



SIEMENS

Learn-/Training Document

Siemens Automation Cooperates with Education
(SCE) | From Version V16

TIA Portal Module 062-121

Servo drive S210 PN on PROFINET IRT
with technology objects in SIMATIC S7-1500

[siemens.com/sce](https://www.siemens.com/sce)

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SINAMICS S210 Frequency converter

- **SINAMICS S210 Servo drive for 1 AC 200 - 240 V with PROFINET**
Order no.: 6SL3080-8BB00-0AA0

Alternative:

- **SINAMICS S210 Servo drive for 3 AC 380 - 480 V with PROFINET, exclusively with S7-1500**
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SIMATIC controllers

- **SIMATIC ET 200SP Open Controller CPU 1515SP PC2 F with WinCC RT Advanced 512 PTs**
Order no.: 6ES7677-2SB42-4AB1
- **SIMATIC ET 200SP Distributed Controller CPU 1512SP F-1 PN Safety**
Order no.: 6ES7512-1SK00-4AB2
- **SIMATIC CPU 1516F PN/DP Safety**
Order no.: 6ES7516-3FN00-4AB2
- **SIMATIC S7 CPU 1516-3 PN/DP**
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Servo drive system S210 PN on PROFINET IRT with technology objects in SIMATIC S7-1500

1 Objective

In this chapter, you will learn how a SINAMICS S210 PN frequency converter can be commissioned with a SIMATIC S7 controller – based on the example of a CPU1516F-3 PN/DP with PROFINET IRT (Isochronous Real Time).

The module explains the commissioning of the SERVO drive system S210 PN with the SINAMICS Startdrive software in the TIA Portal.

Subsequently, we show step-by-step how the servomotor from the program of the CPU1516F-3 PN/DP can be controlled and monitored via technology objects.

The SIMATIC S7 controllers listed in chapter 3 can be used.

2 Requirement

This chapter builds on the chapter "Global data blocks" of SIMATIC S7. To implement this chapter, you can use the following project, for example:

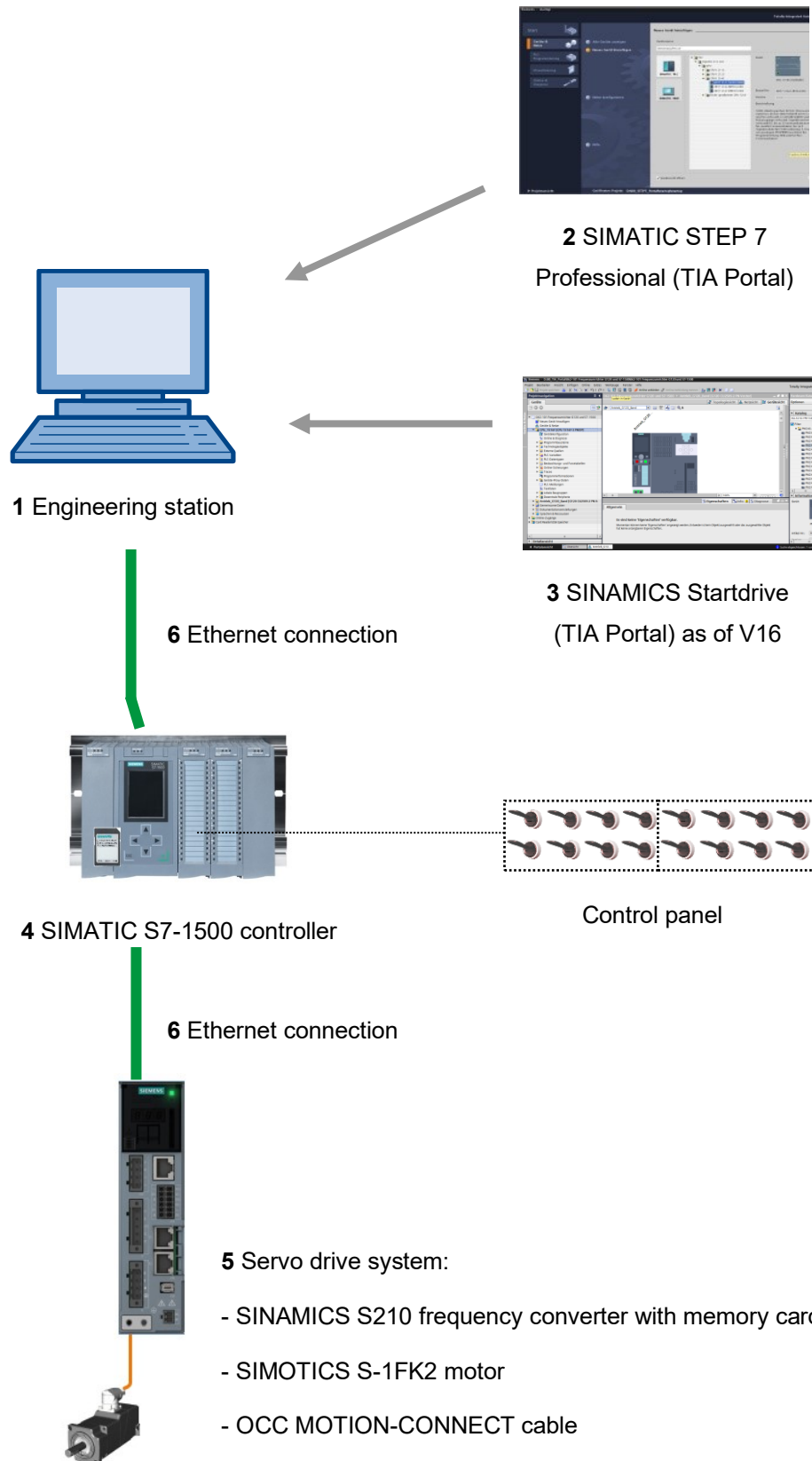
"032-600-global-data-blocks ...".

3 Hardware and software required

- 1 Engineering station: Hardware and operating system requirements apply (for additional information, see Readme on the TIA Portal Installation DVDs)
- 2 SIMATIC STEP 7 Professional software in the TIA Portal – as of V16
- 3 SINAMICS Startdrive software in the TIA Portal – as of V16
- 4 SIMATIC S7-1500 controller, e.g. CPU 1516F-3 PN/DP – as of firmware V2.8 with memory card and 16DI/16DO

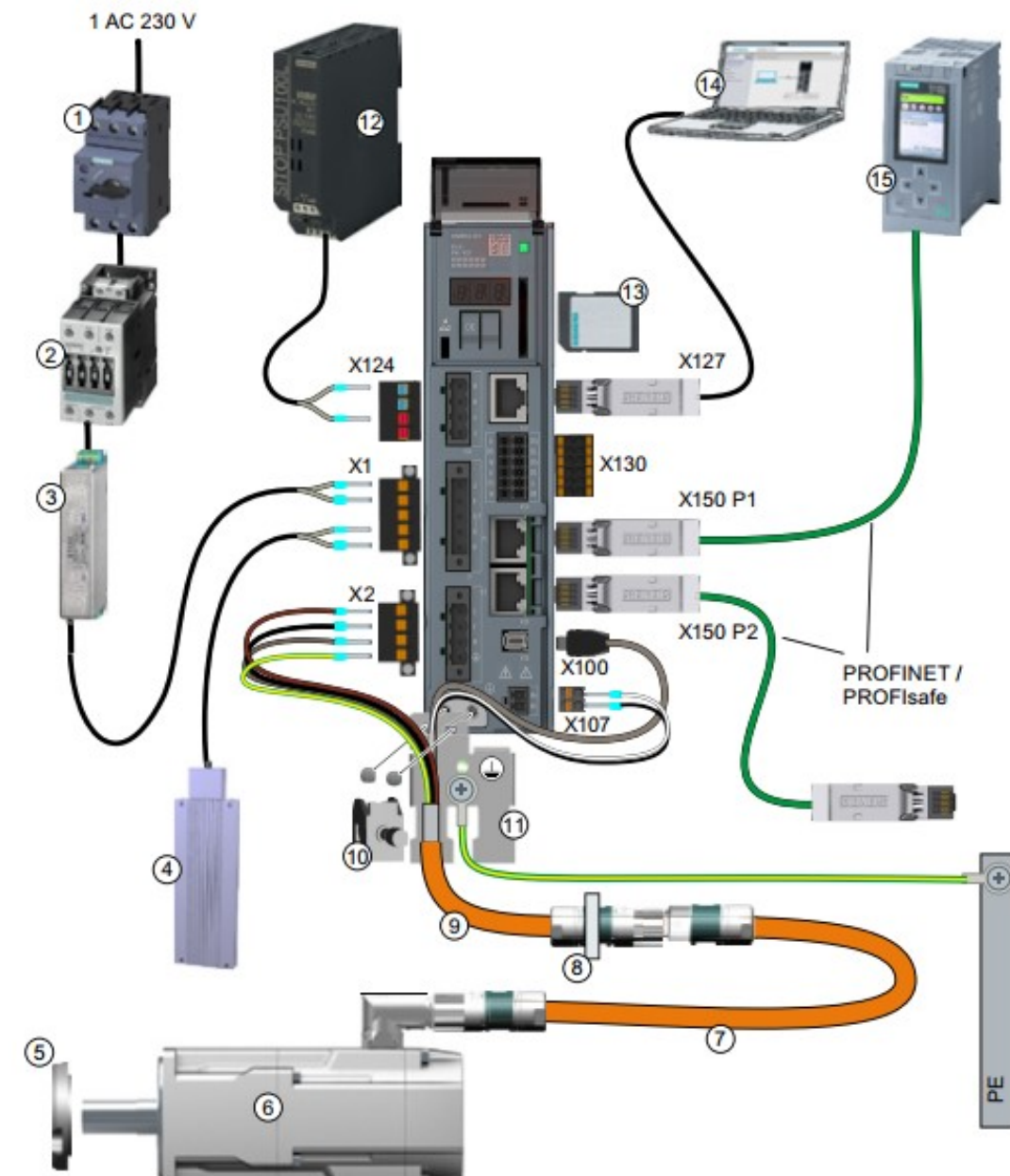
Note: The digital inputs should be fed out to a control panel.

- 5 Servo drive system:
 - SINAMICS S210 frequency converter with memory card
 - SIMOTICS S-1FK2 electric motor
 - OCC MOTION-CONNECT cable
- 6 Ethernet connection between the engineering station and controller and between the controller and frequency converter



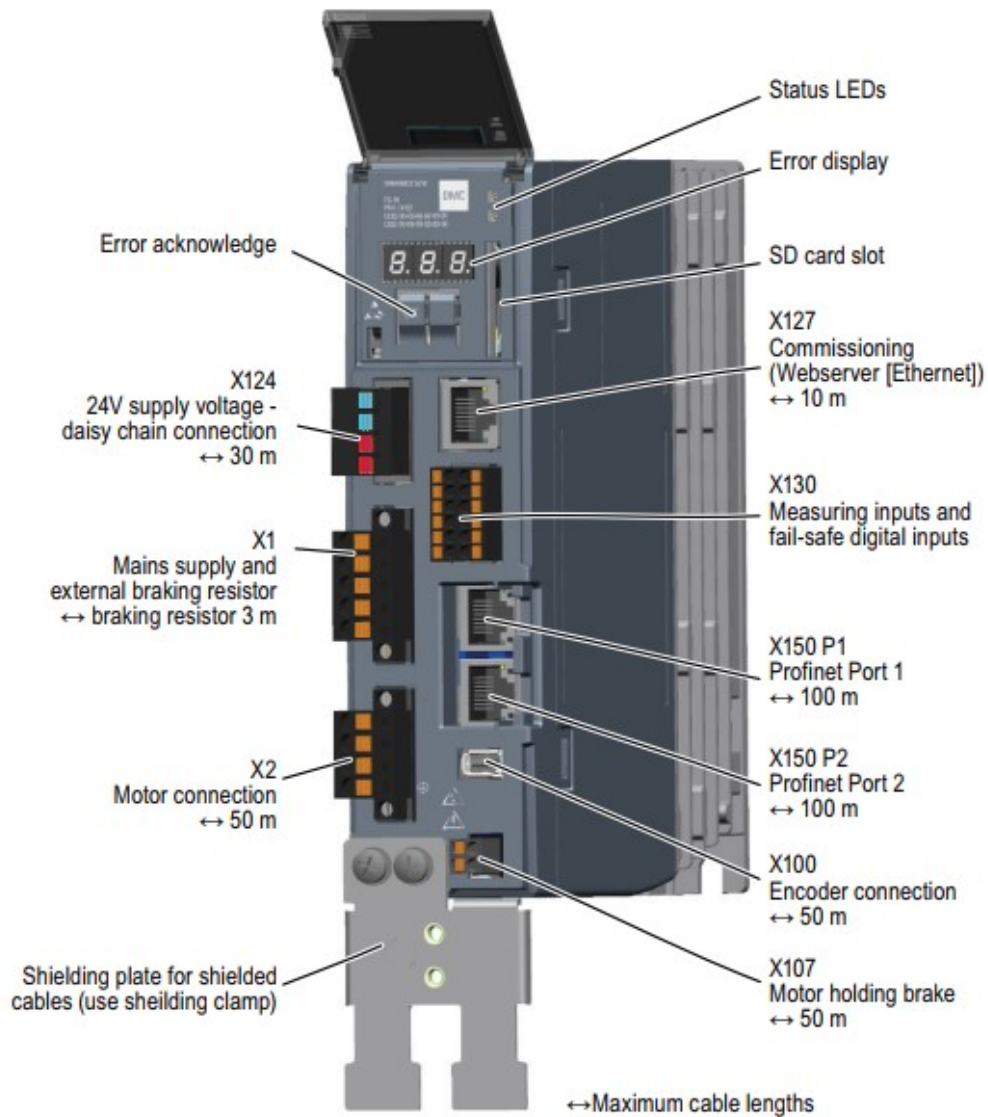
4 Theory

4.1 System overview

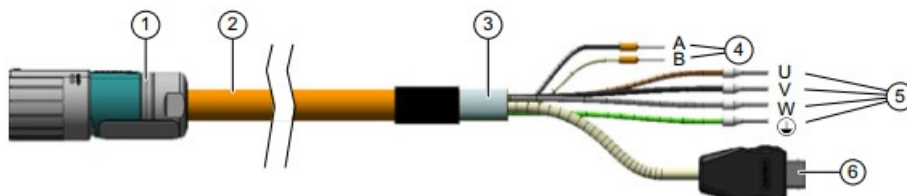


1. Fuse or circuit breaker	2. Line contactor (optional)
3. Line filter (optional)	4. External braking resistor (optional)
5. Shaft sealing ring for IP65 (optional)	6. 1FK2 servo motor
7. OCC extension cable (optional)	8. Mounting for control cabinet bushing (optional)
9. OCC connection cable for motor, motor holding brake and encoder	10. Shielding terminal
11. Shield plate	12. 24 V power supply
13. SD memory card (optional)	14. Commissioning device, e.g. laptop
15. Controller, e.g. SIMATIC S7-1500	

4.2 Converter connections and operator controls



4.3 OCC connecting cable




1. M12 or M17 round connector, 10-pin	2. MOTION-CONNECT OCC cable
3. Shielding	4. Cables for holding brake
5. Power cables	6. SIEMENS IX connector for signal line


For details, see the manuals at support.automation.siemens.com.

4.4 Safety measures and warnings

The following safety information and warnings are to be observed before the installation and commissioning of the SINAMICS S210.

4.4.1 General

	WARNING
<p>Danger to life if the safety instructions and installation instructions are not observed The Quick Installation Guide only contains the most important information for the installation of the converter. If the safety instructions and installation instructions in the associated documentation are not observed, accidents involving severe injuries or death can occur.</p> <ul style="list-style-type: none"> • Observe the safety instructions and installation instructions given in the associated operating instructions: www.siemens.com/sinamics-s210 • Also observe the safety instructions for the integrated functional Safety functions. Make sure that these functions are fully operational again after replacing a converter. 	

	DANGER
<p>Danger to life through electric shock due to residual charge in the DC link capacitors Because of the DC link capacitors, a hazardous voltage is present for up to 5 minutes after the power to the converter has been removed. Contact with live parts of the converter can result in death or serious injury.</p> <ul style="list-style-type: none"> • Do not open the protective covers or the terminal covers until 5 minutes after the power has been removed. • Before starting any work, check that the system is in a voltage-free state by measuring all terminals, including to ground. • Ensure that the associated warning labels, in the appropriate languages, are attached. 	

Note:

- *It is assumed that a ready pre-assembled converter unit with servo motor is being used for the following operating steps and tasks. Observe the safety regulations and warnings of the manufacturers when carrying out the electrical installation. Instructions and directives for mounting and electrical installation can be found in the manuals of the SINAMICS S210.*

4.5 Telegrams

Various telegrams, whose process data lengths and contents differ, are available for selection for IRT communication with the frequency converter.

Standard telegram 5 is used here.

4.5.1 Process data (PZD) for SINAMICS S210 with standard telegram 5

Control words and setpoints (PLC -> SINAMICS) or status words and actual values (SINAMICS -> PLC) can be transferred with the process data. The structure of the PZD area is as follows for Telegram 5, for a coupling via PROFINET:

	Request frame (SPS -> SINAMICS)	Response frame (SINAMICS -> SPS)
PZD1	Control word 1 (STW1)	Status word 1 (ZSW1)
PZD2 PZD3	Speed setpoint B (32 bits) (NSOLL_B)	Actual speed value B (32 bits) (NIST_B)
PZD4	Control word 2 (STW2)	Status word 2 (ZSW2)
PZD5	Control word of encoder 1 (G1_STW)	Status word of encoder 1 (G1_ZSW)
PZD2 PZD3	Position deviation (XERR)	Actual position value 1 of encoder 1 (G1_XIST1)
PZD2 PZD3	Gain factor for the position controller (KPC).	Actual position value 2 of encoder 1 (G1_XIST2)

4.5.2 Control word 1 (STW1)

Bit	Meaning
00	ON/OFF1
01	OFF2
02	OFF3
03	Enable operation
04	Disable ramp-function generator
05	Reserved
06	Enable speed setpoint
07	Acknowledge fault
08	Reserved
09	Reserved
10	Control by PLC
11	Reserved
12	Open holding brake
13	Reserved
14	Torque/speed control
15	Reserved

4.5.3 Status word 1 (ZSW1)

Bit	Meaning
00	Ready for switch-on
01	Ready
02	Operation enabled
03	Fault present
04	No coasting active
05	No quick stop active
06	Switching on inhibited active
07	Alarm present
08	Controller enable
09	Control requested
10	Comparison value reached/exceeded
11	Alarm class bit 0
12	Alarm class bit 1
13	Reserved
14	Torque control active
15	Reserved

4.5.4 Speed setpoint B 32 bits (NSOLL_B)

The speed setpoint B (NSOLL_B) is a 32-bit word in which the required speed setpoint is transferred to the converter.

The setpoint is transferred as a signed integer. Bit 31 defines the sign of the setpoint as follows:

- Bit = 0 --> Positive setpoint
- Bit = 1 --> Negative setpoint

Value 1 073 741 824 (4000 0000 Hex) corresponds to the speed in parameter p2000.

In our application, the value 7300 rpm is in parameter p2000.

The current speed setpoint is calculated as follows:

$$n_set = (NSOLL_B \times p2000) / 1\,073\,741\,824$$

4.5.5 Actual speed value B 32 bits (NIST_B)

The actual speed value is a 32-bit word through which the speed of the converter is transferred.

The scaling of this value corresponds to that of the setpoint NSOLL_B.

4.5.6 Control word 2 (STW2)

Bit	Meaning
00	Reserved
01	Reserved
02	Reserved
03	Reserved
04	Reserved
05	Reserved
06	Integrator disable, speed controller
07	Parking axis selection
08	Travel to fixed stop
09	Reserved
10	Reserved
11	Reserved
12	Controller sign-of-life bit 0
13	Controller sign-of-life bit 1
14	Controller sign-of-life bit 2
15	Controller sign-of-life bit 3

4.5.7 Status word 2 (ZSW2)

Bit	Meaning
00	Reserved
01	Reserved
02	Reserved
03	Reserved
04	Reserved
05	Open holding brake
06	Integrator disable, speed controller
07	Parking axis active
08	Travel to fixed stop
09	Reserved
10	Reserved
11	Reserved
12	Device sign-of-life bit 0
13	Device sign-of-life bit 1
14	Device sign-of-life bit 2
15	Device sign-of-life bit 3

4.5.8 Encoder 1 control word (G1_STW)

Bit	Meaning
00	Request function 1
01	Request function 2
02	Request function 3
03	Request function 4
04	Request command bit 0
05	Request command bit 1
06	Request command bit 2
07	Mode
08	Reserved
09	Reserved
10	Reserved
11	Reserved
12	Reserved
13	Request absolute value cyclically
14	Request parking encoder
15	Acknowledge encoder fault

4.5.9 Encoder 1 status word (G1_ZSW)

Bit	Meaning
00	Function 1 active
01	Function 2 active
02	Function 3 active
03	Function 4 active
04	Value 1
05	Value 2
06	Value 3
07	Value 4
08	Measuring input 1 displaced
09	Measuring input 2 displaced
10	Reserved
11	Encoder error acknowledgment active
12	Reserved
13	Absolute value cyclic
14	Parking encoder active
15	Encoder error

4.5.10 Position deviation (XERR)

Position deviation is transferred as right-aligned 32-bit binary value via signal XERR.

4.5.11 Actual position value 1 of encoder 1 (G1_XIST1)

The current incremental actual position of the measuring system without sign is output as a right-aligned 32-bit binary value via signal G1_XIST1.

4.5.12 Gain factor for the position controller (KPC)

The gain factor for the position controller is transferred as a right-aligned 32-bit binary value via signal KPC.

4.5.13 Actual position value 2 of encoder 1 (G1_XIST2)

The current scaled absolute actual position of the measuring system without sign is output as a right-aligned 32-bit binary value via signal G1_XIST2.

4.6 SINAMICS Startdrive commissioning tool for SINAMICS S210

The most recent version of the SINAMICS Startdrive commissioning software can be downloaded from the website:

support.industry.siemens.com .

SINAMICS Startdrive is a tool integrated in TIA Portal and corresponds to the familiar TIA Portal in its structure and handling.

The SINAMICS Startdrive extension contains the data and views for the SINAMICS S210 frequency converters already supported there.

This enables easy parameter assignment and commissioning of the frequency converters. A wide range of functions and aids are available for diagnostics and troubleshooting.

4.6.1 Resetting frequency converters and setting the IP address

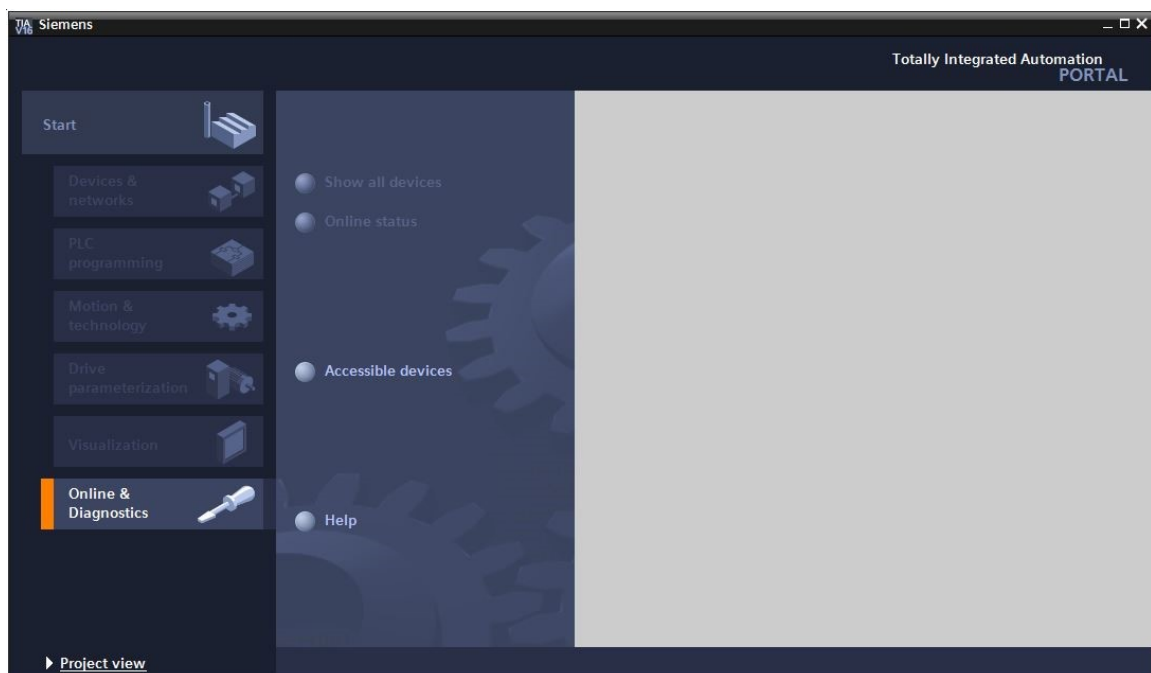
A new IP address can be directly assigned to the Control Unit of the frequency converter with SINAMICS Startdrive in TIA Portal. The Control Unit can now be reset.

→ Open the Totally Integrated Automation Portal with a double click.

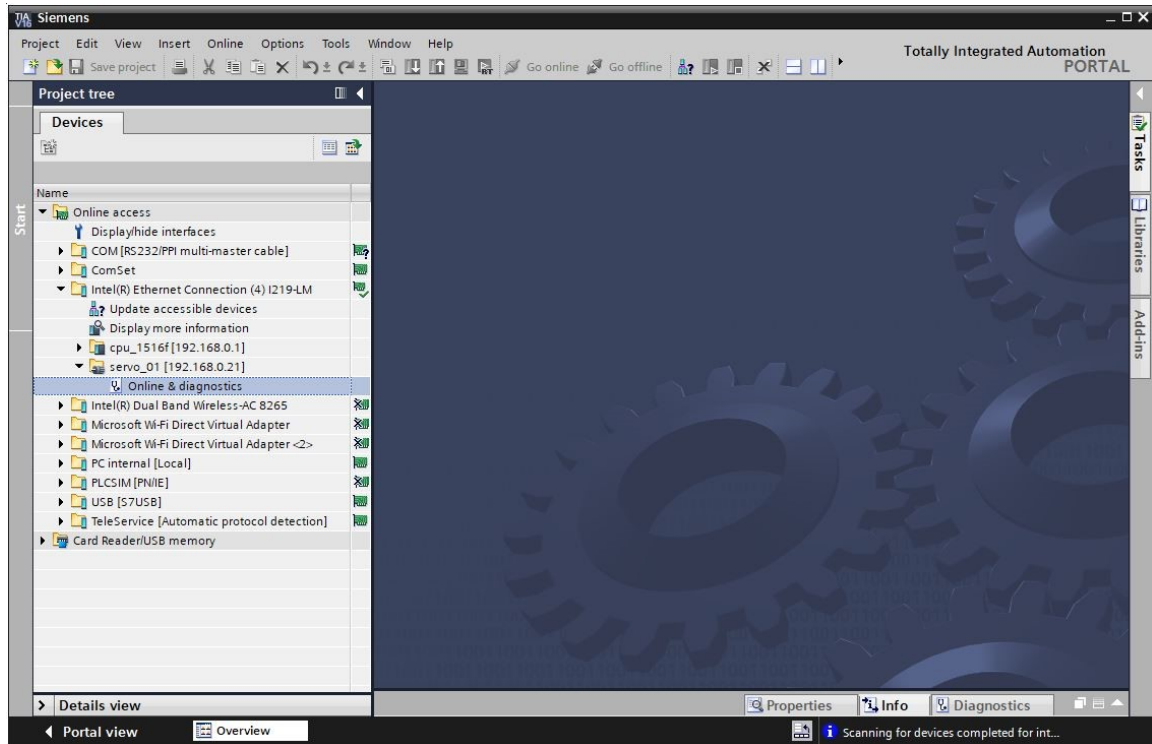
(→ TIA Portal V16).



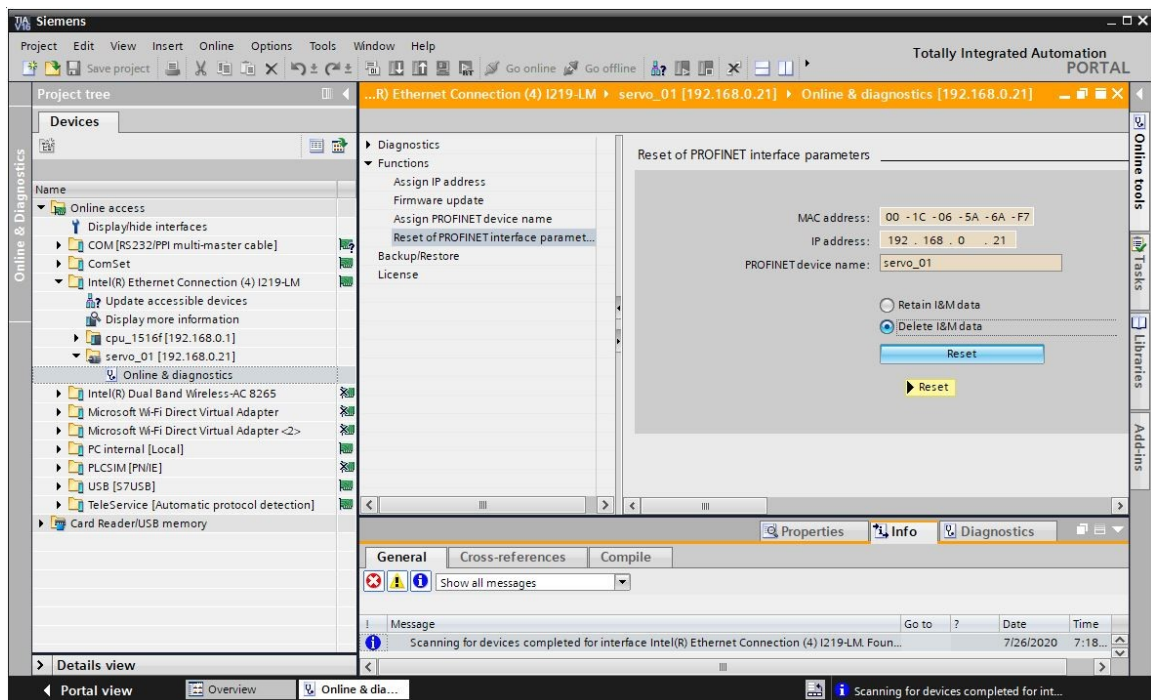
→ Select the item → "Online & Diagnostics" and open the → "Project view".



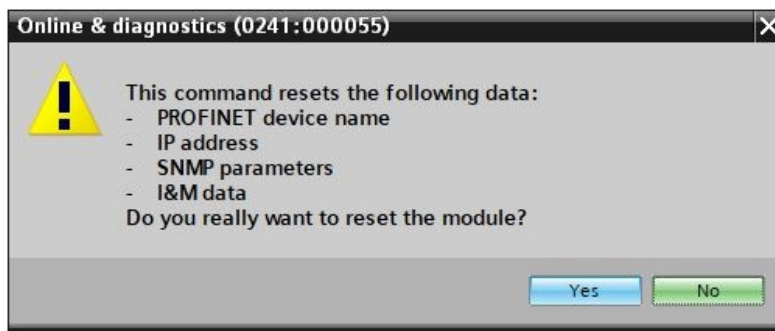
→ In the project tree, select the network card of your computer under → "Online access". When you click → "Update accessible devices", you see the IP address (if already set) or the MAC address (if the IP address has not yet been assigned) of the Control Unit of the connected SINAMICS S210 frequency converter →. Select → "Online & diagnostics".



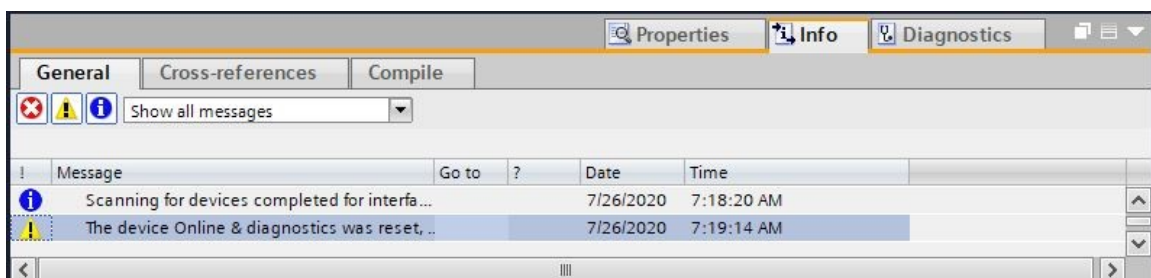
→ Before you reassign the IP address, we recommend that you first reset the PROFINET interface parameters. To do so, select the function → "Reset of PROFINET interface parameters" and click → "Reset".



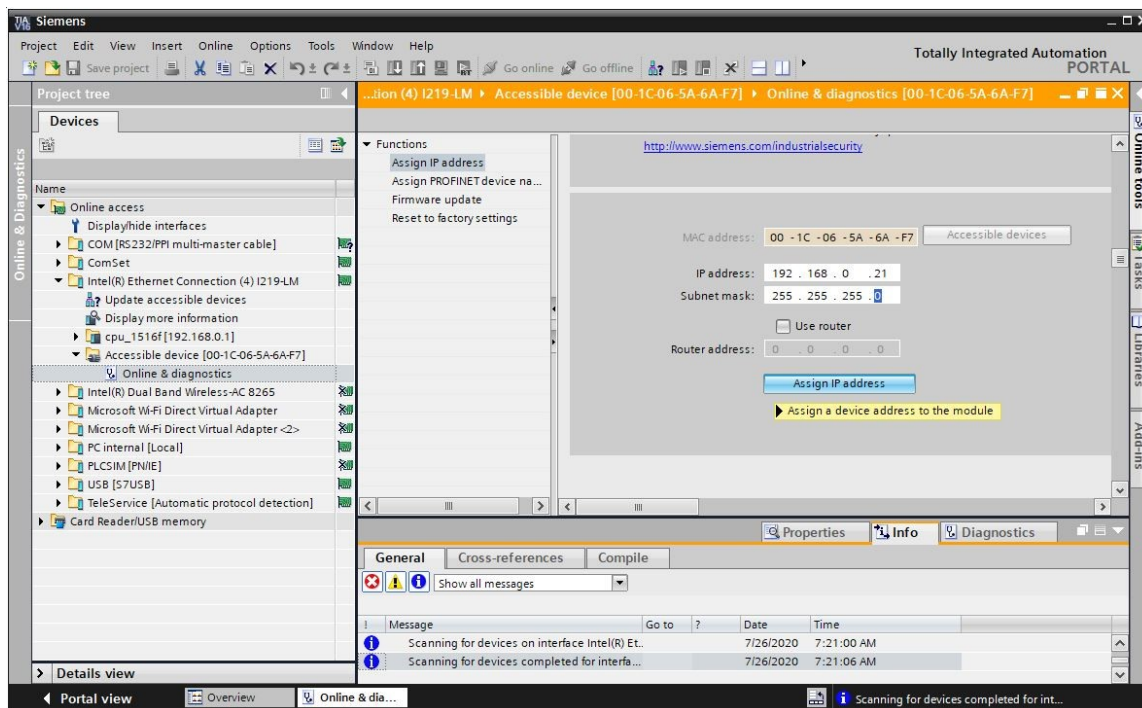
→ Confirm the prompt "Do you really want to reset the module?" with → "Yes"



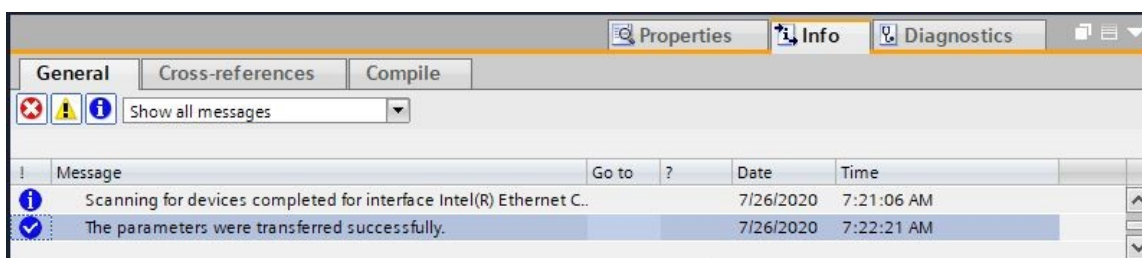
→ Successful resetting can be checked under "Show all messages" in the → "Info" window → "General".



→ Then once again select → "Update accessible devices" and then → "Online & diagnostics" of your frequency converter. To assign the IP address, select the → "Assign IP address" function. Enter the following IP address at this point, for example: → IP address: 192.168.0.21 → Subnet mask: 255.255.255.0. Click → "Assign IP address" and this new address is assigned to the Control Unit of your frequency converter.

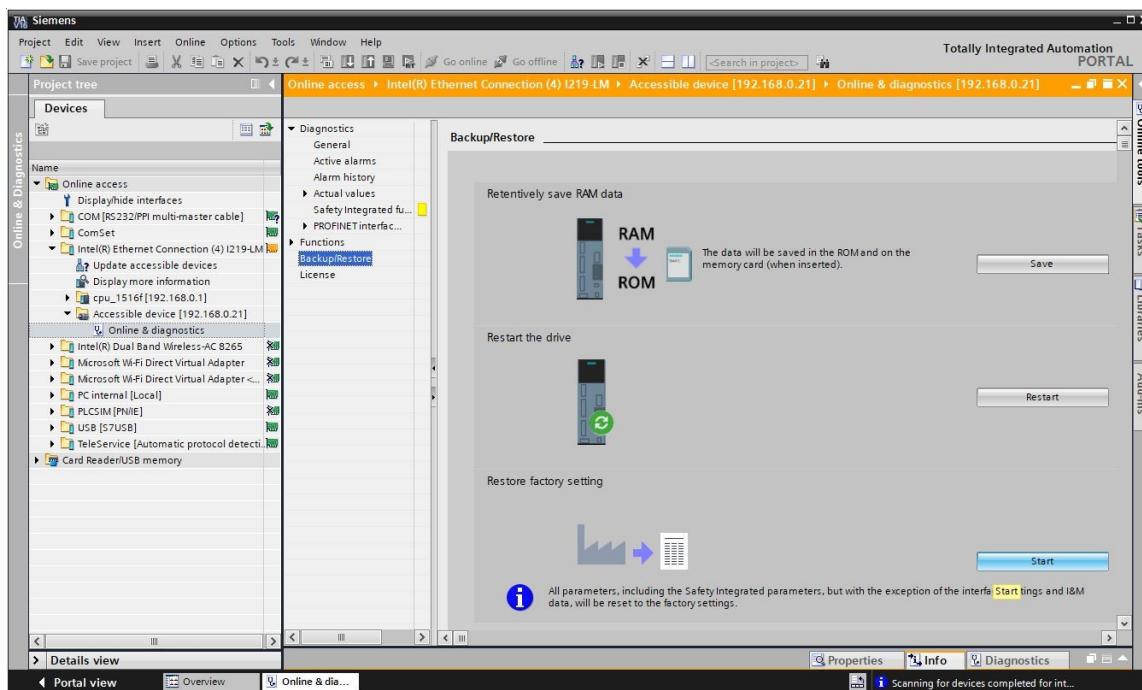


→ The successful assignment of the IP address is shown again as a message in the window → "Info" → "General".



4.6.2 Restoring the factory setting of the SINAMICS S210

- Before you can now carry out resetting of the frequency converter to the factory settings, you must once again select → "Update accessible devices" and the → "Online & diagnostics" of your frequency converter. In order to reset the frequency converter to factory settings, select → "Restore factory setting" under → "Backup/Restore" and click → "Start".



- Select the option ☒ "Also save RAM data retentively" and confirm the prompt asking whether you really want to restore the factory settings with → "OK".

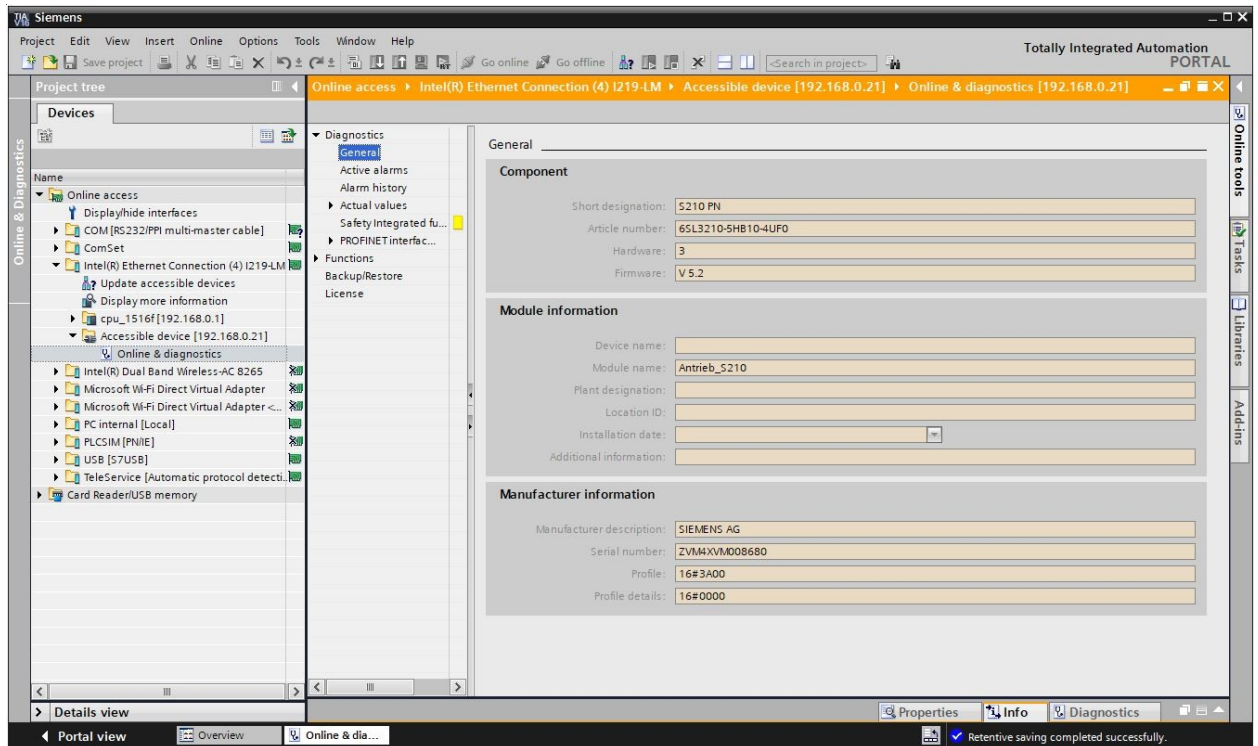


Note:

- The communication settings such as the IP address and the subnet mask are retained when the frequency converter is reset to the factory settings.

4.6.3 Reading out the firmware version and order number of the SINAMICS S210

→ Before you can read out the firmware version and order number of the SINAMICS S210, you must select → "Update accessible devices" again and select → "Online & diagnostics" of the SINAMICS S210. In the menu item → "Diagnostics" → "General", you can read out the short designation, article number, hardware version and firmware version.



5 Task

In the following section, the project from the chapter "032-600_Global_Data_Blocks" is to be supplemented by a frequency converter S210.

It should be possible to quickly and precisely set two different positions of the magazine for plastic parts at the conveyor end using a servo positioning unit.

Control of the servo drive is realized with a technology object via PROFINET IRT.

6 Planning

The positioning unit driven by a servo motor is controlled by a SINAMICS S210 frequency converter.

This frequency converter must be created, configured and commissioned in the project.

The parameter assignment of the frequency converter is done online with the SINAMICS Startdrive software, whereby the basic data is read in from the Control Unit.

The motor data of the servo motor and the encoder data is detected automatically via the DRIVE-CLiQ interface.

The frequency converter is controlled via PROFINET IRT with the motion control technology object "TO_PositioningAxis". This must be created, connected with the S210 servo drive and assigned parameters.

Then, a library-capable "MC_magazine" function block is created via which the following motion control instructions can be performed:

- Acknowledgment of an error
- Jog UP (speed positive/right) / DOWN (speed negative/left)
- Home to fixed stop (bottom) with definition of home position
- Position to Position00 with specification of position value
- Position to Position01 with specification of position value
- Position to Position02 with specification of position value

When the "MC_magazine" function block is called in the organization block "Main" [OB1], the home position and the position values are specified as fixed values.

The start commands are interconnected to inputs.

6.1 Technology schematic diagram

At this point, you see the technology schematic diagram for the task.

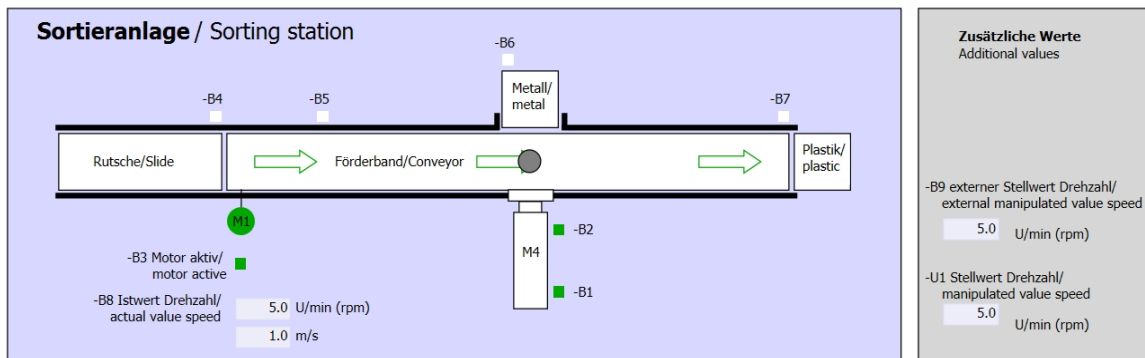


Figure 3: Technology schematic diagram

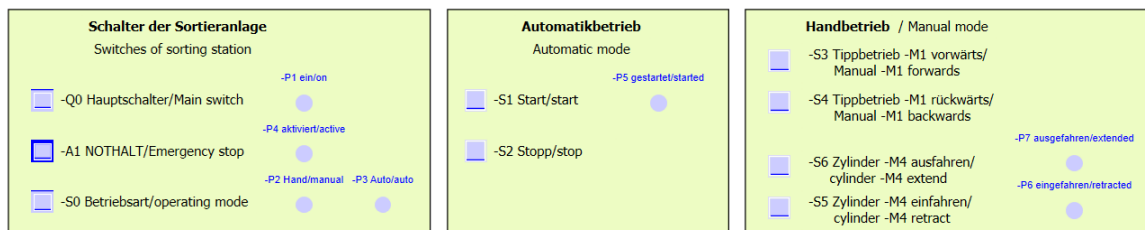


Figure 4: Operator panel

6.2 Reference table

The following signals are required as global operands for this task.

DI	Type	Identifier	Function	NC/NO
I 0.0	BOOL	-A1	Message EMERGENCY STOP ok	NC
I 0.1	BOOL	-K0	System "ON"	NO
I 0.2	BOOL	-S0	Mode selector manual (0) / automatic (1)	Manual = 0 Auto=1
I 0.3	BOOL	-S1	Pushbutton automatic start	NO
I 0.4	BOOL	-S2	Pushbutton automatic stop	NC
I 0.5	BOOL	-B1	Sensor cylinder -M4 retracted	NO
I 1.0	BOOL	-B4	Sensor part at slide	NO
I 1.3	BOOL	-B7	Sensor part at end of conveyor	NO
I 2.0	BOOL	-S10	Acknowledgment button	NO
I 2.1	BOOL	-S11	Jog up button	NO
I 2.2	BOOL	-S12	Jog down button	NO
I 2.3	BOOL	-S13	Set home position button	NO
I 2.4	BOOL	-S14	Start positioning to Position00 button	NO
I 2.5	BOOL	-S15	Start positioning to Position01 button	NO
I 2.6	BOOL	-S16	Start positioning to Position02 button	NO

Legend for reference list

DI Digital input

DO Digital output

AI Analog input

AO Analog output

I Input

O Output

NC Normally Closed

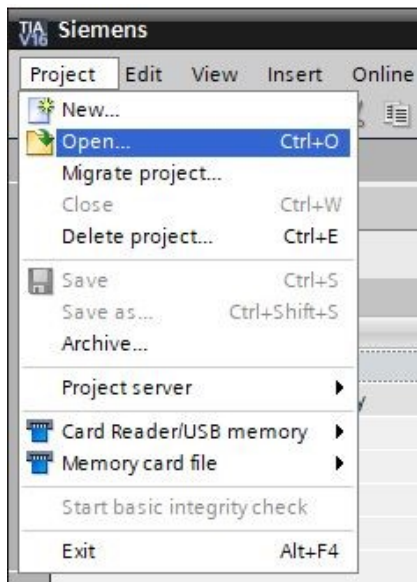
NO Normally Open

7 Structured step-by-step instructions

You can find instructions on how to perform planning below. If you already have a good understanding of everything, it is enough to focus on the numbered steps. Otherwise, simply follow the steps of the instructions illustrated below.

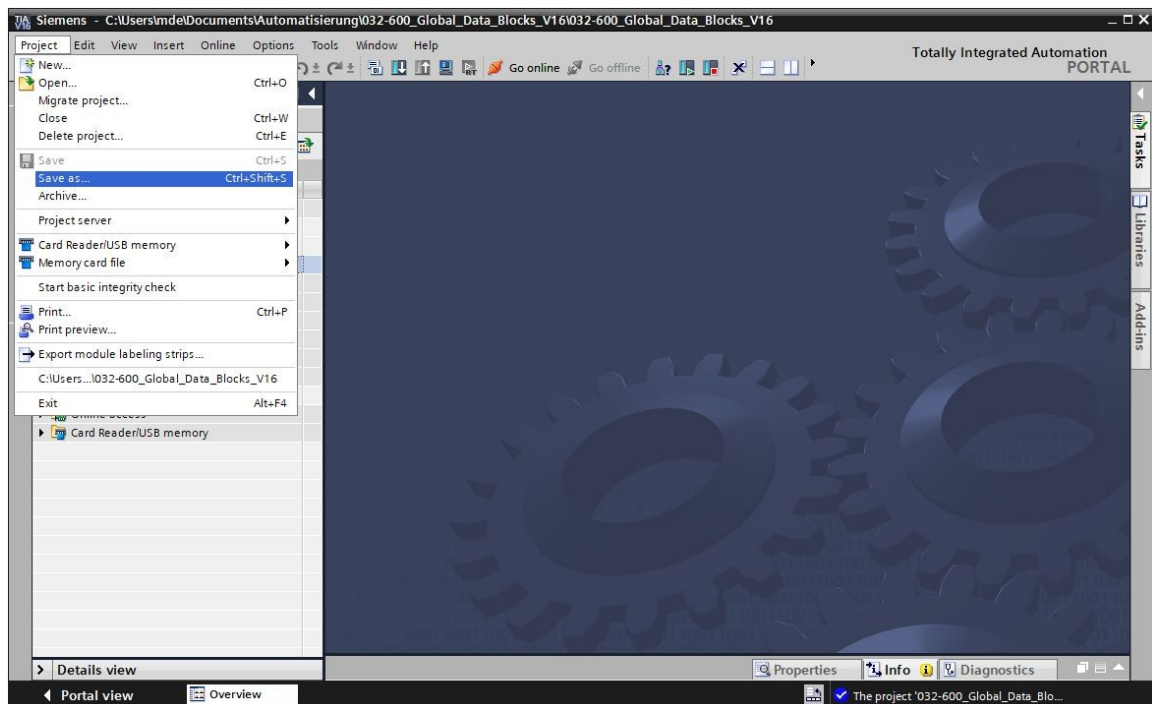
7.1 Retrieving an existing project

→ Before we can extend the project "032-600-Global-Data-Blocks..." from chapter "032-600_Global_Data_Blocks", we must retrieve it. To retrieve an existing project, you must select the respective archive from the Project view under → Project → Retrieve. Confirm your selection with Open. (→ Project → Open → Selection of a .zap archive → Open)



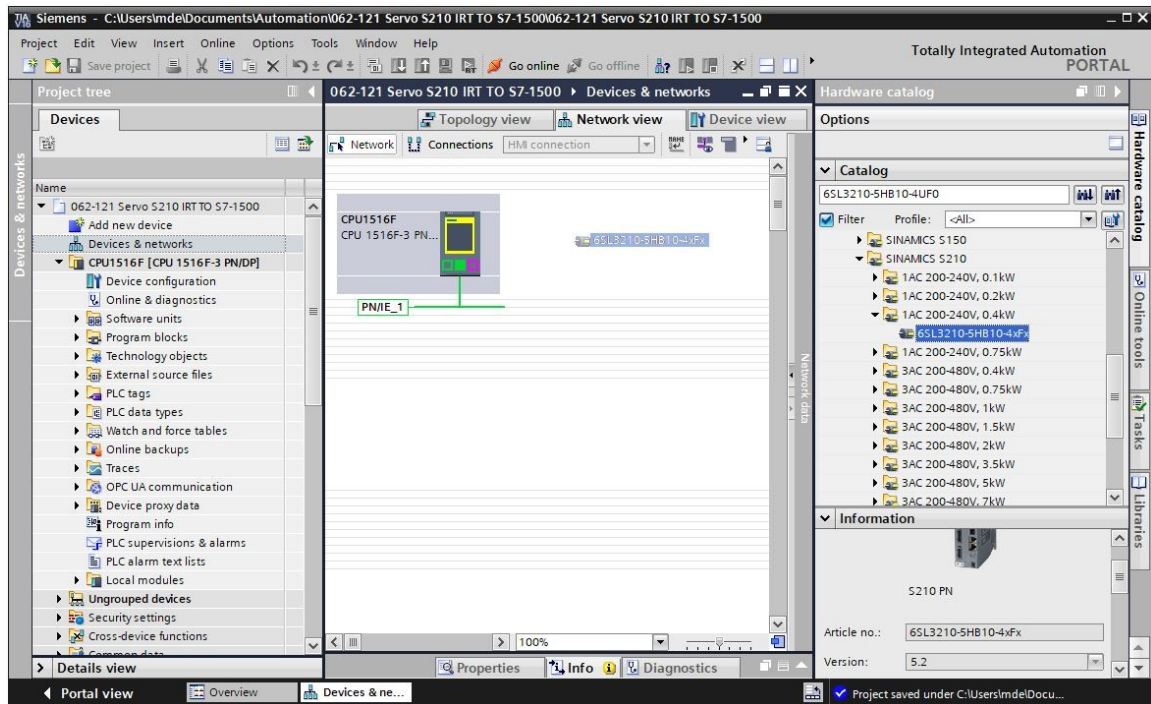
→ Next, the target directory in which the retrieved project is to be stored can be selected. Confirm your selection with "OK". (→ Target directory → OK)

→ You save the opened project under the name "062-121 Servo S210 IRT TO S7-1500".
 (→ Project → Save as... → 062-121 Servo S210 IRT TO S7-1500 → Save)

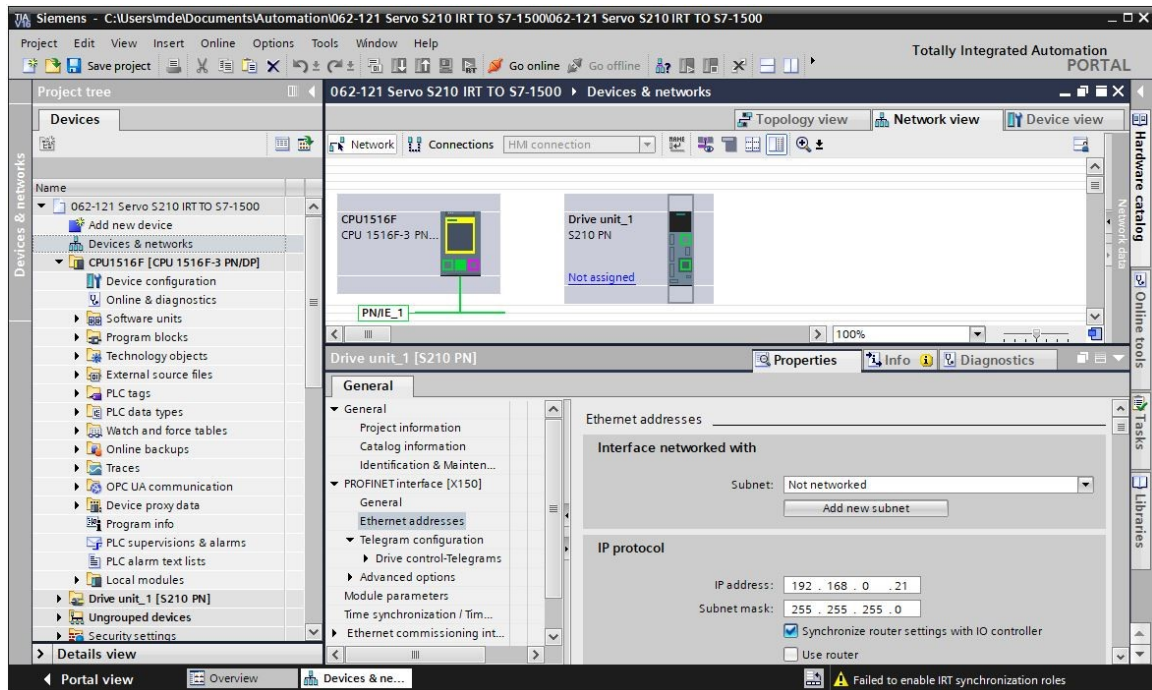


7.2 Creating a servo drive system in the TIA Portal

→ In order to network the servo drive system of the SINAMICS S210 with the CPU1516F-3 PN/DP you must change to the 'Network view'. At this point, the desired 'SINAMICS S210' can be dragged-and-dropped into the network view. (→ Devices & networks → Network view → Drives & starters → SINAMICS drives → SINAMICS S210 → 200-240 V 1AC, 0.4 kW → article no.: 6SL3210-5HB10-4xFx → Version 5.2).



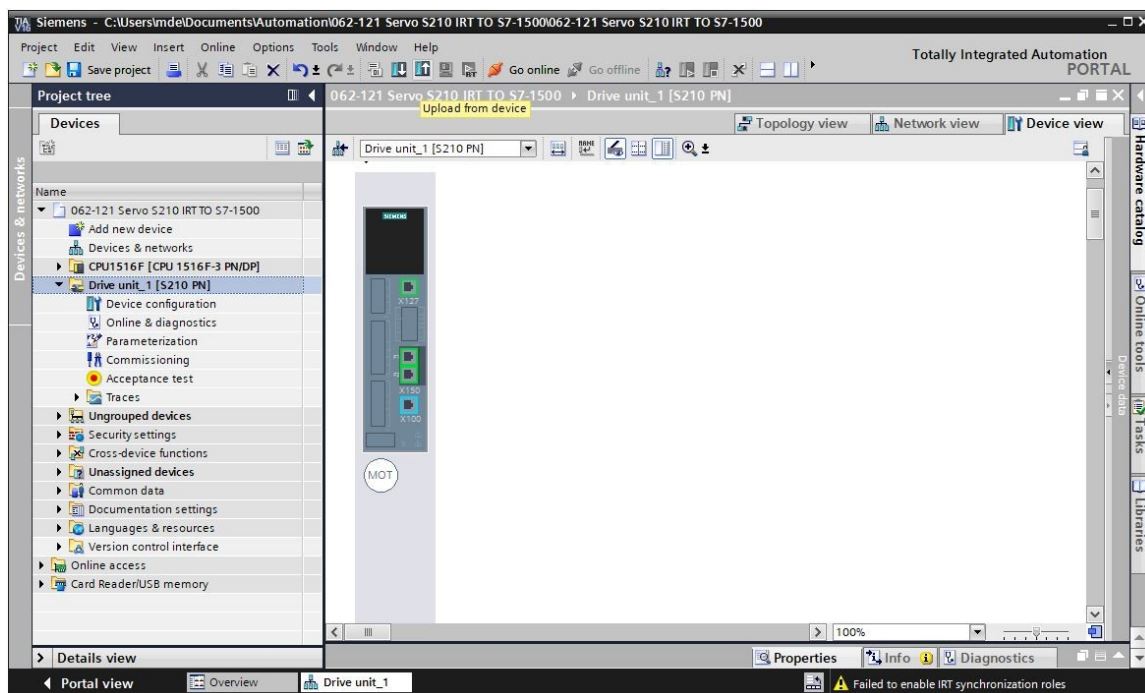
→ Then you set an IP address suitable for the CPU in the properties of the 'PROFINET interface [X1]' of the 'S210 PN'. (→ S210 PN → PROFINET interface[X1] → Properties → Ethernet addresses → IP protocol → IP address: 192.168.0.21)



7.3 Reading in data of the servo motor and encoder data via DRIVE-CLiQ interface

→ The motor data of the servo motor and the encoder data is detected automatically via the DRIVE-CLiQ interface at X100 during startup with the compact servo drive system S210 PN. This data can be simply uploaded from the Control Unit S210 PN.

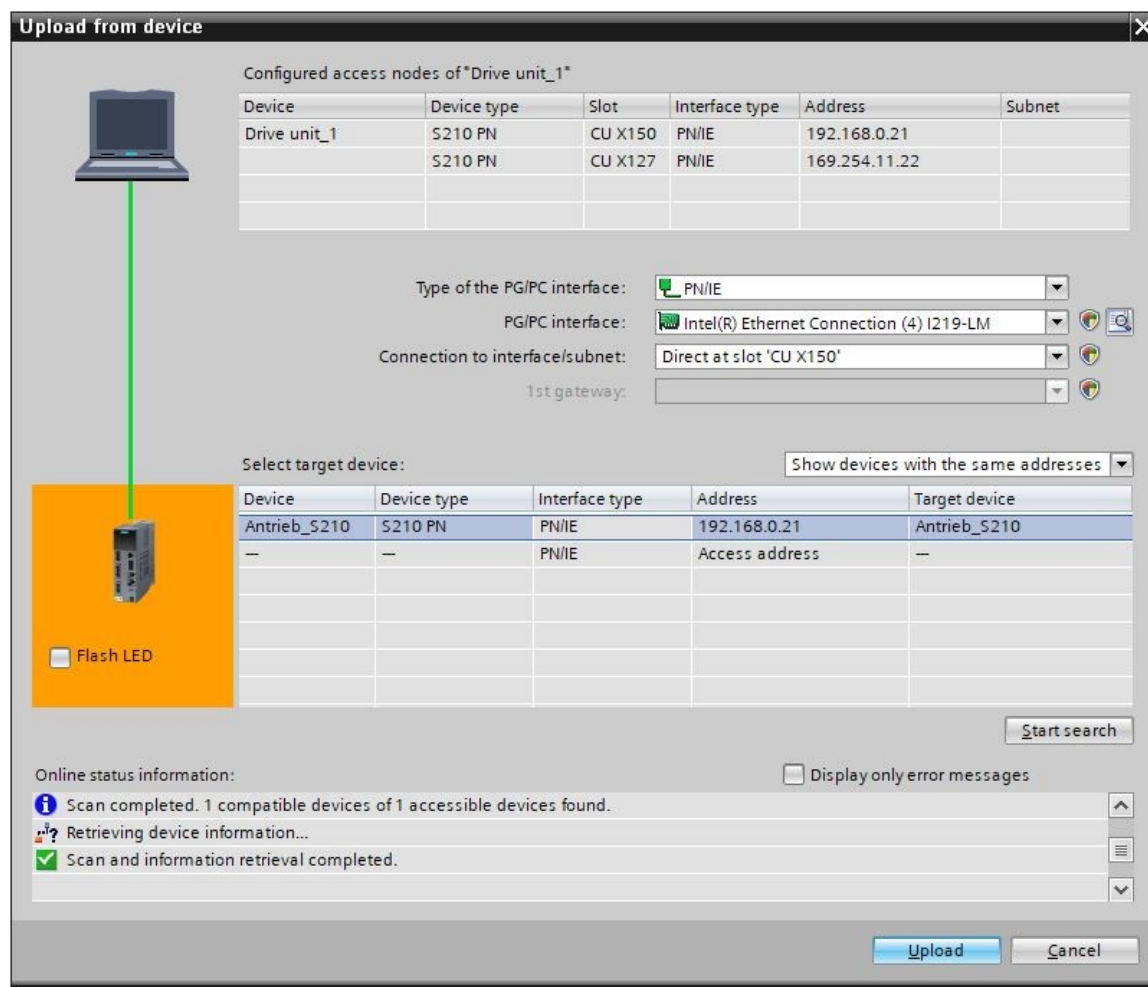
(→ Drive unit_1 →  Upload from device)



Note:


- During the boot procedure, the SINAMICS S210 reads in the electronic motor rating plate of the connected 1FK2 motor and performs motor commissioning. Without a motor, motor commissioning and therefore automatic commissioning cannot be completed. Parameter assignment of the converter is not possible in this state. Therefore, only a small number of functions such as diagnostics or reset are available.

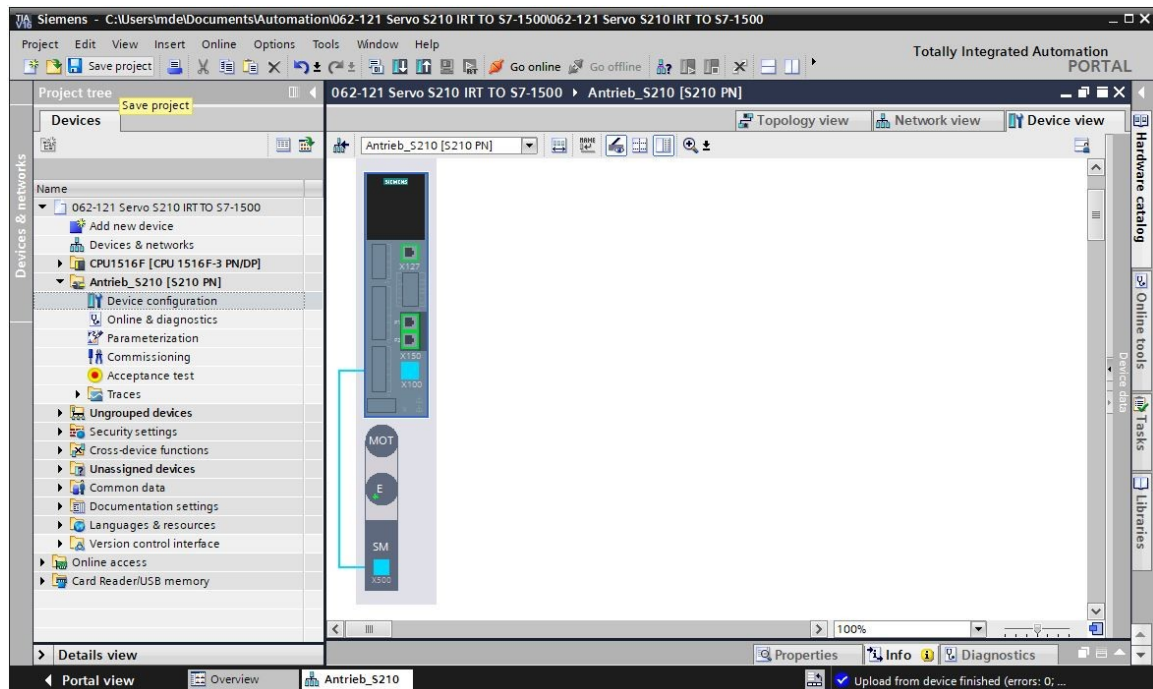
→ In the following dialog, you now select the settings of the PG/PC interface and click on 'Start search'. You should now see your 'SINAMICS drive' and be able to select it as the target device. Click 'Load'. (→ Type of the PG/PC interface: PN/IE → PG/PC interface: → Connection to subnet: Directly at slot 'CU X150' → Start search → S210 PN → Upload)



Note

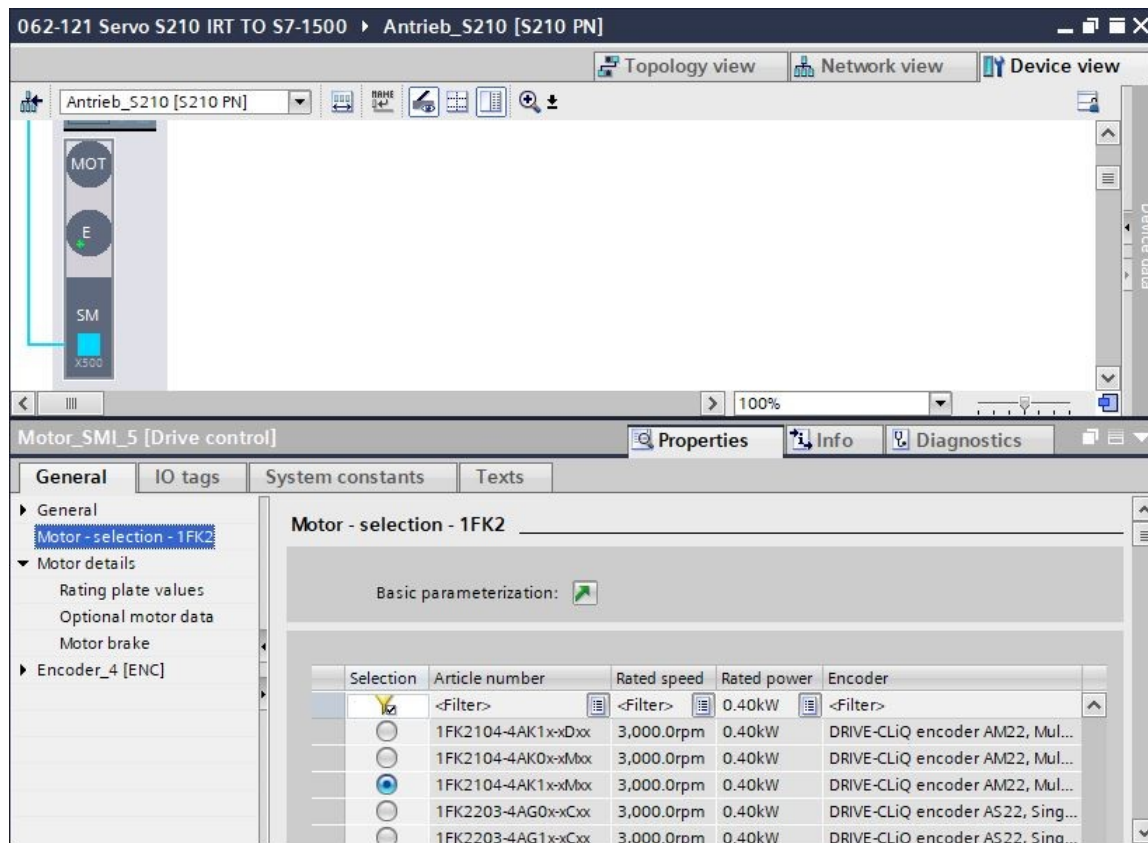
- Although the PROFINET interface parameters were reset and the drive restored to factory settings previously, it is possible that the module name of a previous configuration is still retained and is now assigned as device name. We will change this later.

→ Motor and encoder are now displayed in the device configuration. Save the project with the data you just loaded. (→ Device configuration →  Save project)

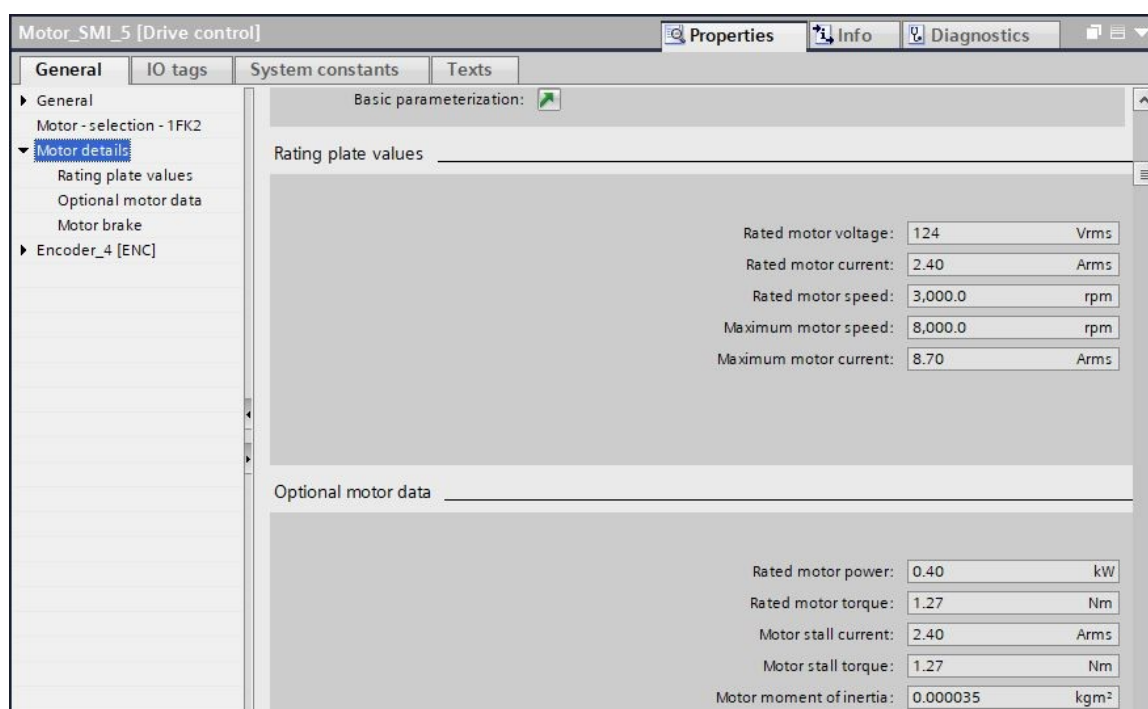


7.4 Details on motor and encoder

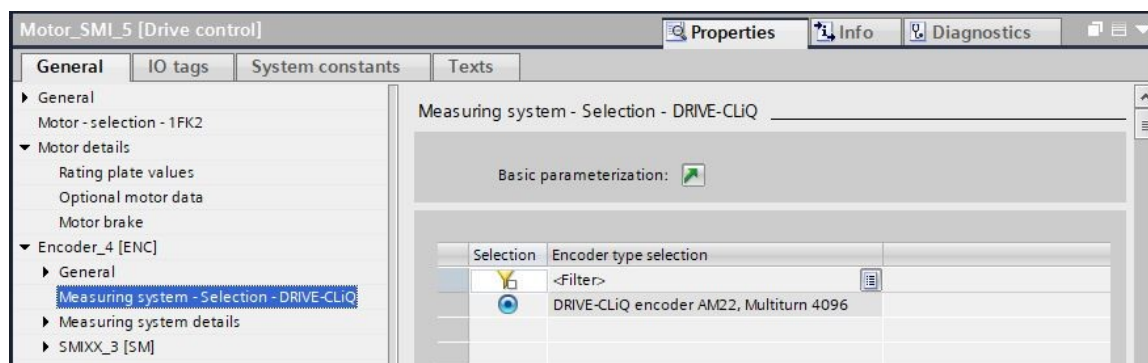
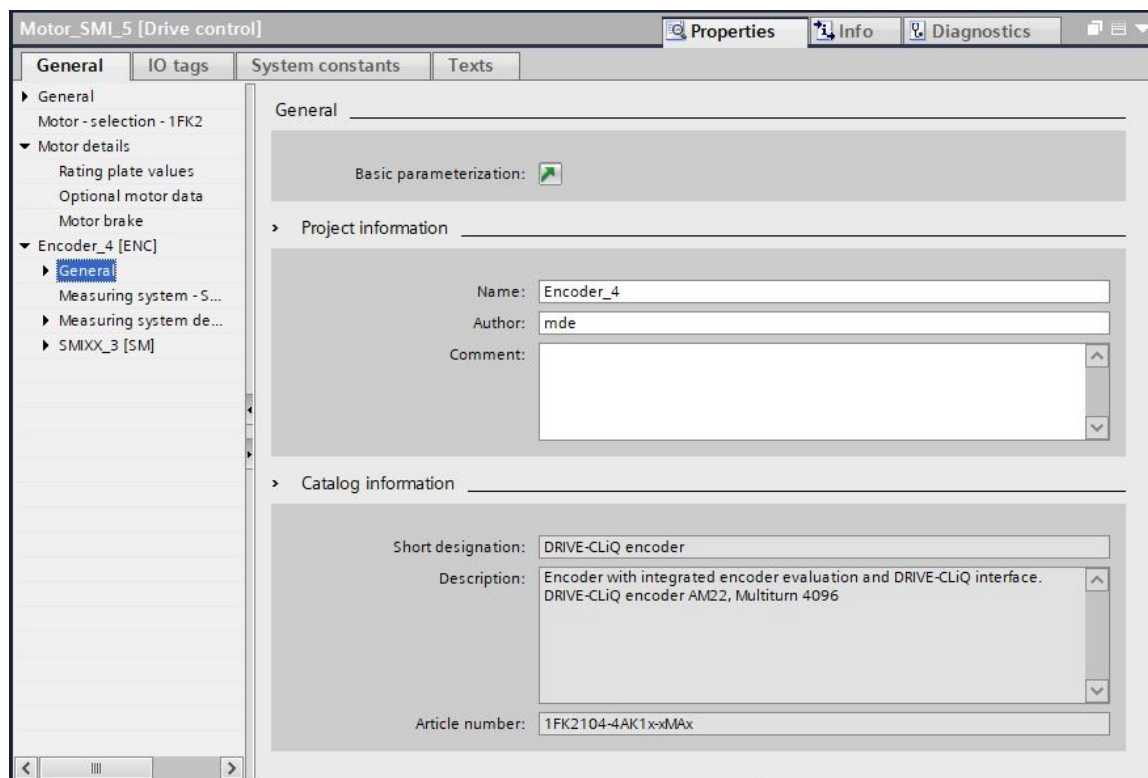
→ The selected motor can be displayed in the properties of the device configuration. (→ Device configuration → Properties → General → Motor - selection - 1FK2)



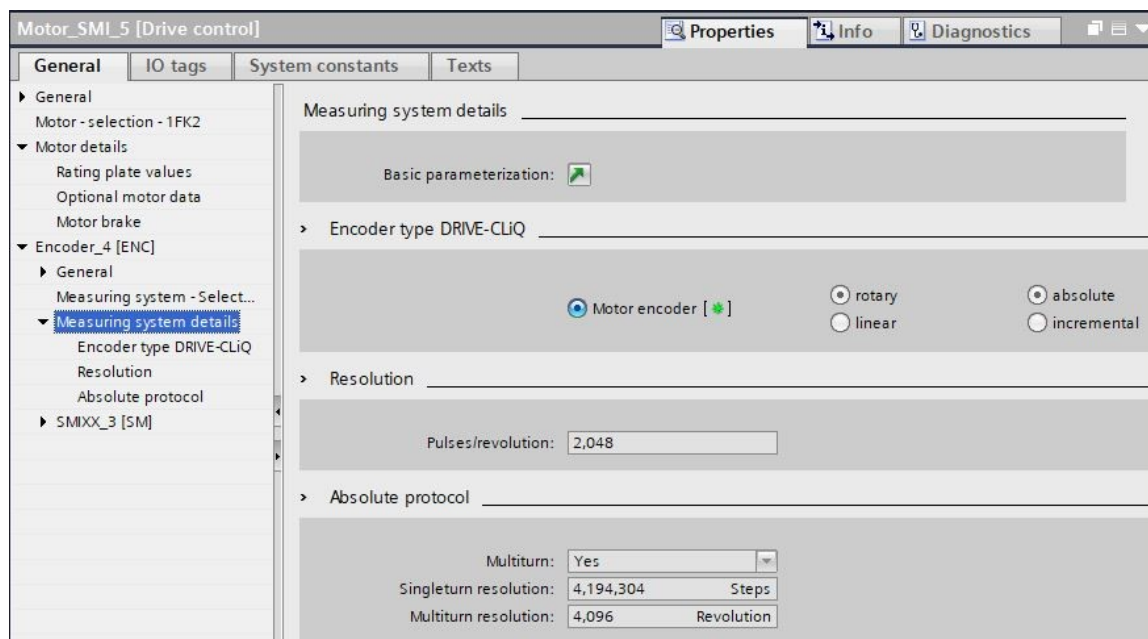
→ The details on the detected motor can be displayed here. (→ Device configuration → Properties → General → Motor details)



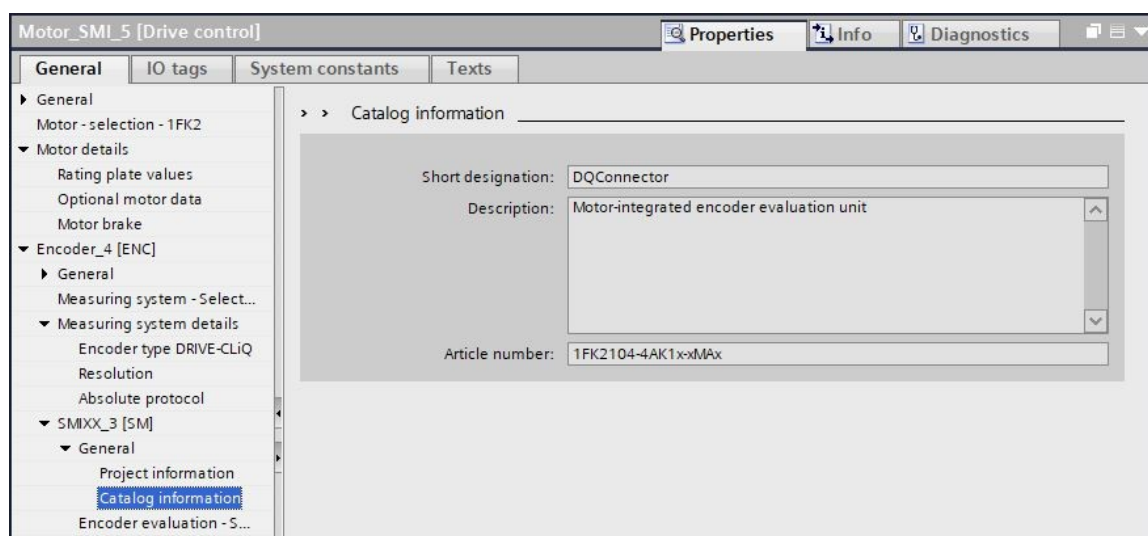
→ Details on the encoder can also be displayed here. (→ Device configuration → Properties → General → Encoder_4 → General → Measuring system – Selection – Drive-CLiQ)



→ Measuring system details are available in a further submenu. (→ Device configuration → Properties → General → Encoder_4 → General → Measuring system details)

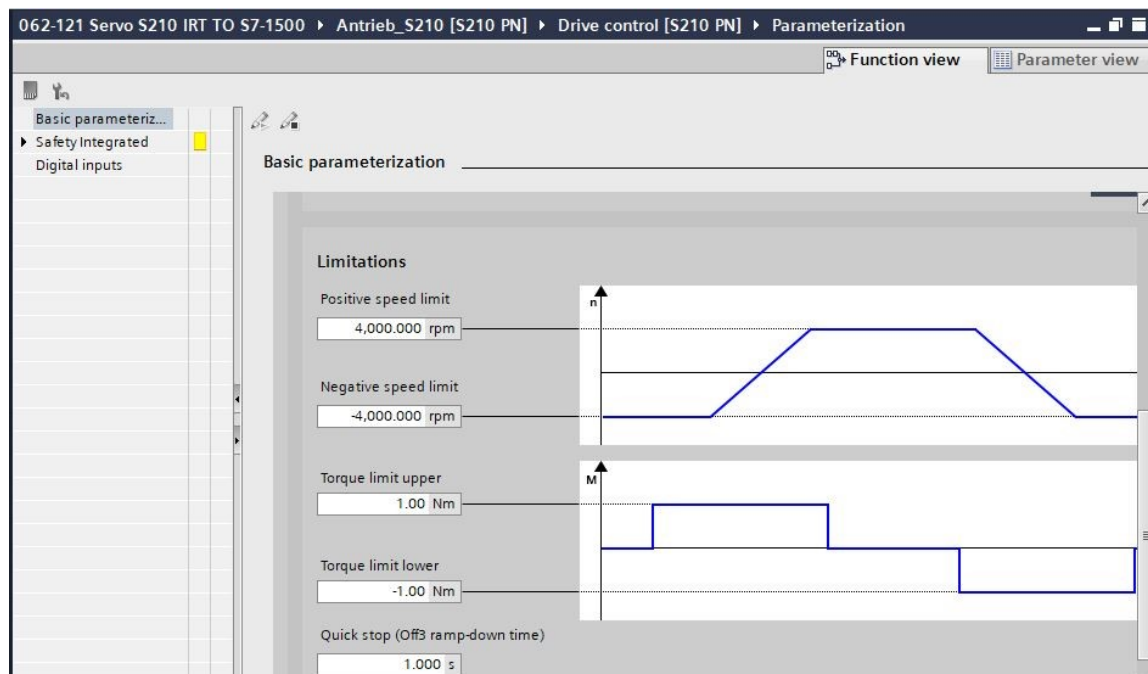
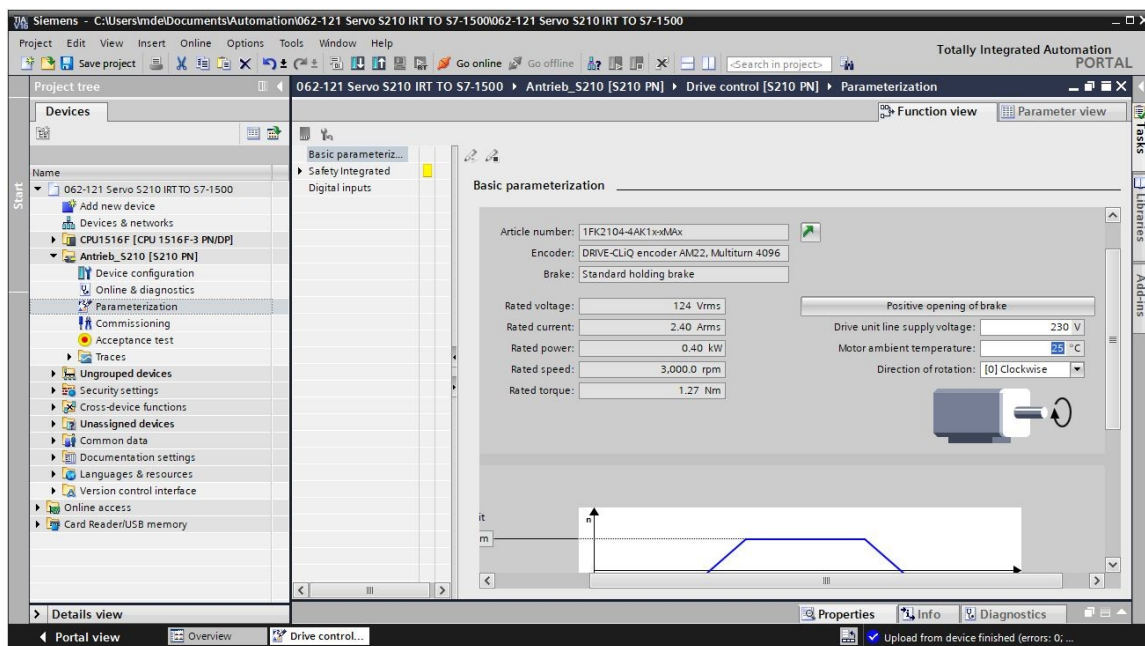


→ The encoder evaluation unit is also shown here. (→ Device configuration → Properties → General → Encoder_4 → SMXX_3)

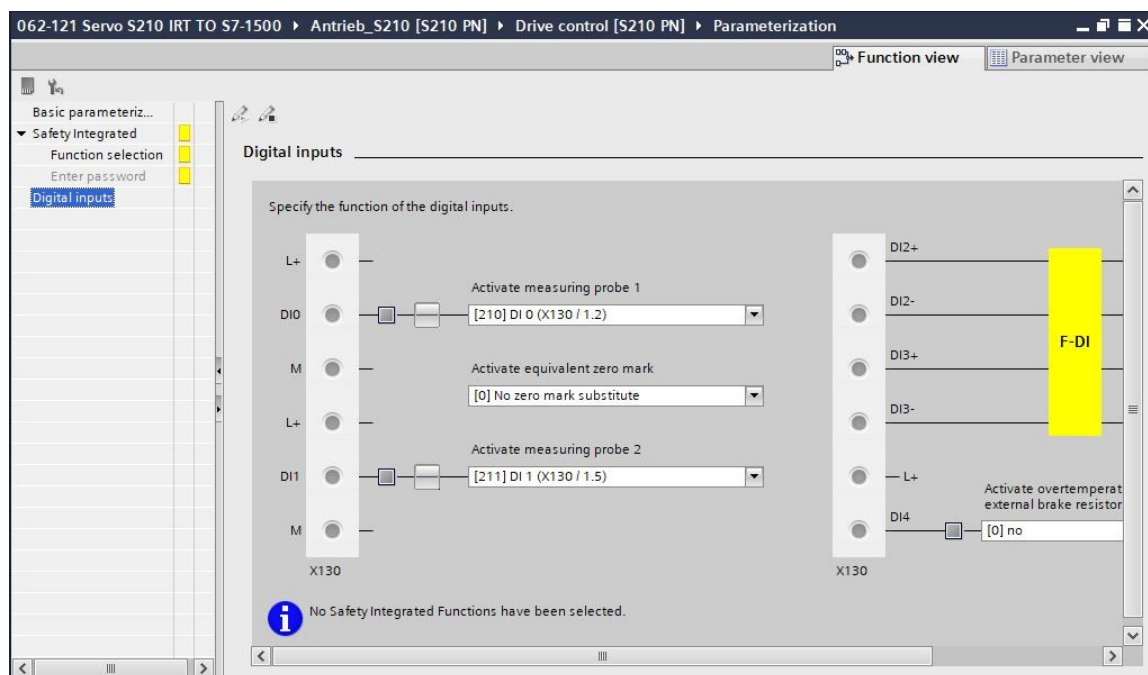


7.5 Parameterizing the drive

→ To assign the further parameters of the frequency converter, we open the 'Parameters' of 'Drive_S210... [S210 PN]' with a double-click and select the 'Basic parameterization' in the 'Function view'. Here, we first adapt the 'Motor ambient temperature' and the limits. (→ Drive_S210...[S210 PN] → Parameterization → Function view → Basic parameterization → Motor → Motor ambient temperature: 25°C → Limits)






→ The settings for 'Safety Integrated' and the "Inputs/outputs" can be made in the 'Function view'.
 (→ Drive_S210...[S210 PN] → Parameters → Function view → Safety Integrated → Inputs/outputs → Digital inputs)

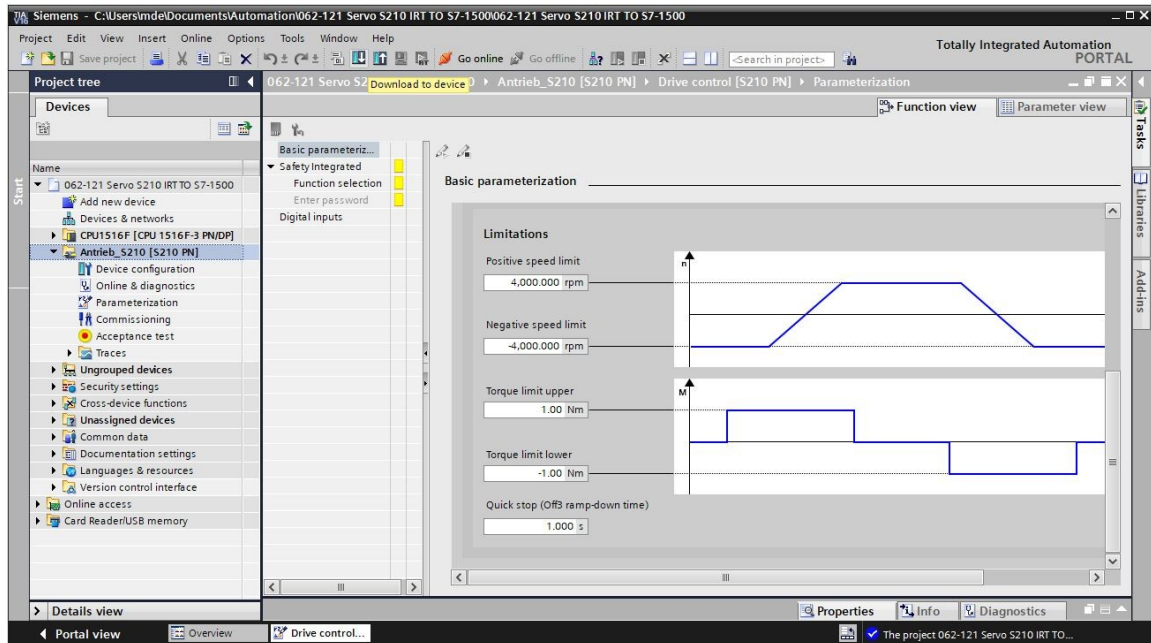


→ In the 'Parameter view', all parameters can be viewed in different lists and changed depending on access rights and the status of the drive. (→ Parameter view)

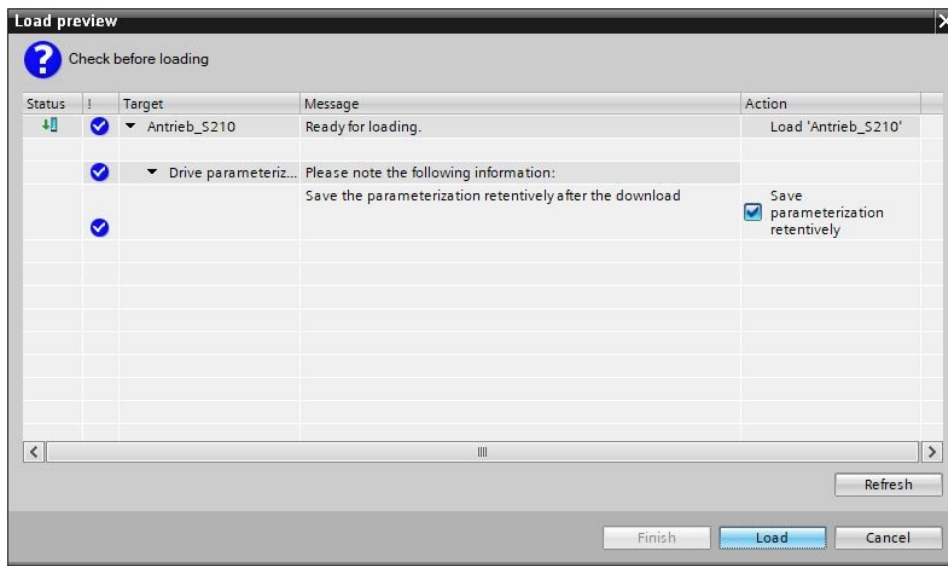
Number	Parameter text	Value	Unit	Data set
r2	Operating display	[42] Switching on inhibited - set *OC/OF...		
p9	Drive commissioning parameter filter 1	[0] Ready		
p10	Drive commissioning parameter filter 2	[0] Ready		
r20	Speed setpoint smoothed	0.0	rpm	
r21	Actual speed smoothed	0.0	rpm	
r26	DC link voltage smoothed	323.5	V	
r27	Absolute actual current smoothed	0.00	Arms	
r31	Actual torque smoothed	-0.02	Nm	
r32	Active power actual value smoothed	0.00	kW	
r34	Motor utilization thermal	0	%	
r37[0]	Drive temperatures, Inverter maximum value	35	°C	
r39[0]	Energy display, Energy balance (sum)	0.14	kWh	
r44	Thermal converter utilization	0.00	%	
r46	Missing enable signal	50001COFH		
r61[0]	Actual speed unsmoothed, Encoder 1	0.00	rpm	
r62	Speed setpoint after the filter	0.00	rpm	
r63	Actual speed smoothed	-0.23	rpm	
r68	Absolute current actual value	0.00	Arms	
r70	Actual DC link voltage	323.50	V	
r76	Current actual value field-generating	0.00	Arms	
r77	Current setpoint torque-generating	0.00	Arms	
r78[0]	Current actual value torque-generating, Unsm..	0.00	Arms	
r79[0]	Torque setpoint total, Unsmoothed	0.00	Nm	
r80	Torque actual value	-0.02	Nm	

→ We now save the project again before we load the parameters into 'Drive_S210... [S210 PN]',

 (→  Save project → Drive_S210...[S210 PN] → )



→ An overview is now displayed again so that you can check the steps to be carried out before loading. Now select '☒ Save parameterization retentively' and click 'Load'. (→ ☒ Save parameterization retentively → Load)




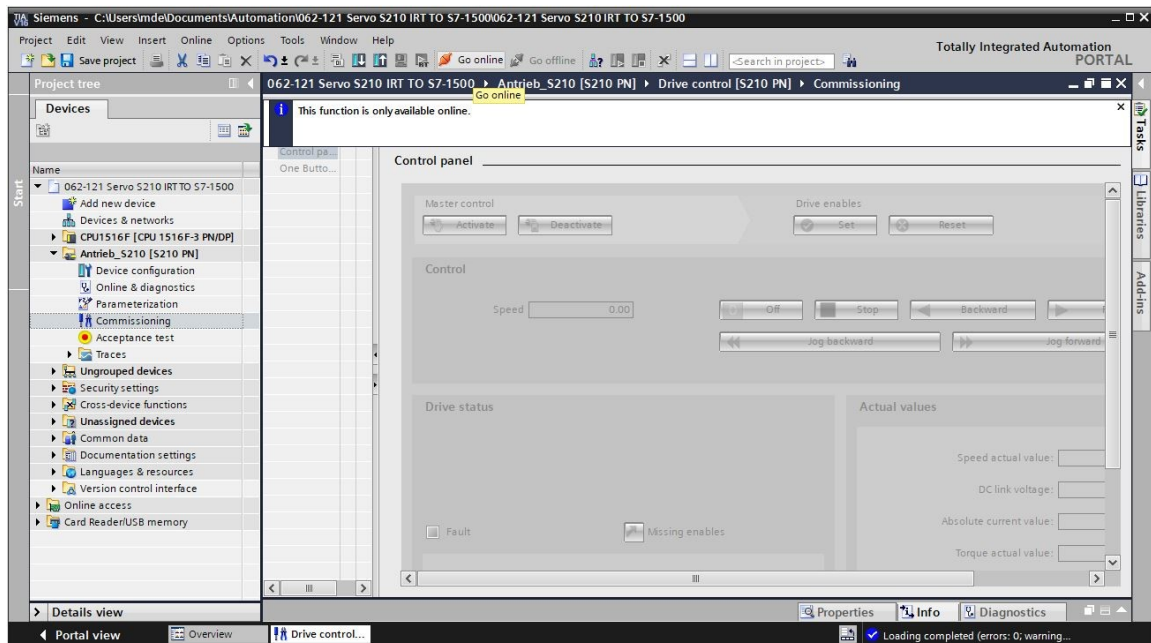
Note



- It is advisable to save the parameters retentively as well, so that these are retained in the case of a voltage drop.

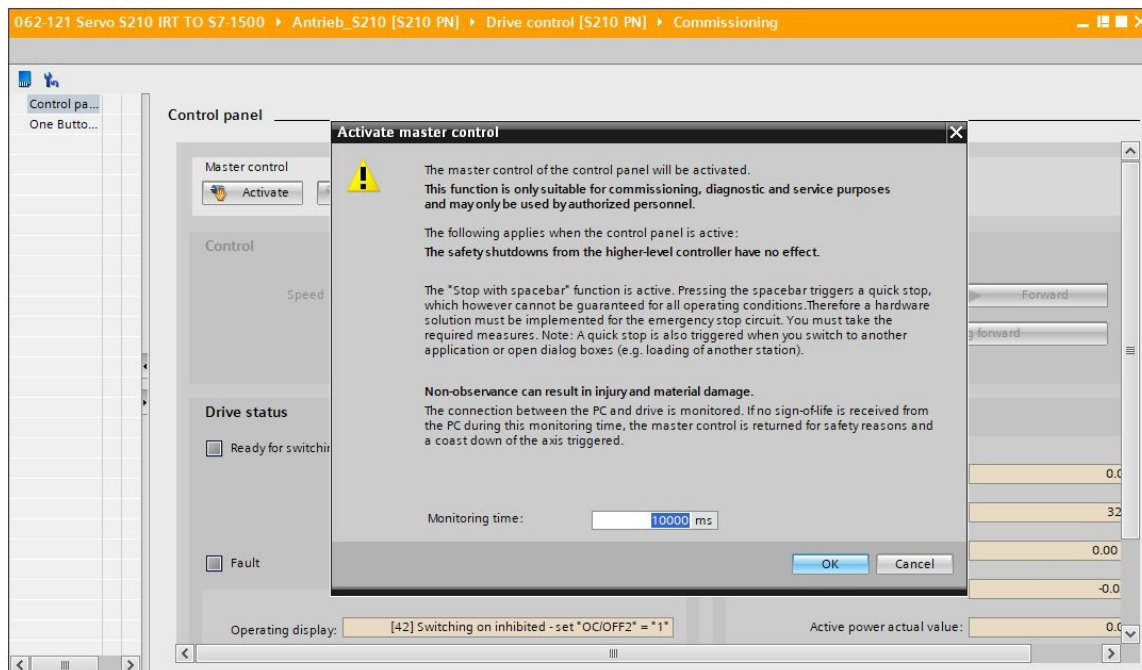
7.6 Testing and commissioning of frequency converters with control panel





→ In order to test the current parameter assignment without PLC program, open the 'Control panel' from the 'Commissioning' menu of the 'Drive_S210... [S210 PN]'. Finally, we click on 'Go online'.

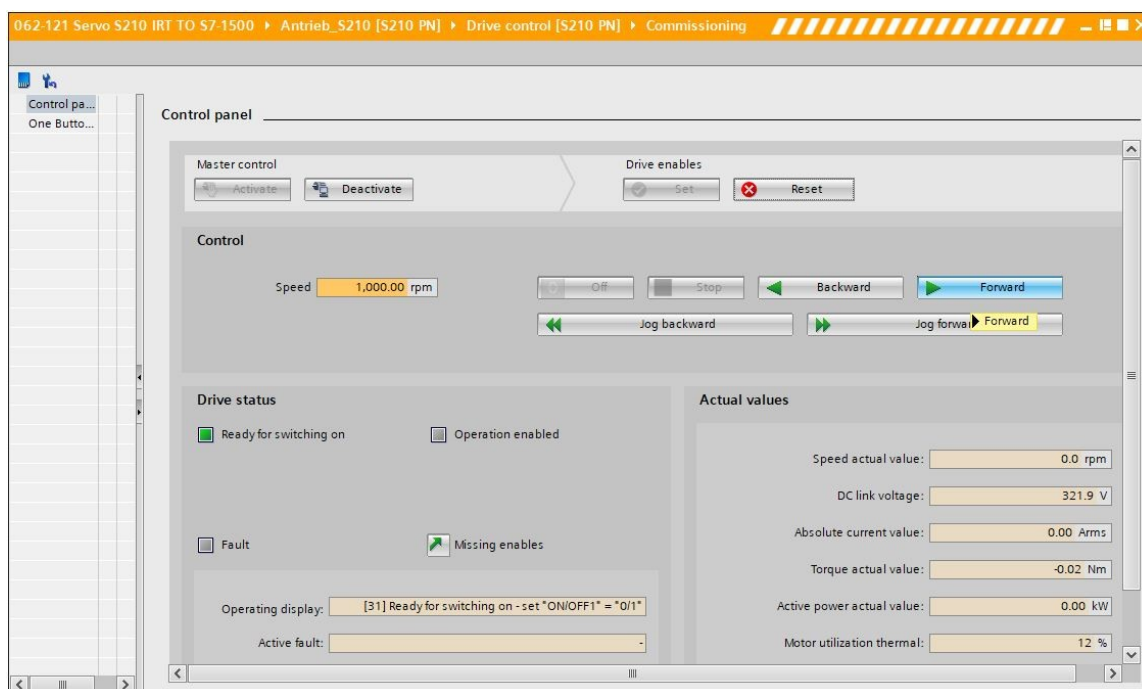
(→ Drive_S210...[S210 PN] → Commissioning → Control panel → )

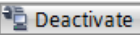

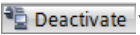


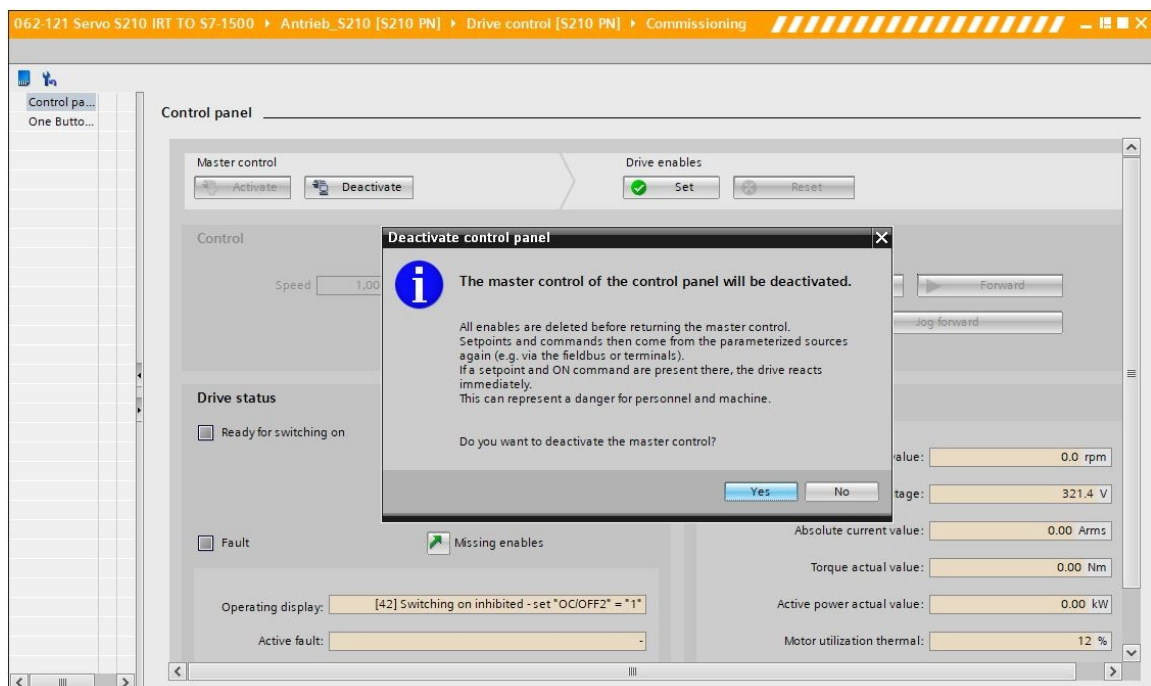
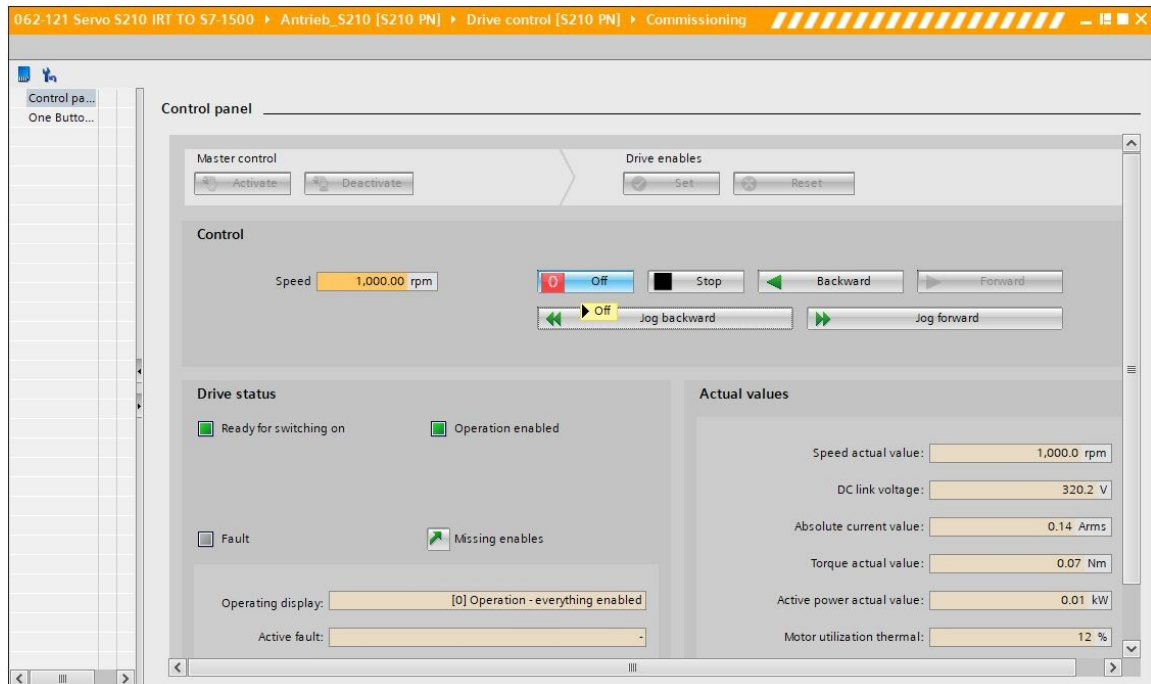
- The first step is to 'Activate master control'  'Activate' in the control panel. The communication between the PC and the converter will then be monitored. It is necessary that successful communication takes place at least every 10000 ms. Otherwise, the motor stops and the enables are reset. (→ Master control:  'Activate' → 10000ms → OK)

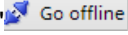
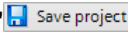


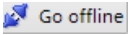
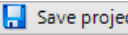
- The drive enables first have to be set in order to start the motor  'Set'. As a rule, this happens automatically. We can now start the motor with the selected speed  'Forward' or  'Backward'. (→ Speed: 1000.00 rpm →  'Forward')

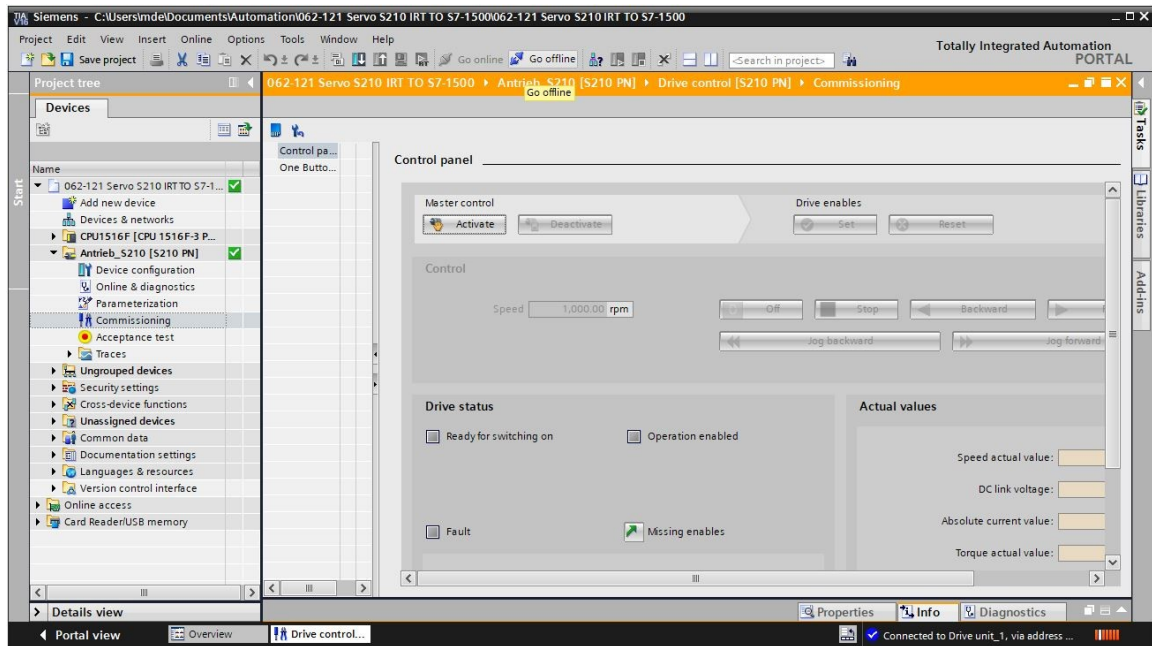


→ The drive can be switched off by clicking '0'. After completion of the test, it is necessary to deactivate  the master control again. (→  → )





→ Finally, we  and save the project again .

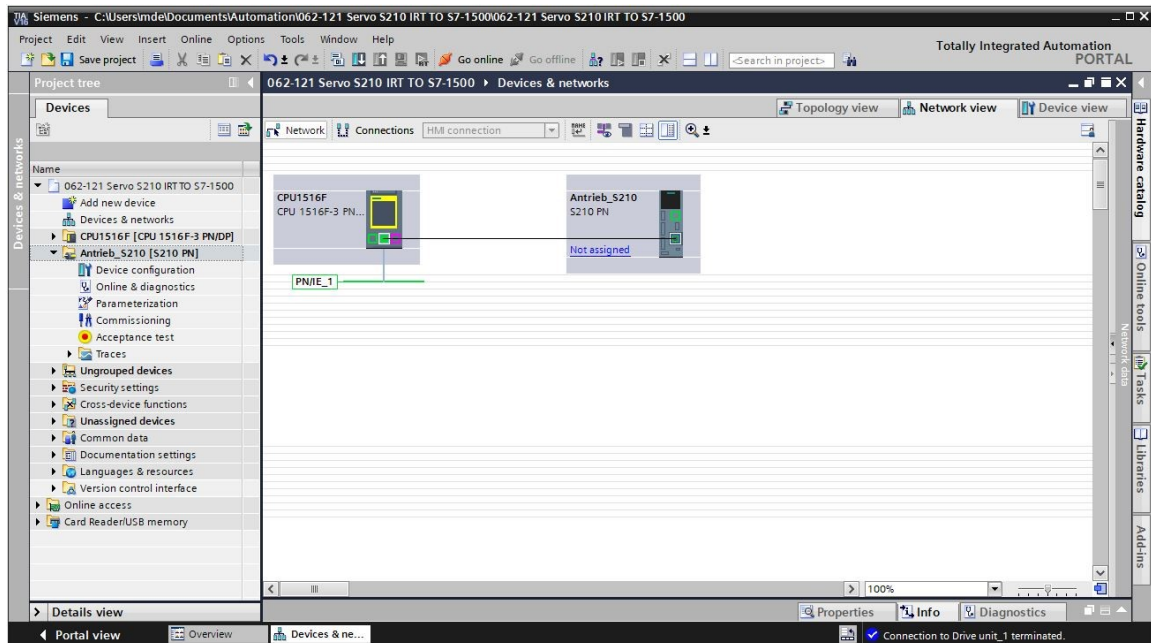
(→  → )





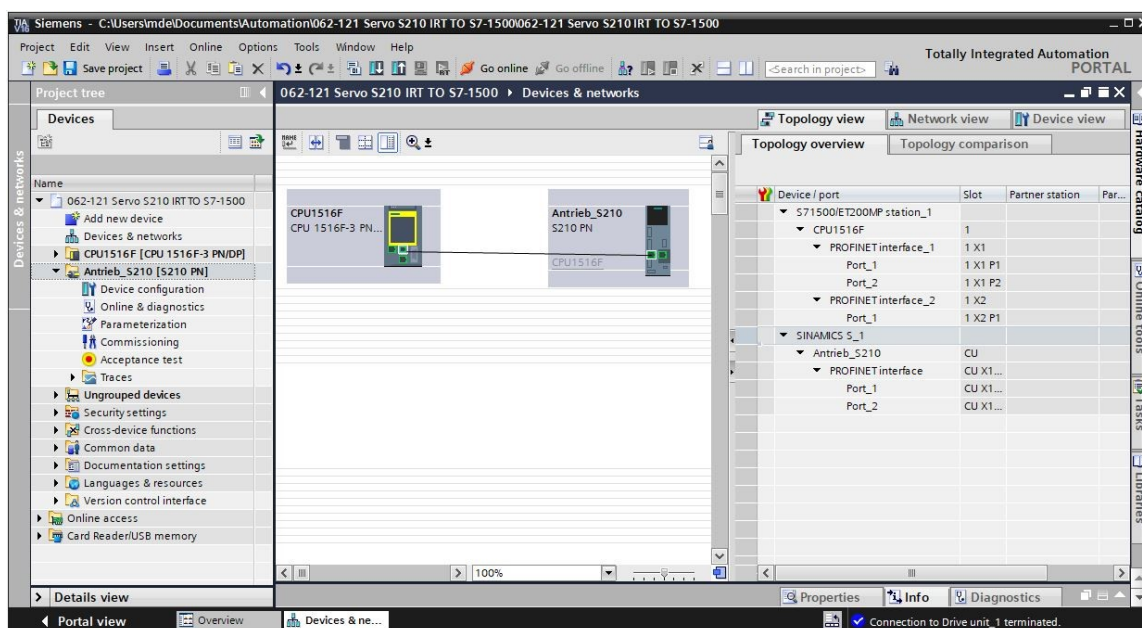
7.7 Assigning the servo drive of the CPU1516F-3 PN/DP as IRT device

→ To assign the SINAMICS S210 to the CPU1516F-3 PN/DP as IRT device, you need to change to the 'Network view'. Here, you connect the Ethernet interfaces of the Control Unit of the S210

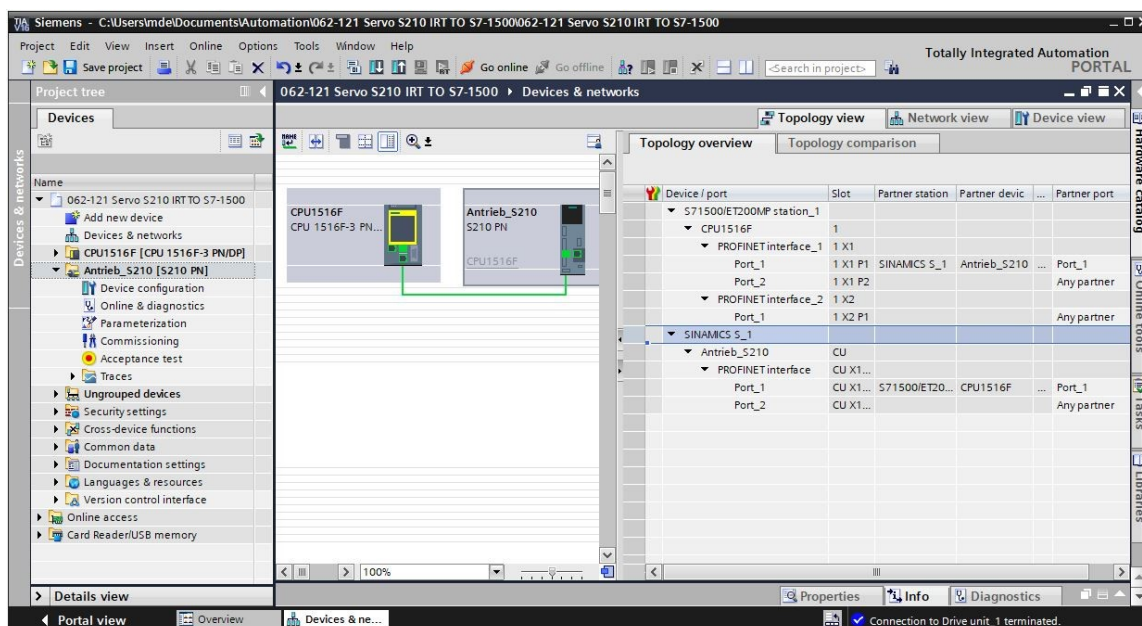
PN and the CPU1516F-3 PN/DP with the mouse. (→  Ethernet →  Ethernet)



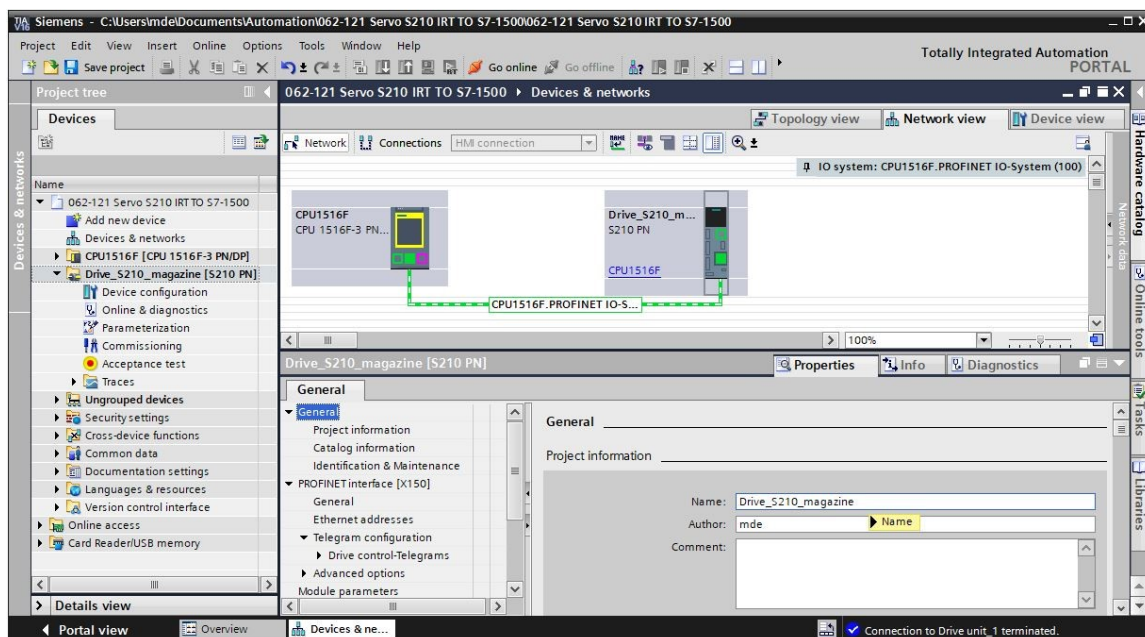
→ Another requirement for an IRT connection is a defined assignment of the ports on the Control Unit of the S210 PN to the ports on the CPU1516F-3 PN/DP. Here we connect Port1 in each case with the mouse. (→ Topology view →  Port_1 →  Port_1)



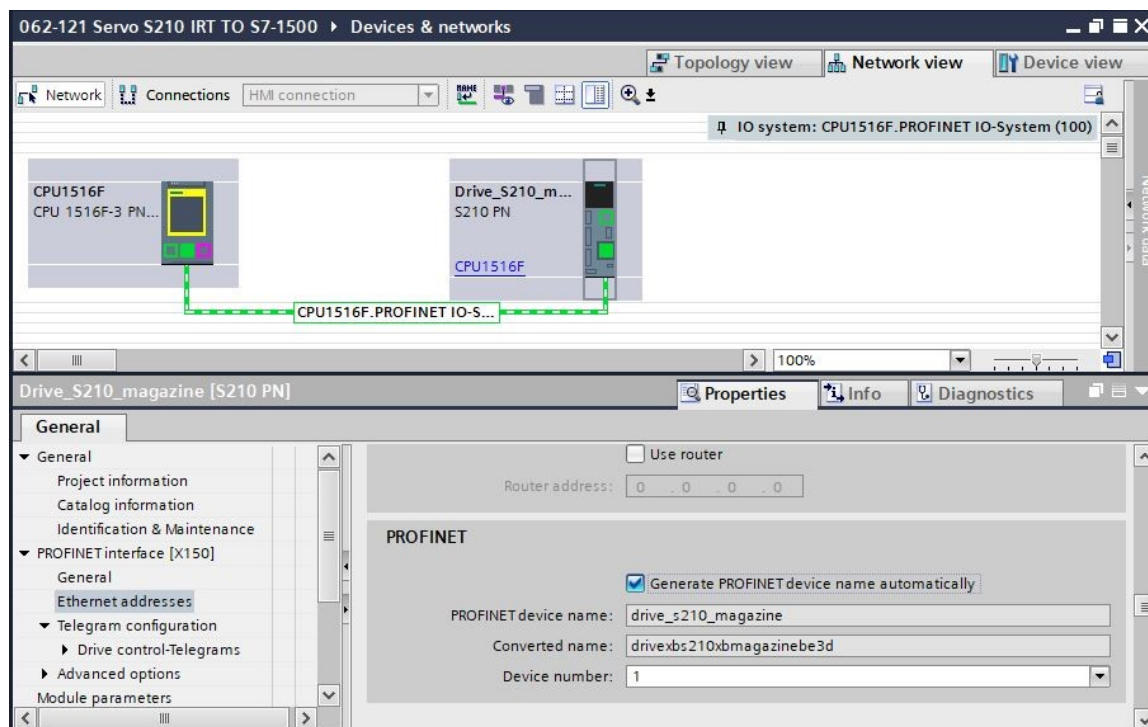
→ Details on the topological assignment can be displayed in the 'Topology overview'. (→ Topology view → Topology overview)




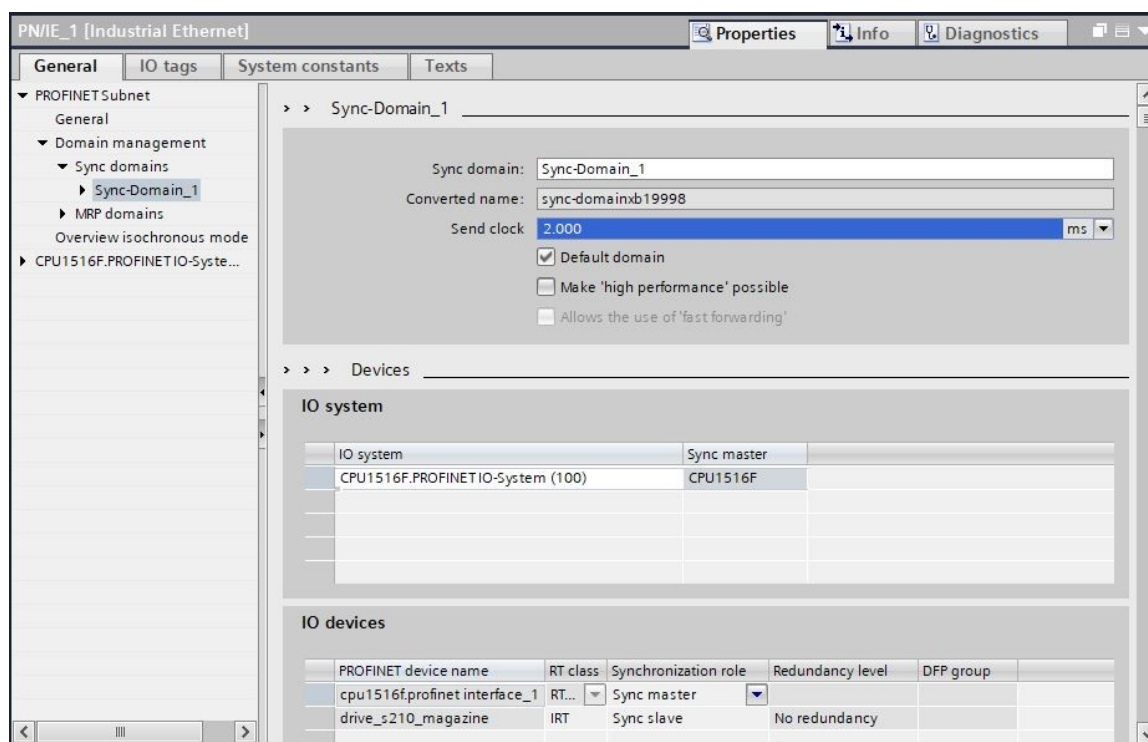
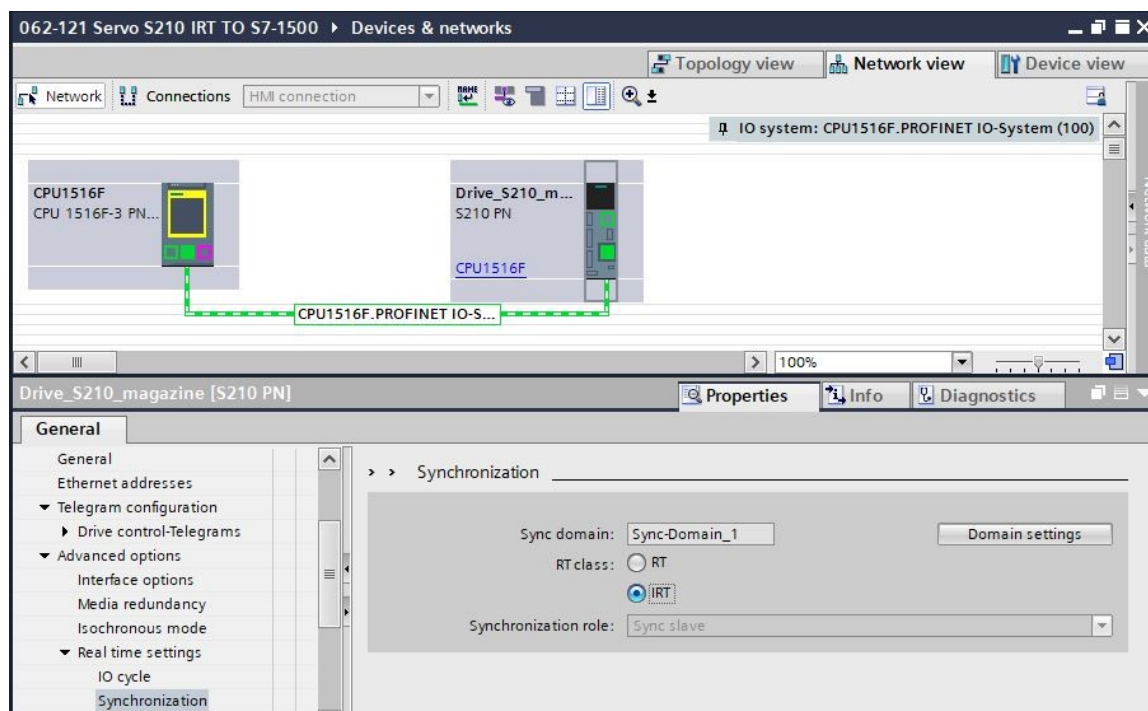
→ Back in the 'Network view', the device name is assigned to the drive under 'General'.
 (→ Network view → General → Name: Drive_S210_magazine)



→ Make sure that this name is applied automatically as the PROFINET device name under the 'PROFINET' item for the 'PROFINET interface' of the 'S210 PN'. (→ PROFINET interface → Ethernet addresses → PROFINET → ☒ Generate PROFINET device name automatically)




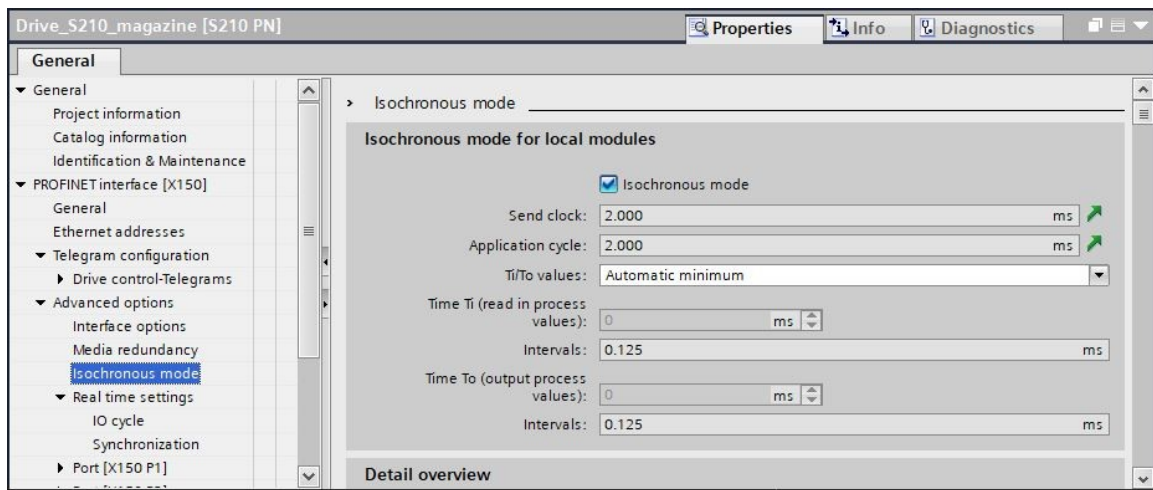
The 'Real time settings' of the 'PROFINET interface' can now be made. With this application, the 'IRT' (Isochronous Real Time) RT class is first selected for synchronization and the domain settings are made. (→ PROFINET interface → Advanced options → Real time settings → Synchronization → RT class:  IRT → Domain settings → cpu_1516f.profinet-interface_1: SyncMaster → Send clock: 2.000 ms)



→ Isochronous mode now needs to be set for the 'Drive_S210_magazine '.

(→ Drive_S210_magazine → PROFINET interface → Advanced options → Isochronous mode

→  Isochronous mode)

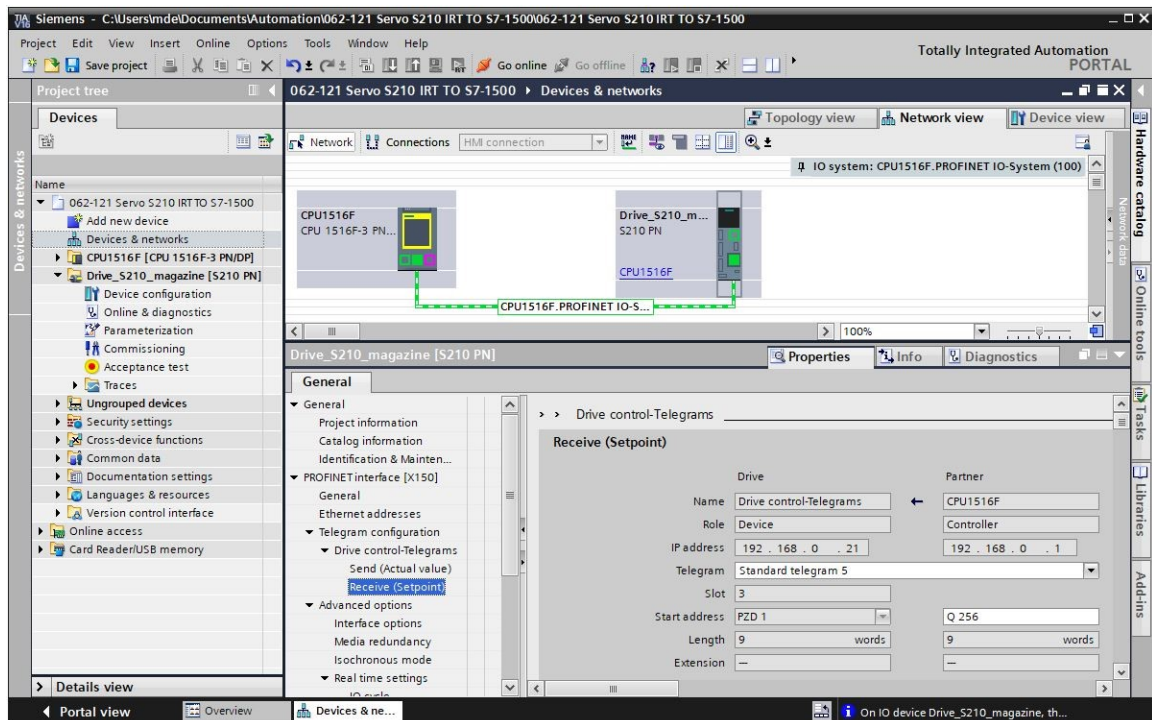
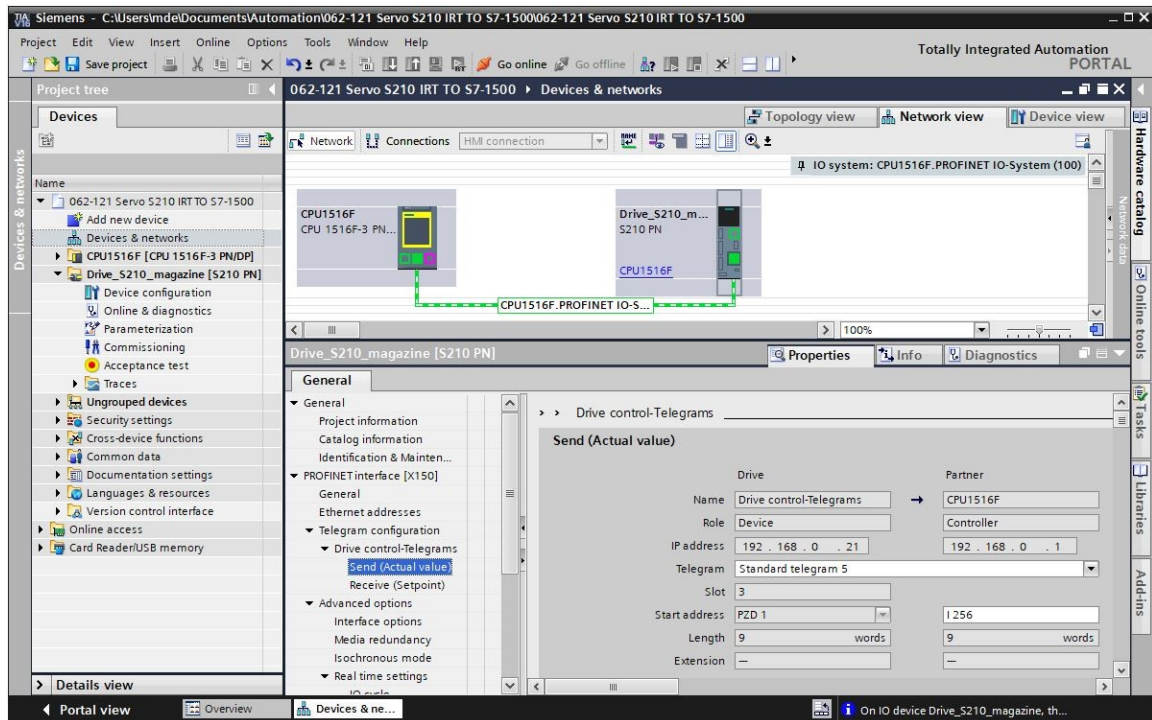



→ The 'Standard telegram 5' is specified for the 'Cyclic data exchange' between the PLC and the frequency converter. (→ PROFINET interface [X150] → Cyclic data exchange → Send (Actual value): Standard telegram 5 → Receive (Setpoint): Standard telegram 5)

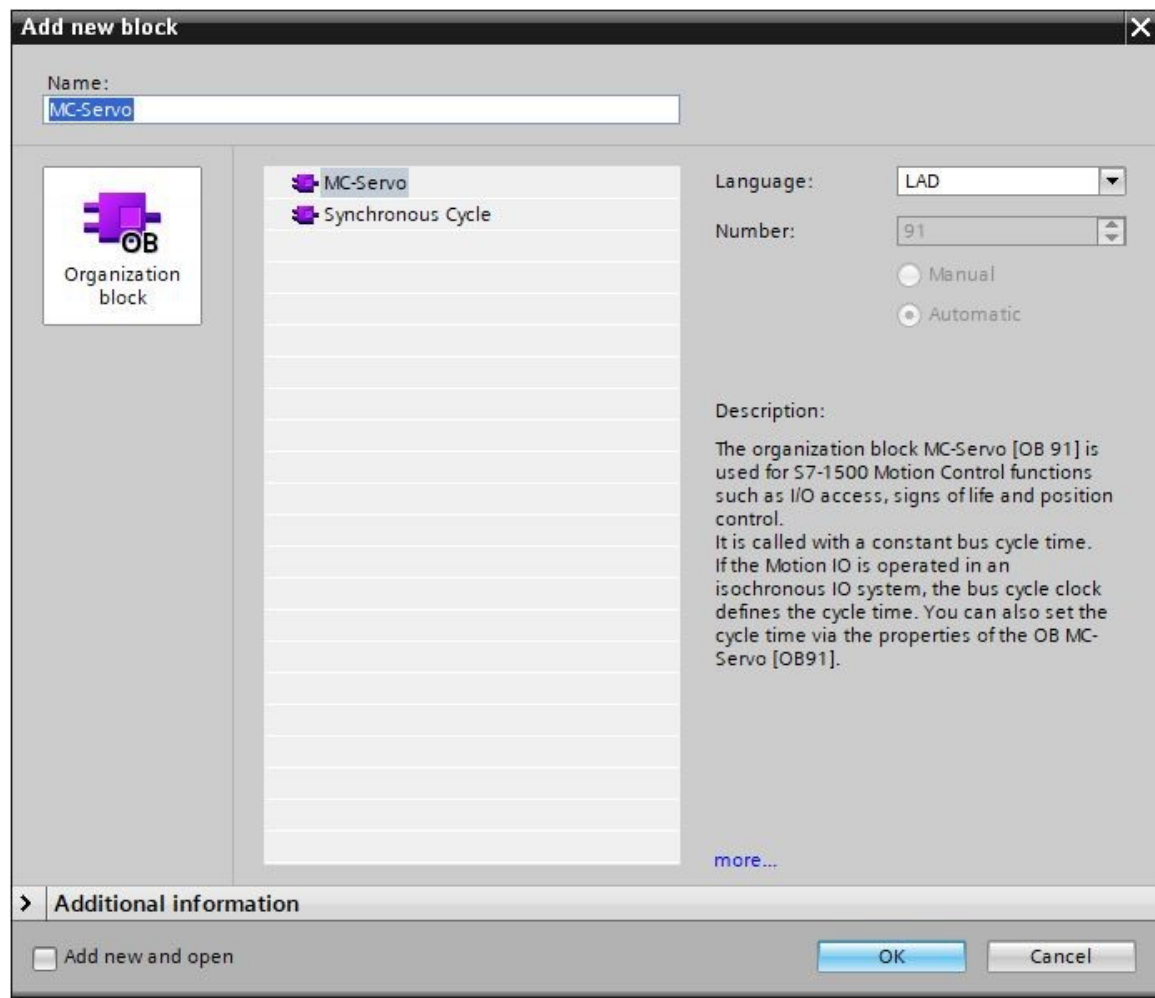
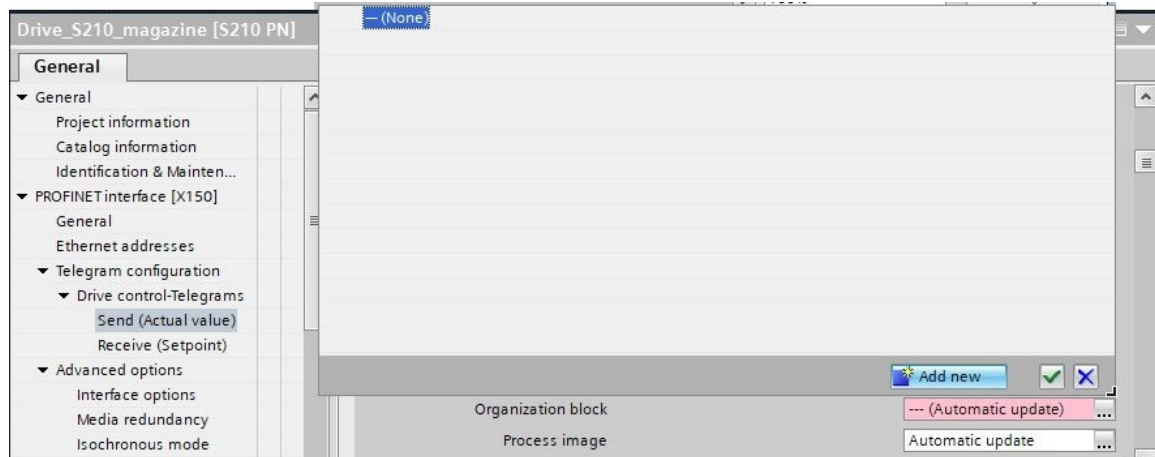
The screenshot displays the Siemens TIA Portal interface. The 'Project tree' on the left shows the project structure, including the '062-121 Servo S210 IRT TO S7-1500' and the 'Drive_S210_magazine [S210 PN]'. The 'Network view' in the center shows the connection between the 'CPU1516F-3 PN' and the 'Drive_S210_magazine [S210 PN]' via the 'CPU1516F.PROFINET IO-S...'. The 'Properties' window for the 'Drive_S210_magazine [S210 PN]' is open, showing the 'General' tab. Under the 'PROFINET interface [X150]' section, the 'Telegram configuration' table is visible.


Name	Item	Link	Telegram	Length	...
Drive control-Telegrams	1				
Send (Actual value)		↗	Standard telegram 5	9 words	...
Receive (Setpoint)		↖	Standard telegram 5	9 words	...
<Add telegram>					

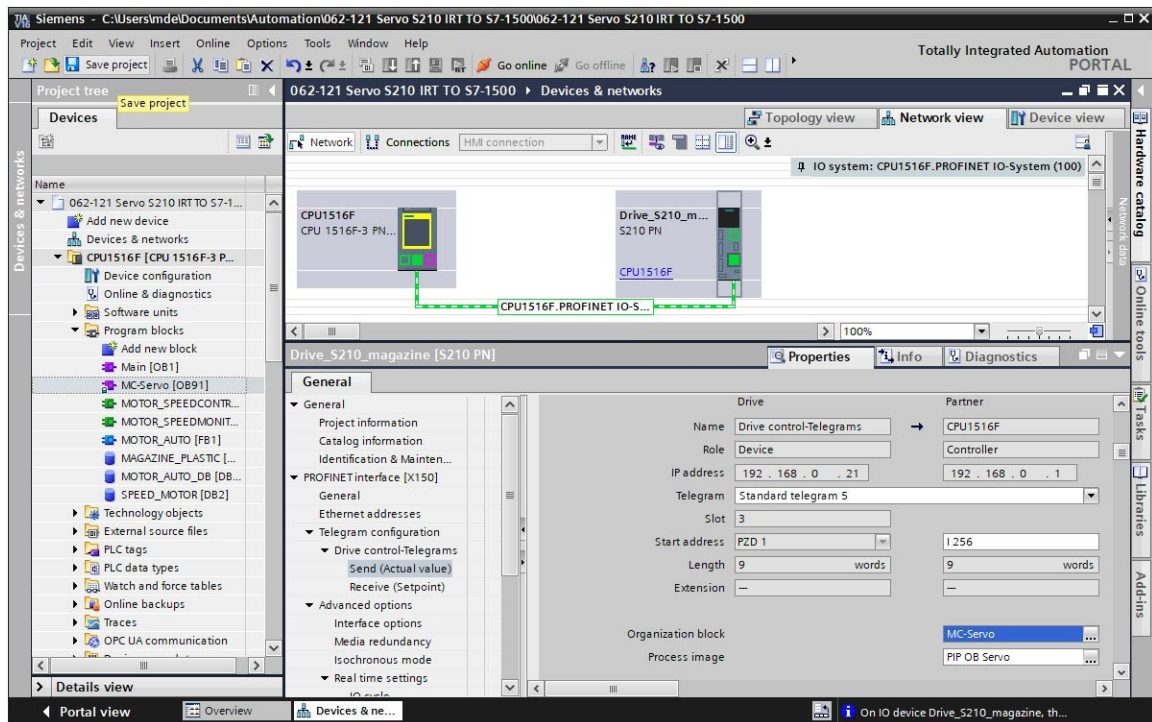
→ For the address ranges, we select 'I 256...264' and 'Q 256 ... 264'.
 (→ PROFINET interface [X150] → Cyclic data exchange → Send (Actual value) → Start address I 256 → Receive (Setpoint) → Start address Q 256)



→ An isochronous organization block still needs to be assigned for the 'Drive_S210_magazine' is isochronous mode. The option 'Add new and open' should be deselected ☐. (→ PROFINET interface[X150] → Cyclic data exchange → Send (Actual value) → Organization block →  → MC-Servo → ☐ Add new and open → OK)

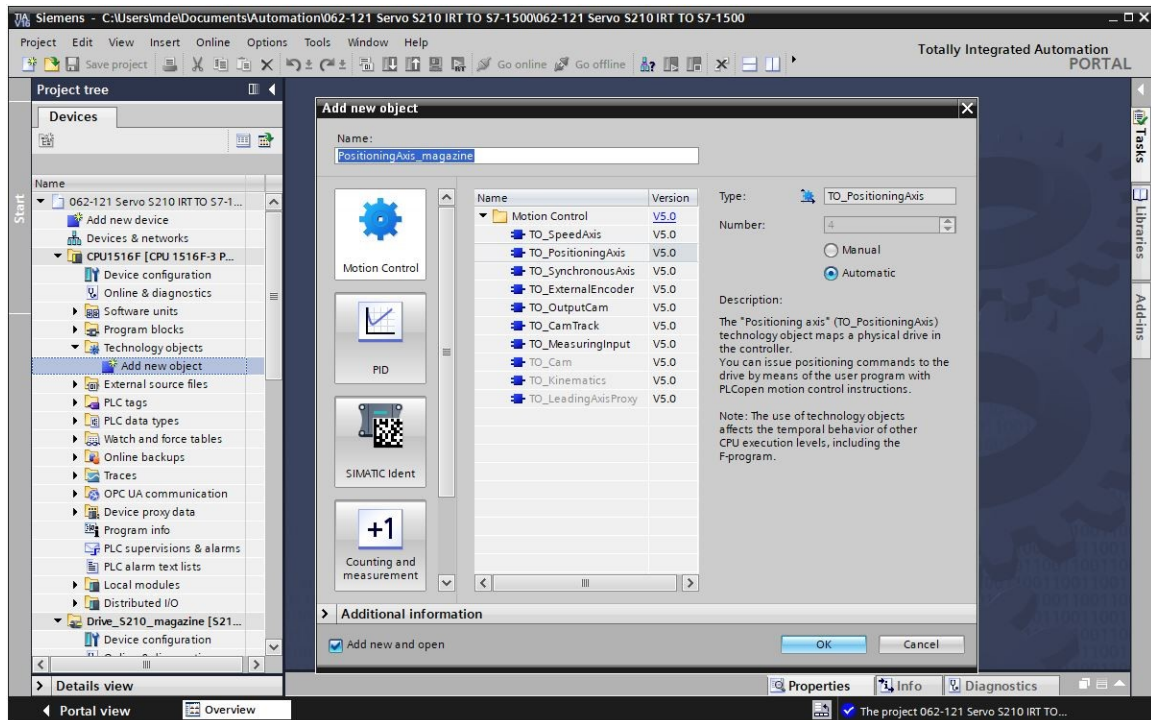


→ The isochronous organization block is automatically also assigned to the receive telegram.
 Now we save the project with the existing settings. (→ PROFINET interface [X150] → Cyclic data exchange → Receive (Setpoint) → Organization block → MC-Servo →  Save project)

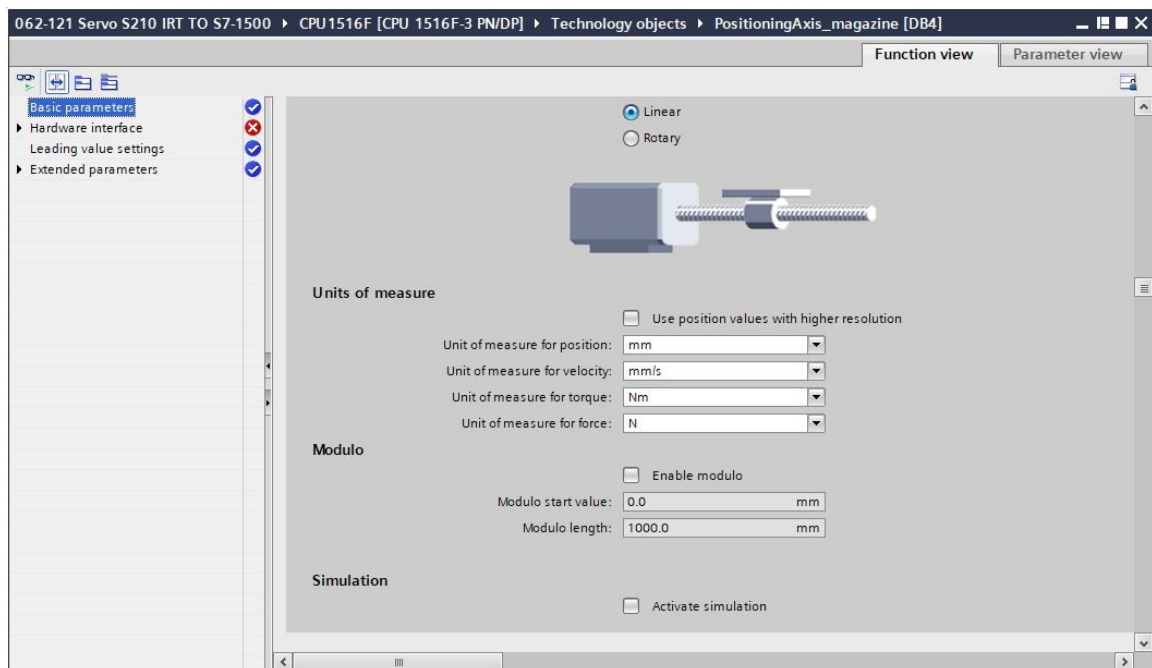
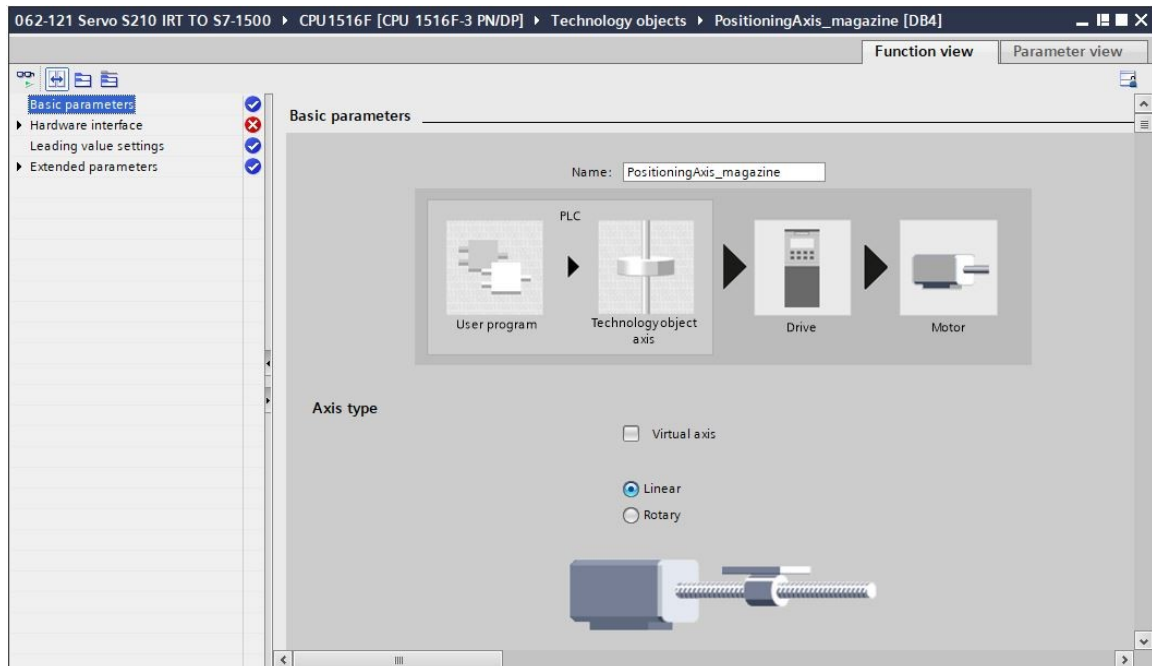


7.8 Creating a technology object in CPU1516F-3 PN/DP

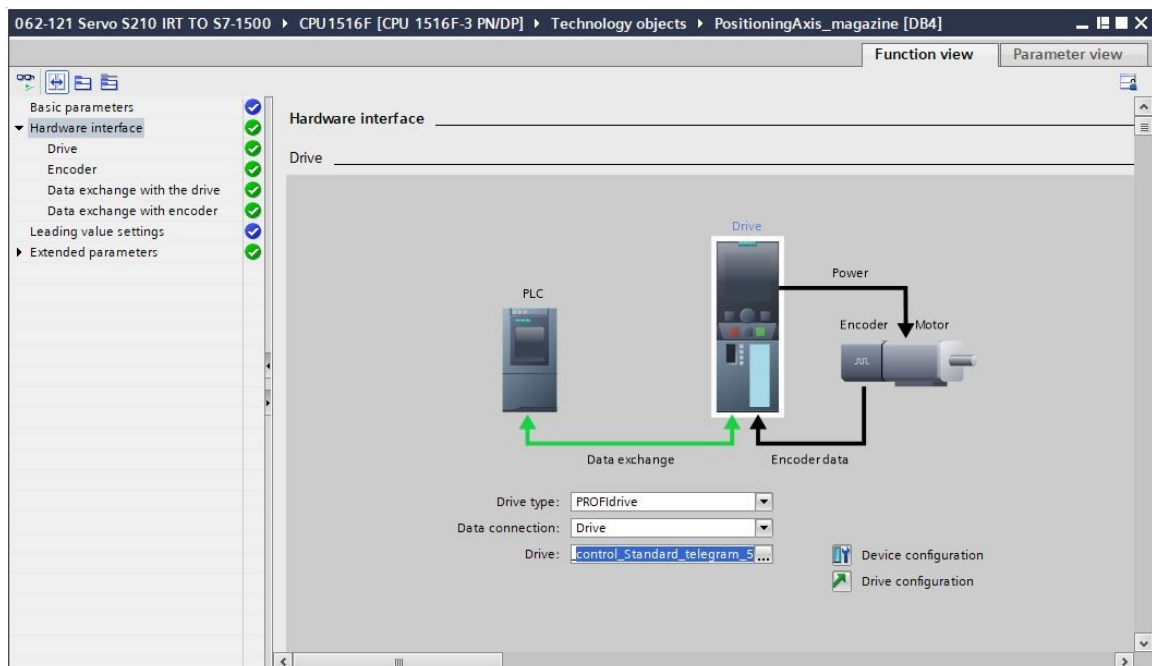
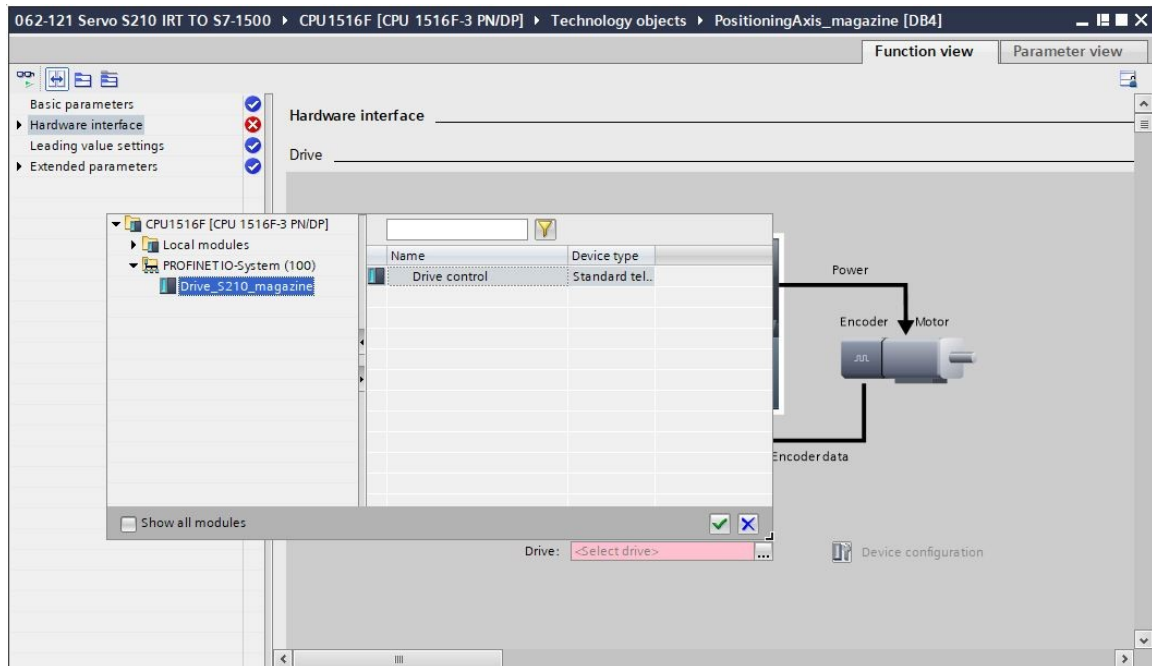
→ To control the positioning application in the servo drive, we create a new technology object in the CPU1516F-3 PN/DP. We select the object 'TO_PositioningAxis' under 'Motion Control' .
(→ CPU1516F-3 PN/DP → Technology objects → Add new object → Motion Control → TO_PositioningAxis → PositioningAxis_magazine → OK)



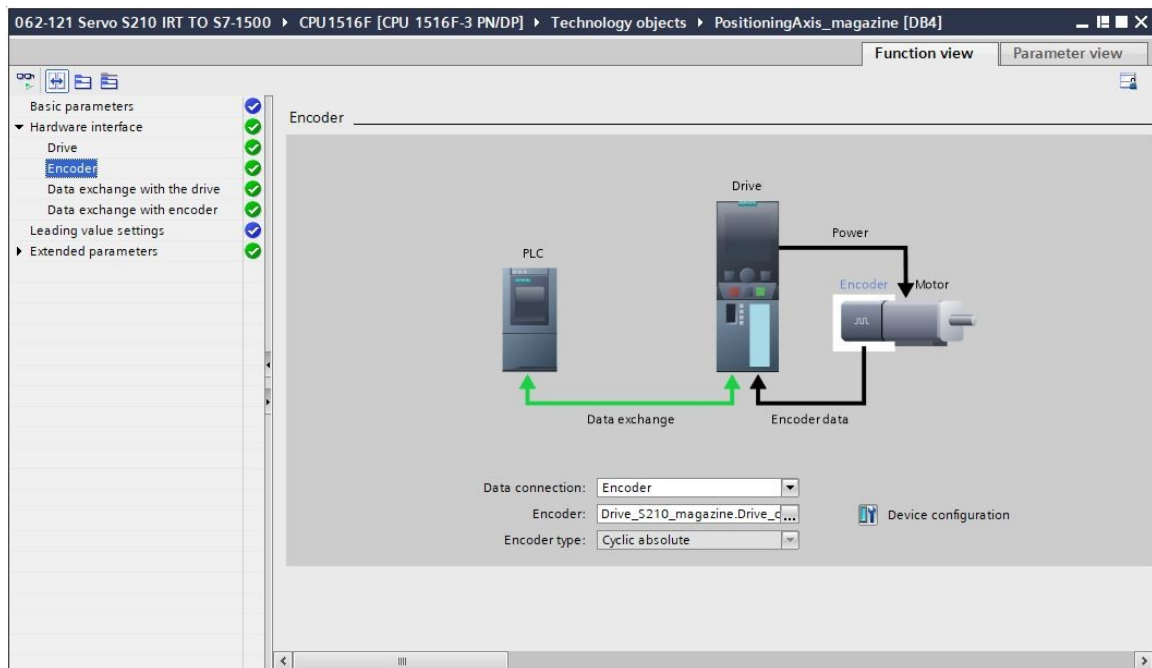
→ Now the 'Function view' for the technology object opens automatically. Here, we first select the 'Basic parameters' displayed here. (→ Function view → Basic parameters)



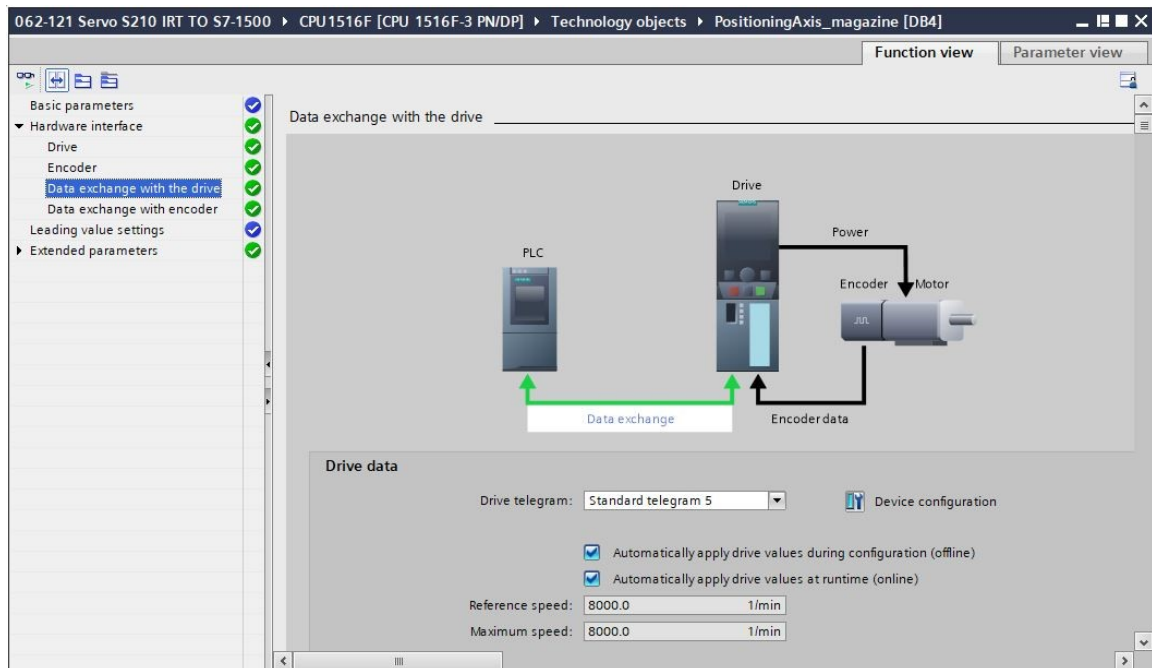
→ Next, we select the 'Drive control' in our 'Drive_S210_magazine' as 'Hardware interface' for the technology object. (→ Hardware interface → Drive → PROFINET IO system(100) → Drive_S210_magazine → Drive control → ✓)



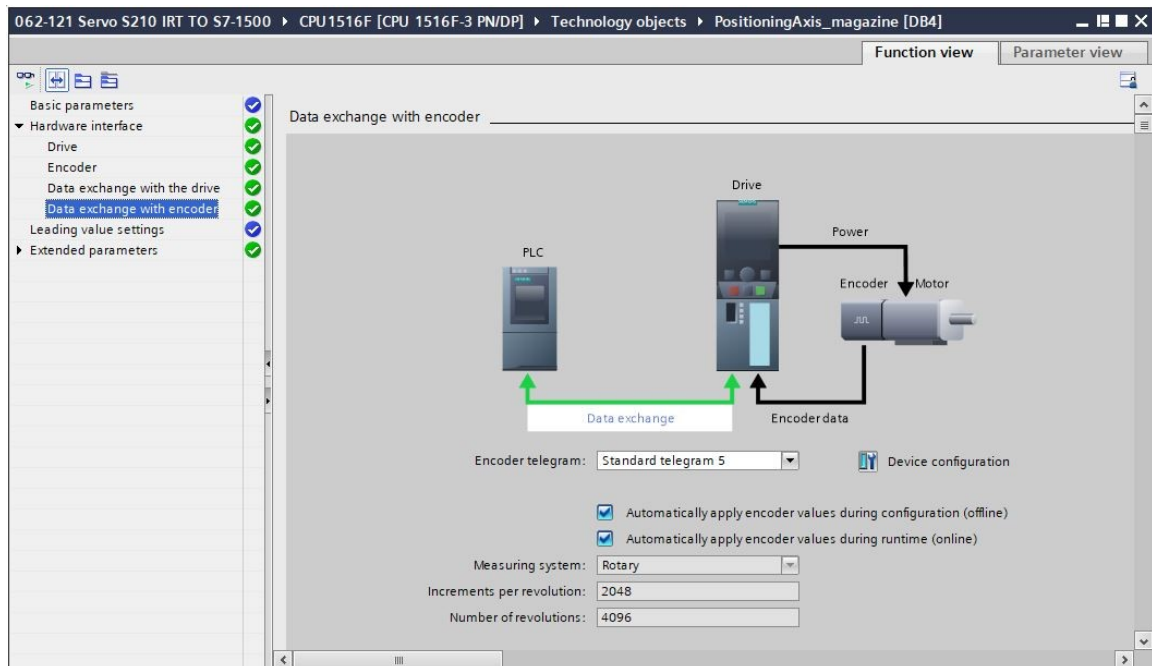
→ The encoder data is applied automatically. (→ Hardware interface → Encoder)



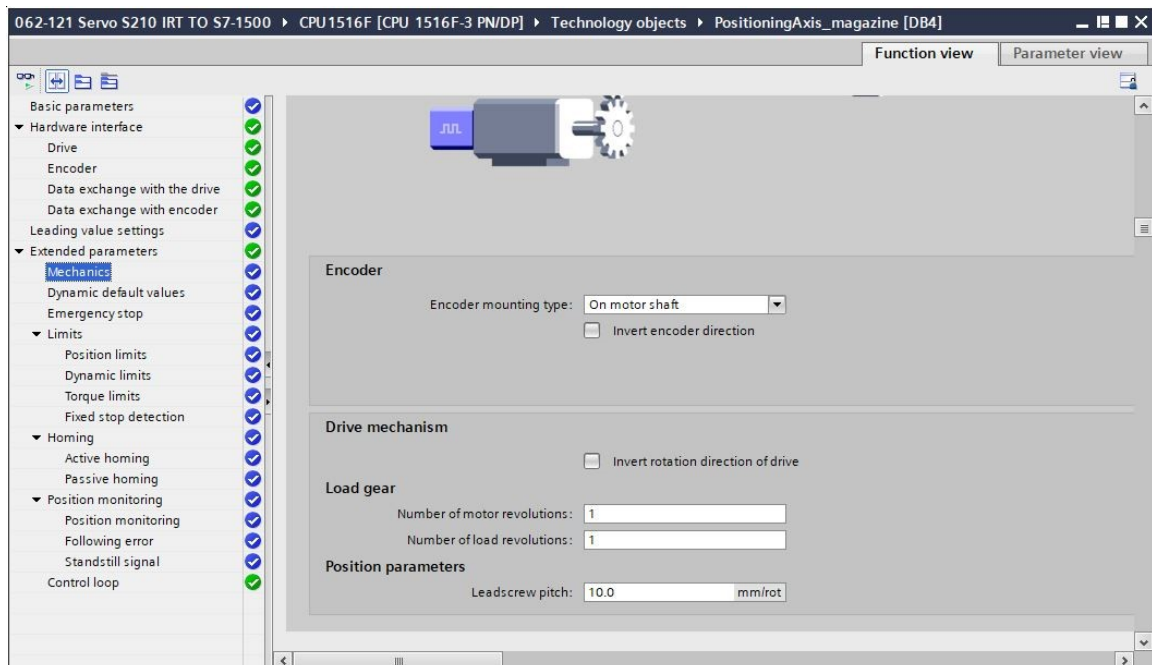
→ We retain the values for data exchange with the drive. (→ Hardware interface → Data exchange with the drive)



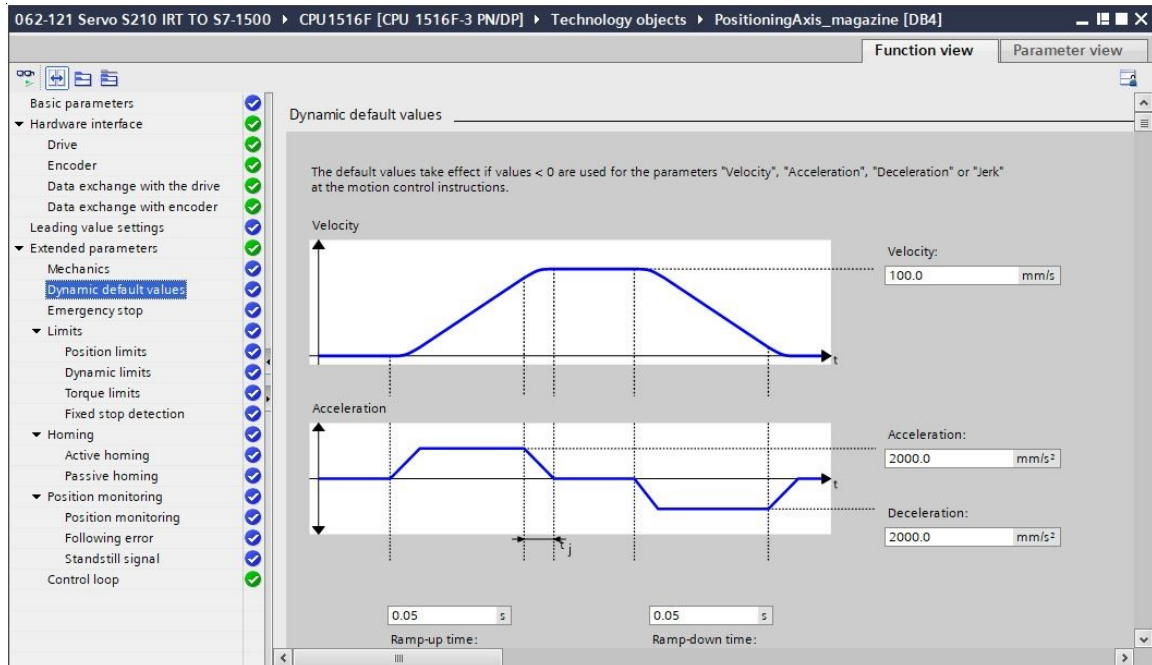
→ We retain the values for data exchange with the encoder. (→ Hardware interface → Data exchange encoder)



→ Adaptation to the specific 'Drive mechanism' can be performed under 'Extended parameters'. Here we select the settings shown. (→ Extended parameters → Mechanics → Drive mechanism)





→ Settings on mechanics, dynamic default values, limits, reference settings, position monitoring etc. can be made under 'Extended parameters'. (Extended parameters → Dynamic default values → ...)

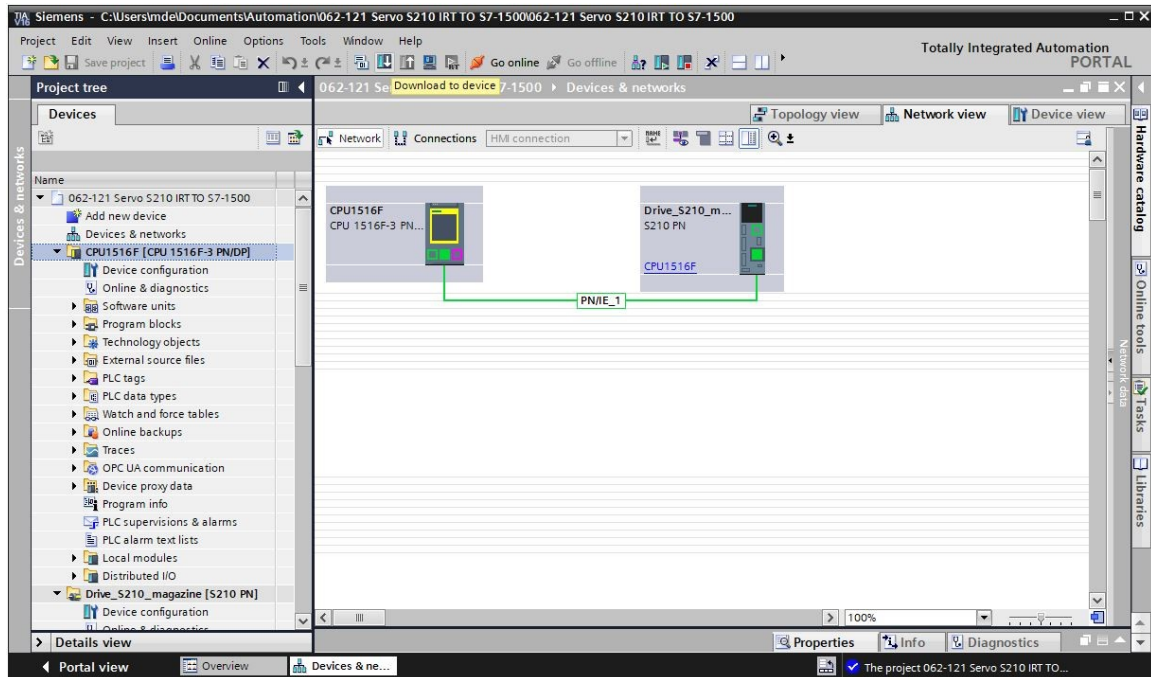


Note:

- You can find more precise information on the individual settings in the online help and the manuals.

7.9 Loading CPU1516F-3 PN/DP and assigning a device name to the drive

→ We now save the project and load the CPU1516F-3 PN/DP with the device configuration, the frequency converter S210 PN as device and the technology object into the 'CPU_1516F [CPU1516F-3 PN/DP]'. ( Save project → CPU_1516F [CPU1516F-3 PN/DP] → )



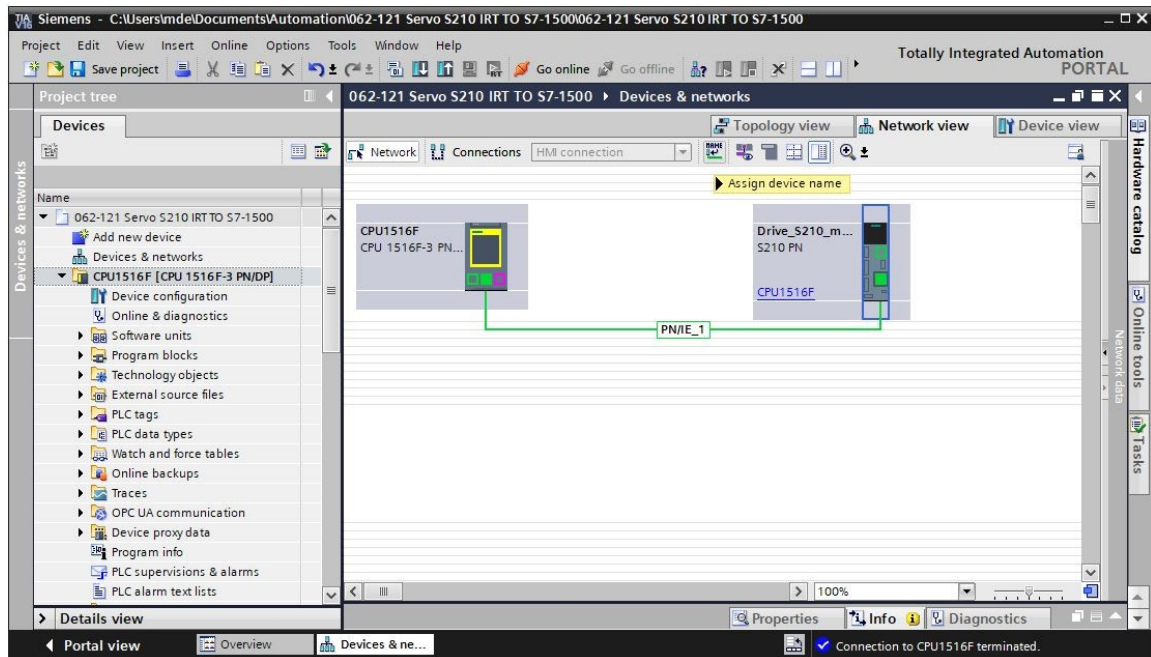
→ The device name still must be assigned to the frequency converter S210 as an IO device of the CPU_1516F. To do so, we first select the 'Drive_S210_magazine' network and click on '



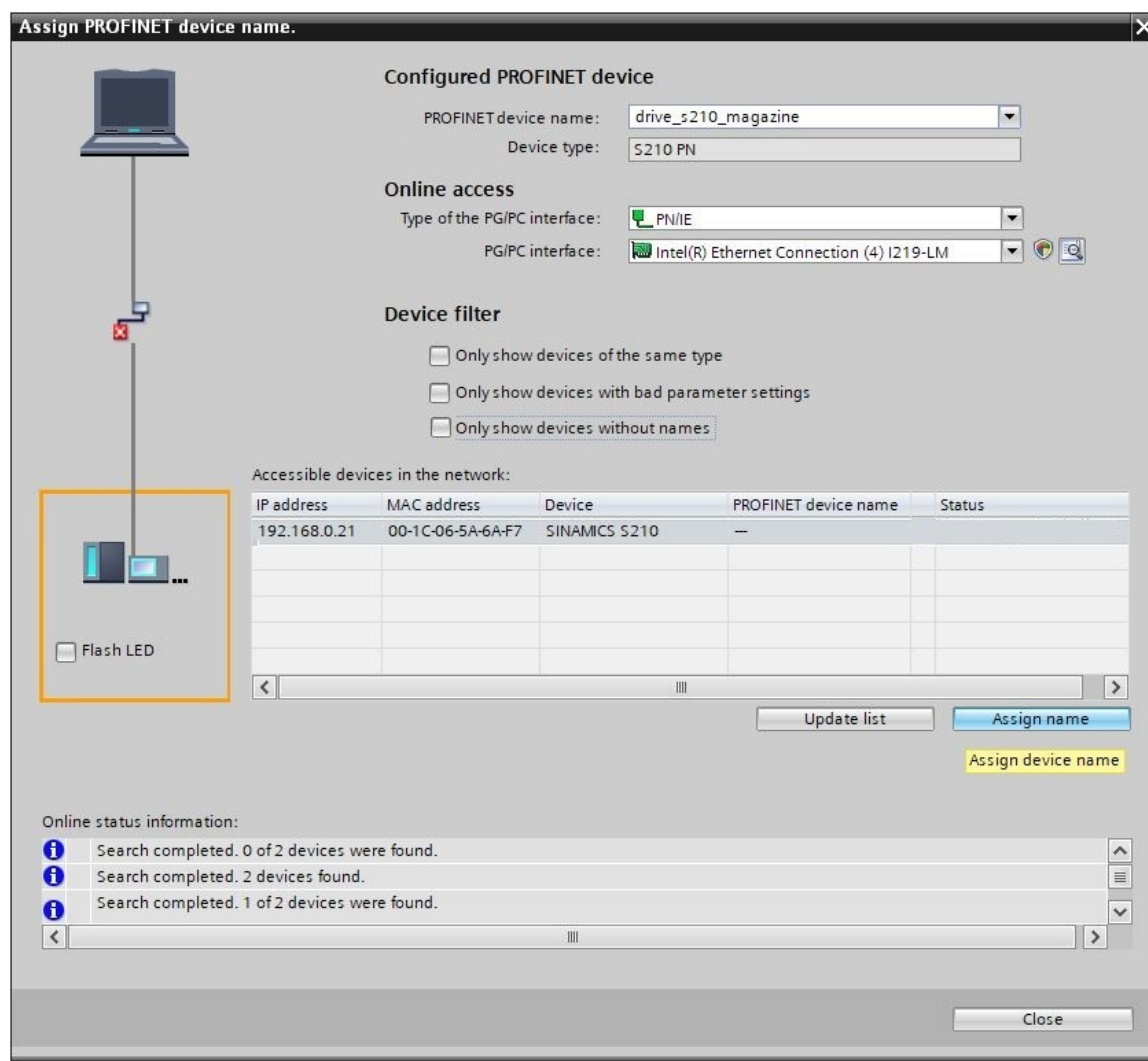
Assign device name'. (→ Drive_S210_magazine →



Assign device name)



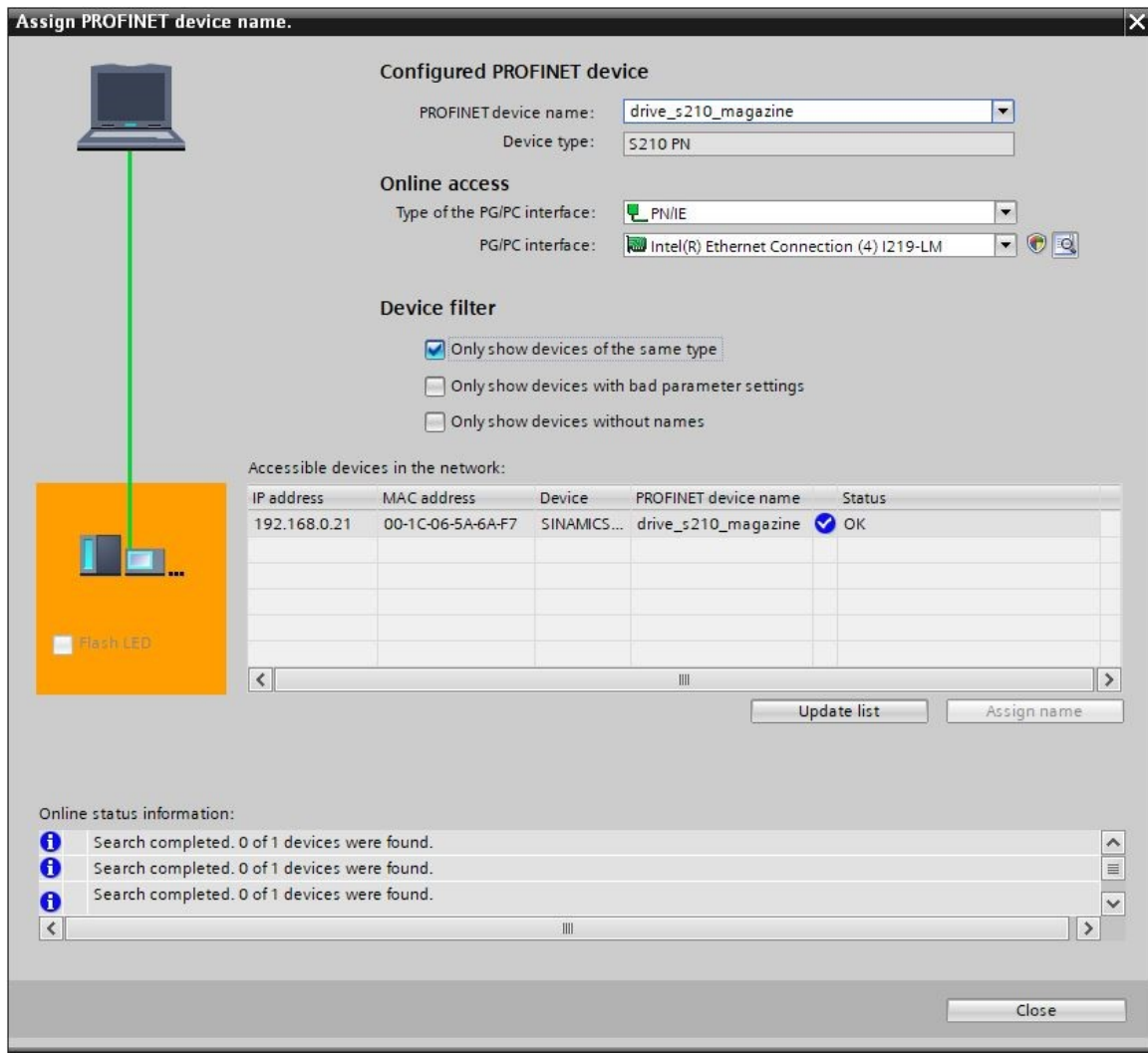
→ In the subsequent dialog, the 'PG/PC interface' can be selected before we select the 'drive_s210_magazine' and 'Assign name'. (→ PROFINET device name: Drive_s120_magazine
→ SINAMICS S210 → Assign name)





Note:

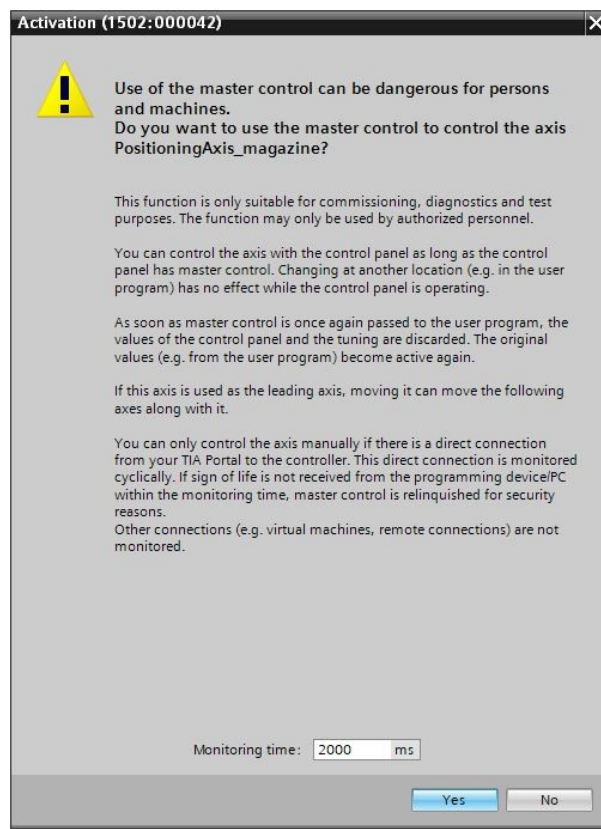
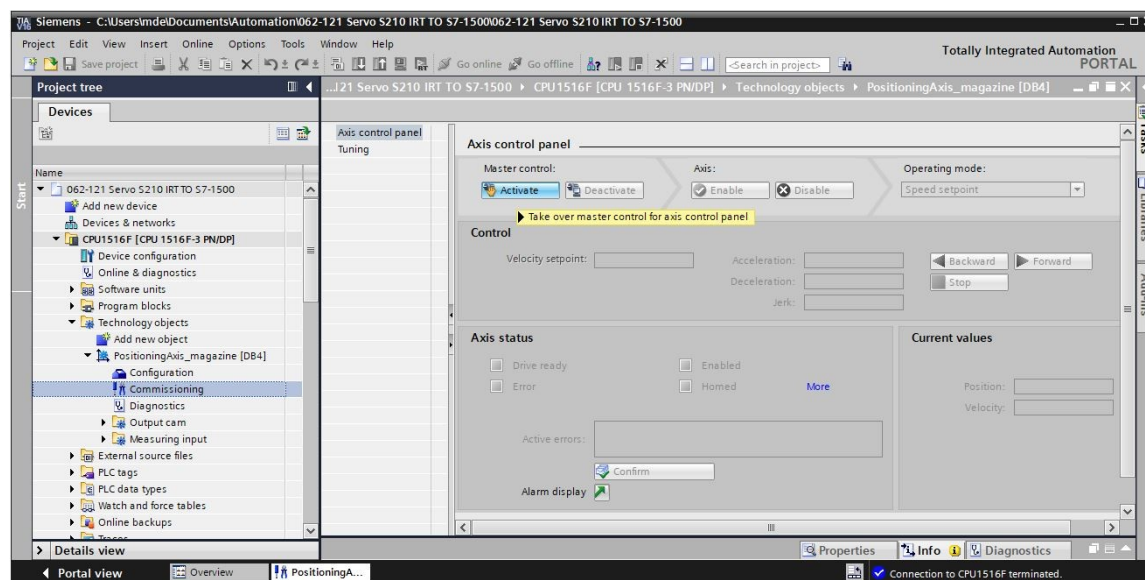
- If several IO devices exist in the network, the device can be identified on the basis of the imprinted MAC address or by 'Flash LED'.


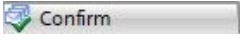

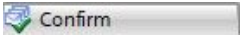
→ If too many components are displayed, the view can be filtered by clicking on 'Only show devices of the same type'. If the device name was assigned successfully, this is indicated by 'OK' in the status. (→ Close)

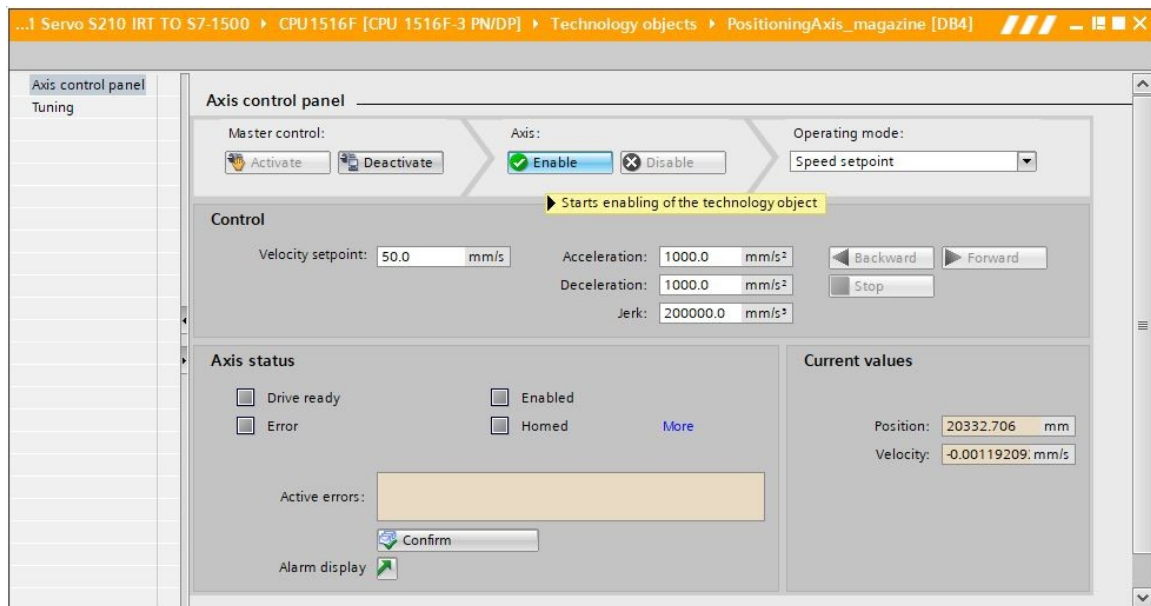


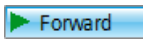
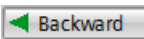

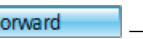

7.10 Testing and commissioning the technology object

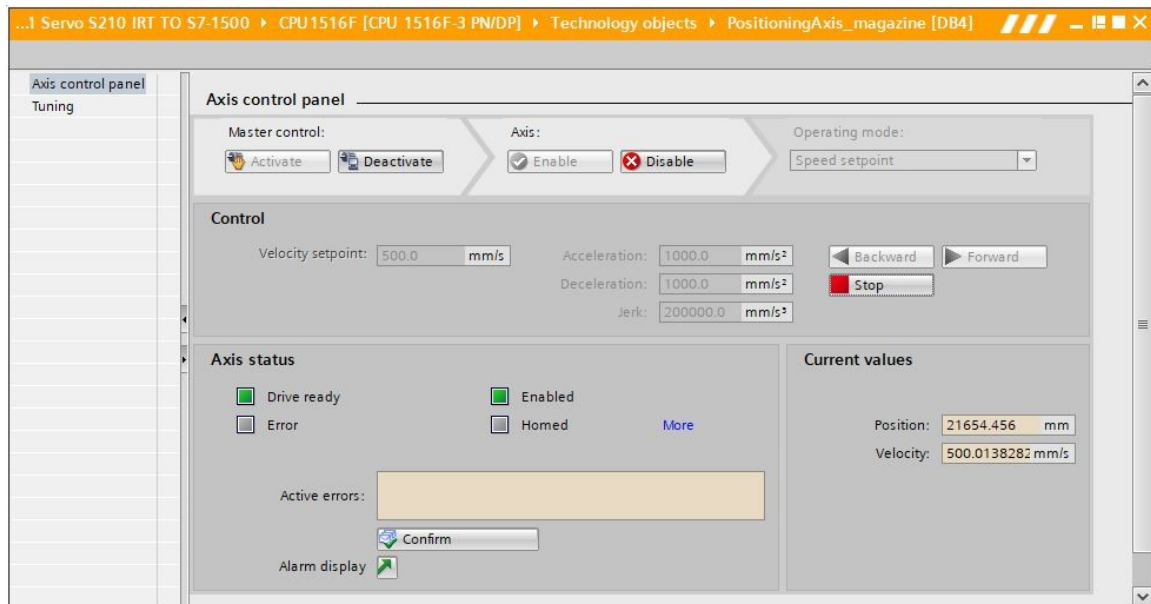
→ To be able to test the technology object, we open the 'Axis control panel' from the 'Commissioning' menu for the 'PositioningAxis_magazine' technology object and  master control there. (→ CPU_1516F [CPU1516F-3 PN/DP] → Technology objects → PositioningAxis_magazine → Commissioning → Axis control panel → Master control:  → 2000ms → OK)




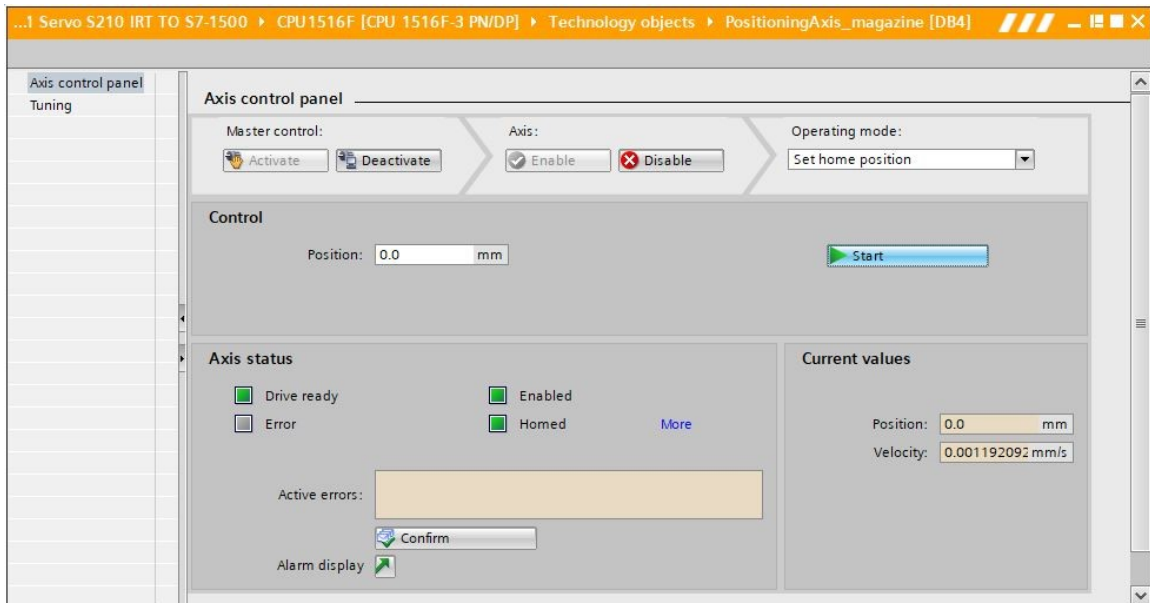
→ For this purpose, we first have to  the axis to start the motor. We can  pending errors here. (→ Axis:  → Pending errors: )

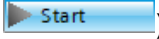


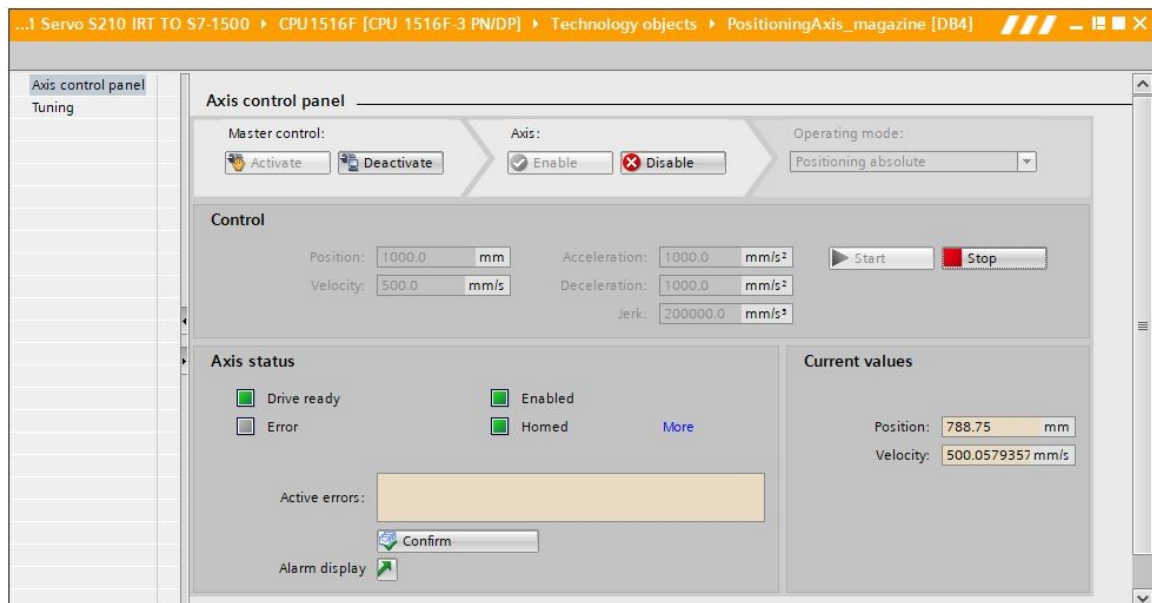
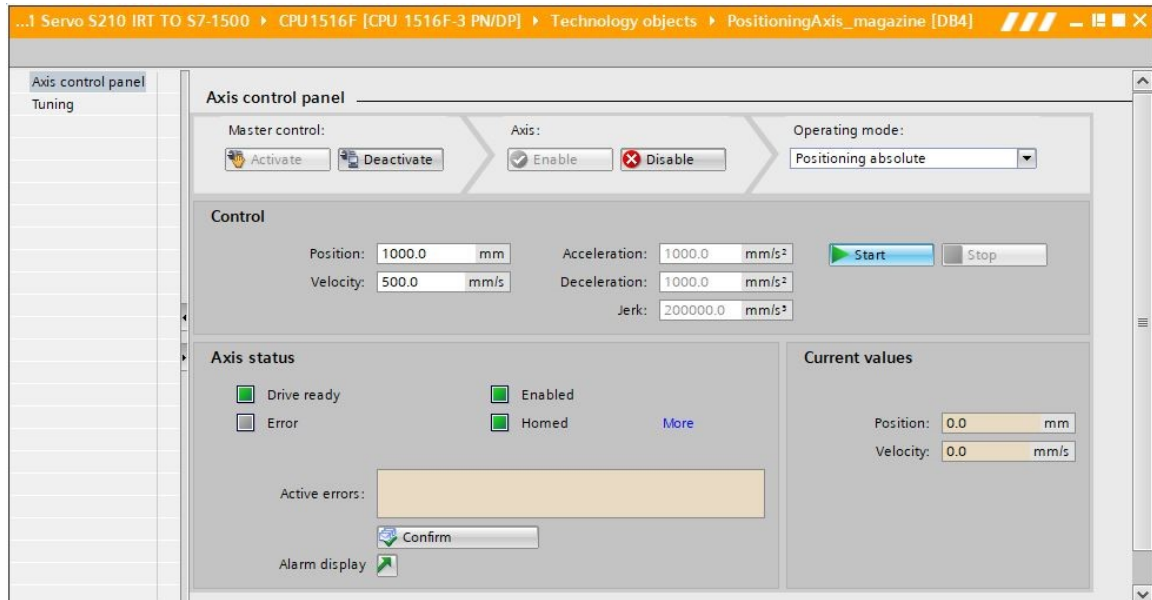
→ We can then start the motor with the selected speed  or  and pause it with . (→ Speed: 500.0 mm/s →  → )

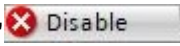
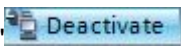
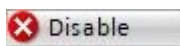



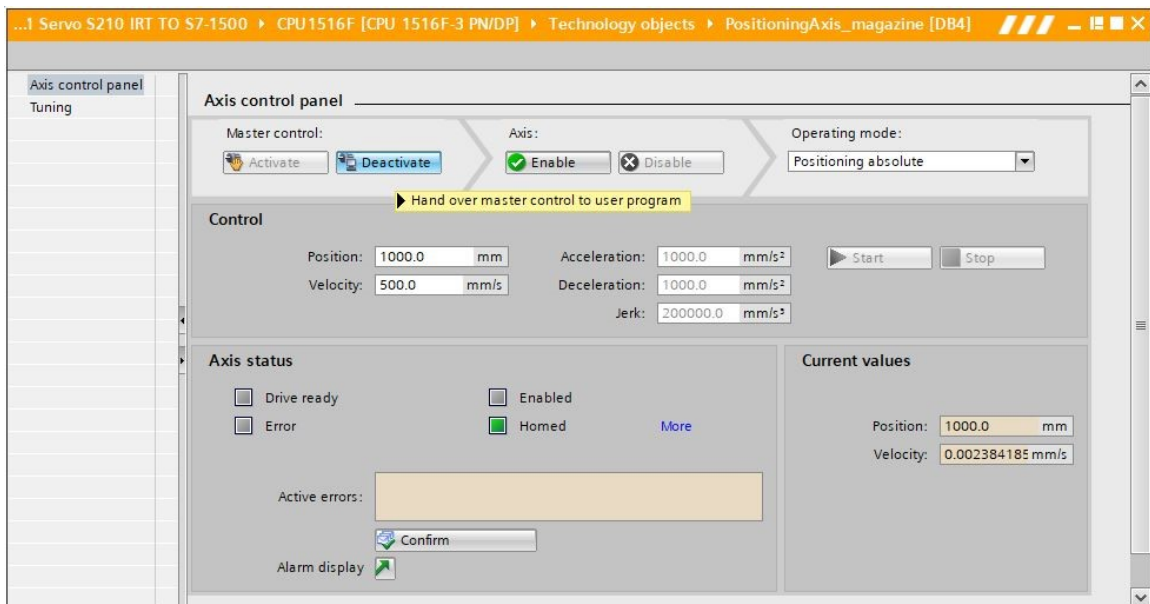
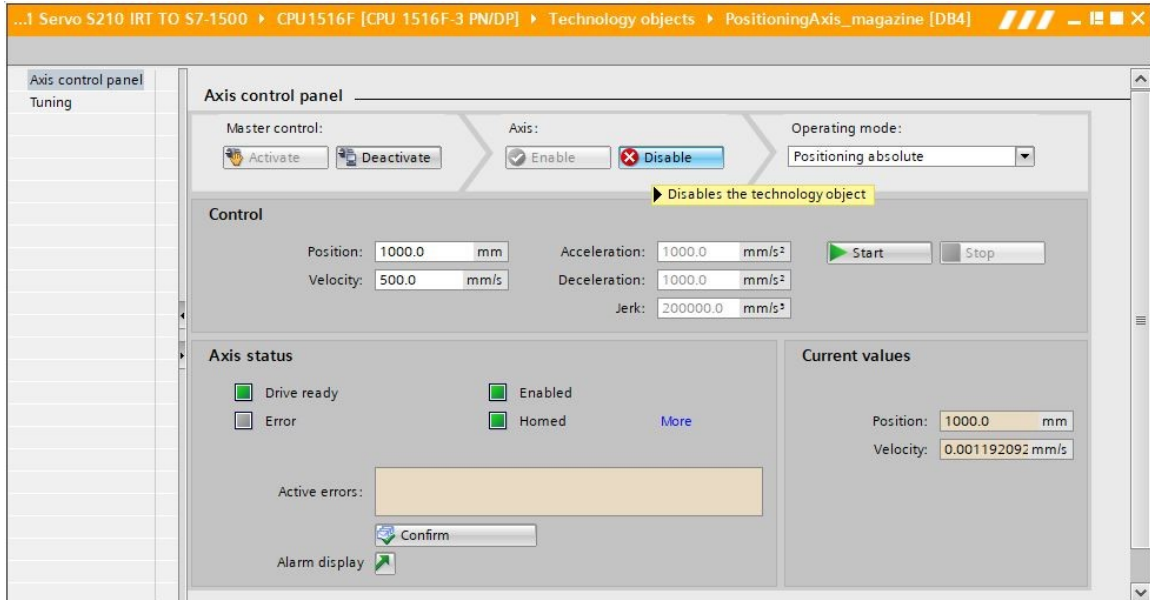
→ Before we can perform absolute commissioning, we need to 'Set home position'. This is done by setting a position value at a specific position, preferably a fixed stop. (→ Operating mode: Set home position → Control → Position 0.0 mm → )



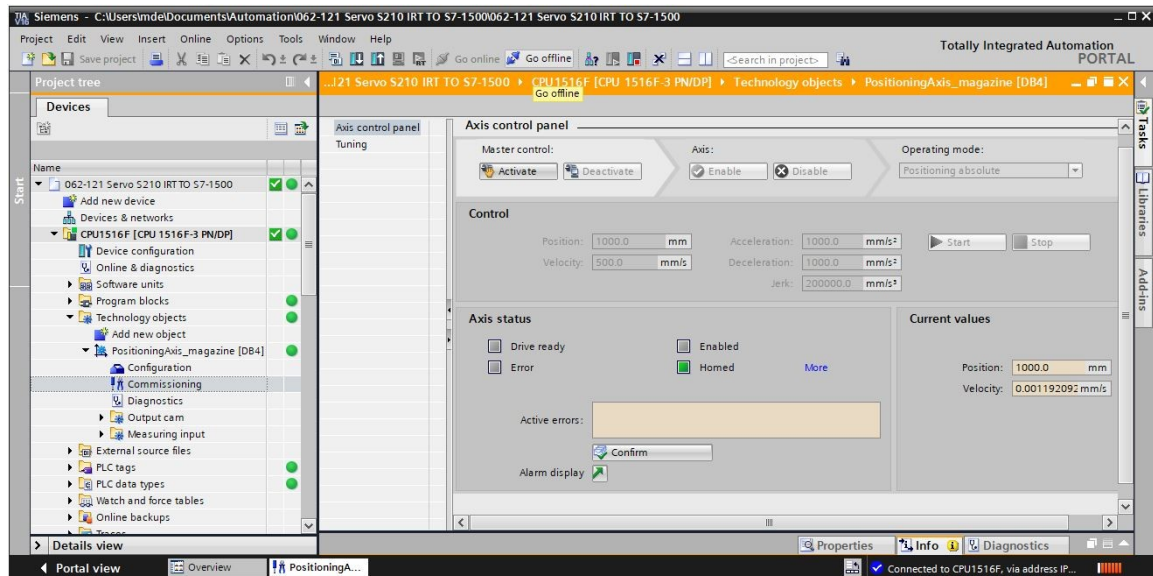
→ If the axis is homed, this is shown in the axis control panel. Absolute positioning can now be started with the values shown here and monitored.
 (→ Operating mode: Absolute positioning → Target position: 1000.0 mm → Velocity: 500.00
 → )



→ We can disable the technology object again by clicking on . After completion of the test, it is necessary to  the master control again. (→  → )

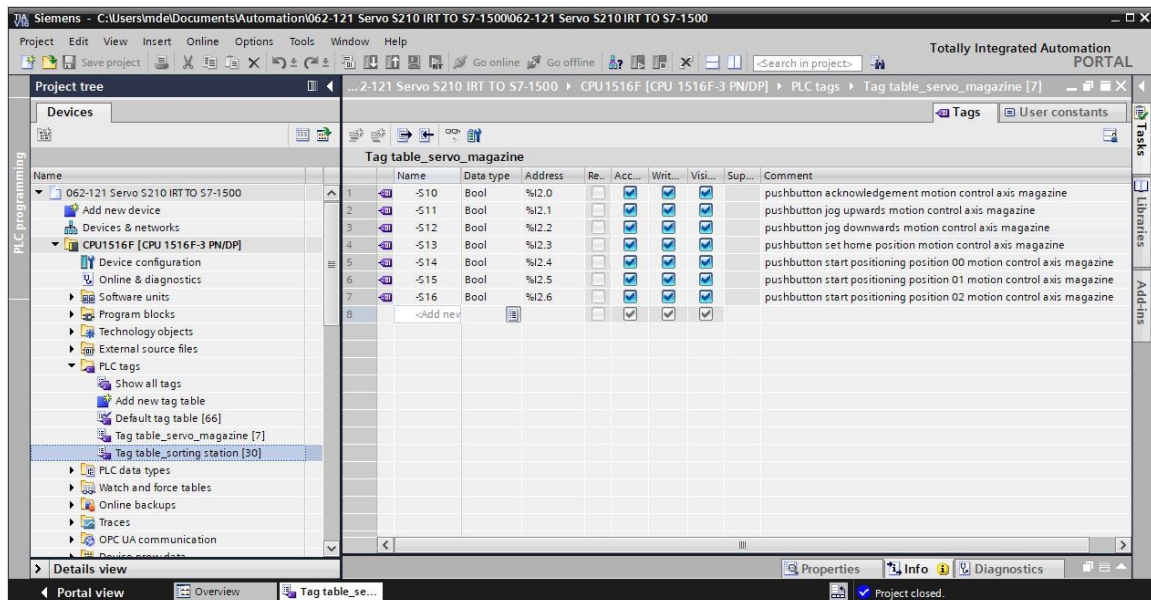


→ Finally, we need to 'Go offline' and save the project again 'Save project'. (→ 'Go offline' → 'Save project')



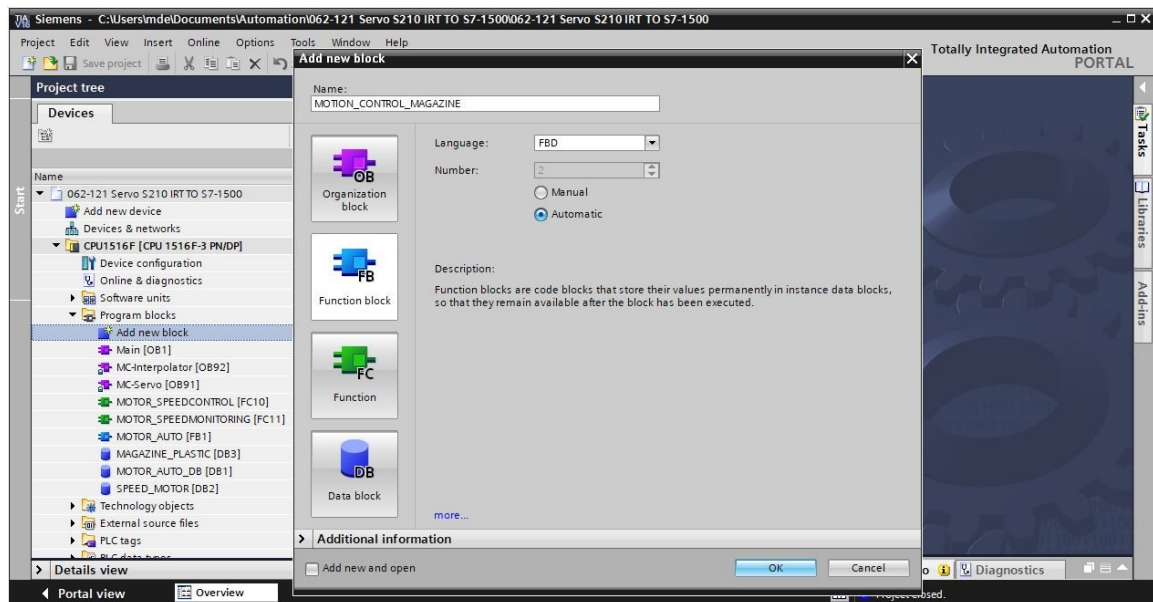
7.11 Creating a program for controlling the servomotor

→ We now want to create the program to control the servo motor. Beforehand, we will create a 'Tag table_servo_magazine' with the tags shown here. (→ CPU_1516F [CPU1516F-3 PN/DP] → PLC tags → Add new tag table → Tag table_servo_magazine)



	Name	Data type	Address	Re...	Acc...	Writ...	Visi...	Sup...	Comment
1	-S10	Bool	%I2.0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		pushbutton acknowledgement motion control axis magazine
2	-S11	Bool	%I2.1		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		pushbutton jog upwards motion control axis magazine
3	-S12	Bool	%I2.2		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		pushbutton jog downwards motion control axis magazine
4	-S13	Bool	%I2.3		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		pushbutton set home position motion control axis magazine
5	-S14	Bool	%I2.4		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		pushbutton start positioning position 00 motion control axis magazine
6	-S15	Bool	%I2.5		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		pushbutton start positioning position 01 motion control axis magazine
7	-S16	Bool	%I2.6		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		pushbutton start positioning position 02 motion control axis magazine

→ Next, we create the 'MOTION_CONTROL_MAGAZINE' function block. (→ Add new block → FB → MOTION_CONTROL_MAGAZINE → FBD → OK)

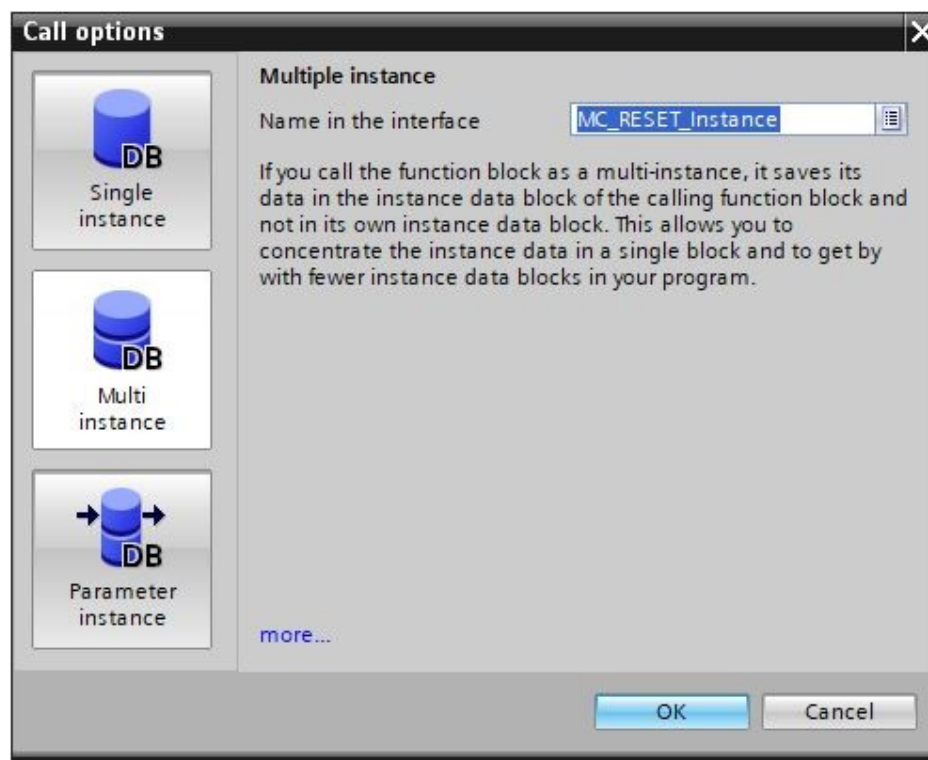
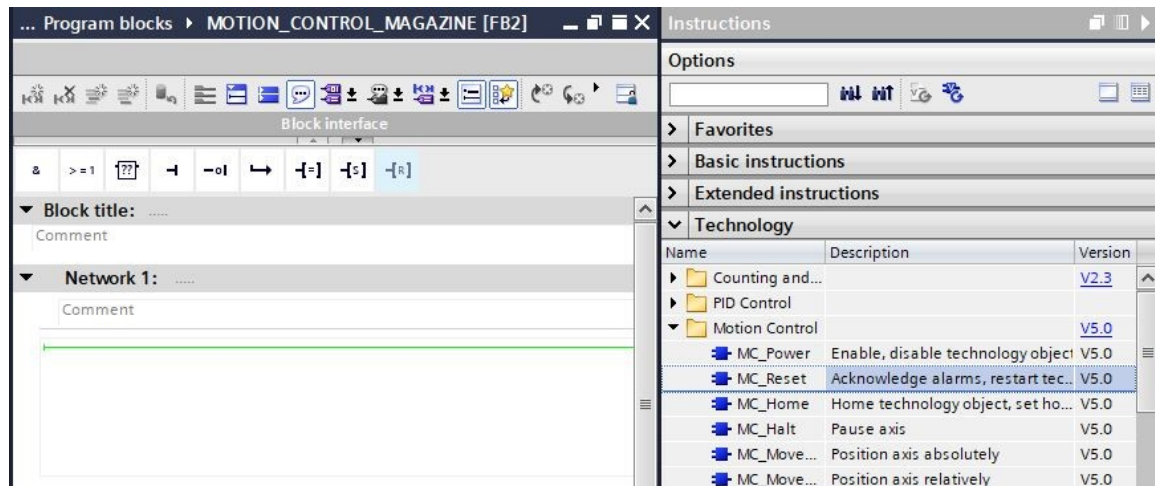


→ As shown here, declare the interface of the 'MOTION_CONTROL_MAGAZINE' function block.
 (→ 'MOTION_CONTROL_MAGAZINE' [FB2] → Block interface)

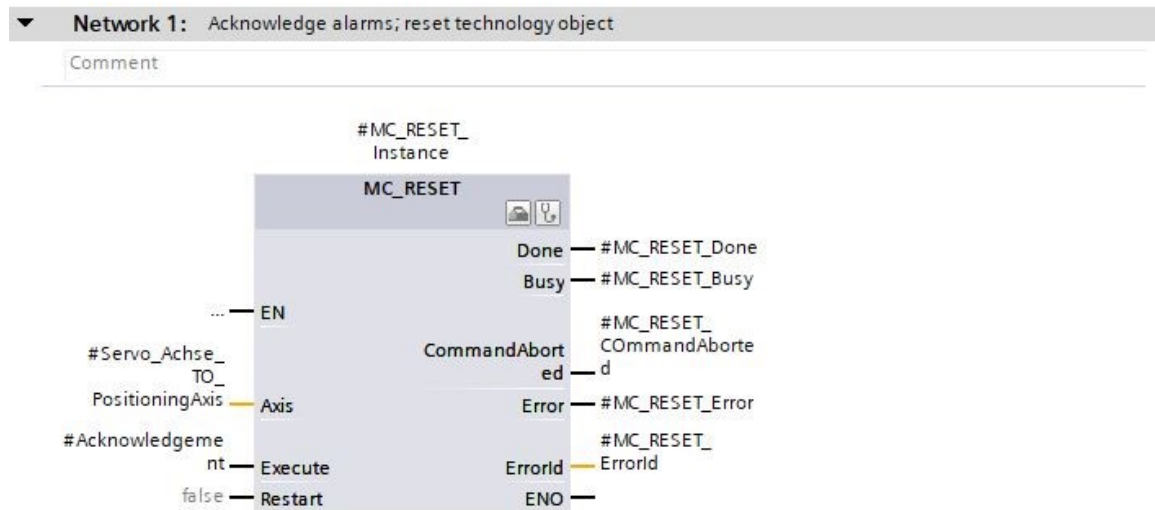
MOTION_CONTROL_MAGAZINE								
	Name	Data type	Default value	Retain	Accessi...	Writa...	Visible in ...	Setpoint
1	▼ Input				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	▶ Servo_Achse_TO_PositioningAxis	TO_PositioningAxis			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Acknowledgement	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Jog_up	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Jog_down	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Pushbutton_set_home_position	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Pushbutton_start_position00	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Pushbutton_start_position01	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Pushbutton_start_position02	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Position_home	LReal	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11	Position00	LReal	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12	Position01	LReal	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13	Position02	LReal	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
14	▼ Output				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	<Add new>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	▼ InOut				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	<Add new>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4	▼ Static				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	MC_RESET_Done	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	MC_RESET_Busy	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	MC_RESET_CommandAborted	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	MC_RESET_Error	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	MC_RESET_ErrorId	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	MC_POWER_Status	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11	MC_POWER_Busy	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12	MC_POWER_Error	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13	MC_POWER_ErrorId	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
14	MC_MOVEJOG_InVelocity	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
15	MC_MOVEJOG_Busy	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
16	MC_MOVEJOG_CommandAborted	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
17	MC_MOVEJOG_Error	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
18	MC_MOVEJOG_ErrorId	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
19	MC_HOME_ReferenceMarkPosition	LReal	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20	MC_HOME_Done	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
21	MC_HOME_Busy	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
22	MC_HOME_CommandAborted	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
23	MC_HOME_Error	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
24	MC_HOME_ErrorId	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
25	MC_MOVEABSOLUTE_Done_00	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
26	MC_MOVEABSOLUTE_Busy_00	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
27	MC_MOVEABSOLUTE_CommandAborted_00	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
28	MC_MOVEABSOLUTE_Error_00	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
29	MC_MOVEABSOLUTE_ErrorId_00	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
30	MC_MOVEABSOLUTE_Done_01	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
31	MC_MOVEABSOLUTE_Busy_01	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
32	MC_MOVEABSOLUTE_CommandAborted_01	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
33	MC_MOVEABSOLUTE_Error_01	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
34	MC_MOVEABSOLUTE_ErrorId_01	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
35	MC_MOVEABSOLUTE_Done_02	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
36	MC_MOVEABSOLUTE_Busy_02	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
37	MC_MOVEABSOLUTE_CommandAborted_02	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
38	MC_MOVEABSOLUTE_Error_02	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
39	MC_MOVEABSOLUTE_ErrorId_02	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

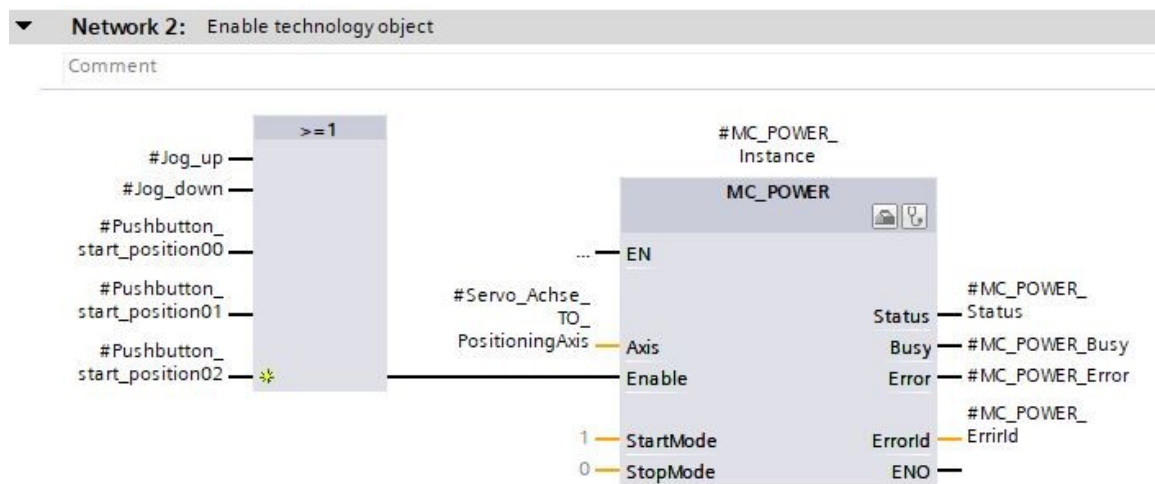
→ Using drag-and-drop, drag the 'MC_RESET' command from the 'Motion Control' point under the 'Technology' instructions into the first network and create the 'MC_RESET_Instance' multi-instance. (→ Instructions → Technology → Motion Control → MC_RESET → Multi-instance → MC_RESET_Instance → OK)



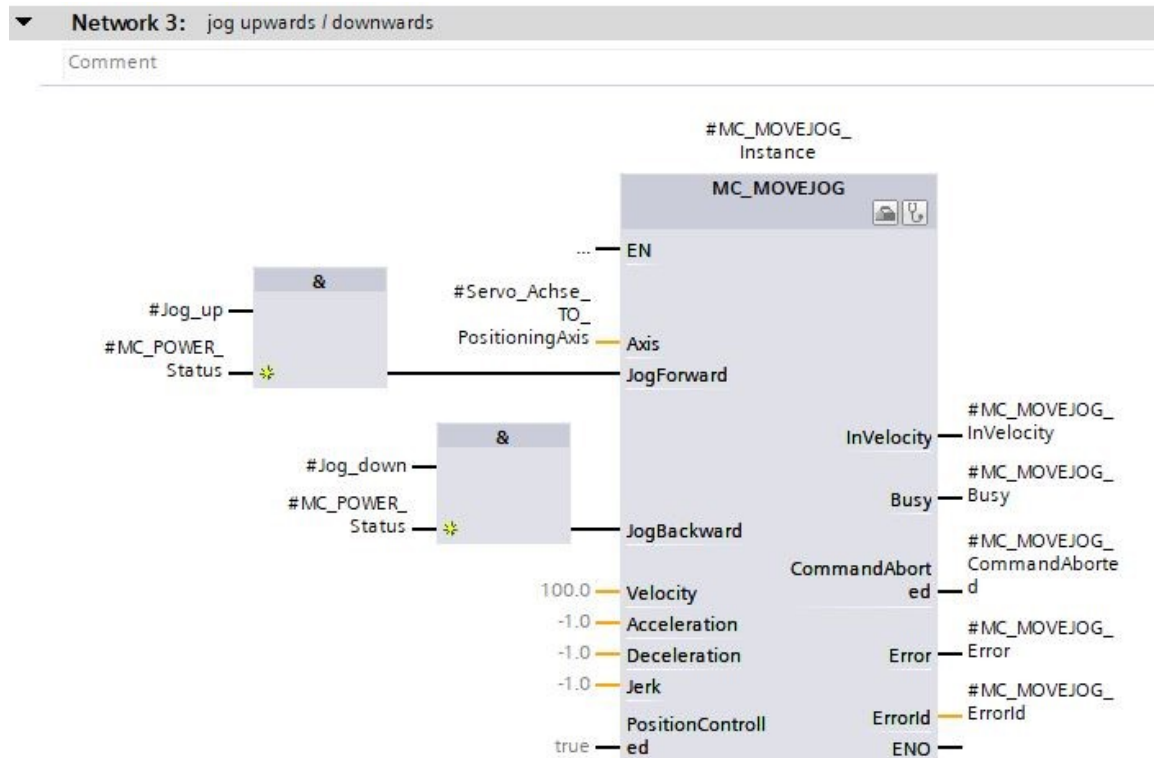
→ Label the network 1 and connect the 'MC_RESET' block as shown below.



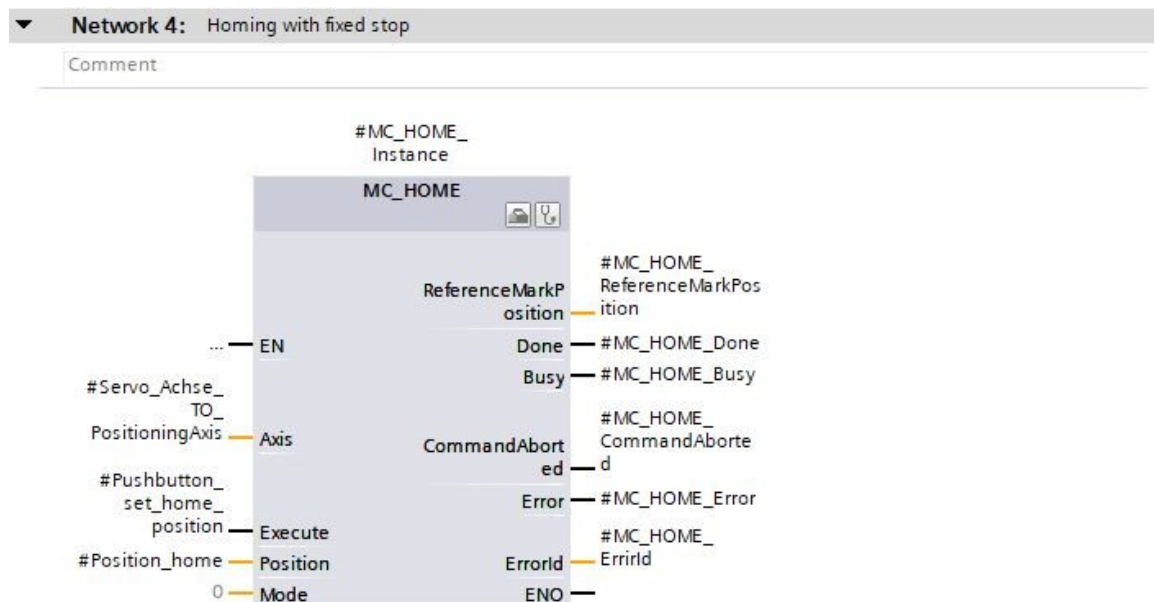
→ In network 2, program the call of the 'MC_POWER' block with multi-instance as shown here.
(→ Instructions → Technology → Motion Control → MC_POWER)



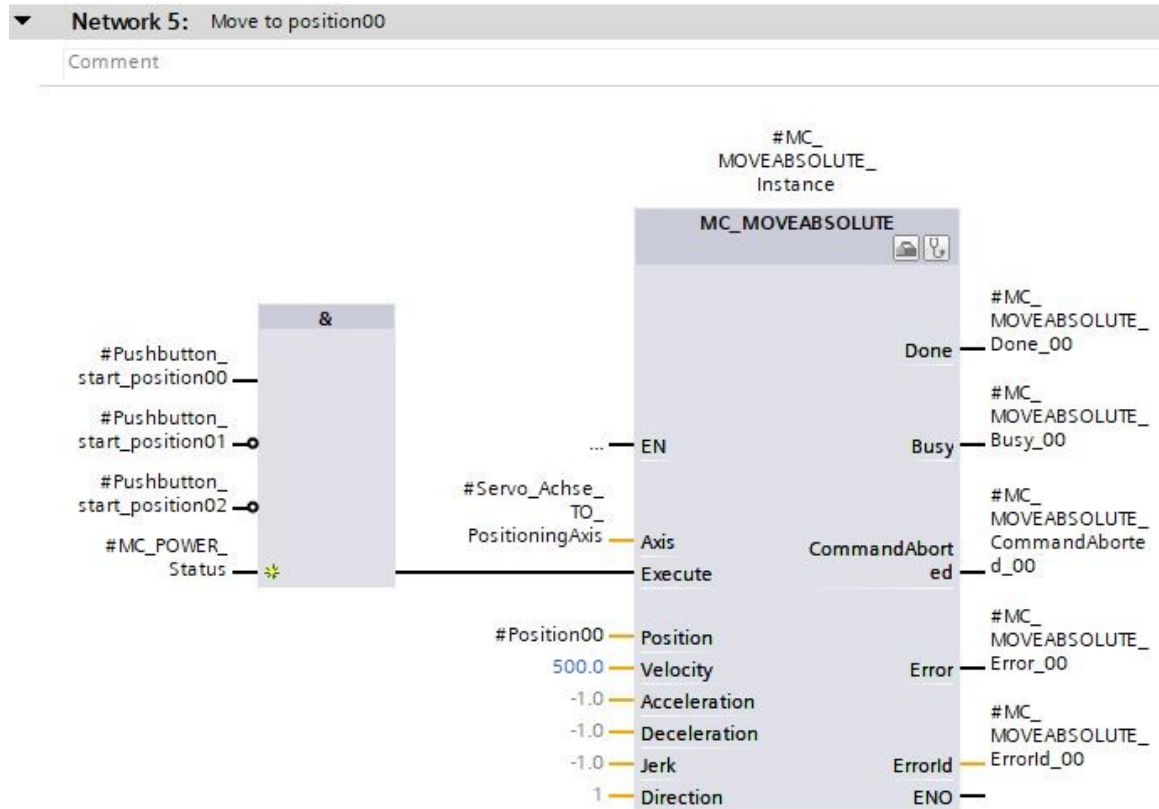
→ In network 3, program the call of the 'MC_MOVEJOG' block with multi-instance as shown here.
 (→ Instructions → Technology → Motion Control → MC_MOVEJOG)



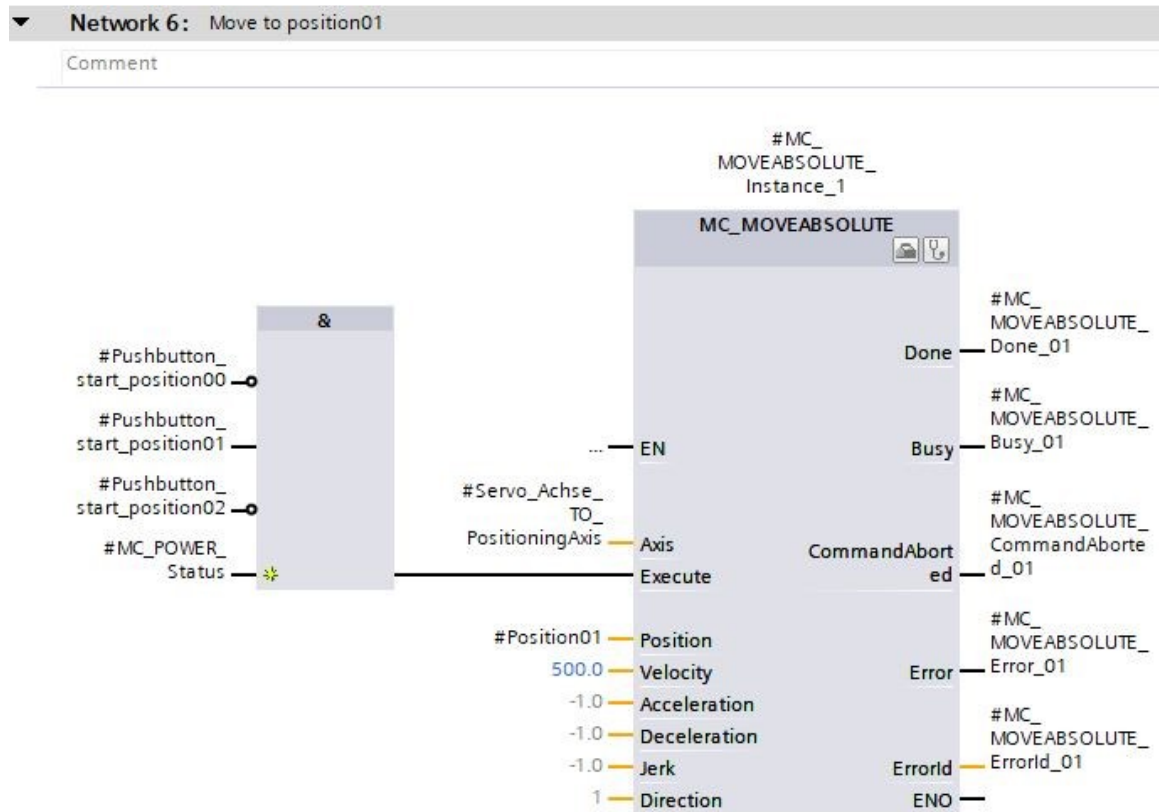
→ In network 4, program the call of the 'MC_HOME' block with multi-instance as shown below.
 (→ Instructions → Technology → Motion Control → MC_HOME)



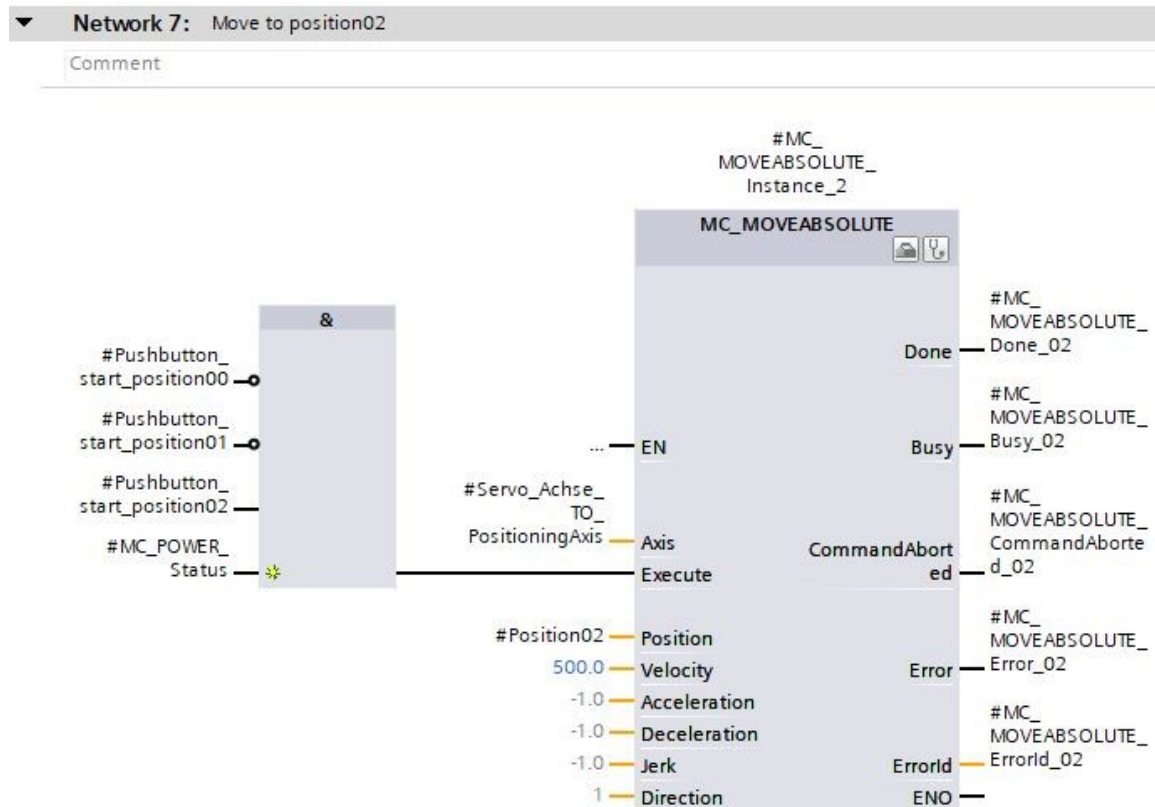
→ In network 5, program the call of the 'MC_MOVEABSOLUTE' block with multi-instance as shown here. (→ Instructions → Technology → Motion Control → MC_MOVEABSOLUTE)



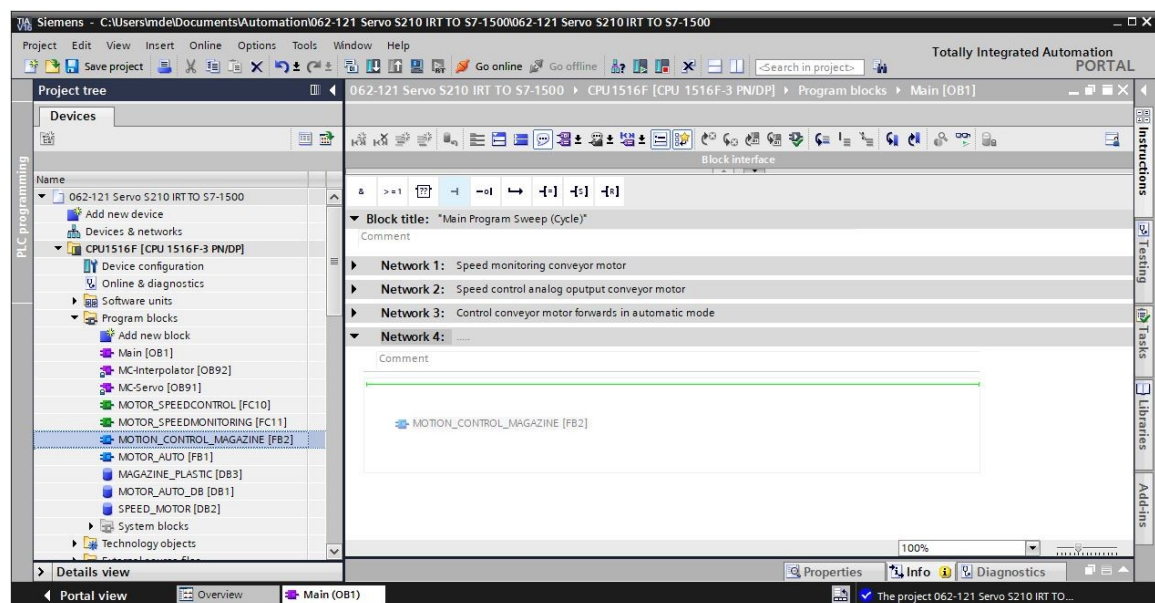
→ In network 6, program the call of the 'MC_MOVEABSOLUTE' block with multi-instance as shown below. (→ Instructions → Technology → Motion Control → MC_MOVEABSOLUTE)



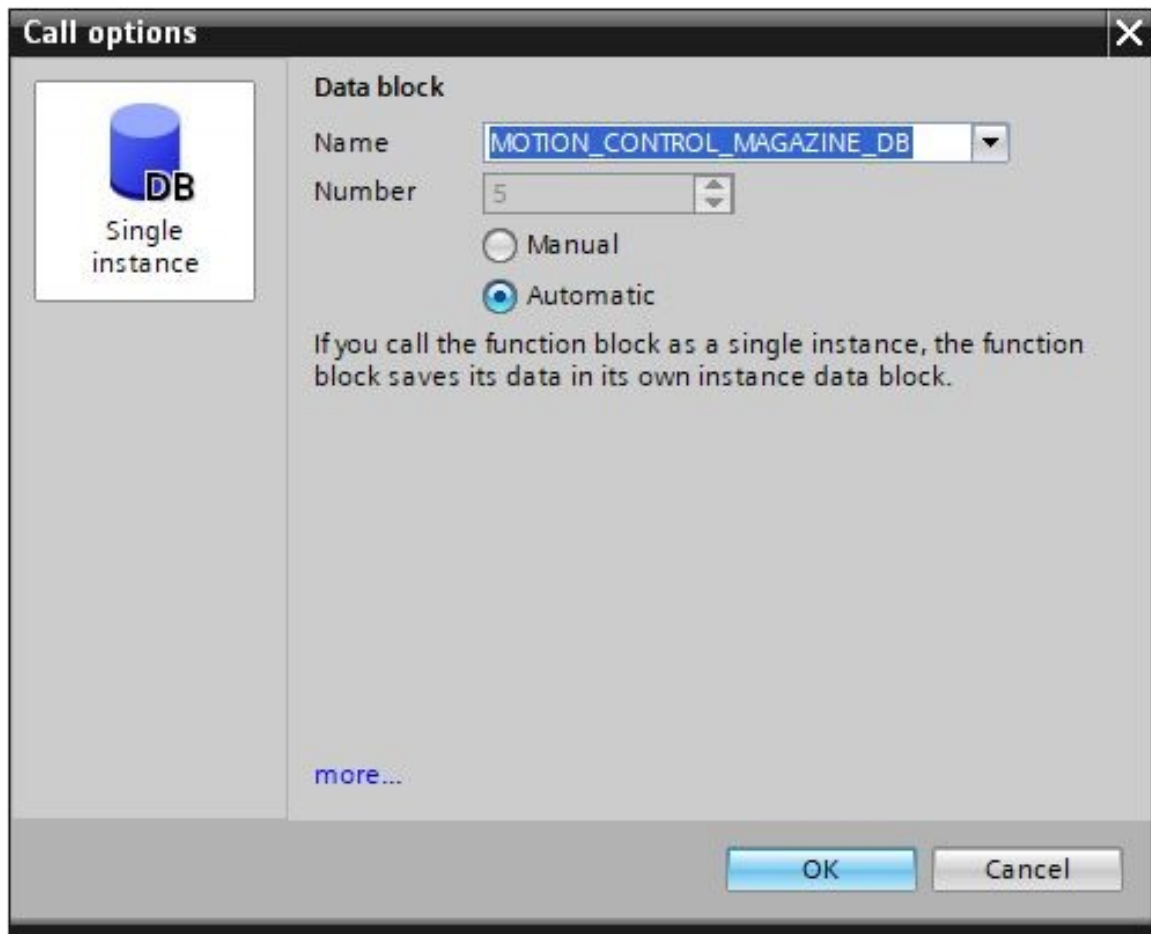
→ In network 7, program the call of the 'MC_MOVEABSOLUTE' block with multi-instance as shown here. (→ Instructions → Technology → Motion Control → MC_MOVEABSOLUTE)



→ Open the 'Main [OB1]' organization block and then call the 'MOTION_CONTROL_MAGAZINE[FB2]' function block in network 4. (→ Main [OB1] → MOTION_CONTROL_MAGAZINE[FB2])

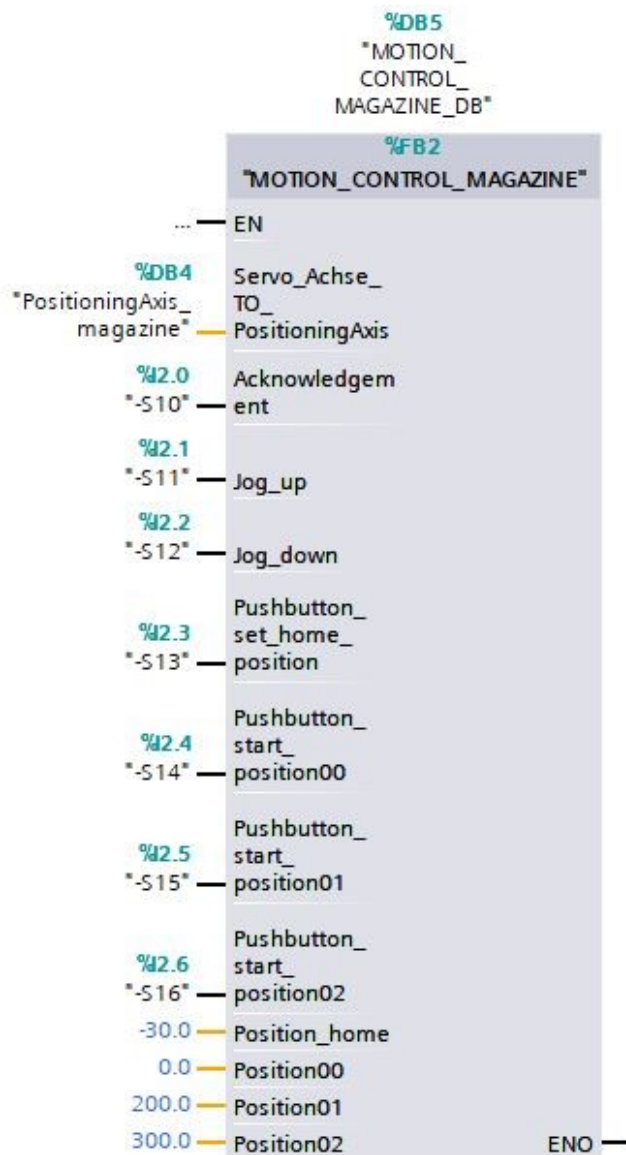


→ Create the instance data block as single instance. (→ Single instance → –
MOTION_CONTROL_MAGAZINE_DB → OK)





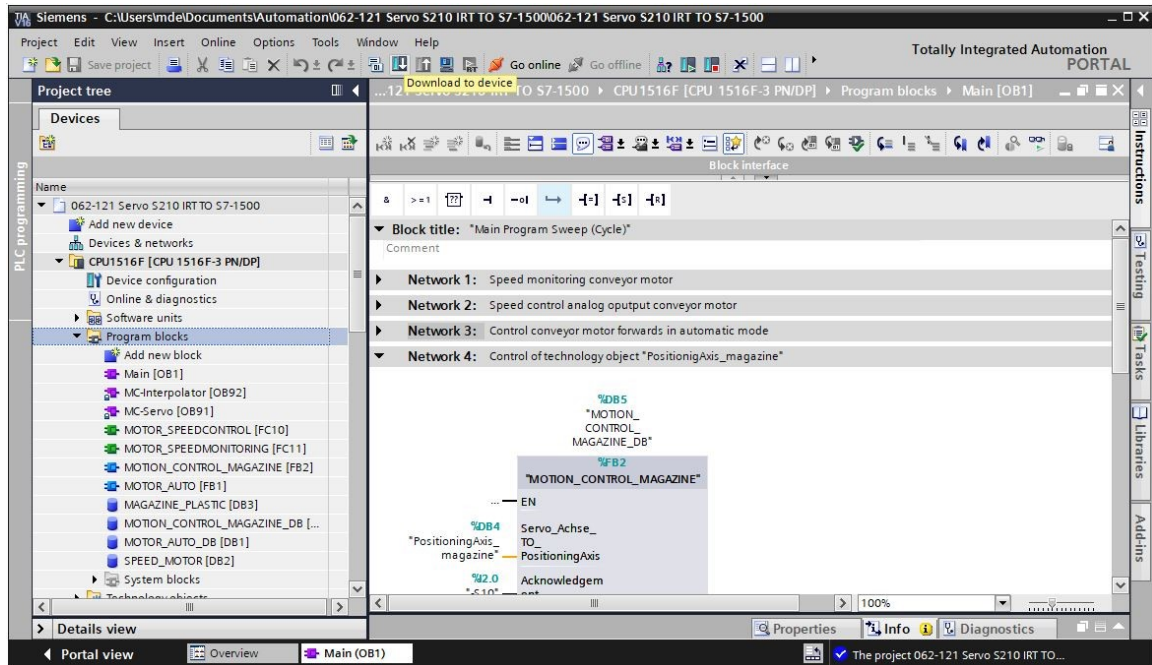
→ Connect the block as shown here and label the network 4.

▼ **Network 4:** Control of technology object "PositioningAxis_magazine"





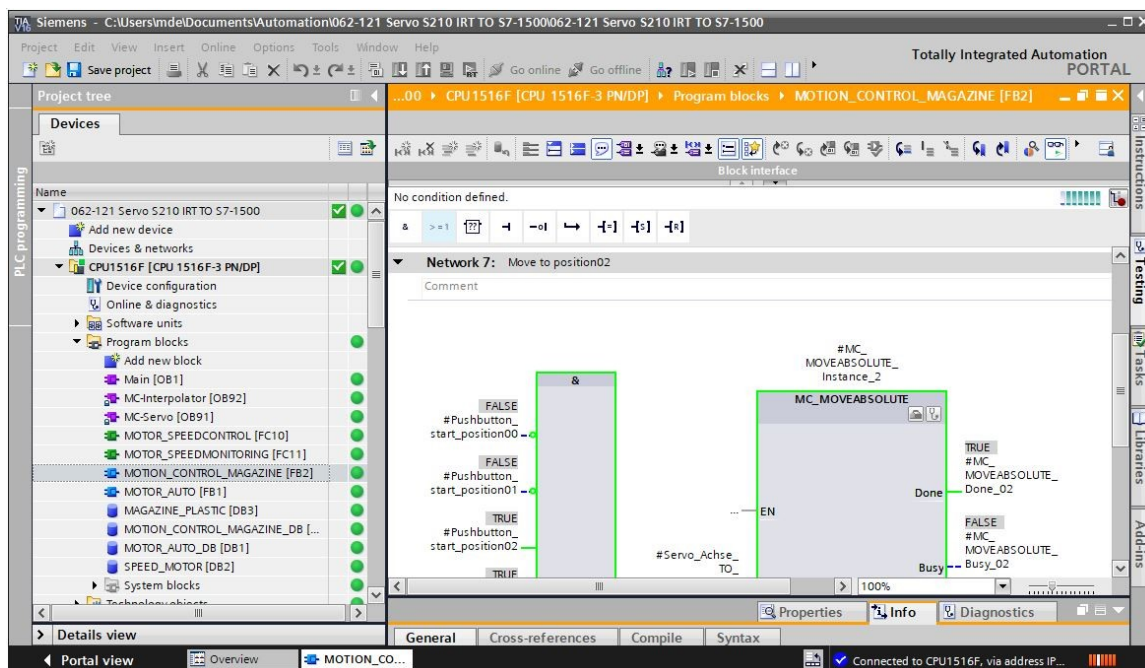
7.12 Downloading the program to SIMATIC S7 CPU 1516F-3 PN/DP


→ We now save the project once more before downloading the modified and created 'Program blocks' to the CPU 1516F-3 PN/DP. (→  Save project → Program blocks → )

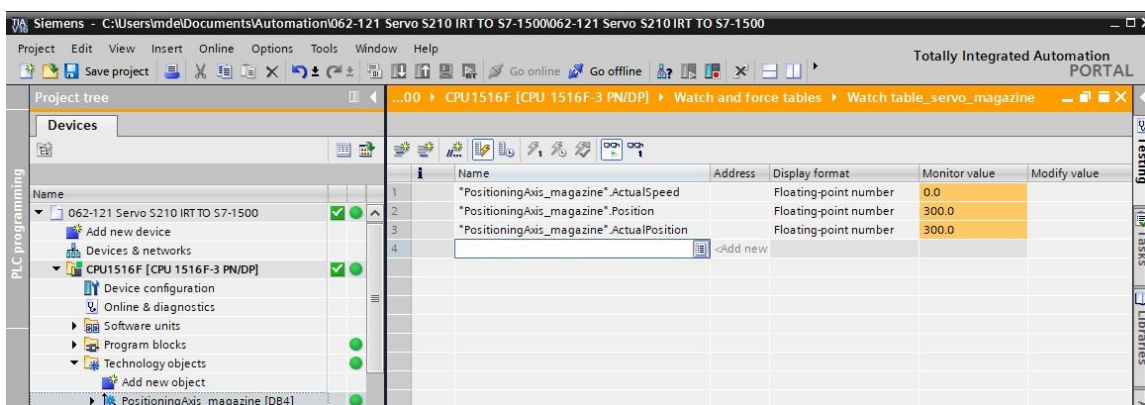


7.13 Diagnostics in the program in SIMATIC S7 CPU 1516F-3 PN/DP

→ The 'MOTION_CONTROL_MAGAZINE[FB2]' function block can be monitored to diagnose the control of the servo drive from the program. Monitoring is activated and deactivated by clicking the  icon. (→ MOTION_CONTROL_MAGAZINE[FB2] → )



→ For diagnostics of the values in the 'PositioningAxis_magazine' technology object, the data in the corresponding data block can be accessed in a watch table and in the program. (→ Add new watch table → Watch table_servo_magazine → Technology object → PositioningAxis_Magazine[DB4] → .ActualSpeed → .Position → .ActualPosition → )





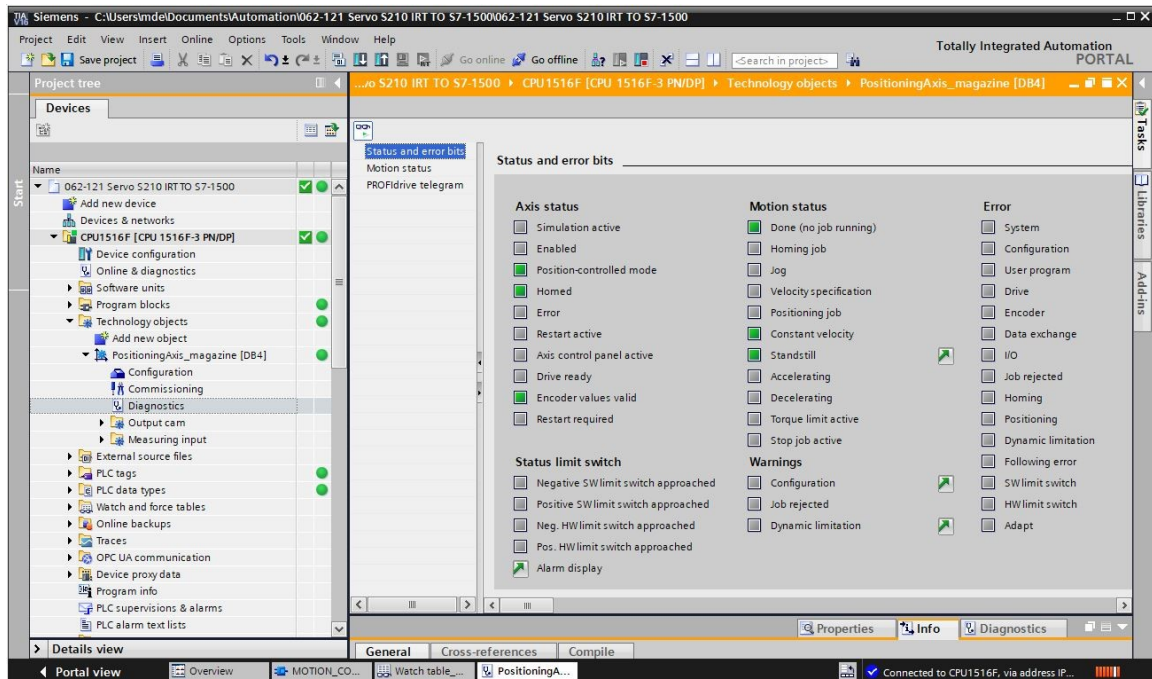
Note:

- Read-only access to this data is recommended

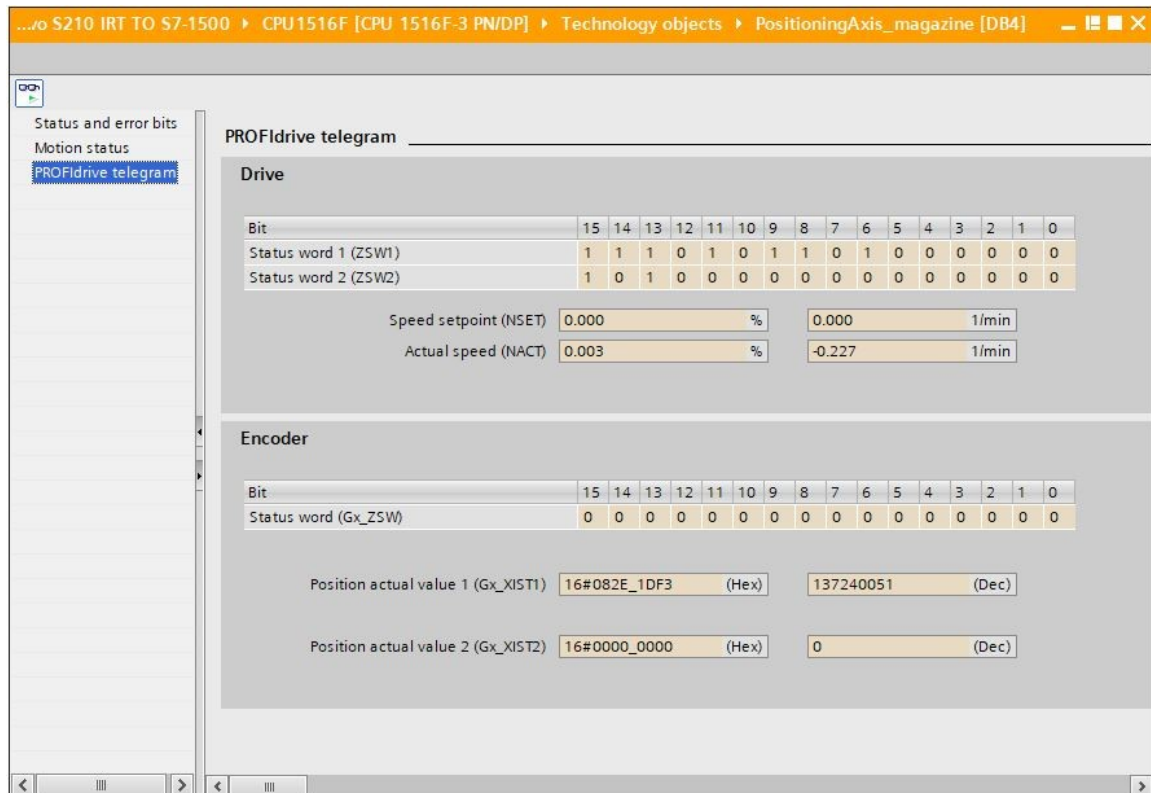
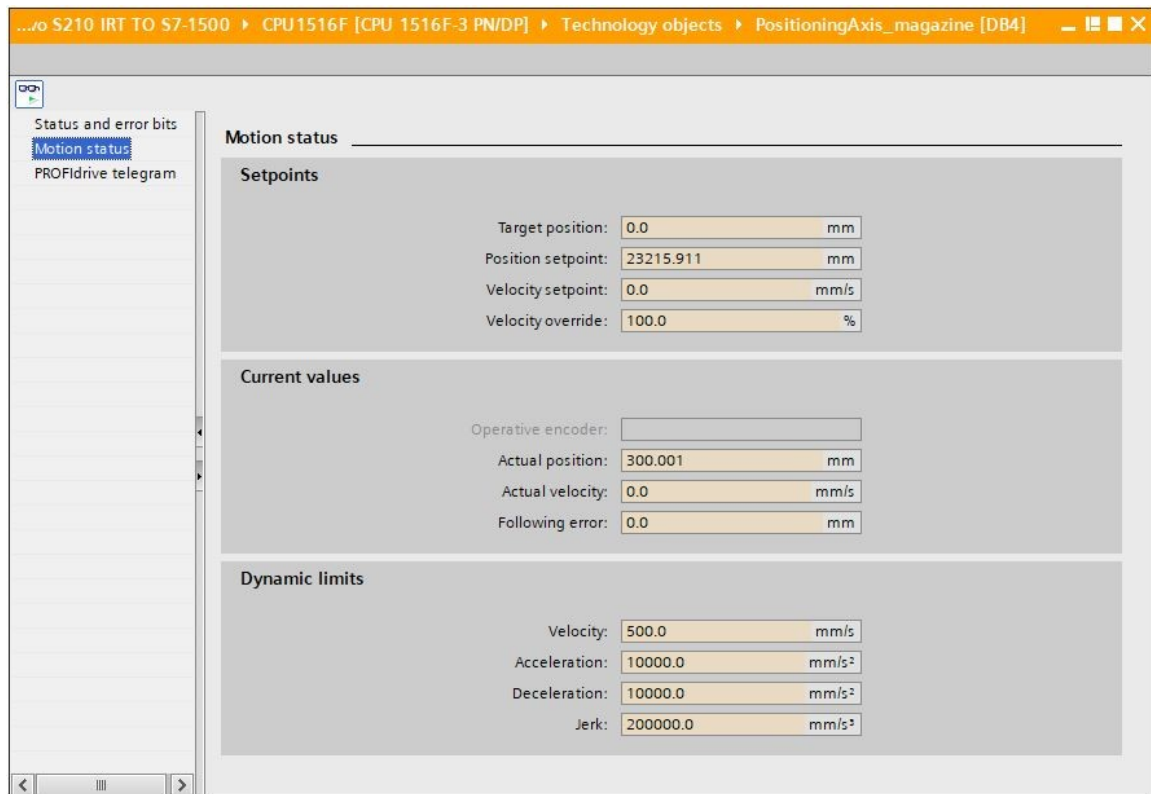
7.14 Diagnostics in the PositioningAxis_magazine technology object

→ Various views for diagnostics support are offered under Diagnostics in the 'PositioningAxis_magazine' technology object. We see the 'Status and error bits' view here first.

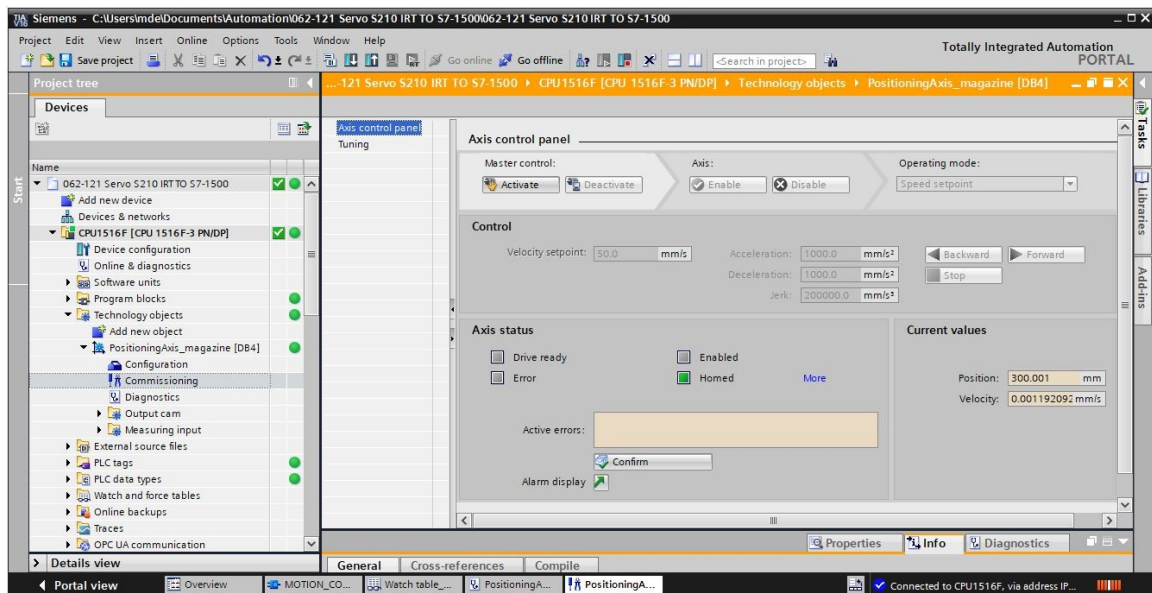
Monitoring is activated and deactivated by clicking . (→ Technology objects → PositioningAxis_magazine → Diagnostics → Status and error bits → )



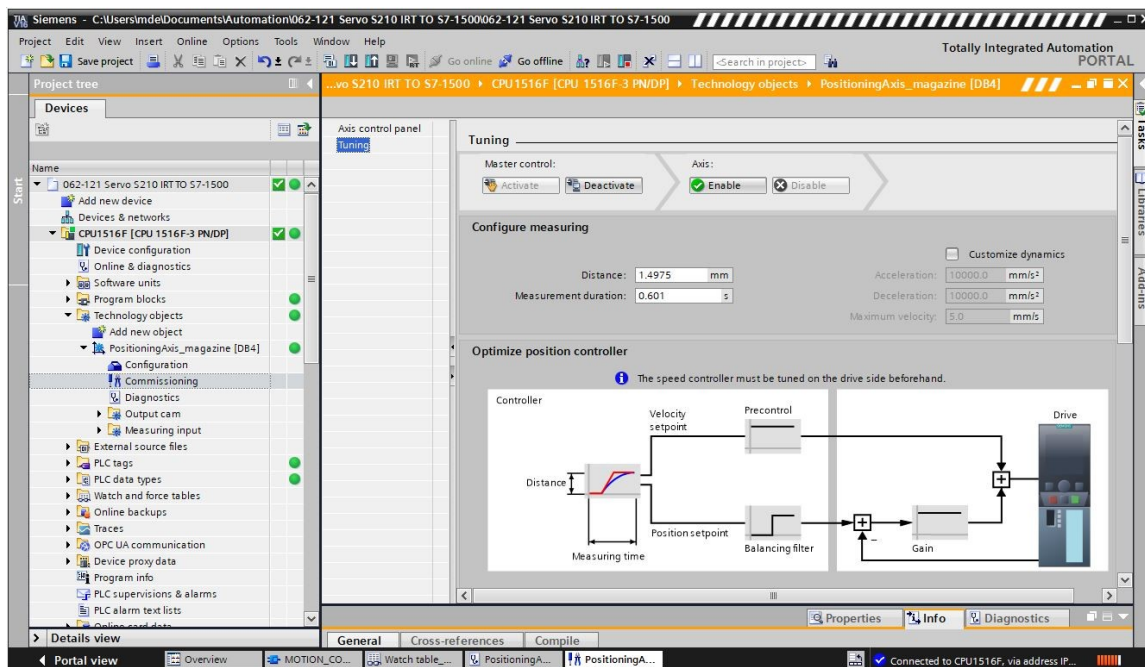
→ 'Motion status' and 'PROFIdrive telegram' are further views. (→ Motion status → PROFIdrive telegram)



→ The 'Axis status' and 'Current values' can also be monitored under 'Commissioning' in the 'Axis control panel' of the 'PositioningAxis_magazine' technology object. (→ Technology objects → PositioningAxis_magazine → Commissioning → Axis control panel)



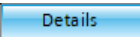

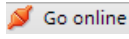
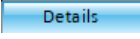

- The "Tuning" function supports you in determining the optimum precontrol and gain (Kv factor) for position control of the axis. For this purpose, the velocity characteristic of the axis is recorded during a configurable positioning movement with the Trace function. You can then evaluate the recording and adapt the precontrol and gain accordingly.
(→ Technology objects → PositioningAxis_magazine → Commissioning → Tuning)

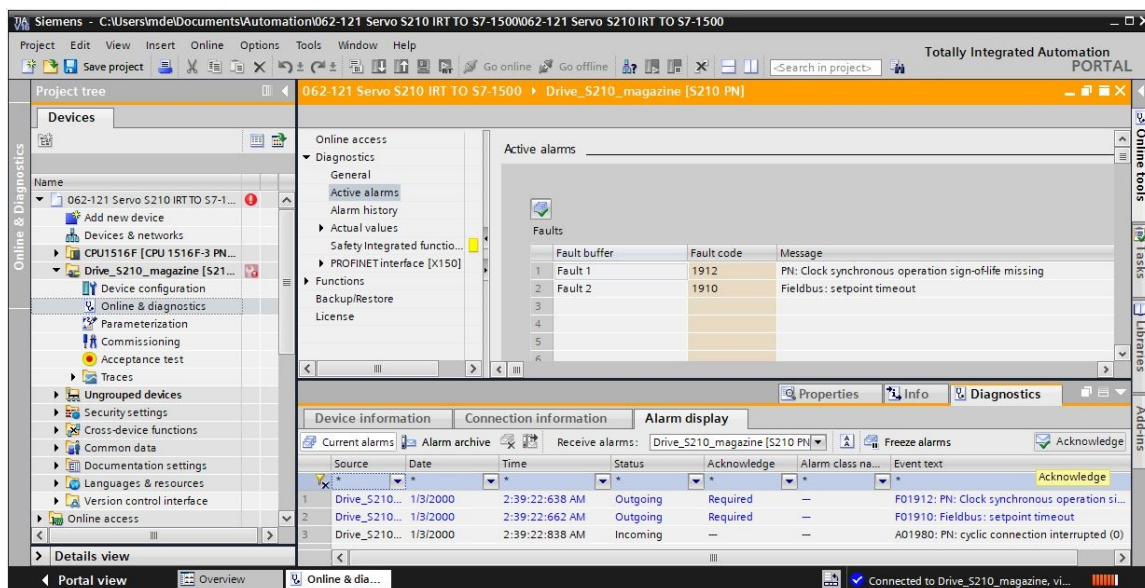


Note:

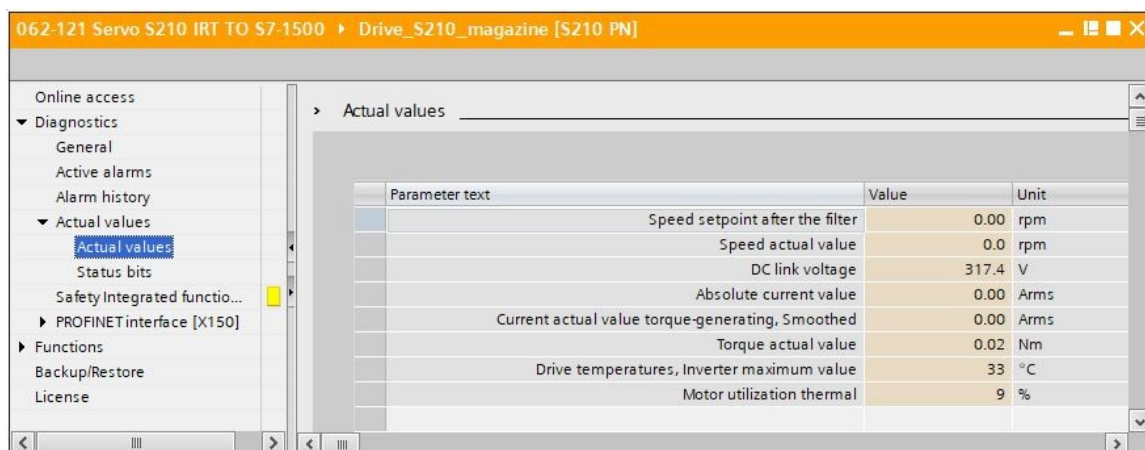
- Before tuning is carried out, 'One Button Tuning' should be performed in the drive.

7.15 Diagnostics with SINAMICS Startdrive for servo drive S210

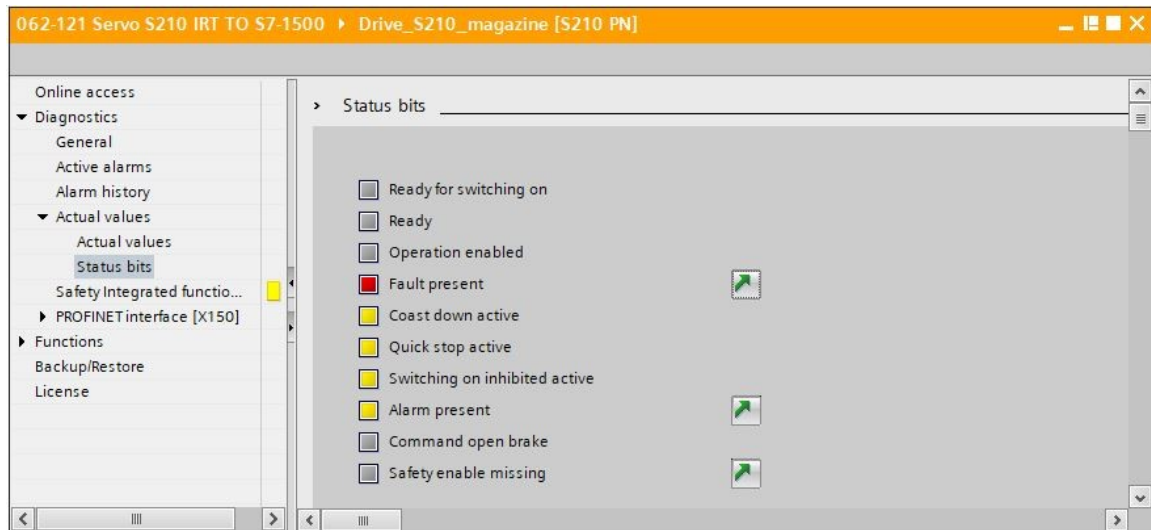
- 'Active alarms' and 'Active faults' can be displayed in the frequency converter. You can find them under 'Online & Diagnostics'. You can click the  icon to view them in the alarm view and acknowledge them there by clicking on the  icon. (→  → Drive_S210... → Online & Diagnostics → Diagnostics → Active alarms →  → )



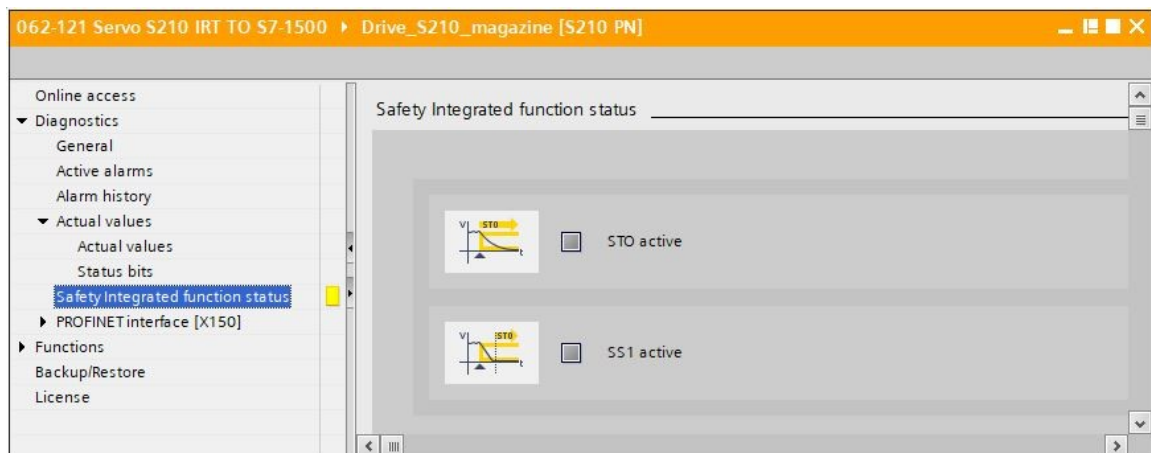
→ You can see important values of the servo drive under 'Actual values'. (→ Drive_S210... → Online & Diagnostics → Diagnostics → Actual values → Actual values)



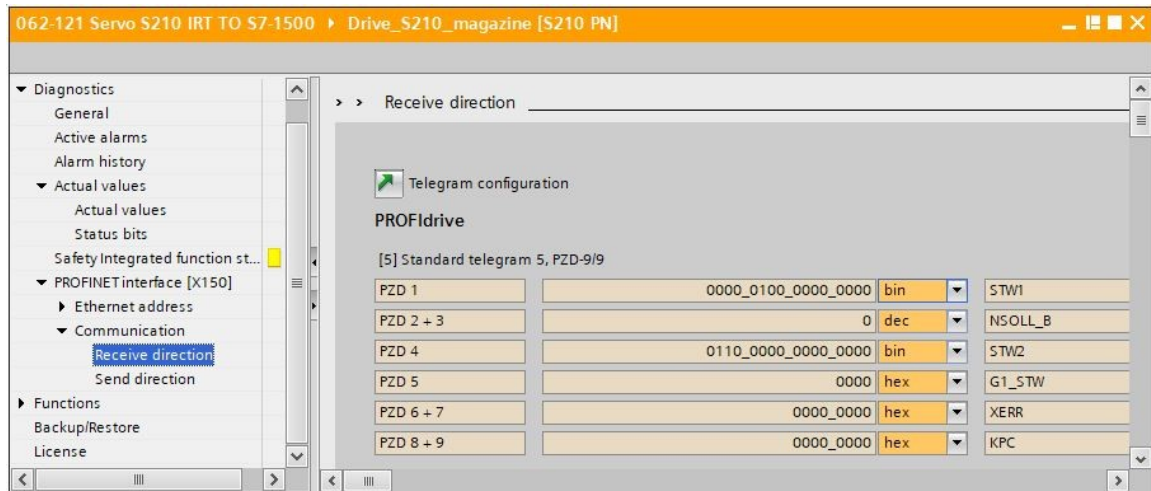
→ The 'Status bits' of the servo drive can also be monitored here.
 (→ Drive_S210... → Online & Diagnostics → Diagnostics → Actual values → Status bits)



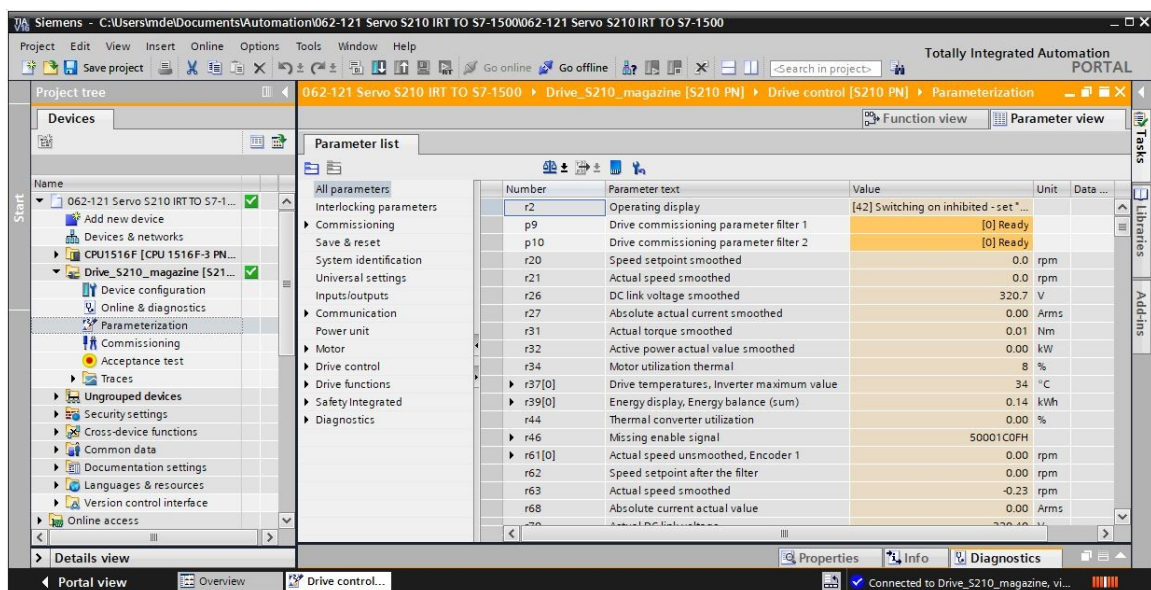
→ The 'Safety Integrated function status' is also displayed here under 'Diagnostics'.
 (→ Drive_S210... → Online & Diagnostics → Diagnostics → Safety Integrated function status)



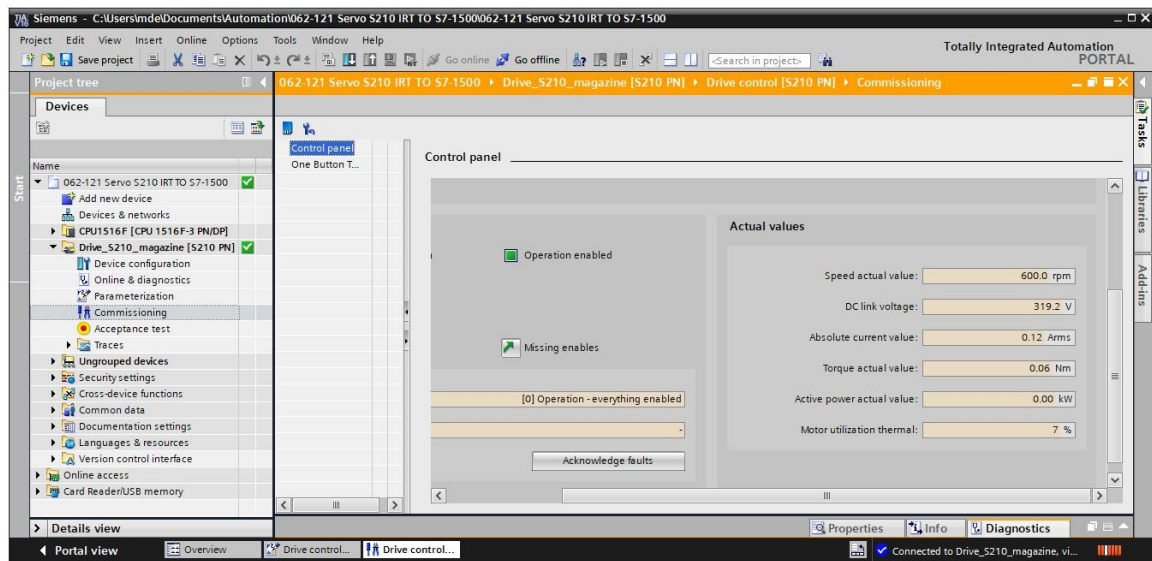
- The telegram data of the communication can be monitored in 'Receive direction' and in 'Send direction'. (→ Drive_S210... → Online & Diagnostics → Diagnostics → PROFINET interface → Communication → Send direction → Receive direction)



- Parameter values can also be monitored online in the 'Parameter view' and the 'Function view' of the 'Parameters'. (→ Parameters → Function view → Parameter view)

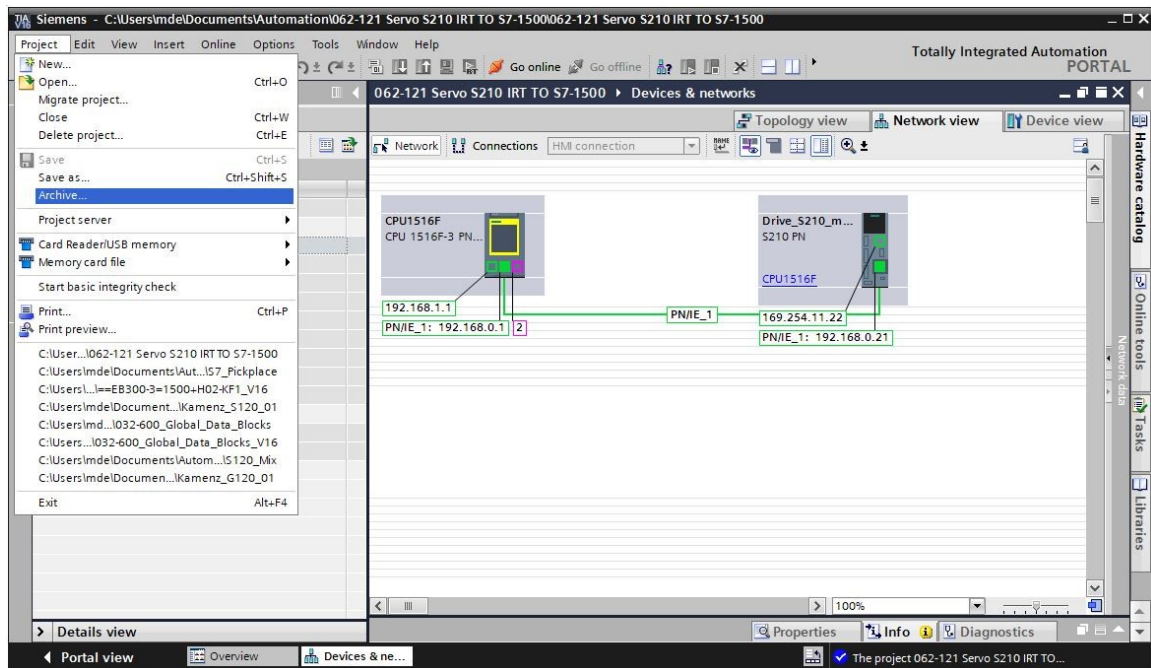


→ States and actual values can be monitored in the 'Control panel' under 'Commissioning'. (→ Commissioning → Control panel)



7.16 Archiving the project

→ Finally, the complete project will be archived. Select → 'Project' → 'Archive ...' in the menu.
 Open a folder in which you want to archive your project and save your project as the file type 'TIA Portal project archive'. (→ Project → Archive → TIA Portal project archive → 062-121-servo-s210-irt-to-s7-1500... → Save)



7.17 Checklist

No.	Description	Checked
1	Servo drive system SINAMICS S210 created in the TIA Portal and assigned parameters with SINAMICS Startdrive.	
2	Servo drive system SINAMICS S210 successfully tested via control panel.	
3	Servo drive SINAMICS S210 of the CPU1516F-3 PN/DP assigned as IRT device.	
4	'TO_PositioningAxis' technology object created in CPU1516F-3 PN/DP.	
5	Device configuration with the servo drive SINAMICS S210 as IRT device downloaded successfully to the CPU1516F-3 PN/DP.	
6	Device name assigned to the SINAMICS S210 servo drive.	
7	Technology object successfully tested via control panel.	
8	'MOTION_CONTROL_MAGAZINE' '[FB2]' function block created and called in Main [OB1].	
9	Program blocks successfully compiled and downloaded without error message.	
10	Press 'Acknowledge'-button (-S10 = 1) briefly to acknowledge errors.	
11	Drive the magazine to the fixed stop with the 'Jog' down button (-S12 = 1).	
12	Perform homing to the position of the fixed stop using the 'Home position' button (-S13 = 1).	
13	Now, the desired position can be approached with the Start positioning to Position 00 (-S14 = 1) Start positioning to Position 01 (-S15 = 1) Start positioning to Position 02 (-S16 = 1) buttons.	
14	Project archived successfully.	

8 Additional information

More information for further practice and consolidation is available as orientation, for example: Getting Started, videos, tutorials, apps, manuals, programming guidelines and trial software / firmware, under the following link:

[Drives](#)

"Further Information" preview

Getting Started, Videos, Tutorials, Apps, Manuals, Trial-SW/Firmware

- TIA Portal Videos
- TIA Portal Tutorial Center
- Getting Started
- Programming Guideline
- Easy Entry in SIMATIC S7-1200
- Download Trial Software/Firmware
- Technical Documentation SIMATIC Controller
- Industry Online Support App
- TIA Portal, SIMATIC S7-1200/1500 Overview
- TIA Portal Website
- SIMATIC S7-1200 Website
- SIMATIC S7-1500 Website

Further Information

Siemens Automation Cooperates with Education
[siemens.com/sce](https://www.siemens.com/sce)

SCE Learning/Training Documents
[siemens.com/sce/documents](https://www.siemens.com/sce/documents)

SCE Trainer Packages
[siemens.com/sce/tp](https://www.siemens.com/sce/tp)

SCE Contact Partners
[siemens.com/sce/contact](https://www.siemens.com/sce/contact)

Digital Enterprise
[siemens.com/digital-enterprise](https://www.siemens.com/digital-enterprise)

Totally Integrated Automation (TIA)
[siemens.com/tia](https://www.siemens.com/tia)

TIA Portal
[siemens.com/tia-portal](https://www.siemens.com/tia-portal)

TIA Selection Tool
[siemens.com/tia/tia-selection-tool](https://www.siemens.com/tia/tia-selection-tool)

SIMATIC Controller
[siemens.com/controller](https://www.siemens.com/controller)

SIMATIC Technical Documentation
[siemens.com/simatic-docu](https://www.siemens.com/simatic-docu)

Industry Online Support
support.industry.siemens.com

Product catalog and online ordering system Industry Mall
mall.industry.siemens.com

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