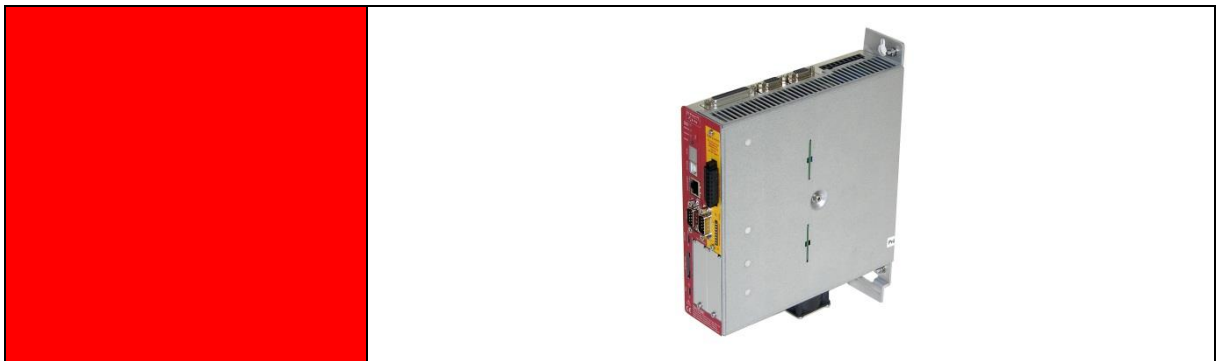


Servo Controller SE-Power FS

- **Programming example Profinet
Siemens TIA V13.1 and V14.0**



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

| Type | Order No. |
|-----------------------------|-----------|
| SE-Power Profibus Interface | 50036340 |

Version of this documentation: SE-Power FS programming example Profinet Siemens TIA V13-V14 vers. 1.1 en.01.06.2022

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



Caution!

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.

Please pay attention to the notes in:

1.1 Documentation

1 General

1.1 Documentation

For the Servo Controllers of the SE-Power 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-Power FS 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-Power FS servo controller series.</p> <p>It is meant for persons who want to get familiar with the SE-Power FS servo controller</p> |



Caution!

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-Power FS series.

Complementary documents to the operating manual:

| present | documentation / description |
|--------------------------|---|
| <input type="checkbox"/> | <ul style="list-style-type: none"> ▪ SE-Power FS mounting instructions <p>This manual is included during delivery of the SE-Power FS devices and provides an extract from the manual represents the installation instructions contained therein make sure that they can easily operate the servo drive.</p> |
| <input type="checkbox"/> | <ul style="list-style-type: none"> ▪ SE-Power FS STO-manual <p>Description of the technical data and the device functionality, installation, and operation of the safety module STO.</p> |
| <input type="checkbox"/> | <ul style="list-style-type: none"> ▪ SE-Power FS MOV-manual <p>Description of the technical data and the device functionality, installation, and operation of the safety module MOV.</p> |

| present | documentation / description |
|-------------------------------------|---|
| <input type="checkbox"/> | <ul style="list-style-type: none"> ▪ SE-Power Software-manual <p>Description of the software SE-Commander with the individual functions.</p> |
| <input type="checkbox"/> | <ul style="list-style-type: none"> ▪ SE-Power CANopen-manual <p>Description of the implemented CANopen protocol according to CiA DSP402 and DS301.</p> |
| <input type="checkbox"/> | <ul style="list-style-type: none"> ▪ SE-Power FS PROFIBUS/PROFINET-manual <p>Description of the implemented PROFIBUS-DP and PROFINET protocols, the technical data and the device functionality, installation, and operation of the fieldbus-modules „SE-Power Profibus Interface“ and „SE-Power Profinet Interface“.</p> |
| <input type="checkbox"/> | <ul style="list-style-type: none"> ▪ SE-Power EtherCAT-manual <p>Description of the fieldbus control by using the CoE (CANopen over EtherCAT) protocol, the technical data and the device functionality, installation, and operation of the fieldbus-module „SE-Power EtherCAT Interface“.</p> |
| <input type="checkbox"/> | <ul style="list-style-type: none"> ▪ SE-Power FS Programming example Profibus Siemens S7 V5.5 <p>Description of the configuration and program to the programming example Profibus for Siemens S7 V5.5.</p> |
| <input type="checkbox"/> | <ul style="list-style-type: none"> ▪ SE-Power FS Programming example Profibus Siemens S7 TIA V12 <p>Description of the configuration and program to the programming example Profibus for Siemens S7 TIA V12.</p> |
| <input checked="" type="checkbox"/> | <ul style="list-style-type: none"> ▪ SE-Power FS Programming example Profinet Siemens S7 TIA V13/V14 <p>Description of the configuration and program to the programming example Profinet for Siemens S7 TIA V13.1 and V14.0.</p> |

These documents are available for download on our homepage:

www.afag.com

2 Programming example for SIEMENS TIA Portal V13.1 and V14.0

2.1 Introduction

For the servo positioning controller SE-Power FS, specifically for the Siemens PLC systems (SIMATIC S7 controllers) were written function blocks that facilitate integration of the servo positioning controller in a PLC program with PROFINET 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-Power_POS_TIAV13.zap13 |
| Positioning | SE-Power_POS_TIAV13.zap14 |



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

The sample project can be retrieved under the Siemens TIA V13.1 or V14.0 Portal. Of this retrieved example project, the relevant FBs, 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 function and data blocks (FB, DB) are the operating mode "**Positioning**" assigned.



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 FBs and DBs within the Siemens S7 world. **This manual does not replace the "SE-Power FS Profibus/Profinet 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 function and data blocks.

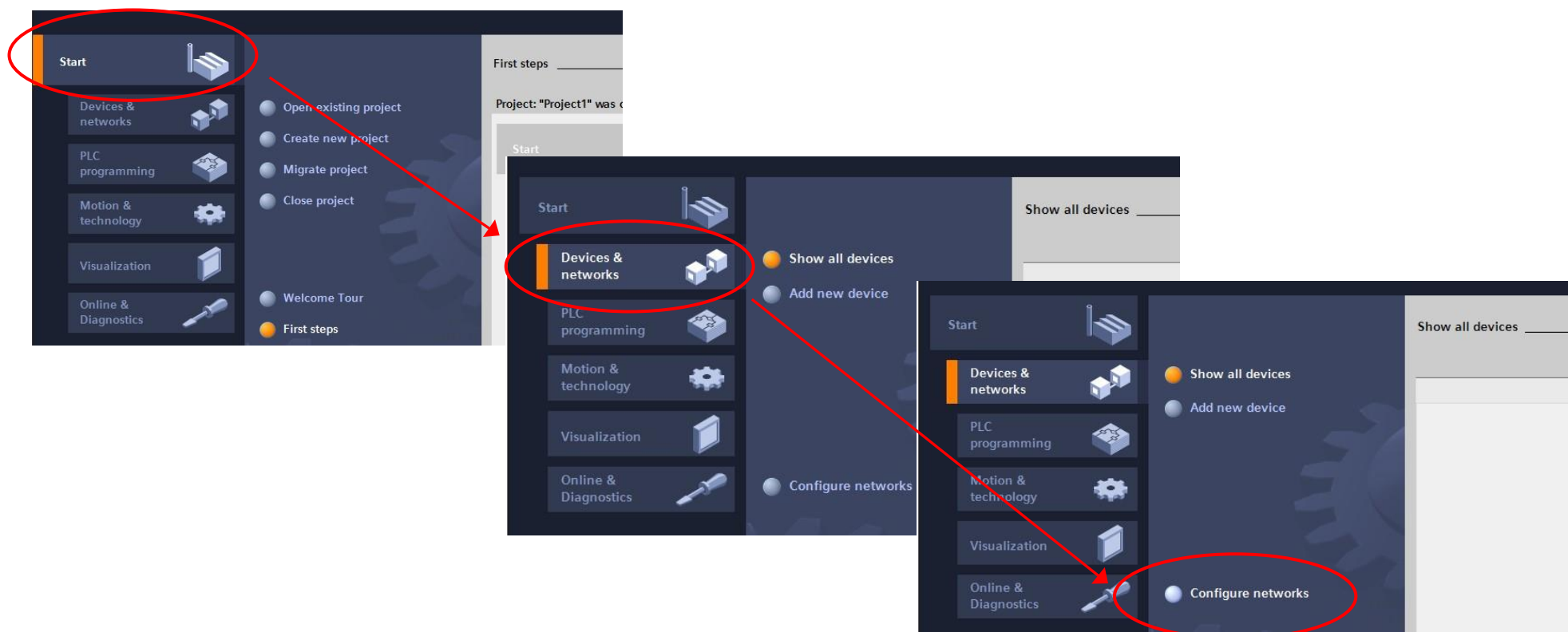
When using the sample programs in customer-specific applications, the user must verify that all functional and safety-relevant conditions are met.

3 Integrate in SIEMENS TIA Portal V12.0

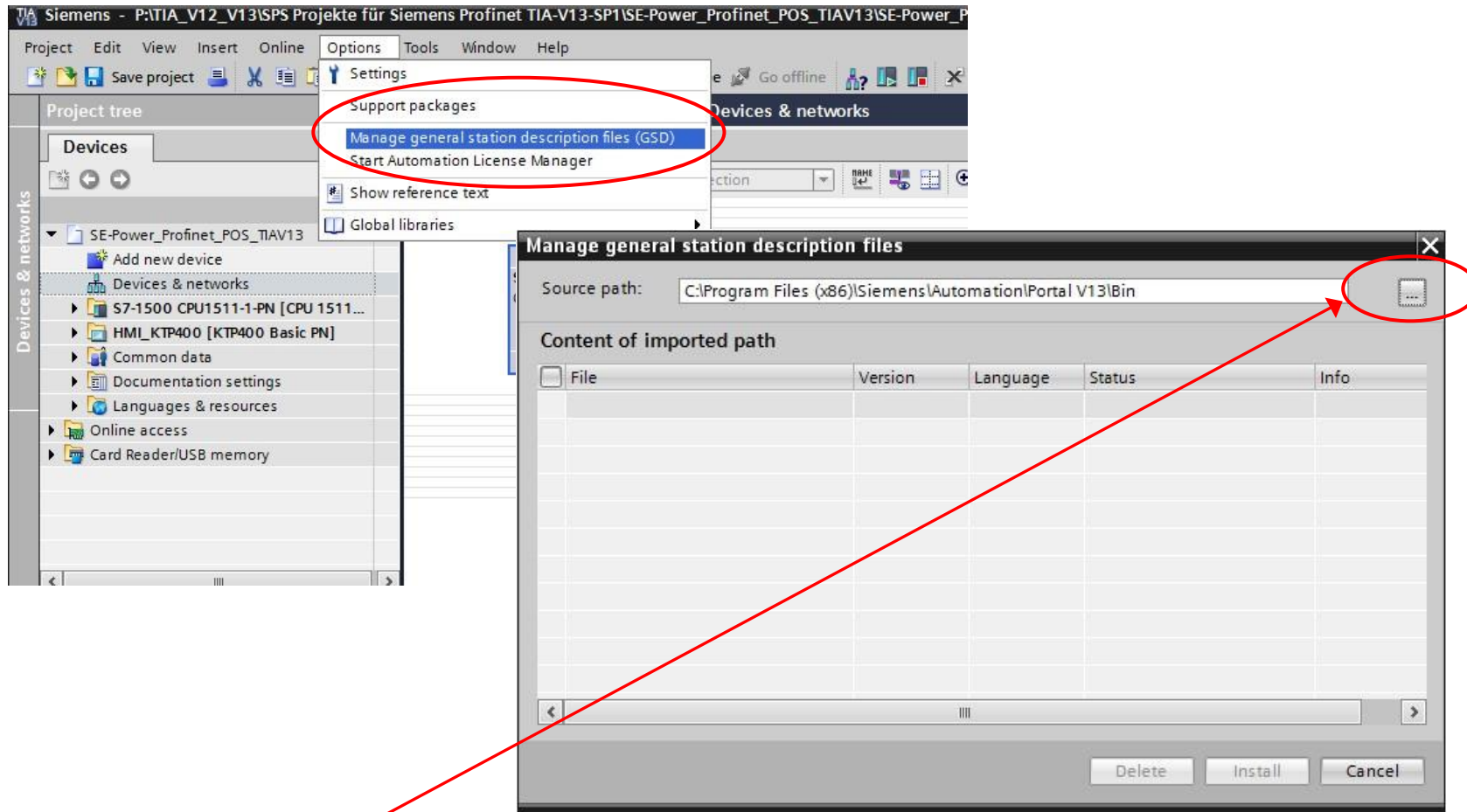
3.1 Configuration

3.1.1 Integrate of the GSD-File

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



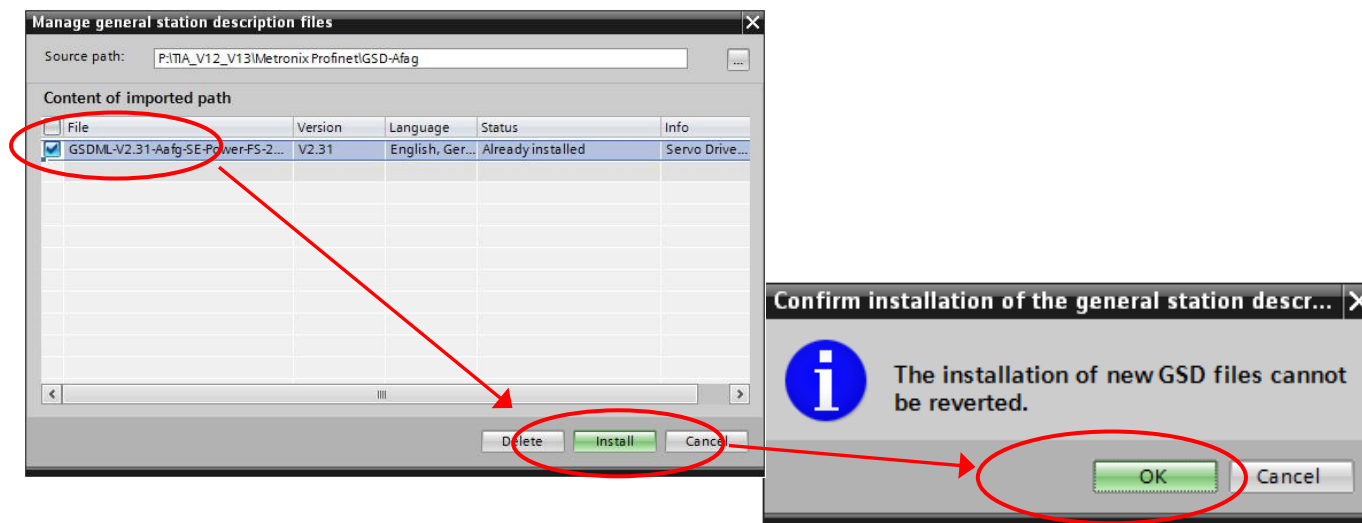
With the command **Options → Install general station description file (GSD)** the window to select the GSD file open.



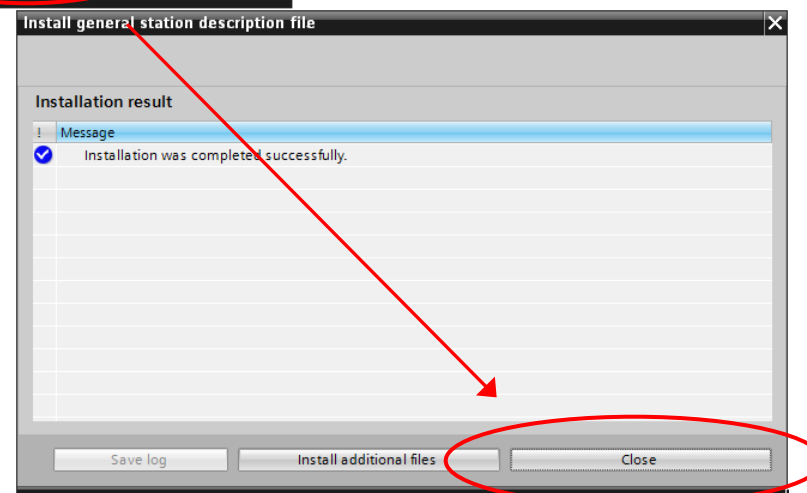
With the button „...“ open the path, which is stored under the corresponding GSD file.

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

The File **GSDML-V2.31-Afag-SE-FS-20160512.xml** select and start **Install**.



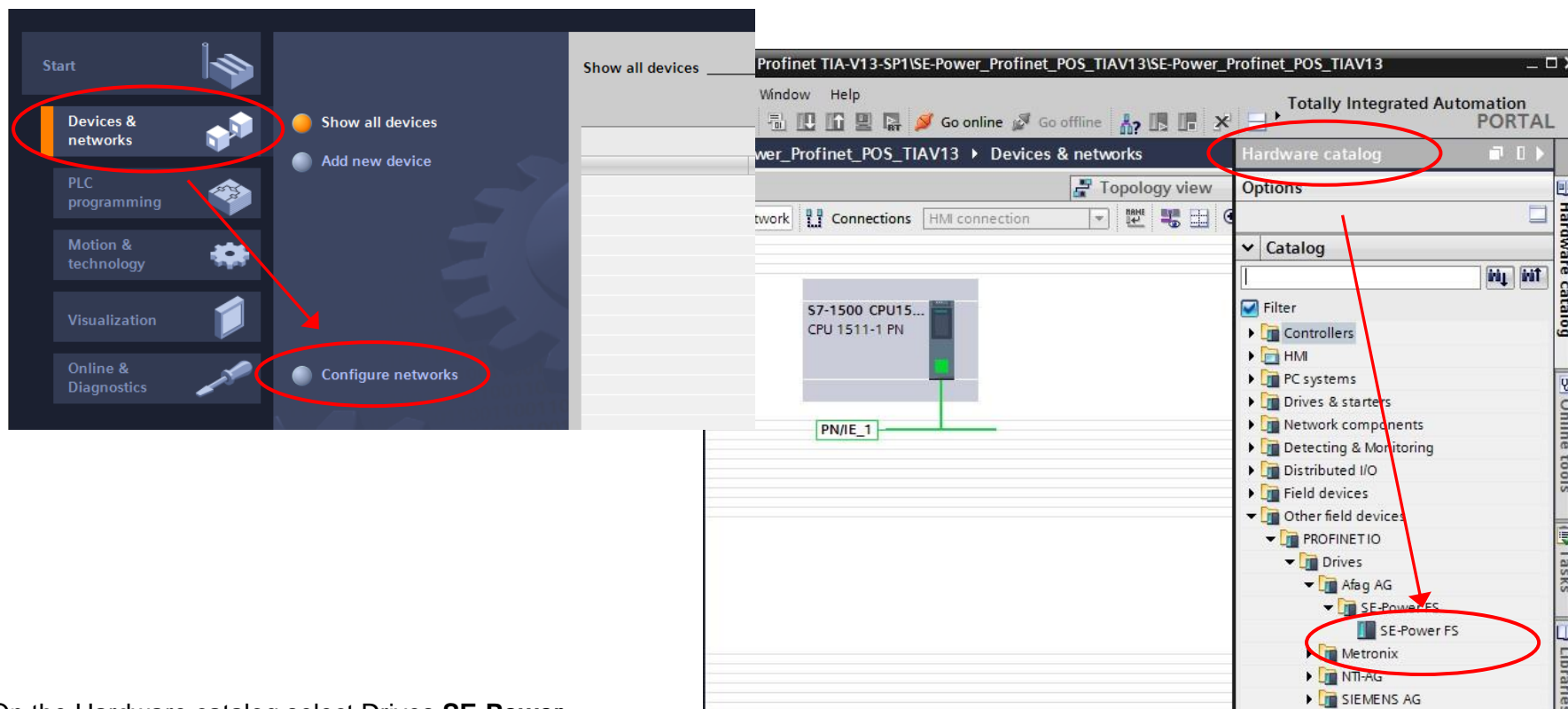
Confirm the message with „OK“.



Finish the installation confirmation with „close“.

3.1.2 Configuration Connection servo controller SE-Power FS on Profinet

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

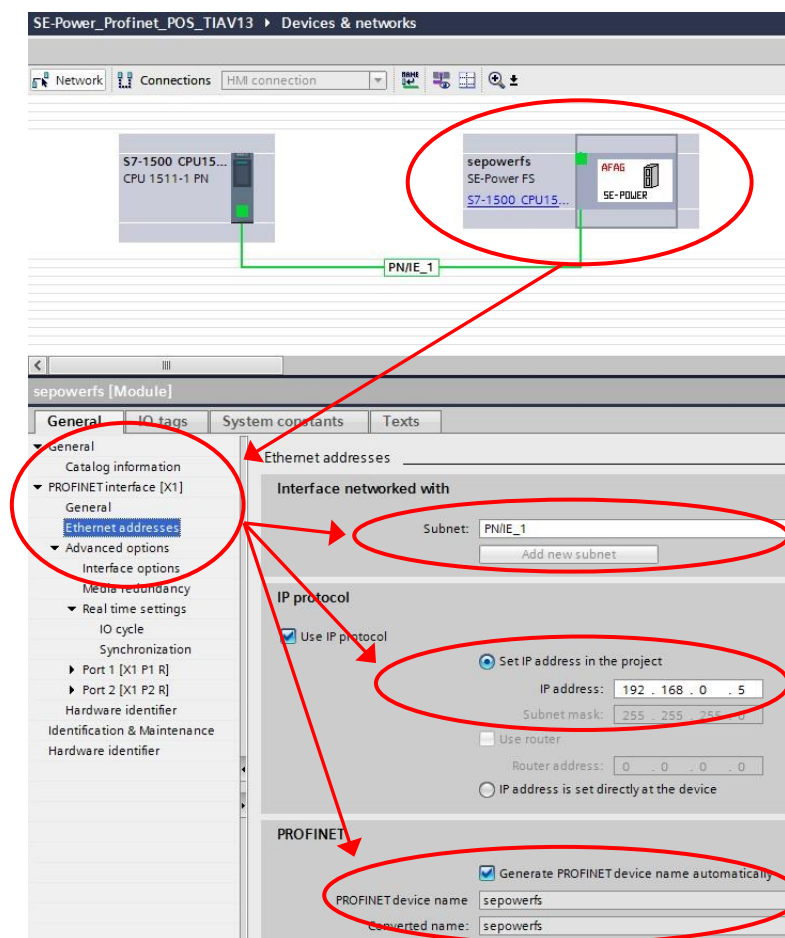


On the Hardware catalog select Drives **SE-Power**.

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

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

Selecting the „SE-Power“ directly in the symbol.

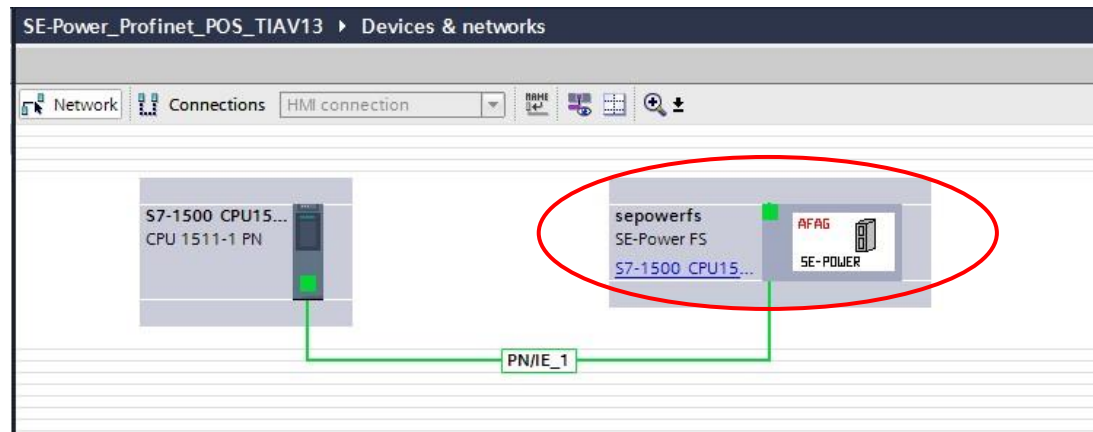


On „General“ select the „ Ethernet -address“:

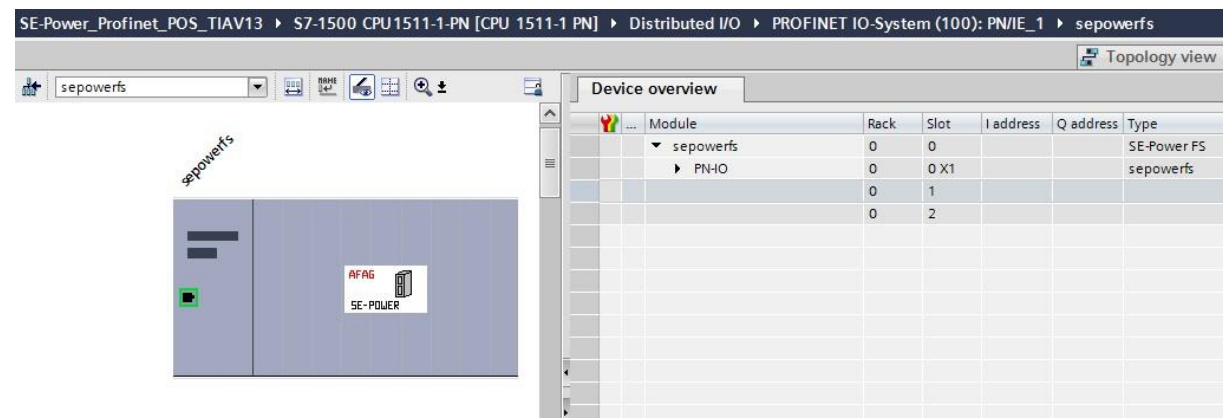
- ➔ Subnet: PN/IE_1
- ➔ Address select
- ➔ Profinet device: sepowerfs

3.1.3 Setting the Profinet telegram data

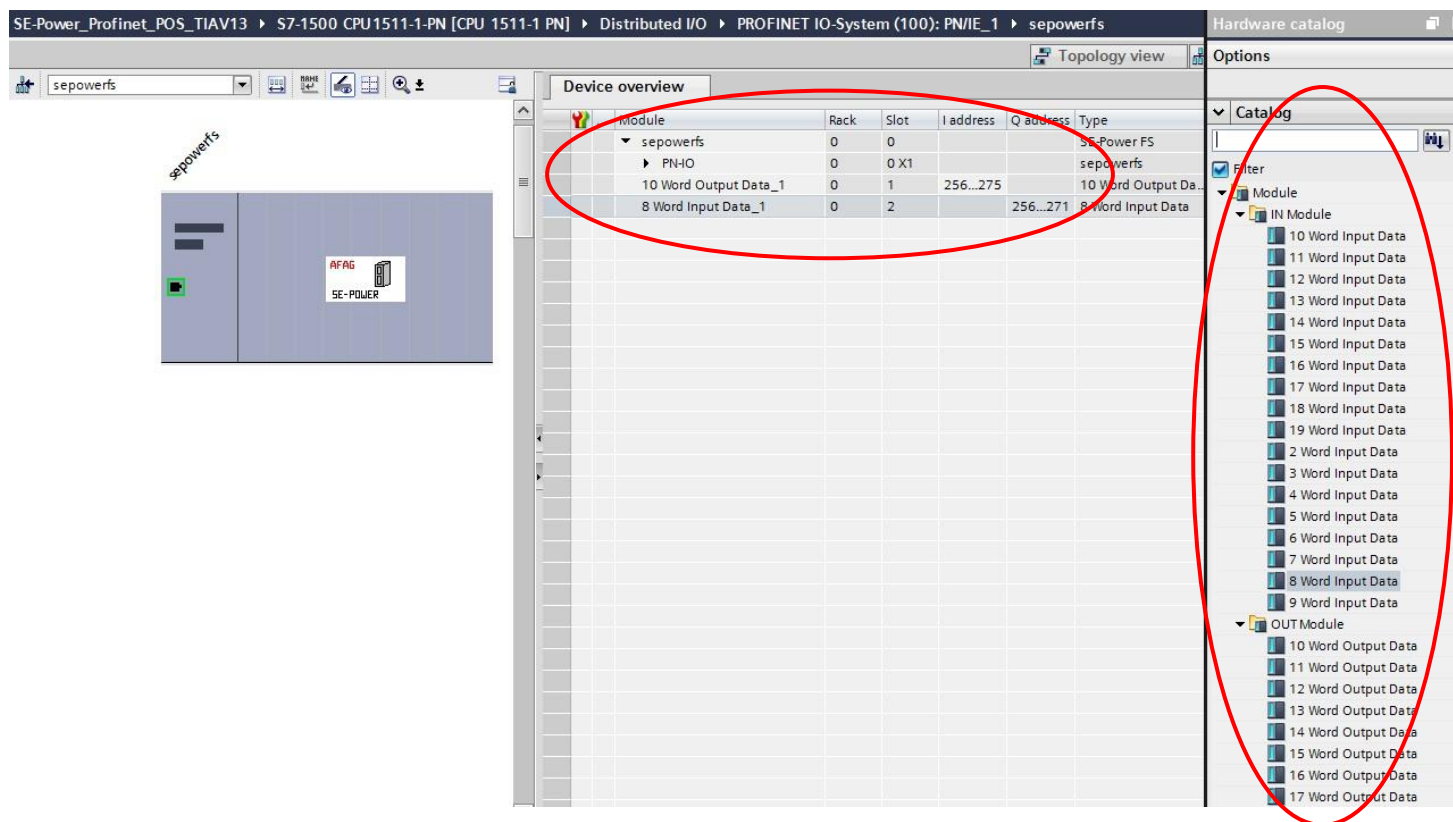
Next the message elements will be inserted. They must match with the data blocks for the target and actual values. For this, the Profinetslave is selected with a double click.



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.

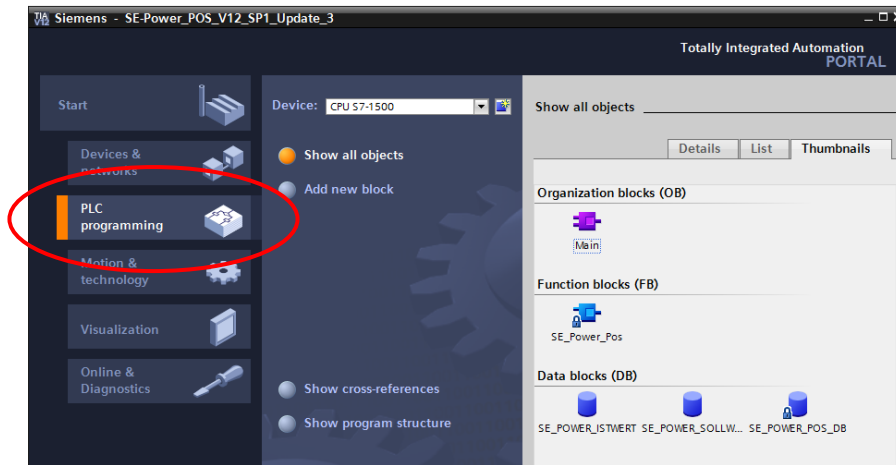
After the input data are created, they correspond to the actual values from the servo controller.

3.2 Program blocks

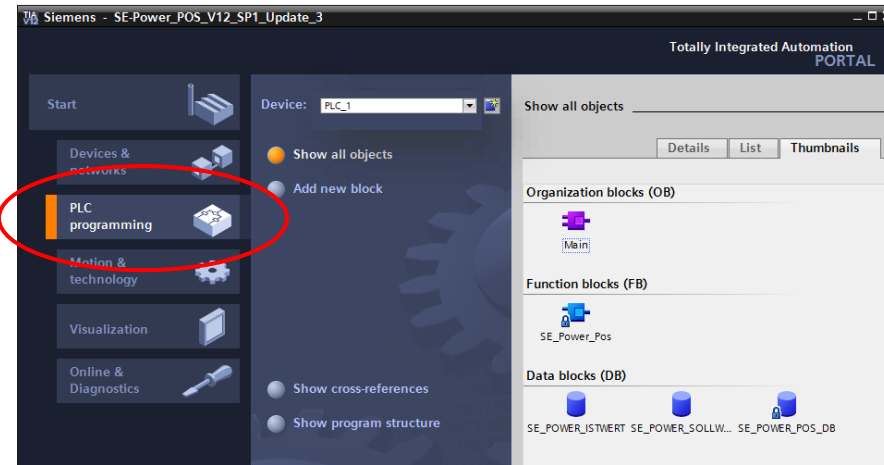
3.2.1 Importing the function- and data blocks and the watch table

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 function and 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"**.

3.2.2 Data Block actual value SE-Power FS

| DB40 SE_POWER_ISTWERT | | | | | | | | | |
|-----------------------|-----------------------------|-----------|--------|-------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--|
| | 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 | Telegram_identifier | Byte | 0.0 | 16#0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 3 | operating_mode | Byte | 1.0 | 16#0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | manufacturer-specific |
| 4 | PROFIDRIVE_Statusword | Word | 2.0 | 16#0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 5 | actual_position | DInt | 4.0 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | transmitted parameters in default-parameterization |
| 6 | actual_speed | DInt | 8.0 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | transmitted parameters in default-parameterization |
| 7 | active_current_actual_value | DInt | 12.0 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | transmitted parameters in default-parameterization |
| 8 | digital_inputs | DInt | 16.0 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | transmitted parameters in default-parameterization |

3.2.3 Data block target value SE-Power FS

| DB42 SE_POWER_SOLLWERT | | | | | | | | | |
|------------------------|------------------------|-----------|--------|-------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|---|
| | 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 | Telegram_identifier | Byte | 0.0 | B#16#E0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 3 | free | Byte | 1.0 | 16#0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | vorläufige Platzhaltervariable |
| 4 | PROFIDRIVE_Controlw... | Word | 2.0 | 16#0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 5 | target_position | DInt | 4.0 | L#3600 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | transmitted parameters in default-parameteriz |
| 6 | driving_speed | DInt | 8.0 | L#12000 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | transmitted parameters in default-parameteriz |
| 7 | acceleration | DInt | 12.0 | L#200000 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | transmitted parameters in default-parameteriz |

3.2.4 Function block FB_position (FB 41 Positioning mode)

The function block (FB) is responsible for monitoring the status diagram implemented in the servo controller.

The current status of the servo controller is symbolized by the Status word 1 in the data block DB40, (Bytes 2 and 3). The Control word 1 serves to control the servo controller it's present in the DB42 (Bytes 2 and 3) and will be written by the FB.

The master connection provides the PLC with the input and output data of the servo controller in defined I/O areas. This data is read from the slave through the DPRD_DAT and written to the slave with the DPWR_DAT. The DPRD_DAT and DPWR_DAT are instructions, which **must** be used for consistent reading and writing of telegrams for lengths > 4 bytes.

The corresponding instructions are used to deposit the data in the data blocks defined for the operating mode. The SFCs are not integrated in the function blocks, and **must** be loaded as S7-program elements.

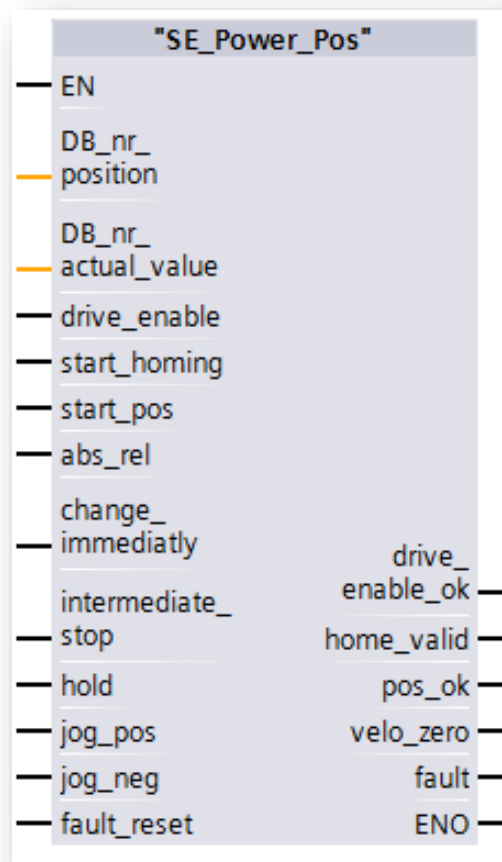
The DBs practically serve as I/O modules, which are used for controlling the statuses of the servo controller and for transferring the data that is to be sent to the servo controller.

Separate function modules are required for each operating mode per servo controller. Under certain conditions, the use of multiple servo controllers in different operating modes can lead to bottlenecks with regard to the memory utilization in the application.



Information

The sequence of the data within the data modules is identical to that which was defined in the telegram format of the respective operating mode (FB).



Parameters:

DB_nr_position:

Number of the data module in which the data for the operating mode Positioning has been stored (INT).

DB_nr_actual_value:

Number of the data module in which the actual value data is stored (INT).

Inputs:

drive_enable:

Activation of the regulator release in operating mode Positioning. The drive is held in its position with position control.

start_homing:

Starts homing, the motor starts to move. Prerequisite is an active controller enable, i.e. the output drive_enable_ok must be set. A resetting of the input start_homing during homing breaks this without error.

start_pos:

A rising edge indicates that a new motion task should be adopted. A falling edge has no effect.

During homing, this input has no effect.

abs_rel:

If this input is set during a rising flank at input start_pos, the positioning is carried out relative to the current position set point. If this input is not set during a rising flank at start_pos, an absolute positioning is carried out.

change_immediatly:

If this input is set during a rising edge at the input start_pos, then an ongoing positioning is immediately terminated and replaced by the new movement order. If this input is not set during a rising edge at the start_pos, the new movement order is appended at the end of an ongoing positioning. In this case, the output pos_ok is not set at the end of the ongoing positioning, but only at the end of the attached positioning.

intermediate_stop

If this input is not set, a started positioning is performed. If the input is set during a running positioning, the drive is stopped and remains in position control. The current positioning is not completed. It will resume when the input intermediate_stop reset. During homing, this input has no effect.

hold:

If this input is set, the ongoing positioning is terminated. The braking acceleration applicable for this positioning is used for braking. The resetting of the input has no effect. During homing, this input has no effect.

jog_pos:

If this input is set, the drive accelerates with the acceleration set in the position set TIPP 0 to the movement velocity also parameterized in this position set. In case of a falling edge at this input, the drive brakes to a standstill with the braking acceleration set in the position set TIPP 0. During homing, this input has no effect.

jog_neg:

If this input is set, the drive accelerates with the acceleration set in the position set TIPP 1 to the movement velocity also parameterized in this position set. In case of a falling edge at this input, the drive brakes to a standstill with the braking acceleration set in the position set TIPP 1. During homing, this input has no effect.

fault_reset:

In case of a rising edge at this input, the queued error messages are acknowledged.

Outputs:

drive_enable_ok:

The controller release of the servo controller is active.

home_valid:

This output is set when a valid home position exists. The output is not set during an active homing. He is set for the first time or again only after a successfully executed homing.

pos_ok:

This output is set, when the current position is in the target window after the positioning run has been completed.

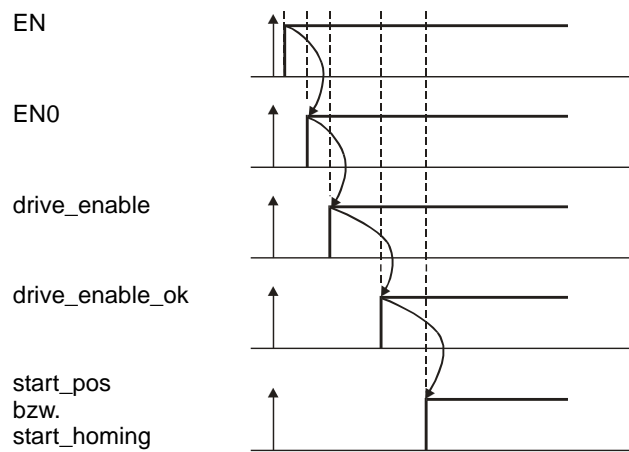
velo_zero:

If this output is set, the drive stands still.

fault:

When output is set, there is an error. The controller enabling is cancelled. The output is reset when the fault is acknowledged.

Please note the timing shown in the diagram when using the function blocks.



3.3 3.3 Profinet communication call in the PLC program

For consistent data exchange between the PROFINET master and the PROFINET slave the instructions DPRD_DAT (consistent read) and DPWR_DAT (consistent writing) must be used. The blocks must be provided with the following parameters:

3.3.1 Reading data from the servo controller via the DPRD_DAT:

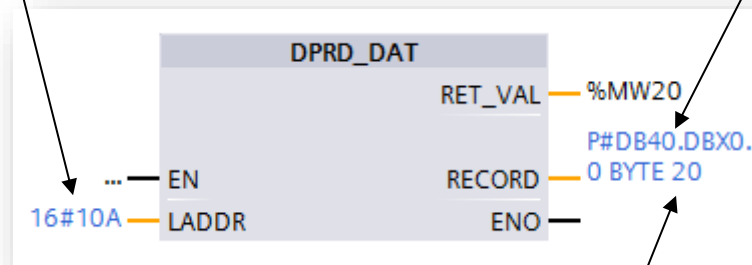
Input data area

hardware identifier

266dez = 10Ahex

Data block number

for data from the Slave



Start address within the DB (DBX0.0)) and number of the received bytes (20 byte)

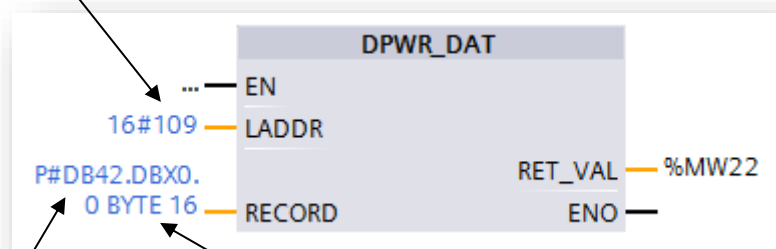
| Parameter | Declaration | Data type | Storage area | Description |
|-----------|-------------|------------------------|-------------------------------|---|
| LADDR | INPUT | HW_IO | E(I), A(Q), M, D, L, constant | Hardware identifier of the DP standard slaves IO-Device, from which have to be read. |
| RET_VAL | RETURN | DINT, INT, LREAL, REAL | E(I), A(Q), M, D, L, | If an error occurs during the processing of the function, the return value contains an error code. |
| RECORD | OUTPUT | VARIANT | E(I), A(Q), M, D, L, | Target area for the useful data read. This area has to be as long as has been projected for the selected module with TIA V13. Only the data type BYTE is permitted. |

3.3.2 Writing data to the servo controller via the DPWR_DAT:

Output data area

hardware identifier

265dez = 109hex



Data block number,
for data to the Slave

Start address within the DB (DBX0.0) and
number of the Bytes (16 Byte) to transmit.

| Parameter | Declaration | Data type | Storage area | Description |
|-----------|-------------|------------------------|-------------------------------|---|
| LADDR | INPUT | HW_IO | E(I), A(Q), M, D, L, constant | Hardware identifier of a DP standard slave IO device to be written to the PIO(PAA) range. |
| RECORD | INPUT | VARIANT | E(I), A(Q), M, D, L, | Source area for the user data to be written. It must be as long as was configured for the selected module with TIA V13. Only the data type BYTE is permitted. |
| RET_VAL | Return | DINT, INT, LREAL, REAL | E(I), A(Q), M, D, L, | If an error occurs during the processing of the function, the return value contains an error code.. |

3.3.3 Watching table

For easy operation the following watching table is in the programming example contain.

| | i | Name | Address | Display ... | Monitor value | Modify val... | | Comment |
|----|---|---|-------------|-------------|---------------|---------------|--------------------------|---------|
| 1 | | "drive enable" | %M10.1 | BOOL | | | <input type="checkbox"/> | |
| 2 | | "start homing" | %M10.2 | BOOL | | | <input type="checkbox"/> | |
| 3 | | "start pos" | %M10.3 | BOOL | | | <input type="checkbox"/> | |
| 4 | | "abs rel" | %M10.4 | BOOL | | | <input type="checkbox"/> | |
| 5 | | "change immediatly" | %M10.5 | BOOL | | | <input type="checkbox"/> | |
| 6 | | "intermediate stop" | %M10.6 | BOOL | | | <input type="checkbox"/> | |
| 7 | | "hold" | %M10.7 | BOOL | | | <input type="checkbox"/> | |
| 8 | | "jog pos" | %M11.0 | BOOL | | | <input type="checkbox"/> | |
| 9 | | "jog neg" | %M11.1 | BOOL | | | <input type="checkbox"/> | |
| 10 | | "fault reset" | %M11.2 | BOOL | | | <input type="checkbox"/> | |
| 11 | | "drive enable ok" | %M11.3 | BOOL | | | <input type="checkbox"/> | |
| 12 | | "home valid" | %M11.4 | BOOL | | | <input type="checkbox"/> | |
| 13 | | "pos ok" | %M11.5 | BOOL | | | <input type="checkbox"/> | |
| 14 | | "velo zero" | %M11.6 | BOOL | | | <input type="checkbox"/> | |
| 15 | | "fault" | %M11.7 | BOOL | | | <input type="checkbox"/> | |
| 16 | | "ENO" | %M12.0 | BOOL | | | <input type="checkbox"/> | |
| 17 | | | | | | | <input type="checkbox"/> | |
| 18 | | "DPRD_DAT RET_VAL" | %MW20 | Hex | | | <input type="checkbox"/> | |
| 19 | | "DPWR_DAT RET_VAL" | %MW22 | DEZ+/- | | | <input type="checkbox"/> | |
| 20 | | | | | | | <input type="checkbox"/> | |
| 21 | | "DB40-SE_POWER_IJTWERT".Telegram_identifier | %DB40.DBB0 | DEZ | | | <input type="checkbox"/> | |
| 22 | | "DB40-SE_POWER_IJTWERT".operating_mode | %DB40.DBB1 | DEZ | | | <input type="checkbox"/> | |
| 23 | | "DB40-SE_POWER_IJTWERT".PROFIDRIVE_Statusword | %DB40.DBW2 | Bin | | | <input type="checkbox"/> | |
| 24 | | "DB40-SE_POWER_IJTWERT".actual_position | %DB40.DBD4 | DEZ+/- | | | <input type="checkbox"/> | |
| 25 | | "DB40-SE_POWER_IJTWERT".actual_speed | %DB40.DBD8 | DEZ+/- | | | <input type="checkbox"/> | |
| 26 | | "DB40-SE_POWER_IJTWERT".active_current_actual_value | %DB40.DBD12 | DEZ+/- | | | <input type="checkbox"/> | |
| 27 | | "DB40-SE_POWER_IJTWERT".digital_Inputs | %DB40.DBD16 | Bin | | | <input type="checkbox"/> | |
| 28 | | | | | | | <input type="checkbox"/> | |
| 29 | | "SE_POWER_SOLLWERT".Telegram_identifier | %DB42.DBB0 | DEZ | | | <input type="checkbox"/> | |
| 30 | | "SE_POWER_SOLLWERT".free | %DB42.DBB1 | DEZ | | | <input type="checkbox"/> | |
| 31 | | "SE_POWER_SOLLWERT".PROFIDRIVE_Controlword | %DB42.DBW2 | Hex | | | <input type="checkbox"/> | |
| 32 | | "SE_POWER_SOLLWERT".target_position | %DB42.DBD4 | DEZ+/- | | | <input type="checkbox"/> | |
| 33 | | "SE_POWER_SOLLWERT".driving_speed | %DB42.DBD8 | DEZ+/- | | | <input type="checkbox"/> | |
| 34 | | "SE_POWER_SOLLWERT".acceleration | %DB42.DBD12 | DEZ+/- | | | <input type="checkbox"/> | |
| 35 | | | | | | | <input type="checkbox"/> | |
| 36 | | "DB41-SE_POWER_POS_DB".DB_nr_actual_value_word | %DB41.DBW10 | Hex | | | <input type="checkbox"/> | |
| 37 | | "DB41-SE_POWER_POS_DB".DB_nr_position_word | %DB41.DBW8 | Hex | | | <input type="checkbox"/> | |
| 38 | | "DB41-SE_POWER_POS_DB".ars_controlword | %DB41.DBW16 | Hex | | | <input type="checkbox"/> | |
| 39 | | "DB41-SE_POWER_POS_DB".ars_statusword | %DB41.DBW14 | Hex | | | <input type="checkbox"/> | |
| 40 | | | <Add new> | | | | <input type="checkbox"/> | |

4 Profinet configuration of the servo controller

To generate a functional PROFINET interface Profinet communication must also be enabled on the servo controller.

Notes on this please refer to the document "SE-Power FS Profibus/Profinet-Manual".



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