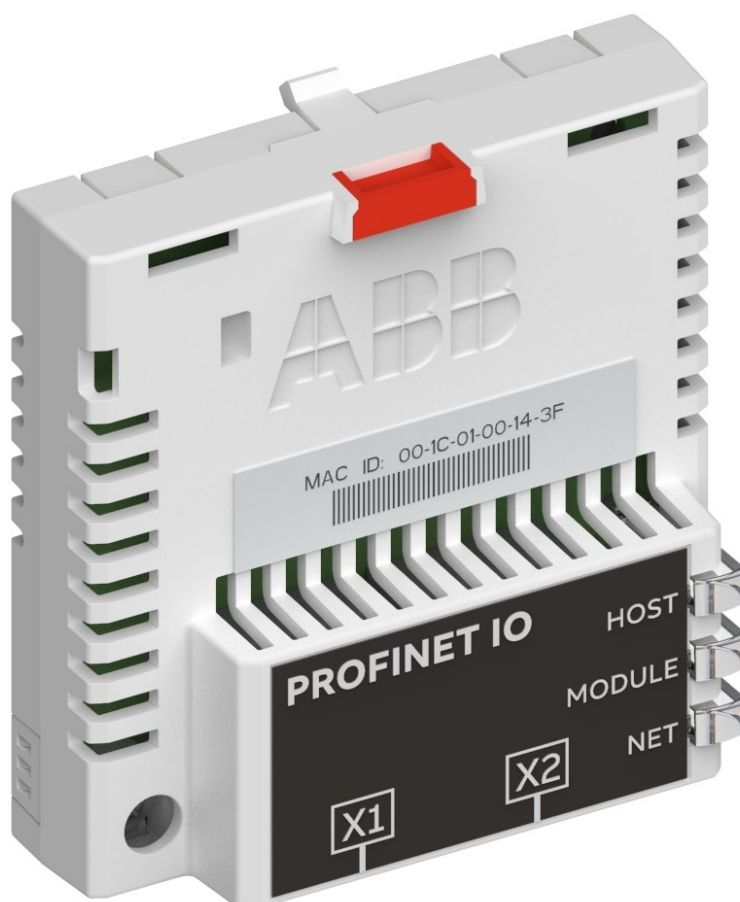


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OPTIONS FOR ABB DRIVES, CONVERTERS AND INVERTERS

# FPNO-21 PROFINET fieldbus adapter module

## User's manual





# FPNO-21 PROFINET fieldbus adapter module

User's manual

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**Further information**





# 1

## Safety instructions

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### Contents of this chapter

The chapter describes the warning symbols used in this manual and refers to the safety instructions which you must obey when you install or connect an option module. If you ignore the safety instructions, injury, death or damage can occur. Read this chapter before you start the installation.

### Use of warnings and notes

Warnings tell you about conditions which can cause injury or death, or damage to the equipment. They also tell you how to prevent the danger. Notes draw attention to a particular condition or fact, or give information on a subject.

The manual uses these warning symbols:

**WARNING!**

Electricity warning tells about hazards from electricity which can cause injury or death, or damage to the equipment.

---

**WARNING!**

General warning tells about conditions other than those caused by electricity, which can cause injury or death, or damage to the equipment.

---

**WARNING!**

Electrostatic sensitive devices warning tells you about the risk of electrostatic discharge which can cause damage to the equipment.

---

## Safety in installation and maintenance

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**WARNING!**

Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning or maintenance work.

---



A large, bold, black number '2' is centered within a light gray square with rounded corners.

# Introduction to the manual

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## Contents of this chapter

This chapter introduces this manual.

## Applicability

This manual applies to the FPNO-21 fieldbus adapter module, adapter revision J or firmware version 2.02 or later.

## Compatibility

### ■ Drives

The FPNO-21 fieldbus adapter module is compatible with:

- ACS880 primary control program version 2.51.0.0 and later
- ACS580 standard control program version 2.02.0.1 and later
- ACH580 HVAC control program 2.01.0.4 and later
- ACQ580 pump control program 2.03.0.3 and later
- ACS355 drives firmware version 5.090 and later
- ACS380 machinery control program version 2.02.0.1 and later
- ACS480 standard control program 2.02.0.3 and later
- ACS560 standard control program 2.08.0.0 and later

**Note:** Not all compatible drives are listed here. For details of compatibility, check the drive's firmware manual. You can check the current firmware version of the drive with parameter 07.05 Firmware version.

---

## ■ Protocol

The FPNO-21 module is compatible with Ethernet standards IEEE 802.3 and IEE 802.3u and it supports the PROFINET IO protocol.

All PROFINET IO masters that support:

- GSDML file version 2.4
- PROFINET IO protocol according to IEC standards 61158 and 61784
- PROFINET IO conformance class B

are compatible with the PROFINET IO module.

In addition, it is possible to have other protocols running on the FPNO-21 module which can be enabled/disabled via web pages:

- ABB IP configuration tool
- Simple Network Time Protocol (SNTP)
- Drive composer tool via Ethernet tool network.

In addition, it is possible to have the no communication protocol running on the FPNO-21 module. This configuration is called the NONE protocol. In this setup, the FPNO-21 module is used only for running Ethernet services. ABB recommends to select the NONE protocol when the PROFINET protocol is not required.

## Target audience

This manual is intended for people who plan the installation, install, start up, use and service the module. Before you do work on the module, read this manual and the applicable drive manual that contains the hardware and safety information for the product in question. You are expected to know the fundamentals of electricity, wiring, electrical components, and electrical schematic symbols.

## Purpose of the manual

The manual provides information on installing, commissioning and using the FPNO-21 module.

## Cybersecurity disclaimer

This product can be connected to and communicate information and data via a network interface. The HTTP protocol, which is used between the commissioning tool (Drive Composer) and the product, is an unsecured protocol. For independent and continuous operation of product such connection via network to commissioning tool is not necessary. However it is Customer's sole responsibility to provide and continuously ensure a secure connection between the product and Customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, prevention of physical access, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Notwithstanding any other provision to the contrary and regardless of whether the contract is terminated or not, ABB and its affiliates are under no circumstances liable

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for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

## Terms and abbreviations

Term	Description
ACT	Actual value <i>Istwert</i>
Acyclic communication	Communication in which messages are sent only once on request
Array	Parameter consisting of data fields of equal data type
Command word	See Control word.
Control word	16-bit or 32-bit word from a controller to the controlled device with bit-coded control signals (sometimes called the Command word).
Cyclic communication	Communication in which messages are sent cyclically at pre-defined intervals
DAP	Device access point
Data object	Special object that contains parameter and process data
DCP	Discovery Control Protocol. A protocol that allows the master controller to find every PROFINET IO device on a subnet.
DHCP	Dynamic Host Control Protocol. A protocol for automating the configuration of IP devices. DHCP can be used to automatically assign IP addresses and related network information.
DP	Decentralized Periphery <i>Dezentrale Peripherie</i>
DP-V0	PROFINET IO extension to the EN 50170 standard, providing the basic functionality of DP, including cyclic data exchange
DP-V1	PROFINET IO extension to the EN 50170 standard, including, eg, acyclic data exchange
Drive	Frequency converter for controlling AC motors
EMC	Electromagnetic compatibility
Fault	Event that leads to tripping of the device
FBA	Fieldbus adapter
Fieldbus adapter module	Device through which the drive is connected to an external communication network, that is, a fieldbus
GSD file	General Station Description file, an ASCII-format device description file in a specified form. Each different slave type on the PROFINET IO network needs to have its own GSD file. GSD files in PROFINET IO are written in GSDML.
GSDML	General Station Description Markup Language
I/O controller	Control system with bus initiative. In PROFINET IO terminology, I/O controllers are also called master stations.
Index	Access reference for objects in PROFINET IO
ISW	See ACT.
LSB	Least significant bit
MAC address	Media Access Control address
MAP	Module access point
Master	Control system with bus initiative. In PROFINET IO terminology, master stations are also called active stations.
MSB	Most significant bit
PAP	Parameter access point
Parameter	In the drive control program, user-adjustable operation instruction to the drive, or signal measured or calculated by the drive. In some (for example fieldbus) contexts, a value that can be accessed as an object. For example, variable, constant, or signal.
Parameter/Process data object	Special object that contains parameter and process data

## 14 Introduction to the manual

<b>Term</b>	<b>Description</b>
PD	Process data <i>Prozessdaten</i>
PKE	Parameter identification <i>Parameter-Kennung</i>
PKW	Parameter identification value <i>Parameter-Kennung-Wert</i>
PLC	Programmable logic controller
PNU	Parameter number <i>Parameternummer</i>
PPO	Parameter/Process data object <i>Parameter-/Prozessdaten-Objekt</i>
Process data	Data that contains Control word and reference value or Status word and actual value. May also contain other (user-definable) control information.
Profile	Adaptation of a communication protocol for a certain application field (for example drives)
PROFINET S2	PROFINET S2 system redundancy device has one Network Access Point (NAP) interface which supports two redundant connections from two redundant controllers.
PWE	Parameter value <i>Parameter-Wert</i>
PZD	PD, Process data
PZDO	Process data object <i>Prozessdatenobjekt</i>
SAP	Service access point
Slave	Passive bus participant. In PROFINET IO terminology, slave stations (or slaves) are also called passive stations. Also referred to as node.
SNTP	Simple Network Time Protocol. A protocol to synchronize drive time with the network time server.
SOW	Reference <i>Sollwert</i>
Status word	16-bit or 32-bit word from a controlled device to the controller with bit-coded status signals
STW	Control word <i>Steuerwort</i>
Warning	Signal caused by an existing alarm which does not lead to tripping of the device
ZSW	Status word <i>Zustandswort</i>

## Related documents

Manual	Code
<b>Drive hardware manuals and guides</b>	
ACS380-04 manuals	9AAK10103A6193
ACS480 manuals	9AKK106930A8739
ACS580-01 manuals	9AKK105713A8085
ACH580-01 manuals	9AKK10103A0587
ACQ580-01 manuals	9AKK106713A2709
ACS580-04 manuals	9AKK106930A9060
ACH580-04 manuals	9AKK106930A9059
ACQ580-04 manuals	9AKK106930A9053
ACS580-07 manuals	9AKK106930A5239
ACH580-07 manuals	9AKK106930A5241
ACQ580-07 manuals	9AKK106930A3150
ACS880-01 manuals	9AKK105408A7004
ACS880-04 manuals	9AKK105713A4819
ACS880-07 (45 to 710 kW) manuals	9AKK105408A8149
ACS880-07 (560 to 2800 kW) manuals	9AKK105713A6663
ACS880-07LC manuals	9AKK107680A9275
ACS880-11 manuals	9AKK106930A9565
ACS880-14 manuals	9AKK107045A8023
ACS880-17 (45 to 400 kW) manuals	9AKK106930A3466
ACS880-17 (160 to 3200 kW) manuals	9AKK106354A1499
ACS880-17LC manuals	9AKK107492A4721
ACS880-31 manuals	9AKK106930A9564
ACS880-34 manuals	9AKK107045A8025
ACS880-37 (45 to 400 kW) manuals	9AKK106930A3467
ACS880-37 (160 to 3200 kW) manuals	9AKK106354A1500
ACS880-37LC manuals	9AKK107492A4722
ACS880 multidrive manuals	9AKK106103A9122
ACS880 multidrive module manuals	9AKK105713A3673
<b>Option manuals and guides</b>	
FPNO-21 PROFINET fieldbus adapter module user's manual	3AXD50000158614
FPNO-21 PROFINET adapter module quick guide	3AXD50000158577

The links above contain lists of documents.

You can find manuals on the Internet. See below for the relevant code/link. For more documentation, go to [www.abb.com/drives/documents](http://www.abb.com/drives/documents).

For manuals not available in ABB library, contact your local ABB representative.

## 16 Introduction to the manual



FPNO-21 PROFINET fieldbus adapter module  
User's manual



Fieldbus connectivity web page



# 3

## Overview of the Ethernet network and the FPNO-21 module

---

### Contents of this chapter

This chapter contains a short description of the Ethernet network and the topology supported by the FPNO-21 adapter module.

### Ethernet network

Ethernet standards support a variety of physical media (coaxial cable, twisted pair, fiber optics) and topologies (bus and star).

The FPNO-21 module supports twisted pair as the physical media

The FPNO-21 supports star topology, daisy chain topology and ring topology ([Media Redundancy Protocol \(MRP\) \(page 61\)](#)). The FPNO-21 supports PROFINET S2 system redundancy with two redundant controllers.

The maximum length for an Ethernet segment on twisted pair media is 100 meters. All twisted pair media between the Ethernet node and the switch or router must be shorter than 100 meters, including media within patch panels.

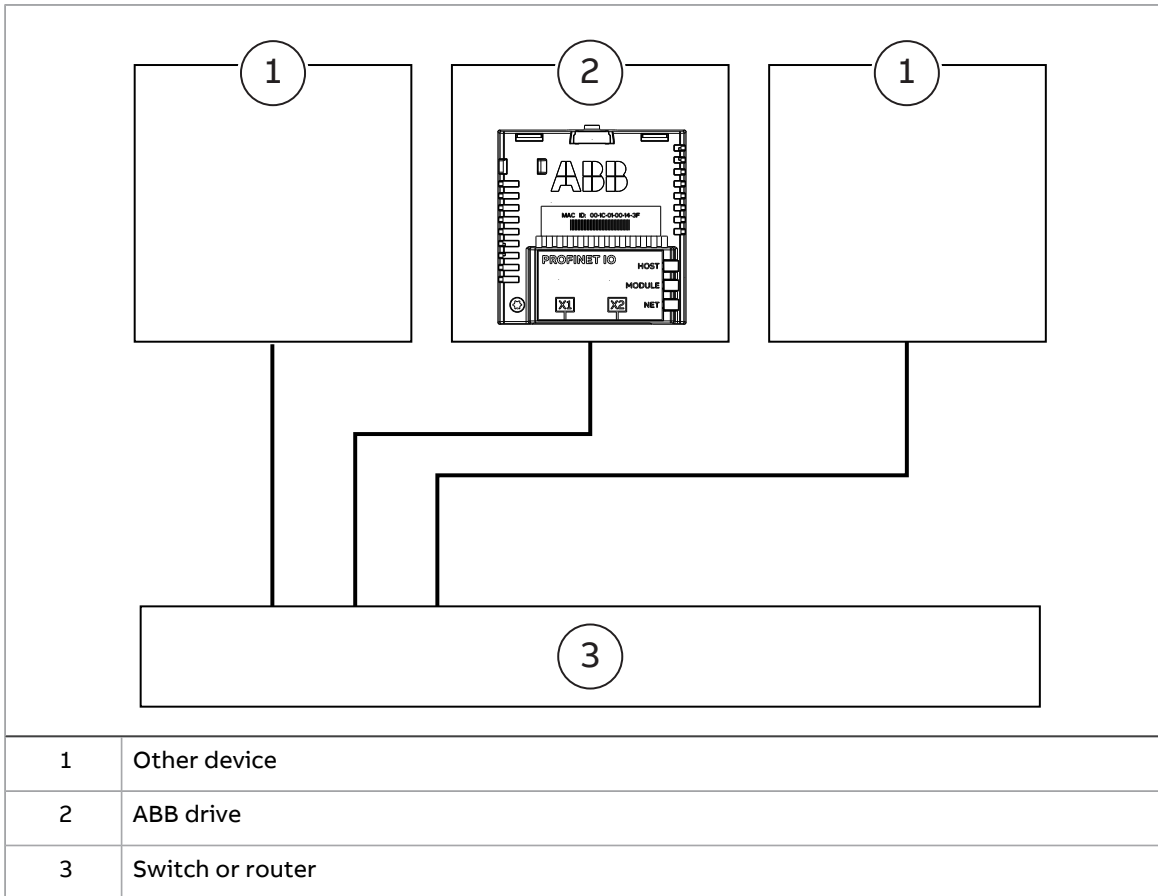
#### ■ Example topology of the Ethernet link

The figures below show example topologies for an Ethernet network with FPNO-21.

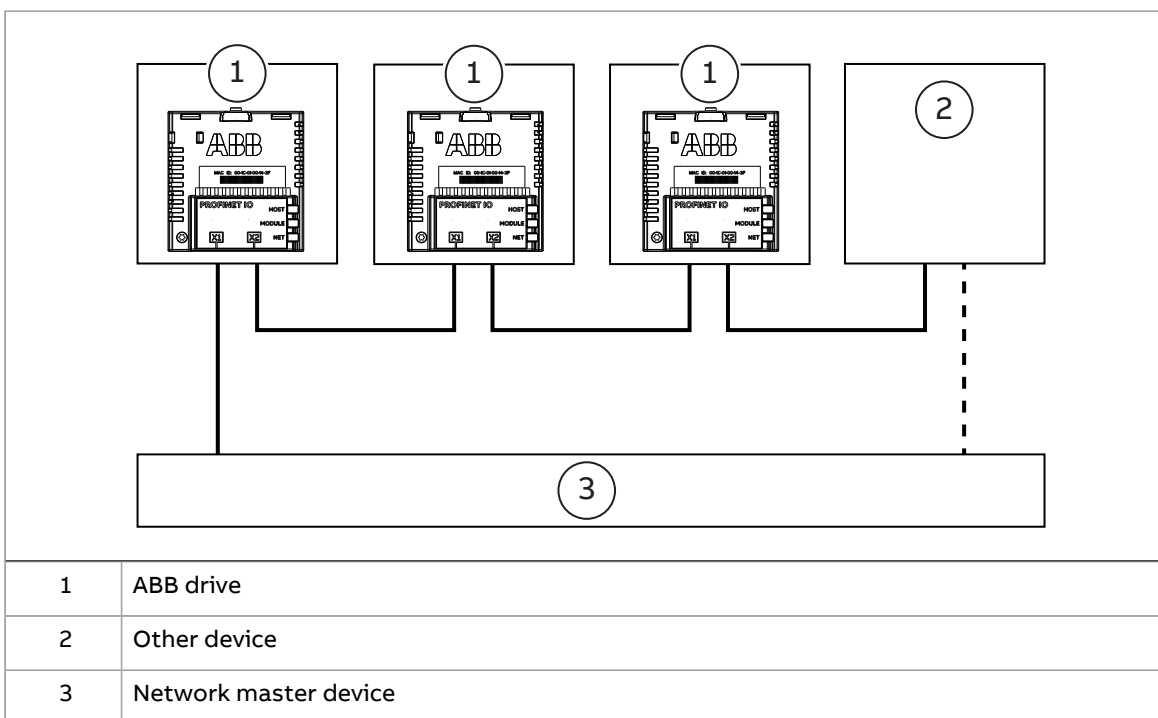
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## 18 Overview of the Ethernet network and the FPNO-21 module

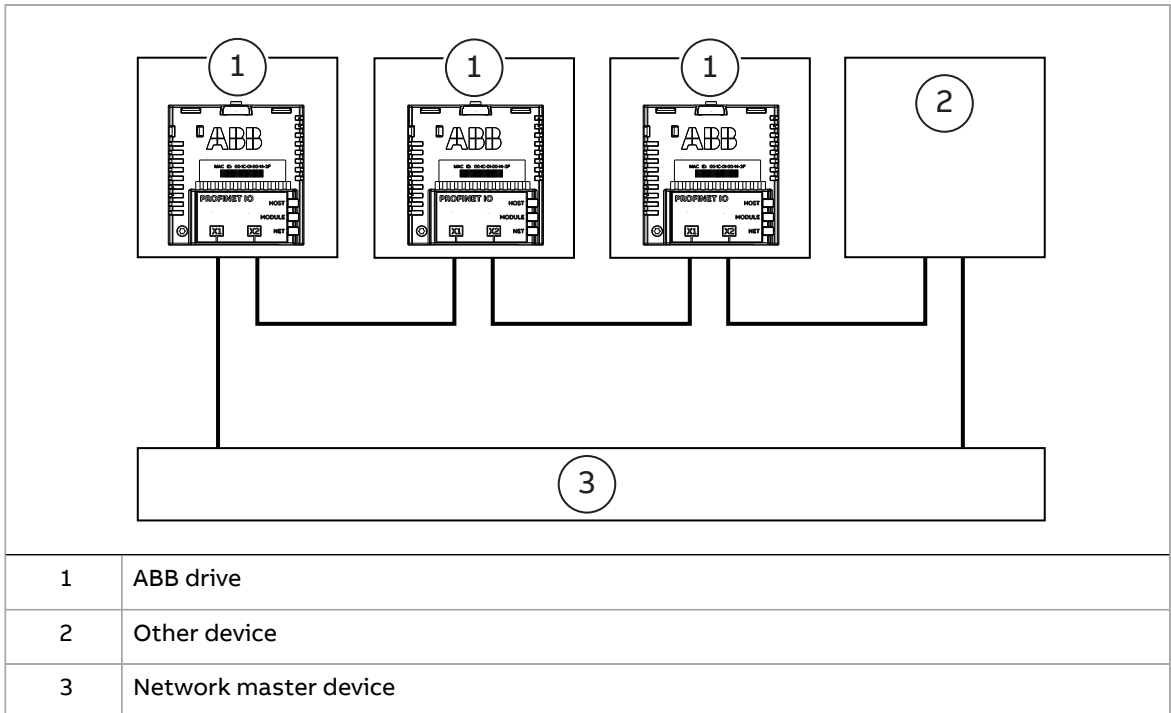
### Star topology



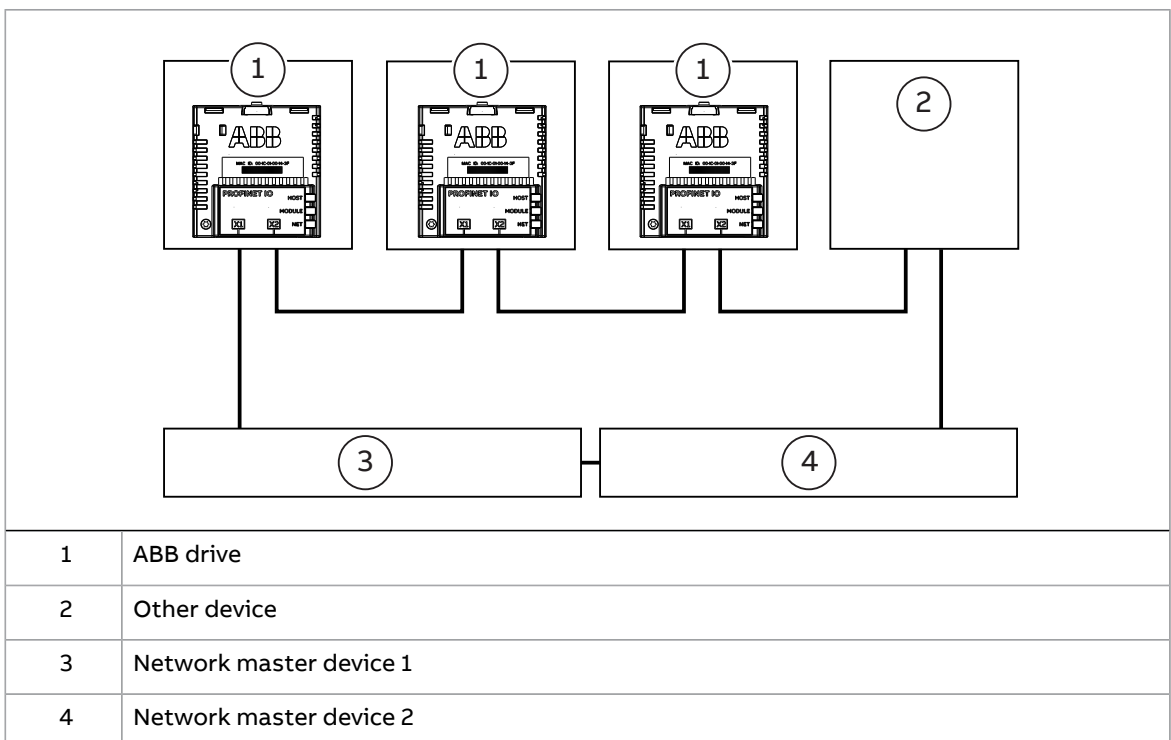
### Daisy chain topology



Ring (MRP) topology



Ring topology with two redundant controllers



**FPNO-21 module overview**

The FPNO-21 adapter module is a plug-in device for ABB drives which enables the connection of the drive to a PROFINET IO network.

Through the adapter module you can:

## 20 Overview of the Ethernet network and the FPNO-21 module

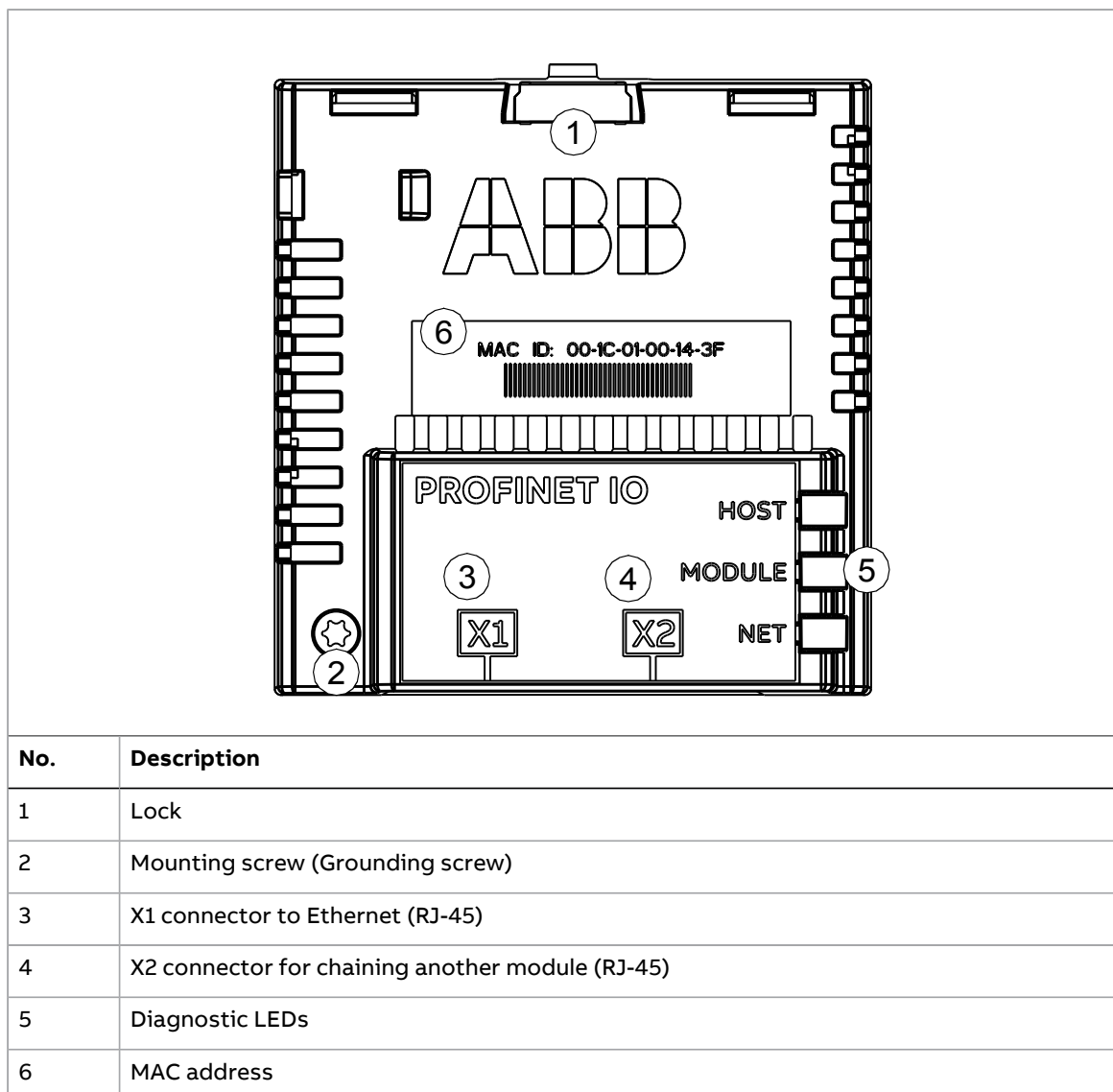
- give control commands to the drive (for example, Start, Stop, Run enable)
- feed a motor speed or torque reference to the drive
- give a process actual value or a process reference to the PID controller of the drive
- read status information and actual values from the drive
- reset a drive fault
- read/write parameters of the drive
- connect Drive composer pro tool
- synchronize real time clock.

The adapter module supports 10 Mbit/s and 100 Mbit/s data transfer rates and automatically detects the data transfer rate used in the network.

**Note:** PROFINET IO uses only 100 Mbit/s in the Full duplex mode.

The adapter module is installed into an option slot on the drive control unit. See the drive manuals for module placement options.

### ■ FPNO-21 layout



# 4

## Mechanical installation

---

### Contents of this chapter

This chapter contains a delivery checklist and instructions on installing the module.

### Necessary tools and instructions

You will need a Torx TX10 screwdriver to secure the FPNO-21 module to the drive. See also the drive hardware manual.

### Unpacking and examining the delivery

1. Open the option package.
2. Make sure that the package contains:
  - fieldbus module, type FPNO-21
  - quick guide.
3. Make sure that there are no signs of damage.

### Before you start

Install the module to a free option slot on the drive control unit. Plastic pins, a lock and one screw hold the module in place. The screw also makes an electrical connection between the module and drive frame for cable shield grounding.

Do not install the FPNO-21 module on the FEA-03 F-series extension adapter.

When the module is installed, it makes the signal and power connection to the drive through a 20-pin connector.

---



## Installing option modules



**WARNING!**

Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur.

Pay attention to the free space required by the cabling or terminals coming to the option modules.

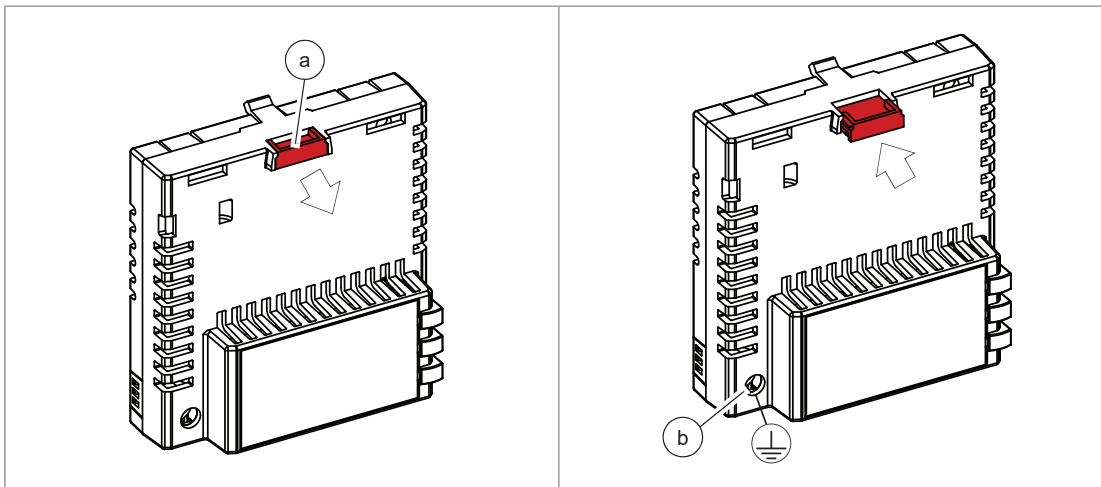
1. Repeat the steps described in the electrical safety precautions of the drive.
2. Pull out the lock (a).
3. Install the module to a free option module slot on the control unit.
4. Push in the lock (a).
5. Tighten the grounding screw (b) to a torque of 0.8 N·m (7 lbf·in).

**Note:** The screw tightens the connections and grounds the module. It is essential for fulfilling the EMC requirements and for proper operation of the module.



**WARNING!**

Do not use excessive force, or leave the screw too loose. Over-tightening can damage the screw or module. A loose screw can cause an operation failure.



6. Connect the wiring to the module. Obey the instructions given in this manual.

# 5

## Electrical installation

---

### Contents of this chapter

This chapter contains general cabling instructions and instructions on connecting the FPNO-21 module to the Ethernet network and the drive.

### Necessary tools and instructions

See the drive hardware manual.

### General cabling instructions

- Arrange the bus cables as far away from the motor cables as possible.
- Avoid parallel runs.
- Use grommets at cable entries.

### Connecting the FPNO-21 to the network

---

**WARNING!**

Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur.

---

The network cable can be CAT5 or higher, braided and foiled shield, with minimum AWG 22 / 0.32mm<sup>2</sup>. Use a PROFINET-certified cable. The cable shield is connected to the drive frame through an RC network. It is recommended to use a dedicated PROFINET-cable for PROFINET installation.

---



**Note:** Further information on PROFINET-wiring is available from the PROFIBUS organization publications at <https://www.profibus.com/download/profinet-installation-guidelines/>

- Design guideline, Order no. 8.062
  - Installation guideline for cabling and assembly, Order no. 8.072
  - Commissioning guide, Order no. 8.082
1. Connect the network cable to the RJ-45 connector (X1) on the adapter module.
  2. If you want to create a daisy chain with FPNO-21 adapter modules, connect the X2 connector of the first adapter module to X1 on the next adapter module, and so on.

**Note:** If a device in the daisy chain is powered off or fails, the rest of the chain is disconnected from the network. In applications where this is not acceptable, consider using ring topology instead.





# 6

## PROFINET IO – Start-up

---

### Contents of this chapter

This chapter contains:

- information on configuring the drive for operation with the adapter module
- drive-specific instructions on starting up the drive with the adapter module
- examples of configuring the master station for communication with the adapter module.

### Warnings

---

**WARNING!**

Obey the safety instructions given in this manual and the drive documentation.

---

### Drive configuration

The information in this section applies to all drive types compatible with the FPNO-21 module, unless otherwise stated.

#### ■ PROFINET IO connection configuration

After the adapter module has been mechanically and electrically installed, you must prepare the drive for communication with the module.

The detailed procedure of activating the module for PROFINET IO communication with the drive depends on the drive type. Normally, you must set the PROFINET parameters to establish the communication. See the [Starting up fieldbus communication for drives](#) (page 35).

---

Once communication between the drive and the adapter module has been established, several configuration parameters are shown to user. These parameters are listed in the tables below and must be checked first and adjusted where necessary. You can adjust the parameters via a drive control panel, a web user interface, or a PC tool.

- The new parameter settings take effect only when you power up the module the next time or when you activate the fieldbus adapter refresh parameter.

### FPNO-21 configuration parameters – group A (group 1)

**Note:** The actual parameter group number depends on the drive type. Group A (group 1) corresponds to:

- parameter group 51 in ACS380, ACS480, ACH580, ACQ580 and ACS580.
- parameter group 51 in ACS880 if the adapter is installed as fieldbus adapter A or group 54 if the adapter is installed as fieldbus adapter B.

No.	Name/Value	Description	Default
01	FBA type	<b>Read-only.</b> Shows the fieldbus adapter type as detected by the drive. The value cannot be adjusted by the user. If the value is 0 = None, the communication between the drive and the module has not been established.	<b>132</b> = PROFINET IO
02	Protocol.Profile	Selects the application protocol and communication profile for the network connection. The selections available for PROFINET IO communication are listed below.	<b>11</b> = PNIO ABB Pro
	<b>10</b> = PNIO Pdrive	PROFINET IO protocol: PROFIdrive profile	
	<b>11</b> = PNIO ABB Pro	PROFINET IO protocol: ABB Drives profile	
	<b>12</b> = PNIO T16	PROFINET IO protocol: Transparent 16-bit profile	
	<b>13</b> = PNIO T32	PROFINET IO protocol: Transparent 32-bit profile	
	<b>14</b> = PNIO PdriveM	PROFINET IO protocol: PROFIdrive positioning mode	
03	Commrate	Sets the bit rate for the Ethernet interface.	<b>0</b> = Auto
	<b>0</b> = Auto	Auto-negotiate	
	<b>1</b> = 100 Mbps FD	100 Mbps, full duplex	
	<b>2</b> = 100 Mbps HD	100 Mbps, half duplex	
	<b>3</b> = 10 Mbps FD	10 Mbps, full duplex	
	<b>4</b> = 10 Mbps HD	10 Mbps, half duplex	

No.	Name/Value	Description	Default
04	IP configuration	<p>Sets the method for configuring the IP address, subnet mask and gateway address for the module. In a PROFINET IO network, the master controller has a Duplicate Address Detection mechanism.</p> <p><b>Note:</b> It is recommended to use IP setting for PROFINET as Static IP and address 0.0.0.0. Use PLC hardware configuration to set the IP address for each device in the network.</p>	0 = Static IP
	0 = Static IP	<p>Configuration will be obtained from parameters 05...13 or from the PLC via DCP. The DCP protocol allows the master controller to find every PROFINET IO device on a subnet. When the adapter module is configured for the PROFINET IO protocol, the IP address is transferred to the PROFINET IO communication stack.</p> <p>If there is a need to change the IP address configured via DCP, it should be done with a DCP tool, such as Siemens Step7. If some of the other methods are used to change the IP address, the module must be restarted to enable any changes.</p>	
	2 = Temp IP	<p>IP address is set as Temporary through DCP by the controller.</p> <p>Parameters 05...13 shows the set IP. After reboot this setting goes back to static IP and address 0.0.0.0 is taken to use. This setting is not allowed to be set by the user.</p>	
05 ... 08	IP address 1	<p>An IP address is assigned to each IP node on a network. An IP address is a 32-bit number that is typically represented in “dotted decimal” notation consisting of four decimal integers, on the range 0...255, separated by periods. Each integer represents the value of one octet (8-bits) in the IP address. Parameters 05...08 define the four octets of the IP address.</p>	0
	0...255	IP address	
	...	...	...
	IP address 4	See parameter 05 IP address 1.	0
	0...255	IP address	

28 PROFINET IO – Start-up

No.	Name/Value	Description	Default																																																																				
09	Subnet CIDR	Subnet masks are used for splitting networks into smaller networks called subnets. A subnet mask is a 32-bit binary number that splits the IP address into a network address and host address. Subnet masks are typically represented in either dotted decimal notation or the more compact CIDR notation, as shown in the table below.	0																																																																				
		<table border="1"> <thead> <tr> <th>CIDR</th> <th>Dotted decimal</th> <th>CIDR</th> <th>Dotted decimal</th> </tr> </thead> <tbody> <tr> <td>31</td> <td>255.255.255.254</td> <td>15</td> <td>255.254.0.0</td> </tr> <tr> <td>30</td> <td>255.255.255.252</td> <td>14</td> <td>255.252.0.0</td> </tr> <tr> <td>29</td> <td>255.255.255.248</td> <td>13</td> <td>255.248.0.0</td> </tr> <tr> <td>28</td> <td>255.255.255.240</td> <td>12</td> <td>255.240.0.0</td> </tr> <tr> <td>27</td> <td>255.255.255.224</td> <td>11</td> <td>255.224.0.0</td> </tr> <tr> <td>26</td> <td>255.255.255.192</td> <td>10</td> <td>255.192.0.0</td> </tr> <tr> <td>25</td> <td>255.255.255.128</td> <td>9</td> <td>255.128.0.0</td> </tr> <tr> <td>24</td> <td>255.255.255.0</td> <td>8</td> <td>255.0.0.0</td> </tr> <tr> <td>23</td> <td>255.255.254.0</td> <td>7</td> <td>254.0.0.0</td> </tr> <tr> <td>22</td> <td>255.255.252.0</td> <td>6</td> <td>252.0.0.0</td> </tr> <tr> <td>21</td> <td>255.255.248.0</td> <td>5</td> <td>248.0.0.0</td> </tr> <tr> <td>20</td> <td>255.255.240.0</td> <td>4</td> <td>240.0.0.0</td> </tr> <tr> <td>19</td> <td>255.255.224.0</td> <td>3</td> <td>224.0.0.0</td> </tr> <tr> <td>18</td> <td>255.255.192.0</td> <td>2</td> <td>192.0.0.0</td> </tr> <tr> <td>17</td> <td>255.255.128.0</td> <td>1</td> <td>128.0.0.0</td> </tr> <tr> <td>16</td> <td>255.255.0.0</td> <td></td> <td></td> </tr> </tbody> </table>	CIDR	Dotted decimal	CIDR	Dotted decimal	31	255.255.255.254	15	255.254.0.0	30	255.255.255.252	14	255.252.0.0	29	255.255.255.248	13	255.248.0.0	28	255.255.255.240	12	255.240.0.0	27	255.255.255.224	11	255.224.0.0	26	255.255.255.192	10	255.192.0.0	25	255.255.255.128	9	255.128.0.0	24	255.255.255.0	8	255.0.0.0	23	255.255.254.0	7	254.0.0.0	22	255.255.252.0	6	252.0.0.0	21	255.255.248.0	5	248.0.0.0	20	255.255.240.0	4	240.0.0.0	19	255.255.224.0	3	224.0.0.0	18	255.255.192.0	2	192.0.0.0	17	255.255.128.0	1	128.0.0.0	16	255.255.0.0			
	CIDR	Dotted decimal	CIDR	Dotted decimal																																																																			
	31	255.255.255.254	15	255.254.0.0																																																																			
	30	255.255.255.252	14	255.252.0.0																																																																			
	29	255.255.255.248	13	255.248.0.0																																																																			
	28	255.255.255.240	12	255.240.0.0																																																																			
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	26	255.255.255.192	10	255.192.0.0																																																																			
	25	255.255.255.128	9	255.128.0.0																																																																			
	24	255.255.255.0	8	255.0.0.0																																																																			
	23	255.255.254.0	7	254.0.0.0																																																																			
	22	255.255.252.0	6	252.0.0.0																																																																			
	21	255.255.248.0	5	248.0.0.0																																																																			
	20	255.255.240.0	4	240.0.0.0																																																																			
	19	255.255.224.0	3	224.0.0.0																																																																			
	18	255.255.192.0	2	192.0.0.0																																																																			
17	255.255.128.0	1	128.0.0.0																																																																				
16	255.255.0.0																																																																						
1...31	Subnet mask in CIDR notation																																																																						
10 ... 13	GW address 1	IP gateways connect individual physical IP subnets into a unified IP network. When an IP node needs to communicate with an IP node on another subnet, the IP node sends the data to the IP gateway for forwarding. Parameters 10...13 define the four octets of the gateway address.	0																																																																				
	0...255	GW address																																																																					
	...	...	...																																																																				
	GW address 4	See parameter 10 GW address 1.	0																																																																				
	0...255	GW address																																																																					
14	Commrate 2	Sets the bit rate for the Ethernet port 2.	0 = Auto																																																																				
	0 = Auto	Autonegotiate																																																																					
	1 = 100 Mbps FD	100 Mbps, full duplex																																																																					
	2 = 100 Mbps HD	100 Mbps, half duplex																																																																					
	3 = 10 Mbps FD	10 Mbps, full duplex																																																																					
	4 = 10 Mbps HD	10 Mbps, half duplex																																																																					

No.	Name/Value	Description	Default
15	Service configuration	<p>Disables services that are not required.</p> <p>Each service is represented by a single bit. Bit 0, Lock configuration, can be used to prevent accidental changing of this parameter.</p> <p>By default, all services are enabled and configuration is unlocked.</p> <p>ABB recommends to disable all services that are not used after commissioning.</p>	
	<b>Bit</b>	<b>Name</b>	<b>Information</b>
	0	Lock configuration	Changing this bit to one will lock service configuration and no bit can be changed. Only resetting the fieldbus configuration will unlock the parameter. To reset the fieldbus configuration, choose "Reset all fieldbus settings" or "Clear all" in parameter 96.06 Parameter restore.
	1	Disable IP config tool	When this bit is set, access from ABB IP Configuration tool is prevented.
	2	Disable ETH tool network	When this bit is set, access from Ethernet tool network (eg, ABB Drive Composer tool) is prevented.
	3	Disable ping response	When this bit is set, response to ICMP (ping) message is prevented.
	4	Unsecured ETH tool network	When this bit is set, access from Ethernet tool network is unsecured. <b>Note:</b> Drive Composer pro before V2.7 supports unsecured communication only.
	5	Disable configuring web pages	When this bit is set, access to web pages is disabled.
	000000b ... 111111b	Service configuration	
16	Module emulation	Emulation mode for PROFINET IO identification data of FENA-xx modules. Can be used to connect PLC programs made for FENA-xx to FPNO-21.	0 = No emulation
	0 = No emulation	FPNO-21 native identification data used. Use FPNO-21 GSDML to configure PLC.	
	1 = FENA-01	FENA-01 identification data used, use when PLC is configured for FENA-01. Connect only port 1 to Profinet network.	
	2 = FENA-11	FENA-11 identification data used, use when PLC is configured for FENA-11. Connect only port 1 to Profinet network.	
	3 = FENA-21	FENA-21 identification data used, use when PLC is configured for FENA-21.	
17 18	Reserved	These parameters are not used by the adapter module when the module is configured for PROFINET IO.	N/A

### 30 PROFINET IO – Start-up

No.	Name/Value	Description	Default
19	T16 scale	Defines the scaling for reference 1 and actual 1 with Transparent 16 profile. (Protocol.Profile = PNIO T16) Scaling also depends on the selected Reference type on 50.04 FBA A Ref 1 type and 50.34 FBA B Ref 1 type and 50.07 and 50.37 for the actual 1. Ref type = Transparent $FBA\_A/B\_Ref1 = Ref1\_from\_PLC * (T16\_Scale + 1)$ Ref type = General $FBA\_A/B\_Ref1 = Ref1\_from\_PLC * (T16\_Scale + 1) / 100$	99
	0...65535	Reference multiplier/actual value divisor	
20	Telegram type	<b>Read-only.</b> Indicates the telegram type selected for PROFINET IO communication. The adapter module automatically detects the telegram type defined in the PLC. For more information on the supported PPO message types, see section <a href="#">PPO types (page 91)</a> .	0 = Unknown
	0 = Unknown	Cyclical communication between the master and the module has not been established yet.	
	3 = PPO3	PPO3 selected	
	4 = PPO4	PPO4 selected	
	6 = PPO6	PPO6 selected	
	7 = PPO7	PPO7 selected	
	8 = ST1	ST1 selected	
	9 = ST2	ST2 selected	
21	Diagnostic alarm	Disables the PROFIdrive alarm mechanism which generates alarms in case of drive faults. But the standard PROFINET alarms are still sent. For more information on the diagnostics and alarm mechanism for PROFIdrive, see section <a href="#">Diagnostic and alarm mechanism (page 110)</a> .	0 = Enabled
	0 = Enabled	PROFIdrive alarms are enabled.	
	1 = Disabled	PROFIdrive alarms are disabled.	
22	Map selection	Defines the preferred data type of mapped parameters when mapping is done through PROFIdrive parameters.	1 = 16bit
	0 = 32bit	32 bits	
	1 = 16bit	16 bits	
23 ... 24	Reserved	This parameter is not used by the adapter module when the module is configured for PROFINET IO.	N/A

No.	Name/Value	Description	Default
25	PN Name Index	<p>Allows to use pre-defined format of the PROFINET station name.</p> <p>By default this value is 0 and the station name is set from the network. When the value is set to other than 0, the PROFINET station name is overwritten in the format “abdrive-xx”, where xx is the value of the parameter name index.</p> <p>Example: Setting this value to 12 results in the name “abdrive-12”.</p> <p><b>Note:</b> During every boot the FPNO-21 module checks the value of PN Name Index,</p> <ul style="list-style-type: none"> <li>• If the value is not Zero then the active PN Name Index overrides the PROFINET station name.</li> <li>• If the new name is set by DCP Set command as permanent, the new name is used and stored to flash. The PN Name Index parameter value is not changed, so after next boot, the name is taken according to the PN Name Index.</li> <li>• If the new name is set by DCP Set command as temporary, the new name is used and the empty name is stored to flash. The PN Name Index parameter value is not changed, so after next boot name is taken according to the PN Name Index.</li> <li>• The PROFINET DCP factory reset also resets the PN Name Index value to default (0).</li> </ul>	0
	0...65535		
26	Reserved	Reserved for web page functionality. For more information, see <a href="#">Appendix C - FPNO-21 configuration web pages (page 141)</a> .	N/A
27	FBA A/B par refresh	<p>Validates any changed adapter module configuration parameter settings. After refreshing, the value reverts automatically to 0 = Done.</p> <p><b>Note:</b> This parameter cannot be changed while the drive is running.</p>	0 = Done
	0 = Done	Refreshing done	
	1 = Refresh	Refreshing	
28	FBA A/B par table ver	<p><b>Read-only.</b> Displays the parameter table revision of the fieldbus adapter module mapping file stored in the memory of the drive. In format <b>xyz</b>, where</p> <p><b>x</b> = major revision number  <b>y</b> = minor revision number  <b>z</b> = correction number</p> <p>OR</p> <p>in format <b>axyz</b>, where</p> <p><b>a</b> = major revision number  <b>xy</b> = minor revision numbers  <b>z</b> = correction number or letter.</p>	N/A
		Parameter table revision	

### 32 PROFINET IO – Start-up

No.	Name/Value	Description	Default
29	FBA A/B drive type code	<b>Read-only.</b> Displays the drive type code of the fieldbus adapter module mapping file stored in the memory of the drive.	N/A
		Drive type code of the fieldbus adapter module mapping file	
30	FBA A/B mapping file ver	<b>Read-only.</b> Displays the fieldbus adapter module mapping file revision stored in the memory of the drive in decimal format.	N/A
		Mapping file revision	
31	D2FBA A/B comm status	<b>Read-only.</b> Displays the status of the fieldbus adapter module communication. <b>Note:</b> The value names may vary by drive. <b>Note:</b> Only active drive-controlled channel will change comm status <i>online</i> . PROFIsafe alone will not change the comm status.	<b>0</b> = Idle or <b>4</b> = Offline
	<b>0</b> = Idle	Adapter is not configured	
	<b>1</b> = Exec.init	Adapter is initializing.	
	<b>2</b> = Time out	A timeout has occurred in the communication between the adapter and the drive.	
	<b>3</b> = Conf.err	There is an internal error in the communication between the adapter and the drive. Contact your local ABB representative.	
	<b>4</b> = Off-line	Adapter is off-line	
	<b>5</b> = On-line	Adapter is on-line	
	<b>6</b> = Reset	Adapter is performing a hardware reset.	
32	FBA A/B comm SW ver	<b>Read-only.</b> Displays patch and build numbers of the adapter module's firmware version in <b>xyy</b> format, where: <b>xx</b> = patch number <b>yy</b> = build number. Example: If the firmware version (<major>.<minor>.<patch>.<build>) is 3.10.200.13, the value C80D is displayed. If the version is 3.10.0.0, the value 0 is displayed. See also parameter 33.	N/A
33	FBA A/B appl SW ver	<b>Read-only.</b> Displays major and minor revision numbers of the adapter module's firmware version in <b>xyy</b> format, where: <b>xx</b> = major revision number <b>yy</b> = minor revision number Example: If the firmware version (<major>.<minor>.<patch>.<build>) is 3.10.200.13 or 3.10.0.0, the value 310 is displayed. See also parameter 32.	N/A



**FPNO-21 configuration parameters – group B (group 2)**

Note: The actual parameter group number depends on the drive type. Group B (group 2) corresponds to:

- parameter group 53 in ACS380, ACS480, ACH580, ACQ580 and ACS580
- parameter group 53 in ACS880 if the adapter is installed as fieldbus adapter A or group 56 if the adapter is installed as fieldbus adapter B.

No. 1)	Name/Value	Description	Default						
01	FBA data out 1 (master to drive)	Selects the resolution of control word (16 bit or 32 bit) received by the drive.	1 or 11 <sup>2)</sup>						
	<b>1</b> = CW 16bit	Control word (16 bits)							
	<b>11</b> = CW 32bit	Control word (32 bits)							
02	FBA data out 2	Selects data word 1 received by the drive over the PROFINET network. The content is defined by a decimal number in the range of 0 to 9999 as follows: <table border="1" data-bbox="635 891 1206 1048"> <tr> <td>0</td> <td>Not used</td> </tr> <tr> <td>1...99</td> <td>Virtual address area of drive control</td> </tr> <tr> <td>101...9999</td> <td>Parameter area of the drive</td> </tr> </table>	0	Not used	1...99	Virtual address area of drive control	101...9999	Parameter area of the drive	0 or 2
	0	Not used							
	1...99	Virtual address area of drive control							
	101...9999	Parameter area of the drive							
	<b>0</b> = None	Not used							
	<b>1</b> = CW 16bit	Control word (16 bits)							
	<b>2</b> = Ref1 16bit	Reference REF1 (16 bits)							
	<b>3</b> = Ref2 16bit	Reference REF2 (16 bits)							
	<b>11</b> = CW 32bit	Control word (32 bits)							
	<b>12</b> = Ref1 32bit	Reference REF1(32 bits)							
	<b>13</b> = Ref2 32bit	Reference REF2 (32 bits)							
<b>21</b> = CW2 16bit	Control word 2 (16 bits)								
101...9999	Parameter index with format <b>xyyy</b> , where <ul style="list-style-type: none"> <li>• <b>xx</b> is the parameter group number (1...99)</li> <li>• <b>yy</b> is the parameter number index within that group (01...99).</li> </ul>								
Other	Path to parameter area selection.								
03 ... 10	FBA data out 3 ... FBA data out12	See parameter 02 FBA data out 1.	0						

<sup>1)</sup> The number of parameters in this group may vary by drive type and drive firmware.

<sup>2)</sup> 11 (CW 32bit) is the default setting if the Transparent32 profile is used.

**FPNO-21 configuration parameters – group C (group 3)**

**Note:** The actual parameter group number depends on the drive type. Group C (group 3) corresponds to:

- parameter group 52 in ACS380, ACS480, ACH580, ACQ580 and ACS580
- parameter group 52 in ACS880 if the adapter is installed as fieldbus adapter A or group 55 if the adapter is installed as fieldbus adapter B.

No. <sup>1)</sup>	Name/Value	Description	Default						
01	FBA data in 1 (drive to master)	Selects the resolution of status word (16 bit or 32 bit) sent by the drive.	4 or 14 <sup>2)</sup>						
	4 = SW 16bit	Status word (16 bits)							
	14 = SW 32bit	Status word (32 bits)							
02	FBA data in 2 (drive to master)	Selects data word 1 sent by the drive over the PROFINET network. The content is defined by a decimal number in the range of 0 to 9999 as follows: <table border="1" data-bbox="486 974 1053 1137"> <tr> <td>0</td> <td>Not used</td> </tr> <tr> <td>1...99</td> <td>Virtual address area of drive control</td> </tr> <tr> <td>101...9999</td> <td>Parameter area of the drive</td> </tr> </table>	0	Not used	1...99	Virtual address area of drive control	101...9999	Parameter area of the drive	0 or 5
0	Not used								
1...99	Virtual address area of drive control								
101...9999	Parameter area of the drive								
	0 = None	Not used							
	4 = SW 16bit	Status word (16 bits)							
	5 = Act1 16bit	Actual value ACT1 (16 bits)							
	6 = Act2 16bit	Actual value ACT2 (16 bits)							
	14 = SW 32bit	Status word (32 bits)							
	15 = Act1 32bit	Actual value ACT1 (32 bits)							
	16 = Act2 32bit	Actual value ACT2 (32 bits)							
	24 = SW2 16bit	Status word 2 (16 bits)							
	101...9999	Parameter index with format <b>xyyy</b> , where <ul style="list-style-type: none"> <li><b>xx</b> is the parameter group number (1...99)</li> <li><b>yyy</b> is the parameter number index within that group (01...99).</li> </ul>							
	Other	Path to parameter area selection.							
03 ... 10	DATA IN 3... DATA IN 12	See parameter 01 FBA data in 1.	0						

<sup>1)</sup> The number of parameters in this group may vary by drive type and drive firmware.

<sup>2)</sup> 14 (SW 32bit) is the default setting if the Transparent32 profile is used.

## ■ Control locations

ABB drives can receive control information from multiple sources including digital inputs, analog inputs, the drive control panel and a fieldbus adapter module. ABB drives allow the user to separately determine the source for each type of control information (Start, Stop, Direction, Reference, Fault reset, etc.).

To give the fieldbus master the most complete control over the drive, you must select the adapter module as the source of this information. The drive-specific parameter setting examples below contain the drive control parameters relevant in the examples. For a complete parameter list, see the drive documentation.

## Starting up fieldbus communication for drives

1. Power up the drive.
  2. Enable the communication between the adapter module and the drive by selecting the correct slot number in parameter **50.01 FBA A enable**.  
The selection must correspond to the slot where the adapter module is installed. For example, if the adapter module is installed in slot 2, you must select "slot 2".
  3. With parameter **50.02 FBA A comm loss func**, select how the drive reacts to a fieldbus communication break.  
Note that this function monitors both communication between the fieldbus master and the adapter module and communication between the adapter module and the drive.
  4. With parameter **50.03 FBA A comm loss t out**, define the time between communication break detection and the selected action.
  5. Select application-specific values for the rest of the parameters in group 50, starting from **50.04**.  
Examples of appropriate values are shown in the tables below.
  6. Set the module configuration parameters in group 51.  
At the minimum, select the communication protocol and profile with parameter **51.02 Protocol/Profile** and configure the network settings with parameters **51.03...51.13**.
  7. Define the process data transferred to and from the drive in parameter groups 52 and 53.  
**Note:** The adapter module automatically sets the communication profile-specific virtual address for the Status word in parameter **52.01** and for the Control word in parameter **53.01**.
  8. Save the valid parameter values to permanent memory with parameter **96.07 Parameter save manually**.
  9. Validate the settings made in parameter groups 51, 52 and 53 with parameter **51.27 FBA A par refresh**.
  10. Set the relevant drive control parameters to control the drive according to the application.  
Examples of appropriate values are shown in the tables below.
-

## Parameter setting examples – ACS380, ACS480, ACH580, ACQ580, and ACS580

### ■ Frequency control using PROFIdrive communication profile with PPO Type 4

This example shows how to configure a basic frequency control application that uses the PROFIdrive profile. In addition, some application-specific data is added to the communication.

The start/stop commands and reference are according to the PROFIdrive profile, speed control mode. For more information, see the PROFIdrive state machine on page 80.

The reference value  $\pm 16384$  (4000h) corresponds to parameter **46.02 Frequency scaling** in the forward and reverse directions.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control word	Frequency reference	Constant frequency 1 <sup>1)</sup>		Constant frequency 2 <sup>1)</sup>	
In	Status word	Frequency actual value	Power <sup>1)</sup>		DC bus voltage <sup>1)</sup>	

1) Example

The table below gives an example of the drive parameter settings.

Drive parameter	Setting for drives	Description
50.01 FBA A enable	<b>1</b> = Enable	Enables communication between the drive and the fieldbus adapter module.
50.04 FBA A ref1 type	<b>5</b> = Frequency	Selects the fieldbus A reference 1 type and scaling.
50.07 FBA A act1 type	<b>5</b> = Frequency	Selects the actual value type and scaling according to the currently active Ref1 mode defined in parameter 50.04.
51.01 FBA A type	<b>132</b> = PROFINET IO <sup>1)</sup>	Displays the type of the fieldbus adapter module.
51.02 Protocol/Profile	<b>10</b> = PNIO Pdrive	Selects the PROFINET IO protocol and the PROFIdrive profile.
51.03 Commrate	<b>0</b> = Auto	Ethernet communication rate is negotiated automatically by the device.
51.04 IP configuration	<b>0</b> = Static IP	Configuration will be obtained from parameters 51.05...13 or from the PLC via the DCP protocol.
52.01 FBA DATA IN1	<b>4</b> = SW 16bit	Status word
52.02 FBA DATA IN2	<b>5</b> = Act1 16bit	Actual value 1
52.03 FBA data in3	01.14	Output power
52.05 FBA data in5	01.11	DC voltage
53.01 FBA DATA out1	<b>1</b> = CW 16bit	Control word

Drive parameter	Setting for drives	Description
53.02 FBA DATA out2	<b>2</b> = Ref1 16bit	Reference 1 (frequency)
53.03 FBA data out3	28.26	Constant frequency 1
53.05 FBA data out5	28.27	Constant frequency 2
51.27 FBA A par refresh	<b>1</b> = Refresh	Validates the configuration parameter settings.
19.12 Ext1 control mode	<b>2</b> = Speed	Selects speed control as the control mode 1 for external control location 1.
20.01 Ext1 commands	<b>12</b> = Fieldbus A	Selects the fieldbus A interface as the source of the start and stop commands for external control location 1.
22.11 Speed ref1 source	<b>4</b> = FB A REF1	Selects the fieldbus A reference 1 as the source for speed reference 1.

<sup>1)</sup> Read-only or automatically detected/set

The start sequence for the parameter example above is given below.

Control word:

- Reset the fieldbus communication fault (if active).
- Enter 47Eh (1150 decimal) → READY TO SWITCH ON.  
Enter 47Fh (1151 decimal) → OPERATING.

## Parameter setting examples – ACS880

### ■ Speed control using PROFIdrive communication profile with PPO Type 4

This example shows how to configure a basic speed control application that uses the PROFIdrive profile. In addition, some application-specific data is added to the communication.

The start/stop commands and reference are according to the PROFIdrive profile, speed control mode. For more information, see the PROFIdrive state machine on page 80.

The reference value  $\pm 16384$  (4000h) corresponds to parameter **46.01 Speed scaling** in the forward and reverse directions.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control word	Speed reference	Constant speed 1 <sup>1)</sup>		Constant speed 2 <sup>1)</sup>	
In	Status word	Speed actual value	Power <sup>1)</sup>		DC bus voltage <sup>1)</sup>	

<sup>1)</sup> Example

The table below gives an example of the drive parameter settings.

### 38 PROFINET IO – Start-up

Drive parameter	Setting for drives	Description
50.01 FBA A enable	<b>1</b> = Option slot 2 <sup>2)</sup>	Enables communication between the drive and the fieldbus adapter module.
50.04 FBA A ref1 type	<b>4</b> = Speed	Selects the fieldbus A reference 1 type and scaling.
50.07 FBA A act1 type	<b>4</b> = Speed	Selects the actual value type and scaling according to the currently active Ref1 mode defined in parameter 50.04.
51.01 FBA A type	<b>132</b> = PROFINET IO <sup>1)</sup>	Displays the type of the fieldbus adapter module.
51.02 Protocol/Profile	<b>10</b> = PNIO Pdrive	Selects the PROFINET IO protocol and the PROFIdrive profile.
51.03 Commrate	<b>0</b> = Auto <sup>2)</sup>	Ethernet communication rate is negotiated automatically by the device.
51.04 IP configuration	<b>0</b> = Static IP	Configuration will be obtained from parameters 51.05...13 or from the PLC via the DCP protocol.
52.01 FBA DATA IN1	<b>4</b> = SW 16bit	Status word
52.02 FBA DATA IN2	<b>5</b> = Act1 16bit	Actual value 1
52.03 FBA data in3	01.14	Output power
52.05 FBA data in5	01.11	DC voltage
53.01 FBA DATA out1	<b>1</b> = CW 16bit	Control word
53.02 FBA DATA out2	<b>2</b> = Ref1 16bit	Reference 1 (speed)
53.03 FBA data out3	22.26	Constant speed 1
53.05 FBA data out5	22.27	Constant speed 2
51.27 FBA A par refresh	<b>1</b> = Refresh	Validates the configuration parameter settings.
19.12 Ext1 control mode	<b>2</b> = Speed	Selects speed control as the control mode 1 for external control location 1.
20.01 Ext1 commands	<b>12</b> = Fieldbus A	Selects the fieldbus A interface as the source of the start and stop commands for external control location 1.
22.11 Speed ref1 source	<b>4</b> = FB A REF1	Selects the fieldbus A reference 1 as the source for speed reference 1.

1) Read-only or automatically detected/set

2) Example

The start sequence for the parameter example above is given below.

Control word:

- Reset the fieldbus communication fault (if active).
- Enter 47Eh (1150 decimal) → READY TO SWITCH ON.  
Enter 47Fh (1151 decimal) → OPERATING.

## Configuring the master station

After the adapter module has been initialized by the drive, you must prepare the master station for communication with the module. Examples of an ABB AC500 PLC and Siemens SIMATIC S7 PLC are given below. If you are using another master system, refer to its documentation for more information.

The examples apply to all drive types compatible with the module.

### ■ Downloading the GSD file

Configuration of the master station requires a type definition (GSD) file. In PROFINET IO, the GSD file is written in XML-based language called GSDML.

Download the FPNO-21 GSD file from the Document library (<http://new.abb.com/drives/connectivity/fieldbus-connectivity/profinet>). The file name format is **GSDML-Vx.x-ABB-FPNO-yyyymmdd.xml**.

The GSD file describes the vendor-specific and PROFIdrive-specific features of the adapter module. Vendor-specific features can be used, for example, in the ABB Drives communication profile. The PROFIdrive profile supports a set of services described in the PROFIdrive specification.

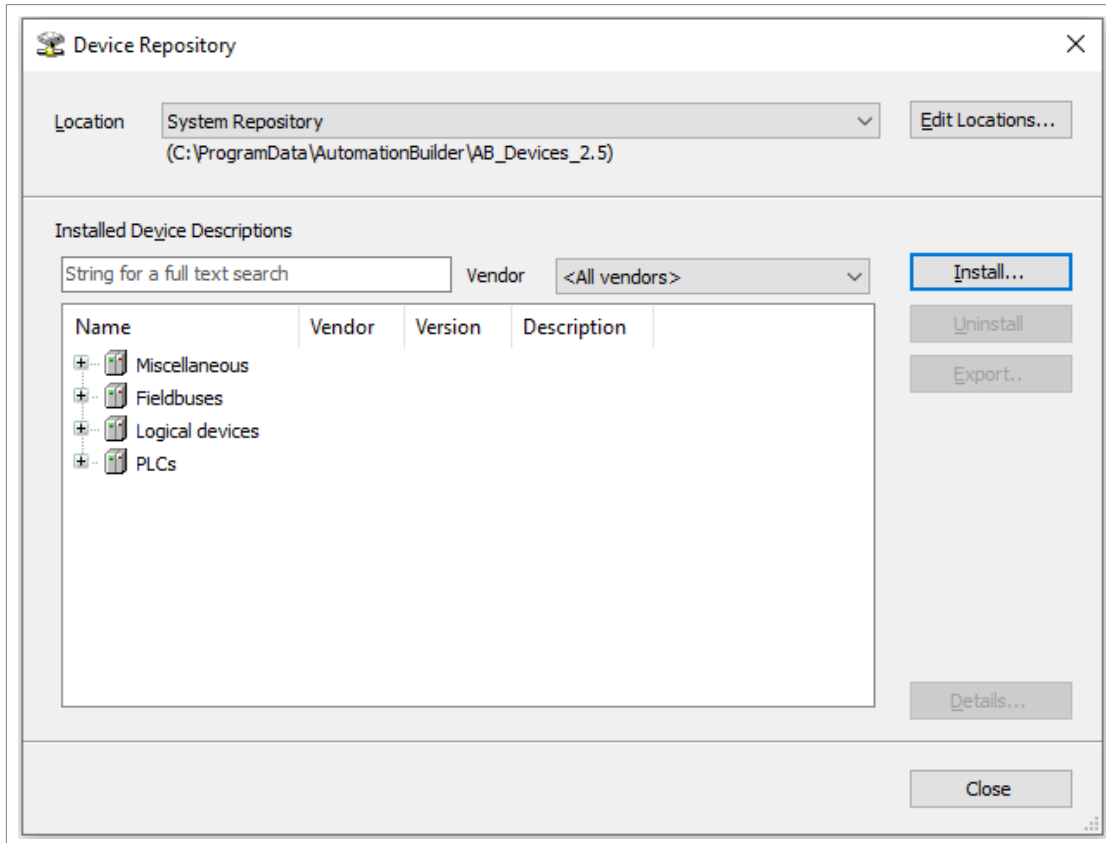
### ■ Configuring an ABB AC500 PLC

This example shows how to configure communication between an ABB AC500 PLC and the adapter module using Automation builder, software version 2.1.0 and later.

Before you start, make sure that you have downloaded the FPNO-21 GSD file from the Document library.

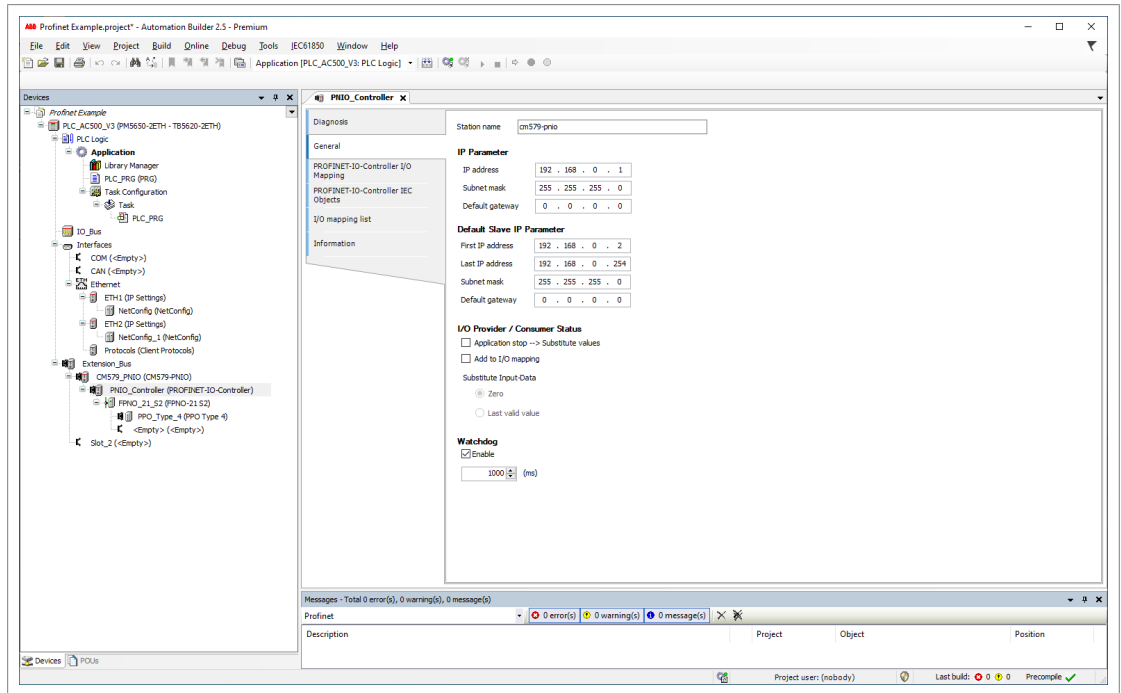
1. Start the ABB Automation Builder software.
  2. On the **Tools** menu, select **Device Repository**.
  3. In the window that opens, click **Install...** and browse for the GSD file.
-

## 40 PROFINET IO – Start-up



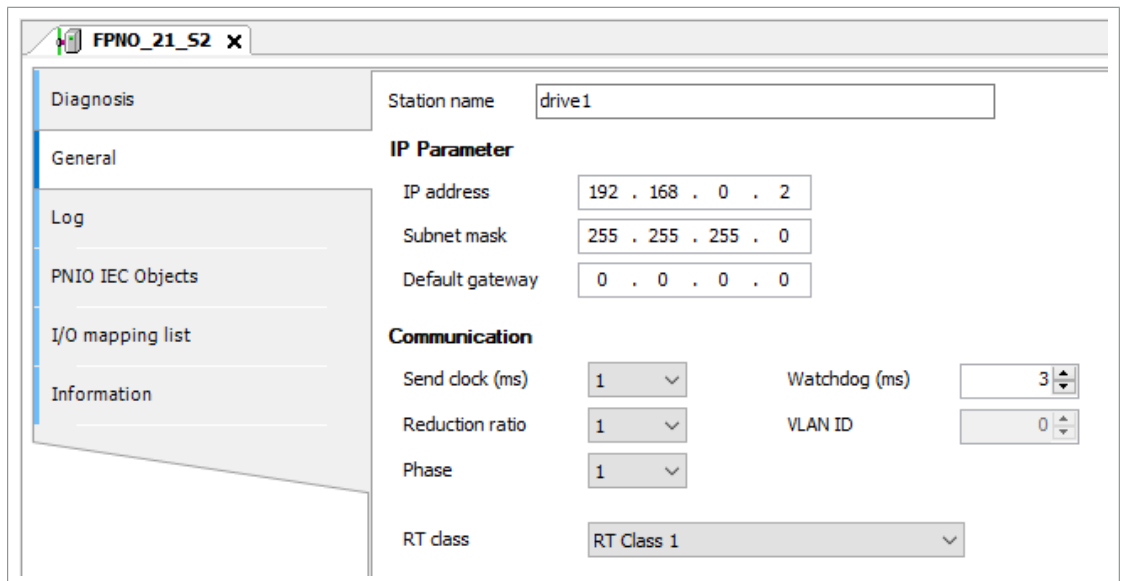
4. Open or create the PLC project that is used to control the drive.
5. Add the CM579-PNIO PROFINET master device to the PLC project, if necessary.
6. Add the adapter module to the PROFINET IO network.
7. Add the I/O module, for example, PPO Type 4 to the adapter module to define cyclical communication between the module and the PLC.
8. Define the CM579-PNIO master properties, such as the IP address and address settings for slaves.





9. Define the adapter module properties:

On the **PNIO identification** tab, select the IP address and Subnet mask, and type the Station name. **Note:** Use only small letters for the Station name.



10. Open the PLC program.

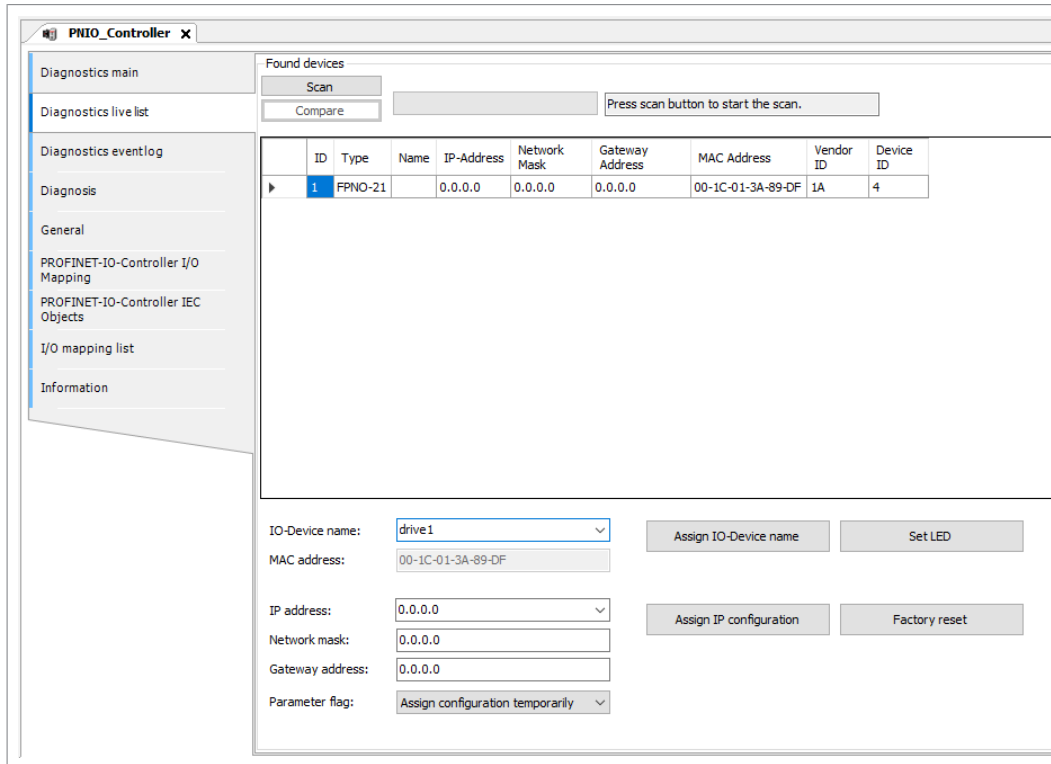
11. Compile the project and download it to the PLC.

This is necessary for you to be able to configure the CM579-PNIO master device and allow it to scan the network.

12. Return to the CM579-PNIO master properties. On the **Assign station name** tab, do the following tasks:

- Click **Connect to PLC (Login)** and select the communication link used between Automation builder and the PLC. Then, click **Scan slaves** to find all PROFINET slaves connected to the network.

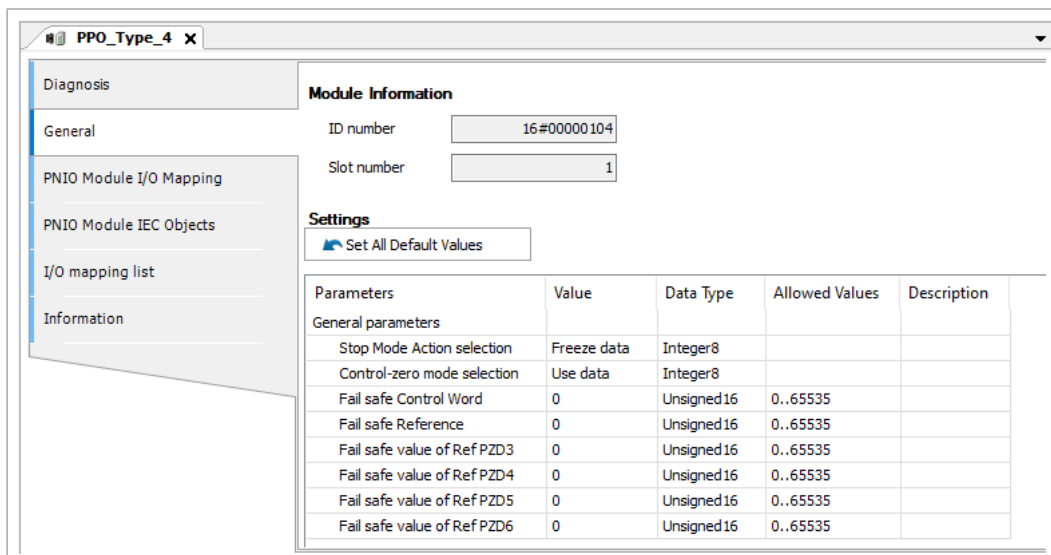
## 42 PROFINET IO – Start-up



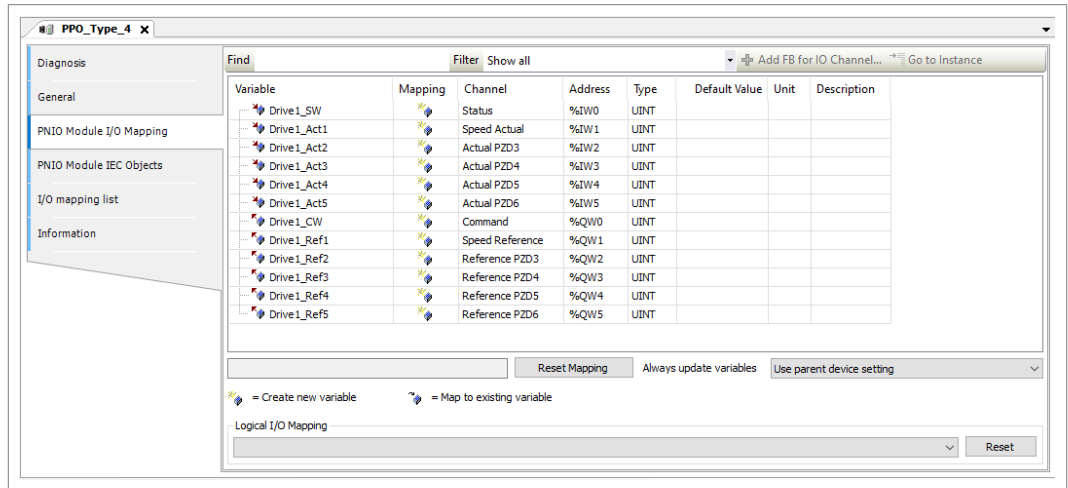
- In the **Configure station name** box, select the station name defined for the module in step 9, and then click **Assign station name**.
- In the **IP address** and **Network mask** boxes, select/type the IP address and subnet mask defined in step 9, and then click **Assign IP configuration**.

### 13. Define the I/O module properties:

- On the **PNIO parameters** tab, configure the Stop mode and Control-zero mode functionalities, and define fail safe values for the PLC output process data (PZDs).

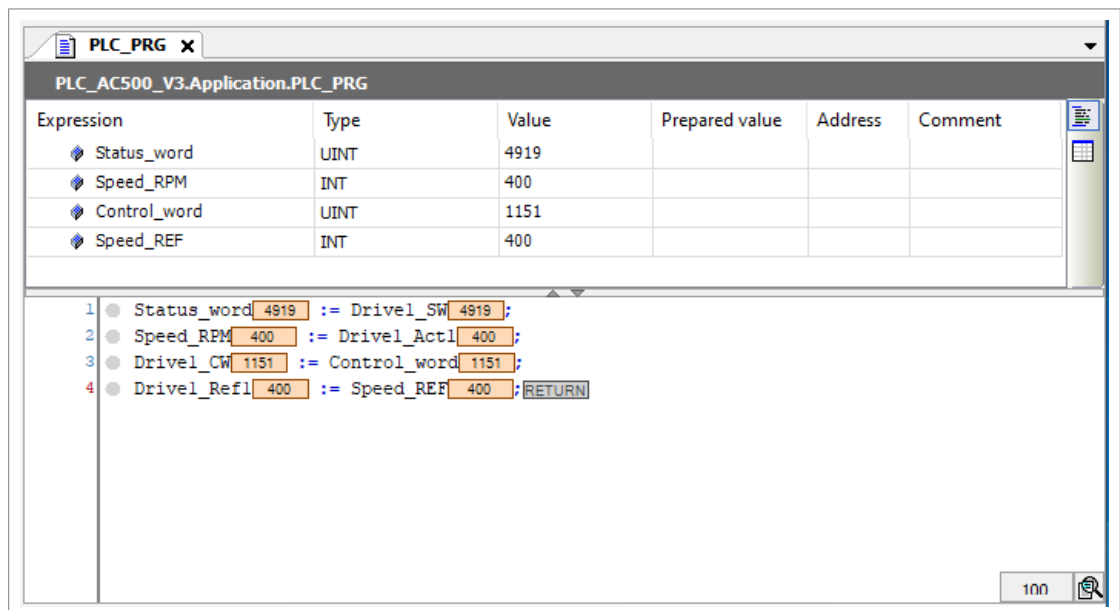


- On the **PNIO Module I/O Mapping** tab, type names for the variables that refer to the drive's signals in the PLC program.



14. Open the PLC program and create a program that controls the drive.
15. Compile the project and download it to the PLC.

**Note:** Make sure that the variable names defined for the drive's signals are used in the PLC program. Otherwise the communication will not work.



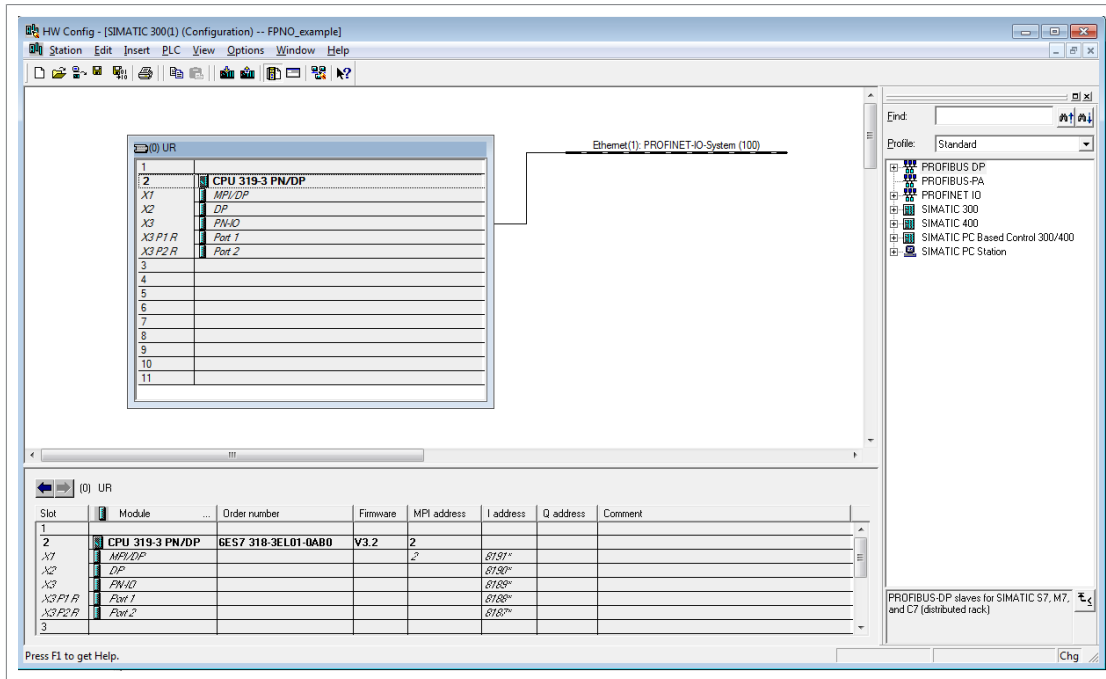
### ■ Configuring a Siemens SIMATIC S7 PLC

This example shows how to configure communication between a Siemens SIMATIC S7 PLC and the adapter module using SIMATIC Manager Step 7.

Before you start, make sure that you have downloaded the FPNO-21 GSD file from the Document library.

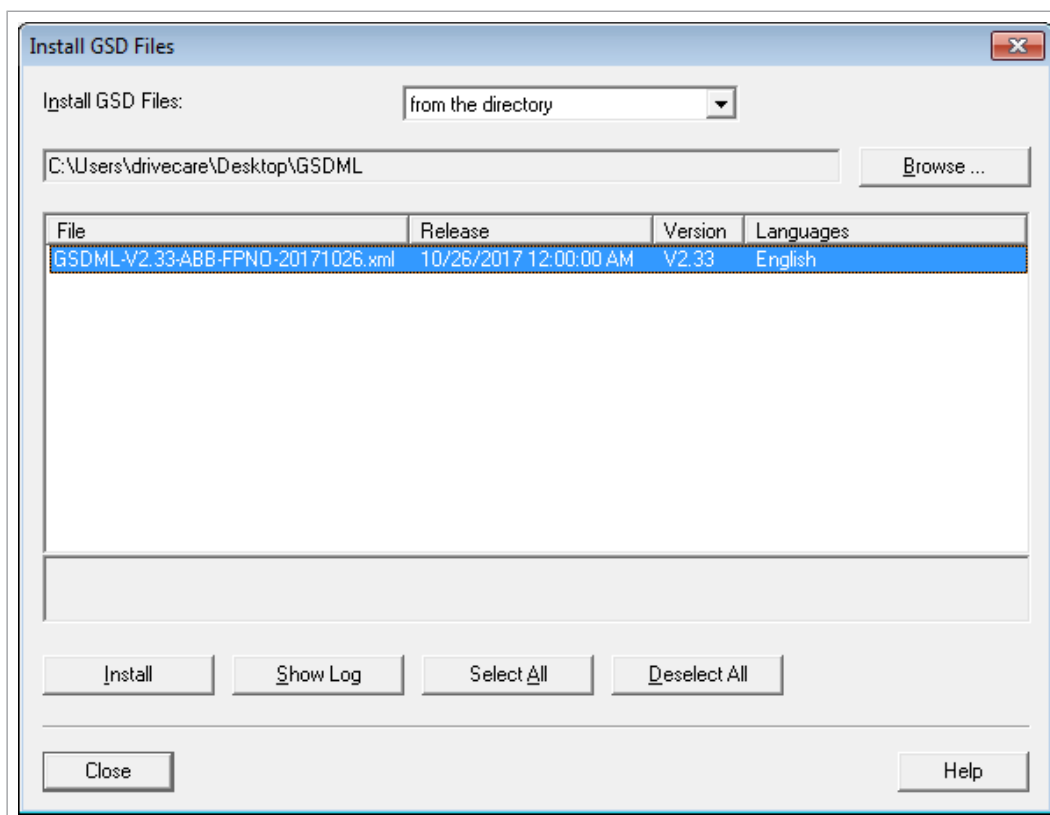
1. Start the SIMATIC manager and open/create a SIMATIC program.
2. Open the hardware configuration of the project.

## 44 PROFINET IO – Start-up

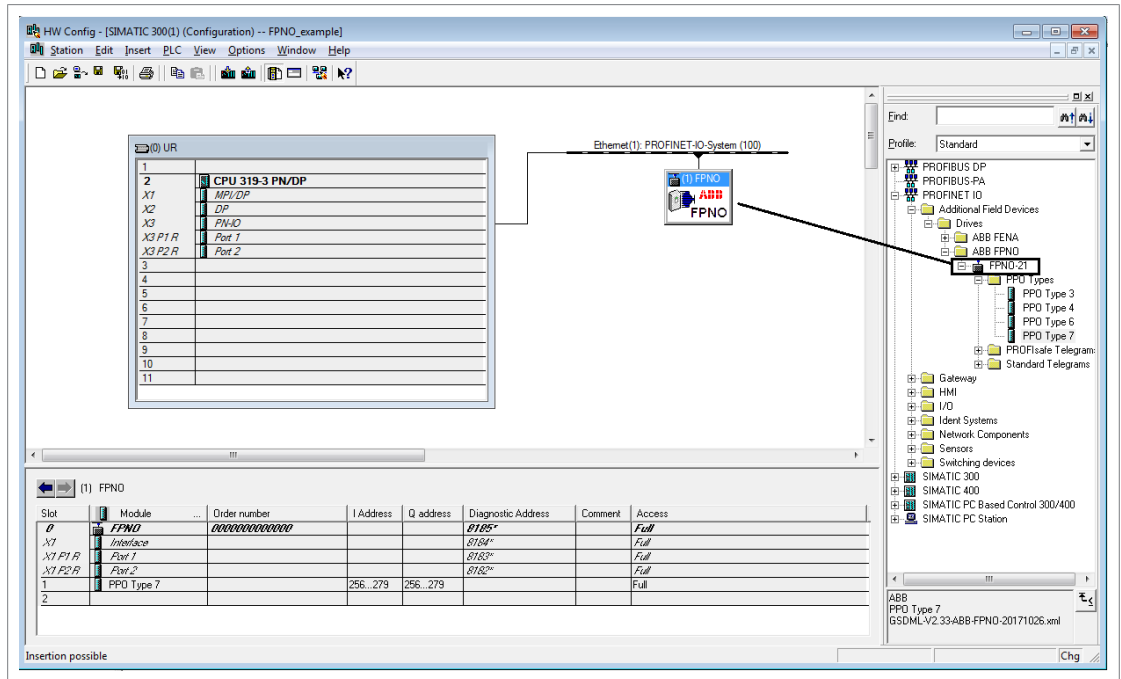


### 3. Install the FPNO-21 GSD file:

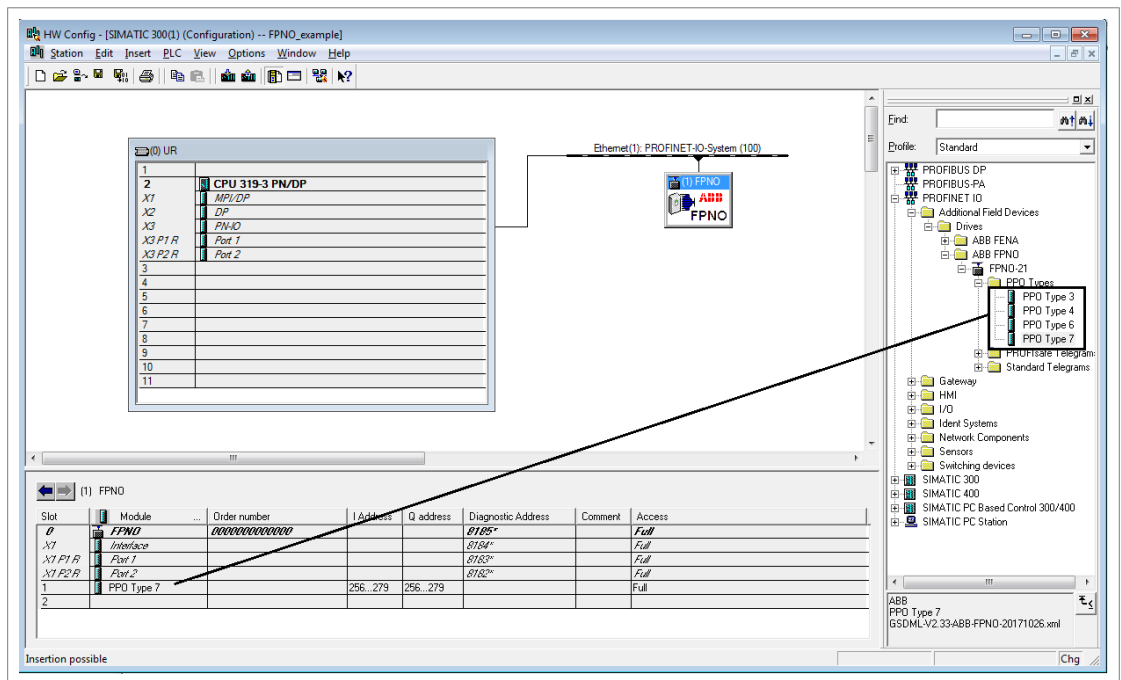
- On the **Options** menu, select **Install GSD Files**.
- Browse for the GSD file downloaded from the Document library and click **Install**.



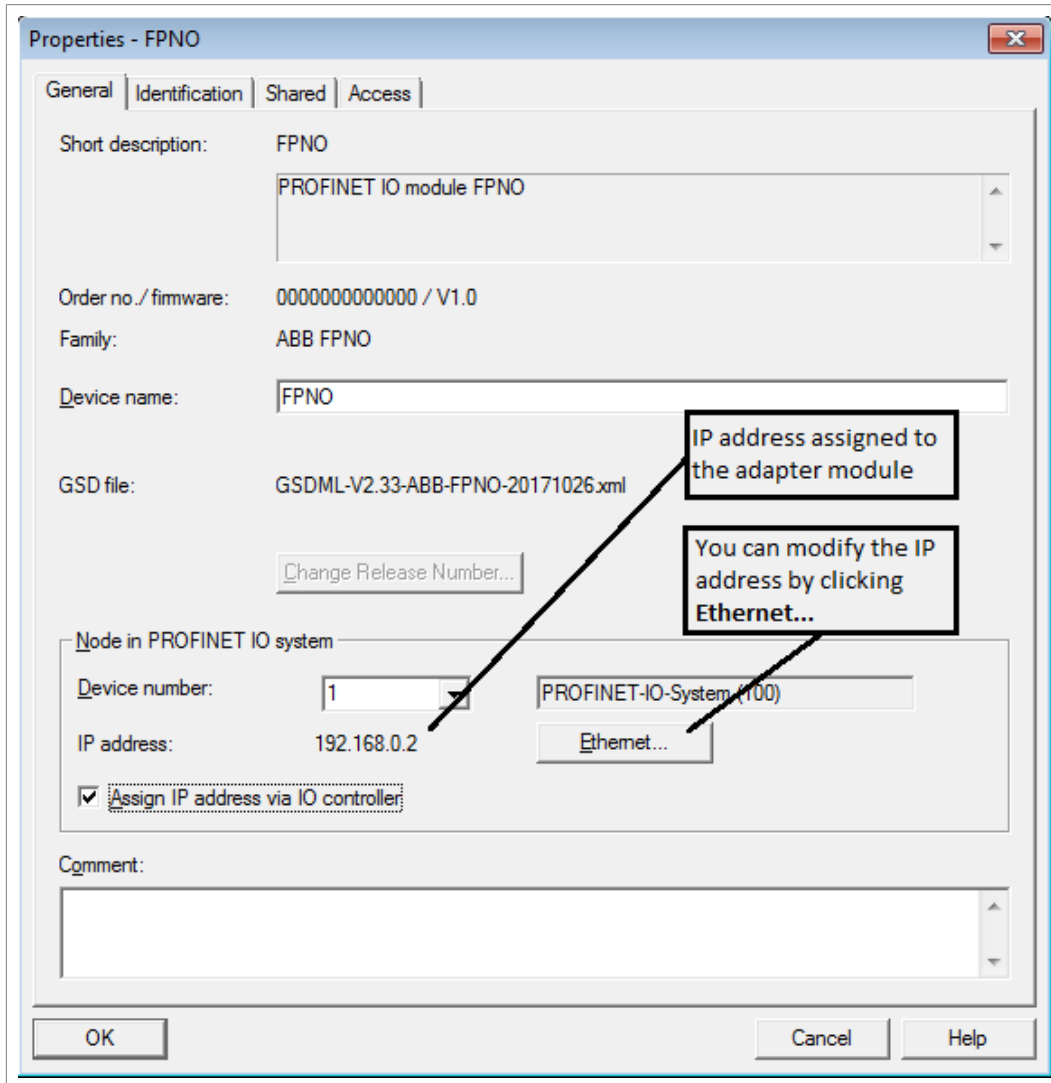
4. Click and drag the FPNO-21 object from the device catalog to the Ethernet (1): PROFINET-IO-System.



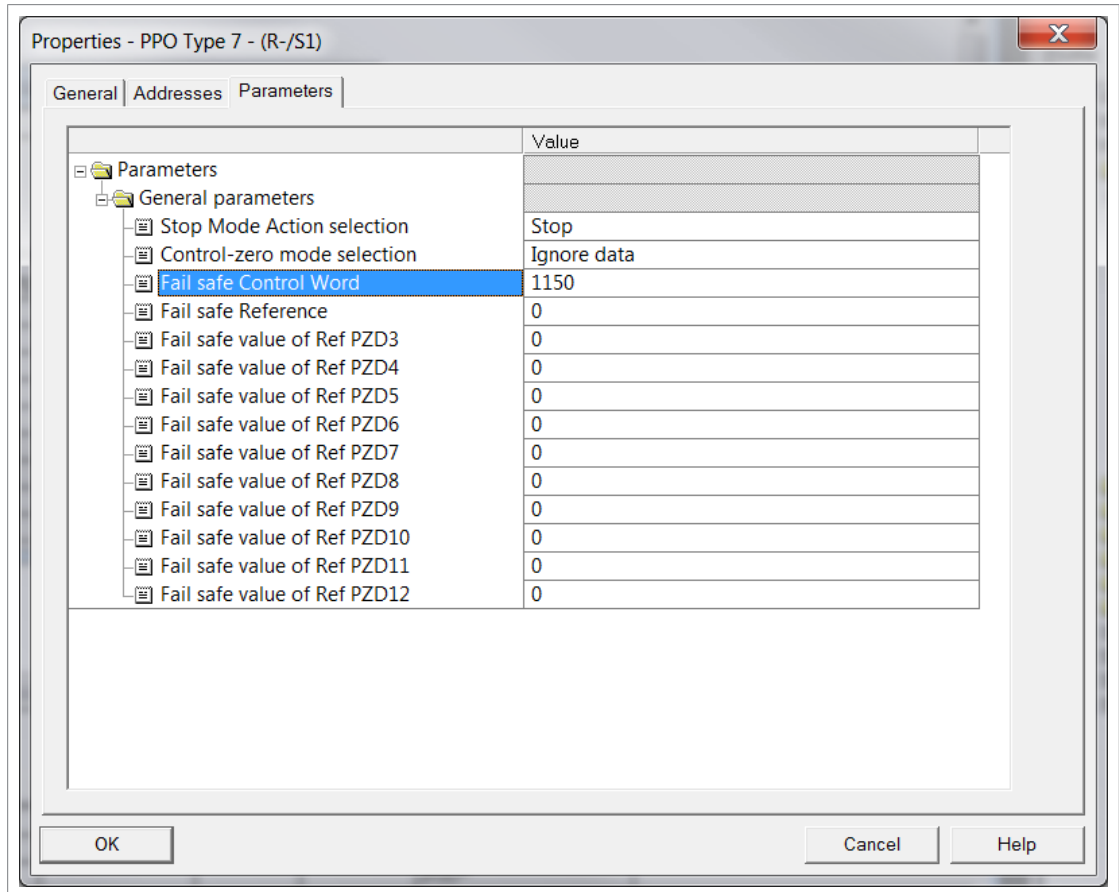
- Click and drag the PP0 Type 7 object to Slot 1. Then, double-click FPNO-21 to open the **Properties** window.



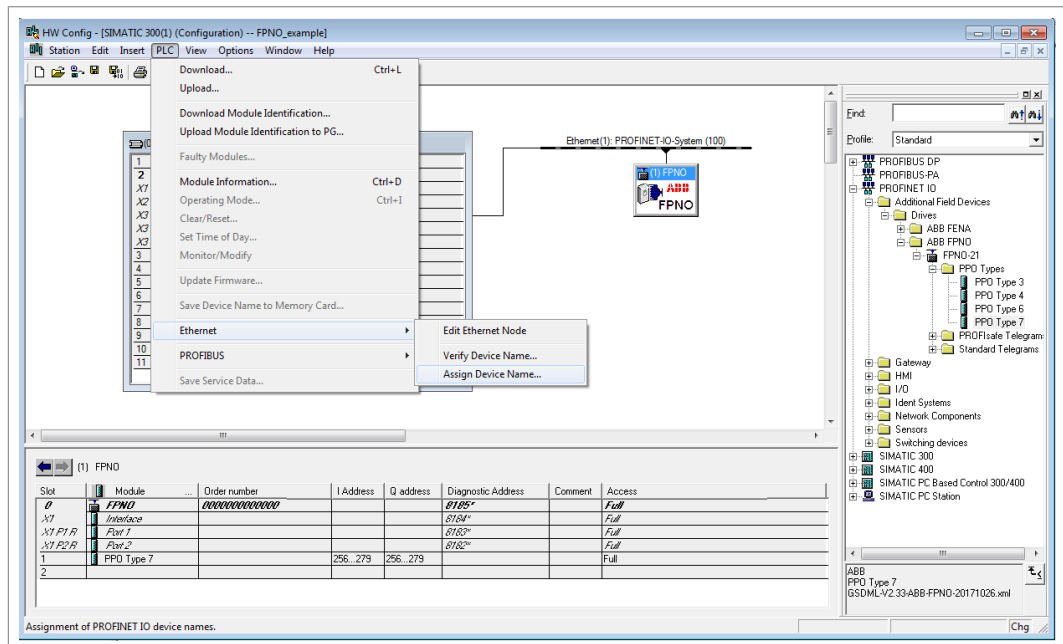
- On the **General** tab, type a name for the adapter module in the **Device name** box.



7. In the hardware configuration, double-click PPO Type 7 in Slot 1 to open the **Properties** window.
8. On the **Parameters** tab, configure the stop mode and control-zero mode functionality, and define fail safe values for the PLC output process data (PZDs).

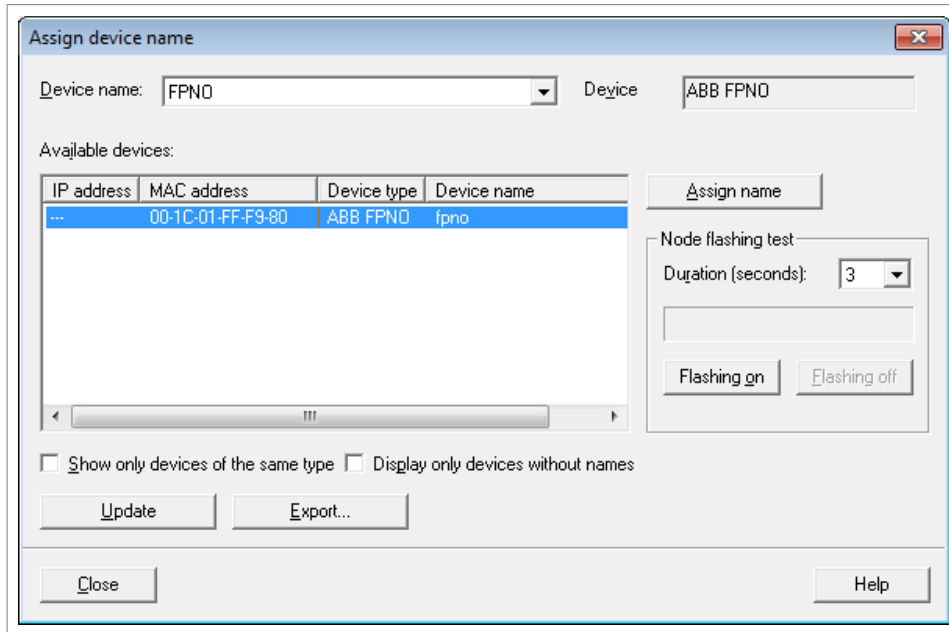


9. Assign the device name (defined in step 6) to the adapter module:
  - In the hardware configuration, click FPNO-21.
  - On the **PLC** menu, select **Ethernet**, and then select **Assign Device Name**.



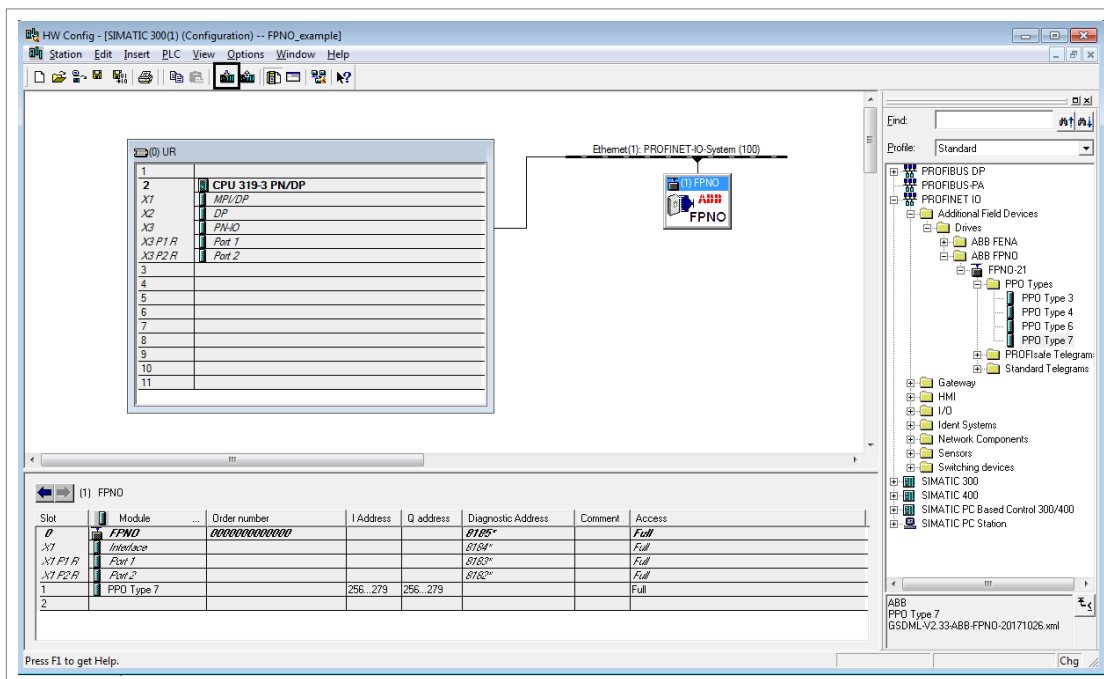
- Click the available device with the correct MAC address to which the device name is to be assigned. This will assign the name to the FPNO-21 adapter module. Then click **Assign name**.

## 48 PROFINET IO – Start-up



10. Download the hardware configuration to the PLC.

The PLC is now ready for communication with the adapter module.

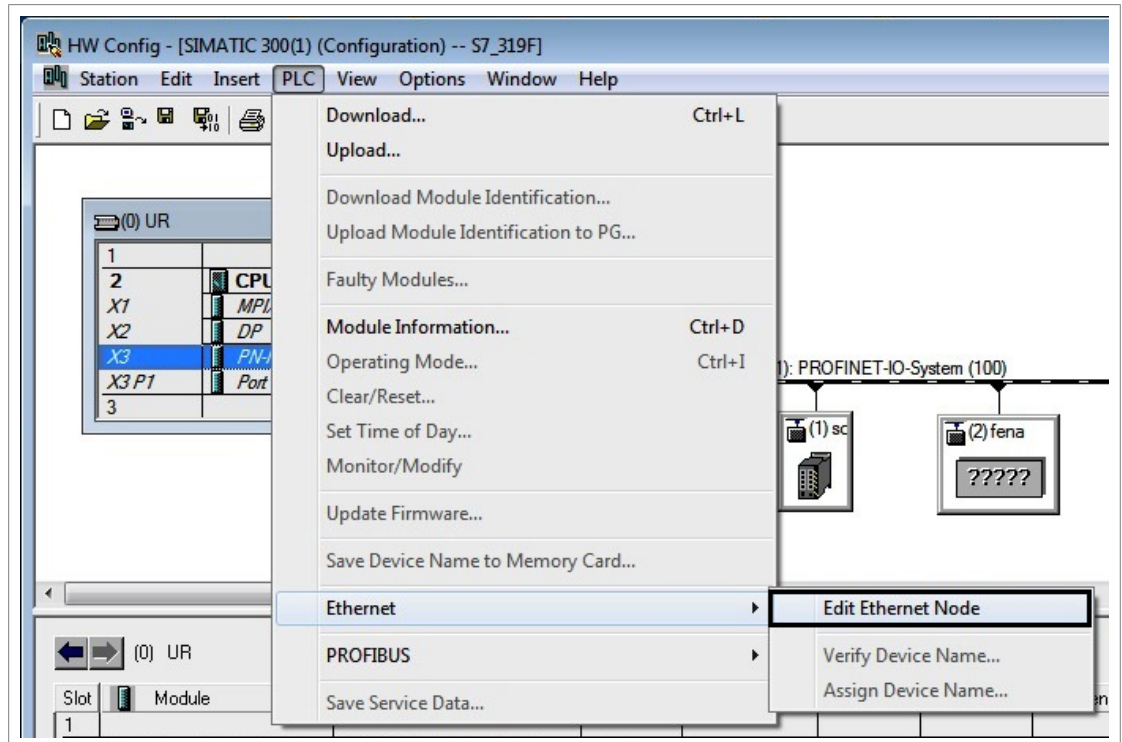


### ■ Resetting PROFINET IO device to factory default via S7

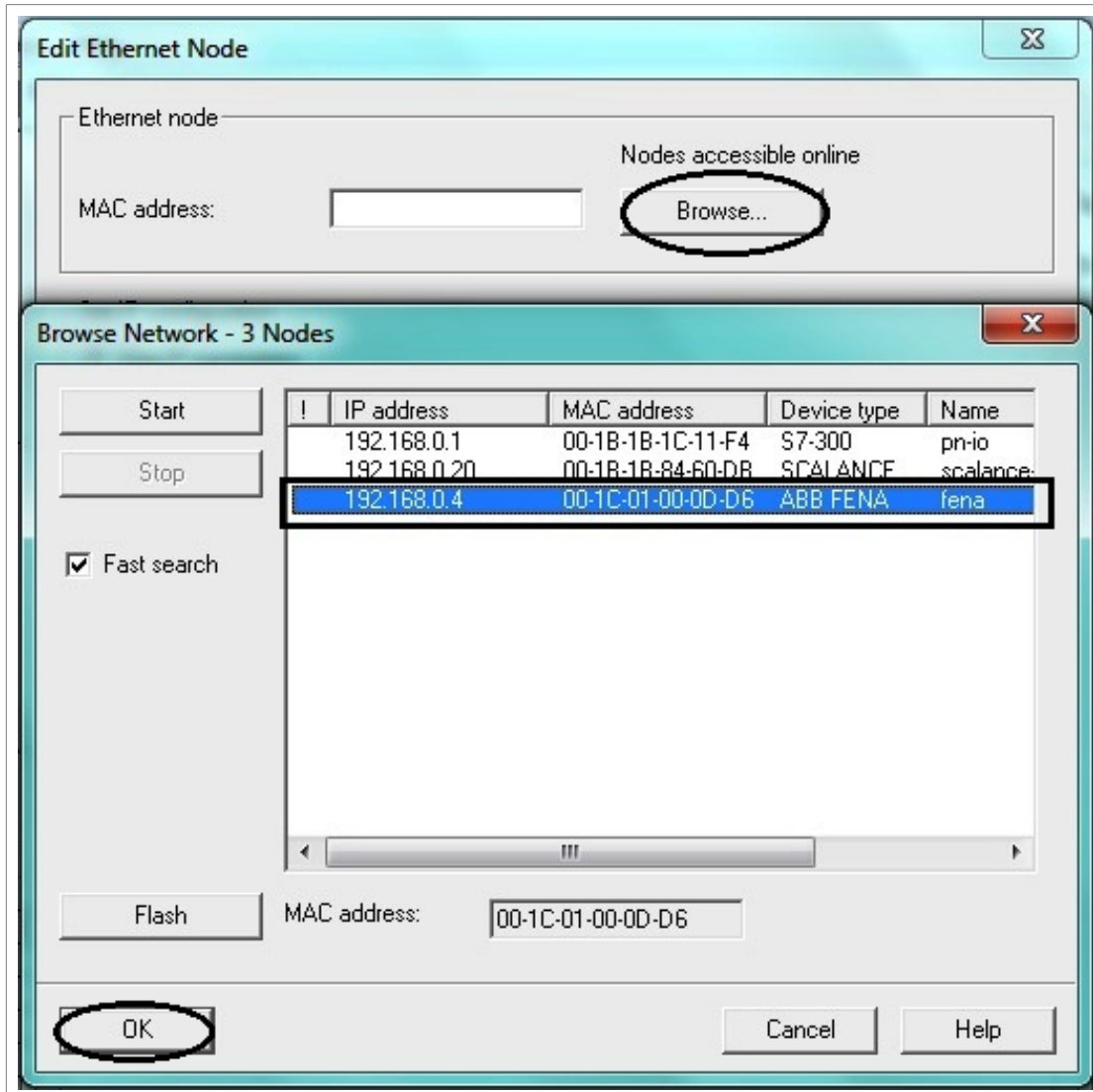
You can reset the PROFINET IO device to factory default.

1. In HW configuration go to PLC → Ethernet → Edit Ethernet Node.





2. In the Edit Ethernet Node window, click **Browse...**



The list of available devices appear.

3. Select the device that needs to be reset to default. Click **OK**.
4. Click **Reset** to clear configuration.

**Edit Ethernet Node**

Ethernet node

MAC address:

Nodes accessible online

Set IP configuration

Use IP parameters

IP address:  Gateway

Subnet mask:   Do not use router

Use router

Address:

Obtain IP address from a DHCP server

Identified by

Client ID  MAC address  Device name

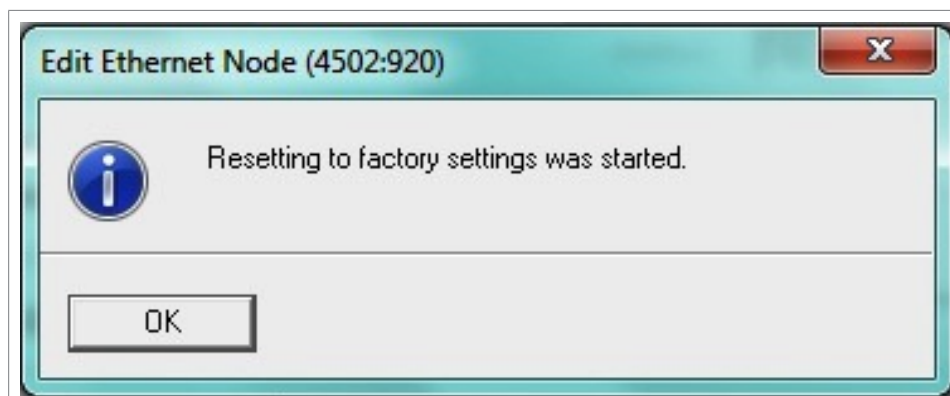
Client ID:

Assign device name

Device name:

Reset to factory settings

5. A pop-up window appears when reset started. Click **OK**.



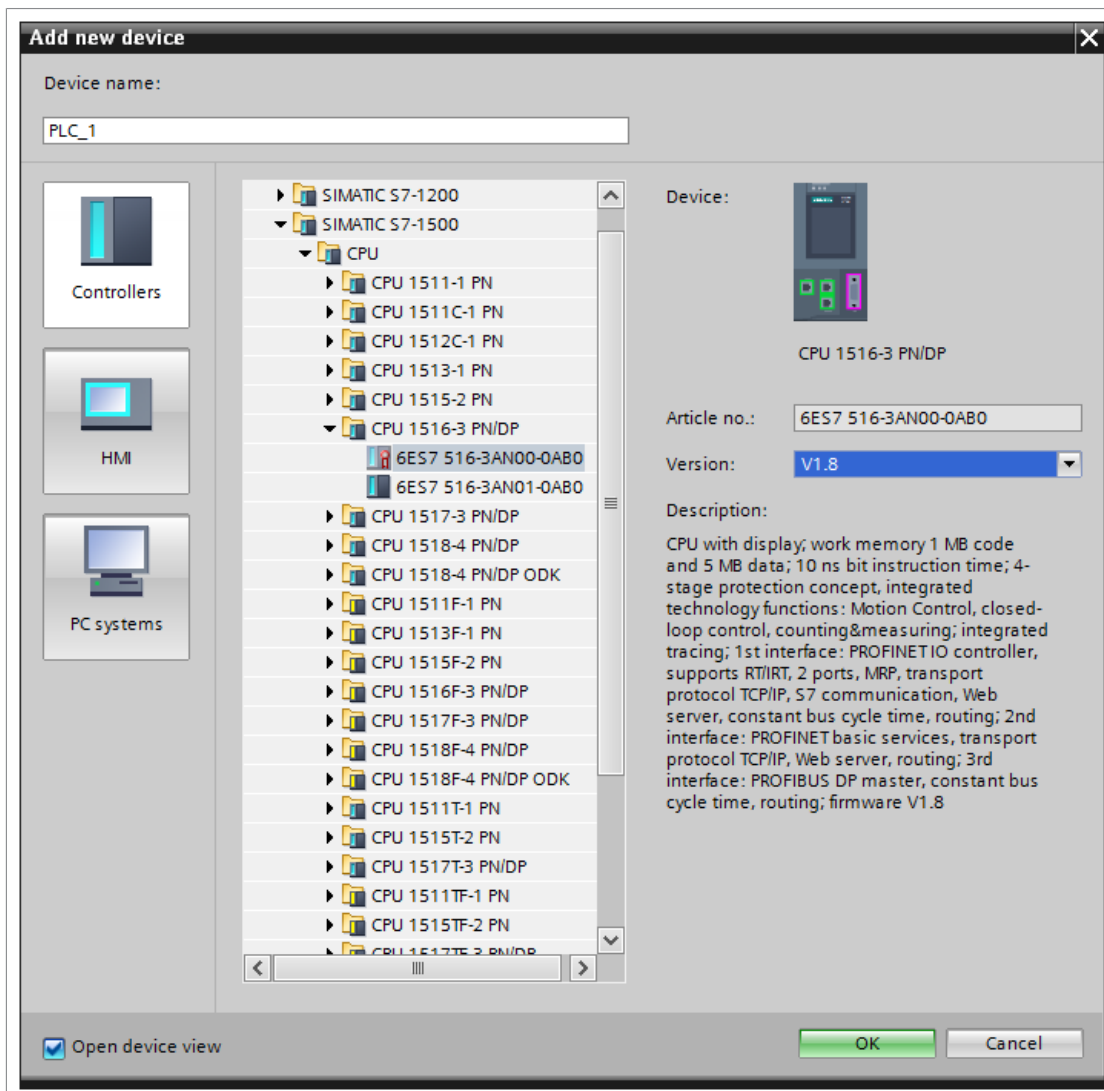
The configuration is now reset to default (PROFINET IO station name, Ethernet services configuration).

### ■ Configuring a Siemens PLC with TIA14

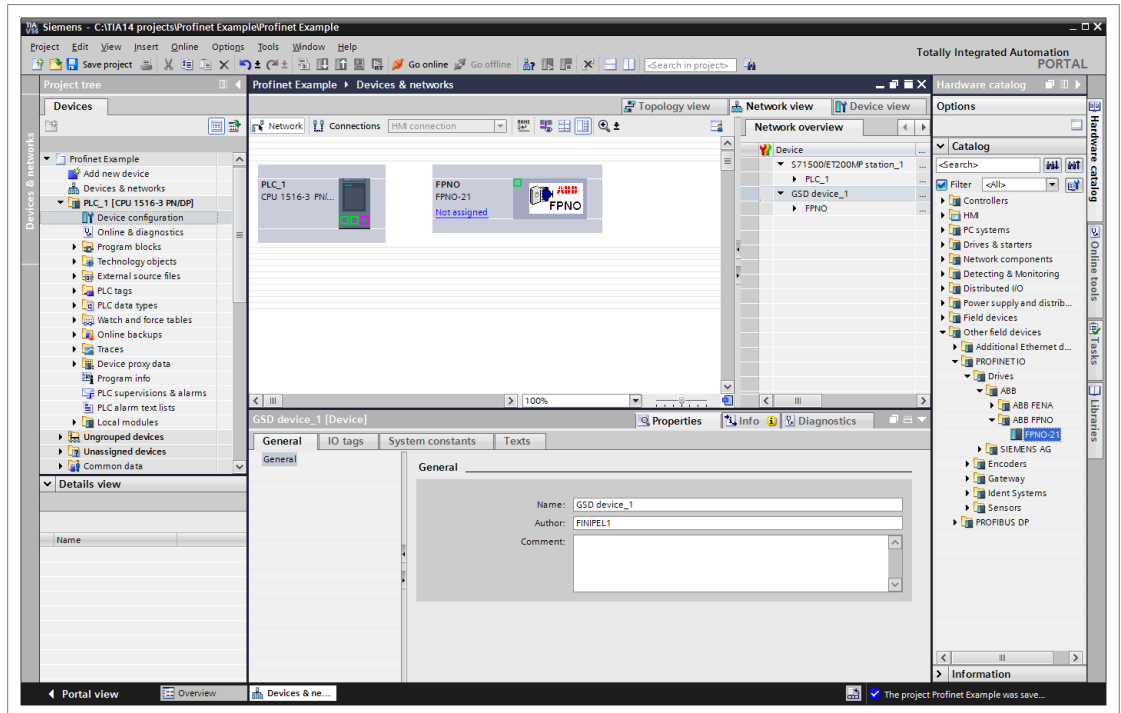
This example shows how to configure communication between a Siemens SIMATIC S7 PLC and the adapter module using SIMATIC Manager Step 7.

Before you start, make sure that you have downloaded the FPNO-21 GSD file from the Document library.

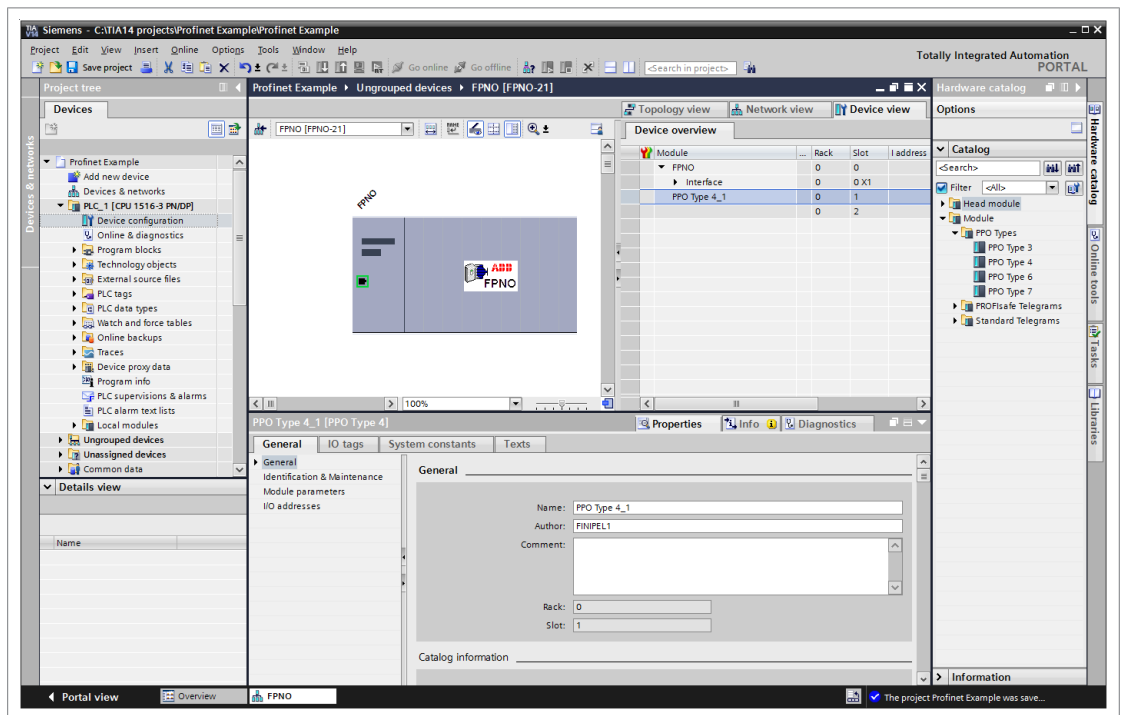
1. Start TIA14 and create new project.
2. Change to project view.
3. Install the FPNO-21 GSD file:
  - Options > Manage general station description files
  - Browse to source path where GSDML file is located.
  - Select the check box and click Install.
4. Add new device and select CPU from list.



5. Add FPNO-21 to device configuration.

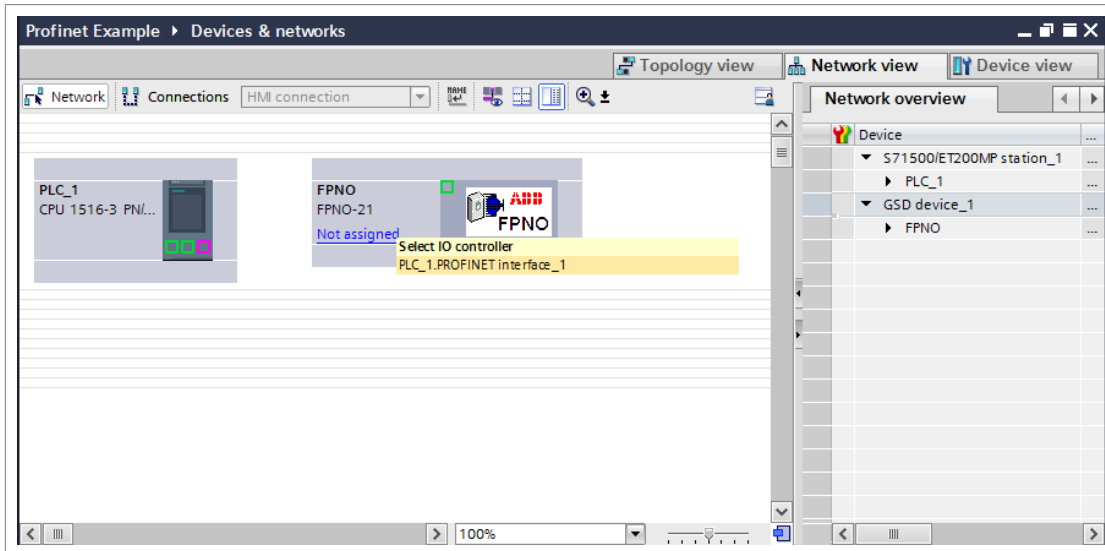


6. Open FPNO-21 device view and add desired telegram to slot 1.

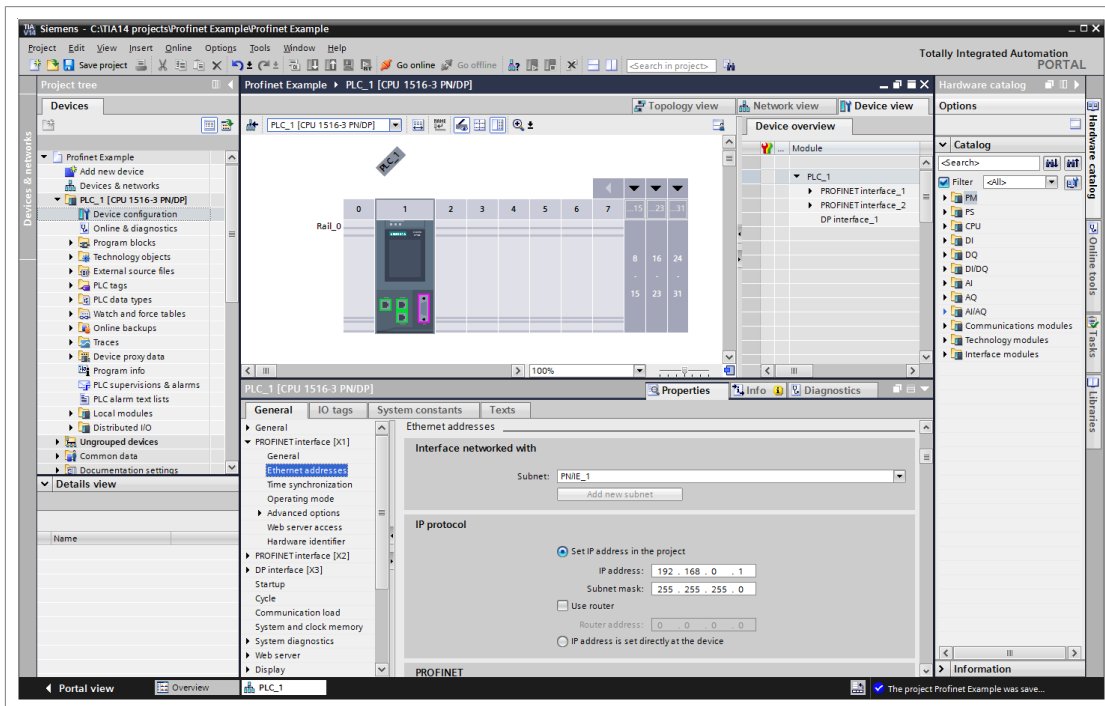


7. Assign FPNO-21 to PROFINET controller.

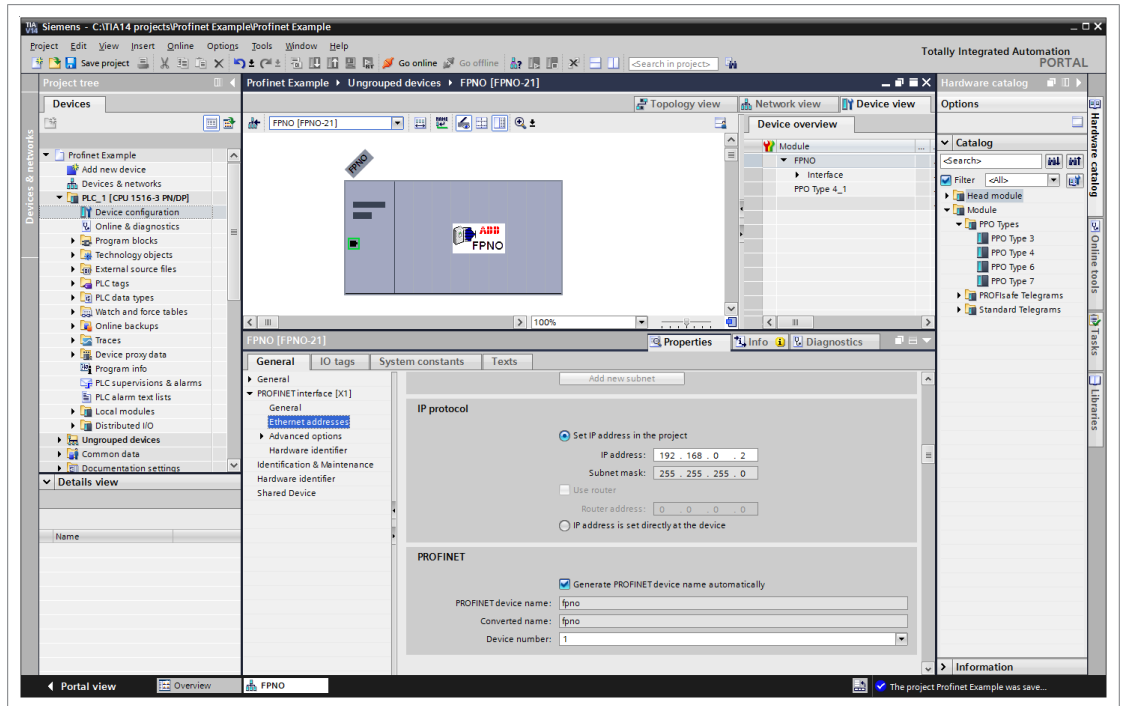
## 54 PROFINET IO – Start-up



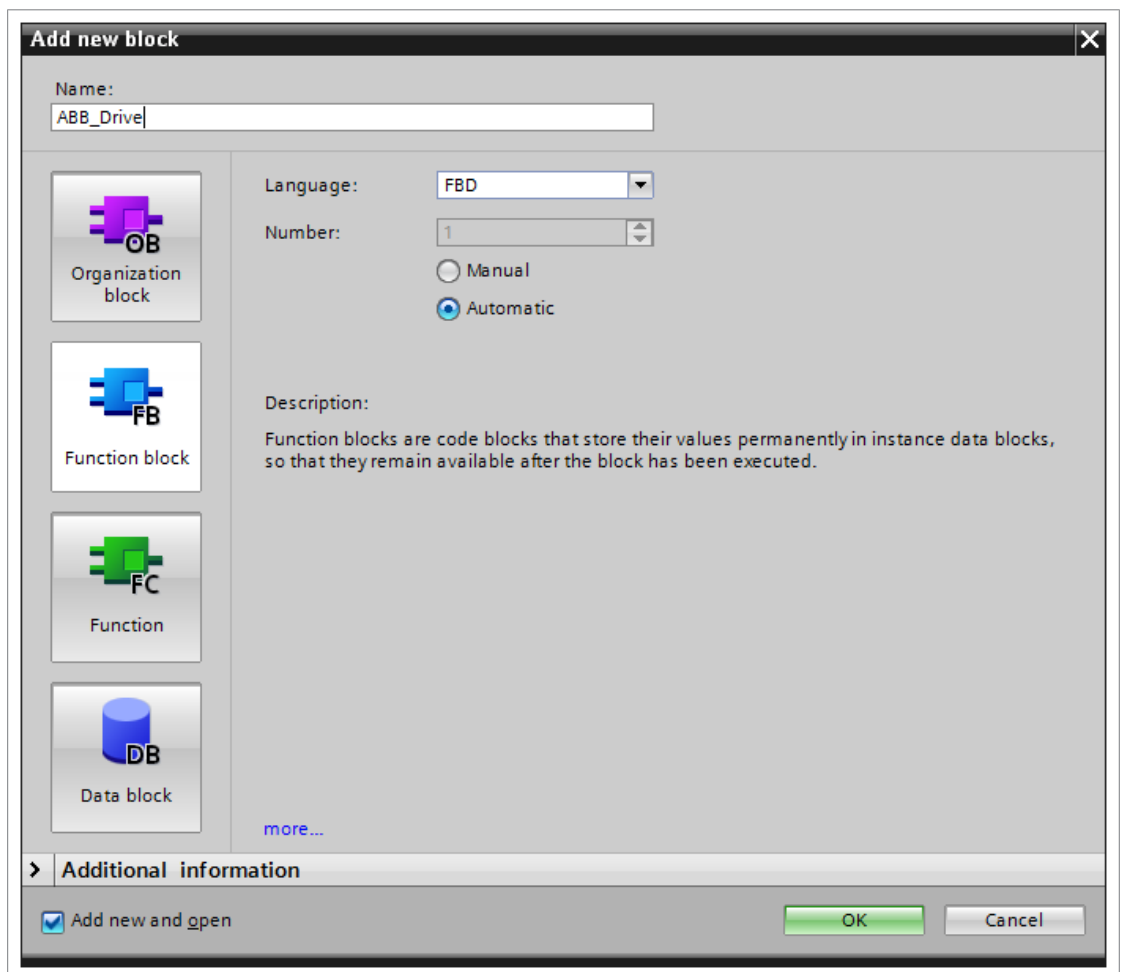
8. Select Properties tab > General tab > Ethernet addresses submenu, and set the PLC IP address.



9. In FPNO-21 properties, Ethernet addresses submenu, set FPNO-21 IP address and PROFINET device name. Device name will be used as identification. After successful identification, PLC will assign IP address to FPNO-21.



10. Add new function block ABB\_Drive.



11. Add variables to ABB\_Drive FB.

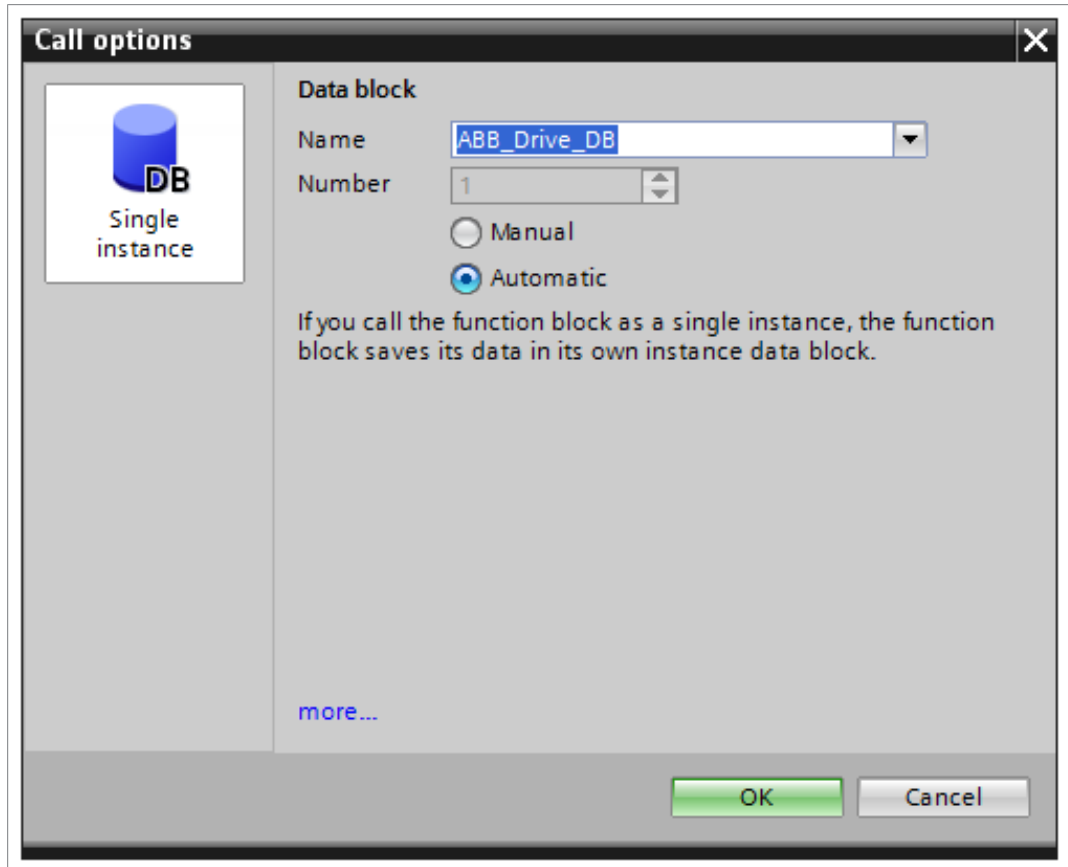
## 56 PROFINET IO – Start-up

The screenshot shows the 'ABB\_Drive' configuration window in SIMATIC Manager. The window title is 'Profinet Example > PLC\_1 [CPU 1516-3 PN/DP] > Program blocks > ABB\_Drive [FB1]'. The table below represents the data shown in the screenshot.

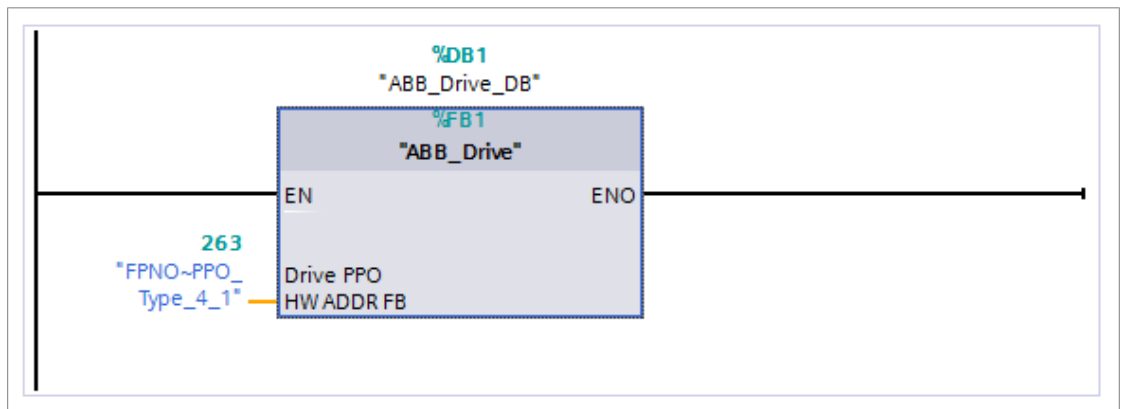
	Name	Data type	Default value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint	Su...
1	▼ Input								
2	Drive PPO HW ADDR FB	HW_SUBMODULE	0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3	▼ Output								
4	<Add new>								
5	▼ InOut								
6	<Add new>								
7	▼ Static								
8	PZD read error	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
9	PZD write error	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10	▼ PPO OUT	Struct		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
11	PZD OUT_1	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
12	PZD OUT_2	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13	PZD OUT_3	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
14	PZD OUT_4	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
15	PZD OUT_5	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
16	PZD OUT_6	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
17	▼ PPO IN	Struct		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
18	PPO IN_1	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
19	PPO IN_2	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
20	PPO IN_3	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
21	PPO IN_4	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
22	PPO IN_5	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
23	PPO IN_6	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
24	<Add new>								
25	<Add new>								
26	▼ Temp								
27	<Add new>								
28	▼ Constant								
29	<Add new>								

12. Add ABB\_Drive to OB1. Assign new instance Data Block for ABB\_Drive FB.



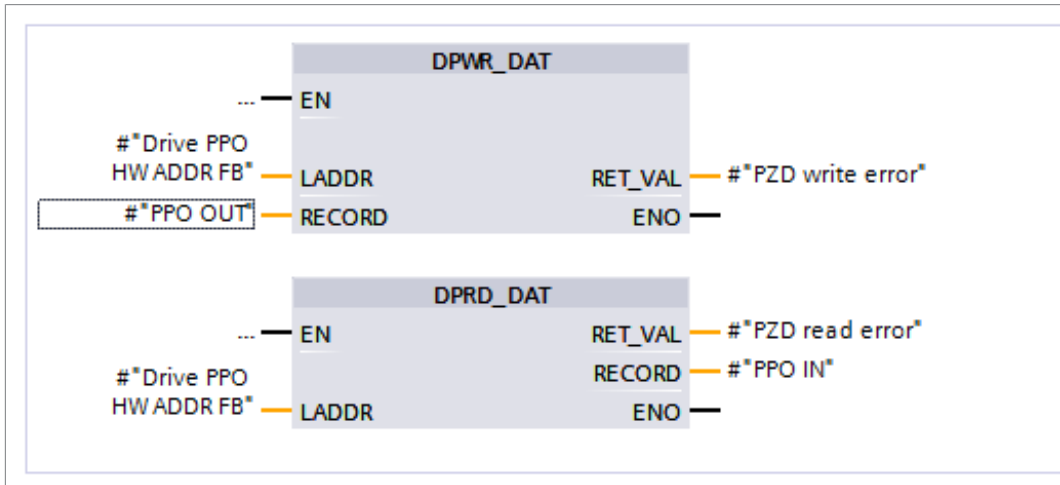


13. Add FPNO-21 PPO HW address to Drive PPO HW ADDR FB input.

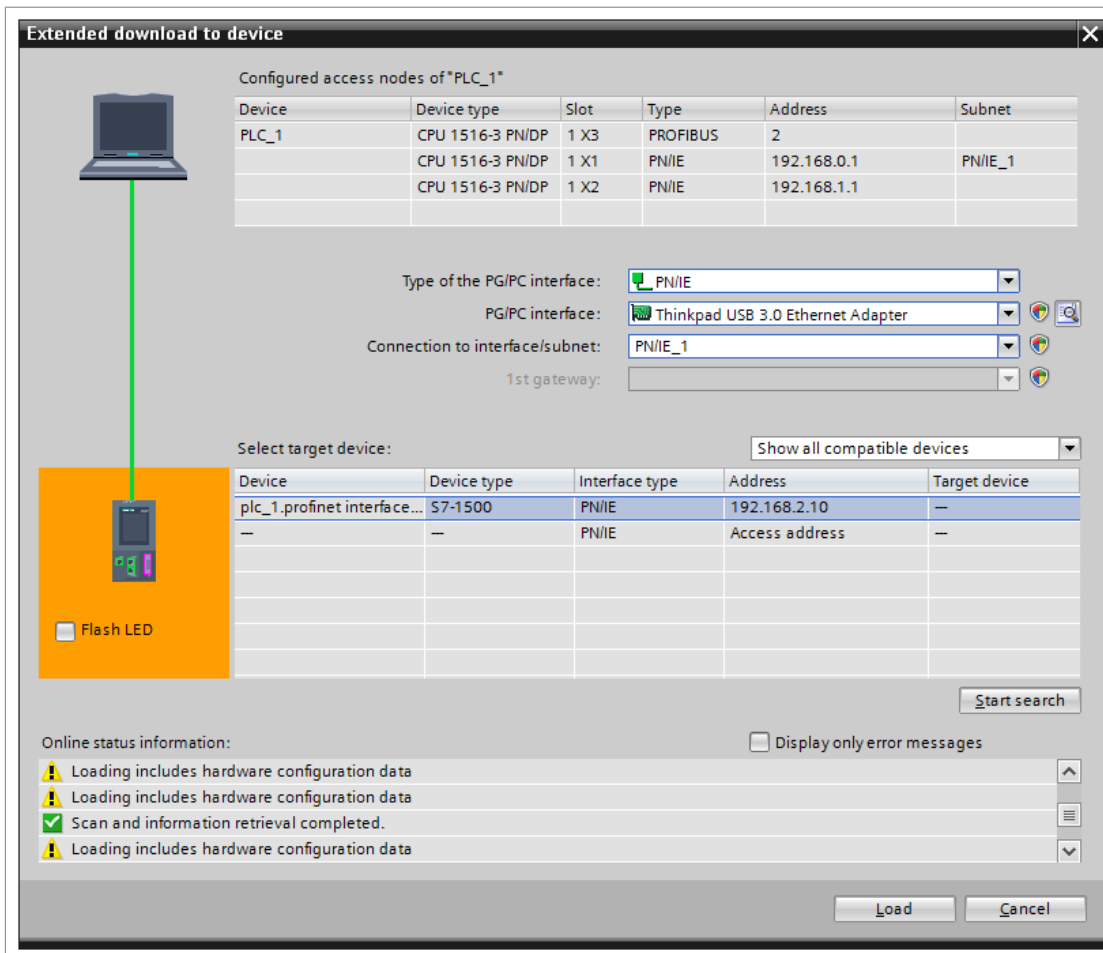


14. Add blocks DPRD\_DAT and DPWR\_DAT to ABB\_Drive FB. Map inputs and outputs.

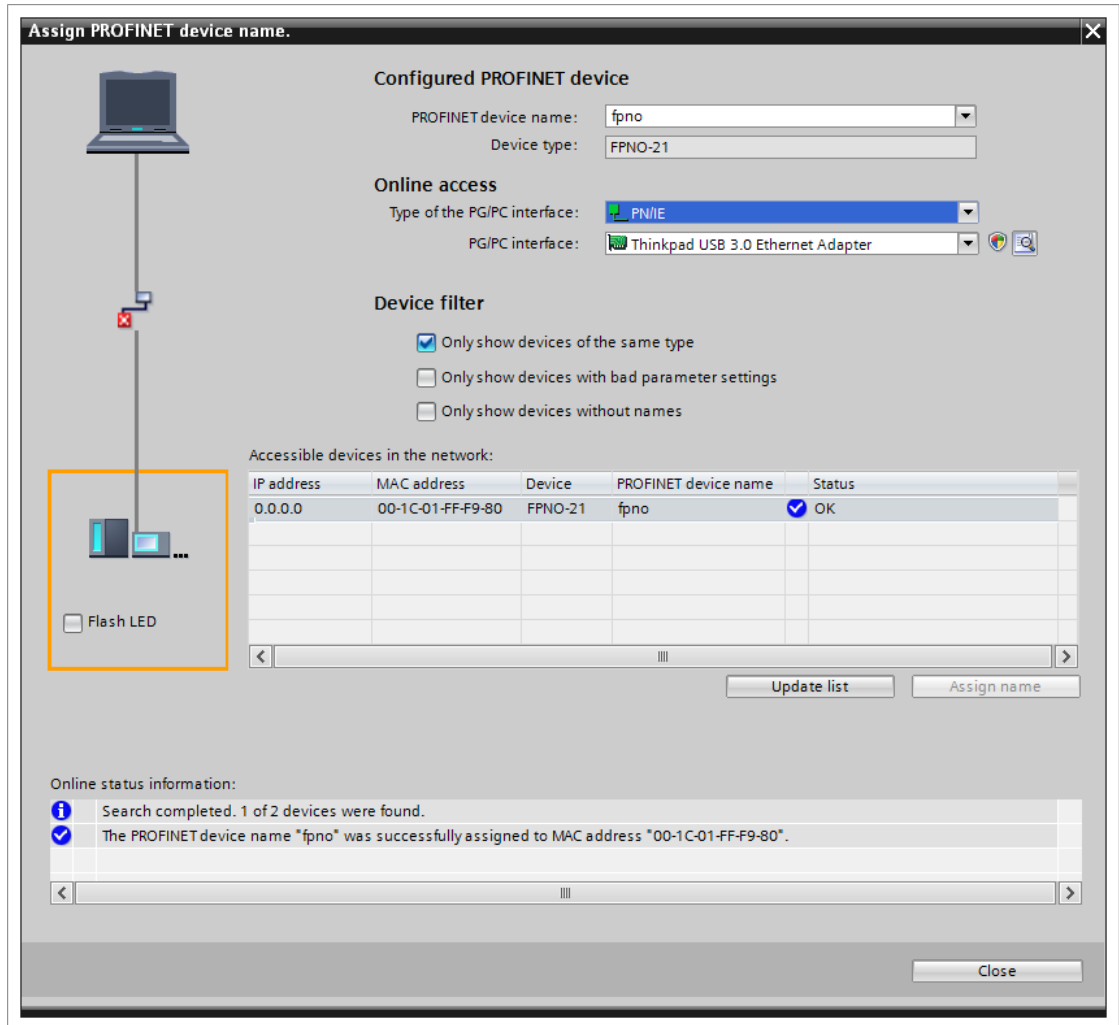
58 PROFINET IO – Start-up



15. Save and download project to PLC.

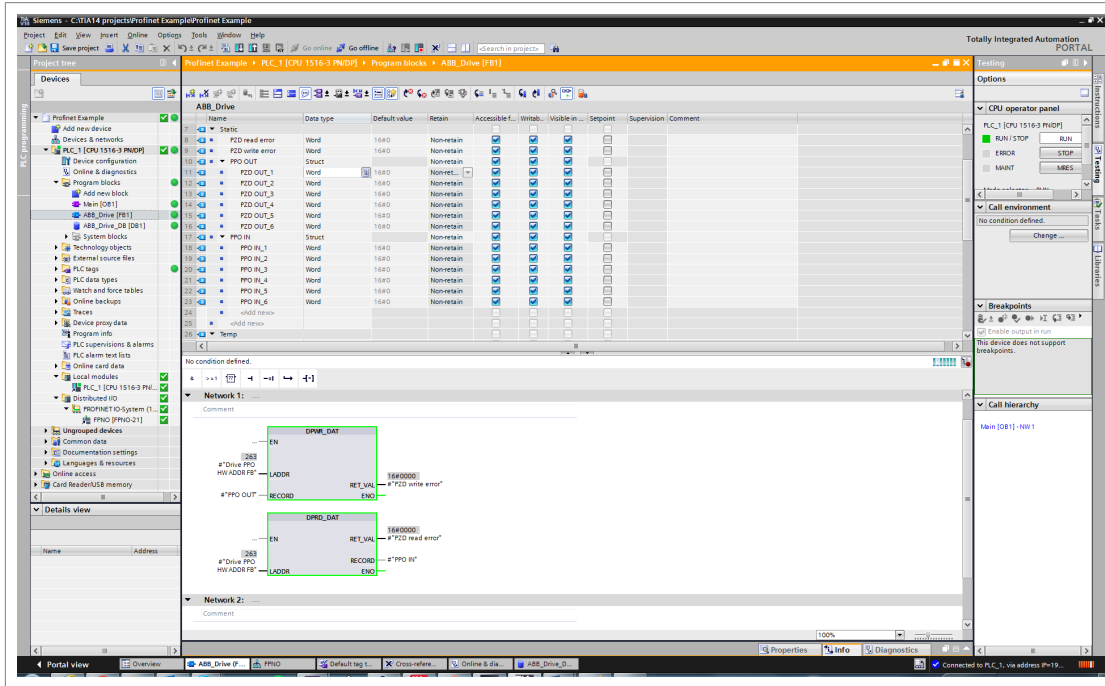


16. In device configuration, right-click FPNO-21 icon and select Assign device name.



17. Values can now be monitored when online.

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18. If values want to be forced, add FPNO-21 addresses to tag table, and add the tag table variables to the force table.

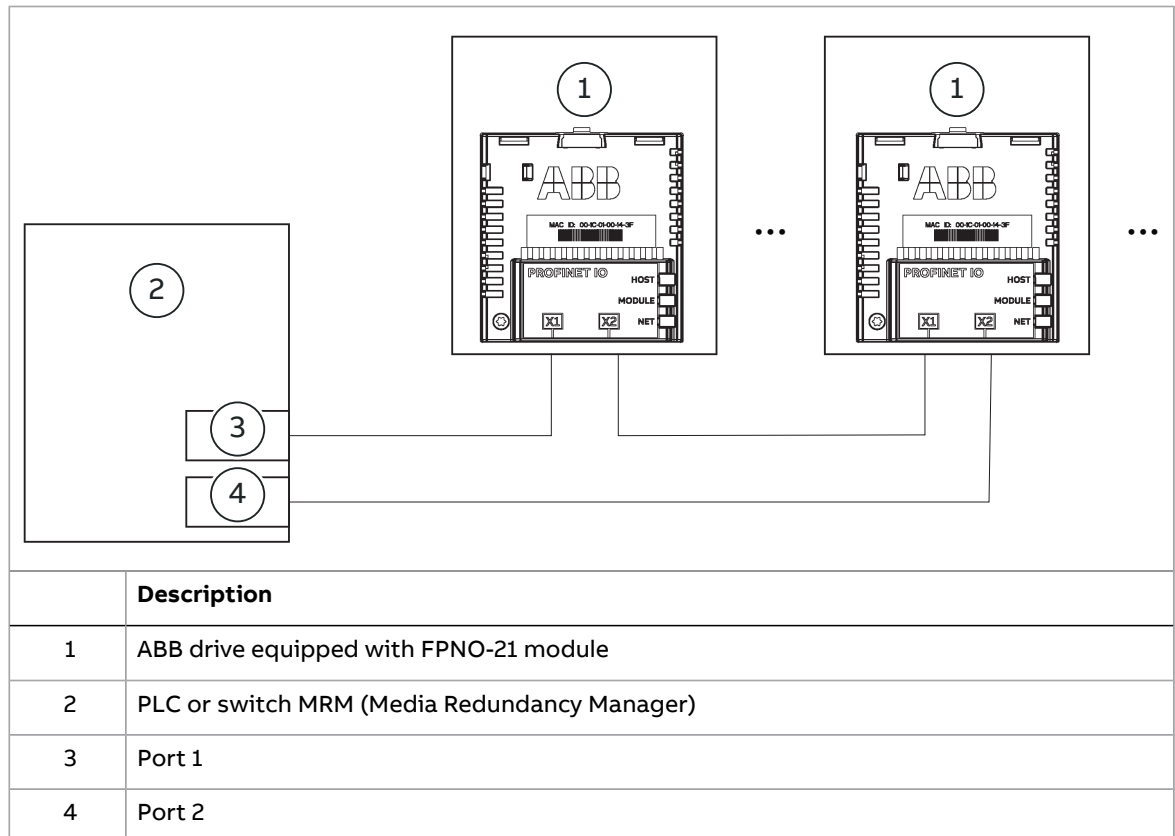
Profinet Example > PLC_1 [CPU 1516-3 PN/DP] > Watch and force tables > Force table									
	Name	Address	Display format	Monitor value	Monitor with trig...	Force value	F	C...	
1	"ABB_Drive_DB"."PPO IN"."PPO IN_1"		Hex	16#1231	Permanent		<input type="checkbox"/>		
2	"ABB_Drive_DB"."PPO IN"."PPO IN_2"		Hex	16#0000	Permanent		<input type="checkbox"/>		
3	"ABB_Drive_DB"."PPO IN"."PPO IN_3"		Hex	16#0000	Permanent		<input type="checkbox"/>		
4	"ABB_Drive_DB"."PPO IN"."PPO IN_4"		Hex	16#0000	Permanent		<input type="checkbox"/>		
5	"ABB_Drive_DB"."PPO IN"."PPO IN_5"		Hex	16#0000	Permanent		<input type="checkbox"/>		
6	"ABB_Drive_DB"."PPO IN"."PPO IN_6"		Hex	16#0000	Permanent		<input type="checkbox"/>		
7	"ABB_Drive_DB"."PPO OUT"."PZD OUT_1"		Hex	16#0000	Permanent		<input type="checkbox"/>		
8	"ABB_Drive_DB"."PPO OUT"."PZD OUT_2"		Hex	16#0000	Permanent		<input type="checkbox"/>		
9	"ABB_Drive_DB"."PPO OUT"."PZD OUT_3"		Hex	16#0000	Permanent		<input type="checkbox"/>		
10	"ABB_Drive_DB"."PPO OUT"."PZD OUT_4"		Hex	16#0000	Permanent		<input type="checkbox"/>		
11	"ABB_Drive_DB"."PPO OUT"."PZD OUT_5"		Hex	16#0000	Permanent		<input type="checkbox"/>		
12	"ABB_Drive_DB"."PPO OUT"."PZD OUT_6"		Hex	16#0000	Permanent		<input type="checkbox"/>		
13	"ABB_Drive_DB"."PZD read error"		Hex	16#0000	Permanent		<input type="checkbox"/>		
14	"ABB_Drive_DB"."PZD write error"		Hex	16#0000	Permanent		<input type="checkbox"/>		
15	"SW":P	%IW0:P	Hex	16#1231	Permanent		<input type="checkbox"/>		
16	"Act1":P	%IW2:P	DEC	0	Permanent		<input type="checkbox"/>		
17	"CW":P	%QW0:P	Hex	16#047E	Permanent	16#047E	<input checked="" type="checkbox"/>		
18	"Ref1":P	%QW2:P	DEC	500	Permanent	500	<input checked="" type="checkbox"/>		
19	<Add new>						<input type="checkbox"/>		

## Media Redundancy Protocol (MRP)

The Media Redundancy Protocol (MRP) network uses ring topology that includes multiple nodes as shown in the connection diagram below. One of the nodes has the Media Redundancy Manager (MRM) role and the nodes with FPNO-21 module(s) have the role of Media Redundancy Clients (MRC). Each node, MRM or MRC, has a pair of ports for connecting in the ring.

For FPNO-21 module, the link speed of both ports is 100 Mbit/s, full duplex.

**Note:** The number of nodes in the ring should not exceed 50 nodes.

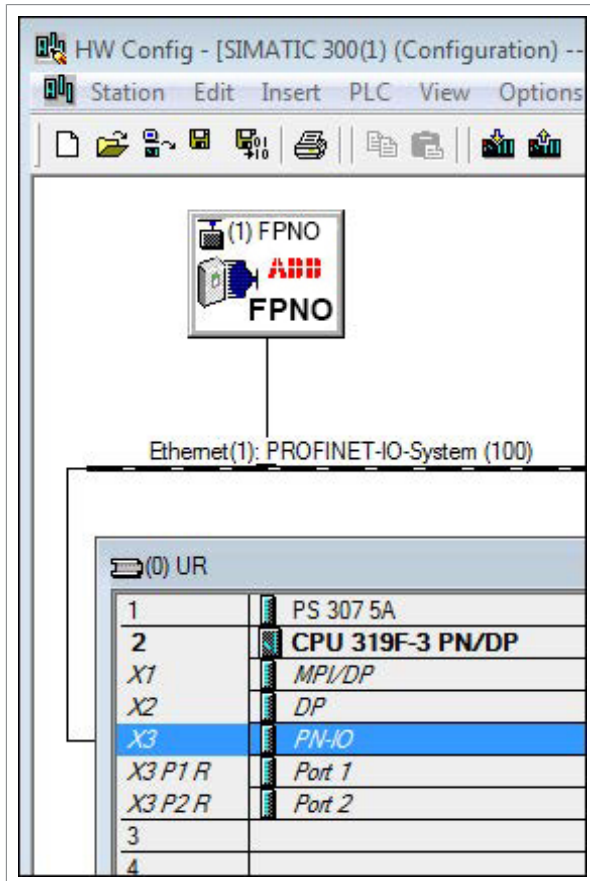


### ■ Configuring Media Redundancy Protocol (MRP) with Siemens PLC

You can configure MRP for Siemens PLC with SIMATIC S7 after setting the basic configuration. For instructions on basic configuration, see section [Configuring a Siemens SIMATIC S7 PLC](#) (page 43).

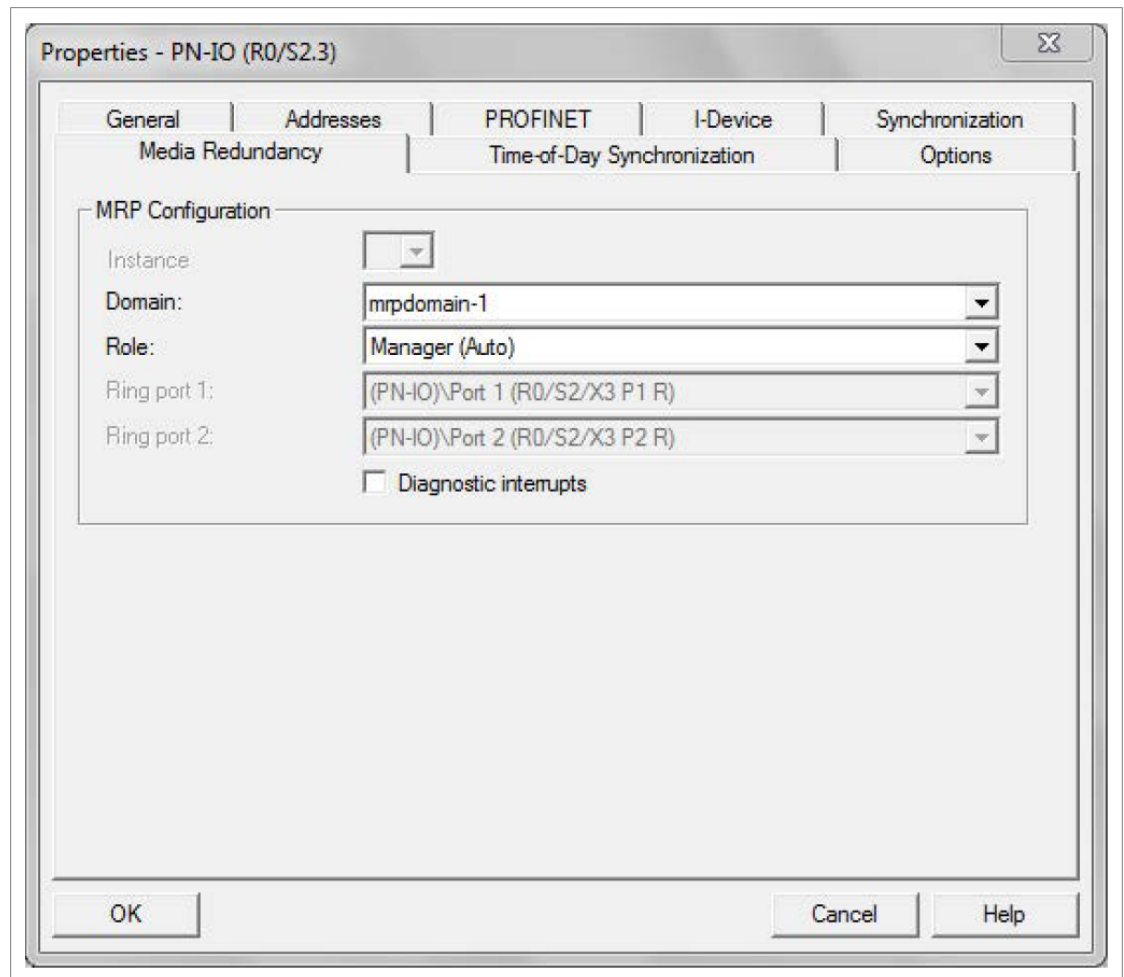
1. Double-click PN-IO in the station window.

## 62 PROFINET IO – Start-up



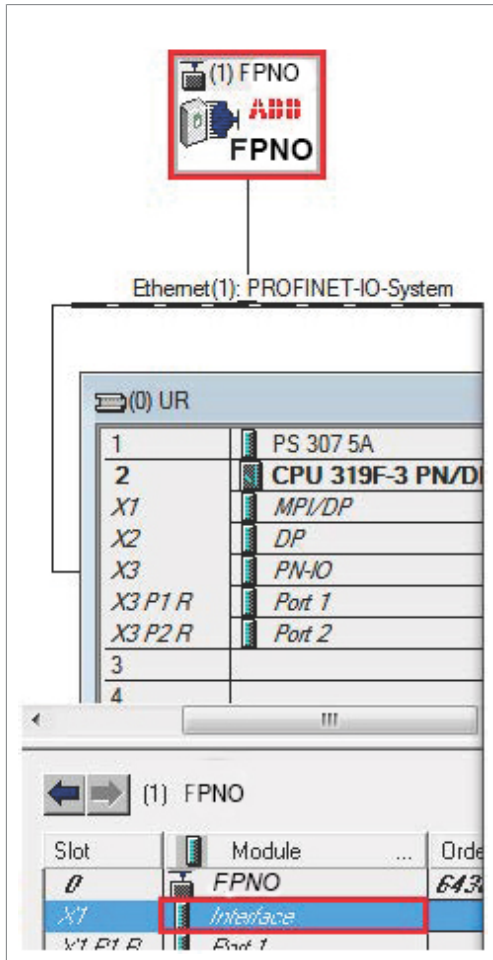
PN-IO properties window is displayed.

2. In the Properties PN-IO window, select Media Redundancy tab.



3. From the Role drop-down list, select Manager (Auto) role for the PLC and then click OK.
4. In the master station window, click FPNO and then double-click Interface.

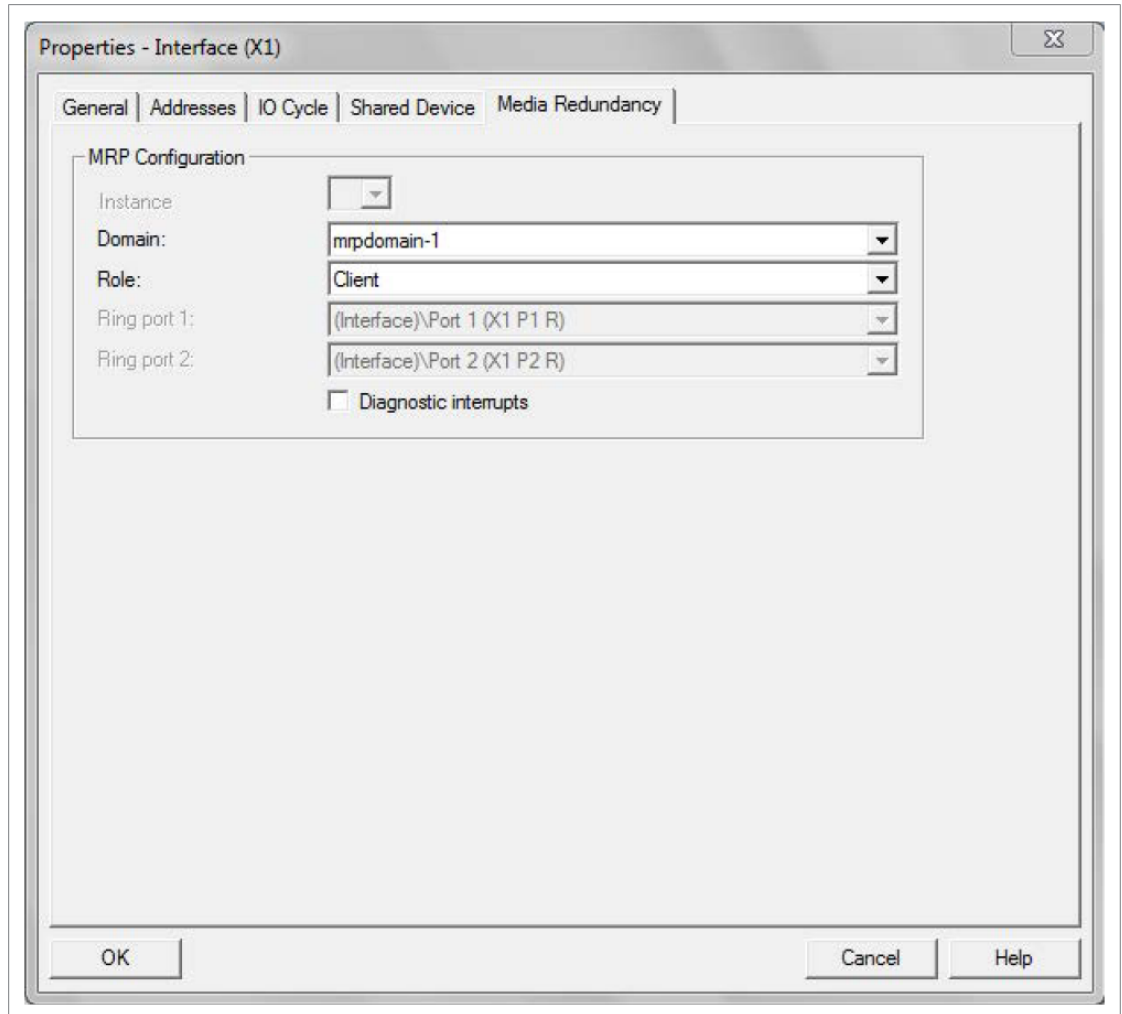
## 64 PROFINET IO – Start-up



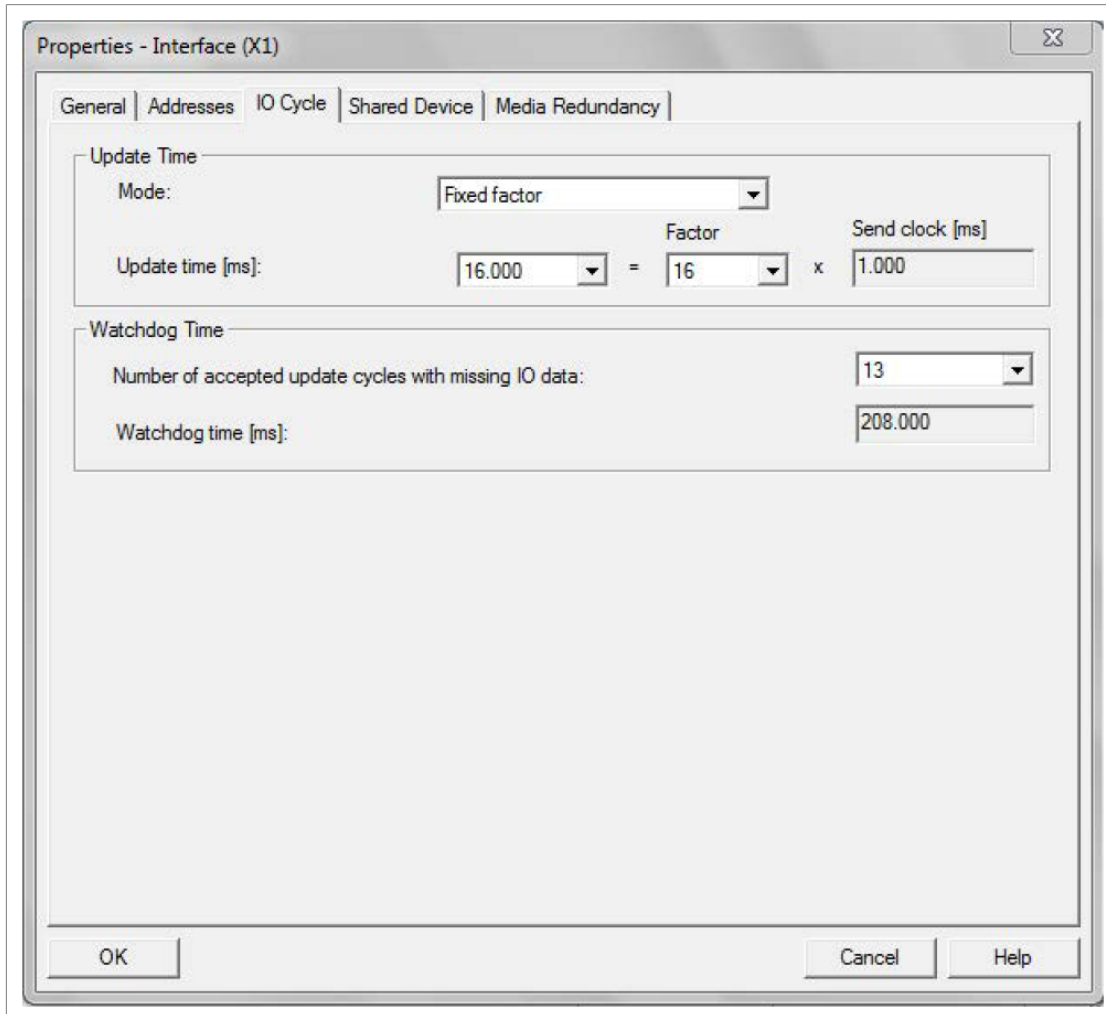
Properties-Interface window is displayed.

5. In the Properties-Interface window, select Media Redundancy tab.



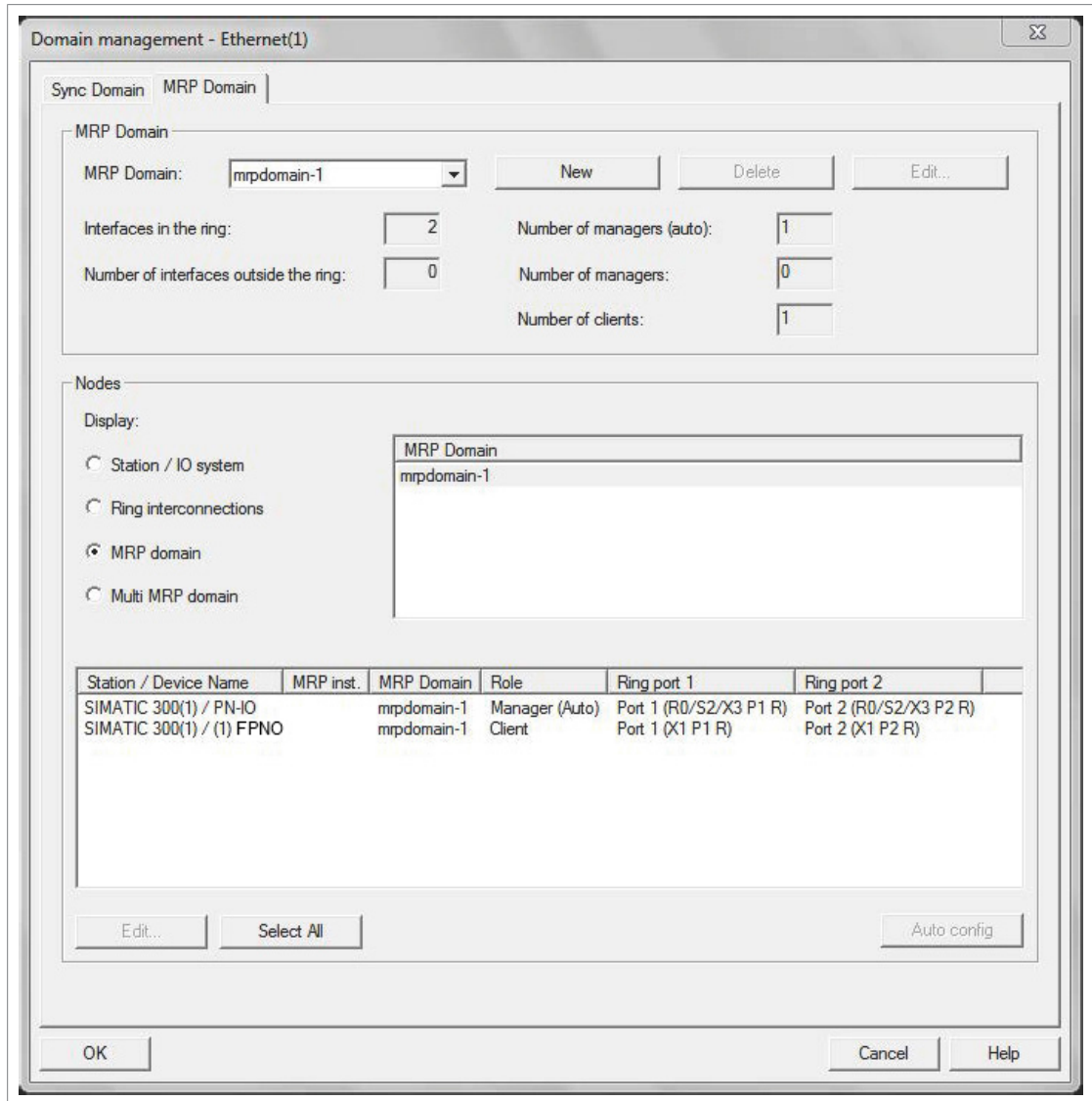


6. From the Role drop-down list, select Client role for the FPNO module.
7. In the Properties-Interface window, select IO Cycle and set watchdog time.  
A recommended value for the watchdog time is 200 ms. Make sure that the connection is maintained during the ring break.



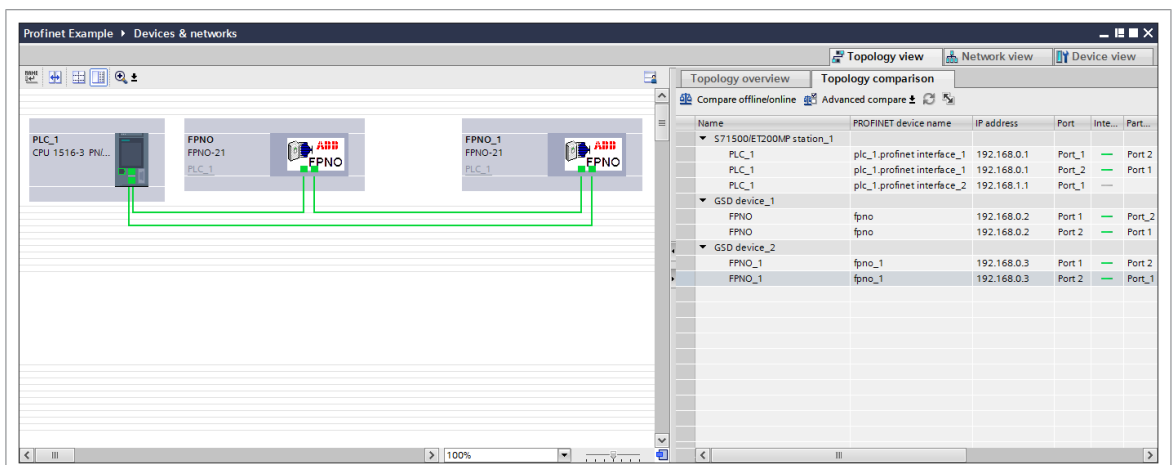
8. In the master station window, right-click on PROFINET IO System and select PROFINET IO Domain Management.

The configured devices (PN-IO and FPNO) are shown in the Domain management window.



### ■ Configuring Media Redundancy Protocol (MRP) with TIA14

You can configure MRP for Siemens PLC with TIA14 after setting the basic configuration. For instructions of basic configuration, see section [Configuring a Siemens PLC with TIA14](#) (page 52).

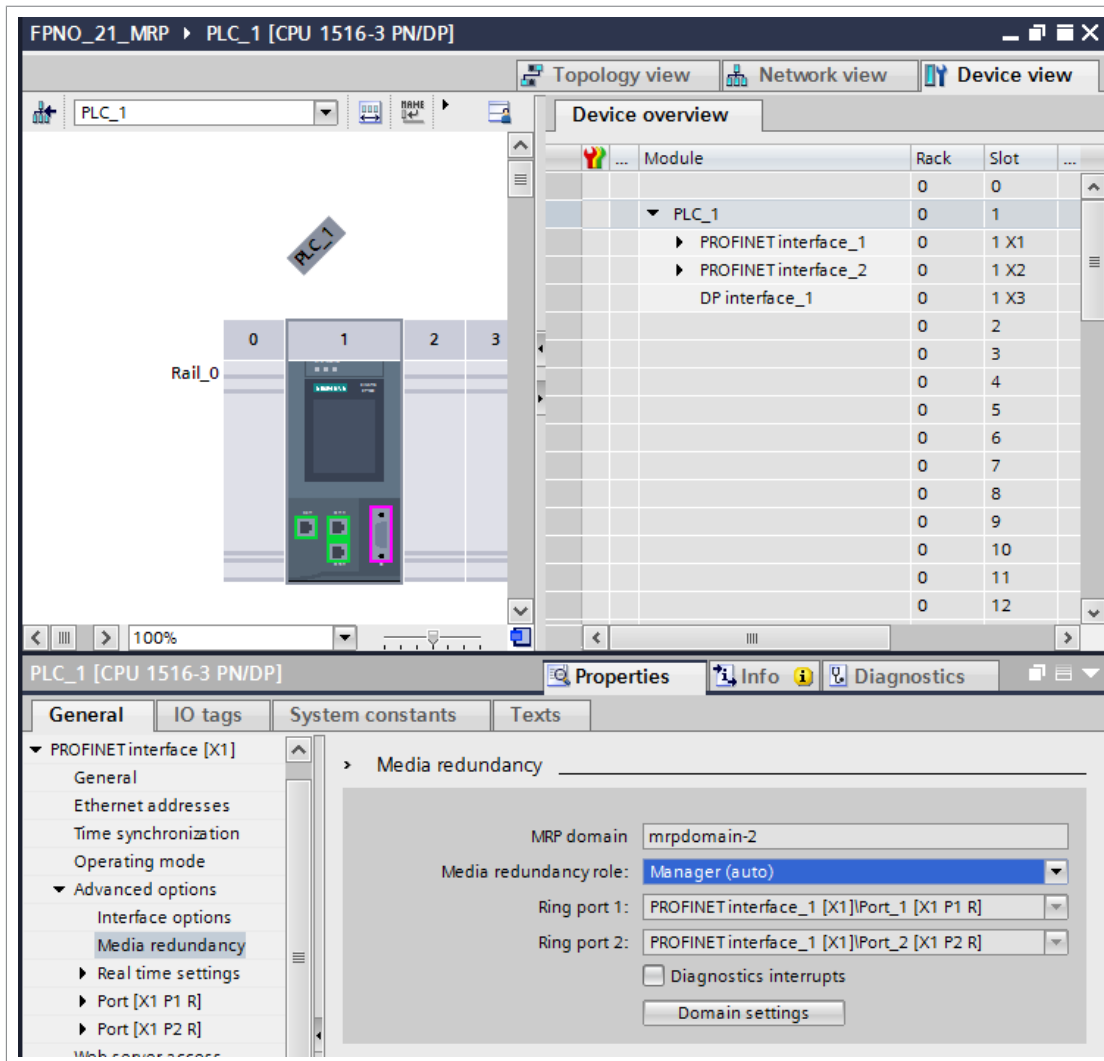


To configure an MRP with TIA portal, proceed as follows:

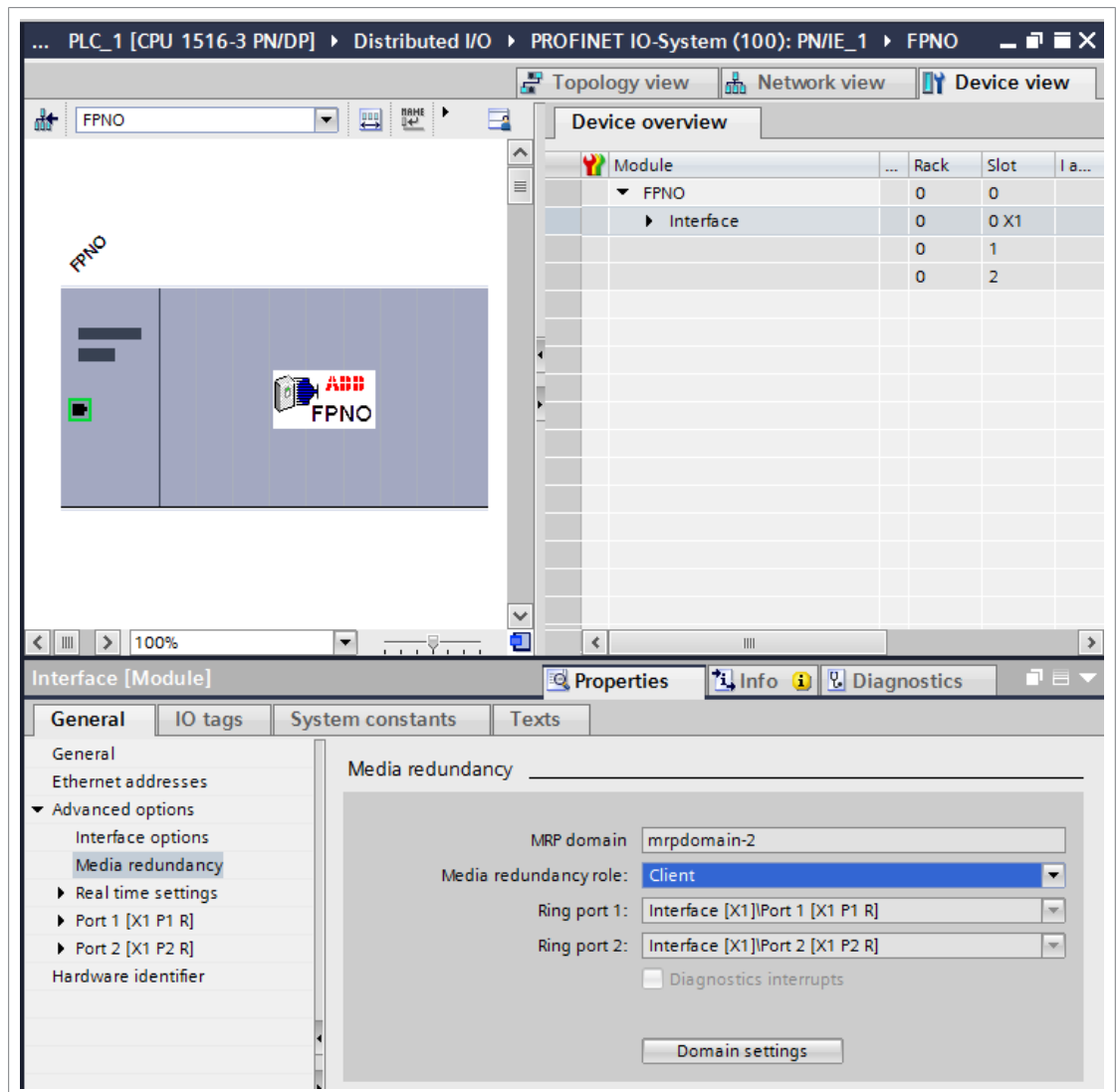
## 68 PROFINET IO – Start-up

1. In TIA portal Device overview, expand PLC and select the desired PROFINET interface.

PROFINET interface view is displayed.

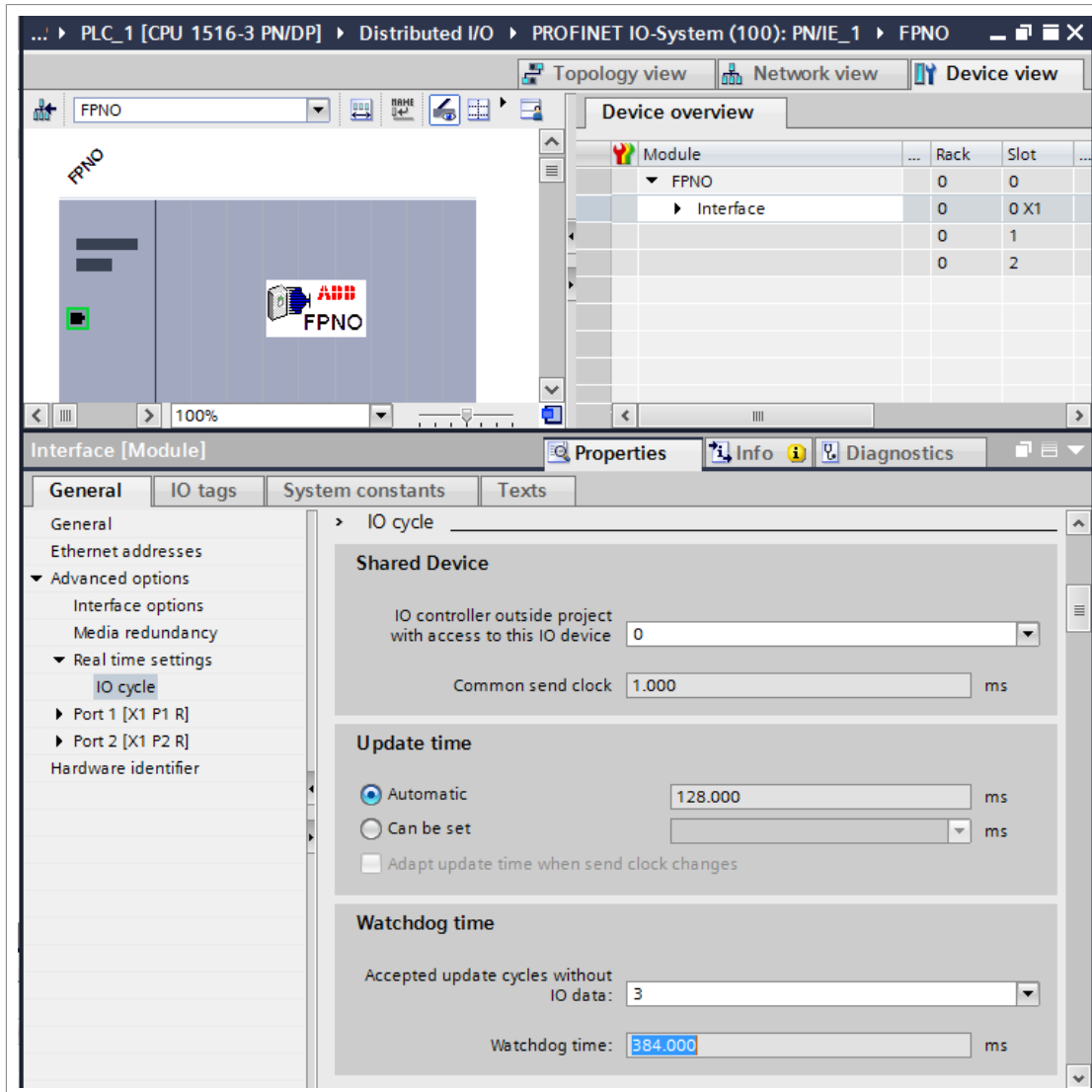


2. In PROFINET interface view, click General tab and select Media Redundancy and then select Manager (auto) role for the PLC.
3. In the Device overview, expand FPNO-21 and select Interface.  
PROFINET interface view is displayed.



4. In PROFINET interface view, click General tab and select Media Redundancy and then select Client role for the FPNO-21.
5. In the General tab, select IO cycle and set watchdog time.

The recommended value for the watchdog time is 200 ms. Make sure that the connection is maintained during the ring break.



For MRP domain management, go to Media Redundancy view and click Domain settings button.

## Shared Device

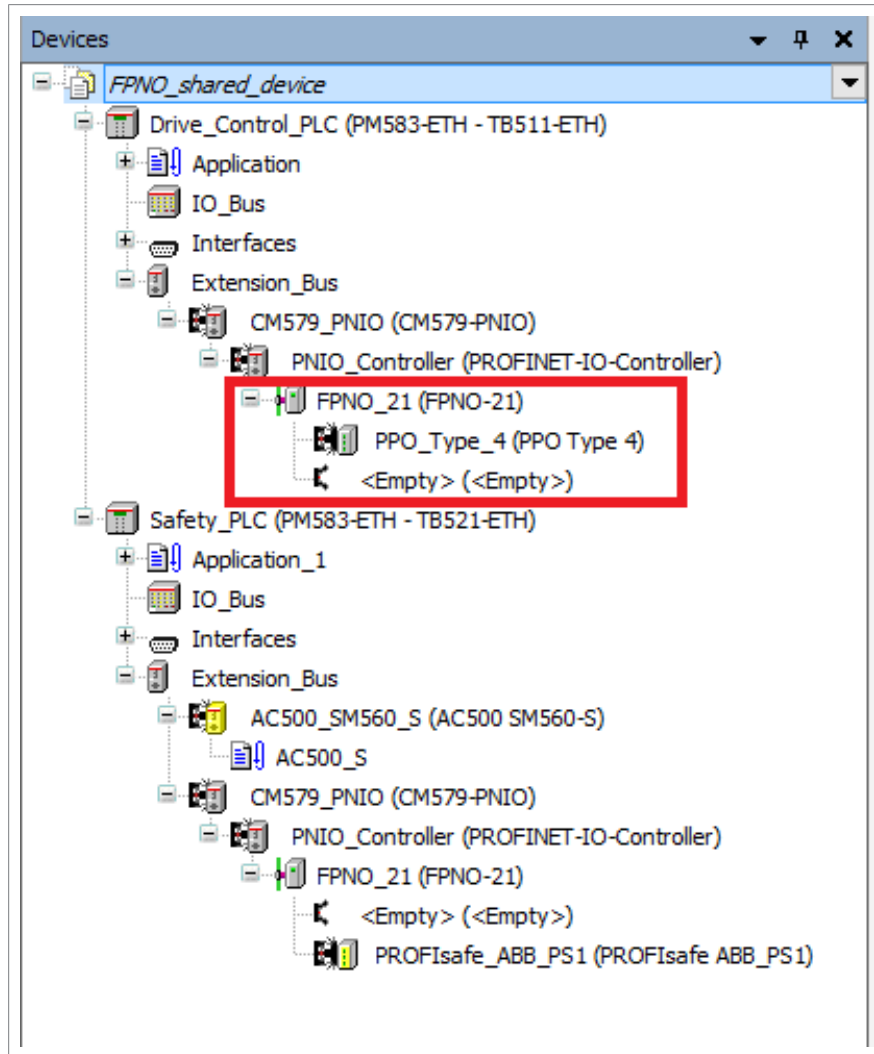
Using Shared Device enable option, you can access one drive from two controllers through one FPNO-21 module.

For example, one PLC to control the drive, other Safety PLC for safety communication. The PROFINET drive control and PROFIsafe can be used by separate PLCs.

### ■ Configuring Shared Device for ABB PLC with Automation Builder

#### Configuring drive control PLC

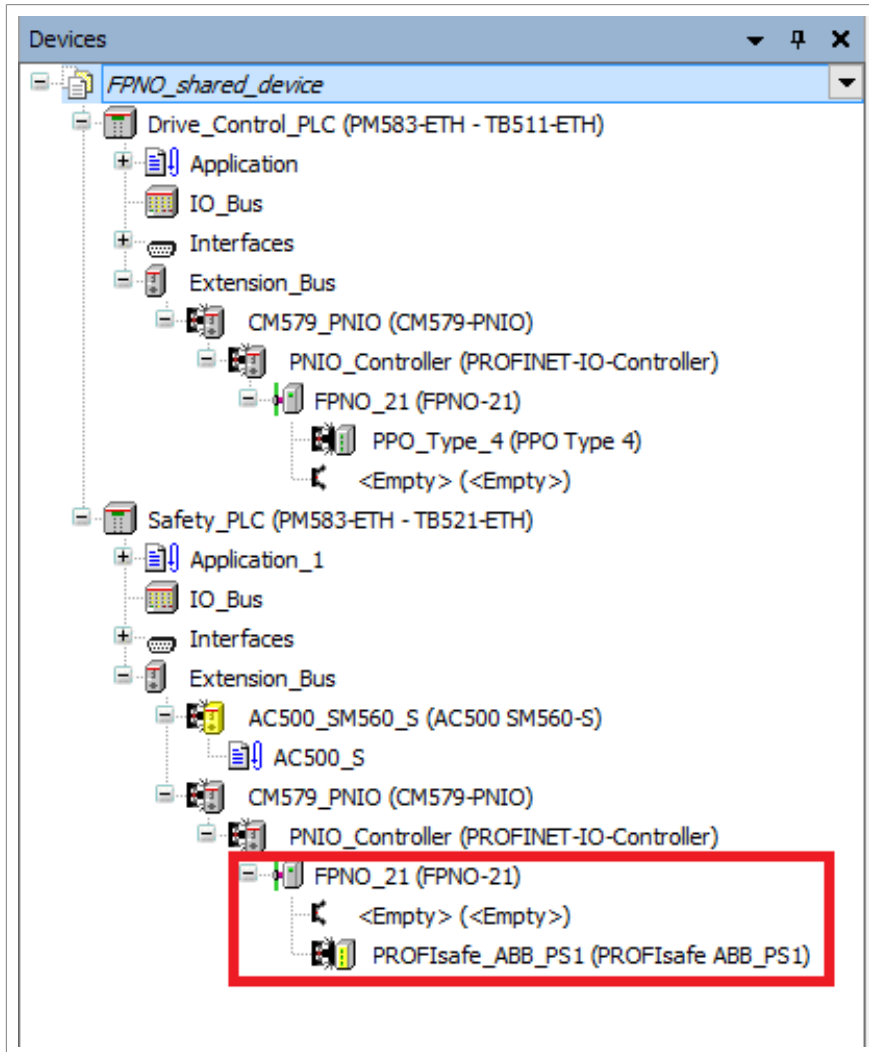
1. Select PPO telegram to use on slot 1. Leave slot 2 empty.
2. Define PROFINET station name and IP address based on the network.



### Configuring safety PLC

1. Select safety telegram to use on slot 2. Leave slot 1 empty.

## 72 PROFINET IO – Start-up



2. Use same PROFINET station name as in drive control PLC configuration.
3. Under Option tab, tick the Shared Device check box.

The screenshot shows the 'FPNO\_21' configuration window. The window has a sidebar with tabs: General, Options, I/O mapping list, PROFINET IO Device, and Information. The 'Options' tab is selected. In the 'Options' tab, the 'Shared Device' checkbox is checked. Below this, there is a 'Port Data' section with two rows. The first row is for 'Port-001' and the second row is for 'Port-002'. Each row has fields for 'Peer-Station/Port', 'Cable Length', and 'MAUType'. The 'Peer-Station/Port' field for Port-001 is set to 'controller'. The 'Cable Length' for Port-001 is set to '< 10 m'. The 'MAUType' for Port-001 is set to '100BaseTXFD (Copper)'.



## ■ Configuring Shared Device for Siemens PLC with TIA portal

### Configuring drive control PLC

1. Select PPO telegram to use on slot 1. Leave slot 2 empty.
2. Define PROFINET station name and IP address.

### Configuring safety PLC

1. Select FPNO-21 in the Device view.
2. Select safety telegram to use on slot 2. Leave slot 1 empty.
3. Use same PROFINET station name as in drive control PLC configuration.
4. From the Shared Device tab, select access rights to the PROFI-safe slot for the Safety PLC.

The screenshot shows the configuration window for device FPNO\_1 [FPNO-21]. The 'Shared Device' tab is selected, displaying a table with the following data:

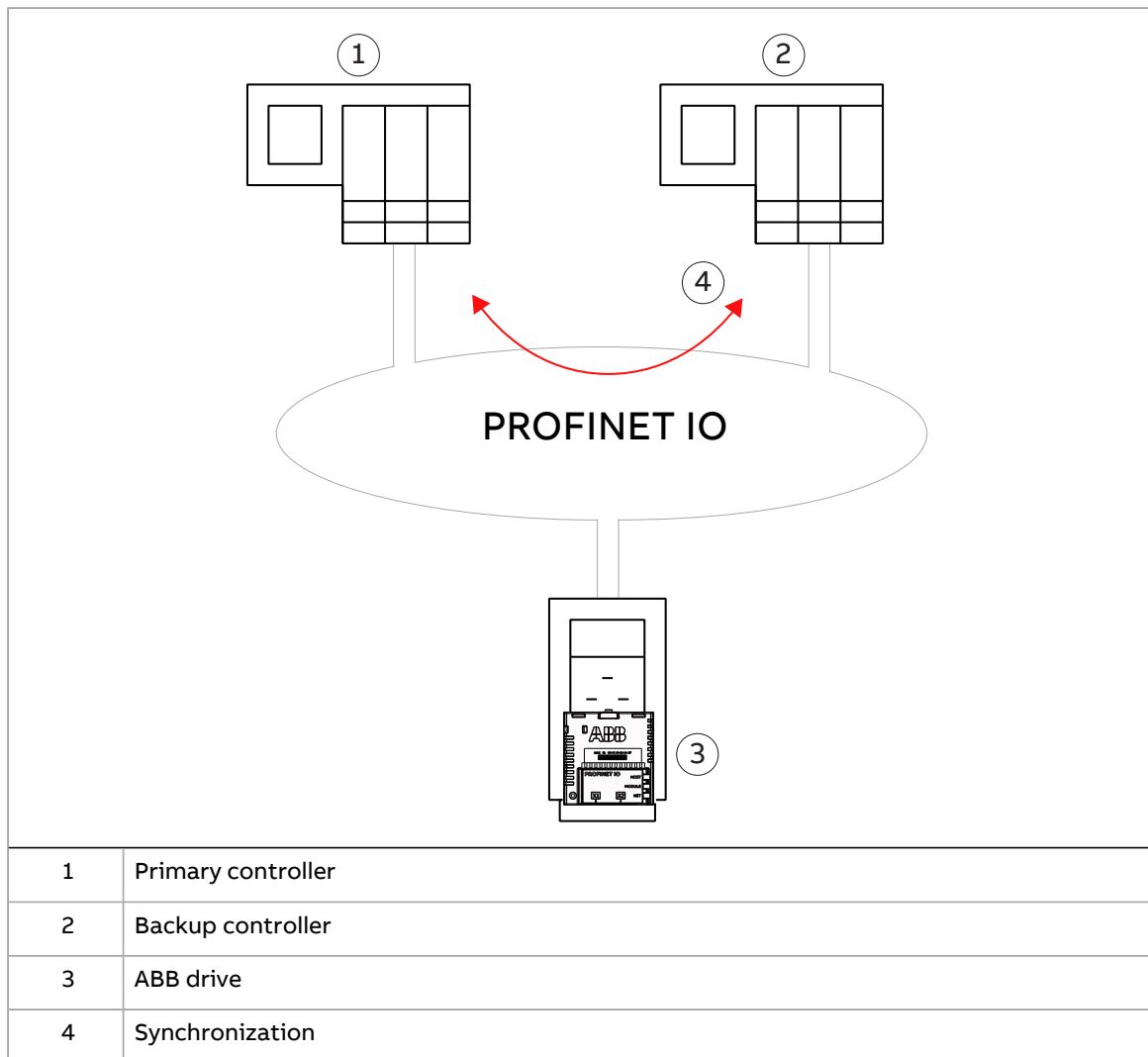
Name	Fail-safe	Access
FPNO_1		PLC_1
Interface		—
Port 1		—
Port 2		—
PROFI-safe ABB_PS1_1	<input checked="" type="checkbox"/>	PLC_1

## S2 system redundancy

System redundancy can be used to increase system availability by making it more fault tolerant. In S2 system redundancy there are redundant PROFINET controllers in the network. In case of failure in the primary controller connection a backup controller will detect the failure and take over control of the devices in the network. It is possible to combine the S2 system redundancy with the ring topology (MRP).

Note that both primary and backup controllers establish their own cyclic PROFINET connections to the devices doubling the amount of cyclic communication data. This needs to be taken into account in the network dimensioning.

FPNO-21 supports S2 system redundancy from firmware version 1.10 onwards with GSDML-V2.4-ABB-FPNO-20201118 and later.



7

# PROFINET IO – Communication profiles

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## Contents of this chapter

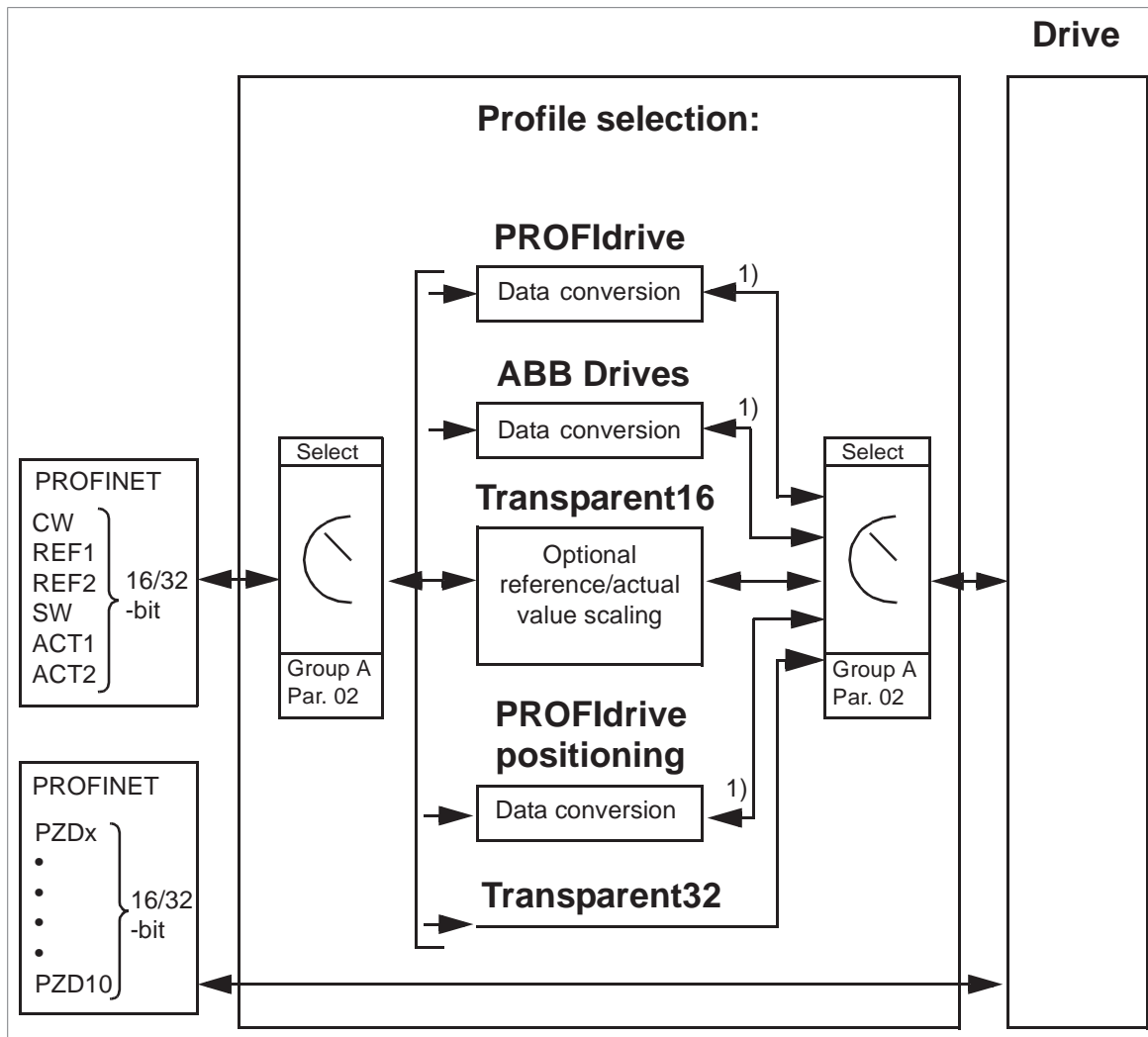
This chapter describes the communication profiles used in the communication between the PROFINET IO master, the adapter module and the drive.

## Communication profiles

Communication profiles are ways of conveying control commands (Control word, Status word, references and actual values) between the master station and the drive.

With the FPNO-21 module, the PROFINET network may employ either the PROFIdrive profile or the ABB Drives profile. Both are converted to the native profile (eg, DCU or FBA) by the adapter module. In addition, two Transparent modes – for 16-bit and 32-bit words respectively – are available. With the Transparent modes, no data conversion takes place.

The figure below illustrates the profile selection:



**Note:** The diagram is applicable only when PPO messaging is used. If Standard Telegrams (ST) are used, the communication profile is selected automatically.

The following sections describe the Control word, the Status word, references and actual values for the PROFIdrive and ABB Drives communication profiles. Refer to the drive manuals for details on the native profiles.

## PROFIdrive communication profile

### ■ Control word and Status word

The Control word (PROFIdrive parameter 967) is the principal means for controlling the drive from a fieldbus system. It is sent by the fieldbus master station to the drive through the adapter module. The drive switches between its states according to the bit-coded instructions in the Control word and returns status information to the master in the Status word (PROFIdrive parameter 968).

The contents of the Control word and the Status word are detailed below. See the drive documentation for information on the drive-specific bits. The drive states are presented on page 80. The drive states for the positioning mode are presented on page 81.

### Control word contents

The table below shows the contents of the Control word for the PROFIdrive communication profile (PROFIdrive parameter 967). The upper case boldface text refers to the states shown in the state machine on page 80.

Bit	Name	Value	STATE/Description	
			Speed control mode	Positioning mode
0	ON	1	Proceed to <b>READY TO OPERATE</b> .	
	OFF1	0	Emergency OFF, stop by the selected deceleration ramp. Proceed to <b>OFF1 ACTIVE</b> ; proceed further to <b>READY TO SWITCH ON</b> unless other interlocks (OFF2, OFF3) are active.	
1	OFF2	1	Continue operation (OFF2 inactive).	
		0	Emergency OFF, coast to stop. Proceed to <b>OFF2 ACTIVE</b> ; proceed further to <b>SWITCH-ON INHIBIT</b> .	
2	OFF3	1	Continue operation (OFF3 inactive).	
		0	Emergency stop, stop according to fastest possible deceleration mode. Proceed to <b>OFF3 ACTIVE</b> ; proceed further to <b>SWITCH-ON INHIBIT</b> . <b>Warning:</b> Ensure motor and driven machine can be stopped using this stop mode.	
3	OPERATION_ENABLE	1	Proceed to <b>ENABLE OPERATION</b> .	
		0	Inhibit operation. Proceed to <b>OPERATION INHIBIT</b> .	
4	ENABLE_RAMP_GENERATOR or TRAVERSING_TASK	1	Normal operation. Proceed to <b>RAMP FUNCTION GENERATOR: ENABLE OUTPUT</b> .	Normal operation. Do not reject traversing task.
		0	Stop according to selected stop type.	Reject traversing task.
5		1	Normal operation. Proceed to <b>RAMP FUNCTION GENERATOR: ENABLE ACCELERATION</b> .	Normal operation. No intermediate stop.
		0	Halt ramping (Ramp Function Generator output held).	Intermediate stop
6		1	Normal operation. Proceed to <b>OPERATING</b> . Note: This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.	Activate traversing task (0 → 1). This is a toggle bit; each rising edge of signal enables a traversing task or a new set point.
		0	Force Ramp Function Generator input to zero.	
7	RESET	0 → 1	Fault reset if an active fault exists. Proceed to <b>SWITCH-ON INHIBIT</b> . <b>Note:</b> This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.	
		0	(Continue normal operation)	

Bit	Name	Value	STATE/Description	
			Speed control mode	Positioning mode
8	JOGGING_1		Jogging 1 (Not supported by all drive types)	
9	JOGGING_2		Jogging 2 (Not supported by all drive types)	
10	REMOTE_CMD	1	Fieldbus control enabled	
		0	Control word <> 0 or reference <> 0: Retain last Control word and reference. Control word = 0 and reference = 0: Fieldbus control enabled.	
11		1	Vendor-specific bit as defined by PROFIdrive parameter 933	Start homing procedure.
		0		Stop homing procedure.
12			Vendor-specific bit as defined by PROFIdrive parameter 934. As default mapped to Drive Main CW bit 12.	
13			Vendor-specific bit as defined by PROFIdrive parameter 935. As default mapped to Drive Main CW bit 13.	
14			Vendor-specific bit as defined by PROFIdrive parameter 936. As default mapped to Drive Main CW bit 14.	
15			Vendor-specific bit as defined by PROFIdrive parameter 937. As default mapped to Drive Main CW bit 15.	

### Status word contents

The table below shows the contents of the Status word for the PROFIdrive communication profile (PROFIdrive parameter 968). The upper case boldface text refers to the states shown in the state machine on page 80.

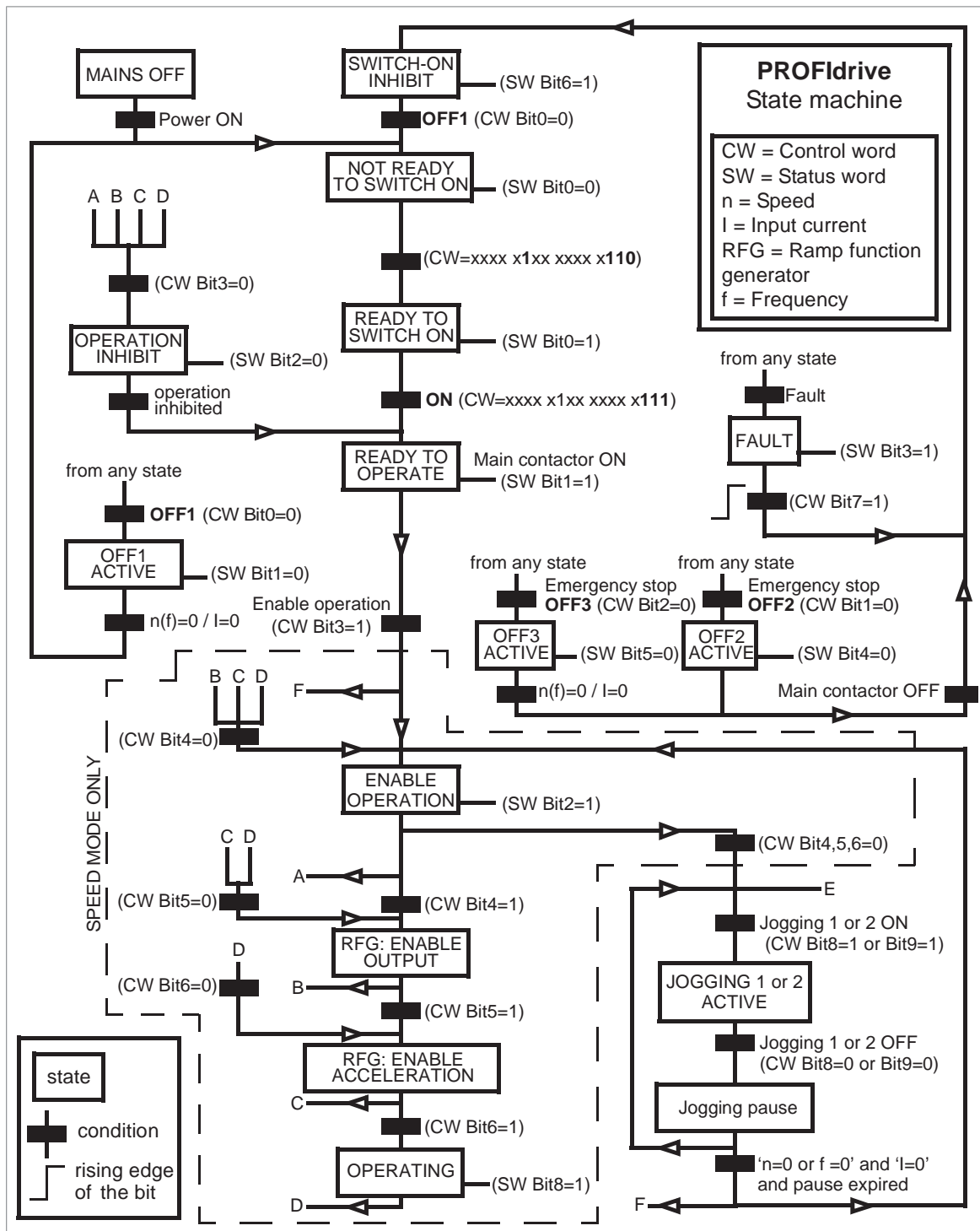
Bit	Name	Value	STATE/Description	
			Speed control mode	Positioning mode
0	RDY_ON	1	<b>READY TO SWITCH ON</b>	
		0	<b>NOT READY TO SWITCH ON</b>	
1	RDY_RUN	1	<b>READY TO OPERATE</b>	
		0	<b>OFF1 ACTIVE</b>	
2	RDY_REF	1	<b>ENABLE OPERATION</b>	
		0	<b>OPERATION INHIBIT</b>	
3	TRIPPED	1	<b>FAULT</b>	
		0	No fault	
4	OFF_2_STA	1	OFF2 inactive	
		0	<b>OFF2 ACTIVE</b>	

Bit	Name	Value	STATE/Description	
			Speed control mode	Positioning mode
5	OFF_3_STA	1	OFF3 inactive	
		0	<b>OFF3 ACTIVE</b>	
6	SWC_ON_INHIB	1	<b>SWITCH-ON INHIBIT ACTIVE</b>	
		0	<b>SWITCH-ON INHIBIT NOT ACTIVE</b>	
7	ALARM	1	Warning/Alarm	
		0	No Warning/Alarm	
8	AT_SETPOINT	1	<b>OPERATING.</b> Actual value equals reference value (= is within tolerance limits).	
		0	Actual value differs from reference value (= is outside tolerance limits).	
9	REMOTE	1	Automation system is requested to assume control.	
		0	Control by automation system is not possible. Control is possible only at the device or by another interface.	
10		1	Actual frequency or speed value equals or is greater than supervision limit.	Target position reached.
		0	Actual frequency or speed value is within supervision limit.	Not at target position
11		1	Mapped to PROFIdrive SW bit 11.	Homing procedure was executed and is valid.
		0	Vendor-specific bit as defined by PROFIdrive parameter 939. As default mapped to PROFIdrive SW bit 11.	No valid home position available.
12		1	Mapped to PROFIdrive SW bit 11.	Traversing task acknowledgement (0 → 1)
		0	Vendor-specific bit as defined by PROFIdrive parameter 940. As default mapped to PROFIdrive SW bit 12.	
13		1	Mapped to PROFIdrive SW bit 11.	Drive stopped.
		0	Vendor-specific bit as defined by PROFIdrive parameter 941. As default mapped to PROFIdrive SW bit 13.	Drive moving. Traversing task is executed (n <> 0).
14			Vendor-specific bit as defined by PROFIdrive parameter 942. As default mapped to PROFIdrive SW bit 14.	

Bit	Name	Value	STATE/Description	
			Speed control mode	Positioning mode
15			Vendor-specific bit as defined by PROFIdrive parameter 943	

**State machine for all operating modes**

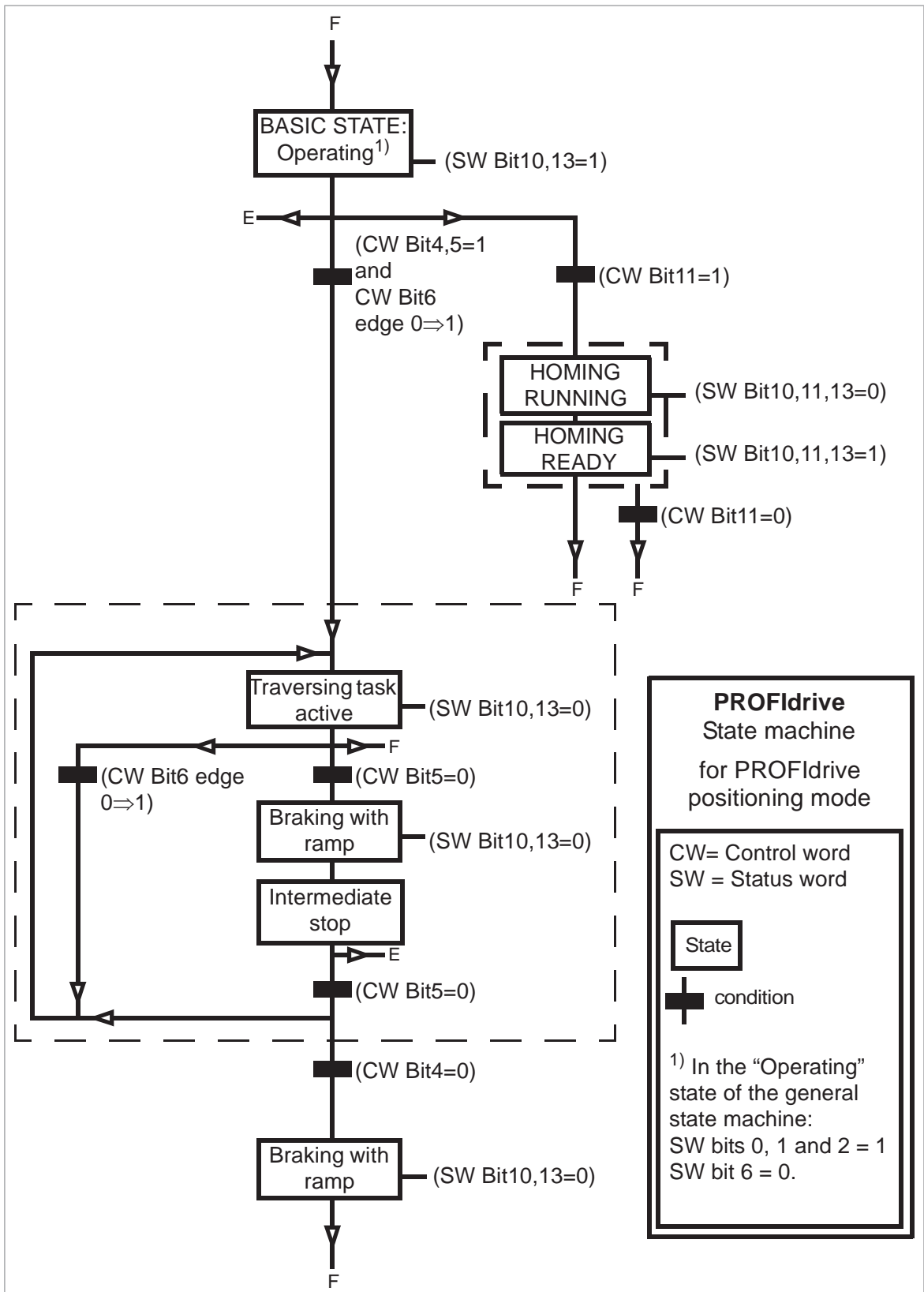
The general PROFIdrive state machine for all operating modes is shown below.





**State machine for the positioning mode**

The PROFIdrive state machine for the positioning mode is shown below.



## ■ References

ABB drives can receive control information from multiple sources including analog and digital inputs, the drive control panel and a fieldbus adapter module (for example, FPNO-21). To have the drive controlled through PROFINET, you must select the module as the source for control information, for example, reference.

### References in speed control mode

In the speed control mode, references are 16-bit or 32-bit words containing a sign bit and a 15-bit or 31-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference.

A 16-bit speed reference (REF or NSOLL\_A) in hexadecimal (0...4000h) corresponds to 0...100% of Maximum Reference (as defined with a drive parameter).

A 32-bit speed reference (NSOLL\_B) in hexadecimal (0...4000 0000h) corresponds to 0...100% of Maximum Reference (as defined with a drive parameter).

## ■ Actual values

Actual values are 16-bit or 32-bit words containing information on the operation of the drive. The functions to be monitored are selected with a drive parameter.

### Actual values in speed control mode

The scaling of 16-bit actual speed values (ACT or NIST\_A) in hexadecimal (0...4000h) corresponds to 0...100% of the maximum reference (as defined with a drive parameter, for example, speed scaling in ACSM1, ACS850, ACQ810, ACS480, ACS580 and ACS880, and external reference in ACS355).

The scaling of 32-bit actual speed values (NIST\_B) in hexadecimal (0...4000 0000h) corresponds to 0...100% of the maximum reference (as defined with a drive parameter, for example, speed scaling in ACSM1, ACS850, ACQ810, ACS480, ACS580 and ACS880, and external reference in ACS355).

## ABB Drives communication profile

### ■ Control word and Status word

The Control word is the principal means for controlling the drive from a fieldbus system. It is sent by the fieldbus master station to the drive through the adapter module. The drive switches between its states according to the bit-coded instructions in the Control word and returns status information to the master in the Status word.

The contents of the Control word and the Status word are detailed below. The drive states are presented on page 85.

### Control word contents

The table below shows the contents of the Control word for the ABB Drives communication profile. The upper case boldface text refers to the states shown on page 85.

Bit	Name	Value	STATE/Description
0	OFF1_CONTROL	1	Proceed to <b>READY TO OPERATE</b> .
		0	Stop along currently active deceleration ramp. Proceed to <b>OFF1 ACTIVE</b> ; proceed to <b>READY TO SWITCH ON</b> unless other interlocks (OFF2, OFF3) are active.
1	OFF2_CONTROL	1	Continue operation (OFF2 inactive).
		0	Emergency OFF, coast to stop. Proceed to <b>OFF2 ACTIVE</b> , proceed to <b>SWITCH-ON INHIBITED</b> .
2	OFF3_CONTROL	1	Continue operation (OFF3 inactive).
		0	Emergency stop, stop within time defined by drive parameter. Proceed to <b>OFF3 ACTIVE</b> ; proceed to <b>SWITCH-ON INHIBITED</b> . <b>Warning:</b> Ensure that motor and driven machine can be stopped using this stop mode.
3	INHIBIT_OPERATION	1	Proceed to <b>OPERATION ENABLED</b> . <b>Note:</b> Run enable signal must be active; see drive documentation. If the drive is set to receive the Run enable signal from the fieldbus, this bit activates the signal.
		0	Inhibit operation. Proceed to <b>OPERATION INHIBITED</b> .
4	RAMP_OUT_ZERO	1	Normal operation. Proceed to <b>RAMP FUNCTION GENERATOR: OUTPUT ENABLED</b> .
		0	Force Ramp Function Generator output to zero. Drive ramps to stop (current and DC voltage limits in force).
5	RAMP_HOLD	1	Enable ramp function. Proceed to <b>RAMP FUNCTION GENERATOR: ACCELERATOR ENABLED</b> .
		0	Halt ramping (Ramp Function Generator output held).
6	RAMP_IN_ZERO	1	Normal operation. Proceed to <b>OPERATION</b> . <b>Note:</b> This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	Force Ramp Function Generator input to zero.
7	RESET	0 → 1	Fault reset if an active fault exists. Proceed to <b>SWITCH-ON INHIBITED</b> . <b>Note:</b> This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	Continue normal operation.
8 ... 9	Reserved		
10	REMOTE_CMD	1	Fieldbus control enabled
		0	Control word and reference not getting through to the drive, except for CW bits OFF1, OFF2 and OFF3.
11	EXT_CTRL_LOC	1	Select External Control Location EXT2. Effective if control location parameterized to be selected from fieldbus.
		0	Select External Control Location EXT1. Effective if control location parameterized to be selected from fieldbus.

Bit	Name	Value	STATE/Description
12 ... 15	Drive-specific (For information, see the drive documentation.)		

### Status word contents

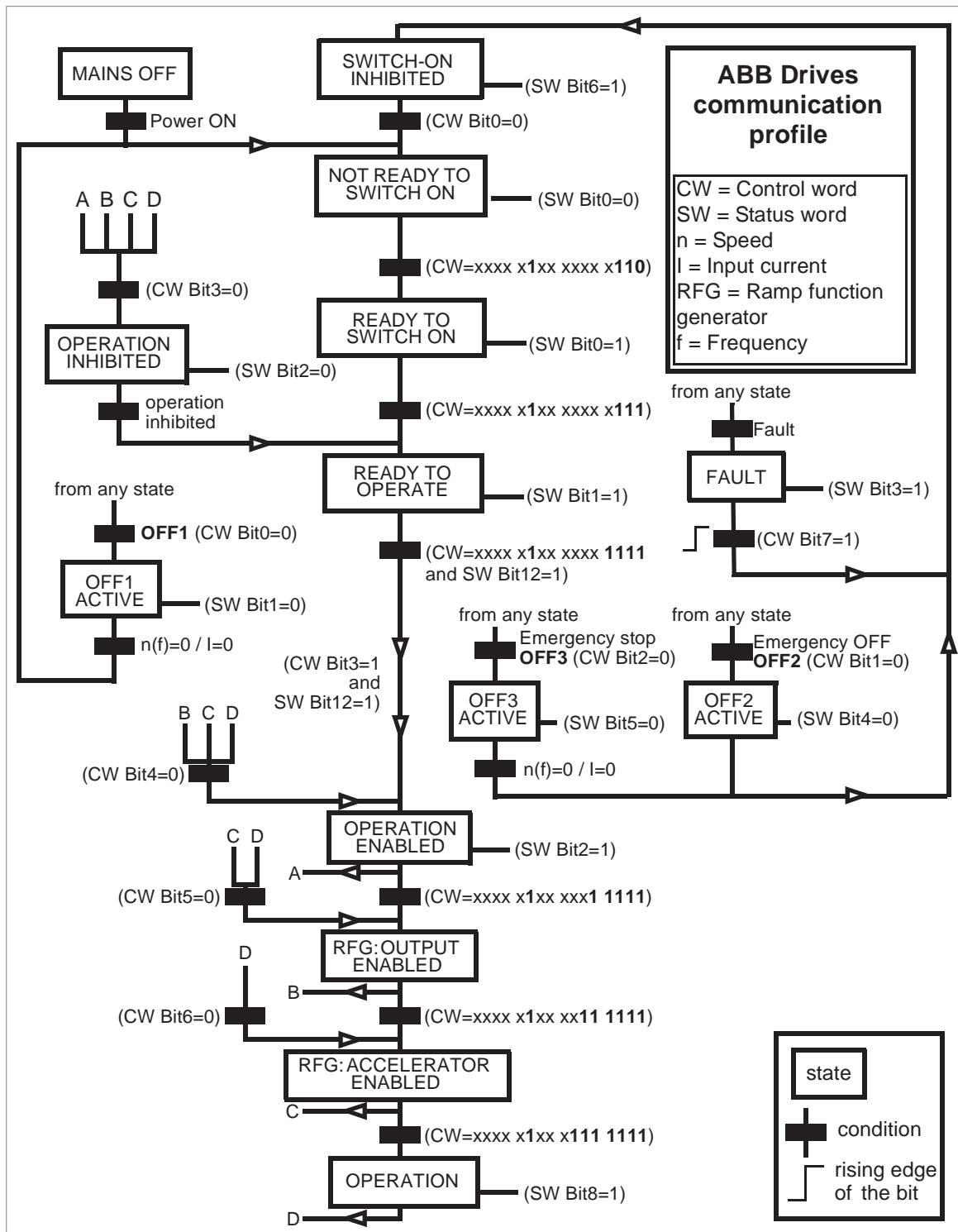
The table below shows the contents of the Status word for the ABB Drives communication profile. The upper case boldface text refers to the states shown on page 85.

Bit	Name	Value	STATE/Description
0	RDY_ON	1	<b>READY TO SWITCH ON</b>
		0	<b>NOT READY TO SWITCH ON</b>
1	RDY_RUN	1	<b>READY TO OPERATE</b>
		0	<b>OFF1 ACTIVE</b>
2	RDY_REF	1	<b>OPERATION ENABLED</b>
		0	<b>OPERATION INHIBITED</b>
3	TRIPPED	1	<b>FAULT</b>
		0	No fault
4	OFF_2_STA	1	OFF2 inactive
		0	<b>OFF2 ACTIVE</b>
5	OFF_3_STA	1	OFF3 inactive
		0	<b>OFF3 ACTIVE</b>
6	SWC_ON_INHIB	1	<b>SWITCH-ON INHIBITED</b>
		0	–
7	ALARM	1	Warning/Alarm
		0	No warning/alarm
8	AT_SETPOINT	1	<b>OPERATION.</b> Actual value equals reference (= is within tolerance limits, i.e., in speed control, speed error is 10% max. of nominal motor speed).
		0	Actual value differs from reference (= is outside tolerance limits).
9	REMOTE	1	Drive control location: REMOTE (EXT1 or EXT2)
		0	Drive control location: LOCAL
10	ABOVE_LIMIT	1	Actual frequency or speed equals or exceeds supervision limit (set by drive parameter). Valid in both directions of rotation.
		0	Actual frequency or speed within supervision limit

Bit	Name	Value	STATE/Description
11	EXT_CTRL_LOC	1	External Control Location EXT2 selected. <b>Note concerning ACS880:</b> This bit is effective only if the fieldbus interface is set as the target for this signal by drive parameters. User bit 0 selection (06.33)
		0	External Control Location EXT1 selected
12	EXT_RUN_ENABLE	1	External Run Enable signal received. <b>Note concerning ACS880:</b> This bit is effective only if the fieldbus interface is set as the target for this signal by drive parameters. User bit 1 selection (06.34)
		0	No External Run Enable signal received
13 ... 14	Drive-specific (For information, see the drive documentation.)		
15	FBA_ERROR	1	Communication error detected by fieldbus adapter module
		0	Fieldbus adapter communication OK

### State machine

The state machine for the ABB Drives communication profile is shown below.



■ **References**

References are 16-bit words containing a sign bit and a 15-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference.

ABB drives can receive control information from multiple sources including analog and digital inputs, the drive control panel and a fieldbus adapter module (for example, FPNO-21). To have the drive controlled through the fieldbus, you must select the module as the source for control information, for example, reference.

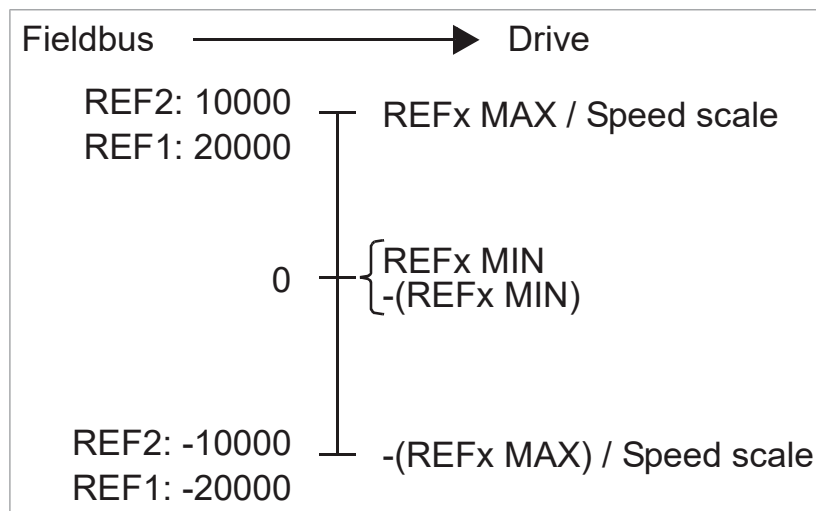
### Scaling

References are scaled as shown below.

**Note:** The values of REF1 MAX and REF2 MAX are set with drive parameters. See the drive manuals for further information.

In ACSM1, ACS850, ACQ810, ACS480, ACS580 and ACS880, the speed reference (REFx) in decimal (0...20000) corresponds to 0...100% of the speed scaling value (as defined with a drive parameter). You can adjust the minimum reference value in some drives. For more information, refer to the parameter 46.06 or 46.07 in the drive's firmware manual.

In ACS355, drive parameter REFx MIN may limit the actual minimum reference.



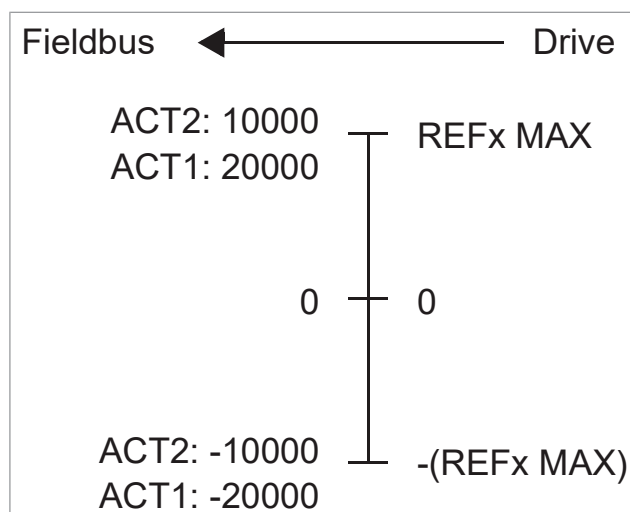
### ■ Actual values

Actual values are 16-bit words containing information on the operation of the drive. The functions to be monitored are selected with a drive parameter.

### Scaling

Actual values are scaled as shown below.

**Note:** The values of REF1 MAX and REF2 MAX are set with drive parameters. See the drive manuals for further information.









# PROFINET IO – Communication protocol

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## Contents of this chapter

This chapter describes the PROFINET IO communication protocol for the adapter module. For detailed information on PROFINET IO communication, refer to PROFINET specification Application Layer protocol for decentralized periphery and distributed automation v2.0.

## PROFINET IO

PROFINET IO is a fieldbus protocol that enables communication between programmable controllers and distributed field devices in an Ethernet network. The protocol classifies devices into I/O controllers, I/O supervisors and I/O devices, which have a specific collection of services.

PROFINET IO uses three different communication channels to exchange data:

- The standard UDP/IP and TCP/IP channel is used for parameterization and configuration of devices and for acyclic operations.
- The real time (RT) channel is used for cyclic data transfer and alarms.
- The isochronous real time (IRT) channel is used, for example, in motion control applications (not implemented in FPNO-21).

PROFINET IO devices are structured in slots and sub-slots, which can contain modules and sub-modules correspondingly. A device can have almost any number of slots and sub-slots, and they can be virtual or real. Device-specific data is represented in slot 0; module-specific and sub-module-specific data in subsequent slots and sub-slots.

One of the benefits of PROFINET IO is the diagnostics and alarm mechanism. Every module and sub-module provide alarm data to the I/O controller using the cyclic

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channel. Diagnostic data can be read non-cyclically from the device by using record data.

The properties and services of a PROFINET IO device are described in a GSD file written in GSDML (General Station Description Markup Language). The GSD file describes the device-specific modules and the method of assigning modules and sub-modules to predefined slots and sub-slots. For more information, see section [Downloading the GSD file \(page 39\)](#) .

## PROFINET network settings

In PROFINET, network devices are identified with station names. The controller uses DCP (Discovery and Configuration protocol) to find devices with configured names from the network. Device with the given name responds with an Identity response which also contains the current IP address of the device.

If the current IP address differs from the address in the hardware configuration of the controller, the controller sets the device with a new IP address according to the configuration. This IP is set as temporary, which means that after reboot of the device, the IP address will be 0.0.0.0 as specified in the PROFINET standard.

The recommended IP setting for PROFINET is Static IP and address is 0.0.0.0. With this setting, there is need to configure the IP in only one place (hardware configuration) and this avoids any IP conflicts among the devices.

## PROFINET IO in FPNO-21

When PROFINET IO is selected as the communication protocol, the FPNO-21 module can employ the ABB Drives, Transparent 16 and Transparent 32 communication profiles or the PROFIdrive profile. You can select the profile via FPNO-21 configuration parameter 02 Protocol/Profile. You can select the appropriate device access point (DAP) and functional module with the tool as well.

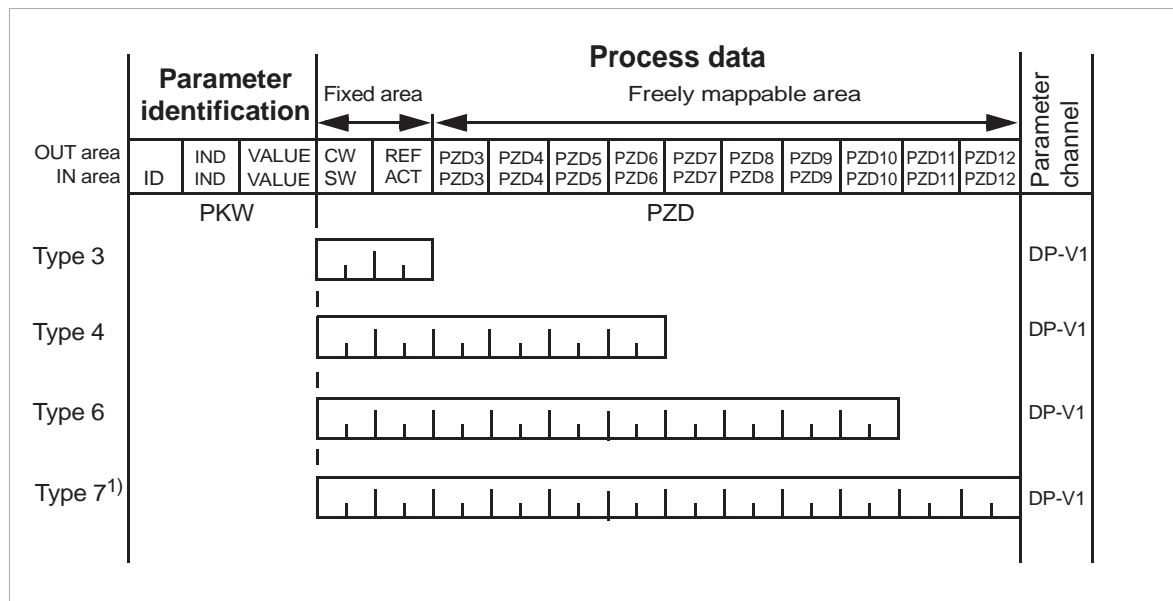
- Slot 0 has sub-slots, and the DAP module attached to it represents the device itself. The following sub-slots are available:
    - sub-slot 0x0001 is DAP
    - sub-slot 0x8000 is interface sub-module
    - sub-slot 0x8001 is port 1
    - sub-slot 0x8002 is port 2.
  - Slot 1 and its sub-slots support other functional modules and sub-modules described in the GSD file. The following sub-slots are available:
    1. For PPO types
      - sub-slot 0x0001 is the telegram
    2. For Standard telegrams
      - sub-slot 0x0001 is the Module Access point
      - sub-slot 0x0002 is the telegram
  - Slot 2 is used for PROFIsafe
    - sub-slot 0x0001 is PROFIsafe telegram
-

## The services provided by the FPNO-21 module

- Cyclic messaging
- Acyclic parameter access mechanism
- Identification & Maintenance functions (I&M)
- Media Redundancy Protocol (MRP)
- System redundancy (S2)
- Shared Device
- Network Diagnostic (SNMP)
- Topology information (LLDP) with LLDP-MIB
- PROFIdrive parameters (limited in the ABB Drives and Transparent profiles)
- Diagnostic and alarm mechanism (only with the PROFIdrive profile)
- Fault buffer mechanism (limited in the ABB Drives and Transparent profiles).

## Cyclic message types

### ■ PPO types



**OUT area** – Data sent from master to slave (control data)

**IN area** – Data sent from slave to master (actual data)

**Parameter identification:**

ID – Parameter identification

IND – Index for arrays

VALUE – Parameter value (Max. 4 bytes)

PKW – Parameter ID/value

**Process data:**

CW – Control word

SW – Status word

REF – Reference

ACT – Actual value

PZD – Process data (application-specific)

DW – Data word

■ **Standard telegram (ST) types (DP-V1)**

**ST1**

	<b>PZD1</b>	<b>PZD2</b>
OUT area	STW1 Control word 1	NSOLL_A Speed set point A
IN area	ZSW1 Status word 1	NIST_A Speed actual value A

**ST2**

	<b>PZD1</b>	<b>PZD2...3</b>	<b>PZD4</b>
OUT area	STW1 Control word 1	NSOLL_B Speed set point B	STW2 Control word 2
IN area	ZSW1 Status word 1	NIST_B Speed actual value B	ZSW2 Status word 2

**Note:** For the contents of the Control word, the Status word, references and actual values, see chapter *PROFINET IO – Communication profiles*

■ **Behavior of output data**

<b>If</b>	<b>Then</b>
IOPS (PLC provider status)=Bad	Output data retains last values
Connection loss	Output data retains last values
After power-up	All output data is 0

**Parameter handling using acyclic parameter access mechanism (DP-V1)**

PROFINET IO offers record read and write services for the acyclic parameter access mechanism. When the drive parameters or FPNO-21 parameters are accessed, the corresponding slot, sub-slot and index are set, and a PROFIdrive DP-V1 message is placed on the data block of the record read or write frame.

■ **Header and frame structures**

PROFINET IO uses the DCE RPC (Distributed Computing Environment Remote Procedure Call) protocol for acyclic read and write services. I/O controllers and supervisors take care of formulating most of the request frames. However, it is possible that handling the PROFIdrive request and response headers must be performed in the application logic. The acyclic frame structure, headers and error codes are described further below.

Frames	Dest addr.	Src addr.	Ether type	IP UDP	RPC	NDR	Read or Write	Data
Bytes	6	6	2	28	80	20	64	...

**Dest addr.** and **Src addr.** are the destination and the source of the communication relationship. The addresses are in hexadecimal format, for example, 00-30-11-02-57-AD.

**Ether type** is 0x800 for non-real-time communication.

**IP** and **UDP** fields contain the IP address of the source and the destination as well as the communication ports and length of the message.

**RPC** contains, for example, the read or write service ID, interface description and selected objects.

**NDR** request block describes the length of the following data block. The response block also contains bytes Errorcode, ErrorDecode, Errorcode1 and Errorcode2 for presenting the status of the request. The response error codes are listed in the table below.

Byte	Value and meaning
Errorcode	0xDF (Error Write)
	0xDE (Error Read)
ErrorDecode	0x80 (PNIORW) Errorcode1 decoded as shown in section Errorcode1 (page 93). Errorcode2 is 0.
	0x81 (PNIO) Errorcode1 and Errorcode2 decoded as shown in section Errorcode1 (page 93).
Errorcode1	Error class and error code. See section Errorcode1 (page 93).
Errorcode2	Not described here

### Errorcode1

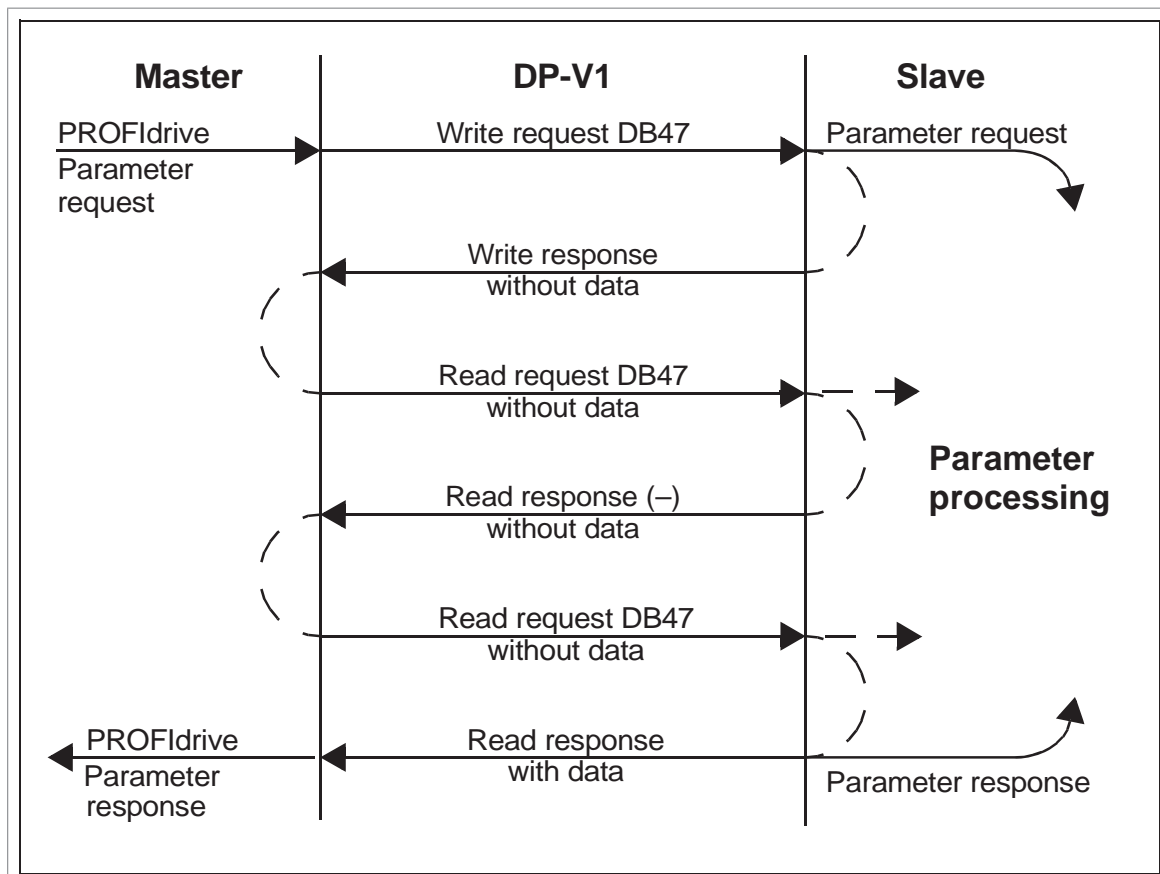
The table below lists the Errorcode1 with PNIORW decoding.

Error class	Meaning	Error code
0...9	(Reserved)	
10 (0x0A)	Application	0 = Read error 1 = Write error 2 = Module failure 3...7 = Reserved 8 = Version conflict 9 = Feature not supported 10...15 = User-specific

11 (0x0B)	Access	0 = Invalid index 1 = Write length error 2 = Invalid slot 3 = Type conflict 4 = Invalid area 5 = State conflict 6 = Access denied 7 = Invalid range 8 = Invalid parameter 9 = Invalid type 10...15 = User-specific
12 (0x0C)	Resource	0 = Read constraint conflict 1 = Write constraint conflict 2 = Resource busy 3 = Resource unavailable 4...7 = Reserved 8...15 = User-specific
13...15	User-specific	

■ **DP-V1 read/write request sequence**

A read/write service on a drive parameter is illustrated below.



The messaging employs DP-V1 data units. The PROFIdrive parameter request is included within the DP-V1 request as data. Likewise, the DP-V1 response contains the PROFIdrive parameter response as data.

A write request is first sent containing the parameter request. If the write request is valid, the adapter module acknowledges it with a DP-V1 write response with no data. The master will then send a read request. If the adapter module is still busy performing

the internal parameter request, it will return a negative response with the DP-V1 error code B5h (State conflict). In this case, the master will repeat the read request until the adapter module has the PROFIdrive response data ready.

If the write request is invalid, a negative response is returned with a DP-V1 error code (see section [ErrorCode1](#) (page 93)).

### Read and write blocks

A read block is used in read requests and responses, while a write block is used in write requests and responses. A request consists of unique identifiers for the connection, addressing information and the length of the record data. A response also contains two additional fields for transferring information.

The table below shows the structure of the read and write blocks in detail.

Field(s)	Description	Range	Type
Service	Request or Response service	Request (0x00) Response (0x80)	UI8
Operation	Read or Write operation	Write (0x08) Read (0x09)	UI8
Block length	Length of the block	0...0xFFFF	UI16
ARUID	Identifier <ul style="list-style-type: none"> <li>• time low</li> <li>• time mid</li> <li>• time high and version</li> <li>• clock</li> <li>• node</li> </ul>		UI32 UI16 UI16 Octet[2] Octet[6]
API	Application process identifier	Device access point (0x0000) PROFIdrive (0x3A00)	UI32
Slot	Slot of the module access point (MAP/PAP)	0x01	UI16
Subslot	Subslot of the module access point (MAP/PAP)	0x01	UI16
Padding	2 bytes		
Index	Index of the record data object	0x2F 0xB02E 0xB02F	UI16
Data length	Length of the data block	0...0xFFFFFFFF	UI32
Additional value 1 (response only)	Field for transferring additional data		UI16
Additional value 2 (response only)	Field for transferring additional data		UI16
Padding	24 bytes for request, 20 bytes for response.		
Data block	Used only with write request and read response.		

**Data block**

The data block contains a PROFIdrive-specific request or response header.

The table below shows the contents of the PROFIdrive request.

Field(s)	Description	Range	Byte/ Word
Request Reference	Unique identification set by the master. Changed for each new request.	1...255	Byte
Request ID	Request type for the issued block	Request Parameter (01h) Change Parameter (02h)	Byte
Drive Object ID	To be set to 0 or 1.	0...255	Byte
No. of Parameters	Number of the parameters that are present in the request	1...37	Byte
Attribute	Type of the object being accessed. Note: "Description" and "Text" are not supported.	Value (10h) Description (20h) Text (30h)	Byte
No. of Elements	Number of the array elements accessed or length of the string accessed. Set to 0 if non-array parameters are used.	0, 1...234	Byte
Parameter Index	Address of the parameter that is being accessed. "0" is allowed by FPNO-21.	1...65535	Word
Subindex	Addresses <ul style="list-style-type: none"> <li>• the first array element of the parameter or</li> <li>• the beginning of a string access or</li> <li>• the text array or</li> <li>• the description element that is being accessed</li> </ul>	0...65535	Word
Format <sup>1)</sup>	See the table on page 97.	See the table on page 97.	Byte
Number of Values <sup>1)</sup>	Number of the values following	0...234	Byte
Values <sup>1)</sup>	The values of the request. In case of an odd number of bytes, a zero byte is appended to ensure the word structure of the telegram.	–	See the Format field.

<sup>1)</sup> Only if Request ID is 02h (Change Parameter). The Format, Number of Values and Values fields are repeated for other parameters.

The table below shows the contents of the PROFIdrive response.

Field(s)	Description	Range
Request Reference (mirrored)	Mirrored from the request.	1...255



Field(s)	Description	Range
Response ID	Response from the slave. In case any requested services fail, a “not acknowledged” (NAK) response will be indicated.	Request Param OK (01h) Request Param NAK (81h) Change Param OK (02h) Change Param NAK (82h)
Drive Object ID	To be set to 1.	0...255
No. of Parameters	Number of the parameters that are present in the response	1...37
Format <sup>1)</sup>	See the table on page 97.	See the table on page 97.
Number of Values <sup>1)</sup>	Number of the values following	0...234
Values <sup>1)</sup>	The values of the request. In case of an odd number of bytes, a zero byte is appended to ensure the word structure of the telegram.	–

<sup>1)</sup> Only if Response ID is 01h (Request Parameter OK). The Format, Number of Values and Values fields are repeated for other parameters.

The table below shows the data types for the Format field in the PROFIdrive response.

Code	Type
0x00	(Reserved)
0x01...0x36	Standard data types 1. Boolean (not supported) 2. Integer8 (not supported) 3. Integer16 4. Integer32 5. Unsigned8 (not supported) 6. Unsigned16 7. Unsigned32 8. Floating point (not supported) 9. Visible string (not supported) ...
0x37...0x3F	(Reserved)
0x40	Zero
0x41	Byte
0x42	Word
0x43	Double word
0x44	Error
0x45...0xFF	(Reserved)

The table below shows the PROFIdrive parameter request error codes.

Error #	Meaning	Used at
00h	Impermissible parameter number	Access to an unavailable parameter

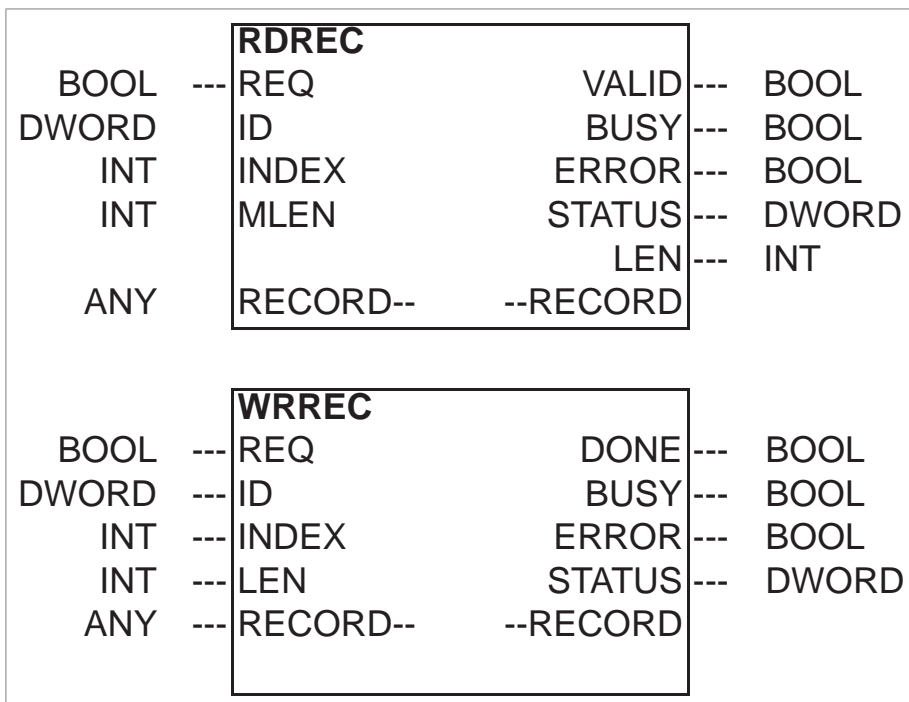
Error #	Meaning	Used at
01h	Parameter value cannot be changed	Change access to a parameter value that cannot be changed
02h	Low or high limit exceeded	Change access with a value outside the limits
03h	Invalid subindex	Access to an unavailable subindex
04h	No array	Access with a subindex to a non-indexed parameter
05h	Incorrect data type	Change access with a value that does not match the data type of the parameter
06h	Setting not permitted (can only be reset)	Change access with a value unequal to 0 when this is not permitted
07h	Description element cannot be changed	Change access to a description element that cannot be changed
09h	No description data available	Access to an unavailable description (parameter value is available)
0Bh	No operation priority	Change access rights without rights to change parameters
0Fh	No text array available	Access to a text array that is not available (Parameter value is available.)
11h	Request cannot be executed because of operating mode	Access is temporarily not possible for reasons that are not specified in detail.
14h	Value impermissible	Change access with a value that is within limits but is not permissible for other long-term reasons (parameter with defined single values)
15h	Response too long	The length of the current response exceeds the maximum transmittable length.
16h	Parameter address impermissible	Illegal value or value that is not supported for the attribute, number of elements, parameter number or sub-index, or a combination
17h	Illegal format	Write request: Illegal format or format of parameter data that is not supported
18h	Number of values inconsistent	Write request: Number of values of the parameter data does not match the number of elements at the parameter address.
65h ... FF	Manufacturer-specific error area	–
65h	Vendor-specific error	Vendor-specific error
66h	Request not supported	Request not supported
67h	Communication error	Request cannot be completed because of a communication error.
6Eh	Non-volatile error	Failure during write to non-volatile memory
6Fh	Time-out error	Request aborted because of a timeout.
78h	PZD map failure	Parameter cannot be mapped to PZD (size mismatch or non-existent).

Error #	Meaning	Used at
79h	PZD memory failure	Parameter cannot be mapped to PZD (out of memory).
7Ah	Multiple PZD map	Parameter cannot be mapped to PZD (multiple PZD write).
82h	Control word bit map	Cannot map Control word bit (parameter 933...937, eg, double mapping of bits).
8Ch	Set torque mode error	Cannot change mode to TORQUE (frequency is used).
90h	Illegal Request ID	The request ID of the response is illegal.
96h	Internal buffer	Buffer overflow
A0h	Internal communication	Communication error between the module and the drive

■ **Function blocks for sending DP-V1 messages (Siemens S7)**

In IEC 61131-3 compatible systems, function blocks are available for accessing data non-cyclically. In Siemens S7, SFB 52 "RDREC" can be used for reading and SFB53 "WRREC" for writing data records as follows:

- On INDEX: Connect the value 0xB02F, 0xB02E or 0x2F.
- On Write record: Set the length of the DP-V1 write request to MLEN.
- On Read record: Set the maximum length of the DP-V1 read response.
- Connect the DP-V1 message to RECORD.



**Note:** The function block names for Siemens 12xx and 15xx series PLCs are RD\_REC and WR\_REC, and this naming convention is also applicable for other blocks.

For more information on the above function blocks, see document *Communication Function Blocks for PROFIBUS DP and PROFINET IO v2.0* available at [www.profibus.com](http://www.profibus.com).

### ■ Parameter data transfer examples

The following examples show how parameter data is transferred using the DP-V1 mechanisms READ and WRITE.

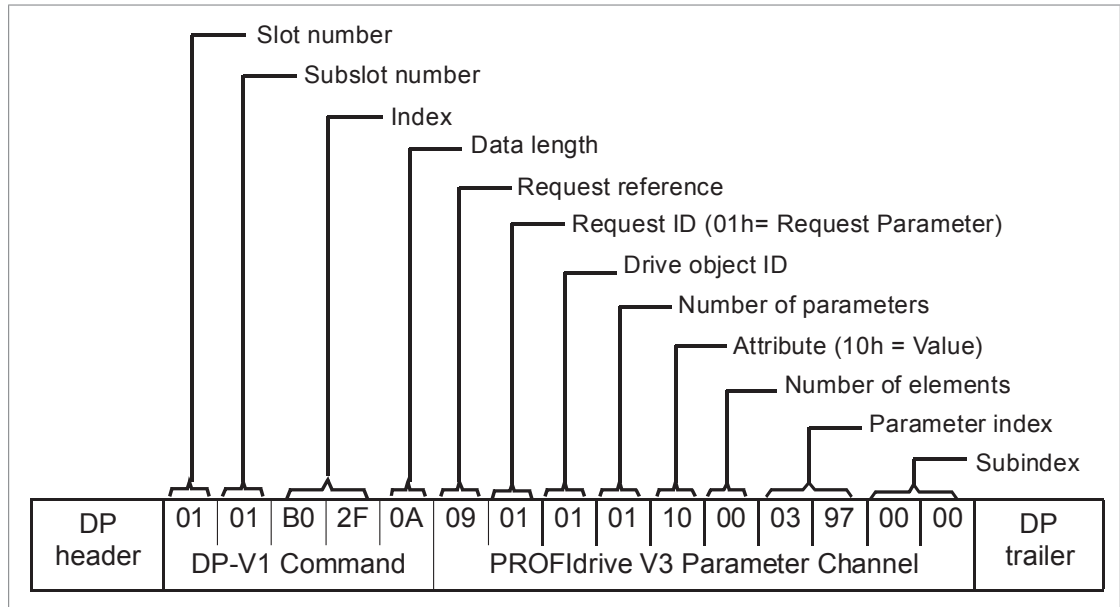
Only the data block part of the request is presented in the examples. See section *Read and write blocks* (page 95).

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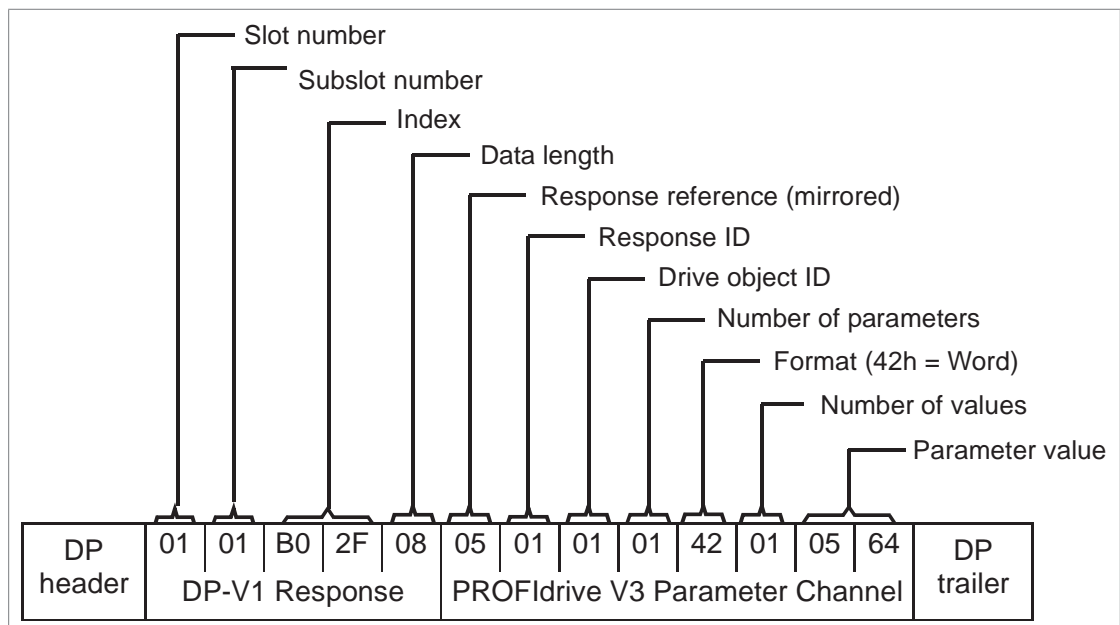
**Example 1a: Reading a drive parameter (array element)**

Drive parameters are addressed so that the drive parameter group corresponds to the Parameter index (PNU), and the drive parameter number within the group corresponds to the Subindex (IND). In the following example, a value is read from drive parameter 12.04 (0C.04h).

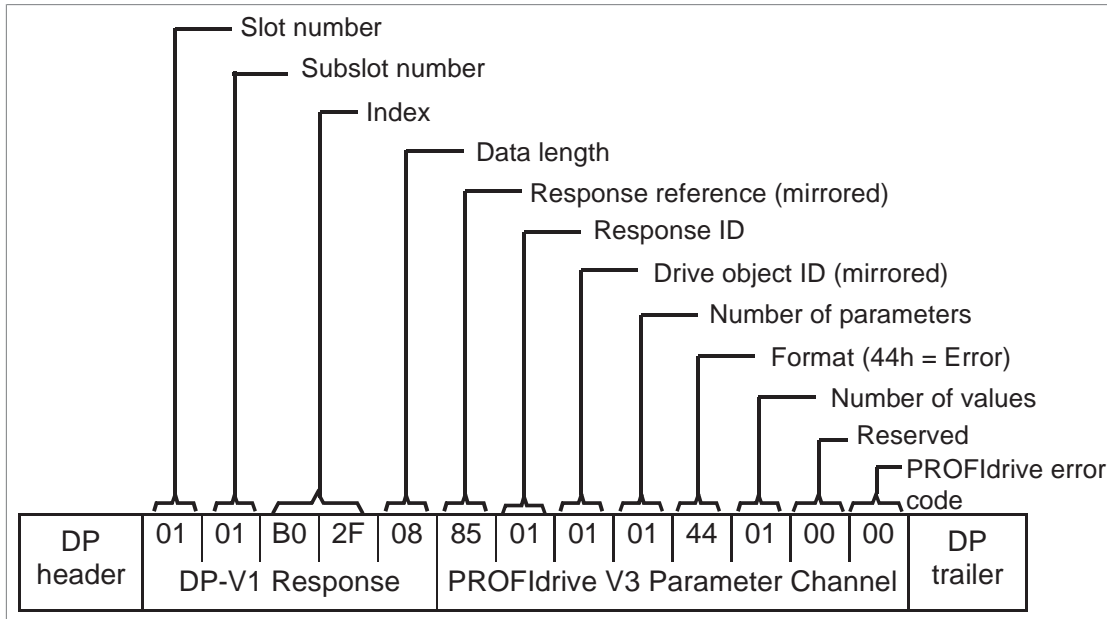
- DP-V1 Write request (Read parameter value):



- Positive Read response to DP-V1 Read request:



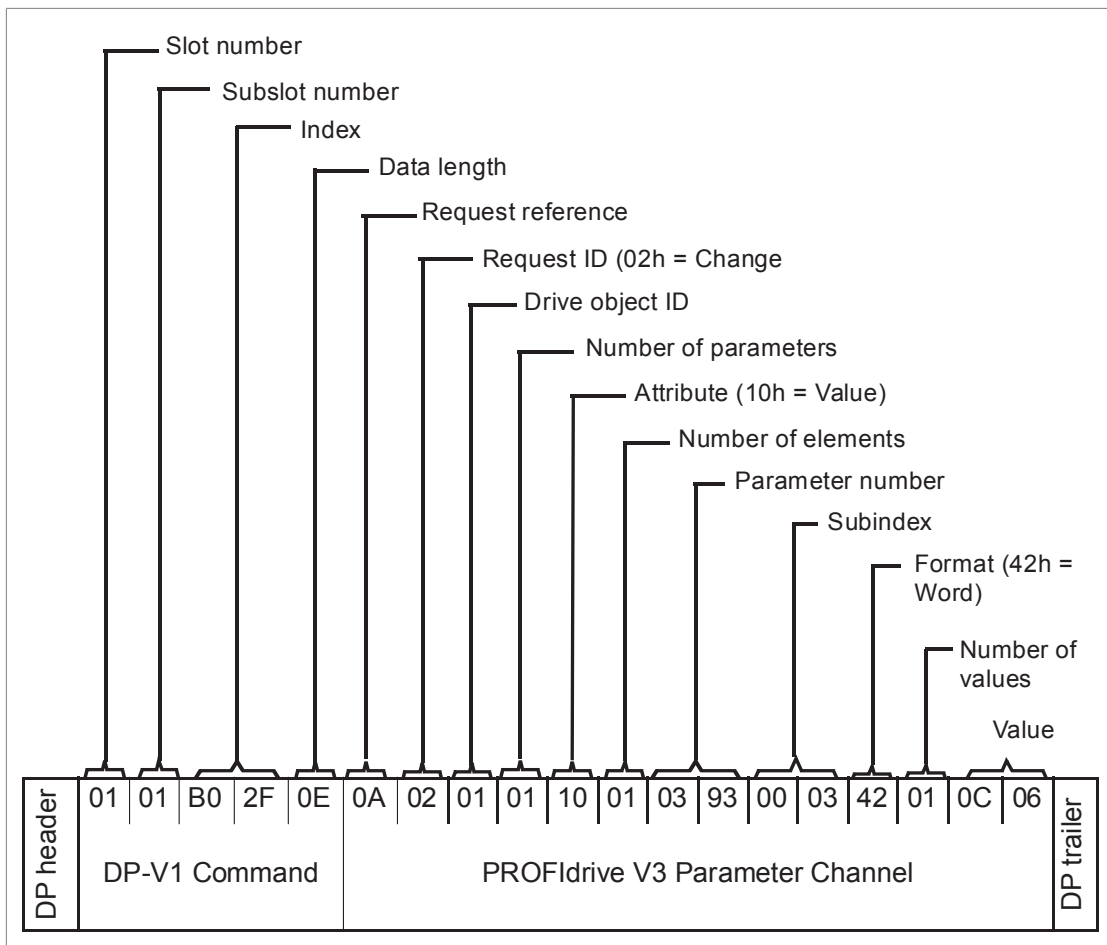
- Negative response to PROFIdrive Read request:



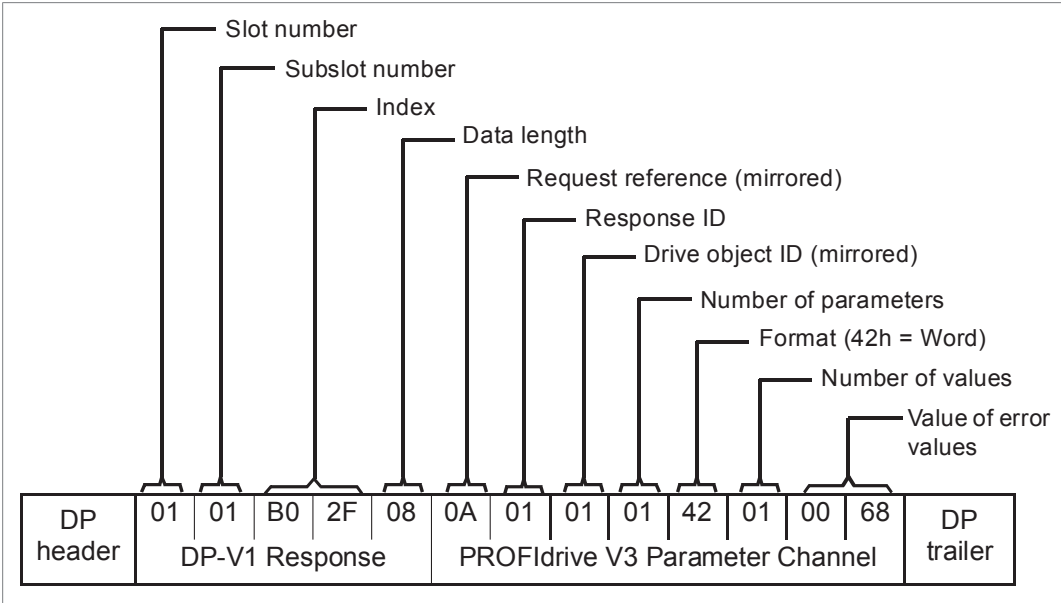
**Example 1b: Reading 3 drive parameters (multi-parameter)**

In this example, three parameters (12.04, 20.08 and 30.19) are read using one telegram.

- DP-V1 Write request (Read parameter value)



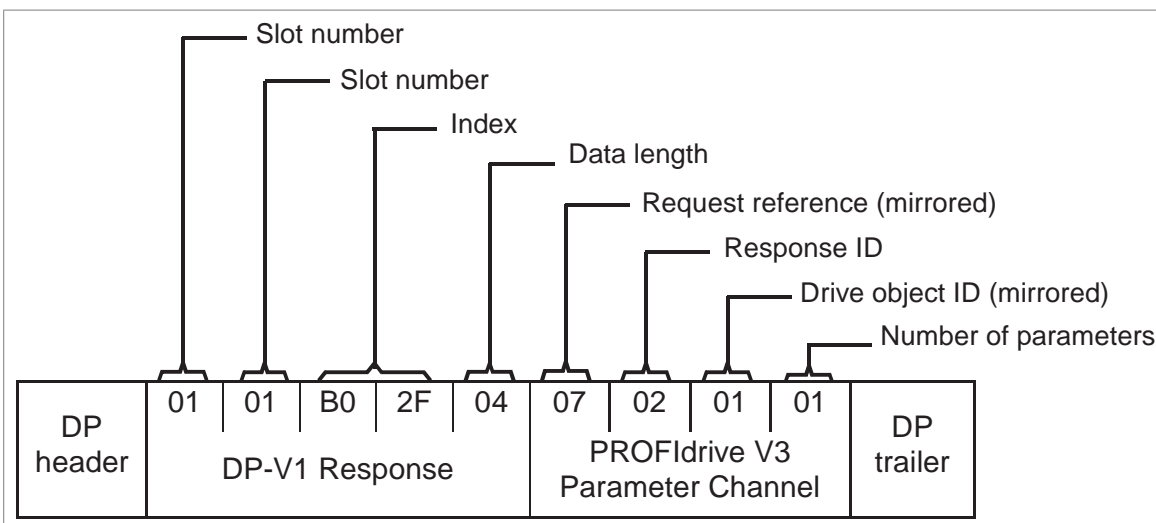
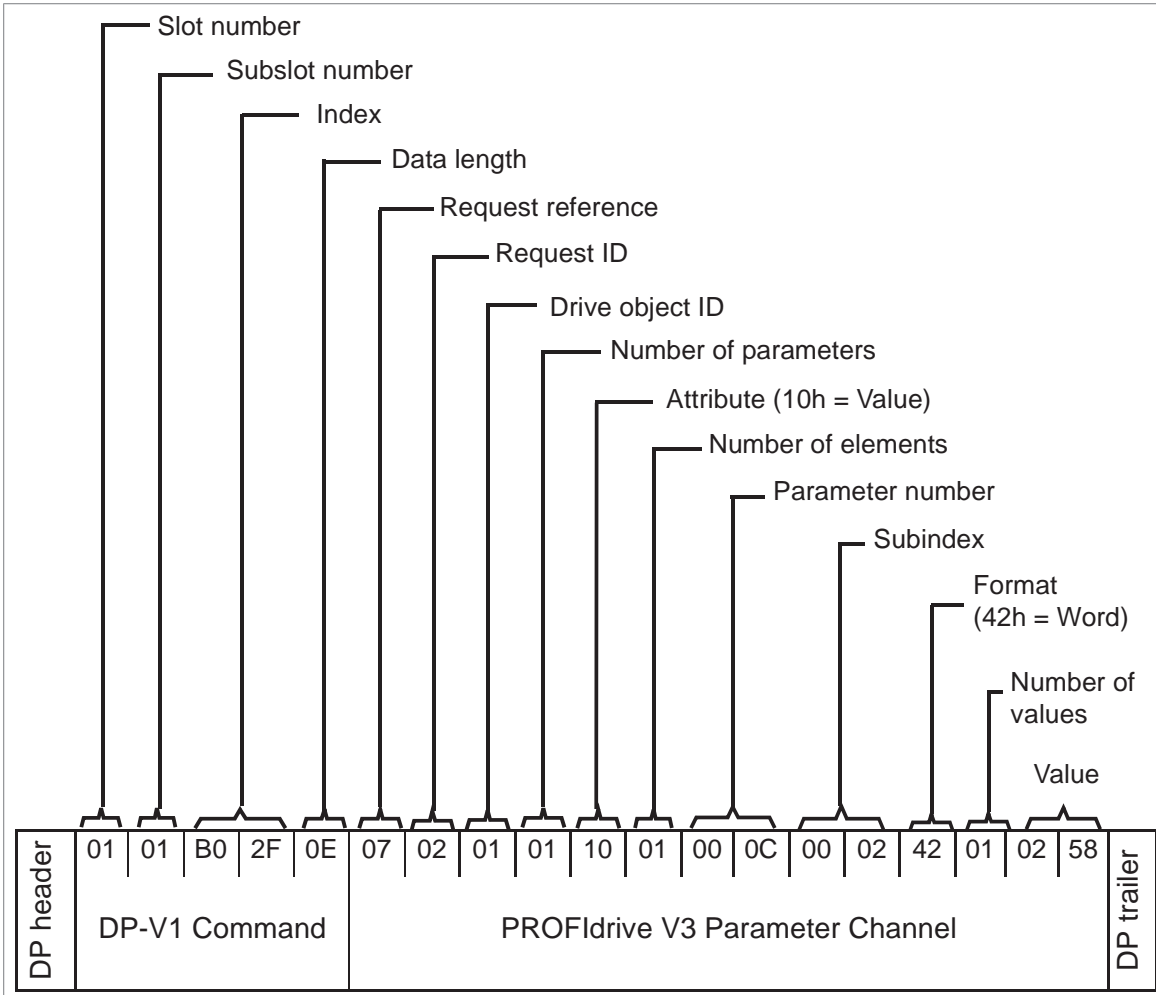
- Positive Read response to DP-V1 Read request:



The values 190h (400), 1F4h (500) and 1Eh (30) are returned.

**Example 2a: Writing a drive parameter (one array element)**

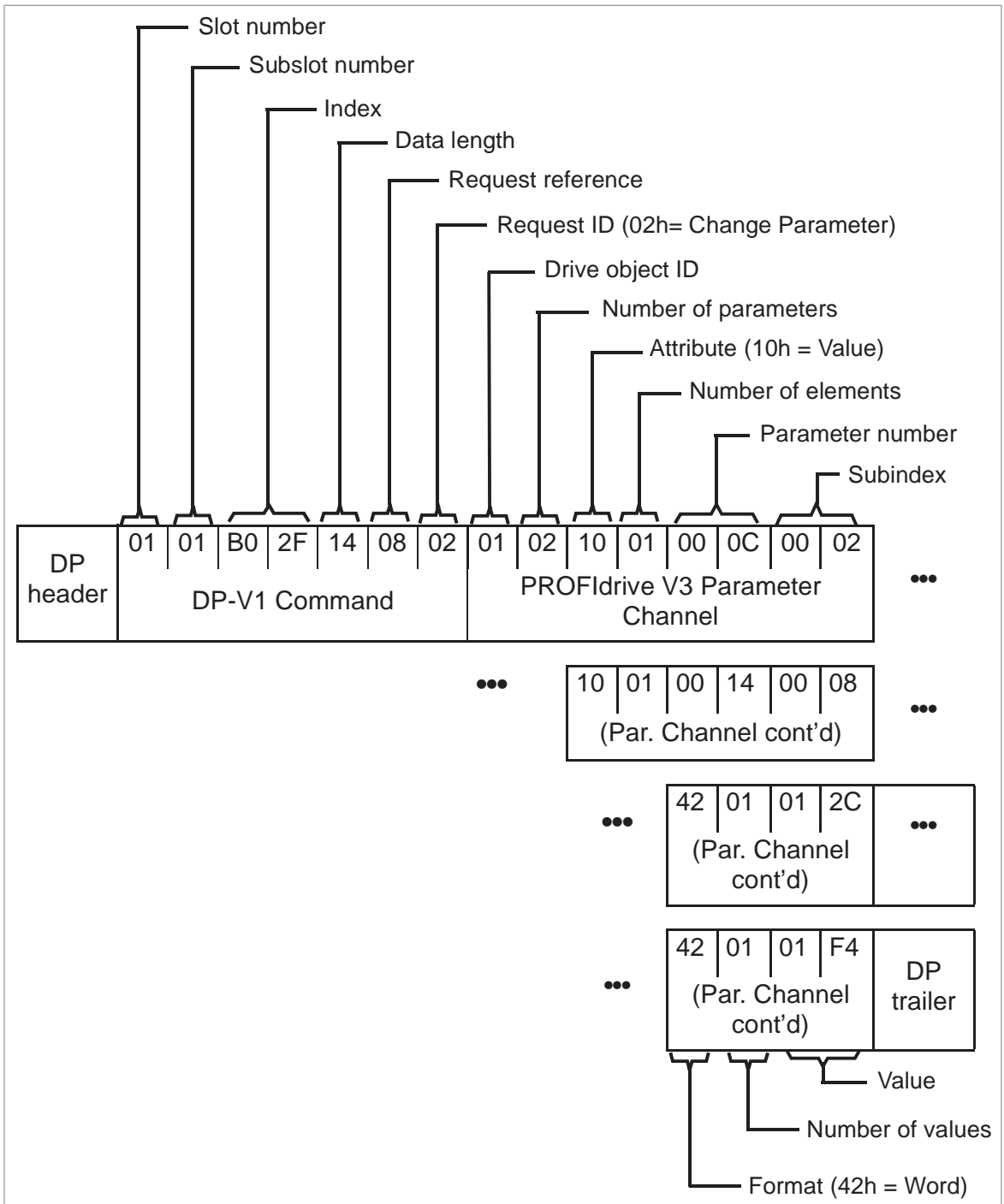
Drive parameters are addressed so that the drive parameter group corresponds to the Parameter index (PNU), and the drive parameter number within that group corresponds to the Subindex (IND). In the following example, a value is written to drive parameter 12.02 (0C.02h).



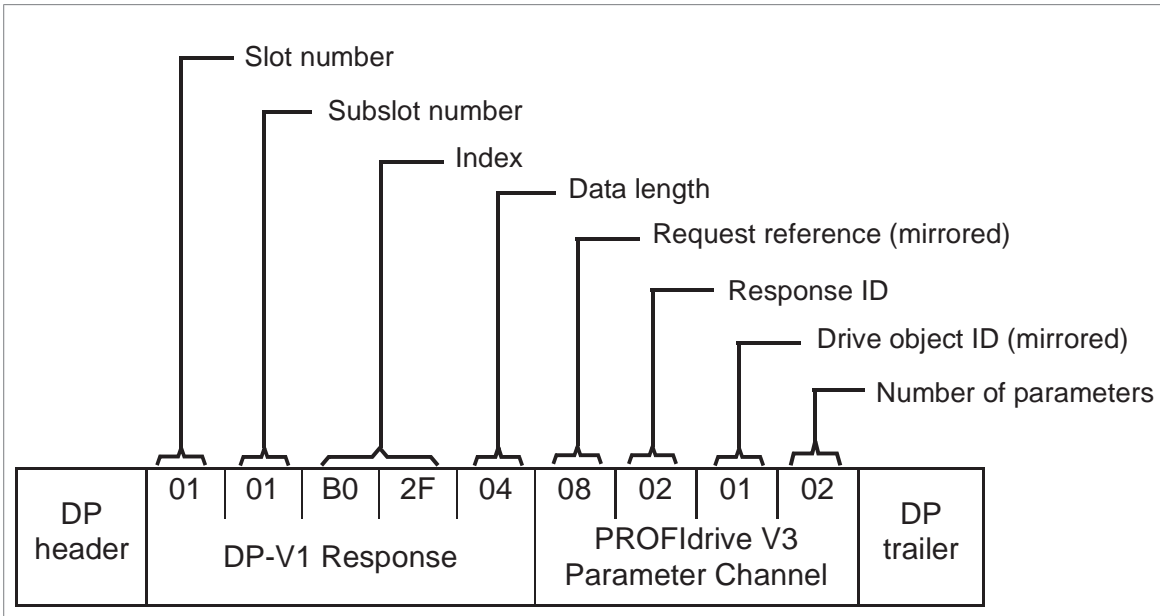


**Example 2b: Writing 2 drive parameters (multi-parameter)**

In this example, the values 300 (12Ch) and 500 (1F4h) are written to drive parameters 12.02 (0C.02h) and 20.08 (14.08h) respectively using one telegram.



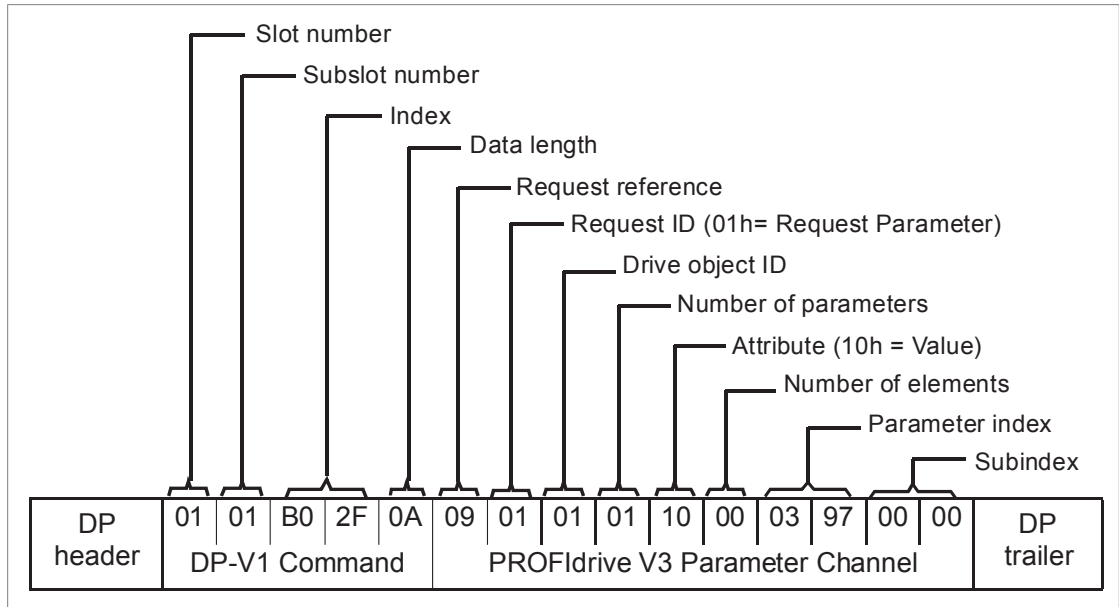
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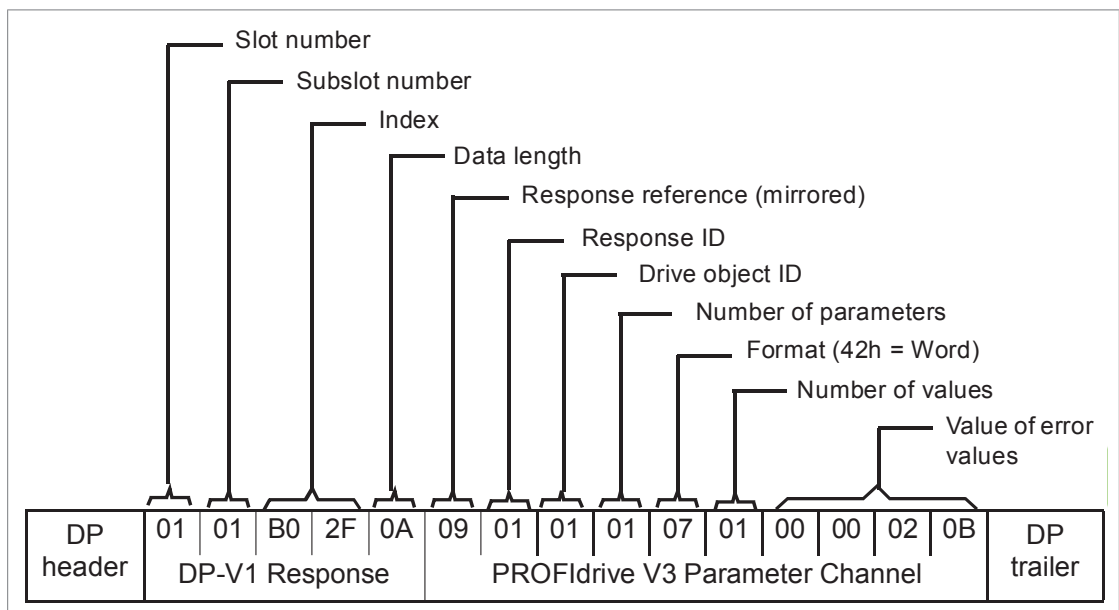
**Example 3: Reading a PROFIdrive parameter**

In this example, PROFIdrive parameter 919 (397h) is used to read the device system number of the slave, which is the product code of the drive.

- DP-V1 Write request (Reading a PROFIdrive parameter):



- DP-V1 Read response:



The slave returns the product code of the drive (20Bh in this example).

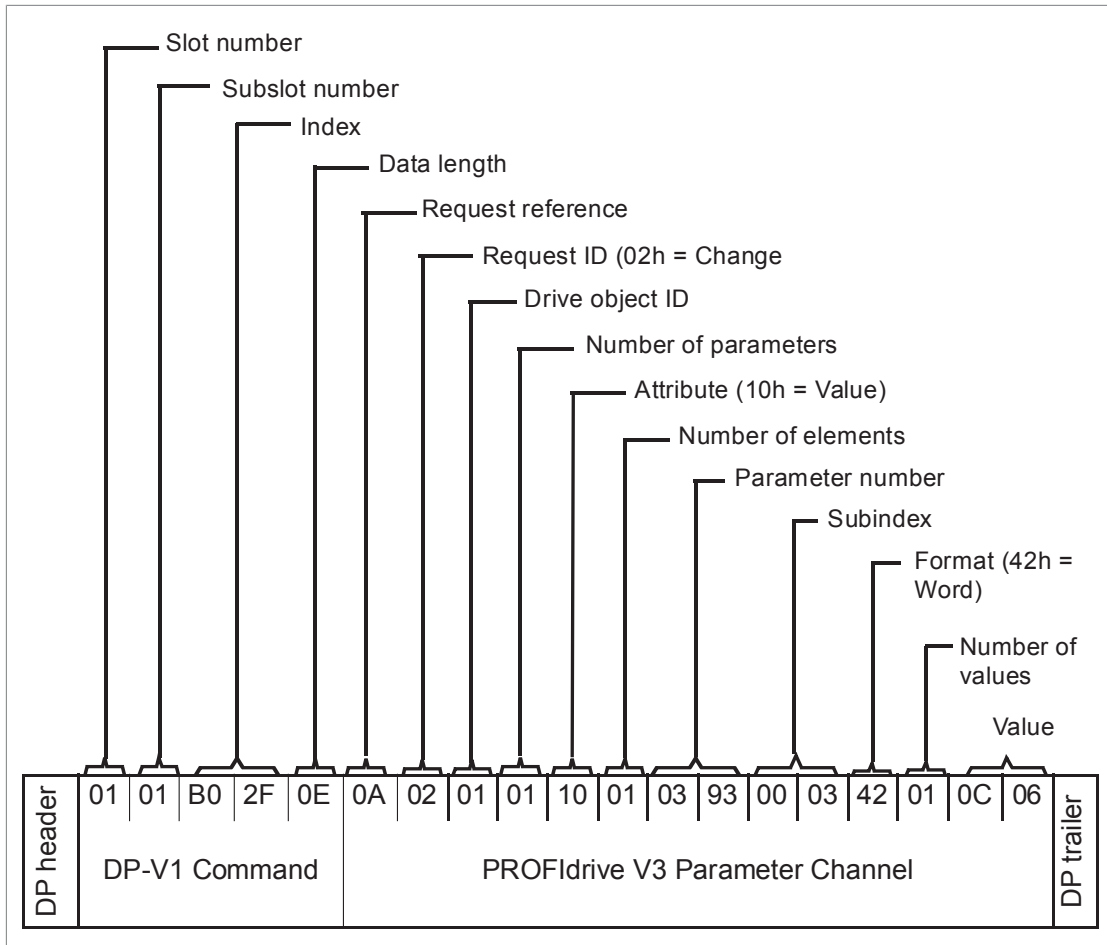
**Example 4: Configuring the process data written to the drive**

PROFIdrive parameter 915 (393h) can be used to define which data is written cyclically to a drive parameter as application-specific process data.

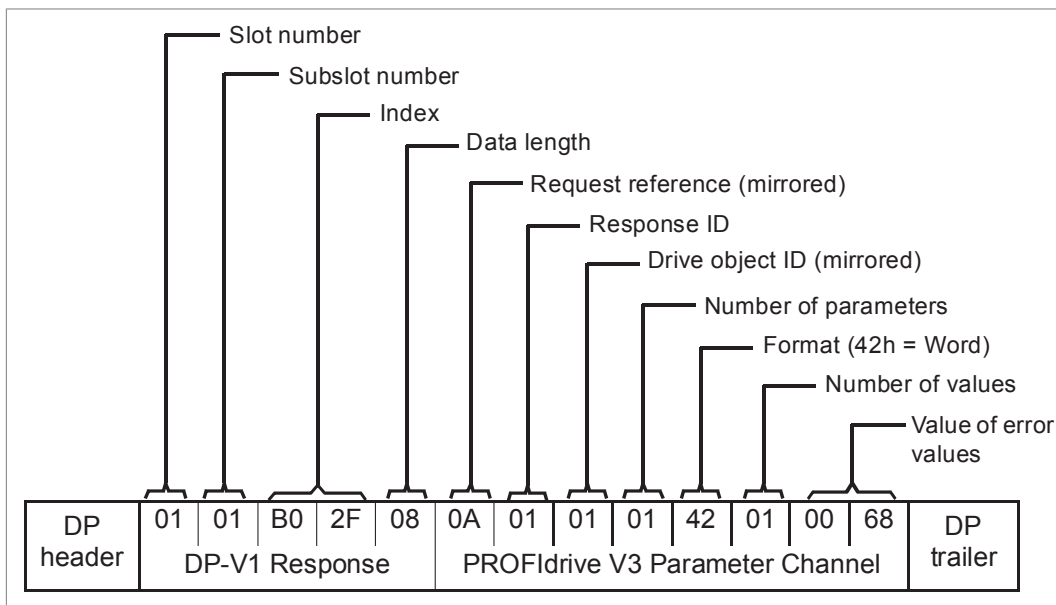
In the example below, the value of drive parameter 12.06 (0C.06h) is selected to be taken from PZD3. The parameter will continue to be updated with the contents of PZD3 in each Request frame until a different selection is made.

*Subindex* (IND) defines which process data word the required data is taken from. *Value* selects the drive parameter to which that word is mapped.

- DP-V1 Write request



- DP-V1 Read response:

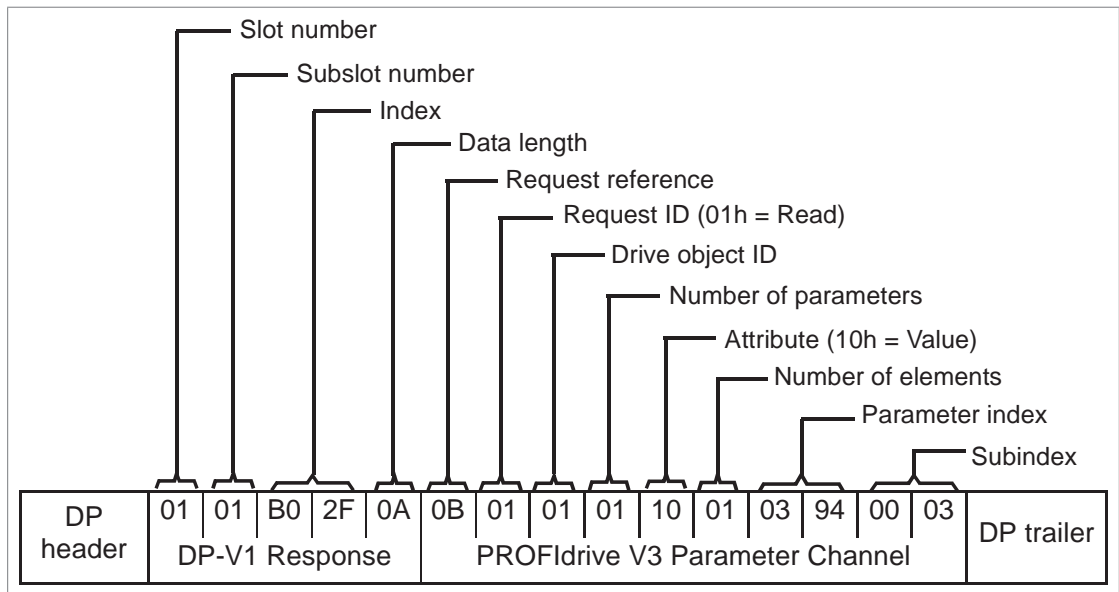


Subsequently, the contents of PZD3 in each Request frame are written to drive parameter 12.06 until a different selection is made.

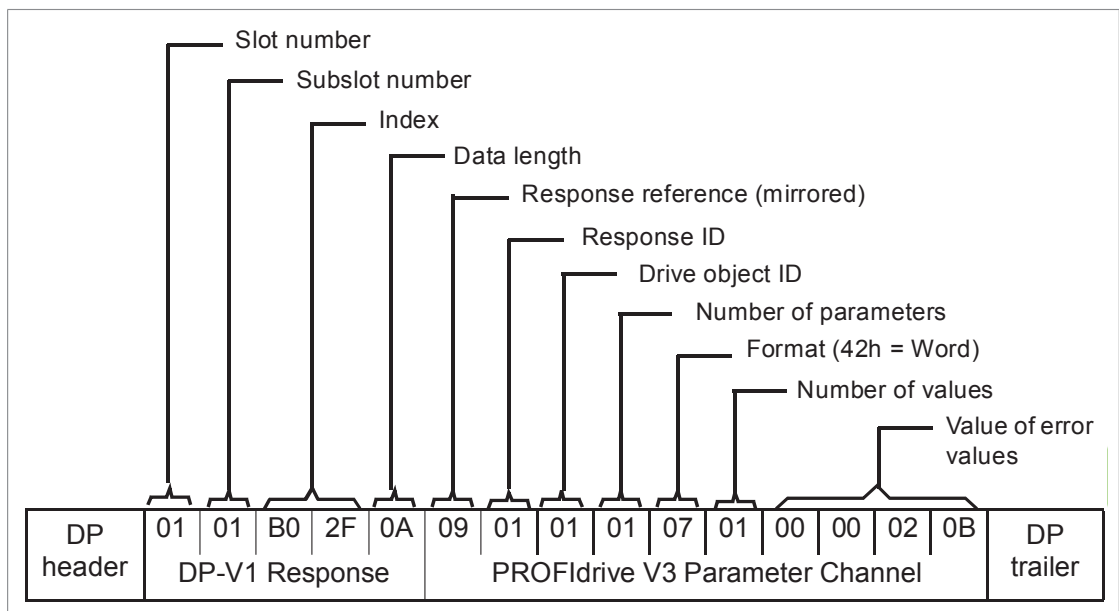
**Example 5: Determining the source of the process data read from the drive**

PROFIdrive parameter 916 (394h) can be used to define which data is read cyclically from the drive as application-specific process data. In the example below, the parameter is used to determine which drive parameter the contents of PZD3 are taken from. Subindex (IND) defines which process data word the required data is transmitted in.

- DP-V1 Write request



- DP-V1 Read response:



*Value* indicates the source of PZD3 as drive parameter 12.05 (0C.05h).

## Diagnostic and alarm mechanism

The FPNO-21 module has mechanisms for sending alarms and saving diagnostics data to a fault buffer. An alarm is triggered if the host or drive has faults in communication or operation. The alarm and fault buffer mechanisms are enabled by default and can be disabled with a configuration parameter 51.21, see [FPNO-21 configuration parameters – group A \(group 1\) \(page 26\)](#).

### ■ Alarm mechanism

When a fault situation occurs, the adapter module sends an alarm notification, which the master station has to acknowledge. Alarm notifications can be acknowledged, viewed and handled, for example, with Siemens S7 blocks OB82, OB83, OB86 and OB122.

- Block OB82 is used to make sure that the drive does not go to the stop mode during a diagnostic alarm.
- Block OB83 is called if a module is inserted or removed from the system or if the module is modified.
- Block OB86 indicates if there is a failure or event in the distributed periphery.
- Block OB122 is called if the CPU calls a device that is not accessible.

### Fault code mapping

An alarm notification contains a fault code, which is called ChannelErrorType. For PROFIdrive API, the drive internal DRIVECOM fault numbers are mapped to PROFIdrive ChannelErrorTypes according to the table below. The fault numbers that are not listed are mapped to ChannelErrorType Other.

ChannelErrorType	Description	DRIVECOM fault numbers
0x9000	Microcontroller hardware or software	4211, 5000, 5401, 5402, 5403, 5484, 5691, 5693, 6100, 6180, 6300, 6306, 6306, 6320, 6481, 6487, 630D, 630F, 64A1, 64A2, 64A3, 64E1, 6581, 65A1, 6682, 6683, 6684, 6881, FF55
0x9001	Mains supply	3291
0x9002	Low voltage supply	3130, 3220
0x9003	DC link overvoltage	3210
0x9004	Power electronics	2211, 2281, 2310, 2312, 2340, 2381, 3180, 3181, 3182, 3183, 3184, 3185, 3186, 3187, 3381, 3385, 5400, 5482, 5682, 5692, FF56
0x9005	Overtemperature electronic device	4110, 4210, 4212, 4290, 4310, 4313, 4981, 7182, 42F1, 4380
0x9006	Earth/ground fault	2330
0x9007	Motor overload	7121
0x9008	Fieldbus system	
0x9009	Safety channel	8182, 8183, 5090, 5091, FA81, FA82, FF7A, FFA0, FFA1, FFA2

ChannelErrorType	Description	DRIVECOM fault numbers
0x900A	Feedback	7301, 7310, 7380, 7381, 7389, 7391, 8480, 8584, 738A, 738B, 738C, 73A0, 73A1
0x900B	Internal communication	5480, 5681, 5690, 7000, 7080, 7081, 7510, 7520, 7540, 7584
0x900C	Infeed	
0x900D	Brake resistor	7111, 7112, 7113, 7181, 7183, 7184, 7185, 7186, 7187, 7191, 71A2, 71A3, 71A5
0x900E	Line filter	
0x900F	External	9000, 9001, 9081, FF81, FF82, FF8E, FF90
0x9010	Technology	6382
0x9011	Engineering	
0x9012	Other	5080, 5093, 5210, 5300, 6200, 7583, 8110, 8500, 8582, 8583, FF61, FF69, FF6A, FF83, FF84, FF95

#### ■ Fault buffer mechanism

The PROFIdrive profile has a mechanism that can store eight fault situations to PROFIdrive parameters. Fault and diagnostic data, like fault number and fault code, can be accessed simultaneously with only one subindex. The mechanism consists of four PROFIdrive parameters:

- PNU944: Fault message counter.
  - Incremented each time the fault buffer changes.
- PNU945: PROFIdrive fault codes presented in the table above.
- PNU946: Fault code list that converts fault numbers to fault codes.
  - Read using the fault number as a subindex to get the corresponding fault code.
- PNU947: Fault numbers according to the DRIVECOM profile.

The table below illustrates the structure of a fault buffer. The fault buffer consists of two parameters: fault number (PNU 947) and fault code (PNU 945). The rows of the fault buffer are represented by the parameter subindices. Fault messages are entered into the buffer in the sequence they are detected. Each line in the fault buffer represents a fault message, which is a part of a fault situation. A fault situation lasts from a detection of a fault to its acknowledgement.

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Fault situation	PNU947	PNU945	
	Fault number	Fault code	Subindex
Actual fault situation n	0x4210	0x9005	0
	0	0	1
	0	0	2
	0	0	3
	0	0	4
	0	0	5
	0	0	6
	0	0	7
Fault situation n-1	0x7510	0x900B	8
	0	0	9
	0	0	10
	0	0	11
	0	0	12
	0	0	13
	0	0	14
	0	0	15
...	...	...	...
Fault situation n-7	0	0	56
	0	0	57
	0	0	58
	0	0	59
	0	0	60
	0	0	61
	0	0	62
	0	0	63





## PROFINET IO – Diagnostics

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### Contents of this chapter

This chapter explains how to trace faults with the status LEDs on the adapter module when the module is used for PROFINET IO communication.

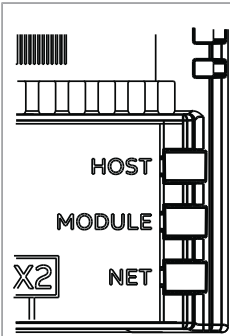
### Fault and warning messages

For the fault and warning messages concerning the adapter module, see the drive firmware manual.

### LEDs

The adapter module is equipped with three bicolor diagnostic LEDs. The LEDs are described below.

---



Name	Color	Function
HOST	Flashing green	Establishing communication to drive
	Green	Connection to drive OK
	Flashing red	Communication to drive lost temporarily
	Flashing orange, alternating with the MODULE flashing orange	Internal file system error. The error may be cleared by cycling drive power. If the error persists, contact your local ABB representative.
MODULE	Off	There is no power applied to the device.
	Flashing orange	Device is blinking. Used for identification. The blinking is started by the PROFINET master and also the network LED is flashing green.
	Flashing green	Device is waiting for PROFINET connection. This may be caused by missing PROFINET station name configuration or PLC is not running.
	Green	Device is operating in normal condition.
	Flashing red (two times per second)	Network link is down. Check the Ethernet cable connections.
	Flashing red (one time per second)	Mapped data is not fitting to the selected cyclic message type. Check group B and C parametrization.
	Red	Ethernet interface is disabled. Duplicate Address Detection may have detected a duplicate address. Check the IP configuration and either initiate a Fieldbus Adapter parameter refresh or cycle power to the drive.
	Flashing red-green	Device is in Self Test.
Flashing orange, alternating with the HOST flashing orange	Internal file system error. The error may be cleared by cycling drive power. If the error persists, contact your local ABB representative.	
NETWORK/NET	Off	Device is not on-line. <ul style="list-style-type: none"> <li>• The device has not completed the Duplicate Address Detection yet.</li> <li>• The device may not be powered; look at the MODULE status LED.</li> </ul>
	Flashing green	Device is receiving/transmitting on the Ethernet.

# 10

## NONE – Start-up

---

### Contents of this chapter

This chapter contains:

- information on configuring the drive for operation with the adapter module
- drive-specific instructions on starting up the drive with the adapter module
- information on configuring the client for communication with the adapter module.

### Warnings

---



**WARNING!**

Obey the safety instructions given in this manual and the drive documentation.

---

### Drive configuration

The information in this section applies to all drive types compatible with the adapter module, unless otherwise stated.

#### ■ Connection configuration using NONE protocol

After the adapter module is mechanically and electrically installed according to the instructions in chapters [Mechanical installation](#) and [Electrical installation](#), you must prepare the drive for communication with the module.

The detailed procedure of activating the module using the NONE protocol with the drive depends on the drive type. Normally, you must adjust a parameter to activate the communication. See the drive-specific start-up sections [Starting up fieldbus communication](#) (page 121).

---

Once communication between the drive and the adapter module is established, several configuration parameters are copied to the drive. These parameters are shown in the tables below and must be checked first and adjusted where necessary. You can adjust the parameters via a drive control panel, a web user interface, or a PC tool.

**Note:**

- Not all drives will display the descriptive names for the configuration parameters.
- The new parameter settings take effect only when you power up the module the next time or when you activate the fieldbus adapter refresh parameter.
- Use the NONE protocol selection when no fieldbus protocol is required. For example, when only the Ethernet tool network is used or for synchronizing time.

**FPNO-21 configuration parameters – group A (group 1)**

**Note:** The actual parameter group number depends on the drive type. Group A (group 1) corresponds to:

- parameter group 51 in ACS380, ACS480, ACH580, ACQ580 and ACS580.
- parameter group 51 in ACS880 if the adapter is installed as fieldbus adapter A or group 54 if the adapter is installed as fieldbus adapter B.

No.	Name/Value	Description	Default
01	FBA TYPE	<b>Read-only.</b> Shows the fieldbus adapter type as detected by the drive. The value cannot be adjusted by the user. If the value is <b>0</b> = None, the communication between the drive and the module has not been established.	<b>132</b> = PROFINET IO
02	Protocol/Profile	Selects the application protocol and communication profile for the network connection. Select NONE to disable PROFINET protocol. Other services (ABB IP Configuration tool, Ethernet tool network, SNTP, etc.) are still available, see <i>Service configuration page (page 147)</i> .	<b>11</b> = PNIO ABB Pro
	<b>200</b> = NONE	NONE protocol	
03	Commrate	Sets the bit rate for the Ethernet interface.	<b>0</b> = Auto
	<b>0</b> = Auto	Autonegotiate	
	<b>1</b> = 100 Mbps FD	100 Mbps, full duplex	
	<b>2</b> = 100 Mbps HD	100 Mbps, half duplex	
	<b>3</b> = 10 Mbps FD	10 Mbps, full duplex	
	<b>4</b> = 10 Mbps HD	10 Mbps, half duplex	
04	IP configuration	Sets the method for configuring the IP address, subnet mask and gateway address for the module.	<b>1</b> = Dyn IP DHCP
	<b>0</b> = Static IP	Configuration is obtained from parameters 05...13.	
	<b>1</b> = Dyn IP DHCP	Configuration is obtained via DHCP.	

No.	Name/Value	Description	Default																																																																				
05 ... 08	IP address 1	An IP address is assigned to each IP node on a network. An IP address is a 32-bit number that is typically represented in “dotted decimal” notation consisting of four decimal integers, on the range 0...255, separated by periods. Each integer represents the value of one octet (8-bits) in the IP address. Parameters define the four octets of the IP address.	0																																																																				
	0...255	IP address																																																																					
	...	...	...																																																																				
	IP address 4	See parameter 05 IP address 1	0																																																																				
	0...255	IP address																																																																					
09	Subnet CIDR	Subnet masks are used for splitting networks into smaller networks called subnets. A subnet mask is a 32-bit binary number that splits the IP address into a network address and host address.  Subnet masks are typically represented in either dotted decimal notation or the more compact CIDR notation, as shown in the table below.	0																																																																				
		<table border="1"> <thead> <tr> <th>CIDR</th> <th>Dotted decimal</th> <th>CIDR</th> <th>Dotted decimal</th> </tr> </thead> <tbody> <tr> <td>31</td> <td>255.255.255.254</td> <td>15</td> <td>255.254.0.0</td> </tr> <tr> <td>30</td> <td>255.255.255.252</td> <td>14</td> <td>255.252.0.0</td> </tr> <tr> <td>29</td> <td>255.255.255.248</td> <td>13</td> <td>255.248.0.0</td> </tr> <tr> <td>28</td> <td>255.255.255.240</td> <td>12</td> <td>255.240.0.0</td> </tr> <tr> <td>27</td> <td>255.255.255.224</td> <td>11</td> <td>255.224.0.0</td> </tr> <tr> <td>26</td> <td>255.255.255.192</td> <td>10</td> <td>255.192.0.0</td> </tr> <tr> <td>25</td> <td>255.255.255.128</td> <td>9</td> <td>255.128.0.0</td> </tr> <tr> <td>24</td> <td>255.255.255.0</td> <td>8</td> <td>255.0.0.0</td> </tr> <tr> <td>23</td> <td>255.255.254.0</td> <td>7</td> <td>254.0.0.0</td> </tr> <tr> <td>22</td> <td>255.255.252.0</td> <td>6</td> <td>252.0.0.0</td> </tr> <tr> <td>21</td> <td>255.255.248.0</td> <td>5</td> <td>248.0.0.0</td> </tr> <tr> <td>20</td> <td>255.255.240.0</td> <td>4</td> <td>240.0.0.0</td> </tr> <tr> <td>19</td> <td>255.255.224.0</td> <td>3</td> <td>224.0.0.0</td> </tr> <tr> <td>18</td> <td>255.255.192.0</td> <td>2</td> <td>192.0.0.0</td> </tr> <tr> <td>17</td> <td>255.255.128.0</td> <td>1</td> <td>128.0.0.0</td> </tr> <tr> <td>16</td> <td>255.255.0.0</td> <td></td> <td></td> </tr> </tbody> </table>	CIDR	Dotted decimal	CIDR	Dotted decimal	31	255.255.255.254	15	255.254.0.0	30	255.255.255.252	14	255.252.0.0	29	255.255.255.248	13	255.248.0.0	28	255.255.255.240	12	255.240.0.0	27	255.255.255.224	11	255.224.0.0	26	255.255.255.192	10	255.192.0.0	25	255.255.255.128	9	255.128.0.0	24	255.255.255.0	8	255.0.0.0	23	255.255.254.0	7	254.0.0.0	22	255.255.252.0	6	252.0.0.0	21	255.255.248.0	5	248.0.0.0	20	255.255.240.0	4	240.0.0.0	19	255.255.224.0	3	224.0.0.0	18	255.255.192.0	2	192.0.0.0	17	255.255.128.0	1	128.0.0.0	16	255.255.0.0			
CIDR	Dotted decimal	CIDR	Dotted decimal																																																																				
31	255.255.255.254	15	255.254.0.0																																																																				
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23	255.255.254.0	7	254.0.0.0																																																																				
22	255.255.252.0	6	252.0.0.0																																																																				
21	255.255.248.0	5	248.0.0.0																																																																				
20	255.255.240.0	4	240.0.0.0																																																																				
19	255.255.224.0	3	224.0.0.0																																																																				
18	255.255.192.0	2	192.0.0.0																																																																				
17	255.255.128.0	1	128.0.0.0																																																																				
16	255.255.0.0																																																																						
	1...31	Subnet mask in CIDR notation																																																																					

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No.	Name/Value	Description	Default
10 ... 13	GW address 1	IP gateways connect individual physical IP subnets into a unified IP network. When an IP node needs to communicate with an IP node on another subnet, the IP node sends the data to the IP gateway for forwarding. Parameters define the four octets of the gateway address.	0
	0...255	GW address	
	...	...	...
	GW address 4	See parameter 10 GW address 1.	0
	0.255	GW address	
14	Commrte port 2	Sets the bit rate for the Ethernet port 2.	<b>0</b> = Auto
	<b>0</b> = Auto	Autonegotiate	
	<b>1</b> = 100 Mbps FD	100 Mbps, full duplex	
	<b>2</b> = 100 Mbps HD	100 Mbps, half duplex	
	<b>3</b> = 10 Mbps FD	10 Mbps, full duplex	
	<b>4</b> = 10 Mbps HD	10 Mbps, half duplex	
15	Service configuration	<p>Disable services that are not required.</p> <p>Each service is represented by a single bit. Bit 0, Lock configuration, can be used to prevent accidental changing of this parameter.</p> <p>By default, all services are enabled and configuration is unlocked.</p> <p>ABB recommends to disable all services that are not used after commissioning.</p>	
	<b>Bit</b>	<b>Name</b>	<b>Information</b>
	0	Lock configuration	Changing this bit to one will lock service configuration and no bit can be changed. Only resetting the fieldbus configuration will unlock the parameter. To reset the fieldbus configuration, choose "Reset all fieldbus settings" or "Clear all" in parameter 96.06 Parameter restore.
	1	Disable IP config tool	When this bit is set, access from ABB IP Configuration tool is prevented.
	2	Disable ETH tool network	When this bit is set, access from Ethernet tool network (eg, ABB Drive Composer tool) is prevented.
	3	Disable ping response	When this bit is set, response to ICMP (ping) message is prevented.
	4	Unsecured ETH tool network	When this bit is set, access from Ethernet tool network is unsecured. <b>Note:</b> Drive Composer pro before V2.7 supports unsecured communication only.
	5	Disable configuring web pages	When this bit is set, access to web pages is disabled.
	000000b...111111b	Service configuration	

No.	Name/Value	Description	Default
16 ... 25	Reserved	These parameters are not used by the adapter module when using the NONE protocol.	N/A
26	Reserved	Reserved for web page functionality. For more information, see Appendix C - FPNO-21 configuration web pages (page 141).	N/A
27	FBA A/B par refresh	Validates any changed adapter module configuration parameter settings. After refreshing, the value reverts automatically to <b>0</b> = Done.  <b>Note:</b> This parameter cannot be changed while the drive is running.	<b>0</b> = Done
	<b>0</b> = Done	Refreshing done	
	<b>1</b> = Refresh	Refreshing	
28	FBA A/B par table ver	<b>Read-only.</b> Displays the parameter table revision of the fieldbus adapter module mapping file stored in the memory of the drive. In format <b>xyz</b> , where <b>x</b> = major revision number <b>y</b> = minor revision number <b>z</b> = correction number OR in format <b>axyz</b> , where <b>a</b> = major revision number <b>xy</b> = minor revision numbers <b>z</b> = correction number or letter.	N/A
		Parameter table revision	
29	FBA A/B drive type code	<b>Read-only.</b> Displays the drive type code of the fieldbus adapter module mapping file stored in the memory of the drive.	N/A
		Drive type code of the fieldbus adapter module mapping file	
30	FBA A/B mapping file ver	<b>Read-only.</b> Displays the fieldbus adapter module mapping file revision stored in the memory of the drive in decimal format.	N/A
		Mapping file revision	

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No.	Name/Value	Description	Default
31	D2FBA A/B comm status  <b>0 = Idle</b>  <b>1 = Exec.init</b>  <b>2= Time out</b>  <b>3= Conf.err</b>  <b>4 = Off-line</b>  <b>5 = On-line</b>  <b>6 = Reset</b>	<b>Read-only.</b> Displays the status of the fieldbus adapter module communication.  <b>Note:</b> The value names may vary by drive.  Adapter is not configured.  Adapter is initializing.  A timeout has occurred in the communication between the adapter and the drive.  There is an internal error in the communication between the adapter and the drive. Contact your local ABB representative.  Adapter is off-line.  Adapter is on-line.  Adapter is performing a hardware reset.	<b>0 = Idle</b> or <b>4 = Offline</b> or <b>2 = Time out</b>
32	FBA A/B comm SW ver	<b>Read-only.</b> Displays patch and build numbers of the adapter module's firmware version in <b>xyy</b> format, where: <b>xx</b> = patch number <b>yy</b> = build number. Example: If the firmware version (<major>.<minor>.<patch>.<build>) is 3.10.200.13, the value C80D is displayed. If the version is 3.10.0.0, the value 0 is displayed. See also parameter 33.	N/A
33	FBA A/B appl SW ver	<b>Read-only.</b> Displays major and minor revision numbers of the adapter module's firmware version in <b>xyy</b> format, where: <b>xx</b> = major revision number <b>yy</b> = minor revision number Example: If the firmware version (<major>.<minor>.<patch>.<build>) is 3.10.200.13 or 3.10.0.0, the value 310 is displayed. See also parameter 32.	N/A



## Starting up fieldbus communication

1. Power up the drive.
  2. Enable communication between the adapter module and the drive by selecting the correct slot number in parameter 50.01 FBA A enable.  
The selection must correspond to the slot where the adapter module is installed. For example, if the adapter module is installed in slot 1, you must select slot 1.
  3. Set the module configuration parameters in group 51.
    - select the communication protocol and profile with parameter 51.02, and
    - configure the network settings with parameters 51.03...51.13.
  4. Save the valid parameter values to permanent memory with parameter 96.07 Parameter save manually.
  5. Validate the settings made in parameter groups 51 with parameter 51.27 FBA A par refresh.
-



A large, bold, black number '11' is centered within a light gray rounded square background.

# NONE – Diagnostics

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## Contents of this chapter

This chapter explains how to trace faults with the status LEDs on the adapter module using the NONE protocol.

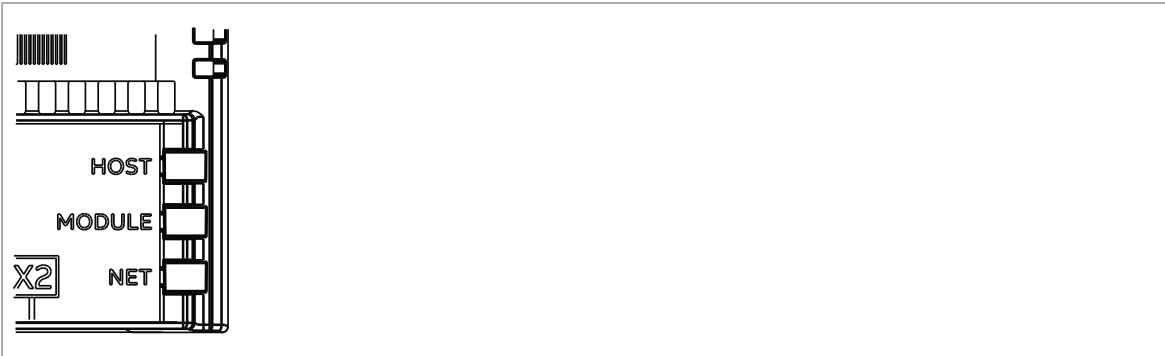
## Fault and warning messages

For the fault and warning messages concerning the adapter module, see the drive firmware manual.

## LEDs

The adapter module is equipped with three bicolor diagnostic LEDs. The LEDs are described below.

---



Name	Color	Function
HOST	Flashing green	Establishing communication to drive
	Green	Connection to drive OK
	Flashing red	Communication to drive lost temporarily
	Flashing orange, alternating with the MODULE flashing orange	Internal file system error. The error may be cleared by cycling drive power. If the error persists, contact your local ABB representative.
MODULE	Off	There is no PC tool connected to the device.
	Flashing orange	Device is attempting to obtain IP configuration from the DHCP server.
	Orange	Device is executing Duplicate Address Detection.
	Green	PC tool is connected to the device.
	Flashing red	Ethernet link is down.
	Red	Ethernet interface is disabled. Duplicate Address Detection may have detected a duplicate address. Check the IP configuration and either initiate a Fieldbus Adapter parameter refresh or cycle power to the drive.
	Flashing orange, alternating with the HOST flashing orange	Internal file system error. The error may be cleared by cycling drive power. If the error persists, contact your local ABB representative.
NETWORK / NET	Off	Ethernet link is down.
	Flashing green	Ethernet link is up at 100 Mbps. Flashing indicates activity on interface.
	Flashing orange	Ethernet link is up at 10 Mbps. Flashing indicates activity on interface.

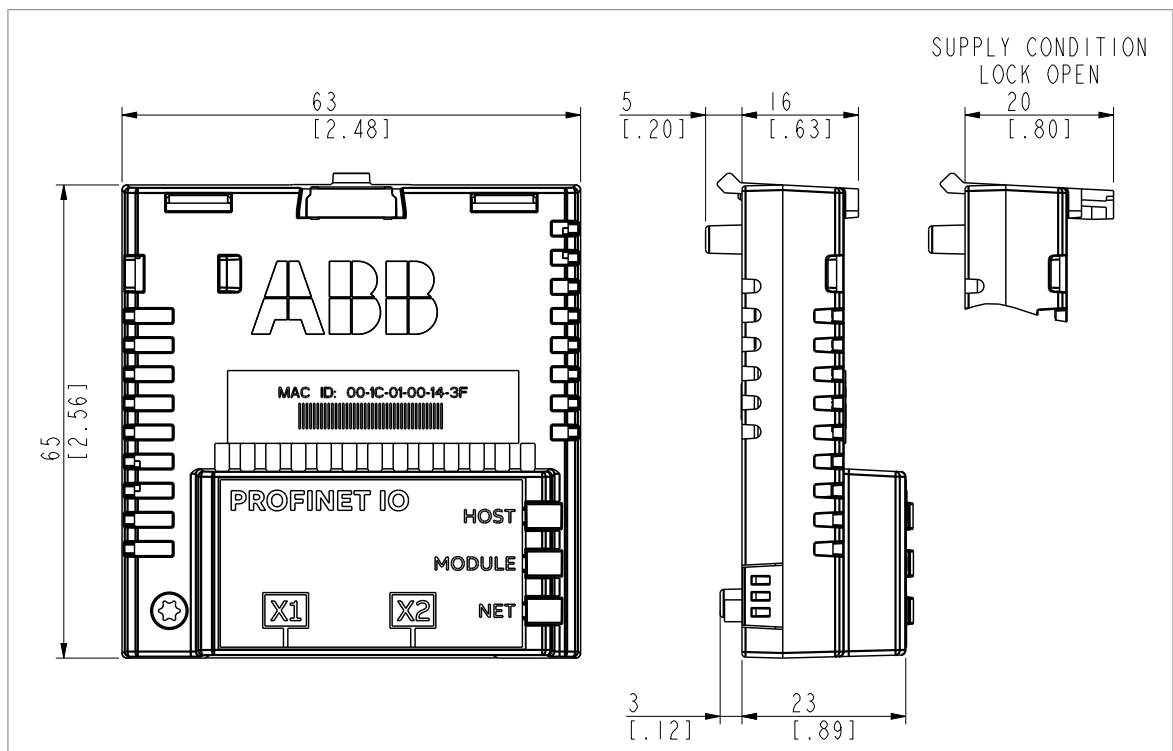
# 12

## Technical data

### Contents of this chapter

This chapter contains the technical specifications of the FPNO-21 module.

### Dimension drawing



## General data

<b>Installation</b>	Into an option slot on the drive control unit
<b>Degree of protection</b>	IP20
<b>Ambient conditions</b>	The applicable ambient conditions specified for the drive in its manuals are in effect.
<b>Package</b>	Cardboard. Plastic wrapping: Antistatic air bubble sheet (PE).
<b>Indicators</b>	Three bicolor LEDs (HOST, MODULE, NETWORK/NET)
<b>Connectors</b>	A 20-pin connector to the drive RJ-45 connector to Ethernet (X1) RJ-45 connector for chaining another adapter module (X2)
<b>Power supply</b>	+3.3 V $\pm$ 5% max. 400 mA (supplied by the drive)
<b>General</b>	Complies with EMC standard EN 61800-3:2004 Printed circuit board conformal coated

## Ethernet link

<b>Compatible devices</b>	Ethernet Standard IEEE 802.3 and IEEE 802.3u devices.
<b>Medium</b>	10BASE-TX or 100Base-TX with Auto-negotiation and Auto-MDIX (Auto-crossover) <ul style="list-style-type: none"> <li>• Wiring: CAT5e/6 S/FTP, CAT5e/6 S/STP, CAT5e/6 SF/FTP</li> <li>• Connector: RJ-45</li> <li>• Termination: Internal</li> <li>• Maximum segment length: 100 m / 328 ft</li> </ul>
<b>Topology</b>	Bus, star or ring. Max. 50 nodes allowed for FPNO-21 module in a ring topology. In a chain maximum recommended amount of nodes is 50. More can be used but PROFINET cycle time should be adjusted because of the delays in the network. Each FPNO-21 has an integrated switch which adds 19 $\mu$ s forwarding delay for the minimum Ethernet frame. Length of PROFINET cyclic frame FPNO-21 uses is minimum Ethernet frame so 50 nodes will add 1 ms delay for the PROFINET frame.
<b>Transfer rate</b>	10 Mbps or 100 Mbps
<b>Serial communication type</b>	Half or full duplex
<b>Protocol</b>	PROFINET IO
<b>Number of connections</b>	Three

## TCP and UDP service ports

There are multiple in-bound and out-bound network services running on the module. Some ports are protocol-specific and are not used when other protocols are selected.

Port	Service	Purpose
34962 (TCP/UDP)	PROFINET	PROFINET RT Unicast. <b>Note:</b> Used only when PROFINET IO protocol is selected.
34963 (TCP/UDP)	PROFINET	PROFINET RT Multicast. <b>Note:</b> Used only when PROFINET IO protocol is selected.
34964 (TCP/UDP)	PROFINET	PROFINET Context Manager. <b>Note:</b> Used only when PROFINET IO protocol is selected.
80 (TCP)	HTTP	Used for Ethernet tool communication. To disable, go to <a href="#">Service configuration page (page 147)</a> via web interface.
68 (UDP)	DHCP	DHCP client <b>Note:</b> Used only when IP configuration method is selected as "Dyn IP DHCP".
24576 (UDP)	ABB Netconfig	<ul style="list-style-type: none"> <li>• Auto discovery protocol</li> <li>• Used by ControlBuilder plus (IP Configuration tool) and Drive composer pro and DriveWindow 2.40 PC tools</li> <li>• Discovers ABB-specific Ethernet devices in a local network segment, by listening to and responding to UDP broadcasts.</li> </ul> To disable, go to <a href="#">Service configuration page (page 147)</a> via web interface. To disable, go to <b>Service Configuration parameter 51.15</b> or to <a href="#">Service configuration web page</a> .
161 (UDP)	SNMP	Simple Network Management Protocol (SNMP). <b>Note:</b> Used only when PROFINET IO protocol is selected. To disable, go to <a href="#">Service configuration page (page 147)</a> via web interface.
123 (UDP)	SNTP	Simple Network Time Protocol. This service is disabled by default. To enable the service, go to <a href="#">Service configuration page (page 147)</a> via web interface.
443 (TCP)	HTTPS	HTTPS protocol, used for access to FPNO-21's web page and for Ethernet tool Network (like Drive Composer pro).





# 13

## Appendix A – PROFIdrive parameters and I&M records of PROFINET IO

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### Contents of this chapter

This chapter contains:

- PROFIdrive parameters of the PROFINET IO communication protocol
- telegram and response structures for the I&M (Identification & Maintenance) records of the PROFINET IO communication protocol.

### PROFIdrive parameters

Par. no.	R/W <sup>1)</sup>	Data type	Description
915	R/W	Array [12] Unsigned16	Assignment PZD1 to PZD12 in PPO-write
916	R/W	Array [12] Unsigned16	Assignment PZD1 to PZD12 in PPO-read
919	R	Octet String4	Device system number
922	R	Unsigned16	Telegram selection

---

130 Appendix A – PROFIdrive parameters and I&M records of PROFINET IO

Par. no.	R/W <sup>1)</sup>	Data type	Description																																	
923	R	Array [n] Unsigned16	List of all parameters for signals. Mandatory if process data normalization is used and/or parameters 915 and 916 are implemented.																																	
			<table border="1"> <thead> <tr> <th>Signal no. and name</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>1 – Control word 1 (STW1)</td> <td>Unsigned16</td> </tr> <tr> <td>2 – Status word 1 (ZSW1)</td> <td>Unsigned16</td> </tr> <tr> <td>3 – Control word 2 (STW2)</td> <td>Unsigned16</td> </tr> <tr> <td>4 – Status word 2 (ZSW2)</td> <td>Unsigned16</td> </tr> <tr> <td>5 – Speed set point A (NSOLL_A)</td> <td>Signed16</td> </tr> <tr> <td>6 – Speed actual value A (NIST_A)</td> <td>Signed16</td> </tr> <tr> <td>7 – Speed set point B (NSOLL_B)</td> <td>Signed32</td> </tr> <tr> <td>8 – Speed actual value B (NIST_B)</td> <td>Signed32</td> </tr> <tr> <td>27 – Position set point A (XSOLL_A)</td> <td>Signed32</td> </tr> <tr> <td>28 – Position actual value A (XIST_A)</td> <td>Signed32</td> </tr> <tr> <td>32 – Traversing block selection (SATZANW) (not supported)</td> <td>Unsigned16</td> </tr> <tr> <td>33 – Actual traversing block (AKT-SATZ) (not supported)</td> <td>Unsigned16</td> </tr> <tr> <td>34 – Target position (TARPOS_A) (not supported)</td> <td>Signed32</td> </tr> <tr> <td>35 – Velocity (VELOCITY_A)</td> <td>Unsigned32</td> </tr> <tr> <td>101...9999 – Drive-specific</td> <td>–</td> </tr> </tbody> </table>		Signal no. and name	Type	1 – Control word 1 (STW1)	Unsigned16	2 – Status word 1 (ZSW1)	Unsigned16	3 – Control word 2 (STW2)	Unsigned16	4 – Status word 2 (ZSW2)	Unsigned16	5 – Speed set point A (NSOLL_A)	Signed16	6 – Speed actual value A (NIST_A)	Signed16	7 – Speed set point B (NSOLL_B)	Signed32	8 – Speed actual value B (NIST_B)	Signed32	27 – Position set point A (XSOLL_A)	Signed32	28 – Position actual value A (XIST_A)	Signed32	32 – Traversing block selection (SATZANW) (not supported)	Unsigned16	33 – Actual traversing block (AKT-SATZ) (not supported)	Unsigned16	34 – Target position (TARPOS_A) (not supported)	Signed32	35 – Velocity (VELOCITY_A)	Unsigned32	101...9999 – Drive-specific	–
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Appendix A – PROFIdrive parameters and I&M records of PROFINET IO 131

Par. no.	R/W <sup>1)</sup>	Data type	Description	
929	R	Unsigned16	Selected PPO type	
			<b>Value</b>	<b>PPO type</b>
			1	PPO1
			2	PPO2
			3	PPO3
			4	PPO4
			5	PPO5
			6	PPO6
7	PPO7			
			<b>Note:</b> This parameter is not available if Standard telegram ST1 or ST2 is selected.	
930	R/W	Unsigned16	Selection switch for communication profile.	
			<b>Value</b>	<b>Mode</b>
			1	PROFIdrive
			8001h	ABB Drives
			8002h	Transparent 16
			8003h	Transparent 32
8004h	PROFIdrive positioning mode			
933	R/W	Unsigned16	Selection switch for Control word, bit 11.	
			<b>Value</b>	<b>Module Control with bit</b>
			0	None
1 to 5	Vendor-specific 1 to 5 <sup>2)</sup>			
934	R/W	Unsigned16	Selection switch for Control word, bit 12. (See parameter 933 for coding.)	
935	R/W	Unsigned16	Selection switch for Control word, bit 13. (See parameter 933 for coding.)	
936	R/W	Unsigned16	Selection switch for Control word, bit 14. (See parameter 933 for coding.)	
937	R/W	Unsigned16	Selection switch for Control word, bit 15. (See parameter 933 for coding.)	
939	R/W	Unsigned16	Selection switch for Status word, bit 11.	
			<b>Value</b>	<b>Module Status word bit</b>
			0	None
1 to 4	Vendor-specific 1 to 4 <sup>2)</sup>			
940	R/W	Unsigned16	Selection switch for Status word, bit 12. (See parameter 939 for coding.)	
941	R/W	Unsigned16	Selection switch for Status word, bit 13. (See parameter 939 for coding.)	
942	R/W	Unsigned16	Selection switch for Status word, bit 14. (See parameter 939 for coding.)	
943	R/W	Unsigned16	Selection switch for Status word, bit 15. (See parameter 939 for coding.)	

132 Appendix A – PROFIdrive parameters and I&M records of PROFINET IO

Par. no.	R/W <sup>1)</sup>	Data type	Description	
944	R	Unsigned16	Fault message counter	
945	R	Array[64] Unsigned16	Fault code (Channel Error Type)	
			<b>Sub-index</b>	<b>Contents</b>
			0	Last fault
			8	Second last ackn. fault
			16	Third last ackn. fault
			24	Fourth last ackn. fault
			32	Fifth last ackn. fault
			40	Sixth last ackn. fault
			56	Eighth last ackn. fault
946	R	Array [n] Unsigned16	Fault code list. Contains the mapping between DRIVECOM fault codes and Channel Error Types. If you use a DRIVECOM fault code as an index when reading PNU946, the corresponding Channel Error Type is returned.	
947	R	Array [64] Unsigned16	Fault number (coded according to the DRIVECOM profile).	
			<b>Subindex</b>	<b>Contents</b>
			See parameter 945.	
953	R	Unsigned16	Last alarm <sup>3)</sup>	
954	R	Unsigned16	Second last alarm <sup>3)</sup>	
955	R	Unsigned16	Third last alarm <sup>3)</sup>	
956	R	Unsigned16	Fourth last alarm <sup>3)</sup>	
957	R	Unsigned16	Fifth last alarm <sup>3)</sup>	
964	R	Array [7] Unsigned16	<b>Sub-index</b>	<b>Contents</b>
			0	Manufacturer
			1	Device type
			2	Version
			3	Firmware date (year)
			4	Firmware date (day/month)
5	Number of Axes			
965	R	Octet String2	Profile number of this device. Eg: 0302h = Profile 3, Version 2	
967	R	Unsigned16	Control word (CW)	
968	R	Unsigned16	Status word (SW)	

Appendix A – PROFIdrive parameters and I&M records of PROFINET IO 133

Par. no.	R/W <sup>1)</sup>	Data type	Description	
970	R/W	Unsigned16	Load parameter record	
			<b>Value</b>	<b>Description</b>
			0	No action
			1	Restore factory settings
			The parameter must do a zero-to-one transition and the motor must be stopped.	
971	R/W	Unsigned16	Save parameter record	
			<b>Value</b>	<b>Description</b>
			0	No action
			1	Save the drive parameters to non-volatile memory
			The parameter must do a zero-to-one transition and the motor must be stopped.	
972	R/W	Unsigned16	Software reset	
			<b>Value</b>	<b>Description</b>
			0	No action
			1	Re-boot PROFIBUS module
			The parameter must do a zero-to-one transition and the motor must be stopped.	
975	R	Array[n] Unsigned16	DO identification. For subindexes 0...4, see parameter 964.	
			<b>Sub-index</b>	<b>Meaning</b>
			5	Value 2 = Axis
980 981	R	Array[n] Unsigned16	Number list of defined parameters. If the subindex is 0, the end of the list has been reached. If the subindex is the number of the next list parameter, the list is continued there.	
1000	R/W	Unsigned16	Map 16-bit selection <sup>3)</sup> . Used to request the data type for mapped parameters if mapping is done with parameter 915 or 916.	
			<b>Value</b>	<b>Description</b>
			1	User 16-bit mapping, if available.
1001	R/W	Integer16	SNTP time offset to UTC time.	
			<b>Value</b>	<b>Description</b>
			-1440, 1440	Time in minutes to offset the UTC time received from SNTP
50000	R/W	Unsigned16	Disable alarms.	
			<b>Value</b>	<b>Description</b>
			0	PNIO alarms enabled
			1	PNIO alarms disabled

Par. no.	R/W <sup>1)</sup>	Data type	Description
61000	R	VisibleString24	Name of station
61001	R	Unsigned32	IP of station
61002	R	OctetString[6]	MAC address of station
61003	R	Unsigned32	Default gateway of station
61004	R	Unsigned32	Subnet mask of station

1) Read and/or Write

2) The meaning of vendor-specific bits is defined by the drive control program.

3) Support depends on the drive type.

## I&M records

I&M (Identification & Maintenance) records can be read, for example, with the DTM tool. The FPNO-21 module supports the mandatory I&M0 record as well as the optional I&M1, I&M2, I&M3 and I&M4 records.

### ■ Call-REQ-PDU telegram for read/write access to I&M records

Function	Record Data Index
I&M0	0xAFF0
I&M1	0xAFF1
I&M2	0xAFF2
I&M3	0xAFF3
I&M4	0xAFF4

### ■ Response structure for I&M0 (Read-only)

	Contents	Size	Coding
Header		10 Octets	–

	Contents	Size	Coding
I&M block	MANUFACTURER_ID	2 Octets	0x1A = ABB Automation
	ORDER_ID	20 Octets	6438177508335 = EAN code for FPNO-21 kit
	SERIAL_NUMBER	16 Octets	Serial number of FPNO-21 module
	HARDWARE_REVISION	2 Octets	Hardware version of FPNO-21 module
	SOFTWARE_REVISION	4 Octets	Format: V255.255.255 Eg, V1.0.0 = software version 100
	REVISION_COUNTER	2 Octets	(Marks a change of hardware or its parameters)
	PROFILE_ID	2 Octets	3A00 (...3AFF) PROFIdrive
	PROFILE_SPECIFIC_TYPE	2 Octets	0 = no specific type
	IM_VERSION	2 Octets	0x0101 = version 1.1
	IM_SUPPORTED	2 Octets	30 = I&M0, I&M1, I&M2, I&M3 and I&M4 supported

■ **Response structure for I&M1 (Read/Write)**

	Contents	Size	Coding
Header		10 Octets	–
I&M block	TAG_FUNCTION	32 Octets	Device function or task
	TAG_LOCATION	22 Octets	Device location

■ **Response structure for I&M2 (Read/Write)**

	Contents	Size	Coding
Header		10 Octets	–
I&M block	INSTALLATION_DATE	16 Octets	Installation date. Eg, <b>2011-01-01 16:23</b>
	RESERVED	38 Octets	Reserved

**Note:** I&M1, I&M2 and I&M3 are blank (0x20) by default.

■ **Response structure for I&M3 (Read/Write)**

	Contents	Size	Coding
Header		10 Oct-ets	–
I&M block	DESCRIPTOR	54 Oct-ets	Description of the device set by the user

■ **Response structure for I&M4 (Read/Write)**

I&M4 is read-only and shows the PROFIsafe configuration CRC.

	Contents	Size	Coding
Header		10 Oct-ets	–
I&M block	SIGNATURE	54 Oct-ets	Security code for identifying sessions and changes

**Note:** I&M4 is filled with zeros (0x0) by default.



# 14

## Appendix B – ABB IP configuration tool

---

### Contents of this chapter

This chapter shows how to use the ABB IP configuration tool to:

- find configured and unconfigured **FPNO-21** adapter modules in the network
- rewrite the IP configuration of the adapter modules.

### Installation

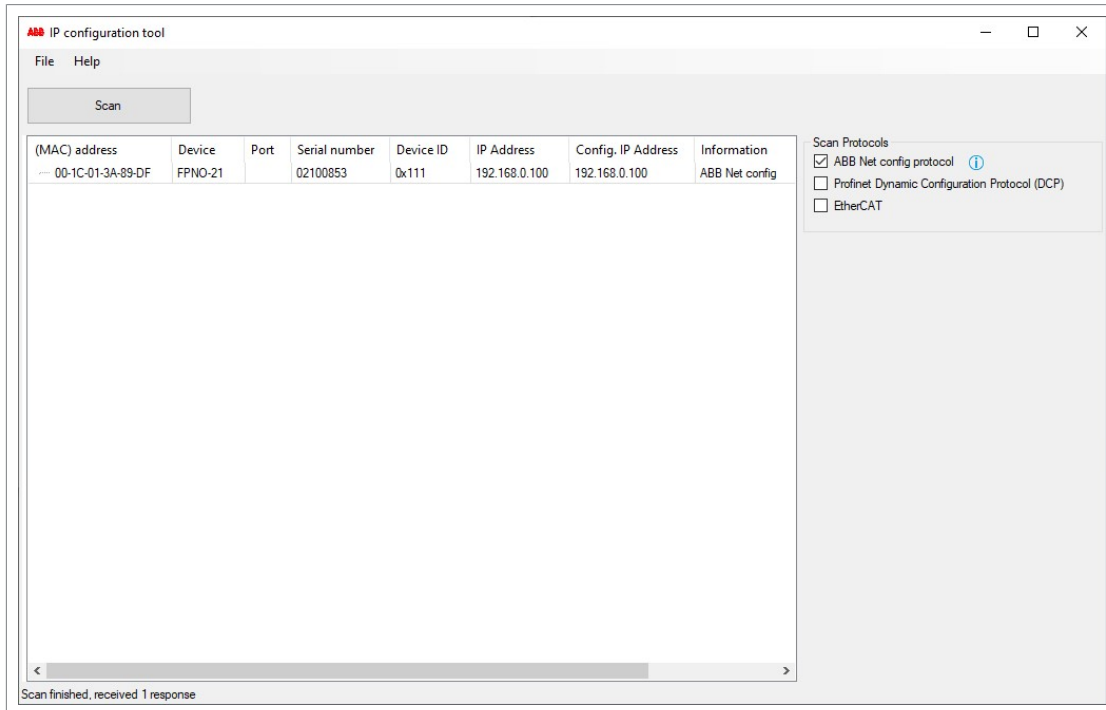
The ABB IP configuration tool is part of the ABB Automation Builder software. No separate installation is needed.

### Finding adapter modules in the network

1. Open the ABB IP configuration tool.
2. Click the **Scan** button.

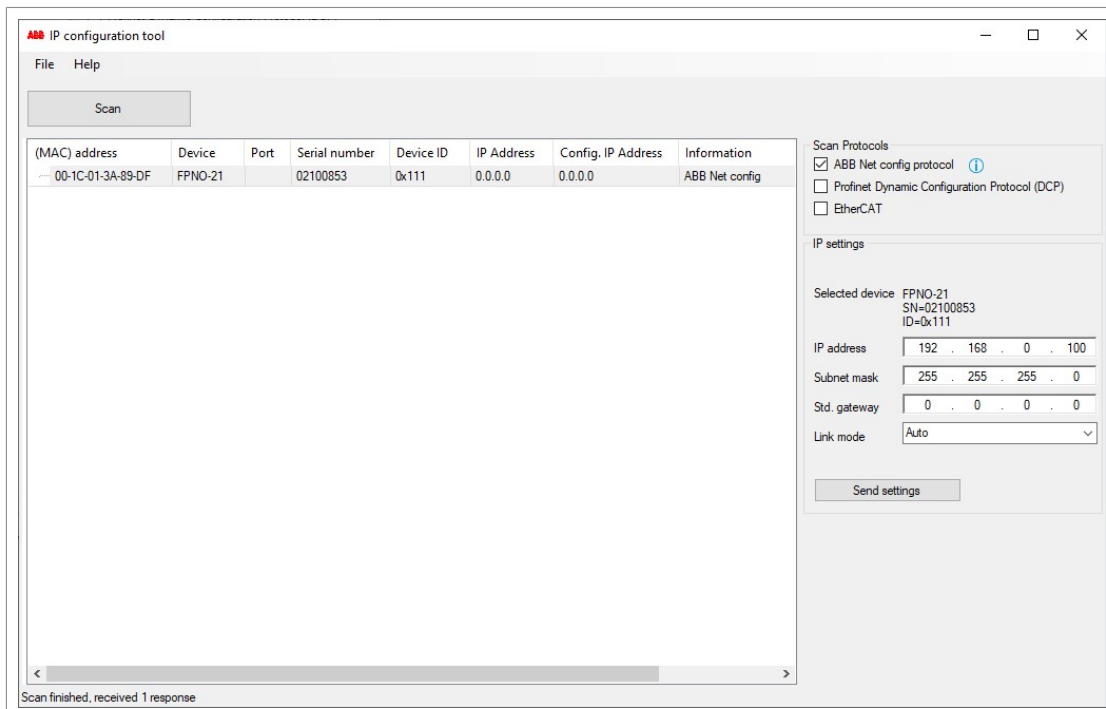
The FPNO-21 adapter modules present in the network appear on the results list.

---



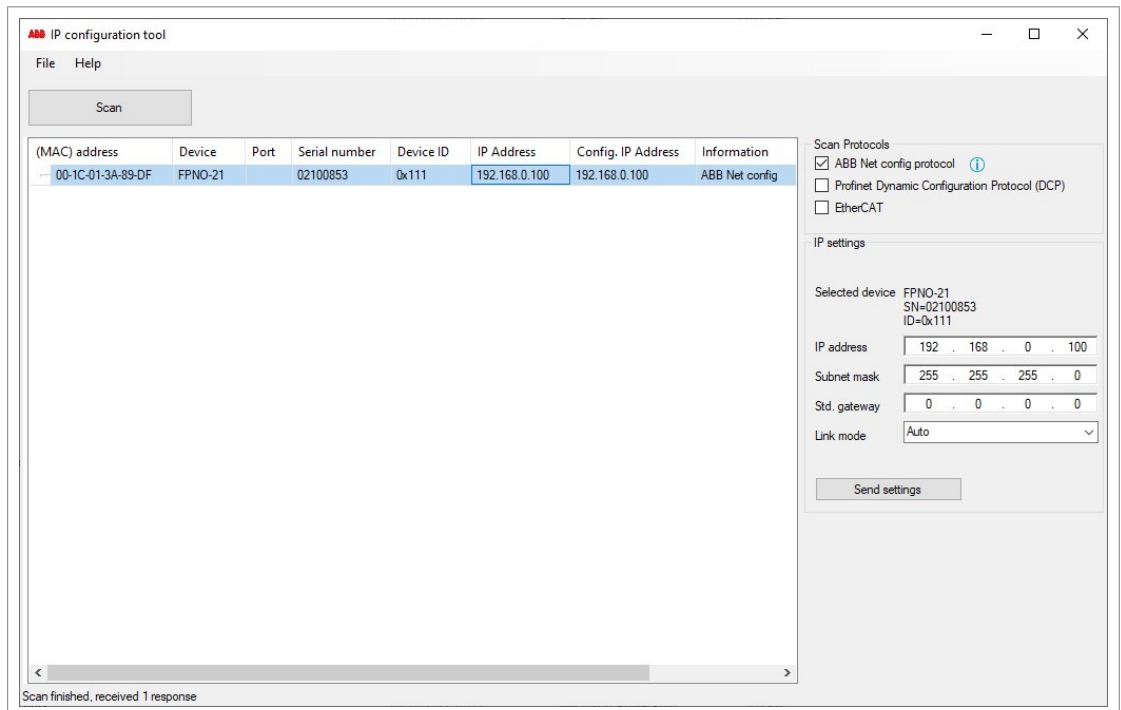
## Rewriting the IP configuration of adapter modules

1. Scan the network for adapter modules.  
For instructions, see section Finding adapter modules in the network (page 137).
2. On the results list, click to select the adapter module whose IP configuration you want to modify.



3. Below **IP settings**, define the IP configuration settings according to your network configuration.
4. To apply the new settings, click the **Send settings** button.

The new current IP address and configured IP address appear on the results list.





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## Appendix C - FPNO-21 configuration web pages

---

### Contents of this chapter

This chapter presents the FPNO-21 configuration web pages.

**Note:** ABB recommends to disable the web pages after the commissioning to reduce cyber security risks. See the *Service configuration page* (page 147).

### Browser requirements

Any web browser can be used.

### Compatibility

The web pages support all drives compatible with the FPNO-21 adapter module.

For the compatibility table, see section *Drives* (page 11).

### Logging in

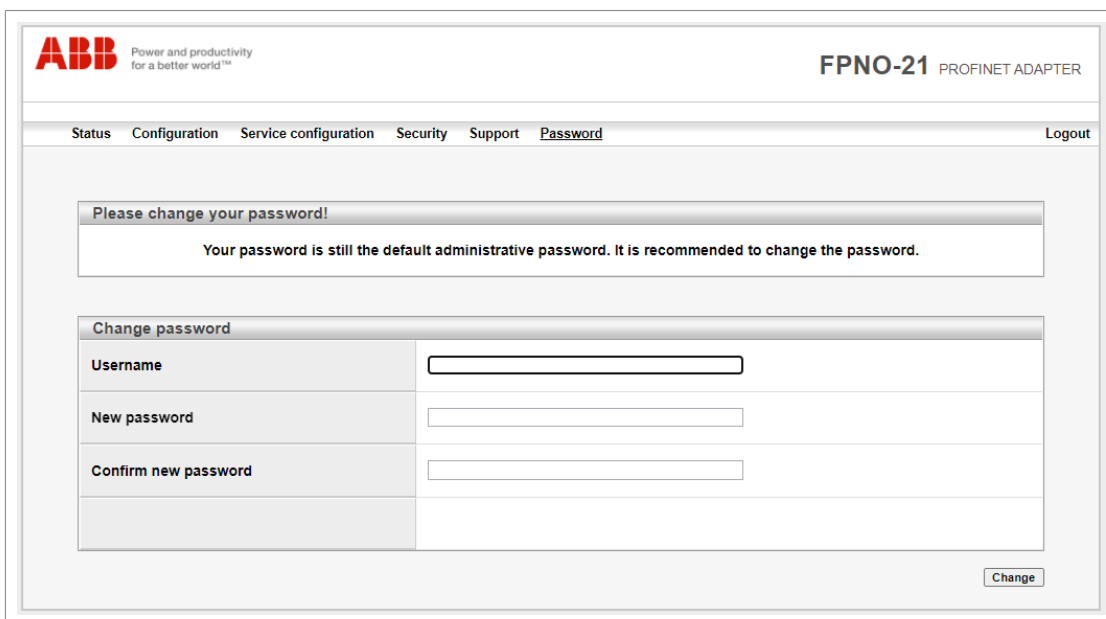
1. Open a web browser and type the IP address of the adapter module in the address field. The IP address is visible in the FPNO-21 configuration parameters, group A, parameter 5...8.

Example: `https://192.168.0.100/`

---



2. Log in with a user name and a password.  
Default user name: admin  
Password: The last six digits of the MAC address of the adapter module, in upper case, without hyphens.  
The MAC ID is visible on the cover of the adapter module and in the ABB IP configuration tool, see Appendix B – ABB IP configuration tool (page 137).  
Example: If the MAC address of the adapter module is 00-1C-01-00-2F-73, the password is 002F73.  
The browser opens the user interface.
3. After successful login, you will be prompted to change the password for security reasons. It is recommended to change the default password.



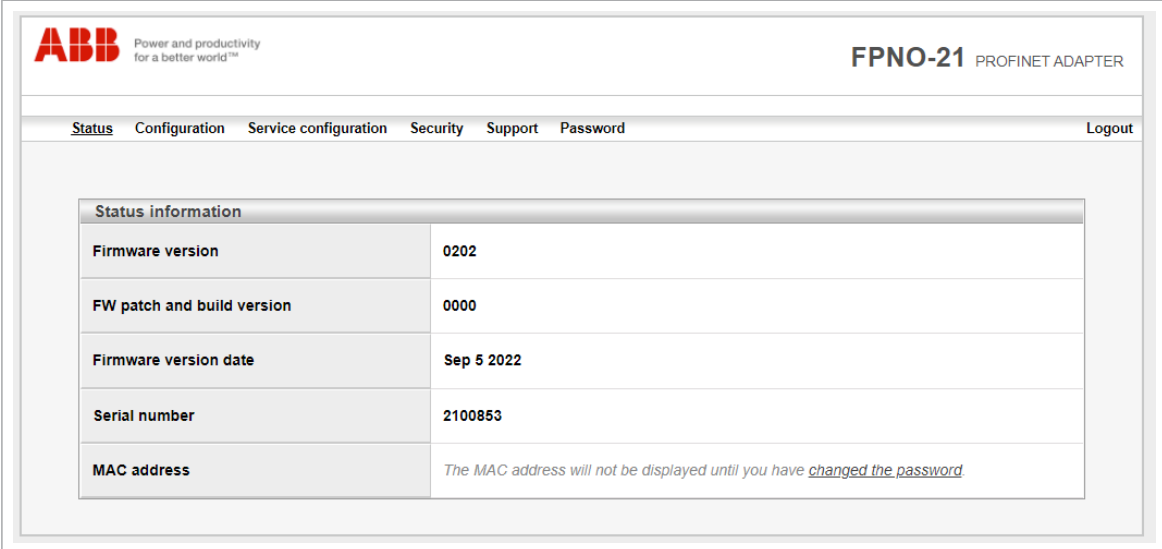
## Menu overview

To navigate on the web pages, use the menu items available:

- Status
- Configuration
- Service configuration
- Security
- Support
- Password.

### ■ Status page

The Status page shows version information, as well as the serial number and MAC address (MAC ID) of the adapter module.




The screenshot displays the web interface for the FPNO-21 PROFINET ADAPTER. At the top left is the ABB logo with the tagline "Power and productivity for a better world™". At the top right, the device name "FPNO-21 PROFINET ADAPTER" is shown. Below the header is a navigation menu with items: Status, Configuration, Service configuration, Security, Support, Password, and Logout. The main content area features a "Status information" table with the following data:

Status information	
Firmware version	0202
FW patch and build version	0000
Firmware version date	Sep 5 2022
Serial number	2100853
MAC address	<i>The MAC address will not be displayed until you have <a href="#">changed the password</a></i>

### ■ Configuration page

On the Configuration page, you can modify parameter settings in the configuration parameter groups A (1), B (2) and C (3).



**ABB** Power and productivity  
for a better world™

**FPNO-21** PROFINET ADAPTER

Status
Configuration
Service configuration
Security
Support
Password
Logout

**Configuration parameters - Group A**

**Module information**

<b>51.01 Fieldbus adapter type</b>	<b>PROFINET</b>
------------------------------------	-----------------

**Ethernet configuration**

<b>51.02 Protocol/Profile</b>	PROFINET IO, ABB Drives Profile (11) ▾
<b>51.03 Communication rate</b>	Auto-negotiate (0) ▾
<b>51.04 IP configuration</b>	Static IP (0) ▾
<b>51.05-08 IP address</b>	192.168.0.100
<b>51.09 Subnet mask</b>	255.255.255.0 (24) ▾
<b>51.10-13 Gateway address</b>	0.0.0.0
<b>51.14 Communication rate for Port 2</b>	Auto-negotiate (0) ▾
<b>51.16 Module emulation</b>	Disabled (0) ▾
<b>51.19 Transparent16 scale</b>	99

**PROFINET IO configuration**

<b>51.20 PROFINET IO Telegram type</b>	0
<b>51.21 PROFINET IO Alarm sending</b>	Enabled (0) ▾
<b>51.22 PROFINET IO Map selection</b>	16bit (1) ▾
<b>25 PROFINET IO Name Index</b>	0
<b>51.PROFINET IO Station Name</b>	

Save and reboot
Save without rebooting



Configuration parameters - Group B	
DATA OUT mapping (client to drive)	
53.01 Data out 1	<input type="text" value="47.12[32]"/>
53.02 Data out 2	<input type="text" value="0"/>
53.03 Data out 3	<input type="text" value="0"/>
53.04 Data out 4	<input type="text" value="0"/>
53.05 Data out 5	<input type="text" value="0"/>
53.06 Data out 6	<input type="text" value="0"/>
53.07 Data out 7	<input type="text" value="0"/>
53.08 Data out 8	<input type="text" value="0"/>
53.09 Data out 9	<input type="text" value="0"/>
53.10 Data out 10	<input type="text" value="0"/>
53.11 Data out 11	<input type="text" value="0"/>
53.12 Data out 12	<input type="text" value="0"/>

Configuration parameters - Group C	
DATA IN mapping (drive to client)	
52.01 Data in 1	<input type="text" value="47.11[32]"/>
52.02 Data in 2	<input type="text" value="0"/>
52.03 Data in 3	<input type="text" value="0"/>
52.04 Data in 4	<input type="text" value="0"/>
52.05 Data in 5	<input type="text" value="0"/>
52.06 Data in 6	<input type="text" value="0"/>
52.07 Data in 7	<input type="text" value="0"/>
52.08 Data in 8	<input type="text" value="0"/>
52.09 Data in 9	<input type="text" value="0"/>
52.10 Data in 10	<input type="text" value="0"/>
52.11 Data in 11	<input type="text" value="0"/>
52.12 Data in 12	<input type="text" value="0"/>

After you have changed any setting in any of the groups, you must click Save and reboot at the bottom of Group A to validate the settings.

### Changing the PROFINET IO station name via web page

The PROFINET IO configuration web page is shown below with default values. The PROFINET IO Station Name field is blank by default.

PROFINET IO configuration	
51.20 PROFINET IO Telegram type	<input type="text" value="1"/>
51.21 PROFINET IO Alarm sending	<input type="text" value="Enabled (0)"/>
51.22 PROFINET IO Map selection	<input type="text" value="32bit (0)"/>
51.25 PROFINET IO Name Index	<input type="text" value="0"/>
51.PROFINET IO Station Name	<input type="text"/>

To set a new name, type the name in the PROFINET IO Station Name field. Click Save without rebooting, and then click Save and reboot to reboot FPNO-21. See screen in Configuration page. The new name is effective only after FPNO-21 reboot.

**Note:** The value in PROFINET IO Name Index field must be 0 to use the set station name. Otherwise the name generated by the PROFINET IO Name index overrides it.

Example: PROFINET IO Station Name is set as fpno-21.

After you click Save without rebooting, and then click Save and reboot, the refreshed web page is as shown below.

PROFINET IO configuration	
51.20 PROFINET IO Telegram type	<input type="text" value="1"/>
51.21 PROFINET IO Alarm sending	<input type="text" value="Enabled (0)"/>
51.22 PROFINET IO Map selection	<input type="text" value="32bit (0)"/>
51.25 PROFINET IO Name Index	<input type="text" value="0"/>
51.PROFINET IO Station Name	<input type="text" value="fpno-21"/> <i>changed</i>

The web page validates the Station name format and displays any correction to the new name, as shown in this example screen.

PROFINET IO configuration	
51.20 PROFINET IO Telegram type	<input type="text" value="1"/>
51.21 PROFINET IO Alarm sending	<input type="text" value="Enabled (0)"/>
51.22 PROFINET IO Map selection	<input type="text" value="32bit (0)"/>
51.25 PROFINET IO Name Index	<input type="text" value="0"/>
51.PROFINET IO Station Name	<input type="text" value="192.168.1.10"/> <i>Profinet name can't be in same format as an IP address.</i>

If PROFINET IO Name Index was set from web page or from parameters, the PROFINET IO Station Name field shows its generated name after reboot, as shown in this example screen.

PROFINET IO configuration	
51.20 PROFINET IO Telegram type	<input type="text" value="1"/>
51.21 PROFINET IO Alarm sending	<input type="text" value="Enabled (0)"/>
51.22 PROFINET IO Map selection	<input type="text" value="32bit (0)"/>
51.25 PROFINET IO Name Index	<input type="text" value="123"/>
51.PROFINET IO Station Name	<input type="text" value="abbdrive-123"/>

### ■ Service configuration page

On the Service configuration page, you can enable or disable certain Ethernet services. All services except Simple Network Time Protocol (SNTP) are enabled by default. You can disable the following services on this page:

- access to FPNO-21 configuration web page
- allow to change IP settings remotely via ABB IP configuration tool
- remote access drive with Drive composer tool via Ethernet tool network
- Ping response
- configure SNTP
- Simple Network Management Protocol (SNMP).

The SNMP can be used to collect and organize information of the managed devices on IP networks.

The new settings take effect after reboot of the module. You can click Save and reboot, to validate the new settings immediately or click Save without rebooting if you want to do other settings also and then reboot.

The screenshot shows the configuration web interface for the FPNO-21 PROFINET ADAPTER. The top navigation bar includes 'Status', 'Configuration', 'Service configuration', 'Security', 'Support', 'Password', and 'Logout'. The main content area is divided into three sections:

- Ethernet service configuration (saved settings will be in use after reboot):**
  - FPNO configuration web pages: Enabled
  - Lock configuration: Disabled
  - ABB IP Configuration tool: Enabled
  - ABB Drive composer tool: Enabled
  - Unsecured ABB Drive composer tool: Disabled
  - Ping response: Enabled
- Simple Network Time Protocol (SNTP) configuration (saved settings will be in use after reboot):**
  - SNTP protocol: Disabled
  - SNTP update interval (seconds): 60
  - SNTP time offset to UTC (minutes): 0
  - SNTP Server address 1: (empty field)
  - SNTP Server address 2: (empty field)
- Simple Network Management Protocol (SNMP) configuration (saved settings will be in use after reboot):**
  - SNMP protocol: Enabled

At the bottom right, there are two buttons: 'Save and reboot' and 'Save without rebooting'.

**Note:** These settings are available only through web pages. When you select to disable the web page, a warning appears to confirm before you can save the selection.

To enable the web page again, see [Enable web page access after it was disabled](#) (page 152).

ABB recommends to disable all services that are not used after commissioning.

### Configuring SNTP

Simple Network Time Protocol (SNTP) can be used to synchronize drive time with a network time server. When SNTP is enabled, FPNO-21 will request the time from configured server at a given interval. To receive this time synchronization, you must set parameter 96.20 Time sync primary source to Fieldbus A. The table below shows the settings for SNTP:

Settings	Description	Value
SNTP update interval	Interval to request time from server.	Default: 30 seconds Minimum: 30 seconds

Settings	Description	Value
SNTP time offset to UTC	Time offset to the time received from SNTP. This value can also be set over PROFIdrive parameter 1001.  <b>Note:</b> SNTP time offset change does not need a reboot.	-1440...1440 minutes
SNTP server address 1	Primary server address for requesting time. Format: IP address followed by optional port number, eg: 192.168.0.1:123  <b>Note:</b> If port number is missing, the default NTP port number "123" is used.	-
SNTP server address 2	Secondary server address used if the request to server 1 fails.	-

### ■ Security page

On the Security page, you can upload a private key and certificates for FPNO-21 to use instead of the self-signed certificate that FPNO-21 uses as a default. You can upload and manage Drive Composer certificate files on Security page under "Drive Composer certificate settings". Up to four certificates are supported at a time.

FPNO-21 uses secure HTTPS (TLS 1.2) communication for the web page server. By default, FPNO-21 does not require client authentication for the PC tool communication. You can use client authentication to improve the system security.

If unsecured communication is required, you can enable it from Service configuration page or by setting parameter 51.15 Service configuration bit 4. When unsecured communication is enabled, the PC tool communication is not encrypted or authenticated.

For more details, refer to [Drive composer start-up and maintenance PC tool user's manual \(3AUA0000094606 \[English\]\)](#).

**Note:** Secure PC tool communication is possible with Drive Composer Pro version 2.7 or later.

■ **Support page**

On the Support page, you can access documentation related to the adapter module and the GSDML file.

The latest files corresponding to the drive firmware are available through the hyperlinks listed under "WWW documentation and downloads". You can find more information about each parameter under "Click here for more information about fieldbus parameters".

## ■ Password page

On the Password page, you can change password. FPNO-21 supports only one user access level.

The screenshot displays the 'Password' page of the FPNO-21 configuration interface. At the top left is the ABB logo with the tagline 'Power and productivity for a better world™'. At the top right, it says 'FPNO-21 PROFINET ADAPTER'. Below this is a navigation menu with the following items: Status, Configuration, Service configuration, Security, Support, Password (which is underlined), and Logout. The main content area is titled 'Change password' and contains a form with three input fields: 'Username', 'New password', and 'Confirm new password'. A 'Change' button is located at the bottom right of the form area.

Change password	
Username	<input type="text"/>
New password	<input type="text"/>
Confirm new password	<input type="text"/>
<input type="button" value="Change"/>	

## Reset FPNO-21 web page password to default

You can reset the FPNO-21 web page password to factory default.

**Note:** The password can be reset only with local access to the drive.

1. Disconnect all cable connections to FPNO-21.  
The NET led should switch off.
2. Write 0 (zero) to the parameter 26 under Group A (e.g. 51.26).
3. Refresh the settings by selecting Refresh in parameter 27 (e.g. 51.27).
4. Write 17989 to parameter 26 under Group A.
5. Refresh the settings by selecting Refresh in parameter 27.
6. Write 20033 to parameter 26 under Group A.
7. Refresh the settings by selecting Refresh in parameter 27.
8. Write 0 to parameter 26 under Group A.

FPNO-21 password is now reset to the default password. For information of default password, see section [Logging in \(page 141\)](#).

## Enable web page access after it was disabled

You can enable the access to web pages with drive parameters.

1. Disconnect all cable connections to FPNO-21.  
The NET led should switch off.
2. Write 0 (zero) to the parameter 26 under Group A (e.g. 51.26).
3. Refresh the settings by selecting Refresh in parameter 27 (e.g. 51.27).
4. Write 87 to parameter 26 under Group A.
5. Refresh the settings by selecting Refresh in parameter 27.
6. Write 17730 to parameter 26 under Group A.
7. Refresh the settings by selecting Refresh in parameter 27.
8. Write 0 to parameter 26 under Group A.

Access to web pages is now enabled.

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## Appendix D - FPNO-21 configuration back-up

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### Contents of this chapter

This chapter presents the settings for FPNO-21 configuration backup.

### Compatibility

FPNO-21 settings are stored in the drive parameters and also in the configuration files. FPNO-21 adapter module supports backup of all settings to the drive. These settings are now also included in any backups made of the drive using the Drive composer PC tool or the control panel.

### Settings for backup

Consider the following points:

- Backup is not slot-specific. For example, backup of FPNO-21 in FBA A, slot 1 can be restored to FPNO-21 FBA A, slot 2.
- Backup depends on the fieldbus channel. For example, backup of FPNO-21 in FBA A is not restored to FPNO-21 in FBA B.
- FPNO-21 configuration parameters are included in the backup when drive parameters are saved.

#### ■ Configuration backup for all protocols in FPNO-21

Backup includes the following configuration for PROFINET IO in FPNO-21:

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Configuration	Description
Ethernet service configuration	Enables different Ethernet services. See <a href="#">Service configuration page (page 147)</a> . When set, backup will automatically include this configuration.
Web page password	Login password for accessing FPNO-21 configuration web pages. See <a href="#">Password page</a> . Backup will automatically include the set password. <b>Note:</b> Backup will include the default password.
SNTP configuration	Enables SNTP, request interval, UTC offset, and server addresses. See <a href="#">Service configuration page (page 147)</a> . When set, backup will automatically include this configuration.
Station name	Sets the station name using DCP. See <a href="#">PROFINET network settings (page 90)</a> . When set, backup will automatically include this configuration.
I&M 1-3	Writable strings for identification and maintenance. See <a href="#">I&amp;M records (page 134)</a> . When set, backup will automatically include this configuration.
PROFIdrive parameters 934-943	PROFIdrive CW and SW user bit mapping. See <a href="#">PROFIdrive parameters (page 129)</a> . <b>Note:</b> Backup will include this configuration only when it is stored with PROFIdrive parameter 971.
System location	Writable SNMP MIB-2 string. When set, backup will automatically include this configuration.
System name	
System contact	

The settings are saved to the drive after 10 seconds. If a Refresh command is given to FPNO-21 using parameter 51.27, the pending backup is transferred to drive immediately and FPNO-21 is rebooted after the transfer is completed.

**Note:** The new setting is not saved to drive if the drive was powered off or the adapter was disconnected from the drive within 10 seconds of changing a setting.

### ■ Using the restored backup

The use cases in the below table show how FPNO-21 settings are used after you restored a backup or after you powered up or enabled the module. The matching status box colours indicate matching configurations.

No.	Configuration status	
	Before restore	After restore
1	Restoring a backup to drive with Drive composer or panel.	
	<p>Drive with any configuration      FB adapter with any configuration      →      Drive with configuration from backup      →      FB with configuration from backup</p>	
	Drive and fieldbus adapter can have any configuration.	Configuration from backup is used in drive and in FPNO-21
2	Replacing a new fieldbus adapter of the same type.	
	<p>Drive with backup      FB adapter with no configuration      →      Drive with backup      →      FB with configuration from drive backup</p>	
	Drive has a backup of FPNO-21 configuration and a new FPNO-21 with no configuration is installed.	Drive backup is used in FPNO-21.
3	Replacing a fieldbus adapter with another adapter of the same type. But the new adapter was used with some other drive previously.	
	<p>Drive with backup      FB adapter with previous configuration      →      Drive with backup      →      FB with configuration from drive backup</p>	
	Drive has a backup of FPNO-21 configuration and a new FPNO-21 with existing configuration is attached.	Drive backup is used in FPNO-21.
4	A new drive and fieldbus adapter are used.	
	<p>Drive with no backup or backup of another FB adapter      FB adapter with default configuration      →      Drive with new backup from FB      ←      FB with default configuration</p>	
	Drive has no backup or a backup of some other type of fieldbus adapter other than FPNO-21 exists. FPNO-21 with no configuration is attached.	FPNO-21 generates a new backup with its default settings and copies it to drive.

No.	Configuration status	
	Before restore	After restore
5	Replacing drive with a new drive and reusing the old Fieldbus adapter.	
	Drive has no backup or a backup of some other type of fieldbus adapter other than FPNO-21 exists. FPNO-21 with an existing configuration is attached.	FPNO-21 copies its backup to drive.
6	Clearing fieldbus configuration from drive and module to defaults.	
	You can clear the fieldbus configuration from drive and module to defaults with parameter 96.06 Parameter restore using the selection Reset all fieldbus settings.	Clears the fieldbus parameters and backup files for FBA A and FBA B on the drive side. If a FPNO-21 module is connected, its configurations are reset to defaults.

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# Further information

## Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to [www.abb.com/searchchannels](http://www.abb.com/searchchannels).

## Product training

For information on ABB product training, navigate to [new.abb.com/service/training](http://new.abb.com/service/training).

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