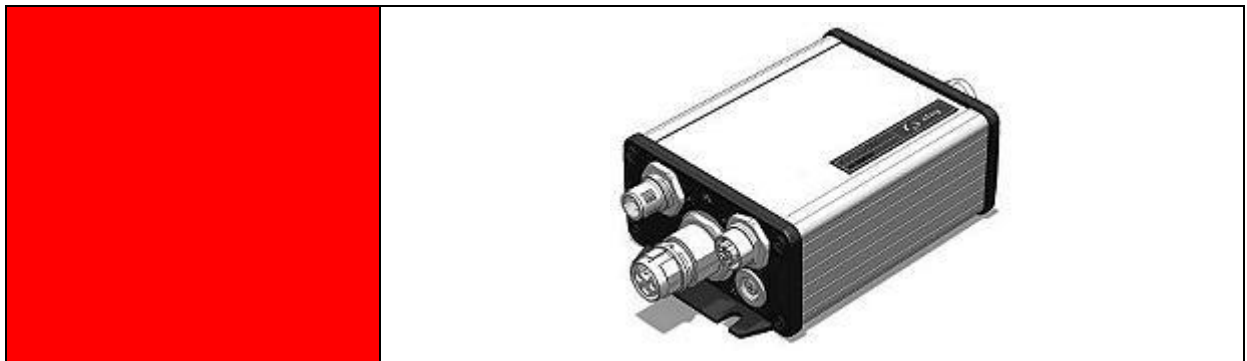


Servo Controller

SE-24

- **Programming example**
Siemens TIA V12.0



Complementary document to the Operating Instructions
© Copyright by Afag Automation AG

This manual is a complementary document to the operating instructions and applies to:

Type	Order No
SE-24 Profibus	50315435

Assembly and initial start-up may be carried out by qualified personnel only and according to these operating instructions.

Version of this documentation: SE-24 programming example Siemens TIA V12.0 vers. 1.3 en. 01.06.2022



 CAUTION	
	<p>As this manual is a complementary document to the operating instructions it alone is not sufficient to carry out installation and commissioning of the device.</p> <p>Please pay attention to the notes in <i>1.1 Documentation</i></p>

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1 General



1.1 Documentation

For the Servo Controllers of the SE-24 series are considerably documentations available. There are main documents and complementary documents.

The documents contain safety instructions that must be followed

Main document:

present	documentation / description
<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ SE-24 Operating Manual <p>Description of the technical data and the functions of the device as well as notes on the plug assignment, installation and operation of the SE-24 servo controller.</p> <p>It is meant for persons who want to get familiar with the SE-24 servo controller.</p>

 CAUTION	
	<p>The operating manual is the main document and must be read by all means before installation and start-up of all devices of the SE-24 series independent of the respective model.</p>



Complementary documents to the operating manual:

present	documentation / description
<input type="checkbox"/>	<ul style="list-style-type: none"> SE-24 Software Manual Description of the "afagTools" parameterization program.
<input type="checkbox"/>	<ul style="list-style-type: none"> SE-24 IO Manual Description of the I/O control of the SE-24 servo controller.
<input type="checkbox"/>	<ul style="list-style-type: none"> SE-24 Profibus Manual Description of the fieldbus control of the SE-24 servo controller under PROFIBUS-DP.
<input type="checkbox"/>	<ul style="list-style-type: none"> SE-24 programming example Siemens S7 V5.5 Description to the programming example for Siemens S7 V5.5.
<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> SE-24 programming example Siemens TIA V12.0 Description to the programming example for Siemens TIA V12.0.
<input type="checkbox"/>	<ul style="list-style-type: none"> SE-24 EtherCAT Manual Description of the fieldbus control of the SE-24 servo controller under EtherCAT.
<input type="checkbox"/>	<ul style="list-style-type: none"> SE-24 programming example Beckhoff TwinCAT 2 Description to the programming example for Beckhoff TwinCAT 2.
<input type="checkbox"/>	<ul style="list-style-type: none"> SE-24 CANopen Manual Description of the fieldbus control of the SE-24 servo controller under CANopen.

These documents are available for download on our homepage:

www.afag.com

2 Safety instructions

 CAUTION	
	<p>The safety instructions in the operating manual must be followed.</p> <p>The operating manual is the main document and must be read by all means before installation and start-up of all devices of the SE-24 series independent of the respective model.</p>


3 Programming example for SIEMENS TIA Portal V12.0

3.1 Introduction

For the servo positioning controller SE-24, specifically for the Siemens PLC systems (SIMATIC S7 controllers) were written data blocks that facilitate integration of the servo positioning controller in a PLC program with PROFIBUS functionality significantly.

The blocks are packaged as a sample project to a file. This file is an archived TIA project. The sample project is:


Mode of operation	Sample project
Positioning	SE-24_POS_TIAV12_EN.zip12

NOTE	
	Download sample project configuration and data blocks under www.afag.com

The sample project can be retrieved under the Siemens TIA V12 Portal. Of this retrieved example project, the relevant DBs and if necessary, instructions can be copied.

In this manual, these blocks and the configuration and integration in a PLC program are described.

The data blocks (DB) are the operating mode "**Positioning**" assigned.

NOTE	
	This manual is intended to provide the user with a quick introduction to the function of the inputs and outputs as well as the handling of the DBs within the Siemens S7 world. This manual does not replace the „SE-24 Profibus Manual“, but is supplementary.

The sample programs provided by Afag available can only be understood as such and give the basic procedure for handling the data blocks.

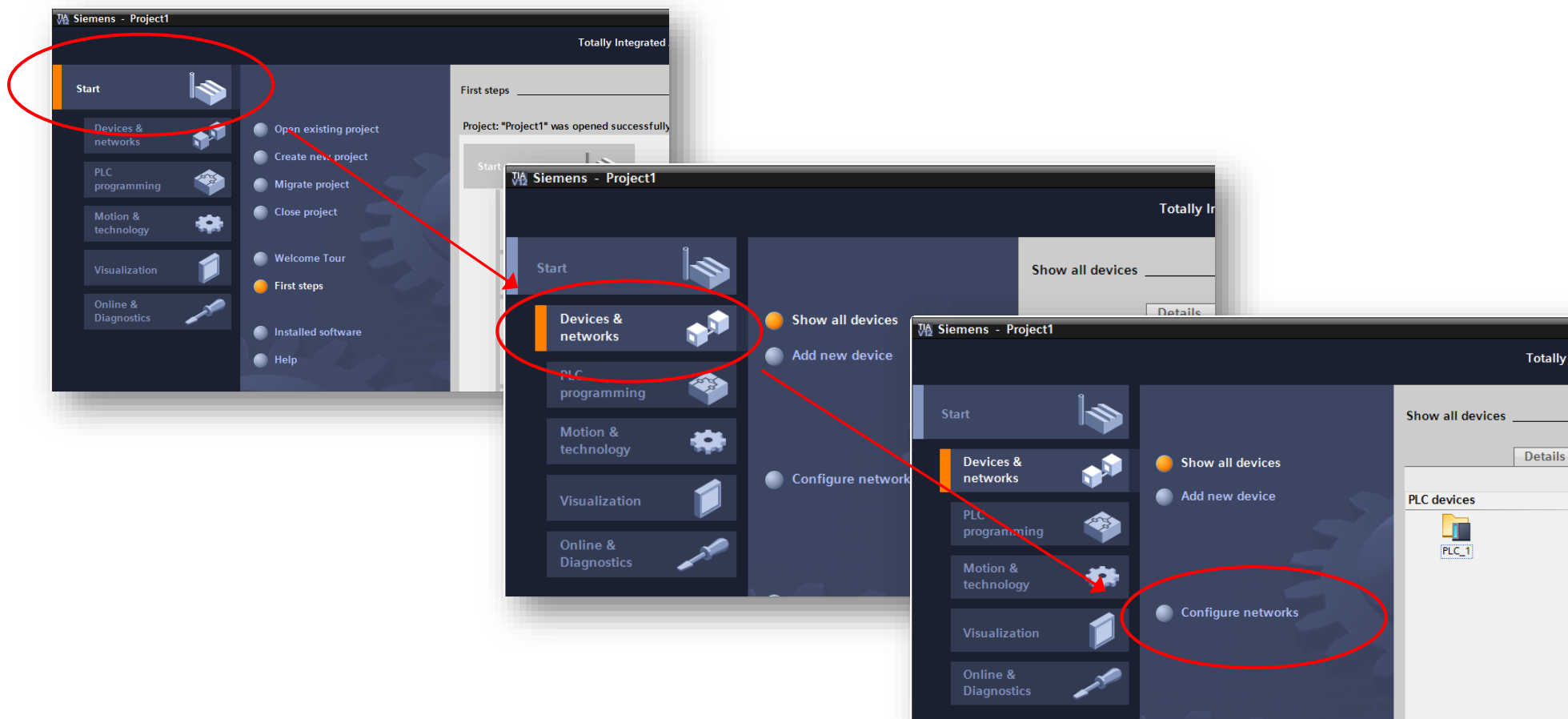
When using the sample programs in customer-specific applications, the user must verify that all functional and safety-relevant conditions are met.

4 Integration in SIEMENS TIA V12.0

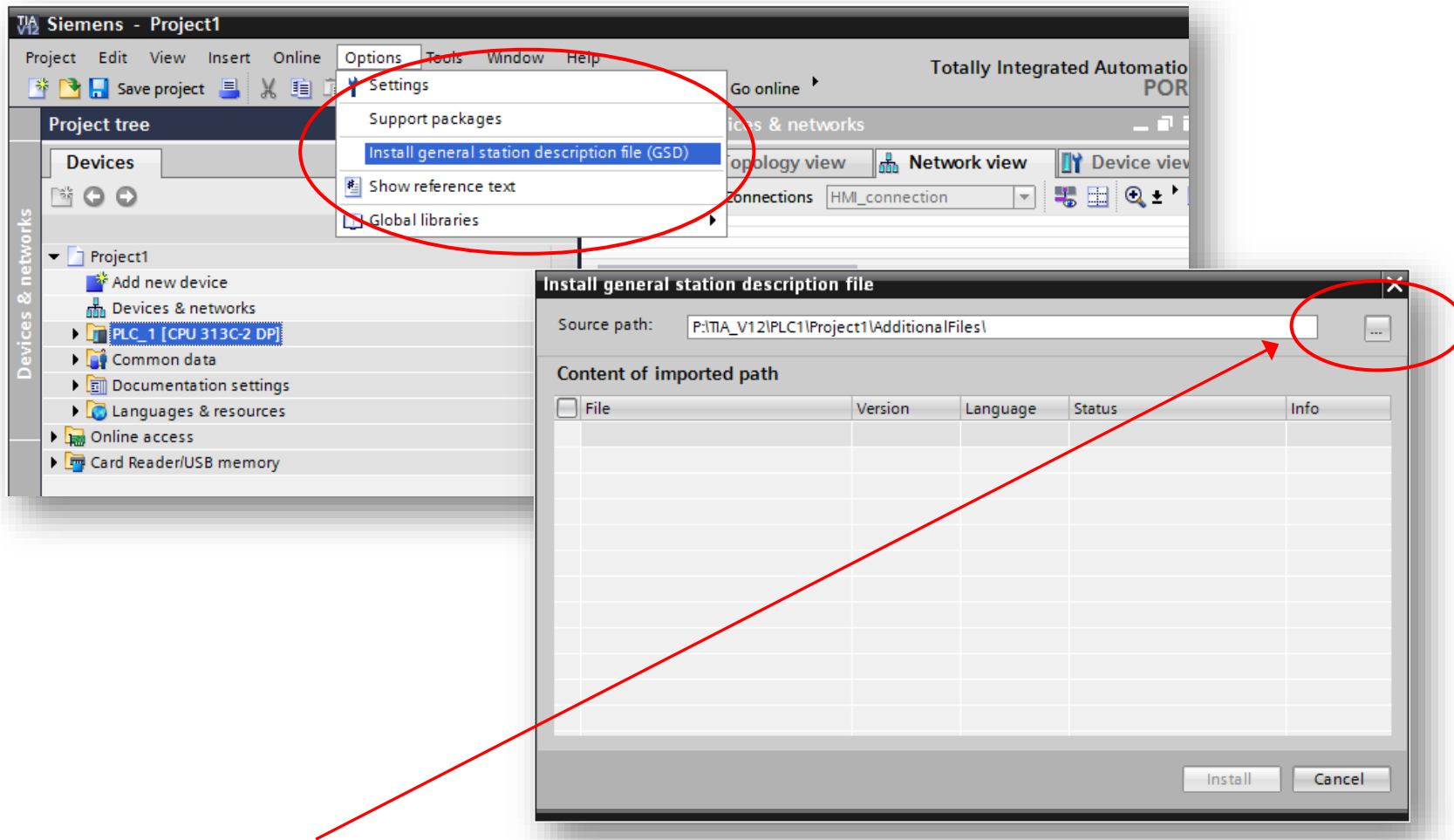
4.1 Configuration

4.1.1 Integrating the GSD file

For integrate of the GSD-File in the TIA Project, change in the Overview „Devices & networks”.



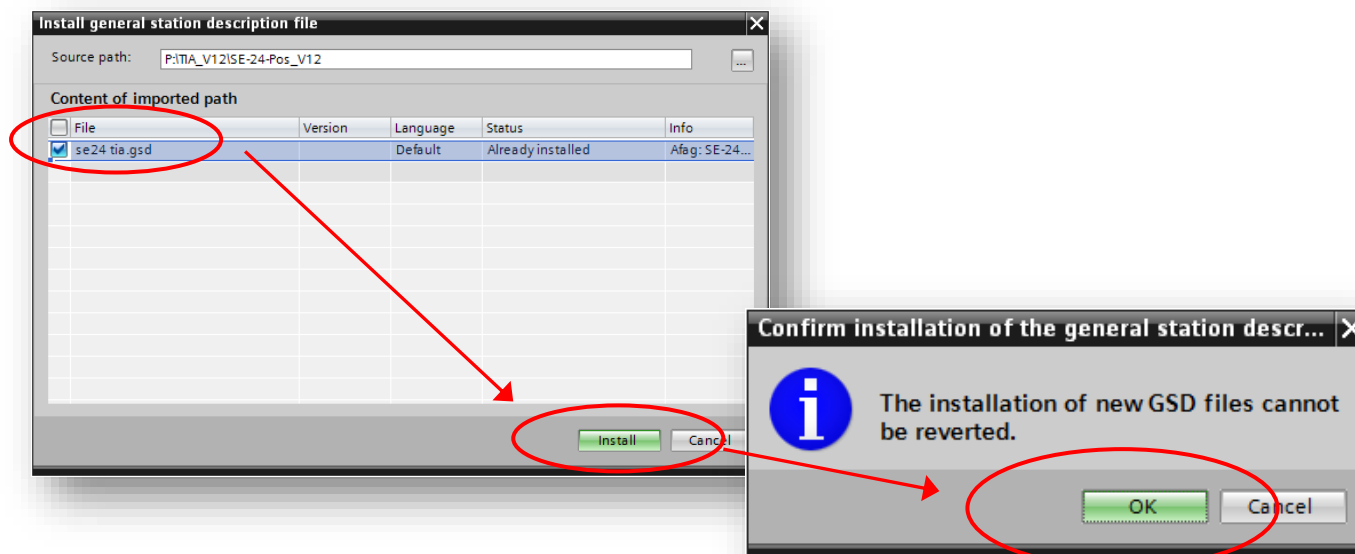
With the command **Options → Install general station description file (GSD)** the window to select the GSD file open.



With the button „...“ open the path, which is stored under the corresponding GSD file.

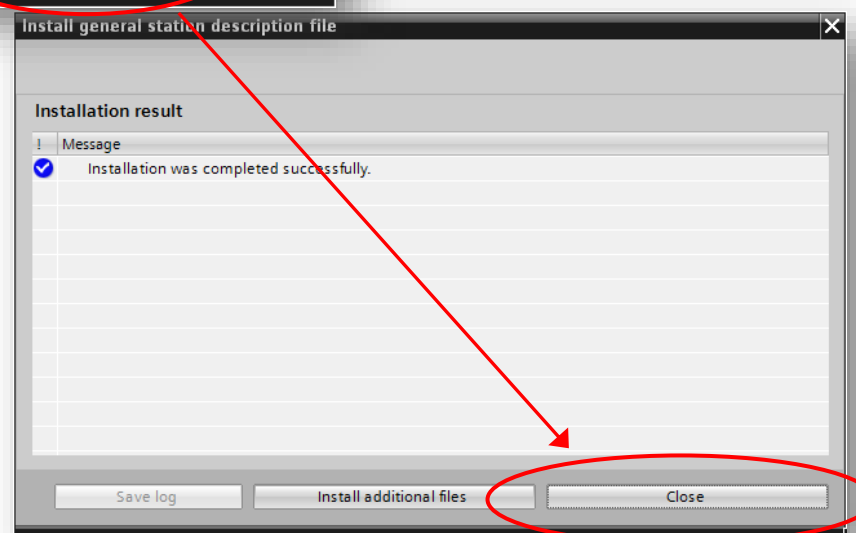
All GSD-Files which will be located in this path will be displayed.

The File **se24tia.gsd** select and start **Install**.



Confirm the message with „OK“.

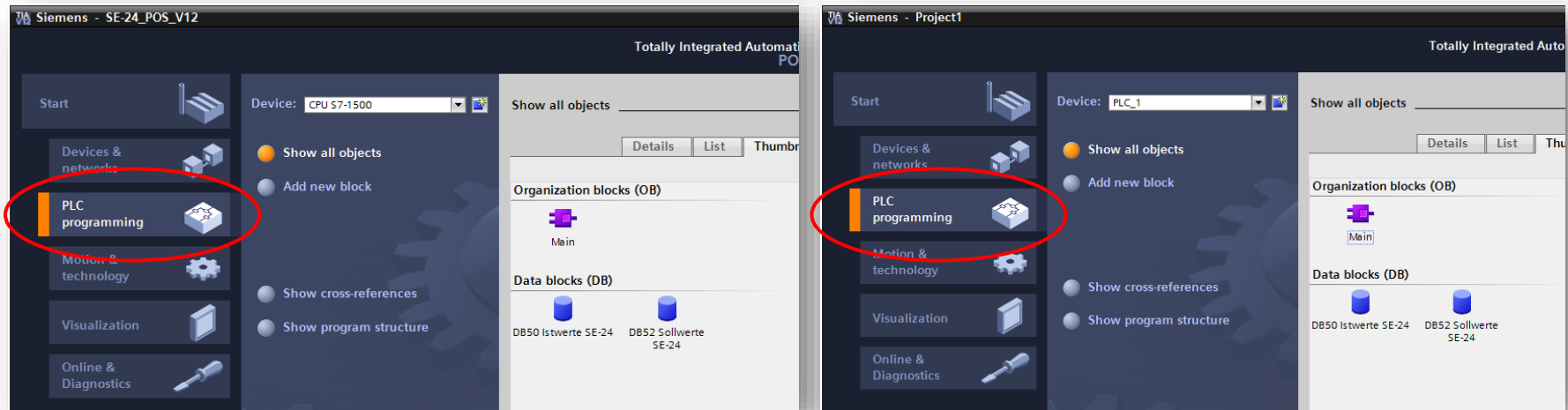
Finish the installation confirmation with „close“.



4.1.2 Importing the data blocks and the watch table

To copy the data blocks, open the TIA Portal twice. In this case, even open the sample project and the target project

Select the view of **PLC-Programming**



Sample project

Target project

Select the sample project click on the desired data blocks with the right mouse button and select **"copy"**.

Create copy in the target project data blocks with the right mouse button and select **"insert"**.



4.1.2.1 SE-24 actual values data block

DB50 Istwerte SE-24									
	Name	Data type	Offset	Start value	Retain	Accessible f...	Visible in ...	Setpoint	Comment
1	Static				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2	Dummy00	Bool	0.0	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
3	Dummy01	Bool	0.1	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
4	Dummy02	Bool	0.2	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
5	Dummy03	Bool	0.3	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
6	Dummy04	Bool	0.4	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
7	Dummy05	Bool	0.5	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
8	Dummy06	Bool	0.6	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
9	Dummy07	Bool	0.7	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
10	ready	Bool	1.0	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ready for operation
11	drive_enable_ok	Bool	1.1	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	power amplifier and controller active
12	rev_valid	Bool	1.2	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	performed referencing
13	move_ok	Bool	1.3	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	performed running motion task
14	Dummy14	Bool	1.4	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
15	Dummy15	Bool	1.5	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
16	Dummy16	Bool	1.6	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
17	Dummy17	Bool	1.7	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
18	error_nr	Int	2.0	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	error register
19	position_value	DInt	4.0	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	position-actual-value
20	current_value	DInt	8.0	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	electricity-actual-value at mA

4.1.2.2 SE-24 target values data block

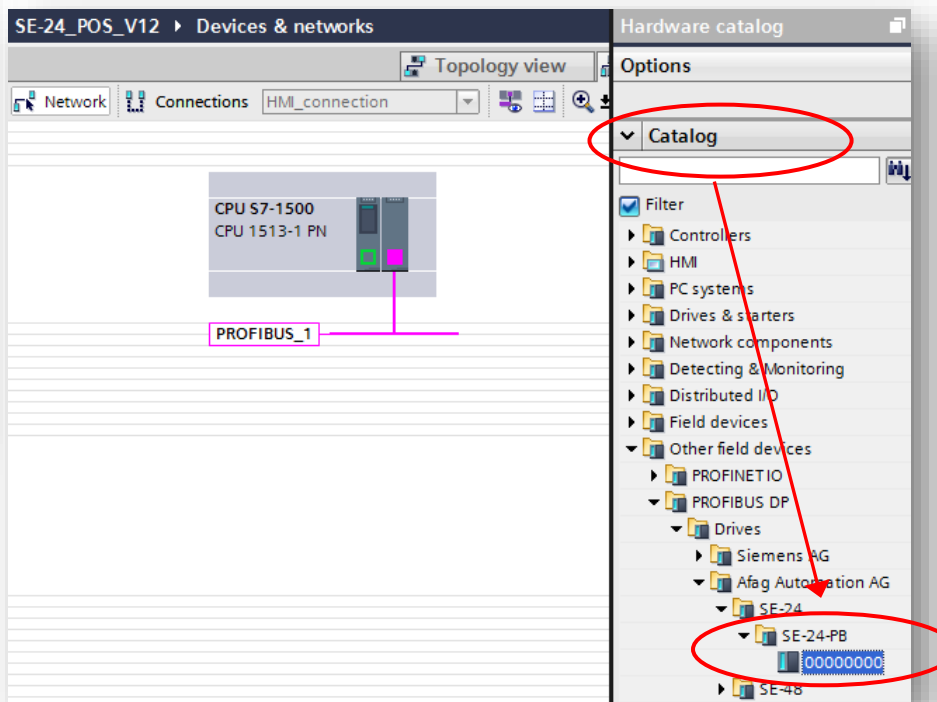
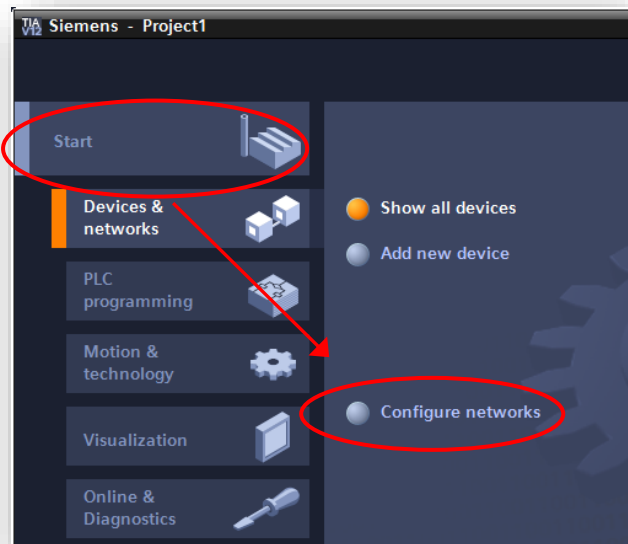
DB52 Sollwerte SE-24									
	Name	Data type	Offset	Start value	Retain	Accessible f...	Visible in ...	Setpoint	Comment
1	Static				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2	jog_pos	Bool	0.0	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	jogging positive
3	jog_neg	Bool	0.1	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	jogging negative
4	move_relativ	Bool	0.2	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1=relatively / 0=absolutely
5	Dummy03	Bool	0.3	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
6	Dummy04	Bool	0.4	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
7	Dummy05	Bool	0.5	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
8	Dummy06	Bool	0.6	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
9	Dummy07	Bool	0.7	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	placeholder
10	drive_enable_fault_res	Bool	1.0	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1=drive enable / 0=fault reset
11	start_stop_ref	Bool	1.1	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1=Start Referenzfahrt / 0=Stopp Referenzfahrt
12	start_stop_mov	Bool	1.2	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1=Start Fahrauftrag / 0=Stopp Fahrauftrag
13	mode	Bool	1.3	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1=Strommodus / 0=Positionsmodus
14	pos_nr_bit0	Bool	1.4	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Positionssatz-Nummer Bit 0
15	pos_nr_bit1	Bool	1.5	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Positionssatz-Nummer Bit 1
16	pos_nr_bit2	Bool	1.6	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Positionssatz-Nummer Bit 2
17	pos_nr_bit3	Bool	1.7	false	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Positionssatz-Nummer Bit 3
18	target_position	DInt	2.0	!#0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	target-position
19	velocity	Int	6.0	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	target-speed
20	deceleration	Int	8.0	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	target-deceleration
21	acceleration	Int	10.0	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	target-acceleration
22	target_current	Int	12.0	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	target-electricity at %

4.1.2.3 Watch list

SE-24_POS_V12 ▶ CPU S7-1500 [CPU 1513-1 PN] ▶ Watch and force tables ▶ Beobachtungstabelle SE-24							
		Name	Address	Display format	Monitor value	Modify value	
1		*DB50 Istwerte SE-24*.ready	%DB50.DBX1.0	Bool	<input type="text"/>		<input type="checkbox"/>
2		*DB50 Istwerte SE-24*.drive_enable_ok	%DB50.DBX1.1	Bool			<input type="checkbox"/>
3		*DB50 Istwerte SE-24*.rev_valid	%DB50.DBX1.2	Bool			<input type="checkbox"/>
4		*DB50 Istwerte SE-24*.move_ok	%DB50.DBX1.3	Bool			<input type="checkbox"/>
5		*DB50 Istwerte SE-24*.error_nr	%DB50.DBW2	DEC+/-			<input type="checkbox"/>
6		*DB50 Istwerte SE-24*.position_value	%DB50.DBD4	DEC+/-			<input type="checkbox"/>
7		*DB50 Istwerte SE-24*.current_value	%DB50.DBD8	DEC+/-			<input type="checkbox"/>
8		*DB52 Sollwerte SE-24*.jog_pos	%DB52.DBX0.0	Bool			<input type="checkbox"/>
9		*DB52 Sollwerte SE-24*.jog_neg	%DB52.DBX0.1	Bool			<input type="checkbox"/>
10		*DB52 Sollwerte SE-24*.move_relativ	%DB52.DBX0.2	Bool			<input type="checkbox"/>
11		*DB52 Sollwerte SE-24*.drive_enable_fault_res	%DB52.DBX1.0	Bool			<input type="checkbox"/>
12		*DB52 Sollwerte SE-24*.start_stop_ref	%DB52.DBX1.1	Bool			<input type="checkbox"/>
13		*DB52 Sollwerte SE-24*.start_stop_mov	%DB52.DBX1.2	Bool			<input type="checkbox"/>
14		*DB52 Sollwerte SE-24*.mode	%DB52.DBX1.3	Bool			<input type="checkbox"/>
15		*DB52 Sollwerte SE-24*.pos_nr_bit0	%DB52.DBX1.4	Bool			<input type="checkbox"/>
16		*DB52 Sollwerte SE-24*.pos_nr_bit1	%DB52.DBX1.5	Bool			<input type="checkbox"/>
17		*DB52 Sollwerte SE-24*.pos_nr_bit2	%DB52.DBX1.6	Bool			<input type="checkbox"/>
18		*DB52 Sollwerte SE-24*.pos_nr_bit3	%DB52.DBX1.7	Bool			<input type="checkbox"/>
19		*DB52 Sollwerte SE-24*.target_position	%DB52.DBD2	DEC+/-			<input type="checkbox"/>
20		*DB52 Sollwerte SE-24*.velocity	%DB52.DBW6	DEC+/-			<input type="checkbox"/>
21		*DB52 Sollwerte SE-24*.deceleration	%DB52.DBW8	DEC+/-			<input type="checkbox"/>
22		*DB52 Sollwerte SE-24*.acceleration	%DB52.DBW10	DEC+/-			<input type="checkbox"/>
23		*DB52 Sollwerte SE-24*.target_current	%DB52.DBW12	DEC+/-			<input type="checkbox"/>

4.1.3 Configuration Connection servo controller SE-24 on Profibus

On Menu „Devices & networks“ select view „Configure networks“

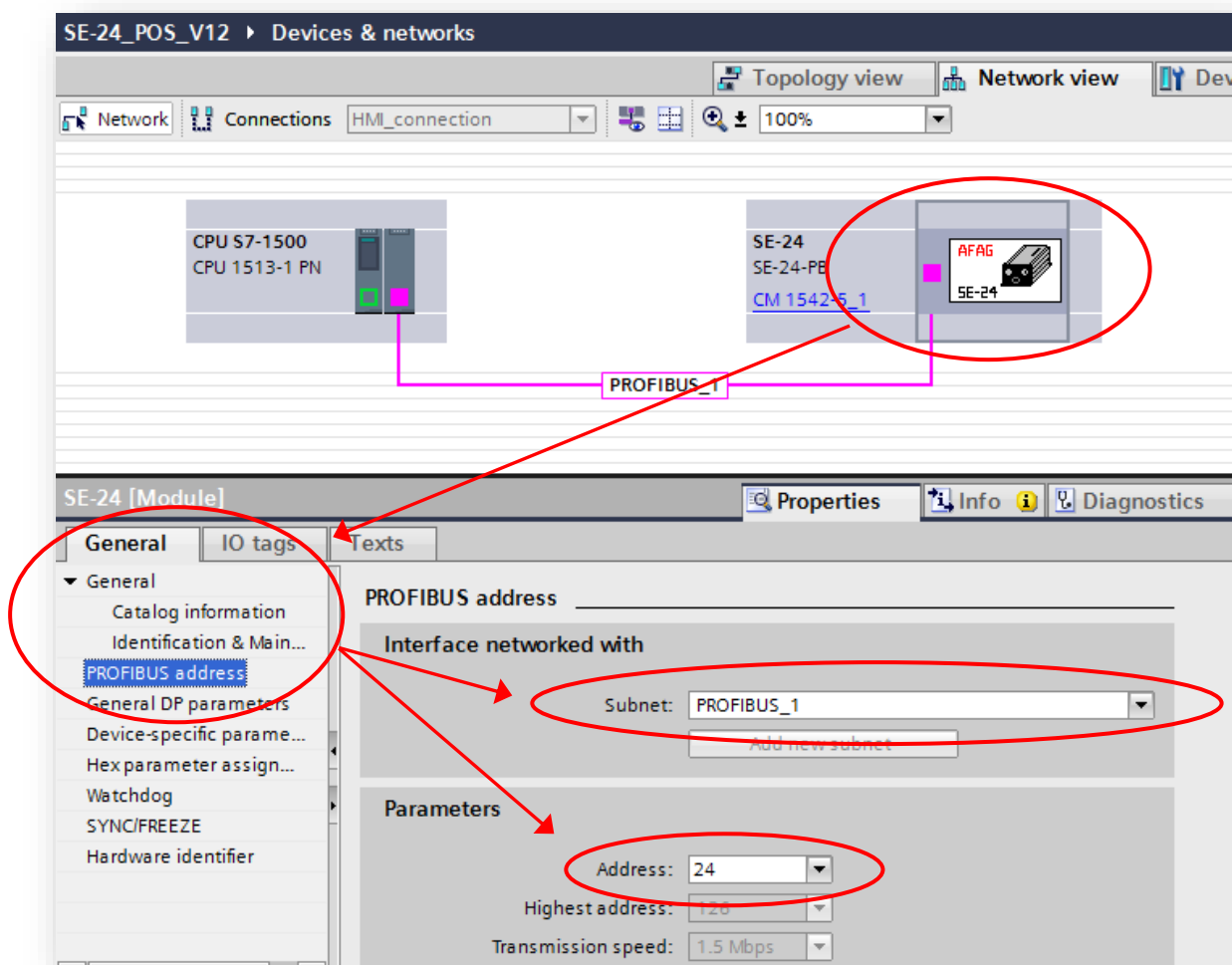


On the Hardware catalog select Drives **SE-24-PB**.

(Other field devices / PROFIBUS DP / Drives / Afag Automation AG / SE-24 / SE-24-PB)

Drag with the left mouse button on the controller with the name "SE-24-PB" into the box to the right of the "PLC 1" and drop.

Selecting the „SE-24“ directly in the symbol

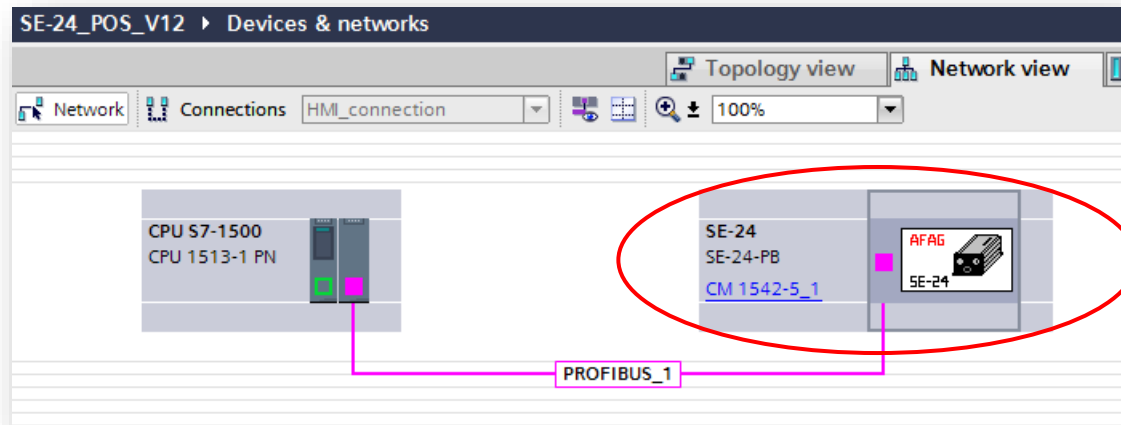


On „General“ select the „PROFIBUS address“:

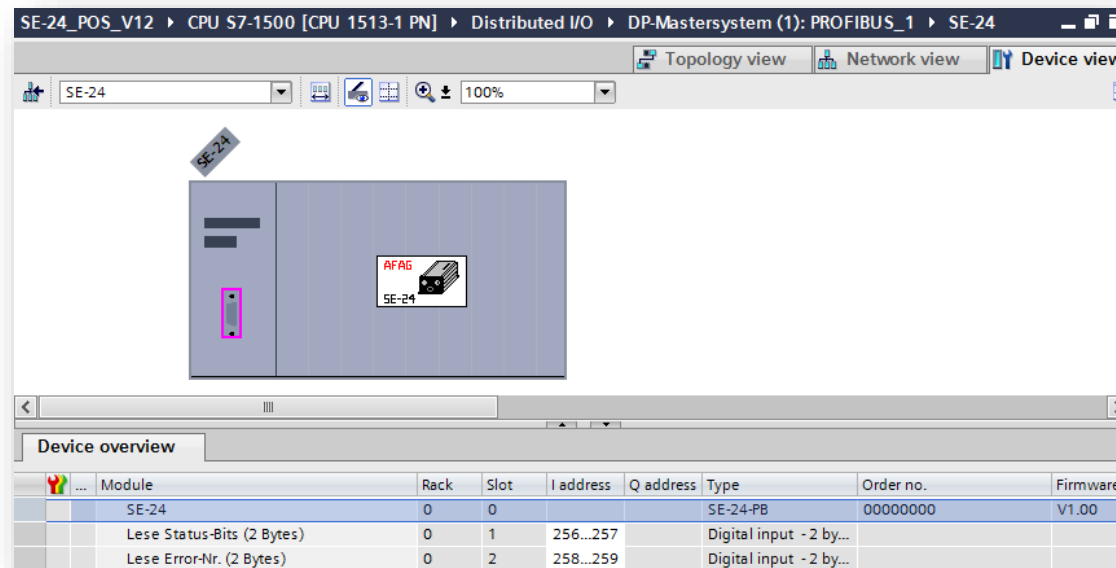
- ➔ Subnet: PROFIBUS_1
- ➔ Select address

4.1.4 Setting the Profibus telegram elements

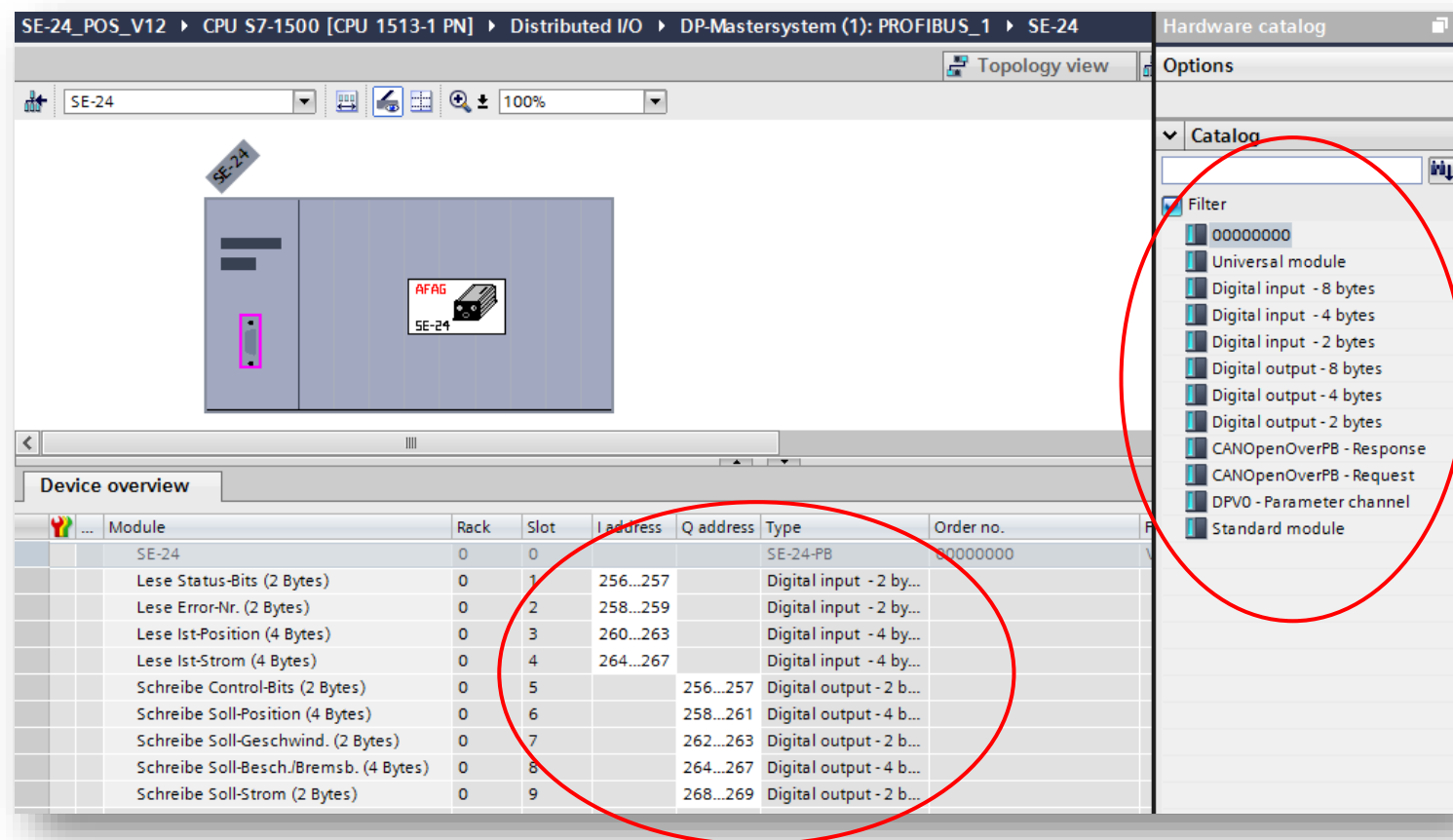
Next the message elements will be inserted. They must match with the data blocks for the target and actual values. For this, the Profibuslave is selected with a double click.



It opens this view:



The required input and output modules are selected from the hardware catalog. These can be clicked with the left mouse button and dragged into the corresponding field of the assembly.



The data are to be considered from the perspective of the PLC. The blocks are inserted individually, it is advisable to keep using the sequence and size of the data in the associated data blocks.

First, the output data are created, they correspond to the desired values from the servo controller.

After the input data are created, they correspond to the actual values from the servo controller.

4.2 Call-up communications in the PLC program

4.2.1 Reading data from the servo controller

Network 1: SE-24 Slave Daten Einlesen

▼ Read the actual value from the slave and writing it to the DB50 actual values.
The start address configured on the LADDR and projekteerte data length at the output RECORD is in the application projects to check in the hardware configuration, and optionally adjust the DPRD_DAT call.

1	// Read blocks individually		
2			
3	// Read Status Bits CALL DPRD_DAT		
4	CALL DPRD_DAT		
5	LADDR :=W#16#10B // corresponds to address 267 in the HW identifier	W#16#10B	
6	RET_VAL := "MW60"	%MW60	
7	RECORD :=P#DB50.DBX0.0 BYTE 2	P#DB50.DBX0.0 BYTE 2	
8			
9	// Read Error-No.		
10	CALL DPRD_DAT		
11	LADDR :=W#16#10C // corresponds to address 268 in the HW identifier	W#16#10C	
12	RET_VAL := "MW62"	%MW62	
13	RECORD := "DB50 Istwerte SE-24".error_nr	%DB50.DBW2	error register
14			
15	// Read actual-position		
16	CALL DPRD_DAT		
17	LADDR :=W#16#10D // corresponds to address 269 in the HW identifier	W#16#10D	
18	RET_VAL := "MW64"	%MW64	
19	RECORD := "DB50 Istwerte SE-24".position_value	%DB50.DBD4	position-actual-value
20			
21	// Read actual-electricity		
22	CALL DPRD_DAT		
23	LADDR :=W#16#10E // corresponds to address 270 in the HW identifier	W#16#10E	
24	RET_VAL := "MW66"	%MW66	
25	RECORD := "DB50 Istwerte SE-24".current_value	%DB50.DBD8	electricity-actual-value at mA
26			

4.2.2 Writing data to the servo controller

Network 2: SE-24 Daten schreiben

▼ Be the setpoint data from the DB52 to the slave.
The start address configured on the LADDR and the configured data length at the input RECORD is to be checked in the application projects in the hardware configurator and adapt gegebenenfalls on DPWR_DAT call.
The information stored in DB52 setpoints must be checked and adjusted as necessary to the drive used.

1	// Write blocks individually		
2			
3	// Write Control-Bits		
4	CALL DPWR_DAT		
5	LADDR :=W#16#10F // corresponds to address 271 in the HW identifier	W#16#10F	
6	RECORD :=P#DB52.DBX0.0 BYTE 2	P#DB52.DBX0.0 BYTE 2	
7	RET_VAL := "MW80"	%MW80	
8			
9	// Write target-position		
10	CALL DPWR_DAT		
11	LADDR :=W#16#110 // corresponds to address 272 in the HW identifier	W#16#110	
12	RECORD := "DB52 Sollwerte SE-24".target_position	%DB52.DBD2	target-position
13	RET_VAL := "MW82"	%MW82	
14			
15	// Write target-speed		
16	CALL DPWR_DAT		
17	LADDR :=W#16#111 // corresponds to address 273 in the HW identifier	W#16#111	
18	RECORD := "DB52 Sollwerte SE-24".velocity	%DB52.DBW6	target-speed
19	RET_VAL := "MW84"	%MW84	
20			
21	// Write target-acceleration and target-deceleration		
22	CALL DPWR_DAT		
23	LADDR :=W#16#112 // corresponds to address 274 in the HW identifier	W#16#112	
24	RECORD :=P#DB52.DBX8.0 BYTE 4	P#DB52.DBX8.0 BYTE 4	
25	RET_VAL := "MW86"	%MW86	
26			
27	// Write target-electricity		
28	CALL DPWR_DAT		
29	LADDR :=W#16#113 // corresponds to address 275 in the HW identifier	W#16#113	
30	RECORD := "DB52 Sollwerte SE-24".target_current	%DB52.DBW12	target-electricity at %
31	RET_VAL := "mw90"	%MW90	
32			



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