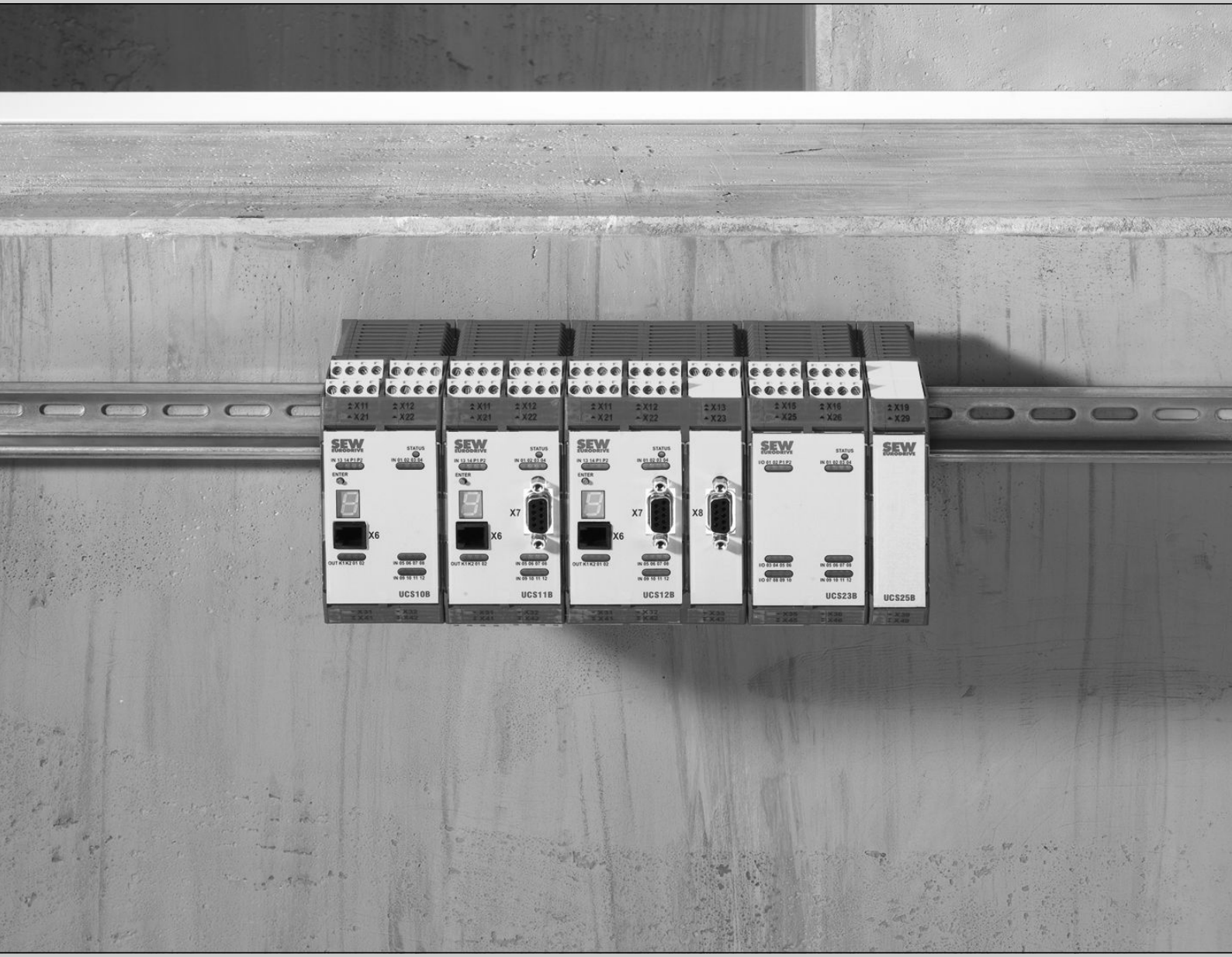
SEW EURODRIVE

Operating Instructions



MOVISAFE® UCS..B Compact Safety Module

Edition 07/2014

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Contents

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1 General information

1.1 How to use this documentation

This documentation is an integral part of the product and contains important information on operation and service. Programming and parameterization is described in the online help of the MOVISAFE® Config UCS CM software. The documentation is intended for all employees who perform assembly, installation, startup, and service work on the product.

The documentation must be accessible and legible. Make sure that persons responsible for the system and its operation as well as persons who work independently with the software and the connected units, have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation or require further information, please contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

The following table shows the grading and meaning of the signal words for safety notes.

Signal word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent hazard	Severe or fatal injuries
⚠ **WARNING**	Possible dangerous situation	Severe or fatal injuries
⚠ **CAUTION**	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the drive system or its environment
INFORMATION	Useful information or tip: Simplifies handling of the drive system.	

1.2.2 Structure of section-related safety notes

Section-related safety notes do not apply to a specific action but to several actions pertaining to one subject. The hazard symbols used either indicate a general hazard or a specific hazard.

This is the formal structure of a safety note for a specific section:

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent hazard.

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Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard
	Warning of dangerous electrical voltage
	Warning of hot surfaces
	Warning of risk of crushing
	Warning of suspended load
	Warning of automatic restart

1.2.3 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

- ⚠ **SIGNAL WORD** Type and source of hazard.

  Possible consequence(s) if disregarded.

  – Measure(s) to prevent hazard.

1.3 Rights 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 this documentation. Therefore, read the documentation before you start working with the software and the connected units!

Make sure that the documentation is 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.

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1.4 Exclusion of liability

You must observe this documentation and the documentation of the connected devices from SEW-EURODRIVE to ensure safe operation 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-adherence to this documentation. In such cases, any liability for defects is excluded.

1.5 Other applicable documentation

Other applicable documentation to observe:

- Online help in the MOVISAFE® Config UCS CM software
- MOVISAFE® UCS..B system manual
- Acceptance protocol of the MOVISAFE® Config UCS CM software. Is used as acceptance protocol during validation.
- Certificates and characteristic safety values for the MOVISAFE® UCS..B safety modules.

Always use the latest edition of the documentation and software. The German version of the "MOVISAFE® UCS..B compact" operating instructions is the original version.

Our documentation is available in various languages for download from the SEW-EURODRIVE homepage (www.sew-eurodrive.com). If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE directly.

If required, you can order printed copies of the documentation from SEW-EURODRIVE.

1.6 Product names and trademarks

The brands and product names in this documentation are trademarks or registered trademarks of their respective titleholders.

1.7 Copyright

1.8 Definitions

- The designation "UCS..B" is used as a generic term for all derivatives of the MOVISAFE® UCS..B product series. If the operating instructions refer to a certain derivative, the full designation is used.
- The term "safe" in this document refers to the classification as a safe function up to category 4/performance level e (PI e) according to EN ISO 13849-1 and SIL3 according to EN 61508.

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- The "MOVISAFE® Config UCS CM" parameter setting software is a programming and configuration tool for the MOVISAFE® UCS..B compact unit series.
- Internally, the assemblies of the MOVISAFE® unit series consist of 2 independent processing units. They are referred to as system A and system B in this document.

1.9 Abbreviations used

Abbreviation	Meaning
BG	German employer's liability insurance association
BST	Safety-related brake module
Cat.	Category
CLK	Clock
CRC	Cyclic Redundancy Check
DC	• Safety functions: Diagnostic coverage • Voltage ratings: DC voltage
DI	Digital input (binary input)
DIN	German institute for standardization
DIO	Digital input/output (binary input/output)
DIP	Dual in-line package
DO	Digital output (binary output)
ECS	Encoder Supervisor
EMC	Electromagnetic compatibility
EMU	Emergency Monitoring Unit
EN	European standard
EOS	External Offset Setup
F PLC	Failsafe programmable logic controller
Hiside	Output switching to positive with DC 24 V
HTL	High transistor logic (on DC 24 V basis)
IFA	Institute for Occupational Safety and Health of the German Social Accident Insurance (formerly BGIA)
IL	Instruction list
IP	Ingress Protection (degree of protection)
ISO	International Organization for Standardization
LED	Light Emitting Diode
Loside	Output switching to the reference potential
OSSD	Output signal switching device
P1, P2	Pulse output 1, 2
PDM	Position deviation mode
PELV	Protective extra low voltage

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Abbreviation	Meaning
PES	Programmable electronic system
PII	Process image of the inputs
PIO	Process image of the outputs
PL	Performance Level
PLC	Programmable logic controller
PLC	Programmable controller
PNO	PROFIBUS user organization
PRF	Position Reference Function
SAR	Safe Acceleration Range
SBC	Safe Brake Control
SCA	Safe Cam
SDI	Safe Direction
SEL	Safe emergency limit
SELV	Safety extra low voltage
SIL	Safety Integrity Level
SLA	Safely Limited Acceleration
SLI	Safely Limited Increment
SLP	Safely Limited Position
SLS	Safely Limited Speed
SOS	Safe operating stop
SRP/CS	Structure of the safety-related parts of a control system
SSR	Safe Speed Range
SSX	Safe stop, can be parameterized as SS1 or SS2
STO	Safe Torque Off
TE	Pitch
TTL	Transistor-transistor logic
VDE	German Association for Electrical, Electronic & Information Technologies

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2 Safety notes

2.1 General information

The following basic safety notes must be read carefully to prevent injury to persons and damage to property. The operator must ensure that the basic safety notes are read and observed.

Make sure that those responsible for the system and its operation as well as those working on the system independently have carefully read through and understood the contents of the documentation. If you are unclear about any of the information in this documentation or require further information, please contact SEW-EURODRIVE.

Also observe the supplementary safety notes in this documentation and in the documentation for the connected units from SEW-EURODRIVE.

This document does not replace the detailed documentation for the connected units. This documentation assumes that the user has access to and is familiar with the documentation for all connected units from SEW-EURODRIVE.

Never install or start up damaged products. In the event of damage, submit a complaint to the shipping company immediately.

This documentation focuses on the basic functions of the unit and the corresponding installation. The programming is illustrated in the online help. The corresponding knowledge is a key requirement for working with MOVISAFE® UCS..B.

Unauthorized removal of covers, improper use, or incorrect installation and operation may result in severe injury to persons, or damage to machinery. Consult the documentation for further information.

2.2 Target group

All work with the software is to be performed exclusively by adequately qualified personnel. Qualified personnel in this context are persons who have the following qualifications:

- Appropriate instruction.
- Knowledge of this documentation and other applicable documentation.
- SEW-EURODRIVE recommends additional product training for products that are operated using this software.

All mechanical work on connected units is to be performed exclusively by adequately qualified personnel. Qualified personnel in the context of this documentation are persons familiar with the design, mechanical installation, troubleshooting and servicing of the product, who possess the following qualifications:

- Training in mechanical engineering, e.g. as a mechanic or mechatronics technician (final examinations must have been passed).
- Knowledge of this documentation and other applicable documentation.

All electrical work on connected units is to be performed exclusively by adequately qualified electricians. Qualified electricians in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting and servicing of the product, who possess the following qualifications:

- Training in electrical engineering, e.g. as an electrician or mechatronics technician (final examinations must have been passed).
- Knowledge of this documentation and other applicable documentation.

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- Knowledge of the relevant safety regulations and laws.
- Knowledge of all other standards, directives and laws named in this documentation.

The above mentioned persons must have the authorization expressly issued by the company to install, operate, program, configure, label and ground units, systems and circuits in accordance with the standards of safety technology.

All work in the areas of transportation, storage, operation and waste disposal must be performed by suitably trained personnel.

2.3 Designated use

The MOVISAFE® UCS..B safety modules are modular, programmable safety controllers for the implementation of safe disconnection functions and safety functions. The units are intended for use:

- In emergency switching off devices
- As safety components according to Directive 2006/42/EC (Machinery Directive)
- As PES for risk reduction according to EN 61508
- In safety circuits according to EN 60204-1
- As PES for functional safety according to EN 62061
- As SRP/CS according to EN ISO 13849
- As devices for implementing the safety functions according to EN 61800-5-2
- As logics unit for signal conversion and processing in two-hand control according to EN 574

The safety modules, including the expansion assembly, are safety components according to appendix IV Directive 2006/42/EC (Machinery Directive). They have been developed, designed and produced in accordance with the directive mentioned above, as well as the EMC Directive 2004/108/EC.

You must observe the technical data and information on the connection requirements as provided on the nameplate and in the documentation.

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- Ensure compliance with nationally applicable laws and directives before you start the designated operation.
- Use of the MOVISAFE® UCS..B safety modules is possible in all UL-relevant countries. Therefore, the maximum voltage of the relay contacts must be limited to DC 24 V.

2.4 Transportation and storage

You must observe the information regarding transport, storage and proper handling according to EN 60068-2-6 in reference to the values specified in the "Technical data" chapter. Comply with the requirements for climatic conditions stated in the "Technical data" chapter.

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2.5 Installation

The safety modules must be installed and cooled according to the regulations and specifications in the relevant documentation.

Protect MOVISAFE® UCS..B safety modules from improper 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.

MOVISAFE® UCS..B safety modules contain components that can be damaged by electrostatic energy and could suffer irreparable damage in case of improper handling. During installation or removal of the safety modules, avoid any electrostatic discharge to the terminal and plug-in connections routed to the outside. Prevent the mechanical damage or destruction of electric components (this may pose a health risk).

The following applications are prohibited unless explicitly permitted:

- Use in potentially explosive atmospheres
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.

2.6 Electrical connection

Observe the applicable national accident prevention regulations when working on live MOVISAFE® UCS..B safety modules (e.g. BGV A3).

Perform electrical installation according to the relevant regulations (e.g. cable cross sections, fusing, PE connection). For any additional information, refer to the applicable 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 safety module. The manufacturer of the system or machine is responsible for maintaining the limit values established by EMC legislation.

Preventive measures and protection devices must meet the regulations in force (e.g. EN 60204).

2.7 Operation

- Systems with integrated MOVISAFE® UCS..B safety modules must be equipped with additional monitoring and protection devices, if necessary, according to the applicable safety guidelines, such as laws governing technical equipment, accident prevention regulations, etc.
- The fact that the operation LED and other display elements are no longer illuminated does not indicate that the unit has been disconnected from the supply system and no longer carries any voltage.
- Mechanical blocking or internal safety functions within the unit can cause the motor to stop. Eliminating the cause of the problem or performing a reset may help to restart the drive automatically. If, for safety reasons, this is not permitted for the drive-controlled machine, disconnect the unit from the supply system before you start troubleshooting.
- The system/machine manufacturer must perform a system/machine-specific risk assessment. The use of the drive system must be considered for the analysis.

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- The safety concept is only suitable for performing mechanical work on the system/ machine components.

  Before carrying out work on the electrical section of the drive system, the supply voltage must be disconnected using an external maintenance switch/main switch.
- When the DC 24 V voltage supply is disconnected, line voltage is still present on the inverter's DC link.
- The safety functions must be implemented according to the risk assessment and the application-related hazard. Regenerative energies such as the lifting axis, inclined tracks and slowing-down paths must be taken into account in this process. If they are part of the safety concept, they must also be implemented using safety technology.
- When using the SS1(c)/SS2(c) function, the deceleration of the drive is not monitored with respect to safety. In the event of a fault, the drive might not be braked during the deceleration time, or it might even accelerate.

  In this case, the STO function is only activated after the set time delay has passed. The resulting danger must be taken into account for the risk assessment of the system/machine. Additional safety measures must be implemented if required.

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3 Unit structure

3.1 Type designation

Example: MOVISAFE® UCSxxB compact		
Series	UCS	Universal Control System
Module type	x	• 1 = Basic module • 2 = Expansion module
Module characteristics	x	• Basic module with logic processing – 0 = Standard variant – 1 = With 1 encoder interface – 2 = With 2 encoder interfaces • Expansion module – 3 = With digital inputs/outputs – 5 = CANopen communication – 6 = PROFIBUS communication – 7 = PROFINET communication
Unit generation	B	-
Communication	PS	PS = PROFIsafe communication

3.2 Scope of delivery

3.2.1 Safety modules

The scope of delivery includes the following components:

- MOVISAFE® UCS..B safety module
- Connector for all signal terminals without encoder connection

3.2.2 Backplane bus connectors

INFORMATION

Note the following if you order a basic module in connection with an expansion or diagnostic module.

- Ordering from the configurator: The required number of backplane bus connectors is enclosed with the delivery.
- Ordering using the part number: The backplane bus connectors must be ordered as accessories:
  - 5 units each under part number 18222447
  - 3 units each under part number 28204689
- You can find detailed information on installing the backplane bus connectors in the "Mechanical installation" chapter.

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Basic modules

The scope of delivery of the basic modules does not include backplane bus connectors.

The following table shows the number of required backplane bus connectors:

MOVISAFE® basic modules					
UCS10B	**UCS10B/PS**	**UCS11B**	**UCS11B/PS**	**UCS12B**	**UCS12B/PS**
2	3	2	3	3	4

Expansion module and diagnostic modules

The scope of delivery for the expansion module and the diagnostic modules contains the following backplane bus connectors:

- 1 backplane bus connector each for the UCS25B, 26B and 27B diagnostic modules
- 2 backplane bus connectors for the UCS23B expansion module

The following table shows the number of required backplane bus connectors:

MOVISAFE®			
Expansion module	**Diagnostic modules**		
UCS23B	**UCS25B**	**UCS26B**	**UCS27B**
2	1	1	1

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3.2.3 Optional scope of delivery

Software

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The license dongle enables the entire functionality of the MOVISAFE® Config UCS CM software. The software can be used without license dongle but the functionality will be limited.

Functions of MOVISAFE® Config UCS CM	
With license dongle	**Without license dongle**
• Creating a program • Compiling a program • Saving a program • Loading a program from the PC to the UCS..B/PS option	• Function block diagram diagnostics and SCOPE • Unit replacement (data storage); upload or download of a configuration file (".cfg") • Activating a safety data set (with UCS..B/PS option) • Creating an acceptance protocol

INFORMATION

- The license dongle is not included in the scope of delivery. You can order the license dongle with part number 10585834.
- The driver for the license dongle is installed during installation of the MOVISAFE® Config UCS CM software.
- The license dongle is compatible with the MOVISAFE® UCS..B and DCS..B product series.

3.3 Unit properties

3.3.1 General information

Property	MOVISAFE® UCS safety module									
	10B	10B/PS	11B	11B/PS	12B	12B/PS	23B	25B	26B	27B
Max. number of expansion modules with digital inputs/outputs	2						-	-	-	-
Safe digital inputs	14						12	-	-	-
Safe configurable digital inputs/outputs	-						10	-	-	-
Safe digital outputs	2						-	-	-	-
Safe relay outputs	1						-	-	-	-
Standard outputs	2							-	-	-
Pulse outputs for crossfault monitoring	2							-	-	-
Encoder interface for SIN/COS, TTL incremental or SSI signals	-	-	1	1	2	2	-	-	-	-
Encoder interface for HTL signals	-	-	1				-	-	-	-
Freely programmable logic	X						-	-	-	-
Safety functions for speed and position monitoring	-	-	X	X	X	X	-	-	-	-
Safe communication (CAN-S)	-	X	-	X	-	X	-	-	-	-
SBus communication	-	X	-	X	-	X	-	-	-	-
Communication (CAN)	-	-	-	-	-	-	-	X	-	-
PROFIBUS communication	-	-	-	-	-	-	-	-	X	-
PROFINET communication	-	-	-	-	-	-	-	-	-	X
Number of monitored axes	-	-	1	1	2	2	-	-	-	-

INFORMATION

- CAN-S enables connection to the fieldbus system PROFIBUS with PROFIsafe or PROFINET with PROFIsafe. The following components can be used for this purpose:
  - DHR/DHF21B and DHR/DHF41B controllers of the type MOVI-PLC® or CCU
  - DFS12B/22B fieldbus interface only in combination with MOVIDRIVE® B
- CAN allows for standard data transmission based on CANopen.
- PROFIBUS allows for standard data transmission based on PROFIBUS.
- PROFINET allows for standard data transmission based on PROFINET.
- SBus allows for connecting the UCS..B to DHR/DHF21B and DHR/DHF41B controllers, as well as to any gateway, in order to send logic and process data to the controllers or to a standard controller via a connected fieldbus.

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3.3.2 Safety functions

The available safety functions in the MOVISAFE® UCS..B modules are based on the definitions of DIN EN 61800-5-2. Partly, they provide further functionalities that exceed the standard definitions.

The MOVISAFE® Config UCS CM software selects possible safety functions depending on the configuration, the basic module used, and the encoder or encoder combination. The safety functions can be freely configured and parameterized in the logic.

The following table provides an overview over the maximum number of safety functions with respect to the individual safety module.

Safety function	UCS10B UCS10B/PS	UCS11B UCS11B/PS	UCS12B UCS12B/PS [1]	UCS12B, UCS12B/PS [2]		UCS23B
			Axis 1	Axis 1	Axis 2	
ECS	-	1	1	1 [3]		-
EMU	2	2	2	2 [3]		10
EOS	-	1	2	1	1	-
DEM	-	1	1	1	1	-
PDM	-	1	1	1	1	-
PRF	-	1	1	1		-
SAR	-	Implementation possible using SCA				-
SBC	Implementation through safe output					
SCA	-	16 [4]	16 [4]	16 [3][4]		-
SDI	-	1	1	1	1	-
SEL	-	1	1	1	1	-
SLA	-	Integrated in SEL, SLP, SCA, SSX, SLS, SOS				-
SLI	-	1	1	1	1	-
SLP	-	2	2	2 [3]		-
SLS	-	8	8	8 [3]		-
SOS	-	1	1	1	1	-
SS1(c)	Implementation using timer and safe output					
SS2(c)	-	Implementation using timer and safe output Requires SOS				-
SSR	-	Implementation possible using SCA				-
SSX [5]	-	2	2	2	2	-
STO	Implementation through safe output					

1) Monitoring of one axis

2) Separate monitoring of 2 axes

3) The number of safety functions can be divided among the axes as required

4) With MOVISAFE® UCS..B/PS and active PROFIsafe communication, only 4 SCA function blocks are available

5) The SSX safety function can be configured as SS1(b) or SS2(b)

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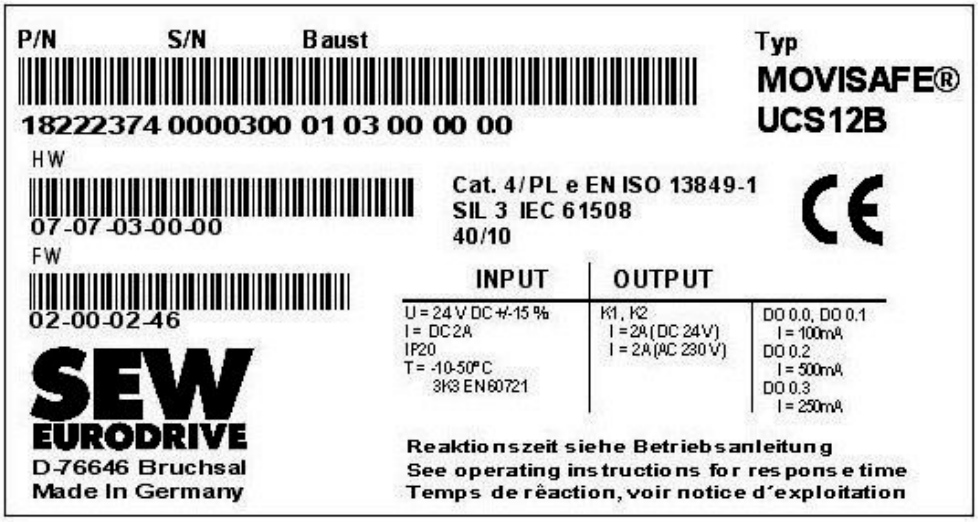
3.4 UCS..B nameplate

The nameplate is attached to the side of the unit and contains the following information:

- Part number (P/N)
- Serial number (S/N)
- Configuration status (Baust)
- Type designation
- Hardware status (HW)
- Firmware status (FW)
- Production date (here: 40/10, corresponds to week 40/2010)
- Permitted standards
- Technical data (input, output)
- Information about response times

Example:



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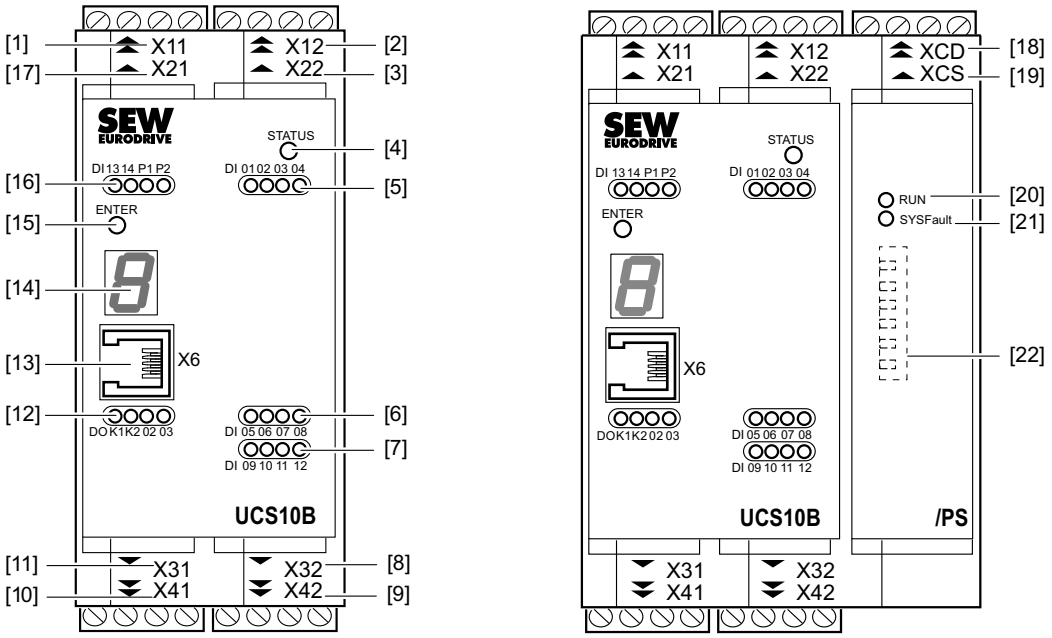
3.5 Unit structure of basic modules

3.5.1 UCS10B, UCS10B/PS



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[1]	X11	Connection for DC 24 V voltage supply
[2]	X12	Auxiliary output connection
[3]	X22	Connection for safe digital inputs
[4]	STATUS	LED display of the system status
[5]	DI 01 – 04	LED display: Status of digital inputs
[6]	DI 05 – 08	LED display: Status of digital inputs
[7]	DI 09 – 12	LED display: Status of digital inputs
[8]	X32	Connection for safe digital inputs
[9]	X42	Connection for safe digital inputs
[10]	X41	Connection for relay outputs
[11]	X31	Connection for HISIDE/LOSIDE outputs
[12]	K1, K2	LED display: Relay output status
	DO 02, 03	LED display: Status of HISIDE/LOSIDE outputs
[13]	X6	Connection for service interface
[14]		7-segment display, display of the system status
[15]	ENTER	Pushbutton for reset and display of the CRC codes
[16]	DI 13, 14	LED display: Digital input status
	P1, P2	LED display: Pulse output status
[17]	X21	Connection for safe digital inputs and pulse outputs

Option UCS10B//PS also features:

[18]	XCD	Connection for CAN diagnostics communication

[19]	XCS	Connection for CAN safe communication (PROFIsafe)
[20]	Run	LED display, communication interface operation status
[21]	SYSFault	LED display, communication interface connection status
[22]		DIP switch, CAN communication addressing (under the front panel)

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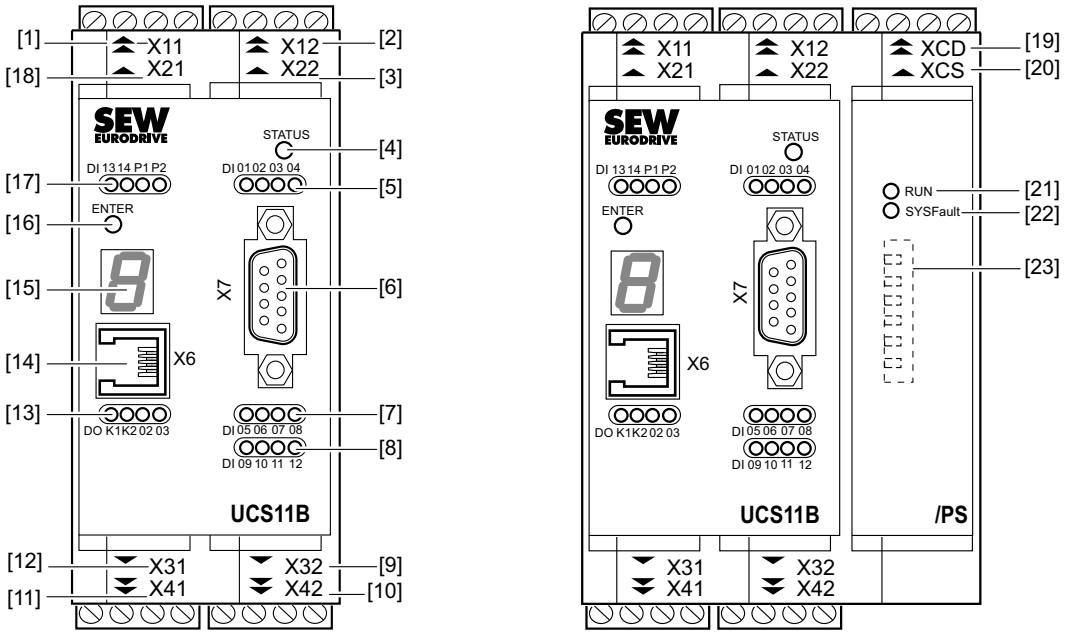
3.5.2 UCS11B, UCS11B/PS



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[1]	X11	Voltage supply connection
[2]	X12	Encoder power supply connection for encoders at X7 Signal output connection
[3]	X22	Input connection
[4]	STATUS	LED display: Display of the system status
[5]	DI 01 – 04	LED display: Status of digital inputs
[6]	X7	Connection for TTL incremental, SIN/COS or SSI encoder
[7]	DI 05 – 08	LED display: Status of digital inputs
[8]	DI 09 – 12	LED display: Status of digital inputs
[9]	X32	Connection for safe digital inputs, HTL sensor connection
[10]	X42	Input connection
[11]	X41	Connection for relay outputs
[12]	X31	Connection for HISIDE/LOSIDE outputs
[13]	K1, K2	LED display: Relay output status
	DO 02, 03	LED display: Status of HISIDE/LOSIDE outputs
[14]	X6	Connection for service interface
[15]		7-segment display, display of the system status
[16]	ENTER	Pushbutton for reset and display of the CRC codes
[17]	DI 13, 14	LED display: Digital input status
	P1, P2	LED display: Pulse output status
[18]	X21	Connection for safe digital inputs, pulse output connection

Option UCS11B//PS also features:

[19]	XCD	Connection for CAN diagnostics communication
[20]	XCS	Connection for CAN safe communication (PROFIsafe)
[21]	Run	LED display, communication interface operation status
[22]	SYSFault	LED display, communication interface connection status
[23]		DIP switch, CAN communication addressing (under the front panel)

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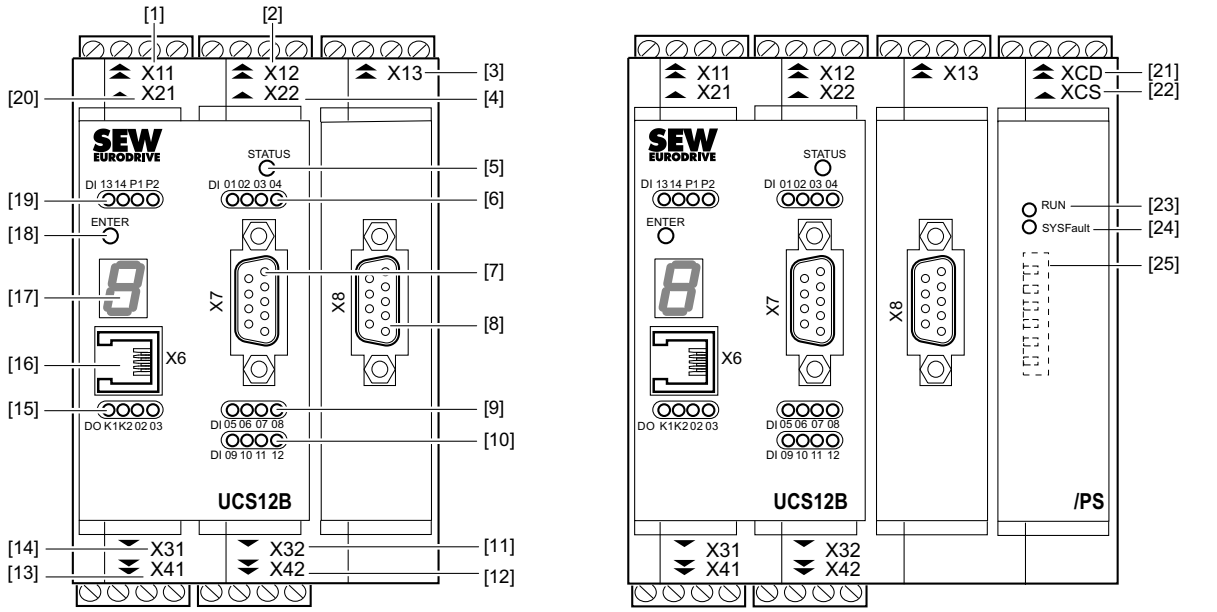
3.5.3 UCS12B, UCS12B/PS



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[1]	X11	Voltage supply connection
[2]	X12	Encoder power supply connection for encoders at X7 Signal output connection
[3]	X13	Encoder power supply connection for encoders at X8
[4]	X22	Input connection
[5]	STATUS	LED display: Display of the system status
[6]	DI 01 – 04	LED display: Status of digital inputs
[7]	X7	Connection for TTL incremental, SIN/COS or SSI encoder
[8]	X8	Connection for TTL incremental, SIN/COS or SSI encoder
[9]	DI 05 – 08	LED display: Status of digital inputs
[10]	DI 09 – 12	LED display: Status of digital inputs
[11]	X32	Connection for safe digital inputs, HTL sensor connection
[12]	X42	Input connection
[13]	X41	Connection for relay outputs
[14]	X31	Connection for HISIDE/LOSIDE outputs
[15]	K1, K2	LED display: Relay output status
	DO 02, 03	LED display: Status of HISIDE/LOSIDE outputs
[16]	X6	Connection for service interface
[17]		7-segment display, display of the system status
[18]	ENTER	Pushbutton for reset and display of the CRC codes
[19]	DI 13, 14	LED display: Digital input status
	P1, P2	LED display: Pulse output status
[20]	X21	Connection for safe digital inputs, pulse output connection

Option UCS12B//PS also features:

[21]	XCD	Connection for CAN diagnostics communication
[22]	XCS	Connection for CAN safe communication (PROFIsafe)
[23]	Run	LED display, communication interface operation status
[24]	SYSFault	LED display, communication interface connection status
[25]		DIP switch, CAN communication addressing (under the front panel)

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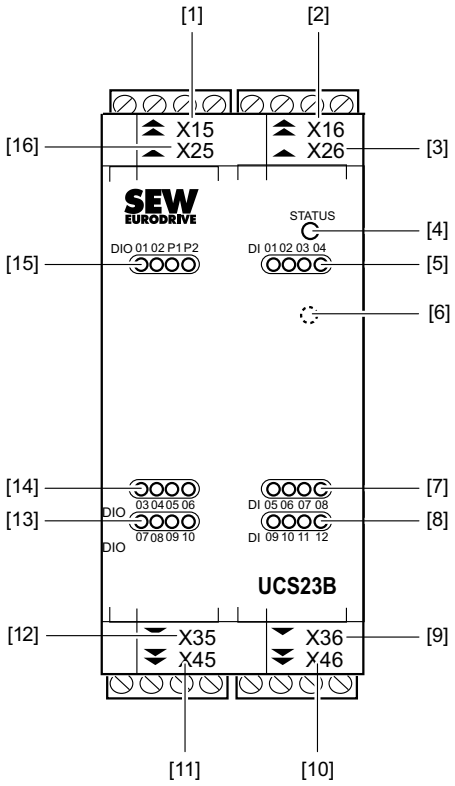
3.6 Unit structure of expansion module

3.6.1 UCS23B



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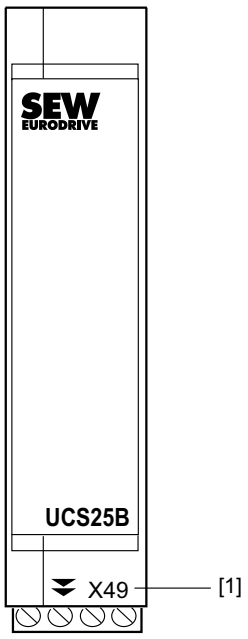
[1]	X15	Voltage supply connection
[2]	X16	Auxiliary output connection
[3]	X26	Digital input connection
[4]	STATUS	LED display of the system status
[5]	DI 01 – 04	LED display: Digital input status
[6]		Address selection switch for addressing the module (on rear of module)
[7]	DI 05 – 08	LED display: Digital input status
[8]	DI 09 – 12	LED display: Digital input status
[9]	X36	Digital input connection
[10]	X46	Digital input connection
[11]	X45	Configurable digital input/output connection
[12]	X35	Configurable digital input/output connection
[13]	DIO 07 – 10	LED display: Configurable digital input/output status
[14]	DIO 03 – 06	LED display: Configurable digital input/output status
[15]	DIO 01, 02	LED display: Configurable digital input/output status
	P1, P2	LED display: Pulse output status
[16]	X25	Configurable digital input/output connection
		Pulse output connection

3.7 Unit structure of diagnostic modules

3.7.1 UCS25B



2085950347

[1] X49 CANopen connection

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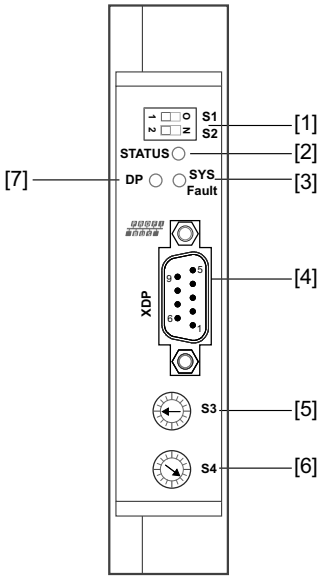
3.7.2 UCS26B (hardware version 02)



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[1]	S1	DIP switch: Backplane bus termination
	S2	DIP switch: PROFIBUS termination
[2]	STATUS	LED display: Display of the system status
[3]	SYSFault	LED display: Status of internal communication to basic module
[4]	XDP	PROFIBUS connection
[5]	S3	Address switch for PROFIBUS address: High Byte setting
[6]	S4	Address switch for PROFIBUS address: Low Byte setting
[7]	DP	LED display: Status of PROFIBUS communication

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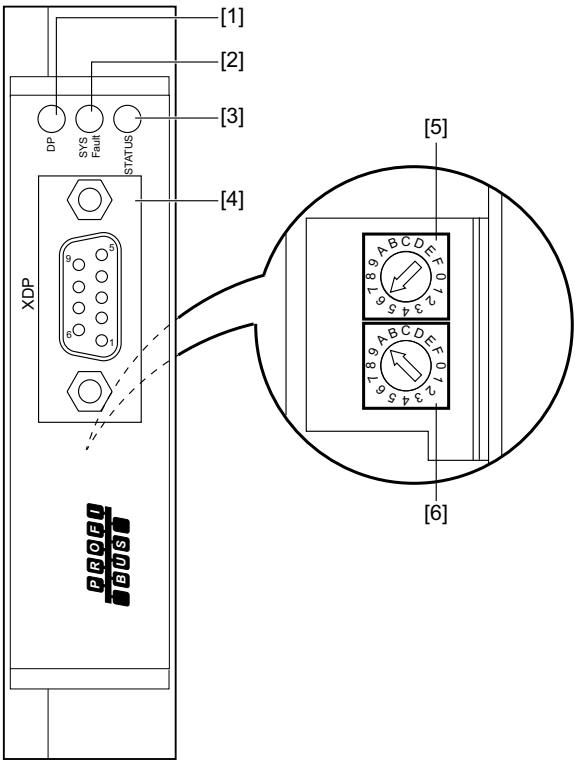
3.7.3 UCS26B (hardware version 03)



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[1]	DP	LED display: Status of PROFIBUS communication
[2]	SYSFault	LED display: Status of internal communication to basic module
[3]	STATUS	LED display: Display of the system status
[4]	XDP	PROFIBUS connection
[5]		Address selection switch for PROFIBUS address (back of the unit): High Byte setting
[6]		Address selection switch for PROFIBUS address (back of the unit): Low Byte setting

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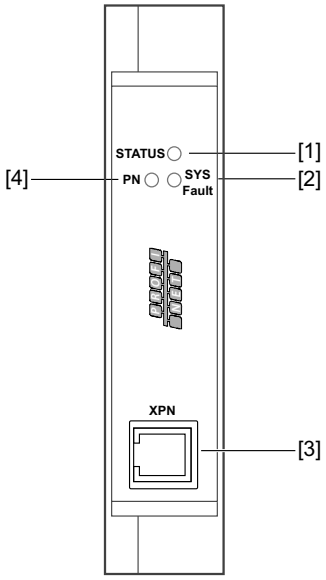
3.7.4 UCS27B



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[1] STATUS LED display: Display of the system status

[2] SYSFault LED display: Status of internal communication to basic module

[3] XPN PROFINET connection

[4] PN LED display: Status of PROFINET communication

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4 Mechanical installation

NOTICE

Observe the following points to prevent MOVISAFE® UCS..B from being damaged:

Switch off the voltage supply before you install or remove MOVISAFE® UCS..B.

4.1 General installation notes

INFORMATION

- The individual safety modules are mounted directly to a profile rail.
- Install the units vertically only. Do not install the units horizontally, tilted or upside down.
- Observe the degree of protection of the safety modules (IP20) when installing MOVISAFE® UCS..B in a control cabinet.
- The control cabinet must have at least the IP54 degree of protection.
- Leave a 10 mm clearance to the top and the bottom in order to allow for appropriate cooling of the safety modules. Make sure air can circulate freely.
- There is no need for clearance at the sides of the unit.
- Route the cables for connecting digital inputs and contact monitoring functions separately from each other.
- Observe the permitted ambient temperature of 0 – 50°C.
- A backplane bus connector is required when expanding a basic module with an expansion module. The necessary backplane bus connectors are installed in the profile rail before mounting the modules.
- The safety modules that are to be connected via backplane bus must be mounted right next to each other. Gaps between the safety modules are not permitted; otherwise the backplane bus will be interrupted.
- A safety module is not properly installed and electrically connected until it locks in place in the backplane connector.

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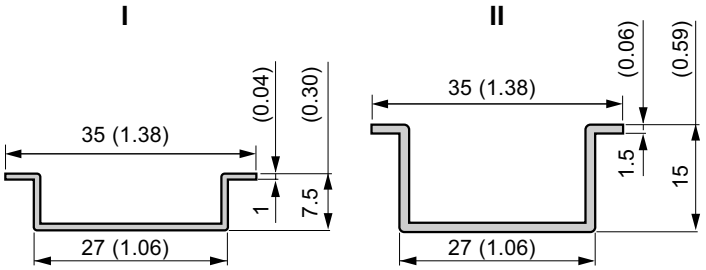
4.2 Dimension drawing of the standard profile rail

You can use the following 35 mm standard profile rail (see the following figure) for installation. SEW-EURODRIVE recommends using version II to ensure sufficient space for the retaining screws of the profile rail under the backplane bus connector when using an expansion module.



2086961035

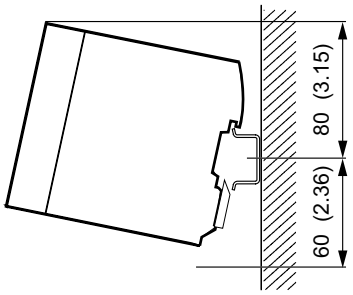
All dimensions in mm (in).

4.3 Installation clearance

Observe the following installation clearances to facilitate assembly and disassembly as well as to ensure the circulation of air.

4.3.1 Installation clearance without backplane bus connector

Ensure a minimum clearance of 80 mm above and 60 mm below the middle of the profile rail when installing the safety modules.

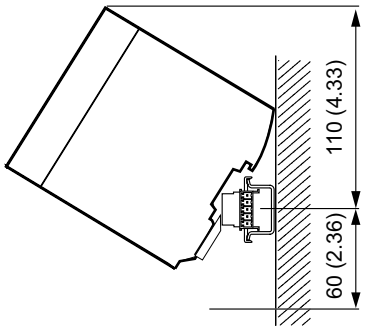


3417262731

All dimensions in mm (in).

4.3.2 Installation clearance with backplane bus connector

Ensure a minimum clearance of 110 mm above and 60 mm below the middle of the profile rail when installing the safety modules.



3417260811

All dimensions in mm (in).

INFORMATION

Observe the excess length of the backplane bus connector on the left when installing expansion modules. This results in a distance of 7 mm to the next unit (e.g. contactor, relay).

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4.4 Step-by-step instructions for installing MOVISAFE® UCS..B

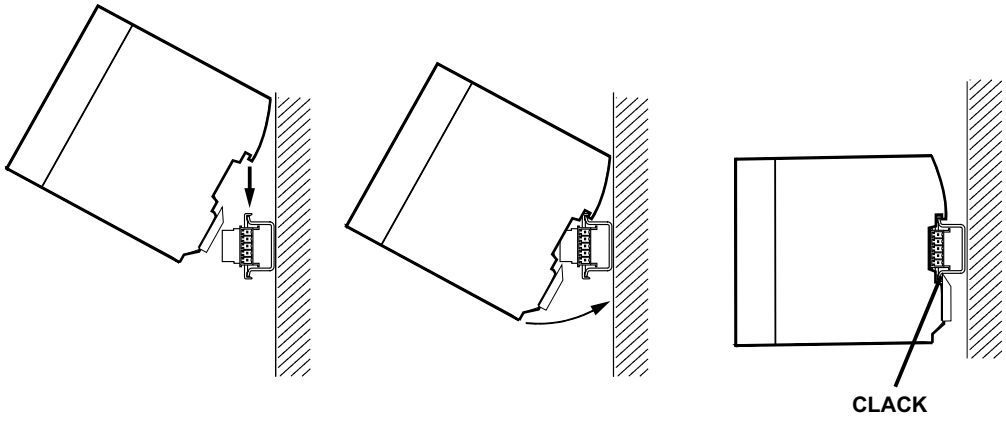
Proceed as follows:

NOTICE

Observe the following points to prevent MOVISAFE® UCS..B from being damaged:

Switch off the voltage supply before you install/remove MOVISAFE® UCS..B on/from the backplane bus connectors.

1. Assemble the profile rail. Adhere to the specified installation clearances.
2. Insert the backplane bus connector into the profile rail until it locks in place. The spring contacts protrude from the profile rail.
3. Plug in the basic module farthest left. Next plug in the required expansion modules to the right of the basic module.
4. Place the safety module you want to install from above at an angle of approx. 45° onto the profile rail. Move the safety module downwards until it locks in place on the profile rail (see following figure). Only then will the module be properly connected with the backplane bus.



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4.5 Step-by-step instructions for removing MOVISAFE® UCS..B

Proceed as follows during removal:

NOTICE

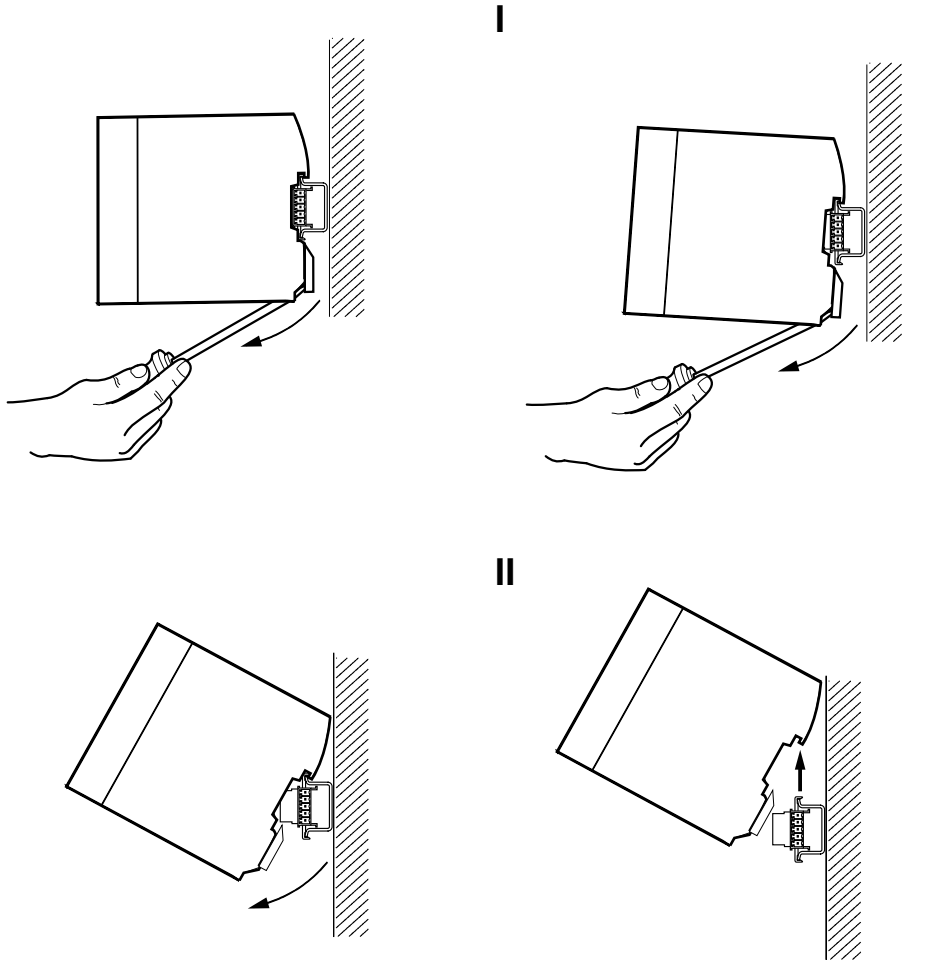
Observe the following points to prevent MOVISAFE® UCS..B from being damaged:

Switch off the voltage supply before you install/remove MOVISAFE® UCS..B on/from the backplane bus connectors.

INFORMATION

The backplane bus is interrupted when MOVISAFE® UCS..B is removed.

1. The housing of the safety module is fitted with a spring-loaded clip at the bottom by which the module can be removed from the rail.
2. Insert a suitable screwdriver into the slot. The safety module is unlocked (see following figure, pos. I).
3. First slew the safety module to the front, then lift it upwards (see the following figure, pos. II).



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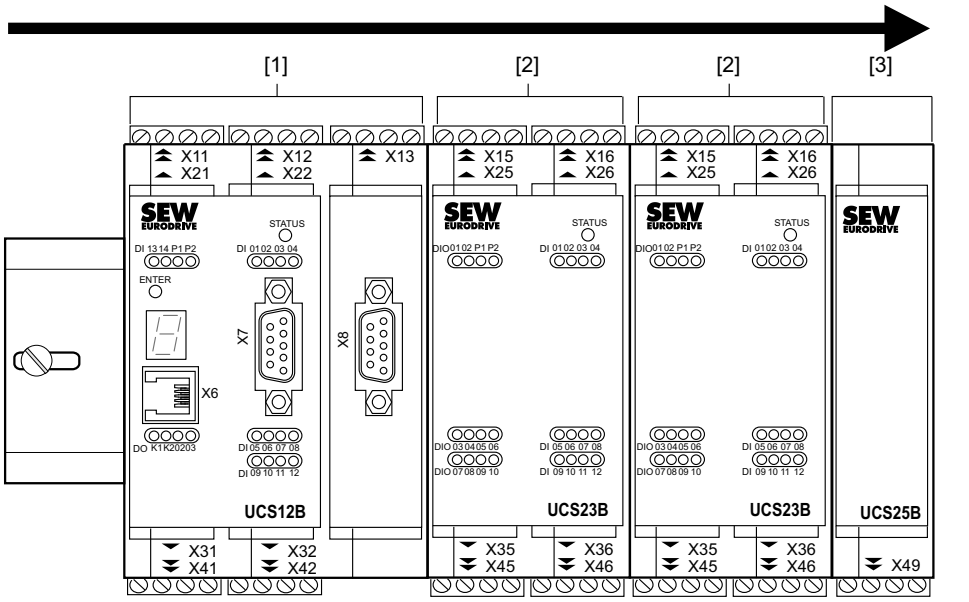
4.6 Expansion of the basic modules

INFORMATION

- The expansion modules must always be installed to the right of the basic module. Expansion with another basic module is not permitted.
- You must register the expansion modules in the MOVISAFE® Config UCS CM software (see chapter on "Addressing an expansion module").
- When expansion modules are used, the PFH value of the overall logic (basic module with expansion module) must be determined for a safety assessment.
- For the PFH values of the modules, refer to the "Technical data" chapter.

4.6.1 Maximum stage of expansion without PROFIsafe option (/PS)

You can add a maximum of 2 expansion modules [2] and 1 diagnostic module [3] horizontally next to 1 UCS..B basic module [1] (see following figure for example).



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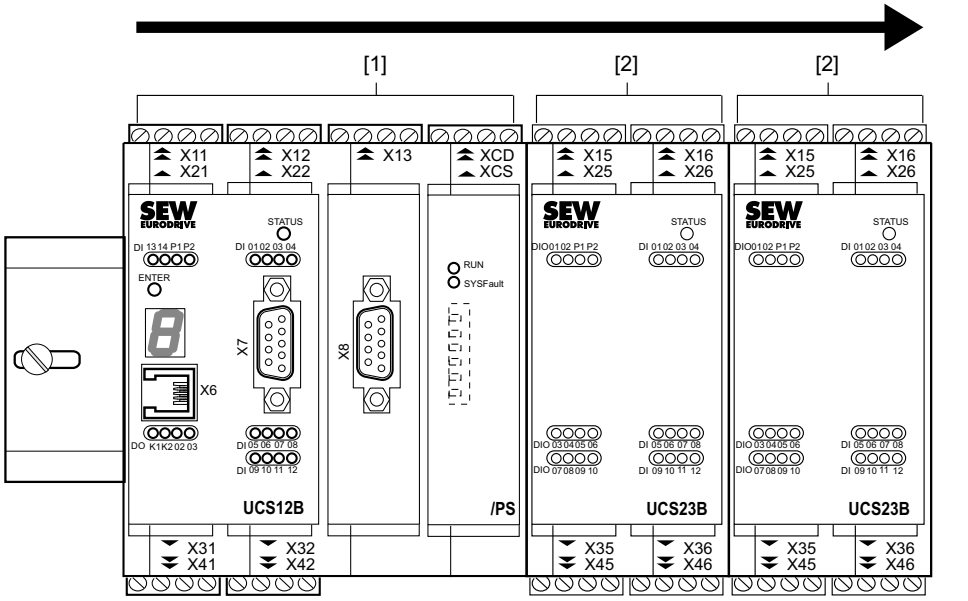
4.6.2 Maximum stage of expansion with PROFIsafe option (/PS)

You can add a maximum of 2 expansion modules [2] horizontally next to 1 UCS..B/PS basic module [1] (see following figure for example).



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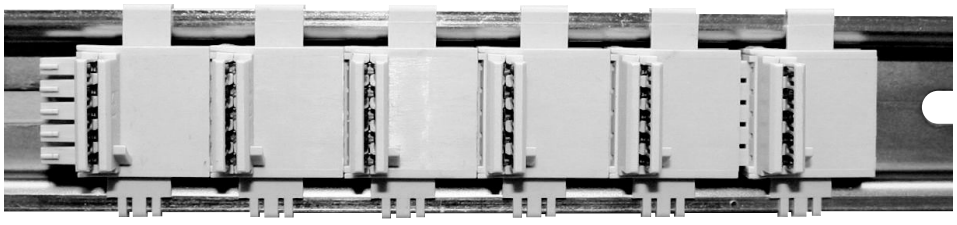
4.6.3 Backplane bus connector

The backplane bus connectors (see following figure) are expandable, 5-pole plug connectors with spring contacts. If an expansion module is added to a basic module, communication between the safety modules is routed via the backplane bus.

The width of a backplane bus connector corresponds to a pitch of 25 mm. You can combine multiple backplane bus connectors to individually adapt the length of the backplane bus to the overall system.

Plug the backplane bus connectors onto the profile rail before mounting the safety modules. When you mount the safety modules to the profile rail, contact is established with the backplane bus. The individual safety module slots are indicated by guide rails.



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The following table shows the number of required backplane bus connectors:

		Number of backplane bus connectors required for expansion with:		
MOVISAFE® basic module	**Without expansion**	**1 × UCS23B**	**2 × UCS23B**	**1 × UCS25B/26B/27B**
UCS10B	No backplane bus connector required	4	6	3
UCS11B		4	6	3
UCS12B		5	7	4
UCS10B/PS		5	7	4
UCS11B/PS		5	7	4
UCS12B/PS		6	8	5

INFORMATION

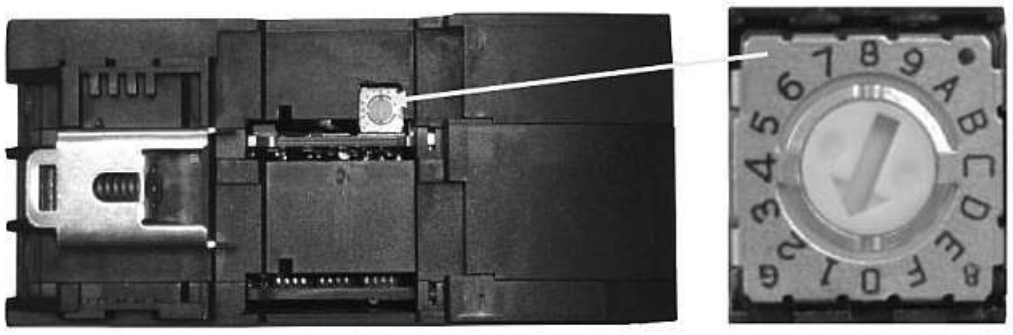
- When using a basic module without expansion, the backplane bus connector is not required.
- In case of an extension, all backplane bus slots of the safety modules to be connected must be used.
- Observe the notes in the "Scope of delivery" chapter.

4.6.4 Addressing an expansion module

Before you can use an expansion module, you have to assign an address to it and register this address in the MOVISAFE® Config UCS CM software.

The address is assigned via the address switch at the bottom of the expansion module (see following figure). Use the following addresses:

- Basic module: address 0 (reserved)
- 1st expansion module: address 1
- 2nd expansion module: address 2



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INFORMATION

If the set address does not correspond to the configured address, MOVISAFE® UCS..B triggers an alarm.

5 Electrical installation

5.1 Connection and terminal description of the basic modules

5.1.1 Part numbers

- MOVISAFE® UCS10B: 18222358
- MOVISAFE® UCS11B: 18222366
- MOVISAFE® UCS12B: 18222374
- MOVISAFE® UCS10B/PS: 18236294
- MOVISAFE® UCS11B/PS: 18236308
- MOVSAFE® UCS12B/PS: 18236316

5.1.2 Terminal description for MOVISAFE® UCS10B/11B/12B

INFORMATION

The following table lists all elements of the MOVISAFE® UCS..B safety modules. Observe the type-specific differences between the individual safety modules (see "MOVISAFE® UCS..B compact safety modules" operating instructions, "Unit structure" chapter).

Description	LED/terminal	Function
STATUS LED	STATUS	The LED shows the status of MOVISAFE® UCS..B (see chapter on "Meaning of the LEDs").
LED DI 01 – 14	DI 01 – 14	The LEDs show the status of each digital input (see chapter on "Operating states").
LED P1, P2	P1, P2	The LEDs show the state of the pulse output (see chapter "Operating states").
LED K1, K2	K1, K2	The LEDs show the state of the relay output (see chapter "Operating states").
LED DO 02 – 03	DO 02, 03	The LEDs show the status of each digital output (see chapter on "Operating states").
RUN LED	RUN	The LED shows the operating state of the communication interface (see chapter "Meaning of the LEDs").
SYS-FAULT LED	SYS-FAULT	The LED shows the connection state of the communication interface (see chapter "Meaning of the LEDs").
7-segment display		The number shows the state of the module (see chapter on "Meaning of the 7-segment display").
Function key	ENTER	Error reset and display of the CRC in state "4".
X6: Connection for service interface	X6	Service interface for point-to-point connection (e.g. UWS21B, USB11A).
X7, X8: Connection for TTL, SIN/COS or SSI absolute encoders	X7 (X8):1–9	Assignment depends on the encoder connected (see "Technical data" chapter).

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Description	LED/terminal	Function
X11: Voltage supply connection	X11:1	DC 24 V
	X11:2	DC 24 V
	X11:3	0V24 reference potential
	X11:4	0V24 reference potential
X12: Connection for encoder power supply for encoder interface X7	X12:1 U_ENC_1	Encoder power supply for encoders connected directly to the X7 encoder interface
	X12:2 GND_ENC_1	Reference potential for encoder power supply
	X12:3 DO 0.00	Auxiliary output 1
	X12:4 DO 0.01	Auxiliary output 2
X13: Connection for encoder power supply for encoder interface X8	X13:1 U_ENC_2	Encoder power supply for encoders connected directly to the X8 encoder interface
	X13:2 GND_ENC_2	Reference potential for encoder power supply
	X13:3 N.C.	
	X13:4 N.C.	
X21: Connection for digital inputs, pulse outputs	X21:1 DI 0.13	Digital input 13 (suitable for OSSD)
	X21:2 DI 0.14	Digital input 14 (suitable for OSSD)
	X21:3 P1	Pulse signal 1 for crossfault monitoring
	X21:4 P2	Pulse signal 2 for crossfault monitoring
X22: Digital input connection	X22:1 DI 0.01	Digital input 1 (suitable for OSSD)
	X22:2 DI 0.02	Digital input 2 (suitable for OSSD)
	X22:3 DI 0.03	Digital input 3 (suitable for OSSD)
	X22:4 DI 0.04	Digital input 4 (suitable for OSSD)
X31: Digital output connection	X31:1 DO 0.02_P	HISIDE output 2
	X31:2 DO 0.02_M	LOSIDE output 2
	X31:3 DO 0.03_P	HISIDE output 3
	X31:4 DO 0.03_M	LOSIDE output 3
X32: Connection for digital inputs or HTL incremental encoder	X32:1 DI 0.05	Digital input 5 / HTL proximity sensor input
	X32:2 DI 0.06	Digital input 6 / HTL proximity sensor input
	X32:3 DI 0.07	Digital input 7 / HTL proximity sensor input
	X32:4 DI 0.08	Digital input 8 / HTL proximity sensor input
X41: Connection for relay outputs	X41:1 K 0.11	Relay output 1
	X41:2 K 0.12	
	X41:3 K 0.21	Relay output 2
	X41:4 K 0.22	
X42: Digital input connection	X42:1 DI 0.09	Digital input 9 (suitable for OSSD)
	X42:2 DI 0.10	Digital input 10 (suitable for OSSD)
	X42:3 DI 0.11	Digital input 11 (suitable for OSSD)
	X42:4 DI 0.12	Digital input 12 (suitable for OSSD)

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Description	LED/terminal	Function
XCS: Connection for CAN-S (PROFIsafe)	XCS:1 CAN_High	CAN-S (PROFIsafe), CAN High
	XCS:2 CAN_Low	CAN-S (PROFIsafe), CAN Low
	XCS:3 DGND	CAN-S (PROFIsafe), CAN reference potential
	XCS:4 120 Ω	CAN-S termination
XCD: CAN connection (standard)	XCD:1 CAN_High	CAN (standard), CAN High
	XCD:2 CAN_Low	CAN (standard), CAN Low
	XCD:3 DGND	CAN (standard), CAN reference potential
	XCD:4 120 Ω	CAN termination

5.2 Connection and terminal description for UCS23B expansion modules

5.2.1 Part number

MOVISAFE® UCS23B: 18222412

5.2.2 Terminal description for MOVISAFE® UCS23B

Description	LED/terminal	Function
STATUS LED	STATUS	The LED shows the status of MOVISAFE® UCS23B (see chapter on "Meaning of the LEDs").
LED DI 01 – 12	DI X.01 – 12	State of the respective digital input
LED P1, P2	P1, P2	State of the pulse output
LED DIO 01 – 10	DIO X.01 – 10	State of the respective digital input or output
X15: Voltage supply connection	X15:1	DC 24 V
	X15:2	DC 24 V
	X15:3	0V24 reference potential
	X15:4	0V24 reference potential
X16: Auxiliary output connection	X16:1 N.C.	
	X16:2 N.C.	
	X16:3 DO X.00	Auxiliary output 1
	X16:4 DO X.01	Auxiliary output 2
X25: Connection Digital inputs/outputs and pulse outputs	X25:1 DIO X.01	Configurable digital input/output 1 (suitable for OSSD)
	X25:2 DIO X.02	Configurable digital input/output 2 (suitable for OSSD)
	X25:3 P1	Pulse output 1 for crossfault monitoring
	X25:4 P2	Pulse output 2 for crossfault monitoring
X26: Digital input connection	X26:1 DI X.01	Digital input 1 (suitable for OSSD)
	X26:2 DI X.02	Digital input 2 (suitable for OSSD)
	X26:3 DI X.03	Digital input 3 (suitable for OSSD)
	X26:4 DI X.04	Digital input 4 (suitable for OSSD)

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Description	LED/terminal	Function
X35: Connection Digital inputs/outputs	X35:1 DIO X.03	Configurable digital input/output 3 (suitable for OSSD)
	X35:2 DIO X.04	Configurable digital input/output 4 (suitable for OSSD)
	X35:3 DIO X.05	Configurable digital input/output 5 (suitable for OSSD)
	X35:4 DIO X.06	Configurable digital input/output 6 (suitable for OSSD)
X36: Digital input connection	X36:1 DI X.05	Digital input 5
	X36:2 DI X.06	Digital input 6
	X36:3 DI X.07	Digital input 7
	X36:4 DI X.08	Digital input 8
X45: Connection Digital inputs/outputs	X45:1 DIO X.07	Configurable digital input/output 7 (suitable for OSSD)
	X45:2 DIO X.08	Configurable digital input/output 8 (suitable for OSSD)
	X45:3 DIO X.09	Configurable digital input/output 9 (suitable for OSSD)
	X45:4 DIO X.10	Configurable digital input/output 10 (suitable for OSSD)
X46: Connection for digital inputs	X46:1 DI X.09	Digital input 9 (suitable for OSSD)
	X46:2 DI X.10	Digital input 10 (suitable for OSSD)
	X46:3 DI X.11	Digital input 11 (suitable for OSSD)
	X46:4 DI X.12	Digital input 12 (suitable for OSSD)

INFORMATION

- X = 1: 1st expansion module
- X = 2: 2nd expansion module

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5.3 Connection and terminal description of diagnostic modules

5.3.1 Part numbers

MOVISAFE® UCS25B: 18222439

MOVISAFE® UCS26B: 18249744

MOVISAFE® UCS27B: 18249752

5.3.2 Terminal description for MOVISAFE® UCS25B/26B/27B

Description	LED/ terminal/DIP switch	Function
Status LED	STATUS	The LED shows the state of a diagnostic module (see chapter "Meaning of the LEDs").
SYSFault LED	SYSFault	The LED shows the connection state of the communication interface (see chapter "Meaning of the LEDs").
DP LED	DP	The LED shows the connection state with PROFIBUS (see chapter "Meaning of the LEDs").
PN LED	PN	The LED shows the connection status with PROFINET (see chapter on "Meaning of the LEDs").
DIP switch S1: Backplane bus termination (only with UCS26B)	S1: ON S1: OFF	Backplane bus termination enabled Backplane bus termination disabled
DIP switch S2: PROFIBUS termination (only with UCS26B)	S2: ON S2: OFF	Termination on PROFIBUS enabled Termination on PROFIBUS disabled
DIP switches S3 and S4: Address switch for setting the PROFIBUS address (only with UCS26B)	S3: High Byte S4: Low Byte	Address switch for PROFIBUS address: High Byte setting Address switch for PROFIBUS address: Low Byte setting
X49: CAN connection	X49:1 DGND X49:2 CAN_High X49:3 CAN_Low X49:4 N.C.	CAN reference potential CAN High CAN Low -
XDP: PROFIBUS connection	XDP	PROFIBUS fieldbus interface (see chapter "Technical Data").
XPN: PROFINET connection	XPN	PROFINET fieldbus interface (see chapter on "Technical data").

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5.4 Installation

5.4.1 Installation notes

The cable lengths for the digital inputs and outputs must generally not exceed 30 m.

If the cable length exceeds 30 m, you must provide for measures to prevent unacceptable overvoltages. Appropriate measures include lightning protection for outer conductors, overvoltage protection of the plant on the inside and protected cable routing.

5.4.2 Measures for electromagnetic compatibility (EMC)

The MOVISAFE® UCS..B safety modules are intended for industrial use (based on the EN 55011 EMC test specifications). MOVISAFE® UCS..B safety modules can be installed in a control cabinet with inverter technology without any problems. A requirement for safe installation is that the electromagnetic compatibility of the entire system is ensured by appropriate measures. The following measures ensure designated operation of the safety modules:

- Make sure that the MOVISAFE® voltage supply cables and the converter's "switching cables" are routed separately.
- Route the converter's signal cables, bus cables and power cables in separate cable ducts. The minimum distance between the cable ducts should be 10 mm.
- Route the cables for connecting the digital inputs and contact monitoring separately from one another.
- All contactors in the immediate vicinity of the safety modules must be equipped with appropriate suppressors or protective diodes.
- Make sure that the converter technology in the immediate vicinity of the safety modules complies with the EMC guidelines. Check the routing and design of the shielding for the motor cable and braking resistor connection. Follow the installation guidelines of SEW-EURODRIVE for inverter technology.
- Note the following when connecting position and speed sensors:
  - Use only shielded cables. The cable for transmitting signals must be suitable for the EIA485 standard (formerly RS485).
  - Make sure that the shield is connected properly and that the velocity sensors are in the correct position on the sensor end. Also connect the shield to the shield connection of the frequency inverter and to UCS..B over a large area at the PE connection (e.g. the mounting plate or shield connection of the encoder signal split box). Simply connecting the shield in the 9-pin D-sub connector is not enough.
  - Use prefabricated cables from SEW-EURODRIVE or the DAE70B/71B encoder signal split box for splitting the signals of position and speed sensors (see the "Optional cables for connecting an encoder system" chapter).
- Observe the following points for connection to a fieldbus system:
  - Use only shielded cables.
  - Use only connectors with a metal housing or a metalized housing.
  - Connect the shielding in the connector over a wide surface area.
  - Apply the shielding of the bus cable on both ends.
  - Avoid using plug connectors to extend fieldbus cables.

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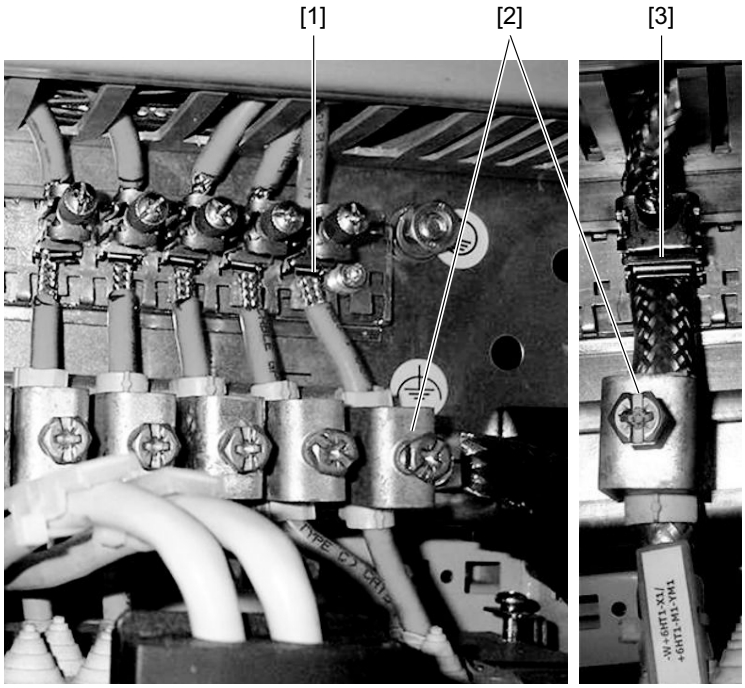
5.4.3 Installation example

The following figure shows the connection of braided shields in practice:



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[1] Shield of encoder cable connected to shield plate of control components

[2] Mechanical cable relief

[3] Shield of motor cable connected to shield plate of power components

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5.5 Voltage supply of the safety modules

The MOVISAFE® UCS..B safety modules require an external voltage supply of DC 24 V (see SELV or PELV, EN 50178). The following conditions must be taken into account for project planning and installation of the power supply unit:

- It is essential that you observe the minimum and maximum tolerances of the supply voltage.

Nominal voltage	Tolerance	
	Minimum (-15 %)	Maximum (+15 %)
DC 24 V	DC 24 V -15 % = DC 20.4 V	DC 24 V +15 % = DC 27.6 V

- To achieve a rather low residual ripple of the supply voltage, we recommend using a 3-phase power supply unit or an electronically controlled unit. The power supply unit must meet the requirements in EN 61000-4-11 (voltage dip).
- The voltage supply supplies the safety modules' internal electronics. If you are using encoders, the encoder power supply must be supplied separately (see the "Voltage supply for encoder systems" chapter).
- Always ensure safe galvanic isolation against the voltage supply system (e.g. AC 230 V). Select power supply units that meet the guidelines stipulated in DIN EN 60741 or DIN EN 50178. When selecting the unit, make sure it has equipotential bonding between PE and DC 0 V on the secondary side.
- Fuse the safety modules individually on the primary side with a 2 A fuse. SEW-EURODRIVE recommends using type Z miniature circuit breakers or miniature fuses, "fast-acting" characteristics. Observe local regulations when dimensioning the connection cables.
- The external voltage insulation strength of the MOVISAFE® UCS..B safety modules is DC 32 V (fused with suppressor diodes at the input).

5.6 Digital input connection

MOVISAFE® UCS..B is equipped with safe digital inputs. They are suited for connecting 1 or 2-channel sensors, in some cases with output signal switching devices (OSSD) according to EN 61131-2 type 2. For the OSSD capability of an input, refer to the "Plug connectors of basic module" and "Plug connectors of expansion module" chapters.

The connected signals must have a "high" level of DC 24 V (DC +15 V to DC +30 V) and a "low" level of DC 0 V (DC −3 V to DC +5 V). The inputs are equipped with input filters.

Generally, the digital inputs are designed for safety-related use only in combination with the pulse outputs (see chapter on "Using pulse outputs").

If you do not use the pulse outputs, you must provide for external measures, especially an appropriate cable routing, to prevent a short circuit in the external wiring between different inputs and against the supply voltage of the UCS..B safety modules.

Each digital input of MOVISAFE® can be configured separately for the following signal sources:

- Digital input is assigned to pulse P1 of the same module
- Digital input is assigned to pulse P2 of the same module
- Digital input is assigned to DC 24 V continuous voltage

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An internal diagnostic function checks cyclically whether the binary functions, including the input filters, are working properly. When a fault is detected, MOVISAFE® goes into the alarm status. At the same time, all MOVISAFE® outputs are deactivated (see the "Diagnostics" chapter). The non-configured digital inputs are waiting for the "pulse P1" signal, meaning that MOVISAFE® enters the "ALARM" status when DC 24 V are connected.

INFORMATION

Triggered safety functions or alarm messages can be acknowledged as follows:

- Using the ENTER function key on MOVISAFE®
- Using a configurable reset (pulse length > 150 ms and < 3 s) at the digital input DI 0.01 – DI 0.12
- With active PROFIsafe communication, only using the F-bus reset (bit length > 150 ms and < 3 s).

INFORMATION

If an error occurs both on the frequency inverter and MOVISAFE® UCS..B compact, make sure that you reset the two errors in the correct sequence.

- First acknowledge the error on the frequency inverter and then acknowledge it on the MOVISAFE® UCS..B safety module.
- Acknowledging both errors at once can cause a fatal error on MOVISAFE® UCS..B, particularly if MOVISAFE® UCS..B is operated as an SSI listener in the encoder configuration.

Error messages can only be acknowledged by switching MOVISAFE® off and then on again. Both the MOVISAFE® Config UCS CM software interface and the MOVISAFE® UCS..B system manual contain a list of error and alarm messages.

Depending on the required performance level, you can use digital inputs individually or combined in groups. The MOVISAFE® Config UCS CM software interface provides various predefined input elements for this purpose (see the "Description of input elements" chapter).

MOVISAFE® UCS..B ensures comprehensive diagnostic functions for the input subsystem to achieve the highest possible DC values (**D**iagnostic **C**overage). These functions are executed permanently or optionally (cross fault monitoring by means of pulse detection). You can use the DC values for the input sensors given in the "Diagnostic values" chapter for a safety-relevant evaluation of the overall system.

Digital inputs of basic module and expansion module:

Digital inputs	Achievable performance Level (PL)	Comments
DI X.01 to DI X.04 DI X.01 to DI X.04	PL e	Suitable for all kinds of input elements with or without pulse, achievable PL, depending on $MTTF_d$ of the input elements and error eliminations in the external cabling.

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Digital inputs	Achievable performance Level (PL)	Comments
DI X.05 to DI X.08	PL e	1-channel with pulse: • Predominantly high-level required (T_{High} > 100 × T_{Low}) • At least one request/day due to the application • Fault detection on request
	PL d	1-channel without pulse: • Short circuit fault exclusion between the signals and after V_{CC} • Fault detection on request
	PL e	2-channel: • At least one request/day due to the application • Fault detection on request
DI X.13, DI X.14	PL e	Use of pulse 1 and pulse 2
	PL d	Without pulse/with pulse 1 or pulse 2 on both inputs. Fault detection on request

Digital input on the expansion module (DIO configured as input):

Digital inputs	Achievable performance Level (PL)	Comments
DIO X.01 to DIO X.10 (only UCS23B)	-	Without pulse, 1-channel static signal (auxiliary input)
	PL e	Without pulse, 2-channel static signal • At least one request/day due to the application • Fault detection only on request
	PL d	2-channel without pulse, static signal • Less than one request/day due to the application • Fault detection on request
	PL e	1-channel with pulse: • Predominantly high-level required (T_{High} > 100 × T_{Low}) • At least one request/day due to the application • Fault detection on request
	PL d	1-channel with pulse: • Less than one request/day
	PL e	2-channel with pulse 1 and pulse 2

INFORMATION

- X = 0: Basic module
- X = 1: 1st expansion module
- X = 2: 2nd expansion module

5.6.1 Using pulse outputs

In addition to the digital inputs, MOVISAFE® UCS..B offers two pulse outputs (P1 and P2) at the basic module and at each expansion module. The pulse outputs are DC 24 V outputs that are intended exclusively for monitoring the digital inputs of each module. The pulse outputs must not be used for other functions within the application. The frequency of the P1 and P2 pulse outputs is 125 Hz each.

Observe the following points during project planning:

- The connected cables must not exceed the maximum length of 30 m, and the maximum permitted total current for the pulse outputs must not exceed 250 mA.
- Pulse P1 and pulse P2 must be used for one specific module each. It is not possible to mix the pulses of basic and expansion modules.

INFORMATION

Without using pulsing, the digital inputs can be connected as follows:

- With single-channel, self-monitoring sensors, you can establish structures up to category 2. This means you can achieve a performance level in accordance with EN ISO 13849-1.
- With dual-channel sensors without a function test within 24 hours, you can establish structures up to category 3. This means you can achieve a performance level in accordance with EN ISO 13849-1.
- With dual-channel sensors and a function test within 24 hours, you can establish structures up to category 4. This means you can achieve a performance level in accordance with EN ISO 13849-1. Note that external measures, in particular suitable cable routing, must be taken to prevent short circuits in the external wiring between different inputs and against the supply voltage of MOVISAFE® UCS..B.

5.7 Connecting the outputs

5.7.1 General information

MOVISAFE® UCS..B offers outputs on the basic module and on the expansion modules. Comprehensive diagnostics functions in the output subsystem ensure high DC values.

Make sure that elements for switching amplification, such as relays, contactors, etc., are included in the switch-off circuit. You can use the DC values for the output sensors in the "Diagnostic values" chapter for a safety-relevant evaluation of the overall system.

If the unit-internal diagnostic function is enabled, it will cyclically check the digital outputs for proper functioning. During this plausibility check, the digital output is switched to its inverse value for the duration of the check (< 500 µs). This means a P digital output is briefly switched to DC 0 V potential, and an M digital output is briefly switched to DC 24 V potential. There is no diagnostics at the auxiliary outputs.

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The relay outputs are checked for plausibility during each switching cycle. The relay outputs have to be tested (switched) cyclically to maintain the safety function. A test should be performed at least once per year. For increased demands, the test cycle is to be determined based on the application.

Auxiliary outputs on the basic or expansion module are not tested and are not permitted for safety technology applications.

The MOVISAFE® Config UCS CM software can be used to activate or deactivate the internal diagnostics function for the 10 safe digital outputs or the expansion module. In the "UCS23B multi-unit configuration" dialog window:

- Dynamic

  means that the internal diagnostics function at the output is enabled. Using the output on touch probe inputs may cause an unintended switching and is therefore prohibited. This includes, for example, the digital inputs of frequency inverters.

- Static

  means that the internal diagnostics function at the output is disabled. This allows for using the output on touch probe inputs.

INFORMATION

- Cross circuits and short circuits in the external wiring of the digital outputs are not detected. For safe outputs, crossfaults and short circuits have to be prevented according to EN ISO 13849-2 table D.4.
- For a safety assessment of switching amplifiers in the switch-off circuit, e.g. relay or contactor, the manufacturer's specification ($MTTF_d$ value, FIT value, $B10_d$ value, etc.) must be used.
- When used for safety purposes, the proper functioning of switching amplifiers, e.g. relays or contactors, must be monitored via suitable feedback contacts.
- Fault exclusions are permitted according to the relevant standards. The effective peripheral conditions must be permanently ensured.
- If an error is detected, MOVISAFE® UCS..B switches to alarm/error status and indicates this status (see the "Diagnostics" chapter).
- If you use switching amplification elements in safety circuits, you must monitor their functionality via suitable feedback contacts, etc. Suitable feedback contacts are contacts that are connected with the contacts in the cut-off circuit in a forced-switching manner.
- The switching capacity of the external switching amplifiers must be tested cyclically. The test interval must be specified by the application based on request and ensured via suitable measures. Suitable measures can be of an organizational (power off/on at the start of a shift) or a technical (automatic, cyclical switching) nature.
- Observe the DC values as well as the corresponding conditions (see chapter "Diagnostics values").
- Applications with frequent requests of the safe disconnection should be tested at short intervals, e.g. at the start of a shift once a day. A test should at least be performed cyclically once a year.
- The diagnostics function of the outputs is performed in group control and single control. The standard outputs are not tested.
- The outputs High-Side (DO 0.02_P, DO 0.03_P) and Low-Side (DO 0.02_M, DO 0.03_M) may not be used for safety tasks individually. Use for safety tasks is only permitted in high side/low side combination.

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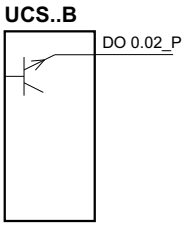
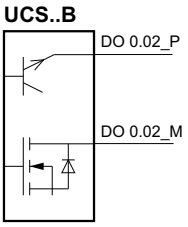
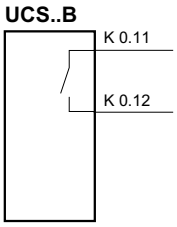
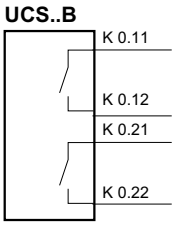
5.7.2 Connection of outputs at the basic module

Depending on the required performance level, you can use the digital or relay outputs individually or combined in groups.

Sourcing digital output	Sourcing and sinking digital output	Relay output	Relay output
			

Output	Output type	Achievable performance Level (PL)	Requirements
DO 0.00 to DO 0.01	Auxiliary output	-	-
DO 0.02_P with DO 0.02_M	Digital output, 2-channel	PL e	-
DO 0.02_P	Auxiliary output	-	-
DO 0.02_M	Auxiliary output	-	-
DO 0.03_P with DO 0.03_M	Digital output, 2-channel	PL e	-
DO 0.03_P	Auxiliary output	-	-
DO 0.03_M	Auxiliary output	-	-
K 0.1 with K 0.2	Relay output, 2-channel	PL e	-
K 0.1	Auxiliary output	-	-
K 0.2	Auxiliary output	-	-

INFORMATION

- For safety-relevant applications, use only external switching elements with a minimum holding current of > 1.2 mA.
- Cross circuits and short circuits in the external wiring of the digital outputs are not detected. For safe outputs, crossfaults and short circuits have to be prevented according to EN ISO 13849-2 table D.4.

Permitted capacitive and inductive load at safe outputs

The safe outputs have OSSD characteristics. This means that the safe outputs are scanned cyclically to test their cut-off capability and the status is read out.

The cut-off capability is tested according to the following criteria:

- After the output is deactivated, the output voltage may not be more than 5.6 V.
- The permitted voltage level must be reached after no more than 400 µs.

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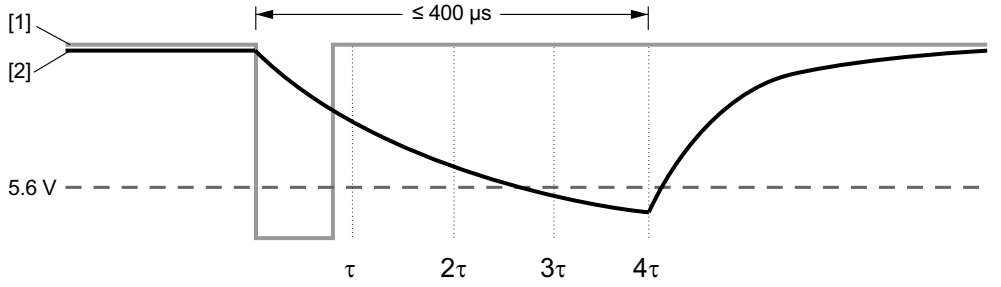
- If the permitted voltage level is reached, the test is considered successful. The output is reactivated without delay.
- If the permitted voltage level has not been reached after 400 µs, an alarm is triggered and all the safe outputs (second channel for safe outputs) are deactivated.

The following figure shows an ideal version [1] and a typical version [2] of this process.



[1] Ideal version

[2] Typical version

The time constant τ of the real RC or RL element at the output must be taken into account to determine the maximum permitted capacitance or inductance. This RC or RL element determines the real discharging curve.

The voltage level of 5.6 V is safely reached after 3 τ. The following applies:

- 3 τ ≤ 350 µs
- τ ≤ 100 µs

When τ = R × C = L/R, the maximum capacitive or inductive load that can be used in combination with its ohmic load can be determined:

- $C_{max} = \tau/R = 10^{-4}/R$

  or

- $L_{max} = \tau \times R = 10^{-4} \times R$

Typical values are 20 nF for the capacitance C and 100 mH for the series inductance L.

Using the safe outputs to activate the STO safety function

You can use the safe digital outputs or the safe relay outputs to control the STO (Safe Torque Off) safety function for MOVIDRIVE® B (X17), MOVITRAC® B (X17) and MOVIAXIS® (X7/X8) (see the following figures).

NOTICE

Power consumption at terminal X17 of MOVIDRIVE® B and MOVITRAC® B is too high.

Component parts of MOVISAFE® could be destroyed, or malfunctions of the STO safety function could occur.

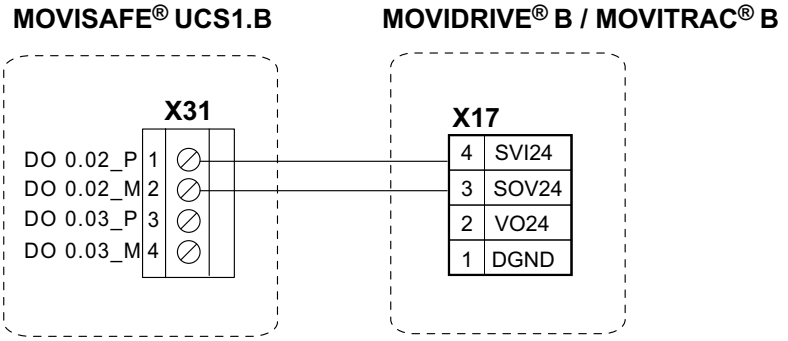
- Note the specific power consumption at terminal X17 of MOVIDRIVE® B and MOVITRAC® B. It is listed in the "Functional safety" manual for the relevant product.

Using safe digital outputs

INFORMATION

Outputs DO 0.02_P/_M and DO 0.03_P/_M can drive the following maximum number of units, depending on the required current:

- 2x MOVIDRIVE® B
- 2x MOVITRAC® B
- 2x MOVIDRIVE® B and 2x BST safety-oriented brake modules
- 2x MOVITRAC® B and 2x BST safety-oriented brake modules



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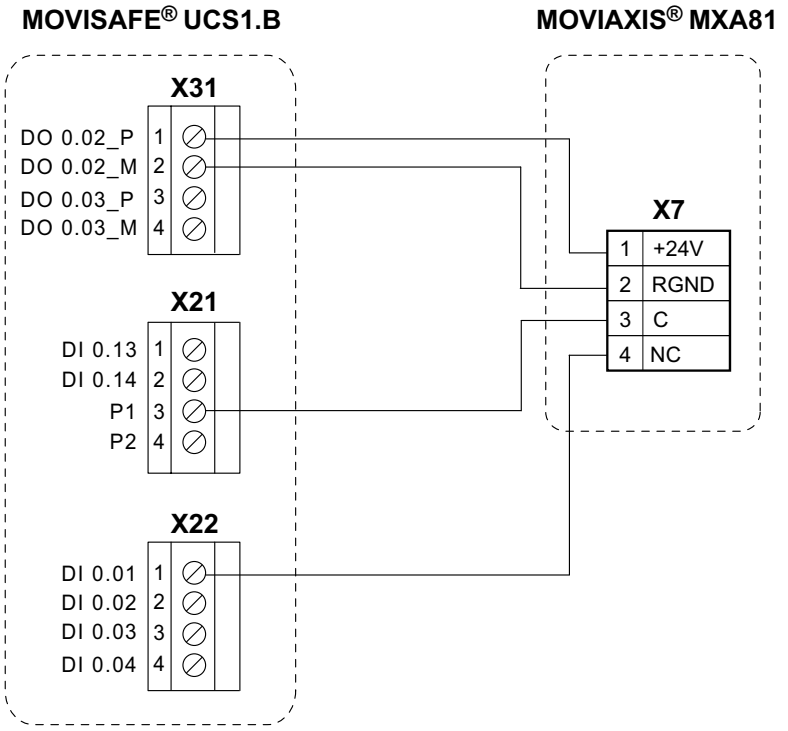

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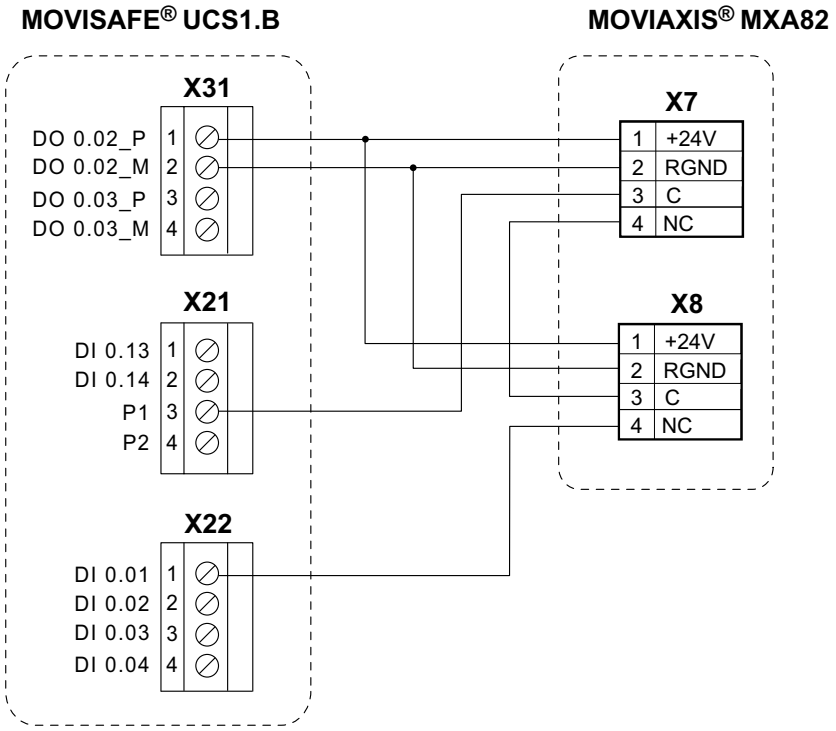

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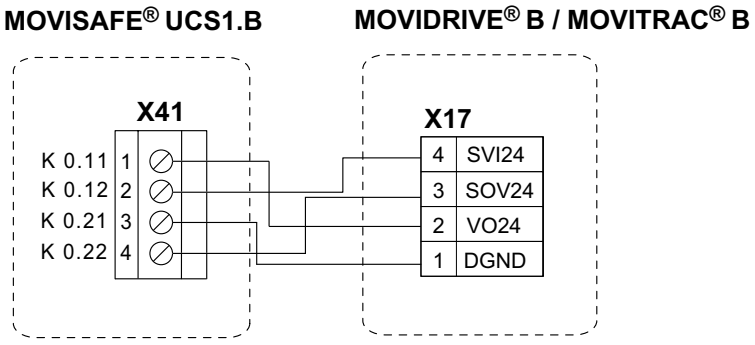
INFORMATION

If you want to selectively monitor the X7 and X8 relays, the relays must be connected with 2 safe outputs each (e.g. DO 0.02_P/_M and DO 0.03_P/_M), and the loopback circuit must be read back to one input each.

Using safe relay outputs



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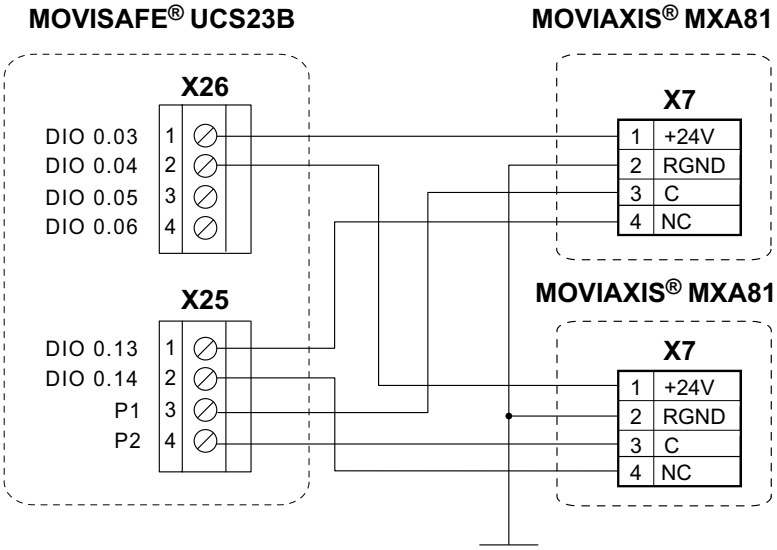
Use of configurable digital inputs/outputs



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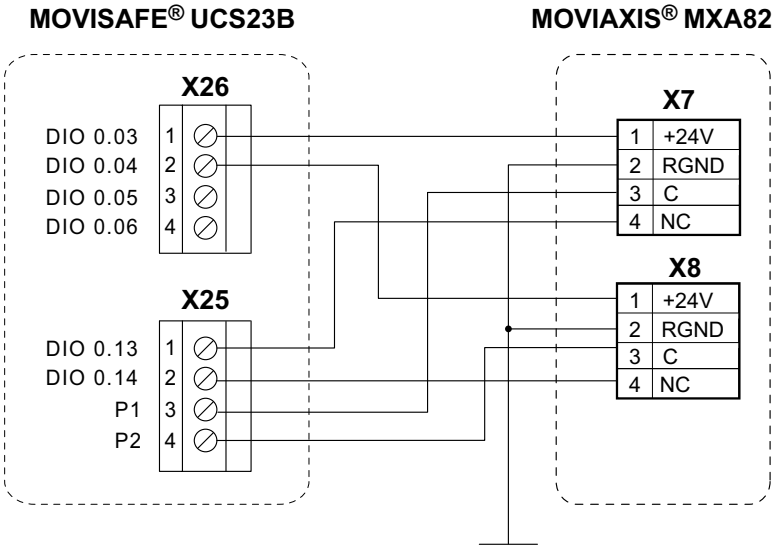
INFORMATION

With single-channel disconnections, you have to make certain fault assumptions and provide for corresponding fault exclusions.



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Using the safe outputs and auxiliary outputs to implement the SS1 safety function

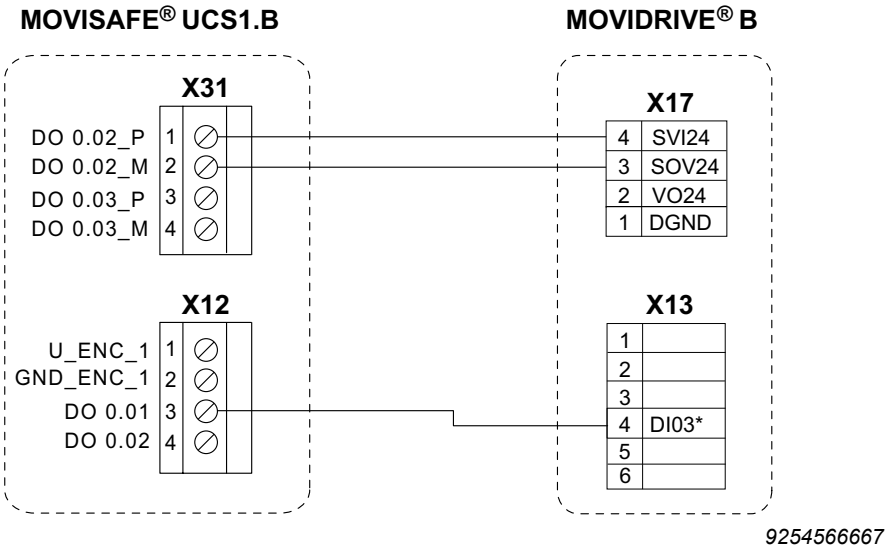
You can use the safe digital outputs or safe auxiliary outputs to control the SS1 (Safe Stop 1) safety function for MOVIDRIVE® B (see the following figures).

NOTICE

Power consumption at terminal X17 of MOVIDRIVE® B is too high.

Component parts of MOVISAFE® could be destroyed, or malfunctions of the SS1 safety function could occur.

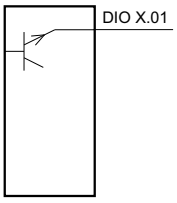
Note the specific power consumption at terminal X17 of MOVIDRIVE®. It is listed in the "Functional safety" manual.



* "Enable/stop" factory setting

5.7.3 Connection of outputs at the expansion module

Depending on the required performance level, you can connect digital outputs via one or two channels.

Sourcing digital output
UCS..B 

Output	Output type	Achievable performance Level (PL)	Requirements
DO X.01 to DO X.02	Auxiliary output	-	-
DIO X.01 to DIO X.10	Digital output, 1-channel, static	PL c	Fault detection/error response according to cat. 2
	Digital output, 2-channel, static	PL e	Outputs of different groups.
	Digital output, 2-channel, static	PL d	Outputs of the same group with short circuit fault exclusion at both outputs.
	Digital output, 1-channel, dynamic	PL d	-
	Digital output, 2-channel, dynamic	PL e	-

- The configurable digital outputs are assigned groups internally:
  - Group 1: DIO X.01 to DIO X.06
  - Group 2: DIO X.07 to DIO X.10
- X = 1: 1st I/O expansion module
- X = 2: 2nd I/O expansion module

INFORMATION

- For safety-relevant applications, use only external switching elements with a minimum holding current of > 1.2 mA.
- Cross circuits and short circuits in the external wiring are not detected. For safety outputs, crossfaults and short circuits must be excluded according to EN ISO 13849-2, table D.4.

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5.8 Connecting the position and velocity sensors

5.8.1 Before you start

NOTICE

Do not plug in or remove encoder connections during operation.

Doing so can cause irreparable damage to the electrical component parts on the encoder.

De-energize connected encoders and MOVISAFE® UCS..B **before** you plug in or remove the encoder connections.

For fault detection in the encoder system, there are several diagnostics measures implemented in the MOVISAFE® UCS..B safety modules depending on the selected encoder configuration. They are activated automatically when you select the encoder type and the encoder combination in the MOVISAFE® Config UCS CM software interface. You can use the diagnostic coverage values for the encoder sensors in the "Diagnostic values" chapter for a safety-relevant evaluation of the overall system.

INFORMATION

- Observe the notes in the "General installation notes for encoders" and "Voltage supply for encoder systems" chapters.
- The activation on the position processing requires at least one SSI absolute encoder.
- All monitoring functions use an internal digit format for the input fields. This may automatically convert the entered values to the internal digit format.

5.8.2 General installation notes for encoders

- Observe the notes in the "Measures for electromagnetic compatibility (EMC)" chapter.
- Maximum length of encoder cables:

  100 m (328 ft) with a capacitance per unit length ≤ 120 nF/km.
- Core cross section: 0.2 – 0.5 mm (AWG25 – AWG21)
- Use shielded cables with twisted pair conductors and make sure they are grounded on both ends over a large surface area:
  - At the encoder in the cable gland or in the encoder plug
  - To the metal clamp/strain relief on the bottom of the inverter or to the equipotential bonding (PE)
- With single encoders, you have to at least provide for a fault exclusion for the mechanical installation.
- With two encoders, the encoders must not have an impact on each other. This refers to both the electrical and mechanical part.
- The mechanical connection of the encoder must be positive and must not comprise parts that are subject to wear (chains, toothed belts, etc.).
- If you use two encoders, you have to configure the encoder with the higher resolution as encoder 1 (process encoder), and the encoder with the lower resolution as encoder 2 (reference encoder).

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5.8.3 Assignment of the encoder types to the safety module

You can connect the following conventional encoder types to the safety modules depending on the respective module:

- TTL
- HTL 1Z/2Z (counting input for HTL proximity sensors)
- SIN/COS
- SSI (binary or gray code)

The connected encoders are parameterized using the MOVISAFE® Config UCS CM software interface. The following table shows the connection options of the different encoders to the corresponding encoder interfaces of the safety modules.

Safety module	Encoder interface design		
	D-sub socket		Terminal
	X7	X8	X32
UCS10B UCS10B/PS	-	-	-
UCS11B UCS11B/PS	TTL SIN/COS SSI	-	HTL 1Z or HTL 2Z
UCS12B UCS12B/PS	TTL SIN/COS SSI	TTL SIN/COS SSI	HTL 1Z or HTL 2Z

MOVISAFE® UCS..B detects faults in the safety-relevant signals of an encoder system. Specific diagnostics are activated depending on the encoder configuration. For the specification of the encoder interfaces and the implemented diagnostics, refer to the "Specification of the encoder interfaces" chapter.

5.8.4 Combination of various encoder types

The MOVISAFE® UCS..B safety modules always need a redundant encoder signal. Whether the signal comes from one or two encoders depends on the required performance level and the safety function. The encoder system is selected and configured in the user interface of the MOVISAFE® Config UCS CM software. You can choose between a single-encoder concept and a double-encoder concept.

Single-encoder concept

Single-encoder concepts require a safety-rated encoder. Single-encoder concept means that one encoder is used to monitor the safe movement. It is not possible to use the encoder signal for controlling an inverter and for safe monitoring of the movement at the same time. In this case, use the suitable prefabricated encoder cable to split the encoder signal between the inverter and safety module.

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Double-encoder concept

Double-encoder concepts can be implemented using various standard encoders. Double-encoder concept means that two encoders are used to monitor the safe movement. The safety module compares the two encoder signals, which reduces the requirements on the individual encoder. The safety functions that can be implemented are selected in the user interface of the MOVISAFE® Config UCS CM software depending on the configured encoder system.

UCS11B, UCS11B/PS		Safety function												
Encoder 1	**Encoder 2**	**SEL**	**SLP**	**SCA**	**SSX**	**SLI**	**SDI**	**SLS**	**SOS**	**PDM**	**ECS**	**EOS**	**PRF**	**DEM**
TTL.	-			x	x	x	x	x	x		x			x
TTL	HTL 1Z			x	x			x	x		x			x
TTL	HTL 2Z			x	x	x	x	x	x		x			x
-	-													
HTL 1Z	HTL 1Z			x	x			x	x		x			x
HTL 2Z	HTL 2Z			x	x	x	x	x	x		x			x
SIN/COS	-			x	x	x	x	x	x		x			x
SIN/COS	HTL 2Z			x	x	x	x	x	x		x			x
SSI	HTL 2Z	x	x	x	x	x	x	x	x		x	x	x	x

UCS12B, UCS12B/PS (1-axis monitoring)		Safety function												
Encoder 1	**Encoder 2**	**SEL**	**SLP**	**SCA**	**SSX**	**SLI**	**SDI**	**SLS**	**SOS**	**PDM**	**ECS**	**EOS**	**PRF**	**DEM**
TTL	TTL			x	x	x	x	x	x		x			x
TTL	SSI	x	x	x	x	x	x	x	x	x	x	x	x	x
-	-													
SIN/COS	TTL			x	x	x	x	x	x		x			x
SIN/COS	SIN/COS			x	x	x	x	x	x		x			x
SIN/COS	SSI	x	x	x	x	x	x	x	x	x	x	x	x	x
SSI	SSI	x	x	x	x	x	x	x	x	x	x	x		x

UCS12B, UCS12B/PS[1] (monitoring of 2 axes)		Safety function												
Encoder 1	**Encoder 2**	**SEL**	**SLP**	**SCA**	**SSX**	**SLI**	**SDI**	**SLS**	**SOS**	**PDM**	**ECS**	**EOS**	**PRF**	**DEM**
TTL	-			x	x	x	x	x	x		x			x
TTL	HTL 1Z			x	x			x	x		x			x
TTL	HTL 2Z			x	x			x	x		x			x
-	-													
HTL 1Z	HTL 1Z			x	x			x	x		x			x
HTL2Z[2]	HTL 2Z[2]			x	x	x	x	x	x		x			x
SIN/COS	-			x	x	x	x	x	x		x			x

UCS12B, UCS12B/PS[1] (monitoring of 2 axes)		Safety function												
Encoder 1	**Encoder 2**	**SEL**	**SLP**	**SCA**	**SSX**	**SLI**	**SDI**	**SLS**	**SOS**	**PDM**	**ECS**	**EOS**	**PRF**	**DEM**
SIN/COS	HTL 2Z			x	x	x	x	x	x		x			x
SSI	HTL 2Z	x	x	x	x	x	x	x	x		x	x	x	x

1) Identical selection for axes 1 and 2

2) Only one axis can be monitored

- There must be at least one signal from the SSI absolute encoder to activate position processing.
- When using SSI absolute encoders, bear in mind that velocities are calculated from the position signals. This is why the encoder needs a suitable resolution and reproducibility.
- In a system prone to slip, observe the assignment of the process sensor in the encoder configuration in MOVISAFE® Config UCS CM:
  - The process sensor is relevant for internal calculation and monitoring of limit values. It determines the switch-off point for the implemented safety function.
  - The reference sensor is relevant for the plausibility of encoder data. This sensor is referenced to the process sensor.
- If position processing is not enabled, the reference sensor is automatically adjusted to the process sensor. The adjustment is made cyclically after a specific distance or number of revolutions. You determine the track length until the next adjustment as follows:
  - Read the measuring length in the encoder configuration in MOVISAFE® Config UCS CM (e.g. 500 revolutions)
  - Calculate the interval for adjustment: 1/4 × measuring length

    (e.g. 1/4 × 500 rev = 125 rev)

  Result: The reference sensor is adjusted to the process sensor every 125 revolutions.

  The following sample values are obtained for encoder adjustment depending on the selected user unit.

Measuring section	User travel unit	Adjustment
Linear	mm/s	2500 mm
	m/s	12.5 m
Rotational	Degree/s	125 degrees
	1/s	125 rev
	rpm	125 rev

- SEW-EURODRIVE recommends that you not exceed a maximum resolution ratio of 1:10,000 between "encoder 1" and "encoder 2."
- If you change the encoder configuration at a later date in the MOVISAFE® Config UCS CM software interface, the existing parameters for the monitoring functions might no longer be compatible with the new encoder configuration. In this case, check the parameter settings and value ranges of all the monitoring functions in use.

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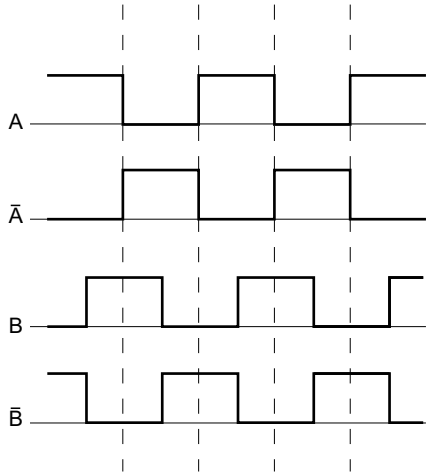
5.8.5 Connection of HTL proximity sensors

HTL proximity sensors are connected to the safety modules UCS11B, UCS11B/PS, UCS12B and UCS12B/PS using the X32 (DI 0.05 – DI 0.08) terminal. The digital inputs are used as counting inputs. The circuit logic of the HTL proximity sensors must be debounced. When using HTL sensors, the signals are always to be read-in with standard and complementary tracks (A, B and **A**, **B** with a phase shift of 90°).



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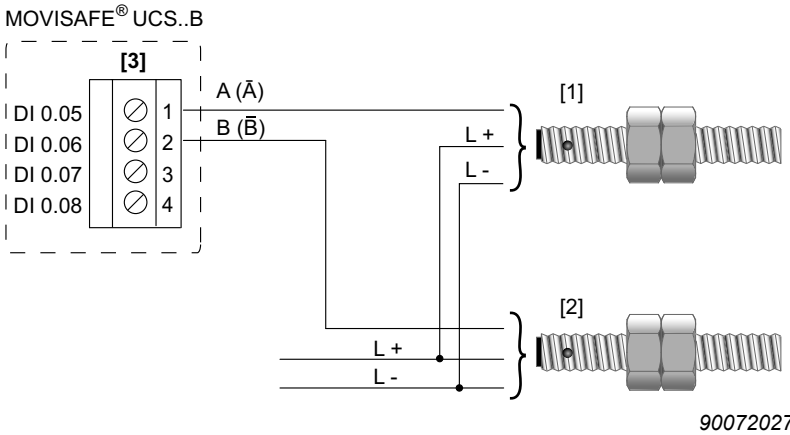
The connection assignment of HTL proximity sensors varies depending on the selected encoder combination. When selecting HTL 1Z (1 counter) only one track is read per encoder, with HTL 2Z (2 counters), two tracks are read. It is important that the assignment matches your configuration. The assignment is indicated in the user interface of the MOVISAFE® Config UCS CM software.

When using HTL proximity sensors, bear in mind that the encoder power supply is not monitored by the safety module. You therefore have to include the possibility of a supply voltage failure in the possible sources of error for the whole system. You have to make sure that a violation of the values specified for the encoder power supply will be detected as an error or can be ruled out.

Below an example of two typical connection combinations.

1. Connection of an HTL proximity sensor with the combination 1Z/1Z.



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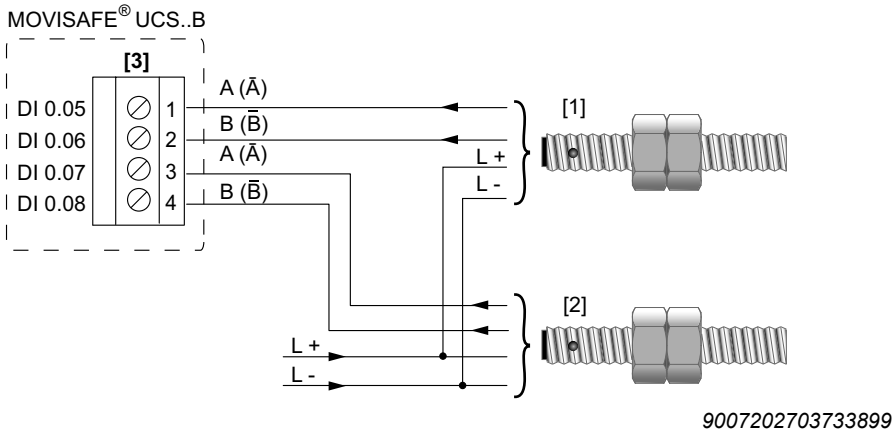
[1] HTL proximity sensor 1
[2] HTL proximity sensor 2
[3] X32 for UCS11B, UCS11B/PS, UCS12B, UCS12B/PS

2. Connection of an HTL proximity sensor with the combination 2Z/2Z.



[1] HTL proximity sensor 1
[2] HTL proximity sensor 2
[3] X32 for UCS11B, 11B/PS, 12B, 12B/PS

INFORMATION

Low-resolution HTL proximity sensors are not suitable for the resolution of low speeds.

5.8.6 Connection of SSI encoders

You can connect SSI encoders to MOVISAFE® UCS..B in parallel and to MOVIDRIVE® B or MOVIAXIS® using split cables. Depending on the unit used (MOVIDRIVE® or MOVIAXIS®) and the encoder option card used in each case, you must observe the following settings when parameterizing the SSI interface. The table shows an example of parameterization for SSI encoders with 24-bit positions. If there is a different absolute position, adjust *Data length* and *Data index* accordingly.

Unit	Encoder option	SSI interface setting		
		Frame length	Data length	Data index
MOVIAXIS®	XGS11A	25	24	1
MOVIDRIVE® B	DEU21B	25	24	1
	DIP11B	27	24	3
	DEH21B	27	24	3

The units' SSI clock frequency must be set as follows:

- MOVIDRIVE® B setting with DEH21B option:
  P952 clock frequency: 30% – 50%
- MOVIDRIVE® B setting with DEU21B option:
  Clock frequency parameter: 125 kHz
- MOVIAXIS® setting:
  Clock frequency parameter: 125 kHz

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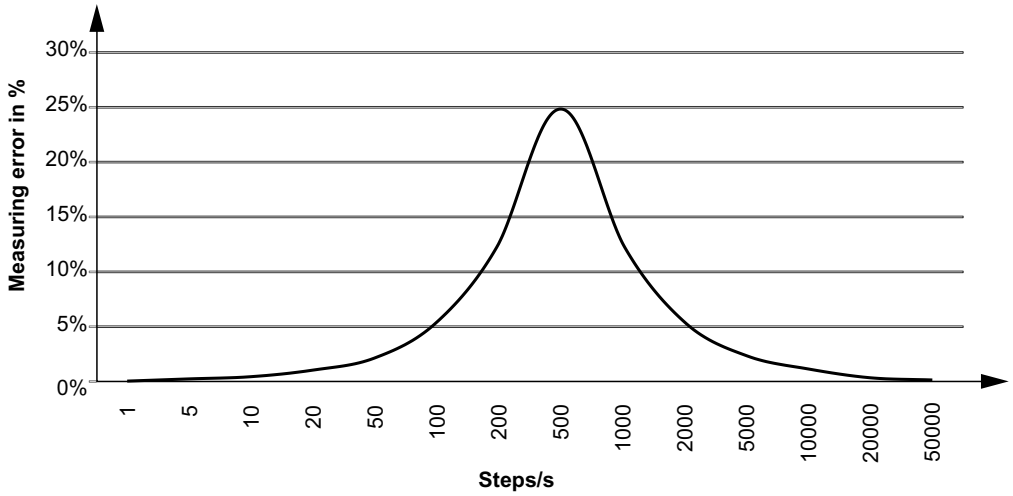
5.8.7 Measuring error during speed measurement

MOVISAFE® UCS..B measures the speed up to a frequency of 500 steps/s using the time measuring method. Frequencies higher than 500 steps/s are measured using the frequency measuring method. Both measuring methods are subject to a measuring error as shown below.

If you operate your application within this speed range, take the measuring error into account when dimensioning the switch-off limits of the safety functions. The measuring error can be reduced by selecting a suitable encoder or by making suitable encoder settings in MOVISAFE® Config UCS CM.



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Example 1: Speed monitoring

- PPR count: 256 steps/rev
- Required switch-off limit: 120 rpm
- Steps per second for the required switch-off limit:
  256 steps/rev × 120 rev/min × 1/60 min/s = 512 steps/s
- Resulting measuring error according to the illustration: approx. 25%
- Required switch-off limit: 120 rev/min × 1.25 = 150 rev/min

Example 2: Reducing the measuring error with a higher PPR count:

- PPR count: 1024 steps/rev
- Required switch-off limit: 120 rpm
- Steps per second for the required switch-off limit:
  1024 steps/s × 120 1/min × 1/60 min/s = 2048 steps/s
- Resulting measuring error according to the illustration: approx. 6.5%
- Required switch-off limit: 120 rpm × 1.065 ≈ 127 rpm

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5.8.8 Voltage supply for encoder systems

NOTICE

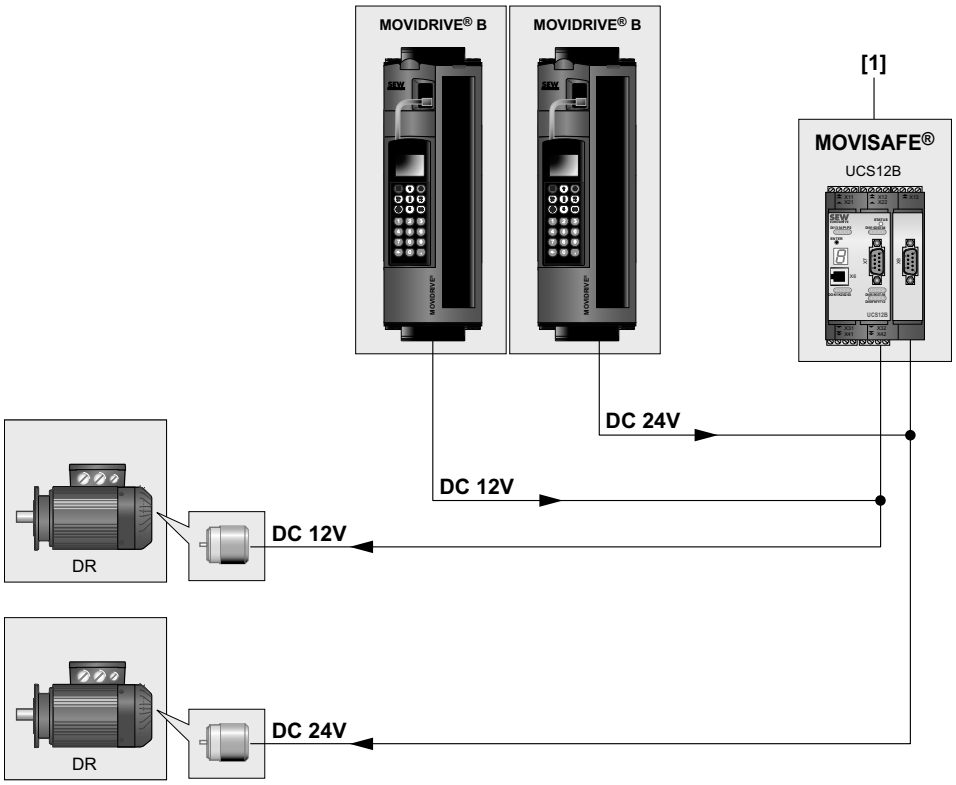
The encoder system is connected to more than one voltage supply.

More than one voltage supply can result in a destruction of the encoder. Undetected voltage dips can lead to a failure of the safety functions.

An encoder system on the basic module is required for monitoring movements and positions. Note that the basic module does not provide a voltage supply for the encoder system.

There are 2 ways to implement the voltage supply for the encoder system:

- Splitting the signal using a split cable/encoder signal split box via prefabricated cables



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If the signals are split between the basic module UCS12B [1] and the frequency inverter (e.g. MOVIDRIVE® B), the encoder is supplied with power via the encoder card of the frequency inverter. The prefabricated cables route the encoder power supply to the UCS12B basic module for monitoring purposes. Terminals X12 and X13 of the basic module are not connected in this connection type.

- Direct connection of the encoder system to the basic module (without signal splitting)

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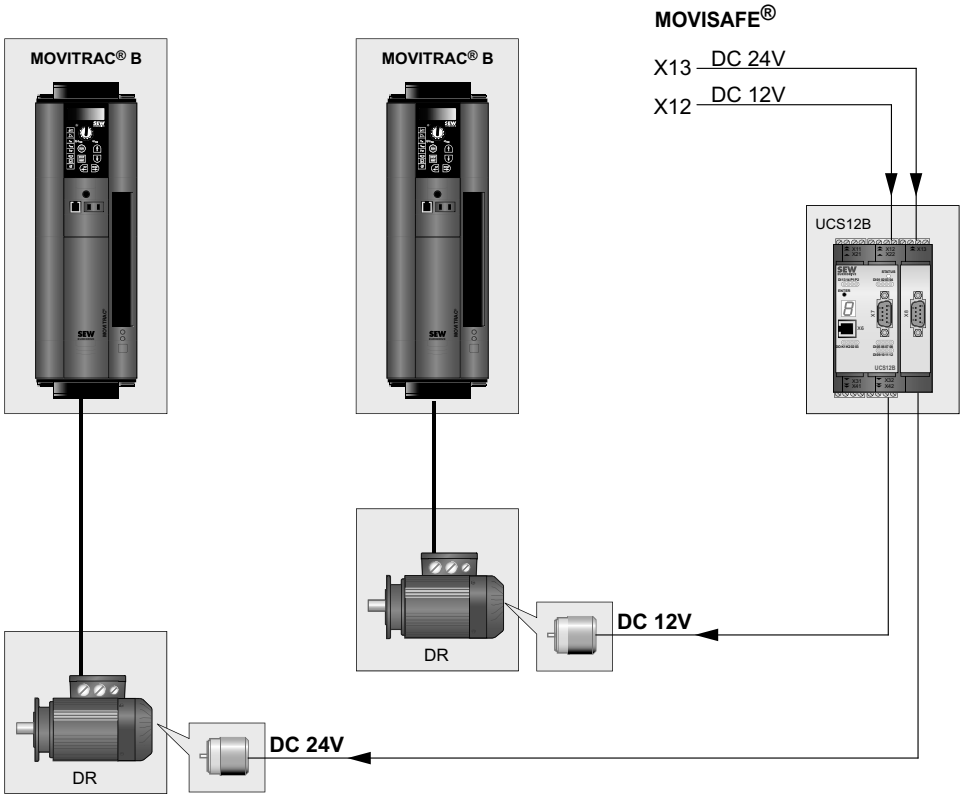

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When the encoder system is connected directly to the UCS12B basic module, the encoder power is supplied via the basic module. In this case, connect the required encoder voltage to terminals X12 and X13 of the basic module. The encoder voltage is monitored in the basic module. The encoder power supply must be fused with max. 2 A.

The encoder power supply is monitored internally with a tolerance range. You can adjust the internal monitoring to the encoder power supply using the MOVISAFE® Config UCS CM software interface. A violation of the tolerance limits results in an error and disables the outputs. The following settings are available in MOVISAFE® Config UCS CM:

Setting in MOVISAFE® Config UCS CM	Minimum voltage	Maximum voltage
[V]	[V]	[V]
5	4.4	5.6
8	7	8.8
10	8	12
12	10	14
20	16	24
24	20	29

INFORMATION

- Ensure safe galvanic isolation of the encoder power supply to the AC 230 V or AC 400 V system. Select supply units that comply with VDE 0551, EN 60742 and DIN EN 0160.
- Provide for equipotential bonding between PE and DC 0 V of the encoder power supply.
- The encoder voltage to be monitored can be parameterized separately for each encoder interface (X7, X8) in MOVISAFE® Config UCS CM.
- The voltage monitoring at X7 and X8 cannot be deactivated.
- When using HTL proximity sensors, bear in mind that the encoder power supply is not monitored by the safety module. For this reason, you have to include the possibility of a supply voltage failure in the possible sources of error for the whole system. You have to make sure that a violation of the specified encoder power supply values will be detected as an error or can be ruled out.

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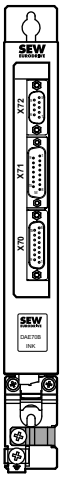
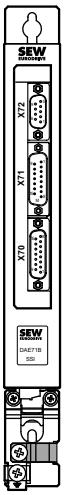
5.8.9 Connection options for an encoder system

An encoder system can be connected as follows:

- Using prefabricated cables
- Using the encoder signal split box DAE70B/71B

The following overview shows the connection options for an encoder system.

Encoder signal split boxes

Designation	Description	Connection	Part number	Icon
DAE70B	Encoder signal split box for incremental encoder (INK)	• X26: TF temperature sensor • X70: Encoder connection • X71: MOVIDRIVE® B/MOVIAXIS® • X72: MOVISAFE® UCS..B/DCS..B	18243797	 *4916135051*
DAE71B	Encoder signal split box for absolute encoder (SSI)	• X26: TF temperature sensor • X70: Encoder connection • X71: MOVIDRIVE® B/MOVIAXIS® • X72: MOVISAFE® UCS..B/DCS..B	18243800	 *4916138507*

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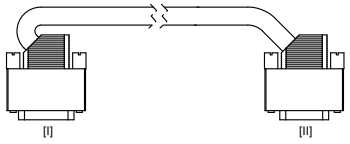
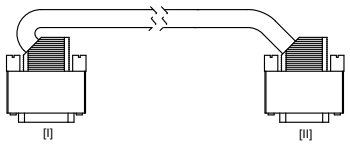
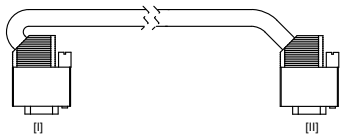
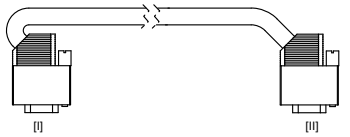
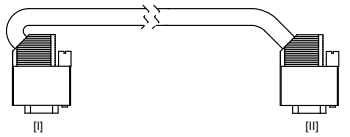
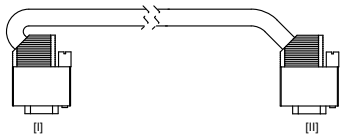
Connection cable for encoder signal split boxes

The connection cables can be configured from 0.8 m to 6 m.

Designation	Description	Connection	Part number	Icon
DAE80B	Connection between encoder signal split box and MOVIDRIVE® B	MOVIDRIVE® B: • DEH11B:X15 • DEH21B:X15 • DEU21B:X15	18132650	
DAE81B	Connection between encoder signal split box and MOVIAXIS®	MOVIAXIS®: • MXA:X13 • XGH11A:X63 • XGS11A:X64	18166261	
DAE82B	Connection between encoder signal split box and MOVISAFE® UCS..B	MOVISAFE®: • UCS..B:X7 • UCS..B:X8	18131123	
DAE83B	Connection between encoder signal split box and MOVISAFE® DCS..B	MOVISAFE®: • DCS..B:X84 • DCS..B:X85	18131115	
DAE84B	Connection between encoder signal split box and MOVIDRIVE® B	MOVIDRIVE® B: • DEH21B:X62 • DIP11B:X62	18143210	
DAE86B	Connection between encoder signal split box and MOVIDRIVE® B	MOVIDRIVE® B: • DEU21B:X14	18157351	

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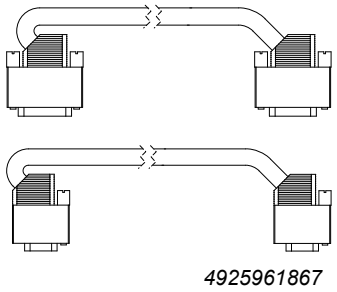
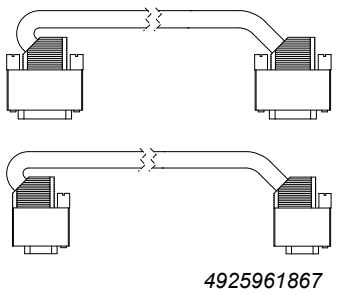
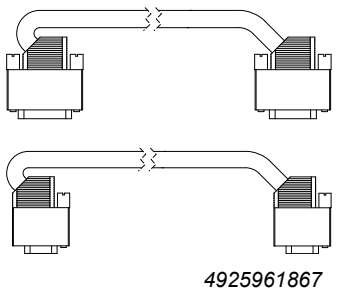
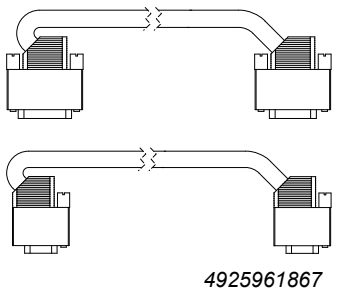
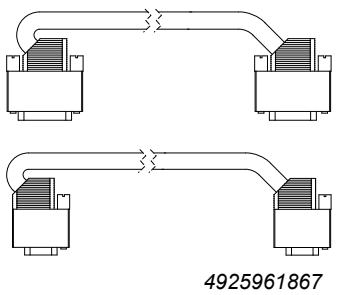
Cable sets for encoder signal split box

The connection cables for the cable sets are delivered with a fixed length of 1.5 m.

Designation	Description	Connection	Part number	Icon
Cable set 1	Cable set for encoder signal split box for MOVIDRIVE® B with DEH11B, DEH21B and DEU21B and MOVISAFE® UCS..B for splitting SIN/COS and TTL signals; with DEU21B also SSI signals	Includes the cables: • DAE80B • DAE82B	18246907	
Cable set 2	Cable set for encoder signal split box for MOVIDRIVE® B with DEH11B, DEH21B and DEU21B and MOVISAFE® DCS..B for splitting SIN/COS and TTL signals; with DEU21B also SSI signals	Includes the cables: • DAE80B • DAE83B	18246915	
Cable set 3	Cable set for encoder signal split box for MOVIAXIS® and MOVISAFE® UCS..B for splitting SIN/COS, TTL and SSI signals	Includes the cables: • DAE81B • DAE82B	18166342	
Cable set 4	Cable set for encoder signal split box for MOVIDRIVE® B with DIP11B and DEH21B and MOVISAFE® DCS..B for splitting SSI signals	Includes the cables: • DAE84B • DAE83B	28203038	
Cable set 5	Cable set for encoder signal split box for MOVIDRIVE® B with DIP11B and DEH21B and MOVISAFE® UCS..B for splitting SSI signals	Includes the cables: • DAE84B • DAE82B	28203046	

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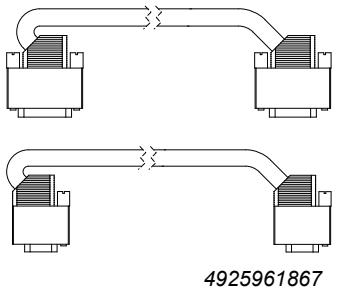
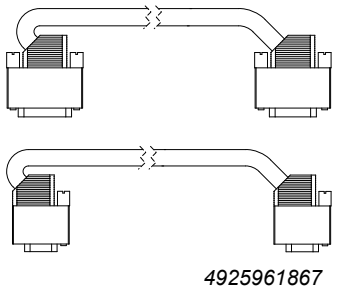
Designation	Description	Connection	Part number	Icon
Cable set 6	Cable set for encoder signal split box for MOVIDRIVE® B with DEU21B and MOVISAFE® UCS..B for splitting SSI signals	Includes the cables: • DAE86B • DAE82B	28215044	
Cable set 7	Cable set for encoder signal split box for MOVIDRIVE® B with DEU21B and MOVISAFE® DCS..B for splitting SSI signals	Includes the cables: • DAE86B • DAE83B	28215052	

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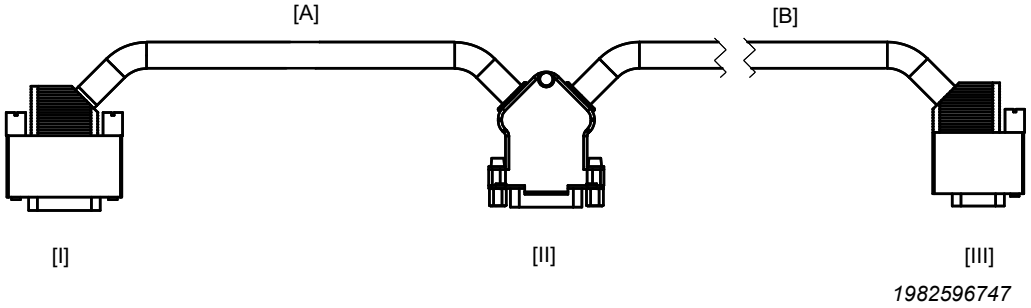
Split cables and adapter cables

The length of the adapter cables and the B-side of the split cables can be configured from 0.5 m to 6 m.



[A] A-side with fixed length (0.8 m)

[B] B-side with variable length (0.5 m to 6 m)

[I] Encoder card connection

[II] Encoder connection

[III] MOVISAFE® UCS..B connection

Split cable for MOVISAFE® UCS..B

Designation	Description	Connection	Part number	Icon
DAE50B	Splitting of SIN/COS and TTL encoders (asynchronous motor)	MOVIDRIVE® B: • DEH11B:X14 • DER11B:X14 • DEU21B:X14	18114474	
DAE52B	Splitting of SIN/COS and TTL encoders (asynchronous motor)	MOVIDRIVE® B: • DEH11B/21B:X15 • DEU21B:X15 MOVIAXIS®: • MXA:X13 • XGH11A:X63 • XGS11A:X64	18114490	
DAE53B	Splitting of SIN/COS and TTL encoders (synchronous motor)	MOVIDRIVE® B: • DEH11B/21B:X15 • DEU21B:X15 MOVIAXIS®: • MXA:X13 • XGH11A:X63 • XGS11A:X64	18114504	
DAE54B	Splitting of SSI encoders	MOVIDRIVE® B: • DIP11B:X62 • DEH21B:X62	18114512	

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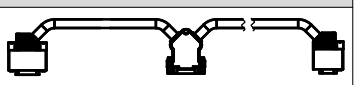
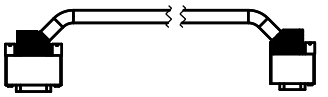
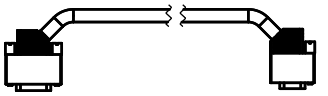
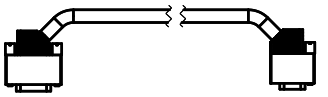
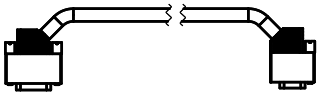
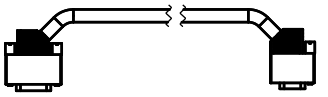
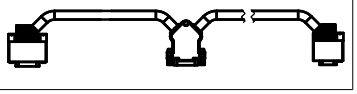
Designation	Description	Connection	Part number	Icon
DAE55B	Splitting of SSI encoders	MOVIDRIVE® B: • DEU21B:X15	18114520	
DAE56B	Encoder simulation adapter	MOVIAXIS®: • XGH11A:X62 • XGS11A:X62	18114644	
DAE57B	Adapter SIN/COS, TTL encoder, encoder simulation	MOVIDRIVE® B: • DEH11B:X14 • DER11B:X14 • DEU21B:X14	18114652	
DAE58B	SSI encoder adapter	Cable (D-sub 9 to D-sub 9) with resistors	18119190	
DAE59B	SSI encoder adapter	Cable (D-sub 15 to D-sub 9) with resistors Encoder voltage DC 24 V on pin 13	18119204	
DAE60B	SSI encoder adapter	Cable (D-sub 15 to D-sub 9) with resistors Encoder voltage DC 12 V on pin 15	18120431	
DAE61B	Splitting of SSI encoders	MOVIAXIS®: • XGS11A:X64	18120423	
DAE62B	Splitting of SSI encoders	MOVIDRIVE® B: • DEU21B:X14	18157378	

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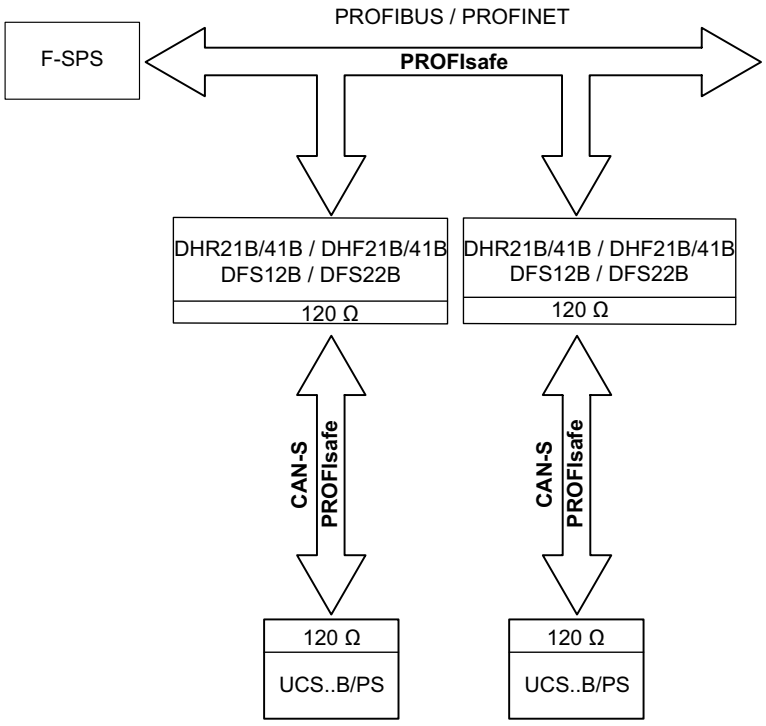
5.9 Fieldbus connection of MOVISAFE® UCS..B/PS to PROFIsafe

5.9.1 Connecting the UCS..B/PS option

The UCS..B/PS option allows for connecting a fieldbus to a higher-level controller. Two CAN communication interfaces are available for connection to PROFIsafe and for exchanging diagnostics data. Both CAN interfaces are designed as a slave and need a CAN master for operation. You can configure the process image for PROFIsafe and for the exchange of diagnostics data in the MOVISAFE® Config UCS CM software.

Example of a fieldbus connection to PROFIsafe:



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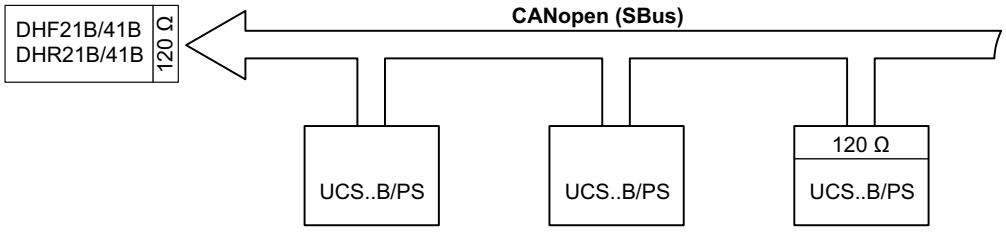
Example of a fieldbus connection to CAN (SBus)

- Block diagram:



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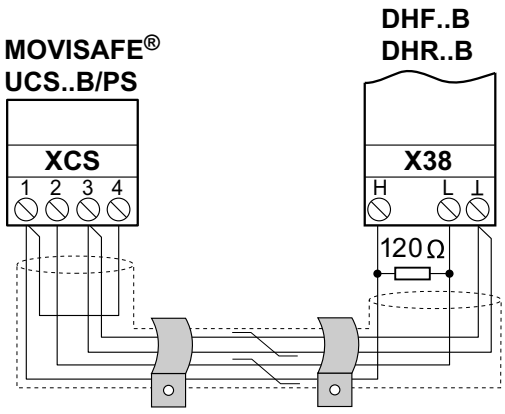
- CAN-S sample circuit with one MOVISAFE® UCS..B/PS module and a DHF..B or DHR..B controller:



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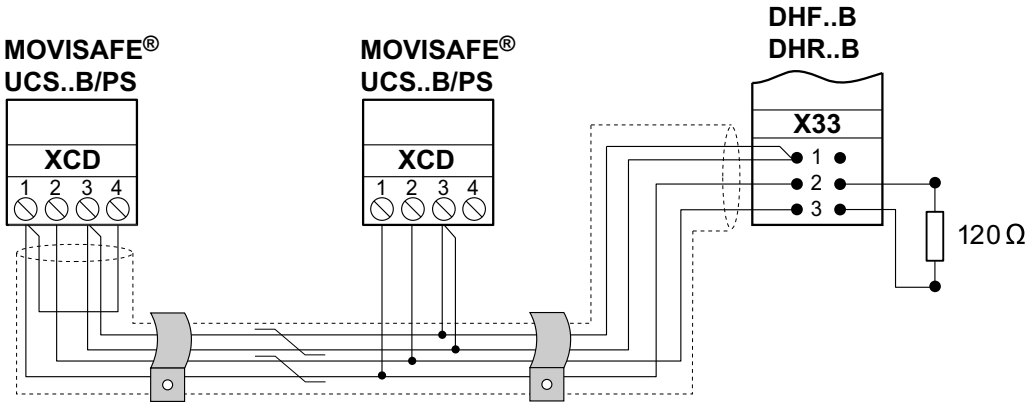
- SBus sample circuit with two MOVISAFE® UCS..B/PS modules and a DHF..B or DHR..B controller:



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Please note the following regarding the sample circuits:

- The fieldbus connection must be terminated with 120 Ω at the first and last station. The UCS..B/PS option already comes equipped with an integrated 120 Ω resistor. To enable termination, connect a wire jumper from terminal XCS:4 to terminal XCS: 1 (PROFIsafe) or from terminal XCD:4 to terminal XCD:1 (CAN). Wiring a 120 Ω resistor is necessary for terminating the controller (for example DHx41B).
- Use a 2×2-core twisted pair and shielded copper cable (data transmission cable with braided copper shield). Connect the shield to the ground potential (PE) and make sure it is connected over a wide area at both ends. The cable must meet the following specifications:
  - Core cross section: 0.25 mm^2 (AWG18) – 0.75 mm^2 (AWG23)
  - Cable resistance: 120 Ω at 1 MHz
  - Capacitance per unit length: ≤ 40 pF/m at 1 kHz

  Suitable cables are CAN bus or DeviceNet cables
- The permitted total cable length depends on the set baud rate:
  - 250 kBd: 160 m
  - 500 kBd: 80 m
  - 1000 kBd: 40 m

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- There must not be any potential shift between the units connected via fieldbus. Take suitable measures to avoid potential shift, such as connecting the unit ground connectors using a separate cable.
- Point-to-point wiring is not permitted.

5.9.2 XCS communication interface

- **CAN-S description**

  Interface for safe communication via PROFIsafe. The safety bus (CAN-S) is implemented on MOVISAFE® based on PROFIBUS or PROFINET via a gateway.

- **Suitable gateways (CAN master)**

  MOVI-PLC®:

  – DHF21B/41B (PROFIsafe via PROFIBUS)

  – DHR21B/41B (PROFIsafe via PROFINET)

  Safe fieldbus interface:

  – DFS12B (PROFIsafe via PROFIBUS)

  – DFS22B (PROFIsafe via PROFINET)

- **Maximum number of modules per gateway**

  Not more than one module may be used per gateway.

- **CAN-S address**

  15 (fixed setting).

- **PROFIsafe address (F destination)**

  1 to 65534.

- **Data transmission**

PROFIBUS PROFIsafe		
Gateway	**PROFIsafe data width**	
DHF41B (MOVI-PLC®/CCU)	12 bytes	Bidirectional
DHF21B (MOVI-PLC®/CCU)	12 bytes	
DFS12B	8 bytes	
PROFINET PROFIsafe		
Gateway	**PROFIsafe data width**	
DHR41B (MOVI-PLC®/CCU)	12 bytes	Bidirectional
DHR21B (MOVI-PLC®/CCU)	12 bytes	
DFS22B	8 bytes	

- **F-bus configuration**

  Can be configured using MOVISAFE® Config UCS CM

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- **Options**
  - Program download
  - Safety data set (SDS) activation
  - Safe exchange of logic and process data to the higher-level controller
  - Diagnostic functions of MOVISAFE® Config UCS CM (such as SCOPE)
  - Data backup in the event of unit replacement
- **Baud rate**

  500 kBd

5.9.3 Configuring the PROFIsafe input profile (PII)

The PROFIsafe input profile is available for the PROFIsafe inputs of the F-PLC. The UCS..B/PS option lets you transmit logic and process data, such as the status of a safety function, the current speed or current position, to a higher-level safety controller for further processing.

In the user interface of the MOVISAFE® Config UCS CM software, you define the number of bits required for logic or process data. The selection is limited by the bandwidth available depending on the selected gateway (for DFS12B/22B: 8 bytes = 64 bits, with DHR/DHF21B/41B: 12 bytes = 96 bits). The UCS..B/PS option monitors the bandwidth and prevents it from being exceeded. For detailed programming information, refer to the online help of the MOVISAFE® Config UCS CM software.

The following information can be selected as process data in the MOVISAFE® Config UCS CM software:

Process data	Source	Data length in bits	Comments
Current position	Axis 1 and/or 2	16, 24	Configurable data length
Current velocity		8, 16	
Current SLP teach-in position	SLP 1 and/or 2	16, 24	
SLP stop position			

The following table shows the process image inputs (PII) from the perspective of the higher-level controller.

PII	Bit	Use
0	0	DI01
1	1	DI02
2	2	DI03
3	3	DI04
4	4	DI05
5	5	DI06
6	6	DI07
7	7	DI08
8	0	DI09
9	1	DI10
10	2	DI11

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PII	Bit	Use
11	3	DI12
12	4	SLP return (only relevant with active position processing)
13	5	SSx 1 return
14	6	SLI 1 return
15	7	SDI 1 return
16	0	EMU 1 return
17	1	SOS 1 return
18	2	SLS 1 return
19	3	SLS 2 return
20	4	SLS 3 return
21	5	SLS 4 return
22	6	SLS 5 return
23	7	SLS 6 return
24	0	SLS 7 return
25	1	SLS 8 return
26	2	SOS 2 return
27	3	EMU 2 return
28	4	SDI 2 return
29	5	SLI 2 return
30	6	SSx 2 return
31	7	SEL 1 return (only relevant with active position processing)
32	0	SCA 1 return
33	1	SCA 2 return
34	2	SCA 3 return
35	3	SCA 4 return
36	4	-
37	5	-
38	6	-
39	7	-
40 – 63		28 bit process data
64 – 95		32 bit process data (only available with controller)

5.9.4 Configuring the PROFIsafe output profile (PIO)

The PROFIsafe output profile is available for the PROFIsafe outputs of the F-PLC. Like the PROFIsafe input profile, the PROFIsafe output profile lets you transmit logic and process data, such as activating a safety function or specifying a position, to the UCS..B/PS safety module via a higher-level safety controller.

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In the user interface of the MOVISAFE® Config UCS CM software, you define the number of bits required for logic or process data. The selection is limited by the bandwidth available depending on the selected gateway (for DFS12B/22B: 8 bytes = 64 bits, with DHR/DHF21B/41B: 12 bytes = 96 bits). The UCS..B/PS option monitors the bandwidth and prevents it from being exceeded. For detailed programming information, refer to the online help of the MOVISAFE® Config UCS CM software.

The following table shows the process image outputs (PIO) from the perspective of the higher-level controller.

PIO	Bit	Use
0	0	DO0.02P/M
1	1	DO0.03P/M
2	2	K1/K2
3	3	DO0.0
4	4	DO0.1
5	5	
6	6	
7	7	
8	0	Reset
9	1	Enable CCW SLI 1
10	2	Enable CCW SLI 2
11	3	Enable CW SLP (only relevant with active position processing)
12	4	Enable CCW SLP (only relevant with active position processing)
13	5	Enable SSx 1
14	6	Enable CW SLI 1
15	7	Enable CW SDI 1
16	0	Enable CCW SDI 1
17	1	Enable SOS 1
18	2	Enable SLS 1
19	3	Enable SLS 2
20	4	Enable SLS 3
21	5	Enable SLS 4
22	6	Enable SLS 5
23	7	Enable SLS 6
24	0	Enable SLS 7
25	1	Enable SLS 8
26	2	Enable SOS 2
27	3	Enable CCW SDI 2
28	4	Enable CW SDI 2
29	5	Enable CW SLI 2
30	6	Enable SSx 2

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PIO	Bit	Use
31	7	Enable SEL 1 (only relevant with active position processing)
32	0	Enable SCA 1
33	1	Enable SCA 2
34	2	Enable SCA 3
35	3	Enable SCA 4
36	4	-
37	5	-
38	6	-
39	7	-

5.9.5 XCD communication interface

- **CAN-D description**

  Interface for non-safe communication with a higher-level controller via CAN (SBus). Allows to transmit diagnostic data and is not permitted for safety-relevant use.

- **Suitable gateways (CAN master)**

  MOVI-PLC®:

  – DHF21B/41B (SBus on PROFIBUS)

  – DHR21B/41B (SBus on PROFINET)

- **SBus address**

  The SBus address (address range 1 to 63) is set using DIP switches S1 to S6 (see the "Setting the baud rate and address for standard communication" chapter).

- **Data transmission**

PROFIBUS		
Gateway	**Data width of diagnostic data**	
DHF41B (MOVI-PLC®)	20 bytes	UCS..B → MOVI-PLC®
DHF21B (MOVI-PLC®)	20 bytes	
PROFINET		
Gateway	**Data width of diagnostic data**	
DHR41B (MOVI-PLC®)	20 bytes	UCS..B → MOVI-PLC®
DHR21B (MOVI-PLC®)	20 bytes	

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- **Options**
  - Program download
  - Data set activation
  - Transmission of 16 bytes of diagnostic data (7 bytes of logic data and 8 bytes of process data). See the "UCS25B Diagnostic Module with CAN Interface" chapter.
  - Diagnostic functions of MOVISAFE® Config UCS CM (such as SCOPE)
  - Data backup in the event of unit replacement
- **Baud rate**

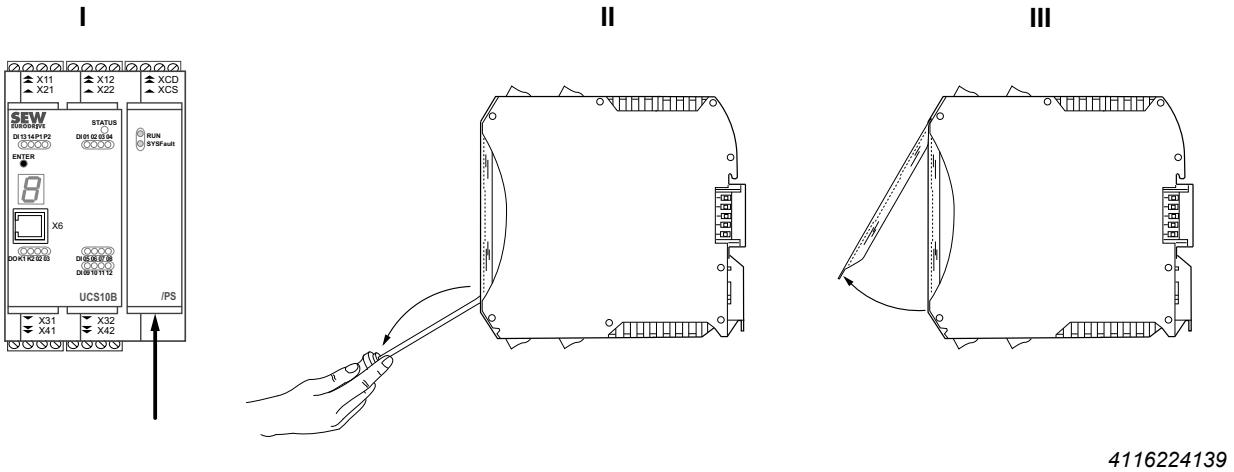
  The baud rate (125 kbaud, 250 kbaud, 500 kbaud or 1 Mbaud) is set using DIP switches S7 and S8 (see the "Structure of CAN messages when using the PS option" chapter).

5.9.6 Setting the baud rate and address for standard communication

The baud rate and SBus address are set on the MOVISAFE® UCS..B/PS safety modules using DIP switches. The DIP switches are located behind the front cover of the UCS..B/PS option.

Proceed as follows to open the front cover:

1. The front cover of the UCS..B/PS option can be opened via a recess (figure I).
2. Insert a suitable screwdriver into the recess and press the screwdriver slightly downward (figure II).
3. The front cover is unlocked and can be pivoted upward (figure III).



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4. The DIP switches for setting the baud rate and the SBus address are located behind the opened front cover. The following figure shows an example of the set SBus address 3 (DIP switches S1 (2^0) and S2 (2^1) = ON), as well as the baud rate of 500 kbaud (DIP switches S7 and S8 = OFF).

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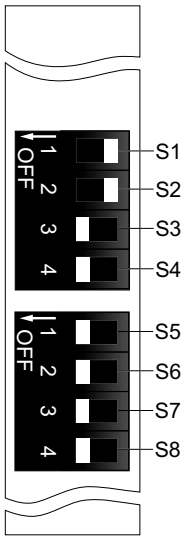
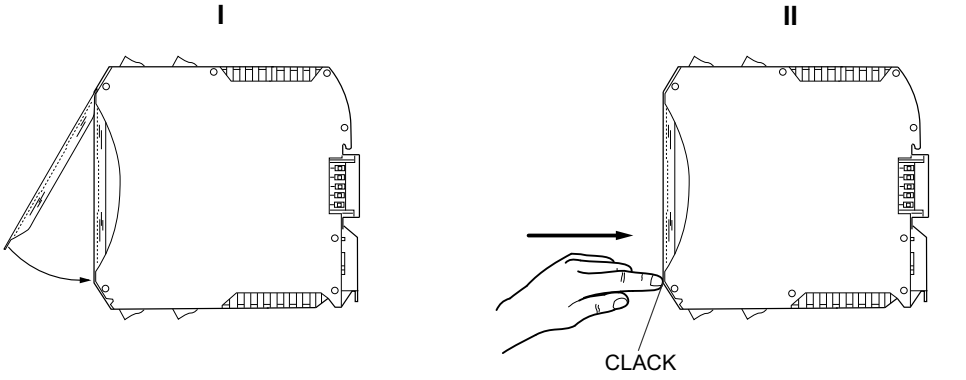
UCS..B/PS option	DIP switches	Description
UCS..B/PS  *9007203371356043*	S1 – S6	Setting the SBus address:
	S1	2^0 → Significance 1×1 = 1
	S2	2^1 → Significance 2×1 = 2
	S3	2^2 → Significance 4×0 = 0
	S4	2^3 → Significance 8×0 = 0
	S5	2^4 → Significance 16×0 = 0
	S6	2^5 → Significance 32×0 = 0
	S7, S8	Setting the baud rate:
	S7:OFF / S8:OFF	500 kbaud (delivery state)
	S7:ON / S8:OFF	125 kBd
	S7:OFF / S8:ON	250 kBd
	S7:ON / S8:ON	1000 kBd

5. Close the front cover once you have set the DIP switches. To do so, tilt down the front cover (figure I). Use your finger to press the front cover until it audibly snaps in place (figure II).



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5.9.7 Structure of CAN messages when using the PS option

With the PS option, logic and process data are transmitted together and are additionally packed in a MOVILINK® message.

This way, the logic data is read in a controller via an SBus with 3 PD or 10 PD (e.g. MOVI-PLC®), or transmitted directly through a gateway to a higher-level controller. The SBus address and the baud rate are set using the DIP switches on the front of the PS option.

Process data word 2 (bits 0 – 3) always contains the current status of the basic modules. This status is also indicated on the 7-segment display. The bit position of the logic data can be configured as required.

Parameters 15900.0 to 15909.0 are available as 16-bit values each for parameter access to the logic data.

PD	Bit	High byte assignment		Low byte assignment	
1	0 – 15	MOVILINK® status word 1			
2	0 – 3			1 = STARTUP 2 = SEND CONFIG 3 = STARTUP BUS 4 = RUN 5 = STOP 6 = FAILURE 7 = ALARM	
	4			0x1 (fixed value)	
	5 – 7			Life counter	
	8 – 15	0			
3	0 – 15	Logic data (bit: 8 – 15)	High byte error code	Logic data (bit: 0 – 7)	Low byte error code
4	0 – 15	Logic data (bit: 24 – 31)	0	Logic data (bit: 16 – 23)	0
5	0 – 15	Logic data (bit: 40 – 47)	0	Logic data (bit: 32 – 39)	0
6	0 – 15	0	0	Logic data (bit: 48 – 55)	0
7	0 – 15	Process data (bit: 0 – 15)			
8	0 – 15	Process data (bit: 16 – 31)			
9	0 – 15	Process data (bit: 32 – 47)			
10	0 – 15	Process data (bit: 48 – 63)			

INFORMATION

It is not possible to adjust the process image of the logic data for access via 3 PD. All 10 PD logic data will always be transmitted in the structure described above. However, the controller can read only the first 3 PD.

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The following information can be selected as process data in the MOVISAFE® Config UCS CM software:

Process data	Source	Data length in bits	Comments
Current position	Axis 1 and/or 2	16, 20, 24	Configurable data length
Current velocity		08, 12, 16	
Current SLP teach-in position	SLP 1 and/or 2	16, 20, 24	
Error and operating messages		16	Data length cannot be configured

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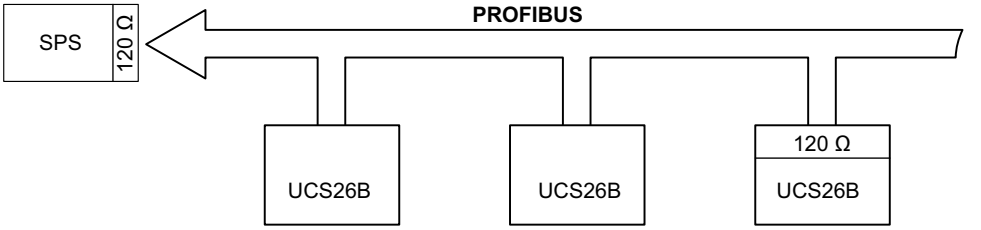
5.10 Fieldbus connection of MOVISAFE® UCS..B to PROFIBUS

5.10.1 MOVISAFE® UCS26B

The UCS26B module can be used to transmit diagnostic messages via PROFIBUS DP. A maximum of 2 data objects can be received and transmitted. The module has to be parameterized as a PROFIBUS node (slave). The baud rate of 9.6 kbaud to 12 Mbaud is detected automatically. The maximum length of PROFIBUS messages is 16 bytes. The corresponding GSD files are available for download from the SEW homepage (www.sew-eurodrive.com). The UCS26B has to be connected with a basic module (UCS10B, UCS11B or UCS12B) via backplane bus connector. PROFIBUS connection via plug connector must be carried out according to the assembly specifications of the PNO.

Example of a PROFIBUS fieldbus connection:



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INFORMATION

- The fieldbus connection must be terminated with 120 Ω at the first and last station. The UCS26B diagnostic module already comes equipped with an integrated 120 Ω resistor. To enable termination, set DIP switch S2 on the UCS26B diagnostic module to ON.
- To enable termination on the backplane bus, set DIP switch S1 on the UCS26B diagnostic module to ON.
- The data transmission cable and the PROFIBUS plug-in connection have to be designed according to the assembly specifications of the PNO (PROFIBUS user organization).
- There must not be any potential shift between the units connected via fieldbus. Take suitable measures to avoid potential shift, such as connecting the unit ground connectors using a separate cable.
- Voltage is supplied via the basic module.

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XDP communication interface

- Description

  Interface for standard communication via PROFIBUS.

- Setting the PROFIBUS address

  The PROFIBUS address of the UCS26B diagnostic module can be set as required using address switches S3 and S4. Set the address in hexadecimal format.

  Example 1: PROFIBUS address 5

Address switch	Function	Setting (hex)
S3	High byte	0
S4	Low byte	5

- Example 2: PROFIBUS address 46

Address switch	Function	Setting (hex)
S3	High byte	2
S4	Low byte	E

- Data transmission

  Transmission of a maximum of 16 bytes of diagnostic data (logic data + process data).

- Baud rate

  9.6 kbaud to 12 Mbaud. The baud rate is detected automatically.

- Cycle time: 20 ms

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PROFIBUS data frame

Byte 0 (bits 0 – 3) of the logic data always contains the current status of the basic modules. This status is also indicated on the 7-segment display. The bit position of the logic data can be configured as required.

Process data that can be configured with MOVISAFE® Config UCS CM is transmitted in bytes 8 – 15.

Block	**Byte**	**Bit position 0 – 7**						
Bit ID signal channel	**Address**	**Signal channel data bit ID**						
Status data	0	Bit 0 – 3	1 = Input 2 = Startup 3 = Startup bus 4 = Run 5 = Stop 6 = Failure 7 = Alarm					
		Bit 4	0x1 (fixed value)					
		Bit 5 – 7	Life bit					
Logic data		1	2	3	4	5	6	7
Bit ID 1 – 56	1 – 7	49 – 56	41 – 48	33 – 40	9 – 16	1 – 8	25 – 32	17 – 24
Alarm/error status	6	Bit 0 – 6		High byte error code				
		Bit 7		Status bit				
	7			Low byte error code				
Process data Max. 64 bits	8	Process data (data bits 56 – 63)						
	9	Process data (data bits 48 – 55)						
	10	Process data (data bits 40 – 47)						
	11	Process data (data bits 32 – 39)						
	12	Process data (data bits 24 – 31)						
	13	Process data (data bits 16 – 23)						
	14	Process data (data bits 8 – 15)						
	15	Process data (data bits 0 – 7)						

The following information can be selected as process data in the MOVISAFE® Config UCS CM software:

Process data	**Source**	**Data length in bits**	**Comments**
Current position	Axis 1 and/or 2	16, 20, 24	Configurable data length
Current velocity		08, 12, 16	
Current SLP teach-in position	SLP 1 and/or 2	16, 20, 24	

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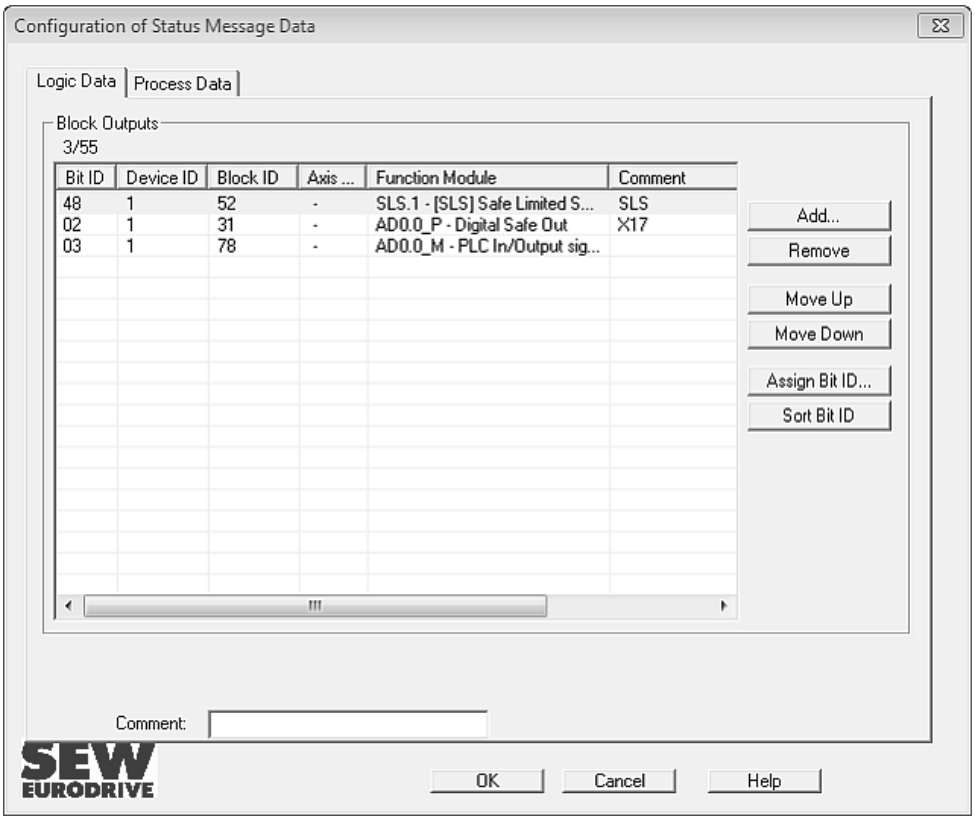
Process data	Source	Data length in bits	Comments
Error and operating messages		16	Data length cannot be configured

INFORMATION

If the unit is in an alarm or error status, the associated alarm or error message is displayed in bytes 6 and 7 (data bits 16 – 30). The status bit (byte 6, bit 7) changes to "1". This means that any configured logic data information will be overwritten. After you have acknowledged the alarm or error status, the error code in bytes 6 and 7 is replaced with the current logic data.

Configuring signal channel data in MOVISAFE® Config UCS CM

- Creating the "signal channel block" module in the function block diagram opens the "Configuration of status message data" dialog (see figure below). In this window, you can configure the required logic data for transmission. Clicking [Add] lets you transfer components of the function block diagram to the table of logic data using bit assignment.



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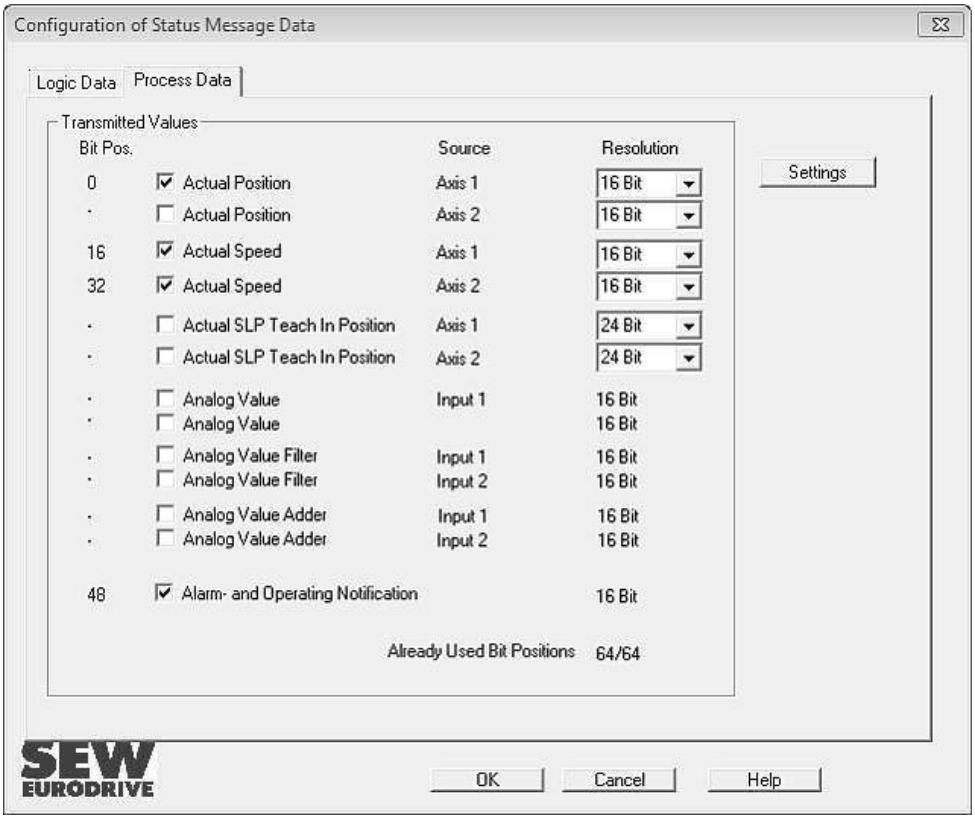
- On the "Process data" tab (following figure), you can enable or disable the transmission of the following values:
  - Current position
  - Current velocity
  - Current SLP teach-in position
  - Error and operating messages



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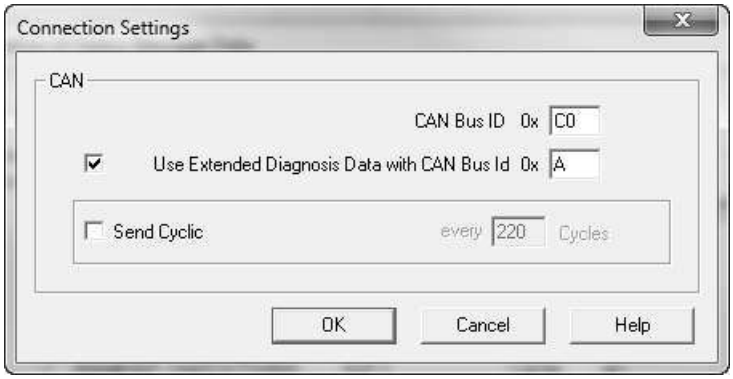
The transmission position (bit position) changes depending on the selection you have made. Analog values cannot be transmitted. The maximum number of bit positions per module is 64.

- Choosing "Connection settings" from the menu lets you make the following settings (see figure below):



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  - "Interface" drop-down menu

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For setting the COM interface with the PC.

– "CAN bus ID" edit box

  Make sure that the setting in the STEP7 hardware configuration is consistent with the CAN ID of slot 1.

– "Use extended diagnostic data with CAN bus ID" edit box

  Make sure that the setting in the STEP7 hardware configuration is consistent with the CAN ID of slot 2.

– "Send cyclic" check box

  The frequency of data transmission can be set from 0 to 100 cycles.

5.11 Fieldbus connection of MOVISAFE® UCS..B to PROFINET

5.11.1 MOVISAFE® UCS27B

The UCS27B diagnostic module can be used for standard communication. It allows for transmitting a maximum of 16 bytes (logic data + process data) from the CAN backplane bus of the UCS..B modules to a higher-level controller via PROFINET. The module has to be parameterized as a PROFINET node (slave). The corresponding GSDML files are available for download from the SEW homepage (www.sew-eurodrive.com). The UCS27B diagnostic module has to be connected with a basic module (UCS10B, UCS11B or UCS12B) via a backplane bus connector.

INFORMATION

- The data transmission cable and the PROFINET plug-in connection have to be designed according to the assembly specifications of the PNO (PROFIBUS user organization).
- There must not be any potential shift between the units connected via fieldbus. Take suitable measures to avoid potential shift, such as connecting the unit ground connectors using a separate cable.
- Voltage is supplied via the basic module.

XPN communication interface

- Description

  Interface for standard communication via PROFINET.

- PROFINET IP address

  IP address and device name are configured by the higher-level controller.

- Data transmission

  Transmission of a maximum of 16 bytes of diagnostic data (logic data + process data).

- Ethernet data rate

  100 Mbit/s in full duplex mode.

- 100 m maximum line length.

PROFINET data frame

Byte 0 (bits 0 – 3) of the logic data always contains the current status of the basic modules. This status is also indicated on the 7-segment display. The bit position of the logic data can be configured as required.

Process data that can be configured with MOVISAFE® Config UCS CM is transmitted in bytes 8 – 15.

Block	**Byte**	**Bit position 0 – 7**						
Bit ID signal channel	**Address**	**Signal channel data bit ID**						
Status data	0	Bit 0 – 3	1 = Input 2 = Startup 3 = Startup bus 4 = Run 5 = Stop 6 = Failure 7 = Alarm					
		Bit 4	0x1 (fixed value)					
		Bit 5 – 7	Life bit					
Logic data		1	2	3	4	5	6	7
Bit ID 1 – 56	1 – 7	49 – 56	41 – 48	33 – 40	9 – 16	1 – 8	25 – 32	17 – 24
Alarm/error status	6	Bit 0 – 6		High byte error code				
		Bit 7		Status bit				
	7			Low byte error code				
Process data Max. 64 bits	8	Process data (data bits 56 – 63)						
	9	Process data (data bits 48 – 55)						
	10	Process data (data bits 40 – 47)						
	11	Process data (data bits 32 – 39)						
	12	Process data (data bits 24 – 31)						
	13	Process data (data bits 16 – 23)						
	14	Process data (data bits 8 – 15)						
	15	Process data (data bits 0 – 7)						

The following information can be selected as process data in the MOVISAFE® Config UCS CM software:

Process data	**Source**	**Data length in bits**	**Comments**
Current position	Axis 1 and/or 2	16, 20, 24	Configurable data length
Current velocity		08, 12, 16	
Current SLP teach-in position	SLP 1 and/or 2	16, 20, 24	

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Process data	Source	Data length in bits	Comments
Error and operating messages		16	Data length cannot be configured

INFORMATION

If the unit is in an alarm or error status, the associated alarm or error message is displayed in bytes 6 and 7 (data bits 16 – 30). The status bit (byte 6, bit 7) changes to "1". This means that any configured logic data information will be overwritten. After you have acknowledged the alarm or error status, the error code in bytes 6 and 7 is replaced with the current logic data.

Configuring signal channel data in MOVISAFE® Config UCS

- Creating the "signal channel block" module in the function block diagram opens the "Configuration of status message data" dialog (see figure below). In this window, you can configure the required logic data for transmission. Clicking [Add] lets you transfer components of the function block diagram to the table of logic data using bit assignment.

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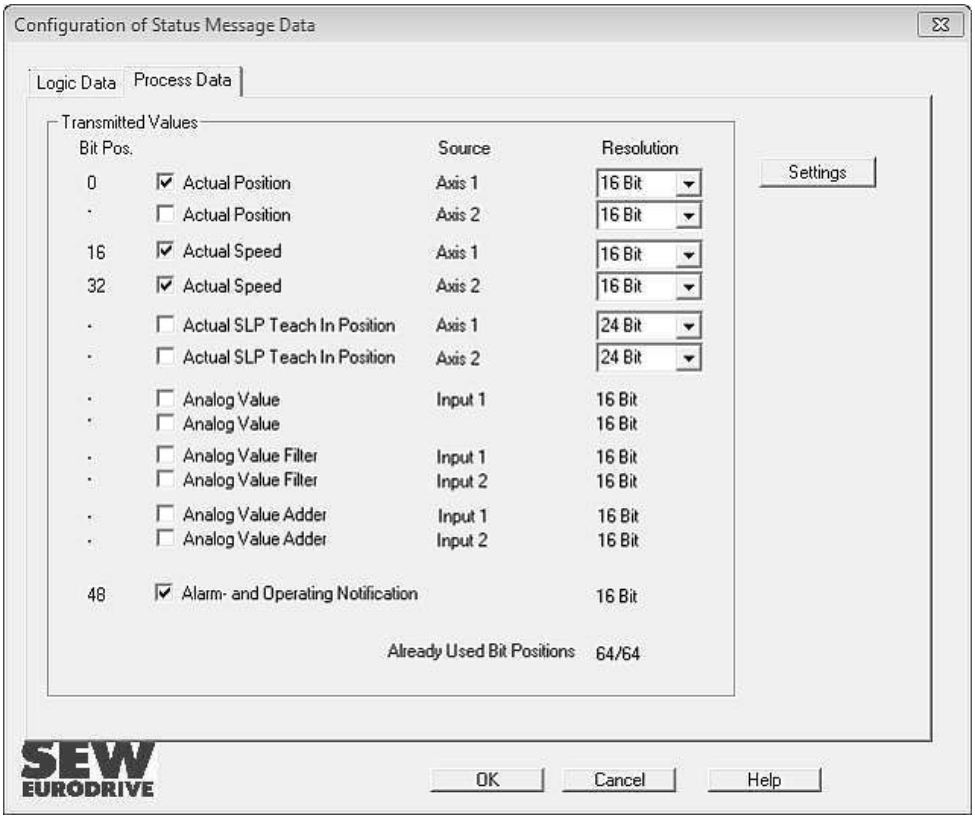
- On the "Process data" tab (following figure), you can enable or disable the transmission of the following values:
  - Current position
  - Current velocity
  - Current SLP teach-in position
  - Error and operating messages



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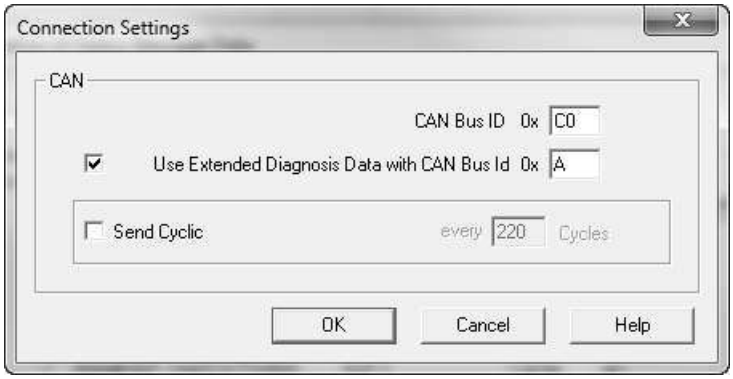
The transmission position (bit position) changes depending on the selection you have made. Analog values cannot be transmitted. The maximum number of bit positions per module is 64.

- Choosing "Connection settings" from the menu lets you make the following settings (see figure below):



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Setting the COM interface with the PC:

- "CAN bus ID" edit box

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Make sure that the setting in the STEP7 hardware configuration is consistent with the CAN ID of slot 1.

– "Use extended diagnostic data with CAN bus ID" edit box

  Make sure that the setting in the STEP7 hardware configuration is consistent with the CAN ID of slot 2.

– "Send cyclic" check box

  The frequency of data transmission can be set from 0 to 100 cycles.

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6 Startup

6.1 General startup instructions

6.1.1 Prerequisites

- The following requirements must be fulfilled to ensure successful startup:
  - The system must be configured correctly
  - Installation of the MOVISAFE® Config UCS CM software. The latest release is available on the Internet on the SEW homepage or on the MOVISAFE® Software ROM.

  For detailed project planning notes and a description of the parameters, refer to the online help of the MOVISAFE® Config UCS CM software.
- Requirements for installing and operating the MOVISAFE® Config UCS CM software:
  - Operating system: Microsoft Windows® 2000, XP, Vista or 7 (32 or 64 bits)
  - Required hard disk space: about 100 MB
  - RAM: 512 MB or more recommended
- Additional requirements for using the UCS..B/PS option with PROFIsafe fieldbus connection via PROFIBUS or PROFINET:
  - MOVITOOLS® MotionStudio, version 5.80 or later
  - MOVISAFE® Config UCS CM, compilation date February 20, 2014 or later
  - DHR21B/41B and DHF21B/41B controllers with fieldbus connection: firmware version 16 or later
  - GSD file (PROFIBUS) or GSDML file (PROFINET):

    Download from www.sew-eurodrive.com

INFORMATION

With the MOVISAFE® Config UCS CM software, you can enable or disable fieldbus communication (UCS..B/PS option). The additional requirements are not necessary when fieldbus communication is disabled.

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6.1.2 Startup steps

- Make sure that the following tasks have been performed properly and in accordance with the application:
  - Installation of MOVISAFE® UCS..B
  - Wiring
  - Terminal assignment
  - Safe disconnection
- Provide for suitable measures to prevent the motor from starting up unintentionally. Take additional safety measures depending on the application to prevent possible injuries to people and damage to machinery.
- Switch on the line voltage and the DC 24 V supply voltage, if applicable.
- Configure and program MOVISAFE® UCS..B to suit your application.
- Perform validation (see the "Validation" chapter). Create an acceptance protocol (see the "Acceptance protocol" chapter).

6.2 Communication and establishing a connection

6.2.1 RS485 interface X6

The RS485 interface X6 of MOVISAFE® UCS..B is implemented as an RJ10 socket. It allows parameterization and diagnostics of the basic modules using the MOVISAFE® Config UCS CM Windows®-based software interface.

The PC can be connected with the parameterization and diagnostic interface X6 of MOVISAFE® UCS..B using, for example, the interface adapter USB11A (USB to RS485).

In RUN mode, the logic is processed in MOVISAFE® UCS..B. Parameterization/ programming is only possible in STOP mode. You can set MOVISAFE® back to RUN mode once you have sent the configuration and the message "Configuration successfully written to flash" has appeared.

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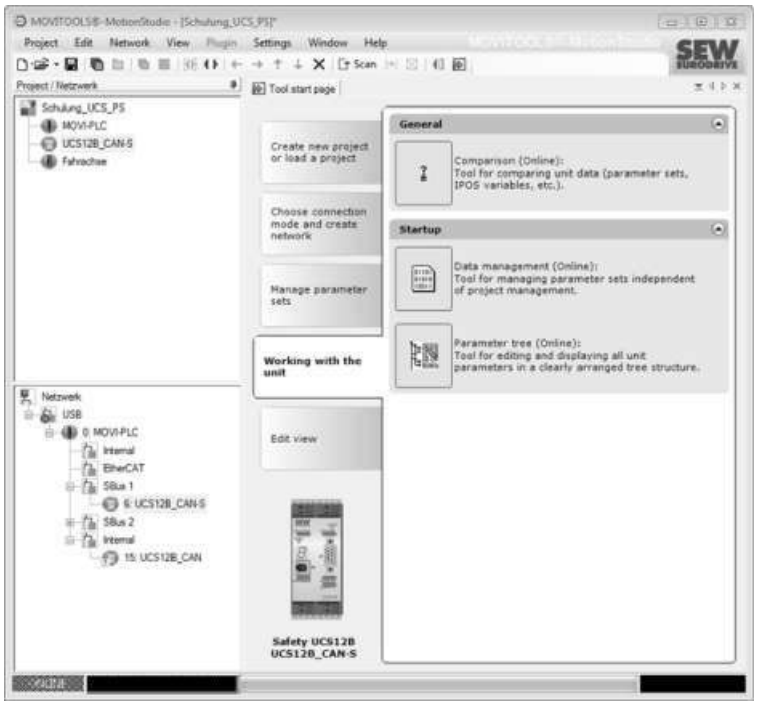
6.2.2 PROFIsafe fieldbus interface

With a PROFIsafe fieldbus interface, the MOVITOOLS® MotionStudio software can be used for communication.



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With MOVITOOLS® MotionStudio:

- The unit and diagnostics data of the UCS..B/PS option can be displayed in the parameter tree.
- Parameter access to unit and diagnostic data is available.
- The MOVISAFE® Config UCS CM software is opened. The connection is set automatically in MOVISAFE® Config UCS CM.
- Data management (reading and sending a configuration file) is possible.
- A configuration for the UCS..B/PS option can be transferred.
- The safety data sets (SDS) are enabled for transferring a configuration.

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7 Validation

⚠ DANGER

Proper functioning of the safety functions and the logic of the user program cannot be guaranteed unless validation is performed.

Severe or fatal injuries.

- Validate each individual safety function and the logic of the user program used in MOVISAFE® UCS..B.

To make sure that the implemented safety functions function properly, the user must check and document the parameters and connections after startup and configuration. This is supported in the MOVISAFE® Config UCS CM software in the form of an acceptance protocol.

The MOVISAFE® concept is based on the following assumptions:

Parameter data and PLC data that is stored in the flash memory of MOVISAFE® UCS.B cannot change automatically. Online tests and corresponding signatures ensure this by implementing basic measures on the module. However, the configuration cannot be evaluated by the module. This concerns the parameterization for the sensors, as well as threshold and limit values.

Validation is completed with the acceptance protocol.

7.1 Procedure

After successful startup, the user must confirm that the data of the acceptance protocol matches the parameters of the module. The user must validate and protocol the parameterized values for the measuring section, sensors and monitoring functions individually by performing a function test. In MOVISAFE® Config UCS CM, you also have to validate and protocol the programmed PLC functions in the form of a code inspection for each link.

All the limit values of MOVISAFE® UCS..B must be tested by exceeding each limit value and then initiating the defined state (safe state = STO + brake de-energized). You may have to take this into account in the machine and system controls.

7.2 Acceptance protocol

7.2.1 Structure of the acceptance protocol

The file contains the following information:

- Editable header data
- Encoder configuration
- Parameters of the monitoring functions
- The IL code of the programmed PLC functions

7.2.2 Creating the acceptance protocol

You can use the MOVISAFE® Config UCS CM software interface to generate an individual acceptance protocol and save it as a PDF file. You can then edit and print the PDF file.

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7.2.3 Entries in the acceptance protocol

You can enter general information about the application (header data) in the acceptance protocol. You can use the first page of the acceptance protocol to enter general information on the system (system designation, customer, supplier, setup operator, etc.). On the second page of the acceptance protocol, you can enter more detailed information on the system/machine. This data is for information only but the content and scope should be coordinated with the approval authorities/inspector. Starting on the third page, the acceptance protocol contains the itemization for the safety check.

The MOVISAFE® Config UCS CM software automatically enters the following information in the PDF file:

- Manufacturer: SEW-EURODRIVE GmbH & Co KG
- Type: MOVISAFE® UCS..B
- Parameterized values of the safety functions

All the other entries must be entered manually by the inspector:

- Date: of the day when the configuration data set was created
- CRC signature: of the verified data set
- Read-off serial number identical to the serial number on the nameplate

  The inspector responsible confirms that the read-off serial number in MOVISAFE® Config UCS CM is identical with the serial number on the nameplate attached to MOVISAFE® UCS..B.
- Identical to option:

  Here, the responsible inspector confirms that the CRC displayed in MOVISAFE® Config UCS CM is identical to the one stored in MOVISAFE® UCS..B. This CRC signature consists of a five-digit number that is displayed in the connection dialog of the software interface when a connection has been established with MOVISAFE® UCS..B.
- Signature of the inspector
- Approval of the function

INFORMATION

- The correct program data and parameter data must be loaded to create the acceptance protocol for validation.
- All listed parameters and program instructions must be validated on the system/ machine and confirmed in the acceptance protocol in writing.
- The inspector must validate all the configured data in the printed acceptance protocol. To do so, the inspector must verify all the set limit values of the monitoring functions used by performing a function test.
- The printed out IL code must be validated, see chapter "Appendix", subchapter "IL instruction list".

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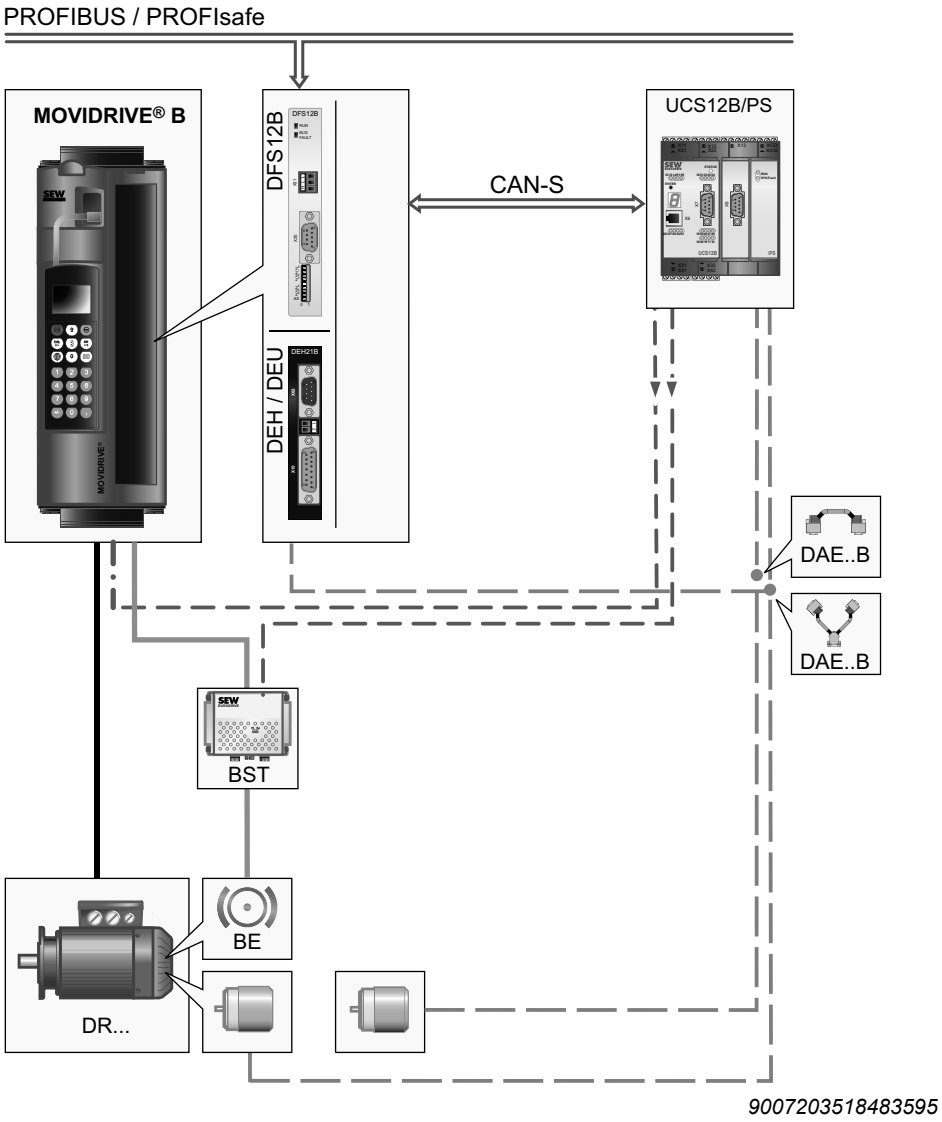
7.3 Determining/checking the response times for validation

The total response time of the drive system has to be determined to assess the slowing-down path of the machine. For this purpose, all the response times of the affected components (electronic and mechanical) must be determined. The following example illustrates this.



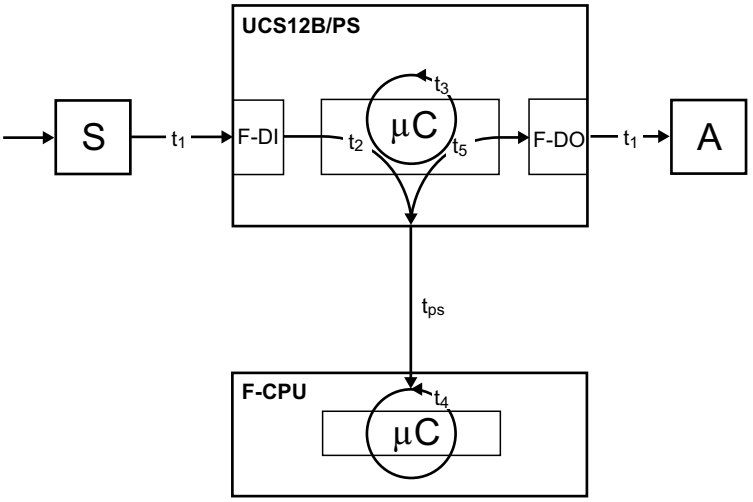
The following components are used:

- MOVIDRIVE® B, size 1, with the following option card:
  - DFS12B as communication interface with PROFIBUS PROFIsafe
  - DEH21B as encoder interface
- Safety-related BST brake module
- DR.. motor with integrated brake (BE20) and SIN/COS encoder
- Additional external SIN/COS encoder
- UCS12B/PS safety module

7.3.1 Example with SLS safety function via PROFIsafe

The drive is to be monitored for safe speed (SLS safety function). If the velocity is exceeded, the drive is switched off immediately (STO safety function). A sensor provides a signal for activating the SLS safety function (t_1). This signal is read locally in the UCS12B/PS safety module and is reported to the safety controller (F-PLC) via PROFIsafe ($t_2 + t_{ps}$). Next, the safety controller activates the SLS safety function in the UCS12B/PS safety module via PROFIsafe (t_{R2}).

The UCS12B/PS safety module reports the status of the SLS safety function to the safety controller via PROFIsafe. When the SLS safety function trips, a message is issued to the safety controller via PROFIsafe (t_{R3}). The safety controller then disables the relevant outputs of the UCS12B/PS safety module via PROFIsafe (STO, t_{R4}). The following figure shows the chain of responses for determining the overall response time from the safety sensor to the actuator.



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UCS12B/PS	Safety module
S	Safety sensor
F-DI	Safe input UCS12B/PS
F-DO	Safe output UCS12B/PS
A	Actuator
F-CPU	Safety controller
µC	Micro-controller

Response time of safety sensor until receipt in safety controller		
t_1	Response time of the safety sensor	According to manufacturer's specifications
t_2	Internal response time of the safe input (NC contact)	16 ms
t_{ps}	PROFIsafe cycle time	According to the specifications of the safety controller
t_{R1}	**Information pending in the F-CPU for further processing**	**Total**

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Response time until the SLS safety function is activated in the UCS12B/PS		
t_4	F-PLC cycle time (worst case = 2 cycles)	Determine from safety controller
t_{ps}	PROFIsafe cycle time	According to the specifications of the safety controller
t_3	Activation of a safety function	24 ms
t_{R2}	**SLS monitoring is activated**	**Total**

Response time of SLS from the time when it is triggered until receipt in the safety controller		
t_3	Response of SLS and status in PROFIsafe process image	112 ms
t_{ps}	PROFIsafe cycle time	According to the specifications of the safety controller
t_{R3}	**Information pending in the F-CPU for further processing**	**Total**

Response time from safety controller to actuator		
t_4	F-PLC cycle time (worst case = 2 cycles)	Determine from safety controller
t_{ps}	PROFIsafe cycle time	According to the specifications of the safety controller
t_5	Internal response time of the safe output	16 ms
t_6	Switching time of the actuator	According to manufacturer's specifications
t_{R4}	**Actuator switches after x ms**	**Total**

The total response time is calculated as follows:

$t_{response, max} = t_{R1} + t_{R2} + t_{R3} + t_{R4}$

INFORMATION

- The total response time becomes longer when using overspeed distance monitoring of the SLS safety function. For an example of how to calculate the response time of overspeed distance monitoring, refer to the "Calculating the response time with overspeed distance monitoring" chapter.
- The total response time becomes longer when you use an SS1/SS2 safety function.
- To reduce the response time, the associated safe outputs can be disabled directly, depending on the status of a safety function. You can find more information in the online help of MOVISAFE® Config UCS CM.
- You can find the response times of the various components in the technical data of the relevant component documentation.

7.4 Checking the performance level according to EN ISO 13849-1

It has to be checked whether the required performance level (PL_r), which was determined in the risk assessment, is achieved by the chosen system for each safety function used. SEW-EURODRIVE recommends checking the calculation using the SISTEMA software tool (free of charge) of the employer's liability insurance association. SEW-EURODRIVE provides a component library which can be used as basis for the calculation. SEW-EURODRIVE offers corresponding services to support the system check by calculation.

If you use another method to validate the performance level, you can use the characteristic safety values specified in the "Technical data" chapter.

INFORMATION

The latest version of the SISTEMA library is available for download from the SEW homepage (www.sew-eurodrive.com).

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8 Operation

8.1 Description of the 7-segment display

The 7-segment display is used to indicate the status of MOVISAFE®.

Status of 7-segment display	Mode	Description
1	STARTUP	Synchronization between the two processor systems and check of the configuration/firmware data
2	SEND CONFIG	Distribution of the configuration/firmware data and another check of this data. Range check of the configuration data.
3	STARTUP BUS	• Initialization of the bus system (PROFIsafe) for the UCS..B/PS option. • Option UCS..B/PS configured via XCD or XCS and safety data set (SDS) not yet enabled.
4	RUN	Normal operation of the MOVISAFE® module. The program is executed cyclically.
5	STOP	In STOP mode, parameters and program data can be loaded externally.
	RUN BUS	An active PROFIsafe interface is indicated by an illuminated dot on the bottom right of the 7-segment display.
F	FAILURE	A fault can only be reset by switching the subassembly off and then on again (see the chapter on "Error and alarm messages").
A	ALARM	An alarm can be reset via a digital input or by pressing the "ENTER" pushbutton on the front panel (see the chapter on "Error and alarm messages").
E	ECS-ALARM	An ECS alarm can be reset via digital inputs or by pressing the "ENTER" pushbutton on the front panel (see the chapter on "Error and alarm messages").

INFORMATION

- In statuses 1, 2, 3 and 5, the outputs are automatically switched off by the firmware.
- In status 4, the implemented MOVISAFE® program assumes control.
- In statuses F and A, all outputs are disabled. If MOVISAFE® UCS..B is restarted after a reset, the outputs are enabled in status 4 and switched as programmed. If a reason for an error or alarm is still present, the outputs are disabled again and a corresponding error or alarm message is issued.
- In status E, only a message is issued. The outputs are not disabled.

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8.2 Meaning of the LEDs

8.2.1 LEDs on the basic module

The status LED indicates the system status.

Status LED	Description
Flashing green	• System OK. The configuration that was loaded via X6 is set to "Validated" by MOVISAFE® Config UCS CM. • System OK. The configuration that was loaded via XCD or XCS is enabled by the safety data set (SDS).
Flashing yellow	• System OK. The configuration that was loaded via X6 is not yet set to "Validated" by MOVISAFE® Config UCS CM. • System OK. The configuration that was loaded via XCD or XCS is not yet enabled by the safety data set (SDS).
Flashing red	Alarm.
Red light	Error.

The RUN and SYSFault LEDs are additionally available for basic modules with the PROFIsafe (/PS) function expansion.

RUN LED	SYSFault LED	Description
Off	Off	Communication interface is off or defective.
Orange	Orange light	Communication interface is booting up.
-	Red light	System error. You can retrieve more information on the error from the unit status.
-	Flashing red	Internal communication error.
Green	-	PROFIsafe (/PS) function expansion is ready for operation.
Orange	-	Communication interface is ready for operation; internal communication could not yet be established.

8.2.2 LEDs on the expansion module

The status LED indicates the system status.

Status LED	Description
Flashing green	System OK.
Off	Error.
Flashing red	Alarm.
Red light	No voltage supply available to expansion module.

8.2.3 LEDs on the diagnostic module

Status LED	Description
Flashing green	System OK.

SYSFault LED	Description
Flashing green	Internal communication to basic module. Data received.

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SYSFault LED	Description
Green light	Processing of the received data OK.
Flashing red	Internal communication error for basic module.
Red light	Unit fault (contact manufacturer)
Alternating red/ green	Self-test mode.

DP LED	Description
Green light	Communication to PROFIBUS is active.
Flashing green	Communication to PROFIBUS is interrupted.
Flashing red	Transferred data is invalid.
Alternating red/ green	Self-test mode.

PN LED	Description
Green light	Communication to PROFINET is active.
Flashing green	Communication to PROFINET interrupted.
Flashing red	Transferred data is invalid.
Alternating red/ green	Self-test mode.

8.3 Meaning of the ENTER function key

- You can use the ENTER function key to acknowledge a pending alarm on the safety module.
- In status 4 (RUN), pressing the ENTER function key for about 3 seconds displays the three CRC codes of the current unit configuration in the 7-segment display.

8.4 Operating states

8.4.1 Switch-on sequences

Each time MOVISAFE® UCS..B is restarted successfully, the following 4 phases are run through and displayed in the 7-segment display on the front of the unit.

7-segment display	Mode	Description
1	STARTUP	Synchronization between the two processor systems and check of the configuration/firmware data.
2	SEND CONFIG	Distribution of the configuration/firmware data and another check of this data. Range check of the configuration data.
3	STARTUP BUS	Configuration must be enabled after transfer (only if MOVITOOLS® MotionStudio is open). MOVISAFE® UCS..B/PS is waiting for integration into PROFIsafe.

7-segment display	Mode	Description
4	RUN	Unit is active, i.e. all outputs can be switched.

INFORMATION

The firmware automatically switches off the outputs for all operating states except for RUN. In "RUN" mode (display "4"), access is possible via the implemented PLC program or fieldbus.

8.4.2 LED display on the basic module

LED DI 01 – 14

LED display	Description
Green light	Signal present at digital input.

LED P1, P2

LED display	Description
Green light	The pulse output is available.

LED DO 02, 03

LED display	Description
Green light	Digital output has tripped.

LED DO K1, K2

LED display	Description
Green light	The relay output has tripped.

8.4.3 LED display on the expansion module

LED DI 01 – 12

LED display	Description
Green light	Signal present at digital input.

LED P1, P2

LED display	Description
Green light	The pulse output is available.

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LED DIO 01 – 10

LED display	Description
Green light	• Configured as input: Signal present at digital input. • Configured as output: Digital output has tripped.

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9 Service

9.1 General information

INFORMATION

- The safety certification and any right to claim under limited warranty become void if the user modifies the unit internally (e.g. replacing components, welding parts).
- Changes to the MOVISAFE® UCS..B module may only be carried out by SEW-EURODRIVE.
- Only SEW-EURODRIVE is authorized to make changes to the firmware.
- Only SEW-EURODRIVE is authorized to repair MOVISAFE® UCS..B.

9.2 Function test

The proper functioning of the safety functions has to be checked once a year to ensure the safety of the module. This is done by testing the function or switch-off of the modules used in the parameterization (inputs, outputs, monitoring functions, and logic modules).

9.3 Replacement of the basic module

9.3.1 Preparation

The following components are required to perform the necessary steps for replacing the basic module:

- MOVISAFE® Config UCS CM programming software
- Interface adapter for connecting the basic module with the PC; see the "Communication and establishing a connection" chapter.

Observe the following points:

- The acceptance protocol of the original startup procedure must be on hand.
- The configuration (original program) must be available if the basic module to be replaced can no longer be accessed or an SSI encoder is connected. Note that the SSI parameterization changed as of version 01-05-xx-xx-00 and is not backwards-compatible.
- If the configuration is inhibited, you need the password to unlock it.
- The hardware and software version of the new basic module must be higher than or the same as that of the old basic module. The hardware and software version is listed on the nameplate of the basic module. If the SSI signal is split, check whether the unit to be replaced has an FW version lower than 2.
- The CRC codes (3) from the basic module must be identical with those of the configuration and the acceptance protocol.

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INFORMATION

- There are 3 different CRC codes. They are each labeled with a letter and 5 numerals.
  - Program CRC (P XXXXX)
  - Parameter CRC (C XXXXX)
  - Overall CRC (L XXXXX)
- After pressing the <ENTER> key for more than 3 seconds, the CRC codes are displayed at the basic module. As an alternative, it is possible to display them in MOVISAFE® Config UCS CM (menu [Connection] / [Diagnostics] / [System information]).
- The CRC codes of the configuration are displayed in the plan management in MOVISAFE® Config UCS CM.

9.3.2 Replacing the basic module

INFORMATION

- Encoder and connection cables may only be connected or disconnected while the voltage supply is switched off.
- When using prefabricated encoder cables or the split box, the voltage can be supplied by the frequency inverter. In this case, you must also switch off the voltage supply of the frequency inverter.
- Unlocking the configuration is not required for reading and transmitting the binary file.

Proceed as follows:

1. Start the MOVISAFE® Config UCS CM software and select the appropriate basic module.
2. Use the PC to establish a connection to the basic module (menu [Connection] / [Connect]).
3. Read the current configuration from the basic module (menu [Connection] / [Validation] / [Read UCS binary file...]).
4. Save the read configuration after the transmission is complete.
5. Disconnect the connection with the basic module (menu [Connection] / [Disconnect]).
6. Switch off the voltage supply of the basic module.
7. Disconnect all encoder and connection cables from the basic module.
8. Remove the basic module from the standard profile rail.
9. Install the new basic module on the standard profile rail.
10. Connect all encoder and connection cables to the new basic module.
11. Switch on the voltage supply of the new basic module.
12. Use the PC to establish a connection with the new basic module (menu [Connection] / [Connect]).
13. Send the configuration saved under point 3 to the new basic module (menu [Connection] / [Validation] / [Send UCS binary file to UCS...]).

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14. After the transmission is complete, start the new basic module (menu [Connection] / [Start]).

9.3.3 Concluding measures

After the new basic module has been installed and configured, the following final measures must be taken:

1. Perform a visual inspection (correct installation, swapped connections, etc.)
2. Read the CRC codes (3) from the new basic module. They must be identical to those in the acceptance protocol.
3. Enter the transmission counter in the acceptance protocol.
4. Enter the serial number of the new basic module in the acceptance protocol.
5. Confirm the changes in the acceptance protocol with the date, your name and your signature.

9.4 Replacing the expansion module

9.4.1 Preparation

The following points must be considered when performing the necessary steps for replacing an expansion module:

- The acceptance protocol of the original startup procedure must be on hand.
- The hardware and software version of the new expansion module must be higher than or the same as that of the old expansion module. The hardware and software version is listed on the nameplate of the expansion module.

9.4.2 Replacing the expansion module

1. Switch off the voltage supply of the basic and expansion modules.
2. Disconnect all connection cables from the expansion module.
3. Remove the expansion module from the standard profile rail. This interrupts the connection to the backplane bus.
4. Read the unit address from the bottom of the expansion module.
5. Set the same unit address on the new expansion module.
6. Install the new expansion module on the standard profile rail. This re-establishes the connection to the backplane bus.
7. Connect all connection cables to the new expansion module.
8. Switch on the voltage supply of the basic module and the new expansion module.

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9.4.3 Concluding measures

After the new expansion module has been installed and connected, the following final measures must be taken:

1. Enter the serial number of the new expansion module in the acceptance protocol.
2. Confirm the changes in the acceptance protocol with the date, your name and your signature.

INFORMATION

When replacing an expansion module, no new CRC code is generated. This means a validation is not necessary after the replacement.

9.5 Replacing the diagnostic module

9.5.1 Preparation

The following point must be considered when performing the necessary steps for replacing a diagnostic module:

- The hardware version of the new diagnostic module must be higher than or the same as that of the old diagnostic module. The hardware version is listed on the nameplate of the diagnostic module.

9.5.2 Replacing the diagnostic module

1. Switch off the voltage supply of the basic module and of the expansion module, if applicable.
2. Disconnect all connection cables from the diagnostic module.
3. Remove the diagnostic module from the standard profile rail. This interrupts the connection to the backplane bus.
4. Install the new diagnostic module on the standard profile rail. This re-establishes the connection to the backplane bus.
5. Connect all connection cables to the new diagnostic module.
6. For UCS26B: Set the same PROFIBUS address in the new diagnostic module as in the old diagnostic module.

   For UCS27B: Assign the same IP address and the same PROFINET device name to the new diagnostic module.
7. Switch on the voltage supply of the basic module and the expansion module.

9.5.3 Concluding measures

Once the new diagnostic module has been installed and connected, perform a visual inspection (correct installation, swapped connections, etc.).

INFORMATION

When replacing a diagnostic module, no new CRC code is generated. This means a validation is not necessary after the replacement.

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9.6 Replacing an SSI absolute encoder

Two cases are distinguished when replacing an SSI absolute encoder:

Position processing in UCS..B	Application
Not active	Simple speed monitoring: • No encoder offset necessary
Active	Positions are monitored: • Necessary to adjust/recalculate the encoder offset (usually with rotative encoders)

9.6.1 Replacing an SSI absolute encoder when position processing is inactive

Preparation

An SSI absolute encoder may only be replaced by the same encoder type.

Replacing an SSI absolute encoder

Proceed as follows to replace an SSI absolute encoder **without active position processing**:

1. Before replacing the encoder, switch off the line voltage and the DC 24 V supply voltage.
2. Disconnect terminal X17 on the MOVIDRIVE® B or MOVITRAC® B units, or terminal X7/X8 on MOVIAXIS®. This prevents the motor or brake from being enabled unintentionally during encoder replacement.
3. Replace the encoder in the application. Make sure that the encoder type is the same.
4. Switch the DC 24 V supply voltage and the line voltage back on.
5. Reconnect terminal X17 (on MOVIDRIVE® B/MOVITRAC® B) or X7/X8 (on MOVIAXIS®).
6. Connect MOVISAFE® UCS..B to your PC; see the "Communication and establishing a connection" chapter.
7. Start the MOVISAFE® Config UCS CM software and establish a connection with the basic module.
8. Use the SCOPE function to check the plausibility of the transmitted position and velocity of your encoder.

INFORMATION

An empty program is sufficient to check the plausibility with the SCOPE function. Select UCS11B or UCS12B because the full SCOPE functionality is only available for basic modules with encoder interface.

Concluding measures

Once the new SSI absolute encoder has been installed and connected, perform a visual inspection (correct installation, swapped encoder connections, etc.).

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9.6.2 Replacing an SSI absolute encoder when position processing is active

Preparation

The following components are required to perform the necessary steps for replacing an SSI absolute encoder when position processing is active:

- MOVISAFE® Config UCS CM programming software.
- Dongle for MOVISAFE® Config UCS CM.
- Interface adapter for connecting the basic module with the PC; see the "Communication and establishing a connection" chapter.

Observe the following points:

- The SSI absolute encoder may only be replaced by the same encoder type.
- The acceptance protocol of the original startup procedure must be on hand.
- The configuration (original program) must be on hand.
- If the configuration is inhibited, you need the password to unlock it.
- The CRC codes (3) from the basic module must be identical with those of the configuration and the acceptance protocol.

Replacing an SSI absolute encoder

Proceed as follows to replace an SSI absolute encoder **with active position processing**:

1. Before replacing the encoder, switch off the line voltage and the DC 24 V supply voltage.
2. Disconnect terminal X17 on the MOVIDRIVE® B or MOVITRAC® B units, or terminal X7/X8 on MOVIAXIS®. This prevents the motor or brake from being enabled unintentionally during encoder replacement.
3. Replace the encoder in the application. Make sure that the encoder type is the same.
4. Switch the DC 24 V supply voltage and the line voltage back on.
5. Reconnect terminal X17 (on MOVIDRIVE® B/MOVITRAC® B) or X7/X8 (on MOVIAXIS®).
6. Connect MOVISAFE® UCS..B to your PC; see the "Communication and establishing a connection" chapter.
7. Start the MOVISAFE® Config UCS CM software and establish a connection with the basic module.
8. Use the SCOPE function to check the transmitted position and velocity of your encoder. If the displayed position is identical with the position in the application, no adjustments are necessary and you can proceed with step 18.
9. If the position of the application is not identical with the displayed position, open the original program in the MOVISAFE® Config UCS CM software. All subsequent changes cause the CRC to be calculated again.
10. Open the encoder dialog and enter the value "0" in the "Offset" input field.
11. Save this new configuration under another name.
12. Send the new configuration to the basic module.
13. Start the sent configuration.
14. Use the SCOPE function to check the displayed position of the encoder.

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15. Re-open the encoder dialog and calculate the offset of the new SSI absolute encoder for the application.
16. Save the adjusted configuration and send it to the basic module.
17. Start the sent configuration and check the displayed position and speed of the SSI encoder again using the SCOPE function.
18. Check the displayed values for plausibility with the real values of the application.

INFORMATION

MOVISAFE® Config UCS CM offers a calculation aid for calculating the offset. You can start it in the dialog for the encoder setting, next to the offset entry.

Concluding measures

Once the new SSI absolute encoder has been installed and connected, take the following measures:

1. Perform a visual inspection (correct installation, swapped connections, etc.)
2. Read the CRC codes (3) from the basic module. Enter the CRC codes in the acceptance protocol.
3. Enter the transmission counter in the acceptance protocol.
4. Enter the new offset value in the acceptance protocol.
5. Archive the changed configuration together with the original configuration.
6. Confirm the changes in the acceptance protocol with the date, your name and your signature.

9.7 Types of error and alarm messages

MOVISAFE® UCS..B basically distinguishes between 3 types of messages as follows.

Message	Description	Impact on the system	Reset condition UCS..B
Error	The last active process is the operation of the 7-segment display via system A. System B is in STOP mode.[1)]	All outputs are disabled.	Switching MOVISAFE® off and then on again.
Alarm	Functional error caused by external process. Both systems (A, B) continue to run cyclically.		Through parameterizable input or <ENTER> button on MOVISAFE®.
ECS	When using the ECS function block in the programming interface, encoder alarm messages will be identified with "E" instead of "A".[1)]	The ECS function block returns "0" as the result.	

1) Error detection in system A (odd-numbered) and system B (even-numbered).

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9.7.1 Display of error or alarm messages

Errors should not occur during normal operation of the module. Error messages on MOVISAFE® UCS..B are distinguished as shown in the following overview.

Display	Meaning
F, A, E _ _ _ _	A **4-digit error message** is issued if **only one MOVISAFE®basic module is used**.
F, A, E _ _ _ _ _	A **5-digit error message** is issued if one **MOVISAFE®basic module and additional expansion modules** are used. The first digit of the error message has the following meaning: • 0: Basic module • 1: Expansion module with logic address 1 • 2: Expansion module with logic address 2

INFORMATION

Both the MOVISAFE® Config UCS CM software interface and the MOVISAFE® UCS..B system manual contain a list of error and alarm messages.

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9.8 Disposal

Observe the applicable national regulations.

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

- Electronics scrap
- Plastic
- Sheet metal
- Copper

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10 Technical data

10.1 General technical data

MOVISAFE® UCS..B, all sizes	
Protection class	IP20 (EN 60529)
Interference immunity	Meets EN 61000-6-2
Interference emission	Meets EN 61000-6-4 (EN 55011)
Ambient temperature	−10°C to 50°C
Climate class	3k3 according to EN 60721-3-3
Service life	90,000 h[1)]

1) At an ambient temperature of 50°C

10.2 Power consumption of the safety modules

Safety module	Maximum power consumption
UCS10B, UCS10B/PS	2.4 W
UCS11B, UCS11B/PS	2.4 W
UCS12B, UCS12B/PS	2.4 W
UCS23B	3.8 W

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10.3 Technical data of the inputs

Type 1 according to EN 61131-2.

Digital inputs		
DI 0.01 to DI 0.04	Nominal voltage	DC 24 V
	Nominal input current	0.02 A
	High level	DC 15 V – DC 30 V
	Low level	DC −3 V to DC +5 V
	Suitable for OSSD	Yes
DI 0.05 to DI 0.08	Nominal voltage	DC 24 V
	Nominal input current	0.02 A
	High level	DC 15 V – DC 30 V
	Low level	DC −3 V to DC +5 V
	Suitable for OSSD	No
DI 0.09 to DI 0.14	Nominal voltage	DC 24 V
	Nominal input current	0.02 A
	High level	DC 15 V – DC 30 V
	Low level	DC −3 V to DC +5 V
	Suitable for OSSD	Yes
DI X.01 to DI X.12	Nominal voltage	DC 24 V
	Nominal input current	0.02 A
	High level	DC 15 V – DC 30 V
	Low level	DC −3 V to DC +5 V
	Suitable for OSSD	Yes
DIO X.01 to DIO X.10	Nominal voltage	DC 24 V
	Nominal input current	0.02 A
	High level	DC 15 V – DC 30 V
	Low level	DC −3 V to DC +5 V
	Suitable for OSSD	Yes

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10.4 Technical data of the outputs

Digital outputs		
DO X.00 to DO X.01	Output voltage	DC 24 V
	Nominal output current	0.1 A
DO X.02_P	Output voltage	DC 24 V
	Nominal output current	0.5 A
DO X.02_M	Output voltage	GND
	Nominal output current	0.5 A
DO X.03_P	Output voltage	DC 24 V
	Nominal output current	0.25 A
DO X.03_M	Output voltage	GND
	Nominal output current	0.25 A
DIO X.01 to DIO X.10 (only for UCS23B)	Output voltage	DC 24 V
	Nominal output current	0.25 A
Relay outputs		
K 0.1 (only for UCS1.B)	Capacity of the relay contact	U_{max} = DC 24 V, I_{max} = 2 A and U_{max} = AC 230 V, I_{max} = 2 A
	Max. switching frequency	2 800 000 (at nominal load)
K 0.2 (only for UCS1.B)	Capacity of the relay contact	U_{max} = DC 24 V, I_{max} = 2 A and U_{max} = AC 230 V, I_{max} = 2 A
	Max. switching frequency	2 800 000 (at nominal load)
Pulse outputs		
P1	Output voltage	DC 24 V with fixed pulse pattern
	Nominal output current	0.1 A (sum P1 + P2)
P2	Output voltage	DC 24 V with fixed pulse pattern
	Nominal output current	0.1 A (sum P1 + P2)

INFORMATION

- X = 0: Basic module
- X = 1: 1st expansion module
- X = 2: 2nd expansion module

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10.5 Safety characteristics of basic modules

10.5.1 MOVISAFE® UCS10B

	Characteristic values according to	
	EN 62061/IEC 61508	**EN ISO 13849-1**
Safety class/underlying standards	SIL 3 according to IEC 61508	PL e
System structure	1oo2D	2-channel (corresponds to category 4)
Operating mode selection	"High demand" according to IEC 61508	
Probability of dangerous failure per hour (PFHd value)	3×10^{-9} 1/h	
Mission time / service life	20 years	
Proof test interval	20 years	-
Safe state	Value "0" for all safety-related F-DO process values (output disabled)	
Safety function	• Safe logic processing • Safe digital inputs/outputs • Safe relay outputs	

10.5.2 MOVISAFE® UCS10B/PS

	Characteristic values according to	
	EN 62061/IEC 61508	**EN ISO 13849-1**
Safety class/underlying standards	SIL 3 according to IEC 61508	PL e
System structure	1oo2D	2-channel (corresponds to category 4)
Operating mode selection	"High demand" according to IEC 61508	
Probability of dangerous failure per hour (PFHd value)	3×10^{-9} 1/h	
Mission time / service life	20 years	
Proof test interval	20 years	-
Safe state	Value "0" for all safety-related F-DO process values (output disabled)	
Safety function	• Safe logic processing • Safe digital inputs/outputs • Safe relay outputs • Safe communication via CAN-S	

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10.5.3 MOVISAFE® UCS11B

	Characteristic values according to	
	EN 62061/IEC 61508	**EN ISO 13849-1**
Safety class/underlying standards	SIL 3 according to IEC 61508	PL e
System structure	1oo2D	2-channel (corresponds to category 4)
Operating mode selection	"High demand" according to IEC 61508	
Probability of dangerous failure per hour (PFHd value)	2.2×10^{-9} 1/h	
Mission time / service life	20 years	
Proof test interval	20 years	-
Safe state	Value "0" for all safety-related F-DO process values (output disabled)	
Safety function	• STO, SS1, SS2, SOS, SLA, SAR, SLS, SSR, SLP, SLI, SDI, SCA, SSM according to IEC 61800-5-2 • Safe logic processing • Safe digital inputs/outputs • Safe relay outputs	

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10.5.4 MOVISAFE® UCS11B/PS

	Characteristic values according to	
	EN 62061/IEC 61508	**EN ISO 13849-1**
Safety class/underlying standards	SIL 3 according to IEC 61508	PL e
System structure	1oo2D	2-channel (corresponds to category 4)
Operating mode selection	"High demand" according to IEC 61508	
Probability of dangerous failure per hour (PFHd value)	2.2×10^{-9} 1/h	
Mission time / service life	20 years	
Proof test interval	20 years	-
Safe state	Value "0" for all safety-related F-DO process values (output disabled)	
Safety function	• STO, SS1, SS2, SOS, SLA, SAR, SLS, SSR, SLP, SLI, SDI, SCA, SSM according to IEC 61800-5-2 • Safe logic processing • Safe digital inputs/outputs • Safe relay outputs • Safe communication via CAN-S	

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10.5.5 MOVISAFE® UCS12B

	Characteristic values according to	
	EN 62061/IEC 61508	**EN ISO 13849-1**
Safety class/underlying standards	SIL 3 according to IEC 61508	PL e
System structure	1oo2D	2-channel (corresponds to category 4)
Operating mode selection	"High demand" according to IEC 61508	
Probability of dangerous failure per hour (PFHd value)	6.2×10^{-9} 1/h	
Mission time / service life	20 years	
Proof test interval	20 years	-
Safe state	Value "0" for all safety-related F-DO process values (output disabled)	
Safety function	• STO, SS1, SS2, SOS, SLA, SAR, SLS, SSR, SLP, SLI, SDI, SCA, SSM according to IEC 61800-5-2 • Safe logic processing • Safe digital inputs/outputs • Safe relay outputs	

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10.5.6 MOVISAFE® UCS12B/PS

	Characteristic values according to	
	EN 62061/IEC 61508	**EN ISO 13849-1**
Safety class/underlying standards	SIL 3 according to IEC 61508	PL e
System structure	1oo2D	2-channel (corresponds to category 4)
Operating mode selection	"High demand" according to IEC 61508	
Probability of dangerous failure per hour (PFHd value)	6.2×10^{-9} 1/h	
Mission time / service life	20 years	
Proof test interval	20 years	-
Safe state	Value "0" for all safety-related F-DO process values (output disabled)	
Safety function	• STO, SS1, SS2, SOS, SLA, SAR, SLS, SSR, SLP, SLI, SDI, SCA, SSM according to IEC 61800-5-2 • Safe logic processing • Safe digital inputs/outputs • Safe relay outputs • Safe communication via CAN-S	

10.6 Safety characteristics of expansion module

10.6.1 MOVISAFE® UCS23B

	Characteristic values according to	
	EN 62061/IEC 61508	**EN ISO 13849-1**
Safety class/underlying standards	SIL 3 according to IEC 61508	PL e
System structure	1oo2D	2-channel (corresponds to category 4)
Operating mode selection	"High demand" according to IEC 61508	
Probability of dangerous failure per hour (PFHd value)	2.6×10^{-9} 1/h	
Mission time / service life	20 years	
Proof test interval	20 years	-
Safe state	Value "0" for all safety-related F-DO process values (output disabled)	
Safety function	Safe digital inputs/outputs	

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10.7 MOVISAFE® response times

The response time is an important safety-relevant value and must be considered for any application. The following section lists response times for individual functions. If this data is insufficient for a specific application, you have to perform a measurement to validate the actual behavior.

INFORMATION

- During startup or after a fault or alarm reset, the outputs can be active for the duration of the response time depending on the configuration. You have to take this into account when planning the safety function.
- You have to specify the response times for each safety function and compare them with the actual value according to the following information.
- Be especially careful if you use filter functions. The filter length or filter time can significantly increase the response time. Take this into account for the safety-related planning.
- If the "distance monitoring" filter is used, the response time will increase depending on the set error distance.
- For particularly critical applications, perform measurements to validate the time behavior.

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10.7.1 Response times of the basic modules

Calculation of response times for MOVISAFE® UCS..B is based on the cycle time of the system. The cycle time (t_{cycle}) is 8 ms. The specified response times correspond to the maximum run time for the specific application **within MOVISAFE®**. Depending on the application, additional application-specific response times, e.g. for filter functions or the sensors and actuators used, have to be added to obtain the total runtime.

Function	Response time in ms
Activating a monitoring function via ENABLE with subsequent disabling of a digital output.	24[1)]
Activating a monitoring function via ENABLE with subsequent disabling of a safety relay.	47[1)]
Response of an already activated **monitoring function** and disabling of a digital output (including PLC processing for position and velocity processing).	16[1)]
Response of an already activated **monitoring function** and disabling of a safety relay (including PLC processing for position and velocity processing).	39[1)]
Enabling a digital input and disabling a digital output.	16
Enabling a digital input and enabling a relay output.	26
Disabling a digital input and disabling a digital output.	16
Disabling a digital input and disabling a relay output.	47
Mean value filter (speed filter) (For setting, see encoder configuration in MOVISAFE® Config UCS CM. This runtime only affects monitoring functions in conjunction with position, velocity or acceleration, not the logic processing)	0, 16, 24, 32, 40, 48, 56, 64

1) When the mean value filter is activated, the response time increases according to the filter value

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10.7.2 Response times of UCS23B expansion modules

Calculation of response times for MOVISAFE® UCS..B is based on the cycle time of the system. The cycle time (t_{cycle}) is 8 ms. The specified response times correspond to the maximum run time for the specific application **within MOVISAFE®**. Depending on the application, additional application-specific response times, e.g. for filter functions or the sensors and actuators used, have to be added to obtain the total runtime.

Function	Designation	Response time in ms
Time for an input signal at the basic module to the process image output (e.g. activation of a monitoring function).	$t_{IN-BASE}$	10
Time for an input signal at the expansion module to the process image output (e.g. activation of a monitoring function).	t_{IN-23}	18
Processing time PAE to PAA in the basic module (e.g. disconnection in the PAE via monitoring function or input).	t_{PLC}	8
Enabling/disabling a digital output in the basic module after a change in the PAA.	$t_{OUT-BASE}$	0
Enabling/disabling a digital output in the expansion module after a change in the PAA.	t_{OUT-23}	8

Evaluation of the total response time

Example 1:

- Input on expansion module
- Activation of a safety function
- Processing in PLC
- Switching an output on the basic module

$t_{RESPONSE} = t_{IN-23} + t_{PLC} + t_{OUT-BASE} = 18\ ms + 8\ ms + 0\ ms = 26\ ms$

Example 2:

- Input on basic module
- Activation of a safety function
- Processing in PLC
- Switching an output on the expansion module

$t_{RESPONSE} = t_{IN-BASE} + t_{PLC} + t_{OUT-23} = 10\ ms + 8\ ms + 8\ ms = 26\ ms$

Example 3:

- Input on expansion module
- Activation of a safety function
- Processing in PLC
- Switching an output on the expansion module

$t_{RESPONSE} = t_{IN-23} + t_{PLC} + t_{OUT-23} = 18\ ms + 8\ ms + 8\ ms = 34\ ms$

10.7.3 Response times for Fast_Channel

Fast_Channel refers to a MOVISAFE® characteristic that allows for a faster response to a safety function with speed requirements than in the normal cycle. The sampling cycle of the Fast_Channel is 2 ms. The response time is 4 ms.

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INFORMATION

- The function can be activated in the safety functions SLS and SOS in MOVISAFE® Config UCS CM.
- Disconnection during the aforementioned response time (when a speed threshold is exceeded) is only possible if the encoder system provides sufficient resolution. The smallest resolvable switching threshold of the Fast_Channel requires at least 2 edge changes at the selected encoder system within 2 ms.
- Fast_Channel is only possible in conjunction with safe digital outputs.

10.7.4 Response times for overspeed distance monitoring

If you use the "overspeed distance monitoring" filter for speed monitoring in SLS or SCA safety functions, the total response time of the MOVISAFE® UCS..B increases by the response time (runtime) of the filter. The filter shifts the set speed threshold upwards. For the application, you have to take into account the additional response time as well as the resulting speed in the event of a disconnection via MOVISAFE® UCS..B. SEW differentiates between the following two cases: The safety function performs a disconnection once the configured permitted distance has been reached.

1. Faulty acceleration beyond the monitored velocity.

$$t_R = \sqrt{\frac{2 \times s_F}{a}} + 2 \times t_{UCS}$$

t_R = Response time of the MOVISAFE® UCS..B (incl. response time of the overspeed distance monitoring)

s_F = Permitted distance of the overspeed distance monitoring (configurable value in safety function)

a = Permitted maximum acceleration, depending on the monitored axis (according to project planning)

t_{UCS} = Cycle time of the MOVISAFE® UCS..B (see the "Technical data" chapter)

2. Constant travel above the monitored velocity.

$$t_R = \frac{s_F}{v_x - v_0} + 2 \times t_{UCS}$$

v_x = Current speed of the monitored axis

v_0 = Monitored speed (SLS/SCA configured value in safety function)

t_R = Response time of the MOVISAFE® UCS..B (incl. response time of the overspeed distance monitoring)

s_F = Permitted distance of the overspeed distance monitoring (configurable value in safety function)

t_{UCS} = Cycle time of the MOVISAFE® UCS..B (see the "Technical data" chapter)

10.8 Diagnostic values

The diagnostic values specify the diagnostic coverage (DC value) that can be assumed for calculating the performance level.

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10.8.1 Digital inputs

INFORMATION

- Refer to the manufacturer's specifications ($MTTF_d$, FIT values, etc.) for a safety-relevant assessment of the sensor subsystem.
- The DC values listed in the table should be applied conservatively to ensure compliance with the boundary conditions ("Comment" column).
- Fault exclusions are permitted according to the relevant standards. The specified boundary conditions must be permanently ensured.
- If several sensor systems are required for an individual safety function to work properly, their partial value must be combined correctly according to the selected method.

General assessment of the diagnostics coverage (DC) for digital inputs according to EN ISO 13849-1.

Measure	DC value	Comment	Use
Cyclical test pulse by changing the input signals dynamically.	90%	Only effective if pulse assignment is active.	Cross fault monitoring for single-channel sensors.
Cross comparison of input signals with dynamic test if short circuits cannot be detected (with multiple inputs/outputs).	90%	Cyclical change of input signals required, for example by regular acknowledgment.	Monitoring of dual-channel sensors.
Cross comparison of input signals and intermediate results in the logic (L) and temporal monitoring of the logical program run as well as detection of static failures and short circuits (with multiple inputs/outputs).	99%	Cyclical change of input signals required, for example by regular acknowledgment.	Monitoring of dual-channel sensors.
Plausibility check, for example using the NO and NC contacts of positively-driven relays.	99%	Only effective in conjunction with active monitoring function for input element (EMU function).	Monitoring of dual-channel, complementary sensors.

10.8.2 Digital outputs

INFORMATION

- Use the manufacturer's specification ($MTTF_d$, FIT values, B_{10d} value, etc.) for a safety assessment of the output subsystem when using external elements in the switch-off circuit, e.g. for switching amplification.
- The DC values listed in the table should be applied conservatively to ensure compliance with the boundary conditions ("Comment" column).
- Fault exclusions are permitted according to the relevant standards. The specified boundary conditions must be permanently ensured.
- When elements are used to amplify signals in safety circuits, the function of these elements must be monitored using suitable feedback contacts, etc. Suitable feedback contacts are contacts that are connected with the contacts in the cut-off circuit in a forced-switching manner.

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General assessment of the diagnostics coverage (DC) for digital outputs according to EN ISO 13849-1.

Measure	DC value	Comment	Use
Cross comparison of output signals and intermediate results in the logic (L) and temporal monitoring of the logical program run as well as detection of static failures and short circuits (with multiple inputs/outputs).	99%	When elements are used to amplify switching (external relays or contactors), the measure is only effective in combination with the feedback function of switch contacts (EMU function).	Monitoring of outputs with direct function as safety circuit, or monitoring of safety circuits with elements to amplify switching in conjunction with feedback function of their outputs.

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10.8.3 General diagnostics for encoder interface

General assessment of the diagnostics coverage (DC) for sensors for position and/or velocity detection according to EN ISO 13849-1.

Measure	DC value	Comment Use only for:	Use
Cross comparison of input signals and direct and intermediate results in the logic (L) and temporal monitoring of the logical program run as well as detection of static failures and short circuits (with multiple inputs/outputs).	99%	• Dual-channel sensor systems (2 separate sensors) • Dual-channel subsystem of sensors (incremental encoders) • Diagnostics for the single- and dual-channel subsystem of specifically suited sensor systems (SIN/COS encoders). • Dynamic operation/no standstill monitoring	Monitoring of dual-channel sensor systems or the relevant subsystem of sensors for dynamic operation. Do not use for standstill monitoring!
Cross comparison of input signals without dynamic test.	60 – 99%	The DC value depends on the following factors: frequency of the dynamic state, which is standstill or movement, and the quality of the monitoring measure (60 – 90% for incremental encoders, 95 – 99% for SIN/COS encoders)	Monitoring of dual-channel sensor systems or subsystem of sensors for non-dynamic operation. To be used in particular for standstill monitoring.
Monitoring of some sensor characteristics (response time, range of analog signals, such as electrical resistance, capacitance).	60%	Diagnostics of specific sensor characteristics. Only for use with velocity and position sensors (see the "Connecting position and velocity sensors" chapter).	Monitoring of the single-channel subsystem of single-channel sensors.

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INFORMATION

- Refer to the manufacturer's specifications ($MTTF_d$, FIT values, etc.) for a safety-relevant assessment of the sensor subsystem.
- If the manufacturer requires specific diagnostic measures to ensure the specified safety-relevant characteristic values, these measures must be checked according to the previous table with respect to the specific encoder. If you are in doubt, please contact the manufacturer.
- The DC values listed in the table should be applied conservatively to ensure compliance with the boundary conditions ("Comment" column).
- An estimate of the frequency of the dynamic state might be necessary to determine the DC value for safety functions with standstill monitoring. A DC value of 90% can be assumed as guide value.
- Fault exclusions are permitted according to the relevant standards. The specified boundary conditions must be permanently ensured.
- If several sensor systems are required for an individual safety function to work properly, their partial value must be combined correctly according to the selected method. This also applies to a combination of sensors (such as safely reduced speed with open safety door = door contact + encoder for speed detection).
- A sufficiently low tolerance with respect to the switch-off thresholds of the individual safety functions must be ensured by selecting a suitable resolution of the sensor system.

10.9 Specification of encoder interfaces

10.9.1 Absolute encoder

Connection to X7 or X8.

Data interface	SSI
Frame length	10 to 31 bits (variable configuration)
Data length	10 to 28 bits (variable configuration)
Status length	0 to 5 bits (variable configuration). For evaluating fault, warning and operating states.
Data format	Binary or gray code
Physical layer	RS422-compliant
Slave mode (listener)	• Max. external clock rate: 200 kHz • Min. clock pulse off time: 30 µs • Max. clock pulse off time: 1 ms
Master mode	Clock rate: 150 kHz

Diagnostics	Parameter	Fault threshold
Supply voltage monitoring	Configurable to 5 V, 8 V, 10 V, 12 V, 20 V or 24 V	±20% ±2% (measuring tolerance)
Monitoring difference levels at the input	RS485 level	±20% ±2% (measuring tolerance)

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Diagnostics	Parameter	Fault threshold
Clock rate monitoring		100 kHz < f < 350 kHz
Plausibility velocity compared to position		ΔP > 2 × v × t ΔP = position change v = current velocity t = 8 ms
Short circuits between the signals	-	-
Interruptions of the signals	-	-
Stuck at 0 or 1 on one or all signals	-	-

10.9.2 TTL encoder

Connection to X7 or X8.

Physical layer	RS422-compliant
Measuring signal A/B	Track with 90° phase difference
Max. input frequency	200 kHz

Diagnostics	Parameter	Fault threshold
Supply voltage monitoring	Configurable to 5 V, 8 V, 10 V, 12 V, 20 V or 24 V	±20% ±2% (measuring tolerance)
Monitoring difference levels at the input	RS485 level	±20% ±2% (measuring tolerance)
Monitoring of the input frequency separated for track A and B		ΔP > 4 increments ΔP = position change
Short circuits between the signals	-	-
Interruptions of the signals	-	-
Stuck at 0 or 1 on one or all signals	-	-

10.9.3 SIN/COS encoder

Connection to X7 or X8.

Physical layer	±0.5 V_{pp} (without voltage offset)
SIN/COS measuring signal	Track with 90° phase difference
Max. input frequency	200 kHz

Diagnostics	Parameter	Fault threshold
Supply voltage monitoring	Configurable to 5 V, 8 V, 10 V, 12 V, 20 V or 24 V	±20% ±2% (measuring tolerance)

Diagnostics	Parameter	Fault threshold
Monitoring of the amplitude $SIN^2 + COS^2$	1 V_{ss}	65% of 1 V_{ss} ±2.5% (measuring tolerance)
Monitoring the SIN/COS phase	90°	±30 ° ±5% (measuring tolerance)
Short circuits between the signals	-	-
Interruptions of the signals	-	-
Stuck at 0 or 1 on one or all signals	-	-

10.9.4 HTL proximity sensor

Connection to X32.

Signal level	DC 24 V/0 V
Max. input frequency	6 kHz, circuit logic of the HTL proximity switch must be debounced.

10.9.5 HTL proximity sensor with advanced monitoring

Connection to X32.

Signal level	DC 24 V/0 V
Max. input frequency	4 kHz, circuit logic of the HTL proximity switch must be debounced.
Max. 0-signal noise blanking	50%
Min. coverage	10%

Advanced monitoring can be activated in the encoder combination HTL 1Z/HTL 1Z when configuring HTL proximity sensors in MOVISAFE® Config UCS CM. Advanced monitoring requires a switching gate on the shaft and detects the following faults:

- Supply voltage failure
- Failure of the output signal in the direction of the driver
- Function failure of the high signal on the proximity sensor
- Signal disruption
- Mechanical misadjustment (e.g. if sensing distance is too large)

For diagnostic purposes, the two states of the HTL counting signals are detected synchronously and are compared logically. A switching gate must ensure attenuation of at least one of the two HTL counting signals. The logic in MOVISAFE® UCS..B evaluates the configuration specification.

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10.10 Plug connectors of the basic module

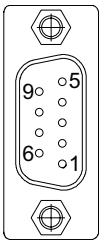
10.10.1 Connector assignment X6

Type: RJ10 plug connector.

X6	Signal description	Specification
	• Parameter setting and diagnostic interface • Point-to-point connection (e.g. UWS21B, USB11A)	Asynchronous, RS485 Baud rate: 38.4 kBd Data bit: 8 Parity: none Stop bit: 1

10.10.2 Connector assignment X7/X8

Type: D-sub socket.

X7/X8	PIN	TTL encoder	SIN/COS encoders	SSI encoder
 *1984587275*	1	N.C.	N.C.	N.C.
	2	DGND	DGND	DGND
	3	N.C.	N.C.	N.C.
	4	B	SIN-	Pulse –
	5	A	COS+	DATA+
	6	A	COS-	DATA−
	7	N.C.	N.C.	N.C.
	8	B	SIN+	Pulse +
	9	U_s	U_s	U_s

INFORMATION

The inner resistance of encoder interfaces X7/X8 is adjusted to a signal split between the SEW frequency inverter and safety module UCS..B. If the encoder is connected directly, you must use a load impedance (typical value = 120 Ω). The load impedance must be installed between pins 5 and 6 for SSI encoders, and between pins 5 and 6, as well as 8 and 4, for TTL incremental encoders and SIN/COS encoders. It may be necessary to adjust the resistance value according to the encoder supplier's specifications.

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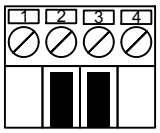
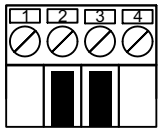
10.10.3 Connector assignment X11

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm^2 (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DC+24 V	DC 24 V supply voltage	DC 20.4 V – 27.6 V
	2	DC+24 V		
	3	0V24	0 V reference potential	-
	4	0V24		

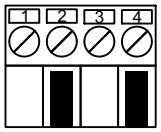
10.10.4 Connector assignment X12

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm^2 (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	U_ENC_1	Encoder power supply X7	DC 5 V – 24 V
	2	GND_ENC_1	Reference potential for encoder power supply X7	-
	3	DO 0.00	Auxiliary output	DC 24 V, 0.1 A
	4	DO 0.01	Auxiliary output	DC 24 V, 0.1 A

10.10.5 Connector assignment X13

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm^2 (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	U_ENC_2	Encoder power supply X8	DC 5 V – 24 V
	2	GND_ENC_2	Reference potential for encoder power supply X8	-
	3	N.C.	-	-
	4	N.C.		

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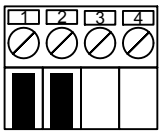
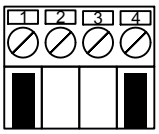
10.10.6 Connector assignment X21

4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DI 0.13	Digital input 13	DC 24 V, suitable for OSSD
	2	DI 0.14	Digital input 14	DC 24 V, suitable for OSSD
	3	P1	Pulse output 1 for crossfault monitoring	24 V with fixed pulse pattern Max. 0.25 A (sum of P1 + P2)
	4	P2	Pulse output 2 for crossfault monitoring	

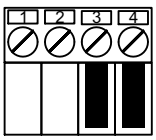
10.10.7 Connector assignment X22

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DI 0.01	Digital input 1	DC 24 V, suitable for OSSD
	2	DI 0.02	Digital input 2	DC 24 V, suitable for OSSD
	3	DI 0.03	Digital input 3	DC 24 V, suitable for OSSD
	4	DI 0.04	Digital input 4	DC 24 V, suitable for OSSD

10.10.8 Connector assignment X31

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DO 0.02_P	HISIDE output 2	DC 24 V, 0.5 A
	2	DO 0.02_M	LOSIDE output 2	DGND, 0.5 A
	3	DO 0.03_P	HISIDE output 3	DC 24 V, 0.25 A
	4	DO 0.03_M	LOSIDE output 3	DGND, 0.5 A

10.10.9 Connector assignment X32

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

HTL counting input	
Signal level	DC 24 V / 0 V
Pulse frequency	Max. 6 kHz (switching logic debounced)

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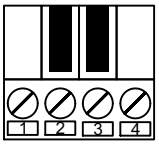
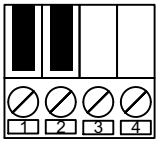
Coding	Terminal	Assignment	Signal description	Specification
	1	DI 0.05	Digital input 5/HTL proximity sensor	DC 24 V
	2	DI 0.06	Digital input 6/HTL proximity sensor	DC 24 V
	3	DI 0.07	Digital input 7/HTL proximity sensor	DC 24 V
	4	DI 0.08	Digital input 8/HTL proximity sensor	DC 24 V

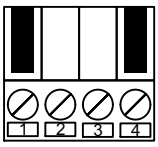
10.10.10 Connector assignment X41

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	K 0.11	Relay 1, contact 1	DC 24 V, 2 A or AC 230 V, 2 A
	2	K 0.12	Relay 1, contact 2	
	3	K 0.21	Relay 2, contact 1	DC 24 V, 2 A or AC 230 V, 2 A
	4	K 0.22	Relay 2, contact 2	

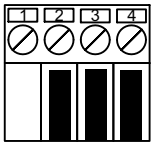
10.10.11 Connector assignment X42

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DI 0.09	Digital input 9	DC 24 V, suitable for OSSD
	2	DI 0.10	Digital input 10	DC 24 V, suitable for OSSD
	3	DI 0.11	Digital input 11	DC 24 V, suitable for OSSD
	4	DI 0.12	Digital input 12	DC 24 V, suitable for OSSD

10.10.12 Connector assignment XCS

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	CAN_High	CAN-S	Connection to PROFIsafe via gateway
	2	CAN_Low		
	3	GND		
	4	N.C.	-	120 Ω terminating resistor for CAN-S

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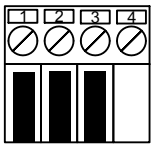
INFORMATION

A cable jumper between pins 1 and 4 terminates the CAN-S with 120 Ω.

10.10.13 Connector assignment XCD

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	CAN_High	CAN (SBus)	SBus communication
	2	CAN_Low		
	3	GND		
	4	N.C.	-	120 Ω terminating resistor for CAN

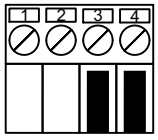
INFORMATION

A cable jumper between pins 1 and 4 terminates the CAN with 120 Ω.

10.11 Plug connectors of the expansion module

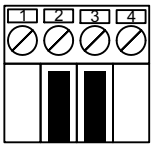
10.11.1 Connector assignment X15

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DC+24 V	DC 24 V supply voltage	DC 20.4 V – 27.6 V
	2	DC+24 V		
	3	0V24	0 V reference potential	-
	4	0V24		

10.11.2 Connector assignment X16

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	N. C.	-	-
	2	N. C.		
	3	DO X.0	Auxiliary output	DC 24 V, 0.1 A
	4	DO X.1	Auxiliary output	DC 24 V, 0.1 A

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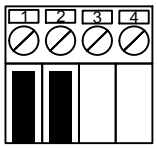
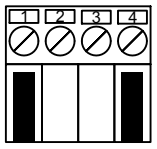
10.11.3 Connector assignment X25

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm^2 (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DIO X.01	Configurable digital input/output 1	DC 24 V, suitable for OSSD DC 24 V, 0.25 A
	2	DIO X.02	Configurable digital input/output 2	DC 24 V, suitable for OSSD DC 24 V, 0.25 A
	3	P1	Pulse output 1 for crossfault monitoring	24 V with fixed pulse pattern Max. 0.25 A (sum of P1 + P2)
	4	P2	Pulse output 2 for crossfault monitoring	

10.11.4 Connector assignment X26

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm^2 (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DI X.01	Digital input 1	DC 24 V, suitable for OSSD
	2	DI X.02	Digital input 2	DC 24 V, suitable for OSSD
	3	DI X.03	Digital input 3	DC 24 V, suitable for OSSD
	4	DI X.04	Digital input 4	DC 24 V, suitable for OSSD

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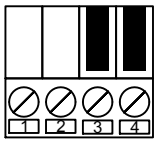
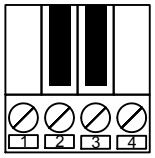
10.11.5 Connector assignment X35

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DIO X.03	Configurable digital input/output 3	DC 24 V, suitable for OSSD DC 24 V, 0.25 A
	2	DIO X.04	Configurable digital input/output 4	DC 24 V, suitable for OSSD DC 24 V, 0.25 A
	3	DIO X.05	Configurable digital input/output 5	DC 24 V, suitable for OSSD DC 24 V, 0.25 A
	4	DIO X.06	Configurable digital input/output 6	DC 24 V, suitable for OSSD DC 24 V, 0.25 A

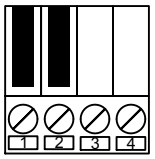
10.11.6 Connector assignment X36

Type: 4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DI X.05	Digital input 5	DC 24 V
	2	DI X.06	Digital input 6	DC 24 V
	3	DI X.07	Digital input 7	DC 24 V
	4	DI X.08	Digital input 8	DC 24 V

10.11.7 Connector assignment X45

4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DIO X.07	Configurable digital input/output 7	DC 24 V, suitable for OSSD DC 24 V, 0.25 A
	2	DIO X.08	Configurable digital input/output 8	DC 24 V, suitable for OSSD DC 24 V, 0.25 A
	3	DIO X.09	Configurable digital input/output 9	DC 24 V, suitable for OSSD DC 24 V, 0.25 A
	4	DIO X.10	Configurable digital input/output 10	DC 24 V, suitable for OSSD DC 24 V, 0.25 A

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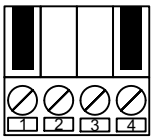
10.11.8 Connector assignment X46

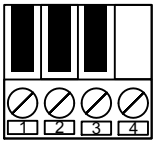
4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment	Signal description	Specification
	1	DI X.09	Digital input 9	DC 24 V, suitable for OSSD
	2	DI X.10	Digital input 10	DC 24 V, suitable for OSSD
	3	DI X.11	Digital input 11	DC 24 V, suitable for OSSD
	4	DI X.12	Digital input 12	DC 24 V, suitable for OSSD

10.12 Plug connectors of the diagnostic module

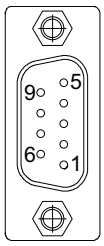
10.12.1 Connector assignment X49 on UCS25B

4-pole Phoenix terminal, max. core cross section 1.5 mm² (AWG16)

Coding	Terminal	Assignment
	1	DGND
	2	CAN High
	3	CAN Low
	4	N.C.

10.12.2 Connector assignment XDP on UCS26B

Type: D-sub socket

XDP	PIN	Signal
	1	N.C.
	2	N.C.
	3	Data B
	4	N.C.
	5	GND bus
	6	+5 V bus
	7	N.C.
	8	Data A
	9	N.C.

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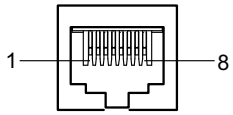
10.12.3 Connector assignment XPN on UCS27B

Type: RJ45 plug connector

XPN	PIN	Signal	Description
	1	TD+	Transmit data +
	2	TD−	Transmit data −
	3	RD+	Receive data +
	4	N.C.	N.C.
	5	N.C.	N.C.
	6	RD−	Receive data −
	7	N.C.	N.C.
	8	N.C.	N.C.

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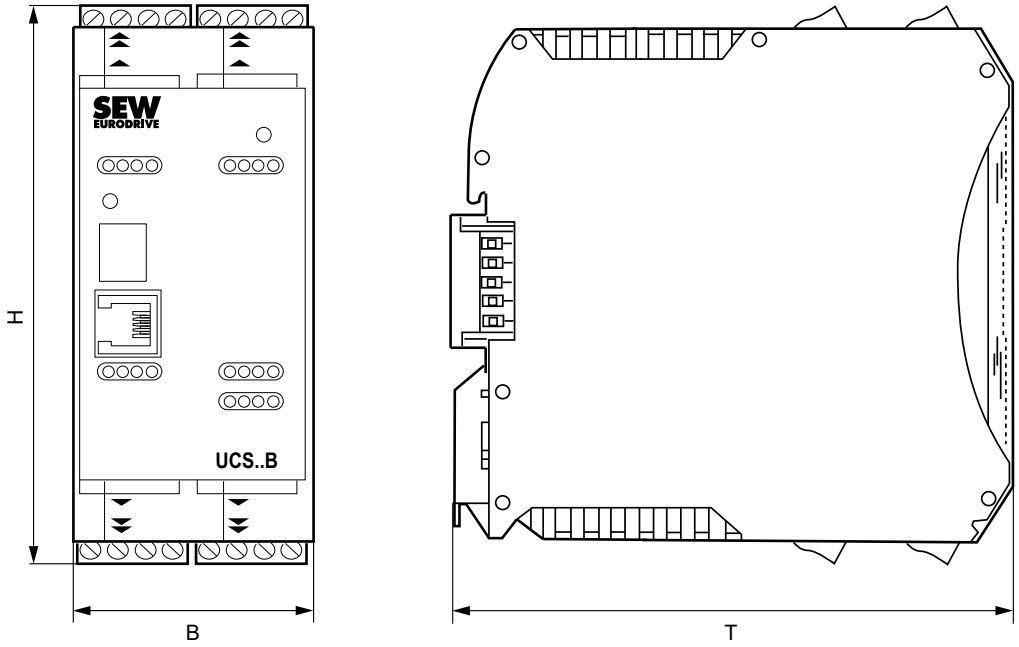
10.13 Dimension drawing



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MOVISAFE®	Size (H × D × W)		Weight	Retaining
	mm	in	kg	
UCS10B	100 × 115 × 45	3.94 × 4.53 × 1.77	0.30	Mounted to standard profile rail
UCS10B/PS	100 × 115 × 67.5	3.94 × 4.53 × 2.66	0.39	
UCS11B	100 × 115 × 45	3.94 × 4.53 × 1.77	0.31	
UCS11B/PS	100 × 115 × 67.5	3.94 × 4.53 × 2.66	0.40	
UCS12B	100 × 115 × 67.5	3.94 × 4.53 × 2.66	0.39	
UCS12B/PS	100 × 115 × 90	3.94 × 4.53 × 3.54	0.48	
UCS23B	100 × 115 × 45	3.94 × 4.53 × 1.77	0.3	
UCS25B	100 × 115 × 22.5	3.94 × 4.53 × 0.89	0.10	
UCS26B	100 × 115 × 22.5	3.94 × 4.53 × 0.89	0.10	
UCS27B	100 × 115 × 22.5	3.94 × 4.53 × 0.89	0.10	

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11 Declaration of conformity

11.1 MOVISAFE® UCS10B, UCS11B, UCS12B, UCS23B

EC Declaration of Conformity

SEW EURODRIVE

900190010

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

declares under sole responsibility that the

safety components of the series	**MOVISAFE® UCS10B** **MOVISAFE® UCS11B** **MOVISAFE® UCS12B** **MOVISAFE® UCS23B**	
are in conformity with		
Machinery Directive	**2006/42/EC**	**1)**
applied harmonized standards	**EN 13849-1:2008** **EN 60204-1:2007** **EN 50178:1997** **EN 13850:2006** **EN 62061: 2006** **EN 574:1996**	**5)**

1) These products are intended for installation in machines. Startup is prohibited until it has been established that the machinery into which these products are to be incorporated complies with the provisions of the aforementioned Machinery Directive.

5) All safety-relevant requirements of the product-specific documentation (operating instructions, manual, etc.) must be met over the entire product life cycle.

Bruchsal	11.12.09	Johann Soder	
Place	Date	Managing Director Technology	a) b)

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents

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11.2 MOVISAFE® UCS10B/PS, UCS11B/PS, UCS12B/PS

EC Declaration of Conformity

SEW EURODRIVE

901500012

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

declares under sole responsibility that the

safety components of the series	**MOVISAFE® UCS10B/PS** **MOVISAFE® UCS11B/PS** **MOVISAFE® UCS12B/PS**	
are in conformity with		
Machinery Directive	**2006/42/EC**	**1)**
EMC Directive	**2004/108/EC**	**4)**
Applied harmonized standards	**EN ISO 13849-1:2008** **EN 13850:2008** **EN 574:1996 + A1:2008** **EN 55011:2007** **EN 62061:2005**	**5)** **5)**
Applied non-harmonized standards:	**IEC 61508 Part 1-7:2010**	

1) The products are intended for installation in machines. Startup is prohibited until it has been established that the machinery into which these products are to be incorporated complies with the provisions of the aforementioned Machinery Directive.

4) According to the EMC Directive, the listed products are not independently operable products. EMC assessment is only possible after these products have been integrated in an overall system. The assessment was verified for a typical system constellation, but not for the individual product.

5) All safety-relevant requirements of the product-specific documentation (operating instructions, manual, etc.) must be met over the entire product life cycle.

Bruchsal	16.07.12	Johann Soder	
Place	Date	Managing Director Technology	a) b)

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents

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12 Appendix

12.1 Reference tables of the inputs and outputs

The following reference tables list the designations of the inputs and outputs in this documentation and the MOVISAFE® Config UCS CM software interface.

12.1.1 Inputs on the basic module

UCS10B/11B/12B:

Designation in		
Documentation	**MOVISAFE® Config UCS CM**	**Function**
DI 0.01	E 0.1	Digital input 1
DI 0.02	E 0.2	Digital input 2
DI 0.03	E 0.3	Digital input 3
DI 0.04	E 0.4	Digital input 4
DI 0.05	E 0.5	Digital input 5
DI 0.06	E 0.6	Digital input 6
DI 0.07	E 0.7	Digital input 7
DI 0.08	E 0.8	Digital input 8
DI 0.09	E 0.9	Digital input 9
DI 0.10	E 0.10	Digital input 10
DI 0.11	E 0.11	Digital input 11
DI 0.12	E 0.12	Digital input 12
DI 0.13	E 0.13	Digital input 13
DI 0.14	E 0.14	Digital input 14
P1	Pulse 1	Pulse output 1
P2	Pulse 2	Pulse output 2

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12.1.2 Inputs on the expansion module

UCS23B:

Designation in		
Documentation	**MOVISAFE® Config UCS CM**	**Function**
DI X.01	E X.1	Digital input 1
DI X.02	E X.2	Digital input 2
DI X.03	E X.3	Digital input 3
DI X.04	E X.4	Digital input 4
DI X.05	E X.5	Digital input 5
DI X.06	E X.6	Digital input 6
DI X.07	E X.7	Digital input 7
DI X.08	E X.8	Digital input 8
DI X.09	E X.9	Digital input 9
DI X.10	E X.10	Digital input 10
DI X.11	E X.11	Digital input 11
DI X.12	E X.12	Digital input 12
DIO X.01	EAE X.1	Configurable digital input/output 1
DIO X.02	EAE X.2	Configurable digital input/output 2
DIO X.03	EAE X.3	Configurable digital input/output 3
DIO X.04	EAE X.4	Configurable digital input/output 4
DIO X.05	EAE X.5	Configurable digital input/output 5
DIO X.06	EAE X.6	Configurable digital input/output 6
DIO X.07	EAE X.7	Configurable digital input/output 7
DIO X.08	EAE X.8	Configurable digital input/output 8
DIO X.09	EAE X.9	Configurable digital input/output 9
DIO X.10	EAE X.10	Configurable digital input/output 10
P1	Pulse 1	Pulse output 1
P2	Pulse 2	Pulse output 2

INFORMATION

X = 1: 1st expansion module

X = 2: 2nd expansion module

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12.1.3 Outputs on the basic module

UCS10B/11B/12B:

Designation in				
Documentation	**MOVISAFE® Config UCS CM**	**Function**		
DO 0.00	A 0.1	Auxiliary output		
DO 0.01	A 0.2	Auxiliary output		
DO 0.02_P	AD 0.0_P	Auxiliary output		In combination: Safe output
DO 0.02_M	AD 0.0_M	Auxiliary output		
DO 0.03_P	AD 0.1_P	Auxiliary output		In combination: Safe output
DO 0.03_M	AD 0.1_M	Auxiliary output		
K 0.1	AK 0.1	Base	Relay 1	In combination: Safe relay output
		NO contact		
K 0.2	AK 0.2	Base	Relay 2	
		NO contact		

12.1.4 Outputs on the I/O expansion module

UCS23B:

Designation in		
Documentation	**MOVISAFE® Config UCS CM**	**Function**
DO X.00	A X.1	Auxiliary output
DO X.01	A X.2	Auxiliary output
DIO X.01	EAA X.1	Configurable digital input/output 1
DIO X.02	EAA X.2	Configurable digital input/output 2
DIO X.03	EAA X.3	Configurable digital input/output 3
DIO X.04	EAA X.4	Configurable digital input/output 4
DIO X.05	EAA X.5	Configurable digital input/output 5
DIO X.06	EAA X.6	Configurable digital input/output 6
DIO X.07	EAA X.7	Configurable digital input/output 7
DIO X.08	EAA X.8	Configurable digital input/output 8
DIO X.09	EAA X.9	Configurable digital input/output 9
DIO X.10	EAA X.10	Configurable digital input/output 10
P1	Pulse 1	Pulse output 1
P2	Pulse 2	Pulse output 2

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INFORMATION

X = 1: 1st expansion module

X = 2: 2nd expansion module

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13 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
Production / Industrial Gears	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Christian-Pähr-Str.10 D-76646 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-2970
Service Competence Center	**Mechanics / Mechatronics**	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@sew-eurodrive.de
	Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-elektronik@sew-eurodrive.de
Drive Technology Center	**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		+49 800 SEWHELP +49 800 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
Production	**Forbach**	SEW-USOCOME Zone industrielle Technopôle Forbach Sud B. P. 30269 F-57604 Forbach Cedex	Tel. +33 3 87 29 38 00
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
	Nantes	SEW-USOCOME Parc d'activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20
	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.		

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Algeria			
Sales	**Algiers**	REDUCOM Sarl 16, rue des Frères Zaghnoune Bellevue 16200 El Harrach Alger	Tel. +213 21 8214-91 Fax +213 21 8222-84 info@reducom-dz.com http://www.reducom-dz.com

Argentina			
Assembly **Sales**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Ruta Panamericana Km 37.5, Lote 35 (B1619IEA) Centro Industrial Garín Prov. de Buenos Aires	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au

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://www.sew-eurodrive.at sew@sew-eurodrive.at

Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 17 298 47 56 / 298 47 58 Fax +375 17 298 47 54 http://www.sew.by sales@sew.by

Belgium			
Assembly **Sales** **Service**	**Brussels**	**SEW-EURODRIVE n.v./s.a.** Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be
Service Competence Center	**Industrial Gears**	**SEW-EURODRIVE n.v./s.a.** Rue de Parc Industriel, 31 BE-6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-wallonie@sew-eurodrive.be

Brazil			
Production **Sales** **Service**	**São Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 152 - Rodovia Presidente Dutra Km 208 Guarulhos - 07251-250 - SP SAT - SEW ATENDE - 0800 7700496	Tel. +55 11 2489-9133 Fax +55 11 2480-3328 http://www.sew-eurodrive.com.br sew@sew.com.br
Assembly **Sales** **Service**	**Rio Claro**	SEW-EURODRIVE Brasil Ltda. Rodovia Washington Luiz, Km 172 Condomínio Industrial Conpark Caixa Postal: 327 13501-600 – Rio Claro / SP	Tel. +55 19 3522-3100 Fax +55 19 3524-6653 montadora.rc@sew.com.br
	Joinville	SEW-EURODRIVE Brasil Ltda. Rua Dona Francisca, 12.346 – Pirabeiraba 89239-270 – Joinville / SC	Tel. +55 47 3027-6886 Fax +55 47 3027-6888 filial.sc@sew.com.br
	Indaiatuba	SEW-EURODRIVE Brasil Ltda. Estrada Municipal Jose Rubim, 205 Rodovia Santos Dumont Km 49 13347-510 - Indaiatuba / SP	Tel. +55 19 3835-8000 sew@sew.com.br

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Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@bever.bg

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 33 431137 Fax +237 33 431137 electrojemba@yahoo.fr

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, ON L6T 3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.watson@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. Tilbury Industrial Park 7188 Honeyman Street Delta, BC V4G 1G1	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Lasalle, PQ H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request.		

Chile			
Assembly **Sales** **Service**	**Santiago**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 info@sew-eurodrive.cn http://www.sew-eurodrive.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267922 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478388 Fax +86 27 84478389 wuhan@sew-eurodrive.cn
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 xian@sew-eurodrive.cn
	Additional addresses for service in China provided on request.		

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Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sew@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. Zeleni dol 10 HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr

Czech Republic			
Sales **Assembly** **Service**	**Hostivice**	SEW-EURODRIVE CZ s.r.o. Floriánova 2459 253 01 Hostivice	Tel. +420 255 709 601 Fax +420 235 350 613 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz
	Drive Service Hotline / 24 Hour Service	HOT-LINE +420 800 739 739 (800 SEW SEW)	**Servis:** Tel. +420 255 709 632 Fax +420 235 358 218 servis@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Copenhagen**	SEW-EURODRIVEA/S Geminivej 28-30 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Egypt			
Sales **Service**	**Cairo**	Copam Egypt for Engineering & Agencies 33 El Hegaz ST, Heliopolis, Cairo	Tel. +20 2 22566-299 +1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Hollola**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Service	**Hollola**	SEW-EURODRIVE OY Keskikankaantie 21 FIN-15860 Hollola	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Production **Assembly**	**Karkkila**	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	ESG Electro Services Gabun Feu Rouge Lalala 1889 Libreville Gabun	Tel. +241 741059 Fax +241 741059 esg_services@yahoo.fr

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. DeVilliers Way Trident Park Normanton West Yorkshire WF6 1GX	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk

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Great Britain			
	Drive Service Hotline / 24 Hour Service		Tel. 01924 896911

Greece			
Sales	**Athens**	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 http://www.sew-eurodrive.hu office@sew-eurodrive.hu

India			
Registered Office **Assembly** **Sales** **Service**	**Vadodara**	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200, +91 265 2831086 Fax +91 265 3045300, +91 265 2831087 http://www.seweurodriveindia.com salesvadodara@seweurodriveindia.com
Assembly **Sales** **Service**	**Chennai**	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 saleschennai@seweurodriveindia.com

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie http://www.alperton.ie

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il

Italy			
Assembly **Sales** **Service**	**Solaro**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 980 999 http://www.sew-eurodrive.it sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Société Industrielle & Commerciale pour l'Afrique 165, Boulevard de Marseille 26 BP 1173 Abidjan 26	Tel. +225 21 25 79 44 Fax +225 21 25 88 28 sicamot@aviso.ci

Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373855 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp

Kazakhstan			
Sales	**Almaty**	ТОО "СЕВ-ЕВРОДРАЙВ" пр.Райымбека, 348 050061 г. Алматы Республика Казахстан	Тел. +7 (727) 334 1880 Факс +7 (727) 334 1881 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz

Kenya			
Sales	**Nairobi**	Barico Maintenances Ltd Kamutaga Place Commercial Street Industrial Area P.O.BOX 52217 - 00200 Nairobi	Tel. +254 20 6537094/5 Fax +254 20 6537096 info@barico.co.ke

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.com info@alas-kuul.com

Lebanon			
Sales Lebanon	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
		After Sales Service	service@medrives.com
Sales Jordan / Kuwait / Saudi Arabia / Syria	**Beirut**	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 info@medrives.com http://www.medrives.com
		After Sales Service	service@medrives.com

Lithuania			
Sales	**Alytus**	UAB Irseva Statybininku 106C LT-63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 irmantas@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brussels**	**SEW-EURODRIVE n.v./s.a.** Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.lu info@sew-eurodrive.be

Madagascar			
Sales	**Antananarivo**	Ocean Trade BP21bis. Andraharo Antananarivo. 101 Madagascar	Tel. +261 20 2330303 Fax +261 20 2330330 oceantrabp@moov.mg

Malaysia			
Assembly **Sales** **Service**	**Johor**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Quéretaro**	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

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Mongolia			
Sales	**Ulan Bator**	SEW-EURODRIVE Representative Office Mongolia Olympic street 8, 2nd floor Juulchin corp bldg., Sukhbaatar district, Ulaanbaatar 14253	Tel. +976-70009997 Fax +976-70009997 http://www.sew-eurodrive.mn sew@sew-eurodrive.mn

Morocco			
Sales **Service**	**Mohammedia**	SEW-EURODRIVE SARL 2 bis, Rue Al Jahid 28810 Mohammedia	Tel. +212 523 32 27 80/81 Fax +212 523 32 27 89 sew@sew-eurodrive.ma http://www.sew-eurodrive.ma

Namibia			
Sales	**Swakopmund**	DB Mining & Industrial Services Einstein Street Strauss Industrial Park Unit1 Swakopmund	Tel. +264 64 462 738 Fax +264 64 462 734 sales@dbmining.in.na

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	SEW-EURODRIVE B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 Service: 0800-SEWHELP http://www.sew-eurodrive.nl info@sew-eurodrive.nl

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Nigeria			
Sales	**Lagos**	EISNL Engineering Solutions and Drives Ltd Plot 9, Block A, Ikeja Industrial Estate (Ogba Scheme) Adeniyi Jones St. End Off ACME Road, Ogba, Ikeja, Lagos Nigeria	Tel. +234 (0)1 217 4332 team.sew@eisnl.com http://www.eisnl.com

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Pakistan			
Sales	**Karachi**	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk

Paraguay			
Sales	**Fernando de la Mora**	SEW-EURODRIVE PARAGUAY S.R.L De la Victoria 112, Esquina nueva Asunción Departamento Central Fernando de la Mora, Barrio Bernardino	Tel. +595 991 519695 Fax +595 21 3285539 sew-py@sew-eurodrive.com.py

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe
Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 676 53 00 Fax +48 42 676 53 49 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	Service	Tel. +48 42 6765332 / 42 6765343 Fax +48 42 6765346	Linia serwisowa Hotline 24H Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl
Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt
Romania			
Sales **Service**	**Bucharest**	Sialco Trading SRL str. Brazilia nr. 36 011783 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro
Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 RUS-195220 St. Petersburg	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru
Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sentoo.sn http://www.senemeca.com
Serbia			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV sprat SRB-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs
Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com
Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	Žilina	SEW-Eurodrive SK s.r.o. Industry Park - PChZ ulica M.R.Štefánika 71 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk

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Slovakia			
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. Ul. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 bgriffiths@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 48 Prospecton Road Isipingo Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 902 3815 Fax +27 31 902 3826 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za

South Korea			
Assembly **Sales** **Service**	**Ansan**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate #1048-4, Shingil-Dong, Danwon-Gu, Ansan-City, Kyunggi-Do Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Swaziland			
Sales	**Manzini**	C G Trading Co. (Pty) Ltd PO Box 2960 Manzini M200	Tel. +268 2 518 6343 Fax +268 2 518 5033 engineering@cgtrading.co.sz

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442 00 Fax +46 36 3442 80 http://www.sew-eurodrive.se jonkoping@sew.se

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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
Tanzania			
Sales	**Dar es Salaam**	SEW-EURODRIVE PTY LIMITED TANZANIA Plot 52, Regent Estate PO Box 106274 Dar Es Salaam	Tel. +255 0 22 277 5780 Fax +255 0 22 277 5788 uroos@sew.co.tz
Thailand			
Assembly **Sales** **Service**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn
Turkey			
Assembly **Sales** **Service**	**Kocaeli-Gebze**	SEW-EURODRİVE Sistemleri San. Ve TIC. Ltd. Sti Gebze Organize Sanayi Böl. 400 Sok No. 401 41480 Gebze Kocaeli	Tel. +90-262-9991000-04 Fax +90-262-9991009 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr
Ukraine			
Assembly **Sales** **Service**	**Dnipropetrovsk**	ООО «СЕВ-Евродрайв» ул.Рабочая, 23-В, офис 409 49008 Днепропетровск	Тел. +380 56 370 3211 Факс. +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua
United Arab Emirates			
Sales **Service**	**Sharjah**	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah	Tel. +971 6 5578-488 Fax +971 6 5578-499 copam_me@eim.ae
USA			
Production **Assembly** **Sales** **Service**	**Southeast Region**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manufacturing +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**Northeast Region**	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Additional addresses for service in the USA provided on request.		

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Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net

Vietnam			
Sales	**Ho Chi Minh City**	**All sectors except harbor and offshore:** Nam Trung Co., Ltd 250 Binh Duong Avenue, Thu Dau Mot Town, Binh Duong Province HCM office: 91 Tran Minh Quyen Street District 10, Ho Chi Minh City	Tel. +84 8 8301026 Fax +84 8 8392223 namtrungco@hcm.vnn.vn truongtantam@namtrung.com.vn khanh-nguyen@namtrung.com.vn
		Harbor and offshore: DUC VIET INT LTD Industrial Trading and Engineering Services A75/6B/12 Bach Dang Street, Ward 02, Tan Binh District, 70000 Ho Chi Minh City	Tel. +84 8 62969 609 Fax +84 8 62938 842 totien@ducvietint.com
	Hanoi	Nam Trung Co., Ltd R.205B Tung Duc Building 22 Lang ha Street Dong Da District, Hanoi City	Tel. +84 4 37730342 Fax +84 4 37762445 namtrunghn@hn.vnn.vn

Zambia			
Sales	**Kitwe**	EC Mining Limited Plots No. 5293 & 5294,Tangaanyika Road, Off Mutentemuko Road, Heavy Industrial Park, P.O.BOX 2337 Kitwe	Tel. +260 212 210 642 Fax +260 212 210 645 sales@ecmining.com http://www.ecmining.com

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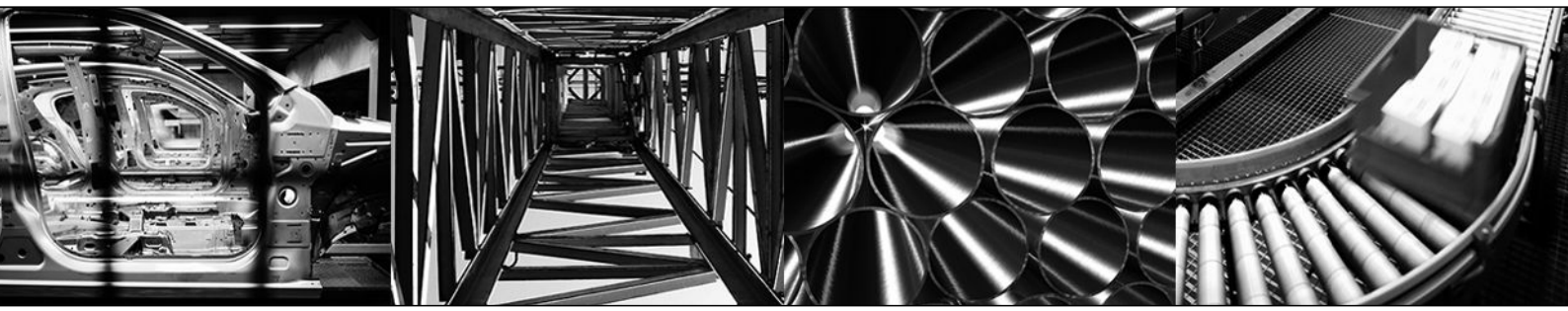

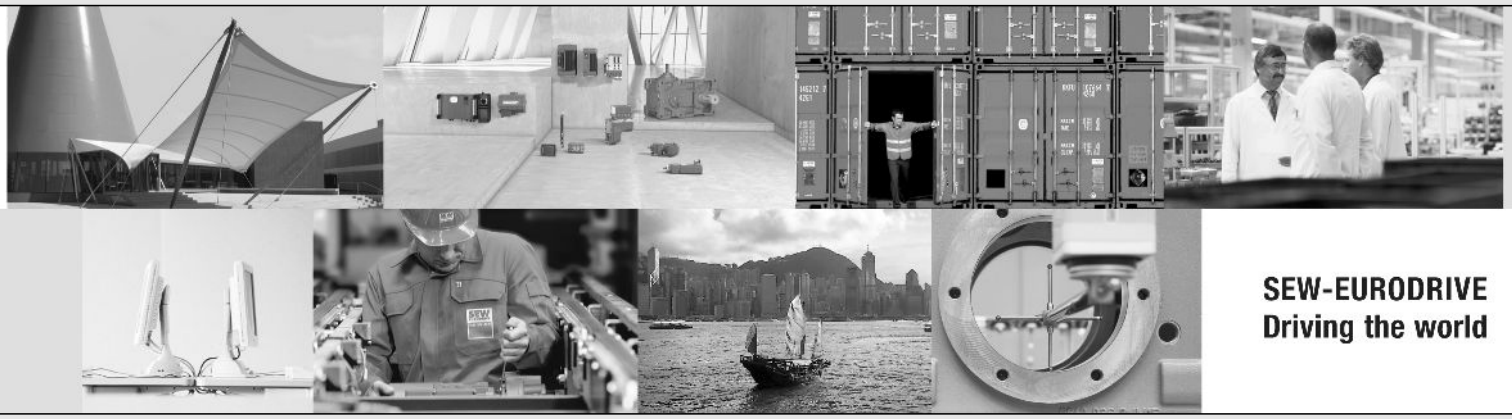

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Driving the world

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