

Instruction manual EXP-ETH2-PN-ADV200 PROFINET interface expansion board



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1. Introduction

This manual describes the option board **EXP-ETH2-PN-ADV200** (Code **S5L93**) to connect ADV200 series drives to PROFINET networks.

Only one fieldbus expansion card can be used per drive.

This manual is intended for technicians and designers responsible for maintenance, initial start-up and operation of PROFINET systems.

The **EXP-ETH2-PN-ADV200** card can only be used with drives with firmware version **7.7.22 or higher**.

1.1 Features

- 2 RJ-45 Ethernet 100 Mbit/s ports available simultaneously.
- PROFINET "RT Real Time" class "Class 1" and "conformance class B and C".
- MRP (Media Redundancy) for ring topology and S2 system redundancy.
- Beacon-based Device Level Ring (DLR).
- Control cycle duration from 1 ms to 3200 ms.
- Maximum input data length 32 bytes.
- Maximum output data length 32 bytes.
- Vendor ID= 0x016F.
- Modbus TCP/IP communication.

1.2 What is PROFINET?

PROFINET is an industrial communication protocol based on Ethernet, mainly used in the industrial automation sector.

PROFINET is standardised in IEC 61158 and IEC 61784. PROFINET is based on Ethernet technology, supports real-time communication, allowing devices to exchange data with predictable and guaranteed latency times.

Thanks to the use of Ethernet, PROFINET offers high data transmission speeds and reliable performance, allowing fast and efficient communication between devices.

1.3 Safety

Before installing the board, carefully read the section on safety instructions in the manual "ADV200 Quick Start Guide, chapter 1 - Safety Precautions".

1.4 Assembly

The EXP-ETH2-PN-ADV200 optional board is supplied with the **EXP LOCK KIT** (code S7BQO4P) to secure and lock the board in the dedicated slot.

EXP LOCK KIT includes: $4 \times M3 \times 8$ mm screws + washers, $1 \times p$ plastic fixing bar, $2 \times hexagonal$ spacers, $2 \times M3.2$ split washers, $1 \times metal$ shield (G) and $1 \times M4 \times 8$ mm screw (H1).

- 1. To remove the lower cover (A), unscrew the 2 screws (B) and slide it off in the direction indicated (C). See figure 1.
- To remove the upper cover (D), loosen the screws (E) by about 2 turns and slide it off in the direction indicated (F). See figure 1.

Figure 1



3. Position and fix the metal screen (G) with the 2 screws M3 x 8 mm (H2), 1 M4 x 8 mm (H1) as shown in figure 2.

Figure 2



 Place the EXP-ETH2-PN-ADV200 card in the dedicated Slot 3 as shown in figure 3, align the ends of the card (L) in the slot and then fully insert the card connector into the drive connector (M).



5) Fasten the 2 hexagonal spacers (N) with the M3.2 split washers (O) in the fixing points (P); then fasten the board with the M3 x 8 mm screw + washer (Q) in point (R) and finally fasten the plastic fixing bar (S) with the no. 2 screws M3 x 8 mm + washer (T) on the hexagonal spacers as shown in figure 4.

Figure 4





1.5 Links

Media bus

2 RJ-45 ProfiNet 100 Mbit/s ports.

Wiring considerations

To ensure reliability over time, it is recommended that all cables used to connect a system are checked using a suitable Ethernet cable tester, especially when the wiring is done on site.

Cables

Cable-related problems are the major cause of network downtime. Make sure that the cables are routed properly, that the cabling is correct, that the connectors are installed correctly and that all switches and routers are industrial-grade. Office Ethernet equipment generally does not offer the same degree of immunity from interference as industrial-grade equipment.

Maximum network length

The major restriction imposed on Ethernet cabling is the length of a single cable segment.

The ADV-PROFINET module has two 100BASE-TX Ethernet ports, which support segment lengths of up to 100 m with category 6 or higher cables.

ADV-PROFINET terminal descriptions

The ADV-PROFINET module has two RJ45 Ethernet ports for the PROFINET network.

Ethernet interface (connectorsRJ45) 10/100Mbit , Ethernet interface full or half duplex operation		
Pin Port 1 IN/OUT (J1) Port 2 IN/OUT (J2)		
4, 5, 7, 8	Connected to chassis earth via serial RC circuit	
6	RD-	
3	RD+	
2	TD-	1 8
1	TD+	
Housing	Cable shielding	

Network topology

The connection between the devices can be done by "daisy chaining":



Or via switch:



The two Ethernet ports are interchangeable, in the sense that there is no defined input and output port. The card behaves like an Ethernet switch.

Minimum node-to-node cable length

There is no minimum recommended cable length for Ethernet standards.

To avoid problems, we recommend leaving enough cable to guarantee a good bending radius and avoid unnecessary stress on the connectors.

1.6 Led - Jumper - Terminal



1.6.1 Link/Activity LED (Green/Yellow)

LED Status	LED Description	
Off	No link, no activity	
Green	Link (100 Mbit/s) established	
Green, flashing	Activity (100 Mbit/s)	
Yellow	Link (10 Mbit/s) established	
Yellow, flashing	Activity (10 Mbit/s)	
LED Status	LED Description	
PWR	Indicates the presence of the board power supply it (green) when the board is powered.	

1.6.2 Network status LED (Green/Red)

LED Status	LED Description	
Off	No power supply or no IP address	
Green	Online, one or more connections established	
Green, flashing	Online, no connection established	
Red	Duplicate , IP address FATAL error	
Red, flashing	Timeout of one or more connections	

1.6.3 Module status LED (Green/Red)

LED Status	LED Description	
Off	No power supply	
Green	Controlled by a scanner in Run state	
Green, flashing	Online, no connection established	
Red	Serious error (status EXCEPTION, FATAL error, etc.)	
Red, flashing	Reversible defect(s). The module configured, but the stored parameters differ from the currently used parameters.	

1.6.4 Jumper

Reference	Description	
P2	If the terminals are mounted, the jumper must be installed in position 2-3.	

1.6.5 Terminal

Reference	Description	
TB1 If the contacts are mounted, they must be left NOT CONNECTED.		

1.7 Optional Card Recognition



At power-up, the drive recognises the presence of option card in the expansion slot 3, and this message appears on the display.

T+ T EN LOC ILim n:0 AL	T+ T- EN	LDC ILim n:0 AL
01 MONITOR	02.19	PAR: 534
02 DRIVE INFO	Slot 3 card	d type
03 STARTUP WIZARD	RTE2	
04 DRIVE CONFIG	Value	772

On the 02 DRIVE INFO menu, select PAR 534 Slot3 card type **Type** to read the type of card recognised.

Value	Description	Type of card
0	Nessuno	-
772	RTE2	EXP-ETH2-PN-ADV200
255	Sconosciuto	-

2. Start-up guide

This section provides a generic guide to setting up the module with a master PLC/controller. It covers the basic steps required to achieve cyclic data communication using the PROFINET protocol on the module.

2.1 Quick Guide

2.1.1 WEG GSDML file

WEG provides the description file for the EXP-ETH2-PN-ADV200 device, which contains the information necessary for the PROFINET network programming device to facilitate configuration.

The GSDML file contains the information to identify the device, insert the communication modules and transmit diagnostic information.

The files are located in the folder:

C:\Program Files (x86)\WEG PC Tools\WEG_eXpress\Catalog\ Drives\Inverter\ADV200\ADV200_7_x_yy\Service\PROFINET

For applications with asynchronous motors use the file: GSDML-V2.41-WEG-ADV200-20241107

For synchronous motors use the file: GSDML-V2.41-WEG-ADV200S-20241107

If you need special support, please contact WEG Customer Service: technohelp@weg.net

2.1.2 Fieldbus menu

To enable the EXP-ETH2-PN-ADV200 card, set the PAR 4000 Fieldbus type parameter to "RTE".

We recommend setting the network mode (Network set) to DHCP unless specifically required.

In the CONFIGURATIONS menu, in COMMUNICATION -> FIELD BUS CONF, relating to the management of the EXP-ETH2-PN-ADV200, the following parameters are available:

IPA	Parameter name	Value	Туре
4000	Fieldbus type	Off	Enum
4010	Fieldbus $M \rightarrow S$ enable	Enable	Enum
4012	Fieldbus alarm mode	0	Int

4014*	Fieldbus state	Stop	Enum
4398	RTE Protocol	None	Enum
5608*	IP Address	0.0.0.0	UnsignedInt
5610*	Netmask	0.0.0.0	UnsignedInt
5612*	Gateway	0.0.0.0	UnsignedInt
5880	IP Address set	192.168.1.10	UnsignedInt
5882	Netmask set	255.255.255.0	UnsignedInt
5884	Gateway set	0.0.0.0	UnsignedInt
5886	Network set	Static	Enum
5888	ETH2 Std Struct	Module	Enum
5896	M2S MaxWords	0	Int
5898	S2M MaxWords	0	Int

*Read-only parameters

NOTE!

All fieldbus settings and configurations only take effect the next time the drive is reset.

- **Fieldbus M \rightarrow S enable =** if set to Disable, the data that the PLC sends to the drive (from master to slave) are no longer loaded by the drive and the current values are maintained.
- Fieldbus alarm mode = if set to 1, the drive generates Bus opt fault errors related to communication loss (Bus Loss) even if the drive is deactivated.

Fieldbus state = status of communication on the network:

- PAR 4014 PROFINET **Fieldbus status** Stop Booting Init Setting-up The EXP-ETH2-PN-ADV200 stays in this state until a Pre-operational Class 1 connection has been opened Safe-op Class 1 connection idle Operational Class 1 connections errors or Unexpected error
- RTE Protocol PROFINET / ProfiDrive.
- IP address set Enter network IP address. Netmask set
- Enter subnet IP address. Enter gateway IP address. Gateway set
- Network set IP address assignment: DCHP = automatically assigned by the server; Static = uses the address configured with the parameters indicated above.
- IP address Displays the IP address in use.
- Netmask Displays the IP address of the subnet in use.
- Gateway Displays the IP address of the gateway in use.
- ETH2 Std Struct Selects the mode of the structures displayed on the fieldbus.
- M2S Max Words Field for assigning the number of words to be exchanged from the PLC to the Drive. If left at 0, the effective value will be 16.
- S2M Max Words Field for assigning the number of words to be exchanged from the Drive to the PLC. If left at 0, the effective value will be 16.

2.1.3 Configuring the PROFINET module for cyclical communications

In the configuration of the PROFINET protocol, the instances that describe the exchanged data as I/O have a fixed size, which must coincide in the settings made on the controller and on the device. The network transmission speed is fixed. The module must be associated with a unique IP address for the subnet in which it is used.

To check that the Ethernet cable connected to the PROFINET module on the drive is connected correctly, observe the LED on the front of the module relating to the connector to be used: if it is green then there is a connection with the master, if it is off check the wiring and that the master has started communication.

In the master, scan the network to verify that the PROFINET module is correctly connected to the master. If the network is configured correctly, one or more PROFINET nodes will appear in the master PLC.

Decide which input/output data you want to send cyclically (objects and/or parameters). The configuration of the input/output data associated with the Polling cyclic data exchange can be done directly through the drive parameters (setting the FIELDBUS M2S and FIELDBUS S2M menus).

It is important to set a compatible data area size between the Master and the PROFINET device: if the setting is made on the drive, it is necessary to verify that the number of bytes occupied coincides with the size of the I/O area set on the master. The size in bytes occupied by the drive can be obtained from the settings of the FIELDBUS M2S and S2M menus, by adding up the size in bytes of each parameter set using the relative parameter "Fieldbus $M \rightarrow S$ n sys" or "Fieldbus $S \rightarrow M$ n sys", according to the following table:

Not assigned	The data in question and all subsequent data (even if assigned) do not contribute to the I/O area.
Count16, Par16, Fill16, MdpPlc16, Eu	2 bytes
Count32, Par32, Fill32, MdpPlc32, Eu float	4 bytes

2.1.4 Downloading the configuration to the master

After downloading the configuration to the master, one or more LEDs on the front of the PROFINET will flash, depending on the connected ports.

If the configuration is correct, when the master status switches to "Run" mode (on the drive parameter 4014 "Fieldbus State" becomes "Operational") the output values sent by the master are visible in the drive parameters associated with the channels configured in the "Fieldbus M2S" menu, while the input values received are updated to the parameter values relating to the "Fieldbus S2M" menu.

2.2 Example configuration of a PROFINET network

This paragraph contains an example of data exchange seen from the PLC side. This is the information normally dictated by the machine specification in the case of an application governed by a programming device for PROFINET profiles. In this example we want to transmit 2 Words from the PLC to the drive and we want to send 3 Words from the drive to the PLC.

2.2.1 Description Cyclic input/output data Communication Master \rightarrow Slave

The two parameters to be written through the process channels are: the first is a command word (which we'll call the control word) in which the individual bits contain certain commands (e.g. enable, start); the second is the reference of ramp 1 (RampRef1) in rpm.

Cyclic input/output data ProfiNet: Master → Slave (max 16 words)

Position	Description	Format	Measurement unit
Word1 $M \rightarrow S$	Control word	16 bit Word	
Word2 $M \rightarrow S$	Ramp Ref 1	Int 16 bit	rpm
Word3 $M \rightarrow S$			
Word4 $M \rightarrow S$			
Word5 $M \rightarrow S$			

Word6 $M \rightarrow S$		
Word7 $M \rightarrow S$		
Word16 $M \rightarrow S$		

CONTROL WORD

Bit	Description	Notes
0	EnableCmd	Enable command from PLC
1	StartCmd	Start command from PLC
2	Free	
3	Free	
4	Free	
5	Free	
6	Free	
7	Free	
8	Digital Out3	PLC-controlled digital output 3
9	Digital Out4	PLC-controlled digital output 4
10	Free	
11	Free	
12	Free	
13	Free	
14	Free	
15	Free	

2.2.2 Description Cyclic input/output data Communication Slave \rightarrow Master

The PROFINET configurator reads three parameters from the drive. The first contains a status word whose individual bits contain information on the drive status (e.g. DriveOk..). The second is the current speed in rpm. The third parameter contains the value of analogue input 2.

<u>Cyclic input/output data Industrial Ethernet Slave \rightarrow Master (max 16 Words)</u>

Posizione	Descrizione	Formato	Unità Misura
Word1 $S \rightarrow M$	Status Word	16 bit Word	BitWide
Word2 $S \rightarrow M$	Actual Speed	Int 16 bit	rpm
Word3 $S \rightarrow M$	Analog Input 2	Int 16 bit	
Word4 $S \rightarrow M$			
Word5 $S \rightarrow M$			
Word6 $S \rightarrow M$			
Word7 $S \rightarrow M$			
Word16 $S \rightarrow M$			

STATUS WORD

Bit	Description	Notes
0	EnableState	Drive enabled
1	Drive Ok	Drive Ok
2	Speed is zero	Zero speed threshold
3	Free	
4	Free	
5	Free	
6	Free	
7	Free	
8	Digital Input 4	Digital input status 4 ADV200
9	Digital Input 5	Digital input status 5 ADV200
10	Free	
11	Free	
12	Free	
13	Free	
14	Free	
15	Free	

2.3 ADV200 programming

In the example given in this paragraph, the first assumption is that the ADV200 drive parameters are the factory settings (**Default parameter** command).

The I/O data exchanged through the EXP-ETH2-PN-ADV200 board can be configured, associating them with drive parameters. The data written by the PROFINET device on the drive are configured on the drive through the parameters of the "Fieldbus M2S" (Master to Slave) menu.

The data read by the PROFINET device is configured on the drive via the parameters of the "Fieldbus S2M" (Slave to Master) menu. A parameter can be either 2 or 4 bytes, depending on the associated

format, selected via the settings relating to "Fieldbus $M \rightarrow S$ n sys" and "Fieldbus $S \rightarrow M$ n sys".

There are 16 input channels and 16 output channels available, in which a number of data items between 0 and 16 can be configured, provided that the total number of bytes required does not exceed 32 input bytes and 32 output bytes.

<u>Example:</u>

It is possible to have:

- from 0 to 16 2-byte data items
- 1 piece of 4-byte data + 0 to 14 pieces of 2-byte data
- 2 pieces of 4-byte data + 0 to 12 pieces of 2-byte data
- •
- 8 pieces of 4-byte data

There are two types of data that can be exchanged:

- drive parameters;
- variables of an MDPIc application.

2.3.1 Reading statuses and writing commands to the drive

To send commands and read the status of the drive, specific parameters are available, in which each bit is programmable and can be associated with a function.

Commands can be sent to the drive using the functions **Word** decomp src PAR 4452. The meaning of the individual bits is programmable. It can be set on an $M \rightarrow Sn$ field bus channel as Count 16.

The drive status is read in **Word comp mon** PAR 4432, programmable on any S \rightarrow Mn field bus channel as Count 16. The meaning of each individual bit can be selected by the user using **Word bit0 src** of PAR 4400... **Word bit15 src** of PAR 4430.

For a detailed description of these parameters, refer to the drive manual.

FIELDBUS CONFIG menu

NOTE!	All fieldbus settings and configurations of drive has been reset.	only
-------	---	------

Program the parameters of the fieldbus menu as in the following figure:

take effect after the

ADV200_4_X_0.gft [FIELDBUS CO	ONF	1G] - WE	iG_eXpress						
Elle View Parameters Larget	26	ervice E	RW mSt TR. 17%		EAST III &	0	🔥 La GFE 🛤		
Menu	×	IPA	Short Description	Value	Default	Unit	Type	Min	Max
	-	4000	Fieldbus type	Rte	Off		Enum		
Menu Selection		4004	Fieldbus baudrate	Auto	500k		Enum		
ENCODER CONFIG	1	4006	Fieldbus address	3	3		Short	0	255
SPEED REG GAINS		4010	Fieldbus M->S enable	Enable	Enable		Enum		
REGULATOR PARAM		4012	Fieldbus alarm mode	0	0		Int	0	1
- ORQUE CONFIG		4014*	Fieldbus state	PreOperational	Stop		Enum		
- 🕅 VF PARAMETERS		4398*	RTE protocol	ProfiNet	None		Enum	2225	122
FIELOBUS MAS FIELOBUS MAS FIELOBUS SZM WORD CONFIG WORD CONFIG APPLICATION InterfaceMenu WIZARD BIAGRAMS DIAGRAMS DISTINATIONS M		<							Þ
Notes:									
O No alarms						Modbu	s, Addr:1, Port:COM4	3 CON	VECTED

In order to optimise the data exchange bandwidth, it is necessary to set the number of parameters exchanged with the PLC by suitably setting the parameters:

- IPA 5896 M2S MaxWords: set it to 2. In general, the value must be set according to the number of words provided in the M2S menu.
- IPA 5898 S2M MaxWords: set to 3. In general, the value must be set according to the number of words expected in the S2M menu.

The exchange of I/O data will only be effectively active when parameter 4014 "Fieldbus state" has the value "Operational". In all other cases the controller has not started the I/O data exchange with the EXP-ETH2-PN-ADV200 card. This could be related to problems in the configuration of the assembly instances. For example, if the size set on the master does not coincide with that obtained from the settings of the "FIELDBUS M2S" and "FIELDBUS S2M" menus, or the master is not in "Run" status. When parameter 4014 "Fieldbus state" is "Operational", the I/O data is updated with the values of the programmed parameters. Only in this state is it possible to enable the drive.

2.3.2 Writing Output data

FIELDBUS M2S menu

The **control word** is configured using Wdecomp. The following figure shows how to program Wdecomp on the first word $M \rightarrow S$ ("Export" mode):

ADV200_4_X_0.gft [FIELDBUS M	12S]	WEG_e	Kpress					• 🔀
<u>File View Parameters Target</u>	2	rvice <u>H</u>	elp					
🎦 📽 🖬 🔮 🎜 💭 R	w	면면	盘 🗶 📽 🖪 🖼	a & E 🗧 🕈 👘	easi 🖬 🖋 🔕 iii	🛆 La 🖭 🥵		
Menu	x	IPA	Short Description	Value	Default Unit	Type	Min	Max 🔺
Menu selection	٦	4020	Fieldbus M->S1 ipa	4452	0	UnsignedShort	0	20000
- 🍘 MOTOR DATA		4022	Fieldbus M->S1 sys	Count 16	Not assign	Enum		
- 🖗 ENCODER CONFIG		4024*	Fieldbus M->S1 mon	0		Int		E
- 🎁 SPEED REG GAINS		4026	Fieldbus M->S1 div	1	1	Float	1	1000
🌔 REGULATOR PARAM		4030	Fieldbus M->S2 ipa	610	0	UnsignedShort	0	20000
👸 TORQUE CONFIG		4032	Fieldbus M->S2 sys	Eu	Not assign	Enum		💷
VF PARAMETERS		4034*	Fieldbus M->S2 mon	0		Int		
		4036	Fieldbus M->S2 div	1	1	Float	1	1000
		4040	Fieldbus M->S3 ipa	0	0	UnsignedShort	0	20000
EIFLIDBUS CONFIG		4042	Fieldbus M->S3 sys	Not assigned	Not assign	Enum		
FIELDBUS M2S		4044*	Fieldbus M->S3 mon	0		Int		
- 🎁 FIELDBUS S2M		4046	Fieldbus M->S3 div	1	1	Float	1	1000
👘 WORD COMP		4050	Fieldbus M->S4 ipa	0	0	UnsignedShort	0	20000
- 🎁 WORD DECOMP	=	4052	Fieldbus M->S4 sys	Not assigned	Not assign	Enum		
🕅 ALARM CONFIG		4054*	Fieldbus M->S4 mon	0		Int		
P APPLICATION		4056	Fieldbus M->S4 div	1	1	Float	1	1000
InterfaceMenu		4060	Fieldbus M->S5 ipa	0	0	UnsignedShort	0	20000
	u	4062	Fieldbus M->S5 sys	Not assigned	Not assign	Enum		
		4064*	Fieldbus M->S5 mon	0		Int		
		4066	Fieldhus M->S5 div	1	1	Float	1	1000
								,
Notes:								
O No alarms					Modbu	s, Addr:1, Port:COM4	CONN	ECTED
	_							

Now connect the individual bits of wdecomp. For the commands, remember that as indicated in the ADV200 manual, the drive must be in "**Remote**" and "**Digital**" mode.

The programming of the first two bits takes place in the command menu as shown in the figure:

© ≌ ⊌ ∰ y ≎ R	w	2 4	H M 🖼 🖻 📴		EOP 🗰 🦻	O 116	🍐 네 11 🖏 👘	1001.0	
Venu	×	IPA	Short Description	Value	Default	Unit	Type	Min	Max
Menu selection		1000	Commands remote sel	Digital	Terminal		Enum		
- 🍘 MainMenu	*	1002	Commands local sel	Keypad	Keypad		Enum		
- MONITOR		1004	Enable/disable mode	Stop/FS&Spd=0	Stop/FS&St		Enum		
- PRIVE INFO		1006	Speed 0 disable dly	1000	1000	ms	UnsignedShort	0	10000
🎁 DRIVE CONFIG		1008	Stop key mode	Inactive	Inactive		Enum		Intel Intel Intel Intel
- 🕅 REFERENCES		1010	Commands safe start	On	On		Boolean		
RAMPS		1012	Dig local/remote	Remote	Remote		Enum		***
MULTI REFERENCE	E	1014	Local/remote src	Dig local/remote	Dig local/re		Enum		
- D MOTORPOTENTIONET		1016	Terminal Start src	FR start mon	FR start mo		Enum		
MONITOR FUNCTION		1018	Digital Enable src	Bit0 decomp mon	Null		Enum		
COMMANDS		1020	Digital Start src	Bit1 decomp mon	Null		Enum		
DIGITAL INPUTS		1022	FastStop src	Null	Null		Enum		
DIGITAL OUTPUTS		1024*	Enable cmd mon	0			UnsignedShort		
ANALOG INPUTS		1026*	Start cmd mon	0			UnsignedShort		
- 🍘 ANALOG OUTPUTS		1028*	FastStop cmd mon	0			UnsignedShort		
🕅 MOTOR DATA		1040	FR mode	Two wire	Two wire		Enum		
O ENCODER CONFIG		1042	FR forward src	Digital input 1 mon	Digital inpu		Enum		
SPEED REG GAINS		1044	FR reverse src	Digital input 2 mon	Digital inpu		Enum)	
TOBOULT CONFIC		1046	FR *stop src	Null	Null		Enum		
	-	1048*	FR start mon	n			UnsignedShort		+

Bits 8 and 9 are programmed from the "Command word" as shown in the figure (Digital Outputs menu):

Meru X IPA Stand Description Value Default Unit Type Manu selection 1310 Diglat cuptor 1 sec Drive OK Drive OK Enum C* Manu Selection 1310 Diglat cuptor 1 sec Drive or Sec Enum C* Man Menu - 1312 Diglat cuptor 1 sec Drive ready Drive ready Enum C* Man Menu - 1312 Diglat cuptor 1 sec Bit 8 decomp mono Speeds 0 Enum C DRIVE INFCO 1320 Diglat cuptor 1 sec Bit 8 decomp mono Speeds 0 Enum C RAIK TREFERINCE 1332 Diglat cuptor 1 sec Bit 8 decomp mono Speeds 0 Enum C RAIK TREFERINCE 1332 Diglat cuptor 1 sec Bit 8 decomp mono Speeds 10 Enum C RAIK TREFERINCE 1332 Diglat cuptor 1 sec Not 1 metricuport 1 metricupo		All and the second second			ALL ALL CE I		- EOP www / 4		-		-
Manu selection 1310 Digital output 1 arc Drive OK Drive OK Enrum - MainMeru - 1310 Digital output 2 arc Drive OK Drive ready Enrum - O RMP ECONFIG - 1314 Digital output 3 arc Bit8 decomp mon Speed is 0 Enrum - O RMP ECONFIG - Digital output 3 arc Bit8 decomp mon Speed is 0 Enrum - O RMP ECONFIG - Digital output 3 arc Bit8 decomp mon Speed is 0 Enrum - O RAMPS - Digital output 3 arc Bit8 decomp mon Off #Stits 0 cleg Enrum - O RAMPS 1332 Dig out 1 inversion Off Off Boolean - O AMATOR EFLECTENT 1336 Dig out 1 inversion Off Off Boolean - O AMATOR FLINCTION 1432 Dig output X strc Null Null Enrum - O CORTAL NUPUTS 1441 Dig output X strc Null Null Enrum - O CORTAL NUPUTS 1445 Dig output X strc Null Null	1		×	IPA	Short Description	Value	Default U	Jnit Type	Min	Max	4
Image: Point Analysis 1312 Digital output 2 src Drive ready Drive ready Drive ready Enum Image: Point Analysis 1312 Digital output 2 src Drive ready Drive ready Enum Image: Point Analysis 1316 Digital output 2 src Bit8 decomp mon Speeds 0 Enum Image: Point Analysis 1316 Digital output 2 src Bit8 decomp mon Speeds 0 Enum Image: Point Analysis 1316 Digital output 2 src Bit8 decomp mon Speeds 0 Enum Image: Point Analysis 1320 Dig out 1 more stato Off Boolean Off Boolean Image: Point Analysis 1332 Dig out 1 more stato Off Off Boolean Off Boolean Image: Point Analysis 1336 Dig out 2 more stato Off Off Boolean Off Boolean Dig out 2 more stato Off Boolean Dig out 2 more stato Off Boolean Dig out 2 more stato Dig out 2 more stato Dig out 2 more stato Diff Dig out 2 more stato Dig ou		Menu selection		1310	Digital output 1 src	Drive OK	Drive OK	Enum			
Image: Constraint of the state of	Ma	ainMenu	*	1312	Digital output 2 src	Drive ready	Drive ready	Enum			
OP DRV: INFO 1316 Organ adoptal Ascc ERF decome mon Net is one Enum O DRV: CONIG 1330 Dig out 1 investion Off Bolean Off Doff Doff </td <td>-0</td> <td>MONITOR</td> <td></td> <td>1314</td> <td>Digital output 3 src</td> <td>Bit8 decomp mon</td> <td>Speed is 0</td> <td>Enum</td> <td></td> <td></td> <td></td>	-0	MONITOR		1314	Digital output 3 src	Bit8 decomp mon	Speed is 0	Enum			
DRVE CONIG 1330 Dig out 1 timestion Off Off Bolean REFERENCE 1332 Dig out 1 timestion Off Off Off Bolean RAMPS 1334 Dig out 3 timestion Off Off Off Bolean MULT REFERENCE 1335 Dig out 3 timestion Off Off Off Bolean MULT REFERENCE 1336 Dig out 3 timestion Off Off Off Bolean O MOUTORPOTENTIONET 1410 Dig output X size Null Null Enum - C COMMANDS 1414 Dig output X size Null Null Enum - C COMMANDS 1414 Dig output X size Null Null Enum - C DIGITAL INFUTS 1415 Dig output X size Null Null Enum - C ANALOG NEUTS 1420 Dig output K size Null Null Enum - C ANALOG NEUTS 1422 Dig output K size Null Nu	-0	DRIVE INFO		1316	Digital output 4 src	Bit9 decomp mon	Ref is 0 del	Enum			
Instruction 132 Dig out 2 investion Off Off Bolean RAMS 133 Dig out 2 investion Off Off Off Bolean MOTORPOTENDMET 1355 Dig out 3 investion Off Off Off Bolean MOTORPOTENDMET 1412 Dig out 3 investion Off Off Off Bolean MOTORPOTENDMET 1412 Dig output X sec Null Null Enum DIGTAL OUTPUTS 1416 Dig output X sec Null Null Enum DIGTAL ADPUTS 1416 Dig output X sec Null Null Enum ANALGO NUTS 1418 Dig output X sec Null Null Enum ANALGO NUTS 1420 Dig output X sec Null Null Enum ANALGO NUTS 1420 Dig output X sec Null Null Enum ANALGO NUTS 1420 Dig output X sec Null Null Enum ANALGO NUTS 1420 Dig output X sec	-0	DRIVE CONFIG		1330	Dig out 1 inversion	Off	Off	Boolean			
P RAMPS 133 Dig out 3 Investion Off Off Boolean MULTREFERENCE 1334 Dig out 3 Investion Off Off Off Boolean MULTREFERENCE 1335 Dig out 3 Investion Off Off Off Boolean MULTREFERENCE 1335 Dig output X src Null Null Enum MONTOR FUNCTION 1412 Dig output X src Null Null Enum COMANDON 1414 Dig output X src Null Null Enum COMANDON 1415 Dig output X src Null Null Enum COMANDON 1415 Dig output X src Null Null Enum COMANDON 1416 Dig output X src Null Null Enum ANALOG NUTPIS 1420 Dig output X src Null Null Enum ANALOG NUTPITIS 1420 Dig output X src Null Null Enum ANALOG NUTPITIS 1422 Dig output X src Null	-0	REFERENCES		1332	Dig out 2 inversion	Off	on	Boolean			
Mol II Reference Iss Disp out a invession Off Off Bolean MOTORPORTUNIDEET ISS Disp out a invession Off Off Bolean MOTORPORTUNIDEET ISS FUNCTION ISS Disp output Xs en Null Null Enum MOTORPORTUNIDEET ISS Disp output Xs en Null Null Enum COMMANDS ISS Disp output Xs en Null Null Enum DISTAL DUTPUTS ISS Disp output Xs en Null Null Enum ANALGO NUTS IASS Disp output Xs en Null Null Enum C ANALGO OUTPUTS IASS Disp output Xs en Null Null Enum C ANALGO OUTPUTS IASS Disp output Xs en Null Null Enum C ANALGO OUTPUTS IASS Disp output Xs en Null Null Enum	-0	RAMPS		1334	Dig out 3 inversion	Off	Off	Boolean			
Information Inflight	-0	MULTIREFERENCE	Ε	1336	Dig out 4 inversion	Off	Off	Boolean			
MONTOR FUNCTION 1412 Dig output 2X src Null Null Enum COMMANDE COMMANDE Null Enum Enum COMMANDE Table Dig output 3X src Null Null Enum Dig Frail ARUTS Table Dig output 4X src Null Null Enum AMALGG RAPUTS Table Dig output 5K src Null Null Enum AMALGG RAPUTS Table Dig output 6K src Null Null Enum MOTOR DALAGE Dig output 6K src Null Null Enum MOTOR DALAGE Dig output 6K src Null Null Enum		IOG EUNICTION		1410	Dig output 1X src	Null	Null	Enum			
COMMANDS 1414 Dig output 3X src Null Null Enum C DIGTAL INPUTS 1416 Dig output 4X src Null Null Enum - C DIGTAL INPUTS 1416 Dig output 4X src Null Null Enum - C DIGTAL INPUTS 1420 Dig output 6X src Null Null Enum - C ANALGO NPUTS 1420 Dig output 6X src Null Null Enum - C ANALGO NPUTS 1420 Dig output 6X src Null Null Enum - C ANALGO NPUTS 1422 Dig output 6X src Null Null Enum - C MALGO NPUTS 1422 Dig output 7X src Null Null Enum -	1	MONITOR EUNCTION		1412	Dig output 2X src	Null	Null	Enum			
Instruction 1415 Dip output X arc Null Null Enum Dip Dirpt Unitry 1415 Dip output X sic Null Null Enum Dip Dirpt Unitry 1435 Dip output X sic Null Null Enum Dip ANALOG INPUTS 1430 Dip output X sic Null Null Enum ANALOG INPUTS 1422 Dip output X sic Null Null Enum ANALOG INPUTS 1422 Dip output X sic Null Null Enum Dip output X sic Null Null Enum Dip output X sic Null Enum	1	COMMANDS		1414	Dig output 3X src	Null	Null	Enum			
D blgTAL OUTPUTS 1418 Dig output 5X src Null Null Enum C) ANALGG NPUTS 1420 Dig output 5X src Null Null Enum - C) ANALGG NPUTS 1420 Dig output 6X src Null Null Enum - C) ANALGG NPUTS 1422 Dig output 5X src Null Null Enum - C) MOTOR DATA UDg output 8X src Null Null Enum -	ň	DIGITAL INPUTS		1416	Dig output 4X src	Null	Null	Enum			
ANALOG NPUTS 1420 Dip output hTX src Null Null Enum ANALOG NPUTPUTS 1422 Dip output hTX src Null Null Enum BANLOG ONTA 1422 Dip output hTX src Null Null Enum BANLOG NATA 1422 Dip output hTX src Null Null Enum BANLOG NATA 1422 Dip output hTX src Null Null Enum	-O	DIGITAL OUTPUTS		1418	Dig output 5X src	Null	Null	Enum			
© ANALOG OUTPUTS 1422 Dig output 7X src Null Null Enum © MOTOR DATA 1424 Dig output 8X src Null Null Enum	-0	ANALOG INPUTS		1420	Dig output 6X src	Null	Null	Enum			
MOTOR DATA 1424 Dig output 8X src Null Null Enum -	-0	ANALOG OUTPUTS		1422	Dig output 7X src	Null	Null	Enum			
ENCODER CONFIC	-0	MOTOR DATA		1424	Dig output 8X src	Null	Null	Enum			
1430 Dig out 1X inversion Off Off Boolean	-0	ENCODER CONFIG		1430	Dig out 1X inversion	Off	on	Boolean			
SPEED REG GAINS 1432 Dig out 2X inversion Off Off Boolean	-0	SPEED REG GAINS		1432	Dig out 2X inversion	Off	Off	Boolean			
TOPULE CONTROL		TOPOULE CONFIG		1434	Dig out 3X inversion	Off	Off	Boolean			
1436 Dio out 4X inversion Off Off Boolean	-0	TORQUE CONFIG	-	1436	Din out 4X inversion	Off	011	Boolean			

REFERENCES menu

The configuration of the second word is done in the REFERENCES menu:

	YY	£ 4	W W C. C. C.		: EXP 🖬 🗡	U 116	1			
lenu .	x	IPA	Short Description	Value	Default	Unit	Type	Min	Ma	х
Menu selection		600	Dig ramp ref 1	0	0	rpm	Short		***	
🗄 🎁 MainMenu	*	602	Dig ramp ref 2	0	0	rpm	Short			
- 🍘 MONITOR		604	Dig ramp ref 3	0	0	rpm	Short		***	
🜔 DRIVE INFO		610	Ramp ref 1 src	Fieldbus M->S2 mon	Analog inpu		Enum			
- DRIVE CONFIG		612	Ramp ref 2 src	Dig ramp ref 2	Dig ramp re		Enum			
REFERENCES		614	Ramp ref 3 src	Mpot output mon	Mpot output		Enum			
RAMPS		616	Ramp ref invert src	FR reverse mon	FR reverse		Enum			
	E	620*	Ramp ref 1 mon	0		rpm	Short			
		622*	Ramp ref 2 mon	0		rpm	Short			
MONITOR FUNCTION		624*	Ramp ref 3 mon	0		rpm	Short			
COMMANDS		634	Ramp ref top lim	1500	0	rpm	Int	0		
DIGITAL INPUTS		636	Ramp ref bottom lim	0	0	rpm	Int	0		
DIGITAL OUTPUTS		630	Reference skip set	0	0	rpm	Short	0		
- 🍘 ANALOG INPUTS		632	Reference skip band	0	0	rpm	Short	0		
ANALOG OUTPUTS		640	Dig speed ref 1	0	0	rpm	Short			
🜔 MOTOR DATA		642	Dig speed ref 2	0	0	rpm	Short			
CONFIG		650	Speed ref 1 src	Dig speed ref 1	Dig speed i		Enum			
PEED REG GAINS		652	Speed ref 2 src	Dig speed ref 2	Dig speed i		Enum			
TOPOUS CONSIG		654	Speed ref invert src	Null	Null		Enum			
TORQUE CONFIG	×	*033	Sneed ref 1 mon	0		mm	Short			
	_	•	III							t

After executing a save command and restarting the drive, it is possible to verify the correct configuration of the $M \rightarrow S$ channels as in the figure (HTML page):

П 🖻 🗐 🕄 ГС К	w	린믹	昂₩ ☎	' 🔁 🐿 🖾 🖨 🗑 🔶 🎽	EASY 🛍 🖋 🛈 🎞 🔥	니 탠 링					
nu	×	Fie	Idhue	M2S Words Mann	ina						
Menu selection		110	labas	m20 morus mapp	ing						
🕅 ENCODER CONFIG	*				Esc key						
🌔 SPEED REG GAINS		Mumha	w of norm	atom anabangadi 2							
- 🌔 REGULATOR PARAM		rumbe	a or paran	leters exchanged. 2							
🕅 TORQUE CONFIG		Numbe	er of word	s mapped: 2							
VF PARAMETERS											
FUNCTIONS											
		Word	Ioa	Parameter name	Format exchange						
FIELDRUS CONFIG		1	4452	Word decomp src	Count 16 - 16bit						
FIELDBUS M2S		2	610	Ramp ref 1 src	Eu - 16bit						
EIELDBUS S2M	m l		_ · _		-						
WORD COMP		-	<u> </u>								
WORD DECOMP		-	<u> </u>		· · ·						
ALARM CONFIG					l		-	<u> </u>			
APPLICATION								<u> </u>	-		
InterfaceMenu											
WIZARD	Е	-	1 · ·								
DIAGRAMS			1 · 1	-	· · ·						
DESTINATIONS				-	1 . 1	-	i				
E FIELDBUS WORDS MAP			1 • 1	-	i i						
🔄 M2S		-	· 1								
52M		-	· .	-	-						
📁 Recipes		-	-		-						
	*										

2.3.3 Writing Input Data

FIELDBUS S2M menu

These channels are configured in the FIELDBUS S2M menu. Wcomp is used to program the first channel.

The following figure shows the S2M programming:

🔯 📾 🗟 🛃 🎜 🛱 N	w 🖱 🖲	: R X 🖻 🖪 🖻	🖾 🖨 🔚 🔶 📍	EASY 🗰 🖋 🔘 📆	🚹 La 🖭 🥵 👘	
Menu	× IPA	Short Description	Value	Default value Uni	t Type	Min
Menu selection	4180	Fieldbus S->M1 ipa	4432	0	UnsignedShort	0
ENCODER CONFIG	4182	Fieldbus S->M1 sys	Count 16	Not assigned	Enum	
SPEED REG GAINS	4184	Dig Fieldbus S->M1	0	0	Int	
REGULATOR PARAM	4186	Fieldbus S->M1 mul	1	1	Float	1
- 🌔 TORQUE CONFIG	4190	Fieldbus S->M2 ipa	260	0	UnsignedShort	0
VF PARAMETERS	4192	Fieldbus S->M2 sys	Eu	Not assigned	Enum	
E-0 FUNCTIONS	4194	Dig Fieldbus S->M2	0	0	Int	
COMMUNICATION	4196	Fieldbus S->M2 mul	1	1	Float	1
RS485	4200	Fieldbus S->M3 ipa	1500	0	UnsignedShort	0
ETEL DRUS M2S	4202	Fieldbus S->M3 sys	Count 16	Not assigned	Enum	
FIELDBUS S2M	4204	Dig Fieldbus S->M3	0	0	Int	
WORD COMP	4206	Fieldbus S->M3 mul	1	1	Float	1
WORD DECOMP	4210	Fieldbus S->M4 ipa	0	0	UnsignedShort	0
ALARM CONFIG	4212	Fieldbus S->M4 sys	Not assigned	Not assigned	Enum	
APPLICATION	4214	Dig Fieldbus S->M4	0	0	Int	
🗇 🧮 InterfaceMenu	4216	Fieldbus S->M4 mul	1	1	Float	1
WIZARD	4220	Fieldbus S->M5 ipa	0	0	UnsignedShort	0
DIAGRAMS	4222	Fieldbus S->M5 sys	Not assigned	Not assigned	Enum	
	4224	Dig Fieldbus S->M5	0	0	Int	
M2S	- 4226	Fieldbus S->M5 mul	1	1	Float	1
4 III F	× -					

The following figure shows the Wcomp programming:

		IDA	Phort Description	Volue	Defaultualua	Unit Tune	Alie
iu	×	1PA	Short Description	Enchla state man	Delault value	Chill Type	MI
Menu selection		4400	Word bitto src	Enable state mon	NUI	Enum	
🕅 ENCODER CONFIG	^	4402	Word bit1 src	Drive OK	NUII	Enum	
SPEED REG GAINS		4404	Word bit2 src	Speed is U	Null	Enum	
REGULATOR PARAM		4406	Word bit3 src	NUII	NUI	Enum	
VE DADAMETERS		4408	Word bit4 src	Null	Null	Enum	
		4410	Word bitb src	Null	Null	Enum	
COMMUNICATION		4412	Word bit6 src	Null	Null	Enum	
C R5485		4414	Word bit7 src	Null	Null	Enum	
FIELDBUS CONFIG		4416	Word bit8 src	Digital input 4 mon	Null	Enum	
FIELDBUS M2S		4418	Word bit9 src	Digital input 5 mon	Null	Enum	
- PIELDBUS S2M		4420	Word bit10 src	Null	Null	Enum	
WORD COMP		4422	Word bit11 src	Null	Null	Enum	
WORD DECOMP		4424	Word bit12 src	Null	Null	Enum	
C ALARM CONFIG	=	4426	Word bit13 src	Null	Null	Enum	
APPLICATION		4428	Word bit14 src	Null	Null	Enum	
InterfaceMenu		4430	Word bit15 src	Null	Null	Enum	
WIZARD		4432*	Word comp mon	0000h		UnsignedInt	

Similarly, after saving and restarting the drive, it is possible to verify the correct programming of the Slave \rightarrow Master channels:

Menu selection Menu selection Poper Res GAINS Regulator Param Torque connig VF Parametres B-C FUNCTIONS	Fieldbus S Number of paramete Number of words m	2M Words Mappi rs exchanged: 3 apped: 3	Esc key	
COMMUNICATION	Word Ipa	Parameter name	Format exchange	
	1 4432	Word comp mon	Count 16 - 16bit	
ELEI DRUS MAS	2 260	Motor speed	Eu - 16bit	
	3 1500	Analog input 1 mon	Count 16 - 16bit	
PIELDBUS SZIVI		-		
WORD COMP				
WORD DECOMP		-	· · ·	
0 ALARM CONFIG		-		
APPLICATION		-		
InterfaceMenu		-		
WIZARD		-		
DIAGRAMS		-		
DESTINATIONS	1.1.1	-		
FIELDBUS WORDS MAP		1.1		
		-	- 1	
52M		-		
Recipes		-	-	
es:	•	III		,

2.3.4 Verification of the communication

The following are some notes/suggestions for verifying the communication.

- Cyclic input/output data communication is only active when parameter 4014 Fieldbus state is equal to "Operational". Check status via WEG_eXpress and expansion board LEDs.
- For Master → Slave communication in the FIELDBUS M2S menu, it is possible to check the value received by the communication channel (e.g. for the first channel is the parameter Fieldbus M→S1 Mon).
- In case of communication in EU (engineering units) remember that the value read on the Mon parameters of FIELDBUS M2S is in internal units (see conversion tables in chapter 5.0

SYSTEM INTERNAL VARIABLES, manual <u>https://www.weg.</u> net/catalog/weg/IT/en/p/MKT_WDC_GLOBAL_PRODUCT_ INVERTER_ADV200).

2.4 Example of a PLC program

The following is an example of a test carried out with Siemens TIA Portal software in Module structure mode.

2.4.1 Cyclic data

The first step is to import the GSDML file that is available in the drive catalogue in the Service/PROFINET folder for the installed FW version.

Project Edit View Insert Online	Options Tools Window Help	
📑 🖪 🗄 Save project 📑 🐰 💷 🕻	Y Settings	ne
Project tree	Support <u>p</u> ackages	11
Devices	Manage general station <u>d</u> escription files (GSD) Start <u>A</u> utomation License Manager	04
Device proxy data	Global libraries	



Insert the PLC controller and the drive into the network. The drive can be selected from the hardware catalogue in the PROFINET I/O \rightarrow Drives \rightarrow weg \rightarrow ADV200 folder.



Connect the drive to the PLC graphically and assign the network.



PROFINET Identify the device in the network IP and the address the device assign to and these settings within the drive properties. associate Select the fields that will be exchanged by selecting them in the hardware catalogue.

You will have to select in order the number of words exchanged from PLC to Drive (Q address ref. M2S) and the number of words exchanged from Drive to PLC (I address ref. S2M).

The number of fields that must be entered must be consistent with the maximum number of parameters set in parameters 5896 and 5898. The example follows the configuration described in the previous paragraphs with 2 Words in M2S and 3 Words in S2M. In this case parameters 5896 and 5898 must be set as:

- IPA 5896 M2S Max Words = 2
- IPA 5898 S2M Max Words = 3

In the example given above, the selection corresponds to the case below.



Access to the variables will be possible according to the addresses set in the I-Address (read – S \rightarrow M) or Q-Address (write M \rightarrow S) fields.

In the case of using structures with submodules it is possible to read and write data using the DPRD_DAT and DPWR_DAT functions as in the example:



For further details on the functions, we recommend you examine the manuals supplied by the PLC supplier.

2.4.2 Acyclic data

In addition to cyclic exchange (deterministic exchange based on the PLC task) it is possible to access all the elements of the inverter database, according to the parameter properties (read only, protected in enabling etc.).

In this mode it is possible to read and write the drive parameters in the same way as with the configurator using the Modbus protocol.

To access acyclic data you can use the RDREC and WRREC commands.

To read parameters use RDREC. The drive interface must be assigned in the ID field, while in the Index field you must assign the IPA address of the parameter you want to read. In MLEN assign the data length and in RECORD the support variable where to read the data.



In the case of writing with WRREC the procedure is similar, in this case the RECORD field is used to write the value on the drive.



3. Protocols

The EXP-ETH2-PN-ADV200 card is a device that allows the operation of PROFINET Real Time networks compatible with Conformance Class C. It supports both RT and IRT communication. In addition to PROFINET communication, it allows access to a webserver useful for displaying the operating status of the device and provides an Ethernet socket used for communication in Modbus - TCP - IP useful for drive configuration.

3.1 PROFINET connection details

3.1.1 General

PROFINET IO defines three Conformance Classes that are based on each other and are oriented towards typical applications.



- CC-A provides basic functions for PROFINET IO with RT communication.
- **CC-B** extends the concept to include network diagnostics via IT mechanisms in addition to topology information.
- CC-C describes the basic functions for devices with hardwaresupported bandwidth reservation and synchronisation (IRT communication) and is therefore the basis for isochronous applications.

ADV200 implements PROFINET RT CC-A and CC-B and allows for the possibility of supporting IRT CC-C networks. An 'IO Device' is identified by the station name. Connection establishment, parameterisation and alarm management are implemented with UDP.

This requires that the **IO Device** also be assigned an IP (Internet Protocol) address in addition to the MAC (Media Access Control) hardware address. Two methods have been established for allocating the IP address, subnet mask and default gateway:

- **DCP**: Discovery and Configuration Protocol;
- DHCP: Dynamic Host Configuration Protocol.

After identifying the IO Device by means of the station name, the **IO Controller** assigns the preconfigured IP address to the **IO Device**.

3.1.2 Establishing the connection

The connection begins with the IO Controller requesting a connection to the IO Device, establishing an application relationship (AR) that includes several communication relationships (CR) between the two. These CRs support the exchange of cyclic data, log data, alarm management and multicasting of cyclic data. After the IO Device recognises the connection instance, the parameterisation is configured. Subsequently, the cyclical data of the I/O processes are cyclically exchanged between the IO Controller and IO Device, keeping the connection active by means of empty data frames. Once all the sub-modules have been configured, the IO Controller signals the end of parameterisation and the IO Device confirms the availability of the application. The cyclic update of valid I/O process data is initiated by the IO Device, followed by the IO Controller, while alarm notifications are exchanged acyclically. The connection terminates when the watchdog time expires, unless it is intentionally terminated by the IO Controller, which will attempt to restart the connection cycle.

3.1.3 Real Time Communication

Real-time data transmission (RT/IRT) in PROFINET IO is based on a cyclical exchange of data between provider and consumer. Using the ISO/OSI model-compliant layer 2 communication mechanisms, ProfiNet IO message frames have priority over standard message frames, guaranteeing the determinism required for automation. Real-time classes allow scalability and improve determinism through data exchange. Although update times can be reduced to 250 μ s in RT, with ADV200 the minimum update time for cyclic data is 1 ms. The maximum real-time (cyclic) data exchange is 32 bytes output and 32 bytes input.

3.1.4 Acyclic data exchange

Acyclic data exchange can be used to parameterise and configure IO devices or to read status information. This is achieved with read/write frames using standard IT services that use UDP/IP. Using this mode, the PLC can read and write all the parameters available from the drive, verifying the accessibility rights of the individual parameters. This information is read with indeterminable times and the update time can depend on the complexity of the data to be read and the bandwidth usage.

3.2 PROFIdrive profile

The drive can be configured to operate with the PROFIdrive profile and/or to operate only in PROFINET mode, by changing parameter 4000 **Fieldbus type** in the **COMMUNICATION/FIELDBUS CONFIG** menu. Selecting **RTE** selects PROFINET mode. Selecting "PROFIdrive" activates Profidrive mode. The active mode is visible in parameter 4398 **RTE Protocol** (visible only if the **Access level** is set to **Expert** in the **DRIVE CONFIG** menu). The different modes require different configurations for data exchange on the drive and different modules to be selected on the Master.

3.2.1 Cyclic data exchange

The **Cyclic data exchange** is automatically configured based on **Standard Telegram 1**:

Figure 1 - Description of the Standard Telegram1 profile type

	Word 1	Word 2	Word 3	 Word 16	
Input	STW1	NSOLL_A	User-defined	 User-defined	
Output	ZSW1	NIST_A	User-defined	 User-defined	

STW1: Control Word 1 NSOLL_A: Speed Setpoint A ZSTW1: Status Word 1 NIST_A: Speed actual value A

With PROFIdrive, the **Standard Telegram 1** is preconfigured for data exchange, in the **FIELDBUS M** \rightarrow **S** menus for input data and in the **FIELDBUS S** \rightarrow **M** menu for output data, while additional user-defined words can be selected by the user in the same menus to correspond to the module selected on the master. When working in "PROFIdrive Mode", the ADV200 acts as a

"Standard Drive" in "Application Class 1" with a desired speed value. The drive is executed based on the ProfiDrive status of the machine, cyclic data is exchanged based on "Standard Telegram 1".

3.2.2 Quick Start Guide with "Standard Telegram 1"

The configuration described in this paragraph corresponds to the default "Standard Telegram 1" module on the master. To activate "PROFIdrive Mode" on the ADV200, set parameter 4000 Fieldbus type to ProfiDrive.

PAR	Description	Value
4000	Fieldbus type	ProfiDrive

In the **COMMUNICATION/FIELDBUS CONFIG** menu save the parameters and restart the drive to apply the mode. Upon restarting, check the active "RTE Protocol" in the same menu at parameter 4398 which should show the value "PROFIdrive".

PAR	Description	Value
4398*	RTE Protocol	ProfiDrive

The following parameters are automatically set in the **COMMUNICATION/FIELDBUS M** \rightarrow **S** menu and correspond to STW1 and NSOLL_A:

PAR	Description	Value
4020	Fieldbus $M \rightarrow S1$ ipa	4346
4022	Fieldbus $M \rightarrow S1$ sys	Count 16
4030	Fieldbus $M \rightarrow S2$ ipa	610
4032	Fieldbus $M \rightarrow S2$ sys	Count 16

In the COMMUNICATION/FIELDBUS $S{\rightarrow}M$ menu, ZSW1 and NIST_A are set:

PAR	Description	Value
4180	Fieldbus $S \rightarrow M1$ ipa	4394
4182	Fieldbus S \rightarrow M1 sys	Count 16
4190	Fieldbus $S \rightarrow M2$ ipa	260
4192	Fieldbus $S \rightarrow M2$ ipa	Count 16

NIST_A is associated with parameter 260 **Motor Speed**. This parameter contains a filtered speed value. If the filter needs to be adjusted for a faster response, the value of parameter 30 **Display spd filter** can be changed from the default value of 200 ms:

PAR	Description	Value
30	Display spd filter	200

This parameter is included in the **SERVICE/FIELDBUS SERVICE** menu, Expert access mode, and the service passwords are required to modify it.

In the COMMANDS menu, the control word is activated.

PAR	Description	Value
1000	Commands remote sel	Digital
1018	Digital Enable src	-
1020	Digital Start src	-
1022	Faststop src	-

The following parameters must be manually set to **Off** to operate the drive remotely:

PAR	Description	Value
1004	Enable / Disable mode	Off

If the hardware enable terminal is active when the drive is powered, the following parameter must also be set to **Off**.

PAR	Description	Value
1010	Command Safe Start	Off

Se la funzione Jog di ProfiDrive è necessaria, inserire anche un valore valido.

PAR	Description	Value
910	Jog setpoint	200 rpm

In the JOG FUNCTION menu.

- This value is used as a reference for PROFIdrive:
- Jog 1 is the 'Jog setpoint' with a positive value;
- Jog 2 is the 'Jog setpoint' with a negative value.

When the configuration is complete, save the parameters on the drive. There is no need to restart the drive. The values are applied immediately. When the module is applied to the master or the drive is powered, 'Cyclic data exchange' is made available.

This can be checked in the **Operational** status in the following parameter:

PAR	Description	Value
4014*	Fieldbus state	Operational

This table is an example of a sequence of commands to start the drive, with the responses, based on the state machine for Application 1 (further details available in "Protocols: PROFIdrive State Diagram"):

PI	C	Dri	ive	Status
STW1	NSOLL_A	ZSW1	NIST_A	
0x400	0x4000	0x340	0	S1
0x406	0x4000	0x331	0	S2
0x407	0x4000	0x333	0	S3
0x47F	0x4000	0x337	0	S4
0x47F	0x4000	0x737	0x4000	S4, speed reached

4. Alarms

If the drive detects a problem related to PROFINET communication, it can generate the 'Opt bus fault' alarm, indicating the presence of an error condition. The 'Opt bus fault' alarm can be generated for a different series of causes:

- Configuration alarm. It appears when the drive starts (you need to press Esc to continue: however, PROFINET communication will not be available). Indicates a nonrecoverable problem in the drive configuration or in the EXP-ETH2-PN-ADV200 board. Check the settings in the "Fieldbus", "Fieldbus M2S" and "Fieldbus S2M" menus. The alarm subcode provides an indication of the cause of the problem.
- Hardware alarm. Irrecoverable problem on the EXP-ETH2-PN-ADV200 card, which occurs after start-up and during normal operation. If it recurs, it may be necessary to replace the card.
- Bus loss alarm, with SubCode = 0. Indicates loss of communication (transition from Run to Off status of the network) when the drive is enabled, or parameter 4012 = 1. Data exchange must be active (4014 = Operational) when the drive is enabled.

Subcode	Description	Notes	
0	Bus loss	Loss of connection to the scanner or Industrial Ethernet status no longer operational	
0x8101	System error	If not recoverable, replace module	
0x8102,0x8104	DPRAM Error, after WarmStart	If not recoverable, replace module	
0x8110	Not Ready timeout, NetX not available	If not recoverable, replace module	
0xFF02	Communication with module not available	DPRAM not recognised. Replace module	
0xFF04	Module software version not compatible		
FF01	Fieldbus type not suitable for expansion card	Check if EXP-ETH2-IP-ADV200 card is installed correctly	
FF14FF23	Object selected not valid for mapping to Channel M2S n	Check 'Fieldbus M→Dest Sn'	
FF24FF33	More than 1 Src points to Channel M2S n	Check multiple destinations on 'Fieldbus M—Dest Sn'	
FF34FF43	Channel M2S n, invalid data size (16 bit on 32 bit parameter or 32 bit on 16 bit parameter)	Check 'Fieldbus M→Sn sys'	
FF44FF53	Invalid parameter on Channel S2M	Check 'Fieldbus S \rightarrow Mn src'	
FF54FF63	Channel M2S n, invalid data size (16 bit on 32 bit parameter or 32 bit on 16 bit parameter)	Check 'Fieldbus S→Mn sys'	
FF64FF73	Selected object invalid for mapping on Channel S2M n	Check 'Fieldbus S \rightarrow Mn src'	
FF74FF83	M2S Channel n: too many words in PDC	Address 'Fieldbus M→Sn Dest' and address 'Fieldbus M→Sn sys' greater than 16 words in PDC	
FF84FF93	S2M Channel n: too many words in PDC	Address 'Fieldbus S→Mn src' Address 'Fieldbus S→Mn sys' greater than 16 words in PDC	
FFB4FFC3	Internal database error on Channel n	Internal error, contact manufacturer	

Depending on parameter 4670 **Optionbus activity**, it is possible to set the action that the drive must take in the event of a communication loss condition. The default setting is "Disable" and indicates that the drive must be disabled. It is possible to choose "Warning" to allow the drive to continue operating, but showing the

presence of the error. For more details, consult the drive manual. With WEG_eXpress it is possible to obtain a description of the cause that generated the "Opt bus fault" alarm, by connecting to the relative HTML page as shown in the following figure:

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Menu selection						.9			
- P ENCODER CONFIG	-					Esc key			
- P SPEED REG GAINS									
REGULATOR PARAM		N	umber	of para	meters exchanged: 2				
TORQUE CONFIG		N	umber	of work	ds mapped: 2				
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H- C FUNCTIONS		C	oningu	irauor	remor - subcode. FF35n - M25	channel 2, data size	r is wrong (16 bits on 32 b	its or 52 bits on 16 bits paramete	
COMMUNICATION									
- 1 R5485		1	Word	Ipa	Parameter name	Format exchange			
EIELDBUS CONFIG		E	1	4452	Word decomp arc	Count 16 - 16bit	1		
FIELDBUS M2S		1	2	3700	Pad 1	Count 16 - 16bit	1		
FIELDBUS S2M									E
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5. Drive configuration in Modbus-TCP

The card allows the drive to be configured via Modbus-TCP communication, superimposed on the dedicated Ethernet network for field-bus communication. The drive can be configured and monitored using the WEG_eXpress and WEG Softscope 3 tools.

6. Connection type

It is possible to make a Peer to Peer connection and/or a remote connection.

In the first case (peer to peer), the connection is made with a local PC connected to the communication network as shown in the figure.



Extra Ethernet (Modbus TCP) traffic

In the second use case (remote), the PROFINET network and the IT network must be appropriately configured to avoid excessive overlapping of data exchange.

To manage the connection between different networks, it is mandatory to use industrial routers that allow the partialisation of data exchange based for example on router technology (natting tables).

Access and communication security must be guaranteed by specific firewall-router protections.



7. WEG_eXpress

To configure the device parameters from WEG_eXpress, the functionality must be enabled within the communication tool with TCP/IP.

Procedure:

 Open the WEG_eXpress tool and select DRIVES, then select INVERTER and choose the ADV200 family drive from the drop-down menu:



- Click on Manual to set manual configuration (automatic mode is not available);
- 3. Select the FW of the connected drive (click on **Select** version).

In the case of connection via Modbus RTU, set the communication data and press **Select**. In the case of connection via Modbus-CP, deselect 'Online mode' and follow the next steps.

шер	WEG_eXpress
3	
	Automatic
ADV200	Manual selection for ADV200
	Select version: 7x20 7x20 PID 2x1.0 7x20 PID 2x1.0 Protocol: Modbus V Port COM 1 Baud: 38400 V Address: 1 Line conf: N.8.1
	SELECT
2 - and	all the first and the

 To enable communication with TCP / IP open the dropdown menu Target / Communication settings and select ModbusTCP:

Target	Service	Help	
✓ Co	nnect		
Co	mmunica	tion settings	
DeviceLink!	Manager Conf	fig 12.1.0.45	×
Selected pro	tocol :	Modbus	
Protocols		Active	^
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Descriptio Modbus Pr	Properties n	Activate OK Can	icel

 Click on Activate and then Properties, a window opens where the IP address and Modbus address of the connected device can be set. The address is the same as the one assigned for Ethernet IP communication. The same procedure can also be applied to Softscope 3. Press OK.

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Cancel

8. References

- https://www.profinet.com/fileadmin/profinet/Implementation/ PROFINET-Field-Devices-EN.pdf
- ADV200 manual "Quick Start Guide Specification and Installation"
- ADV200 manual with "Description of Functions and Parameters" list

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