PROFINET
Integration of 4D*pro* devices into PLC

SICK Sensor Intelligence.

SICK AG

Feb 2020

AGENDA

- PROFINET portfolio of identification sensors
- Basic handling on PLC side
  - Installing the GSDML file
  - Adding sensors
  - Assigning PROFINET names
- Handling at SOPAS ET (optional)
- Data channel / using Sick Functionblock
- Trouble shoouting / Further documentations

PROFINET PORTFOLIO
IDENTIFICATION SENSORS

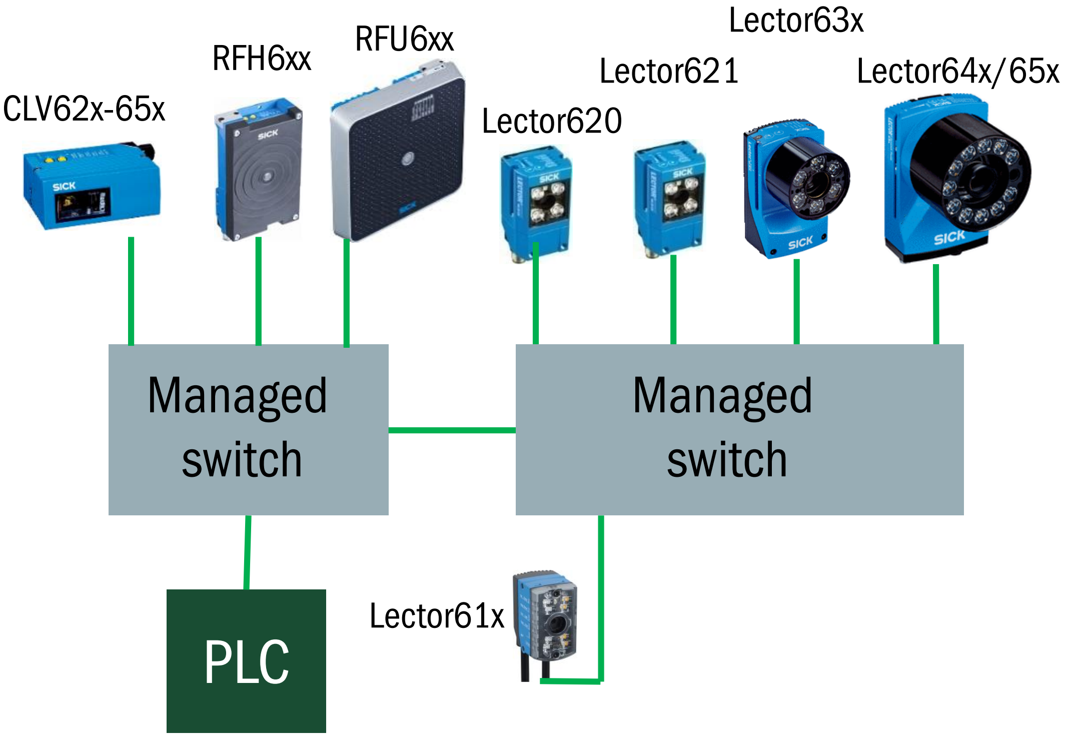
SICK
Sensor Intelligence.

PROFINET on board

SINGLE PORT – DUAL PORT

Single port

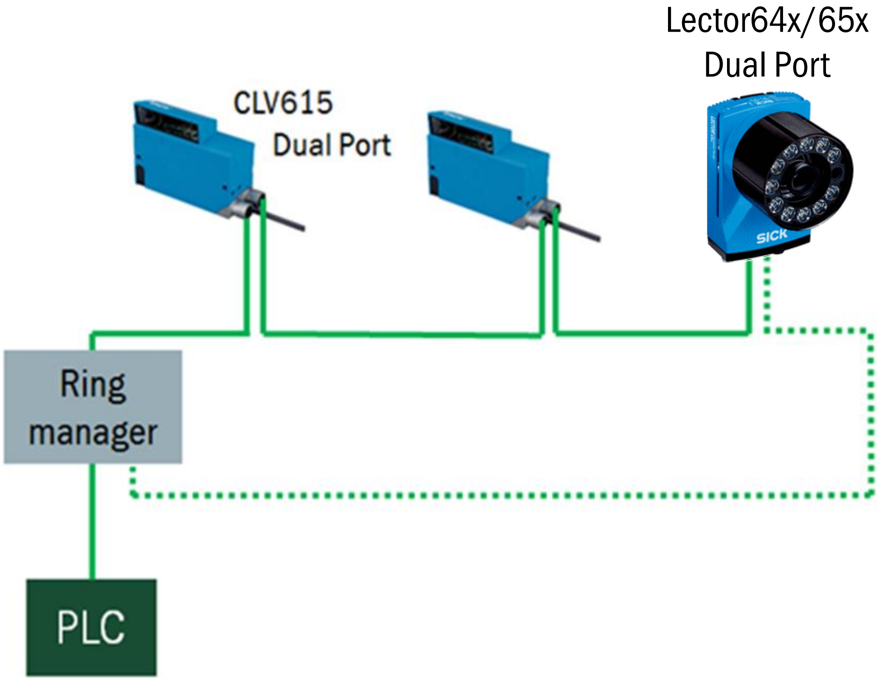
Star Topology



To run PROFINET on board as 1-port use the Ethernet version of 4D*pro* devices

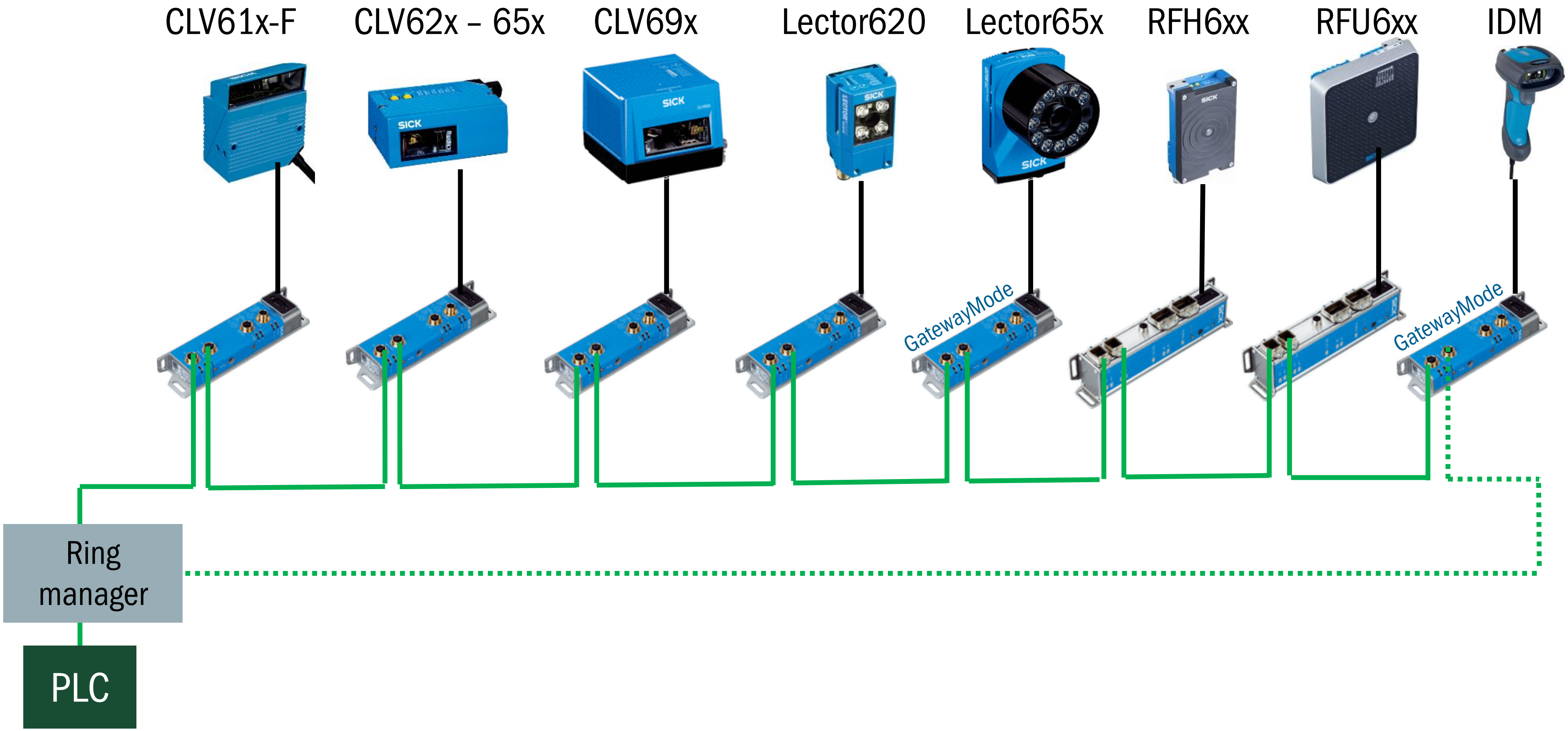
Dual port

Line/Ring Topology



PROFINET via external module

DUAL PORT



Support of further devices on request

HANDLING ON PLC SIDE

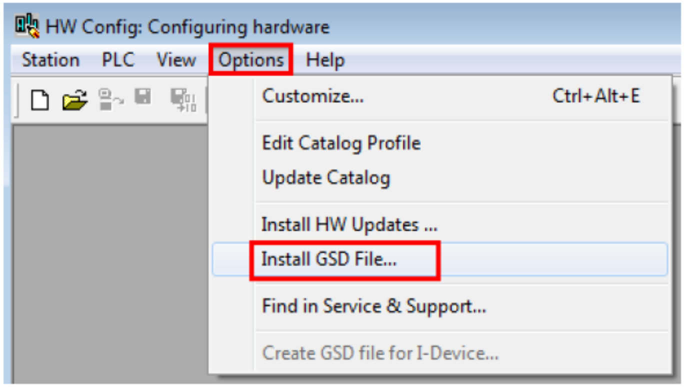
Sensor Intelligence.

02

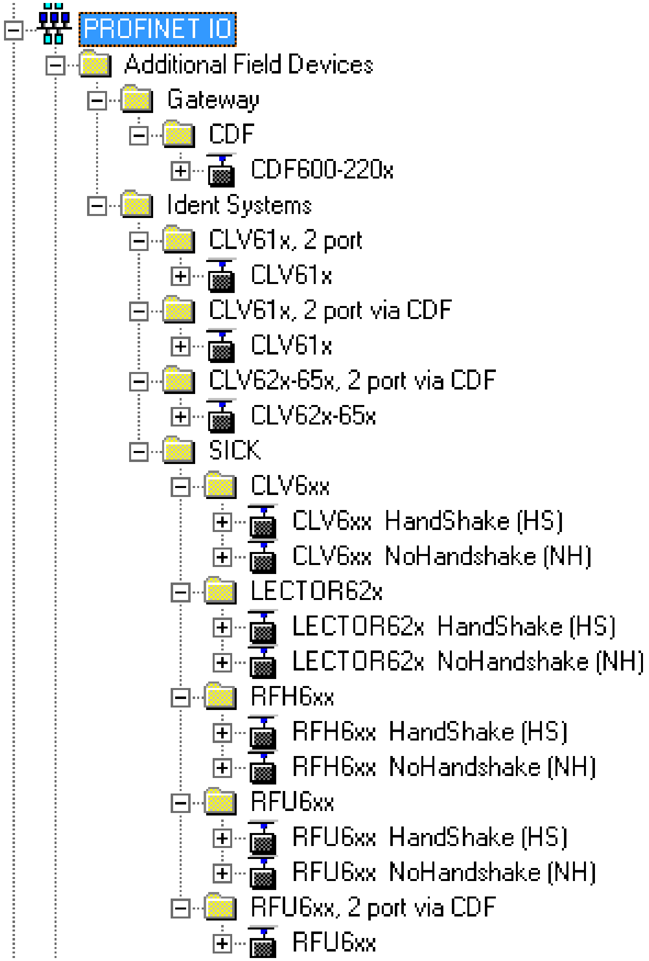
INSTALLING THE GSDML FILE

HW–CONFIG (1)

- Install GSDML file at „Options / Install GSD File …“ and update the catalog



- The 4D*pro* devices can be found in the catalog:
  - PROFINET IO / Additional Field Devices / Gateway/…
    - CDF600-22xx using gateway mode
  - PROFINET IO / Additional Field Devices / Ident Systems /…
    - Sensor single port
      - CLV62x-65x, LECTOR6xx, RFH6xx, RFU6xx
    - Sensor dual port
      - CLV61x-D
    - Sensor dual port via CDF600-22xx (proxy mode)
      - CLV61x, CLV62x-65x, RFU6xx



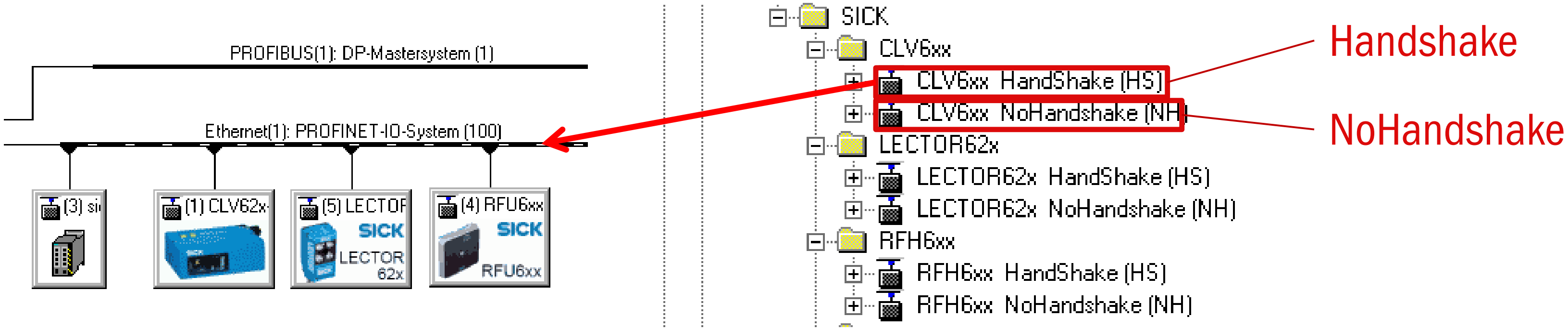
- PROFINET IO
  - Additional Field Devices
    - Gateway
      - CDF
        - CDF600-220x
    - Ident Systems
      - CLV61x, 2 port
        - CLV61x
      - CLV61x, 2 port via CDF
        - CLV61x
      - CLV62x-65x, 2 port via CDF
        - CLV62x-65x
      - SICK
        - CLV6xx
          - CLV6xx HandShake (HS)
          - CLV6xx NoHandshake (NH)
        - LECTOR62x
          - LECTOR62x HandShake (HS)
          - LECTOR62x NoHandshake (NH)
        - RFH6xx
          - RFH6xx HandShake (HS)
          - RFH6xx NoHandShake (NH)
        - RFU6xx
          - RFU6xx HandShake (HS)
          - RFU6xx NoHandshake (NH)
        - RFU6xx, 2 port via CDF
          - RFU6xx

INSTALLING THE GSDML FILE

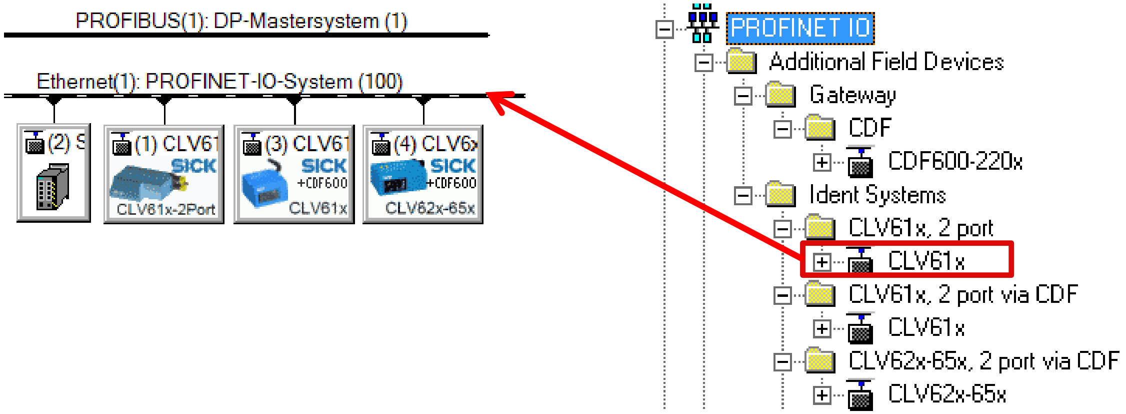
HW-CONFIG (2) → HANDSHAKE SELECTION

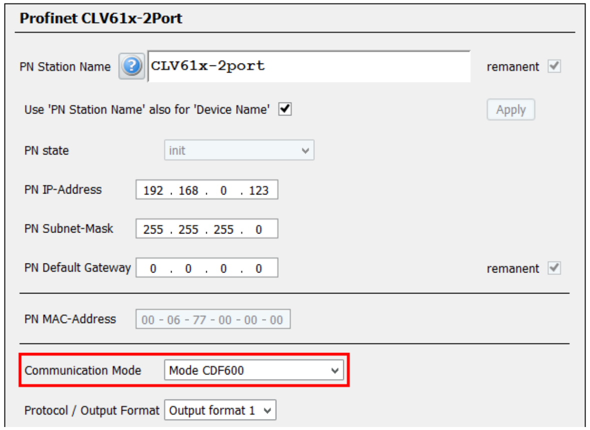
- Insert the required device either as Handshake (HS) or NoHandshake (NH) by using drag & drop on the PROFINET line
  - Dependent on sensor:

    A) PROFINET single port: Choose one of the two lines in the tree to get either Handshake or NoHandshake mode



B) PROFINET dual port: Insert the shown device. The handshake setting is done in the device parameterization, or using a GSD Parameterization module. Default is with handshake.





Profinet CLV61x-2Port

PN Station Name: CLV61x-2port — remanent ☑

Use 'PN Station Name' also for 'Device Name' ☑ — Apply

PN state: init

PN IP-Address: 192 . 168 . 0 . 123

PN Subnet-Mask: 255 . 255 . 255 . 0

PN Default Gateway: 0 . 0 . 0 . 0 — remanent ☑

PN MAC-Address: 00 - 06 - 77 - 00 - 00 - 00

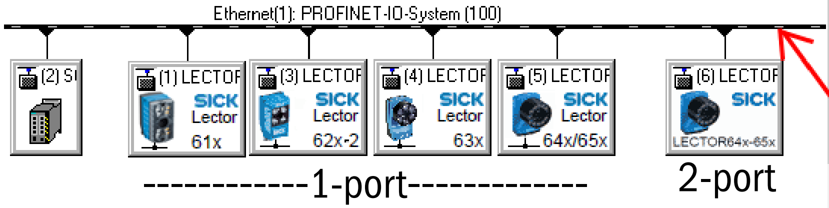
Communication Mode: Mode CDF600

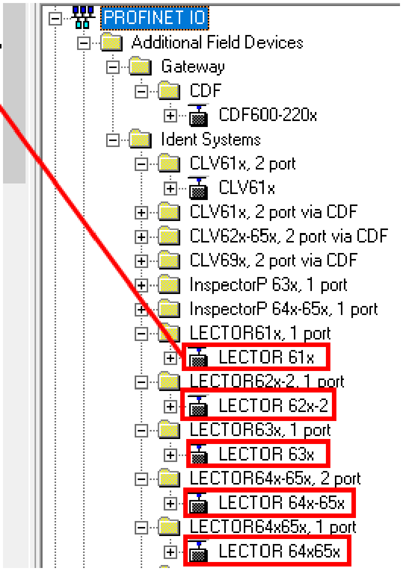
Protocol / Output Format: Output format 1

INSTALLING THE GSDML FILE

HW-CONFIG (3) → HANDSHAKE SELECTION

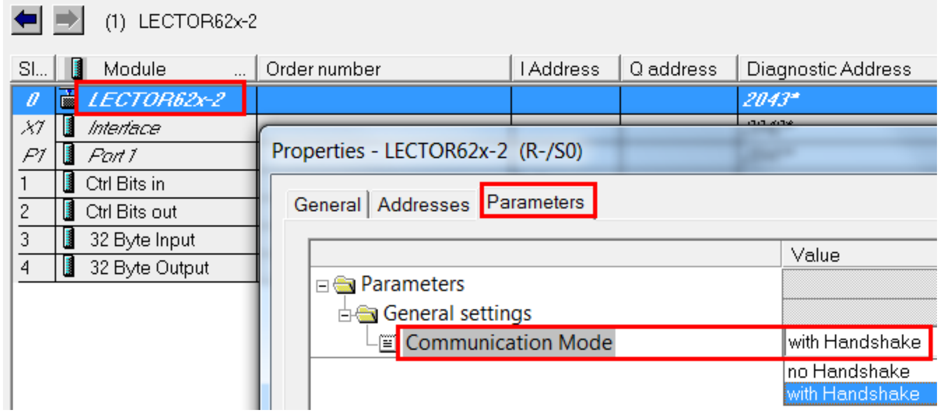
C) PROFINET at Lector64x/65x 2-port and Lector61x, 621, 63x and 64x/65x 1-port:





The handshake setting is done by double clicking the first line (slot 0) and set the handshake.
Default is with handshake, which is fine for using with SICK Function block.
The setting is also shown in SOPAS, but it can be only changed in the PLC HW-Config.

PLC HW-Config:



(1) LECTOR62x-2

Sl...	Module	Order number	I Address	Q address	Diagnostic Address
0	LECTOR62x-2				2043*
X1	Interface				
P1	Port 1				
1	Ctrl Bits in				
2	Ctrl Bits out				
3	32 Byte Input				
4	32 Byte Output				

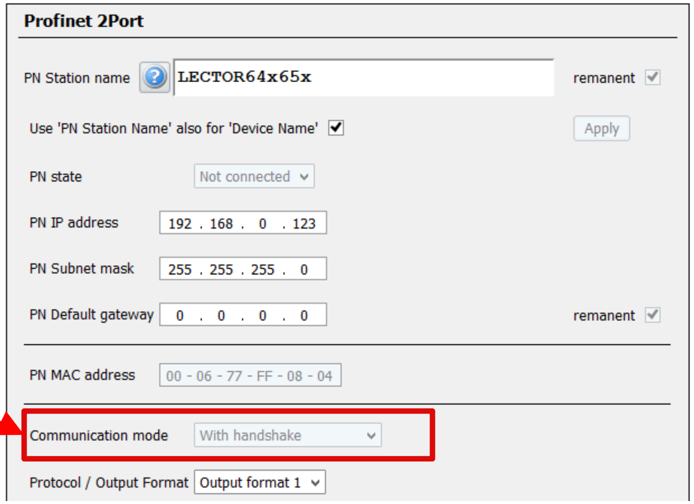
Properties - LECTOR62x-2 (R-/S0)

General | Addresses | Parameters

	Value
Parameters	
General settings	
Communication Mode	with Handshake

no Handshake
with Handshake

SOPAS ET:



Profinet 2Port

PN Station name: LECTOR64x65x — remanent ☑

Use 'PN Station Name' also for 'Device Name' ☑ — Apply

PN state: Not connected

PN IP address: 192 . 168 . 0 . 123

PN Subnet mask: 255 . 255 . 255 . 0

PN Default gateway: 0 . 0 . 0 . 0 — remanent ☑

PN MAC address: 00 - 06 - 77 - FF - 08 - 04

Communication mode: With handshake

Protocol / Output Format: Output format 1

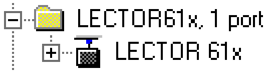
PROFINET GSD FILES AT LECTOR6XX FAMILY

ICON – GSD FILE - DIRECTORY

HW Catalog: Profinet\Additional devices\Ident systems:

Lector61x: >= V4.0.0

SICK_**Lector61x_1P**_Profinet_minV4.0.0:
GSDML-V2.34-SICK-Lector61x_1P-20191122.xml

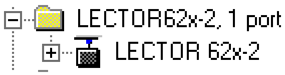

LECTOR61x, 1 port
LECTOR 61x

GSD-Parameterization not available

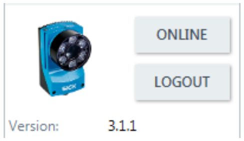
Version: 3.1.1

Lector621: >= V3.1.1 / LectorGLS: >= V3.2.0

SICK_**Lector62x-2_1P**_Profinet_minV3.1.1:
GSDML-V2.34-SICK-Lector62x-2_1P-20190118.xml


LECTOR62x-2, 1 port
LECTOR 62x-2

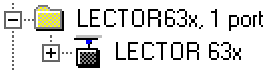
GSD-Parameterization not available



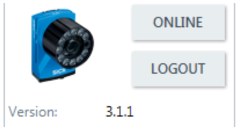
Version: 3.1.1

Lector63x: >= V3.1.1

SICK_**Lector63x_1P**_Profinet_minV3.1.1
GSDML-V2.34-SICK-Lector63x_1P-20190118.xml


LECTOR63x, 1 port
LECTOR 63x

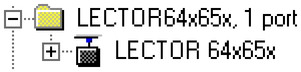
GSD-Parameterization not available



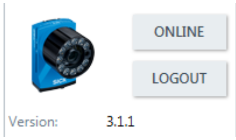
Version: 3.1.1

Lector64x/65x: >= V3.1.1

SICK_**Lector64x65x_1P**_Profinet_minV3.1.1
GSDML-V2.34-SICK-Lector64x65x_1P-20190118.xml


LECTOR64x65x, 1 port
LECTOR 64x65x

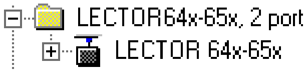
GSD-Parameterization not available



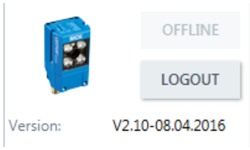
Version: 3.1.1

Lector64x/65x 2port:

SICK_**Lector64x65x-2port**_Profinet_minV142
GSDML-V2.31-SICK-Lector64x65x-20151103.xml


LECTOR64x-65x, 2 port
LECTOR 64x-65x

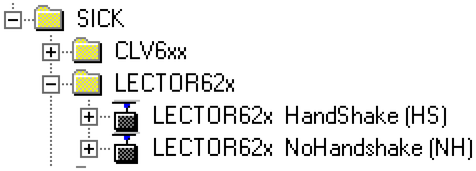
GSD-Parameterization not available



Version: V2.10-08.04.2016

Lector620 V2.10:

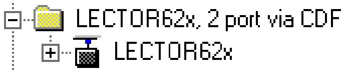
SICK_**Lector62x**_Profinet_minV210
GSDML-V2.3-SICK-Lector62x-20140929.xml


SICK
CLV6xx
LECTOR62x
LECTOR62x HandShake (HS)
LECTOR62x NoHandshake (NH)

GSD-Parameterization available

Lector620 V2.10:

SICK_**Lector62x_Profinet_via_CDF**_minV210
GSDML-V2.3-SICK-Lector62x_via_CDF-20150312.xml


LECTOR62x, 2 port via CDF
LECTOR62x

GSD-Parameterization available

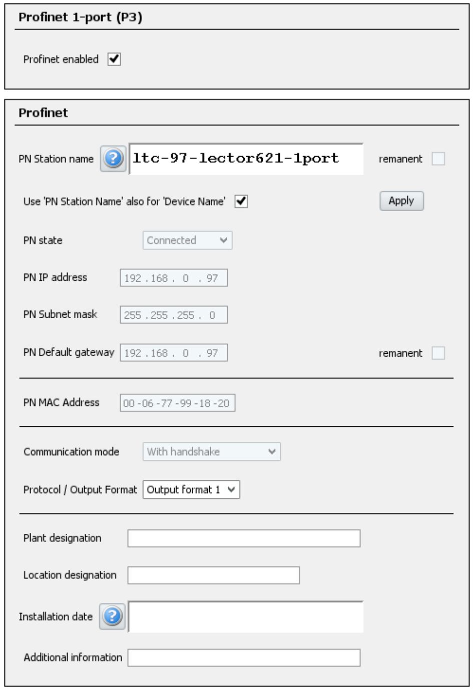
see sick.com for latest GSD files

PROFINET 1PORT AT LECTOR6XX FAMILY

SICK
Sensor Intelligence.

Lector61x/621:

Profinet on P3: 4 pin, M12, D-coded



Profinet 1-port (P3)

Profinet enabled ☑

Profinet

PN Station name ltc-97-lector621-1port remanent □

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

PN state: Connected

PN IP address: 192 . 168 . 0 . 97

PN Subnet mask: 255 . 255 . 255 . 0

PN Default gateway: 192 . 168 . 0 . 97 remanent □

PN MAC Address: 00 -06 -77 -99 -18 -20

Communication mode: With handshake

Protocol / Output Format: Output format 1

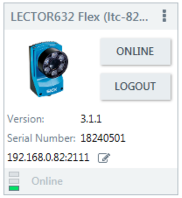
Plant designation

Location designation

Installation date

Additional information

Lector63x:



LECTOR632 Flex (ltc-82...

ONLINE

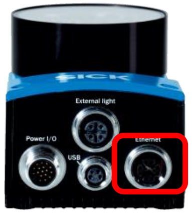
LOGOUT

Version: 3.1.1

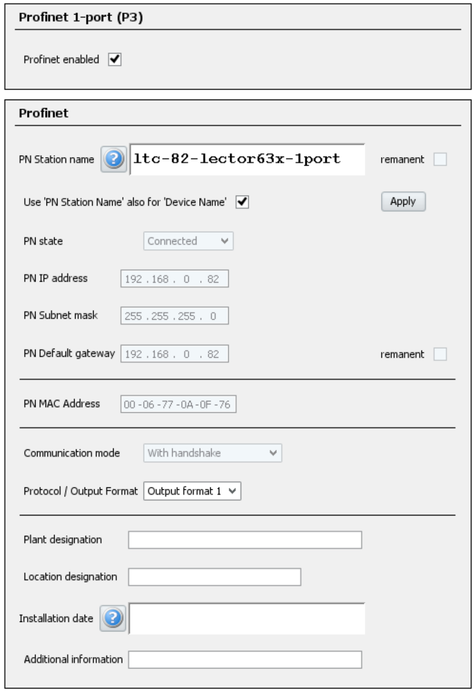
Serial Number: 18240501

192.168.0.82:2111

Online



Profinet on P3: M12, 8-pin, X-coded



Profinet 1-port (P3)

Profinet enabled ☑

Profinet

PN Station name ltc-82-lector63x-1port remanent □

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

PN state: Connected

PN IP address: 192 . 168 . 0 . 82

PN Subnet mask: 255 . 255 . 255 . 0

PN Default gateway: 192 . 168 . 0 . 82 remanent □

PN MAC Address: 00 -06 -77 -0A -0F -76

Communication mode: With handshake

Protocol / Output Format: Output format 1

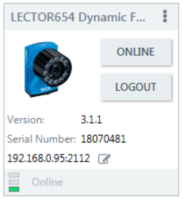
Plant designation

Location designation

Installation date

Additional information

Lector64x/65x:



LECTOR654 Dynamic F...

ONLINE

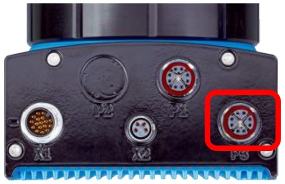
LOGOUT

Version: 3.1.1

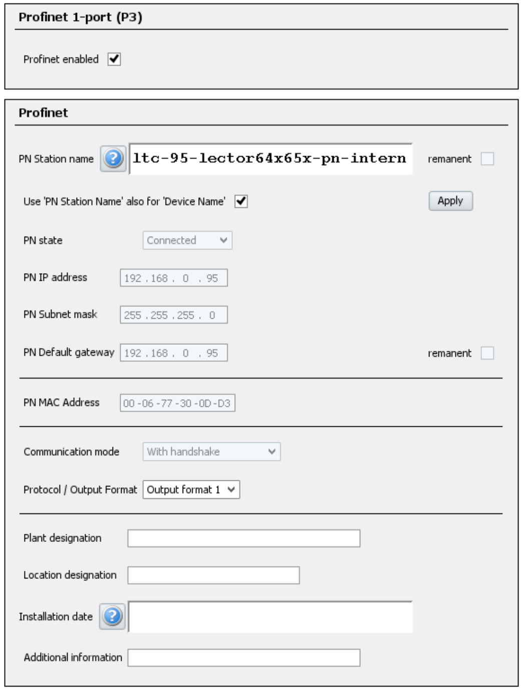
Serial Number: 18070481

192.168.0.95:2112

Online



Profinet on P3: M12, 8-pin, X-coded



Profinet 1-port (P3)

Profinet enabled ☑

Profinet

PN Station name ltc-95-lector64x65x-pn-intern remanent □

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

PN state: Connected

PN IP address: 192 . 168 . 0 . 95

PN Subnet mask: 255 . 255 . 255 . 0

PN Default gateway: 192 . 168 . 0 . 95 remanent □

PN MAC Address: 00 -06 -77 -30 -0D -D3

Communication mode: With handshake

Protocol / Output Format: Output format 1

Plant designation

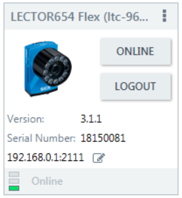
Location designation

Installation date

Additional information

At Lector64x/65x 1port P1 must be set to different Subnet as P3, also when not used.

Lector64x/65x-2port:



LECTOR654 Flex (ltc-96...

ONLINE

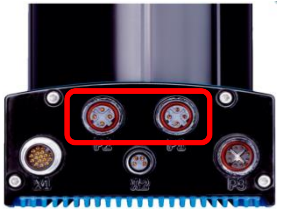
LOGOUT

Version: 3.1.1

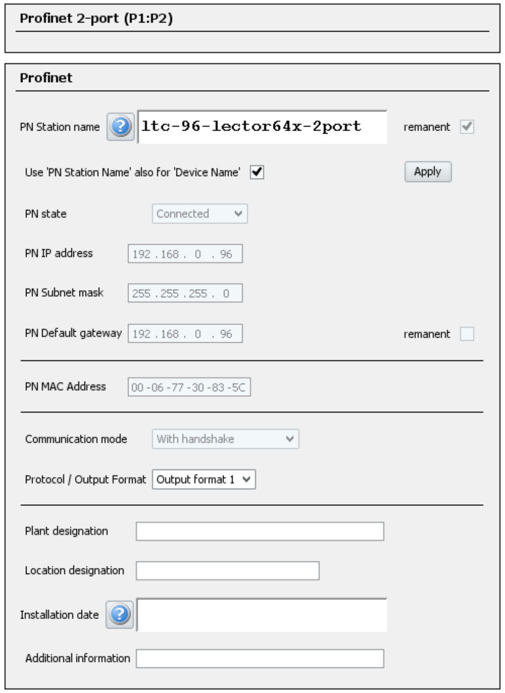
Serial Number: 18150081

192.168.0.1:2111

Online



Profinet on P1/2: M12, 4-pin, D-coded



Profinet 2-port (P1:P2)

Profinet

PN Station name ltc-96-lector64x-2port remanent ☑

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

PN state: Connected

PN IP address: 192 . 168 . 0 . 96

PN Subnet mask: 255 . 255 . 255 . 0

PN Default gateway: 192 . 168 . 0 . 96 remanent □

PN MAC Address: 00 -06 -77 -30 -83 -5C

Communication mode: With handshake

Protocol / Output Format: Output format 1

Plant designation

Location designation

Installation date

Additional information

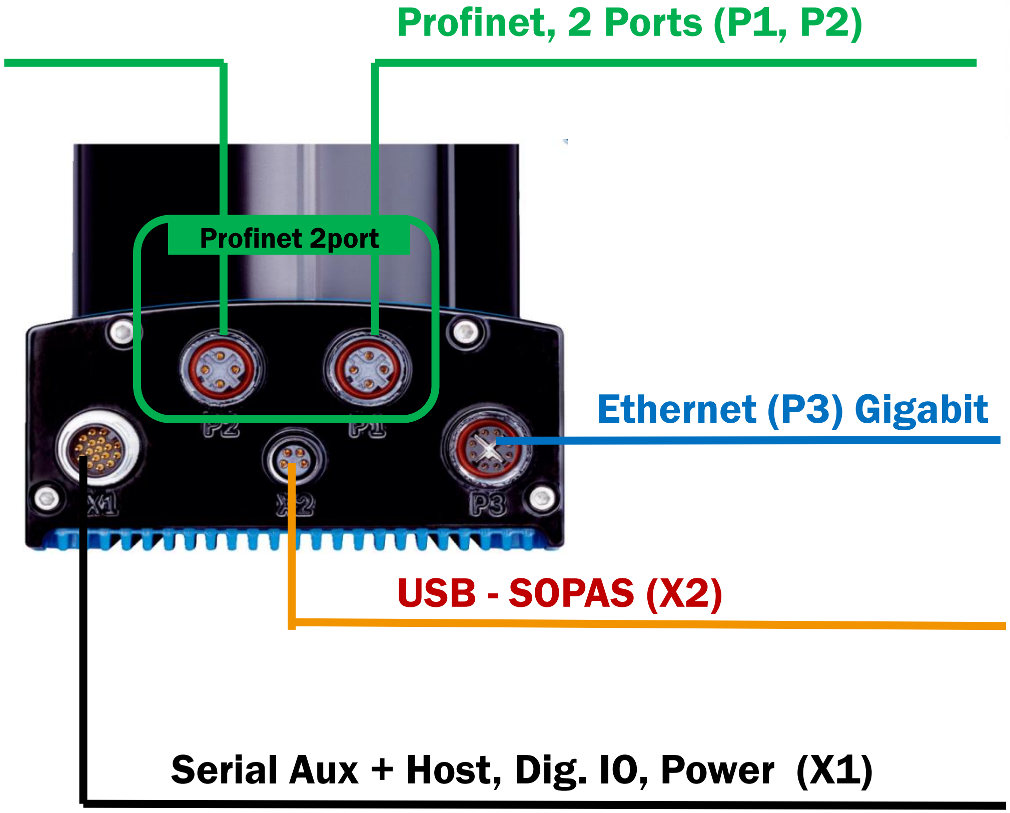
Lector64x/65x 2port: Profinet fix selected

LECTOR 64x/65x DUAL PORT PROFINET ON BOARD

INTERFACE OPTIONS

Lector64x/65x with Dual Port Profinet on board:

1071472	V2D642R-MCXXH6
1075975	V2D652R-MCXXH6
1083896	V2D654R-MCXXH6



Profinet, 2 Ports (P1, P2)

Ethernet (P3) Gigabit

USB - SOPAS (X2)

Serial Aux + Host, Dig. IO, Power (X1)

Dual Port Profinet
for Result Data and Command handling,
e.g. via SICK Function block PN/DP

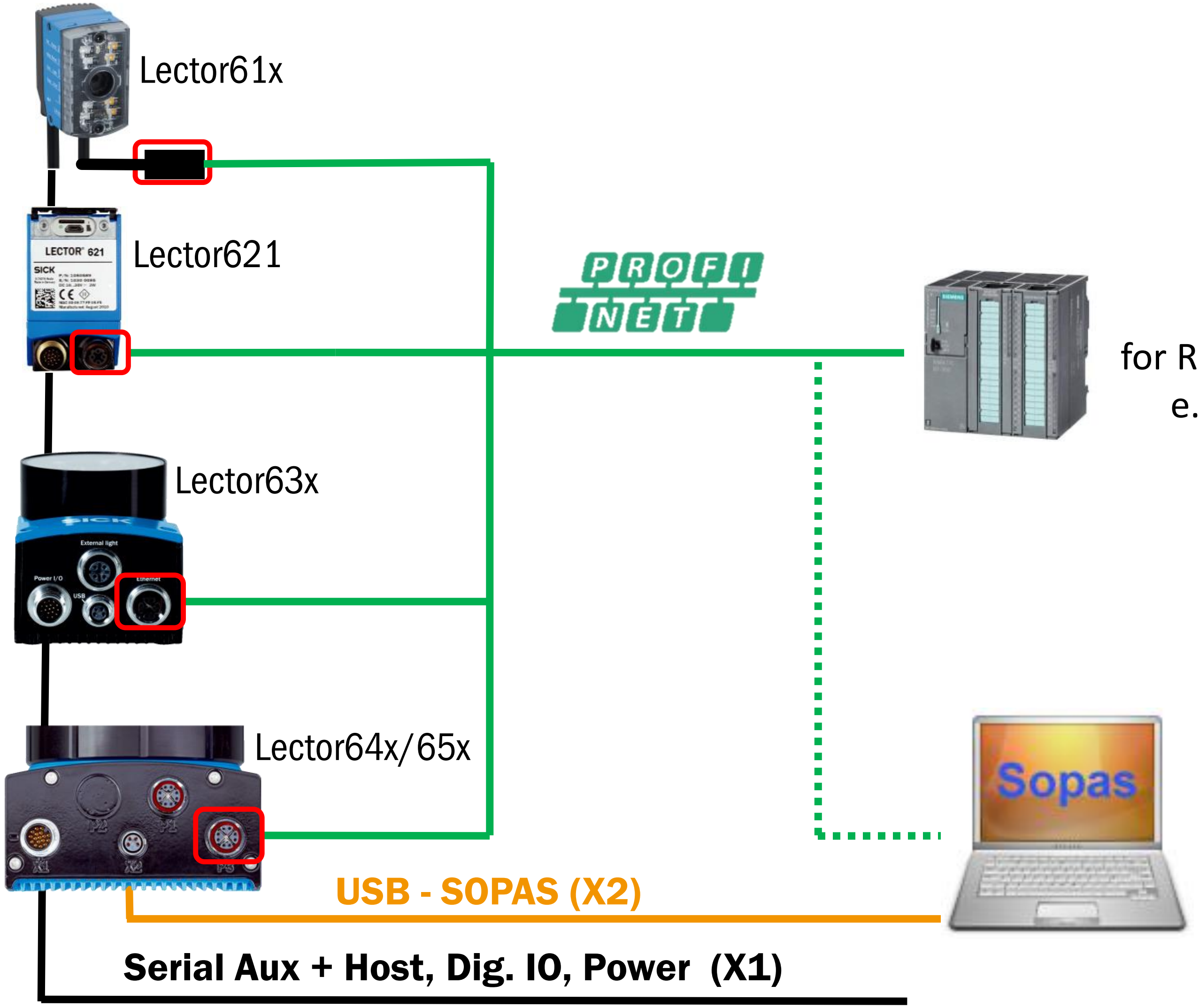
Parameterization and Image
handling via Sopas ET,
only via Ethernet P3 or USB

P3 at Lector64x/65x Dual Port can be set to same Subnet as Profinet P1/P2, when needed. P3 must have then different IP as the Profinet port P1/P2.

LECTOR 61X, 621-65X 1 PORT PROFINET ON BOARD

INTERFACE OPTIONS

Lector61x with V4.0.0 and Lector621, 63x, 64x, 65x with V3.1.1 or higher: Profinet, 1 Port on P3



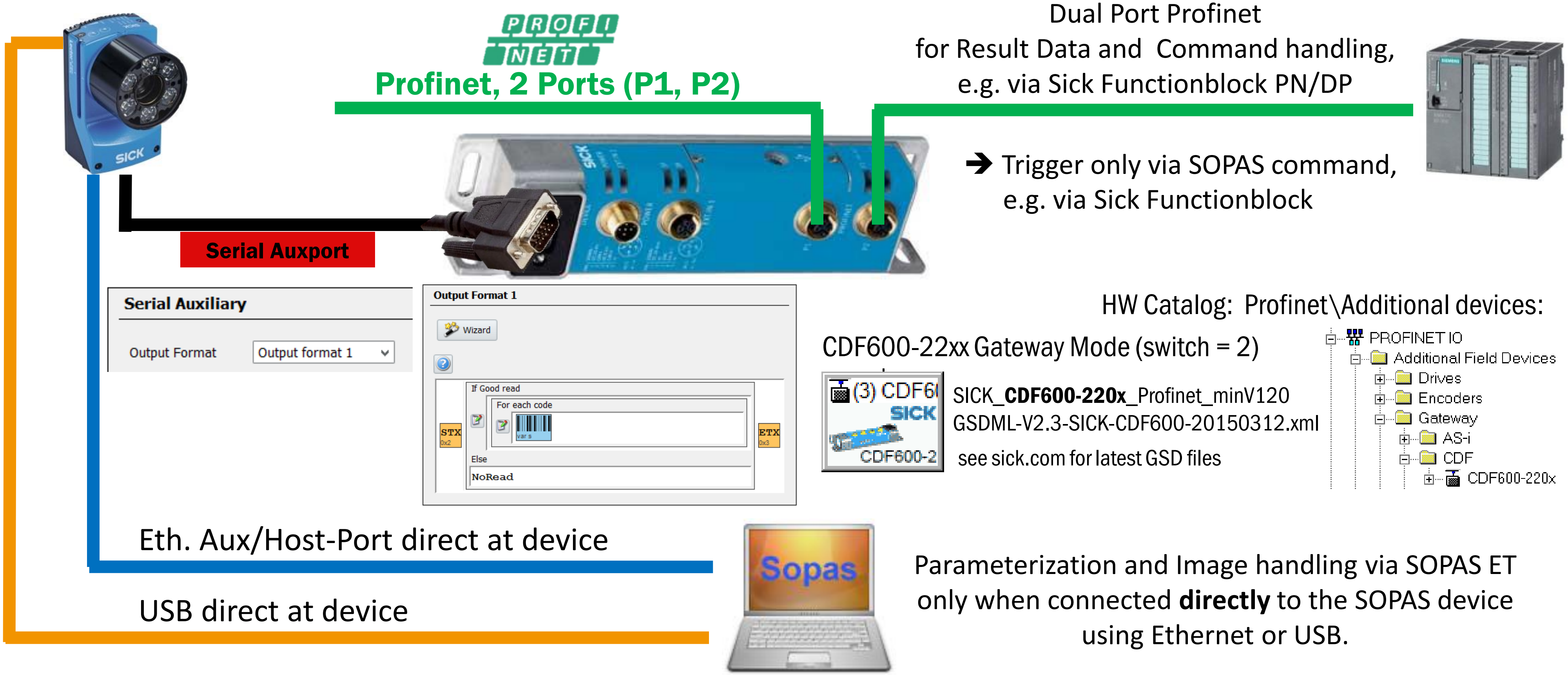
1 Port Profinet
for Result Data and Command handling,
e.g. via SICK Function block PN/DP

Parameterization and Image
handling via Sopas ET
using Ethernet P3 or via USB

P1 at Lector64x/65x 1port must be set to different Subnet as P3, also when not used.

CDF IN GATEWAY MODE - AS ALTERNATIVE
TO CONNECT ANY 4DPRO SENSOR TO PROFINET

As alternative, or when Profinet is not integrated, or 2port is needed, any 4Dpro sensor with Serial Auxport can be connected using CDF600-22xx in Gateway mode to Profnet.
Set Mode switch to 2 and use GSD from CDF600-22xx.
Ser Aux must be set to Output format 1 using an STX ETX framing.
Trigger is only possible by SOPAS command, as easiest using SICK Function Block.


PROFI NET
Profinet, 2 Ports (P1, P2)
Serial Auxport
Eth. Aux/Host-Port direct at device
USB direct at device
Sopas
SICK

Dual Port Profinet
for Result Data and Command handling,
e.g. via Sick Functionblock PN/DP

→ Trigger only via SOPAS command,
e.g. via Sick Functionblock

Serial Auxiliary

Output Format: Output format 1

Output Format 1

Wizard

```
STX 0x2 | If Good read
        |   For each code
        |     var s
        | Else
        |   NoRead
ETX 0x3
```

HW Catalog: Profinet\Additional devices:

CDF600-22xx Gateway Mode (switch = 2)

(3) CDF6… SICK CDF600-2…

SICK_**CDF600-220x**_Profinet_minV120
GSDML-V2.3-SICK-CDF600-20150312.xml
see sick.com for latest GSD files

- PROFINET IO
  - Additional Field Devices
    - Drives
    - Encoders
    - Gateway
      - AS-i
      - CDF
        - CDF600-220x

Parameterization and Image handling via SOPAS ET only when connected **directly** to the SOPAS device using Ethernet or USB.

USING HANDSHAKE OR NO-HANDSHAKE
GUIDELINE

- **Handshake Mode:** recommended
  - SICK function block recommended
  - Can send and receive also longer telegrams
  - Flow control via handshake (Confirmed Messaging protocol)
  - Trigger options: **
    - Fieldbus bit (Ctrl-Bits Out)
    - Hardware input at the sensor
    - Command

Recommended when long data telegrams must be received, or when sending of commands is needed.

For RFU6xx and RFH6xx it is in general recommended to use SICK function blocks. These function block allows to use powerful read and write tag functions.

- **No Handshake Mode:**
  - SICK function block not allowed (no program for handshake needed)
  - Can handle only short telegrams which fits inside the “xx Byte input” module range
  - Can be only used to receive single telegrams (no flow control)
  - Trigger options: **
    - Fieldbus bit (Ctrl-Bits Out)
    - Hardware input at the sensor

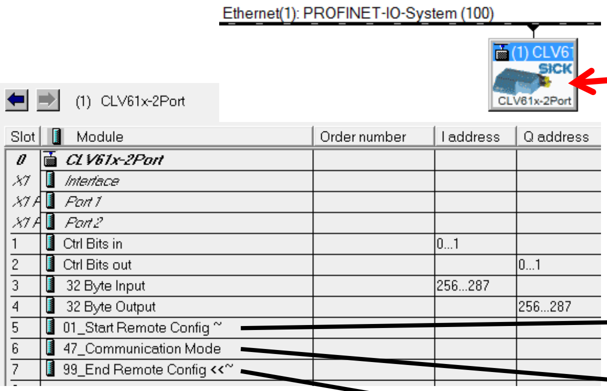
Recommended when just triggering and data receiving and no command sending to the sensor is needed, e.g. at CLV6xx and Lector6xx

** Limited trigger options by using CDF600-2 gateway mode

EXAMPLE FOR NO-HANDSHAKE – CLV61X-DUAL PORT
USING DIRECT DATA ACCESS

SICK Sensor Intelligence.

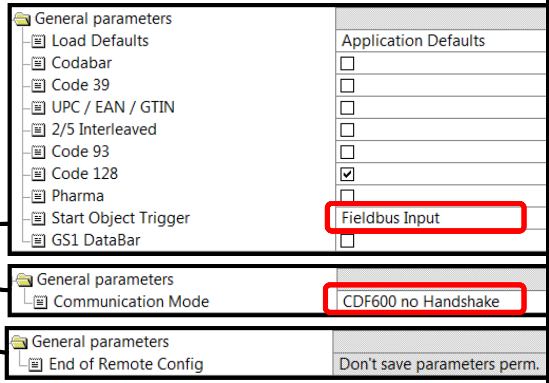
HW-Config: Insert device and use GSD Parametration to set No-Handshake and trigger via Fieldbus



Ethernet(1): PROFINET-IO-System (100)

(1) CLV61x-2Port

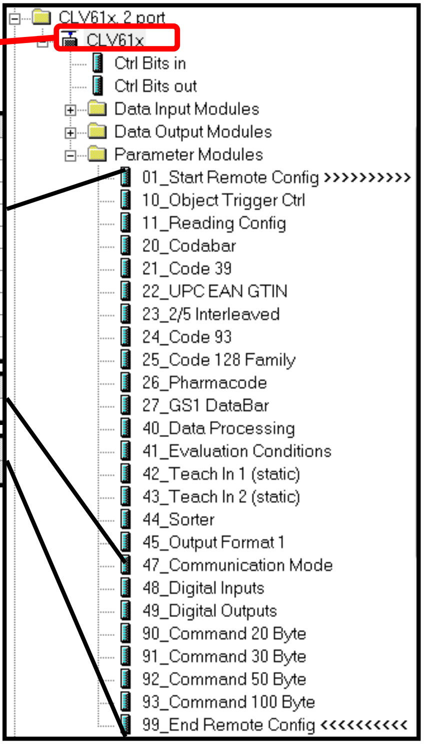
Slot	Module	Order number	I address	Q address
0	***CLV61x-2Port***			
X1	*Interface*			
X1 P	*Port 1*			
X1 P	*Port 2*			
1	Ctrl Bits in		0...1	
2	Ctrl Bits out			0...1
3	32 Byte Input		256...287	
4	32 Byte Output			256...287
5	01_Start Remote Config ~			
6	47_Communication Mode			
7	99_End Remote Config <<~			



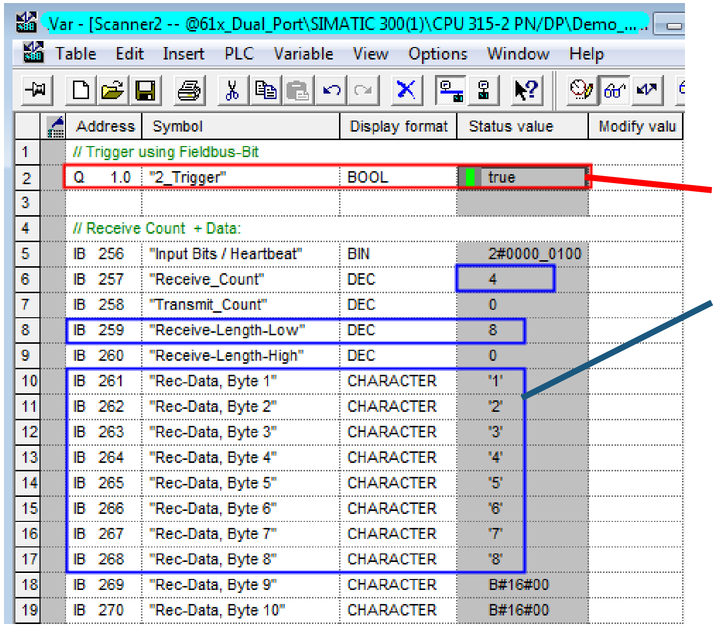
General parameters	
Load Defaults	Application Defaults
Codabar	□
Code 39	□
UPC / EAN / GTIN	□
2/5 Interleaved	□
Code 93	□
Code 128	☑
Pharma	□
Start Object Trigger	Fieldbus Input
GS1 DataBar	□

General parameters	
Communication Mode	CDF600 no Handshake

General parameters	
End of Remote Config	Don't save parameters perm.



- CLV61x 2 port
  - CLV61x
    - Ctrl Bits in
    - Ctrl Bits out
    - Data Input Modules
    - Data Output Modules
    - Parameter Modules
      - 01_Start Remote Config >>>>>>>>>>
      - 10_Object Trigger Ctrl
      - 11_Reading Config
      - 20_Codabar
      - 21_Code 39
      - 22_UPC EAN GTIN
      - 23_2/5 Interleaved
      - 24_Code 93
      - 25_Code 128 Family
      - 26_Pharmacode
      - 27_GS1 DataBar
      - 40_Data Processing
      - 41_Evaluation Conditions
      - 42_Teach In 1 (static)
      - 43_Teach In 2 (static)
      - 44_Sorter
      - 45_Output Format 1
      - 47_Communication Mode
      - 48_Digital Inputs
      - 49_Digital Outputs
      - 90_Command 20 Byte
      - 91_Command 30 Byte
      - 92_Command 50 Byte
      - 93_Command 100 Byte
      - 99_End Remote Config <<<<<<<<<<



Var - [Scanner2 -- @61x_Dual_Port\SIMATIC 300(1)\CPU 315-2 PN/DP\Demo_... .

	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	

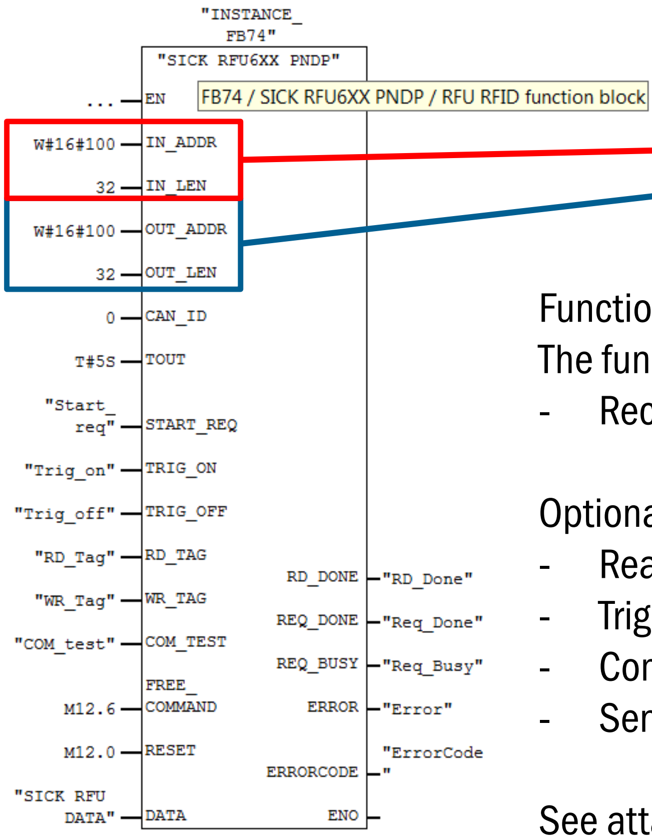
<u>Trigger:</u> Output Bit Q1.0 triggers the scanner:
1 = Trigger on, 0 = Trigger off

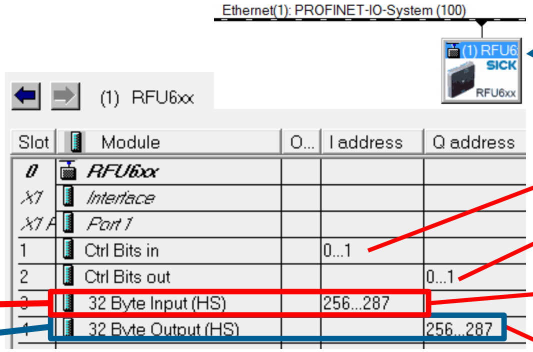
<u>Result data:</u>
The user data are visible in the area outlined in blue.
The "Receive Count" counter increments with each block of data received.
On overflow, the 0 is skipped: 1 to 255, 1 to 255, ...
In the example, eight data bytes were received, with the content "12345678".
No handshake program is needed in this No-Handshake mode.

EXAMPLE FOR HANDSHAKE WITH RFU630

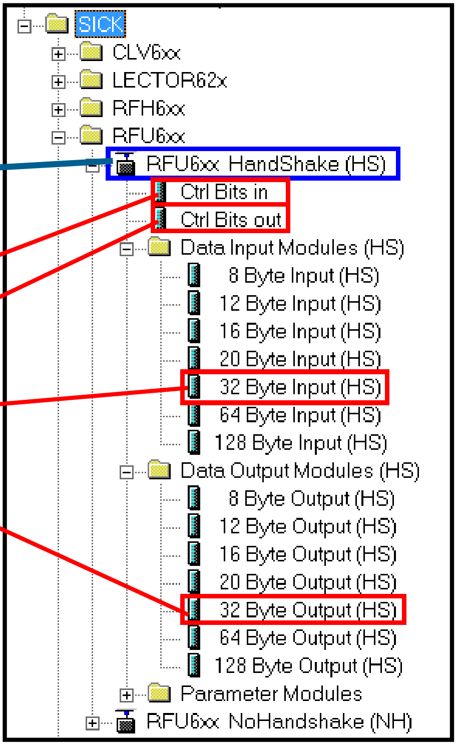
USING SICK S7 FUNCTION BLOCK (NEED HANDSHAKE MODE)

HW-Config: Insert device in handshake mode and use parameterization via SOPAS ET to be flexible for fine tuning local at the device





Slot	Module	O...	I address	Q address
0	***RFU6xx***			
X1	*Interface*			
X1 P	*Port 1*			
1	Ctrl Bits in		0...1	
2	Ctrl Bits out			0...1
3	32 Byte Input (HS)		256...287	
4	32 Byte Output (HS)			256...287



Function Block for RFU6xx (here for S7 300/400 Step 7 V5.5)

The function block do in general:

- Receive result data

Optional you can use these functions:

- Reading and writing of tag contents ➔ Recommended functions
- Triggering of the device (SW-Trigger)
- Communication test
- Send Free Commands

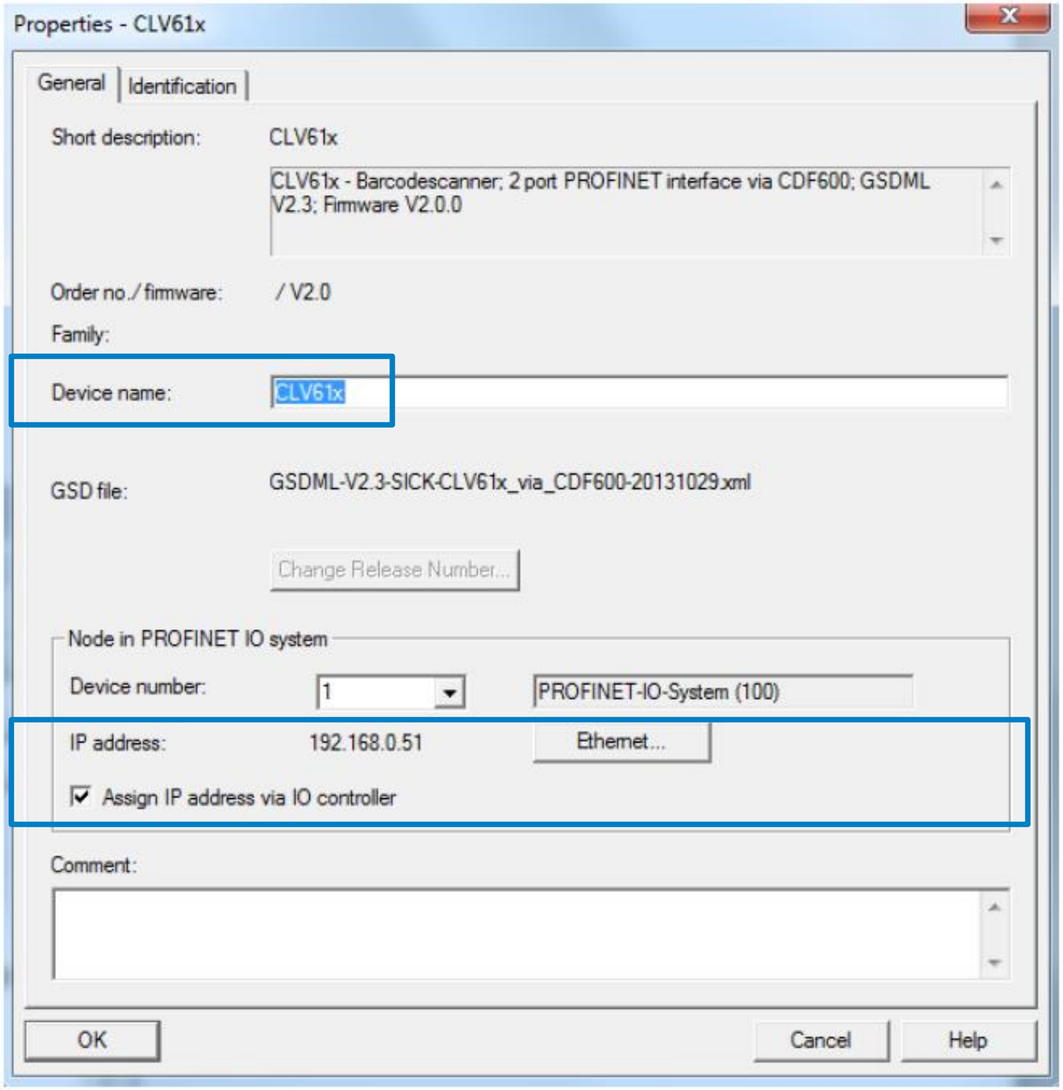
See attached documentation for further details

ADDING SENSORS

HW–CONFIG / SET DEVICE NAME

- Select the Device name for indentifying the device in PROFINET by double clicking on the device icon
- SOPAS ET also displays this name when scanning the network

- The IP address can be controlled by the PLC (IO controller). By default this is active.
  The PLC sets the IP address in the so called „temporary“ mode. This means it is not allowed for the device to save this IP address. At next power cycle it must start with IP 0.0.0.0. The PLC will set the IP address again.



Properties - CLV61x

General | Identification

Short description: CLV61x

CLV61x - Barcodescanner; 2 port PROFINET interface via CDF600; GSDML V2.3; Firmware V2.0.0

Order no./ firmware: / V2.0

Family:

Device name: CLV61x

GSD file: GSDML-V2.3-SICK-CLV61x_via_CDF600-20131029.xml

Node in PROFINET IO system

Device number: 1

PROFINET-IO-System (100)

IP address: 192.168.0.51

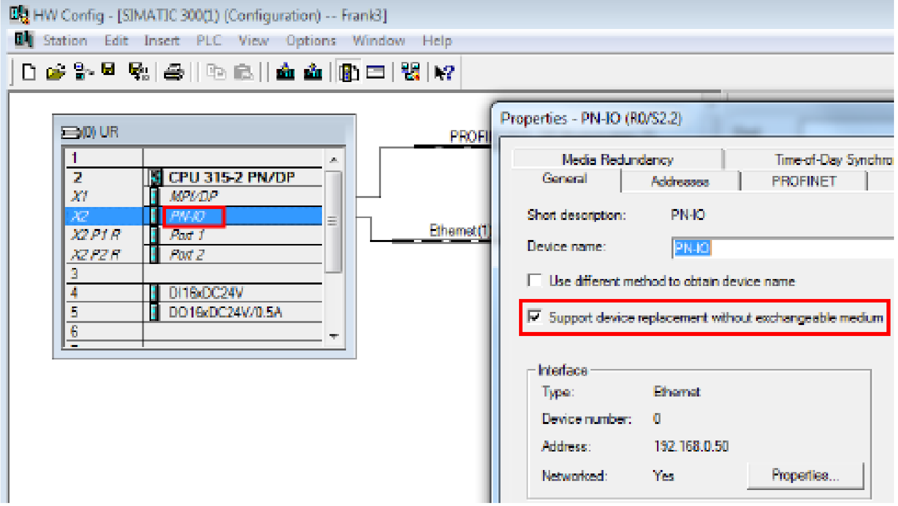
☑ Assign IP address via IO controller

Comment:

ADDING SENSORS
HW–CONFIG / SET PROFINET NAME 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



HW Config - [SIMATIC 300(1) (Configuration) -- Frank3]

(0) UR

1	
2	CPU 315-2 PN/DP
X1	MPI/DP
X2	PN-IO
X2 P1 R	Port 1
X2 P2 R	Port 2
3	
4	DI16xDC24V
5	DO16xDC24V/0.5A
6	

Properties - PN-IO (R0/S2.2)

Short description: PN-IO

Device name: PN-IO

☐ Use different method to obtain device name

☑ Support device replacement without exchangeable medium

Interface

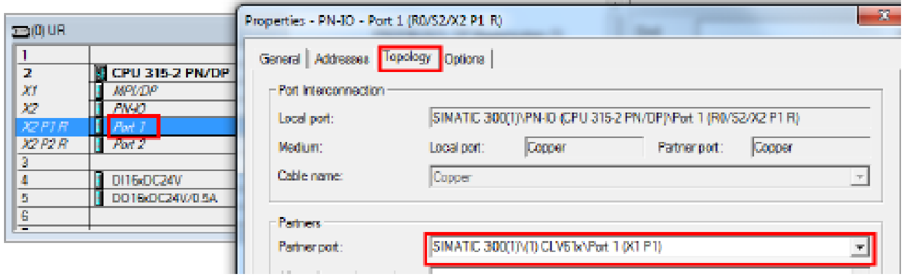
Type: Ethernet

Device number: 0

Address: 192.168.0.50

Networked: Yes

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



(0) UR

1	
2	CPU 315-2 PN/DP
X1	MPI/DP
X2	PN-IO
X2 P1 R	Port 1
X2 P2 R	Port 2
3	
4	DI16xDC24V
5	DO16xDC24V/0.5A
6	

Properties - PN-IO - Port 1 (R0/S2/X2 P1 R)

Port interconnection

Local port: SINATIC 300(1)\PN-IO (CPU 315-2 PN/DP)\Port 1 (R0/S2/X2 P1 R)

Medium: Local port: Copper Partner port: Copper

Cable name: Copper

Partners

Partner port: SINATIC 300(1)\(1) CLV61x\Port 1 (X1 P1)

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

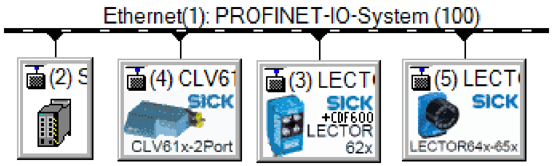
If a PN device is connected with an **empty name** and its type matches, the PN name stored on the PROFINET IO Controller (PLC) is assigned.

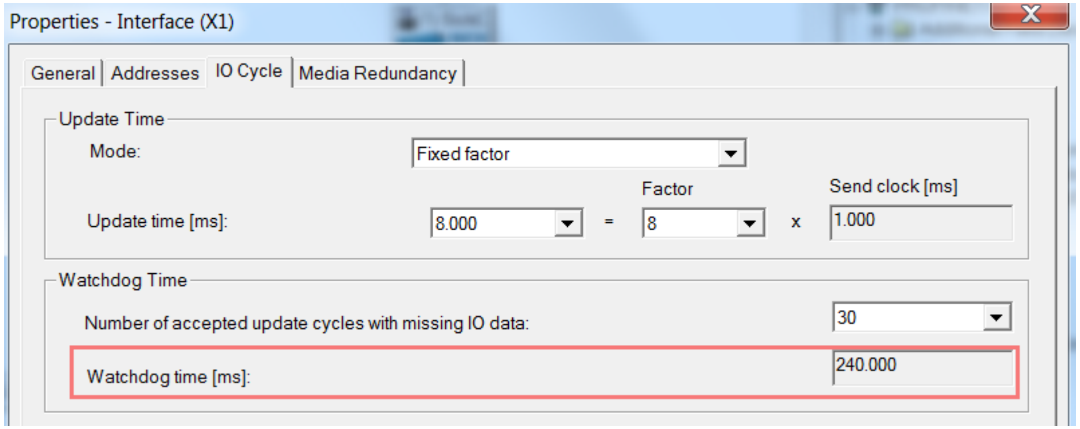
SETUP OF A RING TOPOLOGY BASED ON “MRP”

HW–CONFIG / RING PROTOCOL - MRP

- In an MRP Ring one device has to be MRP-Mananger (e.g. switch). The other devices must be MRP-Clients.
- The reconfiguration time for MRP is 200 ms. With the MRP protocol, it is possible to detect and to reconfigure a defective ring within 200 ms (for up to 50 nodes).
- Accordingly, a watchdog time of > 200 ms has to be selected for <u>each</u> PROFINET device in the ring.
- This can be reached by increasing the <u>update time</u> or the accepted <u>update cycles</u> without IO data.
- For further details see e.g. Siemens Application example Entry ID: 109739614

Example:




Properties - Interface (X1)

Update Time

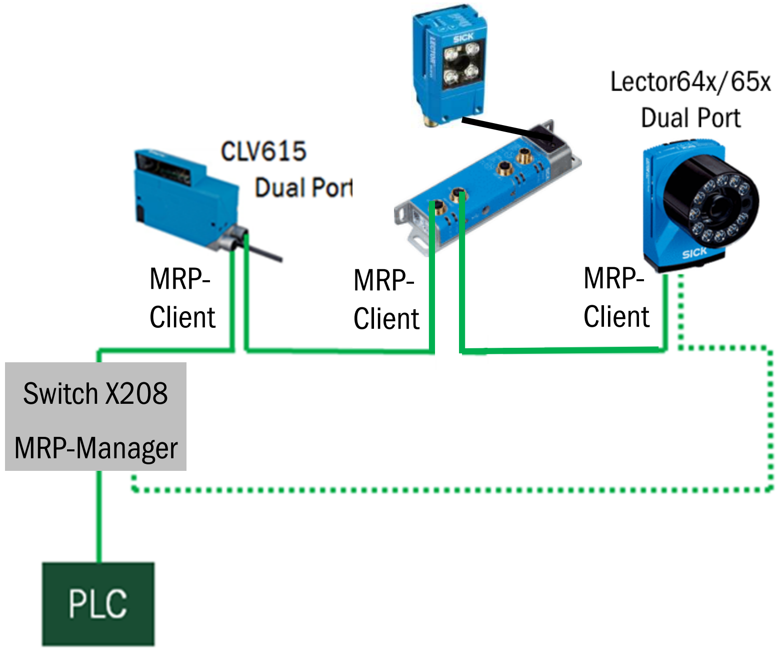
Mode: Fixed factor

Update time [ms]: 8.000 = Factor 8 x Send clock [ms] 1.000

Watchdog Time

Number of accepted update cycles with missing IO data: 30

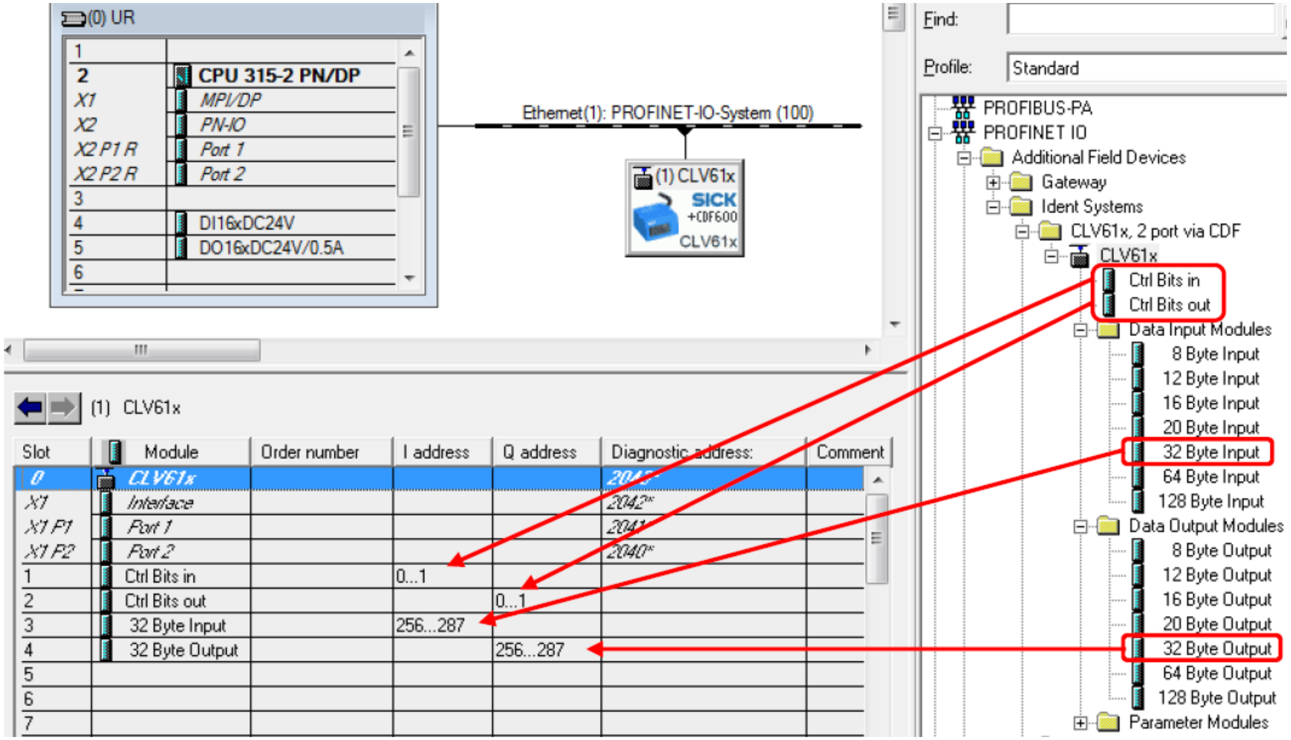
Watchdog time [ms]: 240.000



ADDITION OF DATA MODULES

HW–CONFIG / NECESSARY REQUIREMENT

- Add one input and one output module. The size can be selected (data size = 8 … 128 bytes) Using handshake mode up to 4.000 byte data telegrams can be handled
- The HW config must contain 4 modules (not less): Ctrl-Bits In/Out and Data Byte In/Out
- Depending on device type these 4 modules are automatically inserted when the device is inserted in PROFINET. If not insert these 4 modules by using drag & drop



(0) UR

1	
2	**CPU 315-2 PN/DP**
X1	*MPI/DP*
X2	*PN-IO*
X2 P1 R	*Port 1*
X2 P2 R	*Port 2*
3	
4	DI16xDC24V
5	DO16xDC24V/0.5A
6	

Find:
Profile: Standard

```
PROFIBUS-PA
PROFINET IO
  Additional Field Devices
    Gateway
    Ident Systems
      CLV61x, 2 port via CDF
        CLV61x
          Ctrl Bits in
          Ctrl Bits out
          Data Input Modules
            8 Byte Input
            12 Byte Input
            16 Byte Input
            20 Byte Input
            32 Byte Input
            64 Byte Input
            128 Byte Input
          Data Output Modules
            8 Byte Output
            12 Byte Output
            16 Byte Output
            20 Byte Output
            32 Byte Output
            64 Byte Output
            128 Byte Output
          Parameter Modules
```

(1) CLV61x

Slot	Module	Order number	I address	Q address	Diagnostic address:	Comment
0	*CLV61x*				*2043**	
X1	*Interface*				*2042**	
X1 P1	*Port 1*				*2041**	
X1 P2	*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						
7						

CTRL–BITS–IN @ PROFINET ON BOARD

HW – CONFIG / NECESSARY REQUIREMENT / CTRL-BITS-IN / INPUTS AT PLC

By using the Ctrl-Bits-In, the PLC can monitor the digital inputs and outputs of the ID sensor.
For logical assignment of the Ctrl-Bits-In see below table. The available I/O hardware can vary depending on the type of ID sensor.

Address	Bit	Name	Meaning	CLV62x-65x	Lector61x	Lector620	Lector621-65x	Lector64x-65x 2port	RFH6xx	RFU61x	RFU62x-65x
Add.+1	**D0**	Device Ready	Status of the attached ID sensor	X	X	X	X	X	X	X	X
Add.+1	**D1**	System Ready **	The connected ID sensor is OK (device ready) and the monitored CAN devices are accessible (display in the system status "Net monitoring OK"). **	X	---	---	---	---	X	---	---
Add.+1	**D2**	Good Read *	Status of the last read results *	X	X	X	X	X	X	X	X
Add.+1	**D3**	No Read *	Status of the last read results *	X	X	X	X	X	X	X	X
Add.+1	**D4**	External Output 1	Status of External Output 1 (via CMC600)	X	X	X	X	X	X	---	X
Add.+1	**D5**	External output 2	Status of External Output 2 (via CMC600)	X	X	X	X	X	X	---	X
Add.+1	**D6**	Result 1	Status of Result Output 1	X	X	X	X	X	X	---	X
Add.+1	**D7**	Result 2	Status of Result Output 2	X	X	X	X	X	X	---	X
Add.	**D8**	External Input 1	Status of External Input 1 (via CMC600)	X	---	X	X	X	X	---	X
Add.	**D9**	External input 2	Status of External Input 2 (via CMC600)	X	---	X	X	X	X	---	X
Add.	**D10**	Sensor 1	Status of Sensor Input 1	X	X	X	X	X	X	X	X
Add.	**D11**	Sensor 2	Status of Sensor Input 2	X	X	X	X	X	X	---	X
Add.	**D12**	–	Reserved								
Add.	**D13**	–	Reserved								
Add.	**D14**	–	Reserved								
Add.	**D15**	Toggle	Inverted after each read cycle.	X	X	X	X	X	X	X	X

Observe byte order: D0 stands for the least significant bit of Add.+1, X = supported, --- = not supported

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

** Not supported by every ID sensor.

For Ctrl-Bits at CDF600 please refer to TI of CDF600.

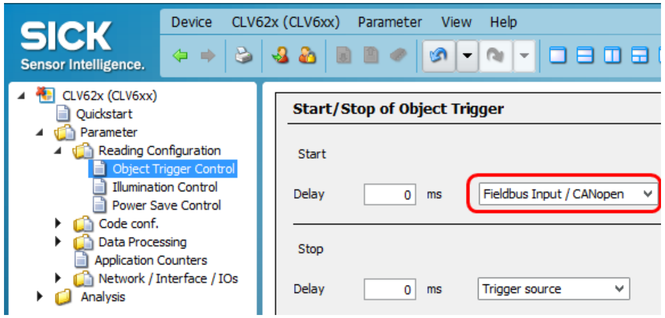
CTRL–BITS–OUT @ PROFINET ON BOARD

HW – CONFIG / NECESSARY REQUIREMENT / CTRL-BITS-OUT / OUTPUTS AT PLC

By using the Ctrl-Bits-Out, various functions can be activated in the ID sensor. For this to be allowed, the respective function must be configured in the ID sensor to **"Fieldbus Input".** For logical assignment of the Ctrl-Bits-In see below table.
The available I/O hardware can vary depending on the type of ID sensor.

Address	Bit	Name	Meaning	CLV62x-65x	Lector61x	Lector620	Lector621-65x	Lector64x-65x 2port	RFH6xx	RFU61x	RFU62x-65x
Add.+1	D0	Trigger	Object trigger for the ID sensor	X	X	X	X	X	X	X	X
Add.+1	D1	Sensor Idle	Attached ID sensor is put into sleep mode **	X	---	---	---	---	---	---	---
Add.+1	D2	Teach In 1	The Teach In 1 teach-in process is triggered **	X	X	X	X	X	---	---	---
Add.+1	D3	Teach In 2	The Teach In 2 teach-in process is triggered **	X	X	X	X	X	---	---	---
Add.+1	D4	External Output 1	Controls external output 1 (via CMC)	X	---	X	X	X	X	---	X
Add.+1	D5	External output 2	Controls external output 2 (via CMC)	X	---	X	X	X	X	---	X
Add.+1	D6	Result 1	Controls Result output 1 **	---	X	X	X	X	---	---	X
Add.+1	D7	Result 2	Controls Result output 2 **	---	X	X	X	X	---	---	X
Add.	D8	-	Reserved								
Add.	D9	-	Reserved								
Add.	D10	-	Reserved								
Add.	D11	-	Reserved								
Add.	D12	Distance_Config_0	Controls bit 0, dynamic (focus) switchover **	X	---	---	---	---	---	---	---
Add.	D13	Distance_Config_1	Controls bit 1, dynamic (focus) switchover **	X	---	---	---	---	---	---	---
Add.	D14	Distance_Config_2	Controls bit 2, dynamic (focus) switchover **	X	---	---	---	---	---	---	---
Add.	D15	Distance_Config_3	Controls bit 3, dynamic (focus) switchover **	X	---	---	---	---	---	---	---

Example:
Set CLV62x-65x to read cycle start via **"Fieldbus Input"** and read cycle stop via "Read Cycle Source".
➔The ID sensor can be triggered by the PLC using the bit **D0 "Trigger"**:



Start/Stop of Object Trigger

Start
Delay 0 ms Fieldbus Input / CANopen

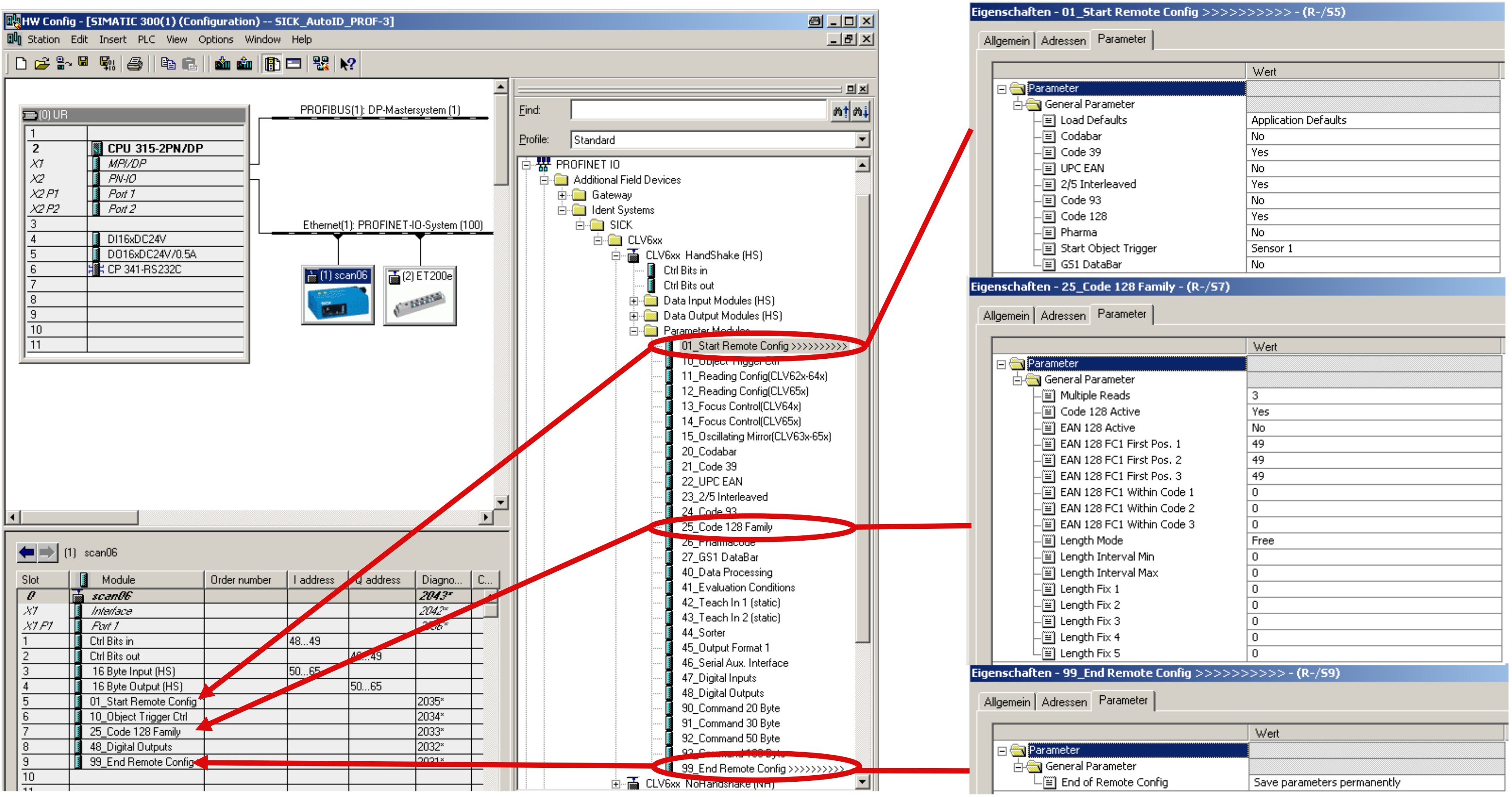
Stop
Delay 0 ms Trigger source

Observe byte order: D0 stands for the least significant bit of Add.+1, X = supported, --- = not supported
** Not supported by every ID sensor
For Ctrl-Bits at CDF600 please refer to TI of CDF600.

GSDML PARAMETERIZATION

HW-CONFIG / OPTIONALLY, DEPENDING ON TYPE

- Insert the required parameterization modules
- Always start with „Start Remote Config“, end with „End Remote Config“.



HW Config - [SIMATIC 300(1) (Configuration) -- SICK_AutoID_PROF-3]

Station Edit Insert PLC View Options Window Help
(0) UR
PROFIBUS(1): DP-Mastersystem (1)
Ethernet(1): PROFINET-IO-System (100)
(1) scan06
(2) ET200e

1	
2	CPU 315-2PN/DP
X1	MPI/DP
X2	PN-IO
X2 P1	Port 1
X2 P2	Port 2
3	
4	DI16xDC24V
5	DO16xDC24V/0.5A
6	CP 341-RS232C
7	
8	
9	
10	
11	

Find:

Profile: Standard

```
PROFINET IO
  Additional Field Devices
    Gateway
    Ident Systems
      SICK
        CLV6xx
          CLV6xx HandShake (HS)
            Ctrl Bits in
            Ctrl Bits out
            Data Input Modules (HS)
            Data Output Modules (HS)
            Parameter Modules
              01_Start Remote Config >>>>>>>>>>
              10_Object Trigger Ctrl
              11_Reading Config(CLV62x-64x)
              12_Reading Config(CLV65x)
              13_Focus Control(CLV64x)
              14_Focus Control(CLV65x)
              15_Oscillating Mirror(CLV63x-65x)
              20_Codabar
              21_Code 39
              22_UPC EAN
              23_2/5 Interleaved
              24_Code 93
              25_Code 128 Family
              26_Pharmacode
              27_GS1 DataBar
              40_Data Processing
              41_Evaluation Conditions
              42_Teach In 1 (static)
              43_Teach In 2 (static)
              44_Sorter
              45_Output Format 1
              46_Serial Aux. Interface
              47_Digital Inputs
              48_Digital Outputs
              90_Command 20 Byte
              91_Command 30 Byte
              92_Command 50 Byte
              93_Command 100 Byte
              99_End Remote Config >>>>>>>>>>
          CLV6xx NoHandshake (NH)
```

(1) scan06

Slot	Module	Order number	I address	Q address	Diagno...	C...
0	scan06				2043*	
X1	Interface				2042*	
X1 P1	Port 1				2036*	
1	Ctrl Bits in		48...49			
2	Ctrl Bits out			48...49		
3	16 Byte Input (HS)		50...65			
4	16 Byte Output (HS)			50...65		
5	01_Start Remote Config				2035*	
6	10_Object Trigger Ctrl				2034*	
7	25_Code 128 Family				2033*	
8	48_Digital Outputs				2032*	
9	99_End Remote Config				2031*	
10						
11						

Eigenschaften - 01_Start Remote Config >>>>>>>>>> - (R-/S5)

Allgemein | Adressen | Parameter

	Wert
Parameter	
General Parameter	
Load Defaults	Application Defaults
Codabar	No
Code 39	Yes
UPC EAN	No
2/5 Interleaved	Yes
Code 93	No
Code 128	Yes
Pharma	No
Start Object Trigger	Sensor 1
GS1 DataBar	No

Eigenschaften - 25_Code 128 Family - (R-/S7)

Allgemein | Adressen | Parameter

	Wert
Parameter	
General Parameter	
Multiple Reads	3
Code 128 Active	Yes
EAN 128 Active	No
EAN 128 FC1 First Pos. 1	49
EAN 128 FC1 First Pos. 2	49
EAN 128 FC1 First Pos. 3	49
EAN 128 FC1 Within Code 1	0
EAN 128 FC1 Within Code 2	0
EAN 128 FC1 Within Code 3	0
Length Mode	Free
Length Interval Min	0
Length Interval Max	0
Length Fix 1	0
Length Fix 2	0
Length Fix 3	0
Length Fix 4	0
Length Fix 5	0

Eigenschaften - 99_End Remote Config >>>>>>>>>> - (R-/S9)

Allgemein | Adressen | Parameter

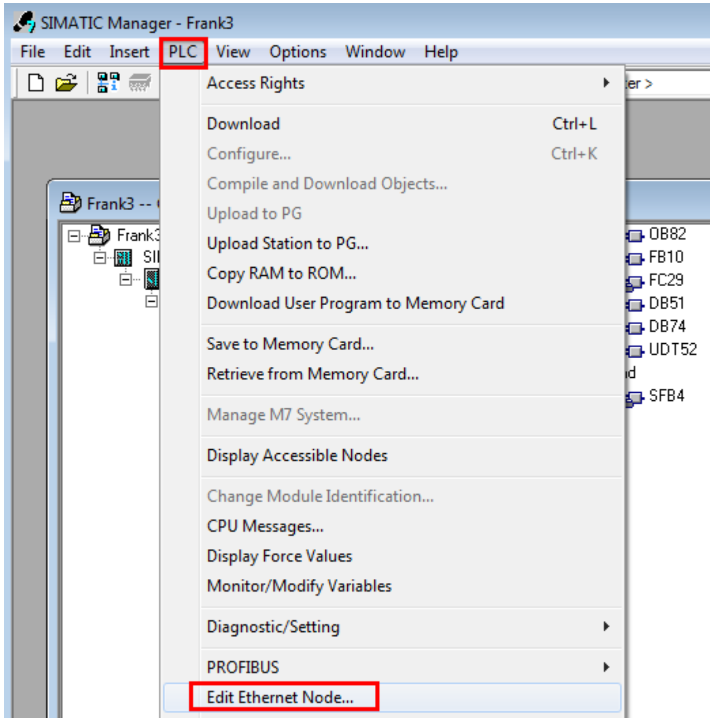
	Wert
Parameter	
General Parameter	
End of Remote Config	Save parameters permanently

Note: The GSDML configuration is always dominant and overwrites existing SOPAS ET parameters with each power cycling of the device or the IO Controller. The GSDML Configuration is not supported by all devices. E.G. the CLV690 do NOT support this function.

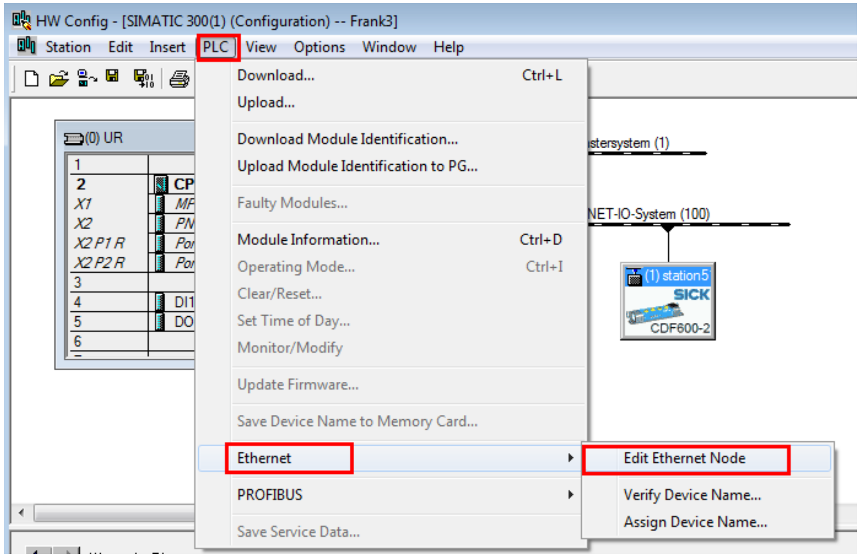
CHECK/SET PROFINET NAME VIA PLC TOOLS
START FROM HW-CONFIG OR S7 MANAGER

Tools for checking and assigning PN name and IP address from the PLC side:
You can use this tool in the S7 programming system to search for a PROFINET device and to check or change the PROFINET device name and IP address.
Starting from S7 manager: PLC > Edit Ethernet Nodes
Starting from S7 HW Config: PLC > Ethernet > Edit Ethernet Nodes

Start in S7 manager:



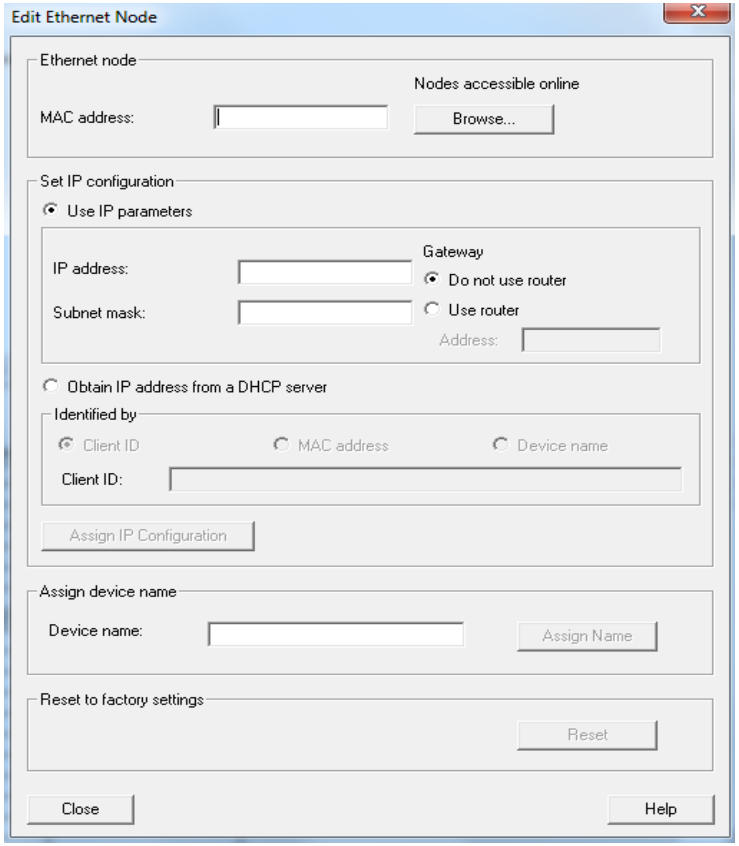
Or start in S7 hardware config:



CHECK/SET PROFINET NAME VIA PLC TOOLS

Using “Browse” you can search for all PROFINET devices. At the selected device the PN-Name or the IP can be set.   The communication is done via MAC address. So can be done also when PN name and IP is not correct or double defined.

Either way, the following window appears:



Edit Ethernet Node

Ethernet node
MAC address:
Nodes accessible online
Browse...

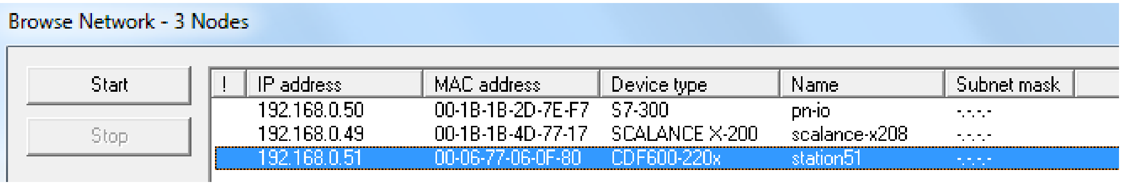
Set IP configuration
● Use IP parameters
IP address:
Subnet mask:
Gateway
● Do not use router
○ Use router
Address:
○ Obtain IP address from a DHCP server
Identified by
● Client ID ○ MAC address ○ Device name
Client ID:
Assign IP Configuration

Assign device name
Device name:
Assign Name

Reset to factory settings
Reset

Close
Help

You can scan the network using "Browse":



Browse Network - 3 Nodes

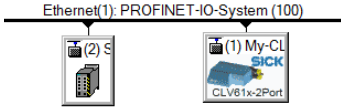
!	IP address	MAC address	Device type	Name	Subnet mask
	192.168.0.50	00-1B-1B-2D-7E-F7	S7-300	pn-io	-.-.-.-
	192.168.0.49	00-1B-1B-4D-77-17	SCALANCE X-200	scalance-x208	-.-.-.-
	192.168.0.51	00-06-77-06-0F-80	CDF600-220x	station51	-.-.-.-

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

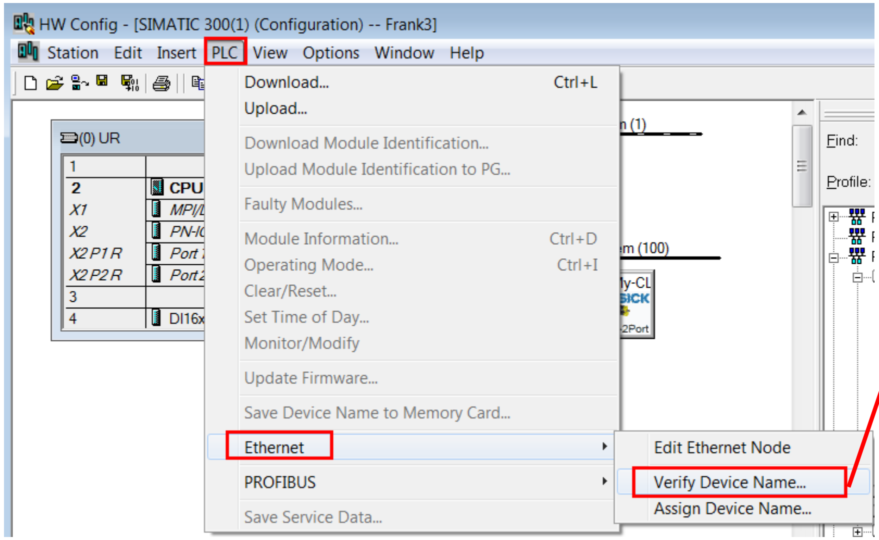
VERIFY PROFINET NAME VIA PLC TOOLS

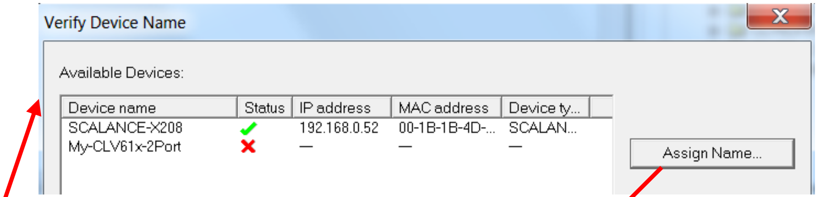
EASIEST WAY TO SET THE PN-NAME TO A DEVICE

Select at first the PN-Line, until it is **solid** (not dotted) displayed:



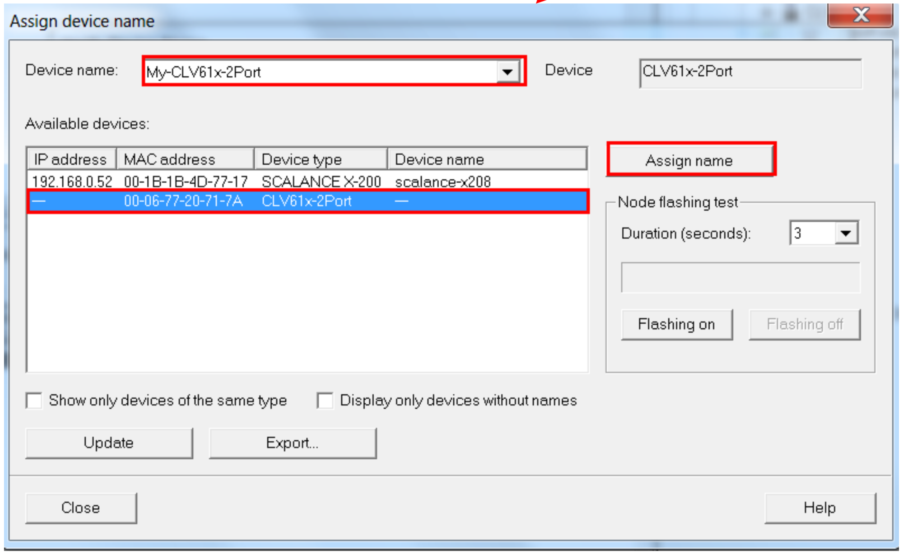
Then start the verify tool in the HW-Config with “PLC > Ethernet > Verify Device Name”.
Then the network is scanned if all defined names are presend. If not, you can press the button “Assign Name”.
Then above the missing name(s) shown and below the devices found in the network are shown. Then you can select the correct device and assign the PN-Name just with one click, without typing it manually again.





Available Devices:

Device name	Status	IP address	MAC address	Device ty...
SCALANCE-X208	✓	192.168.0.52	00-1B-1B-4D-...	SCALAN...
My-CLV61x-2Port	✗	—	—	—



Device name: My-CLV61x-2Port
Device: CLV61x-2Port

Available devices:

IP address	MAC address	Device type	Device name
192.168.0.52	00-1B-1B-4D-77-17	SCALANCE X-200	scalance-x208
—	00-06-77-20-71-7A	CLV61x-2Port	—

Duration (seconds): 3

□ Show only devices of the same type □ Display only devices without names

Note:
The green status ok means only that the **PN-Name is matching**.
You have to verify your own that the correct GSD file is used.

CONFIGURATION VIA SOPAS ET

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03

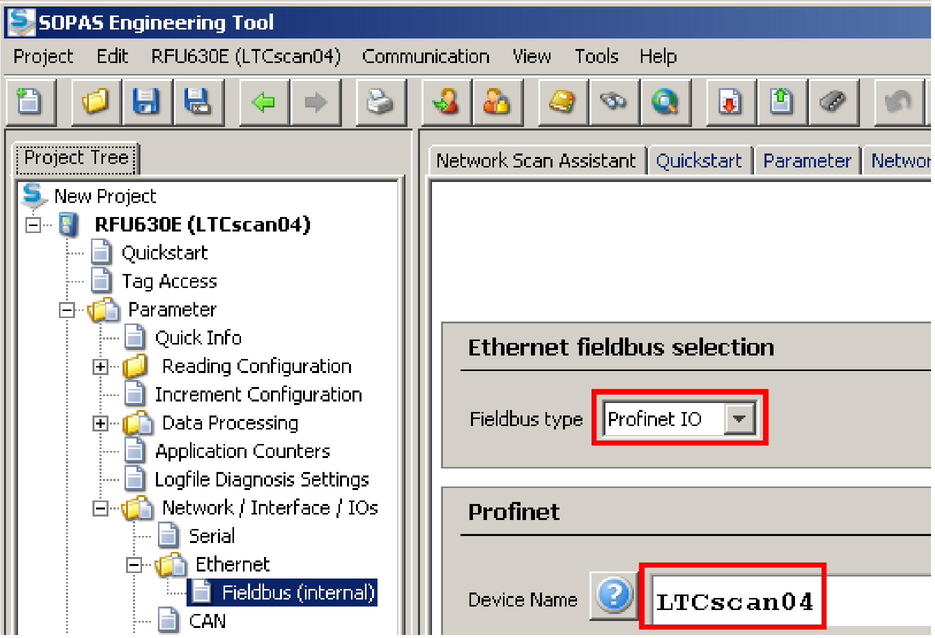
The devices can be fully configured via PLC.

But additional you can use SOPAS ET to configure or check the devices.

ACTIVATE PROFINET

SET DEVICE NAME – AT PROFINET-INTERN

- In SOPAS ET you have to activate PROFINET by selecting „Parameter / Network Interfaces IO / Ethernet / Fieldbus (internal)“ the fieldbus type to „PROFINET“
- Choose the device name to the same name that you have defined in the PLC
- If it is not done by the PLC you also can set the IP address of the device
- To activate the new parameterization save parameter permanent and power cycle the device

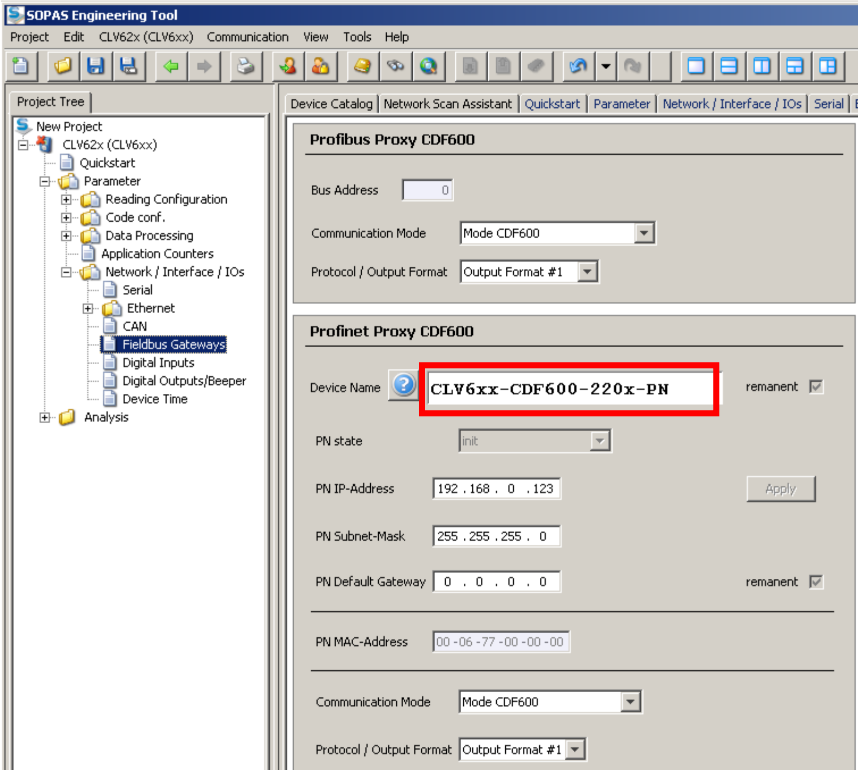


Fieldbus type: Profinet IO

Device Name: LTCscan04

SET DEVICE NAME AT PROFINET VIA CDF600-220X

- When a CLV62x-65x (V5.25 or higher) is connected to CDF600-220x (Mode 0) it shows in SOPAS ET the page „PROFINET Proxy CDF600“ at „Parameter / Network Interfaces / IO / Fieldbus Gateways“.
- Choose the device name to the same name that you have defined in the PLC
- If it is not done by the PLC you also can set the IP address of the device
- To activate the new parameterization **save parameter permanent** and **power cycle** the device



Profibus Proxy CDF600

Bus Address: 0

Communication Mode: Mode CDF600

Protocol / Output Format: Output Format #1

Profinet Proxy CDF600

Device Name: CLV6xx-CDF600-220x-PN — remanent ☑

PN state: init

PN IP-Address: 192 . 168 . 0 . 123

PN Subnet-Mask: 255 . 255 . 255 . 0

PN Default Gateway: 0 . 0 . 0 . 0 — remanent ☑

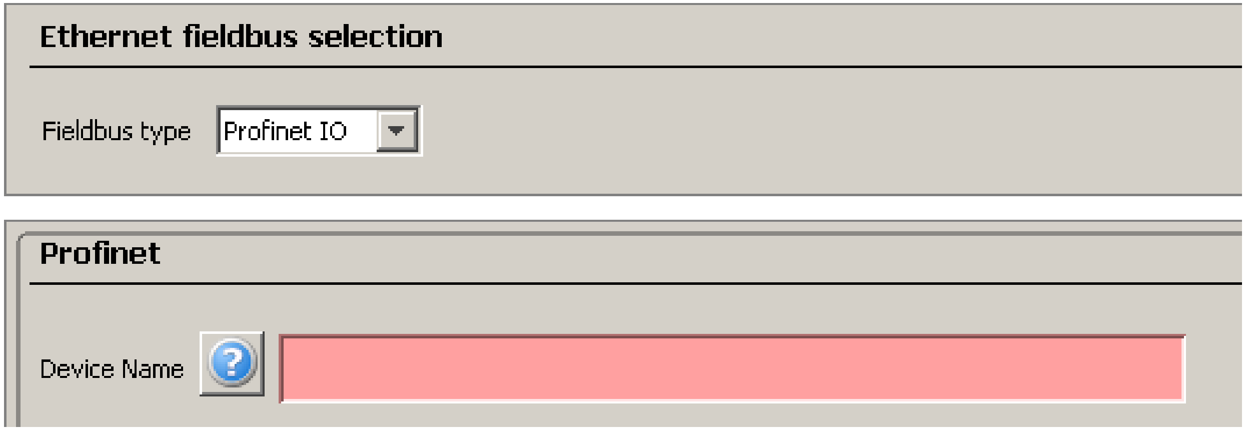
PN MAC-Address: 00 -06 -77 -00 -00 -00

Communication Mode: Mode CDF600

Protocol / Output Format: Output Format #1

STARTING PN „OUT OF THE BOX“ – AT PN-INTERN

- SICK 4Dpro single port devices are delivered with PROFINET not activated
- When you insert a new device with default parameterization in a PROFINET network, it recognizes that it is in a PROFINET environment installed, and activates PROFINET automatically
- It deletes the device name and activates PROFINET
- Then it can be found from HW-Config via „Edit Ethernet nodes“ and a name and/or IP can be manually set.



Ethernet fieldbus selection

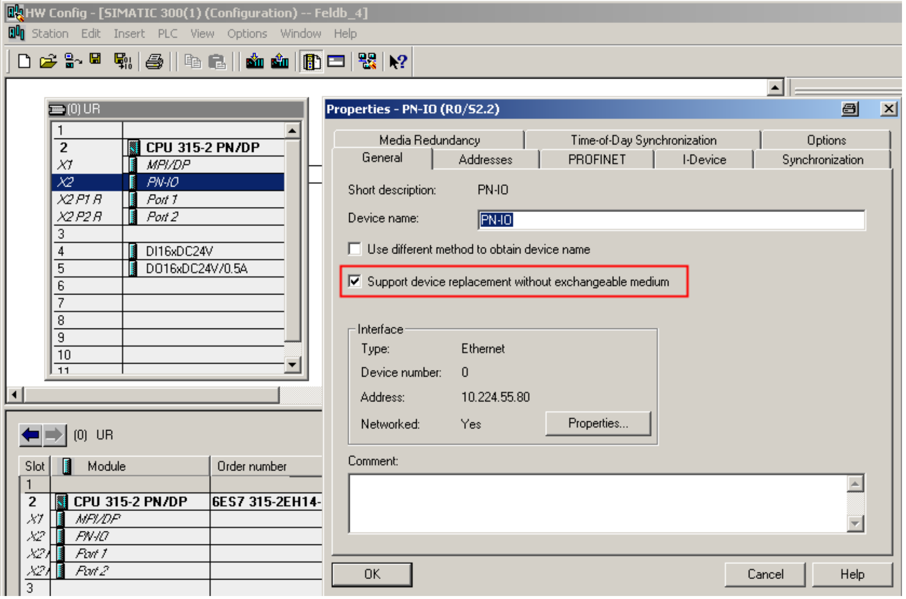
Fieldbus type: Profinet IO

Profinet

Device Name:

AUTOMATICALLY DEVICE REPLACEMENT

- When the „Device replacement without exchangeable medium“ is completely configured in the PLC, and the used environment does support this, the device can get the PROFINET name automatically
- That means:
  - The feature must be activated in the PLC
  - The layout (topology) of the network must be trained or completely configured
  - The switches must support this (managed switches)



HW Config - [SIMATIC 300(1) (Configuration) -- Feldb_4]

(0) UR

1	
2	CPU 315-2 PN/DP
X1	MPI/DP
X2	PN-IO
X2 P1 R	Port 1
X2 P2 R	Port 2
3	
4	DI16xDC24V
5	DO16xDC24V/0.5A
6	
7	
8	
9	
10	
11	

(0) UR

Slot	Module	Order number
1		
2	CPU 315-2 PN/DP	6ES7 315-2EH14-
X1	MPI/DP	
X2	PN-IO	
X2 /	Port 1	
X2 /	Port 2	
3		

Properties - PN-IO (R0/S2.2)

Short description: PN-IO

Device name: PN-IO

□ Use different method to obtain device name

☑ Support device replacement without exchangeable medium

Interface

Type: Ethernet

Device number: 0

Address: 10.224.55.80

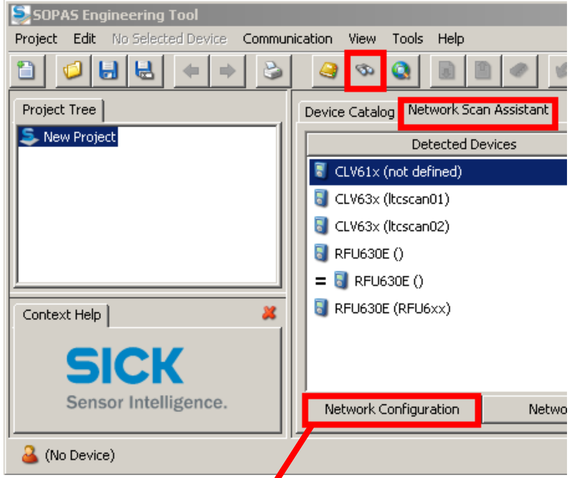
Networked: Yes

Comment:

- When a 4Dpro device with default setting is inserted and the systems starts up, the device:
  - detects PROFINET
  - deletes the device name and activates PROFINET
  - gets its name from the PLC/PN-Controller
  - gets the IP
  - gets the sensor parameter via GSD-Parameterization (when available)
- ➔ So the new device is completely integrated in the PN network

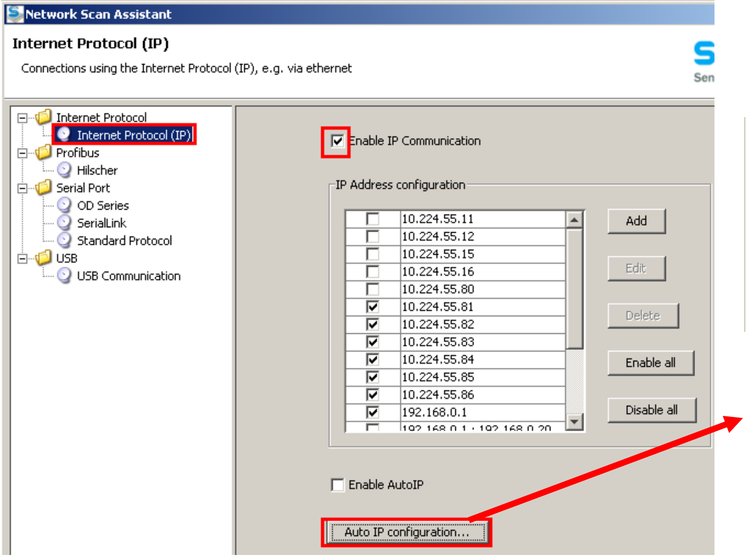
SEARCHING FOR A DEVICE

USING AUTO IP-SCAN OF SOPAS ET V2.X.X



Detected Devices

- CLV61x (not defined)
- CLV63x (ltcscan01)
- CLV63x (ltcscan02)
- RFU630E ()
- RFU630E ()
- RFU630E (RFU6xx)



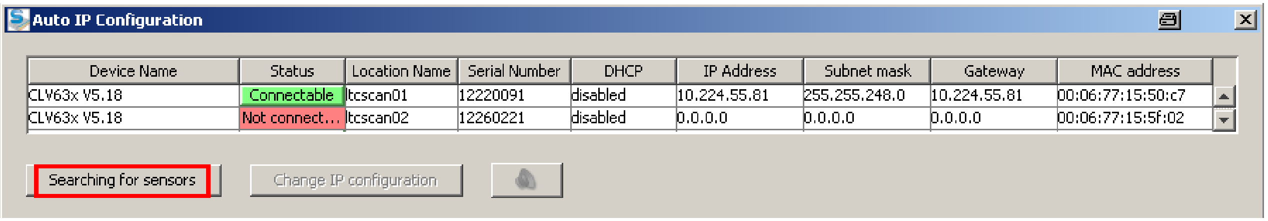
☑ Enable IP Communication

IP Address configuration

- ☐ 10.224.55.11
- ☐ 10.224.55.12
- ☐ 10.224.55.15
- ☐ 10.224.55.16
- ☐ 10.224.55.80
- ☑ 10.224.55.81
- ☑ 10.224.55.82
- ☑ 10.224.55.83
- ☑ 10.224.55.84
- ☑ 10.224.55.85
- ☑ 10.224.55.86
- ☑ 192.168.0.1
- ☐ 192.168.0.1 : 192.168.0.20

☐ Enable AutoIP

- With the device connecting at PROFINET (Ethernet) you can scan it from SOPAS ET. The PC must have a direct connection to the Ethernet network.
- Choose „View / Network Scan Assistant“ and press „Network configuration“.
- Enable „IP Communication“ press the button „Auto IP-Configuration“.
- With „Searching for sensors“ start the Auto IP Scan.
- Auto IP scan is MAC addressed based and will find any **SICK Ethernet device** independend if PROFINET is enabled or not, and also if the IP address is wrong or 0.

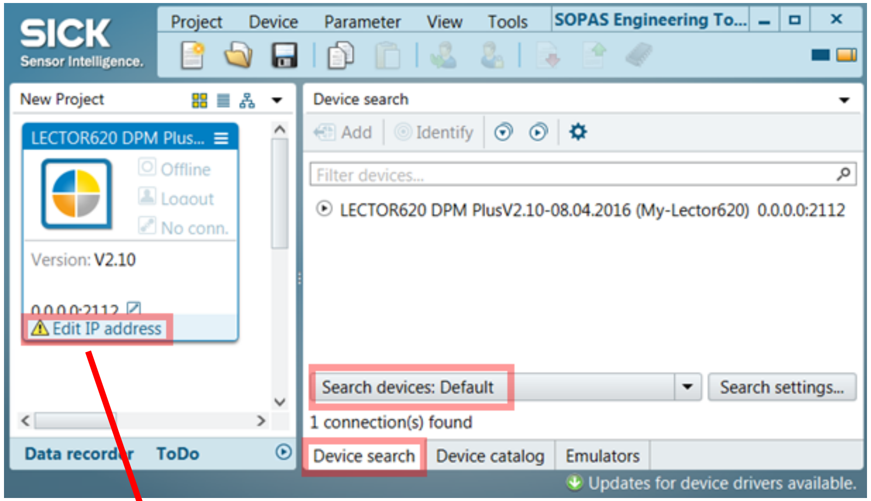


Device Name	Status	Location Name	Serial Number	DHCP	IP Address	Subnet mask	Gateway	MAC address
CLV63x V5.18	Connectable	ltcscan01	12220091	disabled	10.224.55.81	255.255.248.0	10.224.55.81	00:06:77:15:50:c7
CLV63x V5.18	Not connect...	ltcscan02	12260221	disabled	0.0.0.0	0.0.0.0	0.0.0.0	00:06:77:15:5f:02

- By double clicking the device you can set the IP address new.
- With a valid IP address you can connect and parametrize a device with SOPAS ET

SEARCHING FOR A DEVICE

USING SOPAS ET V3.3.2 OR HIGHER



Version: V2.10

0.0.0.0:2112

⚠ Edit IP address

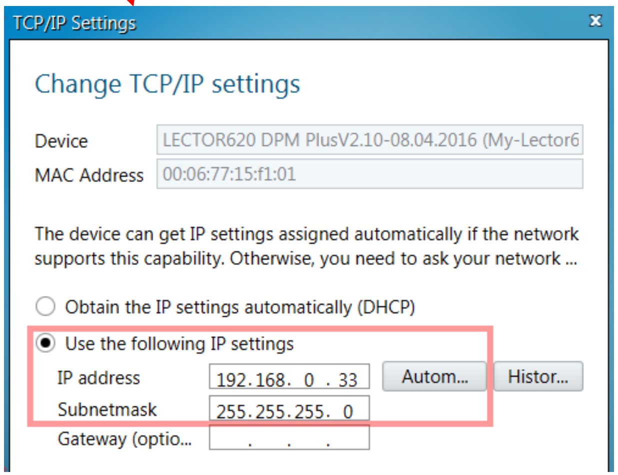
Filter devices...

LECTOR620 DPM PlusV2.10-08.04.2016 (My-Lector620) 0.0.0.0:2112

Search devices: Default ▾ Search settings...

1 connection(s) found

Updates for device drivers available.



Change TCP/IP settings

Device: LECTOR620 DPM PlusV2.10-08.04.2016 (My-Lector6

MAC Address: 00:06:77:15:f1:01

The device can get IP settings assigned automatically if the network supports this capability. Otherwise, you need to ask your network ...

○ Obtain the IP settings automatically (DHCP)

● Use the following IP settings

IP address: 192.168. 0 . 33

Subnetmask: 255.255.255. 0

Gateway (optio...: . . .

- With the device connecting at PROFINET (Ethernet) you can scan it from SOPAS ET. The PC must have a direct connection to the Ethernet network.
- Then search for the devices via Ethernet, e.g. use “Default” search. Then all selected **Sick Ethernet devices** can be found with a valid IP-Address.
- The devices may be then seen also with IP 0.0.0.0 (because IP was set temporary) and can be not direct connected. But when you click on “Edit IP address” you can change the IP address.
- With a valid IP address you can connect and parametrize the device with SOPAS ET.

Note:

The IP is normally set by the PLC (IO-Controller). So if possible connect the device to the PLC with a valid name to get an IP address and use this. But if needed, you may set also via Sopas. When next time the PLC is connected the IP maybe overwritten again.

DATA CHANNEL

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DATA COMMUNICATION

Byte Layout CLV6xx HS-Mode:

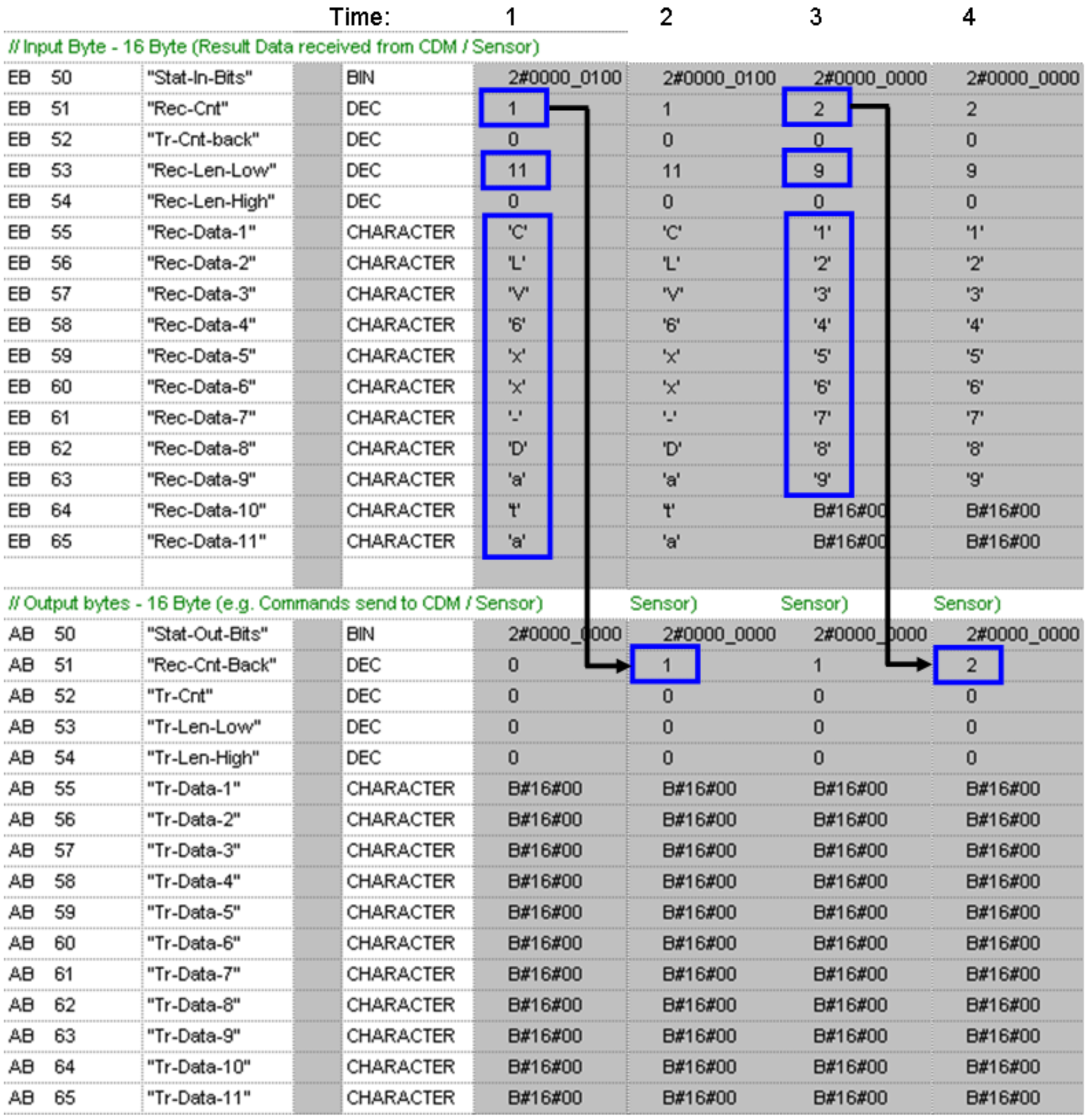
Address	Inputs (data CLV → PLC)		Output (data PLC → CLV)
1	Binary Inputs		Binary Outputs
2	ReceiveCount (counter)	→	ReceiveCountBack (counter)
3	TransmitCountBack (counter)	←	TransmitCount (counter)
4	ReceiveLenght Lowbyte		TransmitLength Lowbyte
5	ReceiveLenght Highbyte		TransmitLength Highbyte
6	ReceiveData, Byte 1		TransmitData, Byte 1
7	ReceiveData, Byte 2		TransmitData, Byte 2
…	…		…
n	ReceiveData, Byte n - 5		TransmitData, Byte n – 5

- There are data modules (chose only one per direction) available with data lengths between 8 .. 128 bytes.
  In handshake mode, the first 5 bytes are used for handing over the data while the rest contains the data itself.
  Therefore, one module with the length of 32 bytes can contain 27 bytes of user data.
- Receive data:
  - CLV6xx puts the data into the field „ReceiveData“ and writes the length into the field „ReceiveLength“. Additionally, the value „ReceiveCount“ is being incremented to show that new data is available.
- Byte handshake:
  - The PLC must answer to show that the data has been correctly received. This is done by copying the value „Receive Count“ to the output module into the value „ReceiveCountBack“ within 10 seconds. You see, the second input byte must be copied to the second output byte. (bytehandshake).
  - CLV6xx recognizes that both values are identical it can send the next data.
  - The value „ReceiveCount“ can be 1…255. The zero is skipped in the standard operation.
  - If CLV6xx shows the value 0, this is an error indication. In this case, it must be started with 0 and the PLC must answer with 0.
  - The PLC normally should copy the value „ReceiveCount“ to the value „ReceiveCountBack“ without any condition.

DATA TRANSMISSION – EXAMPLE 1

DATA RECEIVE CLV6XX

- Input: 16 bytes, Output: 16 bytes, data telegram up to 11 bytes ➔ Single telegram
- Remarks:
  - Time 1: The first data “CLV6xx-Data” (11 bytes) has been received and transmitted to the PLC with ReceiveCount = 1.
  - Time 2: The PLC recognizes and acknowledges this by copying ReceiveCount to ReceiveCountBack. Now, the CLV6xx can deliver the data.
  - Time 3: The second data “123456789” (9 bytes) has been received by CLV6xx and transmitted to the PLC with ReceiveCount = 2.
  - Time 4: The recognizes this and acknowledges this by copying ReceiveCount to ReceiveCountBack.
- The data length that can be transported depends on the input module. Length of input module minus 5 ➔ max. data length

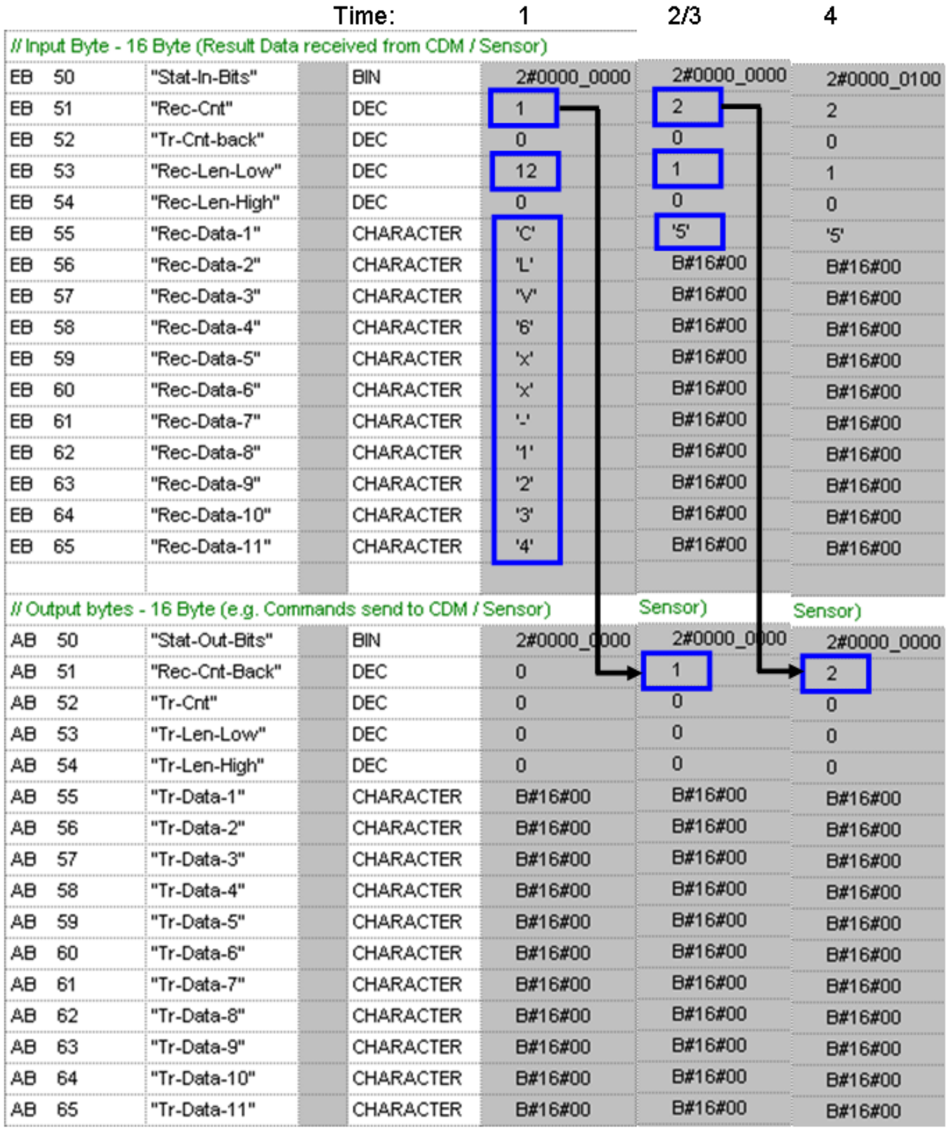


			Time:	1	2	3	4
// Input Byte - 16 Byte (Result Data received from CDM / Sensor)							
EB 50	"Stat-In-Bits"		BIN	2#0000_0100	2#0000_0100	2#0000_0000	2#0000_0000
EB 51	"Rec-Cnt"		DEC	1	1	2	2
EB 52	"Tr-Cnt-back"		DEC	0	0	0	0
EB 53	"Rec-Len-Low"		DEC	11	11	9	9
EB 54	"Rec-Len-High"		DEC	0	0	0	0
EB 55	"Rec-Data-1"		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	'-'	'-'	'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
// Output bytes - 16 Byte (e.g. Commands send to CDM / Sensor)					Sensor)	Sensor)	Sensor)
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

DATA TRANSMISSION– EXAMPLE 2

DATA RECEIVE CLV6XX: LONG TELEGRAMS WITH BLOCKING

- Input: 16 byte, Output: 16 bytes, Data “CLV6xx-12345” (12 bytes) ➔ separation into two blocks
- Remarks:
  - Time 1: First data “CLV6xx-1234” (first 11 bytes) has been received and transmitted to the PLC with ReceiveCount = 1. ReceiveLength is 12 byte.
  - Time 2: The PLC recognizes this and detects that the length (12 bytes) is longer then the input module length. The PLC interprets that there must be more blocks. Again the PLC acknowledges by copying ReceiveCount to ReceiveCountBack.
  - Time 3: CLV6xx directly sends the next block with the rest of data. Here, 1 byte with content „5“ with ReceiveCount = 2 und ReceiveLength = 1.
  - Time 4: The PLC has recognized the following block and acknowledges this by copying ReceiveCount to ReceiveCountBack. Now, the transmission of the complete telegram is finished.
- The data length that can be transported in **one** block depends on the input module
  ➔ max. data length = length of input module minus 5
  Max. telegram length is 4000 bytes (separated into blocks)

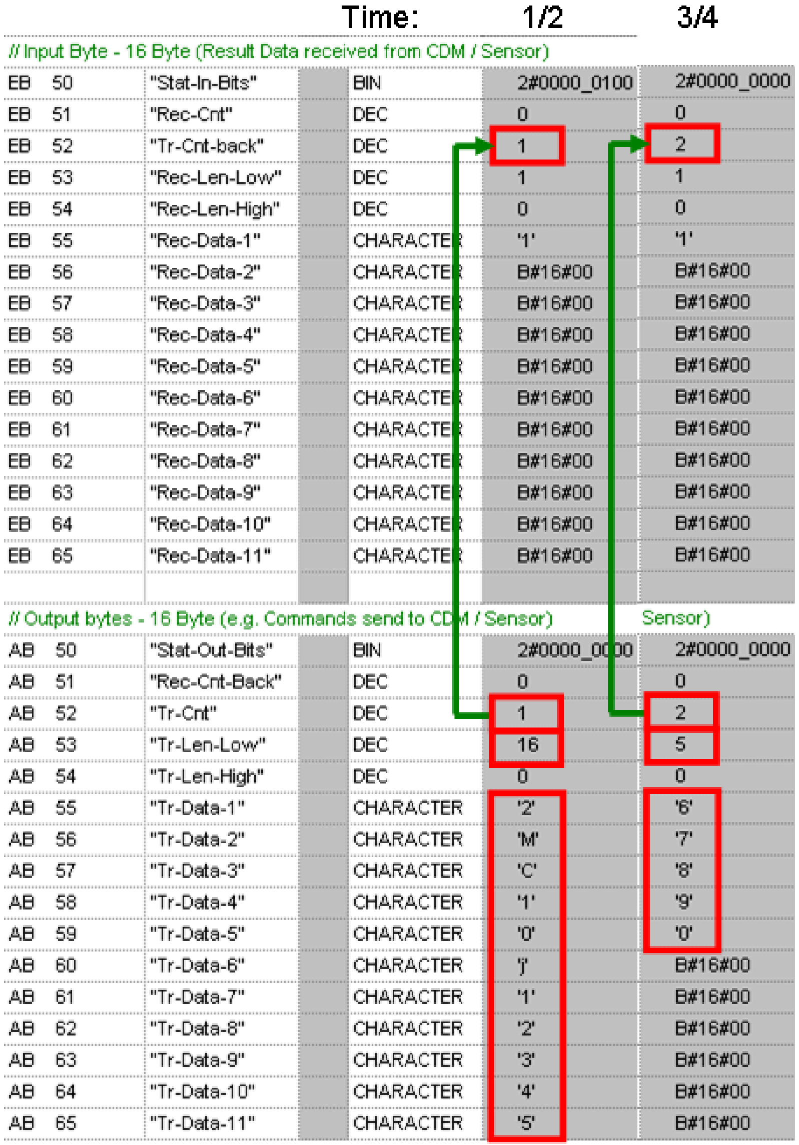


			Time:	1	2/3	4
// Input Byte - 16 Byte (Result Data received from CDM / Sensor)						
EB	50	"Stat-In-Bits"	BIN	2#0000_0000	2#0000_0000	2#0000_0100
EB	51	"Rec-Cnt"	DEC	1	2	2
EB	52	"Tr-Cnt-back"	DEC	0	0	0
EB	53	"Rec-Len-Low"	DEC	12	1	1
EB	54	"Rec-Len-High"	DEC	0	0	0
EB	55	"Rec-Data-1"	CHARACTER	'C'	'5'	'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	'-'	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
// Output bytes - 16 Byte (e.g. Commands send to CDM / Sensor)					Sensor)	Sensor)
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

DATA TRANSMISSION– EXAMPLE 3

SEND COMMANDS CLV6XX: LONG TELEGRAMS WITH BLOCKING

- Input: 16 bytes, output: 16 bytes, Data telegram "2MC10j1234567890" with 16 bytes ➔ separated into 2 blocks
- This command sets the condition „Match 1“ to code 128 with content „1234567890“ for CLV6xx. The command does not create an answer.
- Remarks:
  - Time 1: First data is sent by setting TransmitCount = 1 and TransmitLength = 16.
  - Time 2: CLV6xx recognizes first data and acknowledges by copying TransmitCount to TransmitCountBack.
  - Time 3: Next data is sent by setting TransmitCount = 2 and TransmitLength = 5.
  - Time 4: CLV6xx recognizes the next data and acknowledges by copying TransmitCount to TransmitCountBack.
- TransmitCount must start with 1 when 255 has been reached. 0 is skipped.
  Max. data length is 4000 bytes (separated into several blocks).



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

USING FUNCTION BLOCK PROFIBUS/PROFINET
FOR CLV6XX/LECTOR, RFU AND RFH

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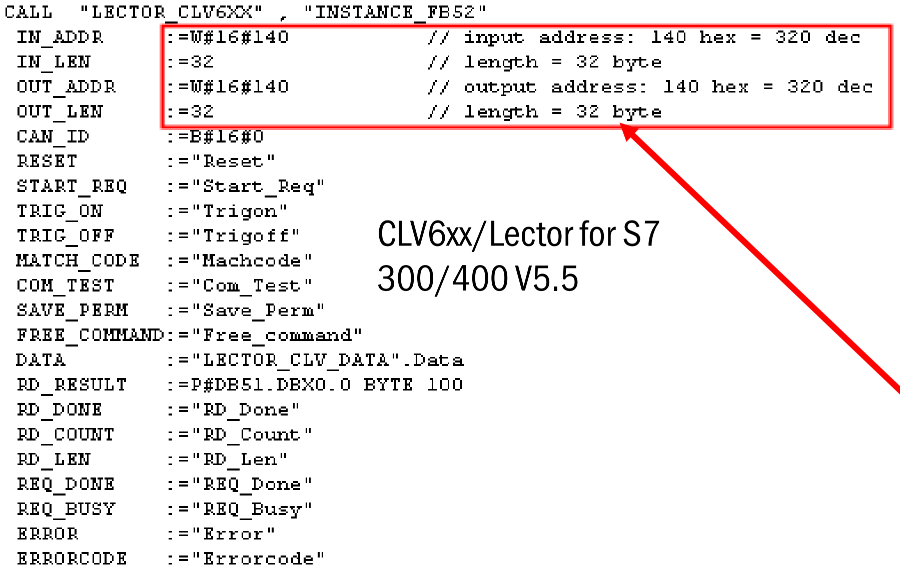
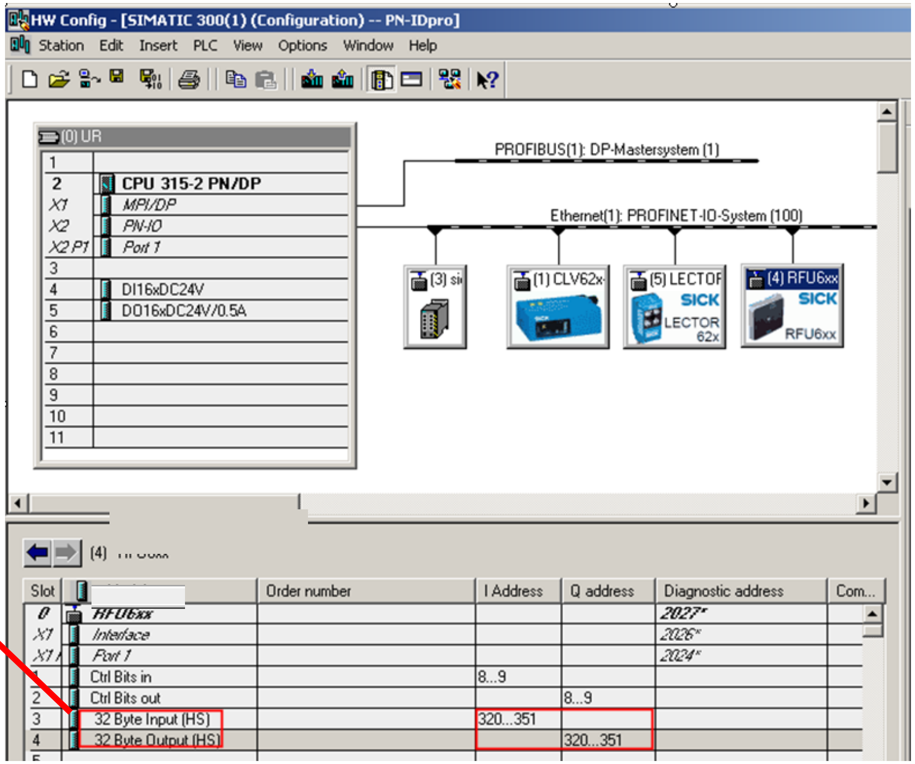
- When a S7 Function block PROFINET / PROFIBUS is used the I/O address of the input and output bytes must be inserted. It handles the handshake mode automatically.
- There exists one for CLV6xx/Lector, RFH and RFU.
  Can be download at : http://www.sick.com/software and select Software category „Function block“ (for further details see attached documentation)
- Available function blocks for: (further versions on request)
  S7 300/400 V5.5 Profinet / Profibus
  S7 300/400 TIA Profinet / Profibus
  S7 1200/1500 TIA Profinet / Profibus



```
CALL  "LECTOR_CLV6XX" , "INSTANCE_FB52"
 IN_ADDR     :=W#16#140          // input address: 140 hex = 320 dec
 IN_LEN      :=32                // length = 32 byte
 OUT_ADDR    :=W#16#140          // output address: 140 hex = 320 dec
 OUT_LEN     :=32                // length = 32 byte
 CAN_ID      :=B#16#0
 RESET       :="Reset"
 START_REQ   :="Start_Req"
 TRIG_ON     :="Trigon"
 TRIG_OFF    :="Trigoff"
 MATCH_CODE  :="Machcode"
 COM_TEST    :="Com_Test"
 SAVE_PERM   :="Save_Perm"
 FREE_COMMAND:="Free_command"
 DATA        :="LECTOR_CLV_DATA".Data
 RD_RESULT   :=P#DB51.DBX0.0 BYTE 100
 RD_DONE     :="RD_Done"
 RD_COUNT    :="RD_Count"
 RD_LEN      :="RD_Len"
 REQ_DONE    :="REQ_Done"
 REQ_BUSY    :="REQ_Busy"
 ERROR       :="Error"
 ERRORCODE   :="Errorcode"
```

CLV6xx/Lector for S7 300/400 V5.5


HW Config - [SIMATIC 300(1) (Configuration) -- PN-IDpro]
Station Edit Insert PLC View Options Window Help
(0) UR
1
2 CPU 315-2 PN/DP
X1 MPI/DP
X2 PN-IO
X2 P1 Port 1
3
4 DI16xDC24V
5 DO16xDC24V/0.5A
6
7
8
9
10
11
PROFIBUS(1): DP-Mastersystem (1)
Ethernet(1): PROFINET-IO-System (100)
(3) si
(1) CLV62x
(5) LECTOR
SICK
LECTOR 62x
(4) RFU6xx
SICK
RFU6xx
(4)

Slot		Order number	I Address	Q address	Diagnostic address	Com...
0	RFU6xx				2027*	
X1	Interface				2026*	
X1	Port 1				2024*	
1	Ctrl Bits in		8...9			
2	Ctrl Bits out			8...9		
3	32 Byte Input (HS)		320...351			
4	32 Byte Output (HS)			320...351		

FURTHER INFORMATION

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05

PROFINET NOT RUNNING – TROUBLE SHOOTING

POINTS TO BE CLARIFIED

- Is the SW-Version of Sensor ok? In general latest update is recommended

CLV61x Dual Port :	V1.34 or higher
CLV62x-65x PN intern:	V5.21 or higher
RFU6xx PN intern:	V1.40 or higher
RFH6xx PN intern::	V3.00 or higher
Lector620 PN intern:	V2.10 or higher
Lector61x PN 1port:	V4.0.0 or higher
Lector621, 63x, 64x, 65x PN 1port:	V3.1.1 or higher
CDF600-220x (Gateway):	V1.20 or higher
CLV61x-Fxxx PN via CDF-220x:	V1.21 or higher
CLV62x-65x PN via CDF-220x:	V5.26 or higher
RFU6xx PN via CDF-220x:	V1.62 or higher

- Is PROFINET in the device activated?
- Is the PROFINET name ok?
- Is the Device Ready LED blinking red /green when the device is power up? It indicates that PROFINET is active, but not online. E.g. it must start blinking when no Ethernet cable is plugged in.
- Is the name and IP correct shown when it is scanned via Sopas Auto IP scan?
- Is the name and IP correct shown when it is scanned via PLC HW-Config Ethernet Nodes?
- Is the PLC hardware config correct with at least four modules? (Ctrl-Bits In/Out and Data Bytes In/Out)
- Is the correct GSDML-File used ? Is PN intern used, or PN via CDF ?
- Is the handshake mode correct selected ?
- When a function block is used: Are the In and Out addresses and lengths are ok ?

FURTHER INFORMATION PROFINET – 4D*pro*

- Operating instruction

  → Detailed information about the device in general

  -> see downloads www.sick.com, select the product family

- Technical information

  → Detailed introduction how to integrate the device into PROFINET

  -> see GSDML package

- GSDML documentation (device depending)

  → Detailed introduction about parameterization via GSDML modules

  -> see GSDML package

- S7 Function block (available for S7 300/400 and S7 1200/1500 TIA)

  ➔ optinal to handle handshake mode automatically

  -> can be downloaded at http://www.sick.com/software, select software category „Function block“

MANY THANKS FOR YOUR ATTENTION.

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