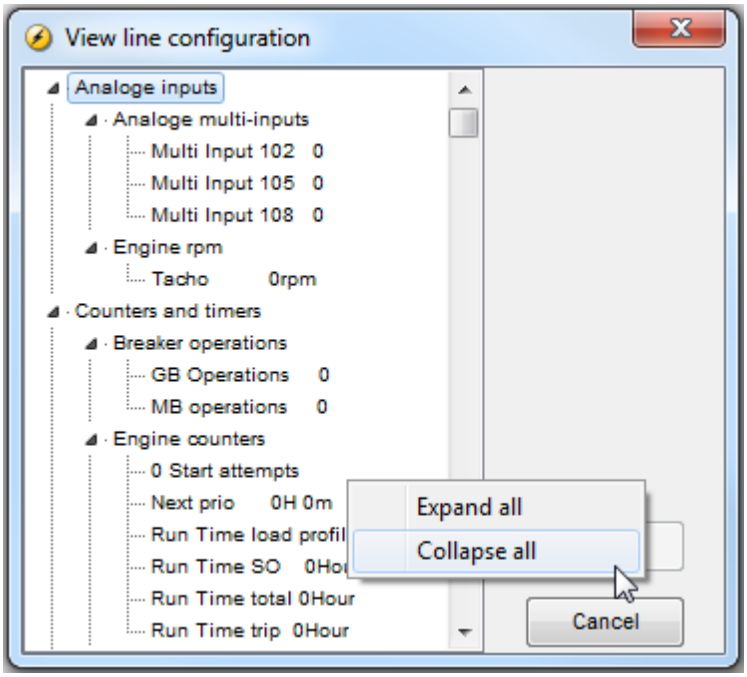
Click any of the lines in the green area to edit the configuration. A popup is shown where values relevant for the view can be selected.
How the popup looks like, depends on the controller type and firmware version. Most controllers get the following popup:



For an QC 4002 Mk.II v. 4 controller with firmware version >= 4.40.0, a popup with a tree-structure is shown:



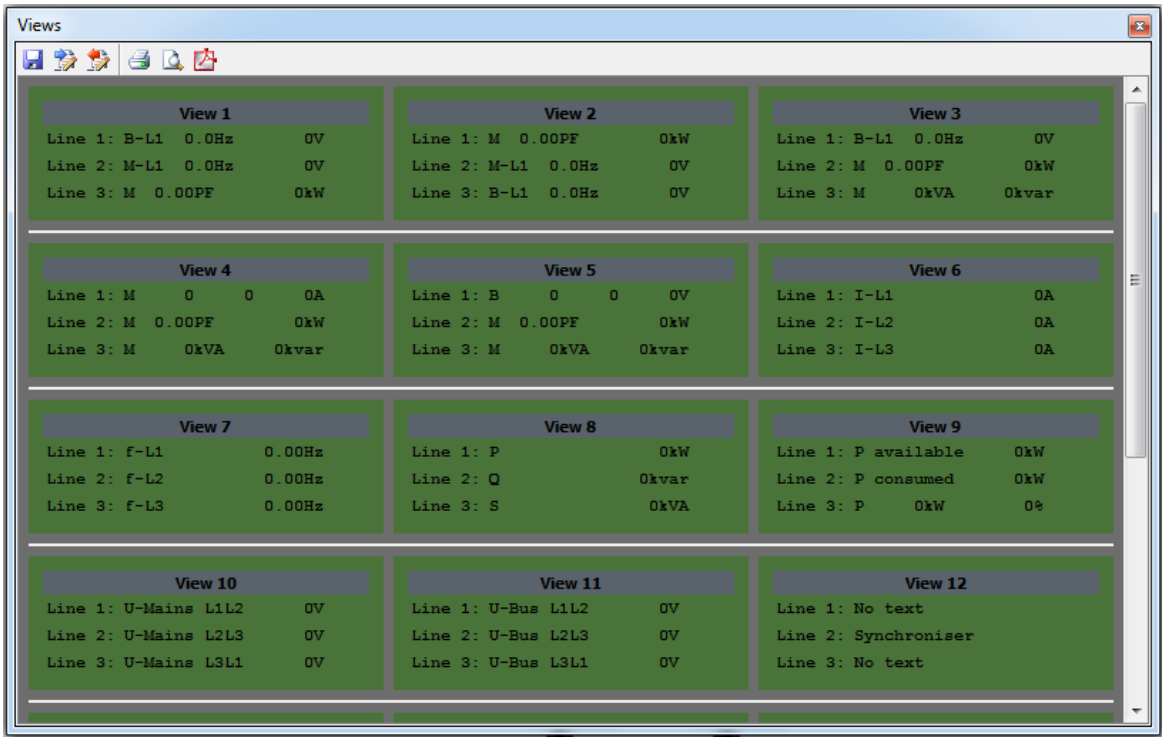
If right-clicking is performed in this popup, the user can choose to expand or collapse the entire tree.



It is only possible to configure the view windows via the PC utility software – configuration via the display unit is not possible.
If the text "no text" is selected in all 3 lines in a window, it will not be displayed. This is to get a continuous displaying, if a window is not to be used.

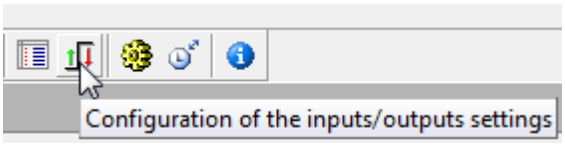
Multiple views

By pressing the  button, all the available views are shown. In this overview, the lines can also be edited. Note that the window is resizable.

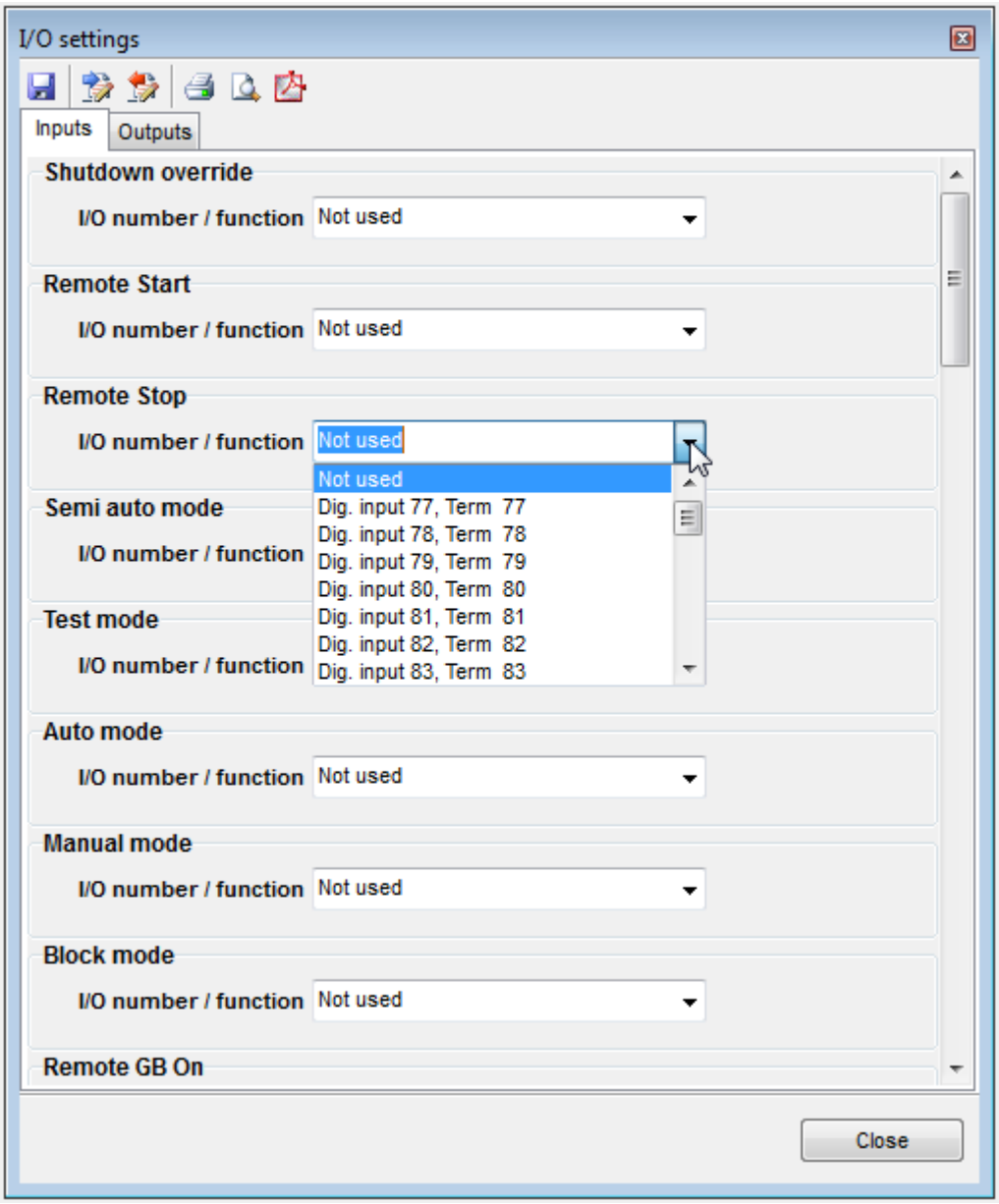


3.4 Inputs & outputs

The Inputs and Outputs settings popup is used to assign an event to a digital input/output terminal. The I/O settings can be configured by clicking the "Configuration of the inputs/outputs settings" button in the menu bar



The desired input number can now be selected for the individual input function via the drop-down list.



To each input terminal one event can be assigned. In contrast to this, one function can be assigned to more than one terminal.

The buttons shown at the top of the I/O popup are

Save the I/O settings to USW file

Read the I/O settings from device

Write the I/O settings to device

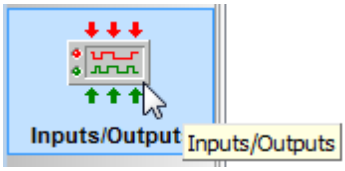
 Print the I/O settings

 Provide a preview of the I/O settings

 Save I/O settings to the pdf file format

It is worth noting that inputs and outputs can also be configured using M-Logic. In M-Logic, the user can build more advanced relationships between inputs/outputs signals and functionality.

The current status off the inputs and outputs are shown on the Inputs/outputs page activated by a button on the left hand side of the application.



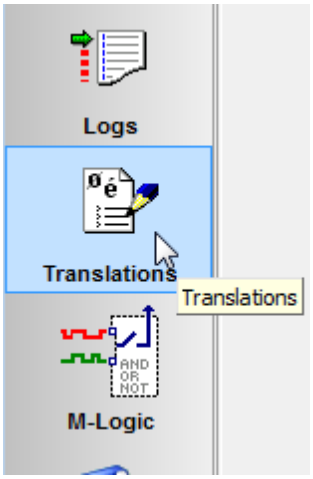
The numbers to the left in both the inputs and the outputs columns are the corresponding terminal numbers.

Input status		Output status	
Digital input 77	77	Status ok	16-17
Digital input 78	78	Horn	18-19
Digital input 79	79	Start Prepare	20-21
Digital input 80	80	Stop coil relay	23-24
Digital input 81	81	Start relay	26
Digital input 82	82	Run coil relay	27
Digital input 83	83	Relay 28	28-29
Digital input 84	84	Relay 30	30-31
Digital input 85	85	Relay 32	32-33
Digital input 86	86	Relay 34	34-35
MB pos feedback ON	87	MB ON relay	36-37-38
MB pos feedback OFF	88	MB OFF relay	39-40
GB pos feedback ON	89	GB ON relay	41-42
GB pos feedback OFF	90	GB OFF relay	43-44-45

3.5 Translations

On the Translation page, the user is able to translate strings shown in the display of the device. These strings can be read from and written to the connected device.

On the Translation page, the languages are shown in vertical columns. Each row corresponds to a translation of a given master string (which can not be edited).



The strings are shown in columns on the Translation page.

Master			
Status	Master language	Language 1 (French)	Language 2 (German)
	P TB A105 #####kW	P TB A105 #####kW	P TB A105 #####kW
	P BTB A105 #####kW	P BTB A105 #####kW	P BTB A105 #####kW
	Inhibit modbus comm.	Inibit com modbus	Sperre Modbus-Komm.
	Ack. alarm	Aquit alarmes	Quitt Alarm
	Clear alarm	effacement alarmes	Lösche Alarm
	MPU ######rpm	T/mn capt ######	Drehz. ######Upm
	Start button pushed	Bouton start pressé	Start Taste betät.
	Stop button pushed	Bouton stop pressé	Stop Taste betät.
	GB Off button pushed	Bouton DG OFF Pressé	GS Aus Taste betät.
	GB On button pushed	Bouton DG ON Pressé	GS Ein Taste betät.
	TB Off button pushed	Bouton DC OFF Pressé	KS Aus Taste betät.
	TB On button pushed	Bouton DC ON Pressé	KS Ein Taste betät.
	Governor output	Sortie régul vitesse	DZR Ausgang
	AVR output	Sortie régul tension	SPR Ausgang

Once inside the Translation page, there are are number of additional buttons in the top menu bar.

The functionality behind these 5 buttons are described in the following:

 Read translations from the device. The user is asked during the reading whether all strings should be retrieved or only the master strings.

 Write translations to the device. Before writing, the user is asked how many of the languages

should be written to the device. The actual number of languages that can be stored is device-dependent. The PC utility software will display 11 languages (which can all be stored in a USW file), but before writing, the user has to decide which languages to be written to device if it supports less than 11 languages.

 Synchronise the master strings in the device with those in the Translation page. This is used to check whether the master strings are different in the Translation page compared to the master strings in the connected device.

 Import translations from a USW file. Using this the user can import translations from several USW files into the columns of the Translation page.

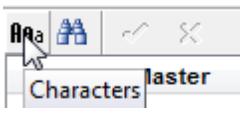
 Edit the sequence of languages. This is used to change the order of the columns containing translations.

Translation steps

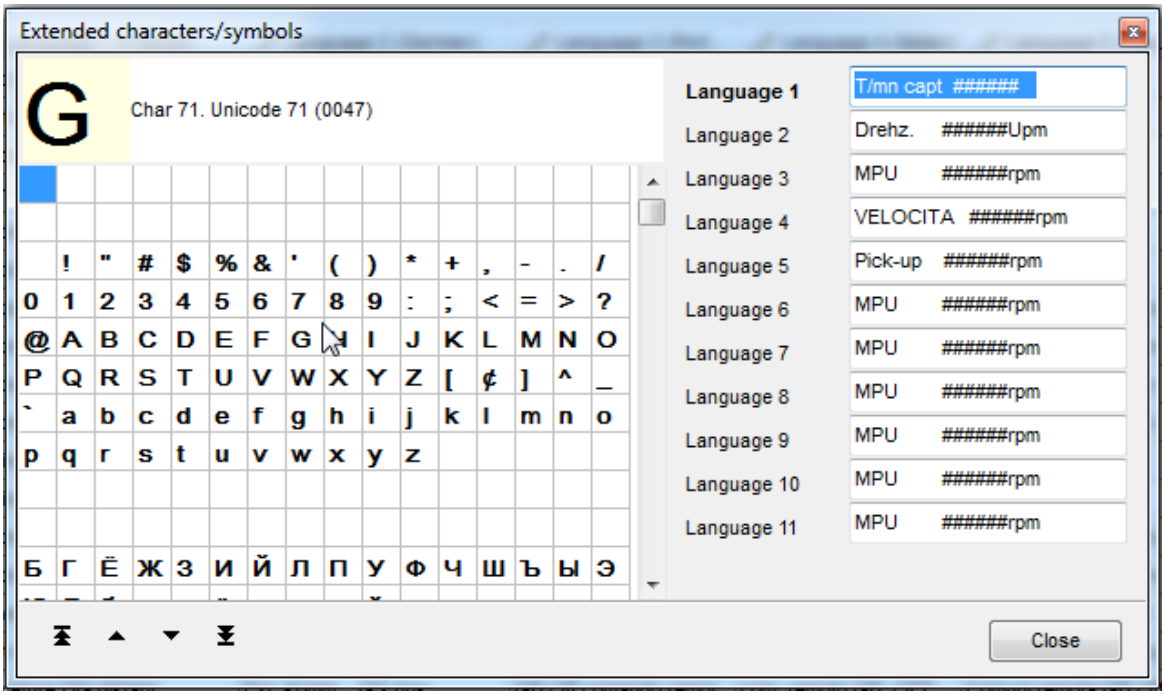
1. read the translations from the device or a USW file
2. import more translations from USW files if needed
3. edit the strings in one or more columns (see below)
4. edit the language caption (see below)
5. save the translations to a USW file for later backup (optional)
6. write the translations to the device

Edit the language strings

The strings can be edited directly on the Translation page. Simply click the field with the string to be edited and type via the keyboard. Alternatively, choose the characters in the Extended Character popup opened by pressing the Characters button. The latter way ensures that only characters, that the device supports, are used in the translations.



This will cause the Extended Character popup to be opened.



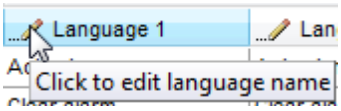
Note that the part of the string with "#" indicates a place were a measured value should be shown. These characters should not be edited.

Sorting the translation strings

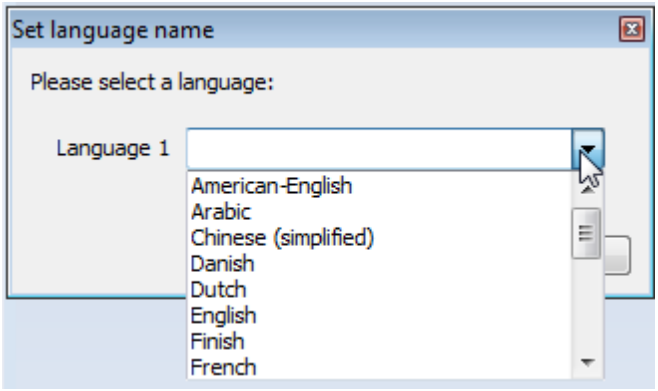
The strings can be sorted by clicking the column header. Holding down the Ctrl button while clicking the column header will remove any sorting and revert to the order of the strings given by the device.

Edit language caption

Edit the language caption by clicking the pencil icon:



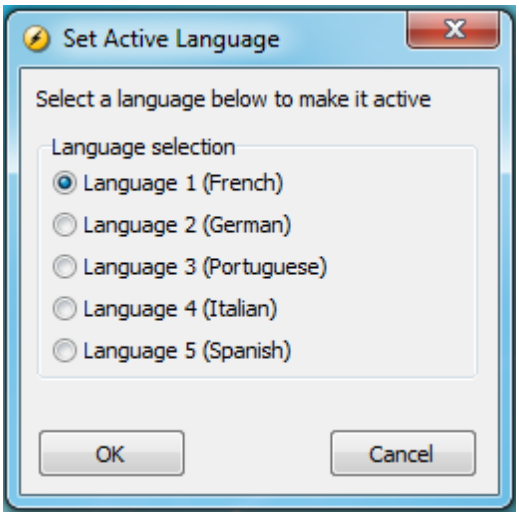
Then a popup will open where the language can be specified. Alternatively, the user can define a selfmade name for the language:



Subsequently, the language name is shown in the header of the language column. The language is saved in a USW file along with the language data if a save is performed.

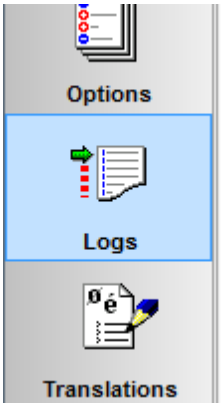
Write the Translations to the device

Press the Write button to write translations to the device. After the writing has been performed, a dialogue box asking which language should be activated, is shown:

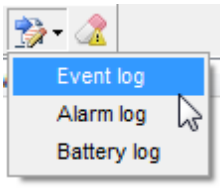


3.6 Logs

The logs from the device can be retrieved by going to the Logs page. Click the Logs icons in the left menu:



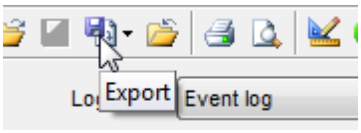
On the Logs page, the log types offered by the device can be retrieved using the Read button at the top of the logs page. For some devices, three types of logs can be retrieved



When pressing the Get logs button, the log lines are displayed in a table:

TimeStamp	Text	Channel	PPower	QPower	PF	Gen. U1	Gen. U2	Gen. U3	Gen. I1	Gen. I2	Gen. I3	Gen. F
2008-02-17 05:24:39.5	SEMI-AUTO MODE	0	0	0	100	0	0	0	0	0	0	0
2008-02-17 05:24:39.5	Power management	0	0	0	100	0	0	0	0	0	0	0

The logs can be saved to pdf, text or Excel file using the Export function in the top menu bar:



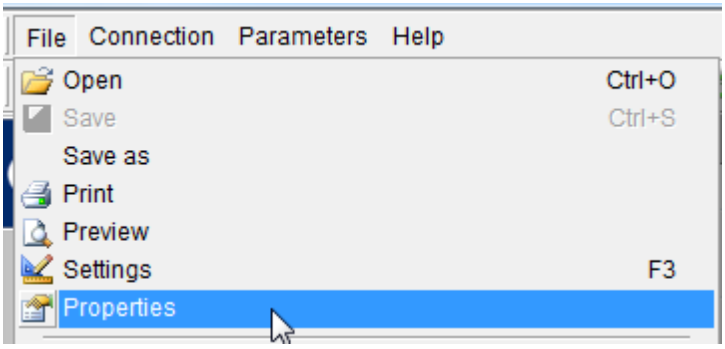
In order to build a complete log file with all the log types, a combined file must be made in Excel.

Reset all logs

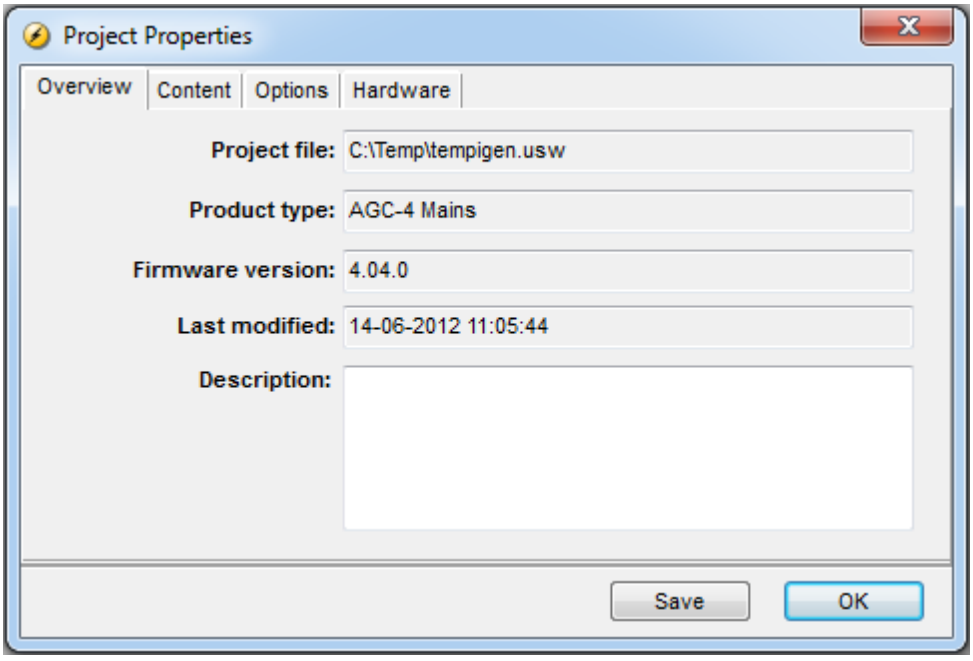
The logs can be reset in selected controllers. If the user has a high access level the "Reset all logs" button will be active in the main menu bar - see below.

3.7 Project Properties

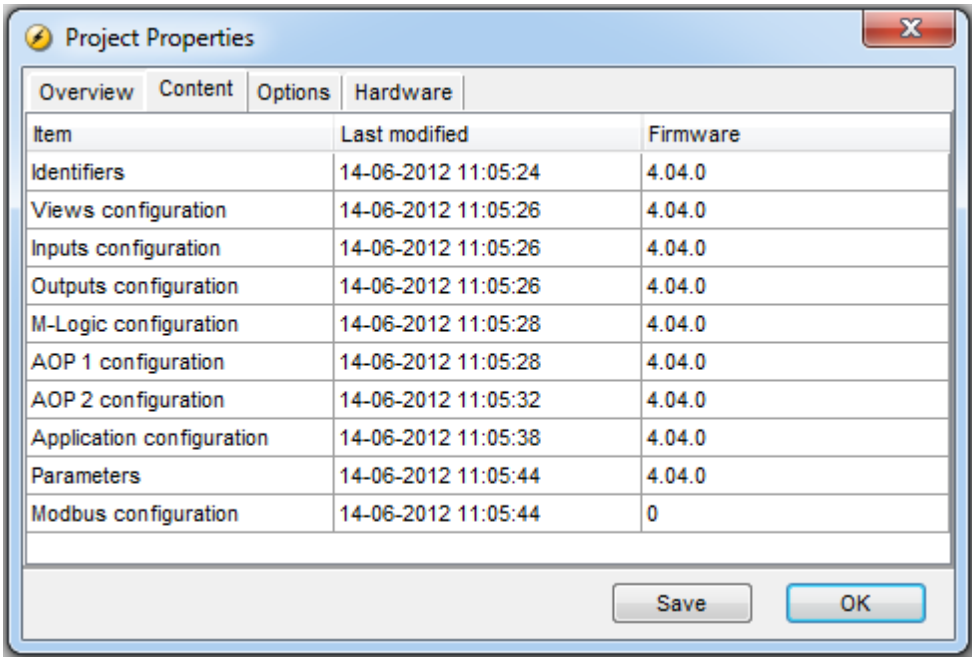
In the Project Properties various settings for an open usw file can been seen. The Project Properties is opened by going to the Properties menu point below the File menu:



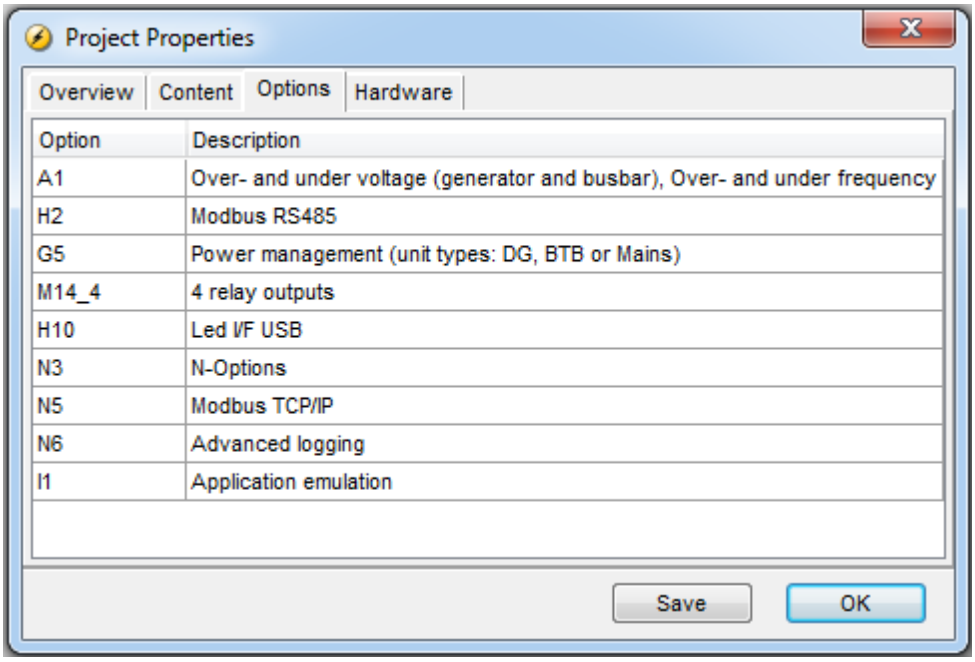
On the Overview tab various info is given. The description field where the user can save the any text as part of the usw file.

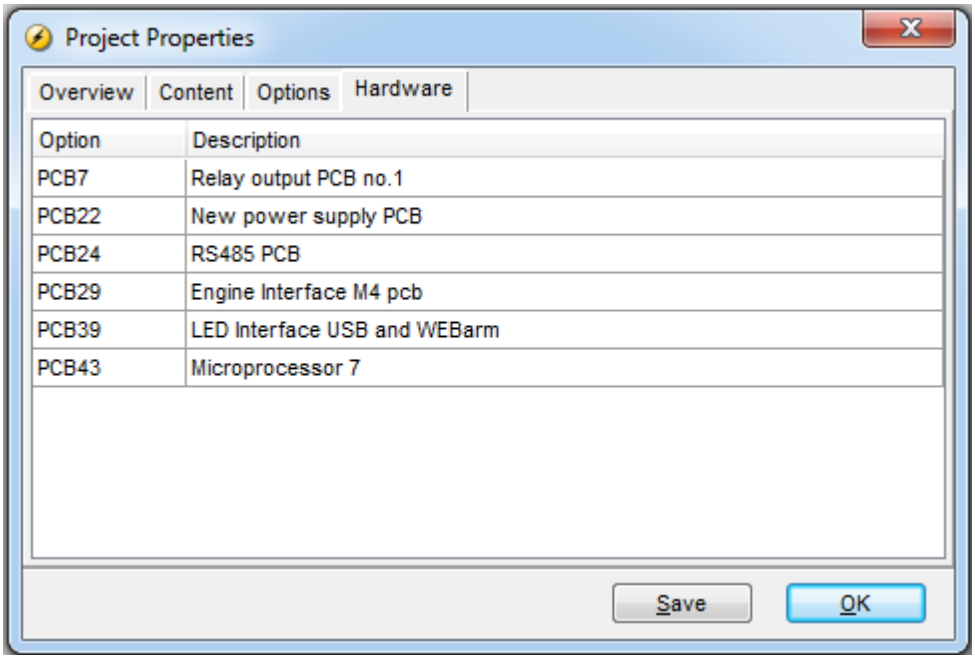


The Content tab lists from which firmware the different components inside the usw file is originating. A date for the last time a given component was changed is also given. In the example below no firmware version is given for the Modbus configuration, this is the case for all older usw files.



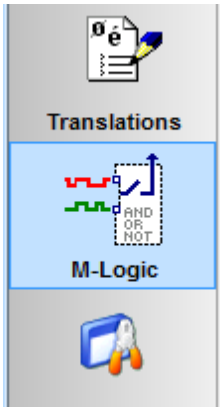
The Options tab contais the options of the controller from which the usw originates. The list of options is from the controller on which data the usw file was first created. If the usw file is later updated by saving components (e.g. M-Logic) originating from a controller





3.8 M-Logic

M-Logic is used to set up advanced logic. An example of use of M-Logic is if the user has a selector switch that changes between the operation modes TEST-AUTO-SEMI-MAN-BLOCK. M-Logic is opened by clicking the M-Logic on the left menu bar:



Once the M-Logic page is opened, new buttons are shown in the top menu bar:

The functionality related to these buttons are described below:

 read M-Logic from the device

 write M-Logic to the device

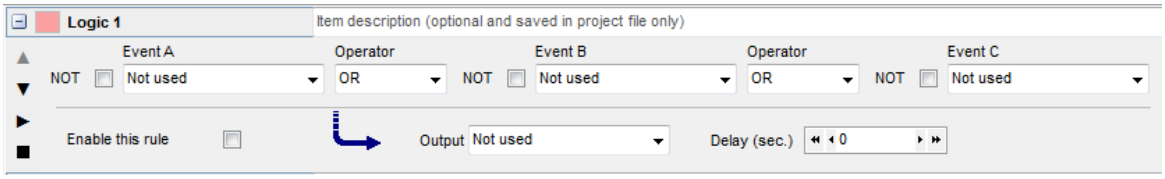
 expand all the M-Logic lines so all details are shown

 collapse all the M-Logic lines

 dynamical evaluation of the M-Logic lines

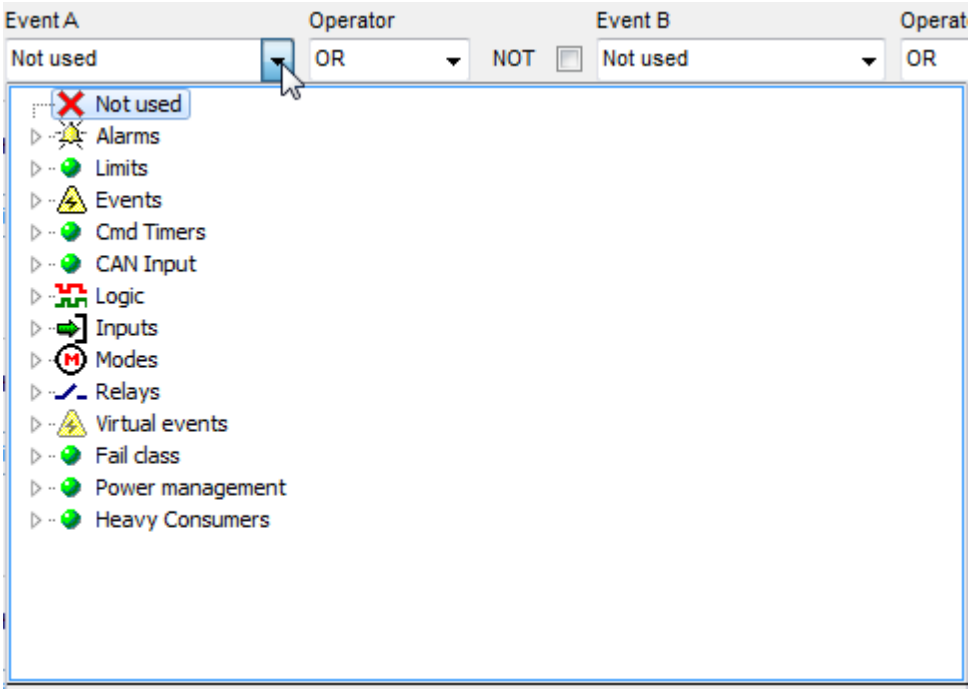
 M-Logic and AOP lines in use

In the M-Logic page, a number of logic statements (items) are listed. The device can store 40 M-Logic items.



Each M-Logic item can be used to build a logic statement consisting of 3 events with logic operators in between. The result ("output") can be sent to, for example, a digital relay.

The input events (Event A, Event B or Event C) can take a broad range of values as shown below:



The Event items are grouped as follows

Field	Description
Alarms	State of alarms that are enabled in the parameters
Limits	State of alarms set up with limit functionality
Events	Events and actions detected by the device
Cmd timers	Configuration of action connected to command timers
CAN input	Can flags that are transmitted through CANbus to the other controllers
Logic	Force outputs
Inputs	
Modes	Selection of genset/plant modes and operation modes
Relays	Status of relays (ON/OFF)
Virtual events	Status of virtual events (ON/OFF)
Fail class	Any alarms with specific fail class is active
Power management	Events and actions related to power management
heavy consumers	Heavy consumer request and ack signals

Each M-Logic line has a field (Item description) where an optional description can be written. Note that the description is not saved to the device, it can only be saved to (and read from) a USW file.

The M-Logic line is only active if the Enable option is set. If the Enable option is set, the colored square in the upper left corner of the M-Logic item turns green. If the M-Logic item is not used, this square is red.

To ensure an overview of which items are active, all items can be collapsed by clicking the "Collapse all items" button in the top menu bar. In the example below, items 1 and 2 are enabled:

When building the logic inside an M-Logic item, it is worth noting that if the line is A or B and C it is equivalent to A or (B and C).

To the left of all M-Logic items, a group of four buttons are shown:

These buttons have the following functions:

move item one position up

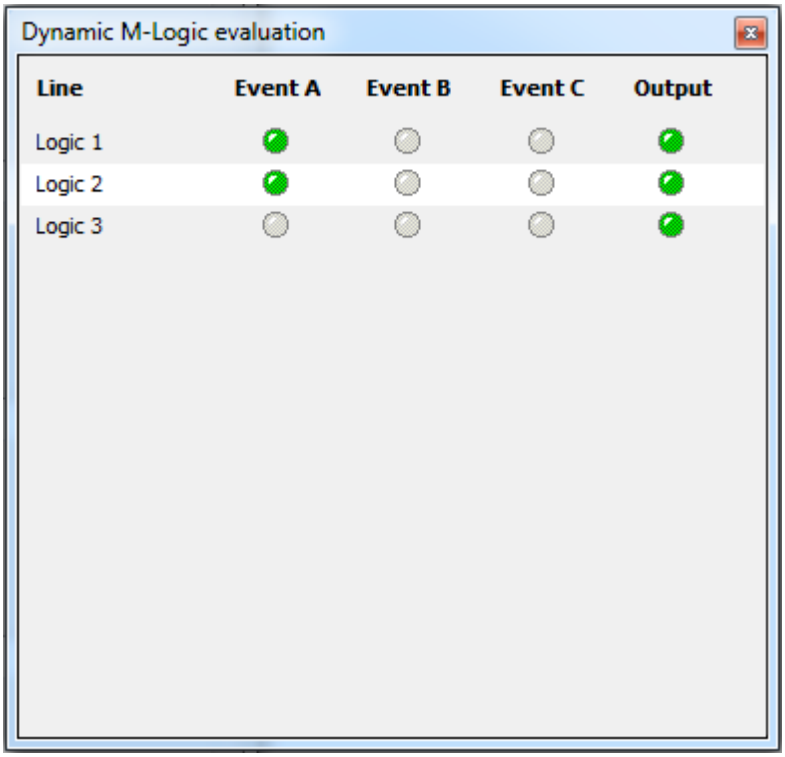
▼ move item one position down

► copy the current item to the item below

■ delete the item

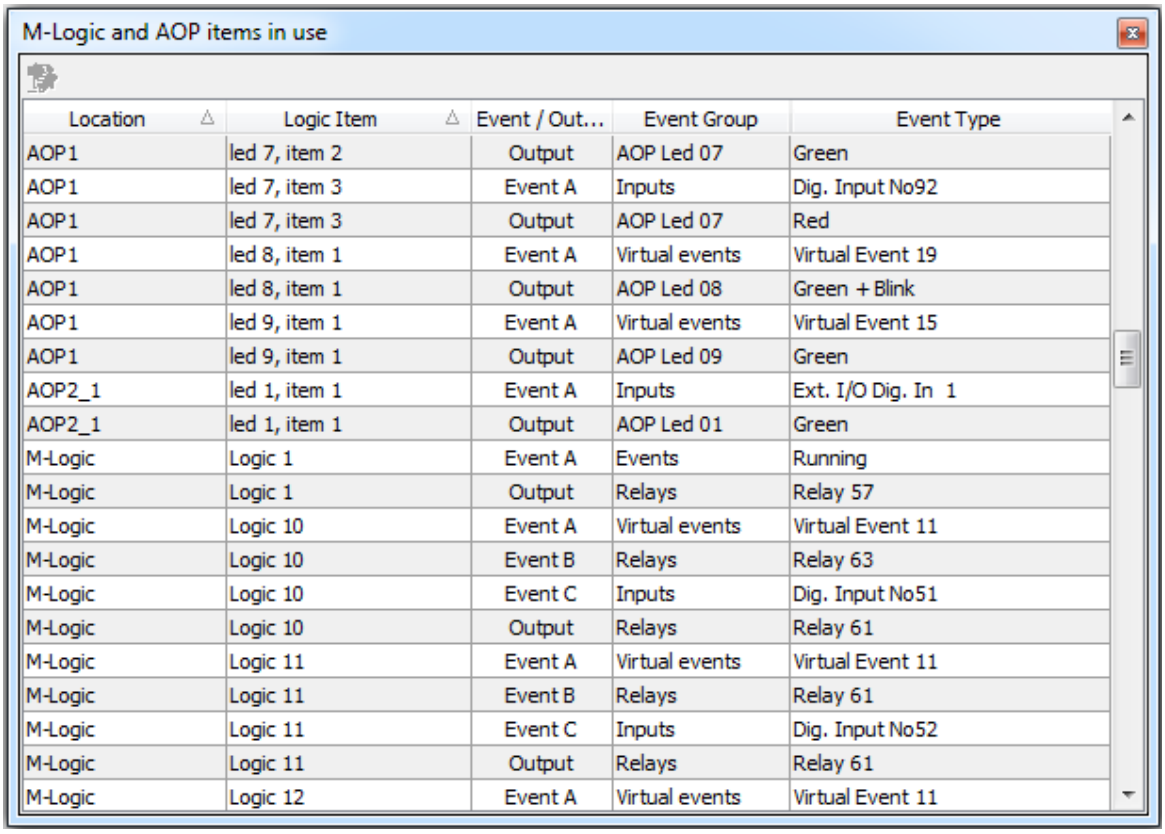
Dynamic M-Logic evaluation

By pressing the button, a popup is shown where the state of each logic line is evaluated:



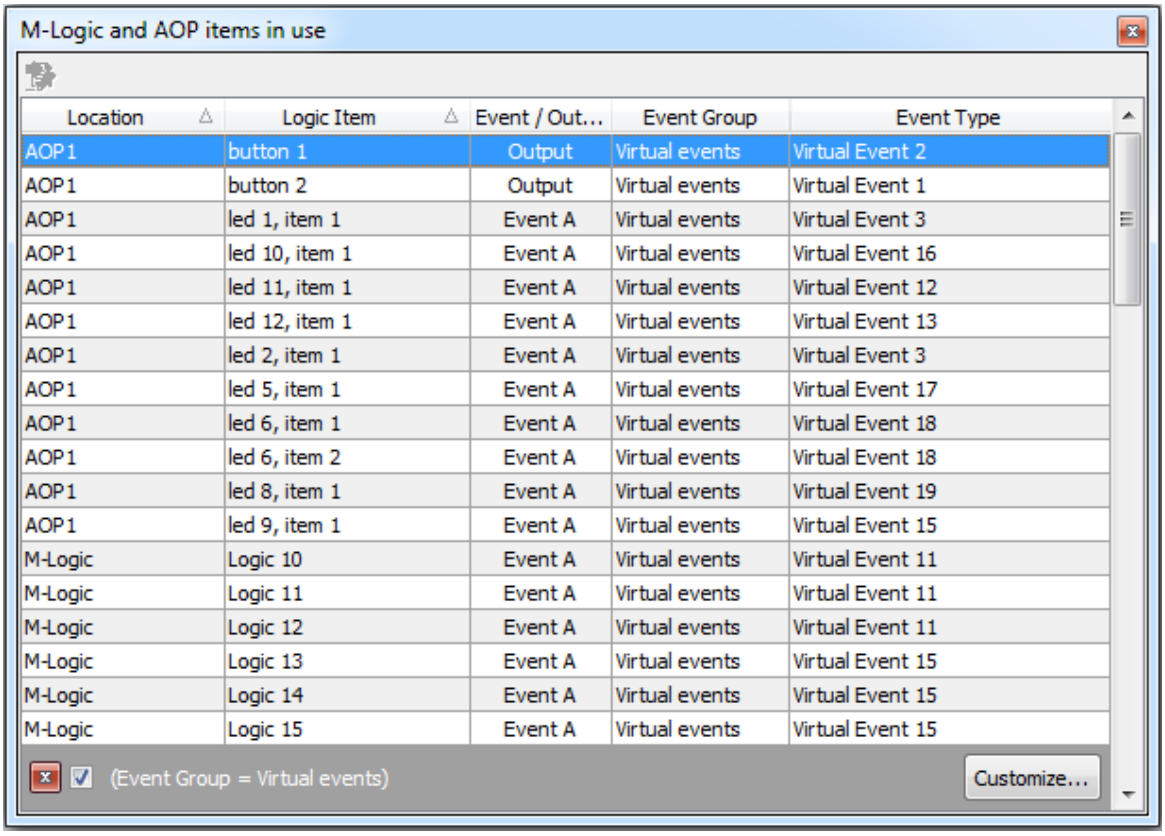
M-Logic and AOP lines in use

When pressing the button, a popup providing an overview of the Events items used in the M-Logic and AOP lines.



Location	Logic Item	Event / Out...	Event Group	Event Type
AOP1	led 7, item 2	Output	AOP Led 07	Green
AOP1	led 7, item 3	Event A	Inputs	Dig. Input No92
AOP1	led 7, item 3	Output	AOP Led 07	Red
AOP1	led 8, item 1	Event A	Virtual events	Virtual Event 19
AOP1	led 8, item 1	Output	AOP Led 08	Green + Blink
AOP1	led 9, item 1	Event A	Virtual events	Virtual Event 15
AOP1	led 9, item 1	Output	AOP Led 09	Green
AOP2_1	led 1, item 1	Event A	Inputs	Ext. I/O Dig. In 1
AOP2_1	led 1, item 1	Output	AOP Led 01	Green
M-Logic	Logic 1	Event A	Events	Running
M-Logic	Logic 1	Output	Relays	Relay 57
M-Logic	Logic 10	Event A	Virtual events	Virtual Event 11
M-Logic	Logic 10	Event B	Relays	Relay 63
M-Logic	Logic 10	Event C	Inputs	Dig. Input No51
M-Logic	Logic 10	Output	Relays	Relay 61
M-Logic	Logic 11	Event A	Virtual events	Virtual Event 11
M-Logic	Logic 11	Event B	Relays	Relay 61
M-Logic	Logic 11	Event C	Inputs	Dig. Input No52
M-Logic	Logic 11	Output	Relays	Relay 61
M-Logic	Logic 12	Event A	Virtual events	Virtual Event 11

Using the filtering provided by the headline items it is possible to get, for example, an overview of where virtual events are used:



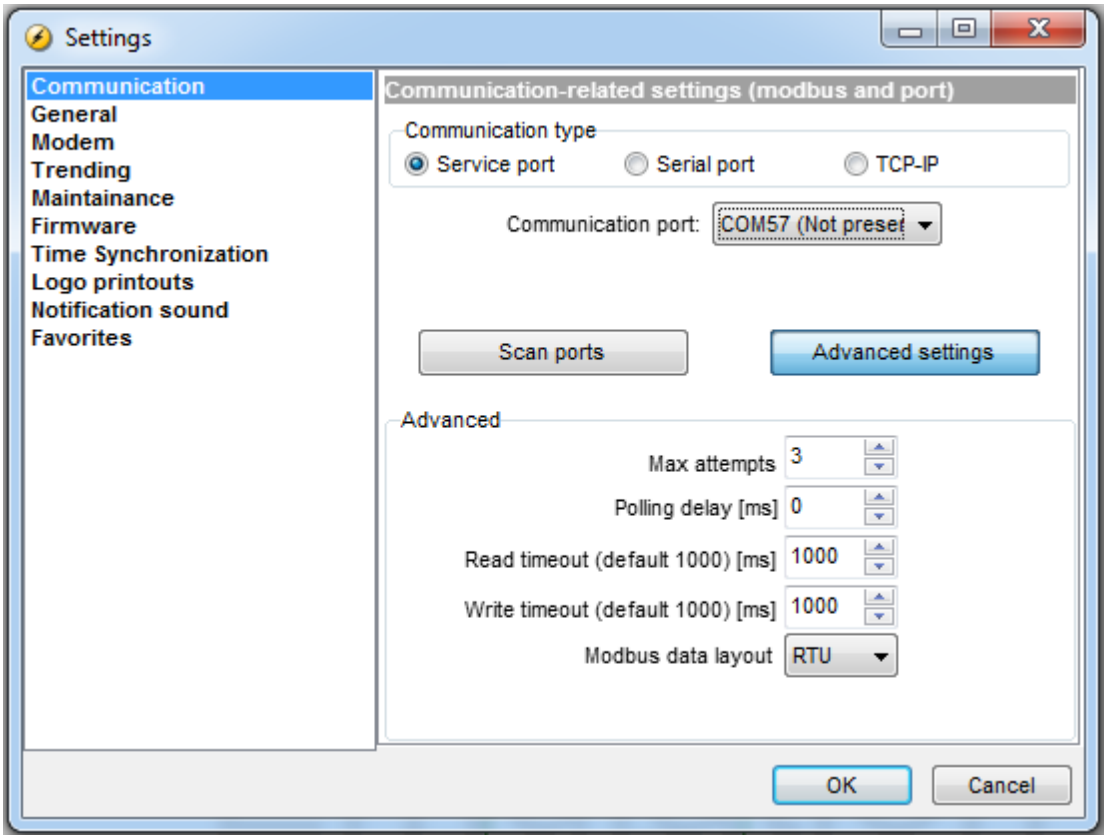
3.9 Settings

The Settings popup is a general setup tool of the PC utility software. In this popup, settings related to communication, trending and other general settings can be configured.

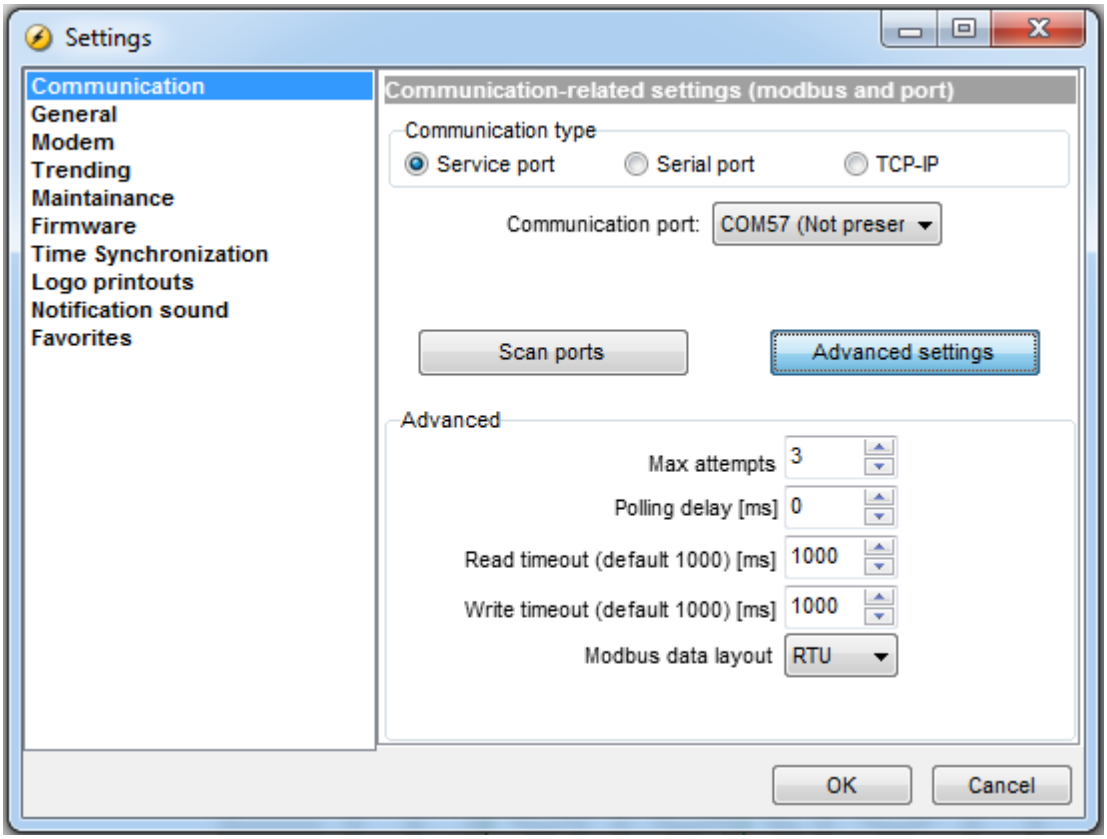
Communication

To set up the communication with the device, open the Settings popup by pressing the following button in the menu bar:

Most devices support RS232/RS485 communication via a serial port. This port might be virtual so it is mapped to the USB port by a driver installed with the PC Utility software. The settings are almost the same whether the physical connection is an RS232/RS485 connection or it is a virtual com port exposed by a physical USB connection; the only difference is that a Modbus id must be specified for the RS232/RD485 connection. Some devices also support TCP-IP communication. For all types of ports, the communication protocol is Modbus. For a serial connection the baud rate is automatically configured to that set in the controller.



If the Advanced settings button is pressed

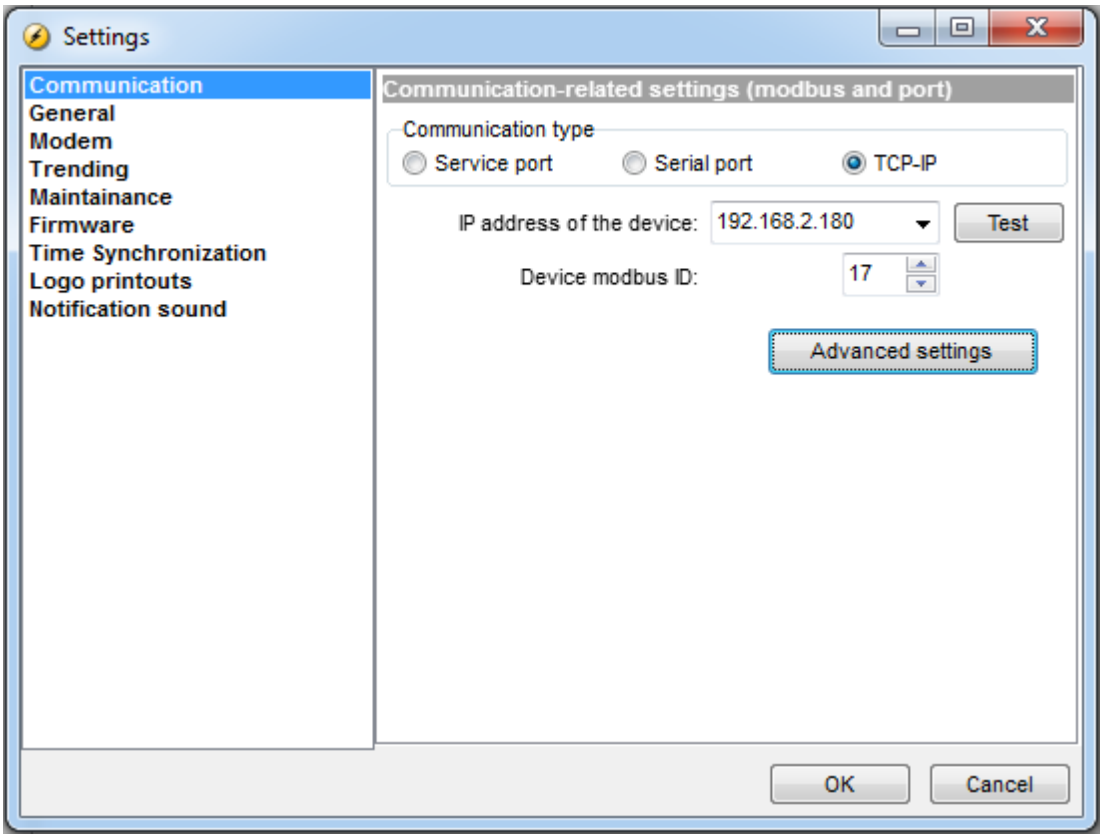


The fields in the communication page of this popup are described in the following table:

Field	Description
Communication port	This is the COM port number. Can be found by opening the Windows device manager.
Device Modbus ID	This is the external Modbus ID. For a physical USB connection, it is automatically set to 1 and it not displayed to the user. For any other serial communication interface, it must be in the range 2..247. Remember to set it in the device (for most devices, it is found at address 7511)
Max attempts	This is the maximum number of attempts the PC utility software tries to read or write info to the device. Once exceeding this limit, a "Connection failed" error message is shown to the user.
Modbus data layout	Per default the Modbus RTU standard is followed, but this option allows the user to force the communication to be based on Modbus ASCII
Data bits	Number of bits in the Modbus telegrams
Scan ports	Com port scan. Used to find ports not listed in the Communcation port dropdown. Note that if Bluetooth is enabled on the PC, the scanning can take long time.
Polling delay	Delay between each time the PC utility software tries to contact the device. Within each attempt to establish

Field	Description
	contact, there might be up to Max attempts (defined above).
Read timeout	Time the PC utility software will wait for an answer.
Write timeout	Time the PC utility software will try to write to device.

The settings for the TCP-IP connection has some fields similar to that of the serial communication

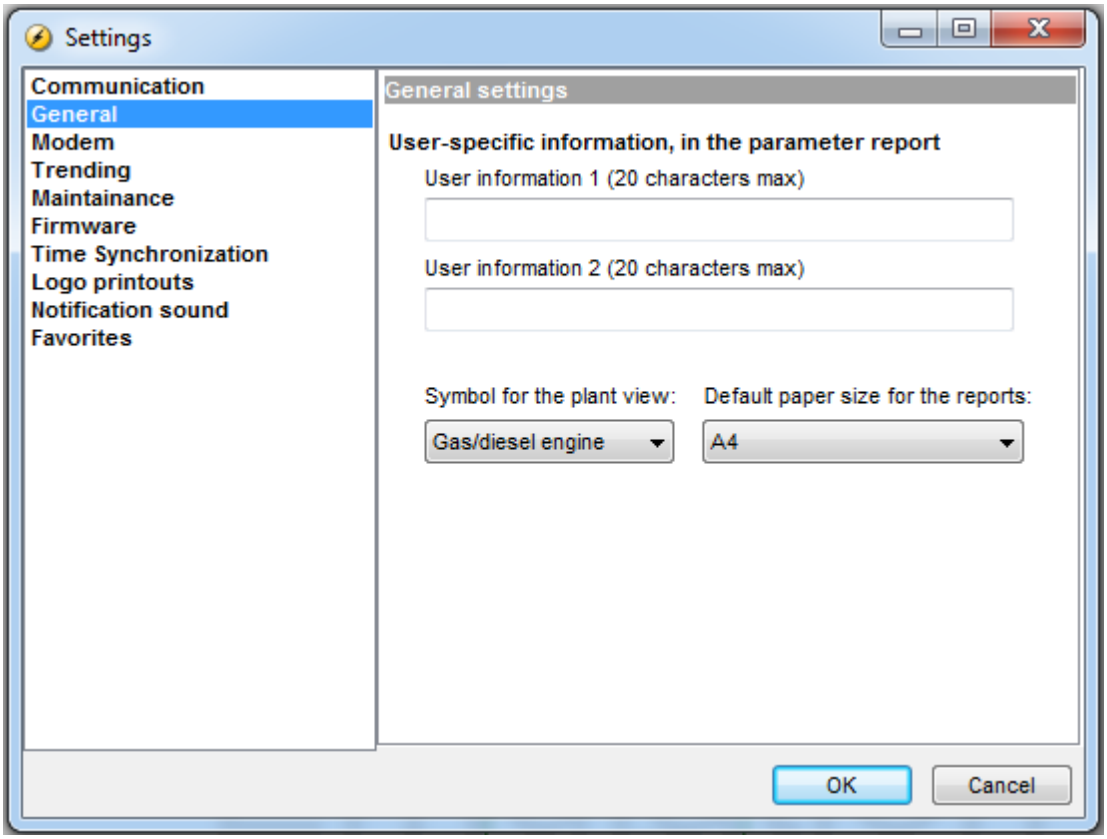


The Test button is used to test the connection to the device.

The Modbus over TCP-IP uses port 502. This is relevant if there are any firewalls in the communication flow between the PC and the device.

General

The General page in the Settings popup looks as follows:

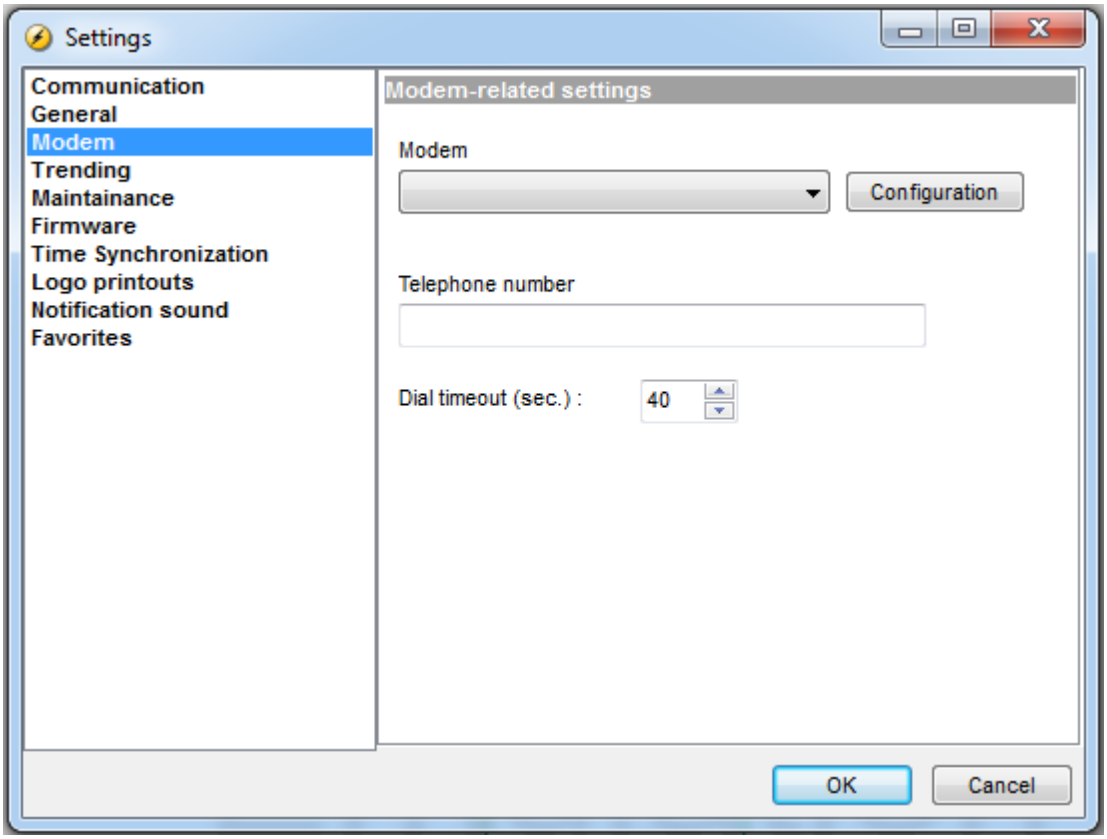


The fields in the popup are:

Field	Description
Language for user interface	Choose the language for the PC Utility software. Restart of the PC utility software is required when the language is changed.
User information	This info is placed in printouts. It is not stored in the device at any point. The text is not stored in USW files either. The user information texts are saved from session to session.
Symbol for the plant view	Dropdown box for selection of the engine type to be shown on the Device page.
Default paper size for the reports	This is the paper size to be used in the print outs.

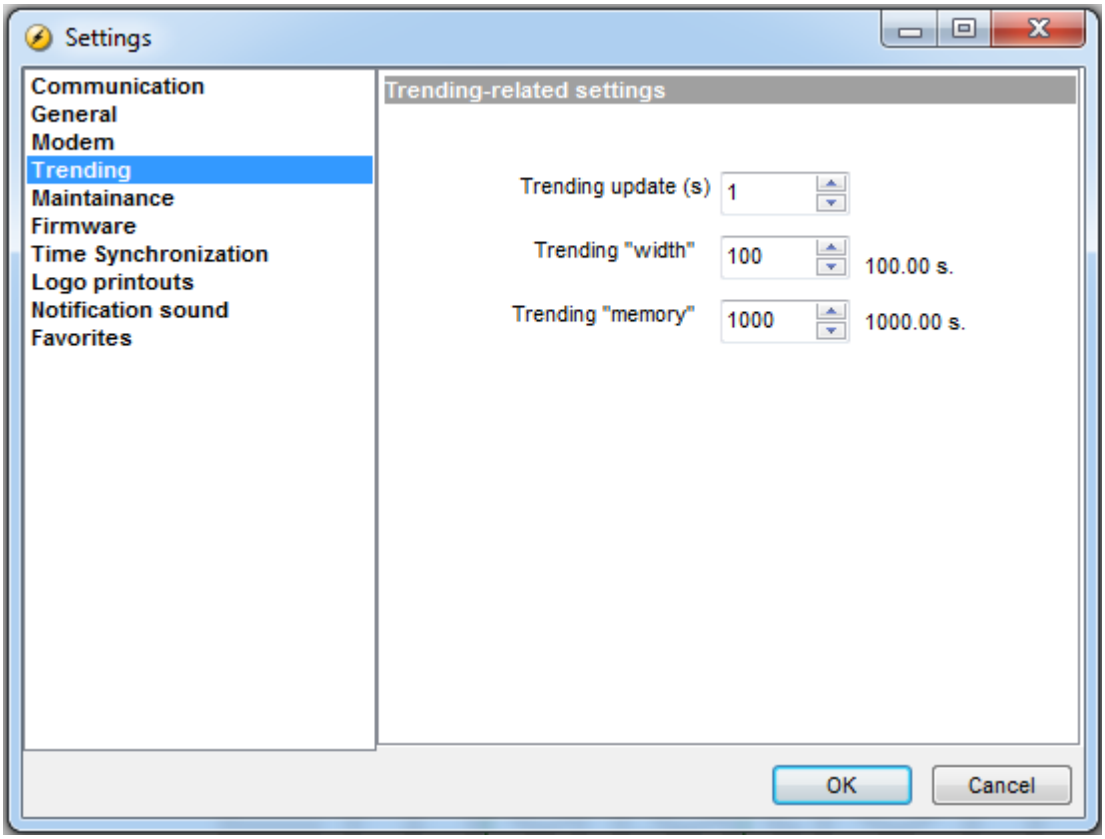
Modem

A modem connection can be configured using the Modem page of the popup:



Trending

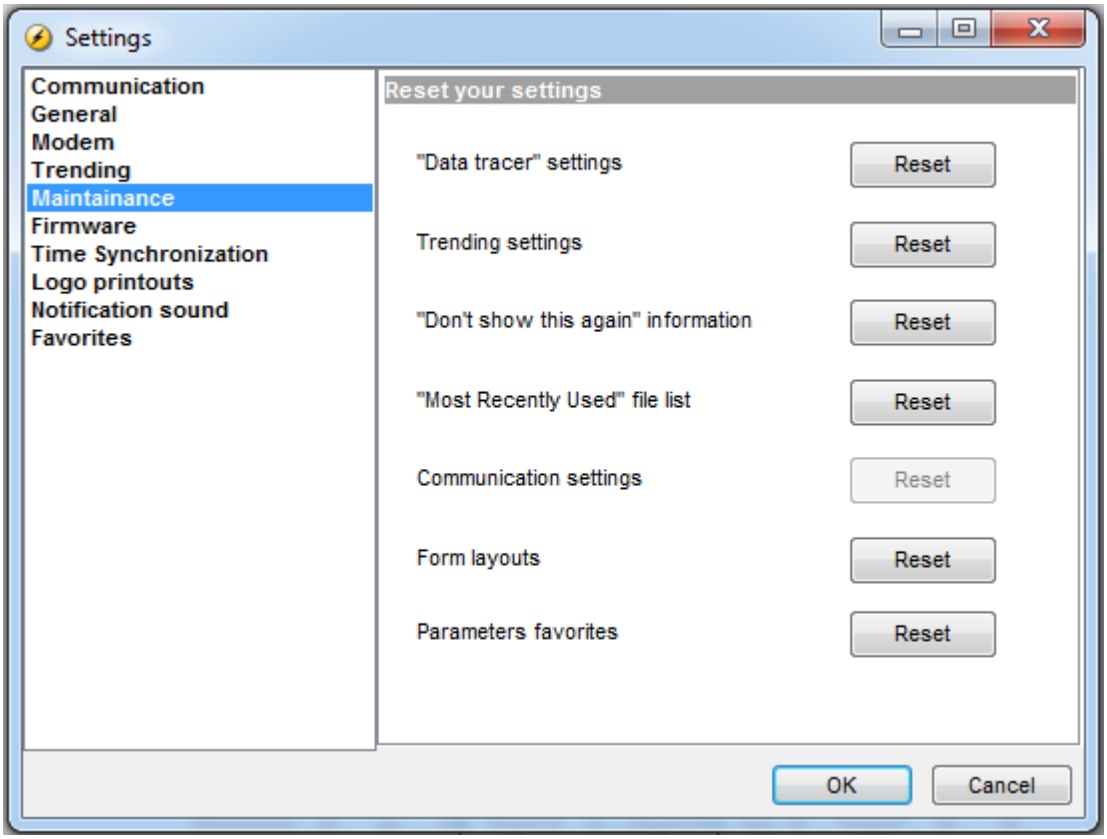
In the Trending section of the Settings popup, a number of options relevant for the Trending page can be set:



Field	Description
Trending update	The frequency by which the trending is updated. So it is the time between each sample. This value is not related to the polling delay given in the Communication section.
Trending width	Width in samples of the trending window.
Trending memory	Duration (in samples) of the trending window stored internally in the PC utility software

Maintenance

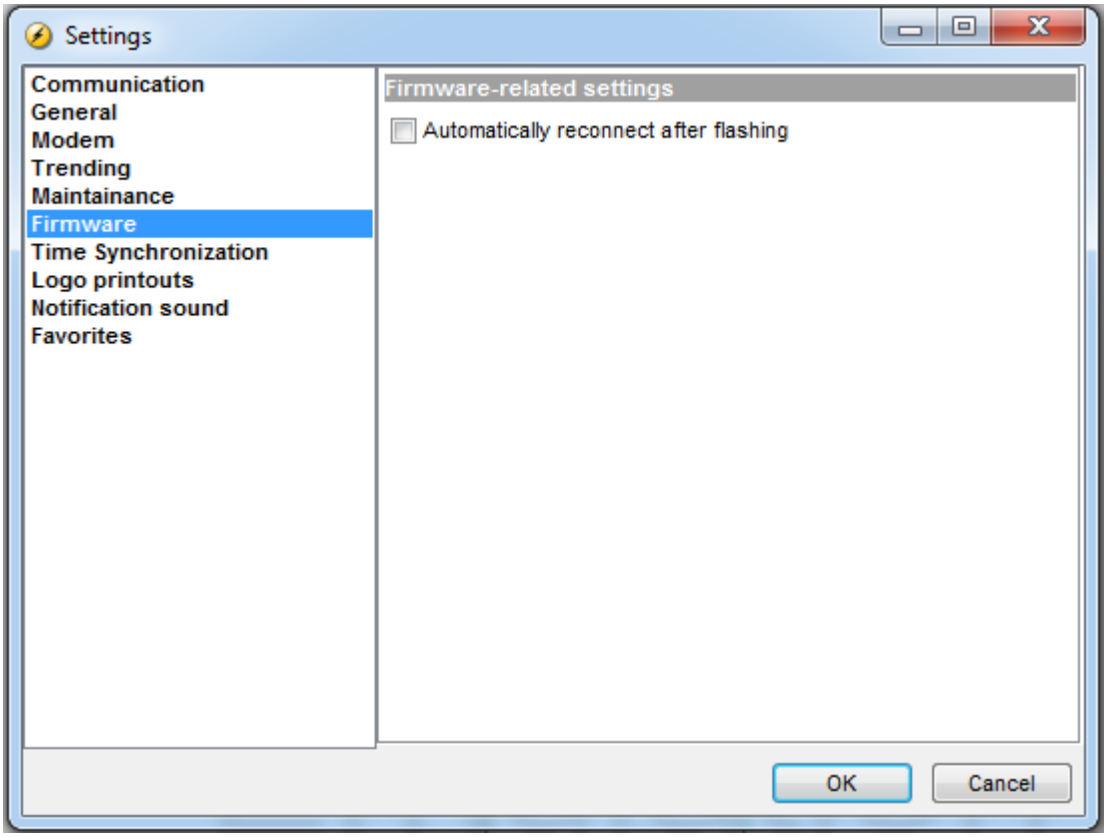
On this page, various settings saved automatically from session to session can be reset.



Field	Description
Data tracer settings	Reset settings in the Data Tracer popup
Trending settings	Reset settings in the Trending page"
"Don't show this again" information	Reset the "Don't show this again" options found in many popup's
"Most recently used" file list	Reset the most recently used file list. This is the names of the usw files used most recently.
Communcations settings	Reset the communication settings. This is, for example, the list of recently used IP addresses.
Form layouts	Reset the custom settings like column widths in the Parameter and Translations pages
Parameter favorites	Reset the favorites defined in the Parameters page

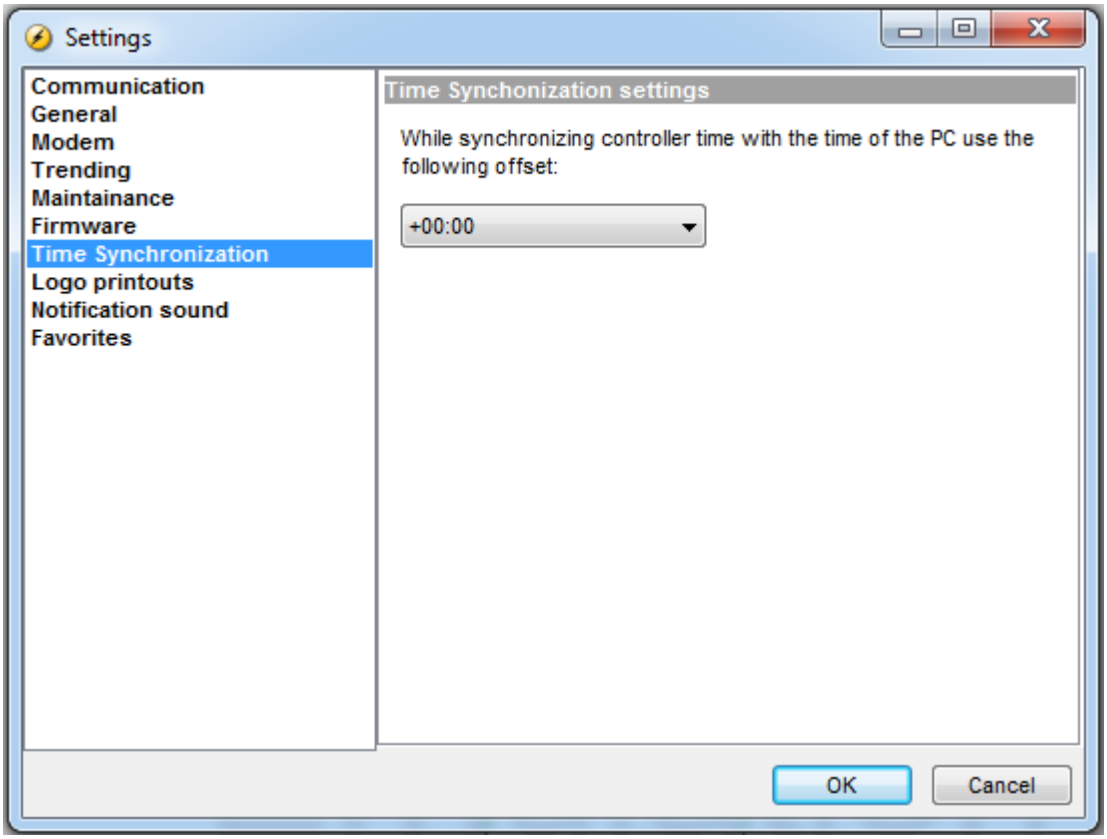
Firmware

On this page, there are settings related to the flashing of firmware in devices:

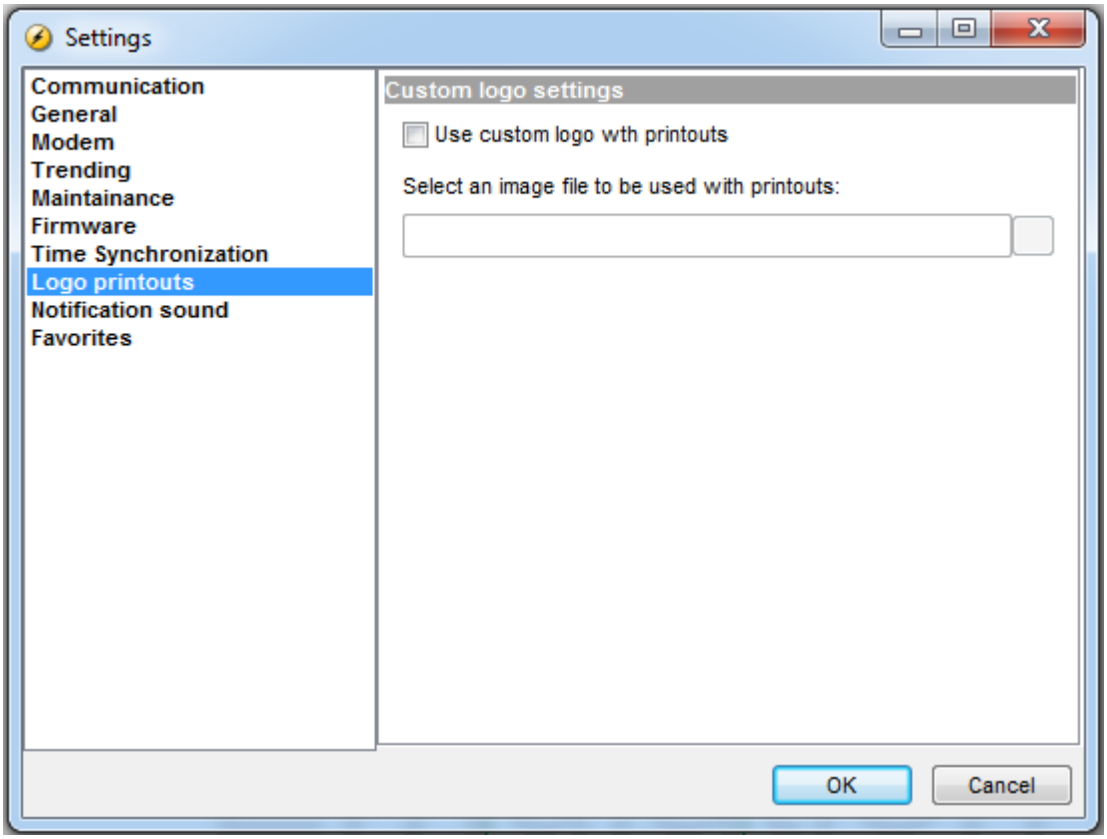


Field	Description
Automatically reconnect after flashing	If set the user is not asked whether the PC Utility software should reconnect after flashing

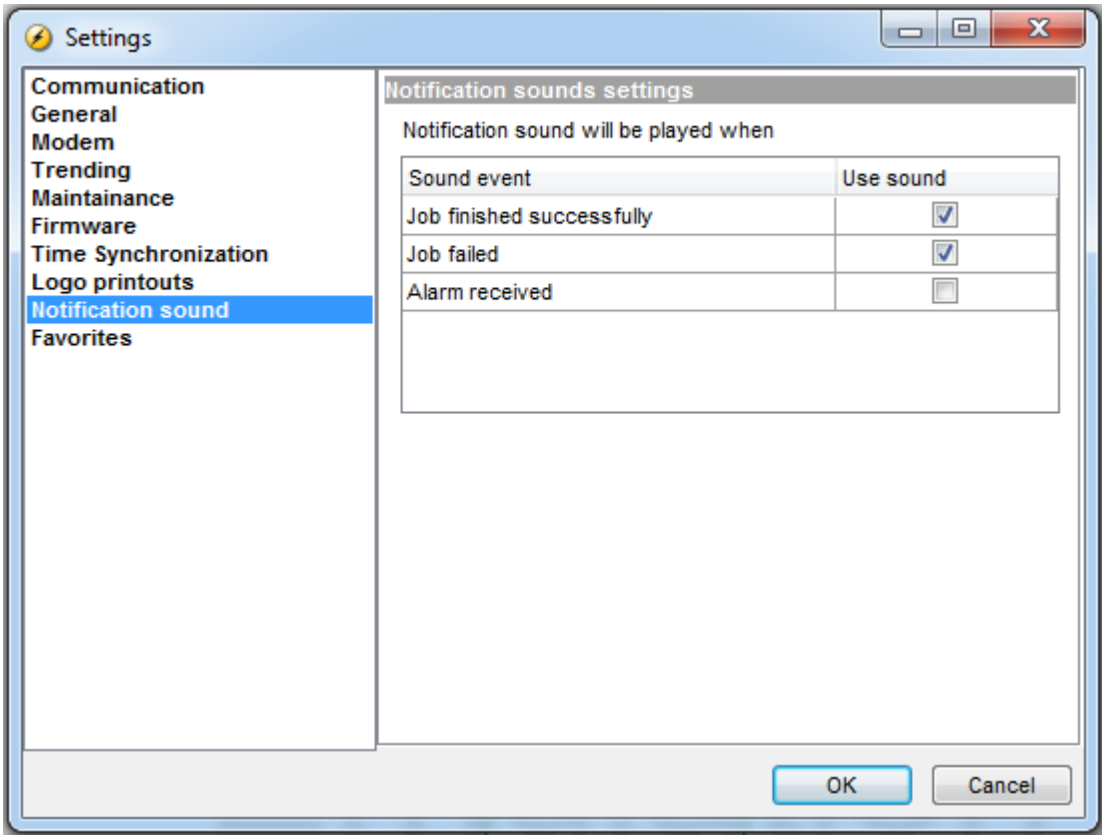
Time synchronisation



Field	Description
While synchronising controller time with the time of the PC, use the following offset	Time offset relative to the time of the PC when setting the time in the controller



Field	Description
Use custom logo with printouts	This allows the user to pop his own logo on the printouts generated from the PC utility software



Field	Description
Checkboxes	Used for activating various notification sounds in case of different events

3.10 Options

The options of a device can be seen on the Options page. See example below. The options list shows which software and hardware features are enabled in the device.

Name	Description
0108	Germany
A1	Over- and under voltage (generator and busbar), Over- and under frequency (generator and busbar), Vector jump, Df/dt (ROCOF)
A4	Positive sequence
A5	Directional overcurrent
C2	Neg. seq + zero seq. voltage/current
CYD	Cyrillic display
E1	2 x (+/-)25mA
E2	2 x 0-20mA,
EF2	1 x (+/-)25mA, 1 x 0-20mA
EF4	1 x (+/-)25mA, 2 x binary output
EF6	2 x (+/-)25mA
EMUL	Application emulation
F1	2 x 0-20mA
G5	Power management (unit types: DG, BTB or Mains)
G7	Plant management
H10	Led I/F USB
H2	Modbus RS485
H3	Profibus
H8_2	External IO CAN1 communication slot 2
H8_8	External IO CAN2 communication slot 8
H9	Modbus RS232
M12	13 binary inputs and 4 relay outputs
M13_2	7 binary inputs
M13_6	7 binary inputs
M13_8	7 binary inputs
M14_2	4 relay outputs
M14_4	4 relay outputs
M14_6	4 relay outputs
M14_8	4 relay outputs
M15_6	4 analogue inputs 4-20 mA
M15_8	4 analogue inputs 4-20 mA
M15_8_MK2	4 analogue inputs 4-20 mA
N3	N-Options
N5	Modbus TCP/IP
N6	Advanced logging
Q1	Class 0.5 measurements

The options are explained in the documentation of the device.

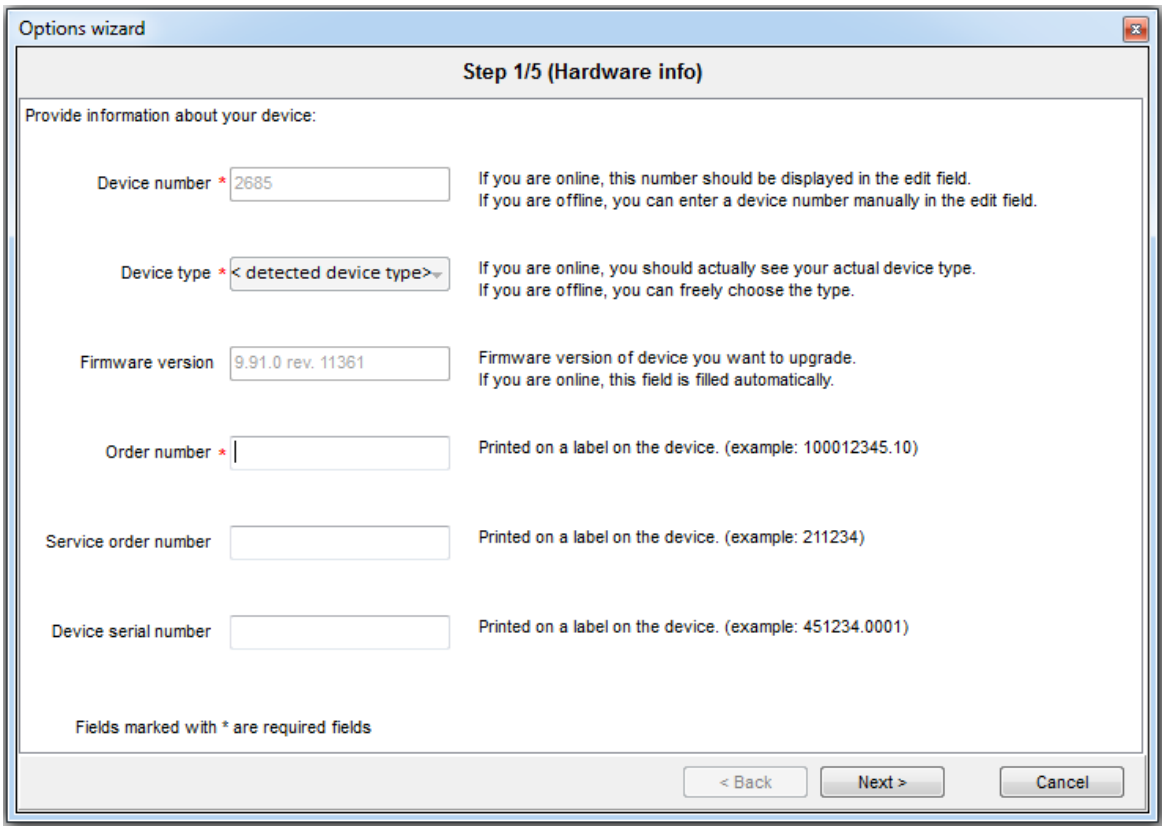
If the user wants to add options, two steps must be performed:

1. Request Options by means of the Options wizard
2. Enter the Option key received

Request an Option

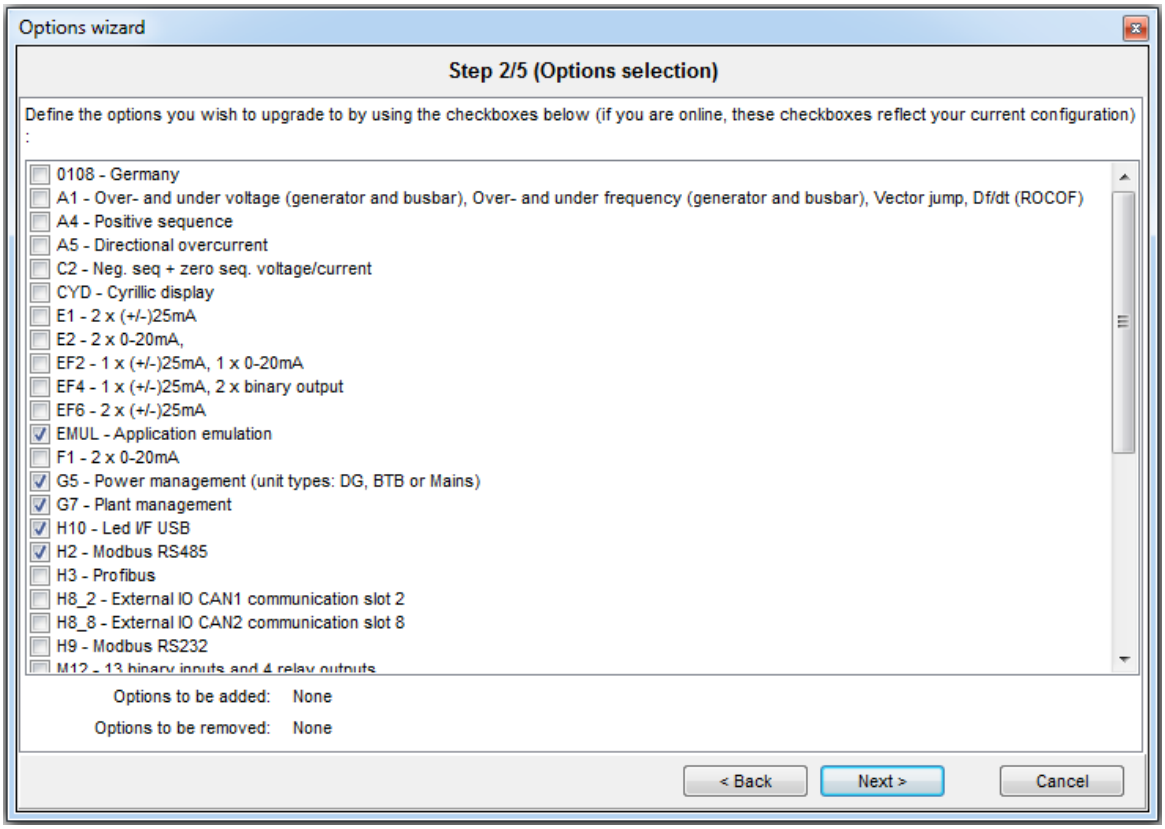
By pressing this button found in the top menu bar, the Option Wizard is opened:

Hardware info:



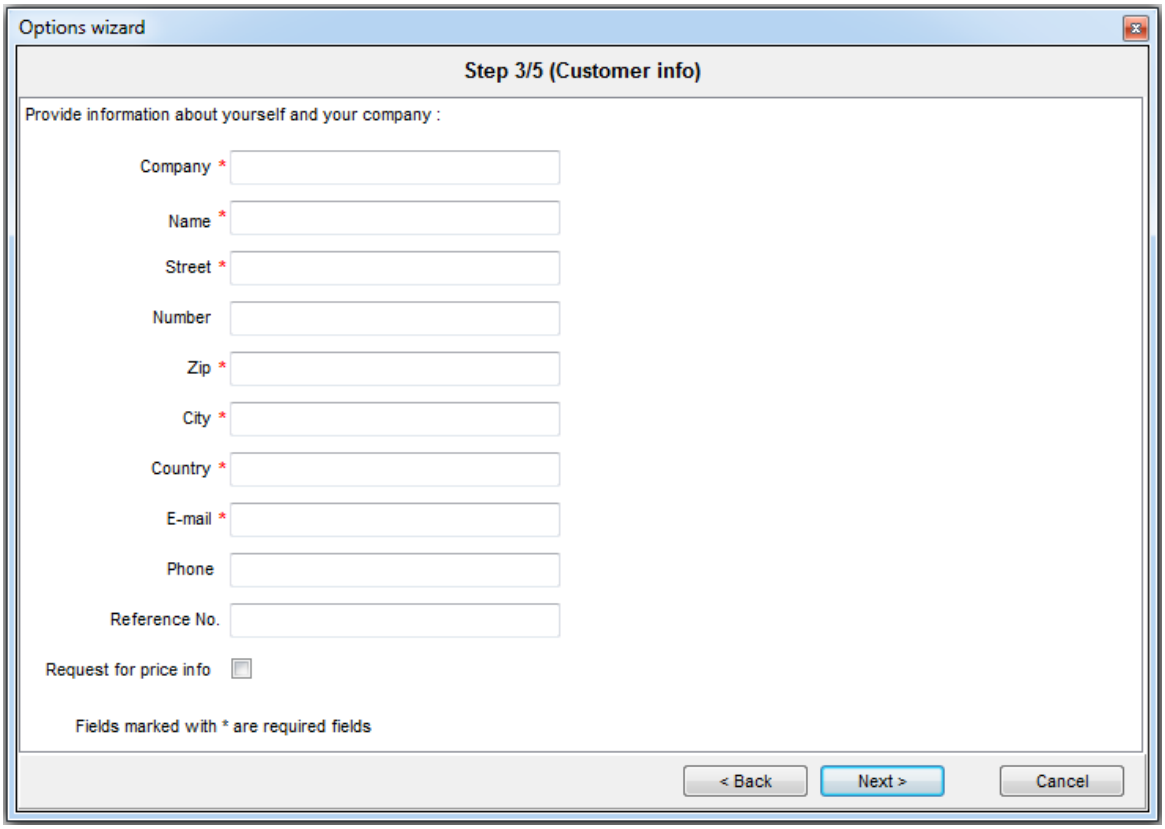
Option selection

Choose which options to add and which to remove:



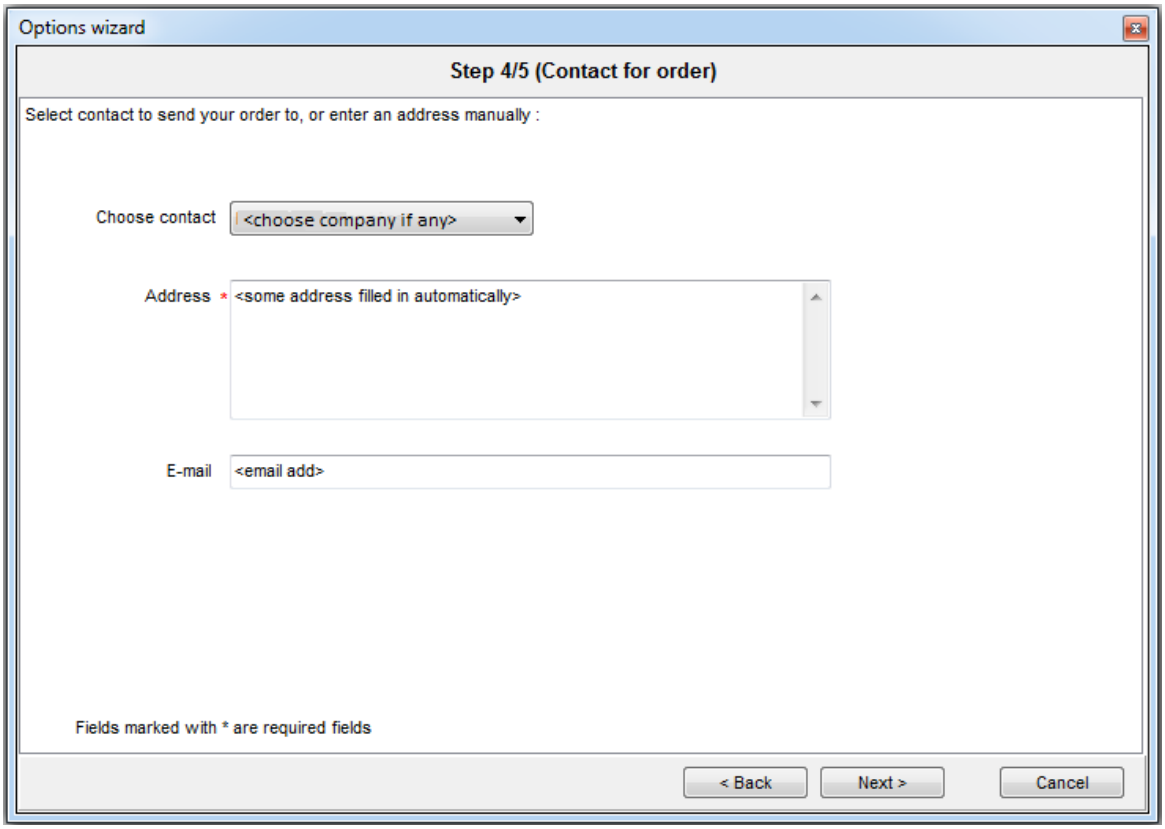
Customer info

Enter the info of the customer who wants new options:

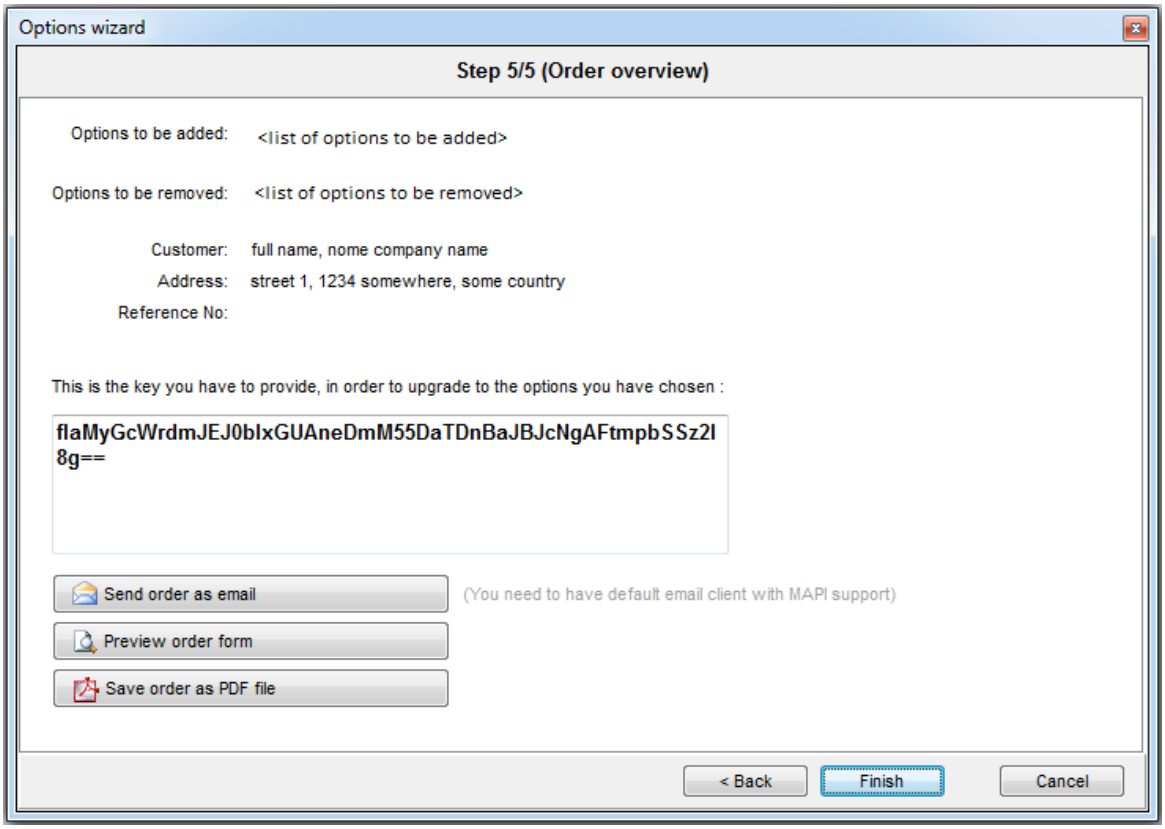


Contact for order

Receiver of the order is entered here



Order overview

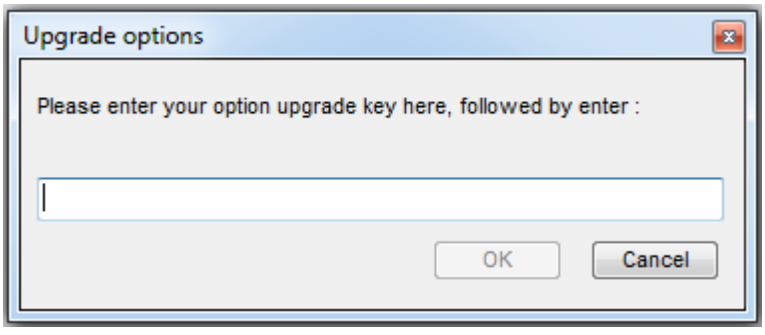


Now the order can be send as email or it can be saved as a pdf file

Enter an option key

By pressing this button in the top menu bar, the user can upgrade a device with new options. In order to do this, the user must have a key from the organisation receiving the order.

In the dialogue box below, the key received must be entered.



3.11 Option N (tcp-ip connection)

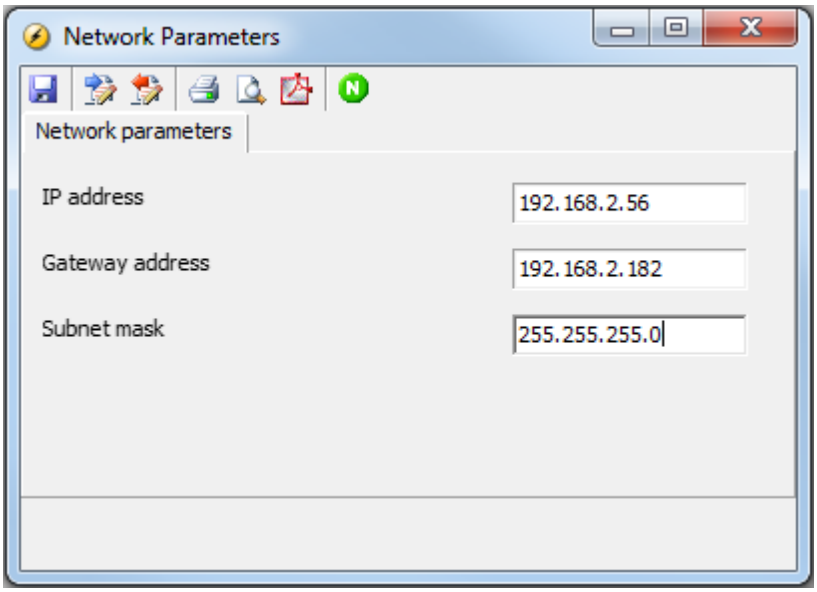
The Option N is equivalent to a TCP-IP port. Notice that this is only relevant for some devices .

The Option N can basically be used for setting up the network parameters like IP address, network mask, gateway and dns server. Additionally, some devices will also facilitate the sending of email and/or text messages in case of alarms.

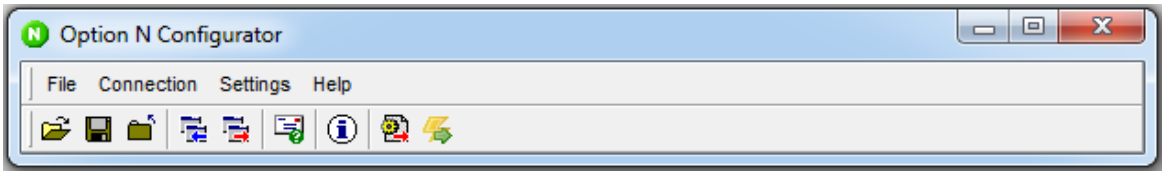
Get and set network parameters

When pressing the Option N button in the top menu bar, the window opened depends on the type of device. There are two possibilities:

a) QC 4002 Mk.II v. 4 controllers with a) firmware >= 4.40 and b) N-option firmware 2.20 or higher

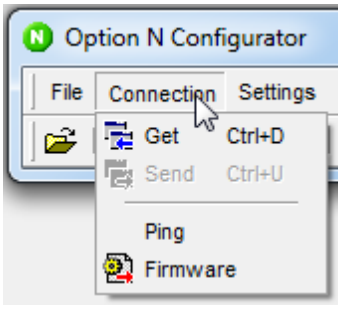


b) for any other device that supports the N-option

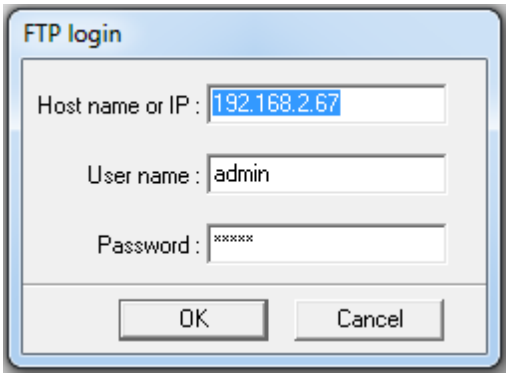


For devices where the Option N Configurator is started, the network settings are retrieved in the following way:

1. Choose Connection and then Get in the dropdown menu

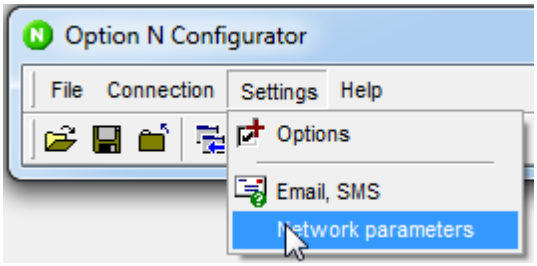


2. Enter the IP address and username + password of the device:

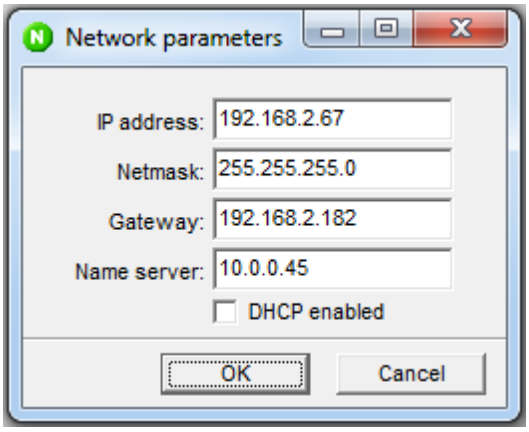


Notice that the default IP address is 192.168.2.21. The default username and password is "admin".

3. Select Settings and choose Network parameters:



4. Change the Network parameters if required



Email and SMS setup

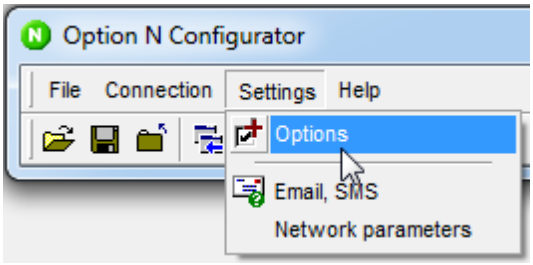
Emails and/or SMSs can be sent in case of an alarm.

Requirements

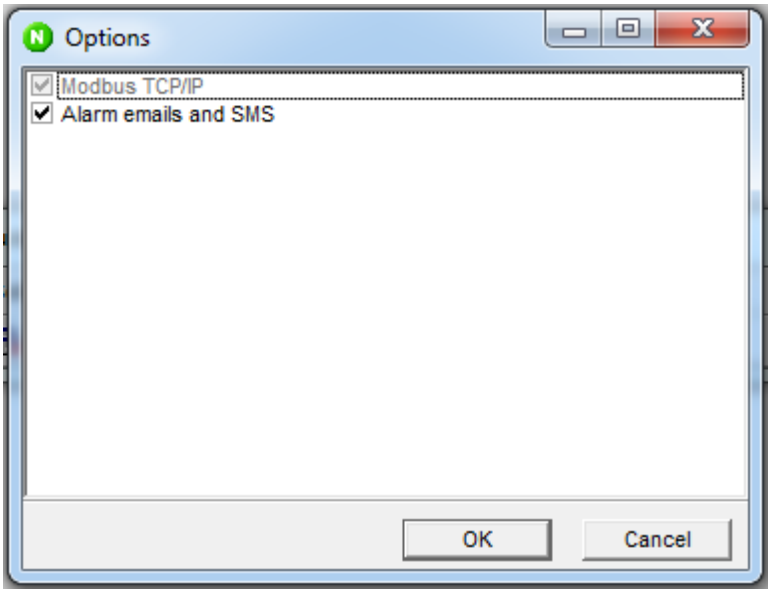
- The sending of emails require an smtp server
- The sending of SMSs require an external service e.g offered by Clickatel

The steps are the following:

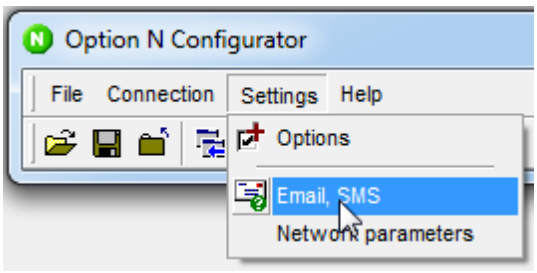
1. Choose Options in the dropdown below Settings



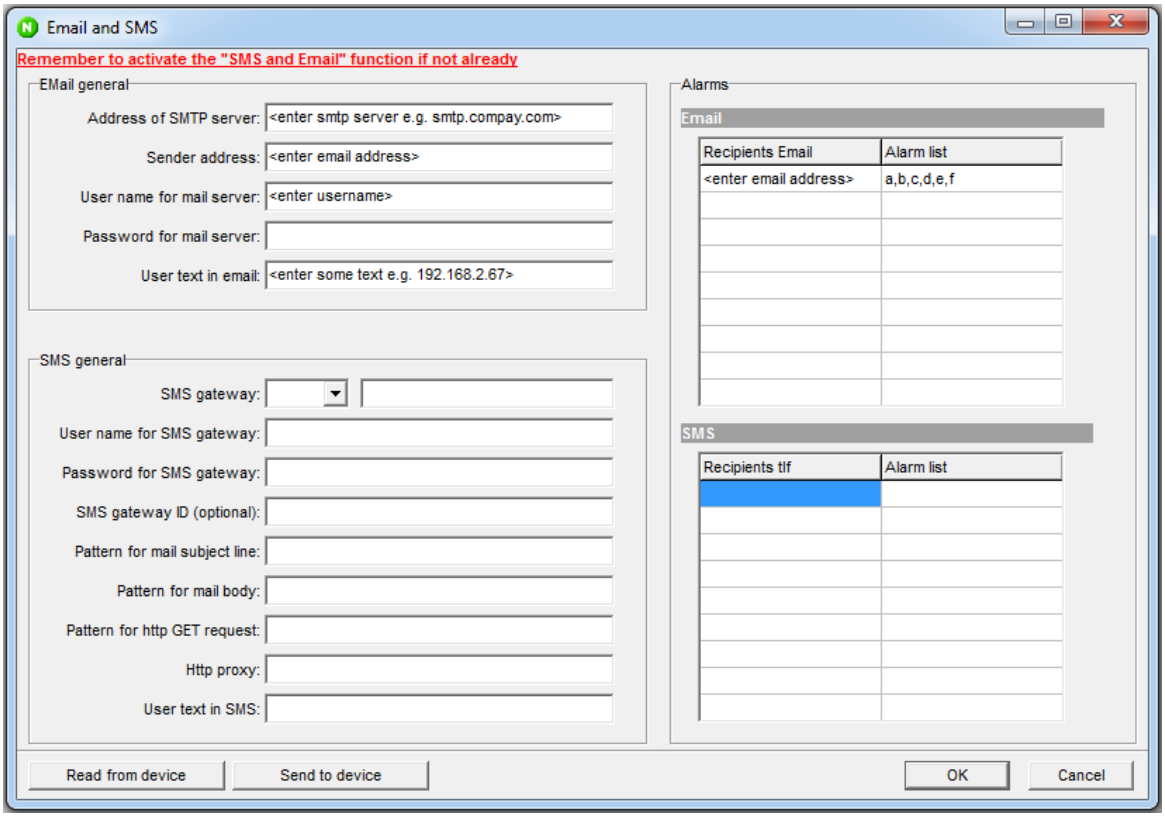
2. Enable the Email/SMS option



3. **Open the email/sms configuration page**



4. **Configure the email and/or SMS settings**



Notice that to send SMSs, an external service like Clickatel must be used. This service will be in charge of sending the sms when receiving a message over the internet from the device.

The alarm list uses the following codes (notice that some codes are not relevant for certain device types):

Alarm list	Description
a	Block
b	Warning
c	Trip GB/MB/BTB/SGB/SCB/EGB
d	Trip + stop
e	Shutdown
f	Trip MB/TB or Safety Stop

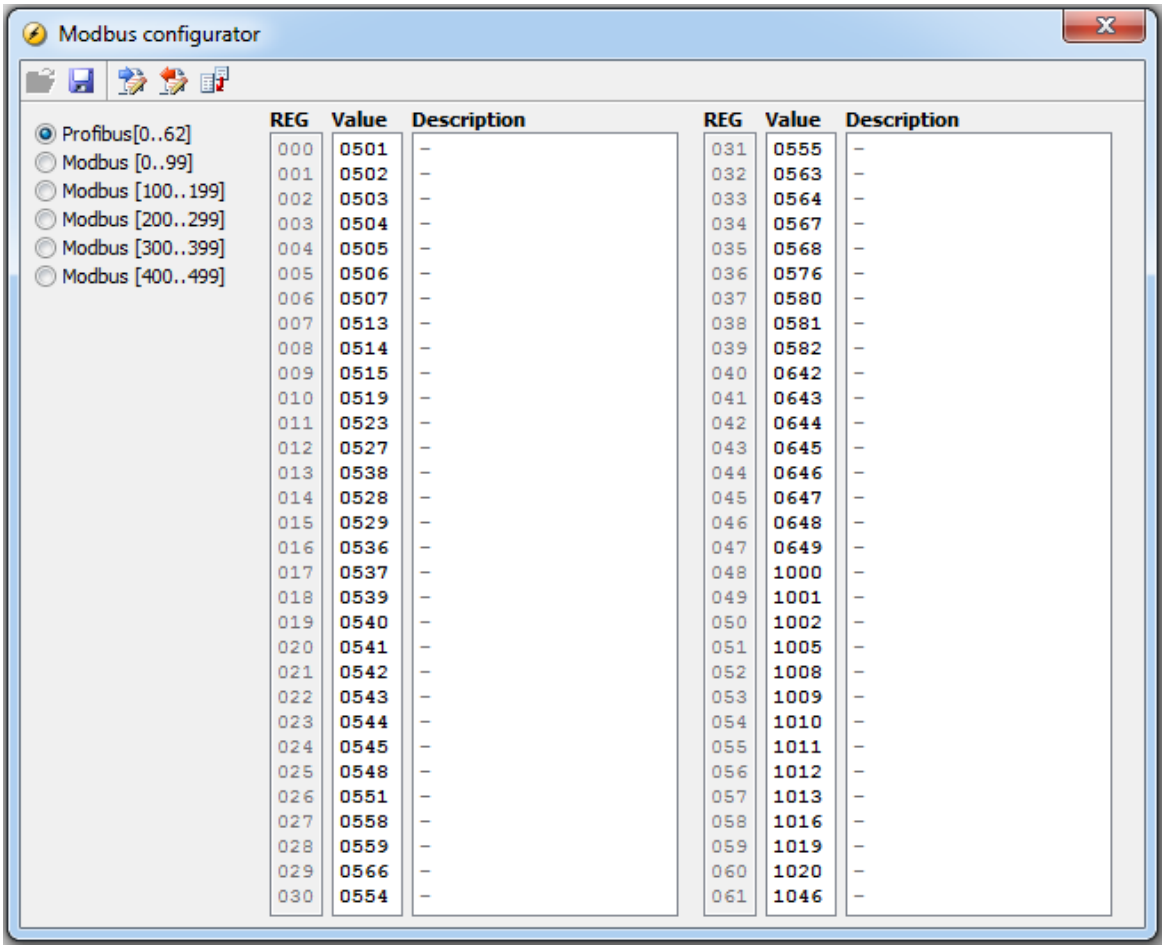
Example of the topic of three emails sent by a device:

MsgNo._3_IDNo._1_"192.168.2.67"_WARNING_U< aux. term. 98
MsgNo._2_IDNo._1_"192.168.2.67"_WARNING_U< aux. term. 1
MsgNo._1_IDNo._1_"192.168.2.67"_WARNING_GB Pos fail

3.12 Modbus Configurator

The Modbus configurator is used to perform a mapping from higher address numbers to the lowest 500 Modbus addresses. The benefit of performing the mapping is that this will allow the user to map those values relevant for fast access from an external SCADA system.

The Modbus Configurator popup looks like below:



In the left hand of the popup, the user can choose among Modbus or Profibus registers. The latter only allow 63 registers.

The columns shown in the popup are described in the table below:

Column	Content	Comment
REG	Modbus register number	

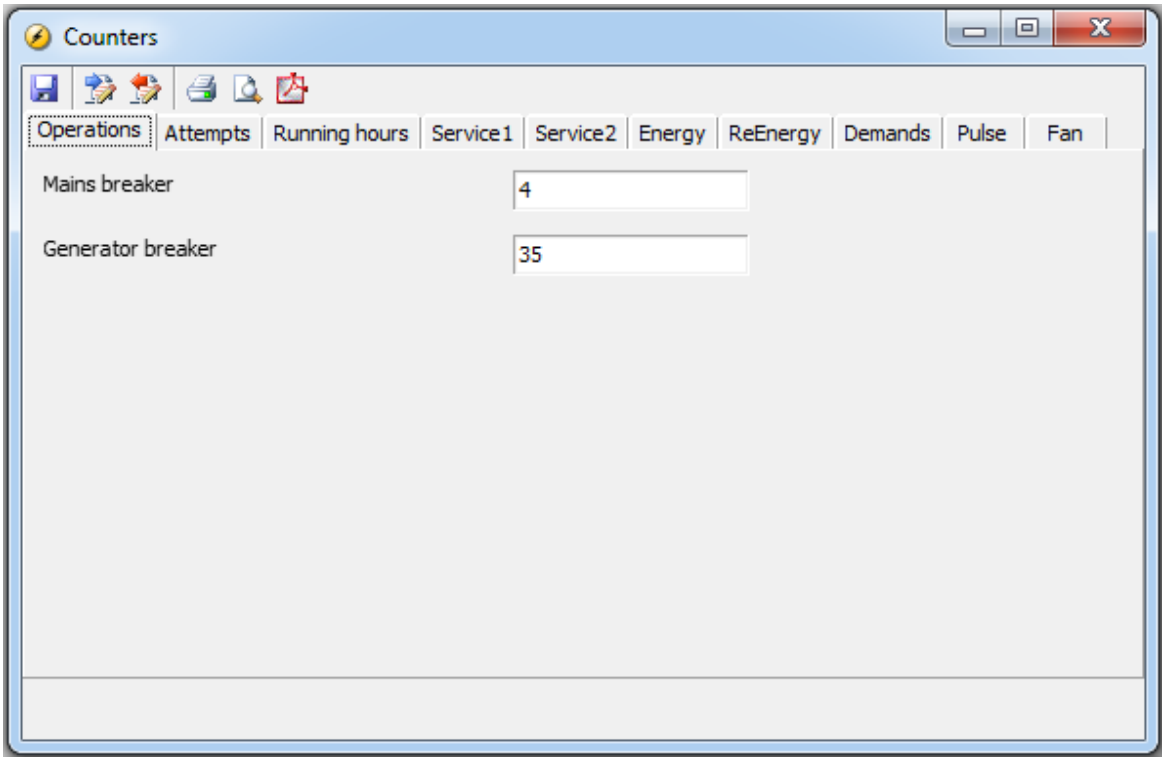
Column	Content	Comment
Value	The Modbus address to be mapped to a given register	
Description	Description of the value	Note that the description will only be saved in a .usw file. The description will not be saved in the controller.

3.13 Counters

The Counters popup contains various counter values relevant for the controller. These values are distributed on a number of tabs.
The tabs and the fields in the tabs depend on the device type. Below an example from a diesel generator controller.

Operations tab

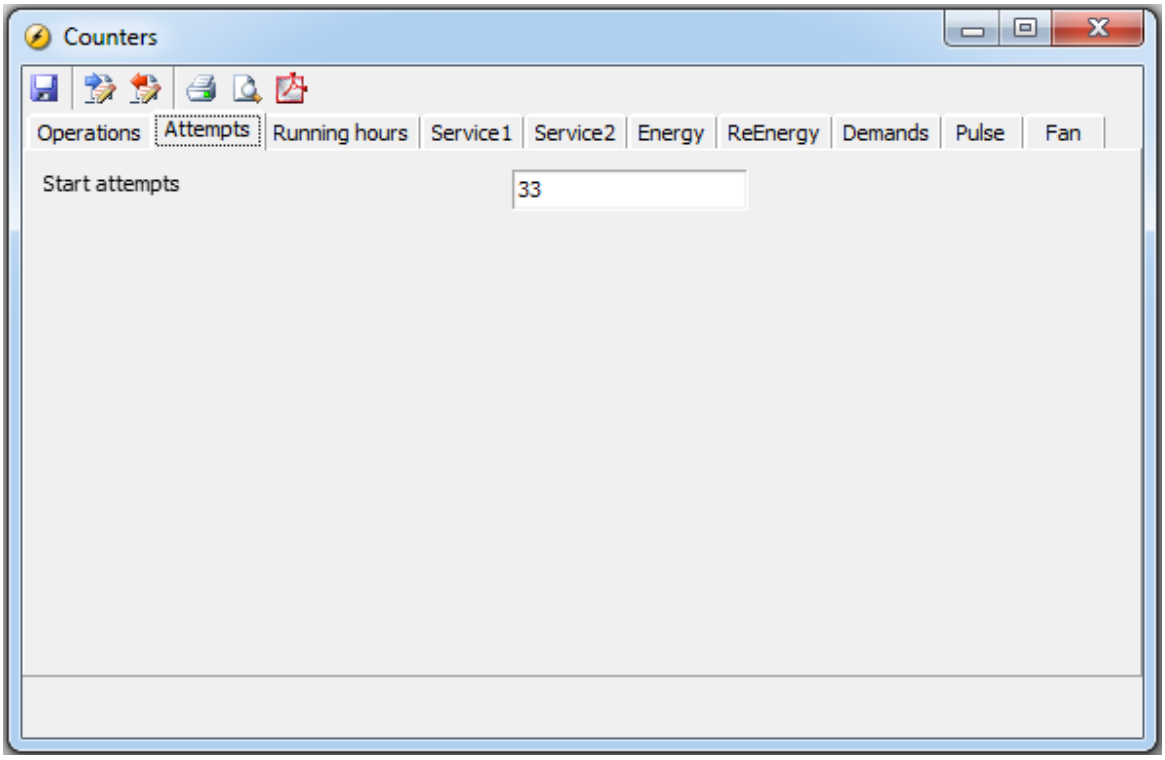
In this tab, various counter values for breakers are displayed.



Field	Content	Comment
Mains breaker	The accumulated number of mains breaker operations	
Generator breaker	The accumulated number of generator breaker operations	

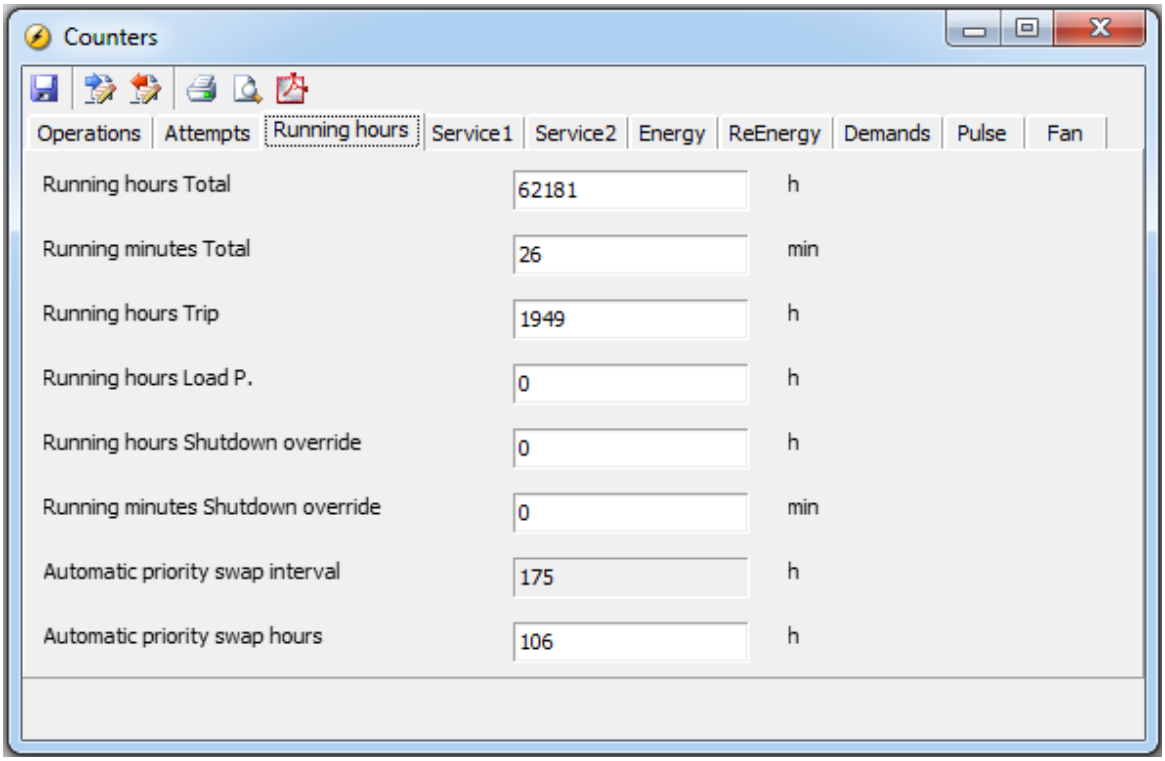
Attempts tab

In this tab, the number of start attempts by the genset is shown.



Field	Content	Comment
Start attempts	Total number of start attempts of the genset	

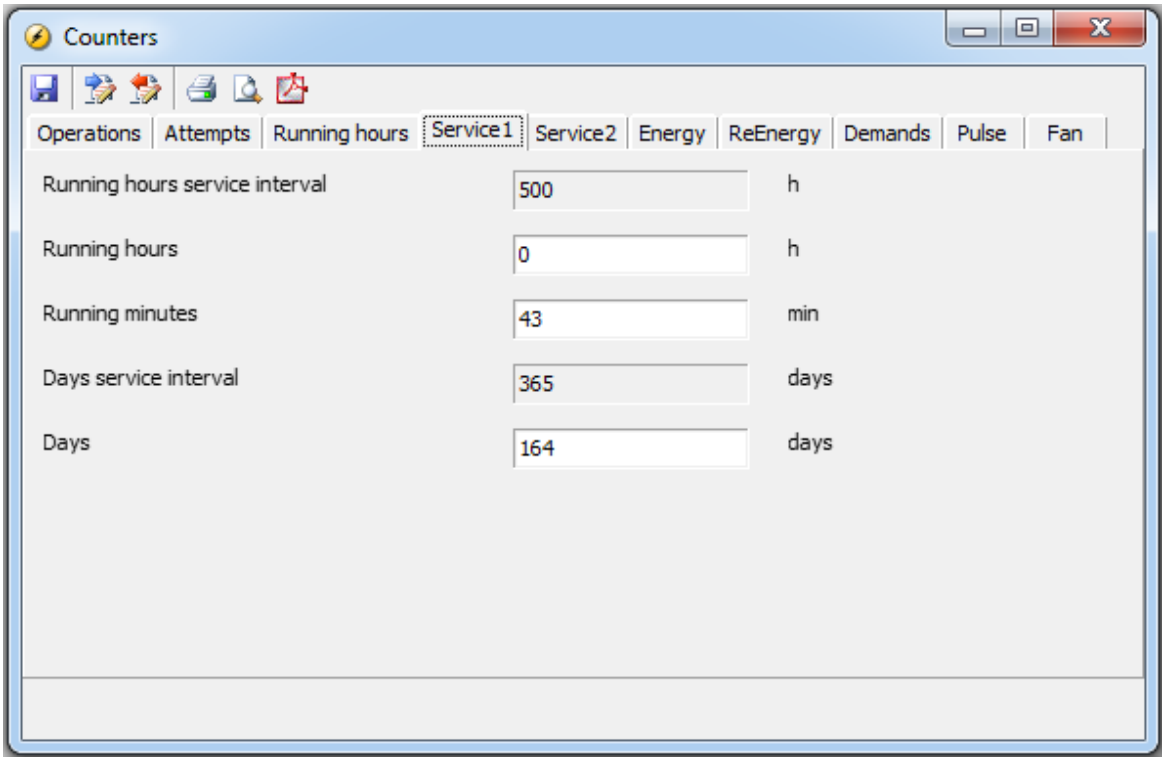
Running Hours tab



Field	Content	Comment
Running hours Total	The total number of hours the genset has been running	
Running minutes total	The minutes counter (range: 0-59) for running hours	The total time is the "Running hours Total" + "Running minutes Total"
Running hours trip	The trip counter for the genset	
Running hours Load P	The running hours load profiled	This number corresponds to the number of hours the genset has been running at 100% load. Example:2 hours at 50% gives 1 "hours load profiled".
Running hours shutdown override	This is the number of hours where the genset has been running in "shutdown override" mode.	The shutdown override mode corresponds to the emergency situation where the genset was running despite shutdown alarms.
Running minutes shutdown override	This is the minutes counter for the "shotdown override" counter	The total time the genset has been running in "shutdown override" is "Running hours shutdown override" + Running hours minutes shutdown override".
Automatic priority swap interval	This is the time (in hours) between a change in priority of the genset	The controllers in a setup are recalculating the priorities with this

Field	Content	Comment
	controllers	time interval.
Automatic priority swap hours	The time elapsed (in hours) since the last priority swap.	When the "Automatic priority swap hours" reaches the "Automiatic priority swap interval", the priorities are recalculated.

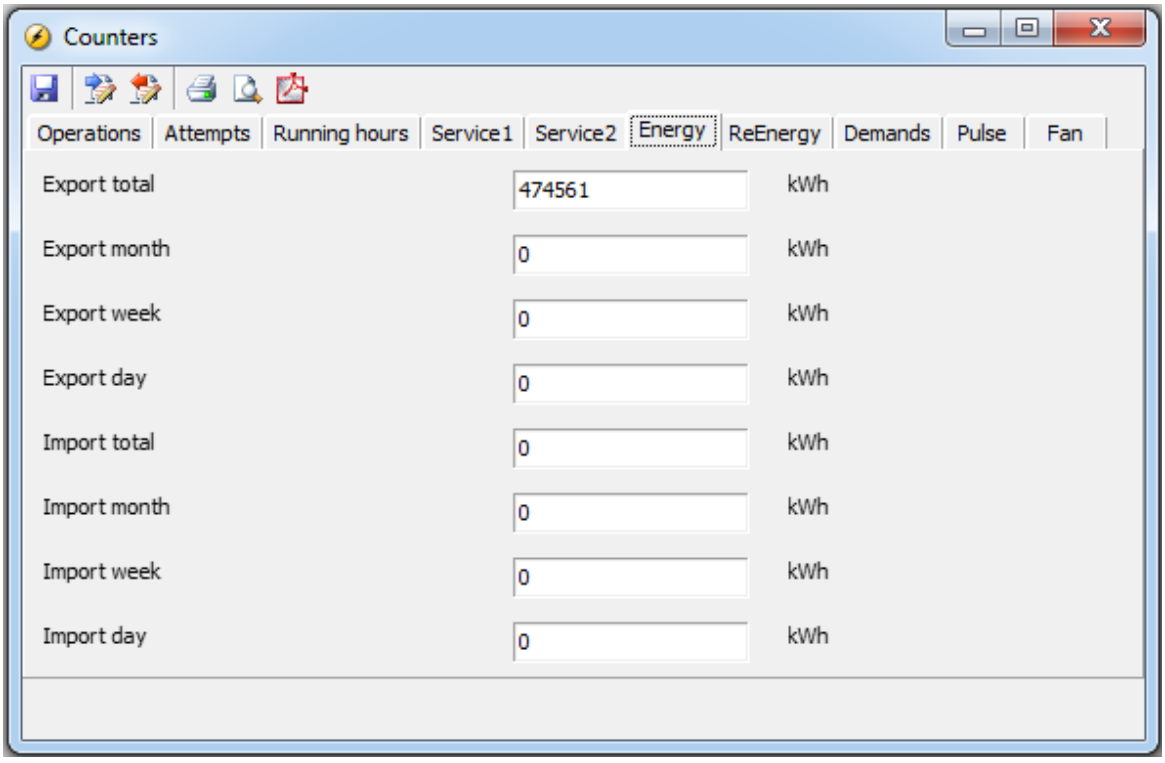
Service 1 and Service 2 tabs



Field	Content	Comment
Running hours service interval	This is the target value for the service time in hours	The service of the genset is required either when the "Running hours service interval" or when "Days service interval" is reached. Can be edited in Parameters in menu 6112
Running hours	The number of hours the genset has been running since the last service	This field is working like a trip counter that is counts up to the "Running

Field	Content	Comment
	session.	hours service interval" value. Note that this field is not the same as the "Running hours total" field given in the Running hours tab.
Running minutes	Counter in minutes for the time the genset has been running since the last service session	The running time is "Running hours" + "Running minutes"
Days service interval	This is the target value for the service time in days	Can be edited in Parameters in menu 6113
Days	The number of days the genset has been running since the last service session	

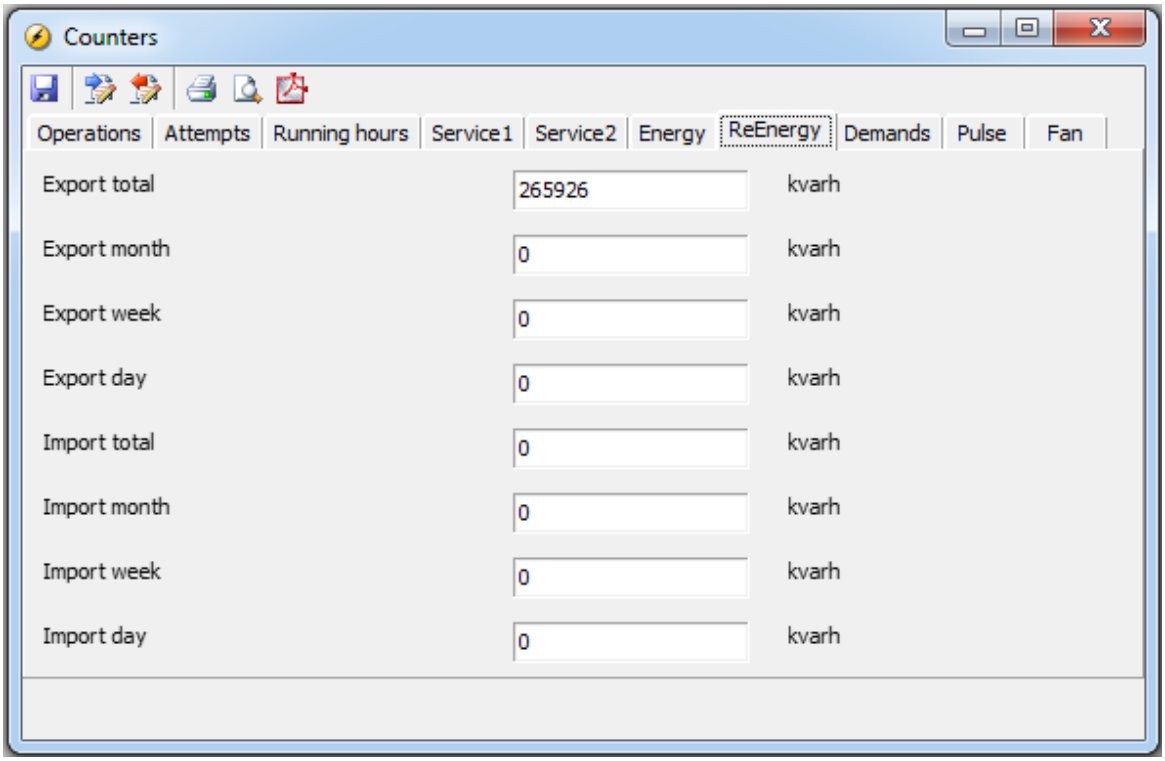
Energy tab



Field	Content	Comment
Export total	The total amount of energy ever produced by the genset	

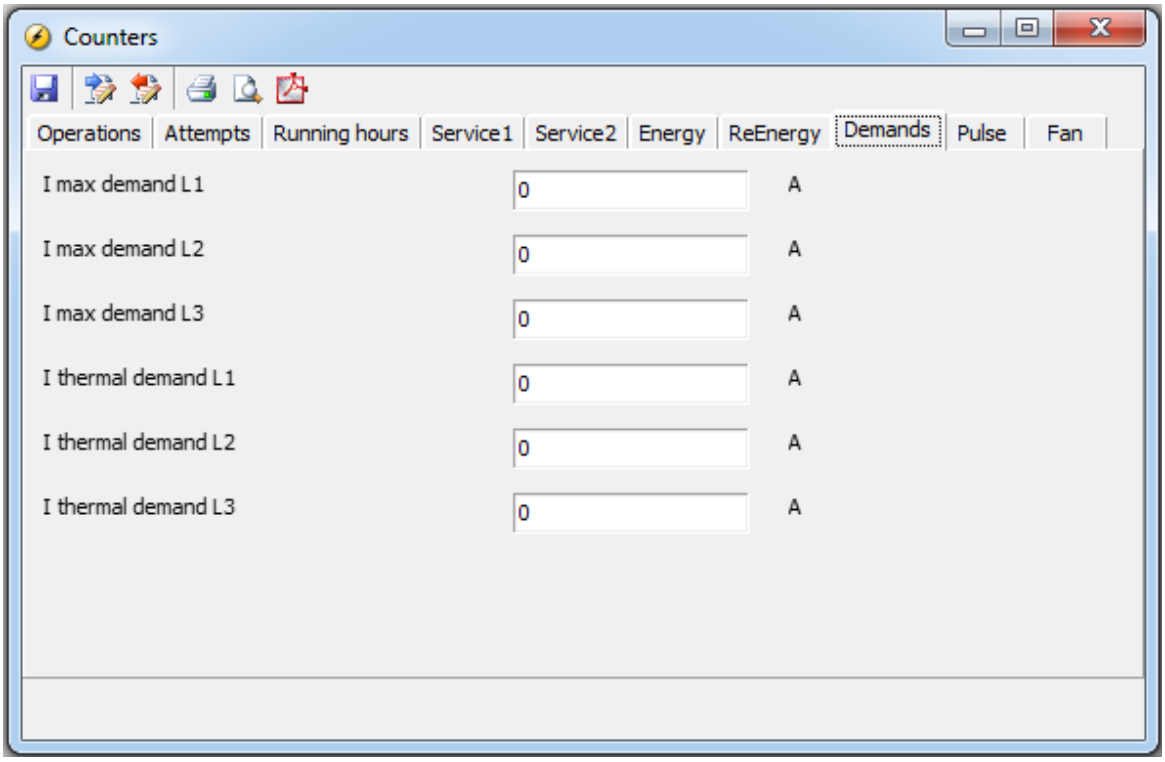
Field	Content	Comment
Export month	The total amount of energy produced this month	
Export week	The total amount of energy produced this week	
Export day	The total amount of energy produced this day	
Import total	The total amount of energy imported	This will be zero for a genset
Import month	The total amount of energy imported this month	This will be zero for a genset
Import week	The total amount of energy imported this week	This will be zero for a genset
Import day	The total amount of energy imported this day	This will be zero for a genset

ReEnergy



Field	Content	Comment
Export total	The total amount of reactive energy ever produced by the genset	
Export month	The total amount of reactive energy produced this month	
Export week	The total amount of reactive energy produced this week	
Export day	The total amount of reactive energy produced this day	
Import total	The total amount of reactive energy ever Imported	
Import month	The total amount of reactive energy imported this month	
Import week	The total amount of reactive energy imported this week	
Import day	The total amount of reactive energy imported this day	

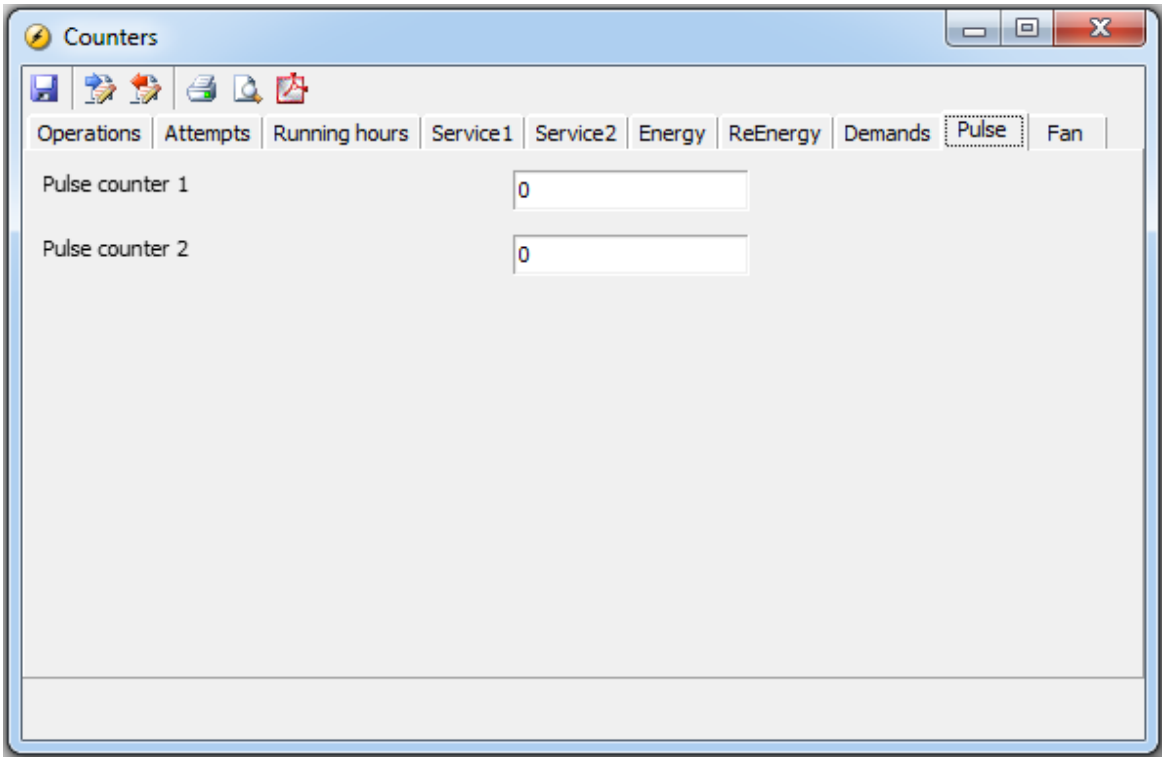
Demands



Field	Content	Comment
I max demand L1	Maximum current ever measured on L1	
I max demand L2	Maximum current ever measured on L2	
I max demand L3	Maximum current ever measured on L3	
I thermal demand L1	Thermal maximum current ever	The thermal value is calculated as the

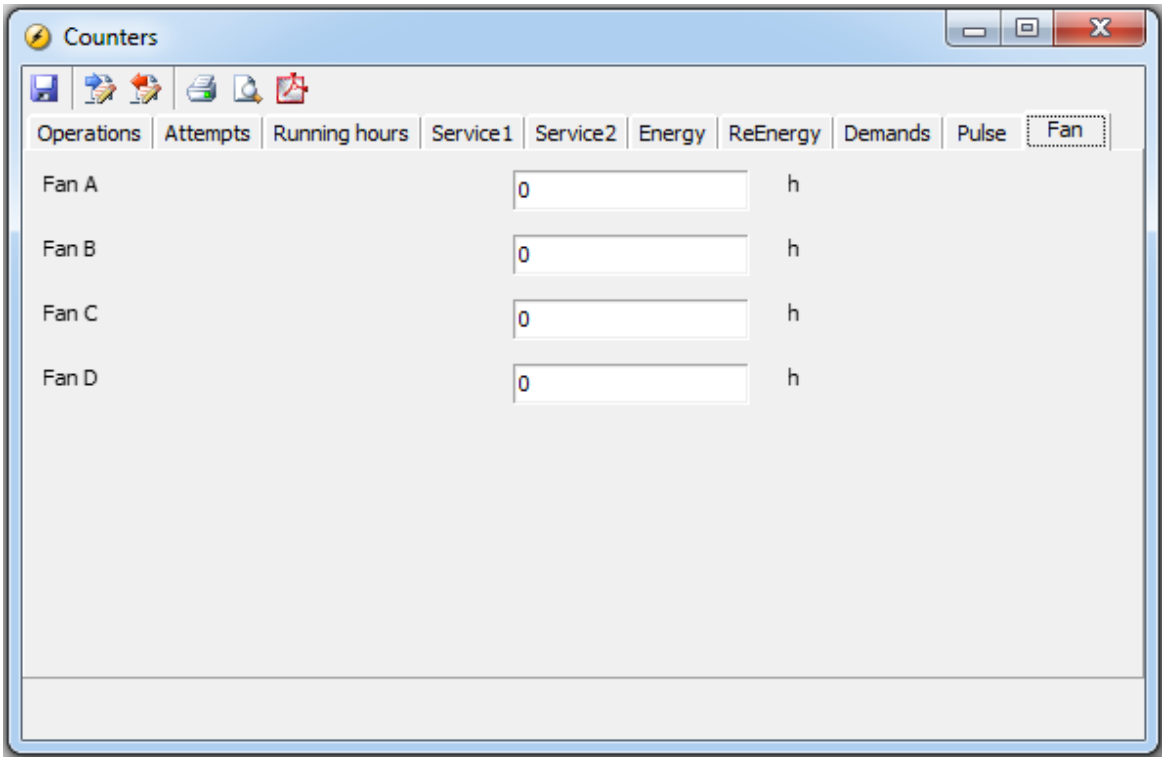
Field	Content	Comment
	measured on L1	average current from a small sliding time-window. In this way, the rapid spikes in the current is without importance.
I thermal demand L2	Thermal maximum current ever measured on L2	
I thermal demand L3	Thermal maximum current ever measured on L3	

Pulse



Field	Content	Comment
Pulse counter 1	Counter which is configured in menu 6851-6853	In M-Logic, a digital input can be used to trigger the counter. How the counter is increased is defined in the menus mentioned.
Pulse counter 2	Counter which is configured in menu 6854-6856	

Fan

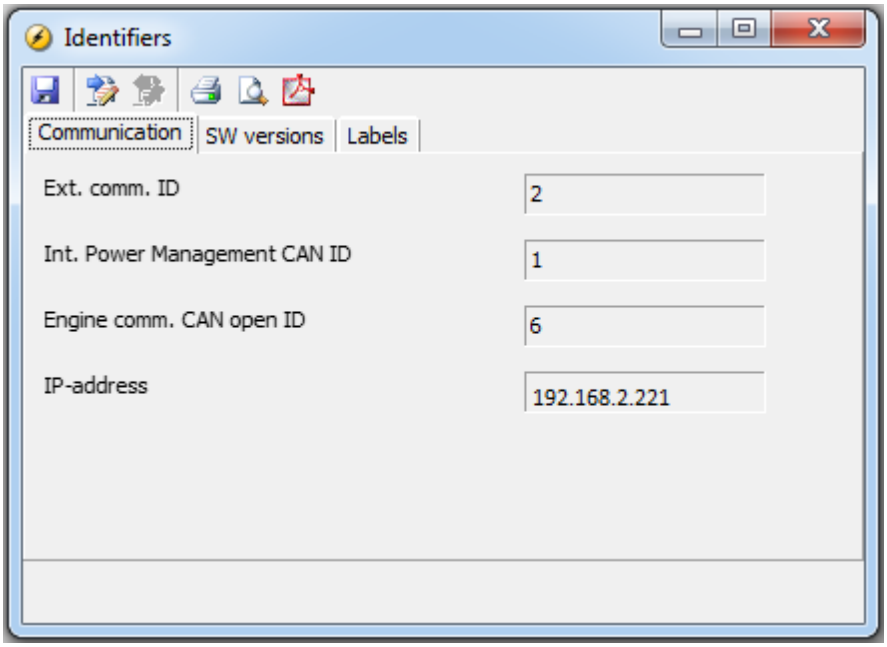


Field	Content	Comment
Fan A	Running hours for fan A	
Fan B	Running hours for fan B	
Fan C	Running hours for fan C	
Fan D	Running hours for fan D	

3.14 Identifiers

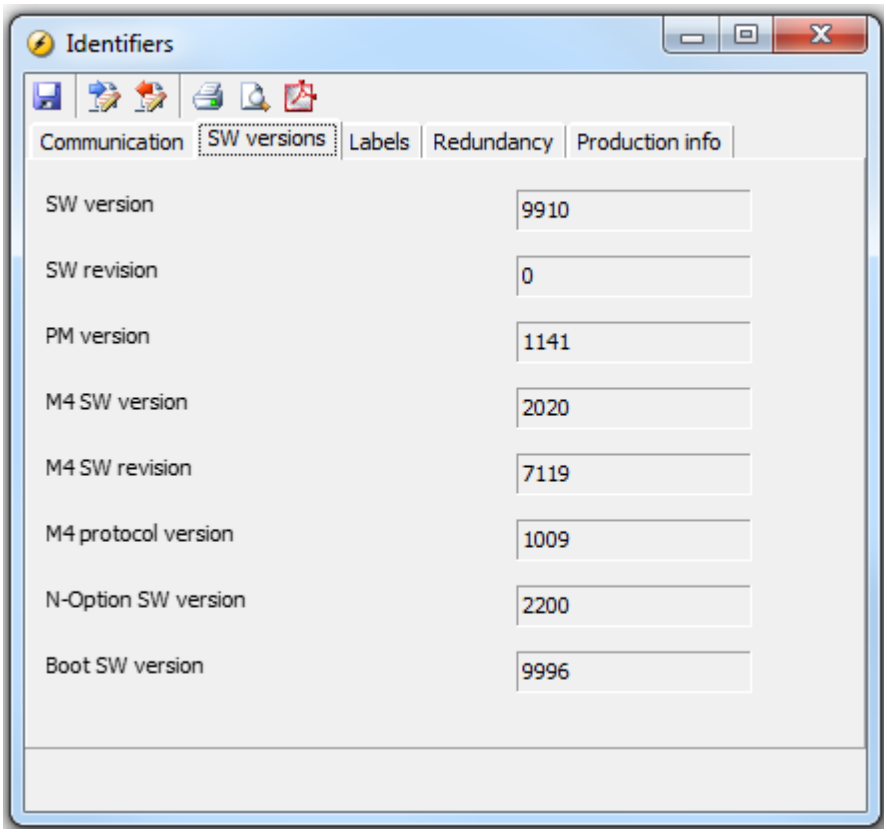
The Identifiers popup displays various ID values relevant for the connected controller. The tabs and the fields in the tabs depends on the device type. Below an example from a diesel generator controller.

Communication tab



Field	Content	Comment
Ext. comm. ID	External Modbus ID	
Int. Power Management CAN Id	Internal power management CAN Id	
Engine comm. CAN open Id	Engine communication CAN open Id	
IP address	IP address	

SW versions

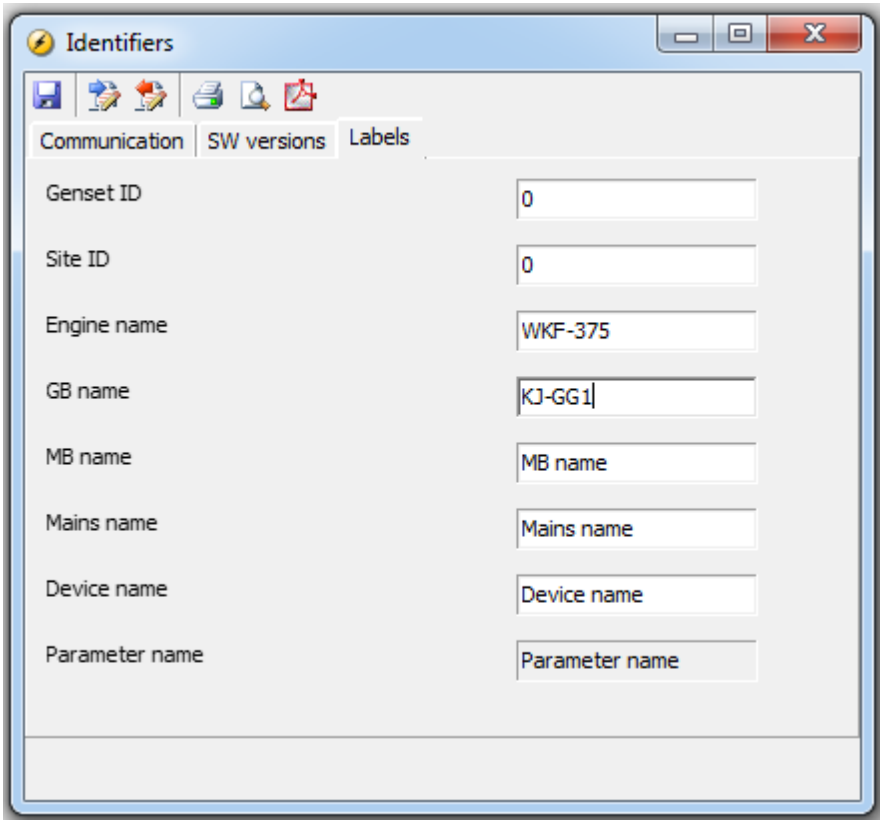


Field	Content	Comment
SW version	Firmware version	
SW revision	Firmware revision	
PM version	Power management version	This is the values also shown in the Compatibility popup (applies only to some device types).
M4 SW version	Version of the software in the M4 hardware	
M4 SW revision	Revision of the software in the M4 hardware	
M4 protocol version		
N-Option SW version	Version of the firmware in the N-Option card.	Relevant only for controllers with a separate N-option card.
Boot SW version	Version of the boot code in the controller	

The fields displaying the N-option software version and the boot code version are only shown for the QC 4002 Mk.II v. 4 controllers with firmware version >= 4.40.0

Labels

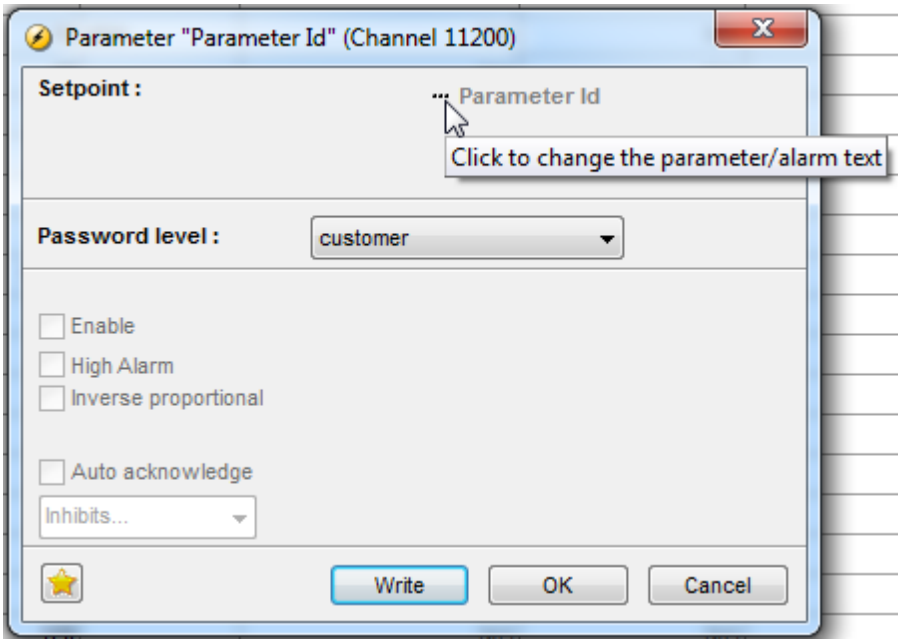
In the labels tab various strings can be entered. Most of these are shown on the Application Supervision page. Note that for a plant composed of several controllers, these strings needs to be specified for each controller independently.



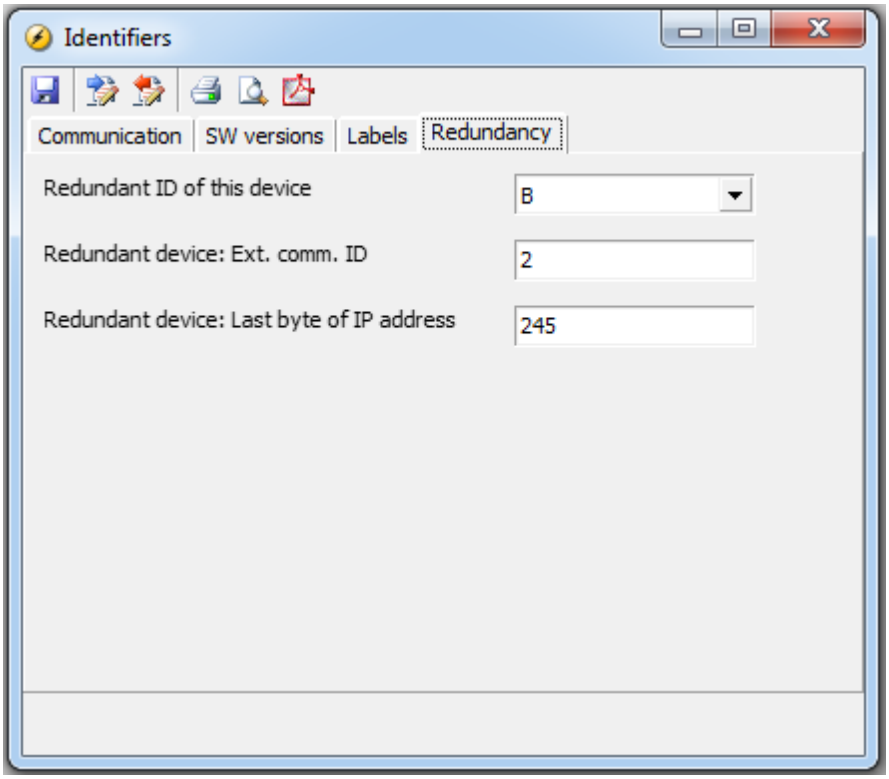
Field	Content	Comment
Genset ID	A number in the range 0..999999999. This number can freely be assigned by the user if he/she has a high enough access level to write Identifiers.	This number is also shown in the Genset data popup inside Application Supervision.
Site ID	A number in the range 0..999999999. This number can freely be assigned by the user if he/she has a high enough access level to write Identifiers.	This number is also shown in the Genset data popup inside Application Supervision.
Engine Name	This is a string of up to 20 characters.	This is the name shown above/below the genset symbol in the Application Supervision page

Field	Content	Comment
GB Name	This is a string of up to 20 characters.	This is the name shown next to the GB symbol in the Application Supervision page
Main Name	This is a string of up to 20 characters.	Note that for a DG controller this name is only relevant for a Single DG setup.The string is shown above/below the mains symbol
MB Name	This is a string of up to 20 characters.	Note that for a DG controller this name is only relevant for a Single DG setup.The string is shown next to the MB symbol
Device Name	This is a string of up to 20 characters. This string can freely be assigned by the user if he/she has a high enough access level to write Identifiers.	Note that this string is not shown in the Application Supervision page.
Parameter Name	This is a string of up to 15 characters stored as part of the parameters. Editable at menu 11200 in parameters.	This string is stored among the parameters and can, for example, be used to save info about when the parameters was changed and by whom. See below how to edit this parameter. Note that in the list of parameters it has the name Parameter id whereas it is called Parameter Name in Identifiers

The Parameter ID is changed in the Parameters page by changing the parameters/alarm text:

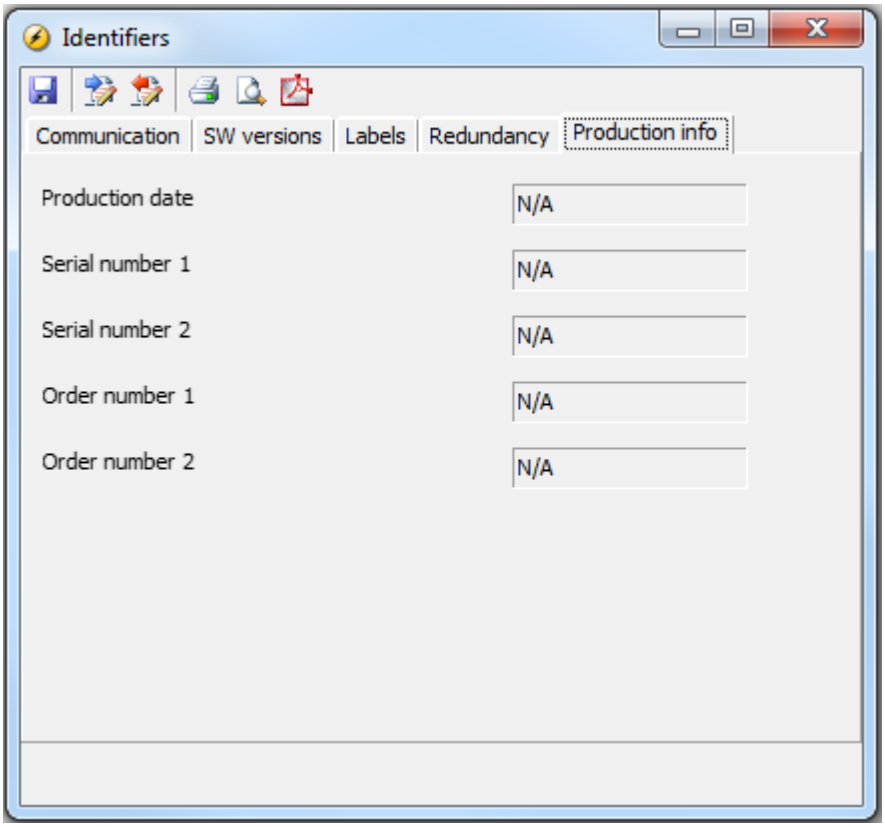


For those controllers with redundancy support (see description here) there is also a "Reduncancy" tab as shown below:



Production Info

This page displays the production date, serial numbers and the order numbers for the controller if available in it.

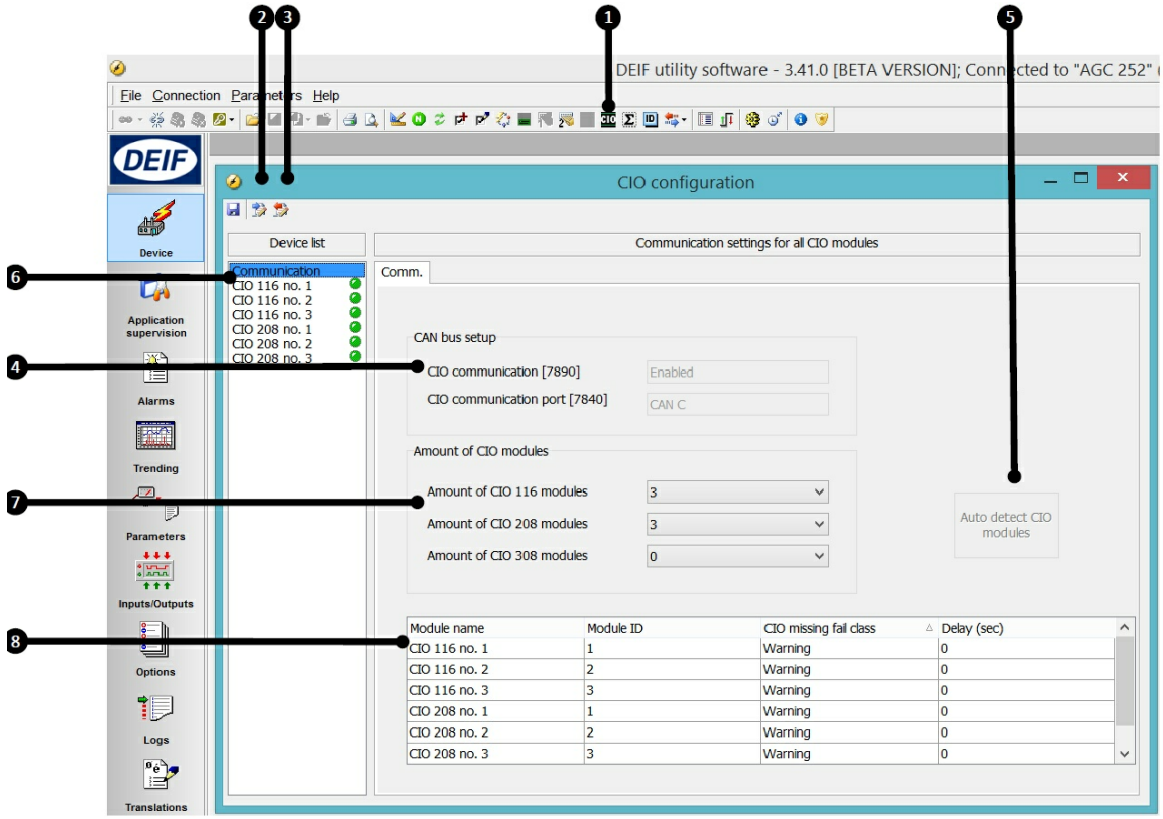


The Production Info applies only for the QC 4002 Mk.II v. 4 controllers with firmware version >= 4.40.0

3.15 CIO

Communication setup

Setup of the CIO modules is done from the CIO configuration menu, it cannot be done from the display. The
CIO configuration menu is accessed from the top menu bar of the USW.



1. CIO configuration menu
When you open the CIO configuration menu, the first page is Communication setup.

2. Read configuration from the controller

3. Write configuration to the controller

4. CAN bus setup
The CAN port for the CIO modules is selected and the communication is enabled here.

5. Auto detect
If the CIO modules are already connected and have the correct ID, the USW can automatically detect the
number and composition of CIO modules.

6. Device navigation list
Click a module from the list to access setup of the module. The green/grey light indicates if connection to the
module is established.

7. Manually select how many devices that are connected

8. List of modules
The module ID must correspond with the ID selected on the module and can be changed manually in the list.

The fail class and delay set here are triggered if the specific module is missing.

●The first time you open the menu, the buttons will be inactive and it is necessary to read the configuration from the controller.
●If the communication to a CIO 116 or CIO 308 module is lost, the AGC will continue with the last received input value.

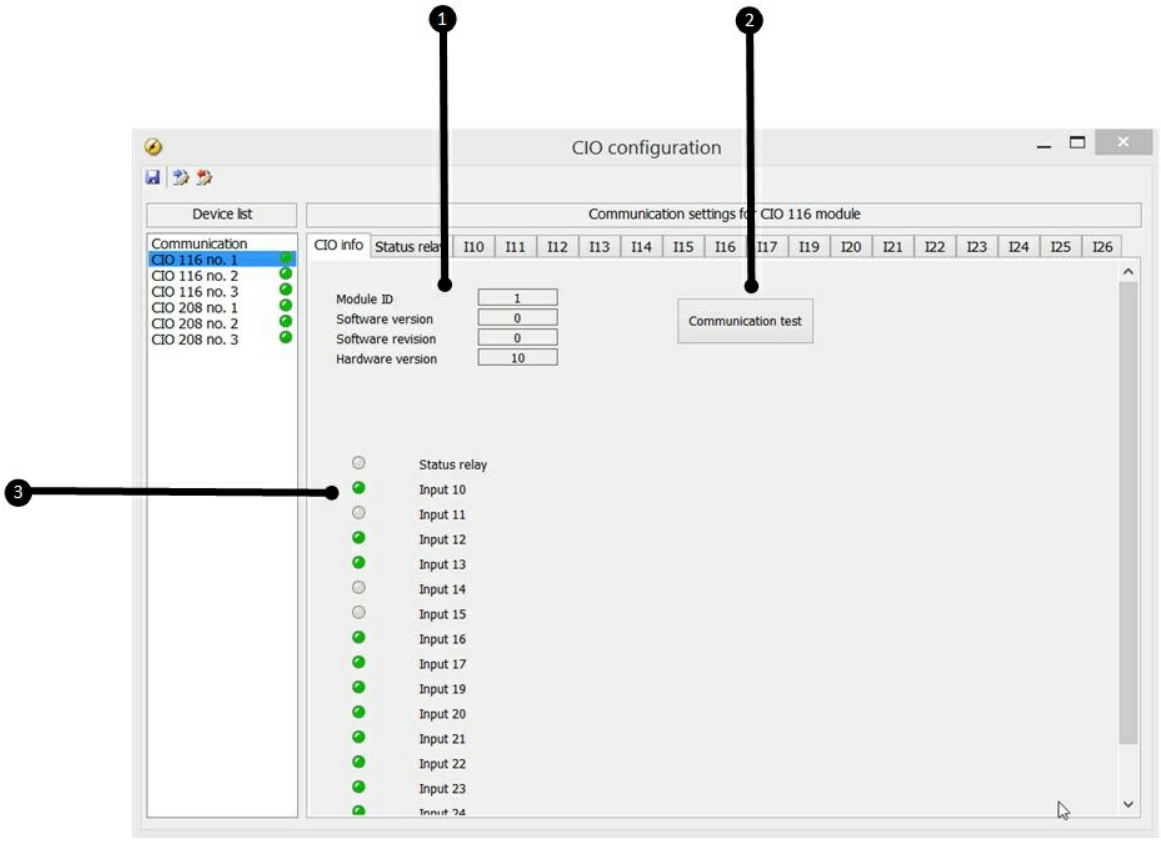
Step-by-step guide to setting up communication the first time
Follow these steps to establish communication to the CIO modules. Setup of the I/Os is described in a later
chapter.

? Select which CAN port to use for CIO (parameter 7840).
? Enable CIO communication (parameter 7890).
? Open CIO menu.
? Read the configuration from the controller.
? Auto-detect the number of modules and their ID.
? Determine fail class for module missing for all modules.
? Write the configuration to the controller.

3.15.1 CIO 116

I/O setup

Info tab



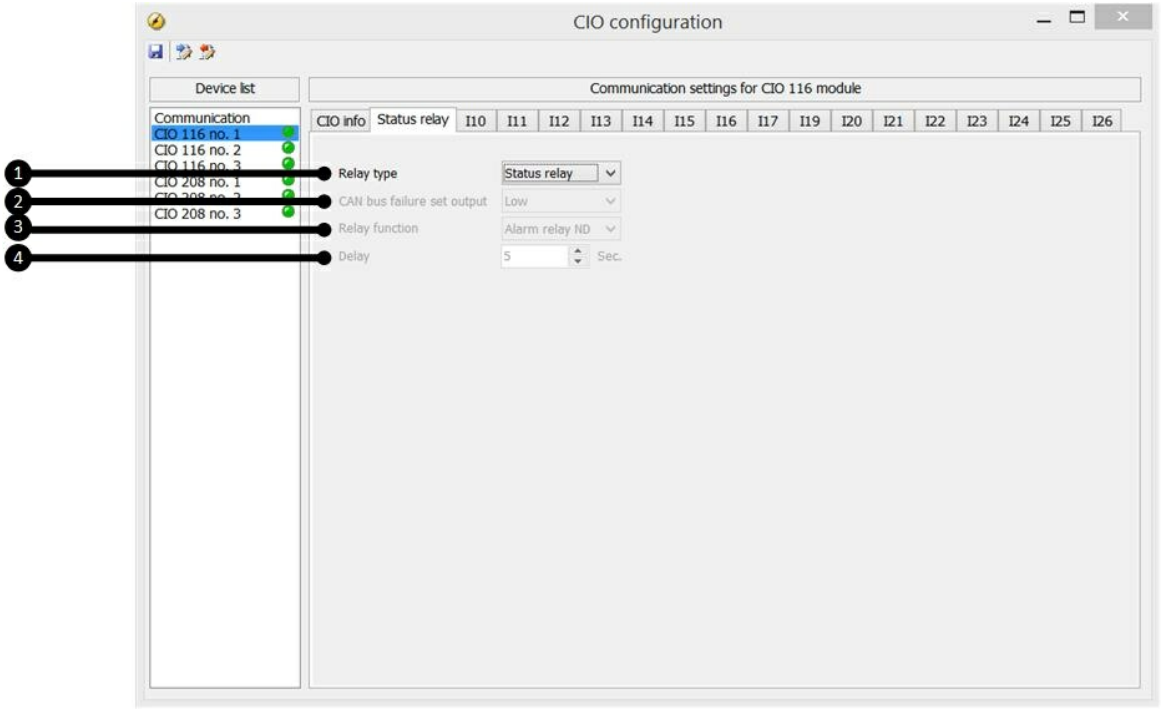
1. Module info
This section gives an overview of the specific module's ID and the software and hardware version of the module.
This information is important if support is needed for the product.

2. Communication test
When you click the Communication test button, the CAN bus LED (LED2) of the corresponding module will
flash green.

3. I/O status
In this section, the state of the input of the specific module is shown.

Status relay

The module has a status relay, which can be used as a status relay or a configurable relay.



1. Relay type
This setting has two states: Status relay and Configurable.
If it is used as a status relay, the relay will stay closed as long as the state of the module is OK, which corresponds
with a constant green status LED (see Status LED). If the relay is used as a status relay, the settings
below are disregarded.

2. CAN bus failure set output
This setting has three levels: Low, High and Stay. In case of a CAN bus failure, the related relay will change
its state based on this setting. If it is set to stay, the relay will keep its current state until communication is
working again.

3. Relay function
The relay function can be set to five different settings:

Alarm relay ND
The related relay is used as an alarm relay of the type "ND" (Normally De-energised).
The relay is activated until the alarm that caused the activation is acknowledged and gone.

Limit relay
The related relay will activate at the limit set point. After the condition that activated this relay has returned to
normal, the relay will deactivate when the "Delay" has expired. The delay is adjustable.
An output relay should be configured as a limit relay. Otherwise, an alarm will be raised whenever the output
is activated.
To use the relay in M-Logic, it must also be configured as a limit relay.

Horn relay
All configurable relays can be selected to be a horn output (horn relay).
This means that, for example, the relay can be connected to an alarm annunciator, like a horn. When "Horn
relay" is selected, an external horn is activated every time a new alarm occurs. If the alarm horn timer in parameter
6130 is adjusted to 0 seconds, the horn remains activated until the alarm is acknowledged. If the alarm horn parameter (6130) is not 0 seconds, the horn relay output resets itself after the adjusted delay has
expired, even though the alarm is still present.

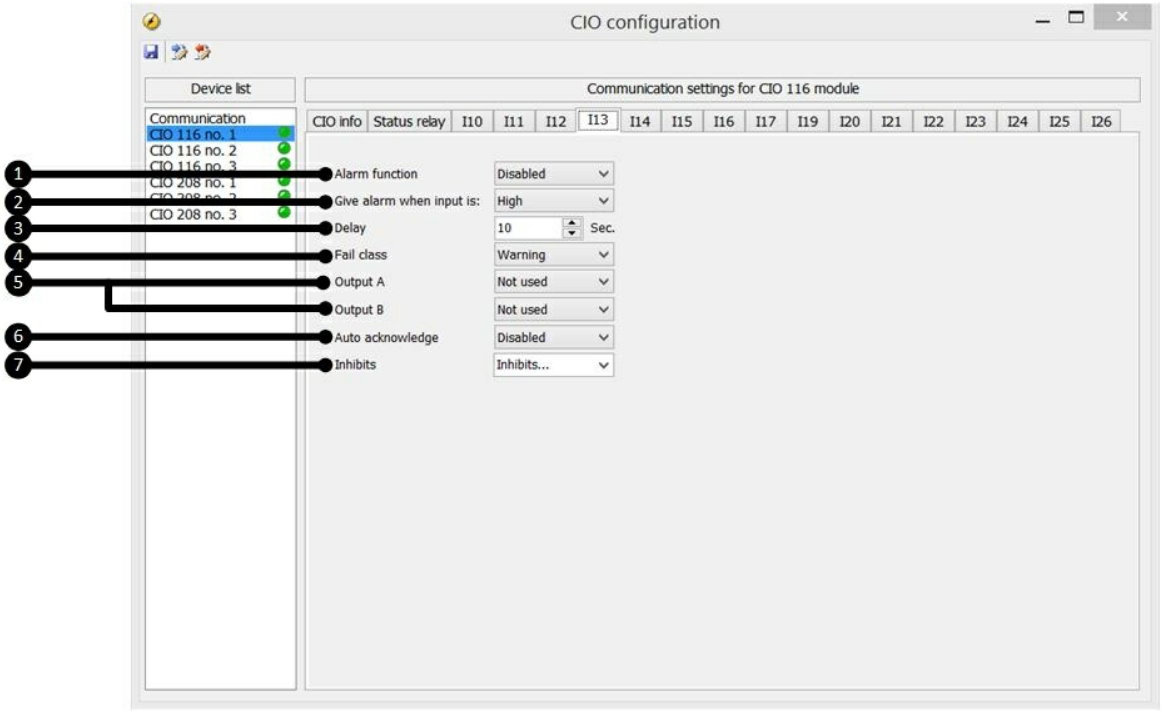
Siren relay
When "Siren relay" is selected, an external siren is activated on all alarms, like the selection "Horn relay".
When the siren relay is activated and another alarm is active, a short-time reset will be activated. If the alarm
horn timer in parameter 6130 is adjusted to 0 seconds, the siren relay remains activated until all alarms are
acknowledged.

Alarm relay NE
The related relay is used as an alarm relay of the type "NE" (Normally Energised).
The relay is deactivated until the alarm that caused the deactivation is acknowledged and gone.

4. Delay
Used when the relay function is "Limit".
The delay setting indicates how many seconds the relay stays energised after the input has become inactive.
This functionality is also called off-delay.

Input settings

In the following, the alarms related to the digital inputs of the CIO 116 are described.



1. Alarm function
Activates/deactivates the alarm function

2. Give alarm when input is
Defines if the alarm is triggered when the signal is high or low.

3. Delay
The timer setting is the time that must expire from the alarm level is reached until the alarm occurs.

4. Fail class
When the alarm occurs, the unit will react depending on the selected fail class. Select the required fail class
from the drop-down list. The list contains the fail classes Block, Warning, Trip GB, Shutdown and Safety stop.

5. Output A/Output B
Select which terminal to activate in case of an alarm. A terminal number can be selected, but "Limit" is also
available in the drop-down list. Limit makes the alarm useable as an input event in M-Logic.
No alarm will appear when both outputs (OA and OB) of the alarm are adjusted to a limit relay.

6. Auto acknowledge
If this option is set, the alarm is automatically acknowledged if the signal related to the alarm disappears.

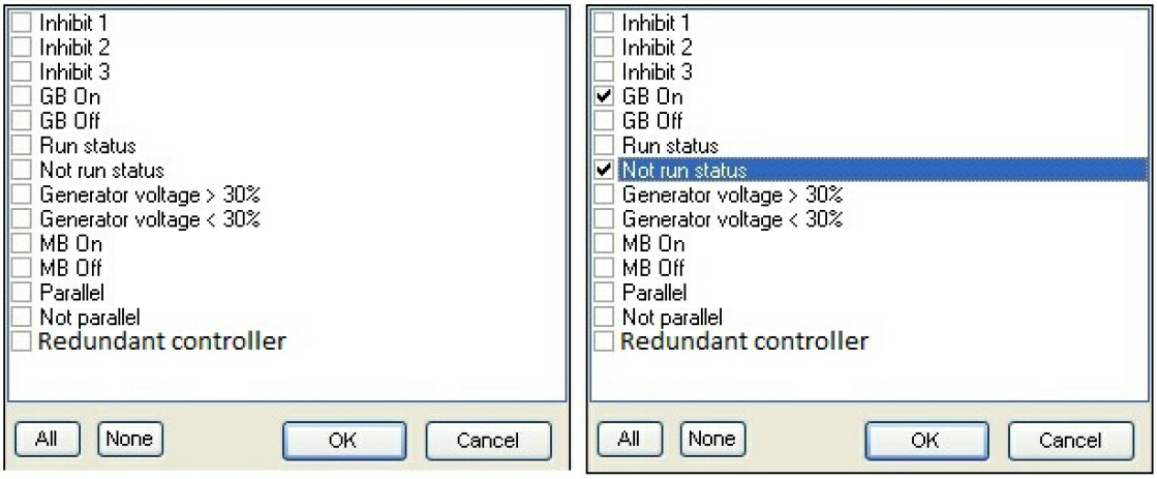
7. Inhibits
Is used to express exceptions to when an alarm must be triggered. In order to select when the alarms are to
be active, a configurable inhibit setting has been made for every alarm. The inhibit functionality is only available

via the PC utility software. For every alarm, there is a drop-down list from which you can select the signals
that must be present in order to inhibit the alarm.

Function	Description
	M-Logic outputs: Conditions are programmed in M-Logic
Inhibit 1	
Inhibit 2	The generator breaker (GB) is closed (TB = tie breaker)
Inhibit 3	The generator breaker is opened
GB On (TB On)	Running is detected and the timer in menu 6160 has expired
	Running is not detected and the timer in menu 6160 has not expired
	Generator voltage is above 30 % of nominal
GB Off (TB Off)	Generator voltage is below 30 % of nominal
	The mains breaker is closed
	The mains breaker is opened
Run status	Both GB (TB) and MB are closed
	Either GB (TB) or MB is closed, but not both
	Allows a redundant controller to operate in hot standby with the master
Not run status	controller,
	and to assume control even in engine running conditions if a problem occurs on the
Generator voltage > 30%	master (hot standby). Only the "Breaker externally tripped" alarm is inhibited as default
	when a unit has redundant status. See the Option T1 manual for more
Generator voltage < 30%	information.
MB On	
MB Off	
Parallel	
Not parallel	
Redundant controller	

.

Example:



Inhibit of the alarm is active, as long as one of the selected inhibit functions is active.
In the example above, inhibit is set to **GB On** and **Not run status**. Here, the alarm will be active when the
generator has started. When the generator has been synchronised to the busbar, the alarm will be disabled
again.

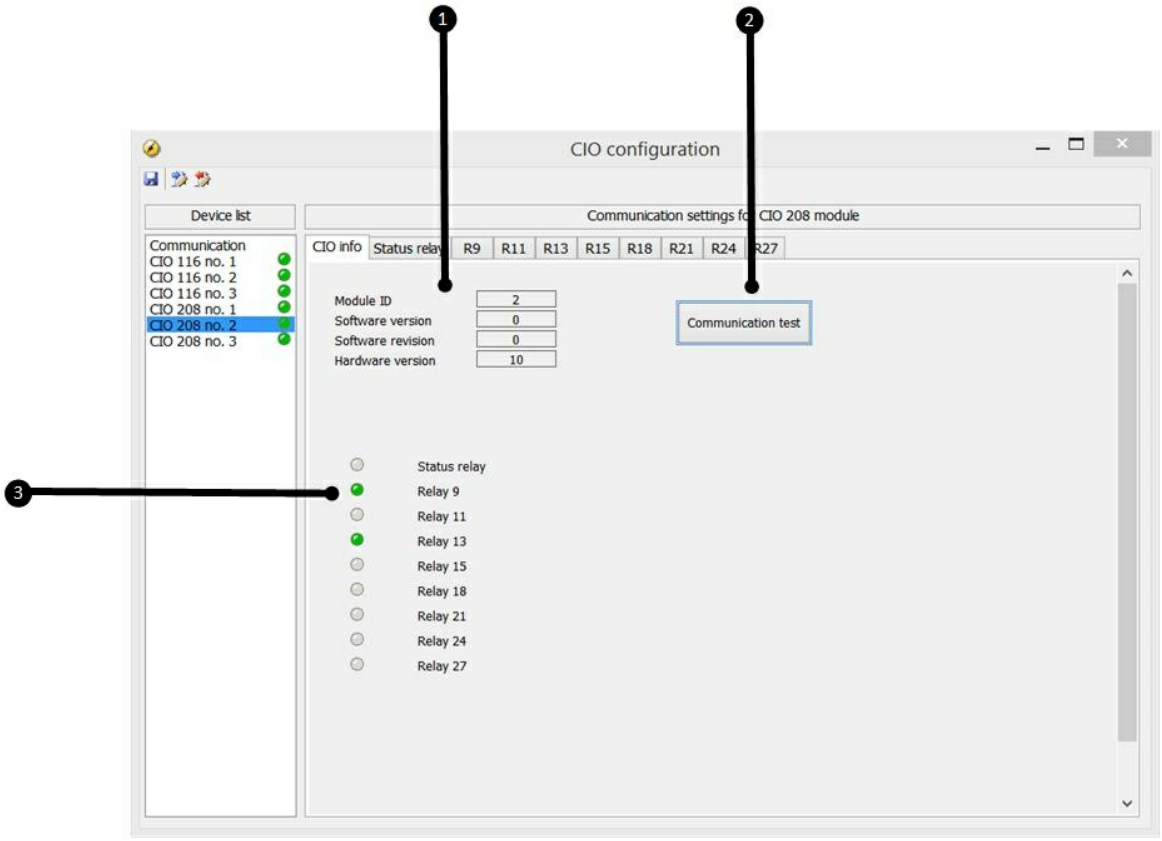
? Function inputs such as running feedback, remote start or access lock are never inhibited. Only alarm inputs
can be inhibited.

? If an alarm is configured to activate a limit relay, the relay will activate even though the inhibit input is ON.

3.15.2 CIO 208

I/O setup

Info tab



1. Module info
This section gives an overview of the specific module's ID and the software and hardware version of the module.
This information is important if support is needed for the product.

2. Communication test
When you click the Communication test button, the CAN bus LED (LED2) of the corresponding module will
flash green.

3. I/O status
In this section, the state of the relays is shown.

Status relay

The module has a status relay, which can be used as a status relay or a configurable relay.

1. Relay type
This setting has two states: Status relay and Configurable.
If it is used as a status relay, the relay will stay closed as long as the state of the module is OK, which corresponds
with a constant green status LED (see Status LED). If the relay is used as a status relay, the settings
below are disregarded.

2. CAN bus failure set output
This setting has three levels: Low, High and Stay. In case of a CAN bus failure, the related relay will change
its state based on this setting. If it is set to stay, the relay will keep its current state until communication is
working again.

3. Relay function
The relay function can be set to five different settings:

Alarm relay ND
The related relay is used as an alarm relay of the type "ND" (Normally De-energised).
The relay is activated until the alarm that caused the activation is acknowledged and gone.

Limit relay
The related relay will activate at the limit set point. After the condition that activated this relay has returned to
normal, the relay will deactivate when the "Delay" has expired. The delay is adjustable.

An output relay should be configured as a limit relay. Otherwise, an alarm will be raised whenever the output

is activated.
To use the relay in M-Logic, it must also be configured as a limit relay.

Horn relay
All configurable relays can be selected to be a horn output (horn relay).
This means that, for example, the relay can be connected to an alarm annunciator, like a horn. When "Horn
relay" is selected, an external horn is activated every time a new alarm occurs. If the alarm horn timer in parameter
6130 is adjusted to 0 seconds, the horn remains activated until the alarm is acknowledged. If the alarm horn parameter (6130) is not 0 seconds, the horn relay output resets itself after the adjusted delay has
expired, even though the alarm is still present.

Siren relay
When "Siren relay" is selected, an external siren is activated on all alarms, like the selection "Horn relay".
When the siren relay is activated and another alarm is active, a short-time reset will be activated. If the alarm
horn timer in parameter 6130 is adjusted to 0 seconds, the siren relay remains activated until all alarms are
acknowledged.

Alarm relay NE
The related relay is used as an alarm relay of the type "NE" (Normally Energised).
The relay is deactivated until the alarm that caused the deactivation is acknowledged and gone.

4. Delay
Used when the relay function is "Limit".
The delay setting indicates how many seconds the relay stays energised after the input has become inactive.
This functionality is also called off-delay.

Relay settings

In the following, the functions for the relays of the CIO 208 are described:

1. CAN bus failure set output
This setting has three levels: Low, High and Stay. In case of a CAN bus failure, the related relay will change
its state based on this setting. If it is set to stay, the relay will keep its current state until communication is
working again.

2. Relay function
The relay function can be set to five different settings.

Alarm relay ND
The related relay is used as an alarm relay of the type "ND" (Normally De-energised).
The relay is activated until the alarm that caused the activation is acknowledged and gone.
The alarm LED is flashing or constant, depending on the acknowledged state.

Limit relay
The related relay will activate at the limit set point. After the condition that activated this relay has returned to
normal, the relay will deactivate when the "Delay" has expired. The delay is adjustable.
An output relay should be configured as a limit relay. Otherwise, an alarm will be raised whenever the output
is activated.
To use the relay in M-Logic, it must also be configured as a limit relay.

Horn relay
All configurable relays can be selected to be a horn output (horn relay).
This means that, for example, the relay can be connected to an alarm annunciator, like a horn.

When "Horn
relay" is selected, an external horn is activated every time a new alarm occurs. If the alarm horn timer in parameter
6130 is adjusted to 0 seconds, the horn remains activated until the alarm is acknowledged. If the alarm horn parameter (6130) is not 0 seconds, the horn relay output resets itself after the adjusted delay has
expired, even though the alarm is still present.

Siren relay
When "Siren relay" is selected, an external siren is activated on all alarms, like the selection "Horn relay".
When the siren relay is activated and another alarm is active, a short-time reset will be activated. If the alarm
horn timer in parameter 6130 is adjusted to 0 seconds, the siren relay remains activated until all alarms are
acknowledged.

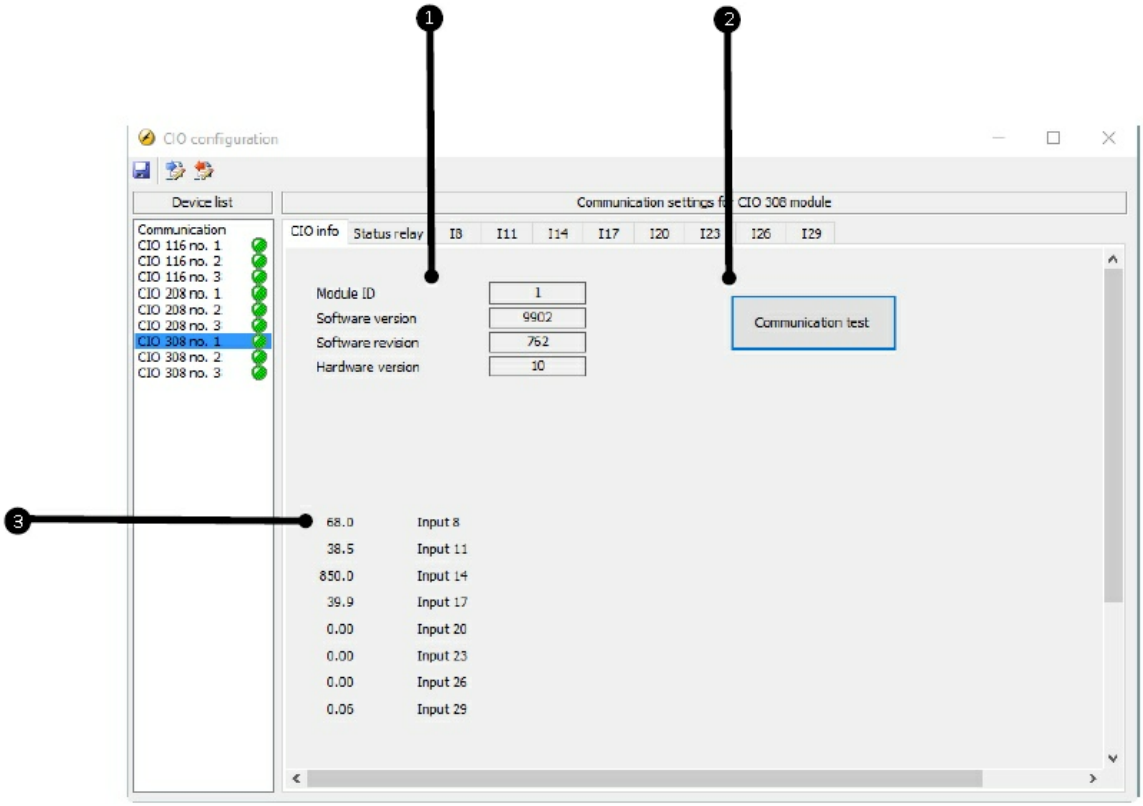
Alarm relay NE
The related relay is used as an alarm relay of the type "NE" (Normally Energised).
The relay is deactivated until the alarm that caused the deactivation is acknowledged and gone.

3. Delay
Used when the relay function is "Limit".
The delay setting indicates how many seconds the relay stays energised after the input has become inactive.
This functionality is also called off-delay.

3.15.3 CIO 308

I/O setup

Info tab



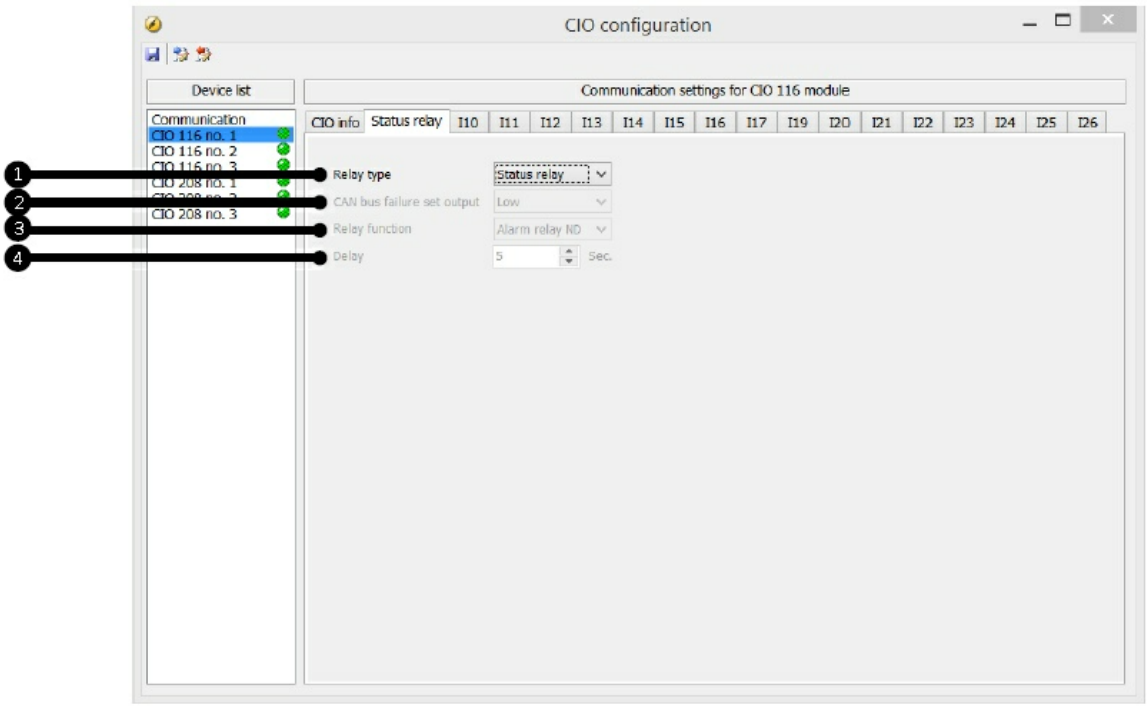
1. Module info
This section gives an overview of the specific module's ID and the software and hardware version of the module.
This information is important if support is needed for the product.

2. Communication test
When you click the Communication test button, the CAN bus LED (LED2) of the corresponding module will
flash green.

3. I/O status
In this section, the value (like temperature, pressure, voltage and so on) is shown for each input.

Status relay

The module has a status relay, which can be used as a status relay or as a configurable relay.



1. Relay type
This setting has two states: Status relay and Configurable.
If it is used as a status relay, the relay will stay closed as long as the state of the module is OK, which corresponds
with a constant green status LED (see Status LED). If the relay is used as a status relay, the settings
below are disregarded.

2. CAN bus failure set output
This setting has three levels: Low, High and Stay. In case of a CAN bus failure, the related relay will change
its state based on this setting. If it is set to Stay, the relay will keep its current state until communication is
working again.

3. Relay function
The relay function can be set to five different settings:

Alarm relay ND
The related relay is used as an alarm relay of the type "ND" (Normally De-energised).
The relay is activated until the alarm that caused the activation is acknowledged and gone.

Limit relay
The relay will activate at a certain predefined limit set point. When the condition that activated the relay has
returned to normal, and when the delay has expired, the relay will deactivate. The delay is adjustable.

An output relay should be configured as a limit relay, otherwise an alarm will be raised when the

output is
activated.
To use the relay in M-Logic, it must also be configured as a limit relay.

Horn relay
All configurable relays can be selected to be a horn output (horn relay).
This means that, for example, the relay can be connected to an alarm annunciator, like a horn. When "Horn
relay" is selected, an external horn is activated every time a new alarm occurs. If the alarm horn timer in parameter
6130 is adjusted to 0 seconds, the horn remains activated until the alarm is acknowledged. If the alarm horn parameter (6130) is not 0 seconds, the horn relay output is active until the timer expires and then
the relay deactivates, even though the alarm is still present.

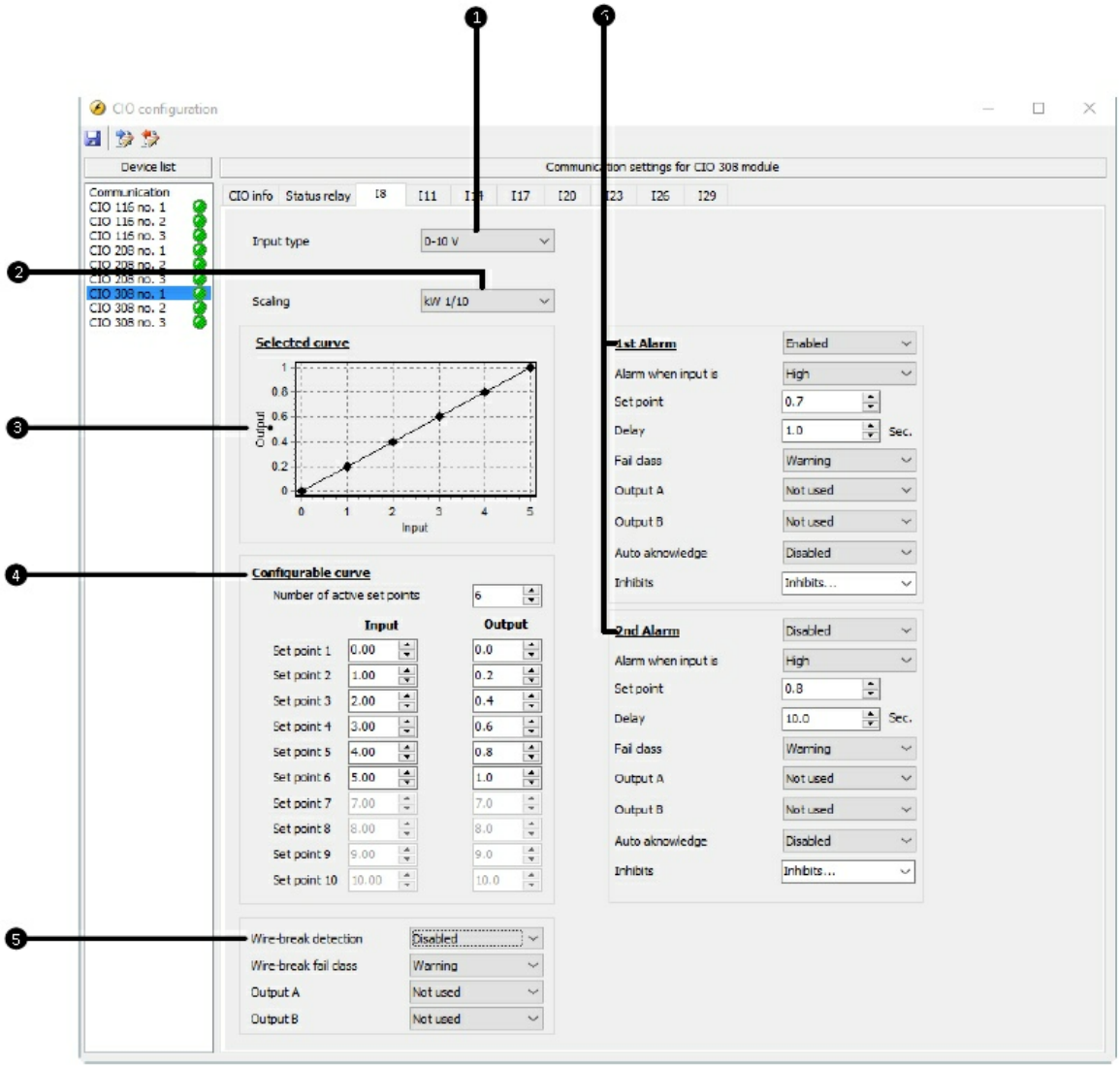
Siren relay
When "Siren relay" is selected, an external siren is activated on all alarms, like the selection "Horn relay".
When the siren relay is activated and another alarm is active, a short-time reset will be activated. If the alarm
horn timer in parameter 6130 is adjusted to 0 seconds, the siren relay remains activated until all alarms are
acknowledged.

Alarm relay NE
The related relay is used as an alarm relay of the type "NE" (Normally Energised).
The relay is normally closed, and if the related alarm occurs, the relay will open until the alarm is acknowledged
and gone.

4. Delay
Used when the relay function is "Limit".
The delay setting indicates how many seconds the relay stays energised after the input has become inactive.
This functionality is also called off-delay.

Multi-input

Below is the functionality generally described. The screen changes depending on the input type (item 1 on
the picture).



1. Input type
This setting determines the type of signal that the sensor sends to the input. Among the options are: Pt100,
Pt1000, 0-10 V, RMI, 0-20 mA, thermocoupler types and binary.

2. Scaling
This list contains options regarding the origin of the multi-inputs measurement. It is possible to select between
various units like °C, bar, kW and "No unit". There is also a scaling involved, which can be 1/1, 1/10 and
1/100.
If 1/100 is selected, there are 2 decimals in the output value, the max value is 327.67, and there are 0 decimals
if 1/1 is chosen, then the max value is 32767.

3. Selected curve
This graph shows the curve for the values in the Configurable Curve table (item 4).

4. Configurable curve
In this table it is possible to type the relation between input 0-10 V and output kW 1/10 in this example.
As seen in the table, the input ranges from 0-5 V, and the output is 0.0-1.0 kW. If the input voltage goes
above 5 V, the output will stay at 1.0 kW.

5. Wire-break detection
If the input signal is outside of configured range, the wire fail detection is activated. It depends on the input
type working area of the sensor whether open circuit and short circuit failures will be detected. Read more
about this in the chapter about wire fail detection.

6. Alarm setup
It is possible to set two alarms, and the related settings are the same as for regular inputs on the AGCs. The
selected set point relates to the output value. In this example, the output value is 0-1 kW, and the first alarm
activates when the value has been above 0.7 kW in 1 second.

3.16 General purpose PID

Introduction

The general purpose PID controllers are principally similar to the PID controllers for AVR and governor output.
They consist of a proportional, integral and differential part, and the integral and differential part is dependent
on the proportional gain. A functional description of the principle can be found in the chapter regarding
controllers for AVR and governor. The GP PIDs are though slightly less responsive. They are meant for
purposes as temperature regulation, controlling fans, valves, etc. The principle of relay control is also described
in the chapter regarding AVR/governor control. Configuration of the GP PIDs are documented by describing
the possibilities of the GP PID interface, and with examples of configuration for different purposes.

Acronyms:
GP: General Purpose
SP: Set Point
PV: Process Variable

GP PID interface in USW

Configuration of the GP PID's input and output settings are done with the "PID"-interface in the DEIF

Utility
SoftWare, and can't be done from the display of the controller.

Inputs

Each of the outputs hold the possibility of up to 3 inputs. Only one input at a time is used for calculation of
output signal. How the selection is handled is described in “Dynamic input selection”.

1: Top drop-down

Here the source of this input is chosen.

2: “Input 1 min.” and “Input 1 max.”
Defines the scale of the input value evaluated.

3: “Reference 1”
The set point for this particular input. (30°C).

4: “Weight 1”
The weight factor is multiplied to the input value. A weight factor of 1 means the real input value is used in
calculations. A weight factor of 3 means the input value is considered 3 times as great in calculations.

5: Bottom drop-down
On: This input will be evaluated.
Off: This input will not be evaluated.

Dynamic input selection

Each of the GP PIDs holds the possibility of up to 3 active inputs. All activated inputs are evaluated constantly,
and the input causing the greatest or smallest output is selected. Priority of great or small output is selected
in the output settings.

Example explaining dynamic input selection
Ventilation of a container fitted with a genset inside is a realistic example for use of the dynamic input selection.
The following three variables depend on the ventilation, hence it makes sense to let them share the output.

? The container is fitted with a temperature sensor for internal container temperature. Due to lifetime of
electronics inside the container, maximum maintained temperature is desired to be 30°C. (Input 1)
? The engine air intake is located inside the container, hence turbo compressor inlet temperature depends
on the air temperature in the container. Maximum maintained intake air temperature is 32°C. (Input 2)
? The alternator is cooled by air in the container, hence the alternator winding temperatures depends on the
air temperature in the container. Maximum maintained winding temperature is 130°C. (Input 3)

These are the data used for configuring the inputs in the above screenshot. All inputs are configured with
both full range of measurement (0-100 %), and a weight factor 1. The common output to the ventilator speed
drive is configured to prioritise maximum output as explained in the next chapter “Output”. This configuration
is meant to ensure that none of the input set points are continuously exceeded, unless maximum ventilation is
reached.
A scenario of operation could be that the controller has been using input 1, and a temperature of 30°

C is
maintained in the container. At a point, the air filter housing is heated by radiation from the engine causing
input 2 to rise more beyond 32°C than input 1 is beyond 30°C. This means input 2 now has the greatest positive
deviation. All inputs are configured with a weight factor of 1 and maximum output is prioritised, hence greatest positive deviation results in maximum output, to put it another way, input 2 is now the one selected.
The genset is running at full load with a maximum of reactive load, and the alternator windings heat up beyond
the 130°C set point, due to high currents. At some point, input 3 is the one of the three, resulting in maximum output and hence selected as the input used in output calculation. Ventilation is increased and the
winding temperature maybe reach a steady state of 130°C with a temperature of 27°C in container room temperature
and 30°C compressor inlet temperature. As long as this is the situation, input 3 will remain as the selected input, as this is the input causing the greatest output.
In case of high ambient temperatures, the ventilation might not be able to influence the temperature enough,
and the temperatures start rising above set point. Output will stay at 100 % as long as any of the inputs are
continuously above their set points.
Weight factor applies for dynamic input selection as well. In the event that different weight factors have been
configured for any of the three inputs, maximum deviation can't be equated with maximum output. If two inputs
with similar deviation to their respective set points are configured with weight factors of respectively 1 and 2, the one will result in twice the output as the other.

Output

1: Priority
This setting determines whether it is min. or max. output that is prioritised. This setting is used for the dynamic
input selection feature. “Maximum output” will result in selection of the input, which gives the greatest output.

"Minimum output" will result in selection of the input, which gives the smallest output.

2: Output type
Choose between relay or analogue output.The following parameters marked "analogue" only applies to the
use of analogue regulation as well as parameters marked "relay" only applies to relay regulation.

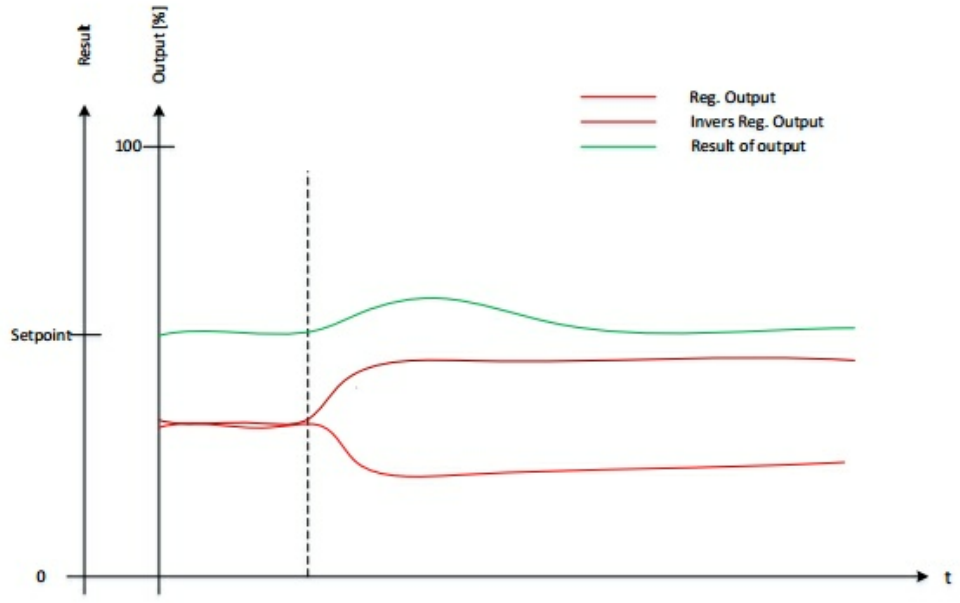
3: Analogue Kp
This is the proportional gain value. Increasing this value gives more aggressive reaction. Adjusting this value
affects also the integral and derivative output. If Kp needs adjustment without affecting Ti or Td-part, adjust
these accordingly.

4: Analogue Ti
Increasing the Ti, result in less aggressive integral action.

5: Analogue Td
Increasing the Td, gives more aggressive derivative action.

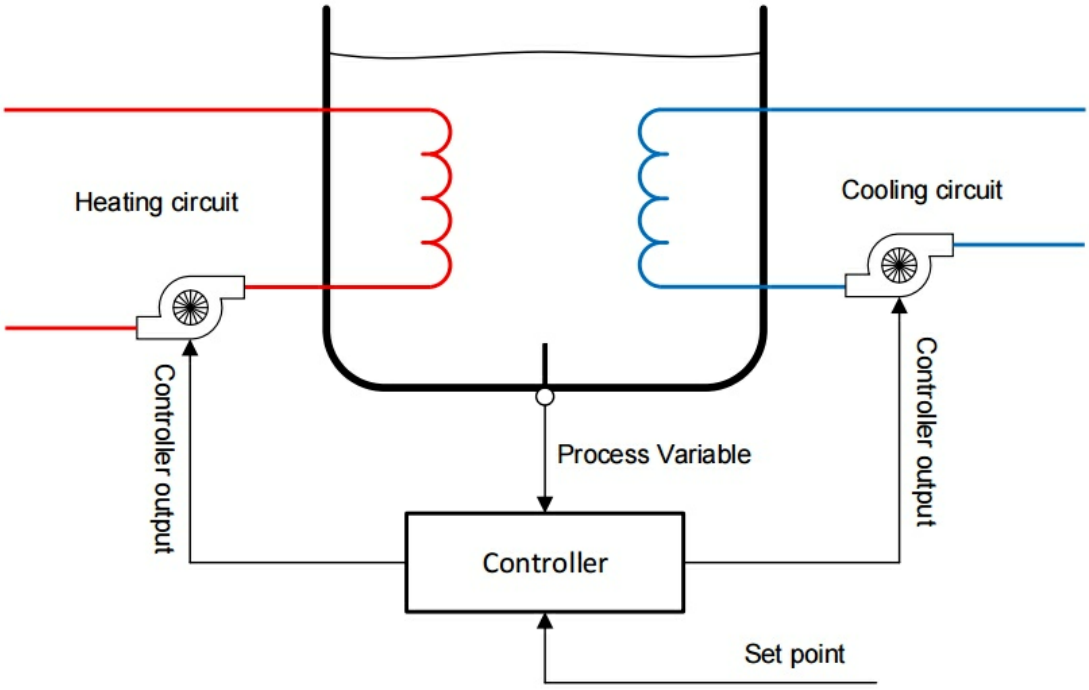
6: Analogue output
Choose the physical internal or external output.

7: Analogue output inverse
Enabling this will inverse the output function.



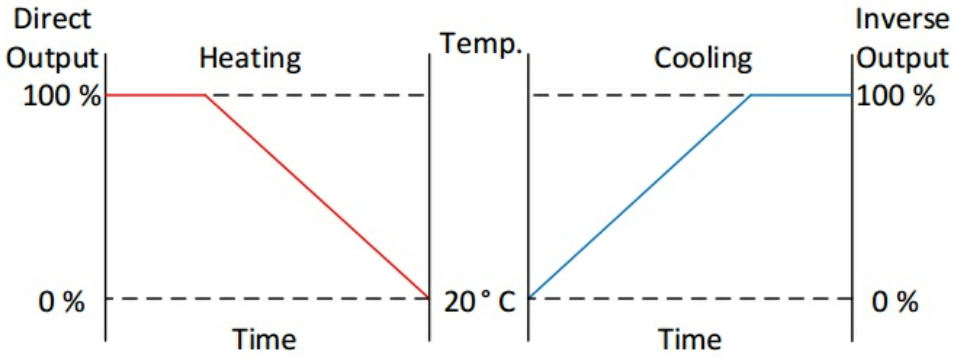
Direct error = SP - PV
Inverse error = PV - SP
Direct output is used in applications where a rise in analogue output is increasing the process variable.
Inverse output is used in applications where a rise in analogue output is decreasing the process variable.

Example:
Typically, heating applications will be using direct output and cooling applications will be using inverse output.
Imagine a container of water, which must be kept at a set point of 20°C at all times. The container can be
exposed to temperatures between 0-40°C, hence it is fitted with both a heating coil and a cooling coil. See
below illustrations of this.

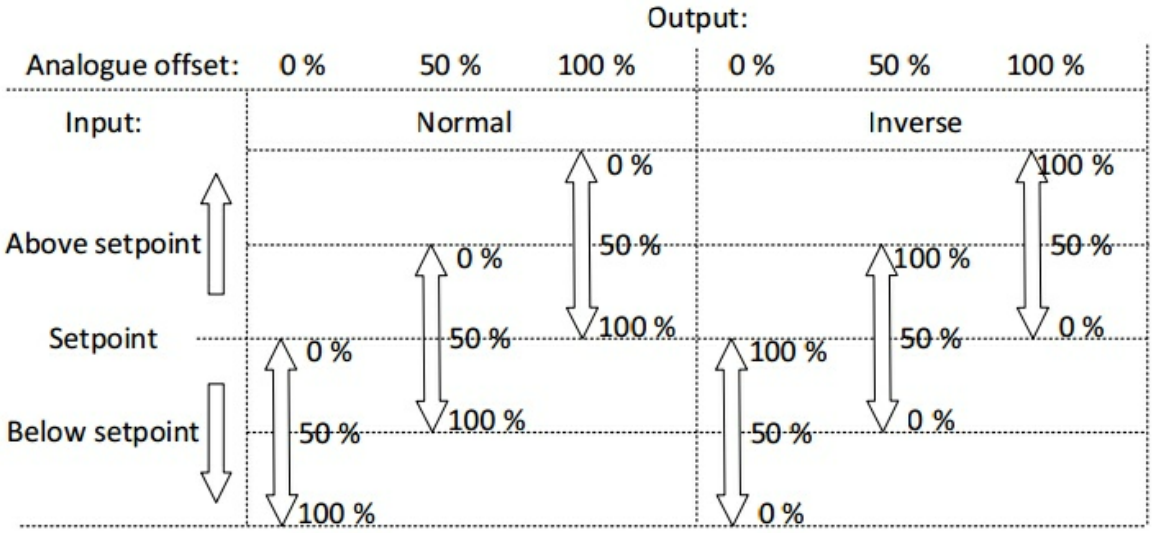


For this application, two controllers need to be configured, one with direct output for the heating pump, and
one with inverse output for the cooling pump. To achieve the illustrated inverse output, an offset of 100 % is
needed. See section about “Analogue offset” and “Example of inverse output with 0 % offset” for more information
regarding offset.

Temperatures below 20°C will then result in a positive output for the heating pump as well as temperatures
above 20°C result in positive output for the cooling pump, and temperature is maintained around set point



8: Analogue offset
Determines the output starting point. The full range of output can be seen as values in the range between 0
and 100 %. The offset displaces this range. 50 % offset centres the range of output at the set point. 0 and
100 % offset result in having the full range of output above or below set point. See the below table that illustrates
how the output will behave according to the input and with different offsets.



100 % offset is commonly used with inverse output, like in the earlier cooling example. For an example of
other use, see “Example of inverse output with 0 % offset”.

9: Analogue min outp.
Determines the minimum output. This applies as long the PID controller is active.

10: Analogue max outp.
Determines the maximum output. This applies as long the PID controller is active.

11: M-Logic min event set point

Determines the activation point of the M-Logic event “PID1 at min output”.

12: M-Logic max event set point
Determines the activation point of the M-Logic event “PID1 at max output”.

13: Relay Db
Dead band setting for relay control.

14: Relay Kp
Proportional gain value for relay control.

15: Relay Td
Derivative output for relay control.

16: Relay min on-time
Minimum output time for relay control. Set this to the minimum time which is able to activate the controlled
actuator.

17: Relay period time
Total time for a relay activation period. When regulation output is above this period time, relay output will be
constantly activated.

18: Relay increase
Choose the terminal for the relay used for positive activation.

19: Relay decrease
Choose the terminal for the relay used for negative activation

M-Logic

All functions of the GP PIDs are activated and deactivated by M-Logic. In the following, events and commands
regarding the GP PIDs are described.

Events

PID active
This event is active when the related PID is activated

PID at min output
This event is active when output is below the output parameter “M-Logic min event set point”.

PID at max output
This event is active when output is above the output parameter “M-Logic max event set point”.

PID using input 1
This event is active when dynamic input selection has selected input 1 for output calculation.

PID using input 2
This event is active when dynamic input selection has selected input 2 for output calculation.

PID using input 3
This event is active when dynamic input selection has selected input 3 for output calculation.

PID Modbus control
This event is active when remote Modbus control of this PID is requested.

Commands

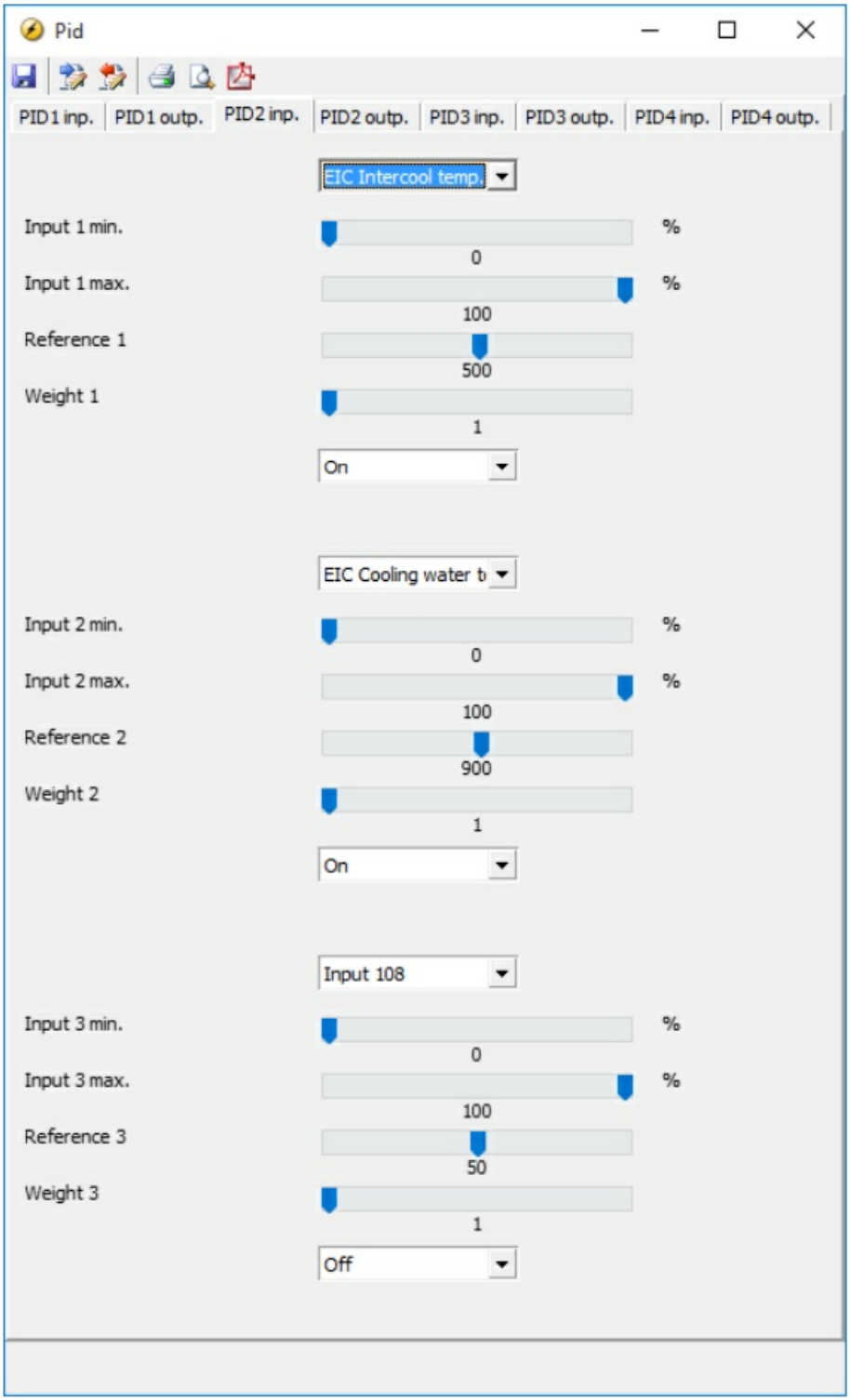
PID activate
This command activates the PID controller.

PID force min. outp.
This command forces the output to the value set in the output parameter “Analogue min outp.”

PID force max. outp.
This command forces the output to the value set in the output parameter “Analogue max outp.” (Eg. for post
cooling purposes)

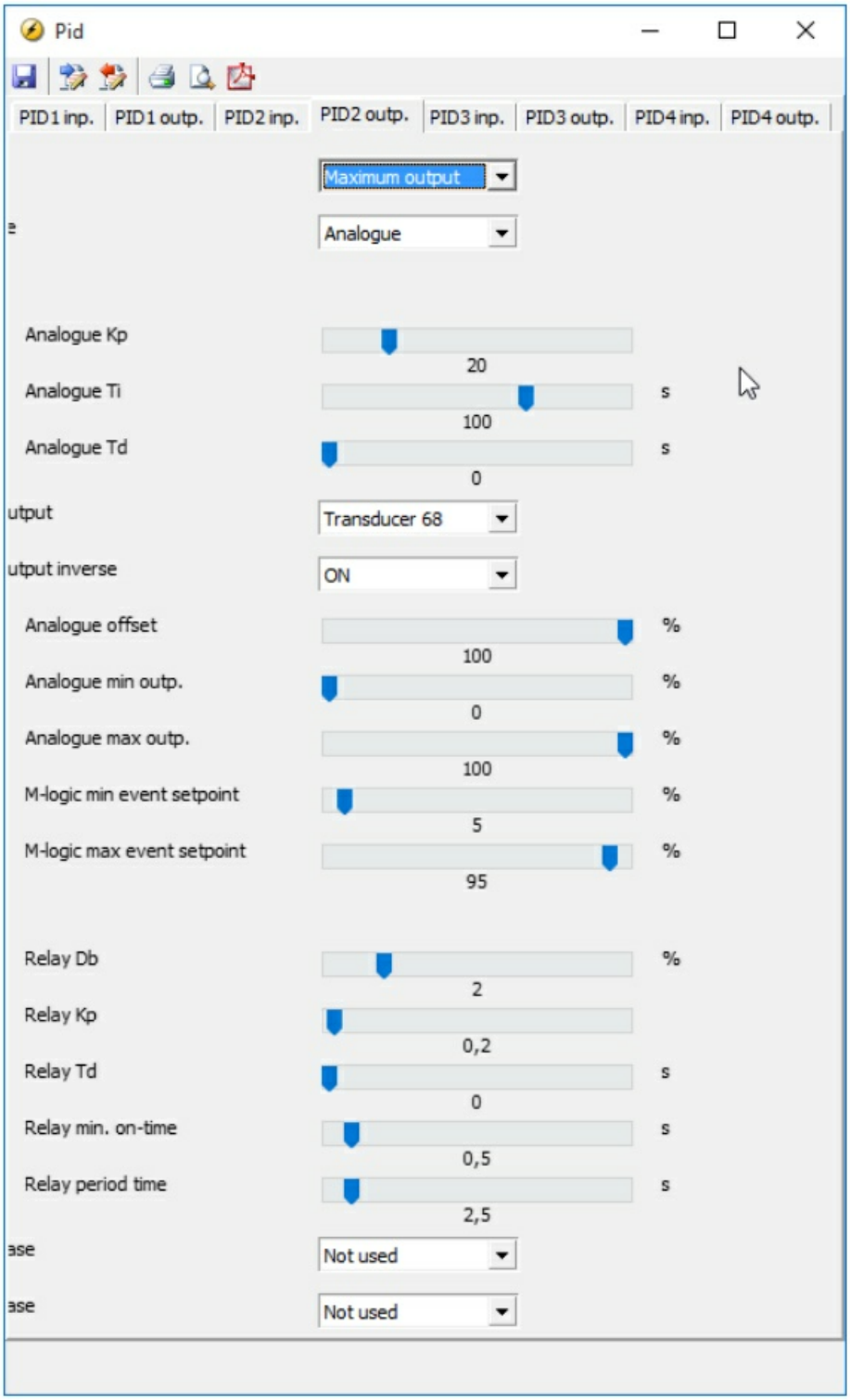
PID reset
This command forces the output to the value set in the output parameter “Analogue offset”.

Example
An example for use of a GP PID could be analogue fan control. The fan in this example is mounted on a
radiator “sandwich” construction. The fan is dragging air through two radiators, one for cooling of the intercooler
coolant and one for cooling of the jacket water. As these two systems have different temperature set points, the dynamic set point selection will be used. PID2 is used in this example, and the picture shows an
example of input settings.



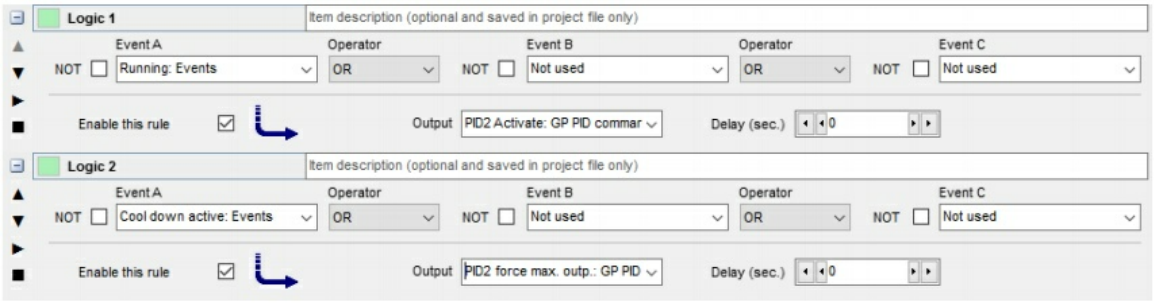
In this example, the ECM (Engine Control Module) measures both the intercooler coolant temperature as well
as the jacket cooling water temperature. The generator controller receives these values by an EIC option (Engine
Interface Comunication).

EIC intercooler temp. is selected as input 1 and EIC Cooling water temp. as input 2. Min. and max. values are
configured for full range. Input 1 reference set point is set at 500 to achieve a temperature set point of 50.0°C
for intercooler coolant. Input 2 has a reference set point set to 900 to achieve a set point of 90.0°C jacket
water coolant. To achieve equal weighting of the inputs when calculating output, both weight factors are set to
a value of 1. Both desired inputs are activated, leaving input 3 to be deactivated.

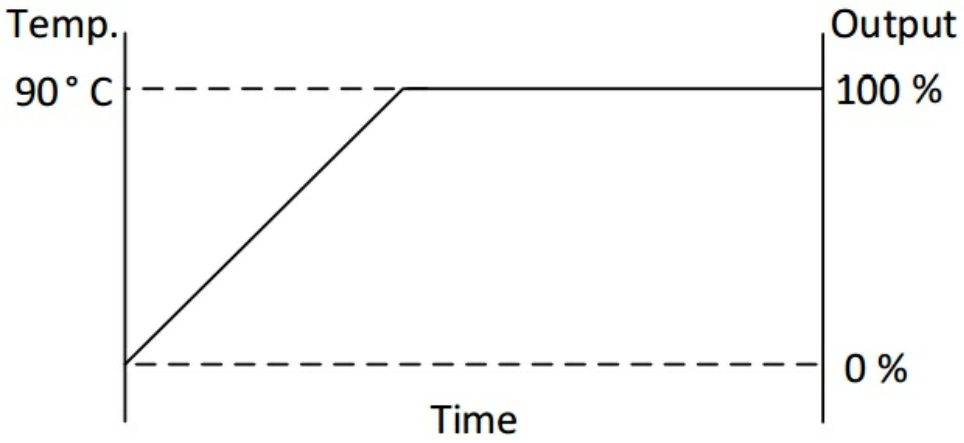


In this application, it is desired to ensure that none of the temperatures permanently exceed their set points.
This is achieved by selecting maximum output as priority for the dynamic input selection.
In this example, "Analogue" is selected as output type, and the physical output is selected to be "transducer

68". Inverse output is activated to obtain a rise in analogue output to the fan when temperature is rising. An offset of 100 % is chosen to achieve 0 % output at the set point.
Full range of output is selected. As this is output for a fan, it may be preferred to use a minimum output. Standard settings are used for M-Logic min/max events.
No relay settings are configured, as this is an analogue function.
Below is an example of M-Logic lines for this application. Logic 1 makes sure that the regulation is active and
output is calculated as long as the engine is running. Logic 2 forces the fan to maximum speed during cooldown
to ensure efficient cooldown.



The fan will then function as in the below description.
When the engine is started and running, the regulation is activated and an output is calculated. When either
intercooler or jacket water coolant is exceeding their set point, the output starts increasing from 0 %. The input,
which is resulting in calculation of greatest output, is prioritised at all times, making sure that both systems
are supplied with adequate cooling. During stop sequence, the fan is forced to max output, ensuring most possible cooling. The output will remain 0 % until the engine is started again.
This is an example, which use inverse output combined with 0 % offset. The application is an engine with
electric thermostat control. During engine start-up, it is preferred to start the output before set point is reached
to help avoid overshooting the set point too much. This is obtained by using inverse output with no offset.
The below diagram illustrates this function if the controller is configured as straight proportional without integral or
derivative action. With these settings the output will be 100 % when set point is reached, and the beginning of
the output is determined by the proportional gain.



3.17 AOP

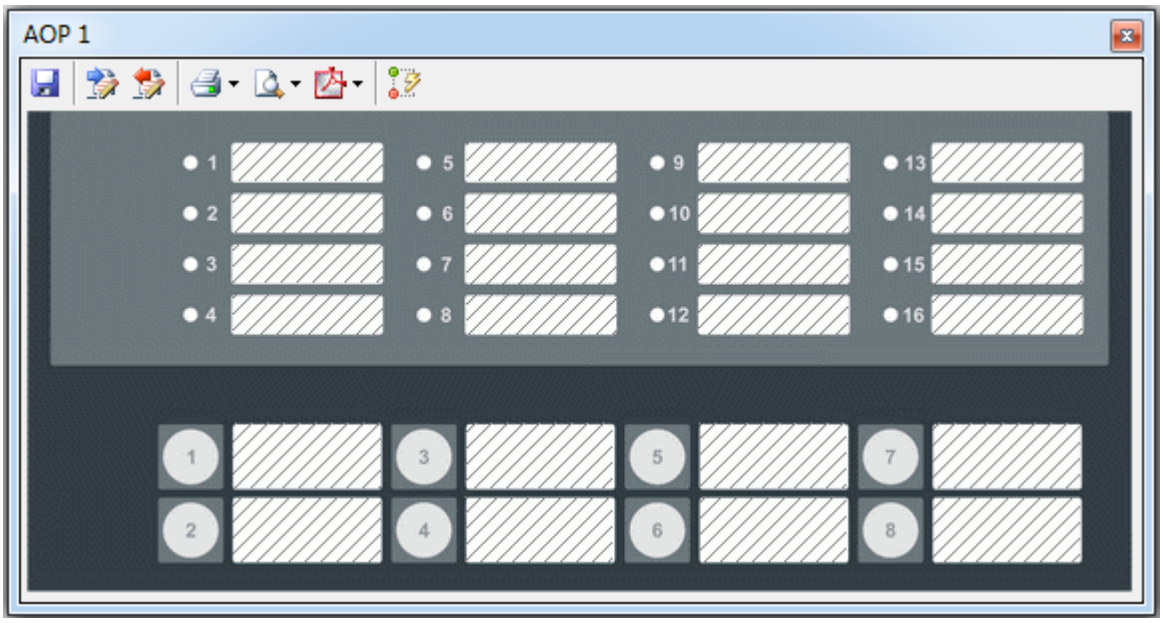
The configuration of the Additional Operator Panels (AOP) 1 and 2 can be opened by pressing either of the AOP buttons in the top menu bar. A typical example of the use of an AOP is to indicate alarm presence, status of generator (ready/not ready) or mode selection:

AOP-1 configuration:

AOP-2 configuration:

The configuration for AOP-1 and AOP-2 are the same except in the latter case an ID must be specified. This is the ID of the AOP-2 of which up to 5 might be connected to the device.

When clicking the AOP-1 button, a popup like below is shown:



A group of LEDs and a group of buttons are shown in the popup. Both the LEDs and the buttons have a label

LED with belonging label

Button with belonging label

The buttons shown at the top of the AOP popup are


Read AOP settings from device


Write AOP setting to device. Note that the texts of the LEDs and buttons are not written to the device. Those texts can only be stored in a USW file.


Print either the AOP settings or print the labels


Provide a preview of either the AOP settings or labels


Save AOP settings or labels to a pdf file.


Dynamic evaluation of the active Logic lines

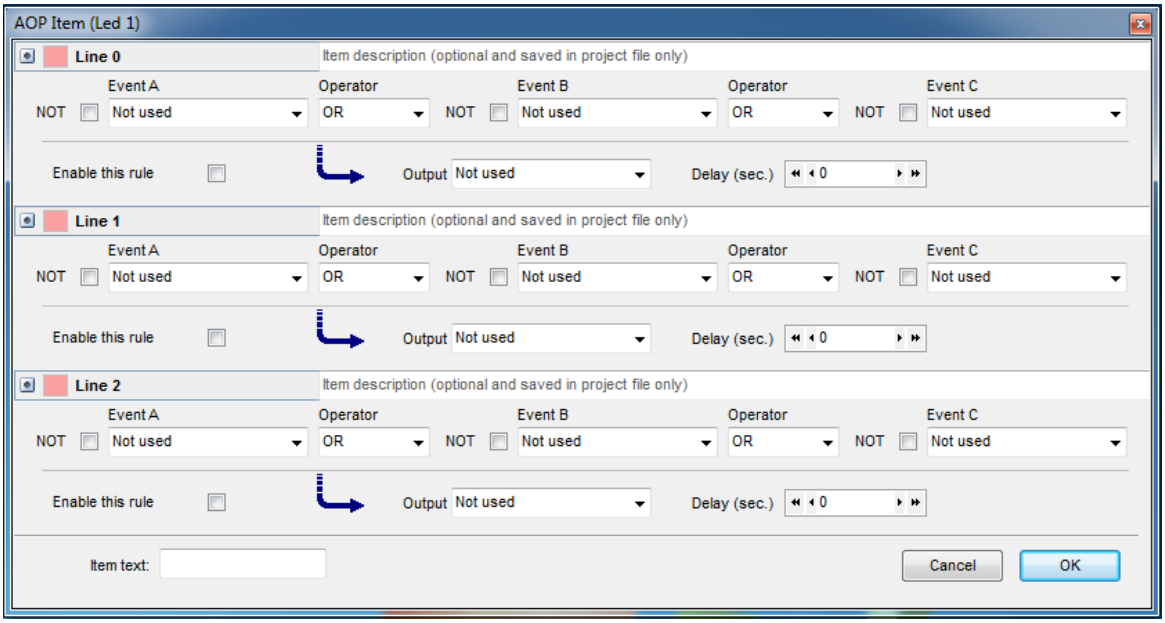
Steps
The process of configuring AOPs can consist of up to three steps:

1. Read AOP settings from the device
2. Edit the AOP settings (explained below)
3. Write the AOP settings to the device (explained below)

If a number of AOP-2s are connected to the device, the configuration of each AOP (selected by means of the ID) must be performed independently of the other AOP-2s.

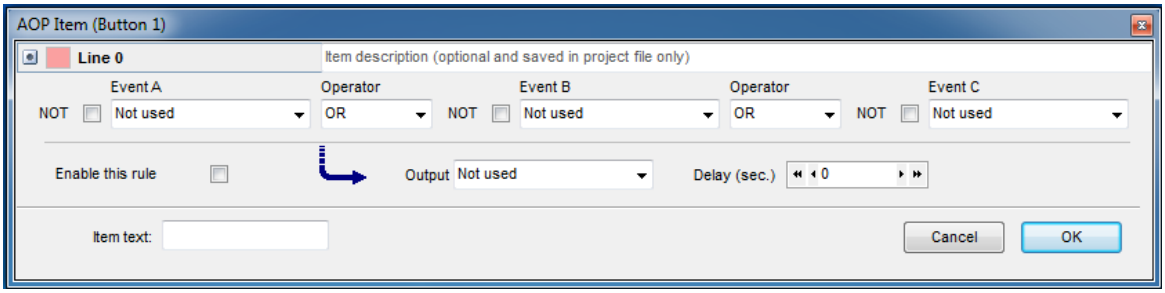
Edit the AOP settings

The popup can be used to configure LEDs (upper part of the popup) and buttons (lower part). To configure a LED, click the field of label next to the LED. Then a popup like below is shown:

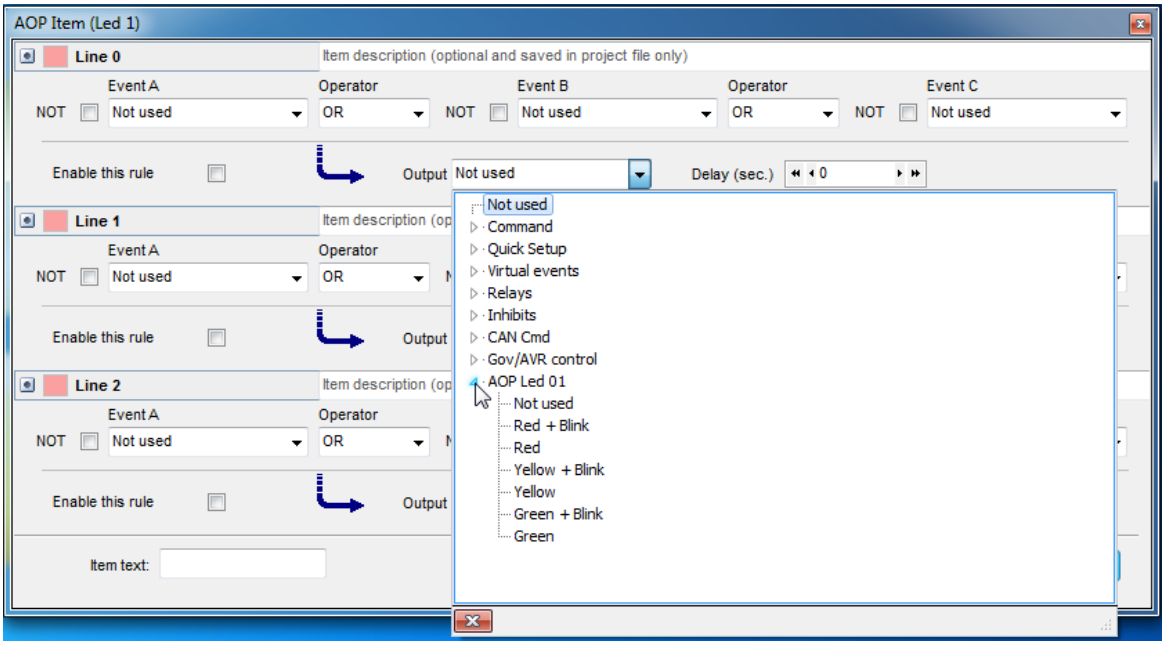


The fields shown in this popup are explained in the M-Logic section. Note the "Item text" field (at the bottom of the popup) is the text label of the LED.

If one of the buttons are clicked, a similar popup is shown:



The colouring of the LEDs can be configured as part of the output - see screen below:



Remember to set the option Enable if a line should be active.

Write the AOP settings

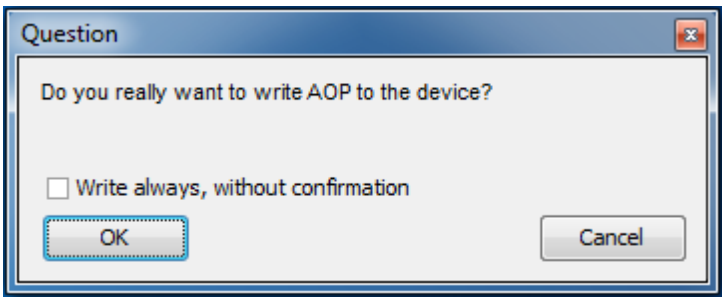
AOP-1

To write the AOP configuration, press .

AOP2

To write the AOP configuration, select the desired AOP-2 ID (1 to 5) and press .

Before writing the AOP settings, the user must accept that the AOP setting in the device is overwritten:

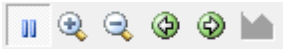


Note that the description entered for each of the items as well as the label texts are not written to the device. These can only be stored in a USW file.

3.18 Trending

On the Trending page, the change of selected data values can be followed as time elapses.

In the top menu bar, there is a number of buttons relevant for trending



These buttons are described as follows:

 Pause the update of the trending window. The Trending continues in the background

 Zoom in

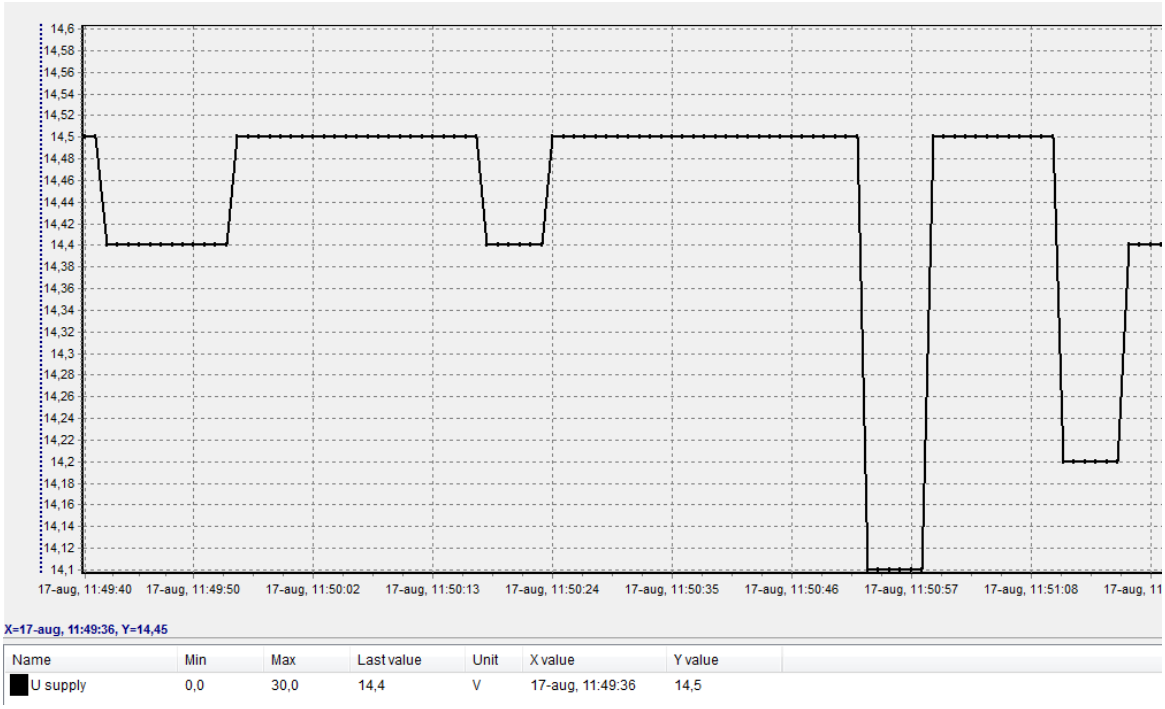
 Zoom out

 Scroll left

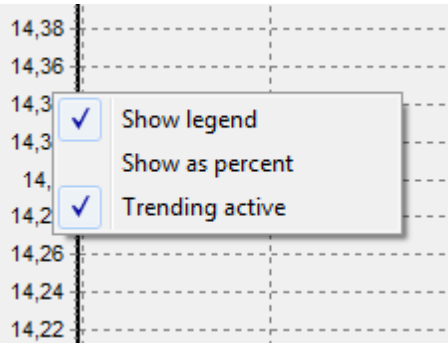
 Scroll right

 Edit the trending tags. Used to set up which values to trend upon (described below).

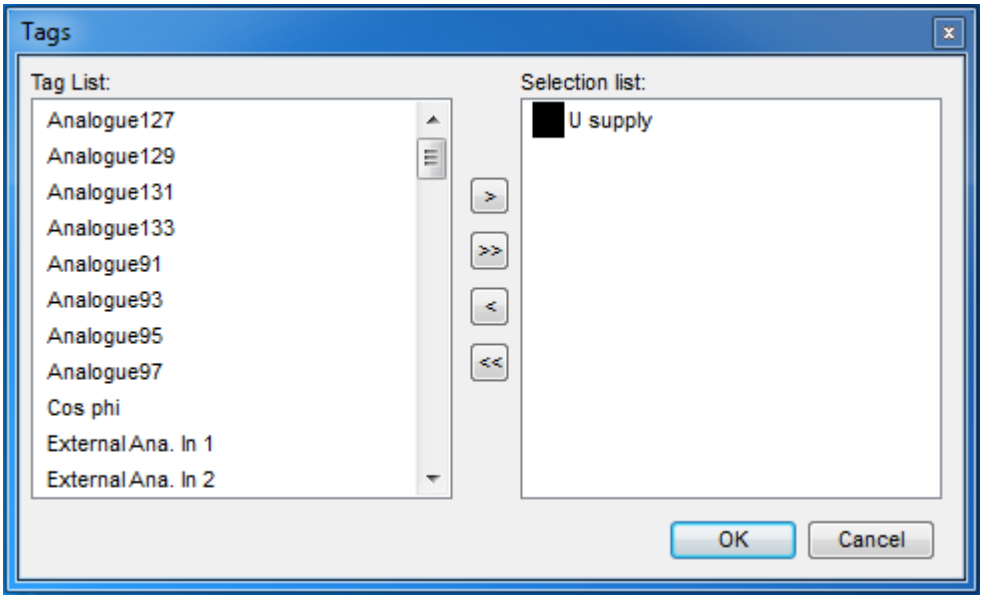
In the Trending page, the progress of the values can be followed and at the bottom of the page, the numerical values are listed.



Note that when right-clicking the vertical y-axis the user can change some settings for the trending



The setup of which data to trend is done in a popup shown when pressing the "Edit the trending tags" button.



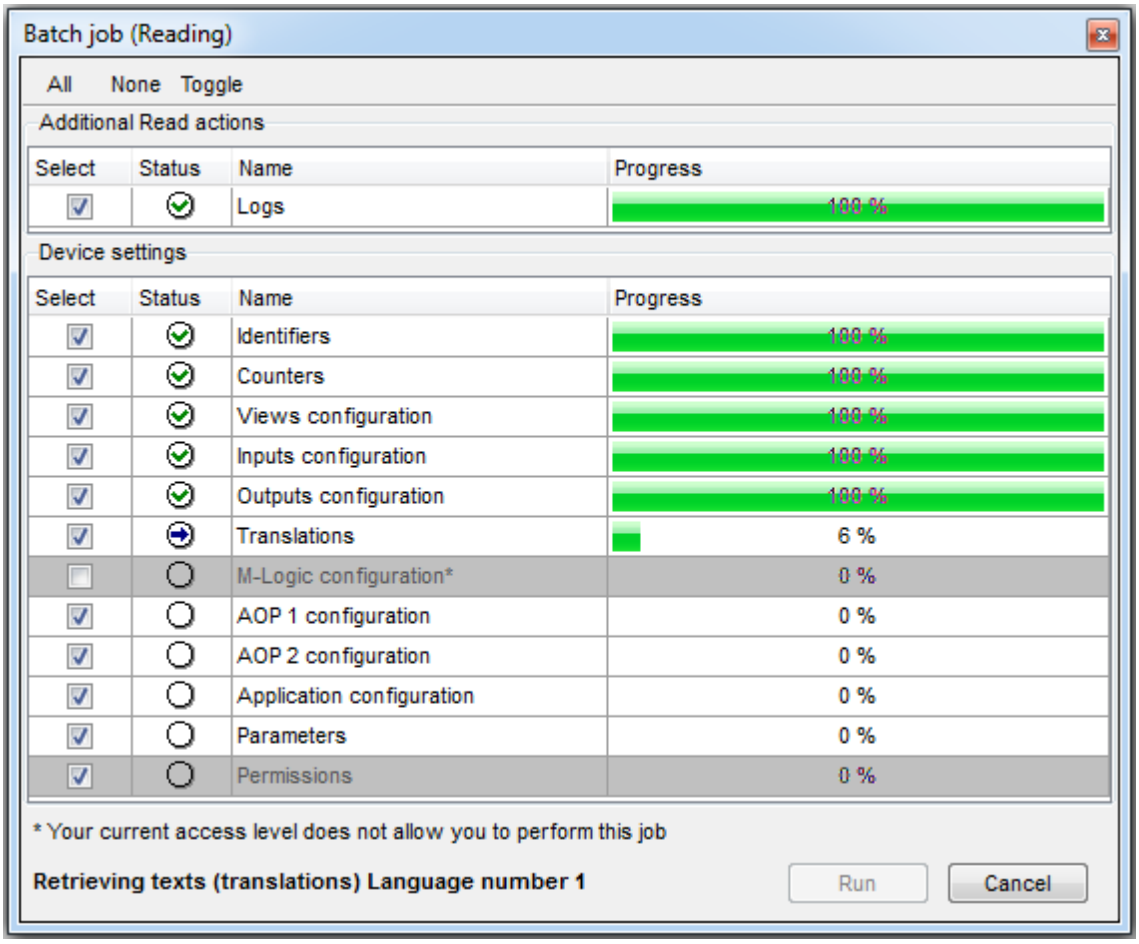
The trending data can be saved to a .trend file by pressing the button in the top menu bar.

3.19 Batch Read/Write

The Batch read/write can be performed by selecting either Read or Write in the dropdown shown when pressing the top menu button. The batch read/write function is used to perform a series of read/write steps.

Batch read

In the Select column, the user can choose what to read from the connected device. When pressing Run, the user is asked where to store the files containing the data read from the device.



The Additional Read Actions section:

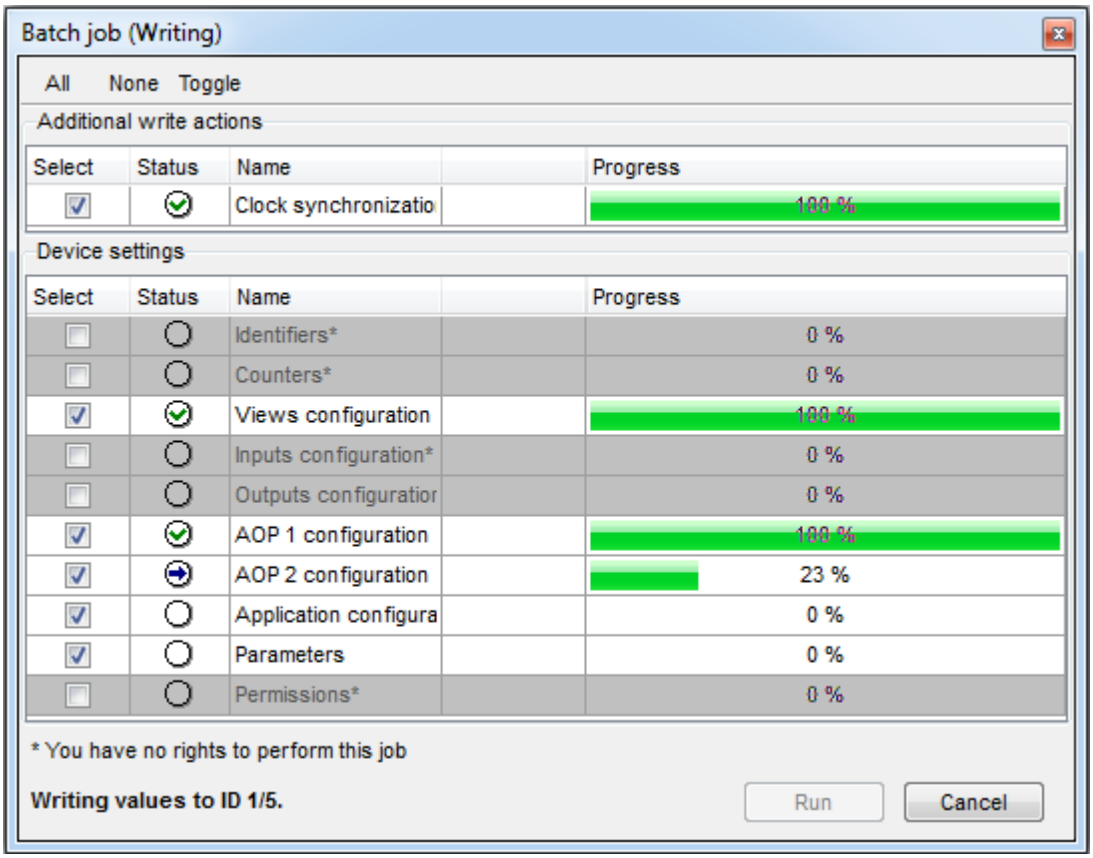
It contains the possibility to read Logs from the device. The log information is stored in .xls files. These names of these log files will, as a prefix, have the name the user provided when asked where to store the files. The log files are stored in the same location as the .usw file. The names of the log files follow the format: <prefix>_<device-type>_<date>_<log-type>.xls

The Device Settings section:

This section shows the different data items that will be stored in a .usw file. In the example above, the current access level does not allow the reading of M-Logic. Who can read and write which items is set in the Permissions popup. The permissions item is always mandatory when performing a Batch Read so the user cannot de-select this item.

Batch write

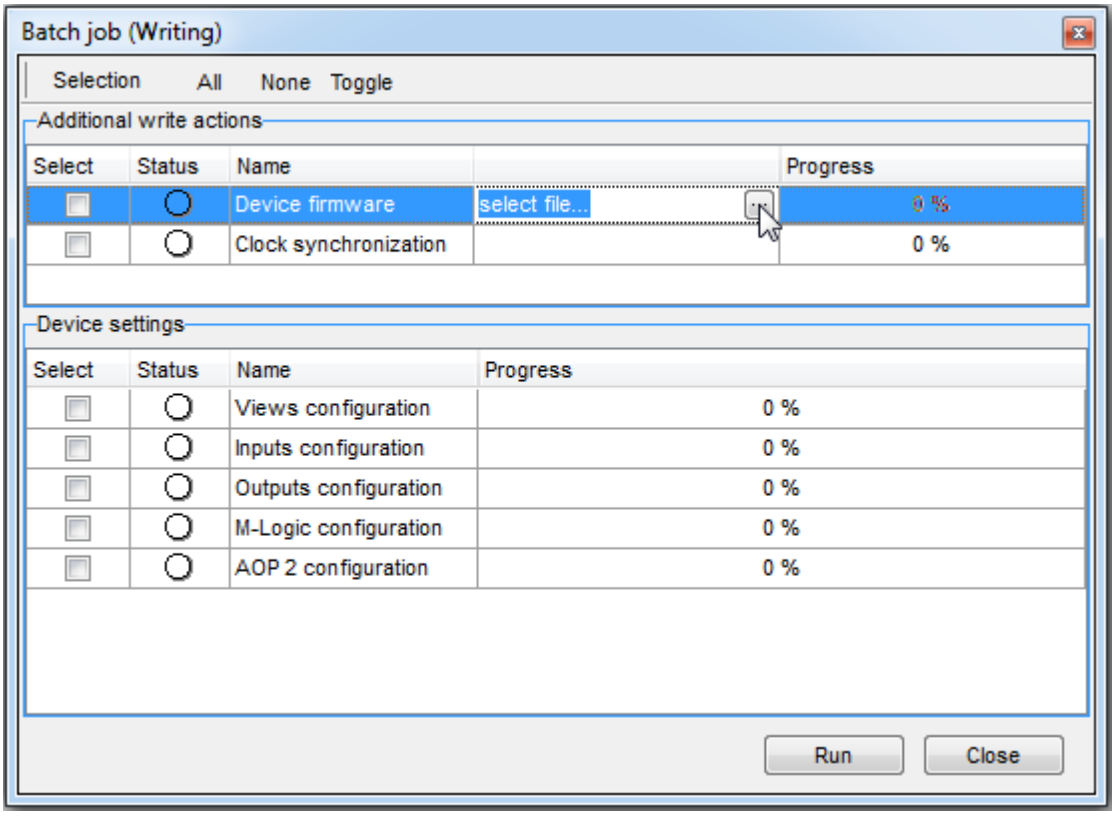
Example of a batch write window:



Special notes regarding an USB connection

At the top of the batch write popup, the user can select to write a firmware prior to writing the device settings. The firmware file has to be entered by the user by clicking the "Select file.." text in the line with the name device firmware. The device settings are stored in the open usw file.

Choose the firmware file by pressing first the "Select file..." text and then the "..." button to open a file explorer.



The QC 4002 Mk.II v. 4 controllers with firmware version >= 4.40 also supports the firmware upgrading (as part of the Batch Write process) over tcp-ip

3.20 Backup/Restore

The backup/restore can be chosen in the dropdown menu below the  , located in the top menu bar.

Backup

The backup of a device can be done by selecting this item. The backup process will generate a ".bak" file. This file can only be opened and displayed at the highest access level. The backup process itself can be done by any access level.

Restore

Using the restore functionality, a ".bak" file can be restored in the device. This is the same as

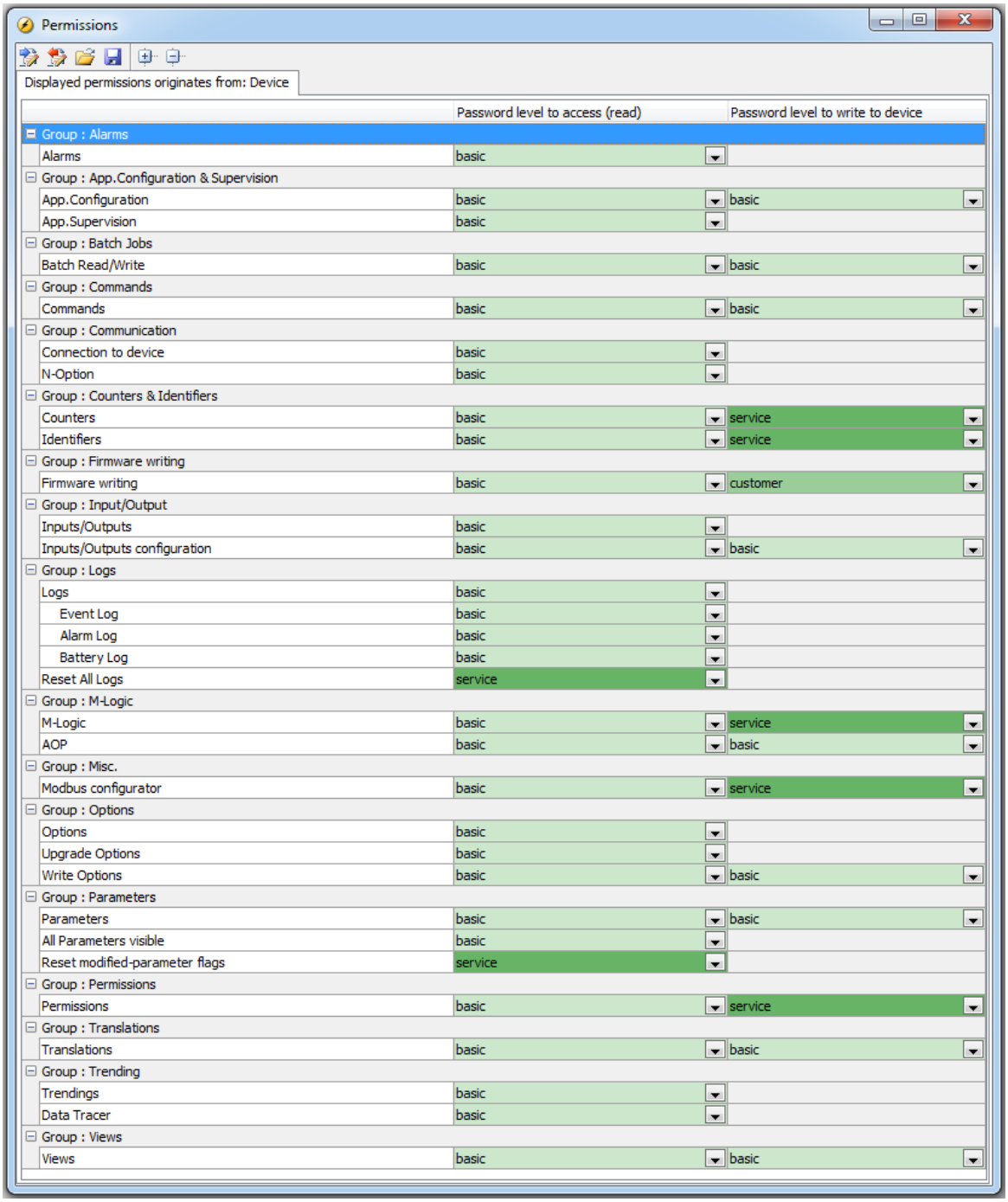
cloning the device. It means that every value for Parameters, Counters, Identifiers etc. are restored in the device. The restore process itself can be done by any access level.

3.21 Permissions

In the permission window, the user can get an overview of the current permissions. The permissions are controlling which access levels can do what. Some device types do not support passwords at all. Instead, a USB dongle corresponding to the various levels are used. The following is only relevant for devices that require an explicit password.

Many of the functions in the Utility software can be reserved to only certain access levels. The access levels vary from device to device; for example, a typical DG device has three levels that do require a password: customer, service and master. Beside these levels there is the default access level named "basic"; this is the level in which the PC Utility Software will open unless the user changes level and provide the corresponding password. The access levels form a hierarchy so that features available at one level will automatically be available at higher levels. Starting with the lowest level, the hierarchy is basic, customer, service and master for DG device.

The features that are assigned a minimum access level is seen from the screenshot below. The column “Read” is used to configure the minimum level required to see a button related to the feature and to read corresponding data from a connected device. The write column is used to set the minimum level required to write the data in question to a connected device. For example, the read permission setting for M-Logic is used to control which access levels can see a M-Logic button, open the M-Logic page and read M-Logic from a device. The write permission for M-Logic is used to set the minimum access level to write M-Logic to a device.



The fields in the Permissions popup are explained in the following table (note that the fields depend on the type of device; in this example the permissions settings are from DG controller). All the access levels mentioned below are minimum access levels; higher access levels will also have access to a given feature.

Group	Field	View (Read) column	Save (write) column
Alarms	Alarms	Access level to see the alarm button in the left hand panel	N/A
App. Configuration & Supervision	App. Configuration	Access level to see the Application Configuration button in the left hand panel.	Access level to write application configuration to the controller
App. Configuration & Supervision	App. Supervision	Access level to see the Application Supervision button in the left hand panel. Note this button is only shown if it is relevant for the controller type. Furthermore, this button is only shown when online with the controller.	N/A
Batch jobs	Batch Read/Write	Access level to see the batch read popup	Access level to perform batch write
Commands	Commands	Access level to see the Commands button in the top menu bar.	Access level to issue a command to the controller.
Communication	Connection to device	Access level to connect to the device	N/A
Communication	N-Option	Access level to open the N-option popup where the IP address and other things can be set	N/A
Counters & Identifiers	Counters	Access level to see the Counters button in the top menu bar and open the Counters popup.	Access level to write the counter fields to the device
Counters & Identifiers	Identifiers	Access level to see the Identifiers button in the top menu bar and open the Identifiers popup.	Access level to write the identifiers fields to the device
Firmware writing	Firmware writing	Access level to see the Firmware writing button in the top menu bar	N/A (the N-option application handles the write access itself)
Input/Output	Inputs/Outputs	Access level to see the Inputs/ Outputs button in the left hand panel.	N/A
Input/Output	Inputs/Outputs configuration	Access level to see the Inputs/ Outputs configuration button in the top menu bar and to open the popup	Access level to write the inputs/outputs configuration to device
Logs	Log	Access level to see the Logs button in the left hand panel	N/A
Logs	Event Log	Access level to retrieve the Event log data in the Logs page	N/A
Logs	Alarm Log	Access level to retrieve the Alarm log data in the Logs page	N/A
Logs	Battery Log	Access level to retrieve the Battery log data in the Logs page	N/A
Logs	Reset all logs	Access level to reset all logs	
Misc.	Modbus Configurator	Access level to see the Modbus Configurator popup where the current configurable memory mapping is shown	Access level to write the configurable memory mapping configured in the Modbus Configurator to a

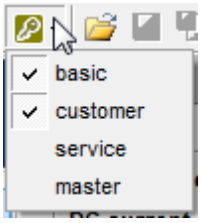
Group	Field	View (Read) column	Save (write) column
			controller.
M-Logic	M-Logic	Access level to see the M-Logic button in the left hand panel and to open the M-Logic page.	Access level to write M-Logic data to device from within the M-Logic page
M-Logic	AOP	Access level to see the AOP buttons in the top menu bar and to open the AOP popups	Access level to write AOP data to device from within the AOP popups
Options	Options	Access level to see the Options button in the left hand panel and to open the Options page	N/A
Options	Upgrade Options	Access level to see the Upgrade Options button in the top menu bar and to open the Upgrade Options popup.	N/A
Options	Write Options	Access level to see the Write Options button in the top menu bar and to open the corresponding popup.	Access level to write an Option string to a device.
Parameters	Parameters	Access level to see the Parameters button in the left hand panel and to open the corresponding page.	Access level to write all Parameters to a device by means of pressing the Write button in the top of the Parameters page. Note that this does not control the writing of parameters opened separately from within the Parameters page. This is controlled by the password level for each parameter.
Parameters	All parameters visible	Access level to see all parameters in the Parameters page. Those users at lower access levels can only see the parameters that their access level allows.	N/A
Parameters	Reset modified-parameter flags	Access level to reset the modified-parameter flags, which are shown as pencils in the parameter table.	
Permissions	Permissions	Access level to see the Permissions button in the top menu bar and to open the corresponding popup.	Access level to write permissions to a device.
Translations	Translations	Access level to see the Translations button in the left hand panel and to open the corresponding page	Access level to write Translations to a device
Trending	Trending	Access level to see the Trending button in the left hand panel and to see the corresponding page	N/A

Group	Field	View (Read) column	Save (write) column
Trending	Data Tracer	Access level to see the Trending button in the top menu bar and to see the corresponding popup	N/A
Views	Views	Access level to see the Trending button in the top menu bar and to see the corresponding popup	Access level to write Views to a device

The permissions do have default values. These settings can be overridden. This is done by writing permissions to a device. When the Utility software later is connected to a device containing permissions, the user interface (i.e. which buttons are shown) adhere to the permissions stored in the device.

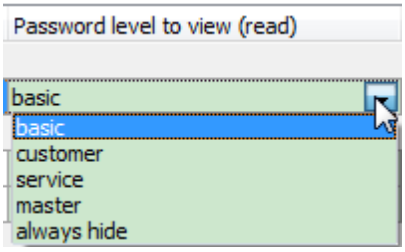
The permissions are also saved as part of an USW file.

The current access level is changed by going to the "Key" icon in the top menubar and providing the right password when prompted. In the example below, the user is already logged in as Customer:



Note: there is a set of permissions for the Permission popup itself. The write column is used to set the minimum level to write the permissions. This setting is controlling whether the Write button at the top of the Permissions popup is active or not.

The Permissions can be changed by selecting a value in the dropdowns (see below). This dropdown contains only those values corresponding to the current access level or lower. After changing the access levels, the permissions must be written to the device. The writing of permissions is controlled by the Permission setting in the Permission popup.



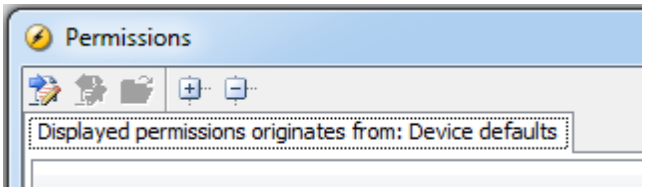
The "always hide" setting is not an access level in the sense that there is a corresponding password. The always hide is used to hide a given feature even for the user at the highest level (Master in this example). The highest level can always change a given value from "always hide" to a

lower level. In case of permissions for Permissions, the always hide cannot be chosen.

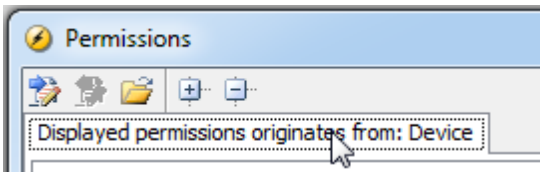
Permission overriding

In the top of the Permissions window it can be seen whether the permissions are either default, from device or from file. The basic rule is that if a connected device contains permissions, these will overrule any other permissions. If there are no permissions stored in the device (this can be seen directly in the Permissions popup as illustrated below), the current permissions depend on whether a usw file (with permissions) is open or not. If there is no usw file open, the default permissions apply. In contrast, if a usw file is open the permissions from it will rule.

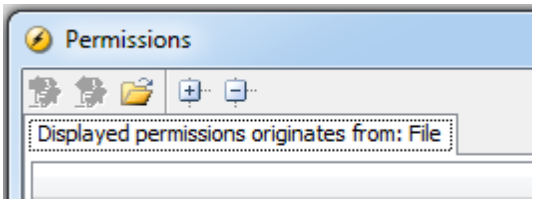
Default permissions:



From device:



From file:



Forgotten passwords

If a user forgets his password, he can ask any user at higher level to retrieve it from the Parameters in a .usw file. In this way, for example, the master level user can see the service level password by going to menu 9117 in the parameters.

9116	Customer passw.
9117	Service passw.
9118	Master Password

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3.22 Firmware upgrade

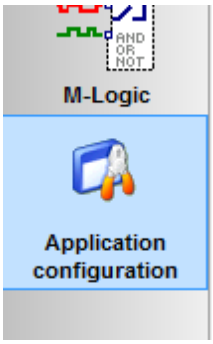
Upgrading of the firmware is possible for all controllers. All controllers can be upgraded over the service port (USB) and some controllers support firmware upgrading over tcp-ip as well.
This applies for the QC 4002 Mk.II v. 4 controllers with a) firmware >= 4.40. N-option firmware needs to be of version 2.20 or higher and 2) the boot code version must be 1.03 or higher. The firmware upgrading process will delete all settings in the controller, so these must be saved via a Batch Read beforehand.

The firmware upgrading can also be done as part of the Batch Write process

3.23 Application Configuration

In the Application Configuration, a setup consisting of several gensets can be configured. The Application Configuration are only supported in the most advanced devices. In Application Configuration, the plant consisting of several gensets can be configured in terms of where the gensets are located logically relative to e.g. a shared busbar, where breakers a logically placed, how the setup is connected to the grid (Mains), etc.

The Application Configuration page is opened by clicking the following icon on the left hand side of the PC utility software



Once inside the Application Configuration page, additional buttons are shown in the top menu bar:

These buttons can shortly be described as follows:

 New Plant Configuration used to build a new application from scratch.

 Used to read the applications stored in the device. There might be up to four of these

 Write the applications to the device.

 Activate an application in the device.

 Broadcast an application between devices.

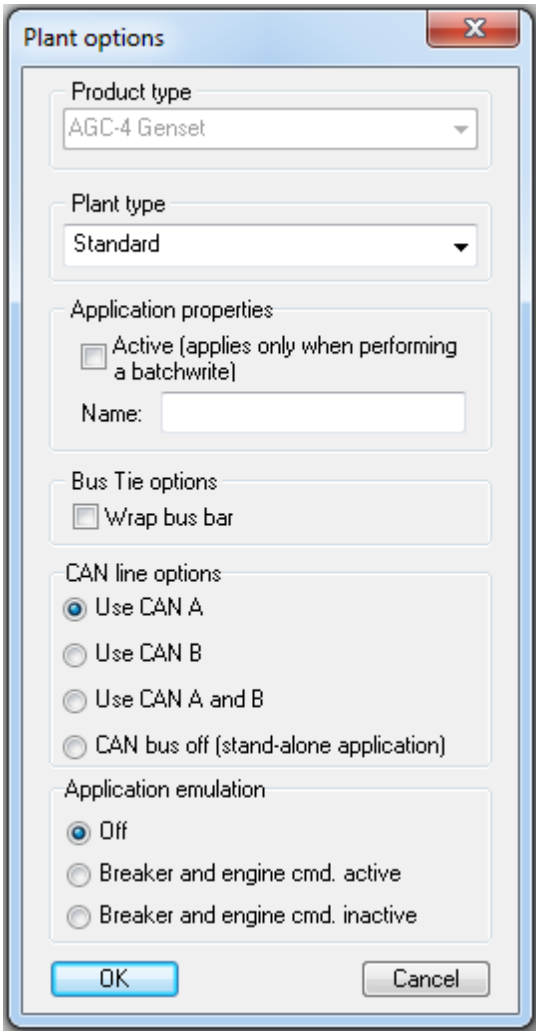
 Edit the Plant Configuration of an already retrieved Application.

Procedure to create or modify the applications

1. Define a new Plant Configuration (described below), or read existing applications either from a device or from a USW file. The Read button is used for reading from device and the Open file is used to load an application stored in a file.
2. Edit the Plant Configuration and edit the applications (described below).
3. Write the applications to the devices (described below).

Define a new plant configuration

By clicking the New Plant Configuration button, the following popup is opened:



The fields in this popup are described below:

Field	Description
Product type	In offline mode, the product type can be selected here. When connected to a product (or when offline but the PC utility software was earlier during the same session connected to a device), this field is filled in automatically. The specification of the product type is important as it rules e.g. the possible plant types.
Plant type	A full list of all possible plant types are given in a table below. Note that the possible plant types differ from device to device
Active	This checkbox shows e.g. the active status of an application stored in a usw file. It can be used to decide which application should be active during a Batch write operation. Note that in itself this checkbox does not activate an application in the

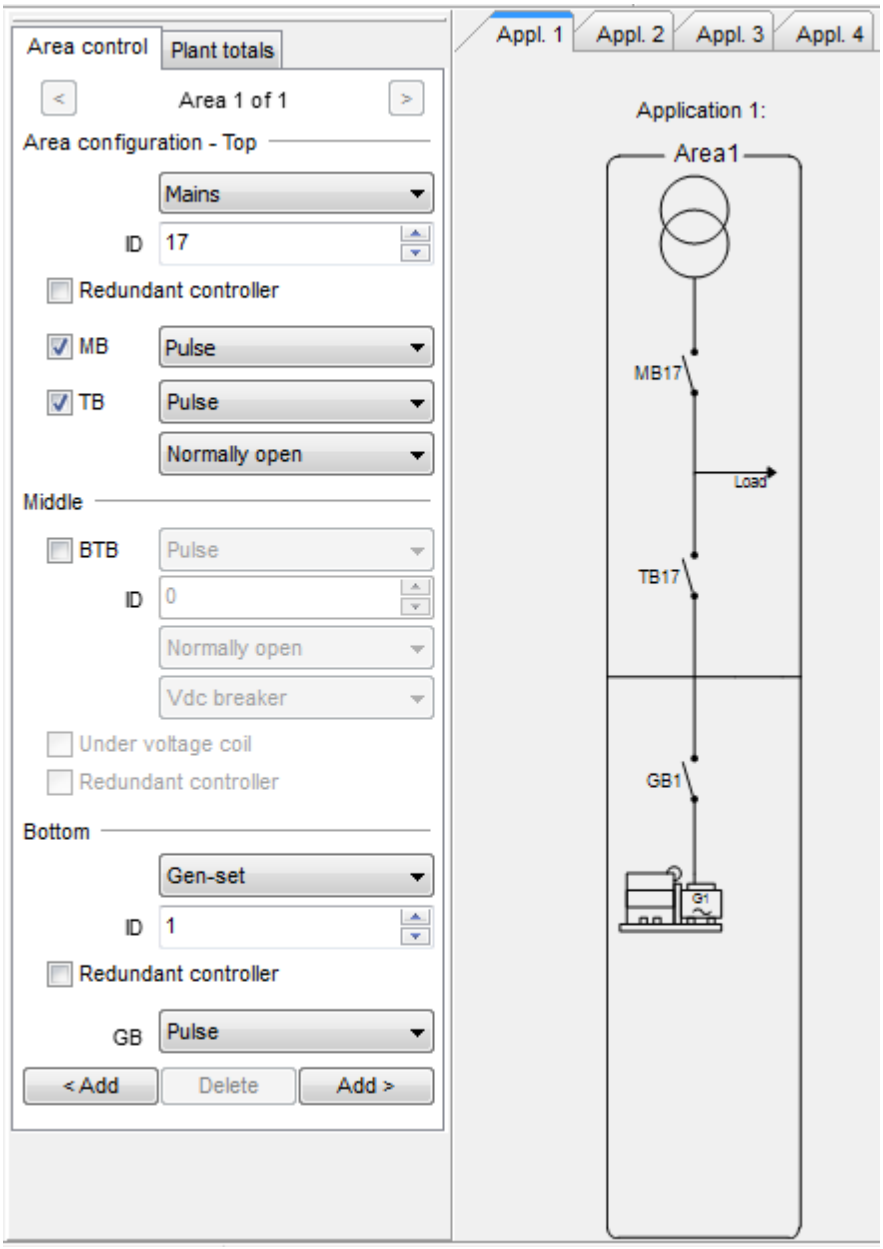
	connected controller
Name	The name of the plant. The name is displayed above the application outline.
Bus tie options	Ring bus connection can be specified here
CAN line options	Used to specify which CAN connection is used for the sharing of the applications between devices.
Application emulation	Used to decide whether Emulation is relevant for the Application or not. If set to "Breaker and engine cmd. active" the device will send out commands to external switchgear. This is not the case if set to "Breaker and engine cmd. inactive".

Possible plant types

Field	Description
Single DG	Single diesel generator
Dual Mains	Setup where two mains connections are sharing one breaker and one connection to the busbar.
Standard	In this setup any application can be made.
Genset Group Plant	Used in Plant setups consisting of more that 16 gensets. The genset Group Plant is the upper level in a two level hierarchy where the upper level consist of device each controlling a genset group.
Genset Group	A genset group is a group of up to 16 gensets.

Edit the application

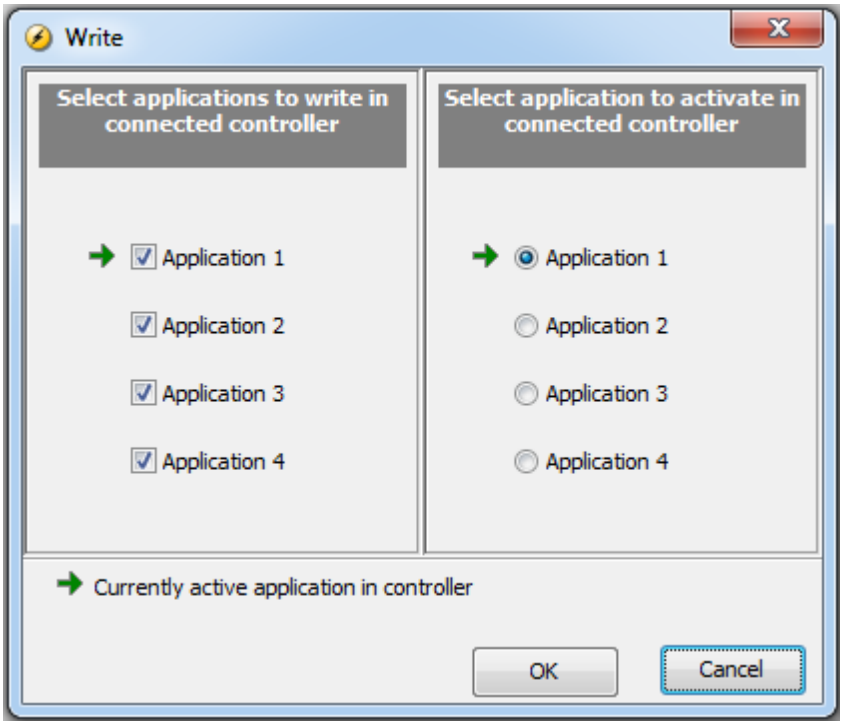
Once the plant options are defined either by the use of the "New Plant Configuration" or "Plant Configuration Options", a screen like below will be shown.



To the right, the plant outline shown and in the Plant options toolbox to the left, the outline can be modified. By clicking Add, another so-called area is added to the plant outline. An area consists of an upper, middle (only in some cases depending on the plant type) and lower part.

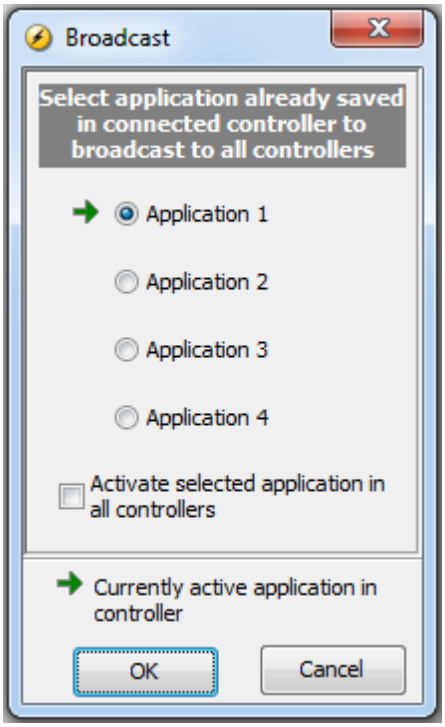
Write the application to the devices

Clicking the Write button in the top menu bar, the user has to decide which applications should be written to the controller and which application should be active in the connected controller.

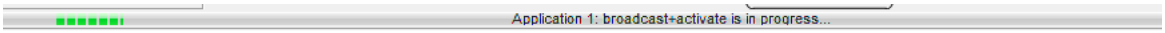


The active application is the application the controller is currently using.

An application can be shared between the controllers over the CANbus connection. This is called broadcasting an application. Broadcasting can be performed by pressing the Broadcast button in the top menu bar. In this case the following popup is shown:



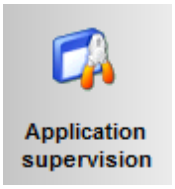
The progress of the broadcast can be seen from the bottom of the screen. While broadcasting (or receiving) of an application, the "running progress bar" (see below) is shown



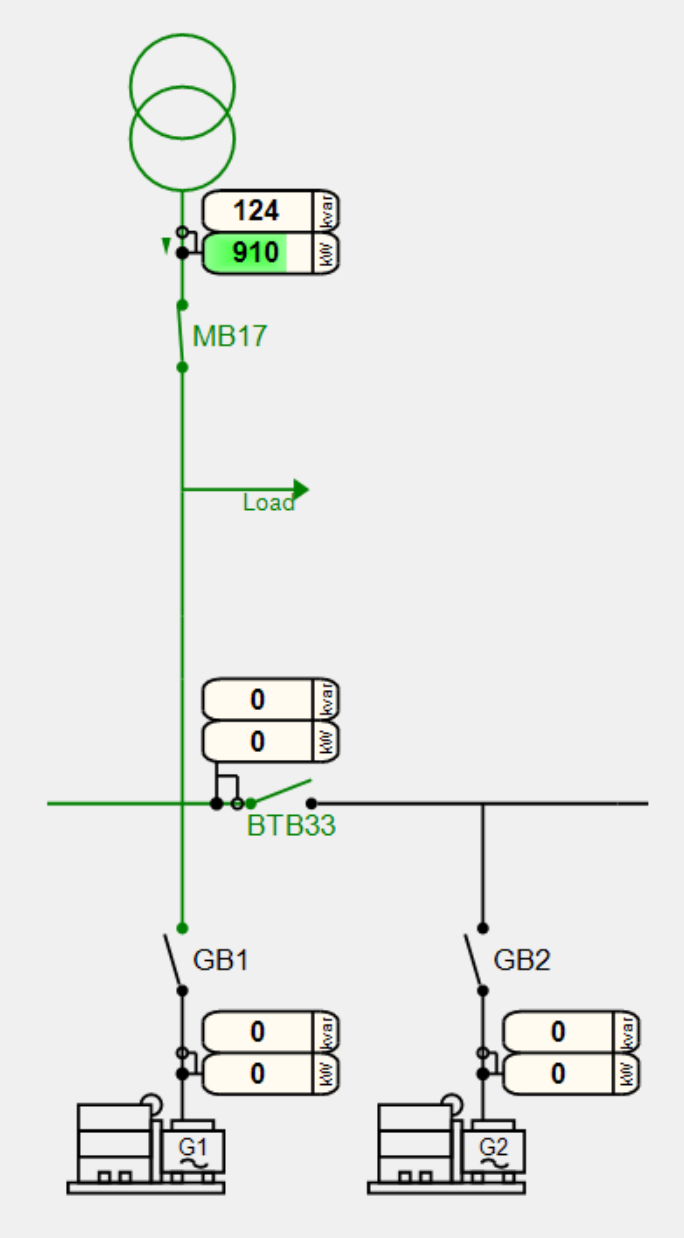
3.24 Application Supervision

An overview of the plant is shown in the Application Supervision page. It is important to note that the Application Supervision is only available in the left hand menubar (see button below) when there is connection with a device.

Note that Application Supervision is only relevant for some devices.



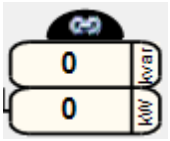
An example of the plant shown in Appliation Supervision:



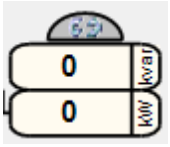
Connect symbols

In the Supervision page the so-called "Connect symbols" are show if compatible with the controller and the connection type is either RS485 or TCP-IP. The Connect symbols has two states:

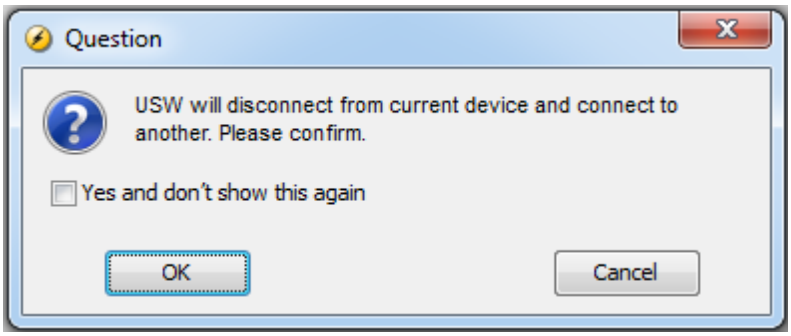
1. Connected to controller



2. Not connected to controller

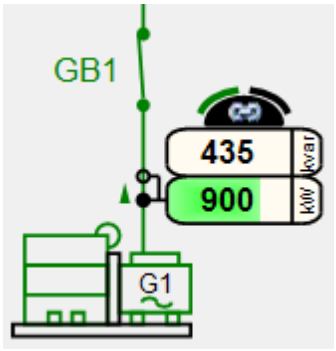


The connect symbols also acts as a quick way of connecting to another controller. If the user click the Connect symbol of a controller to which the PC Utility software is not currently connected, a popup is first shown where the user can decide whether he want to perform a connection to the controller - this might take time on slow connections, so that is why the popup is shown.



Redundancy

Some of the devices can be configured for redundancy. In a redundant setup two devices can control e.g. the same genset and breaker so if one fails, the other is ready to take over immediately. In Supervision the presence of redundant controllers will be indicated by the presence of two arcs above the Connect icon. One arc (the left) corresponds to the so-called A device whereas the B device, and the coloring of the arcs tells about the current status of the A and B controller.



The coloring of the arcs corresponds to the three cases

1. device is controlling at the moment (colored green per default)
2. device is redundant and ready to take over when needed (colored black per default)
3. device is redundant and not ready to take over (colored red per default)

The color or the arcs can be changed in the Color Scheme Editor.

Main menu buttons on Supervision page

When the Application Supervision page is open, additional five buttons are shown in the top menu bar:

These nine buttons are used for the following

Edit the colour schemes. Opens a popup where the colors for gensets, busbars and connections can be specified. Click here for further details.

Show/hide plant supervision legend. Used to show and hide a window on the left hand side containing the actual colouring scheme used for different states of the busbar, connections and gensets. Click here for further details.

Plant settings. Used for the daily operator to change essential parameters.

Engine data. Opens a popup where selected engine data for all engines in the plant is shown. Click here for further details.

Engine data. Displays engine data retrieved over CAN communication.

Electrical data. Displays all electrical data for the controllers

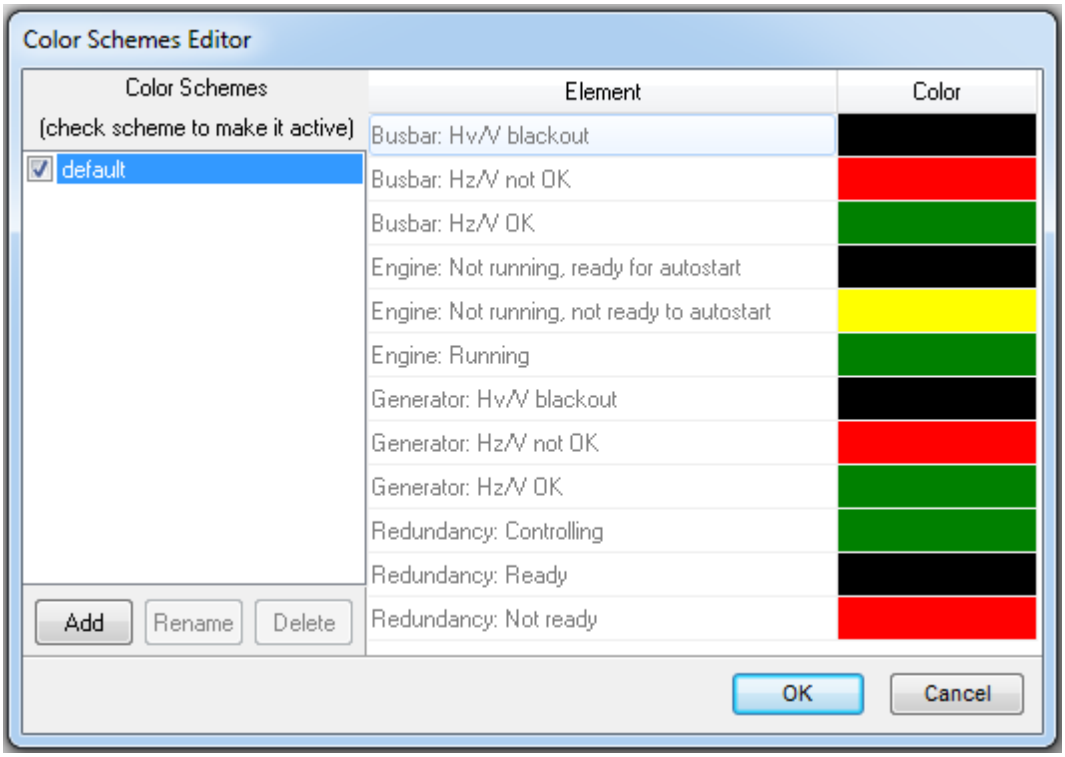
Connectivity check. Opens a popup where the connection to each device can be verified. Click here for further details.

Compatibility check. Opens a popup where the compatibility number and the firmware version is displayed for each device in the plant. Click here for further details

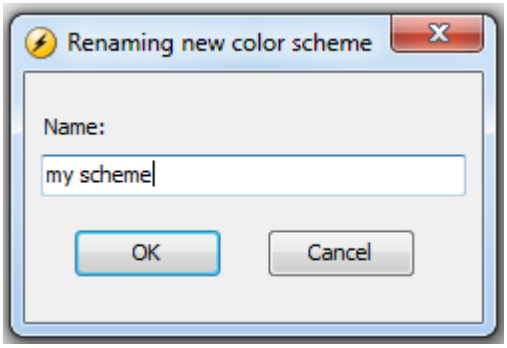
Emulation. Opens a popup where the emulation stimuli can be given.

3.24.1 Edit the Colour Schemes

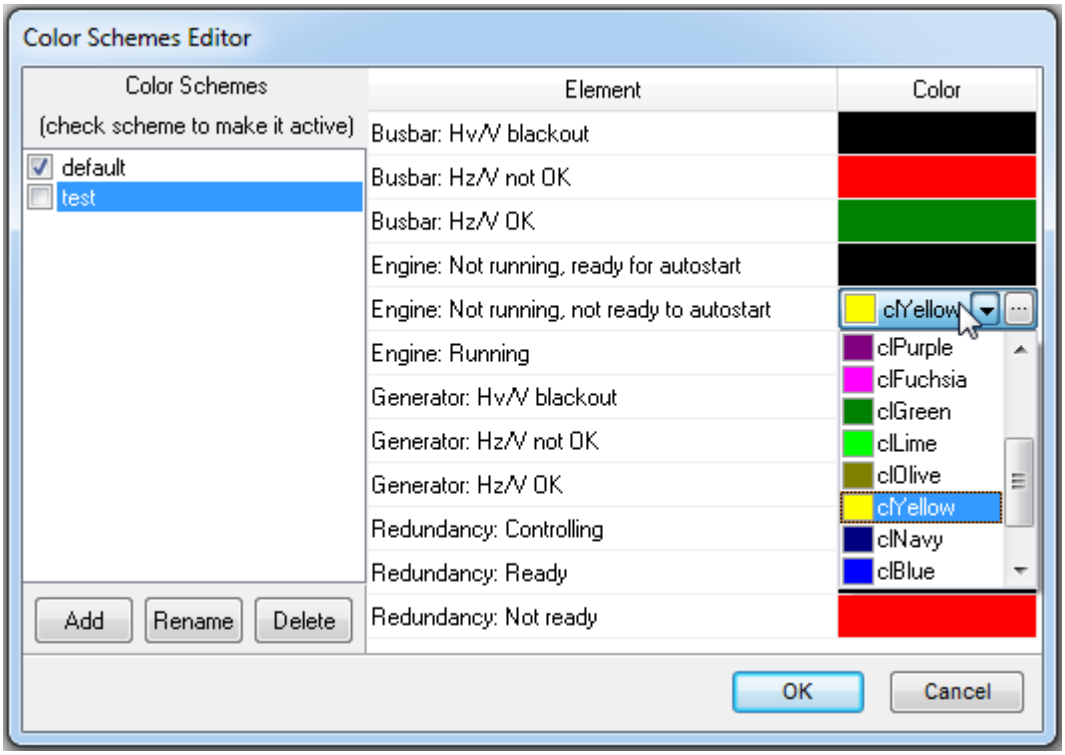
The coloring schemes used in Application Supervision can be modified when pressing the button. Then a dialogue box like below is shown



To the left, a new colouring scheme can be created by pressing the button Add.



The colours can now be changed by clicking the colours to the right.



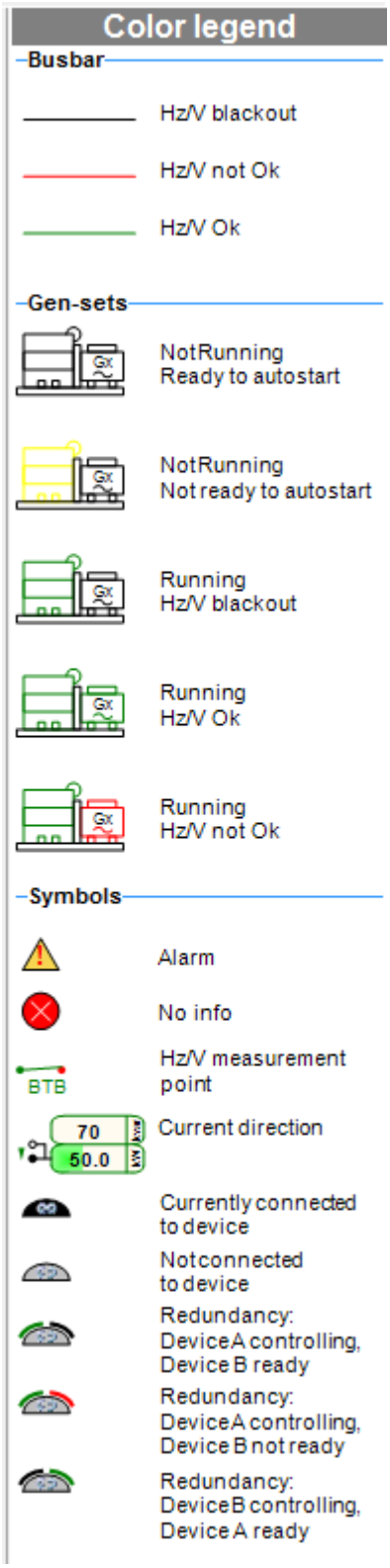
The colouring scheme can be made active by clicking the checkbox to the right of the colour scheme name. The colour can also be customized.

The Redundancy settings control the coloring of the arc's above the Connect symbol. Explanation of the colors related to redundancy:

- Controlling This is the color used for the device in control at the moment
- Ready: This is the color of the arc's if the device is ready to take over.
- Not ready: This is the color of the arc's if a redundant device is to be expected, but it is not ready to take over.

3.24.2 Color Legend

In the plant outline the status of the gensets and the busbar is shown according to a colour scheme. The interpretation of the colour scheme is explained to the right of the main window when the button  is pressed in the top menubar. Then a window like below is shown to the right in the main window:



The colour legend window is divided in three sections

1. Busbar: shows whether the frequency and the voltage is ok or not on the busbar and other connections.

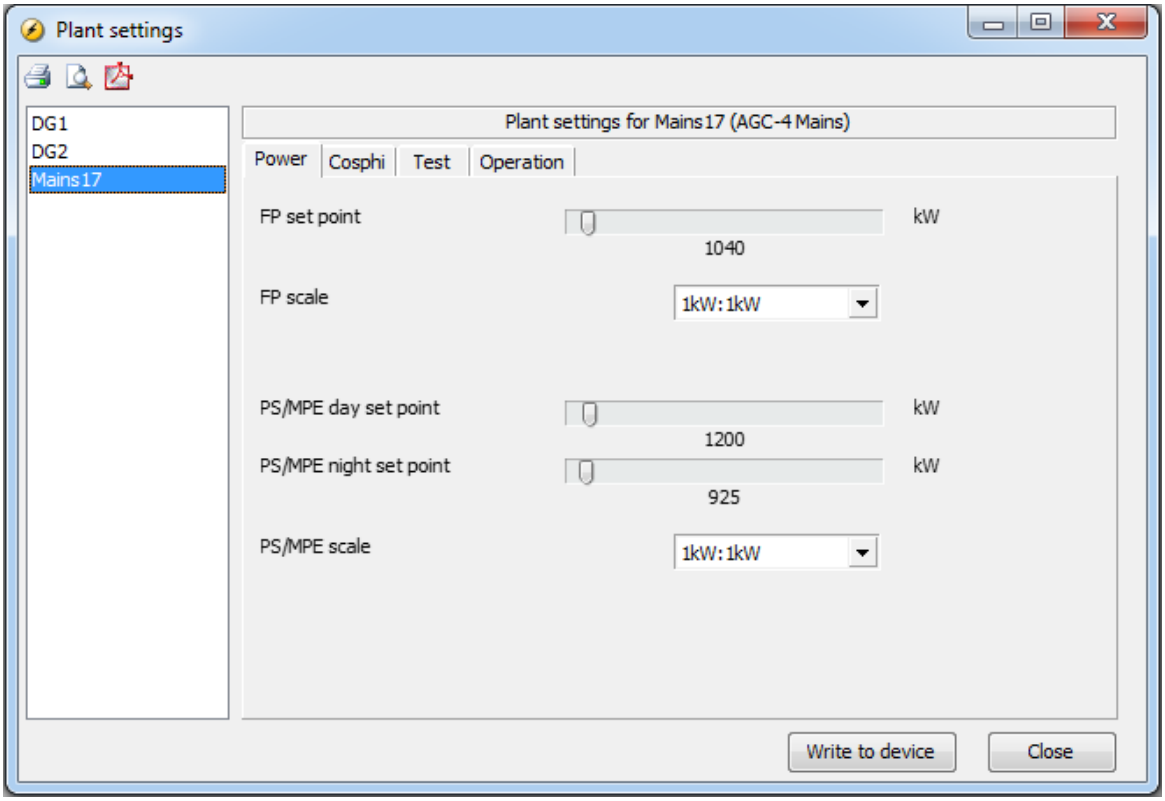
2. gensets: shows running the state of the engine and whether the voltage and frequency from the generator is ok nor not.

3. Symbols: shows additional symbols that gives further details about the plant. Examples: the yellow triangle shows an alarm on a device, the "No info" symbol tells that no CANbus info is available from a given device, and a small arrow given next to the power meters shows the direction of the power.

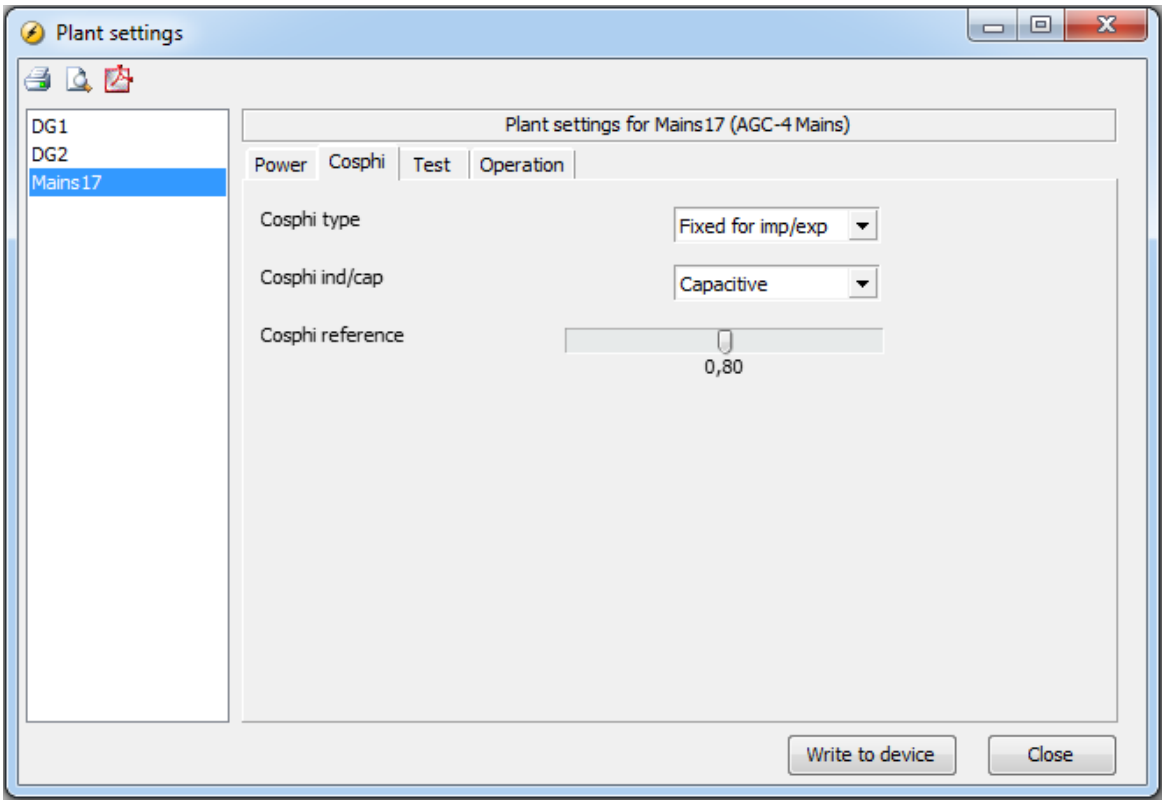
3.24.3 Plant Settings

In the Plant Settings popup the user can adjust parameters that are often changed in the daily operation of a plant. This could for example be various power settings. The values can also be changed in the Parameters page.

Note that the parameters in the Plant settings popup can only be changed if the user has a sufficient access level. If the user has a too low access level the parameters are grey'ed.

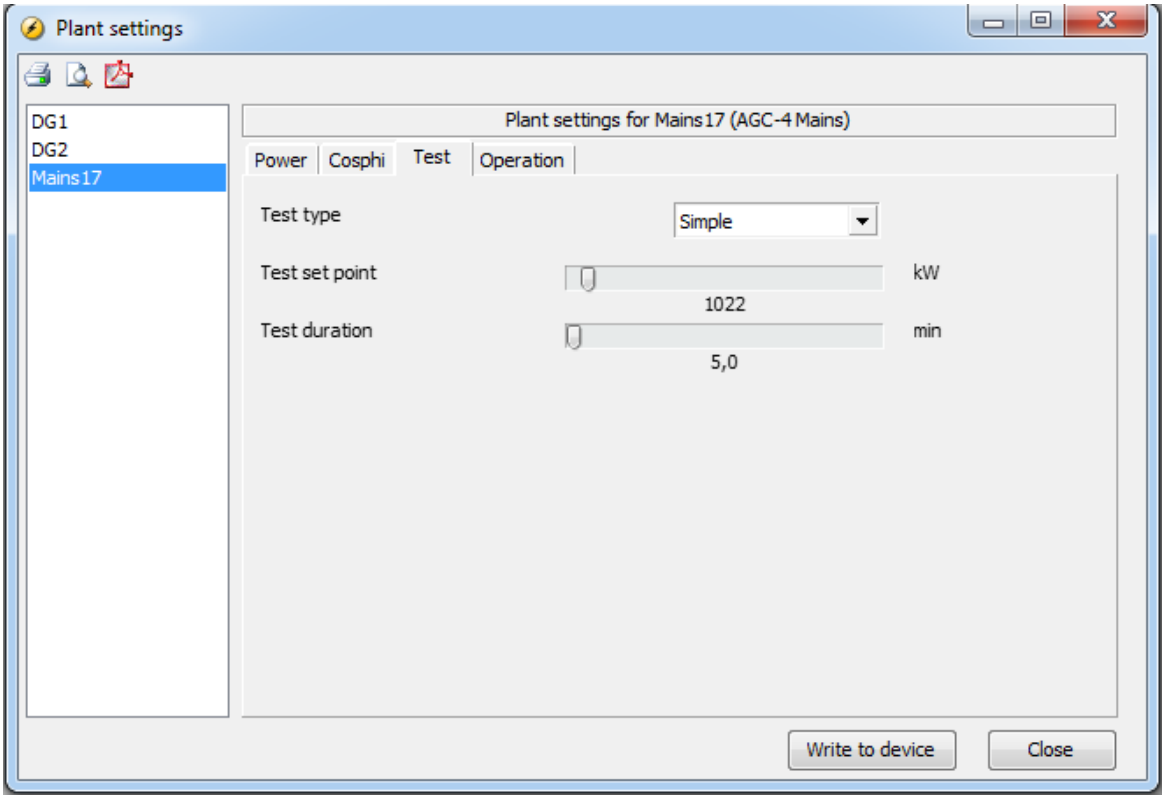


Field	Content	Comment
FP set point	Fixed Power set point	This is the set point that can also be set in menu 7051.
FP scale	Fixed Power scale	This is the set point that can also be set in menu 7055
PS/MPE day set point	Peak Shaving/Mains Power Export day set point	This is the set point that can also be set in menu 7001
PS/MPE night set point	Peak Shaving/Mains Power Export night set point	This is the set point that can also be set in menu 7002
PS/MPE scale	Peak Shaving/Mains Power Export scale	This is the set point that can also be set in menu 7005



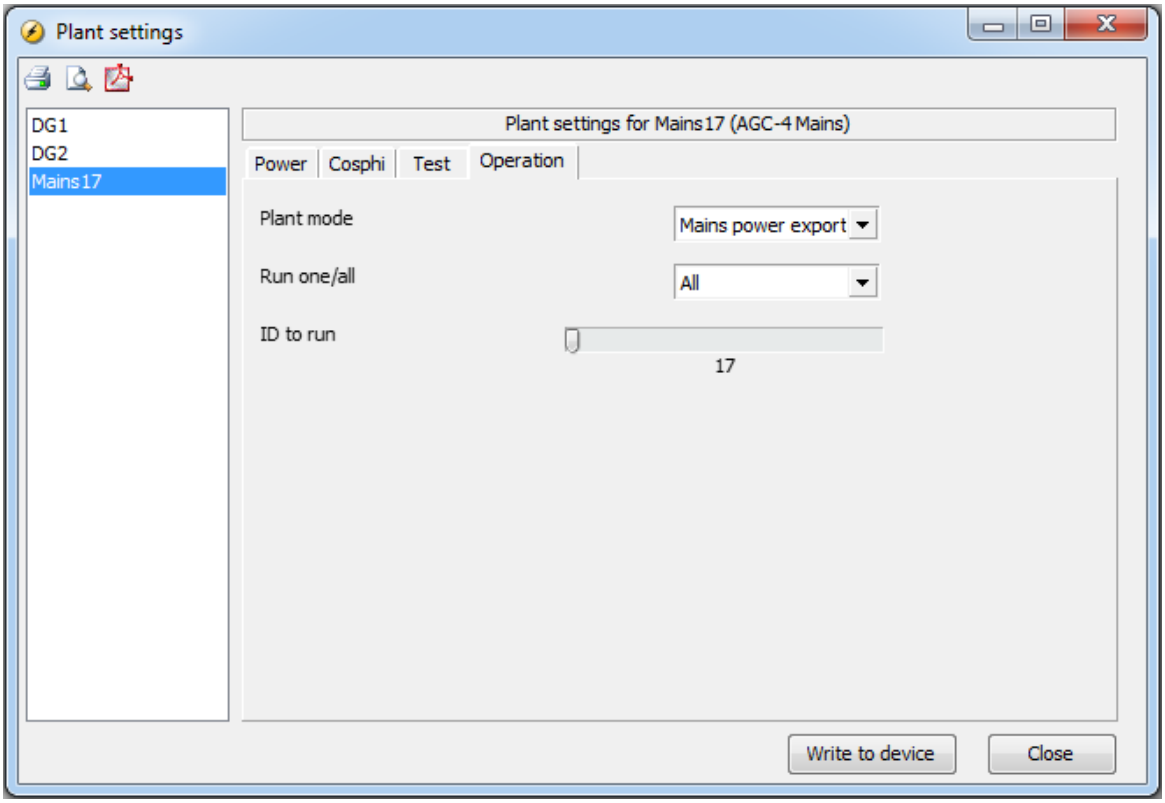
Field	Content	Comment
Cos Phi type	Cos Phi type	This is the set point that can also be set in menu 7054
Cos Phi ind/cap	Cos Phi inductive/capacitive	This is the set point that can also be set in menu 7053

Field	Content	Comment
Cos Phi reference	Cos Phi reference	This is the set point that can also be set in menu 7052



Field	Content	Comment
Test type	Test type	This field specifies the type of test. It can take the following values a) simple: generators will start, but no synchronization is performed. Once the timer expires the generators close down. b) load: generators will synchronize to the mains and produce the "test set point" power until the timer expires. c) full: generators will synchronize to the mains, take over the load, and when the timer ("duration") expires,

Field	Content	Comment
		the load is transferred back to the mains. Finally the generator will stop. The "test set point" power is the target power set point used while the generators provide power to the load. This is the set point that can also be set in menu 7044
Test set point	Test set point	This is the set point that can also be set in menu 7041
Test duration	Test duration	This is the set point that can also be set in menu 7041



Field	Content	Comment
Plant mode	Plant mode	This is the set point that can also be set in menu 6070
Run one/all	Run one/all	This is the set point that can also be

Field	Content	Comment
Id to run	Id to run	set in menu 8185 This is the set point that can also be set in menu 8186

Note:
If the gensets in the plant are in "power management" mode, all the settings in the four tabs are not relevant. For example the MPE power set point is not used for the gensets when in these are in the power management mode. In this example only the MPE power set point value for the Mains controller is relevant.

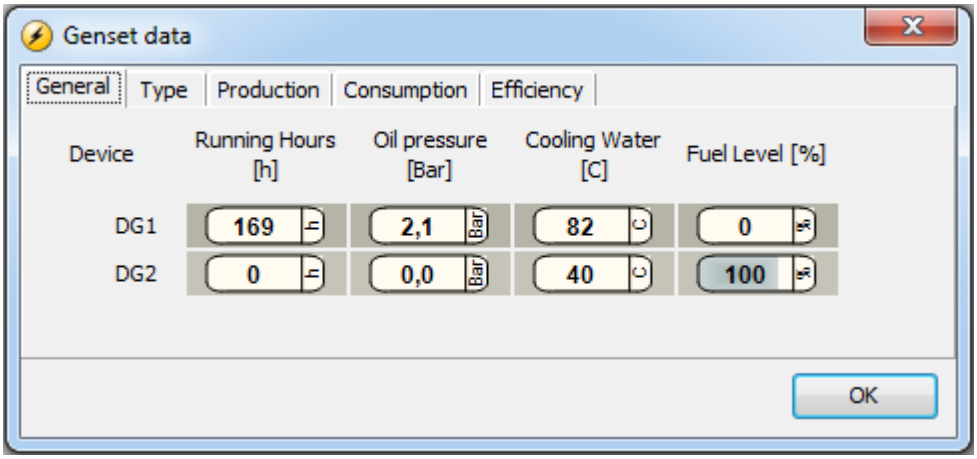
3.24.4 Genset data

A number of key genset data values can be shown for each of the engines in a plant.

The Genset data are shown in a number of different tabs. The content of each of the tabs is shown in the following. Some of the tabs contain either an indication of the sum ("Σ") or an average ("Σ/N") of a given value across DGs
The number of rows presented in the Genset data popup depends on the number of DGs in the plant. The Genset data is updated with an interval of approximately 30 seconds for Power Management systems. For a single DG setup, the Genset data is updated almost immediately.

Genset data: General tab

This tab contains general info about the DGs:



Field	Content	Comment
Running Hours	The number of running hours for the DG	
Oil pressure	Oil pressure of the DG	Oil pressure can be given in either bar or PSI. Change of units is done at channel 10970 from within the PC software
Cooling Water	Cooling water temperature of the DG	Cooling water temperature can be given in Fahrenheit or C. Go to channel 10970 to change the units.
Fuel Level	The fuel level for the DG	Note that the upper limit of the fuel level corresponds to 120%

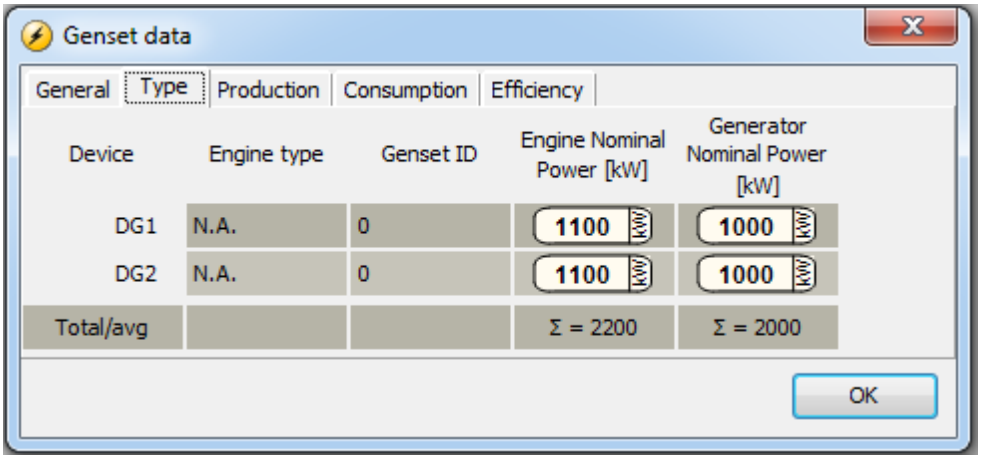
From where the device gets the info about fuel level, oil pressure and cooling water temperature is summarised in the following table:

Info	Detection	Comment
Fuel level	Retrieved from one of the multi-inputs. Either the device automatically detects the fuel level or the user can specify which multi-input to use.	Menu 13012 ("fuel level input") is used to specify how the fuel level is detected. If this menu is set to "Automatic", the device detects by itself which multi-input is used for fuel level. This is done in the device by inspecting which of the menus 10980-10982 ("multi inp. conf. 102", " multi inp. conf. 105", "multi inp. conf. 108") is set to "VDO fuel level".
Oil pressure	Retrieved either from one of the multi-inputs or from the engine directly.	Menu 13011 ("Oil press. input"") is used to specify how the oil pressure is detected. If this menu is set to "Automatic", the device first looks for any multi-input configured for the oil pressure measurement. This is done in the device by inspecting which of the menus 10980-10982 ("multi inp. conf. 102", " multi inp. conf. 105", "multi inp. conf. 108") is set to "VDO oil pressure". If none of the multi-inputs are configured for oil

Info	Detection	Comment
		pressure detection, the device tries to retrieve this from the engine by means of the selected engine communication protocol.
Cooling water temperature	Retrieved either from one of the multi-inputs or from the engine directly.	Menu 13010 ("cool water input"") is used to specify how the oil pressure is detected. If this menu is set to "Automatic", the device first looks for any multi-input configured for the cooling water temperature measurement. This is done in the device by inspecting which of the menus 10980-10982 ("multi inp. conf. 102", " multi inp. conf. 105", "multi inp. conf. 108") is set to "VDO water temperature". If none of the multi-inputs are configured for cooling water temperature detection, the device tries to retrieve this from the engine by means of the selected engine communication protocol.

Genset data: Type tab

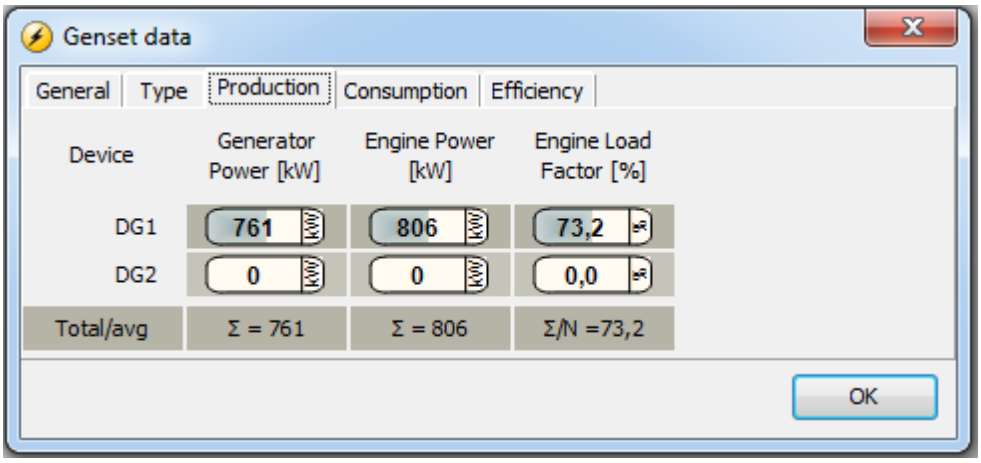
This tab contains info about the engine type and the nominal sizes of the engine as well as of the generator.



Field	Content	Comment
Engine type	The engine communication protocol	Set at menu/channel 7561
Genset ID	Genset identifier	Set in the Identifier popup
Engine Nominal Power [kW]	Nominal power of the engine	
Generator Nominal Power [kW]	Nominal power of the generator	Set at channel 6002

Genset data: Production tab

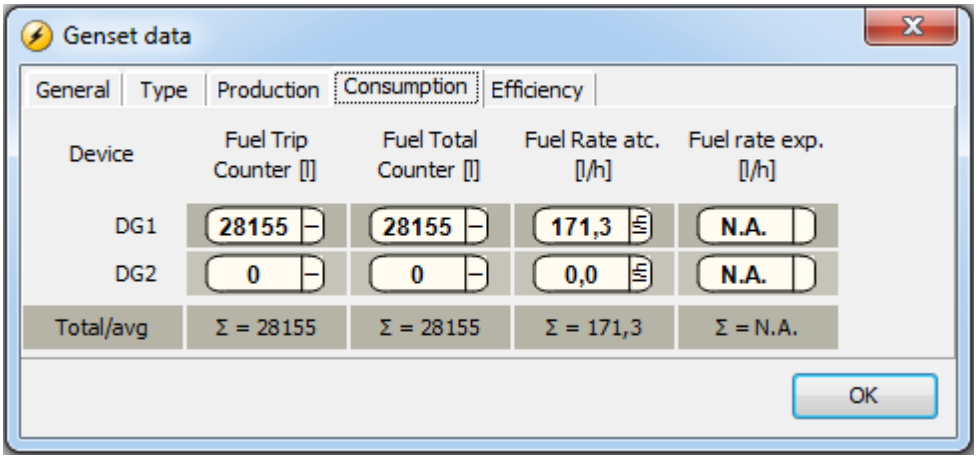
This tab contains info about the power the engine and the generator are producing. Furthermore, the engine load is given.



Field	Content	Comment
Generator Power [kW]	The power produced by the generator	
Engine Power [kW]	The power of the engine	
Engine Load Factor [%]	The load of the engine in percent	Calculated as the ratio between the nominal engine power and the current engine power.

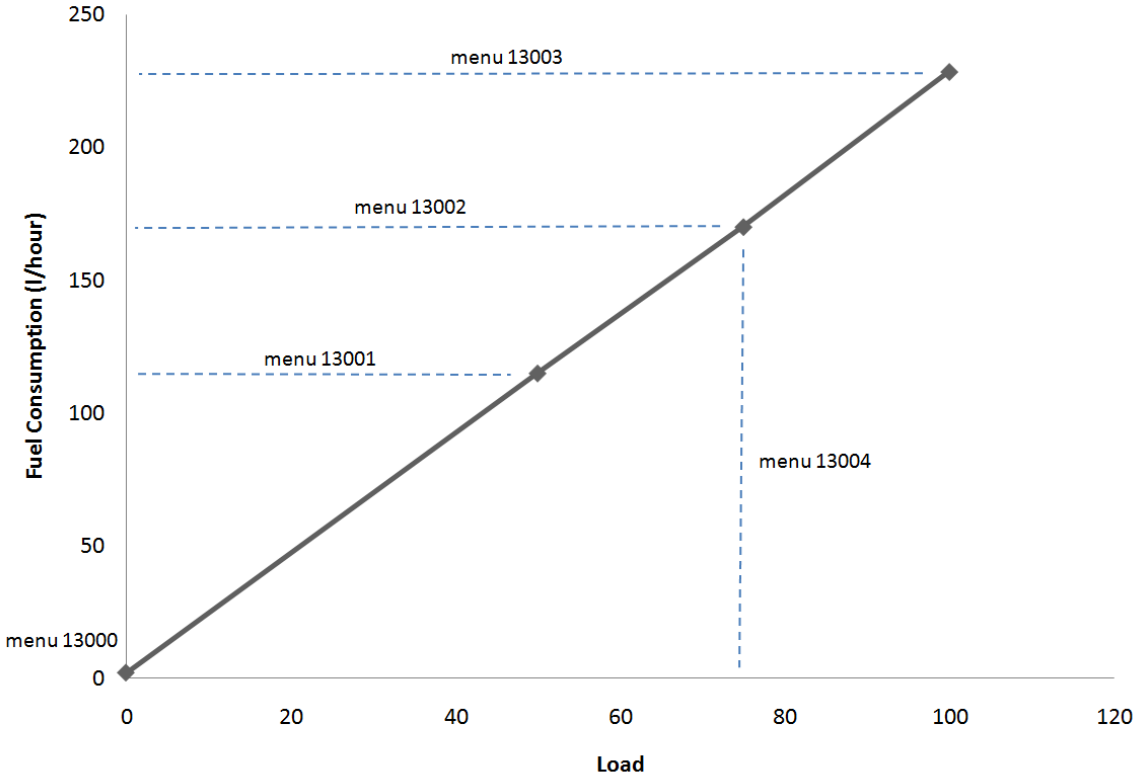
Genset data: Consumption tab

This tab contains info about how much the DGs are consuming:



Field	Content	Comment
Fuel Trip Counter [l]	Litre of fuel measured by the trip counter	
Fuel Total Counter [l]	Litre of fuel ever consumed by the DG	
Fuel Rate Act [l/h]	Actual fuel rate (litre of fuel per hour)	
Fuel Rate exp. [l/h]	Expected fuel rate	The expected fuel rate is found using the fuel curve points entered in the menus 13000-13004 in the Parameter page ("Supervision" tab). Remember to set the enable option in menu 13005 ("fuel rate expected") when the expected fuel rate points have been set. In menu 13005 is disabled "N. A." is shown in the column "Fuel rate exp."

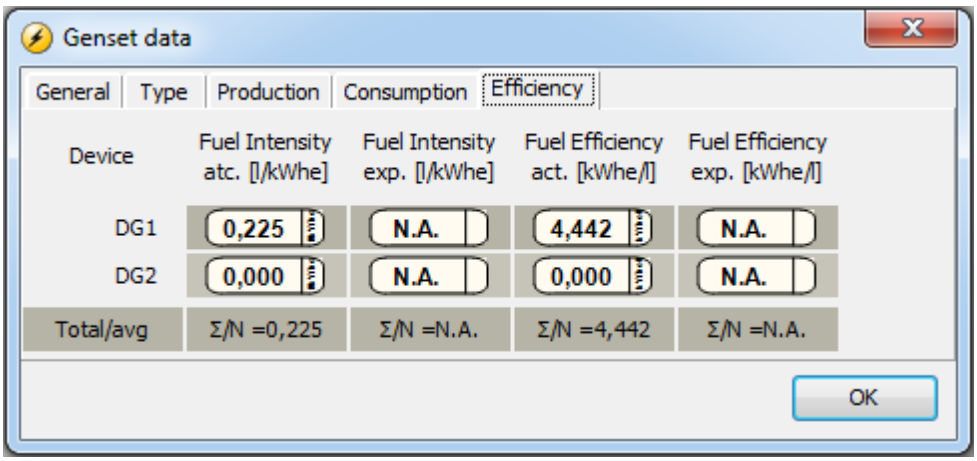
Points in the exptected fuel rate curve is entered using the menus 13000-13004.



After entering the points, the "fuel rate expected" menu (13005) must be enabled.

Genset data: Efficiency tab

The tab contains info about how efficient the DGs are.



Field	Content	Comment

Fuel Intensity act. [l/kWhe]	Actual fuel intensity: the number of litres of fuel per kWh produced at this moment	The "e" in the unit "kWhe" refers to the fact that it is the effective or actual kWh produced.
Fuel Intensity exp. [l/kWhe]	Expected fuel intensity	The expected fuel intensity is not available if the expected fuel curve points have not been specified in the menus 13000-13004 in the Parameter page and enabled by means of menu 13005.
Fuel Efficiency act. [kWhe/l]	Actual fuel efficiency: kWh per litre of fuel at this moment	
Fuel Efficiency exp. [kWhe/l]	Expected fuel efficiency	The expected fuel efficiency is not available if the expected fuel curve points have not been specified in the menus 13000-13004 in the Parameter page and enabled by means of menu 13005.

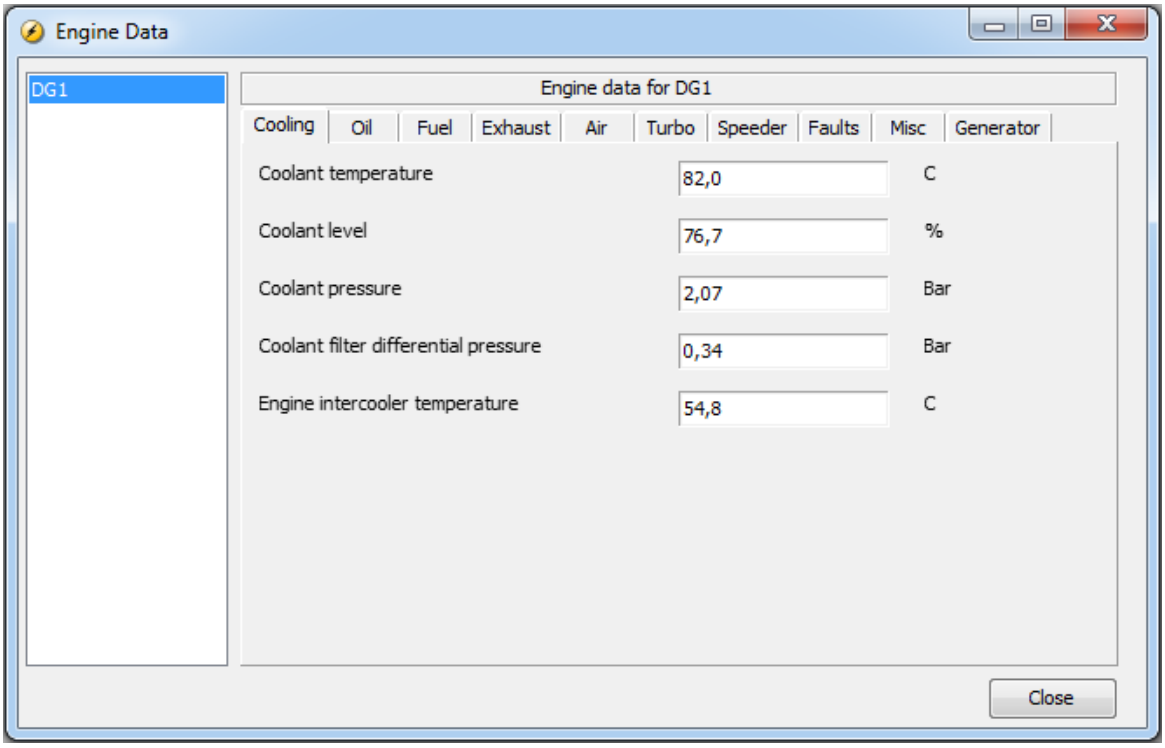
3.24.5 Engine data

The engine data popup shows various data values for the engine in a genset. All values are retrieved directly via engine communication. Different engine communication interfaces will provide different sets of values so there might be values not available.

The data fields are updated automatically. If a value is not available, "N.A." is shown.

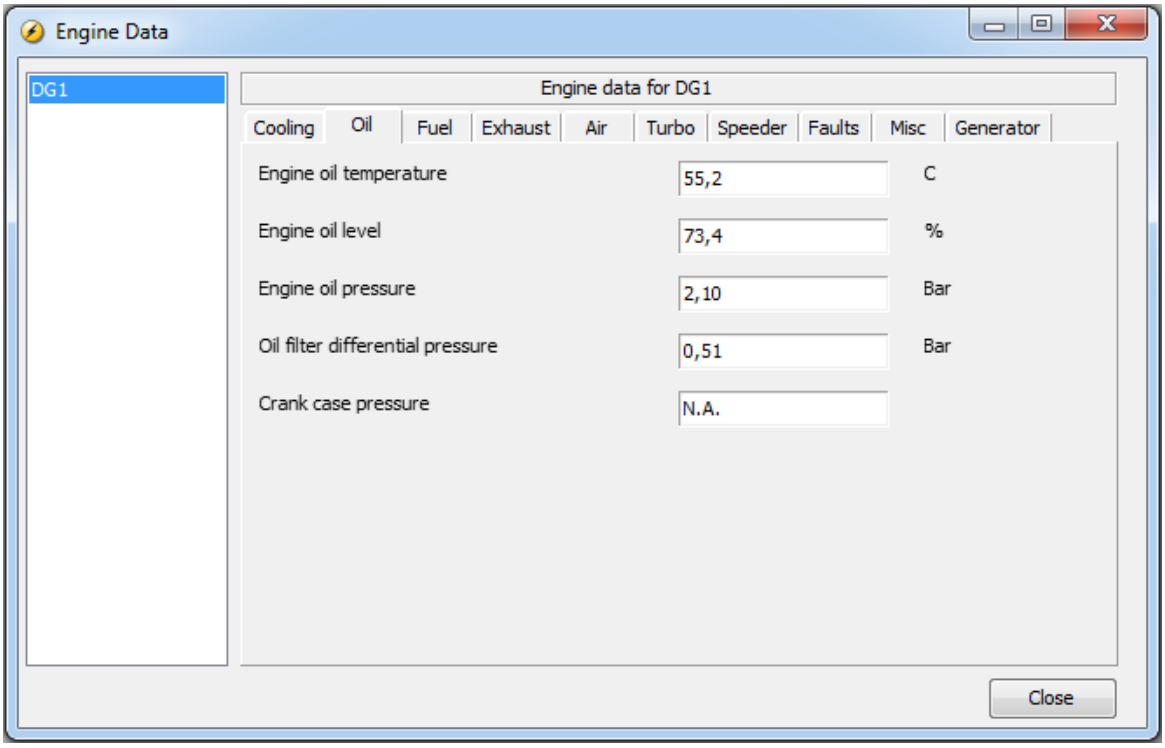
Below there are a number of references to "SPN". This means "Suspect Parameter Number" and it is a standard term originating from J1939 communication.

Cooling



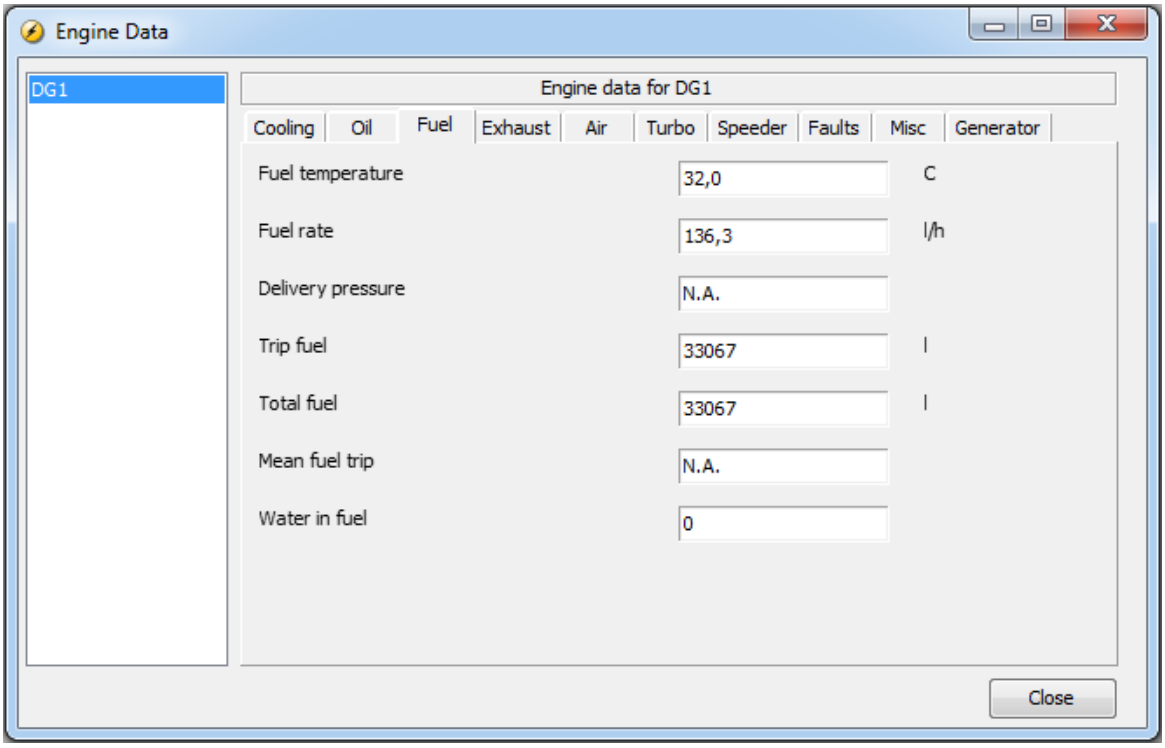
Field	Content	Comment
Coolant temperature	Engine coolant temperature	SPN 110
Coolant level	Engine coolant level	SPN 111
Coolant pressure	Engine coolant pressure	SPN 109
Coolant filter differential pressure	Engine coolant filter differential pressure	SPN 112
Engine intercooler temperature	Engine intercooler temperature	Applies to MTU engines only

Oil



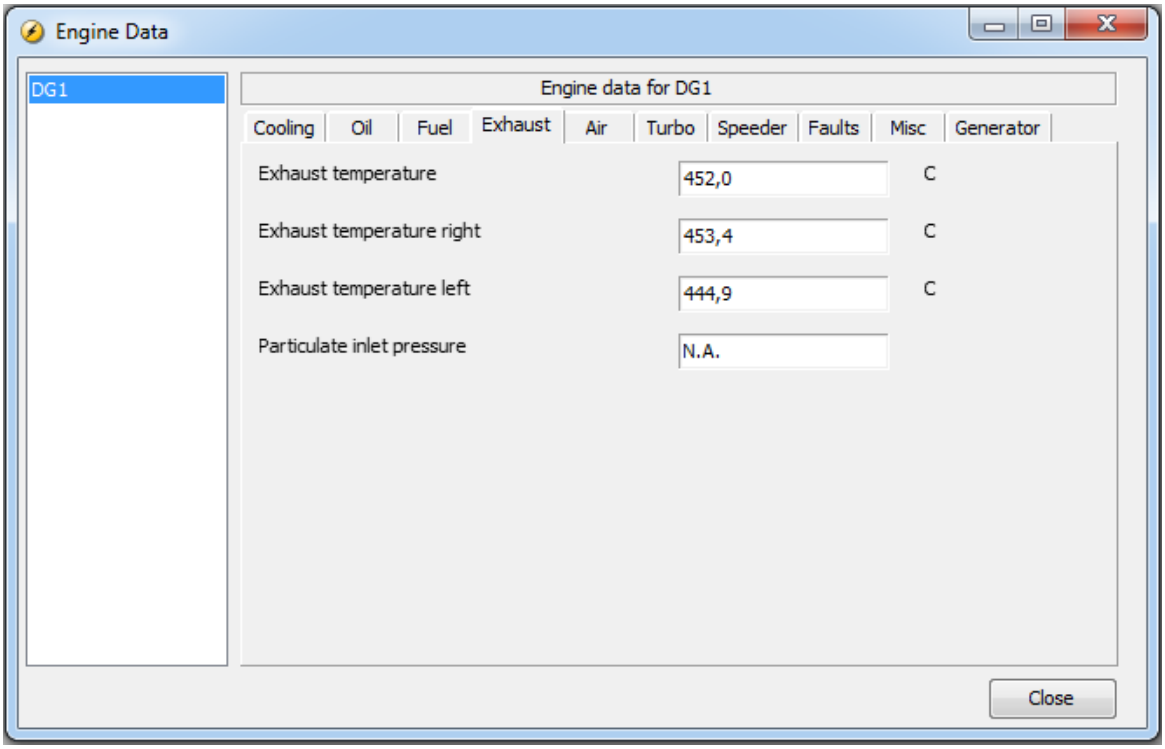
Field	Content	Comment
Engine oil temperature	Engine oil temperature 1	SPN 175
Engine oil level	Engine oil level	SPN 98
Engine oil pressure	Engine oil pressure	SPN 100
Oil filter differential pressure	Engine oil filter differential pressure	SPN 99
Crank case pressure	Engine crank case pressure	SPN 101

Fuel



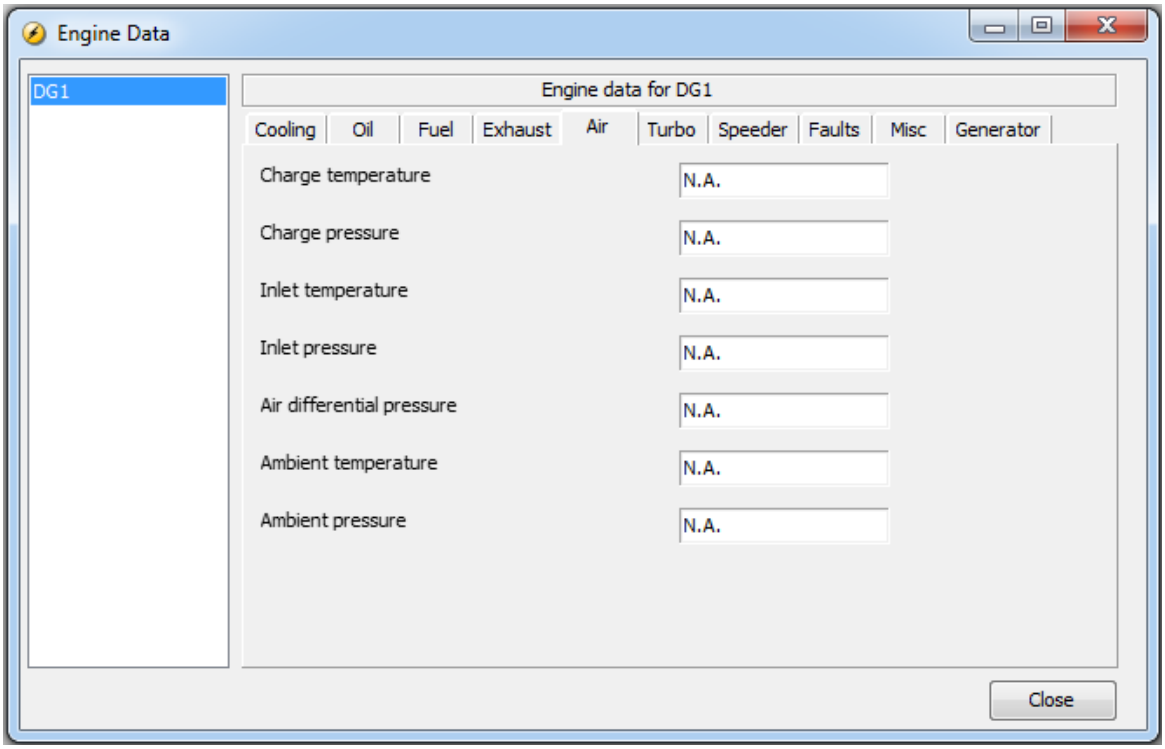
Field	Content	Comment
Fuel temperature	Engine fuel temperature 1	SPN 174
Fuel rate	Engine fuel rate	SPN 183
Delivery pressure	Engine delivery pressure	SPN 94
Trip fuel	Engine trip fuel	SPN 182
Total fuel	Engine total fuel used	SPN 250
Mean fuel trip	Average fuel consumed during the period corresponding to the time the trip has been counting	Applies to MTU engines only
Water in fuel	Water in fuel indicator	SPN 97. Zero means that there is no water in oil

Exhaust



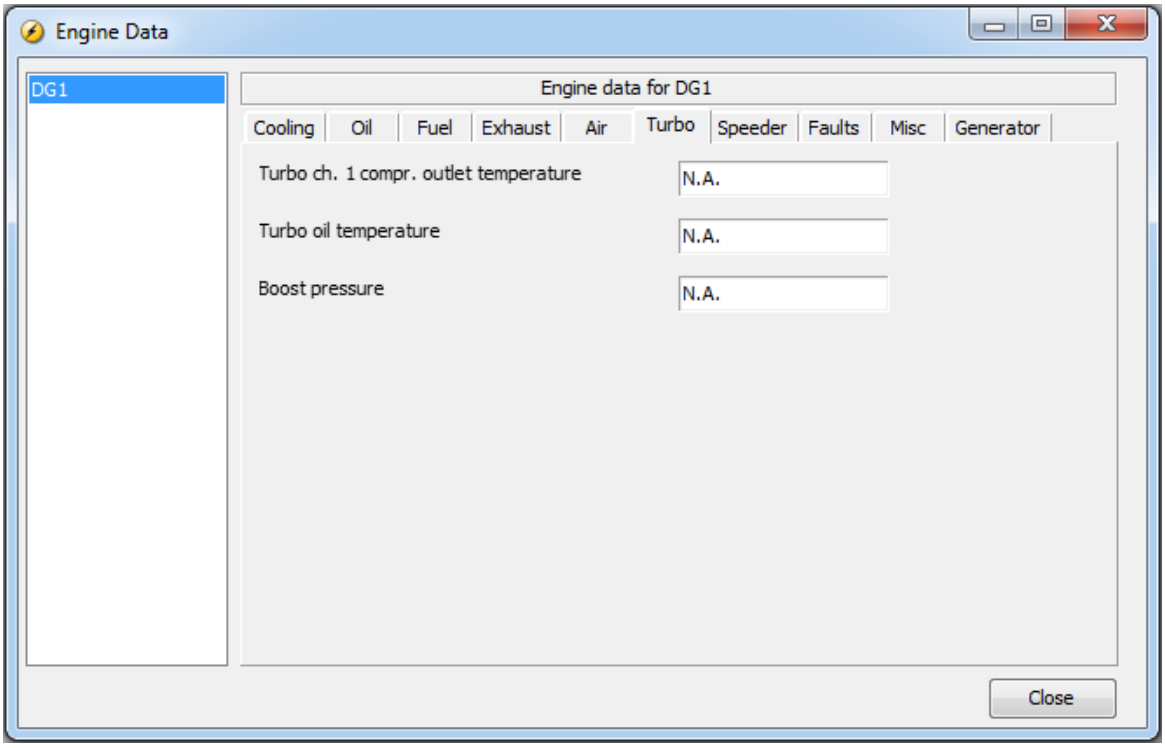
Field	Content	Comment
Exhaust temperature	Engine exhaust gas temperature	SPN 173
Exhaust temperature right	Exhaust temperature for the right manifold	Applies only to MTU engines
Exhaust temperature left		Applies only to MTU engines
Particulate inlet pressure	Engine particulate filter inlet pressure	SPN 81

Air



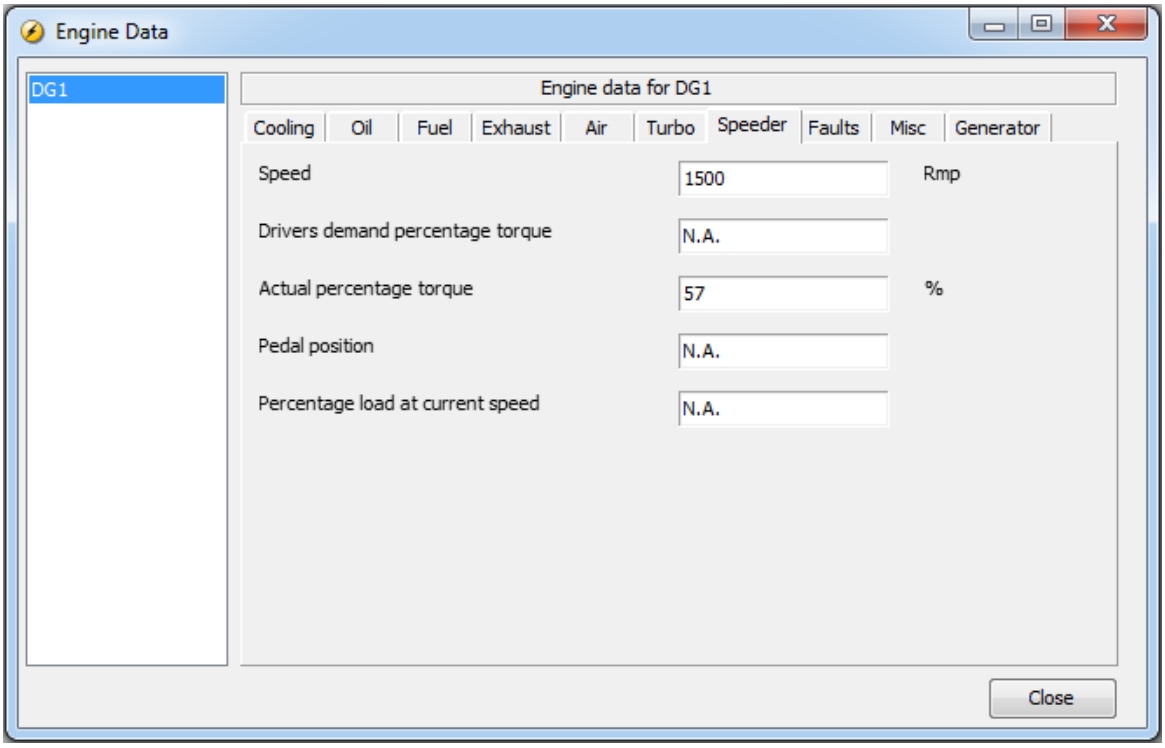
Field	Content	Comment
Charge temperature	Engine intake manifold 1 temperature	SPN 105
Charge pressure	Air intake manifold pressure	Applies only for MTU engines
Inlet temperature	Engine air inlet temperature	SPN 172
Inlet pressure	Engine air inlet pressure	SPN 106
Air differential pressure	Engine air filter 1 differential pressure	SPN 107
Ambient temperature	Ambient air temperature	SPN 171
Ambient pressure	Barometric pressure	SPN 108

Turbo



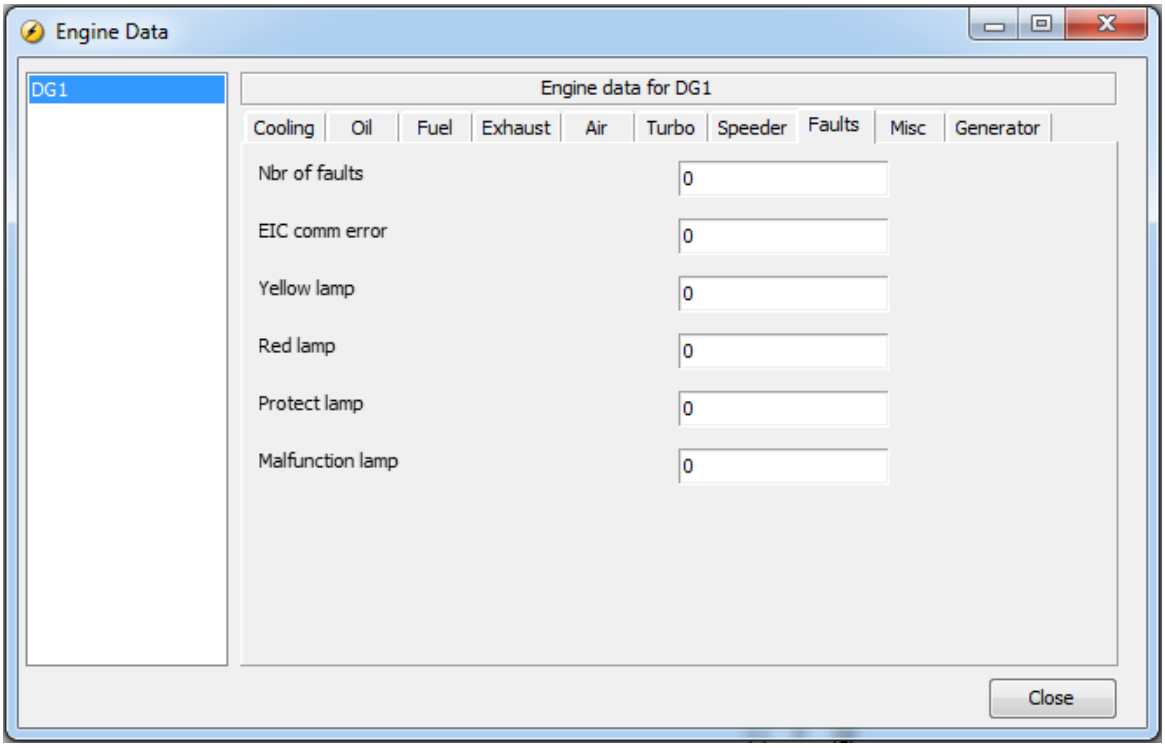
Field	Content	Comment
Turbo ch 1. compr. outlet temperature		Applies only for MTU engines
Turbo oil temperature	Engine turbo charger oil temperature	SPN176
Boost pressure	Engine intake manifold nbr 1 pressure	SPN102

Speeder



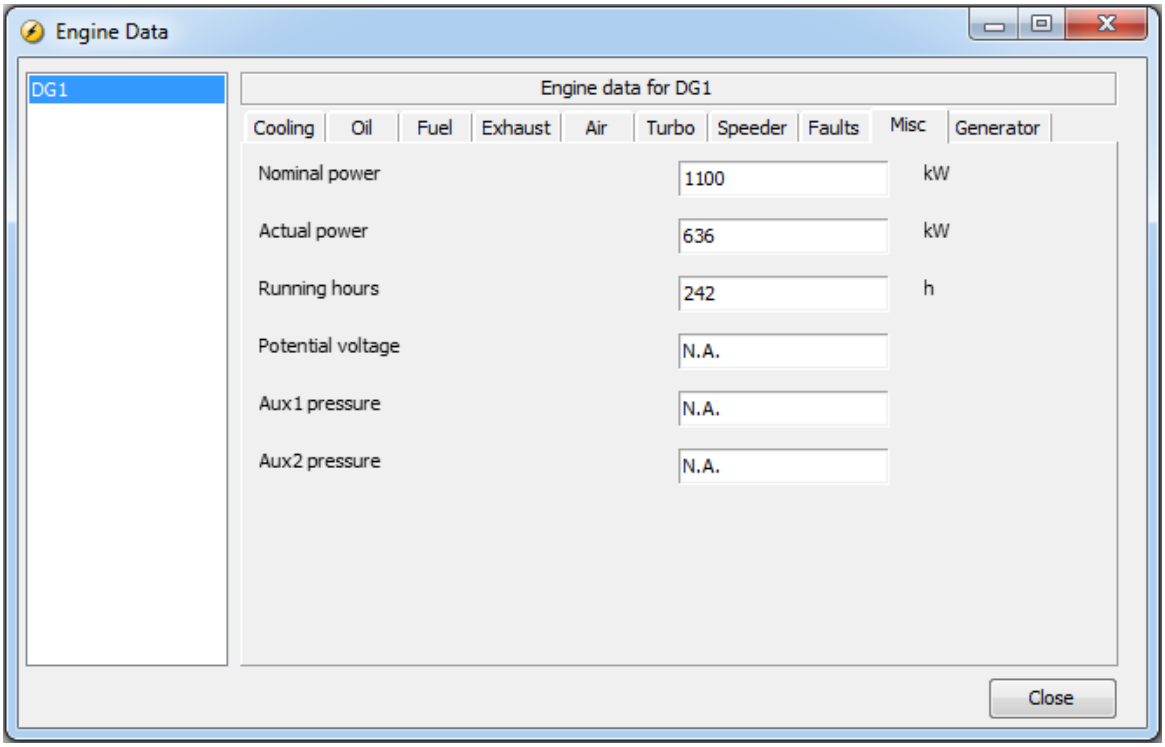
Field	Content	Comment
Speed	Engine speed	SPN 190
Drivers demand percentage torque	Drivers demand engine percent torque	SPN 512
Actual percent torque	Actual engine percent torque	SPN 513
Pedal position	Accelerator pedal position 1	SPN 91
Percentage load at current speed	Engine percent load at current speed	SPN 92

Faults



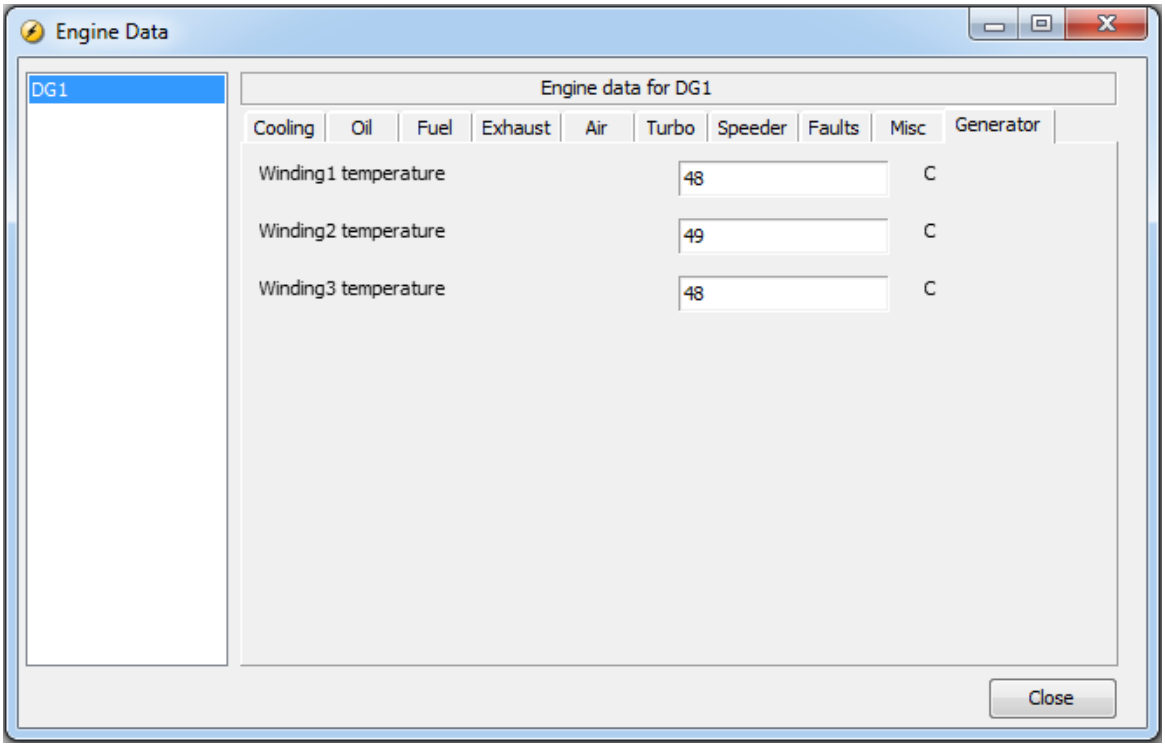
Field	Content	Comment
Nbr of faults	Active trouble codes, diagnostic readiness 1	DM5
EIC comm error	Monitoring of engine communication	Menu 7570
Yellow lamp	This lamp is used to relay trouble code information that is reporting a problem with the engine system but the engine need not be immediately stopped.	
Red lamp	This lamp is used to relay trouble code information that is of a severe enough condition that it warrants stopping the engine.	
Protect lamp	This lamp is used to relay trouble code information that is reporting a problem with an engine system that is most probably not electronic subsystem-related.	
Malfunction lamp	A lamp used to relay only emission-related trouble code information. This lamp is only illuminated when an emission-related trouble is code active.	

Misc



Field	Content	Comment
Nominal power	Nominal power	Applies to MTU engines only
Actual power	Mechanical actual power	Applies to MTU engines only
Running hours	Engine total hours of operation	SPN 247
Potential voltage	Keyswitch battery potential	SPN 158
Aux1 pressure	Auxiliary analog info	Applies to MTU engines only
Aux2 pressure	Auxiliary analog info	Applies to MTU engines only

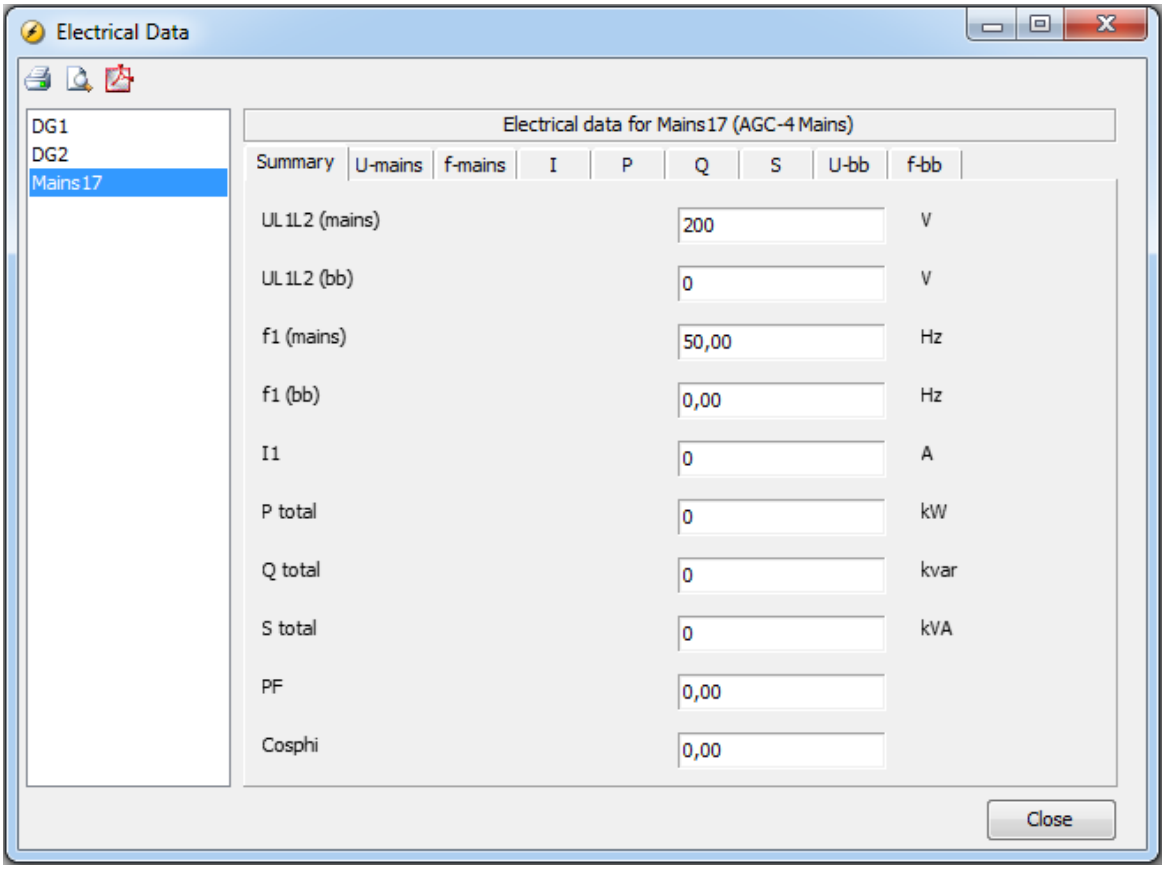
Generator



Field	Content	Comment
Winding 1 temperature	Generator winding 1 temperature	Applies to MTU engines only
Winding 2 temperature	Generator winding 2 temperature	Applies to MTU engines only
Winding 3 temperature	Generator winding 3 temperature	Applies to MTU engines only

3.24.6 Electrical Data

The Electrical Data popup display all available electrical data for a given controller.The user can navigate among all controllers in the plant and thereby get electrical data for all.

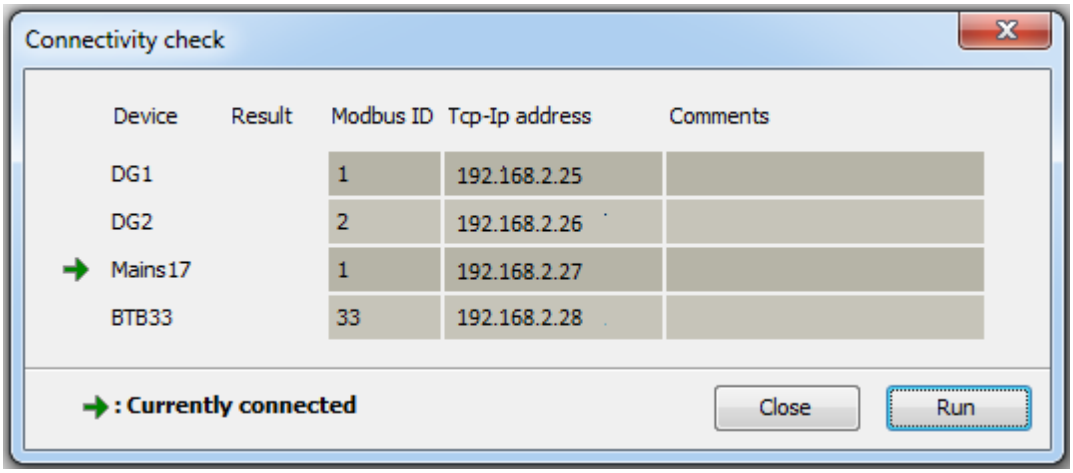


3.24.7 Connectivity Check

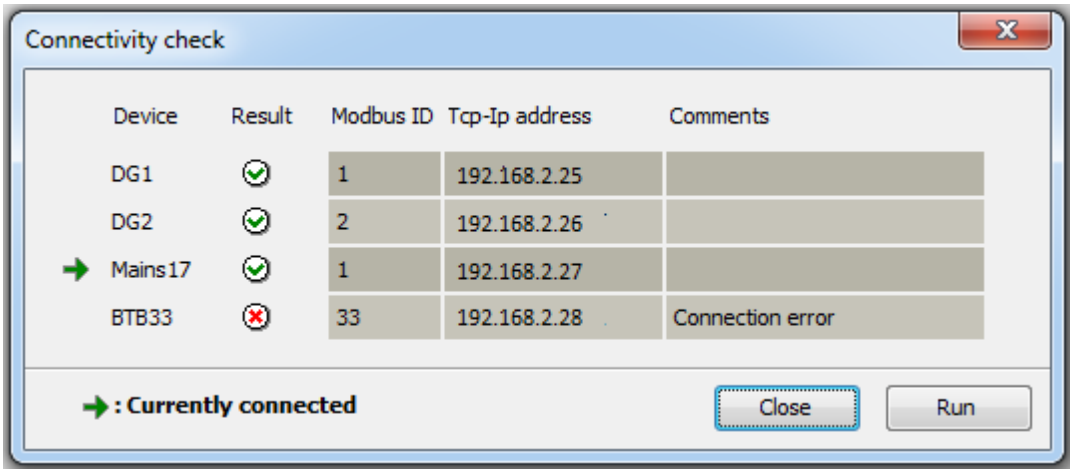
Whether the devices in the plant can be reached over Modbus, can be tested in the Connectivity Check popup.

The connectivity check can perform the test either over connections based on RS485 or TCP-IP.

For TCP-IP-based connections, the Connectivity Check popup looks like below:

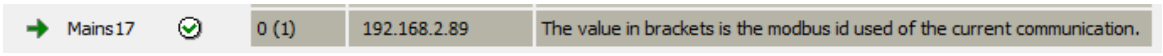


When pressing the Run button, the connection to each device is tested. The result is given in the Result column - see example below



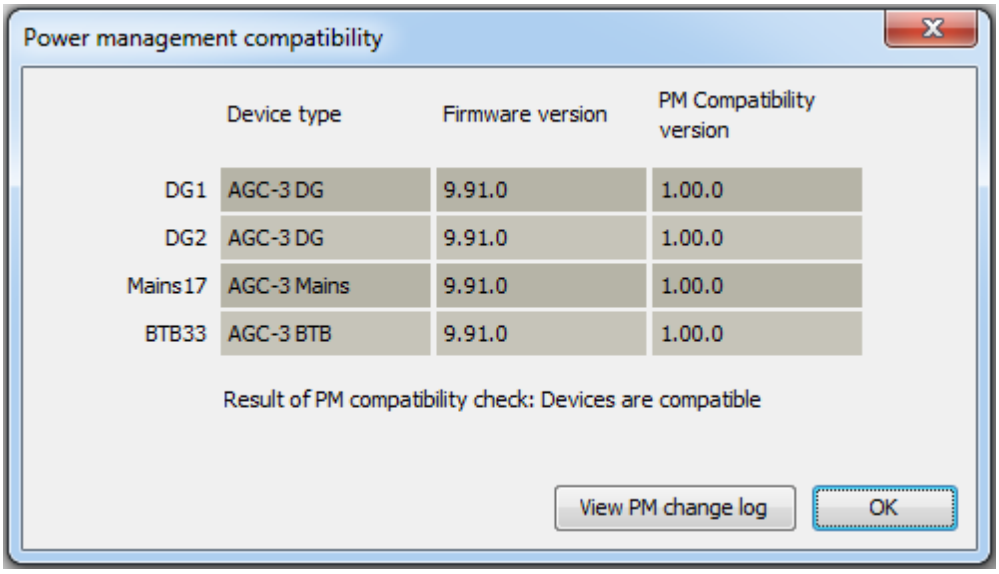
The popup also indicates, via the green arrow, to which device the PC software is currently connected.

If TCP-IP connection is used to access a controller which lacks a serial interface (H2 option), then the Modbus ID is zero. Nevertheless, in the Settings window a Modbus is given. This situation is displayed in the following way in the connectivity check popup



3.24.8 Compatibility Check

The compatibility Check popup is opened by pressing the button. Then a popup like below is shown:



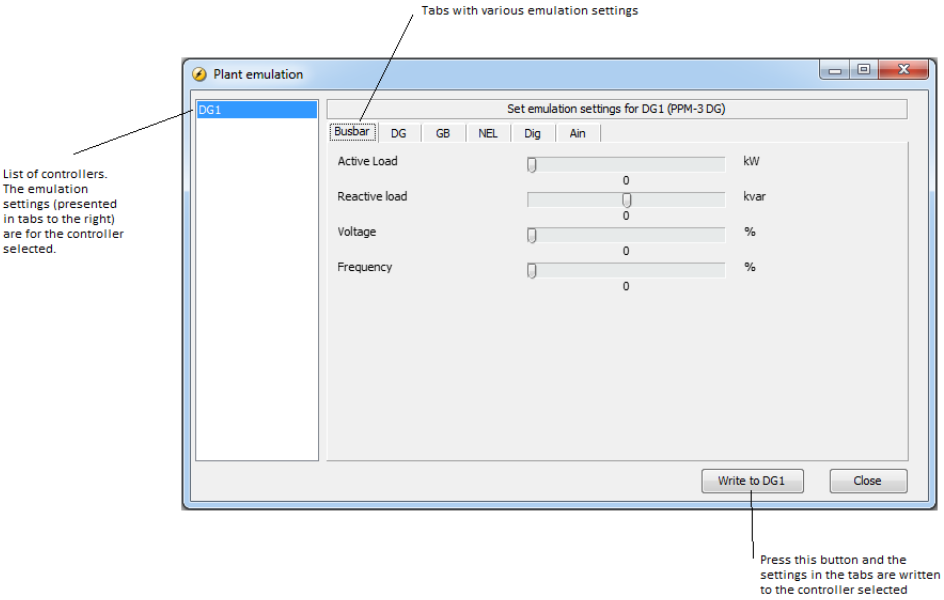
In this popup the device type, the firmware version and the so-called PM Compatibility version are given for each of the devices in the plant.

The Power Management (PM) compatibility version is a number that can be used to check whether devices in the plant are compatible in terms of power management. In order to investigate the differences between the different PM compatibility version numbers, the button View PM change log can be pressed. When the user does that, a PDF document that lists the details between the different versions is shown.

3.24.9 Emulation

Emulation is a feature that provides possibility of testing plant logics without use of external switch gear of any kind. The only demand is to have the necessary controller(s), which are mandatory to run the specific application to be emulated, at hand. At this stage, the emulation is only supported by a small number of controller products. In the following, the screenshots are related to a marine controller.

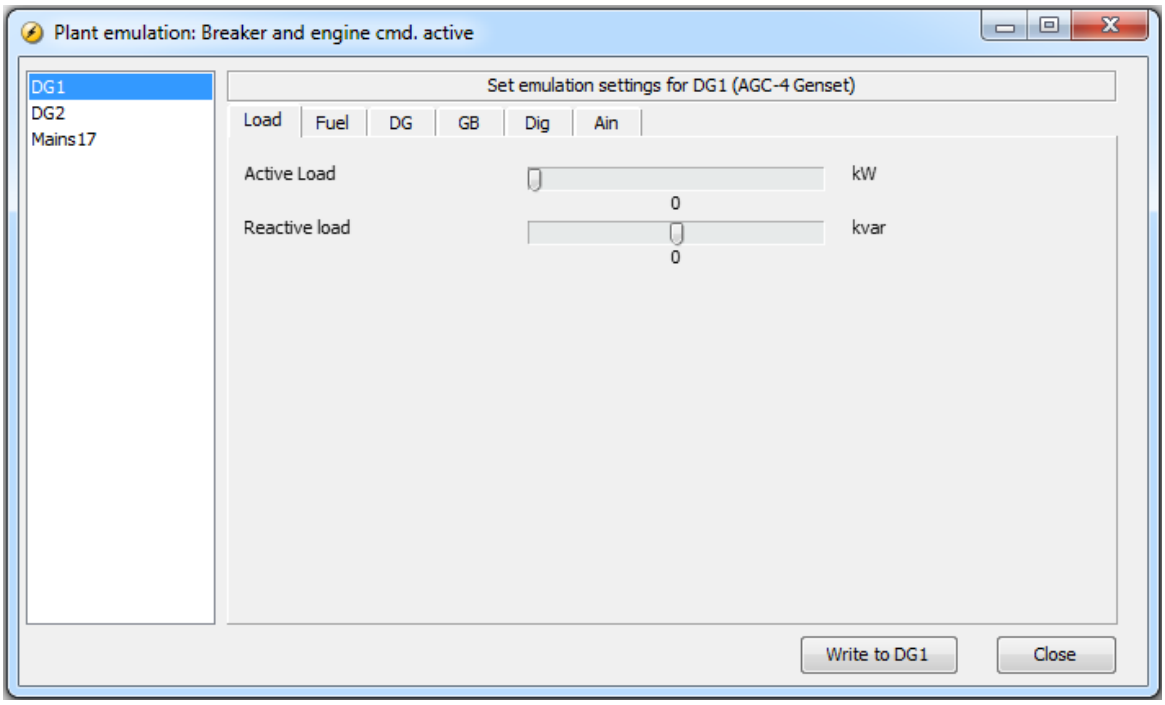
Activating the button will give access to the plant emulation window.



From within this window, it is possible to apply various stimuli to the application being emulated.

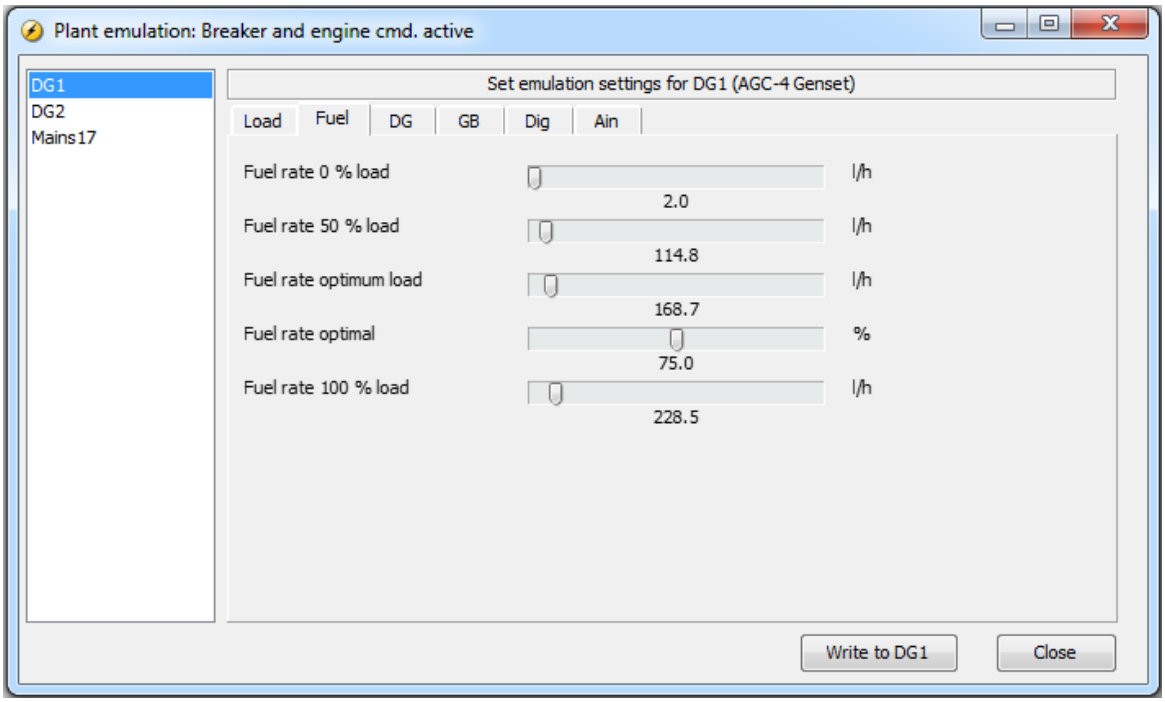
The various tabs are explained in the following. Note that the list of tabs depends on the controller type and the application.

Load



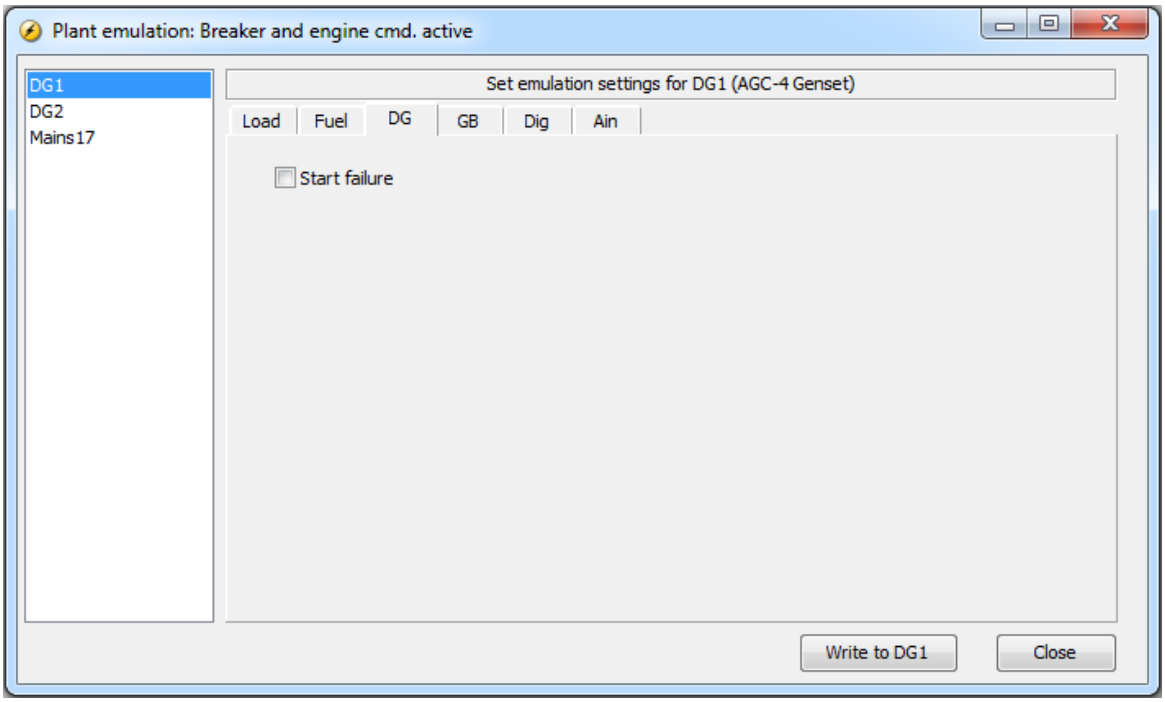
Field	Content	Comment
Active Load	Load related to the controller	Total load on a common busbar is a sum of load values from each controller
Reactive Load	Reactive load related to the controller	

Fuel



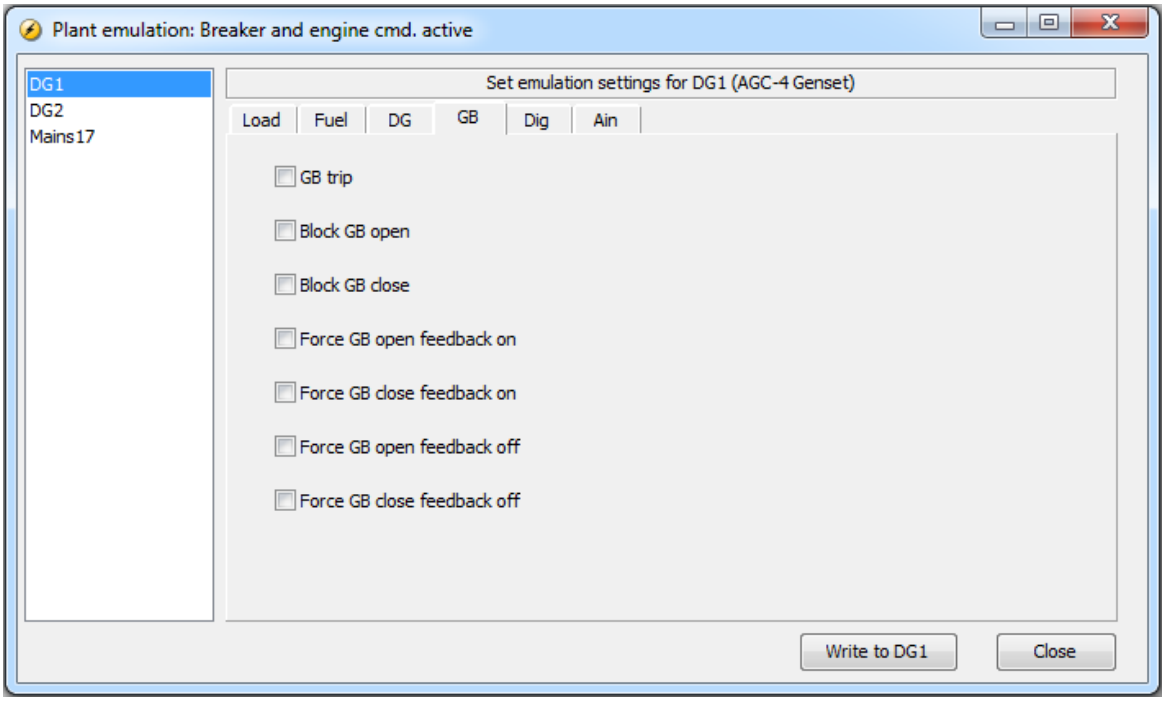
Field	Content	Comment
Fuel rate 0% load	The fuel rate at 0% load	Set in menu 13000 in Parameters
Fuel rate 50% load	The fuel rate at 50% load	Set in menu 13001 in Parameters
Fuel rate optimum load	The fuel rate at optimum load	Set in menu 13002 in Parameters
Fuel rate optimal	The percent value where the genset is running optimum	Set in menu 13004 in Parameters
Fuel rate 100% load	The fuel rate at 100% load	Set in menu 13003 in Parameters

DG



Field	Content	Comment
Start failure	Emulate a start failure by the engine	

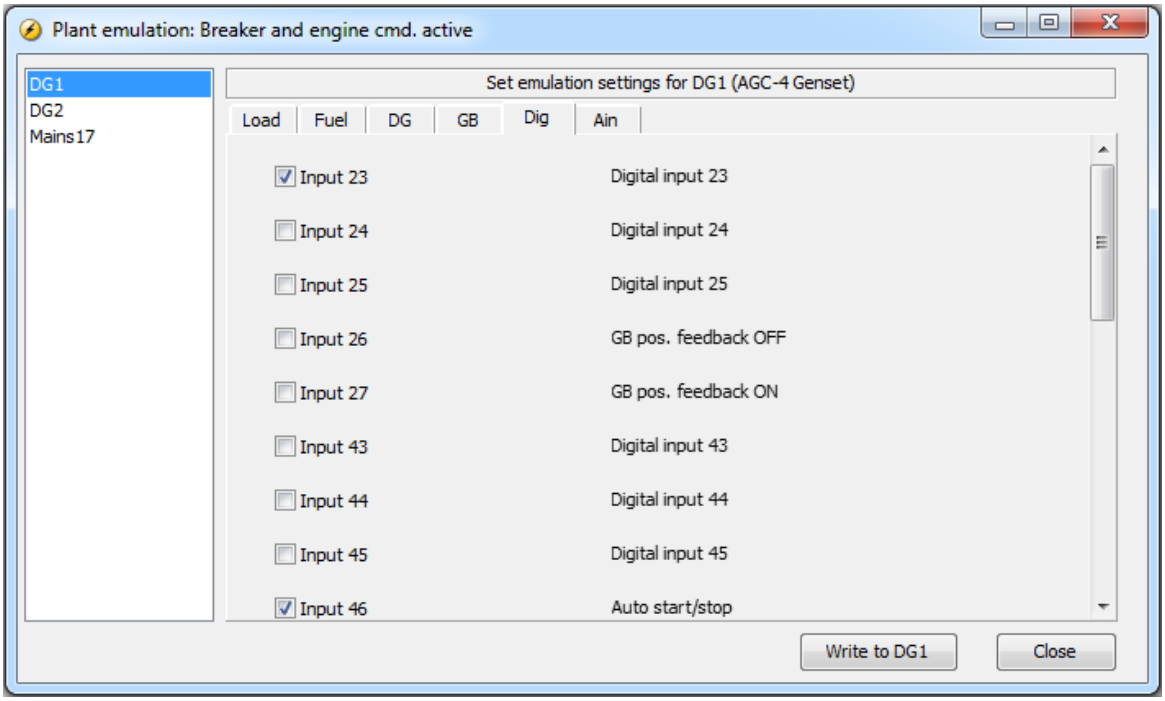
GB



Field	Content	Comment
GB trip Block GB open Block GB close Force GB open feedback on Force GB close feedback on Force GB open feedback off	External trip of GB	
Force GB close feedback off		Both the "Force GB close feedback on" and the "Force GB close feedback off" might be active at the same time in emulation, but in the real world, this will never happen.

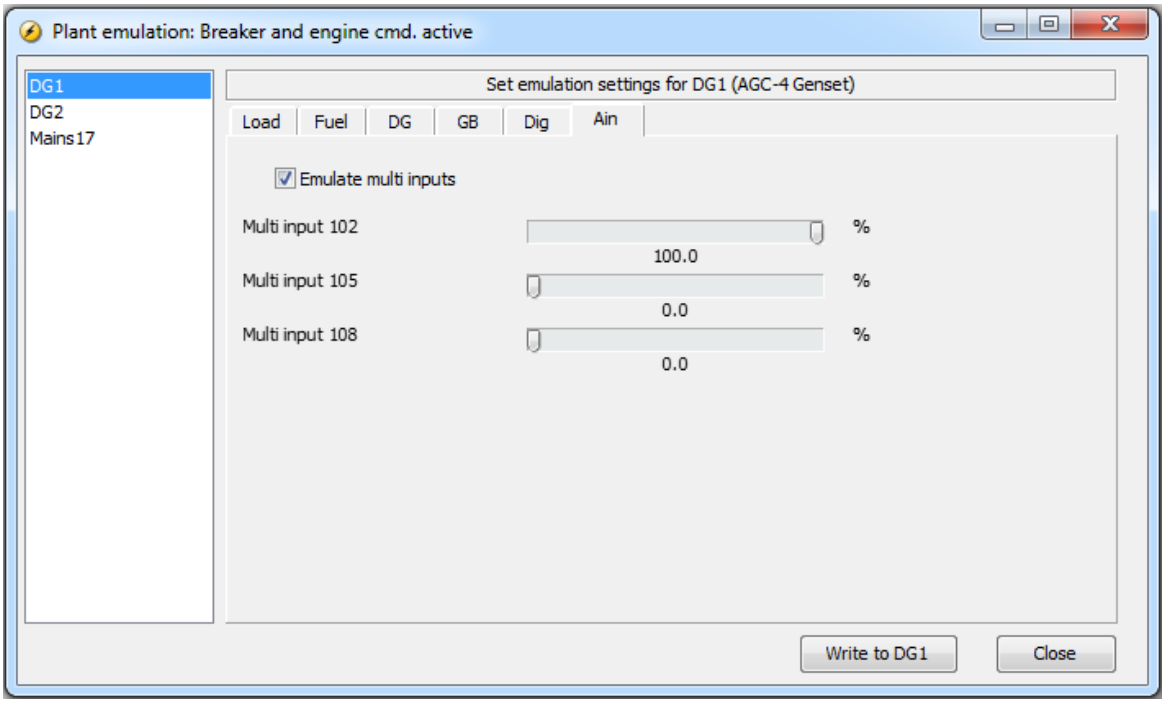
MB

Dig



Field	Content	Comment
Input	Emulate the signal on a given digital input	The name of the input originated from the function assignment

Ain

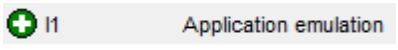


Field	Content	Comment
Emulate multi inputs Multi input	Checkbox used to switch the following block of multi-inputs on/off.	The number of "blocks" of multi-inputs depends on the hardware installed.

Emulation requirements

Requirements for the controller(s) to be able to emulate:

1. Controller with firmware that supports emulation. The controller supports emulation if the I1 option is set. All controllers in the setup needs to have this option set.



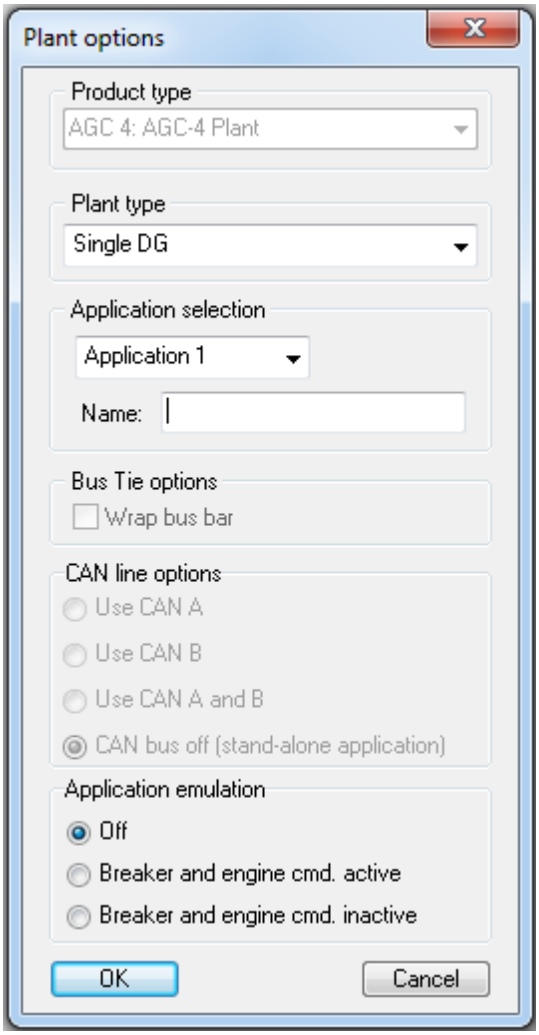
2. CAN interconnection between controllers and connection between a PC (running the Utility Software) and the controllers. For the later type of connection, there are three possibilities
   a) USB connection to service port in one of the controllers
   b) RS485 connection
   c) TCP-IP connection

For RS485 and TCP-IP full emulation functionality is available, whereas if the PC is connected to the USB service port, the emulation data can only be changed for the connected device.

3. Controllers used as DG units must be equipped with option(s) necessary for regulation and the regulators must be activated and adjusted properly for the dynamics of the emulation to reflect real live setups.

4. The CANbus protocol version 2 must be used (menu 9170). Note that this is only relevant if the application type requires CAN communication. This is not the case for a "single DG" application. Note: This is an issue only for older QC4002 products which might only support CANbus protocol version 1.

Setting up an emulation application is done just by adding a check mark in the application emulation field in the plant options window.

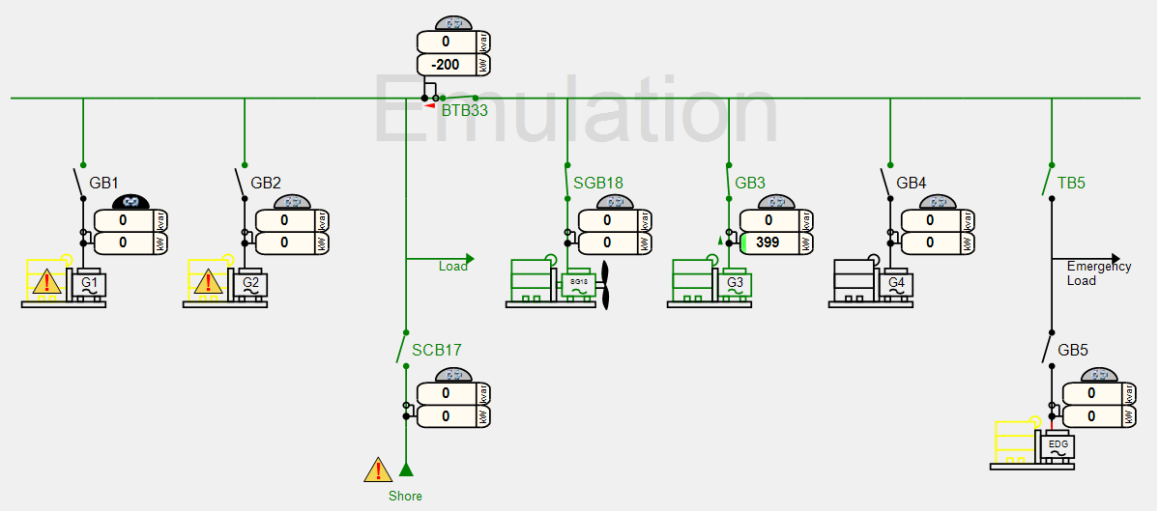


Explanation of the application emulation settings:

Application emulation setting	Description
Off	Emulation inactive. Used for real life applications.
Breaker and engine cmd. active	Emulation active. Commands for starting/stopping of engine as well as for opening/closing of breakers are active. Used for emulation applications where devices are placed outside switchboards or commands in question are isolated and verification of command signals is of interest.
Breaker and engine cmd. inactive	Emulation active. Commands for starting/stopping of engine as well as for opening/closing of breakers are inactive. Used for emulation applications where devices are placed inside switchboards. Emulation can hereby be performed without provoking actual genset operation.

When an emulation application is active it will be indicated on the supervision page by a watermark ("Emulation")

Emulation example: emulation of 8 controllers on a ship. Note the emulation watermark.



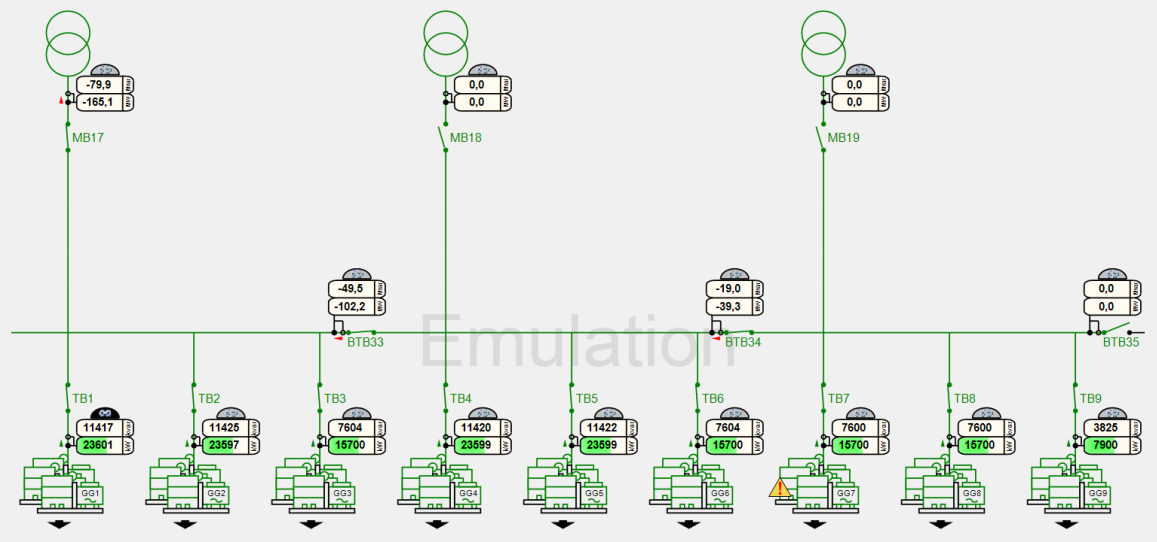
For security reasons, an alarm “Live volt. detected” will activate in the case a controller detects voltage on either its generator or busbar measurements. The alarm will force trip of breaker as well as a shutdown of the engine in case it being a DG unit. Even in a setup on a desk, this alarm might be provoked. To avoid this, the L1, L2 and L3 of both generator and busbar measurements should be connected to ground.

3.24.10 Deep Dive

If there is more than 16 devices in a plant these need to be placed in groups. Each group can contain up to 16 devices. The group is controlled by a genset group tie device. The genset group tie devices (one for each group) form a second level of controllers. This means that there is a socalled high level and a low level (containing the DGs). Notice that a plant with group requires the presence of the G7 option in all devices.

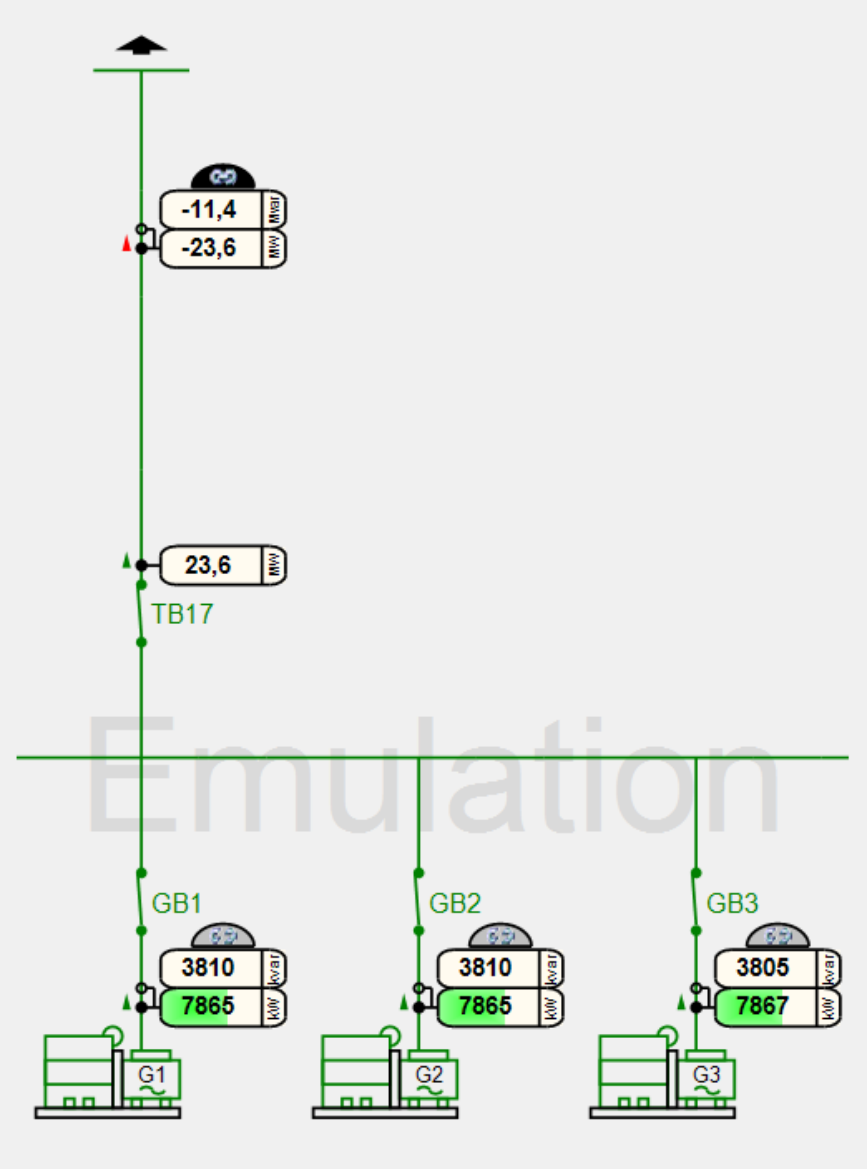
In the Utility Software, the user can "browse" between the two levels; the term "Deep dive" is used for this. The philosophy is that the user must be able to connect to any device in the plant and navigate to any genset group.

The top level can look like below:



In this case, the high level of the plant consists of 9 genset group tie devices, 3 mains devices, and 3 BTB devices.

If the user presses the "arrow down" button  , the group below will be opened - see example below:



In this case, the group consists of 3 DGs.

From the low level, the user can navigate to the high level by pressing the arrow up  .

3.25 Other Information

3.25.1 Command Line

The command line functionality offer the possibility to execute commands at the Windows command prompt. This allows, for example, commands to be specified in a .bat file.This can be used for performing actions like batch read/write on all controllers in a plant.

The requirement is that the PC Utility software is installed on the PC where the command lines will be executed. The PC Utility Software needs not to be started for commands to be executed at the command prompt.

The functions for which there are dedicated command line functionality are

a. Batch read
b. Batch write
c. Firmware write (will not work over TCP-IP to some genset controllers.
d. Read Logs from controller
e. Backup
f. Restore

For example, to perform a batch read from a controller that can be reached over TCP-IP, the following command can be given:

usw3.exe -connect:tcpip,192.168.2.45,1,3 -file:"setup.usw" -batchread

The "usw3.exe" refers to the executable installed with the PC Utility software. This executable can take a number of different command line options. The -connect option specifies how to connect to the controller; either or TCP-IP or a serial COM port. The file option specifies in which file the batchread function must store the read configuration.

The following table specifies the different options available

Option	Parameters to option	Example	Description
connect	There are two possible sets of parameters to the Connect option a) "SERIAL",MODBUS_ID, MAX_ATTEMPTS, SERIAL_PORT_NUMBER, MODBUS_ASCII,DATABITS b) "TCPIP",IP_ADDRESS, MODBUS_ID, MAX_ATTEMPTS c) LATESTSETTINGS d) AUTODETECTSERIAL	-connect:serial,1,3,5,false,8 -connect: tcpip,192.168.2.45,1,3 -connect:latestsettings -connect:autodetectserial	Used to specify either a serial COM port connection or a TCP-IP connection. The parameter "latestsettings" will use the most recently used communication setting used from within the PC Utility software. The parameter autodetectserial will try to find the COM port automatically.

Option	Parameters to option	Example	Description
file	PATH_AND_FILENAME	-file:test.usw	Path and name to usw file
logfile	PATH_AND_FILENAME	-logfile: "c:\temp\commandlinelog.txt"	The logfile contains a summary and result of the actions performed. If the command line fails, an error description will be added to the log file. If the log file exists it will be appended. Note that this log file is different from the log files retrieved from the controller.
alwaysclose	n/a	-alwaysclosse	Used to close the PC Utility Software irrespective whether the command line was successful or failed.
user	ACCESS_LEVEL	-user:service	The possible values for the ACCESS_LEVEL depends on the controller. Typically it is one of the following values a) customer b) service c) master
password	PASSWORD	-password:1234	The password belonging to a given access level
batchread	n/a	-batchread	
batchwrite	n/a	-batchwrite	
exclude-item	BATCHITEM TO EXCLUDE	-exclude-item:"Translations"	The exclude-item option is used to limit which items batchread and batchwrite will read/write. The text in the -exclude-item should be exactly as in the batch read/write as in the PC Utility Software. Note that more than one exclude-item can be given on a command line. Note also, that the name of the item has to correspond to the english translation.
logread	INITIAL_FILENAME_STRING	-logread:devlog this will generate a number of log files like (the exact list of files depends on controller type) devlog_150512_Battery log.xls devlog_150512_Alarm	The logread command allows the read out of the logs stored in the controller. The INITIAL_FILENAME_STRING specifies the first part of the filename for the different log files. The filename of the log files will be of the

Option	Parameters to option	Example	Description
		log.xls devlog_150512_Event log.xls	following format: <INITIAL_FILENAME_STRING><_DATE><_LOGTYPE> will be followed by The number of logs varies for different controller types.
resetalllogs	n/a	-resetalllogs	This will reset all logs if the device supports this feature.
firmwarewrite	n/a	- firmwarewrite	Whether firmware writing is possible depends on the connection type. For some controllers it is not possible over tcp-ip. After firmware writing it will take some time before the controller is ready. Therefore wait 90 seconds before issuing the next command to the controller if flashing over tcp-ip.

Return codes for the command lines:

0: command line was succesful
> 0: command line failed

Examples

batch read:
usw3.exe -logfile:"c:\cmdlog.txt" -alwaysclose -connect:tcpip,192.168.2.75,1,3 -file:"test.usw" -user:service -password:1746 -batchread -exclude-item:"Translations" -exclude-item:"Logs"

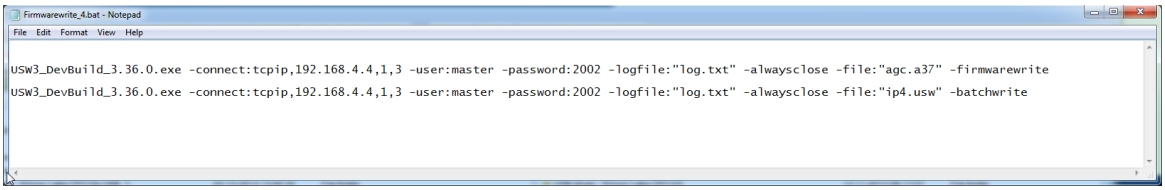
batch write
usw3.exe -logfile:"c:\cmdlog.txt" -alwaysclose -connect:serial,1,3,5,false,8 -user:customer -password:3464 -file:"c:\temp\test.usw" -batchwrite

firmware write:
usw3.exe -logfile:"c:\cmdlog.txt" -alwaysclose -connect:serial,1,3,5,false,8 -user:customer -password:3464 -file:"c:\firmware\xyz_r4545.a37" -firmwarewrite

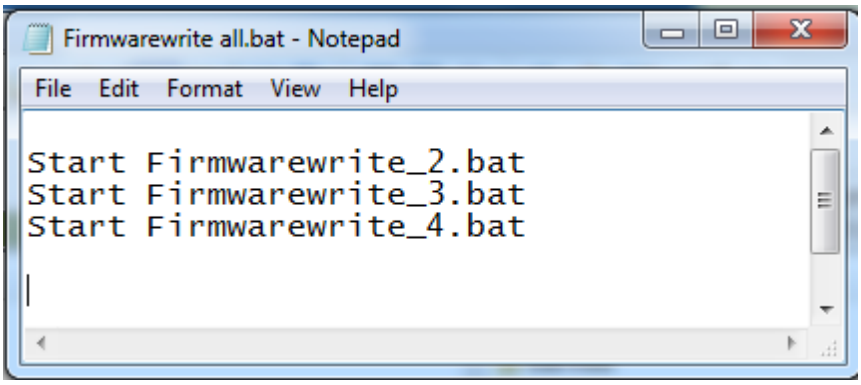
reset all logs:
usw3.exe -logfile:"c:\cmdlog.txt" -alwaysclose -connect:tcpip,192.168.2.75,1,3 -user:service -password:1746 -resetalllogs

In order to firmware upgrade a large number of controllers simultaneously a bat file can be made per controller. The set of bat files can launched from the another bat file. Below is an example where firmware write followed by a batch write is done one 3 controllers.

Make a file like the one below for each of the 3 controllers



Make a bat file that launches all the 3 bat files above.



When executing Firmwarewrite all.bat three instances of the utility software is launched.

3.25.2 Keyboard Shortcuts

The keyboard shortcuts available in the PC software are given in the following table. Note that some of the short cuts does not make sense for some devices as a given feature might not be supported by the device.

Function	Keyboard shortcut
Help	F1
Connect	F5
Disconnect	F4
Open	Crtl-o
Save	Ctrl-s
Close Project	Ctrl-p
Open Application Settings popup	F3
Read	Ctrl-r
Write	Ctrl-w
Select All in Batch Read/Write	Crtl-a
Open dropdown with access levels	Crtl-k
Open Device page	Ctrl-Alt-d
Open Application Supervision	Ctrl-Alt-s
Open Alarms page	Ctrl-Alt-a
Open Trending page	Ctrl-Alt-g

Function	Keyboard shortcut
Open Parameters page	Ctrl-Alt-p
Open I/O page	Ctrl-Alt-i
Open Options page	Ctrl-Alt-o
Open Logs page	Ctrl-Alt-l
Open Translations page	Ctrl-Alt-t
Open M-Logic page	Ctrl-Alt-m
Open App. Configuration page	Ctrl-Alt-c
Open batch read popup	F6
Open batch write popup	F7

4 Use Cases

This chapter gives examples of cases where the Utility Software is used to configure a system of controllers

4.1 Regulation

While configuring a genset the user needs to set up the govenor and the AVR. In the following different examples are given as there different communications interfaces between the device and the govenor or AVR are possible.

The following examples are for an QC 4002 Mk.II v. 4 device.

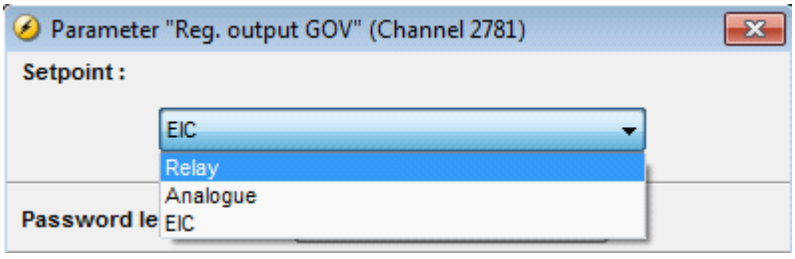
Note that analogue outputs for regulation are option dependent; see option E and F manual for more information. AVR regulation requires option D1; see option D1 manual for more information.

4.1.1 Govenor

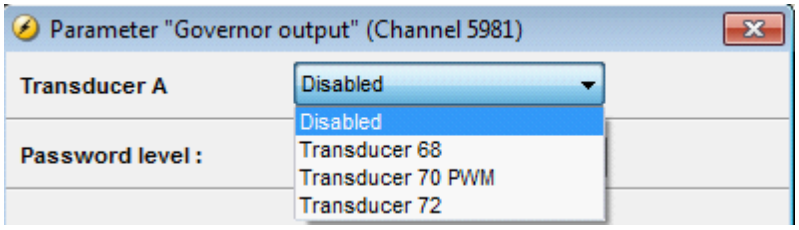
In the following some use cases are given that focus on the configuration of the govenor.

4.1.1.1 Govenor control via relay

1) Set menu 2781 to “Relay”

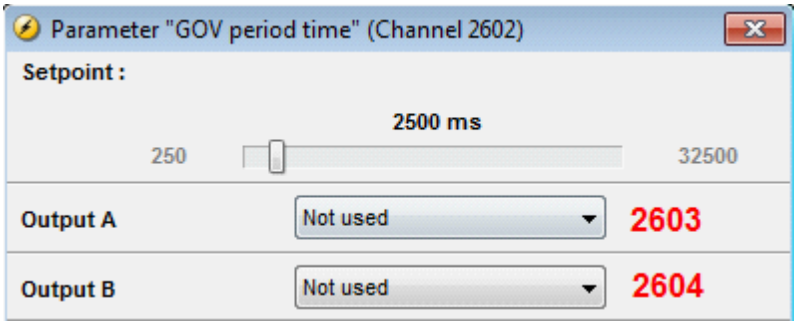


2) Set menu 5981 to “Disabled”

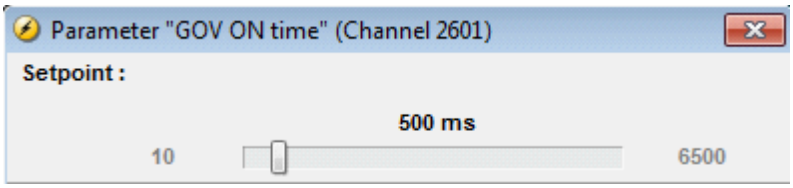


3) Set menu 2603 (output A) to the relay for RAISE/INCREASE (relay list is option dependent)

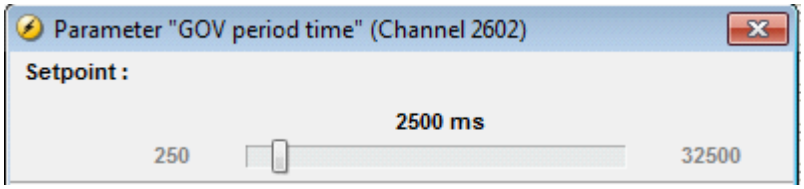
Set menu 2604 (output B) to the relay for LOWER/DECREASE (relay list is option dependent)



4) Set menu 2601 to the “ON” time (time the relay is activated)



5) Set menu 2602 to the “PERIOD” time (time the relay is OFF before being reactivated)



6) Regulation deadband and Kp values are set in the following menus:

2571	f deadband	135	1	%
2572	f Kp relay	136	10	
2581	P deadband	137	2	%
2582	P Kp relay	138	10	
2591	P LS f deadband	139	1	%
2592	P ls. f Kp rel.	140	10	
2593	P LS P deadband	141	2	%
2594	P LS P weight	142	10	%

f = frequency

P = power

P LS = power load sharing

7) Synchronization deadband and Kp values are set in the following menus:

2050	f sync Kp relay	77	10	

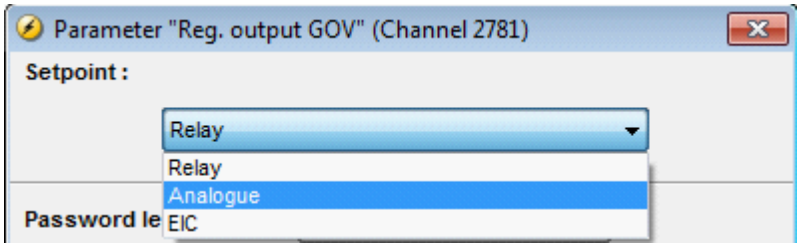
2070	Phase Kp relay	81	10	

f sync = frequency sync (dynamic synchronization)

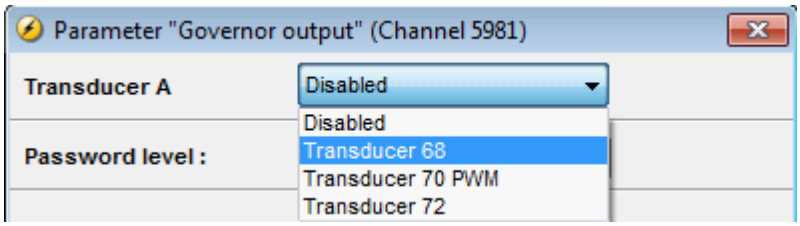
phase = phase sync (static synchronization, enabled in menu 2000)

4.1.1.2 Govenor control via analogue output

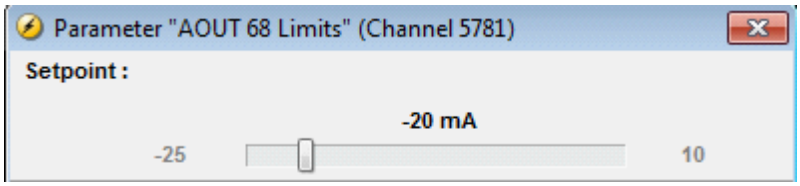
1) Set menu 2781 to “Analogue”



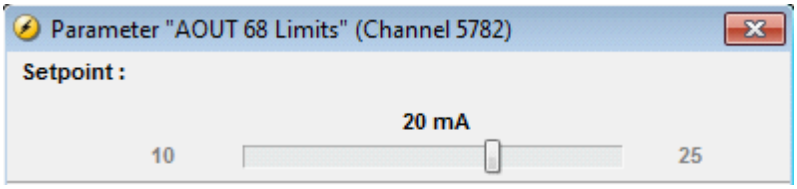
2) Set menu 5981 to the desired transducer output (transducer list is option dependent)



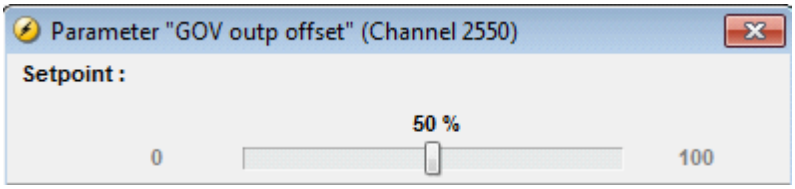
3) Set minimum mA limit for the transducer selected in menu 5981 (example transducer 68 = menu 5781)



4) Set maximum mA limit for the transducer selected in menu 5981 (example transducer 68 = menu 5782)



5) Output offset percentage (default output before regulation begins) is set in menu 2550-2553 (Menu used depends on selection of nominal setting 1-4 in menu 6006)



6) To convert the transducer mA output into V DC, a resistor is placed across the transducer output. The size of the resistor is determined using Ohm's law (V = I*R)

   a. Example: 20mA = max output (menu 5782); -20mA = min output (menu 5781)

   b. +/-5V DC signal is required

c. Using V=I*R and substituting 5 V, 20mA (20mA = .02 A) à 5 = .020 *R

d. Solving for R = 250 ohm resistor required

7) Regulation Kp, Ti, and Td values are set in the following menus:

2511	f Kp	122	0.5	
2512	f Ti	123	5	s
2513	f Td	124	0	s
2531	P Kp	126	0.5	
2532	P Ti	127	5	s
2533	P Td	128	0	s
2541	P loadsh. f Kp	129	0.5	
2542	P loadsh. f Ti	130	5	s
2543	P loadsh. f Td	131	0	s
2544	P LS P weight	132	10	%

f = frequency

P = power

P LS = power load sharing

8) Synchronization Kp, Ti, and Td values are set in the following menus:

2041	f sync. Kp	74	0.5	
2042	f sync. Ti	75	5	s
2043	f sync. Td	76	0	s

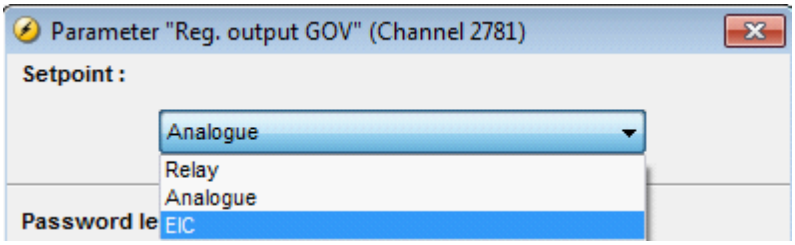
2061	Phase Kp	78	0.5	
2062	Phase Ti	79	5	s
2063	Phase Td	80	0	s

f sync = frequency sync (dynamic synchronization)

phase = phase sync (static synchronization, enabled in menu 2000)

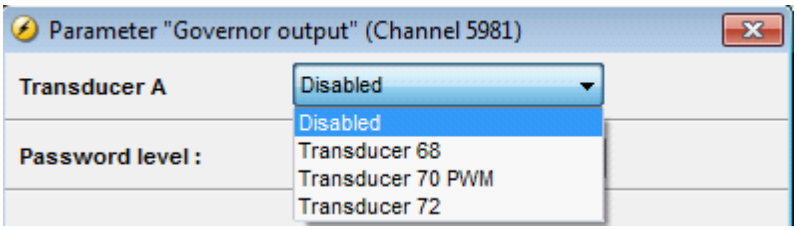
4.1.1.3 Govenor control via J1939

1) Set menu 2781 to “EIC”

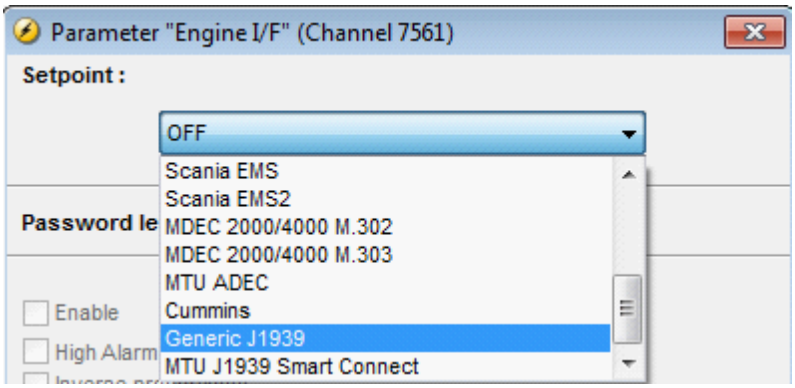


Connect J1939 CANbus wiring from the controller to engine CANbus. See option H5 and H7 manual and use case “EIC communication” for more information

Set menu 5981 to “Disabled”



Set menu 7561 to engine type. See use case “EIC communication” for more information on engine interface settings



5) Regulation Kp, Ti, and Td values are set in the following menus:

2511	f Kp	122	0.5	
2512	f Ti	123	5	s
2513	f Td	124	0	s
2531	P Kp	126	0.5	
2532	P Ti	127	5	s
2533	P Td	128	0	s
2541	P loadsh. f Kp	129	0.5	
2542	P loadsh. f Ti	130	5	s
2543	P loadsh. f Td	131	0	s
2544	P LS P weight	132	10	%

f = frequency

P = power

P LS = power load sharing

6) Synchronization Kp, Ti, and Td values are set in the following menus:

2041	f sync. Kp	74	0.5	
2042	f sync. Ti	75	5	s
2043	f sync. Td	76	0	s

2061	Phase Kp	78	0.5	
2062	Phase Ti	79	5	s
2063	Phase Td	80	0	s

f sync = frequency sync (dynamic synchronization)

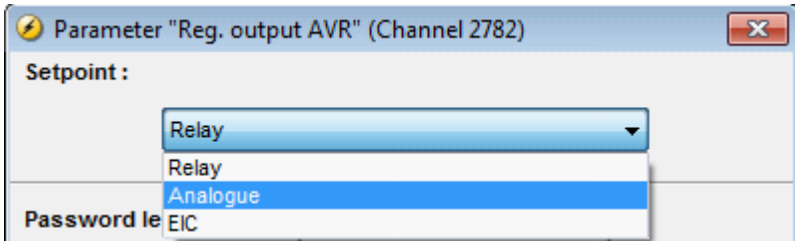
phase = phase sync (static synchronization, enabled in menu 2000)

4.1.2 AVR/DVR

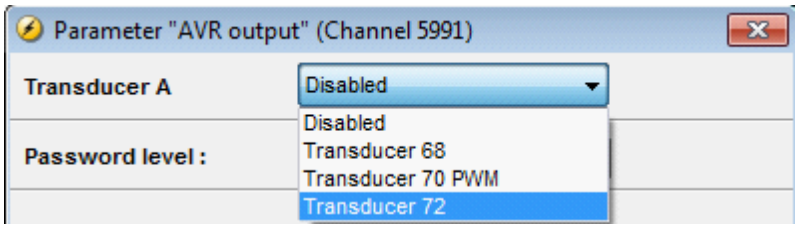
In the following some use cases are given that focus on the configuration of the AVR.

4.1.2.1 AVR control via analogue output

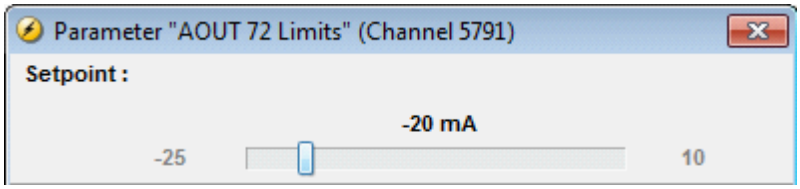
1) Set menu 2782 to “Analogue”



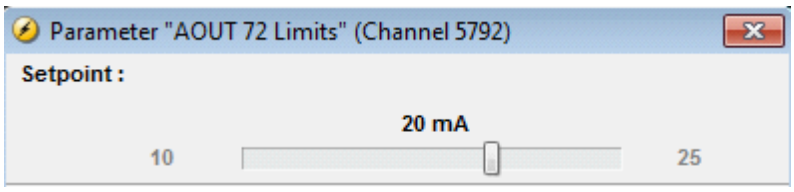
2) Set menu 5991 to the desired transducer output (list is option dependent)



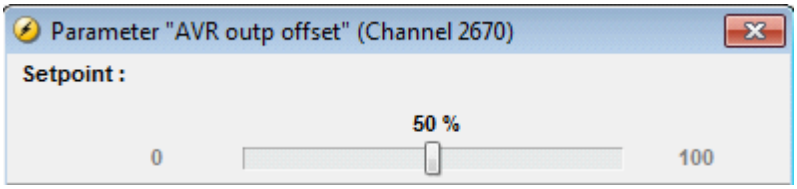
3) Set minimum mA limit for the transducer selected in menu 5991 (example transducer 72 = menu 5791)



4) Set maximum mA limit for the transducer selected in menu 5992 (example transducer 72 = menu 5792)



5) Output offset percentage (default output before regulation begins) is set in menu 2670-2673 (Menu used depends on selection of nominal setting 1-4 in menu 6006)



6) To convert the transducer mA output into V DC, a resistor is placed across the transducer output. The size of the resistor is determined using Ohm's law (V = I*R)

   a. Example: 20mA = max output (menu 5782); -20mA = min output (menu 5781)

   b. +/-5V DC signal is required

   c. Using V=I*R and substituting 5 V, 20mA (20mA = .02 A) à 5 = .020 *R

   d. Solving for R = 250 ohm resistor required

7) Regulation Kp, Ti, and Td values are set in the following menus:

2641	U Kp	151	0.5	
2642	U Ti	152	5	s
2643	U Td	153	0	s
2651	Q Kp	154	0.5	
2652	Q Ti	155	5	s
2653	Q Td	156	0	s
2661	Q loadsh. U Kp	157	0.5	
2662	Q loadsh. U Ti	158	5	s
2663	Q loadsh. U Td	159	0	s
2664	Q LS Q weight	160	10	%

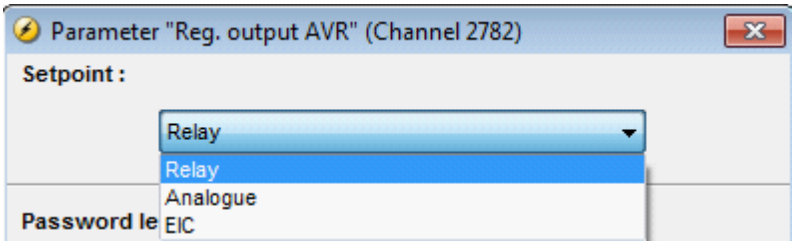
U = voltage

Q = var

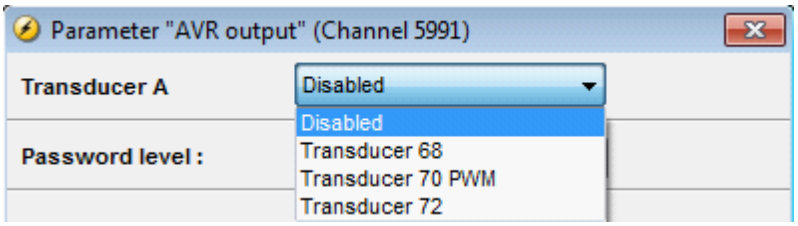
Q LS = var load sharing

4.1.2.2 AVR control via relay

1) Set menu 2782 to “Relay”

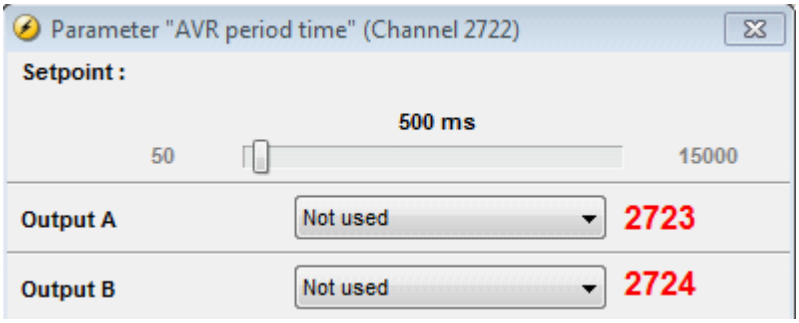


2) Set menu 5991 to “Disabled”

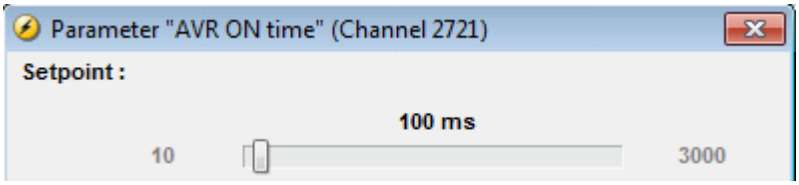


3) Set menu 2723 (output A) to the relay for RAISE/INCREASE (relay list is option dependent)

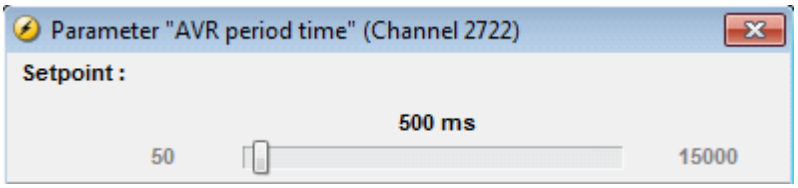
Set menu 2724 (output B) to the relay for LOWER/DECREASE (relay list is option dependent)



4) Set menu 2721 to the “ON” time (time the relay is activated)



5) Set menu 2722 to the “PERIOD” time (time the relay is OFF before being reactivated)



6) Regulation deadband and Kp values are set in the following menus:

2691	U deadband	163	2	%
2692	U Kp relay	164	20	
2701	Q deadband	165	2	%
2702	Q Kp relay	166	20	
2711	Q LS U deadband	167	1	%
2712	Q ls. U Kp rel.	168	20	
2713	Q LS Q deadband	169	2	%
2714	Q LS Q weight	170	10	%

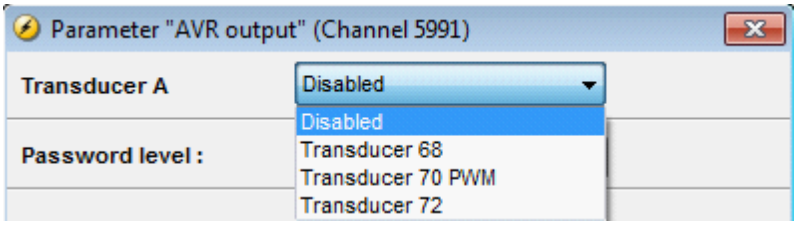
U = voltage

Q = var

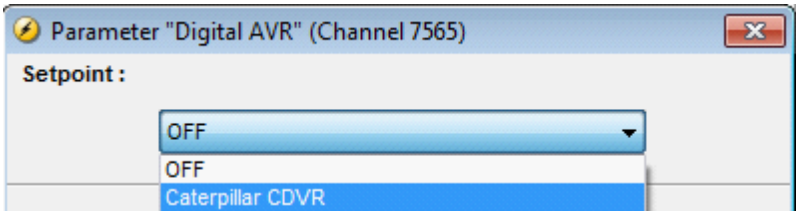
Q LS = var load sharing

4.1.2.3 AVR control via J1939

Set menu 5991 to “Disabled”



Set menu 7565 to AVR type “Caterpillar CDVR”



5) Regulation Kp, Ti, and Td values are set in the following menus:

2641	U Kp	151	0.5	
2642	U Ti	152	5	s
2643	U Td	153	0	s
2651	Q Kp	154	0.5	
2652	Q Ti	155	5	s
2653	Q Td	156	0	s
2661	Q loadsh. U Kp	157	0.5	
2662	Q loadsh. U Ti	158	5	s
2663	Q loadsh. U Td	159	0	s
2664	Q LS Q weight	160	10	%

U = voltage

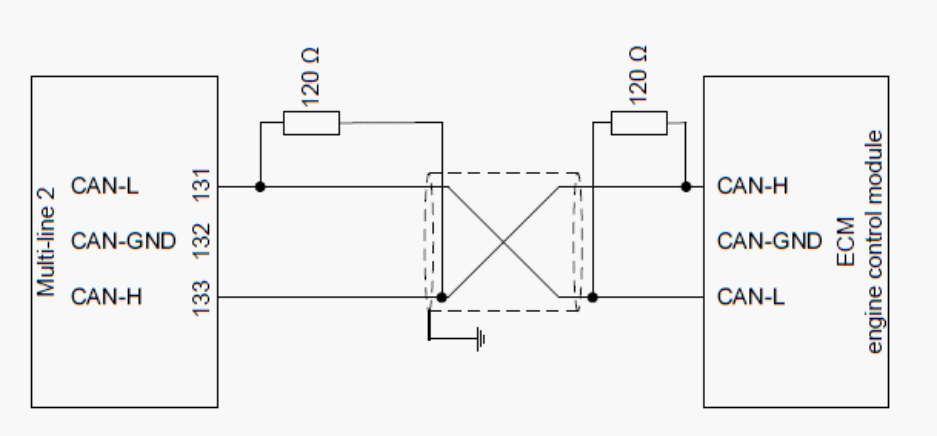
Q = var

Q LS = var load sharing

4.2 Engine Communication

This use case is about how to configure the CAN communication between the QC 4002 Mk.II v. 4 device and the engine controller.

Note: Option H5 or H7 must be installed. See option H5 and H7 manual for more information.



3.2.2 Option H5

The PCB for the engine interface communication module is placed in slot #8.

Term.	Function	Description
133	CAN-H	CANbus card option H5, Engine Interface Communication
132	CAN-GND	
131	CAN-L	
130	CAN-H	
129	CAN-GND	
128	CAN-L	
127	Not used	
126	Not used	

Terminals 133 and 130 are internally connected.
Terminals 131 and 128 are internally connected.

3.2.3 Option H7

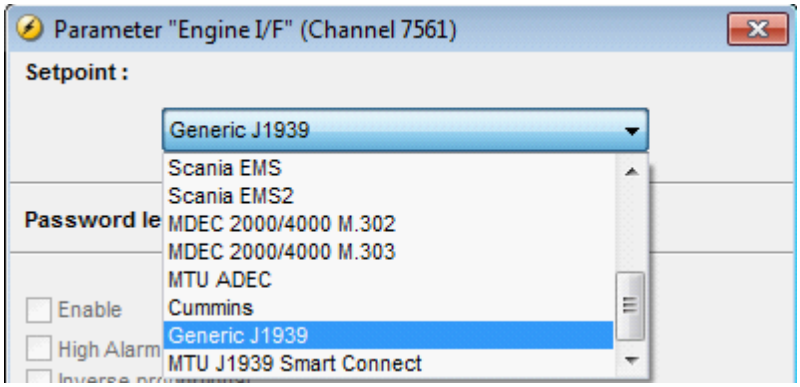
The PCB for the engine interface communication module is placed in slot #7.

Term.	Function	Description
A1	CAN-H	CAN I/F A
A2	CAN-GND	
A3	CAN-L	

AGC-3: If option G5 is active, the option H7 cannot be activated.

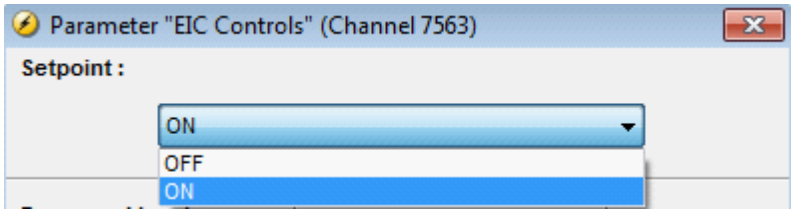
1) Connect J1939 CANbus wiring from DEIF control to engine CANbus

2) Set menu 7561 to the engine type. Reference option H5 and H7 manual for information on each engine type



3) Set menu 7562 to the ADEC engine ID (only applicable if “MTU ADEC” is selected in menu 7561)

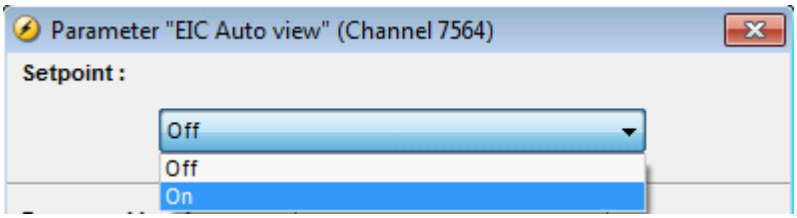
4) Set menu 7563 to “ON” if the DEIF control will issue commands to the engine; or set to “OFF” if the DEIF control will only read values form the engine (for more information on the commands that can be sent to each engine, see the option H5 and H7 manual section titled “Control commands sent to the engine”)

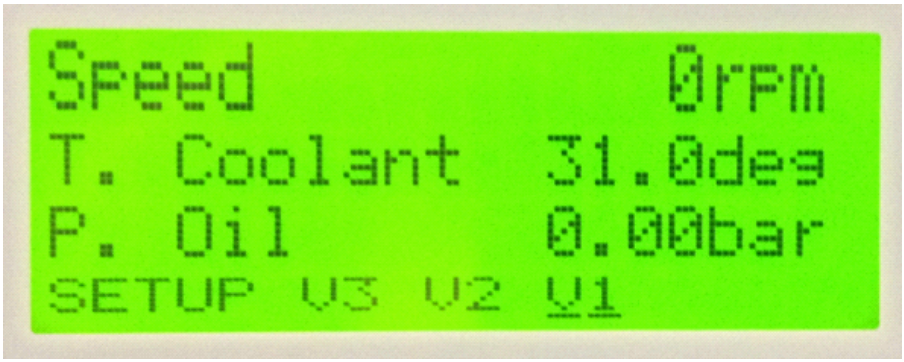


5) Set menu 7564 to “ON” to scan the J1939 network and display any values the DEIF control reads. These values are placed into new view screen(s) in V2 and V1 views. The number of new screens is dependent on the number of values the DEIF control reads from the J1939 network. The Auto view parameter is a momentary “ON”, and the value will revert to “OFF” after scanning the J1939 and creating the new view screen(s).

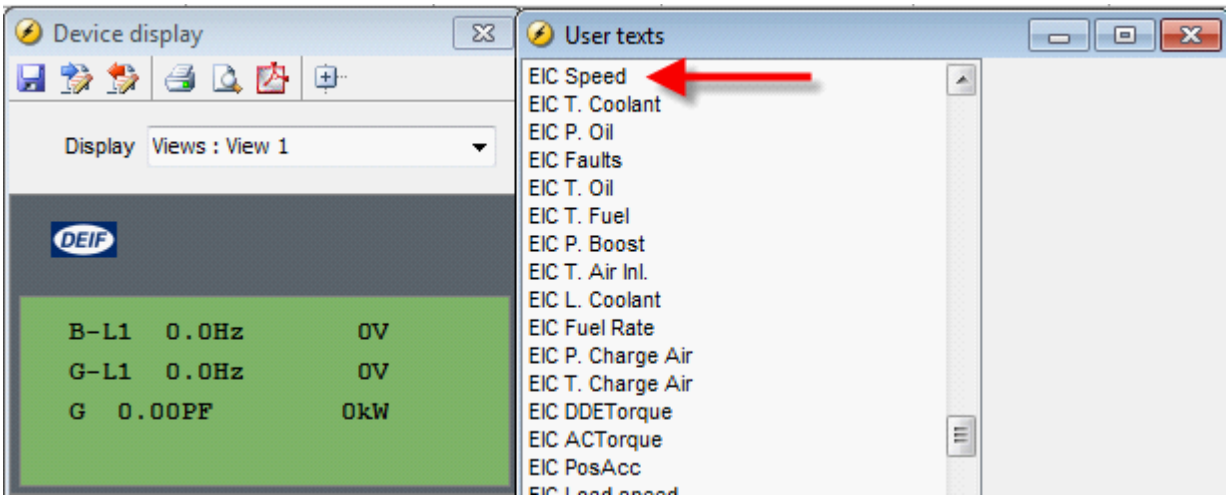
If the wiring and communication is setup properly, new view screens will be created with data from the engine. If the wiring and communication is not setup properly, there will not

be any new view screens.

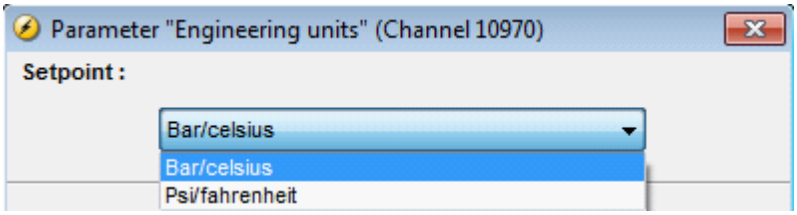




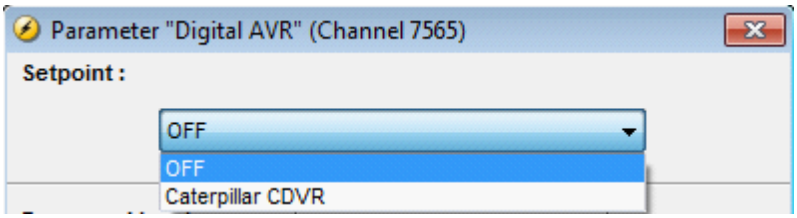
6) View screens can be manually programmed using the J1939 data by selecting values that begin with “EIC”



7) Set menu 10970 to the desired units displayed (temperature, pressure, etc.)

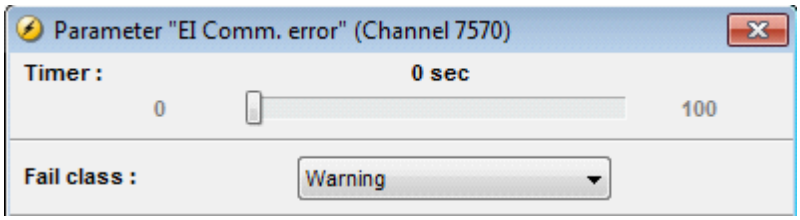


8) Set menu 7565 to “Caterpillar CDVR” if a Caterpillar CDVR voltage regulator will be biased via J1939 (Note: the CDVR must also be connected on the J1939 network)

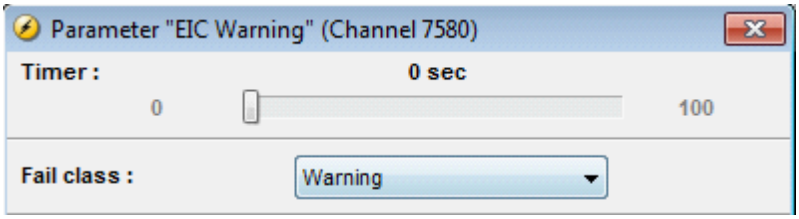


9) The J1939 values displayed by the DEIF control will also be copied into Modbus. For more information on the Modbus addresses, see the option H5 and H7 manual section titled “Modbus communication”

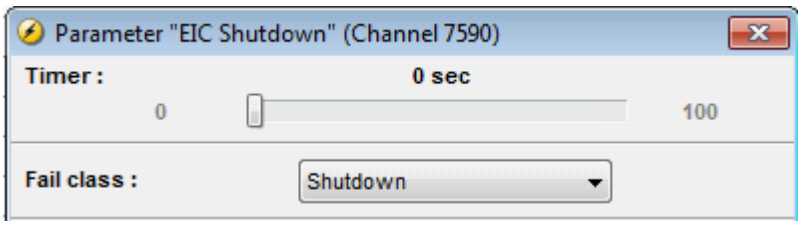
10) Set menu 7570 for the DEIF control to alarm when the EIC communication fails. Set the timer, fail class, and check “enable” to turn the alarm on



11) Set menu 7580 for the DEIF control to alarm when the engine has any warning present. Set the timer, fail class, and check “enable” to turn the alarm on



12) Set menu 7590 for the DEIF control to alarm when the engine has any shutdown present. Set the timer, fail class, and check “enable” to turn the alarm on



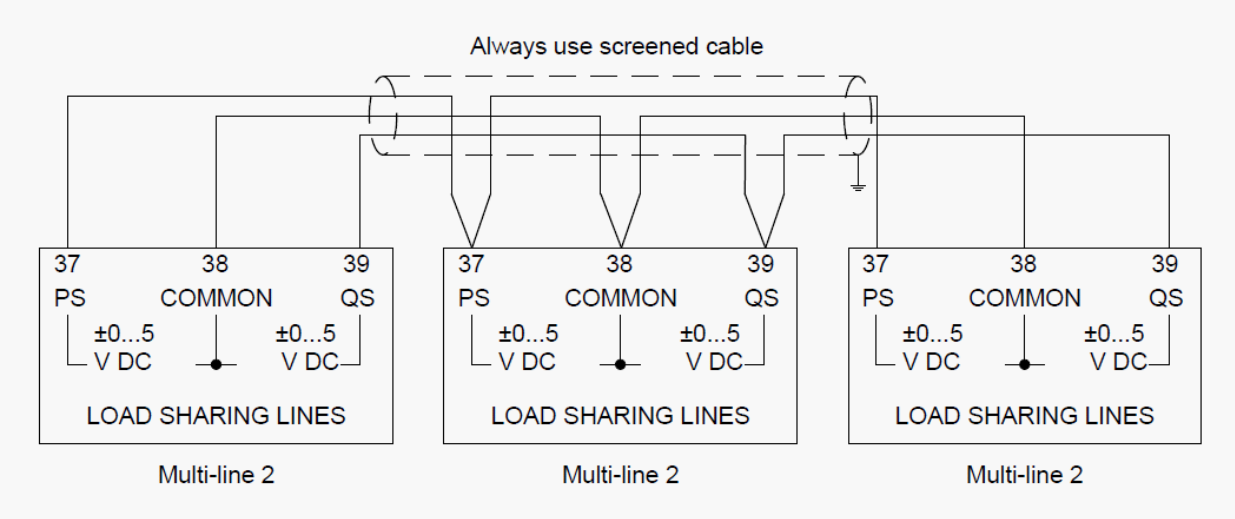
4.3 Analogue load share

This use case is about how to configure an analogue load share.

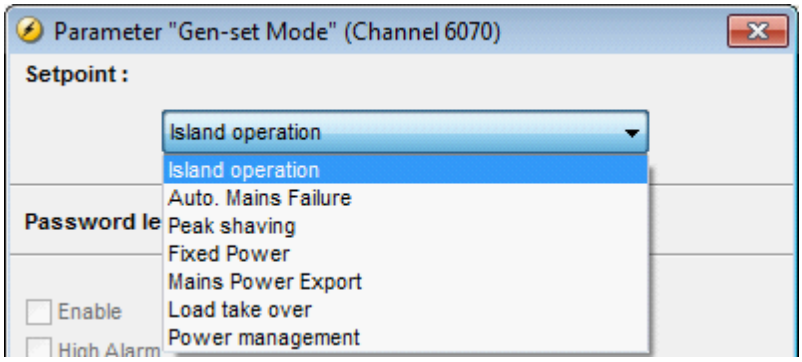
Note: Option G3 must be installed for active load sharing and option D1 must be installed for reactive load sharing. See option G3 manual and option D1 manual for more information.

1) Connect analog load share line between gensets

Term.	Function	Technical data	Description	Comment
37	-5/+5V DC	Analogue I/O	Active load sharing line	Requires option G3
38	Com.	Common	Common	
39	-5/+5V DC	Analogue I/O	Reactive load sharing	Requires option D1/G3



2) Set controller to “Island” mode in menu 6070



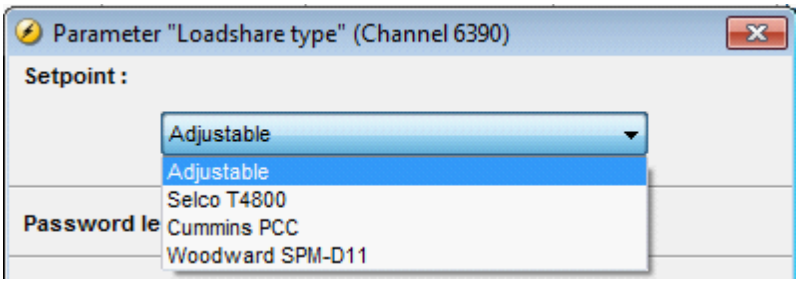
3) Set load share type in menu 6390 to match other load sharing device (if analog load sharing with another Atlas Copco controller, set to “Adjustable”)

   a. Adjustable

   b. Selco T4800

   c. Cummins PCC

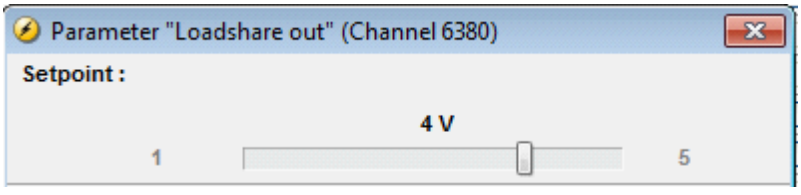
   d. Woodward SPM-D11



4) If menu 6390 is set to “Adjustable” , set signal level in menu 6380 to match other load sharing device, 1-5V (4V is default)

   a. If menu 6390 is set to Selco, Cummins, or Woodward, the setting in menu 6380 is ignored

   b. If load sharing with another Atlas Copco controller, ensure menu 6390 setting is identical in all units

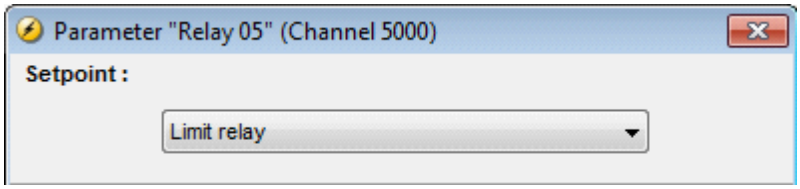


4.4 Pushbutton toggle

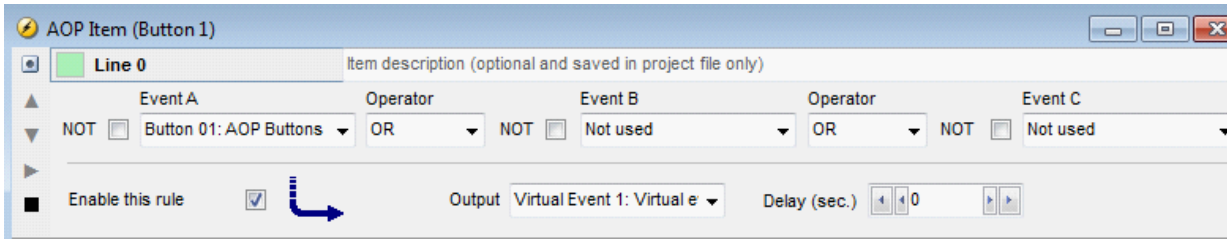
In this use case the user wants to assign a toggle functionality to an AOP button.

Note: In this example, an AOP pushbutton (button 1) will be used to toggle a relay (relay 5) ON/OFF with each push of the button using virtual events (virtual events 1 and 2).

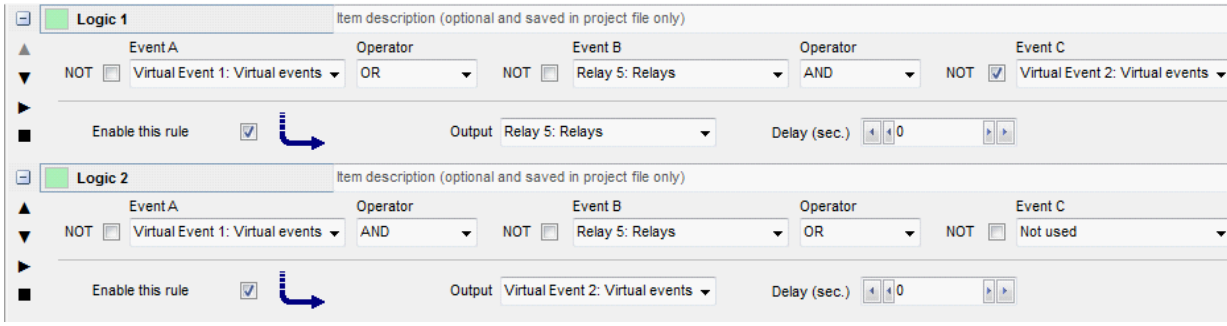
1) Set relay to “Limit relay” (menu 5000 for relay 5)



2) Set AOP button 1 logic to: “Button 1 à Virtual Event 1”



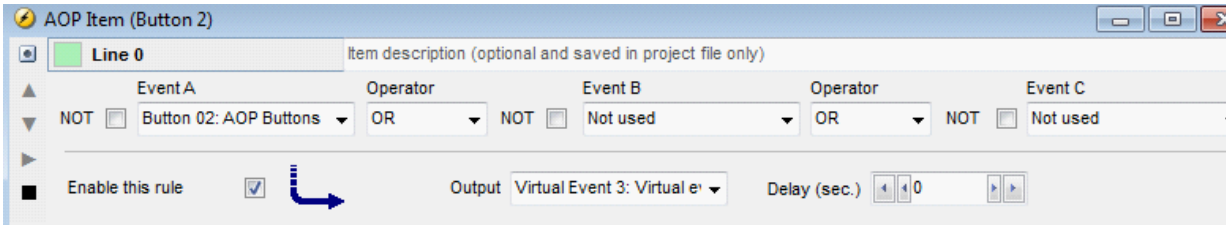
3) Set M-Logic lines to: “Virtual Event 1 OR Relay 5 AND NOT Virtual Event 2 à Relay 5” and the next line “Virtual Event 1 AND Relay 5 à Virtual Event 2”



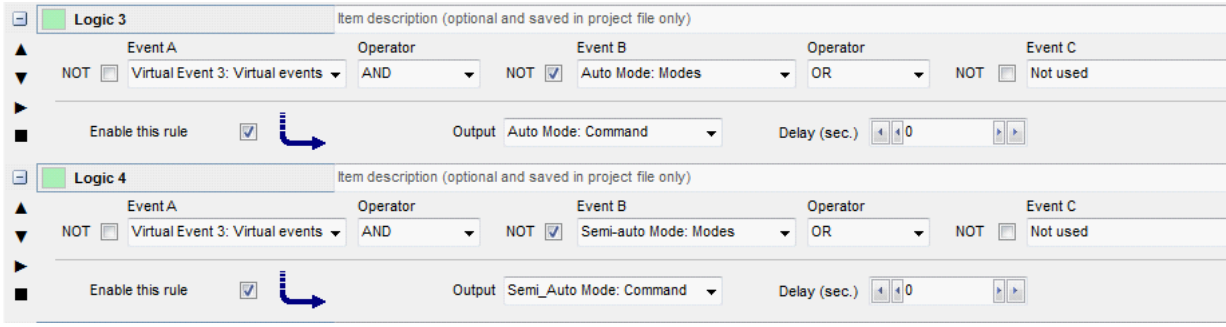
4) AOP Button 1 will now function as a toggle ON/OFF of relay 5 with each push of the button

Note: In this example, an AOP pushbutton (button 2) will be used to toggle the mode from SEMI AUTO to AUTO with each push of the button using a virtual event (virtual events 3)

1) Set AOP button 2 logic to: “Button 2 à Virtual Event 3”



2) Set M-Logic lines to: “Virtual Event 3 AND NOT Auto Mode à Auto Mode” and the next line “Virtual Event 3 AND NOT Semi Auto Mode à Semi Auto Mode”



3) AOP Button 2 will now function as a toggle between Auto and Semi Auto mode with each push of the button

4.5 Fuel level measurement with multiinput

This is an example of how to setup a multi-input for analogue measurement.

Case story:

A 4-20 mA sensor is used to measure fuel level. The measurement is used to start and stop a transfer pump and also to give alarms at critical levels, both low and high level. Low level in case the pump does not start and high level to prevent from over filling

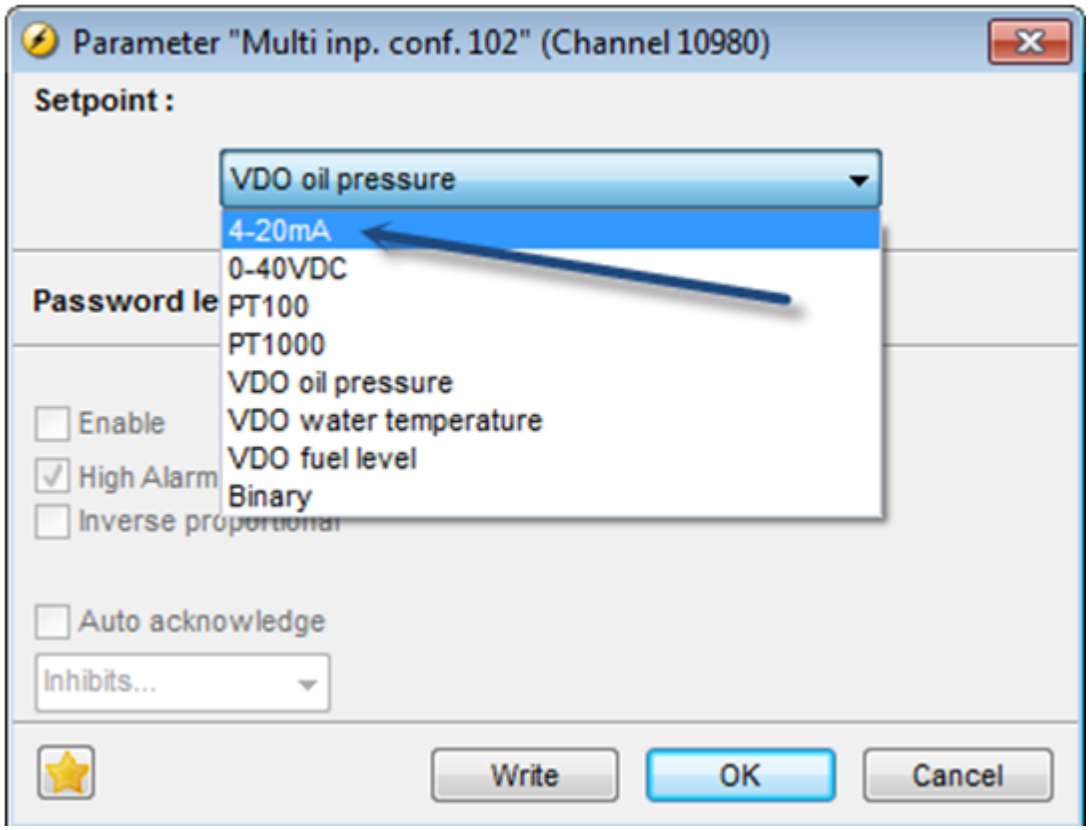
The output must be shown in 0-100%, where 4mA = 0% (empty tank) and 20mA is 100% (full tank) (To change the unit from mA to % please see “Translations” in the Utility software help)
The fuel pump must start when the fuel level drops to 20% and stop at 80%. This function is done with fuel pump logic. Please see Designers reference handbook for more information on how to setup fuel pump logic.

1. Setup Multi input 102 for 4 - 20 mA

a) Connect to the unit, access the parameters and choose the USW tab. Access parameter 10980

10390	PASSW. LANGUAGE PAGE	739	
10400	PASSW. LOG PAGE	740	
10410	PASSW. CONTROL PAGE	741	
10970	Engineering units	797	
10980	Multi inp. conf. 102	798	
10990	Multi inp. conf. 105	799	
11000	Multi inp. conf. 108	800	
11010	4-20mA inp scale 102	870	
11020	4-20mA inp scale 105	871	
11030	4-20mA inp scale 108	872	

b) Choose 4 - 20 mA in the drop down menu, and press the "Write" button

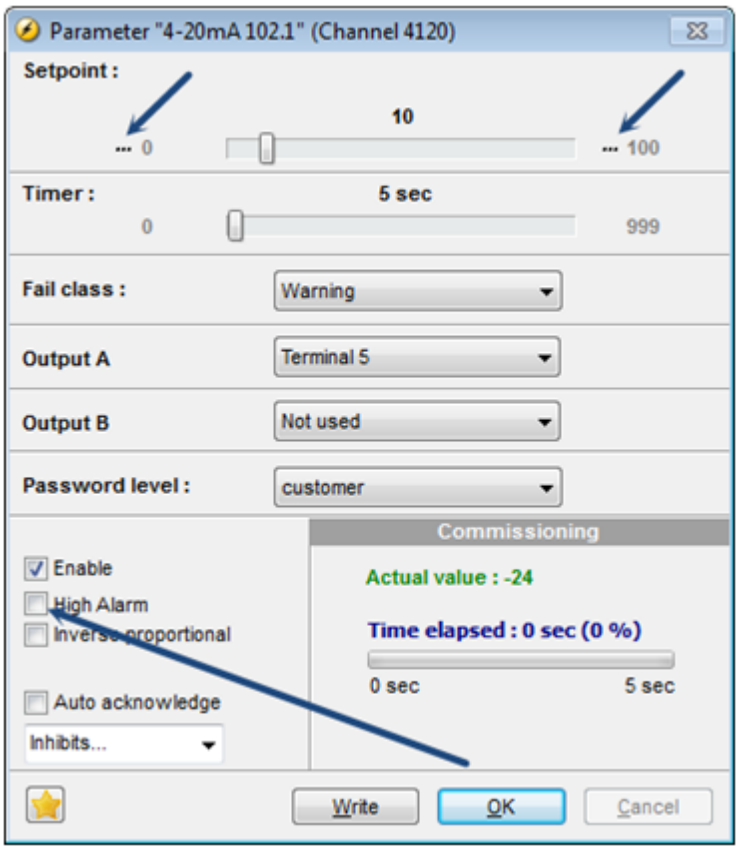


2. Read the parameters
a) Since the multi-input is changed it is necessary to read the parameters again
b) After reading the parameters the 4-20mA appears in the “Ain”(Analogue input) tab.
It is possible to setup two levels of alarms with 102.1 and 102.2 both with individual fail classes and

outputs.

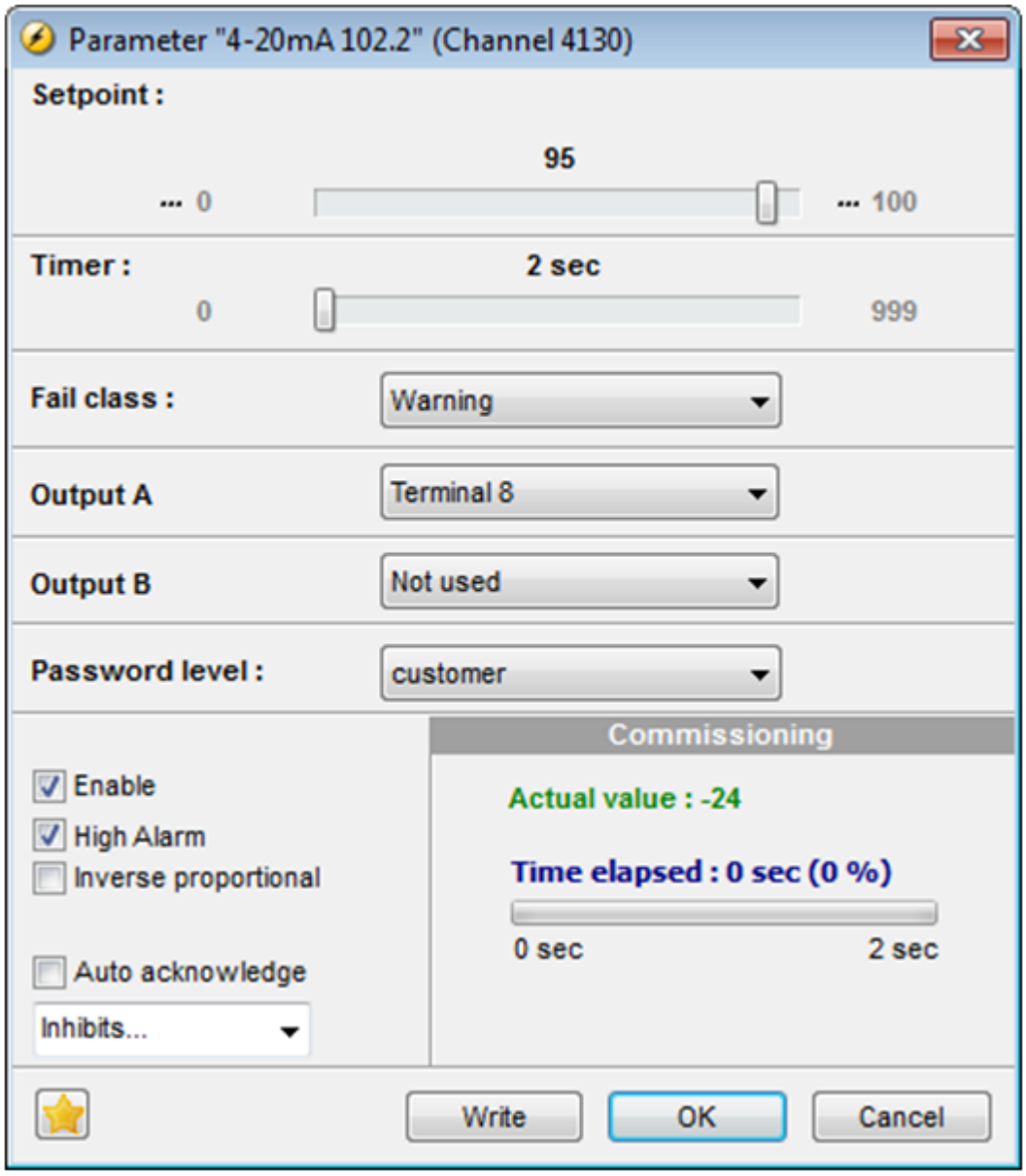
Channel	Text	Address	Value	Unit
4120	4-20mA 102.1	268	2	
4130	4-20mA 102.2	274	1000	
4240	W. fail 102	304	N/A	%

3. Scale the 4-20mA input to fit the range from 0-100 %
a) Enter parameter 4120(alarm level 1 “4-20mA 102.1”). The three dots to the left of the figures, marked with arrows, are buttons. Adjust the input as required for 0-100



b) The figure above shows that the alarm setpoint is set to 10% and when this is on for more than 5 seconds(timer) terminal 5 is activated. Terminal 5 is wired to a flashing light indicator. The alarm is enabled with the “Enable” check box. Since this is the low alarm, the “High Alarm” box must be unchecked.

4. Scale alarm level 2(4-20mA 102.2) to fit the range from 0-100%



a) The figure above shows that the alarm setpoint is set to 95% and when this is on for more than 2 seconds (Timer) terminal 8 is activated. Terminal 8 is wired to power off the transfer pump.

This completes the configuration of the multi input

4.6 Water temperature measurement with multiinput

This is an example of how to setup a multi-input as an analogue current measurement between 4-20mA. An AGC-100 was used in the following example.

Case story:

A 4-20 mA sensor is used to measure the cooling water temperature. The measurement is used as a safety for the engine, to prevent overheat.

The output must be shown in temperature and the range of the thermometer is from e.g. 20 to 120 degrees Celsius. The controller has to give an alarm when the temperature of the cooling water reaches a temperature of 100 degrees, and stop the engine the temperature reaches 110 degrees.

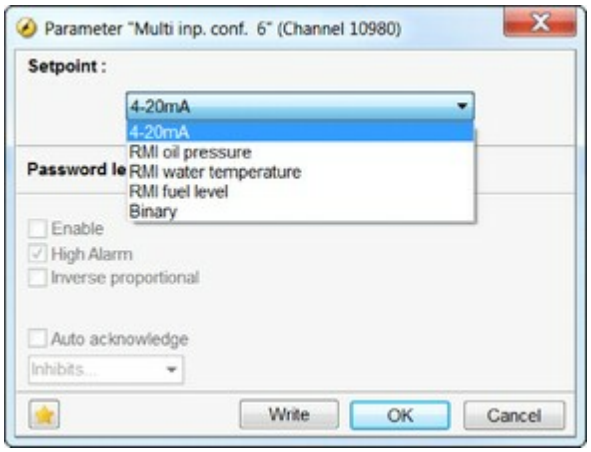
The controller will, when using the multi input as an analogue current measurement, show e.g. “Analog 6 - 4mA”. To change the unit from mA to Celsius please see “Translations” in the Utility software help.

1. Setup the Multi-input as a 4-20 mA current measurement.
   a.

USW	10970	Engineering units	797	0
USW	10980	Multi inp. conf. 6	798	0
USW	10990	Multi inp. conf. 7	799	0
USW	11000	Multi inp. conf. 8	800	0
USW	11010	Analog unit input 6	870	4
USW	11020	Analog unit input 7	871	4

   Connect to the unit, access the parameters and choose the USW tab and access parameter 10980, 10990 or 11000.

   b.

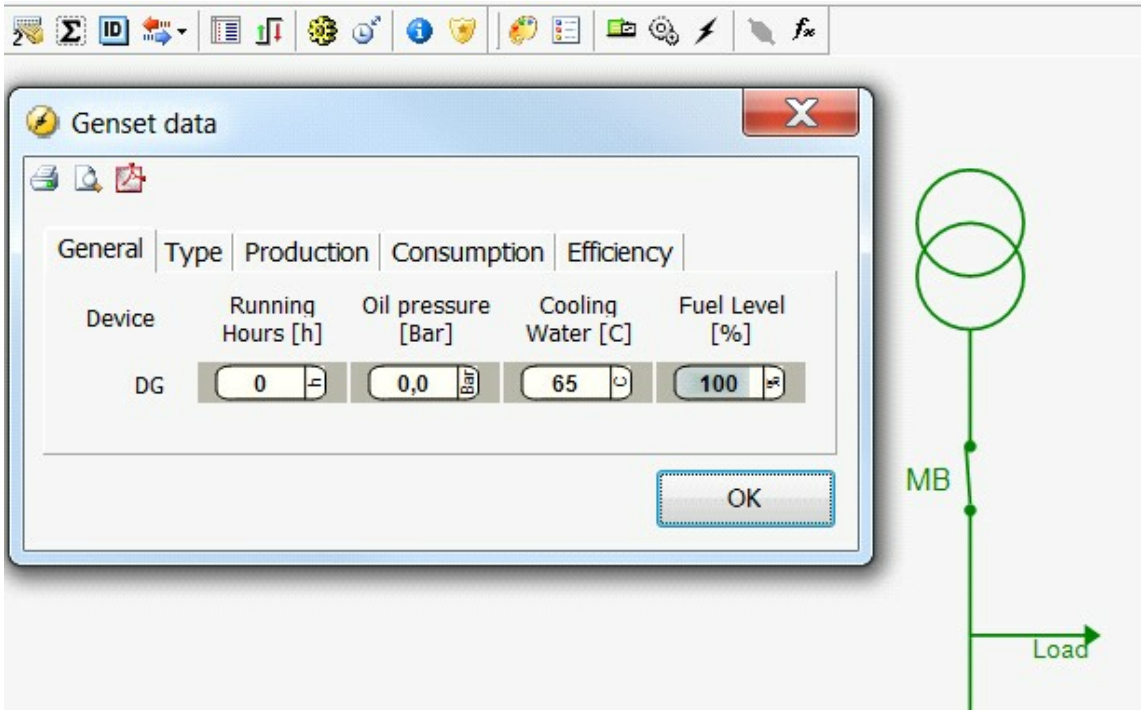


Double click on the parameter you want to change, and a pop-up will occur.

Choose “4-20mA” in the drop down menu, and press the “Write” button.

c. If the version of your USW is older than 3.36, you’ll have to read all parameters again to get access to the “new” parameters. For more information about the parameters please see “Designers reference handbook” page 76.

2.

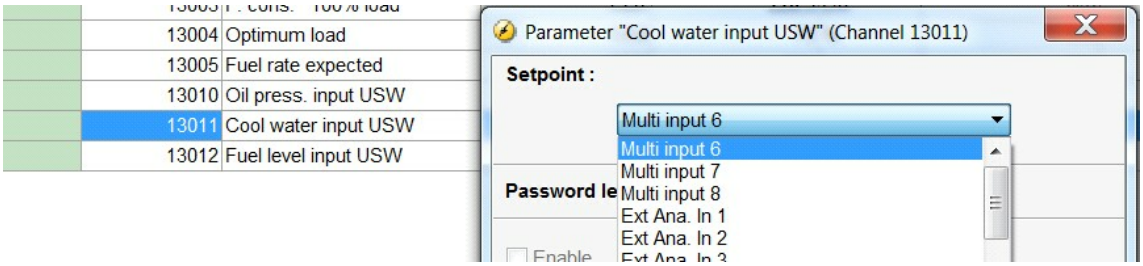


If you want to able to read the cooling water temperature in the “Genset data” tab, you have to specify how the temperature is detected.

a. Choose the “SuperVision” tab and select parameter 13011 “Cool water input

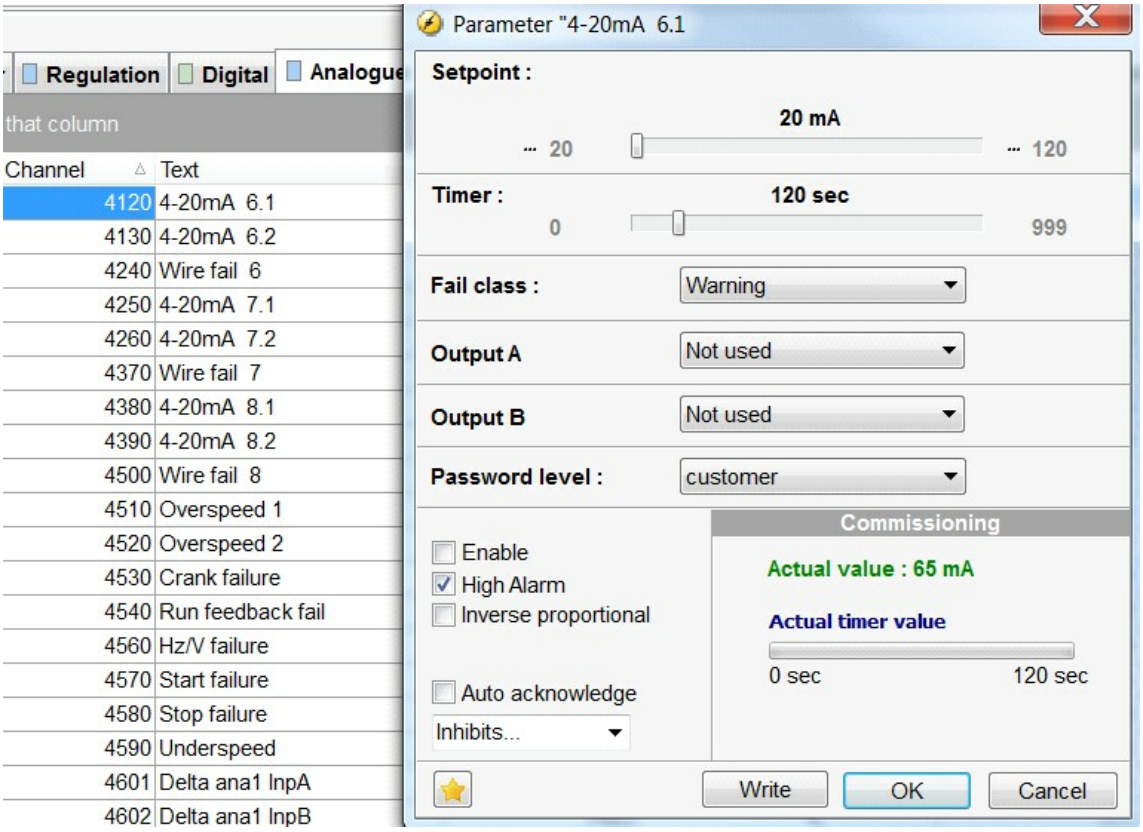
USW". In the drop down menu you select the Multi-input which you selected earlier.

3.



To setup the alarms and the scaling of the display you have to go to the "Analogue" tab.

a.



Each Multi-input has two alarm parameters. The Multi-input 6 has parameter 4120 and 4130. In the menu you can scale the input and set an alarm.

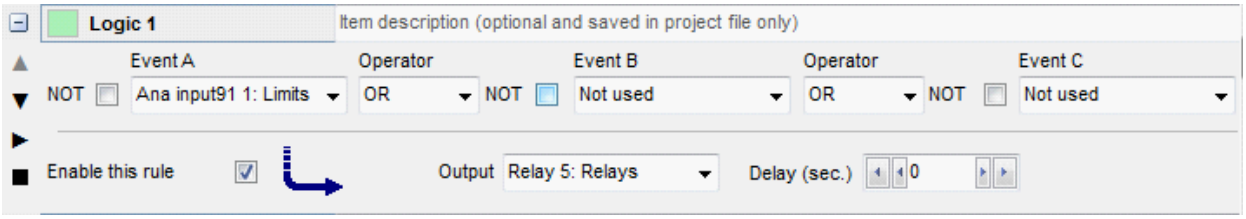
b. Scaling the 4-20 signal to fit the range of the thermometer (20-120). This is done by clicking on the tree dots, marked with arrows. The scaling of parameter 6.1 (4120), is the one which is shown on the display of the controller.

c. The bar between the two scaled setpoints is the alarm bar. You can configure the alarm to go high when you temperature exceeds the selected value or when it's under. This is done by enableing or unenableing the "High Alarm". When it's enabled an alarm will occur when the vaule it exceeded, and when not, the alarm will occur when the value is under the selected setpoint. The timer under the alarm bar is to determent how long time fault has to stay, before the alarm occurs. In the fail class tab you can change the what will happen when a fault occurs.

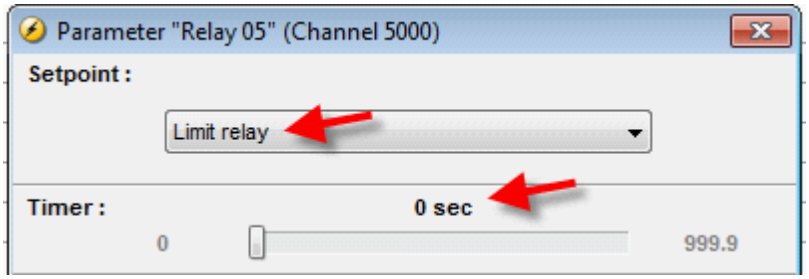
4.7 Analogue input to control a relay output

In this case, analogue input 91 (4…20 mA signal) will control relay 5 ON/OFF depending on the setpoint of Analogue input 91.1. This is accomplished without activating an alarm by creating the following setup.

Program the following M-Logic line: "Ana input 91.1: Limits" --> "Relay 5: Relays"



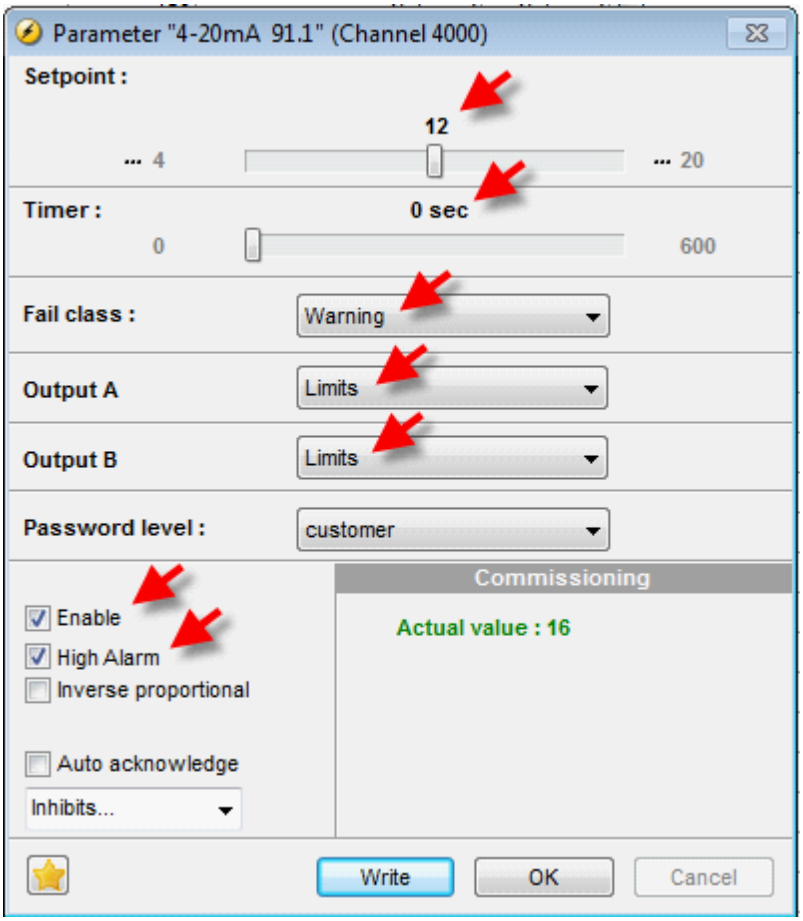
Set "Relay 05" (menu 5000) to "Limit relay" setpoint and "0 sec" timer:



Set "4-20mA 91.1" (menu 4000) to the following:

- Setpoint: mA level limit above/below which the relay will activate
- Timer: time delay before relay will activate
- Fail class: "Warning"

- Output A: “Limits”
- Output B: “Limits” *** both “Output A” **and** “Output B” **must** be set to “Limits”
- Enable: check this box
- High alarm: check this box to activate the relay **above** the Setpoint, or leave the box empty to activate the relay **below** the Setpoint

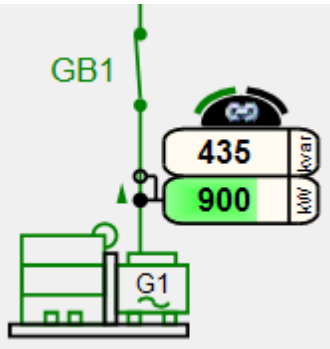


With the above mentioned settings, relay 05 will activate whenever analogue input 91 is above 12 mA.

4.8 Redundancy

Redundancy setups are configurations where the controller has a second controller to take over immediately in case of failure. This chapter explains how to configure such a setup. Redundancy is only relevant for selected controllers. When configured correctly the state of two controllers is indicated in the Application Supervision page; the two arc's above the Connect button represents the state of the redundant controllers - see the chapter about Application Supervision to get an overview the color codes used. The two devices, that will be redundant for each other, are named A and B.

The left arc (above the Connect symbol) represents controller A and the right arc represents controller B.

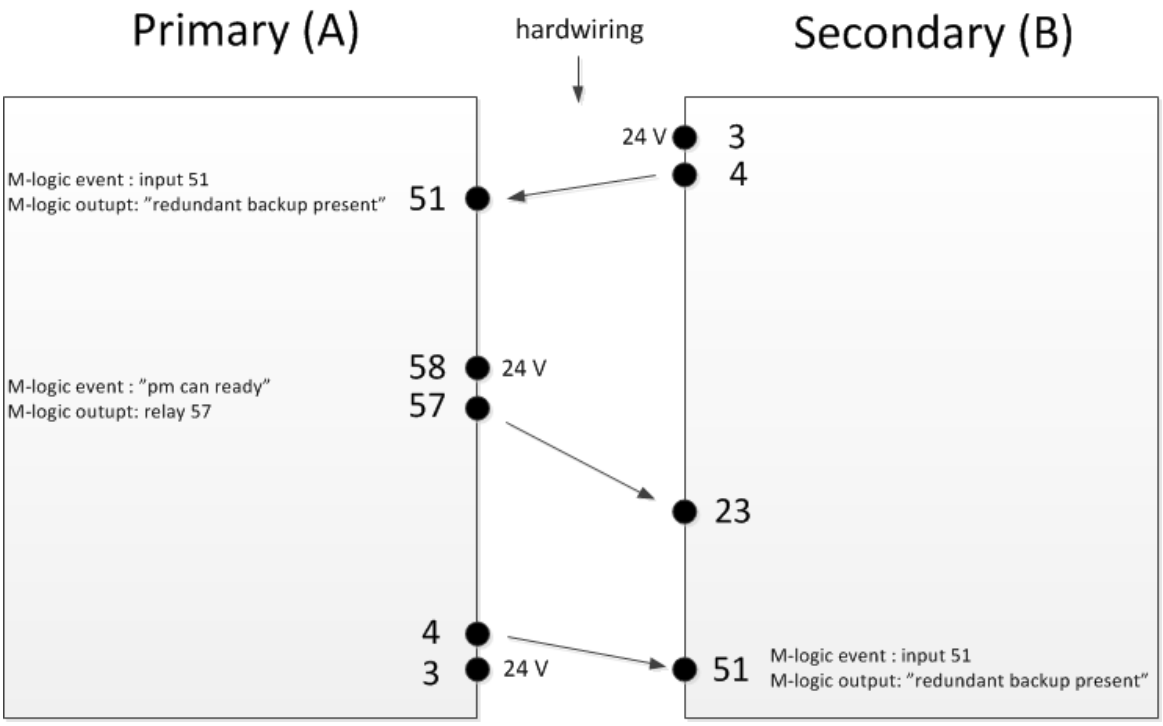


The steps to configure a redundant setup are the following

1. Make sure that all the controllers in a plant have the “Critical Power” option set. Note however, that this does not mean, that there needs to be redundancy for all gen-set, bus-tie breaker and mains controllers. For example, in setup there could be redundancy for the gen-set controllers but not the mains controller.

2. Assign CAN id’s to the controllers and remember that two controllers, that will be redundant for each other, must have identical CAN id.

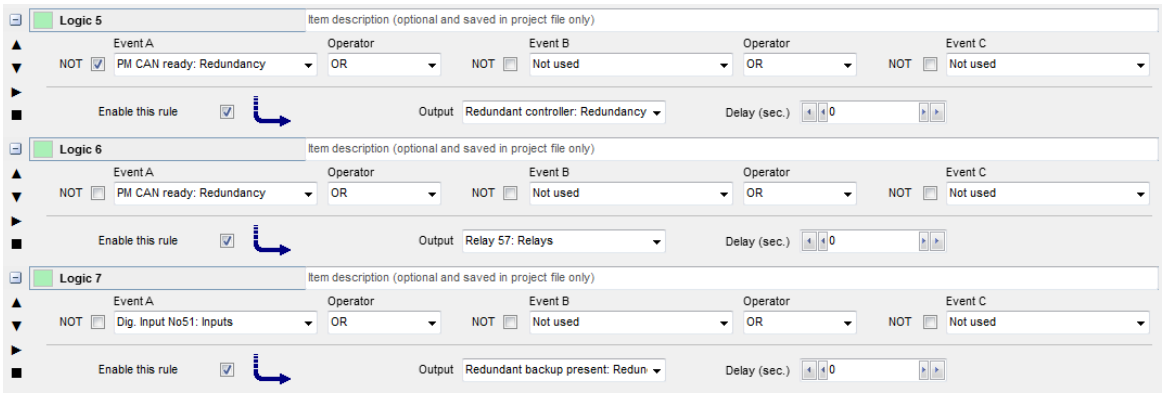
3. The two controllers, that will be redundant for each other, must be interconnected so relay output on one controller goes to an input on the other and vice versa. This hard wiring is needed for one controller to know when the other controller is not working any longer. For example, connect the ”Status” relay (terminal 4) on device A with one input (terminal 51, for example) on controller B. This is used to signal to B whether the A device is ready or not. In a similar way the Status relay of B must be connected to an input of A. Finally, there must be a signal that is used to control which device is redundant initially; connect a relay output (e.g. 57) to an input (e.g. 23) on B.



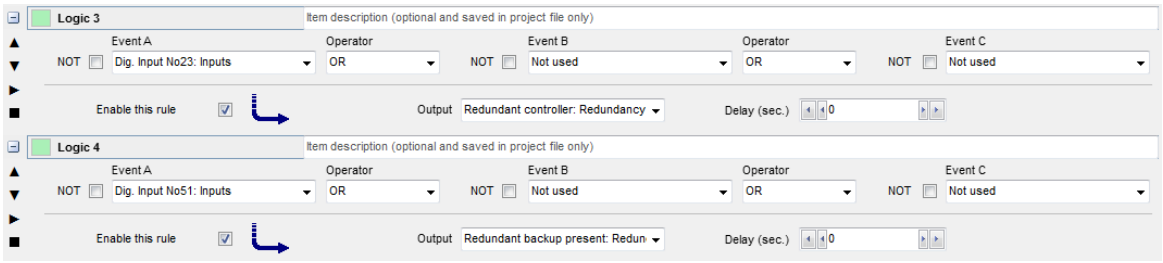
Note that in the sketch above controller A is primary but this could as well be B.

4. Open M-Logic and make a couple of lines that is used for a) configuring which controller (A or B) will be in control initially, b) knowing whether the other controller is alive or not. The M-logic lines explicitly tell which input and relays are used for the hardwiring mentioned above. An example is given below

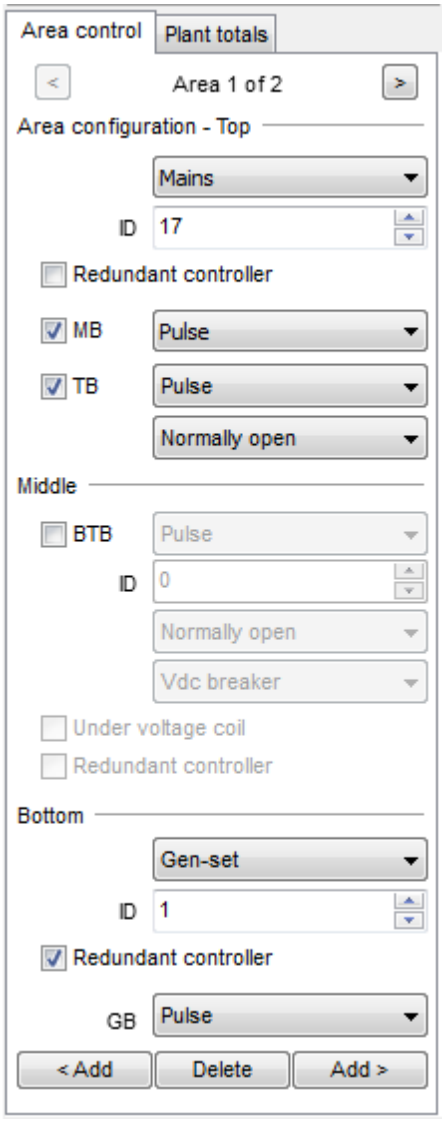
M-Logic in the primary controller (A in the example above):



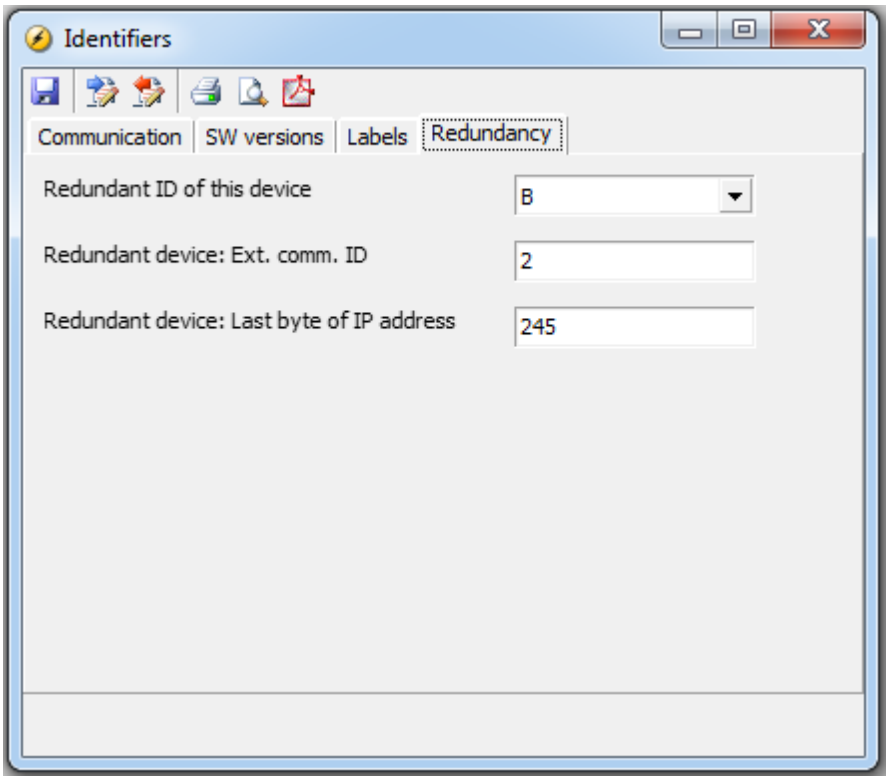
M-Logic in the secondary controller (B in the example above):



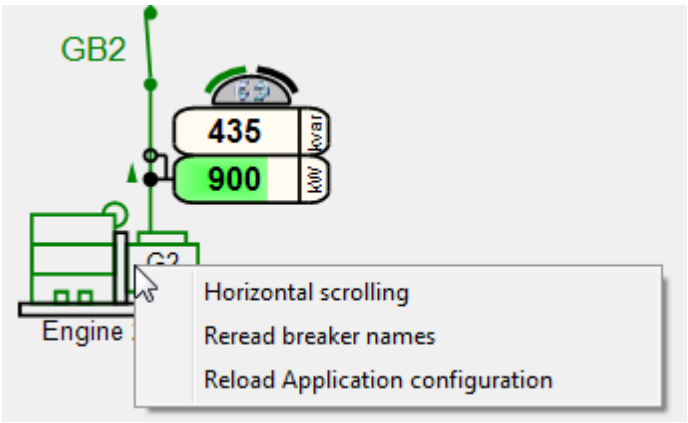
5. Open Application Configuration in the PC Utility Software and create an Application where the checkbox ”Redundancy” is checked wherever it is relevant in the current application. The application can be broadcasted, but there is however one limitation: the redundant device of the device to which the PC utility software is connected, will not receive the Application during broadcasting. Instead the application must be written directly to this device by connecting the PC utility software to it.



6. Open Identifiers for each of the controllers in the plant and assign a letter (A or B) to the controller and provide alone the modbus id or both the modbus id and the last byte of the IP address of the redundant controller. Note that this step has to be performed for all controllers by connecting to these one at the time.



To update the Application Supervision page right-click and choose "Reload Application configuration"



5 Tips & tricks

This chapter gives answers to questions often asked

1. Can the access to a controller be password protected?

Yes. If the access level of "Connection to device" is set to e.g. Customer inside Permissions popup, those users at lower levels cannot connect to the controller.

2. Is it possible to show only those parameters to which the user has both read and write access?

Yes. Go to the "all parameters visible" in the Permission popup. If this is set to e.g. "Master", then all users at lower levels, will only see those parameters which they can edit.

3. Is it possible to synchronize the clock in all controllers in a plant?

Yes.. This can be done by the command line interface by making a batch file with one line of batchwrite per controller.

4. Can multiple controllers easily be updated with new firmware?

Yes for some controllers. Those controllers that can be flashed over tcp-ip.it is possible. It is not possible for those controllers for which connection to the service port for firmware flashing is required.

5. Can the trending data be saved to a file from which the utility software later can reload it?

Yes. When performing a Save while the Trending window is open, a file with the extension ".trend" is made.

6. Will it be saved to the log file when the modified-parameters flags were reset?

Yes. A line "Clear parameter edit" is added to the Event log.

7. Can the translation of the strings be done in Excel?

No. The user can export the translations to Excel but the Utility Software can not import an Excel file with translations. When the translation is done directly in the Utility Software it makes sure that only those characters supported by the display can be entered and it also limits the string lengths according to the limitations of the display. If the translation is performed in Excel these rules might not be obeyed.

8. Is there an easy way to change the permission level for a large number of parameters?

Yes. Chose a set of parameters and use right-click menu to change the access level of the selected parameters.

9. What is the broadcasting of applications used for?

It is used to distribute an application stored in once controller to all the other controllers in the plant. This is done over the CAN bus.

10. Is it possible to see somewhere which batch-read components (.e.g. parameters, counters , ..) are stored in a usw file?

Yes. Go to the file menu in the top of the Utility Software. Choose the menu item Properties, and the content of the usw file will be shown.

11. How can the M-logic page be hidden, so customers can not see the logic I have built?

Yes. In the Permission popup (only supported by some controllers) set the permission level for reading of the M-Logic to any high access level, to which the customer has no access.

12.What is the difference between backup and a batch read?

The backup is in fact a batch read process of all items. The backup process will give a ".bak" whereas the Batch Read will result in an ".usw" file. The bak file will be encrypted so it can only be opened by a user at Master level. The purpose of this is to make it possible for any user (independent of access level) to perform a complete backup of his controller even through there might be features that he is not able to see (this could be M-Logic for example). The backup file can be used for later restore. It can also be sent to users with Master level access for them to make changes to the configuration of the controller.

13.Can usw files be used in different controller types and does the firmware version have any significance?

The usw files can not be used accross different controller types. A usw file can only be stored in controllers of the same type. A usw file originating from an controller with old firmware can be stored in a controller with a newer firmware version. A "newer" usw file can not be stored in a controller with older firmware.

14. Can I pass my favorites to another person?

No. The favorite settings are stored on the computer and can not yet easily the transferred to another computer.

15. Why does the modbus id need to 1 when connecting to the service port?

It is hardcoded in the controller that the modbus id needs to be 1 when connecting through the service port.

16. How can I tell whether there is a problem with CAN communication between controllers?

Yes. In the Supervision page it will be indicated with a red cross symbol if there is no CAN cmmunication to a controller.

17. Will it work if the controllers in a plant have different firmware versions?

Some controllers support the Compatibility Check features in the Application Supervision page. This can be used to check whether controllers are compatible in terms of power management.