SEW
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Operating Instructions

MOVISAFE® UCS..B Compact Safety Modules

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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 the hazard.

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 the 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.

1.4 Content of the documentation

The current version of the documentation is the original.

This document contains additional safety-relevant information and conditions for use in safety-related applications.

1.5 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.

1.6 Other applicable documentation

Observe the following applicable documentation:

- 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.
- Acceptance protocol of the MOVISAFE® Assist UCS software. Is used as acceptance protocol during validation.
- Certificates and safety characteristics for the MOVISAFE® UCS..B safety modules.

Always use the latest edition of documentation and software.

The SEW-EURODRIVE homepage (www.sew-eurodrive.com) provides a broad selection of documentation downloads in various languages. 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.

1.7 Product names and trademarks

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

1.8 Copyright notice

1.9 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 (Pl e) according to EN ISO 13849-1 and SIL3 according to EN 61508.

- The "MOVISAFE® Config UCS CM" parameter setting software is a programming and configuration tool for the MOVISAFE® UCS..B compact device series.

- Internally, the MOVISAFE® devices consist of 2 independent processing units. They are referred to as system A and system B in this document.

1.10 Abbreviations used

Abbrevi- ation	Meaning
ACS	Analog Input Muting
IL	Instruction list
BG	German employer's liability insurance association
BST	Safety-related brake module
DIP	Dual in-line package
IFA	Institute for Occupational Safety and Health of the German Social Accident Insurance (formerly BGIA)
CLK	Clock
CRC	Cyclic Redundancy Check
DC	• Safety functions: Diagnostic coverage • Voltage ratings: DC voltage
DI	Digital input
DIN	German institute for standardization
DIO	Digital input/output (configurable digital input/output)
DO	Digital output
ECS	Encoder Supervisor
EMU	Emergency Monitoring Unit
EMC	Electromagnetic compatibility
EOS	External Offset Setup
EN	Europäische Norm (European standard)
F PLC	Failsafe programmable logic controller
High-side	Output switching to positive with DC 24 V
HTL	High transistor logic (on DC 24 V basis)
IP	Ingress Protection (degree of protection)
ISO	International Organization for Standardization
Cat.	Category

Abbreviation	Meaning
LED	Light Emitting Diode
Low-Side	Output switching to the reference potential
OSSD	Output signal switching device
PIO	Process image of the outputs
PII	Process image of the inputs
P1, P2	Pulse output 1, 2
PELV	Protective extra low voltage
PES	Programmable electronic system
PDM	Position deviation mode
PL	Performance Level
PNO	PROFIBUS Nutzerorganisation e. V. (user organization)
PRF	Position Reference Function
PLC	Programmable logic controller
SAC	Safe Analog Control
SAR	Safe Acceleration Range
SBC	Safe Brake Control
SCA	Safe Cam
SIL	Safety Integrity Level
SLA	Safely Limited Acceleration
SLP	Safely Limited Position
SDI	Safe Direction
SEL	Safe emergency limit
SELV	Safety extra low voltage
SLI	Safely Limited Increment
SLS	Safely Limited Speed
SOS	Safe operating stop
SRP/CS	Safety Related Parts of a Control System
SSR	Safe Speed Range
SSX	Safe stop, can be parameterized as SS1 or SS2
PLC	Programmable controller
STO	Safe Torque Off
MW	Modular width
TTL	Transistor-transistor logic
VDE	German Association for Electrical, Electronic & Information Technologies

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 devices are intended for the use:

- In emergency off devices
- As safety-related component 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 device for implementing the safety functions according to EN 61800-5-2
- As logics unit for signal conversion and processing in two-hand circuit according to EN 574

The safety modules, including the expansion module, are safety components according to appendix IV Directive 2006/42/EC (Machinery Directive). They have been developed, designed and produced in compliance with the directive mentioned above, as well as the EMC Directive 2014/30/EU.

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.
- A 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.

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).

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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 device has been disconnected from the supply system and no longer carries any voltage.

- Mechanical blocking or internal safety functions within the device 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 device 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.

- 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.

3 Device structure

3.1 Type designation

The type designation MOVISAFE® UCSxxB/PS Compact includes the following information:

UCSxxB/PS	MOVISAFE® UCSxxB/PS Compact safety module	
UCS	Series:	
	U	Universal
	C	Control
	S	System
x	Module type:	
	1	Basic module
	2	Expansion module
x	Basic module with logic processing:	
	0	Standard design
	1	With 1 encoder interface for 1 axis
	2	With 2 encoder interfaces for 1 or 2 axes
	4	With 4 encoder interfaces for 1 or 2 axes (max. 2 encoders per axis)
	Expansion module:	
	3	With digital inputs/outputs
	5	CANopen communication
	6	PROFIBUS communication
	7	PROFINET communication
B	Device generation	
/		
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
- Connectors for all signal terminals without encoder connection

3.2.2 Backplane bus connector

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Observe the following information when you order a basic module in connection with an expansion or diagnostic module.

- You have to order the backplane bus connector as accessories for the basic module:
    - 5 pieces with the part number 18222447
    - 3 pieces with the part number 28204689

- For detailed information on the installation of the backplane bus connector, refer to chapter "Mechanical installation".

Basic modules

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

If you want to add at least one expansion module to the basic module, the following table shows the number of required backplane bus connectors for the respective basic module.

MOVISAFE® basic module						
UCS10B	UCS10B/PS	UCS11B	UCS11B/PS	UCS12B	UCS12B/PS	UCS14B/PS
2	3	2	3	3	4	6

Expansion module and diagnostic modules

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

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

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

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

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 • Device replacement (data storage); up-load or download of a configuration file (".cfg") • Activating a safety data set (with UCS..B/PS option) • Creating an acceptance protocol

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• 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 Device properties

3.3.1 General information

Feature	MOVISAFE® UCS safety module										
	10B	10B/PS	11B	11B/PS	12B	12B/PS	14B/PS	23B	25B	26B	27B
Maximum 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 analog inputs	-					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	2	-	-	-	-
Encoder interface for SIN/COS, TTL incremental, SSI signals or resolver	-	-	-	-	-	-	2	-	-	-	-
Encoder interface for HTL signals	-	-		1		2		-	-	-	-
Encoder interface for HTL incremental signals	-						2	-	-	-	-
Freely programmable logic	X							-	-	-	-
Safety functions for speed and position monitoring	-	-	X	X	X	X	X	-	-	-	-
Safe communication (CAN-S)	-	X	-	X	-	X	X	-	-	-	-
SBus communication	-	X	-	X	-	X	X	-	-	-	-
Communication (CAN)	-	-	-	-	-	-	-	-	X	-	-
PROFIBUS communication	-	-	-	-	-	-	-	-	-	X	-
PROFINET communication	-	-	-	-	-	-	-	-	-	-	X
Number of monitored axes	-	-	1	1	2	2	2	-	-	-	-

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- CAN-S enables connection to the fieldbus system PROFIBUS with PROFIsafe or PROFINET with PROFIsafe. The following components can be used for this purpose:
  - Controllers DHR/DHF21B and DHR/DHF41B 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 connected fieldbus.

3.3.2 Safety functions

The available safety functions in the MOVISAFE® UCS..B modules are based on the definitions of the 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 programmed in the logics.

The following table provides an overview of 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]		UCS14B/PS		UCS23B
			Axis 1	Axis 1	Axis 2	Axis 1	Axis 2	
ACS	-	-	-	-	-	1[3]		-
ECS	-	1	1	1[3]		1	1	-
EMU	2	2	2	2[3]		2[3]		10
EOS	-	1	2	1	1	1	1	-
DEM	-	1	1	1	1	1	1	-
PDM	-	1	1	1	1	1	1	-
PRF	-	1	1	1[3]		1[3]		-
SAC	-	-	-	-	-	8[3]		-
SAR	-	Implementation possible with SCA						-
SBC	Implementation with safe output							
SCA	-	16[4]	16[4]	16[3][4]				-
SDI	-	1	1	1	1	1	1	-
SEL	-	1	1	1	1	1	1	-
SLA	-	Integrated in SEL, SLP, SCA, SSX, SLS, SOS						-
SLI	-	1	1	1	1	1	1	-
SLP	-	2	2	2[3]		2[3]		-
SLS	-	8	8	8[3]		8[3]		-
SOS	-	1	1	1	1	1	1	-
SS1(c)	Implementation with timer and safe output							
SS2(c)	-	Implementation with timer and safe output Requires SOS						-
SSR	-	Implementation possible with SCA						-
SSX[5]	-	2	2	2	2	2	2	-
STO	Implementation with 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 up to version 01 07 01 02 xx.

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

3.4   UCS..B nameplate

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

- Part number (P/N)
- Serial number (S/N)
- Version (Baust)
- Type designation
- Hardware status (HW)
- Firmware status (FW)
- Production date (here: 10/15, corresponds to week 11/2015)
- Permitted standards
- Technical data (input, output)
- Information about response times

Example:

9007204180699403

3.5 Structure of basic modules

3.5.1 UCS10B, UCS10B/PS
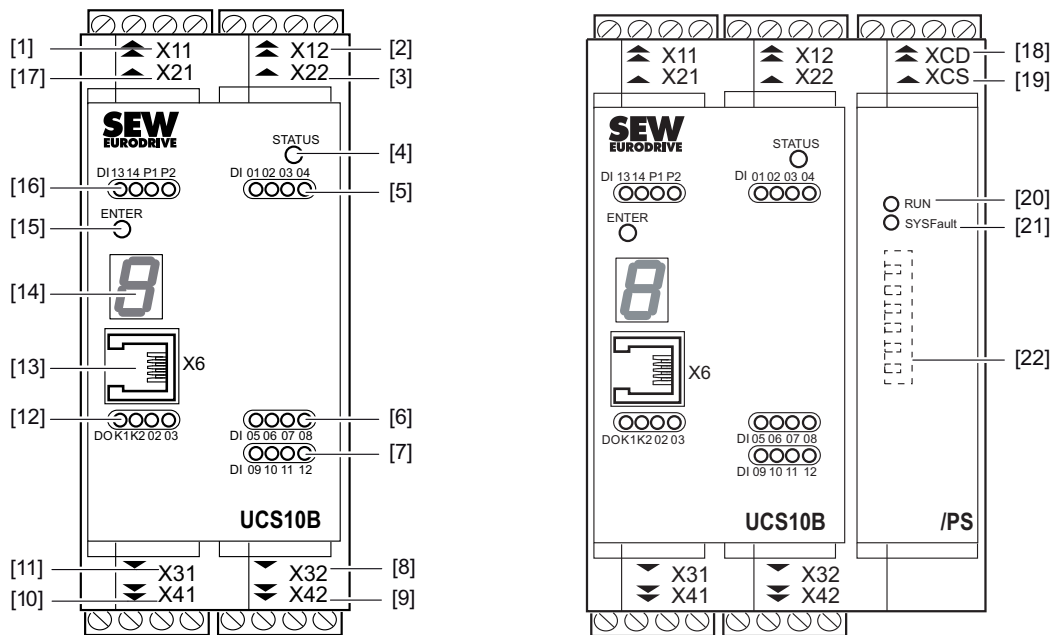
4082910219

[1]	X11	DC 24 V voltage supply connection
[2]	X12	Auxiliary output connection
[3]	X22	Safe digital inputs connection
[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	Safe digital inputs connection
[9]	X42	Safe digital inputs connection
[10]	X41	Relay output connection
[11]	X31	High-side/Low-side outputs connection
[12]	K1, K2	LED display: Relay output status
	DO 02, 03	LED display: High-side/Low-side outputs status
[13]	X6	Service interface connection
[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: Status of digital inputs
	P1, P2	LED display: Pulse output status
[17]	X21	Safe digital input and pulse output connection

In addition with option UCS10B//PS:

[18]	XCD	CAN diagnostics communication connection

[19]	XCS	CAN-Safe communication (PROFIsafe) connection
[20]	Run	LED display, status communication interface operation
[21]	SYSFault	LED display, status communication interface connection
[22]		DIP switch, CAN communication addressing (under front cover)

3.5.2 UCS11B, UCS11B/PS
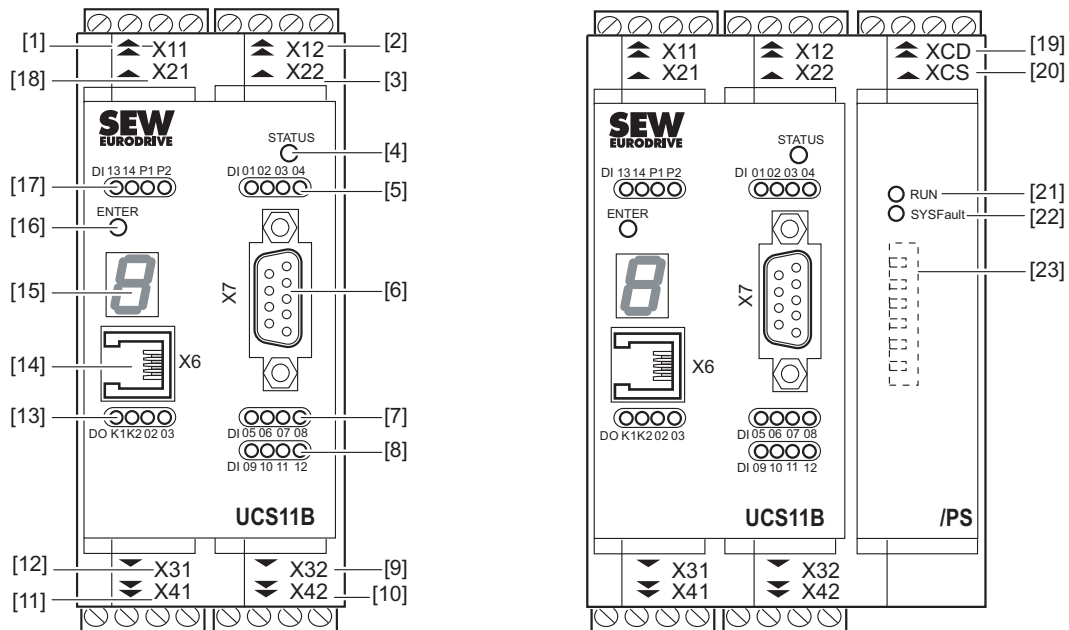
4085481227

[1]	X11	Voltage supply connection
[2]	X12	Encoder voltage supply connection for encoders at X7
		Signal outputs connection
[3]	X22	Inputs connection
[4]	STATUS	LED display: Display of the system status
[5]	DI 01 – 04	LED display: Status of digital inputs
[6]	X7	Connection 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 safe digital inputs, connection HTL proximity sensor
[10]	X42	Inputs connection
[11]	X41	Relay output connection
[12]	X31	High-side/Low-side outputs connection
[13]	K1, K2	LED display: Relay output status
	DO 02, 03	LED display: High-side/Low-side outputs status
[14]	X6	Service interface connection
[15]		7-segment display, system status display
[16]	ENTER	Pushbutton for reset and display of the CRC codes
[17]	DI 13, 14	LED display: Status of digital inputs
	P1, P2	LED display: Pulse output status
[18]	X21	Safe digital input and pulse output connection

In addition with option UCS11B//PS:

[19]	XCD	CAN diagnostics communication connection

[20]	XCS	CAN-Safe communication (PROFIsafe) connection
[21]	Run	LED display, status communication interface operation
[22]	SYSFault	LED display, status communication interface connection
[23]		DIP switch, CAN communication addressing (under front cover)

3.5.3 UCS12B, UCS12B/PS
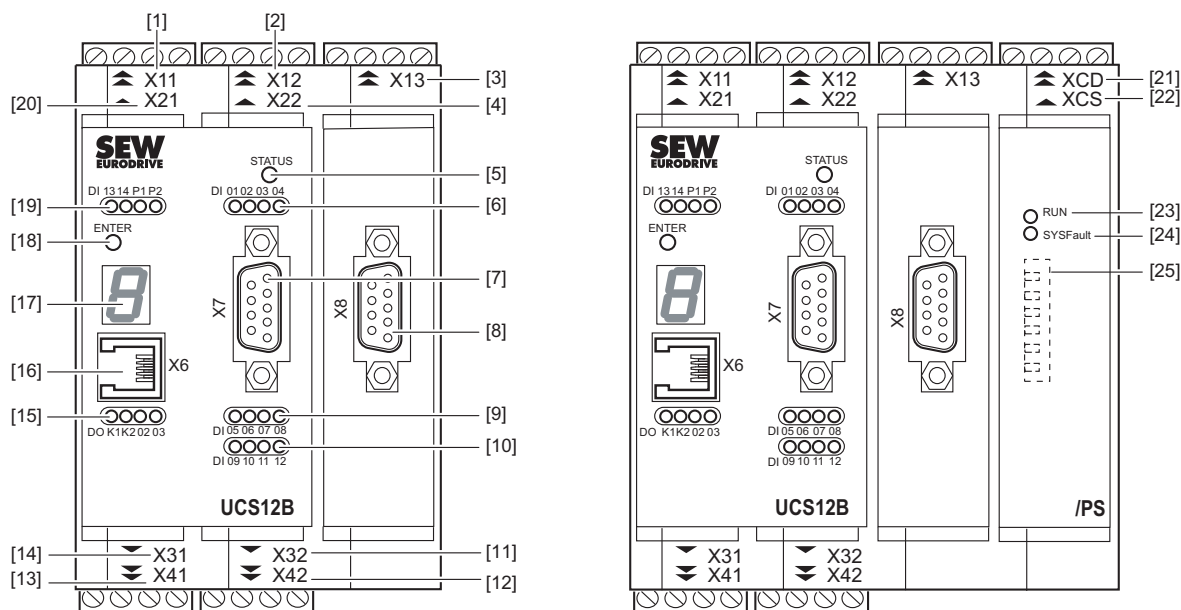
4085536267

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

In addition with option UCS12B//PS:

[21]	XCD	CAN diagnostics communication connection
[22]	XCS	CAN-Safe communication (PROFIsafe) connection
[23]	Run	LED display, status communication interface operation
[24]	SYSFault	LED display, status communication interface connection
[25]		DIP switch, CAN communication addressing (under front cover)

3.5.4 UCS14B/PS
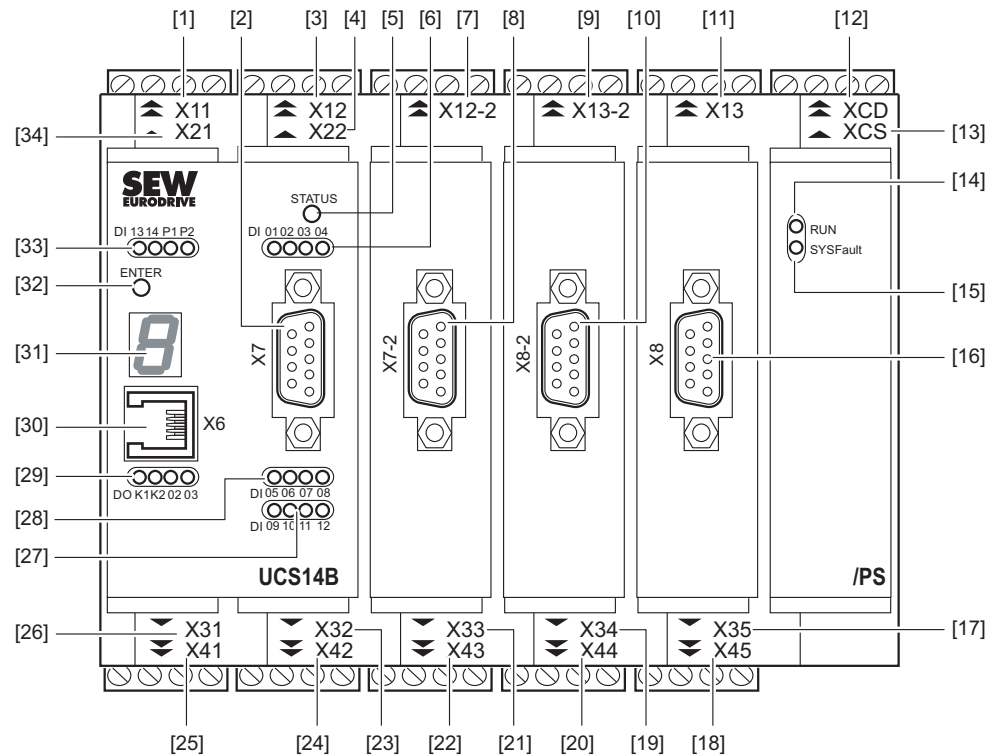
13886567563

[1]	X11	Voltage supply connection
[2]	X7	Connection TTL incremental, SIN/COS or SSI encoder
[3]	X12	Voltage supply connection for encoders at X7
		Signal outputs connection
[4]	X22	Inputs connection
[5]	STATUS	LED display: Display of the system status
[6]	DI 01 – 04	LED display: Status of digital inputs
[7]	X12-2	Voltage supply connection for encoders/resolvers at X7-2
[8]	X7-2	Connection resolver TTL incremental, SIN/COS or SSI absolute encoder
[9]	X13-2	Voltage supply connection for encoders at X8-2
[10]	X8-2	Connection TTL incremental, SIN/COS or SSI encoder, resolver
[11]	X13	Voltage supply connection for encoders at X8
[12]	XCD	CAN diagnostics communication connection
[13]	XCS	CAN-Safe communication (PROFIsafe) connection
[14]	RUN	LED display, status communication interface operation
[15]	SYSFault	LED display, status communication interface connection
[16]	X8	Connection TTL incremental, SIN/COS or SSI encoder
[17]	X35	Analog input voltage input
[18]	X45	Analog input current input
[19]	X34	HTL incremental encoder connection

[20]	X44	HTL incremental encoder connection
[21]	X33	HTL incremental encoder connection
[22]	X43	HTL incremental encoder connection
[23]	X32	Connection safe digital inputs, connection HTL proximity sensor
[24]	X42	Inputs connection
[25]	X41	Relay output connection
[26]	X31	High-side/Low-side outputs connection
[27]	DI 09 – 12	LED display: Status of digital inputs
[28]	DI 05 – 08	LED display: Status of digital inputs
[29]	K1, K2	LED display: Relay output status
	DO 02, 03	LED display: High-side/Low-side outputs status
[30]	X6	Service interface connection
[31]		7-segment display, system status display
[32]	ENTER	Pushbutton for reset and display of the CRC codes
[33]	DI 13, 14	LED display: Status of digital inputs
	P1, P2	LED display: Pulse output status
[34]	X21	Safe digital input and pulse output connection

3.6 Structure of expansion module

3.6.1 UCS23B
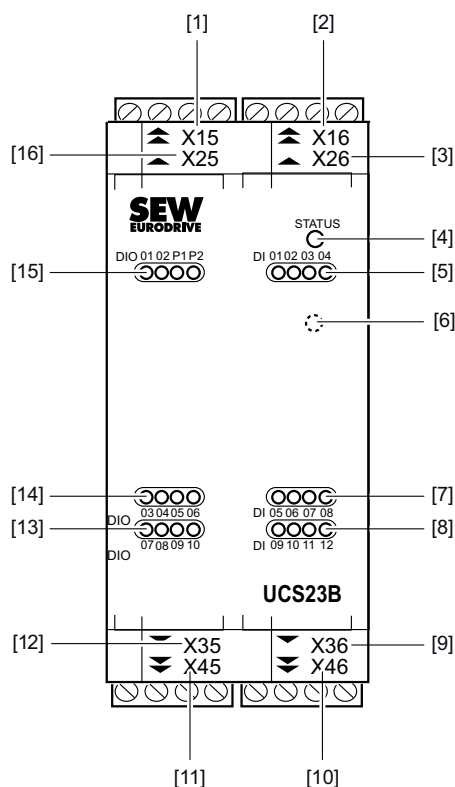
18014400595429387

[1]	X15	Voltage supply connection
[2]	X16	Auxiliary output connection
[3]	X26	Connection digital inputs
[4]	STATUS	LED display of the system status
[5]	DI 01 – 04	LED display: Status of digital inputs
[6]		Address selection switch for addressing the module (on rear of module)
[7]	DI 05 – 08	LED display: Status of digital inputs
[8]	DI 09 – 12	LED display: Status of digital inputs
[9]	X36	Connection digital inputs
[10]	X46	Connection digital inputs
[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 Structure of diagnostic modules

3.7.1 UCS25B
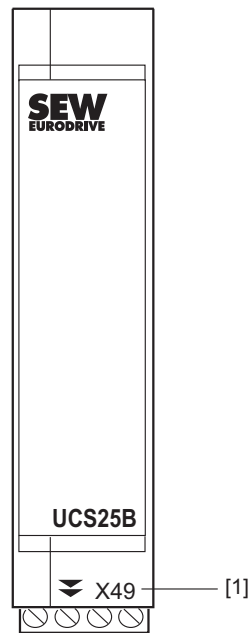
2085950347

[1]   X49   CANopen connection

3.7.2 UCS26B (hardware version 02)
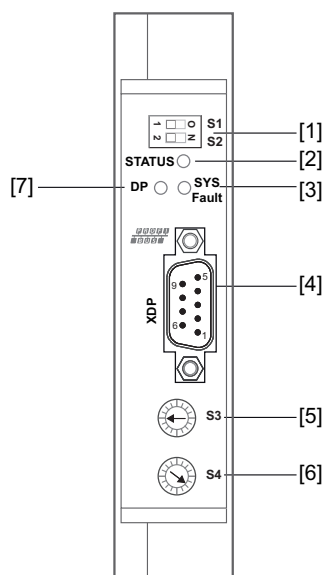
5614201739

[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 internal communication with basic module
[4]	XDP	PROFIBUS connection
[5]	S3	Address switch PROFIBUS address: High-byte setting
[6]	S4	Address switch PROFIBUS address: Low-byte setting
[7]	DP	LED display: PROFIBUS communication status

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3.7.3 UCS26B (hardware version 03)
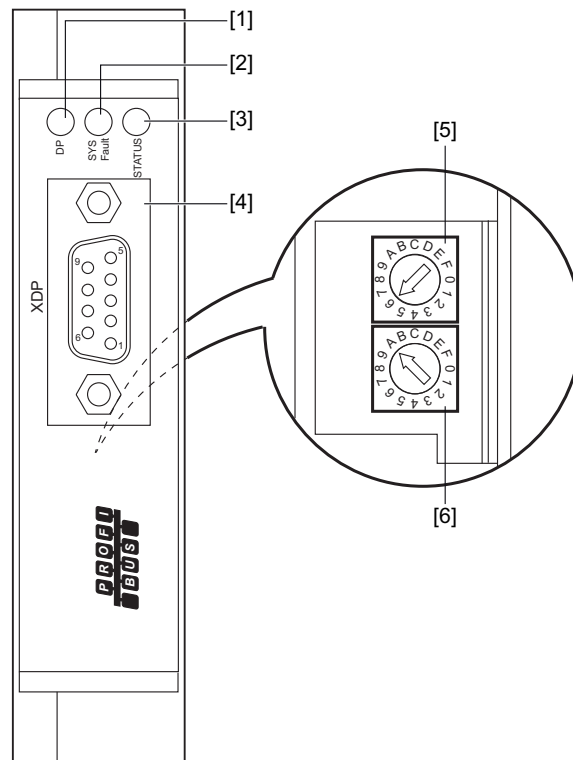
12605408139

[1] DP   LED display: PROFIBUS communication status

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

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

[4] XDP   PROFIBUS connection

[5]   Address selection switch PROFIBUS address (back of the device):
                 High-byte setting

[6]   Address selection switch PROFIBUS address (back of the device):
                 Low-byte setting

3.7.4 UCS27B
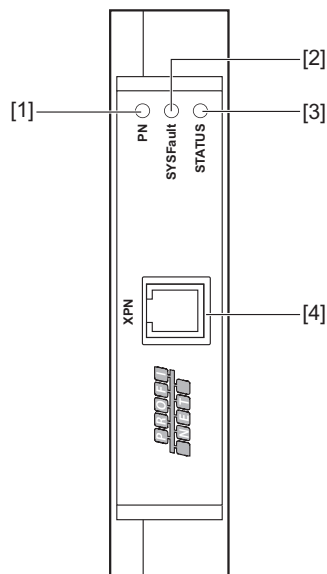
18014404123687179

[1]	PN	LED display: PROFINET communication status
[2]	SYSFault	LED display: Status internal communication with basic module
[3]	STATUS	LED display: Display of the system status
[4]	XPN	PROFINET connection

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

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- Install the individual safety modules directly on the profile rail.
- 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 degree of protection IP54.
- 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 device.
- Route the cables for connecting digital inputs and contact monitoring functions separately from each other.
- Observe the permitted ambient temperature of 0 – 50 °C.
- If you install an expansion or diagnostic module for a basic module, a backplane bus connection is required. Install the required backplane bus connectors 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 modules are not permitted, else the backplane bus will be interrupted.
- A safety module is not properly installed and electrically connected until it locks in place in the backplane bus connector.

4.1.1 Mounting position

To ensure unobstructed air circulation due to convection, install the devices **only vertically**. Do not install the devices horizontally, tilted or upside down.
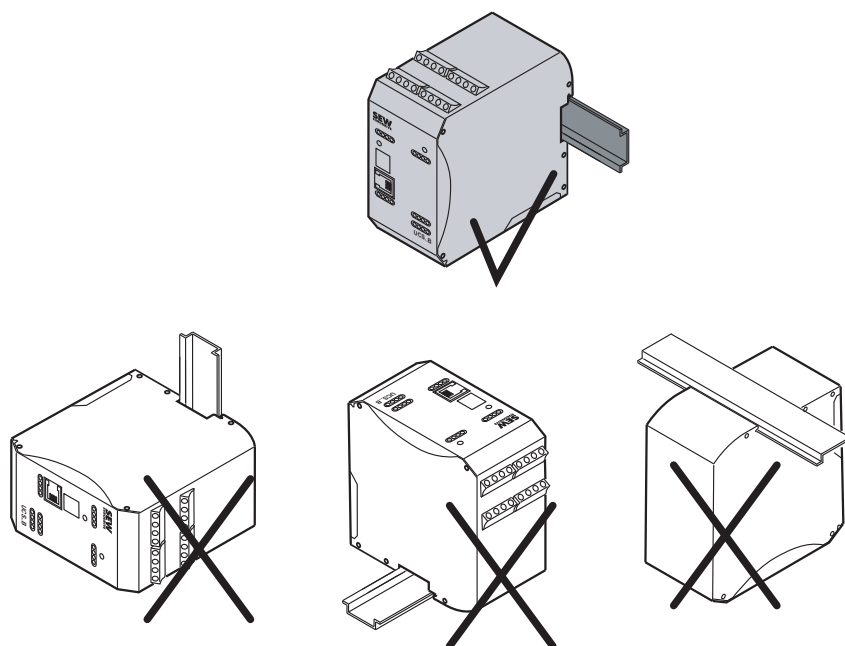
15363692427

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 to use version II to ensure sufficient space for the retaining screws of the profile rail under the backplane bus connector when using an expansion or diagnostic module.
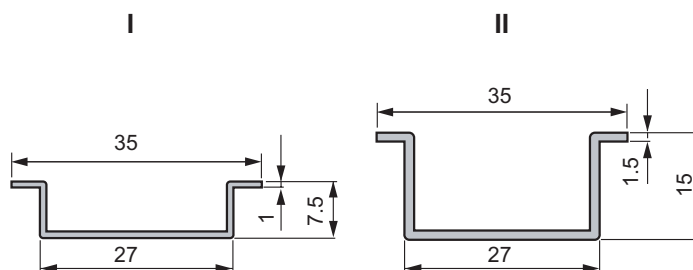
9007201341702027

All dimensions in mm.

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.
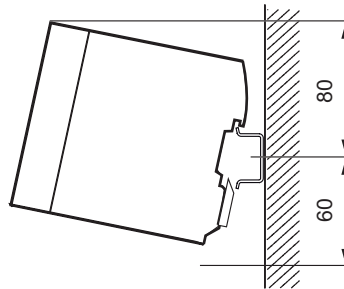
9007202672003723

All dimensions in mm.

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.
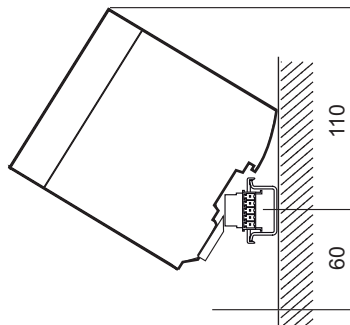
9007202672001803

All dimensions in mm.

INFORMATION

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

4.4 Step-by-step instruction 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 to/from the backplane bus connectors.

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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. Start with the basic module on the left. Install the required expansion and diagnostic modules on the right side of the basic module.

4. Place the safety module you want to install from top 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.

CLACK
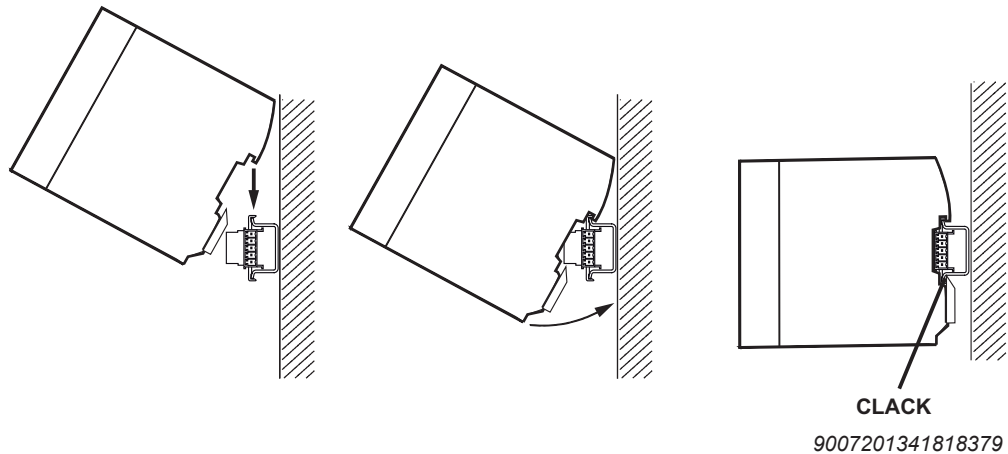
9007201341818379

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4.5 Step-by-step instruction for removing 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 to/from the backplane bus connectors.

INFORMATION

The backplane bus is interrupted by removing MOVISAFE® UCS..B.

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 pivot the safety module to the front then lift it upwards (see the following figure, pos II).
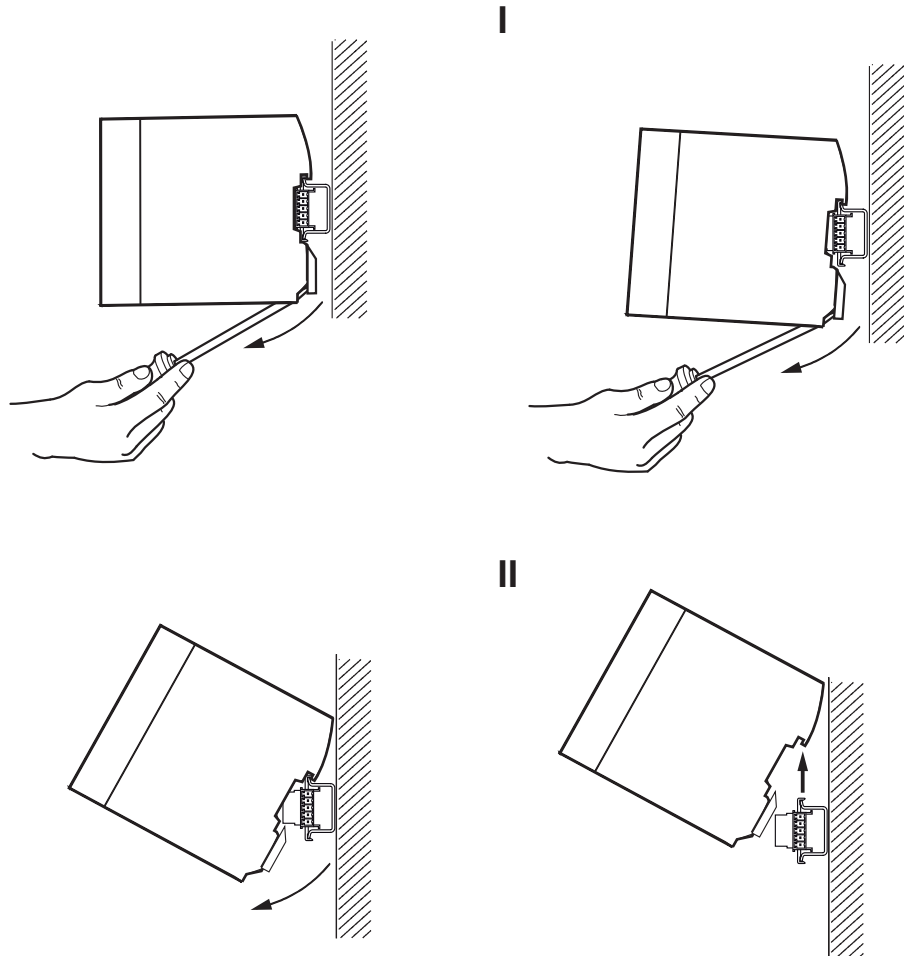
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4.6 Expansion of the basic modules

INFORMATION

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- Always install expansion modules or diagnostic modules on the right of the basic module. It is not permitted to install another basic module with the basic module.

- You must register the UCS23B expansion module in the MOVISAFE® Config UCS CM software (see chapter "Addressing the UCS23B expansion module").

- If you use expansion or diagnostic modules, determine the PFH value of the entire logic (basic module with expansion and diagnostic module) for safety assessment.

- For the PFH values of the modules, refer to chapter "Technical data".

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

You can connect a maximum of 2 UCS23B expansion modules [2] and 1 diagnostic module [3] to a UCS..B basic module [1] (See following figure for example).
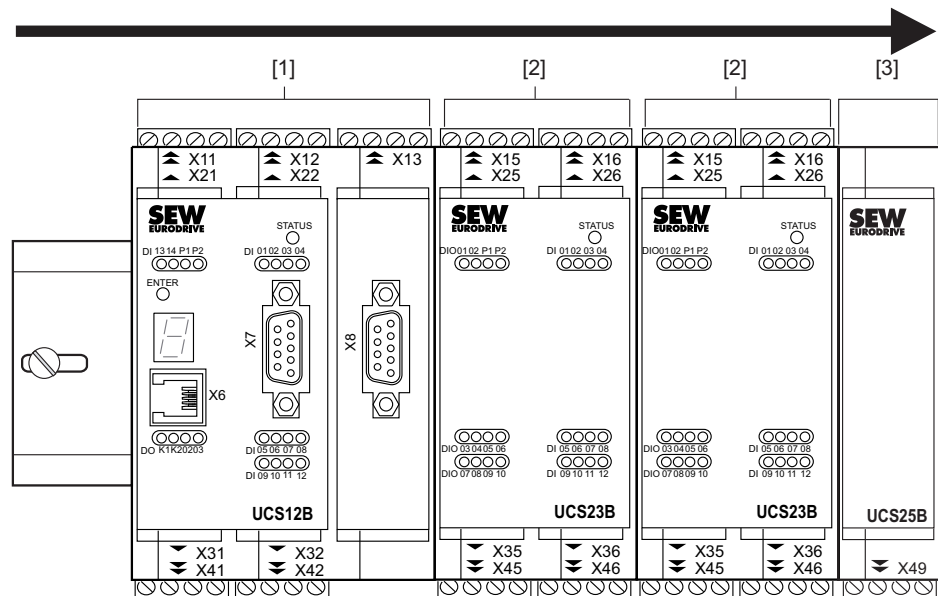
9007201341707915

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

You can connect a maximum of 2 UCS23B expansion modules [2] to a UCS..B/PS basic module [1] (See following figure for example).
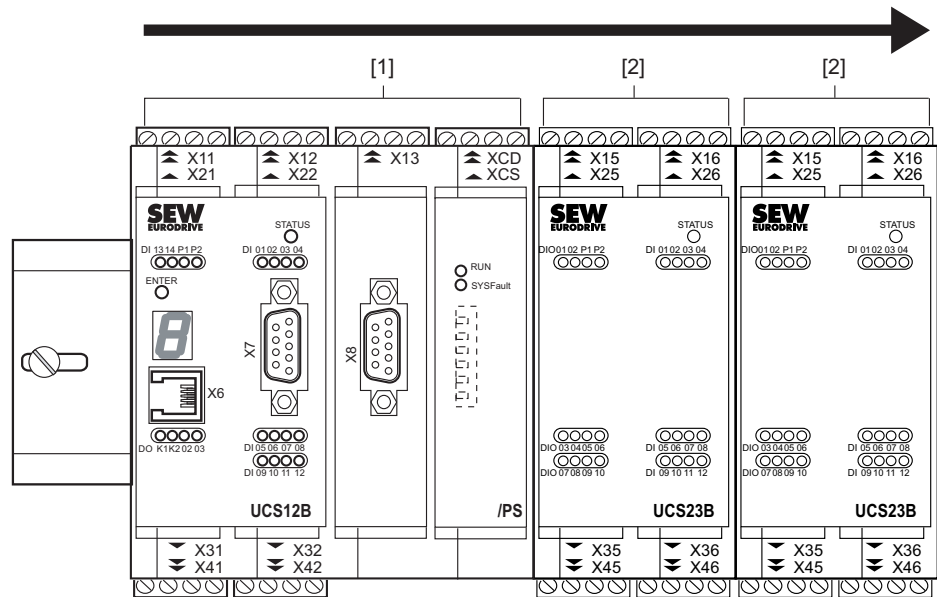
5624009867

4.6.3 Backplane bus connector

The backplane bus connectors (see following figure) are expandable, 5-pin plug connectors with spring contacts. If you install an expansion or diagnostic module with a basic module, the communication between the safety modules is realized 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 mounting the safety modules to the profile rail, contact is established with the backplane bus. The individual safety module slots are indicated by guide rails.
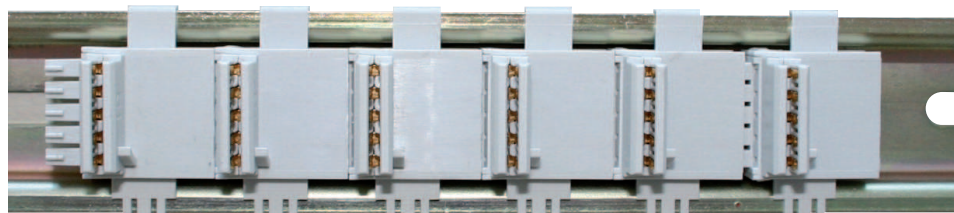
9007201341815691

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

MOVISAFE® basic module	Without expansion and diagnostic module	Number of required backplane bus connectors for connection with		
		Expansion module		Diagnostic module
		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
UCS14B/PS		8	10	7

INFORMATION

- If you only use a basic module without expansion or diagnostic module, no backplane bus connector is required.
- If you connect an expansion or diagnostic module to the basic module, all backplane bus slots of the safety modules to be connected must be assigned.
- Observe the information in chapter "Scope of delivery".

4.6.4 Addressing of UCS23B expansion module

Before you can use the UCS23B 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 UCS23B expansion module (see following figure).
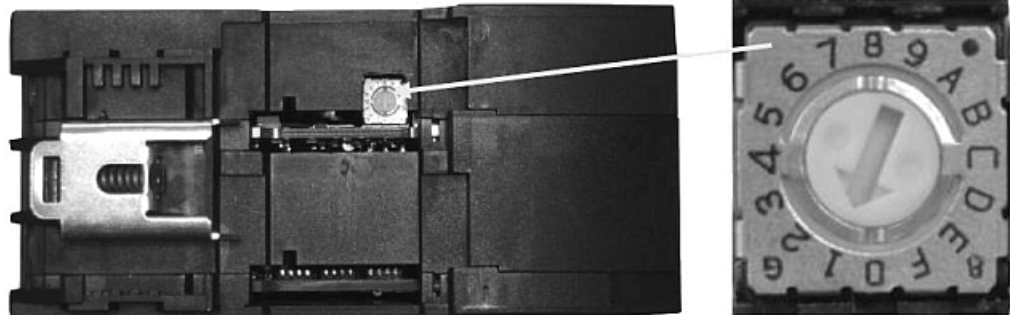
2808061707

Use the following addresses:

- Basic module: Address 0 (reserved)
- 1. expansion module: Address 1
- 2. expansion module: Address 2

INFORMATION

If the set address does not correspond to the address configured in MOVISAFE® Config UCS CM, 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
- MOVISAFE® UCS12B/PS: 18236316
- MOVISAFE® UCS14B/PS: 18236596

5.1.2 Terminal description UCS10B(/PS), 11B(/PS), 12B(/PS), 14B/PS

INFORMATION

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

Description	LED/terminal	Function
STATUS LED	STATUS	The LED shows the status of MOVISAFE® UCS..B (see chapter "Meaning of the LEDs").
LED DI 01 – 14	DI 01 – 14	The LEDs show the status of the digital input (see chapter "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 the digital output (see chapter "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 "Description of the 7-segment display").
Function key	ENTER	For error reset of the module and in status "4" for display of the CRC.
X6: Service interface connection	X6	Service interface for point-to-point connection (e.g. USB11A).
X7, X8: Connection for TTL, SIN/COS or SSI absolute encoders	X7 (X8):1–9	Assignment depending on the connected encoder (see chapter "Technical data").

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Description	LED/terminal	Function
X7-2, X8-2: Connection for TTL, SIN/COS, SSI absolute encoders or resolvers	X7-2 (X8-2):1–9	Assignment depending on the connected encoder (see chapter "Technical data").
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 supply voltage for encoder interface X7	X12:1 U_ENC_1	Encoder voltage supply for encoders directly connected to X7 encoder interface
	X12:2 GND_ENC_1	Reference potential for encoder supply voltage
	X12:3 DO 0.00	Auxiliary output 1
	X12:4 DO 0.01	Auxiliary output 2
X12-2: Connection for encoder supply voltage for encoder interface X7-2	X12-2:1 U_ENC_1_2	Encoder voltage supply for encoders directly connected to X7-2 encoder interface
	X12-2:2 GND_ENC_1_2	Reference potential for encoder supply voltage
	X12-2:3 N.C.	
	X12-2:4 N.C.	
X13: Connection for encoder supply voltage for encoder interface X8	X13:1 U_ENC_2	Encoder voltage supply for encoders directly connected to X8 encoder interface
	X13:2 GND_ENC_2	Reference potential for encoder supply voltage
	X13:3 N.C.	
	X13:4 N.C.	
X13-2: Connection for encoder supply voltage for encoder interface X8-2	X13-2:1 U_ENC_2_2	Encoder voltage supply for encoders directly connected to X8-2 encoder interface
	X13-2:2 GND_ENC_2_2	Reference potential for encoder supply voltage
	X13-2:3 N.C.	
	X13-2:4 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: Connection digital inputs	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: Connection for digital outputs	X31:1 DO 0.02_P	High-side output 2
	X31:2 DO 0.02_M	Low-side output 2
	X31:3 DO 0.03_P	High-side output 3
	X31:4 DO 0.03_M	Low-side output 3

Description	LED/terminal	Function
X32: Connection for digital inputs or HTL proximity sensor	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
X33: HTL incremental encoder connection	X33:1 HTL_A_1	HTL incremental encoder input
	X33:2 HTL_A_2	HTL incremental encoder input
	X33:3 HTL_A_3	HTL incremental encoder input
	X33:4 N.C.	-
X34: HTL incremental encoder connection	X34:1 HTL_B_1	HTL incremental encoder input
	X34:2 HTL_B_2	HTL incremental encoder input
	X34:3 HTL_B_3	HTL incremental encoder input
	X34:4 N.C.	-
X35: Analog input connection (voltage input)	X35:1 AI1	Analog input 1
	X35:2 GND_AI1	Reference potential analog input 1
	X35:3 AI2	Analog input 2
	X35:4 GND_AI2	Reference potential analog input 2
X41: Relay output connection	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: Connection digital inputs	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)
X43: HTL incremental encoder connection	X43:1 HTL_A_1	HTL incremental encoder input
	X43:2 HTL_A_2	HTL incremental encoder input
	X43:3 HTL_A_3	HTL incremental encoder input
	X43:4 N.C.	-
X44: HTL incremental encoder connection	X44:1 HTL_B_1	HTL incremental encoder input
	X44:2 HTL_B_2	HTL incremental encoder input
	X44:3 HTL_B_3	HTL incremental encoder input
	X44:4 N.C.	-
X45: Analog input connection (current input)	X45:1 AI3	Analog input 3
	X45:2 GND_AI3	Reference potential analog input 3
	X45:3 AI4	Analog input 4
	X45:4 GND_AI4	Reference potential analog input 4

Description	LED/terminal	Function
XCS: CAN-S connection (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 UCS23B

Description	LED/terminal	Function
STATUS LED	STATUS	The LED shows the status of MOVISAFE® UCS23B (see chapter "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: Connection digital inputs	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)

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: Connection digital inputs	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 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

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- X = 1: 1. expansion module
- X = 2: 2. 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 UCS25B/26B/27B

Description	LED/terminal/ DIP switch	Function
LED status	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 (only with UCS26B)	DP	The LED shows the connection state with PROFIBUS (see chapter "Meaning of the LEDs").
PN LED (only with UCS27B)	PN	The LED shows the connection state with PROFINET (see chapter "Meaning of the LEDs").
DIP switch S1: Backplane bus termination (only with UCS26B)	S1: ON	Backplane bus termination enabled.
	S1: OFF	Backplane bus termination disabled.
DIP switch S2: PROFIBUS termination (only with UCS26B)	S2: ON	Termination on PROFIBUS enabled.
	S2: OFF	Termination on PROFIBUS disabled.
DIP switch S3 and S4: Address switch for setting the PROFIBUS address (only with UCS26B)	S3:High byte	Address switch PROFIBUS address: High Byte setting
	S4:Low byte	Address switch PROFIBUS address: Low byte setting
X49: CAN connection (only with UCS25B)	X49:1 DGND	CAN reference potential
	X49:2 CAN_High	CAN High
	X49:3 CAN_Low	CAN Low
	X49:4 N.C.	-
XDP: PROFIBUS connection (only with UCS26B)	XDP	PROFIBUS fieldbus interface (see chapter "Technical data").
XPN: PROFINET connection (only with UCS27B)	XPN	PROFINET fieldbus interface (see chapter "Technical data").

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 EMC test specifications EN 55011). MOVISAFE® UCS..B safety modules can be installed in a control cabinet together 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 inductive loads (e.g. contactors, valves) 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. Observe in particular the cable routing and shielding for the motor cable and braking resistor connection. Twist the DC link cables (e.g. between inverter and BST brake module or between inverter and regenerative power supply unit). Route the DC link cables separately from the encoder and signal cables. Follow the installation guidelines of SEW-EURODRIVE for inverter technology.

- Note the following when connecting position and velocity sensors:
  - Use only shielded cables. The cable for transmitting signals must be suitable for EIA485 standard (formerly RS485).
  - Ensure correct connection of the shield of position and velocity sensors on the sensor end. Connect the shield additionally to the shield connection of the frequency inverter and to UCS..B over a large area at the PE connection (e.g. mounting plate or shield connection of encoder signal split box). Connecting the shield only to the 9-pin D-sub connector is not sufficient.
  - Use prefabricated cables from SEW-EURODRIVE or the DAE70B/71B encoder signal split box for splitting the signals of position and velocity sensors (see chapter "Optional cables for encoder system connection").

- 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.

5.4.3   Installation example

The following figure shows the connection of braided shields in practice:
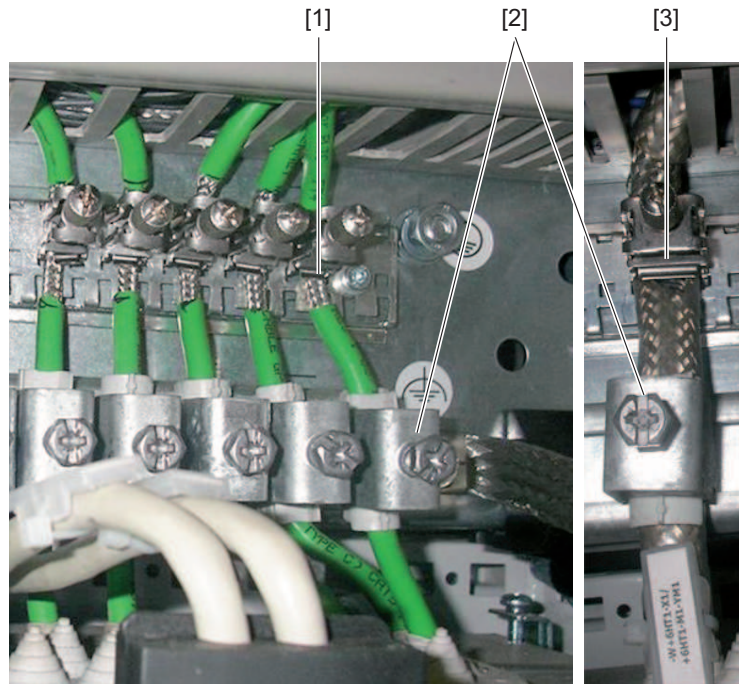
3779830539

[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

5.5 Voltage supply of the UCS..B compact safety modules

The MOVISAFE® UCS..B compact 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 internal safety module electronics. When using encoders, the encoder voltage supply must be supplied separately (see chapter "Voltage supply for encoder systems").

- Always ensure safe electrical isolation against the voltage supply system (e.g. AC 230 V). For this purpose, select power supply units that comply with 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 on the primary side with a 2-A fuse. SEW-EURODRIVE recommends using type Z circuit breakers or miniature fuses, "fast" 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. The safe digital inputs are suited for connecting single- or dual-channel sensors, partly with output signal switching device (OSSD) according to EN 61131-2 type 2. For the OSSD capability of an input, refer to chapters "Plug connectors of basic module" and "Plug connectors of expansion module".

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 "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

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 alarm status. At the same time, all MOVISAFE® outputs are deactivated (see chapter "Diagnostics"). Digital inputs that are not configured expect the signal "Pulse P1". This means that MOVISAFE® enters the "ALARM" state if DC 24 V is connected.

INFORMATION

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

- Using the "ENTER" button of the MOVISAFE®.

- With 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 via FBus reset (bit length > 150 ms and < 3 s).

INFORMATION

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If a fault occurred both at the frequency inverter and the MOVISAFE® UCS..B compact, make sure that the faults are reset in the correct sequence.

- First acknowledge the frequency inverter fault and only then acknowledge the fault at the MOVISAFE® UCS..B safety module.

- When acknowledging both faults simultaneously, a fatal error can occur at the MOVISAFE® UCS..B, especially if the MOVISAFE® UCS..B is operated in the encoder configuration "SSI Listener".

Fault messages can only be acknowledged by switching MOVISAFE® off and on again. For a list of fault and alarm messages, refer to the software interface MOVISAFE® Config UCS CM and the "MOVISAFE® UCS..B" system manual.

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

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

Digital inputs of basic module and expansion module:

Digital inputs	Achievable performance Level (PL)	Note
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 wiring.

Digital inputs	Achievable performance Level (PL)	Note
DI X.05 to DI X.08	PL e	1-channel with pulse: • Predominantly high-level required ($T_{High} > 100 \times T_{Low}$) • At least one request/day due to the application • Error detection on request
	PL d	1-channel without pulse: • Short circuit fault exclusion between the signals and after V_{CC} • Error detection on request
	PL e	2-channel: • At least one request/day due to the application • Error 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. Error detection on request.

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

Digital inputs	Achievable performance Level (PL)	Note
DIO X.01 to DIO X.10 (only UCS23B)	-	1-channel static signal without pulse (auxiliary input).
	PL e	2-channel static signal without pulse: • At least one request/day due to the application • Error detection only on request
	PL d	2-channel static signal without pulse: • Less than one request/day due to the application • Error detection on request
	PL e	1-channel with pulse: • Predominantly high-level required ($T_{High} > 100 \times T_{Low}$) • At least one request/day due to the application • Error 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: 1. expansion module
- X = 2: 2. 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 the respective module. The pulse outputs must not be used for other functions within the application. The frequency at both pulse outputs P1 and P2 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 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 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.

5.6.2 Connection example for analog sensors

MOVISAFE® UCS14B/PS has 2 analog inputs with 2 input channels each. Only 2-channel sensors can be connected to the analog inputs. The internal signal processing is performed separately in both channels by means of cross comparison of the results.

The analog input can be connected as follows:

- Voltage: min. DC –7 V, max. DC +10 V

With suitable sensors and careful wiring of the sensor, PL e to EN ISO 13849 can be achieved.
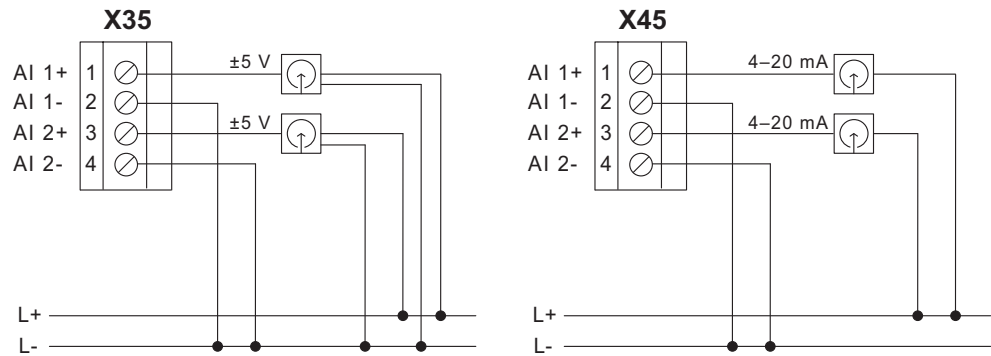
13888215051

The analog current inputs at X45 are equipped with a fixed load impedance (500 Ω). The resistance is not necessary for the analog voltage inputs.

INFORMATION

If 2 non-reactive sensors are used for which the common cause faults can be excluded, PL e to EN ISO 13849-1 can be achieved.

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 chapter "Diagnostic values" for a safety-relevant evaluation of the overall system.

If the device-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 sourcing digital output is briefly switched to DC 0 V potential, and a sinking digital output is briefly switched to DC 24 V potential. There is no diagnostics at the auxiliary outputs.

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.

For the 10 safe digital outputs of the expansion modules, you can enable or disable the internal diagnostics function via the MOVISAFE® Config UCS CM software. In the dialog window of the "UCS23B multi device configuration",

- Dynamic

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

- Static

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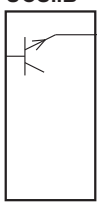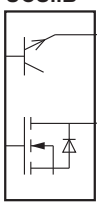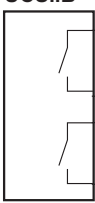
INFORMATION

- Cross circuits and short circuits in the external wiring of the digital outputs are not detected. For safe outputs, crossfaults and short circuit therefore 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 specified boundary conditions must be permanently ensured.

- If an error is detected, MOVISAFE® UCS..B switches to alarm/error state and indicates this state (see chapter "Diagnostics").

- 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 between 2 checks must be specified by the application based on request and ensured via suitable measures. Suitable measures can be of organizational (power off/on at the start of a shift) or technical (automatic, cyclical switching) type.

- Observe the DC values as well as the corresponding conditions (see chapter "Diagnostics values").

- Applications with frequent request of the safe disconnection should be tested at short intervals, e.g. at the start of a shift once a day. A test should be performed cyclically at least once a year.

- The diagnostics function of the outputs is performed in group control and single control. The standard outputs are not tested.

- The high-side (DO 0.02_P, DO 0.03_P) and low-side (DO 0.02_M, DO 0.03_M) outputs may not be used for safety tasks individually. Use for safety tasks is only permitted in high-side/low-side combination.

5.7.2 Connection of outputs at the basic module

Depending on the required performance level, you can use the digital and relay output either individually or grouped together.

Sourcing digital output	Sourcing and sinking digital output	Relay output	Relay output
UCS..B	UCS..B	UCS..B	UCS..B
DO 0.02_P	DO 0.02_P DO 0.02_M	K 0.11 K 0.12	K 0.11 K 0.12 K 0.21 K 0.22

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

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- 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 circuit therefore 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 cyclically scanned and the status is read for testing the cut-off capability.

The cut-off capability test is carried out according to the following criteria:

- After disconnection of the output, the output voltage must not exceed 5.6 V.

- The permitted voltage level must be reached after a minimum of 400 µs.

- If the required voltage level is reached, the test was successful. The output is reactivated without any delay.

- If the required voltage level is not reached within 400 µs, an alarm is triggered and all safe outputs (second channel for safe outputs!) are deactivated.

SEW EURODRIVE

The following figure shows the ideal [1] and typical [2] sequence.
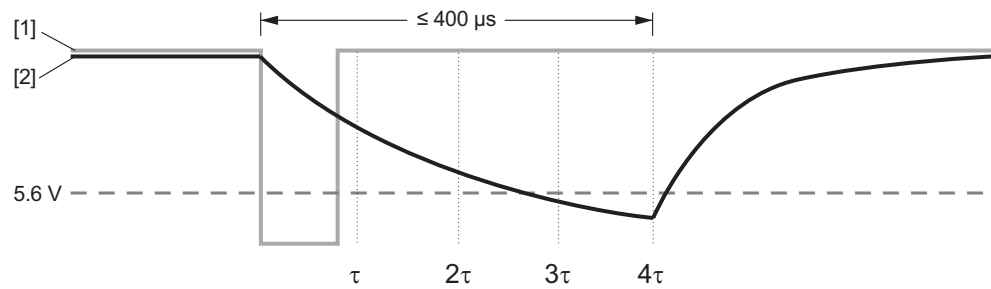
9705090827

[1]   Ideal sequence
[2]   Typical sequence

For determining the maximally permitted capacitance of inductance observe the time constant τ of the real RC and RL element at the output. This RC or RL element determines the real discharging curve.

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

- 3 τ ≤ 350 µs

- τ ≤ 100 µs

With 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} = τ/R = 10^{-4}/R

   or

- L_{max} = τ × R = 10^{-4} × R

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

Use of safe outputs to activate the STO safety function

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

> ## NOTICE
>
> Power consumption at terminal X17 of MOVIDRIVE® B and MOVITRAC® B too high.
>
> Parts of MOVISAFE® could be destroyed, or malfunctions of the STO safety function could be the result.
>
> - Observe the specific power consumption at terminal X17 of MOVIDRIVE® B and MOVITRAC® B. For specifications, refer to the "Functional Safety" manual of the respective product.

Use of safe digital outputs

INFORMATION

ℹ️ Outputs DO 0.02_P/_M and DO 0.03_P/_M can drive the following maximum number of devices dependent of the required current:

- 2 MOVIDRIVE® B/MOVITRAC® B

- 2 MOVIDRIVE® B/MOVITRAC® B and 2 safety-related BST brake modules

MOVISAFE® UCS1.B   **MOVIDRIVE® B / MOVITRAC® B**

X31			X17	
DO 0.02_P	1	⊘	4	SVI24
DO 0.02_M	2	⊘	3	SOV24
DO 0.03_P	3	⊘	2	VO24
DO 0.03_M	4	⊘	1	DGND
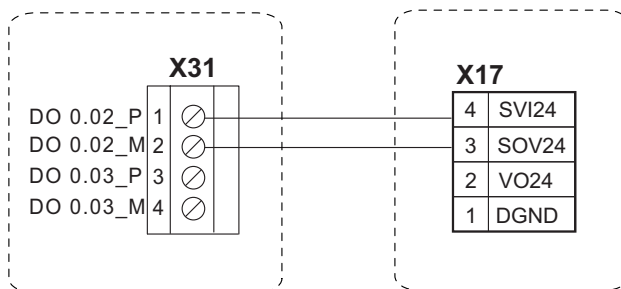
9253827083

MOVISAFE® UCS1.B   **MOVIAXIS® MXA81**

X31		
DO 0.02_P	1	⊘
DO 0.02_M	2	⊘
DO 0.03_P	3	⊘
DO 0.03_M	4	⊘

X7	
1	+24V
2	RGND
3	C
4	NC

X21		
DI 0.13	1	⊘
DI 0.14	2	⊘
P1	3	⊘
P2	4	⊘

X22		
DI 0.01	1	⊘
DI 0.02	2	⊘
DI 0.03	3	⊘
DI 0.04	4	⊘

9253834379

MOVISAFE® UCS1.B   MOVIAXIS® MXA82
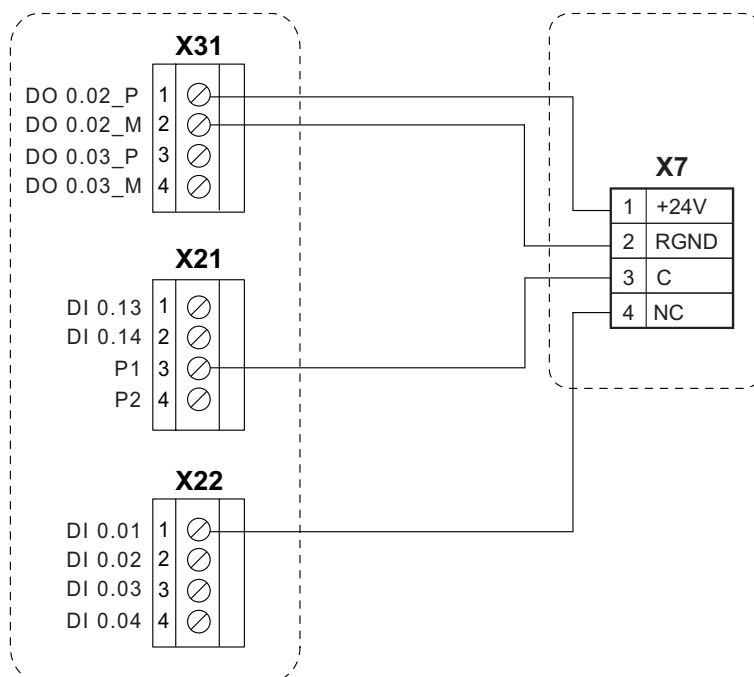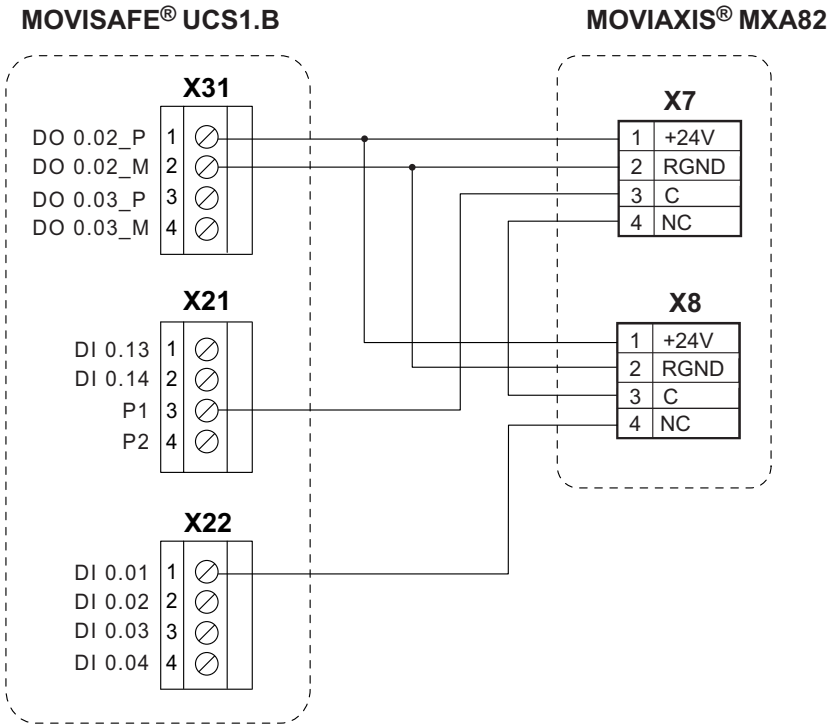
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INFORMATION

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

Use of safe relay outputs

MOVISAFE® UCS1.B   MOVIDRIVE® B / MOVITRAC® B
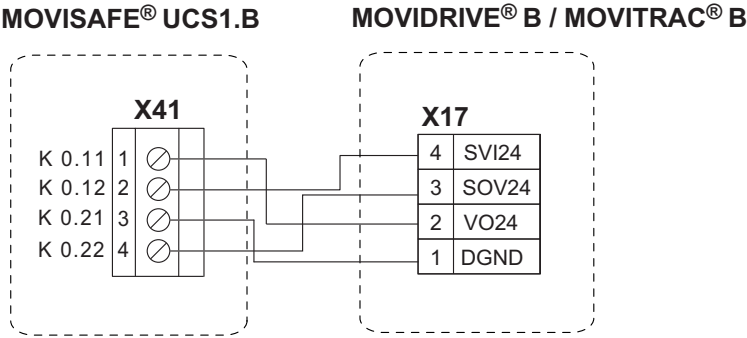
9254164491

Use of configurable digital inputs/outputs
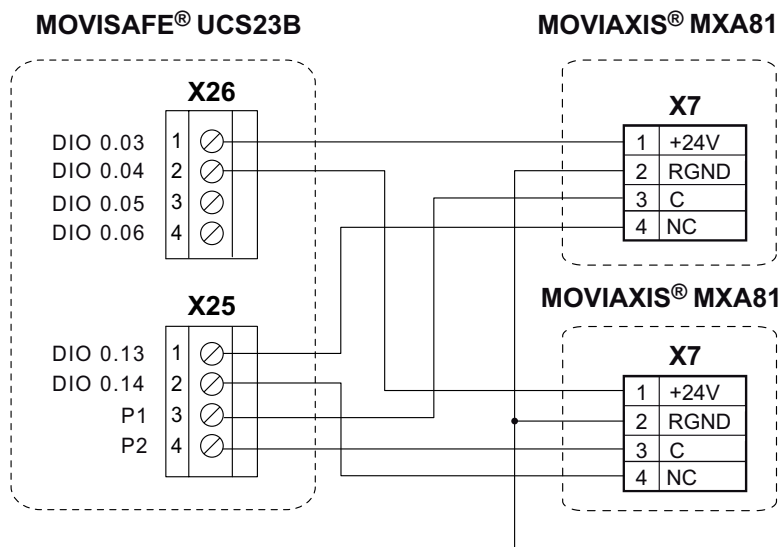
9254207627

INFORMATION

With single-channel disconnections, you have to make certain fault assumptions and provide for corresponding fault exclusions.
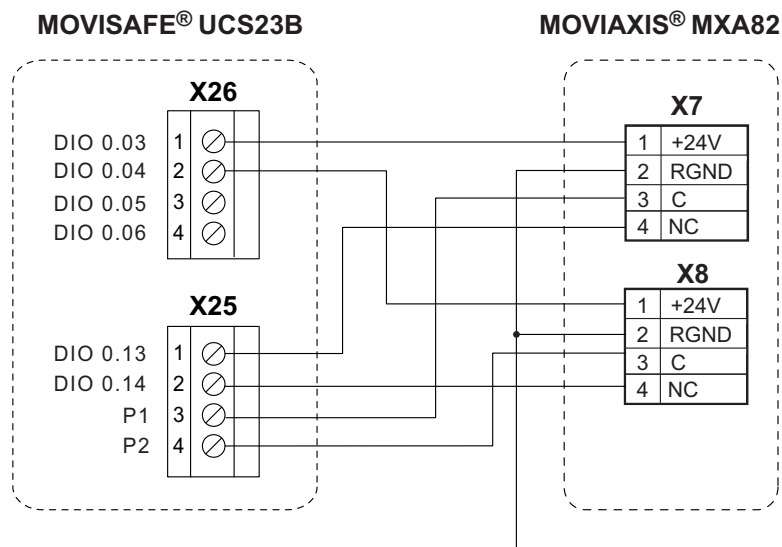
9254236811

Use of safe outputs and auxiliary outputs for realizing SS1 safety function

For controlling SS1 safety function (Safe Stop 1) with MOVIDRIVE® B, you can use the safe digital outputs or the auxiliary outputs (see following figures).

NOTICE

Power consumption at terminal X17 of MOVIDRIVE® B.

Parts of MOVISAFE® could be destroyed, or malfunctions of the SS1 safety function could be the result.

Observe the specific power consumption at terminal X17 of MOVIDRIVE® B. For specifications, refer to the "Functional Safety" manual.
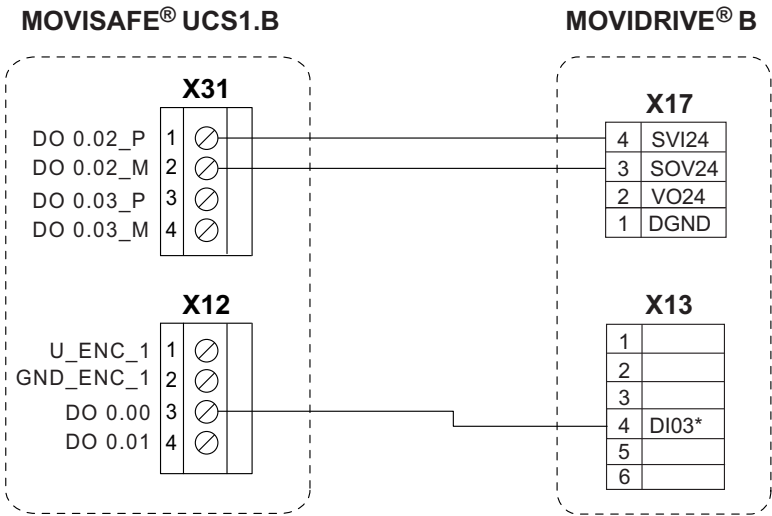
9007208509307659

*   "Enable/stop" factory setting

5.7.3 Connection of outputs at the expansion module

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

Sourcing digital output
UCS..B
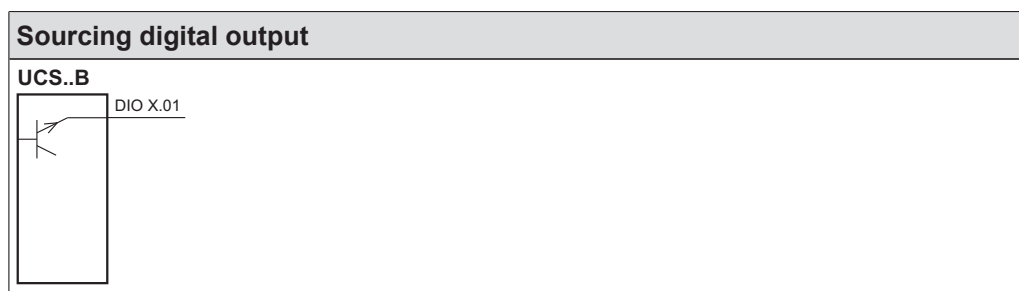
Output	Output type	Achievable performance Level (PL)	Requirements
DO X.00 to DO X.01	Auxiliary output	-	-
DIO X.01 to DIO X.10	Digital output, 1-channel, static	PL c	Error detection/error response according to cat. 2.
	Digital output, 2-channel, static	PL e	Outputs of different groups.
	Digital output, 2-channel, static	PL d	Outputs of the same groups 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 to groups internally:
  - Group 1: DIO X.01 to DIO X.06
  - Group 2: DIO X.07 to DIO X.10
- X = 1: 1. I/O expansion module
- X = 2: 2. 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 safe outputs, crossfaults and short circuit therefore have to be prevented according to EN ISO 13849-2 table D.4.

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.
>
> Electrical equipment in the MOVISAFE® UCS..B safety module or in the encoder can be destroyed.
>
> De-energize connected encoders and MOVISAFE® UCS..B **before** you plug in or remove the encoder connections. This means that the DC 24 V supply voltage of the UCS..B safety module **and** the encoder must be switched off. To de-energize the encoder, it may be necessary to switch off the supply voltage of the device (MOVIDRIVE® B or MOVIAXIS®) as well as the DC 24 V control voltage.

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

INFORMATION

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- Observe the notes in chapters "General installation notes for encoders" and "Voltage supply for encoder systems".
- 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 chapter "Measures for electromagnetic compatibility (EMC)".
- Maximum length of encoder cables:

  100 m with a capacitance per unit length ≤ 120 nF/km.
- Core cross section: 0.2 – 0.5 mm
- Use shielded cables with twisted pair cores. Connect the shield over a wide area at both ends:
  - At the encoder in the cable gland or in the encoder plug
  - At the metal clamp/strain relief at 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 mechanic installation.
- With 2 encoders, the encoders must not 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 wearing parts (chains, toothed belts etc.).

- If you use 2 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).
- If 2 SSI encoders are used, encoder 1 is process encoder.

5.8.3 Assignment of the encoder types

You can connect the following conventional encoder types to the MOVISAFE® UCS..B compact safety modules depending on the respective module:

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

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	X7-2	X8	X8-2	X32	X33/43	X34/44
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	-	-
UCS14B/PS	TTL SIN/COS SSI	TTL SIN/COS SSI Resolver	TTL SIN/COS SSI	TTL SIN/COS SSI Resolver	HTL 1Z or HTL 2Z	HTL	HTL

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

5.8.4 Combination of different encoder types

The MOVISAFE® UCS..B compact safety modules always require a safety-rated encoder signal. Whether this encoder signal comes from 1 or 2 encoders depends on the required performance level and the safety function. The encoder system is selected 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.

Double-encoder concept

Double-encoder concepts can be implemented using diverse standard encoders. Double-encoder concept means that 2 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.

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 (Single-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] (Double-axis monitoring)		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
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 axis 1 and 2.

2) Configuration possible for one axis only.

INFORMATION

For MOVISAFE® UCS14B/PS, note:

Encoder interfaces X7, X7-2, X33 and X43 have fixed assignment to axis 1. Encoder interfaces X8, X8-2, X34 and X44 have fixed assignment to axis 2. Terminal X32 is assigned either to axis 1 and/or axis 2 depending on configuration.

UCS14B[1] (Double-axis monitoring)		Safety function											
Encoder 1	Encoder 2	SEL	SLP	SCA	SSX	SDI	SLI	SLS	SOS	ECS	EOS	PRF	DEM
HTL EX	-			x	x			x		x			x
Incremental	-			x	x					x			x
Incremental	Proxy 1 counter			x	x			x		x			x
Incremental	Proxy 2 counter			x	x			x		x			x
Incremental	Incremental EX			x	x	x	x	x	x	x			x
Incremental	HTL EX			x	x	x	x	x	x	x			x
Incremental	Resolver			x	x			x	x	x			x
Incremental	SIN/COS EX			x	x	x	x	x	x	x			x
Incremental	SSI EX	x	x	x	x	x	x	x	x	x	x	x	x
-	-												
Proxy 2 counter	SSI	x	x	x	x	x	x	x	x	x	x	x	x
Proxy 1 counter	Proxy 1 counter			x	x			x	x	x			x
Resolver	-			x	x	x	x	x	x	x			x

SEW EURODRIVE

UCS14B[1] (Double-axis monitoring)		Safety function											
Encoder 1	Encoder 2	SEL	SLP	SCA	SSX	SDI	SLI	SLS	SOS	ECS	EOS	PRF	DEM
SIN/COS	-			x	x	x	x	x	x	x			x
SIN/COS	Proxy 1 counter			x	x	x	x	x	x	x			x
SIN/COS	Proxy 2 counter			x	x	x	x	x	x	x			x
SIN/COS	Incremental EX			x	x	x	x	x	x	x			x
SIN/COS	HTL EX			x	x	x	x	x	x	x			x
SIN/COS	Resolver			x	x	x	x	x	x	x			x
SIN/COS	SSI EX	x	x	x	x	x	x	x	x	x	x	x	x
SIN/COS EX	-			x	x	x	x	x	x	x			x
SSI	Proxy 2 counter	x	x	x	x	x	x	x	x	x	x	x	x
SSI	HTL EX	x	x	x	x	x	x	x	x	x	x	x	x
SSI	Resolver	x	x	x	x	x	x	x	x	x	x	x	x
SSI	SIN/COS EX	x	x	x	x	x	x	x	x	x	x	x	x
SSI	SSI EX	x	x	x	x	x	x	x	x	x	x		x

1) Identical selection for axis 1 and 2.

- 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 checking 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:
  - The measuring length is calculated depending on the selected resolution and is displayed in the field "Measuring length" in the encoder configuration in MOVISAFE® Config UCS CM (e.g. 500 rev.).
  - 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 distance	User 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 not to exceed a maximum resolution ratio of 1:10000 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 parameterization and the value ranges of all used monitoring functions.

5.8.5   Connection of HTL proximity sensors

HTL proximity sensors are connected to UCS11B, UCS11B/PS, UCS12B, UCS12B/PS, and UCS14B via terminal X32 (DI 0.05 – DI 0.08). The digital inputs are used as counting inputs. The circuit logic of the HTL proximity sensors must be debounced. When using HTL encoders, the signals are always to be read-in with standard and complementary track (A, B and $\overline{A}$, $\overline{B}$ with a phase shift of 90°).
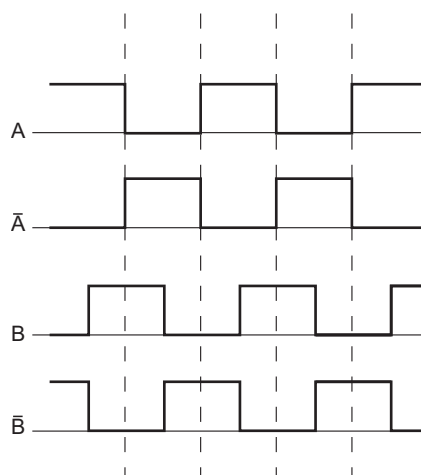
9007202703730443

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 voltage 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 voltage 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.

MOVISAFE® UCS..B
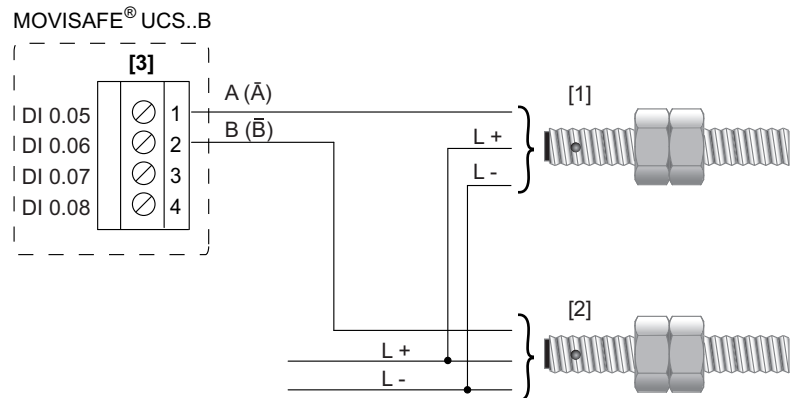
9007202701844875

[1]   HTL proximity sensor 1
[2]   HTL proximity sensor 2
[3]   X32 at UCS11B, UCS11B/PS, 12B, 12B/PS, 14B/PS

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

MOVISAFE® UCS..B
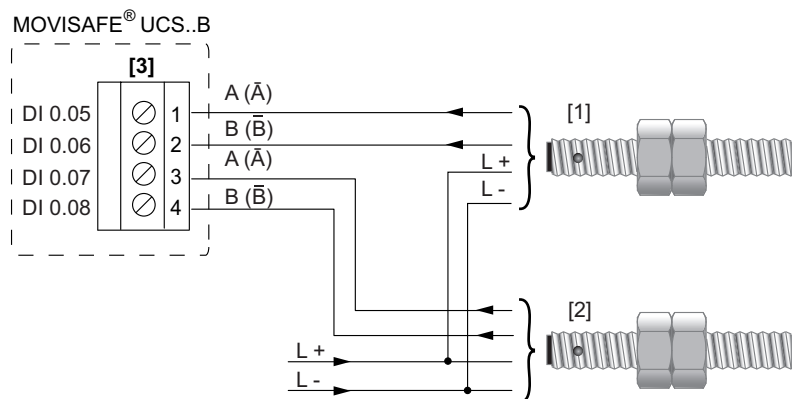
9007202703733899

[1]   HTL proximity sensor 1
[2]   HTL proximity sensor 2
[3]   X32 at UCS11B, 11B/PS, 12B, 12B/PS, 14B/PS

INFORMATION

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

5.8.6 HTL encoder connection

HTL encoder with A and B track
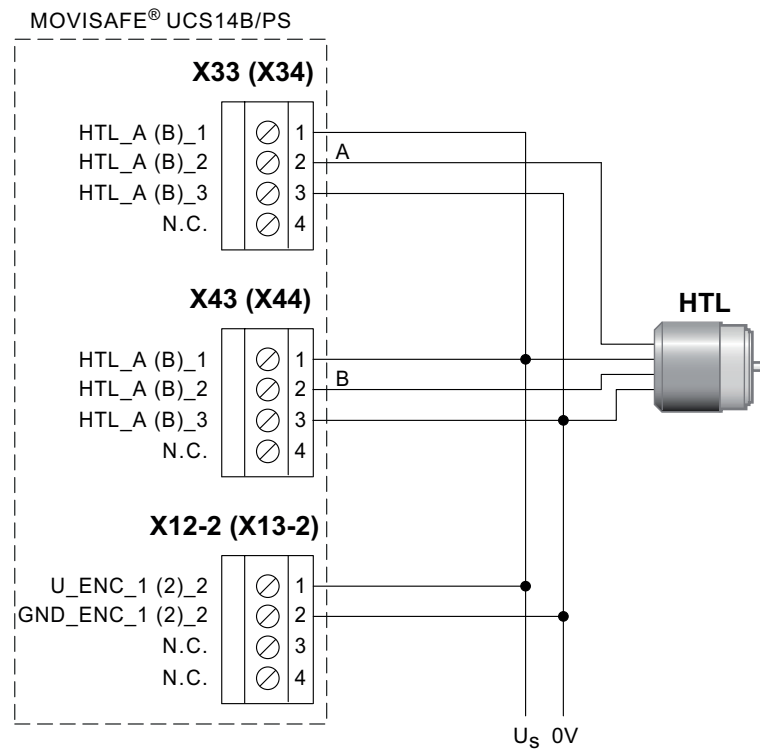
14015112715

HTL encoder with A/$\overline{A}$- and B/$\overline{B}$ track
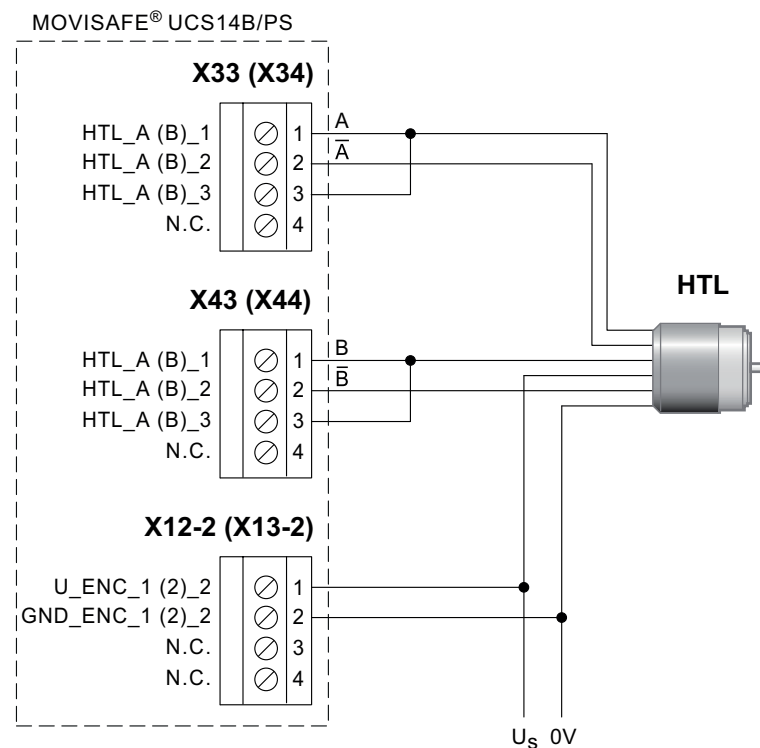
14015424907

5.8.7 Connection of SSI encoders

SSI encoders can be connected to MOVISAFE® UCS..B and to MOVIDRIVE® B or MOVIAXIS® via split cable or encoder signal split box in parallel. Depending on the device in use (MOVIDRIVE® or MOVIAXIS®) and the used encoder option card, you have to observe the following settings when parameterizing the SSI interface. The table shows an exemplary parameterization for SSI encoder with 24 bit position. In case of deviating absolute position, adapt *Data Length* and *Data Index* accordingly.

Device	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 SSI clock frequency of the devices must be set as follows:

• MOVIDRIVE® B setting with DEH21B option:

  P952 Clock frequency: 30 – 50%

• MOVIDRIVE® B setting with DEU21B option:

  Parameter *Clock frequency*: 125 kHz

• MOVIAXIS® setting:

  Parameter *Clock frequency*: 125 kHz

5.8.8 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.
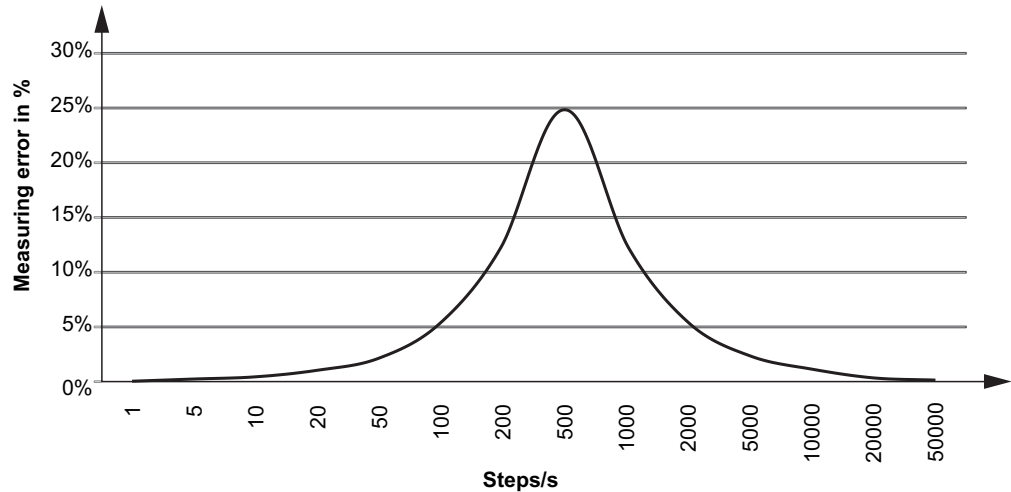
2811251467

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 rpm × 1/60 min/s = 512 steps/s
- Resulting measuring error according to the illustration: approx. 25%
- Required switch-off limit: 120 rpm × 1.25 = 150 rpm

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 rpm × 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

5.8.9 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 via a split cable/encoder signal split box using prefabricated cables
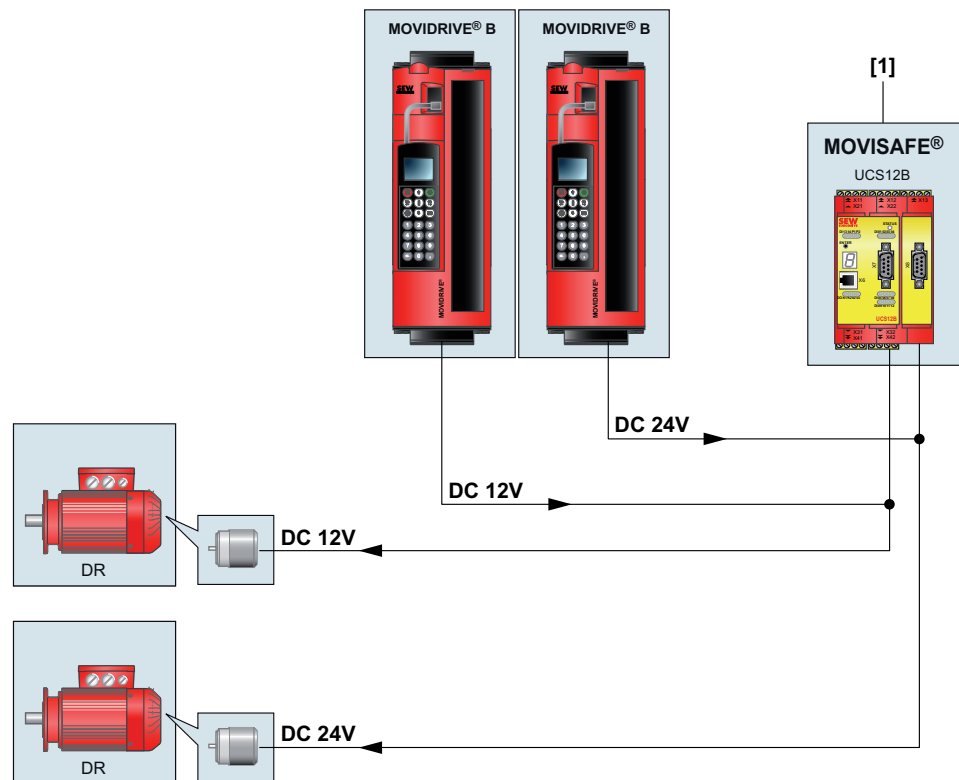
5165839243

If the signals are split between the basic module UCS..B [1] and the frequency inverter (e.g. MOVIDRIVE® B), the encoder is supplied with voltage via the encoder card of the frequency inverter. The prefabricated cables route the encoder voltage supply to the UCS..B basic module for monitoring purposes. Terminals X12, X12-2, X13, and X13-2 of the basic module are not connected in this connection type.

Direct connection of the encoder system to the basic module (without signal splitting)
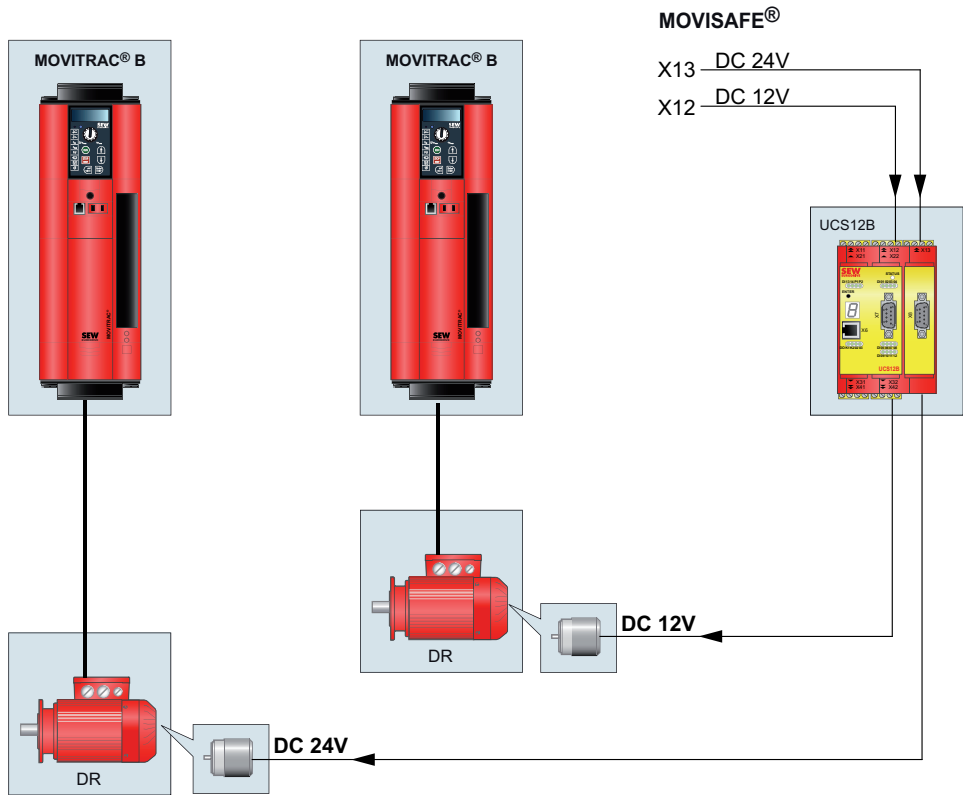
9007204420583691

If the encoder system is directly connected to the UCS..B basic module, encoder voltage supply is realized via the basic module. In this case, connect the required encoder voltage to terminals X12, X12-2, X13, and X13-2 of the basic module. The encoder voltage is monitored in the basic module. Fuse the encoder voltage supply with max. 2 A.

The encoder supply voltage is monitored internally with a tolerance range. You can adjust the internal monitoring to the encoder supply voltage 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:

Settings 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 supply voltage to the AC 230 V or AC 400 V system. For this purpose, select power supply units that comply with VDE 0551, EN 60742 or DIN EN 0160.

- Provide for an equipotential bonding between PE and DC 0 V of the encoder supply voltage.

- The encoder voltage to be monitored can be parameterized separately for each encoder interface (X7, X7-2, X8, X8-2) in MOVISAFE® Config UCS CM.

- It is not possible to disable voltage monitoring at X7, X7-2, X8, and X8-2.

- When using HTL proximity sensors, bear in mind that the encoder voltage 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 specified encoder supply voltage values will be detected as an error or can be ruled out.
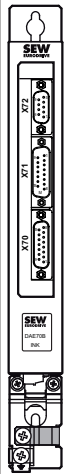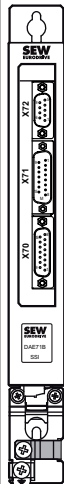
5.8.10 Connection options of an encoder system
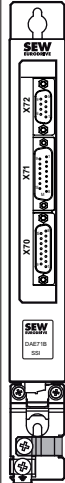
An encoder system can be connected as follows:

- Using prefabricated cables
- Using the encoder signal split box DAE70B/71B/72B

The following overview shows the connection options of an encoder system.
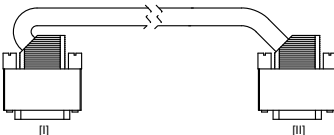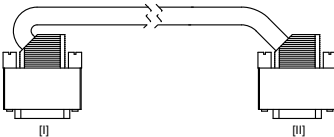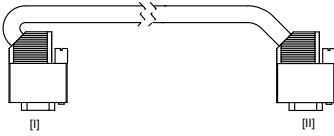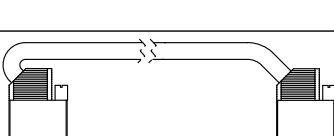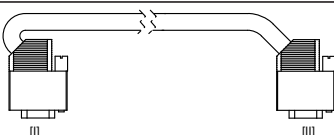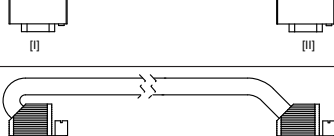
Encoder signal split boxes

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	
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	

Designation	Description	Connection	Part number	Icon
DAE72B	Encoder signal split box for resolver (RES).	• DIP switches 1 – 8: Changeover MOVIDRIVE® B/MOVIAXIS® • X70: Resolver connection • X71: MOVIDRIVE® B/MOVIAXIS® • X72: MOVISAFE® UCS14B/PS	22322232	

Connection cables for encoder signal split boxes
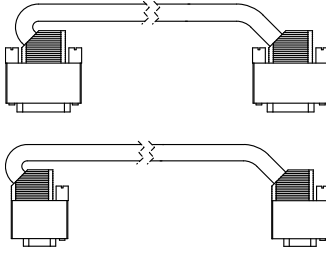
The connection cables can be configured from 0.8 m to 6 m.
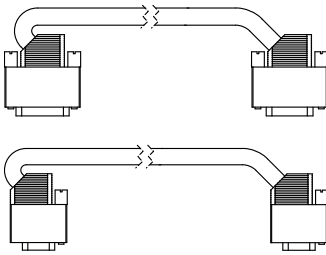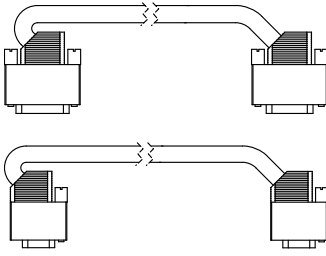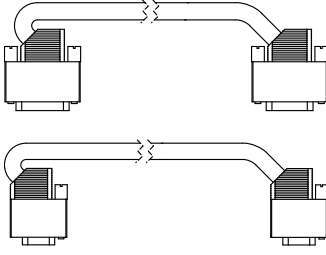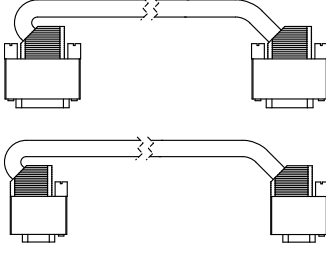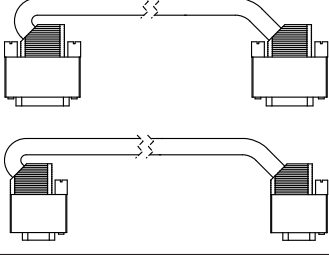
Designation	Description	Connection	Part number	Icon
DAE80B	Connection between encoder signal split box and MOVIDRIVE® B.	MOVIDRIVE® B: • DEH11B:X15 • DEH21B:X15 • DEU21B:X15	18132650	
DAE81B	Connection between encoder signal split box and MOVIAXIS®.	MOVIAXIS®: • MXA:X13 • XGH11A:X63 • XGS11A:X64	18166261	
DAE82B	Connection between encoder signal split box and MOVISAFE® UCS..B. (Not for connection DAE71B:X72 to UCS14B/PS:X7-2, X8-2).	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	
DAE85B	Connection between DAE71B encoder signal split box and MOVISAFE® UCS14B/PS.	MOVISAFE®: • UCS..B:X7-2 • UCS..B:X8-2	18174345	
DAE86B	Connection between encoder signal split box and MOVIDRIVE® B.	MOVIDRIVE® B: • DEU21B:X14	18157351	
DAE87B	Connection between DAE72B encoder signal split box and MOVISAFE® UCS14B/PS.	MOVISAFE®: • UCS..B:X7-2 • UCS..B:X8-2	18177131	
DAE88B	Connection between DAE72B encoder signal split box and MOVIDRIVE® B (Use only with UCS14B/PS).	MOVIDRIVE® B: • DEH21B:X15	18177735	

Designa-tion	Description	Connection	Part number	Icon
DAE89B	Connection between DAE72B encoder signal split box and MOVIAXIS® (Use only with UCS14B/PS).	MOVIAXIS®: • MXA:X13	18177743	 [I] [II]

Cable sets for encoder signal split box

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

Designa-tion	Description	Connection	Part num-ber	Icon

Cable set 1	• For splitting the SIN/COS and TTL signals for the following device combination:
	
	  – MOVIDRIVE® B with DEH11B, DEH21B or DEU21B and MOVISAFE® UCS..B
	
	• For splitting the SSI signals for the following device combination:
	
	  – MOVIDRIVE® B with DEU21B and MOVISAFE® UCS..B
		Includes following cables:
		
		• DAE80B
		
		• DAE82B
			18246907	

Cable set 2	• For splitting the SIN/COS and TTL signals for the following device combination:
	
	  – MOVIDRIVE® B with DEH11B, DEH21B or DEU21B and MOVISAFE® DCS..B
	
	• For splitting the SSI signals for the following device combination:
	
	  – MOVIDRIVE® B with DEU21B and MOVISAFE® DCS..B
		Includes following cables:
		
		• DAE80B
		
		• DAE83B
			18246915	

Cable set 3	For splitting the SIN/COS, TTL and SSI signals for MOVIAXIS® and MOVISAFE® UCS..B. **Note:** Not for SSI encoder connection to X7-2/X8-2 (with UC-S14B/PS).	Includes following cables: • DAE81B • DAE82B	18166342	
Cable set 4	For splitting the SSI signals for the following device combination: • MOVIDRIVE® B with DIP11B and DEH21B and MOVISAFE® DCS..B	Includes following cables: • DAE84B • DAE83B	28203038	

Designation	Description	Connection	Part number	Icon
Cable set 5	For splitting the SSI signals for the following device combination: • MOVIDRIVE® B with DIP11B and DEH21B and MOVISAFE® UCS..B **Note:** Not for SSI encoder connection to X7-2/X8-2 (with UCS14B/PS).	Includes following cables: • DAE84B • DAE82B	28203046	
Cable set 6	For splitting the SSI signals for the following device combination: • MOVIDRIVE® B with DEU21B and MOVISAFE® UCS..B	Includes following cables: • DAE86B • DAE82B	28215044	
Cable set 7	For splitting the SSI signals for the following device combination: • MOVIDRIVE® B with DEU21B and MOVISAFE® DCS..B	Includes following cables: • DAE86B • DAE83B	28215052	
Cable set 8	For splitting the resolver signals for the following device combination: • MOVIDRIVE® B with DER21B and MOVISAFE® UCS14B/PS	Includes following cables: • DAE87B • DAE88B	28221338	
Cable set 9	For splitting the resolver signals for the following device combination: • MOVIAXIS® and MOVISAFE® UCS14B/PS	Includes following cables: • DAE87B • DAE89B	28230914	

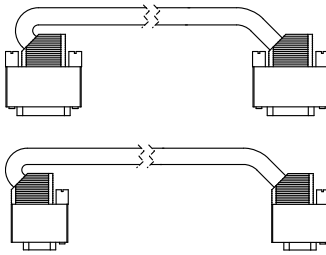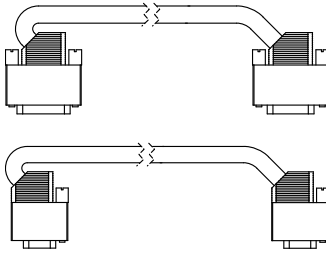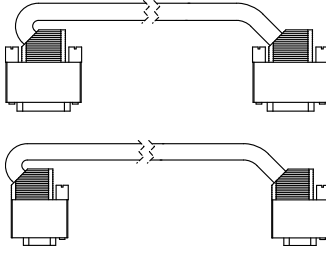**Split cables and adapter cables**

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

1982596747
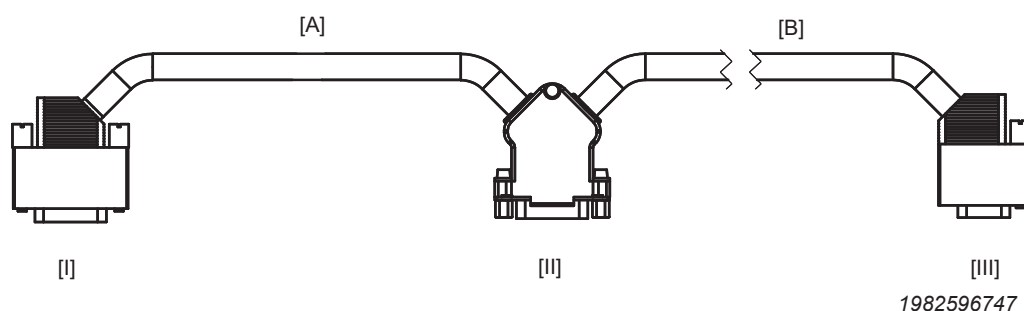
[A]	A-side with fixed length (0.8 m)
[B]	B-side with variable length (0.5 m to 6 m)
[I]	Encoder card connection
[II]	Encoder connection
[III]	Connection of MOVISAFE® UCS..B
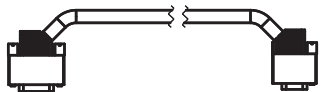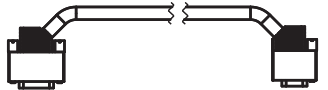
Split cable for MOVISAFE® UCS..B

INFORMATION

The DAE split cable for splitting SSI encoder signals are not compatible with UCS14B/PS:X7-2 and UCS14B/PS:X8-2. In this case, use the encoder signal split box with the corresponding cable set.

Designa-tion	Description	Connection	Part num-ber	Icon
DAE50B	Splitting of SIN/COS and TTL encoder sig-nals.	MOVIDRIVE® B: • DEH11B:X14 • DER11B:X14 • DEU21B:X14	18114474	
DAE52B	Splitting of SIN/COS and TTL encoder sig-nals (without TF cable).	MOVIDRIVE® B: • DEH11B/21B:X15 • DEU21B:X15	18114490	
DAE53B	Splitting of SIN/COS and TTL encoder sig-nals (with TF cable).	MOVIDRIVE® B: • DEH11B/21B:X15 • DEU21B:X15 MOVIAXIS®: • MXA:X13 • XGH11A:X63 • XGS11A:X64	18114504	
DAE54B	Splitting of SSI en-coder signal.	MOVIDRIVE® B: • DIP11B:X62 • DEH21B:X62	18114512	

Designa-tion	Description	Connection	Part num-ber	Icon
DAE55B	Splitting of SSI en-coder signal.	MOVIDRIVE® B: • DEU21B:X15	18114520	
DAE56B	Encoder simulation ad-apter.	MOVIAXIS®: • XGH11A:X62 • XGS11A:X62	18114644	
DAE57B	Adapter for direct con-nection of SIN/COS, TTL encoder or en-coder simulation of en-coder option card to MOVISAFE® UCS..B.	MOVIDRIVE® B: • DEH11B:X14 • DER11B:X14 • DEU21B:X14	18114652	
DAE58B	Adapter for direct con-nection of SSI encoder to MOVISAFE® UCS..B.	Cable (D-sub 9 to D-sub 9) with resistors. MOVISAFE® UCS..B: • X7, X8	18119190	
DAE59B	Adapter for direct con-nection of SSI encoder to MOVISAFE® UCS..B.	Cable (D-sub 15 to D-sub 9) with resistors. Encoder voltage pin 13. MOVISAFE® UCS..B: • X7, X8	18119204	
DAE60B	Adapter for direct con-nection of SSI encoder to MOVISAFE® UCS..B.	Cable (D-sub 15 to D-sub 9) with resistors. Encoder voltage pin 15. MOVISAFE® UCS..B: • X7, X8	18120431	
DAE61B	Splitting of SSI en-coder signal.	MOVIAXIS®: • XGS11A:X64	18120423	
DAE62B	Splitting of SSI en-coder signal.	MOVIDRIVE® B: • DEU21B:X14	18157378	

5.9 PROFIsafe connection of MOVISAFE® UCS..B/PS compact

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 SBus for exchanging diagnostics data. UCS..B/PS can be connected to a controller (e.g. DHR21B/41B or DHF21B/41B) or to the DFS12B/22B options via CAN-S. The process image for PROFIsafe can be configured using the MOVISAFE® Config UCS CM software.

Example of a fieldbus connection to PROFIsafe:
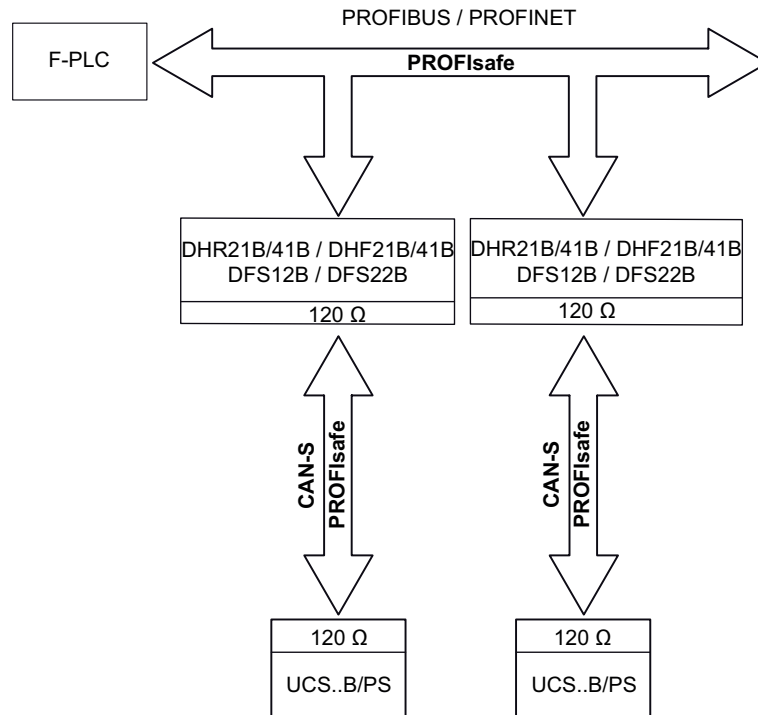
4110988939

- CAN-S sample circuit with one MOVISAFE® UCS..B/PS module and a DHF..B or DHR..B controller:
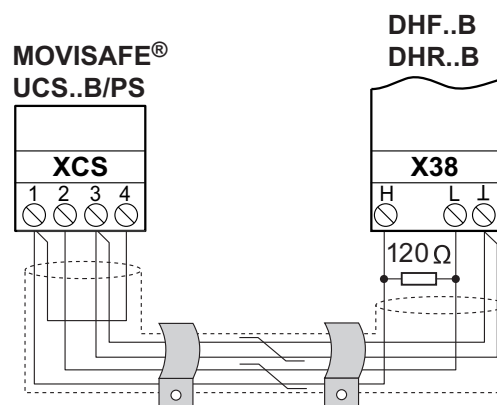
6573117707

Observe the following information on the sample circuit:

- 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). Wiring an 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: $0.25 \ mm^2 - 0.75 \ mm^2$

  - Cable resistance: 120 Ω at 1 MHz

  - Capacitance per unit length: ≤ 40 pF/m at 1 kHz

  Suitable cables are CAN or DeviceNet™ cables.

- The permitted total cable length is 80 m at a baud rate of 500 kBaud.

- There must not be any potential shift between the devices connected via fieldbus. Take suitable measures to avoid potential shift, such as connecting the device 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.

- **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	
DHF21B (MOVI-PLC®/CCU)	12 bytes	Bidirectional
DFS12B	8 bytes	

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

- **FBus configuration**

  Can be configured via MOVISAFE® Config UCS CM

- **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 device 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). With DHR/DHF21B/41B, you can access the first 8 bytes (bit 0 – 63) bit-by-bit and the following 4 bytes in the F-PLC. With DFS21B/22B, you can access the first 4 bytes (bit 0 – 31) bit-by-bit and the following 4 bytes in the F-PLC. 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 chosen as process data in the MOVISAFE® Config UCS CM software:

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

SEW EURODRIVE

Process data	Source	Data length in bits	
Analog value	Input 1/input 2	16 bits	Data length cannot be configured

The following table shows the process image inputs (PII) from 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
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	Return EMU 1
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	Return EMU 2
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

PII	Bit	Use
34	2	SCA 3 return
35	3	SCA 4 return
36	4	-
37	5	-
38	6	-
39	7	-
40 – 63		24 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.

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). With DHR/DHF21B/41B, you can access the first 8 bytes (bit 0 – 63) only bit-by-bit and the following 4 bytes in the F-PLC. With DFS21B/22B, you can access the first 4 bytes (bit 0 – 31) only bit-by-bit and the following 4 bytes in the F-PLC. 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 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

PIO	Bit	Use
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
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	-

5.10 SBus connection of MOVISAFE® UCS..B/PS compact

5.10.1 Connecting the UCS..B/PS option

Example of a fieldbus connection to CAN (SBus):

• Block diagram:
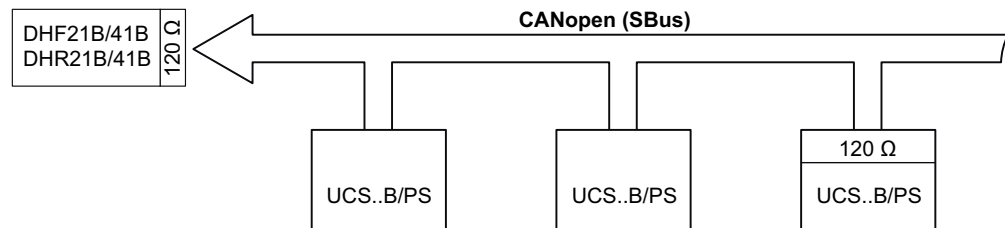
4110992651

• SBus sample circuit with 2 MOVISAFE® UCS..B/PS modules and a DHF..B or DHR..B controller:
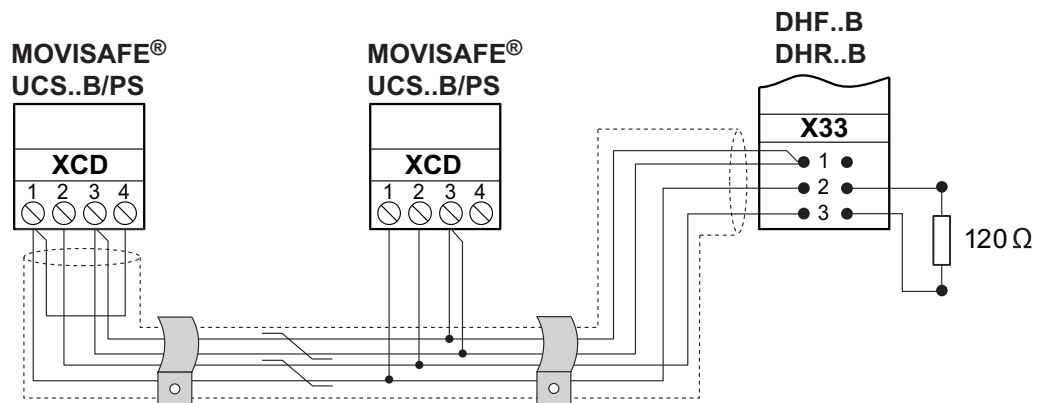
6574261003

Observe the following information on the SBus sample circuit:

• The CAN (SBus) 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 XCD:4 to terminal XCD:1 (CAN). Wiring an 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 – 0.75 mm^2

    – Cable resistance: 120 Ω at 1 MHz

    – Capacitance per unit length: ≤ 40 pF/m at 1 kHz

    Suitable cables are CAN 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

- There must not be any potential shift between the devices connected via fieldbus. Take suitable measures to avoid potential shift, such as connecting the device ground connectors using a separate cable.

- Point-to-point wiring is not permitted.

5.10.2 XCD communication interface

- **CAN-D description**

  Interface for non-safe communication with a higher-level controller via CAN (SBus). The interface allows for transmitting 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) can be set using the DIP switches S1 to S6 (see chapter "Setting baud rate and address for standard communication").

- **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	

- **Options**

  – Program download

  – Data set activation

  – Transmission of logic data and process data.

  – Diagnostic functions of MOVISAFE® Config UCS CM (such as scope)

  – Data backup in the event of device replacement

- **Baud rate**

  The baud rate (125 kBaud, 250 kBaud, 500 kBaud or 1 MBaud) is set using the DIP switches S7 and S8 (see chapter "Setting baud rate and address for standard communication").

5.10.3 Setting the baud rate and address for standard communication

The baud rate and SBus address is set using DIP switches on the MOVISAFE® UCS..B/PS safety modules. 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 can be unlatched and pivoted upwards (figure III).
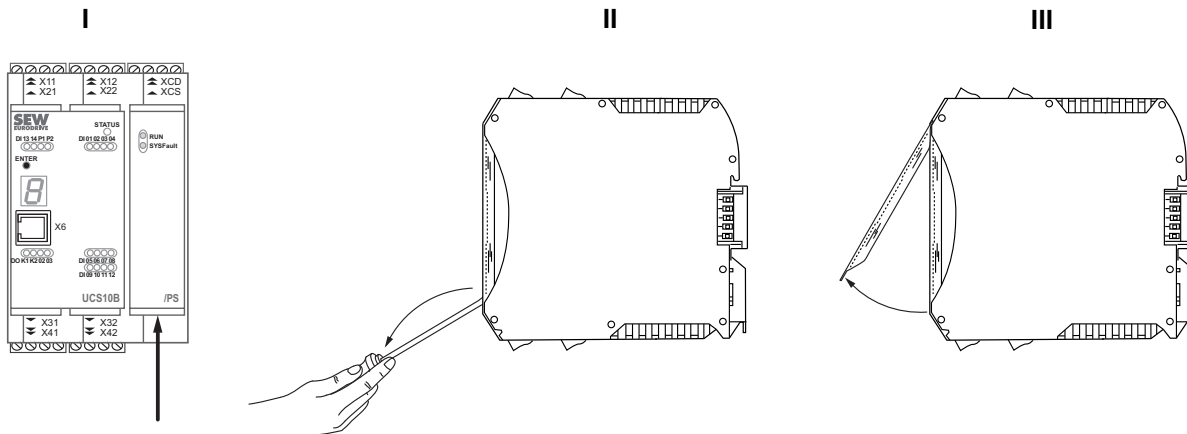
4116224139

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

UCS..B/PS option	DIP switch	Description
UCS..B/PS 	S1 – S6	Setting the SBus address:
	S1	$2^0 \rightarrow$ Significance 1×1 = 1
	S2	$2^1 \rightarrow$ Significance 2×1 = 2
	S3	$2^2 \rightarrow$ Significance 4×0= 0
	S4	$2^3 \rightarrow$ Significance 8×0 = 0
	S5	$2^4 \rightarrow$ Significance 16×0 = 0
	S6	$2^5 \rightarrow$ 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).

I	II

CLACK
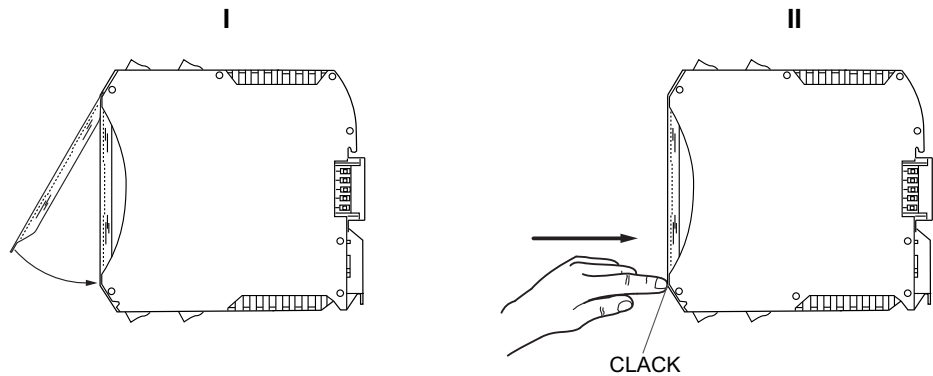
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5.10.4 SBus data frame

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

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

Process data word 1 (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 freely configured.

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

Diagnostics	Process data word	Bit	High byte assignment	Low byte assignment
PS module diagnostics	0	0 – 15	MOVILINK® status word	
UCS..B diagnostics	1	0 – 3		Status
		4		1
		5 – 7		Life bit
		8 – 15	0	
	2	0 – 15	Diagnostic data (bits 8 – 15)	Diagnostic data (bits 0 – 7)
			High byte error code[1]	Low byte error code[1]
	3 (with RUN status)	15	0	
		0 – 14	Diagnostic data (bits 24 – 30)	Diagnostic data (bits 16 – 23)
		15	1	
		0 – 14	High byte ECS code	Low byte ECS code
	4	0 – 15	Logic data (bit: 40 – 47)	Logic data (bit: 32 – 39)
	5	0 – 15	0	Logic data (bit: 48 – 55)
	6	0 – 15	Process data (bit: 0 – 15)	
	7	0 – 15	Process data (bit: 16 – 31)	
	8	0 – 15	Process data (bit: 32 – 47)	
	9	0 – 15	Process data (bit: 48 – 63)	

1) For status "alarm" and "error".

It is not possible to adjust the process image of the logic data for access via 3 PD. All 10 PD logic and process data are always transferred in the setup mentioned above. However, the gateway can read only the first 3 PD. To ensure that the error code is also transferred with gateways with 3 PD, in the status "alarm" and "error", the error code is transferred with process data word 2.

If the error and operating messages are selected as process data, the error code is not transferred in process data word 2. The code of an ECS message is transferred in process data word 3. As soon as an alarm, error, or ECS message is active, bit 15 is set in process data word 3.

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

Process data	Source	Data length in bits	
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
Analog value	Input 1/input 2	16	
Analog value of filter	Input 1/input 2	16	
Analog value of adder	Input 1/input 2	16	

5.11 CAN connection of MOVISAFE® UCS25B

5.11.1 Connection of UCS25B option

The UCS25B diagnostic module can be connected to a higher-level controller or a DHF..BB or DHR..B controller (Use CAN 2 port at controller) to exchange diagnostics information. The process image can be configured using the MOVISAFE® UCS CM software.

- Sample circuit for fieldbus connection of MOVISAFE® UCS25B via DHF..B and DHR..B.
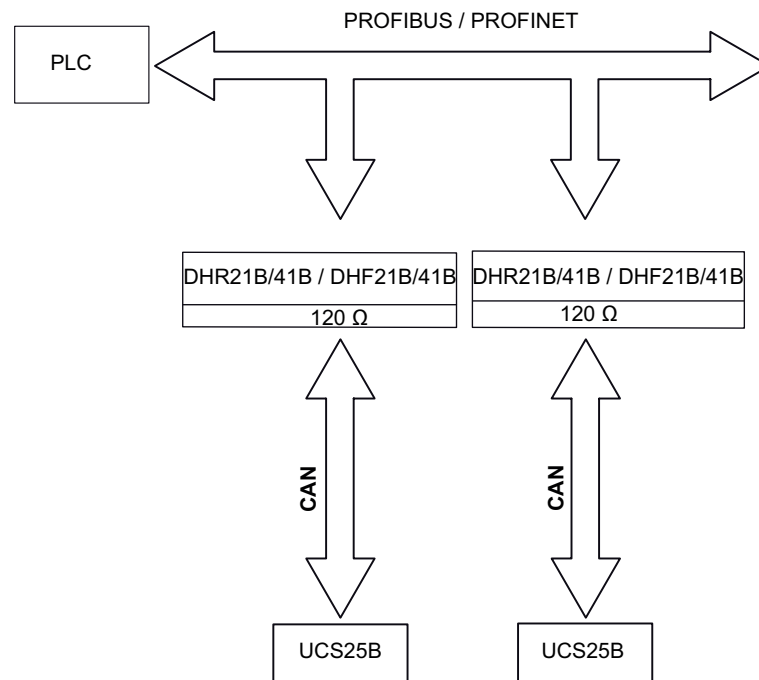
13795437451

- CAN sample circuit with one MOVISAFE® UCS25B module and a DHF..B or DHR..B controller:
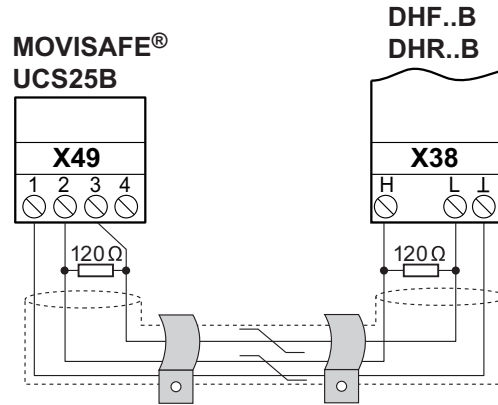
13795635339

Observe the following information on the CAN sample circuit:

- The fieldbus connection must be terminated with 120 Ω at the first and last station. Wiring an 120 Ω resistor each is necessary for both terminating UCS25B and the controller (for example DHF41B).

- 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 mm² – 0.75 mm²

  - Cable resistance: 120 Ω at 1 MHz

  - Capacitance per unit length: ≤ 40 pF/m at 1 kHz

  Suitable cables are CAN or DeviceNet™ cables.

- The permitted total cable length is 80 m at a baud rate of 500 kBaud.

- There must not be any potential shift between the devices connected via fieldbus. Take suitable measures to avoid potential shift, such as connecting the device ground connectors using a separate cable.

- Point-to-point wiring is not permitted.

5.11.2 Structure of CAN messages when using the UCS25B diagnostic module

Using MOVISAFE® Config UCS C, you can set the transmission of 2 CAN messages with 8 bytes each. The first CAN message is always sent and contains variable logic data from the function block diagram. The second CAN telegram can be transmitted optionally and contains configurable process data. The CAN ID assigned to the data frame can be freely configured.

A data frame is structured as follows:

Byte 7	Byte 6	Byte 5	Byte 4	Byte 3	Byte 2	Byte 1	Byte 0

The baud rate of the CAN interface is 500 kBit/s.

Structure of CAN message 1

Byte	Bit	Description	
0	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 bit	
1	0 – 7	Logic data (data bit: 48 – 55)	
2	0 – 7	Logic data (data bit: 40 – 47)	
3	0 – 7	Logic data (data bit: 32 – 39)	
4	0 – 7	Logic data (data bit: 8 – 15)	
5	0 – 7	Logic data (data bit: 0 – 7)	
6	0 – 6	Logic data (data bit: 24 – 30)	High byte error code
	7	"0" (status bit)	"1" (status bit)
7		Logic data (data bit: 16 – 23)	Low byte error code

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 in the CAN telegram 1 can be freely configured.

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If the device is in alarm or error state, 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 having acknowledged the alarm or error status, the error code in bytes 6 and 7 is replaced with the current logic data.

Structure of CAN message 2

The bit position of the process data in CAN message 2 is assigned automatically depending on the configured data and the data length. The bit position is displayed when configuring the process data in MOVISAFE® Config UCS CM.

Byte	Bit	Description
0	0 – 7	Process data (data bit: 56 – 63)
1	0 – 7	Process data (data bit: 48 – 55)
2	0 – 7	Process data (data bit: 40 – 47)
3	0 – 7	Process data (data bit: 32 – 39)
4	0 – 7	Process data (data bit: 24 – 31)
5	0 – 7	Process data (data bit: 16 – 23)
6	0 – 7	Process data (data bit: 8 – 15)
7	0 – 7	Process data (data bit: 0 – 7)

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

Process data	Source	Data length in bits	
Current position	Axis 1 and/or 2	16, 20, 24	
Current velocity		08, 12, 16	Configurable data length
Current SLP position (teach-in)	SLP 1 and/or SLP 2	16, 20, 24	
Error and operating messages	-	16	
Analog value	Input 1/input 2	16	Data length cannot be configured
Analog value of filter	Input 1/input 2	16	
Analog value of adder	Input 1/input 2	16	

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- Bear in mind for configuration that 64 bits is the maximum number of bits of CAN message 2 that can be transmitted.

- Non-existent process data (for example because no encoder has been configured) are transmitted with "0". The availability of process data is not monitored.

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5.12 PROFIBUS connection of MOVISAFE® UCS26B

5.12.1 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. Parameterize the modules as PROFIBUS stations (slave). The baud rate of 9.6 kBaud to 12 MBaud is detected automatically. The maximum length of PROFIBUS messages can be 16 bytes. The corresponding GSD files are available for download from the SEW-EURODRIVE homepage (www.sew-eurodrive.com). The MOVISAFE® 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:

5624528011
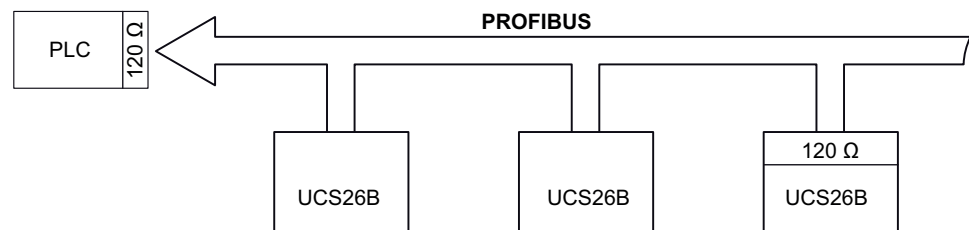
INFORMATION

- 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 devices connected via fieldbus. Take suitable measures to avoid potential shift, such as connecting the device ground connectors using a separate cable.

- Voltage is supplied via the basic module.

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 required address parameters 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

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 freely configured.

Process data, which can be configured with MOVISAFE® Config UCS CM, are transmitted in bytes 8 – 15.

Block	Byte	Bit position 0 – 7						
Signal channel bit ID	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		Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Bit ID 1 – 56	1 – 7	49 – 56	41 – 48	33 – 40	9 – 16	1 – 8	25 – 32	17 – 24
Alarm/error state	6	Bit 0 - 6	High byte error code					
		Bit 7	Status bit					
	7		Low byte error code					
Process data	8	Process data (data bit 56 – 63)						
Max. 64 bits	9	Process data (data bit 48 – 55)						
	10	Process data (data bit 40 – 47)						
	11	Process data (data bit 32 – 39)						
	12	Process data (data bit 24 – 31)						
	13	Process data (data bit 16 – 23)						
	14	Process data (data bit 8 – 15)						
	15	Process data (data bit 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	
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	

Process data	Source	Data length in bits	
Error and operating messages	-	16	Data length cannot be configured
Analog value	Input 1/input 2	16	
Analog value of filter	Input 1/input 2	16	
Analog value of adder	Input 1/input 2	16	

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If the device is in alarm or error state, 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 having acknowledged the alarm or error status, the error code in bytes 6 and 7 is replaced with the current logic data.

5.13 PROFINET connection of MOVISAFE® UCS27B

5.13.1 MOVISAFE® UCS27B

You can use the UCS27B diagnostic module 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. Parameterize the modules as PROFINET stations (slave). The corresponding GSDML files are available for download from the SEW-EURODRIVE homepage (www.sew-eurodrive.com). The UCS27B diagnostic module has to be connected with a basic module (UCS10B, UCS11B or UCS12B) via backplane bus connector.

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• 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 devices connected via fieldbus. Take suitable measures to avoid potential shift, such as connecting the device 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.

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 freely configured.

Process data, which can be configured with MOVISAFE® Config UCS CM, are transmitted in bytes 8 – 15.

Block	Byte	Bit position 0 – 7						
Signal channel bit ID	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 state	6	Bit 0 - 6	High byte error code					
		Bit 7	Status bit					
	7		Low byte error code					
Process data	8	Process data (data bit 56 – 63)						
Max. 64 bits	9	Process data (data bit 48 – 55)						
	10	Process data (data bit 40 – 47)						
	11	Process data (data bit 32 – 39)						
	12	Process data (data bit 24 – 31)						
	13	Process data (data bit 16 – 23)						
	14	Process data (data bit 8 – 15)						
	15	Process data (data bit 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	
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	

Process data	Source	Data length in bits	
Error and operating messages	-	16	Data length cannot be configured
Analog value	Input 1/input 2	16	
Analog value of filter	Input 1/input 2	16	
Analog value of adder	Input 1/input 2	16	

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If the device is in alarm or error state, 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 having acknowledged the alarm or error status, the error code in bytes 6 and 7 is replaced with the current logic data.

6 Startup

6.1 General startup instructions

6.1.1 Prerequisites

- The following prerequisites must be fulfilled to ensure successful startup:
    - The system must be configured correctly
    - The MOVISAFE® Config UCS CM software must be installed. The latest release is available on the internet on the SEW website or on the MOVISAFE® Software ROM.

        For detailed configuration notes and a description of the parameters, refer to the online help in the MOVISAFE® Config UCS CM software.
    - The MOVISAFE® Assist UCS software must be installed. The latest release is available on the internet on the SEW website or on the MOVISAFE® Software ROM.
    - Adobe Acrobat Reader Version 6.0 or higher must be installed.

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INFORMATION

The software MOVISAFE® Config UCS CM and MOVISAFE® Assist UCS is classified as not safety-relevant due to the validation to be performed. MOVISAFE® Config UCS CM and MOVISAFE® Assist UCS are not presented at TÜV (Technical Inspection Association) for testing and are thus not certified.

- Installation prerequisites for installation and operation of the MOVISAFE® Config UCS CM software:
    - Operating system: Microsoft Windows® 8, 7, Vista, XP or 2000
    - Microsoft .NET Framework 3.5

        Microsoft .NET Framework 3.5 has various new features that are incrementally based on *.NET Framework 2.0* and *3.0* and include *.NET Framework 2.0 Service Pack 1* and *.NET Framework 3.0 Service Pack 1*.
    - Microsoft .NET Framework 3.5 Service Pack 1

        Microsoft .NET Framework 3.5 Service Pack 1 is a complete cumulative update that comprises many new features that are incrementally based on *.NET Framework 2.0, 3.0* and *3.5*. Further, it contains a cumulative service update for the subcomponents of *.NET Framework 2.0* and *.NET Framework 3.0*.
    - Required hard disk space: about 100 MB
    - RAM: 512 MB or more recommended
- Installation prerequisites for installation and operation of the MOVISAFE® Assist UCS software:
    - Operating system: Microsoft Windows® 8, 7, Vista, XP or 2000
    - Microsoft .NET Framework 3.5

        Microsoft .NET Framework 3.5 has various new features that are incrementally based on *.NET Framework 2.0* and *3.0* and include *.NET Framework 2.0 Service Pack 1* and *.NET Framework 3.0 Service Pack 1*.
    - Microsoft .NET Framework 3.5 Service Pack 1

        Microsoft .NET Framework 3.5 Service Pack 1 is a complete cumulative update that comprises many new features that are incrementally based on *.NET Framework 2.0, 3.0* and *3.5*. Further, it contains a cumulative service update for the subcomponents of *.NET Framework 2.0* and *.NET Framework 3.0*.

– Required hard disk space: about 100 MB

– RAM: 512 MB or more recommended

– Version: 01-10-xx-xx-00 and higher

• 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 20 Feb 2014 or later

– DHR21B/41B and DHF21B/41B controllers (firmware version 16 and higher) with fieldbus connection (firmware version 16 or higher)

– GSD file (PROFIBUS) or GSDML file (PROFINET):

Download from www.sew-eurodrive.com

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

6.1.2 Startup steps

• Make sure that the following tasks have been performed properly and in accordance with the application:

– MOVISAFE® UCS..B installation

– 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.

• Parameterize and program MOVISAFE®UCS..B to suit your application.

• Perform a validation (see chapter "Validation"). Create an acceptance protocol (see chapter "Acceptance protocol").

6.2 Communication and establishing a connection

6.2.1 RS485 interface X6

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

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.

6.2.2 XCD or XCS communication interfaces

Communication via MOVITOOLS® MotionStudio software is possible with PROFIsafe connection via XCD or XCS communication interfaces.
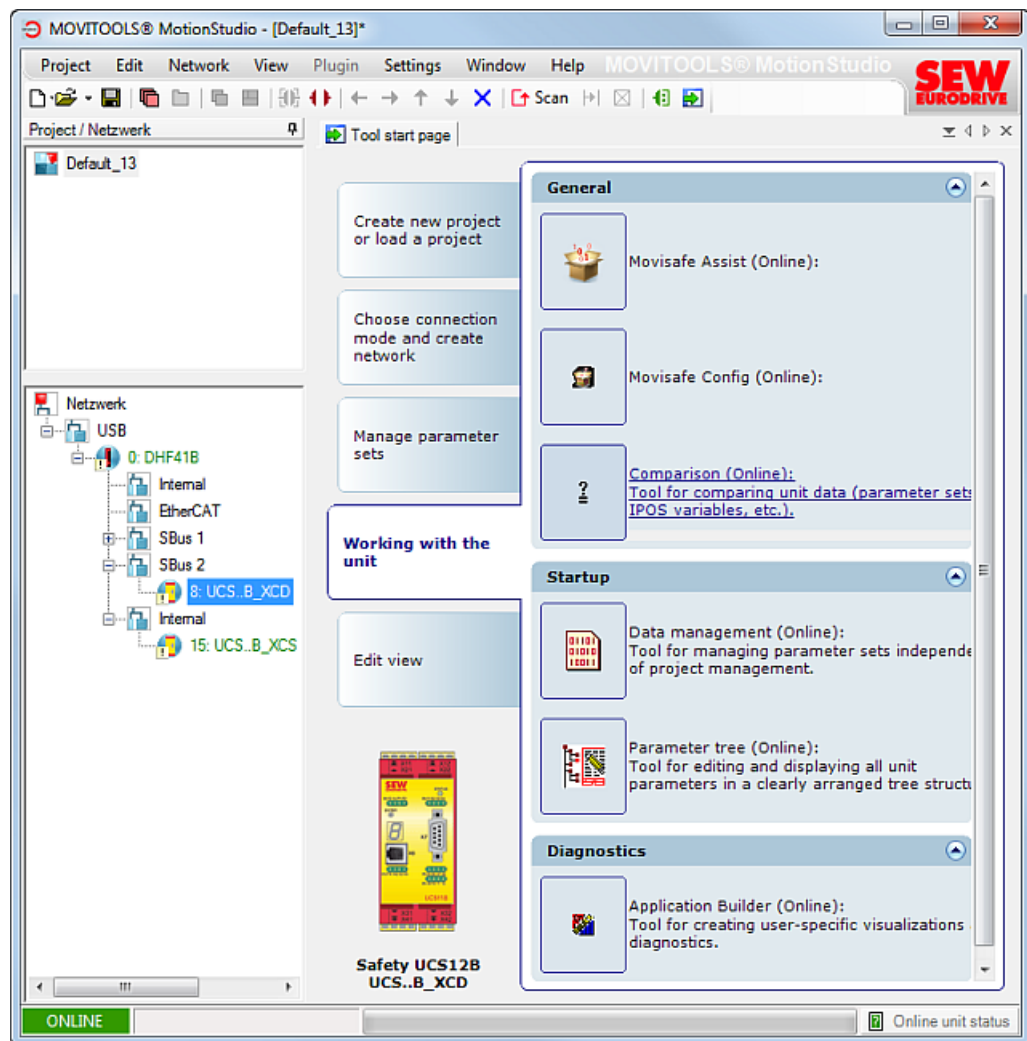
9007203351276043

MOVITOOLS® MotionStudio is used to:

- Display device and diagnostic data of the UCS..B option in the parameter tree.

- Realize parameter access to device and diagnostic data.

- Access MOVISAFE® Config UCS CM or MOVISAFE® Assist UCS. Connection settings are set automatically in MOVISAFE® Config UCS CM or MOVISAFE® Assist UCS.

- Manage data (read and send configuration file).

- Transfer a configuration to the UCS..B option.

- Enable safety data sets (SDS) to transfer a configuration.

6.3 MOVISAFE® Assist UCS

Using the MOVISAFE® Assist UCS software, you can change already approved parameters (e.g. SLS limit value) of already pre-validated software modules without using a license dongle. Only the adjusted parameters are considered in the final validation.

This requires a software module that has been created and validated using MOVISAFE® Config UCS CM (incl. license dongle). For additional information, refer to the online help of the respective software.

7 Validation

> ## ⚠ DANGER
>
> Correct function of the safety functions and the logic of the user program are not guaranteed without validation.
>
> Severe or fatal injuries.
>
> - Validate each safety function as well as 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 or MOVISAFE® Assist UCS software in the form of a acceptance protocol.

The MOVISAFE® concept relies on the following basic assumptions:

Parameter data and PLC data that are 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, thresholds and limit values.

An acceptance protocol is used for validation.

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 generate an individual acceptance protocol in MOVISAFE® Config UCS CM or MOVISAFE® Assist UCS and save the 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. Page 3 and following of the acceptance protocol contain 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 or MOVISAFE® Assist UCS 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 or MOVISAFE® Assist UCS 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

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· 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.

· During validation after startup using the MOVISAFE® Assist UCS software, the adjusted parameters and safety functions must be validated.

· The printed IL code must be validated, see "MOVISAFE® UCS..B" system manual, chapter "Appendix", subchapter "IL instruction list".

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.

9007203518483595
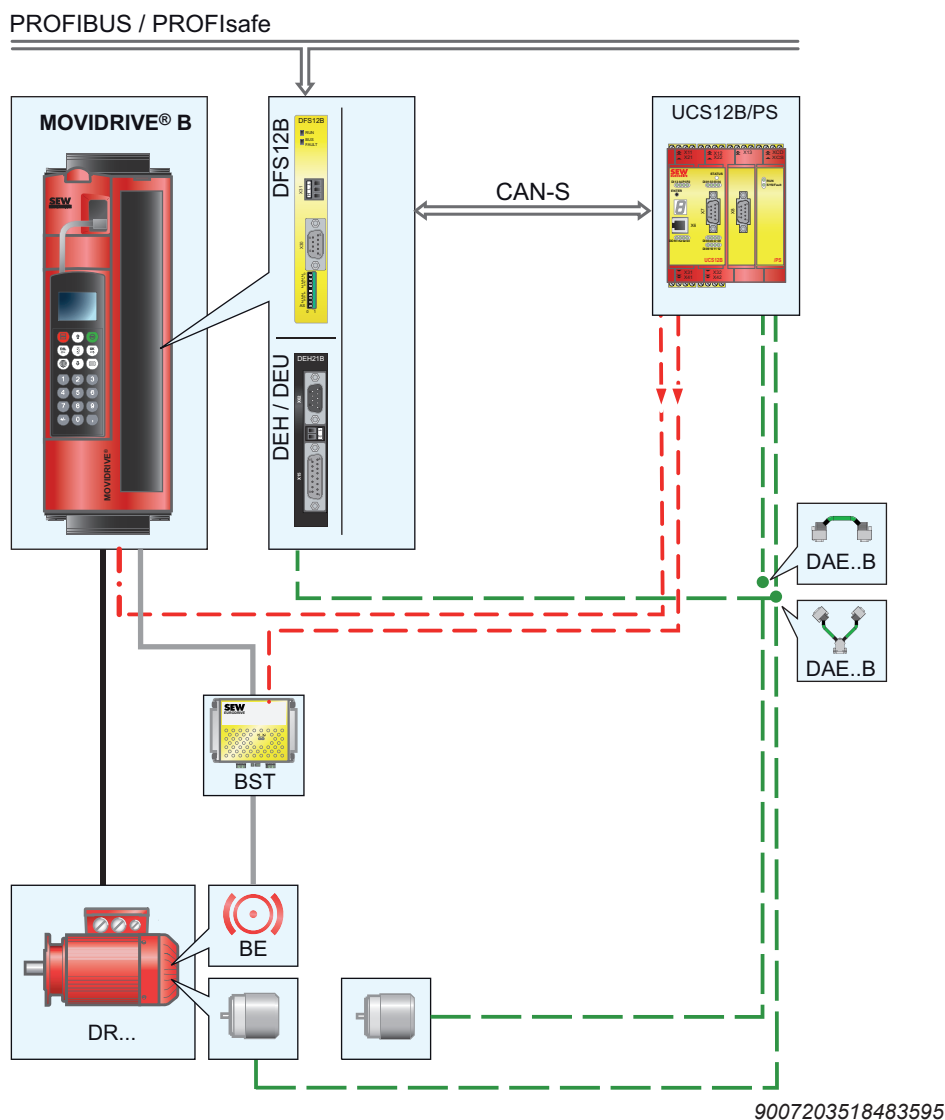
The following components are used:

- 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.
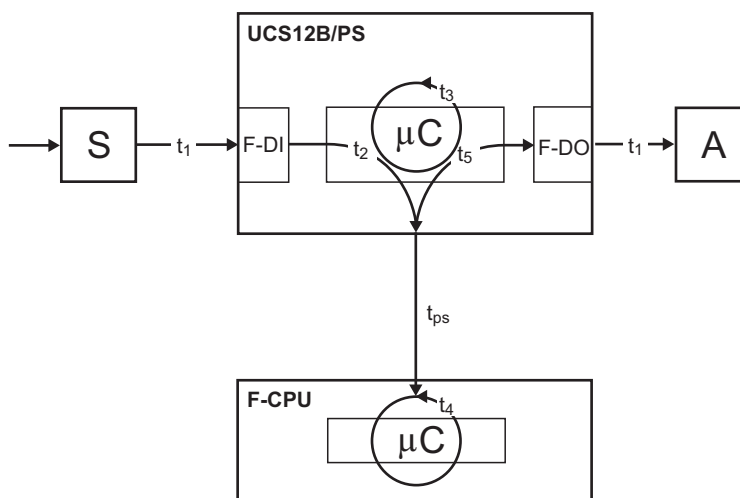
4262008715

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**

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 to check 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 component library is available for download from the SEW website (www.sew-eurodrive.com).

8 Operation

8.1 Description of the 7-segment display

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

7-segment display/ status	Mode	Description
1	STARTUP	Synchronization between both 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 bus system (PROFIsafe) for UCS..B/ PS option (applies up to version 01-07-xx-xx-00). • UCS..B/PS option 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 lit up light in the right lower corner of the 7-segment display. • Off FBus not in use. • Flashing with 2 Hz (applies for version 01-08-xx-xx-00 and higher) No connection to master. • Flashing with 0.5 Hz (applies for version 01-08-xx-xx-00 and higher) UCS..B/PS passivated. • On – Up to version 01-07-xx-xx-00: An active PROFIsafe interface is indicated by an lit up light in the right lower corner of the 7-segment display. – Version 01-08-xx-xx-00 and higher: Connected to FBus.
F	FAILURE	A fault can only be reset by switching the module off and then on again (see chapter "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 chapter "Types of error and alarm messages").
E	ECS-ALARM or ACS-ALARM	An ECS alarm can be reset via digital inputs or by pressing the "ENTER" pushbutton on the front panel (see chapter "Types of error and alarm messages").

INFORMATION

- In states 1, 2, 3 and 5, the outputs are automatically switched off by the firmware.

- In status 4, the implemented MOVISAFE® program is processed and the configured outputs are switched.

- In states 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 automatically.

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 device 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.

Status LED	Description
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.
Green light	Processing of the received data OK.
Flashing red	Internal communication error for basic module.
Red light	Device 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 displays the three CRC codes of the current device configuration in the 7-segment display for about 3 seconds.

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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 device.

7-seg-ment display	Mode	Description
1	STARTUP	Synchronization between both 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 bus system (PROFIsafe) for UCS..B/PS option (applies up to version 01-07-xx-xx-00). • UCS..B/PS option configured via XCD or XCS and safety data set (SDS) not yet enabled.
4	RUN	Device is ready for operation, i.e. all outputs can be switched.

.	RUN BUS	An active PROFIsafe interface is indicated by an lit up light in the right lower corner of the 7-segment display.
		
		• Off
		  FBus not in use.
		• Flashing with 2 Hz (applies for version 01-08-xx-xx-00 and higher)
		  No connection to master.
		• Flashing with 0.5 Hz (applies for version 01-08-xx-xx-00 and higher)
		  UCS..B/PS passivated.
		• On
		  – Up to version 01-07-xx-xx-00:
		    An active PROFIsafe interface is indicated by an lit up light in the right lower corner of the 7-segment display.
		  – Version 01-08-xx-xx-00 and higher:
		    Connected to FBus.

INFORMATION

The firmware automatically disables the outputs for all operating modes 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.

LED DIO 01 – 10

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

9 Service

9.1 General information

INFORMATION

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- The safety certification and any right to claim under limited warranty become void if the user manipulates the device internally (e.g. replacing components or printed circuit boards, 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 chapter "Communication and establishing a connection".

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 exchanged can no longer be addressed or if an SSI encoder is connected. Note that SSI parameterization has changed as of version 01-05-xx-xx-00. It is not backward 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 specified on the nameplate of the basic module. If the SSI signal is split, check if the device to be replaced has FW version 2 or lower.
- The CRC codes (3) from the basic module must be identical with those of the configuration and the acceptance protocol.

INFORMATION

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- The 3 different CRC codes are indicated with a letter and 5 digits.
  - 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 or MOVISAFE® Assist UCS (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

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- Encoder and connection cables may only be connected or disconnected while the voltage supply is switched off.

- When using prefabricated encoder cables or the encoder signal 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.

Proceed as follows:

1. Start the MOVISAFE® Config UCS CM software and select the respective basic module.

2. Use the PC to establish a connection with the basic module (menu [Connection] > [Connect]).

3. Read the current configuration from the basic module (menu [Connection] > [Read] > [Configuration]). If the PRF function is used, the PRF table must be saved separately. Read the current PRF table from the basic module (menu [Connection] > [Read] > [PRF table]).

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. Screw the encoder plug to the D-Sub9 socket of the 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 4 to the new basic module (menu [Connection] > [Send] > [Configuration]). If the PRF function is used, the PRF table must be transferred separately. Transfer the current PRF table from the basic module (menu [Connection] > [Send] > [PRF table]).

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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. Perform a function test.
   - Check if the inputs and outputs respond as required.
   - Check if the encoders provide speed and position values.
3. Read the CRC codes (3) from the new basic module. The CRC codes must be identical with those of the acceptance protocol.
4. Enter the transmission counter in the acceptance protocol.
5. Enter the serial number of the new basic module in the acceptance protocol.
6. Confirm the changes in the acceptance protocol with date, name, and signature.

9.4 Replacing the expansion module

9.4.1 Preparation

The following must be considered for 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 specified 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 device address from the bottom of the expansion module.
5. Set the same device 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.

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 date, name, and signature.

INFORMATION

i 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 for 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 specified 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

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

9.6 Replacing an SSI absolute encoder

3 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 (without EOS safety function)	Positions are monitored: • Adjust/recalculate the required encoder offset (usually with rotary encoders)
Active (with EOS safety function)	Positions are monitored: • The adaptation/recalculation of the required encoder offset (usually with rotary encoders) is realized in the configuration (original program) of EOS.

9.6.1 Replacing the SSI absolute encoder with inactive position processing

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 **with inactive position processing**:

1. Before replacing the encoder, switch off the mains voltage and the DC 24 V supply voltage.

2. Disconnect terminal X17 on MOVIDRIVE® B or MOVITRAC® B device, 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 mains voltage back on.

5. Re-connect terminal X17 (on MOVIDRIVE® B /MOVITRAC® B) or X7/X8 (on MOVIAXIS®).

6. Connect MOVISAFE® UCS..B with your PC, see chapter "Communication and establishing a connection".

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

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An empty program is sufficient to check the plausibility with the SCOPE function. Select UCS11B, UCS12B, o UCS14B/PS basic module 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.).

9.6.2 Replacing the SSI absolute encoder with active position processing

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 mains voltage and the DC 24 V supply voltage.

2. Disconnect terminal X17 on MOVIDRIVE® B or MOVITRAC® B devices, 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 mains voltage back on.

5. Re-connect terminal X17 (on MOVIDRIVE® B /MOVITRAC® B) or X7/X8 (on MOVIAXIS®).

6. Connect MOVISAFE® UCS..B with your PC, see chapter "Communication and establishing a connection".

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. 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. The following changes cause the CRC to be calculated again.

10. Open the encoder dialog and enter the value "0" in the "Offset" edit box.

11. Save this new configuration under another name.

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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.

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

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MOVISAFE® Config UCS CM offers a calculation aid for calculating the offset. You can start in 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.

9.6.3 Replacing the SSI absolute encoder with active position processing with EOS function

Preparation

The 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 **with active position processing with EOS safety function**:

1. Before replacing the encoder, switch off the mains voltage and the DC 24 V supply voltage.

2. Disconnect terminal X17 on MOVIDRIVE® B or MOVITRAC® B devices, 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 mains voltage back on.

5. Re-connect terminal X17 (on MOVIDRIVE® B /MOVITRAC® B) or X7/X8 (on MOVIAXIS®).

6. Move the application to the defined position for referencing of the SSI absolute encoder.

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

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An empty program is sufficient to check the plausibility with the SCOPE function. Select a basic module with encoder interface (UCS11B, 12B, or 14B/PS) because only this was the full SCOPE functionality is available.

9.7 Types of error and alarm messages

MOVISAFE® UCS..B basically distinguishes between 4 types of messages as follows.

Mes-sage	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.	Switch MOVISAFE® off and then on again.
Alarm	Functional error caused by external process. Both systems (A, B) continue to run cyclically.		With parameterizable input or <ENTER> button on MOVISAFE®.
ECS	When using the ECS function block in the programming interface, encoder alarm messages will be indicated with "E" instead of "A"[1].	The ECS function block returns "0" as result.	-
ACS	When using the ACS function block in the programming interface, alarm messages of analog inputs will be indicated with "E" instead of "A"[1].	The ACS function block returns "0" as result.	-

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

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 code has the following meaning:
	• 0: Basic module
	• 1: Expansion module with logic address 1
	• 2: Expansion module with logic address 2

INFORMATION

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For a list of fault and alarm messages, refer to the software interface MOVISAFE® Config UCS CM and the "MOVISAFE® UCS..B" system manual.

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

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	0 °C – 50 °C
Storage temperature	-10 °C – 70 °C
Climate class	3k3 according to EN 60721-3-3
Service life	90000 h[1]

1) At 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
UCS14B/PS	2.4 W
UCS23B	3.8 W

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
	OSSD-suitable	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
	OSSD-suitable	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
	OSSD-suitable	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
	OSSD-suitable	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
	OSSD-suitable	Yes

Analog inputs		
AI 1 to AI 4	Nominal voltage	DC -7 V to DC +10 V
	Nominal input current	0.02 A

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)	Current-carrying 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	2800000 (an nominal load)
K 0.2 (only for UCS1.B)	Current-carrying 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	2800000 (an nominal load)
Pulse outputs		
P1	Output voltage	DC 24 V with fixed pulse pattern
	Nominal output current	0.25 A (sum P1 + P2)
P2	Output voltage	DC 24 V with fixed pulse pattern
	Nominal output current	0.25 A (sum P1 + P2)

INFORMATION

- X = 0: Basic module
- X = 1: 1. expansion module
- X = 2: 2. expansion module

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	

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	

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	

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	

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	

10.5.7 MOVISAFE® UCS14B/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 condition	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 analog inputs • 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	

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.

10.7.1 Response times of the basic modules

The 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 runtime 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 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 enabling 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) (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
Analog filter 1 (2 Hz)	760
Analog filter 2 (3 Hz)	760
Analog filter 3 (4 Hz)	760
Analog filter 4 (5 Hz)	512
Analog filter 5 (6 Hz)	268
Analog filter 6 (8 Hz)	143
Analog filter 7 (10 Hz)	86
Analog filter 8 (20 Hz)	56
The analog filter only affects the safe analog input of UCS14B/PS module. The response times of the analog input filter refer to the input frequency.	

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

10.7.2 Response times of UCS23B expansion modules

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

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.

10.8.1 Digital inputs

i

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. This also applies to a combination of digital and analog sensors (such as safely reduced speed with open safety door = door contact + encoder for speed detection).

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 Analog 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. This also applies to a combination of digital and analog sensors (such as safely reduced speed with open safety door = door contact + encoder for speed detection).

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

Measure	DC value	Comment	Use
Cross comparison of input signals with dynamic test if short circuits cannot be detected (with multiple inputs/outputs).	90%	Comparison of analog input value to identical characteristics of both channels.	Monitoring of dual-channel sensor systems with identical characteristics of input signals.
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%	Comparison of analog input value to diverse characteristics of both channels (e.g. inverse signal course etc.).	Monitoring of dual-channel sensor systems with diverse characteristics of input signals.

10.8.3 Digital outputs

i

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.

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.

10.8.4 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
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%	Use only for: • 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 chapter "Connecting position and velocity sensors").	Monitoring of the single-channel subsystem of single-channel sensors.

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 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 cut-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, X7-2, X8 or X8-2.

Data interface	SSI
Frame Length	10 to 28 bits (variable configuration)
Data Length	10 to 28 bits (variable configuration)
Status Length	0 to 5 bits (variable configuration) For evaluating error, warning and operating states
Data format	Binary or gray code
Physical Layer	RS422-complatible
Slave operation (listener)	• Max. external clock rate: 200 kHz (for connection at X7, X8) • Max. external clock rate: 350 kHz (for connection at X7-2, X8-2) • Min. clock pulse off time: 30 µs • Max. clock pulse off time: 1 ms
Master mode	Clock rate: 150 kHz

Diagnostics	Parameters	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 of the difference levels at the input	RS485 level	±20% ±2% (measuring tolerance)
Clock rate monitoring		100 kHz < f < 350 kHz
Plausibility velocity compared to position		$\Delta P > 2 \times v \times t$ 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, X7-2, X8 or X8-2.

Physical Layer	RS422-complatible
Measuring signal A/B	Track with 90° phase difference
Max. input frequency	• 200 kHz (for connection at X7, X8) • 500 kHz (for connection at X7-2, X8-2)

Diagnostics	Parameters	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 of the difference levels at the input	RS485 level (fixed value)	±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, X7-2, X8 or X8-2.

Physical Layer	±0.5 V_{pp} (without voltage offset)
Measuring signal SIN/COS	Track with 90° phase difference
Max. input frequency	• 200 kHz (for connection at X7, X8) • 500 kHz (for connection at X7-2, X8-2)

Diagnostics	Parameters	Fault threshold
Supply voltage monitoring	Fixed values 5 V, 8 V, 10 V, 12 V, 20 V or 24 V	±20% ±2% (measuring tolerance)
Monitoring of the amplitude SIN^2 + COS^2	Fixed value 1 V_{pp}	65% of 1 V_{pp} ±2.5% (measuring tolerance)
Monitoring of A/B phase	Fixed value 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 SIN/COS encoder – High Resolution Mode

Connection to X7-2, or X8-2.

Physical Layer	$\pm 0.5 \ V_{pp}$ (without voltage offset)
Measuring signal SIN/COS	Track with 90° phase difference
Max. input frequency	15 kHz

Diagnostics	Parameters	Fault threshold
Supply voltage monitoring	Fixed values 5 V, 8 V, 10 V, 12 V, 20 V or 24 V	$\pm 20\% \ \pm 2\%$ (measuring tolerance)
Monitoring of the amplitude $SIN^2 + COS^2$	Fixed value 1 V_{pp}	65% of 1 V_{pp} $\pm 2.5\%$ (measuring tolerance)
Monitoring of A/B phase	Fixed value 90°	$\pm 30\ ° \ \pm 5\%$ (measuring tolerance)
Monitoring quadrant count signal/signal phase	Fixed value	$\pm 45°$

10.9.5 Resolver

Connection to X7-2, or X8-2.

Measuring signal	SIN/COS track with 90° phase difference
Max. count pulse frequency	2 kHz/pole
Resolution	9 bit/pole
Frequency reference signal	6 – 16 kHz
Reference signal shape	Sine, delta

Diagnostics	Parameters	Fault threshold
Monitoring ratio	Fixed values 2:1, 3:2, 4:1	$\pm 20\% \ \pm 2\%$ (measuring tolerance)
Monitoring of the amplitude $SIN^2 + COS^2$	Fixed value	<2.8 V $\pm 5\%$ (measuring tolerance)
Monitoring of A/B phase	Fixed value 90°	$\pm 7\ ° \ \pm 2\%$ (measuring tolerance)
Monitoring reference frequency	Fixed values: • 6 – 12 kHz in steps of 1 kHz • 14 kHz • 18 kHz	$\pm 20\% \ \pm 5\%$ (measuring tolerance)
Reference signal shape	Sine, delta, no monitoring	40% format deviation

Diagnostics	Parameters	Fault threshold
Monitoring quadrant count signal/ signal phase	Fixed value	±45°

10.9.6 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.

10.9.7 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.

10.9.8 HTL encoder

Connection to X33/X43 (only UCS14B/PS) or X34/X44 (only UCS14B/PS).

Signal level	DC 24 V/0 V
Physical Layer	Push/Pull
Measuring signal SIN/COS	Track with 90° phase difference
Max. input frequency	200 kHz

Diagnostics	Parameters	Fault threshold
Supply voltage monitoring	Fixed values 5 V, 8 V, 10 V, 12 V, 20 V or 24 V	±20% ±2% (measuring tolerance)
Monitoring of the difference levels at the input	RS485 level (fixed value)	±20% ±2% (measuring tolerance)
Monitoring of count signal separated for track A and B	Fixed value	ΔP > 4 increments ΔP = position change

10.10 Plug connectors of the basic module
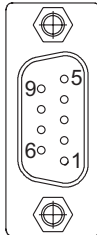
10.10.1 Connector assignment X6

Type: RJ10 plug connector

X6	Signal description	Specification
	• Parameter setting and diagnostic interface • Point-to-point connection (e.g. USB11A)	Asynchronous, RS485 Baud rate: 38.4 kBaud 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 encoder	SSI encoder
	1	N.C.	N.C.	N.C.
	2	DGND	DGND	DGND
	3	N.C.	N.C.	N.C.
	4	$\overline{B}$	SIN-	Pulse –
	5	A	COS+	DATA+
	6	$\overline{A}$	COS-	DATA−
	7	N.C.	N.C.	N.C.
	8	B	SIN+	Pulse +
	9	U_s	U_s	U_s

INFORMATION

ℹ
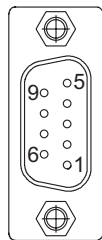
The internal resistance of the encoder interface X7/X8 is adjusted to a signal split between SEW frequency inverter and safety module UCS..B. If the encoder is connected directly, you must use a load impedance (typical value = 120 Ω). The load impedance must be installed between pin 5 and 6 with SSI encoders and between pin 5 and 6 as well as pin 8 and 4 for TTL incremental encoders and SIN/COS encoders. Adjustment of the resistance value might be necessary according to the specification of the encoder supplier.

10.10.3 Pin assignment X7-2/X8-2

Type: D-sub socket.

X7-2/X8-2	PIN	TTL encoder	SIN/COS encoder	SSI encoder X7-2, X8-2	Resolver slave
	1	N.C.	N.C.	N.C.	N.C.
	2	DGND	DGND	DGND	Ref_In−
	3	N.C.	N.C.	Pulse+	Ref_In+
	4	$\overline{B}$	SIN-	N.C.	COS-
	5	A	COS+	DATA+	SIN+
	6	$\overline{A}$	COS−	DATA−	SIN-
	7	N.C.	N.C.	Pulse−	Ref_In−
	8	B	SIN+	N.C.	COS+
	9	U_s	U_s	U_s	Ref_In+

INFORMATION

ℹ
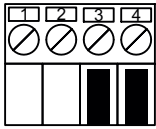
The internal resistance of the encoder interface X7-2/X8-2 is adjusted to a signal split between SEW frequency inverter and safety module UCS..B. If the encoder is connected directly, you must use a load impedance (typical value = 120 Ω). The load impedance must be installed between pin 5 and 6 with SSI encoders and between pin 5 and 6 as well as pin 8 and 4 for TTL incremental encoders and SIN/COS encoders. Adjustment of the resistance value might be necessary according to the specification of the encoder supplier.
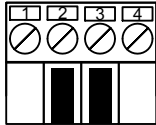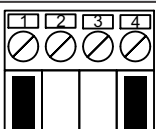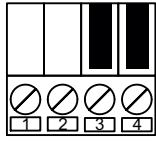
10.10.4 Connector assignment X11

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

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		
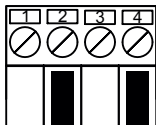
10.10.5 Connector assignment X12

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

Coding	Ter-minal	Assignment	Signal description	Specification
	1	U_ENC_1	Encoder supply voltage X7	DC 5 V – 24 V
	2	GND_ENC_1	Reference potential for encoder supply voltage 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

10.10.6 Pin assignment X12-2
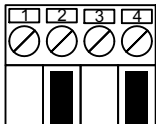
Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

Coding	Ter-minal	Assignment	Signal description	Specification
	1	U_ENC_1	Encoder supply voltage X7-2	DC 5 V – 24 V
	2	GND_ENC_1	Reference potential for encoder supply voltage X7-2	-
	3	N. C.	-	-
	4	N. C.	-	-
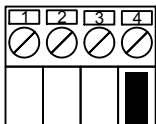
10.10.7 Connector assignment X13

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.
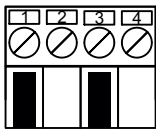
UCS10B, 10B/PS, 11B, 11B/PS, 12B, 12B/PS

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

UCS14B/PS

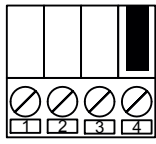| Coding	Ter-minal	Assignment	Signal description	Specification
	1	U_ENC_2	Encoder supply voltage X8	DC 5 V – 24 V
	2	GND_ENC_2	Reference potential for encoder supply voltage X8	-
	3	N.C.	-	-
	4	N.C.		
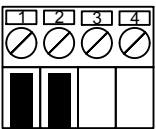
10.10.8 Pin assignment X13-2

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

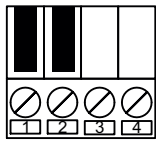| Coding	Ter-minal	Assignment	Signal description	Specification
	1	U_ENC_2	Encoder supply voltage X8-2	DC 5 V – 24 V
	2	GND_ENC_2	Reference potential for encoder supply voltage X8-2	-
	3	N.C.	-	-
	4	N.C.		

10.10.9 Connector assignment X21

4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

Coding	Ter-minal	Assign-ment	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
	4	P2	Pulse output 2 for crossfault monitoring	Max. 0.25 A (sum P1 + P2)

10.10.10 Connector assignment X22

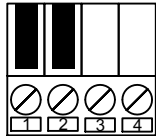Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

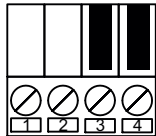| Coding	Ter-minal	Assign-ment	Signal description	Specification
	1	DI 0.01	Digital input 1	DC 24 V, suitable for OSSD
	2	DI 0.02	Digital input 2	DC 24 V, suitable for OSSD
	3	DI 0.03	Digital input 3	DC 24 V, suitable for OSSD
	4	DI 0.04	Digital input 4	DC 24 V, suitable for OSSD
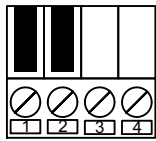
10.10.11 Connector assignment X31

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

UCS10B, 10B/PS, 11B, 11B/PS, 12B, 12B/PS

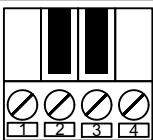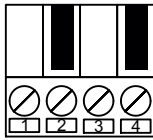| Coding	Ter-minal	Assign-ment	Signal description	Specification
	1	DO 0.02_P	High-side output 2	DC 24 V, 0.5 A
	2	DO 0.02_M	Low-side output 2	DGND, 0.5 A
	3	DO 0.03_P	High-side output 3	DC 24 V, 0.25 A
	4	DO 0.03_M	Low-side output 3	DGND, 0.25 A

UCS14B/PS
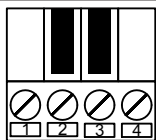
Coding	Ter-minal	Assign-ment	Signal description	Specification
	1	DO 0.02_P	High-side output 2	DC 24 V, 0.5 A
	2	DO 0.02_M	Low-side output 2	DGND, 0.5 A
	3	DO 0.03_P	High-side output 3	DC 24 V, 0.25 A
	4	DO 0.03_M	Low-side output 3	DGND, 0.25 A

10.10.12 Connector assignment X32
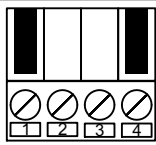
Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

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

UCS10B, 10B/PS, 11B, 11B/PS, 12B, 12B/PS
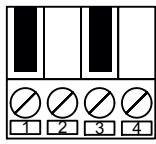
Coding	Ter-minal	Assign-ment	Signal description	Specification
	1	DI 0.05	Digital input 5/HTL proximity sensor	DC 24 V
	2	DI 0.06	Digital input 6/HTL proximity sensor	DC 24 V
	3	DI 0.07	Digital input 7/HTL proximity sensor	DC 24 V
	4	DI 0.08	Digital input 8/HTL proximity sensor	DC 24 V

UCS14B/PS

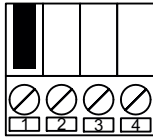| Coding	Terminal	Assignment	Signal description	Specification
	1	DI 0.05	Digital input 5/HTL proximity sensor	DC 24 V
	2	DI 0.06	Digital input 6/HTL proximity sensor	DC 24 V
	3	DI 0.07	Digital input 7/HTL proximity sensor	DC 24 V
	4	DI 0.08	Digital input 8/HTL proximity sensor	DC 24 V

10.10.13 Pin assignment X33

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

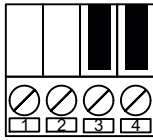| Coding	Terminal	Assignment	Signal description	Specification
	1	HTL_A_1	HTL incremental encoder	DC 24 V
	2	HTL_A_2	HTL incremental encoder	DC 24 V
	3	HTL_A_3	HTL incremental encoder	DC 24 V
	4	N.C.	-	-

10.10.14 Pin assignment X34

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

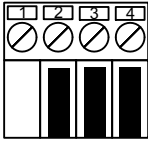| Coding	Terminal	Assignment	Signal description	Specification
	1	HTL_B_1	HTL incremental encoder	DC 24 V
	2	HTL_B_2	HTL incremental encoder	DC 24 V
	3	HTL_B_3	HTL incremental encoder	DC 24 V
	4	N.C.	-	-

10.10.15 Pin assignment X35

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

Coding	Terminal	Assignment	Signal description	Specification
	1	AI1	Analog input 1	DC 24 V
	2	GND_AI1	Reference potential analog input 1	-
	3	AI2	Analog input 2	DC 24 V
	4	GND_AI2	Reference potential analog input 2	-

10.10.16 Connector assignment X41

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

UCS10B, 10B/PS, 11B, 11B/PS, 12B, 12B/PS

Coding	Ter-minal	Assign-ment	Signal description	Specification
	1	K 0.11	Relay 1, contact 1	DC 24 V, 2 A or
	2	K 0.12	Relay 1, contact 2	AC 230 V, 2 A
	3	K 0.21	Relay 2, contact 1	DC 24 V, 2 A or
	4	K 0.22	Relay 2, contact 2	AC 230 V, 2 A
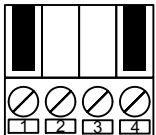
UCS14B/PS

Coding	Ter-minal	Assign-ment	Signal description	Specification
	1	K 0.11	Relay 1, contact 1	DC 24 V, 2 A or
	2	K 0.12	Relay 1, contact 2	AC 230 V, 2 A
	3	K 0.21	Relay 2, contact 1	DC 24 V, 2 A or
	4	K 0.22	Relay 2, contact 2	AC 230 V, 2 A

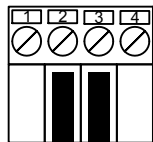### 10.10.17 Connector assignment X42

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

UCS10B, 10B/PS, 11B, 11B/PS, 12B, 12B/PS

Coding	Ter-minal	Assign-ment	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

UCS14B/PS

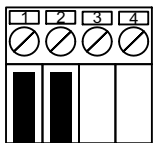| Coding	Terminal	Assignment	Signal description	Specification
	1	DI 0.09	Digital input 9	DC 24 V, suitable for OSSD
	2	DI 0.10	Digital input 10	DC 24 V, suitable for OSSD
	3	DI 0.11	Digital input 11	DC 24 V, suitable for OSSD
	4	DI 0.12	Digital input 12	DC 24 V, suitable for OSSD

10.10.18 Pin assignment X43

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

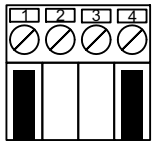| Coding	Terminal	Assignment	Signal description	Specification
	1	HTL_A_1	HTL incremental encoder	DC 24 V
	2	HTL_A_2	HTL incremental encoder	DC 24 V
	3	HTL_A_3	HTL incremental encoder	DC 24 V
	4	N.C.	-	-

10.10.19 Pin assignment X44

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

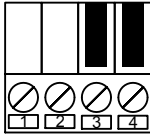| Coding	Terminal	Assignment	Signal description	Specification
	1	HTL_B_1	HTL incremental encoder	DC 24 V
	2	HTL_B_2	HTL incremental encoder	DC 24 V
	3	HTL_B_3	HTL incremental encoder	DC 24 V
	4	N.C.	-	-

10.10.20 Pin assignment X45

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

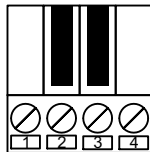| Coding	Terminal	Assignment	Signal description	Specification
	1	AI3	Analog input 3	DC 24 V
	2	GND_AI3	Reference potential analog input 3	-
	3	AI4	Analog input 4	DC 24 V
	4	GND_AI4	Reference potential analog input 4	-

10.10.21 Connector assignment XCS

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

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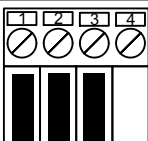
INFORMATION

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

10.10.22 Connector assignment XCD

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

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

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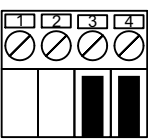
A cable jumper between pins 1 and 4 terminate the CAN with 120 Ω.

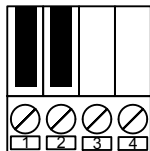## 10.11 Plug connectors of the expansion module

10.11.1 Connector assignment X15

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

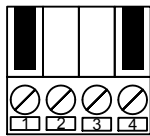| Coding	Terminal	Assignment	Signal description	Specification
	1	DC+24 V	DC 24 V supply voltage	DC 20.4 V – 27.6 V
	2	DC+24 V		
	3	0V24	0 V reference potential	-
	4	0V24		

10.11.2 Connector assignment X16

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

Coding	Ter-minal	Assign-ment	Signal description	Specification
	1	N. C.	-	-
	2	N. C.		
	3	DO X.00	Auxiliary output	DC 24 V, 0.1 A
	4	DO X.01	Auxiliary output	DC 24 V, 0.1 A

10.11.3 Connector assignment X25

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

Coding	Ter-minal	Assign-ment	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
	4	P2	Pulse output 2 for crossfault monitoring	Max. 0.25 A (sum P1 + P2)

10.11.4 Connector assignment X26

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

Coding	Ter-minal	Assign-ment	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

10.11.5 Connector assignment X35

Type: 4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

Coding	Ter-minal	Assign-ment	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-pin Phoenix terminal, max. core cross section 1.5 mm^2.

Coding	Ter-minal	Assign-ment	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-pin Phoenix terminal, max. core cross section 1.5 mm^2.

Coding	Ter-minal	Assign-ment	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

10.11.8 Connector assignment X46
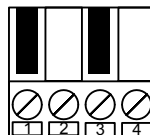
4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

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
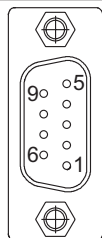
10.12.1 Connector assignment X49 on UCS25B

4-pin Phoenix terminal, max. core cross section 1.5 mm^2.

Coding	Terminal	Assignment
	1	DGND
	2	CAN High
	3	CAN Low
	4	N.C.
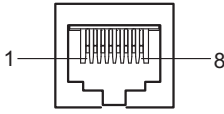
10.12.2 Connector assignment XDP on UCS26B

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.

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.

10.13   Dimension drawing

9007202038842123
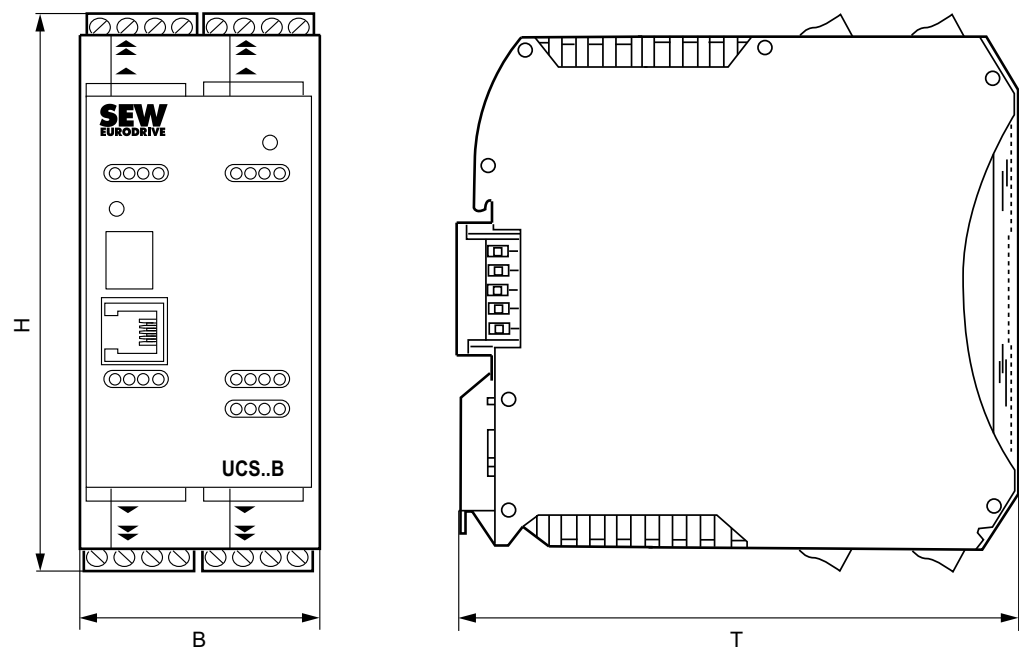
MOVISAFE®	Size (H × D × W)	Weight	Fastening
	mm	kg	
UCS10B	100 × 115 × 45	0.30	Mounted to standard profile rail
UCS10B/PS	100 × 115 × 67.5	0.39	
UCS11B	100 × 115 × 45	0.31	
UCS11B/PS	100 × 115 × 67.5	0.40	
UCS12B	100 × 115 × 67.5	0.39	
UCS12B/PS	100 × 115 × 90	0.48	
UCS14B/PS	100 × 115 × 135	0.73	
UCS23B	100 × 115 × 45	0.3	
UCS25B	100 × 115 × 22.5	0.10	
UCS26B	100 × 115 × 22.5	0.10	
UCS27B	100 × 115 × 22.5	0.10	

11 Declaration of conformity

11.1 MOVISAFE® UCS..B/PS

EU Declaration of Conformity

Translation of the original text

SEW
EURODRIVE

901710016/EN

SEW-EURODRIVE GmbH & Co. KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal
declares under sole responsibility that the following products

Safety component of the series	**MOVISAFE® UCS10B**
	MOVISAFE® UCS10B/PS
	MOVISAFE® UCS11B
	MOVISAFE® UCS11B/PS
	MOVISAFE® UCS12B
	MOVISAFE® UCS12B/PS
	MOVISAFE® UCS13B/PS
	MOVISAFE® UCS14B/PS
	MOVISAFE® UCS23B
	MOVISAFE® UCS25B
	MOVISAFE® UCS26B
	MOVISAFE® UCS27B

are in conformity with

Machinery Directive	**2006/42/EC**	
	(L 157, 09.06.2006, 24-86)	

This includes the fulfillment of the protection targets for "electrical power supply" in accordance with annex I No. 1.5.1 according to the Low Voltage Directive 73/23/EEC -- Note: 2006/95/EC (until 19 Apr 2016) and 2014/35/EU (as of 20 Apr 2016) are currently valid.

EMC Directive	**2004/108/EC (valid until April 19, 2016)**	**4)**
	2014/30/EU (valid as of April 20, 2016)	**4)**
	(L 96, 29.03.2014, 79-106)	
Applied harmonized standards:	**EN ISO 13849-1:2008/AC:2009**	
	EN ISO 13850:2008	
	EN 574:1996/A1:2008	
	EN 62061:2005/AC:2010/A1:2013	
	EN 61800-5-2:2007	
	EN 60204-1:2006/A1:2009/AC:2010 (in part)	
	EN 50178:1997	
	EN 61800-5-1:2007	
	EN 55011:2009/A1:2010	
	EN 61800-3:2004/A1:2012	
	EN 61000-6-2:2005	
	EN 61000-6-4:2007/A1:2011	
Other applied standards:	**IEC 61508 part 1-7:2010**	

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. For the assessment, the product was installed in a typical plant configuration.

Bruchsal	**18.04.2016**	
Place	Date	Johann Soder
		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

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		Function
Documentation	MOVISAFE® Config UCS CM	
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

12.1.2 Inputs on the expansion module

UCS23B:

Designation in		Function
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

i

X = 1: 1st expansion module

X = 2: 2nd expansion module

12.1.3 Outputs on the basic module

UCS10B/11B/12B:

Designation in		Function
Documentation	**MOVISAFE® Config UCS CM**	**Function**
DO 0.00	A 0.1	Auxiliary output

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

INFORMATION

X = 1: 1st expansion module

X = 2: 2nd expansion module

SEW EURODRIVE

13 Address list

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	Drive Service Hotline / 24 Hour Service		Tel. 01924 896911

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	Surabaya	CV. Multi Mas Jl. Raden Saleh 43A Kav. 18 Surabaya 60174	Tel. +62 31 5458589 Fax +62 31 5317220 sianhwa@sby.centrin.net.id http://www.cvmultimas.com

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Kazakhstan			
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	Ulaanbaatar	IM Trading LLC Narny zam street 62 Sukhbaatar district, Ulaanbaatar 14230	Tel. +976-77109997 Fax +976-77109997 imt@imt.mn

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

Luxembourg			
representation: Belgium			

Macedonia			
Sales	Skopje	Boznos DOOEL Dime Anicin 2A/7A 1000 Skopje	Tel. +389 23256553 Fax +389 23256554 http://www.boznos.mk

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

Mexiko			
Assembly Sales Service	Quéretaro	SEW-EURODRIVE MEXICO S.A. de C.V. SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Querétaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Sales Service	Puebla	SEW-EURODRIVE MEXICO S.A. de C.V. Calzada Zavaleta No. 3922 Piso 2 Local 6 Col. Santa Cruz Buenavista C.P. 72154 Puebla, México	Tel. +52 (222) 221 248 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Mongolia			
Technical Office	Ulaanbaatar	IM Trading LLC Narny zam street 62 Union building, Suite A-403-1 Sukhbaatar district, Ulaanbaatar 14230	Tel. +976-77109997 Tel. +976-99070395 Fax +976-77109997 http://imt.mn/ imt@imt.mn

Morocco			
Sales Service	Bouskoura	SEW-EURODRIVE Morocco Parc Industriel CFCIM, Lot 55 and 59 Bouskoura	Tel. +212 522 88 85 00 Fax +212 522 88 84 50 http://www.sew-eurodrive.ma sew@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 anton@dbminingnam.com

Netherlands			
Assembly Sales Service	Rotterdam	SEW-EURODRIVE B.V. Industrieweg 175 3044 AS Rotterdam Postbus 10085 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. 30 Lodestar Avenue, Wigram Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz	

Nigeria			
Sales	Lagos	Greenpeg Nig. Ltd Plot 296A, Adeyemo Akapo Str. Omole GRA Ikeja Lagos-Nigeria	Tel. +234-701-821-9200-1 http://www.greenpegltd.com bolaji.adekunle@greenpegltd.com

Norway			
Assembly Sales Service	Moss	SEW-EURODRIVE A/S Solgaard skog 71 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 sewpy@sew-eurodrive.com.py

Peru			
Assembly Sales Service	Lima	SEW EURODRIVE DEL PERU 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

Philippines			
Sales	Makati	P.T. Cerna Corporation 4137 Ponte St., Brgy. Sta. Cruz Makati City 1205	Tel. +63 2 519 6214 Fax +63 2 890 2802 mech_drive_sys@ptcerna.com http://www.ptcerna.com

Poland				
Assembly Sales Service	Łódź	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 92-518 Łódź	Tel. +48 42 293 00 00 Fax +48 42 293 00 49 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl	
	Service	Tel. +48 42 293 0030 Fax +48 42 293 0043	24 Hour Service Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl	

Portugal			
Assembly Sales Service	Coimbra	SEW-EURODRIVE, LDA. Av. da Fonte Nova, n.º 86 3050-379 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	ЗАО «СЕВ-ЕВРОДРАЙФ» а. я. 36 195220 Санкт-Петербург	Tel. +7 812 3332522 / +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Sambia			
representation: South Africa			

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 http://www.senemeca.com senemeca@senemeca.sn

Serbia			
Sales	Belgrade	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor 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 40 831 06 Bratislava	Tel.+421 2 33595 202, 217, 201 Fax +421 2 33595 200 http://www.sew-eurodrive.sk sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 Mobile +421 907 671 976 sew@sew-eurodrive.sk

Slovenia			
Sales Service	Celje	Pakman - Pogonska Tehnika d.o.o. Ul. XIV. divizije 14 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 11 248-7289 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	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 (PROPRIETARY) LIMITED 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. 7, Dangjaengi-ro, Danwon-gu, Ansan-si, Gyeonggi-do, Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-eurodrive.kr master.korea@sew-eurodrive.com

South Korea			
	Busan	SEW-EURODRIVE KOREA CO., LTD. 28, Noksansandan 262-ro 50beon-gil, Gangseo-gu, Busan, Zip 618-820	Tel. +82 51 832-0204 Fax +82 51 832-0230
Spain			
Assembly Sales Service	Bilbao	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Sri Lanka			
Sales	Colombo	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981
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 6-8 553 03 Jönköping Box 3100 S-550 03 Jönköping	Tel. +46 36 34 42 00 Fax +46 36 34 42 80 http://www.sew-eurodrive.se jonkoping@sew.se
Switzerland			
Assembly Sales Service	Basel	Alfred Imhof A.G. Jurastrasse 10 4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Taiwan			
Sales	Taipei	Ting Shou Trading Co., Ltd. 6F-3, No. 267, Sec. 2 Tung Huw S. Road Taipei	Tel. +886 2 27383535 Fax +886 2 27368268 Telex 27 245 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
	Nan Tou	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
Tanzania			
Sales	Daressalam	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 http://www.sew-eurodrive.co.tz info@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 Hareket 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	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

Uruguay			
Assembly Sales	Montevideo	SEW-EURODRIVE Uruguay, S. A. Jose Serrato 3569 Esqina Corumbe CP 12000 Montevideo	Tel. +598 2 21181-89 Fax +598 2 21181-90 sewuy@sew-eurodrive.com.uy

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 Production +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
	Wellford	SEW-EURODRIVE INC. 148/150 Finch Rd. Wellford, S.C. 29385	IGLogistics@seweurodrive.com
		Additional addresses for service provided on request!	

Uzbekistan			
Technical Office	Tashkent	SEW-EURODRIVE LLP Representative office in Uzbekistan 96A, Sharaf Rashidov street, Tashkent, 100084	Tel. +998 71 2359411 Fax +998 71 2359412 http://www.sew-eurodrive.uz sew@sew-eurodrive.uz

Vietnam			
Sales	Ho Chi Minh City	Nam Trung Co., Ltd Huế - South Vietnam / Construction Materials 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 khanh-nguyen@namtrung.com.vn http://www.namtrung.com.vn
	Hanoi	MICO LTD Quảng Trị - North Vietnam / All sectors except Construction Materials 8th Floor, Ocean Park Building, 01 Dao Duy Anh St, Ha Noi, Viet Nam	Tel. +84 4 39386666 Fax +84 4 3938 6888 nam_ph@micogroup.com.vn http://www.micogroup.com.vn

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