

EHPS Integration with Siemens IO-Link Master in TIA Portal

Step by step description of how to integrate EHPS grippers into TIA Portal with a Siemens IO-Link Master.

EHPS

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1 Components/Software used

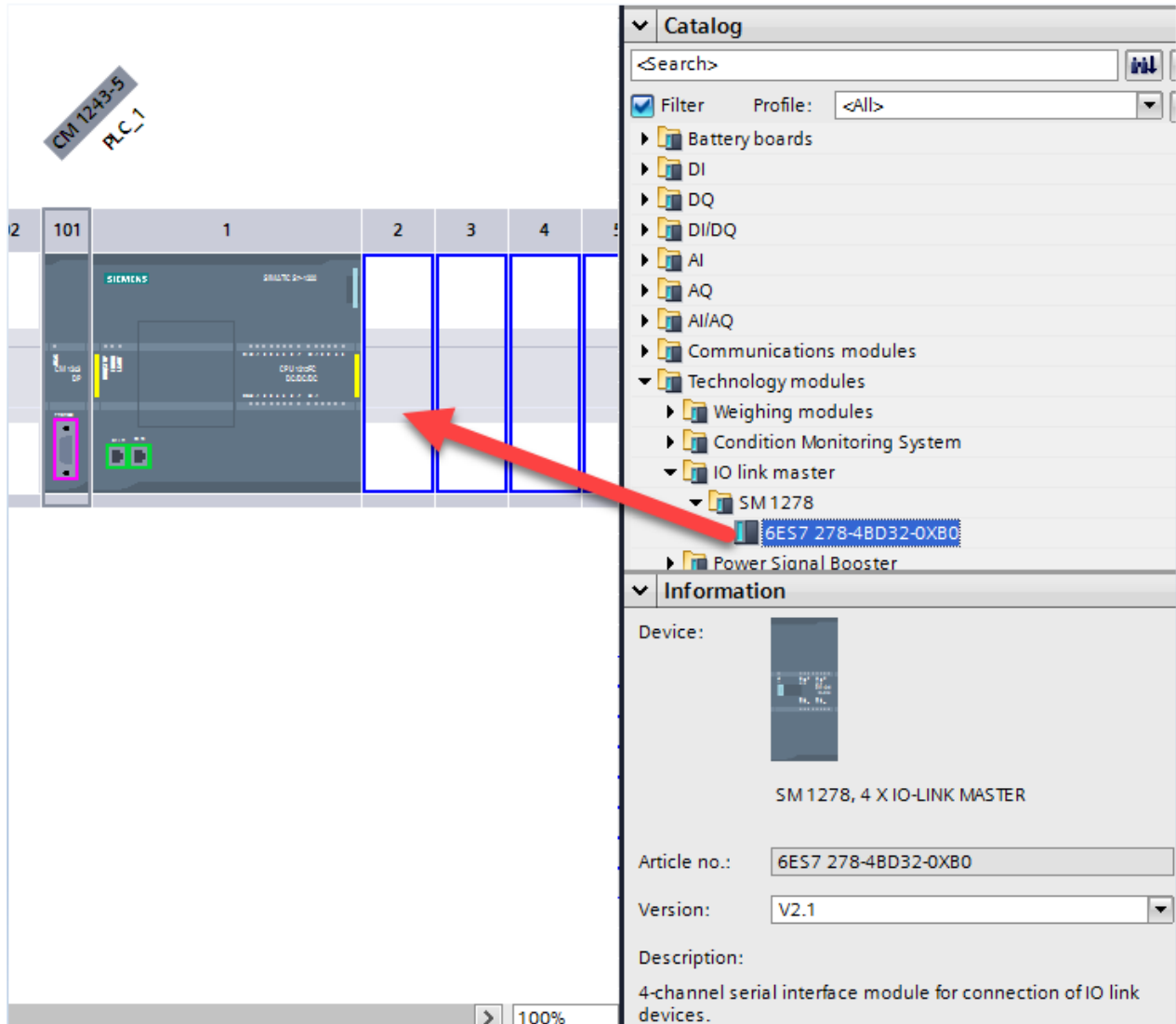
Type/Name	Version Software/Firmware	Date of manufacture
EHPS-16-A-LK	1.0	
TIA Portal	V16	
S7-1200	V4.2	
SM1278	V2.1	

Table 1.1: 1 Components/Software used

2 Configuring the IO-Link Master in TIA Portal

2.1 Configuration of S7-1200 SM 1278 IO-Link Master card.

The SM 1278 IO-Link Master can be found under the Technology Modules -> IO Link Master -> SM 1278 folder.



NOTE

This IO-Link Master has allocate up to 32 I/O Bytes between 4 ports. It can be evenly distributed, which means 8 I/O Bytes per port, or allocate all 32 Bytes to 1 port.

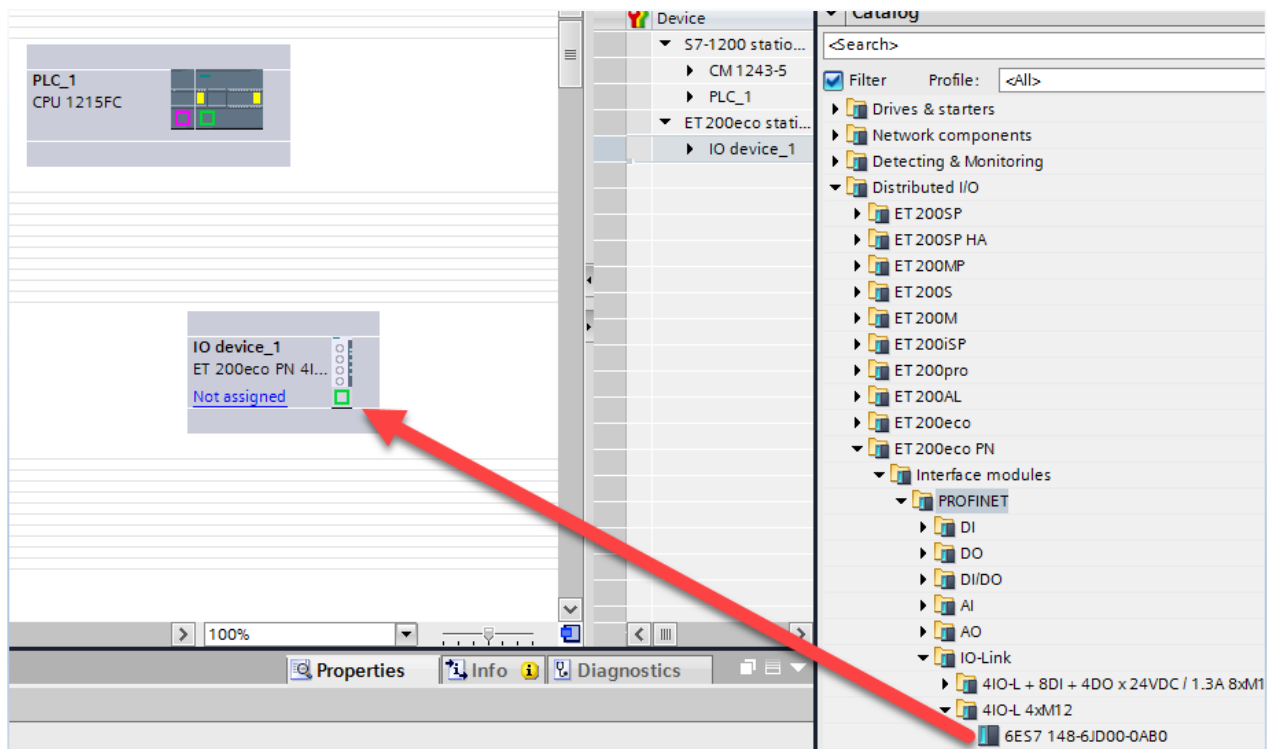


NOTE

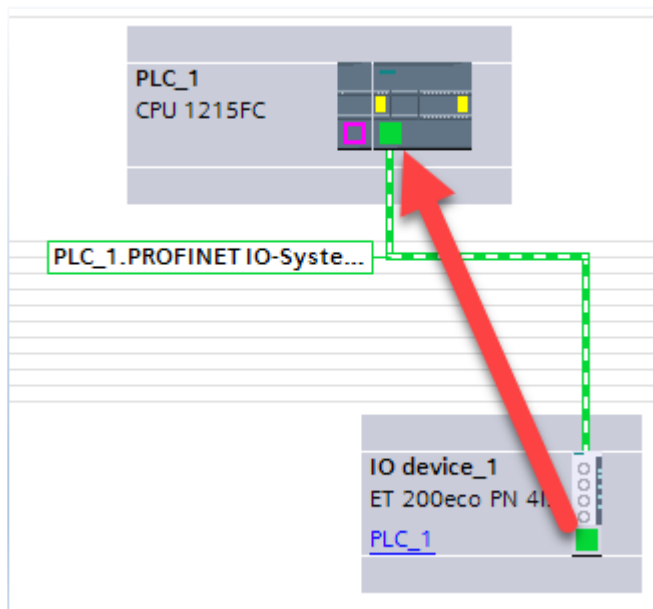
Default settings are 32 Bytes allocated and all Ports can be enabled via S7-PCT.

2.2 Configuration of ET 200eco PN IO-Link Master

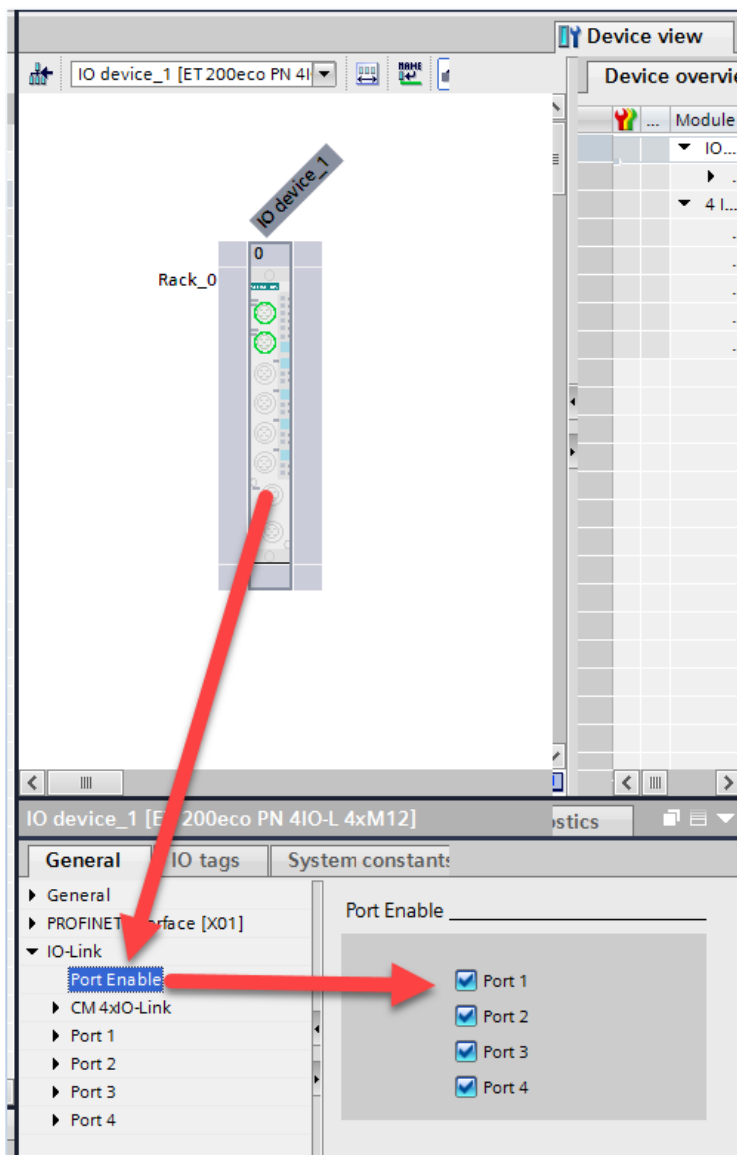
In the network view, drag the ET200eco IO-Link Master into the project. It is found in the path Distributed I/O -> ET200eco PN -> Interface modules -> PROFINET -> IO-Link



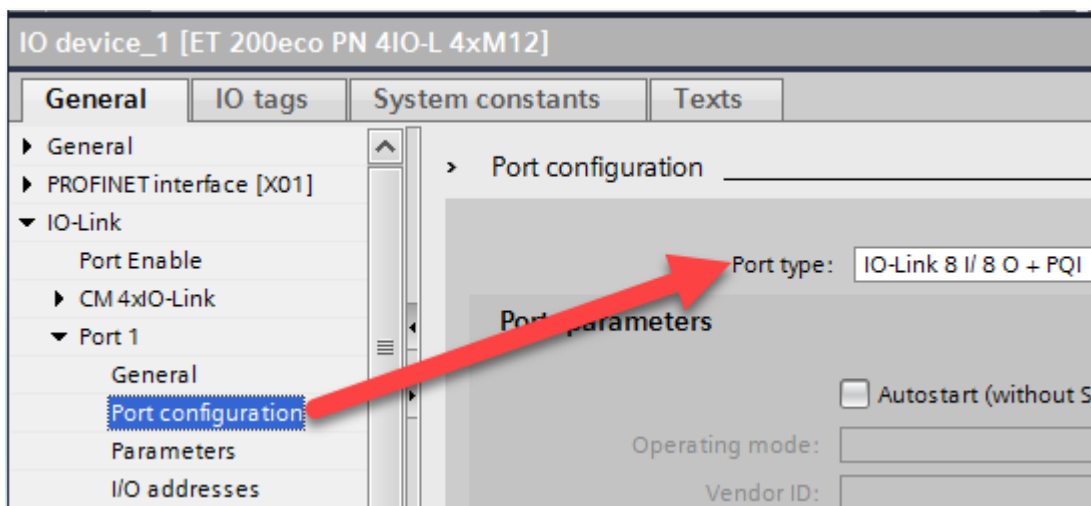
Connect it to the Profinet port of the PLC by connecting the green squares.



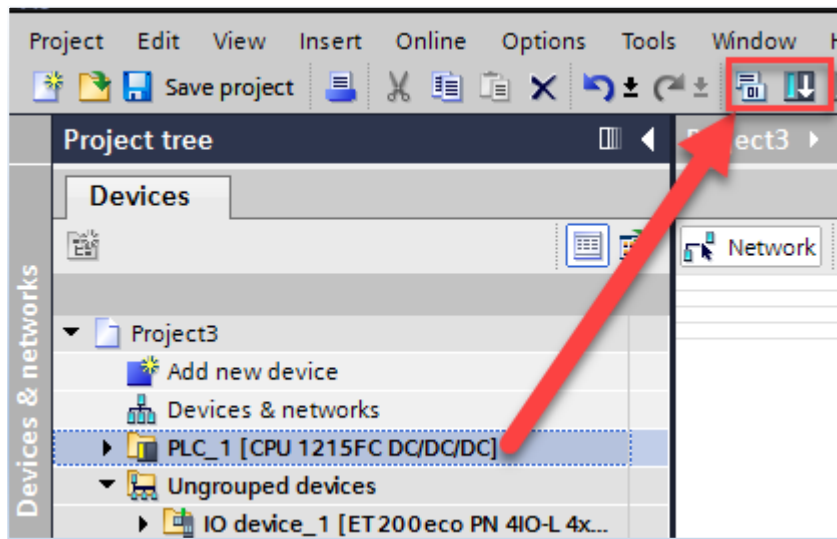
In the Device View of the module, make sure that the Port where EHPS is connected is also Enabled.



In the Port Settings, the I/O size must be set to at least **8 I/O Bytes**, which are needed by EHPS.



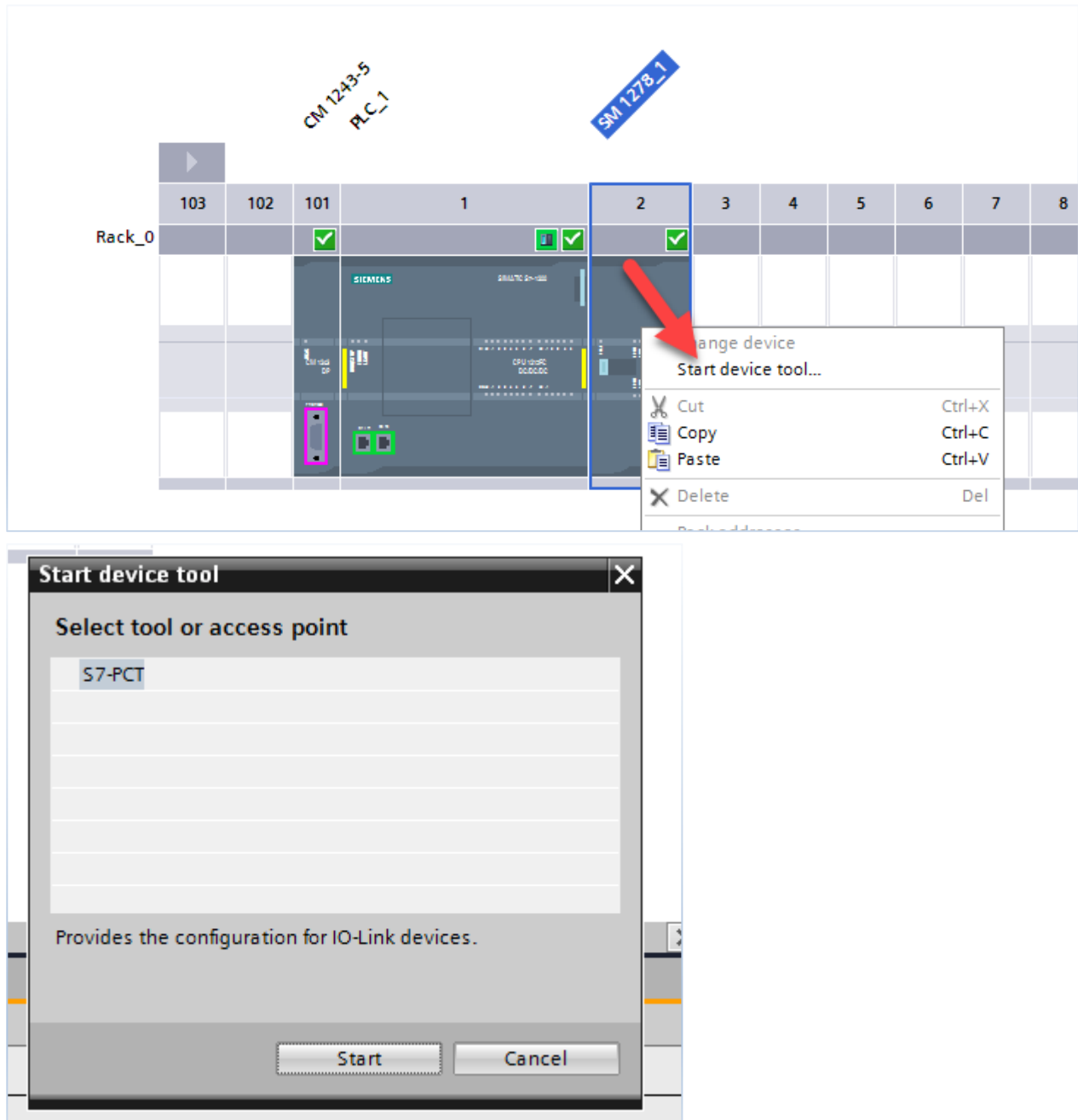
Download the profinet configuration and the port settings to the PLC.



3 Integrating EHPS to S7-PCT

3.1 Start S7-PCT

Once the PLC HW configuration has been done, and there is a connection with the PLC, open S7-PCT by making a **right click** on the IO-Link Master → Start device tool... → S7-PCT

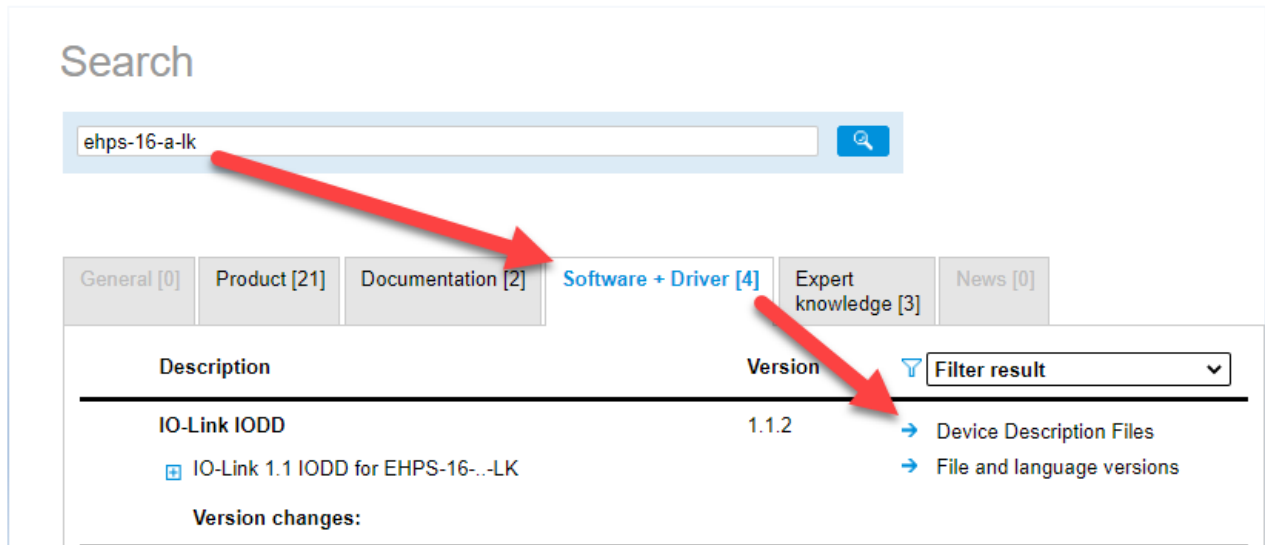


NOTE

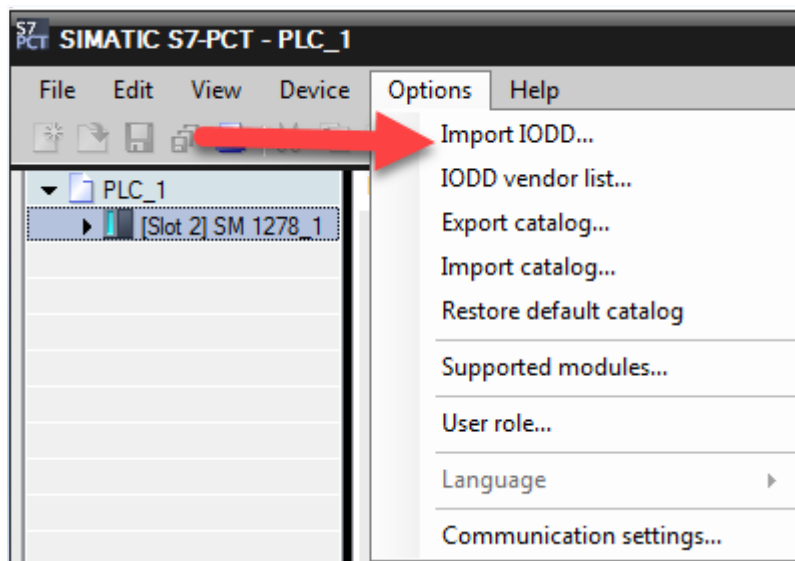
If S7-PCT is not available as an option, it must be downloaded from the [Siemens webpage](#) and installed additionally.

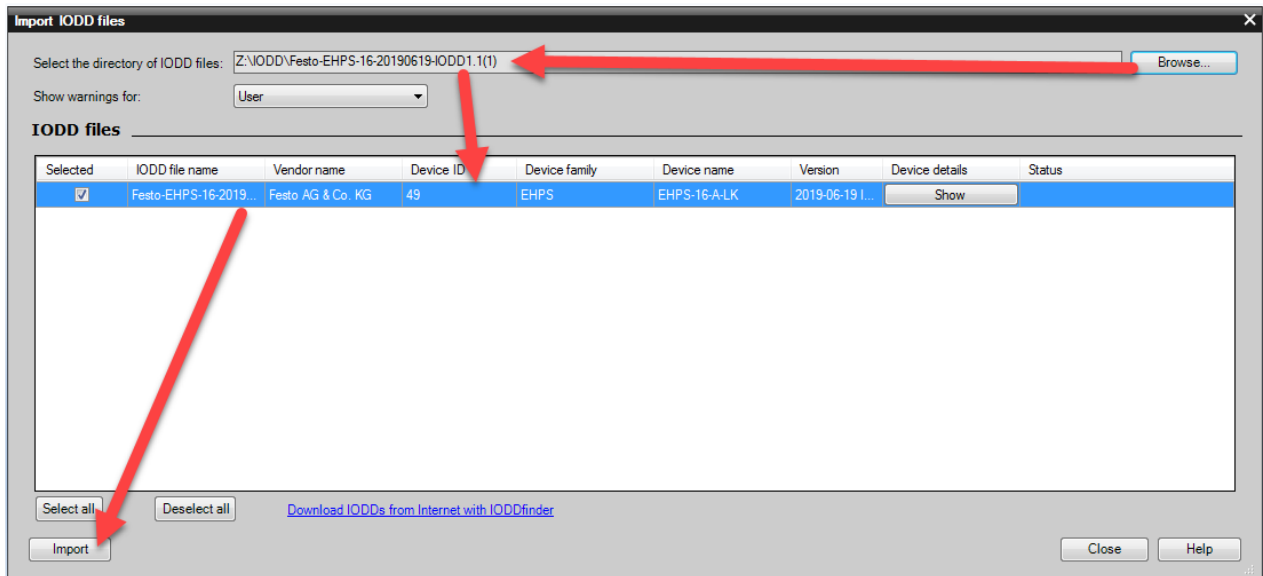
3.2 Installing the IODD File

Download the IODD file from the www.festo.com webpage.



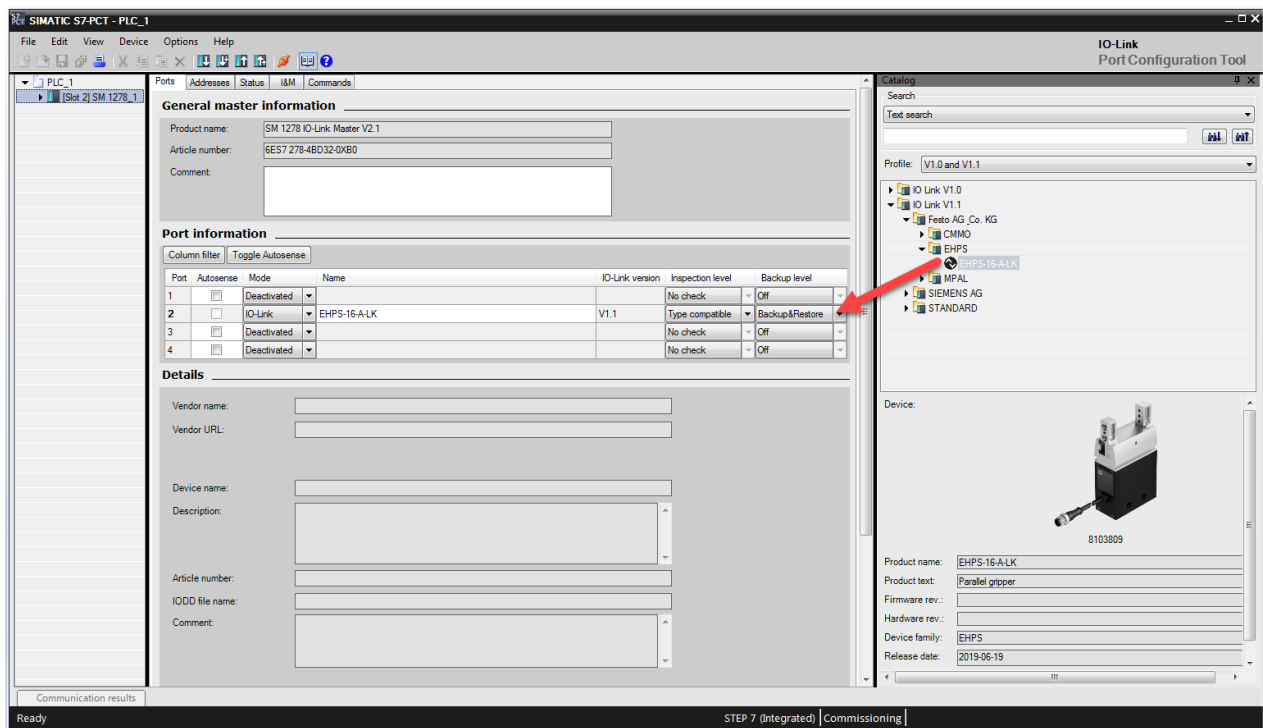
In S7-PCT select the option to **Import IODD...**





3.3 Configuring the IO-Link Master

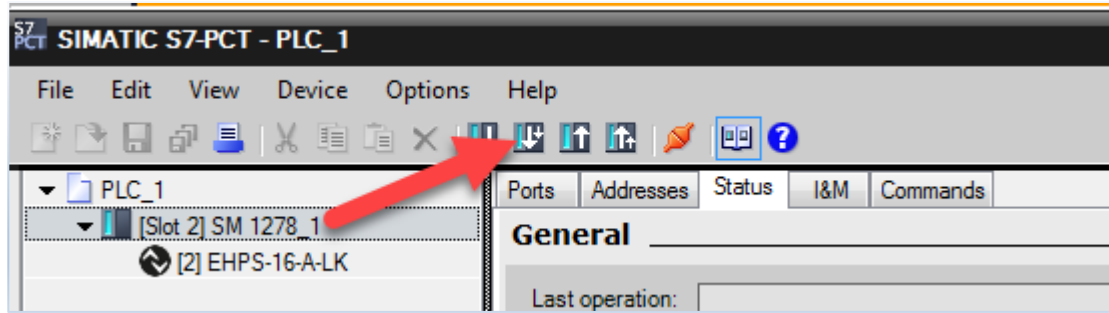
Drag and Drop to the Port where the EHPS is connected.



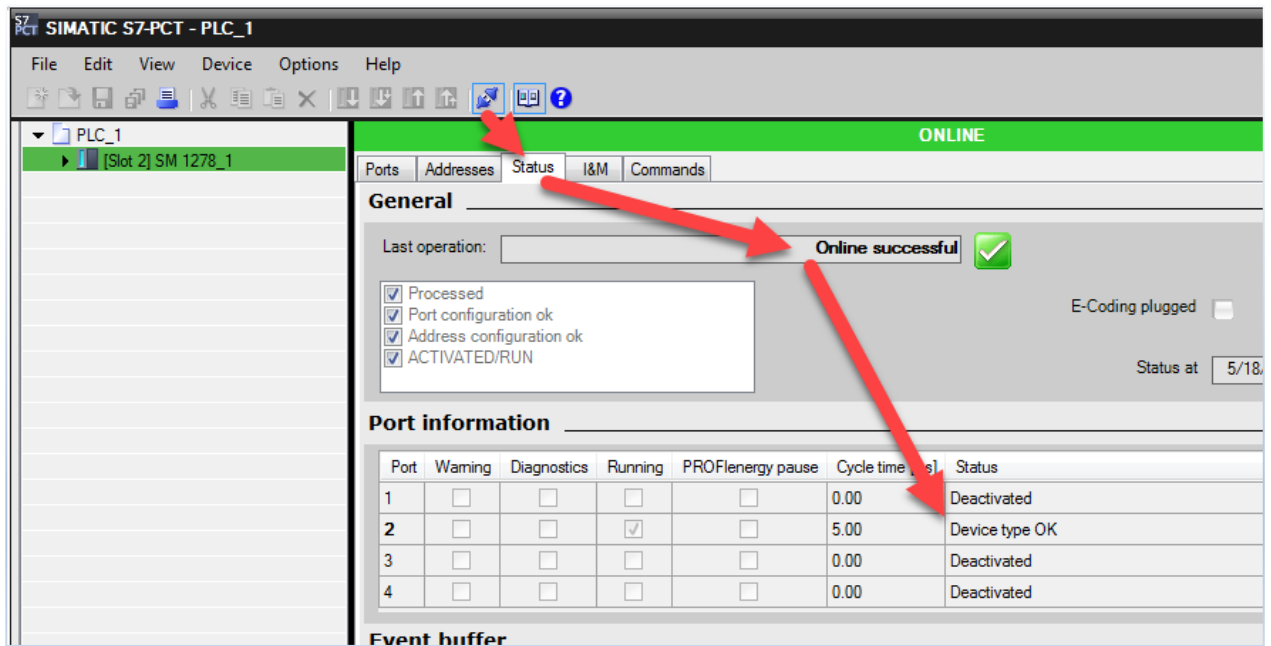
NOTE

EHPS supports Parameter Backup&Restore

Download the port configuration by selecting the **Master** and clicking on the following symbol:



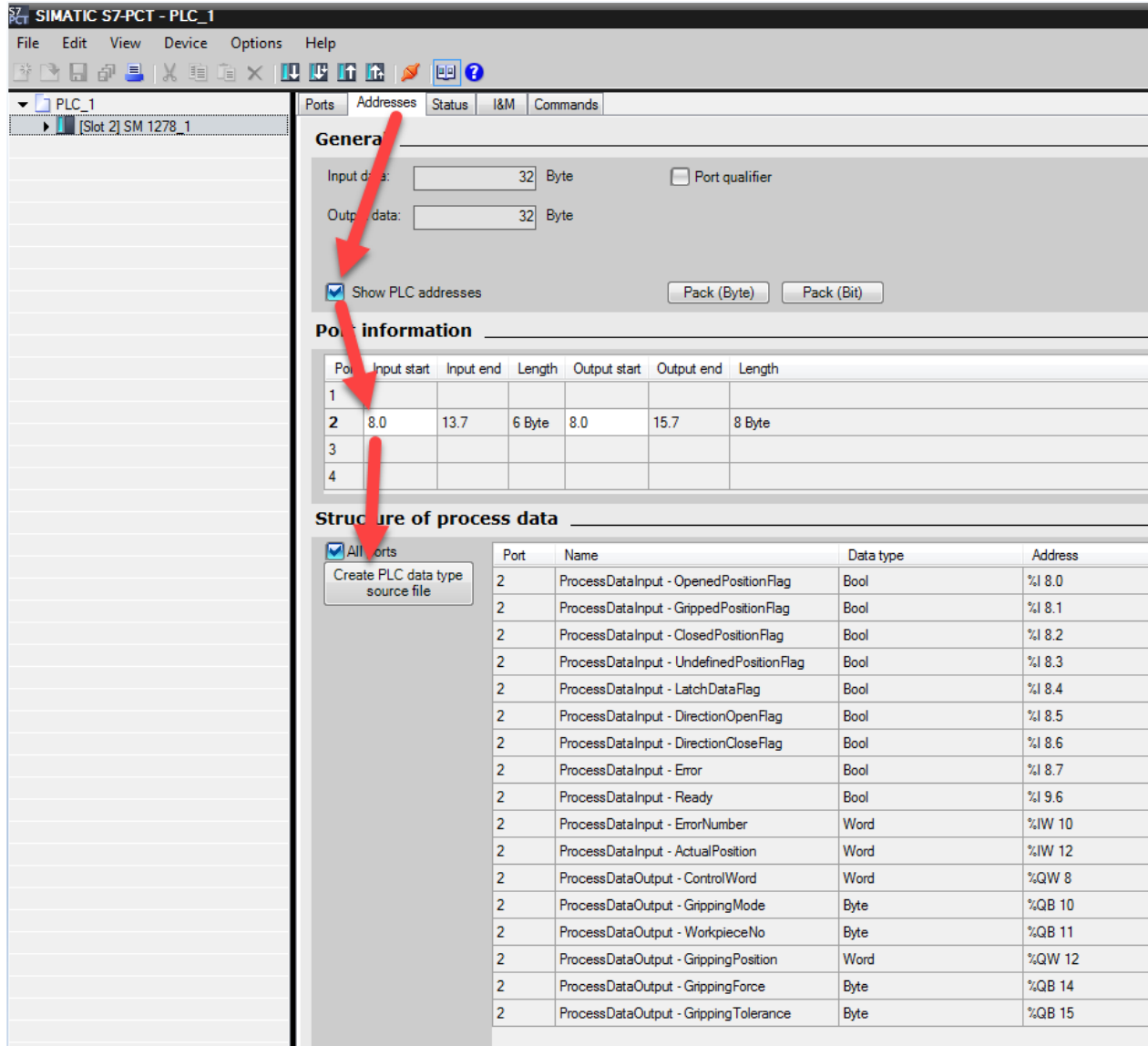
We can confirm the status of the communication by going online and looking at the **Status** Tab.



3.4 Generating the I/O Mapping in S7-PCT via UDT

Select the **Show PLC addresses** checkbox and take note of the **Input start** and **Output Start** Bits.

Then click on the **All Ports** Option and **Create PLC data type source file**.



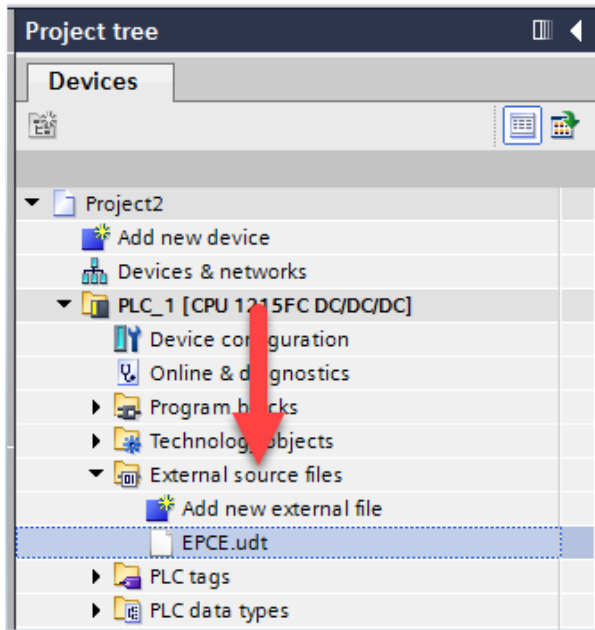
Close S7-PCT

4 TIA Portal

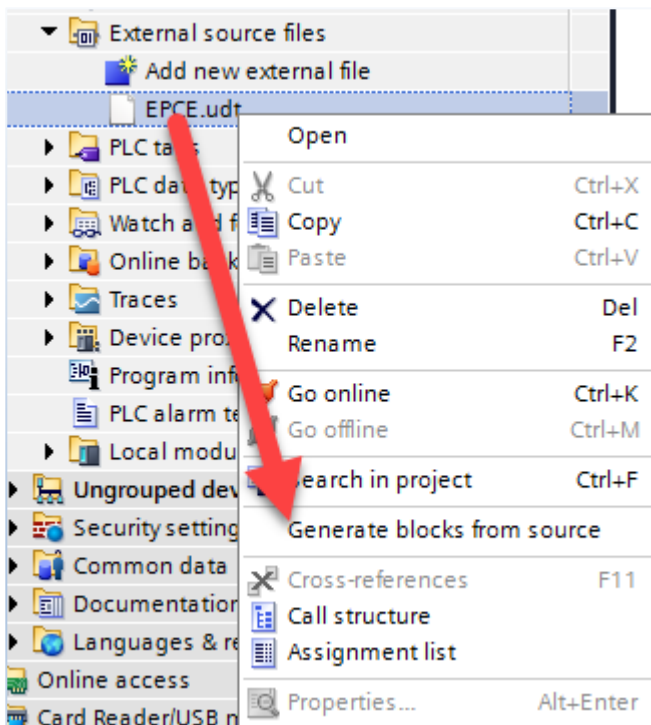
4.1 Importing the UDT

Go to the External source files and click on **Add new external file**.

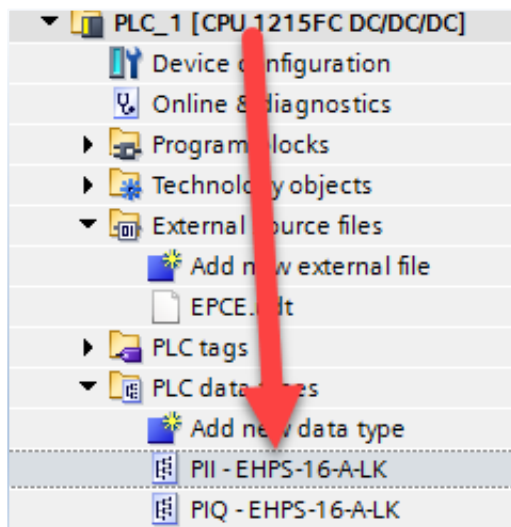
Add the UDT that was created in step 2.4.



Right click on the UDT and select the option Generate blocks from source.

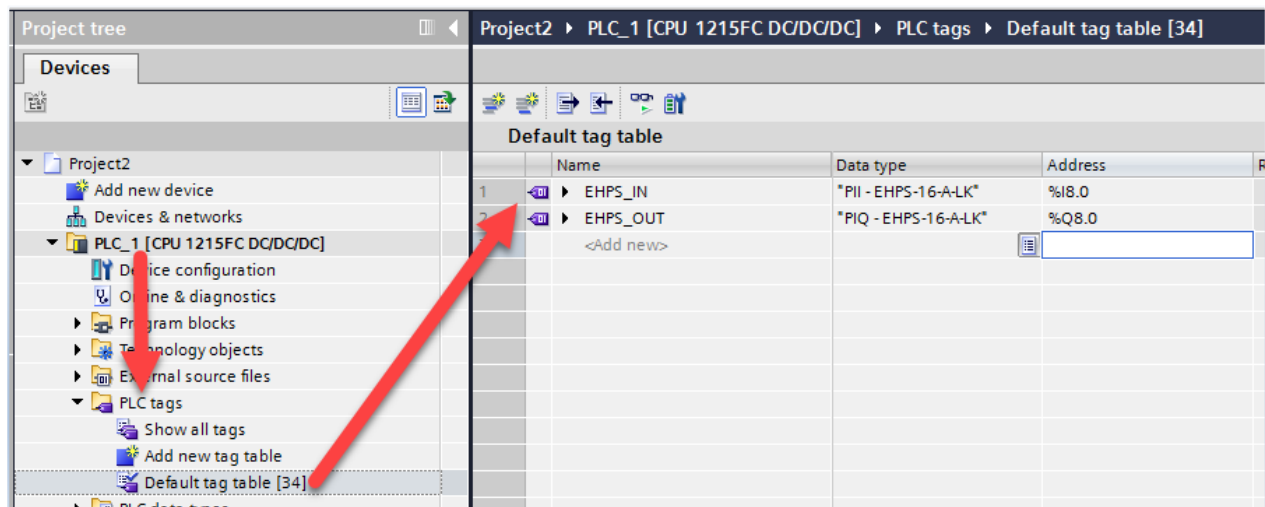


The result will be the following **PLC Data types**.



4.2 Linking UDT to Inputs and Outputs

Go to the **PLC Tags Default tag table** and create 2 variables. The Data type must be the generated PLC Data Types and the Address were noted down in Step 3.4.



5 Configuring EHPS with the IO-Link Process Data

Before EHPS can be moved, we need to configure the **Gripping Mode** and **Gripping Force**.

Gripping mode	Decimal value	Description
"universal"	100	Opening and closing movements are carried out with the force ("GrippingForce") set and thus at the same speed.
"internal gripping"	70	The opening movement takes place with the force set in "GrippingForce" and the (resulting) speed. The closing movement takes place at maximum speed.
"external gripping"	60	The closing movement takes place with the force specified in "GrippingForce" and the (resulting) speed. The opening movement takes place at maximum speed.
"Invalid"	0	–

Tab. 18 Gripping modes

Power stage	Decimal value	Force value
Invalid	0	–
Level 1	1	approx. 50%
Level 2	2	approx. 70%
Level 3	3	approx. 85%
Level 4	4	approx. 100%

Tab. 19 "GrippingForce" parameter

i	Name	Address	Display format	Monitor value	Modify value	
1	"EHPS_IN"."ProcessDataInput - OpenedPositionFlag"	%I8.0	Bool	☐ FALSE		
2	"EHPS_IN"."ProcessDataInput - GrippedPositionFlag"	%I8.1	Bool	☐ FALSE		
3	"EHPS_IN"."ProcessDataInput - ClosedPositionFlag"	%I8.2	Bool	☒ TRUE		
4	"EHPS_IN"."ProcessDataInput - UndefinedPositionFlag"	%I8.3	Bool	☐ FALSE		
5	"EHPS_IN"."ProcessDataInput - LatchDataFlag"	%I8.4	Bool	☐ FALSE		
6	"EHPS_IN"."ProcessDataInput - DirectionOpenFlag"	%I8.5	Bool	☐ FALSE		
7	"EHPS_IN"."ProcessDataInput - DirectionCloseFlag"	%I8.6	Bool	☒ TRUE		
8	"EHPS_IN"."ProcessDataInput - Error"	%I8.7	Bool	☐ FALSE		
9	"EHPS_IN"."Reserved Byte"	%I9.0	Bool	☐ FALSE		
10	"EHPS_IN"."ProcessDataInput - ErrorNumber"	%IW10	Hex	16#0000		
11	"EHPS_IN"."ProcessDataInput - ActualPosition"	%IW12	DEC	2027		
12	"EHPS_OUT"."ProcessDataOutput - ControlWord"	%QW8	DEC	0	0	
13	"EHPS_OUT"."ProcessDataOutput - GrippingMode"	%QB10		100	100	☒
14	"EHPS_OUT"."ProcessDataOutput - WorkpieceNo"	%QB11	Hex	16#00		☐
15	"EHPS_OUT"."ProcessDataOutput - GrippingPosition"	%QW12	Hex	16#0000		☐
16	"EHPS_OUT"."ProcessDataOutput - GrippingForce"	%QB14		4	4	☒
17	"EHPS_OUT"."ProcessDataOutput - GrippingTolerance"	%QB15	Hex	16#00		☐

6 Moving EHPS through the Process Data

Once Gripping mode and gripping force has been selected, we can move the gripper by toggling the following bits of the control word.

9.6 Process Data OUT

The gripper can only be controlled with the cyclically transmitted process data. A maximum of 1 bit only may be set in the "ControlWord".

Bit	63	62	61	60	59	58	57	56
Process data	"ControlWord"							
Data content	"ResetError"	–	–	–	–	–	"Close"	"Open"
Decimal	32768	–	–	–	–	–	512	256
Index	0x0029							
Sub index	1							
Data type	UIntegerT16							

Tab. 10 Process data OUT

To Open, toggle Control Word Bit 8 (Or write a decimal value of 256)

Name	Address	Display format	Monitor value
"EHPS_IN".ProcessDataInput - OpenedPositionFlag"	%I8.0		☒ TRUE
"EHPS_IN".ProcessDataInput - GrippedPositionFlag"	%I8.1	Bool	☒ TRUE
"EHPS_IN".ProcessDataInput - ClosedPositionFlag"	%I8.2	Bool	☐ FALSE
"EHPS_IN".ProcessDataInput - UndefinedPositionFlag"	%I8.3	Bool	☐ FALSE
"EHPS_IN".ProcessDataInput - LatchDataFlag"	%I8.4	Bool	☐ FALSE
"EHPS_IN".ProcessDataInput - DirectionOpenFlag"	%I8.5	Bool	☒ TRUE
"EHPS_IN".ProcessDataInput - DirectionCloseFlag"	%I8.6	Bool	☐ FALSE
"EHPS_IN".ProcessDataInput - Error"	%I8.7	Bool	☐ FALSE
"EHPS_IN".Reserved Byte"	%I9.0	Bool	☐ FALSE
"EHPS_IN".ProcessDataInput - ErrorNumber"	%IW10	Hex	16#0000
"EHPS_IN".ProcessDataInput - ActualPosition"	%IW12	DEC	0
"EHPS_OUT".ProcessDataOutput - ControlWord"	%QW8	Bin	2#0000_0001_0000_0000
"EHPS_OUT".ProcessDataOutput - GrippingMode"	%QB10	DEC	100
"EHPS_OUT".ProcessDataOutput - WorkpieceNo"	%QB11	Hex	16#00
"EHPS_OUT".ProcessDataOutput - GrippingPosition"	%QW12	Hex	16#0000
"EHPS_OUT".ProcessDataOutput - GrippingForce"	%QB14	DEC	4
"EHPS_OUT".ProcessDataOutput - GrippingTolerance"	%QB15	Hex	16#00
	%ID16	Hex	16#0000_0000
	%QD16	Hex	16#0000_0000

To Close, toggle Control Word Bit 9 (Or write a decimal value of 512)

Name	Address	Display format	Monitor value
"EHPS_IN".ProcessDataInput - OpenedPositionFlag"	%I8.0	Bool	☐ FALSE
"EHPS_IN".ProcessDataInput - GrippedPositionFlag"	%I8.1	Bool	☐ FALSE
"EHPS_IN".ProcessDataInput - ClosedPositionFlag"	%I8.2	Bool	☒ TRUE
"EHPS_IN".ProcessDataInput - UndefinedPositionFlag"	%I8.3	Bool	☐ FALSE
"EHPS_IN".ProcessDataInput - LatchDataFlag"	%I8.4	Bool	☐ FALSE
"EHPS_IN".ProcessDataInput - DirectionOpenFlag"	%I8.5	Bool	☐ FALSE
"EHPS_IN".ProcessDataInput - DirectionCloseFlag"	%I8.6	Bool	☒ TRUE
"EHPS_IN".ProcessDataInput - Error"	%I8.7	Bool	☐ FALSE
"EHPS_IN".Reserved Byte"	%I9.0	Bool	☐ FALSE
"EHPS_IN".ProcessDataInput - ErrorNumber"	%IW10	Hex	16#0000
"EHPS_IN".ProcessDataInput - ActualPosition"	%IW12	DEC	2027
"EHPS_OUT".ProcessDataOutput - ControlWord"	%QW8	Bin	2#0000_0010_0000_0000
"EHPS_OUT".ProcessDataOutput - GrippingMode"	%QB10	DEC	100
"EHPS_OUT".ProcessDataOutput - WorkpieceNo"	%QB11	Hex	16#00
"EHPS_OUT".ProcessDataOutput - GrippingPosition"	%QW12	Hex	16#0000
"EHPS_OUT".ProcessDataOutput - GrippingForce"	%QB14	DEC	4
"EHPS_OUT".ProcessDataOutput - GrippingTolerance"	%QB15	Hex	16#00
	%ID16	Hex	16#0000_0000
	%QD16	Hex	16#0000_0000