PowerXL™

DX-NET-ETHERNET-2
Field bus connection EtherNet/IP
for Variable Frequency Drives DA1

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Original Operating Instructions
The German-language edition of this document is the original operating manual.

Translation of the original operating manual
All editions of this document other than those in German language are translations of the original German manual.

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Production: René Wiegand
Translation: globaldocs GmbH

Danger!
Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit the device.
- Cover or enclose any adjacent live components.
- Follow the engineering instructions (AWA/IL) for the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE, PES) must be connected to the protective earth (PE) or the potential equalisation. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that an open circuit on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the extra-low voltage of the 24 V supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause a restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed and with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented.
- Wherever faults in the automation system may cause injury or material damage, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks etc.).
- Depending on their degree of protection, frequency inverters may contain live bright metal parts, moving or rotating components or hot surfaces during and immediately after operation.
- Removal of the required covers, improper installation or incorrect operation of motor or frequency inverter may cause the failure of the device and may lead to serious injury or damage.
- The applicable national accident prevention and safety regulations apply to all work carried on live frequency inverters.
- The electrical installation must be carried out in accordance with the relevant regulations (e. g. with regard to cable cross sections, fuses, PE).
- Transport, installation, commissioning and maintenance work must be carried out only by qualified personnel (IEC 60364, HD 384 and national occupational safety regulations).
- Installations containing frequency inverters must be provided with additional monitoring and protective devices in accordance with the applicable safety regulations. Modifications to the frequency inverters using the operating software are permitted.
- All covers and doors must be kept closed during operation.
- To reduce the hazards for people or equipment, the user must include in the machine design measures that restrict the consequences of a malfunction or failure of the drive (increased motor speed or sudden standstill of motor). These measures include:
  - Other independent devices for monitoring safety-related variables (speed, travel, end positions etc.).
  - Electrical or non-electrical system-wide measures (electrical or mechanical interlocks).
  - Never touch live parts or cable connections of the frequency inverter after it has been disconnected from the power supply. Due to the charge in the capacitors, these parts may still be live after disconnection. Fit appropriate warning signs.

Table of contents

0 About this Manual

0.1 Target group

This manual describes the EtherNet/IP connection DX-NET-ETHERNET-2 for the variable frequency drives of the DA1 device series.

It is aimed at experienced drive specialists and automation technicians. A thorough knowledge of the EtherNet/IP field bus and the programming of a EtherNet/IP master is required. Knowledge of handling the DA1 variable frequency drive is also required.

Please read this manual carefully before installing and operating the EtherNet/IP connection.

We assume that you have a good knowledge of engineering fundamentals, and that you are familiar with handling electrical systems and machines, as well as with reading technical drawings.

To make it easier to understand some of the images included in this manual, the housing and other safety-relevant parts have been left out.
The components described here must be used only with a properly fitted housing and all necessary safety-relevant parts.

Please follow the notes in the IL040004ZU instruction leaflet.

All the specifications in this manual refer to the hardware and software versions documented in it.

More information on the series described here can be found on the Internet under:

www.eaton.eu/powerxl

0.2 Writing conventions

Symbols used in this manual have the following meanings:

▶ Indicates instructions to be followed.

0.2.1 Hazard warnings of material damages

NOTICE

Warns about the possibility of material damage.

0.2.2 Hazard warnings of personal injury

CAUTION

Warns of the possibility of hazardous situations that may possibly cause slight injury.

WARNING

Warns of the possibility of hazardous situations that could result in serious injury or even death.

DANGER

Warns of hazardous situations that result in serious injury or death.

0.2.3 Tips

Indicates useful tips.

0.3 Abbreviations and Symbols

The following abbreviations are used in this manual:

ADI	Application Data Instance
CIP	Common Industrial Protocol
CW	Command
EDS	Electronic Data Sheet
EMC	Electromagnetic compatibility
EtherNet/IP	Ethernet Industrial Protocol
FB	Field bus
FS	Frame Size
GND	Ground (0 V potential)
LED	Light Emitting Diode (LED)
LSB	Least significant bit
MSB	Most significant bit
PC	Personal Computer
PNU	Parameter number
PD	Process Data
PLC	Programmable logic controller
SW	Status Word
UL	Underwriters Laboratories
VSC	Vendor Specific Class

0.4 Units

Every physical dimension included in this manual uses international metric system units, otherwise known as SI (Système International d'Unités) units. For the purpose of the equipment's UL certification, some of these dimensions are accompanied by their equivalents in imperial units.

Table 1: Unit conversion examples

Designation	US-American value	US-American designation	SI value	Conversion value
Length	1 in ('')	inch	25.4 mm	0.0394
Power	1 HP = 1.014 PS	horsepower	0.7457 kW	1.341
Moment of torque	1 lbf in	pound-force inches	0.113 Nm	8.851
Temperature	1 °F (T_F)	Fahrenheit	-17.222 °C (T_C)	$T_F = T_C \times 9/5 + 32$
Rotational speed	1 rpm	Revolutions per minute	1 min^{-1}	1
Weight	1 lb	pound	0.4536 kg	2.205
Flow rate	1 cfm	cubic feet per minute	1.698 m^3/n	0.5889

1 Device series

1.1 Checking the Delivery

→ Before opening the package, please check the nameplate on it to make sure that you received the correct connection.

Your fieldbus connection was carefully packaged and handed over for shipment. The devices should be shipped only in their original packaging with suitable transportation materials. Please observe the labels and instructions on the packaging and for handling the unpacked device.

▶ Open the packaging with adequate tools and inspect the contents immediately after receipt in order to ensure that they are complete and undamaged.

The packaging must contain the following parts:

- A fieldbus connection DX-NET-ETHERNET-2,
- the instruction leaflet IL040004ZU.

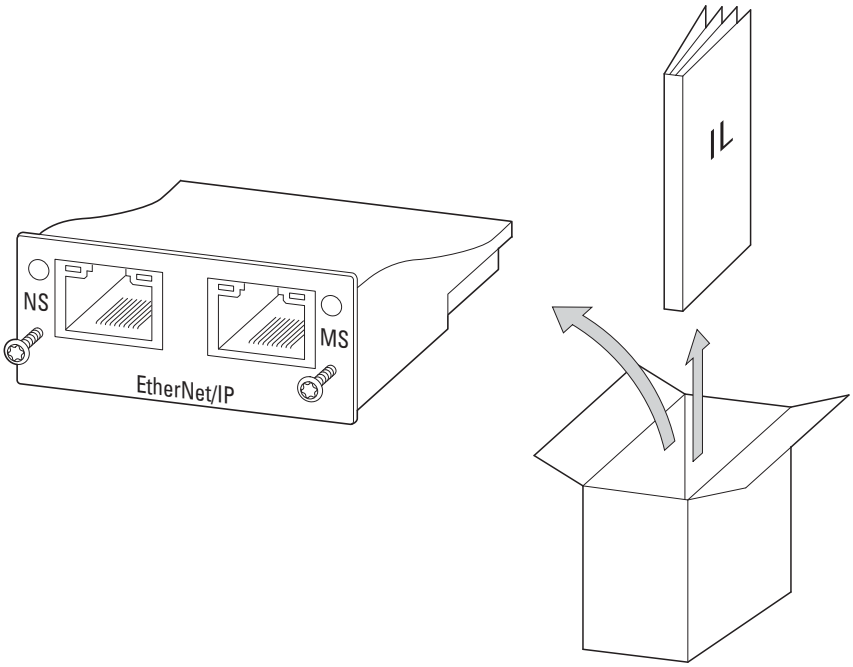


Figure 1: Equipment supplied with fieldbus connection DX-NET-ETHERNET-2

1.2 Key to part numbers

The catalog number selection and the part no. for the DX-NET-… field bus connection card have the following syntax:

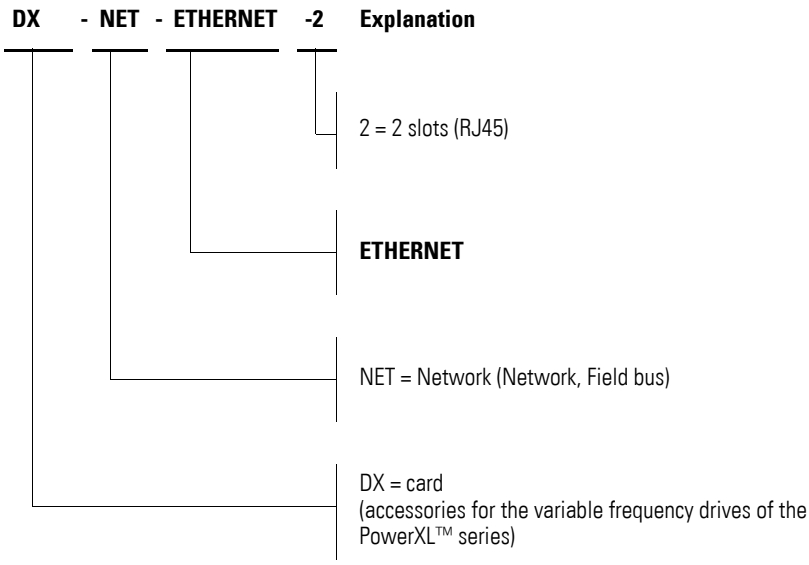


Figure 2: Catalog number selection of field bus interface card DX-NET-…

1.3 General rated operational data

Technical Data	Symbol	Unit	Value
General			
Standards			meets the requirements of the EN 50178 (standard for electrical safety)
Production quality			RoHS, ISO 9001
Ambient conditions			
Operation temperature	ϑ	°C	-40 (no hoarfrost) up to +70
Storage temperature	ϑ	°C	-40 - +85
Climatic proofing	p_w	%	< 95, relative humidity, no condensation permitted
Installation altitude	H	m	max. 1000
Vibration	g	m/s^2	5 – according to IEC 68-2-6; 10 - 500 Hz; 0.35 mm
EtherNet/IP connections			
Interface			RJ45 plug
Data transfer			10/100 MBit/s full duplex/half duplex/ Automatic baud rate detection
Transfer cable			Twisted two-pair balanced cable (screened)
Communication protocol			
EtherNet/IP			IEC 61158
Baud rate		MBit/s	10/100

1.4 Designation at DX-NET-ETHERNET-2

The following drawing shows the DX-NET-ETHERNET-2 fieldbus connection for EtherNet/IP with two RJ45 ports.

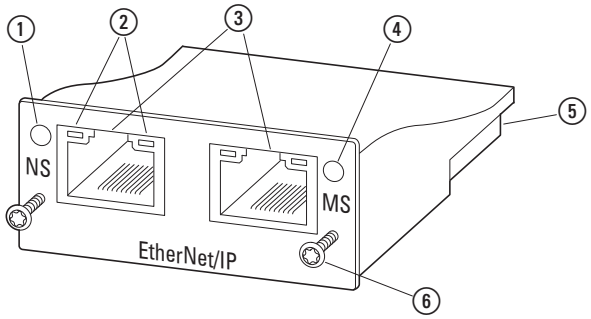


Figure 3: Designations at DX-NET-ETHERNET-2

① Network status LED (NS)
② LINK/Activity-LED
③ RJ45 sockets
④ Module status LED (MS)
⑤ 50-pole adapter extension
⑥ Screws for securing DA1 variable frequency drive

1.5 Proper use

The DX-NET-ETHERNET-2 fieldbus connection is an electrical piece of equipment that can be used to control DA1 variable frequency drives and connect them to a standard EtherNet/IP field bus system. It is intended to be installed in a machine or assembled with other components into a machine or system. It makes it possible for DA1 series variable frequency drives to be integrated as I/O devices into EtherNet/IP field bus systems.

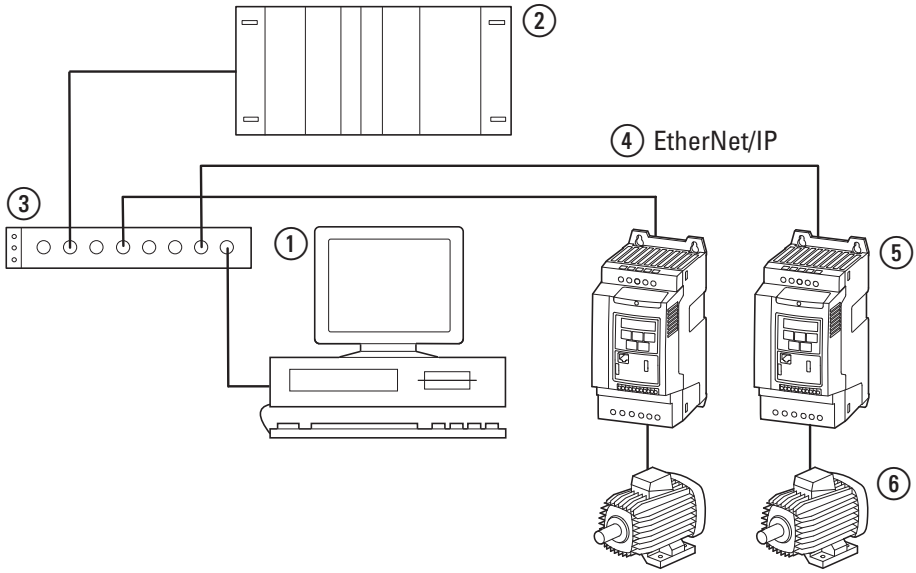


Figure 4: How the DX-NET-ETHERNET-2 fieldbus connection can be integrated into a EtherNet/IP network

① PC
② Head controller (I/O controller)
③ Switch
④ EtherNet/IP cable
⑤ DA1 variable frequency drive with DX-NET-ETHERNET-2 connection
⑥ Motor(s)

→ The DX-NET-ETHERNET-2 fieldbus connection is not a household appliance, but rather a component intended exclusively for use in commercial applications.

→ Observe the technical data and connection requirements described in this manual.
Any other usage constitutes improper use.

1.6 Maintenance and inspection

The DX-NET-ETHERNET-2 fieldbus connection will not require any maintenance if the general rated operational data (→ Page 9), as well as all EtherNet/IP-specific technical data, is adhered to. However, external factors can influence the components's lifespan and function. We therefore recommend that the devices are checked regularly and the following maintenance measures are carried out at the specified intervals.

Table 2: Recommended maintenance

Maintenance measures	Maintenance interval
Check the filter in the control panel doors (see the manufacturer's specifications)	6 - 24 months (depending on the environment)
Check the tightening torques of the control signal terminals	regularly
Check connection terminals and all metallic surfaces for corrosion	6 - 24 months (depending on the environment)

The DX-NET-ETHERNET-2 fieldbus connection has not been designed in such a way as to make it possible to replace or repair it. If the card is damaged by external influences, repair is not possible.

1.7 Storage

If the fieldbus connection is stored before use, suitable ambient conditions must be ensured at the site of storage:

- Storage temperature: -40 - +85 °C,
- Relative average air humidity: < 95 %, no condensation permitted.

1.8 Service and warranty

Contact your local sales partner if you have a problem with your Eaton fieldbus connection.
When you call, have following data ready:

- the exact part no. (= DX-NET-ETHERNET-2),
- the date of purchase,
- a detailed description of the problem which has occurred with the DX-NET-ETHERNET-2 fieldbus connection.

Information concerning the guarantee can be found in the Terms and Conditions Eaton Industries GmbH.

24-hour hotline: +49 (0) 180 5 223 822
e-mail: AfterSalesEGBonn@Eaton.com

1.9 Disposal

The DX-NET-ETHERNET-2 fieldbus connection can be disposed of as electrical waste in accordance with the currently applicable national regulations. Dispose of the device according to the applicable environmental laws and provisions for the disposal of electrical or electronic devices.

2 Engineering

2.1 EtherNet/IP

EtherNet/IP (Ethernet Industrial Protocol) is an open industrial standard that is based on the standards for "normal" Ethernet (IEEE 802.3) and that expands on them with an industrial protocol. EtherNet/IP can be used to connect devices from different vendors to each other, as well as to have these devices communicate with each other.

The EtherNet/IP protocol supports communications between various control products, enabling devices to transfer time-critical application data between each other in an industrial environment. The spectrum of supported devices ranges from simple I/O devices (e.g., sensors) to complex controllers.

EtherNet/IP supports the TCP/IP protocol family and expands it for controller applications with the Common Industrial Protocol (CIP). CIP is used as a real-time application protocol for inputs/outputs.

The number of cards on a EtherNet/IP system is virtually unlimited.

2.2 LED indicators

The module's LED indicators are used to indicate operating andnetwork statuses, making quick diagnostics possible.

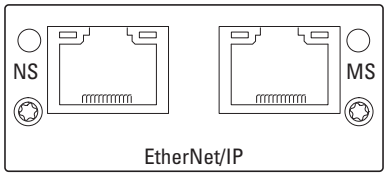


Figure 5: NS and MS LED indicators

2.2.1 NS (Network status)

The network status LED (NS) is used to indicate network statuses.

LED status	Description
off	No supply voltage or no IP address
green illuminating	Connection to EtherNet/IP network established
green flashing	online, but no communication
illuminated red	Error detected (e.g., same IP address assigned twice)
red flashing	Fault detected (e.g., connection request timeout)

2.2.2 MS (Module Status)

The module status LED (MS) is used to indicate the EtherNet/IP module's status.

LED status	Description
off	No supply voltage or device not turned on
green illuminating	Connection to EtherNet/IP controller established
green flashing	Configuration error or module in standby mode
illuminated red	Fatal error detected [1]
red flashing	A reversible error has occurred [1]

1) Reversible errors can be reset by means of a reset or by power cycling the supply voltage (turning it off and then back on). In contrast, fatal errors can only be reset by power cycling the supply voltage or by changing the hardware configuration while the supply voltage is off, as the case may be.

2.2.3 LINK/Activity-LED

The LINK/Activity LED is used to indicate communications statuses.

LED status	Description
off	No communications or port not connected
green illuminating	Communications established (100 Mbit/s), port connected
green flashing	Data transfer active (100 Mbit/s)
illuminated yellow	Communication established (10 Mbit/s)
yellow flashing	Data transfer active (10 Mbit/s)

3 Installation

3.1 Introduction

This chapter provides a description of the mounting and the electrical connection for the fieldbus connection DX-NET-ETHERNET-2.

→ While installing and/or mounting the field bus connection, cover all ventilation slots in order to ensure that no foreign bodies can enter the device.

→ Perform all installation work with the specified tools and without the use of excessive force.

In the case of DA1 variable frequency drives, the way in which the DX-NET-ETHERNET-2 fieldbus connection needs to be installed will depend on the corresponding variable frequency drive's size.

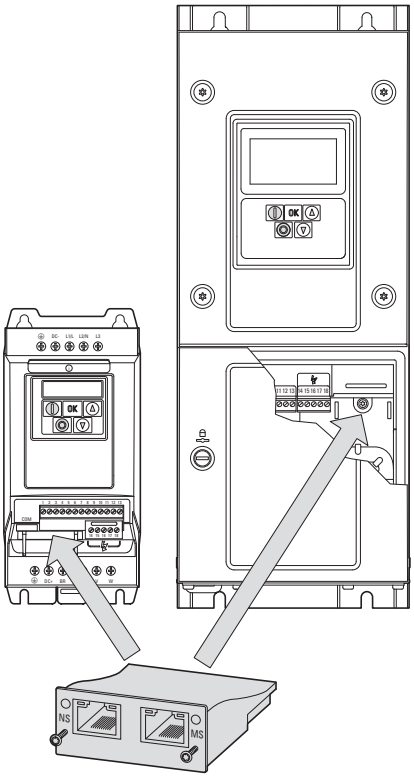


Figure 6: Flush mounting of fieldbus connection

In the case of DA1 variable frequency drives with sizes FS2 and FS3, the fieldbus connection will need to be plugged into the variable frequency drive from below. In the case of sizes FS4 and up, the fieldbus connection will need to be mounted on the right side, underneath the variable frequency drive's front enclosure cover.

3.2 Notes on the documentation

Documents containing installation instructions:

- IL4020010Z instruction leaflet for DA1 variable frequency drive in size FS2 and FS3
- IL4020011Z instruction leaflet for DA1 variable frequency drive from size FS4

These documents are also available as PDF files on the Eaton Internet website. They can be quickly located at

www.eaton.com/moeller → Support

by entering the document number as the search term.

3.3 Notes on the mechanical surface mounting

DANGER

Make sure that the equipment is fully de-energized when performing the handling and installation work required to mechanically set up and install the fieldbus connection.

When installing the DX-NET-ETHERNET-2 fieldbus connection, it will be necessary to open the DA1 variable frequency drive's enclosure. We recommend that this mounting work be carried out before the electrical installation of the variable frequency drive.

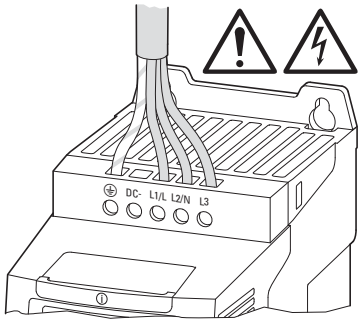


Figure 7: Make sure that the equipment is de-energized when performing installation work

3.4 Mounting for frame sizes FS2 and FS3

In the case of DA1 variable frequency drives with sizes FS2 and FS3, the NET-ETHERNET-2 fieldbus connection needs to be installed on the bottom of the variable frequency drive. To do this, use a flat-blade screwdriver to lift off the cover at the marked cutout (without forcing it) and then remove the cover by hand.

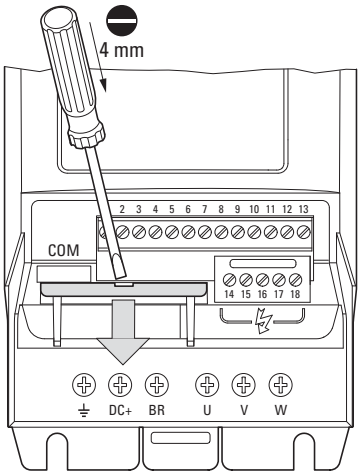


Figure 8: Opening the interface cover

> *NOTICE*
>
> Do not insert tools or other objects into the opened variable frequency drive.
> Ensure that foreign bodies do not enter the opened housing wall.

After doing so, you can insert the connection and secure it with the two screws.

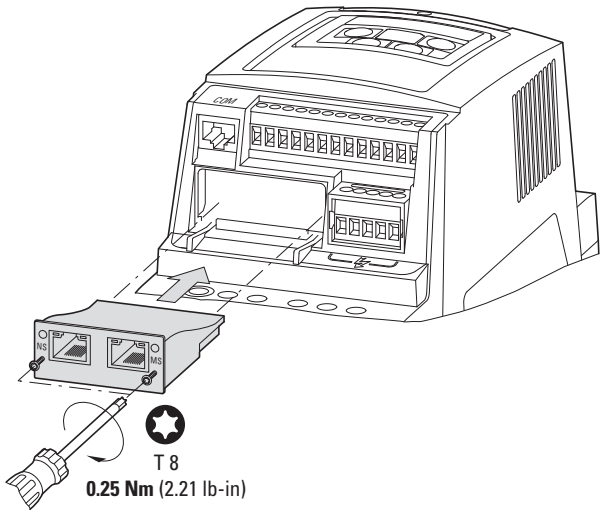


Figure 9: Inserting the fieldbus connection

3.5 Mounting from construction size FS4

When working with DA1 variable frequency drives of size FS4 or larger, the DX-NET-ETHERNET-2 fieldbus connection must be installed inside the variable frequency drive. To do so, use a standard screwdriver to turn the two screws on the front cover 90°. Then proceed to remove the cover.

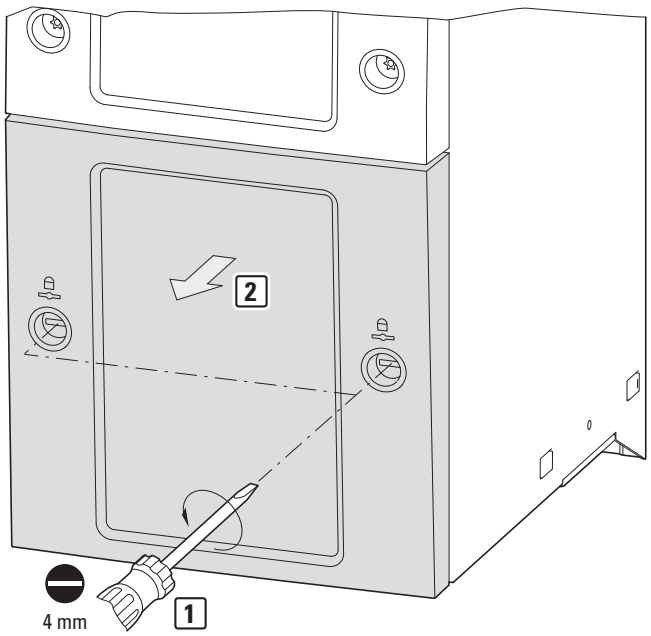


Figure 10:Opening the enclosure of DA1 variable frequency drives with size FS4 and up

NOTICE

Do not insert tools or other objects into the opened variable frequency drive.
Ensure that foreign bodies do not enter the opened housing wall.

After doing so, you can insert the connection on the right-hand side and use the screws to secure it.

Then put the cover back on and use the two screws (turn them 90°) to secure it.

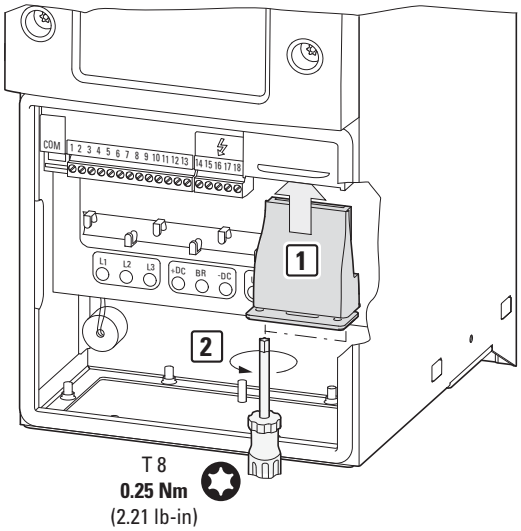
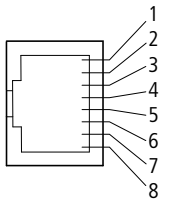


Figure 11:Inserting the fieldbus connection

3.6 Installing the fieldbus connection

An RJ45 plug is used in order to establish a connection to the EtherNet/IP field bus.

Generally, connection cables with RJ45 plugs for EtherNet/IP are available as standard ready-for-use cables. They can also be prepared individually. This will require the connections shown below (pinout).



Pin	Meaning
1	TD+
2	TD-
3	RD+
4	To GND via RC circuit
5	To GND via RC circuit
6	RD-
7	To GND via RC circuit
8	To GND via RC circuit

Figure 12:RJ45 plug pinout

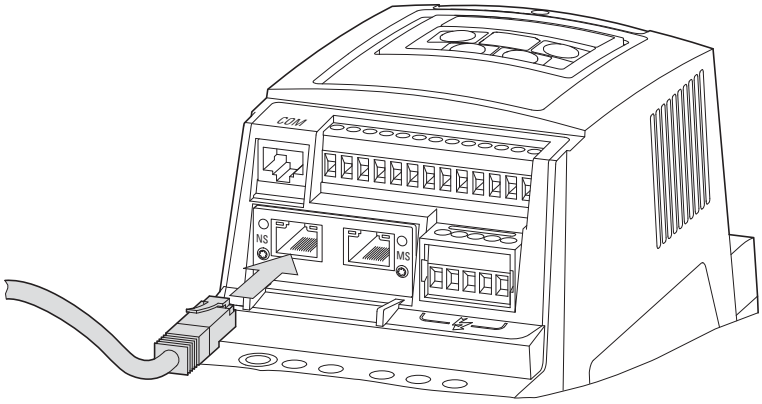


Figure 13:Connecting the RJ45 plug

3.7 Install field bus

Never lay the cable of a field bus system directly parallel to the energy carrying cables.

When installing the connection, make sure that the control and signal cables (0 - 10 V, 4 - 20 mA, 24 V DC, etc.), as well as the field bus system's (EtherNet/IP) connection cables, are not routed directly parallel to mains connection or motor connection cables conveying power.

With parallel cable routing, the clearances between control, signal and field bus cables ② and energy-carrying mains and motor cables ① must be greater than 30 cm. Cables should always intersect at right angles.

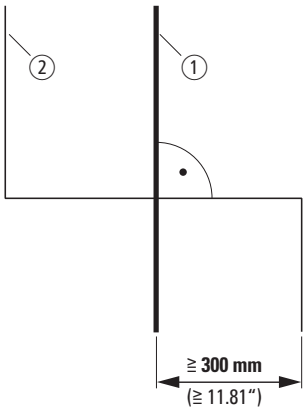


Figure 14:Cable routing for EtherNet/IP ② and mains/motor cables ①

If the system requires a parallel routing in cable ducts, a partition must be installed between the field bus cable ② and the mains and motor cable ①, in order to prevent electromagnetic interference on the field bus.

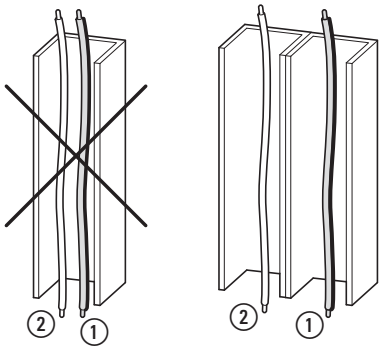


Figure 15:Separate routing in the cable duct

① Mains and motor connection cable
② EtherNet/IP cable

In all cases only use approved EtherNet/IP cables.

4 Commissioning

4.1 DA1 variable frequency drives

→ First of all complete all measures for commissioning the DA1 variable frequency drive as described in the respective manual MN04020005Z-EN.

→ Check the settings and installations for the connection to the EtherNet/IP field bus system which are described in this manual.

NOTICE

Make sure that there is no danger in starting the motor. Disconnect the driven machine if there is a danger in an incorrect operating state.

→ For communications, parameter P12 (drive control) must be set as follows in the DA1 variable frequency drive: P12 = 4.

For detailed information on how to configure parameters, please refer to manual MN04020005Z-EN.

4.2 EDS file

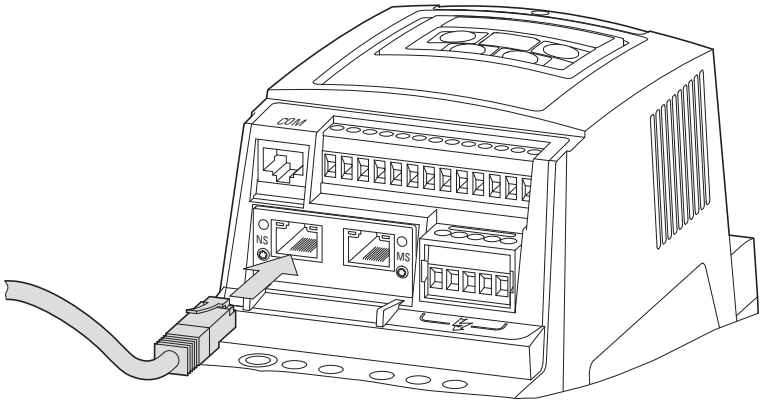
The properties of a EtherNet/IP card are described in the corresponding EDS file. This file is required in order to be able to integrate a DA1 variable frequency drive into a EtherNet/IP network.

→ The EDS file, named "Eatn69122.eds", can be found on the CD-ROM and on the Internet at:

www.eaton.com/moeller → **Support** → **Downloads**

4.3 Engineering the module

The following instructions explain how to configure the communication module with a DA1 variable frequency drive.



▶ Then connect the device to the EtherNet/IP environment.
You will need the following components to do so:
- Head-end controller
- Computer (for programming and configuration purposes)
- DA1 variable frequency drive with DX-NET-ETHERNET-2 connection (I/O device)

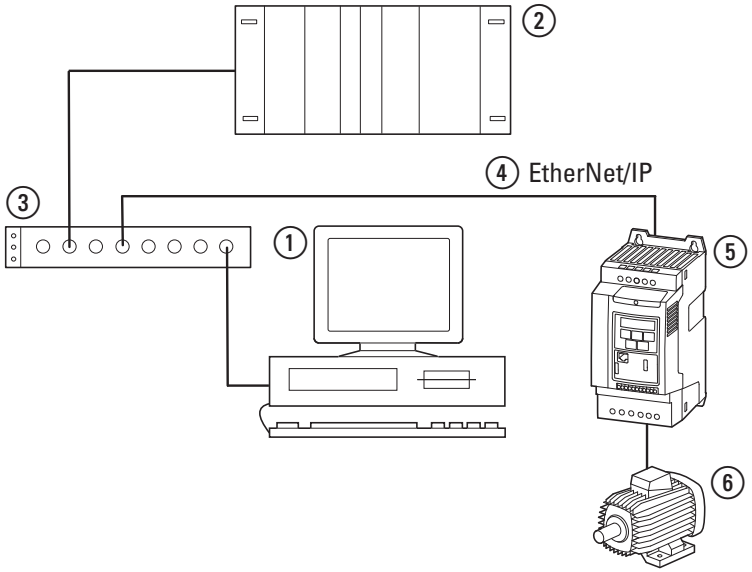
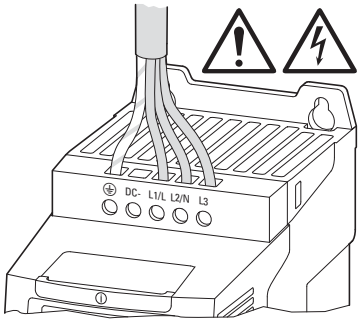
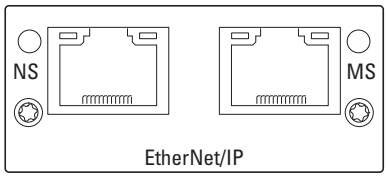


Figure 16:Engineering
① PC (with configuration tool)
② Head controller (I/O controller)
③ Switch
④ EtherNet/IP cable
⑤ DA1 variable frequency drives
⑥ Motor

▶ Switch the device on (turn on the power supply!).



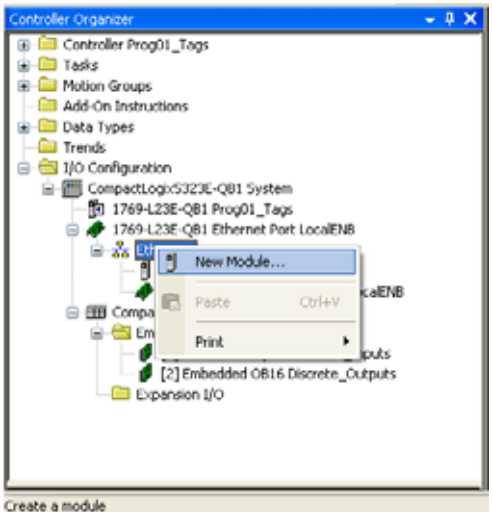
▶ Now configure the project. (For information on a detailed configuration, please consult the manual provided by the PLC's manufacturer.)
▶ Check the LED indicators.
The head-end controller must recognize the device address and the module must light up green (→ Section 2.2, „LED indicators").



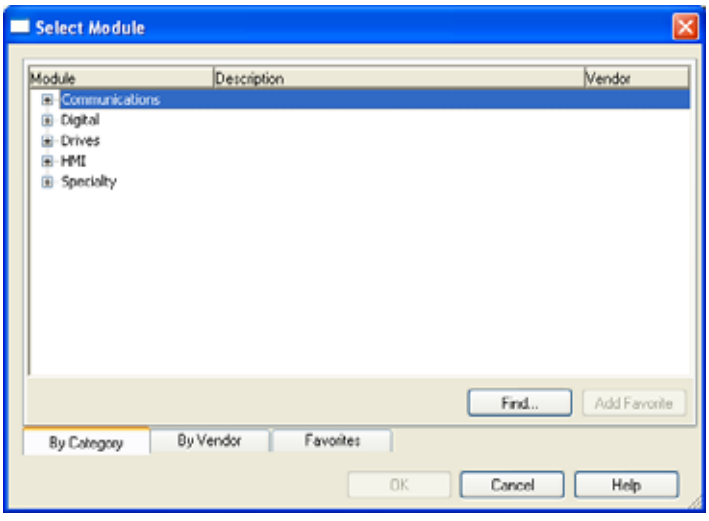
4.4 Configuration of the module

To use the DX-NET-ETHERNET-2 module for the DA1 variable frequency drive in the Allen-Bradley RSLogix 5000 programming system, follow the steps below:
In order to be able to use the DX-NET-ETHERNET-2 module, there must be a (Rockwell) controller with an EtherNet/IP port.

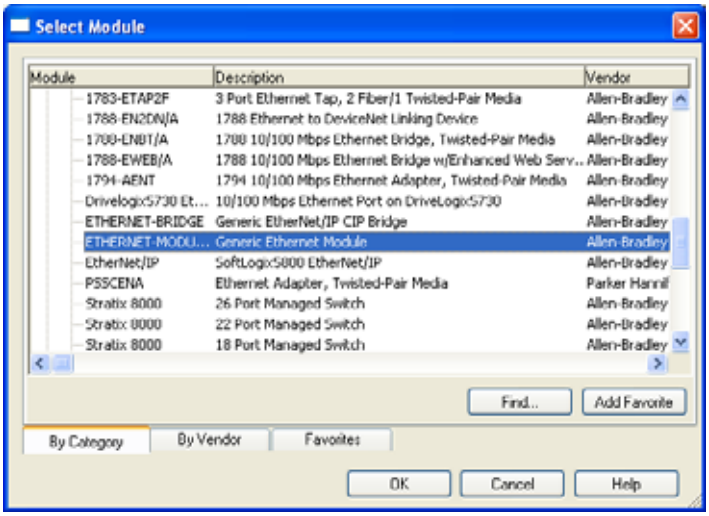
- Unlock the device as described in → Section 4.3, „Engineering the module“.
- Open the programming software's **Controller Organizer** window. The **Ethernet** port can be found under the **I/O Configuration** folder.



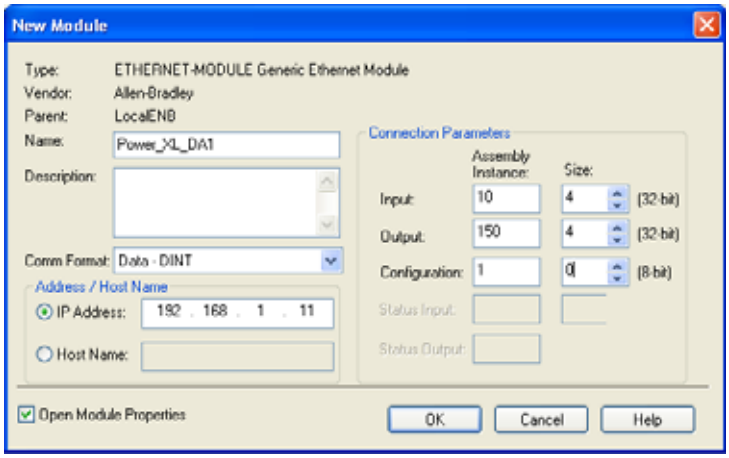
- Click on **File** -> **New Component** ->**Modules** (alternatively: context menu, **New Modules** option) to open the dialog box used to select Ethernet station groups. Select the **Communication** group.



▶ Now click on the plus icon and select the **Generic Ethernet Module** entry from the list. Click on OK to confirm your selection.

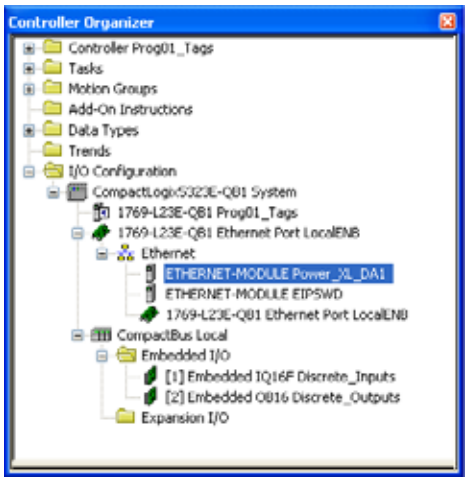


▶ Now, in the dialog box that appears, enter the important properties for communications between the PLC and the DA1 variable frequency drive. This includes Ethernet connection parameters (e.g., the IP address) and the type and size of the input/output data. Select the **Data-DINT** option for the **Comm Format** parameter.



▶ Now copy the additional values for the inputs', outputs', and configuration data's size into the corresponding fields in the RSLogix 5000 parameter dialog box as shown in the screenshot above.

▶ Open the **Ethernet** node (click on the plus icon) and select the Ethernet port to which you want to connect the DA1 variable frequency drive (in this example: **ETHERNET-MODULE Power_XL_DA1**).



→ If you make any changes to the network, the data sizes may be affected.
For example, discrepancies found during a configuration comparison will be indicated with the status indicator on the EtherNet/IP module, → Section 2.2, „LED indicators“, page 14.
If this happens, transfer the modified project to the EtherNet/IP module again and update the values in the above dialog box if necessary.

4.4.1 General information regarding the EtherNet/IP and CIP protocols

The EtherNet/IP protocol relies on the Common Industrial Protocol (CIP) in order to transfer data. It supports the following types of communication:

- Point-to-point or multicast implicit I/O messaging
- Unconnected explicit messaging (UCMM)
- Connected explicit messaging

The EtherNet/IP protocol provides access to the module's data via standard services (CIP object classes) and manufacturer-specific object classes (VSC object classes, VSC = Vendor Specific Class). CIP object classes contain, for example, basic information concerning the device (device name, manufacturer, etc), as well as access to cyclic input/output data.

Standard CIP object classes

The following standard EtherNet/IP classes are supported in accordance with the CIP Specification:

Class	Property Name	Description
01 (0x01)	Identity Object	Information about the device, such as the manufacturer, device model, etc.
02 (0x02)	Message Router Object	Communication interface that can be used to generate requests for all of the device's classes and instances
04 (0x04)	Assembly Object	A package of multiple data corresponding to a data object in a data field. A typical application is using them to group all cyclic input or output data.
06 (0x06)	Connection Manager Object	Used to manage internal resources for I/O and explicit messaging connections
244 (0xF4	Port Object	Device port description
245 (0xF5)	TCP/IP Interface Object	Information regarding the TCP/IP interface's settings
246 (0xF6)	Ethernet Link Object	Status information for an Ethernet 802.3 interface

Service Codes

The following standard EtherNet/IP service codes are used in accordance with the CIP Specification:

Service code	Service name	Description
1 (0x01)	Get_Attribute_All	Delivers the contents of the class or instance of the relevant object
2 (0x01	Set_Attribute_All	Modifies the contents of the instance or of the class attributes of the relevant object
5 (0x05)	Reset	Resets the relevant object to its setpoint values
10 (0x0A)	Multiple_Service_ Packet	Grouping of a user-definable number of attributes belonging to a class or instance
14 (0x0E)	Get_Attribute_Single	Delivers the contents of a single attribute
16 (0x10)	Set_Attribute_Single	Modifies a single attribute

Identity object 01h

The O1h identity object delivers information regarding the DX-NET-ETHERNET-2 EtherNet/IP module. This information includes device name, device version, serial number, and version information.

Overview of functions

Classes/ Instances	Attribute/Services	Value
Classes		
	Attributes	0x1
	Services	0x1, 0xE
Instances		
	Attributes	0x1, 0x2, 0x3, 0x4, 0x5, 0x6, 0x7
	Services	0x1, 0x5, 0xE

Class Attributes

Attribute number	Attribute Name	Access right ro | rw	Data type	Description	Value
1 (0x01)	REVISION	ro	UINT	Version	0x00 01

Instance attributes

Attribute number	Attribute Name	Access right ro | rw	Data type	Description
1 (0x01)	VENDOR	ro	UINT	Manufacturer ID
2 (0x02)	DEVICE TYPE	ro	UINT	Classifies the product as a communication adapter
3 (0x03)	PRODUCT CODE	ro	UINT	Article no.
4 (0x04)	REVISION MAJOR MINOR	ro	STRUCT of USINT USINT	Device version
5 (0x05)	DEVICE STATUS	ro	WORD	Device status (see table below)
6 (0x06)	SERIAL NUMBER	ro	UINT	Device serial number
7 (0x07)	PRODUCT NAME	ro	SHORT STRING	Length (first byte) and product name (DX-NET-ETHERNET-2)

Device status

Bit	Name	Value / Description
0 - 1	reserved	
2	Configured	1: The module has a project configuration 0: The module does not have a project configuration
3	reserved	–
4 - 7	Extended device status	0000: Unknown 0010: Faulty connection 0011: No input/output connection active 0100: Faulty configuration 0110: At least one input/output connection in RUN operating mode 0111: At least one input/output connection or all in IDLE operating mode
8	reversible faults	Minor Faults
9	irreversible fault	Minor Faults
10	reversible faults	Major Faults
11	irreversible fault	Major Faults
12 - 15	reserved	–

Assembly objects (04h)

Input and output assembly objects are groups of multiple individual objects that are used in order to be able to easily read or write large data volumes with a single connection.

Overview of functions

Classes/ Instances	Attribute/Services	Value
Classes		
	Attributes	0x1, 0x2
	Services	0xE
Instances		
	Attributes	0x3
	Services	0xE

Class Attributes

Attribute number	Attribute Name	Access right ro | rw	Data type	Description	Value
1 (0x01)	REVISION	ro	UINT	Version	0x00 02
2 (0x02)	MAX INSTANCE ATTRIBUTE	ro	UINT	Highest number of the implemented instance attribute	–

Instance attributes

Attribute number	Attribute Name	Instance	Access right ro | rw	Data type	Description
3 (0x01)	DATA	100	rw	ARRAY OF USINT	Output data
		101	ro		Input data

4.5 Addressing

EtherNet/IP devices are addressed with both MAC and IP addresses. Every single device has a globally unique MAC address (a 6-byte-long Ethernet address): The first three bytes define the manufacturer-specific ID, while the three remaining bytes define the device's serial device number.

→ The MAC address will be printed on the corresponding nameplate. The DHCP function will be enabled by default.

By having an IP address assigned to it, the variable frequency drive can be integrated into the EtherNet/IP environment and enabled. The remaining parameters can then be configured by the higher-level master in a fully automatic manner.

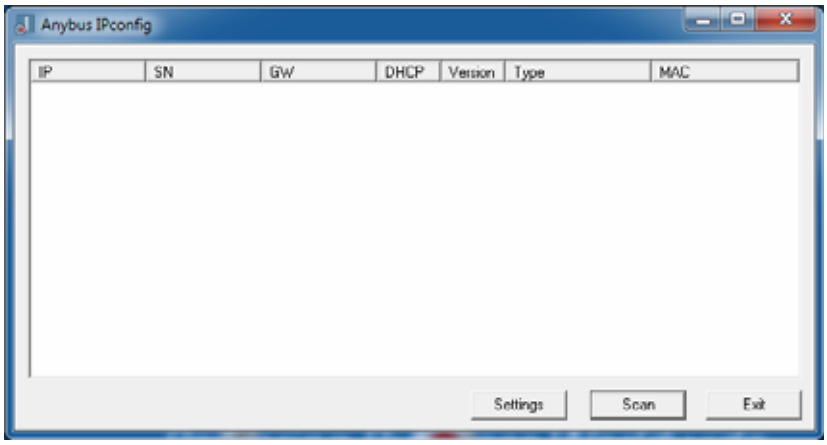
→ The IP address can be configured with a network tool (e.g., RSLogix 5000 or HMS IPconfig).

4.5.1 Configuring the IP address

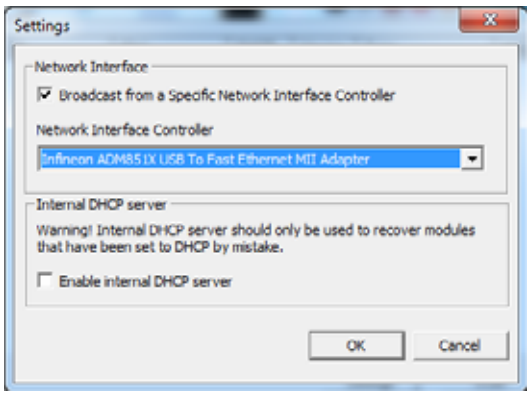
The following instructions explain how to configure the IP address for the communication module.

→ The address is configured using the IPconfig program.
This program can be downloaded on the Internet at:
www.anybus.com/support → **Support**
Select **Tools** from the drop-down menu.

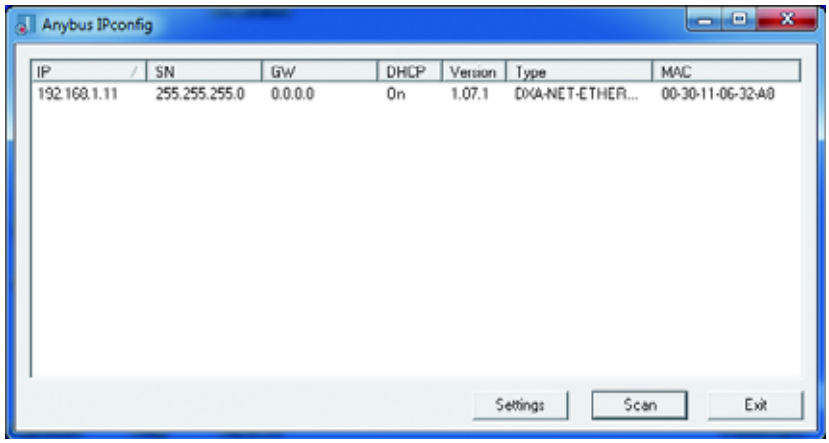
- Plug the module into the variable frequency drive (→ Figure 9, page 17).
- Connect the device to the computer and to the network (connect the RJ45 plug → Figure 13, page 20).
- Switch on the device.
- Open the IPconfig program and click on **Settings**.



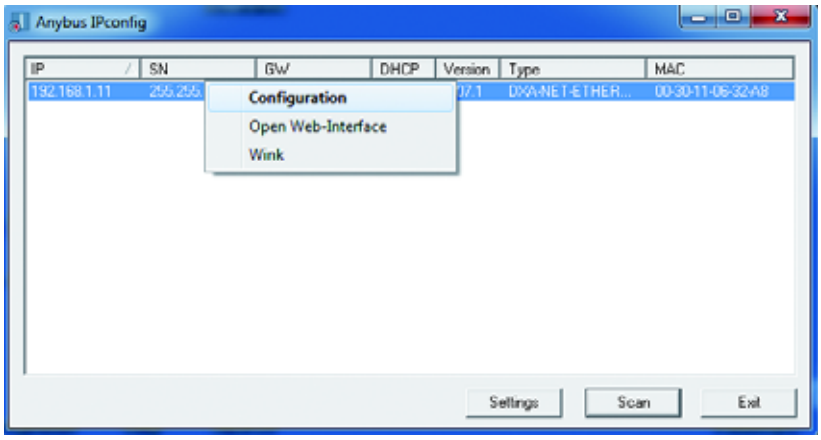
- Select the computer network adapter from the **Network Interface Controller** drop-down menu and click on **OK**.



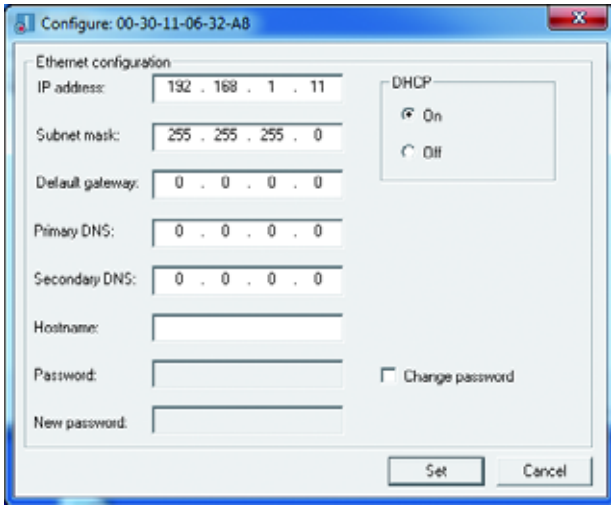
▶ Now click on **Scan**. The program will show all available modules.



▶ Right-click on the line for the module and select the **Configuration** option from the context menu in order to assign the module an IP address.



▶ Now set an IP address. Confirm with **OK**.



4.6 Mode parameter

The abbreviations used in the parameter lists below have the following meaning:

PNU	Parameter number
ID	Identification number of the parameter
RUN	Access rights to the parameters during operation (RUN): / = Modification permissible - = Modification only possible in STOP
ro | rw	Parameter read and write permissions via a fieldbus connection: ro = read only rw = read and write (read and write)
Value	Setting of the parameter
DS	Default setting: (P1.1 = 1) base parameter

Access rights are not shown in the drivesConnect PC software.

Manual

PNU	ID	Access right RUN	Access right ro | rw	Value	Description		DS
①				②	③		④

PC Software

PNU	Description	Value	Range	Default	Visible
①	③	②		④	

figure 17: How the parameters are shown in the manual and in the software

PNU	ID	Access right RUN	Access right ro | rw	Designation	Value range	DS	Value that must be configured
P1-12	112	–	rw	Control level	0 = Control signal terminals (I/O) 1 = Keypad (KEYPAD FWD) 2 = Keypad (KEYPAD FWD/REV) 3 = PID control 4 = field bus system (PROFINET-2, Modbus RTU, etc.) 5 = Slave mode 6 = field bus CANopen	0	4

The Baud rate will automatically be set to match the master.

4.7 Operation

4.7.1 Cyclic data

Process data field

Master → Slave	CW	REF	PDI 3	PDI 4
Slave → Master	SW	ACT	PDO 3	PDO 4

The length of each data unit is 1 word.

Description of data content

Byte:	Meaning	Explanation
CW	Control word	Command
SW	Status word	Status Word
REF	Reference Value	Setpoint value
ACT	Actual Value	Actual value
PDO	Process Data Out	Process data output
PDI	Process Data In	Process data input

Command

PNU	Description	
	value = 0	value = 1
0	stop	Operation
1	Clockwise rotating field (FWD)	Anticlockwise rotating field (REV)
2	No action	Fault Reset
3	No action	free run-down
4	Not used	
5	No action	Quick stop (ramp)
6	No action	Fixed frequency 1 (FF1)
7	No action	Overwrite setpoint value with 0
8	Not used	
9	Not used	
10	Not used	
11	Not used	
12	Not used	
13	Not used	
14	Not used	
15	Not used	

Setpoint value

The permissible values fall within a range of P1-02 (minimum frequency) to P1-01 (maximum frequency). This value will be scaled with a factor of 0.1 in the application.

Process data input 3 (PDI 3)

Configured with parameter P5-14.

The following settings can also be modified during operation:

Value	Description	DS
Field bus module PDI-3 input	0 = Torque limit / reference 1 = User PID reference register 2 = User register 3	0

Process data input 4 (PDI 4)

Configured with parameter P5-13.

The following settings can also be modified during operation:

Value	Description	DS
Field bus module PDI-4 input	0 = Ramp control field bus 1 = User register 4	0

Status word

The status word (consisting of any error messages and the device status) provides information regarding the device status and any error messages.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
MSB															LSB
Error Messages								Device status							

Device status

Bit	Description	
	value = 0	value = 1
0	Drive not ready	ready for operation (READY)
1	stop	Operation (RUN)
2	Clockwise rotating field (FWD)	Anticlockwise rotating field (REV)
3	no error	Fault detected (FAULT)
4	Acceleration ramp	Frequency actual value equals setpoint input
5	–	Zero speed
6	Speed control deactivated	Speed control activated
7	Not used	

Error messages

Failure code [hex]	Value shown on display	Meaning
00	no-FAt	Stop, ready for operation
01	OI-b	Braking chopper overcurrent
02	OL-br	Braking resistance overload
03	O-I	• Overcurrent at variable frequency drive output • Motor overload • Overtemperature on variable frequency drive (heat sink)
04	I.t-trP	Motor, thermal overload
05	SAFE -1	Short-circuit at safety circuit input
06	O Volts	Overvoltage (DC link)
07	U-volts	undervoltage (DC link)
08	O-t	Overtemperature (heat sink)
09	U-t	Undertemperature (heat sink)
0A	P-dEF	Default settings, parameters have been loaded
0B	E-trIP	External error message
0C	SC-Obs	Error, OP bus
0D	FLt-dc	Excessively large voltage waves in DC link
0E	P-LOSS	Phase failure (mains side)
0F	h O-I	Overcurrent at variable frequency drive output
10	th-Flt	Thermistor fault, internal (heat sink)
11	dAtA-F	EEPROM checksum fault
12	4-20F	Analog input: • Out-of-range value • Wire breakage (4 mA monitoring)
13	dAtA- E	Error in internal memory
14	U-dEF	User-definable factory parameters have been loaded
15	F-Ptc	Excessive overtemperature, motor PTC
16	FAn-F	Fault, internal fan
17	O-hEAt	Excessively high ambient air temperature
18	O-torq	Maximum torque limit exceeded
19	U-torq	Output torque too low
1A	Out-F	Fault at variable frequency drive output
1D	SAFE-2	Short-circuit at safety circuit input
1D	Enc-01	Encoder, communication lost
1F	Enc-02	Encoder, speed error
20	Enc-03	Encoder, wrong PPRs set
21	Enc-04	Encoder, channel A fault
22	Enc-05	Encoder, channel B fault
23	Enc-06	Encoder, channel A and B fault
24	Enc-07	Encoder, RS485 data channel error

Failure code [hex]	Value shown on display	Meaning
25	Enc-08	Encoder, I/O communications loss
26	Enc-09	Encoder, incorrect type
27	Enc-10	Encoder
28	AtF-01	Motor stator resistance fluctuating between phases
29	AtF-02	The motor's stator resistance is too high
2B	AtF-03	Motor inductance too low
2B	AtF-04	Motor inductance too high
2C	AtF-05	The motor parameters do not match the motor
32	SC-F01	Fault: Modbus communication loss error
33	SC-F02	Fault: CANopen communication loss error
34	SC-F03	Communications with field bus module disconnected
35	SC-F04	Loss of communications (I/O cards)
3C	OF-01	Connection to add-on card lost
3D	OF-02	Add-on card in unknown state
46	PLC-01	Unsupported PLC function
47	PLC-02	PLC program too big
48	PLC-03	Division by 0
49	PLC-04	Lower limit value is higher than upper limit value

Actual value

The variable frequency drive's actual value falls within a value range of 0 to P1-01 (maximum frequency). This value will be scaled with a factor of 0.1 in the application.

Process data output 3 (PDO 3)

Configured with parameter P5-12.

The following settings can also be modified during operation:

Value	Description	DS
Field bus module PDO-3 output	0 = Output current 1 = Output power 2 = DI status 3 = AI2 signal level 4 = Heat sink temperature 5 = User register 1 6 = User register 2 7 = P0-80	0

Process data output 4 (PDO 4)

Configured with parameter P5-08.

The following settings can also be modified during operation:

Value	Description	DS
Field bus module PDO-4 output	0 = Motor torque 1 = Output power 2 = DI status 3 = AI2 signal level 4 = Heat sink temperature	0

4.7.2 Acyclic data

In addition to standard object classes, there are also vendor-specific classes that make it possible to access individual variable frequency drive properties. Object class A2h is used for this purpose.

Class	Property Name	Description
A2h	ADI	Variable frequency drive data for access to acyclic data

4.7.2.1 ADI object (A2h)

The A2h object can be used to access the DA1 variable frequency drive's acyclic data.

Classes/ Instances	Attribute/Services	Value
Classes		
	Attributes	0x01, 0x02, 0x03
	Services	0xE
Instances		
	Attributes	1, 2, 3, 4, 5, 6, 7, 8
	Services	0xE

Class Attributes

Attribute number	Attribute Name	Access right ro | rw	Data type	Description	Value
1	CLASS REVISION	ro	UINT	Version	0x00 01
2	MAX OBJECT INSTANCE	ro	UINT	Maximum number of object instances	–
3	NUMBER OF INSTANCES	ro	UINT	maximum number of instances	–

Instance attributes

Attribute number	Attribute Name	Access right ro | rw	Data type	Description
1	Name	ro	Short_String	Parameter name with length
2	ABCC Data Type	ro	USINT	Data type of the instance value
3	No. of elements	ro	USINT	Number of elements for the specified data types
4	Descriptor .	ro	USINT	Access rights for the instance Bit meaning: kit 0 = Get Access 1 = Set Access
5	Value	rw	Defined by attribute 2	Instance value
6	Max value	ro		Maximum permitted parameter value
7	Min value	ro		Minimum permitted parameter value
8	Default value	ro		Default parameter value (default setting)

4.7.2.2 Acyclic Parameter

Object class A2h needs to be used to access the DA1 variable frequency drive's acyclic data. For "Service", a value of e (read parameter) or 10 (write parameter) must be selected.

For instance attributes, a value of 1 (parameter name) or 5 (parameter value) must be selected.

The relevant ADI number can be found in → Table 3.

4.7.3 List of parameters

Table 3: Parameter Data

PNU	Description	Access right	ADI number	ADI object class
	Variable frequency drive ID	ro	9	A2
	Variable frequency drive part no.	ro	10	A2
	Control section software	ro	11	A2
	Control section checksum	ro	12	A2
	Software power section	ro	13	A2
	Power section checksum	ro	14	A2
	Serial number 1	ro	15	A2
	Serial number 2	ro	16	A2
	Serial number 3	ro	17	A2
	Serial number 4	ro	18	A2
P1-01	maximum frequency / maximum speed	rw	101	A2
P1-02	minimum frequency/DX-NET-ETHERNET-2; minimum speed	rw	102	A2
P1-03	Acceleration time (acc1)	rw	103	A2
P1-04	Deceleration time (dec1)	rw	104	A2
P1-05	Stop Function	rw	105	A2
P1-06	Energy optimization	rw	106	A2
P1-07	Motor, rated operating voltage	rw	107	A2
P1-08	Motor, rated operational current	rw	108	A2
P1-09	Motor, rated frequency	rw	109	A2
P1-10	Motor, rated speed	rw	110	A2
P1-11	Output voltage at zero frequency	rw	111	A2
P1-12	Control level	rw	112	A2
P1-13	Function of the digital input	rw	113	A2
P1-14	Parameter range access code (dependent on P2-40 and P6-30)	rw	114	A2
P2-01	Fixed frequency FF1 / speed 1	rw	201	A2
P2-02	Fixed frequency FF2 / speed 2	rw	202	A2
P2-03	Fixed frequency FF3 / speed 3	rw	203	A2
P2-04	Fixed frequency FF4 / speed 4	rw	204	A2
P2-05	Fixed frequency FF5 / speed 5	rw	205	A2
P2-06	Fixed frequency FF6 / speed 6	rw	206	A2
P2-07	Fixed frequency FF7 / speed 7	rw	207	A2
P2-08	Fixed frequency FF8 / speed 8	rw	208	A2
P2-09	Frequency jump 1, bandwidth	rw	209	A2
P2-10	Frequency skip 1, center	rw	210	A2

PNU	Description	Access right	ADI number	ADI object class
P2-11	AO1 signal (Analog Output)	rw	211	A2
P2-12	AO1, signal range	rw	212	A2
P2-13	AO2 signal (Analog Output)	rw	213	A2
P2-14	AO2, signal range	rw	214	A2
P2-15	RO1 Signal (Relay 1 Output)	rw	215	A2
P2-16	AO1 / RO1 upper limit	rw	216	A2
P2-17	AO1 / RO1 lower limit	rw	217	A2
P2-18	RO2 Signal (Relay Output)	rw	218	A2
P2-19	AO2 / RO2 upper limit	rw	219	A2
P2-20	AO2 / RO2 lower limit	rw	220	A2
P2-21	Scaling factor for value	rw	221	A2
P2-22	scaled display value	rw	222	A2
P2-23	Holding time for speed of zero	rw	223	A2
P2-24	Pulse frequency	rw	224	A2
P2-25	Quick stop deceleration ramp time	rw	225	A2
P2-26	Motor flying restart circuit	rw	226	A2
P2-27	Delay time Standby mode	rw	227	A2
P2-28	Slave speed scaling	rw	228	A2
P2-29	Slave speed scaling factor	rw	229	A2
P2-30	AI1 signal range	rw	230	A2
P2-31	AI1 scaling factor	rw	231	A2
P2-32	AI1 offset	rw	232	A2
P2-33	AI2 signal range	rw	233	A2
P2-34	AI2 scaling factor	rw	234	A2
P2-35	AI2 offset	rw	235	A2
P2-36	REAF, Start function with automatic restart, control signal terminals	rw	236	A2
P2-37	REAF, start function with automatic restart	rw	237	A2
P2-38	Response in the event of a power failure	rw	238	A2
P2-39	Parameter access lock	rw	239	A2
P2-40	Access codes - menu level 2	rw	240	A2
P3-01	PID controllers, P amplification	rw	301	A2
P3-02	PID controller, I time constant	rw	302	A2
P3-03	PID controller, D time constant	rw	303	A2
P3-04	PID controller, control deviation	rw	304	A2
P3-05	PID controller, setpoint source	rw	305	A2
P3-06	PID controller, digital reference value	rw	306	A2
P3-07	PID controller, actual value limiting, maximum	rw	307	A2

PNU	Description	Access right	ADI number	ADI object class
P3-08	PID controller, actual value limiting, minimum	rw	308	A2
P3-09	PID controller, actual value limiting	rw	309	A2
P3-10	PID controller, actual value (PV)	rw	310	A2
P3-11	Maximum PID error for enabling the ramps	rw	311	A2
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P3-15	reserved	-	315	A2
P3-16	reserved	-	316	A2
P3-17	reserved	-	317	A2
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P4-04	Speed controller integral time	rw	404	A2
P4-05	Motor power factor (cos φ)	rw	405	A2
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P4-10	V/Hz characteristic curve modification voltage	rw	410	A2
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P5-08	Field bus module PDO-4 output	rw	508	A2
P5-09	reserved	-	509	A2
P5-10	reserved	-	510	A2
P5-11	reserved	-	511	A2
P5-12	Field bus module PDO-3 output	rw	512	A2
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P6-01	Firmware upgrade enable	rw	601	A2
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PNU	Description	Access right	ADI number	ADI object class
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P6-04	Relay hysteresis band	rw	604	A2
P6-05	Enable incremental encoder feedback	rw	605	A2
P6-06	Incremental encoder scale	rw	606	A2
P6-07	Maximum speed error	rw	607	A2
P6-08	Input frequency at maximum speed	rw	608	A2
P6-09	Droop speed	rw	609	A2
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P6-11	Speed holding time in the event of an enable signal	rw	611	A2
P6-12	Speed holding time in the event of a disable signal	rw	612	A2
P6-13	Motor brake opening time	rw	613	A2
P6-14	Motor brake engagement delay	rw	614	A2
P6-15	Minimum torque for brake opening	rw	615	A2
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P6-18	Voltage for DC injection braking	rw	618	A2
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P6-20	Brake resistor power	rw	620	A2
P6-21	Braking chopper cycle in the event of excessively low temperature	rw	621	A2
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P6-24	Service interval	rw	624	A2
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P6-30	Access code for menu level 3	rw	630	A2
P7-01	Motor stator resistance	rw	701	A2
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P7-03	Motor leakage inductance (d)	rw	703	A2
P7-04	Motor magnetizing current	rw	704	A2
P7-05	Motor leakage factor	rw	705	A2
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P7-09	Overvoltage current limit	rw	709	A2

PNU	Description	Access right	ADI number	ADI object class
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P7-11	Minimum PWM pulse width	rw	711	A2
P7-12	Magnetizing time at the U/f method	rw	712	A2
P7-13	Rotational speed controller D gain	rw	713	A2
P7-14	Torque boost	rw	714	A2
P7-15	Maximum frequency limit for torque boost	rw	715	A2
P7-16	Enable, signal injection	rw	716	A2
P7-17	Signal injection level	rw	717	A2
P8-01	Second acceleration time (acc2)	rw	801	A2
P8-02	Transition frequency (acc1 - acc2)	rw	802	A2
P8-03	Third acceleration time (acc3)	rw	803	A2
P8-04	Transition frequency (acc2 - acc3)	rw	804	A2
P8-05	Fourth acceleration time (acc4)	rw	805	A2
P8-06	Transition frequency (acc3 - acc4)	rw	806	A2
P8-07	Fourth deceleration time (dec4)	rw	807	A2
P8-08	Transition frequency (dec3 - dec4)	rw	808	A2
P8-09	Third deceleration time (dec3)	rw	809	A2
P8-10	Transition frequency (dec2 - dec3)	rw	810	A2
P8-11	Second deceleration time (dec2)	rw	811	A2
P8-12	Transition frequency (dec1 - dec2)	rw	812	A2
P8-13	Ramp selection when there is a preset speed	rw	813	A2
P9-01	Control source - enable	rw	901	A2
P9-02	Control source - quick stop	rw	902	A2
P9-03	Control source - start signal 1 (FWD)	rw	903	A2
P9-04	Control source – start signal 2 (REV)	rw	904	A2
P9-05	Control source - Stay-put function	rw	905	A2
P9-06	Control source - enable (REV)	rw	906	A2
P9-07	Control source - reset	rw	907	A2
P9-08	Control source – external fault	rw	908	A2
P9-09	Control source - terminal control	rw	909	A2
P9-10	Source - speed 1	rw	910	A2
P9-11	Source - speed 2	rw	911	A2
P9-12	Source - speed 3	rw	912	A2
P9-13	Source - speed 4	rw	913	A2
P9-14	Source - speed 5	rw	914	A2
P9-15	Source - speed 6	rw	915	A2
P9-16	Source - speed 7	rw	916	A2
P9-17	Source - speed 8	rw	917	A2

PNU	Description	Access right	ADI number	ADI object class
P9-18	Speed - input 0	rw	918	A2
P9-19	Speed - input 1	rw	919	A2
P9-20	Speed - input 2	rw	920	A2
P9-21	Fixed frequency 0	rw	921	A2
P9-22	Fixed frequency 1	rw	922	A2
P9-23	Fixed frequency 2	rw	923	A2
P9-24	Acceleration ramp input 0	rw	924	A2
P9-25	Acceleration ramp input 1	rw	925	A2
P9-26	Deceleration time input 0	rw	926	A2
P9-27	Deceleration time input 1	rw	927	A2
P9-28	Control source - Up-pushbutton	rw	928	A2
P9-29	Control source - Down-pushbutton	rw	929	A2
P9-30	FWD limit switch	rw	930	A2
P9-31	REV limit switch	rw	931	A2
P9-32	reserved	-	932	A2
P9-33	Source - analog output 1	rw	933	A2
P9-34	Source - analog output 2	rw	934	A2
P9-35	Control source - Relay 1	rw	935	A2
P9-36	Control source - Relay 2	rw	936	A2
P9-37	Control source - scaling	rw	937	A2
P9-38	Source - PID setpoint value	rw	938	A2
P9-39	Source - PID feedback	rw	939	A2
P9-40	Source - torque control reference	rw	940	A2
P9-41	Function choices - Relay output 3, 4, 5	rw	941	A2
	DI 1	ro	1001	A2
	DI 2	ro	1002	A2
	DI 3	ro	1003	A2
	DI 4	ro	1004	A2
	DI 5	ro	1005	A2
	DI 6	ro	1006	A2
	DI 7	ro	1007	A2
	DI 8	ro	1008	A2
	AO 1	ro	1009	A2
	AO 2	ro	1010	A2
	DO 1	ro	1011	A2
	DO 2	ro	1012	A2
	DO 3	ro	1013	A2
	DO 4	ro	1014	A2

PNU	Description	Access right	ADI number	ADI object class
	DO 5	ro	1015	A2
	User register 1	rw	1017	A2
	User register 2	rw	1018	A2
	User register 3	rw	1019	A2
	User register 4	rw	1020	A2
	User register 5	rw	1021	A2
	User register 6	rw	1022	A2
	User register 7	rw	1023	A2
	User register 8	rw	1024	A2
	User register 9	rw	1025	A2
	User register 10	rw	1026	A2
	User register 11	rw	1027	A2
	User register 12	rw	1028	A2
	User register 13	rw	1029	A2
	User register 14	rw	1030	A2
	User register 15	rw	1031	A2
	User AO 1	rw	1032	A2
	User AO 2	rw	1033	A2
	User RO 1	rw	1036	A2
	User RO 2	rw	1037	A2
	User RO 3	rw	1038	A2
	User RO 4	rw	1039	A2
	User RO 5	rw	1040	A2
	User, scaling value	rw	1041	A2
	User, decimal scaling	rw	1042	A2
	User, speed reference	rw	1043	A2
	User, torque reference	rw	1044	A2
	Field bus / User ramp	rw	1045	A2
	Scope index 1 / 2	rw	1046	A2
	Scope index 3/4	rw	1047	A2
	24hour timer	rw	1048	A2
	User display Ctrl	rw	1049	A2
	User display value	rw	1050	A2
	AI 1 (Q12)	ro	1061	A2
	AI 1 (%)	ro	1062	A2
	AI 2 (Q12)	ro	1063	A2
	AI 2 (%)	ro	1064	A2
	DI status	ro	1065	A2

PNU	Description	Access right	ADI number	ADI object class
	Speed reference	ro	1066	A2
	Digital potentiometer value	ro	1067	A2
	Field bus speed reference	ro	1068	A2
	Master speed reference	ro	1069	A2
	Slave speed reference	ro	1070	A2
	Frequency on speed reference input	ro	1071	A2
	Torque reference (Q12)	ro	1072	A2
	Torque reference (%)	ro	1073	A2
	Master torque reference (Q12)	ro	1074	A2
	Field bus torque reference (Q12)	ro	1075	A2
	PID user reference (Q12)	ro	1076	A2
	PID user return value (Q12)	ro	1077	A2
	PID controller reference (Q12)	ro	1078	A2
	PID controller feedback value (Q12)	ro	1079	A2
	PID controller output (Q12)	ro	1080	A2
	Motor velocity	ro	1081	A2
	Motor current	ro	1082	A2
	Motor Torque	ro	1083	A2
	Motor rating	ro	1084	A2
	PID controller starting speed	ro	1085	A2
	DC voltage	ro	1086	A2
	Unit Temperature	ro	1087	A2
	PCB controle temperature	ro	1088	A2
	Drive scaling value 1	ro	1089	A2
	Drive scaling value 2	ro	1090	A2
	Motor, torque (%)	ro	1091	A2
	Expansion, IO input status	ro	1093	A2
	ID, Plug-in module	ro	1096	A2
	ID, field bus boards	ro	1097	A2
	Scope channel 1 - data	ro	1101	A2
	Scope channel 2 - data	ro	1102	A2
	Scope channel 3 - data	ro	1103	A2
	Scope channel 4 - data	ro	1104	A2
	OLED language number	ro	1105	A2
	OLED version	ro	1106	A2
	power section	ro	1107	A2
	Service time	ro	1128	A2
	Fan speed	ro	1129	A2

PNU	Description	Access right	ADI number	ADI object class
	User kWh meter	ro	1130	A2
	User, MWh meter	ro	1131	A2
	Complete, KWh meter	ro	1132	A2
	Complete, MWh meter	ro	1133	A2
	Total, operating hours meter	ro	1134	A2
	Total, operating minutes/seconds meter	ro	1135	A2
	User, hours-run meter	ro	1136	A2
	User, operating minutes/seconds meter	ro	1137	A2

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