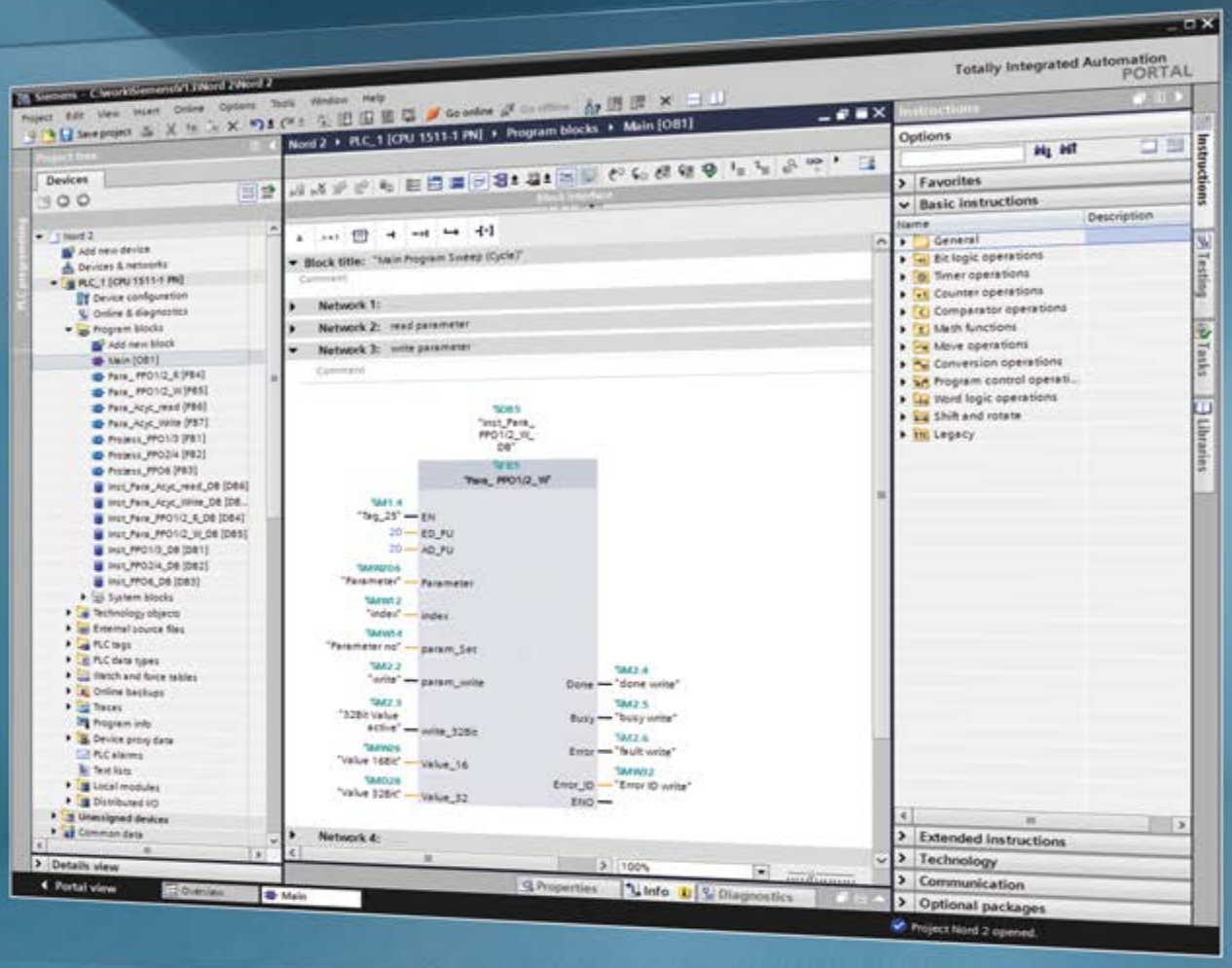
INTELLIGENT DRIVESYSTEMS, WORLDWIDE SERVICES



BU 0950 – en

TIA standard modules

Supplementary manual options for NORD - Frequency Inverters

NORD DRIVESYSTEMS

Table of Contents

1 Introduction

1.1 General

1.1.1 Documentation

Designation: **BU 0950**

Material number: **6079502**

Series: **TIA Standard Modules**

1.1.2 Document History

Issue Order number	Hardware Configurator Version	Comments
BU 0950, April 2018 **6079502** / 1718	TIA Portal V13 SP1	First edition

1.1.3 Copyright notice

As an integral component of the device or the function described here, this document must be provided to all users in a suitable form.

Any editing or amendment or other utilisation of the document is prohibited.

1.1.4 Publisher

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1.2 Registered Trademarks

PROFIBUS® and PROFINET® are registered trademarks of PROFIBUS and PROFINET International (PI).

1.3 About this manual

This manual briefly explains the use and parameterisation of the modules which are intended for the integration of electronic drive technology products from NORD GmbH & Co. KG into the TIA portal. It is intended for qualified electricians who integrate and commission these products in a corresponding control system (📖 Section 2.2 "Selection and qualification of personnel"). The information in this manual assumes that the qualified electricians who are entrusted with this work are familiar with the technology of the relevant field bus system and programmable logic controllers (PLC).

For a more detailed description of the inverter parameters, please refer to the manual for the relevant frequency inverter. If it is necessary to state parameters in order to describe parameterisation, the parameters stated here are in the issue status of March 2015.

1.4 Other applicable documents

This manual is only valid in combination with the operating instructions for the frequency inverter which is used and if necessary, the relevant special documentation for specific special functions or bus systems.

This documentation can be found under www.nord.com.

2 Safety

2.1 Intended use

The TIA standard modules from Getriebebau NORD GmbH & Co. KG are modules for integrating NORD drive electronics into the TIA portal. They have been designed and configured for use with frequency inverters from the series NORDAC *FLEX* (SK 200E … SK 235E) and NORDAC *PRO* (SK 500E … SK 545E) from Getriebebau NORD GmbH & Co. KG.

Any other use of the modules is deemed to be incorrect use.

2.2 Selection and qualification of personnel

The standard modules, bus interface and frequency inverters may only be installed and started up by qualified electricians. These must possess the necessary knowledge with regard to the frequency inverter, the technology of the field bus system, as well as configuration software and the controller (bus master) which are used.

In addition, the qualified electricians must also be familiar with the installation, commissioning and operation of the bus interfaces and the frequency inverters as well as all of the accident prevention regulations, guidelines and laws which apply at the place of use.

2.2.1 Qualified personnel

Qualified personnel includes persons who due to their specialist training and experience have sufficient knowledge in a specialised area and are familiar with the relevant occupational safety and accident prevention regulations as well as the generally recognised technical rules.

These persons must be authorised to carry out the necessary work by the operator of the system.

2.2.2 Qualified electrician

An electrician is a person who, because of their technical training and experience, has sufficient knowledge with regard to

- Switching on, switching off, isolating, earthing and marking power circuits and devices,
- Proper maintenance and use of protective devices in accordance with defined safety standards.
- Emergency treatment of injured persons.

2.3 Safety information

Only use TIA standard modules from the NORD DRIVESYSTEMS Group for their intended purpose, 🕮 Section 2.1 "Intended use".

To ensure safe operation observe all of the instructions in this manual, and in particular the warning information in the other applicable documents for the electronic drive technology which is used.

Work on and with electronic drive technology devices, e.g. bus interfaces and frequency inverters, must only be carried out by qualified personnel, 🕮 Section 2.2 "Selection and qualification of personnel".

2.4 Exclusion of liability

This technical documentation is for users who wish to use TIA standard modules from Getriebebau NORD GmbH & Co. KG. It is solely for information purposes and is only intended for qualified and adequately trained specialist personnel (📖 Section2.2 "Selection and qualification of personnel"). The information is intended as a guide and was compiled and produced in good faith. No claim is made with regard to the completeness of this documentation, in particular for the listing of directives and standards. The technical and schematic diagrams do not constitute binding solutions or application suggestions for the particular application. The illustrated application examples only relate to modules from Getriebebau NORD GmbH & Co. KG. It is the sole responsibility of the user to check and comply with all laws, directives and standards which are relevant for the particular application, design, manufacture and operation of the products. Users act independently at their own responsibility. Getriebebau NORD GmbH & Co. KG accepts no liability or warranties for solutions which are planned by the user.

3 Process modules

Process modules are only used to control a frequency inverter. No parameters are changed. Parameter changes are only made by the use of other measures. If parameter values from the Step 7 programme are to be changed, the appropriate parameter modules must be used. Call-up of the process modules is carried out in the cyclic programme.

Modules used in cyclic operation

- Process_PPO1/3
- Process_PPO2/4
- Process_PPO6

3.1 Process_PPO1/3

3.1.1 Task

This function module is called up in the cyclic section of the programme. It requires the instance module "Inst_PPO1/3_DB". The function module is used to control a frequency inverter with

- A 16Bit setpoint (integer format)
- Control signals (e.g.: enabling, error acknowledgement).

(Details in 🕮 Section 3.1.4 "Parameters")

3.1.2 Use

Frequency inverter	SK 2xxE
	SK 5xxE
Communication path	PROFIBUS DP
	PROFINET IO
Control	S7-1200
	S7-1500

3.1.3 Hardware configuration

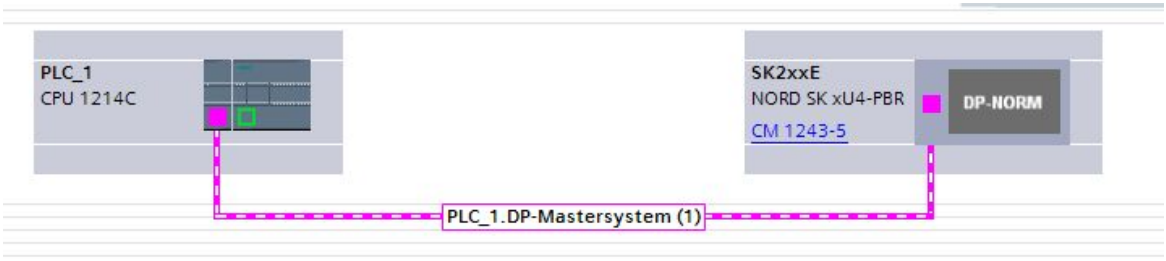
3.1.3.1 PROFIBUS DP

The description is based on the SK 2xxE series and is analogously applicable for the SK 5xxE series. Deviations between the two series are explicitly highlighted.

1. Call up the device configurator
2. Configure the master for the bus interface
3. Select and place the required bus interface from the hardware catalogue [1)]

1) Find the GSD files with a search for "NORD" in the device configurator catalogue.

4. Link the master and slave



5. Make the settings in the device overview

SK 2xxE

Device overview

Fail-safe	Module	Rack	Slot	I address	Q address	Type	Article no.	Firmware
	SK2xxE	0	0			NORD SK xU4-PBR		1.0
	Empty_1	0	Cyclic Bus Module			Empty		
	PPO 1_1	0	Cyclic FI 1	256...267	256...267	PPO 1		
	Empty_2	0	Cyclic FI 2			Empty		
	Empty_3	0	Cyclic FI 3			Empty		
	Empty_4	0	Cyclic FI 4			Empty		

- Set PPO1 or PPO3

SK 5xxE

Device overview

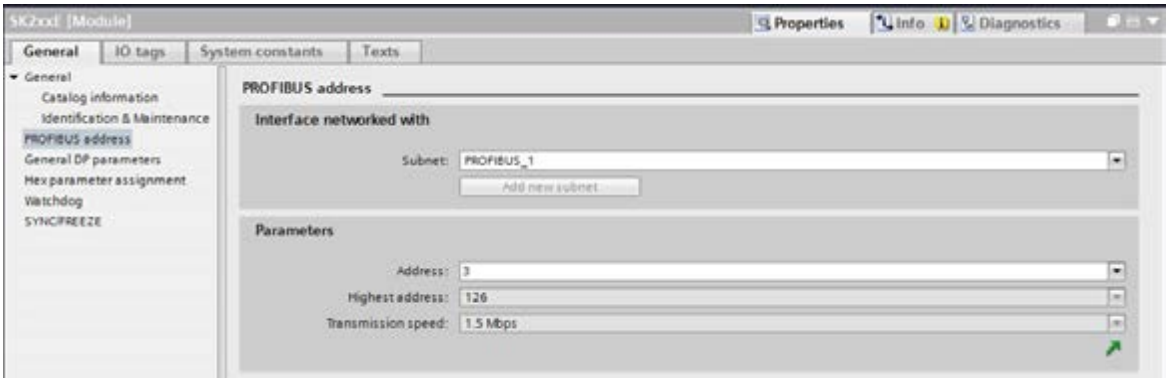
Fail-safe	Module	Rack	Slot	I address	Q address	Type	Article no.	Firmware
	SK5xxE	0	0			NORD SK xU1-3-PBR		2.2
	PPO 1: 4 PKW, 2 PZD_2_1	0	1	68...75	64...71	PPO 1: 4 PKW, 2 PZD		
	PPO 1: 4 PKW, 2 PZD_2_2	0	2	76...79	72...75	PPO 1: 4 PKW, 2 PZD		

- Insert "NORD_1_5.GSD"
- Select and insert the PPO1 type

Optional:

– Assignment of a symbolic name for the bus interface.
– Adapt the I/O addresses

6. Assign the slave address and hardware ID (automatic)

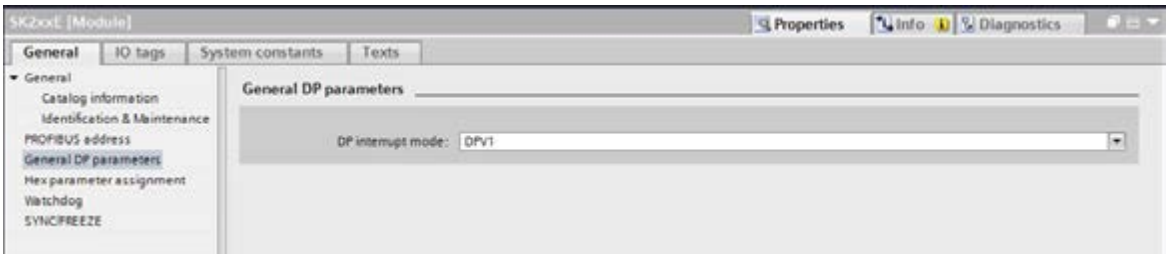


Optional:

– Assign a station name (for documentation purposes)

Recommendation: assign the same starting addresses to the address ranges.

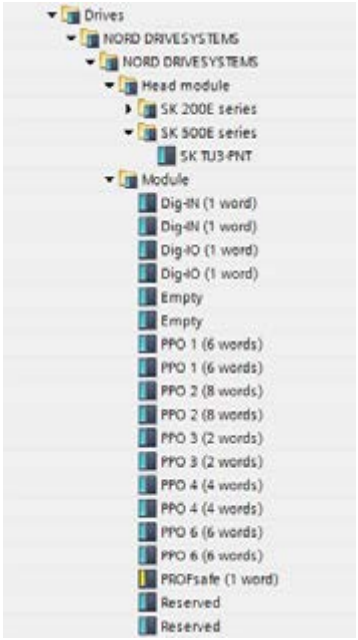
7. Set "DP Alarm Mode" to **DPV1** ("General DP-Parameters" tab)



3.1.3.2 PROFINET IO

The procedure for configuring the frequency inverter is analogous to that for PROFIBUS DP.

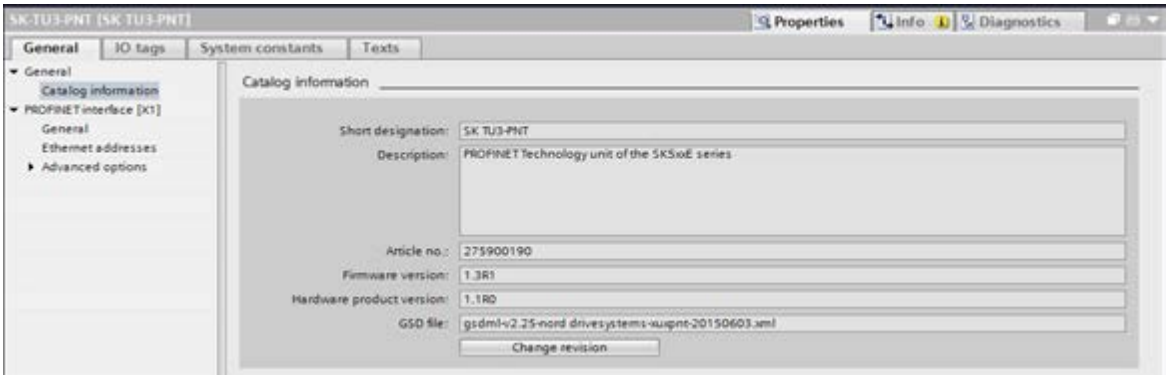
1. Place the header module from the hardware tree
2. Insert the matching PPO type



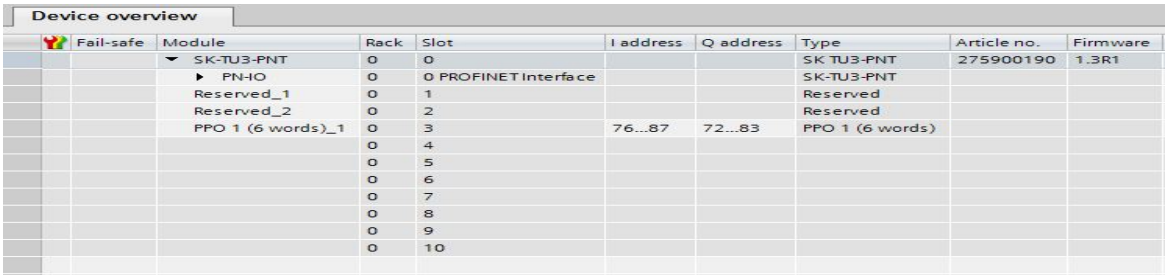
Note:

Use the correct XML file (see the following illustration)!

3. Assign the device number and IP address (automatic)



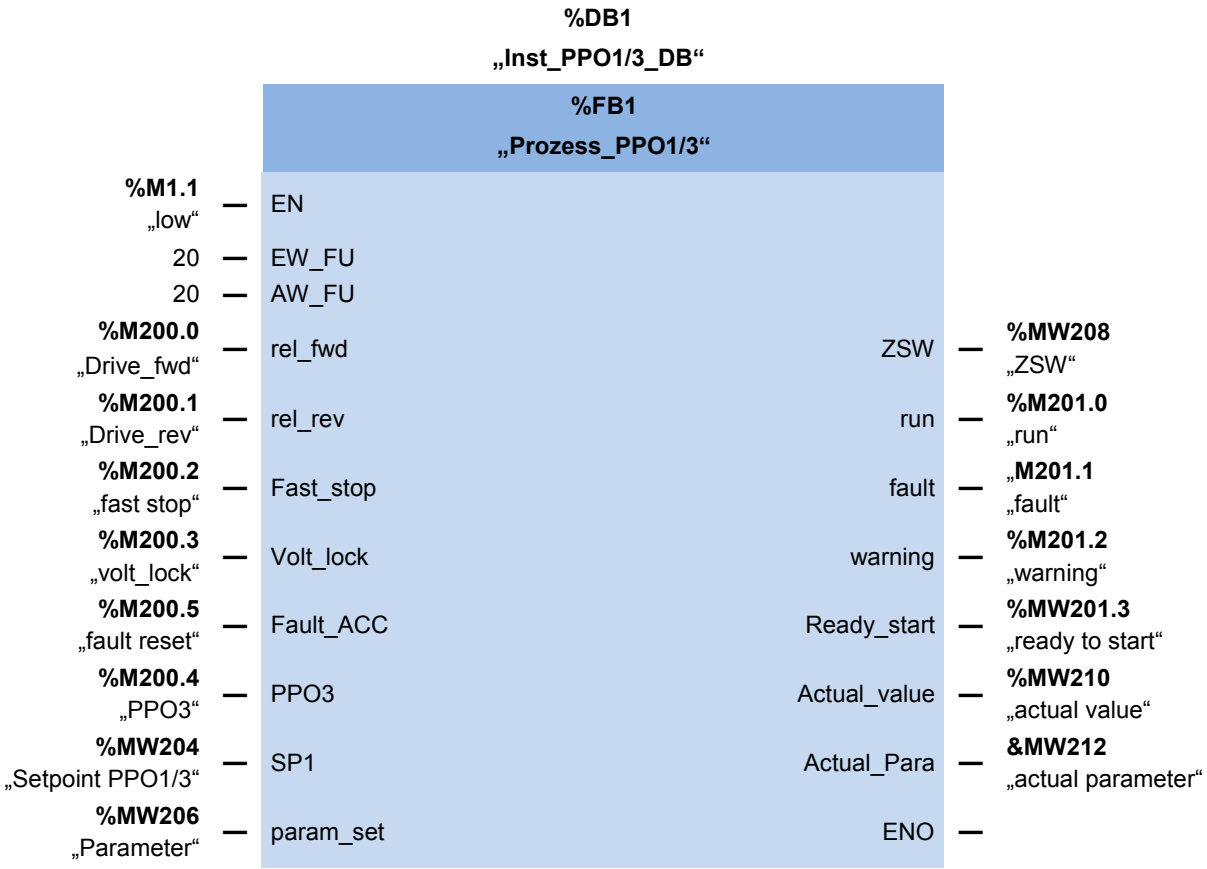
4. Optional:
   - Assign a device name (for documentation purposes)
   - Adapt the I/O addresses.



Fail-safe	Module	Rack	Slot	I address	Q address	Type	Article no.	Firmware
	SK-TU3-PNT	0	0			SK TU3-PNT	275900190	1.3R1
	PN-IO	0	0 PROFINET Interface			SK-TU3-PNT		
	Reserved_1	0	1			Reserved		
	Reserved_2	0	2			Reserved		
	PPO 1 (6 words)_1	0	3	76...87	72...83	PPO 1 (6 words)		
		0	4					
		0	5					
		0	6					
		0	7					
		0	8					
		0	9					
		0	10					

3.1.4 Parameters

The instance module for the function block provides detailed information about the signal status between the PLC and the frequency inverter. Due to the complexity of the instance module it is not shown here. This is self-explanatory.



3.1.4.1 Input parameters

Parameter name	Type	Interface	Description
EW_FU	INT	IN	Start address of the inputs from the hardware configurator
AW_FU	INT	IN	Start address of the outputs from the hardware configurator
rel_fwd	BOOL	IN	Enables the direction of rotation of the drive for a CW rotating field
rel_rev	BOOL	IN	Enables the direction of rotation of the drive for a CCW rotating field
Fast_stop	BOOL	IN	0 = Emergency stop with programmed emergency stop time; at f = 0 Hz voltage enable; the FI goes into "switch-on block" status
			1 = OFF 3 is cancelled; see manual for details
Volt_lock	BOOL	IN	0 = The output voltage is switched off, the FI goes into "Switch-on block" status
			1 = OFF 2 is cancelled; see manual for details
Fault_ACC	BOOL	IN	Faults which are no longer active are acknowledged with a change from 0 to 1. **Information** If a digital input has been programmed for the "ack.fault" function, this bit must not be permanently set to 1 via the bus (otherwise, flank evaluation would be prevented).
PPO3	BOOL	IN	1 = PPO Type 3 can be edited.
SP1	INT	IN	Enter Setpoint 1 (16Bit integer).
param_set	INT	IN	Selection of the required parameter set number (1...4). For details of which parameters have a parameter set number, please refer to the manual for the frequency inverter.

3.1.4.2 Output parameters

Parameter name	Type	Interface	Description
ZSW	WORD	OUT	Status word from the frequency inverter
run	BOOL	OUT	The frequency inverter outputs a 'running' message
fault	BOOL	OUT	The drive has a fault and is therefore inoperative. After acknowledgement, the frequency inverter goes into status "Switch-on block". A new positive flank must be generated at the enabling output ("rel_fwd" or "rel_rev").
warning	BOOL	OUT	The frequency inverter has generated a warning. The drive remains in operation, acknowledgement is not necessary.
Ready_start	BOOL	OUT	Initialisation is complete, the loading relay is in status ON, the output voltage is still disabled.
Actual_value	INT	OUT	Output of actual value 1 from the frequency inverter
Actual_Para	INT	OUT	Currently used parameter set (1…4)

3.2 Process_PPO2/4

3.2.1 Task

This function module is called up in the cyclic section of the programme. It requires the instance module "Inst_PPO2/4_DB". The function module is used to control a frequency inverter with

- Three 16Bit setpoints (integer format) or
- A 16Bit setpoint (integer format) and a 32Bit setpoint (double integer format)
  → Condition: "SP2_3_32_Bit" = "1"
- Control signals (e.g.: enabling, error acknowledgement).

(Details in 🕮 Section 3.2.4 "Parameters")

3.2.2 Use

Frequency inverter	SK 2xxE
	SK 5xxE
Communication path	PROFIBUS DP
	PROFINET IO
Control	S7-1200
	S7-1500

3.2.3 Hardware configuration

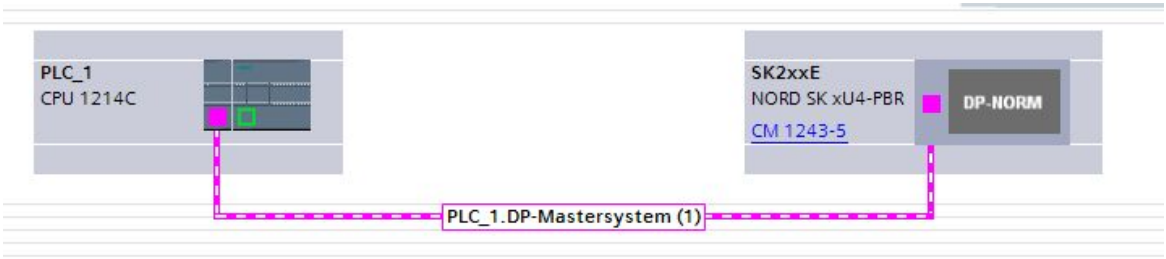
3.2.3.1 PROFIBUS DP

The description is based on the SK 2xxE series and is analogously applicable for the SK 5xxE series. Deviations between the two series are explicitly highlighted.

1. Call up the device configurator
2. Configure the master for the bus interface
3. Select and place the required bus interface from the hardware catalogue [1)]

1) Find the GSD files with a search for "NORD" in the device configurator catalogue.

4. Link the master and slave



5. Make the settings in the device overview

SK 2xxE

Device overview

	Fail-safe	Module	Rack	Slot	I address	Q address	Type	Article no.	Firmware
		SK2xxE	0	0			NORD SK xU4-PBR		1.0
		Empty_1	0	Cyclic Bus Module			Empty		
		PPO 2_1	0	Cyclic FI 1	256...271	256...271	PPO 2		
		Empty_2	0	Cyclic FI 2			Empty		
		Empty_3	0	Cyclic FI 3			Empty		
		Empty_4	0	Cyclic FI 4			Empty		

- Set PPO2 or PPO4

SK 5xxE

Device overview

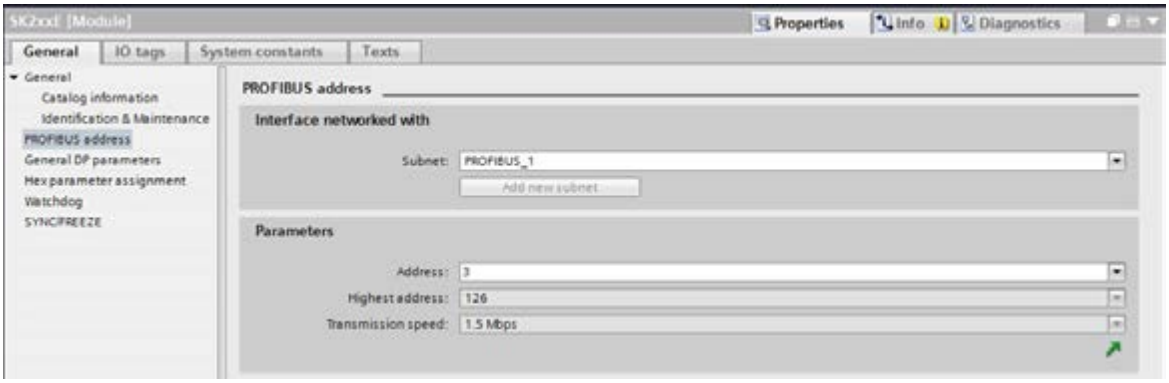
	Fail-safe	Module	Rack	Slot	I address	Q address	Type	Article no.	Firmware
		SK5xxE	0	0			NORD SK xU1-3-PBR		2.2
		PPO 2: 4 PKW, 4 + 2 PZD_2_1	0	1	68...75	64...71	PPO 2: 4 PKW, 4 + 2 PZD		
		PPO 2: 4 PKW, 4 + 2 PZD_2_2	0	2	88...99	84...95	PPO 2: 4 PKW, 4 + 2 PZD		

- Insert "nord0ba8.GSD"
- Select and insert PPO2 type or PPO4 type

Optional:

– Assignment of a symbolic name for the bus interface.
– Adapt the I/O addresses

6. Assign the slave address and hardware ID (automatic)

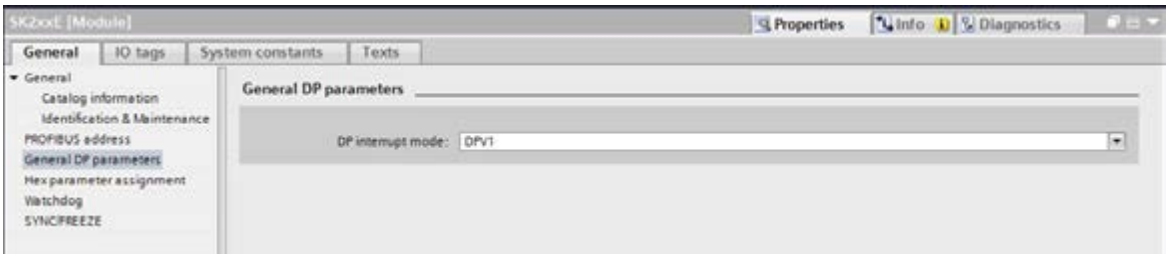


Optional:

– Assign a station name (for documentation purposes)

Recommendation: assign the same starting addresses to the address ranges.

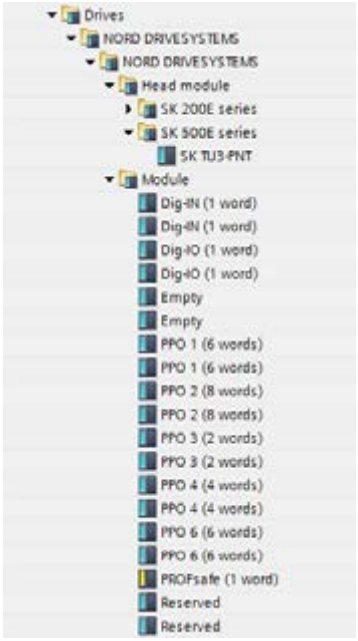
7. Set "DP Alarm Mode" to **DPV1** ("General DP-Parameters" tab)



3.2.3.2 PROFINET IO

The procedure for configuring the frequency inverter is analogous to that for PROFIBUS DP.

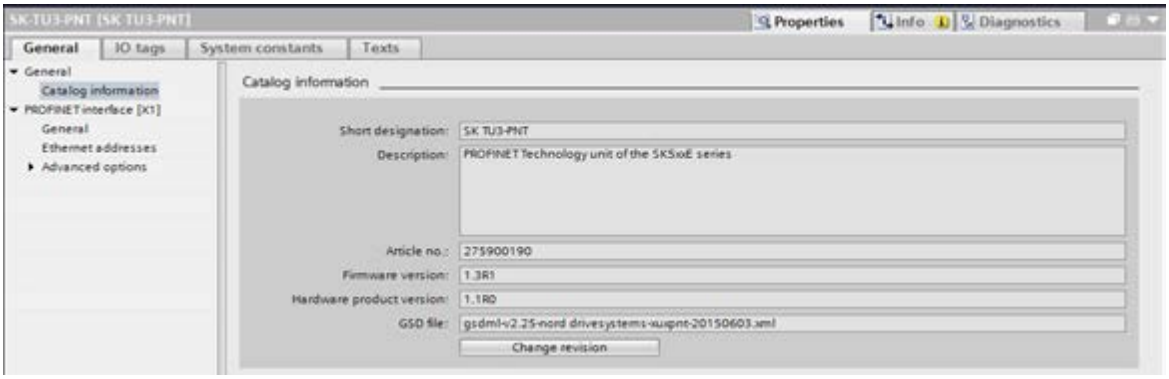
1. Place the header module from the hardware tree
2. Insert the matching PPO type



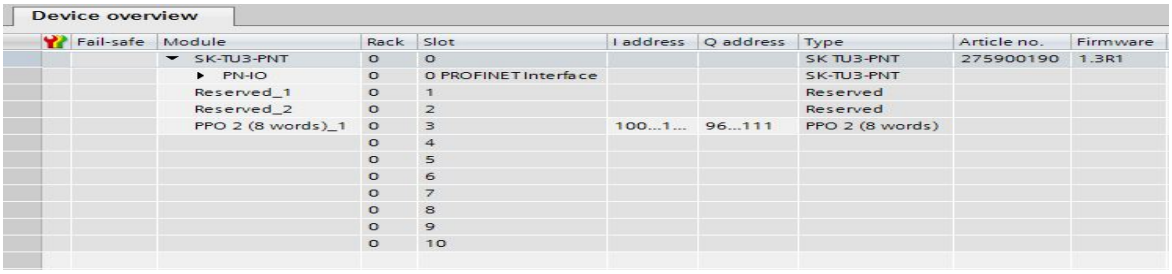
Note:

Use the correct XML file (see the following illustration)!

3. Assign the device number and IP address (automatic)

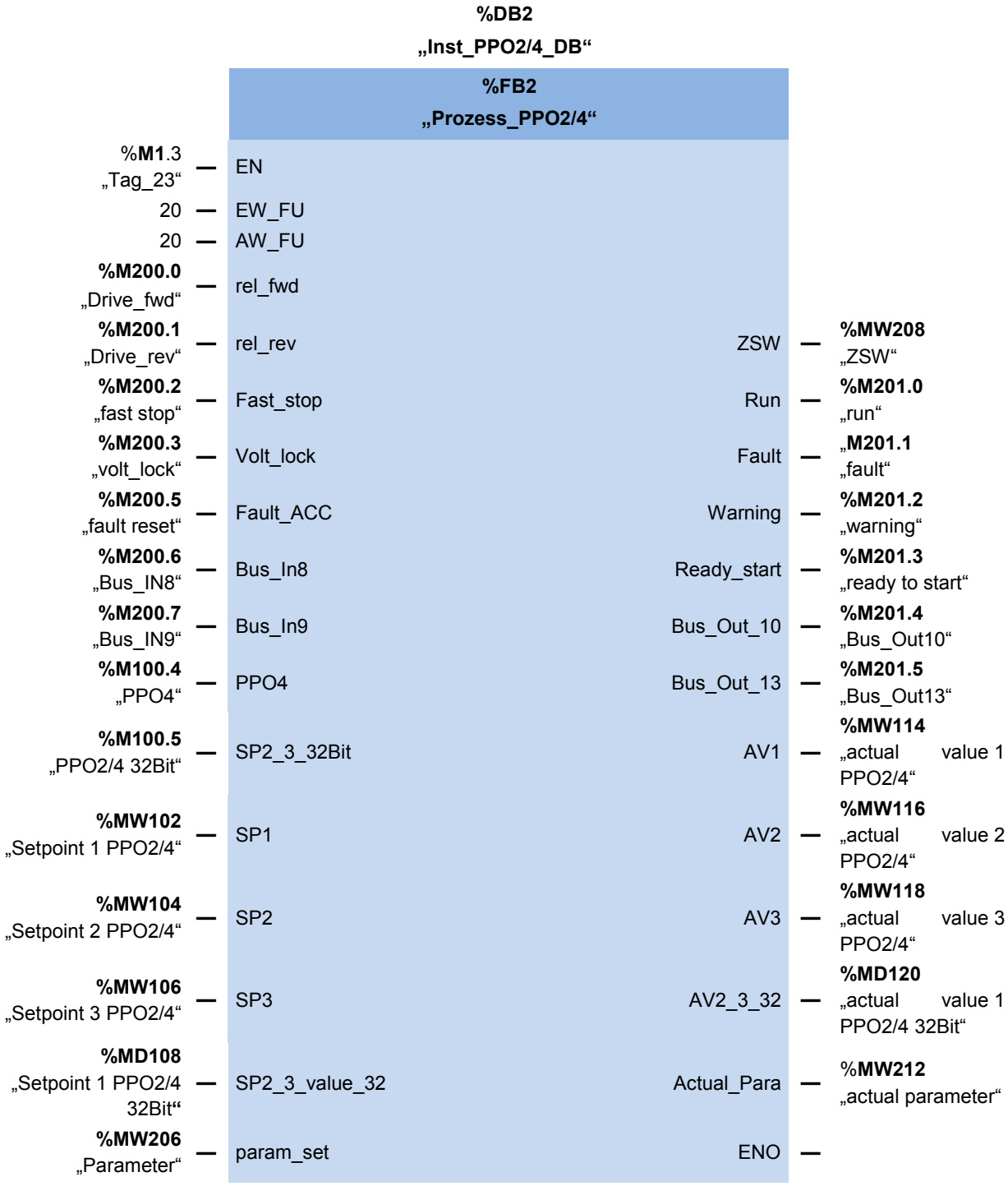


4. Optional:
   – Assign a device name (for documentation purposes)
   – Adapt the I/O addresses.



3.2.4 Parameters

The instance module for the function block provides detailed information about the signal status between the PLC and the frequency inverter. Due to the complexity of the instance module it is not shown here. This is self-explanatory.



3.2.4.1 Input parameters

Parameter name	Type	Interface	Description
EW_FU	INT	IN	Start address of the inputs from the hardware configurator
AW_FU	INT	IN	Start address of the outputs from the hardware configurator
rel_fwd	BOOL	IN	Enables the direction of rotation of the drive for a CW rotating field
rel_rev	BOOL	IN	Enables the direction of rotation of the drive for a CCW rotating field
Fast_stop	BOOL	IN	0 = Emergency stop with programmed emergency stop time; at f = 0 Hz voltage enable; the FI goes into "switch-on block" status 1 = OFF 3 is cancelled; see manual for details
Volt_lock	BOOL	IN	0 = The output voltage is switched off, the FI goes into "switch-on block" status 1 = OFF 2 is cancelled; see manual for details
Fault_ACC	BOOL	IN	Faults which are no longer active are acknowledged with a change from 0 to 1. **Information** If a digital input has been programmed for the "ack.fault" function, this bit must not be permanently set to 1 via the bus (otherwise, flank evaluation would be prevented)
Bus_In8	BOOL	IN	Only for SK 2xxE and SK 5xxE. For further details of the function please refer to parameter P480 in the frequency inverter manual.
Bus_In9	BOOL	IN	Only for SK 2xxE and SK 5xxE. For further details of the function please refer to parameter P480 in the frequency inverter manual.
PPO4	BOOL	IN	1 = PPO Type 4 can be edited.
SP2_3_32Bit	BOOL	IN	1 = The value "SP2_3_value_32" is sent to the frequency inverter as an input variable. SP1/SP2 are ignored.
SP1	INT	IN	Setpoint 1 (16Bit integer)
SP2	INT	IN	Setpoint 2 (16Bit integer)
SP3	INT	IN	Setpoint 3 (16Bit integer)
SP2_3_value_32	DINT	IN	Setpoint 1 (32Bit integer) (SP1 and SP2 are no longer considered).
param_set	INT	IN	Selection of the required parameter set number (1...4). For details of which parameters have a parameter set number, please refer to the manual for the frequency inverter.

3.2.4.2 Output parameters

Parameter name	Type	Interface	Description
ZSW	WORD	OUT	Status word from the frequency inverter
Run	BOOL	OUT	The frequency inverter outputs a 'running' message
Fault	BOOL	OUT	The drive has a fault and is therefore inoperative. After acknowledgement, the frequency inverter goes into status "Switch-on block". A new positive flank must be generated at the enabling output ("rel_fwd" or "rel_rev").
Warning	BOOL	OUT	The frequency inverter has generated a warning. The drive remains in operation, acknowledgement is not necessary.
Ready_start	BOOL	OUT	Initialisation is complete, the loading relay is in status ON, the output voltage is still disabled.
Bus_Out_10	BOOL	OUT	Only with SK 5xxE. For further details of the function please refer to parameter P481 in the frequency inverter manual.
Bus_Out_13	BOOL	OUT	Only with SK 5xxE. For further details of the function please refer to parameter P481 in the frequency inverter manual.
AV1	INT	OUT	Output of the calculated Actual Value 1 from the frequency inverter (scal_AV1 × Actual Bus Value 1 from the frequency inverter)
AV2	INT	OUT	Output of the calculated Actual Value 2 from the frequency inverter (scal_AV2 × Actual Bus Value 2 from the frequency inverter)
AV3	INT	OUT	Output of the calculated Actual Value 3 from the frequency inverter (scal_AV3 × Actual Bus Value 3 from the frequency inverter)
AV2_3_32	DINT	OUT	In this case, the actual value is output as a 32Bit integer (AV1 and AV2 are no longer described)
Actual_Para	INT	OUT	Currently used parameter set (1…4)

3.3 Process_PPO6

3.3.1 Task

This function module is called up in the cyclic section of the programme. This requires the instance module "Inst_PPO6_DB". The function module is used to control a frequency inverter with

- Five 16Bit setpoints (integer format) or
- Three 16Bit setpoints (integer format) and a 32Bit setpoint (double integer format)
  → Condition: "SP2_3_32_Bit" = "1"
- Control signals (e.g.: enabling, error acknowledgement).

(Details in 🕮 Section 3.3.4 "Parameters")

3.3.2 Use

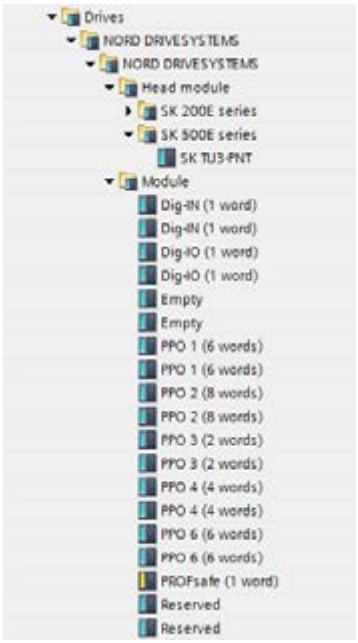
Frequency inverter	SK 2xxE
	SK 5xxE
Communication path	PROFIBUS DP
	PROFINET IO
Control	S7-1200
	S7-1500

3.3.3 Hardware configuration

3.3.3.1 PROFINET IO

The procedure for configuring the frequency inverter is analogous to that for PROFIBUS DP.

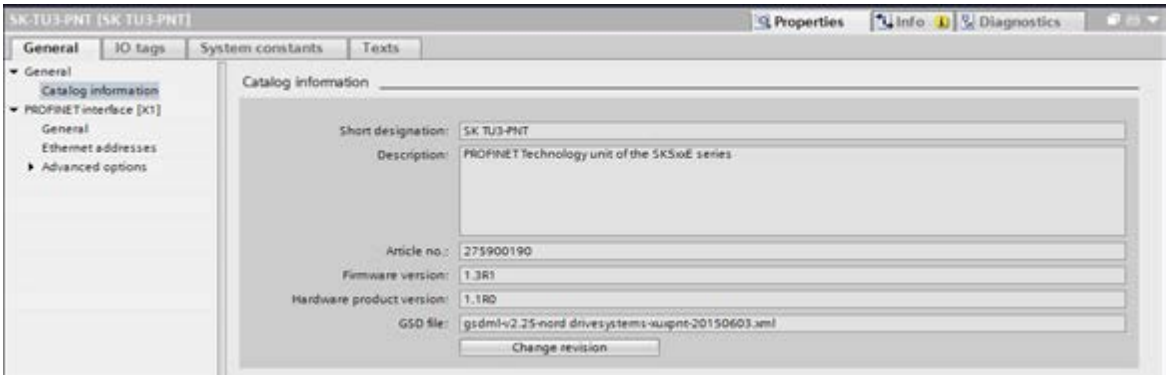
1. Place the header module from the hardware tree
2. Insert the matching PPO type



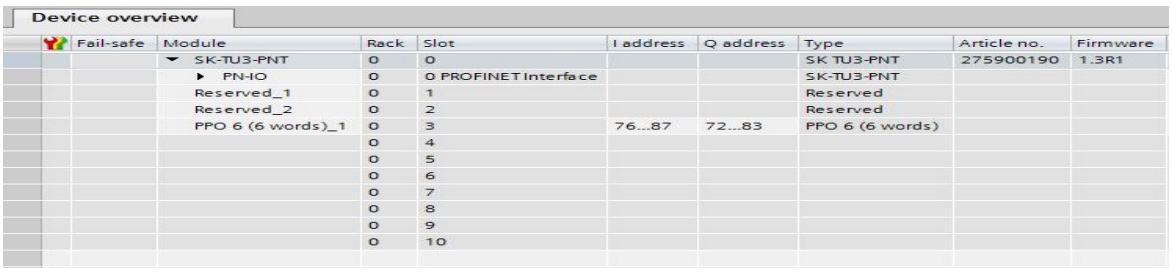
Note:

Use the correct XML file (see the following illustration)!

3. Assign the device number and IP address (automatic)



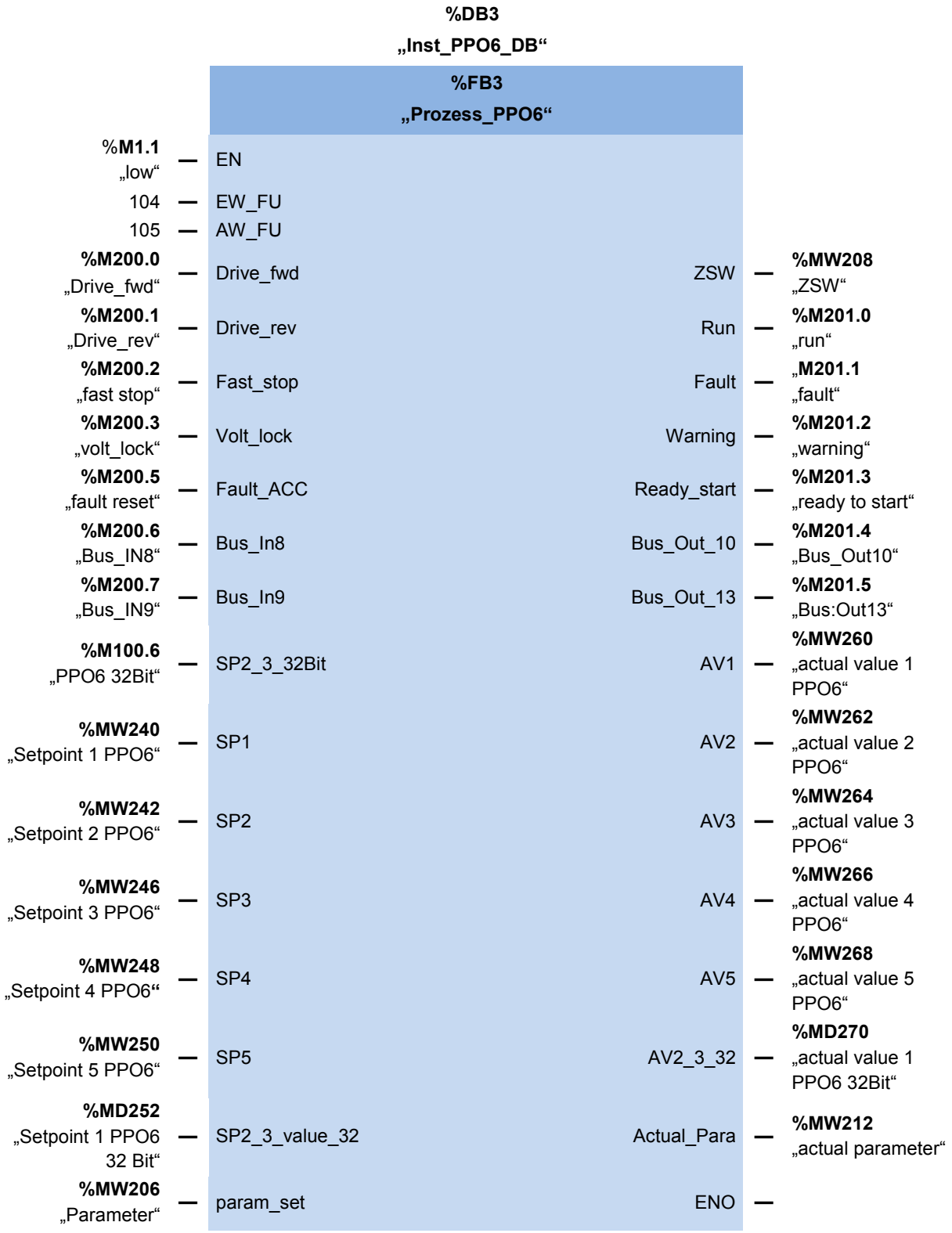
4. Optional:
   - Assign a device name (for documentation purposes)
   - Adapt the I/O addresses.



Fail-safe	Module	Rack	Slot	I address	Q address	Type	Article no.	Firmware
	SK-TU3-PNT	0	0			SK TU3-PNT	275900190	1.3R1
	PN-IO	0	0 PROFINET Interface			SK-TU3-PNT		
	Reserved_1	0	1			Reserved		
	Reserved_2	0	2			Reserved		
	PPO 6 (6 words)_1	0	3	76...87	72...83	PPO 6 (6 words)		
		0	4					
		0	5					
		0	6					
		0	7					
		0	8					
		0	9					
		0	10					

3.3.4 Parameters

The instance module for the function block provides detailed information about the signal status between the PLC and the frequency inverter. Due to the complexity of the instance module it is not shown here. This is self-explanatory.



3.3.4.1 Input parameters

Parameter name	Type	Interface	Description
EW_FU	INT	IN	Start address of the inputs from the hardware configurator
AW_FU	INT	IN	Start address of the outputs from the hardware configurator
Drive_fwd	BOOL	IN	Enables the direction of rotation of the drive for a CW rotating field
Drive_rev	BOOL	IN	Enables the direction of rotation of the drive for a CCW rotating field
Fast_stop	BOOL	IN	0 = Emergency stop with programmed emergency stop time; at f = 0 Hz voltage enable; the FI goes into "switch-on block" status 1 = OFF 3 is cancelled; see manual for details
Volt_lock	BOOL	IN	0 = The output voltage is switched off, the FI goes into "Switch-on block" status 1 = OFF 2 is cancelled; see manual for details
Fault_ACC	BOOL	IN	Faults which are no longer active are acknowledged with a change from 0 to 1. **Information** If a digital input has been programmed for the "ack.fault" function, this bit must not be permanently set to 1 via the bus (otherwise, flank evaluation would be prevented)
Bus_In8	BOOL	IN	Only for SK 2xxE and SK 5xxE. For further details of the function please refer to parameter P480 in the frequency inverter manual.
Bus_In9	BOOL	IN	Only for SK 2xxE and SK 5xxE. For further details of the function please refer to parameter P480 in the frequency inverter manual.
SP2_3_32Bit	BOOL	IN	1 = The value "SP2_3_value_32" is sent to the frequency inverter as an input variable. SP1/SP2 are ignored.
SP1	INT	IN	Setpoint 1 (16Bit integer)
SP2	INT	IN	Setpoint 2 (16Bit integer)
SP3	INT	IN	Setpoint 3 (16Bit integer)
SP4	INT	IN	Setpoint 4 (16Bit integer)
SP5	INT	IN	Setpoint 5 (16Bit integer)
SP2_3_value_32	DINT	IN	Setpoint 1 (32Bit integer) (SP1 and SP2 are no longer considered)
param_set	INT	IN	Selection of the required parameter set number (1...4). For details of which parameters have a parameter set number, please refer to the manual for the frequency inverter.

3.3.4.2 Output parameters

Parameter name	Type	Interface	Description
ZSW	WORD	OUT	Status word from the frequency inverter
Run	BOOL	OUT	The frequency inverter outputs a 'running' message
Fault	BOOL	OUT	The drive has a fault and is therefore inoperative. After acknowledgement, the frequency inverter goes into status "Switch-on block". A new positive flank must be generated at the enabling output "Drive_fwd" or "Drive_rev".
Warning	BOOL	OUT	The frequency inverter has generated a warning. The drive remains in operation, acknowledgement is not necessary.
Ready_start	BOOL	OUT	Initialisation is complete, the loading relay is in status "ON", the output voltage is still disabled.
Bus_Out_10	BOOL	OUT	Only with SK 5xxE. For further details of the function please refer to parameter P481 in the frequency inverter manual.
Bus_Out_13	BOOL	OUT	Only with SK 5xxE. For further details of the function please refer to parameter P481 in the frequency inverter manual.
AV1	INT	OUT	Output of the calculated Actual Value 1 from the frequency inverter (scal_AV1 × Actual Bus Value 1 from the frequency inverter)
AV2	INT	OUT	Output of the calculated Actual Value 2 from the frequency inverter (scal_AV2 × Actual Bus Value 2 from the frequency inverter)
AV3	INT	OUT	Output of the calculated Actual Value 3 from the frequency inverter (scal_AV3 × Actual Bus Value 3 from the frequency inverter)
AV4	INT	OUT	Output of the calculated Actual Value 4 from the frequency inverter (scal_AV3 × Actual Bus Value 4 from the frequency inverter)
AV5	INT	OUT	Output of the calculated Actual Value 5 from the frequency inverter (scal_AV3 × Actual Bus Value 5 from the frequency inverter)
AV2_3_32	DINT	OUT	In this case, Actual Value 1 is output as a 32 bit integer (AV1 and AV2 are no longer described)
Actual_Para	INT	OUT	Currently used parameter set (1…4)

4 Parameter modules

The parameter modules are used to read out parameter values from the frequency inverters or to write values into them. All modules access the parameters in reading mode.

Reading and writing of parameter values in cyclic mode only functions for hardware configurations which correspond to PPO1 or PPO2. Only these two PPO types contain information about the parameter values in their data structure.

For acyclic reading and writing, access to the memory addresses of the frequency inverter is not via the peripheral addresses but rather via the hardware ID. This is explicitly specified during the hardware configuration. Access to the addresses is performed with standard Siemens function modules, which are available in the library of the Simatic Manager. Therefore access to the parameters no longer depends on the PPO type. With PROFIBUS DP, access to the parameters is only possible for Profibus slaves of type DPV1 and for PROFINET IO devices.

Operation	Modules used	Description
Cyclic	“Para_PPO1/2_R“	Reading, all values
	„Para_PPO1/2_W“	Writing, 16/32Bit value
Acyclic	"Para_acyc_read"	Reading, all values
	"Para_acyc_Write"	Writing, 16/32Bit value

4.1 Para_PPO1/2_R

4.1.1 Task

This function module is called up in the cyclic section of the programme. It requires the instance module "Inst_Para_PPO1/2_R_DB". Access to the parameter values is via the peripheral image. The function module is used to read out a parameter from the frequency inverter, taking into account the

- Parameter number
- Parameter set number (if the parameter also depends on the parameter set)
- Index (if the parameter has the format of an index parameter)

(Details in 🕮 Section 4.1.4 "Parameters")

Information **Parameter formats**

For details of the parameter structure, please refer to the manual for the frequency inverter.

4.1.2 Use

Frequency inverter	SK 2xxE
	SK 5xxE
Communication path	PROFIBUS DP
	PROFINET IO
Control	S7-1200
	S7-1500

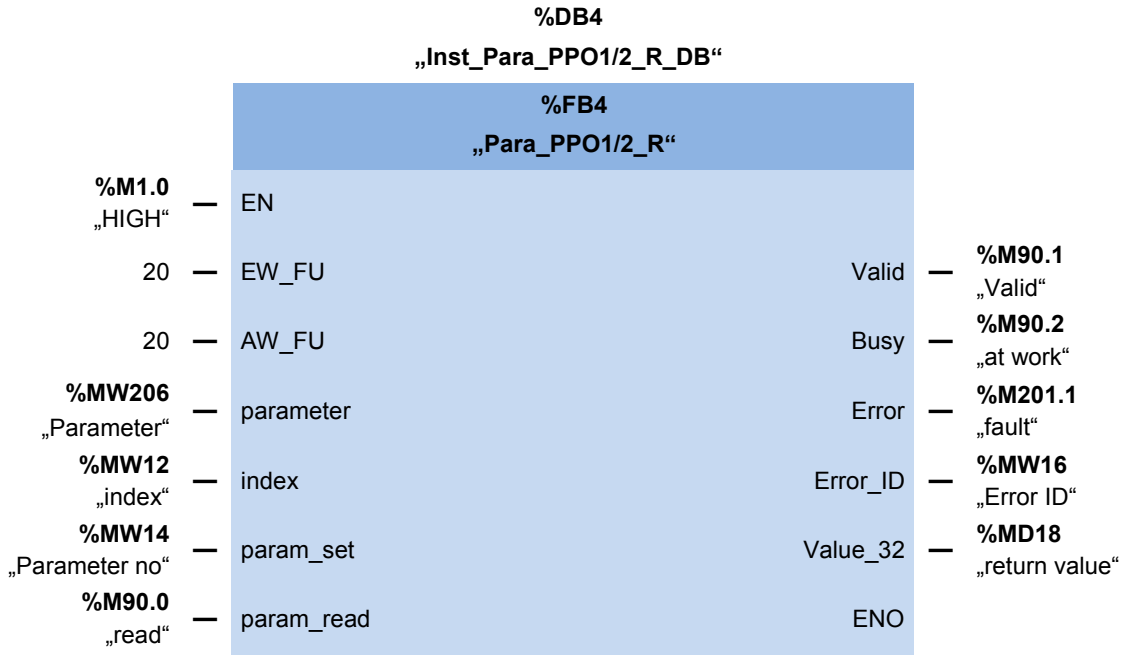
4.1.3 Hardware configuration

4.1.3.1 PROFIBUS DP/PROFINET IO

Configuration of the hardware is performed analogously to Sections3.1.3and3.2.3.

4.1.4 Parameters

The instance module for the function block provides detailed information about the signal status between the PLC and the frequency inverter. Due to the complexity of the instance module it is not shown here. This is self-explanatory.



4.1.4.1 Input parameters

Parameter name	Type	Interface	Description
EW_FU	INT	IN	Start address of the inputs from the hardware configurator
AW_FU	INT	IN	Start address of the outputs from the hardware configurator
parameter	INT	IN	Parameter number
index	INT	IN	Index number. For details of which parameters have an index, please refer to the manual for the frequency inverter. **Information** If this is a parameter without an index, a zero must be entered here.
param_set	INT	IN	Selection of the required parameter set number (1...4). For details of which parameters have a parameter set number, please refer to the manual for the frequency inverter. **Information** If this is a parameter to which none of the four parameter sets is assigned directly, a zero must be entered here.
param_read	BOOL	IN	0= Parameter reading is not requested. The parameter value at the output "Value_32" does need to be valid. 1 = Parameter reading is requested. This signal may be used as a static signal. The output bits "Valid" and "Busy" are updated together with the read command.

4.1.4.2 Output parameters

Parameter name	Type	Interface	Description
Valid	BOOL	OUT	1 = The frequency inverter supplies the requested parameter value. Updating is only performed with a read parameter request at the input "param_read".
Busy	BOOL	OUT	1 = The frequency inverter has not yet sent any valid data as a response to the last read request. 0 = Either there is no read request or the result of the request is available.
Error	BOOL	OUT	1 = Readout produced an error. Error numbers are output to the "Error_ID" output.
Error_ID	WORD	OUT	Output of the frequency inverter error code (refer to the frequency inverter manual). If a valid result is received from the frequency inverter, "Error_ID" outputs the value "0".
Value_32	DWORD	OUT	Result of the parameter request. The data is only valid if the bit "Valid" has the value "1". If an error message is received from the frequency inverter, "Value_32" outputs the value "0".

4.2 Para_PPO1/2_W

4.2.1 Task

This function module is called up in the cyclic section of the programme. It requires the instance module "Inst_Para_PPO1/2_W_DB". Access to the parameter values is via the peripheral image. The function module is used to read out a 16Bit parameter value (integer) from the frequency inverter, taking into account the

- Parameter number
- Parameter set number (if the parameter also depends on the parameter set)
- Index (if the parameter has the format of an index parameter)

(Details in 🕮 Section 4.2.4 "Parameters")

Information **Parameter formats**

For details of the parameter structure, please refer to the manual for the frequency inverter.

4.2.2 Use

Frequency inverter	SK 2xxE
	SK 5xxE
Communication path	PROFIBUS DP
	PROFINET IO
Control	S7-1200
	S7-1500

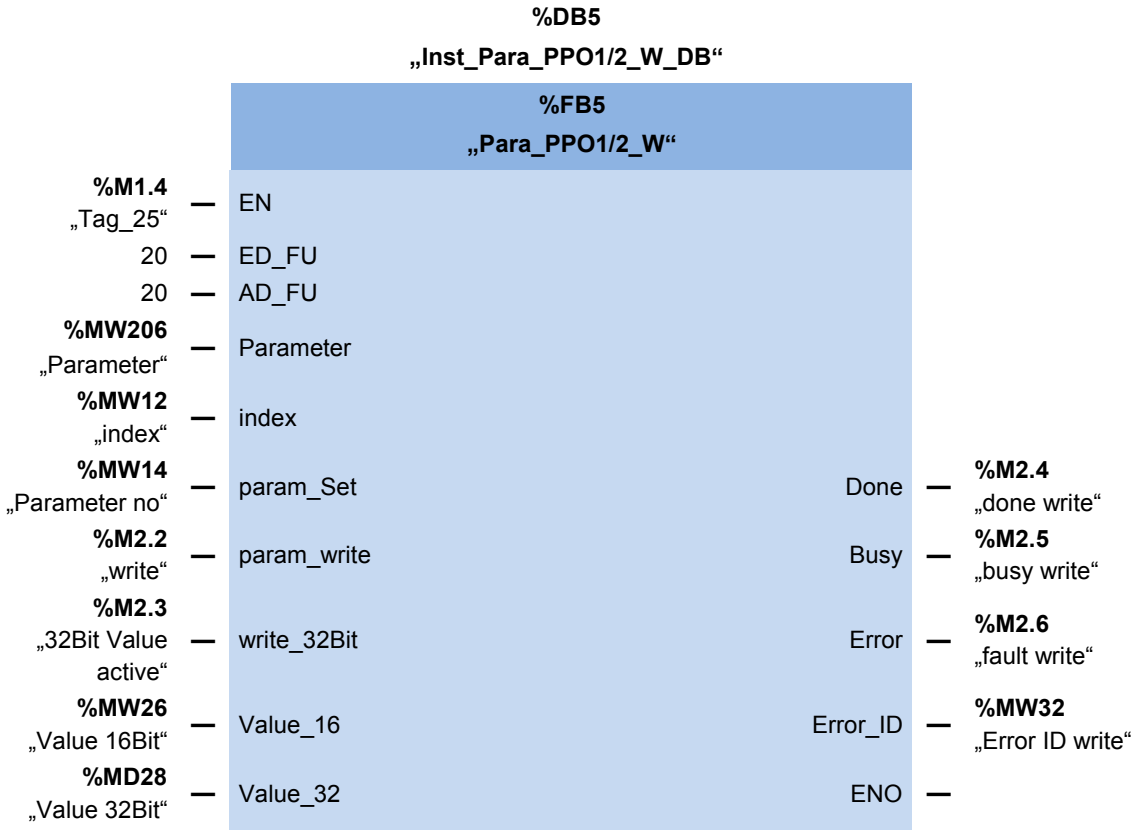
4.2.3 Hardware configuration

4.2.3.1 PROFIBUS DP/PROFINET IO

Configuration of the hardware is performed analogously to Sections3.1.3and3.2.3.

4.2.4 Parameters

The instance module for the function block provides detailed information about the signal status between the PLC and the frequency inverter. Due to the complexity of the instance module it is not shown here. This is self-explanatory.



4.2.4.1 Input parameters

Parameter name	Type	Interface	Description
ED_FU	INT	IN	Start address of the inputs from the hardware configurator
AD_FU	INT	IN	Start address of the outputs from the hardware configurator
Parameter	INT	IN	Parameter number
index	INT	IN	Index number. For details of which parameters have an index, please refer to the manual for the frequency inverter. **Information** If this is a parameter without an index, a zero must be entered here.
param_set	INT	IN	Selection of the required parameter set number (1...4). For details of which parameters have a parameter set number, please refer to the manual for the frequency inverter. **Information** If this is a parameter to which none of the four parameter sets is assigned directly, a zero must be entered here.
param_write	BOOL	IN	0 = Writing of the parameter value is not requested. 1 = Writing of the parameter value is not requested. The module creates a positive flank from this signal. For new writing of the parameter, the signal must change from 0→1.
write_32Bit	BOOL	IN	0 = Selection Value_16 1 = Selection Value_32
Value_16	WORD	IN	Value for a parameter with a data length of 16 Bit[1)]
Value_32	DWORD	IN	Value for a parameter with a data length of 32 Bit[1)]

1) The parameters which are written as 32 Bit or 16 Bit can be obtained from the frequency inverter manual.

4.2.5 Output parameters

Parameter name	Type	Interface	Description
Done	BOOL	OUT	1 = The frequency invert has adopted the sent value and has not output an error. "Done" is only set if the write request "para_write" is still set to "1".
Busy	BOOL	OUT	1 = The frequency inverter has not yet sent any valid data as a response to the last write request. 0 = Either there is no write request or the result of the request is available.
Error	BOOL	OUT	Writing produced an error. Error numbers are output to the "Error_ID" output.
Error_ID	WORD	OUT	Output of the frequency inverter error code (refer to the frequency inverter manual). If a valid result is received from the frequency inverter, "Error_ID" outputs the value "0".

4.3 Para_Acyc_read

4.3.1 Task

This function module called up in the cyclic section of the programme, however it operates in the acyclic communication process. For this, access to the frequency inverter data must not necessarily be completed within a programme cycle.

The function module requires the instance module "Inst_Para_Acyc_read_DB". Access to the frequency inverter is via the hardware ID. The address was explicitly specified during the hardware configuration. Specification is performed separately for each bus participant if a unique name has been assigned in the device overview.

The function module is used to read out a parameter from the frequency inverter, taking into account the

- Parameter number
- Parameter set number (if the parameter also depends on the parameter set)
- Index (if the parameter has the format of an index parameter)

(Details in 🕮 Section 4.3.4 "Parameters")

Information **Parameter formats**

For details of the parameter structure, please refer to the manual for the frequency inverter.

4.3.2 Use

Frequency inverter	SK 2xxE
	SK 5xxE (not possible with SK TU3-PBR)
Communication path	PROFIBUS DP
	PROFINET IO
Control	S7-1200
	S7-1500

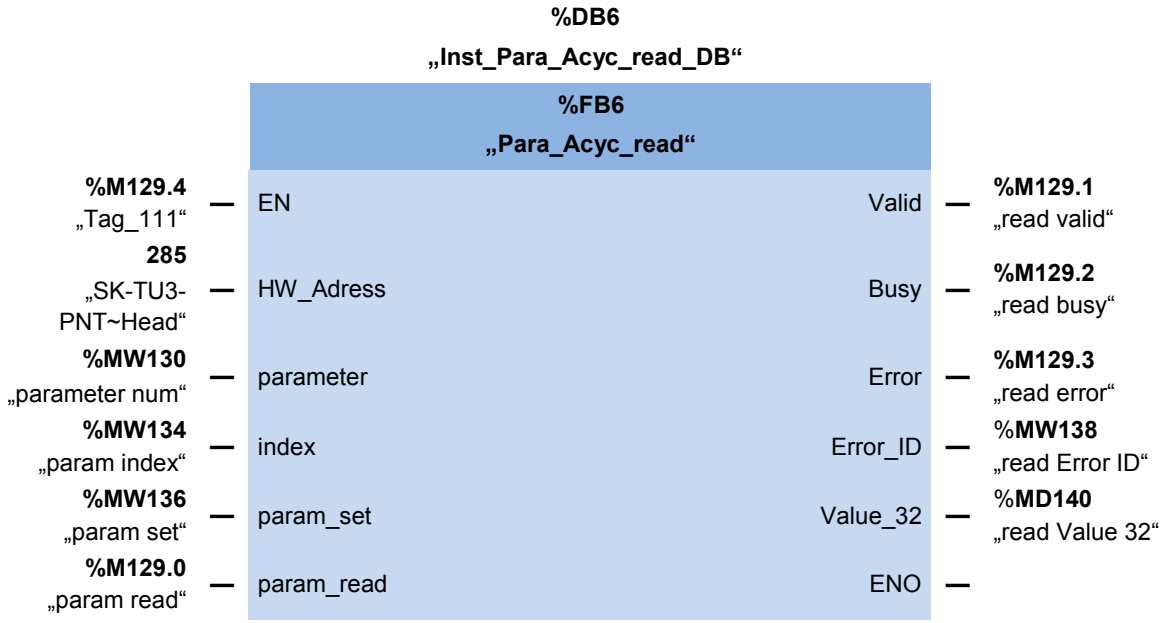
4.3.3 Hardware configuration

4.3.3.1 PROFIBUS DP/PROFINET IO

Configuration of the hardware is performed analogously to Sections3.1.3and3.2.3.

4.3.4 Parameters

The instance module for the function block provides detailed information about the signal status between the PLC and the frequency inverter. Due to the complexity of the instance module it is not shown here. This is self-explanatory.



4.3.4.1 Input parameters

Parameter name	Type	Interface	Description
HW_Adress	INT	IN	Hardware ID/diagnosis address of the frequency inverter. The address can be checked in the hardware configurator.
parameter	INT	IN	Parameter number
index	INT	IN	Index number. For details of which parameters have an index, please refer to the manual for the frequency inverter. **Information** If this is a parameter without an index, a zero must be entered here.
param_set	INT	IN	Selection of the required parameter set number (1...4). For details of which parameters have a parameter set number, please refer to the manual for the frequency inverter. **Information** If this is a parameter to which none of the four parameter sets is assigned directly, a zero must be entered here.
param_read	BOOL	IN	0= Parameter reading is not requested. The parameter value at the output "Value_32" does need to be valid. 1 = Reading of parameter is requested. This signal may be used as a static signal. The output bits "Valid" and "Busy" are updated together with the read command.

4.3.4.2 Output parameters

Parameter name	Type	Interface	Description
Valid	BOOL	OUT	1 = The frequency inverter has taken over the requested data and written the result to the PLC
Busy	BOOL	OUT	1 = The frequency inverter has not yet sent any valid data as a response to the last read request.
			0 = Either there is no read request or the result of the request is available.
Error	BOOL	OUT	1 = Reading the parameter produced an error. Error numbers are output to the "Error_ID" output.
Error_ID	WORD	OUT	Output of the frequency inverter error code (refer to the frequency inverter manual). If a valid result is received from the frequency inverter, "Error_ID" outputs the value "0".
Value_32	DWORD	OUT	Result of the parameter request. The data are only valid if the bit "Valid" has the value "1". If an error message is received from the frequency inverter, "Value_32" outputs the value "0".

4.4 Para_Acyc_Write

4.4.1 Task

This function module called up in the cyclic section of the programme, however it operates in the acyclic communication process. For this, access to the frequency inverter data must not necessarily be completed within a programme cycle.

The function module requires the instance module "Inst_Para_Acyc_Write_DB". Access to the frequency inverter is via the hardware ID. The address was explicitly specified during the hardware configuration. Specification is performed separately for each bus participant if a unique name has been assigned in the device overview.

The function module is used to read out a 16Bit/32Bit parameter value (integer) from the frequency inverter, taking into account the

- Parameter number
- Parameter set number (if the parameter also depends on the parameter set)
- Index (if the parameter has the format of an index parameter)

(Details in 🕮 Section 4.4.4 "Parameters")

A decision must be made, whether the data are to be transferred to the RAM memory, or into the EEPROM memory, where they will not be lost in case of a power failure. For writing to the EEPROM, the limited number of permissible writing cycles must be observed. For detailed information, please refer to the manual for the frequency inverter.

Information **Parameter formats**

For details of the parameter structure, please refer to the manual for the frequency inverter.

4.4.2 Use

Frequency inverter	SK 2xxE
	SK 5xxE (not possible with SK TU3-PBR)
Communication path	PROFIBUS DP
	PROFINET IO
Control	S7-1200
	S7-1500

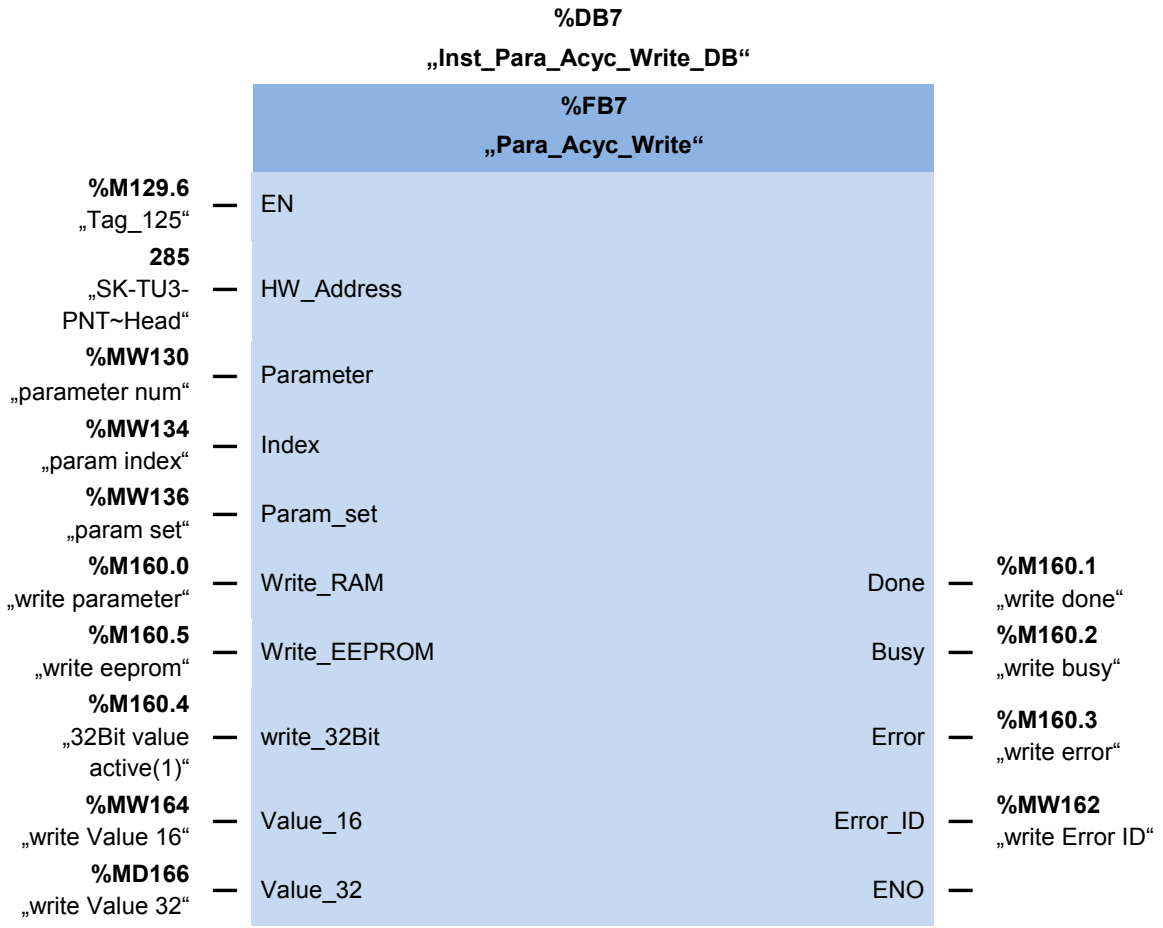
4.4.3 Hardware configuration

4.4.3.1 PROFIBUS DP/PROFINET IO

Configuration of the hardware is performed analogously to Sections3.1.3and3.2.3.

4.4.4 Parameters

The instance module for the function block provides detailed information about the signal status between the PLC and the frequency inverter. Due to the complexity of the instance module it is not shown here. This is self-explanatory.



4.4.4.1 Input parameters

Parameter name	Type	Interface	Description
HW_Address	INT	IN	Hardware ID/diagnosis address of the frequency inverter. The address can be checked in the hardware configurator.
Parameter	INT	IN	Parameter number
Index	INT	IN	Index number. For details of which parameters have an index, please refer to the manual for the frequency inverter. **Information** If this is a parameter without an index, a zero must be entered here.
Param_set	INT	IN	Selection of the required parameter set number (1...4). For details of which parameters have a parameter set number, please refer to the manual for the frequency inverter. **Information** If this is a parameter to which none of the four parameter sets is assigned directly, a zero must be entered here.
Write_RAM	BOOL	IN	0 = Writing of the parameter value is not requested. 1 = Writing of the parameter value is not requested. The module creates a positive flank from this signal. For new writing of the parameter, the signal must change from 0→1. The parameter is written to the RAM.
Write_EEPROM	BOOL	IN	0 = Writing of the parameter value is not requested. 1 = Writing of the parameter value is not requested. The module creates a positive flank from this signal. For new writing of the parameter, the signal must change from 0→1. The parameter is written to the EEPROM. The number of writing cycles is limited (see the manual for the frequency inverter).
write_32Bit	BOOL	IN	0 = Selection Value_16 1 = Selection Value_32
Value_16	WORD	IN	Value for a parameter with a data length of 16 Bit[1)]
Value_32	DWORD	IN	Value for a parameter with a data length of 32 Bit[1)]

1) The parameters which are written as 32 Bit or 16 Bit can be obtained from the frequency inverter manual.

4.4.4.2 Output parameters

Parameter name	Type	Interface	Description
Done	BOOL	OUT	1 = The frequency inverter has taken over the requested data and written the result to the PLC.
Busy	BOOL	OUT	1 = The frequency inverter has not yet sent any valid data as a response to the last read request.
			0 = Either there is no read request or the result of the request is available.
Error	BOOL	OUT	1 = Reading the parameter produced an error. Error numbers are output to the "Error_ID" output.
Error_ID	WORD	OUT	Output of the frequency inverter error code (refer to the frequency inverter manual). If a valid result is received from the frequency inverter, "Error_ID" outputs the value "0".

Key word index

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