PSSu Profibus DP with SIMATIC S7

Product
Type: PSSu
Name: PSSu H SB DP, PSSu H DP
Manufacturer: Pilz GmbH & Co. KG, Safe Automation

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Document Revision History

Release	Date	Changes	Chapter
01	2008-07-11	Creation	all
02	2010-07-12	Make ready for Internet-Release	only logistic data
03	2010-11-23	Edit view	4.2

Exclusion of liability

We have taken great care in compiling our application note. It contains information about our company and our products. All statements are made in accordance with the current status of technology and to the best of our know-ledge and belief.
However, we cannot accept liability for the accuracy and entirety of the information provided, except in the case of gross negligence. In particular it should be noted that statements do not have the legal quality of assurances or assured properties.
We are grateful for any feedback on the contents.

November 2010

Support

Technical help round the clock!
Technical support is available from Pilz round the clock.
This service is provided free of charge beyond standard business hours.

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Contents

1. Useful documentation

Reading of the documentation listed down is necessary for the understanding of this document. The presence of the indicated tools and safe handling are also presupposed with the user.

1.1. Documentation from Pilz GmbH & Co. KG

No.	Description	Item No.
1	Pilz international homepage, download section	www.pilz.com
2	Software "PSSuniversal Assistant", Online Help Pilz's international homepage > Products section > Safety control technology > PSSuniversal > Selection guides (download link)	www.pilz.com
3	Operating manual of module "PSSu H SB DP" (english)	21 275-xx
4	Technical Catalogue of PSSuniversal (english)	21 144-xx
5	System Description of PSSuniversal (english)	21 257-xx
6	Installation Manual of PSSuniversal (English)	21 263-xx

1.2. Documentation from other sources of information

No.	Description	Item No.
1	SIMATIC portal automation systems (international) http://www.automation.siemens.com/simatic/portal/index_00.htm	
2	PROFIBUS portal (english) http://www.profibus.com	

2. Hardware configuration

2.1. PSSu-System

PSSu H SB DP	(PSSu SafetyBUSp Profibus Head)
Slot 0 PSSu E F PS1	(Power Supply)
Slot 1 PSSu E F 4DI	(FS 4 Inputs)
Slot 2 PSSu E F DI OZ 2	(FS one Input and one Dual Output)
Slot 3 PSSu E S 4 DI	(ST inputs used only by SIMATIC PLC)
Slot 4 PSSu E S 4DO 0.5	(ST outputs used only by SIMATIC PLC)

PSSu H SB DP:
SafetyBUS address 33,
PSSu Device output SafetyBUS-I/O-Group 01, PSSu Device input SafetyBUS-I/O-Group 00

The outcome of this is an Fail Safe allocation table:

E33.00 PSS FS input slot 1 clamp 11
E33.01 PSS FS input slot 1 clamp 21
E33.02 PSS FS input slot 1 clamp 14
E33.03 PSS FS input slot 1 clamp 24
E33.04 virtual PSS FS input, result of PSSu monitoring “feedback loop”
E33.05 virtual PSS FS input, result of PSSu monitoring “open circuit detection”

A33.00 Dual FS Output

M116.00 SafetyBUS-I/O-Group 00 attached to all PSSu Device 33 outputs
M116.01 SafetyBUS-I/O-Group 01 attached to all PSSu Device 33 inputs

2.2. Safety PLC (PSS)

No.	Parameter	Data
1	PSS-CPU: model	PSS SB CPU3 (PSS 3000)
2	PSS-CPU: order number	301071
3	PSS-CPU: serial number	101501
4	PSS-CPU: version number	2.3
5	Used SafetyBUS p	☒ yes, ☐ no
6	Used SafetyBUS p lines	line 0: ☒ yes, ☐ no line 1: ☐ yes, ☒ no

Table 1: Configuration of Safety PLC (PSS)

2.3. Standard PLC

No.	Parameter	Data
1	PLC: model	S7-414-2DP
2	PLC: order number	6ES7414-2XG03-0AB0
3	PLC: serial number	V3.1.3
4	PLC: version number	V08
5	Used fieldbus	☐ no ☐ CANopen ☐ Devicenet ☐ Ethernet IP ☐ Interbus LWL ☐ Modbus (TCP) ☒ Profibus ☐ Profinet

Table 2: Configuration of standard PLC

3. Application Task

Connect PSSu Device to a SIMATIC-PLC S7-414-2DP from Siemens via included Profibus Master and code these functions:

- Slot 0 PSSu E F PS1:
  Copy PSSu Device information to the SIMATIC-PLC

- Slot 1 PSSu E F 4DI:
  Copy information of PSS Fail Safe Inputs to the SIMATIC-PLC

- Slot 2 PSSu E F DI OZ 2:
  Configure an enabled FS-Output switch by the SIMATIC-PLC and a switch on monitored feedback loop
  Copy information of PSS Fail Safe Inputs and Output to the SIMATIC-PLC

- Slot 3 PSSu E S 4 DI:
  Use this ST-inputs on SIMATIC-PLC

- Slot 4 PSSu E S 4DO 0.5:
  Use this ST-outputs on SIMATIC-PLC

4. Configuration with modularly GSD file

4.1. ST Configuration on SIMATIC-Side

- Overview of SIMATIC Hardware Configurator from Siemens

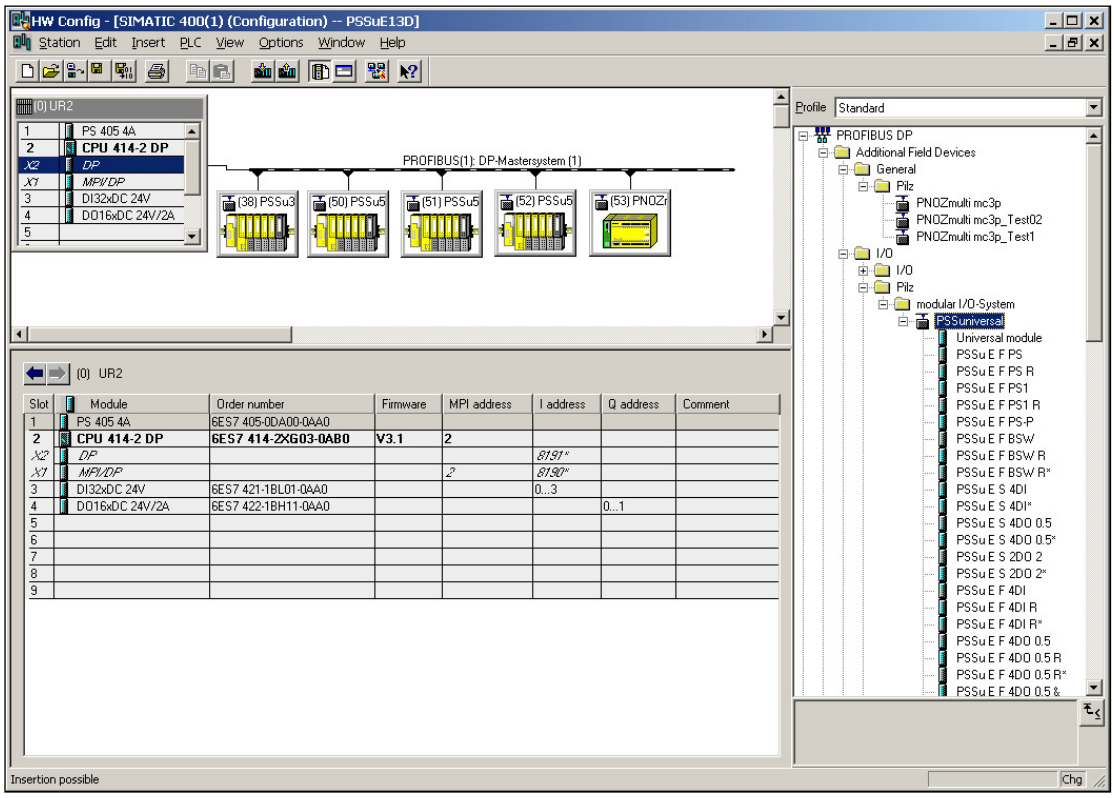


Fig. 1: STEP7 Hardware Config - Overview

4.2. Add the modularly GSD-File

- Download actual modularly GSD-File with associated bitmaps as an packed file (ZIP-format) from Internet presence of Pilz GmbH & Co. KG
  (Download section; Link: http://www.pilz.com/support/downloads/index.en.jsp)
- Notice: You will need to register on the system to access all the functionalities of this download area.

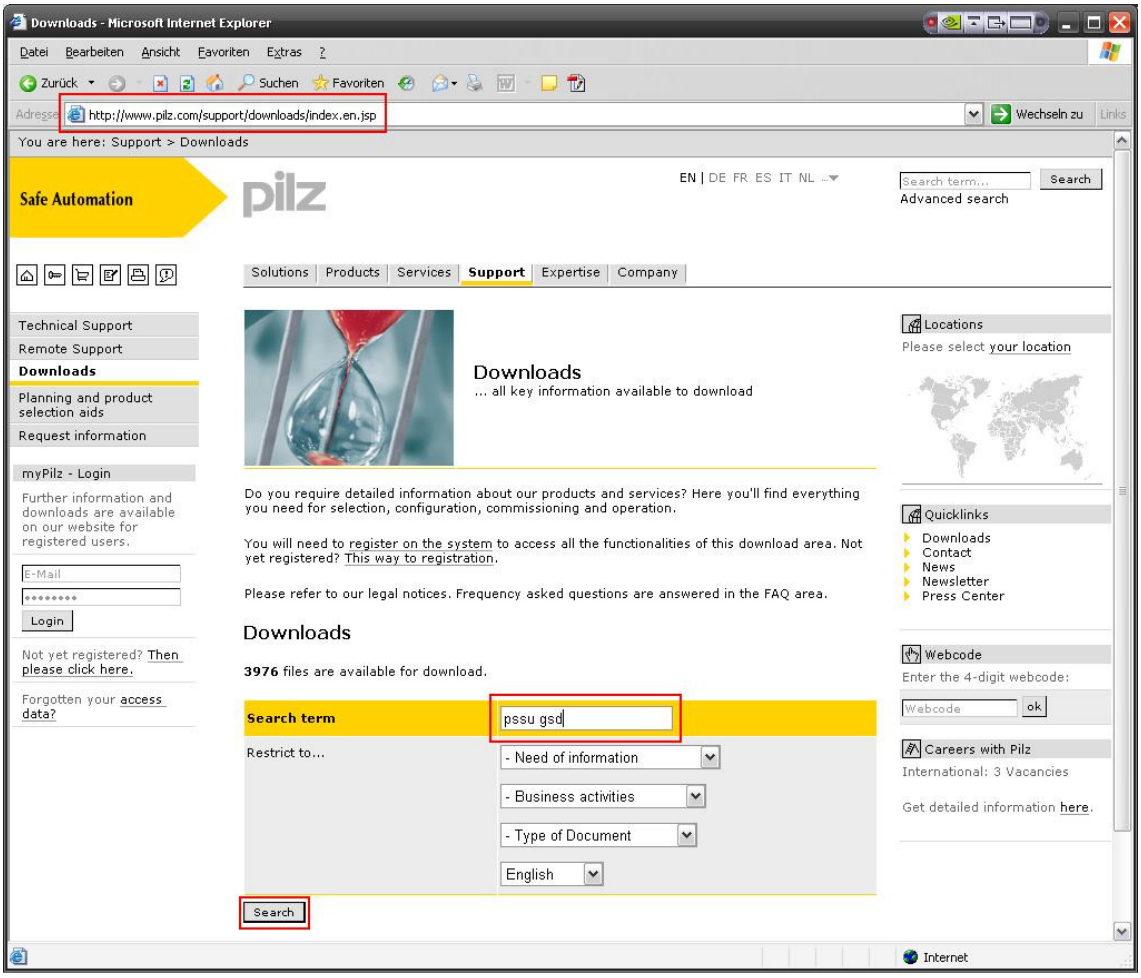


Fig. 2: Download-GSD-File for PSSu System from www.pilz.com

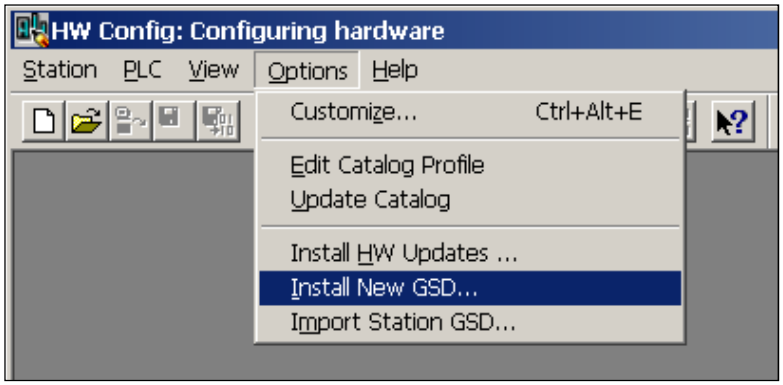


Fig. 3: STEP7 HW Config - Import GSD-File Step1

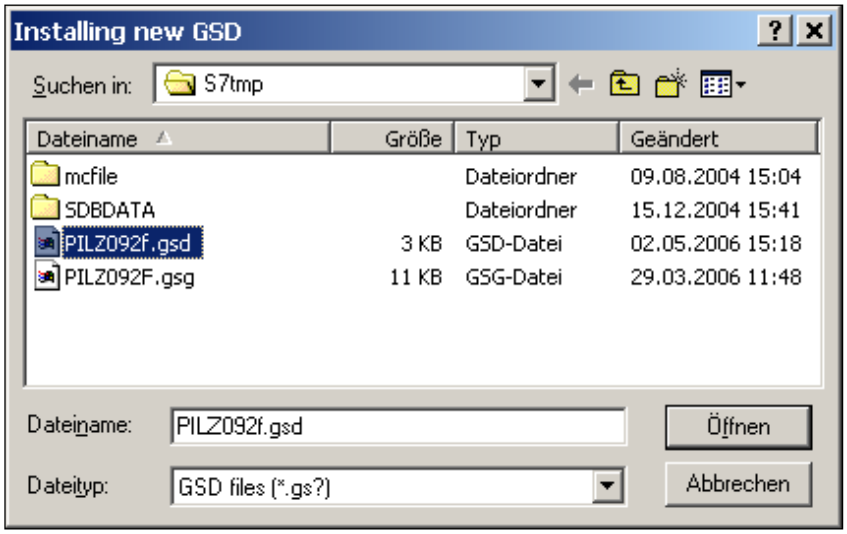


Fig. 4: STEP7 HW Config - Import GSD-File Step2

- GSD-File and Bitmaps successfully installed > listed in I/O catalog

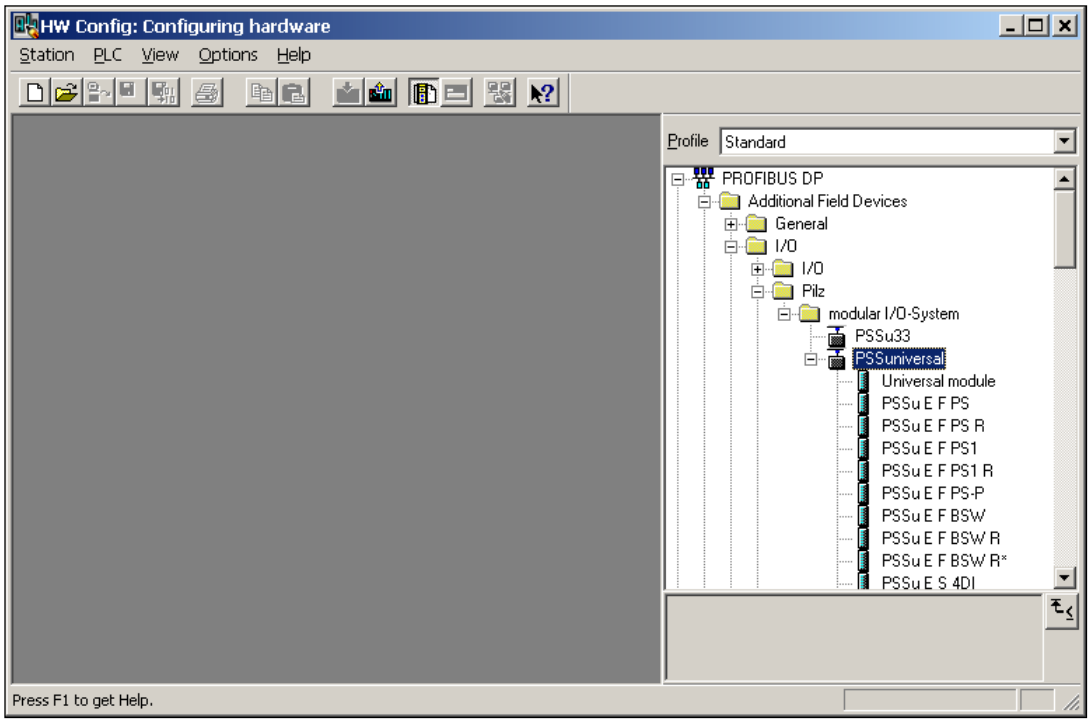


Fig. 5: STEP7 HW Config - GSD-File successfully installed

4.3. Activation of S7-DP-Master function

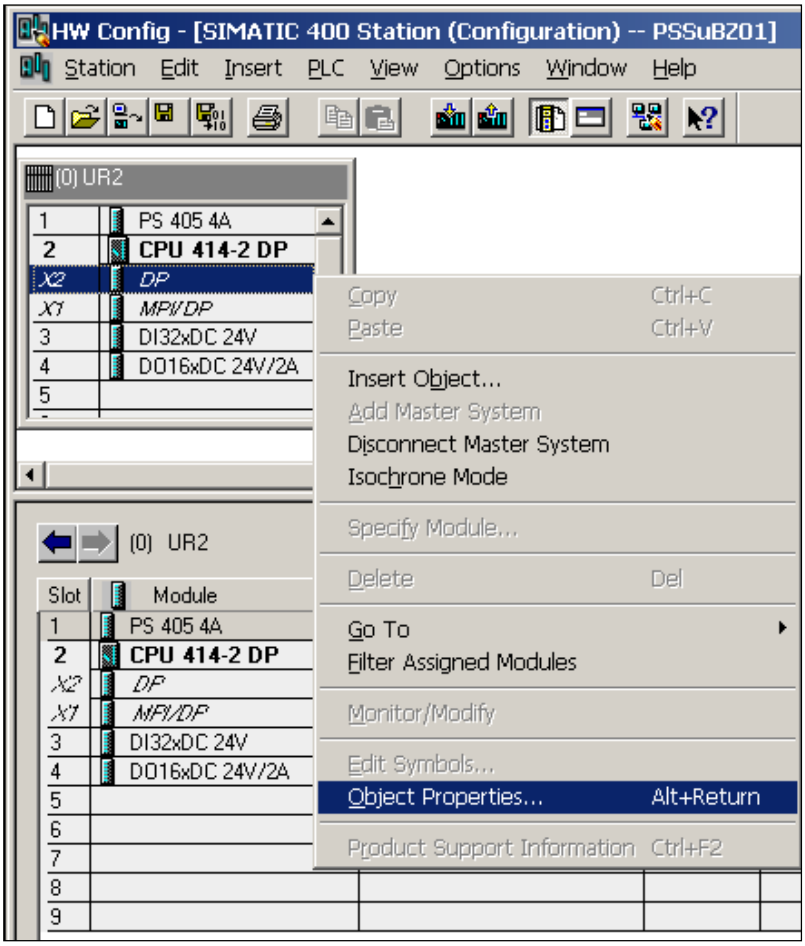


Fig. 6: Object-Properties of S7-DP-Master – General Part1

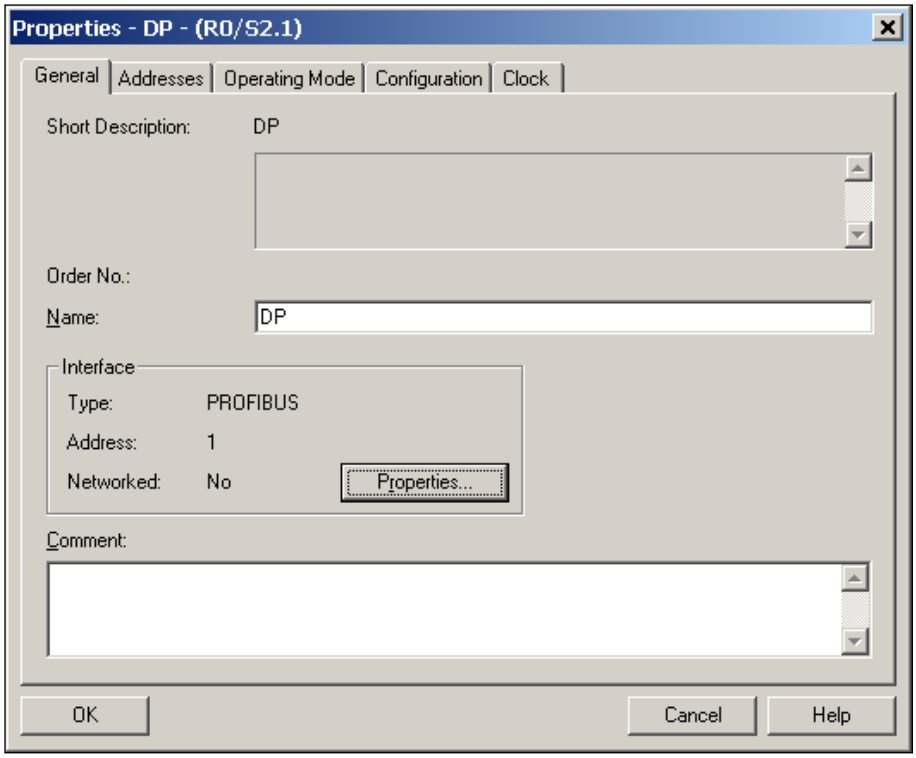


Fig. 7: Object-Properties of S7-DP-Master – General Part2

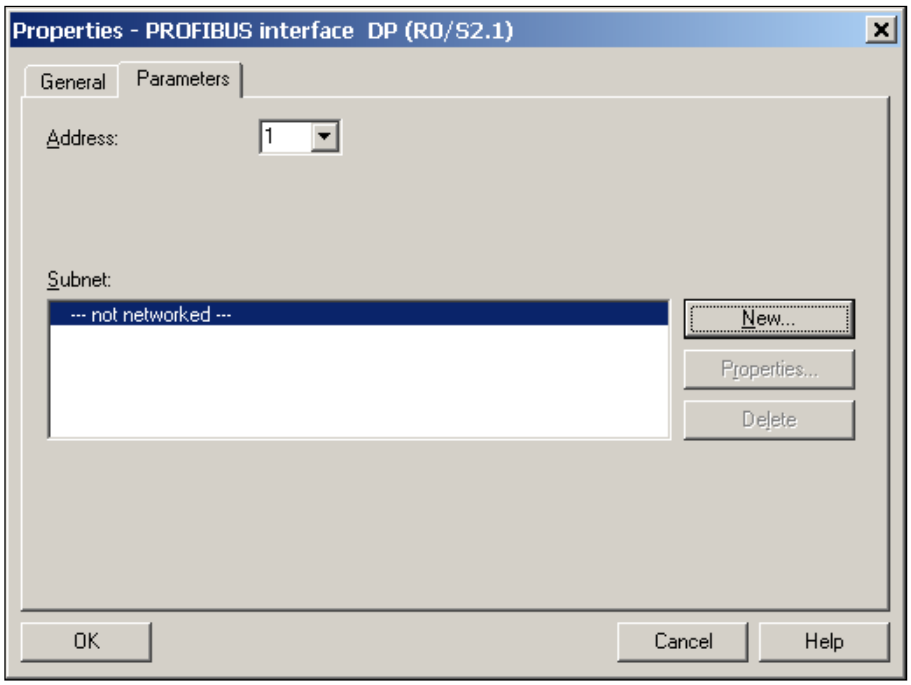


Fig. 8: Object-Properties of S7-DP-Master – Profibus Interface

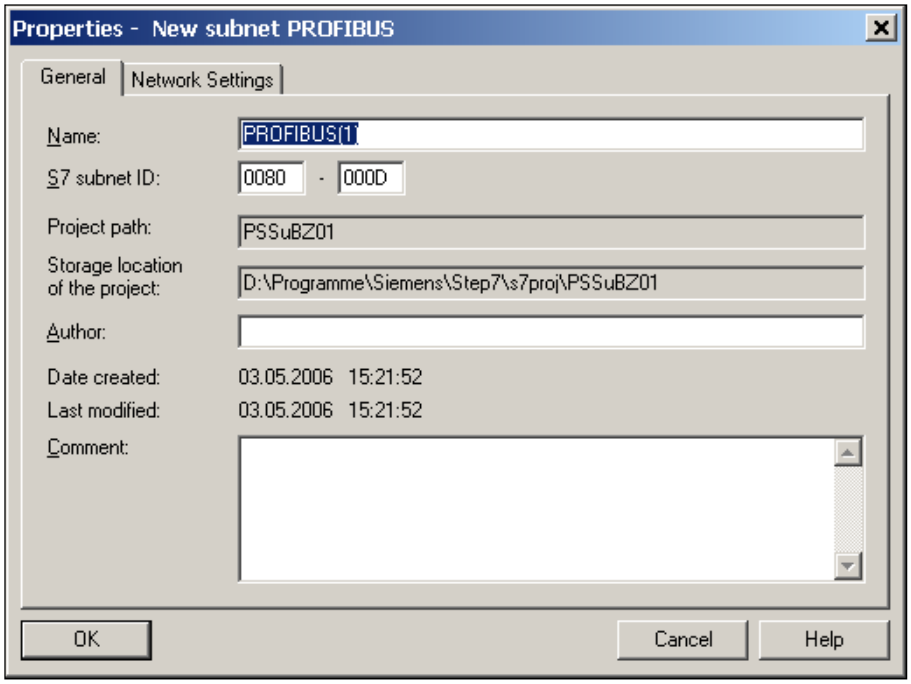


Fig. 9: Object-Properties of S7-DP-Master – New Profibus subnet Part1

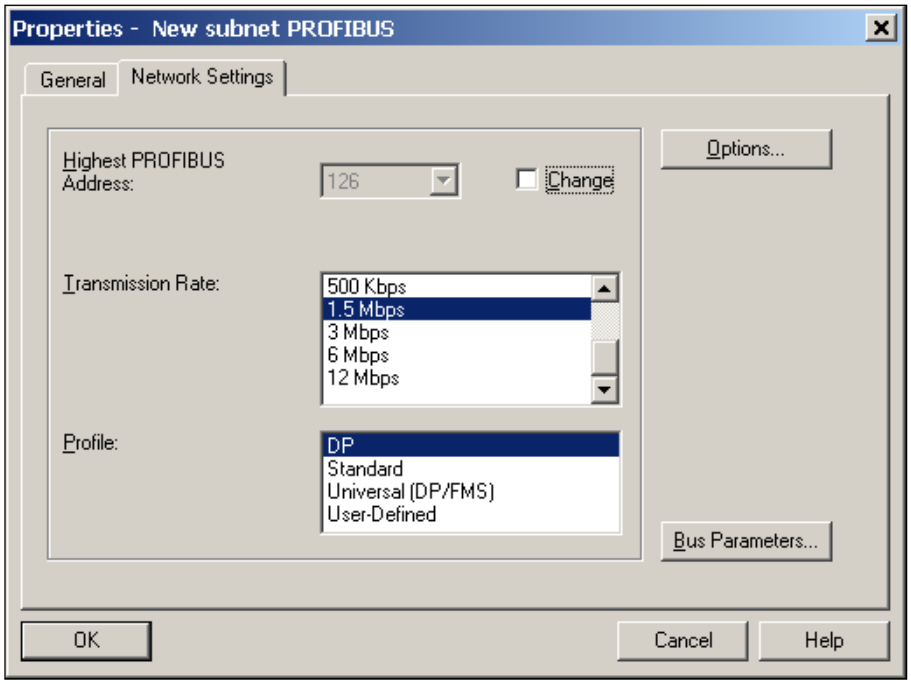


Fig. 10: Object-Properties of S7-DP-Master – New Profibus subnet Part2

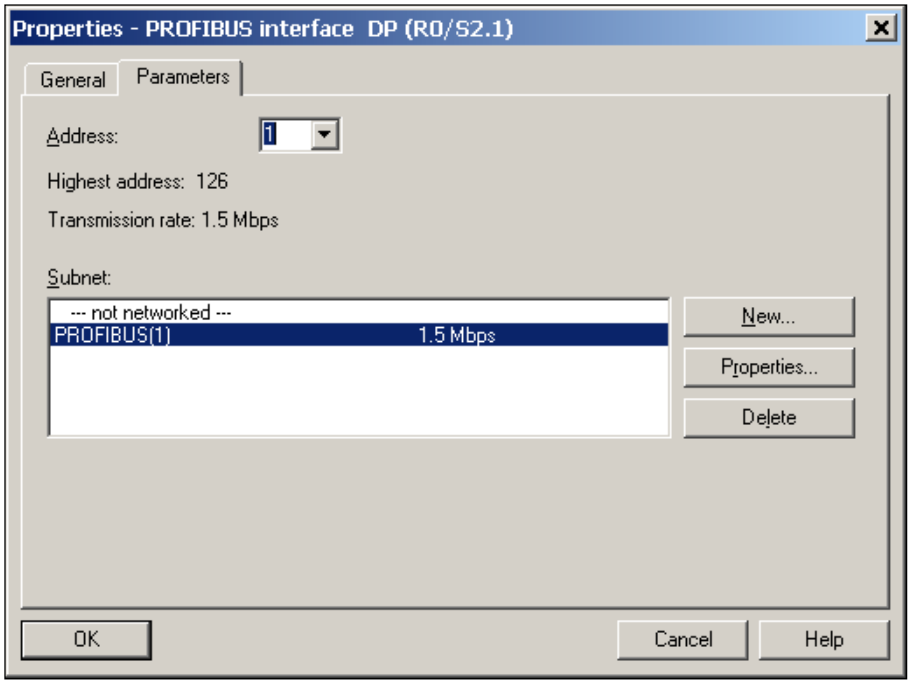


Fig. 11: Object-Properties of S7-DP-Master – New Profibus network created Part1

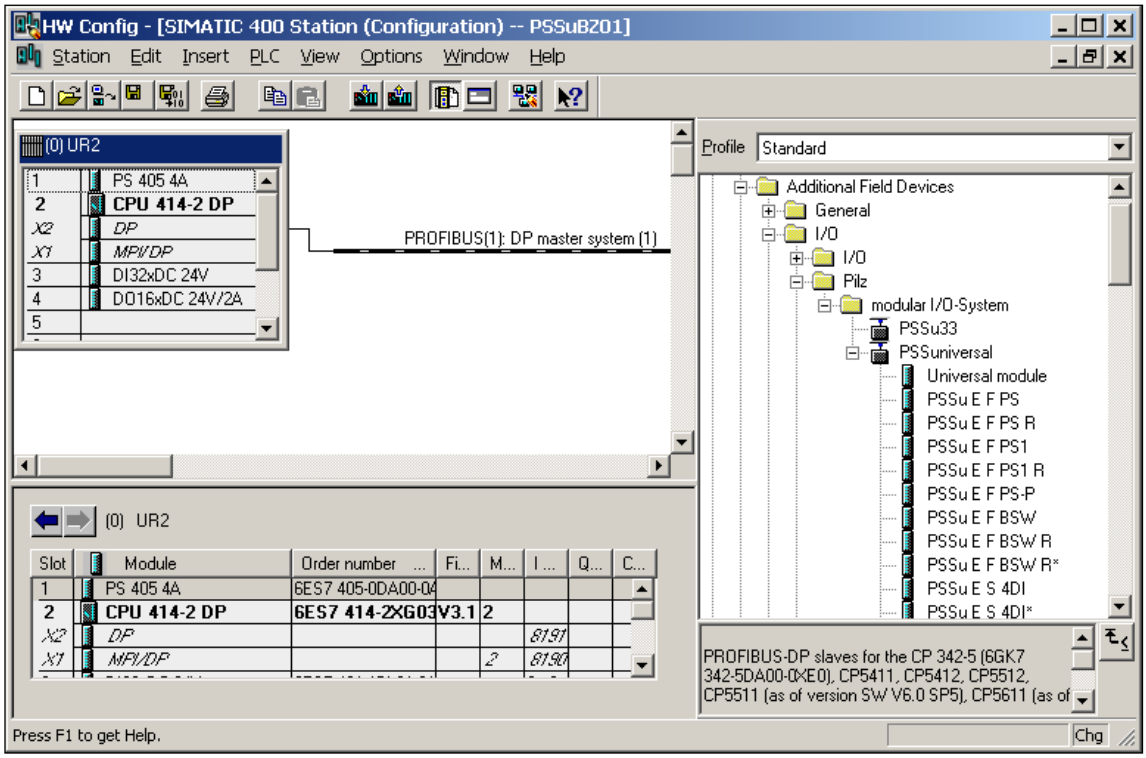


Fig. 12: Object-Properties of S7-DP-Master – New Profibus network created Part2

4.4. Configuration of PSSu as Profibus-Dp Slave

- Use drag and drop for adding a new PSSu system “PSSuniversal” from catalog to the PROFIBUS DP system “PROFIBUS(1): DP master system (1)” and
- select a fieldbus address for this PSSu system in the automatic following dialog box:

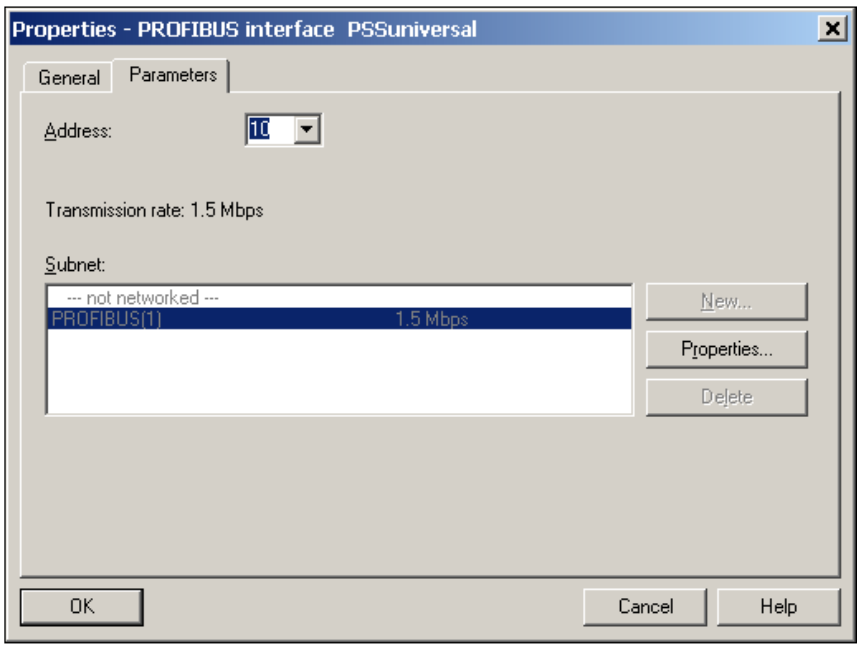


Fig. 13: STEP7 HW config – Add new fieldbus device (Profibus DP)

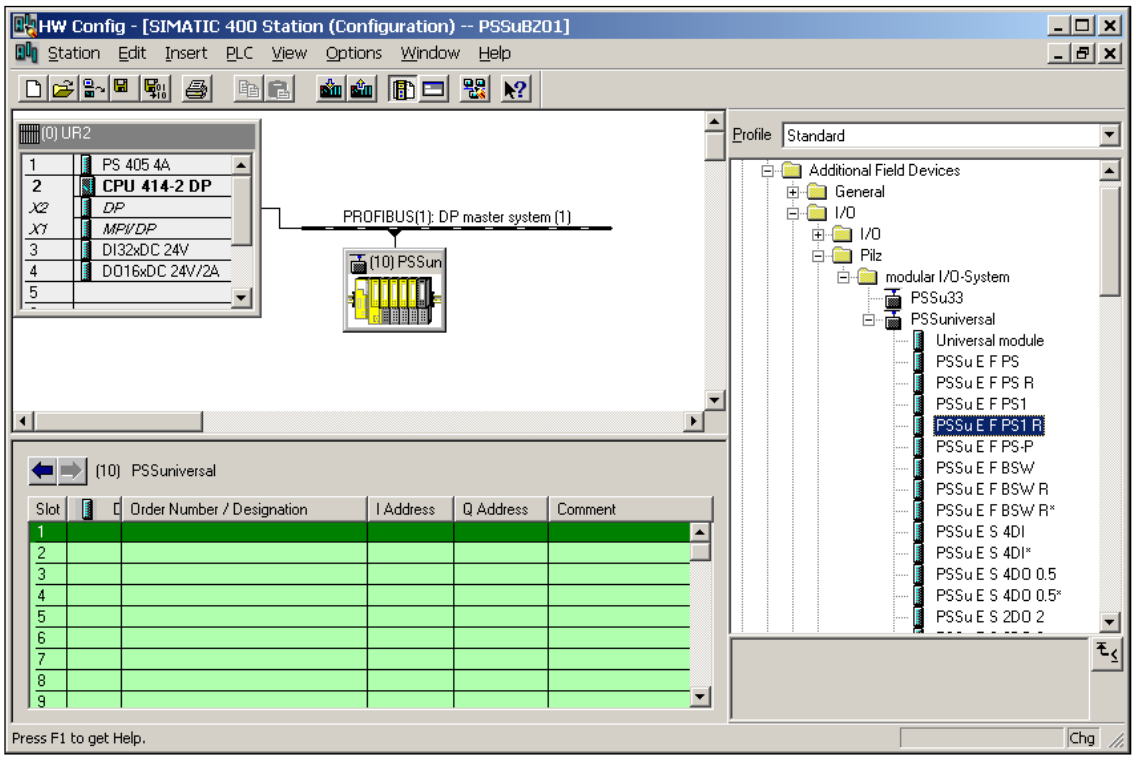


Fig. 14: STEP7 HW config – New fieldbus device added (Profibus DP)

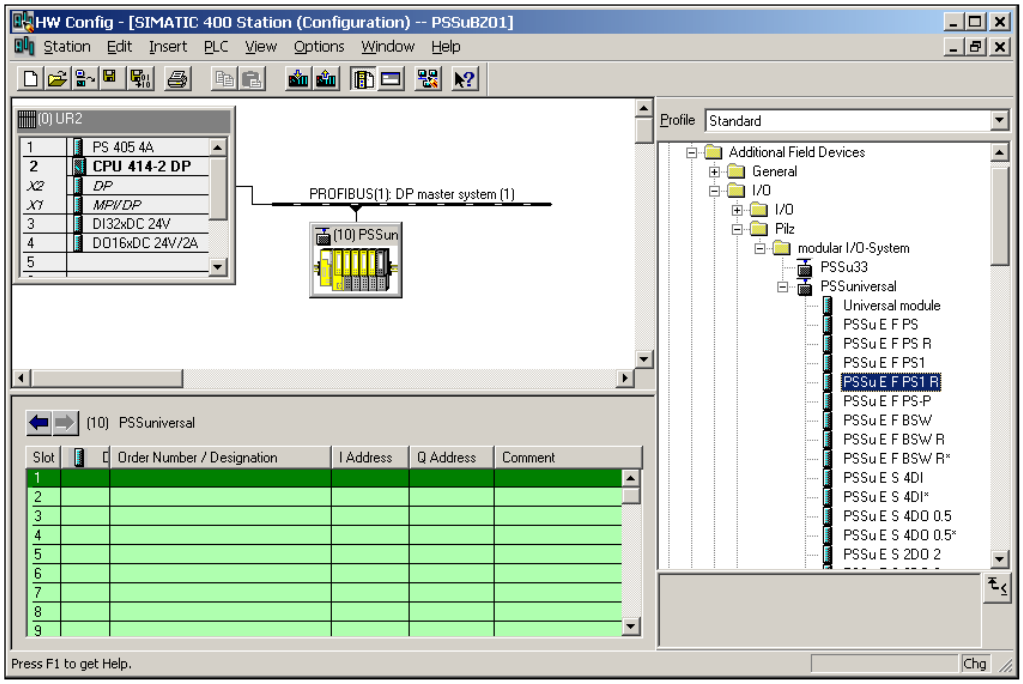


Fig. 15: STEP7 HW config – Add new Power-Supply-Modul to PSSu Slave

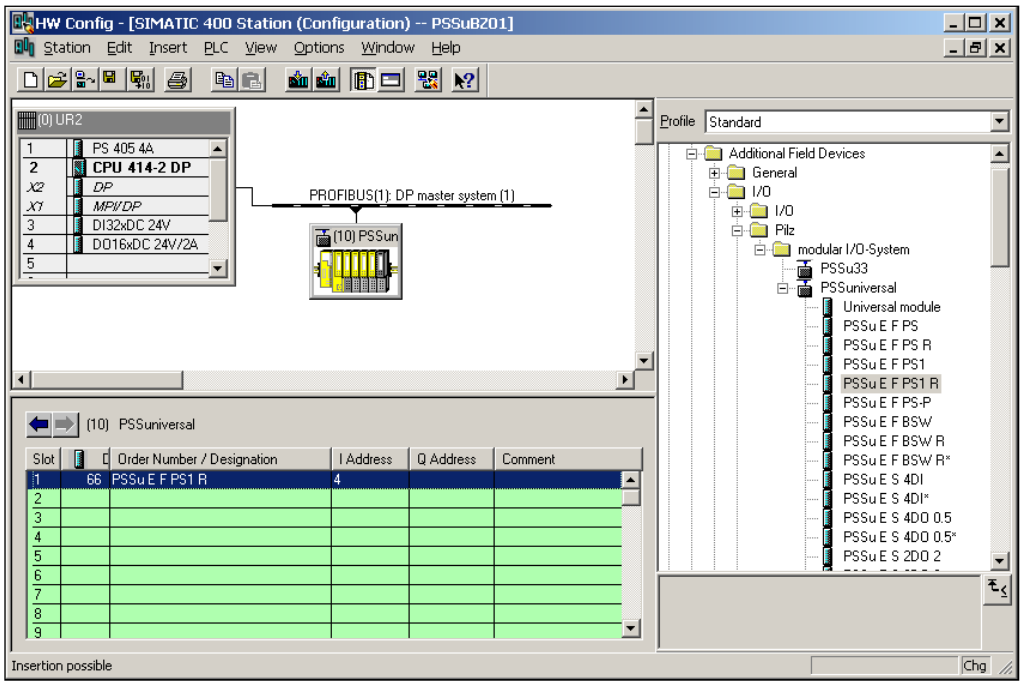


Fig. 16: STEP7 HW config – New Power-Supply-Modul added to PSSu Slave

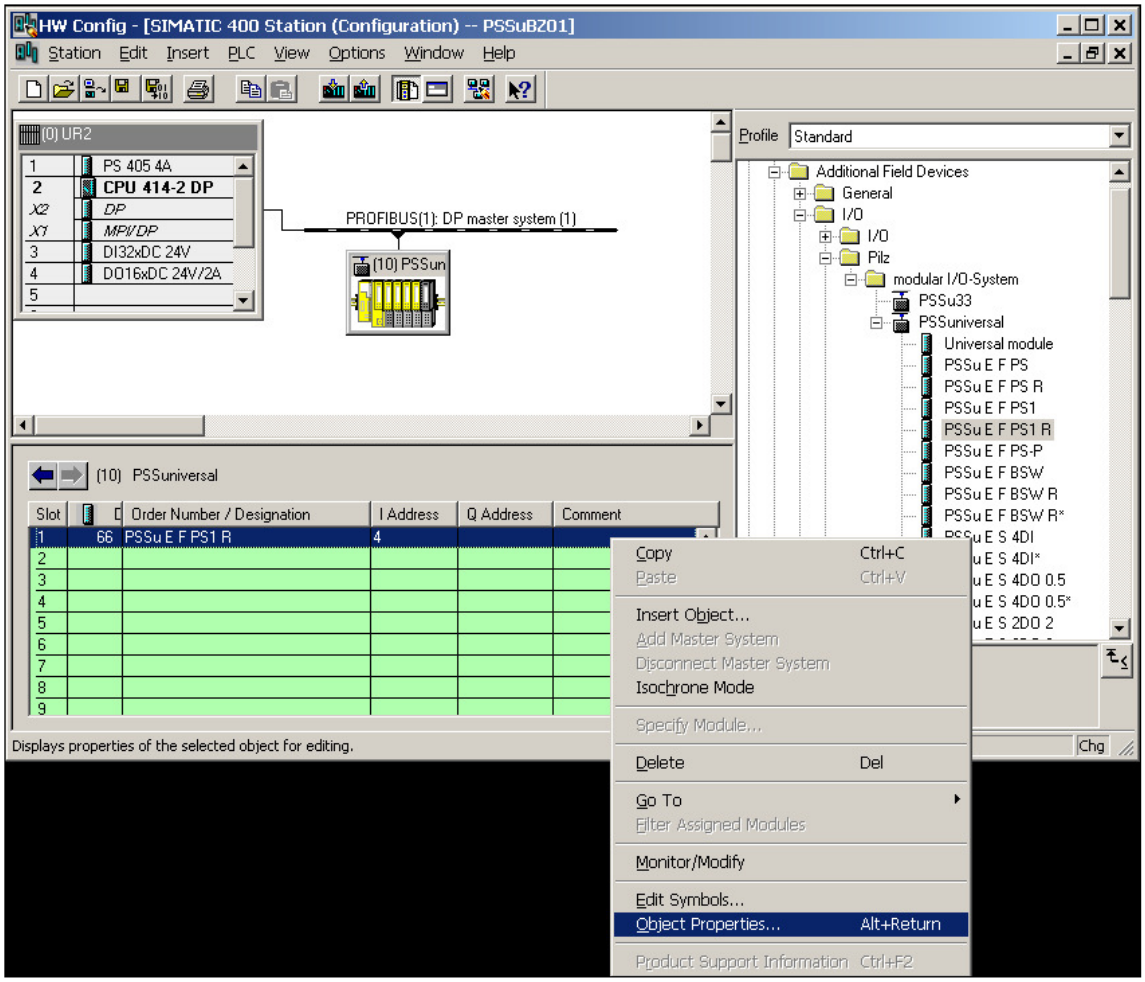


Fig. 17: STEP7 HW config – Object Properties of PSSu Power-Supply-Modul

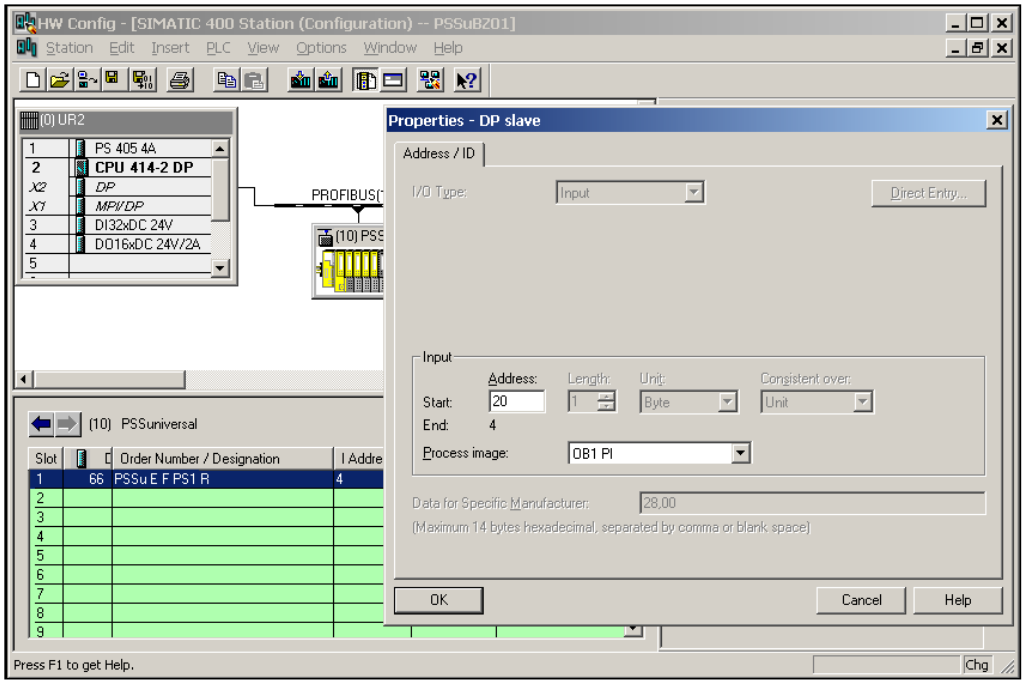


Fig. 18: STEP7 HW config – Change Address of PSSu Power-Supply-Modul (Process Image)

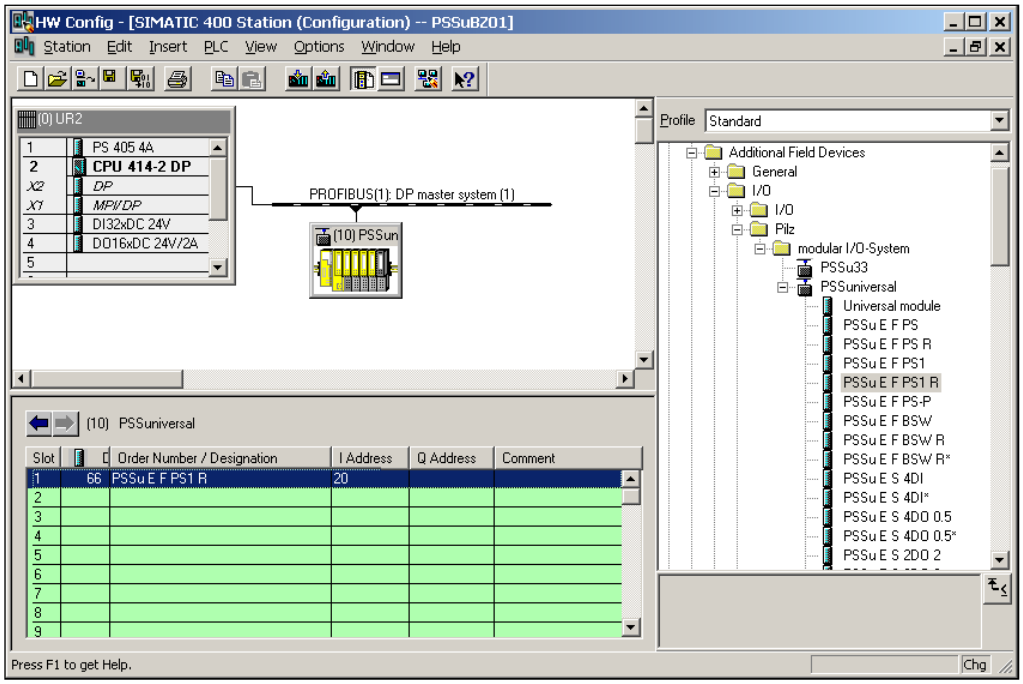


Fig. 19: STEP7 HW config – Address of PSSu Power-Supply-Modul changed

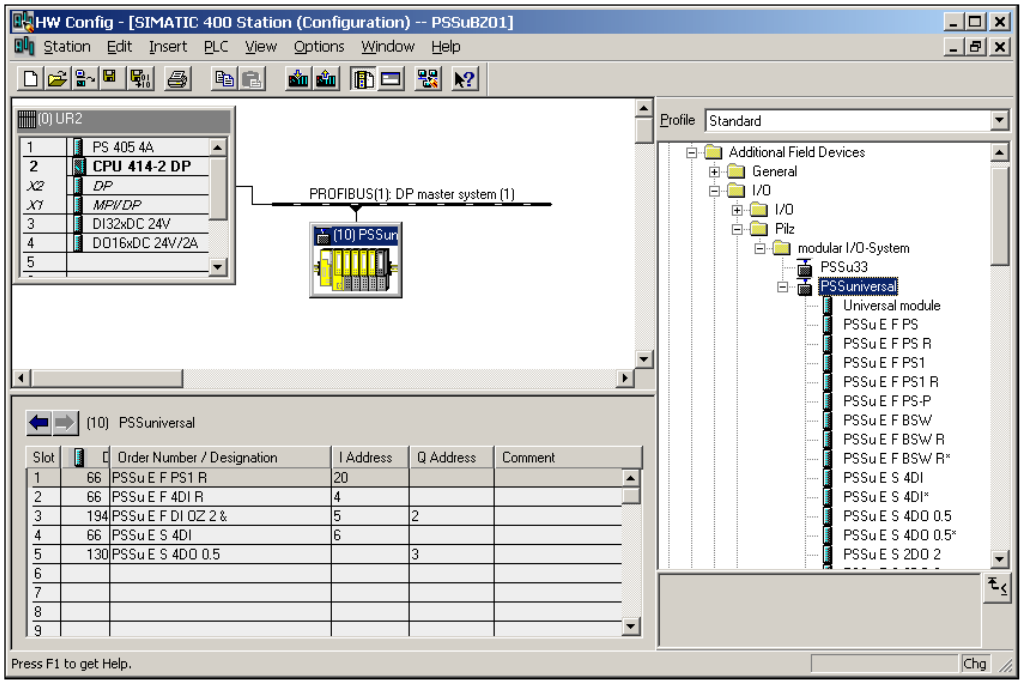


Fig. 20: STEP7 HW config – All PSSu Electronic-Moduls added

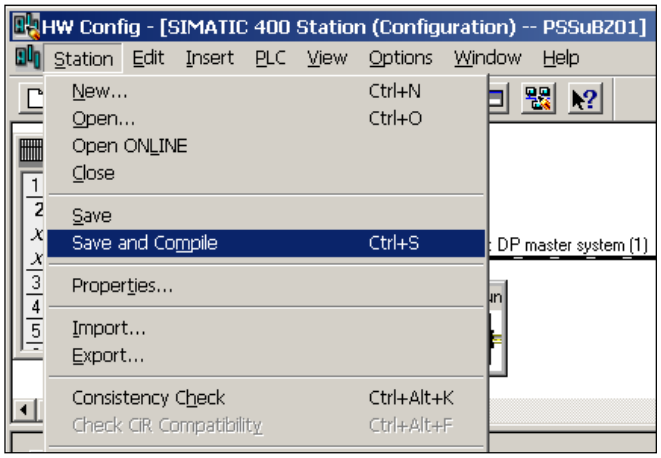


Fig. 21: STEP7 HW config – Save and Compile

- After writing and saving the PLC program both parts must download to the PLC. If the hardware configuration is correct, then the LED “RUN” of PSSu Headmodule is green.
- It is also possible to download first only the completed hardware configuration of the PLC and one or more connected PSSu systems.
- Retry the steps of this chapter for the other PSSu systems.

5. Configuration with PSSu Assistant

- helpful for generation compact GSD files for standardized systems
- lower risk for errors in configuration

5.1. FS Configuration on Pilz-Side

5.1.1. Start of configuration with SafetyBUS p Configurator

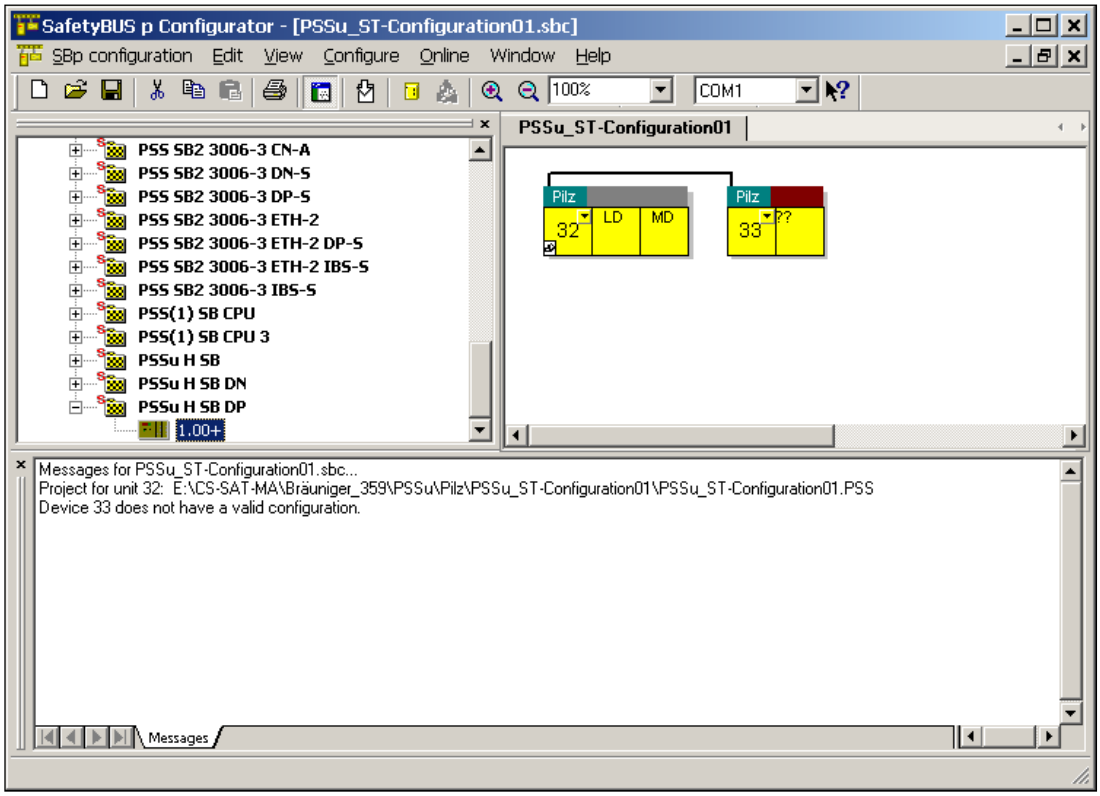


Fig. 22: SafetyBUS p Configurator – Add new device PSSu H SB DP

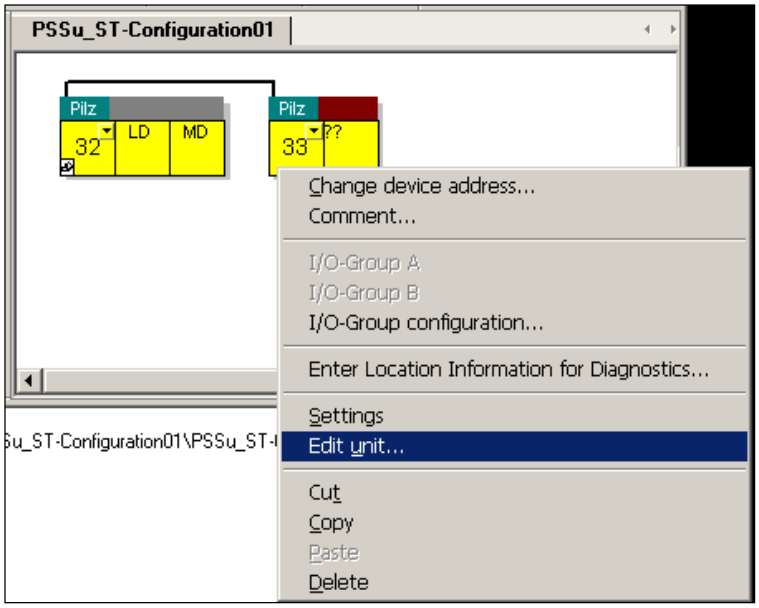


Fig. 23: SafetyBUS p Configurator – Edit device PSSu H SB DP

5.1.2. Configuration with PSSu Configurator (only fail safe section)

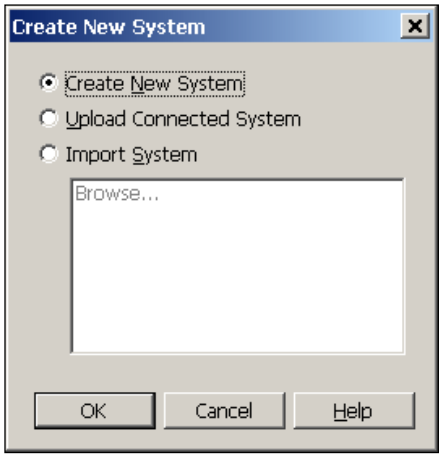


Fig. 24: PSSu Configurator – Create new PSSu system

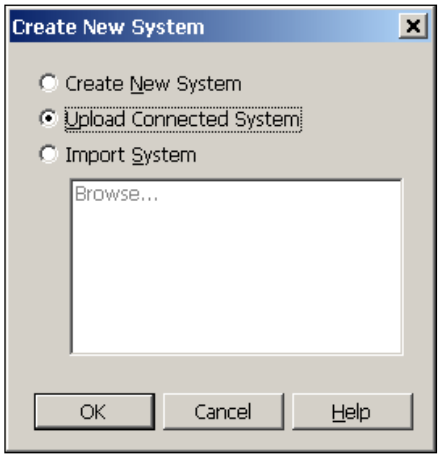


Fig. 25: PSSu Configurator – Upload connected PSSu system

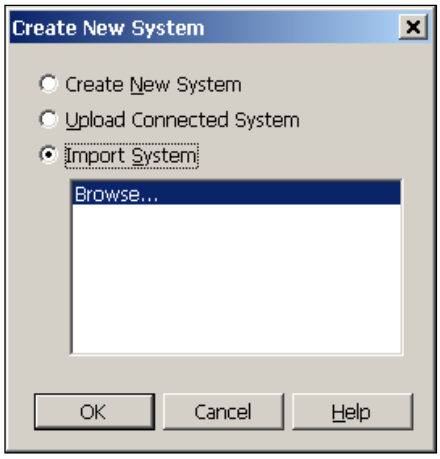


Fig. 26: PSSu Configurator – Import PSSu system from configuration file (PSSu Assistant)

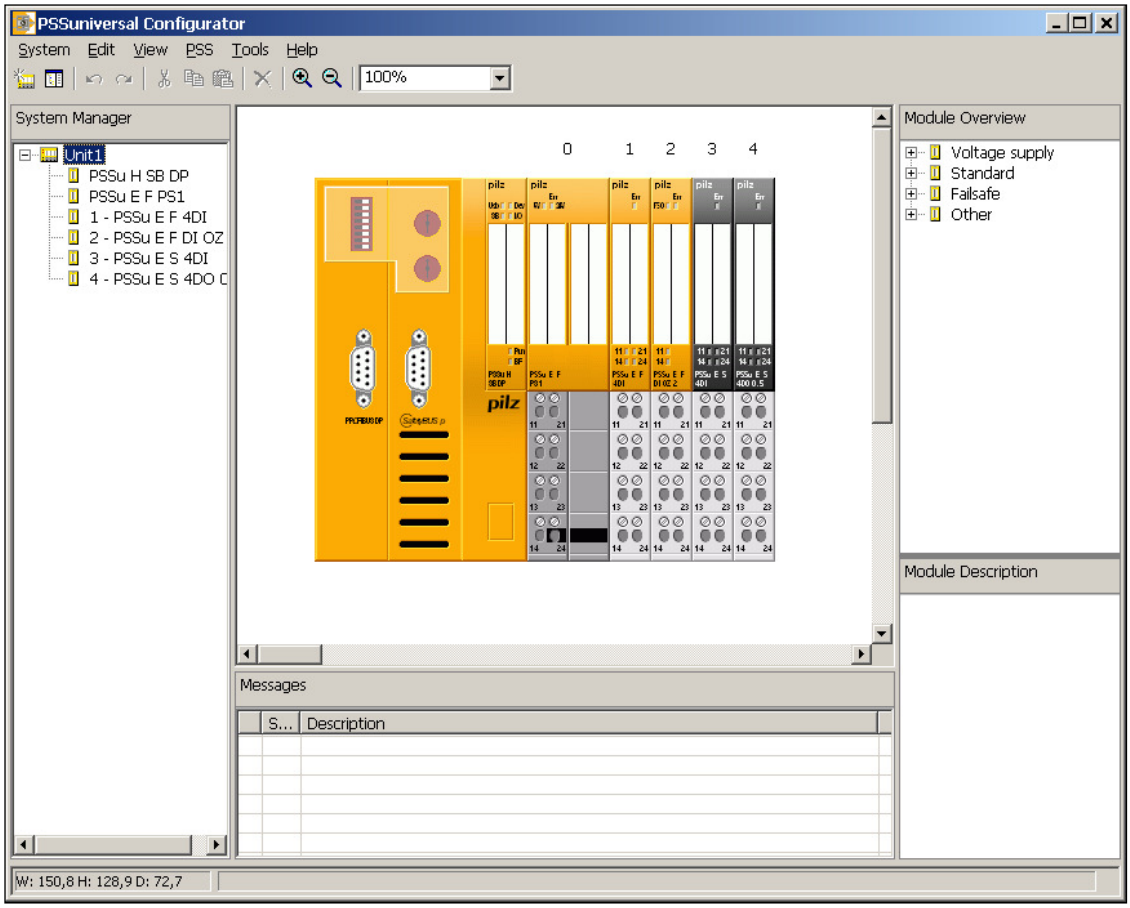


Fig. 27: PSSu Configurator – New PSSu system added

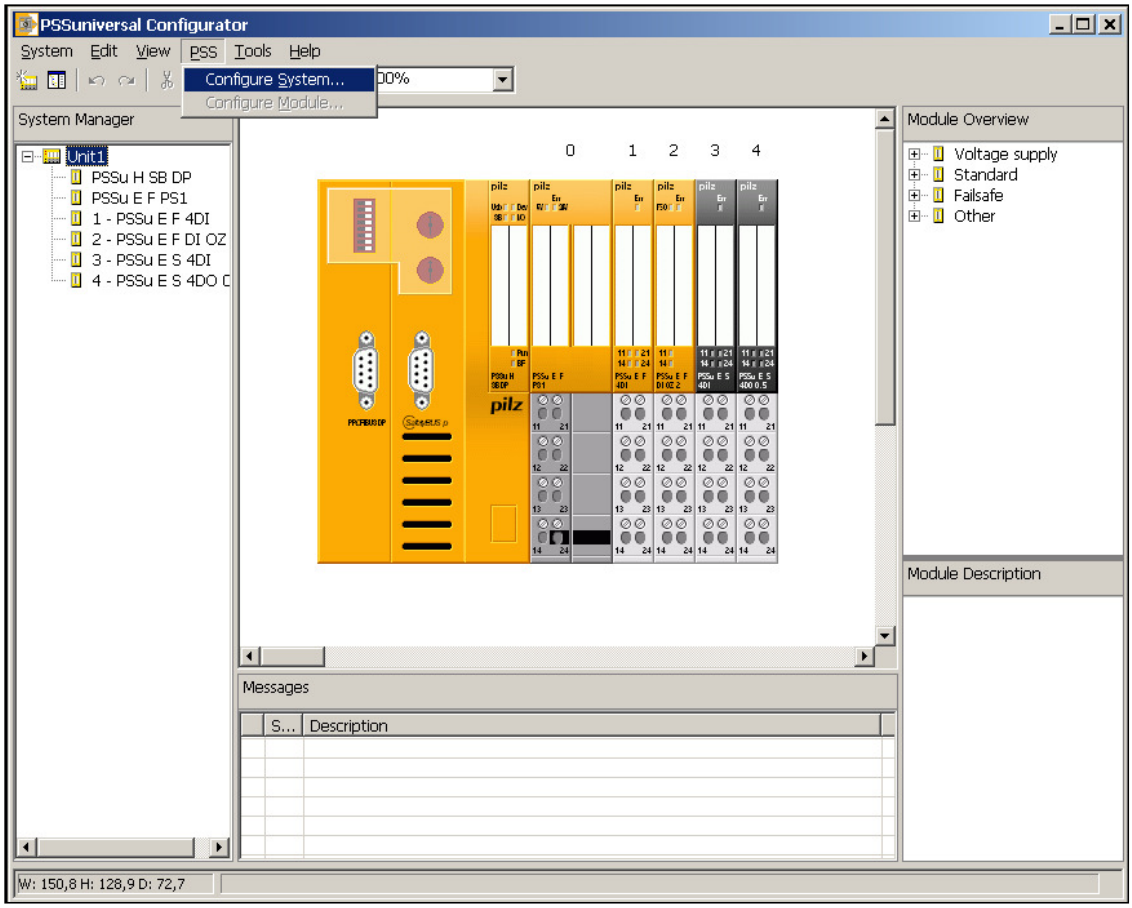


Fig. 28: PSSu Configurator – Configuration of PSSu system

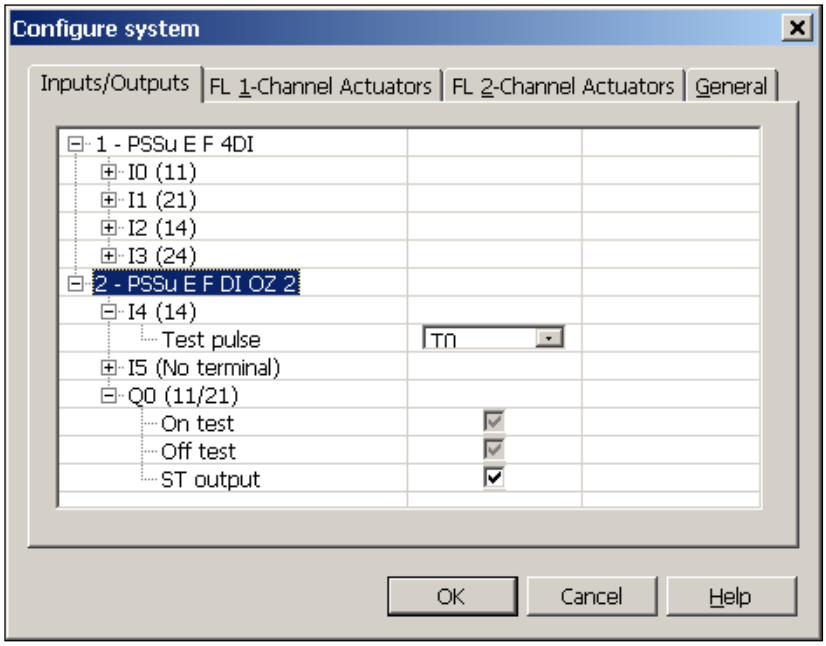


Fig. 29: PSSu Configurator – Configuration of Inputs and Outputs (Parameter)

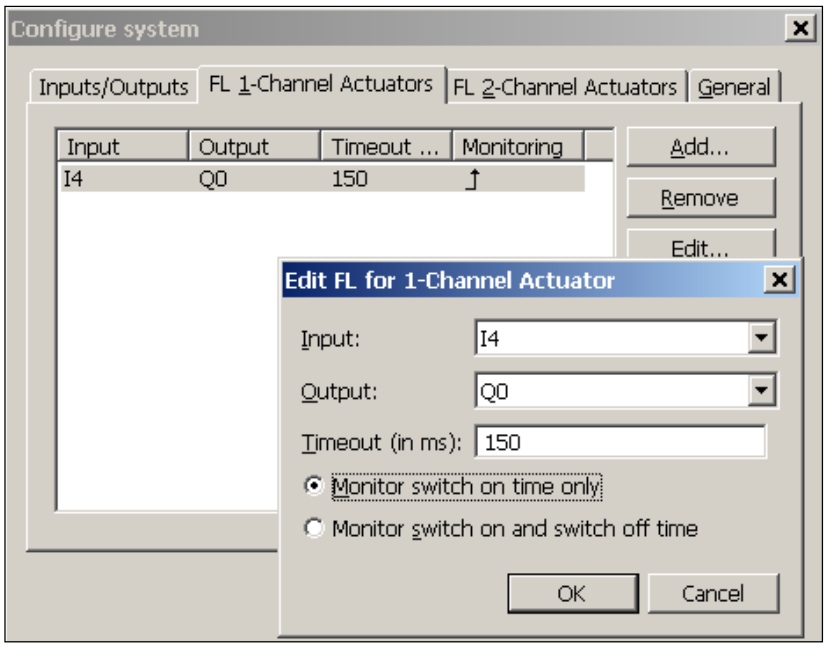


Fig. 30: PSSu Configurator – Configuration of Feedback Loop (Parameter)

5.1.3. Save configuration to SafetyBUS p project

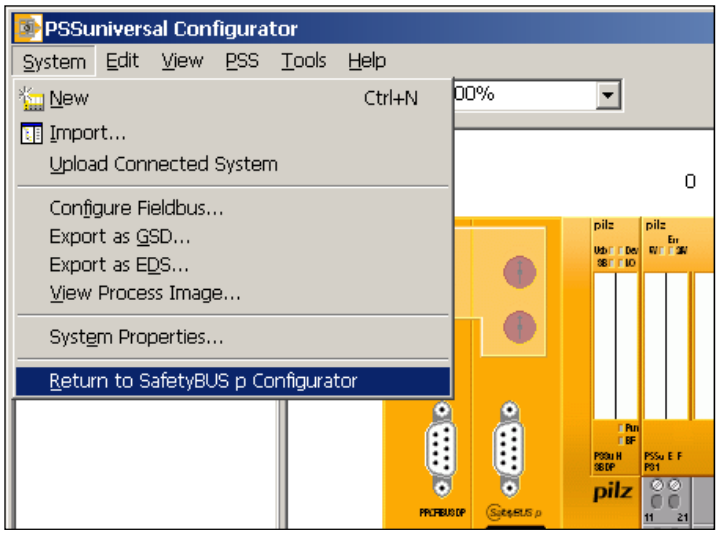


Fig. 31: PSSu Configurator – Return to SafetyBUS p Configurator

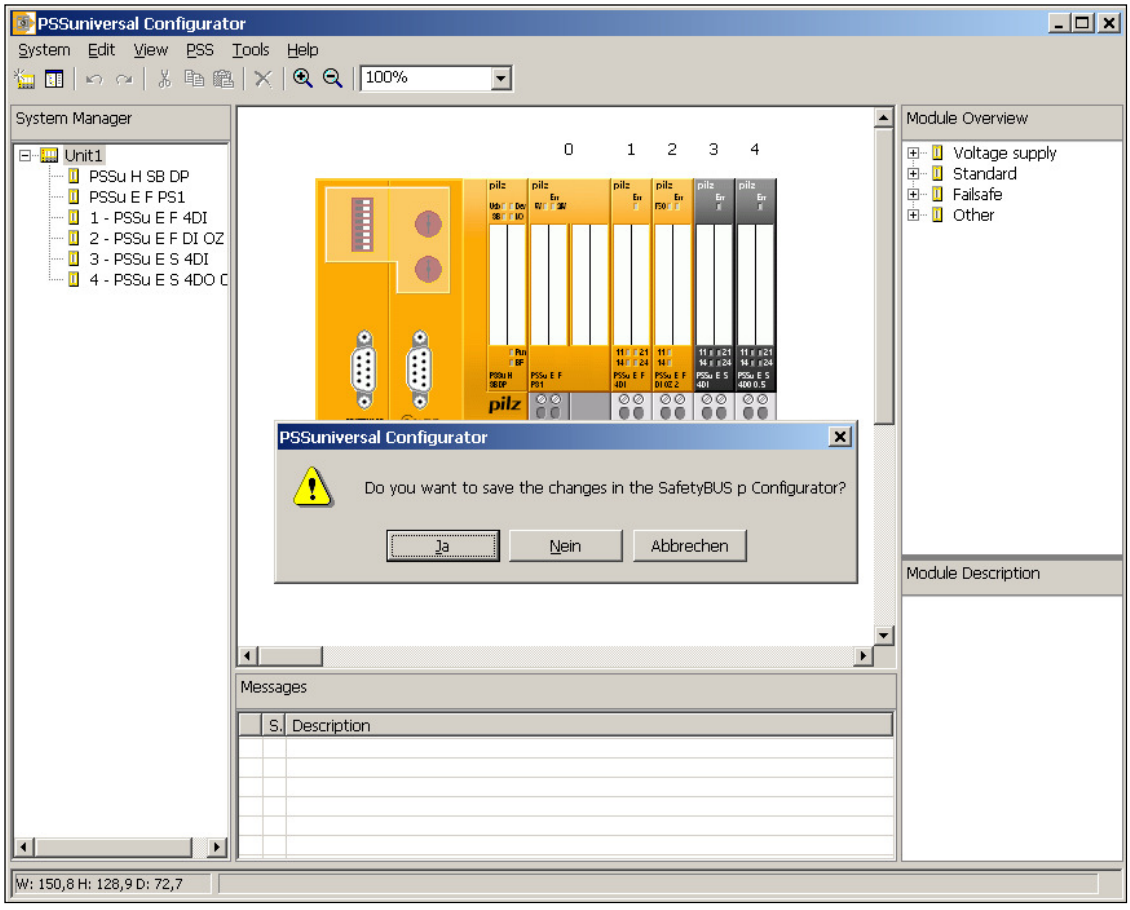


Fig. 32: PSSu Configurator – Return to SafetyBUS p Configurator (query for saving)

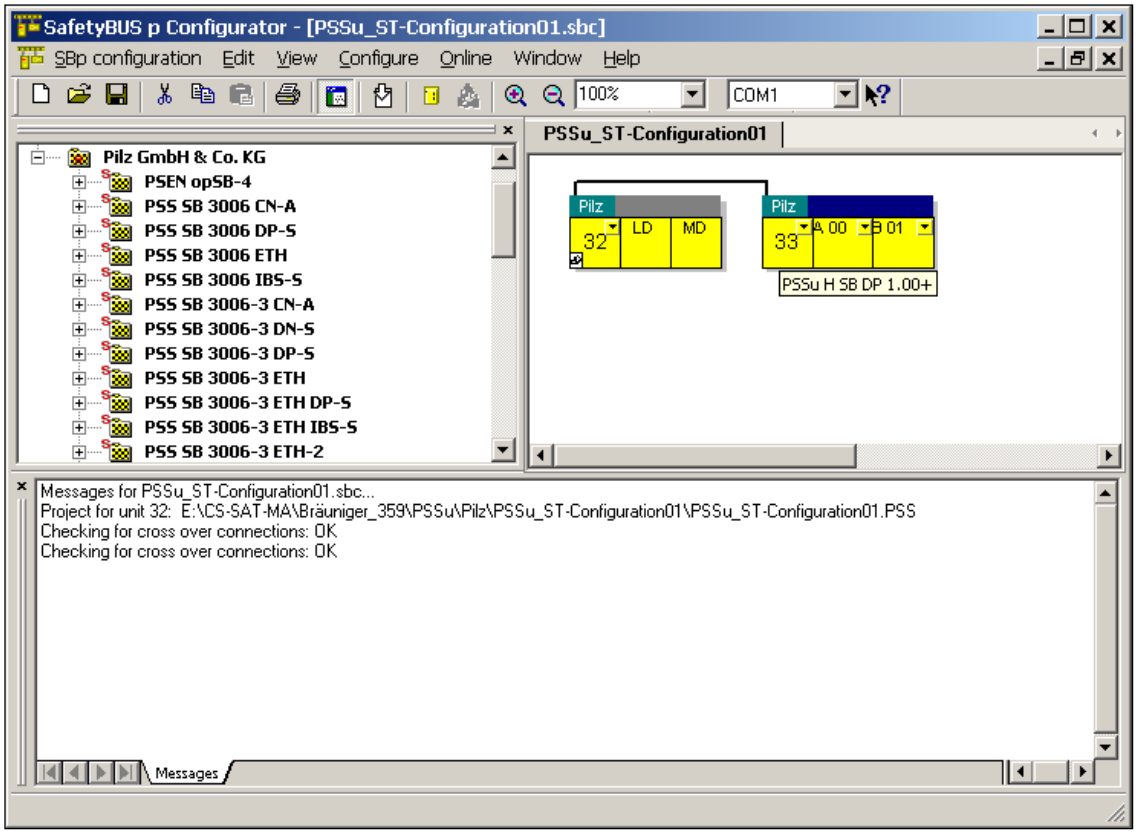


Fig. 33: SafetyBUS p Configurator – FS configuration of device PSSu H SB DP completed

5.2. ST Configuration on Pilz-Side

5.2.1. Configuration with PSSu Configurator (only standard section)

- Open or return to PSSu Configurator like chapter 5.1.1, page 22 and
- open configuration of fieldbus parameters on Pilz side

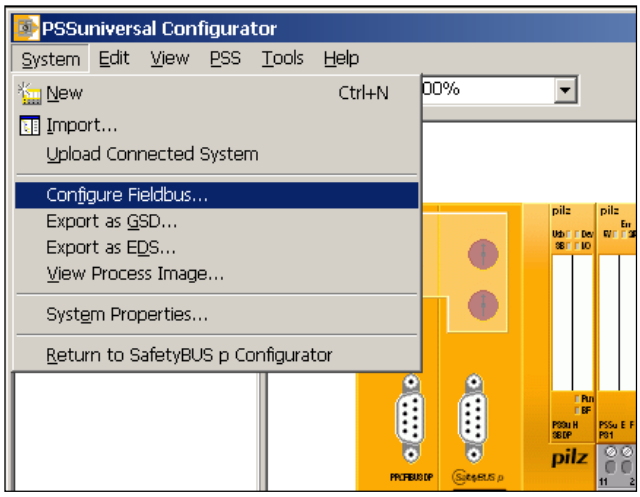


Fig. 34: PSSu Configurator – Open Fieldbus Configuration

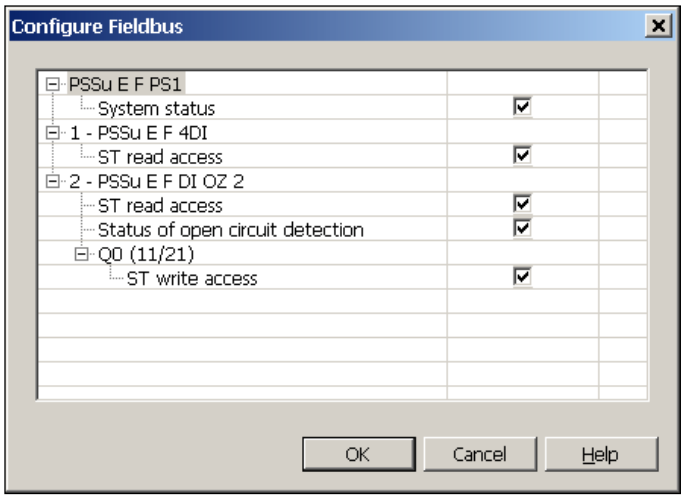


Fig. 35: PSSu Configurator – Configuration of read and write access to fail safe signals

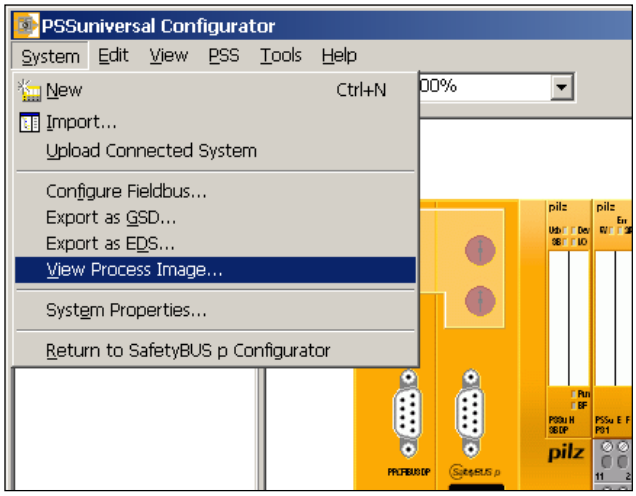
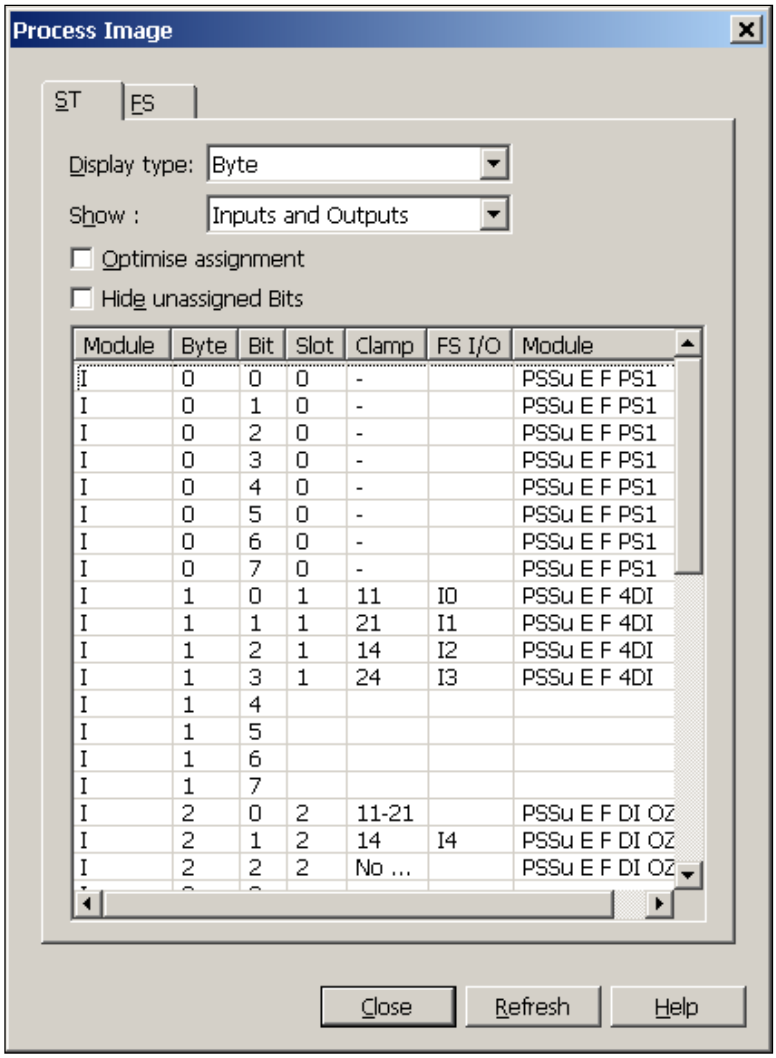
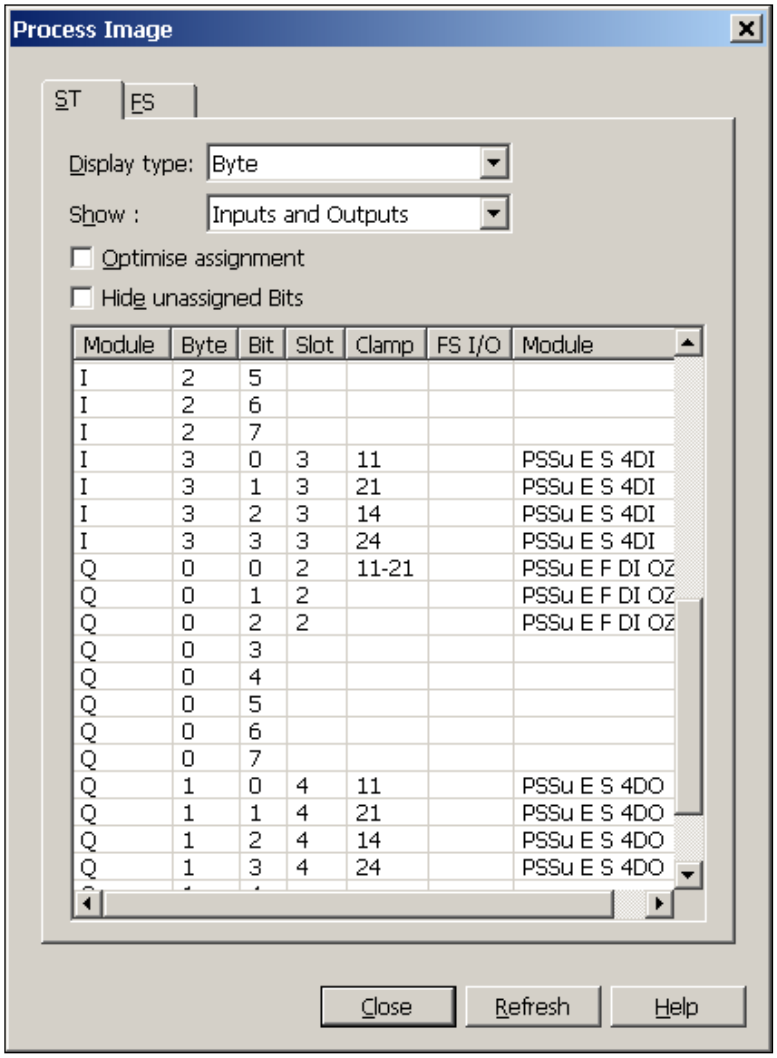


Fig. 36: PSSu Configurator – Open Configuration of process image



Module	Byte	Bit	Slot	Clamp	FS I/O	Module
I	0	0	0	-		PSSu E F PS1
I	0	1	0	-		PSSu E F PS1
I	0	2	0	-		PSSu E F PS1
I	0	3	0	-		PSSu E F PS1
I	0	4	0	-		PSSu E F PS1
I	0	5	0	-		PSSu E F PS1
I	0	6	0	-		PSSu E F PS1
I	0	7	0	-		PSSu E F PS1
I	1	0	1	11	I0	PSSu E F 4DI
I	1	1	1	21	I1	PSSu E F 4DI
I	1	2	1	14	I2	PSSu E F 4DI
I	1	3	1	24	I3	PSSu E F 4DI
I	1	4				
I	1	5				
I	1	6				
I	1	7				
I	2	0	2	11-21		PSSu E F DI OZ
I	2	1	2	14	I4	PSSu E F DI OZ
I	2	2	2	No ...		PSSu E F DI OZ

Fig. 37: PSSu Configurator – View process image (ST-Part1)



Module	Byte	Bit	Slot	Clamp	FS I/O	Module
I	2	5				
I	2	6				
I	2	7				
I	3	0	3	11		PSSu E S 4DI
I	3	1	3	21		PSSu E S 4DI
I	3	2	3	14		PSSu E S 4DI
I	3	3	3	24		PSSu E S 4DI
Q	0	0	2	11-21		PSSu E F DI OZ
Q	0	1	2			PSSu E F DI OZ
Q	0	2	2			PSSu E F DI OZ
Q	0	3				
Q	0	4				
Q	0	5				
Q	0	6				
Q	0	7				
Q	1	0	4	11		PSSu E S 4DO
Q	1	1	4	21		PSSu E S 4DO
Q	1	2	4	14		PSSu E S 4DO
Q	1	3	4	24		PSSu E S 4DO

Fig. 38: PSSu Configurator – View process image (ST-Part2)

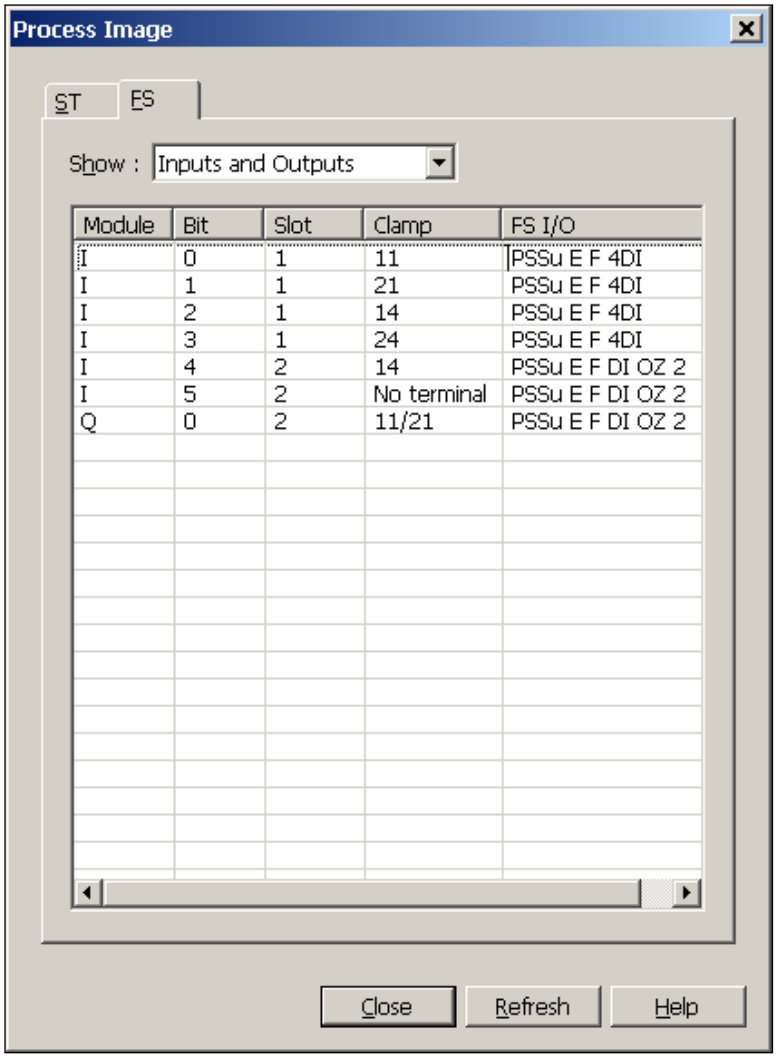


Fig. 39: PSSu Configurator – View process image (FS-Part)

5.2.2. Creation of an unique GSD file

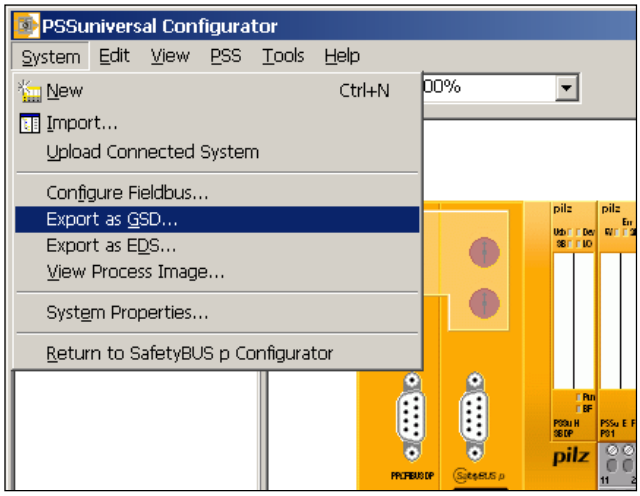


Fig. 40: PSSu Configurator – Open function Export as GSD

- Choose an unique name of “Model_Name” for each PSSu system with maximum 32 characters
  - Background:
    The identifier of “Model_Name” is the name of this parameter in the generated GSD file. Don’t use the default name “PSSuniversal” of the modularly GSD file or the same name for different PSSu systems, because in the hardware catalog (database) it can overwrite existing GSD files by importing the last GSD file.

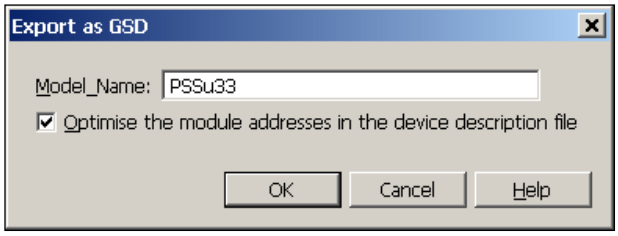


Fig. 41: PSSu Configurator – Function Export as GSD (Model Name)

- Choose an unique name for each GSD file with maximum 8 characters, for instance “PSSuXYZ” for SafetyBUS p (examples: “PSSu033.gsd” and “PSSu195.gsd”)
  - Background:
    Don’t use the default name “PILZ092f.gsd” of the modularly GSD file or the same name for different PSSu systems, because the last GSD file can overwrite an existing file in the same folder.

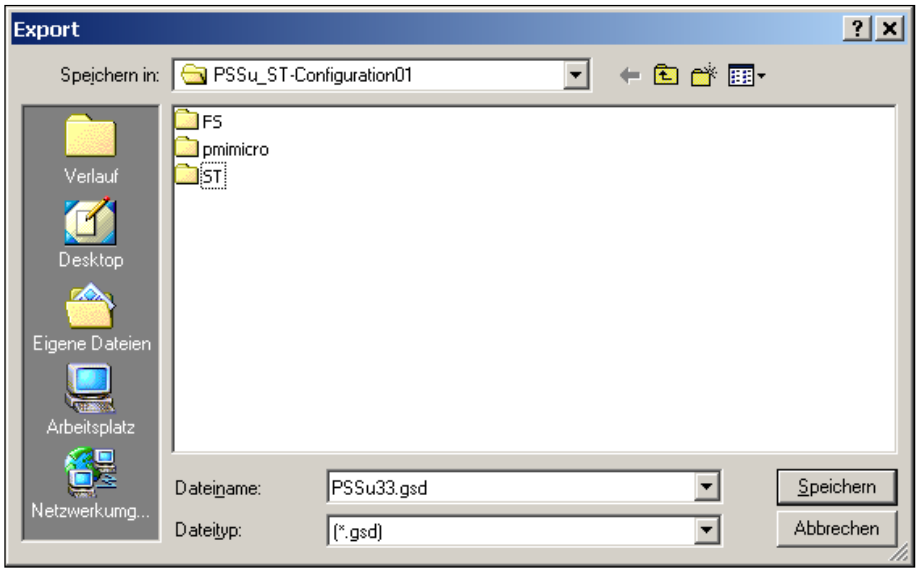


Fig. 42: PSSu Configurator – Function Export as GSD (File Name)

- Retry the steps of last two chapters 5.2.1 und 5.2.2 for the other PSSu systems

5.2.3. ST Configuration on SIMATIC-Side

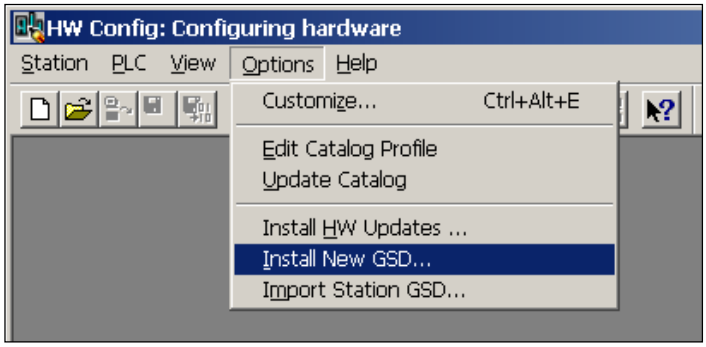


Fig. 43: STEP7 HW Config - Import unique GSD-File Step1

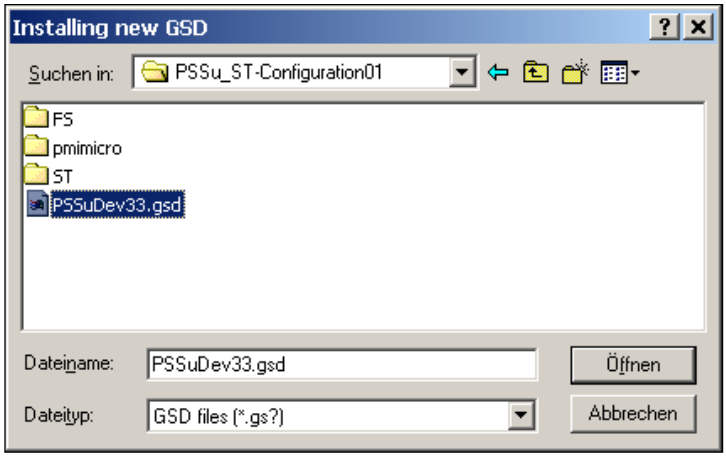


Fig. 44: STEP7 HW Config - Import unique GSD-File Step2

- It is possible, that the software get out a warning of an already installed file (GSD file “*.gsd” or Bitmap “*.dib”) and ask for replacing this existing file.
- Normally the SIMATIC Hardware configurator create an backup from the older file under the following path “…SIEMENS\STEP7\S7DATA\GSD\BKPxxxx*.*” (xxxx is the number of the backup)

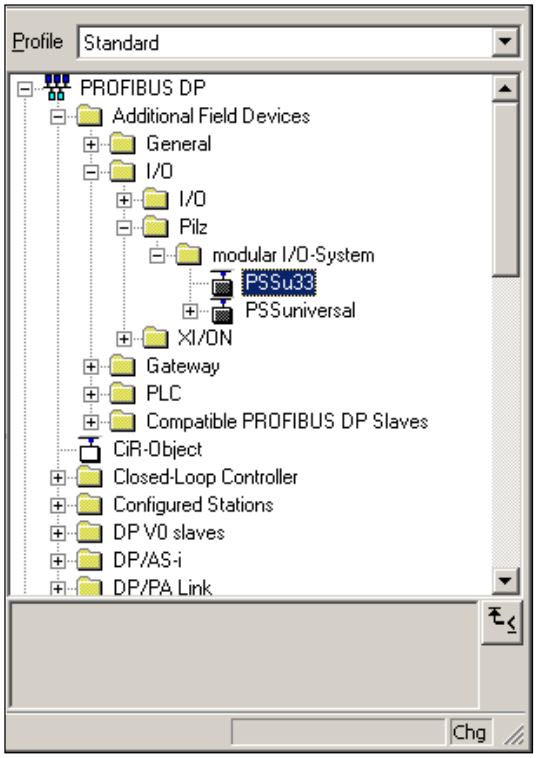


Fig. 45: STEP7 HW Config - Unique GSD-File installed

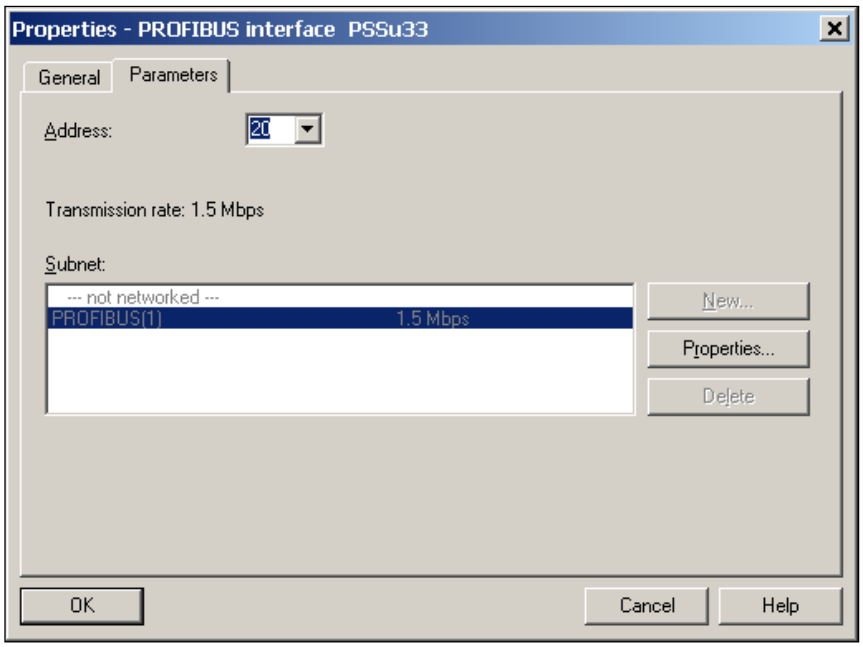


Fig. 46: STEP7 HW config – Add unique fieldbus device (Profibus DP)

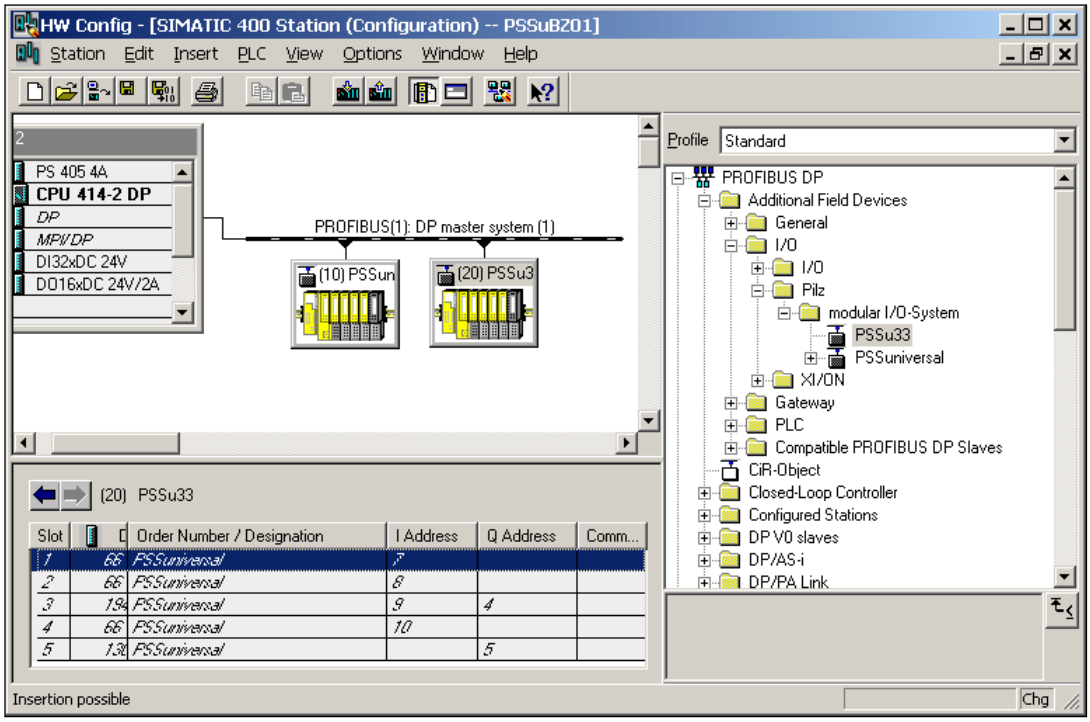


Fig. 47: STEP7 HW config – Unique fieldbus device added (Profibus DP)

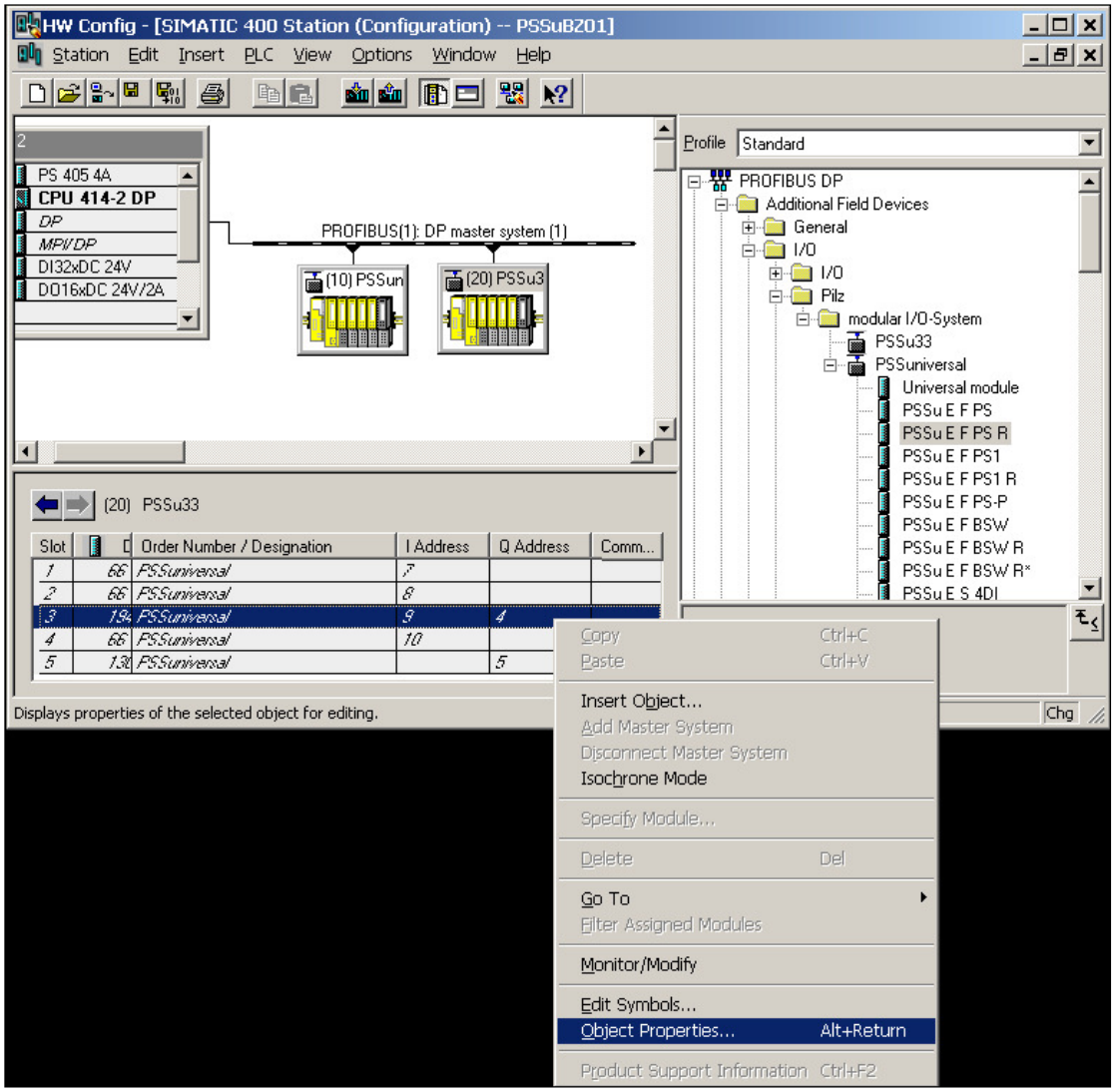


Fig. 48: STEP7 HW config – Object Properties of PSSu Modul E F DI OZ 2&

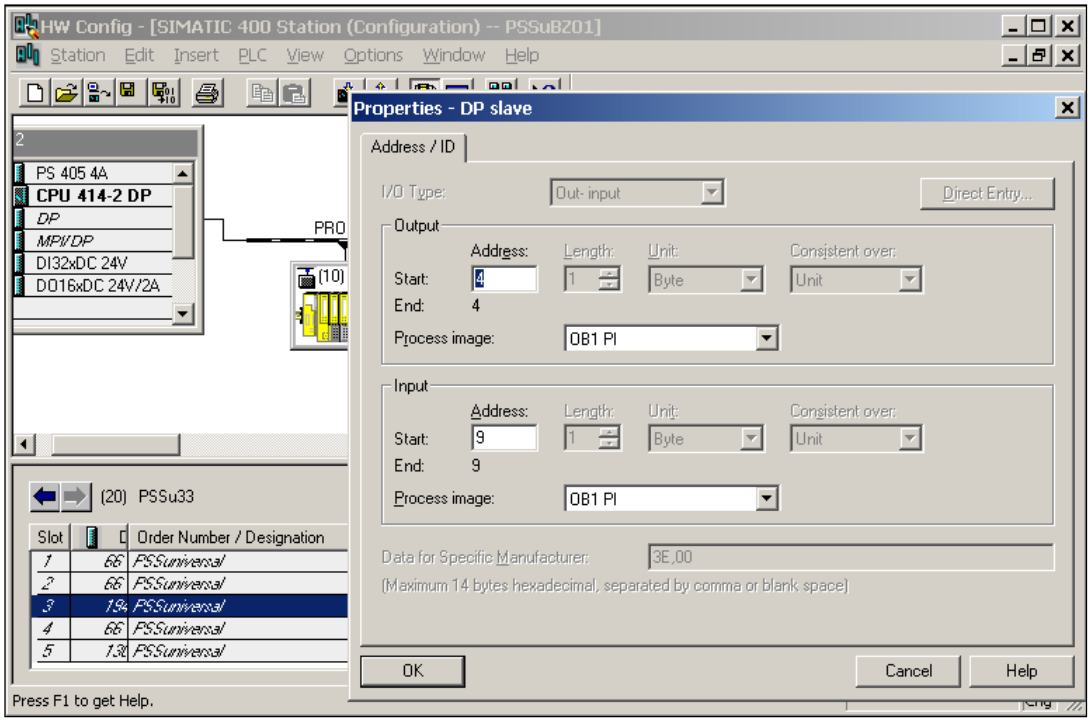
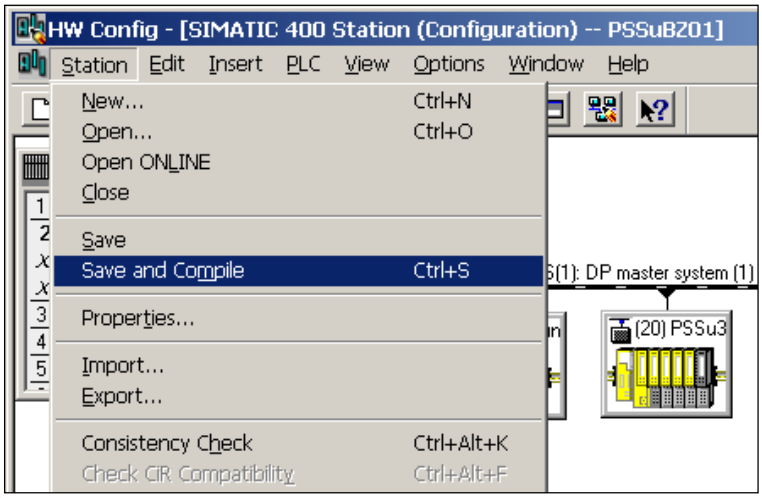


Fig. 49: STEP7 HW config – Object Properties of PSSu Modul E F DI OZ 2& (Process Image)



2&

Fig. 50: STEP7 HW config – Save and Compile

- After writing and saving the PLC program both parts must download to the PLC. If the hardware configuration is correct, then the LED “RUN” of PSSu Headmodule is green.
- It is also possible to download first only the completed hardware configuration of the PLC and one or more connected PSSu systems.
- Retry the steps of this chapter for the other PSSu systems.

6. Special Features

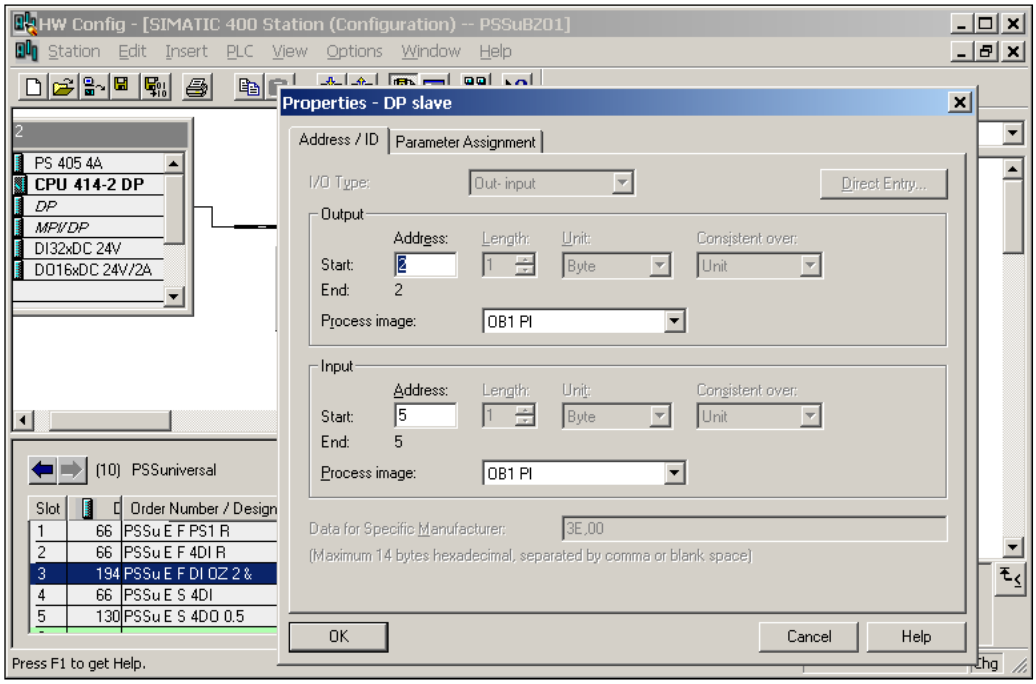


Fig. 51: STEP7 HW config – Object Properties of PSSu Modul E F DI OZ 2& (Process Image)

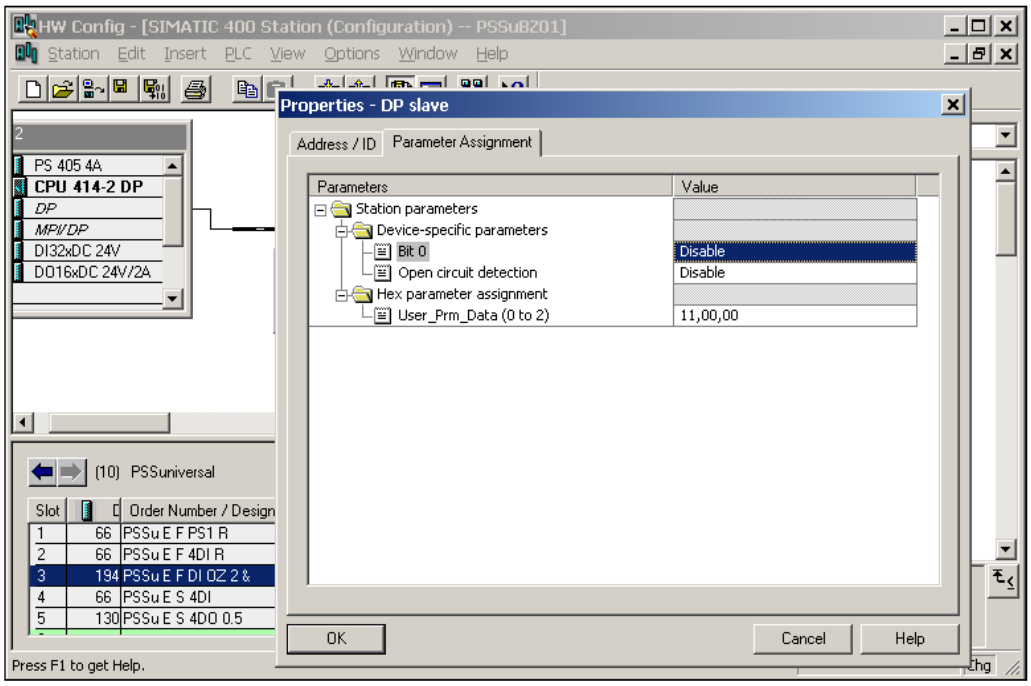


Fig. 52: STEP7 HW config – Object Properties of PSSu Modul E F DI OZ 2& (Default)

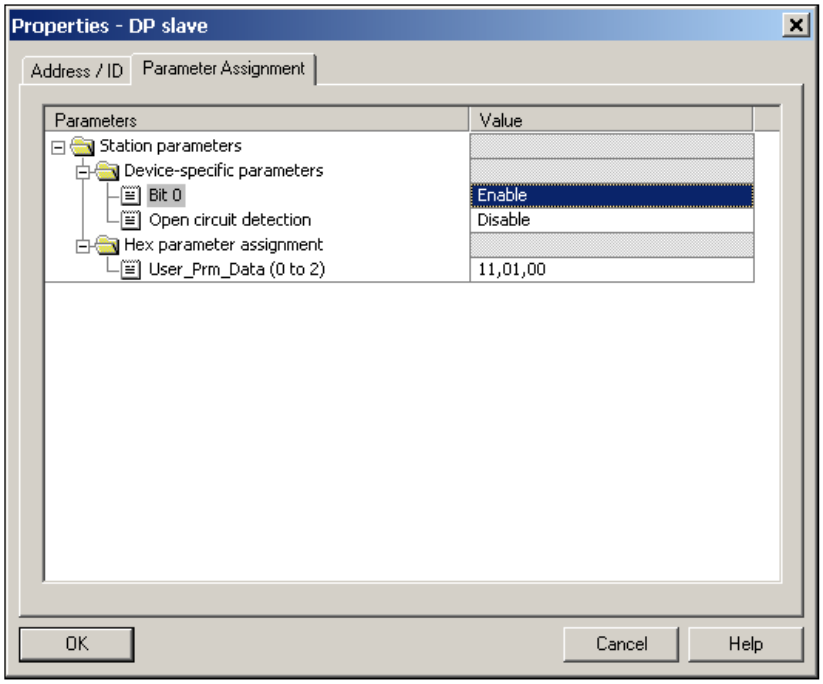


Fig. 53: STEP7 HW config – Object Properties of PSSu Modul E F DI OZ 2& (Input I0)

- Should be avoided!
- has no directly effect at the moment (optional possibility for activation of “&-function”)
- advice: can be deleted for next version of modularly GSD file, because the activation of this parameter for all fail safe outputs is configured by selecting the module type with “&-function”

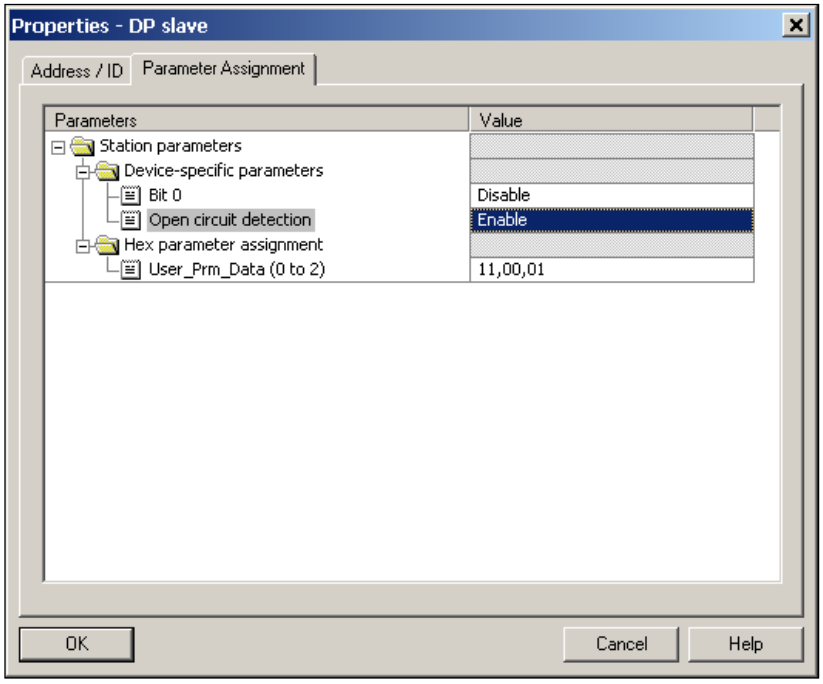


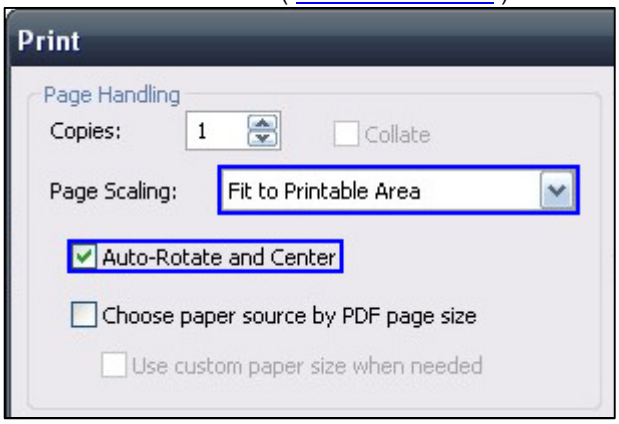
Fig. 54: STEP7 HW config – Object Properties of PSSu Modul E F DI OZ 2& (virtual Input I1)

- activation of signaling of open circuit of dual output in diagnostic stack of PLC,
- can reduce the operational availability, because the worst possible error reaction is the Stop of the PLC (dependent on it configuration)

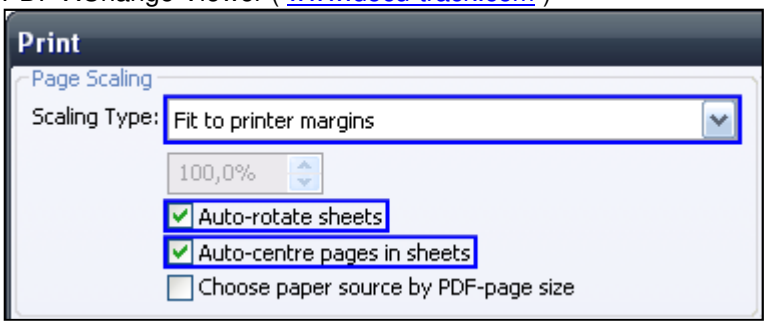
7. Table of figures

Recommended printer settings

Adobe Acrobat Reader (www.adobe.com)



PDF-XChange Viewer (www.docu-track.com)



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