

OPTIONS FOR ABB DRIVES

FPNO-21 PROFINET fieldbus adapter module User's manual



FPNO-21 PROFINET fieldbus adapter module

User's manual



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Table of contents

1 Safety instructions

Contents of this chapter	11
Use of warnings and notes	11
Safety in installation and maintenance	12

2 Introduction to the manual

Contents of this chapter	13
Applicability	13
Compatibility	13
Drives	13
Protocol	14
Target audience	14
Purpose of the manual	14
Cyber security disclaimer	14
Terms and abbreviations	15
Related documents	17

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

Contents of this chapter	19
Ethernet network	19
Example topology of the Ethernet link	19
FPNO-21 module overview	21
FPNO-21 module layout	22

4 Mechanical installation

Contents of this chapter	23
Necessary tools and instructions	23
Unpacking and examining the delivery	23
Before you start	23
Installing option modules	24

5 Electrical installation

Contents of this chapter	25
Necessary tools and instructions	25
General cabling instructions	25
Connecting the FPNO-21 module to the network	25

6 PROFINET IO - Start-up

Contents of this chapter	27
Warnings	27
Drive configuration	27
PROFINET IO connection configuration	27
FPNO-21 configuration parameters – group A (group 1)	28
FPNO-21 configuration parameters – group B (group 2)	36

FPNO-21 configuration parameters – group C (group 3)	37
Emulation modes	38
Control locations	38
Starting up fieldbus communication for drives	39
Parameter setting examples - ACS380, ACS480, ACH580, ACQ580, and ACS580	40
Frequency control using PROFIdrive communication profile with PPO Type 4	40
Parameter setting examples – ACS880	41
Speed control using PROFIdrive communication profile with PPO Type 4	41
Configuring the master station	43
Downloading the GSD file	43
Configuring an ABB AC500 PLC	43
Configuring a Siemens SIMATIC S7 PLC	47
Resetting PROFINET IO device to factory default via S7	52
Configuring a Siemens PLC with TIA14	56
Media Redundancy Protocol (MRP)	65
Configuring Media Redundancy Protocol (MRP) with Siemens PLC	65
Configuring Media Redundancy Protocol (MRP) with TIA14	71
Shared Device	74
Configuring Shared Device for ABB PLC with Automation Builder	74
Configuring the drive control PLC	74
Configuring the safety PLC	75
Configuring Shared Device for Siemens PLC with TIA portal	77
Configuring the drive control PLC	77
Configuring the safety PLC	77
S2 system redundancy	78

7 PROFINET IO – Communication profiles

Contents of this chapter	79
Communication profiles	79
PROFIdrive communication profile	80
Control word and Status word	80
Control word contents	81
Status word contents	82
State machine for all operating modes	85
State machine for the positioning mode	86
References	87
References in speed control mode	87
Actual values	87
Actual values in speed control mode	87
ABB Drives communication profile	87
Control word and Status word	87
Control word contents	87
Status word contents	89
State machine	91
References	91
Scaling	92
Actual values	93
Scaling	93
PROFIdrive v4.2 communication profile	93
Supported drives	93
Control word and Status word	93
Control word contents	93

Status word contents	95
State machine	96
References	98
References in speed control mode	98
Actual values	98
Actual values in speed control mode	98

8 PROFINET IO – Communication protocol

Contents of this chapter	99
PROFINET IO	99
PROFINET network settings	100
PROFINET IO in FPNO-21	100
The services provided by the FPNO-21 module	101
Cyclic message types	101
PPO types	101
Standard telegram (ST) types (DP-V1)	102
Behavior of output data	103
Parameter handling using acyclic parameter access mechanism (DP-V1)	103
Header and frame structures	103
ErrorCode1	104
DP-V1 read/write request sequence	104
Read and write blocks	105
Data block	106
Function blocks for sending DP-V1 messages (Siemens S7)	110
Parameter data transfer examples	110
Example 1a: Reading a drive parameter (array element)	111
Example 1b: Reading 3 drive parameters (multi-parameter)	112
Example 2a: Writing a drive parameter (one array element)	114
Example 2b: Writing 2 drive parameters (multi-parameter)	115
Example 3: Reading a PROFIdrive parameter	117
Example 4: Configuring the process data written to the drive	117
Example 5: Determining the source of the process data read from the drive	e.119
Example 6: Reading one element from the parameter description	120
Diagnostic and alarm mechanism	121
Alarm mechanism	121
Fault code mapping	121
Fault buffer mechanism	122

9 PROFINET IO – Diagnostics

Contents of this chapter	125
Fault and warning messages	125
LEDs	125

10 NONE – Start-up

Contents of this chapter	127
Warnings	127
Drive configuration	127
Connection configuration for the NONE protocol	127
FPNO-21 configuration parameters – group A (group 1)	128
Starting up fieldbus communication	134

11 NONE – Diagnostics

Contents of this chapter	135
Fault and warning messages	135
LEDs	135

12 Technical data

Contents of this chapter	137
Dimension drawing	137
General data	138
Ethernet link	138
TCP and UDP service ports	138

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

Contents of this chapter	141
PROFIdrive parameters	141
PROFIdrive parameter descriptions	147
I&M records	148
Call-REQ-PDU telegram for read/write access to I&M records	148
Response structure for I&MO (Read-only)	149
Response structure for I&M1 (Read/Write)	149
Response structure for I&M2 (Read/Write)	149
Response structure for I&M3 (Read/Write)	149
Response structure for I&M4 (Read/Write)	150
Drive information	150

14 Appendix B - ABB IP configuration tool

Contents of this chapter	51
Installation	51
Finding adapter modules in the network15	51
Rewriting the IP configuration of adapter modules	2

15 Appendix C - FPNO-21 configuration web pages

	55
Browser requirements	55
Compatibility	55
Logging in	55
Menu overview	57
Status page	57
Configuration page	57
Changing the PROFINET IO station name via web page	60
Service configuration page	61
Configuring SNTP	62
Security page	63
Support page	64
Password page	65
Firmware update page	66
Reset FPNO-21 web page password to default	67
Enable web page access if it is disabled16	67

16 Appendix D - FPNO-21 configuration back-up

Contents of this chapter	169
Compatibility	169
Settings for backup	169
Configuration backup for all protocols in FPNO-21	169
Using the restored backup	170

17 Appendix E - OPC UA server

Contents of this chapter	173
OPC UA	173
Compatibility	174
Supported services and features	174
Enabling OPC UA server on an ABB drive	175
Encrypted Communication	175
OPC UA subscription	176
Accessing drive events and event log with OPC UA	
Connection example	178
Technical data	182

Further information

Safety instructions 11



Safety instructions

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 show a particular condition or fact, or give information.

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.

W Ge

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



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.

2

Introduction to the manual

Contents of this chapter

This chapter introduces this manual.

Applicability

This manual applies to the FPNO-21 PROFINET fieldbus adapter module (referred to as FPNO-21 module from here on), adapter revision N or firmware version 2.03 or later.

Compatibility

Drives

The FPNO-21 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 information on compatibility, refer to the drive firmware manual. You can see the current firmware version of the drive from 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.

The FPNO-21 module can run other protocols. You can enable and disable these protocols via web pages:

- ABB IP configuration tool
- Simple Network Time Protocol (SNTP)
- HTTPS for web page
- Open Platform Communications Unified Architecture (OPC UA)
- Drive composer tool via Ethernet tool network.

The FPNO-21 module can also run the NONE protocol which is the no communication protocol. In this setup, the FPNO-21 module is used to run only Ethernet services. When the PROFINET protocol is not required, select the NONE protocol.

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.

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 how to install, commission and use the FPNO-21 module.

Cyber security disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. 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, 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.

ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Term	Description
ACT	Actual value Istwert
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 Dezentrale Peripherie
DP-V0	PROFINET IO extension to the EN 50170 standard, providing the basic func- tionality 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
OPC UA	Open Platform Communications Unified Architecture
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.

Terms and abbreviations

16 Introduction to the manual

Term	Description
Parameter/Process data object	Special object that contains parameter and process data
PD	Process data Prozessdaten
РКЕ	Parameter identification Parameter-Kennung
РКW	Parameter identification value Parameter-Kennung-Wert
PLC	Programmable logic controller
PNU	Parameter number Parameternummer
РРО	Parameter/Process data object Parameter-/Prozessdaten-Objekt
Process data	Data that contains a Control word and reference value or a 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 Parameter-Wert
PZD	PD, Process data
PZDO	Process data object Prozessdatenobjekt
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 a 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 Steuerwort
Warning	Signal caused by an existing alarm which does not lead to tripping of the device
ZSW	Status word Zustandswort

Related documents

Manual	Code		
Drive hardware manuals and guides			
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		
Option manuals and guides			
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.

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

18 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 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
- star topology, daisy chain topology and ring topology (Media Redundancy Protocol (MRP) (page 65))
- PROFINET S2 system redundancy with two redundant controllers.

The maximum length for an Ethernet segment on twisted pair media is 100 m (328 ft). All twisted pair media between the Ethernet node and the switch or router must be shorter than 100 m (328 ft), including media within patch panels.

Example topology of the Ethernet link

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

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

Through the FPNO-21 module you can:

- 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
- synchronize the real time clock
- connect to the drive via OPC UA client for monitoring and diagnostics of the drive
- connect a PC with the Drive Composer pro tool.

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

Note: PROFINET IO uses only 100 Mbit/s in the full-duplex mode.

The FPNO-21 module is installed into an option slot on the drive control unit. Refer to the drive manuals for module placement options.

FPNO-21 module layout





Mechanical installation

Contents of this chapter

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

Necessary tools and instructions

Use a Torx TX10 screwdriver to attach the FPNO-21 module to the drive. For more information, refer to 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 FPNO-21 module in 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 FPNO-21 module and drive frame for cable shield grounding.

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

When you install the FPNO-21 module, 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 and terminals that connect to the option modules.

- 1. Stop the drive and do the steps in section **Electrical safety precautions** of the drive hardware manual.
- 2. Get access to the drive control unit. For the location of the control unit, refer to the drive hardware manual.
- 3. Pull out the lock on the module (a).
- 4. Install the module in a free option module slot on the control unit.
- 5. Push in the lock on the module (a).
- 6. Torque the grounding screw (b) to 0.8 N·m (7 lbf·in).

Note: The screw tightens the connections and grounds the module. It is necessary for fulfilling the EMC requirements and for correct operation of the module.



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



7. Connect the wiring to the module. Obey the instructions in this manual.

If you must remove the adapter module after it was installed into the drive, use a suitable tool (for example, small pliers) to carefully pull out the lock.

5

Electrical installation

Contents of this chapter

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

Necessary tools and instructions

Refer to 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 module 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 a minimum wire size of AWG 22 / 0.32mm². Use a PROFINET-certified cable. The cable shield is connected to the drive frame through an RC network. Use a dedicated PROFINET-cable for PROFINET installation.

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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 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 how to configure the drive for operation with the module
- drive-specific instructions on how to start-up the drive with the module
- examples of configuring the master station for communication with the module.

Warnings

WARNING!

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

Drive configuration

This information applies to all drive types that are compatible with the FPNO-21 module, unless otherwise stated.

PROFINET IO connection configuration

After the FPNO-21 module is mechanically and electrically installed, prepare the drive for communication with the module.

The procedure to set the module for PROFINET IO communication with the drive depends on the drive type. Typically, you must set the PROFINET parameters to establish the communication. Refer to Starting up fieldbus communication for drives (page 39).

When the communication between the drive and the FPNO-21 module is established, the user can see several configuration parameters. These parameters are listed in the

tables below. Examine the parameters and adjust them if it is necessary. You can adjust the parameters through 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	Read-only. 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.	132 = PROFINET IO
02	Protocol.Profile	Selects the application protocol and communication profile for the network connection. The selections available for PROFINET IO commu- nication are listed below.	11 = PNIO ABB Pro
	10 = PNIO Pdrive	PROFINET IO protocol: PROFIdrive profile	
	11 = PNIO ABB Pro	PROFINET IO protocol: ABB Drives profile	
	12 = PNIO T16	PROFINET IO protocol: Transparent 16-bit profile	
	13 = PNIO T32	PROFINET IO protocol: Transparent 32-bit profile	
	14 = PNIO PdriveM	PROFINET IO protocol: PROFIdrive positioning mode	
	15 = PNIO Pdrive v4.2	PROFINET IO protocol: PROFIdrive v4.2 profile	
03	Commrate	Sets the bit rate for the Ethernet interface.	0 = Auto
	0 = Auto	Auto-negotiate	
	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
04	IP configuration	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.	0 = Static IP
		Note: 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.	
	0 = Static IP	Configuration will be obtained from parameters 0513 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 commu- nication stack. If there is a need to change the IP address con- figured via DCP, it should be done with a DCP tool, such as Siemens Step7. If some of the other meth- ods are used to change the IP address, the module must be restarted to enable any changes.	
	2 = Temp IP	IP address is set as Temporary through DCP by the controller. Parameters 0513 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.	
05 08	IP address 1	An IP address is assigned to each IP node on a net- work. An IP address is a 32-bit number that is typic- ally represented in "dotted decimal" notation con- sisting of four decimal integers, on the range 0255, separated by periods. Each integer repres- ents the value of one octet (8-bits) in the IP address. Parameters 0508 define the four octets of the IP address.	0
	0255	IP address	
	IP address 4	See parameter 05 IP address 1.	0
	0255	IP address	

30 PROFINET IO – Start-up

No.	Name/Value		Description		Default		
09 Subnet CIDR		Subnet masks are used for smaller networks called s a 32-bit binary number the into a network address and Subnet masks are typical dotted decimal notation of notation, as shown in the	or splitting ne oubnets. A sub nat splits the I nd host addre ly represented or the more co a table below.	tworks into net mask is P address ess. d in either mpact CIDR	0		
	CIDR	Dotte	d decimal	CIDR	Dotted dec	cimal	
	31	255.25	55.255.254	15	255.254.0.0)	
	30	255.255.255.252		14	255.252.0.0)	
	29	255.25	55.255.248	13	255.248.0.0)	
	28	255.25	55.255.240	12	255.240.0.0)	
	27	255.25	55.255.224	11	255.224.0.0)	
	26	255.25	55.255.192	10	255.192.0.0)	
	25	255.25	55.255.128	9	255.128.0.0)	
	24	255.255.255.0		8	255.0.0.0	0.0.0	
	23	255.25	55.254.0	7	254.0.0.0		
	22	255.25	55.252.0	6	252.0.0.0		
	21	255.25	55.248.0	5	248.0.0.0		
	20	255.25	55.240.0	4	240.0.0.0		
	19	255.25	55.224.0	3	224.0.0.0		
	18	255.25	55.192.0	2	192.0.0.0		
	17	255.25	55.128.0	1	128.0.0.0		
	16	255.25	55.0.0				
			1			1	
	131		Subnet mask in CIDR not	ation			
10 13	10 GW address 1 13 0255		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 1013 define the four octets of the gateway address.		0		
			GW address				
	GW address 4	-	See parameter 10 GW add	dress 1.		0	
	0255		GW address				

No.	Name/Value	Description	Default
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	
	5 = Disable Port	Disable Ethernet port. ABB recommends to disable the second port if it is not in use.	

32 PROFINET IO – Start-up

No.	Name/Value		Des	scription	Default
15	Service configura- tion		Dis Eac Loc al c By c tior ABE not	ables services that are not required. It service is represented by a single bit. Bit 0, It configuration, can be used to prevent accident- hanging of this parameter. default, all services are enabled and configura- n is unlocked. B recommends to disable all services that are t used after commissioning.	
	Bit	Name	1	Information	
	0	Lock configura- tion		Changing this bit to one will lock service con- figuration and no bit can be changed. Only resetting the fieldbus configuration will unlock the parameter. To reset the fieldbus configur- ation, choose "Reset all fieldbus settings" or "Clear all" in parameter 96.06 Parameter re- store.	
	1	Disable IP config tool		When this bit is set, access from ABB IP Con- figuration 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 re- sponse		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. Note: Drive Composer pro before V2.7 sup- ports unsecured communication only.	
	5	Disable configur- ing web pages		When this bit is set, access to web pages is disabled.	
	6	Web-based firm- ware update		When this bit is set, the web-based firmware update is disabled.	
	7	Disable OPC UA		When this bit is set, the OPC UA server is dis- abled. OPC UA is not enabled by default. For more information, refer to Appendix E - OPC UA server (page 173).	
	8	Unencrypted OPC UA		When this bit is set, connection to the OPC UA server is unencrypted.	
	000000b 111111b Se		Ser	vice configuration	
16	Module emulation		Em dat em ide Em	ulation mode for PROFINET IO identification a of FENA modules. Activates/inactives the ulation mode, and selects the PROFINET IO ntification data for the emulation. Refer to ulation modes.	0 = No emulation
	0 = No emulation		FPN 21 (IO-21 native identification data used. Use FPNO- GSDML to configure PLC.	

No.	Name/Value	Description	Default
	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.	
	4 = VIK-NAMUR	VIK-NAMUR identification data used. Use when PLC is configured for VIK-NAMUR drive.	
17 18	Reserved	These parameters are not used by the adapter module when the module is configured for PROFINET IO.	N/A
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
	065535	Reference multiplier/actual value divisor	
20	Telegram type	Read-only. 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 mes- sage types, refer to PPO types (page 101).	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	
	20 = ST20	Standard Telegram 20. Visible only in VIK-NAMUR emulation mode.	

No.	Name/Value	Description	Default
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, refer to Diagnostic and alarm mechanism (page 121).	0 = Enabled
	0 = Enabled	PROFIdrive alarms are enabled.	
	1 = Disabled	PROFIdrive alarms are disabled.	
22	Map selection	Defines the preferred data type of mapped para- meters 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
25	PN Name Index	 Allows to use pre-defined format of the PROFINET station name. 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 "abbdrive-xx", where xx is the value of the parameter name index. Example: Setting this value to 12 results in the name "abbdrive-12". Note: During every boot the FPNO-21 module checks the value of PN Name Index, If the value is not Zero then the active PN Name Index overrides the PROFINET station name. 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. 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. If the new name is not changed, so after next boot, the name is taken according to the PN Name Index. If the new name is used and the empty name is stored to flash. The PN Name Index. The PROFINET DCP factory reset also resets the PN Name Index. 	0
	065535		
26	Reserved	Reserved for web page functionality. For more in- formation, see Appendix C - FPNO-21 configuration web pages (page 155).	N/A

No.	Name/Value	Description	Default
27	FBA A/B par refresh	Validates any changed adapter module configura- tion parameter settings. After refreshing, the value reverts automatically to 0 = Done.	0 = Done
		Note: This parameter cannot be changed while the drive is running.	
	0 = Done	Refreshing done	
	1 = Refresh	Refreshing	
28	FBA A/B par table ver	Read-only. Displays the parameter table revision of the fieldbus adapter module mapping file stored in the memory of the drive. In format xyz, where x = major revision number y = minor revision number z = correction number OR in format axyz, where a = major revision number xy = minor revision number z = correction numbers z = correction number or letter.	N/A
		Parameter table revision	
29	FBA A/B drive type code	Read-only . 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	Read-only . 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	 Read-only. Displays the status of the fieldbus adapter module communication. Note: The value names may vary by drive. Note: Only active drive-controlled channel will change comm status <i>online</i>. PROFIsafe alone will not change the comm status. 	0 = Idle or 4 = Offline
	0 = Idle	Adapter is not configured	
	1 = Exec.init	Adapter is initializing.	
	2 = Time out	A timeout has occurred in the communication between the adapter and the drive.	
	3 = Conf.err	There is an internal error in the communication between the adapter and the drive. Contact your local ABB representative.	
	4 = Off-line	Adapter is off-line	
	5 = On-line	Adapter is on-line	
	6 = Reset	Adapter is performing a hardware reset.	

No.	Name/Value	Description	Default
32	FBA A/B comm SW ver	Read-only. Displays patch and build numbers of the adapter module's firmware version in xxyy format, where:	N/A
		xx = patch number yy = build number.	
		Example: If the firmware version (<ma- jor>.<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.</build></patch></minor></ma- 	
		See also parameter 33.	
33	FBA A/B appl SW ver	Read-only. Displays major and minor revision numbers of the adapter module's firmware version in xxyy format, where:	N/A
		xx = major revision numberyy = minor revision number	
		Example: If the firmware version (<ma- jor>.<minor>.<patch>.<build>) is 3.10.200.13 or 3.10.0.0, the value 310 is displayed.</build></patch></minor></ma- 	
		See also parameter 32.	

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 (mas- ter to drive)	Selects the resolution of control word (16 bit or 32 bit) received by the drive.	1 or 11 ²⁾
	1 = CW 16bit	Control word (16 bits)	
	11 = CW 32bit	Control word (32 bits)	
No. ¹⁾	Name/Value	Description	Default
-------------------	----------------------------------	---	---------
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 fol- lows:	0 or 2
		0 Not used	
		199 Virtual address area of drive control	
		101Parameter area of the drive9999	
	0 = None	Not used	
	1 = CW 16bit	Control word (16 bits)	
	2 = Ref1 16bit	Reference REF1 (16 bits)	
	3 = Ref2 16bit	Reference REF2 (16 bits)	
	11 = CW 32bit	Control word (32 bits)	
	12 = Ref1 32bit	Reference REF1(32 bits)	
	13 = Ref2 32bit	Reference REF2 (32 bits)	
	21 = CW2 16bit	Control word 2 (16 bits)	
	1019999	 Parameter index with format xxyy, where xx is the parameter group number (199) yy is the parameter number index within that group (0199). 	
	Other	Path to parameter area selection.	
03 10	FBA data out 3 FBA data out12	See parameter 02 FBA data out 1.	0

¹⁾ The number of parameters in this group may vary by drive type and drive firmware.
 ²⁾ 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. ¹⁾	Name/Value	Description	Default
No.	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 ²⁾
	4 = SW 16bit	Status word (16 bits)	
	14 = SW 32bit	Status word (32 bits)	

No. ¹⁾	Name/Value	Descripti	on	Default
No.	Name/Value	Descripti	on	Default
02	FBA data in 2 (drive to master)	Selects da PROFINE decimal n lows:	ata word 1 sent by the drive over the I network. The content is defined by a umber in the range of 0 to 9999 as fol-	0 or 5
		0 Not used		
		199	Virtual address area of drive control	
		101 9999	Parameter area of the drive	
	0 = None	Not used		
	4 = SW 16bit	Status wo	ord (16 bits)	
	5 = Act1 16bit	Actual val	ue ACT1 (16 bits)	
	6 = Act2 16bit	Actual val	ue ACT2 (16 bits)	
	14 = SW 32bit	Status wo	ord (32 bits)	
	15 = Act1 32bit	Actual val	ue ACT1 (32 bits)	
	16 = Act2 32bit	Actual val	ue ACT2 (32 bits)	
	24 = SW2 16bit	Status wo	ord 2 (16 bits)	
	1019999	 Parameter index with format xxyy, where xx is the parameter group number (199) yy is the parameter number index within that group (0199). 		
	Other	Path to pa	arameter area selection.	
03 10	DATA IN 3 DATA IN 12	Refer to p	arameter 01 FBA data in 1.	0

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

 $^{(2)}$ 14 (SW 32bit) is the default setting if the Transparent32 profile is used.

Emulation modes

The FPNO-21 module supports emulation modes for FENA-01, FENA-11 or FENA-21 Ethernet adapter modules, or a drive with the VIK-NAMUR control program. In emulation mode, the FPNO-21 module changes its identification information to accept connections from a PLC which is configured to communicate with FENA-01, FENA-11 or FENA-21 module, or drive with the VIK-NAMUR control program.

VIK-NAMUR mode

You can use the VIK-NAMUR mode in combination with the drive with the VIK-NAMUR control program. With this mode, FPNO-21 acts in the transparent mode and the drive control program provides cyclic data content for Standard Telegram 20. Use this mode with the generic VIK-NAMUR GSDML file.

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, and so on).

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

Starting up fieldbus communication for drives

- 1. Power up the drive.
- To enable the communication between the adapter module and the drive, select 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, select "slot 2".
- 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.
- 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.
- 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. Deactivate all services that are not used in the installation with parameter 51.15 Service configuration.
- 8. 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.

- 9. Save the valid parameter values to permanent memory with parameter 96.07 Parameter save manually.
- **10.** Validate the settings in parameter groups **51**, **52** and **53** with parameter **51.27** FBA A par refresh.
- 11. 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, refer to the PROFIdrive state machine on page 85.

The reference value ±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 frec	luency 1 ¹⁾	Constant frec	luency 2 ¹⁾
In	Status word	Frequency actual value	Power ¹⁾		DC bus voltag	le ¹⁾

1) Example

The table gives an example of the drive parameter settings.

Drive parameter	Setting for drives	Description
50.01 FBA A enable	1 = Enable	Enables communication between the drive and the fieldbus adapter module.
50.04 FBA A ref1 type	5 = Frequency	Selects the fieldbus A reference 1 type and scaling.
50.07 FBA A act1 type	5 = Frequency	Selects the actual value type and scaling accord- ing to the currently active Ref1 mode defined in parameter 50.04.
51.01 FBA A type	132 = PROFINET IO ¹⁾	Displays the type of the fieldbus adapter module.
51.02 Protocol/Profile	10 = PNIO Pdrive	Selects the PROFINET IO protocol and the PROFIdrive profile.
51.03 Commrate	0 = Auto	Ethernet communication rate is negotiated automatically by the device.
51.04 IP configuration	0 = Static IP	Configuration will be obtained from parameters 51.0513 or from the PLC via the DCP protocol.
52.01 FBA DATA IN1	4 = SW 16bit	Status word
52.02 FBA DATA IN2	5 = 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	1 = CW 16bit	Control word

Drive parameter	Setting for drives	Description
53.02 FBA DATA out2	2 = 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	1 = Refresh	Validates the configuration parameter settings.
19.12 Ext1 control mode	2 = Speed	Selects speed control as the control mode 1 for external control location 1.
20.01 Ext1 commands	12 = 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	4 = FB A REF1	Selects the fieldbus A reference 1 as the source for speed reference 1.

¹⁾ 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) \rightarrow READY TO SWITCH ON. Enter 47Fh (1151 decimal) \rightarrow 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. 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, refer to the PROFIdrive state machine on page 85.

The reference value ± 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 refer- ence	Constant spe	ed 1 ¹⁾	Constant spe	ed 2 ¹⁾
In	Status word	Speed actual value	Power ¹⁾		DC bus voltag	Je ¹⁾

1) Example

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

Drive parameter	Setting for drives	Description
50.01 FBA A enable	1 = Option slot 2 ²⁾	Enables communication between the drive and the fieldbus adapter module.

Drive parameter	Setting for drives	Description
50.04 FBA A ref1 type	4 = Speed	Selects the fieldbus A reference 1 type and scal- ing.
50.07 FBA A act1 type	4 = Speed	Selects the actual value type and scaling accord- ing to the currently active Ref1 mode defined in parameter 50.04.
51.01 FBA A type	132 = PROFINET IO ¹⁾	Displays the type of the fieldbus adapter module.
51.02 Protocol/Profile	10 = PNIO Pdrive	Selects the PROFINET IO protocol and the PROFIdrive profile.
51.03 Commrate	0 = Auto ²⁾	Ethernet communication rate is negotiated automatically by the device.
51.04 IP configuration	0 = Static IP	Configuration will be obtained from parameters 51.0513 or from the PLC via the DCP protocol.
52.01 FBA DATA IN1	4 = SW 16bit	Status word
52.02 FBA DATA IN2	5 = 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	1 = CW 16bit	Control word
53.02 FBA DATA out2	2 = 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	1 = Refresh	Validates the configuration parameter settings.
19.12 Ext1 control mode	2 = Speed	Selects speed control as the control mode 1 for external control location 1.
20.01 Ext1 commands	12 = 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	4 = 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) \rightarrow READY TO SWITCH ON. Enter 47Fh (1151 decimal) \rightarrow OPERATING.

Configuring the master station

After the adapter module is initialized by the drive, 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.

The examples apply to all drive types that are 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. In the **Tools** menu, select **Device Repository**.
- 3. In the window that opens, click **Install...** and browse for the GSD file.

44 PROFINET IO - Start-up

a cation	Sustan Dee	aaitaass					Edit Locations
_ocation	(C: Program	ository Data\Automatic	onBuilder\AB_D	evices_2.5)		¥	Eur Locatoris
Installed De	e <u>v</u> ice Descriptio	ons					
String for	a full text sear	ch	Vendo	<all th="" vendo<=""><th>ors></th><th>\sim</th><th>Install</th></all>	ors>	\sim	Install
Name		Vendor	Version	Description			<u>U</u> ninstall
	liscellaneous						Evport
	liscellaneous ieldbuses ogical devices ILCs						<u>E</u> xport

- 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 it is 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.

	PLC_AC500_V3: PLC Logic] • 1	05 03) ≡ 0 0 0
s + # X	n PNIO_Controller x	
Profinet Example Image: PLC_ACS00_V3 (PM5650-2ETH - TB5620-2ETH) Image: PLC Logic	Diagnosis	Station name (m579 prio
G Application	General	IP Parameter
Lbrary Manager PLC PRG (PRG)	PROFINET-IO-Controller I/O Mapping	IP address 192 . 158 . 0 . 1
Task Configuration	PROFINET-IO-Controller IEC Objects	Subnet madk 255 .255 .0 Default gateway 0 .0 .0
- 렌 PLC_PRG	I/O mapping list	Default Slave IP Personator
■ Interfaces	Information	First IP address 192, 168, 0, 2
COM (<empty>)</empty>		Last IP address 192 . 168 . 0 . 254
CAN (<empty>)</empty>		Subnet mask 255 . 255 . 255 . 0
ETH1 (IP Settings)		Default gateway 0 . 0 . 0 . 0
NetConfig (NetConfig)		
ETH2 (IP Settings)		I/O Provider / Consumer Status
Protocols (Client Protocols)		Application stop> Substitute values
Extension_Bus		Non to the watching
INIT Children (Children PROFINET-IO-Controller)		© Zero
FPNO_21_S2 (FPNO-21 S2)		
Genoty> (<emoty>)</emoty>		
Slot_2 (<empty>)</empty>		Watchdog
		☑ Enable
		1000 🚖 (ms)
	vessages - Total U error(s), U warning Profinet	s), u message(s)

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.

Diagnosis	Station name dri	ive1
General	IP Parameter	
	IP address	192 . 168 . 0 . 2
Log	Subnet mask	255 . 255 . 255 . 0
PNIO IEC Objects	Default gateway	0.0.0.0
I/O mapping list	Communication	
Information	Send clock (ms)	1 V Watchdog (ms) 3
	Reduction ratio	1 ~ VLAN ID 0
	Phase	1 ~
	RT dass	DT Class 1

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

Diagnostics main	-Found d	devices								
Diagnostics main		Scan							_	
Diagnostics live list	Co	ompare				Press scan	button to start the scan.			
Diagnostics eventlog		ID Type	Name	IP-Address	Network Mask	Gateway Address	MAC Address	Vendor ID	Device ID	
Diagnosis	•	1 FPNO-21		0.0.0.0	0.0.0.0	0.0.0.0	00-1C-01-3A-89-DF	1A	4	
General										
PROFINET-IO-Controller I/O Mapping										
PROFINET-IO-Controller IEC Objects										
I/O mapping list										
Information										
	IO-Dev	vice name:	drive 1			\sim	Assign IO-Device name		Set LED	
	MAC ac	ddress:	00-1C	-01-3A-89-DF						
	IP addr	ress:	0.0.0.0	0		~	Assign IP configuration		Factory res	et
	Networ	rk mask:	0.0.0.	0					, ,	
	Gatewa	ay address:	0.0.0.	0						

- In the **Configure station name** box, select the station name that was given 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).

iagnosis	Module Information				
Seneral	ID number 16	#00000104			
NIO Module I/O Mapping	Slot number	1			
PNIO Module IEC Objects	Settings				
I/O mapping list	Parameters	Value	Data Tupo	Allowed Values	Description
Information	General parameters	Value	Data type	Anowed values	Description
	Stop Mode Action selection	Freeze data	Integer8		
	Control-zero mode selection	Use data	Integer8		
	Fail safe Control Word	0	Unsigned 16	065535	
	Fail safe Reference	0	Unsigned 16	065535	
	Fail safe value of Ref PZD3	0	Unsigned 16	065535	
	Fail safe value of Ref PZD4	0	Unsigned 16	065535	
	Fail safe value of Ref PZD5	0	Unsigned 16	065535	
			_		

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

iagnosis	Find		ilter Show all 🔹 🕂 Add FB for IO Channel 🔭 Go to Instance							
anaral	Variable	Mapping	Channel	Address	Туре	Default Value	Unit	Description		
cilciai	Drive1_SW	***	Status	%IW0	UINT					
NIO Module I/O Mapping	Drive1_Act1	**	Speed Actual	%IW1	UINT					
	Drive1_Act2	***	Actual PZD3	%IW2	UINT					
VIO Module IEC Objects	Drive1_Act3	**	Actual PZD4	%IW3	UINT					
	Drive1_Act4	***	Actual PZD5	%IW4	UINT					
0 mapping list	Drive1_Act5	**	Actual PZD6	%IW5	UINT					
tefe another	Drive1_CW	***	Command	%QW0	UINT					
nformation	Drive1_Ref1	***	Speed Reference	%QW1	UINT					
	Drive1_Ref2	***	Reference PZD3	%QW2	UINT					
	Drive1_Ref3	***	Reference PZD4	%QW3	UINT					
	Drive1_Ref4	**	Reference PZD5	%QW4	UINT					
	Drive1_Ref5	***	Reference PZD6	%QW5	UINT					
			Res	et Mapping	Always	update variables	Use pa	arent device setting		
	Create new variable Logical I/O Mapping	~ ∳ = Ma	ap to existing variable							

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

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

PLC_PRG X						•			
PLC_AC500_V3.Application.PLC_PRG									
Expression	Туре	Value	Prepared value	Address	Comment	Þ			
Status_word	UINT	4919							
Speed_RPM	INT	400							
Control_word	UINT	1151							
Speed_REF	INT	400							
2 Speed_RPM_4 3 Drivel_CW_11 4 Drivel_Refl	00 := Drivel_Ac 51 := Control_wo 400 := Speed_RE	tl 400 ; prd 1151 ; F 400 ; RETURN							

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 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.

	asert <u>PCC V</u> iew	v Options Window He	9 2					-
a						*		
							End	
						=	D	
	== (0) UR				 themet(1): PROFINE I-IO-System (100)		Prome:	Standard
	2 8 X1 X2 X3 X3 X3 X3 P1 A 4 5 6 7 7 8 9 10 11	CPU 319-3 PN/DP MPU/P DP PN/D PA/D Part 1 Part 2						In OFBUS SPE PROFILES FR PROFILES TO SIMATIC 200 SIMATIC PC Sead Control 300/ SIMATIC PC Station
		III.				•		

- 3. Install the FPNO-21 GSD file:
 - In the **Options** menu, select **Install GSD Files**.
 - Browse for the GSD file downloaded from the Document library and click **Install**.

Install GSD Files			—
I <u>n</u> stall GSD Files:	from the directory	•	
C:\Users\drivecare\Desktop\GSDML			<u>B</u> rowse
File GSDML-V2.33-ABB-FPN0-20171026.xm	Release	Version Languages V2.33 English	
Install Show Log	Select <u>A</u> ll	Deselect All	
Close			Help

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

HW Config - [SIMATIC 300(1)) (Configuration) FPNO_examp C View Options Window	ile] Help						- 8 ×
C C C C C C C C C C C C C C C C C C C	CPU 319-3 PN/DP MPVDP DP PN/D For 1 For 2				Ethemet	(1). PROFINET-IO-System (100)		End: PROFIBUS DP PROFIBUS DP PROFIBUS DP PROFIBUS PA PROFIBUS PA PROFIDUS PA
<	m						F	BSensors BSensors BSittering devices SIMATIC 300 BSIMATIC 400
Stot Module Ø FPN0 X1 Interface X1 Ref 1 X1 Part 1 X1 Part 2 1 PP0 Type 7 2 PP0 Type 7	Order number ononononono	256279	Q address 256279	Diagnostic Address 8185* 8183* 8183* 8182* 	Comment	Access Full Full Full Full Full		
Insertion possible								Chg //

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

≩ ≌~ ¤ ¶a ⊕	14 (C.) 🔬 🎪 🌔 🗆 😵	N?							
							<u>^</u>	Find	
							E	<u>r</u> ina:	
(0) U	R				Ethernet	(1): PROFINET-IO-System (100)		Profile:	Standard
1	CPU 319-3 PN/DP							E₩P	ROFIBUS DP ROFIBUS PA
x1	MPI/DP					ABB			ROFINET IO
X2	DP					FPNO		60	Additional Field Devices
X3 X3 P1	PN-IO P Port 1							E	Drives
X3 P2	R Port 2								🗄 🦲 ABB FPNO
3									⊡ → → FPNO-21
4									
6									PPO Typ
7									PPO Typ
8				_			_		H- PRUTyp
10									🗄 🦲 Standard Tel
11									Gateway
									11/0
									Ident Systems
					/		-		Network Components
							F.		Switching devices
				\sim				🗈 🚻 SI	IMATIC 300
								IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	IMATIC 400 IMATIC PC Based Control 3007
Module	Order number	I Address	Q address	Diagnostic Address	Comment	Access		📄 🛄 SI	IMATIC PC Station
FPN0	00000000000			8785°		Full			
TR Rat 1				8183×		Full			
2R Rot 2				8182*		Full		1	
PP0 Type 7		256279	256279			Full		ABB	
								MOD -	-

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

50 PROFINET IO – Start-up

Properties - FPNO		×
General Identification	Shared Access	
Short description:	FPNO PROFINET IO module FPNO	*
Order no./ firmware:	00000000000 / V1.0	
Family:	ABB FPNO	
Device name:	FPNO IP address assigned to	
GSD file:	GSDML-V2.33-ABB-FPNO-20171026 xml the adapter module	
- Node in PROFINET	Change Release Number You can modify the IP address by clicking Ethernet	
Device number:	1 PROFINET-IO-System (100)	
IP address:	192.168.0.2 <u>E</u> themet	
Assign IP addres	ss via IO controller	
Comment:		
		*
ОК	Cancel	Help

- 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 set fail safe values for the PLC output process data (PZDs).

Properties - PPO Type 7 - (R-/S1)			x
General Addresses Parameters			
	Value		
🗉 🔄 Parameters			
🖃 🔄 General parameters			
- Stop Mode Action selection	Stop		
—	Ignore data		
- Fail safe Control Word	1150		
–	0		
– Fail safe value of Ref PZD3	0		
– Fail safe value of Ref PZD4	0		
– Fail safe value of Ref PZD5	0		
– Fail safe value of Ref PZD6	0		
– Fail safe value of Ref PZD7	0		
– Fail safe value of Ref PZD8	0		
– Fail safe value of Ref PZD9	0		
– Fail safe value of Ref PZD10	0		
– Fail safe value of Ref PZD11	0		
- ☐ Fail safe value of Ref PZD12	0		
1			
ОК	Ca	ncel Help	

- 9. Assign the device name (set in step 6) to the adapter module:
 - In the hardware configuration, click FPNO-21.

٠

• On the PLC menu, select Ethernet, and then select Assign Device Name.

¥~ • • • 88 😂	Download	Ct	rl+L						
	Upload						*		
	Download Module Identification	on						End	
	Upload Module Identification t	o PG	- H		Dhama	(1) PROFINET IO States (100)	E	Profiler	Chandrad
	Faulty Modules				Etheme	(1). PROFINET-IO-System (100)		E-₩ F	PROFIBUS DP
2	Module Information	Cti	1+D					쁆	PROFIBUS-PA
X2	Operating Mode	C	trl+I			FPNO			Additional Field Devices
X3	Clear/Reset								🖻 🧰 Drives
X3 X3	Set Time of Day		- H						B B ABB FENA
3	Monitor/Modify								🖻 🚡 FPNO-21
4 5	Update Firmware		E						PPO Types
6 7	Save Device Name to Memory	Card	E						В РРО Тур В РРО Тур
8	Ethernet		•	Edit Ethernet Node					⊡ PPOType ⊛-⊡ PROFisafe Te
10	PROFIBUS		+	Verify Device Name					🗄 🧰 Standard Tele
	Save Service Data			Assign Device Name				÷-	HMI 1/0
_									Ident Systems
								Ð	Sensors
									Switching devices
(1) FPNO									SIMATIC 400
Module	Order number	I Address	Q address	Diagnostic Address	Comment	Access			SIMATIC PC Based Control 50074 SIMATIC PC Station
FPND	00000000000			8185*		Full			
Interface		_		8784*	-	FUR			
7/7 / /////				0103"	-	F (8)			
277 PB0 Tune 7		256 279	266 279	0102		E.II		1	111
a rro type?		230273	230273		-	r ui		ARR	
					1			DOO T-	

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

52 PROFINET IO – Start-up

Assign device name	—
Device name: FPNO Device	ABB FPNO
Avajlable devices:	
IP address MAC address Device type Device name	<u>A</u> ssign name
00-10-01-FF-F3-60 A66 FFIND Iph0	Node flashing test
	Duration (seconds): 3 💌
	Flashing on Elashing off
4	
Show only devices of the same type 🔲 Dis <u>p</u> lay only devices without names	
Update <u>E</u> xport	
<u>C</u> lose	Help

10. Download the hardware configuration to the PLC.

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

	 k ⊕ ₽	e 💼 🛍 🕞 🗆 😤								
	(0) UR					Etheme	(1): PROFINET-IO-System (100)	E	Eind: Profile: Standard	M
	1 2 X1 X2 X3 X3 P1R X3 P1R X3 P1R X3 P2R 3 4 4 5 6 6 7 7 8 9 10 11	CPU 319-3 PN/DP MP/DP DP PN40 Pot 1 Pot 2					PPNO PPNO		Profileus op P	eld Devices 3 FENA 3 FPNO 1 FPNO Types 1 PPO Type 1 Standard Teley
		m						+	Hetwork Co H	mponents evices
(1) FPN0	0 Module	Order number	Address	G address	Diagnostic Address	Comment	Access	1	SIMATIC 400	ised Control 300/4
1 E	PND	000000000000			8185"		Full		Simatic PC S	auon
1/1	terlace				8184"		Full			
	avt 1				8183*		Full			
FIR R	n/2				8182*	_	Full			11
FIR R F2R R			1266 270	1255279			IFul			
PTR A P2R A	PO Type 7		230273						Lenn.	

Resetting PROFINET IO device to factory default via S7

You can reset the PROFINET IO device to the factory default state.

1. In HW configuration, go to PLC \rightarrow Ethernet \rightarrow Edit Ethernet Node.

Station Edit Insert P	LC View Options Window Help		
) 🚅 🐂 🖩 🖏 🎒	Download Upload	Ctrl+L	
(0) UR	Download Module Identification Upload Module Identification to PG		
1 2 CPL	Faulty Modules		
XI MPL X2 DP	Module Information	Ctrl+D	
X3 PN- X3 P1 Port 3	Operating Mode Clear/Reset Set Time of Day	Ctrl+I): PROFINET-IO-System (100)
	Monitor/Modify		2????
	Update Firmware		
	Save Device Name to Memory Card		
	Ethernet		Edit Ethernet Node
(0) UR	PROFIBUS	+	Verify Device Name
Slot 🚺 Module	Save Service Data		Assign Device Name

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

dit Ethernet Node		23
Ethernet node	Nodes accessible online	
MAC address:	Browse	
rowse Network - 3 I	Nodes	X
Start	I Paddress MAC address Device	type Name
Stop	192.168.0.1 00-18-18-1C-11-F4 \$7-300 192.168.0.20 00-18-18-84-60-DB \$CALAN 192.168.0.4 00-1C-01-00-0D-D6 ABB FE	pn-io NCE scalance: NA fena
🔽 Fast search		
		*
Flash	MAC address: 00-1C-01-00-0D-D6	
ОК	Cancel	Help

The list of available devices appears.

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

it Ethernet Node		×
Ethernet node		
MAC address:	00-1C-01-00-0D-D6	Nodes accessible online Browse
-Set IP configuration - Use IP parameter	8	
IP address:	192.168.0.4	Gateway © Do not use router
Subnet mask:	255.255.255.0	C Use router Address: 192.168.0.4
C Obtain IP address	from a DHCP server	
☐ Identified by ———		
Client ID	C MAC address	C Device name
Assign IP Configu	uration	
-Assign device name-		
Device name:	fena	Assign Name
- Reset to factory settir	gs	Reset
Close		Help

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

Edit Ethern	et Node (4502:920)
1	Resetting to factory settings was started.
ОК	

The configuration is now reset to the default settings (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 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.

		_					
rLC_1							
	► 📊 SIMATIC 57-1200	^	Device:	100 100 12			
	▼ Li SIMATIC S7-1500						
Controllers	CPU 1511-1 PN			PB 1			
	CPU 1511C-1 PN						
				CPU 1516-3 PN/DP			
	CPU 1513-1 PN						
	CPU 1515-2 PN		Article no.:	6ES7 516-3AN00-0AB0			
HMI	657 516-3AN00-0AB0		Version:	V1.8			
		≡	Description				
	CPU 1517-3 PN/DP		CPU with disr	alay (work momony 1 MP, code			
			and 5 MB dat	ta; 10 ns bit instruction time; 4-			
			stage protec	tion concept, integrated			
PC systems			technology fu	unctions: Motion Control, closed- counting&measuring: integrated			
-			tracing; 1st i	nterface: PROFINET IO controller,			
			supports RT/I	RT, 2 ports, MRP, transport			
			protocol TCP/	IP, S7 communication, Web			
			interface: PR	OFINET basic services, transport			
			protocol TCP/	IP, Web server, routing; 3rd			
			cycle time, ro	outing; firmware V1.8			
			-,				
		~					
	<						

5. Add FPNO-21 to the device configuration.

Siemens - C:\TIA14 projects\Profinet	Examp	le\Profinet Example					-
Project Edit View Insert Online C	Options	Tools Window Help				Тс	tally Integrated Automation
📑 📑 🔚 Save project 📑 🐰 💷 🗉	X) ± (# ± 16 🛄 🛄 🛄 🔛 🖓	Go online 🔊 Go offline 🔐 🛄 📰 🗶	Search in project	-10		PORTA
Project tree		Profinet Example V Devices a	anetworks				
Devices	_			a lopology view	Network view	iew	Options
		Network Connections	I connection 💌 🕎 👯 🔛 🛄 🍳	± 🔤	Network overview	4	
				/	Pevice		✓ Catalog
 Profinet Example 	^				 S71500/ET200MP station 	u	<search> iiii iiit</search>
Add new device		PLC 1	EPNO		PLC_1		Filter All
Devices & networks		CPU 1516-3 PN/	FPNO-21		 GSD device_1 		Controllers
Lipplc_1 [CPU 1516-3 PN/DP]			Not assigned FPNO		FPNO		HM
Device conliguration							PC systems
Program blocks	=						Drives & starters
Tachnology chiests					1		Network components
External source files							Detecting & Monitoring
PIC taos							Distributed I/O
PIC data types							Power supply and distrib
Watch and force tables							Field devices
Online backups							 Other field devices
Traces							Additional Ethernet d
Device proxy data							 PROFINET IO
Program info							👻 🧊 Drives
PLC supervisions & alarms							👻 🛅 ABB
PLC alarm text lists		<	> 100%			>	ABB FENA
Local modules		GSD device_1 [Device]		Properties	🗓 Info 🔒 🗓 Diagnostics		✓ → ABB FPNO
🕨 🔙 Ungrouped devices		General IO tags Sv	tem constants Texts				FPNO-21
Unassigned devices		Canaval	1				SIEMENS AG
🕨 🙀 Common data	~	deneror	General				Encoders
 Details view 							Gateway
			Name: GSD dev	ice 1			Ident Systems
						-	> Sensors
			Author: FINIPEL1			_	PROFIBUS DP
Name			Comment:			^	
						~	
							> Information
	_						 mormation
Portal view		n Devices & ne			TT 😒	ne projec	t Profinet Example was save

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

roject tree		Profinet Example		od devices) F							Hardware catalog	TORT
Davicas		Tronnet Example 7	ongroup	cu ucvicco v T			Topology view	A Notwork view		o viow	Ontions	
a la							Device evender			e view	options	
2 6	<u> </u>	MT [PENO [PENO-21]			s == [=] <4 =		_ Device overview					
D Profinet Example		1				÷.	Module		Rack Slot	I addres	S Catalog	
Add new device	-	1				=	▼ FPNO		0 0		<earch></earch>	itil (
Devices & networks		1	0				 Interface 	•	0 0 X1	_	Filter <all></all>	-
PLC 1 [CPU 1516-3 PN/DP]		1	PRINC				PPO Type 4_	,1	0 1		🕨 📑 Head module	
Device configuration		1							0 2		🕶 🛅 Module	
Online & diagnostics	=	1									🔻 🛅 PPO Types	
Program blocks		1									📗 PPO Type	3
Technology objects		1			ADD						📗 РРО Туре	4
External source files		1			FPNO						📗 PPO Type	6
PLC tags		1									PPO Type	7
PLC data types		1									PROFisafe Te	elegrams
Watch and force tables		1									Standard Te	legrams
Online backups		1										
Traces	- 11	1										
Device proxy data		1										
Program info		1				~						
PLC supervisions & alarms		< 11	>	100%		- 1	<	11			>	
PLC alarm text lists	- 11	PPO Type 4 1 (PPO)	Type 41				Descetion	🐮 lata 😐 🛛 🖓				
Local modules	_	TTO Type 4_1 (TTO	Type 41				s Properties		gnosues			
Generation of the second devices		General IO ta	gs Sy	stem constants	Texts							
Cammon data		General		C							^	
Common data	Ť	Identification & Maint	enance	General							=	
Details view		Module parameters										
		I/O addresses			Name:	PPO Type 4	_1					
					Author:	FINIPEL1						
Name					Comment							
					comment.					_		
				•						~		
					Rack:	0						
					Slot:	1						

7. Assign FPNO-21 to the PROFINET controller.

Profinet Example > Device	es & networks			_ 7 1	i×
		📱 Topology view	.	Network view 🛛 🛐 Device view	/
Network	HMI connection 💌 🕎 🛄 🔍 🛨	=		Network overview	•
			^	2 Device	
				 S71500/ET200MP station_1 	
PLC_1	FPNO			▶ PLC_1	
CPU 1516-3 PN/	FPNO-21			 GSD device_1 	
	Not assigned			FPNO	
	PLC_1.PROFINET interface_1				
			-		
			•		
			~		
<	> 100%	▼	•	<	>

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



9. In the FPNO-21 properties, Ethernet addresses submenu, set the FPNO-21 IP address and PROFINET device name. Device name is used as identification. After successful identification, the PLC sets an IP address for the FPNO-21 module.

TIA Siemens - C:\TIA14 projects\Profinet Examp	le\Profinet Example				_
Project Edit View Insert Online Options	Tools <u>W</u> indow <u>H</u> elp				Totally Integrated Automation
📑 📑 🔚 Save project 🚊 🐰 🗉 🗊 🗙 🕊) ± (4 ± 🗟 🗉 🖬 🖉 💋 💆	Go online 🖉 Go offline 🛛 🛔 🔳	🗴 🖃 🛄 <search in="" project=""> 🖣</search>	hi i	PORTAL
Project tree 🔲 🖣	Profinet Example > Ungroupe	d devices + FPNO [FPNO-21]		_ # =	i X Hardware catalog ■
Devices			🚰 Topology view	🔥 Network view 🛛 👔 Device view	Options 🙂
19 E	H FPNO (FPNO-21)	- = =		Device overview	
ž					× Catalog
💈 💌 🔄 Profinet Example				Module FRMO	
🗧 📑 Add new device	Part			Interface	
🗧 🛔 Devices & networks				PPO Type 4 1	Filter <al></al>
▼ [] PLC_1 [CPU 1516-3 PN/DP]	_				Head module
Device configuration	_			-	Module Module
Online & diagnostics	_	ADD ADD		•	PPO Type 3
Technology objects	•	FPNO			PPO Type 4
External source files					PPO Type 6
PLC tags					PPO Type 7
Cig PLC data types					PROFIsafe Telegrams
Watch and force tables					Standard Telegrams
Online backups	< 11	> 100%	· · · · · · · · · · · · · · · · · · ·		<u>></u>
Traces	FPNO [FPNO-21]		Properties	🚹 Info 🔒 🧏 Diagnostics 👘 🔍 =	
Device proxy data	General IO tags Sys	tem constants Texts			n
Program into	General		Add new subnet		
PLC alarm text lists	➡ PROFINET interface [X1]				
Local modules	General	IP protocol			Dia la companya di companya
Distributed I/O	Ethernet addresses		_		Tes
Ungrouped devices	 Advanced options 		 Set IP address in the project 		
Common data	Hardware identifier		IP address: 192 . 168 . 0	. 2	=
Documentation settings	Hardware identifier		Subnet mask: 255 . 255 . 255	. 0	
Details view	Shared Device		Use router		
			Router address: 0 0 0		
			IP address is set directly at the device		
Name			,,		
		PROFINET			
			Generate PROFINET device name auton	natically	
		PROFINET device name:	fpno		
		Converted name:	fpno		
		Device number:	1		
					> Information
Portal view Dyenview	EPNO			The are	niert Profinet Example was save
A STOLEN				ine pro	Speet Honnet Example was save

10. Add the new function block ABB_Drive.

Add new block					×
Name					
ABB_Drive					
	Language:	FBD	•		
OB	Number:	1	\$		
Organization		🔘 Manual			
block		 Automatic 			
	Description:				
-FB	Function blocks are	code blocks that store	their values perm	anently in instance (data blocks.
Function block	so that they remain	available after the blo	ck has been execu	ited.	
- 					
FC					
Function					
DB					
Data block					
	more				
> Additional inform	ation				
Add new and open				ок	Cancel
_					

11. Add variables to ABB_Drive FB.

юį	Ъ	5 3 0 1	∦ ≝¦ ➡ ⊟ ⊟ [🖻 📲 t 📲 t 🚟 t	🖃 😰 😋 🤇	• 🖉 📲 🖹	♥ 🚝 🖽	₩ 1	'≡ *≡ N I	61 61 6	r - 📑
	AB	R ⁻ I	Drive								
		Na	me	Data type	Default value	Retain	Accessible f	Writa	Visible in	Setpoint	Su
		Ť	Input		-						
	1	-	Output	HW_20BMODULE	U	Non-retain					
	-	•	output								
	<i>.</i>	-	<add new=""></add>	. 😐							
			<edd news<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></edd>								
	-	÷	Static								
	-		PZD read error	Word	16#0	Non-retain					
	-		PZD write error	Word	16#0	Non-retain					
0	-		 PPO OUT 	Struct		Non-retain					
1	-		PZD OUT_1	Word	16#0	Non-retain					
2	-00		PZD OUT_2	Word	16#0	Non-retain				Ē	
3	-		PZD OUT_3	Word	16#0	Non-retain					
4	-		PZD OUT_4	Word	16#0	Non-retain					
5	-00		PZD OUT_5	Word	16#0	Non-retain			<		
6	-		PZD OUT_6	Word	16#0	Non-retain		\checkmark	\checkmark		
7	-	•	 PPO IN 	Struct		Non-retain		\checkmark	\checkmark		
8	-00		PPO IN_1	Word	16#0	Non-retain					
9	-		PPO IN_2	Word	16#0	Non-retain					
20			PPO IN_3	Word	16#0	Non-retain			✓		
21	-		PPO IN_4	Word	16#0	Non-retain		~	<		
22	-		PPO IN_5	Word	16#0	Non-retain					
23			PPO IN_6	Word	16#0	Non-retain					
24			<a>Add new>								
5		•	<add new=""></add>								
6		•	Temp								
7		•	<add new=""></add>								
8		•	Constant								

12. Add ABB_Drive to OB1. Assign a new instance Data Block for ABB_Drive FB.

Call options	×
Call options	Data block Name ABB_Drive_DB Number 1 O Manual O Automatic If you call the function block as a single instance, the function block saves its data in its own instance data block.
	more OK Cancel

13. Add the 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 the inputs and outputs.



15. Save and download the project to the PLC.

	Device	Device type	Slot	Туре	Address	Subnet
	PLC 1	CPU 1516-3 PN/DP	1 X3	PROFIBUS	2	
	-	CPU 1516-3 PN/DP	1 X1	PN/IE	192.168.0.1	PN/IE 1
		CPU 1516-3 PN/DP	1 X2	PN/IE	192.168.1.1	
	Ту	pe of the PG/PC inte	rface:	PN/IE		
		PG/PC inte	rface:	Thinkpad U	SB 3.0 Ethernet Adapter	
	Conner	ction to interface/su	bnet:	PN/IE_1		- 💎
		1st gat	eway:			
		5	-			
	Select target device:				Show all compatible	devices
	Device	Device type	Interfa	ice type 🛛 🗛	ddress	Target device
	plc_1.profinet interface.	. \$7-1500	PN/IE	1	92.168.2.10	-
			PN/IE	۵		
				^	ccess address	-
* E D					ccess address	
° E 🖡					ccess address	-
r∉∎ Flash I ED					ccess address	-
r 🗄 🖡					ccess address	-
역 [-				ccess address	-
Flash LED	-				ccess address	
Flash LED	2				Display only error	<u>Start search</u>
Flash LED	1:				Display only error n	
Flash LED	1: rdware configuration data rdware configuration data				Display only error n	
Flash LED Diline status information Loading includes ha Loading includes ha Scan and informatic	n: rdware configuration data rdware configuration data ın retrieval completed.				Display only error n	
Flash LED Phine status information Loading includes ha Loading includes ha Scan and informatic	n: rdware configuration data rdware configuration data ın retrieval completed. rdware configuration data				ccess address	

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

Assign PROFINET device na	me.						×
		Configured PRC	FINET dev	ice			
		PROFINET devi	ce name:	fpno		•	
		De	vice type:	FPNO-21			
		Online access					
		Type of the PG/PC	interface:	PN/IE		-	
		PG/PC	interface:	💹 Thinkpad US	SB 3.0 Ethernet Adapter	- 🖲 💽	
ي ا		Device filter					
■		🛃 Only show	devices of t	ne same type			
		Only show	devices wit	n bad paramete	r settings		
		Only show	devices with	nout names			
A	ccessible devi	ces in the network:					
IF	^o address	MAC address	Device	PROFINET devi	ice name Status		
0	0.0.0.0	00-1C-01-FF-F9-80	FPNO-21	fpno	💙 ок		
—							
C Elach I ED							
	e						
					Undata list	Accian name	
					Opdate list	Assign name	
Opling status informations							
Search completed 1 o	f2 devices we	ere found					
The PROFINET device n	ame "fpno" wa	as successfully assign	ed to MAC ad	dress "00-1C-01	I-FF-F9-80".		
<							
						Close	_

17. Values can now be monitored when online.

			Professional and the second		00 00 0		(cost)	projekter						a = x	10
Addem Addem <td< th=""><th>ct uee</th><th></th><th>Profinet Example • PEC_1 (C</th><th>PO 1516-5 MVDPJ</th><th> Program bloc </th><th>S V ABB_DIT</th><th>ve (FBI)</th><th></th><th></th><th></th><th></th><th></th><th></th><th> ^</th><th>Certing</th></td<>	ct uee		Profinet Example • PEC_1 (C	PO 1516-5 MVDPJ	 Program bloc 	S V ABB_DIT	ve (FBI)							^	Certing
Image: Distance Image: Distance Image: Distance Image: Distance Image: Distance Image: Distance Image: Dista	vices					42.00.55	6 L 3	Co. 41. 0. (22)						-	Options
Index training Index t		12	KX KX 2° 2° 1 1 1 1 1	• 🕑 -8 = -4 = 4	a z 🖃 💷 🖬 🖉 🦉	0 (E ¥E 19	9 10 10	M 64 67 💽	3					- 4	
Model and force	Profess Framela		ABB_Drive	0	Defendence in	Densis	Annehited	Maleria Maleria	in Consider	Constant later 100					✓ CPU operator panel
• Original Streams • Original Streams </td <td>Add new device</td> <td></td> <td>7 Ctatic</td> <td>Dota type</td> <td>Delaurt value</td> <td>NEGITI</td> <td>Accessione I.</td> <td>- Willbo. Willie</td> <td>in Sequent</td> <td>supervision (ci</td> <td>omment</td> <td></td> <td></td> <td></td> <td>PLC_1 [CPU 1516-3 PNIDP]</td>	Add new device		7 Ctatic	Dota type	Delaurt value	NEGITI	Accessione I.	- Willbo. Willie	in Sequent	supervision (ci	omment				PLC_1 [CPU 1516-3 PNIDP]
Bit C: (10) 156 2 Recoil (10) 0 100 as certain (10) 0 100 as certain (10) 0 100 as certain (10)	Devices & networks		8 1 PZD read error	Word	16#0	Non-retain									RUN / STOP RUI
Normal Normality	PLC 1 (CPU 1516-3 PN/DP)		9 1 PZD write error	Word	16#0	Non-retain			Ă					_	= =====================================
Work adaptasis No. Propulsion No. Production No. No	Device configuration		10 - PPO OUT	Struct		Non-retain									310
• (a) A (a) A (b) A	Online & diagnostics		11 - PZD OUT_1	Word	16#0	Non-ret *									MAINT MRE
Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1) Work (not 1)	 Program blocks 	•	12 - PZD OUT_2	Word	16#0	Non-retain									
•••••••••••••••••••••••••••••	Add new block		13 - PZD OUT_3	Word	16#0	Non-retain		Image: A state of the state							<
•••••••••••••••••••••••••••••	🖀 Main [081]	•	14 - PZD OUT_4	Word	16#0	Non-retain		Image:							✓ Call environment
	ABB_Drive [FB1]	•	15 - PZD OUT_5	Word	16#0	Non-retain		Image:							and a second below dealland
• • • • • • • • • • • • • • • • • • •	ABB_Drive_DB [DB1]	•	16 - PZD OUT_6	Word	16#0	Non-retain		Image: Section 1.							no contaition defined.
 	System blocks		17 - PPO IN	Struct		Non-retain		Image: A state of the state							Change
• Definition of the monomental state o	Technology objects		18 💶 • PPO IN_1	Word	16#0	Non-retain									
A C 4 40 yrs 20 0 1 100 1	🗑 External source files		19 💶 • PPO IN_2	Word	16#0	Non-retain		Image:							
IP (C data pages IP (C data pages) IP	🕨 🛺 PLC tags	•	20 - PPO IN_3	Word	16#0	Non-retain	Image: A start and a start	Image:							
With And Vice Tables If an Prod A, Wed 1600 Nonestain If an Anderstain <	PLC data types		21 - PPO IN_4	Word	16#0	Non-retain									
• • • • • • • • • • • • • • • • • • •	Watch and force tables		22 4 PPO IN_5	Word	16#0	Non-retain		Image:						_	
break b	Online backups		23 < PPO IN_6	Word	16#0	Non-retain		Image:						_	✓ Breakpoints
Bote program Image and im	🛛 🔤 Traces		24 Add news											_	8. a
Programming Programming Programming Programming Order code Programming Programming Programming Order code Programming Order code Programming Order code Programming Programming Programming Order code Programming Programming Programming Order code Programming Programming Programing Programming	Device proxy data		25 • «Add newo»											_	67 8 V 87 7 41
Image: Section 10 a starting	M Program info		26 💶 👻 Temp											~	W Enable output in run
III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. C. How max final III. L. How max final III. C. How max final III. C. How max final III. L. How max final III. L. How max final IIII. How max final III. L. How max final III. L. How max final IIII. How max final III. L. How max final IIII. How max final IIII. How max final III. L. How max final IIII. How max final IIIII. How max final IIII. How max final IIIII. How max final IIIIII. How max final IIIII. How max final IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	PLC supervisions & alarms		<											>	Inis device does not support
• • • • • • • • • • • • • • • • • • •	PLC alarm text lists		No condition defined.											111	
Image: Control (Control (Contro(Control (Contro) (Control (Control (Control (Control (Control (Co	Online card data	-													
• • • • • • • • • • • • •	Local modules	¥	- × - 1 121	• -[+]											
	PLC_1 [CPU 1516-3 PNL.		 Network 1: 											~	
	T POSIBLE IN Sectors (1													_	✓ Call hierarchy
Important Section	the serie (serie and		Comment												
a Composition Statistics N Market Statistics 16000000 16000000 1600000 16000000 16000000 16000000 16000000 16000000 16000000 16000000 16000000 16000000 16000000 16000000 1600000000 1600000000 16000000000 160000000000 16000000000000000000000000000000000000	Unamured devices	•		DRAB DAT											Main (OB1) - NW 1
Impage A manual to settings Impage A manual to settings <t< td=""><td>Common data</td><td></td><td>EN</td><td>Drive_Door</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Common data		EN	Drive_Door											
Constraints 1 <td< td=""><td>Documentation rattions</td><td></td><td>- CH</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	Documentation rattions		- CH												
Solite #ccs:s: OCC IE 0000 IE 00000 IE 00000 IE 00000	Languages & resources		263												
autorection ************************************	Online access		HWADDR FB" - LADDR		16#0000										
Image: Constant of the second of th	ard Reader/USB memory		0.000	85	T VAL - #"PZD writ	error"									
tails dew		1.5	#"PPO OUT" - RECORD		ENO										
Laborer Laborer <t< td=""><td>as the order of</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	as the order of														
* Address ************************************	tails view	_		DPRD DAT											
• Address • </td <td></td> <td></td> <td></td> <td></td> <td>16#0000</td> <td></td>					16#0000										
Methods 1988 Plane RD min ADD R ² RECORP PP Plane Recorp Methods 2:				RE	T VAL - #"PZD read	error"									
/Docs #P0 iscole *********************************	Address		202		-										
•••• 2001**			#*Drive PPO	RE	CORD - #"PPO IN"										
Methods 2:			HW ADDR FB" - LADDR		ENO										
Network 2: Connern															
Network 2: Comment															
Comment			 Network 2: 												
			Comment												
N N														~	
100% 💌 🛶												10	05 - 8-		

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

ofinet	Example PLC_1 [CPU 1516-3 PN/DF		force tables → F				- 1	
• 💉	<i>∦</i> [#] ∎₀ F,I F, F , 🎌 °°							
i	Name	Address	Display format	Monitor value	Monitor with trig	Force value	F	C
	"ABB_Drive_DB"."PPO IN"."PPO IN_1"		Hex	16#1231	Permanent			
	"ABB_Drive_DB"."PPO IN"."PPO IN_2"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PPO IN"."PPO IN_3"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PPO IN"."PPO IN_4"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PPO IN"."PPO IN_5"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PPO IN"."PPO IN_6"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PPO OUT"."PZD OUT_1"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PPO OUT"."PZD OUT_2"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PPO OUT"."PZD OUT_3"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PPO OUT"."PZD OUT_4"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PPO OUT"."PZD OUT_5"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PPO OUT"."PZD OUT_6"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PZD read error"		Hex	16#0000	Permanent			
	"ABB_Drive_DB"."PZD write error"		Hex	16#0000	Permanent			
	"SW":P	%IWO:P	Hex	16#1231	Permanent			
	"Act1":P	%IW2:P	DEC	0	Permanent			
E	"CW":P	%QW0:P	Hex	20	Permanent	16#047E		
F	"Ref1":P	%QW2:P	DEC	200	Permanent	500		
-		<add new=""></add>		Ť				
		-						

Media Redundancy Protocol (MRP)

The Media Redundancy Protocol (MRP) network uses a ring topology that includes multiple nodes as shown in the connection diagram. 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 to connect to the ring.

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

Note: The maximum number of nodes in the ring is 50.



Configuring Media Redundancy Protocol (MRP) with Siemens PLC

You can configure MRP for Siemens PLC with SIMATIC S7 after you set the basic configuration. For instructions on the basic configuration, refer to Configuring a Siemens SIMATIC S7 PLC (page 47).

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



PN-IO properties window is displayed.

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

PROFINET IO – Start-up 67

General	Addresses PROFINET I-Device	Synchronization
Media Redunda	ncy Time-of-Day Synchronization	Options
MRP Configuration -		
Instance	-	
Domain:	mpdomain-1	_
Role:	Manager (Auto)	
Ring port 1:	(PN-IO)\Port 1 (R0/S2/X3 P1 R)	
Ring port 2:	(PN-IO)\Port 2 (R0/S2/X3 P2 R)	-
	Diagnostic interrupts	_

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

		FPNO FPNO
220	Ethemet(1): PROFINET-IO-System
0	🚍 (0) UR	
	1	PS 307 5A
	2	CPU 319F-3 PN/D
	X1	MPI/DP
	X2	DP
	X3	PN-10
	X3PTR	Port 1
	X3PZR	Port 2
	3	
•	· · ·	
Slot	(1) FPN	0 Module 0rd PNO 643
	1 100000	070

The Properties-Interface window is displayed.

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

General Addresses	IO Cycle Shared Device Media Redundancy		
MRP Configuration -			
Instance	-		
Domain:	mpdomain-1	-	
Role:	Client	•	
Ring port 1:	(Interface)\Port 1 (X1 P1 R)	-	
Ring port 2:	(Interface)\Port 2 (X1 P2 R)	*	
	Diagnostic interrupts		

- 6. From the Role drop-down list, select the Client role for the FPNO-21 module.
- 7. In the Properties-Interface window, select IO Cycle and set the watchdog time.

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

General Addresses IO Cycle S	Shared Device Media Redundancy			
Update Time				-
Mode:	Fixed factor	-		
1700 VARIANCE E VALENCE	Facto	or 👘	Send clock [ms]	
Update time [ms]:	16.000 💌 = 16	▼ ×	1.000	
Watchdog Time				
Number of accepted update	cycles with missing IO data:		13	•
			208 000	_
Watchdog time [ms]:			1	

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.

PROFINET IO – Start-up 71

MRP Domain					
MRP Domain: mrpdomain-1	-	New	Delete	Edit	
Interfaces in the ring:	2	Number of m	anagers (auto): 1	1	
Number of interfaces outside the ring:	0	Number of m	anagers: 0		
	,	Number of c	ients:		
Nodes					
Display:					
C Station / IO system	MRP Domain	ain 1			
C Ring interconnections					
MRP domain					
C Multi MRP domain					
Station / Device Name MRP inst.	MRP Domain	Role	Ring port 1	Ring port 2	T
Station / Device Name MRP inst. SIMATIC 300(1) / PN-IO SIMATIC 300(1) / (1) FPNO	MRP Domain mrpdomain-1 mrpdomain-1	Role Manager (Auto) Client	Ring port 1 Port 1 (R0/S2/X3 P1 R) Port 1 (X1 P1 R)	Ring port 2 Port 2 (R0/S2/X3 P2 R Port 2 (X1 P2 R))
Station / Device Name MRP inst. SIMATIC 300(1) / PN-IO SIMATIC 300(1) / (1) FPNO	MRP Domain mrpdomain-1 mrpdomain-1	Role Manager (Auto) Client	Ring port 1 Port 1 (R0/S2/X3 P1 R) Port 1 (X1 P1 R)	Ring port 2 Port 2 (R0/S2/X3 P2 R Port 2 (X1 P2 R))
Station / Device Name MRP inst. SIMATIC 300(1) / PN-IO SIMATIC 300(1) / (1) FPNO	MRP Domain mrpdomain-1 mrpdomain-1	Role Manager (Auto) Client	Ring port 1 Port 1 (R0/S2/X3 P1 R) Port 1 (X1 P1 R)	Ring port 2 Port 2 (R0/S2/X3 P2 R Port 2 (X1 P2 R))
Station / Device Name MRP inst. SIMATIC 300(1) / PN-IO SIMATIC 300(1) / (1) FPNO	MRP Domain mrpdomain-1 mrpdomain-1	Role Manager (Auto) Client	Ring port 1 Port 1 (R0/S2/X3 P1 R) Port 1 (X1 P1 R)	Ring port 2 Port 2 (R0/S2/X3 P2 R Port 2 (X1 P2 R)) hfig

Configuring Media Redundancy Protocol (MRP) with TIA14

You can configure MRP for Siemens PLC with TIA14 after you set the basic configuration. For instructions of the basic configuration, refer to Configuring a Siemens PLC with TIA14 (page 56).

Profinet Example Device	s & networks									_ I	∎∎×
							🚏 Topology view 🛛 🛔 N	etwork view	De De	vice vi	iew
🕎 🖶 🖽 🛄 🔍 ±				E	4	Topology overview To	pology comparison				
					^	💁 Compare offline/online 📲 Ad	vanced compare 🛓 😂 😼				
					=	Name	PROFINET device name	IP address	Port	Inte	Part
PLC_1	FPNO	COR. AND	FPNO_1	C78. ABB		 S71500/ET200MP station_1 					
CPU 1516-3 PN/	FPNO-21	EPNO	FPNO-21	EDNO		PLC_1	plc_1.profinet interface_1	192.168.0.1	Port_1	-	Port 2
	PLC_1	EPINO	PLC_1			PLC_1	plc_1.profinet interface_1	192.168.0.1	Port_2	-	Port 1
						PLC_1	plc_1.profinet interface_2	192.168.1.1	Port_1		
						 GSD device_1 					
						FPNO	fpno	192.168.0.2	Port 1	-	Port_2
						FPNO	fpno	192.168.0.2	Port 2	-	Port 1
						 GSD device_2 					
						FPNO_1	fpno_1	192.168.0.3	Port 1	-	Port 2
					•	FPNO_1	fpno_1	192.168.0.3	Port 2	-	Port_1
					-						
					~						
<			> 100%		•	<					>

To configure an MRP with TIA portal:

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

FPNO_21_MRP ▶ PLC_1	CPU 1516-3 PN/DP]		_ # # X
	📲 To	opology view 🔒 Network view	Device view
PLC_1		Device overview	
	<u> </u>	YY Module	Rack Slot
			0 0 🔨
		▼ PLC_1	0 1
	c;	PROFINET interface_1	0 1 X1
	4.	PROFINET interface_2	0 1 X2 [≡]
		DP interface_1	0 1 X3
0	1 2 3		0 2
n-ll o			0 3
Rail_0	LABORAL COM		0 4
			0 5
			0 6
			0 7
			0 8
	ÖÖİ		0 9
			0 10
			0 11
	~		0 12 🗸
< Ⅲ > 100%		< III	>
PLC_1 [CPU 1516-3 PN/DF		Properties 🚺 Info 追 🗓 Diag	gnostics 🔤 🗖 🗏 🤜
General IO tags	System constants Texts		
▼ PROFINET interface [X1]			
General	 Media redundancy 		
Ethernet addresses			
Time synchronization	MRP c	Iomain mrpdomain-2	
Operating mode	Media redundan	cv role: Manager (auto)	
 Advanced options 	Dias	port 1: RECEINET interface 1 [V1]Best	1 [V1 P1 P]
Interface options	king		
Media redundancy	Ring	port 2: PROFINET interface_1 [X1]\Port	_2 [X1 P2 R]
Real time settings		Diagnostics interrupts	
Port [X1 P1 R]		Domain settings	
Port [X1 P2 R]	•		
Mab conjor accord			

The PROFINET interface view is displayed.

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

The PROFINET interface view is displayed.
PLC_1 [CPU 1516-3 PN/DF	P] • Distributed I/O	► PF	OFINET I	O-Syste	m (10	0): PN/IE_1	•	FPNO	_ •	■×
			Topology	view	å N	letwork vie	w)evice vi	ew
FPNO		3	Device	overvie	w			1		
		^	- 🙀 Mo	dule	-			Rack	Slot	I a
		≡		FPNO				0	0	
				Interf	face			0	0 X1	
oho								0	1	
*								0	2	
	FPNO									
Interface [Module]	<u> </u>		Dranari	tion	* 1of		lagu	oction	_	
			s Propen	ues	<u>1</u>		lagn	lostics	_	
General IO tags S	ystem constants	Text	S							
General	Media redundan	cy								
Ethernet addresses										
Interface options		N.AT	Plomain	mrndom	anin-7					_
Media redundancy		I VI	u uomani	mpuon	10111-2					
Real time settings	Media	redund	ancy role:	Client						-
Port 1 [X1 P1 R]		R	ng port 1:	Interfac	e [X1]\F	Port 1 [X1 P1 F	R]			T
Port 2 [X1 P2 R]		R	ng port 2:	Interfac	e [X1]\F	Port 2 [X1 P2 F	R]			
Hardware identifier				📃 Diagr	nostics	interrupts				
	•			Dom	nain set	ttings				

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

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

Privo P	> PLC_1 [CPU 1516-3 PN/DP]	Distributed I/O PR	OFINET IO-Syst	em (100): PN/IE_1 🔸	FPNO	_ 7 =	iХ
PPNO PPNO PPNO PPNO PPNO Pono PPNO Pono Peno Pe		.	Topology view	h Network view	🚺 Devi	ce view	
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	20	^	Module	2	Rack	Slot	
Interface In	A.		T FPN	10	0	0	
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 Port 2 [X1 P2 R] Update time Automatic Can be set Adapt update time when send clock changes Watchdog time Accepted update cycles without IO data: 3 Watchdog time: <u>184.000</u> ms 	Port 1 [X1 P1 R]						
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Adapt update time when send clock changes Watchdog time Accepted update cycles without IO data: 3 Watchdog time: 1844.000 ms		🔘 Can be set				ms	
Watchdog time Accepted update cycles without IO data: 3 Watchdog time: 384.000 ms		Adapt update time wh	nen send clock cha	anges			
Accepted update cycles without IO data: 3 Watchdog time: 384.000 ms		Watchdog time					
Watchdog time: 384.000 ms		Accepted update cycles	without Odata: 3			•	
		Watchdo	g time: 384.000			ms	*

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

Shared Device

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

For example, one PLC controls the drive and the other Safety PLC is 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 the drive control PLC

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



Configuring the safety PLC

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



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

General	Shared Devi	ce				
Options	Port Data					
I/O mapping list	Port-001	Peer-Station/Port	controller	~	~	
PROFINET IO Device		Cable Length	< 10 m 🗸 🗸	MAUType	100BaseTXFD (Copper)	\sim
Information	Port-002	Peer-Station/Port		~	~	
		Cable Length	~	MAUType		\sim

Configuring Shared Device for Siemens PLC with TIA portal

Configuring the drive control PLC

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

Configuring the safety PLC

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

FPNO_1 [FPNO-21]					
General IO tags	Syste	em constants	Texts		
 General Catalog information PROFINET interface [X1] 		Shared Devic	e		
General		Name		Fail-safe	Access
Ethernet addresses		▼ FPN	0_1		PLC_1
 Advanced options 		• 1	nterface		-
Interface options			Port 1		-
Media redundancy			Port 2		-
Real time settings		PRO	FIsafe ABB_PS1_1		PLC_1
 Port 1 [X1 P1 R] 					
General					
Port interconnection	•				
Port options					
Hardware identifier	-				
 Port 2 [X1 P2 R] 					
General					
Port interconnection					
Port options					
Hardware identifier					
Hardware identifier					
Identification & Maintenance					
Hardware identifier					
Shared Device					

S2 system redundancy

System redundancy can increase system availability by making it more fault tolerant. In S2 system redundancy there are redundant PROFINET controllers in the network. In case of a failure in the primary controller connection a backup controller detects the failure and takes control of the devices in the network. S2 system redundancy is topology independent. You can 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 and give double the amount of cyclic communication data. Take this 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.





PROFINET IO – Communication profiles

Contents of this chapter

This chapter describes the communication profiles that are 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 can use either the PROFIdrive v4.2, legacy PROFIdrive (referred to as PROFIdrive from here on) or the ABB Drives profile. All are converted to the native profile (for example, DCU or FBA) by the adapter module. In addition, two Transparent modes (for 16-bit and 32-bit words) are available. With the Transparent modes, no data conversion takes place.





¹⁾ Native profile (for example, DCU or FBA).

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

The sections that follow 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 primary procedure to control the drive from a fieldbus system. The fieldbus master station sends it 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. Refer to the drive documentation for information on the drive-specific bits. For the drive states, refer to page 85. For the drive states for the positioning mode, refer to page 86.

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 of the state machine on page 85.

Bit	Name	Value	STATE/Description				
			Speed control mode	Positioning mode			
0	ON	1	Proceed to READY TO OPER	ATE.			
	OFF1	0	Emergency OFF, stop by the Proceed to OFF1 ACTIVE ; pr SWITCH ON unless other int active.	e selected deceleration ramp. roceed further to READY TO terlocks (OFF2, OFF3) are			
1	OFF2	1	Continue operation (OFF2 inactive).				
		0	Emergency OFF, coast to stop. Proceed to OFF2 ACTIVE proceed further to SWITCH-ON INHIBIT .				
2	OFF3	1	Continue operation (OFF3 in	nactive).			
		0	Emergency stop, stop accord celeration mode. Proceed to ther to SWITCH-ON INHIBIT Make sure that the mo- be stopped using this	o OFF3 ACTIVE ; proceed fur- correction of the second seco			
3	3 OPERATION_ENABLE	1	Proceed to ENABLE OPERATION.				
		0	Inhibit operation. Proceed to OPERATION INHIBIT .				
4	ENABLE_RAMP_GENER- ATOR or	1	Normal operation. Proceed to RAMP FUNCTION GENER- ATOR: ENABLE OUTPUT.	Normal operation. Do not reject the traversing task.			
	TRAVERSING _TASK	0	Stop according to the selec- ted stop type.	Reject the traversing task.			
5		1	Normal operation. Proceed to RAMP FUNCTION GENER- ATOR: ENABLE ACCELERA- TION.	Normal operation. No inter- mediate stop.			
		0	Halt ramping (Ramp Func- tion Generator output held).	Intermediate stop			
6		1	Normal operation. Proceed to OPERATING. Note: This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters. Force Ramp Function Gener-	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 Gener- ator input to zero.				

Bit	Name	Value	STATE/D	escription			
			Speed control mode	Positioning mode			
7	RESET	0→1	Fault reset if an active fault ON INHIBIT. Note: This bit is effective or set as the source for this si	exists. Proceed to SWITCH- nly if the fieldbus interface is gnal by drive parameters.			
		0	(Continue normal operation)			
8	JOGGING_1		Jogging 1 (Not supported b	y all drive types)			
9	JOGGING_2		Jogging 2 (Not supported b	y 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 = Fieldbus control enabled.				
11		1	Vendor-specific bit as	Start homing procedure.			
		0	meter 933	Stop homing procedure.			
12			Vendor-specific bit as define 934. As default mapped to Drive	ed by PROFIdrive parameter Main CW bit 12.			
13			Vendor-specific bit as define 935. As default mapped to Drive	ed by PROFIdrive parameter Main CW bit 13.			
14			Vendor-specific bit as define 936. As default mapped to Drive	ed by PROFIdrive parameter Main CW bit 14.			
15			Vendor-specific bit as defin 937. As default mapped to Drive	ed by PROFIdrive parameter 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 of the state machine on page 85.

Bit	Name	Value	STATE/Description			
			Speed control mode	Positioning mode		
0	RDY_ON	1	READY TO SWITCH ON			
		0	NOT READY TO SWITCH ON			
1	RDY_RUN	1	READY TO OPERATE			
		0	OFF1 ACTIVE			
2	RDY_REF	1	ENABLE OPERATION			
			OPERATION INHIBIT			

Bit	Name	Value	STATE/Description					
			Speed control mode	Positioning mode				
3	TRIPPED	1	FAULT					
		0	No fault					
4	OFF_2_STA	1	OFF2 inactive					
		0	OFF2 ACTIVE	OFF2 ACTIVE				
5	OFF_3_STA	1	OFF3 inactive					
		0	OFF3 ACTIVE					
6	SWC_ON_INHIB	1	SWITCH-ON INHIBIT ACTIV	E				
		0	SWITCH-ON INHIBIT NOT A	CTIVE				
7	ALARM	1	Warning/Alarm					
		0	No Warning/Alarm					
8	8 AT_SETPOINT	1	OPERATING . 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 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 ex- ecuted and is valid.				
		0	Vendor-specific bit as defined by PROFIdrive para- meter 939.	No valid home position available.				
			As default mapped to PROFIdrive SW bit 11.					
12		1	Mapped to PROFIdrive SW	Traversing task acknow-				
		0	Vendor-specific bit as defined by PROFIdrive para- meter 940.	leugement (0 / 1)				
			AS default mapped to PROFIdrive SW bit 12.					

84 PROFINET IO – Communication profiles

Bit	Name	Value	STATE/D	escription
			Speed control mode	Positioning mode
13		1	Mapped to PROFIdrive SW	Drive stopped.
	0	0	 Dit 11. Vendor-specific bit as defined by PROFIdrive parameter 941. As default mapped to PROFIdrive SW bit 13. 	Drive operates. Traversing task is executed (n <> 0).
14			Vendor-specific bit as defin 942. As default mapped to PROF	ed by PROFIdrive parameter Idrive SW bit 14.
15			Vendor-specific bit as defin 943	ed by PROFIdrive parameter

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, the FPNO-21 module). To control the drive through PROFINET, 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 that contain 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

The actual values are 16-bit or 32-bit words that contain information on the operation of the drive. Select the functions to be monitored 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 primary procedure to control the drive from a fieldbus system. The fieldbus master station sends it 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. For the drive states, refer to page 91.

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 91.

88 PROFINET IO – Communication profiles

Bit	Name	Value	STATE/Description	
0	OFF1_CONTROL	1	Proceed to READY TO OPERATE .	
		0	Stop along currently active deceleration ramp. Proceed to OFF1 ACTIVE ; proceed to READY TO SWITCH ON unless other interlocks (OFF2, OFF3) are active.	
1	OFF2_CONTROL	1	Continue operation (OFF2 inactive).	
		0	Emergency OFF, coast to stop. Proceed to OFF2 ACTIVE , proceed to SWITCH-ON INHIBITED .	
2	OFF3_CONTROL	1	Continue operation (OFF3 inactive).	
		0	Emergency stop, stop within time defined by drive parameter. Proceed to OFF3 ACTIVE ; proceed to SWITCH-ON INHIBITED . WARNING! Make sure that the motor and driven machine can be stopped using this stop mode.	
3	INHIBIT_OPERATION	1	Proceed to OPERATION ENABLED.	
			Note: Run enable signal must be active; see drive document- ation. If the drive is set to receive the Run enable signal from the fieldbus, this bit activates the signal.	
		0	Inhibit operation. Proceed to OPERATION INHIBITED .	
4	RAMP_OUT_ ZERO	1	Normal operation. Proceed to RAMP FUNCTION GENERATOR: OUTPUT ENABLED.	
		0	Force Ramp Function Generator output to zero. Drive ramps to stop (current and DC voltage limits in force).	
5	RAMP_HOLD	RAMP_HOLD 1	1	Enable ramp function.
			Proceed to RAMP FUNCTION GENERATOR: ACCELERATOR ENABLED.	
		0	Halt ramping (Ramp Function Generator output held).	
6	RAMP_IN_ ZERO	1	Normal operation. Proceed to OPERATION.	
			Note: 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 SWITCH-ON INHIBITED .	
			Note: This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.	
		0	Continue normal operation.	
89	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.	

Bit	Name	Value	STATE/Description
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.
12 15	Drive-specific (For inf	ormation, r	efer to 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 91.

Bit	Name	Value	STATE/Description
0	RDY_ON	1	READY TO SWITCH ON
		0	NOT READY TO SWITCH ON
1	RDY_RUN	1	READY TO OPERATE
		0	OFF1 ACTIVE
2	RDY_REF	1	OPERATION ENABLED
		0	OPERATION INHIBITED
3	TRIPPED	1	FAULT
		0	No fault
4	OFF_2_STA	1	OFF2 inactive
		0	OFF2 ACTIVE
5	OFF_3_STA	1	OFF3 inactive
		0	OFF3 ACTIVE
6	SWC_ON_INHIB	1	SWITCH-ON INHIBITED
		0	-
7	ALARM	1	Warning/Alarm
		0	No warning/alarm
8	AT_SETPOINT	1	OPERATION. Actual value equals reference (= is within toler- ance limits, that is, 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

90 PROFINET IO – Communication profiles

Bit	Name	Value	STATE/Description	
11	EXT_CTRL_LOC	1	External Control Location EXT2 selected. Note concerning ACS880: 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.	
			Note concerning ACS880: 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, refer to the drive documentation.)			
15	15 FBA_ERROR		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. Refer to 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 parameter 46.06 or 46.07 in the drive 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.



PROFIdrive v4.2 communication profile

Supported drives

PROFIdrive v4.2 supports the drives listed in Compatibility (page 13). It does not support ACS355 drives.

Control word and Status word

The Control word (PROFIdrive parameter 967) is the primary procedure to control the drive from a fieldbus system. The fieldbus master station sends it 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. For the drive states, refer to page 96.

Control word contents

The table below shows the contents of the Control word for the PROFIdrive v4.2 communication profile. The upper case boldface text refers to the states shown on page 96.

94 PROFINET IO – Communication profiles

Bit	Name	Value	STATE/Description			
0	ON	1	Proceed to READY TO OPERATE .			
	OFF1	0	Emergency OFF, stop by the selected deceleration ramp. Proceed to RAMP STOP ; proceed further to READY TO SWITCH ON unless other interlocks (OFF2, OFF3) are active.			
1	OFF2	1	Continue operation (OFF2 inactive).			
		0	Emergency OFF, coast to stop. Proceed to SWITCHING ON INHIBITED .			
2	OFF3	1	Continue operation (OFF3 inactive).			
		0	Emergency stop, stop according to the fastest possible deceleration mode. Proceed to QUICK STOP ; proceed further to SWITCHING ON INHIBITED .			
			WARNING! Make sure that the motor and driven machine can be stopped using this stop mode.			
3	OPERATION_ENABLE	1	Proceed to ENABLE OPERATION.			
		0	Inhibit operation. Proceed to READY TO OPERATE .			
4	4 ENABLE_RAMP_GEN- ERATOR		Normal operation. Enables the ramp function generator's output.			
		0	Ramp function generator's output is forced to zero.			
5	UN-	1	Normal operation. Turns on the ramp function generator.			
	ERATOR	0	Ramp function generator's output is frozen to its current value.			
6	ENABLE_SETPOINT	1	Normal operation. Sets the velocity reference as the ramp function generator's input.			
		0	Ramp function generator's input is forced to zero.			
7	RESET	0→1	Fault reset if an active fault exists.			
		0	Continue normal operation.			
8	JOGGING_1		Not supported in PROFIdrive v4.2.			
9	JOGGING_2		Not supported in PROFIdrive v4.2.			
10	REMOTE_ CMD	1	Fieldbus control enabled			
		0				
11	EXT_CTRL_ LOC		Vendor-specific bit.			
12			Vendor-specific bit. Mapped to Drive Main CW bit 12.			
13			Vendor-specific bit. Mapped to Drive Main CW bit 13.			
14			Vendor-specific bit. Mapped to Drive Main CW bit 14.			
15			Vendor-specific bit. Not used.			

Status word contents

The table below shows the contents of the Status word for the PROFIdrive v4.2 communication profile. The upper case boldface text refers to the states shown in the state machine on page 96.

Bit	Name	Value	STATE/Description
0	RDY_ON	1	READY TO SWITCH ON
		0	Not READY TO SWITCH ON
1	1 RDY_RUN		READY TO OPERATE
		0	Not READY TO OPERATE
2	RDY_REF	1	OPERATION ENABLED
		0	Operation disabled
3	TRIPPED	1	FAULT
		0	No fault
4	OFF_2_STA	1	OFF2 inactive
		0	OFF2 active
5	OFF_3_STA	1	OFF3 inactive
		0	OFF3 active
6	6 SWC_ON_INHIB		SWITCHING ON INHIBITED
		0	Not SWITCHING ON INHIBITED
7	ALARM	1	Warning/alarm
		0	No warning/alarm
8 SPEED_ERROR_WITH- IN_TOLER- ANCE_RANGE		1	Actual value is within tolerance limits of ramp function gener- ator's output.
			Note: The behavior is different from PROFIdrive's status word bit 8 (AT_SETPOINT).
		0	Actual value is outside tolerance limits of ramp function generator's output.
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 by or by another interface.
10	ABOVE_LIMIT	1	Actual frequency or speed value equals or is larger than super- vision limit.
		0	Actual frequency or speed value is within supervision limit.
11			Vendor-specific bit. Mapped to Drive Main SW bit 11.
12			Vendor-specific bit. Mapped to Drive Main SW bit 12.
13			Vendor-specific bit. Mapped to Drive Main SW bit 13.
14			Vendor-specific bit. Mapped to Drive Main SW bit 14.

Bit	Name	Value	STATE/Description
15			Vendor-specific bit. Not used.

State machine

The state machine and definitions for the PROFIdrive v4.2 communication profile are shown below. The jogging mode is not available in PROFIdrive v4.2.

Symbol	Definition
n	Speed
	State transition priority. Transitions with more circles have a higher priority. A transition with no circles has the lowest priority.
	Rising edge of the bit
	Condition



For PROFIdrive v4.2, the ramp function generator operates the same as in the PROFIdrive profile. The only difference is that if the PROFIdrive control word bit4 is set to false while in the **RAMP STOP** state, the drive stops as fast as possible within

the current and DC voltage limits. This occurs because setting bit4 to false forces the output of the ramp function generator to 0.

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-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 ACS880).

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 ACS880).

8

PROFINET IO – Communication protocol

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 the PROFINET specification Application Layer protocol for decentralized periphery and distributed automation v2.0.

PROFINET IO

PROFINET IO is a fieldbus protocol for 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 for parameterization and configuration of devices and for acyclic operations.
- The real time (RT) channel for cyclic data transfer and alarms.
- The isochronous real time (IRT) channel, for example, in motion control applications (not implemented in FPNO-21).

PROFINET IO devices are structured in slots and sub-slots, that 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

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, refer to Downloading the GSD file (page 43).

PROFINET network settings

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

If the current IP address differs from the address in the hardware configuration of the controller, the controller gives the device 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 use the ABB Drives, Transparent 16 and Transparent 32 communication profiles, PROFIdrive or PROFIdrive v4.2 profiles. You can select the profile with FPNO-21 configuration parameter 02 Protocol/Profile. You can also select the device access point (DAP) and functional module with the tool.

- Slot 0 has sub-slots, and the DAP module attached to it represents the device itself. These 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. These 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 profiles)
- Fault buffer mechanism (limited in the ABB Drives and Transparent profiles)
- Support PROFIdrive profile for standardized way of controlling drive. Standard telegram 1 & 2 are supported.

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

	PZD1	PZD2
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

	PZD1	PZD23	PZD4
OUT area	STW1	NSOLL_B	STW2
	Control word 1	Speed set point B	Control word 2
IN area	ZSW1	NIST_B	ZSW2
	Status word 1	Speed actual value B	Status word 2

ST20

ST20 applies to VIK-Namur profile and to ACS880 with VIK-NAMUR control program.

	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
OUT area	STW1 Control word 1	NSOLL_A/FSOLL Either speed setpoint or frequency set- point (de- pends on the drive control mode)	-	-	-	-
IN area	ZSW1 Status word 1	NIST_A_GLATT / FIST_GLATT Speed actual or frequency actual (de- pends on the drive control mode)	IAIST_GLATT Output cur- rent	ITIST_GLATT or MIST_GLATT Active current (par set 1) or Torque actual (par set 2)	PIST_GLATT Active power	MELD_NAMUR Drive fault word

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

Behavior of output data

If	Then
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 ad- dr.	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 in ErrorCode1 (page 104). ErrorCode2 is 0.
	0x81 (PNIO) ErrorCode1 and ErrorCode2 decoded as in ErrorCode1 (page 104).
ErrorCode1	Error class and error code. Refer to ErrorCode1 (page 104).

Byte	Value and meaning
ErrorCode2	Not described here

ErrorCode1

The table below lists the ErrorCode1 with PNIORW decoding.



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 (refer to ErrorCode1 (page 104)).

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	Туре
Service	Request or Response service	Request (0x00) Response (0x80)	UI8
Operation	Read or Write operation	Write (0x08) Read (0x09)	UI8

Field(s)	Description	Range	Туре
Block length	Length of the block	00xFFFF	UI16
ARUUID	Identifier • time low • time mid • time high and version • clock • node		UI32 UI16 UI16 Octet[2] Octet[6]
ΑΡΙ	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	00xFFFFFFF	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.	1255	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.	0255	Byte
No. of Parameters	Number of the parameters that are present in the request	137	Byte
Attribute	Type of the object being accessed. Note: "Description" and "Text" are not supported.	Value (10h) Description (20h) Text (30h)	Byte

Field(s)	Description	Range	Byte/ Word
No. of Elements	Number of the array elements ac- cessed or length of the string ac- cessed. Set to 0 if non-array para- meters are used.	0, 1234	Byte
Parameter Index	Address of the parameter that is being accessed. "0" is allowed by FPNO-21.	165535	Word
Subindex	 Addresses the first array element of the parameter or the beginning of a string access or the text array or the description element that is being accessed 	065535	Word
Format ¹⁾	Refer to the table on page 108.	Refer to the table on page 108.	Byte
Number of Values ¹⁾	Number of the values that follow	0234	Byte
Values ¹⁾	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.	-	Refer to the the Format field.

¹⁾ 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.	1255
Response ID	Response from the slave. In case any reques- ted 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.	0255
No. of Parameters	Number of the parameters that are present in the response	137
Format ¹⁾	Refer to the table on page 108.	Refer to the table on page 108.
Number of Values ¹⁾	Number of the values that follow	0234
Values ¹⁾	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.	-

¹⁾ Only if Response ID is 01h (Request Parameter OK). The Format, Numberof Values and Values fields are repeated for other parameters.

108 PROFINET IO – Communication protocol

0x43

0x44

0x45...0xFF

Code	Туре	
0x00	(Reserved)	
0x010x36	 Standard data types Boolean (not supported) Integer8 (not supported) Integer16 Integer32 Unsigned8 (not supported) Unsigned16 Unsigned32 Floating point (not supported) Visible string (not supported) 	
0x370x3F	(Reserved)	
0x40	Zero	
0x41	Byte	
0x42	Word	

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

The table below shows the PROFIdrive parameter request error codes.

Error

Double word

(Reserved)

Error #	Meaning	Used at
00h	Impermissible parameter number	Access to an unavailable parameter
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)
OBh	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.)
Error #	Meaning	Used at
-----------	--	--
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.
21h	Service not supported	Illegal or unknown request ID (response ID will be 80h)
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 commu- nication 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 mis- match or non-existent).
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 933937, 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.

Parameter data transfer examples

These examples show how the DP-V1 READ and WRITE mechanisms transfer parameter data.

Only the data block part of the request is presented in the examples. Refer to Read and write blocks (page 105).

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

Note: Drive parameter access is not available in PROFIdrive v4.2 profile. Refer to parameter 02 Protocol.Profile.

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)

Note: Drive parameter access is not available in PROFIdrive v4.2 profile. Refer to parameter 02 Protocol.Profile.

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)

Note: Drive parameter access is not available in PROFIdrive v4.2 profile. Refer to parameter 02 Protocol.Profile.

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)

Note: Drive parameter access is not available in PROFIdrive v4.2 profile. Refer to parameter 02 Protocol.Profile.

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.





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).

Example 6: Reading one element from the parameter description

Note: This example works only with PROFIdrive v4.2 profile.

In the example below, PROFIdrive parameter 965 (3C5h) subindex 2 (length of the string) of parameter description is read.

DP-V1 Write request:



DP-V1 Read response:



Diagnostic and alarm mechanism

The FPNO-21 module has mechanisms to send 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, refer to FPNO-21 configuration parameters – group A (group 1) (page 28).

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 soft- ware	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, 9082, 9083, 9084, 9085, 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 profiles have a mechanism that can store eight fault situations to PROFIdrive parameters. Fault and diagnostic data, such as fault numbers and fault codes, can be accessed simultaneously with only one subindex. The mechanism consists of five 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.
- PNU950: Size of the fault buffer.

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.

Fault situation	PNU947	PNU945	Subindex
	Fault number	Fault code	
Actual fault situation n	0x4210	0x9005	0

Fault situation	PNU947	PNU945	Subindex
	Fault number	Fault code	
Fault situation n-1	0x7510	0x900B	1
Fault situation n-2	0	0	2
Fault situation n-3	0	0	3
Fault situation n-4	0	0	4
Fault situation n-5	0	0	5
Fault situation n-6	0	0	6
Fault situation n-7	0	0	7

PROFINET IO – Diagnostics

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, refer to the the drive firmware manual.

LEDs

The adapter module has three bicolor diagnostic LEDs. The LEDs are described below.

	냄
MACT	
1031	
MODULE	┞╼╦┦║
X2 NET	

Name	Color	Function			
	Flashes green	Establishing communication to the drive			
	Green	The connection to the drive operates			
	Flashes red	The connection to the drive is temporarily lost			
HOST	Flashes orange, al- ternating with the MODULE flashing orange	Internal file system error. Cycle the drive power off and on. If the error persists, contact your local ABB representative.			
	Off	The device does not have power.			
	Flashes orange	Used for identification. The PROFINET master starts to flash the MODULE LED and also flashes the NET LED.			
	Flashes green	The device waits for the for PROFINET connection.			
		This can be caused by a missing PROFINET station name or if the PLC does not operate.			
	Green	The device operates normally.			
	Flashes red (two times per second)	The network link is down. Examine the Ethernet cable connections.			
	Flashes red (one time per second)	The mapped data is not fitting to the selected cyclic message type. Examine the group B and C parametrization.			
MODULE	Red	The Ethernet interface is disabled. Duplicate Address Detec- tion may have detected a duplicate address. Examine the IP configuration and either start a Fieldbus Adapter parameter refresh or cycle the drive power off and on.			
	Flashes red-green	The device is in Self Test.			
	Flashes orange, al- ternating with the HOST flashing or- ange	Internal file system error. Cycle the drive power off and on. If the error persists, contact your local ABB representative.			
	Off	Device is not on-line.			
		 The device has not completed the duplicate address detection yet. The device may not have power. Look at the MODULE status LED. 			
NETWORK/NET	Flashes green	Device is receiving/transmitting on the Ethernet.			

NONE – Start-up

Contents of this chapter

This chapter contains:

- information on how to configure the drive for operation with the adapter module
- drive-specific instructions on how to start-up the drive with the adapter module
- information on how to configure the client for communication with the adapter module.

Warnings

WARNING!

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

Drive configuration

This information applies to all drive types that are compatible with the adapter module, unless it is otherwise stated.

Connection configuration for the NONE protocol

After the adapter module is mechanically and electrically installed according to the instructions in chapters Mechanical installation and Electrical installation, set 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. Refer to the the drive-specific start-up sections Starting up fieldbus communication (page 134).

128 NONE – Start-up

When 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 if it is necessary. You can adjust the parameters via a drive control panel, a web user interface, or a PC tool.

Note:

- Not all drives show 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 to synchronize 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	Read-only. Shows the fieldbus adapter type as detected by the drive. The value cannot be adjusted by the user.	132 = PROFINET IO
		the drive and the module has not been established.	
02	02 Protocol/Profile Selects the application protocol and communica profile for the network connection.		11 = PNIO ABB Pro
		Select NONE to disable PROFINET protocol. Other services (ABB IP Configuration tool, Ethernet tool network, OPC UA, SNTP, and so on) are still avail- able, refer to Service configuration page (page 161).	
	200 = NONE	NONE protocol	
03	Commrate	Sets the bit rate for the Ethernet interface.	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	
04	IP configuration	Sets the method for configuring the IP address, subnet mask and gateway address for the module.	0 = Static IP
	0 = Static IP	Configuration is obtained from parameters 0513.	
	1 = Dyn IP DHCP	Configuration is obtained via DHCP.	

No.	Name/Valu	me/Value Description				Default
05 08	5 IP address 1 8		An IP address is assigned to each IP node on a net- work. An IP address is a 32-bit number that is typic- ally represented in "dotted decimal" notation con- sisting of four decimal integers, on the range 0255, separated by periods. Each integer repres- ents the value of one octet (8-bits) in the IP address. Parameters define the four octets of the IP address.		0	
	0255		IP address			
	IP address 4	4	See parameter 05 IP add	ress 1		0
	0255		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	
	CIDR	Dotted	decimal	CIDR	Dotted decir	nal
	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	0.0		
	131		Subnet mask in CIDR not	ation		

No.	Name/Value	Description	Default
10 13	10GW address 1IP gateways connect individual physical IP sub into a unified IP network. When an IP node ner to communicate with an IP node on another sub the IP node sends the data to the IP gateway forwarding. Parameters define the four octet the gateway address.		0
	0255	GW address	
	GW address 4	See parameter 10 GW address 1.	0
	0.255	GW address	
14	Commrate port 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	
	5 = Disable Port	Disable Ethernet port. ABB recommends to disable the second port if it is not in use.	

No.	Name/Va	alue	Descriptio	n	Default	
15	Service configuration		Disable ser Each servic Lock config al changing By default, tion is unlo ABB recom not used a	vices that are not required. the is represented by a single bit. Bit 0, guration, can be used to prevent accident- g of this parameter. all services are enabled and configura- bocked. Immends to disable all services that are fter commissioning.		
	Bit	Name	1	Information		
	0	Lock configuration		Changing this bit to one will lock service configuration and no bit can be changed. Only resetting the fieldbus configura- tion will unlock the parameter. To reset the fieldbus configur- ation, choose "Reset all fieldbus settings" or "Clear all" in parameter 96.06 Parameter restore.		
	1			When this bit is set, access from ABB II is prevented.	P Configuration tool	
	2	Disable ETH tool net- work		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. Note: 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.		
	6	Web-based firmware update		When this bit is set, the web-based firmware update is dis- abled. The update is enabled as a default.		
	7	Disable OPC UA		When this bit is set, the OPC UA server is disabled. OPC UA is not enabled by default. For more information, refer to Appendix E - OPC UA server (page 173).		
	8	Unencrypt	ed OPC UA	When this bit is set, connection to the OPC UA server is unen- crypted.		
	000000b111111b Serv		Service cor	ce configuration		
16 25	Reserved These para module wh		These para module wh	meters are not used by the adapter en using the NONE protocol.	N/A	
26	Reserved Reserved formation, web pages		Reserved for formation, web pages	or web page functionality. For more in- see Appendix C - FPNO-21 configuration (page 155).	N/A	

No.	Name/Value	Description	Default
27	FBA A/B par refresh	Validates any changed adapter module configura- tion parameter settings. After refreshing, the value reverts automatically to 0 = Done.	0 = Done
		Note: This parameter cannot be changed while the drive is running.	
	0 = Done	Refreshing done	
	1 = Refresh	Refreshing	
28	FBA A/B par table ver	Read-only. Displays the parameter table revision of the fieldbus adapter module mapping file stored in the memory of the drive. In format xyz, where x = major revision number y = minor revision number z = correction number OR in format axyz, where a = major revision number xy = minor revision number z = correction numbers z = correction number or letter.	N/A
		Parameter table revision	
29	FBA A/B drive type code	Read-only . 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	Read-only. 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	Read-only. Displays the status of the fieldbus adapter module communication.	0 = Idle or 4 = Offline
		Note: The value names may vary by drive.	or 2 = Time out
	0 = Idle	Adapter is not configured.	
	1 = Exec.init	Adapter is initializing.	
	2 = Time out	A timeout has occurred in the communication between the adapter and the drive.	
	3 = Conf.err	There is an internal error in the communication between the adapter and the drive. Contact your local ABB representative.	
	4 = Off-line	Adapter is off-line.	
	5 = On-line	Adapter is on-line.	
	6 = Reset	Adapter is performing a hardware reset.	

No.	Name/Value	Description	Default
32	FBA A/B comm SW ver	Read-only. Displays patch and build numbers of the adapter module's firmware version in xxyy format, where:	N/A
		xx = patch number yy = build number.	
		Example: If the firmware version (<ma- jor>.<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. Refer to parameter 33.</build></patch></minor></ma- 	
33	FBA A/B appl SW ver	Read-only. Displays major and minor revision numbers of the adapter module's firmware version in xxyy format, where:	N/A
		xx = major revision number yy = minor revision number	
		Example: If the firmware version (<ma- jor>.<minor>.<patch>.<build>) is 3.10.200.13 or 3.10.0.0, the value 310 is displayed.</build></patch></minor></ma- 	
		Refer to parameter 32.	

Starting up fieldbus communication

- 1. Power up the drive.
- To enable communication between the adapter module and the drive, select 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 as NONE (parameter 51.02 = NONE),
 - configure the network settings with parameters 51.03...51.13, and
 - deactivate all services that are not used in the installation with parameter 51.15 Service configuration.
- 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.



NONE – Diagnostics

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, refer to the drive firmware manual.

LEDs

The adapter module has three bicolor diagnostic LEDs. The LEDs are described below.

Name	Color	Function		
HOST	Flashes green	Establishing communication to the drive		
	Green	The connection to the drive operates		
	Flashes red	The connection to the drive is temporarily lost		
	Flashes orange, al- ternating with the MODULE flashing orange	Internal file system error. Cycle the drive power off and on. If the error persists, contact your local ABB representative.		
MODULE	Off	There is no PC tool connected to the device.		
	Flashes orange	The device is attempting to obtain IP configuration from the DHCP server.		
	Orange	The device is executing duplicate address detection.		
	Green The PC tool is connected to the device.			
	Flashes red The Ethernet link is down.			
	Red	Ethernet interface is disabled. Duplicate address detection may have detected a duplicate address. Examine the IP configuration and either initiate a Fieldbus Adapter parameter refresh or cycle the drive power off and on.		
	Flashes orange, al- ternating with the HOST flashing or- ange	Internal file system error. Cycle the drive power off and on. If the error persists, contact your local ABB representative.		
NETWORK /	Off	The Ethernet link is down.		
INE I	Flashes green	The Ethernet link is up at 100 Mbps. Flashes to show activity on the interface.		
	Flashes orange	The Ethernet link is up at 10 Mbps. Flashes to show activity on the interface.		

Technical data

Contents of this chapter

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

Dimension drawing



General data

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

Ethernet link

Compatible devices	Ethernet Standard IEEE 802.3 and IEEE 802.3u devices.			
Medium	 10BASE-TX or 100Base-TX with Auto-negotiation and Auto-MDIX (Auto-crossover) Wiring: CAT5e/6 S/FTP, CAT5e/6 S/STP, CAT5e/6 SF/FTP Connector: RJ-45 Termination: Internal Maximum segment length: 100 m (328 ft) 			
Topology	Bus, star or ring. A maximum of 50 nodes is permitted for FPNO-21 module in a ring topology. In a chain the maximum recommended number of nodes is 50. More can be used but PROFINET cycle time should be adjusted be- cause of the delays in the network. Each FPNO-21 has an integrated switch which adds 19 µs 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.			
Transfer rate	10 Mbps or 100 Mbps			
Serial communication type	Half-duplex or full-duplex communication			
Protocol	PROFINET IO			
Number of connections	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.	
		Note: Used only when PROFINET IO protocol is selected.	
34963 (TCP/UDP)	PROFINET	PROFINET RT Multicast.	
		Note: Used only when PROFINET IO protocol is selected.	
34964 (TCP/UDP)	PROFINET	PROFINET Context Manager.	
		Note: Used only when PROFINET IO protocol is selected.	
80 (TCP)	НТТР	Used for Ethernet tool communication. To disable, go to Service configuration page (page 161) via web interface.	
68 (UDP)	DHCP	DHCP client	
		Note: Used only when IP configuration method is selected as "Dyn IP DHCP".	
24576 (UDP)	ABB Netconfig	 Auto discovery protocol Used by ControlBuilder plus (IP Configuration tool) and Drive Composer pro and DriveWindow 2.40 PC tools Discovers ABB-specific Ethernet devices in a local network segment, by listening to and responding to UDP broad- casts. To disable, go to Service configuration page (page 161) via web interface. 	
161 (UDP)	SNMP	Simple Network Management Protocol (SNMP).	
		Note: Used only when PROFINET IO protocol is selected. To disable, go to Service configuration page (page 161) via web interface.	
123 (UDP)	SNTP	Simple Network Time Protocol. This service is disabled by de- fault. To enable the service, go to Service configuration page (page 161) via web interface.	
4840 (TCP)	OPC UA	OPC UA server.	
443 (TCP)	HTTPS	HTTPS protocol, used for access to FPNO-21's web page and for Ethernet tool Network (like Drive Composer pro).	

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

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 ¹⁾	Data type	Description
915	R/W	Array [12] Unsigned16	Assignment PZD1 to PZD12 in PPO-write
			Note: this parameter is not available with PROFIdrive v4.2 profile.
916	R/W	Array [12] Unsigned16	Assignment PZD1 to PZD12 in PPO-read
			Note: this parameter is not available with PROFIdrive v4.2 profile.
919	R	Unsigned32	Device system number
			Note: this parameter is not available with PROFIdrive v4.2 profile.
922	R	Unsigned16	Telegram selection

Par. no.	R/W ¹⁾	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.		
			Signal no. and name		Туре
			1 – Control word 1 (STW1)		Unsigned16
			2 – Status v	word 1 (ZSW1)	Unsigned16
			3 – Control	word 2 (STW2)	Unsigned16
			4 – Status v	word 2 (ZSW2)	Unsigned16
			5 – Speed s	set point A (NSOLL_A)	Signed16
			6 – Speed a	actual value A (NIST_A)	Signed16
			7 – Speed s	et point B (NSOLL_B)	Signed32
			8 – Speed a	actual value B (NIST_B)	Signed32
			27 – Positic	on set point A (XSOLL_A)	Signed32
			28 – Positio	on 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
			1019999	– Drive-specific	-
			Note: this p profile.	arameter is not available w	ith PROFIdrive v4.2
927	R/W	Unsigned16	Operator co	ontrol rights (parameter ic	lentification, PKW)
	R/W	Unsigned16	Value	Mode	
			0	Parameters cannot be written, only read (927 can be written).	
			1	Parameters can be writt fault).	en and read (de-
928			Control rights (process data, PZD).		
			Value	Mode	
			0	PZD part is disabled, tha PZD data is ignored.	t is, receipt of new
			1	PZD part is enabled (de	fault).

Par. no.	R/W ¹⁾	Data type	Description			
929	R	Unsigned16	Selected I	Selected PPO type		
			Value	PPO type		
			1	PPO1		
			2	PPO2		
			3	PPO3		
			4	PPO4		
			5	PPO5		
			6	PPO6		
			7	PPO7		
	D. A.V.		Note: Thi gram ST1 Note: Thi v4.2 profi	s parameter is not available if Standard tele- or ST2 is selected. s parameter is not available with PROFIdrive le.		
930	R/W	Unsigned16	Selection	Selection switch for communication profile.		
			Malua	Made		
			value			
			1			
			8001h	ADD Drives		
			8002h			
			8003h	PDOFIdrive positioning mode		
			8004h	PROFidence positioning mode		
			80050	PROFIGIVE		
			Behavior when any other profile is active:			
			Value	Mode		
			1	PROFIdrive		
			8001h	ABB Drives		
			8002h	Transparent 16		
			8003h	Transparent 32		
			8004h	PROFIdrive positioning mode		
			8005h	PROFIdrive v4.2		
022			Coloction	switch for Control word bit 11		
333	R/W	Unsignedito	Value	Module Control with bit		
	R/W	Unsigned16	1 to 5	Vender-specific 1 to 52)		
			1 10 5	vendor-specific 1 to 5-7		
			Note: Thi v4.2 prof	s parameter is not available with PROFIdrive le.		
934			Selection 933 for co	switch for Control word, bit 12. (See parameter ding.)		
			Note: Thi v4.2 profi	s parameter is not available with PROFIdrive le.		

Par. no.	R/W ¹⁾	Data type	Description		
935	R/W	Unsigned16	Selection switch for Control word, bit 13. (See parameter 933 for coding.)		
			Note: This parameter is not available with PROFIdrive v4.2 profile.		
936	R/W	Unsigned16	Selection switch for Control word, bit 14. (See parameter 933 for coding.)		
			Note: This v4.2 profile	parameter is not available with PROFIdrive 2.	
937	R/W	Unsigned16	Selection sv 933 for cod	witch for Control word, bit 15. (See parameter ing.)	
			Note: This v4.2 profile	parameter is not available with PROFIdrive 2.	
939	R/W	Unsigned16	Selection s	witch for Status word, bit 11.	
			Value	Module Status word bit	
			0	None	
			1 to 4	Vendor-specific 1 to 4 ²⁾	
			Note: This parameter is not available with PROFIdrive v4.2 profile.		
940	R/W	Unsigned16	Selection switch for Status word, bit 12. (See parameter 939 for coding.)		
			Note: This parameter is not available with PROFIdrive v4.2 profile.		
941	R/W	Unsigned16	Selection switch for Status word, bit 13. (See parameter 939 for coding.)		
			Note: This parameter is not available with PROFIdrive v4.2 profile.		
942	R/W	Unsigned16	Selection switch for Status word, bit 14. (See parame 939 for coding)		
			Note: This parameter is not available with PROFIdriv v4.2 profile.		
943	R/W	Unsigned16	Selection switch for Status word, bit 15. (See parameter 939 for coding.)		
			Note: This v4.2 profile	parameter is not available with PROFIdrive a.	
944	R	Unsigned16	Fault message counter		
945	R	Array[64] Unsigned16	Fault code (Channel Error Type)		
			Sub- index	Contents	
			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	
			48	Seventh last ackn. fault	
			56	Eighth last ackn. fault	
Par. no.	R/W ¹⁾	Data type	Descriptio	Description	
----------	-------------------	-----------------------	---	---------------------------------	--------------------------
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 pro		o the DRIVECOM profile).
			Subindex Contents		Contents
			See parar	neter 945.	
950	R	Array [2] Unsigned16	Size of the fault buffer		
			Sub- index	Contents	
			0	Amount of fault situ	ations
			1	Amount of fault me	sages
953	R	Unsigned16	Last alarm	³⁾	
954	R	Unsigned16	Second la	Second last alarm ³⁾	
955	R	Unsigned16	Third last alarm ³⁾		
956	R	Unsigned16	Fourth last alarm ³⁾		
957	R	Unsigned16	Fifth last alarm ³⁾		
964	R	Array [6] Unsigned16	Sub- index	Contents	
			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 nur	mber of this device.	
			Eg: 0302h	= Profile 3, Version 2	
967	R	V2	Control w	ord (CW)	
968	R	V2	Status wo	rd (SW)	
970	R/W	Unsigned16	Load para	meter record	
			Value	Description	
			0	No action	
			1	Restore factory se	ttings
			The parameter must do a zero-to-one transitio motor must be stopped.		o-one transition and the

Par. no.	R/W ¹⁾	Data type	Description	
971	R/W	Unsigned16	Save parameter record	
			Value	Description
			0	No action
			1	Save the drive parameters to non-volatile memory
			The parame motor must Note: This p	ter must do a zero-to-one transition and the be stopped. parameter is not available with PROFIdrive
			v4.2 profile.	
972	R/W	Unsigned16	Software reset	
			Value	Description
			0	No action
			1	Re-boot PROFINET module
			The parame motor must	ter must do a zero-to-one transition and the be stopped.
975	R	Array[n] Unsigned16	DO identific 964.	cation. For subindexes 04, see parameter
			Sub- index	Meaning
			5	Value 2 = Axis
			6	PROFIdrive DO sub class 1
			7	Drive Object ID
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 contin- ued there. Note: The value returned from this parameter is different in PROFIdrive v4.2 and PROFIdrive profiles. This is be- cause the profiles have differences in their available	
1000	R/W	Unsigned16	Map 16-bit s mapped pai 915 or 916.	election ³⁾ . Used to request the data type for rameters if mapping is done with parameter
			Value	Description
			1	User 16-bit mapping, if available.
				-
1001	R/W	Integer16	SNTP time o	offset to UTC time.
			Value	Description
			-1440, 1440	Time in minutes to offset the UTC time re- ceived from SNTP
50000	R/W	Unsigned16	Disable alarms	
		Description		
			0	PNIO alarms enabled
			1	PNIO alarms disabled

Par. no.	R/W ¹⁾	Data type	Description
60000	R/W	Float32	Velocity reference scaling value
61000	R	OctetString[240]	Name of station
61001	R	OctetString[4]	IP of station
61002	R	OctetString[6]	MAC address of station
61003	R	OctetString[4]	Default gateway of station
61004	R	OctetString[4]	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.

PROFIdrive parameter descriptions

PROFIdrive v4.2 profile supports parameter descriptions for the PROFIdrive parameters. Parameter descriptions can be read using DP-V1 Write request with Attribute (20h = Description).

Subindex	Data type	Description
0	OctetString[46]	Complete description
1	V2	Identifier (ID)
2	Unsigned16	Number of array elements or length of string
3	Floating Point	Standardization factor
4	OctetString[2]	Variable attribute
5	OctetString[4]	Reserved
6	VisibleString16	Name
7	OctetString[4]	Low limit
8	OctetString[4]	High limit
9	OctetString[2]	Reserved
10	V2	ID extension
11	Unsigned16	DO IO DATA reference parameter
12	V2	DO IO DATA normalization

The table below shows the parameter description element "Identifier (ID)":

Bit	Description
0 to 7	Numeric identifier of the parameter value's data type
8	Standardization factor and variable attribute not relevant. This bit is set if parameters have data types to which physical values may not be calculated, for example the data type string.
9	Parameter not writable

Bit	Description
10	Additional text array available
11	Reserved
12	Parameter was changed with respect to the factory setting. This bit is set if the para- meter value is unequal to the factory setting.
13	Parameter value may be reset only. If this bit is set, the associated parameter value is increased exclusively by internal processing, while externally, it may only be set to "0".
14	Array
15	Reserved

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

	Contents	Size	Coding
Header		10 Octets	-
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&MO (Read-only)

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, 2011-01-01 16:23
	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 Octets	-

	Contents	Size	Coding
I&M block	DESCRIPTOR	54 Octets	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 Octets	-
I&M block	SIGNATURE	54 Octets	Security code for identifying ses- sions and changes

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

Drive information

The FPNO-21 module enables the retrieval of drive-specific information through the reading of PROFINET records.

Record data index	Description
0x03f0	Drive type
0x03f1	Drive application
0x03f2	Drive firmware version
0x03f3	Drive serial number



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 in the network are shown in the results list.

ile Help										
	_									
Scan										
MAC) address — 00-1C-01-3A-89-DF	Device FPNO-21	Port	Serial number 02100853	Device ID (x111	IP Address 192.168.0.100	Config. IP Address 192.168.0.100	Information ABB Net config	Scan Protocols ABB Net config protocol Profinet Dynamic Configuration Protoc EtherCAT	ol (DCP)	

Rewriting the IP configuration of adapter modules

- Scan the network for adapter modules.
 For instructions, refer to section Finding adapter modules in the network (page 151).
- 2. In the results list, select the adapter module.

Scan Scan <th< th=""><th> in coningulation to</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>_</th><th>, LU</th><th></th></th<>	in coningulation to										_	, LU	
Scan Scan Scan Protocola (MAC) address Device Port Serial number Device ID IP Address Config. IP Address Information Scan Protocola Image: Config. IP Address Information Image: Config. IP Address MAB Net config Profinet Dynamic Configuration Protocol (DCP) Image: Configuration Protoc	File Help												
(MAC) address Device Port Serial number Device ID IP Address Config. IP Address Information 00-1C-01:3A-89-DF 02100853 0x111 0.0.0 0.0.0 ABB Net config Information Image: Configuration Protocol (D) Image: Configuration Protocol (DCP) IP settings Selected device FPNO-21 Selected device FPNO-21 Selected device FPNO-21 IP settings Selected device FPNO-21 Image: Configuration Protocol (DCP) Image: Configuration Protocol (DCP) IP settings Selected device FPNO-21 Selected device FPNO-21 Selected device FPNO-21 Subnet mask 255 255 255 55 55 55 55 Sid. gateway 0 0 0 0 0 0 0 0	Scan												
Send settings	(MAC) address ~ 00-1C-01-3A-89-DF	Device FPNO-21	Port	Serial number 02100853	Device ID 0x111	IP Address 0.0.0	Config. IP Address 0.0.0	Information ABB Net config	Scan Protocols ABB Net cor Profinet Dyn EtherCAT IP settings Selected device IP address Subnet mask Std. gateway Link mode Send set	fig protocol amic Configur SN=021008 ID=0x111 192 . 255 . 0 . Auto tings	①	0 . 255 . 0 .	2) 10 0

- 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.

le Help									
Scan									
MAC) address	Device	Port	Serial number	Device ID	IP Address	Config. IP Address	Information	Scan Protocols	
00-1C-01-3A-89-DF	FPNO-21		02100853	0x111	192.168.0.100	192.168.0.100	ABB Net config	ABB Net config protocol Profinet Dunamic Configuration Protocol (DCP)	
								EtherCAT	
								IP settings	
								Selected device FPNO-21 SN=02100853 ID=0x111	
								IP address 192 . 168 . 0 .	100
								Subnet mask 255 . 255 . 255 .	0
								Std. gateway 0 . 0 . 0 .	0
								Link mode Auto	_
								Send settings	
							>		

15

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. Refer to Service configuration page (page 161).

Browser requirements

You can use any web browser.

Compatibility

The web pages support all drives compatible with the FPNO-21 adapter module. For the compatibility table, refer to Drives (page 13).

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/

156 Appendix C - FPNO-21 configuration web pages

🗖 🔂 https://192.164	3.0.100 × +
\leftarrow \rightarrow C () 🔥 Not secure 🛛 https://192.168.0.100 🛛 A 🏠
	Sign in to access this site Authorisation required by https://192.168.0.100 Username Password Sign in Cancel

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, refer to Appendix B – ABB IP configuration tool (page 151).

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 are prompted to change the password for security reasons. ABB recommends that you change the default password. For the password restrictions, refer to Password page (page 165).

d. It is recommended to change the password.
d. It is recommended to change the password.
rd. It is recommended to change the password.
Show Password
Show Password
Show Password

Menu overview

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

- Status
- Configuration
- Service configuration
- Security
- Support
- Password
- Firmware update

Status page

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

<u>Status</u>	Configuration	Service configuration	Security	Support	Password	Firmware update	Lo
Stat	us informatio	'n					
Firm	ware version		020	3			
FW	patch and build	1 version	000	0			
Firm	ware version d	late	Dec	22 2023			
Seri	al number		102	0259			
MAC	address		The	MAC addr	ess will not b	e displayed until you have changed the password.	

Configuration page

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

158 Appendix C - FPNO-21 configuration web pages

tatus <u>Configuration</u> Service configuration	Security Support Password Firmware u	pdate	
Configuration parameters - Group A			
Module information			
51.01 Fieldbus adapter type	PROFINET		
Ethernet configuration	DDOFINITE IO ADD Drives Drefile (44)		
51.02 Protocol/Profile	PROFINET IO, ABB Drives Profile (11)	~	
51.03 Communication rate	Auto-negotiate (0)	\checkmark	
51.04 IP configuration	Static IP (0)	~	
51.05-08 IP address	192.168.0.100		
51.09 Subnet mask	255.255.255.0 (24)	*	
51.10-13 Gateway address	0.0.0.0		
51.14 Communication rate for Port 2	Auto-negotiate (0)	~	
51.19 Transparent16 scale	99		
PROFINET IO configuration			
51.16 Module emulation	Disabled (0)	~	
51.20 PROFINET IO Telegram type	8		
51.21 PROFINET IO Alarm sending	Enabled (0)	~	
51.22 PROFINET IO Map selection	16bit (1)	~	
51.25 PROFINET IO Name Index	1		
PROFINET IO Station Name	abbdrive-1		

DATA OUT mapping (client to d	rive)	
53.01 Data out 1	47.12[32]	
53.02 Data out 2	0	
53.03 Data out 3	0	
53.04 Data out 4	0	
53.05 Data out 5	0	
53.06 Data out 6	0	
53.07 Data out 7	0	
53.08 Data out 8	0	
53.09 Data out 9	0	
53.10 Data out 10	0	
53.11 Data out 11	0	
53 12 Data out 12	0	

DATA IN mapping (drive to clier	nt)	
52.01 Data in 1	47.11[32]	
52.02 Data in 2	0	
52.03 Data in 3	0	
52.04 Data in 4	0	
52.05 Data in 5	0	
52.06 Data in 6	0	
52.07 Data in 7	0	
52.08 Data in 8	0	
52.09 Data in 9	0	
52.10 Data in 10	0	
52.11 Data in 11	0	
52.12 Data in 12	0	

After you change any setting in any of the groups, 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	
51.21 PROFINET IO Alarm sending	Enabled (0)
51.22 PROFINET IO Map selection	32bit (0)
51.25 PROFINET IO Name Index	0
51.PROFINET IO Station Name	
	Save and reboot Save without rebooting

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. Refer to the screen on the 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.

PROFINET IO configuration				
51.20 PROFINET IO Telegram type	1			
51.21 PROFINET IO Alarm sending	Enabled (0)			
51.22 PROFINET IO Map selection	32bit (0)			
51.25 PROFINET IO Name Index	0			
51.PROFINET IO Station Name	fpno-21 changed			
	Save and reboot Save without rebooting			

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

PROFINET IO configuration	
51.20 PROFINET IO Telegram type	1
51.21 PROFINET IO Alarm sending	Enabled (0)
51.22 PROFINET IO Map selection	32bit (0)
51.25 PROFINET IO Name Index	0
51.PROFINET IO Station Name	192.168.1.10 Profinet name can't be in same format as an IP address.
	Save and reboot Save without rebooting

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 in this example screen.

PROFINET IO configuration	
51.20 PROFINET IO Telegram type	1
51.21 PROFINET IO Alarm sending	Enabled (0)
51.22 PROFINET IO Map selection	32bit (0)
51.25 PROFINET IO Name Index	123
51.PROFINET IO Station Name	abbdrive-123
	Save and reboot Save without rebooting

Service configuration page

On the Service configuration page, you can enable or disable certain Ethernet services. All services except Simple Network Time Protocol (SNTP) and OPC UA server are enabled by default. You can disable or enable 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
- web-based firmware update
- OPC UA server
- configure SNTP
- Simple Network Management Protocol (SNMP).

You can use SNMP 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.

Status Configuration Service configuration	Security Support Password Firmware undate	
Suitas Comgaration <u>Service comgaration</u>		
Ethernet service configuration (saved	settings will be in use after reboot)	
FPNO configuration web pages	Enabled V	
Lock configuration	Disabled V	
ABB IP Configuration tool	Enabled ~	
ABB Drive composer tool	Enabled	
Unsecured ABB Drive composer tool	Disabled	
Ping response	Enabled	
Web-based firmware update	Enabled	
OPC UA Server	Enabled	
OPC UA Server unsecured	Disabled	
Simple Network Time Protocol (SNTP	configuration (saved settings will be in use after reboot)	
SNTP protocol	Disabled V	
SNTP update interval (seconds)	60	
SNTP time offset to UTC (minutes)	0	
SNTP Server address 1		
SNTP Server address 2		
Simple Network Management Protoco	I (SNMP) configuration (saved settings will be in use after reboot)	

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, refer to Enable web page access if it is disabled (page 167).

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

Configuring SNTP

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

Settings	Description	Value
SNTP update interval	Interval to request time from server.	Default: 30 seconds Minimum: 30 seconds
SNTP time offset to UTC	 Time offset to the time received from SNTP. This value can also be set over PROFIdrive parameter 1001. Note: SNTP time offset change does not need a reboot. 	-14401440 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 Note: 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 bit 4 of parameter 51.15 Service configuration. 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".

	Power and productivity for a better world TM		FPNO-21 PROFINET ADAPT
Status	Configuration Service configurati	on Security <u>Support</u> Password Firmware update	Lo
Clic	k here for more information about	Profinet adapter parameters.	
GS	DML file	GSDML File	
10/10	W documentation and downloa	ds	
Fiel	dbus connectivity web page:	Fieldbus communications	

Password page



WARNING! ABB recommends that you change the password and username as soon as possible.

On the Password page, you can change your password and username.

FPNO-21 supports only one user access level.

The password must contain:

- 6 to 20 characters
- at least 1 uppercase letter
- at least 1 lowercase letter
- at least 1 number
- at least one of the permitted special characters: !@#\$%^&*[]<>{}_-

The username must contain:

- 5 to 20 characters
- no special characters or spaces (only uppercase letters, lowercase letters and numbers are allowed).

	uration Security Support <u>Password</u> Firmware update	
Username		
New password	Show Password	
Confirm new password	Show Password	
	Change	
Change username		
Current username		
Current password	Show Password	
Current password New username	Show Password	
Current password New username Confirm new username	Show Password	
Current password New username Confirm new username	Show Password	

Firmware update page

On the Firmware update page, you can view the current firmware version of the adapter module and update the firmware. The firmware update requires adapter restart, so you cannot start the firmware update if the drive is currently controlled by the fieldbus adapter. All Ethernet communication to the drive (including PROFINET, Drive composer and OPC UA) will be lost during the firmware update.



WARNING! ABB recommends that you update the FPNO-21 module only when the drive is in local mode and not operational.

To update the adapter firmware, first upload the firmware loading package*:

- Click Browse.
- Select the correct firmware loading package (.lpe).
- Click Submit.

After uploading the firmware loading package, click Update to start the firmware update. The adapter restarts to complete the firmware installation.

*For the firmware loading package, contact ABB.

	tion Security Support Password <u>Firmware update</u>	
Fieldbus adapter loading package	e	
Select loading package for uploadi	ing Browse No file selected. Submit	
User uploaded loading package	No firmware loading package found. Upload the firmware loading package to the adapter.	
Current firmware version informa	ttion	
Firmware version	0203	
FW patch and build version	0000	

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.

- Disconnect all cable connections to FPNO-21. The NET led should switch off.
- 2. Write 0 (zero) to the parameter 26 under Group A (for example, 51.26).
- 3. Refresh the settings by selecting Refresh in parameter 27 (for example, 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, refer to Logging in (page 155).

Enable web page access if it is disabled

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

- Disconnect all cable connections to FPNO-21. The NET led should switch off.
- 2. Write 0 (zero) to the parameter 26 under Group A (for example, 51.26).
- 3. Refresh the settings by selecting Refresh in parameter 27 (for example, 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.

16

Appendix D - FPNO-21 configuration back-up

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 these 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:

Configuration	Description	
Ethernet service configuration	n Enables different Ethernet services. Refer to Service configuration page (page 161).	
	When set, backup automatically includes this configuration.	
Web page password	Login password for accessing FPNO-21 configuration web pages. Refer to Password page.	
	Backup will automatically include the set password.	
	Note: Backup includes the default password.	
SNTP configuration	Enables SNTP, request interval, UTC offset, and server addresses. Refer to Service configuration page (page 161).	
	When set, backup will automatically include this configuration.	
Station name	Sets the station name using DCP. Refer to PROFINET network set- tings (page 100).	
	When set, backup will automatically include this configuration.	
I&M 1-3	Writable strings for identification and maintenance. Refer to I&M re- cords (page 148).	
	When set, backup will automatically include this configuration.	
PROFIdrive parameters 933- 937 and 939-943	PROFIdrive CW and SW user bit mapping. Refer to PROFIdrive parameters (page 141).	
	Note: Backup will include this configuration only when it is stored with PROFIdrive parameter 971.	
System location	Writable SNMP MIB-2 string.	
System name	When set, backup will automatically include this configuration.	
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.



172 Appendix D - FPNO-21 configuration back-up





Appendix E - OPC UA server

Contents of this chapter

This chapter provides instructions on how to enable, configure, and use the OPC UA server and client.

OPC UA

OPC UA is a communication protocol for interoperability and data exchange between different devices, systems and applications. OPC UA stands for Open Platform Communications Unified Architecture, and it is based on open standards and technologies.

OPC UA provides a secure, reliable and scalable way to access data from drives and other sources. OPC UA supports different transport protocols, data formats and encryption methods. OPC UA supports strong authentication methods that differentiate the client and user with fine granular role-based access rights.

With OPC UA, users can access real-time and historical data and events from drives, such as speed, torque, current, voltage, temperature, alarms, faults and diagnostic codes. OPC UA allows users to create custom views and dashboards of the drive data, as well as to integrate the drive data with other systems and applications, such as SCADA, HMI, MES, ERP and cloud services. OPC UA enables data collection parallel to various protocols and networks, such as PROFINET.



Compatibility

OPC UA server enables ABB drives to operate with any OPC UA compliant client. OPC UA requires FPNO-21 version 2.03 or later.

Supported drives:

- ACS880 primary control program version 2.90.0.0 and later
- ACS580 standard control program version 2.20.0.13 and later
- ACH580 HVAC control program version 2.20.0.13 and later
- ACQ580 pump control program version 2.20.0.13 and later
- ACS480 standard control program version 2.20.0.13 and later
- ACH480 standard control program version 2.20.0.13 and later
- ACS380 machinery control program version 2.20.0.13 and later

Note: The previous software version is also fully compatible with OPC UA, but it does not support access to drive events.

Supported services and features

The OPC UA server supports these OPC UA services and features:

- Read and write service: Read and write OPC UA node data.
- Browse service: Examine the OPC UA server address space and read the OPC UA nodes and their attributes.
- Supported endpoints: For secure and encrypted communication between the OPC UA server and the client. Support for None, Sign and Sign & Encrypt security modes. Support for None, Basic128RSA15 and Basic 256 security policies. For more information, refer to Encrypted Communication.
- Subscription and monitored item service: Subscribe to OPC UA node data and notifications when the data changes.
- Event service: Subscribe to Drives events, warnings, faults and receiving notifications when events occur. Historical event access is available.
- Information model: OPC UA Device Integration (DI) information model for asset and actual value monitoring. OPC UA FX (Field eXchange) information model to represent assets information for drives, motors and interface adapters.
- Anonymous user authentication modes
- Accessible to multiple OPC UA clients at the same time.

Enabling OPC UA server on an ABB drive

The OPC UA server on the ABB drive is not enabled by default. You can enable the OPC UA server with parameter 15 Service configuration, bit 7.

Note: After you enable the OPC UA server for the first time or if the IP address changes, the OPC UA server creates a self-signed certificate. This can take up to 60 seconds.

Note: For the OPC UA timestamps to function properly, the drive time must be synchronized with the universal coordinated time (UTC). Set the drive time to UTC before establishing the OPC UA connection. You can use the drive control panel or drive composer tool to adjust the drive time. ABB recommends SNTP (Simple Network Time Protocol) server to synchronize the time of all drives to same source. Refer to Configuring SNTP (page 162).

Encrypted Communication

The OPC UA server supports encrypted communication with different security policies. The OPC UA server provides the following endpoints for encrypted communication:

• None: No encryption or signing. It is deactivated by default. Use this only for testing or in trusted networks. To enable it, refer to parameter 15 Service configuration, bit 8.



WARNING! ABB recommends that you do not use None in unprotected networks to reduce cyber security risks.

- Sign with Basic256Sha256: This endpoint uses SHA-256 as the hash algorithm and RSA as the signature algorithm with 256-bit keys. It signs the messages but does not encrypt them. It is deactivated by default. Use this only when encryption is not required or supported by the client. To enable it, refer to parameter 15 Service configuration, bit 8.
- **SignAndEncrypt with Basic256Sha256:** This endpoint uses SHA-256 as the hash algorithm, RSA as the signature algorithm with 256-bit keys, and AES as the

encryption algorithm with 256-bit keys. It signs and encrypts the messages. This is the recommended endpoint for most applications.

- Sign with Aes128_Sha256_RsaOaep: This endpoint uses SHA-256 as the hash algorithm, RSA with OAEP padding as the signature algorithm with 2048-bit keys, and AES as the encryption algorithm with 128-bit keys. It signs the messages but does not encrypt them. It is deactivated by default. Use this only when the client does not support Basic256Sha256. To enable it, refer to parameter 15 Service configuration, bit 8.
- SignAndEncrypt with Aes128_Sha256_RsaOaep: This endpoint uses SHA-256 as the hash algorithm, RSA with OAEP padding as the signature algorithm with 2048-bit keys, and AES as the encryption algorithm with 128-bit keys. It signs and encrypts the messages. This endpoint offers a higher level of security than Basic256Sha256. Use this endpoint when the client supports it.

To use an encrypted endpoint, the OPC UA client software must provide a valid certificate and trust the certificate of the OPC UA server. The certificates are used to authenticate the identity of the OPC UA server and the client and to exchange the encryption keys. The certificates can be self-signed or issued by a trusted authority. The OPC UA server and the client must also have the same security policy and security mode selected for the encrypted communication to work. The OPC UA client software can display the available endpoints of the OPC UA server and allow the user to choose the preferred one.

Note: Only a self-signed certificate is supported by FPNO-21 V2.03 OPC UA server.

OPC UA subscription

The OPC UA server supports up to 50 subscriptions. An OPC UA subscription lets an OPC UA client software get data changes and events from the OPC UA server. The OPC UA client sets the monitored items, the sampling interval, the publishing interval, and other parameters for the subscription. The publishing interval is the time between notification messages from the OPC UA server. The monitored items are the variables or events that the OPC UA client software wants to get updates on. Each monitored item has a sampling interval, which is the frequency with which the OPC UA server checks its value or status. The OPC UA server sends notification messages with the data changes or events to the OPC UA client software at the publishing interval. The OPC UA client software can create, modify, or delete subscriptions as needed.

Monitored Item Set	ttings ? ×
Sampling Interval: Queue Size: Discard Oldest:	250,00 ÷
Data Change Trigger: Deadband Type: Deadband Value:	Status/Value/Timestamp ∨ Absolute ∨ 4,00
	OK Cancel

Accessing drive events and event log with OPC UA

The OPC UA server can send OPC UA Events to inform an OPC UA client about drive events, such as warnings and faults.

Property BrowseName	Data type	Description		
EventId	Nodeld	A unique identifier for the event. This identifier can be used to distinguish between different events.		
EventType	Nodeld	Identifies the type of the event. It specifies the event type that is instantiated.		
		The following event types a	re supported:	
		EventType	Description	
		1:DriveFaultEventType	Generate on fault	
		1:DriveWarningActiveEvent- Type	Generate when warning activates	
		1:DriveWarningCleare- dEventType	Generate when warning is cleared	
		1:DrivePureEventType	Generate on general notific- ation	
		1:DriveFaultResetEvent- Type	Generate on fault reset	
SourceNode	Nodeld	Node that caused the event "i=2253".	. SourceNode is always	
Message	LocalizedText	A human-readable description of the event. It shows the drive event name including fault code and aux code in HEX format.		

Drive events use specific event types derived from 1:DriveEventType.

Property BrowseName	Data type	Description
Severity	UInt16	Represents the severity of the event. It provides an indic- ation of the urgency or importance of the event.
		50: Fault reset
		100: Event
		500: Warning
		750: Fault
SourceName	String	DisplayName of the object node (SourceNode) that caused the event. = "Server"
Time	UtcTime	Indicates the time the event occurred. This is the time the event is generated.
ReceiveTime	UtcTime	Indicates the time the server received the event over drive back end (option card interface)
1:BasicCode	UInt16	The drive event code
1:AuxCode	UInt32 Auxiliary code of the drive event code	

Note: ns=1: http://www.abb.com/Motion.

Example of the event notification:

× · · ·							
Д	С	Time	Severity	Server/Object	SourceName	Message	EventType
		20.06.2024 15:34:19.789	5 <mark>00</mark>	ACS580, SN: 1173000643@192.168.0.6 / Server	Server	External warning 1 [A981:0]	DriveWarningActiveEventType
		20.06.2024 15:34:32.137	500	ACS580, SN: 1173000643@192.168.0.6 / Server	Server	External warning 1 [A981:0]	DriveWarningClearedEventType
		20.06.2024 15:34:47.045	750	ACS580, SN: 1173000643@192.168.0.6 / Server	Server	External fault 3 [9083:0]	DriveFaultEventType
		20.06.2024 15:35:35.307	50	ACS580, SN: 1173000643@192.168.0.6 / Server	Server	Fault reset [64FF:0]	DriveFaultResetEventType

Connection example

The OPC UA client software in this example is UaExpert v1.7. from Unified Automation GmbH. For more information, refer to

https://www.unified-automation.com/products/development-tools/uaexpert.html.

To connect the OPC UA client to an OPC UA server on an ABB drive:

- 1. Enable the OPC UA server with parameter 15 Service configuration, bit 7.
- 2. Start the OPC UA client software and open the project that was created or configured previously.
- 3. Discover the OPC UA server.

Enter the endpoint URL of the OPC UA server in the format "opc.tcp://<ip_address>:4840". The <ip_address> refers to the IP address of the Ethernet connection on the ABB drive. The default port number of the OPC UA server is 4840. Example: opc.tcp://192.168.21.210:4840. Alternatively you can select the OPC UA server from the list of available servers and click Connect.

- 4. Select the security mode and the security policy for the OPC UA connection. The security mode can be none, sign, or sign and encrypt.
- 5. Select the Anonymous Authentication method.

🖉 Add Server		? ×
Configuration Name @		
PKI Store Default		~
Discovery Advanced		
Endpoint Filter: No Filter		~
> 🔍 ServersOnNetwork	Enter URL	? X
> Global Discovery Set Current Set Current Set Current Set Current Set Set Set Set Set Set Set Set Set Se	Enter the LIBL of a computer with disc	overv service running:
Custom Discovery	opc.tcp://192.168.21.210:4840	~
 ✓ Q opc.tcp://192.1 ✓ Ø ACS880 SN 	б	Cancel
a None -	None (uatcp-uasc-uabinary)	
🖉 Basic25	6Sha256 - Sign (uatcp-uasc-uabinary)	
Basic25	6Sha256 - Sign & Encrypt (uatcp-uasc	-uabinary)
Aes128	Sha256_RsaOaep - Sign (uatcp-uasc-u	uabinary)
Aes128	Sha256_KsaOaep - Sign & Encrypt (ua	itcp-uasc-uabinary)
Reverse Discovery	to Add Reverse Discovery >	
Username		Store
Password		
Certificate		
Private Key		
Connect Automatically		
,		OK Capcel
		Cancel

- 6. Accept the certificate of the OPC UA server.
- 7. Wait for the OPC UA connection to be established and verified. The OPC UA client software should show a message that the connection is successful and show the status and the details of the connection.

Example of the information model:

Mo Highlight V				
Root				
V 🖨 Objects				
Y 💑 DeviceSet				
Y 💑 Drive				
ActualSignals				
> 🗀 ActualValues				
> 🛅 Devicel/O				
> 🛅 Diagnostics				
> 🛅 DriveStateMachine				
> 🛅 EnergyEfficiency				
> 🗀 FaultsAndWarnings				
DeviceManual				
DeviceRevision				
> 🚕 FieldbusAdapter				
HardwareRevision				
Manufacturer				
Ø Model				
RevisionCounter				
SerialNumber				
SoftwareRevision				
> 💑 Motor				
✓ ➡ FxRoot				
Y 💑 PowerTrain				
Assets				
Y 👶 Drive				
FirmwareVersion				
Manufacturer				
Model Control Number				
V SerialiNumber				
> 🙀 FieldbusAdapter				
> 🧠 Motor				
> 📪 Server				
> 🛄 iypes				
> 🛄 Views				


Technical data

The default OPC UA Application name is <Drive type>, SN: <drive serial number>. Example: ACS880, SN 1234567890.

The implementation of the OPC UA server is based on these specifications:

- OPC UA v1.05.02 (released 2022)
- OPC 10000-100, Device Model v1.04 (released 2022)
- OPC UA Field eXchange with:
 -OPC 10000-80, Overview and Concepts v1.00 (released 2022)
 -OPC 10000-81, Connecting Devices and Information Model v1.00.02 (released 2022)
- VDMA 40400-1: OPC UA for Powertrain -Part 1: Asset Management

Maximum number of connections	5
Maximum number of subscription	50
Maximum number of monitored items (over all clients)	50
Maximum monitored items per subscription	50
Minimum sample rate	100 ms

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/contact-centers.

Product training

For information on ABB product training, navigate to new.abb.com/service/training.

Providing feedback on ABB manuals

Your comments on our manuals are welcome. Navigate to forms.abb.com/form-26567.

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