

PSS u2 I/O EtherNet/IP with CIP Safety Protocol on a Allen-Bradley ControlLogix with Studio 5000



Product

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Name: PSS u2 P0 F/S EIP
Manufacturer: Pilz GmbH & Co. KG, Safe Automation

Document

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01	31/01/2018	Creation	all

Validity of Application Note

This present Application Note is valid until a new version of the document is published.

This and other Application Notes can be downloaded in the latest version and for free from www.pilz.com.

For a simple search, use our [content document \(1002400\)](#) or the [direct search function](#) in the download area.

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While every effort has been made to ensure the information provided is accurate, we cannot accept liability for the accuracy and entirety of the information provided, except in the case of gross negligence. In particular, all information on applicable standards, safety-related classifications and time characteristics should be viewed as provisional. 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.

January 2018

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Abbreviations

Abbreviation / term	Description	Source
AN	Application Note	 AN content (1002400)">www.pilz.com > AN content (1002400)
PNOZ	Pilz E-STOP positive-guided (DE: Pilz NOT -AUS-Zwangsgeführt)	 PNOZ">www.pilz.com > PNOZ
PSS	Programmable control system (DE: Programmierbares Steuerungssystem)	 PSS">www.pilz.com > PSS
PSS u2	PSS universal, 2 nd generation	 PSS u2">www.pilz.com > PSS u2
DIP (switch)	Dual In-line Package	
EIP	EtherNet/IP	
CIP	Common Industrial Protocol	
CRTL	Connection Reaction Time Limit	
RPI	Request Packet Interval	
SNN	Safety Network Number	
SCID	Safety Configuration Identifier	
TUNID	Target Unique Identifier	
.L5X	Rockwell Automation RSLogix 5000 import / export file	

Definition of symbols

- Information that is particularly important is identified as follows:



CAUTION!

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



NOTICE

This describes a situation in which the product or devices could be damaged and also provides information on preventive measures that can be taken.
It also highlights areas within the text that are of particular importance.



INFORMATION

This gives advice on applications and provides information on special features.

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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. / Download
1	Pilz international homepage, download section	www.pilz.com
2	Software „PASconfig“, Online help Pilz international Webportal > Products and Solution > Controllers > PLC Controllers and I/O systems > I/O modules PSSuniversal 2 or the Head module under section “Software”	Products solutions > Controller > PLC controllers and I/O systems 328071 (Order number head module) www.pilz.com > Download 328071
3	System Description PSSuniversal 2	Not yet available.
4	Installation manual PSSuniversal 2	1004152-EN-xx www.pilz.com > Download 1004152
5	Operation manual PSS u2 P0 F/S EIP	1004528-EN-xx www.pilz.com > Download 1004528
6	Operation manual PSS u2 EF 8DI	1003619-EN-xx www.pilz.com > Download 1003619
7	Operation manual PSS u2 EF 8DO 0.5	1003621-EN-xx www.pilz.com > Download 1003621
8	Operation manual PSS u2 ES 8DID	1003612-EN-xx www.pilz.com > Download 1003612
9	Operation manual PSS u2 ES 8DOD 0.5	1003614-EN-xx www.pilz.com > Download 1003614

1.2. Documentation from other sources of information

No.	Description	Item No. / Download
1	Allen-Bradley portal (international)	Internet-Link to "ab.rockwellautomation.com"
2	Product catalogue of Allen-Bradley ControlLogix System (PLC)	Internet-Link to product catalogue "ControlLogix System"

2. Used hardware and software

2.1. Pilz products

No.	Descriptions	Order number	Version	IP address
1	Hardware head module 1x PSS u2 P0 F/S EIP	328071	01	192.168.1.16
2	Hardware Terminal block 9-pin, 1 piece PSS u2 T 9 SD (1 pc.) Note: 1 piece is included on the head module	328 830	--	--
3	Hardware Backplane 4 Slots 2x PSS u2 B 4	328 810	01	--
4	Hardware electronic module 2x PSS u2 EF 8DI	328101	01	--
5	Hardware electronic module 2x PSS u2 EF 8DO 0.5	328131	01	--
6	Hardware electronic module 2x PSS u2 ES 8DI	328301	01	--
7	Hardware electronic module 2x PSS u2 ES 8DOD 0.5	328 401	01	--
8	Hardware terminal block 16-pin, 1 piece 16x PSS u2 T 16 (1 pc.) Note: Also available in packs of 10 and 50 pieces.	328 850	--	--
9	Hardware Ethernet-plug 8-pin RJ45 male connector, straight, in accordance with the standard IEC 60603-7-1, Cat.6a RJ45 Connector	380 401	--	--
10	Hardware Ethernet-cable SafetyNET p cable, Standard, 4-wire SafetyNET p Cable	380 000	--	--
11	Software PASconfig	--	2.0.0 B.30	--

2.2. Third-party products

No.	Descriptions	Order number	Version	IP address
1	Hardware PLC 1756 GuardLogix Integrated Safety Controller	1756-L71	30.11	--
2	Hardware Ethernet/IP scanner 1756 ControlLogix Communication Module for Ethernet/IP	1756-EN2TR	10.0	192.168.1.10
3	Software Studio 5000	--	30.00	--

3. Preface

This Application Note describes the commissioning of a PSSUniversal 2 Remote I/O system on a current Allen-Bradley GuardLogix system. They communicate via EtherNet/IP with the CIP Safety protocol, using the automation software Studio 5000.

In this case, its user program controls the failsafe input and output modules of the PSS u2 electronic modules for the safety functions.

The essential procedure for a successful basic configuration is shown step-by-step, usually with screenshots.

**NOTICE**

- ▶ A detailed explanation of safety functions used in the failsafe application and its evaluation regarding functional safety are not a part of this document.
- ▶ This document only describes the procedure for use of the Remote I/O-System PSS u2 with the order number 328071 and is not intended as a technical documentation for general use of the software Studio 5000 and GuardLogix Integrated Safety Controller.

4. Technical notes for the PSS u2 system

A PSS u2 system is a modular system with Ethernet/IP interface (CIP Safety over Ethernet/IP).

The PASconfig system software is available for PSS u2 systems. The system software provides support as you select, configure and commission components.

A PSS u2 system consists of:

- One head module
- Backplanes
- Input/output modules for standard and failsafe applications
- Terminal blocks

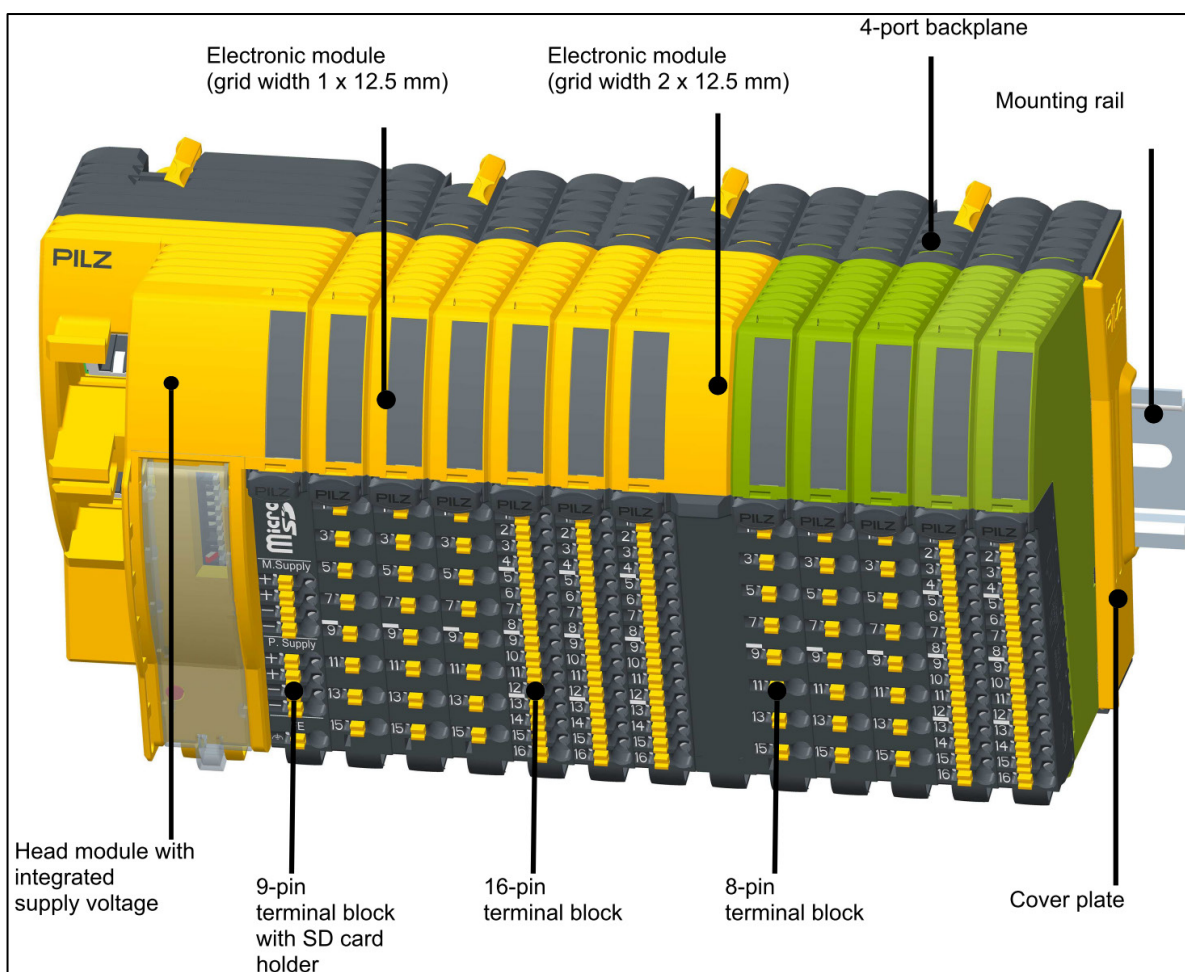


Figure 1: PSS u2 – Modular structure of the PSS u2 system (schematic)



CAUTION!

Risk of material damage:

Backplanes and head module may only be inserted or removed when the supply voltage is switched off.

- ▶ Switch off the supply voltage before inserting or removing the backplane or head module.

5. Application description

The aim is to show how a basic EtherNet/IP communication with the CIP Safety protocol and Allen-Bradley GuardLogix Safety Controller can be built up to form a remote I/O system PSS u2.

The detailed hardware configuration for the Controller is not part of this Application Note
Detailed information on this subject can be found in its manual or online help for the software.

- see Chapter 1.2 Documentation from other sources of information, [page 5](#)

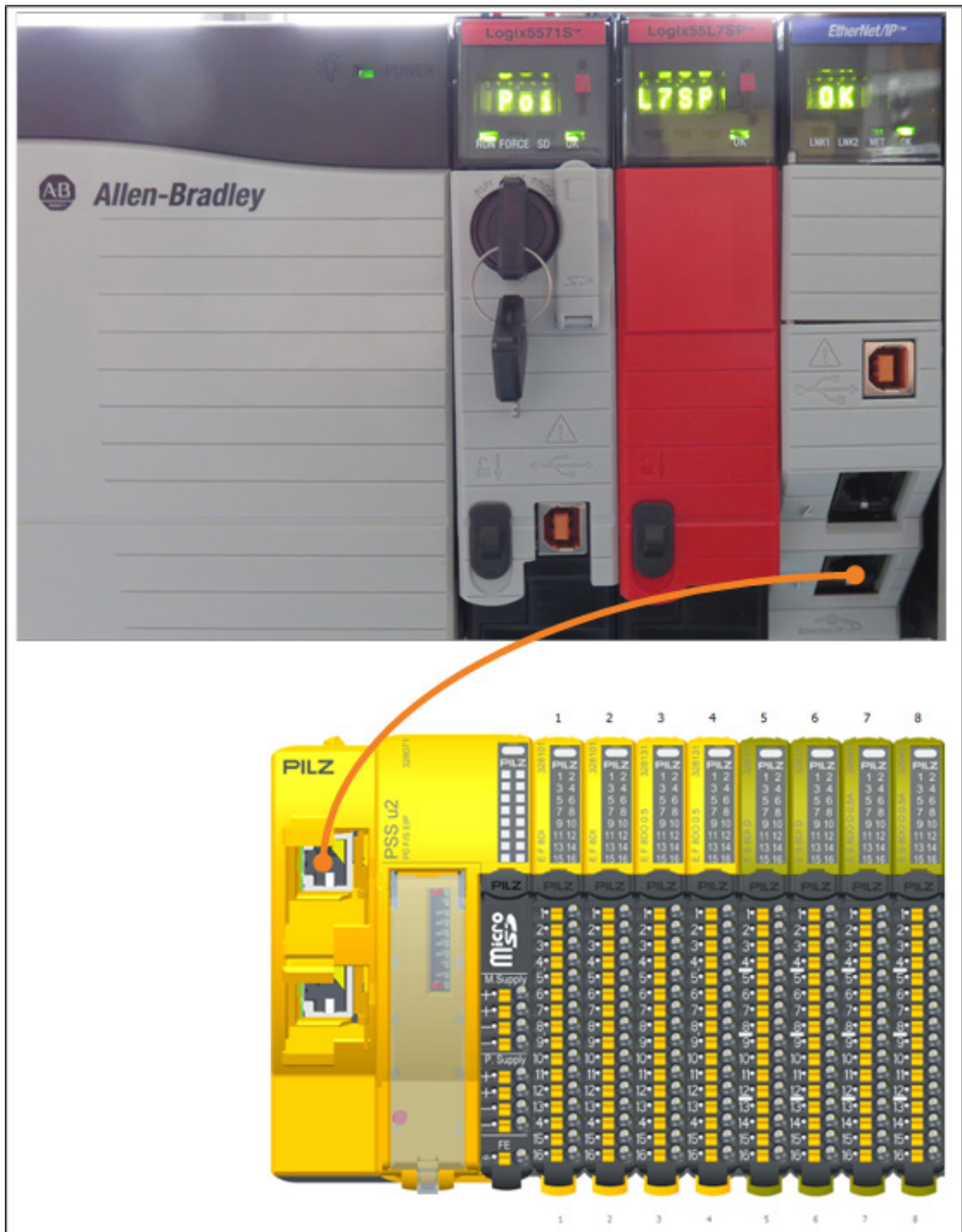


Figure 2: Application – Structure of the hardware (schematic)

6. Hardware configuration

6.1. Used hardware

6.1.1. Pilz devices

- ▶ The used Pilz modules are listed in the table of the following link:
 - Chapter 2.1 Pilz products, [page 6](#)
- ▶ The relevant important documents are named and linked here:
 - Chapter 1.1 Documentation from Pilz GmbH & Co. KG, [page 5](#)

	PSS u2 P0 F/S EIP
	1 - PSS u2 EF 8DI
	2 - PSS u2 EF 8DI
	3 - PSS u2 EF 8DO 0.5A
	4 - PSS u2 EF 8DO 0.5A
	5 - PSS u2 ES 8DID
	6 - PSS u2 ES 8DID
	7 - PSS u2 ES 8DOD 0.5A
	8 - PSS u2 ES 8DOD 0.5A

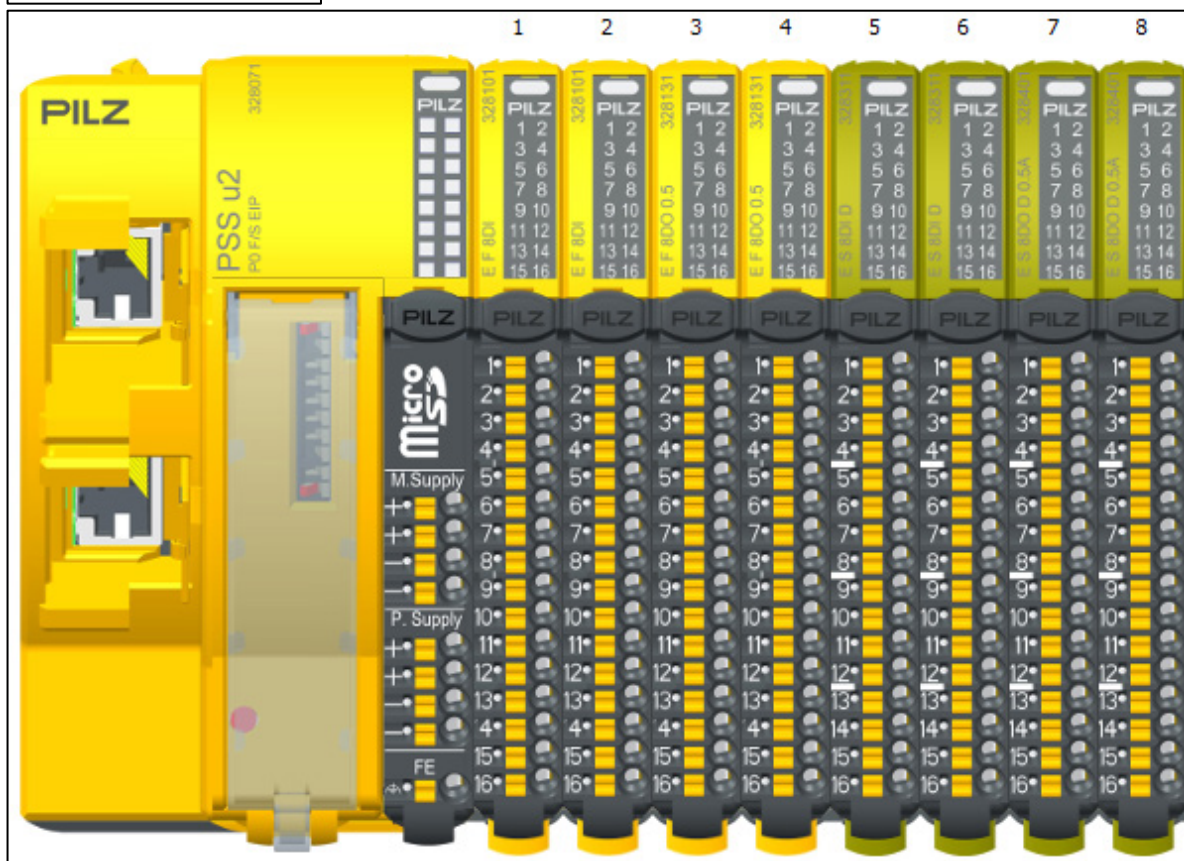


Figure 3: PSS u2 – Hardware » Overview of used modules

6.1.2. Rockwell devices

- ▶ The used Allen-Bradley devices are listed in the table of the following link:
 - Chapter 2.2 Third-party products, [page 6](#)
- ▶ The relevant important documents are named and linked here:
 - Chapter 1.2 Documentation from other sources of information, [page 5](#)

6.2. Setting up the IP address of PSS u2 EIP head module

The IP address can be set using the DIP switch on head module or using tool PASconfig. The DIP switch (hardware) has precedence over the setting in PASconfig (software).

6.2.1. Setting up the IP address via DIP switch

The DIP switch only allows the last byte of the IP address "192.168.1.xxx" to be set with the subnet mask "255.255.255.0". The last number "xxx" is the value that can be set with the DIP switch.

► Note: To apply changes on the DIP Switches a restart of I/O head module is required.

No.	DIP switch	Description																								
1	Adress <table> <tr><td>1</td><td>☐</td><td>128</td></tr> <tr><td>2</td><td>☐</td><td>64</td></tr> <tr><td>3</td><td>☐</td><td>32</td></tr> <tr><td>4</td><td>☐</td><td>16</td></tr> <tr><td>5</td><td>☐</td><td>8</td></tr> <tr><td>6</td><td>☐</td><td>4</td></tr> <tr><td>7</td><td>☐</td><td>2</td></tr> <tr><td>8</td><td>☐</td><td>1</td></tr> </table> ON OFF	1	☐	128	2	☐	64	3	☐	32	4	☐	16	5	☐	8	6	☐	4	7	☐	2	8	☐	1	IP address can be configured in PASconfig (.0).
1	☐	128																								
2	☐	64																								
3	☐	32																								
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1	☒	128																								
2	☒	64																								
3	☒	32																								
4	☒	16																								
5	☒	8																								
6	☒	4																								
7	☒	2																								
8	☒	1																								

Figure 4: PSS u2 – Hardware » Setting up the IP address via DIP switches

6.2.2. Setting up the IP address via the PASconfig tool

The IP address set in PASconfig is only used, if the DIP switch is set to 0 or 255.

You can change the head module's IP address in the dialogue box "Set Target Unique Network Identifier (TUNID)".

► Notes:

- The DIP switch has precedence over the setting in PASconfig (see Chapter 6.2.1, [page 11](#)).
- The IP address entered in PASconfig is only adopted if the DIP switch is set to "0" or "255".
- Prerequisite: A "Safety network number" (SNN) has been entered.

Procedure:

- Select PSS u2 system and
 ► start function: menu "PSS u2 system" » "Set Target Unique Network Identifier (TUNID)":

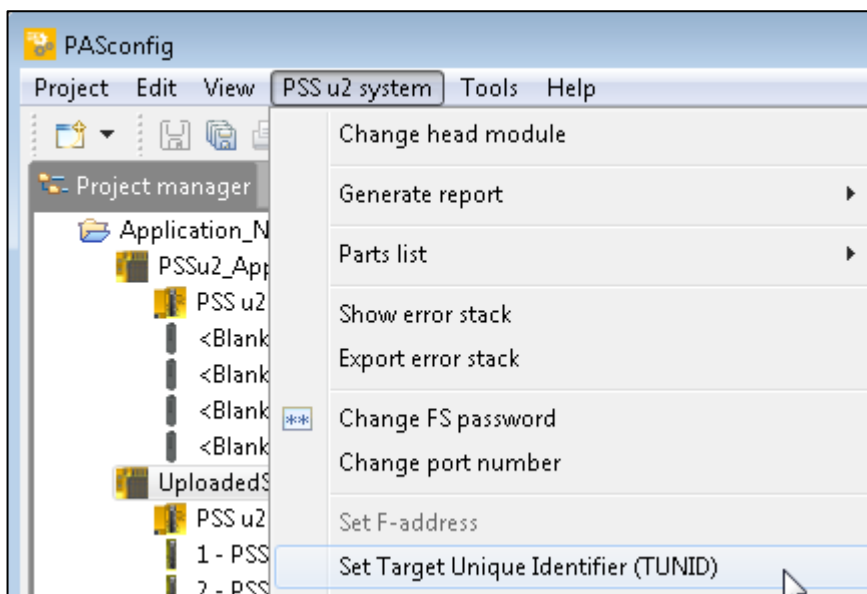


Figure 5: PASconfig – Set IP address » Start function "TUNID" (Part 1)

- Set the "Safety network number" (SNN) and enter a new "IP address":

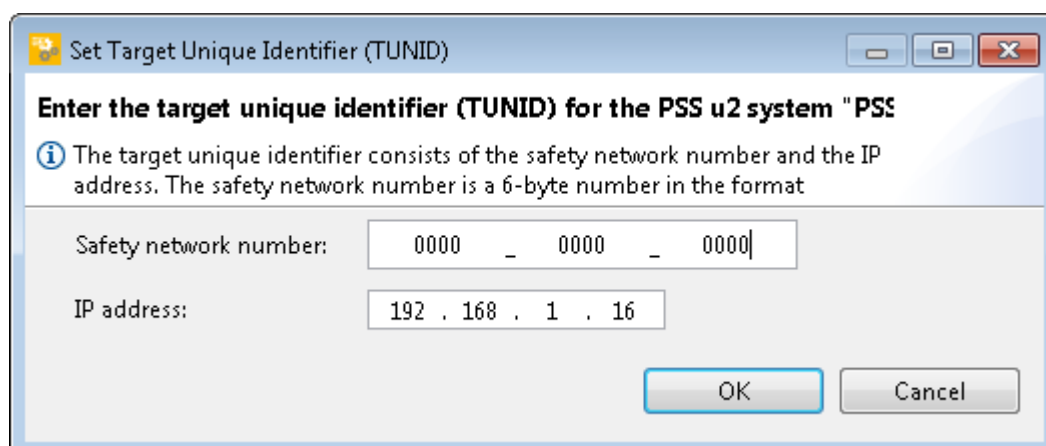


Figure 6: PASconfig – Set IP address » Settings of "SNN" and "IP address" (Part 2)

- After the IP address has been entered, the system is restarted.

7. Configuration of the PSS u2 failsafe system

- ▶ To create a new configuration you can:
 - [A] Read out the configuration (upload) of the connected PSS u2 system.
 - or
 - [B] Create a new configuration and select the needed modules by yourself.

7.1. PASconfig – [A] Upload the configuration

- ▶ Note: To upload the configuration you need a working connection to a PSS u2 system.
 - see Chapter 7.3 PASconfig – Connection manager, pages 18ff
- ▶ Start function: menu “PSS u2 system” » “Upload system data” or via icon:

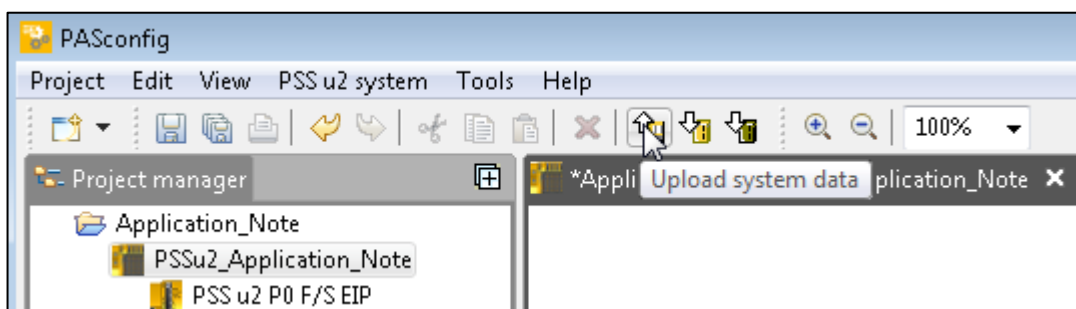


Figure 7: PASconfig – Upload system data » Start function (Part 1)

- ▶ Select a connection and start upload:

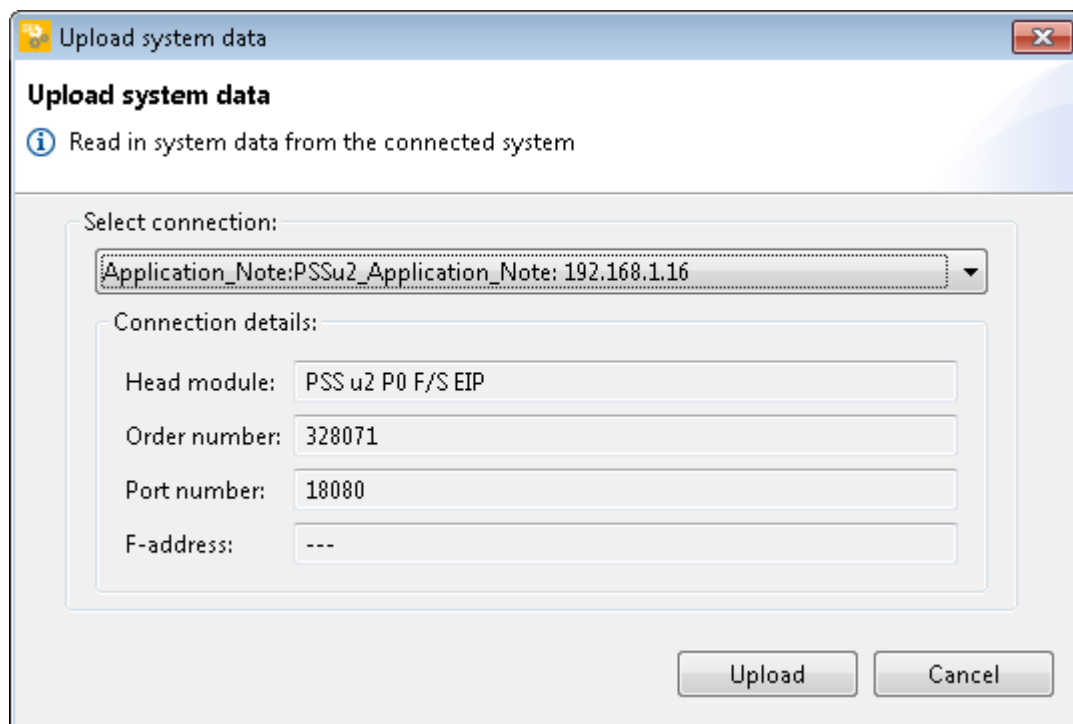


Figure 8: PASconfig – Upload system data » Select connection (Part 2)

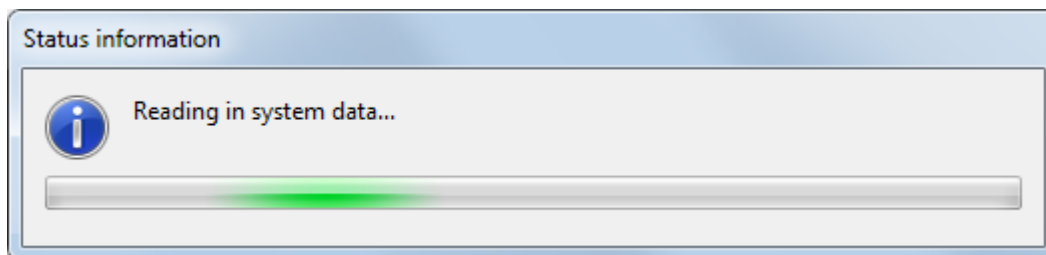


Figure 9: PASconfig – Upload system data » Reading in system data ... (Part 3)

- Create a new project or add it to an existing project:

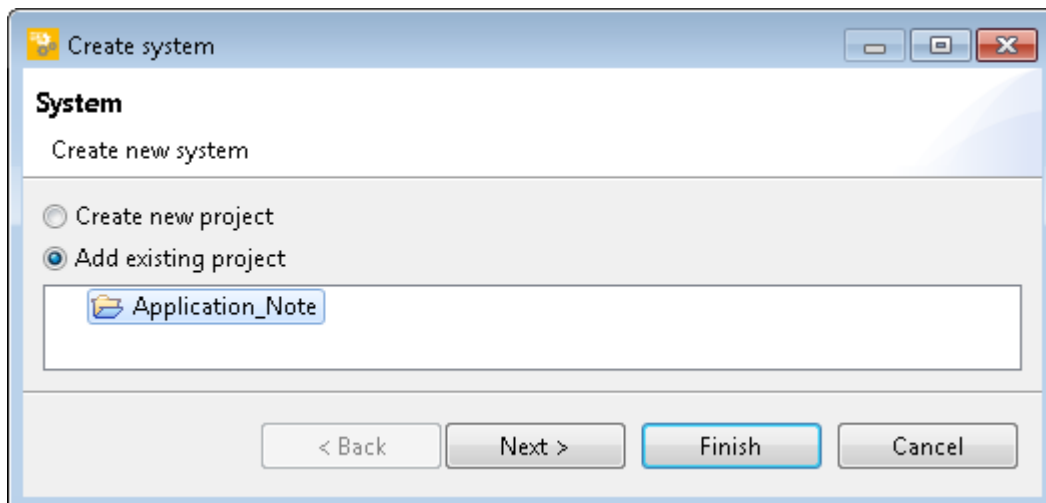


Figure 10: PASconfig – Upload system data » Add existing project (Part 4)

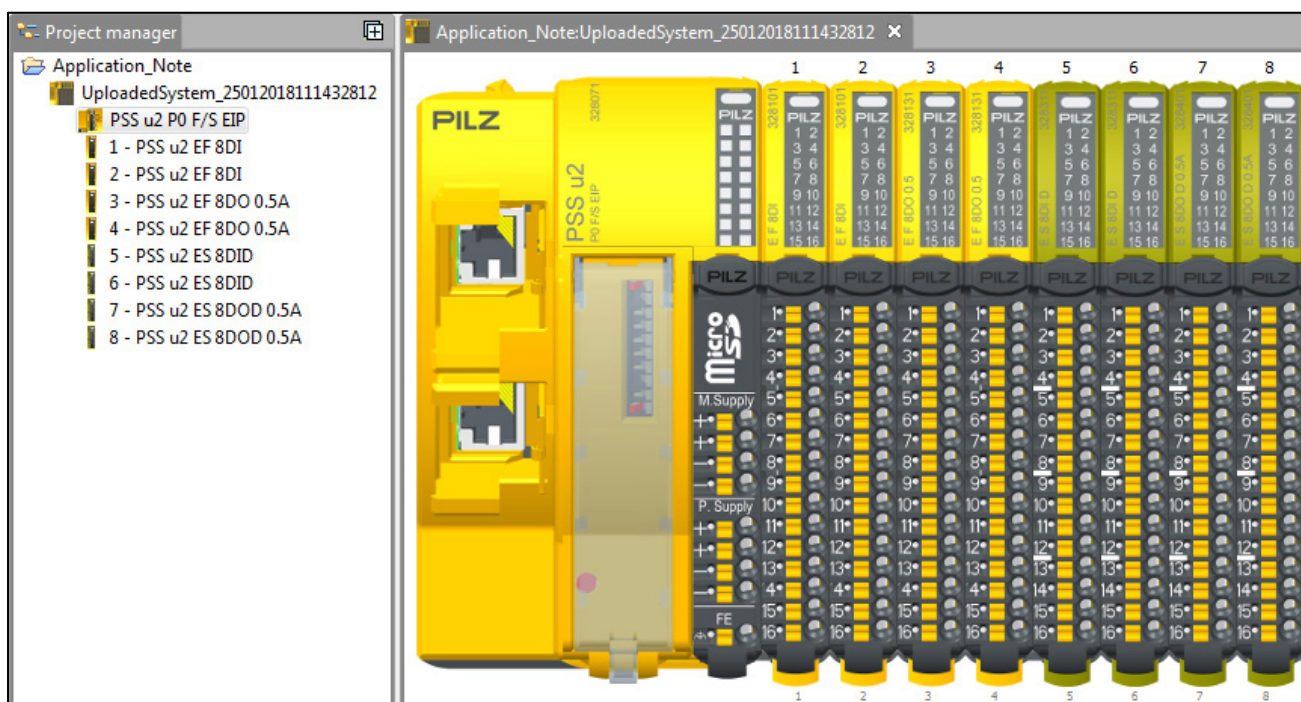


Figure 11: PASconfig – Upload system data » Finalization (Part 5)

- Notes:

- The properties of the electronic modules now have the default configuration!
- Please check this configuration and adapt it to your application, please see on [page 17](#) Figure 16 "PASconfig – Create a new project » Select the needed modules" and following hints.

7.2. PASconfig – [B] Create a new configuration

- ▶ Create a new project:

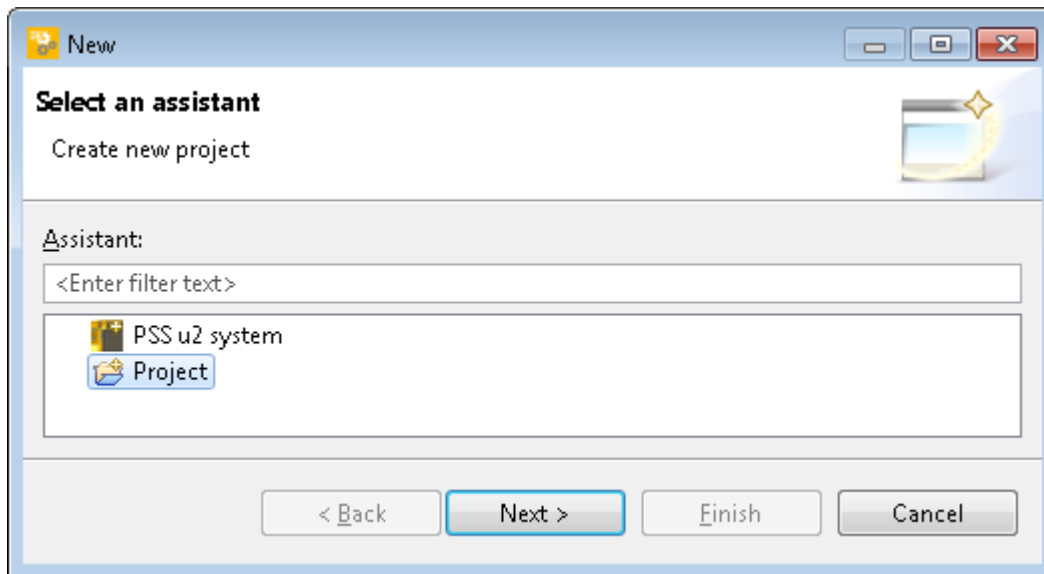


Figure 12: PASconfig – Create a new project » Select an assistant (Part 1)

- ▶ Add project data like the “Project name” and the “Author”:

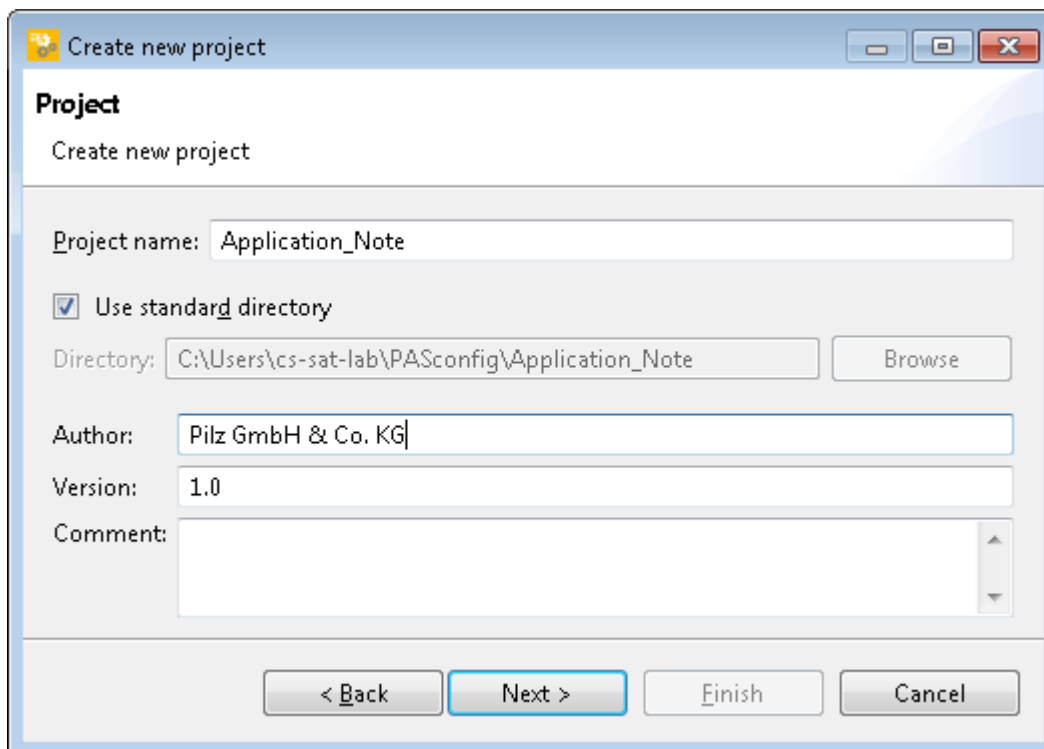


Figure 13: PASconfig – Create a new project » Add project data (Part 2)

- ▶ Select the head module “PSS u2 P0 F/S EIP” with order number ‘328071’:

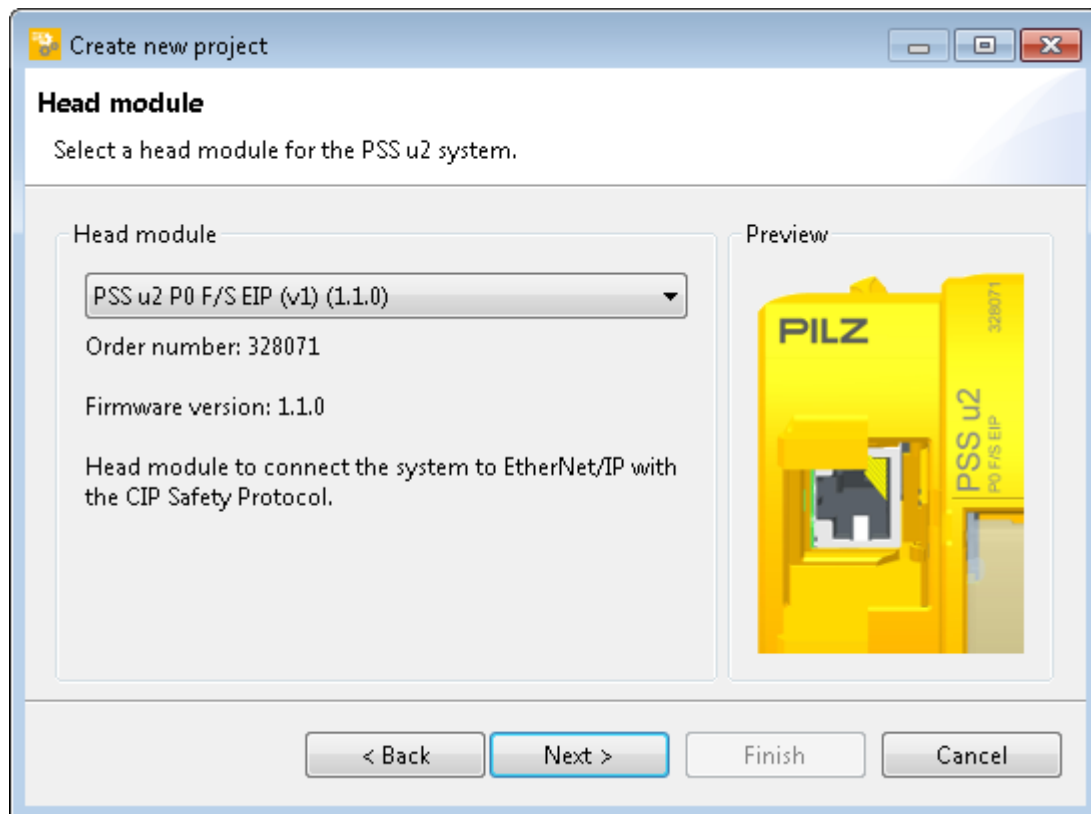


Figure 14: PASconfig – Create a new project » Select head module (Part 3)

- ▶ Enter the name for the PSS u2 system, here “PSSu2_Application_Note”:

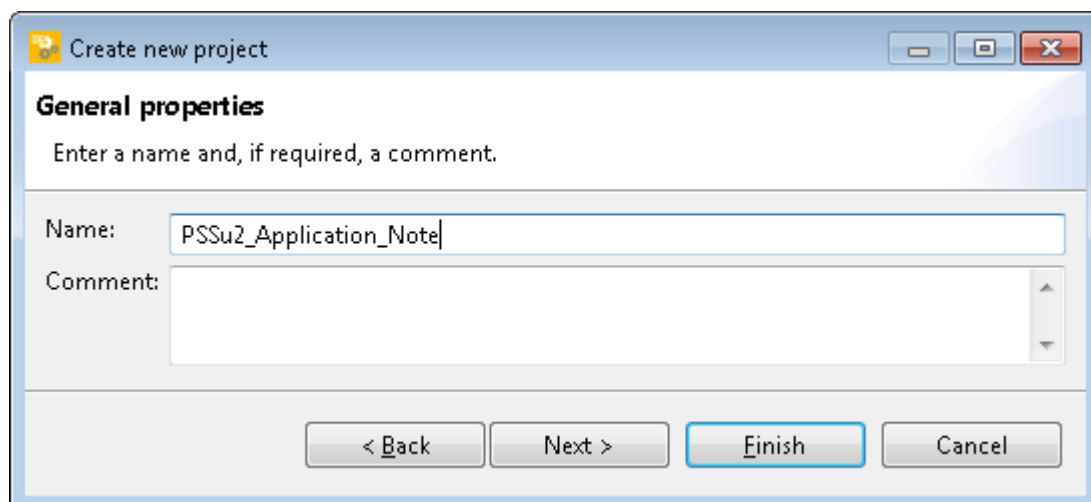


Figure 15: PASconfig – Create a new project » Naming of PSS u2 system (Part 4)

- Choose the needed electronic modules on the right side in “*Palette*” and insert them with drag and drop to the “*Workspace*”:

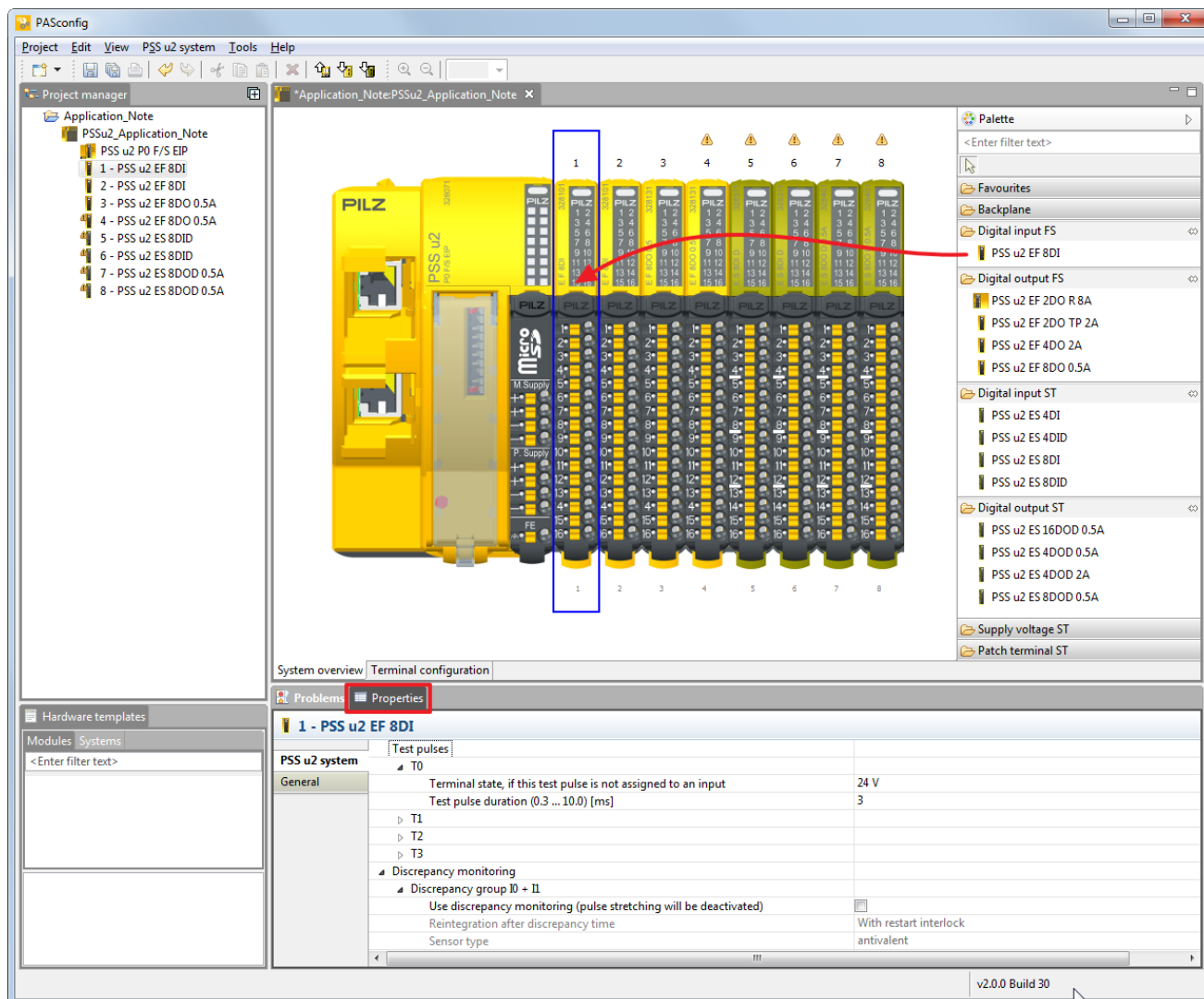


Figure 16: PASconfig – Create a new project » Select the needed modules (Part 5)

- You can now change the properties of each electronic module:
 1. Select an electronic module in the “*Project windows*” or the “*Workspace*”,
 2. then select in the “*Information window*” the tab “*Properties*” and
 3. edit the parameters of the selected module.
 The properties are explained in the Online Help of tool PASconfig.
- Note: You can use **hardware templates** to build a system quicker, using a previously defined configuration. There are two possibilities:
 - A hardware template for an electronic module save and restore the module configuration. and
 - A hardware template for a PSS u2 system save and restore the entire system with its complete structure and configuration of all included modules.

7.3. PASconfig – Connection manager

To perform various online actions, you will need an online connection between the PASconfig-PC and the PSS u2 system, e.g. firmware update or download of FS/ST configuration data. Make sure, that the IP address of the PASconfig-PC is in the same subnet as the IP address of the PSS u2 system (see Chap. 6.2 Setting up the IP address of PSS u2 EIP head module, [pages 11ff](#)).

- ▶ Start function: menu “Tools” » “Connection manager”:

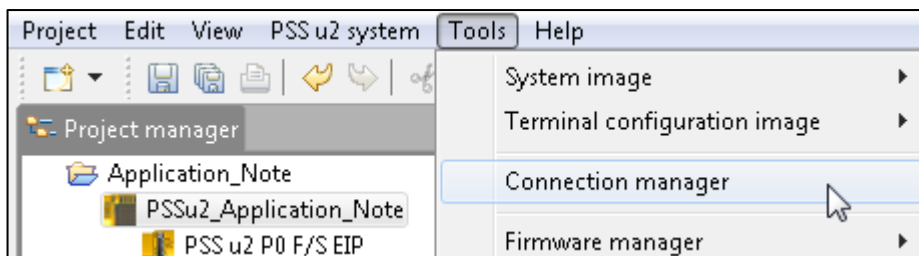


Figure 17: PASconfig – Connection manager » Start (Part 1)

- ▶ Create a new connection or edit an existing one:

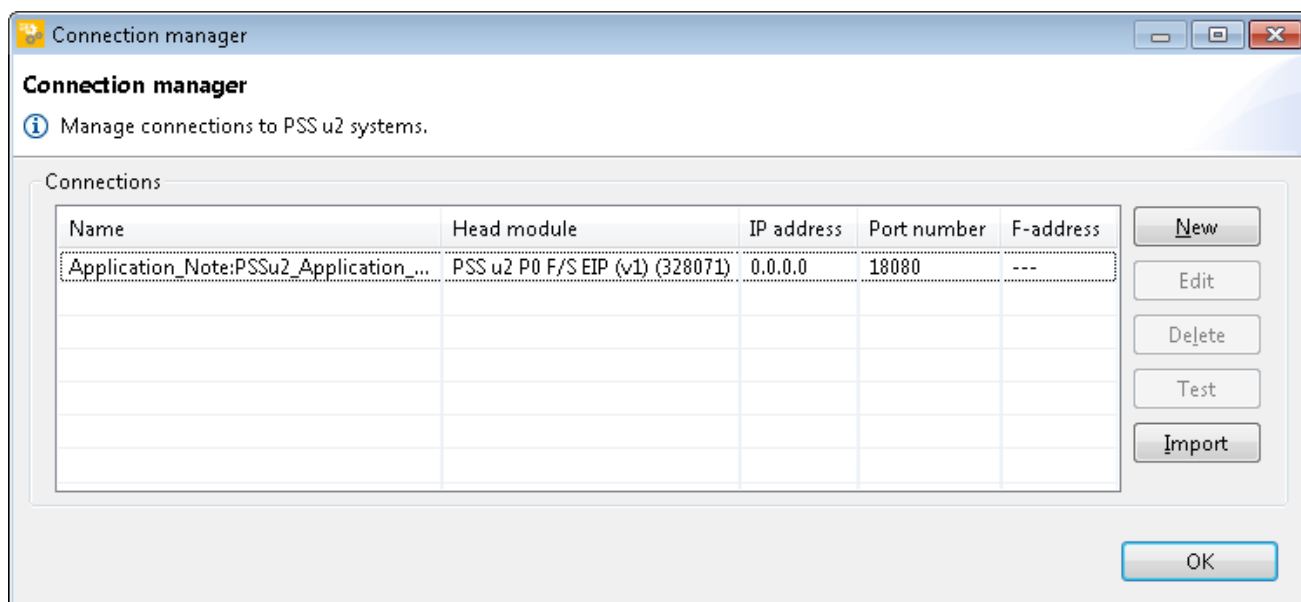


Figure 18: PASconfig – Connection manager » Manage connections (Part 2)

- ▶ Enter the “IP address” of the PSS u2 head module:

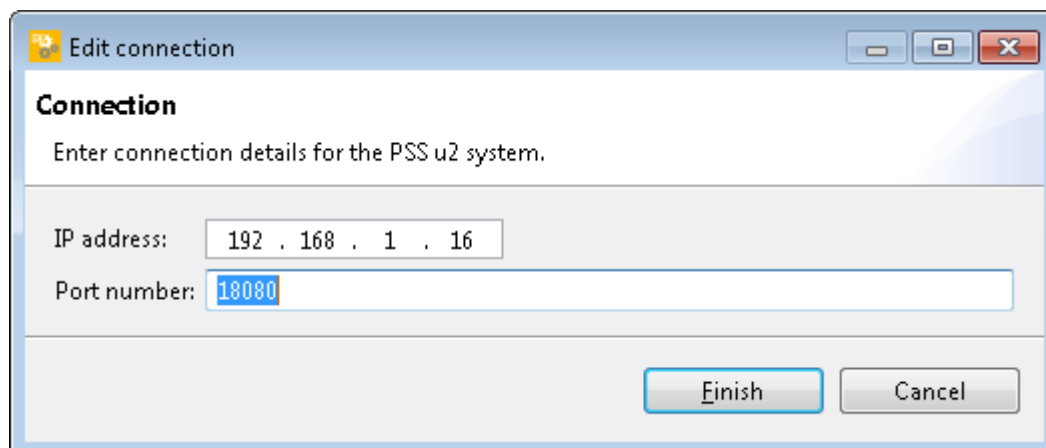


Figure 19: PASconfig – Connection manager » Edit connection (Part 3)

7.4. Manage system configuration with .L5X file

7.4.1. PASconfig – Export system configuration to .L5X file

To simplify configuration in Rockwell's RSLogix software, a file with the system configuration for an EtherNet/IP system can be exported from tool PASconfig.

- ▶ Note: The .L5X file can only be imported into **RSLogix from Version 29!**
- ▶ The generated configuration contains the following information:
 - EtherNet/IP subscriber,
 - Length of process data,
 - Assembly object instance and
 - Comments for the modules and process data.
- ▶ Start function: menu "PSS u2 system" » "Export system configuration to .L5X file ...":

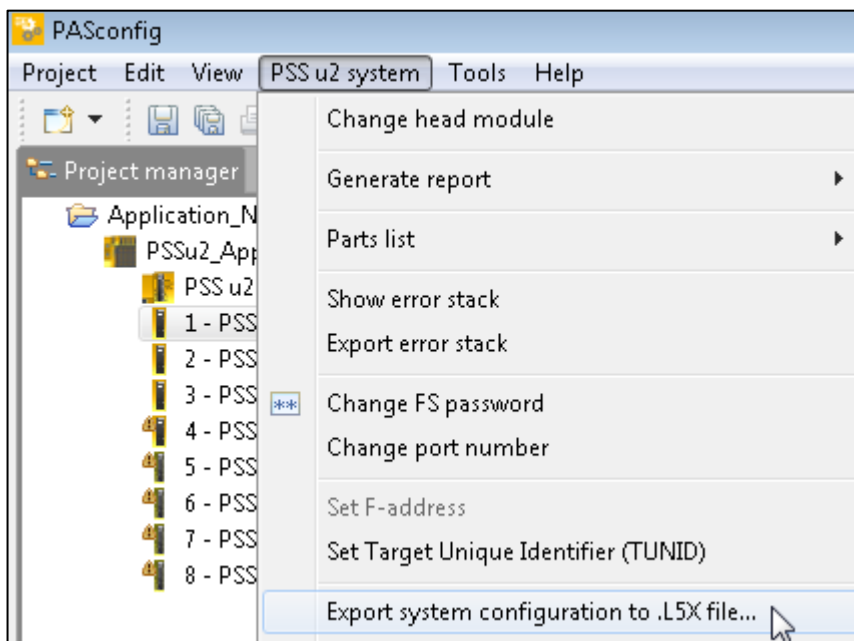


Figure 20: PASconfig – Export system configuration to .L5X file (Part 1)

- ▶ Select a folder to export the .L5X file:

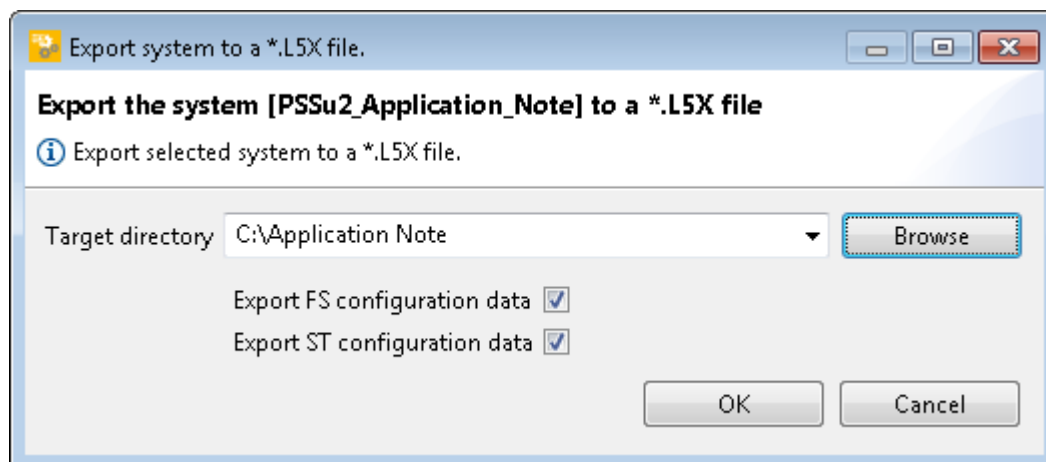


Figure 21: PASconfig – Export system configuration to .L5X file (Part 2)

The filename will generate automatically, it is a combination of the system name, date and time.

- ▶ Our Example: "PSSu2_Application_Note_yyyymmdd_hhmmss.l5x" (see Figure 23, [page 21](#))

7.4.2. Studio 5000 – Import .L5X file

- ▶ The .L5X file can be imported in Studio 5000 with a right-click on the Ethernet Controller:

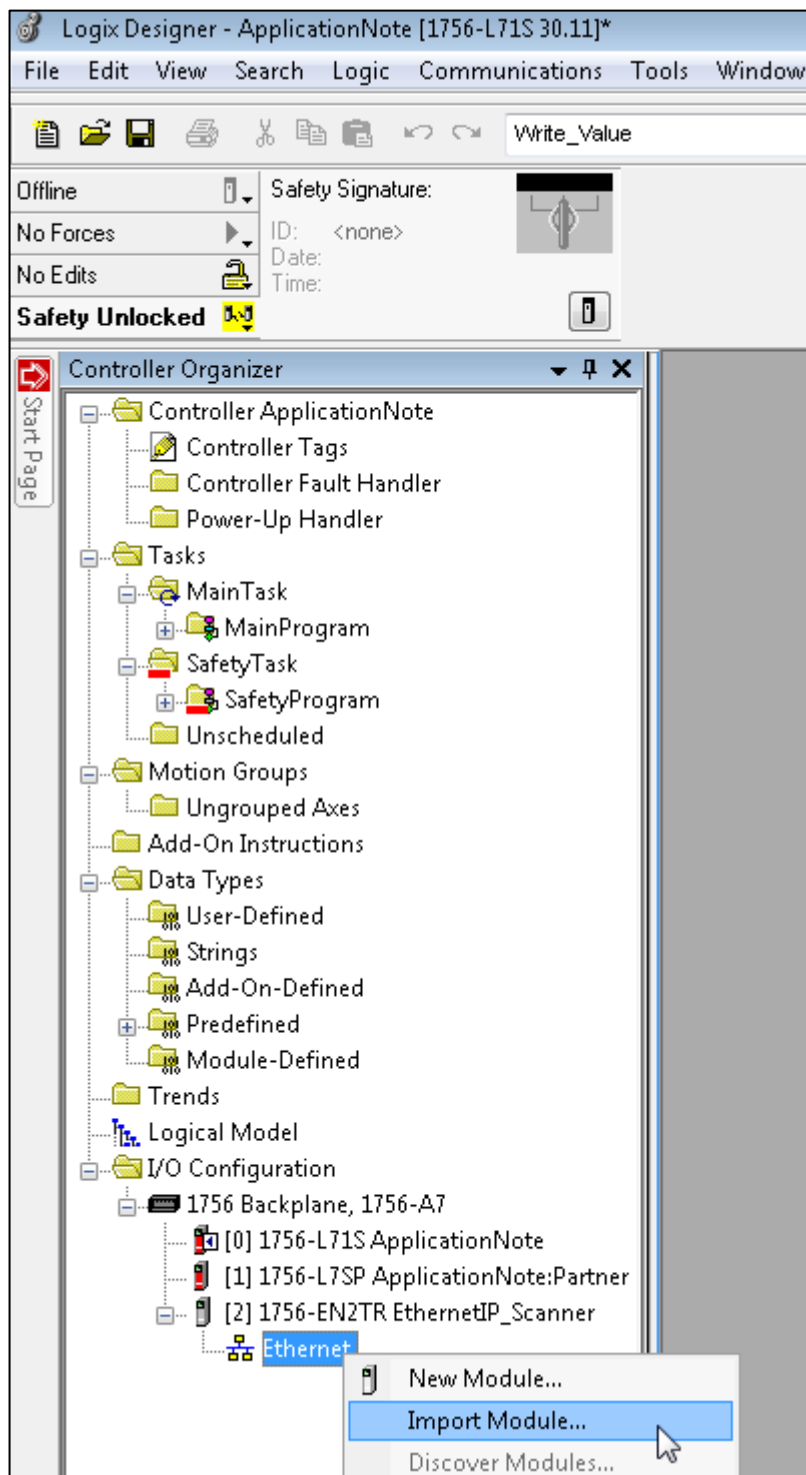


Figure 22: Studio 5000 – Import system configuration from .L5X file (Part 1)

- ▶ In the new subwindow, select now the previously created .L5X file (Figure 21, page 19) and press the “Open” button:

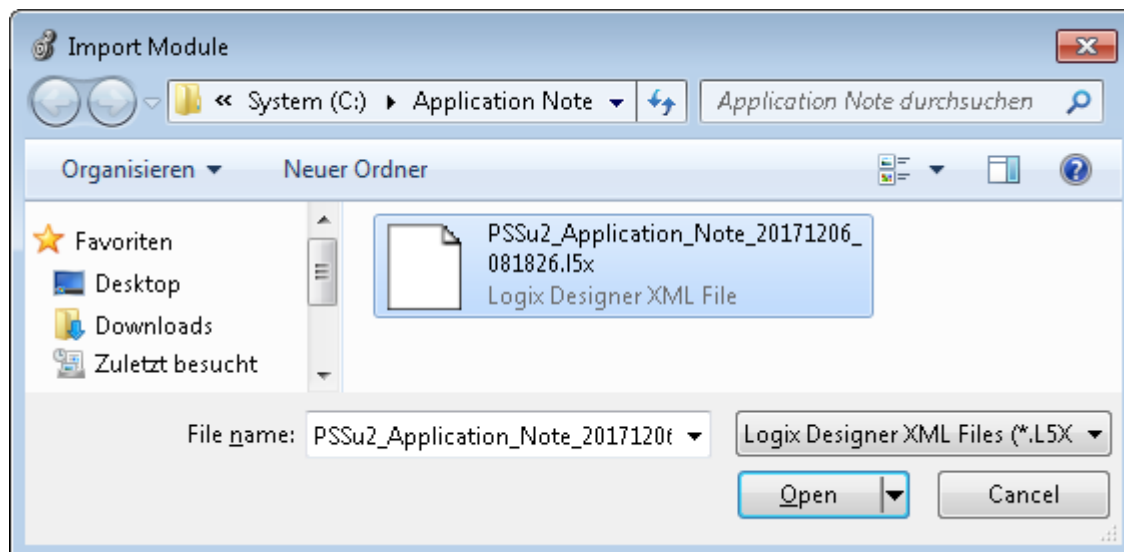


Figure 23: Studio 5000 – Import system configuration from .L5X file (Part 2)

- ▶ Press the “OK” button:

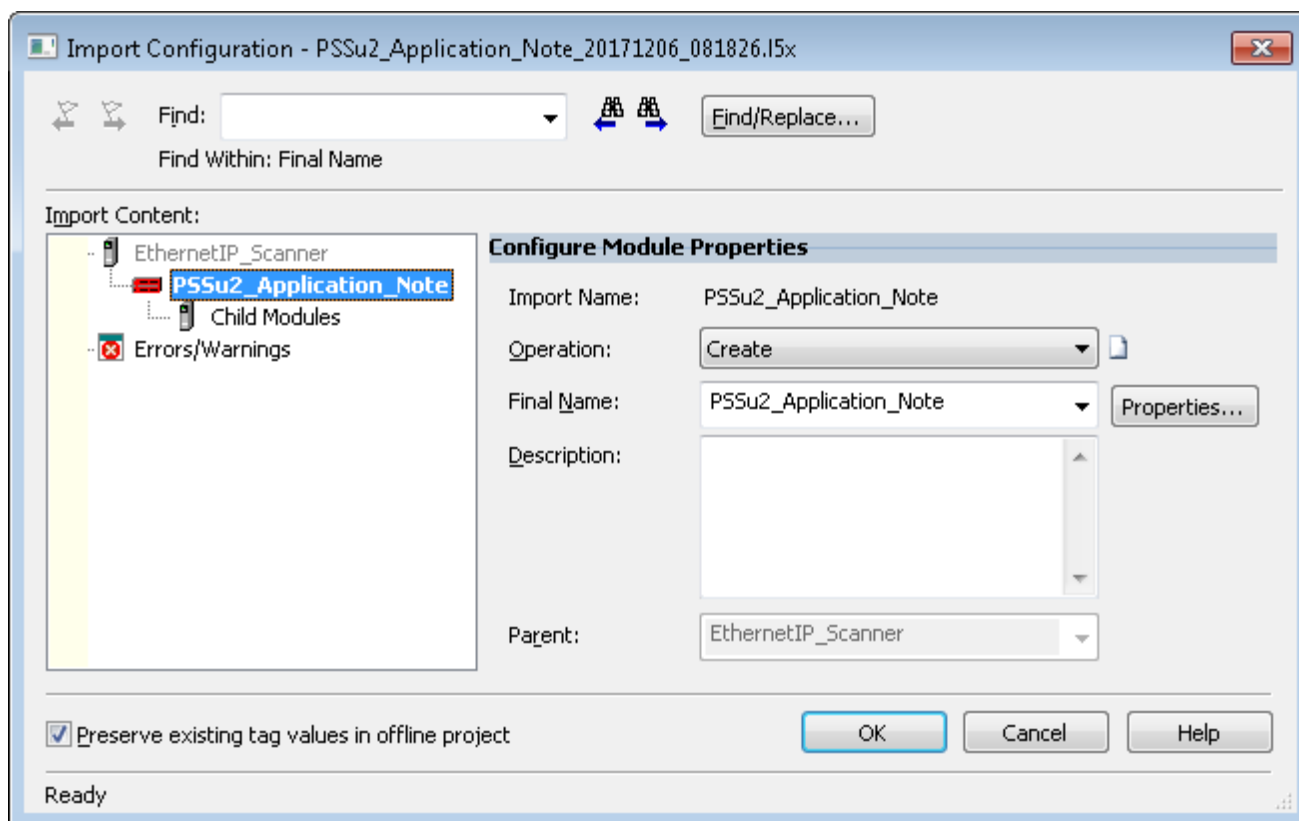


Figure 24: Studio 5000 – Import system configuration from .L5X file (Part 3)

- ▶ The imported PSS u2 system is shown as an “Ethernet-Safety-Standard-Module”:

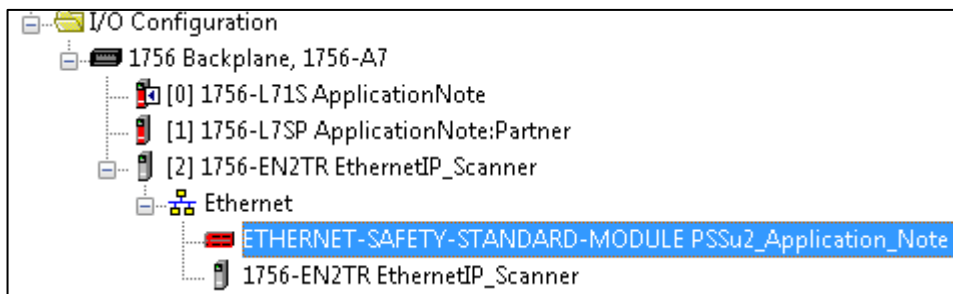


Figure 25: Studio 5000 – .L5X file » Ethernet-Safety-Standard-Module (Part 4)

7.4.2.1. General properties – Generic EtherNet/IP safety and standard modules

- ▶ Double-click on the “ETHERNET-SAFETY-STANDARD-MODULE” (Figure 25) opens the parameters of the PSS u2 System.
- ▶ The “IP address” and the “Connection parameters” are filled in **after import of the .L5X file** and can be viewed and edited in the following window:

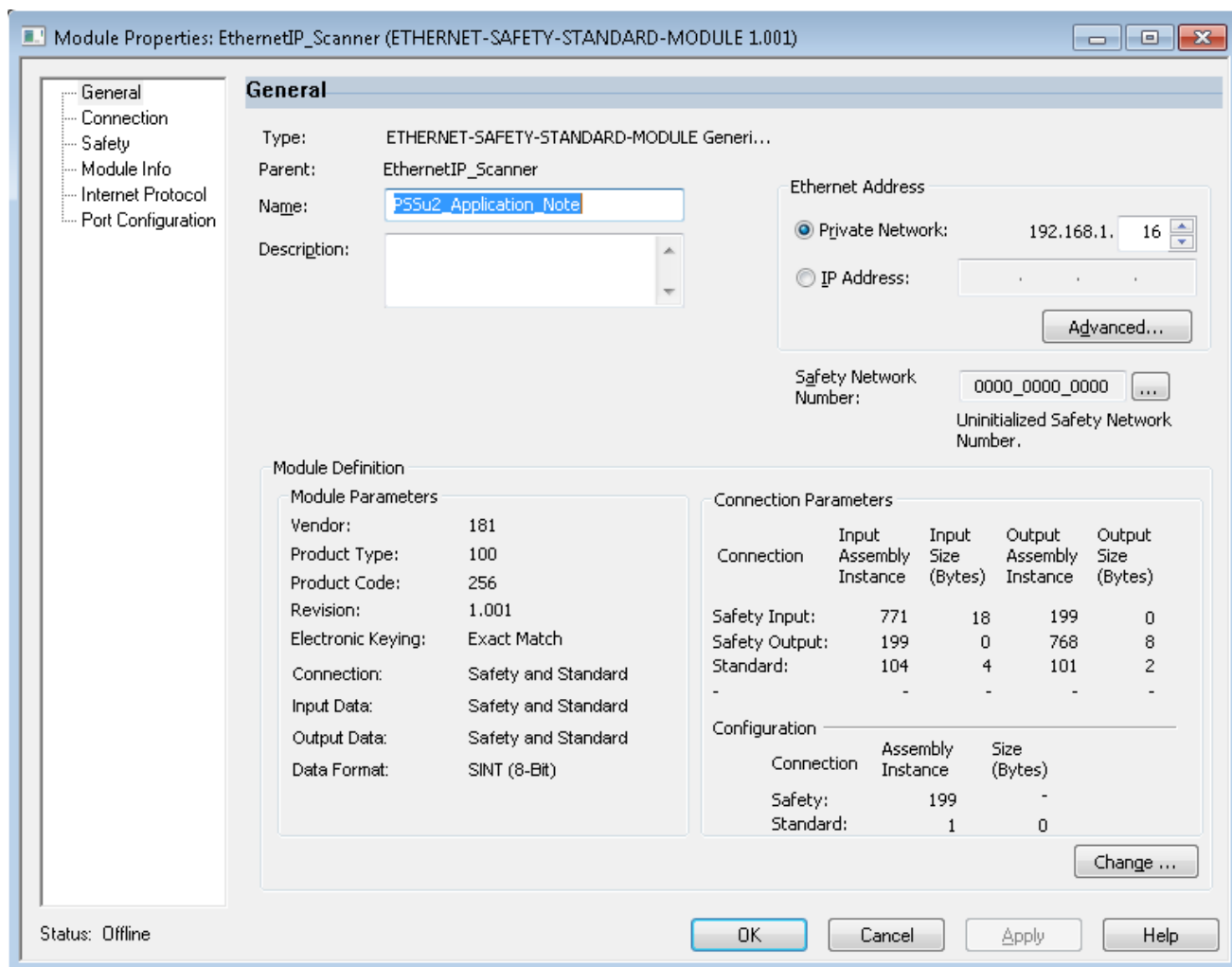


Figure 26: Studio 5000 – Ethernet-Safety-Standard-Module » General properties

7.4.2.2. Safety properties – RPI and CRTL



NOTICE

- ▶ The Parameters "*Request Packet Interval*" and "*Connection Reaction Time Limit*" are important and influence the safety reaction time.
- ▶ Increasing reaction time possibly may lead to a loss of a safety function, and should always be considered.

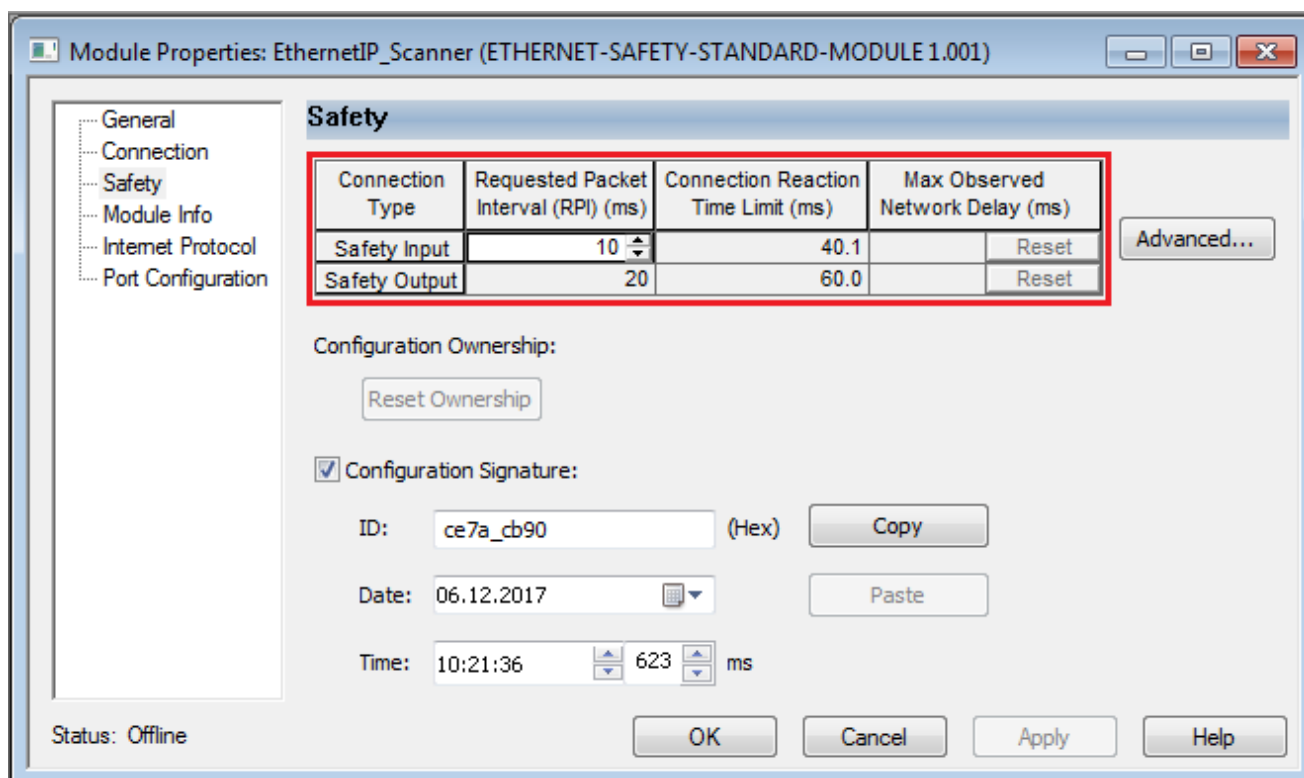


Figure 27: Studio 5000 – Ethernet-Safety-Standard-Module » Safety properties RPI/CRTL

7.5. Studio 5000 – Controller Tags

- ▶ Double-click on the "Controller Tags" opens and displays the associated lists in following figures:

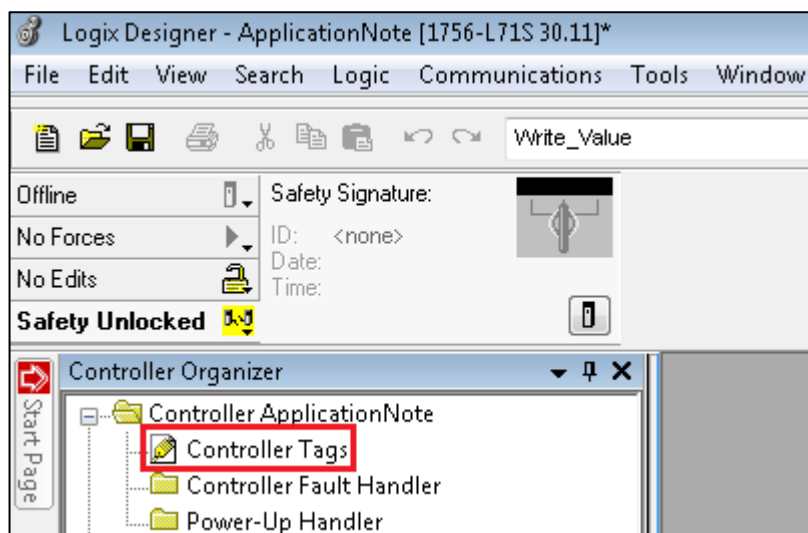


Figure 28: Studio 5000 – Controller Tags » Open lists

The imported L5X file also contains the description of the Controller Tags. There is a description of each electronic module and of each bit, original generated in tool PASconfig.

- see Chapter 7.4.1 PASconfig – Export system configuration to .L5X file, [page 19](#)

► List of Controller Tags of the PSS u2 standard modules:

Name	Value	Forc	Style	Data Type	Class	Description
+ PSSu2_Application_Note:C	{...}	{...}		AB:ETHER...	Standard	
- PSSu2_Application_Note:I	{...}	{...}		AB:ETHER...	Standard	
- PSSu2_Application_Note:I.Data	{...}	{...}	Decimal	SINT[4]	Standard	
- PSSu2_Application_Note:I.Data[0]	0		Decimal	SINT	Standard	Module 05: PSS u2 ES 8DI
- PSSu2_Application_Note:I.Data[0].0	0		Decimal	BOOL	Standard	i0
- PSSu2_Application_Note:I.Data[0].1	0		Decimal	BOOL	Standard	i1
- PSSu2_Application_Note:I.Data[0].2	0		Decimal	BOOL	Standard	i2
- PSSu2_Application_Note:I.Data[0].3	0		Decimal	BOOL	Standard	i3
- PSSu2_Application_Note:I.Data[0].4	0		Decimal	BOOL	Standard	i4
- PSSu2_Application_Note:I.Data[0].5	0		Decimal	BOOL	Standard	i5
- PSSu2_Application_Note:I.Data[0].6	0		Decimal	BOOL	Standard	i6
- PSSu2_Application_Note:I.Data[0].7	0		Decimal	BOOL	Standard	i7
+ PSSu2_Application_Note:I.Data[1]	0		Decimal	SINT	Standard	Module 06: PSS u2 ES 8DI
+ PSSu2_Application_Note:I.Data[2]	0		Decimal	SINT	Standard	Module 07: PSS u2 ES 8DO 0.5A
+ PSSu2_Application_Note:I.Data[3]	0		Decimal	SINT	Standard	Module 08: PSS u2 ES 8DO 0.5A
- PSSu2_Application_Note:O	{...}	{...}		AB:ETHER...	Standard	
- PSSu2_Application_Note:O.Data	{...}	{...}	Decimal	SINT[2]	Standard	
- PSSu2_Application_Note:O.Data[0]	0		Decimal	SINT	Standard	Module 07: PSS u2 ES 8DO 0.5A
- PSSu2_Application_Note:O.Data[0].0	0		Decimal	BOOL	Standard	o0
- PSSu2_Application_Note:O.Data[0].1	0		Decimal	BOOL	Standard	o1
- PSSu2_Application_Note:O.Data[0].2	0		Decimal	BOOL	Standard	o2
- PSSu2_Application_Note:O.Data[0].3	0		Decimal	BOOL	Standard	o3
- PSSu2_Application_Note:O.Data[0].4	0		Decimal	BOOL	Standard	o4
- PSSu2_Application_Note:O.Data[0].5	0		Decimal	BOOL	Standard	o5
- PSSu2_Application_Note:O.Data[0].6	0		Decimal	BOOL	Standard	o6
- PSSu2_Application_Note:O.Data[0].7	0		Decimal	BOOL	Standard	o7
+ PSSu2_Application_Note:O.Data[1]	0		Decimal	SINT	Standard	Module 08: PSS u2 ES 8DO 0.5A
+ PSSu2_Application_Note:SI	{...}	{...}		AB:ETHER...	Safety	
+ PSSu2_Application_Note:SO	{...}	{...}		AB:ETHER...	Safety	

Figure 29: Studio 5000 – Controller Tags » PSS u2 standard modules

► List of Controller Tags of the PSS u2 failsafe inputs:

Name	Value	Forc	Style	Data Type	Class	Description
[-] PSSu2_Application_Note:SI	{...}	{...}		AB:ETHER...	Safety	
[-] PSSu2_Application_Note:SI.RunMode	0		Decimal	BOOL	Safety	
[-] PSSu2_Application_Note:SI.ConnectionFaulted	0		Decimal	BOOL	Safety	
[-] PSSu2_Application_Note:SI.Data	{...}	{...}	Decimal	SINT[18]	Safety	
[-] PSSu2_Application_Note:SI.Data[0]	0		Decimal	SINT	Safety	Module 00: PSS u2 P0 F/S EIP
[-] PSSu2_Application_Note:SI.Data[0].0	0		Decimal	BOOL	Safety	cis
[-] PSSu2_Application_Note:SI.Data[0].1	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[0].2	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[0].3	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[0].4	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[0].5	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[0].6	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[0].7	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[1]	0		Decimal	SINT	Safety	Module 00: PSS u2 P0 F/S EIP
[-] PSSu2_Application_Note:SI.Data[1].0	0		Decimal	BOOL	Safety	cos
[-] PSSu2_Application_Note:SI.Data[1].1	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[1].2	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[1].3	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[1].4	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[1].5	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[1].6	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[1].7	0		Decimal	BOOL	Safety	reserved
[-] PSSu2_Application_Note:SI.Data[2]	0		Decimal	SINT	Safety	Module 01: PSS u2 EF 8DI
[-] PSSu2_Application_Note:SI.Data[2].0	0		Decimal	BOOL	Safety	i0
[-] PSSu2_Application_Note:SI.Data[2].1	0		Decimal	BOOL	Safety	i1
[-] PSSu2_Application_Note:SI.Data[2].2	0		Decimal	BOOL	Safety	i2
[-] PSSu2_Application_Note:SI.Data[2].3	0		Decimal	BOOL	Safety	i3
[-] PSSu2_Application_Note:SI.Data[2].4	0		Decimal	BOOL	Safety	i4
[-] PSSu2_Application_Note:SI.Data[2].5	0		Decimal	BOOL	Safety	i5
[-] PSSu2_Application_Note:SI.Data[2].6	0		Decimal	BOOL	Safety	i6
[-] PSSu2_Application_Note:SI.Data[2].7	0		Decimal	BOOL	Safety	i7
[+] PSSu2_Application_Note:SI.Data[3]	0		Decimal	SINT	Safety	Module 01: PSS u2 EF 8DI
[+] PSSu2_Application_Note:SI.Data[4]	0		Decimal	SINT	Safety	Module 02: PSS u2 EF 8DI
[+] PSSu2_Application_Note:SI.Data[5]	0		Decimal	SINT	Safety	Module 02: PSS u2 EF 8DI
[+] PSSu2_Application_Note:SI.Data[6]	0		Decimal	SINT	Safety	reserved
[+] PSSu2_Application_Note:SI.Data[7]	0		Decimal	SINT	Safety	reserved
[+] PSSu2_Application_Note:SI.Data[8]	0		Decimal	SINT	Safety	reserved
[+] PSSu2_Application_Note:SI.Data[9]	0		Decimal	SINT	Safety	reserved
[+] PSSu2_Application_Note:SI.Data[10]	0		Decimal	SINT	Safety	Module 03: PSS u2 EF 8DO 0.5A
[+] PSSu2_Application_Note:SI.Data[11]	0		Decimal	SINT	Safety	Module 04: PSS u2 EF 8DO 0.5A
[+] PSSu2_Application_Note:SI.Data[12]	0		Decimal	SINT	Safety	reserved
[+] PSSu2_Application_Note:SI.Data[13]	0		Decimal	SINT	Safety	reserved

Figure 30: Studio 5000 – Controller Tags » PSS u2 failsafe inputs

► List of Controller Tags of the PSS u2 failsafe outputs:

Name	Value	Forc	Style	Data Type	Class	Description
+ PSSu2_Application_Note:C	{...}	{...}		AB:ETHER...	Standard	
+ PSSu2_Application_Note:I	{...}	{...}		AB:ETHER...	Standard	
+ PSSu2_Application_Note:O	{...}	{...}		AB:ETHER...	Standard	
+ PSSu2_Application_Note:SI	{...}	{...}		AB:ETHER...	Safety	
- PSSu2_Application_Note:SO	{...}	{...}		AB:ETHER...	Safety	
- PSSu2_Application_Note:SO.Data	{...}	{...}	Decimal	SINT[8]	Safety	
- PSSu2_Application_Note:SO.Data[0]	0		Decimal	SINT	Safety	Module 03: PSS u2 EF 8DO 0.5A
- PSSu2_Application_Note:SO.Data[0].0	0		Decimal	BOOL	Safety	o0
- PSSu2_Application_Note:SO.Data[0].1	0		Decimal	BOOL	Safety	o1
- PSSu2_Application_Note:SO.Data[0].2	0		Decimal	BOOL	Safety	o2
- PSSu2_Application_Note:SO.Data[0].3	0		Decimal	BOOL	Safety	o3
- PSSu2_Application_Note:SO.Data[0].4	0		Decimal	BOOL	Safety	o4
- PSSu2_Application_Note:SO.Data[0].5	0		Decimal	BOOL	Safety	o5
- PSSu2_Application_Note:SO.Data[0].6	0		Decimal	BOOL	Safety	o6
- PSSu2_Application_Note:SO.Data[0].7	0		Decimal	BOOL	Safety	o7
- PSSu2_Application_Note:SO.Data[1]	0		Decimal	SINT	Safety	Module 04: PSS u2 EF 8DO 0.5A
- PSSu2_Application_Note:SO.Data[1].0	0		Decimal	BOOL	Safety	o0
- PSSu2_Application_Note:SO.Data[1].1	0		Decimal	BOOL	Safety	o1
- PSSu2_Application_Note:SO.Data[1].2	0		Decimal	BOOL	Safety	o2
- PSSu2_Application_Note:SO.Data[1].3	0		Decimal	BOOL	Safety	o3
- PSSu2_Application_Note:SO.Data[1].4	0		Decimal	BOOL	Safety	o4
- PSSu2_Application_Note:SO.Data[1].5	0		Decimal	BOOL	Safety	o5
- PSSu2_Application_Note:SO.Data[1].6	0		Decimal	BOOL	Safety	o6
- PSSu2_Application_Note:SO.Data[1].7	0		Decimal	BOOL	Safety	o7
+ PSSu2_Application_Note:SO.Data[2]	0		Decimal	SINT	Safety	reserved
+ PSSu2_Application_Note:SO.Data[3]	0		Decimal	SINT	Safety	reserved
+ PSSu2_Application_Note:SO.Data[4]	0		Decimal	SINT	Safety	reserved
+ PSSu2_Application_Note:SO.Data[5]	0		Decimal	SINT	Safety	reserved
+ PSSu2_Application_Note:SO.Data[6]	0		Decimal	SINT	Safety	reserved
+ PSSu2_Application_Note:SO.Data[7]	0		Decimal	SINT	Safety	reserved

Figure 31: Studio 5000 – Controller Tags » PSS u2 failsafe outputs

7.6. Generation of Safety Network Number (SNN)

The Safety Network Number is defined in the originator (e.g. ControlLogix Controller) for each target. It must be unique within a safety network and consists of six octets in hexadecimal format:

- The SNN can be generated in software Studio 5000.
There is a copy button to copy it to the clipboard.
- In tool PASconfig you can paste it with shortcut "CTRL+V".

- Note: After inserting the SNN in tool PASconfig a (new) download of the configuration data to the PSS u2 system is necessary!

7.6.1. Studio 5000 – Generate SNN

- First open the general properties of Ethernet-Safety-Standard-Module (Figure 26, [page 22](#)) and
 ► click on the button in the SNN field:

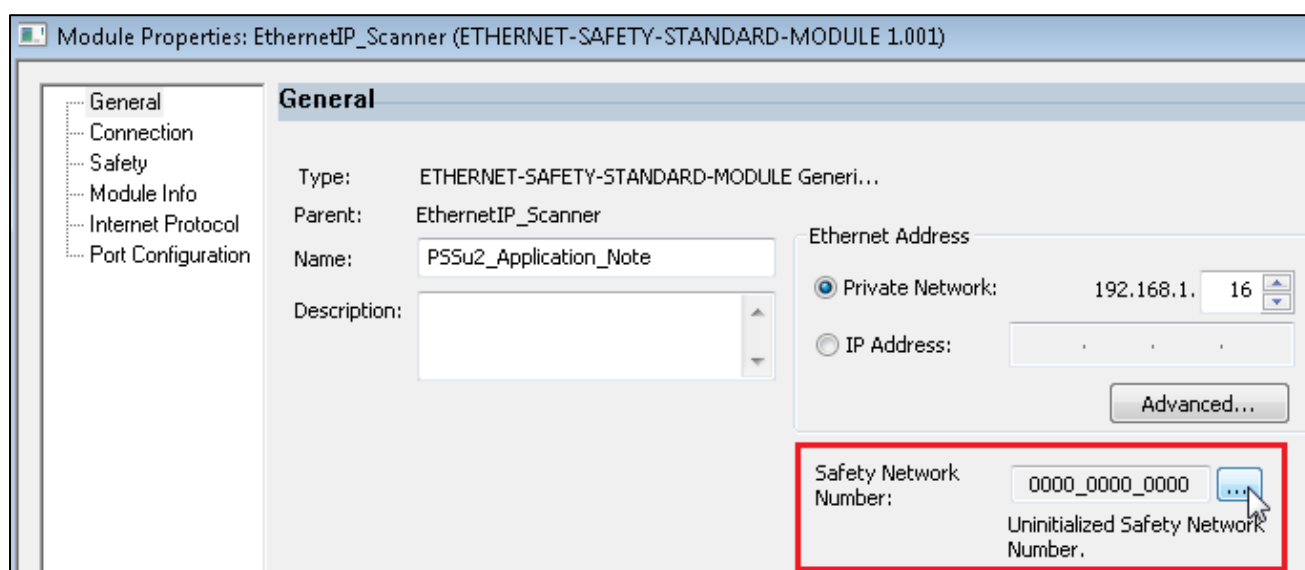


Figure 32: Studio 5000 – Generate SNN » Initialized process (Part 1)

- In the now-opening subwindow select format with radio-button for "Time-based" [1],
 ► then press button "Generate" [2] and
 ► for copy of octets "4188_01DC_CFD4" press button "Copy" [3]:

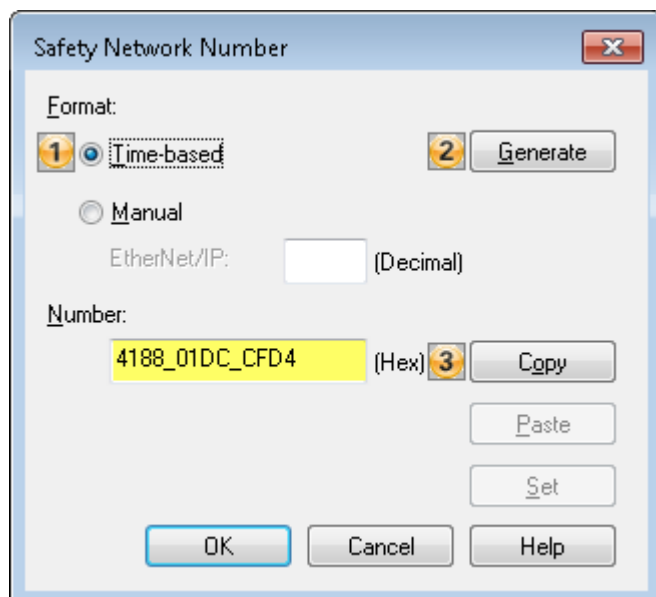


Figure 33: Studio 5000 – Generate SNN » Generation and copy (Part 2)

7.6.2. PASconfig – Import SNN

- ▶ Switch to tool PASconfig and
- ▶ start function “Set Target Unique Identifier (TUNID)” in menu “PSS u2 system”:

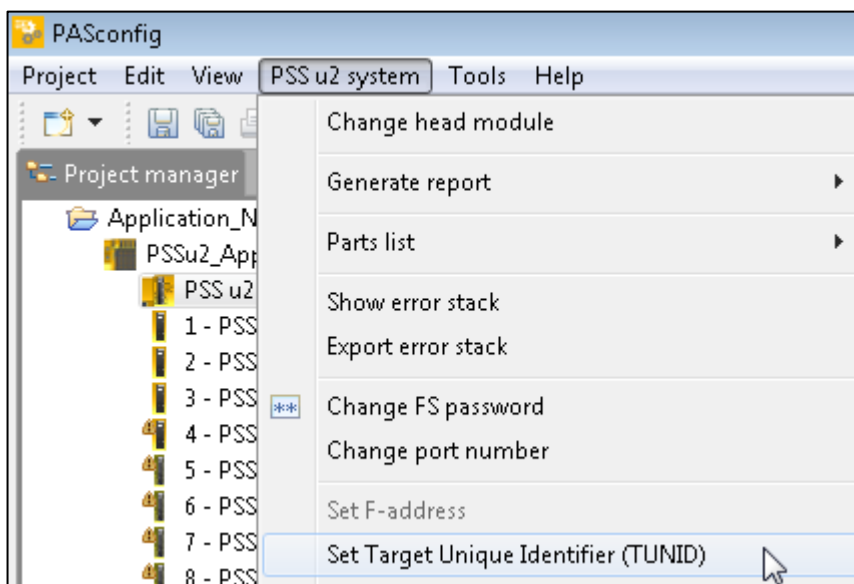


Figure 34: PASconfig – Set SNN » Start function “Set TUNID” (Part 1)

- ▶ Paste the previously copied Safety Network Number (Figure 36, [page 28](#)) in the first text field via shortcut “CTRL+V”:

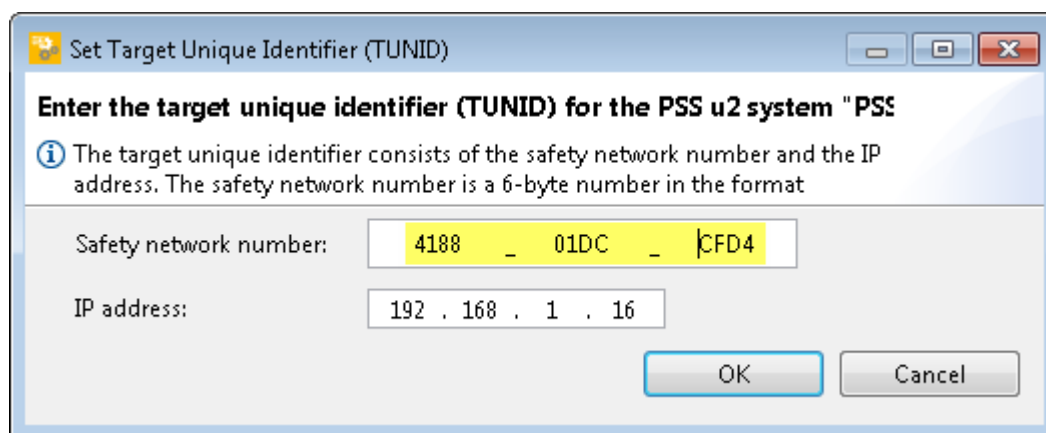


Figure 35: PASconfig – Set SNN » Paste SNN (Part 2)

- ▶ Activate restart of PSS u2 system:

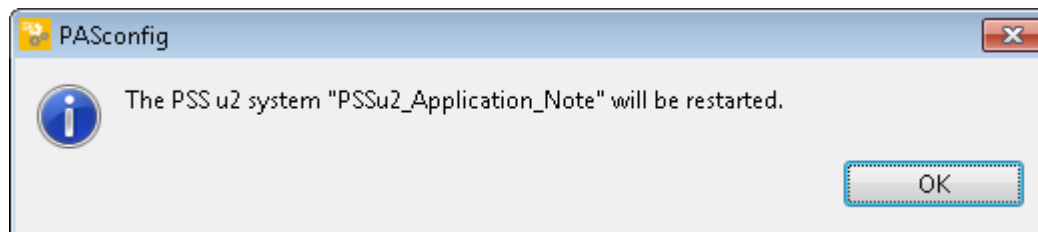


Figure 36: PASconfig – Set SNN » Restart PSS u2 system (Part 3)

7.7. Configuration Signature

- ▶ In system properties, you can:
 - read information for each configured system and
 - copy the Configuration Signature, also referred the Safety Configuration Identifier (SCID) to the clipboard.
- ▶ Start the procedure with function “Properties (of PSS u2 system)” in menu “PSS u2 system”:

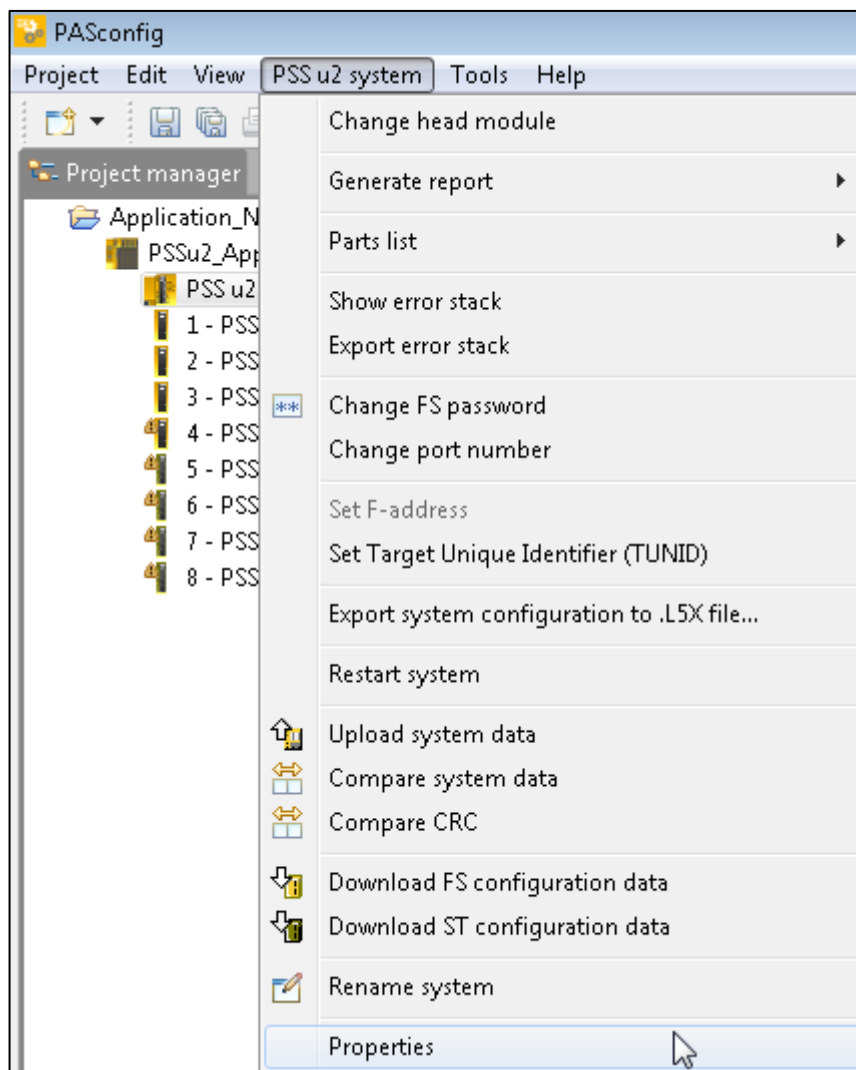


Figure 37: PASconfig – Configuration Signature » Show PSS u2 system properties (Part 1)

- ▶ You can read in the following information (Figure 38):
 - FS/ST check sum of configured system with associated Length of FS/ST configuration in bytes
 - » Values of current *Configured System* in tool PASconfig
 - Only “FS check sum” of last loaded system configuration with associated “Date” and “Time”
 - » Values of *Last download* of configuration, that was last loaded into PSS u2 head module
- ▶ Copy Configuration Signature (Figure 39):
 - The Configuration Signature consists of the “FS check sum” plus the “Date” and “Time”, including the value for “milliseconds”, at which the configuration was downloaded into the system.
 - The Configuration Signature ensures that the originator (e.g. ControlLogix Controller) and target are working with a valid (appropriate) configuration.
 - If the Configuration Signature is not used, the user has to assure that safety is still guaranteed.

Note:

- ▶ A download to the PSS u2 system is required on the first time to readout the Configuration Signature, see Chapter 7.8 PASconfig – Download configuration to PSS u2 system, pages 31ff

- Note the values or copy them via the button using the clipboard to a text editor:

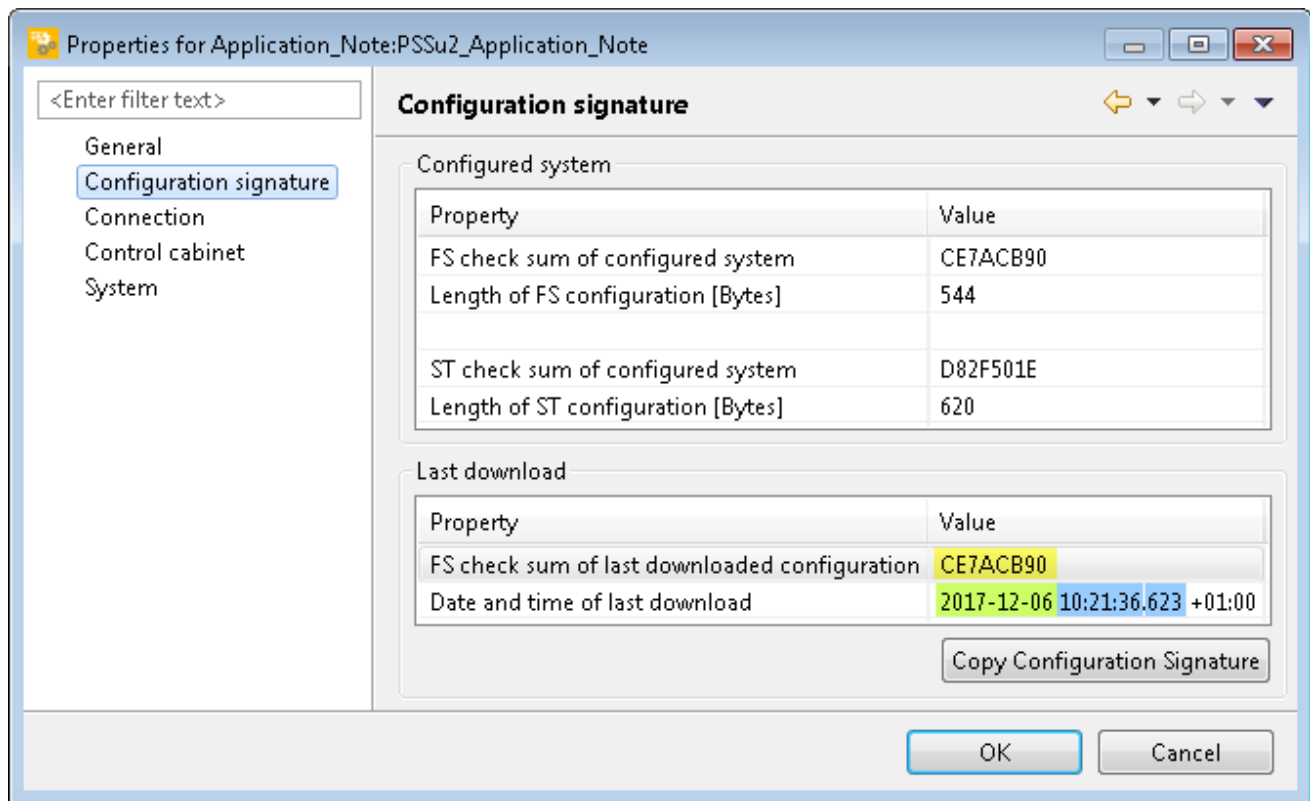


Figure 38: PASconfig – Configuration Signature (Part 2)

- Insert the values into the four fields for “ID”, “Date”, “Time” and “ms”:

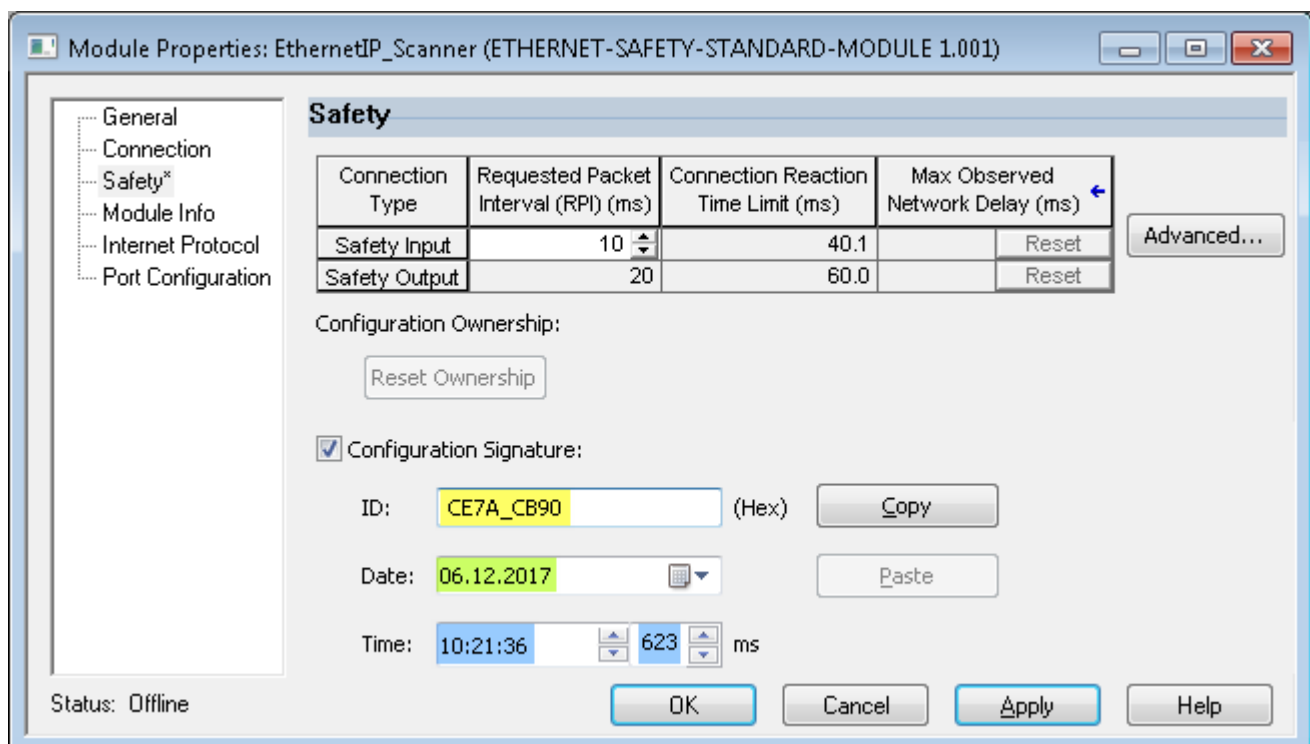


Figure 39: Studio 5000 – Configuration Signature (Part 3)

7.8. PASconfig – Download configuration to PSS u2 system

- ▶ The configuration you just created must be saved:

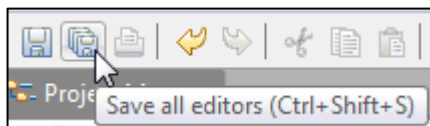


Figure 40: PASconfig – Save configuration » Save all editors

- ▶ Note: A password is required to transfer the FS configuration.
 - The default password is "pssu".
 - It can be changed via the menu item "PSS u2 System" » "Change FS password ...".
- ▶ Start download with function "Download FS configuration data":

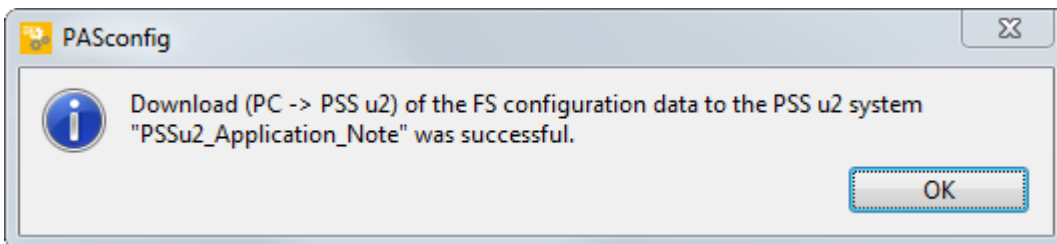
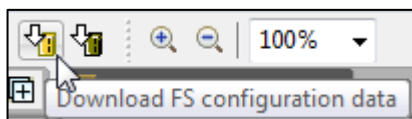


Figure 41: PASconfig – Download configuration » Download FS configuration data

If PSS u2 standard modules are used, the ST configuration must also be downloaded.

- ▶ In this case, the following dialog box should be confirmed with "Yes".

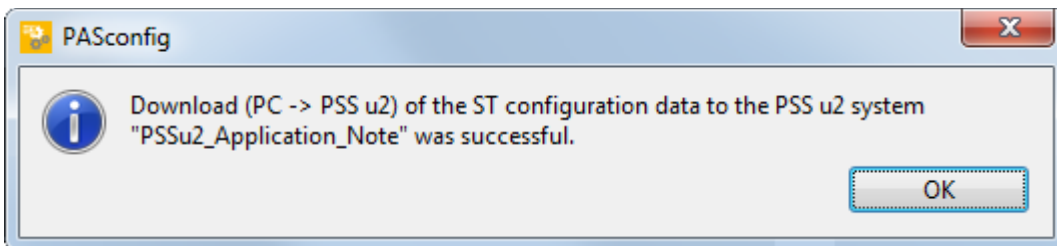
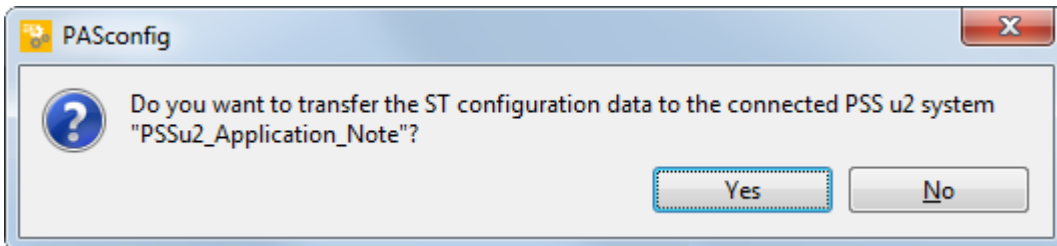


Figure 42: PASconfig – Download configuration » Download ST configuration data

- ▶ The PSS u2 system must now be restarted:

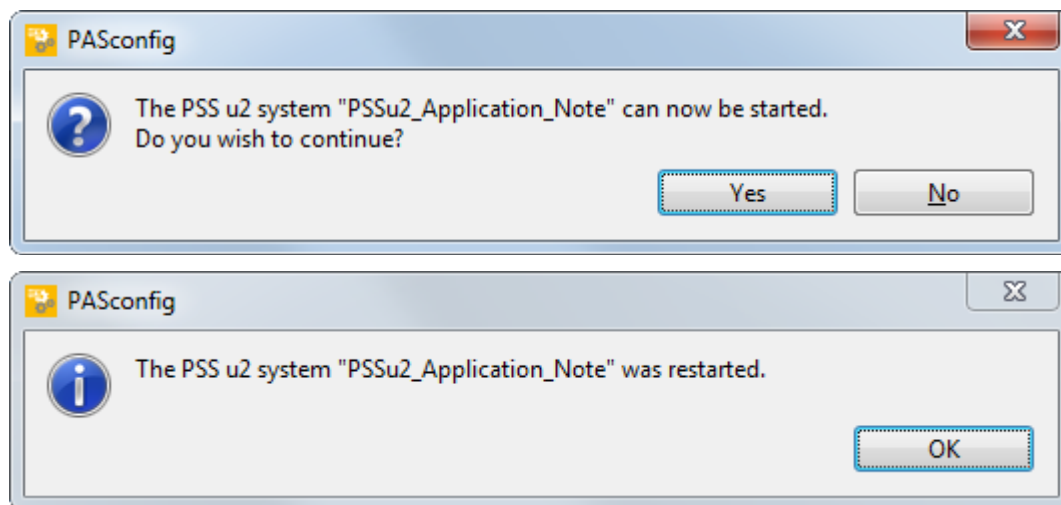


Figure 43: PASconfig – Download configuration » Restart PSS u2 system

7.9. Studio 5000 – Download project to ControlLogix Controller

- ▶ First save the project [1].
- ▶ Check before downloading, that correct communication path to ControlLogix Controller is set [2].
- ▶ Go online [3] and start downloading the project to the Controller [4].

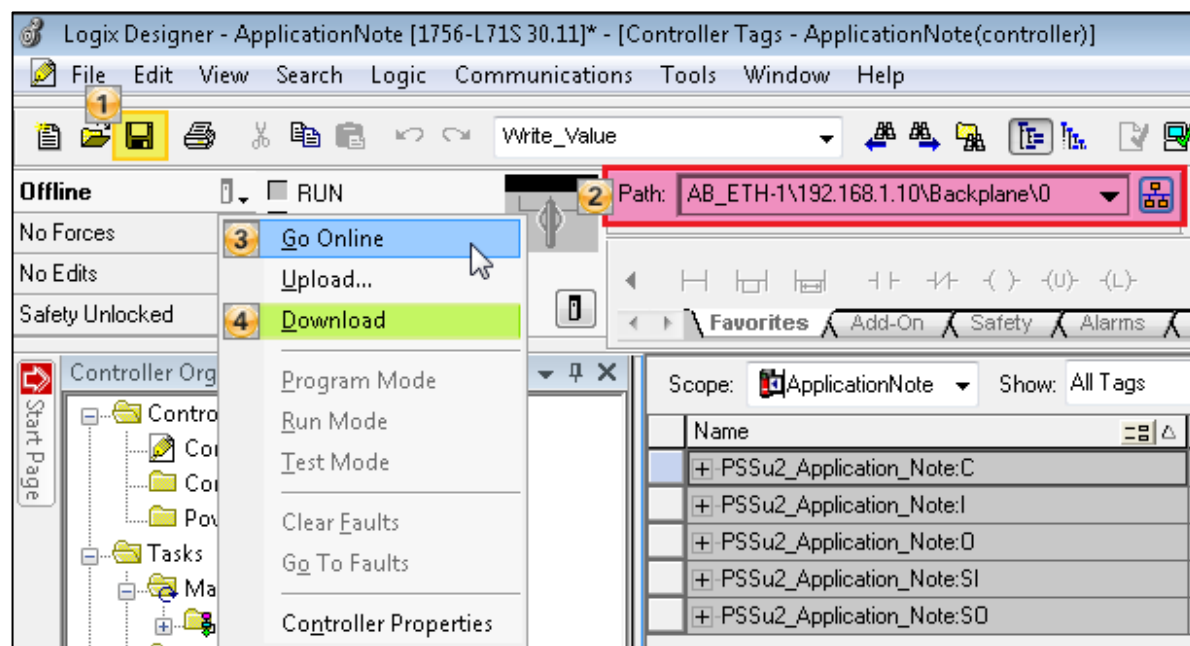


Figure 44: Studio 5000 – Download project to Controller (Part 1)

- ▶ Before starting the download, check the following condition:

!

NOTICE

▶ If the Key-Switch on ControlLogix Controller is in RUN position, move it before you continue with download to REM or PROG position!

⚠ The keyswitch is in the RUN position. Move it to REM or PROG in order to download.

- ▶ Activate “Enable Time Synchronization” and download the configuration to the Controller:

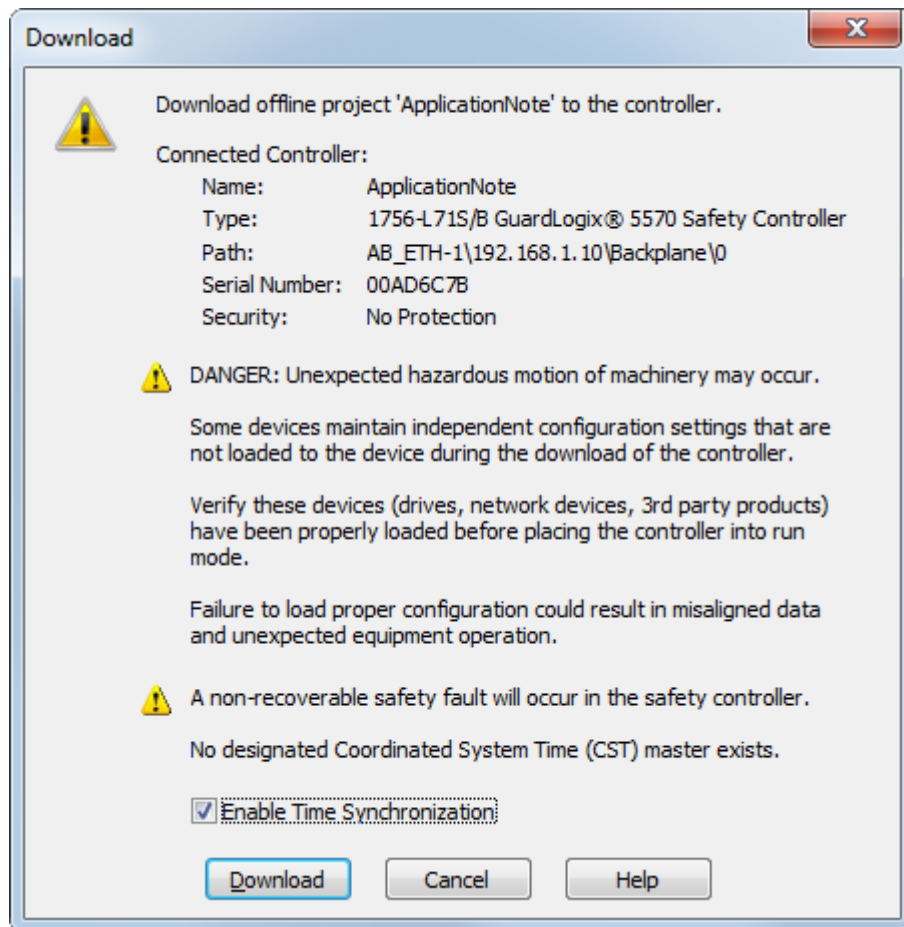


Figure 45: Studio 5000 – Download project to Controller (Part 2)

- ▶ After download: Move Key-Switch on Controller back to RUN position!

8. PSS u2 – diagnostic information

8.1. Diagnostic information via status LEDs

The status of the I/O modules is:

- displayed via the "Module status display" and "Terminal status display";
- this is signalled to the head module and
- any error is entered in the head module's diagnostic log.

The head module contains a number of status LEDs, which provide information on the status of various system sections.

► The relevant important documents are named and linked here:

- Chapter 1.1 Documentation from Pilz GmbH & Co. KG, [page 5](#)

8.2. Diagnostic information via PASconfig error stack

In PASconfig you can read out the Errorstack of the connected PSS u2 system. The error stack contains important information for diagnostics and troubleshooting. The entry at the bottom is the most recent entry.

- Start function: menu “PSS u2 system” » “Show error stack”:

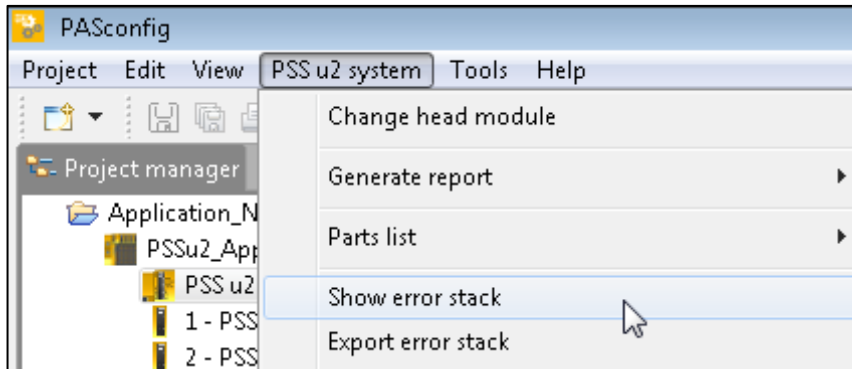


Figure 46: PASconfig – Error stack » Start function “Show error stack” (Part 1)

- Expand the entry to see more details and remedy:

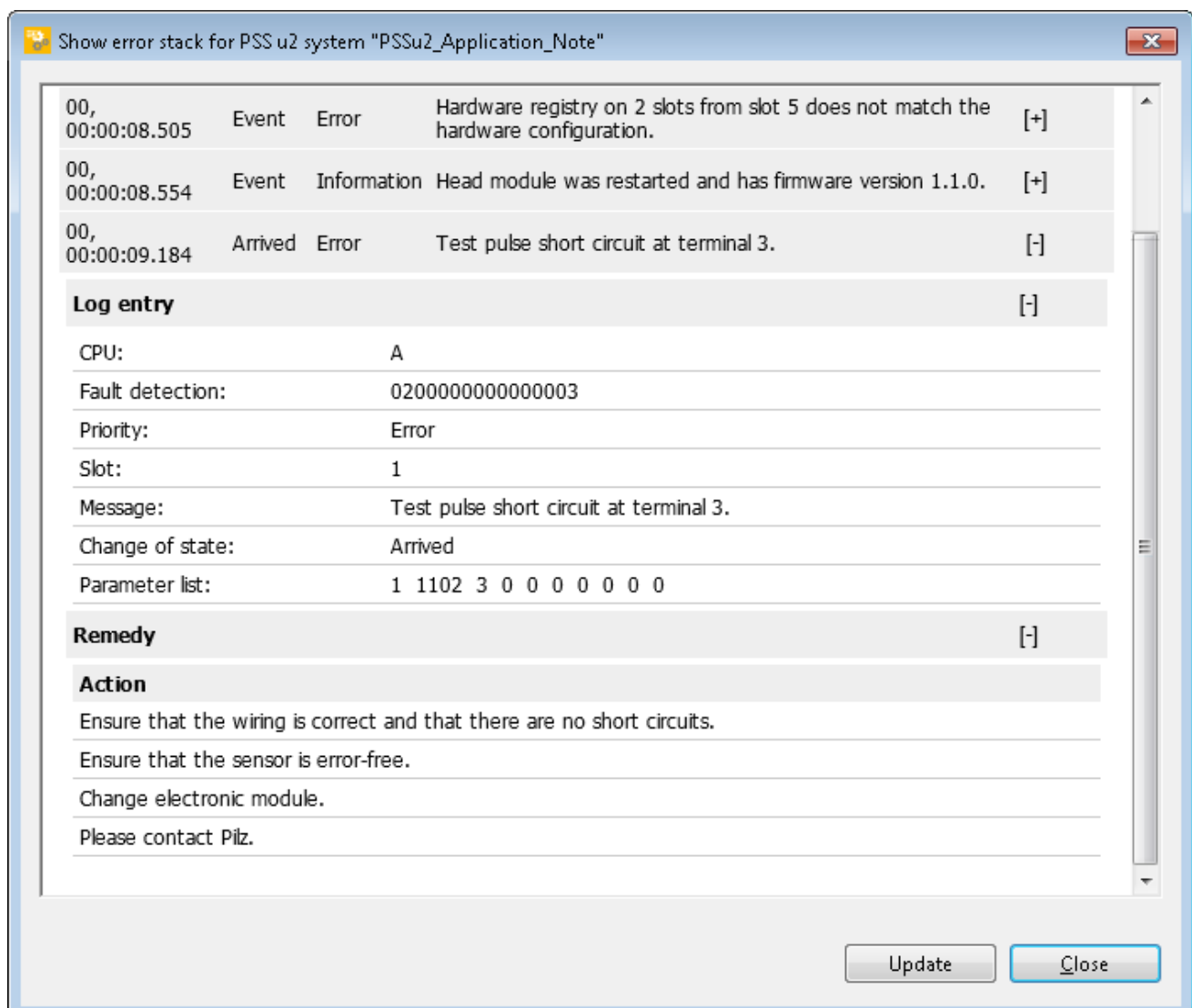


Figure 47: PASconfig – Error stack » Display error stack (Part 2)

9. Appendix – Basics of the PSS u2 system

9.1. Terminal assignment of the used PSS u2 electronic modules

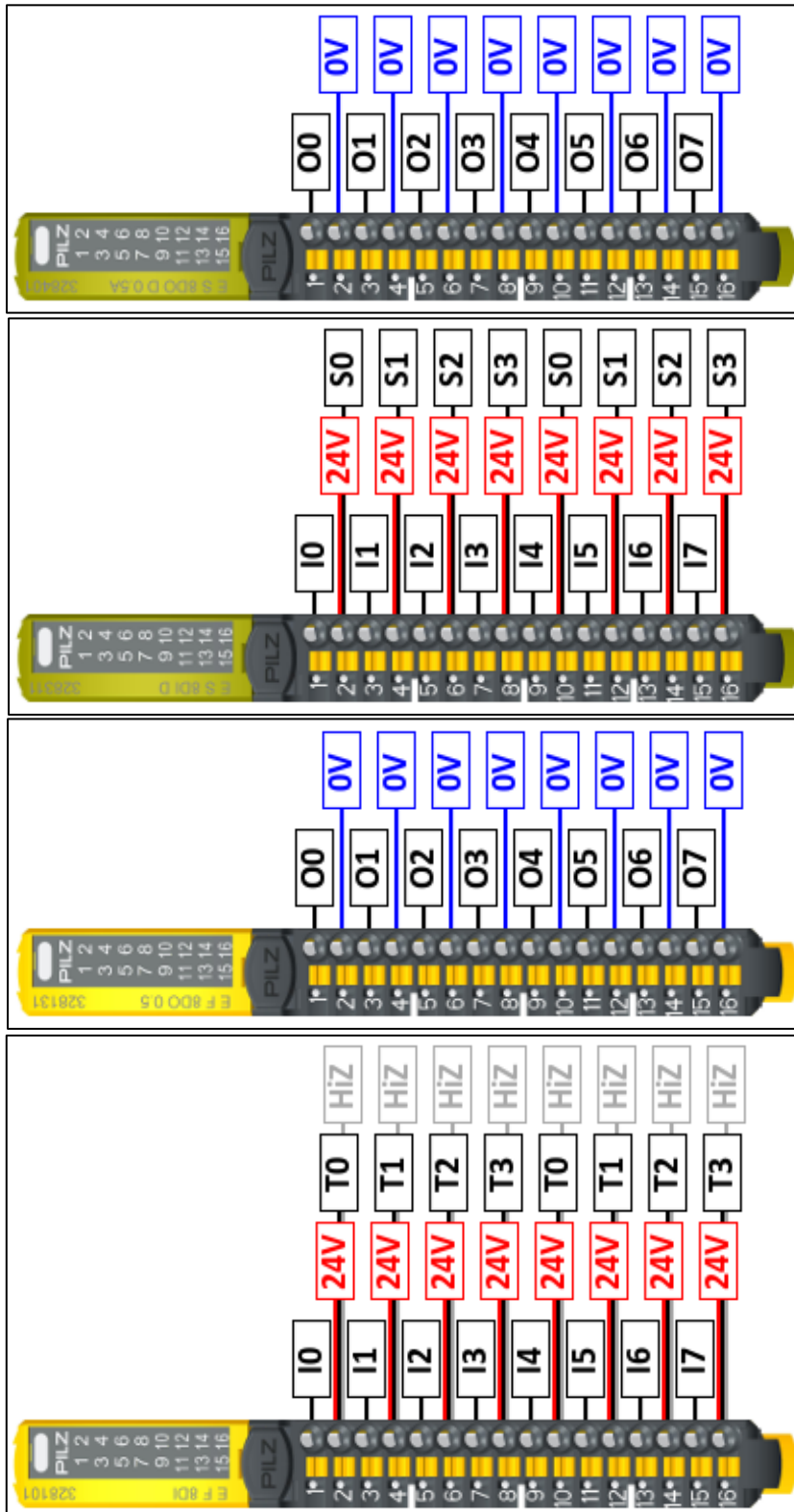


Figure 48: PSS u2 – Wiring » Terminal assignment of PSS u2-modules (schematic)

9.2. Wiring of input/output modules

The wiring is **aligned horizontally** on the PSS u2-System; this applies in particular for function expansions. The system can be optimally configured for different requirements from the maximum packing density up to the maximum functional scope.

For reserve or subsequent function expansions (any) slots on the backplane can be left free. Therefor is no need for a "placeholder module" for PSSuniversal 2.

The following three examples show digital input/output modules for standard applications.

► 1-wire wiring with maximum packing density (Standard, Word alignment):

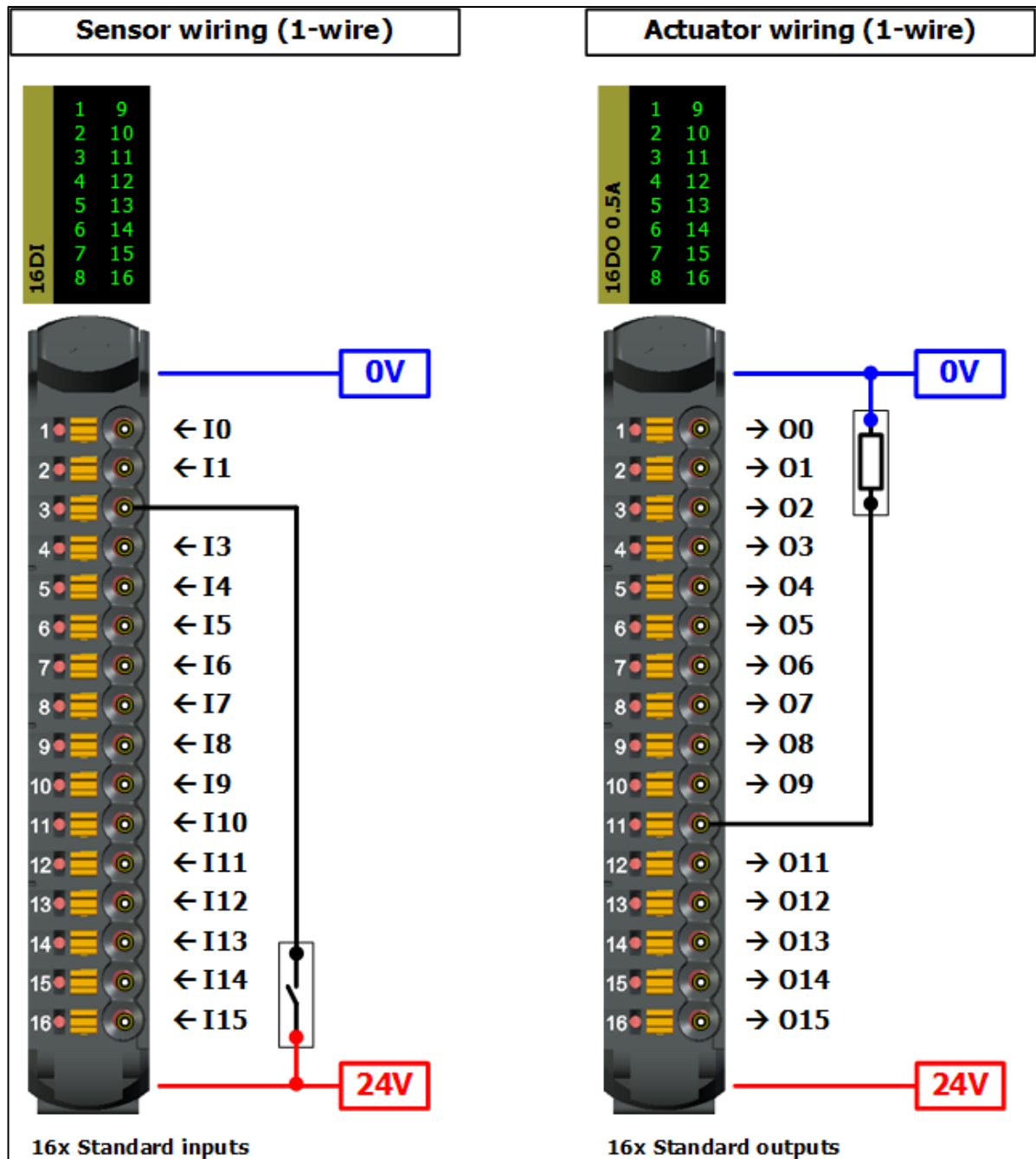


Figure 49: PSS u2 – Wiring » Standard digital (1-wire)

- 2-wire wiring with byte alignment per input/output module (standard):

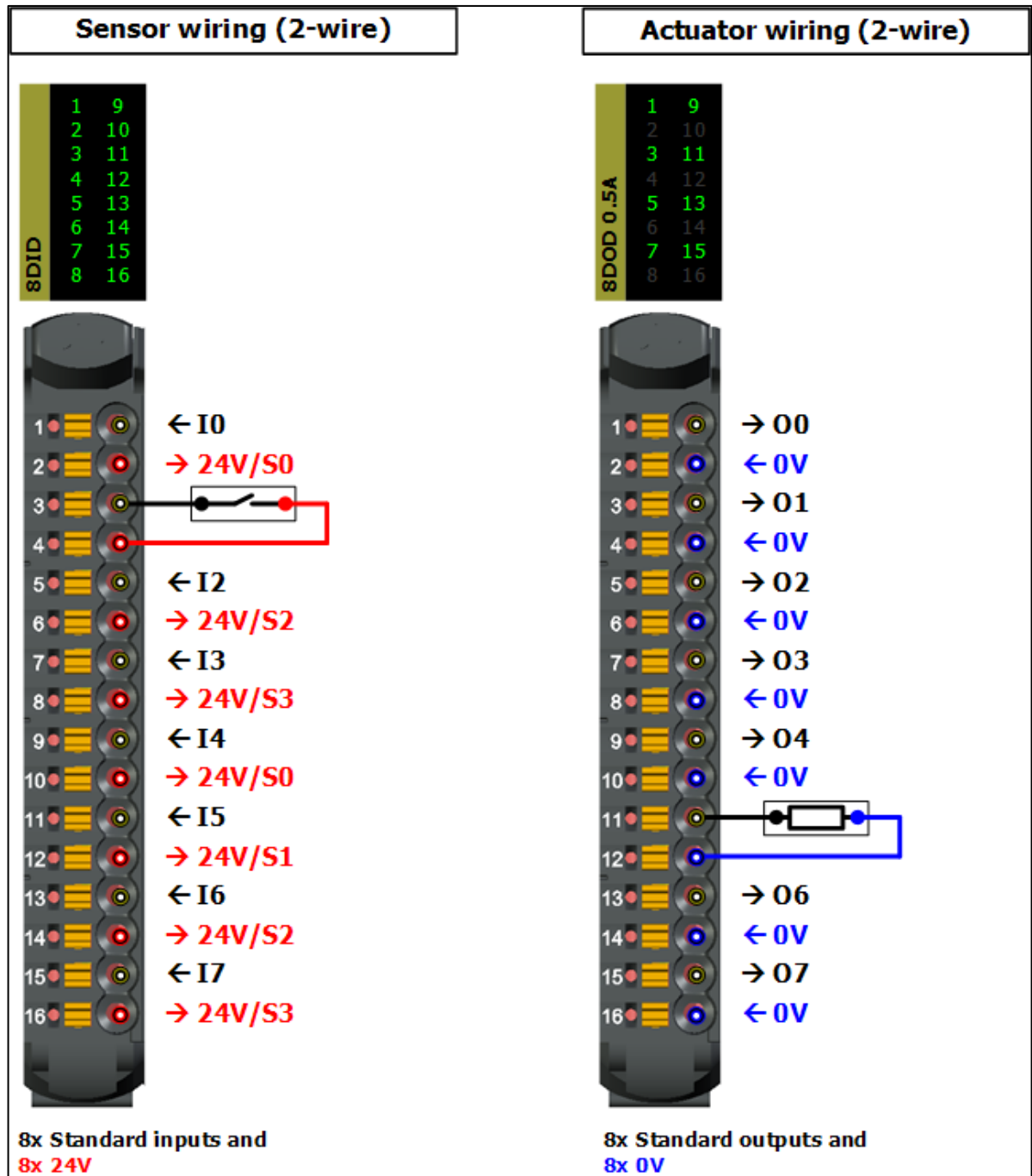


Figure 50: PSS u2 – Wiring » Standard digital (2-wire)

► 3-wire wiring with function expansion (standard):

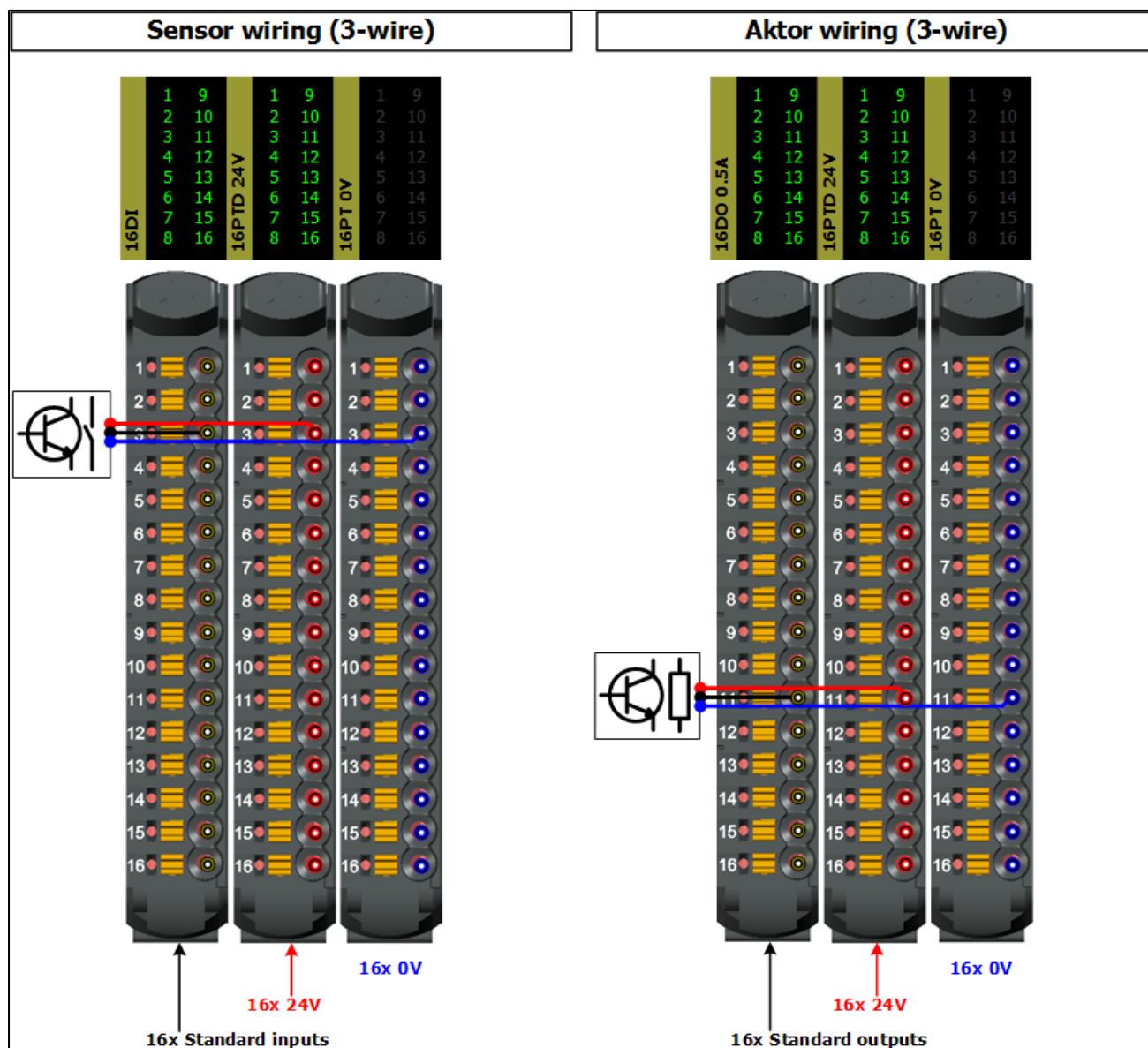


Figure 51: PSS u2 – Wiring » Standard digital (3-wire)

Here is an example with digital input/output modules for failsafe applications.

- 5-wire wiring with function expansion (failsafe):

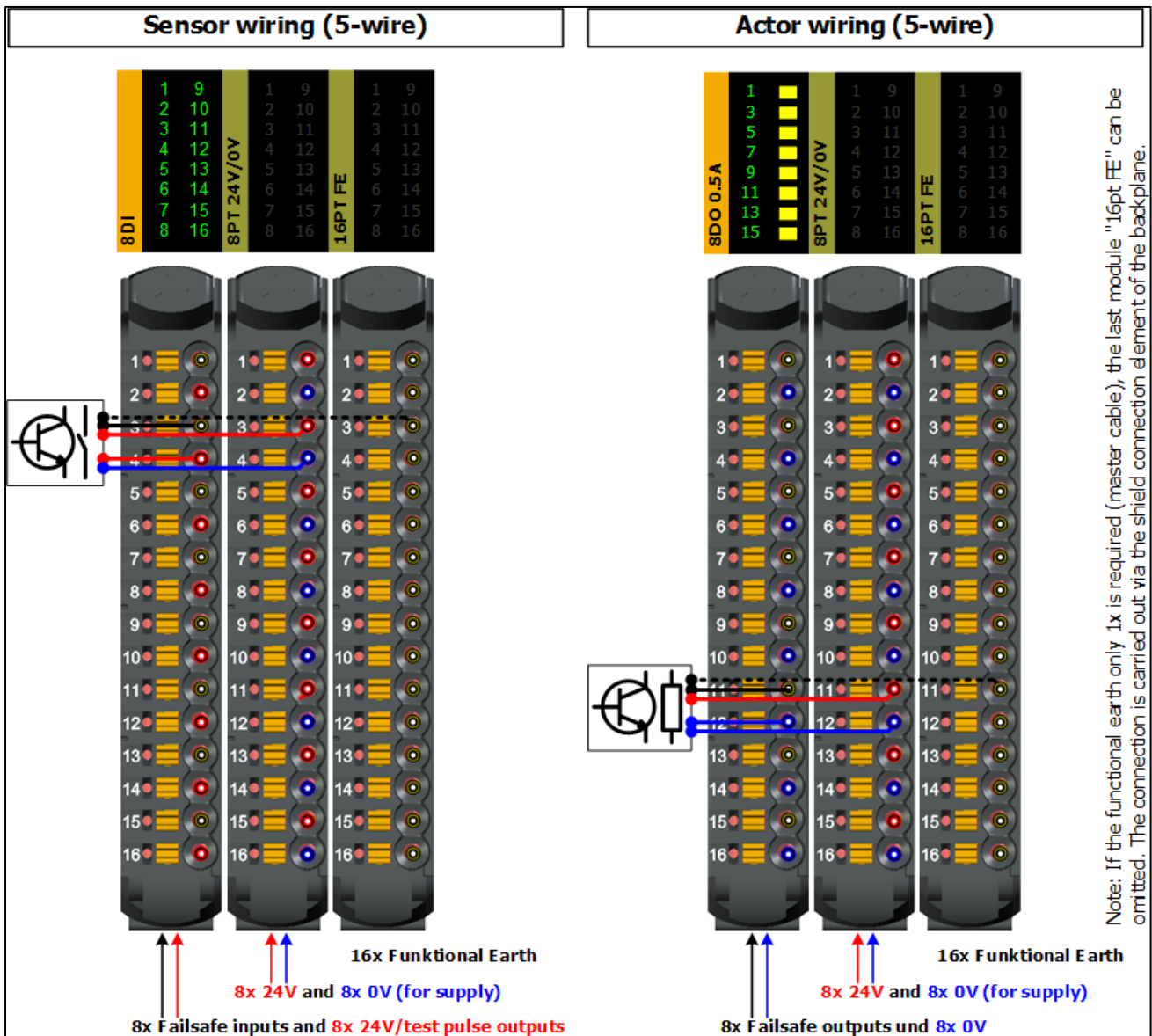


Figure 52: PSS u2 – Wiring » Failsafe digital (5-wire)

- Shield connection element for the backplane and head module:

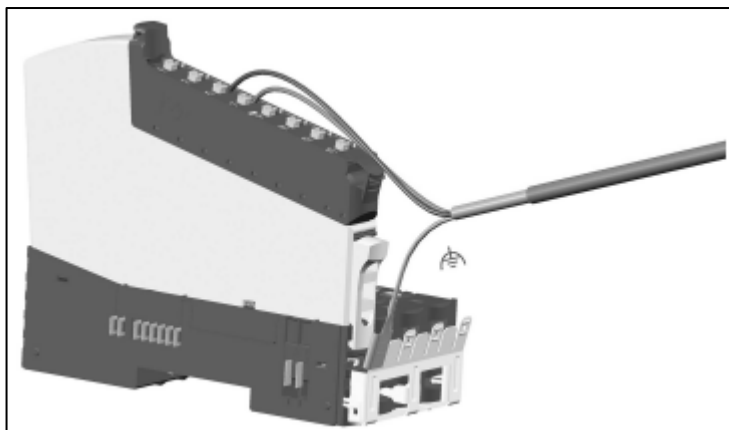


Figure 53: PSS u2 – Wiring » Shield connection element

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