

PROFIBUS for motor controller CMMP...

FESTO

Description

PROFIBUS
CMMP...



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1. General information

1.1 Documentation

This documentation describes how to connect the field bus to the CMMP motor controller in a PROFIBUS-DP network. It describes how to configure the PROFIBUS and explains the user protocol FHPP. A detailed description of the FHPP can be found in the FHPP manual.

Further information can be found in the following CMMP manuals:

- Product manual CMMP-AS-...-3A:
Description of the technical specifications and device functions as well as instructions on installing and operating the servo positioning controller CMMP-AS-C10-3A-P3 for 1-phase servo positioning controllers.
- Product manual "Servo positioning controller P-BE-CMMP-AS-...-11A":
Description of the technical specifications and device functions as well as instructions on installing and operating the servo positioning controller CMMP-AS-C10-11A-P3 for 3-phase servo positioning controllers.
- FHPP manual "P.BE-CMM-FHPP-SW-...":
Description of the implemented Festo profiles for handling and positioning.
- Manual P.BE-CMMP-AS-PB-S7

This manual is intended for people who are already familiar with this motor controller series and the DeviceNet protocol.

The documentation contains safety instructions which must be observed.

1.2 Festo Profile for Handling and Positioning (FHPP)

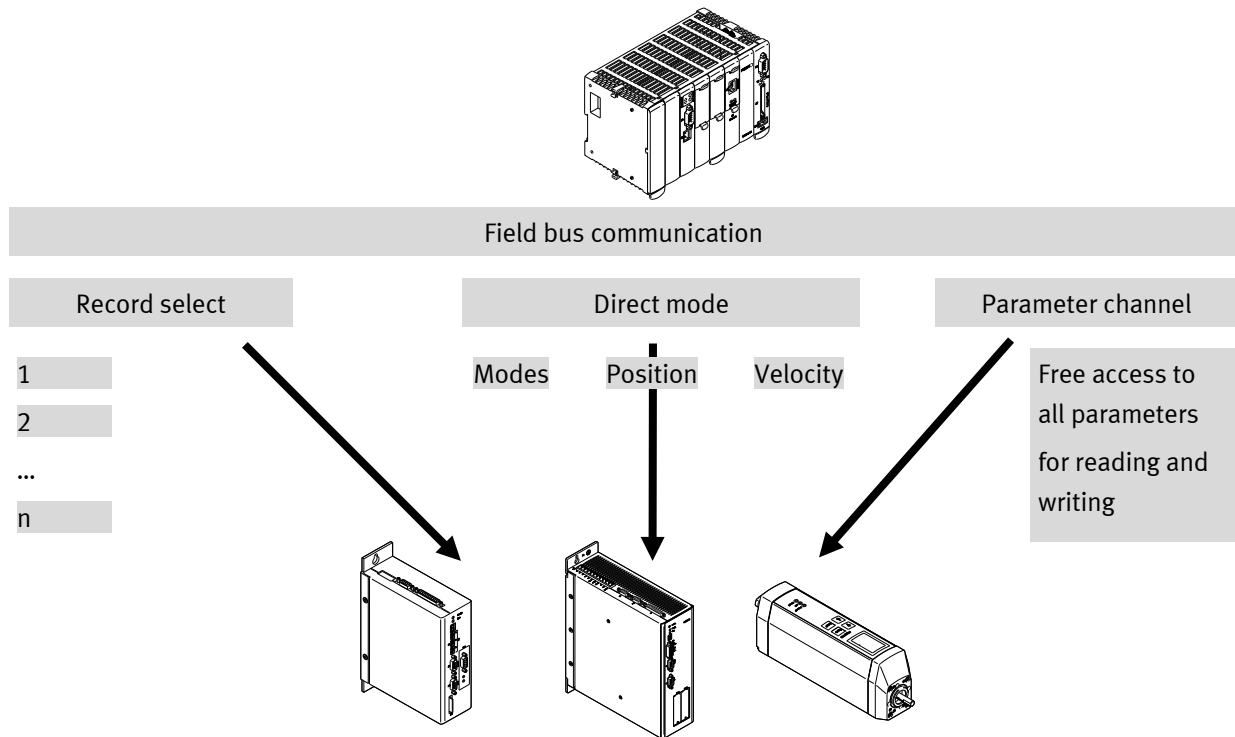
Festo has developed an optimised data profile, the "Festo Handling and Positioning Profile (FHPP)", tailored to the target applications for handling and positioning tasks.

The FHPP enables uniform control and programming for the various field bus systems and controllers from Festo.

In addition it defines the following for the user:

- the operating modes
- the I/O data structure
- the parameter objects
- the sequence control.

1. General information



Tab. 1.1: The FHPP principle

Information on the FHPP profile (parameters, device data...) can be found in the documentation P.BE-CMM-FHPP-SW-EN.

1.3 Data exchange in the PROFIBUS

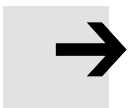
PROFIBUS (**PRO**cess **FI**eld **BUS**) is a standard developed by the PROFIBUS User Organisation. A complete description of the field bus system can be found in the following standard:

IEC 61158 "Digital data communication for measurement and control – Field bus for use in industrial control systems": This standard contains several parts and defines 10 "field bus protocol types." PROFIBUS is specified amongst these as type 3. PROFIBUS exists in two designs. PROFIBUS-DP can be found for fast data exchange in manufacturing technology and building automation (DP = decentral periphery). The incorporation into the ISO/OSI layer model is also described in this standard.

Further information, contact addresses etc. can be found under www.PROFIBUS.com

2. Safety instructions for electric drives and controllers

2.1 Icons and signs



Note

Important information and instructions



Caution

Considerable damage to property may occur if these instructions are not observed.



Warning

DANGER!

Considerable damage to property and injury to human beings may occur if these instructions are not observed.



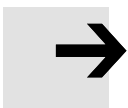
Warning

Dangerous voltage

The safety instructions contain reference to dangerous voltages which may occur.

2.2 General instructions

Festo SE & Co. KG is not liable for damage caused by failure to observe the warning instructions in these operating instructions.

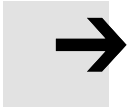


Note

Before commissioning you must read the “Safety instructions for electric drives and controllers” as from page 8.

If the documentation is not clearly understood in this language version, please inform the supplier.

The faultless and reliable operation of the motor controller depends on its correct transport, storage, mounting and installation as well as on careful operation and maintenance.



Note

Only trained and qualified personnel should be allowed to handle the electric systems.

Trained and qualified personnel

For the purpose of this manual and the warning instructions on the product itself, technicians working with this product must be adequately familiar with the setting up, mounting, commissioning and operation of the product as well as with all warnings and precautionary measures in accordance with the operating instructions in this product manual, and must be sufficiently qualified for this task:

- Training and instructions on or authorization to switch on and switch off devices/ systems in accordance with technical safety standards, and to earth and mark them appropriately in accordance with the application requirements.
- Training or instructions in using and maintaining suitable safety equipment in accordance with technical safety standards.
- Training in first aid.

The following instructions must be read before the first commissioning of the system in order that bodily injuries and/or damage to property can be avoided.



These safety instructions must be observed at all times.



- Do not try to install or commission the motor controller before you have carefully read through all safety instructions for electric drives and controllers in this documentation.

You must read through these safety instructions and all other user instructions before working with the motor controller.



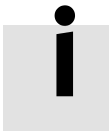
If you do not have any user instructions for the motor controller, please contact your relevant sales representative.

- Request that the operating instructions are sent immediately to the responsible person, in order that the motor controller can be operated correctly and safely.

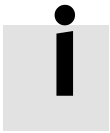


These safety instructions must also be provided if the motor controller is sold, lent and/or passed on to third parties.

2. Safety instructions for electric drives and controllers



For safety and guarantee reasons it is not permitted for the motor controller to be opened by the user.



The prerequisite for faultless functioning of the motor controller is skilled project planning.



Warning

DANGER!

Incorrect handling of the motor controller and failure to observe the specified warning instructions, as well as unskilled interference with the safety devices can lead to damage to property, bodily injury, electric shock or in extreme cases to death.

2.3 Dangers due to incorrect use



Warning

DANGER!

High electric voltage and high working current.

Danger of death or serious bodily injury due to electric shock!



Warning

DANGER!

High electric voltage due to incorrect connection.

Danger of death or bodily injury due to electric shock!



Warning

DANGER!

Surfaces of the device housing may be hot.

Danger of injury. Danger of burning.



Warning

DANGER!

Dangerous movements.

Danger of death, serious bodily injury or damage to property due to unintentional movement of the motors.

2.4 Safety instructions

2.4.1 General safety information



Warning

The motor controller complies with protection class IP20.



Warning

Use only accessories and spare parts which are approved of by the manufacturer.



Warning

The motor controllers must be connected to the mains network in accordance with EN standards and appropriate national regulations, so that they can be disconnected with suitable uncoupling devices (e.g. main switch, fuse, circuit breaker).



The motor controller can be fused with a 300 mA all-current sensitive FI protective switch (RCD = Residual Current protective Device).



Warning

For switching the control contacts you should use gold-plated contacts or high-pressure contacts.



Precautionary measures must be taken for preventing interference to switching systems, e.g. switching protective switches and relays with RC elements or diodes.

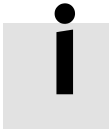


You must observe the safety regulations and directives of the country in which the device is to be used.



Warning

- The environmental conditions specified in the product documentation must be observed.
- Safety-critical applications are not permitted if they are not explicitly approved of by the manufacturer.



- Instructions for EMC-approved installations can be found in the product manuals for the CMMP family.
The manufacturer of the system or machine is responsible for ensuring that the limit values requested by the national regulations are observed.



Warning

The technical specifications as well as the connection and installation conditions for the motor controller can be found in this product manual. These specifications must be observed at all times.



Warning

DANGER!

- The general installation and safety regulations for working on high-current systems (e.g. DIN, VDE, EN, IEC or other national and international regulations) must be observed here.
Failure to observe these regulations can lead to bodily injury, death or considerable damage to property.



The following precautionary measures also apply without claim to completeness:

- VDE 0100 Regulation for setting up high-voltage systems up to 1000 volts
- EN 60204 Electrical equipment for machines
- EN 50178 Equipping high-voltage systems with electronic operating media

2.4.2 Safety instructions for assembly and maintenance

For assembling and maintaining the system, the relevant DIN, VDE, EN and IEC regulations, as well as all national and local safety and accident prevention regulations must always be observed. The system manufacturer or the user is responsible for ensuring that these regulations are observed.



Warning

The operation, maintenance and/or commissioning of the motor controller may only be carried out by trained qualified personnel and with electrical appliances suited for this work.

2. Safety instructions for electric drives and controllers

Avoiding accidents, bodily injury and/or material damage:



Warning

The series-supplied motor holding brake or an external motor-holding brake controlled by the drive controller alone is not suitable for protecting human beings.

- Vertical axes must be additionally secured against falling or sliding down when the motor is switched off with e.g.
 - mechanical locking of the vertical axis,
 - external braking, safety catch or clamping devices or
 - sufficient weight compensation of the axis.



Warning

The external or internal braking resistance is activated and can carry a dangerous intermediate circuit voltage for up to approx. 5 minute after the motor controller has been switched off. This can cause serious bodily injury or even death if it is touched.

- Before carrying out maintenance work, make sure that the power supply is switched off and locked and that the intermediate circuit is discharged.
- Switch the electrical equipment free of voltage via the main switch and make sure that it cannot be switched on again. Wait until the intermediate circuit is discharged after
 - maintenance work and repairs
 - cleaning
 - long periods out of use.



Warning

Proceed carefully with mounting. Make sure that during mounting as well as later during the operation of the drive that no drilling shavings, metal dust or mounting parts (screws, nuts, pieces of wire) can fall into the motor controller.



Make sure also that the external voltage supply of the controller (24 V) is switched off.



The intermediate circuit or the mains voltage must always be switched off before the 24 V controller supply is switched off.



Warning

- Other work in the vicinity of the machine must only be carried out when the AC or DC supply is switched off and locked. Switched-off final stage or switched-off controller enable are not suitable locking conditions. In the event of a fault, this could lead to unintentional movement of the drive.



Warning

Carry out commissioning with a free-running motor, in order to avoid mechanical damage, e.g. due to incorrect direction of rotation.



Warning

Electronic devices are never fail-proof.

- The user is responsible for ensuring that his system is brought into a safe state if the electric device fails.



Warning

DANGER!

The servo drive controller and in particular the braking resistance, external or internal, can become very hot. This can cause serious burning if the devices are touched.

2.4.3 Protection against touching electric components

This section concerns only devices and drive components with voltages over 50 V. It is dangerous to touch components with voltages of more than 50 V, as this can cause an electric shock. When electric devices are operated, certain components in these devices are always under dangerous tension.



Warning

Dangerous voltage

High electric voltage!

Danger of death or serious bodily injury due to electric shock!

For operation the relevant DIN, VDE, EN und IEC regulations, as well as all national and local safety and accident prevention regulations must always be observed. The system manufacturer or the user is responsible for ensuring that these regulations are observed.

2. Safety instructions for electric drives and controllers



Warning

- Before switching the device on, fit the covers and protective screens so that the device cannot be touched.

For devices which are to be fitted in a control cabinet, make sure that a housing is fitted so that the electric components cannot be touched.

Regulation VGB4 must be observed.



Warning

- Always connect the protective earth conductor of the electrical equipment and the devices firmly to the supply network.

Due to the integrated network filter the leakage current is greater than 3.5 mA.



Warning

Note the minimum copper cross section for the protective conductor during the complete sequence in accordance with standard EN 60617.



Warning

- Before commissioning, also for brief measuring and test purposes, always connect the protective conductor to all electric devices or connect to an earth cable in accordance with the connection diagram.

Otherwise, high voltages may occur on the housing. These could cause an electric shock.



Warning

Do not touch the electrical connection points of the components when the device is switched on.



Warning

- Before touching electric components with voltages over 50 V, disconnect the device from the mains or voltage source.
- Protect the device against being switched on again.



Warning

- During installation note the amount of intermediate circuit voltage, especially with regard to insulation and protective measures.

Make sure that the earthing, the cross section size of the conductor and the corresponding short-circuit protection are correct.



Warning

The device has an intermediate fast discharge circuit in accordance with EN 60204, section 6.2.4. In certain device constellations, particularly where several motor controllers are switched parallel in the intermediate circuit or with a non-connected braking resistance, the fast discharge may not have any effect. The motor controllers can stand under dangerous tension for up to 1 minute after being switched off (capacitor residual charge).

2.4.4 Protection by low voltage (PELV) against electric shock

Voltages from 5 to 50 V on the connections and terminals of the motor controller are protective small voltages which can be touched without danger in accordance with the following standards:

- International: IEC 60364-4-41
- European countries in the EU: EN 50178/1998, section 5.2.8.1



Warning

DANGER!

High electric voltage due to incorrect connection.

Danger of bodily injury or death due to electric shock!

Devices, electrical components and cables may only be connected to connections and terminals from 0 to 50 V, providing they have a protective low voltage (PELV = Protective Extra Low Voltage).

Connect only voltages and current circuits which have reliable separation of dangerous voltages.

Such separation is achieved e.g. with isolating transformers, reliable optocouplers or battery operation separate from the mains network.

2.4.5 Protection from dangerous movements

Dangerous movements can be caused by incorrect control of connected motors. There are various causes:

- Unsafe or faulty circuitry or cabling
- Faults in operating the components
- Faults in the measured value and signal generators
- Defective or non-EMC valid components
- Faults in the software in the higher-order control system

These faults can occur immediately after the device is switched on or after a certain period of operation.

2. Safety instructions for electric drives and controllers

The monitoring functions in the drive components exclude to a large extent the possibility of incorrect operation of the connected drives. With regard to the protection of human beings, especially the danger of bodily injury and/or material damage, one must not rely on these circumstances alone. Until the fitted monitoring functions become effective, you must reckon with at least one incorrect drive movement, the extent of which depends on the type of control and on the operating state.



Warning

DANGER!

Dangerous movements.

Danger of injury or death, serious bodily injury or material damage.

For the above-mentioned reasons, the protection of human beings must be ensured with the aid of monitoring systems or by measures which are of higher order than the system. These measures are foreseen depending on the specific features of a danger and fault analysis by the system manufacturer. The safety regulations applicable to the system must be observed here as well. Undesired movements of the machine or other incorrect functions can occur as a result of switching off, avoiding or failing to activate safety devices.

2.4.6 Protection against touching hot components



Warning

DANGER!

Surfaces of the device housing may be hot.

Danger of injury. Danger of burning.



Warning

Danger of burning.

- Do not touch the surface of the housing in the vicinity of hot sources.
- After switching devices off, leave them for 10 minutes to cool down before touching them.

If you touch hot parts of the device such as the housing which contains the heat sink and resistors, you may burn yourself.

2.4.7 Protection when handling and assembling

Handling and assembling certain components in an unsuitable manner can under circumstances cause injury.



Warning

DANGER!

Danger of injury as a result of incorrect handling.

Bodily injury caused by squeezing, cutting, pushing.

The following safety measures apply here:



Warning

- Observe the general regulations on setting up and safety when handling and assembling.
- Use suitable assembly and transport devices.
- Prevent clamping and squashing (of fingers).
- Use only suitable tools. If specified, use special tools.
- Use lifting devices and tools in a correct manner.
- If necessary, use suitable protective equipment (e.g. protective glasses, safety shoes, safety gloves).
- Do not stand under hanging loads.
- Wipe up spilt liquids on the floor to avoid slipping.

3. Assembly and installation

The PROFIBUS interface is implemented in the device family CMMP by an optional interface module CAMC-PB.

The PROFIBUS bus connection is designed as a 9-pin sub-D socket on the CAMC-PB as per EN 50170.

3.1 Connecting and display elements

The following elements can be found on the front plate of the CAMC-PB.

- a green LED for the bus readiness message
- a 9-pin sub-D socket
- two DIP switches for actuating the terminating resistors.

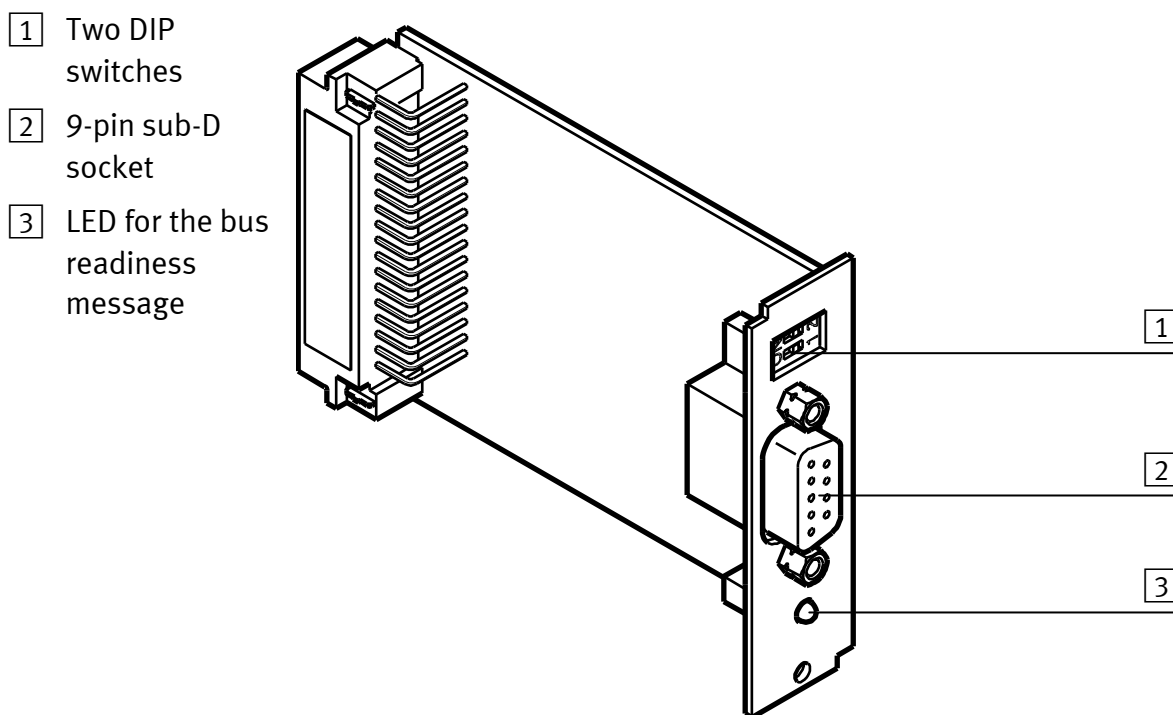


Fig. 3.1: Connecting and display elements on the PROFIBUS-DP interface

3.2 Assembly



Caution

The motor controller must be disconnected from all current carrying cables before an additional module is fitted. After switching off the operating voltage, you must wait 1 minute before the capacitors in the motor controller are fully discharged.



Caution

Make sure that measures for ESD protection are taken when handling the additional module.

Use a suitable screwdriver to remove the front cover over the module shaft of the motor controller (Fig. 3/2). The additional module is now placed in the open module shaft so that the printed circuit board slides into the guides on the sides of the module shaft (Fig. 3.3). Push the board in as far as possible. The front plate of the additional module is then screwed to the motor controller housing with a Philips screw. Make sure that the front plate fits flush with the front in order that it has conductive contact with the housing.

1 Front cover

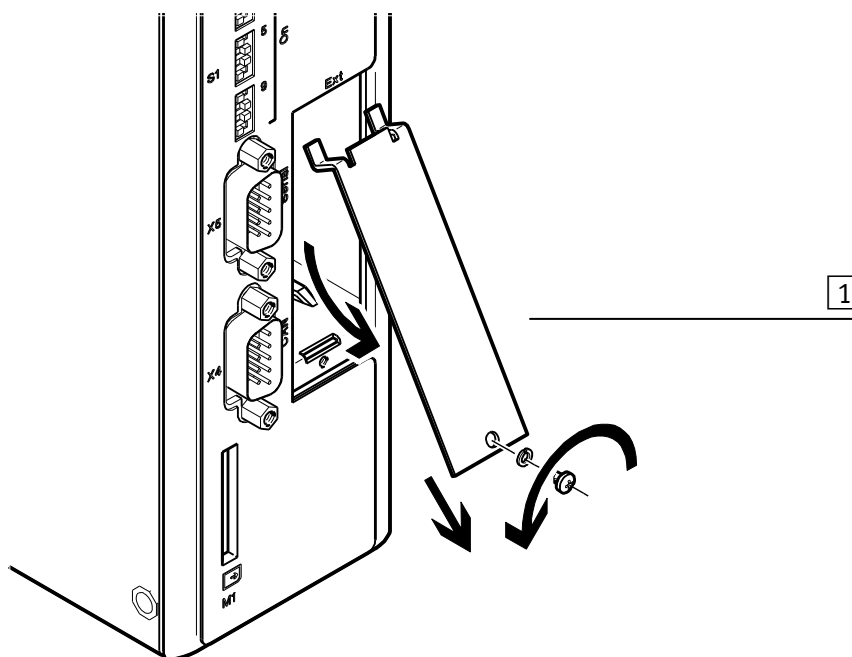


Fig. 3.2: Unscrew front cover

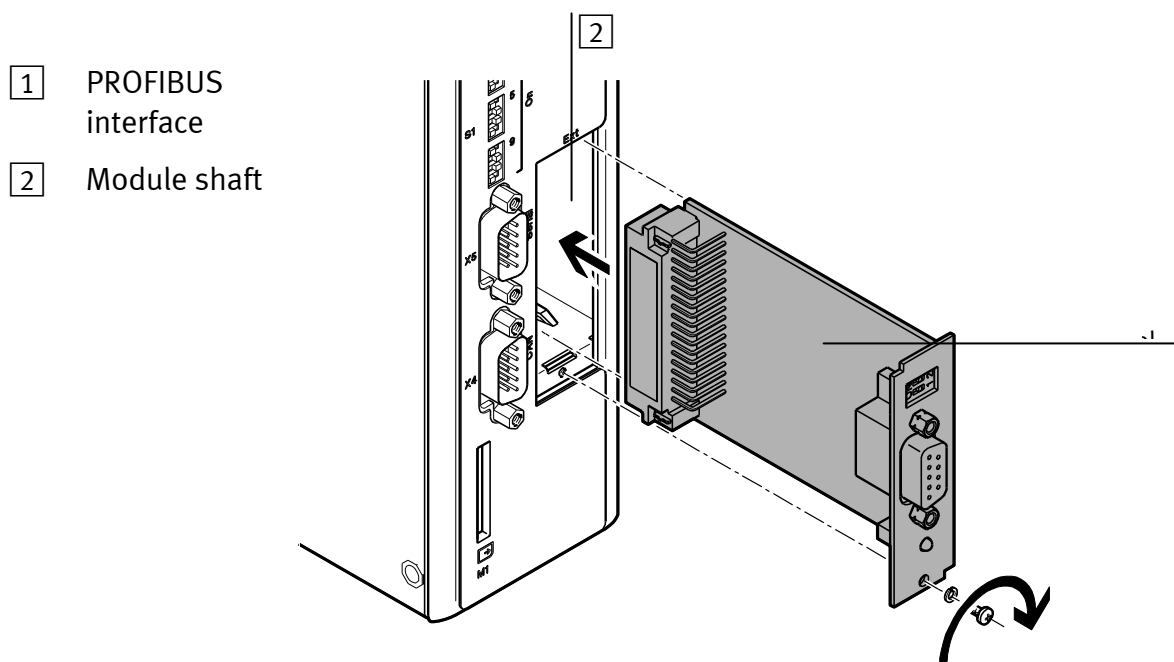


Fig. 3.3: Insert PROFIBUS interface

3.3 Installation

On the CMMP motor controllers the PROFIBUS interface has been designed in the form of an optional additional module.



Warning

PROFIBUS® cabling

Due to the possibly very high baud rates, we recommend also the use of the standardized cable and plug connector. These are in some cases provided with additional diagnostic possibilities and in the event of a fault they facilitate the fast analysis of the field bus hardware.

When setting up the PROFIBUS network, you must follow the advice in the relevant literature or the following information and instructions in order to maintain a stable, faultless system. If the cabling is not correct, faults may occur on the PROFIBUS which cause the motor controller to switch off with a fault for safety reasons.

3.3.1 Pin assignment of PROFIBUS interface

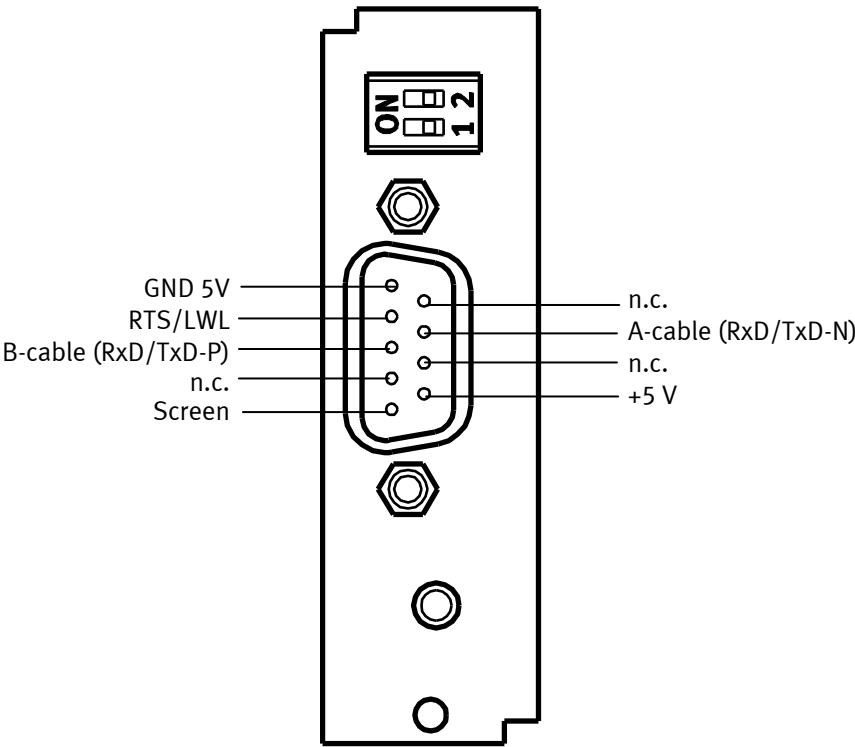


Fig. 3.4: PROFIBUS module - pin assignment

Pin no.	Name	Value	Type
1	Screen	-	Cable screening/shield
6	+5V	+5 V	+5 V – output (potential isolated) ¹⁾
2	-	-	not assigned
7	-	-	not assigned
3	RxD / TxD-P		Received / transmitted data B cable
8	RxD / TxD-N		Received / transmitted data A cable
4	RTS / LWL	Request to Send ²⁾	
9	-	-	not assigned
5	GND5V	0 V	Reference potential GND 5V ¹⁾
¹⁾ Use for external bus termination or for supplying transmitter/receiver of an external LWL module.			
²⁾ Signal is optional, serves for direction control when used with an external LWL module.			

Tab. 3.1: Connector pin assignment: PROFIBUS-DP interface

3.3.2 Termination and bus terminating resistors

Each bus segment of a PROFIBUS network must be fitted with terminating resistors in order to minimize cable reflexions and to set a defined rest potential on the cable. The bus termination is made at the beginning and end of a bus segment.



An incorrect bus termination is often the cause of a fault.

The terminating resistors are already provided on most commercially-available PROFIBUS plug connectors. The PROFIBUS-DP interface has its own terminating resistors for coupling to buses without terminating resistors. These can be switched via the two DIP switches on the module (**both** switches to ON).

In order that the terminating resistors can be switched off, **both** switches must be set to OFF.

In order that the network can be operated reliably, only one bus termination must be used, internal (via DIP switch) **or** external.

The external circuitry can also be set up discretely (see Fig. 3.5). The 5 V supply voltage required for the externally switched terminating resistors is provided at the PROFIBUS plug of the PROFIBUS-DP interface (see pin assignment in the Tab. 3.1).

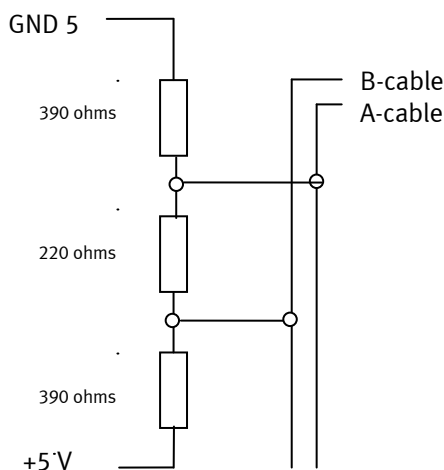


Fig. 3.5: Bus termination

If the set baud rate is greater than 1.5 Mbaud, plugs with integrated series inductance (110 nH) must be used due to the capacitive load of the slave and the cable reflexion thereby created.

4. Configuration of the PROFIBUS module

Several steps are required in order to produce a functioning PROFIBUS module. Some of these settings should or must be carried out before the PROFIBUS communication is activated. This chapter provides an overview of the relevant steps. The exact procedure is described in the following chapters in more detail.

When planning the PROFIBUS module, the user must make firm decisions. Only then should the parametrizing of the field bus connection on both sides be made. We recommend that the parametrizing of the slave be undertaken first. Then the master should be configured. With correct parametrizing the application is ready immediately without communication faults.

As some parameters are not effective until save and reset, we recommend the following procedure.

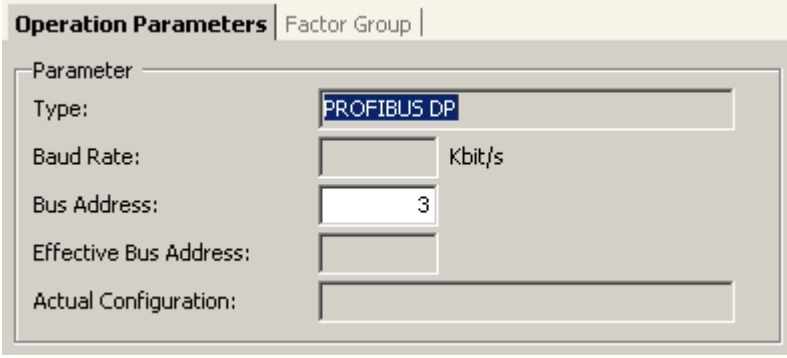
1. Setting the bus address in the FCT program in the window **Operation Parameters**.
2. Parametrizing and commissioning with the FCT. Especially also the setting **physical units**.
3. Configuration of the PROFIBUS master.

For correct functioning it is necessary to define the physical units of the processing data transmitted via the field bus. These can be set via the FCT.

4.1 Setting the slave address

The inserted PROFIBUS module will be recognized automatically when the motor controller is switched on.

Each device (PROFIBUS module) in the network must be assigned with a clear bus address. The bus address is set in the FCT program in the window **Operation Parameters**.



Operation Parameters Factor Group	
Parameter	
Type:	PROFIBUS DP
Baud Rate:	Kbit/s
Bus Address:	3
Effective Bus Address:	
Actual Configuration:	

Permitted bus addresses are 3 ... 125.

Addresses cannot be assigned by the master (the service Set_Slave_Address is not supported). Each address is only assigned once.

4.2 PROFIBUS communication

After configuration with subsequent download and saving, the PROFIBUS communication will be actuated with a reset. Please note that the above mentioned parameters can only be modified when the protocol is deactivated. All parameters are only valid when the PROFIBUS communication is deactivated and then re-activated.



Please note that the PROFIBUS communication can only be activated when the parameter records have been saved and a Reset has been carried out.

4.3 PROFIBUS configuration

PROFIBUS configuration	Cyclic I/O update	Acyclic data
PROFIBUS	2 modules for selection: Module 1: Name = "FHPP standard" Identifier = 0xB7 (8 bytes I/O consistent) Module 2: Name = "FHPP standard + FPC" Identifier = 0xB7, 0xB7 (2 x 8 bytes I/O consistent)	-

Tab. 4.1: PROFIBUS configuration

4.4 PROFIBUS slave configuration

This section provides an overview of the steps required by the slave for parametrization and configuration. As some parameters are only effective after saving and reset, we recommend that commissioning with the FCT without connection to the PROFIBUS be carried out first.



Note on commissioning with the Festo Configuration Tool can be found in the help to the device-specific FCT PlugIn.

Important processing data for position, velocity and acceleration are transferred in **physical units**. These should be parametrized before starting communication because they determine how the data are to be interpreted in the motor controller.

4.5 PROFIBUS master configuration

This section provides an overview of the steps required by the master for parametrization and configuration. We recommend the following procedure:

1. Installing the **GSD file**
2. Slave address
3. Configuration of the input and output data

On the part of the master, the motor controller must be incorporated in the PROFIBUS. First the **GSD file** is installed if this has not already been done. Finally, the address and the input and output data for the slave must be configured.

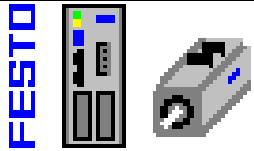
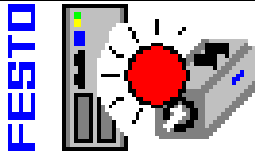
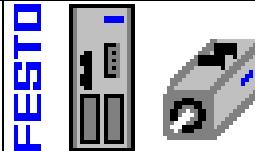
In order to make commissioning fast and simple, the abilities of the PROFIBUS interface of the motor controller are described in an EDS file. By using a suitable configuration tool you can configure a device within a network. The EDS is contained on the CD supplied with the product. The latest version can be downloaded from our home page (www.festo.com) - Automation - Download Area - Download Software - Product group "Electric drives").

4. Configuration of the PROFIBUS module

GSD file	Description
P-AS0B06.gsd	Motor controller CMMP-AS

Tab. 4.2: GSD file

Use the following icon files in order to represent the motor controller CMMP-AS in your configuration software (e.g. SIEMENS SIMATIC S7).

Normal operating status	Diagnostic case	Special operating status
		
cmmas_n.bmp	cmmas_d.bmp	cmmas_s.bmp

Tab. 4.3: Bitmaps CMMP-AS

This is shown below as an example of incorporating under SIEMENS SIMATIC S7.

4.5.1 Configuration with SIMATIC manager

The software package SIMATIC Manager serves for project planning and commissioning in conjunction with PROFIBUS masters from Siemens or compatible masters.

In order that the motor controller can be incorporated in the PROFIBUS network, it must be selected in the hardware catalogue (HW Config –SIMATIC...). The motor controller CMMP can be found under "PROFIBUS-DP\Additional Field Devices \Drives\Festo").

- 1. Pull the station type "Festo CMMP" by drag and drop onto the PROFIBUS-DP master system.

4. Configuration of the PROFIBUS module

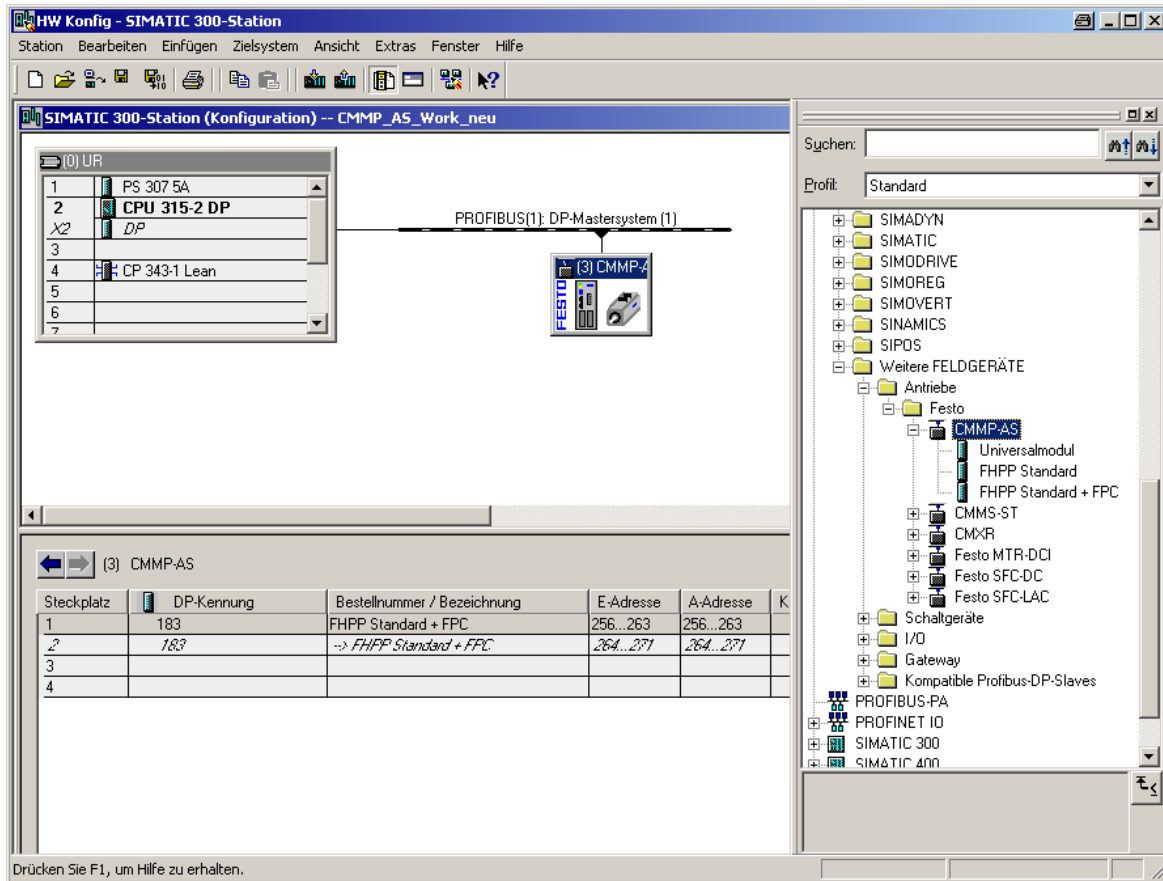


Fig. 4.1: Hardware configuration

2. Enter the PROFIBUS address in the dialogue window "Properties - PROFIBUS interface..." and confirm with OK.

The bitmap of the motor controller will be shown on the master system and must be selected.

3. Then the length of the **input and output data** must be defined. Pull the desired configuration (with the mouse button) into the appropriate line under Module/ DP identifier. The following modules are contained in the GSD:

Configuration	I/O range	Description
Universal module	If step 7 is shown, do not use	
FHPP standard	8 bytes of I/O data, consistent transmission	Cyclic transmitted 8-byte control and status data.
FHPP standard + FPC	2 x 8 bytes of I/O data, consistent transmission	As FHPP standard, additional 8 bytes I/O data for parametrizing

Tab. 4.4: Configuration

The I/O addresses can be defined with a double click on the location.

4. Configuration of the PROFIBUS module

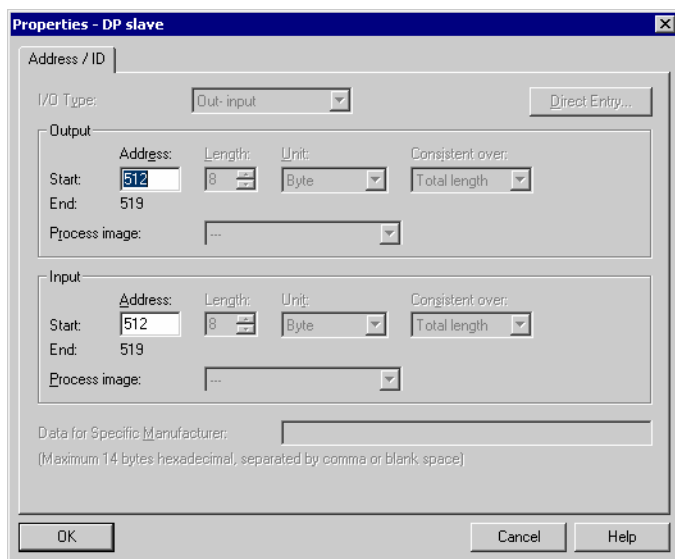


Fig. 4.2: PROFIBUS module - address assignment

4. When the configuration is concluded, transfer the data to the master.

Control and parametrizing methods and the functioning of the parametrizing can be found in manual CMMP-AS-PB-S7-EN.

System functions used

An example of a project and the documentation CMMP-AS-PB-S7 can be found on the CD.

5. Diagnosis

5.1 Network status LED

The network status LED shows the communication status.

LED is	Status	Shows:
Off	No bus communication	No communication via PROFIBUS.
green	Bus communication active	

Tab. 5.1: Status LED

5.2 PROFIBUS error codes

The following faults can occur if the PROFIBUS module is used: A complete list can be found in the System Manual for the controller.

Fault message		Meaning of fault message	Measure
Main index	Sub-index		
22	0	PROFIBUS: faulty initialization	Technology module defective? Please contact technical support.
	1	PROFIBUS: reserved	
	2	PROFIBUS communication fault	Check set slave address Check bus connection Check cables
	3	PROFIBUS: invalid slave address	Communication has been started with slave address 126. Select a different slave address.
	4	PROFIBUS: fault in value range	Mathematical fault in the calculation of the physical units. Value range of the data and the physical units are not suited together. Contact technical support

Tab. 5.2: PROFIBUS error codes

The following faults concern FHPP, but can also occur if the PROFIBUS module is used: Please refer to the FHPP manual for detailed information.

5. Diagnosis

Code	Name	Description	Activity
70-1	FHPP: Maths error	Overflow/underflow or division by zero during calculation of cyclic data.	Check the cyclic data and/or check the factor group.
70-2	FHPP: Factor Group invalid	Calculation of the factor group leads to invalid internal values.	Check the factor group.
70-3	FHPP: Operation mode change failure	Changing from the current to the desired operating mode is not permitted.	Check your application. It may be that not every change is permitted.

Tab. 5.3: FHPP error codes

Fault messages can be quitted with:

- the parametrizing interface
- via the field bus (control word),
- a falling edge at DIN5 (controller enable).

A. Technical specifications

General technical specifications see System manual for the controller used.

Range	Values
Storage temperature range	-25 ... +75 °C
Operating temperature range / deratings	0 ... +50 °C
Air humidity	0 ... 90 % non-condensing
Installation height	up to 1000 m above sea level
Dimensions (LxWxH):	approx. 92 x 65 x 19 mm suitable for the technology shaft
Weight	approx. 50 g

Tab. A.1: Technical specifications of environment

Range	Values
Communication interface	PROFIBUS module
Controller	PROFIBUS controller VPC3+, max. 12 MBaud
Baud rates supported (auto baud rate)	9.6 kBaud 19.2 kBaud 45.45 kBaud 93.75 kBaud 187.5 kBaud 500.0 kBaud 1.5 MBaud 3.0 MBaud 6.0 MBaud 12.0 MBaud
Protocol	PROFIBUS-DP
Interface	Potential-isolated, D-SUB 9-pin, integrated switchable bus terminating resistors
Special functions	Supports diagnostic data, RTS signal, no fail-safe mode, no Sync/Freeze

Tab. A.2: PROFIBUS technical specifications module