PNOZ m ES Ethernet/IP with Allen Bradley ControlLogix

PILZ
THE SPIRIT OF SAFETY

Product
Type: PNOZ m ES Ethernet/IP
Name: PNOZ multi 2 series
Manufacturer: Pilz GmbH & Co. KG, Safe Automation

Document
Release Number: 01
Release Date: 3 December 2015

Document Revision History

Release	Date	Changes	Chapter
01	2015-12-03	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.

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 knowledge 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.

December 15

Contents

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	PNOZmulti 2 Communication Interfaces	1002971-EN-XX
3	Technical Catalogue PNOZmulti	1001153-EN-XX
4	Operating Manual PNOZ m B0	1002660-EN-XX
5	Operating Manual PNOZ m ES Ethernet/IP	1003387-EN-XX

1.2. Documentation from other sources of information

No.	Description	Item No.
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. Configuration

2.1. Used Hardware

2.1.1. Pilz products

No.	Descriptions	Order number	Version	Number
1	PNOZ m B0	772100	1.2	1
2	PNOZ m ES Ethernet/IP	772137	1.2	1

2.1.2. Rockwell products

No.	Descriptions	Order number	Version	Number
1	CPU ControlLogix 1756-L71S	-	23.12	1
2	Ethernet/IP Scanner 1756-EN2TR	-	10.1	1

2.2. Used IP addresses

2.2.1. Pilz products

No.	Descriptions	IP address
1	PNOZ m ES Ethernet/IP	192.168.1.131

2.2.2. Rockwell products

No.	Descriptions	IP address Version
1	Ethernet/IP Scanner 1756-EN2TR	192.168.1.10

2.3. Hardware configuration

2.3.1. Pilz products

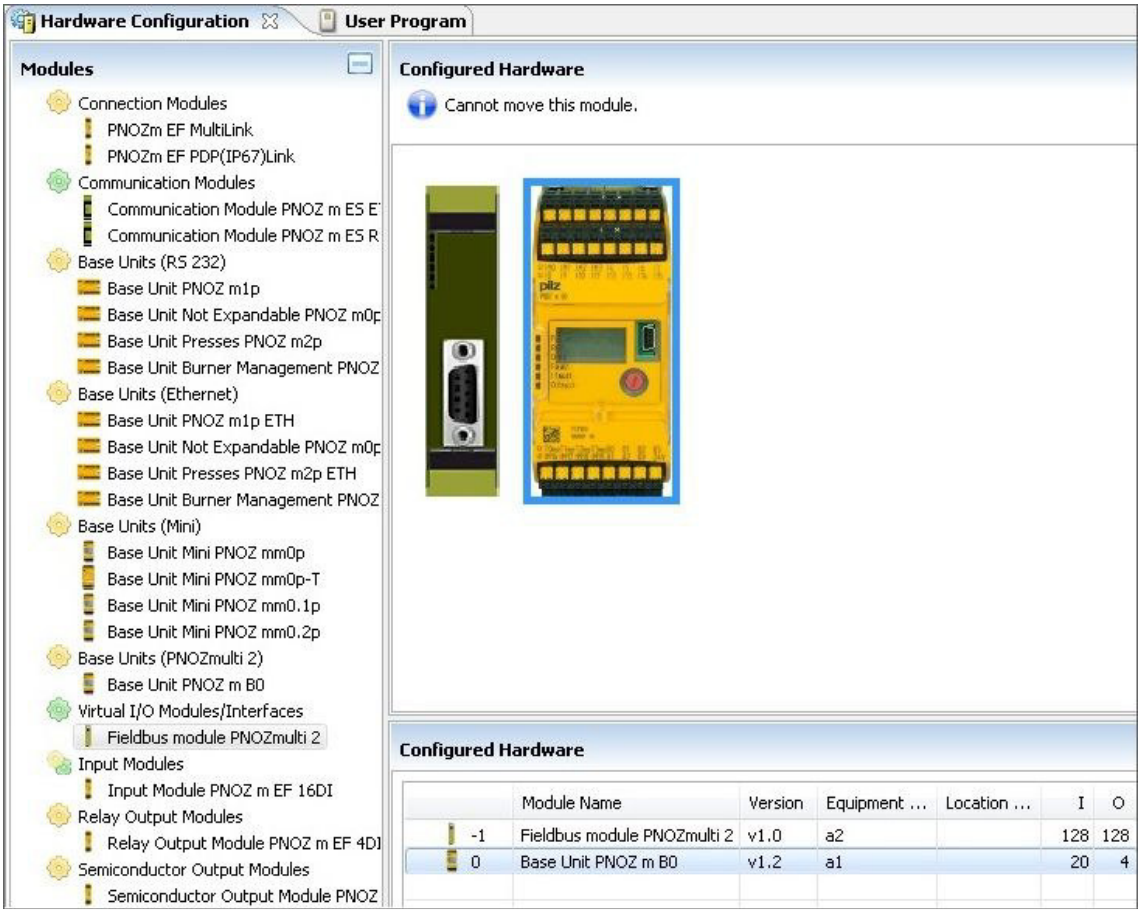


Fig. 1: PNOZ multi Configurator – Hardware Configuration

2.3.2. Rockwell products

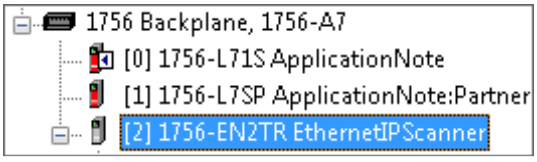


Fig. 2: Studio 5000 – Hardware Configuration Allen-Bradley ControlLogix PLC

2.4. Used Software

2.4.1. Pilz products

No.	Descriptions	Version
1	PNOZmulti Configurator	9.6.0 Build 20
2	PNOZ_m_ES_EtherNetIP.eds	-

2.4.2. Rockwell products

No.	Descriptions	Version
1	Studio 5000	23.00
2	EDS Hardware Installation Tool	-
3	BOOTP-DHCP Server	2.3.2.0

3. Application Task

Create a connection with EtherNet/IP to communicate between PNOZ m ES Ethernet/IP and Allen-Bradley ControlLogix PLC.
The initial ControlLogix Hardware configuration is not implemented in this “Application Note”.
You can get further details if you read the Allen-Bradley ControlLogix manuals, e.g.:

- Allen-Bradley User Manual “EtherNet/IP Network Configuration”
- Allen-Bradley Quick Start “Logix5000 Control Systems: Connect POINT I/O Modules Over an EtherNet/IP”

In this application note is described how to

- Import EDS file
- Setting IP address on PNOZ m ES Ethernet/IP
- Configure the PNOZ m ES Ethernet/IP module in Allen-Bradley ControlLogix PLC
- Configure the PNOZmulti
- Download user program to the PNOZmulti

3.1. Steps before you can start

3.1.1. Set IP address of your PC

- In this example the IP address for the PC is 192.168.1.100

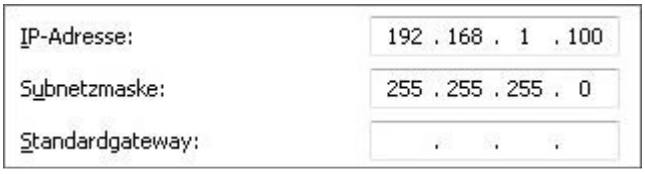


Fig. 3: PC – Set IP address

3.1.2. Import EDS file

- Start „EDS Hardware Installation Tool“

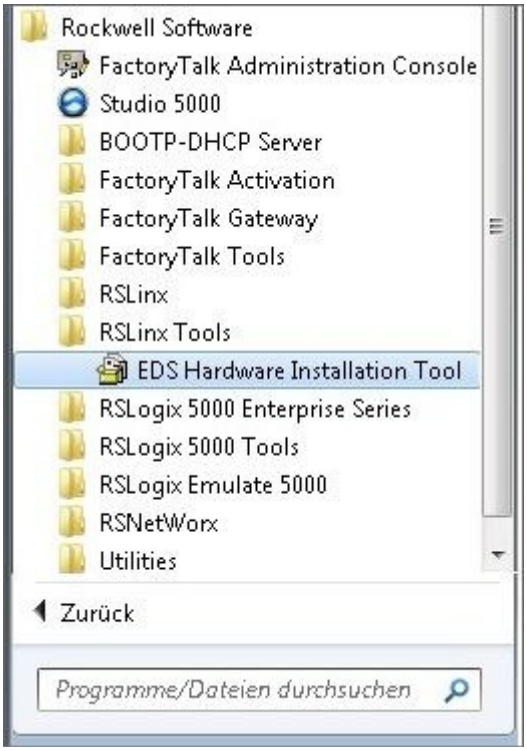


Fig. 4: Start “EDS Hardware Installation Tool”

- Click “Add”

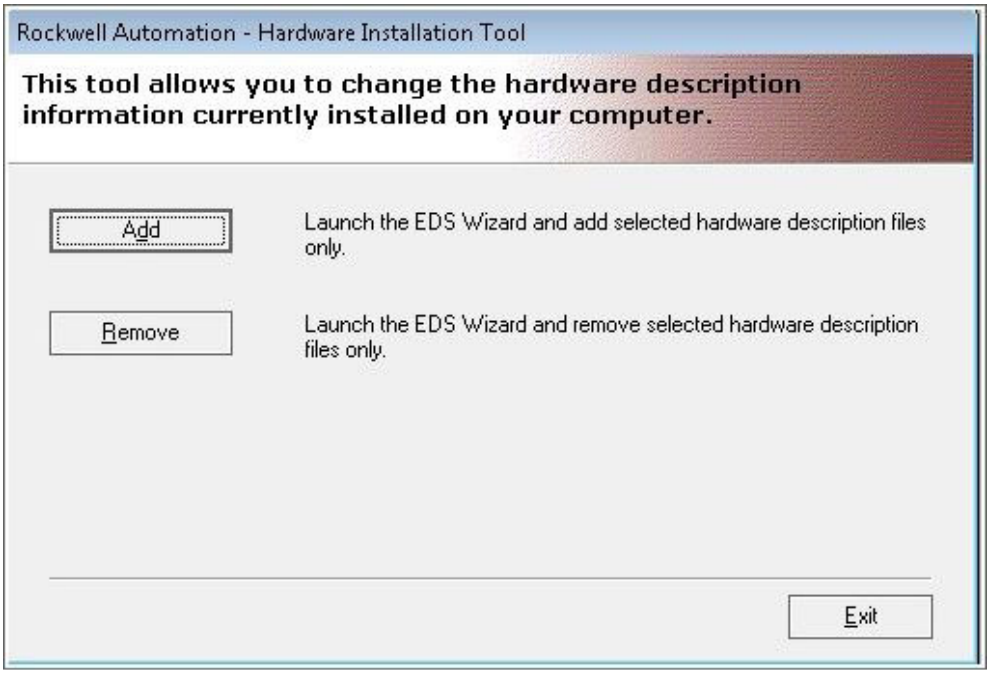


Fig. 5: EDS Hardware Installation Tool

- Select EDS file

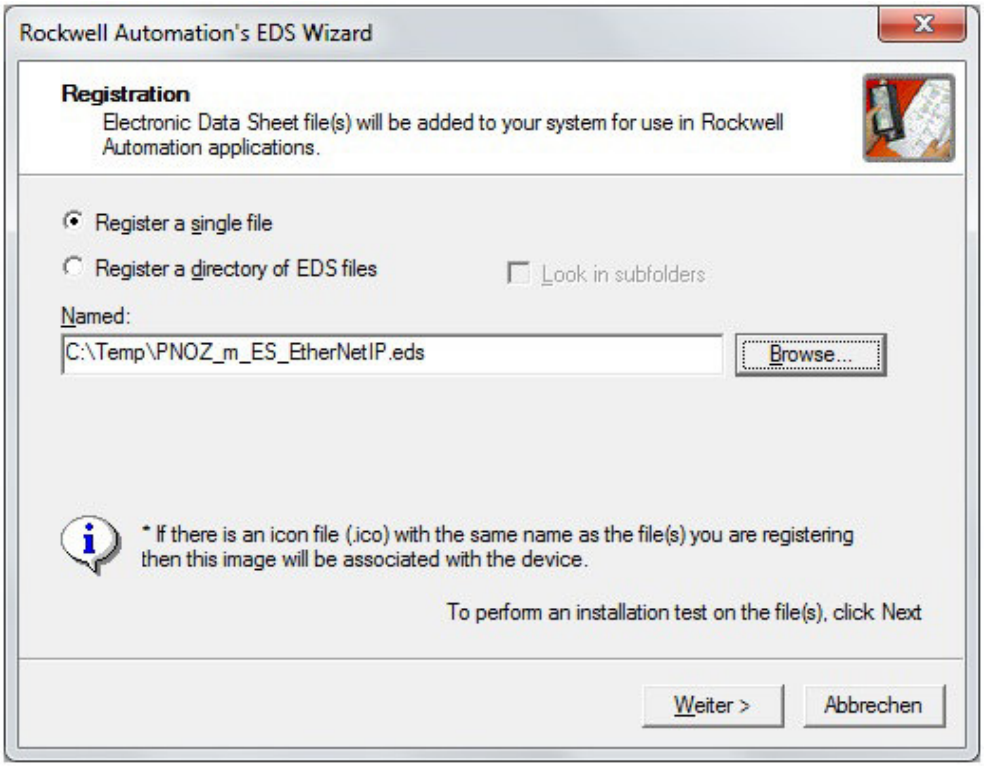


Fig. 6: EDS Hardware Installation Tool – Select the EDS file

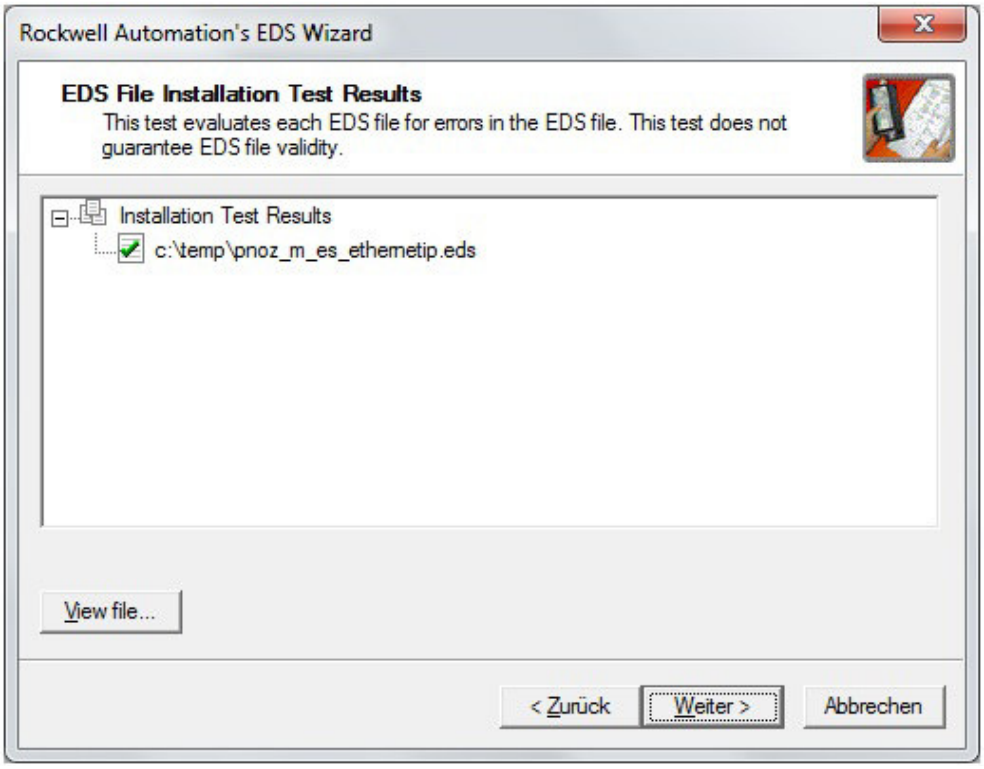


Fig. 7: EDS Hardware Installation Tool – Installing EDS file (1)

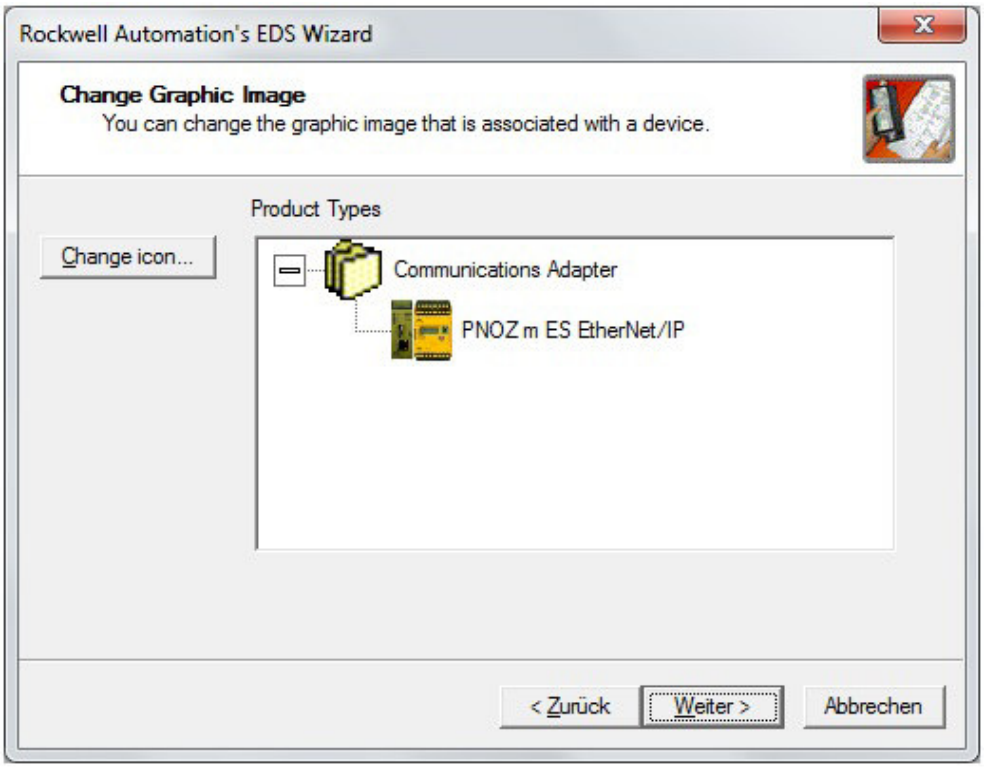


Fig. 8: EDS Hardware Installation Tool – Installing EDS file (2)

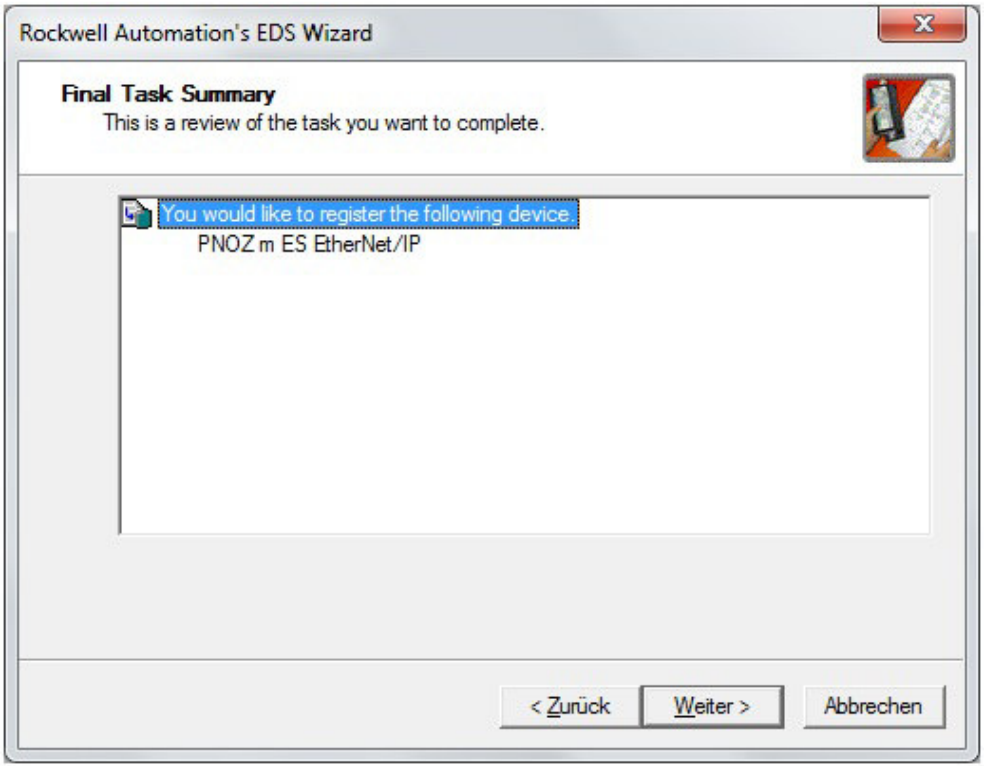


Fig. 9: EDS Hardware Installation Tool – Installing EDS file (3)

3.2. Setting IP address on PNOZ m ES Ethernet/IP

You can set the IP address via

- DHCP
- DIP Switch
- Web-Server

3.2.1.1. Setting the IP address via BOOTP/DHCP Server

- Select the device with the correct MAC Address, Add to Relation List.

Enter the desired IP Address.

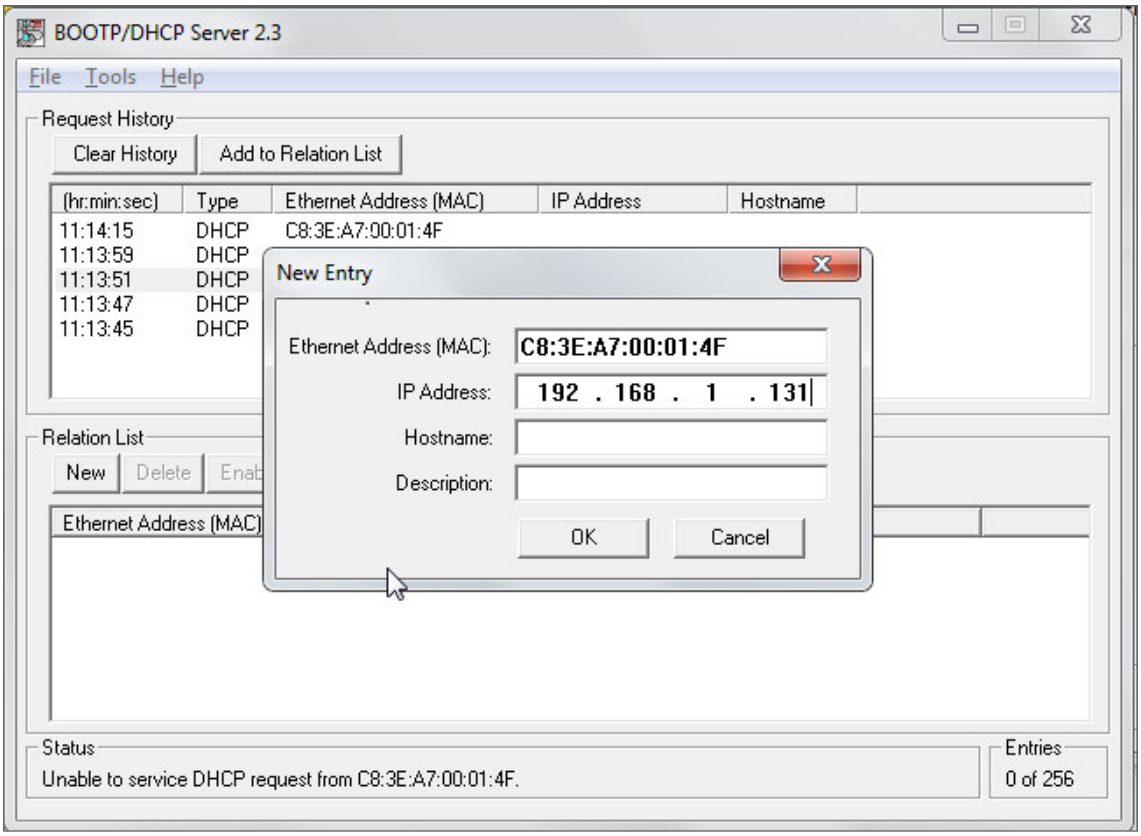


Fig. 10: BOOTP/DHCP Server – Enter the desired IP Address

- IP Address is set to 192.168.1.131

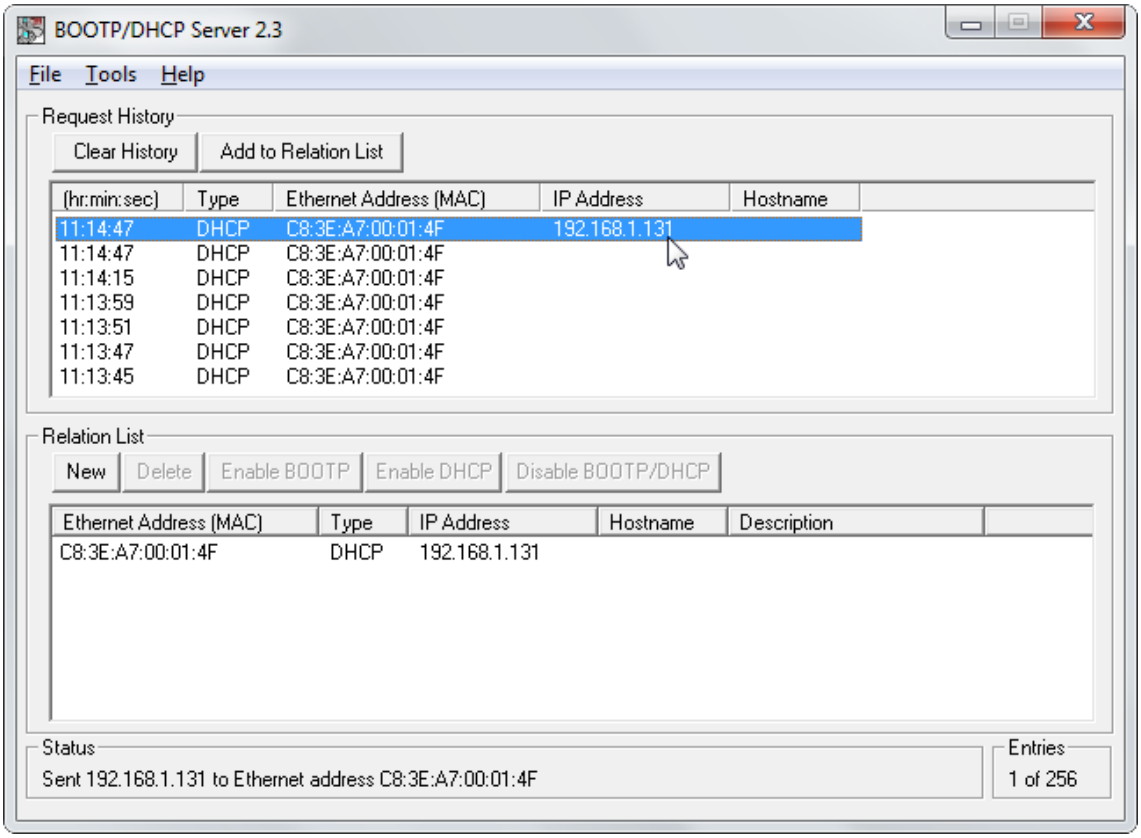


Fig. 11: BOOTP/DHCP Server – IP Address is set to 192.168.1.131

- Disable the BOOTP/DHCP in the Module.

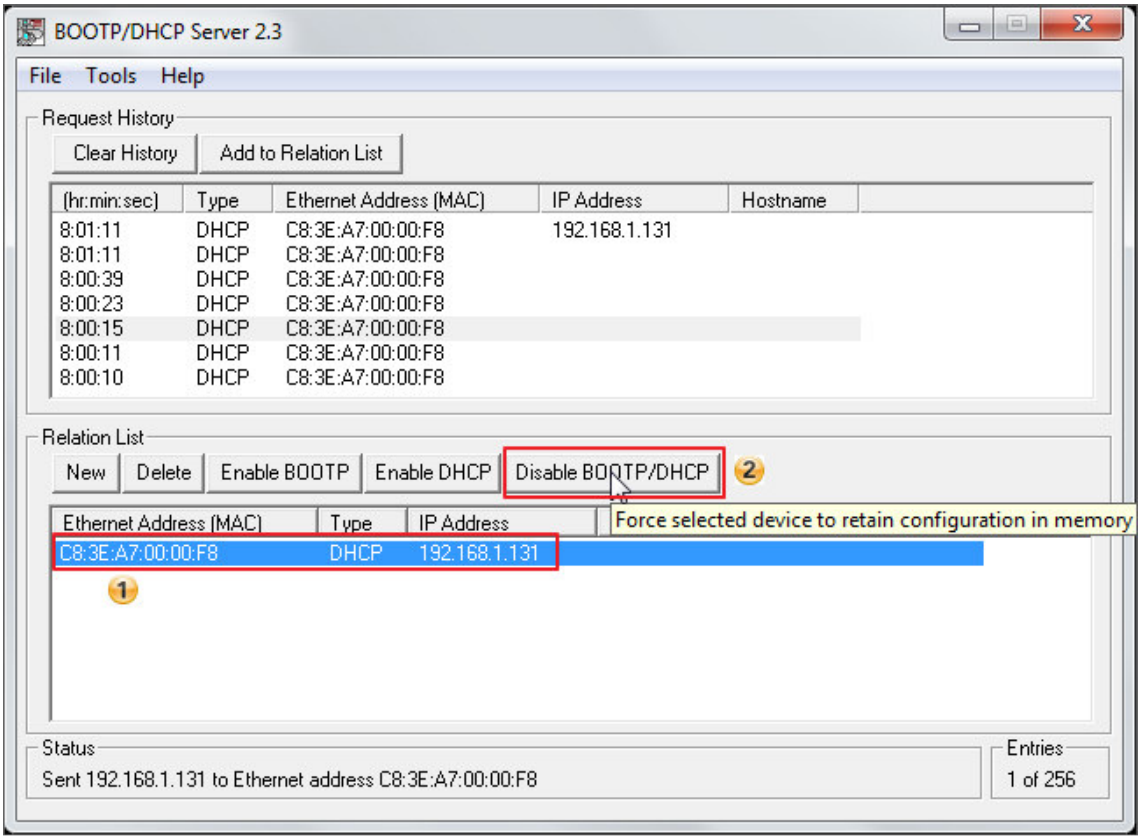


Fig. 12: BOOTP/DHCP Server – Disable BOOTP/DHCP

3.2.1.2. Setting the IP address via DIP Switch

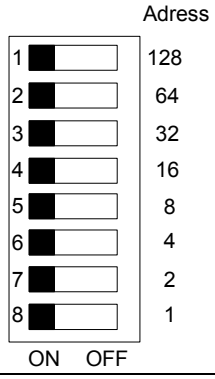
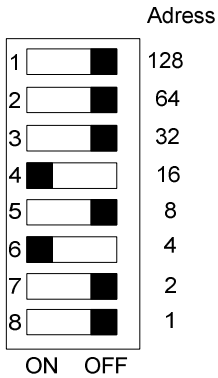
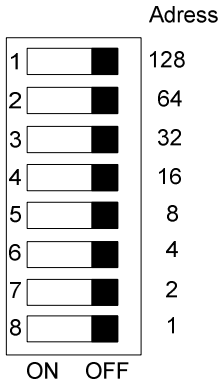
DIP Switch	Description
	DHCP on
	IP address is 192.168.1.20
	Configuration via Web-Server

Fig. 13: Setting IP address via DIP Switch

More information how to set the IP address you can find in the User Manual.

3.2.1.3. Setting the IP address via Web-Server

- Enter the IP Address of the PNOZ m ES Ethernet/IP Module

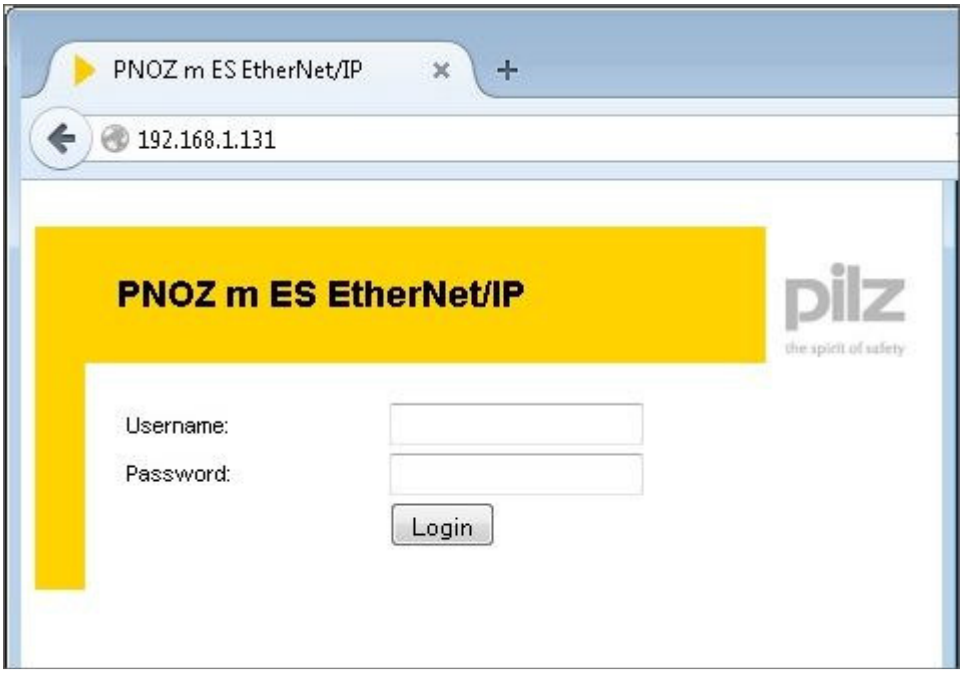


Fig. 14: Web-Server: Login Screen

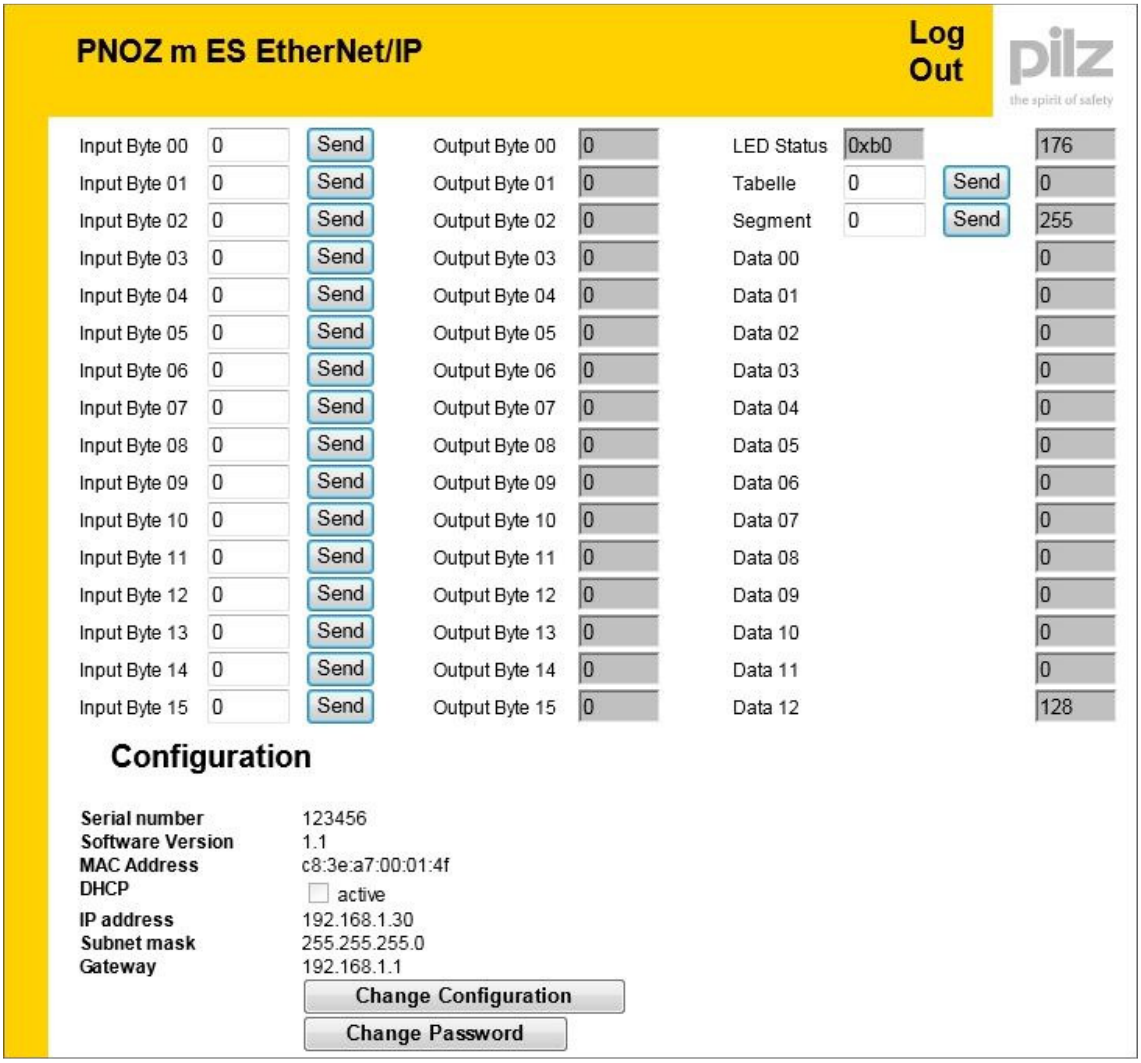


Fig. 15: Web-Server: Overview

- Select “Change Configuration” to setup a new IP Address

- Enter an IP Address and select “Apply”, set all DIP-Switches in the OFF position and restart the device

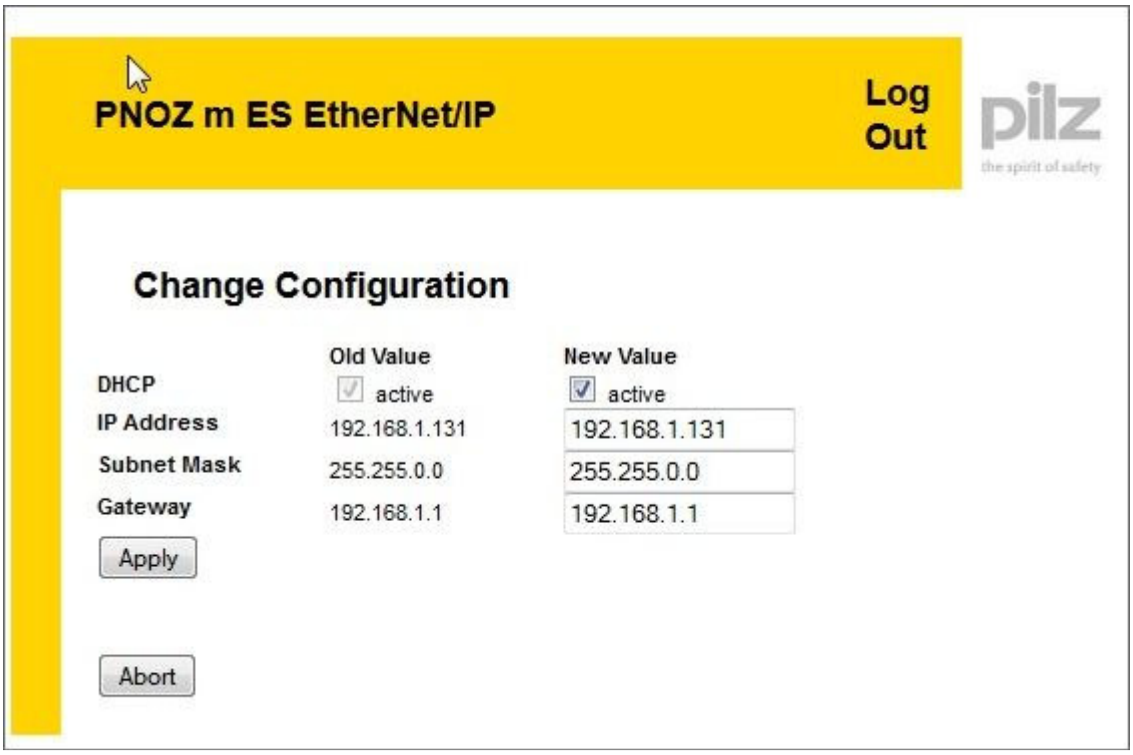


Fig. 16: Web-Server: Setup a new IP Address

3.3. Steps for Allen-Bradley ControlLogix PLC

- Start software “Studio 5000”

3.3.1. Ethernet/IP Scanner / Adapter Configuration

Create new Module Type (for EtherNet/IP Scanner):

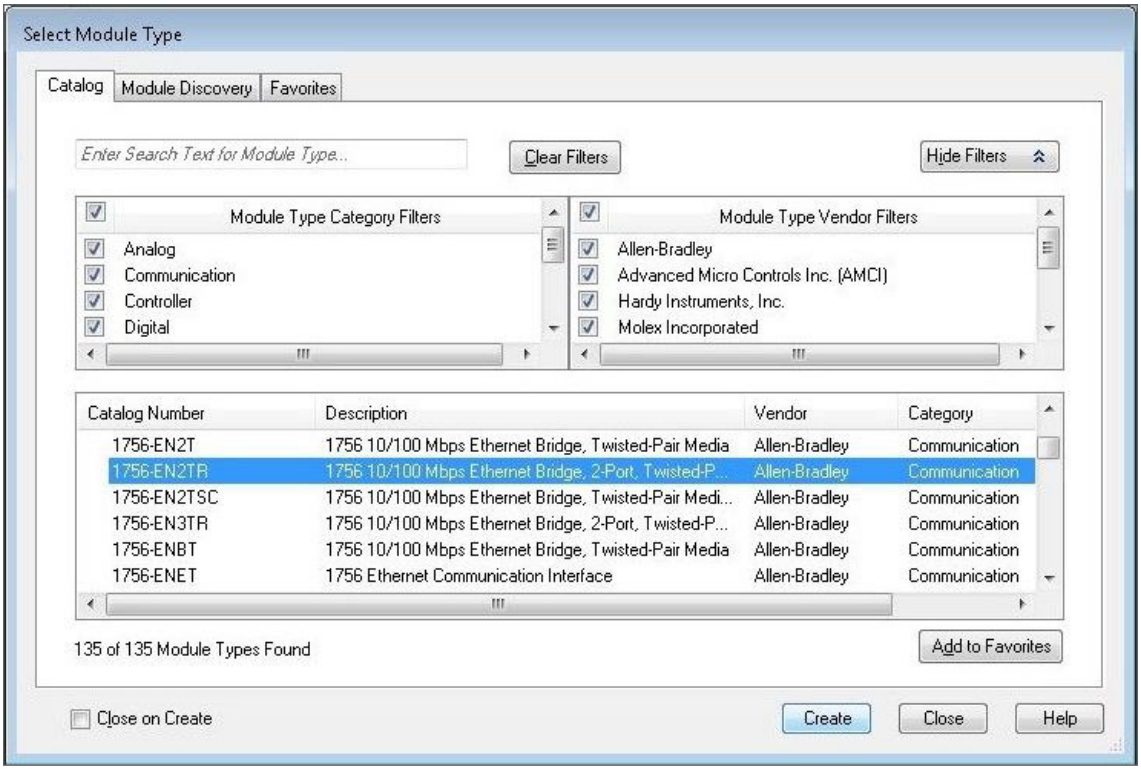


Fig. 17: Studio 5000 – Create new Module Type for Ethernet/IP Scanner (1)

- Enter a Name and the IP Address of the Ethernet/IP Scanner

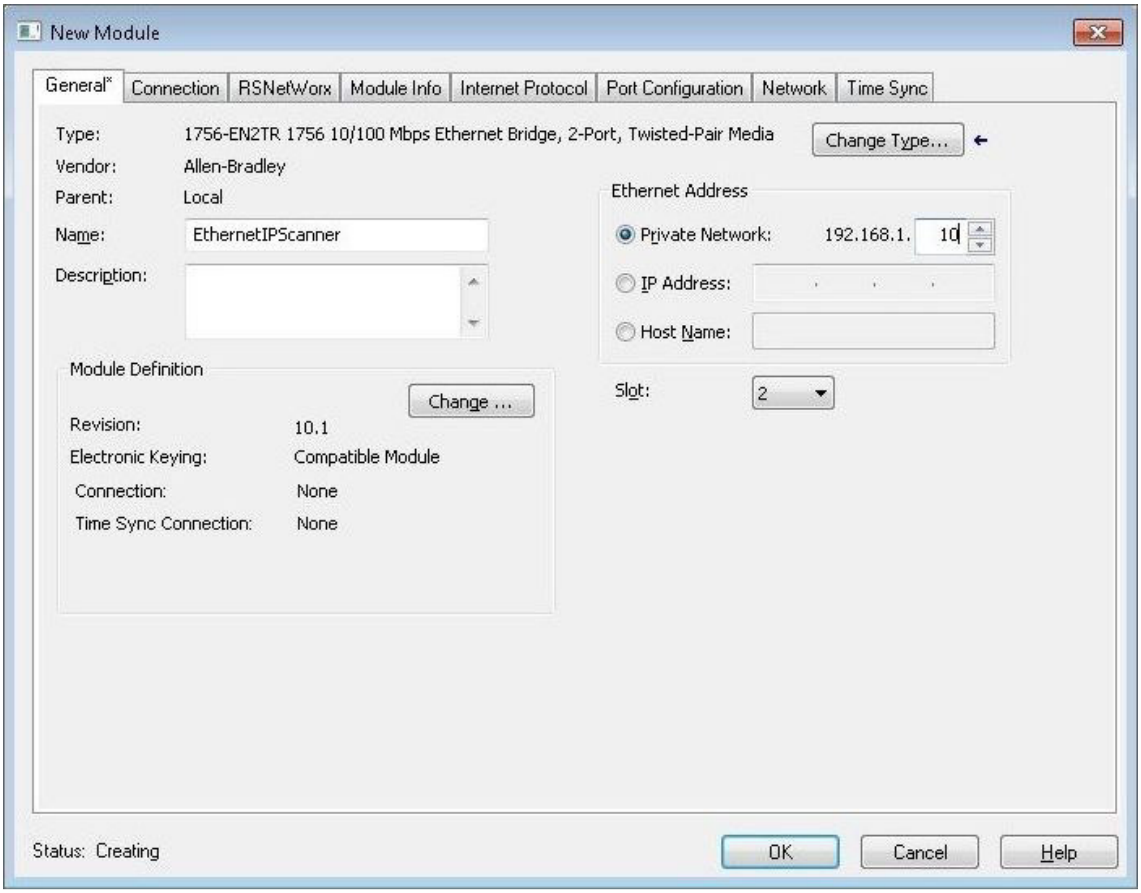


Fig. 18: Studio 5000 – Create new Module Type for Ethernet/IP Scanner (2)

- Add a PNOZ m ES Ethernet/IP Module

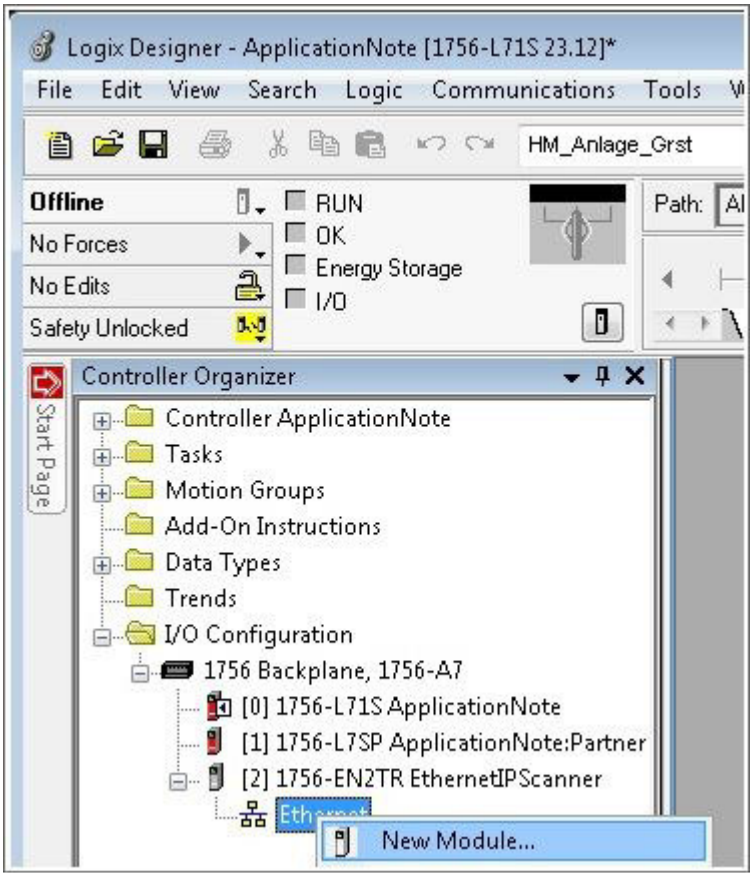


Fig. 19: Studio 5000 – Create new PNOZ m ES Ethernet/IP Module (1)

- Add the PNOZ m ES Ethernet/IP Module

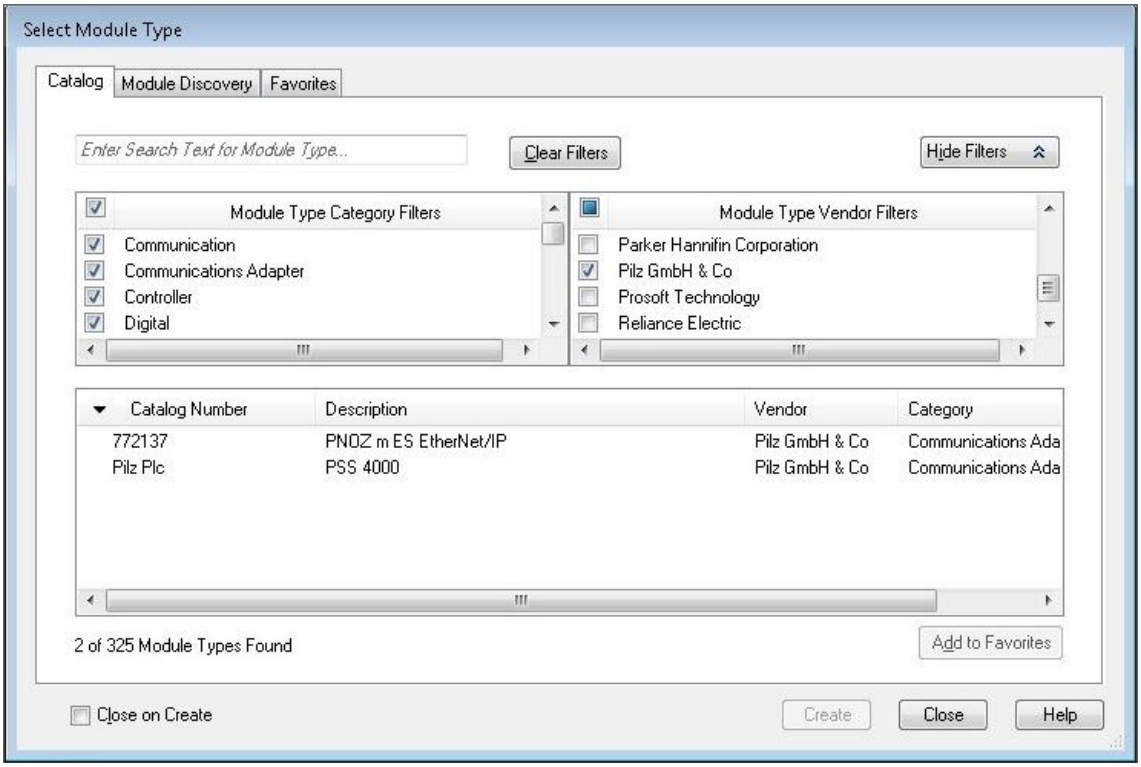


Fig. 20: Studio 5000 – Create new PNOZ m ES Ethernet/IP Module (2)

- Enter a Name and the IP Address of the Ethernet/IP Adapter
- More about the IP Address of the Module you can find in Chapter 5.2

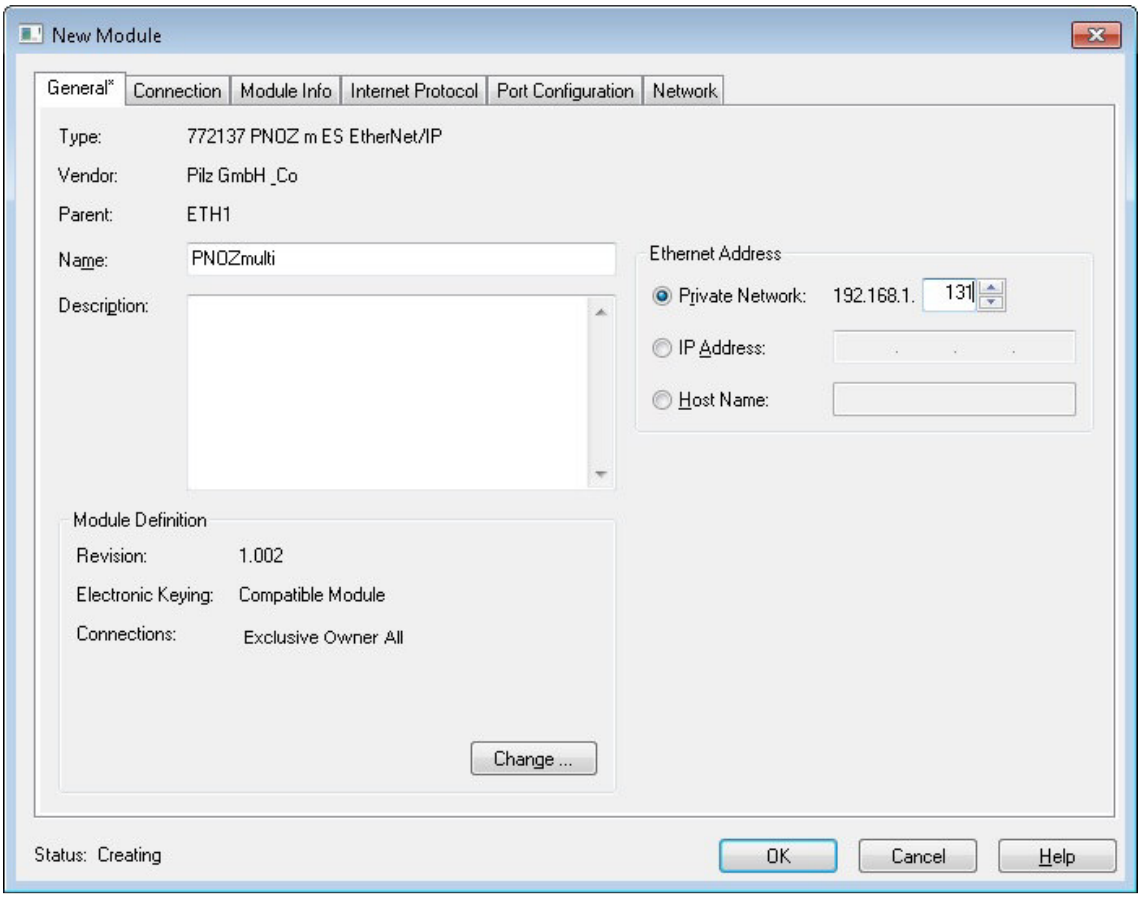


Fig. 21: Studio 5000 – Create new PNOZ m ES Ethernet/IP Module (3)

- Click to “Change” - If necessary disable keying and change the length of transferred IO/Data

  You can select between
- “Exclusive Owner All” with 32 Bytes (virtual I/Os, LED Status of Base Modul and table segments)
- “Exclusive Owner Assembley” with 17 Bytes (virtual I/Os and LED Status)
- The Structure of the cyclic transferred data is explained in Chapter 5.3.4

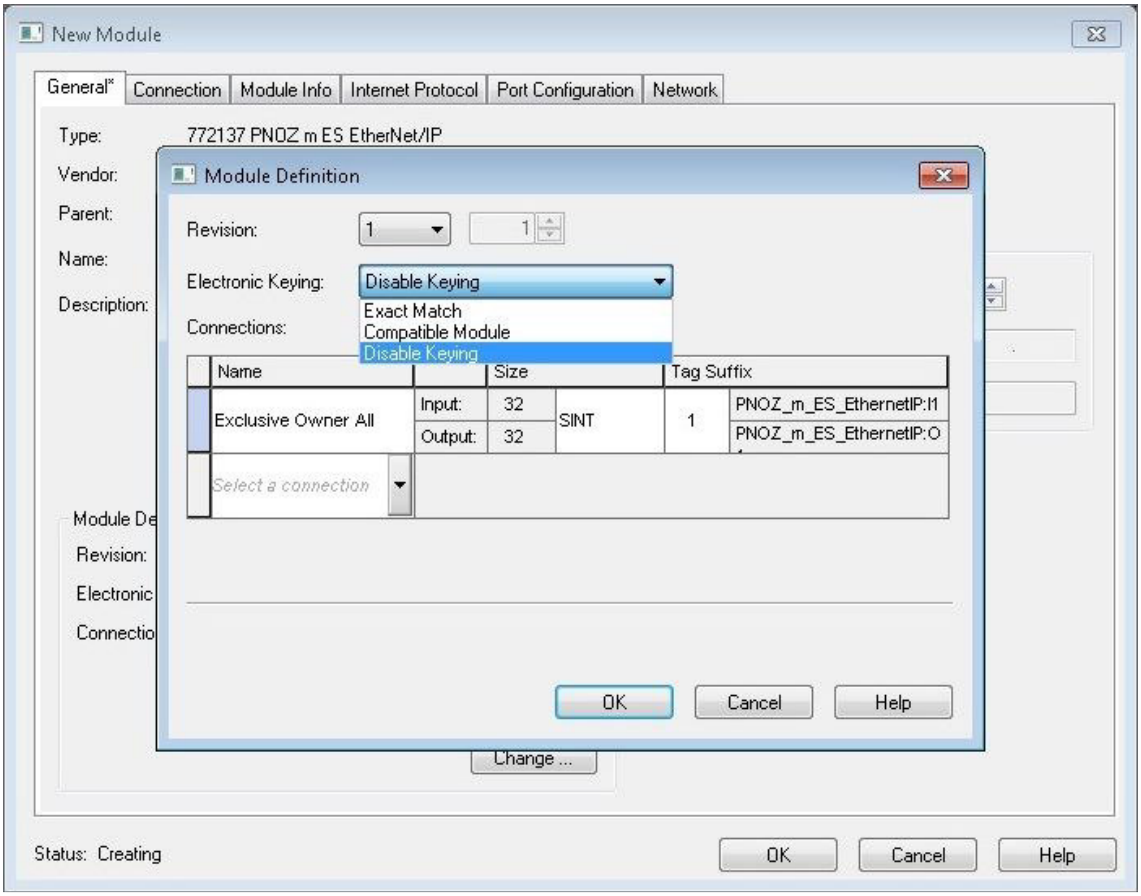


Fig. 22: Studio 5000 – Create new PNOZ m ES Ethernet/IP Module (4)

- Enter a valid RPI

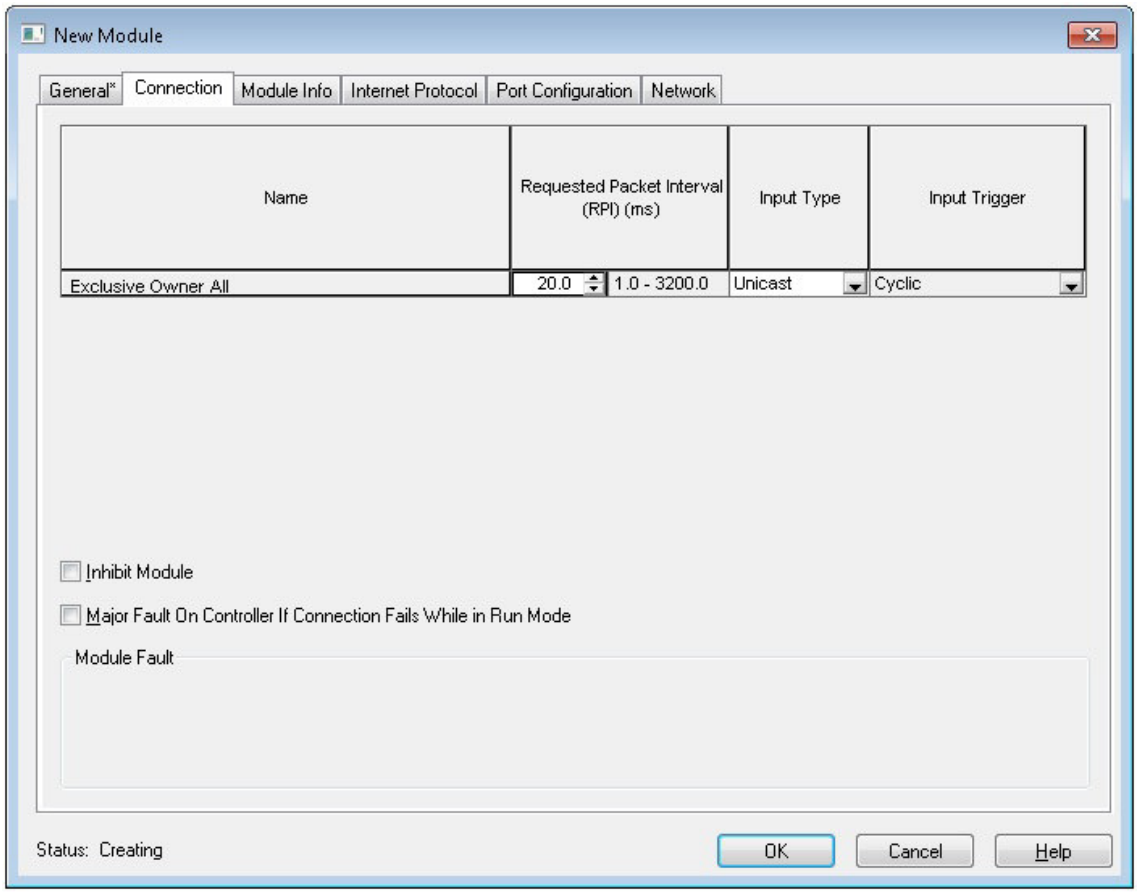


Fig. 23: Studio 5000 – Create new PNOZ m ES Ethernet/IP Module (4)

Notice
If the used version of RSLogix5000 configuration file (EDS) is not supported, use the Generic Ethernet Module and configure the properties manually.
» Input: Assembly Instance 100 (32 Bytes) or 101 (17 Bytes)
» Output: Assembly Instance 150 (32 Bytes) or 151 (17 Bytes)
» Configuration: Assembly Instance 4 (0 Byte)

3.3.2. Download project to ControlLogix PLC

Check before downloading that the correct communication path to ControlLogix PLC is set.

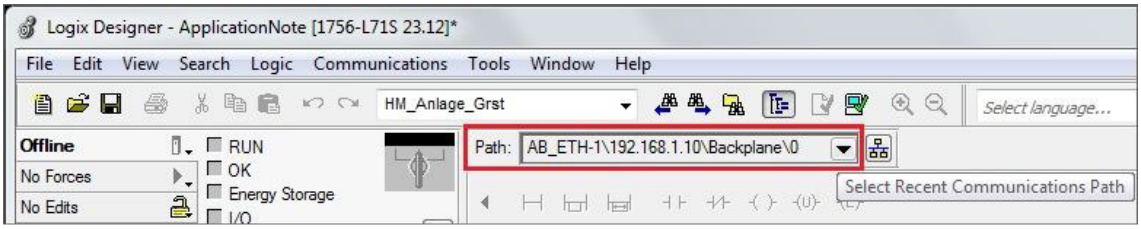


Fig. 24: Studio 5000 – Select recent communication path

- Start Download:

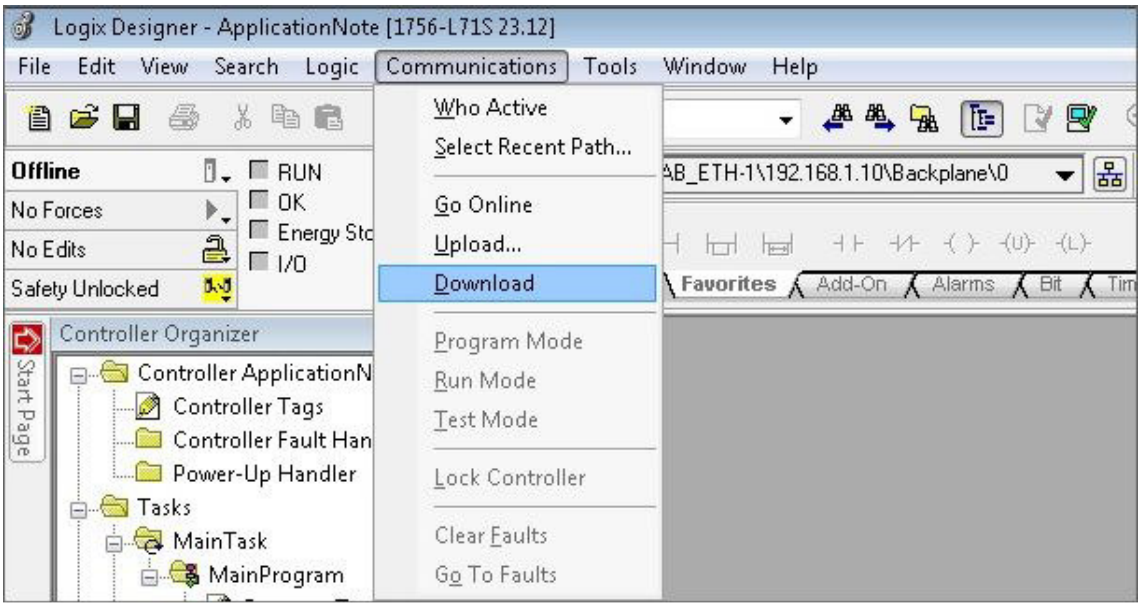
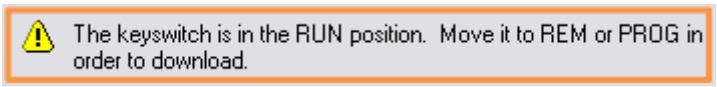


Fig. 25: Studio 5000 –Start Download to ControlLogix PLC

Notice

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



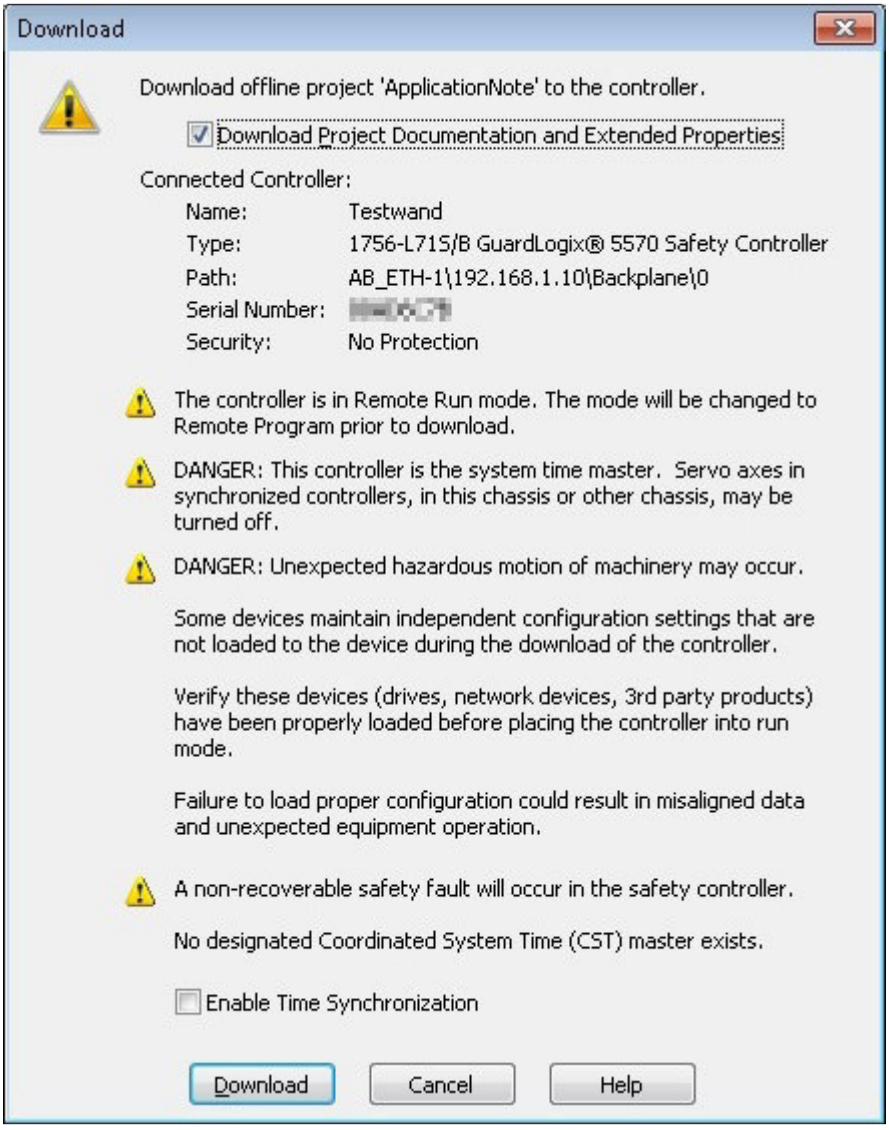


Fig. 26: Studio 5000 – Continue download to ControlLogix PLC

Notice
After download move > Key-Switch on ControlLogix Controller back to REM or RUN position!

3.3.3. Controller Tags

To view the process data from PNOZ m ES Ethernet/IP Module open the Controller Tags in the tree

- Go Online
- Select “Monitor Tags”
- Select the PNOZmulti

3.3.4. Structure of the cyclic transferred data (Implicite Messaging)

Scanner Input Byte 00	Virtual Output 0..7	Exclusive Owner All, Assembey Instance Input 100	Exclusive Owner, Assembey Instance Input 101
Scanner Input Byte 01	Virtual Output 8..15		
Scanner Input Byte 02	Virtual Output 16..23		
Scanner Input Byte 03	Virtual Output 24..31		
Scanner Input Byte 04	Virtual Output 32..39		
Scanner Input Byte 05	Virtual Output 40..47		
Scanner Input Byte 06	Virtual Output 48..55		
Scanner Input Byte 07	Virtual Output 56..63		
Scanner Input Byte 08	Virtual Output 64..71		
Scanner Input Byte 09	Virtual Output 72..79		
Scanner Input Byte 10	Virtual Output 80..87		
Scanner Input Byte 11	Virtual Output 88..95		
Scanner Input Byte 12	Virtual Output 96..103		
Scanner Input Byte 13	Virtual Output 104..111		
Scanner Input Byte 14	Virtual Output 112..119		
Scanner Input Byte 15	Virtual Output 120..127		
Scanner Input Byte 16	LED status		
Scanner Input Byte 17	Table Number		---
Scanner Input Byte 18	Segment Number		
Scanner Input Byte 19	Reserved		
Scanner Input Byte 20	Reserved		
Scanner Input Byte 21	Reserved		
Scanner Input Byte 22	Reserved		
Scanner Input Byte 23	Reserved		
Scanner Input Byte 24	Reserved		
Scanner Input Byte 25	Reserved		
Scanner Input Byte 26	Reserved		
Scanner Input Byte 27	Reserved		
Scanner Input Byte 28	Reserved		
Scanner Input Byte 29	Reserved		
Scanner Input Byte 30	Reserved		
Scanner Input Byte 31	Reserved		

Fig. 27: Structure of the cyclic transferred data – Scanner Input Bytes

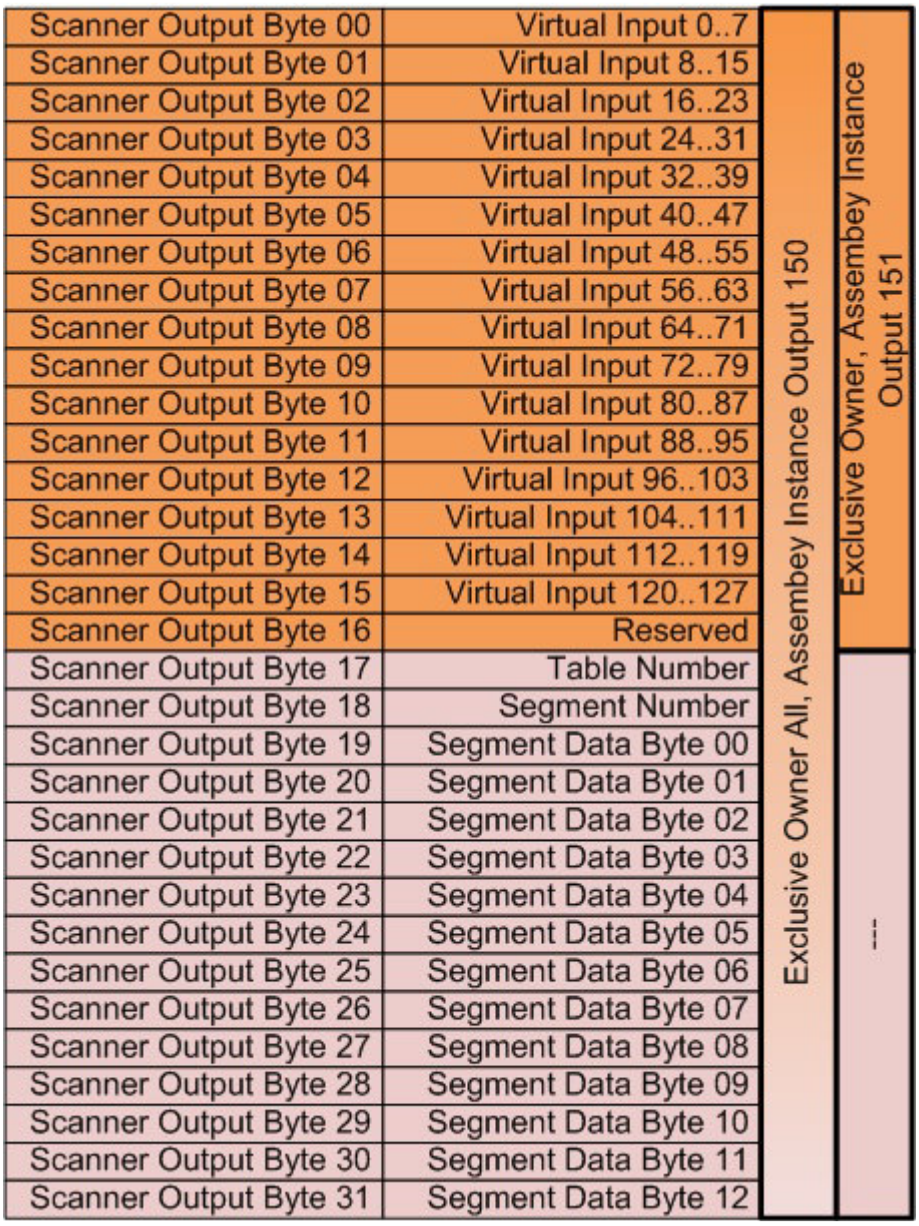


Fig. 28: Structure of the cyclic transferred data – Scanner Output Bytes

Notice
The content of the Segment Data Bytes you can find in the Document “PNOZ multi 2 Communication Interfaces”

3.3.5. Structure of the acyclic transferred data (Explicit Messaging)

The PNOZ m ES Ethernet/IP Module also supports Explicit Messaging.
In the document “PNOZmulti 2 Communication Interfaces” you can find the Instance and Attribute Number.

3.4. Steps for PNOZ multi

3.4.1. PNOZ multi Configuration

- Create a new project
- Select Modules

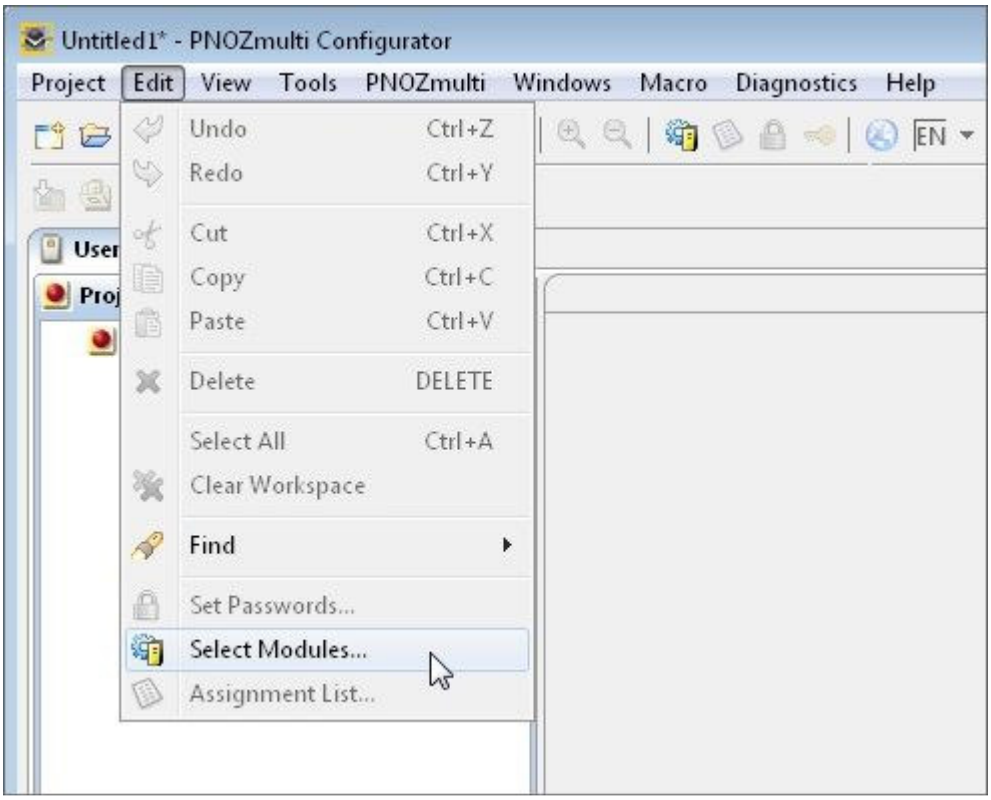


Fig. 29: PNOZmulti Configurator – Select Modules

- Select the used Hardware

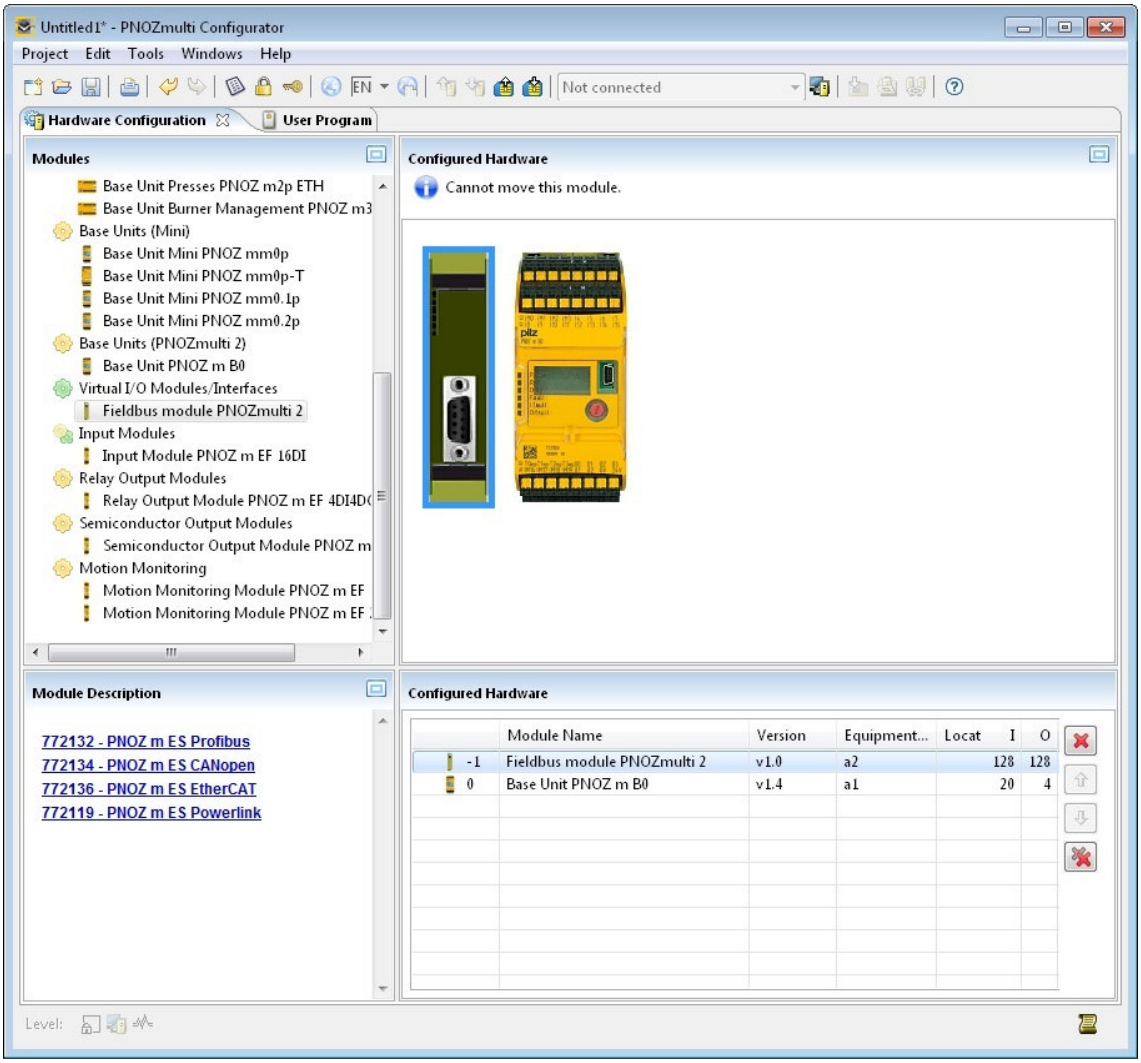


Fig. 30: PNOZmulti Configurator – Select the used Hardware

Notice
To test the communication between the PNOZ multi and the Ethernet/IP Scanner you need at least one safety function in the PNOZ multi program.

- Insert a safety function, e.x. E-STOP

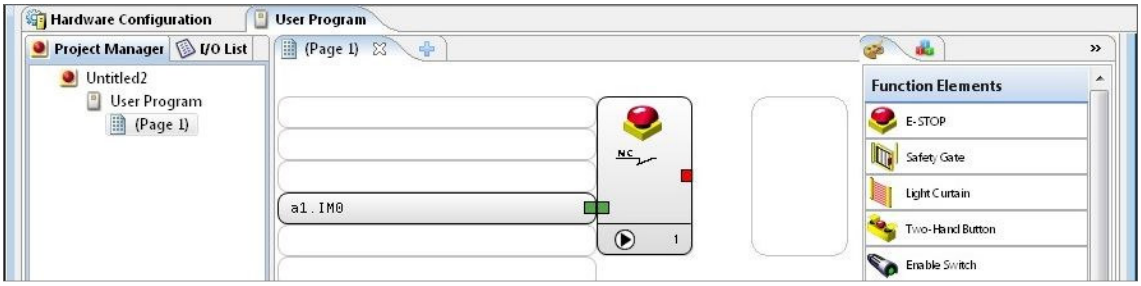


Fig. 31: PNOZmulti Configurator – Insert E-Stop

- Insert an output and connect it with the E-STOP

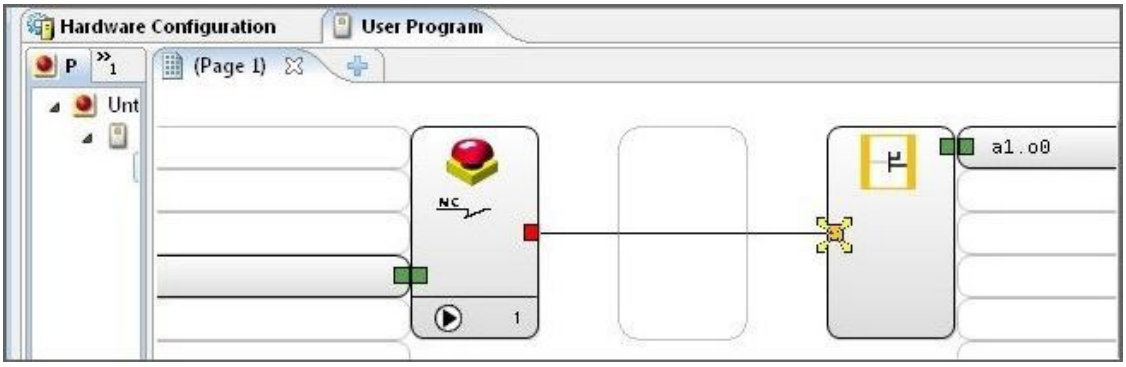


Fig. 32: PNOZmulti Configurator – Insert Output

- Insert a virtual Output

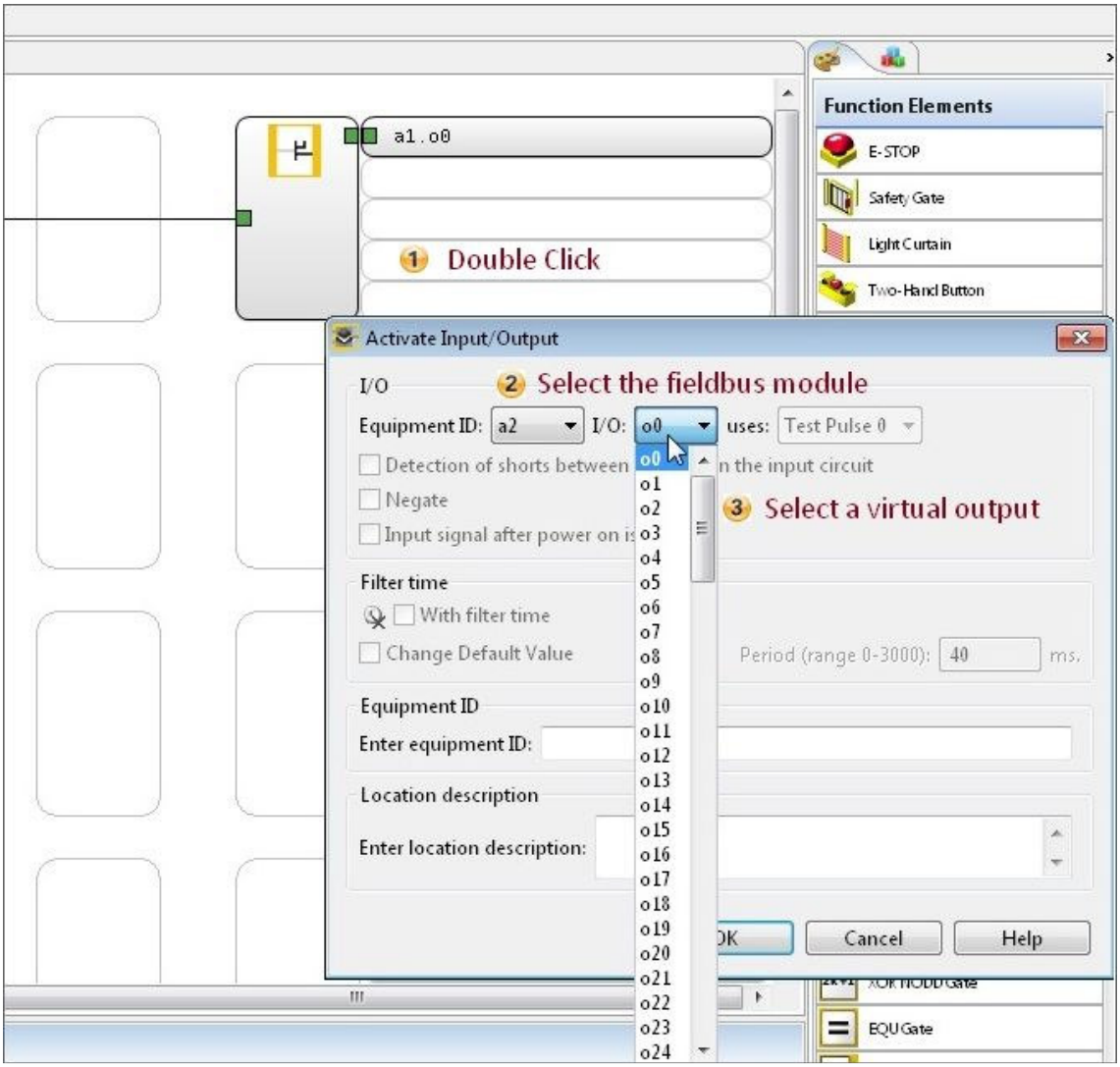


Fig. 33: PNOZmulti Configurator – Insert a virtual Output

- Connect the virtual Output with the E-STOP to get the status of the E-STOP

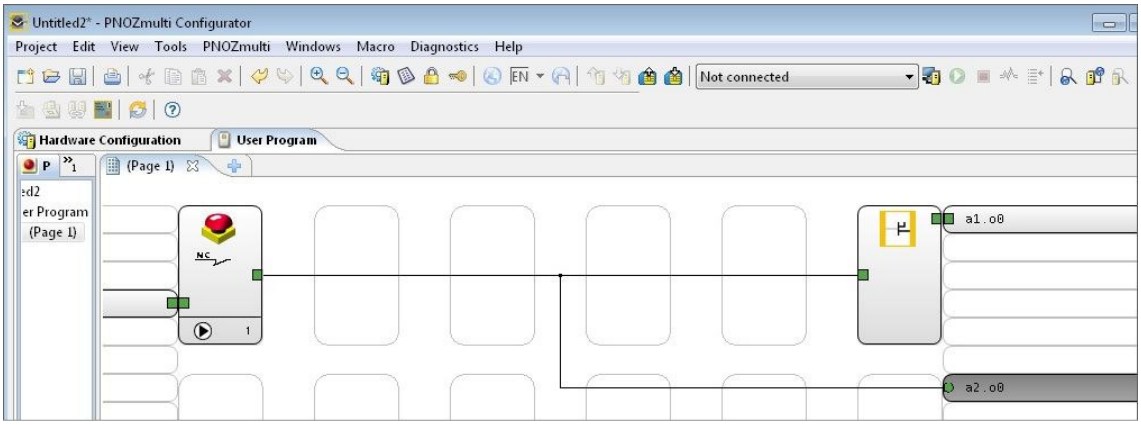


Fig. 34: PNOZmulti Configurator – virtual Output is connected with E-Stop

3.4.2. PNOZ multi Download

- Select Interface

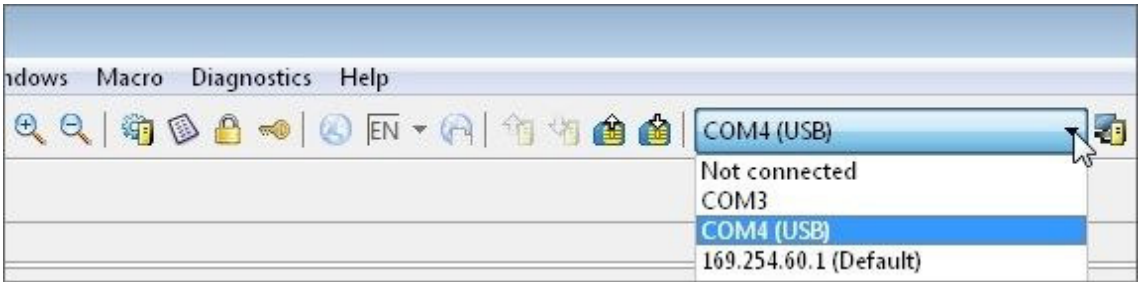


Fig. 35: PNOZmulti Configurator – Select the Interface

Fig. 36: PNOZmulti Configurator – Download to PNOZmulti (1)

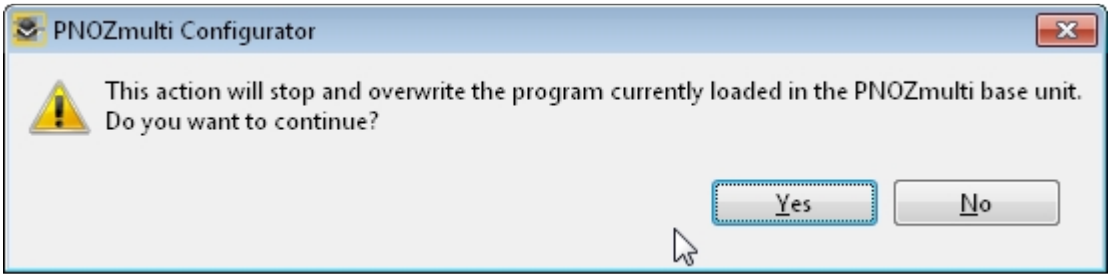


Fig. 37: PNOZmulti Configurator – Download to PNOZmulti (2)

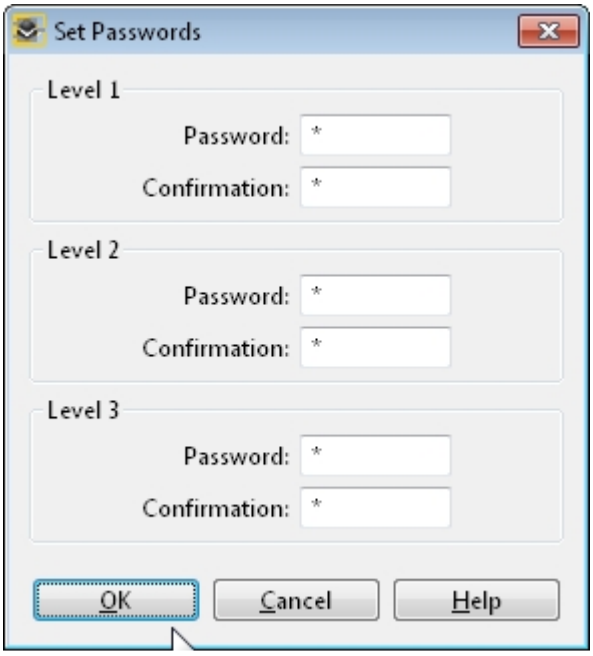


Fig. 38: PNOZmulti Configurator – Download to PNOZmulti (3)

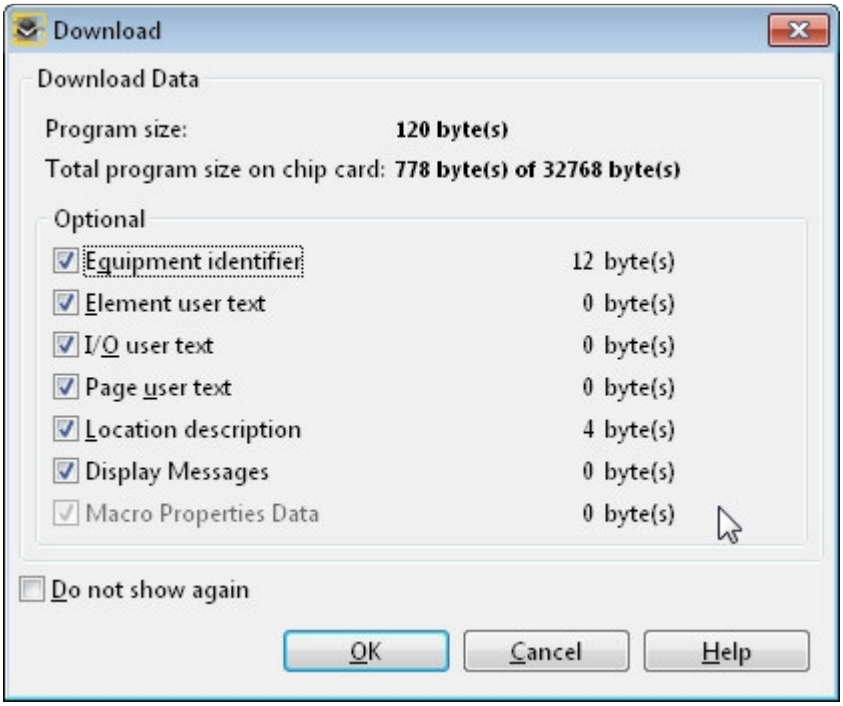


Fig. 39: PNOZmulti Configurator – Download to PNOZmulti (4)

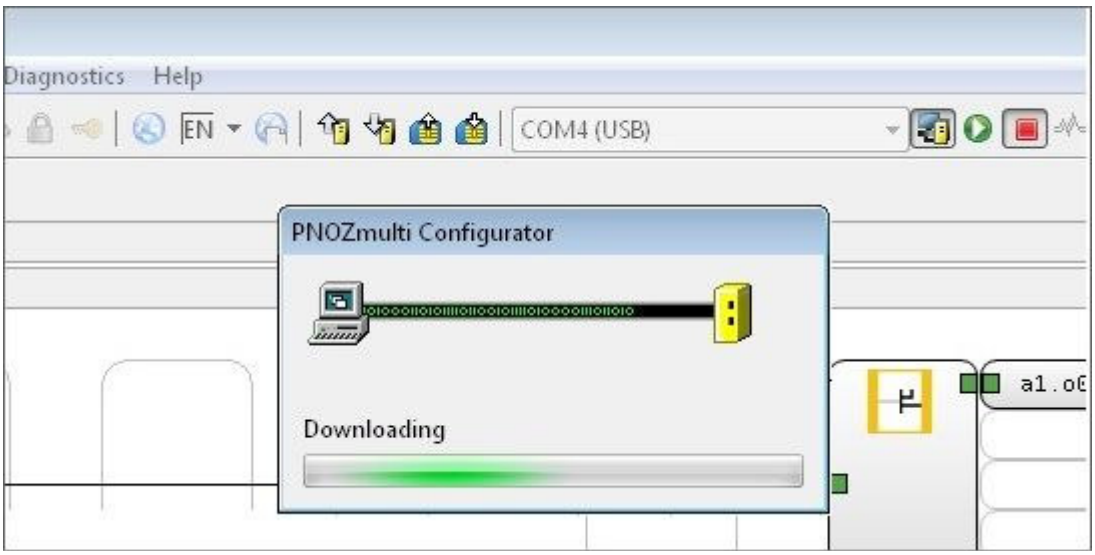


Fig. 40: PNOZmulti Configurator – Download to PNOZmulti (5)

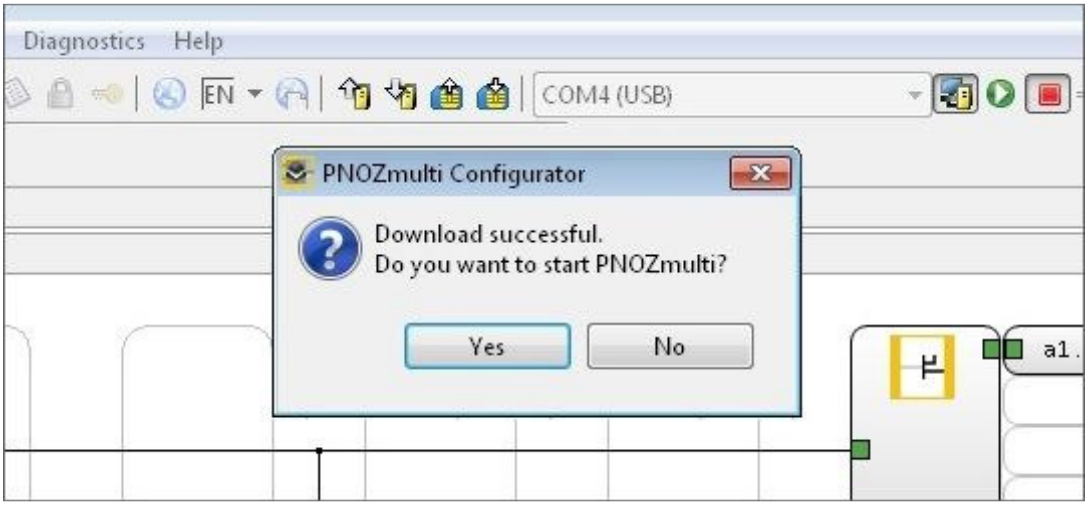
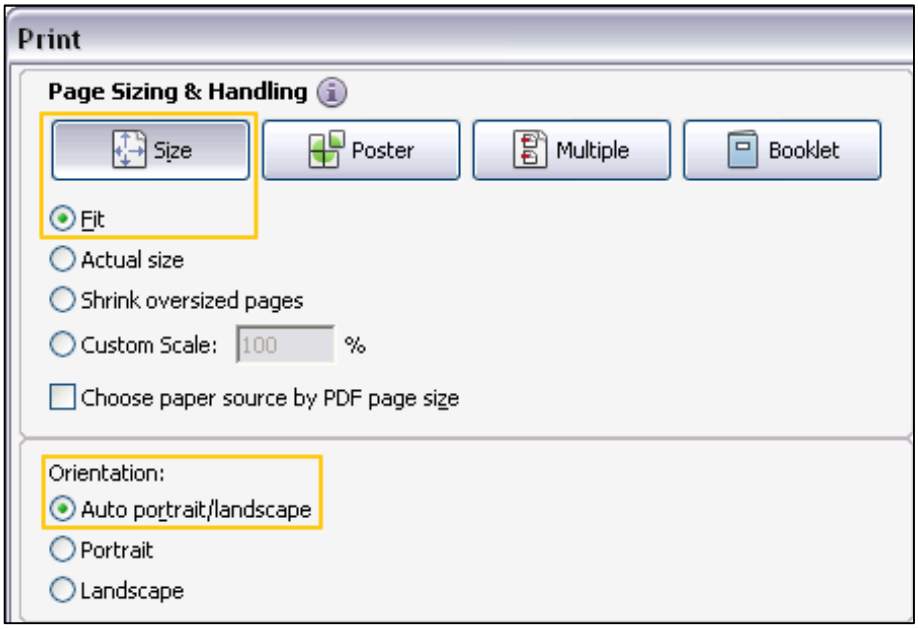


Fig. 41: PNOZmulti Configurator – Download to PNOZmulti (6)

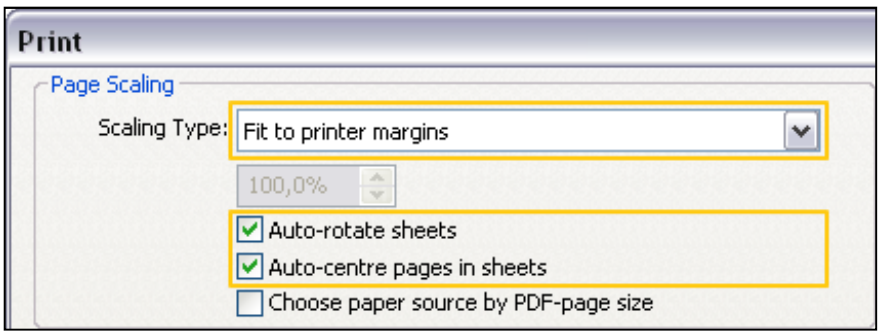
4. Table of figures

Recommended printer settings

Adobe Acrobat Reader (www.adobe.com)



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



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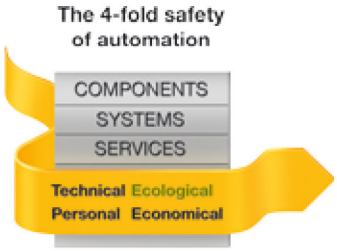

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