Bonfiglioli
Vectron

AXIA VERT

Communication Module Manual
CMA-IE-01 for PROFIBUS®

Frequency inverter 230 V / 400 V
0,25 kW ... 15 kW

Bonfiglioli

CONTENTS

1 General Information about the Documentation

For better clarity, the documentation of the frequency inverter is structured according to the customer-specific requirements.

The present manual was created in the German language. The German manual is the original version. Other language versions are translated.

Quick Start Guide
The "Quick Start Guide" describes the basic steps required for mechanical and electrical installation of the frequency inverter. The guided commissioning supports you in the selection of necessary parameters and the configuration of the software of the frequency inverter.

User manual
The user manual documents the complete functionality of the frequency inverter. The parameters required for special purposes, for adjustment to the application and the numerous additional functions are described in detail.

Separate user manuals are supplied for optional components for the frequency inverter. These manuals complement the operating instructions and the "Quick Start Guide" for the frequency inverter.

Application manual
The application manual complements the documentation to ensure goal-directed installation and commissioning of the frequency inverter. Information on various topics in connection with the use of the frequency inverter is described in context with the specific application.

Installation instructions
The installation manual describes the installation and use of devices, complementing the "Quick Start Guide" and the user manual.

1.1 This document

The present user manual of the CMA-PB-01 communication module complements the Operating Instructions and the "Quick Start Guide" for the frequency inverters of the AXIA device series.

The user manual contains important information on the installation and use of the PROFIBUS® communication module CMA-PB-01 in its specified application range. Compliance with user documentation contributes to avoiding risks, minimizing repair cost and downtimes, and increasing the reliability and service live of the frequency inverter.

For this reason, make sure you read the user manual carefully.

IMPORTANT:

Compliance with the documentation is required to ensure safe operation of the frequency inverter. Bonfiglioli Deutschland GmbH shall not be held liable for any damage caused by any non-compliance with the documentation.

In case any problems occur which are not covered by the documentation sufficiently, please contact the manufacturer.

For safe commissioning and operation of the AXIA series, the following documentation must be complied with:

- The Operating Instructions Document
- Safety manual "Functional Safety Manual"

1.2 Warranty and liability

Bonfiglioli Deutschland GmbH (hereinafter referred to as "manufacturer") notes that the contents of this Operating Instructions document do not form part of any previous or existing agreement, assurance or legal relationship between the manufacturer and the user of these Operating Instructions (hereinafter referred to as the "User"). Neither are they intended to supplement or replace such agreements, assurances or legal relationships. Any obligations of the manufacturer shall solely be based on the relevant purchase agreement which also includes the complete and solely valid warranty stipulations. These contractual warranty provisions are neither extended nor limited by the specifications contained in this documentation.

The manufacturer reserves the right to correct or amend the specifications, product information and omissions in these operating instructions without prior notice. The manufacturer assumes no responsibility to update these Operating Instructions. The manufacturer shall not be liable for any damage, injuries or costs which may be caused by the aforementioned reasons.

In addition, the manufacturer excludes any warranty and disclaims all liability, including without limitation direct, indirect, special, punitive, incidental, exemplary or consequential damages arising out of or in connection with one or more of the following causes:

- inappropriate use of the frequency inverter,
- non-compliance with the instructions, warnings and prohibitions contained in the documentation,
- unauthorized modifications of the frequency inverter,
- insufficient monitoring of parts of the machine/plant which are subject to wear,
- repair work at the machine/plant not carried out properly or in time,
- catastrophes by external impact and Force Majeure.

1.3 Obligation

These Operating Instructions must be read before commissioning and complied with. Anybody entrusted with tasks in connection with the

- transport,
- assembly,
- installation of the frequency inverter and
- operation of the frequency inverter

must have read and understood the Operating Instructions and, in particular, the safety instructions in order to prevent personal and material losses.

1.4 Copyright

In accordance with applicable law any copyrights relating to this document shall remain with

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47807 Krefeld
Germany

1.5 Storage

The documentation forms an integral part of the frequency inverter. It must be stored such that it is accessible to operating staff at all times. If the frequency inverter is sold on to other users, then the documentation must also be handed over.

2 General safety instructions and information on use

The chapter "General safety instructions and information on use" contains general safety instructions for the Operator and the Operating Staff. At the beginning of certain main chapters, some safety instructions are included which apply to all work described in the relevant chapter. Special work-specific safety instructions are provided before each safety-relevant work step.

2.1 Terminology

According to the documentation, different activities must be performed by certain persons with certain qualifications.

The groups of persons with the required qualification are defined as follows:

Operator
This is the entrepreneur/company who/which operates the frequency inverter and uses it as per the specifications or has it operated by qualified and instructed staff.

Operating staff
The term Operating Staff covers persons instructed by the Operator of the frequency inverter and assigned the task of operating the frequency inverter.

Skilled Personnel

The term **Skilled Personnel** covers staff that are assigned special tasks by the Operator of the frequency inverter, e.g. installation, maintenance and service/repair and troubleshooting. Based on their qualification and/or know-how, **Skilled Personnel** must be capable of identifying defects and assessing functions.

Qualified electrician
The term Qualified Electrician covers qualified and trained staff that has special technical know-how and experience with electrical installations. In addition, Qualified Electricians must be familiar with the applicable standards and regulations, they must be able to assess the assigned tasks properly and identify and eliminate potential hazards.

Instructed person
The term Instructed Person covers staff that was instructed and trained about/in the assigned tasks and the potential hazards that might result from inappropriate behavior. In addition, instructed persons must have been instructed in the required protection provisions, protective measures, the applicable directives, accident prevention regulations as well as the operating conditions and verified their qualification.

Expert
The term Expert covers qualified and trained staff that has special technical know-how and experience relating to the frequency inverter. Experts must be familiar with the applicable government work safety directives, accident prevention regulations, guidelines and generally accepted rules of technology in order to assess the operationally safe condition of the frequency inverter.

2.2 Designated use

The frequency inverter is designed according to the state of the art and recognized safety regulations.

The frequency inverters are electrical drive components intended for installation in industrial plants or machines. Commissioning and start of operation is not allowed until it has been verified that the machine meets the requirements of the EC Machinery Directive 2006/42/EC and DIN EN 60204-1.

The frequency inverters meet the requirements of the low voltage directive 2014/35/EU and DIN EN 61800-5-1. CE-labelling is based on these standards. Responsibility for compliance

with the EMC Directive 2014/30/EU lies with the operator. Frequency inverters are only available at specialized dealers and are exclusively intended for commercial use as per EN 61000-3-2.

No capacitive loads may be connected to the frequency inverter.

The technical data, connection specifications and information on ambient conditions are indicated on the rating plate and in the documentation and must be complied with in any case.

2.3 Misuse

Any use other than that described in "Designated use" shall not be permissible and shall be considered as misuse.

For example, the machine/plant must not be operated

- by uninstructed staff,
- while it is not in perfect condition,
- without protection enclosure (e.g. covers),
- without safety equipment or with safety equipment deactivated.

The manufacturer shall not be held liable for any damage resulting from such misuse. The sole risk shall be borne by the operator.

Explosion protection
The frequency inverter is an IP 20 protection class device. For this reason, use of the device in explosive atmospheres is not permitted.

2.4 Residual risks

Residual risks are special hazards involved in handling of the frequency inverter which cannot be eliminated despite the safety-compliant design of the device. Residual risks are not obviously identifiable and can be a potential source of injury or health hazard.

Typical residual hazards include:

Electrical hazard
Danger of contact with energized components due to a defect, opened covers or enclosures or improper working on electrical equipment.

Danger of contact with energized components inside of the frequency inverter if no external disconnection device was installed by the operator.

Electrostatic charging
Touching electronic components bears the risk of electrostatic discharges.

Thermal hazards
Risk of accidents by hot machine/plant surfaces, e.g. heat sink, transformer, fuse or sine filter.

Charged capacitors in DC link
The DC link may have dangerous voltage levels even up to three minutes after shutdown.

Danger of equipment falling down/over, e.g. during transport
Center of gravity is not the middle of the electric cabinet modules.

2.5 Safety and warning signs on the frequency inverter

- Comply with all safety instructions and danger information provided on the frequency inverter.
- Safety information and warnings on the frequency inverter must not be removed.

2.6 Warning information and symbols used in the user manual

2.6.1 Hazard classes

The following hazard identifications and symbols are used to mark particularly important information:

DANGER

Identification of immediate threat holding a **high** risk of death or serious injury if not avoided.

WARNING

Identification of immediate threat holding a **medium** risk of death or serious injury if not avoided.

CAUTION

Identification of immediate threat holding a **low** risk of minor or moderate physical injury if not avoided.

NOTICE

Identification of a threat holding a risk of material damage if not avoided.

2.6.2 Hazard symbols

Symbol	Meaning	Symbol	Meaning
	General hazard		Suspended load
	Electrical voltage		Hot surfaces

2.6.3 Prohibition signs

Symbol	Meaning
	No switching; it is forbidden to switch the machine/plant, assembly on

2.6.4 Personal safety equipment

Symbol	Meaning
	Wear body protection

2.6.5 Recycling

Symbol	Meaning
	Recycling, to avoid waste, collect all materials for reuse

2.6.6 Grounding symbol

Symbol	Meaning
	Ground connection

2.6.7 ESD symbol

Symbol	Meaning
	ESD: Electrostatic Discharge (can damage components and assemblies)

2.6.8 Information signs

Symbol	Meaning
	Tips and information making using the frequency inverter easier.

2.6.9 Font style in documentation

Example	Font style	Use
0x1234	bold	Representation of object numbers
/01	bold, underlined	Representation of sub-index numbers
/d1	bold, underlined	Representation of data set numbers
Object	Italic, Font Times New Roman	Representation of object names
P.1234	bold	Representation of object numbers without name, e.g. in formulas
Q.1234	bold	Representation of source numbers
01234	Courier new	Representation of firmware object values / object settings

2.7 Directives and guidelines to be adhered to by the operator

The operator must follow the following directives and regulations:

- Ensure that the applicable workplace-related accident prevention regulations as well as other applicable national regulation are accessible to the staff.
- An authorized person must ensure, before using the frequency inverter, that the device is used in compliance with its designated use and that all safety requirements are met.
- Additionally, comply with the applicable laws, regulations and directives of the country in which the frequency inverter is used.
- Any additional guidelines and directives that may be required additionally shall be defined by the operator of the machine/plant considering the operating environment.

2.8 Operator's general plant documentation

- In addition to the user manual, the operator should issue separate internal operating instructions for the frequency inverter. The Operating Instructions of the frequency inverter must be included in the user manual of the whole plant.

2.9 Operator's/operating staff's responsibilities

2.9.1 Selection and qualification of staff

- Any work on the frequency inverter may only be carried out by qualified technical staff. The staff must not be under the influence of any drugs. Note the minimum age required by law. Define the staff's responsibility in connection with all work on the frequency inverter clearly.
- Work on the electrical components may only be performed by a qualified electrician according to the applicable rules of electrical engineering.
- The operating staff must be trained for the relevant work to be performed.

2.9.2 General work safety

- In addition to the user manual of the machine/plant, any applicable legal or other regulations relating to accident prevention and environmental protection must be complied with. The staff must be instructed accordingly.
  Such regulations and/or requirements may include, for example, handling of hazardous media and materials or provision/use of personal protective equipment.
- In addition to this user manual, issue any additional directives that may be required to meet specific operating requirements, including supervision and reporting requirements, e.g. directives relating to work organization, workflow and employed staff.
- Unless approved of expressly by the manufacturer, do not modify the frequency inverter in any way, including addition of attachments or retrofits.
- Only use the frequency inverter if the rated connection and setup values specified by the manufacturer are met.
- Provide appropriate tools as may be required for performing all work on the frequency inverter properly.

2.10 Organizational measures

2.10.1 General

- Train your staff in the handling and use of the frequency inverter and the machine/plant as well as the risks involved.
- Use of any individual parts or components of the frequency inverter in other parts of the operator's machine/plant is prohibited.
- Optional components for the frequency inverter must be used in accordance with their designated use and in compliance with the relevant documentation.

2.10.2 Use in combination with third-party products

- Please note that Bonfiglioli Deutschland GmbH will not accept any responsibility for compatibility with third-party products (e.g. motors, cables or filters).
- In order to enable optimum system compatibility, Bonfiglioli Deutschland GmbH offers components facilitating commissioning and providing optimum synchronization of the machine/plant parts in operation.
- If you use the frequency inverter in combination with third-party products, you do this at your own risk.

2.10.3 Transport and storage

- The frequency inverters must be transported and stored in an appropriate way. During transport and storage, the devices must remain in their original packaging.
- The units may only be stored in dry rooms which are protected against dust and moisture and are exposed to small temperature deviations only. The requirements of DIN EN 60721-3-1 for storage, DIN EN 60721-3-2 for transport and labeling on the packaging must be met.
- The duration of storage without connection to the permissible nominal voltage may not exceed one year.

2.10.4 Handling and installation

- Do not commission any damaged or destroyed components.
- Prevent any mechanical overloading of the frequency inverter. Do not bend any components and never change the isolation distances.
- Do not touch any electronic construction elements and contacts. The frequency inverter is equipped with components which are sensitive to electrostatic energy and can be damaged if handled improperly. Any use of damaged or destroyed components will endanger the machine/plant safety and shall be considered as a non-compliance with the applicable standards.
- Only install the frequency inverter in a suitable operating environment. The frequency inverter is exclusively designed for installation in industrial environments.
- If seals are removed from the case, this can result in the warranty becoming null and void.

2.10.5 Electrical connections

- The five safety rules must be complied with.
- Never touch live terminals. The DC link may have dangerous voltage levels even up to three minutes after shutdown.
- When performing any work on/with the frequency inverter, always comply with the applicable national and international regulations/laws on work on electrical equipment/plants of the country in which the frequency inverter is used.
- The cables connected to the frequency inverters may not be subjected to high-voltage insulation tests unless appropriate circuitry measures are taken before.
- Only connect the frequency inverter to suitable supply mains.

The five safety rules

When working on/in electrical plants, always follow the five safety rules:

1. Isolate
2. Secure to prevent restarting
3. Check isolation
4. Earth and short-circuit,
5. Cover or shield neighboring live parts.

2.10.6 Safe operation

- During operation of the frequency inverter, always comply with the applicable national and international regulations/laws on work on electrical equipment/plants.
- Before commissioning and the start of the operation, make sure to fix all covers and check the terminals. Check the additional monitoring and protective devices according to the applicable national and international safety directives.
- During operation, never open the machine/plant
- Do not connect/disconnect any components/equipment during operation.
- The machine/plant holds high voltage levels during operation, is equipped with rotating parts (fan) and has hot surfaces. Any unauthorized removal of covers, improper use, wrong installation or operation may result in serious injuries or material damage.
- Some components, e.g. the heat sink or brake resistor, may be hot even some time after the machine/plant was shut down. Don't touch any surfaces directly after shutdown. Wear safety gloves where necessary.
- The frequency inverter may hold dangerous voltage levels until the capacitor in the DC link is discharged. Wait for at least 3 minutes after shutdown before starting electrical or mechanical work on the frequency inverter. Even after this waiting time, make sure that the equipment is deenergized in accordance with the safety rules before starting the work.
- In order to avoid accidents or damage, only qualified staff and electricians may carry out the work such as installation, commissioning or setup.
- In the case of a defect of terminals and/or cables, immediately disconnect the frequency inverter from mains supply.
- Persons not familiar with the operation of frequency inverters must not have access to the frequency inverter. Do not bypass nor decommission any protective facilities.
- The frequency inverter may be connected to power supply every 60 s. This must be considered when operating a mains contactor in jog operation mode. For commissioning or after an emergency stop, a non-recurrent, direct restart is permissible.
- After a failure and restoration of the power supply, the motor may start unexpectedly if the Auto Start function is activated.
  If staff are endangered, a restart of the motor must be prevented by means of external circuitry.
- Before commissioning and the start of the operation, make sure to fix all covers and check the terminals. Check the additional monitoring and protective devices according to EN 60204 and applicable the safety directives (e.g. Working Machines Act or Accident Prevention Directives).

2.10.7 Maintenance and service/troubleshooting

- Visually inspect the frequency inverter when carrying out the required maintenance work and inspections at the machine/plant.
- Perform the maintenance work and inspections prescribed for the machine carefully, including the specifications on parts/equipment replacement.
- Work on the electrical components may only be performed by a qualified electrician according to the applicable rules of electrical engineering. Only use original spare parts.
- Unauthorized opening and improper interventions in the machine/plant can lead to personal injury or material damage. Repairs on the frequency inverters may only be carried out by the manufacturer or persons authorized by the manufacturer. Check protective equipment regularly.
- Before performing any maintenance work, the machine/plant must be disconnected from mains supply and secured against restarting. The five safety rules must be complied with.

2.10.8 Final decommissioning

Unless separate return or disposal agreements were made, recycle the disassembled frequency inverter components:

- Scrap metal materials
- Recycle plastic elements
- Sort and dispose of other component materials

Electric scrap, electronic components, lubricants and other utility materials must be treated as special waste and may only be disposed of by specialized companies.

Always comply with any applicable national disposal regulations as regards environmentally compatible disposal of the frequency inverter. For more details, contact the competent local authorities.

After the end of product service life, the user/operator must take the device out of operation.

For more information about the decommissioning of the device refer to the applicable operating instructions document.

Disposal requirements under European Union WEEE regulations

The product is marked with the WEEE symbol shown below.

This product cannot be disposed as general household waste. Users responsible for the final disposal must make sure that it is carried out in accordance with the European Directive 2012/19/EU, where required, as well as the relative national transposition rules. Fulfil disposal also in according with any other legislation in force in the country.

3 Introduction

The present document describes the possibilities and properties of the PROFIBUS® communication module CMA-PB-01 for the frequency inverters of the *AXIA* series of devices.

For a PROFIBUS® connection, the frequency inverter must be equipped with the CMA-PB-01 communication module. The CMA-PB-01 component is supplied separately and must be installed by the operator. The installation procedure is described in chapter 4.1.

This manual is not to be understood as providing general/basic information on PROFIBUS® bus architecture or protocol. This document presupposes basic knowledge of the methods and effects of PROFIBUS® on the user's side.

Manufacturer ID:
The PROFIBUS® component CMA-PB-01 has manufacturer-ID **0x020B** (hexadecimal).

ID Number:
The Identification Number is **117B HEX** for the 1-axis device and **117C HEX** for the 2-axis device.

GSD file:
The device is described via a GSD file. There is one GSD file for each device type:

- **Bonf117B.GSD** for 1-axis device and
- **Bonf117C.GSD** for a 2-axis device.

The manufacturer-ID and designation of the GSD files have been assigned by the PROFIBUS® user organization in Karlsruhe Germany.

WARNING

Physical injuries or major material damage
With the communication module CMA-PB-01, it is possible to access **ALL** frequency inverter objects from a controller.

Changing objects, the functions of which are not known to the user, can result in unintended movements and material and/or personal losses as well as inoperativeness of the frequency inverter.

- Only qualified persons are allowed to work at the device.

4 Installation/Disassembly of the communication module

The CMA-PB-01communication module is a separate component and must be assembled with the frequency inverter.

4.1 Installation

CAUTION

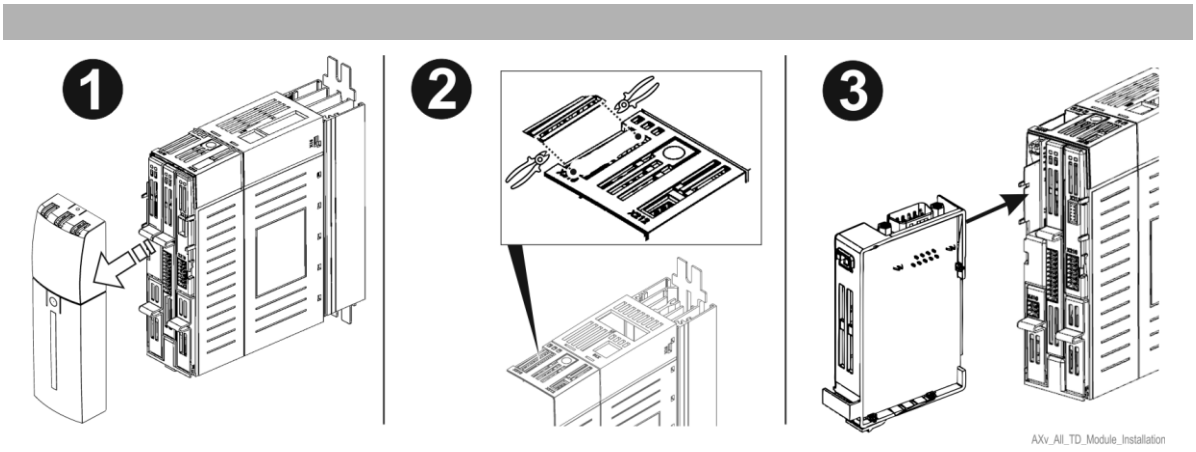
Destroying inverter and/or communication module

Connecting/disconnecting the module while the inverter is connected to live voltage can destroy the module and/or the inverter.

- Disconnect the frequency inverter from the power supply before installation of the communication module. Assembly under live voltage is not permissible.
- Do not touch the PCB visible on the back of the module, otherwise components may be damaged.

Work steps:

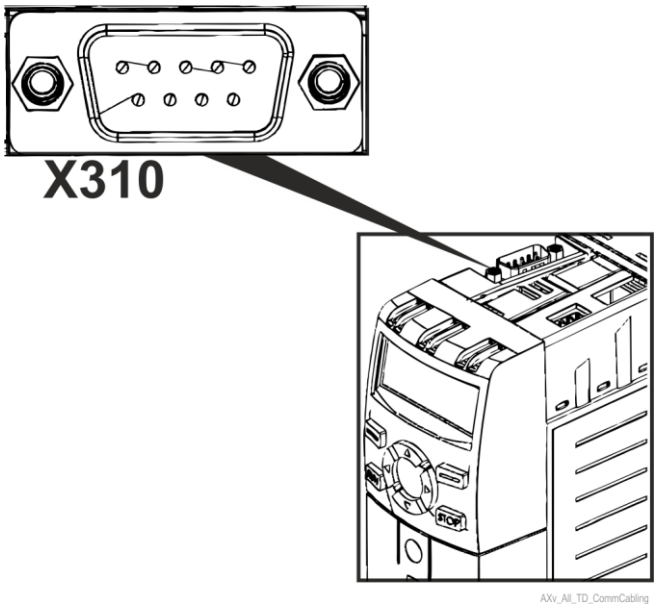
- Disconnect the frequency inverter from the mains voltage and protect it against being energized unintentionally.
- Disconnect the frequency inverter from the external 24 V if used and protect it against being energized unintentionally.



1. Remove covers of the frequency inverter. The upper left slot for the communication module is now accessible.
2. In the upper cover, break out the pre-punched cut-out for the interface X310, if necessary.
3. Insert the communication module into the slot until it engages audibly.

4.1.1 Connector Assignment

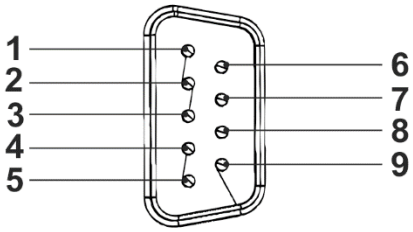
The CMA-PB-01 module uses 9-pin D-Sub connectors.



X310	RS232/RS485, 9-pin D-Sub

The interface is electrically isolated from the inverter.

CMA-PB-01 Technical characteristics: Bus Connector X310



The X310 (9-pol D-Sub) bus connector is occupied according to the PROFIBUS®-DP-Norm EN50170. See the following table for details of the pin assignment.

CMA-PB-01 9-pin D-Sub socket (female): Pin assignment

Pin	Name	Description
Housing	Screen	Connected with PE
1	PE	PE
2	not used	-
3	RxD/TxD-P	positive signal RxD/TxD-P, corresponding to RS485 B-Line
4	CNTR-P	control signal for repeater
5	DGND	isolated ground for bus connection
6	VP	isolated 5V for bus connection

CMA-PB-01 9-pin D-Sub socket (female): Pin assignment		
Pin	**Name**	**Description**
7	not used	-
8	RxD/TxD-N	negative signal RxD/TxD-N, corresponding to RS485 A-Line
9	not used	-

Only admissible types are to be used for the bus socket. They must all be suited for the 12 MBaud transmission rate.

This is, for example, type **Profibus connector 12 MBAUD** (6ES7 972-0BA11-0XA0) from Siemens.

Only admissible types are to be used as a line for the Profibus (line type A).

This is, for example, type **UNITRONIC-BUS L2/F.I.P. 1x2x0,64** from Lappkabel.

The line screen is to be connected to ground (PE) on both sides with good conductivity.

4.1.2 Bus termination

The bus termination necessary on the bus line in the physically first and last subscriber can be activated via corresponding circuits in the bus connection sockets (e.g. built by Siemens).

Attention!
The device will only communicate with the master if:

- the master is connected to the mains (or powered by 24V DC)
- the device is connected to the mains (or powered by 24V DC)
- the first and the last subscriber on the connected branch have a correctly set bus termination.
- all other devices in between have no bus termination or a deactivated bus termination.

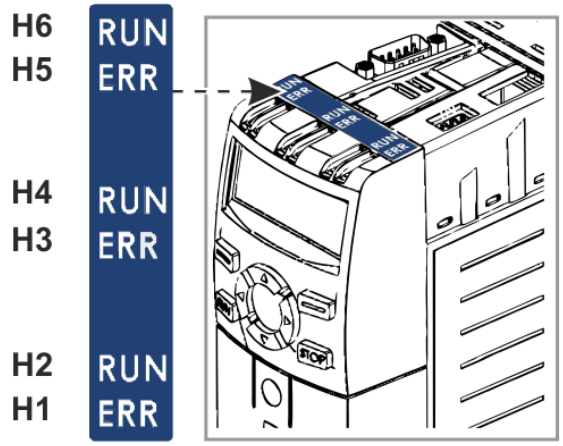
4.1.3 Status LEDs

NOTICE

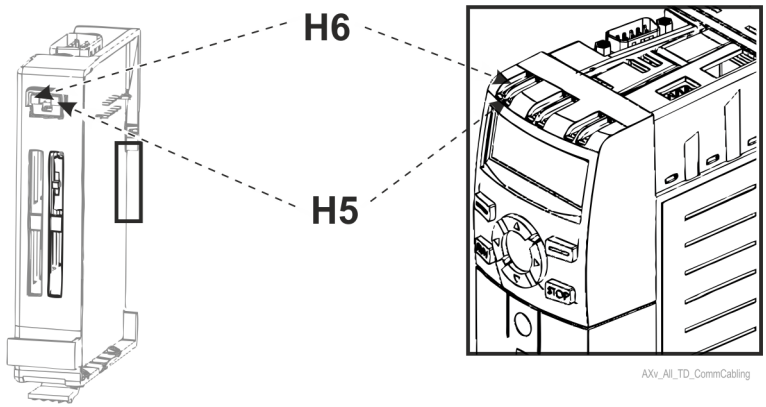
Residual risk
When LEDs and/or other indicating elements on the frequency inverter are not active, the inverter still may be energized.

- Before carrying out any work with the device, where contact with energized parts might be possible, always check if the device is deenergized, irrespective of the status of any indicating elements that may be installed.

- Make sure the adhesive label has been placed correctly according to CEMA leaflet included in the scope of supply.



Status output via communication module LEDs:
The front LEDs (H5, H6) indicate the current status of the corresponding port of the communication module.



H5 Operation Mode LED
H6 Status LED

H5: Operation Mode LED

This LED indicates the current status of the network connection.

Operation Mode LED	
LED State	**Indication**
Off	Not online/no power
Green	Online, data exchange
Flashing Green	Online clear
Flashing Red (1 flash)	Parametrization error
Flashing Red (2 flashes)	PROFIBUS® Configuration error

H6: Status LED

The module LED indicates the current status of the module.

Status LED	
LED State	**Indication**
Off	Not initialized
Green	Initialized
Flashing Green	Initialized, diagnostic event(s) present (*)
Red	Exception error (**)

*** Diagnostic Event**

When the inverter enters the error state, a diagnostic event is sent from the inverter controller to the CMA-PB-01. The CMA-PB-01 then sends a diagnostic message to the PROFIBUS® master. The PROFIBUS® master device is then able to display the inverter error. The LED stops flashing after the acknowledgement of the inverter error.

Diagnostic events are handled by a S7-CPU with OB82/OB86. If these objects are NOT loaded the CPU enters the STOP state in the case of a diagnostic event.

**** Exception Error**

An exception error indicates a fatal error on the CMA-PB-01 or communication loss between CMA-PB-01and inverter controller. Check the inverter error message with the Operator Panel or AxiaManager GUI.

4.2 Disassembly

- Disconnect the frequency inverter from mains voltage and external 24 V and protect it against being energized unintentionally.
- Remove covers of the frequency inverter, if necessary.
- Disconnect/unplug any connected lines.
- Unplug the communication module from its slot by unlocking the locking hooks on the right- and left-hand side of the module from the case of the frequency inverter using a small screwdriver.
- Proceed carefully to not damage the module.

5 Initial settings

5.1 Baud rate setting/line length

The baud rate is not explicitly set. The PROFIBUS® component supports the **Auto_Baud** function and independently determines the baud rate set on the bus.

The maximum line length recommended by the PNO correlates to the Baud rate.

PROFIBUS®-DP interface	
BAUD rate [kBaud]	**Max. cable length [m]**
9.6	1200
19.2	1200
45.45	1200
93.75	1200
187.5	1000
500.0	400
1500.0	200
3000.0	100
6000.0	100
12000.0	100

5.2 Setting the Station Address

A maximum of 125 slave frequency inverters can be operated on the PROFIbus-DP. Each frequency inverter is assigned a node ID for its unambiguous identification. This ID may only exist once in the system. The setting of the node ID is carried out via object **0x3916/1** *PROFIbus Address Set*.

Index	Sub index	Description	Data type	Setting
0x3916	1	PROFIbus Address Set	UInt 8	1–126 126 = Default 0 = PROFIbus function switched off
0x3916	2	PROFIbus Address Act	Boolean	
0x3916	3	PROFIbus Address SSA	Boolean	SSA enable

If SSA is enabled, the support of the *Set Slave Address Service* (SSA) is activated.

- Address Network Configuration Object 0x04
  Instance#1, Attribute#5 = 126

The default value of the address is 126. Support of the SSA service is activated with this value and the SSA enable flag set in the PROFIBUS® DP-V1 object.

If the address is changed on the GUI side it will only be adopted after a reset. The content of attribute#5 is transferred to attribute#6.

If the address has been set via SSA service, the valid address is contained in attribute#6 (value) . The content of attribute#5 (configured value) contains the "locally" set address (126).

- SSA PROFIBUS® DP-V1 Object 0xFD
  Instance #1, Attribute #4 = true

If the slave address was set via SSA Service, it can solely be deactivated by resetting to Network Configuration Object 0x04. This can be made in the AxiaManager GUI, ☞ AxiaManager GUI manual) or the Keypad.

5.3 Configuration on the DP Master (STEP7 Screenshots)

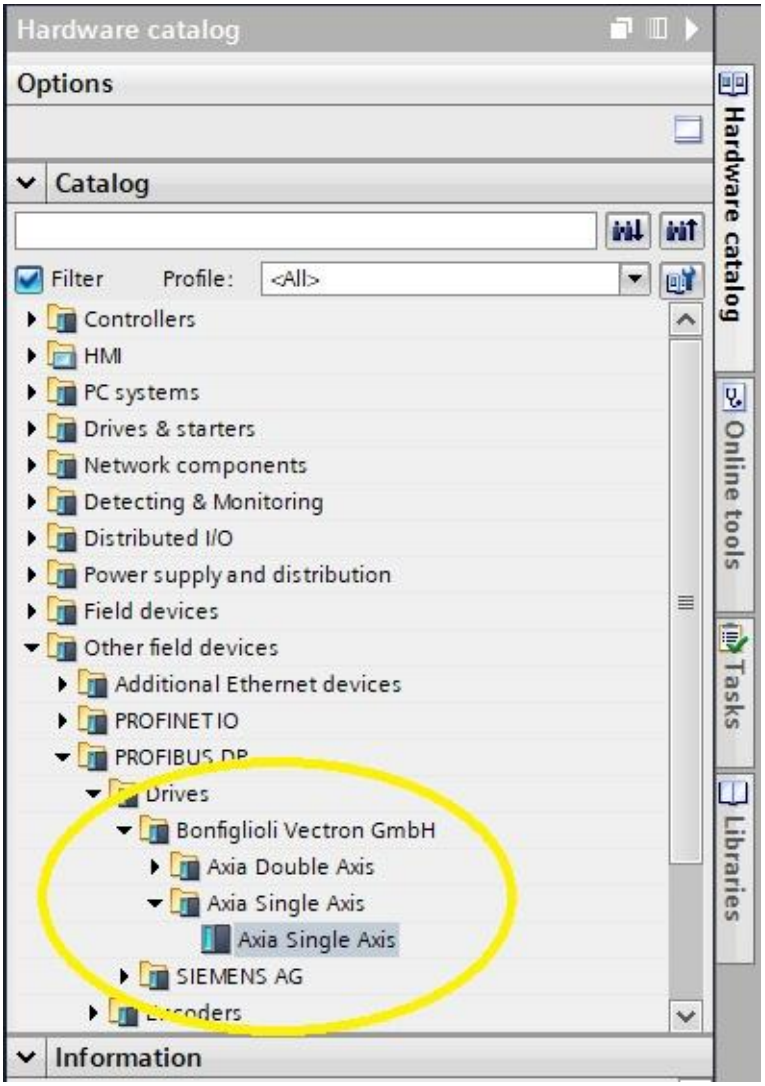
The configuration process of the frequency inverter with the PROFIBUS® communication module CMA-PB-01 is shown here using the example of a Siemens STEP7 hardware configurator. The process is principally valid for other configurations in an equivalent form.

First, the GSD file is installed in the hardware configurator (if not done already). This is done with the menu selection **Options\Install GSD File**. Here, enter the path and the name of the GSD file (see chapter 3).

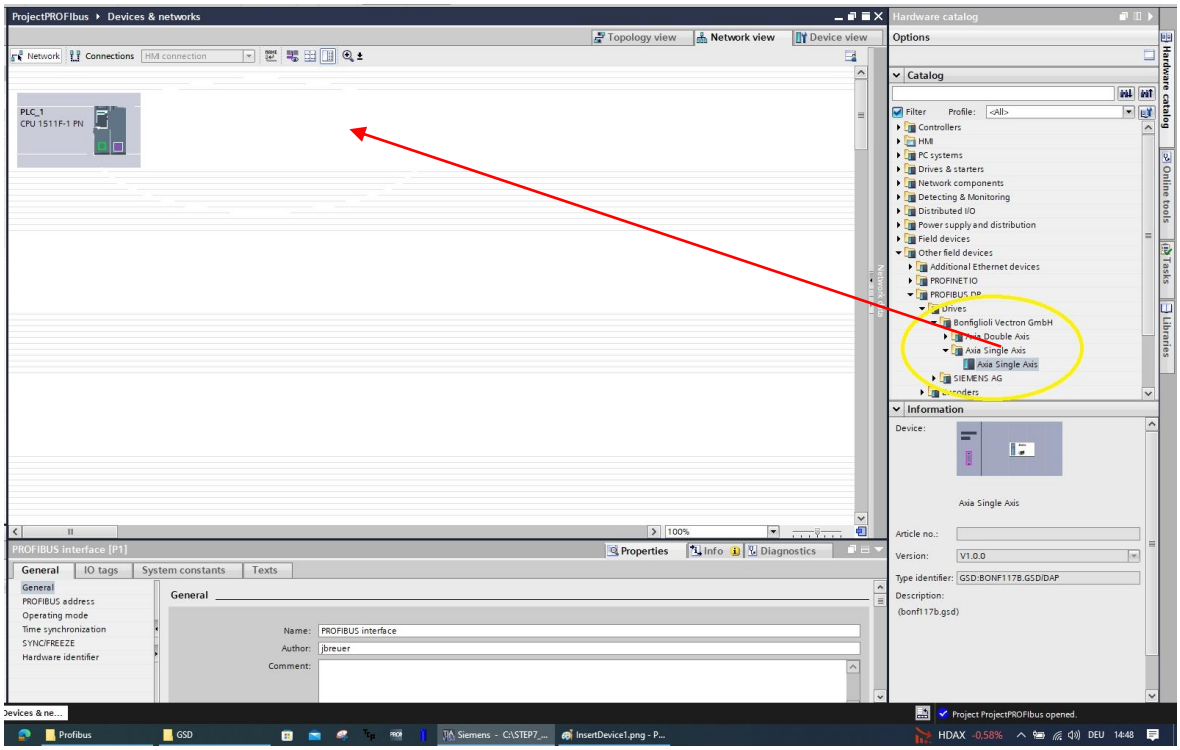
- Install the GSD file in the hardware configurator by selecting menu **Options\Install GSD File**. Here, enter the path and the name of the GSD file (☞ 3).

  Once the GSD file is installed, the frequency inverter can be identified.
- Open a project in the TIA Portal.
- Select Online > Hardware detection > PROFIBUS devices from network…

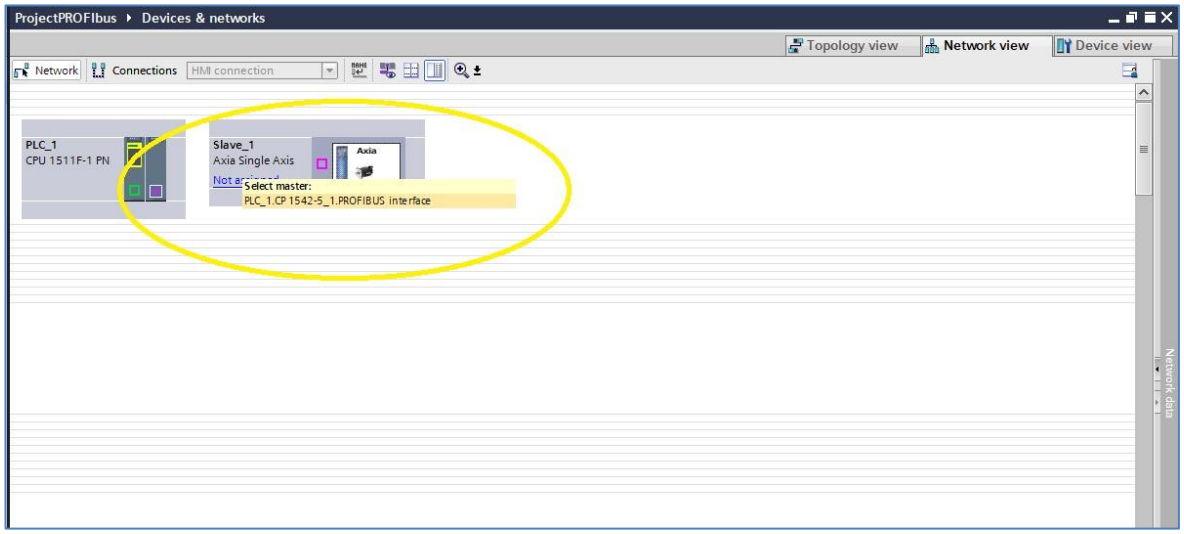
If the GSD file has been installed correctly, the frequency inverter appears in the hardware catalog:



You will find the Axia device in the folder: Other field devices \ PROFIBUS DP \ Drives \ Bonfiglioli. This folder shows **Axia Single Axis** or **Axia Double Axis**.

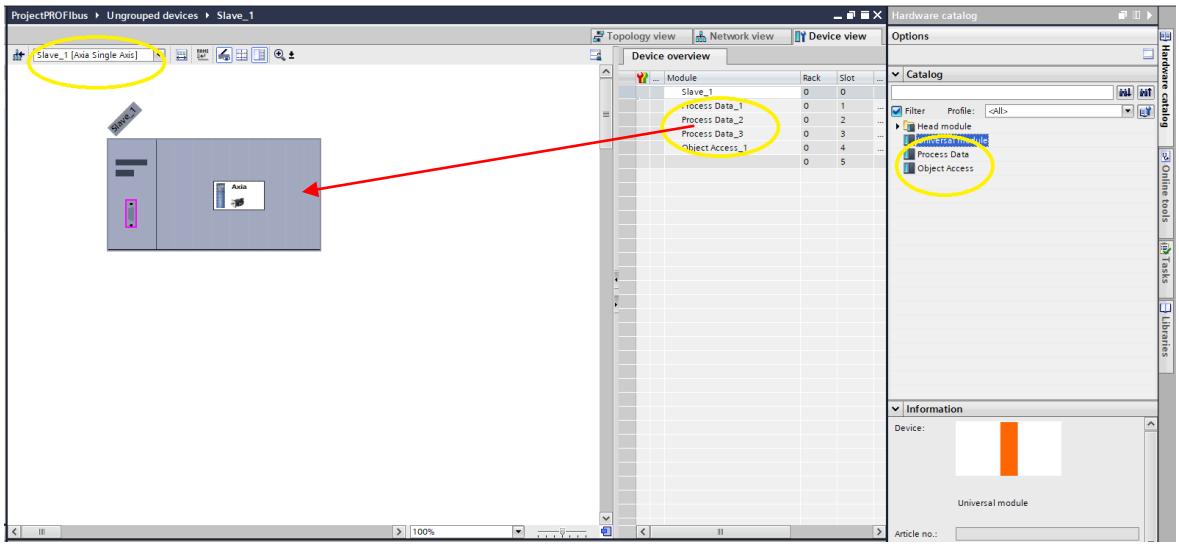


From this position, an AXIA frequency inverter can be connected to the PROFIBUS® by dragging & dropping the device to the Step 7 Network view window.



- Select the desired port in the PLC.
- Select the PLC as master (Here: PLC_1.CP 1542-5_1 PROFIBUS® interface").

Double click on the Axia device or open the tab "Device view" in the project window.



The available Process Data and Object access modules are visible in the device overview window. The required object can be assigned to the inverter by Drag & Drop.

The configuration setting is:

1 Object Access module	8 bytes or 4 words, communication object (input/output)
4 PD module	16 bytes or 8 words, process data objects (input/output)

- The data direction IN/input and OUT/output are from the master's point of view.

5.3.1 Restrictions for user defined configuration settings

- The Object Access module is allowed only once and must be inserted as the first object in the first slot of the axis.
  In case of a 2-axis device, this module may only be plugged in once. It must be inserted either in the first slot of the first axis or in the first slot of the second axis.
- As a minimum, one PD object must be configured.
  In the case of a 2-axis device, it must be present at least once in each axis.
- If an Object Access module is plugged in, a maximum of 4 Process Data modules may still be plugged in.
- If only Process Data modules are plugged in, a maximum of 5 Process Data modules may be plugged in.
- The Axis Separator module must not be present on a 1-axis device.
- The Axis Separator module must be present as the last module for each axis on a 2-axis device.
- The resulting number of all objects must be less than or equal to 36 bytes (18 words).

The total number of configured data bytes for OUT and IN data must be:

- 1-axis device: ≤24 bytes
- 2-axis device: ≤48 bytes (max. 24 bytes per axis)
- Process Data module: 4 bytes
- Object Access module: 8 bytes
- Axis Separator module: 0 bytes

If one of the rules is violated, the configuration is rejected.

A restriction violation results in a configuration error message from the PLC on the PROFIBUS® start up cycle. Also the Operation Mode LED on the CMA-PB-01 flashes red (2 flashes).

In the event of deviating configuration data (default/actual) from the configuration data sent by the DP master, do the following:

- Check data for validity.
- If the received data is valid, update the process data mapping.
- Send a positive acknowledgement of the newly received configuration.

See next section for the structure and behavior of the configuration data.

5.3.2 Default Setting of Configuration Data

The configuration data uses a PROFIBUS® DP-V1 object. The default setting uses only one Process Data module:

Inst. #1 Attr. #3/Expected Configuration

- 1-axis device 0xF1
- 2-axis device 0xF1,0x01,0xFE,0xF1,0x01,0xFE

If a 2-axis device is used, consider the Axis Separator 0x01,0xFE (see chapter 7.3).

When establishing the connection between the PROFIBUS® master and PROFIBUS® slave, the configuration data are checked. The module provides the host with write access to the DP-V1 channel, instance #1, attribute #3 (expected configuration).

#3: Expected Configuration

The process data is managed via this attribute. These are defined in the form of modules that can be mapped. In this attribute, a default setting or the last valid configuration data is stored.

During start-up, the PLC writes an array of uint8, with each element defining process data. If the data sent by the control unit is identical to the existing data, this is acknowledged positively and then the process data exchange starts. If the data is different, it is first checked for validity. If the received data is valid, the process data mapping must be updated. After that, a positive acknowledgement of the newly received configuration must be sent.

The module reads data from this object which replaces the default values of the module. Only the attributes described here are implemented. The attempt to access non-implemented attributes will cause an error message.

5.3.3 Maximum Amount of IO Data in GSD File

The maximum length of the IO data is specified in the GSD file. The file must be pre-defined for the expected amount of process data bytes. If configured with the corresponding data, 24 bytes of process data can be transferred per direction. This results in the following values of *Max_Output_Len* and *Max_Input_Len* in the GSD file:

- 24 bytes for a 1-axis device
- 48 bytes for a 2-axis device (max. 24 bytes per axis)

If only Process Data modules are used the maximum number of modules *Max_Module* is:

- 5 for a 1-axis device
- 12 for a 2-axis device

If a 2-axis device is used, consider the Axis Separator 0x01,0xFE (see chapter 7.3).

6 PROFIBUS® communication

Depending on the application used, different process data objects with various lengths and contents are required for data exchange. The CMA-PB-01 module enables a wide range of settings. Using a hardware configurator, the user can design the process data objects required for the relevant application.

The required objects must be created in the hardware configuration of the PROFIBUS® IO controller. On the frequency inverter side it is not possible to set up the required objects. The frequency inverter adjusts itself to the created objects automatically.

If a PROFIBUS® slave has been recognized, parameterized and configured by its master on the bus, there is a cyclic exchange of data with the PROFIBUS® data exchange service, in which the output data are transmitted from the master to the slave and the input data from the slave to the master in one cycle. The repetition rate with which the slaves carry out the exchange of data with the master, the so-called bus rotation time, is a function of the transmission rate, the number of subscribers and the size of the objects transmitted. If there are few subscribers, a high transmission rate and short objects being exchanged, bus rotation times of 1 to 2 ms are possible.

It is therefore sensible to configure the objects to suit the application. Depending on the application, the focus can be transmission speed, number of objects or a combination of both.

Two module types (PD = Process Data channel, Object Access = communication object) are available for configuration.

The **process data channel** is processed in every cycle. The reference values are accepted and the actual values forwarded. Therefore, a data update takes place with every data exchange, see chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**

The **object access channel** is used for accessing (write/read) parameters in the frequency inverter. An exception is formed by the string parameters, to which there is NO access. The communication proceeds according to a firmly defined hand-shake process and lasts for a number of data exchange cycles, see chapter 0

Direction of transmission Master → Slave (OUT)

Object Access Channel				**Process Data Channel**					
Object ID value				PD area					
Parameter identification	Index	Parameter value	Parameter value	PD 1	PD 2	PD x	PD x	PD x	PD x
		High Word	Low Word	Control word	Main reference value	OUtx	OUtx	OUtx	OUtx

Outx: user-defined

Direction of transmission Slave ← Master (IN)

Communication Channel				**Process Data Channel**					
Object ID value				PD area					
Parameter identification	Index	Parameter value	Parameter value	PD 1	PD 2	PD x	PD x	PD x	PD x
		High Word	Low Word	Status word	Main actual value	Inx	Inx	Inx	Inx

Inx: user defined

Consistency area

Communication Channel				Process Data Channel					
Access object				PD objects					
Parameter identification	**Index**	**Parameter value**	**Parameter value**	**PD 1**	**PD 2**	**PD 3**	**PD 4**	**PD 5**	**PD 6**
full length				word	word	word	word	word	word

The consistency area describes the parts of the object which must have consistent contents. The consistency states are encrypted in the configuration data of the GSD file and have effects on the possible access mechanisms on the part of the DP master. In this way, the 8 bytes of the communication channel in a PLC of type Siemens S7 can only be reached via the special functions **SFC14 (DPRD_DAT)** and **SFC15 (DPWR_DAT)**. The words of the process data channel are directly addressable as **periphery input/output words (PEW, PAW)**.

With the help of the Process Data objects and the Object Access objects you are able to build your own application specific configuration.

- The communication channel is always treated identically.
- The process data channel object PD1 is firmly defined and its contents cannot be altered. This definition is also valid for user defined configurations.
- The contents of process data channels PD2 to PD5 (maximum, without communication channel PKW) is user defined.

In the data transmission, the **Motorola format** is presupposed for the position of Low/High byte first, as is also supported by a PLC of the type Siemens S7. If the DP master supports the Intel format, Low/High byte are to be swapped on the master side before transmission and after receipt.

For more information on the data exchange refer to chapter 7.

6.1 Definition of Modules

Configuration bytes are used to define modules. Three different modules are defined for Axia, which are clearly functionally assigned and differentiated.

There are the modules for:

- Process Data
- Object Access
- Axis Separator

For the first plugged Process Data module, there is a fixed assignment to inverter objects (see chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**).

ENDIAN:

BigEndian is used for PROFIBUS®. This means that the objects defined as **Word** or **Long** must be swapped before being saved.

	PROFIBUS®	**Inverter**
16 bit size	High byte	Low byte
	Low byte	High byte
32 bit size	High byte High word	Low byte Low word
	Low byte High word	High byte Low word
	High Byte Low Word	Low Byte High Word
	Low Byte Low word	High Byte High Word

For the OUT/IN data transfers, it may not be possible to write or read the listed reference objects of the DS402 directly. The data must be written/read directly to/from the application variables.

The data set is always on the high byte of "Index" (data set/Byte No. 2).

If the Systembus function is available a Systembus address is set on the low byte of "Index" (SB/Byte No. 3). With the help of this parameter the access to a Systembus subscriber is possible. For details see the Systembus manual.

6.2 Process Data and Object Access Structure

As a function of the application in question, various process peripheral objects (PPOs) with differing lengths and contents are used for data exchange. The CMA-PB-01 offers a wide range of PPO settings. With the help of a hardware configuration tool the user is able to construct PPO settings as needed for his application.

PPO objects and two additional objects (process data object PD, communication object) are available for free configuration.

The required objects must be created in the hardware configuration of the PROFIBUS® IO controller. On the frequency inverter side it is not possible to set up the required objects. The frequency inverter adjusts itself to the created objects automatically.

PROFIBUS® - Modules

Module	Module length/ Bytes	Module length/ Words
Process Data	4	2
Object Access	8	4

Further information on the contents of the objects is described in chapter 7 "Data Exchange".

Process Data

Each PD module has two words of input/output data. The handling of the module is explained in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**.

Object Access

The access object module is used for accessing parameters (read/write) in the inverter. This module causes additional busload because it sends its contents with every data exchange cycle, whether it is used or not. As an alternative function without the necessity of the object access module, the CMA-PB-01 module supports the DP-V1 channel. This function is explained in chapter 7.2.

6.3 Commands SYNC/FREEZE

The PROFIBUS® component supports the PROFIBUS® commands SYNC/UNSYNC and FREEZE/ UNFREEZE. These commands are used to synchronize a number of slaves.

With the FREEZE command, all the slaves keep their input data. They are then read out in sequence by the bus master. As all the slaves keep their inputs simultaneously with the FREEZE command, the bus master is given a process pattern of all the slaves at a defined time. With the UNFREEZE command, this state is cancelled and the slaves update their inputs again.

With the SYNC command, all the slaves retain their current outputs. Subsequently arriving data are not put through to the outputs but is buffered. The bus master can give new commands to the slaves and activate all the slaves simultaneously with the UNSYNC command. They immediately transfer the buffer data to their outputs with the UNSYNC command.

7 Data Exchange

The PROFIBUS® communication module CMA-PB-01 provides the possibility to use the PROFIBUS® V1-channel. The V1-channel data is sent only when a parameter access is necessary. The PROFIBUS® V1-channel can access all parameter types including string parameters. This data type complies with the **process data** channel (PD), see chapter 7.1.

If the process data channel is not supported in the intended setup, the **object access** communication can be used for the data exchange as an alternative. This data exchange object is always sent on the bus, whether it is used or not, and therefore causes higher busload.

This data type corresponds to the PKW data channel, see chapter 7.2.

7.1 Process Data Channel

In this chapter the handling of the process data channel (PD) is described. In the frequency inverter, this module is represented as source for output objects (data received from controller) and as input object for sources (data to be sent to controller).

The PD object consists of two-word objects (4 bytes) (OUT/IN).

The data flow direction IN/input and OUT/output is given from the PLC's point of view.

A fixed and unchangeable assignment applies to the first plugged module of the Process Data type (see 7.1.1):

OUT:

Word 0 Control word

Word 1 Frequency Setpoint

IN:

Word 0 Status word

Word 1 Actual Frequency

All other Process Data modules are assigned to:

OUT data → Sources

IN data ← Input objects

With the objects/sources it is possible to transfer any data objects with 1/2/4 bytes using the input objects and sources method.

The OUT data received is made available via sources.

The PD channel has the following structure:

OUT (PLC to frequency inverter) → Sources

Byte	Source no.	Word	Source no.	Double word	Source no.
Byte 0		Word 0		Long 0	
Byte 1					
Byte 2		Word 1			
Byte 3					

The validity of the sources depends on the use on the PLC program side.

The data to be transmitted is set via objects listed in chapter 7.1.1.1

IN (frequency inverter to PLC) → input objects

Byte	Index/ Sub index	Word	Index/ Sub index	Double word	Index/ Sub index
Byte 0		Word 0		Long 0	
Byte 1					
Byte 2		Word 1			
Byte 3					

The validity of the input parameters depends on the use on the PLC program side. Unused input sources are set to NULL (also by default) and are therefore inactive (no data is assigned).

The data to be sent is defined via objects listed in chapter 7.1.4

7.1.1 Fixed Assignment PD1

The fixed assignment applies to the first plugged module (PD1). It consists of two Out/In objects:

Object					Setting		
Object type	**Index**	**Sub index**	**Designation**	**Data type**	**Min. value**	**Max. value**	**Default**
Out	0x6040	0	Control word	UInt16	0	65535	0
Out	0x21F1	1	Frequency Setpoint N2	Int16	0x8000	0x7FFF	0
In	0x6041	0	Status word	UInt16	0	0	0
In	0x21F1	3	Actual Frequency N2	Int16	0	0	0

PD1 comprises two-word objects (4 bytes): Status word for input and Control word for output. For the calculation of the reference value the object *Scaling Factors* **0x21F1** (axis 1) is used.

Before sending a reference speed via object **0x21F1/1** make sure that one of the speed reference objects (**0x2511** – **0x2514** *Speed Reference 1 … 4*) is set to source `0x0021F010 SRC: PROFIx Target Velocity`.

Examples:

PLC → Servo drive
Control word	**Control word 0x6040**
0x0000	0x0000
0x0010	0x0010
0x0001	0x0001
Frequency Setpoint N2 0x21F1/1 (Scaling Factor 0x21F1/0 = 1500 rpm)	**Speed Reference [rpm]**
0x4000 ≙ 100% x 0x21F1/0	1500
0x7FFF ≙ 200% x 0x21F1/0	3000
0xE000 ≙ 50% x 0x21F1/0	750
0x8000 ≙ –200% x 0x21F1/0	–3000
Frequency Setpoint N2 0x21F1/1 (Scaling Factor 0x21F1/0 = 3000 rpm)	**Speed Reference [rpm]**
0x4000	3000
0x7FFF	6000
0xE000	1500

Servo drive → PLC	
Status word 0x6041	**Status word**
0x0040	0x0040
Actual Frequency [rpm]	**Actual Frequency N2 0x21F1/3** (Scaling Factor 0x21F1/0 = 1500 rpm)
1500	0x4000
3000	0x8000
Actual Frequency [rpm]	**Actual Frequency N2 0x21F1/3** (Scaling Factor 0x21F1/0 = 1500 rpm)
1500	0x4000

7.1.1.1 Control word and Status word

In PD1, the master gives its control commands (control word) to the frequency inverter in the output data set and receives the information on its state (status word) in the input data set.

The control of the frequency inverter can be carried out with three different operation modes. These are set via the data set change-over capable object *Control Mode* **0x2200**.

Object			Setting		
No.	**Description**	**Data type**	**Min.**	**Max.**	**Default**
0x2200	Control Mode	UInt8	(No list)	Mode of Control	IOs

For operation on the Profibus, only the settings `1 - IOs` and `3 -Statemachine` are relevant. The remaining settings relate to the possibilities of control via the Keypad.

The inverter's behavior with respect to *Control Word / Status Word* (**0x6040**/**0x6041**) varies in the two different types of configurations.

Control via I/Os

Necessary settings:

- *Control Mode* **0x2200** = `1 - IOs`

The control (Start, Stop, Frequency change over, etc.) is typically carried out via:

- Digital contacts
- Remote contacts via Field bus

Reference values result from the selected configuration. Typical configurations:

– Reference speed / Reference frequency:

- Analog input
- Fixed values from parameters
- Target velocity

– Percentage reference value for technology controller or Torque control:

- Analog input
- Fixed values from parameters

– Reference target position

Control via Statemachine

Necessary settings:

- *Control Mode* **0x2200** = `3 -Statemachine`

The control (Start, Stop, mode change over, etc.) is carried out via the Control word.

Reference values result from the selected Modes of Operation.

Typical Modes of Operation are:

- Reference speed via target velocity

– Target position

The usage of the Motion Control Interface is described in ☞📖 AXIA Operating instructions VEC2en1.

7.1.2 Free Assignments PD2 – PD5

The freely assignable PD modules are for free usage. They consist of four resp. two In/Out objects. Two Uint16 for In and two Uint16 for Out, or one Uint32 for In and one Uint32 for Out. They are entered respectively displayed in the following Uint32 objects:

Object				Value setting		
Object	**Sub index**	**Designation**	**Data type**	**Min. value**	**Max. value**	**Default**
0x3916	20–25	PD1-PD6 Value Out (Rx)	UInt32	0	0	0
0x3916	10–15	PD1-PD6 Value In (Tx)	UInt32	0	0xFFFF FFFF	0

Content selection (mapping) can be made by the following objects, e.g.:

Object				
Object no.	**Sub index**	**Designation**	**Data type**	**Source no.**
0x3915	09, 41, 73, 105, 137, 169	PD1 Tx Int16_0 – PD6 Tx Int16_0[1)]	Uint32	See choice list (Annex)
0x3915	11, 43, 75, 107, 113, 139, 171	PD1 Tx Int16_1 – PD6 Tx Int16_1[2)]	Uint32	See choice list (Annex)
0x3915	17, 49, 81, 113, 145, 177	PD1 Tx Int32_0 – PD6 Tx Int32_0[3)]	Uint32	See choice list (Annex)

1) The first 2 bytes are only possible if the value of sub index 33 is 0.
2) The second 2 bytes are only possible if the value of sub index 33 is 0.
3) All 4 bytes are only possible if the values of sub indexes 17 and 19 are 0.

Each source can be linked to an input object of the frequency inverter of the same data type.

Choice lists are available for mapping these objects. see Annex.

7.1.3 Output sources

In the table below, the available PLC output sources of the freely assignable PD objects are listed. The content of the sources depends on the application. For the different data types, the relevant sources must be linked to the input objects of the frequency inverter.

- Availability of output sources depends on the number of configured PD objects.
- Each configured PD object comprises either two Boolean, two Word or one Long output object(s).
- An output object can only be used for one data type (depending on the application requirements).
- The first object configured (obligatory) represents object **0x6040/0** and **0x21F1/01** with fixed contents and functions.

Object				Value setting		
Object	**Sub index**	**Designation**	**Data type**	**Min. value**	**Max. value**	**Default**
0x3916	20–25	PD1-PD6 Value Out (Rx)	UInt32	0	0xFFFF FFFF	0

7.1.4 Input sources

In the table below, the available input sources of the of the freely assignable input objects are listed. The content of the sources depends on the application. For the different data types, the relevant input objects must be linked to the sources of the frequency inverter. A choice list is available for these objects.

- Availability of input sources depends on the number of configured objects.
- Each configured object comprises either two Boolean, two Word or one Long input object(s).
- An input object can only be used for one data type (depending on the requirements of the application).
- The first object configured (obligatory) represents object **0x6041/0** and **0x21F1/03** with fixed contents and functions.

Object				Value setting		
Object	**Sub index**	**Designation**	**Data type**	**Min. value**	**Max. value**	**Default**
0x3916	10–15	PD1-PD6 Value In (Tx)	UInt32	0	0	0

When an object is set to a certain source, it must be ensured that the relevant objects have the preset values at the same place.

Current standardization

Standardization			
Reference Value	**Binary**	**Decimal**	**Hexadecimal**
+ 100%	+ 2^{14}	16384	0x4000

Possible range = ±200% = +32768 to -32768 = 0x8000 through 0x7FFF

For internal standardization, the data set switchable object *Rated Current* **0x2003** is used as the reference value.

Objects		Settings		
No.	**Description**	**Min.**	**Max.**	**Factory setting**
0x2003	Rated current	0.01 · I_{FUN}	10 · I_{FUN}	I_{FUN}

7.1.5 Data types of OUT/IN-objects

Boolean data type

The valid value for boolean is FALSE/0x0000 and TRUE/0xFFFF.

data type – Boolean		
	boolean value	**data content hexadecimal**
OUT/IN-PDn Boolean	FALSE	0x0000
OUT/IN-PDn Boolean	TRUE	0xFFFF

n = 3 … 18

Word data type

The Word data type can be used for percentage, current and torque variables. Current and torque are possible in applications with field-orientation. The scalings in question are described below.

Word data type – Percentage

The value range for percentage values is -300.00 to +300.00%. The values in OUT/IN-PZDn are displayed with a multiplication factor of 100.

Word data type – Percent			
	data content hexadecimal	**data content decimal**	**logical interpretation**
OUT/IN-PDn Word	0x8AD0	- 30000	- 300.00 %
OUT/IN-PDn Word	0x0000	0	0.00 %
OUT/IN-PDn Word	0x7530	+ 30000	+ 300.00 %

n = 3 … 18

Word data type – Current

For the current, calculation must be done in the device-internal scaling.

The scaling is:

Reference value = (Reference current[A] / scaling current[A]) · 2^{13}

2^{13} = 8192 (decimal) = 0x2000 (hexadecimal)

Word data type – Torque

For the torque specification, the calculation must be done in the device-internal scaling. The scaling for a torque value is identical to the specification of the reference current (see Current). If the machine is operated with nominal flux, a reference torque corresponds to a reference current.

The equation stated for current (torque) applies for operation with nominal flux. If a machine is operated in the field weakening area, this is to be considered in the specification values.

If the current or torque variables are used, please consider the device-specific scaling.

Long data type

The Long data type can be used for the frequency and position variables.

Frequencies use the internal notation of the inverter (**xxx Hz / 4000 Hz) * 2^{31}.**

Examples:

50.00 Hz → (50.00 / 4000.00) * 2^{31} = 0x01999999

-80.00 Hz → (-80.00 / 4000.00) * 2^{31} = 0xFD70A3D8

Position information depends on the settings of the motion control system.

Long data type			
	data content hexadecimal	**data content decimal**	**logical interpretation**
OUT/IN-PDx/y Long	0xnnnnmmmm	Application-specific	Application-specific

x/y = 3/4, 5/6, … 17/18

7.2 Object Access Channel

In this chapter the handling of the object access channel is described. The object access channel is used for reading and writing access to addressed frequency inverter objects. All objects excluding the string objects can be written/read. The object access produces additional bus load because it sends its contents with each data exchange cycle, no matter if it is actually needed or not.

The module consists of 8 bytes Out/In each. Strings cannot be written/read. Alternatively, any objects of any length can be accessed in the device using an acyclic read/write service.

Object access over process data is realized by use of the object **0x3916/30** and **0x3916/31**.

Object				Value setting		
Object	**Sub in-**	**Designation**	**Data**	**Min. value**	**Max. value**	**Default**
0x3916	30	ObjAccess In (Tx)	UInt64	0	0	0
0x3916	31	ObjAccess Out (Rx)	UInt64	0	0xFFFF FFFF FFFF FFFF	0

7.3 Axis Separator Channel

In order to be able to map two axes under one node address in PROFIBUS®, a special identifier must be used. Whereas for a 1-axis device only the module identifiers are listed for the used modules, the objects' start and end points for the axes are marked via axis separators (AS) with a 2-axis device.

Example:

0xF3 , 0xF1 , 0xF1 , **AS** , 0xF1 , 0xF1, 0xF1 , **AS**

Drive Axis	**1**			**2**		
Slot	**1**	**2**	**3**	**4**	**5**	**6**
DP ID	0xE4 (output)	0xD8 (input)	0x01 0xFE (axis separator)	0xE4 (output)	0x08 (input)	0X01 0xFE (axis separator)

Slot	**1**	**2**	**3**	**4**
PROFIdrive ID	0xC3 0XC4 0xC8 0xFD 0x00 0x03	0x01 0xFE (axis separator)	0xC3 0xC4 0xC8 0xFD 0x00 0x03	0x01 0xFE (axis separator)

0x01,0xFE is the identifier of the Axis Separator module.

Each axis must be finalized with the Axis Separator.

8 Object Structure

The available objects are marked with "index" and "sub index" and must be addressed via this ID. The following definitions apply:

Access type			
Read only	The PLC/user can only read data from the frequency inverter.		
Read/Write	The PLC/user is granted unlimited access (reading and writing) to the frequency inverter data.		
Data type			
UInt64	64 Bit value:	$0…2^{64}$-1 0…0xFFFF FFFF FFFF FFFF	
UInt32	32 Bit value:	$0…2^{32}$-1 0…0xFFFF FFFF	
UInt16	16 Bit value:	$0…2^{16}$-1 0…0x FFFF	(0…65535)
UInt8	8 Bit value:	$0…2^{8}$-1 0…0xFF	(0…255)
Int32	Signed 32 Bit value	$-2^{31}…2^{31}$-1 0x8000 0000…0x7FFF FFFF	
Int16	Signed 16 Bit value:	$2^{15}…2^{15}$-1 0x8000…0x7FFF	(-32768…32767)
Int8	Signed 8 Bit value:	$2^{7}…2^{7}$-1 0x80…0x7F	(-128…127)

"Highest sub index supported" shows the highest sub index supported by the object.

Object Grouping

Every object is addressed via a 16 Bit index, which is displayed as a 4-digit hexadecimal number.

The object indexes in this chapter are sorted in groups according to the PROFIBUS® functions:

Cyclic data exchange:
- Process data objects
- Mapping objects

Acyclic objects:
- Information and maintenance objects

Devices/network diagnostics:
- Diagnostics
- Operating behavior in the case of bus connection failure
- Resetting errors

Process data objects can be subdivided in axis-specific objects versus axis-independent objects. There is an offset of 0x0800 per axis in the axis-specific range.

Axis-specific object ranges (with reference to DS402 objects 0x6nnn):
- 0x6000 – 0x60FF (axis 1)
- 0x6800 – 0x68FF (axis 2)
- 0x21F1 (1 – 4) for speed reference rescaling

Axis-independent object range:
- 0x3915 – 0x3916

8.1 Process Data Objects

8.1.1 Output Sources

Object			Value setting	
Object no.	**Sub index**	**Designation**	**Min. value**	**Max. value**
0x6040	00	Control word	0	0xFFFF (65535)
0x21F1	01	Frequency Setpoint N2	0x8000 (-32768)	0x7FFF (32767)
0x3916	20–25	PD1–PD6 Value Out (Rx)	0	0xFFFF FFFF
0x3916	31	ObjAccess Out (Rx)	0	0xFFFF FFFF FFFF FFFF

see 7.1.3

The objects are described as follows:

Object		Value setting		
Index/sub index	**Designation**	**Min. value**	**Max. value**	**Default**
0xabcd/xyz	Object name	0	0xFFFFFFFF	0

Example:

Object		Value setting	
Index/sub index	**Designation**	**Value**	**Designation**
0x3916/21	PD2 Value Out (Rx)	0x003B A302	PLC inputs

8.1.2 Input Sources

Object			Value setting	
Object no.	**Sub index**	**Designation**	**Min. value**	**Max. value**
0x6041	00	Status word	0	0
0x21F1	03	Actual frequency N2	0	0
0x3915	09, 41, 73, 105, 137, 169	PD1 Tx Int16_0 – PD6 Tx Int16_0	(No List)	PROFIx PDx 16Bit_List (see Annex)
0x3915	11, 43, 75, 107, 113, 139, 171	PD1 Tx Int16_1 – PD6 Tx Int16_1	(No List)	PROFIx PDx 16Bit_List (see Annex)
0x3915	17, 49, 81, 113, 145, 177	PD1 Tx Int32_0 – PD6 Tx Int32_0	(No List)	PROFIx PDx 32Bit_List (see Annex)
0x3916	10 – 15	PD1 ActValue In (Tx) – PD6 ActValue In (Tx)	0	0
0x3916	30	ObjAccess In (Tx)	0	0

see 7.1.4

The objects are described as follows:

Object		Value setting		
Index/sub index	**Designation**	**Min. value**	**Max. value**	**Default**
0xabcd/xyz	Object name	0	0xFFFFFFFF	0

Example:

Object		Value setting	
Index/sub index	**Designation**	**Value**	**Designation**
0x3915/11	PD2 Value In (Tx)	0x0039 4100	SRC: Status Word 6041:00

8.2 Objects Access Channel

Object			Value setting	
Object no.	**Sub index**	**Designation**	**Min. value**	**Max. value**
0x3916	30	ObjAccess In (Tx)	0	0
0x3916	31	ObjAccess Out (Rx)	0	0xFFFF FFFF FFFF FFFF

Example:

Object		Value setting	
Index/sub index	**Designation**	**Value**	**Designation**
0x3916/31	ObjAccess Out (Rx)	0x00604100	Status Word 6041:00

The communication channel has the following structure:

OUT / Request (PLC → Inverter)

Byte	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
			MSB	LSB	MSB		LSB	
	cmd	SubIdx	Index		Data			

IN / Response (Inverter → PLC)

Byte	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
			MSB	LSB	MSB		LSB	
	cmd	SubIdx	Index		Data			

Index/SubIndex (SubIdx) are specified in the request (read/write), which are returned as an echo in the response. The "data" bytes contain the data to be read/written. The valid data length is specified in "cmd".

Structure "cmd"

Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
request	v	r/w	x	x	x	n	n	n
response	v	r/w	E	x	x	n	n	n

v valid — 0 → data not valid
1→ valid data

r/w read/write — 0 → Read command (r/w is reported back in response)
1 → Write command

E Error — 0 → No error feedback
1 → Error response, error code is in "data" (4 bytes)

nnn valid data bytes in "data" (1, 2 or 4)

Values for "data", "index" and "sub index" are set first, then the value for "cmd".

Cmd =

0x80	valid/read
0xC1	valid/write/1 Byte
0xC2	valid/write/2 Bytes
0xC4	valid/write/4 Bytes
0x00	clear channel (response: IN cmd = 0x00)

The write operation of the communication channel is volatile. Written values are not stored in the EEPROM.

Object values (= data) of type Integer/Unsigned Integer (16 Bit) and Long (32 Bit) can be written and read. The data type is specified in the order ID. In the case of data set switchable objects (array), the required data set is given under the index byte (byte 2).

Sequence of communication

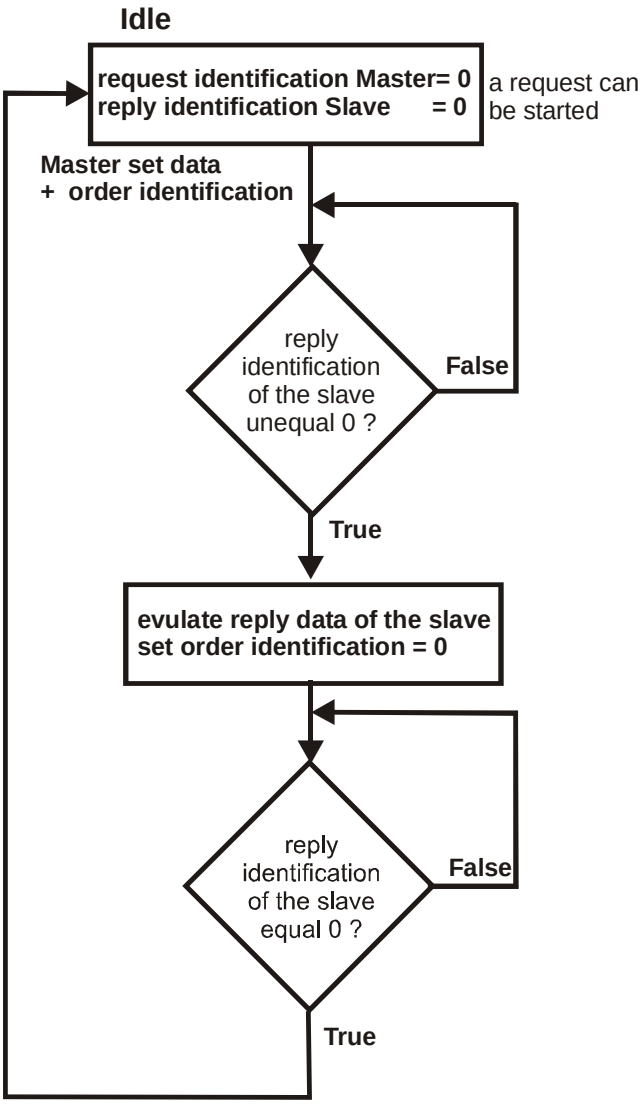
The PLC enters all the data in the request and sets the cmd byte with v = 1 as the last operation.

The inverter recognizes with the content that there is a request of the cmd byte and v = 1.

The inverter enters the response data in the response and sets the cmd byte with v = 1 as the last operation.

After the PLC has evaluated the response, it sets v = 0 in the request. This is recognized by the inverter and also answered with v = 0 in the response.

It is recommended to set the complete request to zero. The complete response is always set to zero on the inverter side.



8.2.1 Handling of Data Sets/Cyclic Writing

Access to the object values is carried out on the basis of the object number and the required data set.

There are objects which only have one value as well as objects which have four values. The latter are used for the data set change-over of an object.

NOTICE

Component damage possible

Only a limited number of write cycles is permissible for the EEPROM (approx. 1 million cycles). When this number is exceeded, the EEPROM will be destroyed.

- If values are to be written cyclically with a high repetition rate, avoid entries into the EEPROM.
- Data which must be written cyclically can be entered in the RAM exclusively without a writing cycle on the EEPROM. In this case, the data is volatile, i.e. it is lost when the supply voltage is switched off (Mains Off). Data must be written into the RAM again after the restart (Mains On).

As a safety measure, the number of consecutive write cycles per minute is limited to 10. This safety measure works for up to 32 objects.

8.3 Operating behavior in the case of bus connection failure

The operating behavior in the case of failure of the PROFIBUS® systems can be parameterized. The required behavior can be set via the object **0x6007/0** *Abort conn. option code* and **0x605E/0** *Fault reaction option code*.

Abort conn. option code **0x6007**		**Function**
0x00000000	No Action	Operating point is maintained
0x00000001	Fault Signal **Default**	"Fault" status will be activated immediately. **Factory setting**.
0x00000002	Disable Voltage Command	Control command "Disable voltage" and switch to "switch on disabled" status.
0x00000003	Quick Stop Command	Control command "Quick stop" and switch to "switch on disabled" status.
0xFFFFFFFE	Slow Down Ramp, Fault	
0xFFFFFFFF	Quick Down Ramp, Fault	

Fault reaction option code **0x605E**		**Function**
0x00000000	Disable drive function	Drive functions will be disabled directly.
0x00000001	Slow Down on Slow Down Ramp	
0x00000002	Slow Down on Quick Stop Ramp **Default**	

If the *Abort conn. option code* is set to "Fault signal" the PLC reacts according to the setting in the *Fault reaction option code*. In all other settings the reaction is directly according to *Abort conn. option code*.

8.4 Resetting errors

Depending on the settings and operating state of the device, errors can be reset in various ways:

- When using control via object *Control Mode* **0x2200** = `3 - Statemachine`:
- Set bit 7 of control word = 0x8000.
- By pressing the STOP button of the control panel (only possible if object *Control Mode* **0x2200** permits control via the control panel = `2 - Keypad`).
- Via object *Fault Reset* **0x2102** which is assigned a logic signal or a digital input.

A reset via a digital signal can only be carried out when object *Control Mode* **0x2200** permits this.

Some errors will occur again after an error reset. In such cases, it may be necessary to take certain measures (e.g., moving from a limit switch in the non-disabled direction).

9 Annex

9.1 Choice list for UInt16 data type objects

No.	Choice Name	No.	Choice Name
00000000	0/ null / false / none	0039173C	PROFIx Tel114/P05 Rx i16_0
00000005	Debug Sine	0039173D	PROFIx Tel114/PD5 Rxi16_1
00219800	Brake Output	00391768	PROFIx Tel115/ P06 Rxui16_0
0021B000	Multiplexer Output	00391769	PROFIx Tel115/P06 Rx ui16_1
00220402	Control Word Override	0039176C	PROFIx Tel115/PD6 Rx i16_0
00220A0B	ADC Output Phase a	0033176D	PROFIx Tel115/P06 Rx i16_1
00220A0C	ADC Output Phase b	00391D03	FB Sync DataCycleFactor
00220A0D	ADC Output Phase c	00394000	Status Digital Inputs Filtered
00382120	Status Digital Outputs	00394040	Status Digital Inputs
00391018	SB RxPDO1 Ulnt16 0	003CA030	PLC Out Ulnt16
00391019	SB RxPDO1 Ulnt16 1	003CA031	PLC Out Ulnt 16 1
0039101A	SB RxPDO1 Ulnt16 2	003CA032	PLC Out Ulnt16 2
0039101B	SB RxPDO1 Ulnt16 3	003CA033	PLC Out Ulnt16 3
0039101C	SB RxPDO1 lnt16 0	003CA034	PLC Out Ulnt16 4
0039101D	SB RxPDO1 Int 16 1	003CA035	PLC Out Ulnt 16 5
0039101E	SB RxPDO1 lnt 16 2	003CA036	PLC Out Ulnt16 6
0039101F	SB RxPDO1 lnt16 3	003CA037	PLC Out Ulnt16 7
00391068	SB RxPD02 Ulnt16 0	003CA040	PLC Out lnt16 0
00391069	SB RxPD02 Ulnt16 1	003CA041	PLC Out lnt161
0039106A	SB RxPD02 Ulnt16 2	003CA042	PLC Out lnt16 2
00391068	SB RxPD02 Ulnt16 3	003CA043	PLC Out lnt16 3
0039106C	SB RxPD02 lnt16 0	003CA044	PLC Out lnt16 4
0039106D	SB RxPD02 Int 16 1	003CA045	PLC Out lnt16 5
0039106E	SB RxPD02 Int 16 2	003CA046	PLC Out lnt16 6
0039106F	SB RxPD02 lnt16 3	003CA047	PLC Out lnt16 7
003910B8	SB RxPDO3 Ulnt16 0	00410001	Fault Quantity Auto Ackn. total)
003910B9	SB RxPDO3 Ulnt 16 1	00410002	Fault Quantity Auto Ackn. (F0500)
003910BA	SB RxPDO3 Ulnt16 2	00410003	Fault Quantity Auto Ackn . (F0507)
003910BB	SB RxPDO3 Ulnt16 3	00410004	Fault Quantity Auto Ackn. (F0700)
00J910BC	SB RxP003 lnt16 0	00604000	Control Word 6040:00
00J910BD	SB RxPDO3 Int 16 1	00604100	Status Word 6041:00
00J910BE	SB RxP003 lnt16 2	00604200	Target Velocity 6042:00
00J910BF	SB RxPOO3 Int 16 3	00604300	Velocity Demand 6043:00
00391618	PROFIx Tel110/PD1 Rx ui16_0	00604400	Actual Velocity 6044 00
00391619	PROFIx Tel110/PD1 Rx ui16_1	00604802	Acc. Delta Time 6048:02
0039161C	PROFIx Tel110/PD1 Rx i16_0	00604902	Dec. Delta Time 6049:02
0039161D	PROFIx Tel110/PD1 Rx i16_1	00604A02	Q. Stop Delta Time 604A:02
00391668	PROFIx Tel111/P02 Rx ui16_0	00604801	VL Set-Point Factor Numerator 604B:01
00391669	PROFIx Tel111/P02 Rx ui16_1	00604802	VL Set-Point Factor Denumerator 604B:02
0039166C	PROFIx Tel111/P02 Rx i16_0	00606800	Position Window Time 6068:00
0039166D	PROFIx Tel111/PD2 Rx i16_1	00607200	Max Torque 6072:00
00J916B8	PROFIx Tel112/P03 Rx ui16_0	00607700	Actual Torque 6077:00
003916B9	PROFIx Tel112/PD3 Rx ui16_1	00608600	Motion Profile Type 6086:00
003916BC	PROFIx Te112/P03 Rx i16_0	00608800	Touch Probe Function 60B8:00
003916BD	PROFIx Tel112/PD3 Rx i16_1	00608900	Touch Probe Status 60B9:00
003916F8	PROFIx Tel113/P04 Rx ui16_0	00600500	TP 1 Counter R Edge 60D5:00
003916F9	PROFIx Tel113/PD4 Rx ui16_1	00600600	TP 1 Counter F Edge 60D6:00
003916FC	PROFIx Tel113/P04 Rx i16_0	00600700	TP2 Counter R Edge 60D7:00
003916FD	PROFIx Tel113/PD4 Rx i16_1	00600800	TP2 Counter F Edge 60D8:00
00391738	PROFIx Tel114/P05 Rx ui16_0	0060E000	Pos. Torque Limit 60E0:00
00391739	PROFIx Tel114/P05 Rx ui16_ 1	0060E100	Neg. Torque Limit 60E1:00

9.2 Choice list for UInt32 data type objects

No.	Choice Name		No.	Choice Name
00000000	0 / null / false / none		003910C9	SB RxPD03 Int32 1
00000002	One		003910E0	SB RxPD03 Single 0
00000004	Hundred Percent		003910E1	SB RxPD03 Single 1
00205001	Brake Status		00391620	PROFIx Tel110/PD1 Rx ui32_0
00207801	Encoder X4X2: Angle Mech.		00391628	PROFIx Te110/PD1 Rx i32_0
00207802	Encoder X4X2: Position		00391640	PROFIx Tel110/PD1 Rx f32_0
00207803	Encoder X4X2: Speed		00391670	PROFIx Tel111/PD2 Rx ui32_0
00207804	Encoder X4X2: Motor Winding Temperature Digital		00391678	PROFIx Tel111/PD2 Rx i32_0
00207805	Encoder X4X2: Add. Sensor 1 Digital		00391690	PROFIx Tel111/PD2 Rx f32_0
00207806	Encoder X4X2: Add. Sensor 2 Digital		003916C0	PROFIx Tel112/PD3 Rx ui32_0
00211000	MFAI 1 (X4X2)		003916C8	PROFIx Tel112/PD3 Rx i32_0
00211003	MFAI 1 Temperature (X4X2)		003916E0	PROFIx Tel112/PD3 Rx f32_0
00219800	Brake Output		00391700	PROFIx Tel113/PD4 Rx ui32_0
0021A102	Comparator 1 Constant 1		00391708	PROFIx Tel113/PD4 Rxi32_0
0021A103	Comparator 1 Constant 2		00391708	PROFIx Tel113/PD4 Rx i32_0
0021A112	Comparator 2 Constant 1		0391720	PROFIx Te113/PD4 Rx f32_0
0021Al 13	Comparator 2 Constant 2		00391740	PROFIx Tel114/PD5 Rx ui32_0
0021A122	Comparator 3 Constant 1		00391748	PROFIx Tel114/PD5 Rx i32_0
0021A123	Comparator 3 Constant 2		00391760	PROFIx Tel114/PD5 Rx f32_0
0021A132	Comparator 4 Constant 1		00391770	PROFIx Tel115/PD6 Rx ui32_0
0021A133	Comparator 4 Constant 2		00391778	PROFIx Tel115/PD6 Rx i32_0
0021A300	Simple Math. 1 Output		00391790	PROFIx Tel115/PD6 Rx f32_0
0021A301	Simple Math. 1 Output Inverted		00391D01	FB Sync Time ns
0021A310	Simple Math. 2 Output		00391D02	FB Sync Mode
0021A311	Simple Math. 2 Output Inverted		00397000	Dialog Output
0021A320	Simple Math. 3 Output		00397400	10V Steady
0021A321	Simple Math. 3 Output Inverted		00398000	MFAI 1 (X210)
0021A330	Simple Math. 4 Output		00398001	MFAI 1 Voltage (X210)
0021A331	Simple Math. 4 Output Inverted		00398002	MFAI 1 Current (X210)
0021A331	Simple Math. 4 Output Inverted		00398003	MFAI 1 Temperature (X210)
0021F010	PROFIx_Target Velocity		00398010	MFAI 2 (X210)
00220900	VAlpha		00398011	MFAI 2 Voltage (X210)
00220901	VBeta		00398012	MFAI 2 Current (X210)
00220A01	Phase Current a		00398013	MFAI 2 Temperature (X210)
00220A02	Phase Current b		0039A000	MFAI 1 (X432)
00220A03	Phase Current c		0039A003	MFAI 1 Temperature (X432)
00220A04	lAlpha		003C0000	Internal Temperature
00220A05	IBeta		003C0001	PCB Temperature
00220A06	Id		003C0002	Capacitor Temperature
00220A07	lq		003CA050	PLC Out UInt32 0
00220A08	I Abs.		003CA051	PLC Out UInt32 1
00220A09	I Abs. Filtered		003CA052	PLC Out UInt32 2
00220A0A	Zero Current		003CA053	PLC Out UInt32 3
00221000	V/f Vd		003CA053	PLC Out UInt32 3
00221001	V/fVq		003CA054	PLC Out UInt32 4
00221002	V/f Freq. Elec.Ref.		003CA055	PLC Out UInt32 5

No.	Choice Name		No.	Choice Name
00226000	Iq Ref. FOC		003CA056	PLC Out UInt32 6
00226001	Spd TorqCtrl Saturation Status		003CA057	PLC Out UInt32 7
00228000	Speed Ref.		003CA060	PLC Out Int32 0
00228001	Contouring Error		003CA061	PLC Out Int32 1
00228002	Contouring Warning Timer		003CA062	PLC Out Int32 2
00228003	Contouring Error Timer		003CA063	PLC Out Int32 3
00220006	Speed Limit Positioning		003CA064	PLC Out Int32 4
00228100	Speed Limit ObJ2281		003CA065	PLC Out Int32 5
00229001	VdcCtrl Current Limit Pos.		003CA066	PLC Out Int32 6
00229002	VdcCtrl Current Limit Neg.		003CA067	PLC Out Int32 7
00229003	VdcCtrl Freq. Limit Pos.		003CA070	PLC Out Float32 0
00229004	VdcCtrl Freq. Limit Neg.		003CA071	PLC Out Float32 1
00229004	VdcCtrl Freq. Limit Neg.		003CA072	PLC Out Float32 2
00229005	VdcCtrl Status		003CA073	PLC Out Float32 3
00229006	VdcCtrl Imr Limit Min		003CA074	PLC Out Float32 4
00229007	VdcCtrl Imr Limit Max		003CA075	PLC Out Float32 5
00229009	VdcCtrl PWM Frequency Reduction		003CA076	PLC Out Float32 6
0022A000	Current Motor Chopper		003CA077	PLC Out Float32 7
0022B000	ModCtrl Id Ref.		00401511	Power Warnings
0022B001	ModCtrl Iq Ref.		00401512	Communication Warnings
0022B002	ModCtrl Iq Limit		00401513	Application Warning
0022B003	ModCtrl Status		00403000	Reference Speed
0022B800	FluxCtrl Id Ref.		00403100	Reference Torque
0022B801	FluxCtrl Status		00403200	Percentage Setpoint Ch.
0022B802	FluxCtrl Deviation		00403201	Fixed Percentage Value
0022C001	CurrentCtrl Vd Ref.		00403202	Percentage Motorpoti
0022C002	CurrentCtrl Vq Ref.		00403202	Percentage Motorpoti
0022C004	CurrentCtrl Status		00403203	Percentage Analog In
0022E000	Multiplexer Id Ref.		00403204	Percentage MFI Analog
0022E001	Multiplexer Iq Ref.		00403B00	Pos. Torque Limit
0022F000	Acc. Feed Forward Iq		00403B01	Neg. Torque Limit
0022F001	Acc. Feed Forward Torque		00404001	Freq. Elec. Filtered
0022F500	Magnetizing Current Ref.		00404002	Slip Freq. Filtered
0022F501	Status Flux Reference		0040400A	Speed Filtered
00230093	Motion Profile Ref. Speed		0040401A	Speed
00230099	Motion Profile Ref. Speed User		00404101	Aux Forming Voltage Filtered
0023009B	Motion Profile Ref. Pos. User		00404102	Torque Forming Voltage Filtered
00231200	PID Controller Output		00404103	V Abs. Filtered
00231201	PID In Front Limiter		00404111	Aux Forming Voltage
00231202	PID Behind Limiter		00404112	Torque Forming Volt.
00231203	PID Fixed Percent Setpoint		00404113	V Abs.
00231203	PID Fixed Percent Setpoint		00404201	Id Filtered
00232500	Intelligent Current Limit Output		00404202	Iq Filtered
00240501	Ixt Long Term Overload		00404203	IAbs. Filtered
00240502	Ixt Short Term Overload		00404204	Active Current Filtered
00240503	Ixt State		00404205	Reactive Current Filtered
00240504	Ixt Nom. Current Limit		00404214	Active Current
00240505	Ixt Long Term Current Limit		00404215	Reactive Current

No.	Choice Name		No.	Choice Name
00240506	Ixt Short Term Current Limit		00404301	Active Power Filtered
00240507	Ixt Trip Current Limit		00404302	Reactive Power Filtered
00241100	Motor Thermal Contact Temperature		00404303	Apperant Power Filtered
00241500	I2t Motor 1		00404304	Power Factor Filtered
00241501	I2t Motor 2		00404311	Active Power
00241502	I2t Motor 3		00404312	Reactive Power
00241503	I2t Motor 4		00404313	Apperant Power
00241504	I2t Winding 1		00404313	Apperant Power
00241505	I2t Winding 2		00404314	Power Factor
00241506	I2t Winding 3		00404401	Torque Filtered
00241507	I2t Winding 4		00404411	Torque
00242000	Heatsink Temperature		00404501	Flux Filtered
00245000	Auto. Fault Ack. SM State		00404502	Flux Normalized Filtered
00251000	Speed Setpoint Channel		00404511	Flux
00251001	Fixed Speed		00404512	Flux Normalized
00251002	Speed Motorpoti		00404601	Rotor Time Constant Filtered
00251003	Speed MFAI 1 (X210.13)		00404701	Modulation Index Filtered
00251004	Speed MFAI 2 (X210.9)		00404711	Modulation Index
00253000	Torque Setpoint		00404801	Motor Temperature Filtered
00253010	Target Position		00404811	Motor Temperature
00253011	Target Speed User		0040D000	El Gear Out: Speed
00253012	Target Speed		0040D100	El Gear Out: Position
00253012	Target Speed		00420301	Max. Elec. Freq.
00253013	Ref. Acceleration CW		00420302	Max. Speed [u/s]
00253014	Ref. Ramp Rise Time CW		00590000	DC-Link Voltage
00253015	Ref. Deceleration CW		00590001	DC-Link Voltage Filtered
00253016	Ref. Ramp Fall Time CW		00590003	Vxt DC-Link Voltage
00253017	Ref. Acceleration CCW		00590004	Vxt Integral
00253018	Ref. Ramp Rise Time CCW		00604601	VL min amount 6046:01
00253019	Ref. Deceleration CCW		00604602	VL max amount 6046:02
0025301A	Ref. Ramp Fall Time CCW		00604801	Acc. Delta Speed 6043:01
0025F100	Interpolated Position		00604901	Dec. Delta Speed 6049:01
0025F101	Interpolated Speed		00604A01	Q. Stop Delta Speed 604A:01
00260020	Safe Speed		00604C01	VL Dimension Factor Numerator 604C:01
00260021	SLS-SL Speed Setpoint		00604C02	VL Dimension Factor Denumerator 604C:02
00384001	Encoder X210: Angle Mech.		00605E00	Fault Reaction Type
00384002	Encoder X210: Position		00604C02	VL Dimension Factor Denumerator 604C:02
00384003	EncoderX210: Speed		00605E00	Fault Reaction Type
00385001	Encoder X432: Angle Mech.		00606400	Position Actual Value 6064:00
00385002	Encoder X432: Position		00606700	Position Window 6067:00
00385003	Encoder X432: Speed		00606C00	Velocity Actual Value 606C:00
00385004	Encoder X432: Motor Winding Temperature Digital		00607100	Target Torque Ratio
00385005	Encoder X432: Add. Sensor 1 Digital		00607A00	Target Position 607A:00
00385006	Encoder X432: Add. Sensor2 Digital		00607C00	Home Offset 607C:00
00390600	Sync OS Distance		00607D01	Min Position Limit 607D:01
00390601	PD OS Distance		00607D02	Max Position Limit 6070:02

No.	Choice Name		No.	Choice Name
00390602	Sync Time Ref (ns)		00608000	Max Motor Speed 6080:00
00390603	Sync Time Ad (Ticks)		00608100	Profile Velocity 6081:00
00390604	Sync Count		00608300	Profile Acceleration 6083:00
00390605	Sync Timer Act Ticks)		00608400	Profile Deceleration 6084 :00
00391020	SB RxPD01 Ulnt32 0		00608500	Quick Stop Deceleration 6085:00
00391020	SB RxPD01 Ulnt32 0		00609101	Motor shaft revolutions 6091:01
00391021	SB RxPD01 Ulnt32 1		00609102	Driving shaft revolutions 6091:02
00391028	SB RxPD01 lnt32 0		00609201	Feed 6092:01
00391029	SB RxPD01 lnt32 1		00609202	Shaft Revolutions 6092:02
00391040	SB RxPD01 Single 0		0060BA00	TP1 Rising Edge 60BA:-OO
00391041	SB RxPD01 Single 1		0060B800	TP1 Falling Edge 60B8:00
00391070	SB RxPD02 Ulnt32 0		0060BC00	TP2 Rising Edge 60BC:OO
00391071	SB RxPD02 Ulnt32 1		0060B000	TP2 Falling Edge 608D:00
00391078	SB RxPD02 lnt32 0		0060D100	TP1 Time R Edge 60D 1 :00
00391079	SB RxPD02 lnt32 1		0060D200	TP1 Time F Edge 60D2:00
00391090	SB RxPD02 Single 0		0060D300	TP2 Time R Edge 60D3:00
00391091	SB RxPD02 Single 1		0060D400	TP2 Time F Edge 60D4:00
003910C0	SB RxPD03 Ulnt32 0		0060F400	Following Error Act Val 60F4:00
003910C1	SB RxPD03 Ulnt32 1		0060FF00	Target Velocity 60FF:00
003910C8	SB RxPD03 lnt32 0			

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