OPERATING INSTRUCTION

Sensor Integration Gateway - SIG100

Integration Products

SICK
Sensor Intelligence.

Described product

SIG - Sensor integration gateway

SIG100

Manufacturer

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Production location

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Legal information

Original document

This document is an original document of SICK AG.

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Contents

1 About this document

1.1 Further information

You can find the product page with further information under the **SICK Product ID** at: pid.sick.com/{**P/N**}.

P/N corresponds to the part number of the product.

The following information is available depending on the product:

- Data sheets
- These publication in all available languages
- CAD files and dimensional drawings
- Certificates (e.g., declaration of conformity)
- Other publications
- Software
- Accessories

1.2 Symbols and document conventions

Warnings and other notes

DANGER
Indicates a situation presenting imminent danger, which will lead to death or serious injuries if not prevented.

WARNING
Indicates a situation presenting possible danger, which may lead to death or serious injuries if not prevented.

CAUTION
Indicates a situation presenting possible danger, which may lead to moderate or minor injuries if not prevented.

NOTICE
Indicates a situation presenting possible danger, which may lead to property damage if not prevented.

NOTE
Highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

Instructions to action

▶ The arrow denotes instructions to action.

1. The sequence of instructions is numbered.
2. Follow the order in which the numbered instructions are given.

✓ The tick denotes the results of an action.

2 Safety information

2.1 Safety notes

- Read the operating instructions before commissioning.
- Connection, mounting, and setting may only be performed by trained specialists.
- Not a safety component in accordance with the EU Machinery Directive.
- When commissioning, protect the device from moisture and contamination.
- These operating instructions contain information required during the life cycle of the product.
- This is a class A product. In a household environment, this device can cause radio interference. The user should take appropriate measures as required.

2.2 Correct use

The SIG100 Sensor Integration Gateway is an IO-Link sensor hub with several separate sensor inputs and several separate outputs. It can be used as a stand-alone device or as an IO-Link device to efficiently transmit the data from all connected devices. When the SIG100 is used as an IO-Link device, an IO-Link master is also required. When a T-coupler is used to split the signal on pins 2 and 4 on each of the six available sensor connections (S1 to S6), up to 12 separate inputs or outputs can be connected to the SIG100. A particular advantage of the SIG100 Sensor Integration Gateway is that all connected devices can be interconnected via logic functions. This is made possible by the implemented logic editor, which can be accessed via the SOPAS ET user interface. A browser-capable PC can be used for visualization. The required SOPAS ET software can be downloaded at www.sick.com.

NOTE
It is NOT a mandatory requirement to use an IO-Link master. The SIG100 can be used in SIO mode. An IO-Link master is only required if the SIG100 is intended to be used as an IO-Link device. Furthermore, the SIG100 can be used as a standalone controller without an additional PLC.

Table 1: SIG100 Implementation

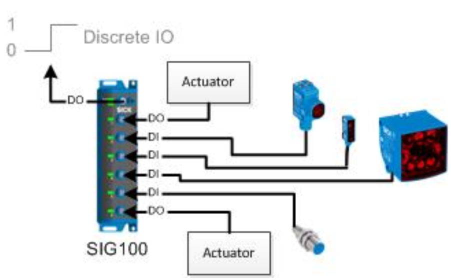


Figure 1: Stand alone system 1

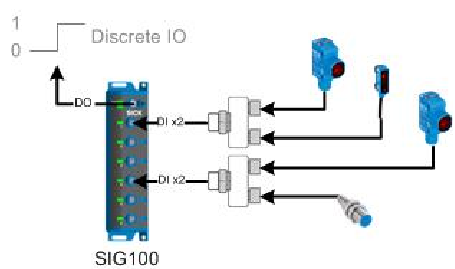


Figure 2: Stand alone system 2

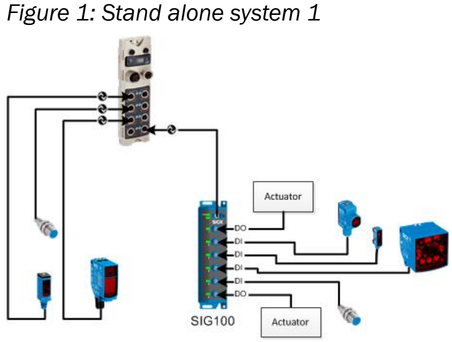


Figure 3: SIG100 as an IO-Link device

If the product is used for any other purpose or modified in any way, any warranty claim against SICK AG shall become void.

3 Product description

3.1 Operating and status indicators

When Sensor Integration Gateway SIG100 is operating, the status of the connections are indicated visually by status LEDs. Using these status indicators, the operator can find out quickly and easily whether the SIG100 and all connected devices are working properly.

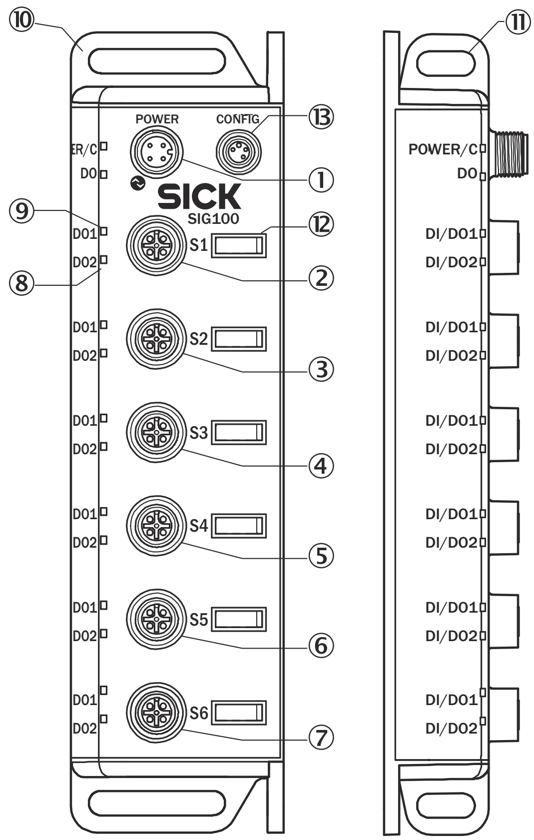


Figure 4: dimensional drawing

① IO-Link / Power in
② Port S1 for the connection of a standard inputs or standard outputs
③ Port S2 for the connection of a standard inputs or standard outputs
④ Port S3 for the connection of a standard inputs or standard outputs
⑤ Port S4 for the connection of a standard inputs or standard outputs
⑥ Port S5 for the connection of a standard inputs or standard outputs
⑦ Port S6 for the connection of a standard inputs or standard outputs
⑧ Port LED pin 2
⑨ Port LED pin 4
⑩ Mounting ears for front mounting
⑪ Mounting ears for side mounting
⑫ Marker tag pocket
⑬ USB configuration port (only for configuration and diagnosis)

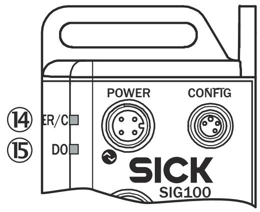


Table 2: Power/IO-Link Port LEDs

⑭	Green	Power Supply / IO-Link Activity
⑮	Amber	Q Output: off: logic editor output QL1 low (=0) or output not used. orange: logic editor output QL1 high (=1)

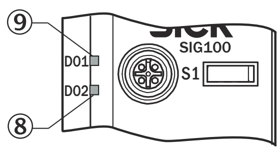


Table 3: I/O connector LEDs (Port S1-S6)

⑨	Amber	pin 4 is active
⑧	Amber	pin 2 is active

4 Transport and storage

4.1 Transport

For your own safety, please read and observe the following notes:

NOTE
Damage to the device due to improper transport.

- The device must be packaged for transport with protection against shock and moisture.
- Recommendation: Use the original packaging as it provides the best protection.
- Transport should be performed by specialist staff only.
- The utmost care and attention is required at all times during unloading and transportation on company premises.
- Note the symbols on the packaging.
- Do not remove packaging until immediately before you start mounting.

4.2 Transport inspection

Immediately upon receipt at the receiving work station, check the delivery for completeness and for any damage that may have occurred in transit. In the case of transit damage that is visible externally, proceed as follows:

- Do not accept the delivery or only do so conditionally.
- Note the scope of damage on the transport documents or on the transport company's delivery note.
- File a complaint.

NOTE
Complaints regarding defects should be filed as soon as these are detected. Damage claims are only valid before the applicable complaint deadlines.

4.3 Storage

Store the device under the following conditions:

- Recommendation: Use the original packaging.
- Do not store outdoors.
- Store in a dry area that is protected from dust.
- So that any residual damp can evaporate, do not package in airtight containers.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Technical data", page 53.
- Relative humidity: see "Technical data", page 53.
- For storage periods of longer than 3 months, check the general condition of all components and packaging on a regular basis.

5 Mounting

The SIG100 is mounted with two screws, maximum M6, and two flat washers.

Note the maximum permissible tightening torque of 0.8 Nm.

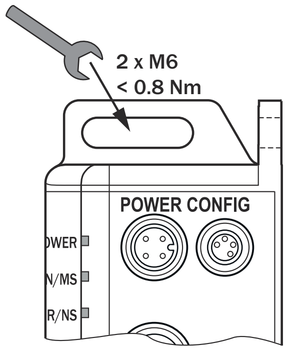


Figure 5: Mounting

6 Electrical installation

Establish a power supply connection (M12 A-coded connector) to the SIG100. Connect the desired devices (sensors/actuators) to the SIG100.

The sensors must be connected in a voltage-free state (U_V = 0 V). The following information must be observed, depending on the connection type:

The total current draw of the SIG100 must not exceed 4A.

NOTICE DAMAGE OF EQUIPMENT
Equipment damage due to incorrect supply voltage! Please note the instructions for electrical installation.

An incorrect supply voltage may result in damage to the equipment. Operation in short-circuit protected network max. 8 A.

Only apply voltage/switch on the voltage supply (U_V > 0 V) once all electrical connections have been established.

Female connectors that are not used must be sealed with blind caps so that the enclosure rating of IP 67 is assured.

The IO-Link output draws power via the sensor supply.

The digital input correspond to the input characteristic according to EN 61131-2, type 1 and type 3.

Explanation of the connection diagram.

DI = Digital input

DO = Digital output

n. c. = not connected

6.1 DC

DC: 10 ... 30 V DC, see "Technical data", page 53

NOTE
SIG100 is only made for the connection of PNP sensors and not for NPN sensors.

Table 4: Power Port, M12 A-coded

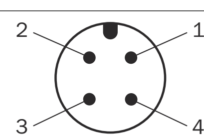
Pin	Signal	Description
1	+ (L+)	+ 24 V DC nominal
2	DO	configurable as a Standard Output
3	M	0 V
4	DO / C	configurable as IO Link or standard output
	 I_N = 4 A	

Table 5: USB Port (for configuration), M8

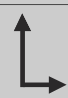
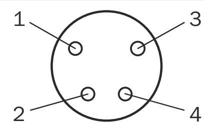
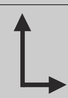
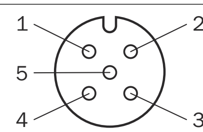
Pin	Signal	Description
1	+ (L+)	+ 5 V DC nominal
2	- Data	
3	+ Data	0 V (logic ground)
4	M	
		

Table 6: Port S1-S6, M12, A-coded

Pin	Signal	Description
1	+ (L+)	+ 24 V DC nominal
2	DI / DO	Configurable as Discrete Input or Discrete Output
3	M	0 V (logic ground)
4	DI / DO	Configurable as Discrete Input or Discrete Output
5	n. c.	
		

! **NOTICE**
Each port (S1-S6, Pin 1) is limited to 50 mA. The power consumption of the device or devices must be checked before starting a new project.

! **NOTICE**
Each output (Pin 2 / Pin 4) of each port (S1-S6) is limited to 50 mA. Maximum current consumption of a whole port thus is 150 mA. The maximum power consumption of the SIG100 as a device is 500 mA and needs to be limited to this.

7 SIG100 configuration

The SIG100 can be configured on a computer (running Microsoft Windows) via USB using the SOPAS Engineering Tool software.

The required cable (M8, USB) can be ordered separately. The part number is 6051163.

The SOPAS Engineering Tool application can be downloaded at www.sick.com.

Please make sure that the installed application is the latest version of SOPAS ET (V2021.3 or higher).

After you have started SOPAS ET, install the SIG100 device driver (SDD). The SDD can be uploaded via a connected device or downloaded from www.sick.com.

NOTE
Please note that two different SDDs are available at www.sick.com. One SDD is intended for use via USB (→ direct connection of the SIG100 to a laptop/PC via USB cable, e.g., 6051163), and the other SDD for use by SOPAS via IO-Link (with SiLink2 master 1061790).

The configuration options for the SIG100 will vary depending on the SDD used.

- For USB, you need to first select the “Maintenance” user to change configurations. (For details see section 7.4.1). The logic editor is also available in this case.
- For IO-Link, the different user levels have no effect on the configuration options. Changes can be made at any time regardless of the user. However, it should be noted that the IO-Link SDD does not support the logic editor and therefore no decentralized logics can be created.

If you want to use the logic editor, please make sure that you run SOPAS ET via USB and using the correct SDD file. To be able to use the full range of functions of the SIG100, we therefore recommend using the USB SDD.

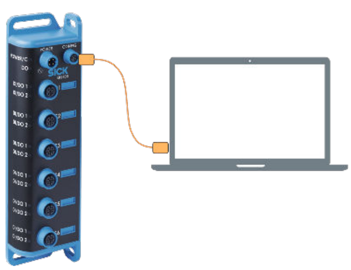


Figure 6: Configuration setup using the USB (M8) interface (plus power connector)

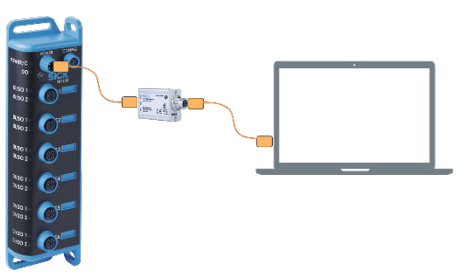


Figure 7: Configuration setup using the IO-Link interface

7.1 Operation via SOPAS ET

The SOPAS Engineering Tool allows configuring the SIG100 with a personal computer running Microsoft Windows operating system.

NOTE
Please make sure that you are using the latest version of SOPAS ET (V2021.3 or higher).

7.1.1 Opening a new project in SOPAS

Connect the SIG100 to your computer. Start SOPAS ET.

When the program is started, the Ethernet and USB interfaces are always scanned for connected devices and devices found are automatically displayed as a new project icon.

If the connected SIG100 does not automatically appear as a new project, check that the SIG100 is correctly connected to the computer and add the device to the project manually.

To do so, run the device search again. Then select the desired SIG100 in the search results. Add to the project via drag and drop or double-click. Devices that are already in the project are grayed out in the search results.

NOTE
Make sure you are using the interface oriented search (→ click on **Search settings** and select **Interface oriented search** and “USB”).

If a SIG100 is inserted into a SOPAS project for the first time, then the corresponding device driver must be installed. To do so, click on the **Install device driver** button in the project icon and upload the required SDD either from the SICK homepage www.sick.com or directly from the device. The uploaded device driver now appears in the device catalog.

NOTE
Make sure that the device driver available in the device catalog matches the firmware version of the SIG100 used. If these do not match, uninstall the SDD by right-clicking on the corresponding entry in the device catalog. You can then upload the device driver again as described above.

If the device status appears as OFFLINE in the project icon, then the SIG100 must first be switched online. To do so, click the “OFFLINE” button and synchronize the parameter values in the project and on the device.

To parameterize the SIG100, double-click anywhere on the project icon.

The device window opens, in which all device parameters are displayed. Here you can configure the device, load parameters into or from the device, or monitor parameter values.

NOTE
Other functions are available in the context menu of the project icon. To do so, click on the button with the three dots at the upper right edge of the device tile to open the context menu.

7.1.2 SOPAS ET overview and standard functions on each page

SIG100 pages have the following common layout:

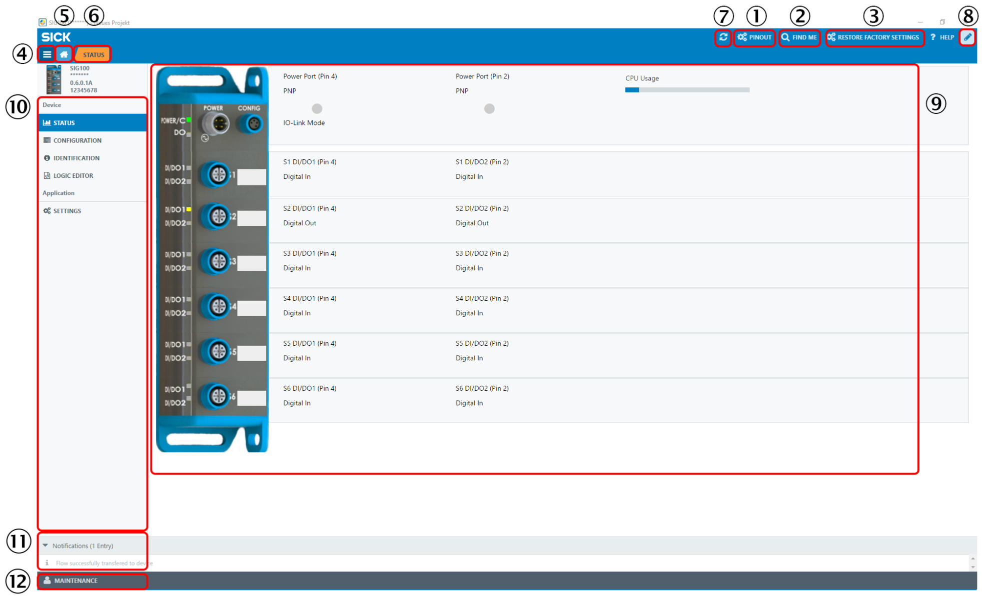


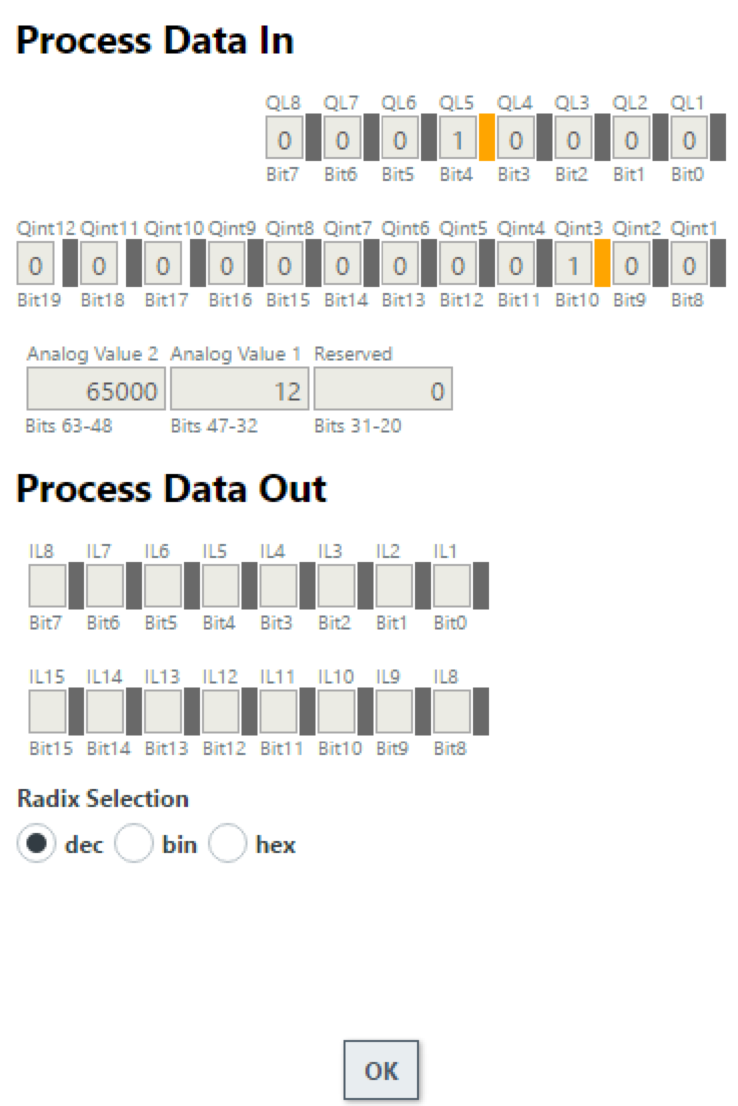
Figure 8: SOPAS ET layout

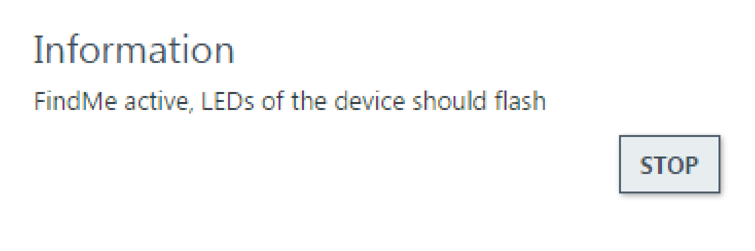
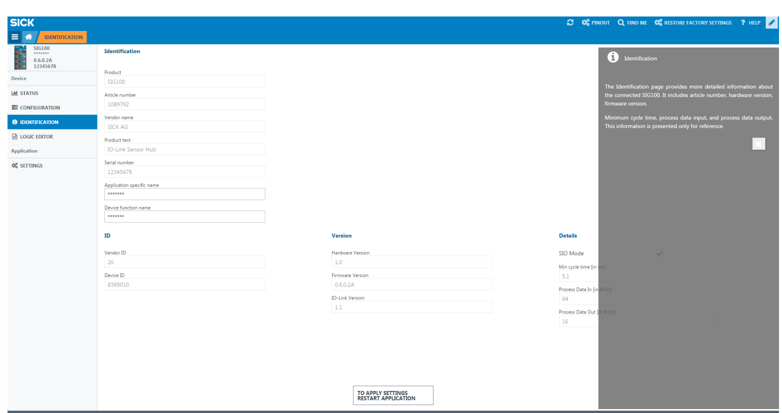
① Update page
② PINOUT (pin assignment): Display process data
③ FIND ME (Identify)
④ RESTORE FACTORY SETTINGS (Reset to factory settings)
⑤ HELP (Help)
⑥ Edit mode
⑦ Page contents
⑧ Menu
⑨ Device information
⑩ Page selection
⑪ Notifications
⑫ User access level (e.g., maintenance)

The buttons located in the upper right portion of the interface provide global device configuration. These buttons will be present on every configuration page.

Table 7: Functions

EDIT	The EDIT button allows the settings on a given configuration page to be changed. The EDIT button will be highlighted light blue when activated. Pages that can be configured will be gray until the EDIT button is pressed.
	NOTE 1. Click on the button EDIT (on the upper right side) 2. Click on the button RUN (on the lower left side) 3. Change the user mode from RUN into MAINTENANCE 4. Insert the password "main" 5. Now you can change the settings

<table>
<tr>
<td>PINOUT: Show process data
PINOUT</td>
<td>The Pinout button provides the IO-Link process data structure and a visualization of the connected SIG100.
Process Data In: process data from SIG100 to the IO-Link master. It is 8 bytes long and lists the bit location and state of each input.
Process Data Out: process data from the PLC / from the IO-Link master to the SIG100. It is 2 bytes long and provides the combined output state from logic configuration for up to 16 outputs.

</td>
</tr>
</table>

FIND ME function FIND ME	Clicking on this button the "DO" LED next to the power port of the SIG100 will flash with 1Hz until the button is clicked again. The function is intended to allow you to identify the device when already mounted to an application. **NOTE** While FIND ME is active, no other interface navigation is possible until pressing the STOP button on the dialogue box. 
RESTORE FAC-TORY SETTINGS RESTORE FACTORY SETTINGS	Clicking on this button the SIG100 will reset all settings to the factory defaults. As a factory default, all ports are configured as digital inputs. The selection of the RESTOR FACTORY SETTINGS has to be double checked in a "Confirm Action" box. Any setting currently stored in the device is overwritten if "OK" is clicked. After clicking "OK", a "Success" box will appear indicating that the connected SIG100 has been restored to factory default settings. **NOTE** While both of the dialogues boxes are active, no other interface navigation is possible. **NOTE** The Restore Factory Defaults button works from any of the configuration pages.
HELP HELP	The HELP button toggles a help screen on the right side of the user inter-face for each configuration page. This provides more information about the SIG100 as it relates to each page. **NOTE** The HELP screen will stay open while toggling different configuration pages on the configuration tree. 

Menu 	Clicking on this button the "Page selection" menu can be shown or hidden to make navigation on smaller screens easier. **NOTE** The button is highlighted light blue when the device tree is hidden.
Home 	The home button will always navigate back to the Status device page.
Refresh page 	Clicking on this button the page contents are refreshed.
Device information	This area on the top left side of the page shows the product name, user-defined location, firmware version, and serial number.
Page contents	This area shows the selected page.
SETTINGS	The settings page allows the user to change language, units, and display mode (tablet, PC or phone) in the user interface.
Device notifications	SIG100 device notifications will appear on the bottom of the home screen. These are informational only for configuration exchanges and errors.
RUN	Click the RUN button to change username access level to Maintenance. The Password is "main". Device settings found on the Configuration, Logic Editor, and Settings device pages are only possible when in Maintenance mode. **NOTE** The device settings on other pages are gray and cannot be changed until the Maintenance mode is active. Please ensure that you have clicked on the Edit button on the top right corner as well if you would like to do any configurations.

7.1.3 Status page

The Status page is the start page of SIG100 gives an overview of the current module status and the device function.

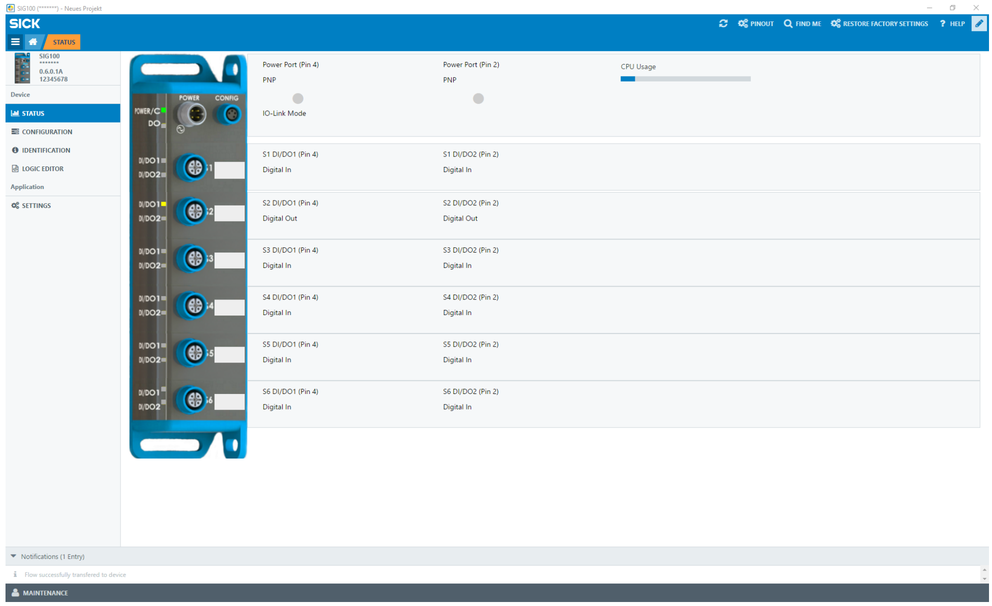


Figure 9: Status page

The page contents show the configuration of each port for pin 2 and pin 4 and the current input or output level. The LEDs on the SIG100 picture will change state based on the actual state of the connected device. The ports will reflect the input or output setting established on the Configuration page. The port labels will update to reflect the user defined port labels from the Configuration page.

The Power port (pin 2) visualizes the output "DO2" of the Logic Editor and shows the current status. The gray circle changes from gray to green depending on the output level.

The Power port (pin 4) visualizes the Output "DO1" of the Logic Editor and shows the current status. The gray circle changes from gray to green depending on the output level. This is not configurable.

In the picture on the left side the "Power/C" LED is always green to visualize that the SIG100 is powered on.

The "DO" LED next to the Power port is visualizing the "QL1" of the Logic Editor. This is not configurable and can not be changed.

7.1.4 Configuration page

The configuration page of SIG100 allows changing of any setting of each M12 port. The page is separated into sub-pages that can be selected by clicking on one of the tabs on top of the page.

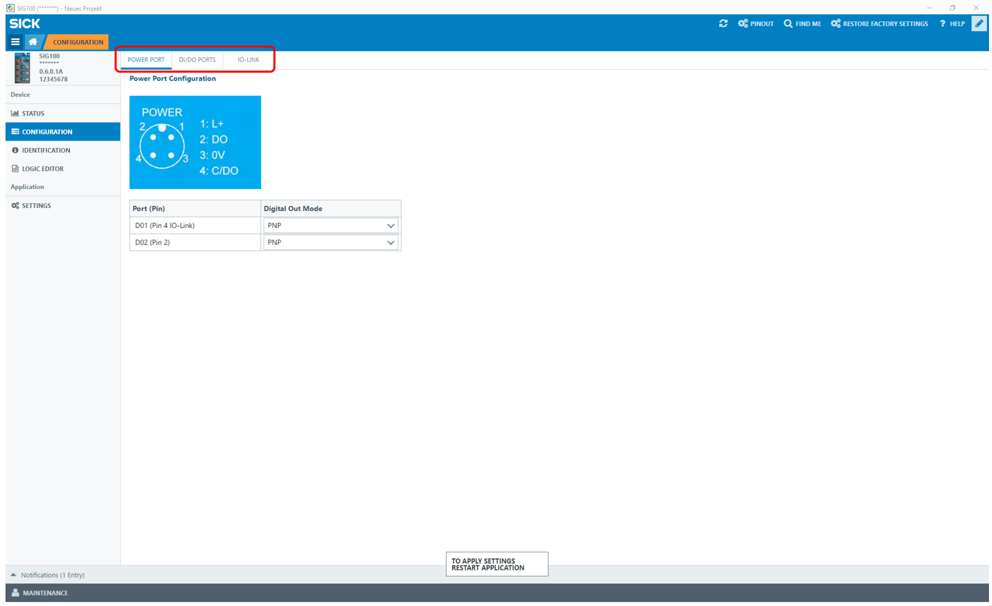


Figure 10: Configuration page

Power port

The Power port tab allows configuring settings of the Power port.

It's possible to configure the outputs on pin 2 and pin 4 of the Power port as PNP, Push-Pull or OFF.

To edit the setting, login as Maintenance and click the edit button. Select the drop down box and choose the desired output setting. A PNP output will provide the SIG100 supply voltage to the load. The Push-Pull output will provide either SIG100 supply voltage or 0 V depending on the load requirements.

DI/DO ports

The DI/DO ports tab allows configuring settings of the DI/DO ports.

The DI/DO page allows you to change pin 2 and pin 4 on each of the six M12 ports (S1-S6). They can be set as either input or an output. S number refers to the port number with S1 being the first "top" port and S6 being the very bottom port. DI/DO1 will always refer to pin 4 and DI/DO2 will always refer to pin 2.

IO-Link

The IO-Link tab allows to configure the process data out mode. This process data out mode (from IO-Link Master to SIG100) can be either Digital (having 16 Logic Editor inputs --> IL1...IL16) or Analog (having 1 Analog input).

This process data out structure will be displayed also on the PINOUT view and in the logic editor. Depending on what was choosen in this IO-Link tab, the logic editor and the PINOUT overview will be adapted automatically.

NOTE

The process data out belongs to the 2 Bytes of process data which are coming from PLC/IO-Link Master to the SIG100. Be aware this configuration has no impact on the process data in (from SIG100 to the IO-Link Master/PLC).

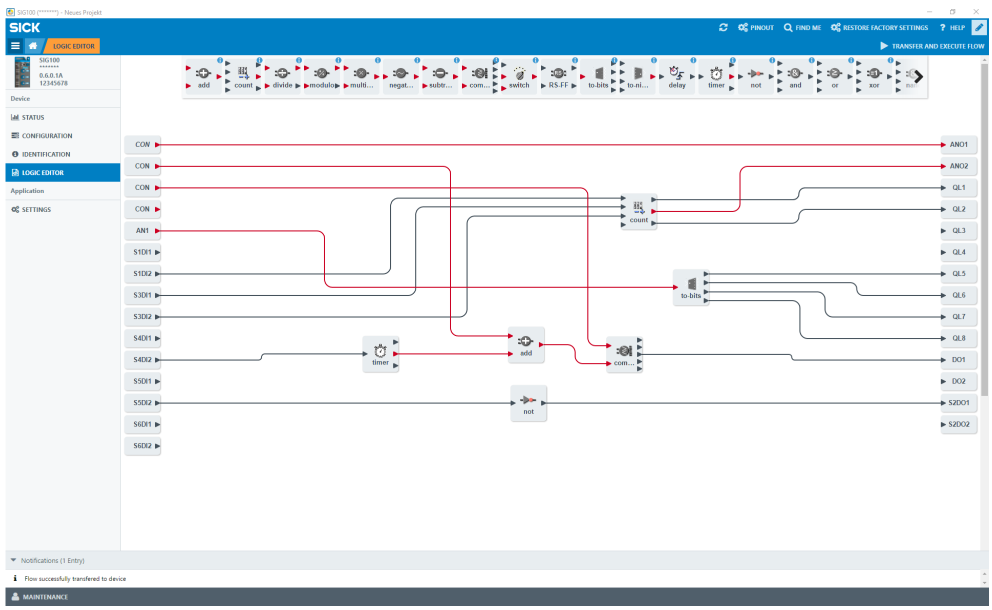
7.1.5 Identification page

The Identification page of SIG100 shows the device identification data.

It is possible to define an application and device specific name.

7.1.6 Logic Editor page

The Logic Editor page of SIG100 allows user-defined logic functions to be applied to the available input signals and transmit the results on various output signals, by dragging and dropping logic gates and connection lines.



The left side of the screen lists all configured inputs. The upper middle bar has the available logic gates that can be dragged down into the workspace. And listed on the right side are the configured outputs.

NOTE

Note that the screen is gray until the user clicks the “Edit” button, see "SOPAS ET overview and standard functions on each page", page 15.

To establish new logic functions you need to log in as **maintenance**, see "Editing Mode", page 28.

Creating a logic system

1 Select the required logic gates: click and drag them into the workspace.

NOTE

If a logic block incorrectly selected, or needs to be removed, click on it and drag it back up to the selection bar. A garbage bin will appear to remove the selected logic gate from the workspace.

2 Make connections from the inputs to the logic gates: click on the desired input, click again and hold on the arrow. A connection line will be created. Note that you can then drag the line to a desired input logic gate.
Getting close in proximity, the logic gate inputs will expand to accept the connection line. Once the connection is made, the bend location (if the connection is bent), the logic gate location, and the window size can be moved. The connection will automatically scale. An incorrect connection can be removed by clicking and holding on the connection line: the garbage bin will appear at the top-center of the interface.
Some logic blocks require minimum two input signals.
Please be aware that inputs always need to be occupied from top to down (e. g. in case of two inputs use A+B and not A+D).
The inputs have a red halo when making connections to indicate that the connection is still required in this space. The two inputs C and D will only be active in the logic truth table if a connection is made.

NOTE
Green input arrows and green text: a connection is possible

If connection is not possible, the text will have red color and it is not possible to drag a connection to the input.

NOTE
Some inputs and logic gates have a small gear indicating that some additional settings are possible. Clicking on the gear will open the additional settings dialogue box and allows for additional configuration (e. g. delay time).

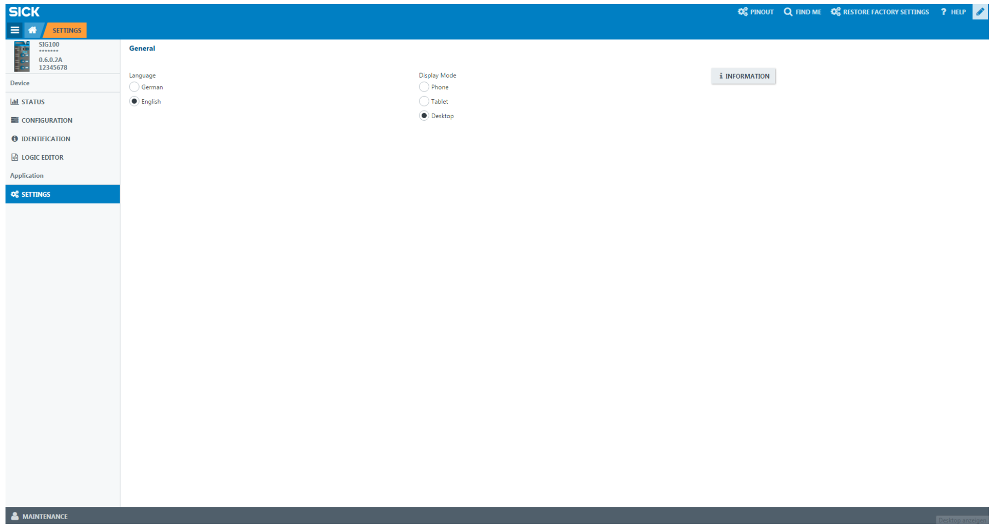
3 Close the setup by using the Transfer and Execute Flow button: the new logic configuration is transfered to the connected SIG100.

NOTE
An error will appear if there are any improper or missing connections. The notification area will indicate a successful transfer.

7.1.7 Settings

The following settings are possible:

Setting	Possible values
Language	english / german
Display mode	phone / tablet / desktop



The information button provides more details about the interface software release.

7.2 Operation via IO-Link

The SIG100 can exchange process data and parameters via IO-Link. To do so, the IO-Link Sensor Hub (SIG100) is connected to a suitable IO-Link Master.

The IO-Link interface of the SIG100 has the following properties:

Table 8: IO-Link properties

Characteristic	Values
Digital inputs	max. 12 x PNP type 1
Digital outputs	max. 12 x PNP
IO-Link specification	V 1.1
IO-Link port class	port class A
Minimum cycle time	5.1 ms
Transmission rate	COM2 (38.4 kBaud)
Process data width	8 Byte Process Data In (from SIG100 to IO-Link Master) 2 Byte Process Data Out (from IO-Link Master to SIG100)
Parameter server (Data Storage)	Yes
Initialization time after switch-on	< 8 s
Min. time for a logic from one sensor port (e.g. S1DI1) to another sensor port (e.g. S2DO2)	1 ms (max. switching frequency: 200 Hz)
Min. time for 10 connected logic blocks (e.g. NOT gates)	2 ms
Min. time for 20 logic blocks (e.g. NOT gates)	3 ms

NOTE
The total cycle time for SIG100 depends on the amount and type of used logic blocks and is always application specific.

NOTE
Please be aware that Integer functions are significant slower than Boolean functions.

NOTE
There is no event indicating a jitter or overload condition. You can test your configured logic by running the application and checking if the „CPU load bar" on the Status page in SOPAS is maxed out.

7.2.1 Process data

The Sensor Integration Gateway SIG100 uses both Process Data In (data from IO-Link Sensor Hub to IO-Link Master) and Process Data Out (data from IO-Link Master to IO-Link Sensor Hub).

Process Data In contains the following data:

- Unprocessed signals on the DI/DO ports
  - DI/DO port pin configured as "Digital Input": Current logic level
  - DI/DO port pin configured as "Digital Output": Monitoring of output level
- Processed digital output signals of the Logic Editor
- Processed integer output values of the Logic Editor

NOTE
The unprocessed signals are always available on Process Data In regardless of programmed Logic Editor application.

NOTE
Logic Editor values (e.g. Counter value) will be lost after a power cycle.

7.2.1.1 Process data structure

Table 9: PD IN SIG100 -> IO-Link Master

Byte	Bit	Value	Signal input / output	Data type
0 ... 1	Bit 63 ... 48	AV2	Analog value 2	UInteger 16
2 ... 3	Bit 47 ... 32	AV1	Analog value 1	UInteger 16
4	Bit 31	Reserved		
	Bit 30	Reserved		
	Bit 29	Reserved		
	Bit 28	Reserved		
	Bit 27	Reserved		
	Bit 26	Reserved		
	Bit 25	Reserved		
	Bit 24	Reserved		
5	Bit 23	Reserved		
	Bit 22	Reserved		
	Bit 21	Reserved		
	Bit 20	Reserved		
	Bit 19	Qint 12	Port 6 pin 2 (input or output)	Boolean
	Bit 18	Qint 11	Port 6 pin 4 (input or output)	Boolean
	Bit 17	Qint 10	Port 5 pin 2 (input or output)	Boolean
	Bit 16	Qint 9	Port 5 pin 4 (input or output)	Boolean

Byte	Bit	Value	Signal input / output	Data type
6	Bit 15	Qint 8	Port 4 pin 2 (input or output)	Boolean
	Bit 14	Qint 7	Port 4 pin 4 (input or output)	Boolean
	Bit 13	Qint 6	Port 3 pin 2 (input or output)	Boolean
	Bit 12	Qint 5	Port 3 pin 4 (input or output)	Boolean
	Bit 11	Qint 4	Port 2 pin 2 (input or output)	Boolean
	Bit 10	Qint 3	Port 2 pin 4 (input or output)	Boolean
	Bit 9	Qint 2	Port 1 pin 2 (input or output)	Boolean
	Bit 8	Qint 1	Port 1 pin 4 (input or output)	Boolean
7	Bit 7	QL8	Logic Editor output signal	Boolean
	Bit 6	QL7	Logic Editor output signal	Boolean
	Bit 5	QL6	Logic Editor output signal	Boolean
	Bit 4	QL5	Logic Editor output signal	Boolean
	Bit 3	QL4	Logic Editor output signal	Boolean
	Bit 2	QL3	Logic Editor output signal	Boolean
	Bit 1	QL2	Logic Editor output signal	Boolean
	Bit 0	QL1	Logic Editor output signal	Boolean

The following two data formats are available for Process Data out and are selected via the user interface (see "Process data Select", page 66).

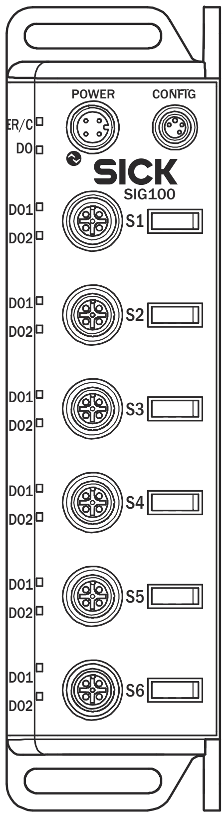
Table 10: PD OUT IO-Link Master -> SIG100 / Mode 1

	Bit	Value	Signal input / output	Data type
0	Bit 15	IL16	Logic Editor input	Boolean
	Bit 14	IL15	Logic Editor input	Boolean
	Bit 13	IL14	Logic Editor input	Boolean
	Bit 12	IL13	Logic Editor input	Boolean
	Bit 11	IL12	Logic Editor input	Boolean
	Bit 10	IL11	Logic Editor input	Boolean
	Bit 9	IL10	Logic Editor input	Boolean
	Bit 8	IL9	Logic Editor input	Boolean
1	Bit 7	IL8	Logic Editor input	Boolean
	Bit 6	IL7	Logic Editor input	Boolean
	Bit 5	IL6	Logic Editor input	Boolean
	Bit 4	IL5	Logic Editor input	Boolean
	Bit 3	IL4	Logic Editor input	Boolean
	Bit 2	IL3	Logic Editor input	Boolean
	Bit 1	IL2	Logic Editor input	Boolean
	Bit 0	IL1	Logic Editor input	Boolean

Table 11: PD OUT IO-Link Master -> SIG100 / Mode 2

Byte	Bit	Value	Signal input / output	Data type
0 ... 1	Bit 0 ... 15	AV1	Analog value 1	Uinteger 16

7.2.1.2 Bit-Mapping of the ports (S1-S6)



Bit 0	...
. . .	
Bit 8 = S1	pin 4
Bit 9 = S1	pin 2
Bit 10 = S2	pin 4
Bit 11 = S2	pin 2
Bit 12 = S3	pin 4
Bit 13 = S3	pin 2
Bit 14 = S4	pin 4
Bit 15 = S4	pin 2
Bit 16 = S5	pin 4
Bit 17 = S5	pin 2
Bit 18 = S6	pin 4
Bit 19 = S6	pin 2
. . .	
Bit 63	...

7.2.2 Device data

In addition to the process data, device data (parameters, identification data, and diagnostic information) can be transmitted to and from the Sensor Integration Gateway SIG100. To use this function, a specific device description file (IODD) can be used together with an IO-Link Master.

A download package including the IODD file and supplementary documentation for SIG100 is available at www.sick.com.

NOTE
Not all functions available through SOPAS ET are also available through IO-Link. This mainly concerns the use of the Logic Editor.

7.3 Device functions

All available configuration functions are explained in the annex, see "Technical Information", page 56. For each function the available interface is listed (i.e. SOPAS ET and/or IO-Link).

7.4 Logic Editor

The Logic Editor of SIG100 is a key function allowing you to realize arbitrary applications with connected sensors or actuators.

NOTE
The Logic Editor configuration is not accessible via IO-Link. However, IO-Link process data (Process Data In or Process Data Out) can be used as output or input value for the Logic Editor.

7.4.1 Editing Mode

Depending on whether the SIG100 is used via USB or the IO-Link interface in SOPAS ET, it will be necessary to log in with a higher user level to make changes.

When using the USB interface, change the editing mode.

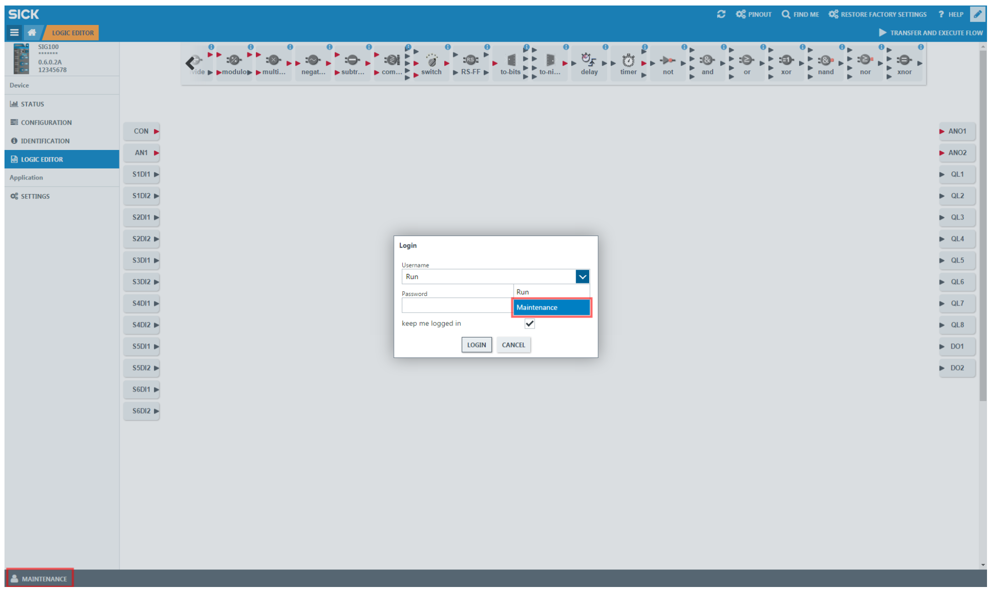
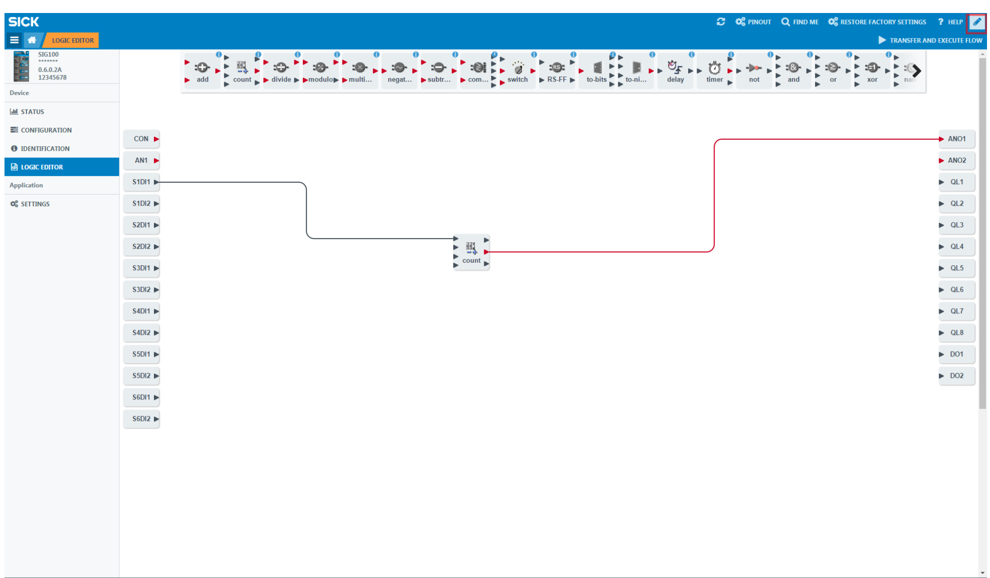
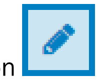


Figure 11: Editing Mode

1. To start your configuration change the operating mode from **Run** to **Maintenance** because the **Run** mode is an read only mode.
2. Click on **Run** on the bottom left side and select **Maintenance** in the drop-down menu.
3. The login password for the maintenance mode is: **main**
4. Click on **Login** to select the Maintenance Mode.



5. To start with a new configuration, click on  **EDIT** in the upper right corner.

7.4.2 Overview

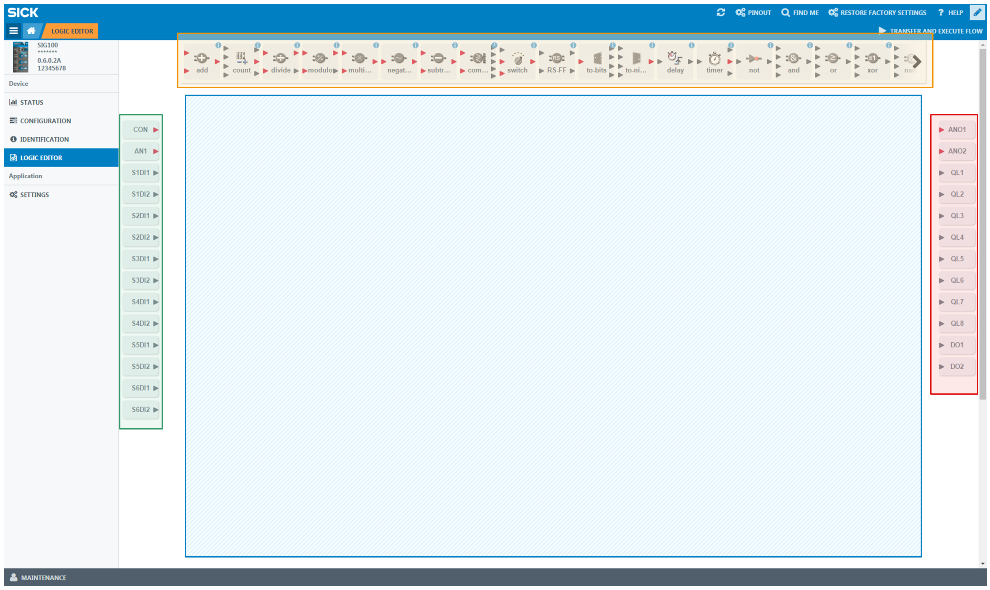


Figure 12: Logic editor screen

- orange: logic blocks
- green: inputs
- red: outputs
- blue: workspace

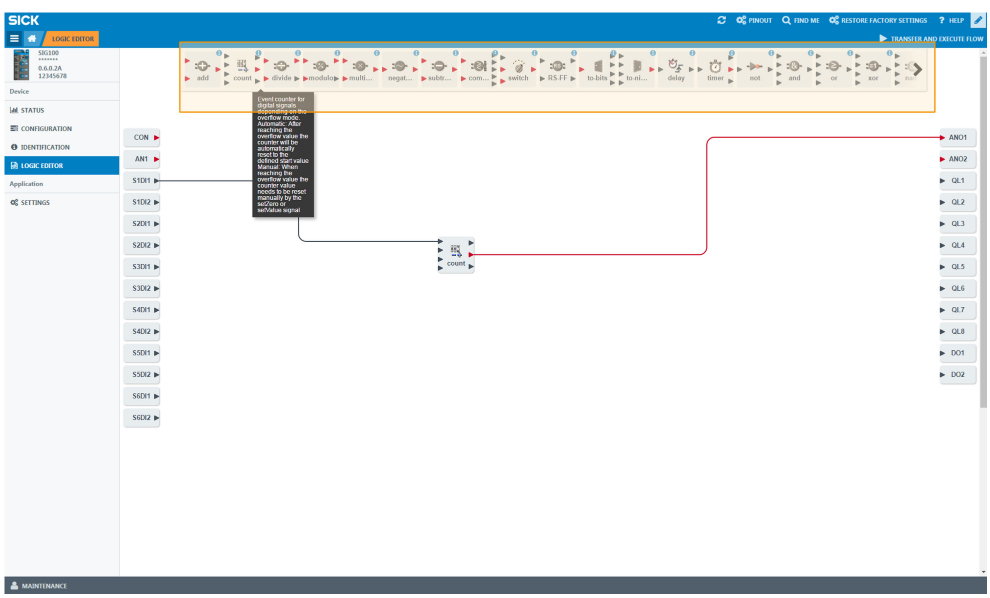


Figure 13: Detailed information

Move your mouse over individual logic blocks to get more detailed information about their function.

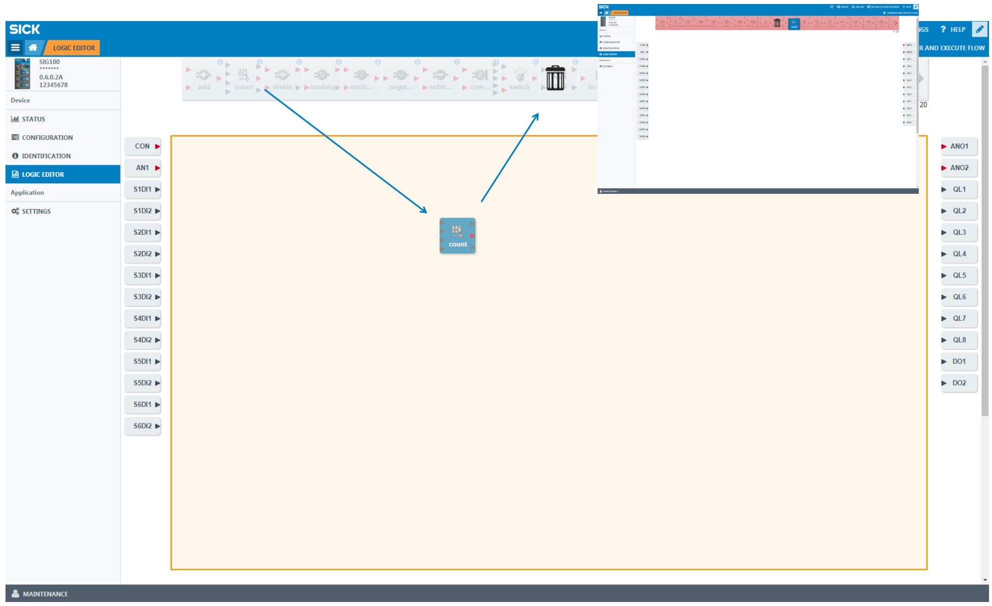


Figure 14: Logic blocks

- Use drag & drop to select the desired logic block and put it into the workspace.
- To delete logic blocks put them back in the upper area via drag & drop.
- The maximum amount of logic blocks which can be used in the logic editor in parallel is 20 blocks.

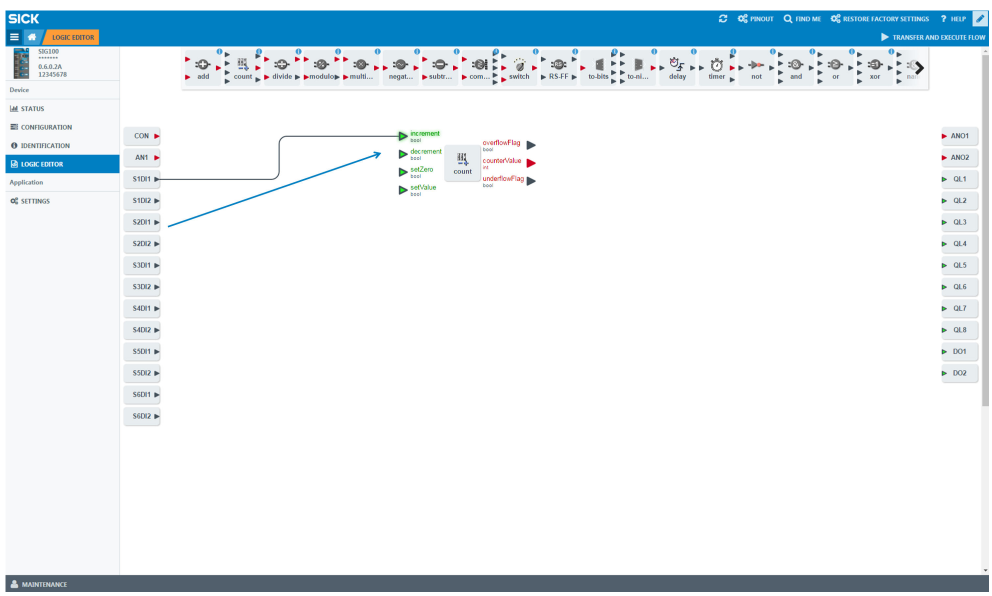


Figure 15: Connections

- Connect your logic blocks with drag & drop with the inputs and outputs. Click first on the triangle on the input, hold the line and connect it to a triangle of the logic block.
- Please note to use always the upper inputs first, starting at A, then B, then C. In case you use only two inputs please use always the top two inputs A+B and not e. g. B+D.
- Please note whether the values are Integer or Boolean it is only possible to connect Integer with Integer and Boolean with Boolean. Boolean values have a black triangle. Integer values can be easily identified with a red triangle.

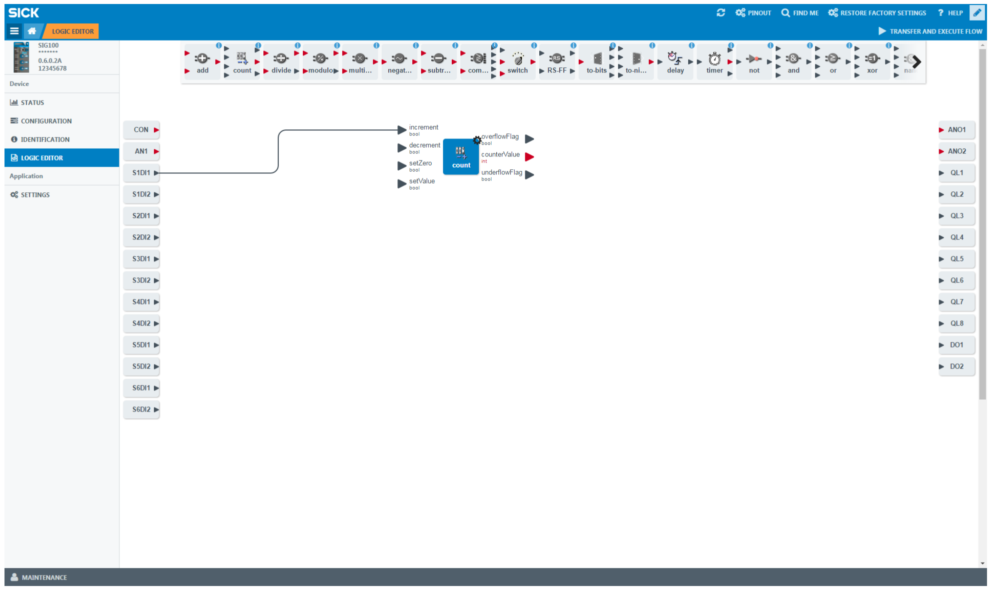


Figure 16: Possible connections

By clicking on logic block you get information about the possible connections to this individual block.

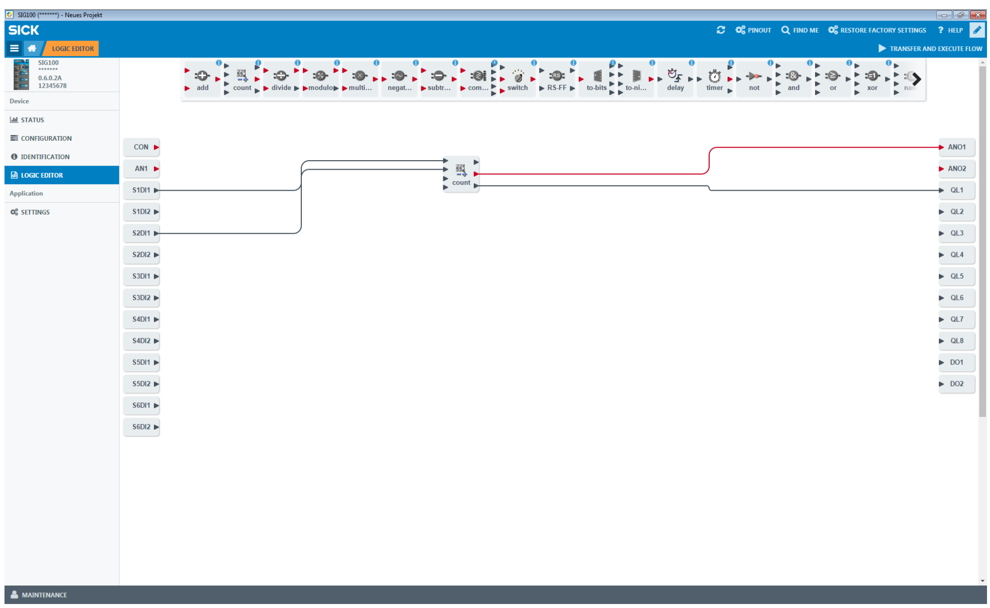
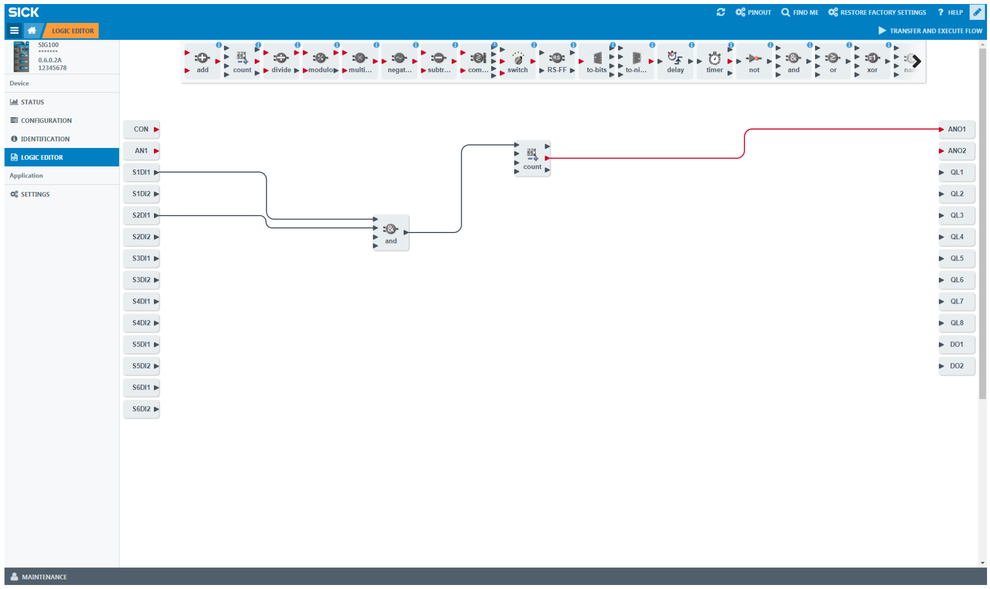
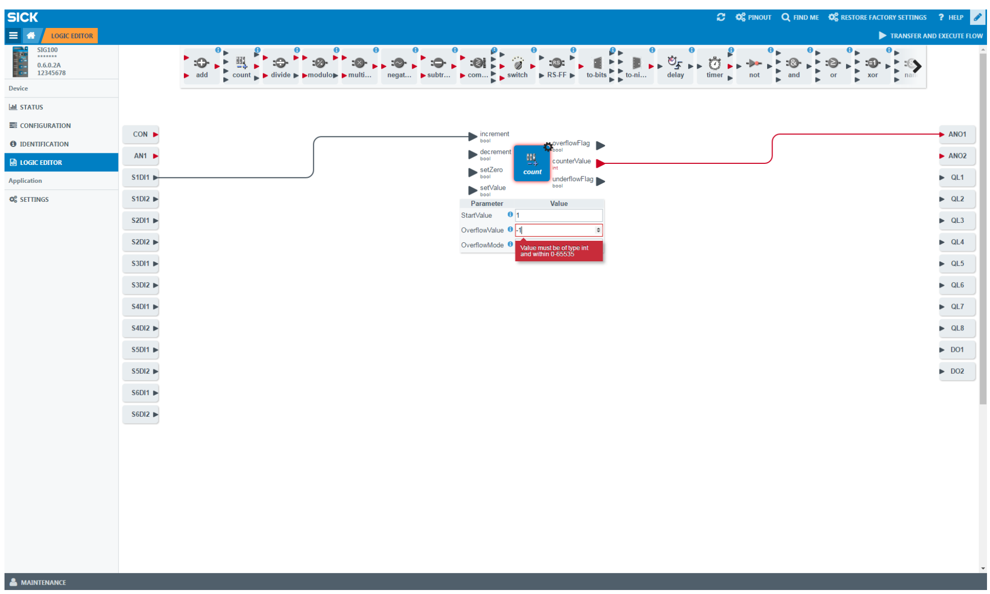


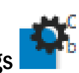
Figure 17: Several inputs and outputs

It is possible to connect several inputs and outputs with logic blocks.



- A combination of logic blocks is possible as well.
- Pay attention to inputs and outputs (Integer/Boolean).



- Click on **Settings**  (=gear) to configure parameters and values of the logic block or input/output variable.
- Please note that only integer values are allowed (0-65535).

NOTE
Not all logic blocks are adjustable.

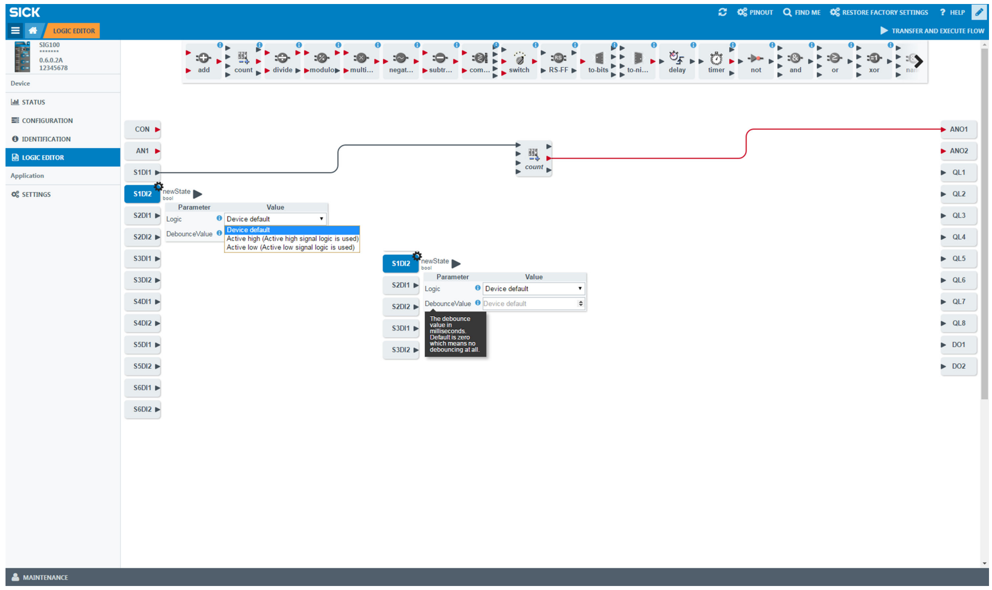


Figure 18: Configuration of digital inputs

- A configuration of your digital inputs is also possible.
- For configuration click on the selected port first and on the gear second to set **Logic** and **DebounceValue.**
- Use your mouse to get more information about **Logic** or **DebounceValue.**

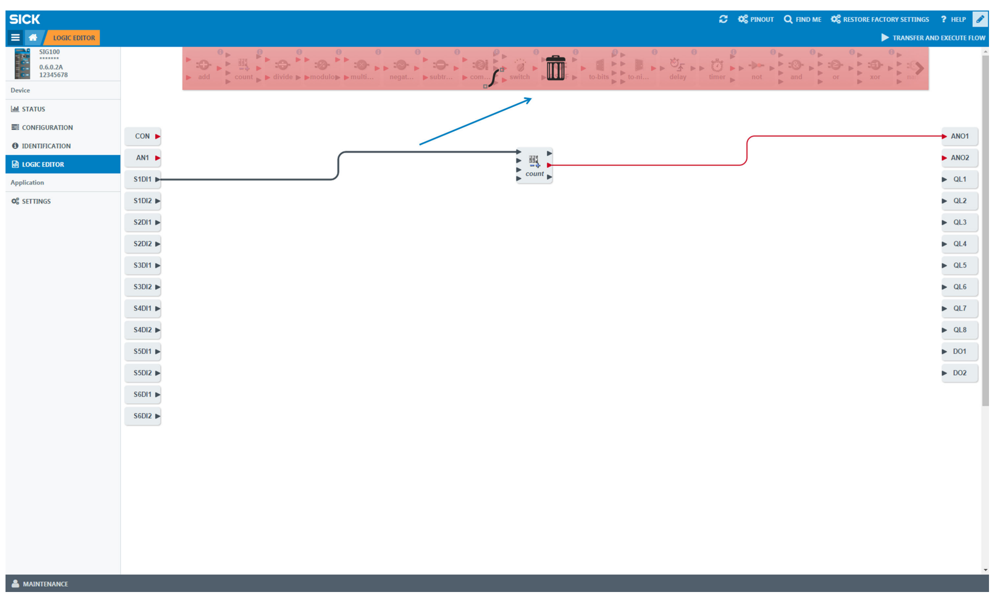


Figure 19: Delete connections

To remove a connection click on your desired connection and put it in into the garbage bin on the upper area via drag & drop.

7.4.3 Download new Logic to the Device

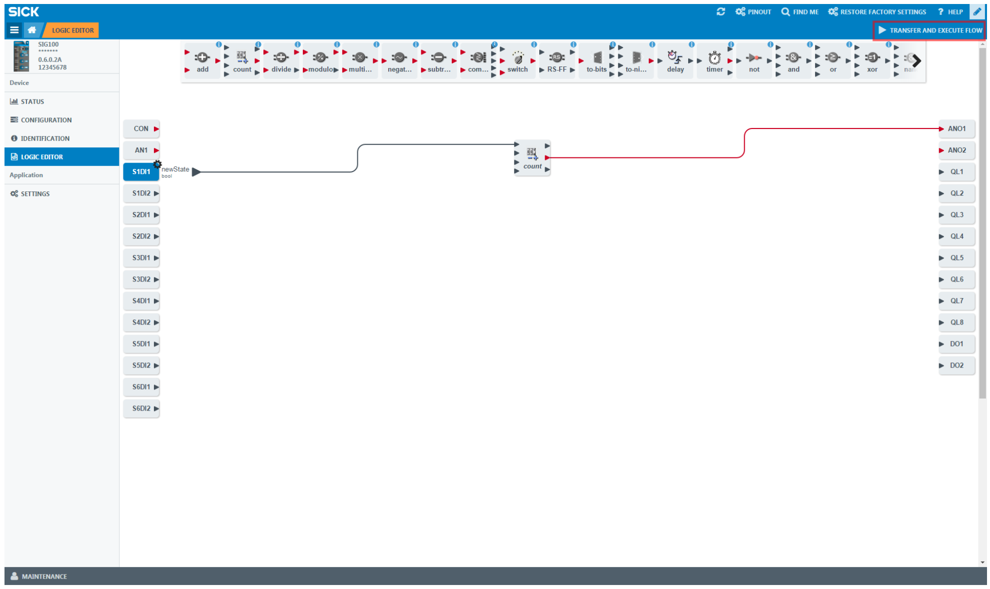


Figure 20: Transfer and apply the functional scheme.

Press **TRANSFER AND EXECUTE FLOW** to synchronize your workflow with your device. All changes you made without pressing this button will be lost and are not downloaded to your SIG100 device.

NOTE
Logics cannot be copied from one SIG100 to another SIG100 independently of the configuration. To replicate logic flows, the complete project must always be copied from one SIG100 to another device. (see section 7.5)

7.4.4 Explanation of Inputs, Outputs and Logic Blocks

Digital Inputs

Figure 21: Digital inputs

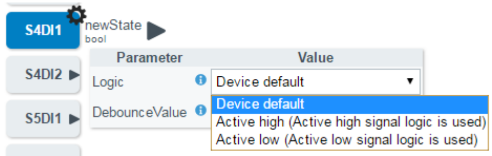
The Logic Editor shall offer each connected DI signal (pin 2 or pin 4 of each DIO port) as a Boolean signal input.

The Logic Editor shall foresee the following configuration parameters for Digital inputs block:

Logic inverted/not inverted

Debounce filter (with number of consecutive stable samplings configurable from 1... 100)

The Logic Editor shall label each DI signal according to the following scheme: SxDI1 (for port x=1...6 pin 4 as input), SxDI2 (for port x=1...6 pin 2 as input).



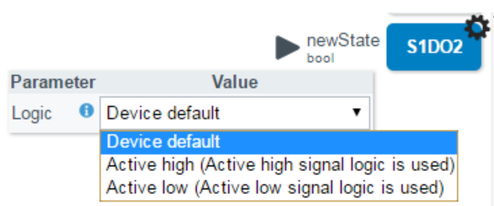
The individual digital inputs on port S1-S6 can be configured either as active high or active low when clicking on the gear symbol next to the digital output block. Furthermore, a debounce value (in ms) can be configured.
Min: 1 ms
Max: no limit

Digital Outputs

Figure 22: Digital outputs

The Logic Editor enables to use each connected DO signal as a Boolean signal output. This includes the signal on pin 2 and pin 4 of each DI/DO port (S1-S6).

NOTE
The power port is named in the logic editor with DO1 (pin 4) and DO2 (pin 2).



The individual digital outputs on port S1-S6 can be configured either as active high or active low when clicking on the gear symbol next to the digital output block.

NOTE
If IO-Link pin 4 changes from SIO mode to IO-Link mode the signal output shall be deactivated (and vice versa).

The Logic Editor shall label each DO signal according to the following scheme: SxDO1 (for port x=1...6 pin 4 as output), SxDO2 (for port x=1...6 pin 2 as output), DO1 (for power port pin 4 in SIO mode), DO2 (for power port pin 2).

Analog Inputs

The user can select between two process data Out mode.

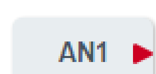
Either:

1

Digital – For the use of 16 logic editor inputs (Boolean, IL1- IL16)

2

or Analog – for the use of one Analog value (1 Byte, Integer, AN1)



Constant

It is possible to calculate within the logic editor with a constant value. This value can be set to every number 0-65535. It is possible to use multiple constant values. A second constant value will automatically appear on the input side as soon as the first constant value is used in the logic.

Analog Outputs

There are 2 Byte for analogue values reserved within the 8 Byte process data IN. This analog value can be used to e.g. easily transmit a counter value to the PLC.

Power

DO1 belongs to the Power Port pin 4. DO2 belongs to the Power Port pin 2. Both outputs can be used in the logic editor.

Logic Editor Outputs

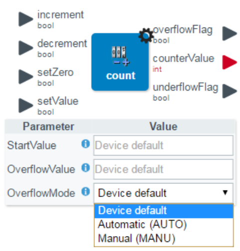
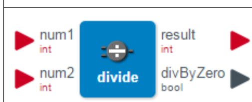
Within the process data IN there are 8 Bits reserved for logic editor outputs (QL1-QL8). The DO LED beside the power port is mapped to QL1 and visualizes this output.

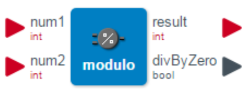
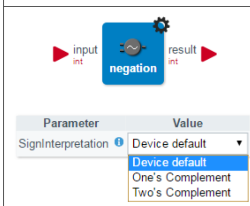
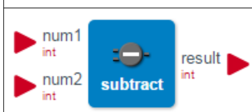
NOTE
QL1-QL8 are Boolean outputs.

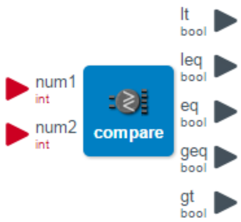
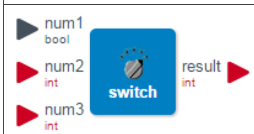
Logics

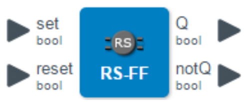
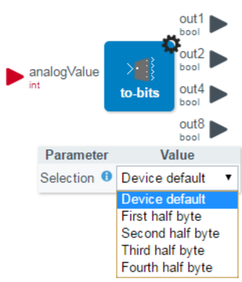
Table 12: Logic blocks

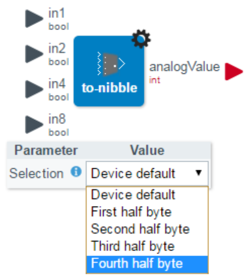
	Description	**Addition of the two input values.**
	Number of inputs	2
	Input data type	Integer
	Input description	num1: first input value num2: second input value
	Number of outputs	1
	Output data type	Output 1 (“+“): Identical to input data type
	Output description	result: result after addition of the two input values
	Settings	no settings available

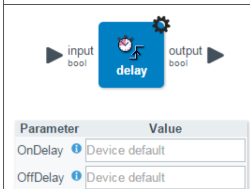
	Description	**Event counter for digital signals.** **Maximum switching frequency (e. g. for a NOT gate): 200 Hz** **Maximum switching frequency for the Counter: 90 Hz**
	Number of inputs	4
	Input data type	Input 1 ("Up"): 1-bit Input 2 ("Down"): 1-bit Input 3 ("Reset to 0"): 1-bit Input 4 ("Set to start value"): 1-bit
	Input description	**increment**: value will be counted up **decrement**: value will be counted down **setZero**: set counter to zero **setValue**: set counter to StartValue
	Number of outputs	3
	Output data type	Output 1 ("Overflow"): 1-bit Output 2 ("Counter value"): 16-bit Output 3 ("Underflow"): 1-bit
	Output description	**overflowFlag:** bit is set if the count exceeds the overflow value **counterValue:** current counter value. Counter values are NOT saved through a power cycle. **underflowFlag:** flag is set when the value is below the over-flow value. The default OverflowValue is 65535
	Settings	**StartValue:** Counter value which will be set when the setValue is triggered (Default 0) **OverflowValue:** Maximum value of counter output (Default 65535) **OverflowMode:** Behavior of the counter value in case of an unteror overflow **AUTO:** After reaching the overflowvalue, the counter will be automatically reset to the defined start value **MANU:** When reaching the overflowvalue, the counter value can only be reset manually by the setZero or setValue signal Additional information: If the max counter value (overflow value) is reached then the overflow output is set high. But there is a difference between the automatic and manual mode. The automatic mode the value will be set to 0 on next rising edge of the increment input and of course the counter value can be changed by the setZero or setValue input. In the manual mode, the countervalue will stay on the over-flowvalue until a rigsing edge on the decrement, setZero or setValue input is detected. The Default value for the counter start is 0 but can be set to any value within the range (16 bit).
	Description	**Division between the two input values.**
	Number of inputs	2
	Input data type	Integer
	Input description	**num1**: first input value **num2**: second input value
	Number of outputs	2
	Output data type	Output 1 ("/"): Identical to input data type Output 2 ("/0"): 1-bit
	Output description	**result**: Result after dividing the two input values **divByZero**: When dividing by 0 (not possible) this output is set
	Settings	No settings available

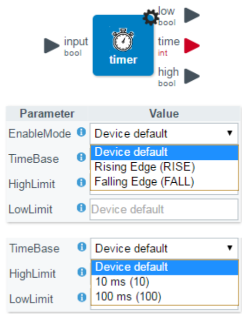
	Description	**Modulo operation between the two input values.**
	Number of inputs	2
	Input data type	Integer
	Input description	**num1:** first input value **num2:** second input value
	Number of outputs	2
	Output data type	Output 1 ("/"): Identical to input data type Output 2 ("/0"): 1-bit
	Output description	**result:** Result with rest after dividing the two input values **divByZero:** When dividing by 0 (not possible) this output is set
	Settings	No settings available
	Description	**Multiplication between the two input values.**
	Number of inputs	2
	Input data type	Integer
	Input description	**num1:** first input value **num2:** second input value
	Number of outputs	1
	Output data type	Output 1 ("x"): Identical to input data type
	Output description	**result:** Result after multiplying the two input values
	Settings	No settings available
	Description	**Negation of the input value either one´s or two´s complement depending on the configuration.**
	Number of inputs	1
	Input data type	Signed Integer
	Input description	**input:** analog input value
	Number of outputs	1
	Output data type	Output 1 ("-"): Identical to input data type
	Output description	**result:** The one's or two's complement of the input value. (So the analog output value is the opposite of the input value).
	Settings	Selection of the one's or two's complement (Default Two's Complement)
	Description	**Subtraction of the two input values.**
	Number of inputs	2
	Input data type	Integer
	Input description	**num1:** first input value **num2:** second input value
	Number of outputs	1
	Output data type	Output 1 ("-"): Identical to input data type
	Output description	**result:** Result after subtraction of the two input values
	Settings	No settings available

	Description	**Compares the two analog input values: It is set when input 1 less than input 2. leq is set when input 1 less than or equal input 2. Eq us set when input 1 equal input 2. Geq is set when input 1 greater than or equal input 2. Gt is set when input 1 greater than input 2.**
	Number of inputs	2
	Input data type	Integer
	Input description	**num1:** first input value **num2:** second input value
	Number of outputs	1 ... 5
	Output data type	Output 1 ("<"): 1-bit Output 2 ("≤"): 1-bit Output 3 (":"): 1-bit Output 4 ("≥"): 1-bit Output 5 (">"): 1-bit
	Output description	**lt:** < input is less than input 2 **leq:** ≤ input 1 is less or equal to input 2 **eq:** = input 1 is equal to input 2 **geq:** ≥ input 1 is greater or equal to input 2 **gt:** > input 1 is greater than input 2
	Settings	No settings available
	Description	**Selection between two analog input values depending on the boolean input.**
	Number of inputs	3
	Input data type	Integer & Boolean Input 1 ("If"): 1-bit Input 2 ("Then"): Any Input 3 ("Else"): Any
	Input description	**num1:** Boolean input **num2:** Analog input 1 **num3:** Analog input 2
	Number of outputs	1
	Output data type	Integer
	Output description	**result:** If num1 is 1, then num2 is forwarded to the result. If num1 is 0, then num3 is forwarded to the result (false means 0).
	Settings	No settings available

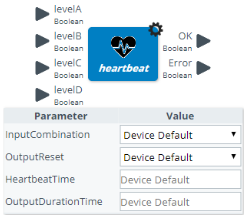
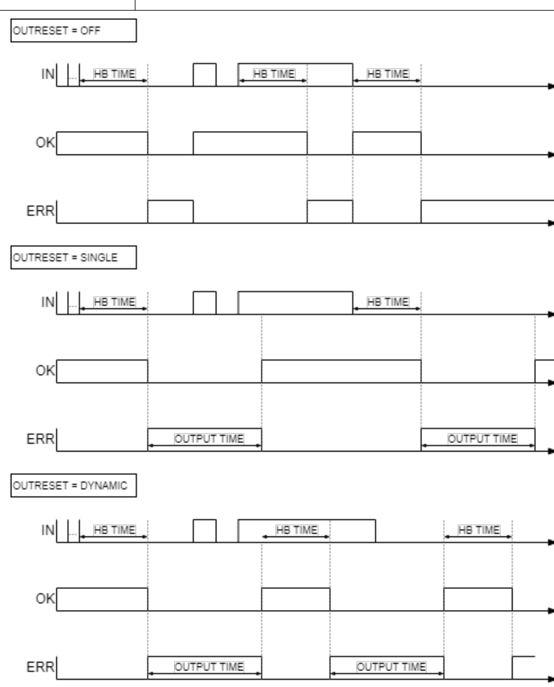
	Description	**Basic RS-Flip Flop functionality.** if (set == false and reset == false) then Q = Keeps it's last value elseif (set == false and reset == true) then Q = false elseif (set == true and reset == false) then Q = true elseif (set == true and reset == true) then Q = false end
	Number of inputs	2
	Input data type	Input 1 ("Set"): 1-bit Input 2 ("Reset"): 1-bit
	Input description	**set:** See above truth table description **reset:** See above truth table description
	Number of outputs	2
	Output data type	Output 1 ("Q"): 1-bit Output 2 ("/Q"): 1-bit
	Output description	**Q:** See above in description **notQ:** Always equals Q inverted
	Settings	No settings available
	Description	**Conversion of an analog input to four digital outputs.**
	Number of inputs	1
	Input data type	Integer
	Input description	analogValue: analog input value
	Number of outputs	4
	Output data type	Output 1 ... 16: 1-bit
	Output description	**out1**: first digital output **out2**: second digital output **out4**: third digital output **out8**: fourth digital output
	Settings	To select which half byte should be connected to the output (Default First half byte) If First half byte selected send lowest 4 bits (bits marked with x) ----|----|----|xxxx If Second half byte selected send bits marked with x ----|----|xxxx|---- If Third half byte selected send bits marked with x ----|xxxx|----|---- If Fourth half byte selected send bits marked with x xxxx|----|----|----

	Description	**Conversion of four digital inputs to an analog half byte value.**
	Number of inputs	4
	Input data type	Input 1 ... 16: 1-bit
	Input description	**in1**: first digital input **in2**: second digital input **in4**: third digital input **in8**: fourth digital input
	Number of outputs	1
	Output data type	Output 1: Integer or UInteger, 8 or 16 bits
	Output description	analogValue: analog half byte output value
	Settings	To select which half byte should be connected to the output (Default First half byte) If First half byte selected send lowest 4 bits (bits marked with x) ----|----|----|xxxx If Second half byte selected send bits marked with x ----|----|xxxx|---- If third half byte selected send bits marked with x ----|xxxx|----|---- If Fourth half byte selected send bits marked with x xxxx|----|----|----

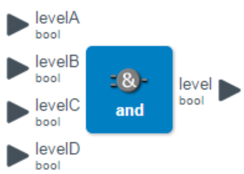
	Description	**The input signal is delayed by the configured time.**
	Number of inputs	1
	Input data type	1-bit
	Input description	**input:** input value
	Number of outputs	1
	Output data type	1-bit
	Output description	output: when the input becomes true, the output becomes true after a preset time delay. The output remains true as long as the input is true. When the input is false or becomes false, the output becomes false with no delay.
	Settings	**OnDelay:** Set delay for a rising edge transmitted to the output (Default 1 ms) **OffDelay:** Set delay for a falling edge transmitted to the output (Default 1 ms) The may. delay value for one delay is: 65535 ms The falling edge is configured with the OffDelay setting.



Description	**Measures the pulse time of the digital input signal triggered by the rising or falling edge depending on the configuration. Information: There is no reset. Once it reaches the High Limit it stops.**
Number of inputs	1
Input data type	Input 1 ("Enable"): 1-bit
Input description	**input:** input signal
Number of outputs	3
Output data type	Output 1 ("High"): 1-bit Output 2 ("Time"): UInteger 16 Output 3 ("Low"): 1-bit
Output description	**low:** This output is active when the time output is lower than LowLimit (Information: The 1 ms option is not available). **time:** This value increments once per TimeBase whenever input is active. **high:** This output is active when the time output is higher than the HighLimit.
Settings	**EnableMode:** Enable mode to define which time to be measured. Either between rising and falling edge of the input signal or between falling and rising edge (Default Rising Edge) **TimeBass:** Select the time base for the time measurement (Default 100 ms) **HighLimit:** Defines a high value for the boolean output signal which is set when the timer value exceeds the defined high limit (Default 0) **LowLimit:** Defines a low value for the boolean output signal which is set when the timer value is lower than the defined low limit (Default 0)

	Description	**Monitors the state of the inputs and detects if they are not changing as expected within the heartbeat time.**
	Number of inputs	2
	Input data type	Input 1 ... 2: 1-bit
	Input description	**levelA:** first input to be monitored **levelB:** second input to be monitored **levelC:** third input to be monitored **levelD:** fourth input to be monitored
	Number of outputs	2
	Output data type	Output 1 ... 2: 1-bit
	Output description	**ok:** As long as the input signals are changing, this output will be high. **error:** This output will be high in case the input signals are not changing within the defined heartbeat time.
	Settings	**InputCombination:** (Any / All) When Any is selected, the ok output will stay high as long as at least one input signal switches in the heartbeat time. If "Input combination" = All, the ok output will only stay high as long as all input signals switch within the heartbeat time. **OutputReset:** (Off / Single / Dynamic) If "Output reset" = Off, an Err = high (and OK = low) output will stay this way until one of the inputs switches again. If "Output reset" = Single, Err = high (and OK = low) will revert automatically after the "Output duration" has elapsed and keep this state until a change in the inputs retrigger the heartbeat timer. If "Output reset" = Dynamic, Err = high (and OK = low) will revert automatically after the "Output duration" has elapsed. In this case Err and OK will not revert due to any input switching. However, any input switching during this period will retrigger the heartbeat time. **HeartbeatTime:** 0...65535 ms Setting of the heartbeat time within the input(s) must change. **OutputDurationTime:** 0...65535 ms Setting of the time the output signal stays high after a "no input change" condition has been detected.
		

Description	**Invert the input signal with a logical NOT.**
Number of inputs	1
Input data type	1-bit (future extension: or n-bit)
Input description	levelA: first input value
Number of outputs	1
Output data type	Identical to input data type
Output description	**level:** the input signal will be inverted with a logical not. Example: a high signal gets converted into a low signal.
Settings	No settings available

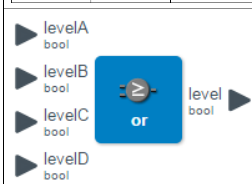


AND

Table 13: Thruth table

Input A	Input B	Output
1	1	1
1	0	0
0	1	0
0	0	0

Description	**Combine the input signals with a logical AND.**
Number of inputs	4
Input data type	1-bit (future extension: n-bit)
Input description	**levelA:** first input **levelB:** second input **levelC:** third input **levelD:** fourth input Maximum 4 inputs can be linked together. If you want to link more signals, you can work with several AND blocks.
Number of outputs	1
Output data type	Identical to input data type
Output description	**level:** the output depends on the various inputs. For more information see truth table
Settings	No settings available



OR

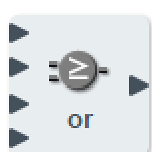
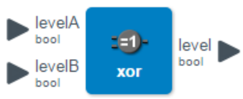


Table 14: Thruth table

Input A	Input B	Output
1	1	1
1	0	1
0	1	1
0	0	0

Description	**Combine the input signals with a logical OR.**
Number of inputs	4
Input data type	1-bit (future extension: n-bit)
Input description	**levelA:** first input **levelB:** second input **levelC:** third input **levelD:** fourth input Maximum 4 inputs can be linked together. If you want to link more signals, you can work with several OR blocks.
Number of outputs	1
Output data type	Identical to input data type
Output description	**level:** the output depends on the various inputs. For more information see truth table
Settings	No settings available



XOR

Description	**Combine the input signals with a logical XOR.**
Number of inputs	2
Input data type	1-bit (future extension: or n-bit)
Input description	**levelA:** first input **levelB:** second input Maximum 2 inputs can be linked together. If you want to link more signals, you can work with several XOR blocks.
Number of outputs	1
Output data type	Identical to input data type
Output description	**level:** the output depends on the various inputs. For more information see truth table
Settings	No settings available

Table 15: Thruth table

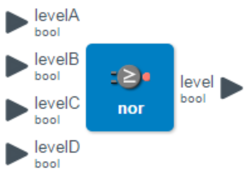
Input A	Input B	Out-put
1	1	0
1	0	1
0	1	1
0	0	0

NAND

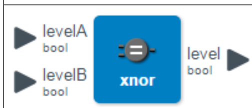
Description	**Combine the input signals with a logical NAND.**
Number of inputs	4
Input data type	1-bit (future extension: or n-bit)
Input description	**levelA:** first input **levelB:** second input **levelC:** third input **levelD:** fourth input Maximum 4 inputs can be linked together. If you want to link more signals, you can work with several NAND blocks.
Number of outputs	1
Output data type	Identical to input data type
Output description	**level:** the output depends on the various inputs. For more information see truth table
Settings	No settings available

Table 16: Thruth table

Input A	Input B	Out-put
1	1	0
1	0	1
0	1	1
0	0	1

<table>
<tr><td rowspan="8">

NOR


Table 17: Thruth table
<table>
<tr><th>Input A</th><th>Input B</th><th>Out-put</th></tr>
<tr><td>1</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>1</td></tr>
</table></td><td>Description</td><td>Combine the input signals with a logical NOR.</td></tr>
<tr><td>Number of inputs</td><td>4</td></tr>
<tr><td>Input data type</td><td>1-bit (future extension: or n-bit)</td></tr>
<tr><td>Input description</td><td>levelA: first input
levelB: second input
levelC: third input
levelD: fourth input
Maximum 4 inputs can be linked together. If you want to link more signals, you can work with several NOR blocks.</td></tr>
<tr><td>Number of outputs</td><td>1</td></tr>
<tr><td>Output data type</td><td>Identical to input data type</td></tr>
<tr><td>Output description</td><td>level: the output depends on the various inputs. For more information see truth table</td></tr>
<tr><td>Settings</td><td>No settings available</td></tr>
<tr><td rowspan="8">

XNOR


Table 18: Thruth table
<table>
<tr><th>Input A</th><th>Input B</th><th>Out-put</th></tr>
<tr><td>1</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>1</td></tr>
</table></td><td>Description</td><td>Combine the input signals with a logical XNOR.</td></tr>
<tr><td>Number of inputs</td><td>2</td></tr>
<tr><td>Input data type</td><td>1-bit (future extension: or n-bit)</td></tr>
<tr><td>Input description</td><td>levelA: first input
levelB: second input
levelC: third input
levelD: fourth input
Maximum 4 inputs can be linked together. If you want to link more signals, you can work with several XNOR blocks.</td></tr>
<tr><td>Number of outputs</td><td>1</td></tr>
<tr><td>Output data type</td><td>Identical to input data type</td></tr>
<tr><td>Output description</td><td>level: the output depends on the various inputs. For more information see truth table</td></tr>
<tr><td>Settings</td><td>No settings available</td></tr>
</table>

NOTE
Please be aware that the Integer values have a value range from 0....65.535. There is no overflow or underflow indication.

NOTE
The logic editor does only support integers (e. g. 2) and no decimal numbers (e. g. 2,345). In case, the calculated result would be a decimal number, the logic editor will round up or down.

7.4.5 Restriction when a data store is activated (data repository)

The logic functions in the logic editor are always part of the data store. This means that if a data repository is activated, the logic used is also transferred to the replacement device when the device is replaced. The more complex the logic functions, the greater the amount of memory required for the logic. It is therefore possible that the logic used will exceed the data repository size limit of 2 kB.

As soon as the logic reaches the size limit, a warning appears in SOPAS during transfer and the logic is excluded from the data store. The logic will therefore not be transferred if the device is replaced.

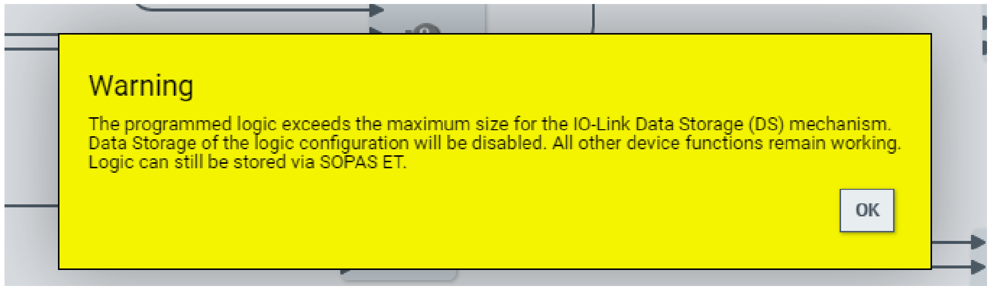


Figure 23: Warning

If the complexity of the logic functions is subsequently reduced so that the size limit is no longer exceeded, it is automatically reintegrated into the scope of the data repository and transferred when the device is replaced.

7.5 Duplicating the device configuration to new devices

When using the SIG100, it is possible that several devices will be operated with the same configuration and with the identical logic.

It will then be necessary to transfer the entire device configuration from one SIG100 to the additional device. The prerequisite for problem-free duplication is that the devices have the same firmware version.

To duplicate the configuration, proceed as follows:

In the SOPAS Engineering Tool, select the project icon that corresponds to the source device. Open the context menu via the ellipsis button. Then select the Export → To file... button.

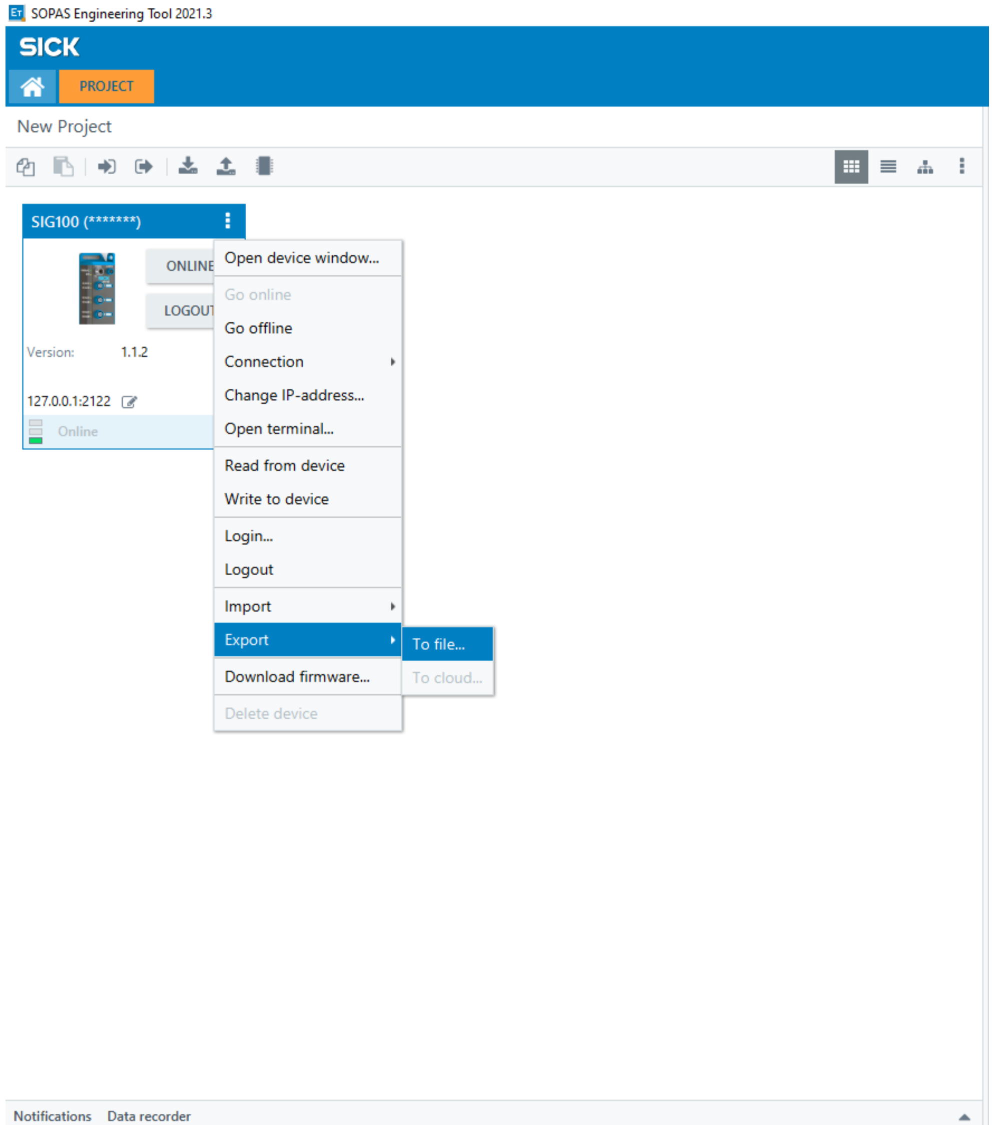


Figure 24: Export to file

A SOPAS data file is now generated that contains all the required configurations. Another window (**Device-Export**) opens where you can select the location for the file. This file is used to transfer the configuration to other SIG100s.

NOTE

To now import this configuration into another SIG100, you need to ensure that both device variants have the same firmware version. You can check this directly via the respective project icons in SOPAS ET. If the firmware versions do not match, you need to contact SICK Service to update the firmware.

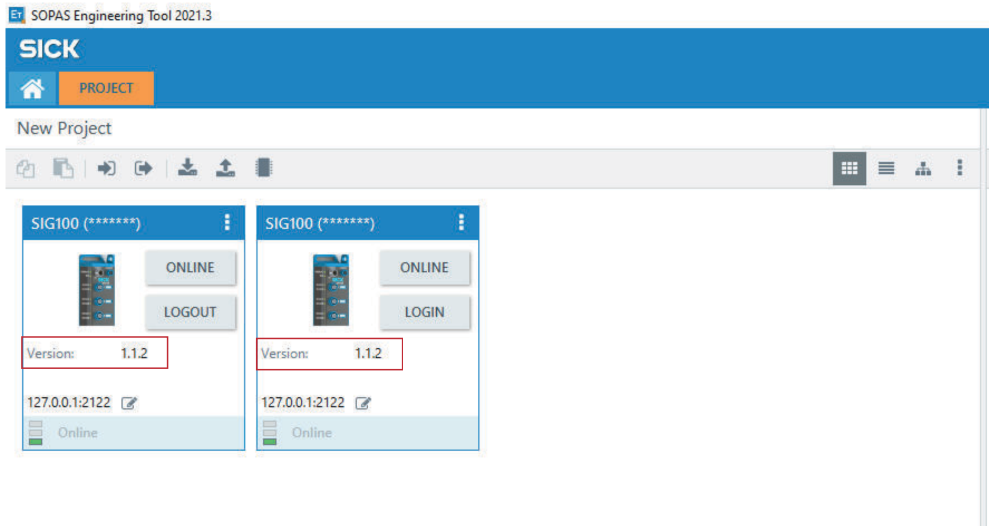


Figure 25: Comparison of firmware versions

The SOPAS data file can then be imported into a new SIG100 in the same manner. To do so, open the context menu for the new SIG100 and this time select Import → From file…. In the import dialog that opens, select the previously saved data file and confirm by clicking the Open button. Another dialog window opens where you need to select the desired user level. It is recommended to use the Maintenance user.

8 Troubleshooting

The Troubleshooting table indicates measures to be taken if the sensor stops working.

LED indication

Table 19: LEDs on SIG100

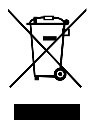
LED	LED	Cause	Measures
Green power LED	○	Supply voltage off or too low	check all electrical connections (cables and plug connections)
Orange DI/DO LED	○	no input/output connected or signal low (=0)	check the input/output connec-tions

9 Disassembly and disposal

The sensor must be disposed of in line with applicable country-specific regulations. When disposing of them, you should try to recycle them (especially the precious metals).

NOTE

Disposal of batteries, electric and electronic devices

- According to international directives, batteries, accumulators and electrical or electronic devices must not be disposed of in general waste.
- The owner is obliged by law to return this devices at the end of their life to the respective public collection points.
- WEEE:  This symbol on the product, its package or in this document, indicates that a product is subject to these regulations.

10 Maintenance

SICK sensor integration gateways are maintenance-free.

We recommend doing the following regularly:

- Clean the device
- Check the screwed and plugged connections

No modifications may be made to devices.

Subject to change without notice. Specified product properties and technical data are not written guarantees.

11 Technical data

11.1 General technical data

Mechanical data

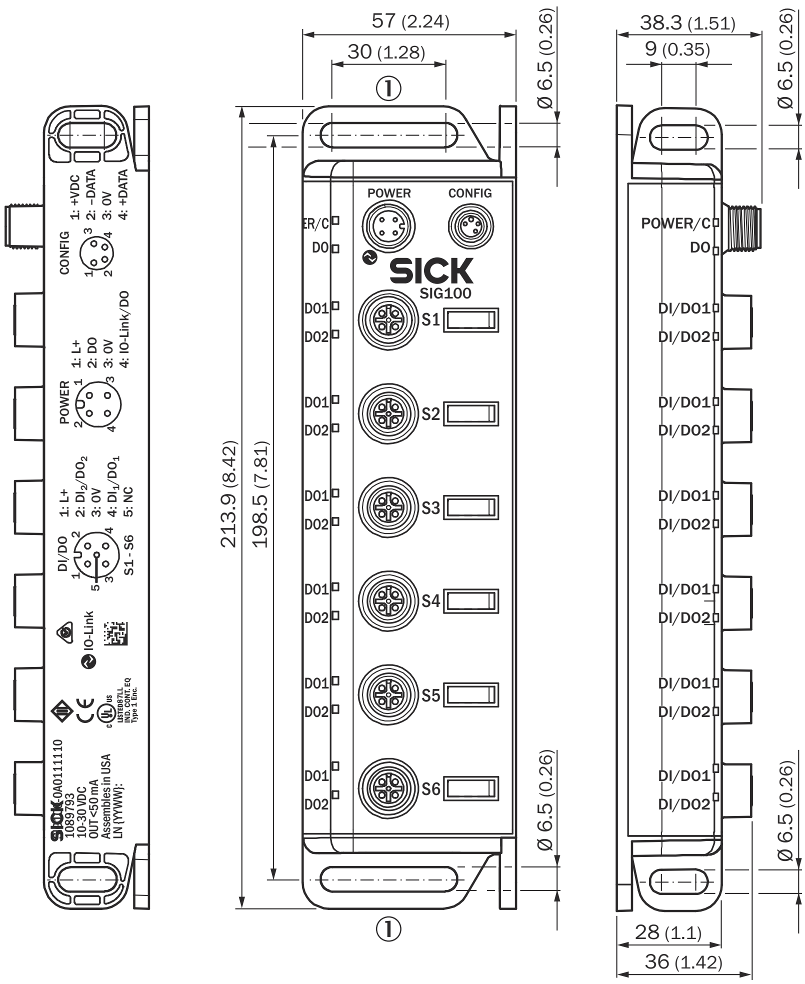


Figure 26: Dimensional drawing (dimensions in mm (inch))

① Long hole (4 x), for mounting with M6 screw

Housing material	ABS
Enclosure rating per IEC 60529	IP 67 (only when plugged-in and threaded-in)
Dimensions (W x H x D)	212 x 38.3 x 50 mm
Mounting type	2-hole screw mounting
Weight	289 g

Operating conditions

Operating temperature	-40 °C ... +60°C
Storage temperature	-40 °C ... +70°C
EMC - Immunity - Emission	- EN 61000-6-2 - EN 61000-6-4
Shock / shaking	EN 60068-2-6, EN 60068-2-27, EN 60068-2-29, EN 60068-2-64

Electrical data

Power supply SIO Mode		10 ... 30 V DC
Power supply IO-Link Mode		18 ... 30V DC
Voltage ripple		< 1 %
Device (Power Port)	Max. device current (without connected sensors and outputs off)	≤ 50 mA @ 24 V
	Pin 1 max. device current[1]	≤ 500 mA
	Pin 2 max. output supply current[2]	≤ 50 mA
	Pin 4 max. output supply current[2]	≤ 50 mA
	Pin 2 & 4 output characteristics	$V_H \geq V_{US}$ - 2 V
Port (S1-S6)	Pin 1 max. supply current	≤ 50 mA
	Pin 2 max. output supply current[2]	≤ 50 mA
	Pin 4 max. output supply current[2]	≤ 50 mA
	Pin 2 & 4 output characteristics	$V_H \geq V_{US}$ - 2 V
	Pin 2 & 4 input voltage level	Type 3 IEC 61131-2

1 The sum of all ports including digital outputs must not exceed the maximum device current. Current needs to be limited.

2 Configured as digital output. Maximum output supply current of pin 2 / 4 is independent of maximum supply of pin 1.

12 Annex

12.1 Conformities and certificates

You can obtain declarations of conformity, certificates, and the current operating instructions for the product at www.sick.com. To do so, enter the product part number in the search field (part number: see the entry in the “P/N” or “Ident. no.” field on the type label).

12.2 List of abbreviations

Table 20: List of abbreviations

AN1	Analog value (In)	
ANO	Analog value (Out)	
COM 1 – 3	SDCI communication mode	1 = 4.8 kbit/s 2 = 38.4 kbit/s 3 = 230.4 kbit/s
CON	Constant	Constant value for calculations within the logic editor
CONFIG	Configuration Configuration Port (M8) on SIG100	
DI	Digital Input	Digital input (e. g. Sensor connected to one of the ports S1-S6)
DO	Digital Output	Digital Output (e. g. Actuator connected to one of the ports S1-S6)
IL	Logic Editor Input	
Int	Integer	
IODD	IO-Link Device Description	Device description file of an IO-Link device
ISDU	Indexed Service Data Unit	Service data object in IO-Link
OF	Over Flow	
PD In	Process Data from SIG100 to IO-Link Master/PLC	
PD Out	Process Data from IO-Link Master/PLC to SIG100	
PID	Profile Identifier	
Qint	Output on the Ports (S1-S6)	
QL	Logic Editor Output	
S1DI1	Port S1 Digital Input 1	Port S1 pin number 4 is used as a digital input
S1DO2	Port S1 Digital Output 1	Port S1 pin number 4 is used as a digital output
SDCI	Single-drop digital interface	Official (specification) name for IO-Link technology
SDD	SOPAS ET Device Description	Device description file / driver for SICK SOPAS ET software
SIG	Sensor Integration Gateway	Active Connectivity Products made by SICK
SIO-Mode	Standard Input Output Mode	
SOPAS ET	SOPAS Engineering Tool	The SOPAS Engineering tool is the configuration software from SICK
UInt	Unsigned Integer	
UF	Under Flow	

TECHNICAL INFORMATION

Sensor Integration Gateway - SIG100

SICK Smart Sensors / IO-Link

Device configuration - Advanced operating instructions

SICK
Sensor Intelligence.

SMART SENSORS
IO-Link

12.4 About this document

12.4.1 About this document

The ISDU descriptions in this document apply to IO-Link-enabled Sensor Integration Gateway SIG100.

In some cases, functions may be described in this document which are not supported by individual IO-Link devices from SICK. The functions in question are marked accordingly (see "Symbols", page 57).
The specific functional scope of an individual sensor or Sensor Integration Gateway is described in full in the Supplement to operating instructions on the relevant product page www.sick.com.

12.4.2 Intended use

Use IO-Link only as described in this documentation.

12.4.3 Symbols

NOTICE
This symbol indicates important information.

NOTE
This symbol provides additional information, e.g., dependencies / interactions between the described function and other functions, or when individual functions are not supported by every sensor.

12.5 Description of IO-Link

IO-Link and control integration

IO-Link is a non-proprietary internationally standardized communication technology, which makes it possible to communicate with sensors and actuators in industrial environments (IEC 61131-9).

IO-Link devices communicate with higher-level control systems via an IO-Link master. The IO-Link devices are connected to it via a point-to-point connection. An IO-Link device can be a single IO-Link sensor or a Sensor Integration Gateway such as the SIG100. The SIG100 acts as an IO-Link sensor hub that detects binary switching signals and converts them into an IO-Link message.
Different variants of the IO-Link master are available for easy integration into the most common industrial fieldbus environments. In most cases, these are decentralized fieldbus gateways or input cards for the backplane bus of the controller used.

To make it possible for an IO-Link sensor to communicate with the control, both the IO-Link Master and the IO-Link device must be integrated in the hardware configuration in the control manufacturer's Engineering Tool.

To simplify the integration process, SICK provides sensor-specific device description files (IODD = IO-Link Device Description) for IO-Link devices .
You can download these device description files free of charge at www.sick.com/[device-part number].

Not all control system manufacturers support the use of IODDs. If third-party IO-Link Masters are used, it is possible to integrate the IO-Link sensor by manually entering the relevant sensor parameters directly during the hardware configuration.

To ensure that the IO-Link device can be easily integrated into the control program, SICK also provides function blocks for many control systems. These function blocks make it easier to read and write the individual device parameters and provide support when it comes to interpreting the process data supplied by the IO-Link device.

You can also download them free of charge from the homepage: www.sick.com/[device-part number].

On SICK's YouTube channel, you will find some tutorials that will help you to integrate IO-Link masters from SICK: www.youtube.com/SICKSensors.

If you have any questions, SICK's Technical Support is available to help all over the world.

12.6 Accessories for visualization, configuration and integration

Using the M8 Configuration port (USB) on the SIG100 and in combination with one of the suitable accessory cables (e. g. 6051163), you can easily connect the Sensor Integration Gateway from SICK to a PC or a laptop via USB. You can then quickly and easily test or configure the SIG100 (→ including logic fuctions across multiple connected binary switching sensors which are connected to SIG100) using the SOPAS ET software (SICK Engineering Tool).

The needed visualization files (SDD = SOPAS Device Description) can be easily uploaded from the device itself when the device is connected the first time to SOPAS.

You can download SOPAS ET and the device-specific SDDs directly and free of charge from the SICK homepage: www.sick.com.

There are two different SDD files provided for SIG100. One for the use of SOPAS via USB (via the USB cable) and one for the use of SOPAS via IO-Link (using SIG100 and a SiLink2 Master 1061790). Note: When using the IO-Link SDD and a SiLink2 Master together with SIG100 not all device functions can be accessed.

Various IO-Link Masters are available from SICK for integrating IO-Link Masters using fieldbus. For more details, see www.sick.com.

12.7 Data repository

When the current IO-Link standard V1.1 was introduced, the automatic data repository (Data Storage) was added to IO-Link's range of functions. The data repository allows the machine operator to replace defective IO-Link devices with corresponding replacement devices without having to reconfigure these manually.

When the data repository is activated, the IO-Link V1.1 Master always saves the last valid setting parameters of all connected IO-Link V1.1 devices in its local memory (up to 2KB). If you replace one of the connected IO-Link devices with another device which has the same device ID and functionality, the IO-Link Master will transfer the last valid parameter set of the previous IO-Link device to the new device automatically.

The data repository therefore means that devices can be replaced in a plug-and-play manner within a matter of seconds – without complex reconfiguration, special hardware or software tools, and specific specialist knowledge.

NOTE

- To use the data repository, you must activate it in the IO-Link Master.
- When the conversion of one or several IO-Link device parameters is initiated via the control, then the control must activate the **Data Storage Upload Request-Flag** as the final command in the sensor. Only this initiates the data repository.
- Uploading / downloading IO-Link device parameters using the data repository function can take up to 15 seconds depending on the volume of data and the IO-Link Master used (typical values; values can differ in practice).
- For details on using the data repository, see IO-Link Interface and System Specification, V1.1.2, chapter 10.4 Data Storage (DS) at www.io-link.com, Downloads menu item.

12.8 Physical Layer

The physical layer describes the basic IO-Link device data (see table below). The device data is automatically shared with the IO-Link Master. It is important to ensure that the connected IO-Link Master supports the performance of IO-Link device data for proper operation.

NOTICE

The maximum current consumption of the IO-Link hub (including the load at the outputs) must not exceed the permissible output current of the respective connection on the IO-Link master.

Table 21: Physical layer - IO-Link device data

SIO Mode	yes

Min. Cycle Time	5.1 ms
Baud rate	COM 2 (38.4 kbit/s)
IO-Link Frame Type	F-Sequence Type 2 V
PD-In: Process data length, incoming (from the IO-Link device to the IO-Link Master)	8 Byte
PD-Out: Process data length, outcoming (from the IO-Link Master to the IO-Link Device)	2 Byte
Inputs	max. 12 x PNP, Type 1
Outputs	max. 12 x PNP
Supported IO-Link Version	V1.1

12.9 Process data

Process data is transmitted cyclically. There is no acknowledgment of receipt.
The master sets the cycle time, but this must not be less than the minimum cycle time of the IO-Link hub.

NOTE
The Service data (acyclic data) does not influence the cycle time.

12.9.1 Process data structure

Table 22: PD IN SIG100 -> IO-Link Master

Byte	Bit	Value	Signal input / output	Data type
0 ... 1	Bit 63 ... 48	AV2	Analog value 2	UInteger 16
2 ... 3	Bit 47 ... 32	AV1	Analog value 1	UInteger 16
4	Bit 31	Reserved		
	Bit 30	Reserved		
	Bit 29	Reserved		
	Bit 28	Reserved		
	Bit 27	Reserved		
	Bit 26	Reserved		
	Bit 25	Reserved		
	Bit 24	Reserved		
5	Bit 23	Reserved		
	Bit 22	Reserved		
	Bit 21	Reserved		
	Bit 20	Reserved		
	Bit 19	Qint 12	Port 6 pin 2 (input or output)	Boolean
	Bit 18	Qint 11	Port 6 pin 4 (input or output)	Boolean
	Bit 17	Qint 10	Port 5 pin 2 (input or output)	Boolean
	Bit 16	Qint 9	Port 5 pin 4 (input or output)	Boolean

Byte	Bit	Value	Signal input / output	Data type
6	Bit 15	Qint 8	Port 4 pin 2 (input or output)	Boolean
	Bit 14	Qint 7	Port 4 pin 4 (input or output)	Boolean
	Bit 13	Qint 6	Port 3 pin 2 (input or output)	Boolean
	Bit 12	Qint 5	Port 3 pin 4 (input or output)	Boolean
	Bit 11	Qint 4	Port 2 pin 2 (input or output)	Boolean
	Bit 10	Qint 3	Port 2 pin 4 (input or output)	Boolean
	Bit 9	Qint 2	Port 1 pin 2 (input or output)	Boolean
	Bit 8	Qint 1	Port 1 pin 4 (input or output)	Boolean
7	Bit 7	QL8	Logic Editor output signal	Boolean
	Bit 6	QL7	Logic Editor output signal	Boolean
	Bit 5	QL6	Logic Editor output signal	Boolean
	Bit 4	QL5	Logic Editor output signal	Boolean
	Bit 3	QL4	Logic Editor output signal	Boolean
	Bit 2	QL3	Logic Editor output signal	Boolean
	Bit 1	QL2	Logic Editor output signal	Boolean
	Bit 0	QL1	Logic Editor output signal	Boolean

The following two data formats are available for Process Data out and are selected via the user interface (see "Process data Select", page 66).

Table 23: PD OUT IO-Link Master -> SIG100 / Mode 1

	Bit	Value	Signal input / output	Data type
0	Bit 15	IL16	Logic Editor input	Boolean
	Bit 14	IL15	Logic Editor input	Boolean
	Bit 13	IL14	Logic Editor input	Boolean
	Bit 12	IL13	Logic Editor input	Boolean
	Bit 11	IL12	Logic Editor input	Boolean
	Bit 10	IL11	Logic Editor input	Boolean
	Bit 9	IL10	Logic Editor input	Boolean
	Bit 8	IL9	Logic Editor input	Boolean
1	Bit 7	IL8	Logic Editor input	Boolean
	Bit 6	IL7	Logic Editor input	Boolean
	Bit 5	IL6	Logic Editor input	Boolean
	Bit 4	IL5	Logic Editor input	Boolean
	Bit 3	IL4	Logic Editor input	Boolean
	Bit 2	IL3	Logic Editor input	Boolean
	Bit 1	IL2	Logic Editor input	Boolean
	Bit 0	IL1	Logic Editor input	Boolean

Table 24: PD OUT IO-Link Master -> SIG100 / Mode 2

Byte	Bit	Value	Signal input / output	Data type
0 … 1	Bit 0 … 15	AV1	Analog value 1	Uinteger 16

12.9.1.1 Process data description

Table 25: System-specific ISDUs - PD Descriptor

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range [1)]
Index		Sub-Index							
DEC	HEX								
14	0E	-	PD Input descriptor	Array	-	9 Byte	ro	0x01 0x14 0x00 0x02 0x10 0x20 0x02 0x10 0x30	Octet String [3]
15	0F	-	PD Output descriptor	Array	-	3 Byte	ro	PD OUT Mode 1 0x01 0x10 0x00 PD OUT Mode 2 0x02 0x10 0x00	Octet String [1]

1) Description of the process data

PD input descriptor (ISDU 14) and **PD output descriptor** (ISDU 15) provide information about the data structure of the (input and output) process data. The coding is described in the **Smart Sensor profile** specification.
Each part of the process data is described with 3 bytes.

Byte 1 Data type:
0: OctetStringT
1: Set of BoolT
2: UIntegerT
3: IntegerT
4: Float32T.
Byte 2 Length of the data in bits.
Byte 3 Bit offset of the corresponding process data variables in the process data.

12.9.1.2 Process data input

Table 26: System-specific ISDUs – Process data input

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
40	28	-	Process data input	PD in	-	8 byte	ro	-	-

In this ISDU, the current process data input (from IO-Link Device to IO-Link Master) is provided as an ISDU.

12.9.1.3 Process data output

Table 27: System-specific ISDUs – Process data output

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
41	29	-	Process data output	PD Out	-	8 byte	ro	-	-

In this ISDU, the current process data out (from IO-Link Master to IO-Link Device) is provided as an ISDU.

12.9.1.4 Process data selection

In the following section, the process data, which is required for the application and is described under section 12.9, can be set.

Table 28: Process data selection

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-Index							
DEC	HEX								
120	78	-	Process data select	UInt	yes	8 Bit	rw	128	128 = PDOut option 1 (IL1 ... IL6) 129 = PDOut option 2 (Analog value)

NOTE
Only Process data out can be changed, process data In is fixed.

12.10 Service data

Service data is only exchanged between the control and IO-Link device via the IO-Link Master on request by the control (acyclically). The service data is designated as ISDU's. ISDU's allow the user to read information about the status of the connected IO-Link device and/or write new parameters to change the configuration.

The respective counterpart confirms receipt of the data.

If the IO-Link device does not answer within five seconds, the master reports a communication error.

12.10.1 Device identification

12.10.1.1 Device identification

Table 29: Device identification

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
16	10	-	Vendor name	String	-	18 byte	ro	SICK AG	
17	11	-	Vendor text			64 byte		www.sick.com	
18	12	-	Product name			18 byte			
19	13	-	Product ID			32 byte		see Index 219	
219	DB	0	Article No.			32 byte			

The **Product ID** is also the part number of the connected IO-Link device.

For reasons of standardization, this may also contain a reference to ISDU 219. In this case, the **Product ID** (part number) is filed under ISDU 219.

12.10.1.2 Product text and serial number

Table 30: Device identification – Product text / serial number

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
20	14	-	Product text	String	-	45 byte	ro	IO-Link Sensor Hub	
21	15	-	Serial Number			8 byte			

Format of the serial number:
YYWWnnnn (Y = year, W = week, n = sequential numbering)

NOTE
The serial number combined with the part number (**Product ID**) enables the device to be clearly identified.

12.10.1.3 Hardware and firmware version

Table 31: Device identification – Version

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
22	16	-	Hardware version	String	yes	4 byte	ro	xxxx	
23	17	-	Firmware version	String	yes	16 byte	ro	Vxxx.xxx.xxx	

These ISDUs indicates the hardware and software versions.

12.10.1.4 Definable names

Table 32: Device identification – Specific tag

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
24	18	-	Application-specific tag	String	yes	32 byte	rw	*******	
64	40	-	Device-specific tag		No			*******	

In **Application-specific tag**, you can store any text with a maximum of 32 characters. This can be useful for describing the exact position or task of the sensor in the overall machine. The **Application-specific tag** is saved via the **Data repository**.

In **Device-specific tag**, you can also store any text with a maximum of 32 characters. This name is NOT saved via the **Data repository** and is therefore available for information which is valid temporarily or only on the specific device for which it was defined.

NOTE
The user can enter any UTF-8 character

12.10.1.5 Find me

Table 33: Device identification – Find me

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
204	CC	-	Find me	UInt	No	8 bit	rw	0	0 = Find me deactivated 1 = Find me activated

The sensor can be uniquely identified using **Find me**. For machines with several identical devices, it is therefore possible to uniquely identify the device with which communication is currently taking place.
When **Find me** is activated, the orange DO indicator beside the power port on SIG100 flashes at 1Hz.

12.10.1.6 SICK-Profile version

Table 34: Device identification – SICK-profile version

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
205	CD	-	SICK-Profile Version	String	No	4 byte	ro		

SICK IO-Link devices implement a defined set of functions identified by the SICK-Profile version. This ISDU indicates the version number.

12.10.2 General device settings

12.10.2.1 Restore factory settings/reset

Table 35: General device settings – Restore factory settings

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
2	02	-	Standard command	UInt	-	8 bit	ro		128 = Device reset 130 = Restore factory settings

Device reset SIG100 performs a restart.
Restore factory settings SIG100 is reset to factory settings.

12.10.2.2 Data storage index

Table 36: General device settings – Data storage index

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
3	03	-	Data Storage Index	Record	yes	111 byte	rw		

The SIG100 supports the IO-Link data storage feature. Up to 2 Kilobyte of SIG100 data can be stored in an IO-Link Master port. Data storage of SIG100 includes following indices:

ISDU 12 - Device Access Locks
ISDU 24 - Application Specific Tag
ISDU 91 - IO-Link port output type pin 4
ISDU 92 - IO-Link port output type pin 2
ISDU 120 - Process data select
ISDU 227 - Notification handling
ISDU 4005 - DI/DO port configuration
ISDU 4007 - Logic Editor configuration (part 1)
ISDU 4008 - Logic Editor configuration (part 2)
ISDU 4009 - Logic Editor configuration (part 3)
ISDU 4010 - Logic Editor configuration (part 4)
ISDU 4011 - Logic Editor configuration (part 5)
ISDU 4012 - Logic Editor configuration (part 6)
ISDU 4013 - Logic Editor configuration (part 7)
ISDU 4014 - Logic Editor configuration size
ISDU 4015 - DI/DO port1 pin 4 label
ISDU 4016 - DI/DO port1 pin 2 label
ISDU 4017 - DI/DO port2 pin 4 label
ISDU 4018 - DI/DO port2 pin 2 label
ISDU 4019 - DI/DO port3 pin 4 label
ISDU 4020 - DI/DO port3 pin 2 label
ISDU 4021 - DI/DO port4 pin 4 label
ISDU 4022 - DI/DO port4 pin 2 label
ISDU 4023 - DI/DO port5 pin 4 label
ISDU 4024 - DI/DO port5 pin 2 label
ISDU 4025 - DI/DO port6 pin 4 label
ISDU 4026 - DI/DO port6 pin 2 label

12.10.2.3 General device settings

Table 37: General device settings – Device access locks

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range	
Index		Sub-index								
DEC	HEX									
12	02	-	Device access locks (key lock)	Record	yes	2 byte	rw		Bit no.	
									0	
			Data storage lock					0	1	0 = Unlocked 1 = Locked
			Not available						2 – 15	Not available

With **Device access locks**, you can lock or unlock various sensor functions. The functionality has been recorded in the IO-Link interface specification.

Bit 1 **Data storage lock** You can lock the data repository functionality using bit 1. When the bit is set, the device rejects data repository write requests from the IO-Link Master with an error message. For newer devices, the data repository function can no longer be deactivated.

12.10.2.4 Handling notifications

Table 38: General device settings – Notification handling

ISDU			Name	Data type	Data storage	Length	Access	Default value	Value/Range
Index		Sub-index							
DEC	HEX								
227	E3	-	Notification handling	UInt	-	1 byte	rw	0	0 = All enabled 1 = All disabled 2 = Events enabled, PD invalid flag disabled 3 = Events disabled, PD invalid flag enabled

Notification handling enables the generation of IO-Link events in the sensor and the function for marking the process data as invalid to be activated/deactivated.

12.10.3 SIG100 configuration settings

12.10.3.1 IO-Link port configuration

Table 39: IO-Link Port (Power/C) pin 2 and pin 4 configuration

ISDU			Name	Daten-typ	Da-ten-hal-tung	Länge	Zu-griff	De-fault-wert	Wert/Bereich
Index		Sub-In-dex							
DEC	HEX								
91	5B	-	IO-Link port output type pin 4	UInt	yes	8 Bit	rw	0	0 = PNP / IO-Link 2 = Push/Pull 3 = Deactivated
92	5C	-	IO-Link port output type pin 2	UInt	yes	8 Bit	rw	0	0 = PNP / IO-Link 2 = Push/Pull 3 = Deactivated

Default value for pin 4 is PNP, meaning IO-Link commincation gets started automatically after the wake-up from IO-Link Master. In case SIG100 is connected e. g. to a standard digital input card from a PLC, pin 4 will stay in the default PNP mode and will be operating in SIO mode.

Pin 4 communication can be deactivated e. g. in case the SIG100 is acting as a standalone controller without connection to any upper system, like IO-Link Master / PLC.

Default value for Index 92 is PNP. Pin 2 deactivated means pin 2 in high-impedance state.

NOTE
Please choose the right pin 2/pin 4 configuration depending on your application.

12.10.3.2 Process data Select

Table 40: Process data Select

ISDU			Name	Data type	Data reposi-tory	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
120	78	-	Process data select	UInt	yes	1 byte	rw	128	128 = PDOut option 1 (IL1 ... IL16) 129 = PDOut option 2 (analog value)

Select which kind of process data output selection you would like to use. You can choose either 16 Logic Inputs or 1 analog value with 16 bits.

Be aware, the size of the process data output is always fixed, it is 2 byte (=16 bits).

12.10.3.3 DI/DO port configuration

Table 41: DI/DO port configuration

ISDU			Name	Data type	Data reposi-tory	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
4005	FA5	-	DI/DO port configura-tion	Record	-	2 byte	rw	-	Bit 0: Port S1 pin 4 Bit 1: Port S1 pin 2 Bit 2: Port S2 pin 4 Bit 3: Port S2 pin 2 ... Bit 10: Port S6 pin 4 Bit 11: Port S6 pin 2

Select the port mode digital input or digital output for the 6 sensor ports S1-S6 depending on the devices you would like to connect.

To configure a pin as an output you set the corresponding bit in index 4005 to 1. To configure a pin as an input you set the coressponding bit in index 40005 to 0 (--> DI = 0 and DO=1).

12.10.3.4 Logic Editor configuration

Table 42: Logic Editor configuration

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-Index							
DEC	HEX								
4007	FA7	-	Logic Editor configuration (part 1)	OStr	-	228 Byte	rw	-	
4008	FA8		Logic Editor configuration (part 2)						
4009	FA9		Logic Editor configuration (part 3)						
4010	FAA		Logic Editor configuration (part 4)						
4011	FAB		Logic Editor configuration (part 5)						
4012	FAC		Logic Editor configuration (part 6)						
4013	FAD		Logic Editor configuration (part 7)						
4014	FAE		Logic Editor configuration size	UInt	-	16 Bit			

Logic editor part 1- part 7 represents the logic editor configuration (recipe) The Logic editor configuration size is a 16 bit value and indicated the length of the logic editor configuration file.

12.10.3.5 DI/DO ports

Table 43: DI/DO Ports

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
4015	FAF	-	DI/DO Port S1 pin 4 Label	String	-	8 Byte	rw	-	pin label port 1 pin 4
4016	FB0		DI/DO Port S1 pin 2 Label						pin label port 1 pin 2
4017	FB1		DI/DO Port S2 pin 4 Label						pin label port 2 pin 4
4018	FB2		DI/DO Port S2 pin 2 Label						pin label port 2 pin 2
4019	FB3		DI/DO Port S3 pin 4 Label						pin label port 3 pin 4
4020	FB4		DI/DO Port S3 pin 2 Label						pin label port 3 pin 2
4021	FB5		DI/DO Port S4 pin 4 Label						pin label port 4 pin 4
4022	FB6		DI/DO Port S4 pin 2 Label						pin label port 4 pin 2
4023	FB7		DI/DO Port S5 pin 4 Label						pin label port 5 pin 4
4024	FB8		DI/DO Port S5 pin 2 Label						pin label port 5 pin 2
4025	FB9		DI/DO Port S6 pin 4 Label						pin label port 6 pin 4
4026	FBA		DI/DO Port S6 pin 2 Label						pin label port 6 pin 2

Index 4015 untill 4026 identify the virtual DI/DO port labels for pin 2 and pin 4 of each of the 6 configurable ports (S1-S6).

NOTE

UTF-8 characters are allowed. The max. lenght for each label is 8 bytes. Please be aware that some UTF-8 characters need more than 1 byte (e.g. German umlauts need 2 bytes, Chinese/Japanese characters need 3 bytes). That is why the label length depends on the use of the choosen symbols.

The User Interface SOPAS will cut off labels with more than 8 bytes.

12.10.4 Installation / Diagnostics

12.10.4.1 Device State

Table 44: Device state

ISDU			Name	Data type	Data repository	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
36	24	-	Device status	UInt	-	1 byte	ro	0	0 = Device is OK 1 = Maintenance required 2 = Out of specification 3 = Functional check 4 = Failure 5 – 255 = Reserved

12.10.5 System-specific ISDUs

12.10.5.1 Profile characteristic

Table 45: System-specific ISDUs – Profile characteristic

ISDU			Name	Data type	Data reposi-tory	Length	Access	Default value	Value/range
Index		Sub-index							
DEC	HEX								
13	D	-	Profile characteristic	Arry	-	8 byte	ro	-	UInt 16 [4]

Profile characteristic indicates which standardized profiles and functionalities the sensor supports.
The values are emitted in five 16-bit blocks.
At most, the following profiles / functionalities are supported:

1 PID (Profile Identifier) “Smart Sensor Profile”.
32768 Device Identification
The device supports enhanced identification options, see Identification chapter.
32769 Binary Data Channel
The device provides switching signals in a specified manner.
32770 Process data variables
The sensor provides analog values as items of process data.

12.11 Events

IO-Link communication is a master-slave communication system.
With “Events”, an IO-Link device reports events to the master (without being prompted by the master). Device-specific events are classified as follows:

Table 46: Device-specific events

Notification	For information purposes only; system is not restricted.
Warning	System is still functional, but is impaired in some way. You must rectify this with suitable measures as soon as possible.
Error	System is no longer functional. Depending on the cause of the error, it may be possible to restore functionality.

An event issues an event code, which contains the cause of the occurrence of the event.

NOTE
Not all IO-Link masters support the event mechanism.
You can deactivate the generation of events on the device side in ISDU 227 Notification handling.

The following events are supported:

12.11.1 Events

Table 47: Events

Code		Name	Type	Comment	Action
Dec	Hex				
36001	8CA1	New parameters	Notification	Parameters have been amended	None

12.12 Errors

Table 48: Errors

Code				Name	Remark	Action
Dez	Hex	Additional Code / Dez	Additional Code / Hex			
128	80	17	11	Index not available	Access occurs to a not existing index	
128	80	18	12	Subindex not available	Access occurs to a not existing subindex	

Code				Name	Remark	Action
Dez	Hex	Additional Code / Dez	Additional Code / Hex			
128	80	32	20	Service temporarily not available	Parameter is not accessible due to the current state of the device application	
128	80	34	22	Service temporarily not available - device control	Parameter is not accessible due to a remote triggered state of the device application	
128	80	35	23	Access denied	Write access on a read-only parameter	
128	80	48	30	Parameter value out of range	Written parameter value is outside its permitted value range	
128	80	51	33	Parameter length overrun	Written parameter length is above its predefined length	
128	80	52	34	Parameter length underrun	Written parameter length is below its predefined length	
128	80	53	35	Function not available	Written command is not supported by the device application	
128	80	54	36	Function temporarily unavailable	Written command is not available due to the current state of the device application	
128	80	65	41	Inconsistent parameter set	Parameter inconsistencies were found at the end of block parameter transfer, device plausibility check failed	

12.13 Index

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