

PSSu DeviceNet with Beckhoff



Product

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

Document

Release Number: 05
Release Date: 22 March 2011

Document Revision History

Release	Date	Changes	Chapter
01	2008-08-05	Creation	all
02	2009-03-08	Error correction with the type of PSSu device, new Overview	2, 3
03	2010-07-15	Make ready for Internet-Release	only logistic data
04	2010-07-19	Correction identifier	cover sheet
05	2011-03-22	Adjustments for publication	only editorial

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We are grateful for any feedback on the contents.

March 2011

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1. Useful documentation

Reading the documentation listed below is necessary for understanding this application note.
The availability 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 DN" / "PSSu H SB DN-T"	21 280-EN-xx / 21 603-EN-xx
4	Operating manual of module "PSSu H DN" / "PSSu H DN-T"	21 548-EN-xx / 21 774-EN-xx
5	Technical Catalogue of PSSuniversal (english)	1001264-EN-xx
6	System Description of PSSuniversal	21 256-EN-xx
7	Installation Manual of PSSuniversal	21 262-EN-xx

1.2. Documentation from other sources of information

No.	Description	Item No.
1	Beckhoff Automation GmbH (international) http://www.beckhoff.com	
2	ODVA (Open DeviceNet Vendors Association portal, english) http://www.odva.org	

2. Hardware configuration

2.1. PSSu-System

- ▶ PSSu H SB DN (PSSu SafetyBUSp DeviceNet 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 Beckhoff PLC)
 - Slot 4 PSSu E S 4DO 0.5 (ST outputs used only by Beckhoff PLC)

- ▶ PSSu H SB DN:
 - 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

3. Application Task

- Connect PSSu Device to a Beckhoff-System via Beckhoff DeviceNet-Scanner CX1500-M520 and code these functions:
 - Slot 0 PSSu E F PS1:
Copy PSSu Device information to the Beckhoff-PLC
 - Slot 1 PSSu E F 4DI:
Copy information of PSS Fail Safe Inputs to the Beckhoff-PLC
 - Slot 2 PSSu E F DI OZ 2:
Configure an enabled FS-Output switch by the Beckhoff-PLC and a switch on monitored feedback loop
 - Slot 3 PSSu E S 4 DI:
Use this ST-inputs on Beckhoff-PLC
 - Slot 4 PSSu E S 4DO 0.5:
Use this ST-outputs on Beckhoff-PLC

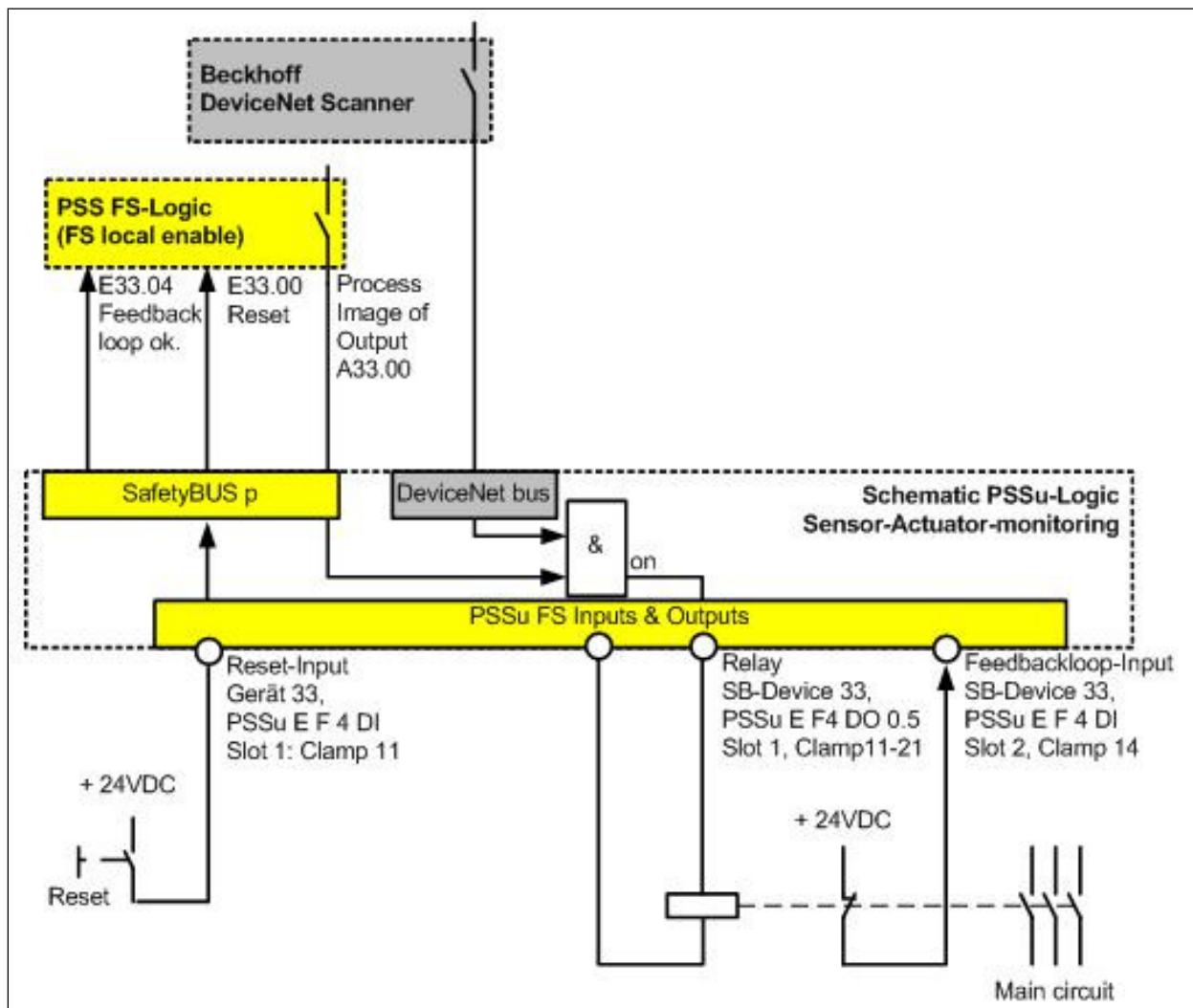


Fig. 1: Overview – Application task

4. Configuration with PSSu Assistant

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

4.1. FS Configuration on Pilz-Side

4.1.1. Start configuration with SafetyBUS p Configurator

- ▶ **Step 1:** Start SafetyBUS-Configurator and add a new PSSu H DN Device to the workspace

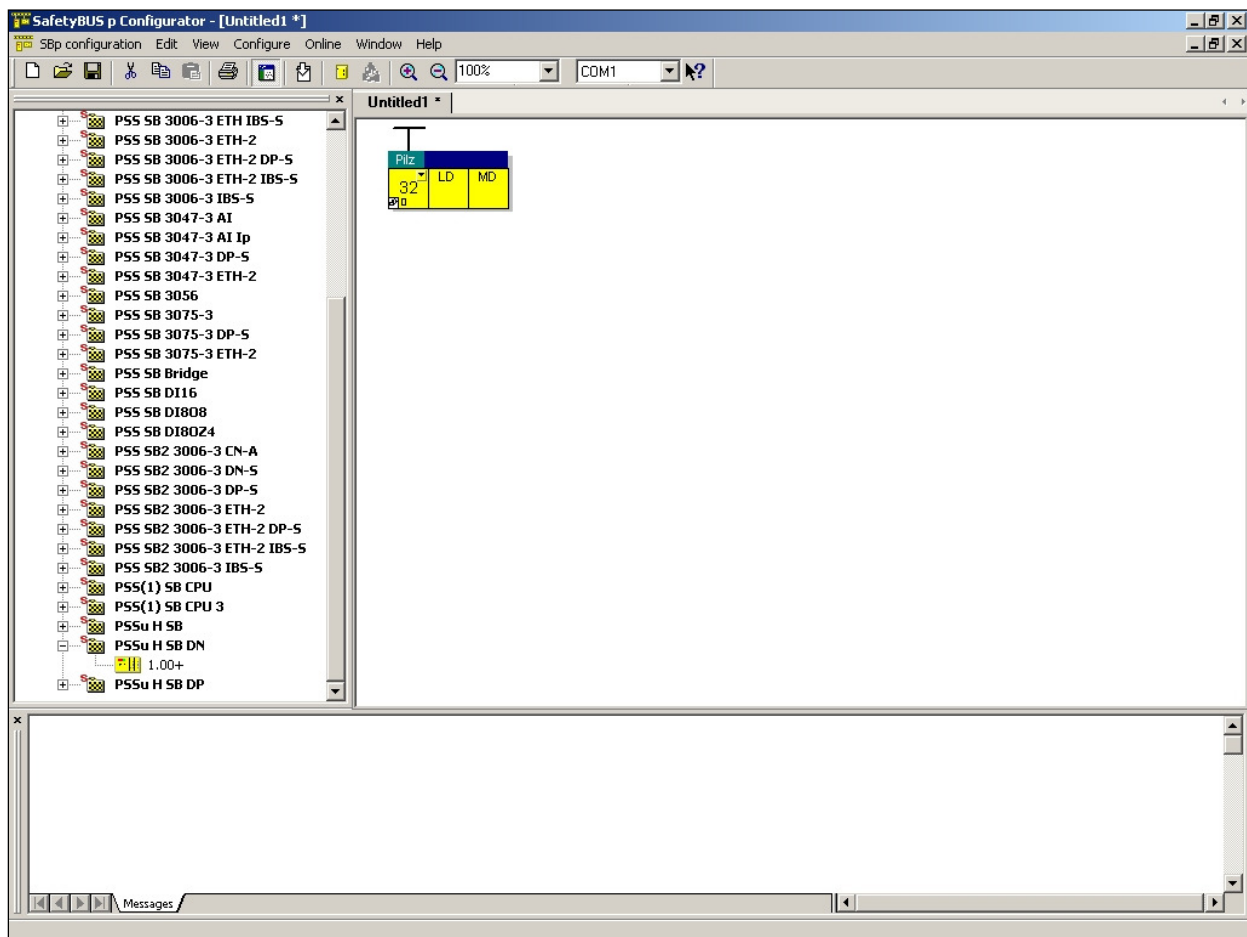


Fig. 2: SafetyBUS p Configurator – Start new configuration

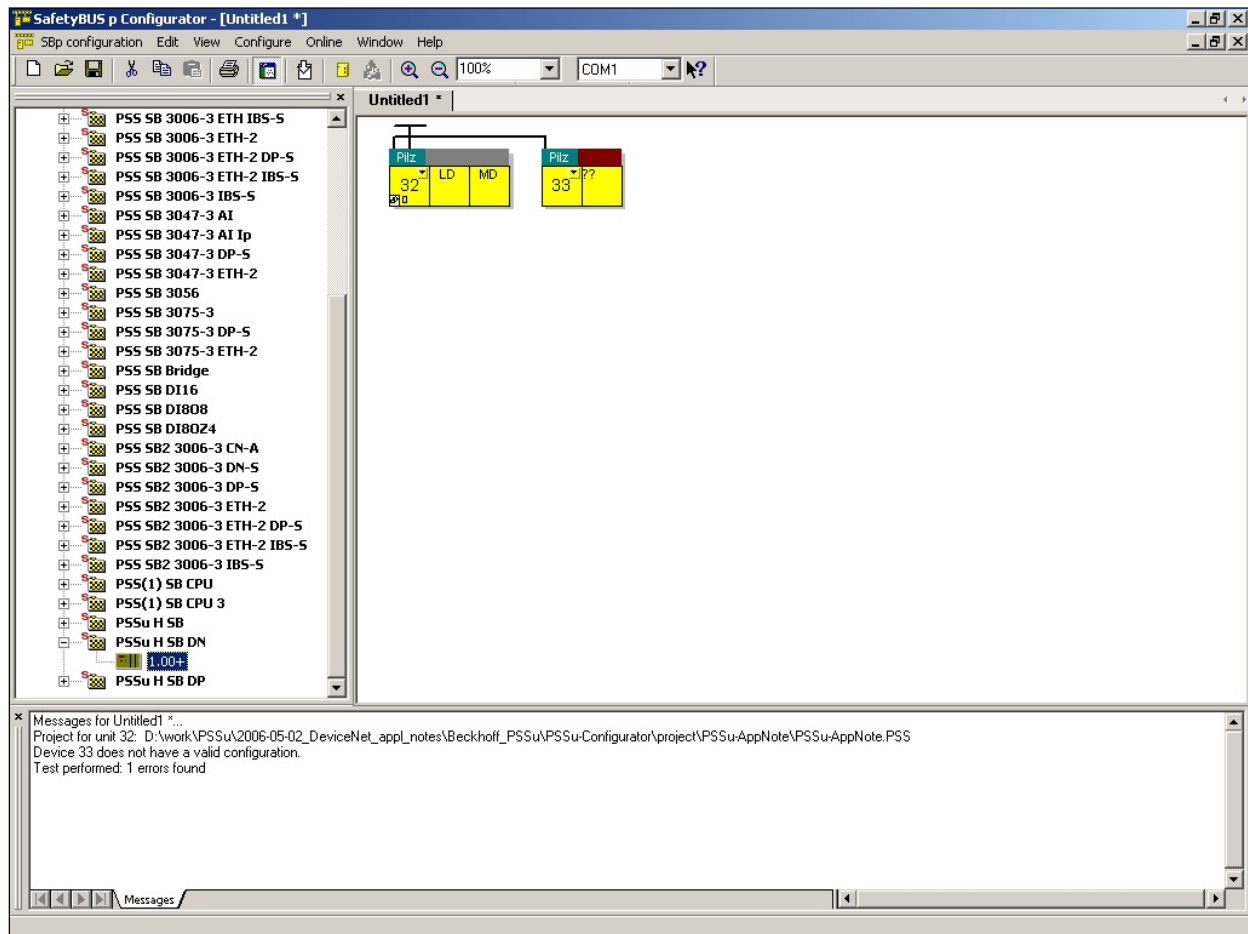


Fig. 3: SafetyBUS p Configurator – Add new device PSSu H SB DN

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

- ▶ Start the PSSu Configurator by opening the new PSSu H DN Device double clicking.
- ▶ **Step 2:** Import FS Configuration via USB port

Requirement: The Pilz USB driver is installed on the PC.

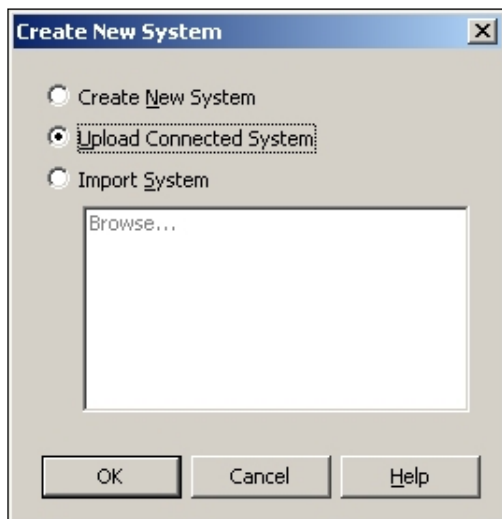


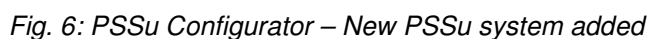
Fig. 4: PSSu Configurator – Upload connected PSSu system

- ▶ Connect the PSSu H DN head module via Mini-USB and press the "OK"-button.
- ▶ **Step 3:** Message box no configuration upload



Fig. 5: PSSu Configurator – Upload Message Box

The message box means, that you will upload only the mounting sequence without FS & ST-Configuration.



► Step 4: Start PSS FS Configuration

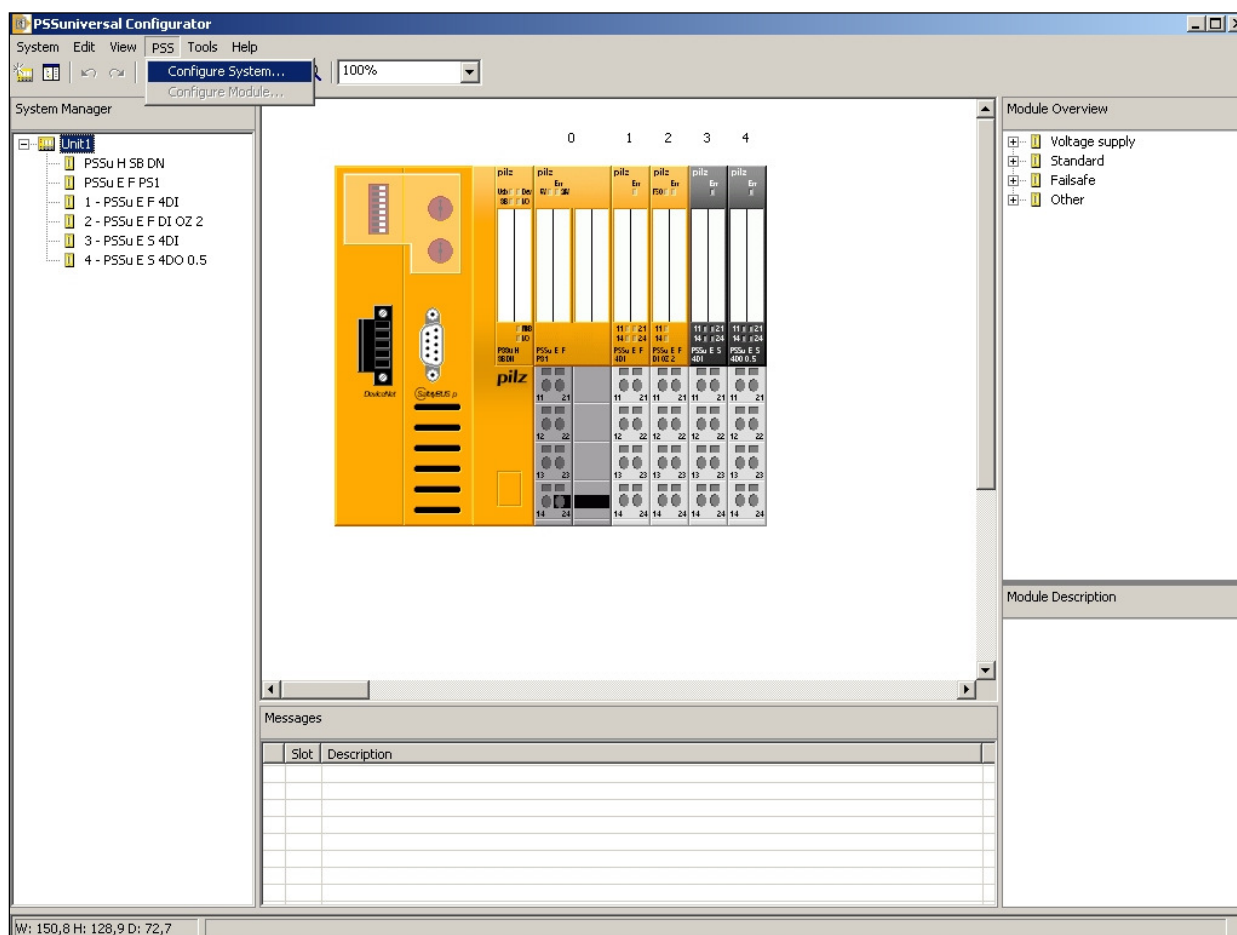


Fig. 7: PSSu Configurator – Configuration of PSSu system

Input 4 (E33.04) will use test pulse T0.

- Select "ST output" for local enabling of the FS output A33.00 from the Beckhoff-side:

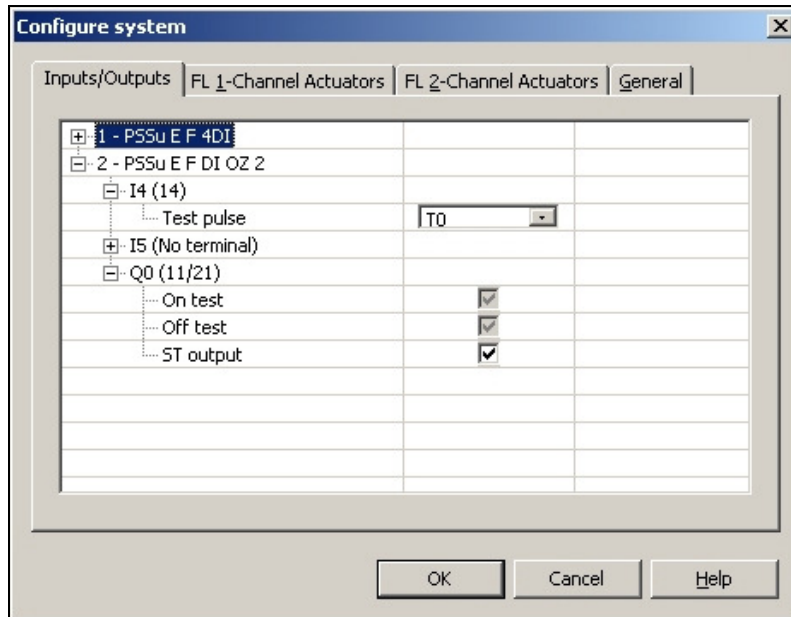


Fig. 8: PSSu Configurator – Configuration of Inputs and Outputs (Parameter)

- Select "On test" for the FS output A33.00 in the menue "Monitoring PSSu feedback loop":

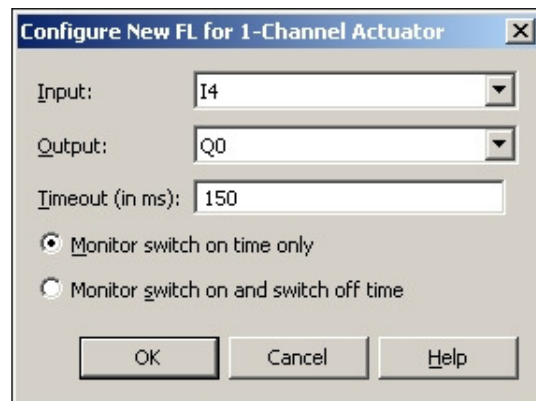


Fig. 9: PSSu Configurator – Configuration of Feedback Loop (Parameter)

► **Step 5:** Exit PSSu configurator and save FS-information

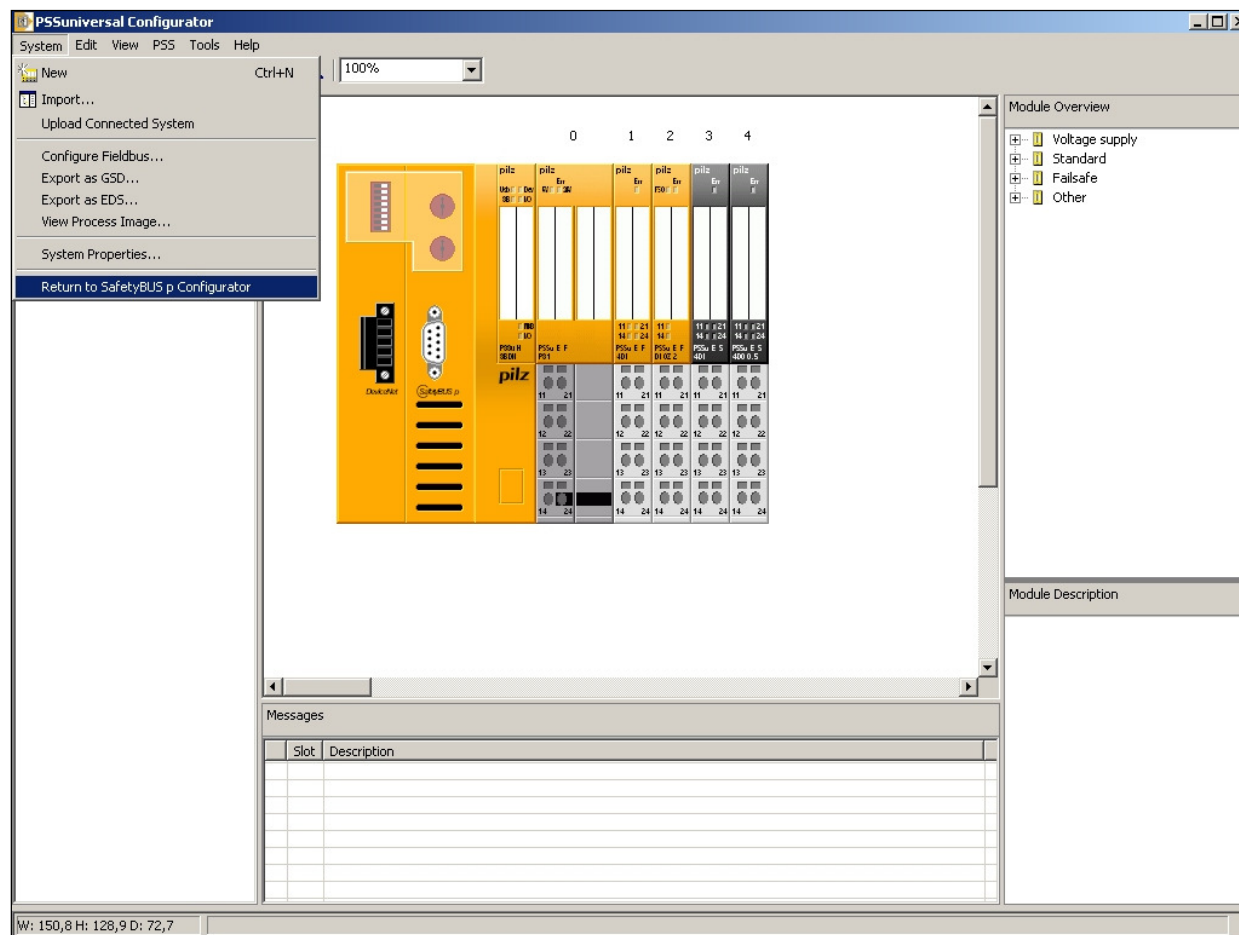


Fig. 10: PSSu Configurator – Return to SafetyBUS p Configurator

- Do you want to save the SafetyBUS p Configuration? Answer: "Ja" ("Yes")

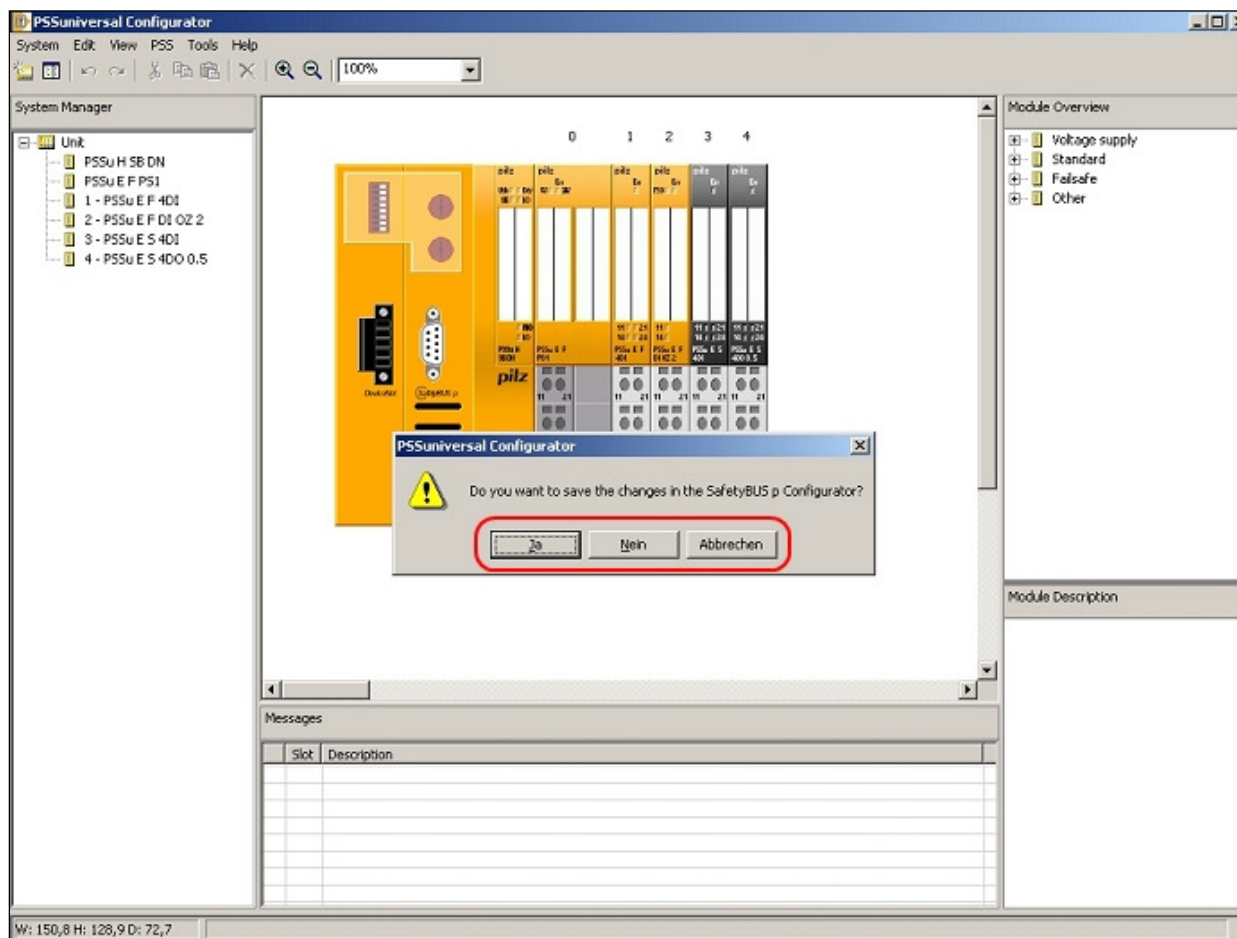


Fig. 11: PSSu Configurator – Return to SafetyBUS p Configurator (query for saving)

- ▶ **Step 6:** SafetyBUS I/O groups of the PSSu device
- ▶ Assign PSSu Device FS outputs to SafetyBUS-I/O-Group 0 and the PSSu Device FS inputs to SafetyBUS-I/O-Group 1.

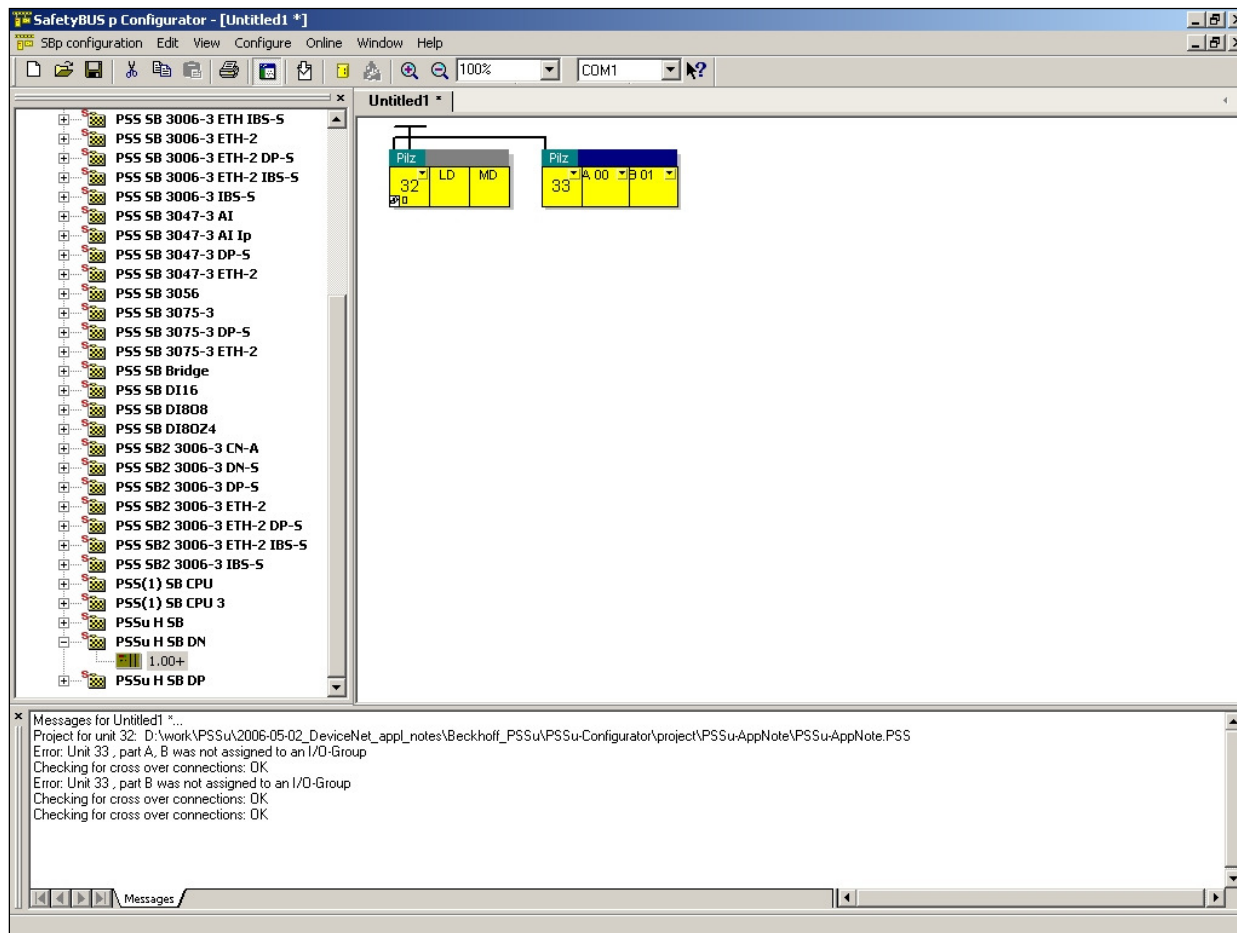


Fig. 12: SafetyBUS p Configurator – FS configuration of device PSSu H SB DN completed

4.2. ST Configuration on Pilz-Side

4.2.1. Configuration with PSSu Configurator (only standard section)

- **Step 1:** Start Configuration of fieldbus settings

Note: This ST-settings are only needed for generating an EDS-file.

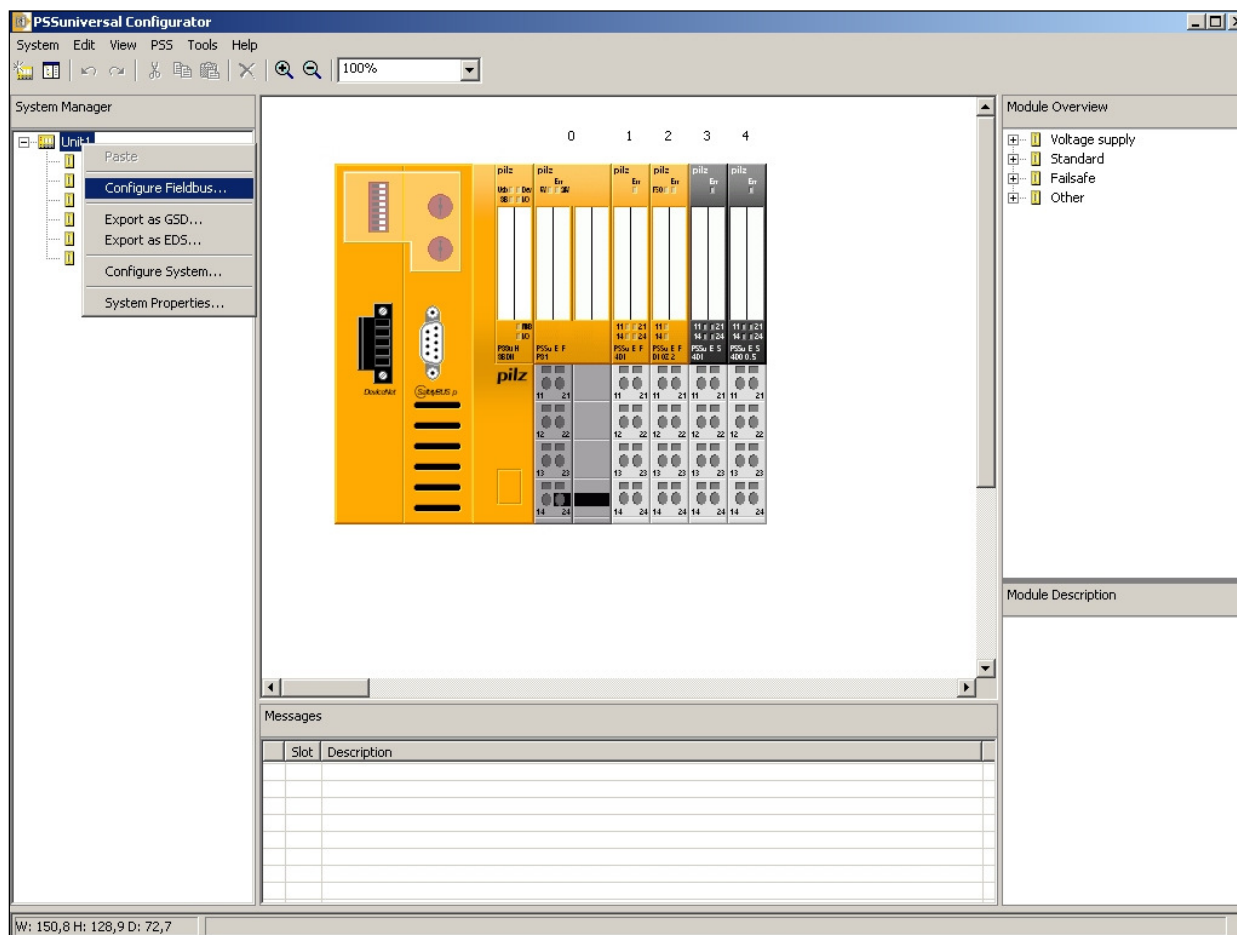


Fig. 13: PSSu Configurator – Open Fieldbus Configuration

- **Step 2:** FS read access and local enabling
 - Enable reading PSSu Device "System Status" of slot 0
 - Enable "read access" of all FS Inputs and Outputs of slot 1 and 2
 - Select Local enabling "ST write access" of slot 2 output A33.00

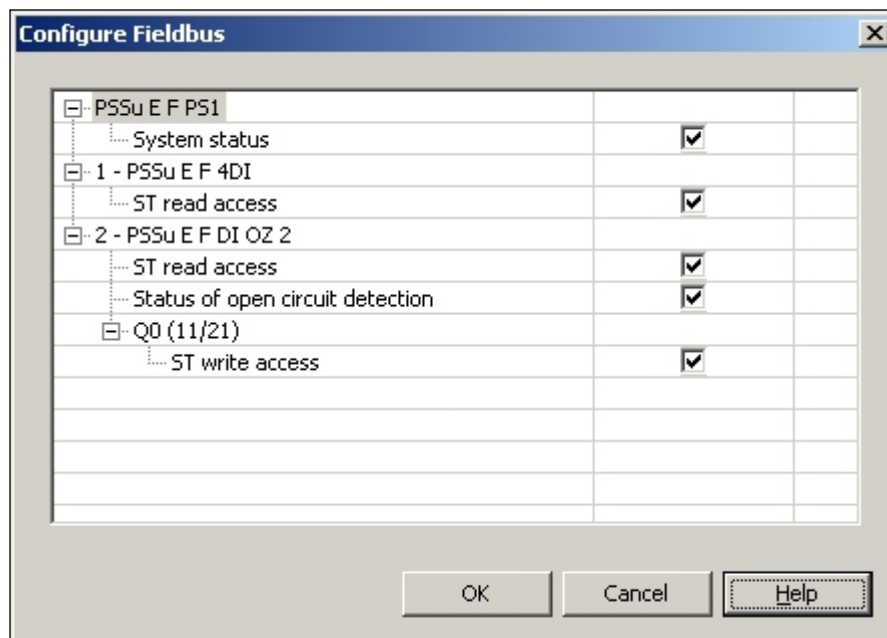


Fig. 14: PSSu Configurator – Configuration of Inputs and Outputs (Parameter)

- **Step 3 (optional):** Check the result of fieldbus configuration on process image menu

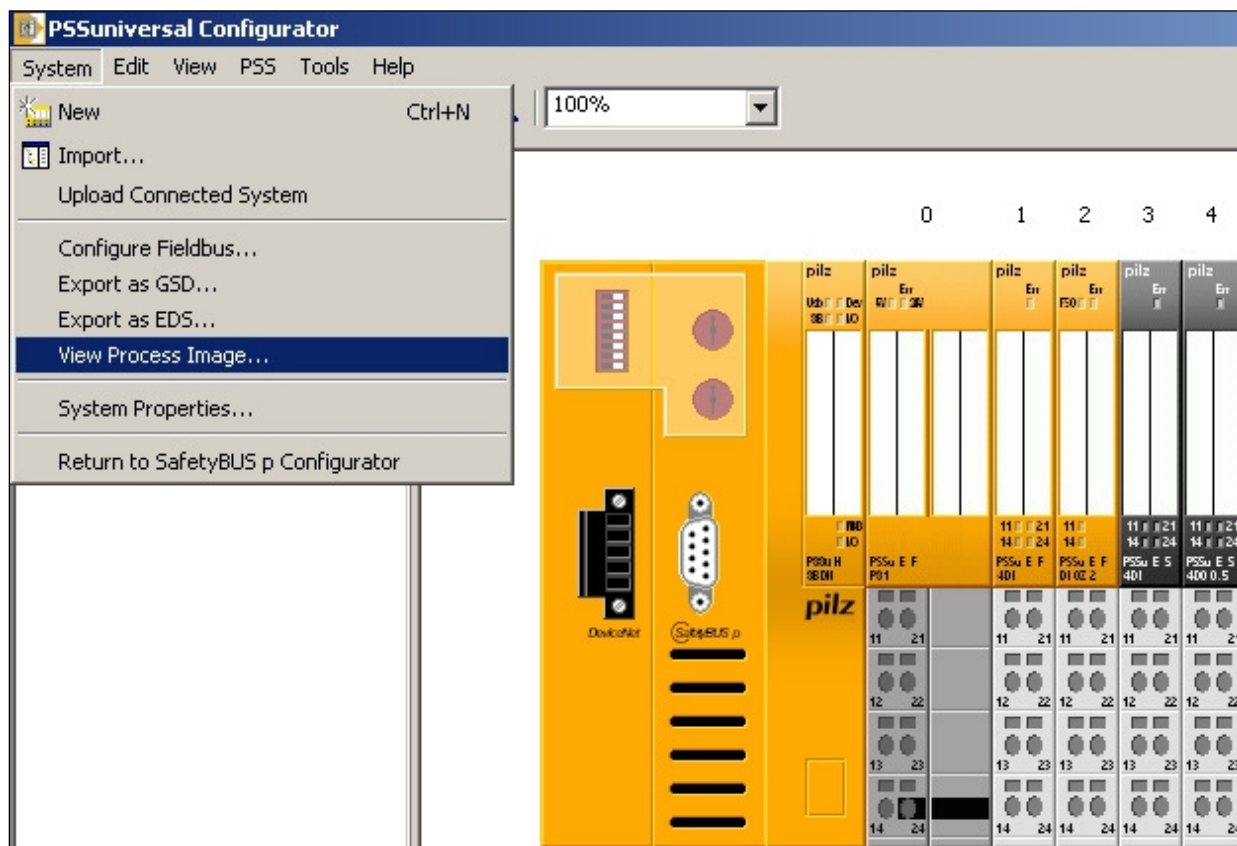


Fig. 15: PSSu Configurator – View process image (ST-Part1)

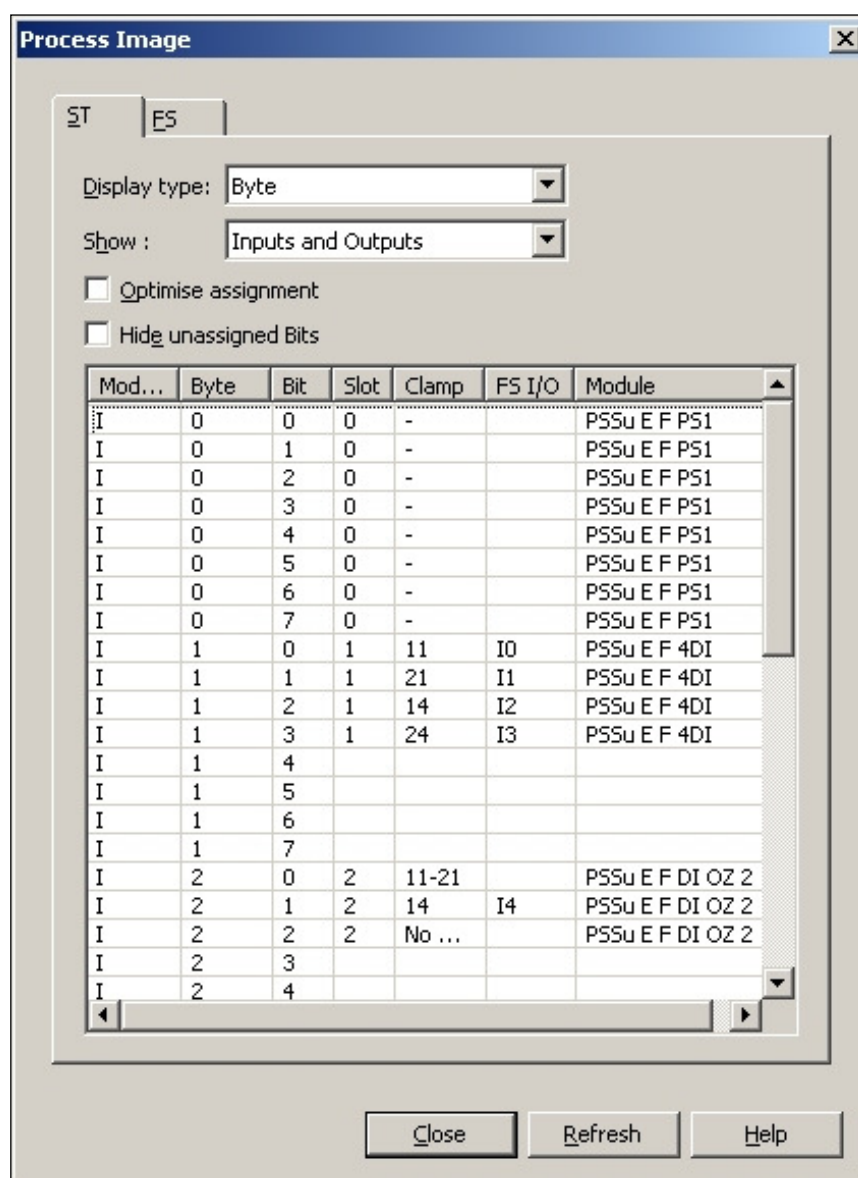


Fig. 16: PSSu Configurator – View process image (ST-Part2)

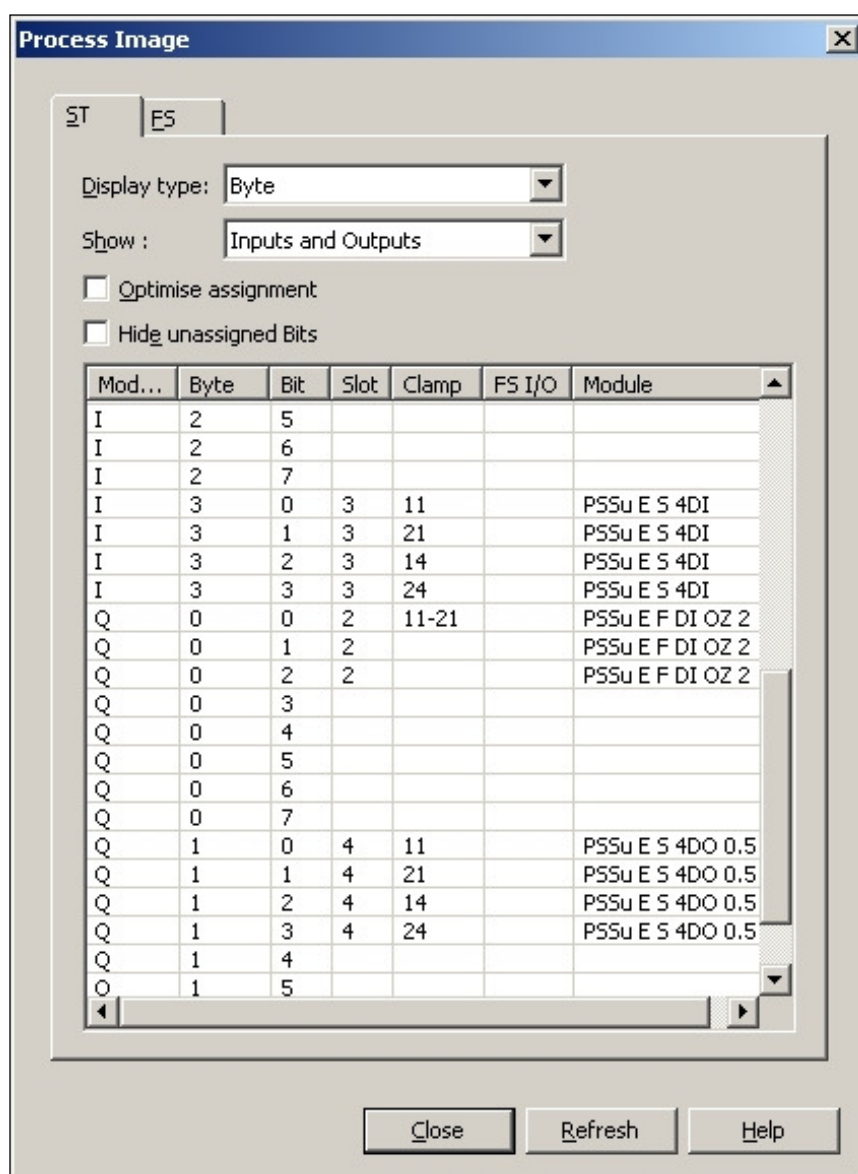


Fig. 17: PSSu Configurator – View process image (ST-Part3)

4.2.2. Creation of an unique EDS file

- **Step 4:** PSS-Configurator exports an EDS-File

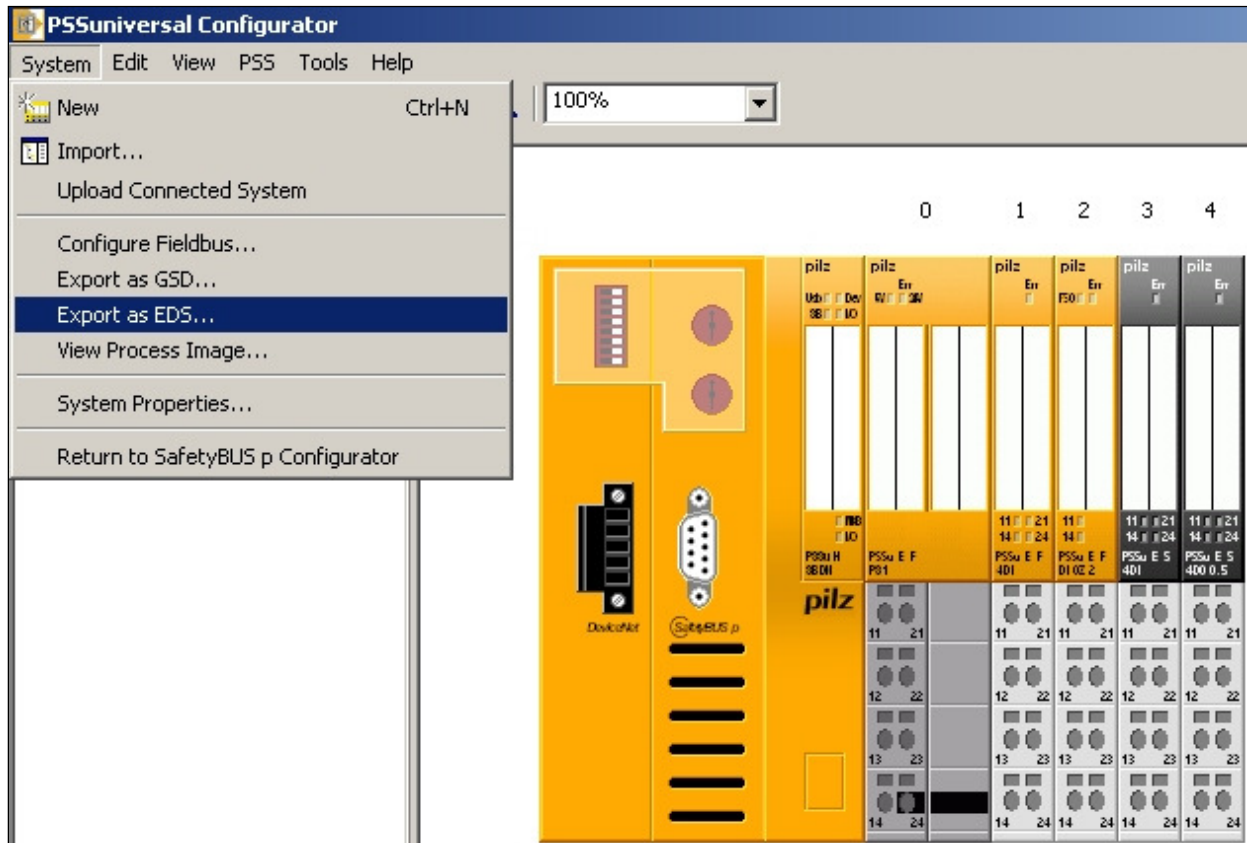


Fig. 18: PSSu Configurator – Open function Export as EDS

Note:

Enable Optimizing would compress the bit alignment and save data with. You can check the outcome on menu process image by enabling "Optimize assignment".

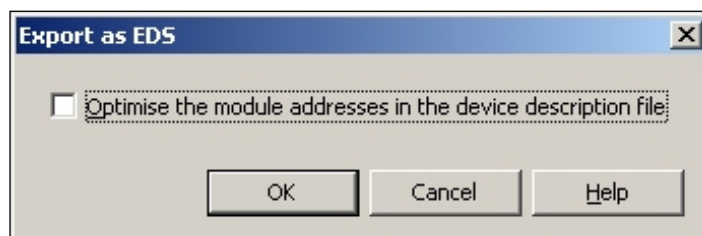


Fig. 19: PSSu Configurator – Optimizing assignment of EDS

Press "Speichern" to save the generated EDS-file:

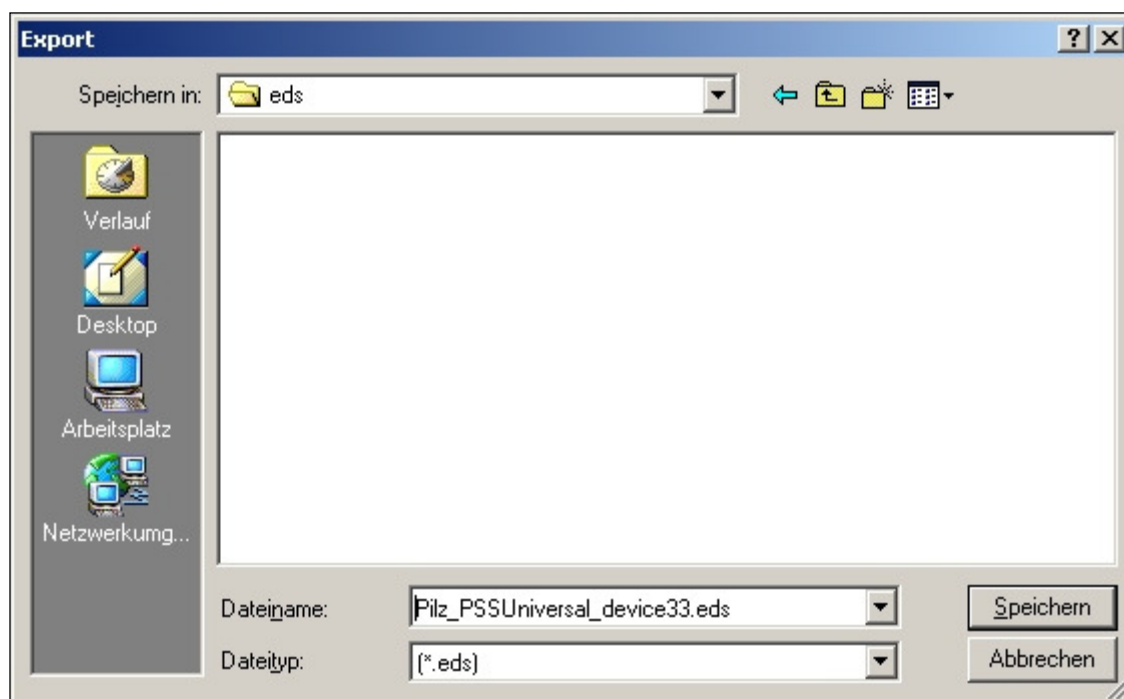


Fig. 20: PSSu Configurator – Function Export as EDS-file (File Name)

Press "Speichern" to save the generated EDS-file.

4.2.3. ST Configuration on Beckhoff-Side

- **Step 1:** Beckhoff DeviceNet-Scanner CX1500-M520 settings
 - Mac-ID = 0
 - Baudrate = 500 kB/S

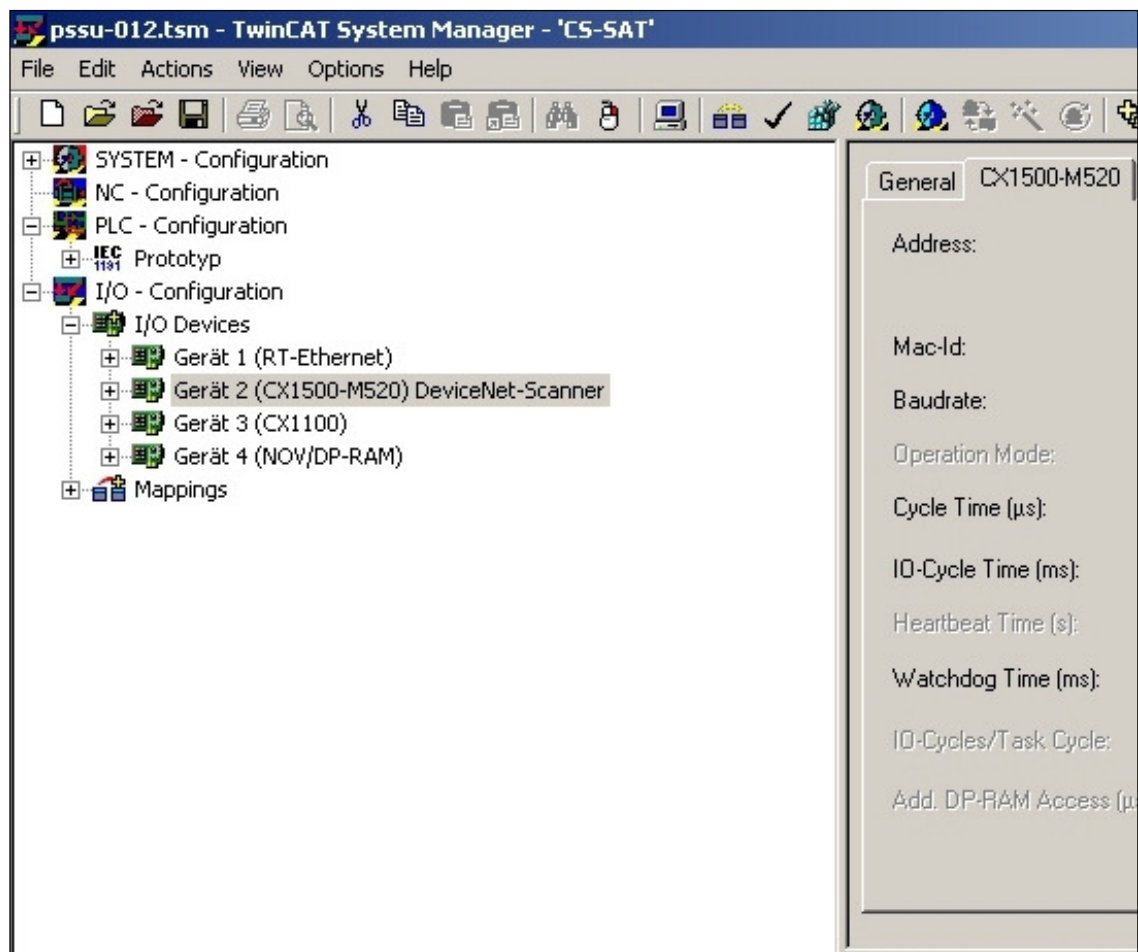


Fig. 21: TwinCAT System Manager – Scanner configuration (Part1)

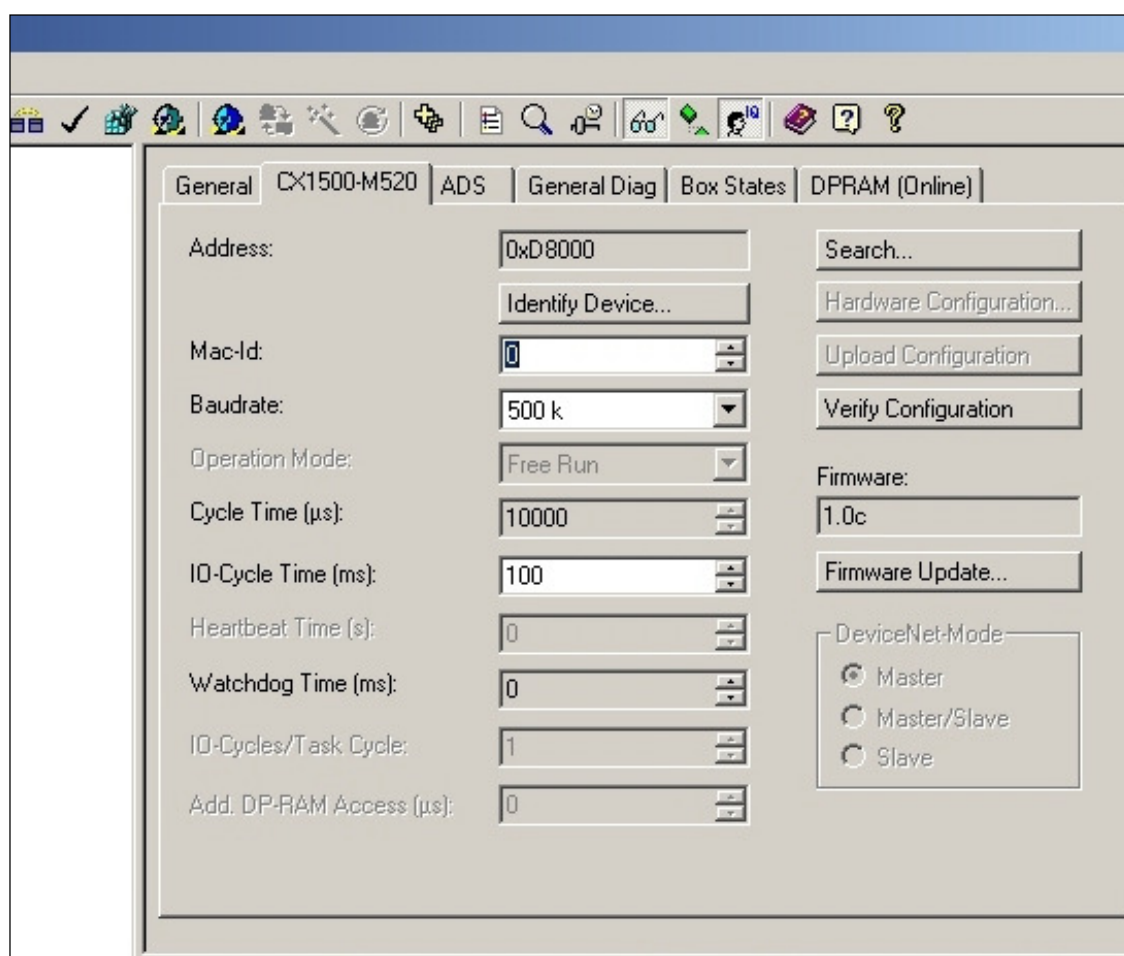


Fig. 22: TwinCAT System Manager – Scanner configuration (Part2)

- **Step 2:** Append a new DeviceNetBox with the PSSu-EDS-file of Device 33

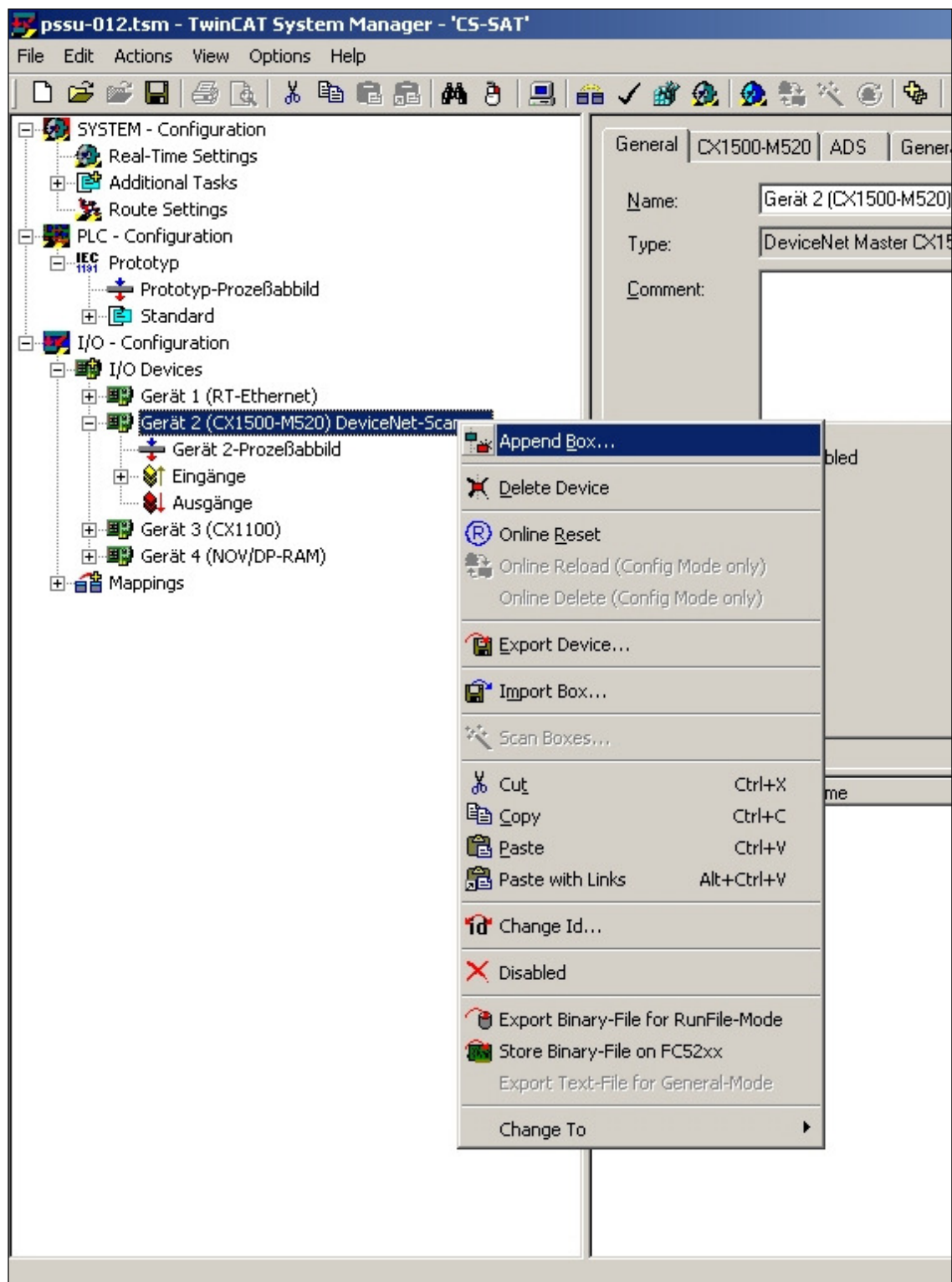


Fig. 23: TwinCAT System Manager – Import unique EDS-file (Step1)

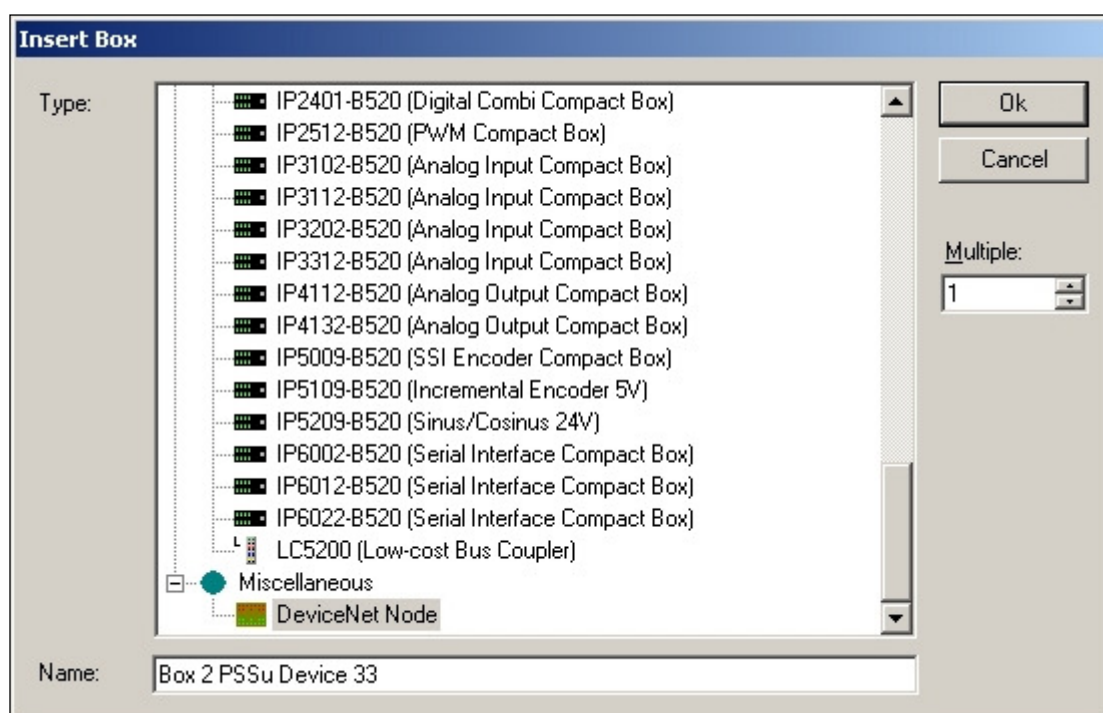


Fig. 24: TwinCAT System Manager – Import unique EDS-file (Step2)

- Change to the EDS-source folder and open EDS-file:

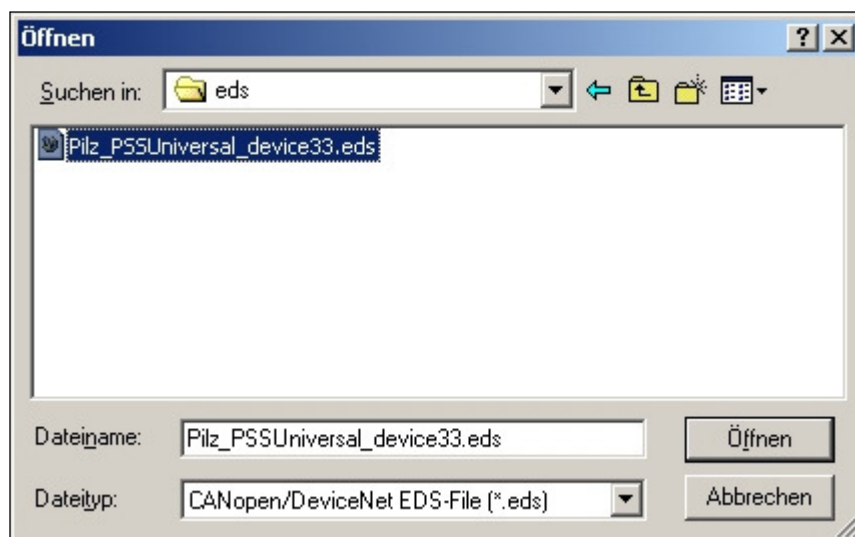


Fig. 25: TwinCAT System Manager – Import unique EDS-file (Step3)

Here you see the implemented polled input variables (Assembly Instance 102) and the polled output variables (Assembly Instance 101).

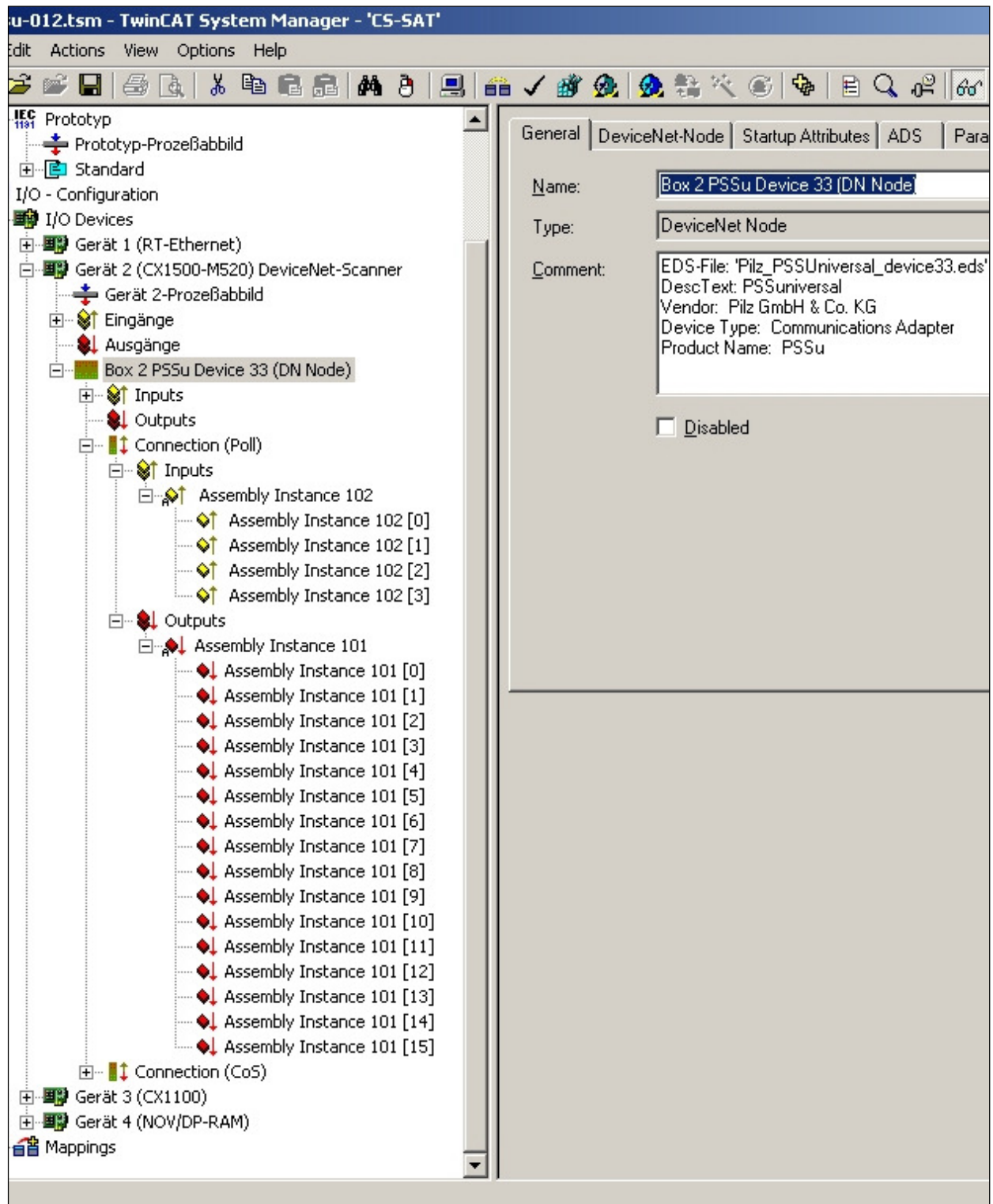


Fig. 26: TwinCAT System Manager – Configuration of variables

- **Step 3:** PSSu Device 33 DeviceNet settings
 - MAC-ID = 2
 - Enable: Check Vendor-ID
 - Enable: Check Device Type
 - Enable: Check Product Code
 - Change of State/Cyclic
 - Disable: Produced

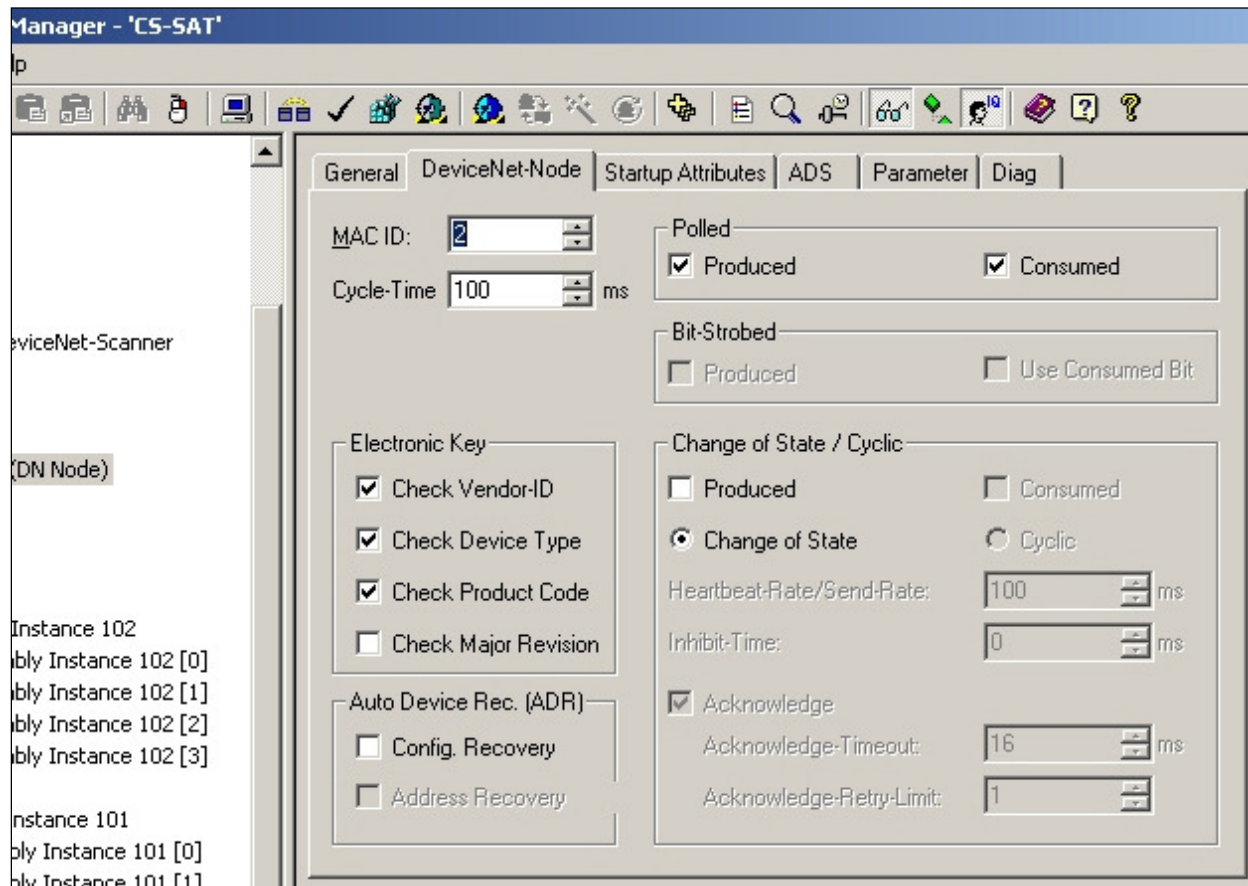


Fig. 27: TwinCAT System Manager – Configuration of DeviceNet-Node

- **Step 4 (optional):** Change names of EDS-generated variables
 - Change variable name and comments to PSSu related names:

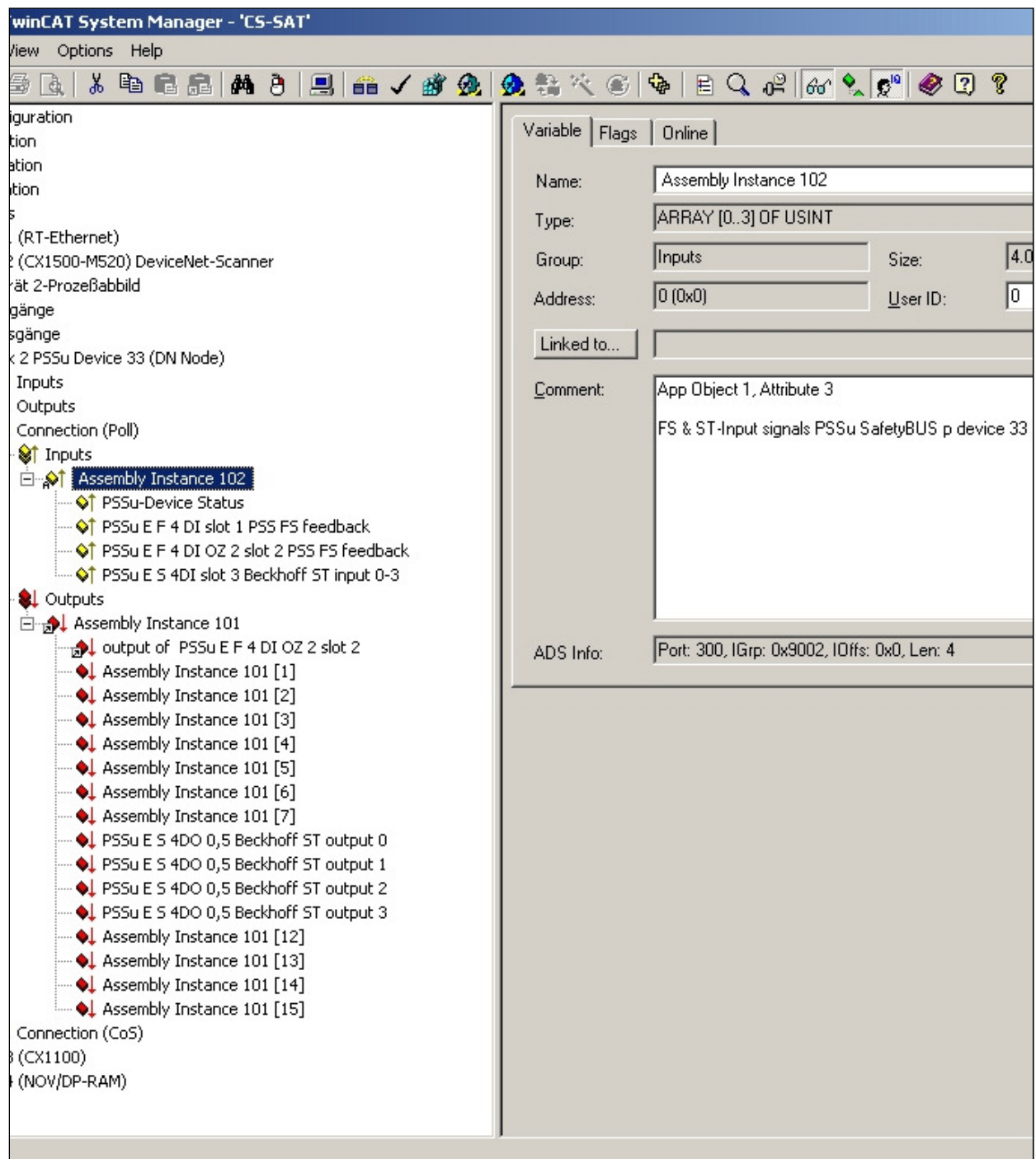


Fig. 28: TwinCAT System Manager – Change names and comments of variables (Part1)

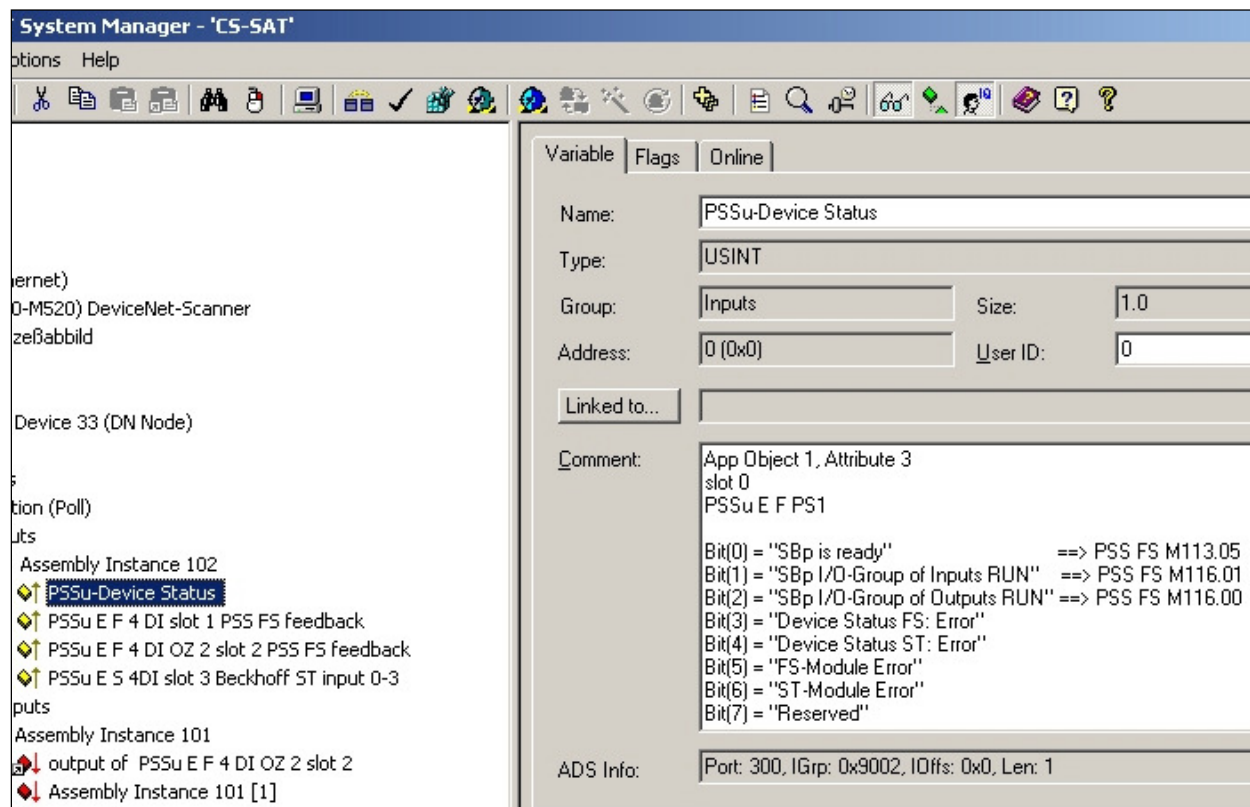


Fig. 29: TwinCAT System Manager – Change names and comments of variables (Part2)

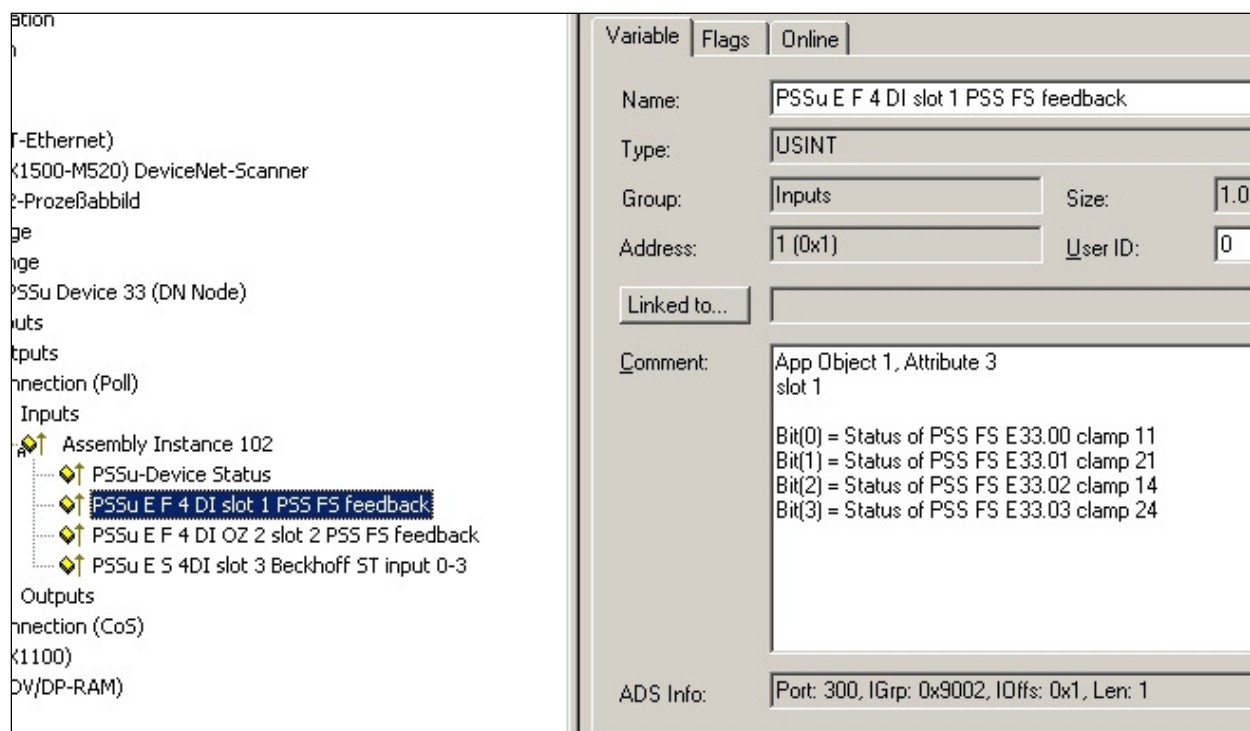


Fig. 30: TwinCAT System Manager – Change names and comments of variables (Part3)

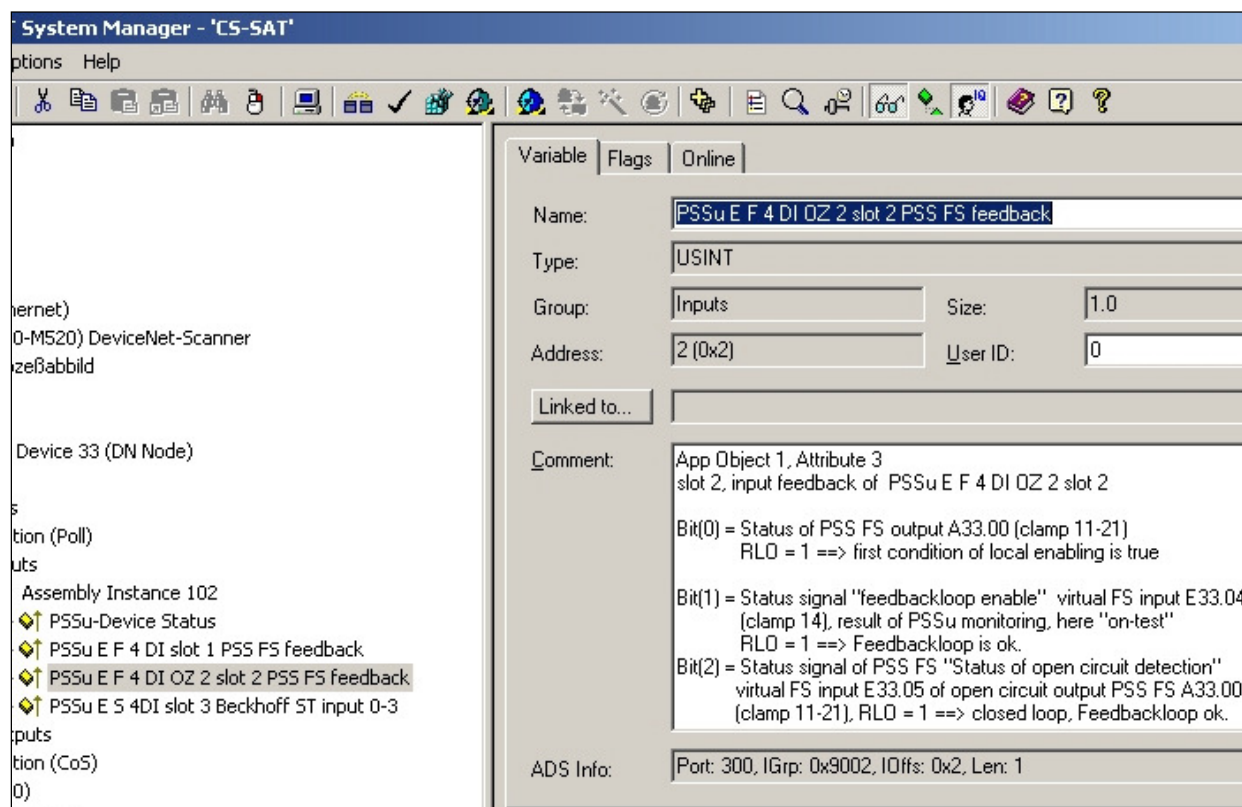


Fig. 31: TwinCAT System Manager – Change names and comments of variables (Part4)

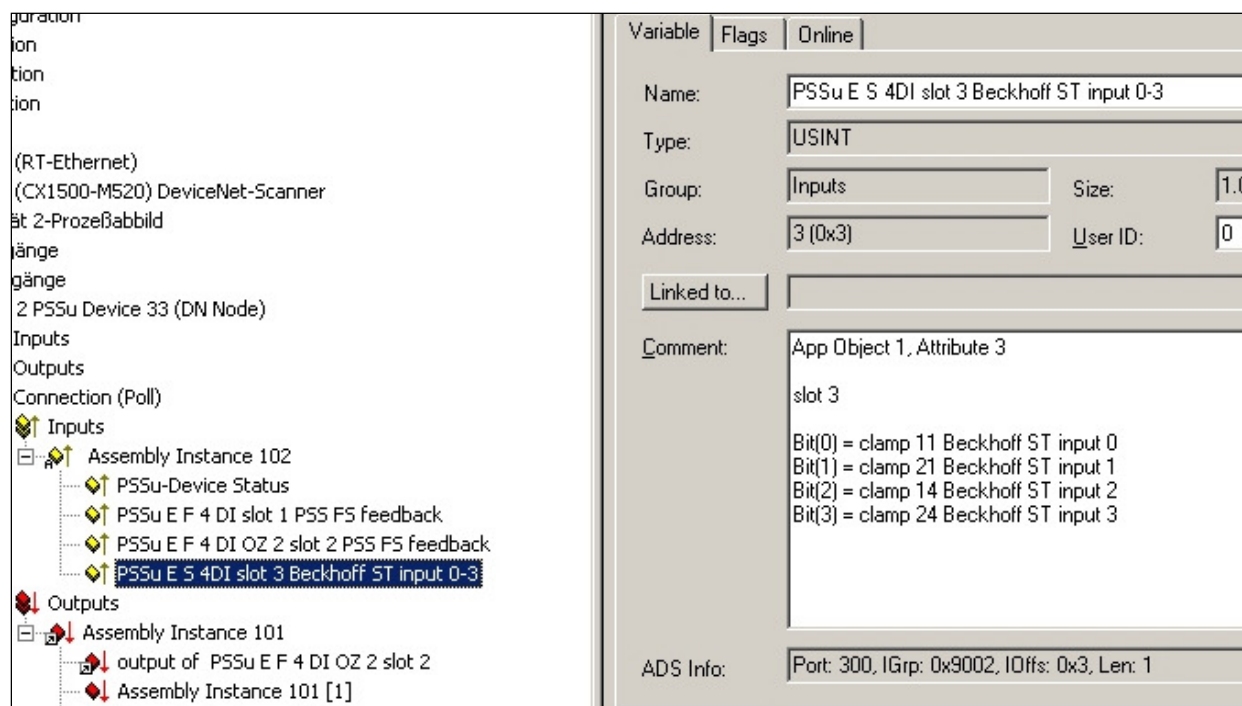


Fig. 32: TwinCAT System Manager – Change names and comments of variables (Part5)

- **Step 5:** Link the PSSu variables to PLC Configuration
 - Link your input and output variables to your PLC Configuration
i.e. Select Output variable "output of PSSu E F 4 DI OZ 2 slot 2" and press the "linked to" button.

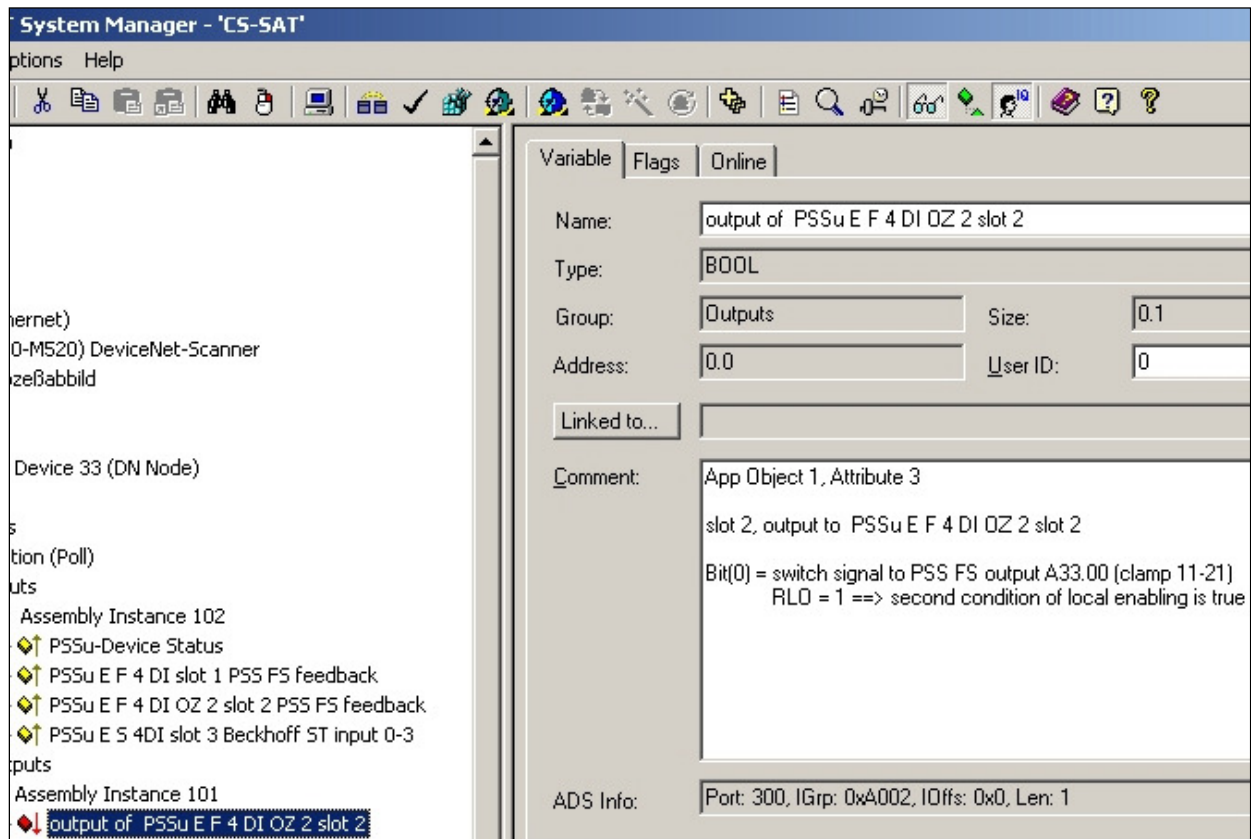


Fig. 33: TwinCAT System Manager – Link variables to PLC (Part1)

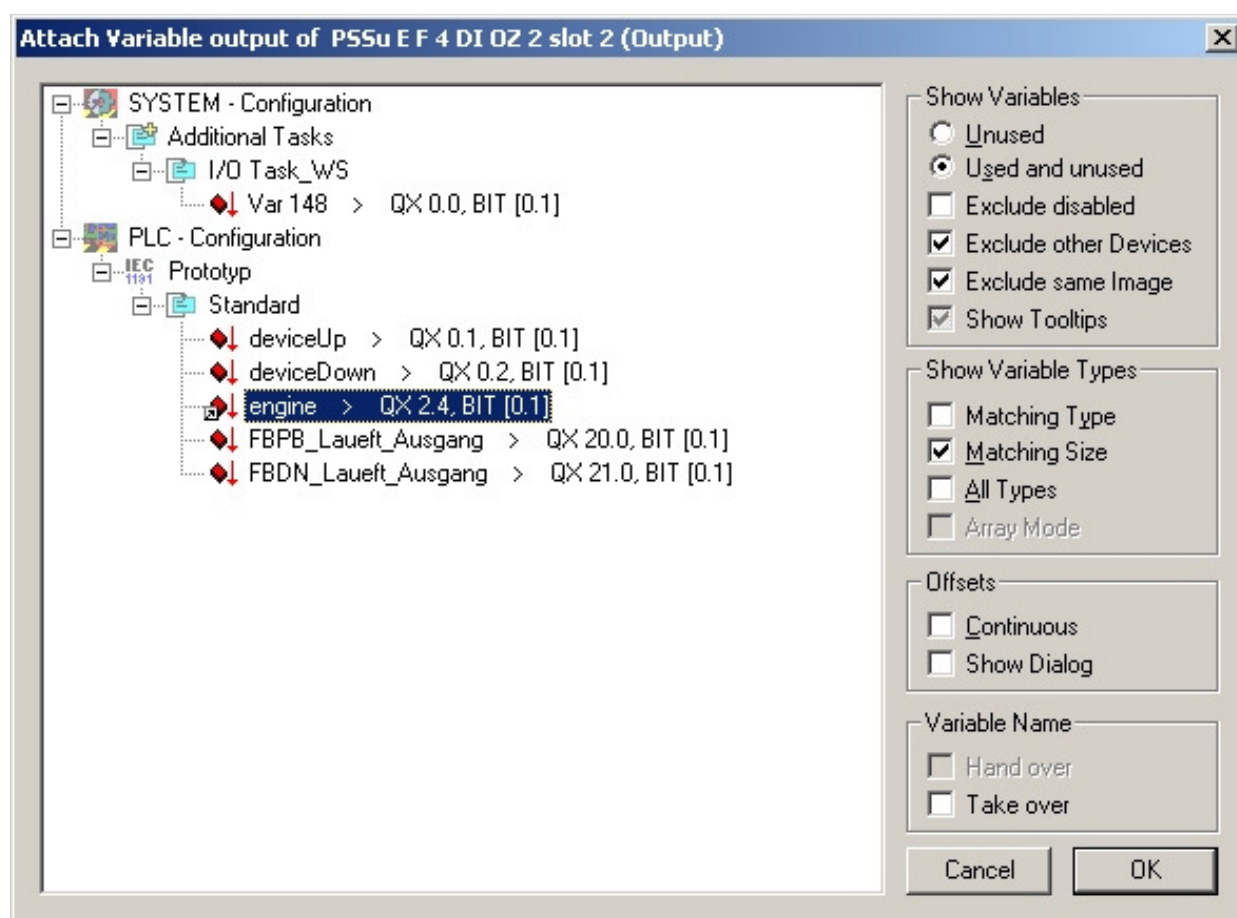


Fig. 34: TwinCAT System Manager – Link variables to PLC (Part2)

After pressing "OK" the PC-Configuration output "engine" is attached to the PSSu output of the PSSu E F DI OZ 2 for switching through the Beckhoff and enabling by PSS.

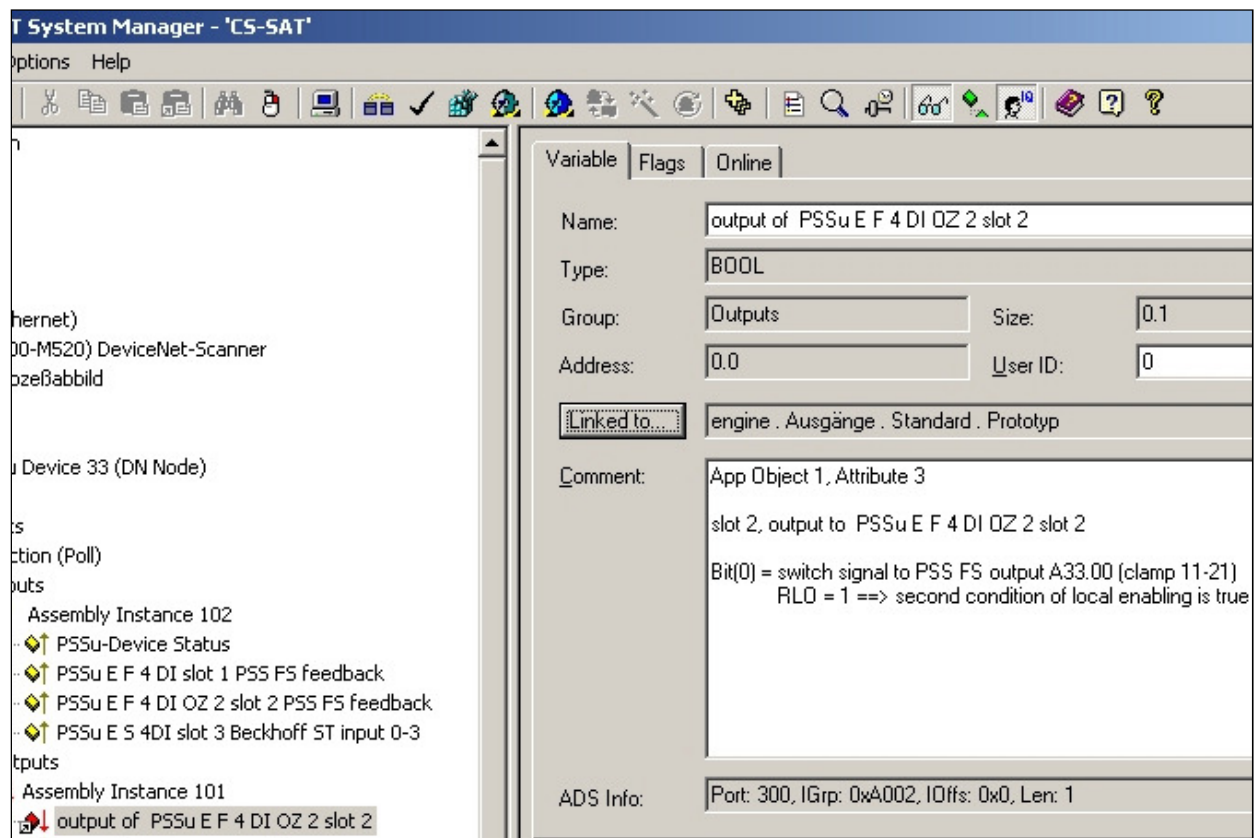


Fig. 35: TwinCAT System Manager – Link variables to PLC (Part3)

► **Step 6:** Download System Configuration to PLC

- Beckhoff Actions:

- > *Generate Mappings*
- > *Check Configuration* (One output variable of any DeviveNet device should be linked)
- > *Activate Configuration* (download)
- > *Set TwinCat in Run Mode*

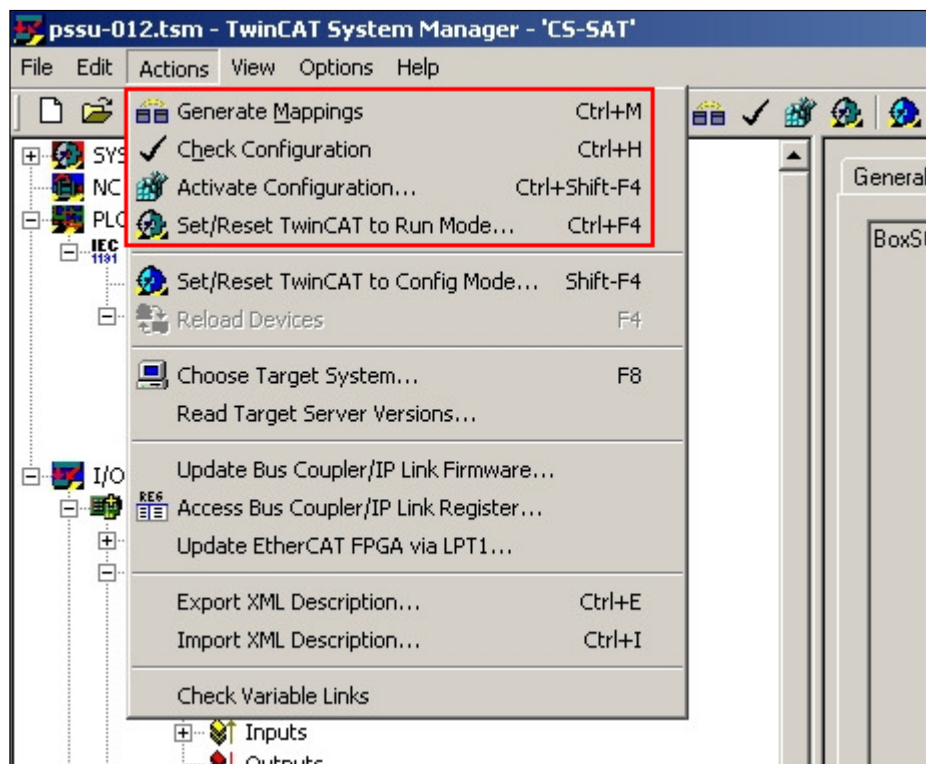


Fig. 36: TwinCAT System Manager – Download System Configuration

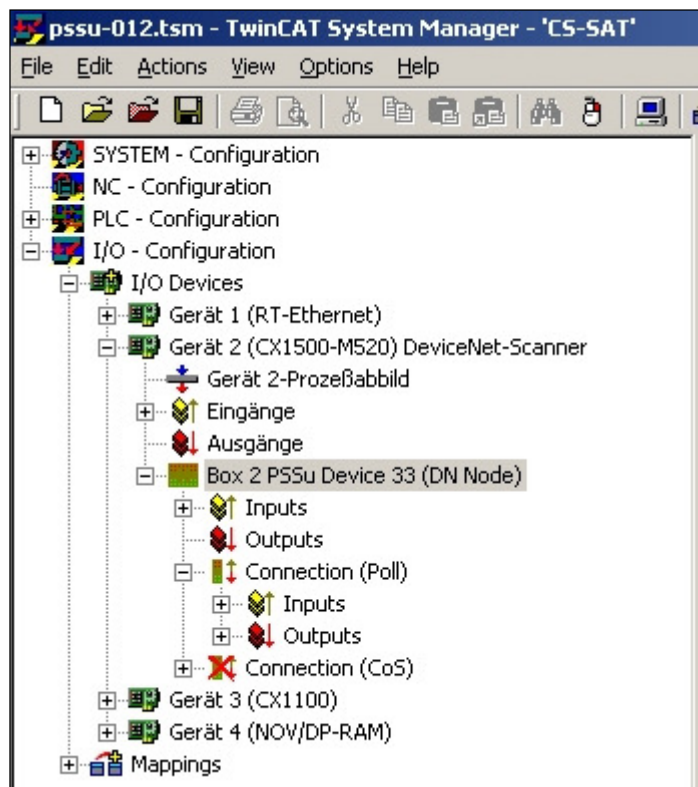


Fig. 37: TwinCAT System Manager – Integrated PSSu system

- ▶ The PSSu-device is in IDLE-mode:
 - LED-display on the PSSu Device
 - MNS-LED is green
 - I/O is red

The consumed I/O data is wrong, because the PSSu DeviceNet parameters are not written to the DeviceNet-Device.

► **Step 7: Write PSSu DeviceNet Slot-Parameters**

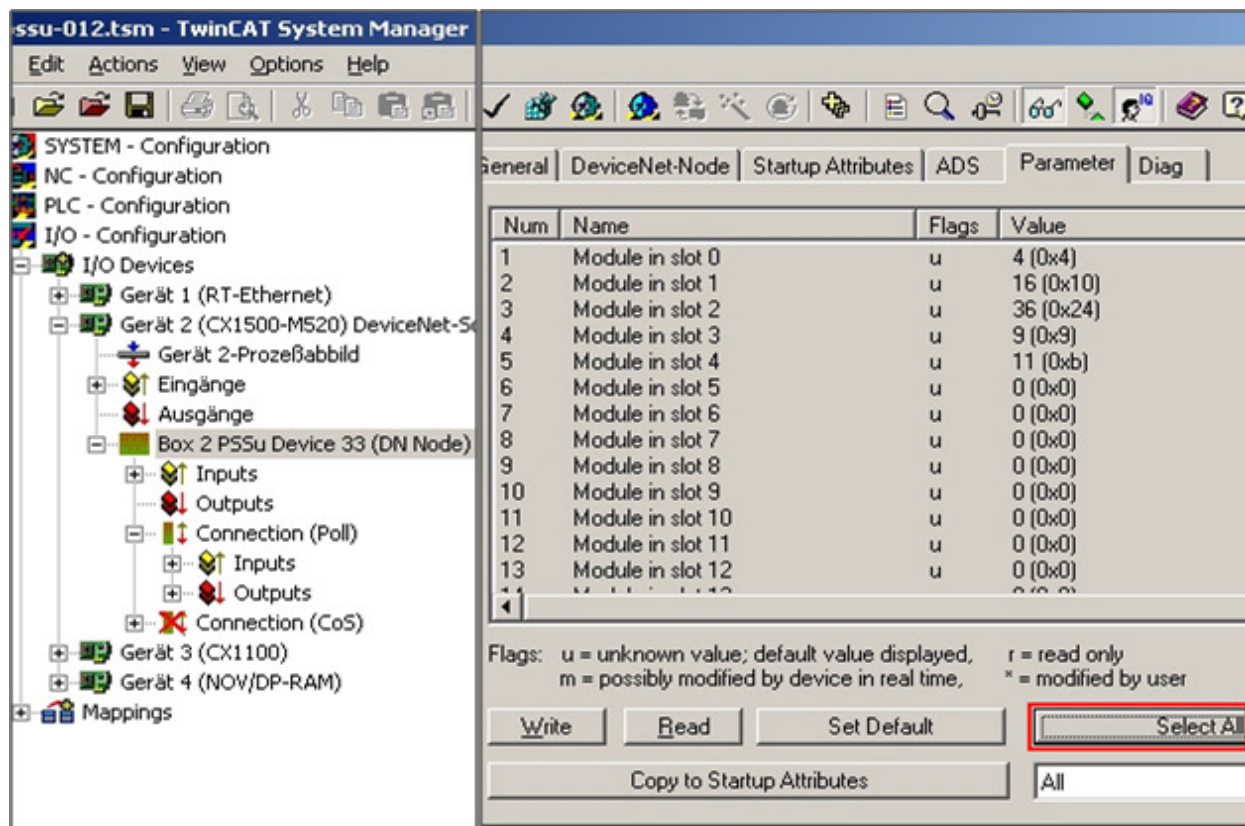


Fig. 38: TwinCAT System Manager – Write DeviceNet Slot Parameters (PSSu-System)

On the flag "u" you see that needed values are unknown. Select all Parameter entries by pressing "Select All" and write the parameters to the DeviceNet-System by pressing "write".

A few seconds later all "u"-character should disappear after this write-operation.

If not all "u"-characters have disappeared repeat the write-operation by pressing "select all", "set default" and start the write-operation one more time.

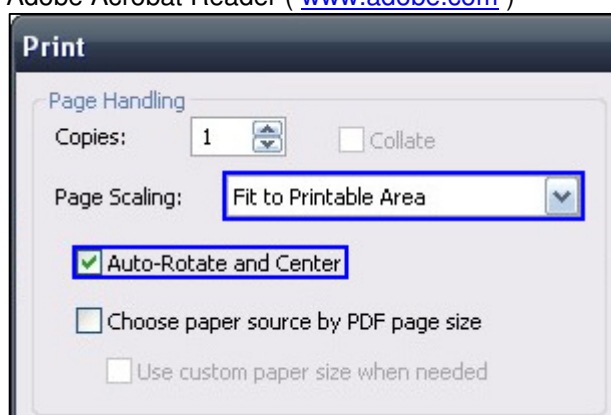
- After a few seconds later you will get a running PSSu-Device in RUN-mode:
 - LED-display on the PSSu Device
 - MNS-LED is green
 - I/O is green

5. Table of figures

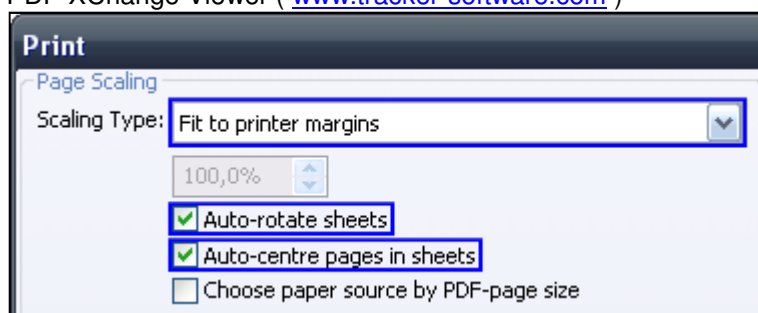
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Recommended printer settings

Adobe Acrobat Reader (www.adobe.com)



PDF-XChange Viewer (www.tracker-software.com)





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