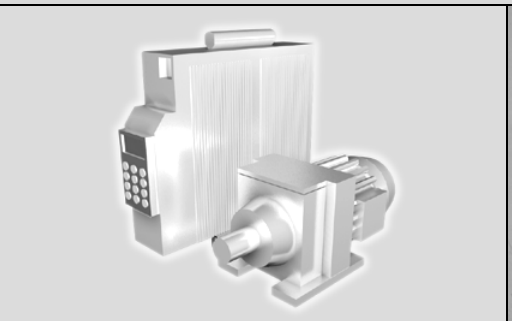
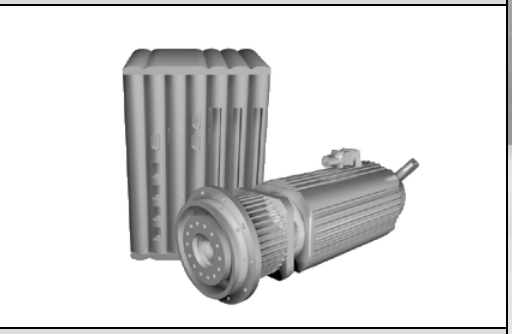
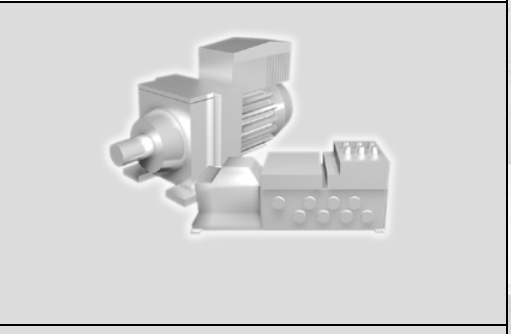
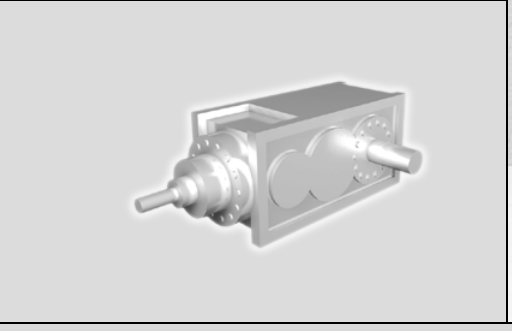
SEW EURODRIVE









MOVIAXIS® MX Multi-Axis Servo Inverter

Edition 07/2007
11508213 / EN

Operating Instructions

SEW EURODRIVE

1 General Information

1.1 Structure of the safety notes

The safety notes in these operating instructions are structured as follows:

Symbol	SIGNAL WORD
	Nature and source of hazard. Possible consequence(s) if disregarded. • Measure(s) to avoid the hazard.

Symbol	Signal word	Meaning	Consequences if disregarded
Example:  General hazard  Specific hazard, e.g. electric shock	**HAZARD**	Imminent hazard	Severe or fatal injuries
	WARNING	Possible hazardous situation	Severe or fatal injuries
	CAUTION	Possible hazardous situation	Minor injuries
	**STOP**	Possible damage to property	Damage to the drive system or its environment
	**NOTE**	Useful information or tip. Simplifies drive system handling.	

1.2 Right to claim under warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the operating instructions. Read the operating instructions before you start working with the unit.

Make sure that the operating instructions are available to persons responsible for the system and its operation as well as to persons who work independently on the unit. You must also ensure that the documentation is legible.

1.3 Exclusion of liability

You must comply with the information contained in these operating instructions to ensure safe operation of the MOVIAXIS® multi-axis servo inverter and to achieve the specified product characteristics and performance requirements. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

2 Safety Notes

The following basic safety notes are intended to prevent injury to persons and damage to property. The operator must make sure that the basic safety notes are read and observed. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the operating instructions carefully and understood them. If you are unclear about any of the information in this documentation, or if you require further information, please contact SEW-EURODRIVE.

2.1 General information

Never install damaged products or take them into operation. Submit a complaint to the shipping company immediately in the event of damage.

During operation, multi-axis servo inverters can have live, bare and movable or rotating parts as well as hot surfaces, depending on their enclosure.

Removing covers without authorization, improper use as well as incorrect installation or operation may result in severe injuries to persons or damage to property.

Refer to the documentation for more information.

2.2 Target group

Only qualified personnel are authorized to install, startup or service the units or correct unit faults (observing IEC 60364 or CENELEC HD 384 or DIN VDE 0100 and IEC 60664 or DIN VDE 0110 as well as national accident prevention guidelines).

Qualified personnel in the context of these basic safety notes are persons familiar with installation, assembly, startup and operation of the product who possess the necessary qualifications.

All activity in the other areas of transportation, storage, operation, and disposal must be carried out by persons who are appropriately trained.

2.3 Designated use

The MOVIAXIS® MX multi-axis servo drives are units for use in industrial and commercial systems to operate permanent-field synchronous AC motors and asynchronous AC motors with encoder feedback. These motors must be suitable for operation with servo inverters. Connect other loads to the units after consultation with the manufacturer only.

The MOVIAXIS® MX multi-axis servo drives are intended for use in metal control cabinets. These metal control cabinets represent the necessary enclosure for the application as well as the grounding over a large area required for EMC purposes.

In case of installation in machines, startup of the multi-axis servo inverters (i.e. start of designated operation) is prohibited until it is determined that the machine meets the requirements stipulated in the EC Directive 98/37/EC (machine guideline). You must also observe EN 60204.

Startup (i.e. start of designated operation) is only permitted with adherence to EMC (89/336/EEC) guideline.

The multi-axis servo inverters meet the requirements stipulated in the low voltage guideline 2006/95/EC. The harmonized standards of the EN 61800-5-1 DIN VDE/T105 series in connection with EN 60439-1 VDE 0660 part 500 and EN 60146 VDE/0558 are applied to the multi-axis servo inverters.

Technical data and information on the connection requirements are provided on the nameplate and in the documentation; these must be observed under all circumstances.

Safety functions

MOVIAXIS® multi-axis servo inverters may not take on safety functions without a higher-level safety system. Use higher-level safety systems to ensure protection of equipment and personnel.

For safety applications, refer to the information in the following publications:

- Safe Disconnection for MOVIAXIS® – Conditions.
- Safe Disconnection for MOVIAXIS® – Applications.

2.4 Transportation, storage

You must observe the notes on transportation, storage and proper handling. Observe the climatic conditions as stated in sec. 9.1. "General technical data".

2.5 Installation

The units must be installed and cooled according to the regulations and specifications in the corresponding documentation.

Protect the multi-axis servo inverters from excessive strain. Especially during transportation and handling, do not allow the components to be deformed or insulation spaces altered. Avoid contact with electronic components and contacts.

Multi-axis servo inverters contain components that can be damaged by electrostatic energy and could be destroyed in case of improper handling. Prevent mechanical damage or destruction of electric components. This may pose health risks under certain circumstances.

The following applications are prohibited unless the unit is explicitly designed for such use:

- Use in potentially explosive areas.
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.
- Use in non-stationary applications that are subject to mechanical vibration and shock loads in excess of the requirements in EN 61800-5-1.

2.6 Electrical connection

Observe the applicable national accident prevention guidelines when working on live multi-axis servo inverters (for example, BGV A3).

Perform electrical installation according to the pertinent regulations (e.g. cable cross sections, fusing, protective conductor connection). Additional information is contained in the documentation.

You will find notes on EMC-compliant installation, such as shielding, grounding, arrangement of filters and routing of lines, in the documentation of the multi-axis servo inverters. Always observe these notes even with multi-axis servo inverters bearing the CE marking. The manufacturer of the system or machine is responsible for maintaining the limits established by EMC legislation.

Preventive measures and protection devices must correspond to the regulations in force (e.g. EN 60204 or EN 61800-5-1).

Required preventive measures: The unit must be grounded.

Cables may only be connected and switches may only be operated in a de-energized state.

2.7 Safe disconnection

The unit meets all requirements for safe disconnection of power and electronic connections in accordance with EN 61800-5-1. All connected circuits must also satisfy the requirements for safe disconnection.

2.8 Operation

Systems with integrated multi-axis servo inverters must be equipped with additional monitoring and protection devices, if necessary, according to the applicable safety guidelines, such as the law governing technical equipment, accident prevention regulations, etc. Changes to the drive inverter using the software are permitted.

Do not touch live components or power connections immediately after disconnecting the multi-axis servo inverters from the supply voltage because there may still be some charged capacitors. Note the respective reference plates on the multi-axis servo inverter.

Cables may only be connected and switches may only be operated in a de-energized state.

Keep all covers and doors closed during operation.

The fact that status LEDs and other display elements are no longer illuminated does not indicate that the unit has been disconnected from the mains and no longer carries any voltage.

Mechanical blocking or internal safety functions of the unit can cause a motor standstill. Eliminating the cause of the problem or performing a reset can result in the drive re-starting automatically. If, for safety reasons, this is not permitted for the driven machine, disconnect the unit from the mains before correcting the fault.

2.9 Unit temperature

MOVIAXIS® multi-axis servo inverters are usually operated with braking resistors. The braking resistors can also be installed in the housing of the supply modules.

The braking resistors can reach surface temperatures ranging from 70 °C to 250 °C.

Never touch the housings of the MOVIAXIS® modules or the braking resistors during operation or in the cool down phase once the unit has been switched off.

3 Unit Design

3.1 Axis system with CAN-based system bus

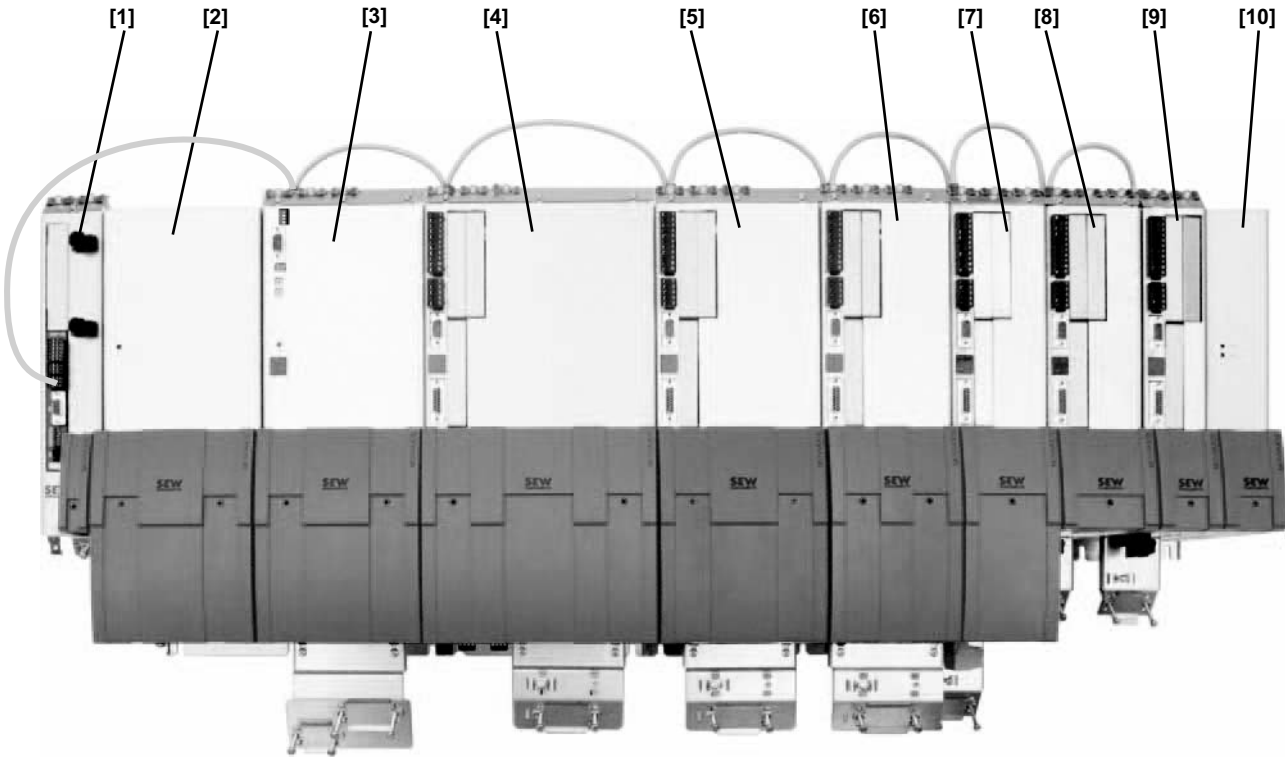


Figure 1: Sample structure of a MOVIAXIS® axis system

[1]	Master module	[6]	Axis module size 4
[2]	Capacitor or buffer module	[7]	Axis module size 3
[3]	Supply module size 3	[8]	Axis module size 2
[4]	Axis module size 6	[9]	Axis module size 1
[5]	Axis module size 5	[10]	24 V switched-mode power supply module, additional module

3.2 Axis system with EtherCAT-based system bus

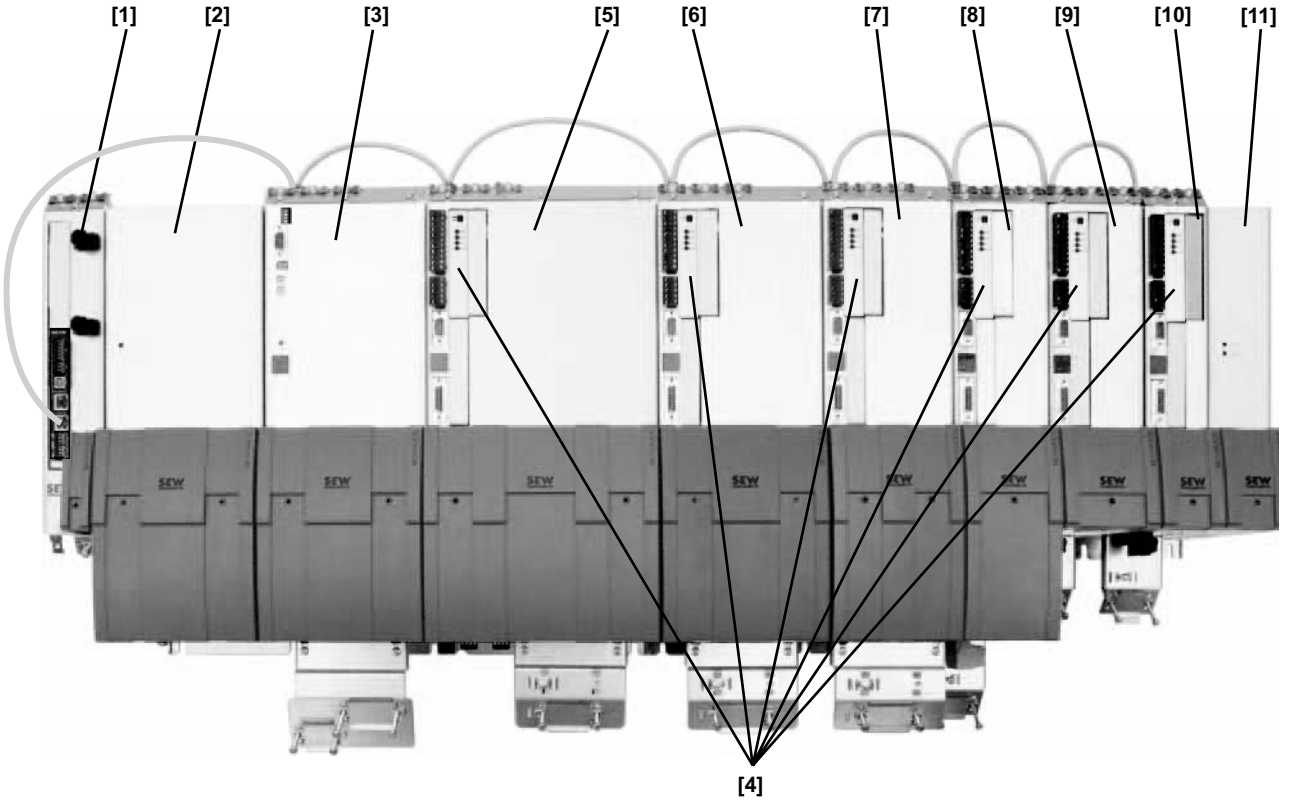


Figure 2: Sample structure of a MOVIAXIS® axis system

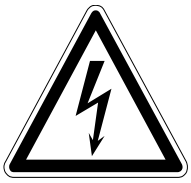
[1]	Master module	[7]	Axis module size 4
[2]	Capacitor or buffer module	[8]	Axis module size 3
[3]	Supply module size 3	[9]	Axis module size 2
[4]	Option card for EtherCAT-based system bus in all axis modules	[10]	Axis module size 1
[5]	Axis module size 6	[11]	24 V switched-mode power supply module, additional module
[6]	Axis module size 5		

3.3 Important notes

Protective measures and **protective equipment** have to meet the respective national **regulations in force**.

Required preventive measures:	Protective grounding (protection class I)
Required protection devices:	The overcurrent protection devices have to be designed to protect the lines at the customer's site.

	**NOTE**
	Follow the specific operating instructions during installation and startup of the motor and the brake!

	**⚠ WARNING**
	The 'Unit design' figures displayed on page 23 ... page 38 represent the units without the provided protection cover (touch guard). The protection cover protects the area of the mains and braking resistor connections. Uncovered power connections. Severe or fatal injuries from electric shock. • Never start the unit if the protective covers are not installed. • Install the protective covers according to the regulations.

3.4 Nameplates and unit designations

The nameplate is divided into up to three parts depending on the module.

- Part "I"of the nameplate indicates the unit designation, production number and status.
- Part "II" of the nameplate indicates the factory installed options and the version status.
- Part "III" of the nameplate (system nameplate) contains the technical data of the module.

The **system nameplate** is located on the side of the unit for the supply module and axis module.

The nameplate contains a description of the version and the scope of supply of the multi-axis servo inverter at the time of delivery.

There may be deviations if

- E. g. option cards are installed or removed at a later time
- Or if the unit firmware is updated.

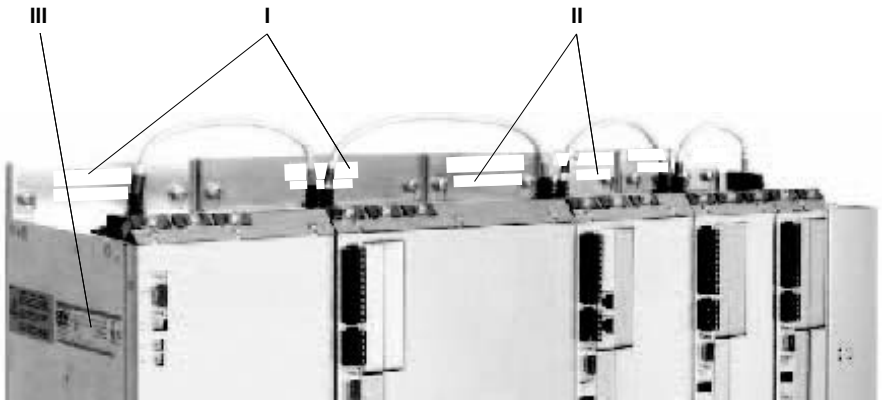


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Figure 3: Location of part 1 of the nameplate

I Part "I" of the nameplate

II Part "II" of the nameplate

III Part "III" of the nameplate (system nameplate)

Axis module nameplate

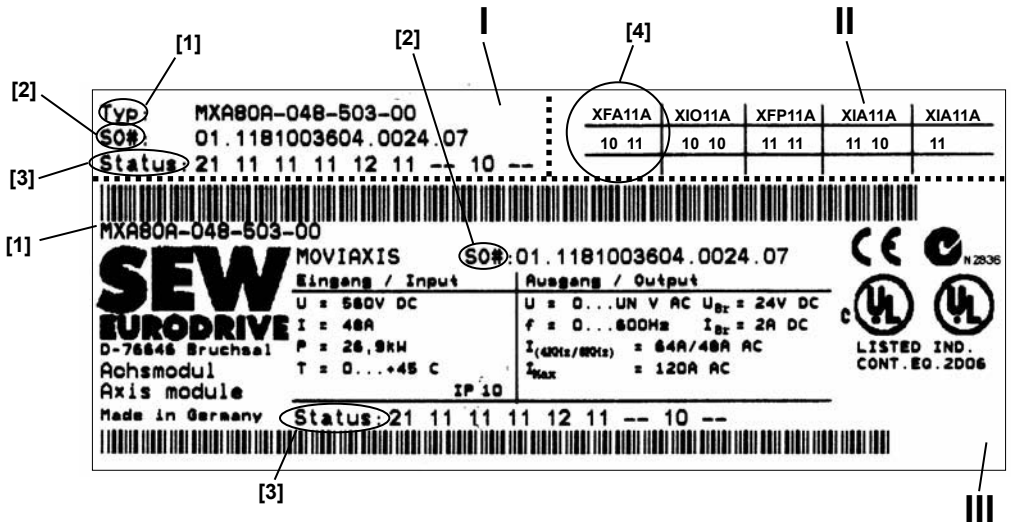

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Figure 4: Example: MOVIAXIS® MX axis module nameplate

I	Part "I" of the nameplate: Located on the upper fastening plate of the module	[1]	Unit designation, see page 17
II	Part "II" of the nameplate: Located on the upper fastening plate of the module	[2]	Production number
III	Part "III" of the nameplate: Located at the side of the module housing	[3]	Status
		[4]	Communication slots, firmware status

Supply module nameplate

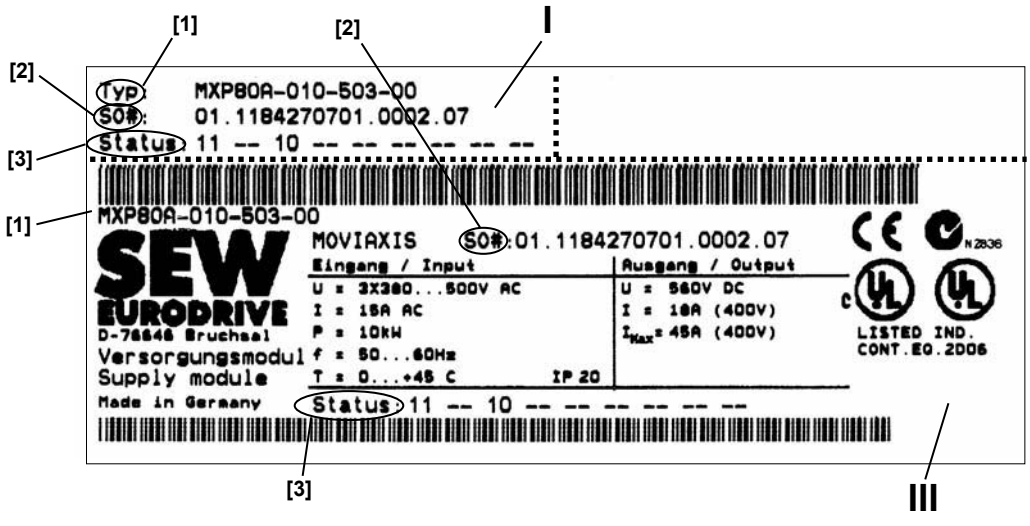

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Figure 5: Example: Nameplate of the MOVIAXIS® MXP power supply module

I	Part "I" of the nameplate: Located on the upper fastening plate of the module	[1]	Unit designation, see page 17
III	Part "III" of the nameplate: Located at the side of the module housing	[2]	Production number
		[3]	Status

Nameplate of the 24 V switched mode power supply additional module

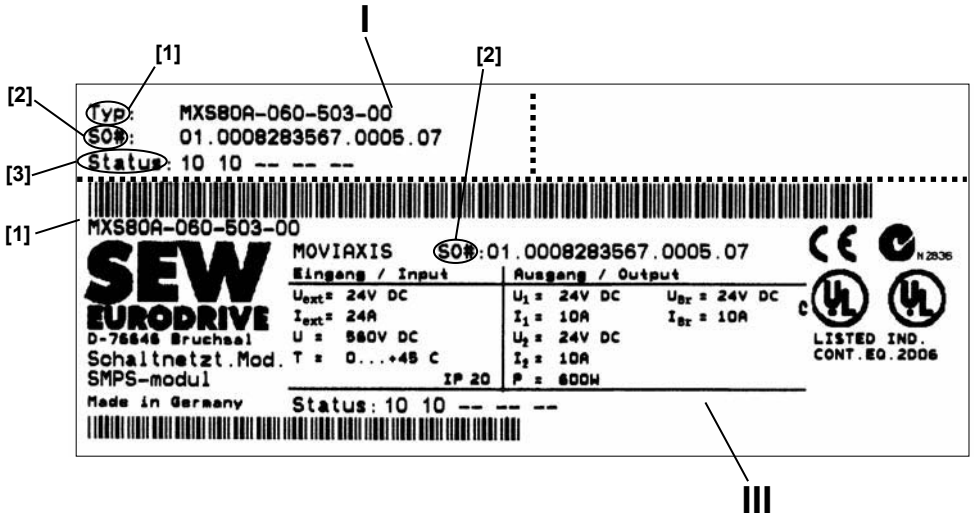

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Figure 6: Example: Nameplate of a 24 V switched-mode power supply module

I	Part "I" of the nameplate: Located on the upper fastening plate of the module	[1]	Unit designation
III	Part "III" of the nameplate: Located at the side of the module housing	[2]	Production number
		[3]	Status

Nameplate of the DC link discharge additional module

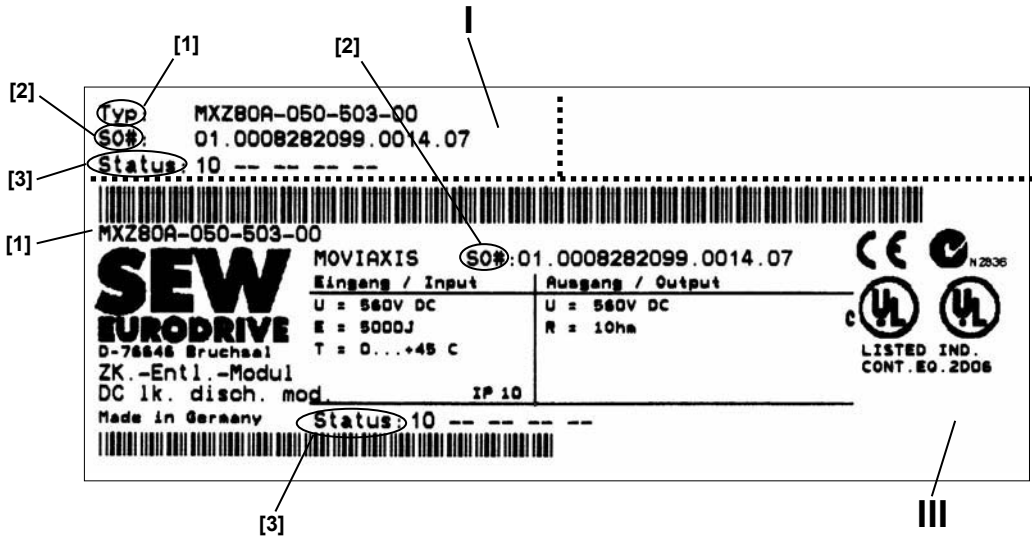

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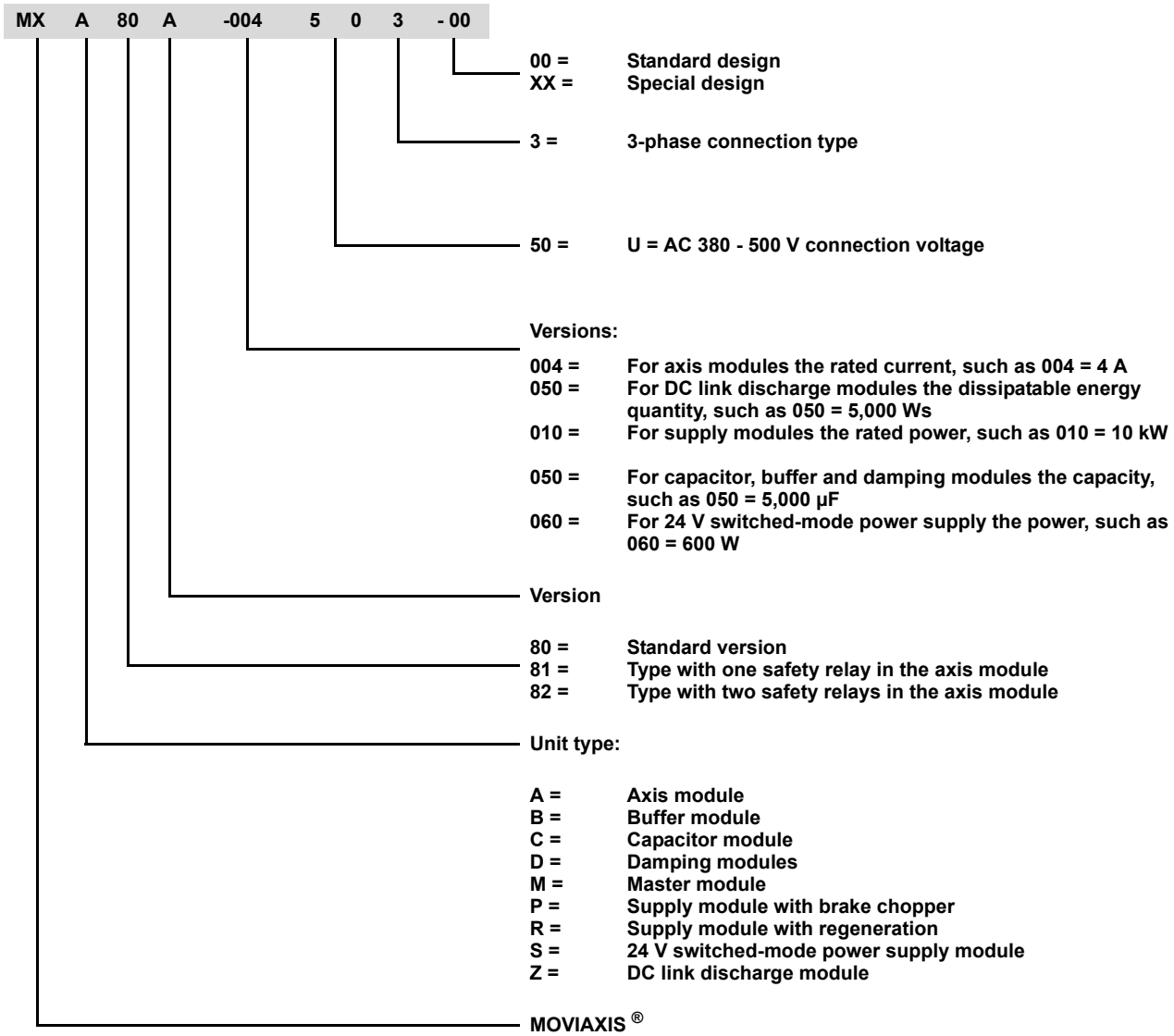
Figure 7: Example: Nameplate of a MOVIAXIS® MXZ DC link discharge module

I	Part "I" of the nameplate: Located on the upper fastening plate of the module	[1]	Unit designation, see page 17
III	Part "III" of the nameplate: Located at the side of the module housing	[2]	Production number
		[3]	Status

Example: Unit designation for MOVIAXIS® basic units



Unit designation for the axis module:

MXA80A-004-503-00 = Axis module with 4 A rated current

Unit designation for the buffer module component

MXB80A-050-503-00 = Buffer module

Unit designation for the capacitor module component

MXC80A-050-503-00 = Capacitor module

Unit designation for the master module component:

MXM80A-000-000-00 = Master module

Unit designation for the supply module:

MXP80A-010-503-00	=	10 kW supply module
MXR80A-025-503-00	=	25 kW supply module with regeneration (in preparation)

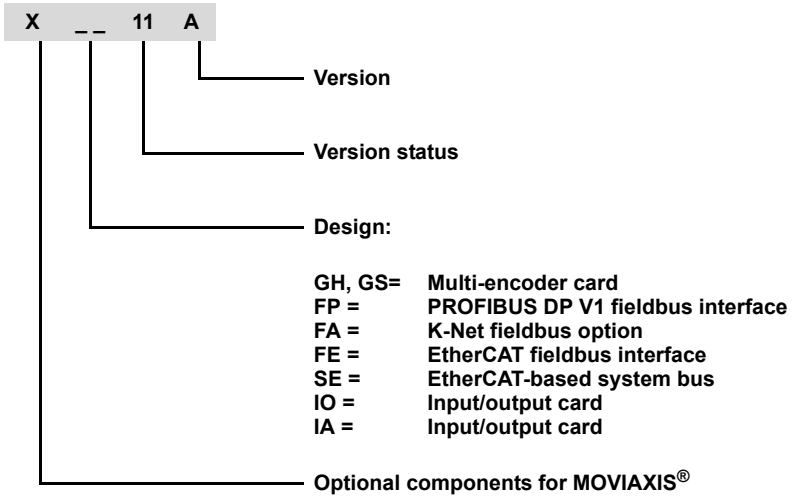
Unit designation for the 24 V switched-mode power supply module component

MXS80A-060-503-00	=	24 V switched-mode power supply module

Unit designation DC link discharge module component:

MXZ80A-050-503-00	=	DC link discharge module with a dissipatable energy quantity of 5,000 Ws

MOVIAXIS® MX optional components



3.5 Standard accessories

Standard accessories are included with the basic unit at delivery.

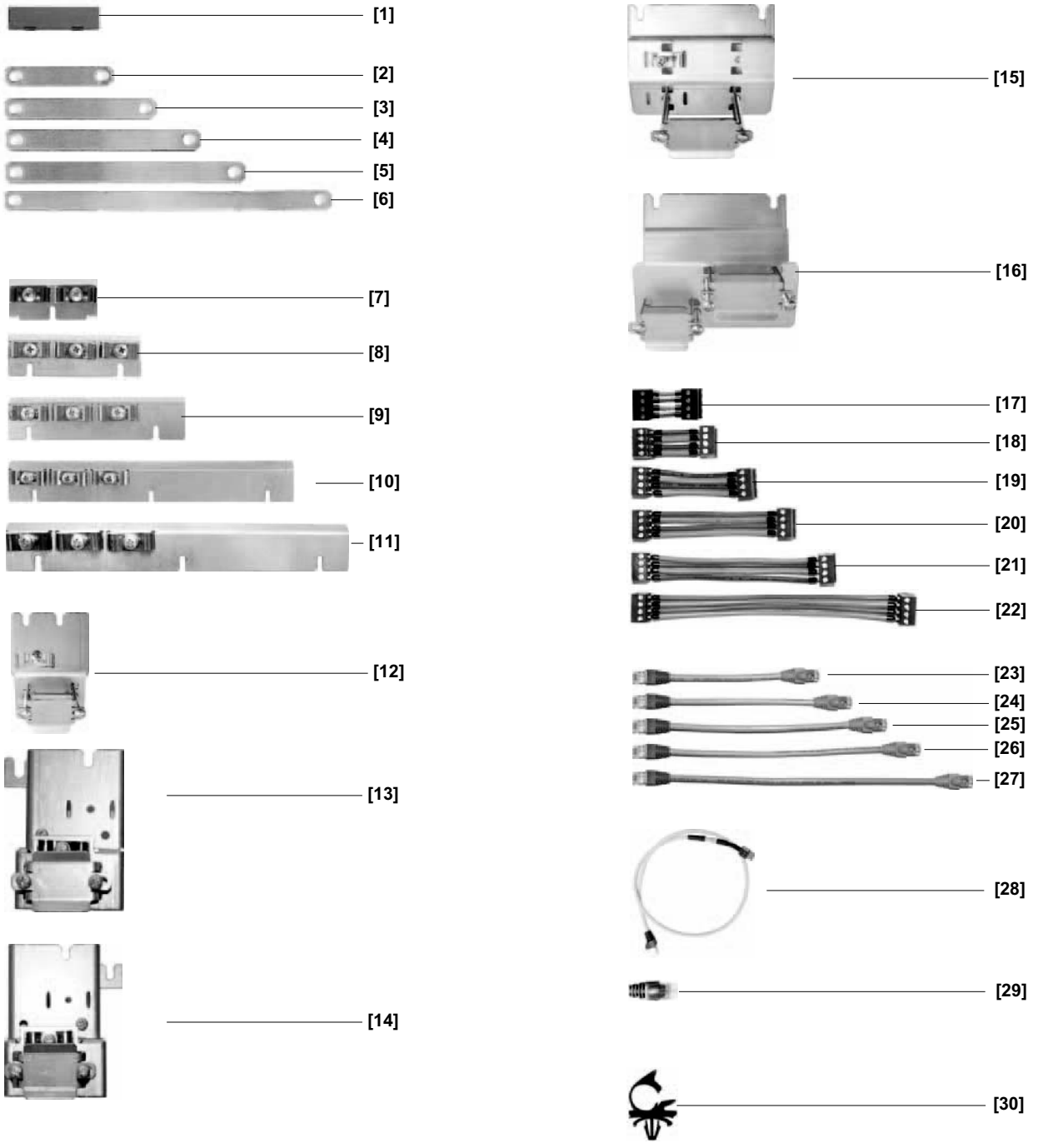


Figure 8: Standard accessories

The corresponding mating connectors for all connectors are installed at the factory. An **exception** are the D-sub connectors; they are supplied without mating connector.

Standard accessory assignment table

No.	Dimensions[1]	MXM	MXZ	MXS	MXP [kW]				MXA [A]										MXC	MXB
					10	25	50	75	2	4	8	12	16	24	32	48	64	100		
Touch guard																				
[1]					2x	2x	2x	2x												
DC link connection																				
[2]	76 mm			3x					3x	3x	3x									
[3]	106 mm				3x							3x	3x	3x	3x					
[4]	136 mm		2x													3x				
[5]	160 mm					3x	3x	3x									3x		3x	3x
[6]	226 mm																	3x		
Electronics shield clamp																				
[7]	60 mm	1x							1x	1x	1x									
[8]	90 mm				1x							1x	1x	1x	1x					
[9]	120 mm															1x				
[10]	150 mm					1x	1x	1x									1x			
[11]	210 mm																	1x		
Power shield clamp																				
[12]	60 mm				1x		1x		1x	1x	1x	1x	1x	1x						
[13]	60 mm[2]					1x														
[14]	60 mm[3]														1x					
[15]	105 mm		1x			1x										1x	1x	1x		
[16]	105 mm						1x	1x												
24 V supply cable																				
[17]	40 mm	1x																		
[18]	50 mm			1x					1x	1x	1x									
[19]	80 mm				1x	1x						1x	1x	1x	1x					
[20]	110 mm		1x													1x				
[21]	140 mm						1x	1x									1x		1x	1x
[22]	200 mm																	1x		
Signal bus connection cable (suitable for CAN-/ EtherCAT-based system bus)																				
[23]	200 mm								1x	1x	1x									
[24]	230 mm				1x	1x						1x	1x	1x	1x					
[25]	260 mm															1x				
[26]	290 mm						1x	1x									1x			
[27]	350 mm																	1x		
Connection cable CAN – master module																				
[28]	520 mm	1x																		
CAN terminating resistor																				
[29]					1x	1x	1x	1x												
Cable lugs																				
[30]		3x																		

1) Length of the cables: Length of the cable without plug

2) Clamp with short support, 60 mm wide

3) Clamp with long support, 60 mm wide

3.6 Optional accessories

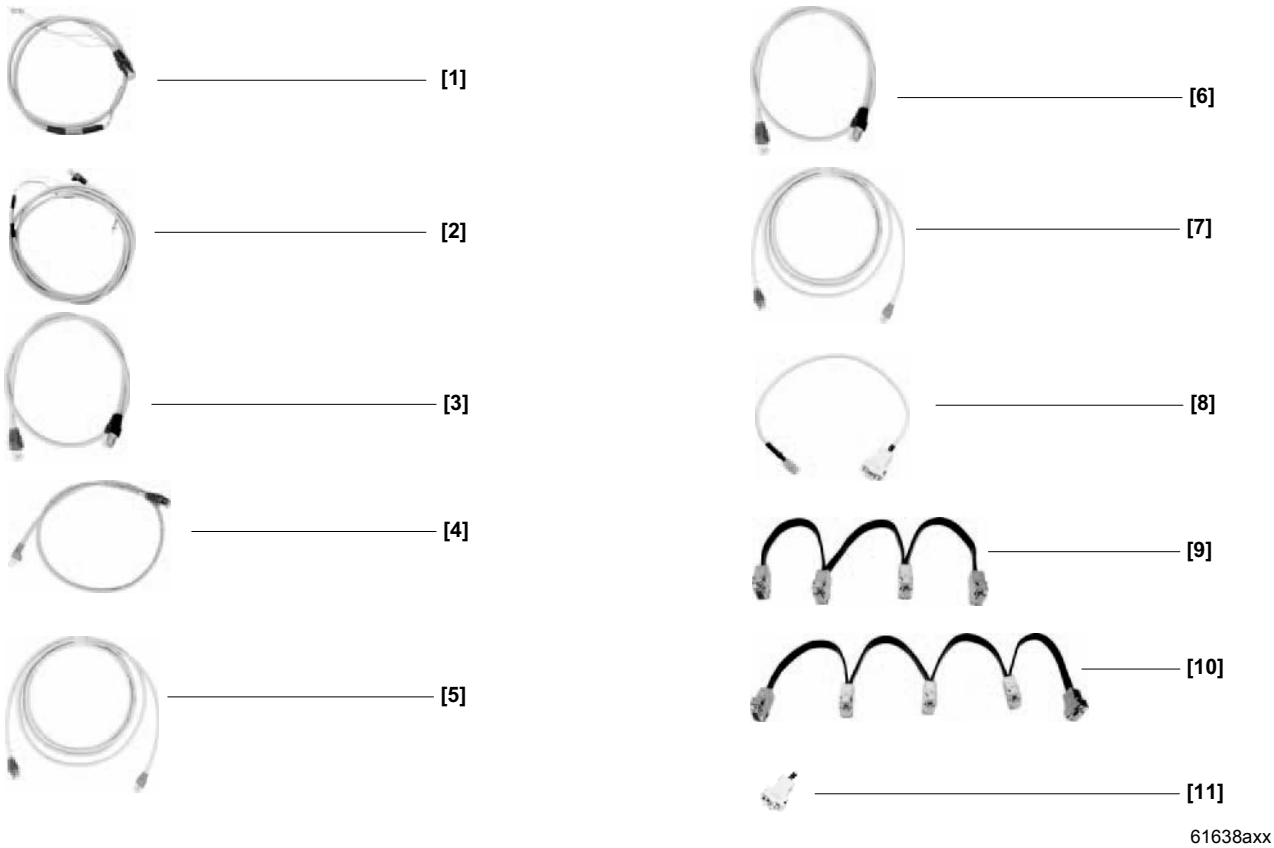


Figure 9: Optional accessories

Optional accessory assignment table

No.	Dimension / Designation / Connector type
System bus connection cable for CAN-based system bus (axis system with other SEW units)	
[1]	750 mm RJ45 / open end
[2]	3,000 mm RJ45 / open end
Connection cable EtherCAT – master module	
[3]	750 mm 2 x RJ45
System bus connection cable for EtherCAT-based system bus (axis system to other SEW units)	
[4]	750 mm 2 x RJ45 (special assignment)
[5]	3,000 mm 2 x RJ45 (special assignment)
System bus connection cable CAN (axis system to axis system)	
[6]	750 mm 2 x RJ45 (special assignment)
[7]	3,000 mm 2 x RJ45 (special assignment)
Adapter cable master module to CAN2	
[8]	500 mm Weidmüller to Sub-D9 f
Connection cable CAN2	
[9]	3 modules Sub-D9 m/f
[10]	4 modules Sub-D9 m/f
CAN2 terminating resistor	
[11]	Sub-D9

3.7 Overview of an axis system

The units are displayed without cover in the following figure.

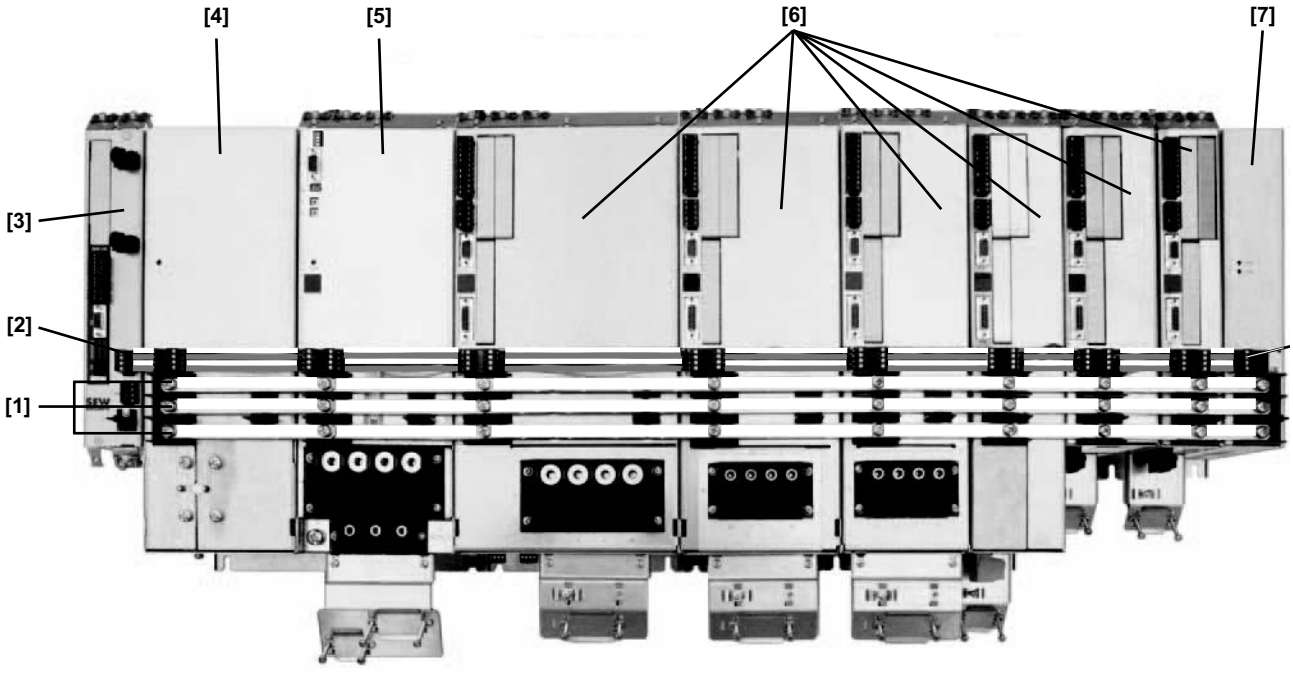


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Figure 10: Exemplary representation of the energy supply in the axis system

[1] X4: DC link connection
[2] X5a, X5b: 24 V voltage supply
[3] Master module
[4] Capacitor / buffer module
[5] Supply module BG 3
[6] Axis modules (size 6 ... size 1)
[7] 24 V switched-mode power supply module

3.8 Unit design of MOVIAXIS® MXP power supply module

The following figures show the units without cover.

MOVIAXIS® MXP supply module size 1

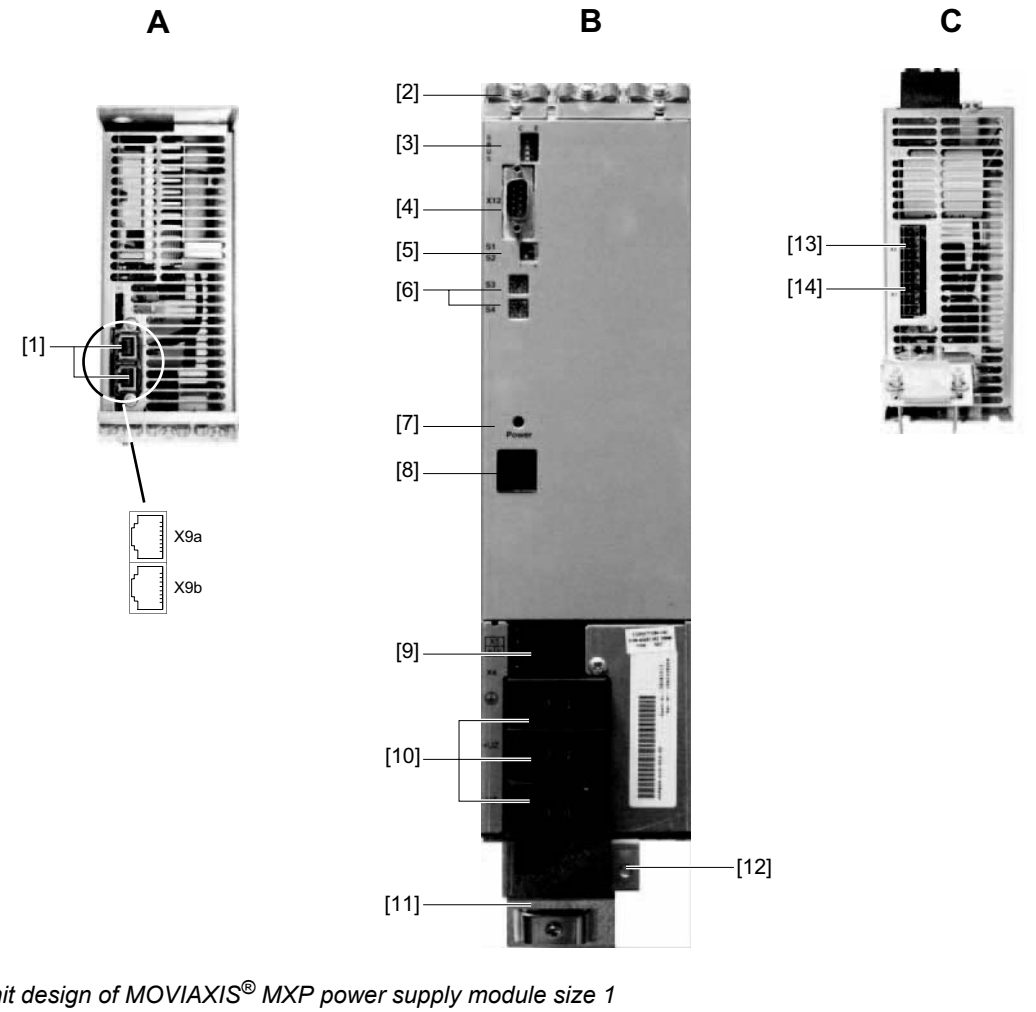


Figure 11: Unit design of MOVIAXIS® MXP power supply module size 1

A	**View from top**
[1]	Signaling bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	C, E: DIP switches - C: CAN-based system bus - E: EtherCAT-based system bus
[4]	X12: System bus CAN
[5]	S1, S2: DIP switch for CAN baud rate
[6]	S3, S4: Axis address switch
[7]	Standby display (Power)
[8]	2 x 7-segment display
[9]	X5a, X5b: 24 V voltage supply
[10]	X4: DC link connection
[11]	Power shield clamp
[12]	Housing grounding point

C	**View from bottom**
[13]	X3: Braking resistor connection
[14]	X1: Mains connection

MOVIAXIS® MXP supply module size 2

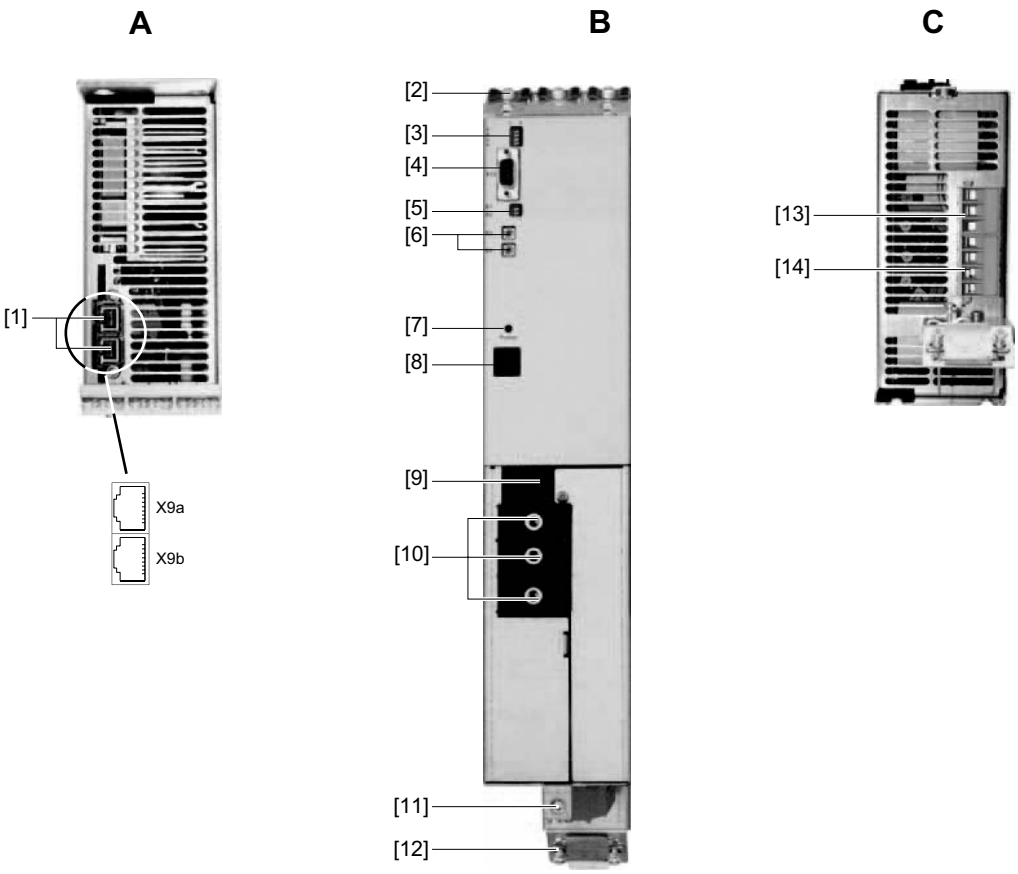


Figure 12: Unit design of MOVIAXIS® MXP power supply module size 2

A	**View from top**
[1]	Signaling bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	C, E: DIP switches - C: CAN-based system bus - E: EtherCAT-based system bus
[4]	X12: System bus CAN
[5]	S1, S2: DIP switch for CAN baud rate
[6]	S3, S4: Axis address switch
[7]	Standby display (Power)
[8]	2 x 7-segment display
[9]	X5a, X5b: 24 V voltage supply
[10]	X4: DC link connection
[11]	Housing grounding point
[12]	Power shield clamp

C	**View from bottom**
[13]	X3: Braking resistor connection
[14]	X1: Mains connection

MOVIAXIS® MXP supply module size 3

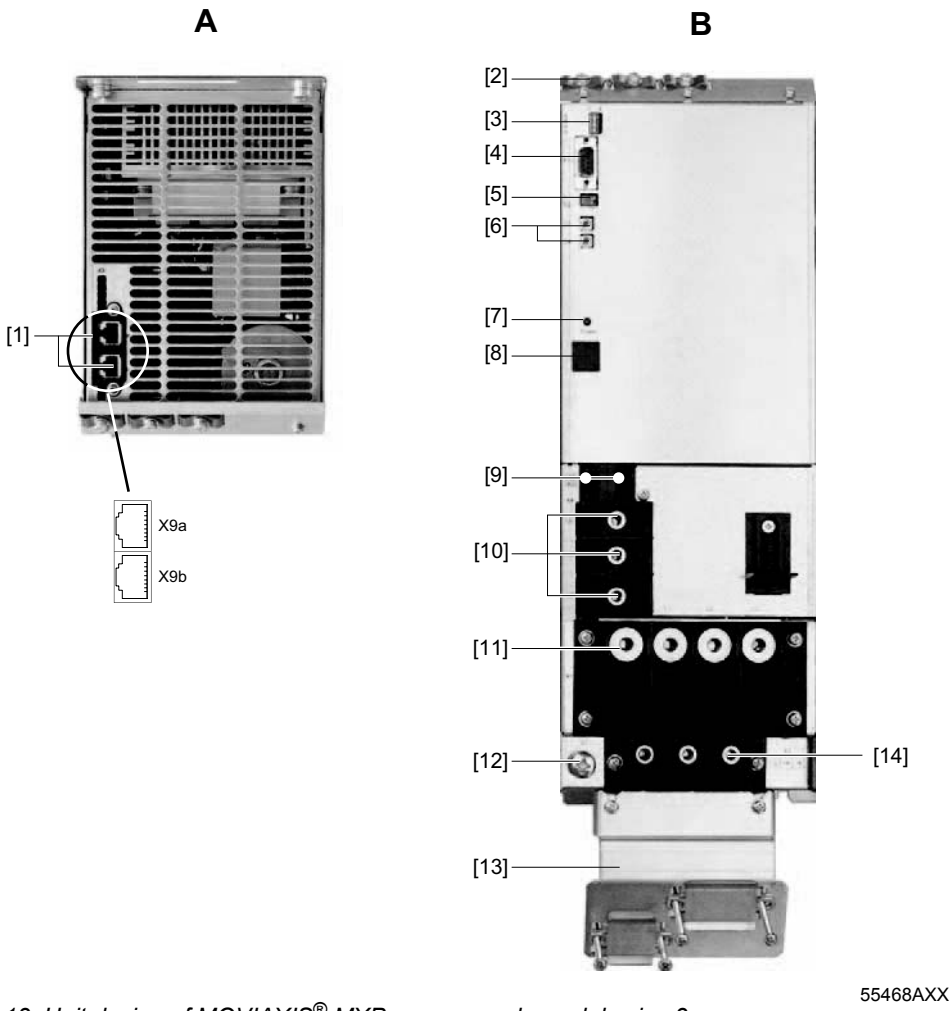


Figure 13: Unit design of MOVIAXIS® MXP power supply module size 3

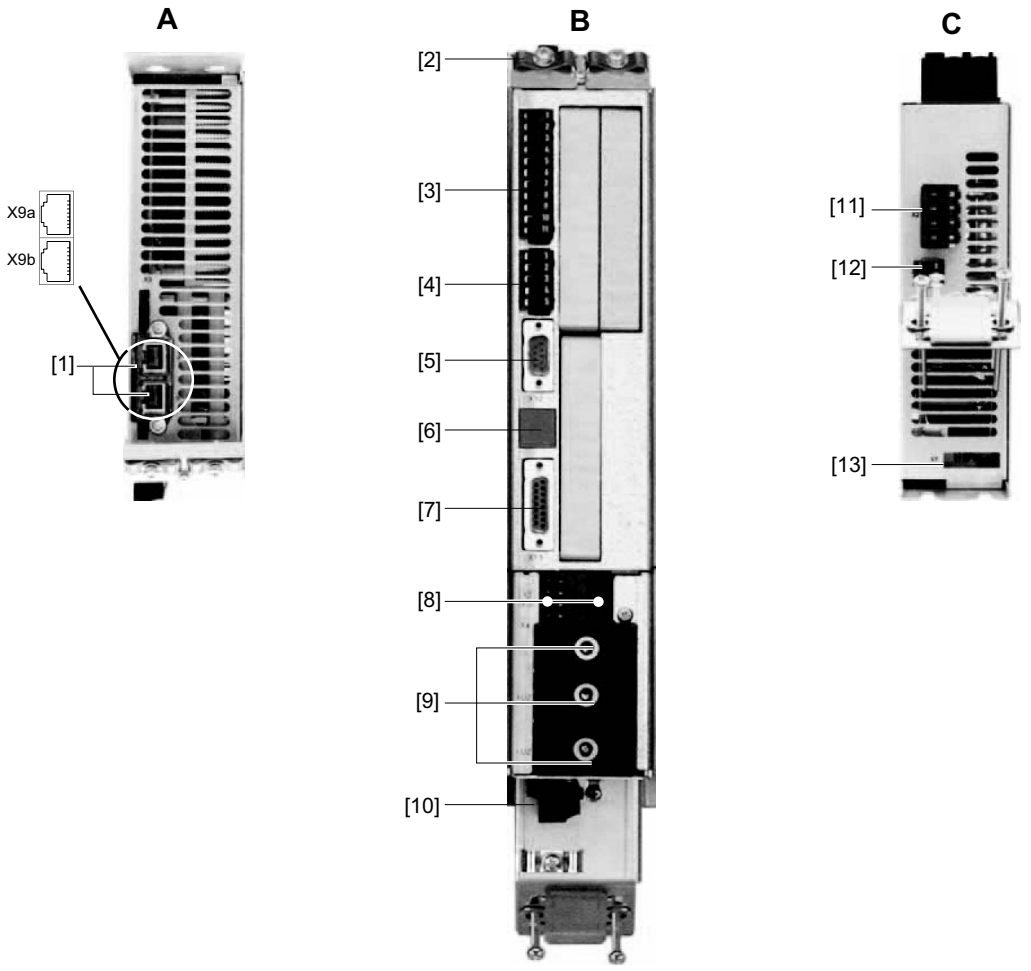
A	**View from top**
[1]	Signaling bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	C, E: DIP switches - C: CAN-based system bus - E: EtherCAT-based system bus
[4]	X12: System bus CAN
[5]	S1, S2: DIP switches
[6]	S3, S4: Axis address switch
[7]	Standby display (Power)
[8]	2 x 7-segment display
[9]	X5a, X5b: 24 V voltage supply
[10]	X4: DC link connection
[11]	X1: Mains connection
[12]	Housing grounding point
[13]	Power shield clamp
[14]	X3: Braking resistor connection

3.9 Unit design of MOVIAXIS® MXA axis modules

The following figures show the units without cover.

MOVIAXIS® MXP axis module size 1



61544axx

Figure 14: Unit design of MOVIAXIS® MXA axis module size 1

A	**View from top**
[1]	Signaling bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13: Connection motor encoder (resolver or Hiperface + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	Power shield clamp

C	**View from bottom**
[11]	X2: Motor connection
[12]	X6: Brake control system
[13]	X7: 1 Safety relay (optional design)

MOVIAXIS® MXP axis module size 2

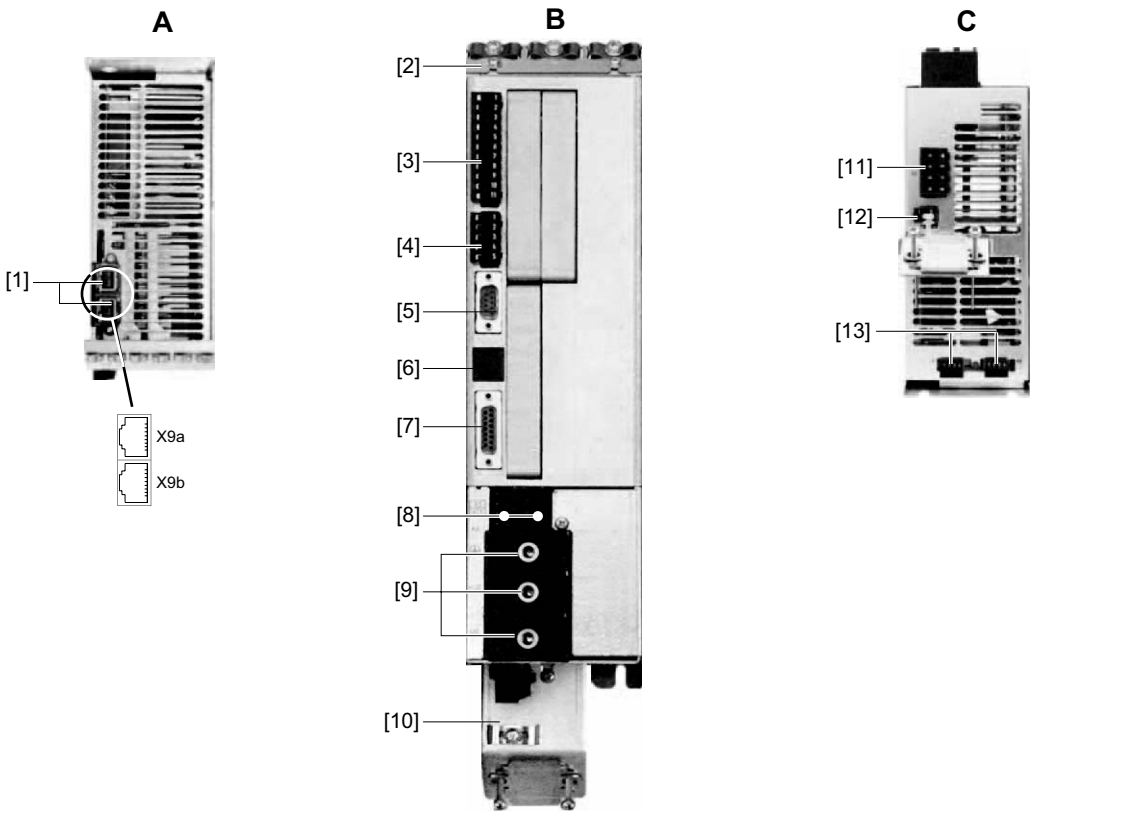


Figure 15: Unit design of MOVIAXIS® MXA axis module size 2

A	**View from top**
[1]	Signaling bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13: Connection motor encoder (resolver or Hiperface + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	Power shield clamp

C	**View from bottom**
[11]	X2: Motor connection
[12]	X6: Brake control system
[13]	X7, X8: 2 Safety relays (optional design)

MOVIAXIS® MXP axis module size 3

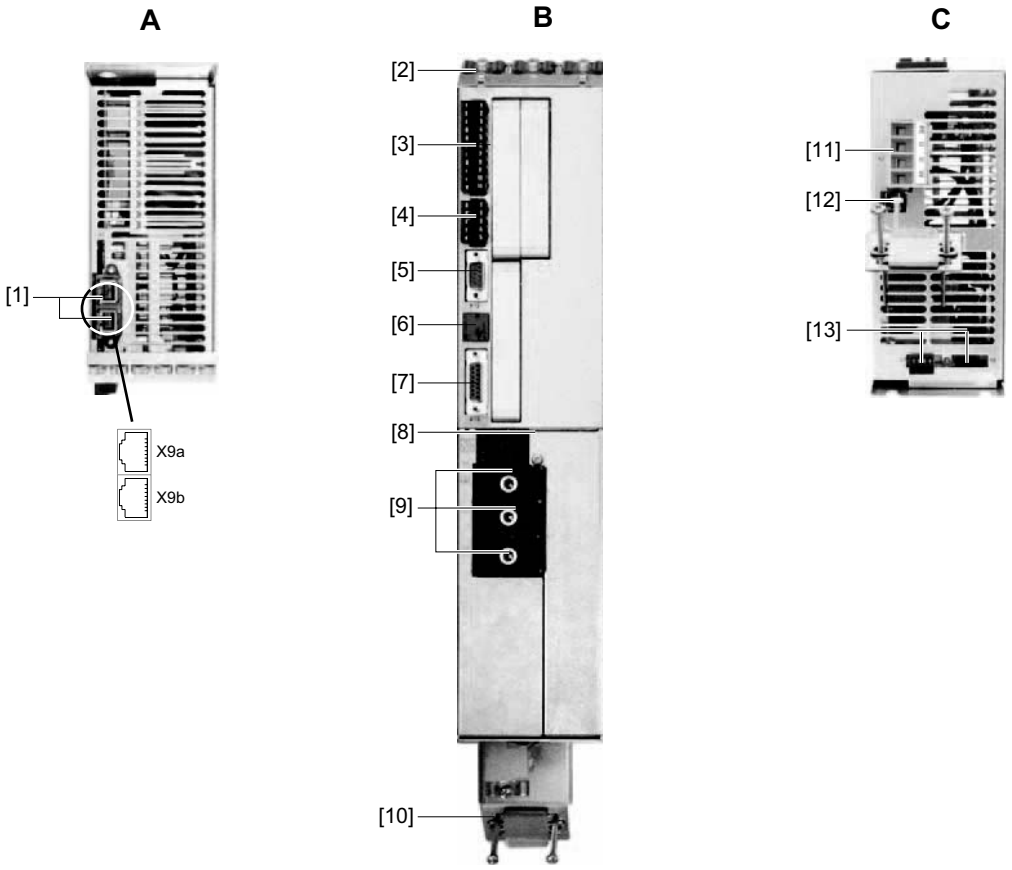


Figure 16: Unit design of MOVIAXIS® MXA axis module size 3

A	**View from top**
[1]	Signaling bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13: Connection motor encoder (resolver or Hiperface + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	Power shield clamp

C	**View from bottom**
[11]	X2: Motor connection
[12]	X6: Brake control system
[13]	X7, X8: 2 Safety relays (optional design)

MOVIAXIS® MXP axis module size 4

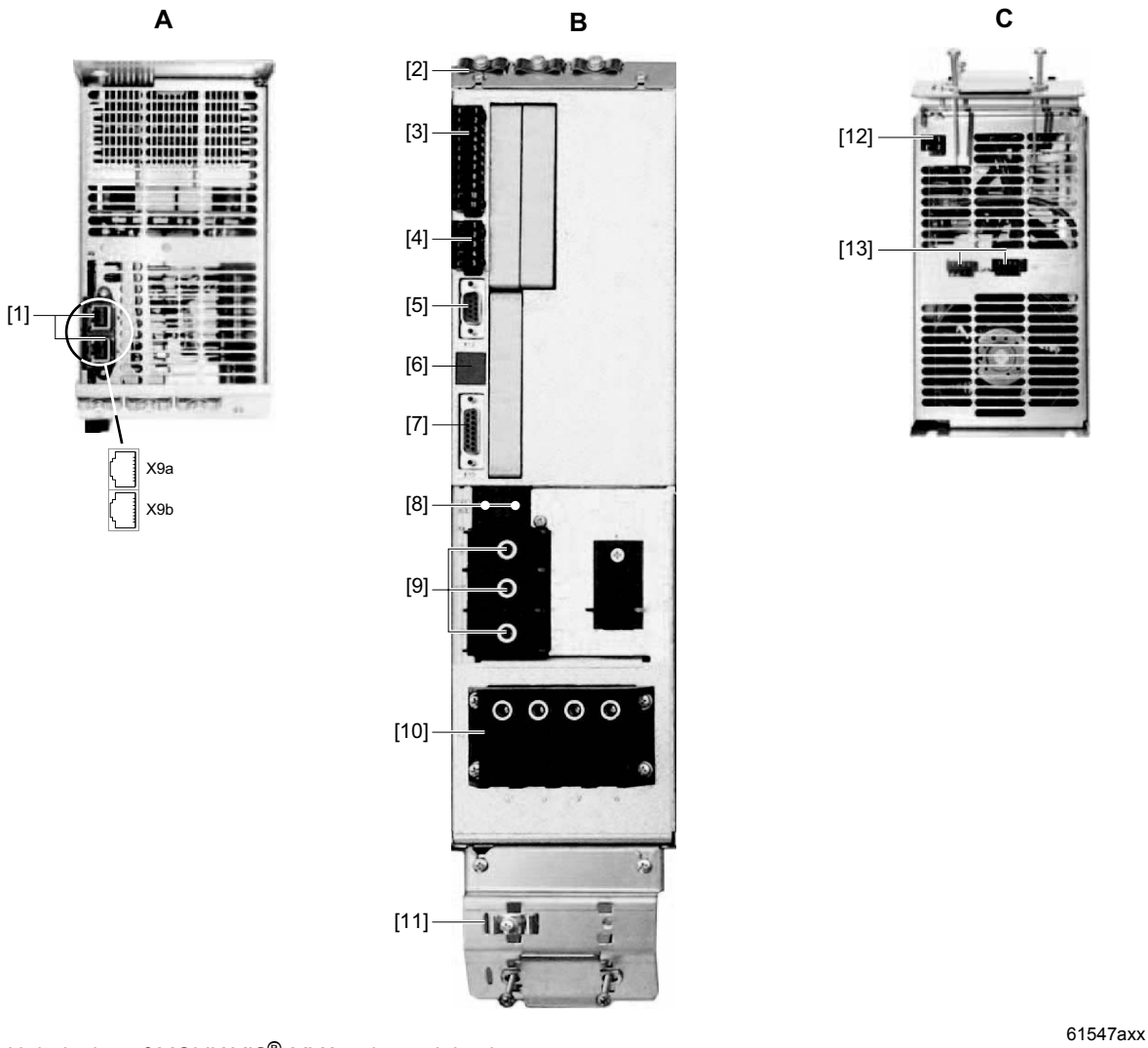


Figure 17: Unit design of MOVIAXIS® MXA axis module size 4

A	**View from top**
[1]	Signaling bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13: Connection motor encoder (resolver or Hiperface + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	X2: Motor connection
[11]	Power shield clamp

C	**View from bottom**
[12]	X6: Brake control system
[13]	X7, X8: 2 Safety relays (optional design)

MOVIAXIS® MXP axis module size 5

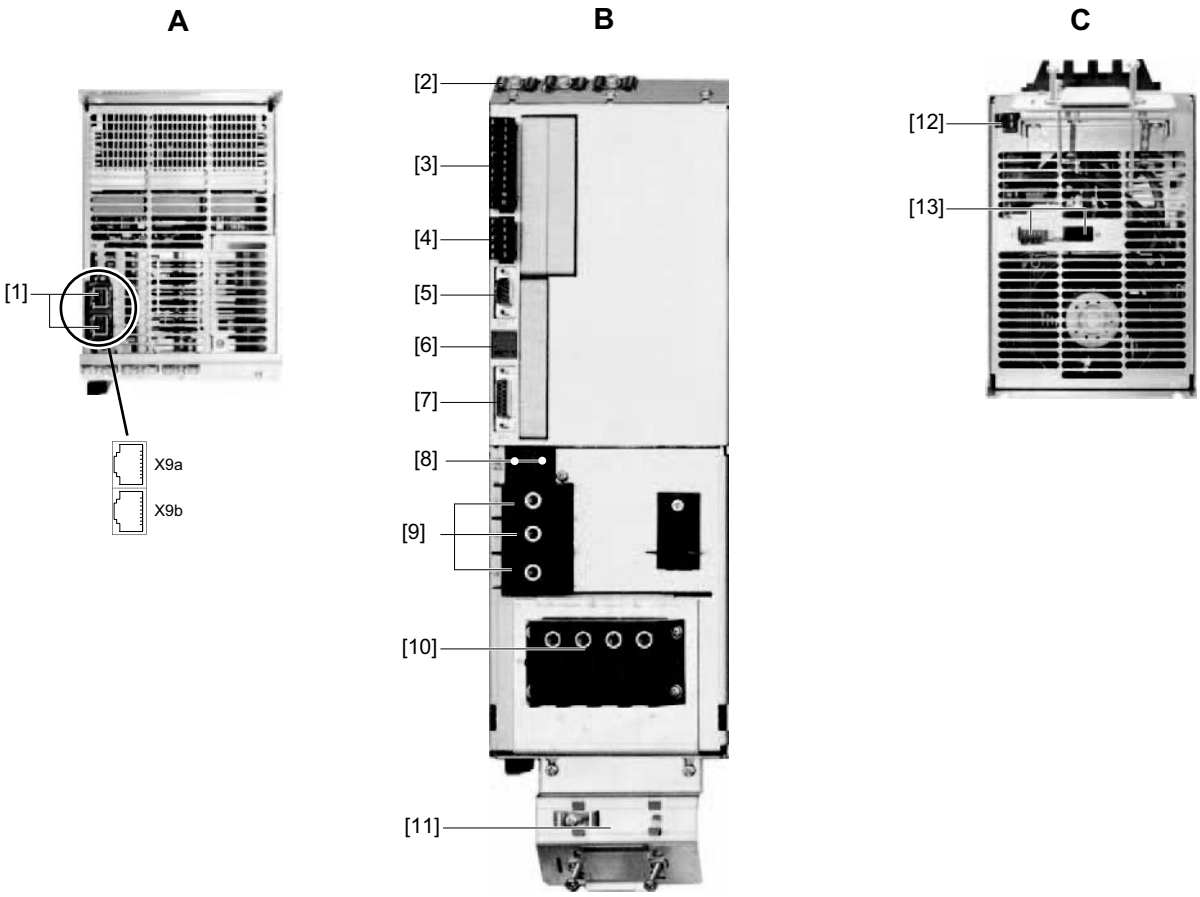


Figure 18: Unit design of MOVIAXIS® MXA axis module size 5

A	**View from top**
[1]	Signaling bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13: Connection motor encoder (resolver or Hiperface + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	X2: Motor connection
[11]	Power shield clamp

C	**View from bottom**
[12]	X6: Brake control system
[13]	X7, X8: 2 Safety relays (optional design)

MOVIAXIS® MXP axis module size 6

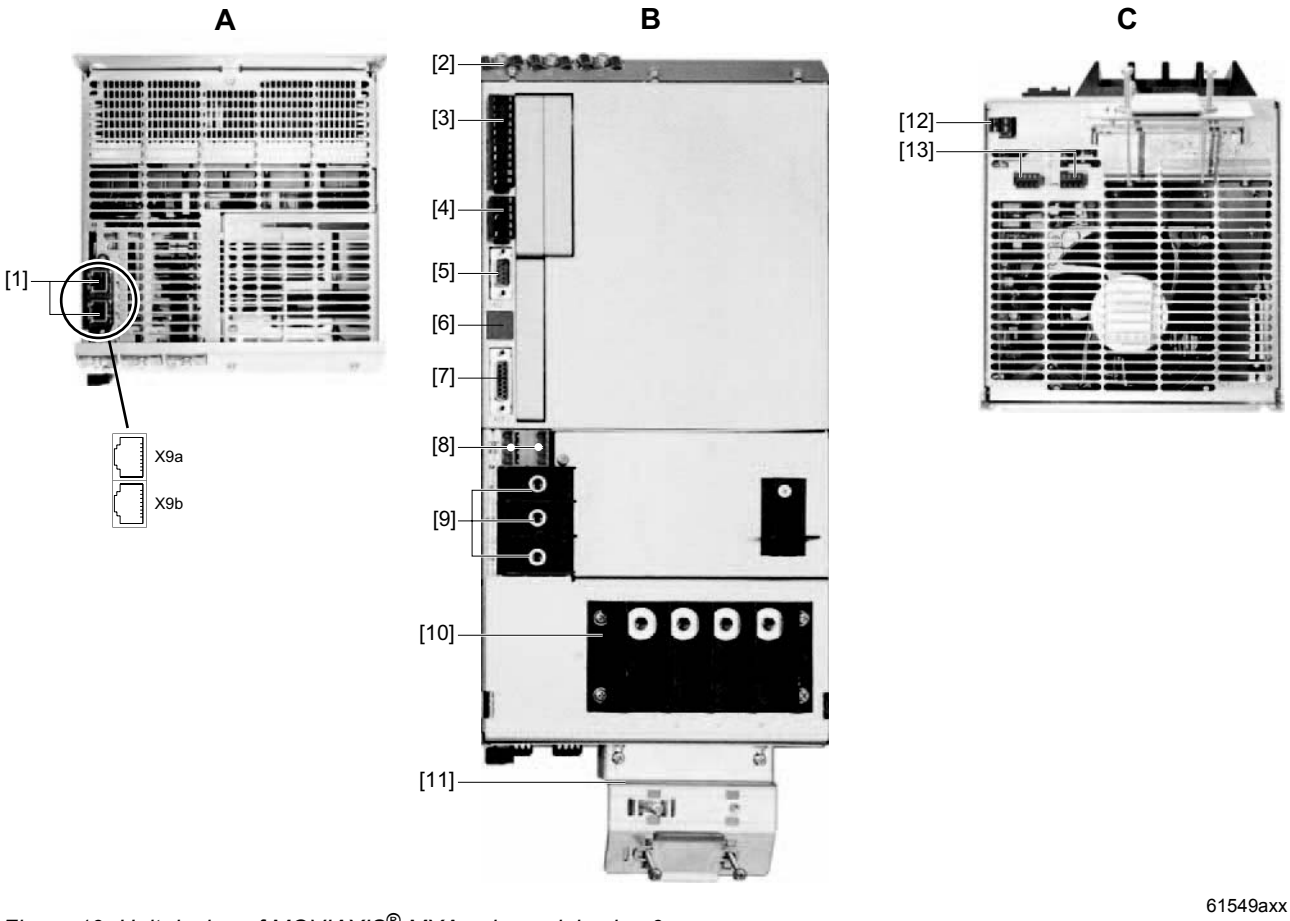


Figure 19: Unit design of MOVIAXIS® MXA axis module size 6

A	**View from top**
[1]	Signaling bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13: Connection motor encoder (resolver or Hiperface + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	X2: Motor connection
[11]	Power shield clamp

C	**View from bottom**
[12]	X6: Brake control system
[13]	X7, X8: 2 Safety relays (optional design)

3.10 System bus in EtherCAT- or CAN-based version

Axis modules can be equipped with different system bus versions:

- CAN-based system bus,
- EtherCAT-based system bus.

The figures displayed on page 26... page 31 show the axis modules with CAN-based system bus.

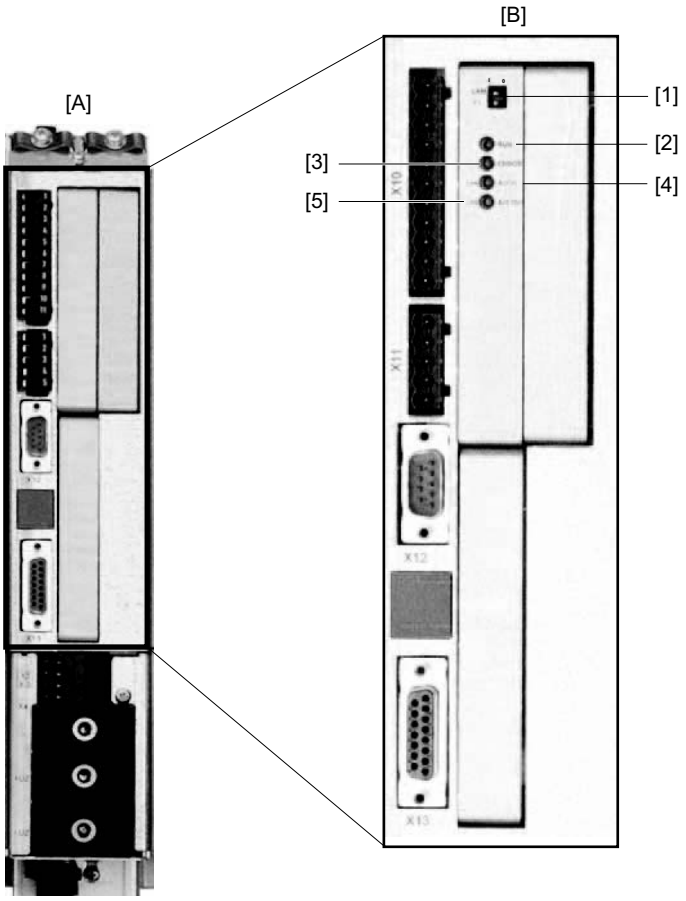


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Figure 20: System bus in CAN- or EtherCAT-based version

[A] CAN-based system bus

[B] EtherCAT-based system bus

[1] LAM switch
- Switch setting 0: All axis modules except the last one
- Switch setting 1: Last axis module in the system

Switch F1
- Switch setting 0: Delivery condition
- Switch setting 1: Reserved for added functions

[2] LED RUN; color: green / orange - Shows the operating status of the bus electronics and communication

[3] LED ERR; color: red - Shows EtherCAT error.

[4] LED link IN; color: green - EtherCAT connection to the previous unit is active

[5] LED link OUT; color: green - EtherCAT connection to the subsequent unit is active

3.11 Unit design of the MOVIAXIS® MXM master module component

The following figure shows the unit without cover.

MOVIAXIS® MXM master module in MOVI-PLC basic version

The master module shown here has the following designation: MXM80A-000-000-00/DHP11A.

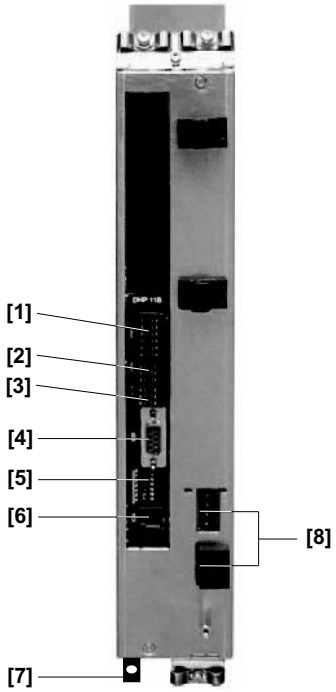


Figure 21: Unit design of the master module, MOVI-PLC® Basic version

View from front

[1] - [6]	For terminal assignment see "MOVI-PLC® basic DHP11B Controller" manual
[7]	Housing grounding point
[8]	X5a, X5b: 24 V voltage supply

STOP	**STOP**
	Servo inverter can possibly be damaged! The master module may only be operated when implemented in a system according to its designated purpose as shown on page 22. Remote operation will damage the master module and is not permitted.

MOVIAXIS® MXM master module in MOVI-PLC advanced version

The master module shown here has the following designation: MXM80A-000-000-00/DHE41B.

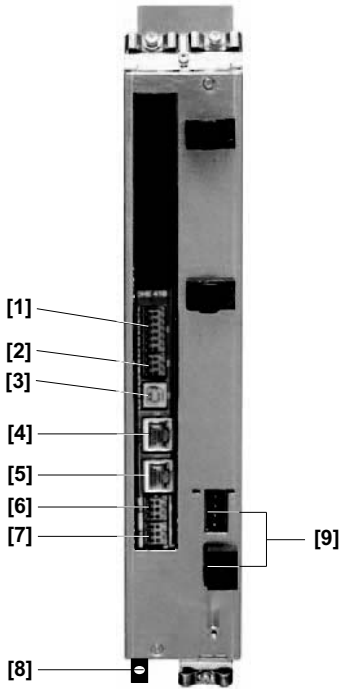


Figure 22: Unit design of the master module, MOVI-PLC® Advanced version

View from front

[1] - [7] For terminal assignment see "MOVI-PLC® advanced DH.41B Controller" manual

[8] Housing grounding point

[9] X5a, X5b: 24 V voltage supply

STOP	**STOP**
	Servo inverter can possibly be damaged! The master module may only be operated when implemented in a system according to its designated purpose as shown on page 22. Remote operation will damage the master module and is not permitted.

3.12 Unit design of the MOVIAXIS® MXC capacitor module component

The following figure shows the unit without protective cover.

Capacitor module MXC

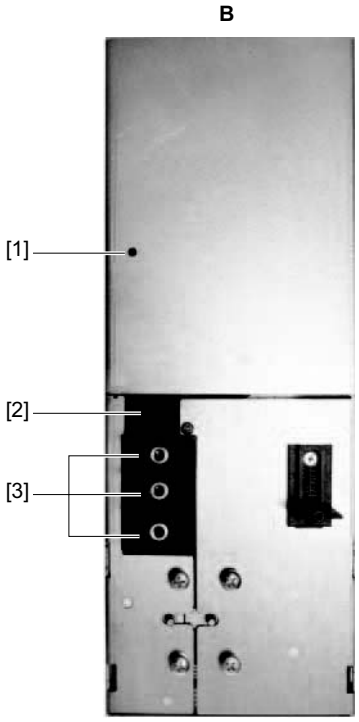


Figure 23: Unit design of the MOVIAXIS® MXC capacitor module

B	**View from front**
[1]	Standby display (Power)
[2]	X5a, X5b: 24 V voltage supply
[3]	X4: DC link connection

3.13 Unit design of the MOVIAXIS® MXB buffer module component

The following figure shows the unit without protective cover.

Buffer module MXB

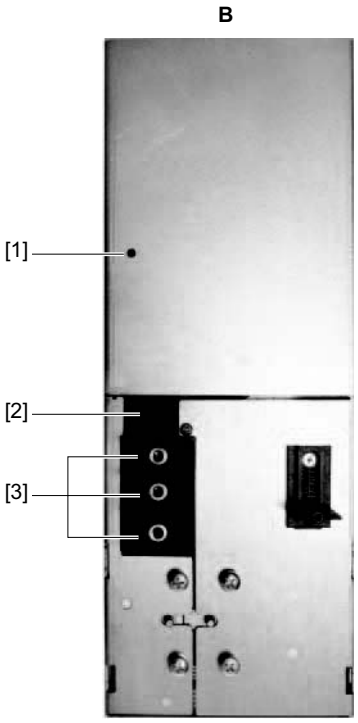


Figure 24: Unit design of the MOVIAXIS® MXB buffer module

B	**View from front**
[1]	No function
[2]	X5a, X5b: 24 V voltage supply
[3]	X4: DC link connection

3.14 Unit design of the MOVIAXIS® MXS 24 V switched-mode power supply module component

The following figure shows the unit without protective cover.

24 V switched-mode power supply module

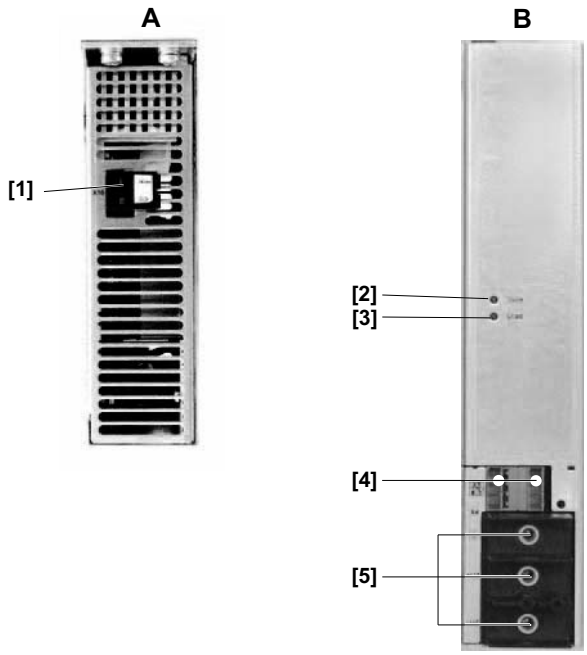


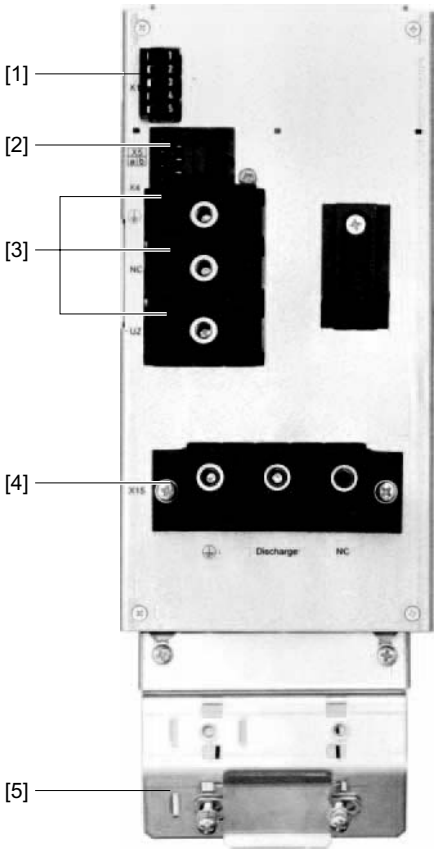
Figure 25: Units design of the 24 V switched-mode power supply module

A	View from top	B	View from front
[1]	X16: 24 V external	[2]	LED State
		[3]	LED Load
		[4]	X5a, X5b: 24 V voltage supply
		[5]	X4: DC link connection

3.15 Unit design of the MOVIAXIS® MXZ DC link discharge module component

The following figure shows the unit without protective cover.

DC link discharge module MOVIAXIS® MXZ



54427BXX

Figure 26: Unit design of MOVIAXIS® MXZ DC link discharge unit

View from front

[1] X14: Control connector

[2] X5a, X5b: 24 V voltage supply

[3] X4: DC link connection

[4] X15: Connection braking resistor for discharge

[5] Power shield clamp

3.16 Option combinations on delivery

The axis modules include an expansion system for up to three options.

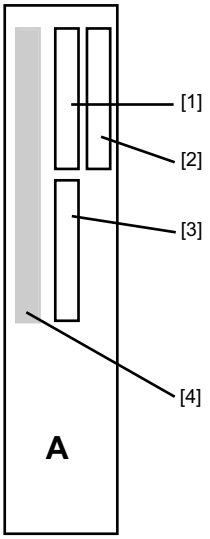


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Figure 27: Slot combinations

[1 - 3] Slots 1 - 3, assignment see following table
[4] Control board - Basic unit components

EtherCAT-capable units

The following table shows the possible combinations and the fixed assignment of cards to the slots.

Combinations with EtherCAT-based system bus

The following option card combinations are possible:

Combination	Slot 1	Slot 2	Slot 3
1	XSE24A		
2		XIO11A	
3			XIA11A
4			XGH
5			XGS
6			XIO11A
7		XIA11A	
8			XGH
9			XGS
10			XIA11A
11			XGH
12		XGS	
13		XGH	
14			XGS
15		XGS	

CAN version of the units

The following tables show the possible combinations and the fixed assignment of cards to the slots.

Fieldbus combinations

The fieldbus options can be plugged in the following combinations:

Combination	Slot 1	Slot 2	Slot 3
1	Fieldbus option[1)]		
2	XIO11A	Fieldbus option[1)]	
3			XIA11A
4			XGH
5			XGS
6			XIO11A
7	XIA11A		
8			XGH
9			XGS
10			XIA11A
11	Fieldbus option[1)]		XGH
12	XGS	Fieldbus option[1)]	
13	XGH		
14	Fieldbus option[1)]		XGS
15	XGS	Fieldbus option[1)]	

1) Fieldbus option: - XFE24A: EtherCAT or - XFP11A: PROFIBUS or - XFA11A: K-Net

Combinations with XIO

The following option card combinations are possible:

Combination	Slot 1	Slot 2	Slot 3
1	XIO11A		
2		XIA11A	
3			XGH
4			XGS
5		XIA11A	XGH
6			XGS
7		XGS	XGH
8		XGH	
9		XGS	XGS
10		XIO11A	
11			XGH
12			XGS

Combinations with XIA

The following option card combinations are possible:

Combination	Slot 1	Slot 2	Slot 3
1	XIA11A		
2			XGH
3			XGS
4		XGS	XGH
5		XGH	
6		XGS	XGS
7		XIA11A	
8			XGH
9			XGS

Combinations with XGH, XGS only

The following option card combinations are possible:

Combination	Slot 1	Slot 2	Slot 3
1			XGH
2	XGS		
3	XGH		

Combinations with XGS only

The following option card combinations are possible:

Combination	Slot 1	Slot 2	Slot 3
1			XGS
2	XGS		

3.17 Multi-encoder card option XGH11A, XGS11A

The multi-encoder card expands the MOVIAXIS® system for evaluation of additional encoders.

Two different multi-encoder cards are available. Their selection is based on the encoder type that is to be evaluated, see table on page 44. An analog, differential input (±10 V) is available in addition.

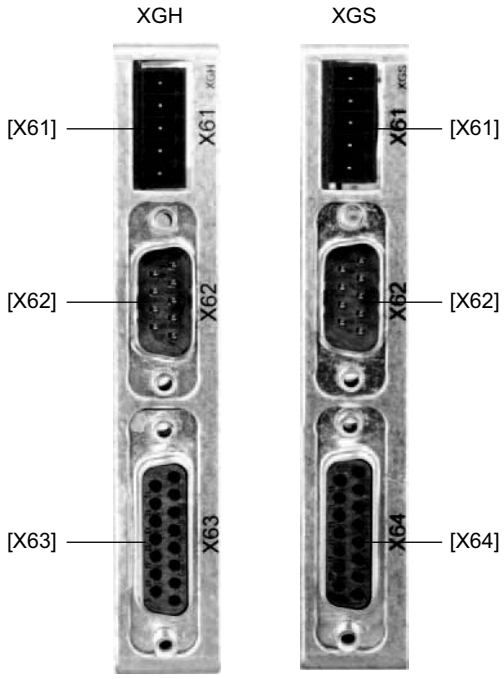

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Figure 28: Multi-encoder card in version XGH and XGS

Technical data

Technical data of the differential input X61:

- Tolerance: ± 10 V
- Resolution: 12 bits
- Update every 1 ms

The input can be used as

- n or M setpoint input
- General measured data input
- Torque limit value

Technical data X62:

- RS422.
- Maximum frequency: 200 kHz.
- Simulation output is based on the motor or option encoder, can be selected via unit parameters.
- PPR count can be freely selected in powers of two from 2^6 - 2^{12} [pulses / revolution].
- Encoder signals can be multiplied.
- The maximum possible speed depends on the emulation PPR count set:

Set PPR count	Maximum possible speed [min^{-1}]
64 - 1024	No limit
2048	5221
4096	2610

Overview of functions

Functions	XGH version	XGS version
SSI functionality	--	x
Hiperface functionality:	x	x
EnDat 2.1 functionality		
Incremental encoder / sin-cos functionality		
Encoder simulation		
Temperature evaluation		
Analog input		
Optional 24 V voltage supply		
Resolver	--	--

- Please contact SEW-EURODRIVE before installing HTL encoders.
- You need 15-pole SUB-D connectors for all encoders that are to be connected to the multi-encoder card.

Suitable encoders

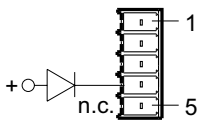
The encoders listed in the following tables are evaluated by the multi-encoder card.

SEW encoder designation	Encoder system	Manufacturer designation / manufacturer	Voltage
AL1H	Hiperface linear encoder	L230 / SICK-Stegmann	12 V
EK0H	Hiperface single-turn	SKS36 / SICK-Stegmann	
AS0H	Hiperface single-turn absolute encoder	SRS36 / SICK-Stegmann	
ES1H	Hiperface single-turn	SRS50 / SICK-Stegmann	
ES3H/ES4H	Hiperface single-turn absolute encoder	SRS64 / SICK-Stegmann	
AK0H	Hiperface multi-turn	SKM36 / SICK-Stegmann	
AS1H	Hiperface multi-turn	SRM50 / SICK-Stegmann	
AS3H/AS4H	Hiperface multi-turn absolute encoder	SRM64 / SICK-Stegmann	
AV1H	Hiperface absolute encoder	SRM50C3 / SICK-Stegmann	
EV1C	HTL	ROD436 1024 / Heidenhain	
EV1R	TTL	ROD466 1024 / Heidenhain	
EV1S	Sine	ROD486 1024 / Heidenhain	
EV1T	TTL	ROD426 1024 / Heidenhain	
EV2R	Encoder	OG71-DN 1024R / Hübner	
EV2T	Encoder	OG71-DN 1024TTL / Hübner	
AV1Y	SSI absolute encoder	ROQ424SSI / Heidenhain	
ES1S	Encoder	OG72S-DN1024R / Hübner	
ES2S		OG72S-DN1024R / Hübner	
EV2S		OG71S-DN1024R / Hübner	
EH1S		HOG74-DN1024R / Hübner	
ES1R		OG72-DN1024R / Hübner	
ES2R		OG72-DN1024R / Hübner	
EH1R		HOG74-DN1024R / Hübner	
ES1T		OG72-DN1024TTL / Hübner	
ES2T		OG72-DN1024TTL / Hübner	
EH1T		HOG74-DN1024TTL / Hübner	

Encoder system	Manufacturer designation / manufacturer	Voltage
Laser encoder	DME5000 / SICK-Stegmann	24 V
Laser encoder	DME4000 / SICK-Stegmann	
Hiperface single-turn absolute encoder	SRS60 / SICK-Stegmann	12 V
Hiperface multi-turn absolute encoder	SRM60 / SICK-Stegmann	
Single-turn absolute encoder	ECN1313 / Heidenhain	
Multi-turn absolute encoder	EQN1325 / Heidenhain	
SSI	BTL5-S112-M1500-P-S32 / Balluf	24 V
	GM401 / IVO	12 V
	AMS200/200 / Leuze	24 V
	OMS1 / Leuze	
	WCS2 LS 311 / Pepperl & Fuchs	
	DME 3000 111 / Sick	
	DME 5000 -111 / Sick	
	AG100 MSSI / Stegmann	12 V
	AG626 / Stegmann	24 V
	CE58 / T&R	12 V
	LE100 / T&R	24 V
	EDM / Visolux	
	OMS2 / Leuze	24 V
	WCS2A / Pepperl & Fuchs	

Connection and terminal description of the card

PIN assignment
X61

	Terminal	Assignment	Brief description	Type of connector
	X61			
	1	AI 0+	Analog, differential input	Mini Combicon 3.5, 5-pole. Cable cross section max: 1.5 mm^2, min: 0.75 mm^2
	2	AI 0-		
	3	DGND	Reference for PIN 4	
	4	24 V	Optional encoder voltage supply	
	5	n.c.		

NOTE

The 24 V supply at PIN 4 is only permitted if 24 V encoders are used. Ensure UL-compliant fusing. See sec. "UL-compliant installation" on page 99.

The supply must be connected via a diode with sufficient current carrying capacity.

Restrictions for the evaluation of inputs for axis modules equipped with I / O and multi-encoder cards

	NOTE
	If the axis module is equipped with two I / O and one multi-encoder card or with one I / O and two multi-encoder cards (see following table), the following restrictions apply for the evaluation of inputs and outputs: **Evaluation is only possible for the inputs and outputs (if applicable) of two cards.**

Variant	Plugged card	Plugged card	Plugged card
1	I / O card	I / O card	Multi-encoder card
2	I / O card	Multi-encoder card	Multi-encoder card

Wiring diagrams for encoders with external voltage supply

The wiring diagrams show the connection of one and two multi-encoder cards. For 12 V encoders, external voltage supply only becomes necessary with two multi-encoder cards if the total current of the encoders is ≥ 800 mA.

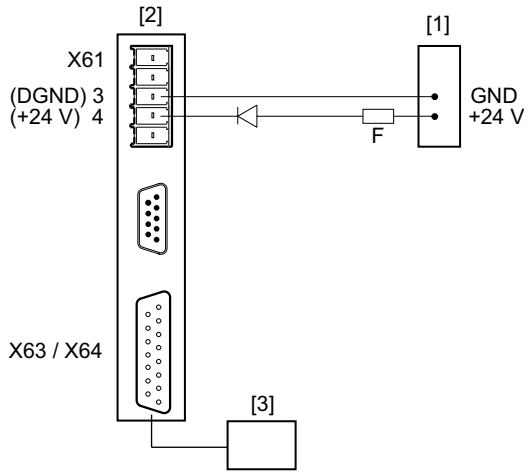


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Figure 29: Wiring diagram with one multi-encoder card

Key see Figure 30.

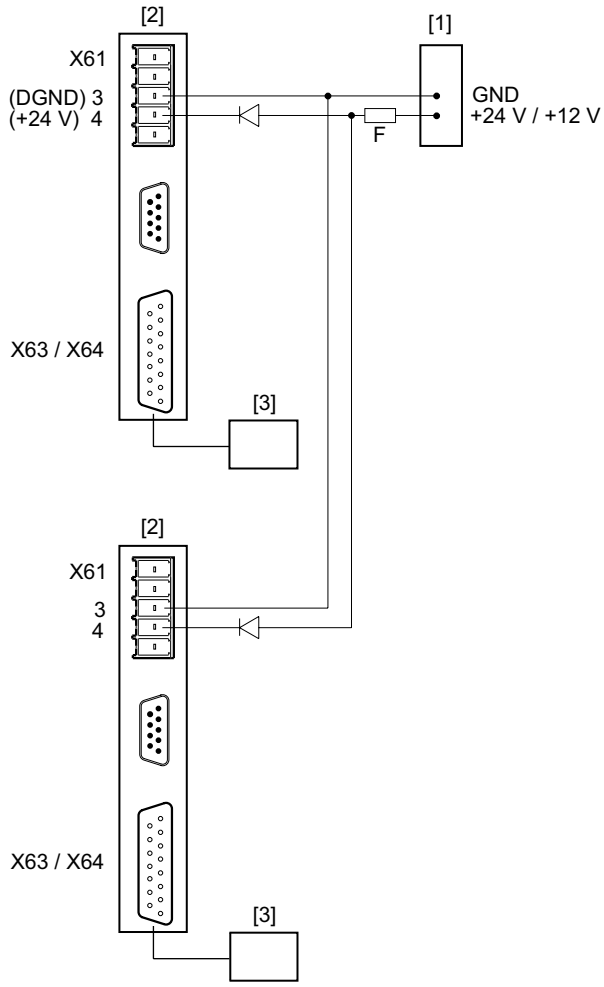
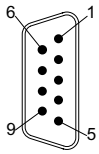


Figure 30: Wiring diagram with two multi-encoder cards

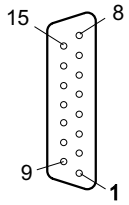
[1] Voltage source
[2] Multi-encoder card
[3] Encoders

PIN assignment X62 encoder emulator signals

	Terminal	Assignment	Brief description	Type of connector
	**X62**			
	1	Signal track A (cos+)	Encoder emulator signals	Sub-D 9-pole (male)
	2	Signal track B (sin+)		
	3	Signal track C		
	4	n.c.[1)]		
	5	DGND		
	6	Signal track A_N (cos-)		
	7	Signal track B_N (sin-)		
	8	Signal track C_N		
	9	n.c.[1)]		

1) Do not connect a cable

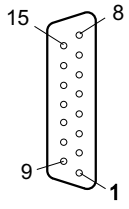
PIN assignment X63 XGH X64 XGS with TTL encoder, sin/cos encoder



Terminal	Function for TTL encoder, sin/cos encoder	Type of connector
	X63 (XGH)	
1	Signal track A (cos+)	Sub-D 15-pole (female)
2	Signal track B (sin+)	
3	Signal track C	
4	n.c.[1)]	
5	n.c.[1)]	
6	TF / TH / KTY -	
7	n.c.[1)]	
8	DGND	
9	Signal track A_N (cos-)	
10	Signal track B_N (sin-)	
11	Signal track C_N	
12	n.c.[1)]	
13	n.c.[1)]	
14	TF / TH / KTY +	
15	Us	

1) Do not connect a cable

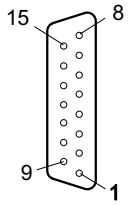
PIN assignment X63 XGH X64 XGS with Hiperface encoder



Terminal	Function for Hiperface encoder	Type of connector
	X63 (XGH)	
1	Signal track A (cos+)	Sub-D 15-pole (female)
2	Signal track B (sin+)	
3	n.c.[1)]	
4	DATA +	
5	n.c.[1)]	
6	TF / TH / KTY -	
7	n.c.[1)]	
8	DGND	
9	Signal track A_N (cos-)	
10	Signal track B_N (sin-)	
11	n.c.[1)]	
12	DATA -	
13	n.c.[1)]	
14	TF / TH / KTY +	
15	Us	

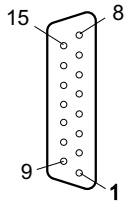
1) Do not connect a cable

PIN assignment X63 XGH X64 XGS with EnDat 2.1

	Terminal	Function for EnDat 2.1	Type of connector
	X63 (XGH)		
	1	Signal track A	Sub-D 15-pole (female)
	2	Signal track B	
	3	Cycle +	
	4	DATA +	
	5	n.c.[1]	
	6	TF / TH / KTY -	
	7	n.c.[1]	
	8	DGND	
	9	Signal track A_N	
	10	Signal track B_N	
	11	Cycle-	
	12	DATA -	
	13	n.c.[1]	
	14	TF / TH / KTY +	
	15	Us	

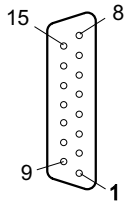
1) Do not connect a cable

PIN assignment X64 XGS with SSI

	Terminal	Function for SSI	Type of connector
	X64 (XGS)		
	1	n.c.[1]	Sub-D 15-pole (female)
	2	n.c.[1]	
	3	Cycle +	
	4	DATA +	
	5	n.c.[1]	
	6	TF / TH / KTY -	
	7	n.c.[1]	
	8	DGND	
	9	n.c.[1]	
	10	n.c.[1]	
	11	Cycle-	
	12	DATA -	
	13	n.c.[1]	
	14	TF / TH / KTY +	
	15	Us	

1) Do not connect a cable

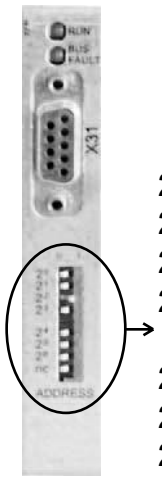
PIN assignment X64 XGS with SSI (AV1Y)

	Terminal	Function for SSI (AV1Y)	Type of connector
	**X64 (XGS)**		
	1	Signal track A (cos+)	Sub-D 15-pole (female)
	2	Signal track B (sin+)	
	3	Cycle +	
	4	DATA +	
	5	n.c.[1)]	
	6	TF / TH / KTY -	
	7	n.c.[1)]	
	8	DGND	
	9	Signal track A_N (cos-)	
	10	Signal track B_N (sin-)	
	11	Cycle-	
	12	DATA -	
	13	n.c.[1)]	
	14	TF / TH / KTY +	
	15	Us	

1) Do not connect a cable

3.18 PROFIBUS XFP11A fieldbus interface option

Terminal assignment

Front view of XFP11A	Description	DIP switches Terminal	Function
56596AXX  2^0 2^1 2^2 2^3 2^4 2^5 2^6 nc	**RUN: PROFIBUS operation LED (green)** **BUS FAULT: PROFIBUS error LED (red)**		Indicates that the bus electronics are operating correctly. Indicates PROFIBUS-DP error.
			Assignment
	X31: PROFIBUS connection	**X31:1** **X31:2** **X31:3** **X31:4** **X31:5** **X31:6** **X31:7** **X31:8** **X31:9**	N.C. N.C. RxD / TxD-P CNTR-P DGND (M5V) VP (P5V/100 mA) N.C. RxD/TxD-N DGND (M5V)
	ADDRESS: DIP switch for setting the PROFIBUS station address	**2^0** **2^1** **2^2** **2^3** **2^4** **2^5** **2^6** **nc**	Significance: 1 Significance: 2 Significance: 4 Significance: 8 Significance: 16 Significance: 32 Significance: 64 Reserved

Pin assignment

Connection to the PROFIBUS network is established using a 9-pin sub D plug according to IEC 61158. The T-bus connection must be made using a plug with the corresponding configuration.

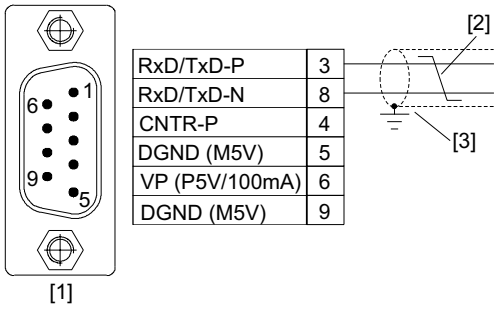


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Figure 31: Assignment of 9-pin sub D plug to IEC 61158

[1] 9-pin sub D plug

[2] Signal line, twisted

[3] Conductive connection over a large area between plug housing and shield

MOVIAXIS® / PROFIBUS connection

As a rule, the XFP11A option is connected to the PROFIBUS system using a shielded twisted-pair cable. Observe the maximum supported transmission rate when selecting the bus connector.

The twisted-pair cable is connected to the PROFIBUS connector using pins 3 (RxD TxD-P) and 8 (RxD / TxD-N). Communication takes place via these two contacts. The RS-485 signals RxD / TxD-P and RxD / TxD-N must be connected to the same contacts in all PROFIBUS stations.

The PROFIBUS interface sends a TTL control signal for a repeater or fiber optic adapter (reference = pin 9) via pin 4 (CNTR-P).

	NOTE
	If long bus cables are used, the bus stations must have a "hard" common reference potential.

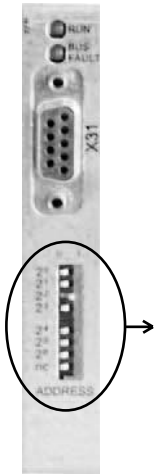
Baud rates larger than 1.5 MBaud

The XFP11A option with baud rates > 1.5 MBaud can only be operated with special 12 MBaud PROFIBUS connectors.

Setting the station address

The PROFIBUS station address is set using DIP switches 2^0... 2^6 on the option card. MOVIAXIS® supports the address range 0...125.

The default setting for the PROFIBUS station address is 4:



2^0 2^0 → Significance: 1 × 0 = 0
2^1 2^1 → Significance: 2 × 0 = 0
2^2 2^2 → Significance: 4 × 1 = 4
2^3 2^3 → Significance: 8 × 0 = 0
2^4 2^4 → Significance: 16 × 0 = 0
2^5 2^5 → Significance: 32 × 0 = 0
2^6 2^6 → Significance: 64 × 0 = 0
nc

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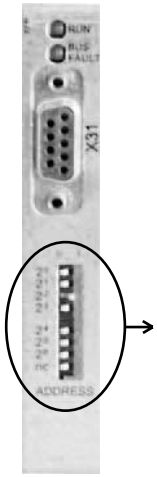
Any change made to the PROFIBUS station address during ongoing operation does not take effect immediately. The change takes effect when the servo drive is switched on again (power supply +24 V OFF/ON).

Example: Setting the PROFIBUS station address 17



2^0 2^0 → Significance: 1 × 1 = 1
2^1 2^1 → Significance: 2 × 0 = 0
2^2 2^2 → Significance: 4 × 0 = 0
2^3 2^3 → Significance: 8 × 0 = 0
2^4 2^4 → Significance: 16 × 1 = 16
2^5 2^5 → Significance: 32 × 0 = 0
2^6 2^6 → Significance: 64 × 0 = 0
nc

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3.19 K-Net XFA11A fieldbus interface option

The XFA11A (K-Net) fieldbus interface is a slave module for connection to a serial bus system for high-speed data transfer. Install no more than one XF11A fieldbus interface per axis module.

Terminal assignment

		Brief description	Terminal
		K-Net connection (RJ-45 socket)	**X31:**
		K-Net connection (RJ-45 socket)	**X32:**

	NOTE
	X31 and X32 can be used as either input or output.

Technical data

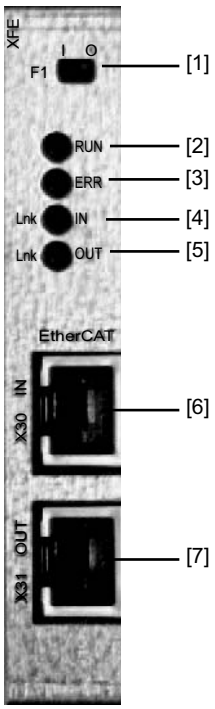
K-Net	
Electrical isolation	No
Bus bandwidth	max. 50 Mbit/s
Connection technology	2xRJ-45
Max. bus length	50 m
Transmission medium	CAT7 cable

3.20 EtherCAT XFE24A fieldbus interface option

The XFE24A fieldbus interface is a slave module for connection to EtherCAT networks. Only one XFE24A fieldbus interface can be installed per axis module. The XFE24A fieldbus interface allows MOVIAXIS® to communicate with all EtherCAT master systems. All standardizations of the ETG (EtherCAT Technology Group), such as wiring, are supported.

Technical data

XFE24A option (MOVIAXIS®)	
Standards	IEC 61158, IEC 61784-2
Baud rate	100 Mbaud full duplex
Connection technology	2 × RJ45 (8x8 modular jack)
Bus termination	Not integrated because bus termination is automatically activated.
OSI Layer	EtherNet II
Station address	Setting via EtherCAT master
Vendor ID	0x59 (CANopenVendor ID)
EtherCAT services	• CoE (CANopen over EtherCAT) • VoE (Simple MOVILINK protocol over EtherCAT)
Firmware status MOVIAXIS®	Firmware status 21 or higher
Tools for startup	• PC program MOVITOOLS® MotionStudio from version 5.40



[1] LAM switch
- Switch setting 0: All axis modules except the last one
- Switch setting 1: Last axis module in the system

Switch F1
- Switch setting 0: Delivery condition
- Switch setting 1: Reserved for added functions

[2] LED RUN; color: Green / orange

[3] LED ERR; color: Red

[4] LED link IN; color: Green

[5] LED link OUT; color: Green

[6] Bus input

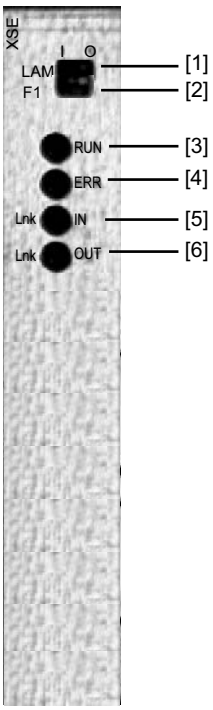
[7] Bus output

For more information about the EtherCAT fieldbus interface, refer to the "MOVIAXIS® MX Multi-Axis Servo Inverter XFE24A EtherCAT Fieldbus Interface" manual.

3.21 XSE24A EtherCAT-based system bus option

The EtherCAT based system bus XSE24A is an optional, axis-internal expansion module. This module realizes the functionality of an EtherCAT based high-speed system bus for MOVIAXIS®. The XSE24A option module is no fieldbus card. It cannot be used for communication with non-SEW EtherCAT masters.

Analogously to the wiring of the CAN system bus, the system is connected using the RJ-45 plug connection on the top of the unit included in the standard scope of delivery. The CAN system bus is not available when XSE24A is used.



[1] LAM switch
- Switch setting 0: All axis modules except the last one
- Switch setting 1: Last axis module in the system

[2] Switch F1
- Switch setting 0: Delivery condition
- Switch setting 1: Reserved for added functions

[3] LED RUN; color: Green / orange

[4] LED ERR; color: Red

[5] LED link IN; color: Green

[6] LED link OUT; color: Green

3.22 Terminal expansion board type XIO11A option

	**NOTE**
	For information on the ground designations used in the following diagrams, refer to sec. "Terminal assignment" on page 89.

	**STOP**
	There is **electrical isolation** between servo drive and analog inputs and outputs on the XIO card. Please note that there is no electrical isolation **between binary inputs and outputs**.

Supply

- The logic of the module is supplied by MOVIAXIS®.
- Binary inputs and outputs are supplied via the DCOM and 24 V terminals on the front. The supply voltage must be protected with a 4 A fuse, see also page 99 in section "UL compliant installation".
- The binary inputs and outputs are electrically isolated from the logic supply.

Module response

Short circuit

In the event of a short circuit of a binary output, the driver will change to pulse mode and in this way protects itself. The status of the binary output does not change.

Once the short-circuit is eliminated, the status of the binary output is that which is output by MOVIAXIS® at that point.

Switching inductive loads

- The module does not contain an internal free-wheeling diode for receiving inductive energies when inductive loads are switched off.
- The inductive load per output is 100 mJ at a frequency of 1 Hz.
- The inductive energy is converted into heat energy in the switching transistor. A voltage of -47 V is present. In this way, the energy can be reduced faster than by using a free-wheeling diode.
- The load capacity of the outputs through inductive loads can be increased by adding an external free-wheeling diode. However, switching off will take considerably longer.

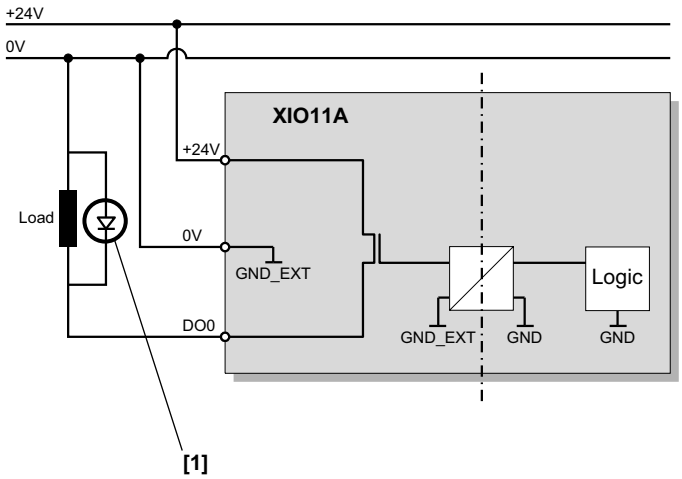


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Figure 32: Block diagram for using a free-wheeling diode at the binary output

[1] Free-wheeling diode

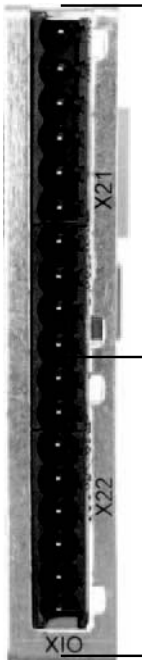
Parallel connection of binary outputs

Connecting two binary outputs in parallel doubles the rated current.

This module has

- 8 binary inputs,
- 8 binary outputs,
- Electrical isolation between inputs and outputs as well as electronics.

Terminal assignment

	Designation	Terminal	Connectors	Connector size
	DCOM	1	X21	COMBICON 5.08 One conductor per terminal: 0.20...2.5 mm^2 Two conductors per terminal: 0.25...1 mm^2
	+24 V	2		
	DO 0	3		
	DO 1	4		
	DO 2	5		
	DO 3	6		
	DO 4	7		
	DO 5	8		
	DO 6	9		
	DO 7	10		
	DI 0	1	X22	
	DI 1	2		
	DI 2	3		
	DI 3	4		
	DI 4	5		
	DI 5	6		
	DI 6	7		
	DI 7	8		

Connection diagram

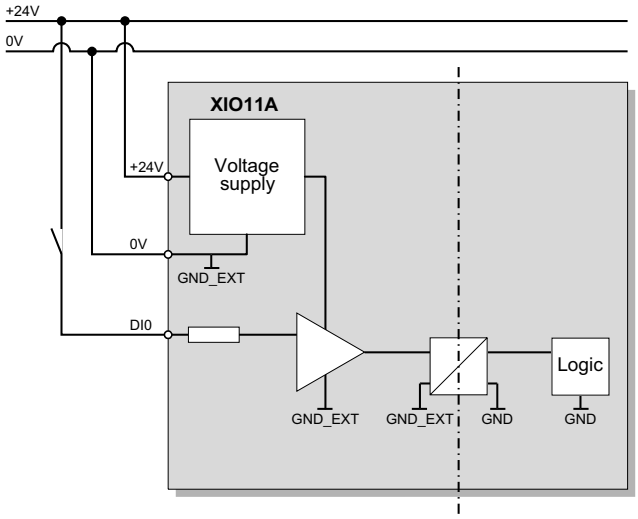


Figure 33: Block diagram of a binary input

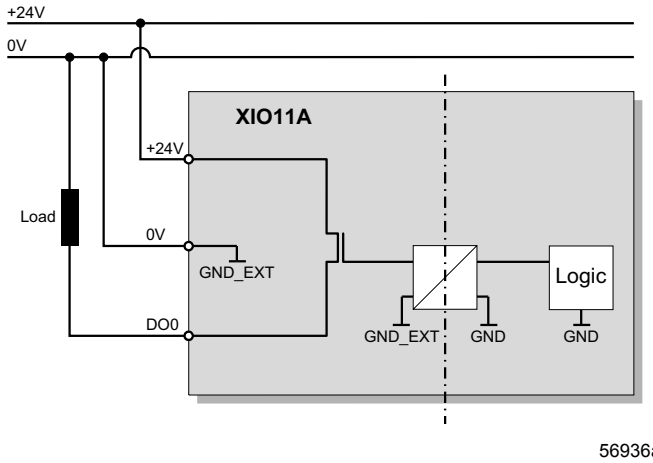


Figure 34: Block diagram of a binary output

	NOTE
	It the 24 V supply for the outputs is disconnected, the inputs will not function any longer.

3.23 Terminal expansion board type XIA11A option

	NOTE
	For information on the ground designations used in the following diagrams, refer to sec. "Terminal assignment" on page 89.

	STOP
	There is **no electrical isolation** between servo drive and analog inputs and outputs on the XIA card.

Supply

- The logic of the module is supplied by MOVIAXIS®.
- Analog inputs and outputs are also supplied by MOVIAXIS®.
- Binary inputs and outputs are supplied via the DCOM and 24 V terminals on the front. The supply voltage must be protected with a 4 A fuse, see also page 99 in section "UL compliant installation".
- The binary inputs and outputs are electrically isolated from the logic supply.

Module response

Short circuit

In the event of a short circuit of a binary output, the driver will change to pulse mode and in this way protects itself. The status of the binary output does not change.

Once the short-circuit is eliminated, the status of the binary output is that which is output by MOVIAXIS® at that point.

Switching inductive loads

- The module does not contain an internal free-wheeling diode for receiving inductive energies when inductive loads are switched off.
- The inductive load per output is 100 mJ at a frequency of 1 Hz.
- The inductive energy is converted into heat energy in the switching transistor. A voltage of -47 V is present. In this way, the energy can be reduced faster than by using a free-wheeling diode.
- The load capacity of the outputs through inductive loads can be increased by adding an external free-wheeling diode. However, switching off will take considerably longer.

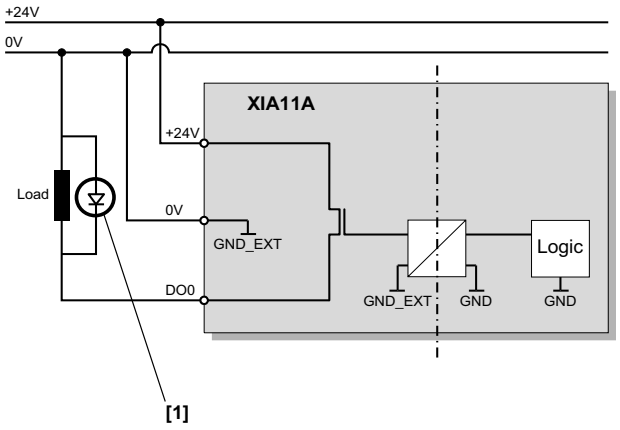


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Figure 35: Block diagram for using a free-wheeling diode at the binary output

[1] Free-wheeling diode

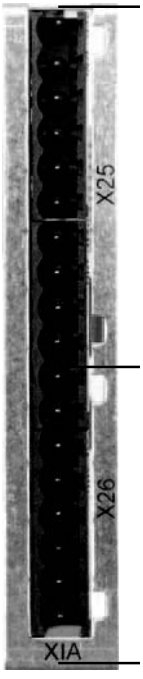
Parallel connection of binary outputs

Connecting two binary outputs in parallel doubles the rated current.

This module has

- 2 analog inputs (differential),
- 2 analog outputs,
- 4 binary inputs,
- 4 binary outputs,
- Electrical isolation between binary inputs and outputs as well as electronics.

Terminal assignment

	Designation	Terminal		
	DCOM	1	X25	COMBICON 5.08 One conductor per terminal: 0.20...2.5 mm^2 Two conductors per terminal: 0.25...1 mm^2
	24 V	2		
	DO 0	3		
	DO 1	4		
	DO 2	5		
	DO 3	6		
	DI 0	7		
	DI 1	8		
	DI 2	9		
	DI 3	10		
	AI 0+	1	X26	
	AI 0-	2		
	AI 1+	3		
	AI 1-	4		
	AO 0	5		
	AO 1	6		
	DGND	7		
	DGND	8		

Connection diagram

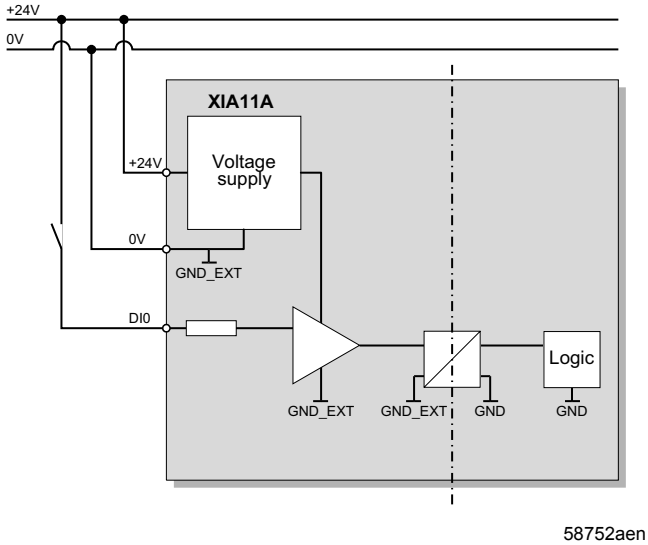


Figure 36: Block diagram of a binary input

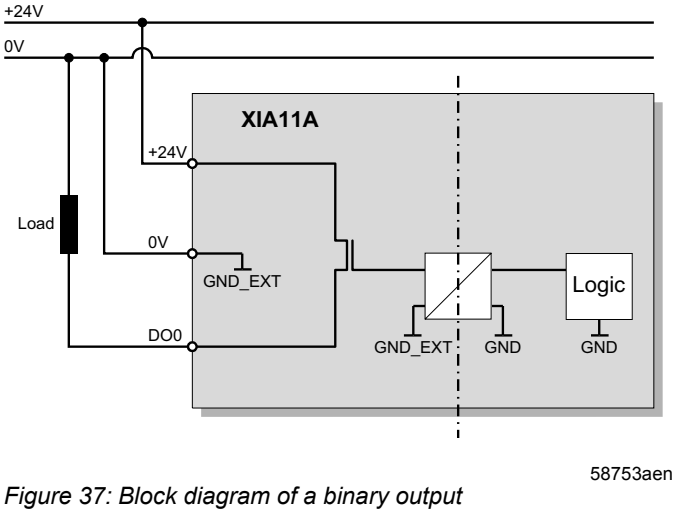


Figure 37: Block diagram of a binary output

	NOTE
	The XIA11A analog / binary hybrid module has no internal free-wheeling diodes.

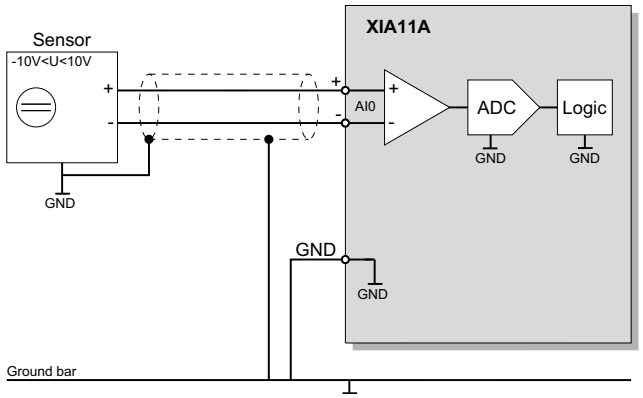


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Figure 38: Block diagram of an analog input

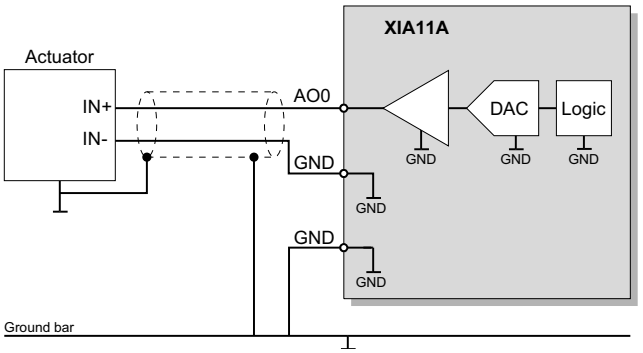

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Figure 39: Block diagram of an analog output

4 Installation

4.1 Mechanical installation

⚠ CAUTION

Do not install defective or damaged modules of the MOVIAXIS® MX multi-axis servo inverter; they can possibly result in injuries or damage parts of the production system.

- Check the MOVIAXIS® MX multi-axis servo inverter modules prior to installing them for external damage and replace any damaged modules.

- Check to make sure that the delivery is complete.

STOP

The mounting plate in the control cabinet must be conductive over a large area for the mounting surface of the drive system (metallically clean, conductive). An EMC compliant installation of the MOVIAXIS® MX multi-axis servo drive can only be accomplished with a mounting plate that is conductive over a large area.

- Mark the four bores for the retaining threads on the mounting platform for each unit according to figure 40 and figure 41 and the table listed below. Make the bores with a tolerance according to ISO 2768-mK.
- The lateral distance between two axis systems must be at least 30 mm.
- Units within an axis system are mounted next to another without clearance.
- Cut the matching threads in the mounting platform and fasten the MOVIAXIS® MX multi-axis servo inverter with M6 screws. Screw head diameter 10 mm to 12 mm.

The following table shows the dimensions for the unit housings of the modules viewed from the back.

MOVIAXIS® MX	Dimensions for housing - MOVIAXIS® MX back views			
	A [mm]	B [mm]	C [mm]	D [mm]
Axis module size 1	60	30	353	362.5
Axis module size 2	90	60	353	362.5
Axis module size 3	90	60	453	462.5
Axis module size 4	120	90	453	462.5
Axis module size 5	150	120	453	462.5
Axis module size 6	210	180	453	462.5
Supply module size 1	90	60	353	362.5
Supply module size 2	90	60	453	462.5
Supply module size 3	150	120	453	462.5
Master module	60	30	353	362.5
Capacitor module	150	120	453	462.5
Buffer module	150	120	453	462.5
24 V switched-mode power supply module	60	30	353	362.5
DC link discharge module	see page 65			

Rear view of MOVIAXIS® MX axis and supply module housing

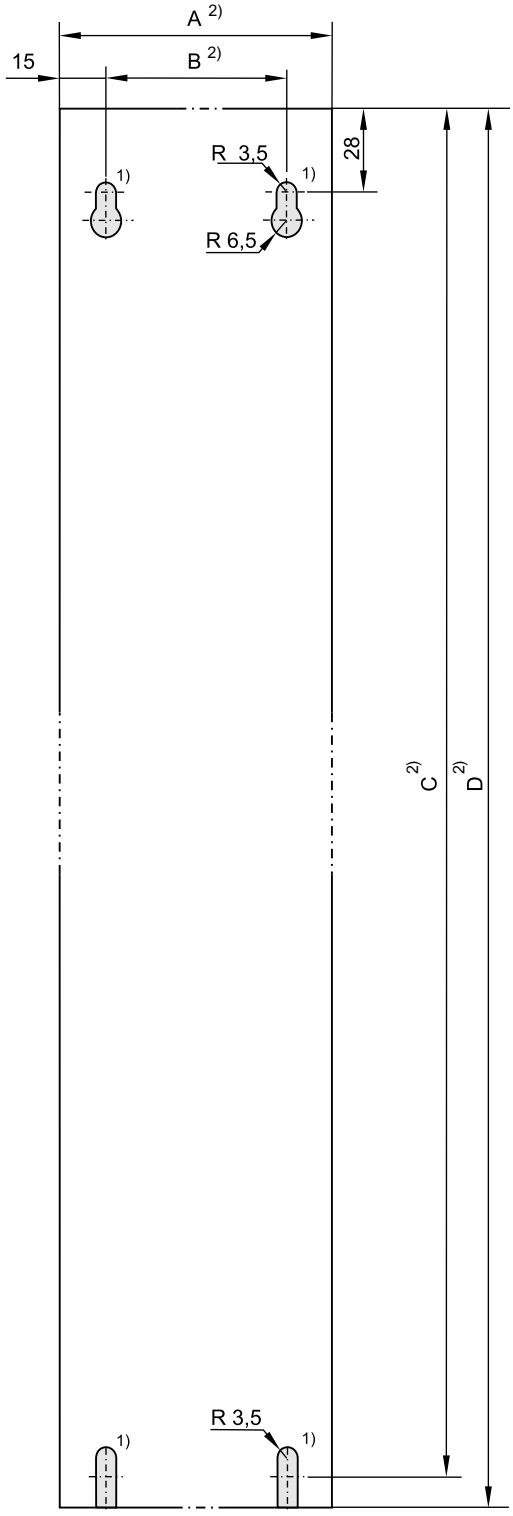

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Figure 40: Drilling template

1) Position of tapped hole

2) Table with dimensions, see page 63

Rear view of MOVIAXIS® MX DC link discharge module housing

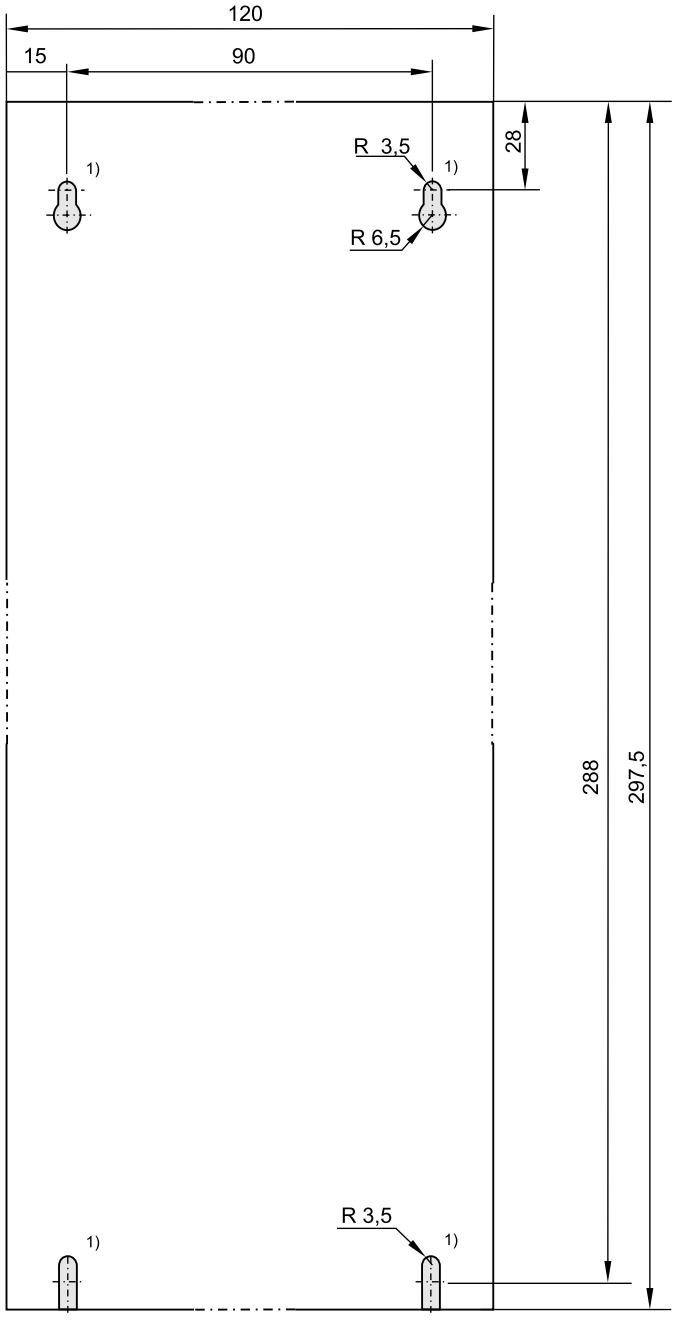


Figure 41: Drilling template

1) Position of tapped hole

Minimum clearance and mounting position

- Leave **100 mm (4 in) clearance at the top and bottom** for optimum cooling. Make sure air circulation in the clearance is not impaired by cables or other installation equipment.
- **Ensure unobstructed cooling air supply and make sure that air heated by other units cannot be drawn in or reused.**
- Units within an axis system must be lined up without space in between.
- Only install the units **vertically**. You must not install them horizontally, tilted or upside down.

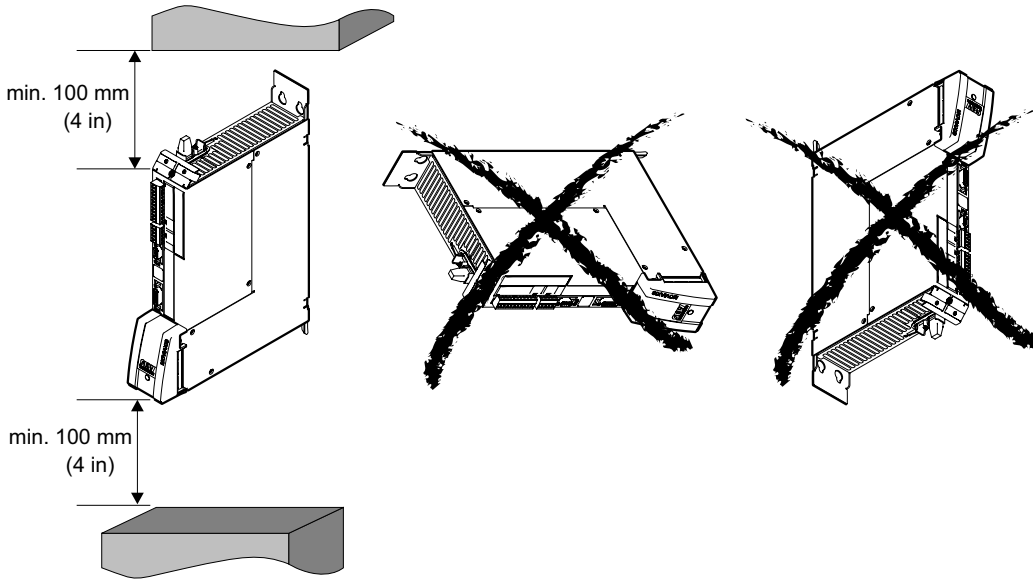


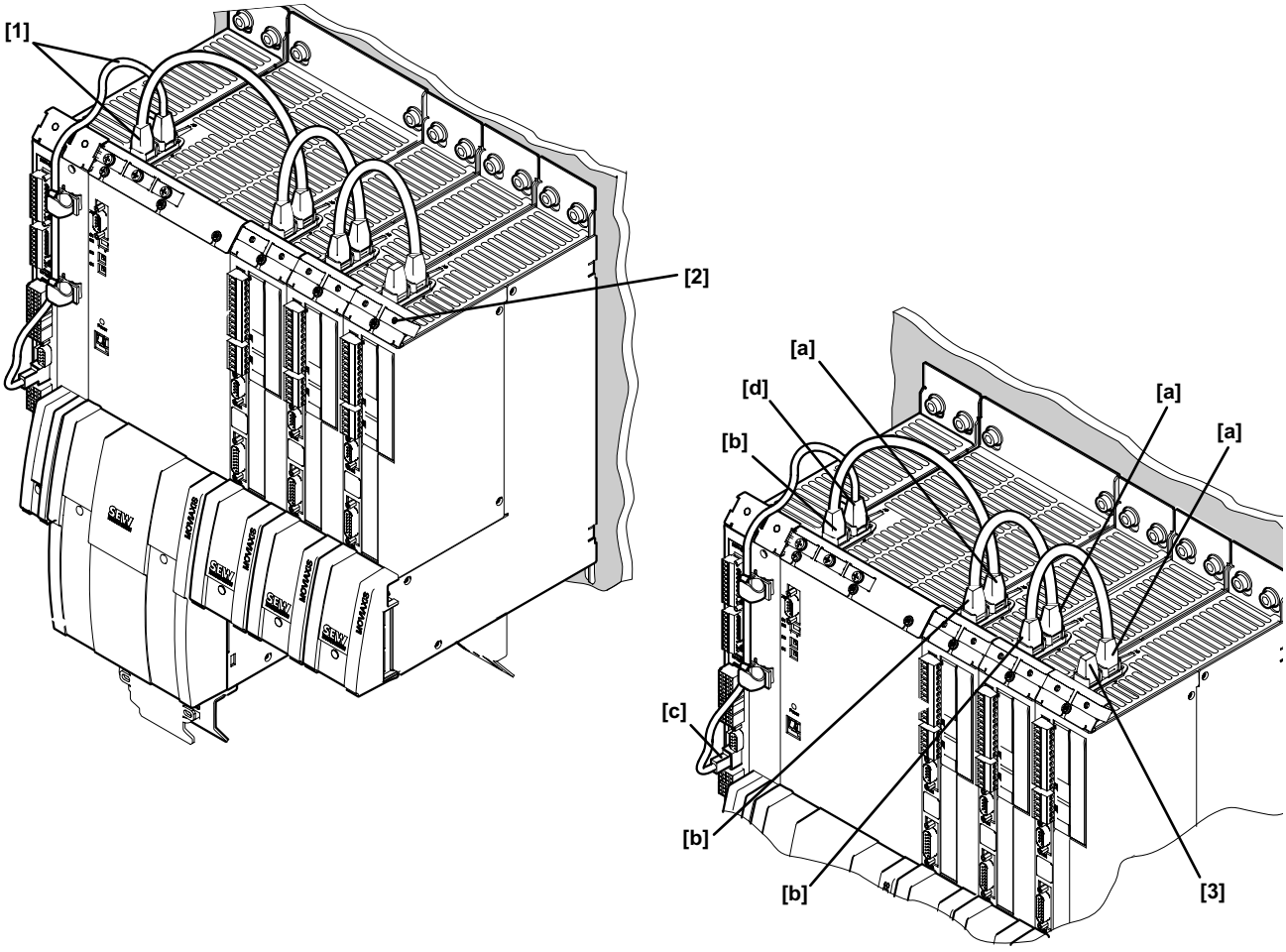
Figure 42: Minimum clearance and mounting position of the units

STOP	**STOP**
	Special bending spaces are required according to EN 61800-5-1 for cables with a cross section of 10 mm^2 and larger. This means the clearance must be increased if required.

4.2 Connection cable for CAN-based system bus with optional master module

The following describes how the signal bus cables of the CAN system bus must be connected in the axis system.

- Insert the CAN1 signal bus plugs **[1]** as described in the following (X9a, X9b):
  - The plugs on each end of the cable are color coded. Insert them in the following order: red (b)- green (a) - red (b) - green (a) - red (b) ..... .
    - red (b): Output (RJ45), X9b
    - green (a): Input (RJ45), X9a
    - black (c): MXM output (Weidmüller)
    - black (d): MXP input (RJ45), X9a



	NOTE
	Important: Install a terminating resistor **[3]** in the last axis module of the axis system (included in the scope of delivery of the supply module).

Shield clamps

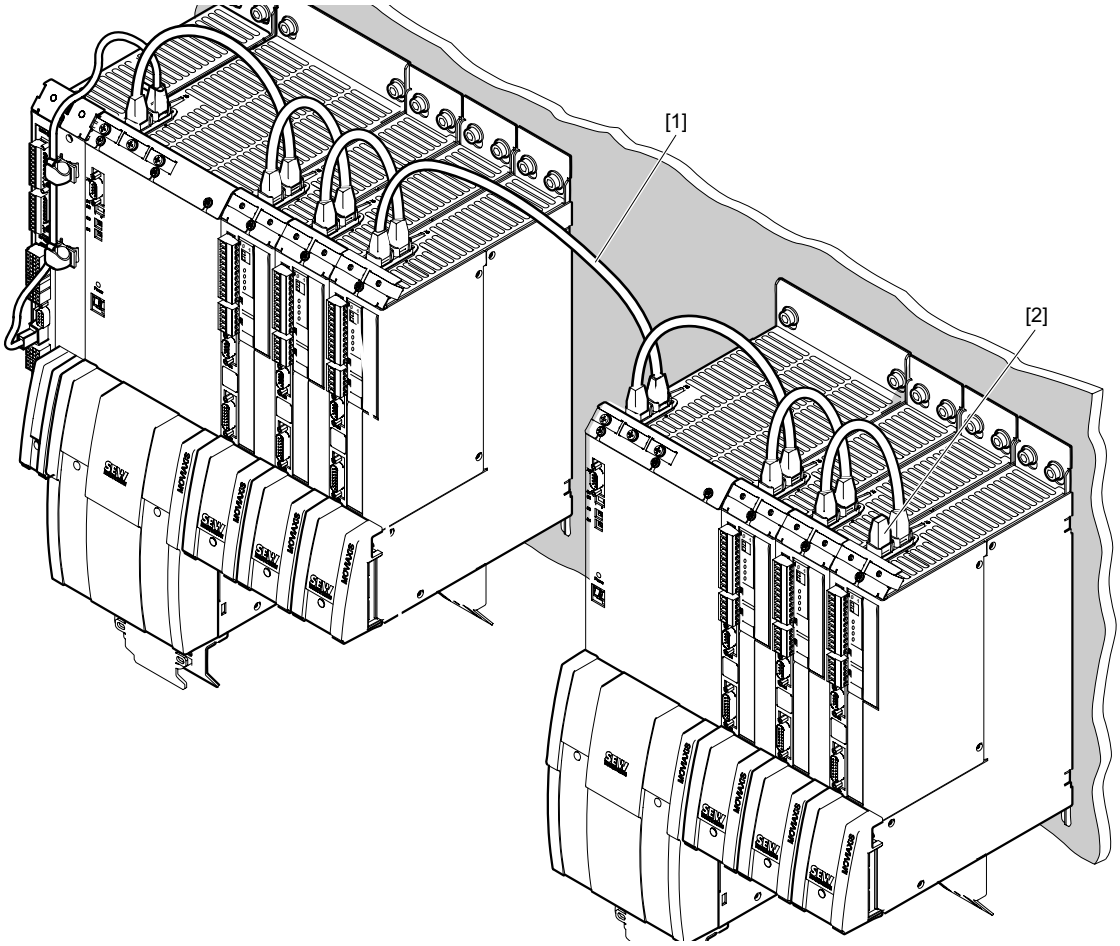
- Install the cables properly and screw on electronics shield clamps **[2]**.

4.3 System bus connection cable for several axis systems – CAN-based

- The individual axis systems are connected as described on page 67.
- The CAN connection cable **[1]** is routed from the red output (X9b) of the last axis module in one axis system to the green input (X9a) of the first axis module of the subsequent system.

	NOTE
	The mounting plates on which the axis systems are mounted must have a sufficiently large ground connection, e.g. a ground strap.

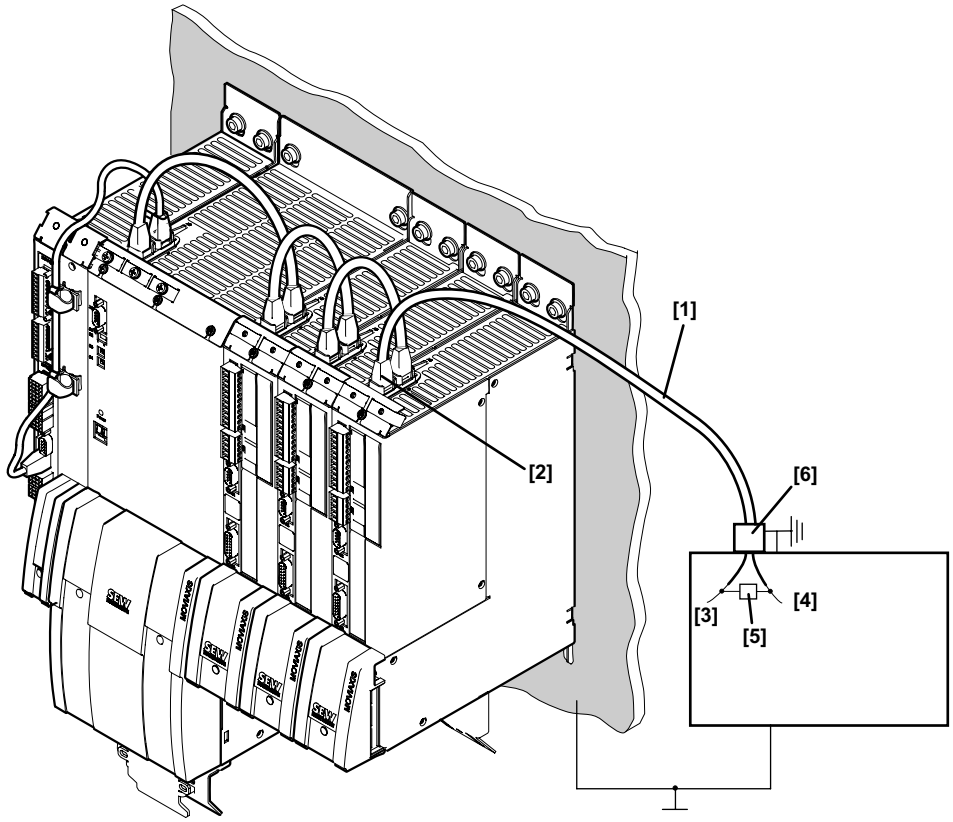
The lengths of the pre-fabricated system bus connection cables **[1]** are 0.75 m and 3 m.



[1] System bus connection cable [2] Terminating resistor

	NOTE
	Important: Install a terminating resistor **[2]** in the last axis module of the axis system (included in the scope of delivery of the supply module).

4.4 System bus connection cable to other SEW units – CAN-based



[1]	System bus connection cable	[4]	CAN H orange-white
[2]	Output plug black	[5]	Terminating resistor
[3]	CAN L orange	[6]	Contact shield connection

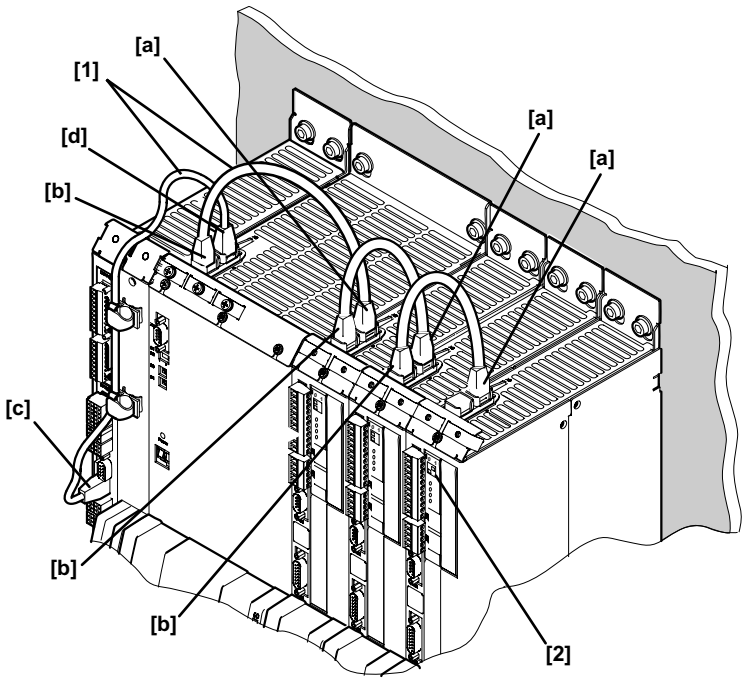
	NOTE
	Establish a common ground potential, e.g. connection of the 24 V ground of the supply voltages.

The lengths of the pre-fabricated connection cables **[1]** are 0.75 m and 3 m.

4.5 Connection cable EtherCAT-based system bus – optional master module

The following describes how the signal bus cables of the EtherCAT-based system bus must be connected in the axis system.

- Insert the signal bus plugs **[1]** as described in the following (X9a, X9b):
  - The RJ-45 plugs on each end of the cable are color coded. Insert them in the following order: red (b)- green (a) - red (b) - green (a) - red (b) ..... .
    - red (b): Output (RJ45), X9b
    - green (a): Input (RJ45), X9a
    - yellow (c): MXM output (RJ45) (MOVI-PLC advanced, UFX41 gateway)
    - black (d): MXP input (RJ45), X9a



[1] Signal bus connection cable

[2] LAM switch
- Switch setting 0: All axis modules except the last one
- Switch setting 1: Last axis module in the system

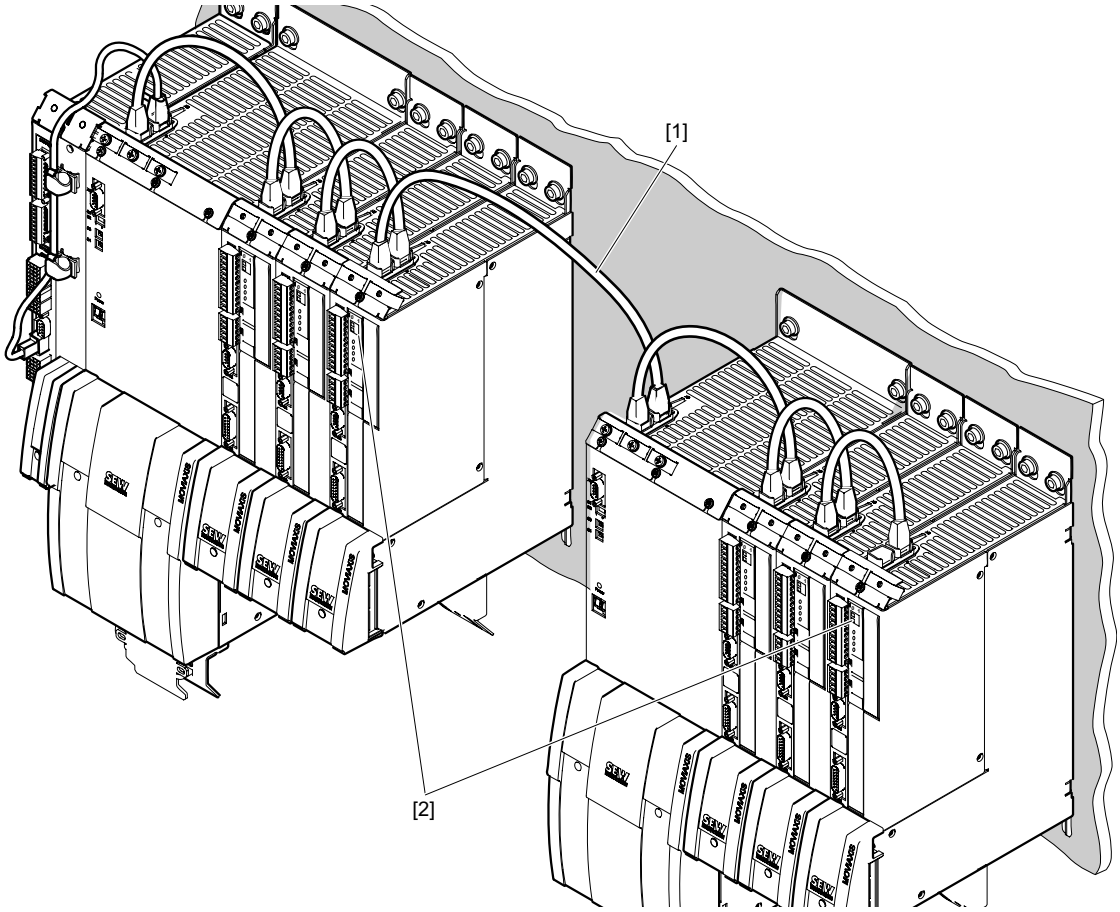
STOP	**STOP**
	The DIP switch LAM **[2]** must be set to "1" at the last axis module in a system. At all other axis modules, it must be set to "0".

4.6 Signal bus connection cable for several axis systems – EtherCAT-based

- The individual axis systems are connected as described on page 70.
- The connection cable **[1]** is routed from the yellow output (b) of the last axis module in one axis system to the black input (a) of the first axis module of the subsequent system.

	NOTE
	The mounting plates on which the axis systems are mounted must have a sufficiently large ground connection, e.g. a ground strap.

The lengths of the pre-fabricated system bus connection cables **[1]** are 0.75 m and 3 m.

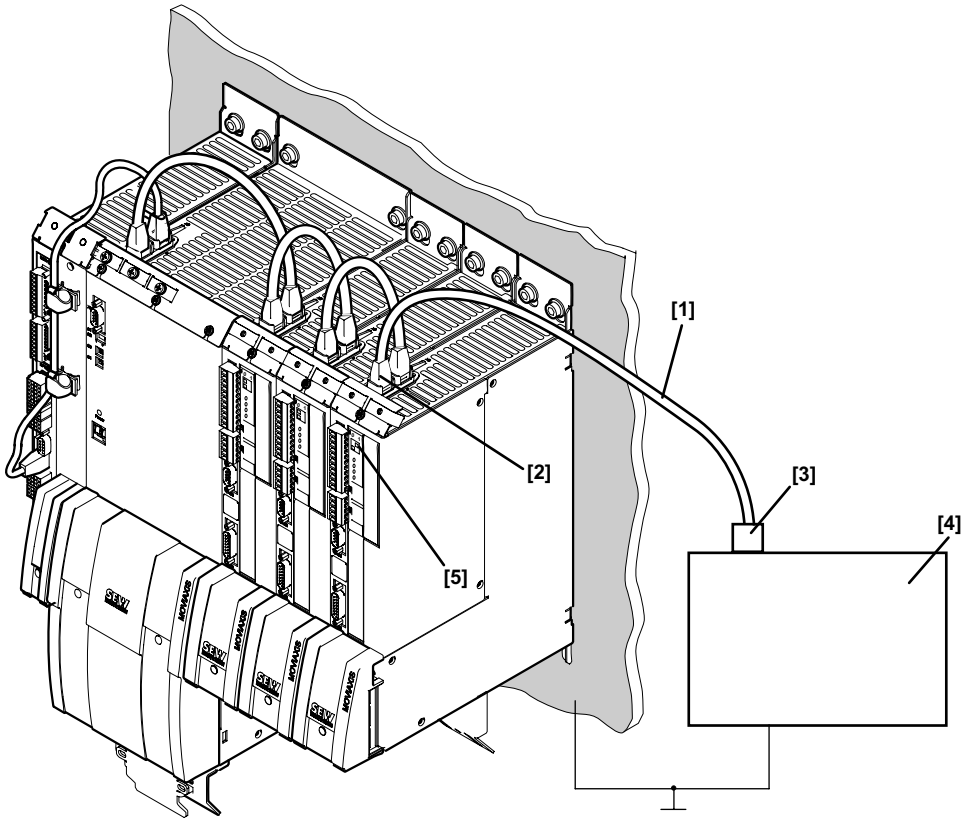


[1] System bus connection cable [2] LAM switch

- Switch setting 0: All axis modules except the last one
- Switch setting 1: Last axis module in the system

	STOP!
	The DIP switch LAM **[2]** must be set to "12" at the last axis module in each system. At all other axis modules, it must be set to "0".

4.7 Signal bus cables to other SEW units - EtherCAT-based system bus



[1] System bus connection cable

[2] Output plug yellow

[3] Input plug green, RJ45

[4] SEW stations with SEW EtherCAT interface

[5] LAM switch
- Switch setting 0: All axis modules except the last one
- Switch setting 1: Last axis module in the system

STOP	**STOP**
	Important: The DIP switch LAM **[5]** must be set to "1" at the last axis module in a system. At all other axis modules, it must be set to "0".

The lengths of the pre-fabricated connection cables **[1]** are 0.75 m and 3 m.

STOP	**STOP**
	Use only pre-fabricated cables from SEW-EURODRIVE (special assignment) for this connection.

4.8 Covers and touch guards

Cover

The following units come equipped with a cover:

- Master module (not shown),
- Capacitor module (not shown),
- Buffer module (not shown),
- Supply module; all sizes,
- Axis module; all sizes.
- 24 V switched-mode power supply (not shown),
- DC link discharge module; all sizes, (not shown).

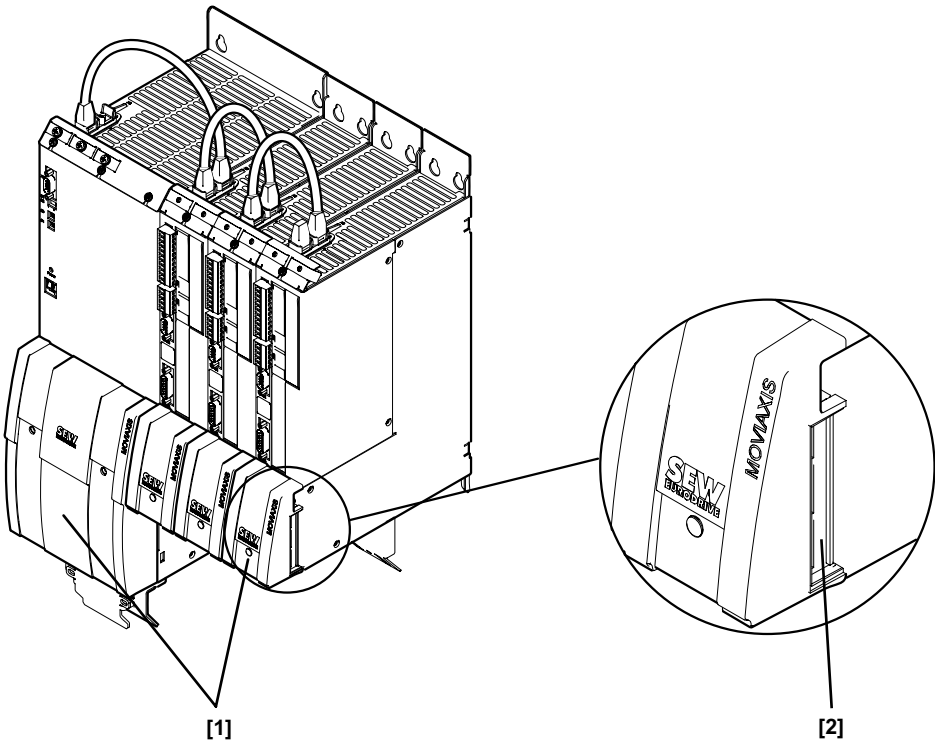


Figure 43: Covers and touch guards

[1] Cover

[2] Touch guard

The tightening torque for the cover bolts is 0.8 Nm.

When driving in the self-tapping screw, make sure that it screws into the existing thread.

Touch guard cover

⚠ WARNING

Touch guard covers not installed.

Severe or fatal injuries from electric shock.

- The touch guard covers have to be installed on the left-hand and right-hand side of the axis system so that there is no risk of touching any electrically conductive parts.

Two touch guard covers are included with each supply module.

4.9 Electrical Installation

⚠ HAZARD

Dangerous voltage levels may still be present inside the unit and at the terminal strips up to 10 minutes after the complete axis system has been disconnected from the mains.

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- Disconnect the axis system from the mains and wait ten minutes before removing the covers.
- After maintenance work, do not operate the axis system unless you have replaced the cover because the unit only has degree of protection IP00 without the cover.

⚠ HAZARD

A leakage current > 3.5 mA can occur during operation of the MOVIAXIS® MX multi-axis servo inverter.

Severe or fatal injuries from electric shock.

To prevent electric shock:

- With a supply system lead < 10 mm^2, route a second PE conductor with the same cross section as the supply system lead via separate terminals. Alternatively, you can use a PE conductor with a copper cross section ≥ 10 mm^2 or aluminum ≥16 mm^2.
- With a supply system lead ≥ 10 mm^2, it is sufficient to install a PE conductor with a copper cross section ≥ 10 mm^2 or aluminum ≥ 16 mm^2.
- If an earth leakage circuit breaker can be used for protection against direct and indirect contact, it must be universal current sensitive (RCD type B).

NOTE

Installation with reliable isolation.

The unit meets all requirements for reliable isolation between power and electronic connections according to EN 61800-5-1. The connected signal circuits have to meet the requirements according to SELV (**S**afe **E**xtremly **L**ow **V**oltage) or PELV (**P**rotective **E**xtra **L**ow **V**oltage) to ensure reliable isolation. The installation must meet the requirements for reliable isolation.

Temperature sensor in the motor

⚠ WARNING

Dangerous contact voltages at the unit terminals when connecting the wrong temperature sensors.

Severe or fatal injuries from electric shock.

- Connect only temperature sensors with reliable isolation from the motor winding to the temperature evaluation. Otherwise, the requirements for reliable isolation are not met. Dangerous contact voltages may occur at the unit terminals via the signal electronics in case of an error.

Supply system and brake contactors

- **Use contactors in utilization category AC-3 only** (IEC 158-1) as mains and brake contactors.
- Supply lead: **Cross section according to rated input current** I_{mains} at rated load.
- Motor lead: **Cross section according to rated output current** I_R.
- Electronics cables:
  - One core per terminal 0.20 ... 2.5 mm^2
  - 2 conductors per terminal 0.25 ... 1 mm^2

Unit output

STOP

An axis module can suffer irreparable damage if you connect capacitive loads to it.

- **Only connect ohmic/inductive loads (motors).**
- Never connect capacitive loads.

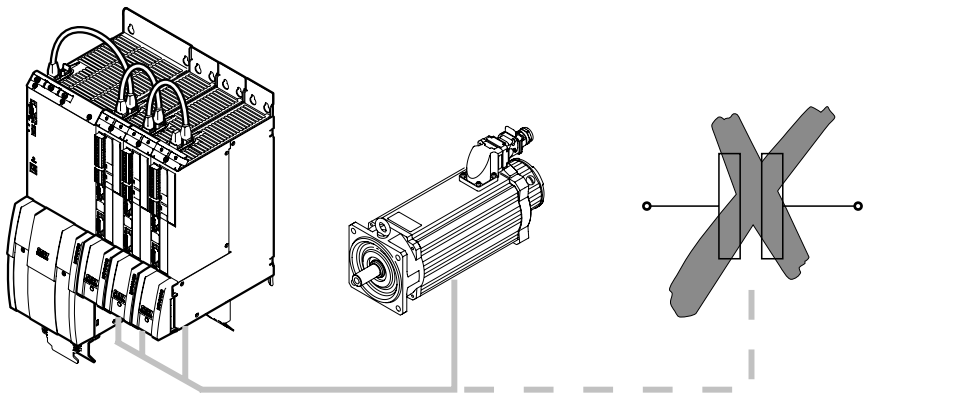


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Figure 44: Only connect ohmic / inductive loads; do not connect capacitive loads

Connecting braking resistors

- Protect the braking resistor with an **overload relay**, see figure 47. Set the **trip current** according to the **technical data of the braking resistor**, see page 199.
- SEW-EURODRIVE recommends to connect the braking resistor as shown in figure 46. Install switch F16 close to the unit system. If an unshielded cable is used for connecting switch F16 with the supply module, keep the length as short as possible. Preferably use a shielded line cable or drilled individual lines as connecting cable to the braking resistor. The cross section must be selected depending on the rated current of the braking resistor.

Operating braking resistors

- The connection leads to the braking resistors carry a **high DC voltage of about 900 V** during rated operation.

⚠ WARNING

The surfaces of the braking resistors will reach temperatures of up to 250° C when the braking resistors are loaded with P_{rated}.

Risk of burns and fire.

- Choose a suitable installation location. Braking resistors are usually mounted on top of the control cabinet.
- Do not touch any braking resistor.

Binary inputs / binary outputs

- The **binary inputs** are electrically **isolated** by optocouplers.

STOP

The **binary outputs** are **short-circuit proof** but **not interference-voltage-proof**. Externally applied voltages can damage the binary outputs.

Permitted voltage supply systems

- MOVIAXIS® is intended for operation on voltage supply systems with a directly grounded star point (TN and TT power systems). Operation on voltage supply systems with a non-grounded star point (for example IT power systems) is permitted. In such a case, SEW-EURODRIVE recommends using earth-leakage monitors employing pulse-code measurement. Use of such devices prevents the earth-leakage monitor mis-tripping due to the earth capacitance of the servo drive.
- No EMC limits are specified for interference emission in voltage supply systems without a grounded star point (IT systems). The effectiveness of line filters is severely limited.

Electrical installation

- Connect the supply terminals of all units in the MOVIAXIS® MX axis system according to the wiring diagrams in section "Wiring diagrams" page 78 ff.
- Check to see that the assignment of multi-axis servo drive and motor is correct according to project planning specification.
- Check to see that all grounding cables have been connected.
- Take suitable measures to prevent the motor starting up inadvertently, for example by removing the electronics terminal block X10 on the axis module. Integrate additional safety features for certain applications to prevent possible injuries and damages to machines.
- Only use closed cable lugs for connection to the screw bolt in order to prevent litz strands from escaping.

4.10 Wiring diagrams

General notes on the wiring diagrams

- You will find more information on the connection of power electronics and control electronics in section "Technical Data", page 187.
- All units within the axis group will have to be connected to each other via the DC link bus connection (PE, + U_Z, - U_Z), the 24 V bus (X5a, X5b) and the signaling bus (X9a, X9b).
- The supply system contactor "K11" must be installed between the supply system and the line filter.

	NOTES
	• Connect the brake rectifier using a separate supply system lead. • Supply via the motor voltage is not permitted.

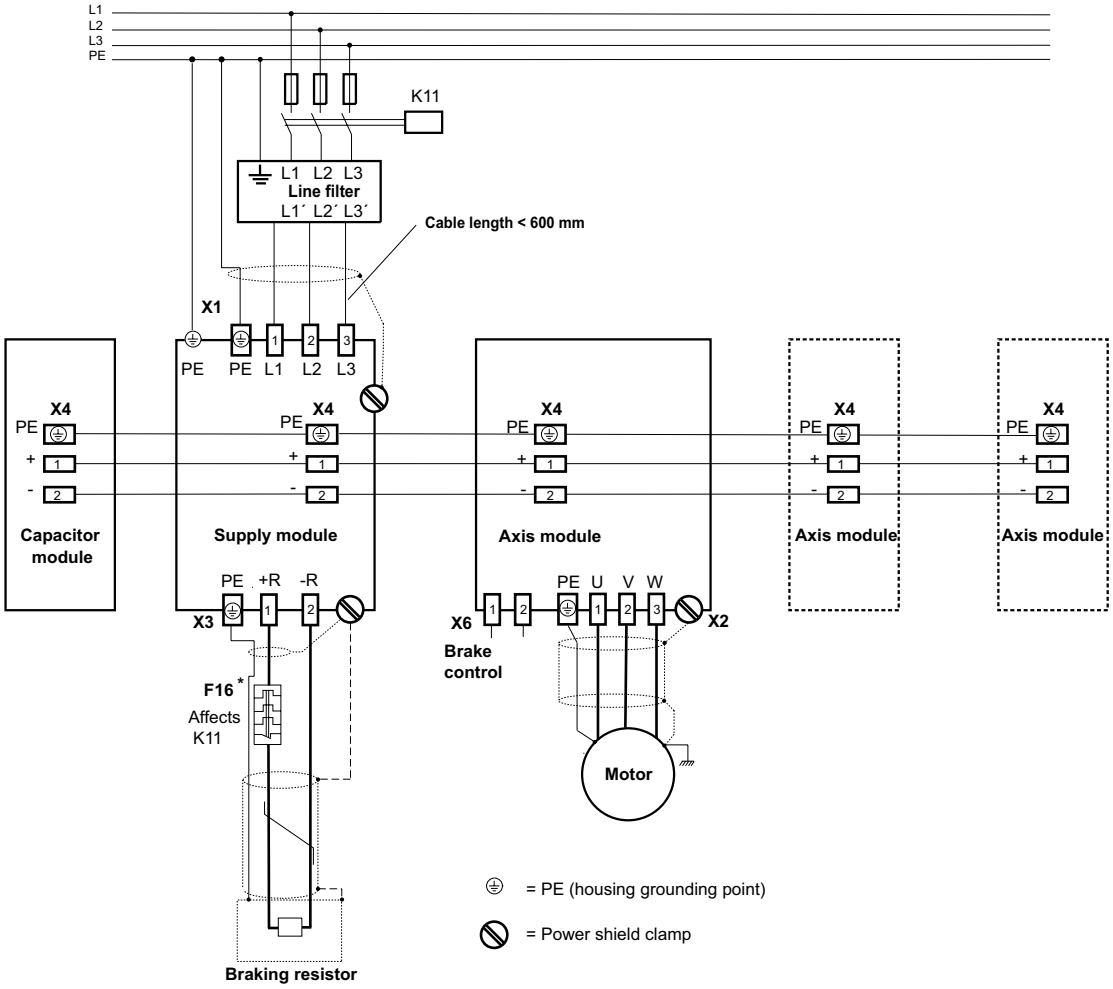
	NOTES
	• If the brake connection and the motor connection are combined in one power cable, the brake line must be shielded separately. The shielding of the power cable and the brake cable must be connected with PE on the motor and servo inverter. • Use a shielded cable as brake cable with separate installation of the brake cable. • Observe the different project specifications for determining the length of brake cable and motor cable.

Brake rectifier in the control cabinet

Install the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is permitted with shielded power cables only.

Connection of supply module, axis module and capacitor or buffer module

Wiring of power terminals



* When F16 (trip contact at overload relay)
triggers, K11 must be opened and
DI∅∅ "Output stage enable" must receive a "0" signal.
F16 is a signal contact, which means the resistor circuit must not be interrupted.

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Figure 45: Wiring diagram MOVIAXIS® MX, recommended wiring

Connection of supply module, capacitor / buffer module, axis module, brake and 24 V switched-mode power supply module

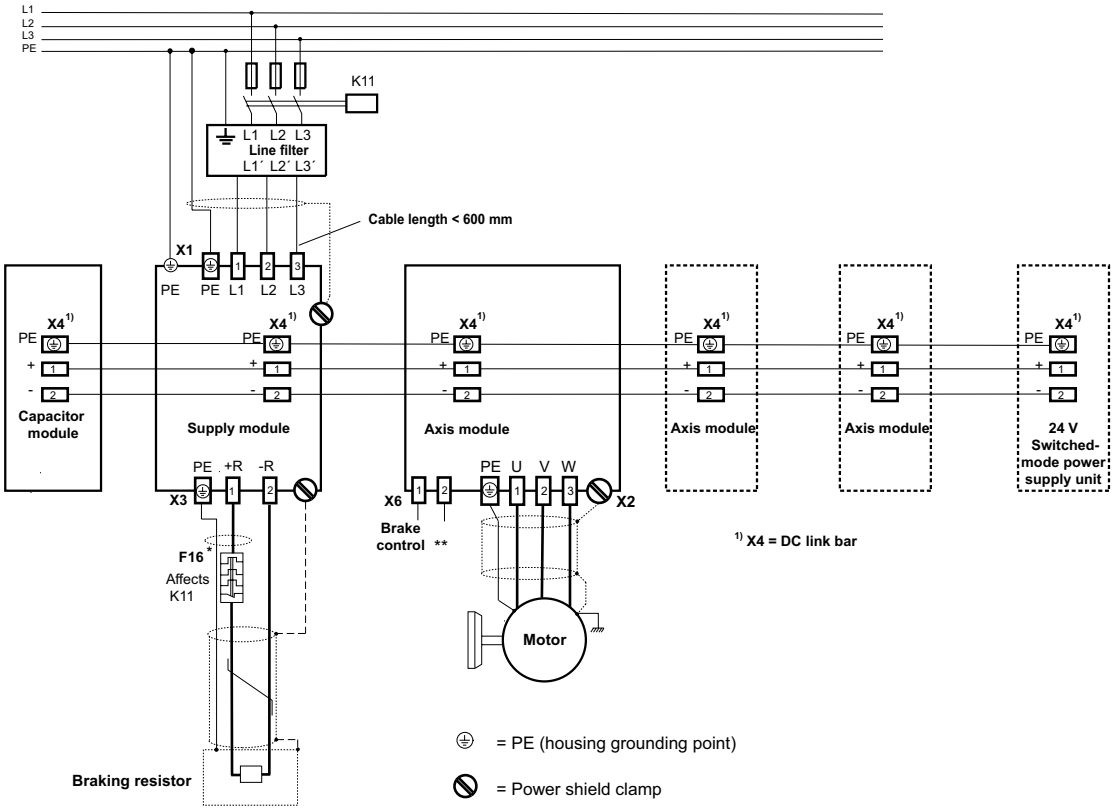

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Figure 46: Example: Wiring diagram MOVIAXIS® MX and brake, recommended wiring

* When F16 (trip contact at overload relay) triggers, K11 must be opened and DI00 "Output stage enable" must receive a "0" signal. F16 is a signal contact, which means the resistor circuit must not be interrupted.

** Make sure to provide separate isolation for the brake lines when controlling the brakes with 24 V. We recommend using SEW hybrid cables that offer complete shielding with shielding supports as well as separate shielding for the brake line.

*** Install the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is only permitted with shielded power cables.

Brake control

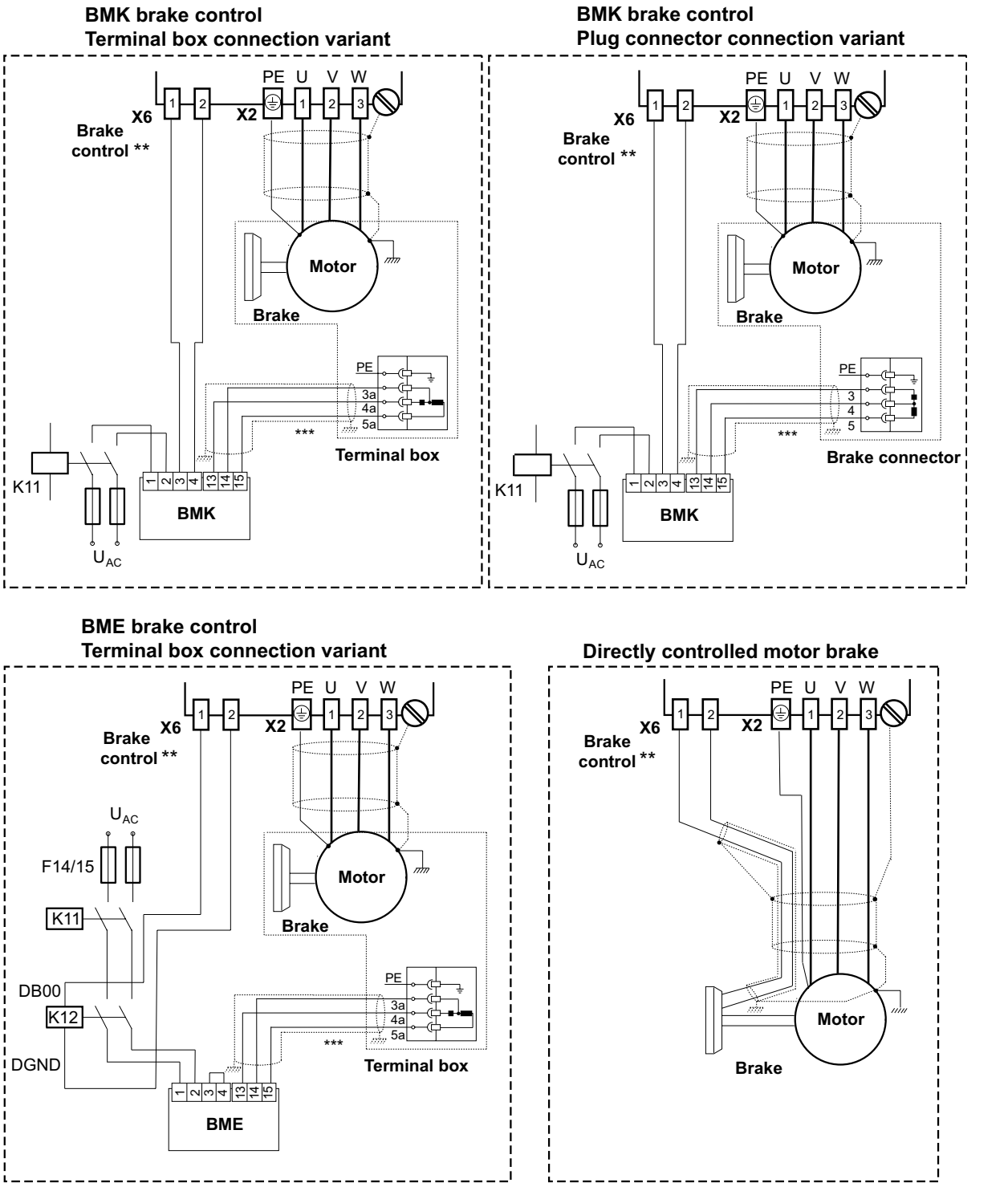

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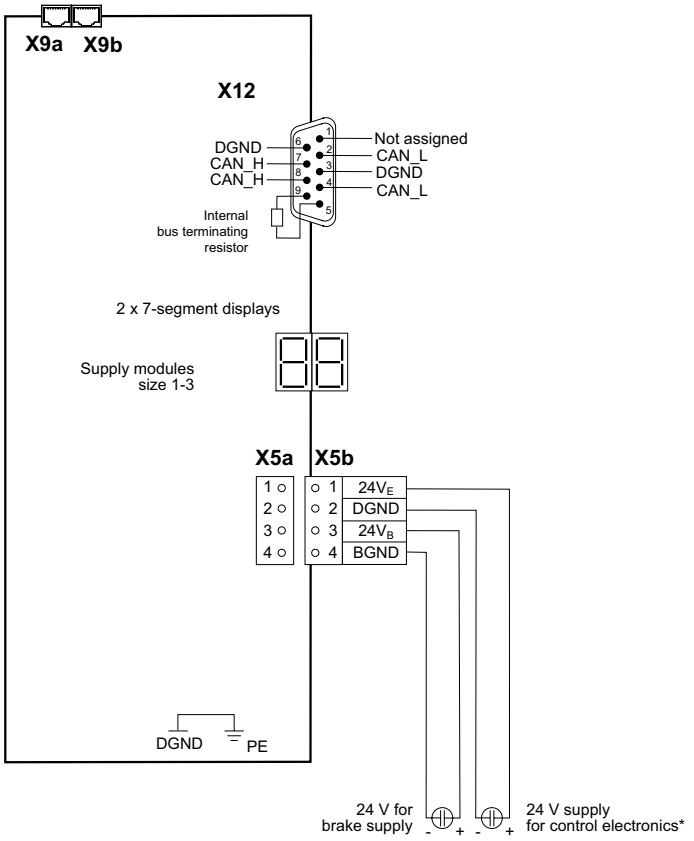
Figure 47: Brake control variants

Footnotes see page 80.

Connection of supply module

Wiring of control electronics



53664AEN

Figure 48: Wiring diagram control electronics MOVIAXIS® MXP supply module

* Connection via supplied pre-fabricated cables.

X9a Signal bus input

X9b Signal bus output

Connection of axis modules

Wiring of control electronics

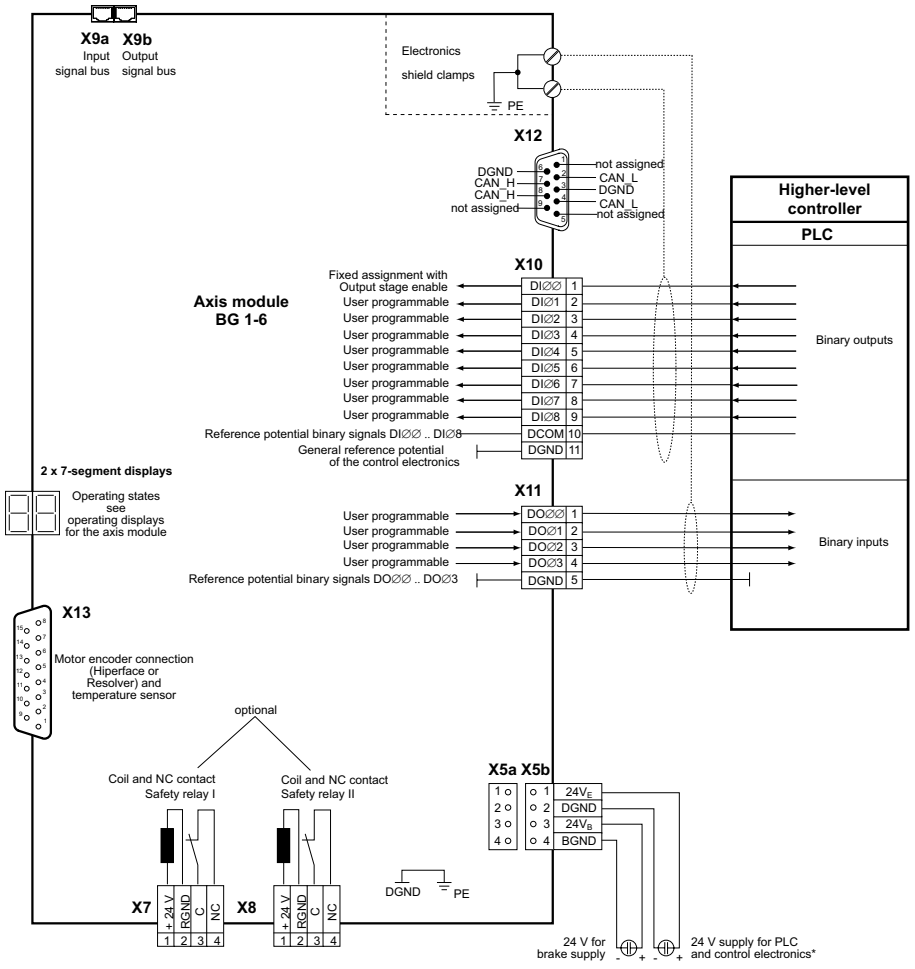


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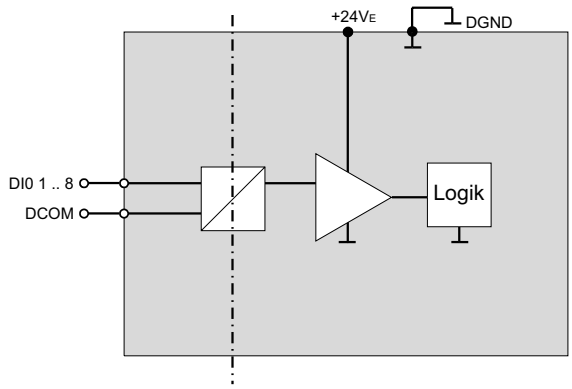
Figure 49: Wiring diagram control electronics MOVIAXIS® MXA axis module

* Connection via supplied pre-fabricated cables.

Connection diagram of binary inputs and outputs



60888axx

Figure 50: Block diagram of a binary input

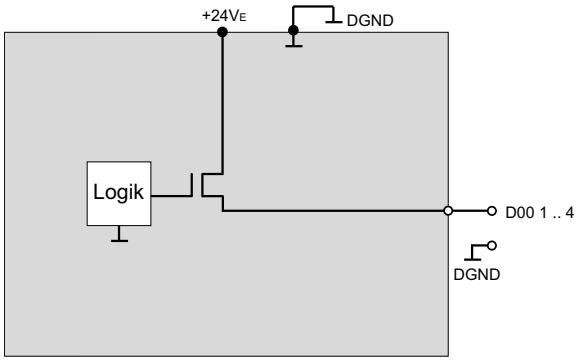


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Figure 51: Block diagram of a binary output

Connection of master module component

Wiring

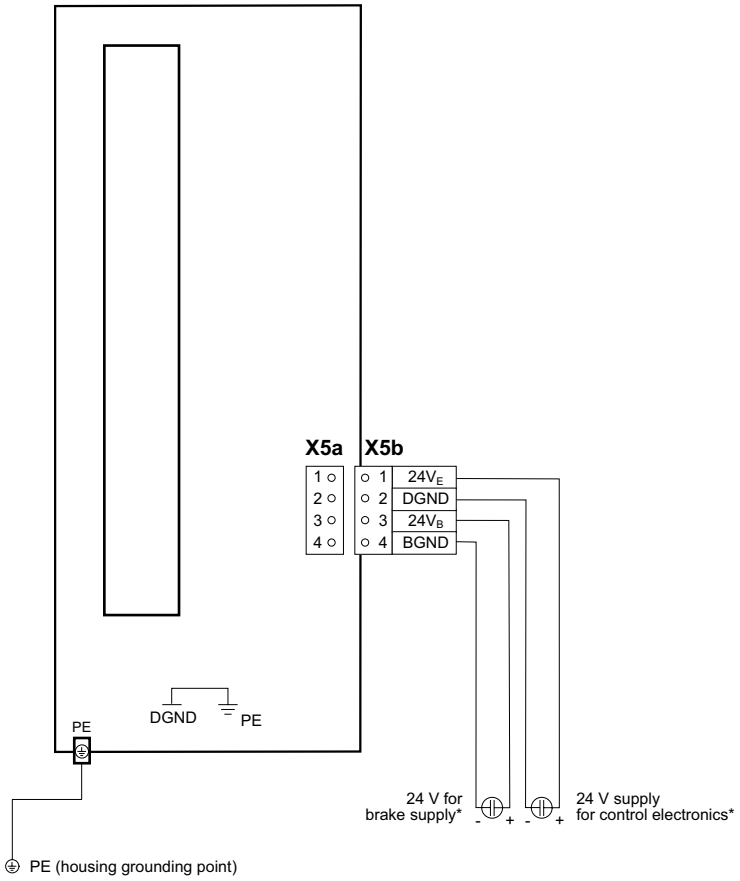


Figure 52: Wiring diagram of MOVIAXIS® MXM master module

* Connection via supplied pre-fabricated cables.

STOP	**STOP**
	The housing grounding point of the master module must be connected to PE, e.g. at the control cabinet.

Connection of capacitor module component

Wiring of control electronics

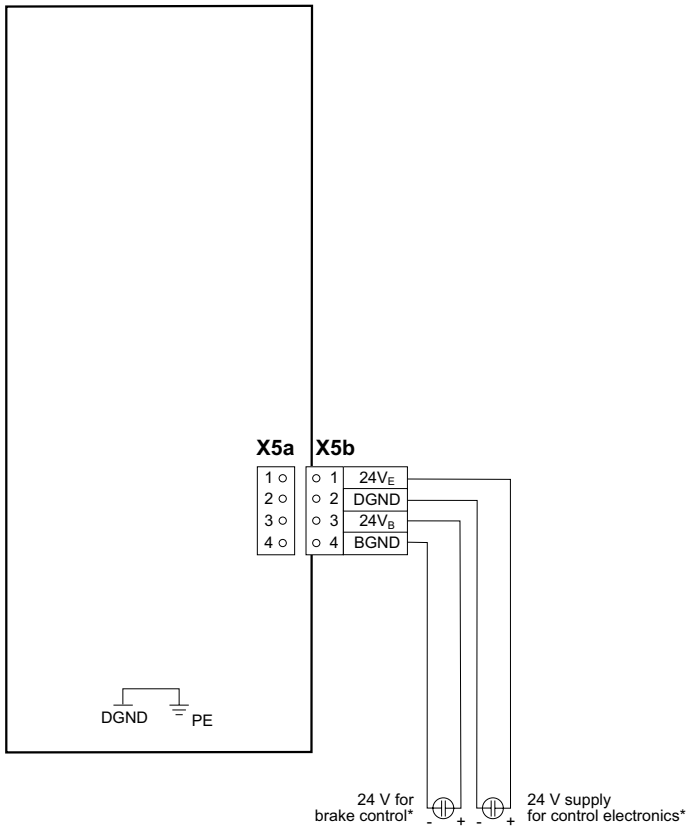


Figure 53: Wiring diagram control electronics MOVIAXIS® MXC capacitor module

* Connection via supplied pre-fabricated cables.

Connection of buffer module component

Wiring of control electronics

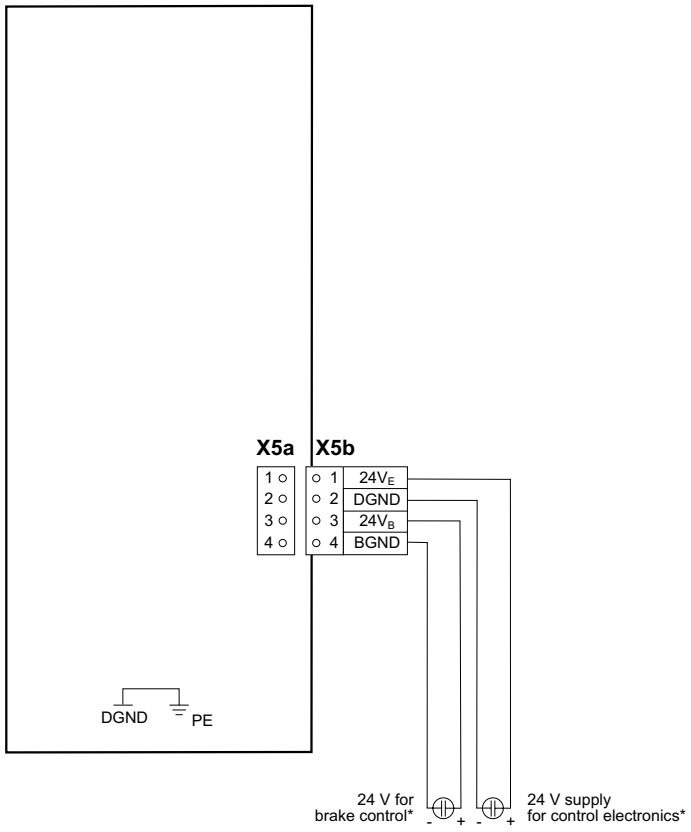


Figure 54: Wiring diagram control electronics MOVIAXIS® MXB buffer module

* Connection via supplied pre-fabricated cables.

Connection of 24 V switched-mode power supply module component

Wiring

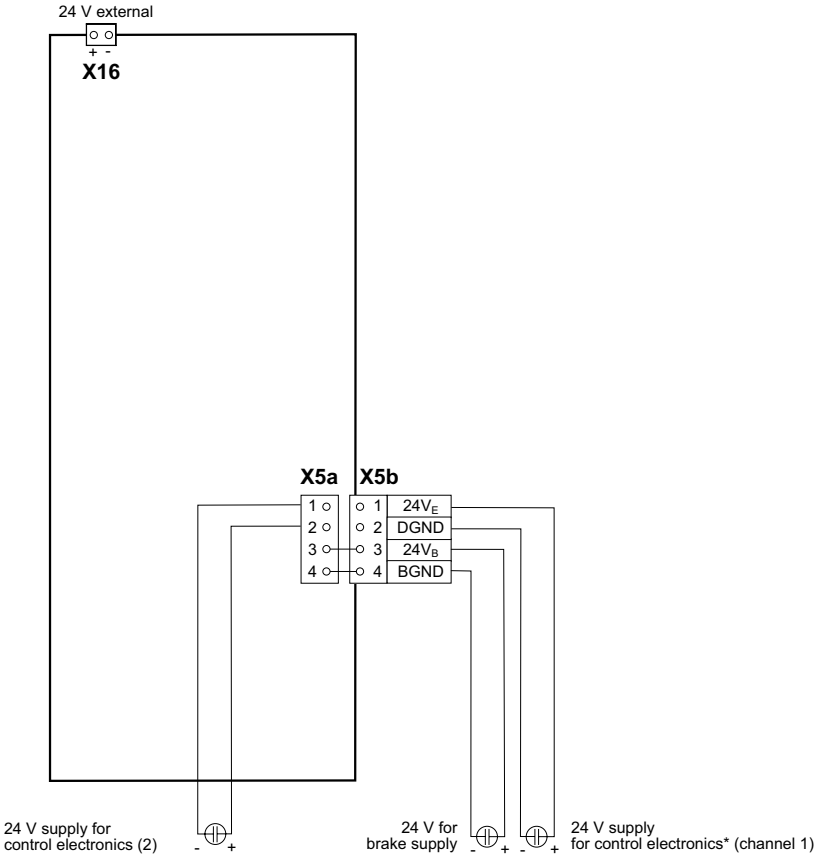


Figure 55: Wiring of the 24 V switched-mode power supply module

* Connection via supplied pre-fabricated cables.

You can find more information on 24 V supply and control electronics in the "MOVIAXIS® Project Planning Manual".

4.11 Terminal assignment

NOTES

Reference potentials inside the unit:

The designation of the reference potentials is listed in the following table:

Designation	Meaning
DGND PE	General reference potential of control electronics. There is a metallic connection to PE.
BGND	Reference potential for brake connection
RGND	Reference potential for safety relay
DCOM	Reference potential for binary inputs

NOTES

Connection elements:

All connection elements are represented in the following tables as viewed from top.

Terminal assignment of the MXP supply modules (10 kW, 25 kW, 50 kW, 75 kW)

	NOTES
	The technical data for the connections of power electronics and control electronics are listed in section 9 "Technical Data".

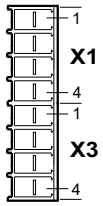
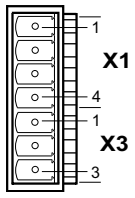
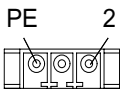
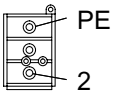
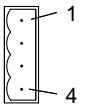
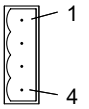
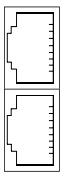
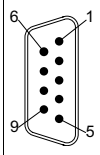
	Terminal	Assignment	Brief description
	**X1:1** **X1:2** **X1:3** **X1:4**	**PE** **L1** **L2** **L3**	Power supply connection (BG1 / 10 kW)
	X3:1 **X3:2** **X3:3** **X3:4**	**+R** **-R** **n.c.** **PE**	Braking resistor connection (BG1 / 10 kW)
	**X1:1** **X1:2** **X1:3** **X1:4**	**PE** **L1** **L2** **L3**	Power supply connection (BG2 / 25 kW)
	X3:1 **X3:2** **X3:3**	**+R** **-R** **PE**	Braking resistor connection (BG2 / 25 kW)
	**X1:PE** **X1:1** **X1:2** **X1:3**	**PE** **L1** **L2** **L3**	Power supply connection (BG3 / 50, 75 kW)
	**X3:PE** **X3:1** **X3:2**	**PE** **+R** **-R**	Braking resistor connection (BG3 / 50, 75 kW)
	**X4:PE** **X4:1** **X4:2**	**PE** **+U_Z** **- U_Z**	DC link bus connection
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X9a** **X9b**		a = Input: Signal bus, with green connector b = Output: Signal bus, with red connector

Table continued on next page

	Terminal	Assignment	Brief description
 1)	**X12:1** **X12:2** **X12:3** **X12:4** **X12:5** **X12:6** **X12:7** **X12:8** **X12:9**	**n.c.** **CAN_L** **DGND** **CAN_L** **$R_{termination}$** **DGND** **CAN_H** **CAN_H** **$R_{termination}$**	 CAN bus low Reference potential CAN bus CAN bus low Unit internal SBus terminating resistor Reference potential CAN bus CAN bus high CAN bus high Unit internal SBus terminating resistor

1) Only for CAN-based system bus. No function for EtherCAT-based system bus.

Terminal assignment of the MXA axis modules

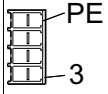
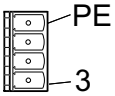
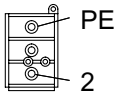
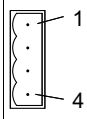
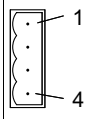
	Terminal	Assignment	Brief description
	**X2:PE** **X2:1** **X2:2** **X2:3**	**PE** **U** **V** **W**	Motor connection sizes 1, 2
	**X2:PE** **X2:1** **X2:2** **X2:3**	**PE** **U** **V** **W**	Motor connection size 3
	**X2:PE** **X2:1** **X2:2** **X2:3**	**PE** **U** **V** **W**	Motor connection sizes 4, 5, 6
	**X4:PE** **X4:1** **X4:2**	**PE** **+U_Z** **- U_Z**	DC link bus connection
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X6:1** **X6:2**	**DBØØ** **BGND**	Brake connection (switched)

Table continued on next page. Footnotes on next page.

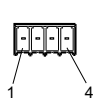
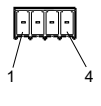
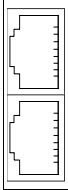
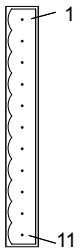
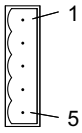
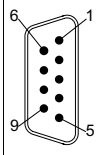
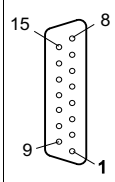
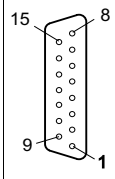
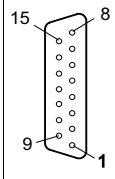
	Terminal	Assignment	Brief description	
			**Unit design with one safety relay, optional**	
	X7:1 X7:2 X7:3 X7:4	+24 V RGND C NC	Safety relay I (sizes 1-6) Safety relay I (size 1-6), common contact Safety relay I (sizes 1-6), NC contact The connector comes equipped with a coding nose.	
			**Design with two safety relays, optional**	
	X8:1 X8:2 X8:3 X8:4	+24 V RGND C NC	Safety relay II (sizes 2-6) Safety relay II (sizes 2-6), common contact Safety relay II (sizes 2-6), NC contact The connector comes equipped with a coding nose.	
	**X9a** **X9b**		a = Input: Signal bus, with green plug b = Output: Signal bus, with red plug	
	**X10:1** **X10:2** **X10:3** **X10:4** **X10:5** **X10:6** **X10:7** **X10:8** **X10:9**	**DIØØ** **DIØ1** **DIØ2** **DIØ3** **DIØ4** **DIØ5** **DIØ6** **DIØ7** **DIØ8**	Binary input 1, with fixed assignment "Output stage enable" Binary input 2, freely programmable Binary input 3, freely programmable Binary input 4, freely programmable Binary input 5, freely programmable Binary input 6, freely programmable Binary input 7, freely programmable Binary input 8, freely programmable Binary input 9, freely programmable	Electrically isolated via opto-coupler with reference to DCOM (X10:10).
	X10:10 **X10:11**	**DCOM** **DGND**	Reference potential for binary inputs DIØØ..DIØ8 General reference potential of control electronics	
	**X11:1** **X11:2** **X11:3** **X11:4** **X11:5**	**DOØØ** **DOØ1** **DOØ2** **DOØ3** **DGND**	Binary output 1, freely programmable Binary output 2, freely programmable Binary output 3, freely programmable Binary output 4, freely programmable Reference potential for binary outputs DOØØ..DOØ3	
	**X12:1** **X12:2** **X12:3** **X12:4** **X12:5** **X12:6** **X12:7** **X12:8** **X12:9**	**n.c.** **CAN_L** **DGND** **CAN_L** **$R_{termination}$** **DGND** **CAN_H** **CAN_H** **$R_{termination}$**	CAN2 Bus Low Reference potential CAN bus CAN2 Bus Low Unit internal SBus terminating resistor Reference potential CAN bus CAN2 Bus High CAN2 Bus High Unit internal SBus terminating resistor	
	**X13:1** **X13:2** **X13:3** **X13:4** **X13:5** **X13:6** **X13:7** **X13:8** **X13:9** **X13:10** **X13:11** **X13:12** **X13:13** **X13:14** **X13:15**	**S2 (SIN +)** **S1 (COS +)** **n.c.**[2] **n.c.**[2] **R1 (REF +)** **TF / TH / KTY -** **n.c.**[2] **n.c.**[2] **S4 (SIN -)** **S3 (COS -)** **n.c.**[2] **n.c.**[2] **R2 (REF -)** **TF / TH / KTY +** **n.c.**[2]	Motor resolver connection	

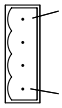
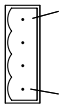
Table continued on next page. Footnotes on next page.

	Terminal	Assignment	Brief description
	**X13:1** **X13:2** **X13:3** **X13:4** **X13:5** **X13:6** **X13:7** **X13:8** **X13:9** **X13:10** **X13:11** **X13:12** **X13:13** **X13:14** **X13:15**	**Signal track A (COS +)** **Signal track B (SIN +)** **Signal track C** **n.c.**[2] **n.c.**[2] **TF / TH / KTY -** **n.c.**[2] **DGND** **Signal track A_N (COS -)** **Signal track B_N (SIN -)** **Signal track C_N** **n.c.**[2] **n.c.**[2] **TF / TH / KTY +** **U_S**	Connection of motor encoders: sin/cos encoder, TTL encoder
	**X13:1** **X13:2** **X13:3** **X13:4** **X13:5** **X13:6** **X13:7** **X13:8** **X13:9** **X13:10** **X13:11** **X13:12** **X13:13** **X13:14** **X13:15**	**Signal track A (COS +)** **Signal track B (SIN +)** **n.c.**[2] **DATA +** **n.c.**[2] **TF / TH / KTY -** **n.c.**[2] **DGND** **Signal track A_N (COS -)** **Signal track B_N (SIN -)** **n.c.**[2] **DATA -** **n.c.**[2] **TF / TH / KTY +** **U_S**	Hiperface motor encoder connection

1) The pin assignment is identical for both connectors (X7 and X8) and they are interchangeable. Coding does prevent an incorrect connection.

2) Do not connect a cable.

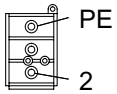
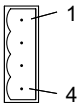
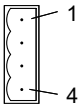
Terminal assignment of the MXM master module

	Terminal	Assignment	Brief description
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics[1]
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply[1]
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics[1]
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply[1]

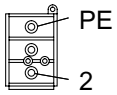
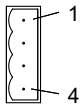
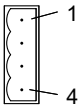
1) Only for through transmission

For terminal assignment of the cards see "MOVI-PLC® DHP11B Control Card" manual.

Terminal assignment of the MXC capacitor module

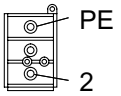
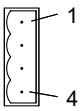
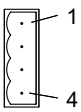
	Terminal	Assignment	Brief description
	**X4:PE** **X4:1** **X4:2**	**PE** **+U_Z** **- U_Z**	DC link bar
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply

Terminal assignment of the MXB buffer module

	Terminal	Assignment	Brief description
	**X4:PE** **X4:1** **X4:2**	**PE** **+U_Z** **- U_Z**	DC link bar
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics[1)]
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply[1)]
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics[1)]
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply[1)]

1) Only for through transmission

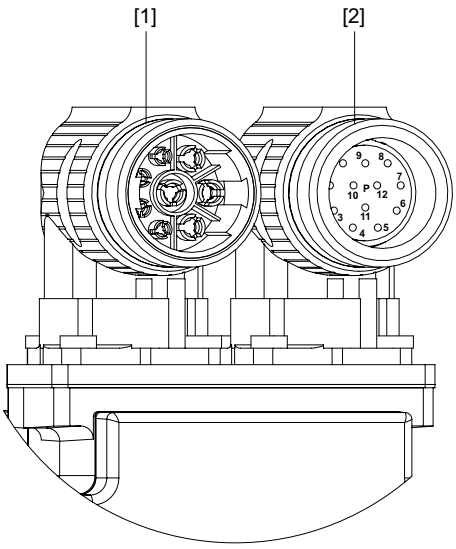
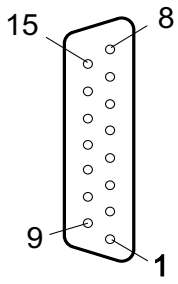
MXS 24 V switched-mode power supply module

	Terminal	Assignment	Brief description
	**X4:PE** **X4:1** **X4:2**	**PE** **n.c.** **- U_Z**	DC link bar
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X16:1** **X16:2**	**+24 V** **-24 V**	External 24 V voltage supply

4.12 Connecting encoders to the basic unit

	NOTES
	The core colors specified in the wiring diagrams are in accordance with IEC 757 and correspond to the core colors used in the pre-fabricated cables from SEW-EURODRIVE. You will find detailed information in the "SEW encoder systems" manual. The manual is available from SEW-EURODRIVE.

Example

View of the flange sockets in a servomotor	View connection motor encoder to axis module
	

[1] Power connection

[2] Encoder connection

	WARNING
	Dangerous contact voltages at the unit terminals when connecting the wrong temperature sensors. Severe or fatal injuries from electric shock. • Connect only temperature sensors with reliable isolation from the motor winding to the temperature evaluation. Otherwise, the requirements for reliable isolation are not met. Dangerous contact voltages may occur at the unit terminals via the signal electronics in case of an error.

For the pin assignment, refer to sec. 4.11 "Terminal assignment", paragraph "Terminal assignment of MXA axis modules".

General installation notes

Encoder connection

- Max. cable length: 100 m with a capacitance per unit length ≤ 120 nF/km.
- Core cross section: 0.2 ... 0.5 mm^2.
- If you do not use a core of the encoder cable: Isolate the core end.
- Use shielded cables with twisted pair conductors and make sure they are grounded on both ends over a large surface area:
  - To the encoder in the cable gland or in the encoder plug,
  - To the servo drive in the housing of the D-sub connector.
- Route the encoder cable separately from the power cables.

Shielding

Connect the shield of the encoder cable over a large area.

At the servo inverter

Connect the shield on the servo drive end in the housing of the sub D connector.

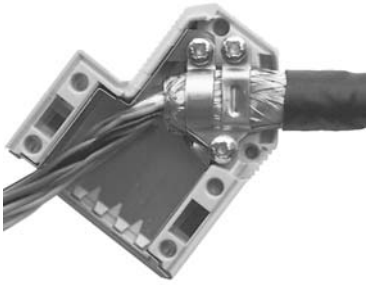


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Figure 56: Connect the shield in the sub D connector

On the encoder / resolver

Connect the shield on the encoder side only on the respective earthing clamps, not on the cable gland.

For drives with a plug connector, connect the shield on the encoder plug.

Prefabricated cables

SEW-EURODRIVE offers prefabricated cables for connecting encoders. SEW-EURODRIVE recommends to use these prefabricated cables.

You can find details on prefabricated cables in the "MOVIAXIS® MX Multi-Axis Servo Inverter" catalog.

4.13 Notes on electromagnetic compatibility

Separate cable ducts

- Route **power cables** and **electronics leads** in **separate cable ducts**.

Shielding and grounding

- Only use **shielded control cables**.
- Apply the **shield by the shortest possible route and make sure it is grounded over a wide area at both ends**. To avoid ground loops, you can ground one end of the shield via a suppression capacitor (220 nF / 50 V). If using double-shielded cables (in the case of multi-core cables in some cases with several shielded bunched cables), ground the outer shield on the servo inverter end and the inner shield on the other end.

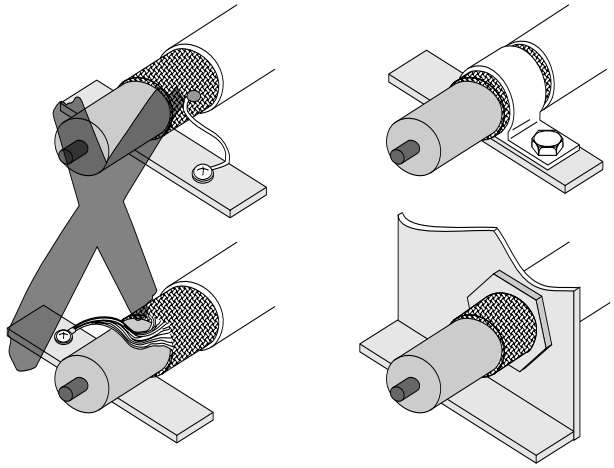

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Figure 57: Examples of correct shield connection using metal clamp (shield clamp) or metal cable gland

- **Shielding** can also be achieved by laying the cables in **grounded sheet metal ducts or metal pipes**. **Always install the power and signal lines separately.**
- Ground the **multi-axis servo drive** and **all additional devices to meet the high-frequency guidelines**. You achieve this, e. g. through a wide area metal-on-metal contact between the unit housing and ground, for example by means of unpainted control cabinet mounting panels.

Line filter

- Install the **line filter close to the servo drive** but outside the minimum clearance for cooling.
- Do not switch between the line filter and the MOVIAXIS® multi-axis servo inverter.
- Keep the **length of the cable between the line filter and servo drive to an absolute minimum**, and never more than 600 mm. Unshielded, twisted cables are sufficient. Use also unshielded lines for the supply system lead. Shielded cables must be used for cables longer than 600 mm.
- **No EMC limits are specified for interference emission** in **voltage supply systems without grounded star point** (IT systems). The **effectiveness of line filters** in IT systems is **severely limited.**

Interference emission

SEW-EURODRIVE recommends the following EMC measures to limit interference emission:

- **On the supply end:**
  - Select line filters according to the assignment tables of braking resistors and line filters in the MOVIAXIS® catalog. You find notes on the selection of line filters in the "MOVIAXIS® MX Multi-Axis Servo Inverter" project planning manual.
- **On the motor end:**
  - Shielded motor cables.
- **Braking resistor:**
  - You find notes on the selection of braking resistors in the "MOVIAXIS® MX Multi-Axis Servo Inverter" project planning manual.

Interference emission category

Compliance with category "C2" according to EN 61800-3 has been tested on a specified test setup. SEW-EURODRIVE can provide detailed information on request.

⚠ WARNING

This product can cause high-frequency interferences in residential areas which can require measures for interference suppression.

4.14 UL compliant installation

Note the following points for UL-compliant installation:

- Use only copper cables with the temperature range 60 / 75 °C as connection cables.
- The permitted tightening torques for MOVIAXIS® power terminals are:

	Tightening torque	
Power supply module	**Mains connection X1**	**Braking resistor terminals**
Size 1	0.5 - 0.6 Nm	0.5 - 0.6 Nm
Size 2	3.0 - 4.0 Nm	3.0 - 4.0 Nm
Size 3	6.0 - 10.0 Nm	3.0 - 4.0 Nm
Axis module	**Motor connection X2**	**---**
Size 1	0.5 - 0.6 Nm	---
Size 2	1.2 - 1.5 Nm	---
Size 3	1.5 - 1.7 Nm	---
Size 4	3.0 - 4.0 Nm	---
Size 5	3.0 - 4.0 Nm	---
Size 6	6.0 - 10.0 Nm	
DC link discharge module	**Braking resistor connection X15**	**---**
All sizes	3.0 - 4.0 Nm	---

Permitted tightening torques

The permitted tightening torque

- of the **signal terminals** X10, X11 for all units is 0.5 - 0.6 Nm.
- for all **DC link bars** X4 is 3.0 - 4.0 Nm.
- of the **safety relay terminals** X7, X8 for all units is 0.22 - 0.25 Nm.
- of the **terminals for brake connection** X6 for the axis modules is 0.5 - 0.6 Nm.
- of the **terminals for 24 V voltage supply** is 0.5 - 0.6 Nm.
- of the **terminals X61 for multi-encoder cards XGH, XGS** is 0.22 - 0.25 Nm.
- of the **terminals X21, X22, X25, X26 of the input / output cards XIO, XIA** is 0.5 - 0.6 Nm

STOP

Servo inverter can possibly be damaged!

- Only use the stipulated connection elements and observe the prescribed tightening torques. Otherwise, excessive heat can develop which would damage the MOVIAXIS® multi-axis servo inverter.

- MOVIAXIS® MX multi-axis servo inverters are suitable for operation in voltage networks with earthed star point (TN and TT networks), a maximum mains current of 42,000 A and a maximum mains voltage of AC 500 V.

- The maximum permitted value of the input fuse is:

MXP power supply module	10 kW	25 kW	50 kW	75 kW
Input fuse	20 A	40 A	80 A	125 A

- Only use melting fuses as input fuses.
- If you use cable cross sections that are dimensioned for a smaller current than the rated current of the unit, make sure that the fuse is dimensioned for the used cable cross section.
- For information on selecting cable cross sections, refer to the project planning manual.
- Comply with the country-specific installation regulations in addition to the above notes.
- The plug-in connections of the 24 V supply are limited to 10 A.
- Option cards that are supplied via the 0 V and 24 V terminals at the front must be protected individually or in groups by 4 A melting fuses to UL 248.

NOTES

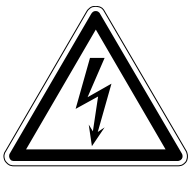
UL certification does not apply to operation in voltage supply systems without earthed star point (IT systems).

STOP

We recommend protection of the braking resistor with a thermal overload relay to implement an UL approved application design.

5 Startup

5.1 General information



⚠ HAZARD

Uncovered power connections.

Severe or fatal injuries from electric shock.

- Install the covers at the modules, see page 73.
- Install the touch guards according to the regulations, see page 73.
- Never startup MOVIAXIS® if the protective covers and touch guards are not installed.

Prerequisites

The drive must be configured correctly to ensure that startup is successful. Refer to the "MOVIAXIS® MX Multi-Axis Servo Inverter" system manual for detailed project planning notes and an explanation of the parameters.

The startup functions described in this section are used to set the multi-axis servo drive so it is optimally adapted to the connected motor and to the given boundary conditions. Startup has to take place according to the instructions in this section.

Hoist applications

⚠ HAZARD

Risk of fatal injury if the hoist falls.

Severe or fatal injuries.

- MOVIAXIS® is not designed for use as a safety device in hoist applications. Use monitoring systems or mechanical protection devices to ensure safety.

Mains connection of axis system

STOP

- Observe a minimum switch-off time of 10 s for the relay K11.
- Do not turn the mains supply on or off **more than once per** minute!

Irreparable damage to the unit or unpredictable malfunctions.

It is essential to observe the specified times and intervals.

Connecting cables, operating switches

STOP

Cables may only be connected and switches may only be operated in a de-energized state.

Irreparable damage to the unit or unpredictable malfunctions.

De-energize the unit.

5.2 Supply module settings for a CAN-based system bus

The following settings are necessary:

- The CAN baud rate is set using the two DIP switches S1 and S2 on the supply module, see sec. "Setting the CAN baud rate".
- The 4 DIP switches for setting the system bus are set to "C".
- The axis address is set using the two address switches S3 and S4 on the supply module, see sec. "Setting the CAN axis address". The next axis address will be set automatically based on the first address.

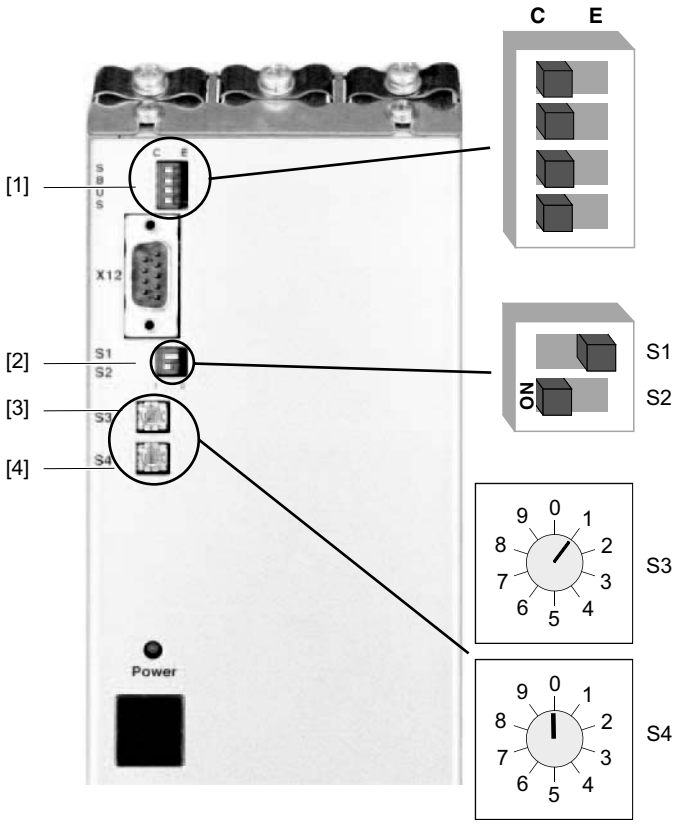


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Figure 58: DIP switches and axis address switch on the supply module

[1] DIP switches system bus

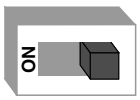
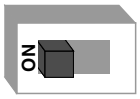
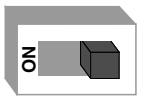
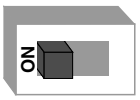
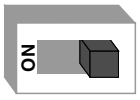
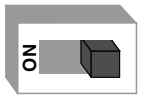
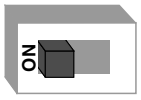
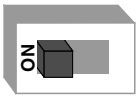
[2] S1, S2: DIP switch for CAN baud rate

[3] S3: Axis address switch 10^0

[4] S4: Axis address switch 10^1

Setting the CAN baud rate

The two DIP switches S1 and S2 have been installed in the supply module for setting the CAN baud rate, see figure 58.

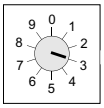
	125 kBit/s	250 kBit/s	500 kBit/s	1 MBit/s
S1				
S2				

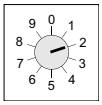
NOTES

The default factory setting is 500 kBit / s.

Setting the CAN axis address

The supply module is equipped with two rotary switches S3 and S4 for setting the axis address of the axis system, see Figure 58. Use these rotary switches to set a decimal address between 0 and 99.

S3 rotary switch  **10^0 ≙ Single digit**

S4 rotary switch  **10^1 ≙ Ten digit**

Axis address "23" serves as an example in the figure above.

NOTES

The default factory setting is "1".

The addresses within the axis system are assigned as follows:

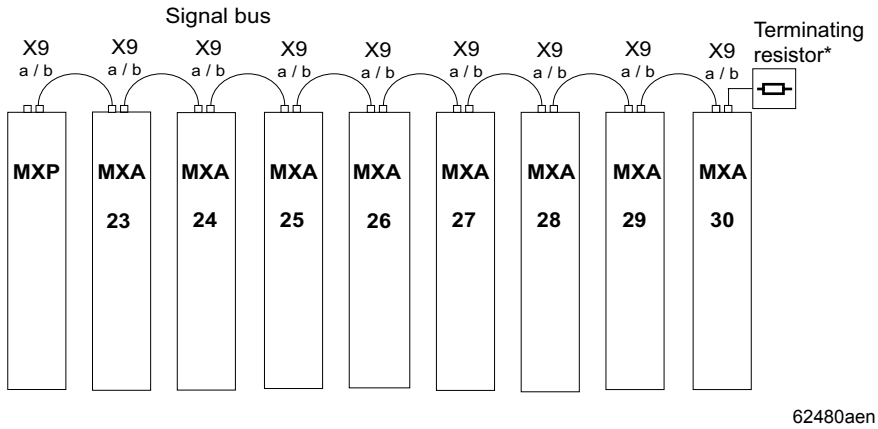


Figure 59: Example for address assignment in the axis system

* Terminating resistor only for CAN transmission

In the example, the address of the first axis module is "23". The other axes are assigned addresses in ascending order.

If the axis system includes less than eight axes, the "remaining" addresses will not be assigned.

The axis address set this way is used for the addresses of the CAN communication (part of the signaling bus) or the KNet fieldbus interface option. The axis addresses are assigned only once during startup of the 24V DC voltage supply of the axis system.

The basic addresses are only changed during operation when the axis module is start up again (24 V supply voltage on / off).

Connections and PC diagnostics

	NOTES
	CAN connections should only be implemented in the control cabinet to avoid any difference of potential.

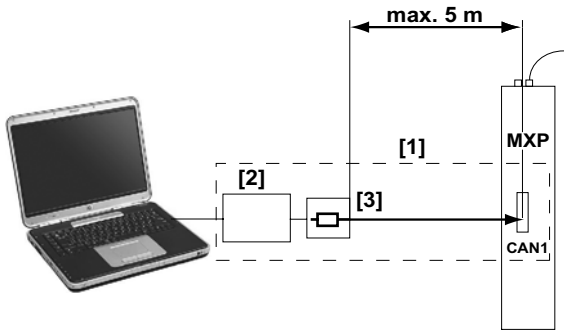


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Figure 60: CAN cable length

[1] Connection cable between PC and CAN interface on the supply module. The connection cable consists of the USB-CAN interface [2] and the cable with integrated terminating resistor [3].

[2] USB-CAN interface [3] Cable with integrated terminating resistor (120 Ω between CAN_H and CAN_L)

The maximum permitted cable length between terminating resistor and supply module is 5 m.

	NOTES
	Observe the notes of the cable manufacturer on CAN suitability when selecting the cable.

For more information on communication between PC and the MOVIAXIS® system, refer to page 111.

Connecting CAN cables to the supply module:

Connection assignment of connection and extension cables

The connecting and extension cables between the CAN adapter (see page 111) and the axis system comes equipped with a 9 pin D-sub socket on both ends. The pin assignment of the connection cable with the 9 pin D-sub CAN connector is shown in the following figure.

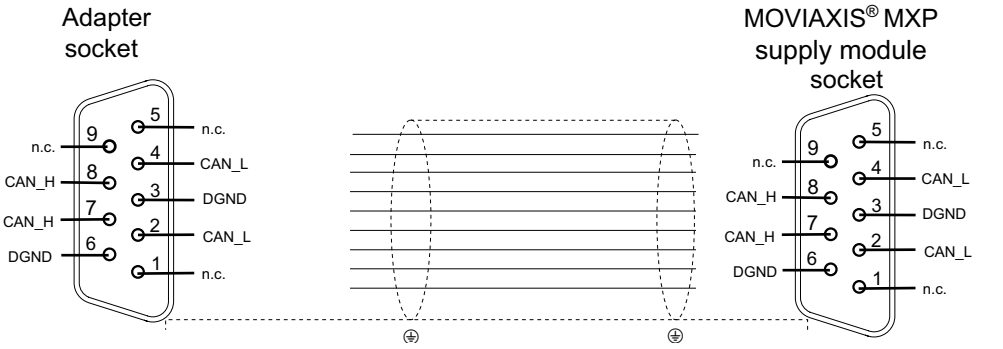

Figure 61: Connection and extension cable CAN adapter and supply module

Connection assignment of X12 (pin) on the supply module

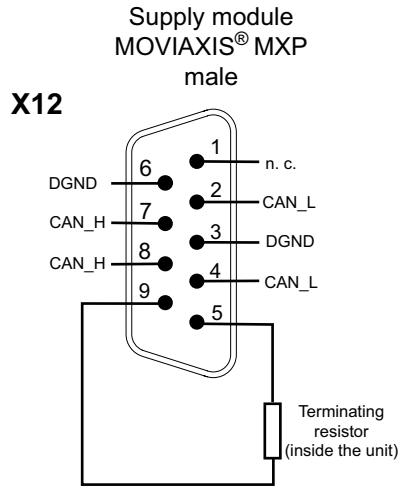

Figure 62: Pin assignment of the built-in X12 socket at the supply module

Bus terminating resistors for CAN / signal bus connection:

The signal bus connection includes the CAN1 connection between supply module and axis module. The CAN bus requires a terminating resistor.

The following figures show the diagram of possible combinations for CAN communication and the respective position of the terminating resistor (supply module option).

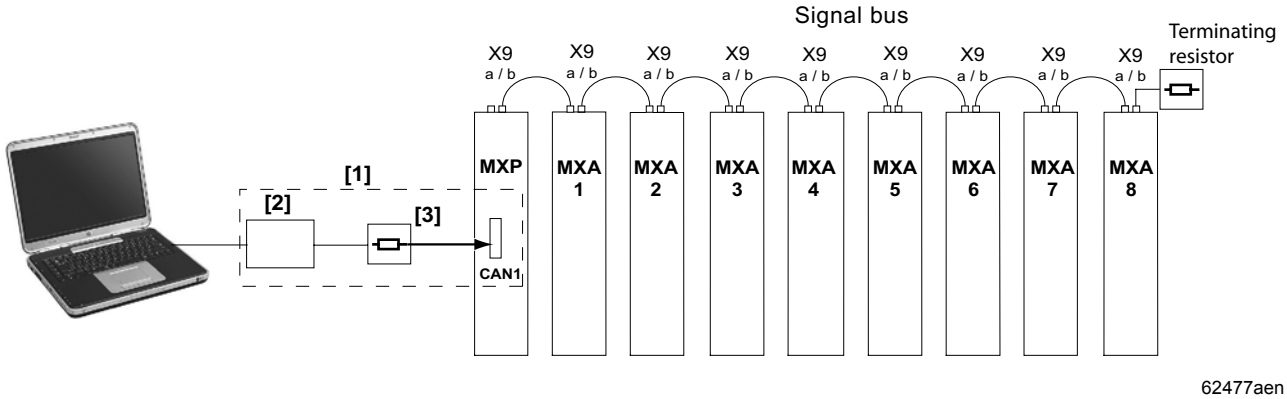

Figure 63: Communication via CAN on the supply module

[1] Connection cable between PC and CAN interface on the supply module. The connection cable consists of the USB-CAN interface [2] and the cable with integrated terminating resistor [3].

[2] USB-CAN interface

[3] Cable with integrated terminating resistor (120 Ω between CAN_H and CAN_L)

For more information on communication between PC and the MOVIAXIS® system, refer to page 111.

5.3 CAN2 bus information and settings

	NOTES
	CAN connections should only be implemented in the control cabinet to avoid any difference of potential.

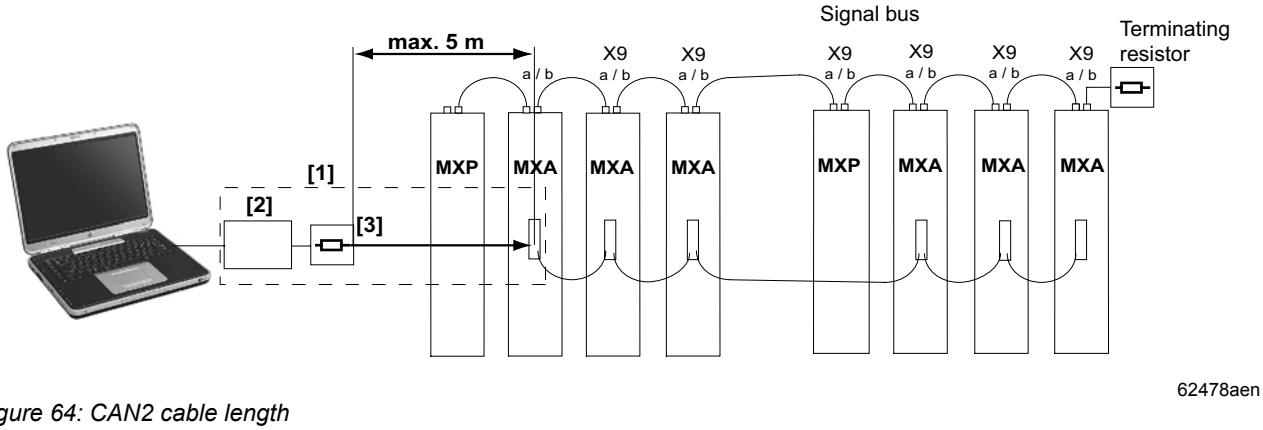

Figure 64: CAN2 cable length

[1] Connection cable between PC and CAN interface on the axis module. The connection cable consists of the USB-CAN interface [2] and the cable with integrated terminating resistor [3].

[2] USB-CAN interface

[3] Cable with integrated terminating resistor (120 Ω between CAN_H and CAN_L)

The maximum permitted cable length between terminating resistor and the first axis module is 5 m.

	NOTES
	For the connection between the axis systems, please use pre-fabricated cables from SEW-EURODRIVE.

For more information on communication between PC and the MOVIAXIS® system, refer to page 111.

Setting the CAN2 axis address

All axis modules are set to address "4" at the factory. Each axis module must be given a CAN2 axis address by means of parameter setting.

Connecting CAN2 cables to the axis modules:

Connection assignment of connection and extension cables

The connecting and extension cables between the CAN adapter (see page 111) and the axis system comes equipped with a 9 pin D-sub socket on both ends. The pin assignment of the connection cable with the 9 pin D-sub CAN connector is shown in the following figure.

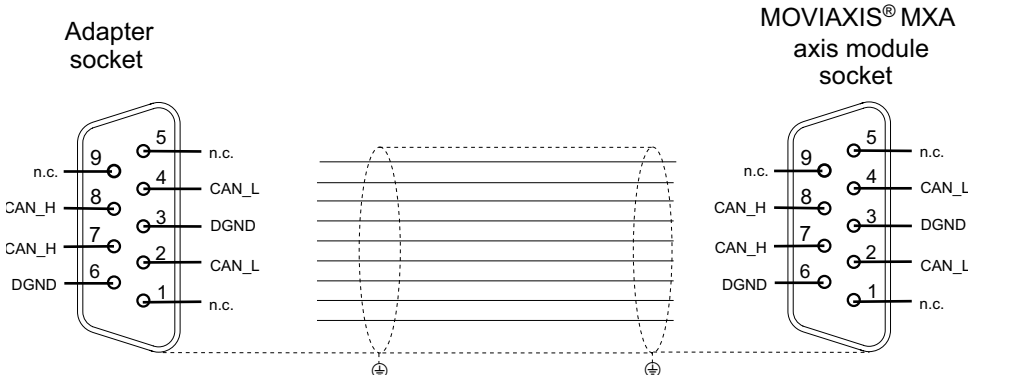

Figure 65: Connection and extension cable CAN adapter axis module

Connection assignment of X12 (pin) on the axis module

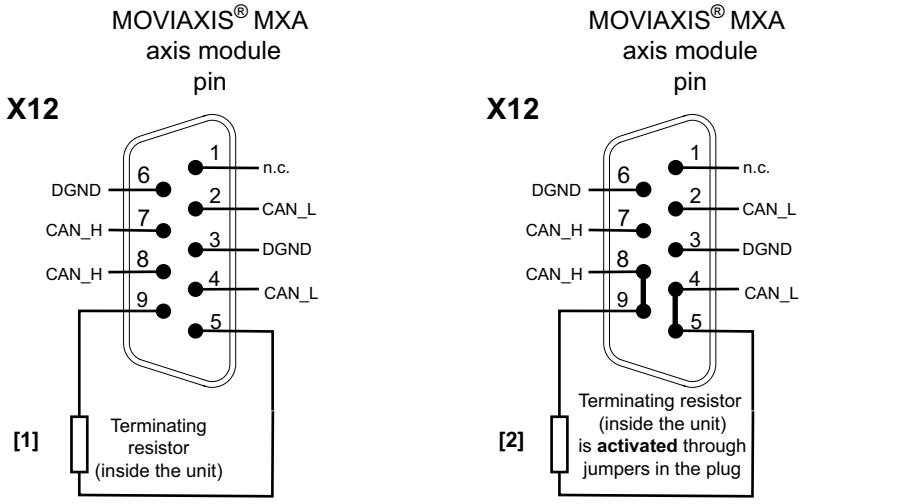

Figure 66: Pin assignment of the built-in X12 socket at the axis module

[1] Terminating resistor not active

[2] Terminating resistor active

Bus terminating resistors for CAN2 bus connection:

The signal bus connection includes the CAN2 connection between supply module and axis module. The CAN2 bus requires a terminating resistor.

The following figure shows the diagram of possible combinations for CAN communication and the respective position of the terminating resistor (supply module accessory).

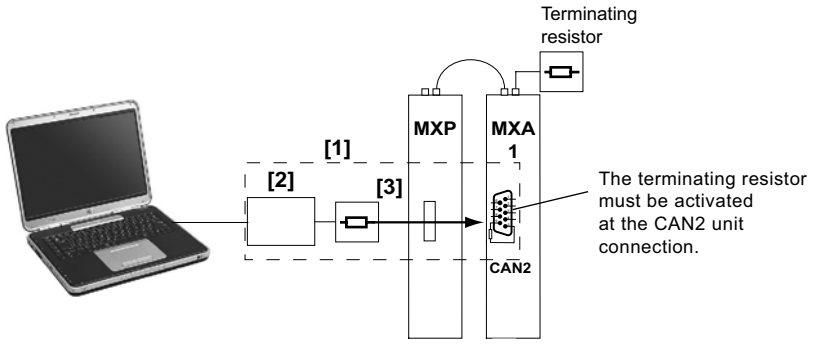

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Figure 67: Communication via CAN2 at an axis module

[1] Connection cable between PC and CAN interface on the axis module. The connection cable consists of the USB-CAN interface [2] and the cable with integrated terminating resistor [3].

[2] USB-CAN interface [3] Cable with integrated terminating resistor (120 Ω between CAN_H and CAN_L)

	NOTES
	Install terminating resistor. The terminating resistor in the last axis module of the axis system must be activated, see page 109.

For more information on communication between PC and the MOVIAXIS® system, refer to page 111.

5.4 Communication via CAN adapter

For communication between a PC and a MOVIAXIS® system, we recommend using the CAN adapter from SEW-EURODRIVE, which is supplied with a pre-fabricated cable and a terminating resistor. The part no. of the CAN adapter is 18210597.

As an alternative, the CAN adapter "USB Port PCAN-USB ISO (IPEH 002022)" from Peak can be used.

- In case you design the terminals yourself, you must install a terminating resistor of 120 Ω between CAN_H and CAN_L.
- For secure data transmission, you also need a shielded cable suitable for CAN networks.
- There are two communication paths for the axes in the axis system:
  1. Via the 9-pin D-sub connector X12 on the supply module (CAN), see page 106.
  2. Via the 9-pin D-sub connector X12 on the axis module (CAN2) of the axis system, see page 108.

	NOTES
	Cable connection and cable extension SEW-EURODRIVE recommends **connection and extension cables** with **1:1 through-connection** in **shielded** design. Observe the notes of the cable manufacturer on CAN suitability when selecting the cable.

5.5 Settings for EtherCAT-based system bus

Please note the following when using an EtherCAT-based system bus:

- Set the 4 DIP switches on the supply module to setting "E", see Figure 68.
- Switches S1, S2, S3 and S4 plus X12 on the supply modules have no function in this version.
- Set the DIP switch LAM to **setting "1"** at the **last** axis module in the system. At all other axis modules, the LAM DIP switch must be set to "0", see figure 69.
- In this version, X9b does not require a terminating resistor.

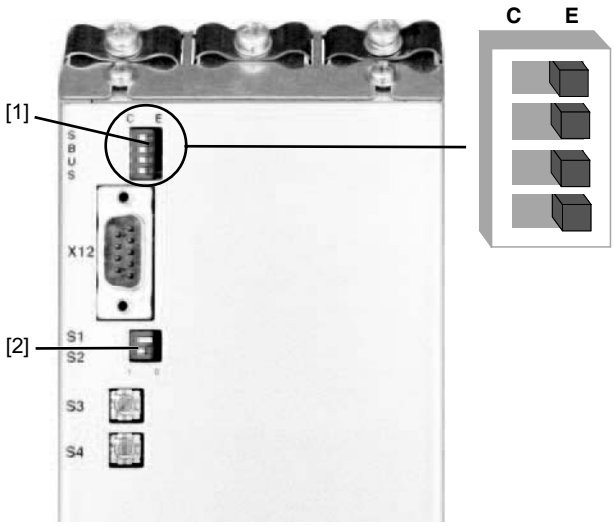

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Figure 68: DIP switch settings on the supply module

[1] Settings for EtherCAT operation: All 4 switches set to "E"

[2] DIP switches S1, S2, S3 and S4 and X12 have no functions

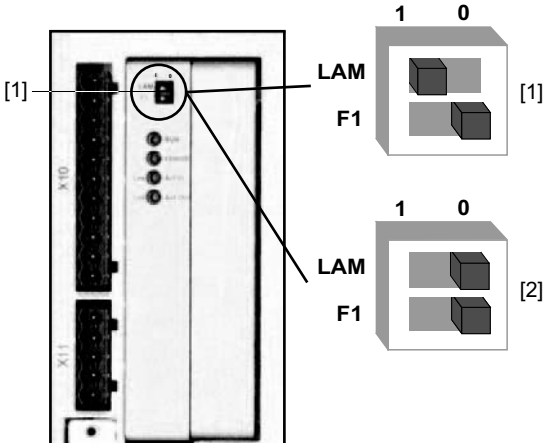

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Figure 69: DIP switch settings on the axis module

[1] Setting the LAM DIP switch on the **last** axis module of a system

[2] Setting the LAM DIP switch of all axis modules of a system except for the last axis module

5.6 Description of the startup software

The MOVITOOLS® MotionStudio software package is the SEW engineering tool that you can use to access all SEW drive units. For the MOVIAXIS® series, you can use MOVITOOLS® MotionStudio for startup, parameter setting and diagnostics.

For information such as installation instructions and system prerequisites, refer to the "MOVITOOLS® MotionStudio" manual.

MOVITOOLS® MotionStudio startup software

Once you have installed MOVITOOLS® MotionStudio, you will find the corresponding entries in the WINDOWS start menu at the following path:

"Start\Programs\SEW\MOVITOOLS MotionStudio".

	NOTES
	For a detailed description of the following steps, please refer to the online help in MOVITOOLS® MotionStudio or to the "MOVITOOLS® MotionStudio" manual.

1. Start MOVITOOLS® MotionStudio.
2. Configure communication channels.
3. Perform an online scan.

5.7 Communication selection

The following figures show the possible access types for the system buses of the unit system.

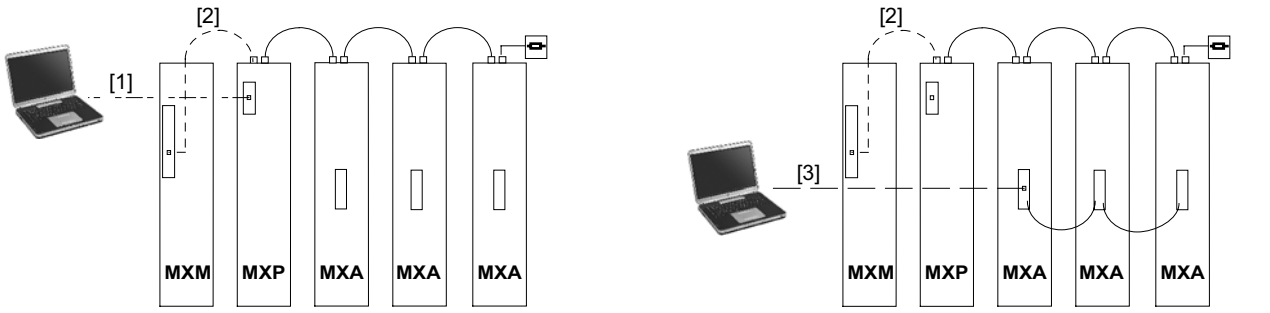

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Figure 70: Communication access

[1] PC-CAN to CAN

[2] Master module with CAN- / EtherCAT-based system bus

[3] PC-CAN to CAN2

SEW-EURODRIVE recommends the following communication paths:

- Unit system without master module: CAN
- Unit system with master module + DHP: CAN
- Unit system with master module + DHE/DHF/DHR/UFx: TCP/IP or USB

Use the following table to select the type of communication for startup depending on the unit configuration.

Hardware configuration of the unit system	Access to							Access via
	Master module						Supply module	Axis modules
	Via communication interface ...							
	PROFIBUS	CAN	RS485	TCP/IP	USB[3]	RT	CAN[1]	CAN2[2]
Without master module							x	x
Master module + DHP	x	x	x					x
Master module + DHE		x	(x)	x	x			x
Master module + DHF/UFx41[3]	x[4]	x	(x)	x	x			x
Master module + DHR/UFx41[3]		x	(x)	x	x	x[5]		x

1) CAN-based system bus
2) Only if CAN2 is free for engineering
3) In preparation
4) Only for operation for DP
5) Realtime Ethernet parameter channel via controller

5.8 Sequence in case of new startup

There are two different variants for new startup:

- New startup without master module
- New startup with master module and MOVI-PLC®

New startup without master module

1. Startup
   - Motor startup
   - Controller setting
   - User-defined units
   - System and application limits
2. Standard application
   - Technology editor for single-axis positioning (+ monitor)
3. Scope, recording of
   - Currents
   - Speeds
   - Positions
   - etc.
4. Data management
   - Loading and saving data records of individual axes

New startup with master module and MOVI-PLC®

1. Startup
   - Motor startup
   - Controller setting
   - User-defined units
   - System and application limits
2. Scope, recording of
   - Currents
   - Speeds
   - Positions
   - etc.
3. Data management
   - Loading and saving data records of individual axes

5.9 MOVIAXIS® startup - Single-motor operation

- Start the motor startup by selecting the respective unit in the hardware tree with the right mouse button.
- Double-click on the "Startup" entry.
- Click on "Next" to continue with the startup sequence.

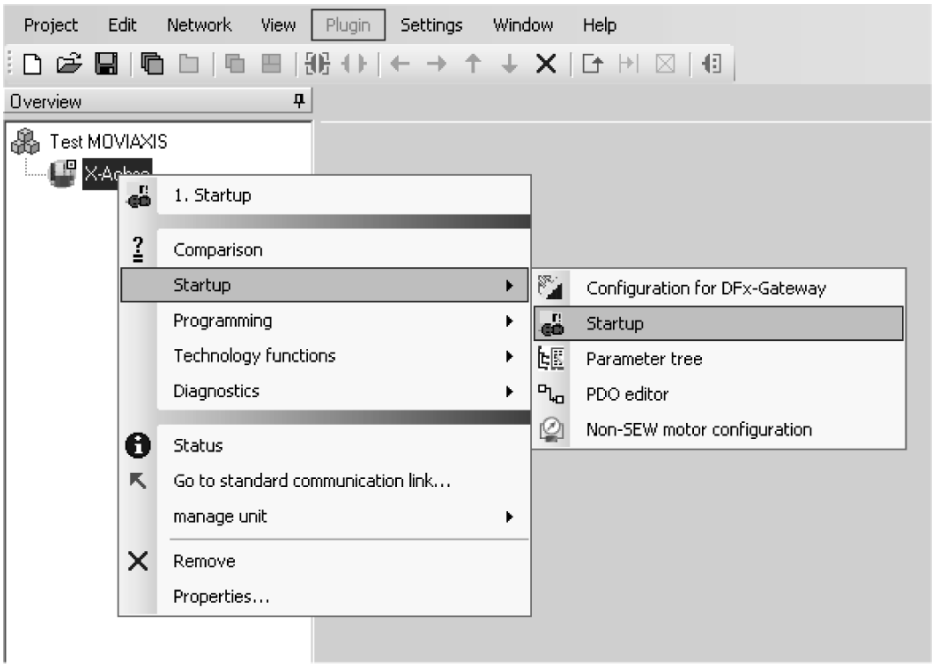

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Figure 71: Commencing startup

	NOTES
	There are 3 parameter records available for startup, which can be assigned to 3 different motors. The parameter record that is to be used for startup can be selected by clicking on it, see figure 72. Please note that only one parameter record can be started up at one time. If you want to startup several parameter records, this can only be done one after another. This means that when the startup of the first parameter record is completed, the entire startup procedure has to be performed again for the subsequent parameter records.

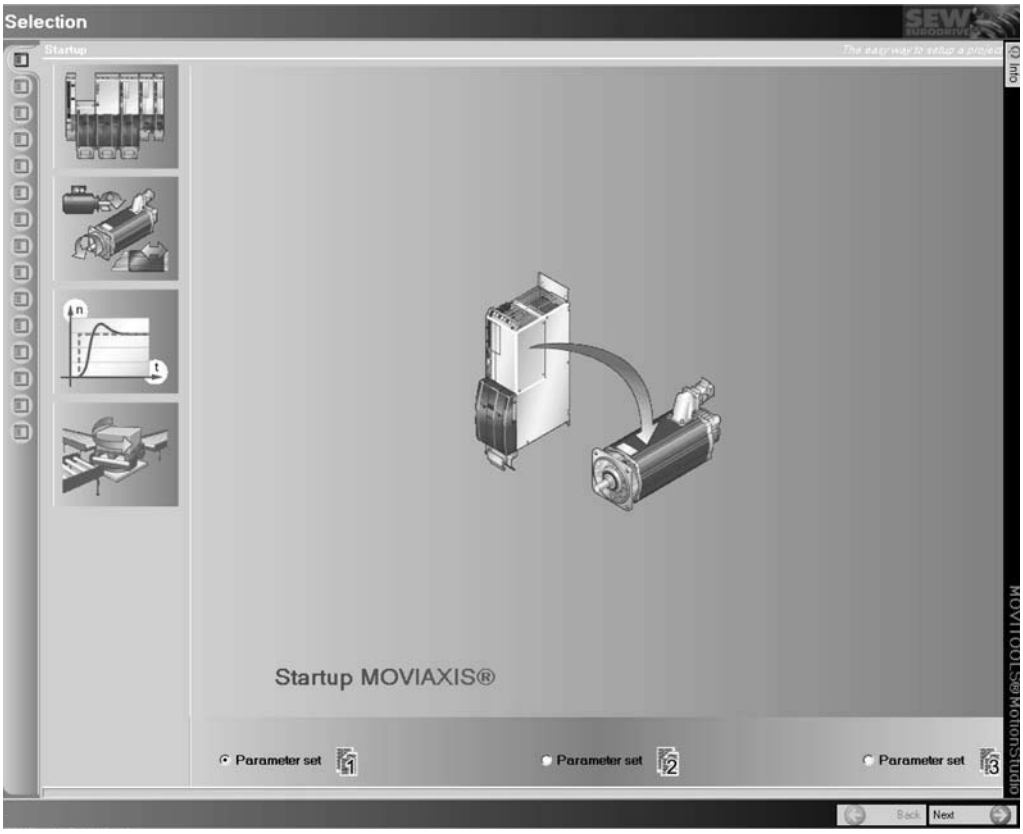

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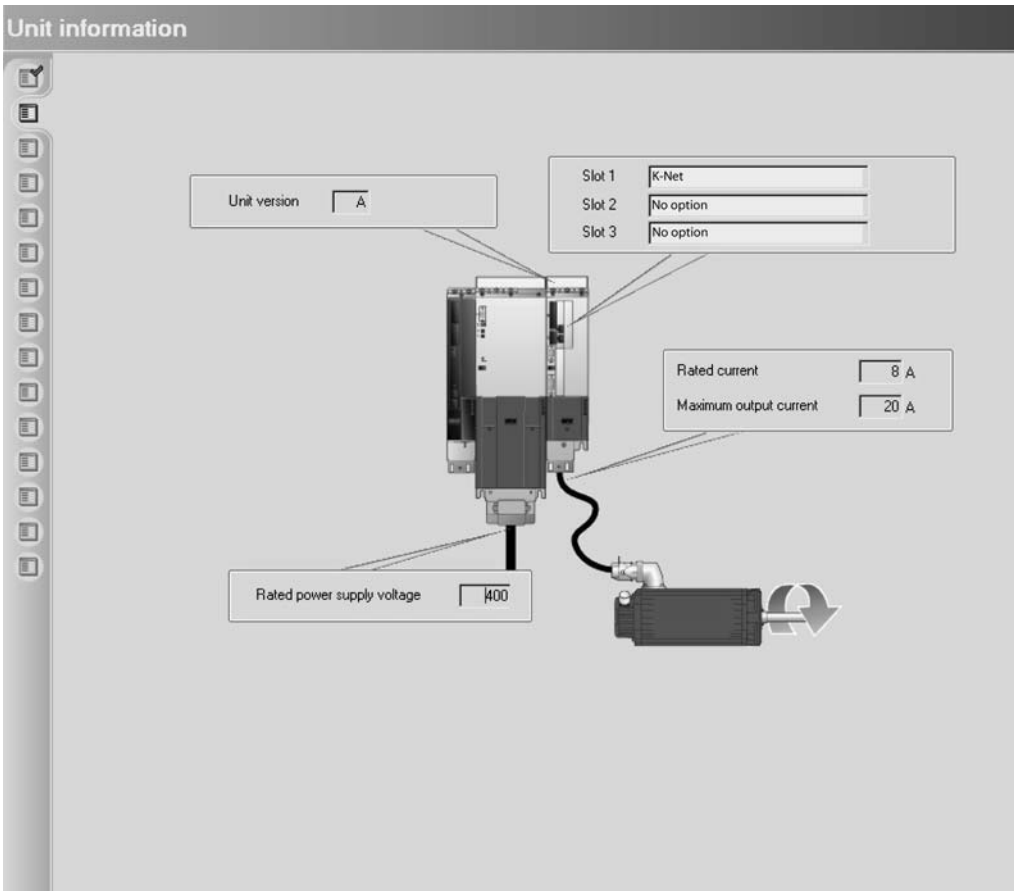
Figure 72: Initial window MOVIAXIS® MX startup

Current settings

The figure below shows the current settings.



11798aen

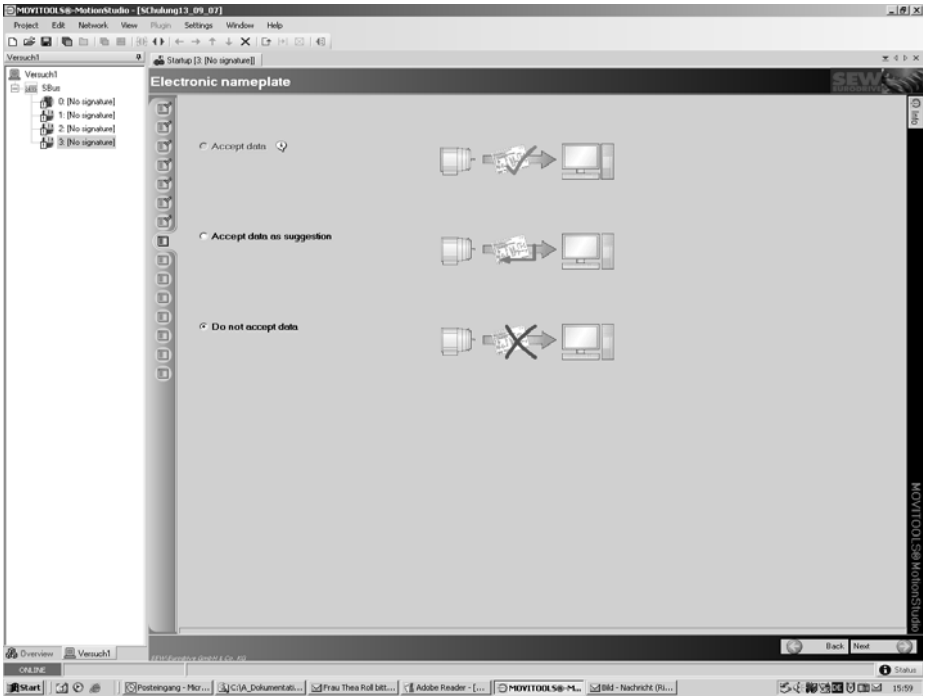
Figure 73: Overview of current settings

The card types of option cards inserted into the card slots are shown in this figure.

In this example:

- Slot 1: K-Net.
- Slot 2: Empty.
- Slot 3: Empty.

Encoder management of SEW encoders



11833aen

Figure 74: Encoder with electronic nameplate

When using encoders with a **SEW nameplate** (electronic nameplate), i. e. encoders which were programmed according to SEW specifications, you can select one of the following options for data transfer:

- **Accept data:**

  The motor data stored in the encoder is read out from the encoder and used for startup. The read-in data cannot be altered.

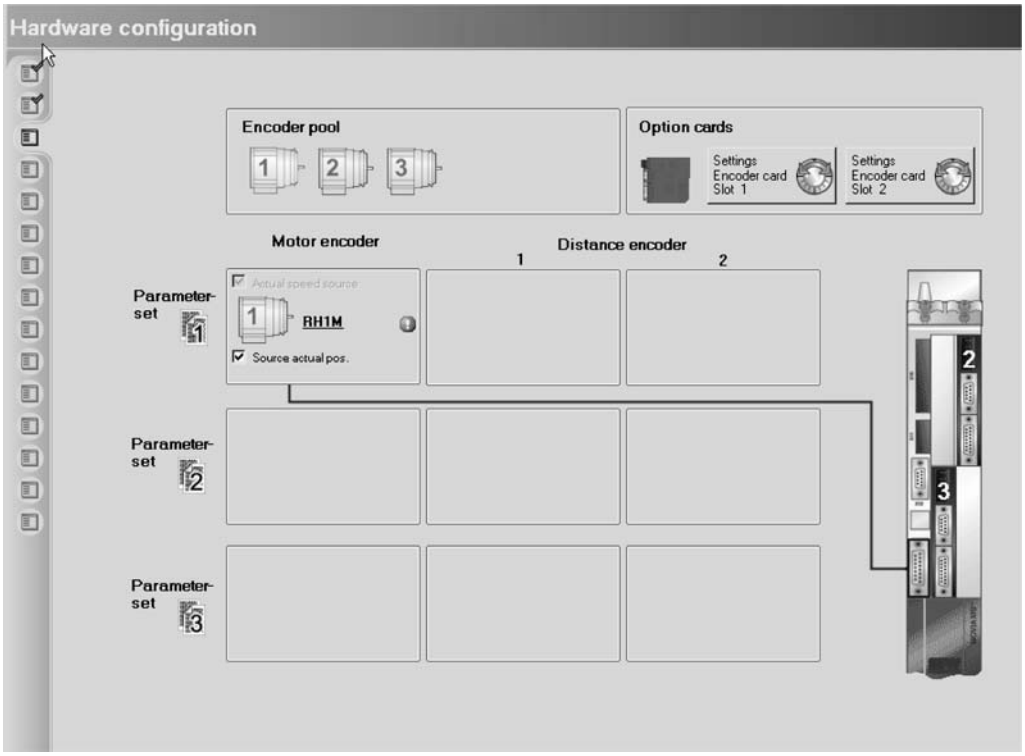
- **Accept data as suggestion:**

  The motor data stored in the encoder is read out from the encoder and made available as a suggestion. The read-in data can be altered.

- **Do not accept data:**

  The motor data stored in the encoder is not used.

Encoder management



11799aen

Figure 75: Encoder management

Encoder management allows you to assign the yellow-marked encoders offered in the encoder pool to the individual parameter records or motors. If several motors are to be operated on one axis module, you need additional multi-encoder cards (option).

- Click on the required encoder and hold the left mouse button down to drag the encoder to the intended parameter record. In the example above, encoder 1 is assigned to parameter record 1.

Encoder selection

The encoder pool represents the maximum three physical MOVIAXIS encoder inputs. Encoder 1 is the encoder input of the basic unit. Encoders 2 and 3 can be expanded with multi-encoder cards.

- Use each encoder only once.
- **Tachometer**:

  Encoders in the "Motor encoder" column are always the "Actual speed sources" and thus tachometers.
- **Position encoder**:

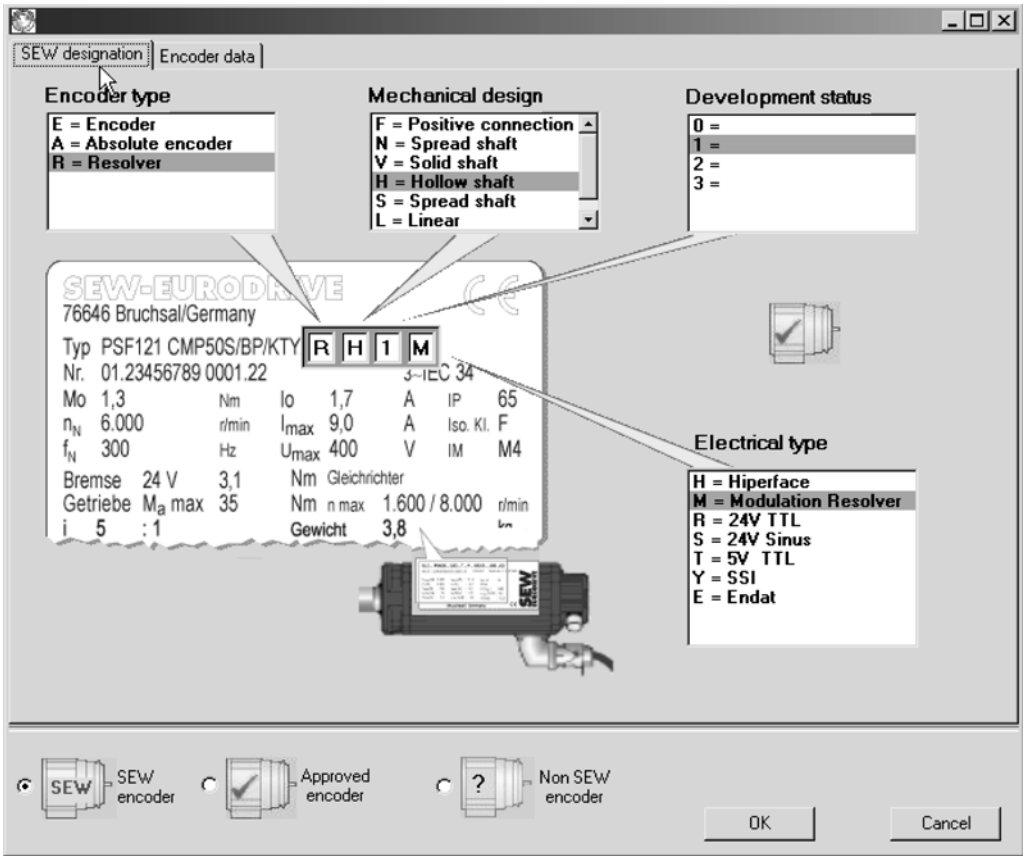
  Encoders in the two "Distance encoder" columns can also be used as position encoders.

  Only one encoder can be the "Actual position source" per parameter record. For this purpose, the "Source actual pos." checkbox must be ticked.

SEW designation of encoders

Double-click on an encoder symbol to open the "Encoder selection" submenu.

In this menu, the SEW designations of the encoders are listed. They are necessary for selecting the encoders.



11800aen

Figure 76: SEW designation of the encoders

- Click on the individual encoder designations to set the encoder type that is mounted on the motor. A requirement for this is that the function "Load data permanently" is **not** selected.

	NOTES
	The encoder type is specified on the nameplate of the motor.

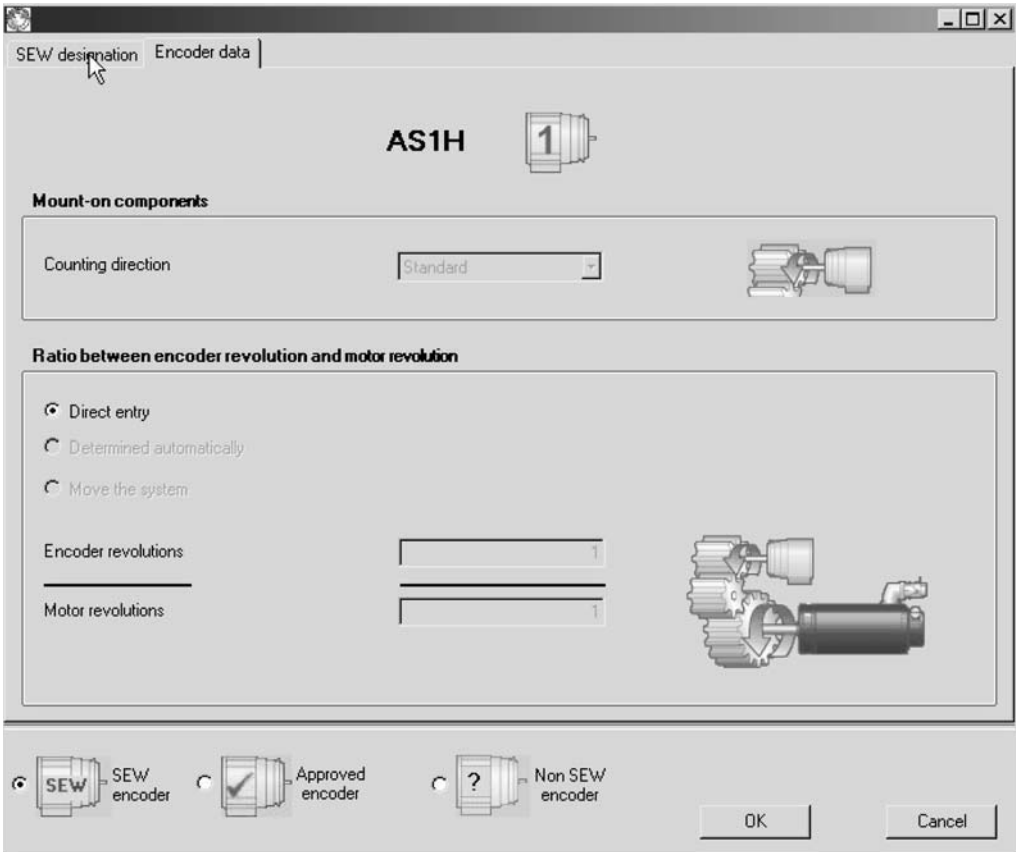
Encoder data assignment:

- **Resolver**: RH1M/ RH1L / RH3L/ RH3M
- **Hiperface**: ES1H / ES2H / EV1H /AS1H / AV1H
- **Sine/cosine encoder**: EH1S / ES1S / ES2S / EV1S / EV2S
- **Hiperface linear encoder**: AL1H
- **Non-SEW encoder**

Encoder data

You can enter encoder data in this menu.

However, you cannot enter data if the encoder is defined as "motor encoder".

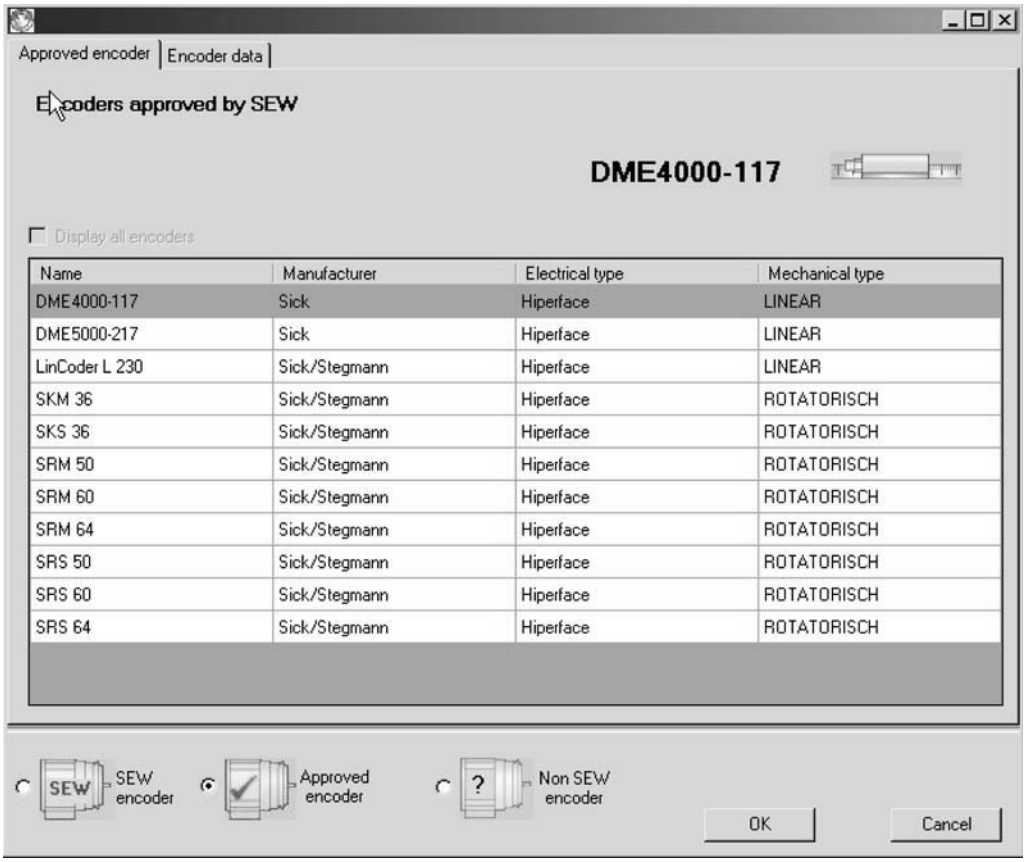


11801aen

Figure 77: Encoder data

Approved encoders

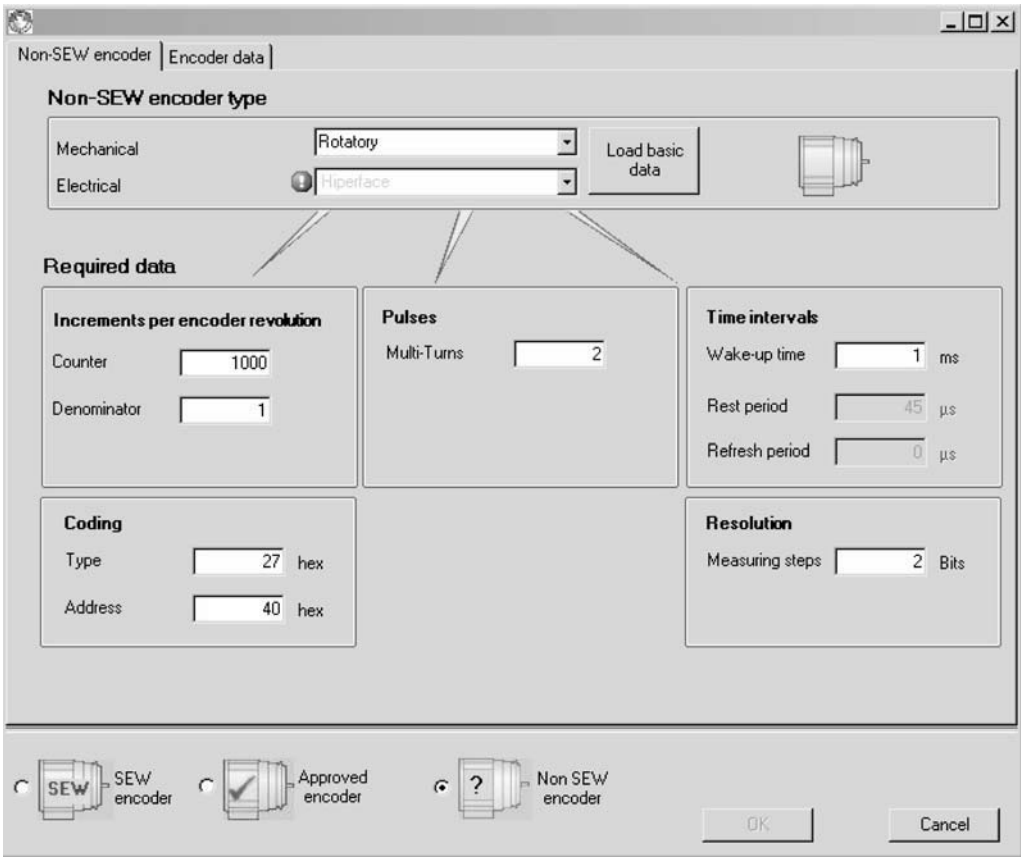
You can view the list of approved encoders by selecting "Approved encoders".



11802aen

Figure 78: Approved encoders

Encoder management for non-SEW encoders



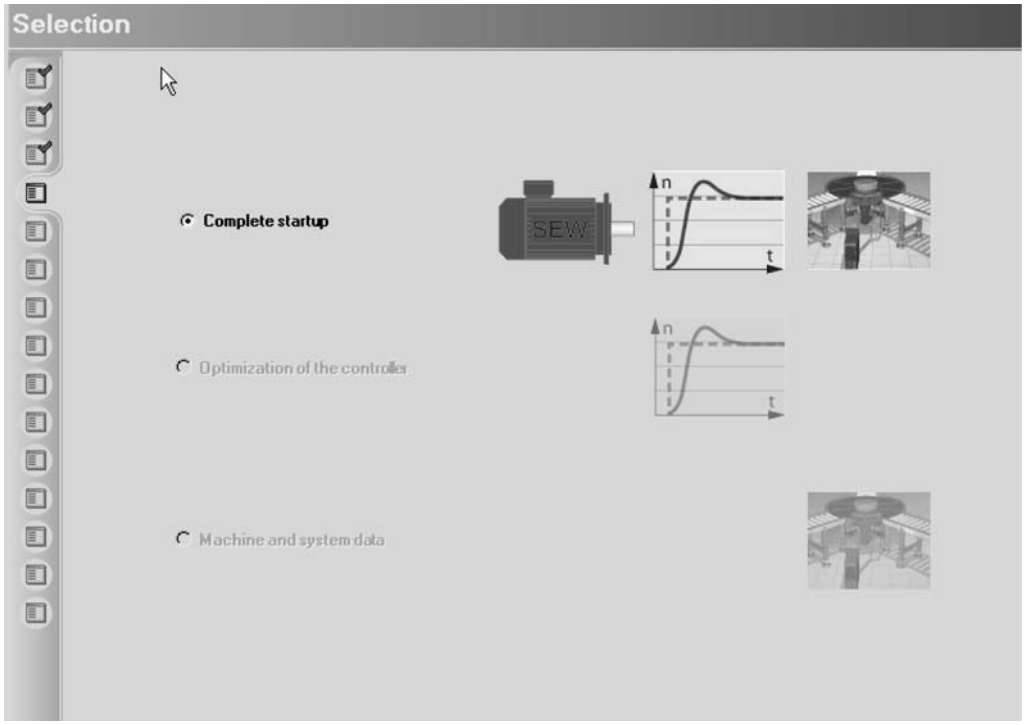
11803aen

Figure 79: Encoder management / non-SEW encoder

Input data	Description
Mechanically	• Rotational • Linear
Electrical	• Hiperface • Resolver • TTL • HTL • sin/cos
Counting direction	There are two counting directions: • **Normal** - Standard. Encoder rotates with motor (encoder mounted on motor shaft). • **Inverted** - Encoder rotates in opposite direction of motor (encoder not mounted on motor shaft).

Input data	Description
Numerator / denominator factor	This factor determines the encoder resolution. The value that has to be entered depends on the encoder type. • **Non-SEW TTL, non-SEW sin/cos, non-SEW Hiperface** $\frac{\textbf{Factor numerator encod.1}}{\textbf{Factor denominator encod.1}} = \frac{\textbf{Encoder resolution}}{\textbf{Revolution}}$ Example: sin / cos encoder: Factor numerator encoder1 = 1024 Factor denominator encoder1 = 1 • **Non-SEW resolver** $\frac{\textbf{Factor numerator encoder1}}{\textbf{Factor denominator encoder1}} = \frac{\textbf{Number of pole pairs}}{\textbf{1}}$ Example: Resolver, 1 pole pair: Factor numerator encoder1 = 1 Factor denominator encoder1 = 1 • **Non-SEW linear sin/cos** Signal period of the encoder Example: AL1H Lincoder, signal period 5 mm

Selection menu



11804aen

Figure 80: Startup options

You have three options for startup in the selection menu:

- **Complete startup:**

  This is the setting option for the initial startup. This part of the program stores the information for motor, speed controller as well as machine and system data.

	NOTES
	The following setting options "Optimization of the controller" and "Machine and system data" are subprograms of the MOVIAXIS® MX startup. These setting options can be selected and executed following a "complete startup" only.

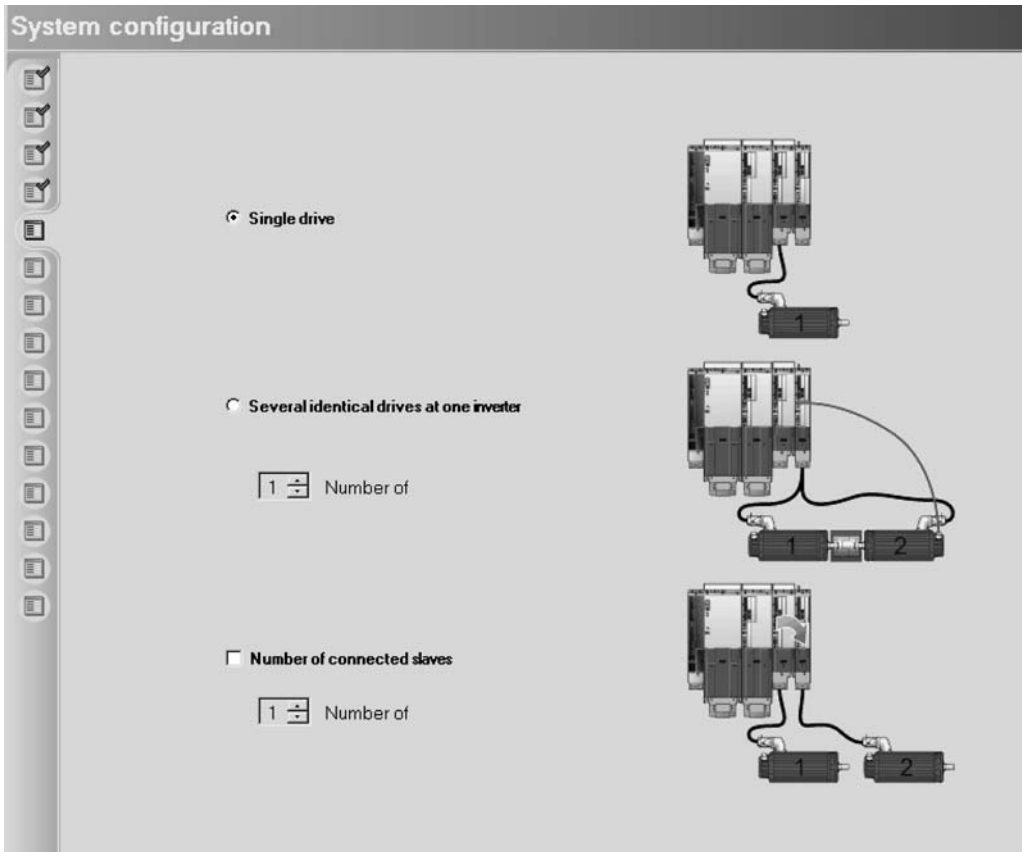
- **Optimization of the controller:**

  Use this setting option to further optimize the speed controller if a complete startup has already been performed.

- **Machine and system data:**

  This setting option is a part of the complete startup and refers to the machine system data only, such as user-defined units, machine and application limit values.

System configuration



11805aen

Figure 81: System configuration

Here, you can select whether several drives work with one load, or whether several motors are connected to one axis.

- **Single drive**

  One drive works with one load without the help of other drives (slaves).

- **Several identical drives at one inverter**

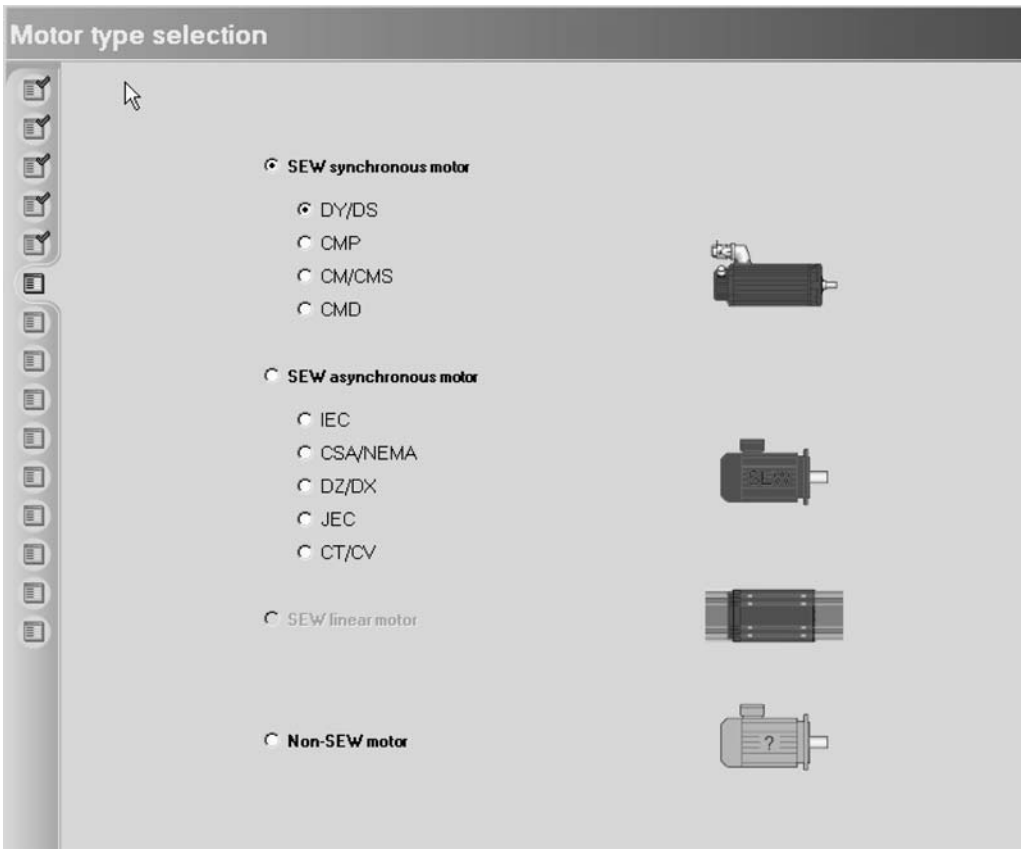
  The drives must be connected rigidly together in order to operate several drives at one servo drive. One drive is equipped with encoder feedback. The other motors are running in the same rotating field. When synchronous motors are used, the two rotors have to be aligned in addition. Please also refer to the SEW documentation "10509011 / EN Multi-Motor Drives" manual.

- **Number of connected slaves**

  With this setting, each motor has its own servo inverter but operates on the same load. This has an effect on the controller parameters and the external load. Please note that two rigidly connected drives acting on one load means that the drives might interfere with one another in the worst case. This can lead to error messages at the servo inverter. Please contact SEW-EURODRIVE if you have any questions on this topic.

Sequence of a complete startup

Motor selection



11806aen

Figure 82: Motor selection menu

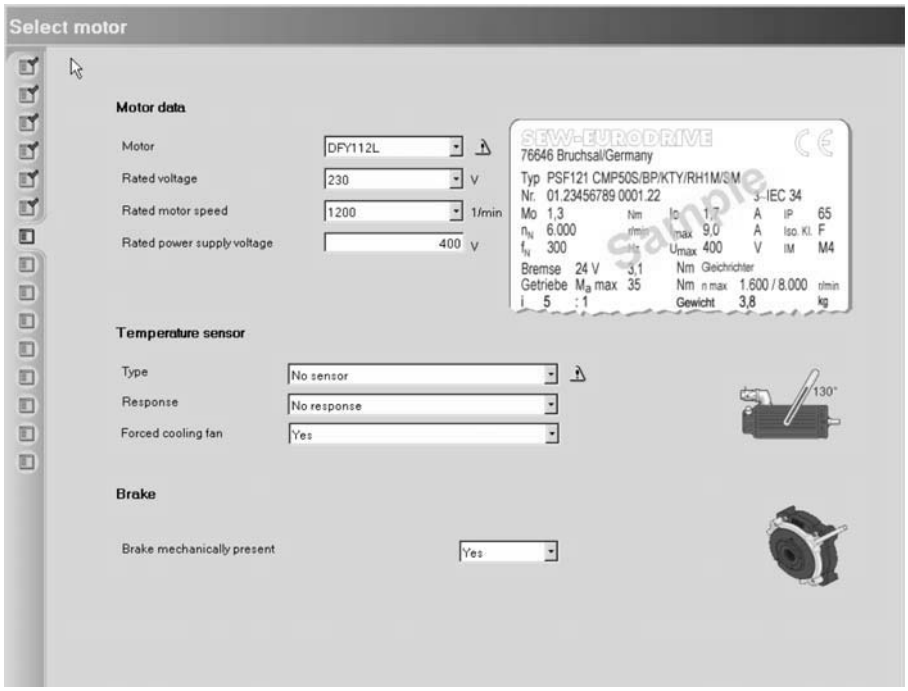
In this menu, you can set the motor to which the MOVIAXIS is connected. The motor type of SEW motors is indicated on the nameplate.

If the motor is a non-SEW motor, activate the radio button "Non-SEW motor." The next menu view will prompt you to load an XML file created by SEW-EURODRIVE.

Motor type	Description

Non-SEW motor	The connected motor is a non-SEW motor.
	You will need a **file created by SEW-EURODRIVE with** the **motor specifications** to use this option.
	If the function "Non-SEW motor" is selected, you will see the "Load motor file" button. Select the non-SEW motor from the motor database.
	If the motor is a **synchronous motor**, you will have to enter the following motor data:
	• Type designation
	• Pole pairs
	• Rated speed
	• Rated torque
	• Rated current
	• Rated voltage
	• Maximum torque
	• Maximum speed
	• Mass moment of inertia
	• Branch inductance
	• Brake yes/no
	  • Brake mass moment of inertia
	  • Brake release time
	  • Brake application time
	For **asynchronous motors**, additional data is required. The motor must be measured at SEW-EURODRIVE.

Nameplate



11807aen

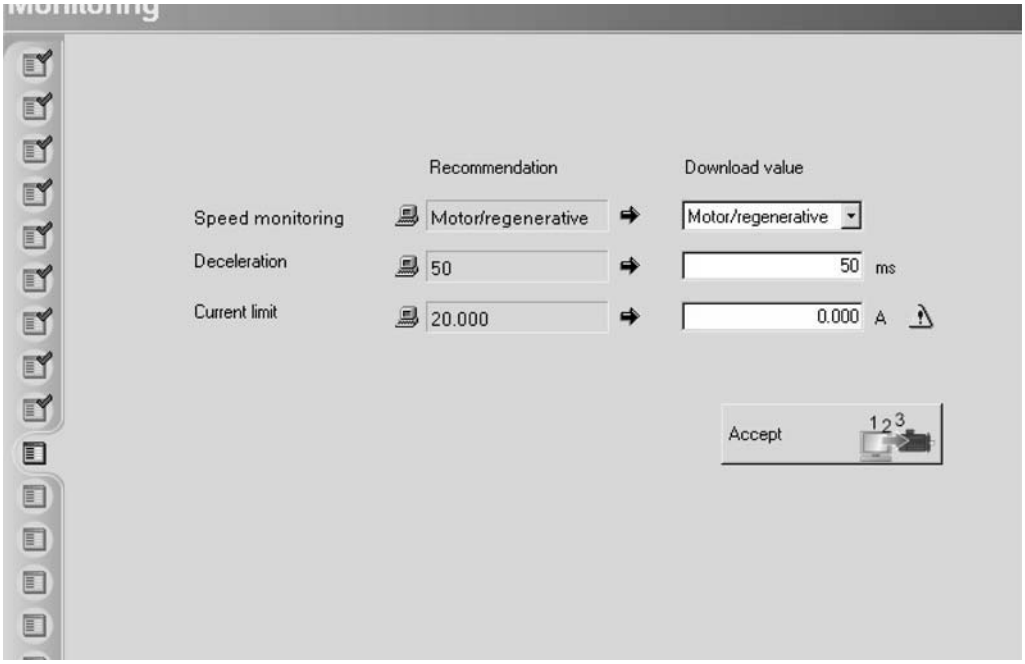
Figure 83: Motor selection nameplate

- Enter the motor data listed on the nameplate of the motor in the drop-down menu.

	NOTES
	In case of Hiperface encoders with electronic nameplate, the drop-down menu will be filled automatically and displayed without the user being able to make any changes. For all other types of encoders, the data listed in the following table have to be entered from the motor nameplate.

Input data	Description
Motor	Enter the motor type without further information, such as gear unit, encoder, brake or motor protection. For example: • Nameplate with gear unit PSF311RCM71S /BR /RH1M /SB51 → motor type CM71S; • Nameplate without gear unit CFM90M /BR /RH1M /SB51 → motor type CM90M.
Rated voltage	The rated motor voltage is the maximum voltage that the motor winding can handle. The rated motor voltage refers to the rated mains voltage. For synchronous motors, the value is indicated as U_{max} on the nameplate.
Rated motor speed	The rated motor speed corresponds to the speed class on the nameplate.
Rated power supply voltage	Enter the rated supply voltage, e. g. 400 V
Temperature sensor type	"Temperature sensor type" of the motor on the nameplate specifies which sensor is used for implementing the motor protection: • No sensor; • TH Thermostat (bimetallic switch); • TF Thermistor sensor (PTC thermistor); • KTY thermistor for detection of motor temperature. The KTY setting means the thermal motor model is activated in MOVIAXIS with SEW motors. The thermal motor model protects the motor thermally together with the KTY temperature sensor. If the motor with KTY is a non-SEW motor, an I^2t model is started if the XML file of the non-SEW motor contains thermal data. The KTY only provides an initial value. Afterwards, the calculation model is responsible for motor protection. If the motor with KTY is a non-SEW motor and the XML file of the non-SEW motor does not contain any thermal data, then a KTY limit temperature shutdown is activated.
Response	Here you can set the shutdown response of the MOVIAXIS® MX multi-axis servo drive in case of a motor overtemperature. The following settings are available: • **No response** - Motor overtemperature is ignored. • **Display only** - the error is only displayed in the 7-segment display; the axis keeps on running. • **Output stage inhibit / pending** - The axis switches to FCB controller inhibit (motor coasts to a stop). The axis performs a "warm start" following a "reset" (see chapter Operating Mode Display in the operating instructions). The reset time is reduced to a minimum because there is no booting involved. • **Emergency stop / pending** - The axis decelerates using the emergency stop ramp. The axis performs a "warm start" following a "reset" (see chapter Operating Mode Display in the operating instructions). The reset time is reduced to a minimum because there is no booting involved. • **Stop at application limits / pending** - The axis decelerates using the application ramp. The axis performs a "warm start" following a "reset" (see chapter Operating Mode Display in the operating instructions). The reset time is reduced to a minimum because there is no booting involved. • **Stop at system limits / pending** - The axis decelerates using the system ramp. The axis performs a "warm start" following a "reset" (see chapter Operating Mode Display in the operating instructions or system manual). The reset time is reduced to a minimum because there is no booting involved.
Forced cooling fan	Use this field to enter whether the motor is equipped with a forced cooling fan. The entered value will be used for the thermal motor model for motor protection.
Brake	Use this field to enter whether the motor is equipped with a brake. This will activate the brake function.

Monitoring



11808aen

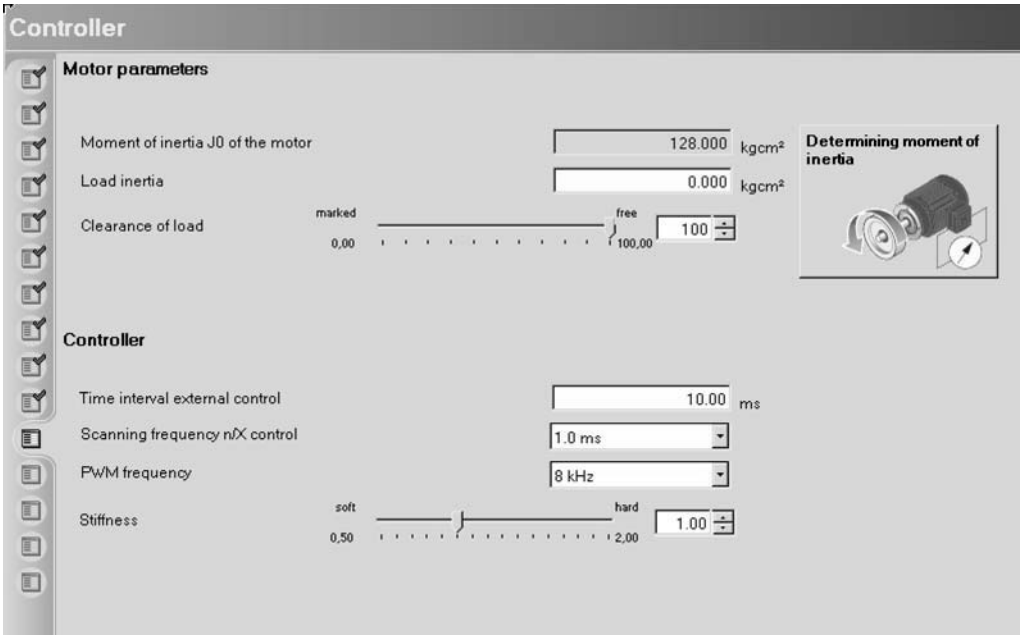
Figure 84: Menu setting for monitoring

	NOTES
	The value in the left column of the input menu is a recommendation, while the value in the right column is the current value of the MOVIAXIS® MX multi-axis servo drive. Click on • "→ " buttons to accept individual recommendations, • "Accept" button to accept all recommendations in one step.

- Enter the general MOVIAXIS® MX control parameters according to the following table.

Input data	Description
Speed monitoring and deceleration time n-monitoring	The speed required by the setpoint can only be achieved if there is sufficient torque available to meet the load requirements. Once the current limit has been reached, the MOVIAXIS® MX multi-axis servo drive assumes that the torque has reached its maximum value. The desired speed cannot be attained. Speed monitoring is triggered if this situation continues throughout the duration of the specified **delay n-monitoring**.
Current limit	The current limitation refers to the apparent output current of the multi-axis servo drive.

Speed controller setting



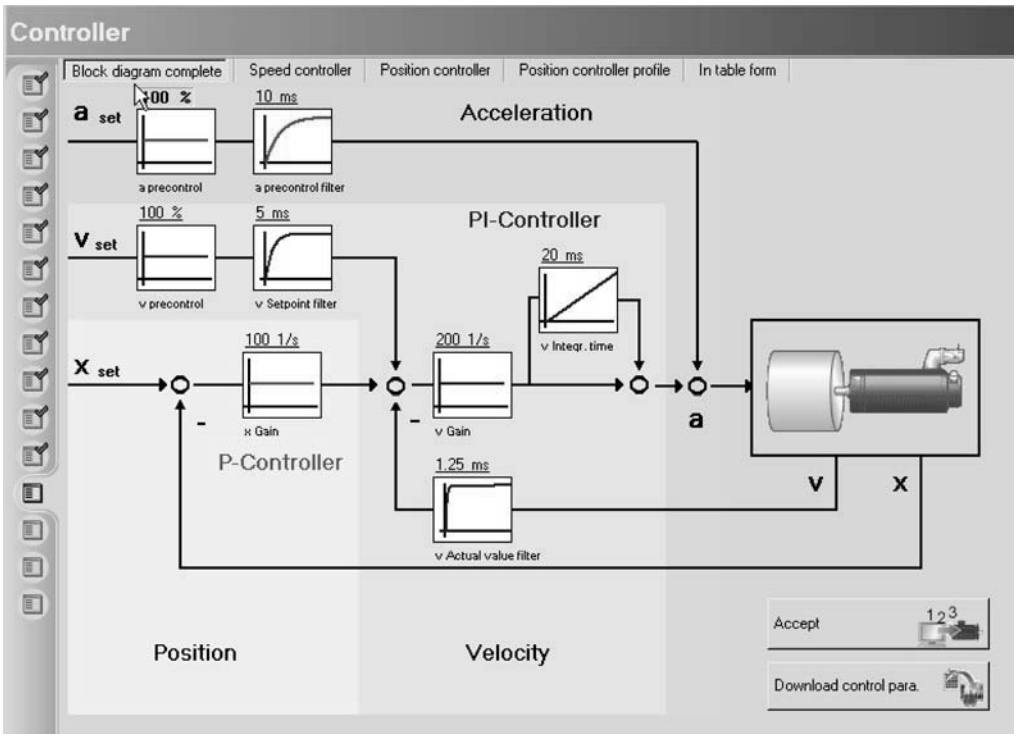
11809aen

Figure 85: Speed controller menu

- Enter the values for the speed controller.

Input data	Description
Moment of inertia J_0 of the motor	Display field for the mass moment of inertia value for the motor previously selected.
Load inertia	Input field for maximum external moment of inertia converted for the motor shaft. In "CFC" and "SERVO" operating modes, you have the option to determine the load mass moment of inertia automatically during a travel process. Click on the "Determine moment of inertia" button to determine the load mass moment of inertia. Startup must be performed at least once in order to use this function. In addition to that, a ramp must be traveled cyclically.
Clearance of load	Use the slider to set the clearance of the drive train.
Time interval external control	Enter the time interval of the external controller. This value is required for all FCBs that generate a setpoint in an interpolated manner (external ramp generator) as well as for analog setpoint selection. Note: The input value is not relevant for internal setpoint selection, e. g. FCB09 Positioning.
Scanning frequency n/X control	Use this field to specify the required scanning frequency of the speed / position controller. The default setting 1 ms should only be shortened for extremely dynamic applications.
Stiffness	Use the slider to set the stiffness of the speed controller. The value for the stiffness depends on the power transmission (direct drive high, toothed belt low) and is a measure for the velocity of the speed control loop. The value for the standard setting is 1. You enter the stiffness of the speed control loop either with the sliding scale or the input field. • If you increase the stiffness value, you will also increase the control rate. SEW-EURODRIVE recommends to increase the value during startup in small increments (0.05) until the control loop starts oscillating (motor noise). You will then have to lower the value. This approach ensures an optimum setting. • If you reduce the stiffness value (< 1), the control rate is reduced and the servo lag increases.

Block diagram speed controller

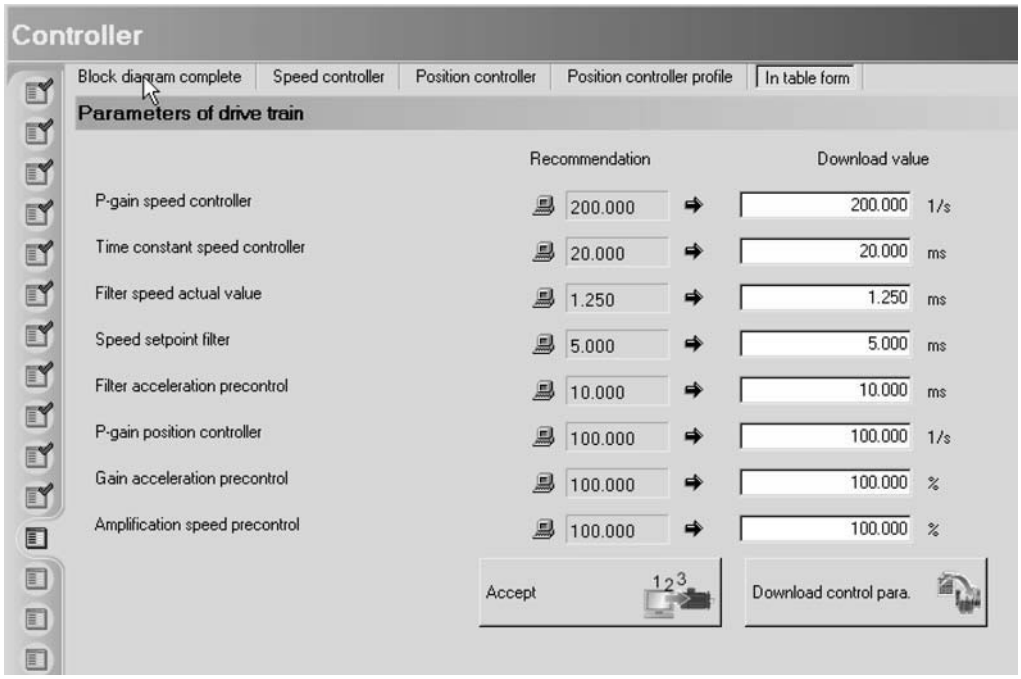


11810aen

Figure 86: Block diagram speed controller

Speed control parameters

In addition, you can set the speed controller parameters to "Classic".



11811aen

Figure 87: Parameter speed control menu

	NOTES
	The value in the left column of the input menu is a recommendation, while the value in the right column is the current value of the MOVIAXIS® MX multi-axis servo drive. Click on • "→ " buttons to accept individual recommendations, • "Accept" button to accept all recommendations in one step.

Input data	Description
P-gain speed controller	Gain factor of the P-component of the speed controller.
Time constant speed controller	Integration time constant of the speed controller. The I-component reacts inversely proportionate to the time constant, i.e. a large numerical value results in a small I-component, although 0 = no I-component.
Filter speed actual value	Filter time constant of the actual speed value filter.
Speed setpoint filter	Speed ramp will be filtered, graduated setpoint entry or interfering impulse at analog input can be smoothed.
Filter acceleration precontrol	Filter time constant of acceleration precontrol. This constant influences the control response of the speed controller. The differentiator is programmed.
P-gain position controller	Setting value for the P controller of the position control loop.
Amplification acceleration precontrol	Amplification factor of acceleration precontrol. This parameter improves the control response of the speed controller.
Amplification speed precontrol	Amplification factor of velocity precontrol. This parameter improves the control response of the position controller.

Axis configuration

11812aen

Figure 88: Axis configuration menu

MOVIAXIS® offers four user-specified units for the following variables:

- Travel distance,
- Velocity,
- Acceleration,
- Torque (not in motor startup → parameter tree).

A numerator, denominator and the decimal places for each variable are loaded to the axis module. The decimal places are only needed for display in the MotionStudio. They are neither used for converting user-defined units nor for bus communication.

"Basic configuration" button

- Travel distance

  Unit: Rotations (of the motor), 4 decimal positions

Example:

Setpoint	Traveled distance	Display in MotionStudio
10000	1 motor revolution	1.0000
15000	1.5 motor revolutions	1.5000

Once motor startup has been executed, the following values are written to the axis module (conversion 16-bit increments / rotation):

- User-defined unit position numerator = 4096
- User-defined unit position denominator = 625
- User-defined unit position resolution = 1E-04

- Velocity

  Unit: 1/min, 3 decimal places

Example:

Setpoint	Velocity	Display in MotionStudio
1000000	1000 1/min	1000.000
2345000	2345 1/min	2.345

Once motor startup has been executed, the following values are written to the axis module:

- User-specified unit velocity numerator = 1
- User-specified unit velocity denominator = 1
- User-specified unit velocity resolution = 1E-03

- Acceleration

  Unit: 1/(min × s) speed change per second, 2 decimal places

Example:

Setpoint	Acceleration	Display in MotionStudio
6500000	65000 1/(min × s)	65000.00
300000	3000 1/(min × s)	3000.00

Once motor startup has been executed, the following values are written to the axis module:

- User-specified unit acceleration numerator = 100
- User-specified unit acceleration denominator = 1
- User-specified unit acceleration resolution = 1E-02

- Torque: in preparation, currently only available via parameter tree.
- Jerk: is fixed.

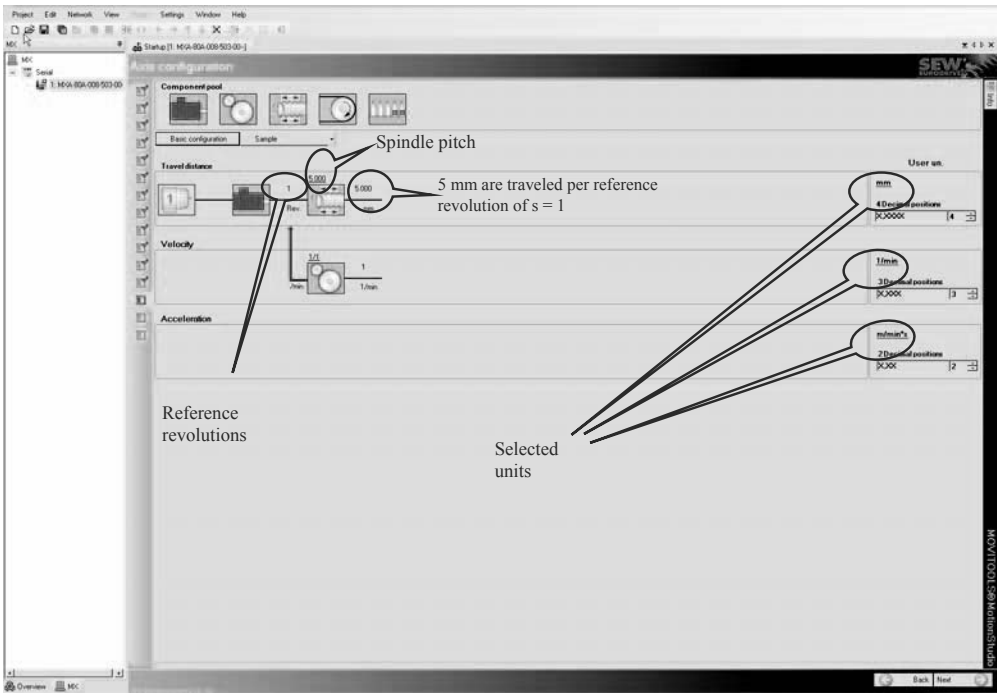
Example

Proceed as follows to set user-defined units other than the basic configuration.

Specification

- Position in (mm × 1E-01)
- Velocity in 1/min
- Acceleration in (m/s^2 × 1E-02)

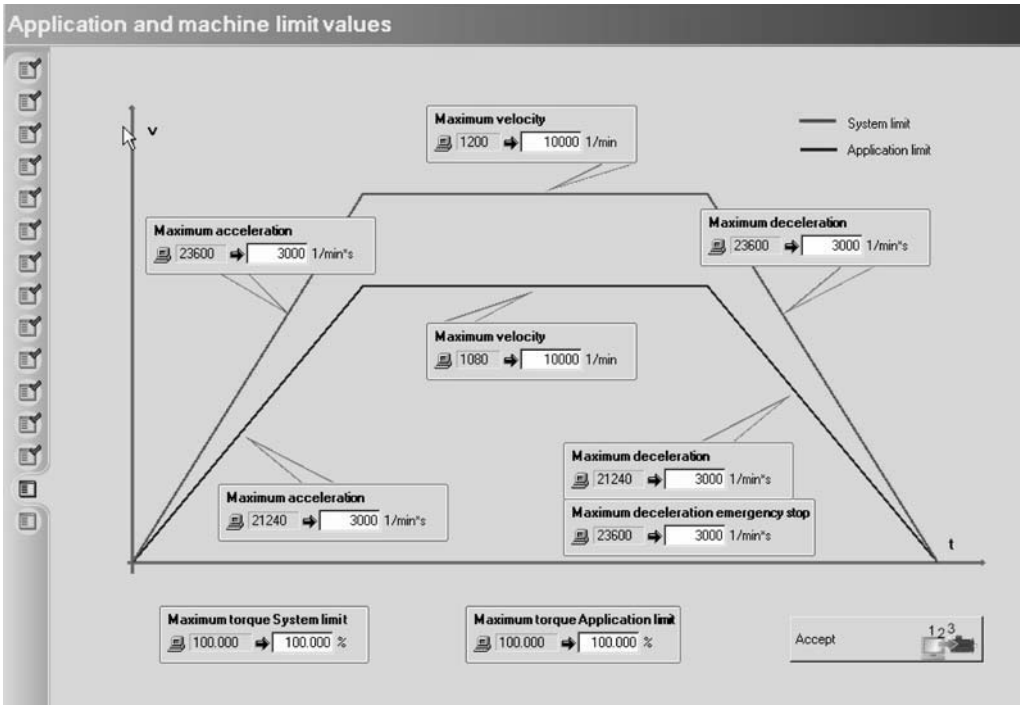
The rotary motion is turned into a linear motion with a spindle (pitch = 5 mm).



62492aen

Figure 89: Example for setting user-defined units

Application and system limits



11813aen

Figure 90: Application and system limits menu

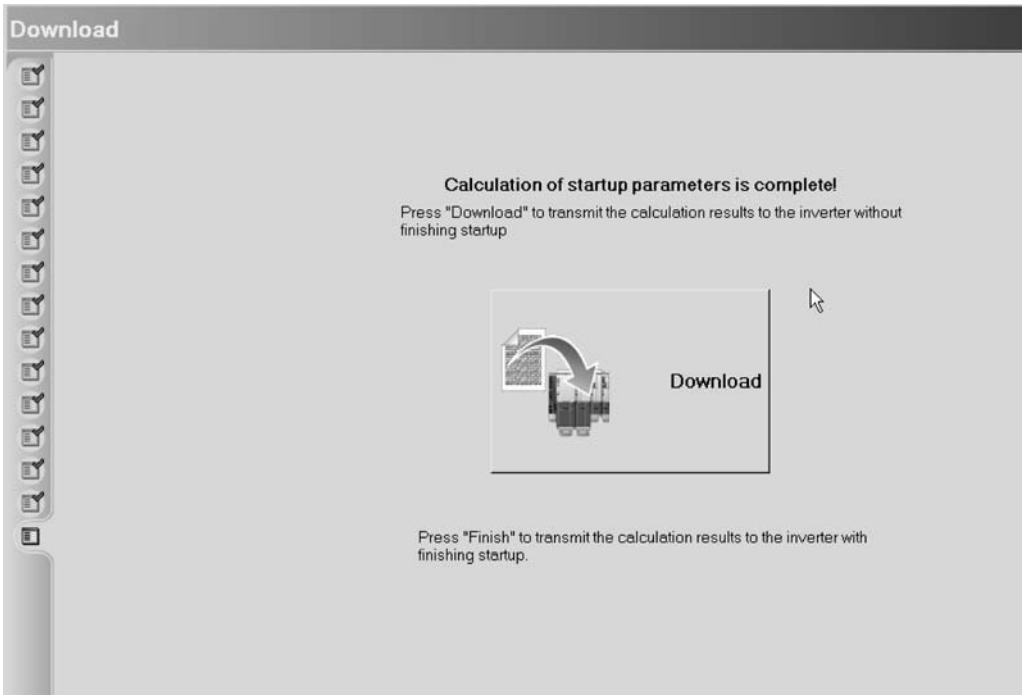
The application and machine limit values refer to the set user-specified units, see figure 89. The user-specified units selected previously are shown in the illustration and cannot be altered.

The fields on the right refer to the download value in the axis, converted to the user-specified unit. The fields on the left are calculated default values.

The following values are the basis for the basic configuration and the delivery status:

Variables	Limit values
System limit values (machine limit values)	
VmaxSys	10000 1/min, corresponds to the maximum speed possible in the axis module
a_maxSys	3000 1/(min × s) acceleration ramp
b_maxSys	3000 1/(min × s) deceleration ramp
Application limit values	
VmaxApp	10000 1/min, corresponds to the maximum speed possible in the axis module
a_maxApp	3000 1/(min × s) acceleration ramp
b_maxApp	3000 1/(min × s) deceleration ramp
Emergency stop deceleration	
b_maxAppNotStop	3000 1/(min × s) deceleration ramp, emergency stop ramp is mainly used for error response.

Download



11814aen

Figure 91: Download menu

- Press the "Finish" button to download the settings to the axis module.
- Close the window to finish startup.

Pxxx controller parameters

Pxxx speed control

Speed control only parameter set 1.

The setting of all parameters important for speed control is supported by the startup functions of the startup manager. Direct alterations to individual controller parameters are reserved for optimization by specialists.

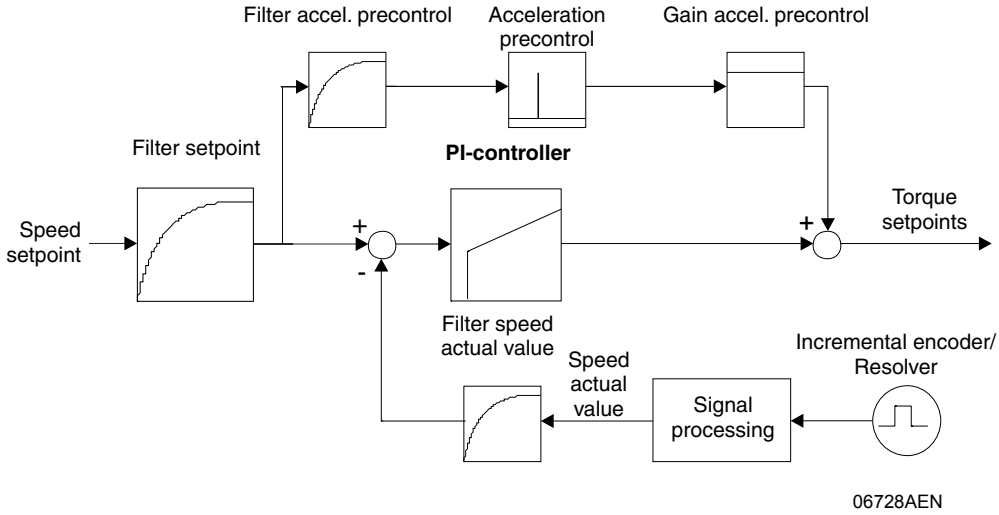


Figure 92: Basic structure of the speed control loop

P-gain speed controller

Gain factor of the P-component of the speed controller.

Time constant speed controller

Integration time constant of the speed controller. The I-component reacts inversely proportionate to the time constant. A large numerical value results in a small I-component, although 0 = no I-component.

Filter speed actual value

Filter time constant of the actual speed value filter.

Speed setpoint filter

Speed ramp will be filtered, graduated setpoint entry or interfering impulse at analog output can be smoothed.

Filter acceleration precontrol

Filter time constant of acceleration precontrol. This constant influences the control response of the speed controller. The differentiator is programmed.

P-gain position controller

Setting value for the P controller of the position control loop.

Amplification acceleration precontrol

Amplification factor of acceleration precontrol. This factor improves the control response of the speed controller.

PWM frequency

Setting the PWM frequency.

5.10 MOVIAXIS® startup - Multi-motor operation

	NOTES
	In this section, the startup menus are described which require special settings for multi-motor operation. The overall startup is performed as described in sec. "MOVIAXIS® startup - Single-motor operation", page 116.

For multi-motor operation, one or two multi-encoder cards are required.

Multi-encoder cards expand the MOVIAXIS® system for evaluation of additional encoders. Two different multi-encoder cards are available. They have to be selected according to the encoder that is to be evaluated. An analog, differential input (±10 V) is also available on the multi-encoder cards.

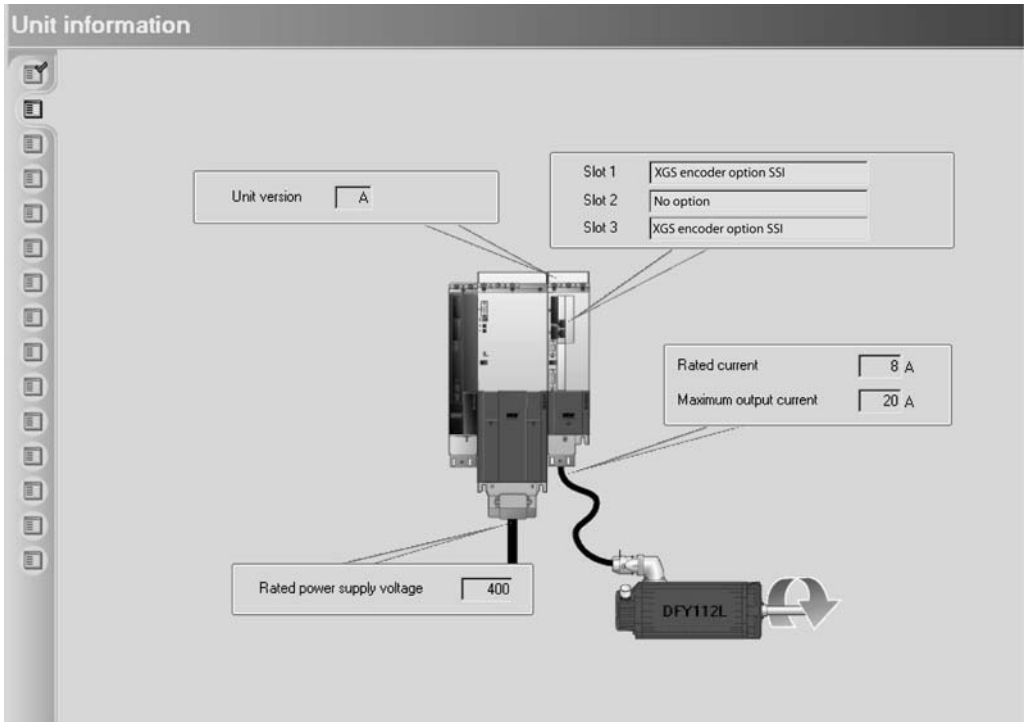
Areas of application

The multi-encoder card can be used for the following areas of application:

- Positioning, either directly using the external encoder or with the motor encoder.
- Multi-motor operation (max. 3 motors).
- SSI absolute encoder evaluation.
- Operation of non-SEW motors that are equipped with EnDat encoders.
- Systems with slip.
- Compensation of rope and belt elongation.
- Reading in of master values for cam and synchronous operation systems.
- Analog setpoint specification and encoder simulation of the actual position to the controller
- General use of the differential analog input ±10 V, for example, for torque setpoint or torque setpoint specification.

Current settings

The figure below shows the current settings.



11815aen

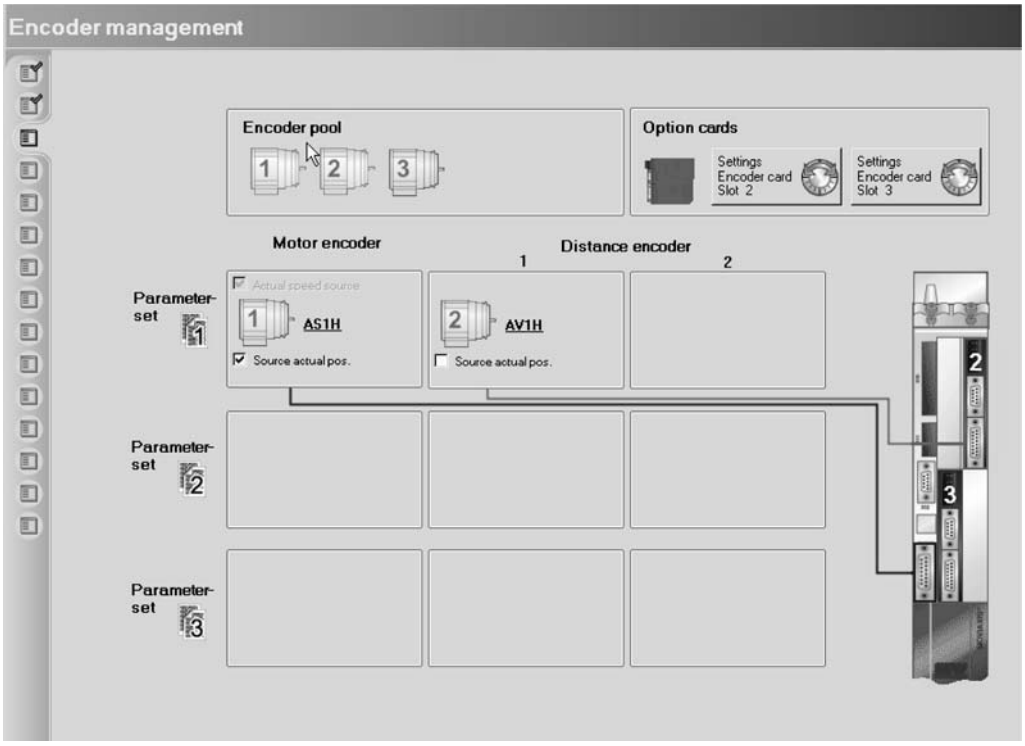
Figure 93: Overview of current settings

The card types of option cards inserted into the card slots are shown in this menu.

In this example:

- Slot 1: Multi-encoder card XGS
- Slot 2: Not assigned
- Slot 3: Multi-encoder card XGS

Encoder management



11818aen

Figure 94: Encoder management

Encoder management allows you to assign the yellow-marked encoders offered in the encoder pool to the individual parameter records or motors. If several motors are to be operated on one axis module, you need additional multi-encoder cards (option).

- Click on the required encoder and hold the left mouse button down to drag the encoder to the intended parameter record. In the example above, encoder 1 of the type AS1H is defined as motor encoder and encoder 2 of the type AV1H as external distance encoder.

Encoder selection

The encoder pool represents the maximum three physical MOVIAXIS® encoder inputs. Encoder 1 is the encoder input of the basic unit. Encoders 2 and 3 can be expanded with multi-encoder cards.

- Use each encoder only once.
- **Tachometer**:

  Encoders in the "Motor encoder" column are always the "Actual speed sources" and thus tachometers.
- **Position encoder**:

  Encoders in the two "Distance encoder" columns are position encoders.

  Encoders in the "Motor encoder" column can also be position encoders. For this purpose, the "Source actual pos." checkbox must be ticked.
- Several encoders can be prepared as position encoders.
- But only one encoder can be the "Actual position source."

Encoder signal processing when using encoder emulation

Encoder emulation can be used to make encoder signals available to a higher-level controller via the emulation output terminals.

Encoder emulation is independent of the connected encoder type.

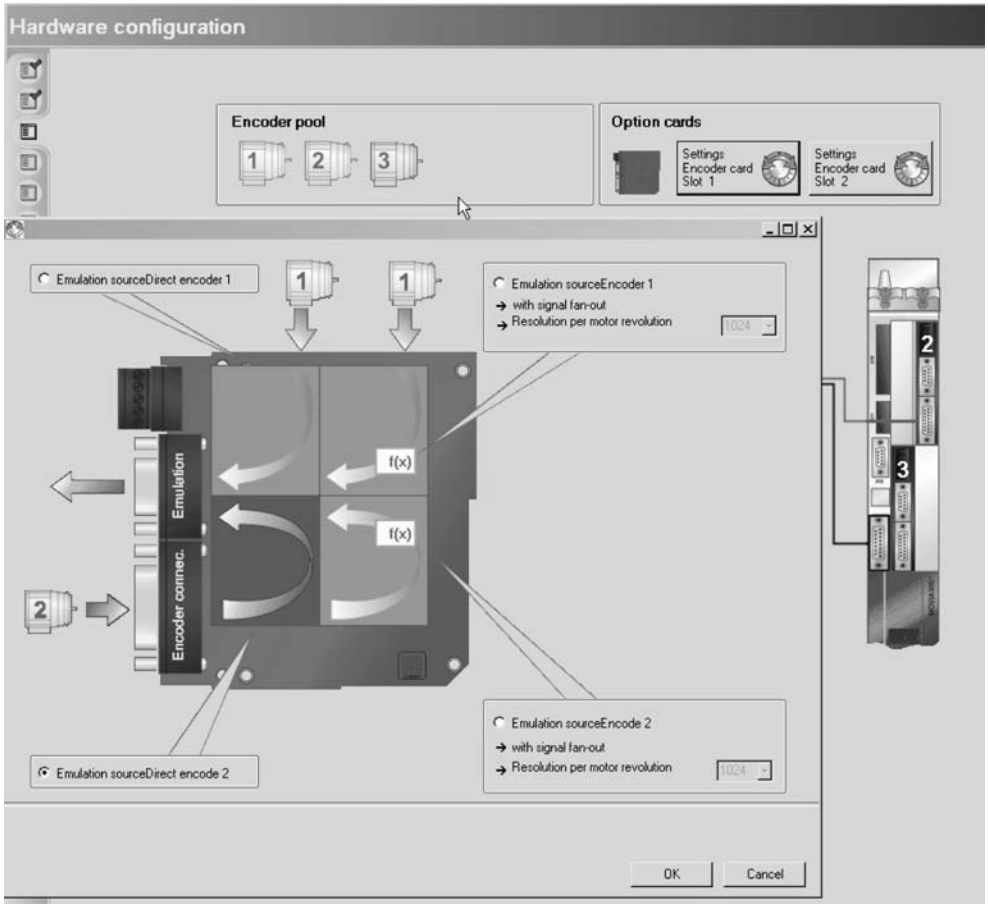


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Figure 95: Encoder signal processing

[1] Emulation source direct is without delay.

[2] Emulation source with signal fan-out: 100 µs

Click on the button **[Settings encoder card slot 1]** or **[Settings encoder card slot 2]** in the menu item "Option cards" to set the emulation source or to assign the encoder that is to be used for incremental encoder simulation. In the example above, this is encoder 2.

The signal processing of the connected encoder can be set as follows:

- Emulation source direct: Encoder 1 / 2
- Emulation source encoder 1 / 2: With signal fan-out, increments per motor revolution.

Emulation source direct

The signals of the connected encoder are looped through to emulation directly.

	NOTES
	If a resolver is connected to the encoder input of the basic unit, this cannot be used as "emulation source direct". This is possible in connection with software emulation only.

With signal fan-out, increments per motor revolution

This selection uses software emulation.

The following settings are possible in "increments per motor revolution": 64 / 128 / 256 / 512 / 1024 / 2048 / 4096.

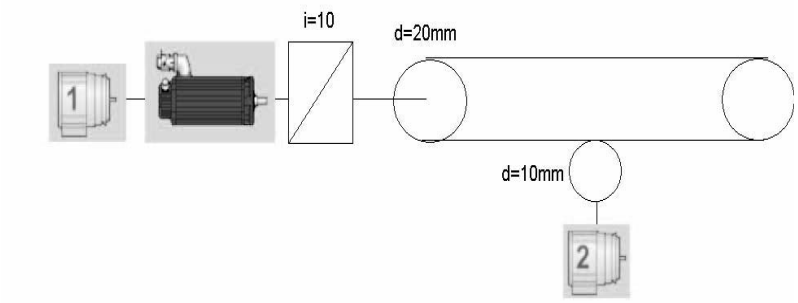
The output increments per motor revolution at the emulation terminal are independent of the resolution of the connected encoder.

5.11 Application examples

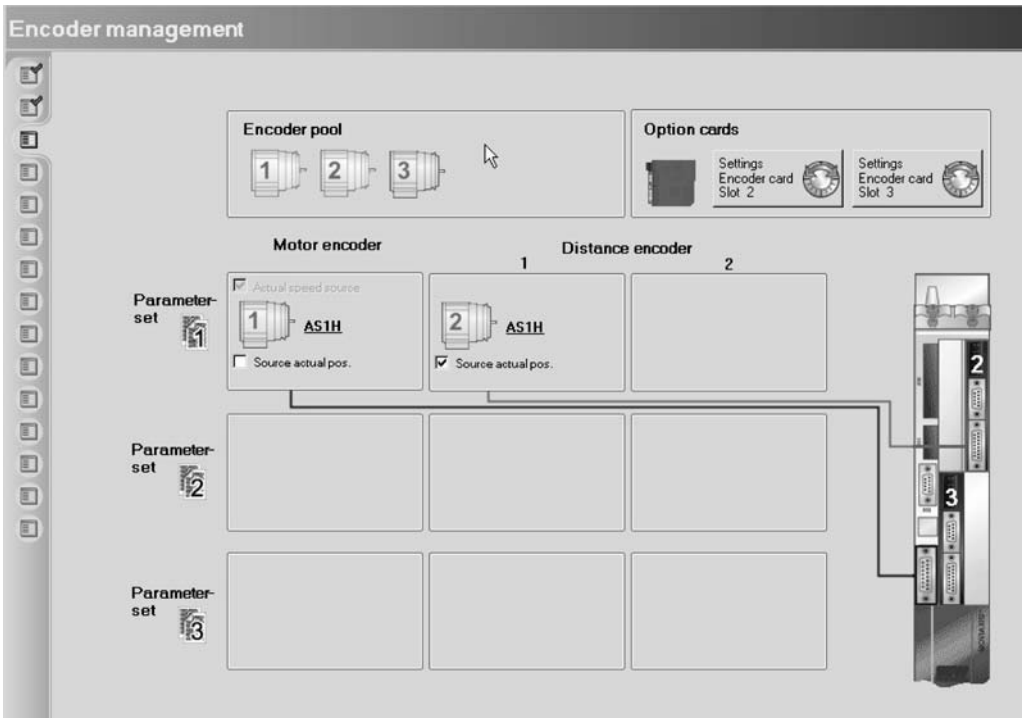
Example 1: Rotatory encoder as distance encoder

Applications: E.g. non-linear transmission elements, such as crank arms, flying saws, master value axes, such as electronic cams.

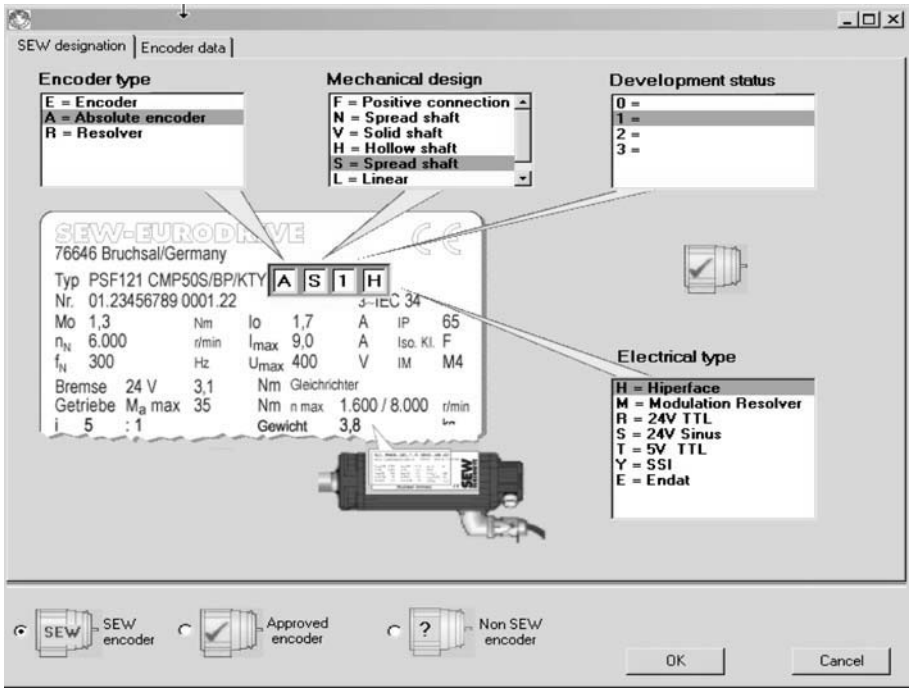
In this example, the position actual value of the absolute encoder designated as encoder 2 is used directly for position control. The encoder ratios for motor encoder (encoder 1) and distance encoder (encoder 2) must be set during startup. In this example, the encoder ratio between encoder 1 and encoder 2 is "1:5". The encoder ratio between encoder 1 and encoder 2 is automatically determined by moving the system. It can also be calculated and entered manually.



Settings:



Encoder 2 must be set as "Source actual position".



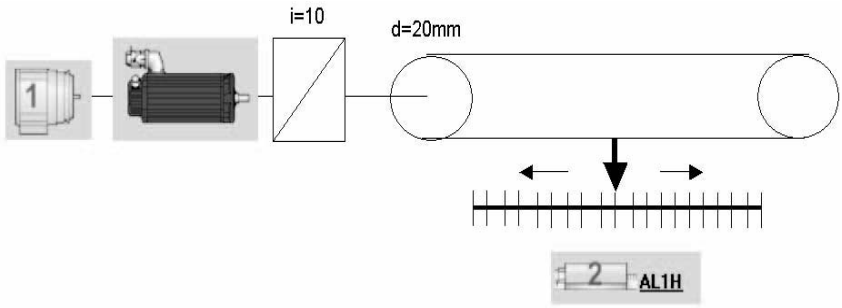
Selection and settings of the encoder type.

Setting the ratio between encoder revolutions and motor revolutions directly, i.e. by calcuation or moving the system.

Example 2: Linear encoder as position encoder

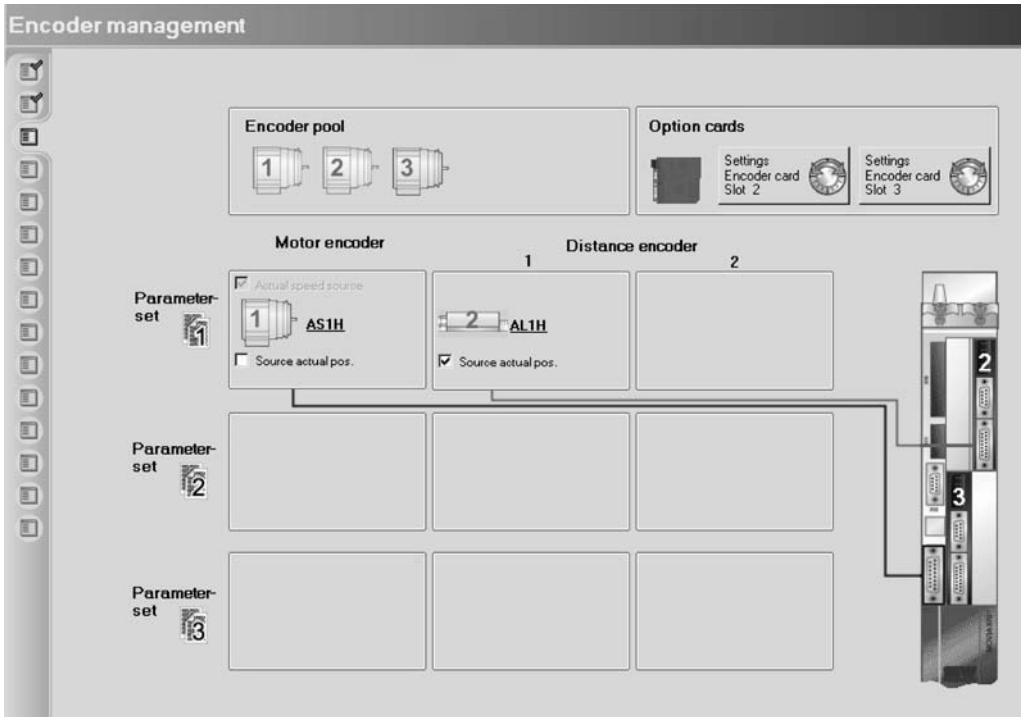
Applications: E.g. storage and retrieval units (because of the slip of the carrying wheels), for systems with backlash.

The travel distance of the linear distance encoder must be entered for one motor revolution. The travel distance for one motor revolution is determined automatically, but it can also be calculated and entered manually.

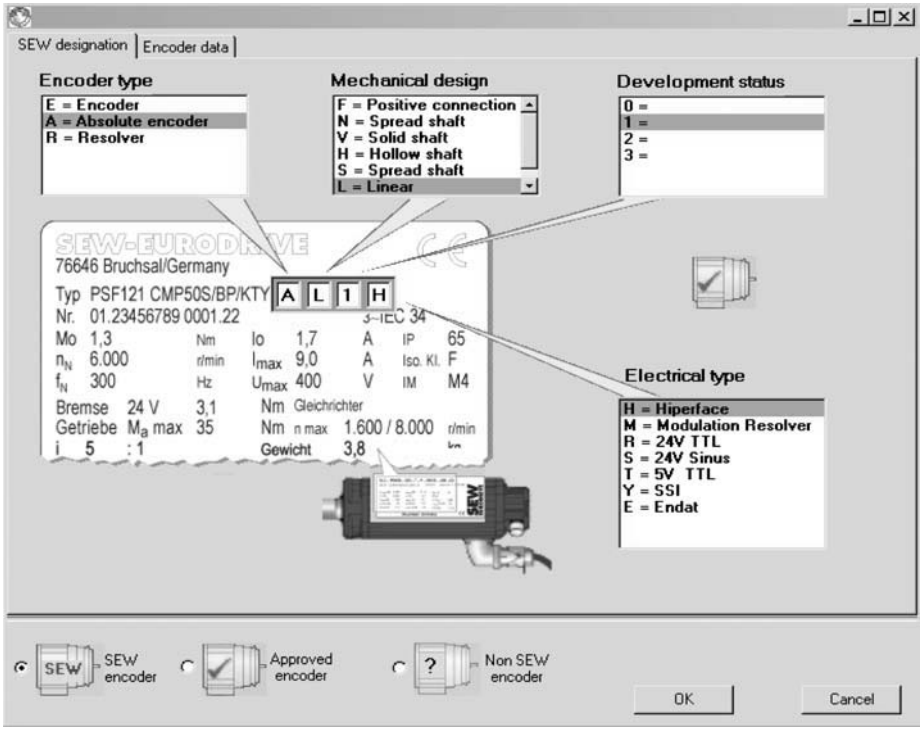


Settings:

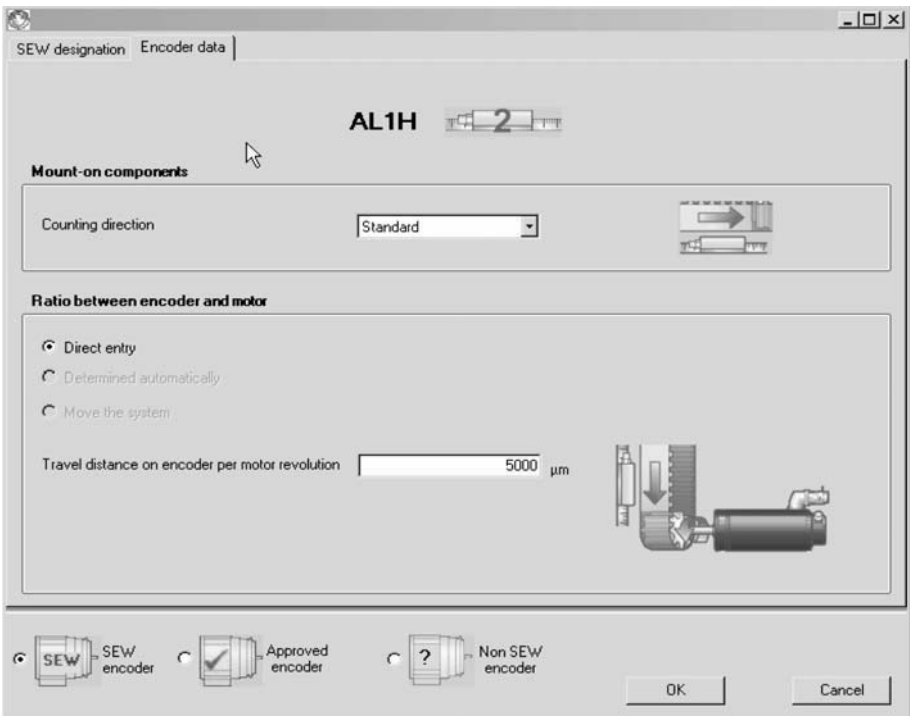
Selection and settings of the encoder type using the example of the linear encoder AL1H.



Encoder 2 must be set as "Source actual position".

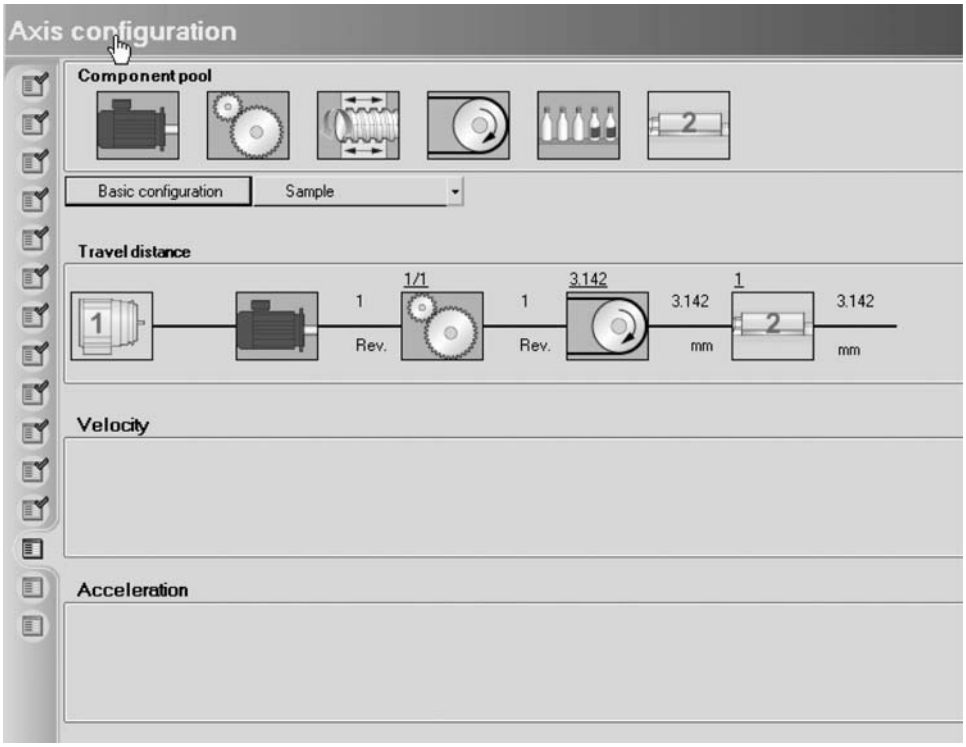


Selection and settings of the used AL1H encoder.

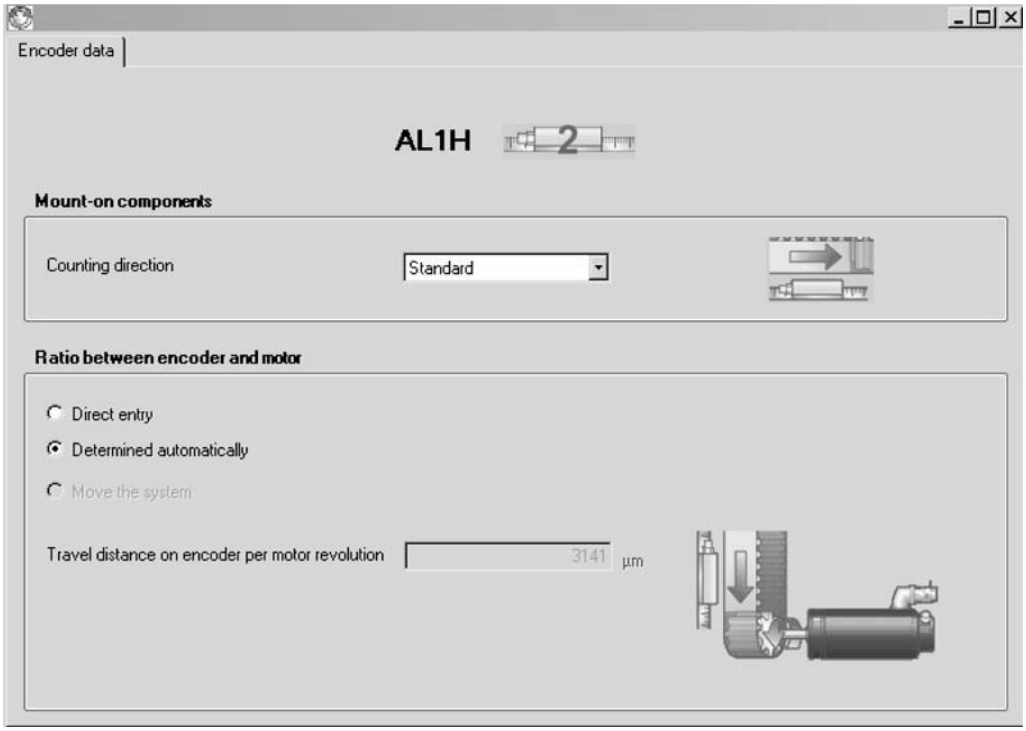


"Travel distance on encoder per motor revolution" can be entered here directly after calculating it manually, or be determined by moving the system.

"Determined automatically" can only be selected under the menu item "Axis configuration", see next figure.



Configuration of the axis.

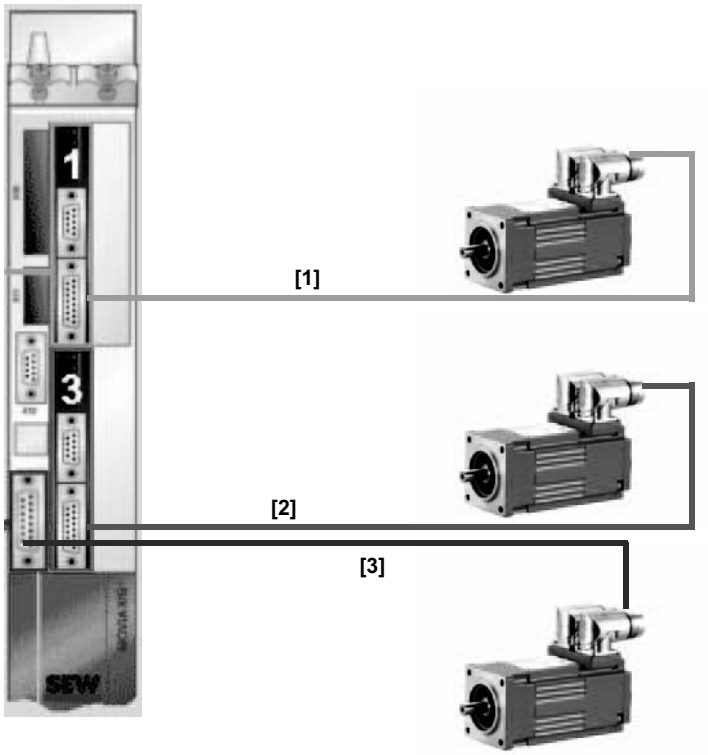


Double-click on encoder 2 "AL1H" to enter the "Travel distance on encoder per motor revolution". It is possible to enter the travel distance by clicking on the "Direct entry" button after calculating it manually, or to determine it by clicking on "Move the system" or by selecting "Determined automatically". In this example, the "Travel distance on encoder per motor revolution" = 3141µm.

Example 3: Multi-motor operation

Application: In applications with several axes, which have the same output torque and which are **not** operated at the same time.

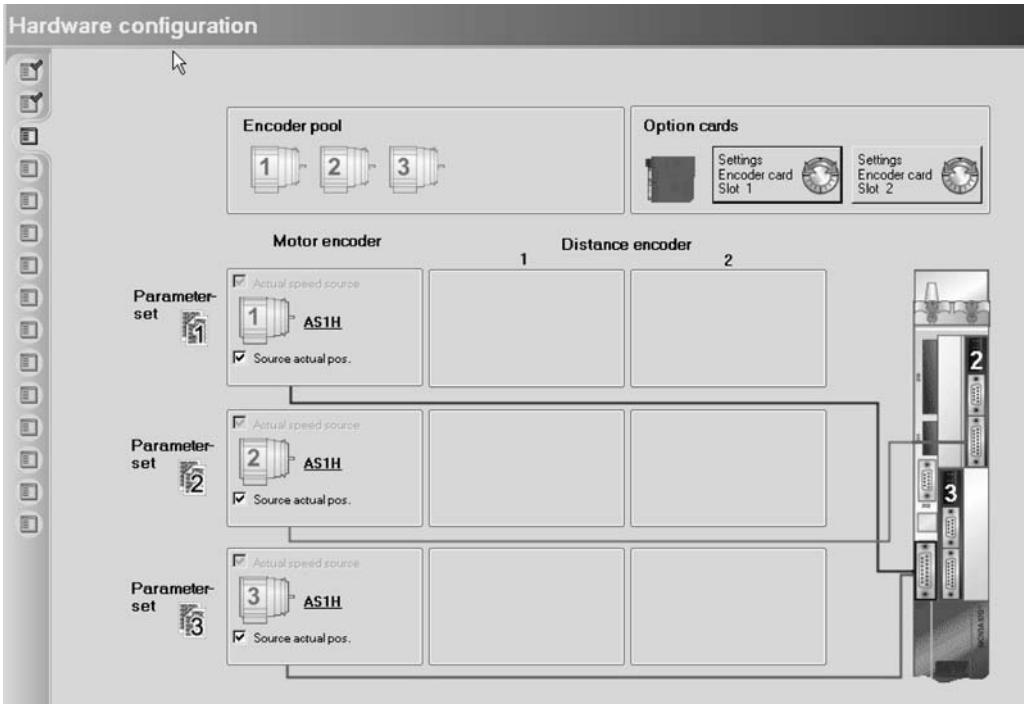
Up to 3 motors can be connected to one axis module. For this purpose, 2 additional multi-encoder cards must be inserted into the axis module, see following figure. The axis module switches the power for the motors to the currently active motor.



[1] Motor encoder 1, multi-encoder card 1

[2] Motor encoder 2, multi-encoder card 2

[3] Motor encoder 3 on basic unit



Encoder 1 must be set as "Actual position source" for parameter record 1.

Encoder 2 must be set as "Actual position source" for parameter record 2.

Encoder 3 must be set as "Actual position source" for parameter record 3.

The individual parameter records can only be started up one after another and only once the startup process has been completed.

The individual parameter records can be selected via parameters, please refer to the parameter description in the "MOVIAXIS® MX Multi-Axis Servo Inverter" project planning manual.

5.12 PDO Editor

Use the PDO Editor to set the process data.

Structure and data flow

You can write setpoints, such as velocity or position, as 16-bit process data into the PD-IN buffer of MOVIAXIS® via a bus system, e.g. a fieldbus. You can specify these setpoints in freely definable user-specific units, e.g.

- [m/s],
- [mm],
- [cycles/min]

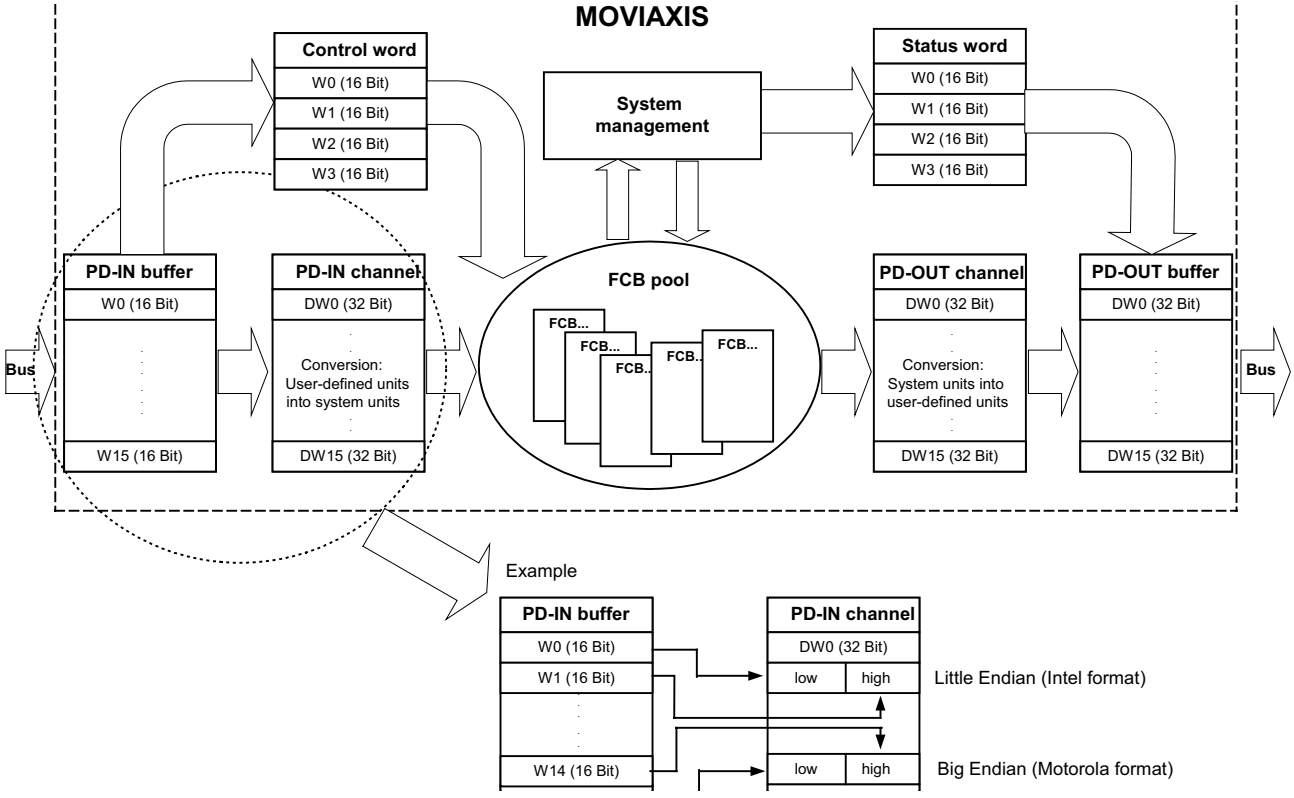


Figure 96: PDO process data flow

This process data is further processed as double word depending on how the subsequent PD-IN channel is configured. The user-specified units are converted into system units and transferred to the relevant FCBs, see figure 96. MOVIAXIS® offers 16 PD-IN channels.

Depending on the process data configuration, actual values such as speed and position can be converted into user-specified units via 16 32-bit wide PD-OUT channels and are transferred to the connected bus system via 16 process data buffers.

Information on the status of the axis, such as

- "Ready for operation",
- "Motor standstill",
- "Brake released"

can also be written to a process data word of the PD-OUT buffer via a status word. The information can also be processed by a higher-level controller via the connected bus.

Four configurable status words are available, see figure 96.

Parameter setting example

This example shows how to set the parameters of a PROFIBUS connection for speed control.

Setting the fieldbus interface parameters

A mouse-click on an IN buffer opens its configuration interface. The communication option is selected as data source for a PROFIBUS connection.

The following three process data words are used in the example:

- FCB activation,
- Ramp,
- Speed

To being able to test the example without PROFIBUS, the update function is first set to off. The configuration interface for these settings looks as follows:

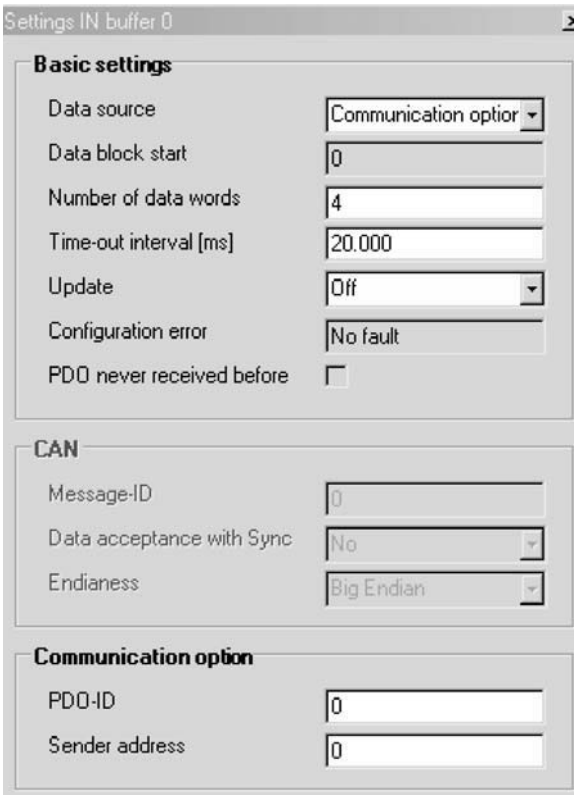


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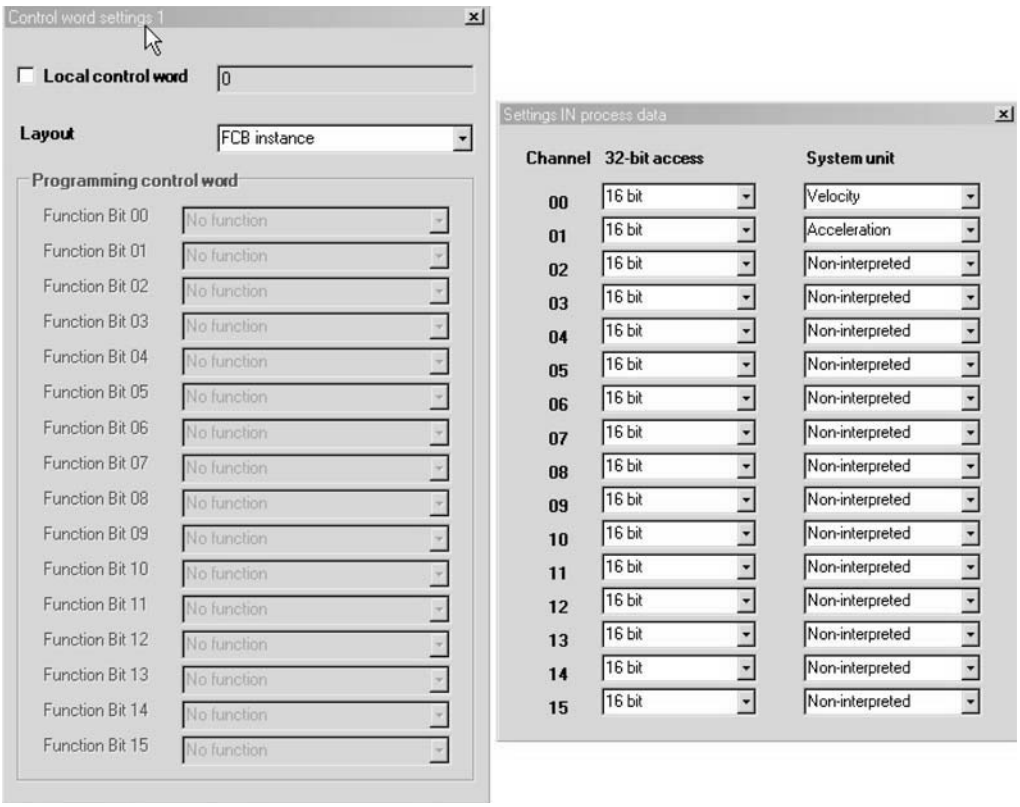
Figure 97: Settings IN buffer 0

Setting the parameters of the control word and the IN process data

A single click on one of the control words, in the example control word 1, opens the configuration interface and selects the FCB / instance layout. The IN process data channel 0 is assigned the system variable "velocity", and channel 1 the system variable "acceleration."



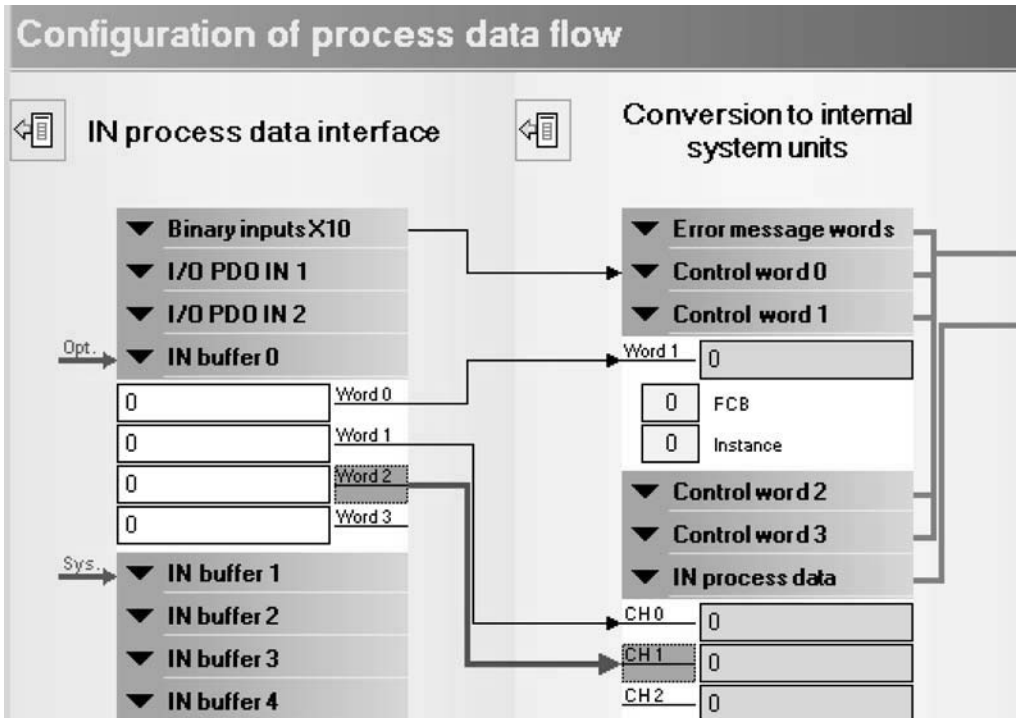
11829aen

Figure 98: Settings control word and IN process data

Assigning the input buffer to the system variables

Next, the words of the IN buffer must be assigned to the control word 1 and the IN process data.

In the example, the first word of the IN buffer is assigned the FCB number, the second word is assigned the speed, and the third word the ramp. You can assign the associated words using drag & drop.



11830aen

Figure 99: IN process data interface, conversion of internal system variable

Setting the FCB parameters

Clicking "FCB" opens the configuration interface of the FCBs. To being able to control the speed controller via fieldbus, the setpoint sources for velocity and acceleration values are set to process data buffer channel 0 or channel 1 in the FCB05.

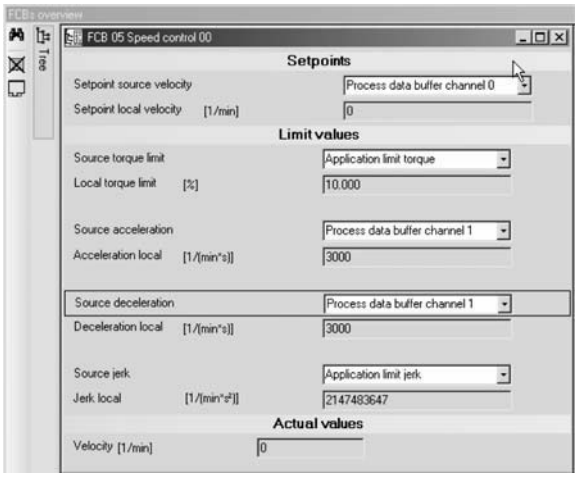


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Figure 100: Overview of FCBs

Testing the configurations

The configuration is now complete and can be tested. You can change the words in the detail view using the keyboard as long as IN buffer update is disabled.

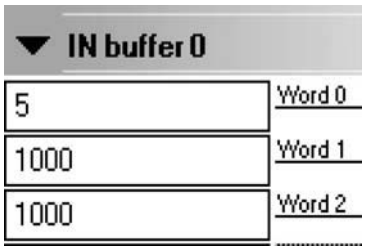


Figure 101: Testing the configuration

Once buffer update is enabled, see figure 97, the words are automatically updated with the values of the bus.

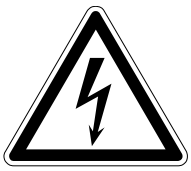
	NOTES
	The update function is automatically enabled when the unit is restarted and has to be disabled, if required.

5.13 Parameter list

You find a parameter list with descriptions in the "MOVIAXIS® MX Multi-Axis Servo Inverter" project planning manual.

6 Operation

6.1 General information



⚠ HAZARD

Dangerous voltages at cables and motor terminals

Severe or fatal injuries from electric shock.

- When the unit switch is in the ON position, dangerous voltages are present at the output terminals as well as any connected cables and motor terminals. This also applies even when the unit is inhibited and the motor is at standstill.
- The fact that the operation LED is no longer illuminated does not indicate that the MOVIAXIS® MX multi-axis servo drive is no longer connected to the mains and is de-energized.
- Before you touch the power terminals, check to see that the MOVIAXIS® MX multi-axis servo drive has been disconnected from the mains.
- Observe the general safety notes in section 2 and the notes in sec. "Electrical Installation" on page 74.

⚠ HAZARD

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

Mechanical blocking or internal safety functions of the unit can cause a motor standstill. Removing the cause of the problem or performing a reset can result in the drive restarting on its own.

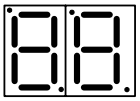
- Ensure that the motor cannot start inadvertently, for example, by removing the electronics terminal block X10.
- Additional safety precautions must be taken depending on the application to avoid injury to people and damage to machinery.

STOP

The motor output of the multi-axis servo inverter may only be switched or disconnected when the **output stage is inhibited**.

6.2 Displays of the supply and axis modules

Operating display of the 7-segment display



- The two 7-segment displays indicate the operating status of the supply modules and axis modules.
- All settings and functions relating to startup of the axis system are located in the axis module. That is the reason for more operating displays in the axis module than in the supply module. The supply module is not equipped with any programmable intelligence.
- Responses to detected errors and warnings take place in the axis module only. The error and warnings are, however, displayed in the axis module and to some extent in the supply module. For some events, other numbers may be displayed in the axis module than in the supply module. These events are marked in the operating display table of the supply module.
- The displays for the axis modules and the supply modules are therefore described separately.

Error display of the 7-segment display

The MOVIAXIS® MX multi-axis servo drive detects any errors that occur and displays them as error code. Each error is clearly defined by its error code and corresponding attributes, such as

- the error response,
- the final status after executing the error response,
- the type of reset response.

Error message with two 7-segment displays

The error codes are indicated as flashing numeric values in the axis and supply module.

The error code is displayed in the following display sequence:

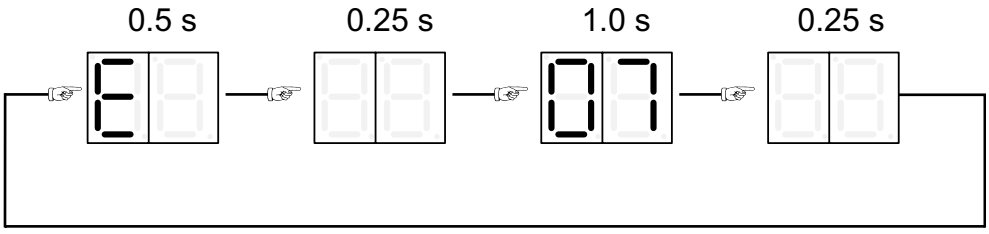


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Figure 102: Example: Error display of error 07 at the axis module

In addition to the error code, a "sub-error code" has been defined to further localize the reason for the error. The "sub-error code" can be read by the operator via the communication connection.

The display can jump back to the statistical operation display depending on the type of error and the response programmed for an error.

Error in the supply module

Errors in the supply module are reported to the axis and processed by the axis.

You execute a reset by interrupting the 24 V electronics supply or via the software.

Error list

Explanation of terms in the error lists

Terms and abbreviations	Meaning
P	Programmable error response
D	Default error response set at the factory
VM	Power supply module
AM	Axis module
ZK	DC link
HW	Hardware
SW	Software
AWE	User-defined unit

The final error status determines which reset type will be executed in case of an error reset, see following table.

Final error status	Response to error confirmation, also see page 160
Display error only	Warm start (delete error code)
System is waiting	Warm start (delete error code)
System is blocked	System restart (execute soft reset)
System is blocked	CPU reset (execute CPU reset)

Responses to error acknowledgement

CPU reset

A true restart of the microcontroller and the firmware will take place in case of a CPU reset. The firmware system is started as though a new axis module has been connected to the network.

Restart of the system has the following results:

- The bootstrap loader will be activated, "b0" will appear in the display,
- Reference positions of incremental encoder systems will be lost,
- Any existing fieldbus interfaces will be reset,
- Any existing control options will be reset,
- Fieldbus communication will be interrupted,
- The interface between options and firmware system is initialized again. A new boot synchronization to the fieldbus or control option takes place.
- Communication via CAN interfaces of the system will be interrupted,
- Connection to the supply module will be synchronized again (hardware information system),
- The existing "error message" will be reset [binary output = 1, system status = 0].

The ready signal will be reset by the system status control after the reset by the system status control.

System restart

There will be **no** true reset of the microcontroller with a system restart.

The system restart has the following results:

- The firmware will be restarted, without the boot loader becoming active (no display "b0" !)
- Reference positions of incremental encoder systems will be lost,
- Any existing fieldbus cards are not affected,
- Any existing control options are not affected,
- The interface between options and firmware system is initialized again. A new boot synchronization to the fieldbus or control option takes place.
- Communication via CAN interfaces of the system will be interrupted,
- Connection to the supply module will be synchronized again (hardware information system),
- The existing "error message" will be reset [binary output = 1, system status = 0].

The ready signal will be reset by the system status control after the reset by the system status control.

Warm start

A warm start only resets the error code.

The warm start has the following results:

- The firmware system is not rebooted
- All reference positions will be maintained
- Communication is not interrupted
- The existing "error message“ will be reset [binary output = 1, system status = 0].

6.3 Operating displays and errors of the MXP supply module

Table of displays

	Description	State	Comment / action	Display on the axis module
Displays during standard operation				
	Ready for operation (ready)	No error/Warning. U_z = > 100 V.	Status display only.	-
Displays of diverse unit states				
	DC link voltage missing or less than 100 V.	No error/Warning. U_z = > 100 V.	Check mains.	X
Displays in case of warnings				
	I^2xt prewarning.	Utilization of the VM has reached the prewarning level.	Check application regarding utilization.	P
	Temperature prewarning.	The temperature of the VM is approaching the cut-off threshold.	Check application regarding utilization, check ambient temperature.	P

Table of errors

	Description	State	Comment / action	Display on the axis module
Displays in case of an error				
	Error brake chopper.	Brake chopper is not ready for operation.	See error list of axis modules.	X
	Error excessive ZK voltage U_z.	Error message by SM via signaling bus when DC link voltage is too high.	Check application design and braking resistor.	X
	Error excessive ZK current.	The DC link current in the SM has exceeded the maximum limit of 250 % I_{rated}.	Check application regarding utilization.	X
	Error I^2xt monitoring.	Utilization of the VM has reached the limit value.	Check application regarding utilization.	X
	Error temperature monitoring.	Temperature of the VM has reached the switch-off threshold.	Check application regarding utilization, check ambient temperature.	X
	Error voltage supply (switched-mode power supply module inside unit).	A supply voltage inside the unit is defective.	Check connected loads for overcurrent or unit for defects.	-
	Error voltage supply (switched-mode power supply module inside unit).	A supply voltage inside the unit is defective.	Check connected loads for overcurrent or unit for defects.	-

6.4 Operating displays and errors of MXA axis module

Table of displays

	Description	State	Comment / action
Displays during boot process			
b0	Unit passes through several states when loading the firmware (boot) to get ready for operation.	• Status: not ready. • Output stage is blocked. • No communication possible.	• Waiting for boot process to finish. • Unit stays in this condition: Unit defective.
b1			
b2			
b3			
br			
Displays of diverse unit statuses			
00	No DC link voltage.	• Status: not ready. • Output stage is blocked. • Communication is possible.	Check mains.
C1	Supply module not ready for operation.		Check supply module.
C2	Axis module 24 V or internal switched-mode power supply module of axis not ready for operation.		24 V check or unit defective.
C2 Flashing	Axis module in safe stop.		Safety function activated.
C3	Synchronization with bus is incorrect. Process data processing not available.		• Check bus connection. • Check synchronization setting at unit and control. • Check process data settings at unit and control. • Check missing of a PDO.

C4
Flashing
	The encoder evaluation is not ready.		• Encoders are initialized.
			• Unit stays in this condition:
			  • No encoder selected.
			  • "Source of actual speed" parameter shows an encoder that does not exist.

Displays during initialization processes (parameters will be reset to default values)			
d0	Basic initialization.	• Status: not ready. • Output stage is blocked. • Communication is possible.	Waiting for initialization to finish.
d1	Initialization delivery status.		
d2	Initialization factory setting.		
d3	Initialization customer-specific set 1.		
d4	Initialization customer-specific set 2.		

	Description	State	Comment / action
Displays during standard operation			
	Output stage inhibit	• Output stage is blocked.	The drive is not actuated by the output stage. The brake is applied; without brake the motor coasts to a halt. This FCB is permanently selected with terminal DI00. But it can be additionally selected by other sources.
	Unassigned	For more information, refer to the chapter parameter description in the project planning manual.	
	Unassigned		
	Unassigned		
	n-control (speed control)		Speed control with internal ramp generator.
	Interpolated n-control		Speed control with setpoints cyclically via bus. The ramp generator is located externally, e.g. in the higher-level controller.
	M-control (torque control)		Torque control
	Interpolated M-control		Torque control with setpoints cyclically via bus.
	Position control		Positioning mode with internal ramp generator.
	Interpolated position control		Positioning mode with setpoints cyclically via bus. The ramp generator is located externally, e.g. in the higher-level controller.
	Limit switch (HW & SW) enable or approach		This FCB is activated by the firmware when the limit switch is hit.
	Reference travel		The drive performs reference travel.
	Stop		Deceleration at application limit. This FCB also becomes active if no other FCB is selected as default FCB.
	Emergency stop		Deceleration at emergency stop limit.
	Stop at system limit		Deceleration at system limit.
	Electronic cam		Electronic cam active.
	Synchronous operation		Synchronous operation active.
	Calibrate encoder		Encoder commutation for synchronous motors.
	Hold control		Position control at current position.
	Jog mode		Jog mode active.
	Brake test		Brake is tested by applying torque while brake is closed.

Table of errors

	NOTES
	Errors or sub-error codes, which are not included in the following list, can be displayed within the framework of displayed error codes. In this case, contact SEW-EURODRIVE.

A "P" in the column "Error response" indicates that the response is programmable. The factory set error response appears in the "Error response" column.

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
00	No error (this display is actually an operation display -> see operation displays)	**---**	---	---	---		Ready = 1 (depending on system status) Malfunction = 1
01	Error "Overcurrent“		• Short-circuit output • Motor too large • Defective output stage	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
02	Error "UCE monitoring“		The error is an additional kind of overcurrent, measured at the collector-emitter voltage of the output stage. The possible reason behind this error is identical to error 01. The distinction is important for internal purposes only.	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
03	Error "Ground fault“		Ground fault • in the motor lead • in the inverter • in the motor	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
04	Error "Brake chopper“		Error message by SM via signal bus. • Too much regenerative power • Braking resistor circuit interrupted • Short circuit in the braking resistor circuit • Brake resistor has too high resistance • Brake chopper defective	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
05	Error "Timeout signaling bus”		The connection between supply module and axis module via signaling bus has been interrupted	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	Connection to signaling bus interrupted				
		02	Timeout flag signaling bus cannot be reset				
06	Error "Mains phase failure“		Error message by SM via signal bus. It was detected that a mains phase is missing.	Display only (D), (P)	---------	Yes	Ready = 0 Malfunction = 0
07	Error "U DC link“		Error message by SM via signaling bus when DC link voltage is too high	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
08	Error "Speed monitoring“		Active speed monitoring has detected an unacceptable deviation between setpoint and actual speed	Output stage inhibit (D), (P)	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Motor speed monitoring				
		02	Regenerative speed monitoring				
		03	System limit actual speed exceeded				
11	Error "Overtemperature“ axis module		The temperature of the AM has reached or exceeded the shutdown limit. Possible reasons: • Ambient temperature too high • Unfavorable air convection - defective fan • Medium utilization too high	Shutdown with emergency stop delay (D), (P)	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Limit heat sink temperature exceeded.				
12	Error “Brake output”		• No brake connected • Brake line separated in 'on' status • Overload through overcurrent > 2A (F13 has priority) • Overload due to excessive connection (approx. > 0.5 Hz) Monitoring is only active with parameter settings "Brake installed" and "Brake applied".	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	Brake output				
13	Error "Brake supply“		Brake supply voltage not within permitted range of +10/- 0%. Monitoring works with parameter setting "Brake installed" and "Brake applied" as well as with CMP and DS motors only.	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	Brake supply voltage				
14	Error "Resolver“		Error with resolver or resolver evaluation.	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	Open circuit detection resolver				
		02	Emulation error resolver (excessive speed)				
		19	Non-permissible angle during calibration				
15	Error "Hiperface Compare Check“		An error has occurred in the checksum of the Hiperface signals.	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	Comparison of the absolute encoder position (via Hiperface parameter channel) with the incremental position of the axis every second.				
		02	Encoder type unknown				
		32	Encoder signals internal error. The error code is displayed as follows: [Displayed value] - 32. You can inquire about this error code at the encoder manufacturer.				

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
16	"Startup" error		Error during startup	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	Denominator of pole pair number of resolver not equal to 1				
		02	Numerator of pole pair number of resolver too great				
		03	Numerator of pole pair number of resolver too small, that means zero				
		04	Denominator of emulation PPR count for resolver not equal to 1				
		05	Numerator of emulation PPR count for resolver too small				
		06	Numerator of emulation PPR count for resolver too great				
		07	Numerator of emulation PPR count for resolver is not a power of two				
		08	Denominator of emulation PPR count for sine encoder not equal to 1				
		09	Numerator of emulation PPR count for sine encoder too small				
		10	Numerator of emulation PPR count for sine encoder too great				
		11	Numerator of emulation PPR count for sine encoder is not a power of two				
		512	Startup for invalid motor type				
		513	Set current limit exceeds maximum current of axis				
		514	Set current limit is less than rated magnetizing current of the motor				
		515	CFC: Factor for calculation of q-current cannot be displayed				
		516	Non-permitted PWM frequency configured				
		517	Parameter "Final speed flux table" not within permitted range				
		518	Parameter "Final flux Id table" not within permitted range				
		519	Output stage enable requested without valid motor startup				
		520	Motor startup not possible with enabled output stage				
		521	Factor for torque limit cannot be displayed (A)				
		522	Factor for torque limit cannot be displayed (B)				
		530	Max. motor current configured incorrectly				

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
		1024	NV memory parameter of rated unit current is greater than NV memory parameter of current measuring range				
		1025	NV memory parameter of current measuring range is zero				
		1026	NV memory parameter of current measuring range is zero				
		1027	NV memory parameter of current measuring range is too large				
		1028	System limits for speed are greater than max. possible speed				
		1029	Application limits for speed are greater than max. possible speed				
		1032	CFC: No absolute encoder used as motor encoder in synchronous motors				
		1033	Position range in position detection mode "without overflow counter" exceeded				
		1034	FCB dual drive: Setpoint deviation window may not be smaller than "standard" setpoint deviation window				
		1035	FCB dual drive: Setpoint deviation window may not be smaller than conditioning threshold				
		1036	Modulo reference offset is not within Modulo limit				
		1037	Position values of software limit switch reversed, positive < negative				
17	Internal computer error (traps)		CPU has detected an internal error	Output stage inhibit	System locked / CPU reset	Yes	Ready = 0 Malfunction = 0
18	Internal software error		The software has detected a non-permissible status.	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		66	FCB position control: Target preset in user-defined unit not within range permitted by user-defined unit				
		67	FCB position control: Target preset in user-defined unit results in target overflow in system units				
		68	FCB position control: ModuloMin ≥ ModuloMax				
		69	Time violation in task system				
		70-78	Error in Knet driver				

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
19	Process data error		Process data are not valid	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	Process data: Negative maximum torque indicated				
		02	Process data: Positive minimum torque indicated				
		03	Process data: Negative motor torque limit indicated				
		04	Process data: Negative regenerative torque limit indicated				
		05	Process data: Torque limit for quadrant 1 is negative				
		06	Process data: Torque limit for quadrant 2 is negative				
		07	Process data: Torque limit for quadrant 3 is negative				
		08	Process data: Torque limit for quadrant 4 is negative				
		09	Torque control: Maximum speed < minimum speed				
		10	Position control: Maximum speed value < 0				
		11	Position control: Maximum speed < 0				
		12	Position control: Minimum speed > 0				
		13	Process data: Enter negative acceleration				
		14	Process data: Enter negative delay				
		15	Process data: Enter negative jerk				
		16	Combination of FCB number and FCB instance does not exist				
		17	Target position outside limit switch range				
20	Setpoint deviation electronic cam		The preset setpoint deviation limit in electronic cam mode was exceeded	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	CAM: Setpoint deviation electronic cam				
21	Setpoint deviation dual drive		The preset setpoint deviation limit in dual drive mode "Engel" was exceeded	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	FCB dual drive: Setpoint deviation in conditioning phase				
		02	FCB dual drive: Setpoint deviation in standard operation				

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
25	Error "Non-volatile parameter memory“		An error was detected during access to non-volatile parameter memory.	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		03	Error during read-in of data from non-volatile memory. The data cannot be used due to a corrupt identification or checksum.				
		04	Initialization error of memory system.				
		05	The read-only memory contains invalid data.				
		06	The read-only memory contains incompatible data of another device (in case of exchangeable data memories)				
26	Error "External terminal“		An error has been reported by a binary input terminal.	Shutdown with emergency stop delay (D), (P)	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Error external terminal				
27	Error "Limit switch“		One or both limit switches cannot be detected at the programmed input terminals or in the control word.	Shutdown with emergency stop delay	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Both limit switches missing or open circuit				
		02	Limit switch reversed				
28	Process data timeout error		Process data communication is interrupted.	Shutdown with application delay (D), (P)	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Error fieldbus timeout				
29	Error "Approach hardware limit switch“		Travel to hardware limit switch during positioning	Shutdown with emergency stop delay (D), (P)	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Travel to right limit switch				
		02	Travel to left limit switch				
30	Error “Delay timeout”		The drive did not come to a standstill within the preset delay time	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Stop ramp time violation				
		02	Time violation stop at application limit				
		03	Time violation stop at system limit				
		04	Emergency stop ramp time violation				
31	Error "Thermal protection motor“		Overtemperature sensor (KTY/TF/TH) of the drive was triggered for motor protection	"No response“ (D), (P)	No response	Yes	Ready = 1 Malfunction = 1
		01	Open circuit motor temperature sensor detected				
		02	Short circuit motor temperature sensor detected				
		03	Motor overtemperature KTY				
		04	Motor overtemperature (synchronous motor model)				
		05	Motor overtemperature (TF/TH)				
		06	Motor overtemperature I2t model				
		07	AD conversion has not taken place				

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
32	Unassigned						
33	Error "SM Boot Timeout“		The supply module (SM) is not or no longer ready for operation.	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
34	Unassigned						
35	Unassigned						
36	Error "Following error synchronous operation“		A preset, maximum permitted following error was exceeded during synchronous operation	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	FCB synchronous operation: Lag error				
37	Error "System Watchdog“		Internal watchdog timer setting has been exceeded	Output stage inhibit	System locked / CPU reset	Yes	Ready = 0 Malfunction = 0
38	Error "Technology functions“		Error in one technology function	Shutdown with application limits, programmable	System is waiting Warm start		Ready = 1 Malfunction = 0
		01	Cam function: Trip point with negative edge < positive edge has been entered			Yes	
		02	Cam function: Command overflow trip-point processing			Yes	
39	Error "Reference travel“		An error has occurred during reference travel	Output stage inhibit (D), (P)	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	FCB reference travel: Timeout error during search for zero pulse				
		02	FCB reference travel: Hardware limit switch before reference cam				
		03	FCB reference travel: Hardware limit switch and reference cam not flush				
		04	FCB reference travel: Referencing for type0 must be set to TP				
		99	FCB reference travel: Reference type was changed during travel				
40	Error "Boot synchronization“		Synchronization with an option card could not be executed appropriately	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
41	Error "Watchdog timer to option“		Connection between main computer and option card computer no longer exists	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		02	Too many options in total or too many options of one kind				
		07	Two options with the same address selection switch detected				
		08	CRC error XIA11A				
		09	Watchdog triggered at XIA11A				
		13	Watchdog error at CP923X				
		14	Timeout during option bus access				
		15	Error interrupt for which no cause could be determined				

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
42	Error "Following error positioning“		A preset, maximum permitted following error was exceeded during positioning • Encoder connected incorrectly • Acceleration ramps too short • P component of positioning controller too small • Incorrectly set speed controller parameters • Value of lag error tolerance too small	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	FCB Positioning: Lag error				
43	Error "Remote timeout“		An interruption has occurred during control via a serial interface	Shutdown with application limits	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	FCB Jog mode: Communication timeout at direction control				
44	Error "Ixt utilization“		Overload in inverter	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Ixt current limit less than required d-current				
		02	Limit chip temperature difference exceeded				
		03	Limit chip temperature exceeded				
		04	Limit electromechanical utilization exceeded				
		05	Short circuit of sensor detected				
		06	Motor current limit exceeded				
		07	AD conversion has not taken place				
45	Error "System initialization“		Error during initialization of the system	Output stage inhibit	System locked / CPU reset	Yes	Ready = 0 Malfunction = 0
		01	The measured current offsets are outside the permitted limit values				
		02	An error occurred during CRC generation for the firmware				
		03	Data bus error during RAM test				
		04	Address bus error during RAM test				
		05	Memory cell error during RAM test				
46	Error "Timeout SBUS#2"		Communication via SBUS #2 is interrupted	Shutdown with application limits [P]	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Timeout CANopen CAN2				
50	Error 24V supply voltage		Error in 24V supply voltage	Output stage inhibit	System is blocked System restart	yes, if system is ready	Ready = 0 Malfunction = 0
		01	24V signals incorrect or switched-mode power supply defective				
51	Error "Software limit switch“		A software limit switch was approached during positioning	Shutdown with emergency stop delay (D), (P)	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	The right software limit switch was approached				
		02	The left software limit switch was approached				

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
53	Error "CRC Flash“		A CRC error occurred during check of the program code by Flash in Code RAM or Resolver DSP.	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	CRC error in Flash EEPROM section "Initial Boot Loader"				
54	Unassigned						
55	Error "FPGA Configuration“		Internal error in logic component block (FPGA)	Output stage inhibit	System locked / CPU reset	Yes	Ready = 0 Malfunction = 0
56	Error "External RAM“		Internal error in external RAM block	Output stage inhibit	System locked / CPU reset	Yes	Ready = 0 Malfunction = 0
		01	Asynchronous DRAM read&write check error				
57	Error "TTL encoder“		Error in TTL encoder	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	TTL sensor: Open circuit				
		02	TTL sensor: Emulation error (excessive speed)				
		19	TTL sensor: Non-permissible angle during calibration				
		512	TTL sensor: Amplitude control has failed				
		513	TTL sensor: EPLD reports error				
58	Error "Sine/cosine encoder“		Error in sine/cosine encoder evaluation	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	Sin/cos encoder: Open circuit detection				
		02	Sin/cos encoder: Emulation error (excessive speed)				
		19	Sin/cos encoder: Non-permissible angle during calibration				
		512	Sin/cos encoder: Amplitude control has failed				
		514	Sin/cos encoder: Quadrant control has failed				

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
59	Error "Hiperface encoder“		Error of Hiperface encoder or in Hiperface evaluation	Shutdown with emergency stop delay	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Hiperface encoder: Quadrant control has failed				
		02	Hiperface encoder: Track angle offset is incorrect				
		16	Hiperface encoder: Encoder does not respond during communication				
		64	Hiperface encoder: Communication error with type read				
		128	Hiperface encoder: Communication error with status read				
		192	Hiperface encoder: Communication error with serial number read				
		256	Hiperface encoder: Communication error during initialization absolute position				
		320	Hiperface encoder: Communication error during re-initialization absolute position				
		384	Hiperface encoder: Communication error during check of absolute position				
		448	Hiperface encoder: Communication error during writing of position				
60	Error "DSP Communication“		Error during flash of the DSP	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	Error DSP JTAG Comm: No JTAG connection				
66	Error process data configuration		Error process data configuration	Shutdown with emergency stop delay	System is blocked System restart	1	Ready = 0 Malfunction = 0
		1	The process data configuration has been changed. The entire process data subsystem has to be restarted by means of an inverter reset.				
		10001	A PDO configured to CAN has an ID located in the area (0x200-0x3ff and 0x600-0x7ff) used for parameter setting by the SBUS.				
		10002	A PDO configured to CAN has an ID located in the area (0x580-0x67f) used for parameter setting by CANopen.				
		10003	A PDO configured to CAN is to transmit more than 4 PD. Only 0..4 PD are possible for CAN.				
		10004	Two or more PDOs configured to the same CAN bus use the same ID.				
		10005	Two PDOs configured to the same CAN bus use the same ID.				
		10008	An invalid transmission mode was entered for a PDO configured to CAN.				
		20001	Configuration conflict with the master				
67	Error "PDO timeout“		An input PDO whose timeout interval is not 0, that has not been set to „Offline“ and that has already been received once has exceeded its timeout interval.	Shutdown with application delay (D), (P)	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
		0	PDO 0				
		1	PDO 1				
		2	PDO 2				
		3	PDO 3				
		4	PDO 4				
		5	PDO 5				
		6	PDO 6				
		7	PDO 7				
		8	PDO 8				
		9	PDO 9				
		10	PDO 10				
		11	PDO 11				
		12	PDO 12				
		13	PDO 13				
		14	PDO 14				
		15	PDO 15				
68	Error “External synchronization“			Shutdown with emergency stop delay	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Time limit for expected synchronization signal has been exceeded				
		02	Synchronization lost, synchronization period outside tolerance range				
		03	Synchronization to synchronization signal not possible				
		04	Duration of sync. signal is not a integer multiple of the PDO system duration				
		05	Time limit for synchronization signal exceeded				
		06	Synchronization lost, period of synchronization signal invalid				
		07	No synchronization of the synchronization signal possible				
		08	Duration of system interval too short				
		09	Duration of system interval too long				
		10	Duration of system interval is not a multiple of the base interval				

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
69	Error "Prewarning motor overtemperature"		Motor temperature has exceeded the adjustable prewarning threshold	No response, display only	---------	Yes	Ready = 1 Malfunction = 1
		01	Thermal motor protection: Prewarning triggered by KTY temperature				
		02	Thermal motor protection: Prewarning triggered by synchronous motor model temperature				
		03	Thermal motor protection: Warning threshold I2t model exceeded				
70	Error 'Error message word 0'		The error message of an unknown device was detected in the error message word	No response, display only	---------	Yes	
		01	Message error control word 0				
71	Error 'Error message word 1'		The error message of an unknown device was detected in the error message word	No response, display only	---------	Yes	
		01	Message error control word 1				
72	Error 'Error message word 2'		The error message of an unknown device was detected in the error message word	No response, display only	---------	Yes	
		01	Message error control word 2				
73	Error 'Error message word 3'		The error message of an unknown device was detected in the error message word	No response, display only	---------	Yes	
		01	Message error control word 3				
74	Error 'Error message word 4'		The error message of an unknown device was detected in the error message word	No response, display only	---------		
		01	Message error control word 4				
75	Error 'Error message word 5'		The error message of an unknown device was detected in the error message word	No response, display only	---------	Yes	
		01	Message error control word 5				
76	Error: "Intelligent option"		MOVI-PLC error	No response, display only	---------	Yes	
77	Unassigned						
78	Unassigned						
79	Unassigned						
80	Unassigned						
81	Error "DC link overcurrent SM“		The DC link current in the SM has exceeded the maximum limit of 250% I_{rated}	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	SM: DC link current too high				
82	Prewarning "I²xt monitoring SM“		Utilization of the SM has reached the prewarning level	No response (D), (P)	--------	Yes	Ready = 1 Malfunction = 1
		01	SM: Pre-warning Ixt utilization				
83	Error "I²xt monitoring SM“		Utilization of the SM has reached or exceeded the cut-off threshold	Shutdown with emergency stop delay (D)	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	SM: Error Ixt utilization				

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
84	Error brake chopper at AM		Error message through supply module via hardware information system. The brake chopper in the supply module is not ready for operation, triggered by BRC short-circuit monitoring or driver voltage monitoring.	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	SM: Error brake chopper				
85	Prewarning “Temperature monitoring SM”		The temperature of the SM approaches the cut-off threshold	No response (D), (P)	---------	Yes	Ready = 1 Malfunction = 1
		01	SM: Temperature prewarning				
86	Error "Overtemperature SM“		Temperature of the SM has reached or exceeded the cut-off threshold	Shutdown with emergency stop delay (D)	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	SM: Temperature error				
87	Prewarning "Utilization braking resistor in SM“		The utilization of the braking resistor installed in the SM has reached the prewarning threshold (applies to 10kW version only)	No response (D), (P)	---------	Yes	Ready = 1 Malfunction = 1
		01	SM: Ixt prewarning braking resistor				
88	Error "Utilization braking resistor in SM“		The utilization of the braking resistor installed in the SM has reached or exceeded the prewarning threshold (applies to 10kW version only)	Shutdown with emergency stop delay (D)	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Ixt utilization error braking resistor of the SM				
89	Error "Switched-mode power supply SM"		Error Switched-mode power supply SM	No response	---------	Yes	Ready = 1 Malfunction = 1
		01	At least one of the supply voltages in the SM is not present				
91	Warning "SM 24V voltage supply“ displayed in supply module only		24 V electronics supply less than 17 V -> No error message for the axis !!	No response	---------	Yes	Ready = 1 Malfunction = 1
		01	24 V electronics power supply too low				
92	Unassigned						
93	Unassigned						
94	Error "Unit configuration data"		An error has occurred in the unit configuration data block during testing in reset phase	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	Unit configuration data: checksum error				
95	Unassigned						
96	Unassigned						
97	Error "Copy parameter set"		Parameter set could not be copied correctly	Output stage inhibit	System is blocked System restart	Yes	Ready = 0 Malfunction = 0
		01	Cancellation of parameter set download to the unit				

Error code	Error message	Sub error code	Possible reason for error	Error response (P = programmable, D = default response)	Final error status / Reset type	Save as History	Message binary outputs (valid for default response)
98	Unassigned						
99	Unassigned						
115	Error "Safety functions"		Connections X7:1 (+24 V) / X7:2 (RGND) or X8:1 (+24 V) / X8:2 (RGND) are reversed. Check wiring.	Output stage inhibit	System is waiting Warm start	Yes	Ready = 1 Malfunction = 0
		01	Safety relays: Switching delay between shutdown channels 1 and 2 is too large				

6.5 Operating displays of MXC capacitor module component

The operating statuses are indicated by a two-color LED at the front of the housing, see page 35.

- LED lights up **green**:
  - Capacitor module is ready for operation.
- LED lights up **red**:
  - General error.
- LED **flashes red** (1 Hz):
  - Full utilization of the capacitor module reached.
- LED does not light up:
  - No voltage is supplied to the capacitor module.

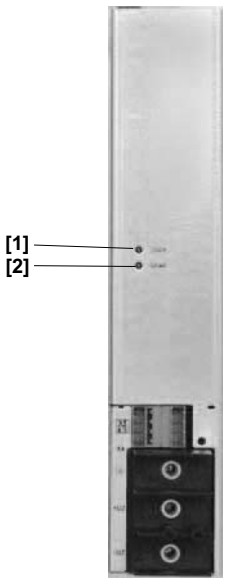
6.6 Operating displays of MXB buffer module component

No messages are issued at the buffer module.

6.7 Operating displays of 24 V switched-mode power supply module

The operating status, such as utilization and error of the switched-mode power supply, is indicated by two LEDs on the front of the unit.

- LED State:
  - Normal operation **green**.
  - Error **red**. A malfunction has occurred because of:
    - Overload,
    - Overvoltage,
    - Undervoltage.
- LED Load:
  - Normal operation **green**.
  - With ca. 80 % utilization per output (8 A) **yellow**.



57910axx

Figure 103: Operating displays 24 V switched-mode power supply module

[1] LED State [2] LED Load

7 Service

7.1 General information

No inspection or maintenance intervals required during active operation.

Send in for repair

Please contact **SEW-EURODRIVE electronics service if an error cannot be repaired** (→ "Customer and spare parts service").

When contacting the SEW electronics service, please always quote the production number and order number, so that our service personnel can assist you more effectively. You find the production number on the nameplate, see page 15.

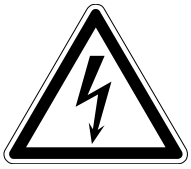
Please provide the following information when sending the unit in for repair:

- Production number (see nameplate),
- Unit designation,
- Unit type,
- Digits of the production number and order number,
- Short application description (drive type, control),
- Connected motor (motor type, motor voltage),
- Type of error,
- Accompanying circumstances,
- Your own assumptions as to what has happened,
- Unusual events preceding the problems.

7.2 Removing / installing a module

This chapter describes how to replace an axis module in the axis system. The master module, capacitor module, buffer module, supply module, DC link discharge module and the 24 V switched mode power supply unit are all installed / removed in the same way.

Safety notes Always adhere to the following safety instructions.



⚠ HAZARD

Dangerous voltages may still be present inside the unit and at the terminal strips up to 10 minutes after the complete axis system has been disconnected from the mains.

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- Disconnect the axis system from the mains and wait ten minutes before removing the protective covers.
- After maintenance work, do not operate the axis system unless you have replaced the protective cover because the unit only has degree of protection IP00 without protective cover.

⚠ HAZARD

A leakage current > 3.5 mA can occur during operation of the MOVIAXIS® MX multi-axis servo inverter.

Severe or fatal injuries from electric shock.

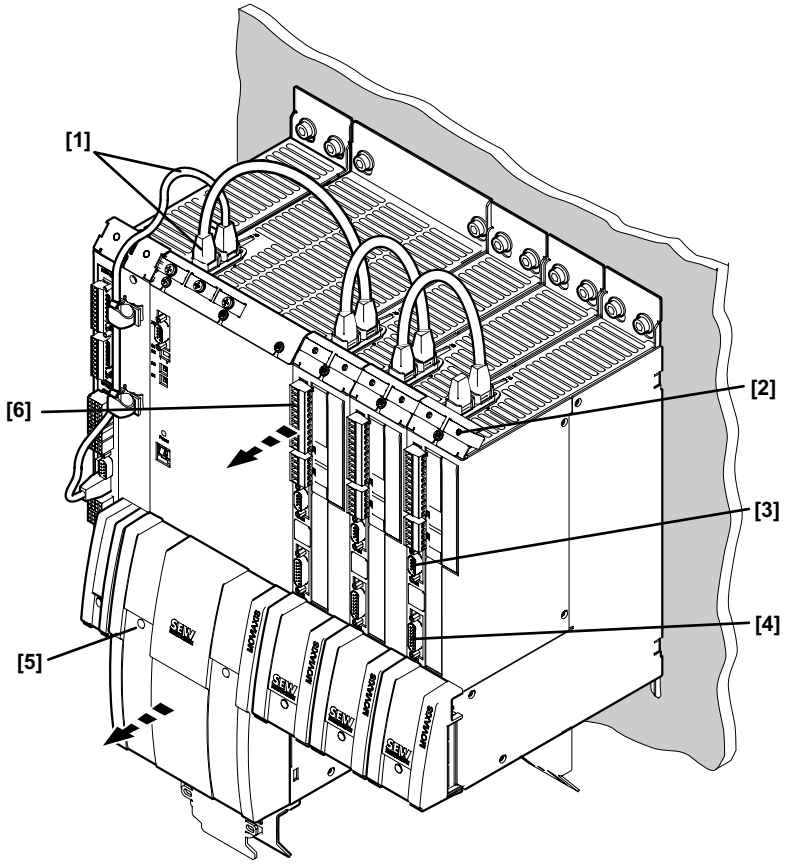
To prevent electric shock:

- With supply system lead < 10 mm^2, route a second PE conductor with the same cross section as the supply system lead via separate terminals. Alternatively, you can use a PE conductor with a copper cross section ≥ 10 mm^2 or aluminum ≥16 mm^2.
- With incoming supply line ≥ 10 mm^2, it is sufficient to install a PE conductor with a cross section copper ≥ 10 mm^2 or aluminum ≥ 16 mm^2.
- If an earth leakage circuit breaker can be used for protection against direct and indirect contact, it must be universal current sensitive (RCD type B).

Removing an axis module

Remove an axis module in the following sequence:

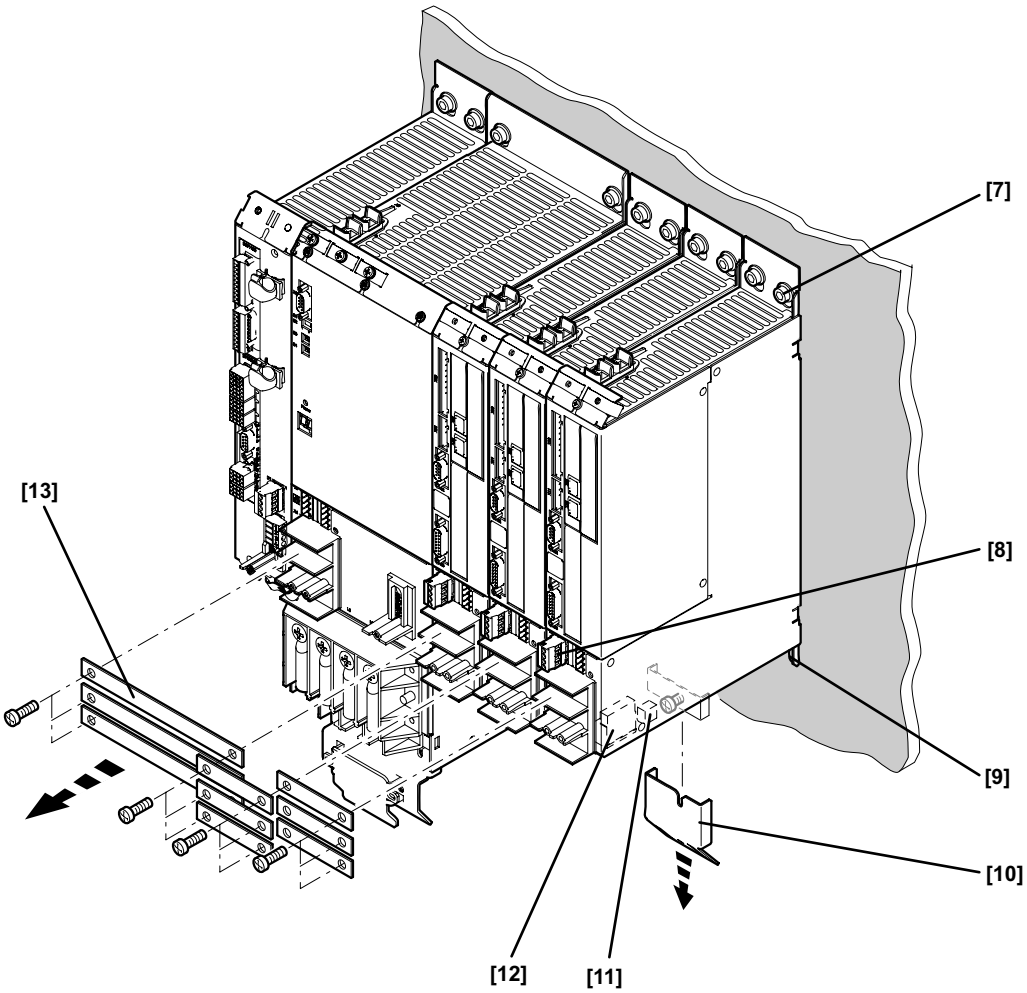
Disconnecting the axis system from the power supply	• Disconnect the entire axis system from the power supply. Follow the safety notes on page 180.
Shield clamps	• Remove electronics shield clamps **[2]**.
Cables	• Remove encoder cable plugs **[4]** (X13). • Remove the signal bus cable plug **[1]** (X9a, X9b). • Remove CAN2 connection cable plugs **[3]** (X12), if there are any.
Covers	• Remove covers **[5]**, also those of the units to the left and right of the unit that is to be removed.
Signal lines	• Remove signal lines **[6]** (X10, X11).



24 V cables	• Remove 24 V cable plugs **[8]** (electronics and brake supply) (X5a, X5b).
DC link bars	• Remove DC link bars **[13]** of the respective units (X4).

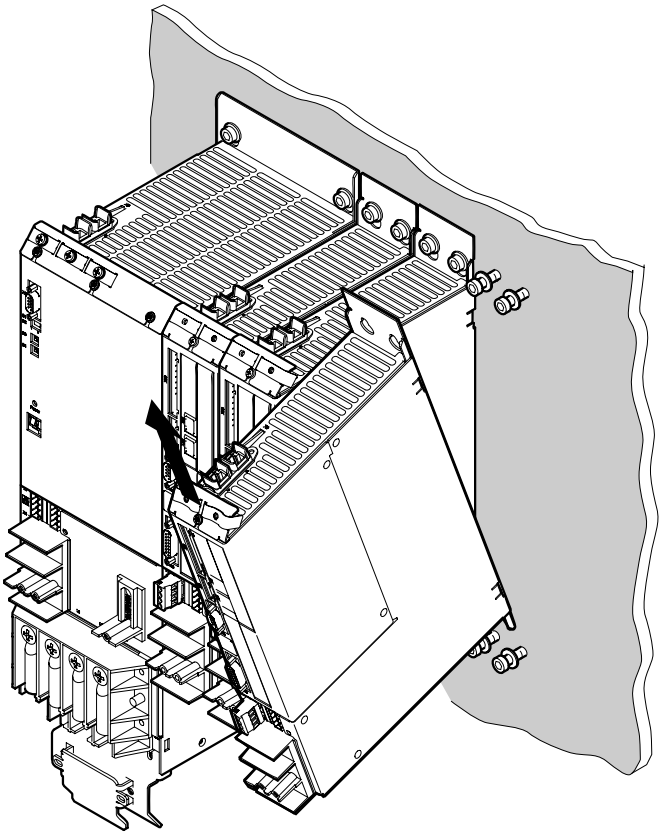
Shield plate	• Remove shield plate on the power terminal **[10]**:
	  • Loosen the screw.
	  • Remove shield plate in downward direction.

Motor lines	• Remove motor line plug **[12]** (X2).
Brake control system	• Remove brake control plug **[11]** (X6).
Safety relays	• Remove safety relay plugs, if there are any.
Retaining screws	• Loosen the two retaining screws **[9]** at the bottom of the axis module. • Loosen the two retaining screws **[7]** at the top of the axis module.



Removing the axis module

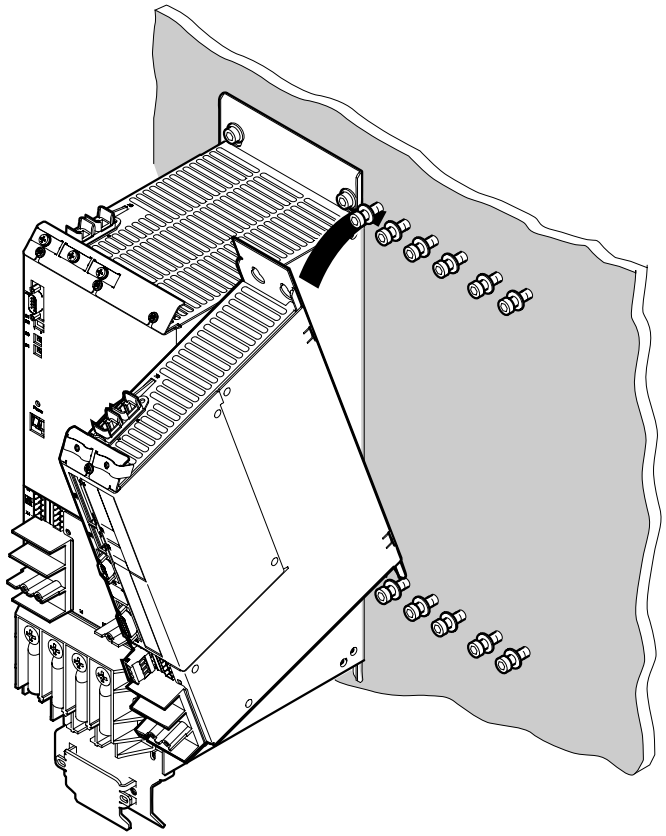
- Slightly raise the axis module, tilt it to the front and remove it in upward direction.



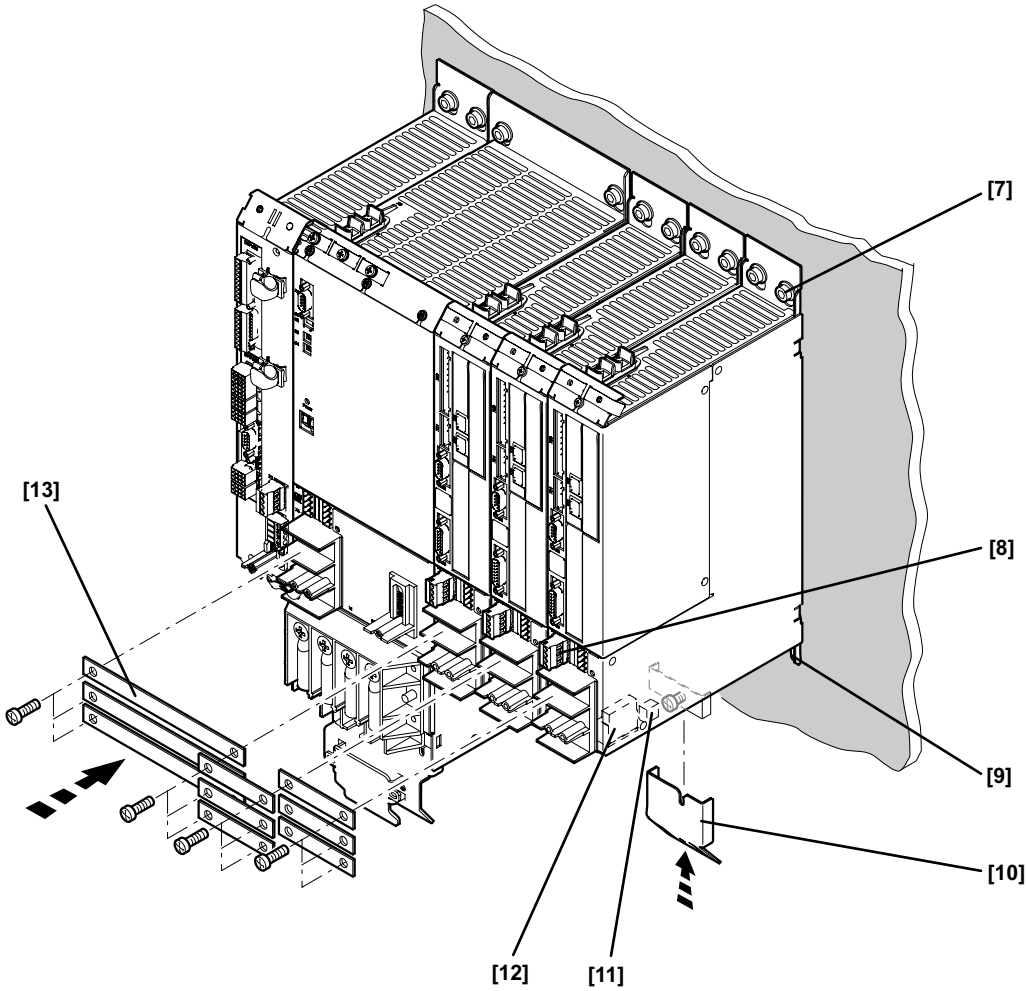
Installing an axis module

Installing an axis module

- Insert the axis module from top into the lower retaining screws, press the axis module backward and then lower it.



Retaining screws	• Tighten upper retaining screws **[7]**. • Tighten bottom retaining screws **[9]**.
Brake control system	• Insert brake control plug **[11]** (X6).
Motor lines	• Insert motor line plug **[12]** (X2).
Shield plate	• Insert and secure shield plate on power terminal **[10]**.
DC link bars	• Insert and secure the DC link bars **[13]** (X4).
24 V cables	• Insert 24 V cable plugs **[8]** (electronics and brake supply) (X5a, X5b).



Signal lines	• Insert signal line plugs **[6]** (X10, X11).
Covers	• Replace the covers **[5]** and secure them.

7.3 Extended storage

If the unit is being stored for a long time, connect it to the mains voltage for at least 5 minutes every 2 years. Otherwise, the unit's service life may be reduced.

The 24 V DC voltage supply can be applied without paying attention to any particular notes.

Procedure when maintenance has been neglected:

Electrolytic capacitors are used in the servo inverters. They are subject to aging effects when deenergized. This effect can damage the capacitors if the unit is connected using the rated voltage after a longer period of storage.

If you have not performed maintenance regularly, SEW-EURODRIVE recommends that you increase the supply voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview.

The following stages are recommended:

AC 400/500 V units:

- Stage 1: 0 V to AC 350 V within a few seconds
- Stage 2: AC 350 V for 15 minutes
- Stage 2: AC 420 V for 15 minutes
- Stage 3: AC 500 V for 1 hour

After you have completed the regeneration process, the unit can be used immediately or stored again for an extended period with maintenance.

7.4 Waste disposal

Please follow the current national regulations.

Dispose of the following materials separately in accordance with the country-specific regulations in force, as:

- Electronics scrap (printed-circuit boards),
- Plastic,
- Sheet metal,
- Copper,
- Aluminum.

8 Technical Data

8.1 CE marking and approvals

The MOVIAXIS® MX multi-axis servo inverters comply with the following directives and guidelines:

CE marking

- Low voltage directive 2006/95/EC.
- Electromagnetic compatibility directive 89/336/EEC.

  The modules of the MOVIAXIS® multi-axis servo inverter are designed for use as components for installation in machinery and systems. They comply with the EMC product standard EN 61800-3 "Variable-speed electrical drives". Provided the installation instructions are complied with, they satisfy the appropriate requirements for CE marking of the entire machine/system in which they are installed, on the basis of the EMC Directive 89/336/EEC.
- Compliance with category "C2" according to EN 61800-3 has been tested on a specified test setup. SEW-EURODRIVE can provide detailed information on request.

CE

The CE mark on the nameplate indicates conformity with the Low Voltage Directive 2006/95/EC and the EMC Directive 89/336/EEC. SEW-EURODRIVE can provide a declaration of conformity on request.

Approvals

The following approvals have been granted for the MOVIAXIS® modules:

MOVIAXIS® module	UL / cUL	c-Tick	CE conformity
MXP supply module 10 kW	-[1)]	x	x
MXP supply module 25 kW	-[1)]	x	x
MXP supply module 50 kW	x	x	x
MXP supply module 75 kW	x	x	x
MXA axis modules	x	x	x
MXM master module	x	x	x
24 V switched-mode power supply module	x	x	x
MXB buffer module	-[1)]	-[1)]	x
MXC capacitor module	-[1)]	-[1)]	x
MXD damping module	-[1)]	-[1)]	x
DC link discharge module	x	x	x

1) In preparation

cUL is equivalent to CSA approval.

C-Tick certifies conformity with ACA (Australian Communications Authority) standards.

8.2 General technical data

The technical data in the following tables is valid for all MOVIAXIS® MX multi-axis servo inverters, regardless of type, version, size and performance.

MOVIAXIS® MX		
Interference resistance		Conforms to EN 61800-3
Interference emission with EMC-compliant installation		Category "C2" according to 61800-3
Ambient temperature **Climate class**	ϑ_A	0 °C...+ 45 °C at I_D = 100 % I_N and f_{PWM} = 8 kHz
Storage temperature	ϑ_S	– 25 °C...+70 °C (EN 60721-3-3, class 3K3)
Storage life		Up to two years without special measures, longer periods see sec. "Service" on page 186.
Cooling type (DIN 51751)		Forced cooling and convection cooling, depending on size
Enclosure EN 60529 (NEMA1)[1)] **Axis module sizes 1 ... 3** **Axis module size 4 - 6** **Supply module size 1** **Power supply module size 2, 3** **Master module** **SMPS module** **Capacitor module** **Buffer module**		 IP20 IP10 IP20 IP10 IP20 IP10 IP10 IP10
Duty cycle type		DB (EN 60034-1)
Pollution class		2 according to IEC 60664-1 (VDE 0110-1)
Overvoltage category		III according to IEC 60664-1 (VDE 0110-1)
Installation altitude	h	Up to h ≤ 1000 m without restrictions. The following restrictions apply at heights ≤ 1000 m: – From 1000 m to max. 2000 m: I_N reduction by 1% per 100 m (330 ft)

1) - The covers on the left and right end of the unit system must be equipped with touch guard covers. - All cable lugs must be insulated.

Permitted voltage supply systems, see page 76.

8.3 Technical data for the supply module

Power component supply module

MOVIAXIS® supply module MXP80A-...-503-00	1)	2)	Size			
			1	2	3	
Type			010	025[3]	050	075
INPUT						
Supply voltage AC V_{mains}	U	V	3 × 380 V ... 3 × 500 V			
Rated supply current[4] AC I_{mains}	I	A	15	36	72	110
Rated power P_N	P	kW	10	25	50	75
Mains frequency f_{mains}	f	Hz	50... 60 ±5%			
Cross-section and contacts on connections		mm^2	COMBICON PC4 pluggable, max. 4	COMBICON PC6 pluggable, max. 16	Screw bolt M8 max. 50	
Cross-section and contacts on shield clamp		mm^2	max. 4 × 4	max. 4 × 10	max. 4 × 50 shielded	
OUTPUT (DC LINK)						
Rated DC link voltage[4] U_{NZK}	U	V	DC 560			
Rated DC link current[5] DC I_{NZK}	I	A	18	45	90	135
Max. DC link current DC $I_{ZK\ max}$	I_{max}	A	45	112.5	225	337.5
Overload capacity for max. 1 s			250 %			
Brake chopper power		kW	Peak power: 250 % × P_N, continuous power: 0.5 × P_N			
Mean regenerative power capacity		kW	0.5 x P_N			
Cross section[6] and contacts		mm	CU rails 3 × 14 mm, M6 screw fitting			
BRAKING RESISTOR						
Minimum permitted braking resistor value R (4-Q operation)		Ω	26	10	5.3	3.5
Cross-section and contacts on connections		mm^2	COMBICON PC4 pluggable, max. 4	COMBICON PC6 pluggable, max. 16	M6 screw bolts max. 16	
Cross-section and contacts on shield clamp		mm^2	max. 4 × 4	max. 4 × 6	max. 4 × 16	

Table continued on next page. Footnotes on next page.

MOVIAXIS® supply module MXP80A-...-503-00		1)	2)	Size 1	2	3	
GENERAL INFORMATION							
Power loss at nominal capacity			W	30	80	160	280
No. of times power may be switched on/off			min^{-1}	< 1/min			
Minimum switch-off time for mains off			s	> 10			
Weight			kg	4.2	10.2	10.7	12.1
Dimensions:	**W**		mm	90	90	150	
	H		mm	300	400		
	D		mm	254			

1) Nameplate information

2) Unit

3) In preparation

4) The output currents must be reduced by 20 % from the nominal values for V_{mains} = 3 × AC 500 V.

5) Decisive value for planning the assignment of supply and axis modules

6) Material strength [mm] × width [mm]

Control section supply module

MOVIAXIS® MX supply module	General electronics data	
CAN interface[1)]	**CAN**: 9-pin sub-D connector	CAN bus to CAN specification 2.0, parts A and B, transmission technology to ISO 11898, max. 64 stations, Terminating resistor (120 Ω) has to be implemented externally, Baud rate can be set from 125 kBaud ... 1 MBaud, expanded MOVILINK protocol, see section 6.4 "Communication via CAN adapter"
Cross section and contacts		
DC 24 V voltage supply	DC 24 V ± 25 % (EN 61131) COMBICON 5.08 One conductor per terminal: 0.20...2.5 mm^2 Two conductors per terminal: 0.25...1 mm^2	
Decoupling of EtherCAT-based system bus from 9-pin Sub D connector	DIP switch, 4-pole	
Shield clamps	Shield clamps for control lines available	
Maximum cable cross section that can be connected to the shield clamp	10 mm (with sheath)	

1) Only for CAN-based system bus

8.4 Technical data for the axis module

Axis module power section

MOVIAXIS® axis module MXA80A-...-503-00	1)	2)	Size									
			1			2		3		4	5	6
Type			002	004	008	012	016	024	032	048	064	100
INPUT (DC link)												
Rated DC link voltage U_{NZK}	U	V	DC 560									
Rated DC link current I_{NZK} 3)	I	A	2	4	8	12	16	24	32	48	64	100
Cross section 4) **and contacts**		mm	CU rails 3 × 14 mm, M6 screw fitting									
OUTPUT												
Output voltage U	U	V	0...max. U_{mains}									
Continuous output current AC I_N PWM = 4 kHz	I	A	2	4	8	12	16	32	42	64	85	133
Rated output current AC I_N PWM = 8 kHz	I	A	2	4	8	12	16	24	32	48	64	100
Rated output current AC I_N PWM = 16 kHz	I	A	1.5	3	5	8	11	13	18	-	-	-
Max. unit output current I_{max} 5)	I_{max}	A	5	10	20	30	40	60	80	120	160	250
Overload capacity for max. 1 s			250 %									
Apparent output power P_{Nout} 6)	S	kVA	1.4	2.8	5.5	8.5	11	17	22	33	44	69
PWM frequency f_{PWM}		kHz	Can be set: 4/8/16; setting on delivery: f_{PWM}=8 kHz									
Maximum output frequency f_{max}	f	Hz	600									
Motor connection to terminals		mm^2	COMBICON PC4 pluggable, max. 4					7)		Screw bolts M6 max. 25		8)
Motor connection to power shield clamp		mm^2	max. 4 × 4					max. 4 × 6		max. 4 × 25		9)
Brake connection	U_{BR} / I_{BR}	V / A	1 binary output brake control			Suitable for direct operation of brake, short-circuit proof. External 24 V required. Tolerance depends on installed brake type, see project planning manual.						
			Signal level: "0" = 0 V "1" = +24 V **Important:** Do not apply external voltage!									
			Function: fixed assignment with "/Brake"									
Brake connection contacts			COMBICON 5.08									
		mm^2	One conductor per terminal: 0.20...2.5 Two conductors per terminal: 0.25...1									
Shield clamps			Shield clamps for brake lines available									
Maximum cable cross section that can be connected to the shield clamp			10 mm (with sheath)									

Table continued on next page. Footnotes on next page.

MOVIAXIS® axis module MXA80A-...-503-00		1)	2)	Size									
				1			2		3		4	5	6
GENERAL INFORMATION													
Power loss at nominal capacity[6]			W	30	60	100	150	210	280	380	450	670	1100
Weight			kg	4.2	4.2	4.2	5.2	5.2	9.2	9.2	9.2	15.6	15.6
Dimensions:	**W**		mm	60			90		90		120	150	210
	H		mm	300			300		400		400	400	400
	D		mm	254									

1) Nameplate information
2) Unit
3) With simplification: $I_{NZK} = I_N$ (typical motor application)
4) Material strength [mm] × width [mm]
5) Indicated values apply to motor operation. Motor and regenerative have the same peak performance.
6) Applies to mains voltage 400 V and 50 Hz / PWM = 8 kHz.
7) PC6 pluggable, one conductor per terminal: 0.5...16 mm^2 ; two conductors per terminal: 0.5...6 mm^2.
8) Max. 4 × 70 mm^2
9) Max. 4 × 50 mm^2, for cross sections > 50 mm^2, the cable shield must be connected outside the unit, e.g. DIN rail clamp.

Notes on brake control

	NOTES
	Note on tolerance requirement for the brake voltage! The brake voltage has to be configured. See project planning manual.

Permitted load of brake control and brake

One complete switching sequence (opening and closing) must not be repeated more often than a maximum of every two seconds. The brake must remain switched off for at least 100 ms before it can be switched on again.

Control section axis module

MOVIAXIS® MX axis module	General electronics data	
DC 24 V voltage supply	DC 24 V ± 25 % (EN 61131) COMBICON 5.08 One conductor per terminal: 0.20...2.5 mm² Two conductors per terminal: 0.25...1 mm²	
X10:1 and X10:10 binary inputs **Internal resistance**	Isolated (optocoupler), PLC compatible (EN 61131), sampling interval 1 ms $R_i \approx 3.0\ k\Omega$, $I_E \approx 10$ mA	
Signal level	+13 V...+30 V = "1" = Contact closed -3 V...+5 V = "0" = Contact open	meets EN 61131
Function	DIØØ: With fixed assignment "Output stage enable" DIØ1...DIØ8: Selection option → parameter menu DIØ1 and DIØ2 suitable for touch probe function (latency period < 100 µs)	
4 binary outputs	PLC compatible (EN 61131-2), response time 1 ms, short-circuit proof, I_{max} = 50 mA	
Signal level	"0"=0 V, "1"=+24 V, **Caution: Do not apply external voltage.**	
Function	DOØØ ... DOØ3: Selection option → parameter menu	
Cross section and contacts	COMBICON 5.08 One conductor per terminal: 0.20...2.5 mm² Two conductors per terminal: 0.25...1 mm²	
Shield clamps	Shield clamps for control lines available	
Maximum cable cross section that can be connected to the shield clamp	10 mm (with sheath)	
Connection contacts for safety functions	Safety relay integrated in unit as option (→ page 201) Suitable for operation as device of stop category 0 or 1 according to EN 60204-1 with prevention of restart for safety applications in: • Category 3 according to EN 954-1 • Protection type III according to EN 201	
Cross section and contacts	Mini COMBICON 3.5 One conductor per terminal: 0.08 ... 1.5 mm² Two conductors per terminal: 0.08 ... 0.75 mm²	

8.5 Technical data for master module component

MOVIAXIS® MX master module MXM80A-...-000-00 Type	1)	2)	Size 1 000
Supply voltage U	U	V	DC 24 V ± 25 % to EN 61131
Cross section and contacts (X5a)	COMBICON 5.08 One conductor per terminal: 0.20...2.5 mm^2 Two conductors per terminal: 0.25...1 mm^2		
Cross section and contacts (X5b)	COMBICON 5.08 One conductor per terminal: 0.20...2.5 mm^2 Two conductors per terminal: 0.25...1 mm^2 Maximum outer diameter of the cable: 3.5 mm. Recommended connector: MSTB 2.5/4-ST-5.08 BK (Phoenix) (COMBICON 5.08 with front-end cable output)		
GENERAL INFORMATION			
Weight		kg	2.3
Dimensions: W		mm	60
Dimensions: H		mm	300
Dimensions: D		mm	254
Shield clamps	Shield clamps for control lines available		
Maximum cable cross section that can be connected to the shield clamp	10 mm (with sheath)		

1) Nameplate information

2) Unit

NOTES
For other technical data, refer to the manual • MOVI-PLC® basic DHP11B Controller • MOVI-PLC® advanced DH.41B Controller

MOVIAXIS® MXM electronics data

Power consumption MOVIAXIS® MXM master module

Master module	
Power	See technical data of the integrated card. Due to the efficiency of 85 % of the integrated switched-mode power supply unit, the power consumption of the integrated card must be multiplied by factor 1.2.

8.6 Technical data for capacitor module component

MOVIAXIS® capacitor module MXC80A-050-503-00		1)	2)	
Type				050
INPUT				
Rated DC link voltage[3] **U_{NZK}**		U	V	DC 560
Storable energy[3]		W	Ws	1000
Peak power capacity			kW	50
Cross section and contacts			mm	CU rails 3 × 14 mm, M6 screw fitting
GENERAL INFORMATION				
Capacity		C	µF	4920
Time from switching the unit on until it is ready for operation			s	10
Weight			kg	12.6
Dimensions:	**W**		mm	150
	H		mm	400
	D		mm	254

1) Nameplate information

2) Unit

3) At U_{mains} = 3 x AC 400 V

Capacitor module control section

MOVIAXIS® MXC capacitor module	General electronics data
DC 24 V voltage supply	DC 24 V ± 25 % (EN 61131) COMBICON 5.08 One conductor per terminal: 0.20...2.5 mm² Two conductors per terminal: 0.25...1 mm²

8.7 Technical data for buffer module component

MOVIAXIS® buffer module MXB80A-050-503-00		1)	2)	
Type				050
INPUT				
Rated DC link voltage[3] U_{NZK}		U	V	DC 560
Cross section and contacts			mm	CU rails 3 × 14 mm, M6 screw fitting
GENERAL INFORMATION				
Capacity		C	µF	4920
Time from switching the unit on until it is ready for operation			s	10
Weight			kg	11
Dimensions:	**W**		mm	150
	H		mm	400
	D		mm	254

1) Nameplate information

2) Unit

3) At U_{mains} = 3 × AC 400 V

8.8 Technical data for 24 V switched-mode power supply module component

MOVIAXIS® 24 V switched-mode power supply module MXS80A-...-503-00 Type	1)	2)	060
INPUT via DC link			
Rated DC link voltage U_{NZK}	U	V	DC 560
Cross section[3] and contacts			CU rails 3 × 14 mm, M6 screw fitting
INPUT via external 24 V			
Rated input voltage U_N • **With direct control of brakes for CMP and DS motors** • **Otherwise**	U	V	DC-24 -0 % / +10 % DC-24 ±25 % (EN 61131)
Cross section and contacts		mm^2	PC6 One conductor per terminal: 0.5...6 Two conductors per terminal: 0.5...6
OUTPUT			
Rated output voltage V	U	V	DC 3 x 24 (shared ground). Tolerance for supply via DC link: DC 24 0 % / +10 %. Tolerance for supply via external 24 V: According to input voltage
Rated output current I	I	A	3 x 10 [4]
Rated output power P	P	W	600
Cross section and contacts		mm^2	COMBICON 5.08 One conductor per terminal: 0.20...2.5 Two conductors per terminal: 0.25...1
GENERAL INFORMATION			
Bridging resistance for U_Z drop[5]	t	s	Rated power for 10 ms
Efficiency			ca. 80 %
Weight		kg	4.3
Dimensions **W**		mm	60
H		mm	300
D		mm	254

1) Nameplate information

2) Unit

3) Material strength [mm] × width [mm]

4) Not possible at the same time because total power is limited to 600 W

5) Applies to the following measuring point: 10 ms are guaranteed for an edge steepness of the falling DC link voltage of (dU_{ZK} / dt) > (200 V / 1 ms). Applies for a power supply voltage U_{ZK} of 3 x AC 380 V.

8.9 Technical data for the DC link discharge module component

Power section of DC link discharge module

MOVIAXIS® MX DC link discharge module MXZ80A-...-503-00		1)	2)	Size 1
Type				050
INPUT (DC link)				
Rated DC link voltage[3] U_{NZK}		U	V	DC 560
Cross section[4] and contacts				CU rails 3 × 14 mm, M6 screw fitting
Convertible energy E		E	J	5000
OUTPUT				
Braking resistor R		R	Ω	1
Discharge connection				Specific screw fitting by SEW
Cross section and contacts			mm^2	M6 screw bolts, max. 4 × 16
Connection to power shield clamp			mm^2	max. 4 × 16
GENERAL INFORMATION				
Ready for operation once mains and 24V have been switched on			s	≤ 10
Ready for operation after short circuit			s	Depending on application, see section "Startup" on page 101
Repeatability of quick discharge			s	60
Duration of quick discharge			s	≤ 1
Shutdown temperature			° C	70
Weight			kg	3.8
Dimensions:	**W**		mm	120
	H		mm	235
	D		mm	254

1) Nameplate information

2) Unit

3) The system and output currents must be reduced by 20 % from the nominal values for U_{mains} = 3 x AC 500 V.

4) Material strength [mm] x width [mm]

Control section of DC link discharge module

MOVIAXIS® MX DC link discharge module	1)	General electronics data
Inhibit		Control signal for discharge process
DC 24 V voltage supply	V	DC 24 ± 25 % (EN 61131-2)
Cross section and contacts	mm^2	COMBICON 5.08 One conductor per terminal: 0.20...2.5 Two conductors per terminal: 0.25...1

1) Unit

8.10 Technical data for 24 V current consumption

The current consumption of the MOVIAXIS® units and their options depends on the switch-on time. It is therefore not possible to specify the current consumption explicitly, but it must be projected in relation to the switch-on time.

For more information on this, refer to the "MOVIAXIS® MX Multi-Axis Servo Inverter" project planning manual.

8.11 Technical data for the braking resistors

UL and cUL approval

Type BW... braking resistors are UL and cUL approved in conjunction with the MOVIAXIS® multi-axis servo inverter. SEW-EURODRIVE will provide a certificate upon request.

The following braking resistors have cRUus approval independent of the MOVIAXIS® multi-axis servo inverter:

- BW012-015-01.
- BW006-025-01,
- BW006-050-01,
- BW004-050-01,

Technical Data

Braking resistor type	[1]	BW027-006	BW027-012	BW247	BW347	BW039-050
Part number		822 422 6	822 423 4	820 714 3	820 798 4	821 691 6
Power class of the supply module	kW	10, 25, 50, 75				
Load capacity at 100 % cdf[2)]	kW	0.6	1.2	2	4	5
Resistance value R_{BW}	Ω	27 ±10 %		47 ±10 %		39 ±10 %
Trip current (of F16) I_F	A_{RMS}	4.7	6.7	6.5	9.2	11.3
Design		Wire-wound resistor				
Connections	mm^2	Ceramic terminals 2.5				
Permitted electric loading of the terminals at 100 % cdf[2)]	A	DC 20				
Permitted electric loading of the terminals at 40 % cdf[2)]	A	DC 25				
Degree of protection		IP20 (when installed)				
Ambient temperature ϑ_U	° C	-20 ... +45				
Type of cooling		KS = Self-cooling				

1) Unit

2) **cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration $T_D \leq$ 120 s.**

Braking resistor type	1)	BW012-015	BW012-015-01 2)	BW012-025	BW012-050	BW012-100	BW915
Part number		821 679 7	1 820 010 9	821 680 0	821 681 9	821 682 7	821 260 0
Power class of the supply module	kW	25, 50, 75					
Load capacity at 100 % cdf 3)	kW	1.5	1.5	2.5	5.0	10	16
Resistance value R_{BW}	Ω	12 ±10 %					15 ±10 %
Trip current (of F16) I_F	A_{RMS}	11.2	11.2	14.4	20.4	28.9	31.6
Design		Steel-grid resistor					
Connections	mm^2	Ceramic terminals 2.5					
Permitted electric loading of the terminals at 100 % cdf 3)	A	DC 20					
Permitted electric loading of the terminals at 40 % cdf 3)	A	DC 25					
Degree of protection		IP20 (when installed)					
Ambient temperature ϑ_U	° C	-20 ... +45					
Type of cooling		KS = Self-cooling					

1) Unit

2) Braking resistors show a tapping of 1 Ω

3) **cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration $T_D \leq 120$ s.**

Braking resistor type	1)	BW006-025-01 2)	BW006-050-01 2)	BW106	BW206	BW004-050-01 2)
Part number		1 820 011 7	1 820 012 5	821 050 0	821 051 9	1 820 013 3
Power class of the supply module	kW	50, 75				75
Load capacity at 100 % cdf 3)	kW	2.5	5.0	13	18	5.0
Resistance value R_{BW}	Ω	5.8 ±10 %		6 ±10 %		3.6 ±10 %
Trip current (of F16) I_F	A_{RMS}	20.8	29.4	46.5	54.7	37.3
Design		Steel-grid resistor				
Connections		M8 stud				
Permitted electric loading of the terminal stud at 100 % cdf 3)	A	DC 115				
Permitted electric loading of the terminal stud at 40 % cdf 3)	A	DC 143				
Degree of protection		IP20 (when installed)				
Ambient temperature ϑ_U	° C	-20 ... +45				
Type of cooling		KS = Self-cooling				

1) Unit

2) Braking resistors show a tapping of 1 Ω

3) **cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration $T_D \leq 120$ s.**

8.12 Technical data for line filter and line chokes

Line filter

Line filter type	[1]	NF018-503	NF048-503	NF085-503	NF150-503
Part number		827 413 4	827 117 8	827 415 0	827 417 7
Power supply module		Size 1	Size 2	BG3	BG3
Rated voltage U_N	V_{AC}	3 x 500 +10 %, 50/60 Hz			
Rated current I_N	A_{AC}	18	48	85	150
Power loss at I_N P_V	W	12	22	35	90
Earth-leakage current at U_N	mA	< 25	< 40	< 30	< 30
Ambient temperature ϑ_U	° C	–25 ... +40			
Degree of protection		IP20 (EN 60529)			
Connections L1-L3/L1'-L3'	mm^2	4	10	35	50
PE		M5 stud	M5/M6 stud	M8	M10
NF...type line filter[2]		cULus			

1) Unit

2) SEW-EURODRIVE will provide a certificate upon request.

Line choke

Line choke type	[1]	ND020-013	ND045-013	ND085-013	ND150-013
Part number		826 012 5	826 013 3	826 014 1	825 548 2
Power supply module		Size 1	Size 2	BG3	BG3
Rated voltage U_N	V_{AC}	3 x 500 +10 %, 50/60 Hz			
Rated current I_N	A_{AC}	20	45	85	150
Power loss at I_N P_V	W	10	15	25	62
Inductance L_N	mH	0.1	--	--	--
Ambient temperature ϑ_U	° C	–25 ... +40			
Degree of protection		IP00 (EN 60529)			
Connections L1-L3/L1'-L3'	mm^2	4	10	35	M10 stud
PE		Terminal strips	Terminal strips	Terminal strips	PE: M8 stud

1) Unit

8.13 Safety technology (safe stop)

NOTES

It is essential to observe the information on this topic in the following publications:

- "Safe Disconnection for MOVIAXIS® – Conditions".
- "Safe Disconnection for MOVIAXIS® – Applications".

9 Appendix

9.1 Cable dimensions to AWG

AWG stands for **A**merican **W**ire **G**auge and refers to the size of the wires. This number specifies the diameter or cross section of a wire in code. This type of cable designation is usually only used in the USA. However, the designations can also be seen in catalogs or data sheets in Europe.

AWG designation	Cross section in mm^2
000000 (6/0)	185
00000 (5/0)	150
0000 (4/0)	120
000 (3/0)	90
00 (2/0)	70
0 (1/0)	50
1	50
2	35
3	25
4	25
5	16
6	16
7	10
8	10
9	6
10	6
11	4
12	4
13	2.5
14	2.5
15	2.5
16	1.5
16	1
18	1
19	0.75
20	0.5
21	0.5
22	0.34
23	0.25
24	0.2

9.2 List of abbreviations

Abbreviation	Definition	Meaning
CAN	**C**ontroller **A**rea **N**etwork	
DI	**D**igital **I**n	
DIN	**D**eutsches **I**nstitut für **N**ormung e.V. (German institute for standardization)	
DIN EN	EN European Standard whose German version has the status of a German standard.	
DIN EN ISO	ISO standard that has been made a European standard and has been adopted into the German book of standards.	
DIN IEC	International standard that has been adopted without changes into the German standard.	
DO	**D**igital **O**ut	
EN	**E**uropäische **N**orm (European standard)	
GND	**G**rou**nd**	
IP	**I**nternational **P**rotection = international type of enclosure	
ISO	**I**nternational **O**rganization for **S**tandardization	The ISO creates ISO standards that should be adopted unrevised by the member states.
PDO	Process data object, process data	
PE	**P**rotected **E**arth: "Protective earth"	Ground connection
PELV	**P**rotective **E**xtra **L**ow **V**oltage	Protection low voltage
PWM	**P**ulse **W**idth **M**odulation	
SELV	**S**afety **E**xtra **L**ow **V**oltage	
TH/TF	**Th**ermostat / **T**emperature **s**ensor	
c UL us	**U**nderwriters' **L**aboratories Inc.	Certification issued in North America
ZK	DC link	

9.3 Definition of terms

CAN bus system	Serial bus system for the automotive industry and industrial control devices. The bus medium is a twisted conductor pair with excellent transmission characteristics in the short-distance range of less than 40 m.
PROFIBUS	PROFIBUS (**Pro**cess **Fi**eld **Bus**) is a standard for fieldbus communication used in automation engineering.
K-Net	The XFA (K-Net) communication module is a slave module for connection to a serial bus system for high-speed data transfer.
EtherCAT	The XFE24A communication component is a slave module for connection to EtherCAT networks.
Multi-encoder card	The multi-encoder card enables evaluation of additional encoders.
EMC compliant housing	EMC compliant housings form a shield against electrical, magnetic or electromagnetic fields. These interference fields are generated by electrostatic discharges occurring during switching sequences, during rapid current or voltage changes, during operation of motors or high-frequency generators and similar situations. These EMC compliant housings are usually equipped with an EMC cable gland.
EMC cable gland	Seal of cable entry with option to apply a cable shield or contacting.
IP code	A coding system to indicate the degrees of protection offered by a housing against access to dangerous parts, ingress of solid foreign objects and the ingress of water.
Insulation resistance	Insulating property of a material to separate two neighboring contacts or one grounded contact at a relatively high resistance value.
Insulating materials	Insulation in plug connectors is ensured by using thermoplastics and thermosetting plastic. The selected material depends on the required thermal and mechanical properties.
Cable	Lines can consist of one or more cores, come equipped with insulating sleeves, shields and a sheath for the protection of structural elements. Lines connected to plug connectors are mainly flexible lines, flat lines, sheathed lines, shielded lines and coaxial lines.
Firmware	Software provided by the manufacturer that cannot be changed by the user.

Address List

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 • D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Service **Competence Center**	**Central** Gear units / Motors	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte-gm@sew-eurodrive.de
	Central Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-mitte-e@sew-eurodrive.de
	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54, route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62, avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

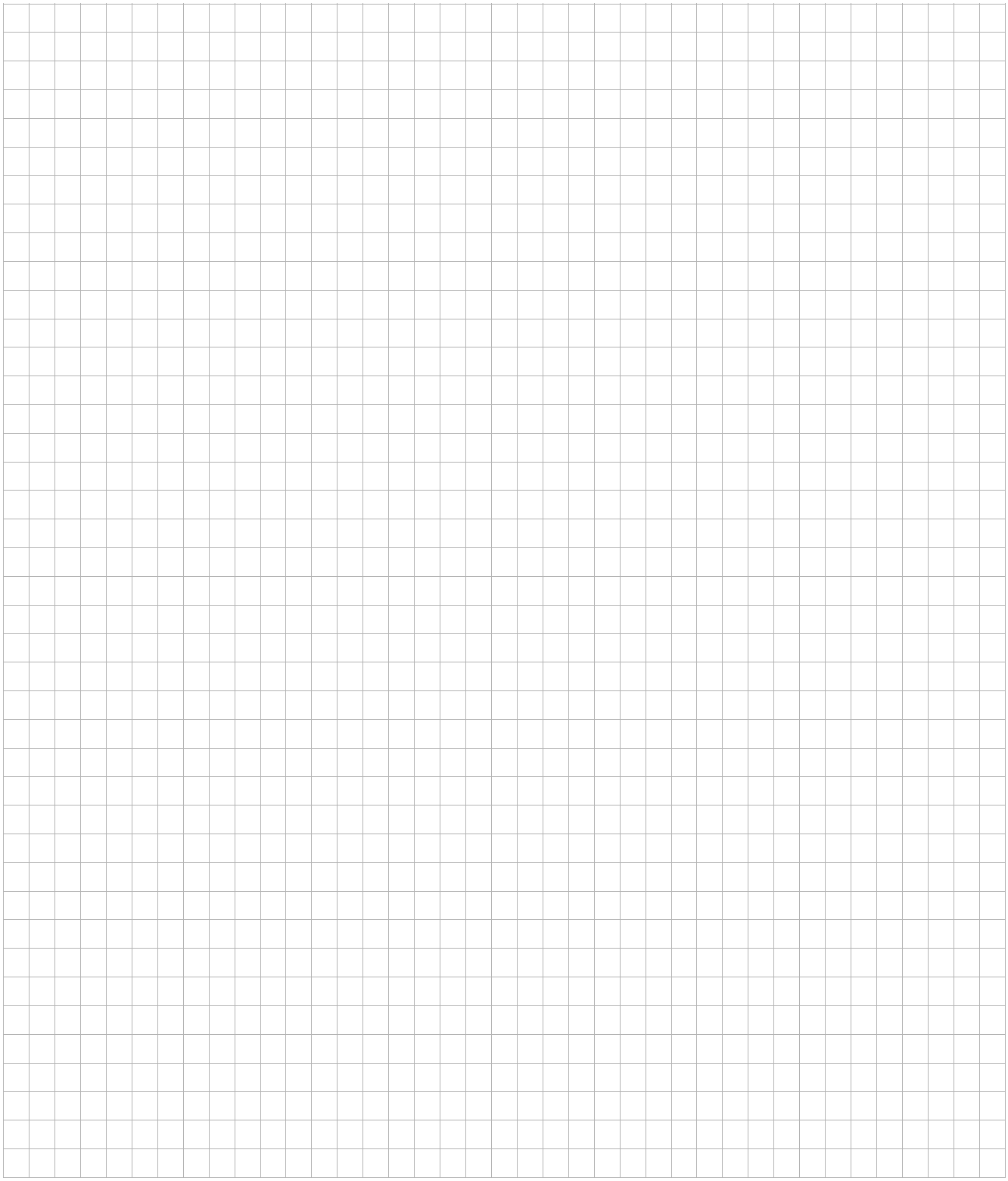
Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://sew-eurodrive.at sew@sew-eurodrive.at

Belgium			
Assembly **Sales** **Service**	**Brüssel**	SEW Caron-Vector S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Italy			
Assembly **Sales** **Service**	**Milano**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 sewit@sew-eurodrive.it

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch



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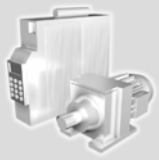

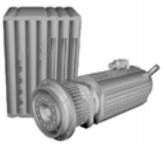

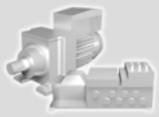

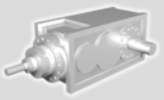

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