

CLV61x Dual Port (PROFINET IO) Bar Code Scanner



Supplements to the operating instructions.
Integration into PROFINET IO.



This document describes the CLV61x Dual Port PROFINET bar code scanner (firmware version V1.31 or higher) in relation to its characteristics for PROFINET IO and GSDML configuration.

The required handling on the part of the PROFINET IO controller is described here using the example of a PLC of the type Siemens S7 300 CPU with integrated PROFINET based on Step7 V5.5.

The bar code scanner CLV61x Dual Port PROFINET is referred to in this document as "CLV61x Dual Port" or "CLV61x 2port".

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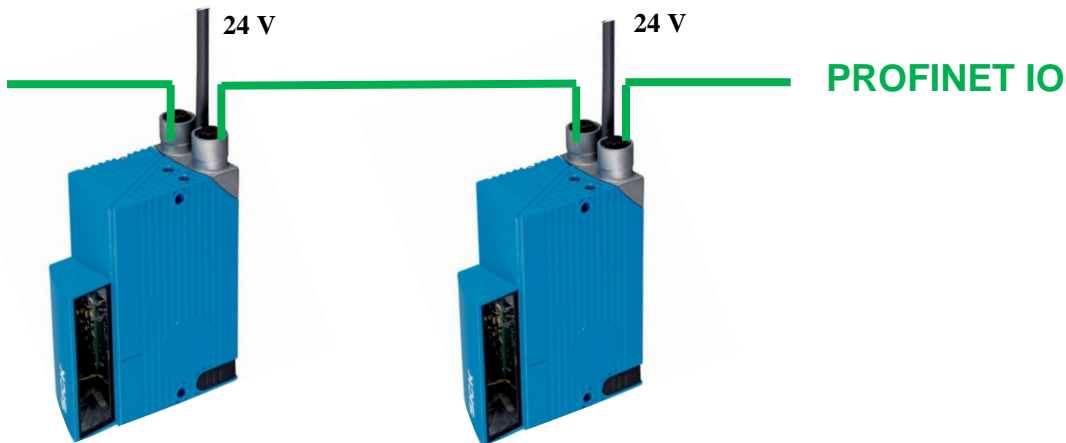
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1 Functions of the CLV61x Dual Port

1.1 Range of functions of the CLV61x Dual Port

The CLV61x Dual Port has two Ethernet connections and can be used in both line and ring topology (MRP Client). The 24 V supply is via connection cables with 4-pin M12 male connector.



The GSDML file of the CLV61x Dual Port must be used.

ID sensor	Model name / Version	GSDML file to be used (or newer version)
 CLV61x-2Port	CLV61x Dual Port / from V1.31	GSDML-V2.3-SICK-CLV61x_2Port-20141022.xml Most up to date GSDML at: http://www.sick.com/software Software type "GSD file".

Range of functions of the CLV61x Dual Port:

- Communication with the PROFINET/PLC (data channel for sending and receiving). This can take place in CDF600 or CDF600 mode without a handshake. The modes are compatible with CDF600/CMF400/ID sensors with PROFINET IO on Board.
- In CDF600 mode, the CLV61x Dual Port can be operated with the SICK function module for CLV6xx (current version at: <http://www.sick.com/software>, category "Function module".)
- Ctrl bits for the PROFINET/PLC (according to the digital switching inputs and outputs)
- Configuration of the CLV61x Dual Port by the PLC possible via the GSCML file. This makes device replacement easier.
- Configuration and monitoring of the CLV61x Dual Port with SOPAS ET:
 - Via USB connection on the CLV61x Dual Port (Micro-USB)
 - Via network via Port 2111/2112 (Ethernet TCP/IP connection), if the PC is connected directly to the network.

The following types of triggering of the CLV61x Dual Port are possible:

- Triggering by software trigger (configure CLV61x Dual Port by command).
- Triggering by trigger bit in the Ctrl bits (configure CLV61x Dual Port by fieldbus input).

The CLV61x Dual Port can also be operated in free-running mode.

Quick start: See appendices to Chapters 7.1 and 7.2

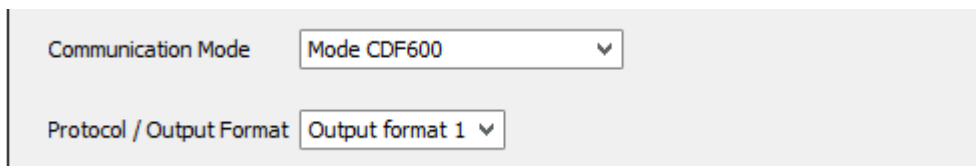
The CLV61x Dual Port complies with PROFINET IO Conformance Class B.

The following features are supported:

- Cyclic RT communication.
- Automatic address issue for equipment replacement without engineering tool.
- I&M 0 functionality as well as reading and writing from I&M 1-4
- MediaReduncy support (MRP-Client)
- FAST Ethernet 100 Base TX/FX
- SNMP support
- Neighborhood detection

1.2 Overview of the communication protocol of the CLV61x Dual Port

The CLV61x Dual Port provides two communication protocols. The communication protocol can be set under "Parameter / Network Interfaces IOs / Profinet":



The screenshot shows a configuration interface with two dropdown menus. The first dropdown is labeled "Communication Mode" and is set to "Mode CDF600". The second dropdown is labeled "Protocol / Output Format" and is set to "Output format 1".

Operation of the SICK function blocks for PROFIBUS / PROFINET is only possible in Handshake mode / Confirmed Messaging (CDF600).

CDF600 Handshake mode / Confirmed Messaging (default setting, recommended)

- Data channel compatible with the Byte Handshake Mode of the CDF600 PROFINET, CDF600 PROFIBUS, CMF400 PROFIBUS, CDM425 and PROFINET on Board.
- Send and receive with max. telegram length of 4000 bytes (with blocking)
- A handshake is required on the PLC side.
- The SICK function blocks can be used for PROFIBUS / PROFINET
- Ctrl bits can be used to trigger or to set I/O's and to monitor.

CDF600 No Handshake mode:

- Data channel compatible with the No Handshake mode of the CDF600 PROFINET, CDF600 PROFIBUS, CMF400 PROFIBUS, CDM425 and PROFINET on Board.
- The max. telegram length is limited by the size of the input/output range and is max. 123 bytes. There is no fragmenting / blocking.
- **No** handshake is required on the PLC side.
- Ctrl bits can be used to trigger or to set I/O's and to monitor.

2 Electrical connection

See operating instructions for "CLV61x Dual Port (PROFINET IO) Bar Code Scanner" (Document 8017842)
Additional information available at http://www.mysick.com/en/clv61x_dual_port.

3 Configuration of the CLV61x Dual Port:

Configuration of the CLV61x Dual Port can be done in three different ways.

Configuration of the CLV61x Dual Port via **GSDML configuration**:

- Takes place directly in the PLC by addition of the GSDML configuration module.
- Allows automatic device replacement, even if the PN name is assigned automatically. See Chapters 3.4 and 4.3.
- Only allows access to the parameters listed in the GSDML modules. This is sufficient for standard applications and simple output formats.

Configuration of the CLV61x Dual Port via **USB with SOPAS ET**

- Carried out locally on the CLV61x Dual Port via SOPAS ET.
- When replacing devices, the CLV61x Dual Port must be reconfigured with SOPAS ET.
- Allows access only to all parameters of the device. This allows more complex output formats and the like to be set.

Configuration of the CLV61x Dual Port via **Ethernet with SOPAS ET**

- Takes place via SOPAS ET over the PROFINET (Ethernet) network via TCP/IP (Port2111/2112). The PC must be connected to the network.
- When replacing devices, the CLV61x Dual Port must be reconfigured with SOPAS ET.
- Allows access only to all parameters of the device. This allows more complex output formats and the like to be set.

3.1 Configuration of the CLV61x Dual Port via GSDML configuration

The CLV61x Dual Port can be **permanently** configured by modules in HW Config.

For this, the configuration modules are to be added **after** the Ctrl bits and the data channel. First, the module **"Start Remote Config"** must be selected and the module **"End Remote Config"** must be added last. Depending on the configuration task, one or more configuration modules can be added.

Through this GSDML configuration, the scope of the configuration for a **typical task** can be handled. Very extensive or special configurations must be carried out per SOPAS ET directly in the CLV61x Dual Port.

Important!

If the GSDML configuration is used, the **CLV61x Dual Port is configured** every time the **PROFINET is restarted**. This cannot be suppressed in the ID sensor.

If in the meantime the CLV61x Dual Port was deconfigured locally (via USB or Ethernet Port 2111/2112) using SOPAS ET, the existing configuration at PROFINET restart is lost as a result. In such a case, it may be necessary to change or remove the GSDML configuration in the PLC in advance.

Example: CLV61x Dual Port bar code scanner:

Slot	Module	Order number	I address	Q address	Diagnostic address	Comment
0	CLV61x 2Port				2843*	
X7	Interface				3842*	
X7.1	Port 1				3841*	
X7.2	Port 2				3840*	
1	Ctrl Bits in		0...1			
2	Ctrl Bits out			0...1		
3	32 Byte Input		256...287			
4	32 Byte Output			256...287		
5	01_Start Remote Config**				2039*	
6	11_Reading Config				2038*	
7	23_2/5 Interleaved				2037*	
8	99_End Remote Config <<<				2036*	
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						

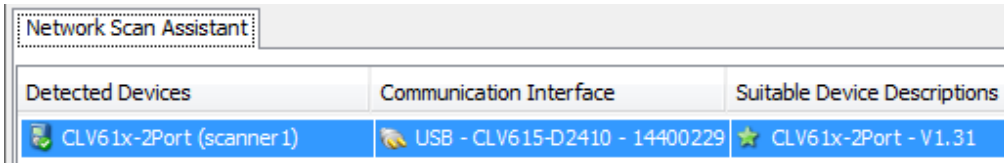
Additional information is available in the GSDML documentation.

3.2 Configuration of the CLV61x Dual Port via USB with SOPAS ET

The CLV61x Dual Port can be configured via SOPAS ET V2.38 (or higher) with a USB cable. The Micro-B USB female connector is located under the rubber cover of the CLV61x Dual Port.



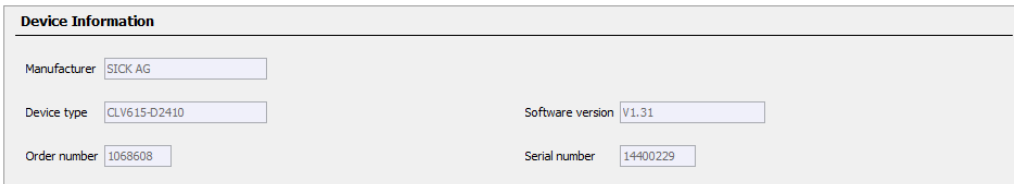
Select the network wizard in SOPAS ET and connect USB. SOPAS ET shows the USB connection of the CLV61x Dual Port and its serial number as the communications interface.



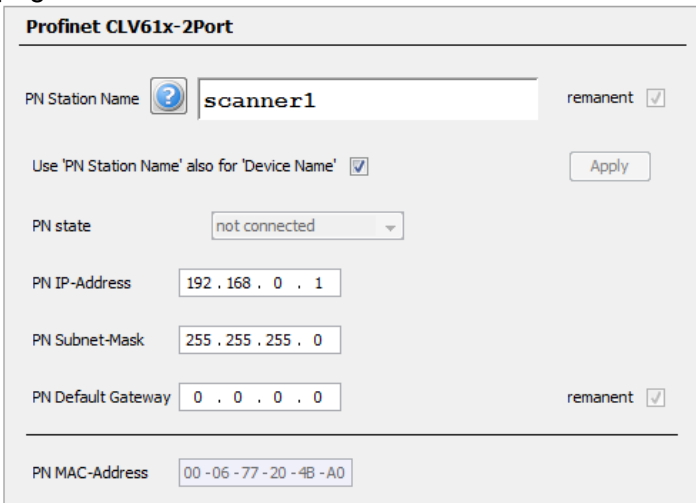
In the SOPAS ET Network Scan Assistant, search by **USB must be activated**. The required **SDD file of the CLV61x Dual Port** must be installed on the PC under SOPAS ET. It can take a relatively long time depending on the ID sensor if not installed and the SDD file has to be loaded from the device. It is recommended to install the required SDD file in advance under "Device Catalog / Install" either online or via the Internet.

If the USB connection is established, SOPAS ET 3.x launches automatically. When using SOPAS 2.38.3, always start SOPAS ET manually and connect it to the CLV61x Dual Port.

With the CLV61x Dual Port, SOPAS ET shows the firmware status of the device under "Service / Operating" data.



In the configuration, the PROFINET parameters are then shown on the "Network/Interfaces/IOs /Profinet" device page.



The **PROFINET station name** (= PN Station Name) is displayed here and can be changed. The PN station name can also be changed by the PLC.

See *appendices to Chapters 7.10, 7.11, and 7.12.*

This PN station name can also be used as a device name.

The device name is displayed in the parameter tree in SOPAS ET and helps when searching for devices.

If the CLV61x Dual Port is **not yet active** in the PROFINET data exchange to the IO Controller (PLC), the PNIP Address, PN Subnet Mask and the PN Standard Gateway of the CDF61x Dual Port can also be set here.

However, note that this is normally carried out automatically by the IO controller (PLC) if the PN station name matches. If the IP is automatically assigned by the IO controller (PLC), the IP address is "temporarily" accepted and then displayed as not remanent in SOPAS ET.

Remanent: (IP address)

This indicates whether the PN IP address, subnet and gateway are permanently stored and also immediately available once power is restored or whether these have only been temporarily assigned and the IP address is 0.0.0.0 following a restart. This characteristic is obligatory for PROFINET IO.

Remanent: (PN station name):

This indicates whether the station name has been permanently stored.

PN status: connected → Der CLV61x Dual Port is exchanging data with PROFINET.
This corresponds to the "BF" LED = off.

After changing the PN name and possibly the IP address, click "Apply" to use the new settings.

In addition, the **Communications Mode** can be set here. If changed from the default setting, the parameters must be **saved permanently** and the CLV61x Dual Port restarted. For details about the communications modes, see *Chapter 5*

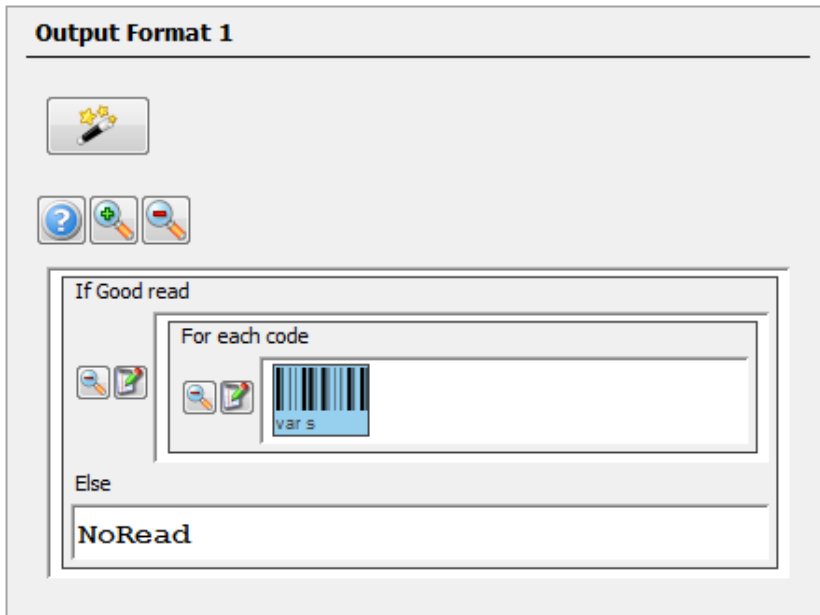
The screenshot shows a configuration panel with two dropdown menus. The first menu is labeled 'Communication Mode' and is set to 'Mode CDF600'. The second menu is labeled 'Protocol / Output Format' and is set to 'Output format 1'.

Likewise, the IM data, such as Plant designation, Location designation, Installation date (mandatory format yyyy-mm-dd hh:mm) and Additional information, can also be displayed and set here. This data is only used for organization and can be read and written by the IO controller (PLC) or by the higher-level system.

The screenshot shows a configuration panel with four input fields. The first field is 'Plant designation', the second is 'Location designation', the third is 'Installation date' with a blue question mark icon to its left, and the fourth is 'Additional information'.

The required output format must also be set. The output format given to PROFINET must not include any STX/ETX frame, because transport works without this ID. If STX/ETX is set as the frame, the characters are entered in the data for the PLC as control characters, which is not normally desirable.

Set output format **without** STX/ETX. This has already been removed in the default setting.



3.3 Configuration of the CLV61x Dual Port via Ethernet (Port 2111/2112) with SOPAS ET

The CLV61x Dual Port can be configured with SOPAS ET V2.38 (or higher) via the network.

The CLV61x Dual Port must have a valid IP (IP is not 0.0.0.0) and the PC must be connected directly to the network (TCP). The connection can be made via Port 2111 or 2112.

Network Scan Assistant		
Detected Devices	Communication Interface	Suitable Device Descriptions
CLV61x-2Port (scanner 1)	192.168.0.1:2111	★ CLV61x-2Port - V1.31
= CLV61x-2Port (scanner 1)	192.168.0.1:2112	★ CLV61x-2Port - V1.31

The actual configuration is then identical to the procedure with USB.

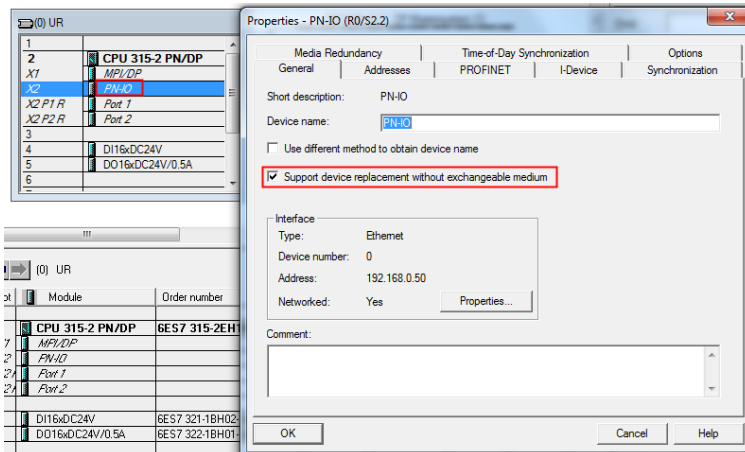
Note that normally, the PLC allocates the IP address assigned to the PN name.

This should avoid the need to change the IP address via SOPAS ET.

3.4 Device replacement of the CLV61x Dual Port

Under the following conditions, device replacement can be achieved with automatic configuration:

- The components used (managed switches, etc.) allow automatic name allocation.
- The topology was "taught" or configured.
- Automatic allocation of PN names by PROFINET IO Controller (PLC) was activated. "Support device replacement without exchangeable medium"



- The IP address is automatically allocated by PROFINET IO Controller (PLC).
- CLV61x Dual Port configuration was stored as GSDML configuration.
- The new CLV61x Dual Port being used must be configured with Factory Default settings, or the PN name at least must be empty.

If the new CLV61x Dual Port is then switched on in the PN, then the PLC recognizes that this station has no PN name and automatically allocates the stored PN name. The IP address is then allocated to the PN name accordingly. The configuration of the CLV61x Dual Port correspondingly takes place with the stored GSDML configuration. → The CLV61x Dual Port is thus completely configured without manual intervention. See also Chapter 4.3 – Automatic allocation of PN name

Manual device replacement:

The CLV61x Dual Port can also be replaced manually and configured with SOPAS ET, either via the USB interface or via the Ethernet TCP/IP interface Port 2111/2112.

GSDML configuration:

If a GSDML configuration is stored in the HW Config of the PROFINET IO Controller (PLC), then configuration is always carried out automatically whenever the PROFINET IO is started. This overwrites the existing parameters.

Any existing **GSDML configuration therefore always overrides any parameters**. This cannot be suppressed locally in the CLV61x Dual Port.

4 Handling on the PLC side

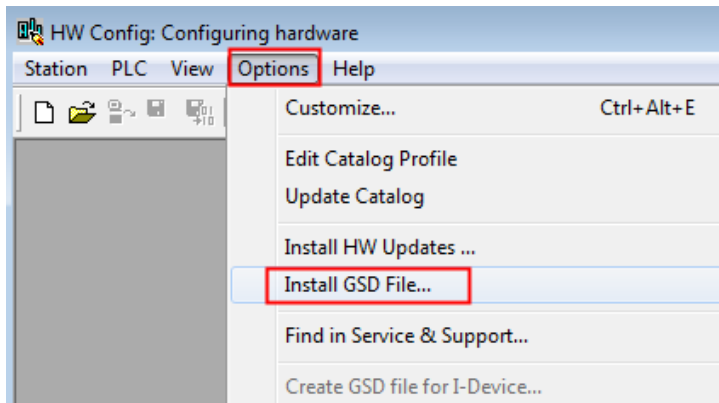
4.1 Installing the GSDML file

The current GSDML files for the relevant sensors to be connected can be downloaded from the following online product page:

www.sick.com/software, Select software type "GSD data file / GSDML".

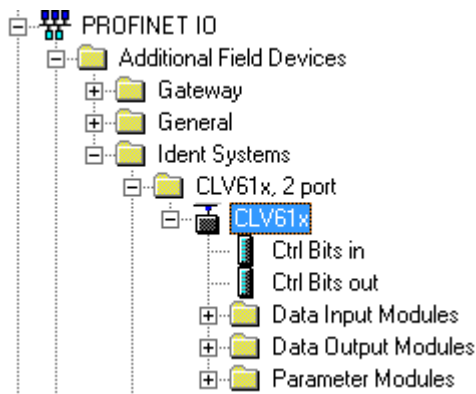
Install the GSDML file associated with the CLV61x Dual Port to be connected as follows:

In the HW Config. Select "Options > Install GSD-Files...".
Then select "Options > Update Catalog".

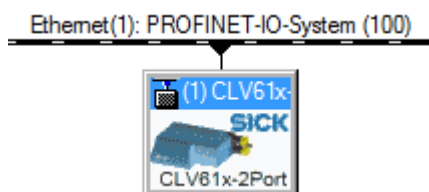


The CLV61x Dual Port is then installed and displayed in the catalog as follows:

"PROFINET-IO / Additional Field Devices / Ident Systems / CLV61x, 2 port"

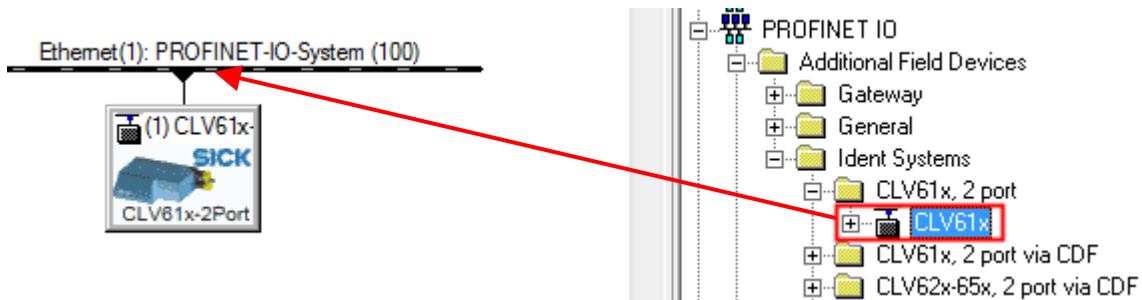


As shown in HW Config:

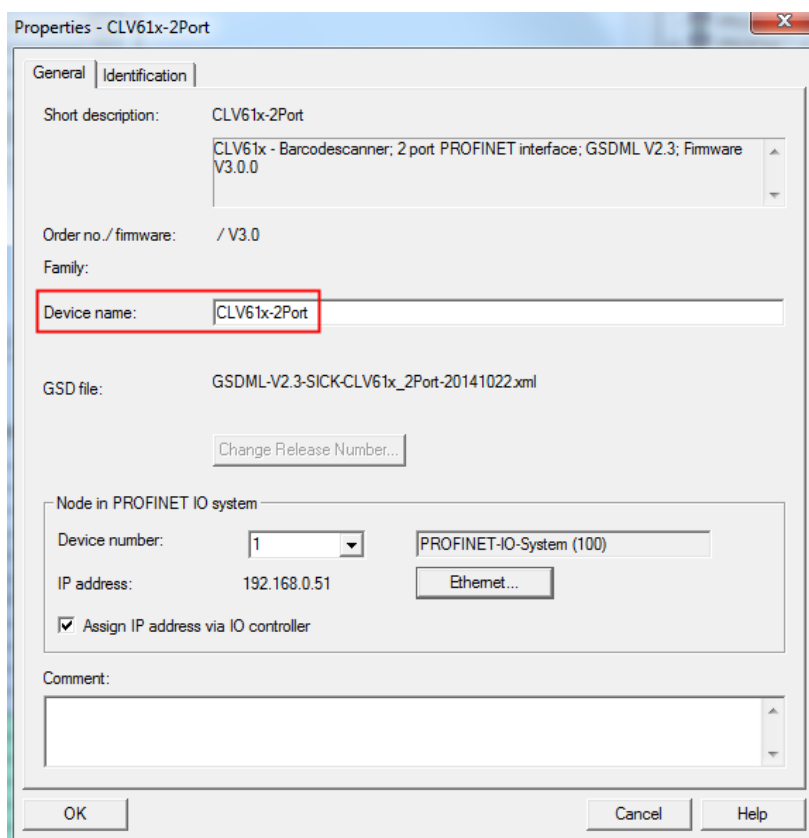


4.2 Adding ID sensors in HW Config

To add the ID sensors to be connected in the system, select the required device, e.g., "CLV61x 2port", and drag-and-drop to the PROFINET line.



You can select the **Device name** for identifying the device in PROFINET by double clicking on the module.



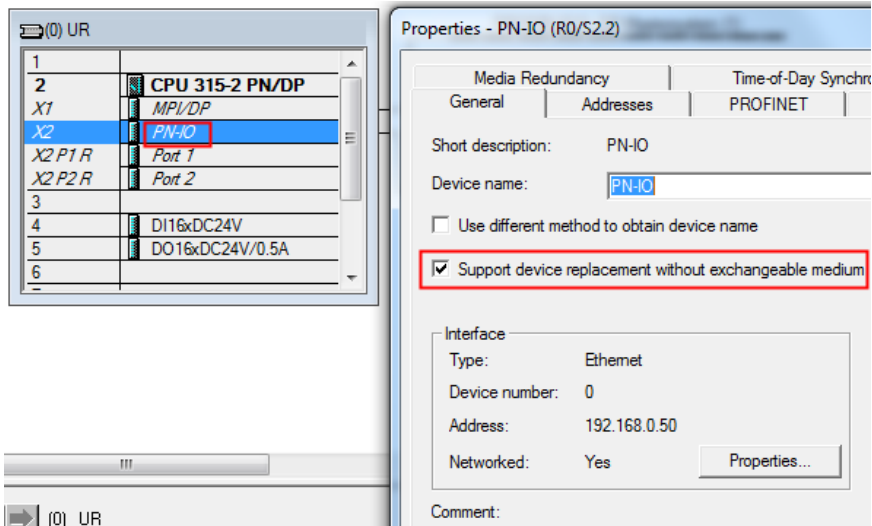
If you activate "Assign IP address via IO controller", the PLC automatically assigns the IP address when a device with the corresponding PROFINET device name has been found.

Make sure that **no duplicate IP addresses** are used. If two devices have the same IP address, change one address before continuing. Use the SOPAS-ET Auto IP Scan, for example, to change the IP address of the ID sensor, or change the IP address of the CLV61x Dual Port via the PLC HW Config.

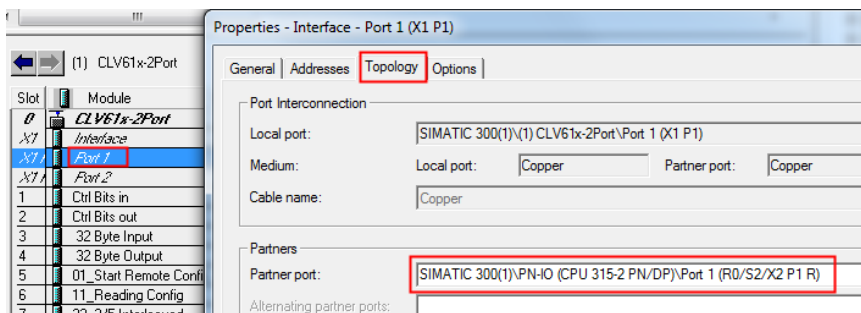
4.3 Assigning PN names automatically

The PN name can be automatically assigned by the PROFINET IO Controller (PLC), if:

- a) This has been activated in the CPU (is activated by default):
Support device replacement without exchangeable medium = active



- b) The topology has been taught-in. A PN partner is then firmly assigned to each used port.



- c) The switches used must support this function, e.g., Scalance X200 series.

If a PN device is connected with an **empty name** and its type matches, the PN name stored on the PROFINET IO Controller (PLC) is assigned. *See also Chapter 3.4 – Device replacement.*

5 Data channel of the CLV61x Dual Port

Various communication protocols can be selected for the data channel in the CLV61x Dual Port. These modes are specific to SICK and require appropriate handling on the software side. The various communication protocols are described in the chapters below.

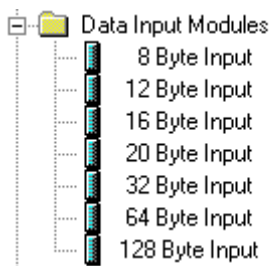
5.1 Handshake Mode / Confirmed Messaging

In this mode, the data channel of the CLV61x Dual Port is operated in Handshake mode / Confirmed Messaging, if the communication protocol has been set to **CDF600 mode** (default setting).

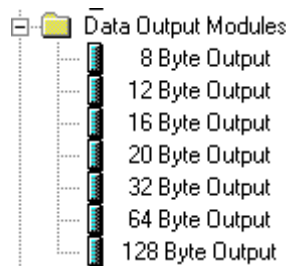
The data channel is compatible with the Byte Handshake mode of the CDF600 PROFINET, CDF600 PROFIBUS, CMF400 PROFIBUS, CDM425, and PROFINET on Board. Send and receive with max. telegram length of 4000 bytes is possible with blocking.

In this mode, **one input and one output module** must be added in the HW Config for the ID sensor or CLV61x Dual Port. The size can be selected. A data size of up to 128 bytes (= 64 words) can be selected. In the input/output modules, 5 bytes are used for administration. A module may contain from 32 bytes to 27 bytes of user data, for example, without necessitating blocking.

Input module (1 – 128 bytes)



Output module (1 – 128 bytes)



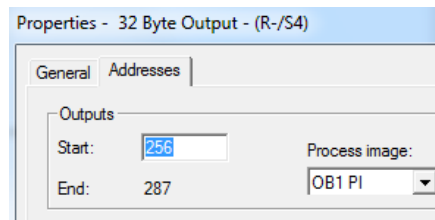
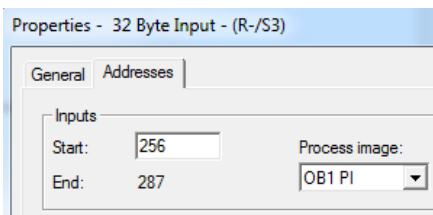
Standard: "32 byte input" and "32 byte output"

Adding one input and one output module as well as the Ctrl bits:

Slot	Module	Order number	I address	Q address	Diagnostic address	Comment
0	CLV61x-2Port				2043*	
X1	Interface				2042*	
X1/1	Port 1				2041*	
X1/2	Port 2				2040*	
1	Ctrl Bits in		0..1			
2	Ctrl Bits out			0..1		
3	32 Byte Input		256...287			
4	32 Byte Output			256...287		
5						
6						

Note: In the case of the CLV61x Dual Port, the input and output modules are added when the device is added. These can be changed if required.

In addition, the I/O address must be selected.

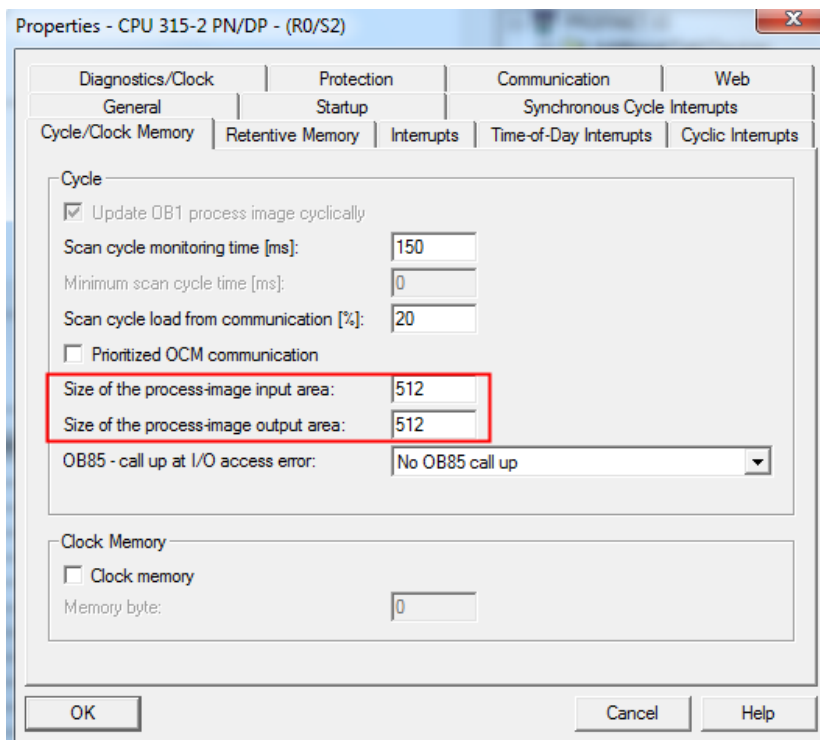


The data must be handled **consistently**. Therefore, the I/O address for an S7-300/400 either must be assigned so that it lies **within its process image** or the **SFC 14/15** modules are used for consistent data transmission.

The size of the process image can be viewed by double-clicking on the CPU in the hardware configuration of S7. More details are available in the S7 documentation.

Example:

A process image size for the S7 CPU of 512 bytes is used here:



5.1.1 Using the SICK function module for PROFINET IO

If the optional SICK function module is used, the addresses of the I/O range incl. the correct length must be assigned to the module. The block then takes over the handling of the Handshake mode and can thus also receive data longer than the input range.

Download at <http://www.sick.com/software>. Category "Function Module".

If the Function Module is used, use of Handshake Mode is obligatory.

The following variants are available:

- a) CLV6xx/Lector6xx for S7 300/400 with integrated PROFINET / PROFIBUS for Step 7 V5.5 ("Classic")
- b) CLV6xx/Lector6xx for S7 300/400 with integrated PROFINET / PROFIBUS for TIA V12 SP1 or higher. (Migrated from Step 7 V5.5)
- c) CLV6xx/Lector6xx for S7 1200/1500 with integrated PROFINET / PROFIBUS for TIA V12 SP1 or higher.

If desired, optional actions such as "Triggering via command", or "Alter Matchcode during operation" can also be used.

More details are available in the documentation of the function block.

Here is an example of the function module for CLV6xx/Lector on a S7 300 with integrated PROFINET based on Step 7 V5.5:

The screenshot displays the SIMATIC Manager interface. On the left, the HW Config window shows a rack configuration for a SIMATIC 300 station. Slot 2 contains the CPU 315-2 PN/DP. Slot 3 contains the CLV61x-2Port module. The rack table below shows the module details:

Slot	Module	Order number	I address	Q address	Diagnostic address
0	CLV61x-2Port				2042*
X1	Interface				2042*
X1 A	Port 1				2041*
X1 A	Port 2				2040*
1	Ctrl Bits in		0...1		
2	Ctrl Bits out			0...1	
3	32 Byte Input		256...287		
4	32 Byte Output			256...287	

On the right, the LAD editor shows the ladder logic for the SICK LECTOR CLV PNDP function block. The block is connected to the hardware configuration. The following parameters are highlighted with red boxes:

- IN_ADDR: W#16#100
- IN_LEN: 32
- OUT_ADDR: W#16#100
- OUT_LEN: 32

Other parameters shown include CAN_ID (0), TOUT (T#10S), and three M12 outputs: M12.0 (Start_Req), M12.1 (Trigon), and M12.2 (Trigoff).

5.1.2 Byte layout CLV61x Dual Port

The data storage area is set up in CDF600 mode as shown below:

The length of the data storage area is up to 128 bytes depending on the module selected.

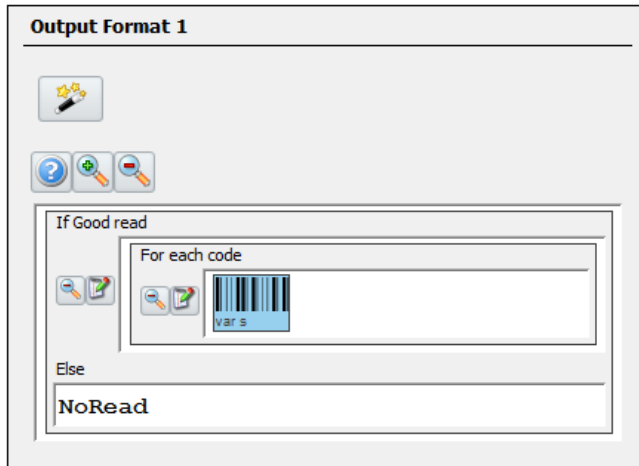
Address	Inputs (Data CLV → PLC)		Output (Data PLC → CLV)
1	Binary status bits In		Binary Status Bits Out
2	ReceiveCount (counter)	→	ReceiveCountBack (counter)
3	TransmitCountBack (counter)	←	TransmitCount (counter)
4	ReceiveLength Lowbyte		TransmitLength Lowbyte
5	ReceiveLength Highbyte		TransmitLength Highbyte
6	ReceiveData, Byte 1		TransmitData, Byte 1
7	ReceiveData, Byte 2		TransmitData, Byte 2
...
n	ReceiveData, Byte n - 5		TransmitData, Byte n - 5

5.1.3 Receiving data

Transmission from the CLV61x Dual Port to the PROFINET IO Controller requires no STX/ETX framing characters.

If the output format contains STX/ETX, it is transmitted as data content to the PLC.

The output format must be formatted **without STX/ETX** in the sensor:



The CLV61x Dual Port puts the received data in the *ReceiveData* field and also adds the *ReceiveLength*. The *ReceiveCount* value is also incremented to show that new data has been received.

Byte handshake:

To show that the PLC has received the data correctly, the PLC must respond to the CLV61x Dual Port by copying the *ReceiveCount* value to the output side for *ReceiveCountBack* within 10 seconds. The second input byte must be copied to the second output byte. (byte handshake →). If the CLV61x Dual Port determines that both values are again identical, it can send the next data block. The *ReceiveCount* runs from 1 to 255. 0 is omitted in normal operation.

If the CLV61x Dual Port sets the value to 0 during operation, it indicates that an error has occurred. In such case, the count must be restarted. To restart the count, the PLC must respond with 0. Otherwise, the count and data transmission does not continue. The PLC must always copy the *ReceiveCount* value to the *ReceiveCountBack* without restriction.

Longer data telegrams are divided into blocks (fragmentation):

If the received data is too long and does not fit in the input range of the PLC completely, it is automatically divided into blocks. The *ReceiveLength* always shows the length of the remaining data. In the first block, the length corresponds to the complete telegram length. If the block was answered with the byte handshake, the next block is sent and the length decremented.

Example:

Receipt of 100 bytes with a block size of 32-byte input (may contain up to 27 bytes in one block)

ReceiveCount	ReceiveLength	ReceiveData
1	100	first 27 data bytes
2	73	next 27 data bytes
3	46	next 27 data bytes
4	19	last 19 data bytes, the rest will be filled with 00

The *ReceiveLength* must be checked to determine whether a single block or the start of longer fragmented data was received. If *ReceiveLength* is longer than the data input variable, then fragmentation occurs.

If shorter, it is a single telegram.

5.1.4 Example 1, receipt of a single block telegram (HS mode):

Input: 16 bytes, output: 16 bytes, data telegram with up to 11 bytes → single block
 This can be done by triggering the CLV61x Dual Port, e.g. via the trigger bit in the Ctrl bits.
 Only data can then be received by the PLC.

			Time:	1	2	3	4
<i>// Input Byte - 16 Byte (Result Data received from CDM / Sensor)</i>							
EB 50	"Stat-In-Bits"	BIN		2#0000_0100	2#0000_0100	2#0000_0000	2#0000_0000
EB 51	"Rec-Cnt"	DEC		1	1	2	2
EB 52	"Tr-Cnt-back"	DEC		0	0	0	0
EB 53	"Rec-Len-Low"	DEC		11	11	9	9
EB 54	"Rec-Len-High"	DEC		0	0	0	0
EB 55	"Rec-Data-1"	CHARACTER		'C'	'C'	'1'	'1'
EB 56	"Rec-Data-2"	CHARACTER		'L'	'L'	'2'	'2'
EB 57	"Rec-Data-3"	CHARACTER		'V'	'V'	'3'	'3'
EB 58	"Rec-Data-4"	CHARACTER		'6'	'6'	'4'	'4'
EB 59	"Rec-Data-5"	CHARACTER		'x'	'x'	'5'	'5'
EB 60	"Rec-Data-6"	CHARACTER		'x'	'x'	'6'	'6'
EB 61	"Rec-Data-7"	CHARACTER		'I'	'I'	'7'	'7'
EB 62	"Rec-Data-8"	CHARACTER		'D'	'D'	'8'	'8'
EB 63	"Rec-Data-9"	CHARACTER		'a'	'a'	'9'	'9'
EB 64	"Rec-Data-10"	CHARACTER		't'	't'	B#16#00	B#16#00
EB 65	"Rec-Data-11"	CHARACTER		'a'	'a'	B#16#00	B#16#00
<i>// Output bytes - 16 Byte (e.g. Commands send to CDM / Sensor)</i>							
AB 50	"Stat-Out-Bits"	BIN		2#0000_0000	2#0000_0000	2#0000_0000	2#0000_0000
AB 51	"Rec-Cnt-Back"	DEC		0	1	1	2
AB 52	"Tr-Cnt"	DEC		0	0	0	0
AB 53	"Tr-Len-Low"	DEC		0	0	0	0
AB 54	"Tr-Len-High"	DEC		0	0	0	0
AB 55	"Tr-Data-1"	CHARACTER		B#16#00	B#16#00	B#16#00	B#16#00
AB 56	"Tr-Data-2"	CHARACTER		B#16#00	B#16#00	B#16#00	B#16#00
AB 57	"Tr-Data-3"	CHARACTER		B#16#00	B#16#00	B#16#00	B#16#00
AB 58	"Tr-Data-4"	CHARACTER		B#16#00	B#16#00	B#16#00	B#16#00
AB 59	"Tr-Data-5"	CHARACTER		B#16#00	B#16#00	B#16#00	B#16#00
AB 60	"Tr-Data-6"	CHARACTER		B#16#00	B#16#00	B#16#00	B#16#00
AB 61	"Tr-Data-7"	CHARACTER		B#16#00	B#16#00	B#16#00	B#16#00
AB 62	"Tr-Data-8"	CHARACTER		B#16#00	B#16#00	B#16#00	B#16#00
AB 63	"Tr-Data-9"	CHARACTER		B#16#00	B#16#00	B#16#00	B#16#00
AB 64	"Tr-Data-10"	CHARACTER		B#16#00	B#16#00	B#16#00	B#16#00
AB 65	"Tr-Data-11"	CHARACTER		B#16#00	B#16#00	B#16#00	B#16#00

Remarks:

- Time 1: The initial data block "CLV6xx-Data" (11 bytes) has been received and the PLC shows ReceiveCount = 1.
- Time 2: The PLC has detected the data and confirms it by copying from ReceiveCount to ReceiveCountBack. The CLV61x Dual Port is now ready for the next data block.
- Time 3: The next data block "123456789" (9 bytes) has been received by the CLV61x Dual Port and the PLC shows ReceiveCount = 2
- Time 4: The PLC has detected the data and confirms it by copying from ReceiveCount to ReceiveCountBack. The CLV61x Dual Port is now ready for the next data block.

5.1.5 Example 2, receipt of a blocked telegram (HS mode):

Input: 16 bytes, output: 16 bytes, data telegram "CLV6xx-12345" with up to 12 bytes → divided into 2 blocks
 This can be done by triggering the CLV61x Dual Port, e.g. via the hardware. Only data can then be received by the PLC.

			Time:	1	2/3	4
<i>// Input Byte - 16 Byte (Result Data received from CDM / Sensor)</i>						
EB 50	"Stat-In-Bits"	BIN	2#0000_0000	2#0000_0000	2#0000_0100	
EB 51	"Rec-Cnt"	DEC	1	2	2	
EB 52	"Tr-Cnt-back"	DEC	0	0	0	
EB 53	"Rec-Len-Low"	DEC	12	1	1	
EB 54	"Rec-Len-High"	DEC	0	0	0	
EB 55	"Rec-Data-1"	CHARACTER	'C'	'5'	'5'	
EB 56	"Rec-Data-2"	CHARACTER	'L'	B#16#00	B#16#00	
EB 57	"Rec-Data-3"	CHARACTER	'V'	B#16#00	B#16#00	
EB 58	"Rec-Data-4"	CHARACTER	'6'	B#16#00	B#16#00	
EB 59	"Rec-Data-5"	CHARACTER	'x'	B#16#00	B#16#00	
EB 60	"Rec-Data-6"	CHARACTER	'x'	B#16#00	B#16#00	
EB 61	"Rec-Data-7"	CHARACTER	'l'	B#16#00	B#16#00	
EB 62	"Rec-Data-8"	CHARACTER	'1'	B#16#00	B#16#00	
EB 63	"Rec-Data-9"	CHARACTER	'2'	B#16#00	B#16#00	
EB 64	"Rec-Data-10"	CHARACTER	'3'	B#16#00	B#16#00	
EB 65	"Rec-Data-11"	CHARACTER	'4'	B#16#00	B#16#00	
<i>// Output bytes - 16 Byte (e.g. Commands send to CDM / Sensor)</i>						
AB 50	"Stat-Out-Bits"	BIN	2#0000_0000	2#0000_0000	2#0000_0000	
AB 51	"Rec-Cnt-Back"	DEC	0	1	2	
AB 52	"Tr-Cnt"	DEC	0	0	0	
AB 53	"Tr-Len-Low"	DEC	0	0	0	
AB 54	"Tr-Len-High"	DEC	0	0	0	
AB 55	"Tr-Data-1"	CHARACTER	B#16#00	B#16#00	B#16#00	
AB 56	"Tr-Data-2"	CHARACTER	B#16#00	B#16#00	B#16#00	
AB 57	"Tr-Data-3"	CHARACTER	B#16#00	B#16#00	B#16#00	
AB 58	"Tr-Data-4"	CHARACTER	B#16#00	B#16#00	B#16#00	
AB 59	"Tr-Data-5"	CHARACTER	B#16#00	B#16#00	B#16#00	
AB 60	"Tr-Data-6"	CHARACTER	B#16#00	B#16#00	B#16#00	
AB 61	"Tr-Data-7"	CHARACTER	B#16#00	B#16#00	B#16#00	
AB 62	"Tr-Data-8"	CHARACTER	B#16#00	B#16#00	B#16#00	
AB 63	"Tr-Data-9"	CHARACTER	B#16#00	B#16#00	B#16#00	
AB 64	"Tr-Data-10"	CHARACTER	B#16#00	B#16#00	B#16#00	
AB 65	"Tr-Data-11"	CHARACTER	B#16#00	B#16#00	B#16#00	

Remarks:

- Time 1: The first data block "CLV6xx-1234" (the first 11 bytes) has been received and the PLC shows ReceiveCount = 1. The ReceiveLength is 12 bytes.
- Time 2: The PLC has detected the data and because it has noted that 12 bytes do not fit in the input range, it knows that at least one more block follows. It confirms the first block by copying ReceiveCount to ReceiveCountBack.
- Time 3: The CLV61x Dual Port sends the next block "5" (just 1 byte is left) to the PLC with ReceiveCount = 2 and ReceiveLength = 1.
- Time 4: The PLC has detected the next block and confirms it by copying from ReceiveCount to ReceiveCountBack. Transmission of the entire telegram has been completed.

The transportable data volume depends on the input range selected.
 Input size minus 5 → Input block size
 The max. length of a data telegram is 4000 bytes divided into several blocks.

5.1.6 Send data

The PLC can also send data, such as commands, to the CLV61x Dual Port. This is optional and only required if actions such as triggering by SOPAS ETcommand must be carried out. In the CLV61x Dual Port, only commands that produce an echo or response, e.g., SOPAS ET commands, are permitted.

Data can be sent and received independently. It is recommended to first implement data receipt in the PLC and then to start creating the send routine.

To send data, it must be copied to the output range of the CLV61x Dual Port. The send data is entered without the STX/ETX frame.

Example:

PLC output range: 4 bytes with content: **S R I 0**

→ Sent as SOPAS command to ID sensor and answered with "sRA ...".

The **Send begins by incrementing** the *TransmitCount*-value by 1. The value must run from 1 to 255 and then start again at 1. The 0 must be omitted.

By copying the *TransmitCount* to *TransmitCountBack*, the CLV61x Dual Port confirms that the data has been sent. **Before the next data block can be sent**, the PLC must wait until these values are **again identical**.

If the CLV61x Dual Port has set the *TransmitCountBack* to 0, it indicates that an error has occurred and the count must start again. The PLC also has to set the *TransmitCount* to 0 for approx. 1 second to confirm that the error was detected. Data can then be sent again.

The cause of an error may be:

- Invalid length > 4000 bytes
- A transmission started with the first block, but subsequent blocks could not be sent or were faulty.
- *TransmitCount* was not incremented in the correct order.
The counting must be 1, 2, 3, ... 255, 1, 2, 3, etc.

Longer send data must be divided into blocks (fragmentation):

If a longer data telegram needs to be sent, it can be transmitted to the CLV61x Dual Port in blocks. Therefore, start with the first block and always set the length to the data length to be sent. If the block was answered by the CLV61x Dual Port with *TransmitCountBack* as a byte handshake, the next block can be sent and the length decremented. The next block must follow within 10 seconds. Otherwise, a timeout occurs.

Example:

Transmission of 100 bytes with a block size of 32-byte output (may contain up to 27 bytes in one block)

TransmitCount	TransmitLength	TransmitData
1	100	first 27 data bytes
2	73	next 27 data bytes
3	46	next 27 data bytes
4	19	last 19 data bytes

5.1.7 Example 3, transmission of a single block telegram (HS mode)

Input: 16 bytes, output: 16 bytes, data telegram with 4 bytes "sRI0" is sent.

The CLV61x Dual Port responds with "sRA ...".

The command can be used to query the software version of the sensor / SDD file or to generally check the communication channel. This command can be used for all SOPAS ET based Cola-A sensors (CLV6xx, LECTOR62x, RFH6xx, RFU6xx, etc.) irrespective of the configuration.

				Time:	1/2	3/4	5	6/7	8
// Input Data - 16 byte (result Data received from PLC)									
EB 50	"Stat-In-Bits"	BIN			2#0000_0000	2#0000_0000	2#0000_0100	2#0000_0000	2#0000_0100
EB 51	"Rec-Cnt"	DEZ		1	2	2	3	3	
EB 52	"Tr-Cnt-Back"	DEZ		1	1	1	2	2	
EB 53	"Rec-Len-Low"	DEZ		22	11	11	6	6	
EB 54	"Rec-Len-High"	DEZ		0	0	0	0	0	
EB 55	"Rec-Data-1"	ZEICHEN		's'	'6'	'6'	's'	's'	
EB 56	"Rec-Data-2"	ZEICHEN		'R'	'2'	'2'	'F'	'F'	
EB 57	"Rec-Data-3"	ZEICHEN		'A'	'x'	'x'	'A'	'A'	
EB 58	"Rec-Data-4"	ZEICHEN		''	''	''	''	''	
EB 59	"Rec-Data-5"	ZEICHEN		'0'	'5'	'5'	'1'	'1'	
EB 60	"Rec-Data-6"	ZEICHEN		''	''	''	'1'	'1'	
EB 61	"Rec-Data-7"	ZEICHEN		'6'	'V'	'V'	B#16#00	B#16#00	
EB 62	"Rec-Data-8"	ZEICHEN		''	'5'	'5'	B#16#00	B#16#00	
EB 63	"Rec-Data-9"	ZEICHEN		'C'	'.'	'.'	B#16#00	B#16#00	
EB 64	"Rec-Data-10"	ZEICHEN		'L'	'1'	'1'	B#16#00	B#16#00	
EB 65	"Rec-Data-11"	ZEICHEN		'V'	'1'	'1'	B#16#00	B#16#00	
// Output Data - 16 byte (e.g. Commands send from PLC)									
AB 50	"Stat-Out-Bits"	BIN		2#0000_0000	2#0000_0000	2#0000_0000	2#0000_0000	2#0000_0000	
AB 51	"Rec-Cnt-Back"	DEZ		0	1	2	2	3	
AB 52	"Tr-Cnt"	DEZ		1	1	1	2	2	
AB 53	"Tr-Len-Low"	DEZ		4	4	4	4	4	
AB 54	"Tr-Len-High"	DEZ		0	0	0	0	0	
AB 55	"Tr-Data-1"	ZEICHEN		's'	's'	's'	's'	's'	
AB 56	"Tr-Data-2"	ZEICHEN		'R'	'R'	'R'	'R'	'R'	
AB 57	"Tr-Data-3"	ZEICHEN		'I'	'I'	'I'	'I'	'I'	
AB 58	"Tr-Data-4"	ZEICHEN		'0'	'0'	'0'	'X'	'X'	
AB 59	"Tr-Data-5"	ZEICHEN		B#16#00	B#16#00	B#16#00	B#16#00	B#16#00	
AB 60	"Tr-Data-6"	ZEICHEN		B#16#00	B#16#00	B#16#00	B#16#00	B#16#00	
AB 61	"Tr-Data-7"	ZEICHEN		B#16#00	B#16#00	B#16#00	B#16#00	B#16#00	
AB 62	"Tr-Data-8"	ZEICHEN		B#16#00	B#16#00	B#16#00	B#16#00	B#16#00	
AB 63	"Tr-Data-9"	ZEICHEN		B#16#00	B#16#00	B#16#00	B#16#00	B#16#00	
AB 64	"Tr-Data-10"	ZEICHEN		B#16#00	B#16#00	B#16#00	B#16#00	B#16#00	
AB 65	"Tr-Data-11"	ZEICHEN		B#16#00	B#16#00	B#16#00	B#16#00	B#16#00	

Remarks:

- Time 1: First data telegram "sRI0" (SDD version) was sent by setting TransmitCount = 1 on the output side. If the CLV61x Dual Port has sent the data, it confirms it by copying TransmitCount to TransmitCountBack on the input side.
- Time 2: The CLV61x Dual Port responds with "RA 0 6 CLV62x 5 V5.11" (22 bytes). The first 11 bytes ("sRA 0 6 CLV") are reported to the PLC with ReceiveCount = 1 and ReceiveLength 22 bytes (total length). The PLC has detected the data and because it has noted that 22 bytes does not fit in the input range, it knows that another block follows. It confirms the first block by copying ReceiveCount to ReceiveCountBack.
- Time 3: The CLV61x Dual Port immediately sends the next (last) block "62x 5 V5.11" (11 bytes) to the PLC with ReceiveCount = 2 and ReceiveLength = 11.

- Time 4/5: The PLC has detected the additional data and confirms it by copying from ReceiveCount to ReceiveCountBack. The CLV61x Dual Port is now ready for the next data block.
- Time 6: The next data telegram "sRIX" (here a faulty command) was sent by incrementing TransmitCount on the output side to 2. The CLV61x Dual Port confirms this by TransmitCountBack = 2 on the input side.
- Time 7: The device responds here with an error message "sFA 11" (6 bytes, FA = error response, 11 = character error). This is reported to the PLC with ReceiveCount = 3 and ReceiveLength 6 bytes.
- Time 8: The PLC has detected the data and confirms it by copying the ReceiveCount to ReceiveCountBack. The device is now ready for additional data.

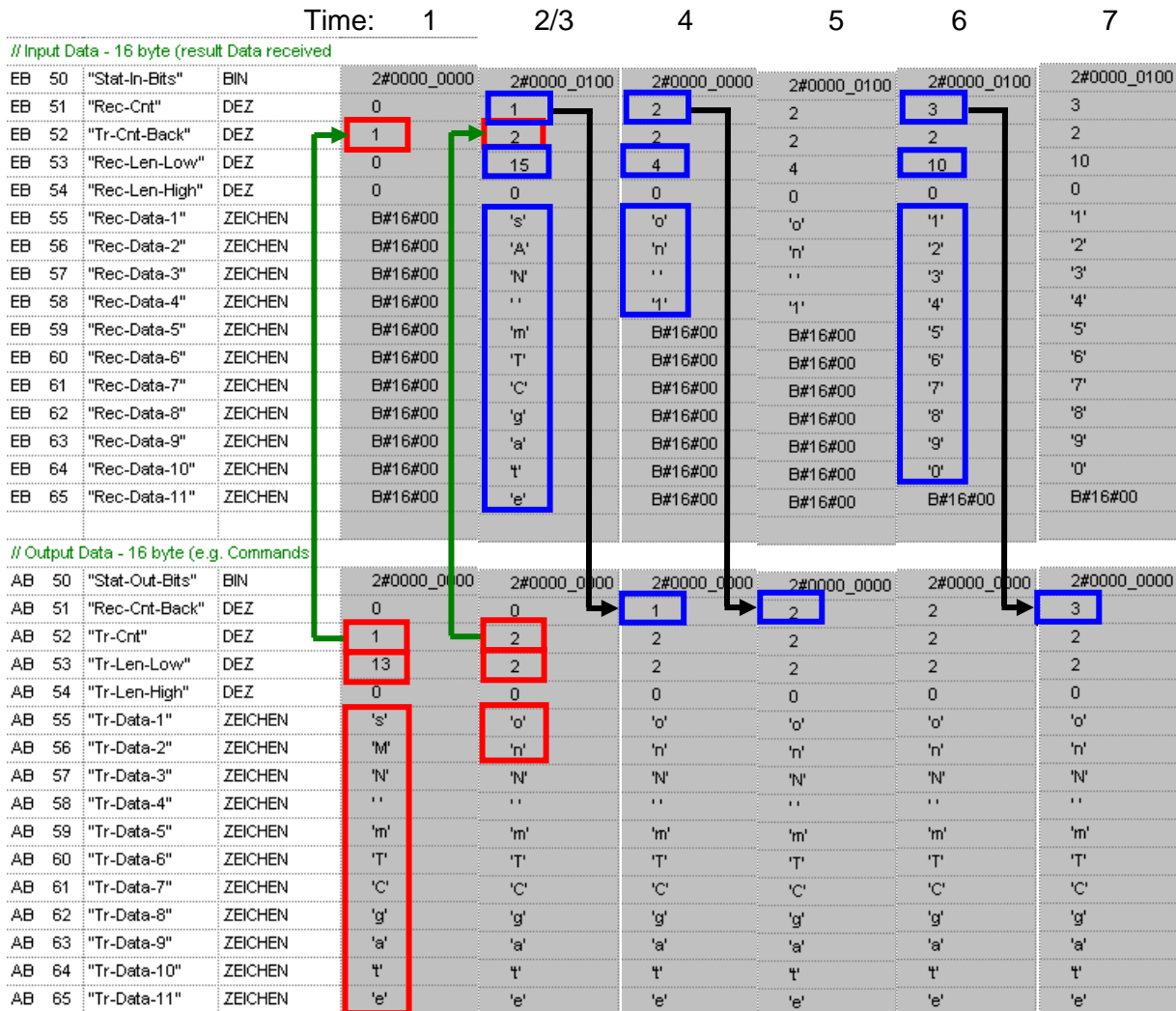
It is also advisable to test the required commands in advance e.g., using the SOPAS ET terminals connected to the serial AUX interface or the AUX port of the Ethernet interface of the ID sensor. The CLV61x Dual Port can process SOPAS ET commands from any of its data interfaces.

5.1.8 Example 4, transmission of a blocked telegram (HS mode):

Input: 16 bytes, output: 16 bytes, data telegram software trigger "sMN mTCgateon" with 13 bytes.
 Because the telegram is too long, 2 blocks are required.

This command can be used for all ID sensors (CLV6xx, Lector6xx, RFH6xx, RFU6xx, etc.) for triggering. The trigger source must be configured to (SOPAS) command.

A successful reading with output is immediately shown. If desired, the command "sMN mTCgateoff" (14 bytes) can also be used to terminate the trigger. This is not shown here.



Remarks:

- Time 1: The first data block of 11 bytes has been sent by setting TransmitCount = 1 with TransmitLength = 13. If the CLV61x Dual Port has received the first data block, it confirms it by copying TransmitCount to TransmitCountBack on the input side.
- Time 2: The second data block of the last 2 bytes has been sent by incrementing from TransmitCount = 2 with TransmitLength = 2. If the CLV61x Dual Port has received the second data block, it confirms it by copying TransmitCount to TransmitCountBack on the input side.
- Time 3: The CLV61x Dual Port sends the echo of the trigger command "sMN mTCgateon" to the PLC with ReceiveCount = 1 and ReceiveLength 15 bytes.
- Time 4: The PLC confirms receipt of the first 11 bytes with ReceiveCountBack = 1. The CLV61x Dual Port then sends the remaining 2 bytes to the PLC with ReceiveCount = 2 and RecLength = 2.
- Time 5: The PLC confirms receipt of the data with ReceiveCountBack = 2
- Time 6: On receiving "Output immediately", the CLV61x Dual Port sends the result immediately, e.g., upon detection of the bar code. 10 bytes ("1234567890") are reported to the PLC with ReceiveCount = 3 and ReceiveLength 10 bytes.

Time 7: The PLC confirms receipt of the data with ReceiveCountBack = 3.

The TransmitCount must begin again with 1 when 255 is reached, i.e., 0 must be omitted.

The transportable data volume depends on the output range selected.

Output size minus 5 → Output block size

The max. length of a data telegram is 4000 bytes divided into several blocks.

5.1.9 Binary status bits In

The first input byte (see *chapter 5.1.2*) displays the binary status bits In.

It contains some status bits and one heartbeat bit.

Bit	Name	Meaning
D7	–	Reserved
D6	<i>Transmit Buffer Overrun</i>	0: No error 1: The CLV61x Dual Port has received send data from the PLC and the queue is full. Reset: With the next successful transmit telegram sent from the PLC.
D5	<i>Receive Buffer Overrun</i>	0: No error 1: The receive buffer is full and the received data must be discarded. Reset: With the next modified ReceiveCountBack from the PLC side.
D4	–	Reserved
D3	<i>PLC Error</i>	0: No error 1: The CLV61x Dual Port identified a handling error when sending data in the PROFINET IO controller (PLC). The fieldbus module does not accept the transmitted data if this error occurs and requires resynchronization with the PROFINET IO controller (PLC). The PLC program must be corrected based on the error. Possible causes: - Impermissible length (e.g., length > 4000). - The subsequent block was not received within 10 seconds. - TransmitCount was incremented in the wrong sequence. If "PLC Error" bit is set, no send data are transmitted. However, the receiver side is further processed. If "PLC Error" bit is set, TransmitCountBack is set to 0. The PLC Error bit is cleared after TransmitCount is reset to 0 by the PLC.
D2	<i>Heartbeat</i>	0/1: Changes every second – shows the presence of the CLV61x Dual Port.
D1	–	Reserved
D0	–	Reserved

"Binary Status Bits" - Assignment in Handshake / No-Handshake mode

5.1.10 Binary Status Bits Out

The first output byte in the header is reserved. It must be set to zero.

Bit	Name	Meaning
D7	–	Reserved
D6	–	Reserved
D5	–	Reserved
D4	–	Reserved
D3	–	Reserved
D2	–	Reserved
D1	–	Reserved
D0	–	Reserved

"Binary Status Bits Out" - Assignment in Handshake / No-Handshake mode

5.2 No-Handshake Mode

The data channel of the CLV61x Dual Port is operated in No Handshake mode, if the communication protocol has been configured with **CDF600 NO Handshake mode**.

The data channel is compatible with the No-Handshake mode of the CDF600 PROFINET, CDF600 PROFIBUS, CMF400 PROFIBUS, CDM425, and PROFINET on Board. The max. telegram length is limited by the size of the input/output range and is max. 123 bytes. There is no fragmenting / blocking.

In this mode, **one input and one output module, Ctrl bits In and Ctrl bits Out** must be added in HW Config for the CLV61x Dual Port. The size can be freely selected. In the input/output modules, 5 bytes are used for administration. A module may contain from e.g. 32 bytes to 27 bytes of user data.

This mode is only recommended if the length of the received data does not exceed the input range minus 5. It is also necessary to ensure that the PLC always has enough time to receive the data before the next data block arrives. Therefore, this mode is only recommended for testing or for individual devices with low communication load.

To select No-Handshake mode, "CDF600 No-Handshake mode" must be configured and permanently saved in the ID sensor. The mode is only active after restarting the CLV61x Dual Port.

For the data channel, one input module and one output module must be selected as in CDF600 mode (Handshake mode). In terms of the layout, the mode is identical to the HS mode except that fragmentation is not possible on both the receiver and transmission sides.

The binary inputs and outputs are identical to the Handshake mode.
The Ctrl bits can also be used.

5.2.1 Byte layout in No-Handshake Mode (NH):

Address	Inputs (Data CLV → PLC)		Output (Data PLC → CLV)
1	Binary inputs		Binary outputs
2	ReceiveCount (counter)	→	ReceiveCountBack (counter)
3	TransmitCountBack (counter)	←	TransmitCount (counter)
4	ReceiveLength Lowbyte		TransmitLength Lowbyte
5	ReceiveLength Highbyte		TransmitLength Highbyte
6	ReceiveData, Byte 1		TransmitData, Byte 1
7	ReceiveData, Byte 2		TransmitData, Byte 2
...
N	ReceiveData, Byte n - 5		TransmitData, Byte n - 5

The length of the data storage area is up to max. 123 bytes depending on the module selected. The first 5 bytes are used for administration and have special meaning. The remaining bytes from byte 6 onward are the ASCII data for sending / receiving.

The binary inputs and outputs are identical to the Handshake mode.

5.2.2 Receiving data in No-Handshake Mode

The data format is set as in Handshake mode without the STX/ETX frame.

The CLV61x Dual Port puts the received data in the *ReceiveData* field and also adds its *ReceiveLength*. The *ReceiveCount* value is also incremented to show that new data has been received.

If the data is too long, the overhanging data is truncated and lost during transmission.

If additional data is received, it is always presented to the PLC directly. It is not checked if the user program in the PLC has already received the data. As a result, data may be overwritten without warning. However, the user program can check whether the *ReceiveCount* value is incremented by more than 1 to determine that data has been overwritten.

5.2.3 Example 5, receive telegram (NH mode):

Input: 16 bytes, output: 16 bytes, data telegram with up to 11 bytes are possible. No Handshake is required. This can occur, for example, by triggering the CLV61x Dual Port via the fieldbus trigger bit, so that the PLC only has to complete data receipt.

			Time:		
			1	2	3
<i>// Input Byte - 16 Byte (Result Data received from CDM / Sensor)</i>					
EB 50	"Stat-In-Bits"	BIN	2#0000_0100	2#0000_0000	2#0000_0100
EB 51	"Rec-Cnt"	DEC	1	2	3
EB 52	"Tr-Cnt-back"	DEC	0	0	0
EB 53	"Rec-Len-Low"	DEC	8	4	6
EB 54	"Rec-Len-High"	DEC	0	0	0
EB 55	"Rec-Data-1"	CHARACTER	'1'	'S'	'N'
EB 56	"Rec-Data-2"	CHARACTER	'2'	'I'	'o'
EB 57	"Rec-Data-3"	CHARACTER	'3'	'C'	'R'
EB 58	"Rec-Data-4"	CHARACTER	'4'	'K'	'e'
EB 59	"Rec-Data-5"	CHARACTER	'5'	B#16#00	'a'
EB 60	"Rec-Data-6"	CHARACTER	'6'	B#16#00	'd'
EB 61	"Rec-Data-7"	CHARACTER	'7'	B#16#00	B#16#00
EB 62	"Rec-Data-8"	CHARACTER	'8'	B#16#00	B#16#00
EB 63	"Rec-Data-9"	CHARACTER	B#16#00	B#16#00	B#16#00
EB 64	"Rec-Data-10"	CHARACTER	B#16#00	B#16#00	B#16#00
EB 65	"Rec-Data-11"	CHARACTER	B#16#00	B#16#00	B#16#00
<i>// Output bytes - 16 Byte (e.g. Commands send to CDM / Sensor)</i>					
AB 50	"Stat-Out-Bits"	BIN	2#0000_0000	2#0000_0000	2#0000_0000
AB 51	"Rec-Cnt-Back"	DEC	0	0	0
AB 52	"Tr-Cnt"	DEC	0	0	0
AB 53	"Tr-Len-Low"	DEC	0	0	0
AB 54	"Tr-Len-High"	DEC	0	0	0
AB 55	"Tr-Data-1"	CHARACTER	B#16#00	B#16#00	B#16#00
AB 56	"Tr-Data-2"	CHARACTER	B#16#00	B#16#00	B#16#00
AB 57	"Tr-Data-3"	CHARACTER	B#16#00	B#16#00	B#16#00
AB 58	"Tr-Data-4"	CHARACTER	B#16#00	B#16#00	B#16#00
AB 59	"Tr-Data-5"	CHARACTER	B#16#00	B#16#00	B#16#00
AB 60	"Tr-Data-6"	CHARACTER	B#16#00	B#16#00	B#16#00
AB 61	"Tr-Data-7"	CHARACTER	B#16#00	B#16#00	B#16#00
AB 62	"Tr-Data-8"	CHARACTER	B#16#00	B#16#00	B#16#00
AB 63	"Tr-Data-9"	CHARACTER	B#16#00	B#16#00	B#16#00
AB 64	"Tr-Data-10"	CHARACTER	B#16#00	B#16#00	B#16#00
AB 65	"Tr-Data-11"	CHARACTER	B#16#00	B#16#00	B#16#00

Remarks:

- Time 1: The first data block "12345678" (8 bytes) has been received and the PLC shows ReceiveCount = 1
- Time 2: The second data block "SICK" (4 bytes) has been received and the PLC shows ReceiveCount = 2.
- Time 3: The third data block "NoRead" (6 bytes) has been received and the PLC shows ReceiveCount = 3

5.2.4 Example 6, send telegram (NH mode)

Input: 16 bytes, output: 16 bytes, data telegram with 4 bytes "sRI0" is sent.

The CLV61x Dual Port responds with "sRA ...".

The command can be used to query the software version of the CLV61x Dual Port/SDD file or to check the communication channel generally. This command can be used for all ID sensors (CLV6xx, Lector62x, RFH6xx, RFU6xx, etc.) irrespective of the configuration.

		Time:		1/2	3/4
<i>// Input Data - 16 byte (result Data received from PLC)</i>					
EB 50	"Stat-In-Bits"	BIN	2#0000_0000	2#0000_0100	
EB 51	"Rec-Cnt"	DEZ	1	2	
EB 52	"Tr-Cnt-Back"	DEZ	1	2	
EB 53	"Rec-Len-Low"	DEZ	22	6	
EB 54	"Rec-Len-High"	DEZ	0	0	
EB 55	"Rec-Data-1"	ZEICHEN	's'	's'	
EB 56	"Rec-Data-2"	ZEICHEN	'R'	'F'	
EB 57	"Rec-Data-3"	ZEICHEN	'A'	'A'	
EB 58	"Rec-Data-4"	ZEICHEN	' '	' '	
EB 59	"Rec-Data-5"	ZEICHEN	'0'	'1'	
EB 60	"Rec-Data-6"	ZEICHEN	' '	'1'	
EB 61	"Rec-Data-7"	ZEICHEN	'6'	B#16#00	
EB 62	"Rec-Data-8"	ZEICHEN	' '	B#16#00	
EB 63	"Rec-Data-9"	ZEICHEN	'C'	B#16#00	
EB 64	"Rec-Data-10"	ZEICHEN	'L'	B#16#00	
EB 65	"Rec-Data-11"	ZEICHEN	'V'	B#16#00	
<i>// Output Data - 16 byte (e.g. Commands send from PLC)</i>					
AB 50	"Stat-Out-Bits"	BIN	2#0000_0000	2#0000_0000	
AB 51	"Rec-Cnt-Back"	DEZ	0	0	
AB 52	"Tr-Cnt"	DEZ	1	2	
AB 53	"Tr-Len-Low"	DEZ	4	4	
AB 54	"Tr-Len-High"	DEZ	0	0	
AB 55	"Tr-Data-1"	ZEICHEN	's'	's'	
AB 56	"Tr-Data-2"	ZEICHEN	'R'	'R'	
AB 57	"Tr-Data-3"	ZEICHEN	'I'	'I'	
AB 58	"Tr-Data-4"	ZEICHEN	'0'	'X'	
AB 59	"Tr-Data-5"	ZEICHEN	B#16#00	B#16#00	
AB 60	"Tr-Data-6"	ZEICHEN	B#16#00	B#16#00	
AB 61	"Tr-Data-7"	ZEICHEN	B#16#00	B#16#00	
AB 62	"Tr-Data-8"	ZEICHEN	B#16#00	B#16#00	
AB 63	"Tr-Data-9"	ZEICHEN	B#16#00	B#16#00	
AB 64	"Tr-Data-10"	ZEICHEN	B#16#00	B#16#00	
AB 65	"Tr-Data-11"	ZEICHEN	B#16#00	B#16#00	

Remarks:

- Time 1: First data telegram "sRI0" (SDD version) was sent by setting TransmitCount = 1 on the output side. If the CLV61x Dual Port has sent the data, it confirms it by copying TransmitCount to TransmitCountBack on the input side.
- Time 2: The CLV61x Dual Port responds with "RA 0 6 CLV62x 5 V5.11" (22 bytes). The first 11 bytes ("sRA 0 6 CLV") are reported to the PLC with ReceiveCount = 1 and ReceiveLength 22 bytes (total length). The remaining 11 bytes of data are lost. You may want to select a larger input range.
- Time 3: The next data telegram "sRIX" (here a faulty command) was sent by incrementing TransmitCount on the output side to 2. The CLV61x Dual Port confirms this by TransmitCountBack = 2 on the input side.

Time 4: The CLV61x Dual Port responds here with an error message "sFA 11" (6 bytes, FA = error response, 11 = character error). This is reported to the PLC with ReceiveCount = 2 and ReceiveLength 6 bytes.

The TransmitCount must begin again with 1 when 255 is reached, i.e., 0 must be omitted. Before sending again, TransmitCount and TransmitCountBack must be identical.

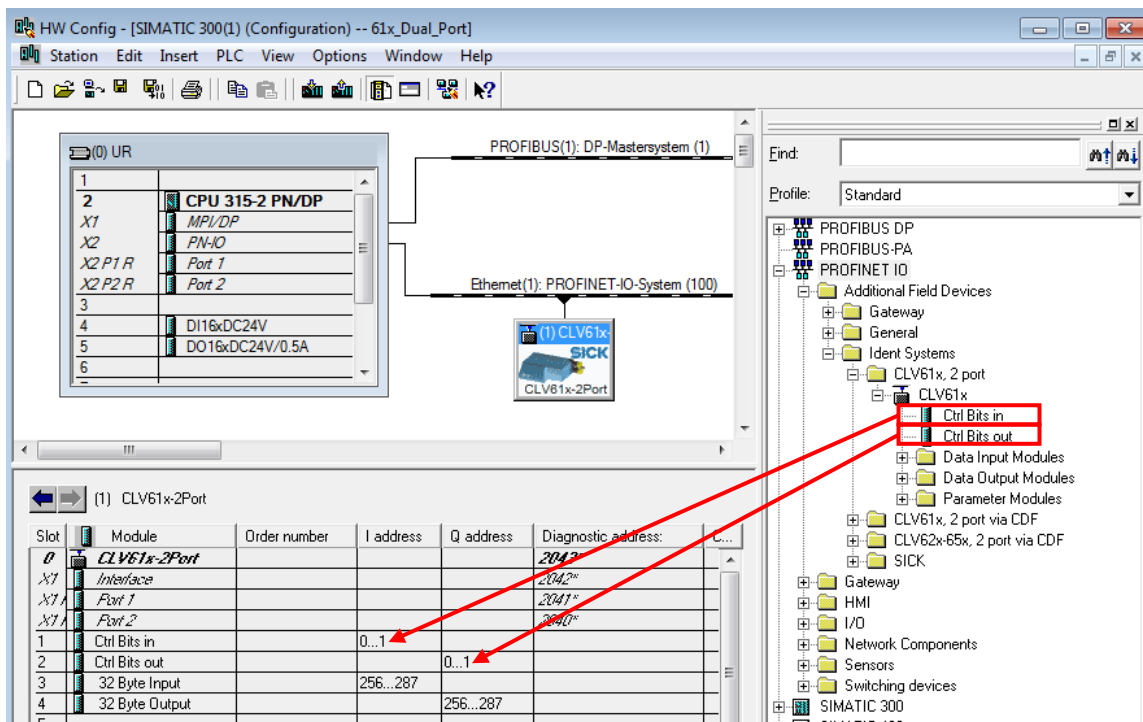
It is also advisable to test the required commands in advance, e.g., using the SOPAS ET terminals connected to the USB AUX interface or the AUX port of the Ethernet interface of the ID sensor. The ID sensor can process SOPAS ET commands from any of its data interfaces.

6 Digital inputs/outputs

The PLC can also read and control the information for the digital inputs/outputs of the CLV61x Dual Port.

6.1 Ctrl bits

The Ctrl bits can be added in the HW Config before or after the data channel.



6.1.1 Ctrl bits In

By adding the Ctrl bits In, the PLC can monitor the digital inputs and outputs of the CLV61x Dual Port. Here is the assignment for the CLV61x Dual Port.

Addr.	Bit	Name	Meaning
Addr.+1	D0	Device Ready	Status of the CLV61x Dual Port
Addr.+1	D1	–	Reserved
Addr.+1	D2	Good Read *	Status of the last read results *
Addr.+1	D3	No Read *	Status of the last read results *
Addr.+1	D4	External Output 1	Only available as a bit logical, no hardware output
Addr.+1	D5	External output 2	Only available as a bit logical, no hardware output
Addr.+1	D6	Result 1	Only available as a bit logical, no hardware output
Addr.+1	D7	Result 2	Only available as a bit logical, no hardware output
Addr.	D8	-	Reserved
Addr.	D9	-	Reserved
Addr.	D10	Sensor 1	Status of dig. input sensor 1. (Hardware dependent, equipment type on request)
Addr.	D11	-	Reserved
Addr.	D12	–	Reserved
Addr.	D13	–	Reserved
Addr.	D14	–	Reserved
Addr.	D15	Toggle	Inverted after each read cycle.

Observe byte order: D0 stands for the least significant bit of Addr.+1.

* The bits are valid if the "Toggle" bit changes.

6.1.2 Ctrl bits Out

By adding the Ctrl bits Out, various functions can be activated in the CLV61x Dual Port. For this to be permitted, the respective function must be configured in the CLV61x Dual Port to "Fieldbus Input".

Assignment of the Ctrl bits Out for the CLV61x Dual Port.


Add.	Bit	Name	Meaning
Add.+1	D0	Trigger	Object trigger for the CLV61x Dual Port. Object trigger must be configured for "Fieldbus input".
Add.+1	D1	-	Reserved
Add.+1	D2	Teach In 1	The Teach In 1 teach-in process is triggered. Teach In 1 activation must be configured for "Fieldbus input".
Add.+1	D3	-	Reserved
Add.+1	D4	-	Reserved
Add.+1	D5	-	Reserved
Add.+1	D6	-	Reserved
Add.+1	D7	-	Reserved
Add.	D8	-	Reserved
Add.	D9	-	Reserved
Add.	D10	-	Reserved
Add.	D11	-	Reserved
Add.	D12	-	Reserved
Add.	D13	-	Reserved
Add.	D14	-	Reserved
Add.	D15	-	Reserved

Observe byte order: D0 stands for the least significant bit of Add.+1

Example:

Set CLV61x Dual Port to Object Trigger start via "Fieldbus input " and stop via "Trigger source". The ID sensor can be triggered by the PLC using the bit D0 "Trigger":

Start/Stop of Object Trigger



A. Start by Fieldbus Input a. Start delay ms

B. Stop by Trigger source or Not defined or Not defined b. Stop delay ms

7 Appendix

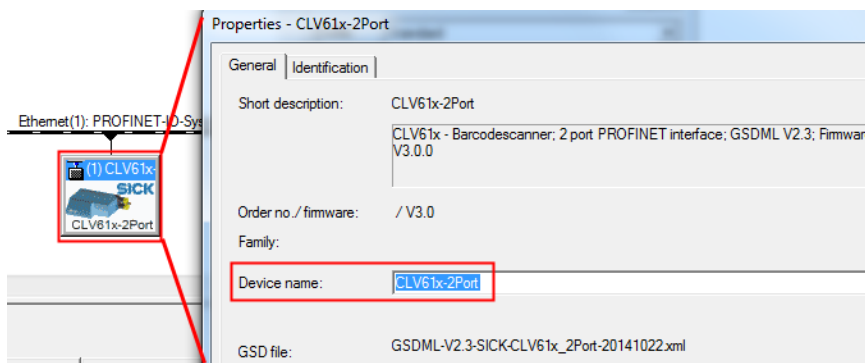
7.1 Quickstart CLV61x Dual Port – simple example with GSDML configuration

Quickstart describes the commissioning of the CLV61x Dual Port with GSDML configuration by the PROFINET Controller (PLC) centrally. A **simple example** with **No Handshake** was chosen here, so that no program or function module needs to be used for data transfer.

Provide 24 V DC supply for the CLV61x Dual Port and connect it with the PROFINET IO network.

S7 HW configuration:

- Install the CLV61x GSDML file in the PLC (S7 HW Config).
HW Config: "**Install Extras / GSD**", also see *Chapter 4.1*.
The CLV61x Dual Port is then added as follows in the S7 HW catalog:
"PROFINET IO / Additional FIELD DEVICES / Ident Systems / CLV61x, 2port"
- Drag the CLV61x Dual Port onto the PROFINET line.
Double click the CLV61x icon and allocate the PROFINET name.
This PN name is the individual identifier for the PN and must be clearly allocated for each relevant device, e.g., "Scanner 10":



- When adding the CLV61x Dual Port, these four modules are added automatically:

Ctrl Bits in		2...3	
Ctrl Bits out			2...3
32 Byte Input		288...319	
32 Byte Output			288...319

Both of the modules Ctrl Bits In and Ctrl Bits Out must be used.
Both data modules can also be exchanged for smaller or larger ones if required.
The I/O address can be customized.

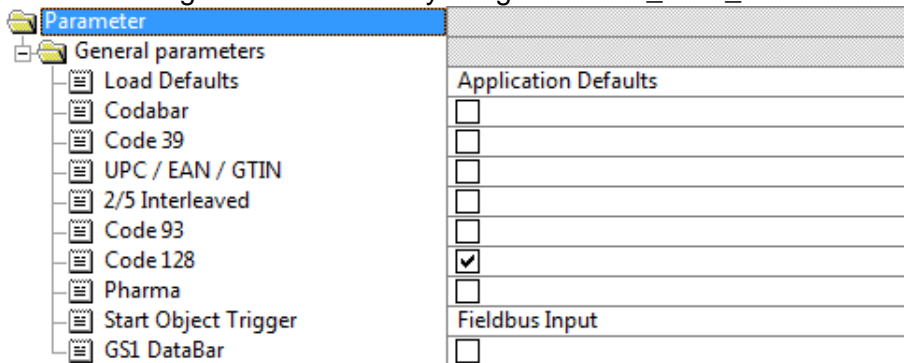
GSDML configuration:

Note that GSDML configuration is optional and is sent to the CLV61x Dual Port every time PROFINET starts. This overwrites the existing parameters in the CLV61x Dual Port.

Example:

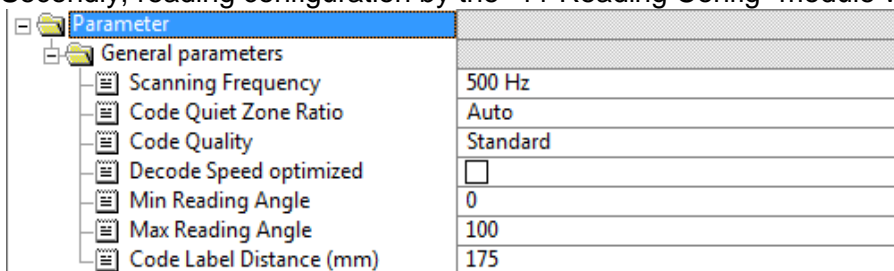
Slot	Module	Order number	I address	Q address	Diagnostic addr...
0	CLV61x-2Port				2043*
X1	Interface				2042*
X1	Port 1				2041*
X1	Port 2				2040*
1	Ctrl Bits in		0...1		
2	Ctrl Bits out			0...1	
3	32 Byte Input		256...287		
4	32 Byte Output			256...287	
5	01_Start Remote Config ~				2039*
6	11_Reading Config				2038*
7	47_Communication Mode				2037*
8	99_End Remote Config <<~				2036*

- GSDML configuration must always begin with "01_Start_Remote Config":



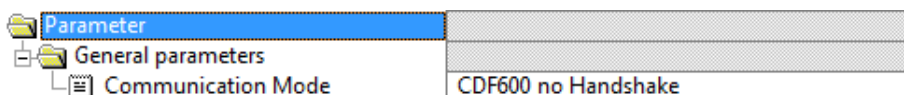
→ For this, only Code 128 was activated and triggering via fieldbus bit selected.

- Secondly, reading configuration by the "11 Reading Config" module was selected:



For example, the scanning frequency can be adjusted here.

- As this is a simple application, the Handshake mode is switched off.



Note:

No Handshake must be carried out on the PLC and simple operation with a short data string can take place.

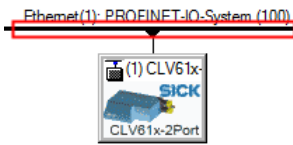
If the SICK function module is to be used, the Handshake must be switched on.

- Additional configuration modules can be selected according to the application. The process must always be completed with the "99_End_Remote Config" module.
- The HW Config must finally be saved and transferred to the PLC.

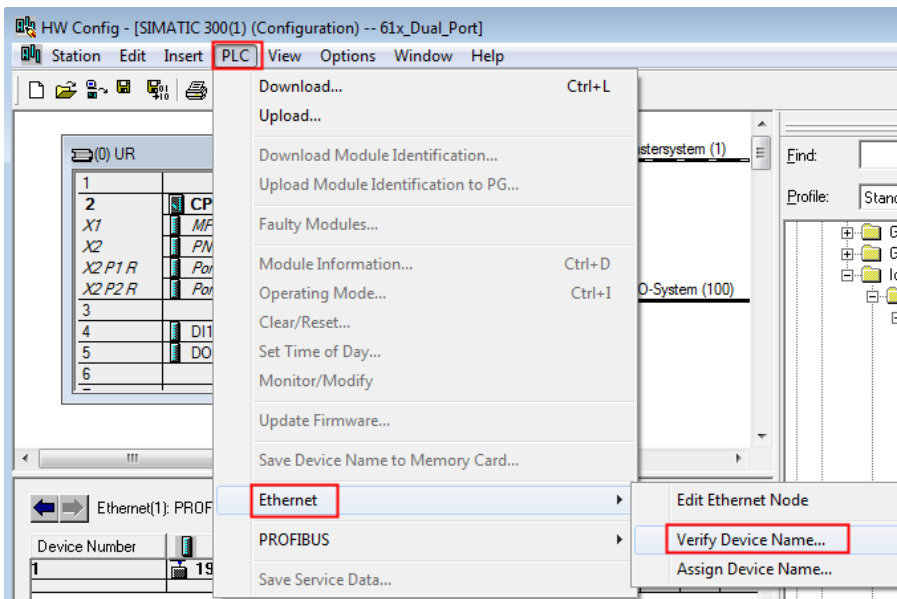
PROFINET name allocation:

The PN name allocation ("baptism") can be carried out very simply following prior checking of the PN name by allotting the PN name from the S7 HW Config.

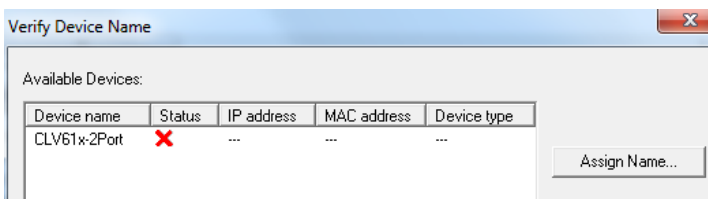
- First mark the Ethernet cable (➔ Cable is continuously identified)



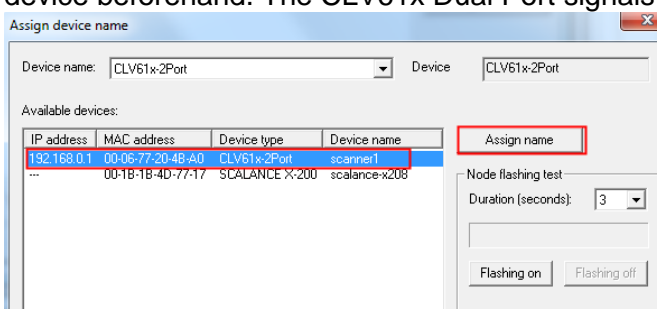
- Next, select the PN name test: "PLC / Ethernet / Verify Device Name".



- It will now be verified whether the desired PN name is available in the network. Then click "Assign Name".



- In the following dialog box, the PN name to be allocated can be selected at the top, and at the bottom the PN devices present in the network are represented. Now the desired device can be selected and using "Assign name", the PN name is transferred to this device. If there is any uncertainty as to the location of each device, flashing can be activated for a PN device beforehand. The CLV61x Dual Port signals flashing at the "SF" LED.



Checking triggering and data output in No Handshake mode:

Triggering and monitoring of the data output can be performed easily using a variable table. In the No Handshake mode, no program or function module is necessary.

Addressing selected in the example:

Slot	Module	Order number	I address	Q address
0	CLV61x-2Port			
X7	Interface			
X7	Port 1			
X7	Port 2			
1	Ctrl Bits in		0...1	
2	Ctrl Bits out			0...1
3	32 Byte Input		256...287	
4	32 Byte Output			256...287

Trigger bit: Q1.0 Bit 0 of Adr + 1 of "Ctrl Bits Out"

Counter for data: from IB 256: Adr of "32 Byte Input"

User data: from IB 261: Adr + 5 of "32 Byte Input"

Variable table:

	Address	Symbol	Display format	Status value	Modify valu
1		// Trigger using Fieldbus-Bit			
2	Q 1.0	"2_Trigger"	BOOL	true	
3					
4		// Receive Count + Data:			
5	IB 256	"Input Bits / Heartbeat"	BIN	2#0000_0100	
6	IB 257	"Receive_Count"	DEC	4	
7	IB 258	"Transmit_Count"	DEC	0	
8	IB 259	"Receive-Length-Low"	DEC	8	
9	IB 260	"Receive-Length-High"	DEC	0	
10	IB 261	"Rec-Data, Byte 1"	CHARACTER	'1'	
11	IB 262	"Rec-Data, Byte 2"	CHARACTER	'2'	
12	IB 263	"Rec-Data, Byte 3"	CHARACTER	'3'	
13	IB 264	"Rec-Data, Byte 4"	CHARACTER	'4'	
14	IB 265	"Rec-Data, Byte 5"	CHARACTER	'5'	
15	IB 266	"Rec-Data, Byte 6"	CHARACTER	'6'	
16	IB 267	"Rec-Data, Byte 7"	CHARACTER	'7'	
17	IB 268	"Rec-Data, Byte 8"	CHARACTER	'8'	
18	IB 269	"Rec-Data, Byte 9"	CHARACTER	B#16#00	
19	IB 270	"Rec-Data, Byte 10"	CHARACTER	B#16#00	

The scanner can be controlled by setting the A1.0 bits marked in red:

1 → Trigger on, 0 → Trigger off

In the first byte EB256, Bit 2 is inverted every second (heartbeat bit).

The user data is visible in the area outlined in blue.

The "Receive Count" counter increments with each block of data received. On overflow, the 0 is skipped: 1 to 255, 1 to 255.

In the example, eight data bytes were received, with the content "12345678".

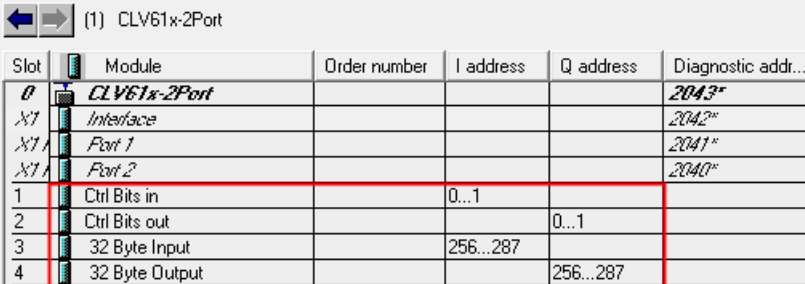
For more details on data reception, see Chapter 5.2.

7.2 Quickstart CLV61x Dual Port – Example with configuration with SOPAS ET

Quickstart describes the commissioning of the CLV61x Dual Port without GSDML configuration. If not already done, the CLV61x Dual Port must concurrently be configured with SOPAS ET.

The procedure for this is identical to that under 8.1, except that the GSDML configuration page is not necessary.

The configuration includes only these four modules and no configuration modules:

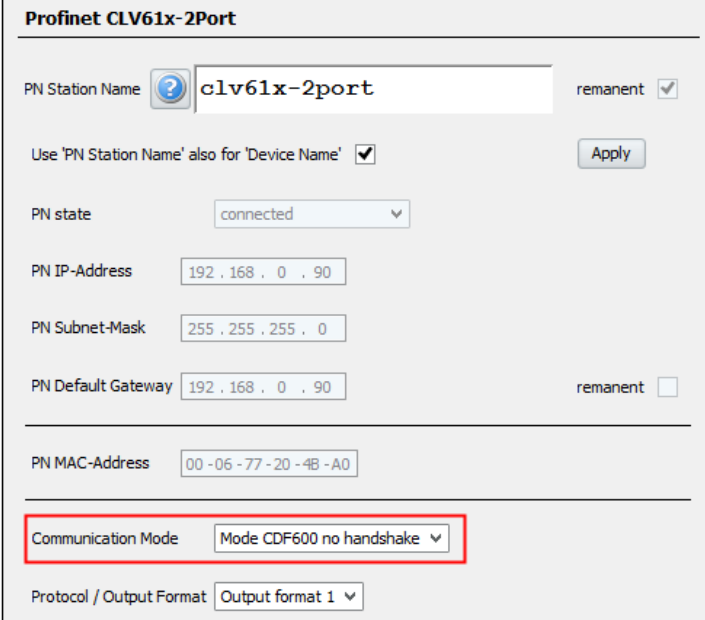


Slot	Module	Order number	I address	Q address	Diagnostic addr...
0	CLV61x-2Port				2043*
X1	Interface				2042*
X1	Port 1				2041*
X1	Port 2				2040*
1	Ctrl Bits in		0...1		
2	Ctrl Bits out			0...1	
3	32 Byte Input		256...287		
4	32 Byte Output			256...287	

The remaining sequence for commissioning is identical from here on.

Following the PROFINET IO commissioning, it is appropriate to configure the sensor using SOPAS ET. The connection for this can be made via USB or Ethernet Port 2111 (or 2112).

If no Handshake is to be used, this can be set in SOPAS ET under: "Network Interfaces/ IOs /Profinet":



Profinet CLV61x-2Port

PN Station Name remanent

Use 'PN Station Name' also for 'Device Name'

PN state

PN IP-Address

PN Subnet-Mask

PN Default Gateway remanent

PN MAC-Address

Communication Mode

Protocol / Output Format

If the function module is to be used, the Handshake mode must be switched on immediately. See also *Chapter 5.1.1*.

7.3 Troubleshooting

This chapter provides some information on fault finding and rectification in the form of a condensed list.

- Check the voltage supply – Is the upper sensor LED lit blue?
- Check the Ethernet connection – Is LED P1 or LED P2 lit?
LED P1/P2: Green = connected, yellow = data exchange
- Was the correct CLV61x Dual Port GSDML file used?
GSDML-V2.3-SICK-CLV61x_2Port-20141022.xml, or later.
- Is the CLV61x Dual Port visible in the PROFINET with suitable name and IP?
Check the PN name via HW Config or the PST tool. See *Chapters 7.10, 7.11, and 7.12*

!	IP address	MAC address	Device type	Name	Subnet mask
	192.168.0.50	00-1B-1B-2D-7E-F7	S7-300	pn-io
	0.0.0.0	00-1B-1B-4D-77-17	SCALANCE X-200	scalance-x208
	192.168.0.90	00-06-77-20-4B-A0	CLV61x-2Port	clv61x-2port

- Read CLV61x Dual Port with SOPAS ET.
Check parameters such as PN name and IP address under "Network /Interfaces IOs / Profinet":

Profinet CLV61x-2Port

PN Station Name remanent

Use 'PN Station Name' also for 'Device Name'

PN state

PN IP-Address

PN Subnet-Mask

PN Default Gateway remanent

PN MAC-Address

Communication Mode

Protocol / Output Format

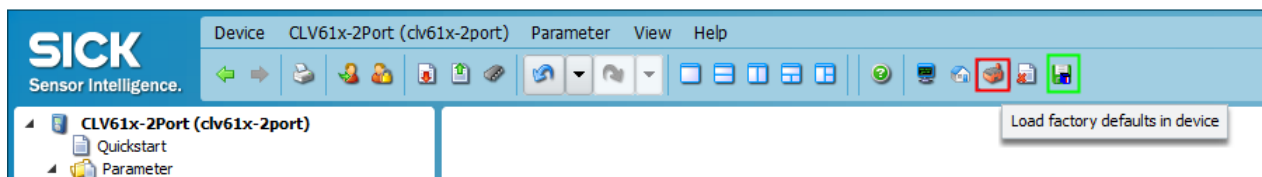
- Is the mode selected suitable?
Handshake = Function module or program necessary.
(Check E/A addresses and data length)
No Handshake = Operation possible without programming
- Is the triggering selected suitable?
Is the correct bit being used for fieldbus trigger? Bit 0 of Adr + 1 of "Ctrl Bits Out"
- Can the CLV61x Dual Port read the desired code in Quickstart as a percentage value?
- Check the GSDML configuration. If necessary, test by removing the GSDML configuration modules.

If no data arrives:

- Check modules in HW Config.
- Address for inputs and outputs correctly applied in calling up the functional component? (Hex/dec representation)
- If no block is used, is the I/O address within the process image?
Or get data with SFC 14/15.
- Heartbeat bit appears?
- Does only the first data block appear and no others?
Then the handshake does not work correctly? → Check addresses.
Set handshake manually or with function block.

7.4 Resetting the CLV61x Dual Port to default setting

If the CLV61x Dual Port is connected to SOPAS ET, the device can be completely reset using the "Factory Default" button:



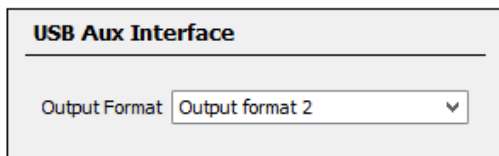
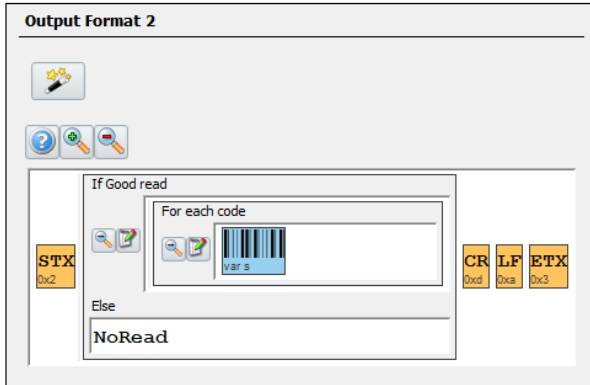
Then carry out Permanent Storage via the "Green Diskette" symbol on the extreme right.

Following this, the PN name is empty and the CLV61x Dual Port can, if necessary, automatically get a new name from the PLC.

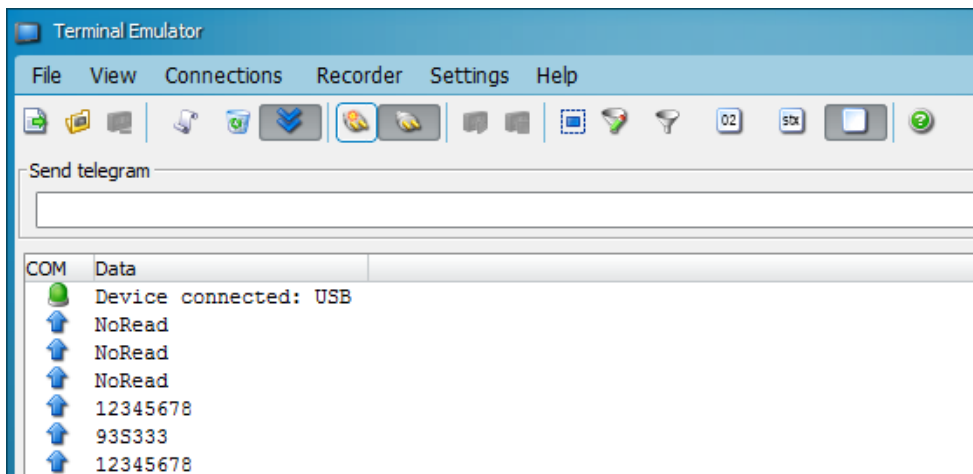
7.5 Monitoring data output using the SOPAS ET terminal via USB

Open the SOPAS ET terminal and establish a connection via USB.

Every data format can be monitored via USB. It should be noted, however, that the SOPAS ET terminal requires STX/ETX framing and possibly a CR LF at the end to display correctly. The most simple method is therefore to select a suitable output format as Output Format 2 and assign it to the USB port.



Monitoring data via USB:

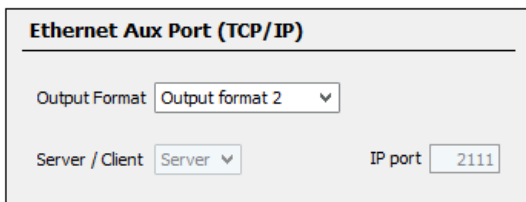
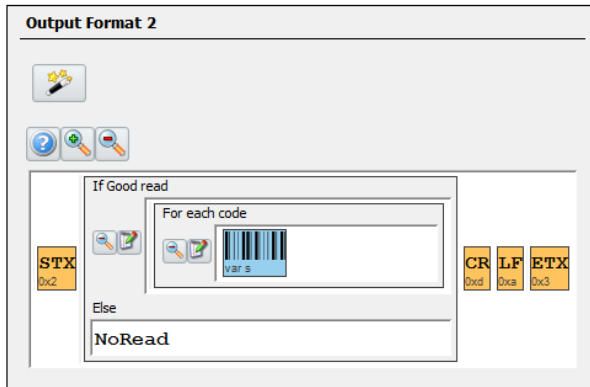


7.6 Monitoring data output using the SOPAS ET terminal via Ethernet

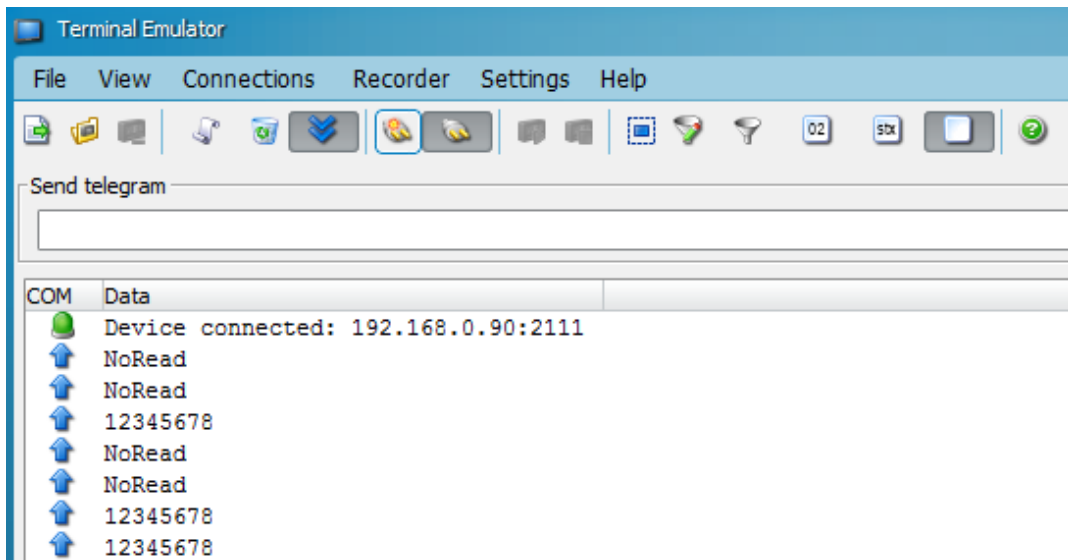
To do so, open the SOPAS ET terminal and set up a connection via Ethernet on Port 2111 (or 2112).

Only a data format that contains STX/ETX framing can be monitored via Ethernet.

For correct representation in the SOPAS ET terminal, a CR LF at the end is also advisable. The most simple method is therefore to select a suitable output format as Output Format 2 and assign it to the USB port.

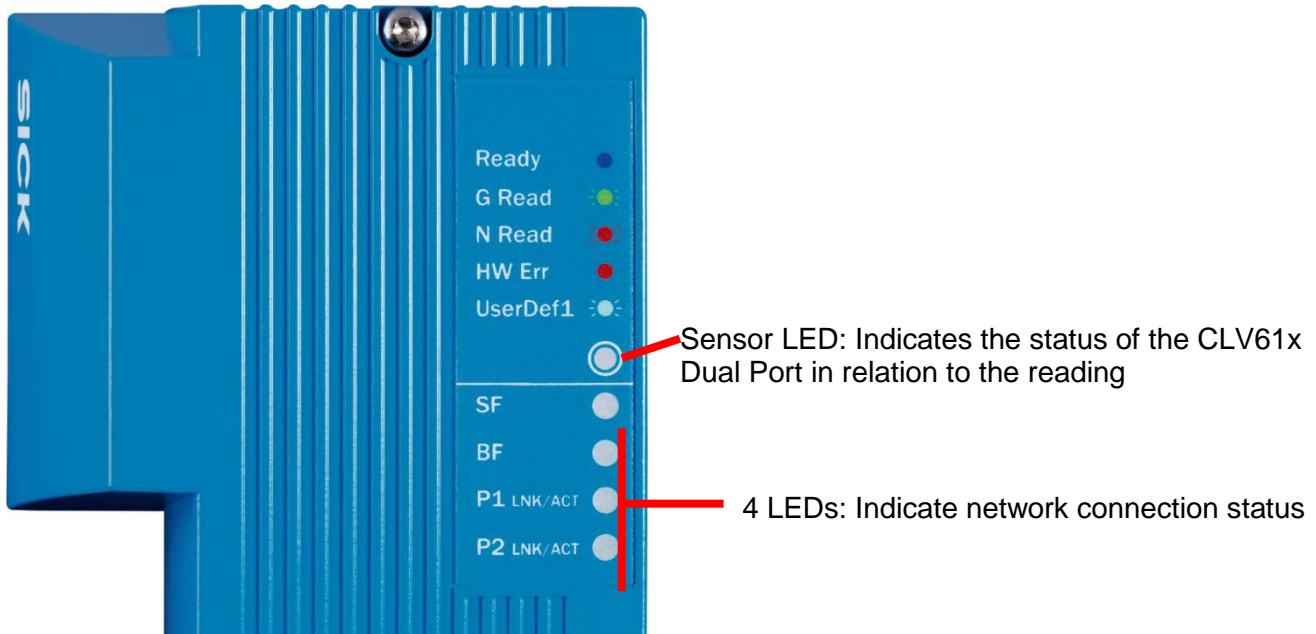


Monitoring data via Ethernet Port 2111:



7.7 Function of the LEDs of the CLV61x Dual Port

Statuses and errors for the CLV61x Dual Port are indicated via 5 status LEDs:



Sensor LED: Indicates the status of the CLV61x Dual Port in relation to the reading:

Indicator	Color of LED		Status
Ready		Blue	Lights up constantly after switching on and completion of successful self-test.
	-	-	Goes out when downloading configuration data from the CLV61x
G Read		Green	Lights up briefly after Good Read
N Read		Red	Lights up briefly after No Read
HW Err		Red	Lights up constantly in case of hardware error
Further indicators		Red Blue	Firmware download: Indicator flashes alternately
		Red	Firmware download: Lights up constantly in case of error

● = lights up constantly or once briefly
 ● = flashes, ● = ● = flashes alternately

The other four LEDs indicate the network connection status:

7.7.1 Status of the "SF" LED

The "SF" LED indicates the internal status of the CDF600-22xx.

SF LED (red)	Meaning
OFF	CLV61x Dual Port without internal error
ON	Activation of the PROFINET interface
Flashing	"Flashing" was, for example, required by the HW configuration.

7.7.2 Status of the "BF" LED

The "BF" LED indicates the status of the PROFINET.

BF LED (red)	Meaning
OFF	Data exchange OK, CLV61x Dual Port operates OK as PROFINET slave
ON	No connection to PROFINET IO controller (PLC). No data exchange. Possible reasons: <ul style="list-style-type: none"> • Bus not connected • Master not available / OFF • Incorrect PROFINET name • Wrong GSDML file used • Wrong GSDML module selected
Flashing (0.5 Hz)	<ul style="list-style-type: none"> • Parameterization / configuration error in IO controller, no data exchange

7.7.3 "P1 LNK/ACT" status LED

P1 LNK/ACT LED	Meaning
OFF	CLV61x Dual Port is not connected to any active network; no data traffic
ON (green)	Active network connected
ON (orange)	LED flickers when the CLV61x Dual Port is sending or receiving data, data traffic

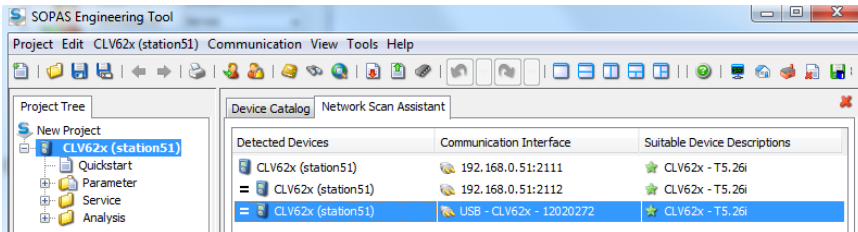
7.7.4 "P2 LNK/ACT" status LED

P2 LNK/ACT LED	Meaning
OFF	CLV61x Dual Port is not connected to any active network; no data traffic.
ON (green)	Active network connected
ON (orange)	LED flickers when the CLV61x Dual Port is sending or receiving data, data traffic.

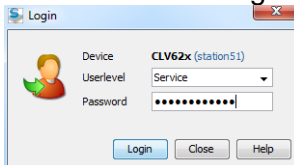
7.8 Firmware update of the CLV61x Dual Port via SOPAS ET

The CLV61x Dual Port be updated with SOPAS ET via **USB** or via **TCP/IP (Port 2111 and 2112)**. If the update is carried out via Ethernet, the IP address must be accessible in a stable condition, i.e., the CLV61x Dual Port must retain this IP address even after a restart, or retrieve it from the attached PLC. It may be necessary to test beforehand whether the CLV61x Dual Port is reachable after rebooting.

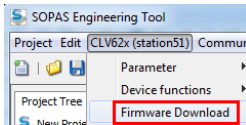
1. Use the SOPAS ET Network Scan Assistant to scan the network
 → The CLV61x Dual Port is found via USB
2. Add attached ID sensor to the project:



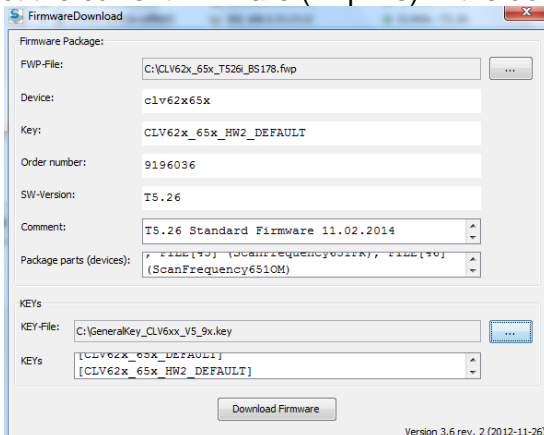
3. Log into the device using the password for user-level service: "servicelevel":



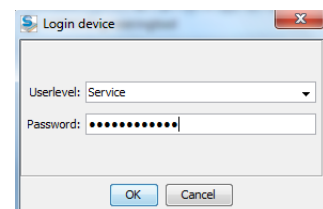
5. Use the command "CLV ... > Firmware Download" to open the download window:



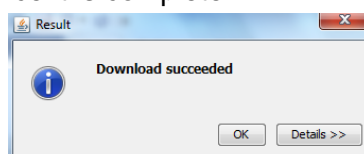
6. Select the current firmware (.fwp file) in the download window and the matching *.key file:



7. Start download. Password for user-level service: "servicelevel":



8. Depending on the ID sensor, the download can take up to approx. 40 min. and the message "Download succeeded" will appear once it is complete:

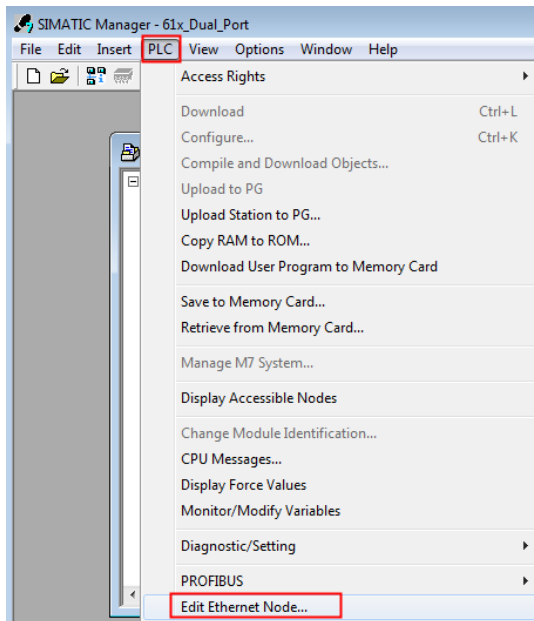


7.9 Software versions of the CLV61x Dual Port

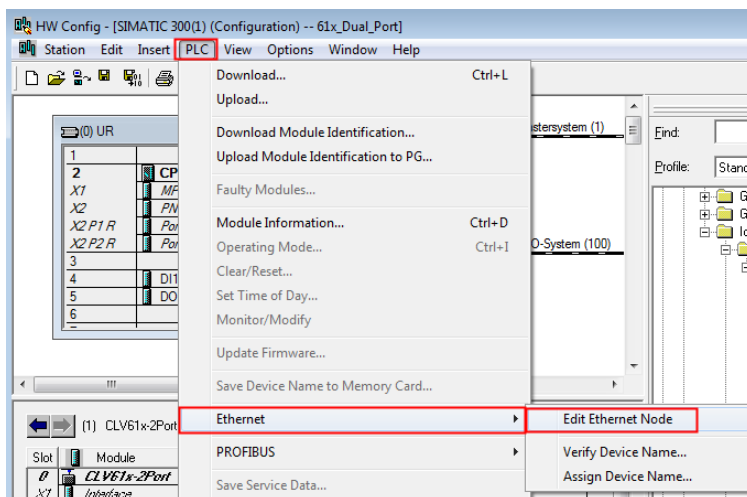
V1.31 First firmware version of the CLV61x Dual Port

7.10 Tools for checking and assigning PN name and IP address from the PLC side

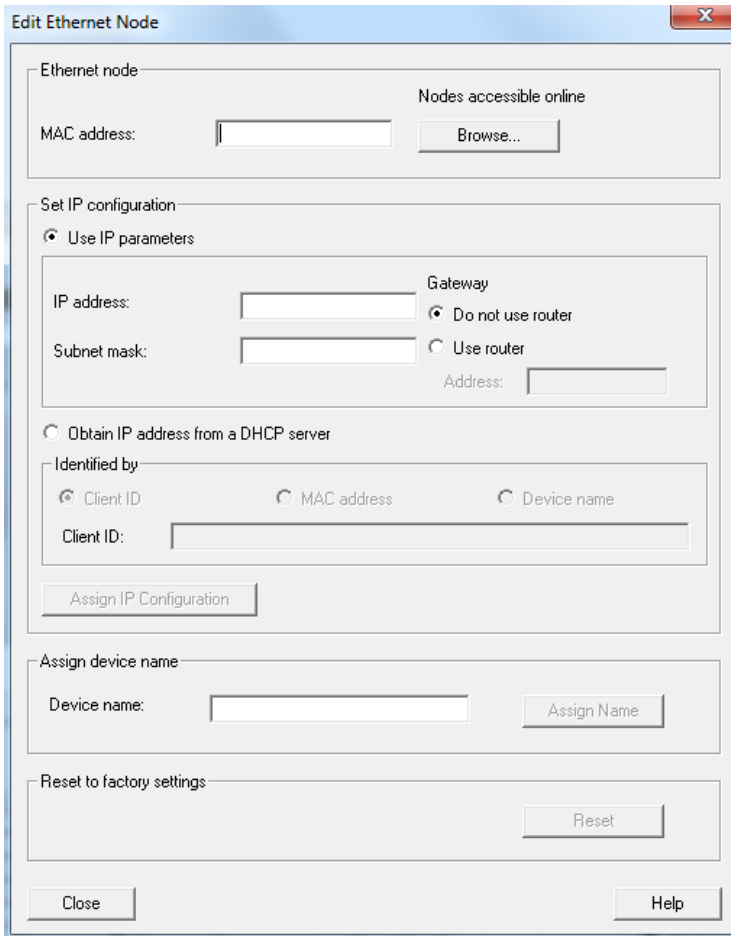
You can use this tool in the S7 manager to search for a PROFINET device and to check or change the PROFINET device name and IP address.



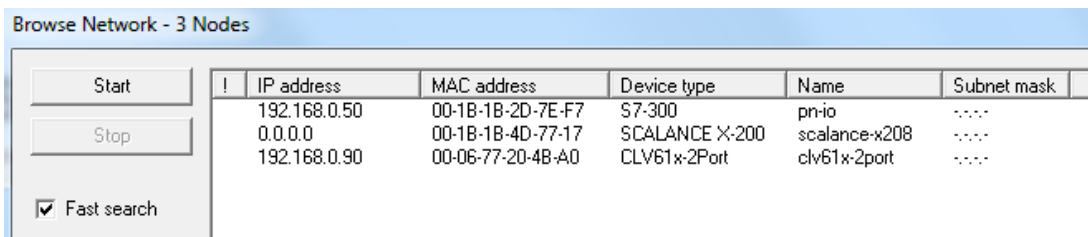
Or you can start it in the S7 HW Config:



This window opens in both cases:



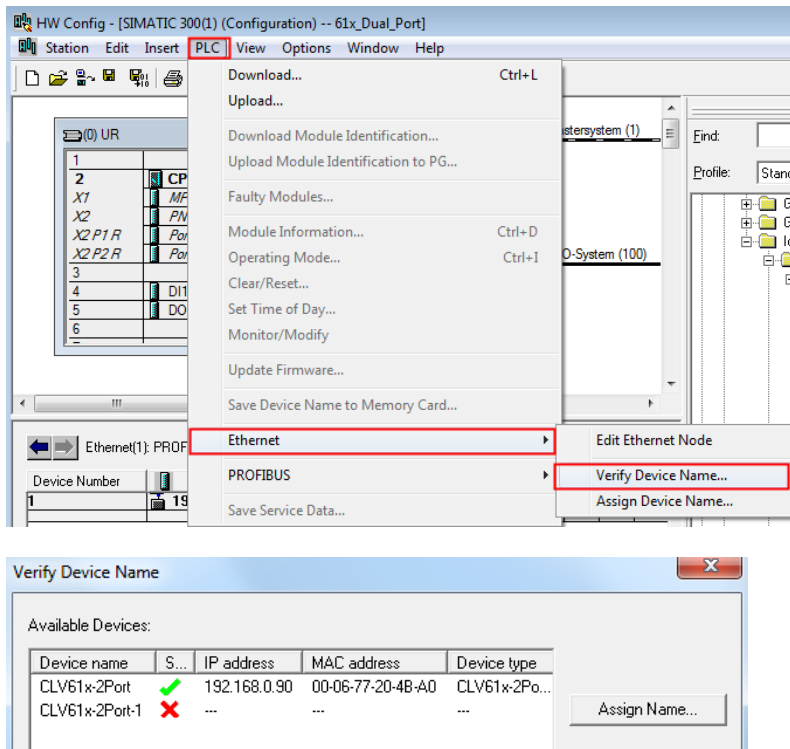
You can scan the network using "Start":



You can search for a device (MAC address) and assign this a device name or an IP address.

7.11 Checking and, if necessary, assigning a PROFINET name from the PLC side via HW Config

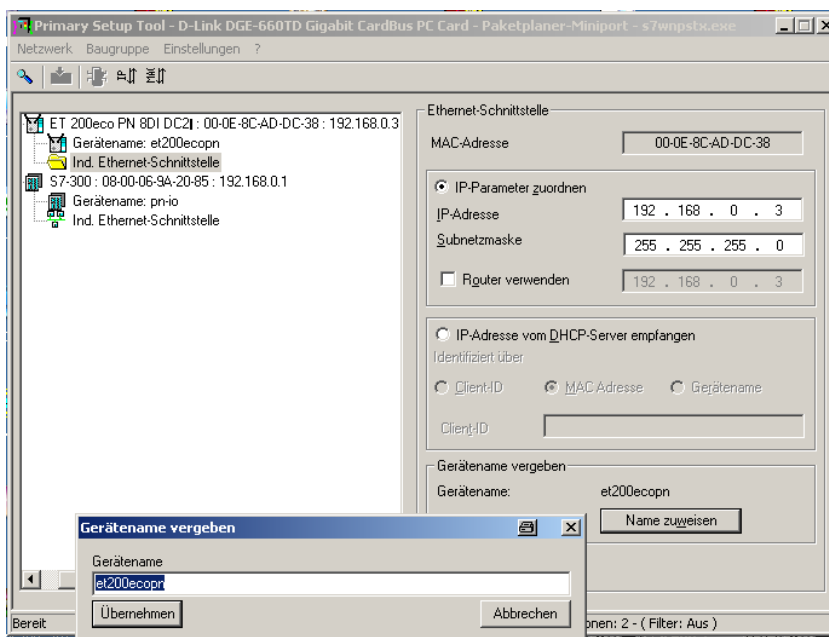
You can use this tool to check the PROFINET names of the PROFINET devices. Select the PROFINET line and start this function:



If some names are not available, a name can be assigned here.

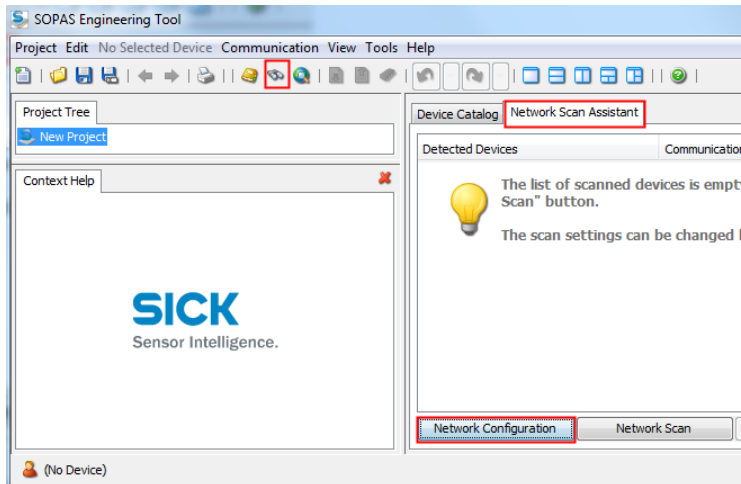
7.12 Checking the PROFINET name using the PST (Primary Setup Tool)

Alternatively, you can use the PST tool from Siemens to scan the PROFINET devices in the network and assign the IP addresses and device name.

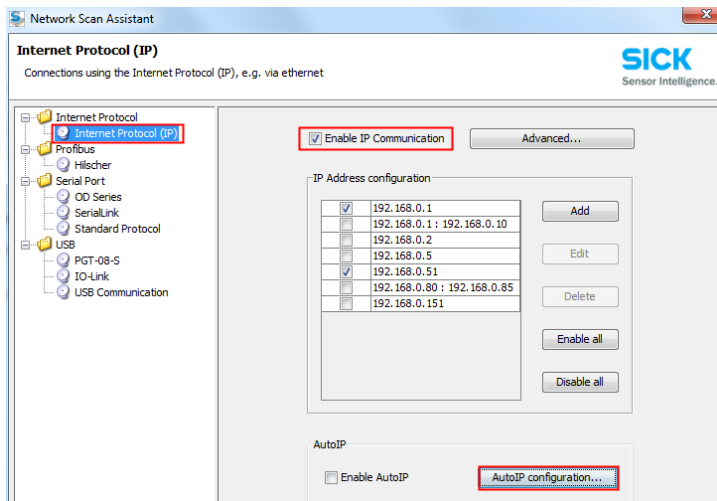


7.13 Searching the network using SOPAS Auto IP Scan

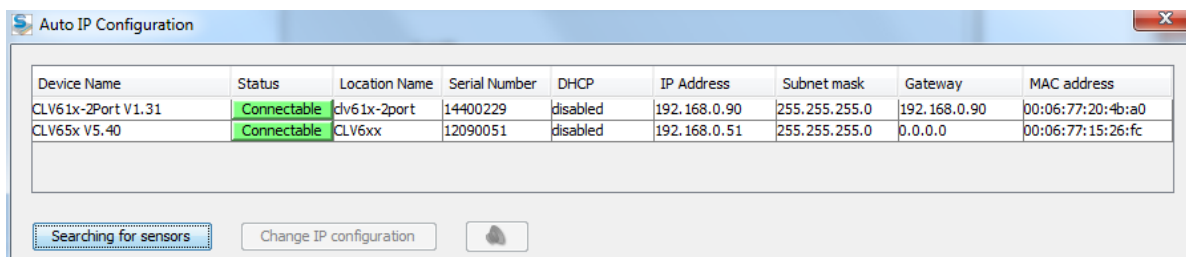
The SOPAS Auto IP Scan can also be used to scan the network for SICK devices. To do so, start a new project in SOPAS ET and call up the Network Scan Assistant:



Then enable IP communication and select the Auto IP settings:



Now you can search for SICK sensors. The search is based on MAC addresses and includes all SICK devices (MAC address = 00 06 77 xx xx xx). A CLV61x Dual Port is also found if the IP address is 0.0.0.0.



You can also change the IP address by double-clicking on the device. In the case of CLV61x Dual Port, the IP address can only be adjusted if the CLV61x Dual Port is no longer actively exchanging data with the PROFINET IO controller (PLC).

7.14 Notes regarding operation on other PROFINET IO controllers

If the CLV61x Dual Port is operated on a different controller to an S7, for which no ready-made function block is available, we recommend the following procedure:

- To begin, set No Handshake.
- Set triggering to fieldbus input or slow (e.g., 5 sec.) auto cycle and only examine the data receipt at first.
- Use Hex representation for the first 10 input bytes: Can the Heartbeat bit be identified? Can the data be identified according to chapter 5.2.3., Example 5, receive telegram (NH mode)?
Check the representation of bytes per integer/value variable. Byte order?
- Then, if necessary, switch to Handshake mode and different triggering, e.g., trigger via command.

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