ComAp
The heart of smart control

DriveConfig

InteliDrive PC software

SW version 3.9.2

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1.1 Clarification of notation

Note: *This type of paragraph calls readers attention to a notice or related theme.*

IMPORTANT: This type of paragraph highlights a procedure, adjustment etc., which can cause a damage or improper function of the equipment if not performed correctly and may not be clear at first sight.

Example: This type of paragraph contains information that is used to illustrate how a specific function works.

1.2 About this guide

This guide shows how to properly use InteliDrive PC software - DriveConfig (especially how to configure connection with controller and setup the device).

1.3 Available files

DriveConfig is distributed in self extracting archive together with other ComAp tools related to InteliDrive and InteliBifuel controllers.

Archives (*.exe)
For InteliDrive and InteliBifuel High-end controllers
InteliDrive-Install-Suite-3.9.0.exe
DriveConfig-Install-3.9.2.exe (as a sub part for new Install Suite package)

1.4 Available related documentation

Documents	Description
DriveConfig 3.3 Reference Guide	Reference guide of DriveConfig
InteliDrive-Install-Suite-3.9.0	Content of software package DriveConfig

1.5 Document history

Revision number	Version	Date of issue	Author
9	3.9.2	22.3.2018	Jan Kovačka
8	3.9.0	12.1.2018	Jan Kovačka
7	3.8.0	1.8.2017	Petr Weinfurt
6	3.7.0	27.4.2017	Petr Weinfurt
5	3.6.0	22.1.2016	Jan Kovačka
4	3.5.0	16.1.2015	Pavel Doubek
3	3.4	21.3.2014	Pavel Doubek
2	3.3.1	5.12.2013	Pavel Doubek
1	3.3	6.9.2013	Pavel Doubek

Note: *Version 3.9.1 was not officially release. All changes are covered by version 3.9.2.*

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General security recommendations and set of measures

1. AccessCode

• Change the AccessCode BEFORE the device is connected to a network.

• Use a secure AccessCode – ideally a random string of 8 characters containing lowercase, uppercase letters and digits.

• For each device use a different AccessCode.

2. Password

• Change the password BEFORE the device enters a regular operation.

• Do not leave displays or PC tools unattended if an user, especially administrator, is logged in.

3. Controller Web interface

• The controller web interface at port TCP/80 is based on http, not https, and thus it is intended to be used only in closed private network infrastructures.

• Avoid exposing the port TCP/80 to the public Internet.

4. MODBUS/TCP

• The MODBUS/TCP protocol (port TCP/502) is an instrumentation protocol designed to exchange data between locally connected devices like sensors, I/O modules, controllers etc. From it's nature it does not contain any kind of security – neither encryption nor authentication. Thus it is intended to be used only in closed private network infrastructures.

• Avoid exposing the port TCP/502 to the public Internet.

5. SNMP

• The SNMP protocol (port UDP/161) version 1,2 is not encrypted. Thus it is intended to be used only in closed private network infrastructures.

• Avoid exposing the port UDP/161 to the public Internet.

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2.1 PC Hardware requirements

DriveConfig software is based on Windows 2000/XP/Vista/Win7/Win8 or higher platform. Use PC suitable for this platform. No other special requirements are necessary.

2.2 How to check DriveConfig version?

Use Help – About command to display current DriveConfig version window.

2.3 Controller software

There are two controller file types: mhx firmware and aid archives.

Delivered controller contains firmware and default configuration. Any Application file can be modified by customer using **DriveConfig** PC software. It is possible to download Application file from the controller, or open it from PC modify it and download (save to PC) back. There must be corresponding version of Application file with firmware in controller.

Note: *Configuration aid file does not contain the History record when had been read from the ID controller by DriveConfig.*

Note: *To load History file from InteliDrive use DriveMonitor software only.*

Full configurability with Inteli extension modules – for example all possible setting of Inteli AIN8 including impulse input.

2.3.1 Application file – archive

There exists one binary type of configuration file only. Config file "*.aid" contains:

- Complete I/O configuration (include extension modules if any)
- Setpoints setting
- All available languages texts
- Controller History record (only when was downloaded from using DriveMonitor)

2.4 Support of InteliBifuel Mobile

- Software configuration of binary input type (Pull up/Pull down)
- Software configuration of binary output
  - Power outputs have new option:
    - Binary Output/PWM output/output Point Injection (parametric PWM)
    - Output polarity (Low/High side)
  - Software configuration of analog input
    - Type of sensor - for specific inputs newly added sensor range ±85 mV, ±70 mV
  - Software configuration of analog output
    - Output type - current (0-20 mA), voltage (0-10 V)

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3.1 Open file - offline

Each application AID file modification is provided in off line mode. There are two ways to open application file:

- Open AID file stored in PC (default or already modified archive)
- Load current AID file from controller

There are separate files for different engine application (e.g. AUX, PRP, … etc.). The application type is part file name and it is visible in DriveConfig after is open in bottom status line (include directory path). There is directory with Default archives that can be modified.

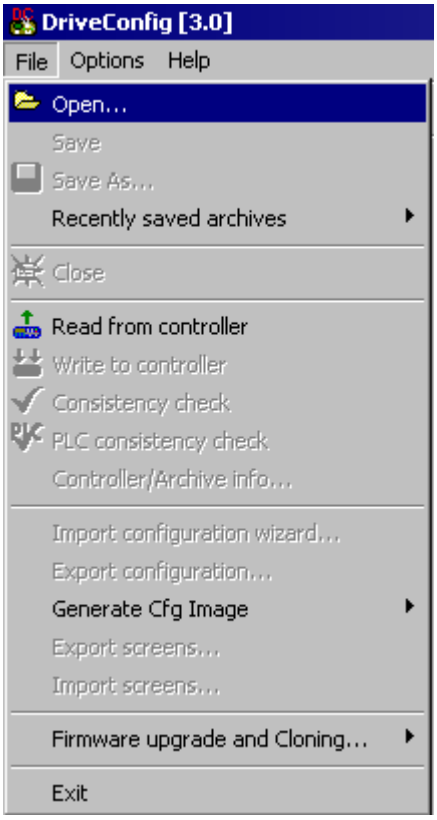

Image 3.1 Open file from PC

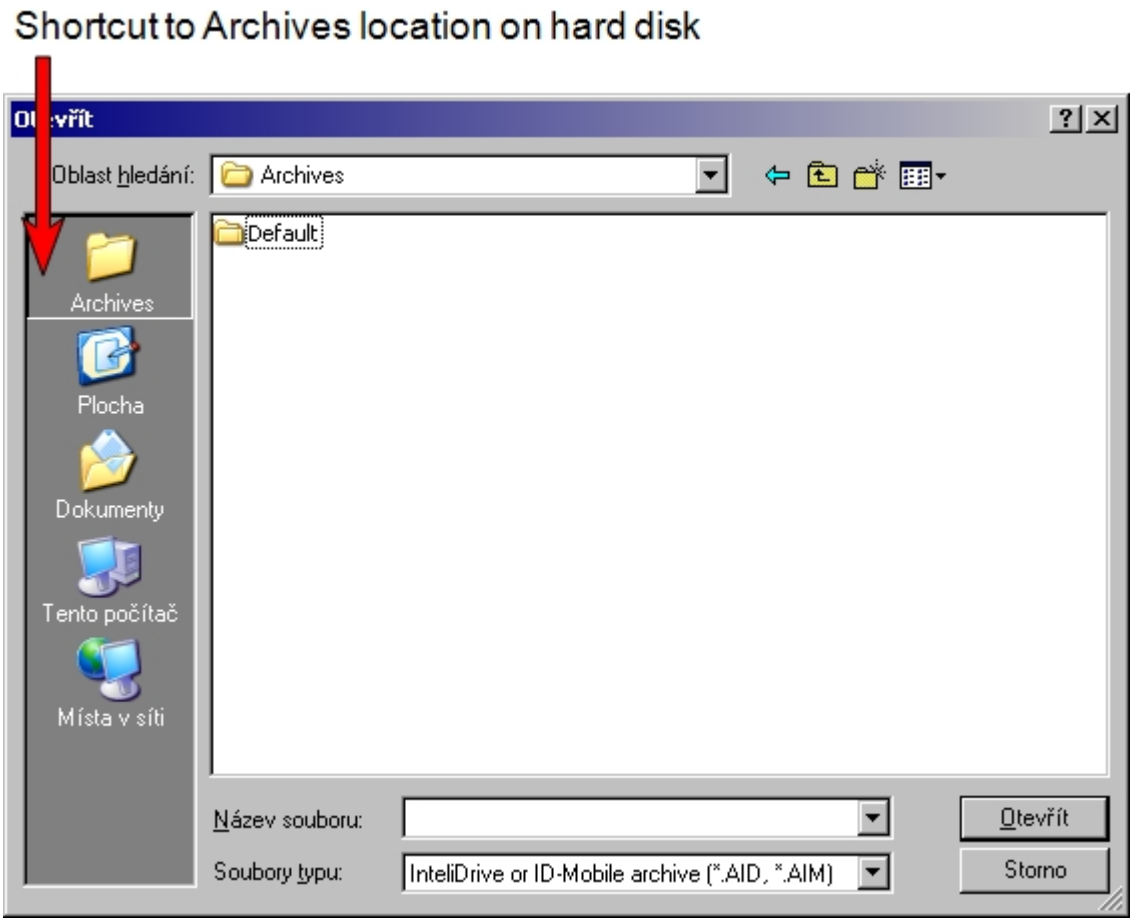

Image 3.2 Read configuration from controller

3.2 Select connection

The connection between DriveConfig and controller is opened only for a short time of Application AID file Up/Down loading or during of firmware upgrade. For proper connection must be correctly set

PC COM port and controller address (see setpoint Basic setting: Controller address in controller).

Note: *Note that not all USB/RS232 converters are working with DriveConfig and DriveMonitor.*

Recommended USB/RS232 converters:

- ASIX - UCAB232E (http://www.asix.cz/)
- VPI - USS-101/111 (http://www.vpi.us/usb-serial.html)
- C-232-MM (http://www.usbgear.com/item_288.html)

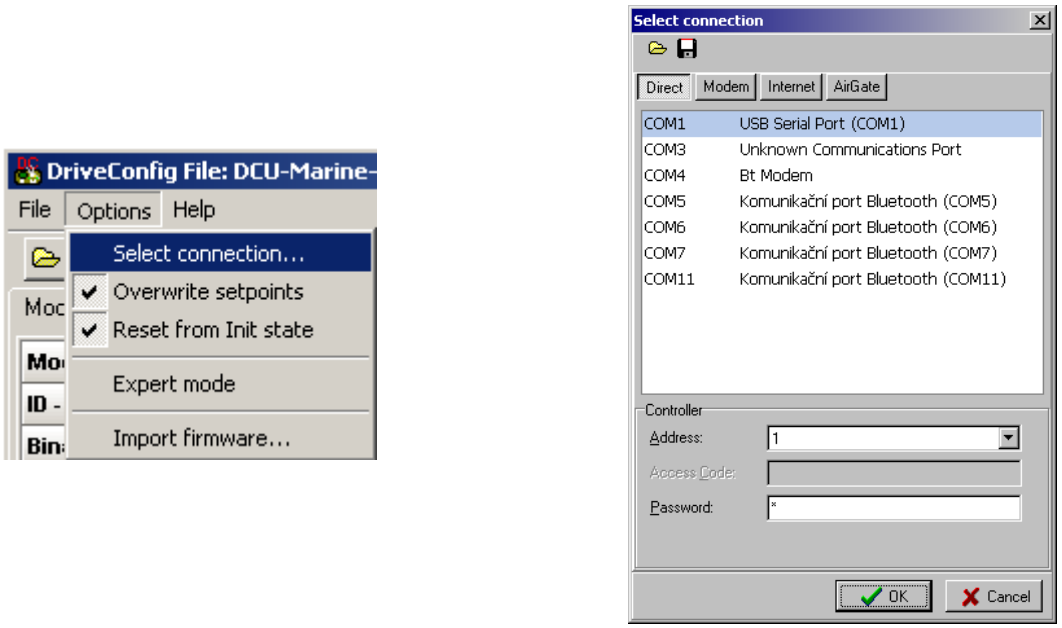

Image 3.3 Set PC COM port and controller address

3.3 Direct connection

Direct connection via RS232 (up to 10m). For longer distance use RS232/RS485 converters (e.g. ADVANTECH – ADAM 4520).

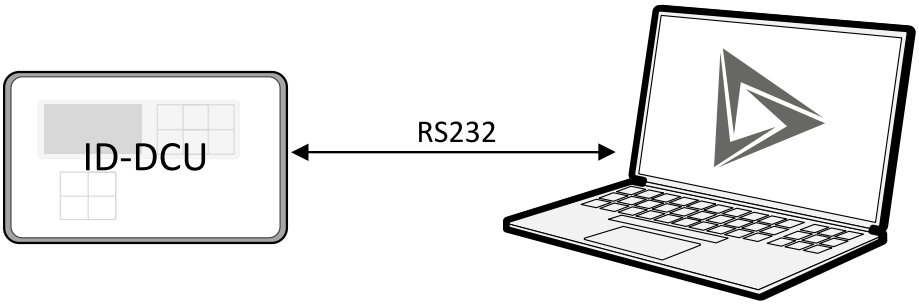

Image 3.4 RS232 connection

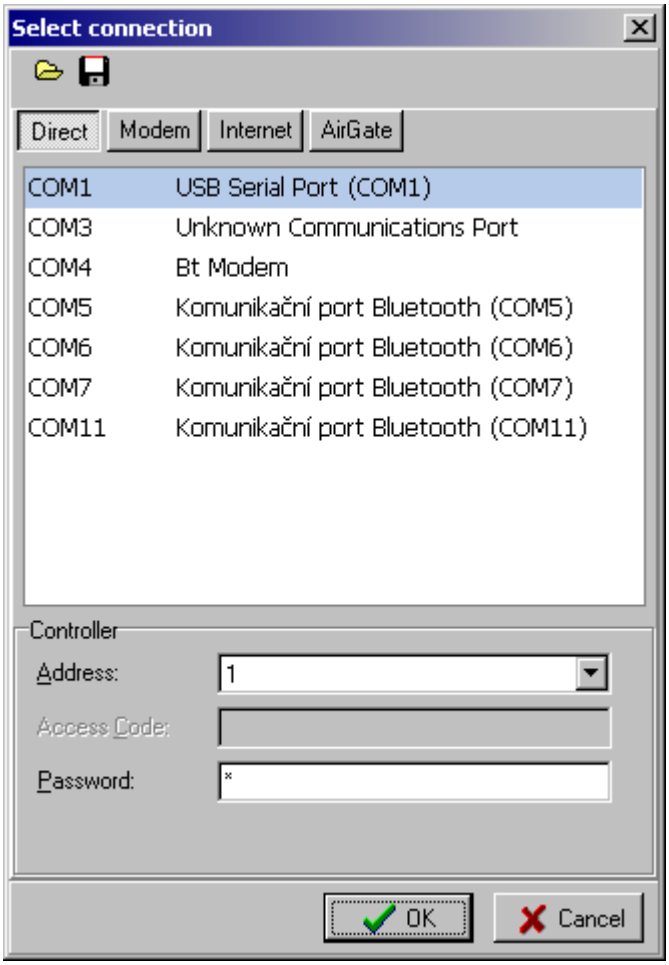

Image 3.5 Selection of direct connection

3.4 Modem connection

Modem connection via Analog, ISDN or GSM modem.

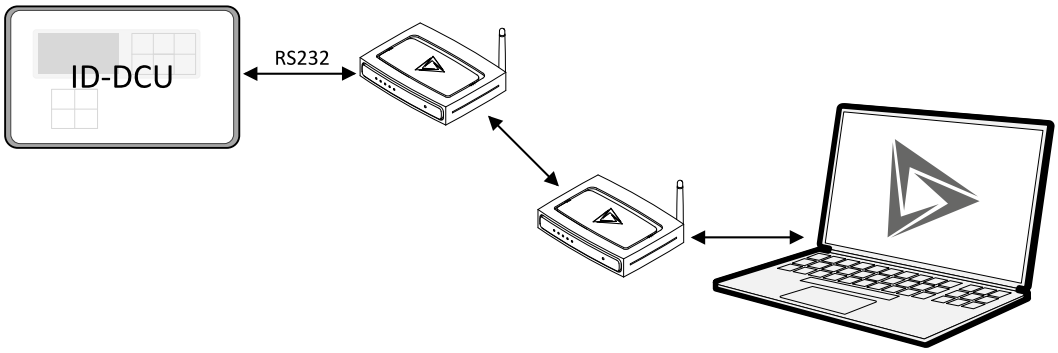

Image 3.6 Modem connection

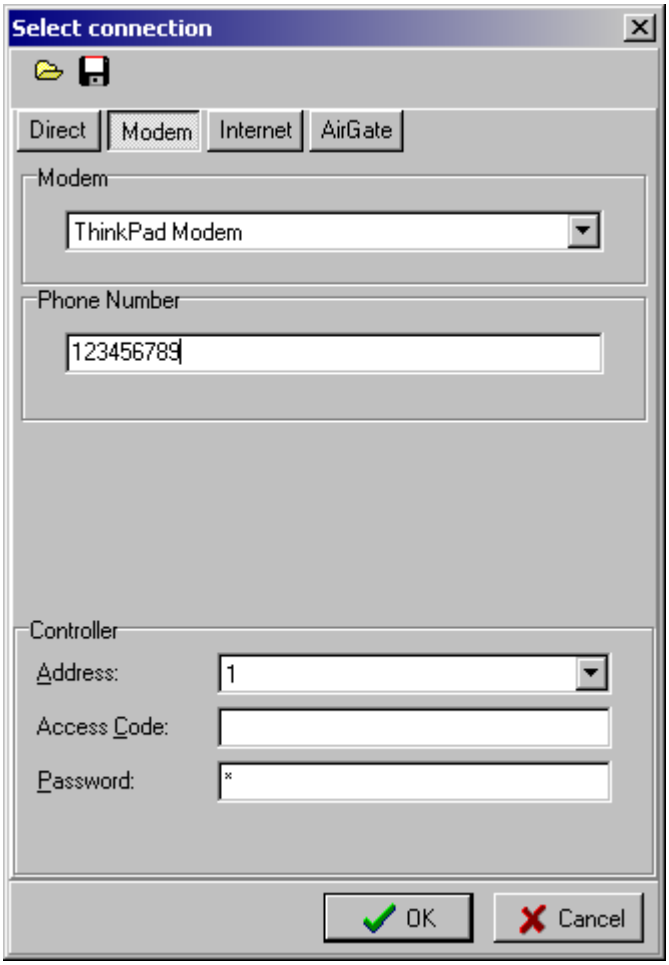

Image 3.7 Selection of modem connection

3.5 Internet connection

Internet via IG-IB (InteliGen internet interface unit). IG-IB Internet - Ethernet or Dial-up connection is available.

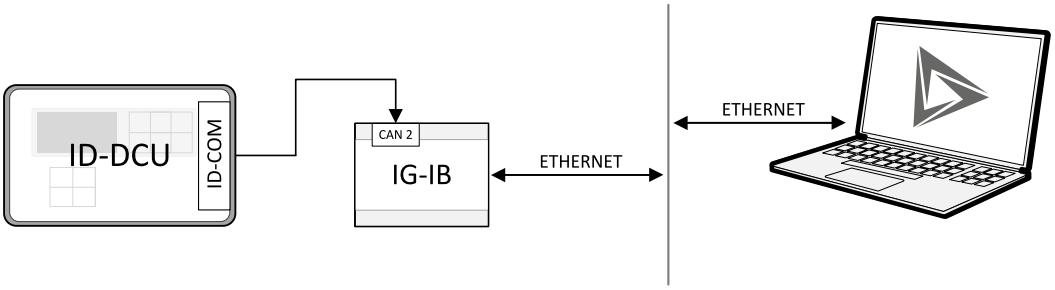

Image 3.8 Ethernet connection

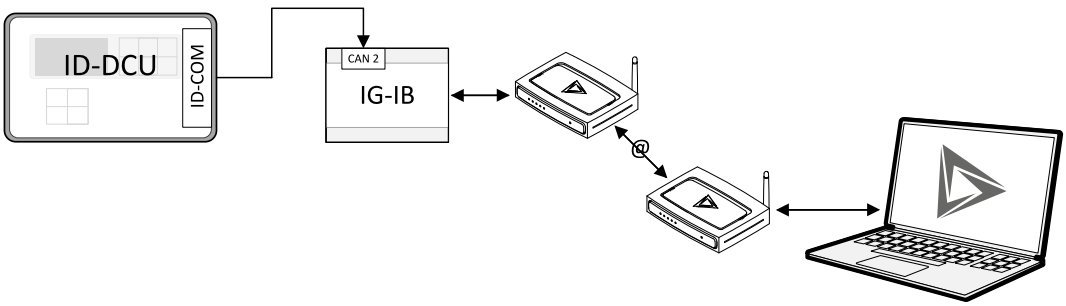

Image 3.9 Dial-up connection

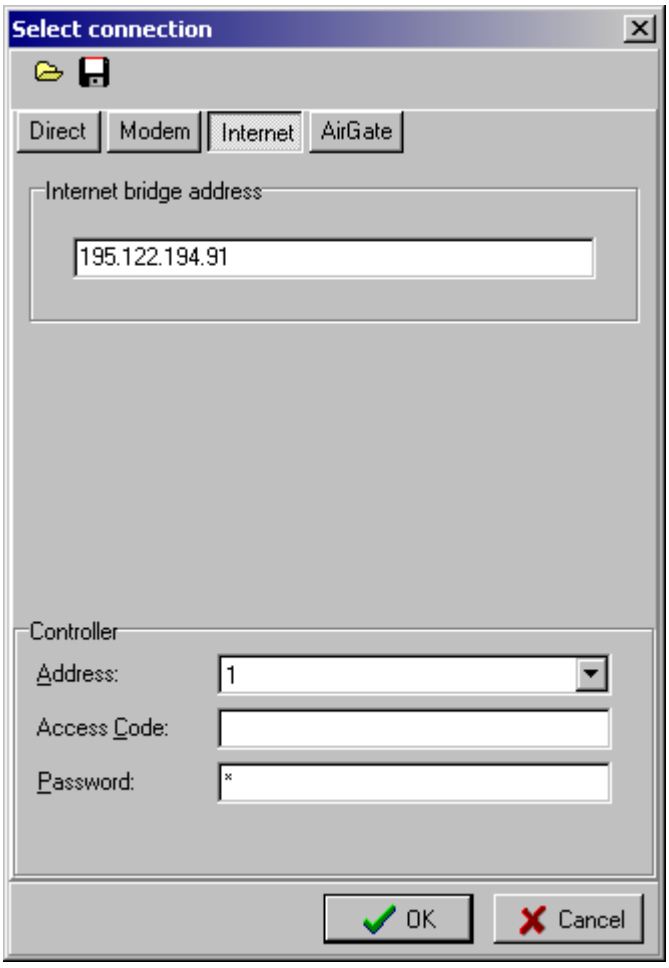

Image 3.10 Selection of internet connection

Note: *More detail regarding different types of connection see in IGS-NT Communication Guide.*

3.6 AirGate

Direct connection to controller via AirGate – available only for ID-Mobile controller with ID-Mobile GPRS modem.

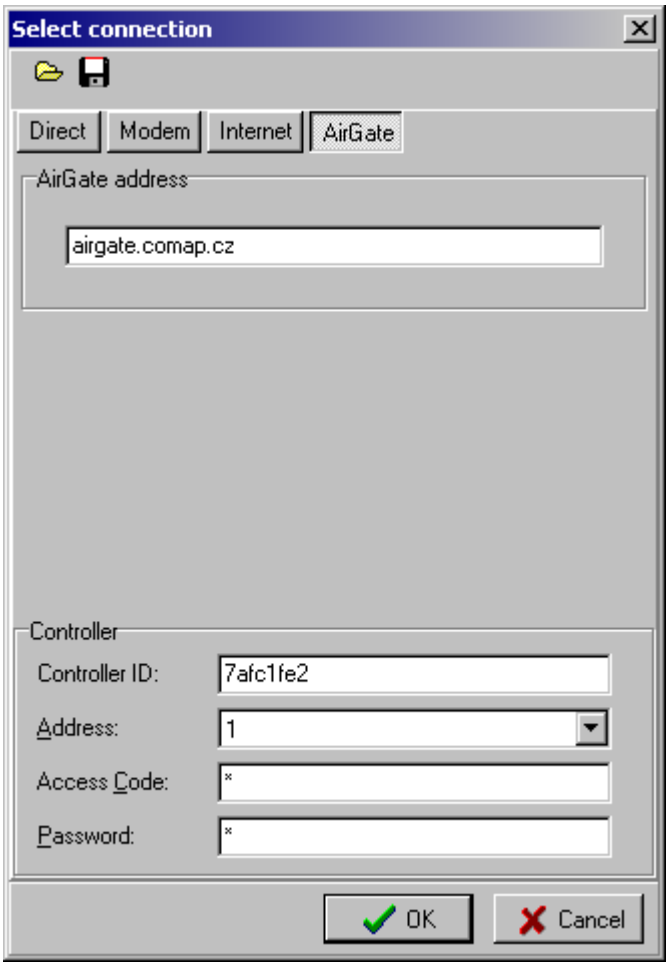

Image 3.11 Selection of AirGate connection

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▶ Following configuration steps are available in DriveConfig software

- Configure addresses of Extension modules when more inputs and outputs are required
- Configure J1939/J1587 interface when Electronic engine is connected
- Configure Binary inputs as Protection or Function
- Configure Binary outputs
- Configure Analog inputs as Protection or Function
- Define user sensors
- Configure History record
- Configure password protection
- Add/Translate the language
- Modify InteliVision5 CAN or InteliVision8 screen layout if needed (controller firmware has to support ScreenEditor features otherwise the ScreenEditor is not available in DriveConfig)
- Configure PLC functions

4.1 Modules

Following modules are available to extend number of InteliDrive analog and binary Inputs and Outputs. Data from/to modules are transmitted via CAN1 (Extension modules) bus. To receive messages correctly the InteliDrive module address configuration must correspond to Extension modules address setting.

One or more messages are transmitted from one extension module.

Extension Module	Number of I/O	Messages	Address range
IS-BIN16/8	16BI + 8 BO	BIN, BIN, BOUT	1 to 14
IS-AIN8 (TC)	8 AI	AIN	1 to 8

IGS-PTM	8BI + 8BO + 4AI+1AO	BIN, BOUT, AIN, AOUT	1 to 4
I-AOUT8	8 AO	AOUT	
IGL-RA15	15BO (LED)	BOUT, BOUT	5, 6 (fix)

Table 4.1 Extension modules overview

From InteliDrive view there are following messages groups. Each message in one group has to have different (relative) address on CAN2 bus.

Message Group	Content	Max number of message	Address range
BIN	8 binary inputs	14	1 to 14
BOUT	8 binary outputs	14	1 to 14
AIN	8 analog inputs	8	1 to 8
AOUT	8 analog outputs	8	8

Table 4.2 Message groups overview

4.2 ID Modules address configuration

Tick selected addresses for all Binary Inputs, Binary outputs, Analog inputs, Analog outputs and J1939 periphery modules.

In following example are configured two groups BOUT-1 and BOUT-2 for Binary Inputs modules.

For J1939 configuration tick J1939-1 and then J1939 engine type.

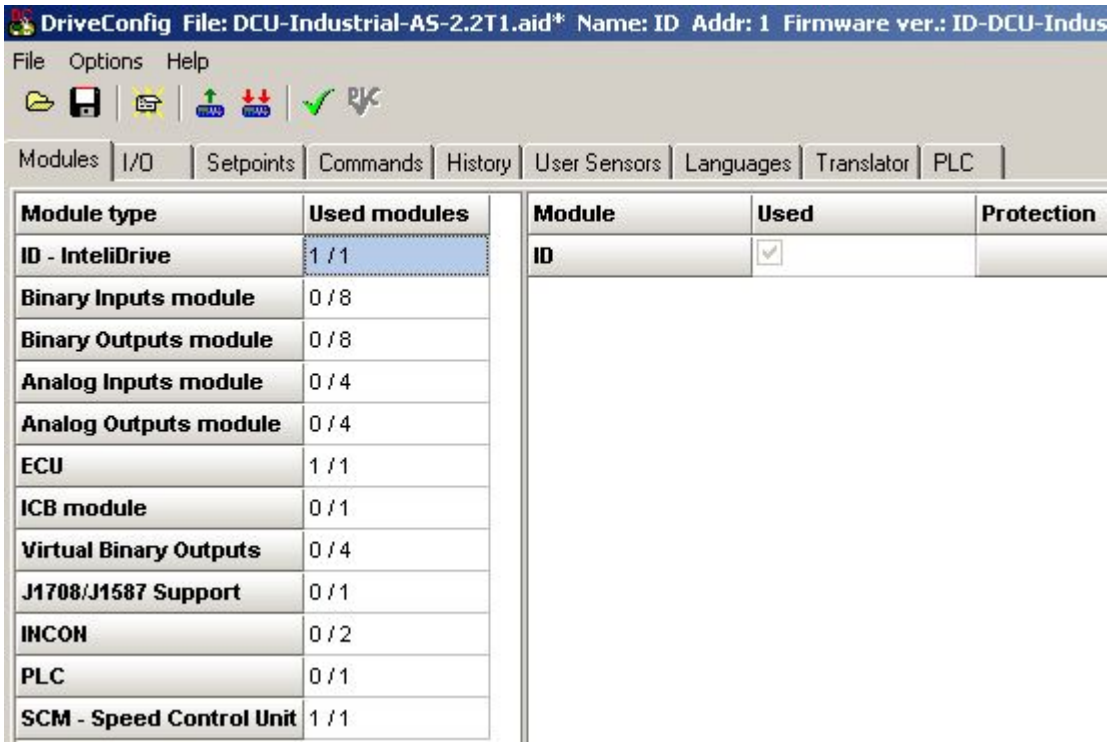

Image 4.1 Example of module selection

4.2.1 Configuration examples

	BIN	BOUT	AIN	AOUT	Modules	Module address
1	☑	☑	☑	☑	1st IGS-PTM	No jumper
2	☑	☑	☑	☑	2nd IGS-PTM	Adr.1 jumper
3	☑	☑	☑		1st IS-BIN + 1st IS-AIN	BIN = 3, BOUT=3 AIN = 3
4	☑					
5		☑			IGL-RA15 (hw v1.2)	IS jumper
6		☑				
7	☑	☑			2nd IS-BIN	BIN = 7, BOUT=7
8	☑					

Table 4.3 Message oriented external modules communication philosophy

- It is possible to connect up to four IGS-PTM modules on addresses 1 to 4 with corresponding ADR1 and ADR2 jumper setting in IGS-PTM
- Only one IGL-RA15 can to be configured for BOUT5 and BOUT6 (fix) only
- Maximal 8 IS-BIN and IS-AIN modules can be configured to ID-CU
- Binary and Analog I/O values reading are displayed like message group not as hw module
- Lost of any configured BIN, BOUT, AIN message is indicated as corresponding Sd alarm.

4.2.2 Module Communication fail indication

It is possible to configure what protection type is activated for each module: No protection, Warning, Shut down. Selected (Wrn, Sd) protection is recorded to Alarm list and History.

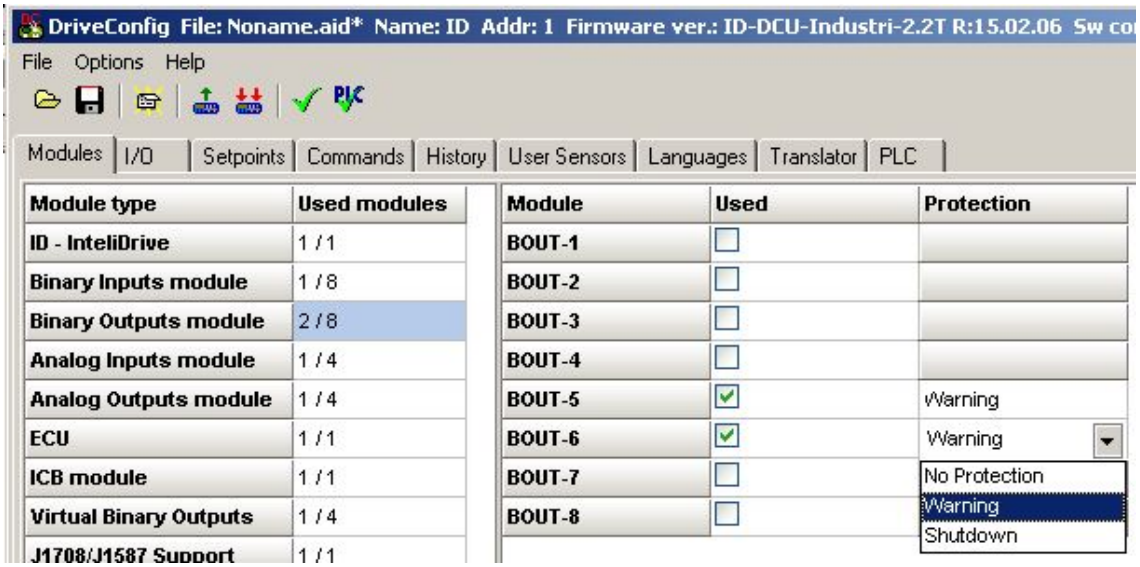

Image 4.2 Example for IGL-RA15 (i.e. BOUT-5 and BOUT-6) modules Warning protection

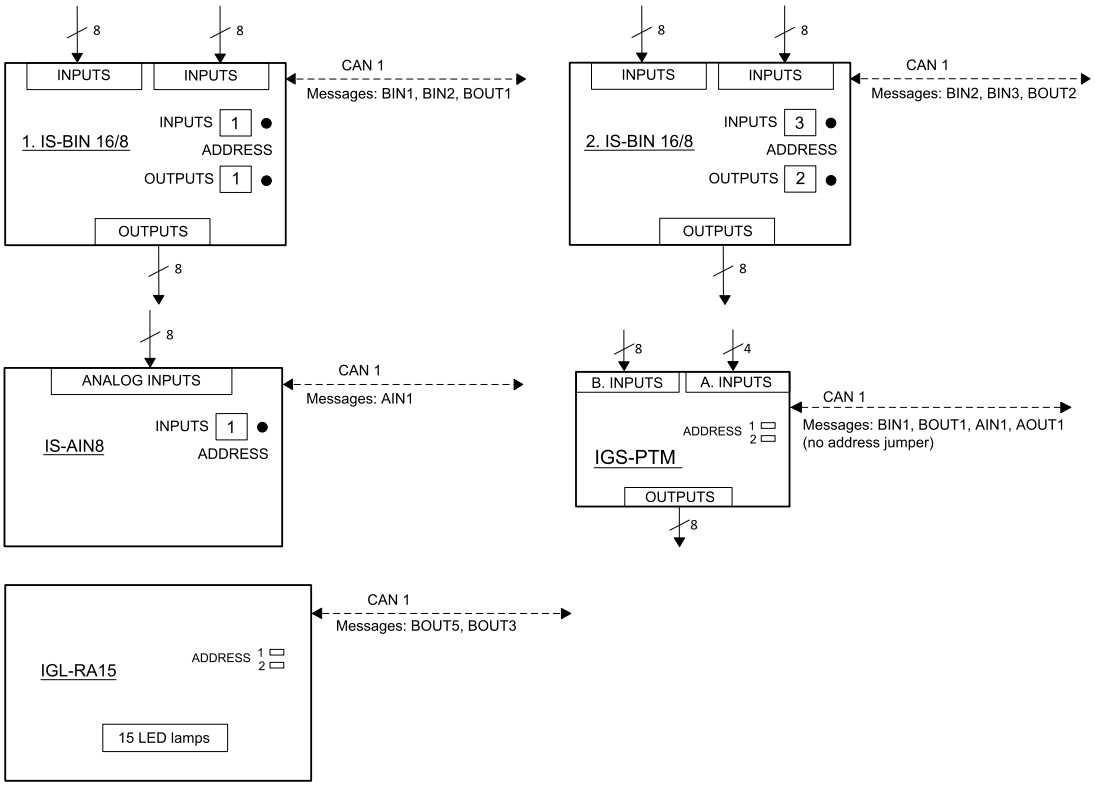

Image 4.3 Module address setting examples

4.3 Binary Inputs configuration

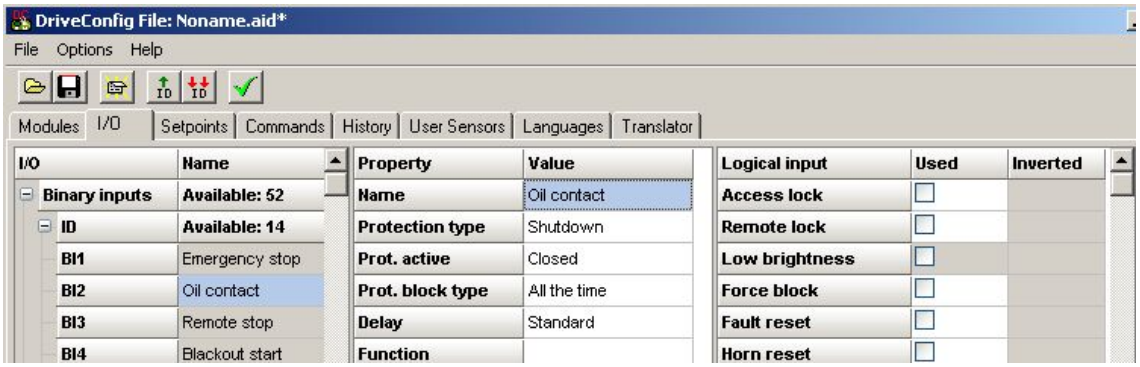

Image 4.4 Binary inputs selection

Selected input can be configured as Protection (e.g. engine Shut down) or Function (e.g. Access lock).

4.3.1 Protection types

Warning	Indication only (no engine stop)
Shutdown	Fast engine stop
Cooldown	Engine stop with cooling period
Fail sensor	Measured value is out of sensor characteristics.
Warning+BW	Indication + Broken wire detection
Shutdown+BW	Shut down + Broken wire detection
Warning + Fls	Warning is activated in the case of sensor fail as well
Shutdown + Fls	Shut down is activated in the case of sensor fail as well
Sd override	This protection stays active in the case of Sd override is activated.
Alarm only	Only Alarm list indication, disappear without confirmation
HistRecOnly	History record only

Table 4.4 Protection types overview

4.3.2 Binary outputs function depends on Binary inputs configuration

AL	= Alarm list record
HST	= History record
BO Alarm	= Binary output Alarm
BO Horn	= Binary output Horn
BO Com AL	= Binary output Common Alarm
BO Com x	= Binary output Common wrn, Common Sd, Common Cd

Name	Up to 14 ASCII characters		AL	HST	BO Alarm	BO Horn	BO Com AL	BO Com x
Prot. Active	Opened	Active when opened contact						
	Closed	Active when closed contact						
Protection Type	No protection	No protection						
	Warning	Alarm list indication	Y	Y	Y	Y	Y	
	Shutdown	Fast engine stop without cooling	Y	Y	Y	Y		Y
	Cooldown	Engine stop with cooling	Y	Y	Y	Y		Y
	Sensor fail	Sensor fail indication	Y	Y	Y	Y	Y	
	Alarm only	Only Alarm list indication (disappears without Fault reset), Binary outputs Alarm and Horn are not activated.	Y				Y	
	HistRecOnly	History record only		Y				

Table 4.5 Protection overview

Block type	All the time	Protection is active All the time
	Force block	Protection is activated BinBlock Del after binary input BI Force block is opened.
	RunOnlyBlkDel1	Protection is activated RunOnlyBlkDel1 after engine running state.
	RunOnlyBlkDel2	Protection is activated RunOnlyBlkDel2 after engine running state.
	RunOnlyBlkDel3	Protection is activated RunOnlyBlkDel3 after engine running state.

Table 4.6 Protection modes

IMPORTANT: All protections must be confirmed by Fault reset button after deactivation (except Alarm only).

4.3.3 Binary inputs function

Select function from Logical input list for each physical binary input. No protection is usually used when any Logical input is selected. Logical inputs description see in corresponding InteliDrive manual.

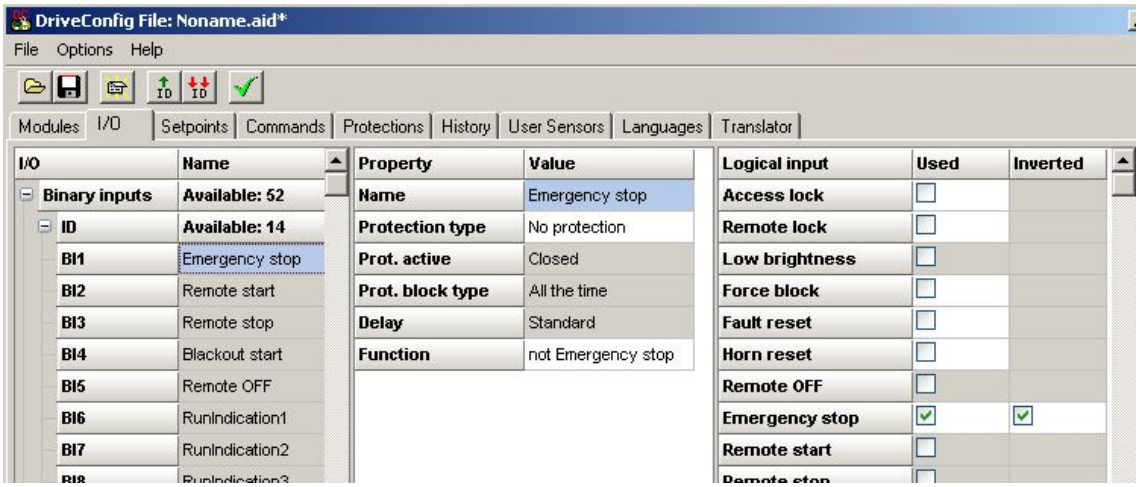

Image 4.5 Logical input list

4.4 Binary output configuration

Selected item from the

- Logical binary output list,
- Programmable states,
- Analog protections or
- Any physical binary inputs

Can be connected to any physical input.

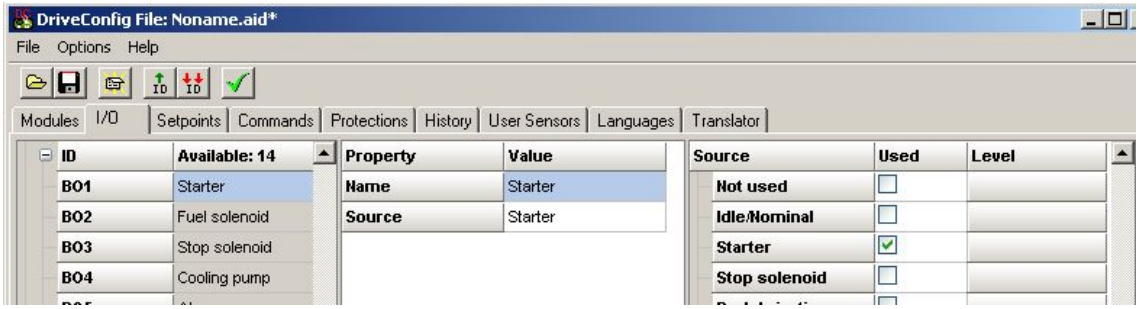

Image 4.6 Binary output configuration

4.5 Analog input configuration

Analog input can be configured to Protection or/and function (from the list).

4.5.1 Protections

Note: *Any analog input protection can be configured in following items.*

			AL	HST	BO Alarm	BO Horn	BO Com AL	BO Com x
Name	Up to 14 ASCII characters							
Dim	Dimension (bar, psi, ...)							
Sensor	Select from the list							
Resolution	Set number of decimal points (1; 0,1; 0,01; …)							
Range	Maximal measured range							
Bargraph 100%	Bargraph range							
Protection	No protection	No protection						
	Sensor fail	Sensor fail indication	Y	Y	Y	Y	Y	
	Warning	Alarm list indication	Y	Y	Y	Y	Y	
	Wrn+Shutdown	Fast engine stop without cooling	Y	Y	Y	Y		Y
	Alarm only		Y				Y	
	Wrn+Cooldown	Engine stop with cooling	Y	Y	Y	Y		Y
	HistRecOnly	History record only		Y				

Table 4.7 Analog input configuration

Direction	Over	Activation over limit
	Under	Activation under limit
Block type	All the time	Protection is active All the time
	Force block	Protection is activated BinBlock Del after BI Block protect is opened.
	RunOnlyBlkDel1	Blocked RunOnlyBlkDel1 after engine running state
	RunOnlyBlkDel2	Blocked RunOnlyBlkDel2 after engine running state
	RunOnlyBlkDel3	Blocked RunOnlyBlkDel3 after engine running state

Table 4.8 Protection modes

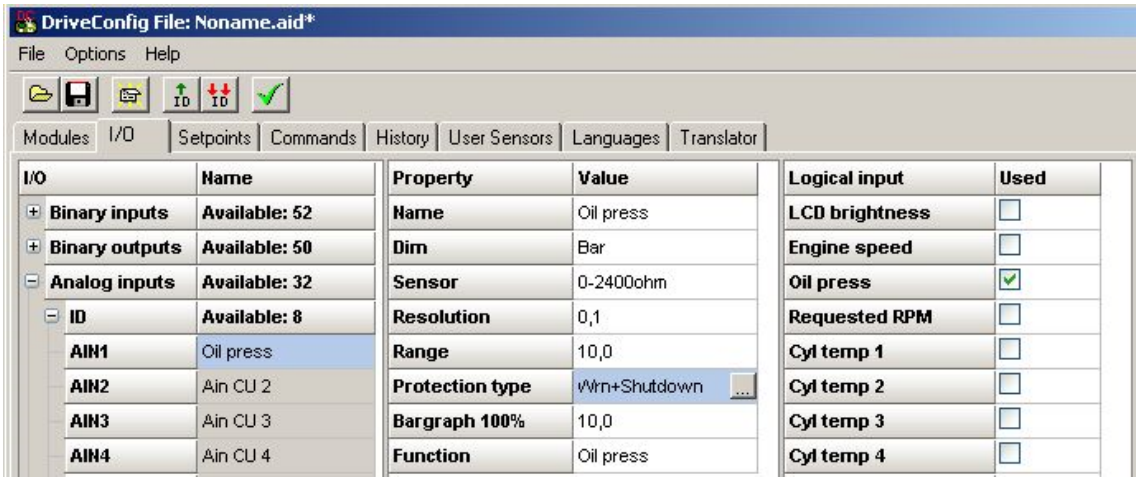

Image 4.7 Protection selection

4.5.2 Standard – two levels protection

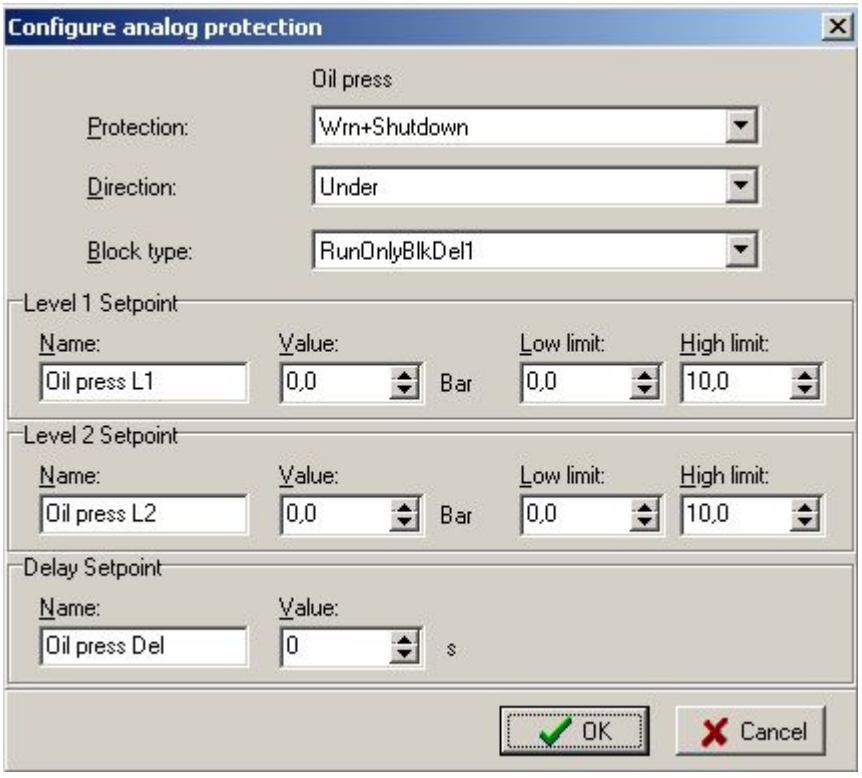

Image 4.8 Analog protection

Note: *Setpoint Low or High limit change does not change real setpoint setting that can go out of limit. Some default sensor characteristics (e.g. °F) are supported from IS-AIN8 version 2.2.*

4.5.3 Expert mode – more protection levels configuration

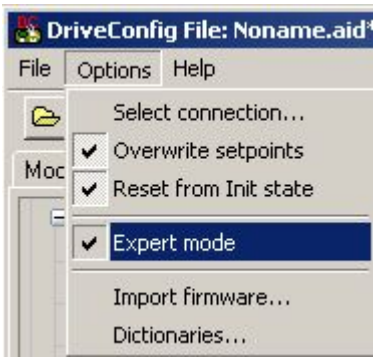

Image 4.9 Expert mode selection

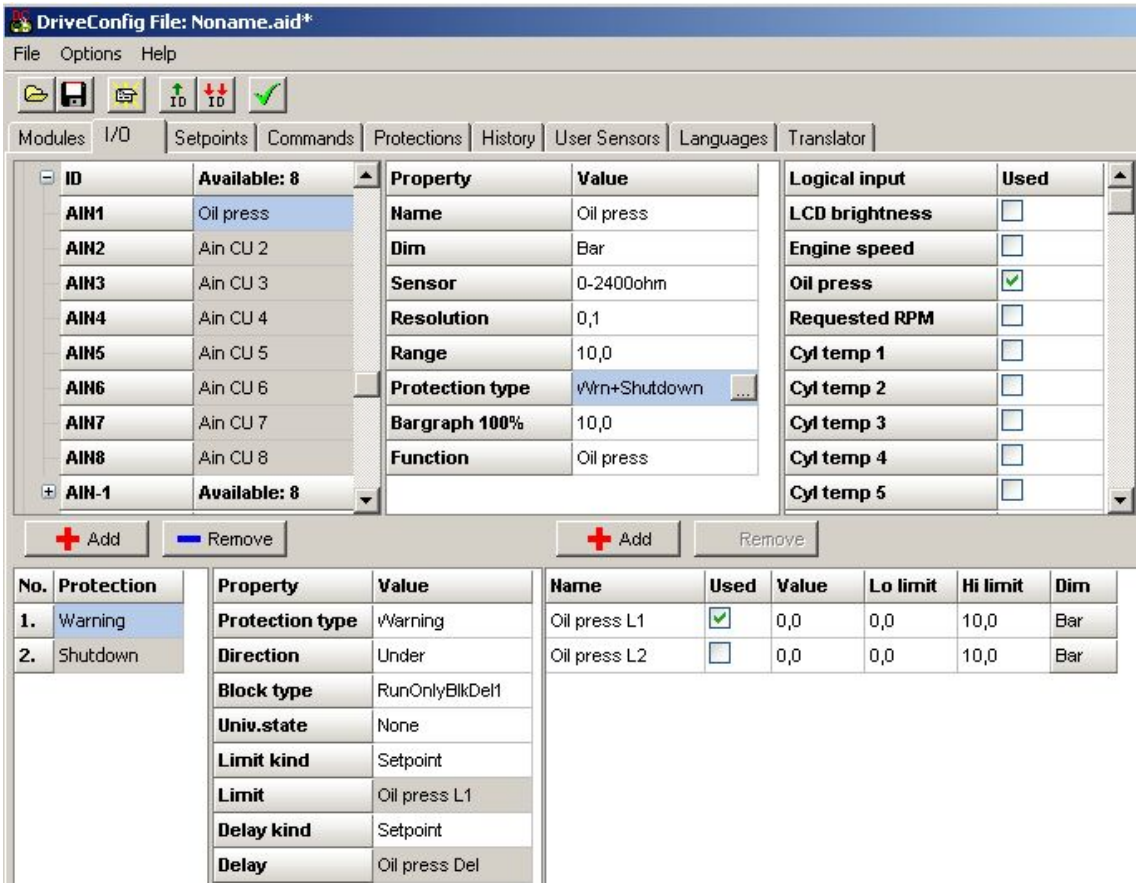

Image 4.10 Protection selection in Expert mode

4.6 Analog outputs configuration

- There are three types of analog output units
  - General AOUT module with 8 analog outputs
  - ID-SCM module with three analog outputs
  - ECU fictive 4-analog output module

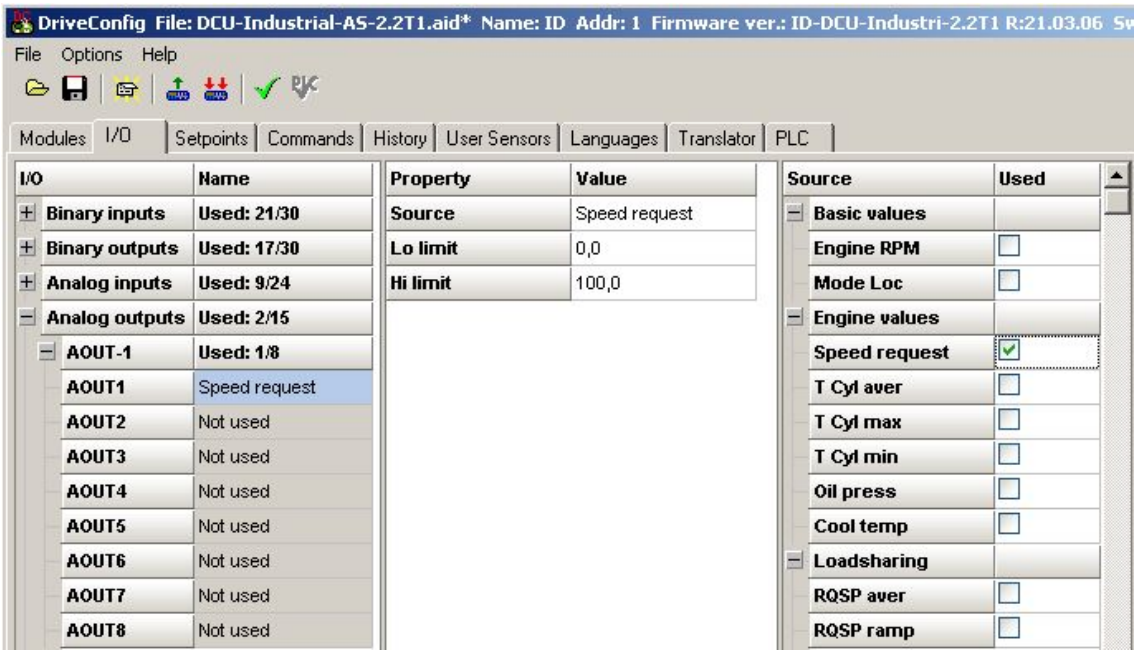

Image 4.11 Analog outputs selection

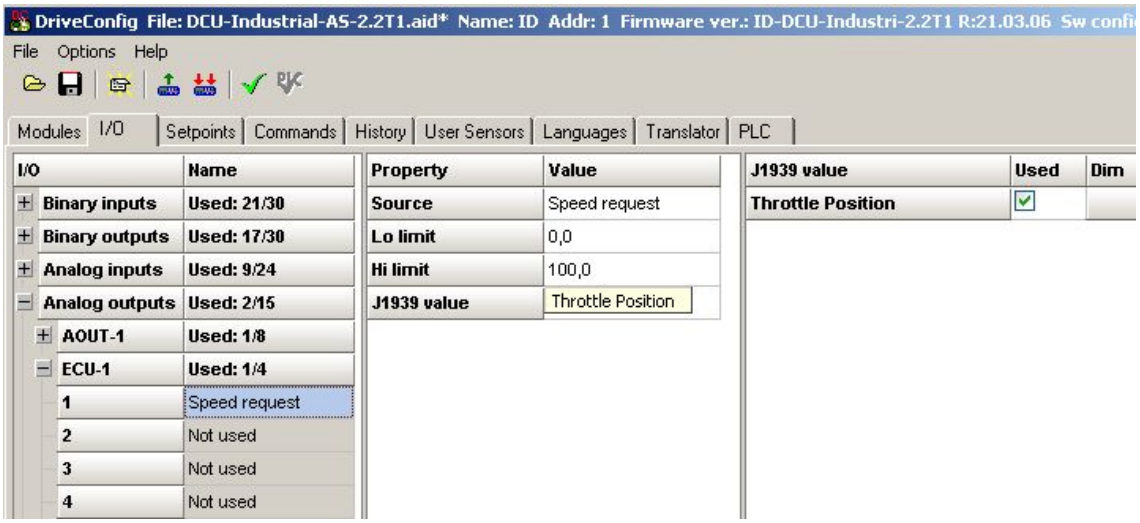

Image 4.12 ECU fictive 4-analog output module

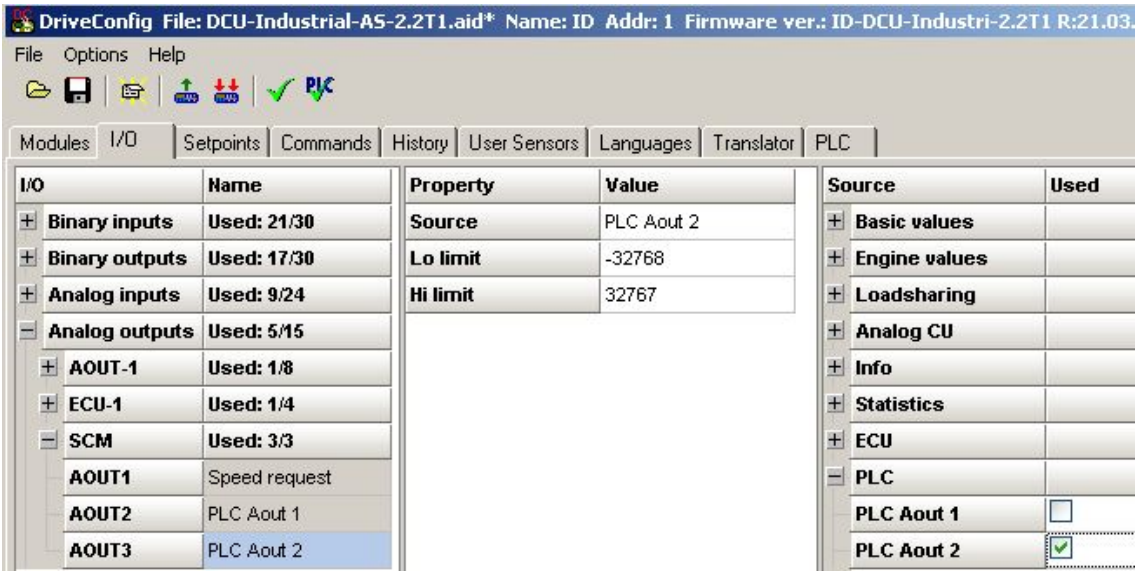

Image 4.13 ID-SCM module with three analog outputs

4.7 Setpoints value and password level

Setpoint value is written or not depends on DriveConfig menu: Option – Overwrite setpoints setting.

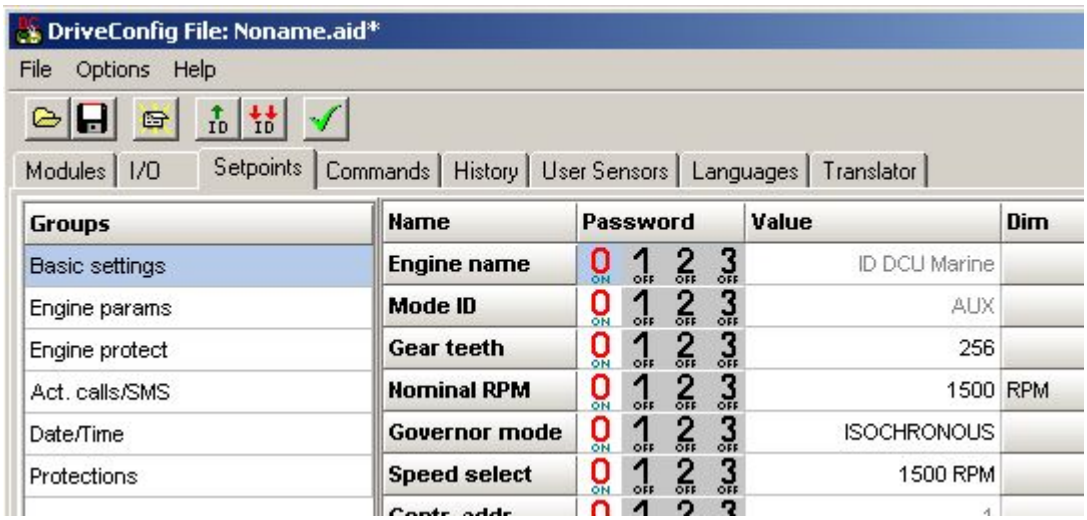

Image 4.14 Setpoints setting

Note: *The ID controller setpoints does not change when changed in DriveConfig (because of off-line mode) but after aid configuration file is loaded to controller - see File – Write to controller command.*

Note: *The setpoints in "grey" characters (see in orange oval above) are not changed in ID controller even when aid archive is loaded.*

4.8 Commands password protection

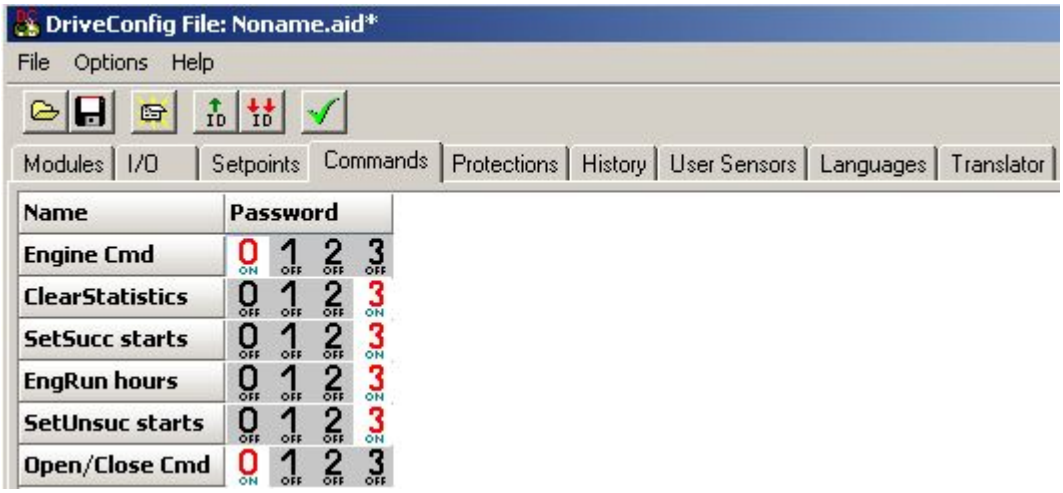

Image 4.15 DriveConfig commands setup

4.9 Protection – expert option

Enables to modify standard protections or to configure universal protections.

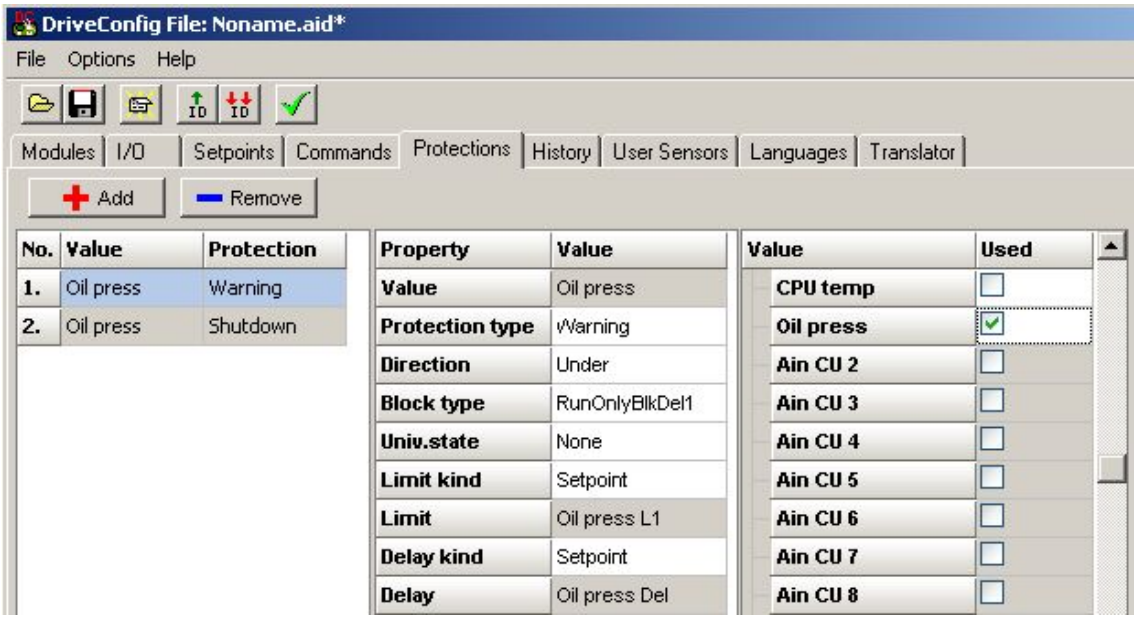

Image 4.16 Protections tab overview

4.10 History record configuration

It is possible to modify history record and Value abbreviation.

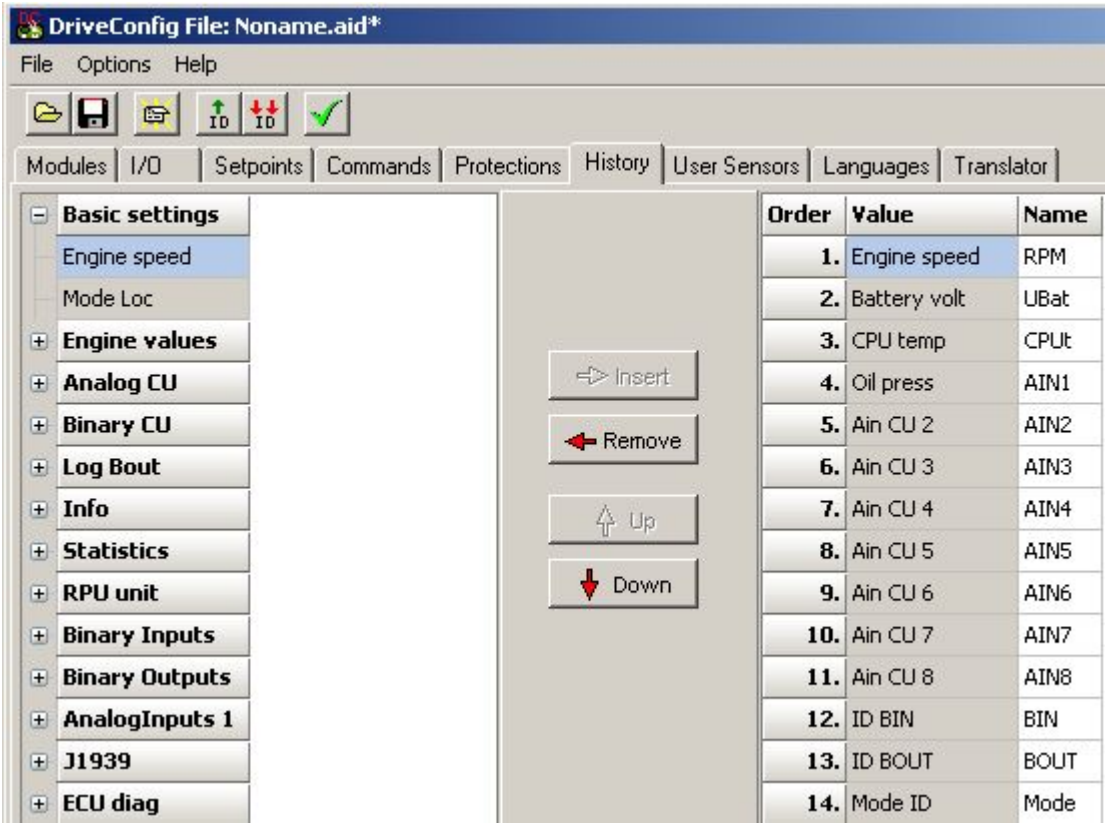

Image 4.17 History tab overview

Note: *Configuration aid file does not contain the History record when had been read from the ID controller by DriveConfig.*

Note: *To load History file from InteliDrive use DriveMonitor software only.*

Note: *Support of controller history with 4096 records.*

4.11 User sensor configuration

CU 0 - 20 mA CU 0 - 1 V CU 0 - 100 mV CU 0 - 2500 Ω	ID-DCU
± 100 mV ± 1 V 0 - 2,5 V 0 - 10 V	Extension modules

Table 4.9 HW configuration

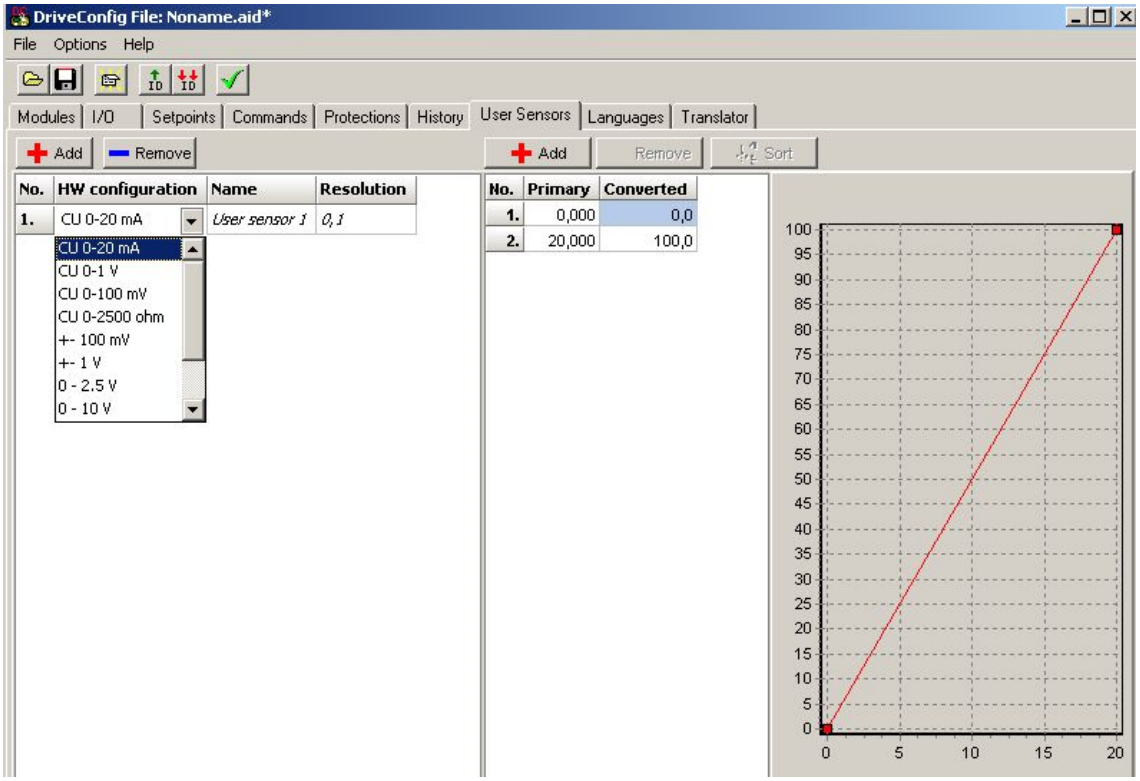

Image 4.18 User Sensors setup

4.12 Language translator

The controller can contain texts in more different languages. The number of slots available for additional languages depends on the number of texts used in the configuration (i.e. on the application complexity, ECU size, number of extension modules etc.).

Note: *The language slot #1 is not changeable and always contains English.*

The procedure of adding a new language consists of two steps:

1. Create new language
2. Translate the texts

4.12.1 Create language

- Use the button to remove all unnecessary additional languages. If you want to create a "graphical" language which uses large font (Korean, Chinese etc.), **do not remove existing large font based language with Unicode flag.**
- Click to the button (1) and create new language. If you want to create a Latin language, select English as the base language. If you want to create graphical one, select an existing graphical language as e.g. Chinese or "English-large" (2) as the base language.
- Then give a suitable name (3) to the language and select locale ID (4) and time/date format (5). Code page will be completed automatically after locale ID is selected.
- Now you can remove the original graphical language, which was used as the base language.
- Continue to the Translator tab to translate the texts from English to the target language.

6 back to Controller configuration steps

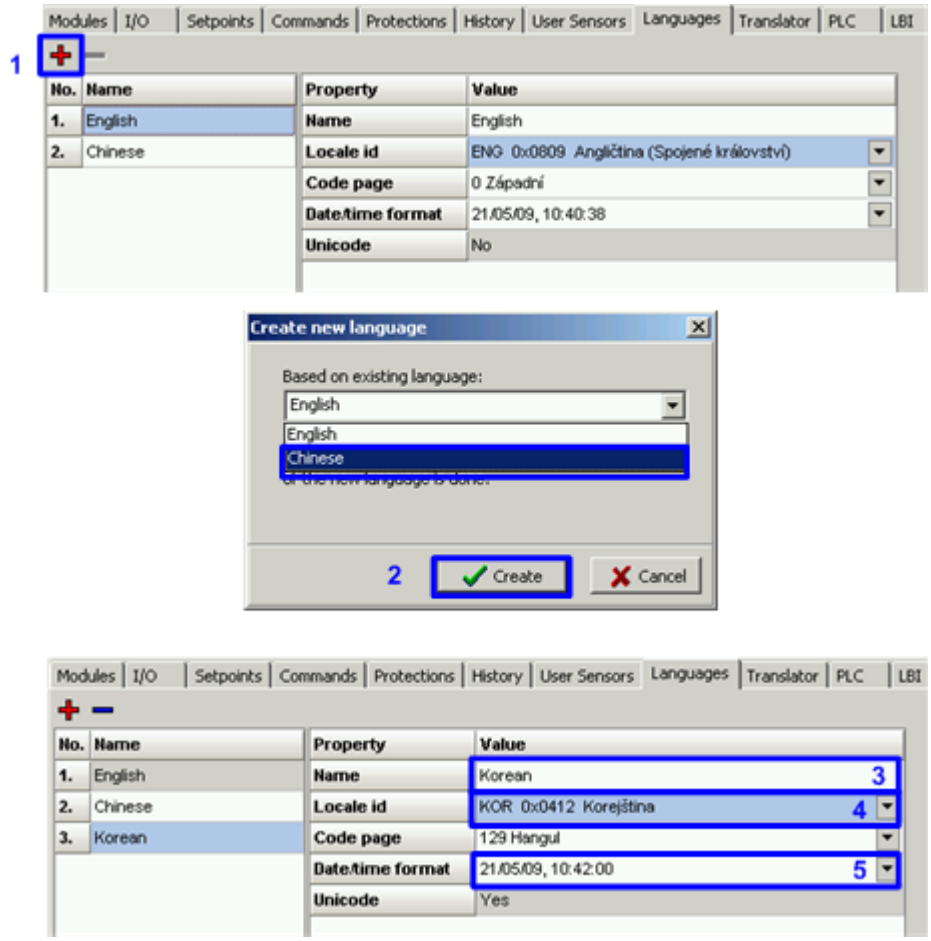

Image 4.19 Create language steps

4.12.2 Translating the texts

Just after the language is created all the texts in the language are in English and need to be translated into the target language.

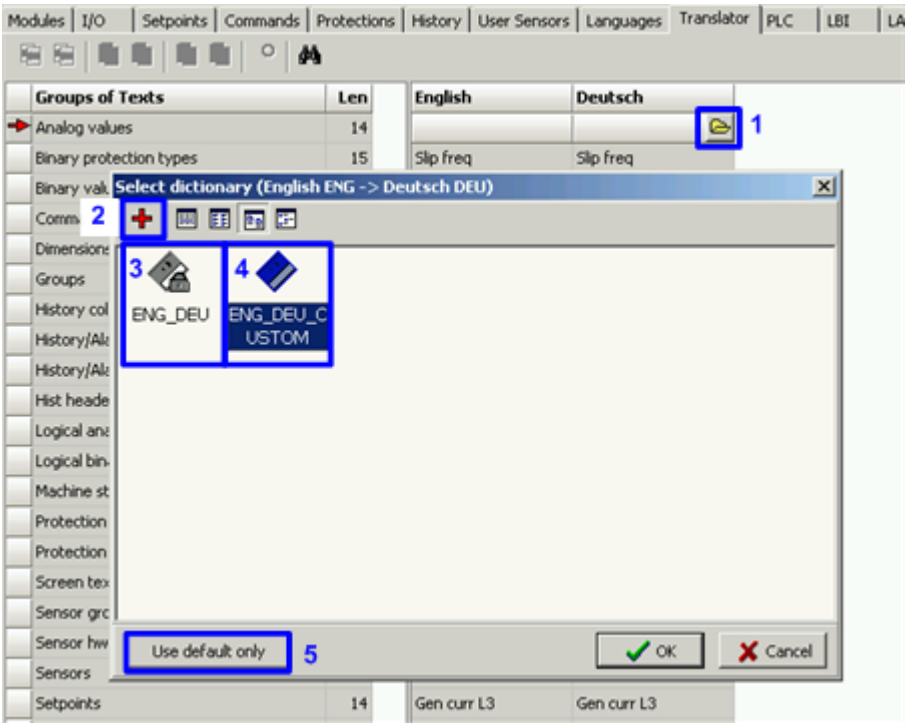

Image 4.20 Dictionary selection

- Click on the button (1) to open a **working** (4) dictionary. A window with a list of dictionaries will open. Select proper one or use the + button (2) to create new. The dictionaries with gray icon (3) are default dictionaries and can't be selected as working. Use the button **Use default only** to perform the translation with default dictionary only. In such case it is not possible to add/modify the translations.

Note: *To prevent user translations from overwriting by new version of default dictionary, the user translations are stored in a user-created working dictionary. The default dictionaries, which are delivered together with the software, are read-only and can't be used as working dictionaries. The translations are searched in the working dictionary first and if it is not found there, then the default dictionary is used.*

- Now un-translated items (that are not present in any dictionary) are shown in cyan color (3), translated by user dictionary are white (1) and translated by default dictionary are gray (2). If a group contains at least one un-translated item, it is shown in cyan (4), if all items of the group are translated, the group is gray or white (5).

Note: *The icon (6) indicates that the texts from the particular group is used on the controller display. The groups without this icon contain texts visible only in GenConfig. In some cases it may be sufficient to translate only the "controller" texts and save time needed for the translation.*

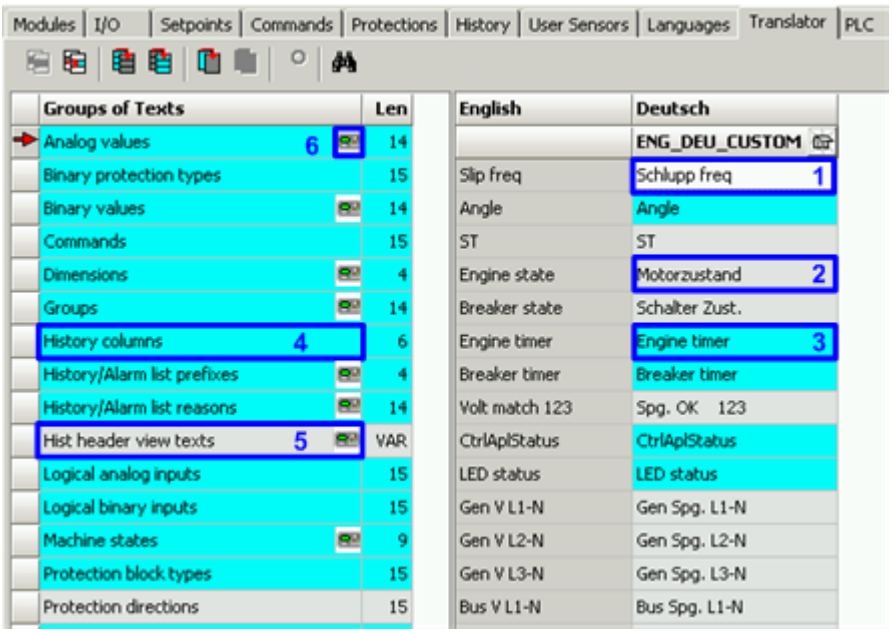

Image 4.21 Translator setup

- Translate un-translated items by editing them directly in the column of the appropriate language. Items are added to the working dictionary automatically. Go through all groups of texts (select group in the left part of the window).
- Using icons in the toolbar of the Translator tab you can mark all or one text as translated while leaving the original text. It is possible also revert translated item to original text and mark it as un-translated back.

5 PLC

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5.1 PLC Editor

PLC Editor is powerful tool which helps you to create your own PLC scheme. It has graphical interface to have user interface easy to use.

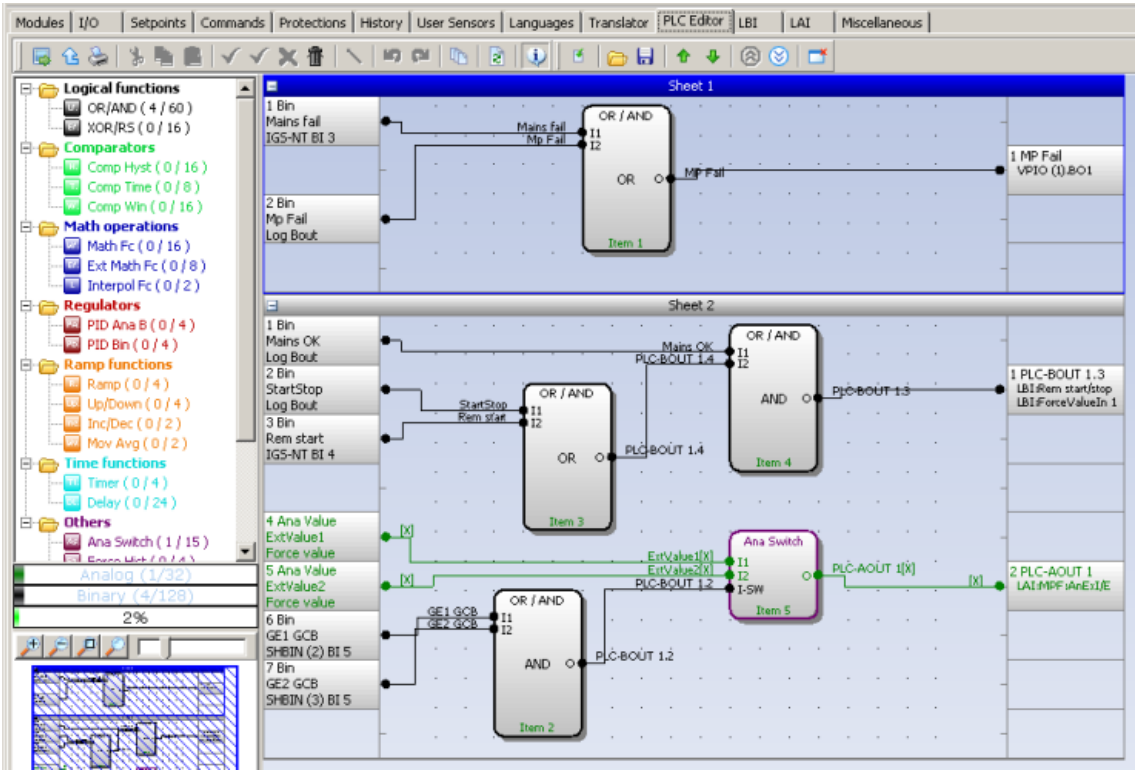


Image 5.1 PLC Editor interface screen

5.1.1 Working with the editor

Create a PLC drawing

Note: *The list of supported PLC blocks depends on controller type, firmware and presence of a dongle.*

Note: *The program must be switched to Expert mode to enable PLC editor!*

If the currently opened archive does not contain any PLC program, then an empty drawing is created automatically when you select the **PLC Editor**. The procedure of creation of a PLC drawing (program) contains following essential steps:

1. Define inputs and outputs of the PLC program
2. Add more sheets if necessary
3. Add PLC blocks into the sheets
4. Create connections between inputs, blocks and outputs
5. Adjust properties of the blocks

> **IMPORTANT: Please always check that the blocks are ordered correctly, especially if you use direct feedbacks from outputs to inputs within one sheet. Wrong order of blocks may lead to incorrect results!!!**

Add new sheet

Press the button on the PLC toolbar to add new sheet under the selected sheet. Drag the sheet edges to resize the sheet according your needs.

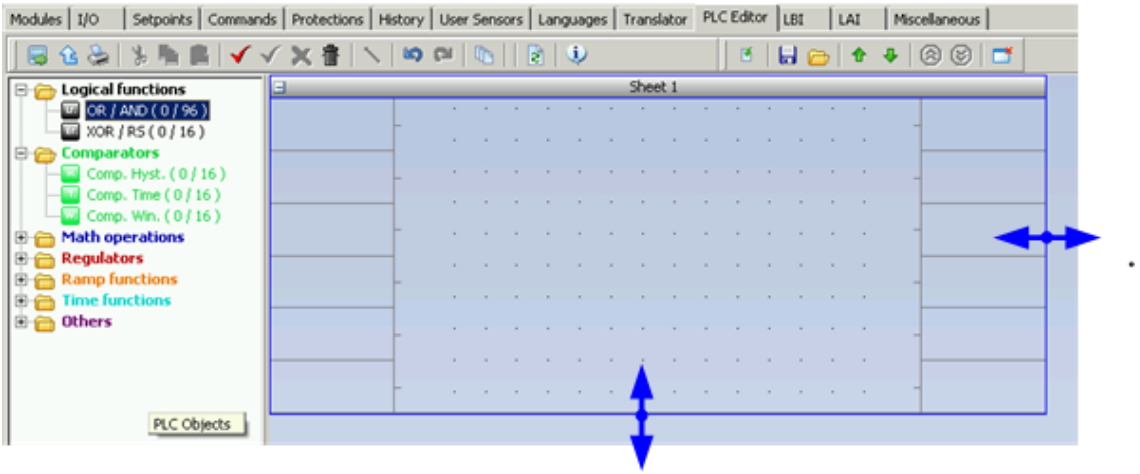


Image 5.2 Resize sheet

Note: *The print function prints each sheet of the drawing at one sheet of paper, i.e. large sheets are zoomed out to fit the paper size. This can cause that large sheets will be difficult to read.*

Delete a sheet

Press the button on the PLC toolbar to delete currently selected sheet from the drawing.

Define sheet inputs

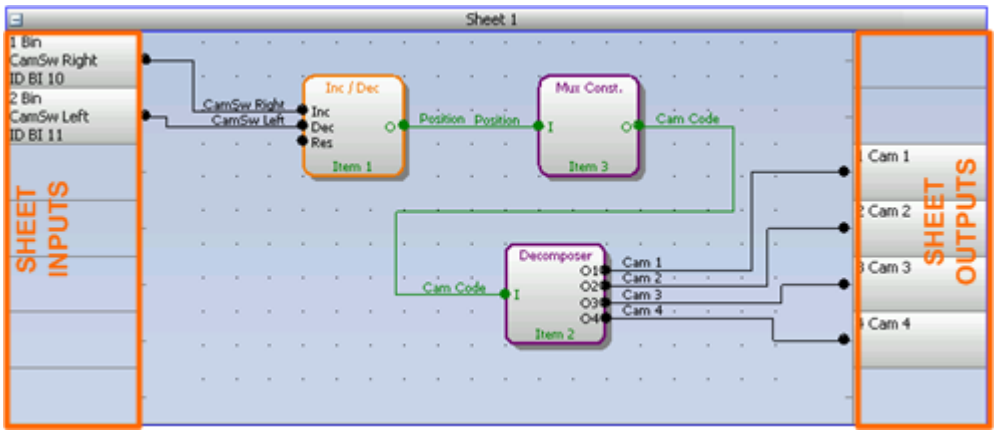


Image 5.3 Sheet inputs and outputs

Sheet inputs are located at the left side of a sheet. Follow the procedure below to add or edit an input.

1. Double-click on a free input position or existing input to add new input or edit the existing one.
2. Select the source for the input. If you create a binary input, you can select a source from following categories:

- **Bin. values** - this category contains all binary values available in the controller as binary inputs, logical binary outputs etc.
- **Sheet outputs** - this category contains outputs of all sheets. Use this category if you need an output from a sheet to be an input into another sheet.

3. If you create an analog input, you can select a source from following categories:
   - **Ana. values** - this category contains all analog values available in the controller as analog inputs, electrical values, values from ECU etc.
   - **All setpoints** - this category contains all setpoints of the controller except the dedicated PLC setpoints. Names, resolutions and dimensions of these setpoints can not be modified.
   - **PLC setpoints** - this category contains a group of setpoints which are dedicated for using in the PLC program. PLC setpoints can be renamed (1), their dimension (2), resolution (3) and limits (4) can be modified according to need of PLC blocks where they are used.

Note: *There is a check to see if maximum number of dimensions has been exceeded. If the limit is reached, the new dimension is not allowed to define. The information is read from the configuration table. Most controllers can have 32 different dimension, newer controllers allow 64 different dimensions.*

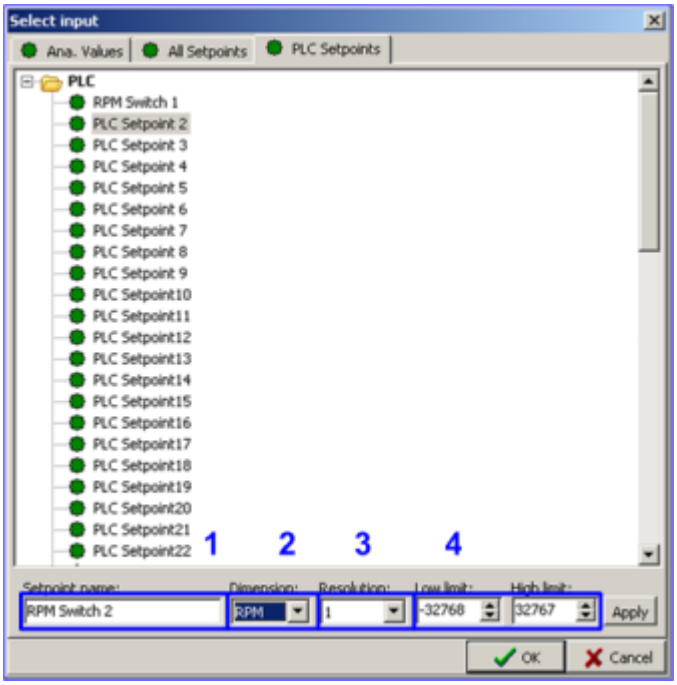


Image 5.4 PLC Setpoints

- **Sheet outputs** - this category contains outputs of all sheets. Use this category if you need an output from a sheet to be an input into another sheet.

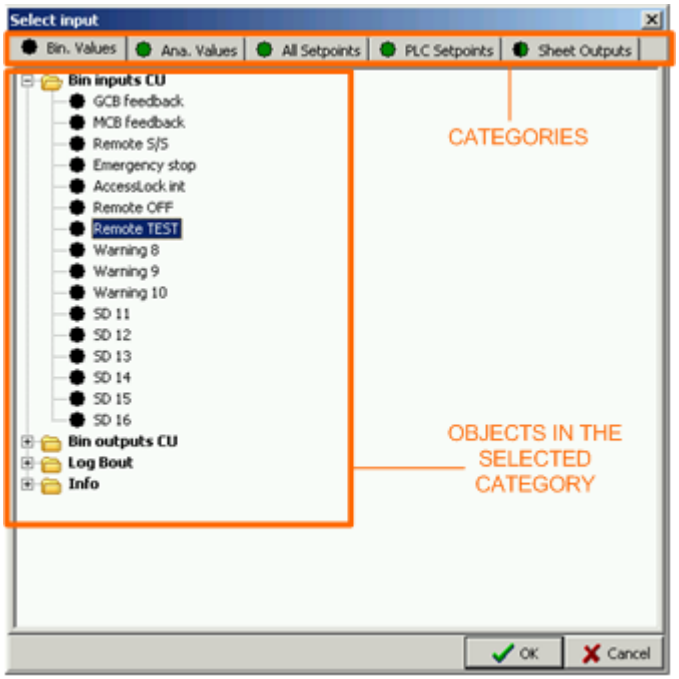


Image 5.5 Input categories

Define sheet outputs

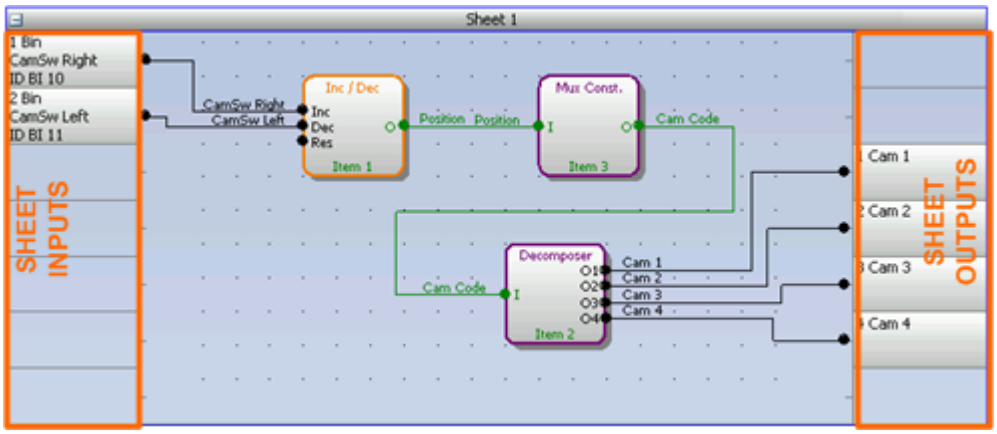


Image 5.6 Sheet inputs and outputs

Sheet outputs are located at the right side of a sheet. Double-click on a free output position to **add new sheet output**. Select type of the output (analog or binary). New sheet output is also **automatically created** when a wire is connected from a block inside of the sheet to a free sheet output position. Double-click on an already created output to **configure the output** onto a controller output terminal or a logical binary input.

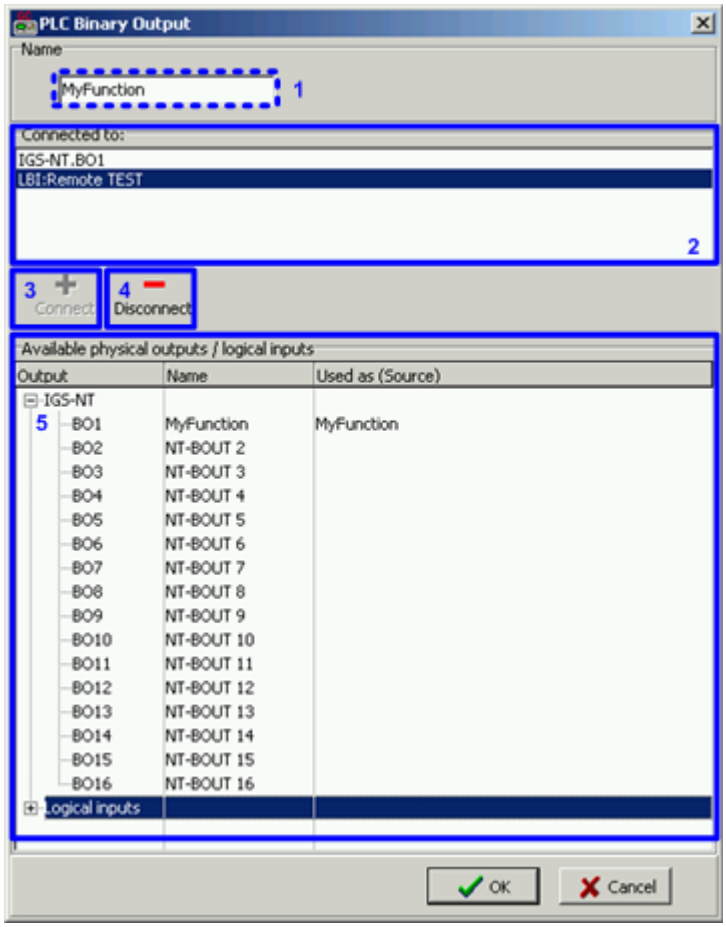


Image 5.7 Sheet output configuration

- You can rename the output in the box
- The list (2) contains all targets where the sheet output is connected to.
- If you want to delete an existing connection, select it in the list (2) and then press the button (4).
- If you want add a new connection, select a target in the list (5) and then press the button (3). The connection will then appear in the list (2).

Adding blocks to a sheet

1. Select required block from the tree at the left and drag it into the sheet.
2. Double-click on the block and adjust properties of the block.
3. Connect the block inputs and outputs by drawing wires in the sheet. If you want the inputs to be connected to sheet inputs, define the sheet inputs first.

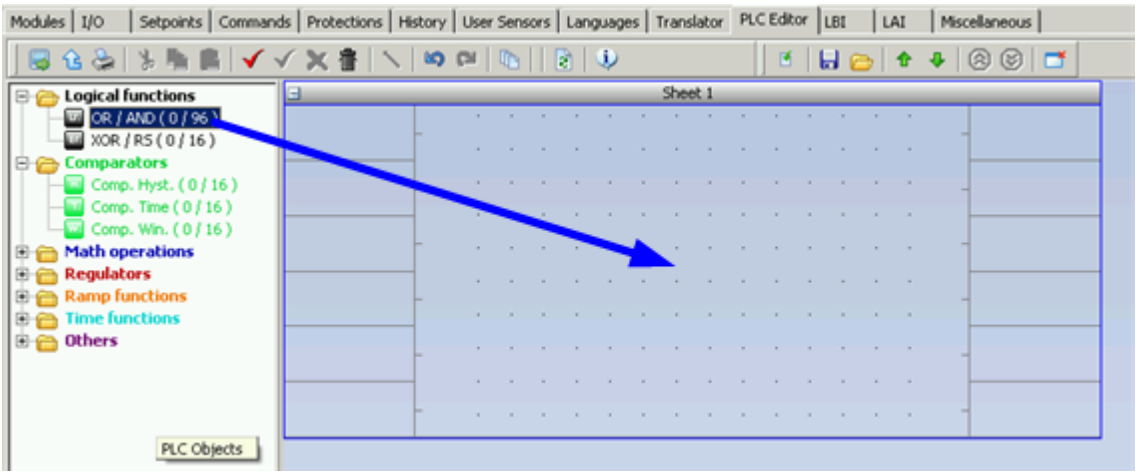


Image 5.8 Adding blocks to a sheet

Drawing wires

1. Locate the mouse pointer over the starting point of the wire. If the area under the mouse pointer is a connection point, the pointer will change to an upright arrow.
2. Press and hold the left mouse button and drag to the destination point of the wire. If you point over a valid connection point, the connection point will be marked with a green circle.
3. Release the left mouse button to draw a wire between the two points. The wire is routed automatically.

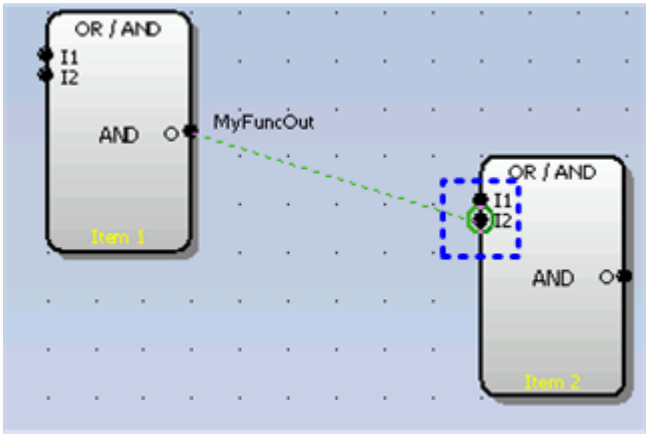


Image 5.9 Valid connection point indication

4. The wires can be edited by dragging it's sections. The first section of a wire that goes from the output of a block is not editable. A direct connection of an output back to an input of the same block is not editable as well.

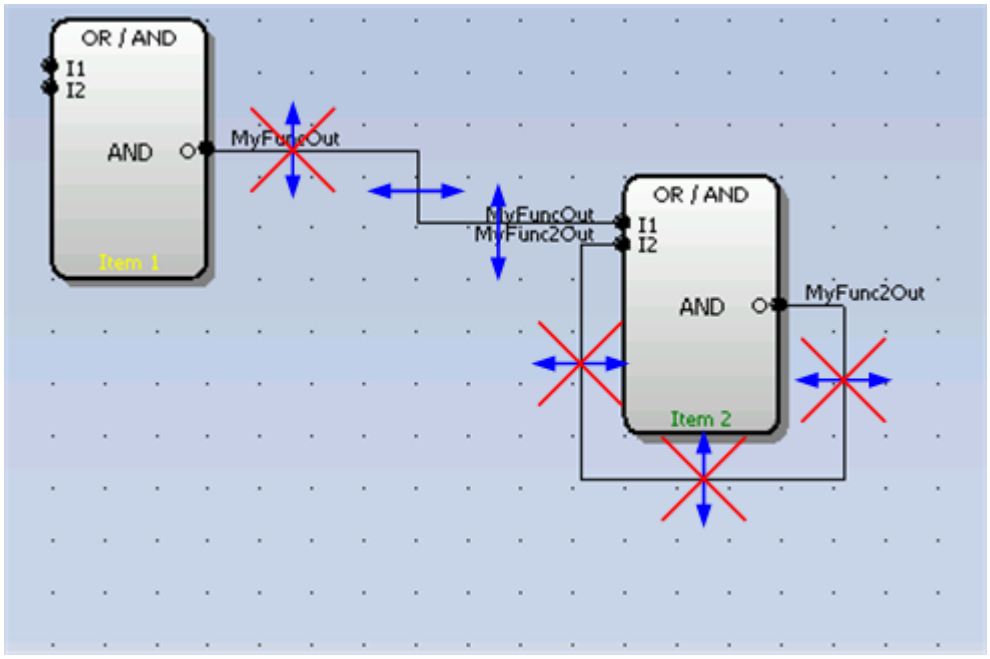


Image 5.10 Editing wires

Using the clipboard

- Selecting one element: Click on a sheet element to select the particular element.
- Creating a multiple selection: Click somewhere in the free area of the sheet and drag over the desired sheet elements while holding the left mouse button to create a multiple selection.

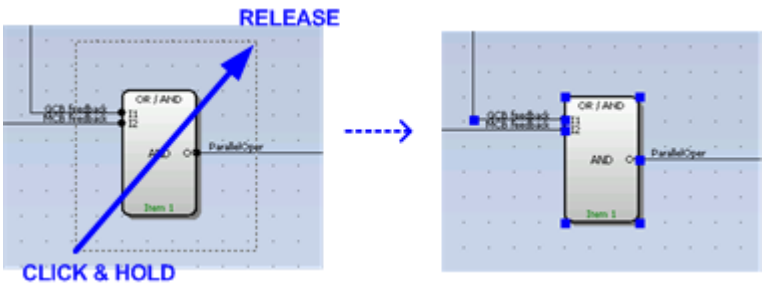


Image 5.11 Element selection

Following clipboard/selection operations are available:

	CTRL+X	Cut selection
	CTRL+C	Copy selection
	CTRL+V	Paste from clipboard
	CTRL+A	Select whole sheet contents
	ESC	Cancel selection
	DELETE	Delete selection

Table 5.1 Operations overview

Export/Import sheets

Press the button on the PLC toolbar to save currently selected sheet into a file. Press the button to import contents of currently selected sheet from a file. Configuration of sheet outputs is not imported and must be done manually afterwards.

Note: *The import will overwrite all previous sheet contents!*

IMPORTANT: Please always check configuration of sheet inputs, especially if you import a sheet which was originally created in different firmware branch and/or version.

Example: This function can be used e.g. if you have a sheet containing one particular function and you want to use this functionality repeatedly.

PLC data types

Binary PLC inputs and outputs can have value of logical 0 (inactive state) or logical 1 (active state). Binary inputs of a sheet can be connected to **any binary value** in the controller such as physical binary inputs, logical binary outputs or binary outputs from other PLC blocks. Binary outputs of a sheet can be connected to output terminals or logical binary inputs.

Analog PLC inputs and outputs are objects of the INTEGER16 type so they can have value from range -32767 to 32767. Value -32768 indicates that value is out-of-range. This value cannot be used as input for any block. Value -32768 is displayed as #### on terminals. Analog inputs of PLC blocks can be either set to constants or connected to **any controller value** including outputs from other PLC blocks or setpoints. There is a pool of dedicated setpoints for using in the PLC. Their names, dimensions, resolution and limits can be edited.

Note: *Recommended max value of Graphic data length is 8 kB.*

Note: *Although it is possible to connect a value of different data type to a sheet analog input, the PLC program will work correctly only if the input value will be within the INTEGER16 range. If you connect for example a UNSIGNED16 value as e.g. generator current, the block will work correctly with values 0 to 32767, but higher values will be interpreted as negative.*

Note: *Most of PLC blocks require sources for their analog inputs, which have certain dimensions and resolution. E.g. the block PID regulator require a source for the "gain" input, which is in [0.01%]. Only analog objects with the same dimension and resolution can be connected to this input.*

PLC program execution rules

The PLC program is executed every 100ms. The blocks are executed in order according to block numbers (item numbers), which are indicated in each block. The block numbers are assigned automatically according to the scheme at the picture below.

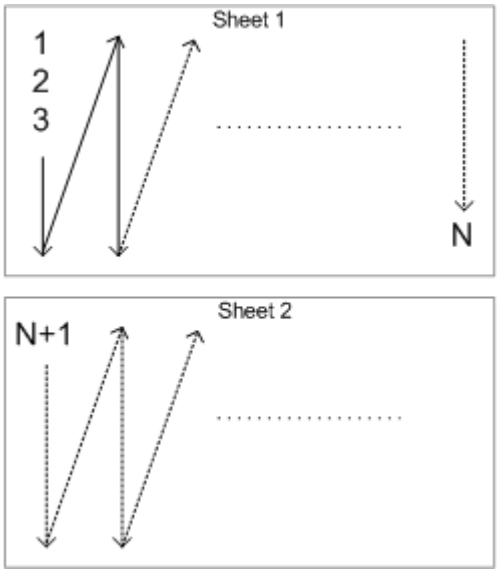


Image 5.12 Block ordering scheme

IMPORTANT: Please always check that the blocks are ordered correctly, especially if you use direct feedbacks from outputs to inputs within one sheet. Wrong order may lead to incorrect results!!!

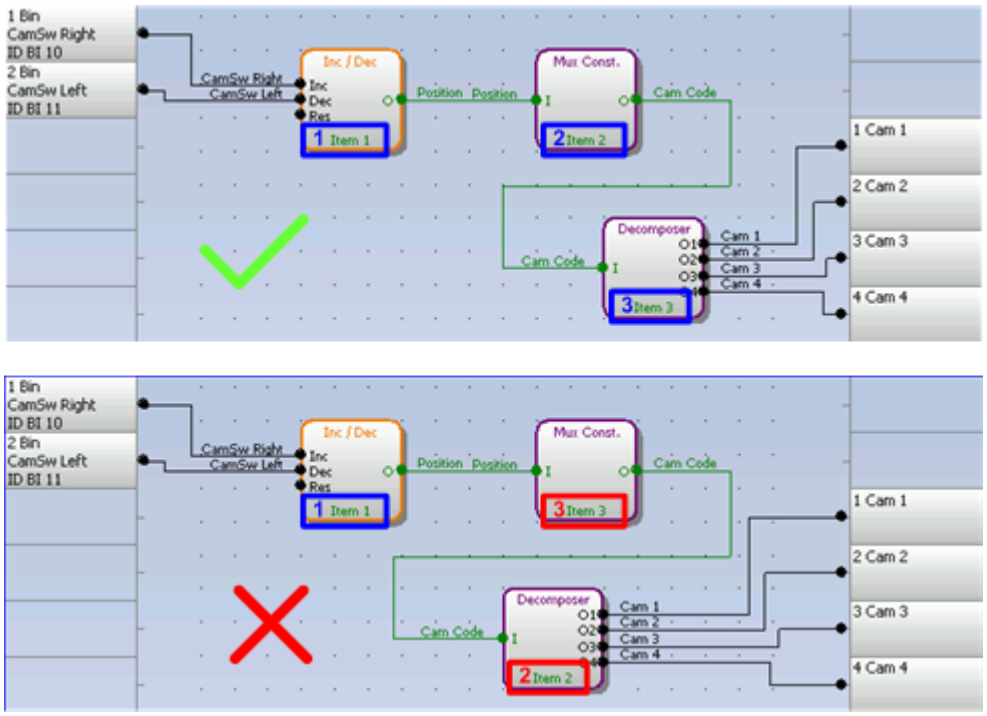


Image 5.13 Block ordering example

PLC Editor toolbar

	Export drawing to image
	Recovery the drawing
	Print the drawing
	Cut selection
	Copy selection
	Paste from clipboard
	Select whole sheet contents
	Cancel selection
	Delete selection
	Delete whole sheet contents
	Reroute selected wire(s)
	Undo last change
	Redo last undo change
	Show drawing history
	Repaint drawing
	Show hints
	PLC Setpoints
	Add new sheet
	Import sheet from file
	Export sheet to file
	Move active sheet up
	Move active sheet down
	Go to previous sheet
	Go to next sheet
	Delete a sheet

6 back to PLC

5.2 List of PLC blocks

List of all available PLC blocks throughout different controller's types and versions. Several PLC blocks are available just in selected controllers or selected versions.

- PLC Block: AND/OR (page 61)
- PLC Block: XOR/RS (page 63)
- PLC Block: Comparator with hysteresis (page 65)
- PLC Block: Comparator with delay (page 67)
- PLC Block: Window comparator (page 69)
- PLC Block: Mathematical function I (page 71)
- PLC Block: Mathematical function II (page 72)
- PLC Block: Interpolation (page 74)
- PLC Block: Interpolation - configurable (Type 'B') (page 76)
- PLC Block: Nonlinear Interpolation function (page 78)
- PLC Block: Mathematical function multiplication/dividing (AxB/C) (page 80)
- PLC Block: PID regulator with analog output (page 82)
- PLC Block: PID regulator with analog output (Type 'B') (page 84)
- PLC Block: PID regulator with analog output with configurable output limit (Type 'C') (page 86)
- PLC Block: PID regulator with up/down binary outputs (page 89)
- PLC Block: PID regulator with up/down binary outputs (Type 'B') (page 91)
- PLC Block: Analog ramp (page 94)
- PLC Block: Up/Down (page 96)
- PLC Block: Inc/Dec (page 98)
- PLC Block: Moving average (page 100)
- PLC Block: Moving average (Type 'B') (page 101)
- PLC Block: Timer (page 103)
- PLC Block: Delay (page 105)
- PLC Block: Delay - s/m/h (Type 'B') (page 107)
- PLC Block: Analog switch (Multiplexer) (page 110)
- PLC Block: Force history record (page 112)
- PLC Block: Force protection (page 113)
- PLC Block: Jump (page 115)
- PLC Block: Multiplexed analog constant (page 116)
- PLC Block: Counter (page 118)
- PLC Block: Decomposer (page 120)
- PLC Block: Convert (page 122)
- PLC Block: 3D Map (page 123)

5.2.1 PLC configuration example

Let suppose a diesel compressor. The engine speed is controlled via ID-SCM (IG-PCM) Speed governor analog output (no data communication). InteliDrive measures output pressure.

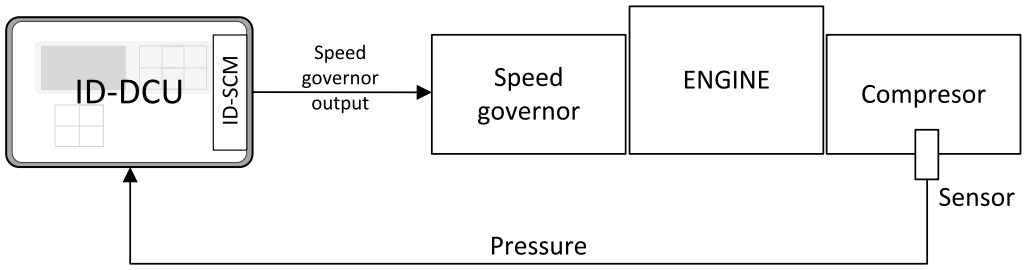


Image 5.14 Diesel compressor control

Required function

Based on adjustable pressure limits ID controller switch the engine between RPM1 to RPM2. When Pressure drops below Pressure ON limit engine increases from RPM1 to RPM2 and after Pressure increases above Press OFF limit goes back to RPM1.

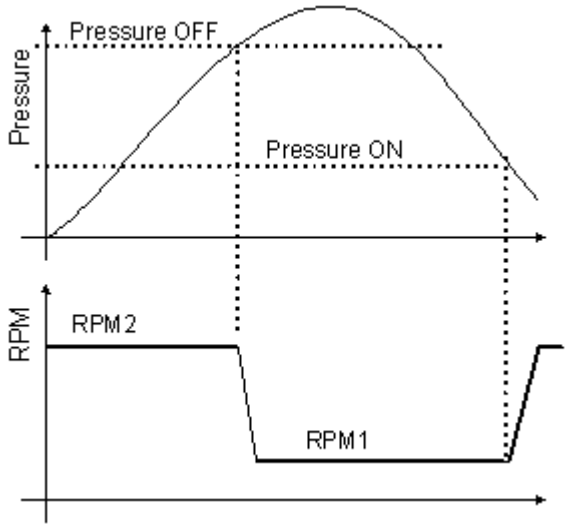


Image 5.15 Pressure and RPM dependence

Function structure

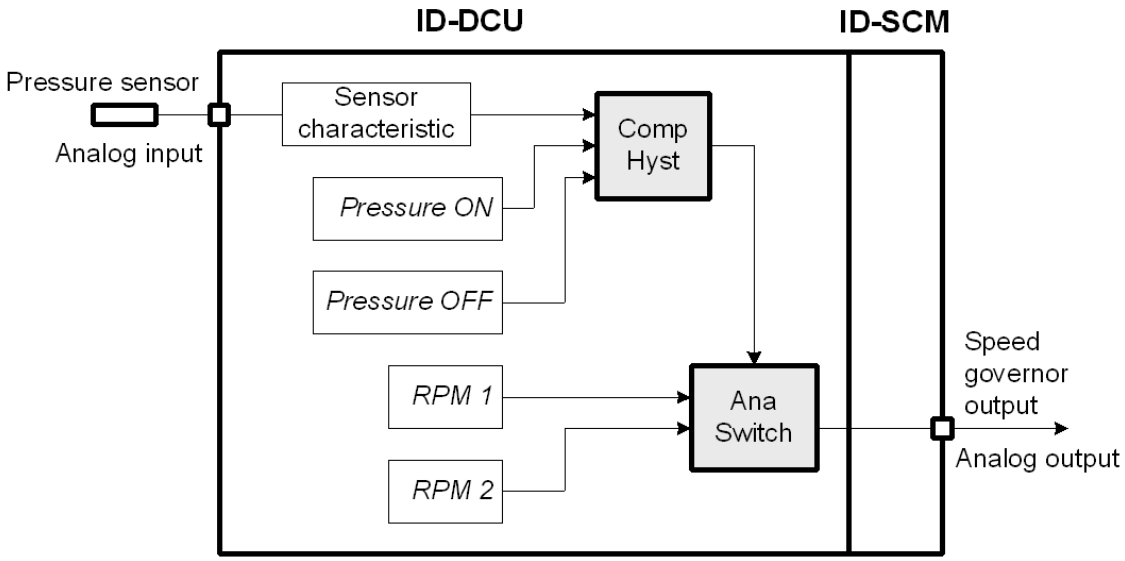


Image 5.16 Controller overview

Configuration steps

1. Start DriveConfig-3.1 and open default DCU-AUX-2.1.aid.
2. Pressure measuring: configure pressure sensor characteristic – suppose range 0 to 10,0 bars on ID-DCU Analog input 4. Wrn and Sd protection limits should be adjusted over Pressure OFF limit.

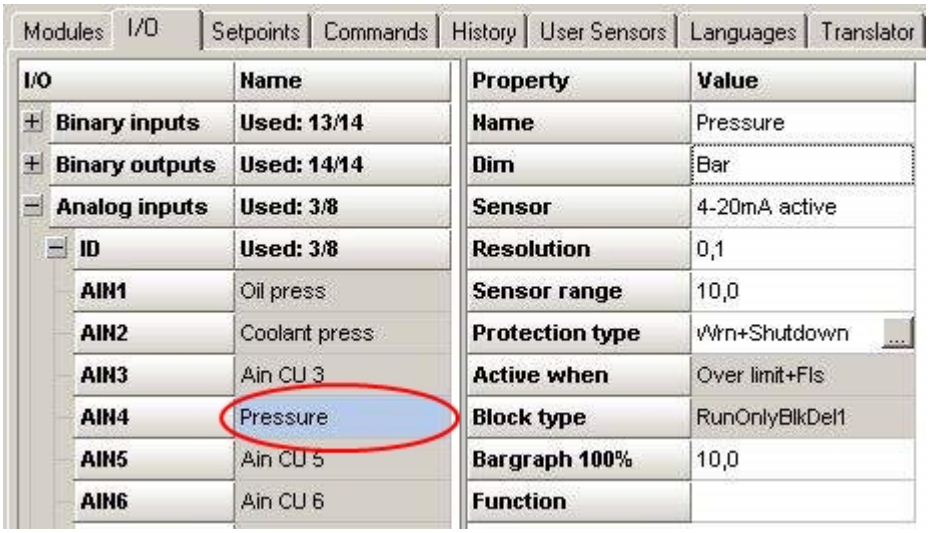


Image 5.17 Pressure sensor characteristic

3. Go to PLC window and drag & drop PLC functional block **Comp Hyst**, double click the block.

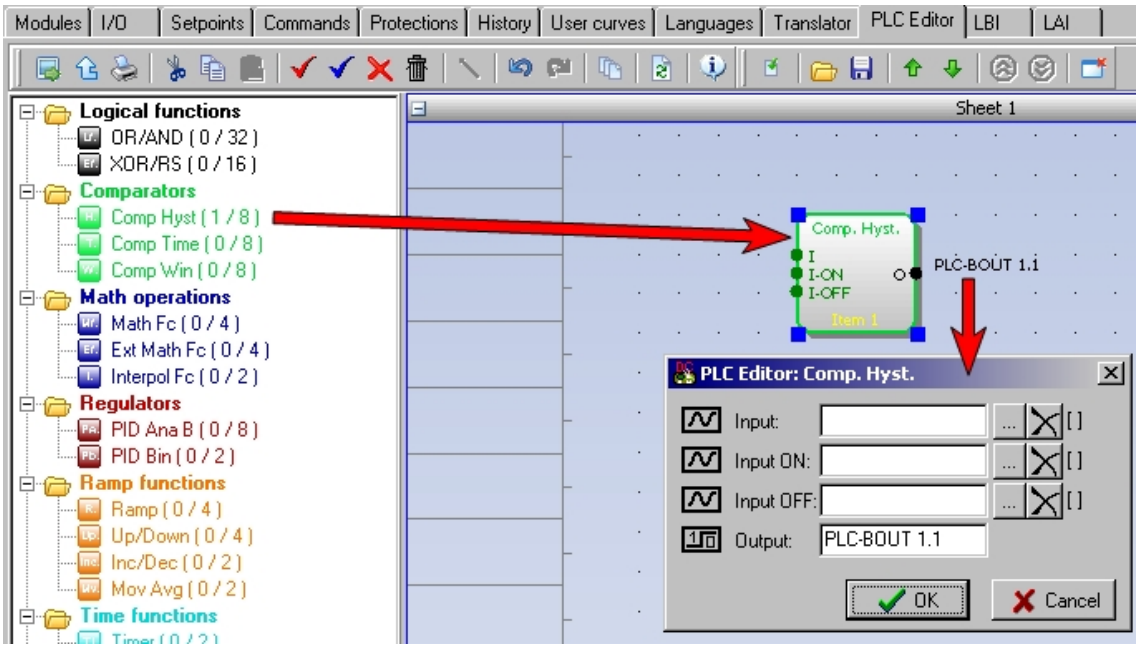


Image 5.18 PLC window

4. Configure Comparator Input: click on [...] button and select input value from the list.

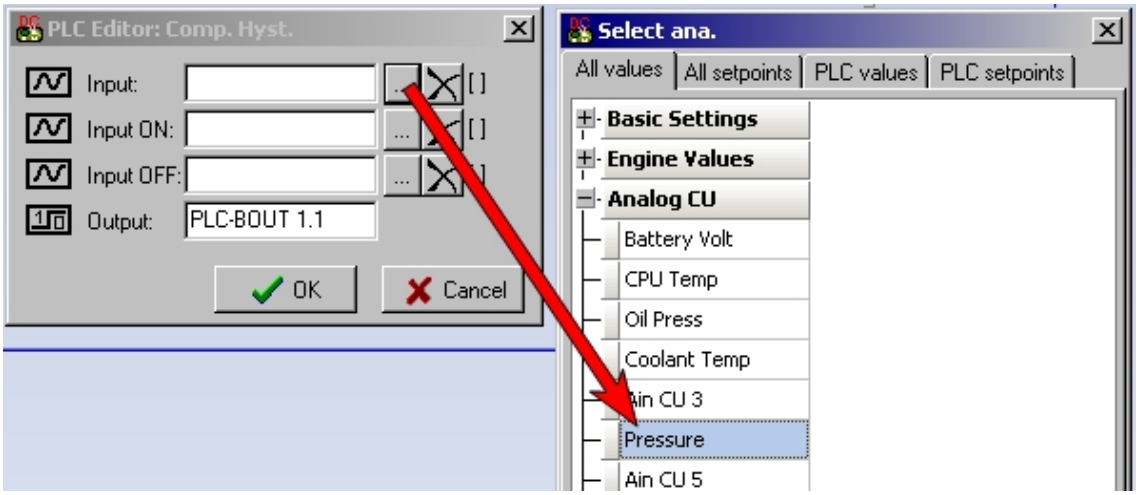


Image 5.19 Configure comparator input

5. Configure comparator limits Input ON, Input OFF as PLC setpoints

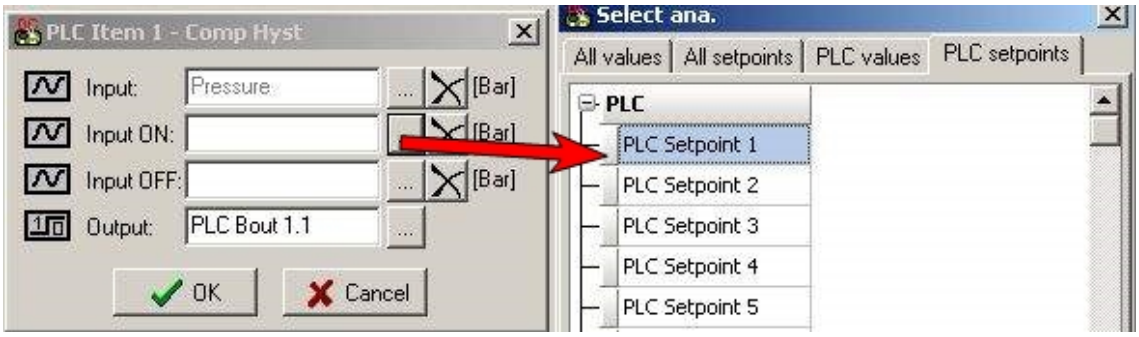


Image 5.20 PLC setpoints selection

6. Edit setpoint name in PLC setpoints list.

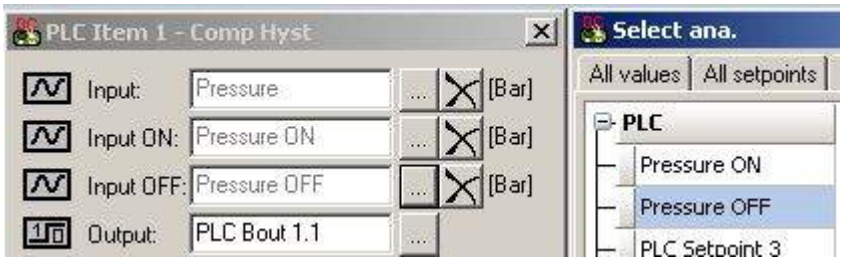


Image 5.21 PLC setpoints list

Result look like this:

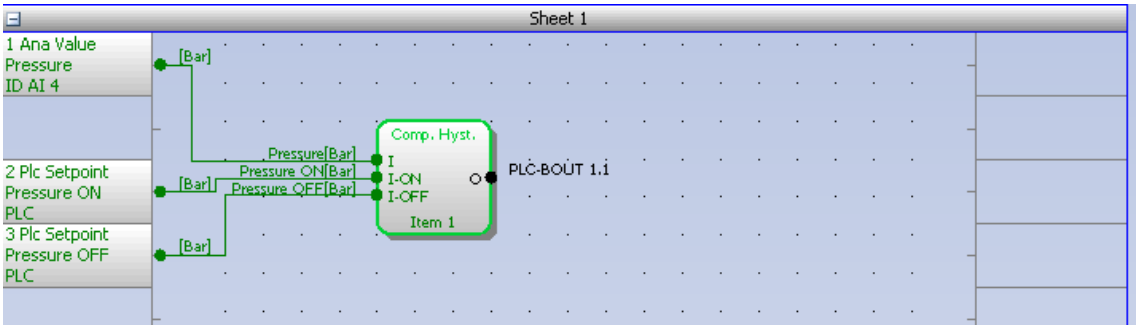


Image 5.22 Setpoints after edit

7. Drag & drop PLC functional block **Ana Switch**, configure Input 1 and Input 2 as PLC setpoints and edit the setpoint names to RPM 1 and RPM 2.

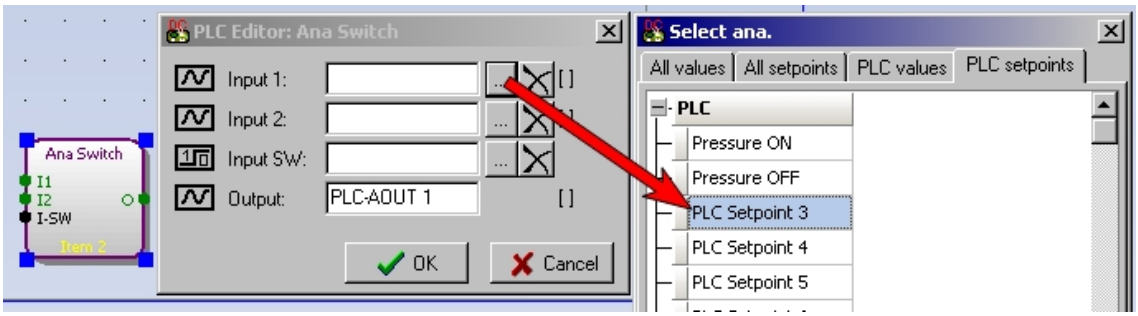


Image 5.23 Ana Switch configuration

8. Configure binary Input SW: PLC values: PLC Bout 1.1.

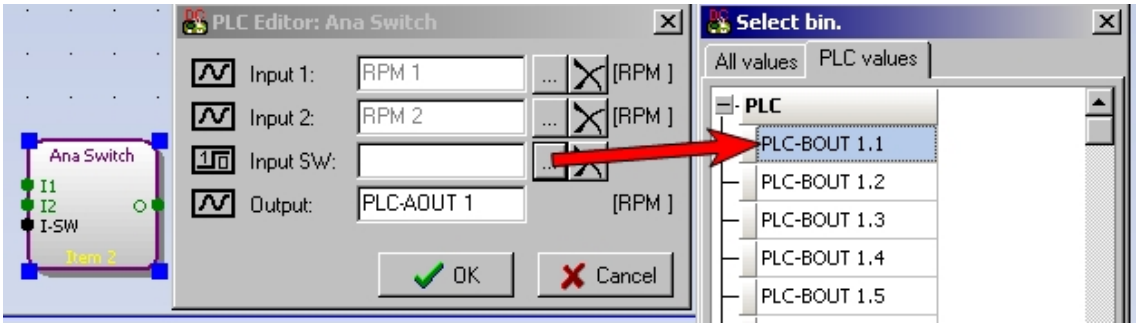


Image 5.24 Binary input configuration

9. Rename output to RPM out.

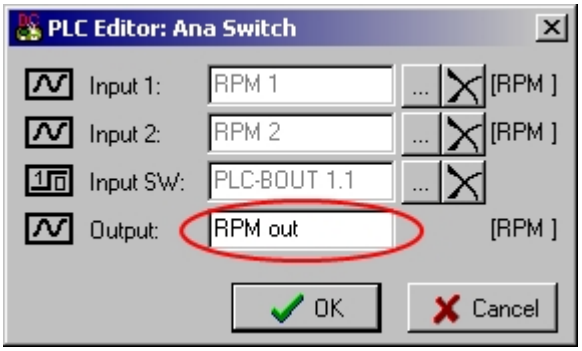


Image 5.25 Output name setup

10. Go to I/O window and configure analog SCM AOUT1 as RPM out. Then configure output convert Low limit (0 RPM ~ 0.00V output) and High output convert limit (2000 RPM ~ 10.00V output).

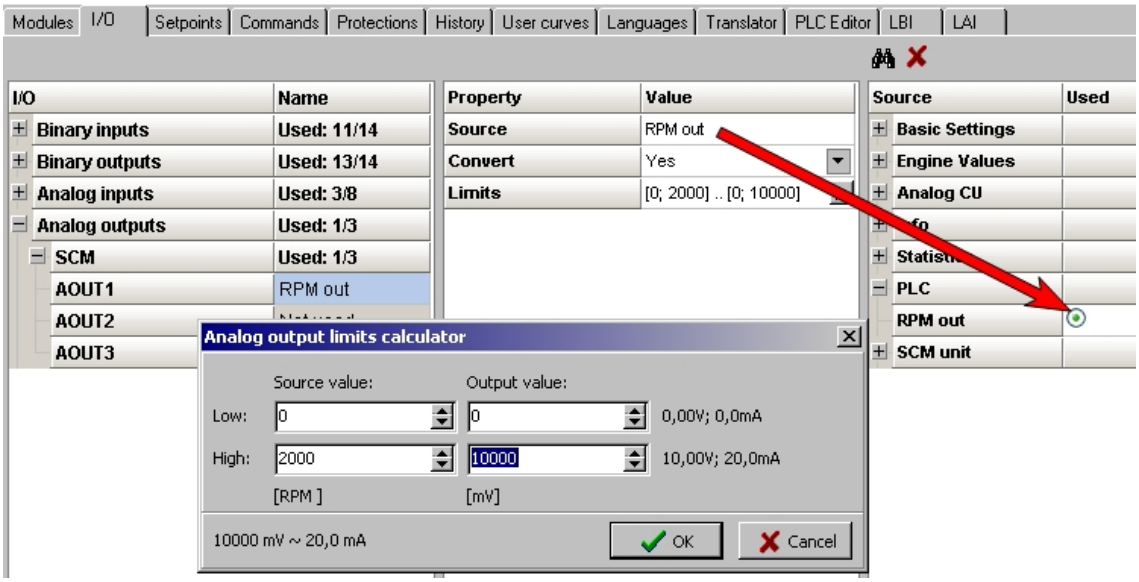


Image 5.26 I/O window

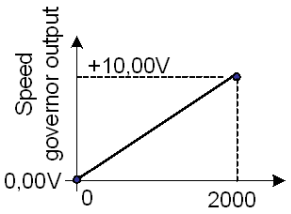


Image 5.27 Speed governor output characteristics

Speed governor output characteristics for Lo limit and Hi limit setting above.
Speed governor output voltage in this case (when RPM1= 500 and RPM2=1800) is 9V when pressure is low and 2,5V when pressure is high.

11. Final PLC layout in DriveConfig

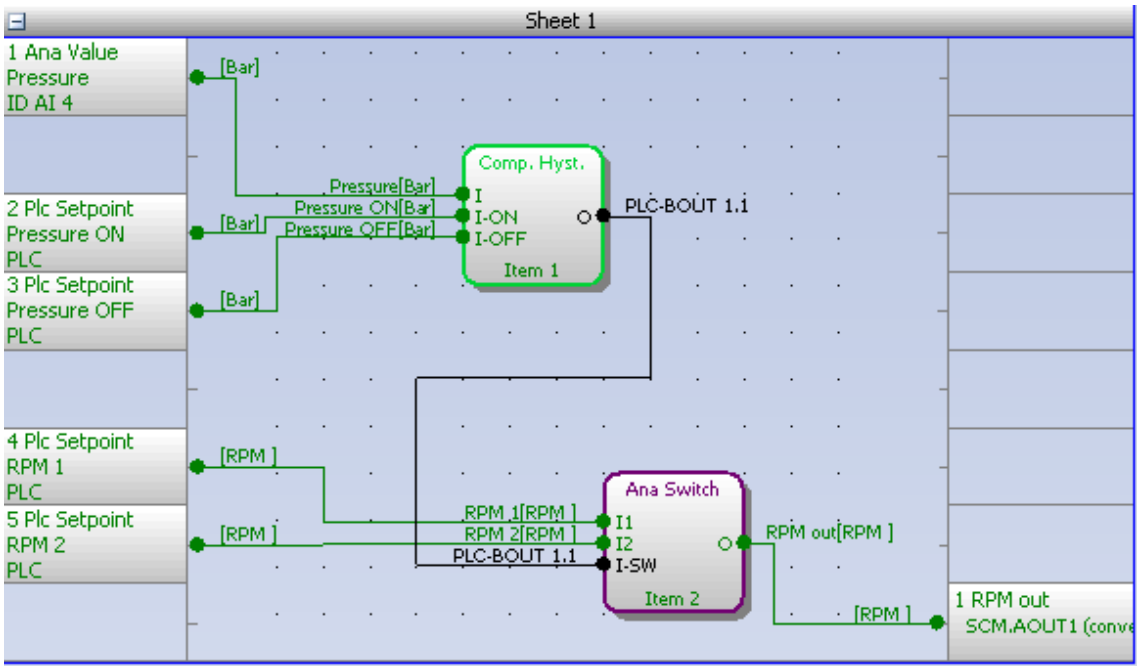


Image 5.28 Final PLC layout

6 back to PLC

5.3 PLC toolbar functions

5.3.1 Export drawing to image

Press the button on the PLC toolbar to export the whole drawing (all sheets) into a windows metafile image (WMF). The WMF is a vector format which can be viewed and edited in most of vector-based graphic editors such as CAD editors, Microsoft Visio etc.

5.3.2 Recovery the drawing

The program creates backups of your drawing automatically. If you close the drawing accidentally, you can recovery it back from the backup copies. Press the button on the PLC toolbar to select which backup copy you want to open. The filenames of the backup copies are generated automatically from current date and time according to following scheme: "yyyy_mm_dd_hh_mm_ss_xxxx.xml"

> **IMPORTANT: If you open a backup copy which was saved from an archive of different firmware version and/or branch than the current archive is, the configuration of sheet inputs and outputs may be incorrect!!**

5.3.3 Print the drawing

Click to the icon to print the whole drawing. After clicking the print preview window is opened, where you can see how the drawing will appear on the paper. Then click to Print button to open the standard windows print dialog.

> ***Note:*** *Each sheet is printed on two separate sheets of paper. The first paper contains the sheet graphic and the second paper (or more) contains summary of the sheet contents in the form of a table. The graphic is always zoomed to fit one paper.*

5.3.4 Cut selection

Use the button or CTRL+X to cut the current selection from the sheet into the clipboard.

5.3.5 Copy selection

Use the button or CTRL+C to copy the current selection from the sheet into the clipboard.

5.3.6 Paste from clipboard

Use the button or CTRL+V to paste the contents of the clipboard into the active sheet.

> ***Note:*** *The clipboard is cleared after the it is pasted into the sheet.*

5.3.7 Select whole sheet contents

Press the button to select all contents of the active sheet.

5.3.8 Cancel selection

Press the button to cancel the current selection.

5.3.9 Delete selection

Press the button to delete current selection.

5.3.10 Delete whole sheet contents

Press the button to delete the whole contents of the active sheet.

5.3.11 Reroute selected wire(s)

5.3.12 Undo last change

Press the button or CTRL+Z to undo the last change that was made in the drawing.

5.3.13 Redo last undo change

Press the button to cancel the last undo step and return one step back.

5.3.14 Show drawing history

Press the button to show/hide a panel at the right of the PLC Editor window, which contains an overview of last changes that were made in the drawing.

5.3.15 Repaint drawing

If the drawing is not correctly displayed, press the button to repaint it.

5.3.16 Show hints

Press the button to activate/deactivate hints for the blocks placed in the drawing. If the hints are enabled and the mouse pointer is located over a block, a hint with block configuration summary is displayed.

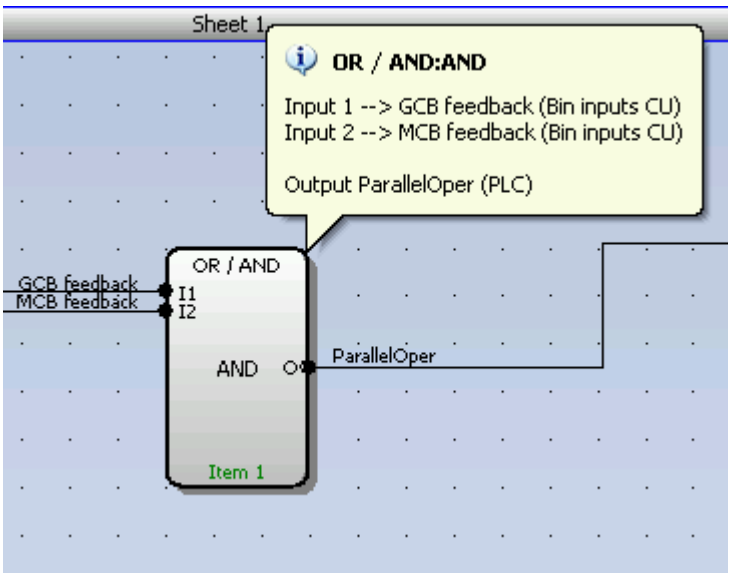


Image 5.29 PLC hint

5.3.17 PLC Setpoints

Press the button to open PLC Setpoints window. In this window it is possible to change name, dimension, resolution and limits.

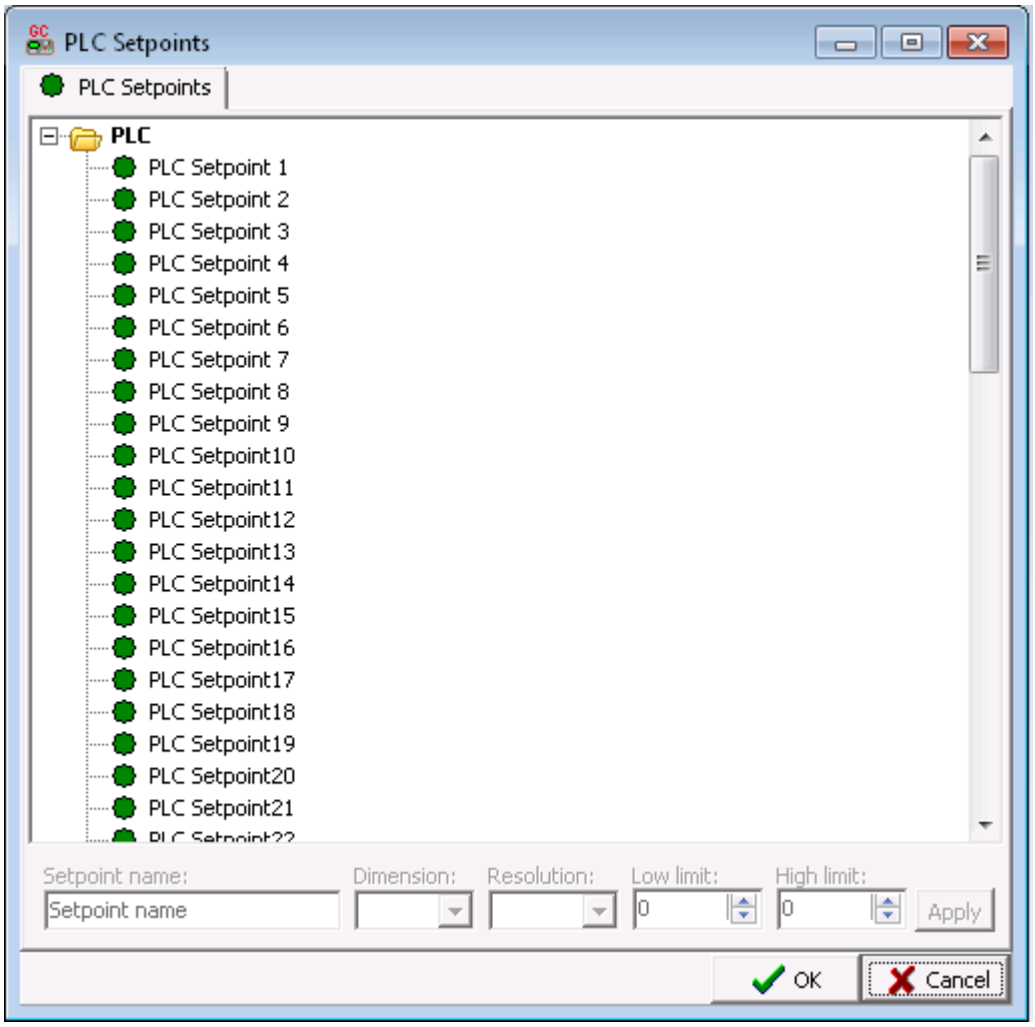


Image 5.30 PLC Setpoints window

5.3.18 Add new sheet

Press the button on the PLC toolbar to add new sheet under the selected sheet. Drag the sheet edges to resize the sheet according your needs.

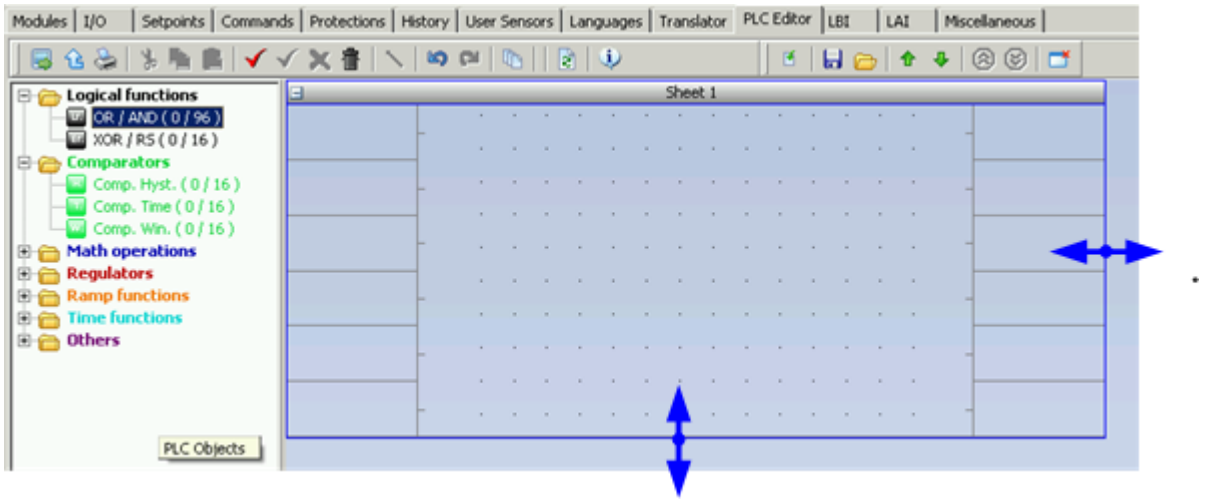


Image 5.31 Resize sheet

Note: *The print function prints each sheet of the drawing at one sheet of paper, i.e. large sheets are zoomed out to fit the paper size. This can cause that large sheets will be difficult to read.*

5.3.19 Export/import of sheets

Press the button on the PLC toolbar to save currently selected sheet into a file. Press the button to import contents of currently selected sheet from a file. Configuration of sheet outputs is not imported and must be done manually afterwards.

IMPORTANT: Please always check configuration of sheet inputs, especially if you import a sheet which was originally created in different firmware branch and/or version.

Example: This function can be used e.g. if you have a sheet containing one particular function and you want to use this functionality repeatedly.

Note: *The import will overwrite all previous sheet contents!*

5.3.20 Move a sheet

Press the button or on the PLC toolbar to move the currently selected sheet within the drawing up or down.

IMPORTANT: Moving sheets causes the order of evaluation of the blocks will be different and might cause the PLC program to work incorrectly.

IMPORTANT: Moving sheets may cause the targets of "jump" blocks will be invalid. Please check "jump" blocks after moving a sheet.

5.3.21 Go to next/previous sheet

Press the button or on the PLC toolbar to display and activate next or previous sheet.

Note: *The active sheet is indicated by the blue sheet border.*

5.3.22 Delete a sheet

Press the button on the PLC toolbar to delete currently selected sheet from the drawing.

5.3.23 PLC locking sheet by sheet

From version 3.8.0 it is possible to lock PLC Sheets individually in the controllers supporting this feature.

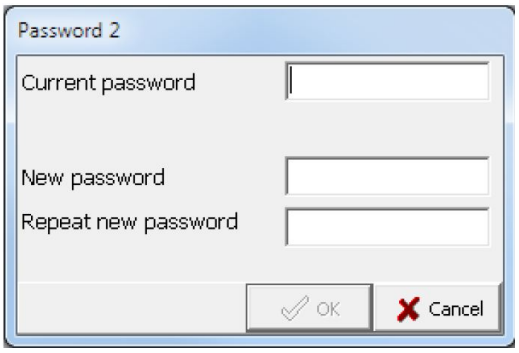
Available are 3 passwords, user can assign one of them to each PLC sheet or leave PLC sheet unlocked.

New button on PLC toolbar to access password settings and login/logout. Button has 3 different colors:

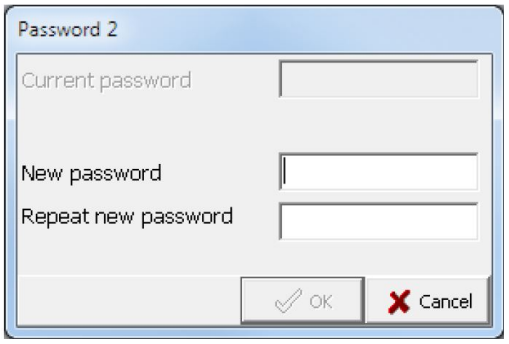
- All existing passwords are entered (all PLC sheets with password are unlocked)
- Any (but not all) existing passwords are entered (any, but not all PLC sheets with password are unlocked)
- No existing password is entered or no password exists (all PLC sheets with passwords are locked)

In Passwords window user can:

- Login by entering correct password and clicking red button
- Logout by clicking green button
- Create/change password by slicking on "Change" button
  - To change password, current and new password must be entered. New password must be entered twice (match check)

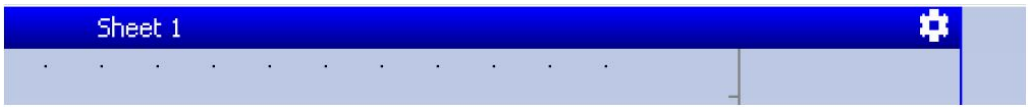


  - To create a new password, enter new password twice (match check)

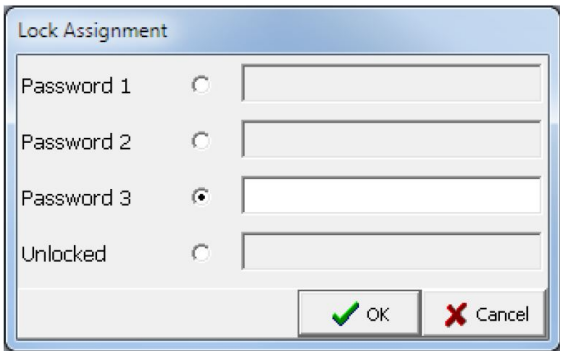


- Delete existing password
  - If password is used for any PLC sheet, password will be removed from appropriate PLC sheets (user has to confirm this). Correct password must be entered.
  - If password is not used for any PLC sheet, password is removed immediately without warning. No need to enter correct password.

To assign password to the PLC sheet, click on assign icon in title of PLC sheet:



In configuration window you can assign one of three passwords. It is necessary to enter correct password. If password does not exists, user is asked to create it.

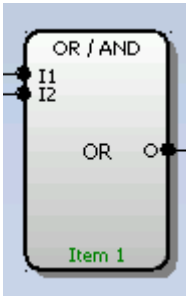


IMPORTANT: Very important parts of the control algorithm must not be locked in PLC sheets. Certification authorities may request their unlocking if necessary.

6 back to PLC

5.4 PLC blocks

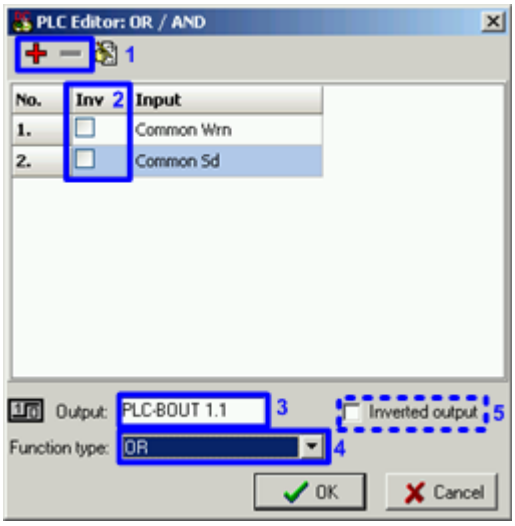
5.4.1 PLC Block: AND/OR

Symbol	
Inputs	Input | Type | Range [dim] | Function Input 1..8 | B | N/A | Inputs 1..8
Outputs	Output | Type | Range [dim] | Function Output | B | N/A | Result of the logical operation.
Description	The block performs logical operation AND / OR of 2 - 8 binary operands. The inputs as well as the output can be inverted. Function AND

I_1	I_2	O
0	0	0
0	1	0
1	0	0
1	1	1

Function OR

I_1	I_2	O
0	0	0
0	1	1
1	0	1
1	1	1

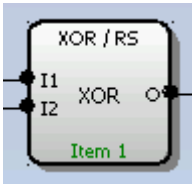


1. Use these buttons to add/remove inputs (up to 8).
2. The inputs can be inverted.
3. Rename the block output.
4. Select function of the block.
5. The output to be inverted.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.2 PLC Block: XOR/RS

Symbol



Inputs

Input	Type	Range [dim]	Function
Input 1	B	N/A	Input 1
Input 2	B	N/A	Input 2

Outputs

Output	Type	Range [dim]	Function
Output	B	N/A	Result of the logical operation.

Description

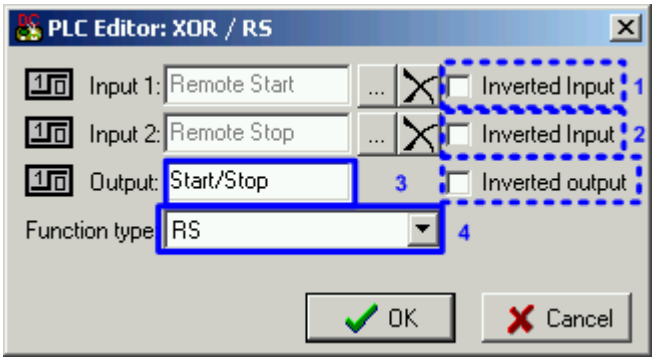
The block provides logical function of two values - XOR or RS flip-flop. Both inputs and output can be inverted.

Function XOR

I_1	I_2	O
0	0	0
0	1	1
1	0	1
1	1	0

Function RS

R	S	Q_{n+1}
0	0	Q_n
0	1	1
1	0	0
1	1	0

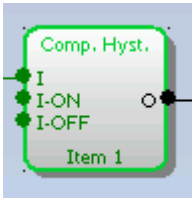


1. The input 1 can be inverted prior to entering the function.
2. The input 2 can be inverted prior to entering the function.
3. Rename the output. The output can be inverted.
4. Finally select the type of the function.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.3 PLC Block: Comparator with hysteresis

Symbol



Inputs

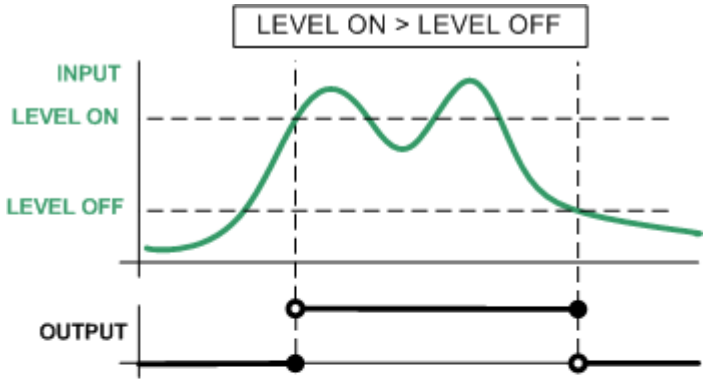
Input	Type	Range [dim]	Function
Input	A	Any	Compared value
Input ON	A	Same as 'Input'	Comparation level for switching on
Input OFF	A	Same as 'Input'	Comparation level for switching off

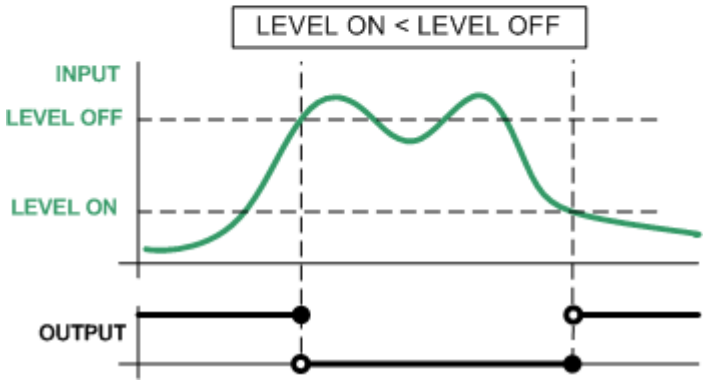
Outputs

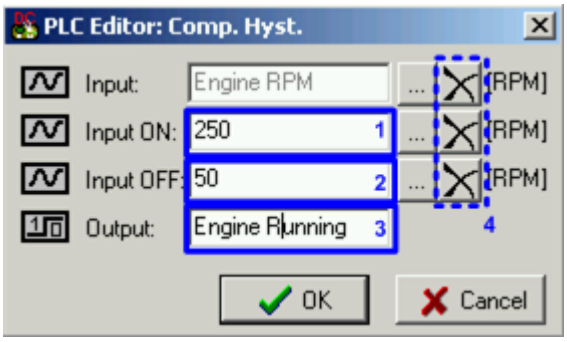
Output	Type	Range [dim]	Function
Output	B	N/A	Comparator output

Description

The block compares the input value with the comparation levels. The behavior depends on whether the ON level is higher than OFF level or vice versa.







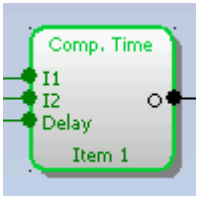
1. If you want the ON level to be a constant, write the constant into this box. Otherwise go back to the sheet, create an input on it and connect the sheet input to the block input by dragging a wire.
2. If you want the OFF level to be a constant, write the constant into this box. Otherwise go back to the sheet, create an input on it and connect the sheet input to the block input by dragging a wire.
3. Rename the output.

Note: *Press the button (4) if you need to delete the currently configured source from the box.*

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.4 PLC Block: Comparator with delay

Symbol



Inputs

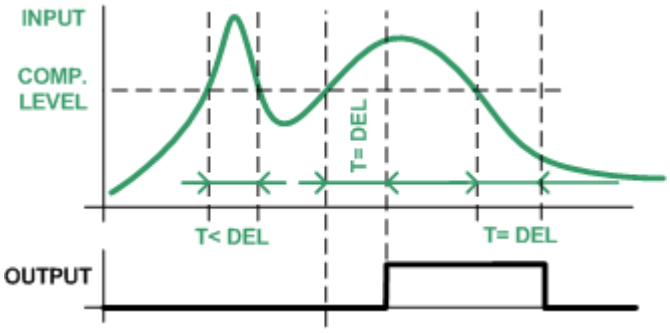
Input	Type	Range [dim]	Function
Input 1	A	Any	Compared value
Input 2	A	Same as 'Input 1'	Comparation level
Delay	A	0.0..3000.0 [s]	Comparation delay

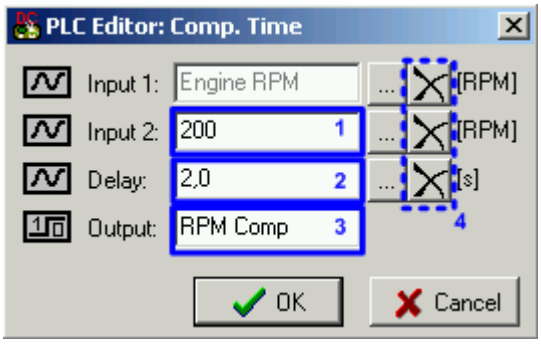
Outputs

Output	Type	Range [dim]	Function
Output	B	N/A	Comparator output

Description

The block works as an analog switch. It compares the input value with the comparation level. The output will switch on if the input is equal or higher than the comparation level for time longer than the delay.

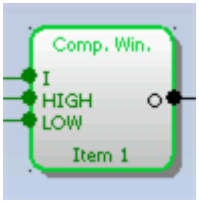




	1. If you want the comparation level to be a constant, write the constant into this box. Otherwise go back to the sheet, create an input on it and connect the sheet input to the block input by dragging a wire. 2. If you want the delay value to be a constant, write the constant into this box. Otherwise go back to the sheet, create an input on it and connect the sheet input to the block input by dragging a wire. 3. Rename the output. ***Note:*** *Press the button (4) if you need to delete the currently configured source from the box.* ***Note:*** *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.5 PLC Block: Window comparator

Symbol



Inputs

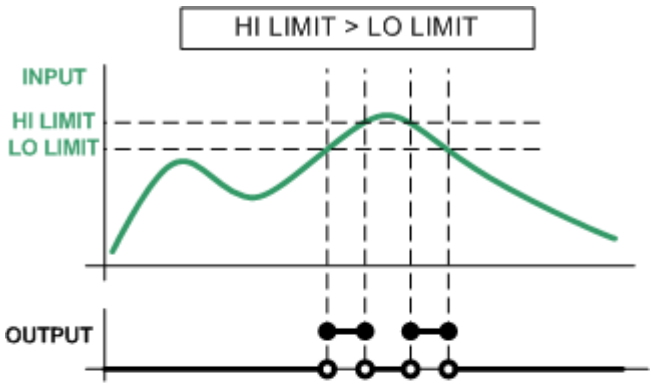
Input	Type	Range [dim]	Function
Input	A	Any	Compared value
Input HIGH	A	Same as 'Input'	Upper window limit
Input LOW	A	Same as 'Input'	Lower window limit

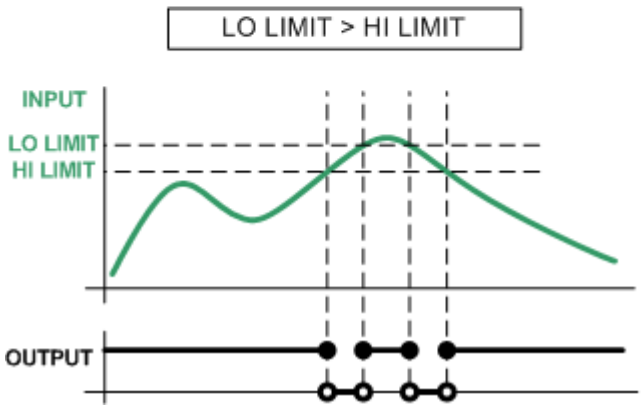
Outputs

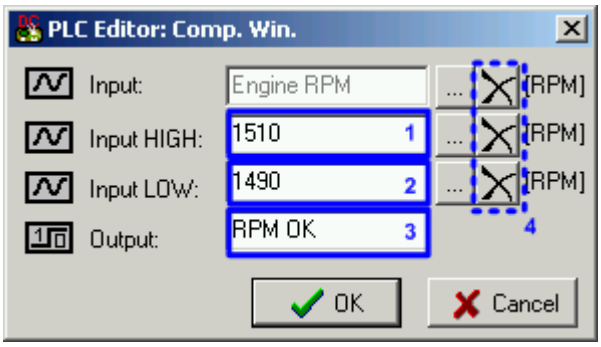
Output	Type	Range [dim]	Function
Output	B	N/A	Comparator output

Description

The block output is switched on whenever the input value is in the range defined by Lo and Hi levels.







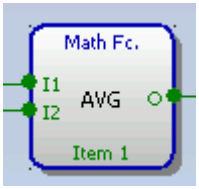
1. If you want the Hi level to be a constant, write the constant into this box. Otherwise go back to the sheet, create an input on it and connect the sheet input to the block input by dragging a wire.
2. If you want the Lo level to be a constant, write the constant into this box. Otherwise go back to the sheet, create an input on it and connect the sheet input to the block input by dragging a wire.
3. Rename the output.

Note: *Press the button (4) if you need to delete the currently configured source from the box.*

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.6 PLC Block: Mathematical function I

Symbol



Inputs

Input	Type	Range [dim]	Function
Input 1	A	Any	Input 1
Input 2	A	Same as 'Input 1'	Input 2

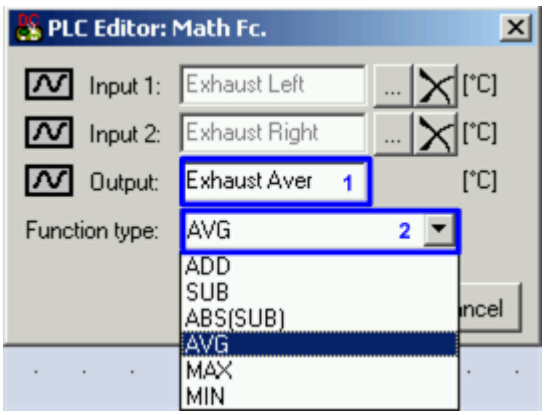
Outputs

Output	Type	Range [dim]	Function
Output	A	Same as 'Input 1'	Result of the mathematical operation.

Description

The block performs basic mathematical operations of 2 operands.

- ADD: Addition
- SUB: Subtraction
- ABS(SUB): Absolute value of subtraction
- AVG: Average
- MIN: Minimum of two
- MAX: Maximum of two

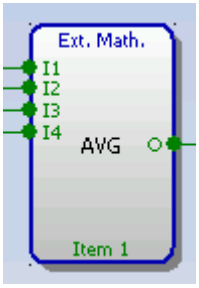


1. Rename the output
2. Select the mathematical operation

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.7 PLC Block: Mathematical function II

Symbol



Inputs

Input	Type	Range [dim]	Function
Input 1	A	Any	Input 1
Input 2..8	A	Same as 'Input 1'	Inputs 2..8

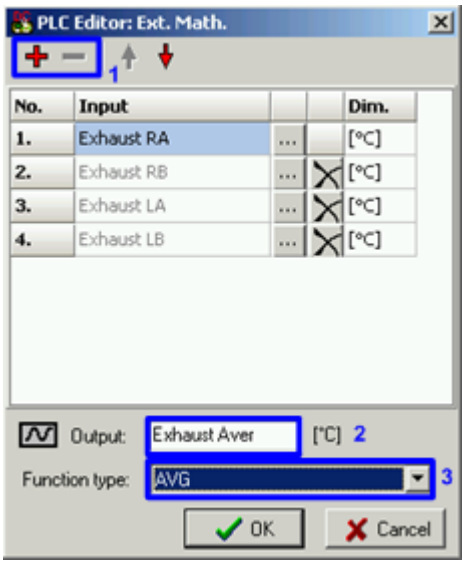
Outputs

Output	Type	Range [dim]	Function
Output	A	Same as 'Input 1'	Result of the mathematical operation.

Description

The block performs basic mathematical operations of 2 - 8 operands.

- ADD: Addition
- AVG: Average
- MIN: Minimal value
- MAX: Maximum value

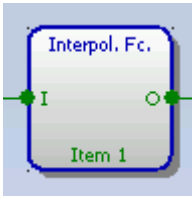


1. Use these buttons to add and remove inputs (up to 8)
2. Rename the output

	3. Select the mathematical operation ***Note:*** *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.8 PLC Block: Interpolation

Symbol



Inputs

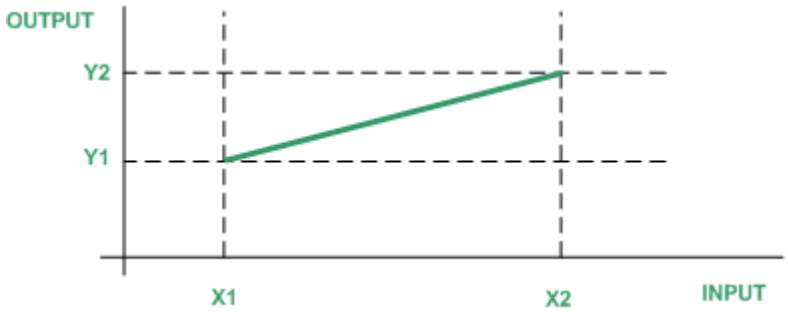
Input	Type	Range [dim]	Function
Input	A	X1..X2 []	Input value

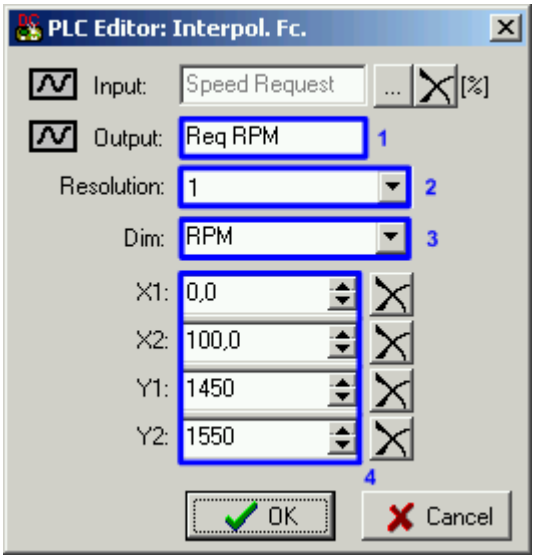
Outputs

Output	Type	Range [dim]	Function
Output	A	Y1..Y2 []	Transformed value

Description

This block performs a linear transformation of the input. The transformation function is defined by two pairs of points [X1, Y1] and [X2, Y2]. The function works only within the region defined by X1,X2. Outside the region the output is an invalid value (-32768). The block can be used e.g. for changing of decimal resolution of a value.



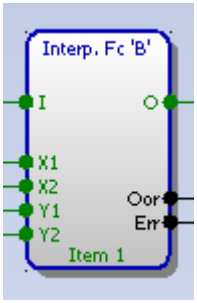


1. Rename the output.
2. Adjust resolution (number of decimal positions) of the output.
3. Adjust dimension of the output.
4. Enter the points of the transformation function. The value of X1 must be lower than the value of X2, however Y1 needn't to be lower than Y2, i.e. the characteristic can be also negative.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.9 PLC Block: Interpolation - configurable (Type 'B')

Symbol



Inputs

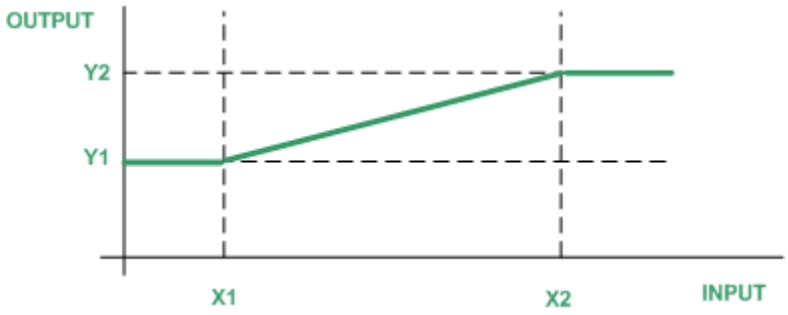
Input	Type	Range[dim]	Function
Input	A	X1..X2 []	Input value
X1	A	-32000..32000 []	Low X limit of definition
X2	A	-32000..32000 []	High X limit of definition
Y1	A	-32000..32000 []	Low Y limit of definition
Y2	A	-32000..32000 []	High Y limit of definition

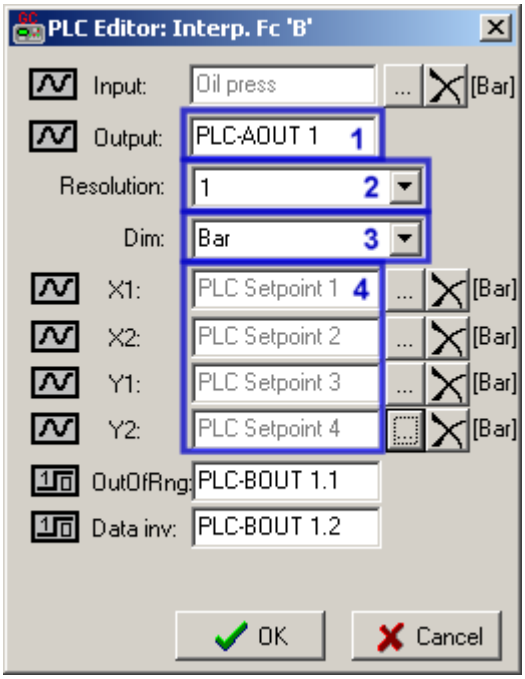
Outputs

Output	Type	Range [dim]	Function
Output	A	Y1..Y2 []	Transformed value
OutOfRange	B	N/A	Input is out of range <X1;X2>
Data Invalid	B	N/A	Value on analog output is invalid

Description

This block performs a linear transformation of the input. The transformation function is defined by two pairs of points [X1, Y1] and [X2, Y2]. If the input lies inside of the interval <X1;X2> the value of output is given by the conversion if the input of the function lies outside of this interval the output of the function is saturated on the high or low limit given by the value of Y1 or Y2 (the binary output *OutOfRange* gets active). All parameters can be set as a constant or can be assigned to any analog value or setpoint of the controller. Resolution of all input parameters is automatically set as resolution of input of the function. If any of the inputs of the function gets invalid the binary output *DataInvalid* gets active and the output of the interpolation function is set to value -32768.





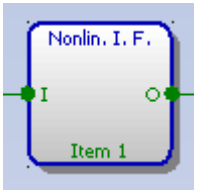
1. Rename the output.
2. Adjust resolution (number of decimal positions) of the output.
3. Adjust dimension of the output.
4. Enter the points of the transformation function or select source value for this points. The value of X1 must be lower than the value of X2, however Y1 needn't to be lower than Y2, i.e. the characteristic can be also negative.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

Note: *This block is available in version 3.0 and later.*

5.4.10 PLC Block: Nonlinear Interpolation function

Symbol



Inputs

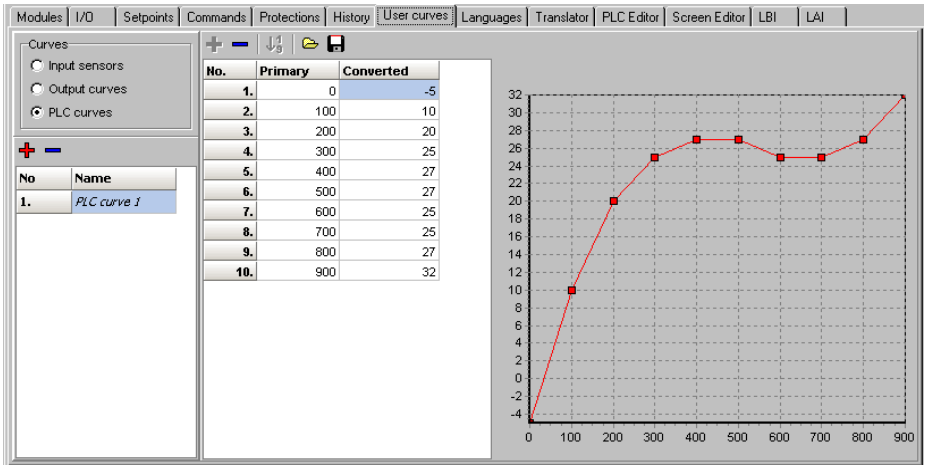
Input	Type	Range [dim]	Function
Input	A	Any	Input value

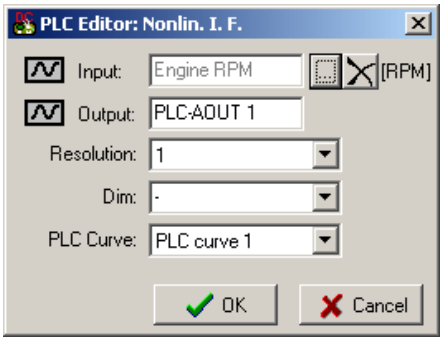
Outputs

Output	Type	Range [dim]	Function
Output	A	Adjustable	Transformed value

Description

This block performs a non linear up to 10 points transformation of the input. The transformation function is defined in User curves - PLC curves table by up to 10 pairs of points. The block can be used for non linear transformation and for changing output value decimal resolution.



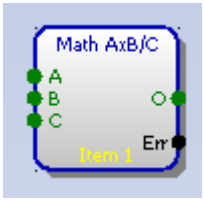


1. Rename the output.
2. Adjust resolution (number of decimal positions) of the output.
3. Adjust dimension of the output.
4. Select conversion function from the list.

	Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.11 PLC Block: Mathematical function multiplication/dividing (AxB/C)

Symbol



Inputs

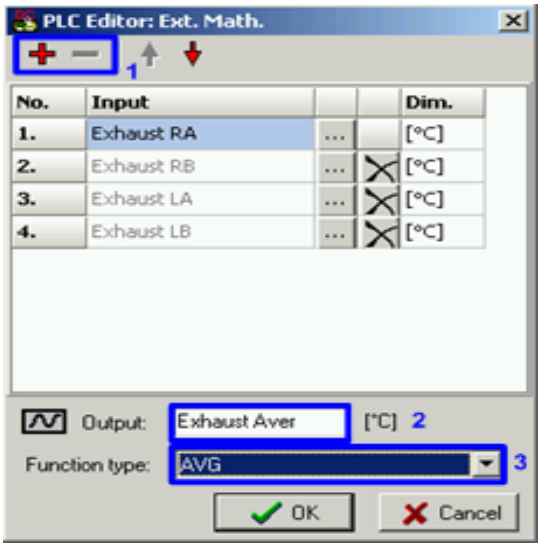
Input	Type	Range [dim]	Function
Input A	A	Any	First multiplicant
Input B	A	Same as 'Input 1'	Second multiplicant
Input C	A	Same as 'Input 1'	Divider

Outputs

Output	Type	Range [dim]	Function
Output	A	Same as 'Input 1'	Result of the mathematical operation.
Data Invalid	B	N/A	Atribute of invalid data on output

Description

The block multiplication/dividing (AxB/C) realizes the mathematic operation of three operands (multiplication and dividing). The function can be used e.g. for scaling of values. In case of any invalid data on any of the inputs the output of the function is set to the invalid value -32768 and binary output *DataInvalid* gets active. The result of multiplication AxB is calculated as first and is stored into 32 bits long value. Whereas the output register is only 16 bits long value, the divider of the operation (input C) has to be selected properly to match the output value of the operation into interval <-32767;32767>. If the result of the operation is out of this range the output of the function is set to invalid value -32768 and the binary output *DataInvalid* gets active.

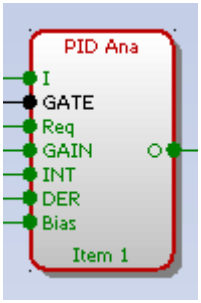


Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

Note: *This block is available in version 3.0 and later.*

5.4.12 PLC Block: PID regulator with analog output

Symbol



Inputs

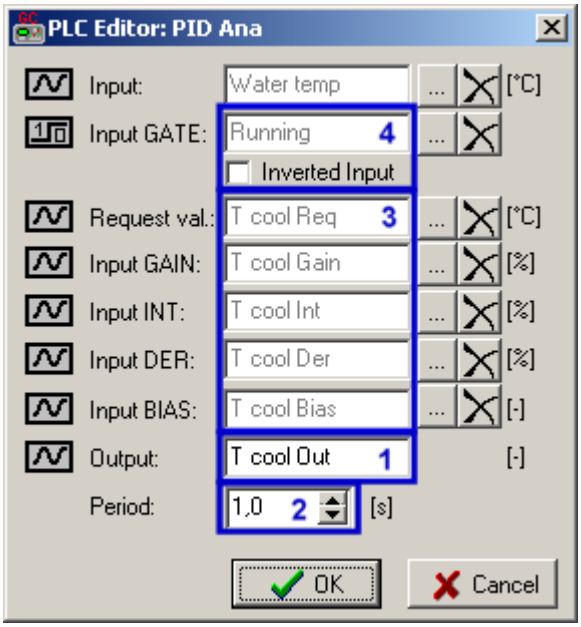
Input	Type	Range[dim]	Function
Input	A	Any	Regulated value
Requested val.	A	Same as 'input'	Required value
Gain	A	-100.00..100.00 [%]	Gain of the regulator
Int	A	-100.00..100.00 [%]	Integrative part of the regulator
Der	A	-100.00..100.00 [%]	Derivative part of the regulator
Bias	A	-10000..10000 [-]	Value of the output while the regulator is off
Gate	B	N/A	Regulator on/off input

Outputs

Output	Type	Range[dim]	Function
Output	A	-10000..10000 [-]	Actuator control output

Description

The block is a PID regulator with analog output and adjustable regulation period. The function of the regulator can be disabled by the gate input. While the regulator is disabled, the output is set to bias value.

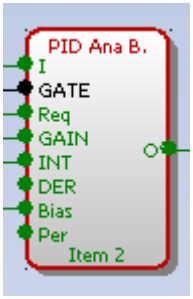


1. Rename the output.
2. Adjust regulation period. The period should be adjusted according to the speed of the response of the system, e.g. longer period for slower systems, shorter period for faster systems.
3. You may want to have some regulation parameters, as e.g. derivative part or bias, constant. In such a case write the constant directly into the appropriate box. If there is a source configured, it must be deleted prior to writing of the constant.
4. If you need the regulator to run only if certain condition is fulfiled, use the gate input. Create a binary value representing the condition (e.g. using other plc blocks) and connect it to the gate input. The regulator will then work only if the gate input is active. If the gate input is not connected, the regulator works all the time the controller is switched on.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.13 PLC Block: PID regulator with analog output (Type 'B')

Symbol



Inputs

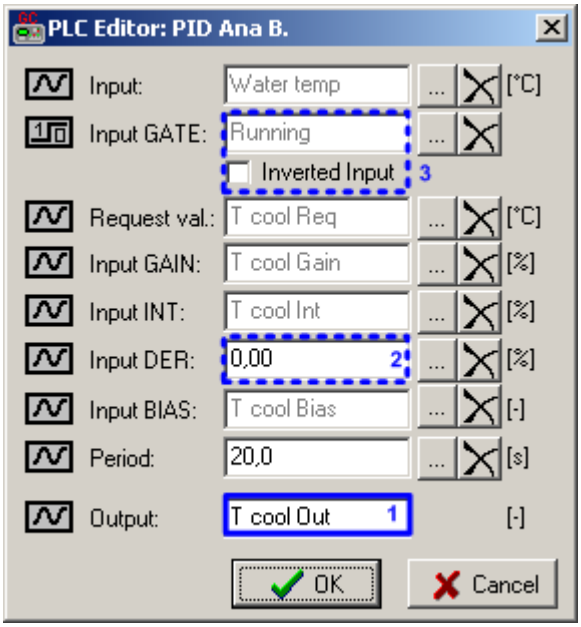
Input	Type	Range[dim]	Function
Input	A	Any	Regulated value
Requested val.	A	Same as 'input'	Required value
Gain	A	-100.00..100.00 [%]	Gain of the regulator
Int	A	-100.00..100.00 [%]	Integrative part of the regulator
Der	A	-100.00..100.00 [%]	Derivative part of the regulator
Bias	A	-10000..10000 [-]	Value of the output while the regulator is off
Period	A	0.1..600.0 [s]	Regulation period. The period should be adjusted according to the speed of the response of the system, e.g. longer period for slower systems, shorter period for faster systems.
Gate	B	N/A	Regulator on/off input

Outputs

Output	Type	Range[dim]	Function
Output	A	-10000..10000 [-]	Actuator control output

Description

The block is a PID regulator with analog output and adjustable regulation period. The function of the regulator can be disabled by the gate input. While the regulator is disabled, the output is set to bias value.

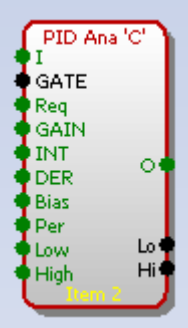


1. Rename the output.
2. You may want to have some regulation parameters, as e.g. derivative part or bias, constant. In such a case write the constant directly into the appropriate box. If there is a source configured, it must be deleted prior to writing of the constant.
3. If you need the regulator to run only if certain condition is fulfiled, use the gate input. Create a binary value representing the condition (e.g. using other plc blocks) and connect it to the gate input. The regulator will then work only if the gate input is active. If the gate input is not connected, the regulator works all the time the controller is switched on.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.14 PLC Block: PID regulator with analog output with configurable output limit (Type 'C')

Symbol



Inputs

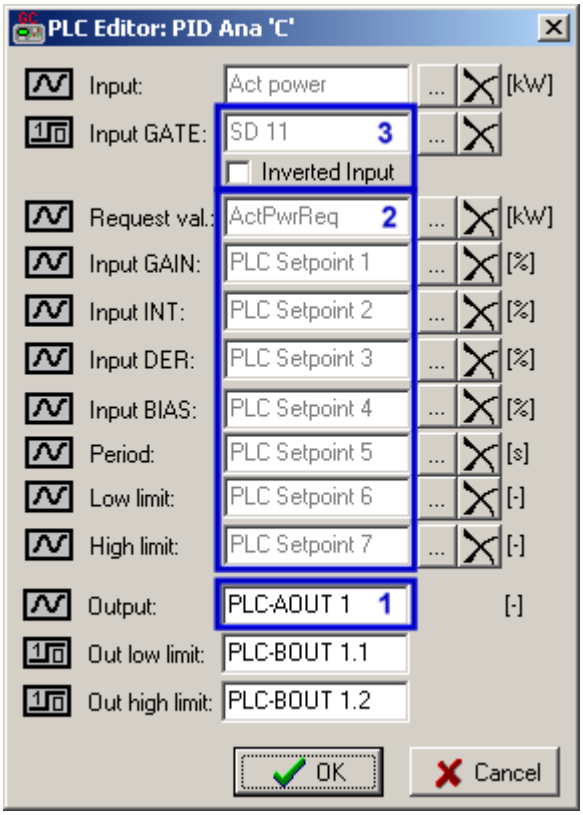
Input	Type	Range[dim]	Function
Input	A	Any	Regulated value
Input Gate	B	N/A	Regulator on/off input
Requested val.	A	Same as 'input'	Required value
Input GAIN	A	-100.00..100.00 [%]	Gain of the regulator
Input INT	A	-100.00..100.00 [%]	Integrative part of the regulator
Input DER	A	-100.00..100.00 [%]	Derivative part of the regulator
Input BIAS	A	-10000..10000 [-]	Value of the output while the regulator is off
Period	A	0,0..600,0 [s]	Period of regulator (speed of response of the system
Low limit	A	-10000..10000 [-]	Low limit of the output, if output reaches this value, the internal integration of the block is stopped. Normally set to -10000
High limit	A	-10000..10000 [-]	High limit of the output, if output reaches this value, the internal integration of the block is stopped. Normally set to 10000

Outputs

Output	Type	Range[dim]	Function
Output	A	-10000..10000 [-]	Actuator control output
Out low limit	B	N/A	This attribute confirms that the output reached the Low limit value
Out high limit	B	N/A	This attribute confirms that the output reached the High limit value

Description

The block is a PID regulator with analog output and adjustable regulation period. The function of the regulator can be disabled by the gate input. While the regulator is disabled, the output is set to bias value.



1. Rename the output.
2. You may want to have some regulation parameters, as e.g. derivative part or bias, constant. In such a case write the constant directly into the appropriate box. If there is a source configured, it must be deleted prior to writing of the constant. Adjust regulation period. The period should be adjusted according to the speed of the response of the system, e.g. longer period for slower systems, shorter period for faster systems.
3. If you need the regulator to run only if certain condition is fulfiled, use the gate input. Create a binary value representing the condition (e.g. using other plc

blocks) and connect it to the gate input. The regulator will then work only if the gate input is active. If the gate input is not connected, the regulator works all the time the controller is switched on.

IMPORTANT:

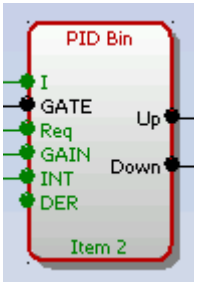
- Input Low limit must be always lower than the input High limit else the output of the regulator is alaways set to value equal to Low limit.
- If Low limit = High limit then the output of the regulator is set to the level equal to Low limit=High limit
- If there is invalid value (-32768) on the input of the regulator the output is set to the level equal to „Input BIAS“
- The output value in BIAS mode (Input GATE is not active or there is invalid value on the Input of regulator) is not limited by the values of High limit or Low limit. The value of output is given by the Input BIAS in whole range of regulator output from -10000 to 10000.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

Note: *This block is available in version 3.0 and later.*

5.4.15 PLC Block: PID regulator with up/down binary outputs

Symbol



Inputs

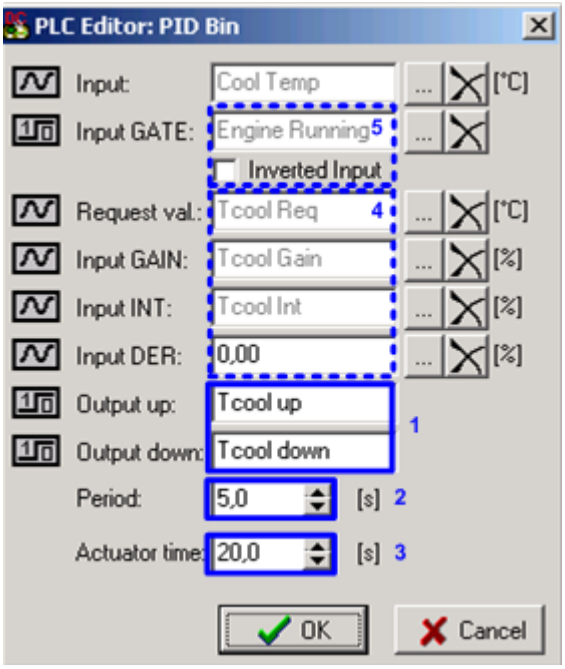
Input	Type	Range[dim]	Function
Input	A	Any	Regulated value
Requested val.	A	Same as 'input'	Required value
Gain	A	-100.00..100.00 [%]	Gain of the regulator
Int	A	-100.00..100.00 [%]	Integrative part of the regulator
Der	A	-100.00..100.00 [%]	Derivative part of the regulator
Gate	B	N/A	Regulator on/off input

Outputs

Output	Type	Range [dim]	Function
Output up	B	N/A	Actuator control - Raise
Output down	B	N/A	Actuator control - Lower

Description

The block is a PID regulator with binary outputs up/down and adjustable regulation period. The function of the regulator can be disabled by the gate input.

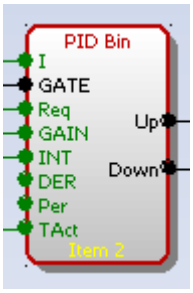


1. Rename the outputs.
2. Adjust regulation period. The period should be adjusted according to the speed of the response of the system, e.g. longer period for slower systems, shorter period for faster systems.
3. Adjust the actuator time. It is time that the actuator (servo etc.) needs for changing position from fully closed to fully open.
4. You may want to have some regulation parameters, as e.g. derivative part, constant. In such a case write the constant directly into the appropriate box. If there is a source configured, it must be deleted prior to writing of the constant.
5. If you need the regulator to run only if certain condition is fulfiled, use the gate input. Create a binary value representing the condition (e.g. using other plc blocks) and connect it to the gate input. The regulator will then work only if the gate input is active. If the gate input is not connected, the regulator works all the time the controller is switched on.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.16 PLC Block: PID regulator with up/down binary outputs (Type 'B')

Symbol



Inputs

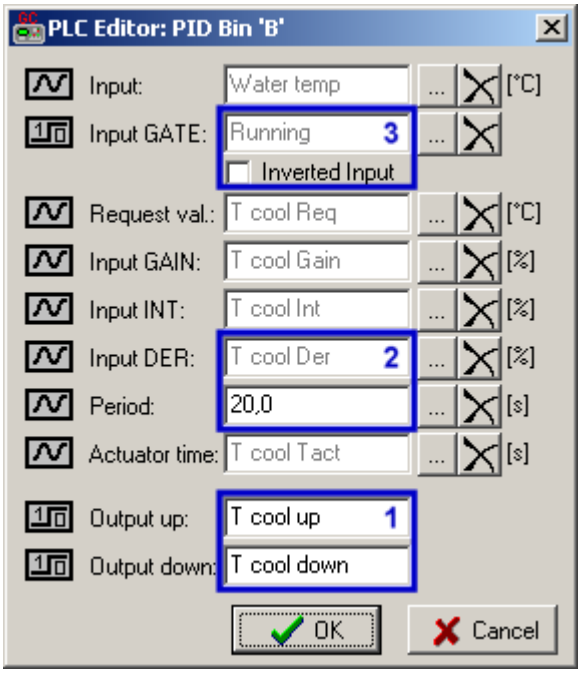
Input	Type	Range[dim]	Function
Input	A	Any	Regulated value
Requested val.	A	Same as 'input'	Required value
Gain	A	-100.00..100.00 [%]	Gain of the regulator
Int	A	-100.00..100.00 [%]	Integrative part of the regulator
Der	A	-100.00..100.00 [%]	Derivative part of the regulator
Period	A	0.1..600.0 [s]	Regulation period. The period should be adjusted according to the speed of the response of the system, e.g. longer period for slower systems, shorter period for faster systems.
Actuator time	A	0.1..60.0 [s]	Actuator time. It is time that the actuator (servo etc.) needs for changing position from fully closed to fully open.
Gate	B	N/A	Regulator on/off input

Outputs

Output	Type	Range [dim]	Function
Output up	B	N/A	Actuator control - Raise
Output down	B	N/A	Actuator control - Lower

Description

The block is a PID regulator with binary outputs up/down and adjustable regulation period. The function of the regulator can be disabled by the gate input.



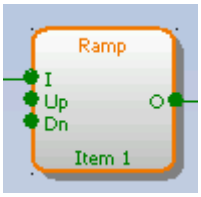
1. Rename the outputs.
2. You may want to have some regulation parameters, as e.g. derivative part, constant. In such a case write the constant directly into the appropriate box. If there is a source configured, it must be deleted prior to writing of the constant.
3. If you need the regulator to run only if certain condition is fulfiled, use the gate input. Create a binary value representing the condition (e.g. using other plc blocks) and connect it to the gate input. The regulator will then work only if the gate input is active. If the gate input is not connected, the regulator works all the time the controller is switched on.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

Note: *This block is available in some customer branches only.*

5.4.17 PLC Block: Analog ramp

Symbol



Inputs

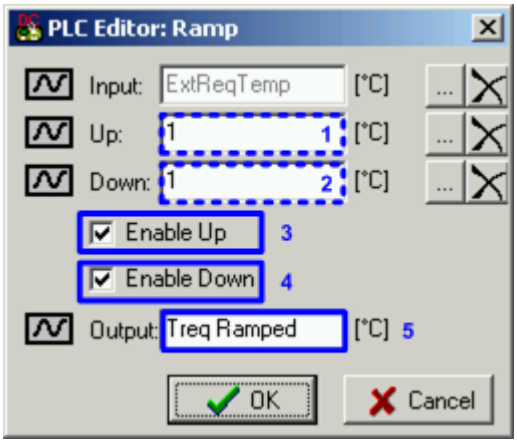
Input	Type	Range [dim]	Function
Input	A	Any	Input value to be ramped.
Up	A	Same as input	Maximal rising rate of the output per one second.
Down	A	Same as input	Maximal lowering rate of the output per one second.

Outputs

Output	Type	Range [dim]	Function
Output	A	Same as input	Ramped value

Description

This block limits the maximal rate of change at the output. The maximal rates up and down are adjustable separately and ramping down and up can be enabled/disabled separately.

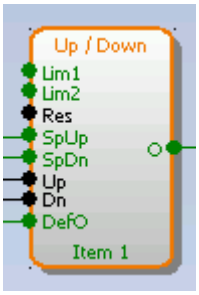


1. Adjust the maximal rising rate of the output per one second. If you want the delay to be a constant, write the constant into the box. Otherwise connect the input to any other analog object.
2. Adjust the maximal lowering rate of the output per one second. If you want the delay to be a constant, write the constant into the box. Otherwise connect the input to any other analog object.
3. Tick the checkbox to activate the rising rate limitation.

	4. Tick the checkbox to activate the lowering rate limitation. 5. Rename the output. ***Note:*** *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.18 PLC Block: Up/Down

Symbol



Inputs

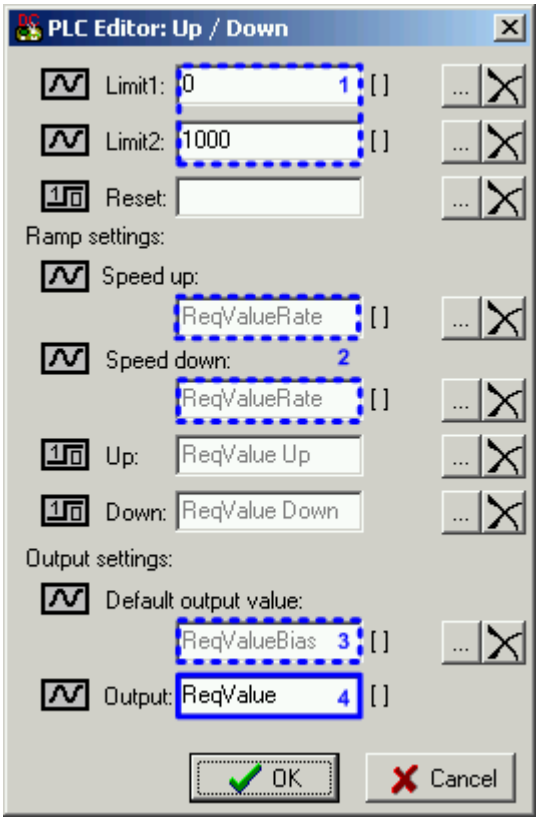
Input	Type	Range[dim]	Function
Lim 1	A	-32768..32767 [-]	Lower limit of the analog output
Lim 2	A	-32768..32767 [-]	Upper limit of the analog output
Speed up	A	-32768..32767 [-]	Rising rate of the analog output per second
Speed down	A	-32768..32767 [-]	Lowering rate of the analog output per second
Default output value	A	-32768..32767 [-]	Bias value of the output. The output is initialized to this value when the controller is switched on, when the reset input is activated or when both Speed up and Speed down inputs are active.
Up	B	N/A	The output is raising it's value with the adjusted rate while this input is active.
Down	B	N/A	The output is lowering it's value with the adjusted rate while this input is active.
Reset	B	N/A	The output is set and held at bias value while this input is active.

Outputs

Output	Type	Range [dim]	Function
Output	A	Lim1..Lim2 [-]	Output value

Description

This block works as an analog ramp controlled by binary inputs "up" and "down". The ramp rates and output limits are adjustable as well as bias value. The output can be reset to bias value by the reset input.

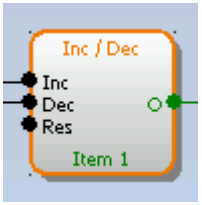


1. Adjust the output limits. If you want them to be constants, write the constants into the box. Otherwise connect the inputs to any other analog objects (e.g. PLC setpoints).
2. Adjust the output rates for raising and lowering. If you want them to be constants, write the constants into the box. Otherwise connect the inputs to any other analog objects (e.g. PLC setpoints).
3. Adjust the output bias value. If you want it to be constant, write the constant into the box. Otherwise connect the input to any other analog object (e.g. PLC setpoint).
4. Rename the output.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.19 PLC Block: Inc/Dec

Symbol



Inputs

Input	Type	Range[dim]	Function
Inc	B	N/A	Rising edge of the input increments the output by 1.
Dec	B	N/A	Rising edge of the input decrements the output by 1.
Reset	B	N/A	Rising edge of the input sets the output to default value.

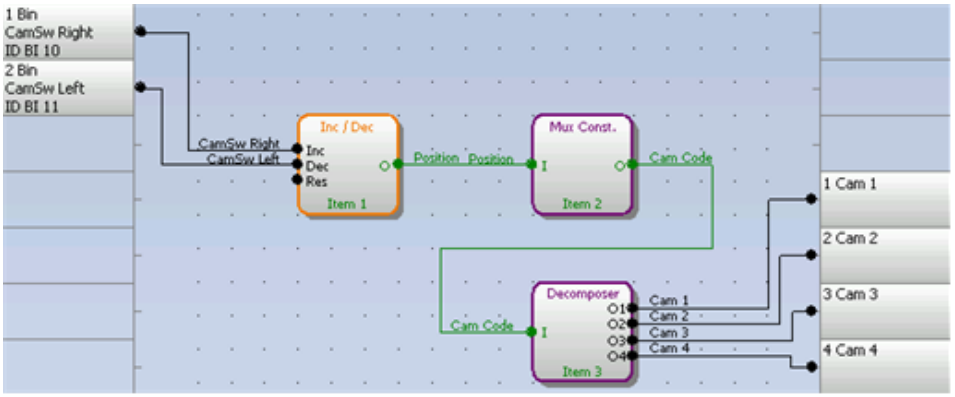
Outputs

Output	Type	Range[dim]	Function
Output	A	0..Max [-]	Output value

Description

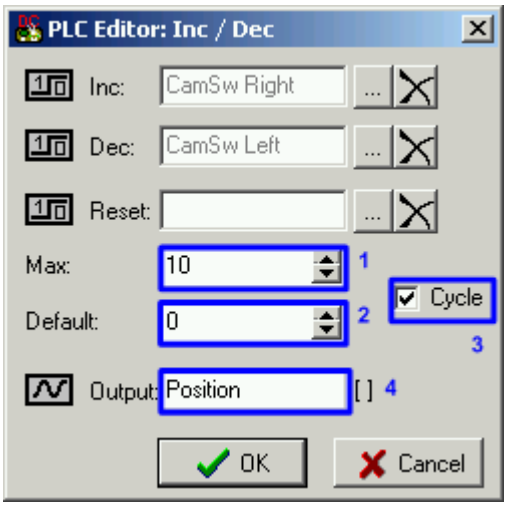
The output of the block is incremented/decremented by every rising edge at the input "Inc"/"Dec". The initial and maximal values of the output are adjustable. The output can be reset to the initial value by the input "Reset". The block can work in cyclical mode (e.g. ...4-5-0-1-2-3-4-5-0-1...) or non-cyclical mode (e.g. ...0-0-1-2-3-4-5-5...).

Example: The module can be used e.g. together with a Decomposer and Multiplexed constant for creation of a camswitch.



Position	Cam Code	Cam1	Cam2	Cam3	Cam4
1	3	0	0	1	1
2	10	1	0	1	0
3	11	1	0	1	1
4	6	0	1	1	0
5	5	0	1	0	1
6	12	1	1	0	0
7	9	1	0	0	1
8	0	0	0	0	0

Example: Camswitch

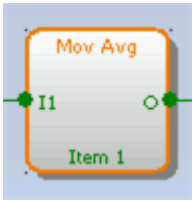


1. Adjust the upper limit of the output.
2. Adjust the initial value of the output after reset.
3. Select whether the output will work in cyclic or non-cyclic mode.
4. Rename the output.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.20 PLC Block: Moving average

Symbol



Inputs

Input	Type	Range [dim]	Function
Input	A	Any	Input value

Outputs

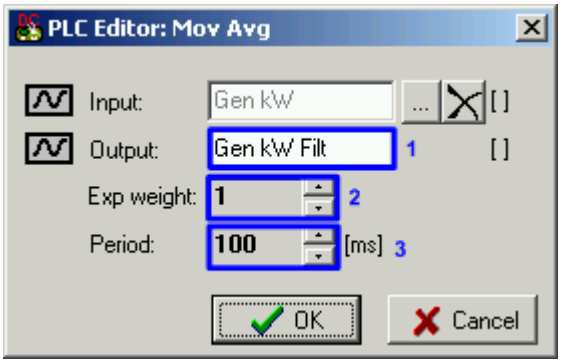
Output	Type	Range [dim]	Function
Output	A	Same as the input	Floating average of the input value

Description

The function calculates average of *N* last samples of the input value. The rate of sampling is adjustable.

Typical usage of this function is filtering of a value (quantity) whose instantaneous value fluctuates rapidly around it's mean, which is changing slower. Using a filered value may avoid problems with further processing of the value e.g. in other PLC blocks or in a supervisory system.

Example of such value can be genset power at a gas engine operating in parallel to mains mode. Even if the mean value is constant, the instantaneous value may fluctuate rapidly due to misfiring.

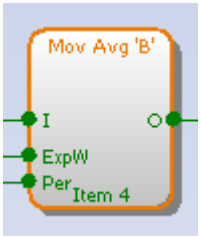


1. Rename the output.
2. The number of consequent samples *N* is given as $2^{\text{exp weight}}$. I.e. adjust 3 for 8 samples, 4 for 16 samples, 5 for 32 samples etc...
3. Adjust the sampling rate.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.21 PLC Block: Moving average (Type 'B')

Symbol



Inputs

Input	Type	Range [dim]	Function
Input	A	Any	Input value
Exp weight	A	1..5 []	Exp weight value
Period	A	100..5000 [ms]	Period value

Outputs

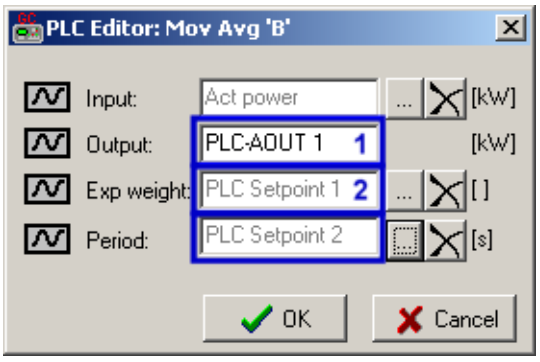
Output	Type	Range [dim]	Function
Output	A	Same as the input	Floating average of the input value

Description

The function calculates average of *N* last samples of the input value. The rate of sampling is adjustable.

Typical usage of this function is filtering of a value (quantity) whose instantaneous value fluctuates rapidly around it's mean, which is changing slower. Using a filered value may avoid problems with further processing of the value e.g. in other PLC blocks or in a supervisory system.

Example of such value can be genset power at a gas engine operating in parallel to mains mode. Even if the mean value is constant, the instantaneous value may fluctuate rapidly due to misfiring.

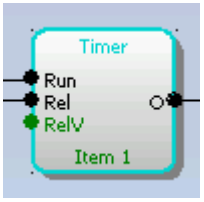


1. Rename the output.
2. The number of consequent samples *N* is given as $2^{exp\ weight}$. I.e. adjust 3 for 8 samples, 4 for 16 samples, 5 for 32 samples etc...

	3. Adjust the sampling rate. ***Note:*** *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.* ***Note:*** *This block is available in some customer branches only.*

5.4.22 PLC Block: Timer

Symbol



Inputs

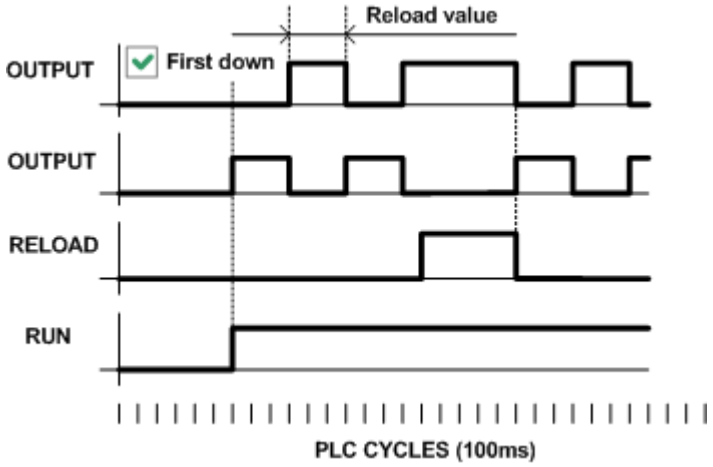
Input	Type	Range [dim]	Function
Run	B	N/A	The timer runs only if this input is active or not connected
Reload	B	N/A	This input reloads the timer to the initial value
Reload val.	A	0..32767 [-]	Initial value of the timer.

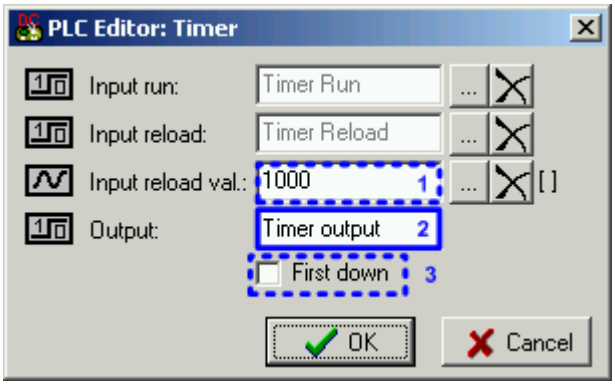
Outputs

Output	Type	Range [dim]	Function
Output	B	N/A	Timer output

Description

The block works as a countdown timer which is decreased by 1 every PLC cycle. The timer initial value is adjustable by the "Reload val" input. As the PLC cycle lasts 100ms, the timer duration equals to "Reload val"/10 [s]. The timer is automatically reloaded with the initial value when it reaches zero or it can be reloaded in any other moment using the "reload" input. The timer is held at reload value until the reload input is deactivated. The timer output is inverted always when the timer is reloaded.



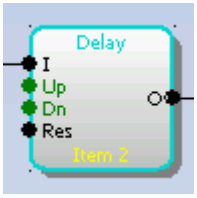


1. Adjust the reload value. The duration of the timer (in seconds) is given by the reload value divided by 10. The reload value can be either constant or a setpoint or any other analog object.
2. Rename the output.
3. If you want the output to start at logical 0, tick this checkbox. Otherwise the output will start at logical 1.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.23 PLC Block: Delay

Symbol



Inputs

Input	Type	Range[dim]	Function
Input	B	N/A	Input signal to be delayed
Input time up	A	-3200.0..3200.0 [s]	Delay of the rising edge resp. pulse length generated by rising edge of the input
Input time down	A	-3200.0..3200.0 [s]	Delay of the falling edge resp. pulse length generated by falling edge of the input
Input reset	B	N/A	Resets the output to logical 0. The output remains in logical 0 while this input is active.

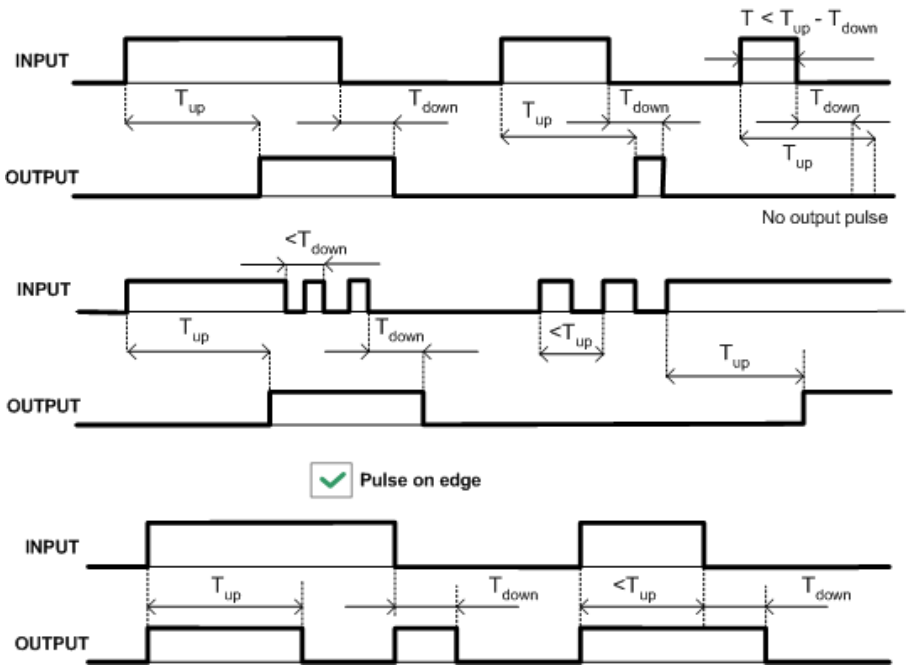
Outputs

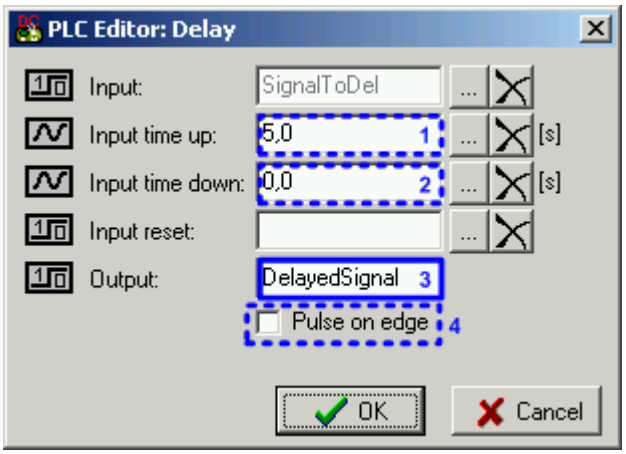
Output	Type	Range[dim]	Function
Output	B	N/A	Output signal

Description

This block can work in two modes of operation:

- Delay mode - the rising edge at the output is generated with delay of "input time up" when a rising edge at the input is detected. The falling edge at the output is generated with delay of "input time down" when a falling edge at the input is detected. If the delayed falling edge at the output came earlier than the delayed rising edge, then no pulse would be generatated at the output.
- Pulse mode - a pulse of "input time up" length is generated at the output when a rising edge is detected, a pulse of "input time down" length is generated at the output when a falling edge is detected.





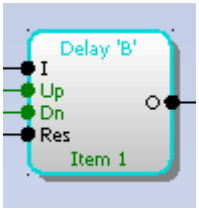
1. Adjust the delay of rising edge. If you want the delay to be a constant, write the constant into the box. Otherwise connect the input to any other analog object.
2. Adjust the delay of falling edge. If you want the delay to be a constant, write the constant to the box. Otherwise connect the input to any other analog object.
3. Rename the output.
4. Select the operation mode (described above)

Note: *If Input time up or Input time down value is <0, this input is internally set to zero.*

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.24 PLC Block: Delay - s/m/h (Type 'B')

Symbol



Inputs

Input	Type	Range[dim]	Function
Input	B	N/A	Input signal to be delayed
Input time up	A	-3200.0..3200.0 [s, m, h]	Delay of the rising edge resp. pulse length generated by rising edge of the input
Input time down	A	-3200.0..3200.0 [s, m, h]	Delay of the falling edge resp. pulse length generated by falling edge of the input
Input reset	B	N/A	Resets the output to logical 0. The output remains in logical 0 while this input is active.

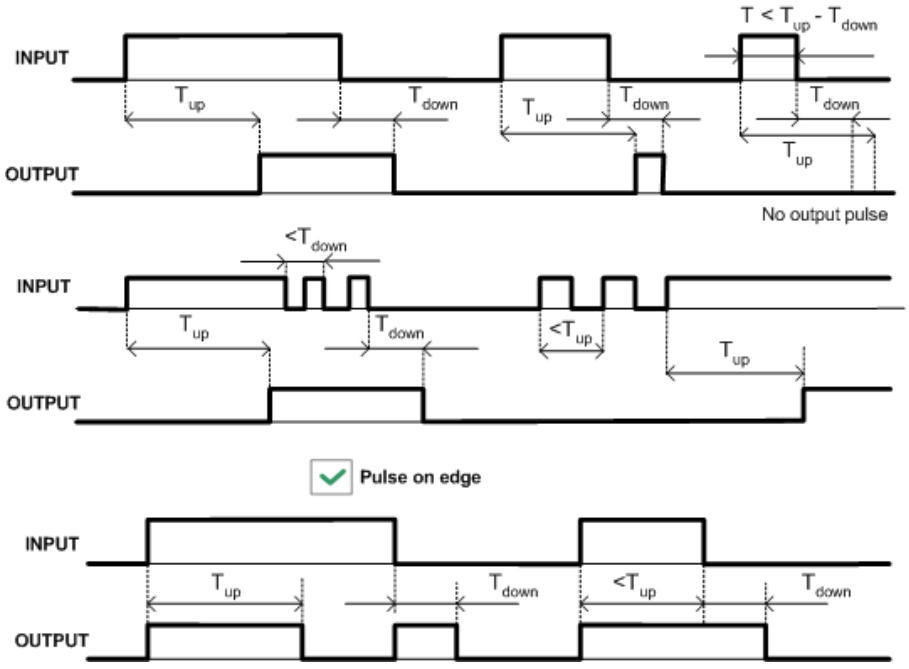
Outputs

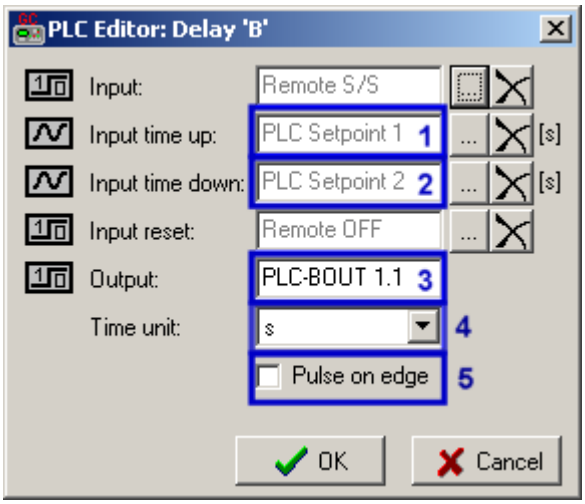
Output	Type	Range[dim]	Function
Output	B	N/A	Output signal

Description

This block can work in two modes of operation:

- Delay mode - the rising edge at the output is generated with delay of "input time up" when a rising edge at the input is detected. The falling edge at the output is generated with delay of "input time down" when a falling edge at the input is detected. If the delayed falling edge at the output came earlier than the delayed rising edge, then no pulse would be generatated at the output.
- Pulse mode - a pulse of "input time up" length is generated at the output when a rising edge is detected, a pulse of "input time down" length is generated at the output when a falling edge is detected.





1. Adjust the delay of rising edge. If you want the delay to be a constant, write the constant into the box. Otherwise connect the input to any other analog object.
2. Adjust the delay of falling edge. If you want the delay to be a constant, write the constant to the box. Otherwise connect the input to any other analog object.
3. Rename the output.
4. Select time unit (seconds/minutes/hours)
5. Select the operation mode (described above)

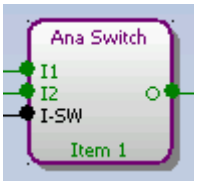
Note: *If Input time up or Input time down value is <0, this input is internally set to zero.*

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

	Note: *This block is available in version 3.0 and later.*

5.4.25 PLC Block: Analog switch (Multiplexer)

Symbol



Inputs

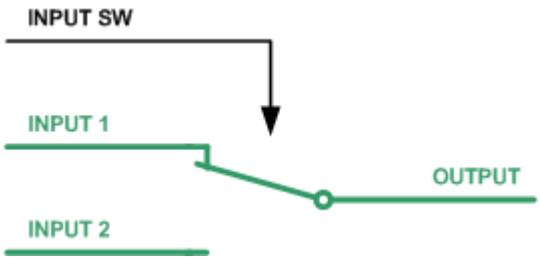
Input	Type	Range [dim]	Function
Input 1	A	Any	Input value 1
Input 2	A	Same as 'Input 1'	Input value 2
Input SW	B	N/A	Switch input

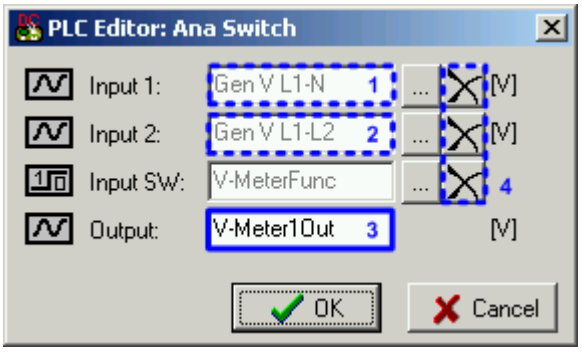
Outputs

Output	Type	Range [dim]	Function
Output	A	Same as 'Input 1'	Copy of 'Input 1' or 'Input 2' depending of the 'Input SW' state

Description

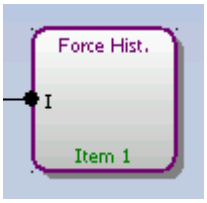
The block works as a multiplexer. If the binary input SW is inactive, the block copies the value of analog input 1 onto the analog output. If the binary input SW is active, the block copies the value of analog input 2 onto the output.





	1. If you want the input 1 to be a constant, write the constant into this box. Otherwise go back to the sheet, create an input on it and connect the sheet input to the block input by dragging a wire. 2. If you want the input 2 to be a constant, write the constant into this box. Otherwise go back to the sheet, create an input on it and connect the sheet input to the block input by dragging a wire. 3. Rename the output. ***Note:*** *Press the button (4) if you need to delete the currently configured source from the box.* ***Note:*** *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.26 PLC Block: Force history record

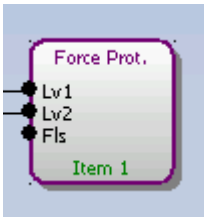
<table>
<tr><td>Symbol</td><td> 
</td></tr>
<tr><td>Inputs</td><td>
<table>
<tr><th>Input</th><th>Type</th><th>Range [dim]</th><th>Function</th></tr>
<tr><td>Input</td><td>B</td><td>N/A</td><td>A record with configured text is recorded into the controller history when the input is activated.</td></tr>
</table>
</td></tr>
<tr><td>Outputs</td><td></td></tr>
<tr><td>Description</td><td>This block writes a record with defined text into the history when the input is activated.

1. Enter the text, which will be used for the "reason" column of the record.

Note: The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.</td></tr>
</table>

5.4.27 PLC Block: Force protection

Symbol



Inputs

Input	Type	Range [dim]	Function
Lvl 1	B	N/A	The input activates yellow level of the configured protection if it is configured.
Lvl 2	B	N/A	The input activates red level of the configured protection if a red level protection is configured.
Fls	B	N/A	The input activates sensor fail if a red level protection is configured.

Outputs

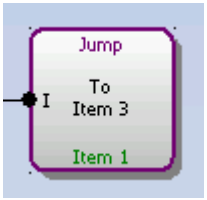
Description

This block issues alarms of configured type and text when appropriate binary input is activated.

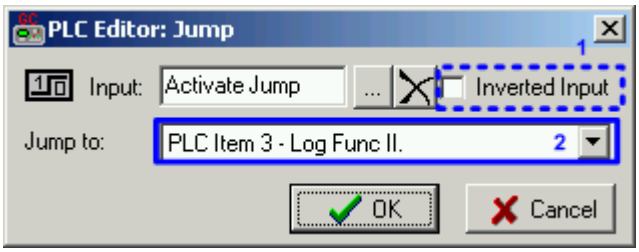
1. Select the protection type from the list.
2. Enter the message, which will appear in the Alarmlist together with the prefix according to protection type when the protection is activated.
3. Go back to the drawing and attach wires to the inputs. Inputs are enabled and disabled according to selected protection type (e.g. if warning is selected, then "Lvl 2" input is disabled). Because of this the protection type must be configured first and then wires can be attached.

	Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.28 PLC Block: Jump

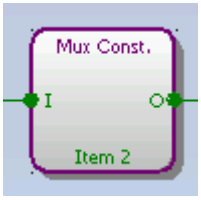
Symbol	
Inputs	

Input	Type	Range [dim]	Function
Input	B	N/A	Input which activates the jump.

Outputs	
Description	If the input is active, then a group of following PLC blocks is skipped and the PLC program continues execution at the block that is specified in the block jump.  1. Select if the input will be inverted at the enter of the block. 2. Select the destination PLC block to which the block will jump. ***Note:*** *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.29 PLC Block: Multiplexed analog constant

Symbol



Inputs

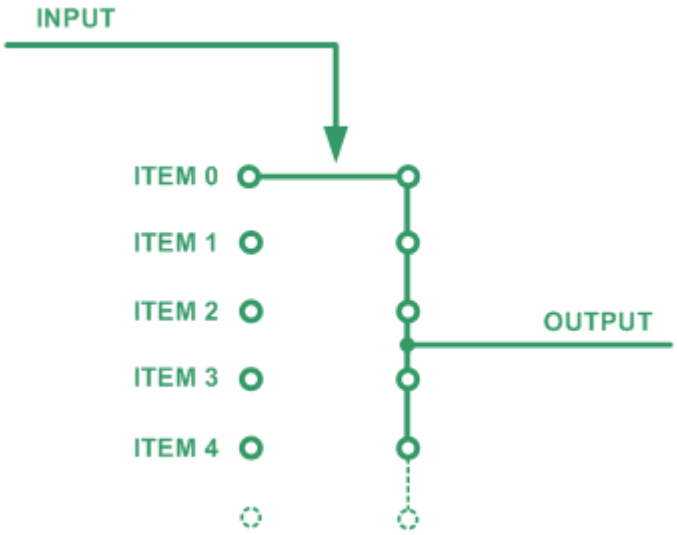
Input	Type	Range [dim]	Function
Input	A	0..31 [-]	Selects which constant will be sent to the output

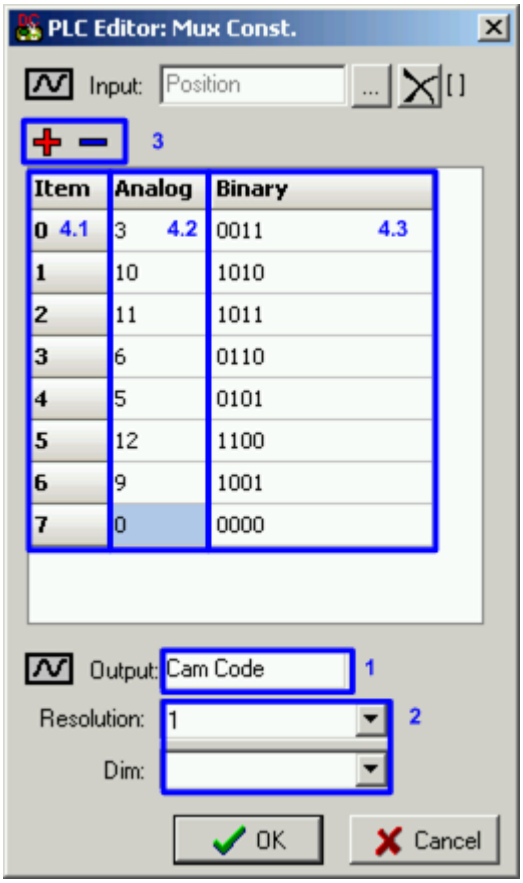
Outputs

Output	Type	Range [dim]	Function
Output	A	Adjustable	Output value is one of the constants selected by the input

Description

The block works as a multiple constant selected by an analog value. The output value is set to the constant with index equal to the input value. The block can be used e.g for creation of a camswitch as described in the Inc/Dec module.



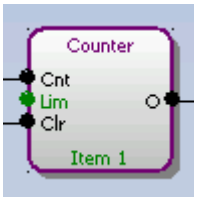


1. Rename the output.
2. Adjust resolution and dimension.
3. Use the buttons to add/remove constants (up to 32).
4. Adjust values of the constants. The column "Item" (4.1) represents indexes of the constants, which are used for selecting of the active constant. The value of the constant can be entered either in decimal form (4.2) or in binary form (4.3).

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.30 PLC Block: Counter

Symbol



Inputs

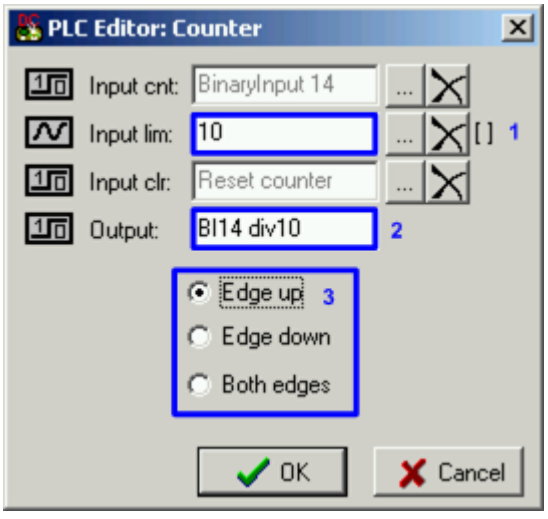
Input	Type	Range [dim]	Function
Input Cnt	B	N/A	Input at which the edges are counted
Input Lim	A	0..32767 [-]	Counter value limit for activation of the output.
Input Clr	B	N/A	Reset input

Outputs

Output	Type	Range [dim]	Function
Output	B	N/A	Output is activated when the counter value exceeds the limit

Description

The block works as a counter of edges (selectable rising, falling or both) with reset input and adjustable counting limit. The maximal counter value is 32767. The counter value is lost when the controller is switched off. The output is activated when the counter value reaches equal or higher value than the adjusted limit and remain active until the block is reset. Activating of the reset input resets the counter value to 0, deactivates the output. Holding the reset input active blocks counting.

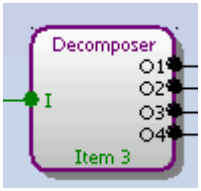


1. Adjust limit value. The counter output is activated when the counter gets over this value. The limit can be constant as well as a setpoint or any other analog value.

	2. Rename the output. 3. Select edges which will be counted. ***Note:*** *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.31 PLC Block: Decomposer

Symbol



Inputs

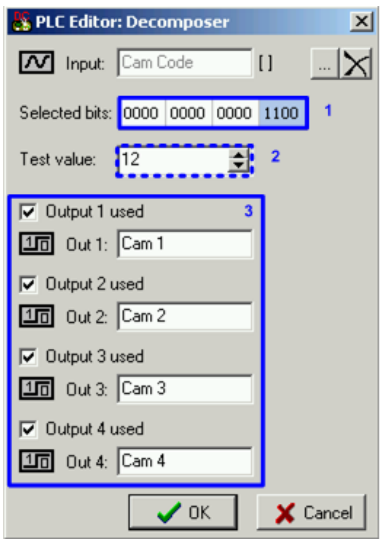
Input	Type	Range[dim]	Function
Input	A	Any	Value to be "decomposed" to bits

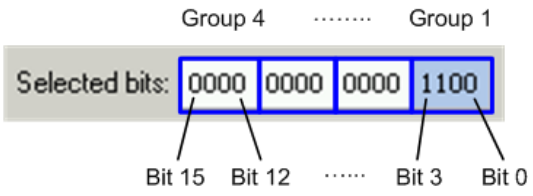
Outputs

Output	Type	Range[dim]	Function
Out 1	B	N/A	Bit 0,4,8,12 - according to selected group of bits.
Out 2	B	N/A	Bit 1,5,9,13 - according to selected group of bits.
Out 3	B	N/A	Bit 2,6,10,14 - according to selected group of bits.
Out 4	B	N/A	Bit 3,7,11,15 - according to selected group of bits.

Description

The block converts the input analog value to binary form and provides selected bits as binary outputs. The block can be used e.g for creation of a camswitch as described in the Inc/Dec module.



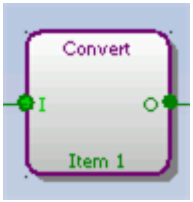


1. Select which group of bits will be mapped to the outputs.
2. Write a number into this box to see the binary form of the number in the selector (1). This box is for test purpose only and does not influence the behavior of the block.
3. Select which outputs will be used and rename them.

	Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.32 PLC Block: Convert

Symbol



Inputs

Input	Type	Range [dim]	Function
Input	A	Any	Input

Outputs

Output	Type	Range [dim]	Function
Output	A	Adjustable	Output

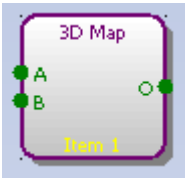
Description

The block converts the input value of any data type to an INTEGER16 value. If the input value is out of INTEGER16 range, the output value is set to invalid status (0x8000).

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

5.4.33 PLC Block: 3D Map

Symbol



Inputs

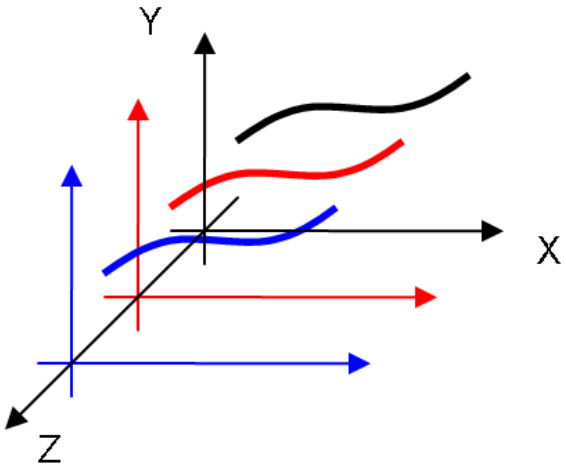
Input	Type	Range [dim]	Function
Input X	A	Any	X Value
Input Z	A	Any	Z Value

Outputs

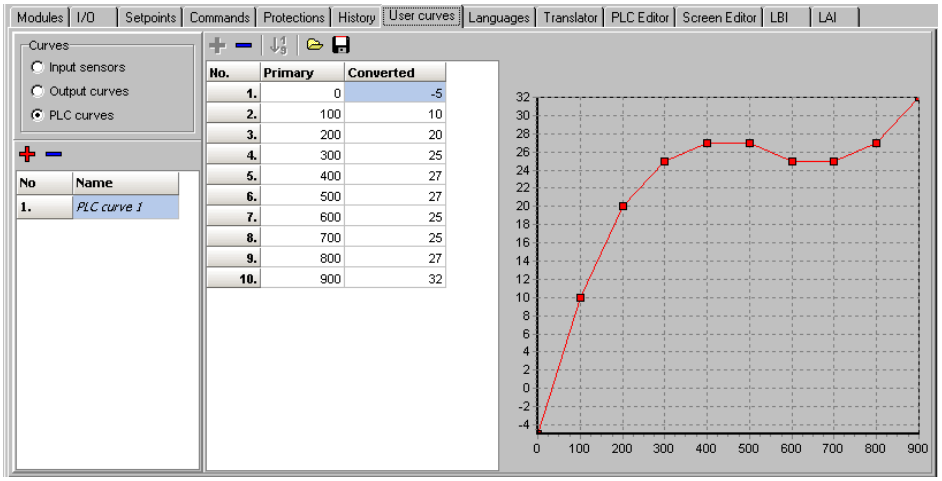
Output	Type	Range [dim]	Function
Output Y	A	Adjustable	Interpolated Y Value

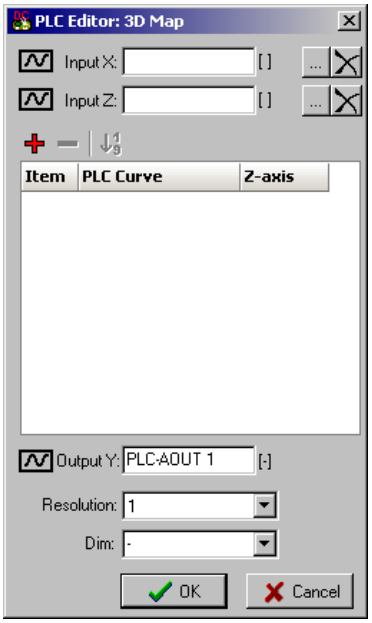
Description

The block interpolates **Y**-coordinate of point located in 3D Map based on **X** and **Z Inputs**.



The 3D Map is composed by set of PLC Curves **Y** = f(**X**) and its **Z-axis** parameter.





1. Create **PLC User Curves** on sheet **User Curves**.
2. Add **PLC Curves** into the block configuration using red "**+**" symbol, up to 10 curves can be added.
3. Set **Z-axis** parameter for every added **PLC Curve**.
4. Rename the **Output**.
5. Adjust **Resolution** (number of decimal positions) of the output.
6. Adjust **Dimension** of the output.

Note: *The inputs are assigned to their sources in the sheet by dragging a wire from the input to the source.*

IMPORTANT: PLC User Curves and Z-axis parameters are defined by whole numbers without decimal point. If there is connected analog value with a decimal resolution to X or Z input then the analog value will be interpretted in wrong way - the 3D Map block "does not see" the decimal resolution. Example: input value 1,56 would be interpretted as value 156.

5.4.34 PLC Block: ForceMem

- Temporary storage of input value/setpoint to controller memory

5.4.35 PLC Block: User Curves

- Extended user curve
- Supported in some of controller's branches

Import of user curves

- Working import function in case of transfer larger curve (with 20 or 30 points) to archive which supports curve with less points
  - Use third level when lists of setpoints, values etc. are required

6 back to PLC

6 InteliVision Screen Editor

The **ScreenEditor** is an integrated function into DriveConfig which allows the user to modify the layout of the screens in the **metering mode** of Intelivision8 and/or InteliVision5 families and/or InteliVision12 Touch.

> **IMPORTANT: Library *QtNetwork4.dll* is required for InteliVision12 Touch support. It is being distributed with DriveConfig package.**

ScreenEditor is available only in Expert mode and only for archives supporting screen editing feature.

Note: *There is a separate help for the ScreenEditor available in the menu* ***Help (page 135)****.*

Generating aftertreatment (Tier 4 Final) screen for ID-DCU internal display.

Note: *A new version of ScreenEditor is available on ComAp's webpage.*

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7 Logical I/O configuration

7.1 Logical Binary Inputs configuration 126
7.2 Logical Analog Inputs configuration 127

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7.1 Logical Binary Inputs configuration

Select Binary Logical inputs source (“internal software wire”).

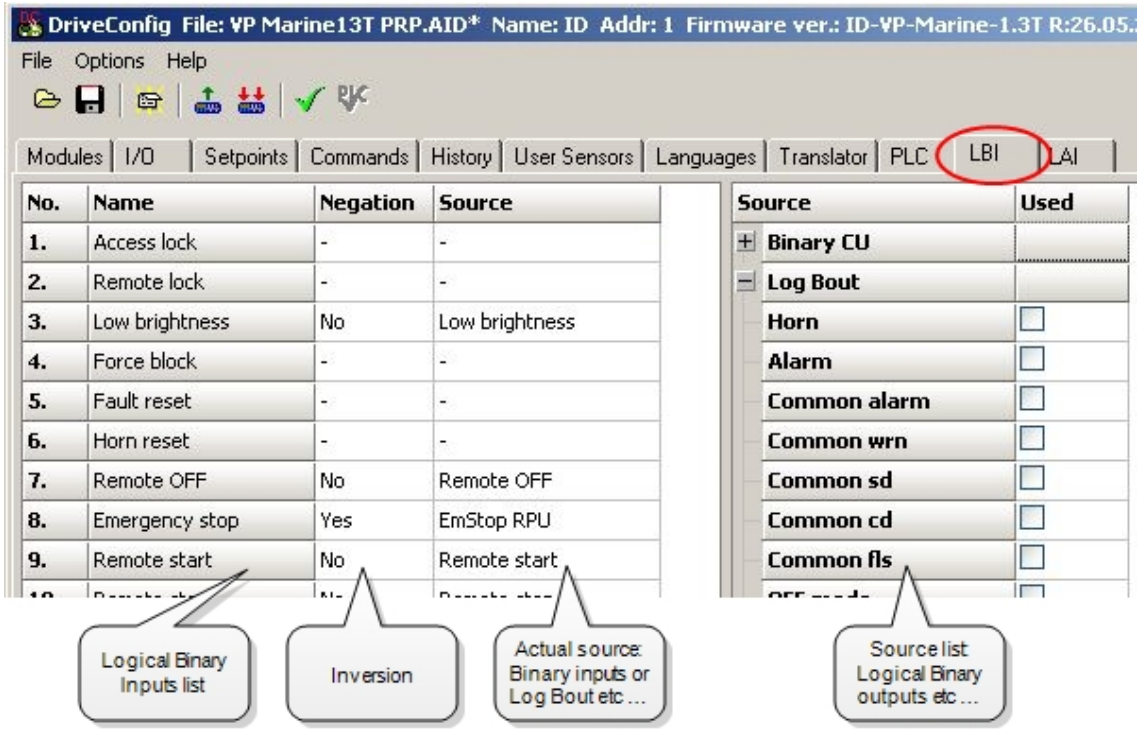

Image 7.1 Binary inputs configuration

7.2 Logical Analog Inputs configuration

Select Analog Logical inputs source (“internal software wire”).

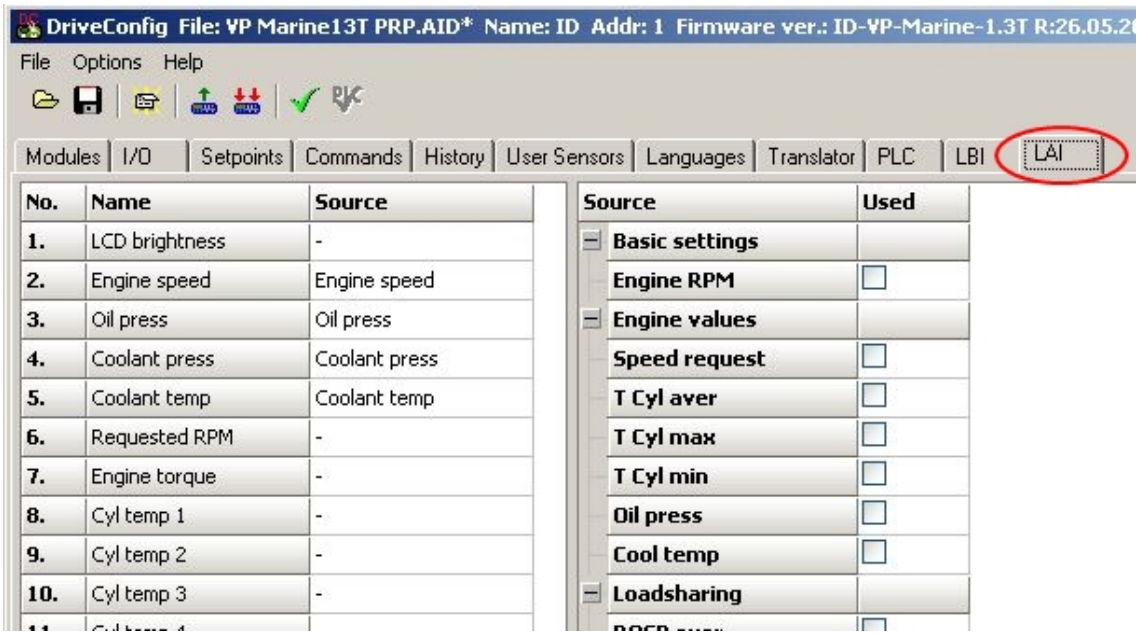

Image 7.2 Analog inputs configuration

7.2.1 LBI and LAI configuration possibilities

DriveConfig-2.2 LBI (and LAI) window enables to configure (make “sw wire”) any of following items to any Logical Binary Input (see drawing below).

1.	PBI = InteliDrive - Physical Binary Input.
2.	LBO = InteliDrive - Logical Binary Output.
3.	PBO = InteliDrive - Physical Binary Output.
4.	InteliDrive - Status values.
5.	EBI = ID Binary input values received from ECU via J1939.
6.	EBO = ID Binary output values transmitted to from ECU via J1939.
7.	InteliDrive PLC Binary I/O values.

Table 7.1 Drawing legend

Please note the standard controller (and Extension modules) Physical inputs configuration procedure is marked as **S** (in drawing below) and it is provided in DriveConfig – I/O window.

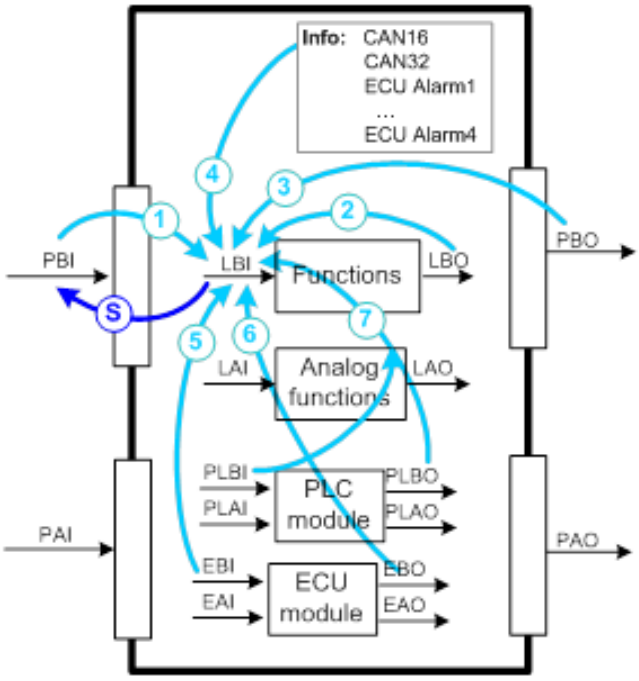

Image 7.3 ID-DCU + Extension modules

PBI	Physical Binary Inputs
PAI	Physical Analog Inputs
PBO	Physical Binary Outputs
PAO	Physical Analog Outputs
LBI	Logical Binary Inputs
LAI	Logical Analog Inputs
LBO	Logical Binary Outputs
LAO	Logical Analog Outputs
PLBI	PLC Binary Inputs
PLBO	PLC Binary Outputs
EBI	ECU Binary Inputs
EBO	ECU Binary Outputs

Table 7.2 Shortcuts explanation

Note: *Option to Export/Import user screen definitions in XML format is no longer available.*

Note: *Analog input protection configuration options for selected controllers is extended into Classes – A, B and C.*

6 back to Logical I/O configuration

8 Communication

8.1 ECU 129
8.2 File 133
8.3 Options 134
8.4 Help 135

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Note: *It is possible to generate list of Modbus Registers according to available vs. unavailable controller's feature to report protection statuses via Modbus. The feature is available in following firmware versions actually:*

- *ID-DCU-Marine 2.1 and newer*
- *ID-DCU-Marine-W 2.2 and newer*
- *ID-Mobile-Logger 2.0 and newer*

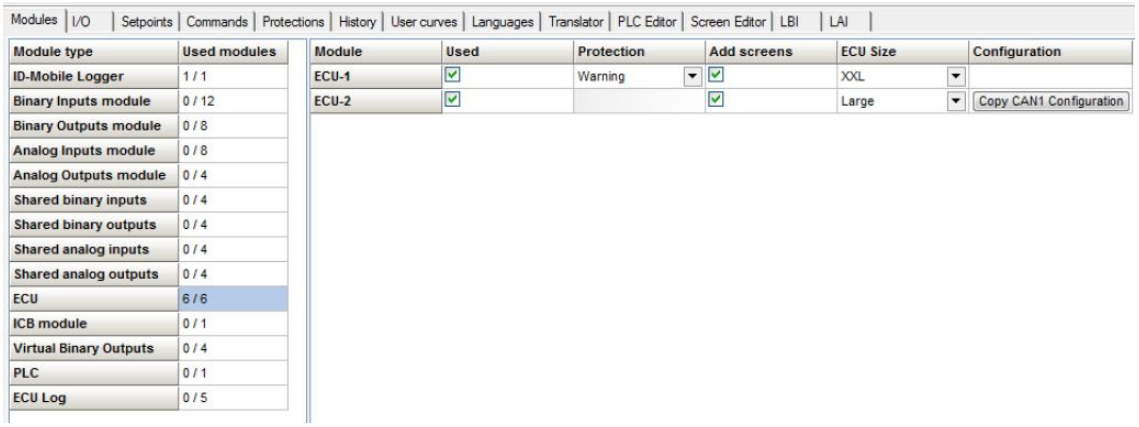
8.1 ECU

ECU size selection is possible by selecting the ECU size by CHECK box

- Standard (1 ECU module)
- Large (2 ECU modules)
- Extra large (3 ECU modules)
- XXL (4 ECU modules)

Support of logging from ECU connected to CAN2 in ID-Mobile-Logger 2.4.0 and newer

- There are available up to 4 ECU modules for CAN1 and 2 ECU modules for CAN2 in the ECU size configuration (if supported by controller)



- Only the same ESF file (Engine type) can be used for both ECU
  - All ECU values are available for configuration for both "CAN1 ECU modules" and " CAN2 ECU modules"
  - DM1 messages from CAN2 are not supported, they are not configurable

- ECU CAN2 has configurable inputs (AINs and BINs) only, outputs (BOUT and AOUT) are not supported. Corresponding BOUT and AOUT I/O modules for CAN2 ECU are not available
- ECU2 values are not configured to BINs and LAIs automatically after esf configuration, they shall be configured manually or the configuration of CAN1 ECU can be copied to CAN2 by "Copy CAN1 Configuration" button.

- There are available up to 4 ECU modules for CAN1 and 2 ECU modules for CAN2 in the ECU size configuration (if supported by controller)
- ECU modules in Analog inputs are named:
  - ECU 1-1 .. 1-4 for CAN1
  - ECU 2-1 .. 2-2 for CAN2
- Protection of configuration is joined for CAN1 and CAN2 ECU, it is not distinguished from which ECU the communication has failed
- Value names
  - ECU1 modules - standard names from ESF
  - ECU2 modules
    - When ECU2 configuration is coppied from ECU1, value names for ECU2 will be taken from the custom ECU1 value names and following changes will be applied to them:
    - If the value name length <= 12 symbols: name of ECU1 value + suffix "-2"
    - If the value name length >= 13 symbols, add suffix + suffix "-2" to the name after reducing name length to 12 with following rules:
      - Remove 1 or 2 symbols (number to reach 12 symbols) in order from left except first character with these priorities:
        - Gaps
        - Vowels - low case in following order: e, a, o, i, u
    - If the value name lower than 12 is not reached - last characters to reach 12 chars are cut

- Support of multi ECU configuration - possible individual configuration up to 10 electronic devices
  - New way of allocation ECU input/output resources
  - User can define 10 character name for each ECU module
  - Separate ECU consistency check
  - Add ECU Fault code configuration
  - Update of ECU Alarm list regarding multi device connection

8.1.1 Wizard

Used when configuring multiple ECU modules with conflicting addresses.

- If there is a conflict pop up window is shown and user should set non-conflicting ECU address

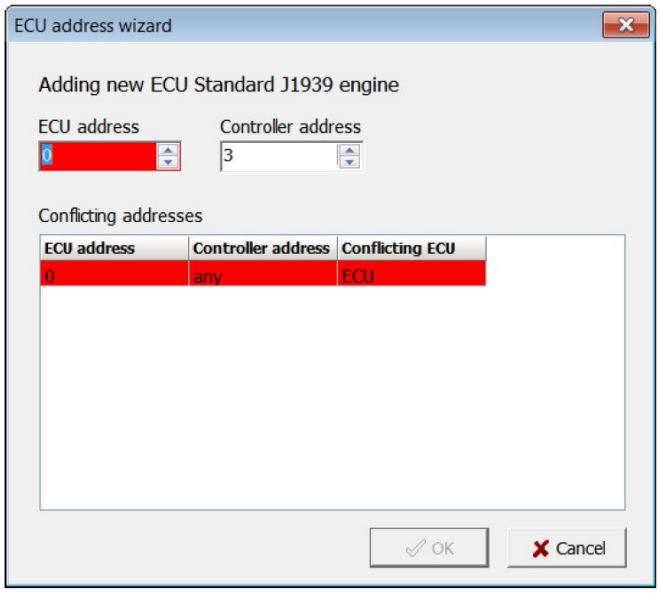


Image 8.1 Example of popup window for choosing non conflicting address

- If the ECU, currently being added, does not support ECU address change and is in conflict, then the particular ECU cannot be added

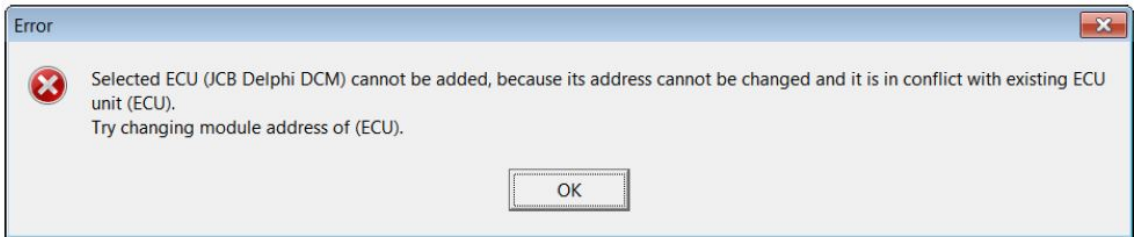


Image 8.2 Error message when conflicting ECU module does not allow address change

- Conflicting fault codes are overwritten. The warning is shown for conflicting ones (if the text is different)
- Conflicting ECU values are disabled to be manually added

There is a control if an incompatible ESF file is configured in an older archive. This can be the case, for example, using an extended structure in an ESF file with a high identifier number.

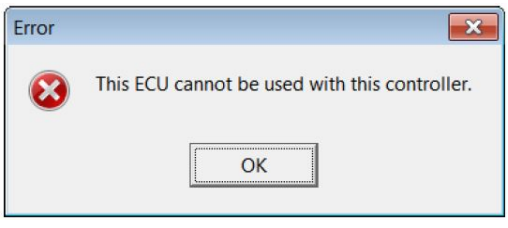


Image 8.3 Error message for incompatible ESF configured into archive

Added new file type support for Firmware Import * .ixc. The user can define multiple types of extensions at once. Utility available in the Options menu - Import firmware ...

New file is being distributed with DriveConfig package - QtNetwork4.dll. This library is required for InteliVision 12 Touch support.

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8.2 File

Open

Opens selected AID archive in off line mode. Archive can be modified and saved by Save or Save as command or loaded to controller by Write to ID command.

Save

Unconditional Save command.

Save as

Save archive using customized file name.

Recently saved archives

List of recently saved archives.

File name and directory can be modified.

Close

Archive save to file and close connection.

Read from controller

Load actual archive from controller. Archive can be modified and saved to file.

Write to controller

Opened archive is loaded to controller. The consistency check runs automatically before archive is loaded.

Consistency check

Consistency check and corresponding warning is activated before configuration file is loaded to controller or saved to PC.

PLC consistency check

Consistency check and corresponding warning is activated before configuration file is loaded to controller or saved to PC.

Controller/Archive info

Basic info about the controller and archive.

Import configuration wizard …

Wizard for archive import into a newer archive format (usually during controller firmware upgrade).

Export configuration …

Export to XLS file. Each module is exported to separate sheet.

Generate Cfg Image …

Generates communication object specification in txt file.

Export screens …

Generates ISC file containing xml description of controller and InteliVision screen layout.

Import screens …

Import of ISC file into the currently opened archive in DriveConfig.

Firmware upgrade and Cloning

Command for controller firmware reprogramming. Available after password level 3 is set. Cloning option enables to create file for future controller cloning.

Exit

Exits DriveConfig software.

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8.3 Options

Select connection

Selection and setting of Direct, Modem, Internet or AirGate connection.

Overwrite setpoints

Option for setpoint values overwrite during configuration aid file upgrade. Setpoint values in controller are replaced when option is selected.

Note: *Some setpoints like Basic setting: Engine name, Controller mode, Controller address are protected against change during aid archive download. Those setpoints are in gray characters.*

Reset from Init state

Software reset from init state is automatically generated after software reprogramming when selected.

Expert mode

Enables additional tools for Special protection functions in “Protection” and “I/O – analog inputs” window. It is possible to configure more than two level or window protection to any analog value.

Import firmware

Command enables to download complete firmware pack to PC. All files (mhx, aid, esf, ..) are automatically copied to corresponding DriveConfig directories.

The user can define multiple types of extensions at once thanks to supporting of new file type Firmware Import *.ixc.

Dictionaries

Dictionary manager enables to create new directory or other tools for existing dictionaries:

Add	create a new one	
Delete	delete dictionary	
Rename	rename dictionary	
Join	put two the same type dictionaries together	
Revert	make opposite dictionary	
Create	cross-languages dictionary	A → C from A → B and B → C
Import	from CSV or TRN format	
Export	to CSV or TRN format	
Dictionary listing		

Table 8.1 Tools in dictionary manager

ESL files

Command enables to download complete set of ESL, ESF and ESC files for ECU support into corresponding DriveConfig directories.

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8.4 Help

8.4.1 DriveConfig Help

Contents help with following items is available in DriveConfig.

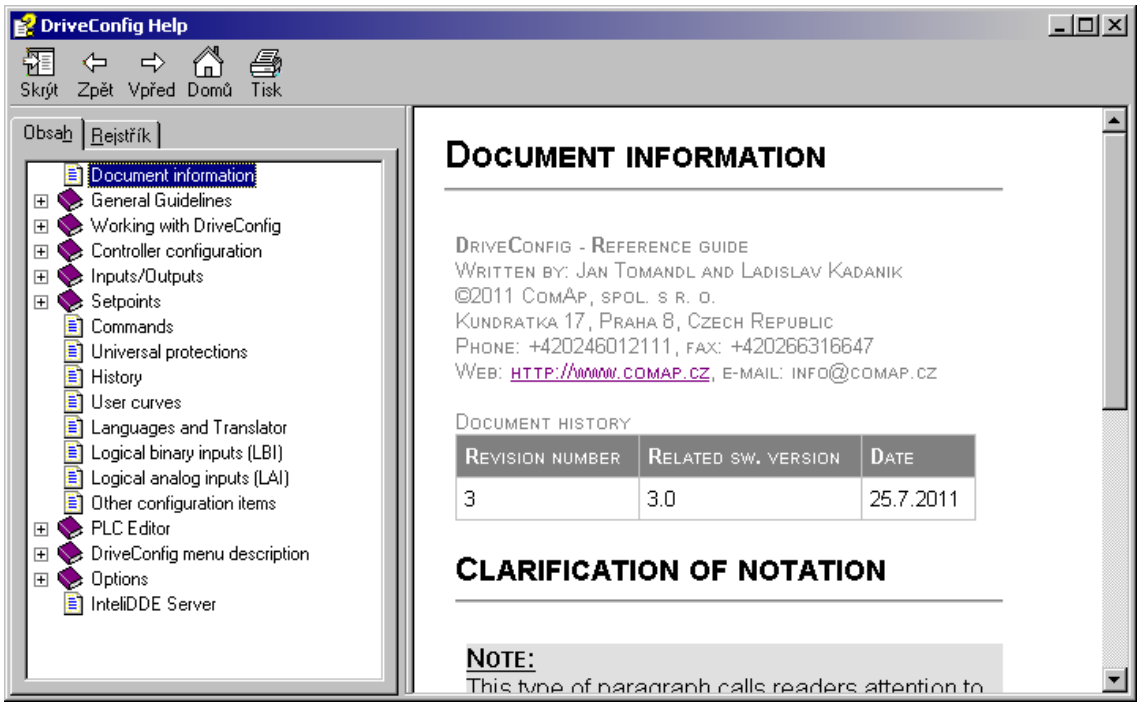

Image 8.4 Document information (DriveConfig)

8.4.2 Controller Help

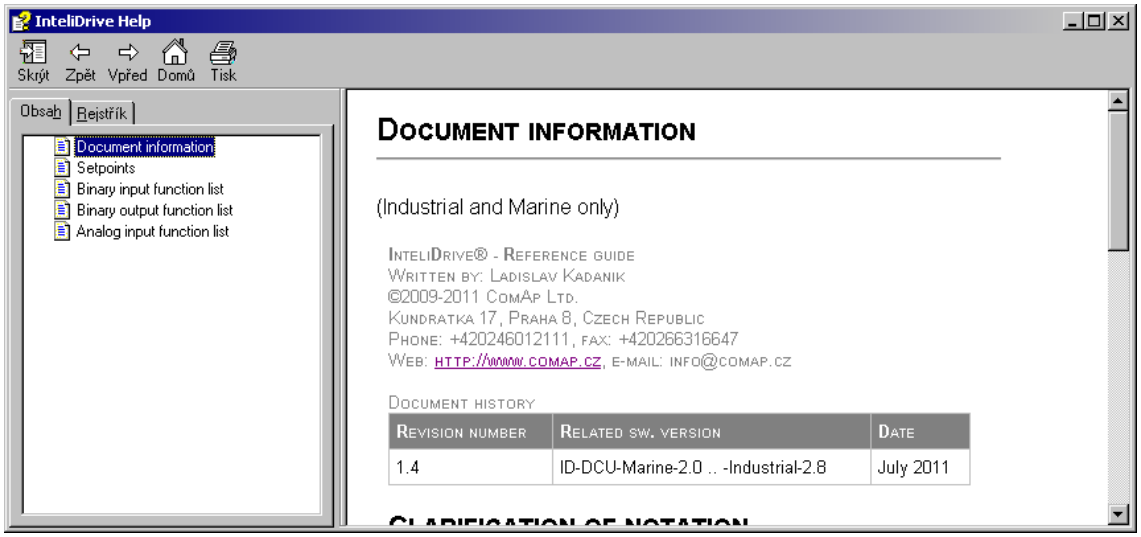

Image 8.5 Document information (controller)

8.4.3 About

Software version info is available in About window.

Image 8.6 About window

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