SEW EURODRIVE

Product Manual

Application Inverter
MOVIDRIVE® system

Edition 02/2019

28487486/EN



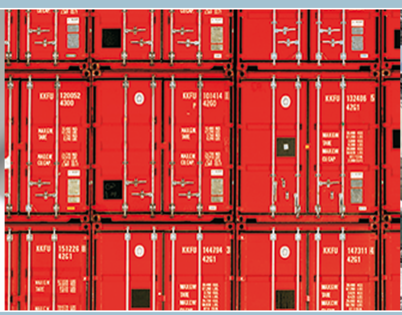



Table of contents

28487486/EN – 02/2019

28487486/EN – 02/2019

1 Product description

With its brand MOVI-C®, SEW-EURODRIVE is launching a new generation of drive and automation technology. MOVI-C® is the modular automation system that enables the highest level of system and machine automation.

MOVI-C® comprises drive technology, MotionControl, control technology, and visualization.

MOVIDRIVE® system is the application inverter for direct line connection, suited for various types of applications, ranging from open-loop speed control to servo drives with kinematic model.

MOVIDRIVE® system consists of:

- Application inverter basic device
- Accessories for EMC-compliant installation
- Cards for functional safety in functionally different versions
- Accessories for connecting and controlling motors and brakes as well as assembled motor and encoder cables

For use in harsh environments, the inverters can be supplied with painted PCBs. The coating of the printed circuit boards increases their resistivity against environmental influences.

Besides MOVIDRIVE® system, the multi-axis system MOVIDRIVE® modular is available. The drive functions of both product series are based on one standardized software platform. The main difference between MOVIDRIVE® modular and MOVIDRIVE® system is the DC link connection of the individual modules with MOVIDRIVE® modular.

The key features of MOVIDRIVE® modular and MOVIDRIVE® system are:

- Control mode:
  - V/f for simple applications with asynchronous motors
  - VFC^{PLUS}: for precise control of asynchronous motors
  - CFC: for asynchronous and synchronous servomotors
  - ELSM®: for synchronous motors without encoders
- Multi-encoder input in the basic unit
- Speed control, torque control, position control
- Expansion slots for I/O, distance encoder, functional safety
- Very compact device size, reduced space requirements in the control cabinet

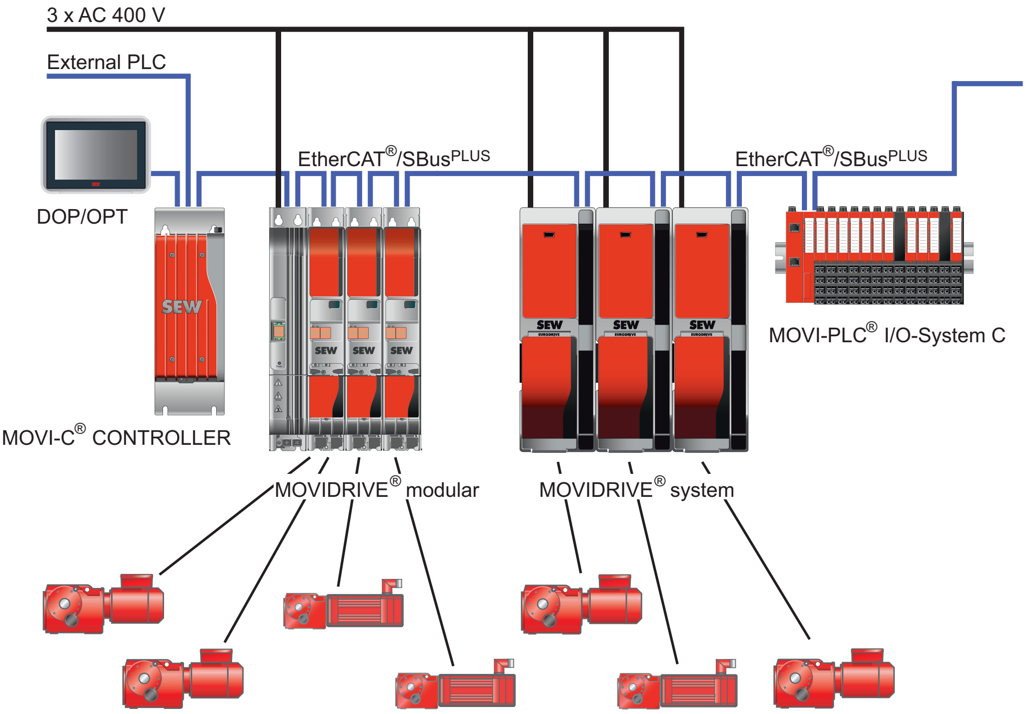
They offer a powerful clock-synchronous connection via the integrated EtherCAT®/SBus^{PLUS} communication interface. Other EtherCAT® clients from SEW-EURODRIVE or other manufacturers can be controlled and diagnosed by the MOVI-C® CONTROLLER.

The functions of the MOVI-C® CONTROLLER are:

- Freely programmable sequence control in accordance with IEC 6-1131 for automating drive and logic tasks
- Central data storage for all MOVI-C® inverters from SEW-EURODRIVE at the EtherCAT®/SBus^{PLUS}
- Plug-and-play device replacement through automatic data recovery
- Central setpoint input for clock-synchronous drives and for auxiliary drives
- Motion functions: Speed control, torque specification, position specification, phase-synchronous operation, cams, application modules, kinematic models

28487486/EN – 02/2019

- EtherCAT®/SBus^{PLUS} master for SEW-EURODRIVE components and for peripherals with EtherCAT® interface
- Fieldbus device interface to higher-level control systems
- Diagnostics and visualization of the automation system



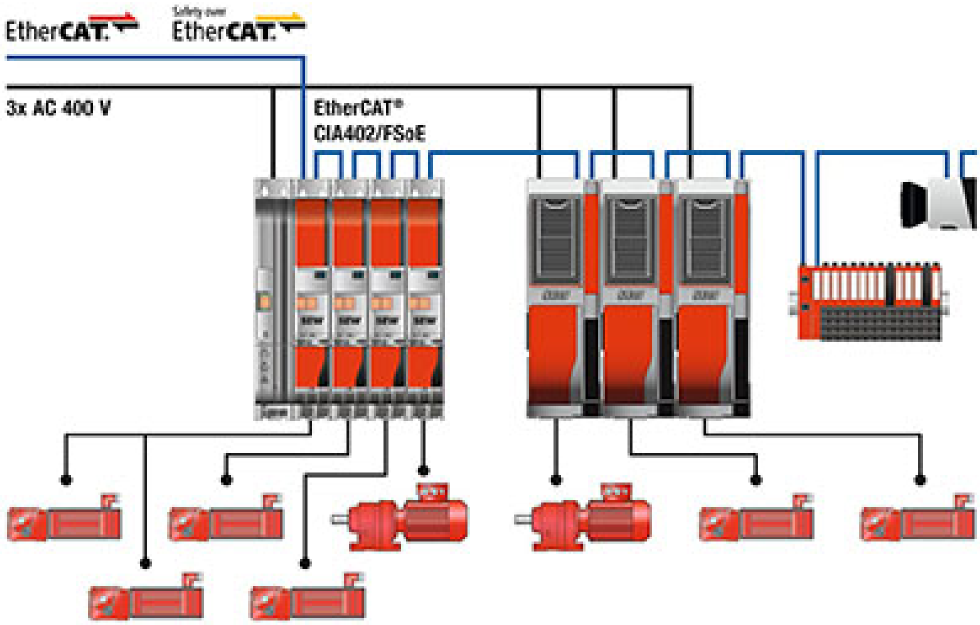
16000611083

The CiA402 device profile for controlling inverters has established itself in plants with very individual motion control functions that are calculated in the external higher-level controller.

For control via CiA402, the MOVIDRIVE® modular and MOVIDRIVE® system application inverters can be directly connected to the higher-level controller using the integrated EtherCAT® interface. This means integration into the higher-level controller can be achieved particularly quickly and easily, and does not require extensive conversion work.

28487486/EN – 02/2019

For applications with requirements on functional safety, the MOVISAFE® CS..A safety cards are available. They are controlled via the integrated inputs and outputs or via safe communication using Safety over EtherCAT® (FSoE).



24494793995

MOVIDRIVE® modular and MOVIDRIVE® system are available with device profile CiA402.

The new engineering software MOVISUITE® is the central module of the MOVI-C® modular automation system. MOVISUITE® allows for intuitive operation with modern operating concepts.

The central functions of MOVISUITE® are:

- Network scan
- Device startup and parameterization
- Data storage and data management
- Scope and diagnostics
- Programming environment for MOVI-C® CONTROLLER
- Parameterization for functional safety
- Parameterization and diagnostics environment for application modules

28487486/EN – 02/2019

1.1 Device availability

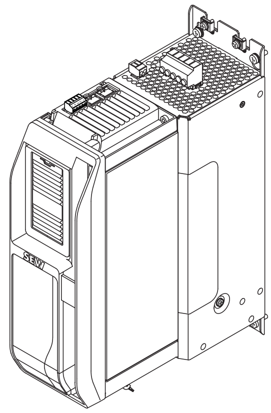
This documentation also lists devices that are not yet available at the time of the publication of this document.

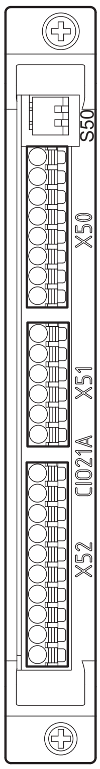
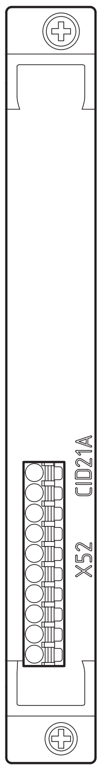
The following table lists the available application inverters. Accessories required for the inverter operation such as braking resistors, chokes, and filters are available.

Type designation
MDX9_A-0020-5E3-4-S00/E00
MDX9_A-0025-5E3-4-S00/E00
MDX9_A-0032-5E3-4-S00/E00
MDX9_A-0040-5E3-4-S00/E00
MDX9_A-0055-5E3-4-S00/E00
MDX9_A-0070-5E3-4-S00/E00
MDX9_A-0095-5E3-4-S00/E00
MDX9_A-0125-5E3-4-S00/E00
MDX9_A-0160-5E3-4-S00/E00
MDX9_A-0240-503-4-S00/E00
MDX9_A-0320-503-4-S00/E00
MDX9_A-0460-503-4-S00/E00
MDX9_A-0620-503-4-S00/E00
MDX9_A-0750-503-4-S00/E00
MDX91A-0910-503-4-S00/E00
MDX91A-1130-503-4-S00/E00
MDX91A-1490-503-4-S00/E00
MDX9_A-0070-2E3-4-S00/E00
MDX9_A-0093-2E3-4-S00/E00
MDX9_A-0140-2E3-4-S00/E00
MDX9_A-0213-203-4-S00/E00
MDX9_A-0290-203-4-S00/E00
MDX9_A-0420-203-4-S00/E00
MDX9_A-0570-203-4-S00/E00
MDX91A-0840-203-4-S00/E00
MDX91A-1080-203-4-S00/E00

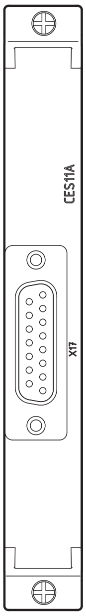
28487486/EN – 02/2019

1.2 MOVIDRIVE® system at a glance

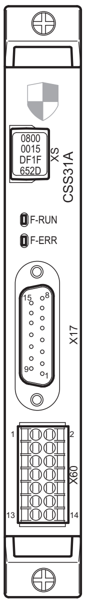
MOVIDRIVE® system	
	Description: (→ 🗎 15) Technical data: (→ 🗎 41) Dimension drawings: (→ 🗎 49) • Nominal output current: 2 – 588 A • Voltage ranges: 3 × 380 – 500 V, 3 × 200 – 240 V, 50 – 60 Hz • Nominal DC link voltage: DC 560 V (400 V), DC 325 V (230 V) • Overload capacity: 200% of the nominal output current for 3 s • System bus: EtherCAT®/SBus^{PLUS} For further information on this device, refer to the following documents: • "MOVIDRIVE® system application inverter" operating instructions • "MOVIDRIVE® system application inverter" product manual • "MOVI-C® – Automation with MOVI-C® CONTROLLER" manual • "Parameter Description MOVIDRIVE® system" manual • "MOVIDRIVE® modular/system with device profile CiA402" operating instructions

Cards		
Input/output card		
CIO21A  	CID21A  	Description: (→ 🗎 17), (→ 🗎 240) Technical data: (→ 🗎 56) CIO21A • 4 digital inputs • 4 digital outputs • 2 analog inputs • 2 analog outputs CID21A • 4 digital inputs • 4 digital outputs For further information on these cards, refer to the following documents: • "MOVIDRIVE® system application inverter" operating instructions • "MOVIDRIVE® system application inverter" product manual

28487486/EN – 02/2019

<table>
<tr><th colspan="2">Cards</th></tr>
<tr><td>CES11A multi-encoder card

</td>
<td>Description: (→ 🗎 17), (→ 🗎 243)
Technical data: (→ 🗎 58)

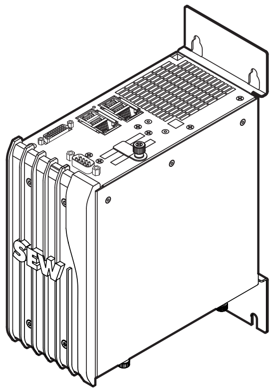
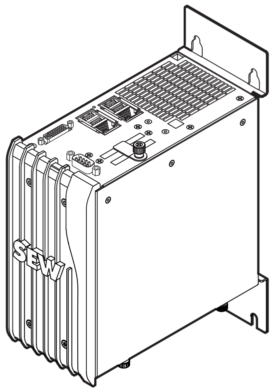
The multi-encoder card makes it possible to evaluate additional encoders.

For information on this card, refer to the following document:
• "Multi-encoder card CES11A" manual</td></tr>
<tr><td>Safety cards CS..A

</td>
<td>Description: (→ 🗎 18)
Technical data: (→ 🗎 59)

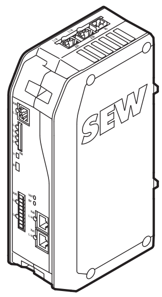
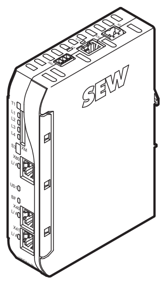
The basic device already contains the safety function STO with activation via safe inputs. Higher-level functional safety requirements can be added by plugging in a CS..A safety card. Different types of higher-level safety functions are realized via 4 different versions.
Safety card properties:
• SIL3 in accordance with EN 61800-5-2, EN 61508
• PL e in accordance with EN ISO 13849-1
• Connectible at any time subsequently; no additional external cables are required. Internal connection to motor encoder, safe communication, and STO
• Safety card parameters are included in the device data set
• Easy replacement during servicing due to pluggable safety key on the safety card
• Parameterization and diagnostics using the MOVISUITE® engineering software
• Process data and safety data in the same Scope recording
• Safe output for activating functionally safe braking systems

For information on this card, refer to the following document:
• "MOVISAFE® CS..A Safety Card" manual</td></tr>
</table>

28487486/EN – 02/2019

MOVI-C® CONTROLLER	
MOVI-C® CONTROLLER power UHX85A 	MOVI-C® CONTROLLER power is characterized by: • Intel Core2Duo 2.2 GHz processor • Windows® Embedded Standard 7 • Ethernet interface for engineering tasks or TCP/IP and UDP via IEC 61131-3 • 16 MB program memory and 64 MB data memory • A maximum of 32 interpolating axes that can be connected • Another 32 auxiliary axes that can be connected • System bus EtherCAT®/SBus^{PLUS} • Optional slave connection via PROFIBUS DPV2 • Optional device connection via PROFINET For further information on this device, refer to the following documents: • "MOVI-C® CONTROLLER power UHX85A and power eco UHX84A" manual • "MOVIDRIVE® system application inverter" operating instructions • "MOVIDRIVE® system application inverter" product manual • "MOVI-C® – Automation with MOVI-C® CONTROLLER" manual
MOVI-C® CONTROLLER power eco UHX84A 	MOVI-C® CONTROLLER power eco is characterized by: • Intel Core2Duo 2.2 GHz processor • Windows® Embedded Standard 7 • Ethernet interface for engineering tasks or TCP/IP and UDP via IEC 61131-3 • 16 MB program memory and 64 MB data memory • A maximum of 16 interpolating axes that can be connected • Another 16 auxiliary axes that can be connected • System bus EtherCAT®/SBus^{PLUS} • Optional slave connection via PROFIBUS DPV2 • Optional device connection via PROFINET For further information on this device, refer to the following documents: • "MOVI-C® CONTROLLER power UHX85A and power eco UHX84A" manual • "MOVIDRIVE® system application inverter" operating instructions • "MOVIDRIVE® system application inverter" product manual • "MOVI-C® – Automation with MOVI-C® CONTROLLER" manual

28487486/EN – 02/2019

MOVI-C® CONTROLLER	
MOVI-C® CONTROLLER advanced UHX45A 	MOVI-C® CONTROLLER advanced is characterized by: • A maximum of 8 interpolating axes that can be connected • Another 8 auxiliary axes that can be connected For further information on this device, refer to the following documents: • "MOVI-C® CONTROLLER advanced UHX45A" manual (in development) • "MOVIDRIVE® system application inverter" operating instructions • "MOVIDRIVE® system application inverter" product manual • "MOVI-C® – Automation with MOVI-C® CONTROLLER" manual
MOVI-C® CONTROLLER standard UHX25A 	MOVI-C® CONTROLLER standard is characterized by: • A maximum of 2 interpolating axes that can be connected • Another 6 auxiliary axes that can be connected For further information on this device, refer to the following documents: • Manual "MOVI-C® CONTROLLER standard UHX25A" • "MOVIDRIVE® system application inverter" operating instructions • "MOVIDRIVE® system application inverter" product manual • "MOVI-C® – Automation with MOVI-C® CONTROLLER" manual

Accessories	
Prefabricated motor and encoder cables	"Description and technical data:" (→ 🗎 154)
Braking resistors	"Description and technical data:" (→ 🗎 62)
TCB thermal circuit breaker	"Description and technical data:" (→ 🗎 72)
Line filter	"Description and technical data:" (→ 🗎 74)
Output filter	"Description and technical data:" (→ 🗎 78)
Line choke	"Description and technical data:" (→ 🗎 76)
Output choke	"Description and technical data:" (→ 🗎 80)
Valid motor encoders	(→ 🗎 88)
MOVISUITE®	• MOVISUITE® standard
MOVIRUN®	• MOVIRUN® smart • MOVIRUN® flexible

Accessories	
MOVIKIT®	The MOVIKIT® software module allows for simple, quick and fault-free startup of all applications. The MOVIKIT® software module supports both the MOVIRUN® smart software platform and the MOVIRUN® flexible software platform. For information on the software modules, refer to the following documents: • "MOVIKIT® MultiAxisController" manual • "MOVIKIT® MultiMotion / MultiMotion Camming" manual • "MOVIKIT® MultiMotion AuxilliaryAxes" manual • "MOVIKIT® Robotics" manual

1.3 MOVIDRIVE® system product overview

Properties

- Coverage of a wide range of power ratings with finely graded performance classes.
- Universal use due to a wide voltage range for line connection.
- Suitable for TN/TT and IT voltage supply systems.
- The EtherCAT®/SBus^PLUS system bus is available for communication.
- 4-quadrant capable due to integrated brake chopper.
- High overload capacity of 200% I_N.

Device data 3 × AC 400 V

Nominal line voltage In accordance with EN 50160	3 × 380 – 500 V
Line frequency	50 – 60 Hz ± 10%
Nominal DC link voltage	DC 560 V
Overload capacity	200%: 3 s with PWM 4 kHz

Type designation	Nominal output current at PWM = 4 kHz	Recommended motor power ASM	Nominal line current	Size	Technical data
	A	kW	A		
MDX9_A-0020-5E3-4-S00/E00	2	0.55	1.9	1	(→ 🗎 41)
MDX9_A-0025-5E3-4-S00/E00	2.5	0.75	2.3		
MDX9_A-0032-5E3-4-S00/E00	3.2	1.1	2.9		
MDX9_A-0040-5E3-4-S00/E00	4	1.5	3.6		
MDX9_A-0055-5E3-4-S00/E00	5.5	2.2	5	2	
MDX9_A-0070-5E3-4-S00/E00	7	3	6.3		
MDX9_A-0950-5E3-4-S00/E00	9.5	4	8.6		
MDX9_A-0125-5E3-4-S00/E00	12.5	5.5	11.3	3	
MDX9_A-0160-5E3-4-S00/E00	16	7.5	14.4		
MDX9_A-0240-503-4-S00/E00	24	11	22	4	
MDX9_A-0320-503-4-S00/E00	32	15	29		
MDX9_A-0460-503-4-S00/E00	45	22	42	5	
MDX9_A-0620-503-4-S00/E00	62	30	56		
MDX9_A-0750-503-4-S00/E00	75	37	68		

28487486/EN – 02/2019

Type designation	Nominal output current at PWM = 4 kHz	Recommended motor power ASM	Nominal line current	Size	Technical data
	A	kW	A		
MDX91A-0910-503-4-S00/E00	91	45	82	6	(→ 🗎 41)
MDX91A-1130-503-4-S00/E00	113	55	102		
MDX91A-1490-503-4-S00/E00	149	75	135		
MDX91A-1770-503-4-S00/E00	177	90	160	7	
MDX91A-2200-503-4-S00/E00	220	110	198		
MDX91A-2500-503-4-S00/E00	250	132	225		
MDX91A-3000-503-4-S00/E00	300	160	280		
MDX91A-3800-503-4-S00/E00	380	200	340	8	
MDX91A-4700-503-4-S00/E00	470	250	435		
MDX91A-5880-503-4-S00/E00	588	315	545		

Device data 3 × AC 230 V

Nominal line voltage In accordance with EN 50160	3 × 200 – 240 V
Line frequency	50 – 60 Hz ± 10%
Nominal DC link voltage	DC 325 V
Overload capacity	200%: 3 s with PWM 4 kHz

Type designation	Nominal output current at PWM = 4 kHz	Recommended motor power ASM	Nominal line current	Size	Technical data
	A	kW	A		
MDX9_A-0070-2E3-4-S00/E00	7	1.5	6.4	2	(→ 🗎 44)
MDX9_A-0093-2E3-4-S00/E00	9.3	2.2	8.4		
MDX9_A-0140-2E3-4-S00/E00	14	3.7	12.4	3	
MDX9_A-0213-2E3-4-S00/E00	21.3	5.5	18.9	4	
MDX9_A-0290-2E3-4-S00/E00	29	7.5	27.4		
MDX9_A-0420-203-4-S00/E00	42	11	40.8	5	
MDX9_A-0570-203-4-S00/E00	57	15	52		
MDX91A-0840-203-4-S00/E00	84	22	76	6	
MDX91A-1080-203-4-S00/E00	108	30	86		

28487486/EN – 02/2019

1.4 Product overview accessories

The functionality and flexibility of MOVI-C® application inverters can be supplemented by many different cards.

1.4.1 CID21A input/output card

This input/output card is used to increase the number of digital inputs and outputs of the basic device.

- 4 digital inputs
- 4 digital outputs

1.4.2 CIO21A input/output card

This input/output card is used to increase the number of digital and analog inputs and outputs of the basic device.

- 4 digital inputs
- 4 digital outputs
- 2 analog inputs (current/voltage)
- 2 analog outputs (current/voltage)

1.4.3 CES11A multi-encoder card

The CES11A multi-encoder card enables evaluation of an additional encoder. The additional encoder can be used as distance encoder or as motor encoder.

The following encoders are supported:

HTL 12/24 V (differential)
TTL (differential)
RS422
SIN/COS 1 V_{SS} (differential)
HIPERFACE® with SIN/COS signals 1 V_{SS}
SEW encoder (RS485) with SIN/COS signals 1 V_{SS}, e.g. AS7W, AG7W
EnDat 2.1 with SIN/COS signals 1 V_{SS}
SSI encoder with/without SIN/COS signals 1 V_{SS}
CANopen encoder

Besides the encoders listed above, further encoders that can be used are described in the chapter "Valid motor encoders from SEW-EURODRIVE".

28487486/EN – 02/2019

1.4.4 Safety cards CS..A

The MOVISAFE® CS..A safety cards provide further functional safety functions to EN IEC 61800-5-2 in addition to STO. The MOVISAFE® CS..A safety cards and the CES11A multi-encoder card are intended to be used in the same card slot and thus cannot be used simultaneously. For this reason, the CS.31A safety cards are available with an additional multi-encoder input.

For a detailed description, refer to the manual "MOVISAFE® CS..A safety card".

	MOVISAFE® CSB21A	MOVISAFE® CSB31A	MOVISAFE® CSS21A	MOVISAFE® CSS31A
Safe inputs	4	4	4	4
Safe outputs	—	2	2	2
Safe stop functions	STO, SS1c	STO, SS1c, SBC	STO, SS1c, SBC	STO, SS1c, SBC
Safe movement functions	—	—	SOS, SS1b, SS2, SLS, SSR, SLA, SSM	SOS, SS1b, SS2, SLS, SSR, SLA, SSM
Safe positioning functions	—	—	SLI, SDI	SLI, SDI
Safe communication	PROFIsafe	PROFIsafe	PROFIsafe	PROFIsafe
Additional multi-encoder input	—	yes	—	yes

28487486/EN – 02/2019

1.5 FCB concept

FCB = Function Control Block

The FCB concept describes the modular firmware design of MOVI-C® inverters. This feature ensures that a wide range of drive functions can be selected or deselected quickly and easily using control words.

All primary functions, i.e. functions that move or control the motors, are designed as individual FCBs that only have to be selected to perform a specific task, for example positioning.

You can switch between different FCBs any time. Switching to another FCB is performed with a maximum delay of 0.5 ms.

Different priorities are assigned to the FCBs. If a FCB with a higher priority than the currently active FCB is selected, the FCB with the higher priority is activated.

The FCBs are sorted in descending order of their priority in the following list:

- FCB 01 Output stage inhibit
- FCB 14 Emergency stop
- FCB 13 Stop at application limits
- FCB 18 Rotor position identification
- FCB 25 Motor parameter measurement
- FCB 12 Reference travel
- FCB 04 Manual mode
- FCB 20 Jog mode
- FCB 19 Position hold control
- FCB 21 Brake test
- FCB 10 Interpolated position control
- FCB 09 Position control
- FCB 06 Interpolated speed control
- FCB 05 Speed control
- FCB 08 Interpolated torque control
- FCB 07 Torque control
- FCB 26 Stop at user limits
- FCB 02 Default stop

1.5.1 Description of the FCBs

FCB 01 Output stage inhibit

Activating FCB 01 stops the connected motor via the motor brake. If no brake is installed, the motor coasts to a stop.

FCB 02 Default stop

FCB 02 stops the drive with the preset profile value "Maximum deceleration". This value is limited by the "Application limit – deceleration".

FCB 02 is active (default), when no other FCB is selected.

FCB 02 is selected by the system, not by the operator.

FCB 04 Manual mode

With the MOVISUITE® engineering software or the CBG.. keypad, manual mode can be selected and activated via the function "manual mode". Manual mode is used for startup or for teach mode without higher-level controller.

FCB 04 is selected by the system, not by the operator.

FCB 05 Speed control

The application inverter can be operated as speed-controlled axis.

The user can specify profile values for acceleration, deceleration, and jerk as the basic conditions for speed control. The actual speed setpoint for the drive controller is generated in the controller cycle by a profile generator integrated in the inverter using the specified limit values.

FCB 06 Interpolated speed control

FCB 06 is used for cyclical speed setpoint inputs from higher-level controllers.

In multi-axis applications, a controller often calculates a path profile for several drive axes. The axis is only assigned setpoints (speed/torque and torque limits/precontrol values/inertia) that it has to follow. The axis limits the setpoints using the application limits. The course of the path curve profile is controlled by the controller.

The setpoint cycle of the controller usually does not correspond to the setpoint cycle of the axis. If the axis were to "see" the same setpoint for several cycles, a step-shaped actual value would result. To prevent this from happening, the axis interpolates intermediate values. To do so, the setpoint cycle of the controller has to be known.

FCB 07 Torque control

The application inverter can be run as a torque-controlled axis.

The user can specify profile values for deceleration and jerk as the basic conditions for torque control. The actual torque setpoint for the drive controller is generated in the controller cycle by a profile generator integrated in the inverter using the specified limit values.

During torque control the maximum speed is restricted by the speed limits so that the drive cannot permanently accelerate with the preset setpoint torque while the counter-torque is too low.

FCB 08 Interpolated torque control

FCB 08 is used for cyclical torque setpoint input from a higher-level controller.

28487486/EN – 02/2019

This higher-level controller usually calculates a track profile for several drive axes. The axis is then assigned just one setpoint (torque, torque limits, precontrol values, inertia) that it has to follow.

The inverter limits the setpoints using the application limits. The course of the path curve profile is controlled by the controller.

The cycle in which the controller sends the setpoints to the axis does not usually correspond to the setpoint processing cycle of the inverter. If the inverter were to "see" the same controller setpoint for several cycles, a step-shaped actual torque value would result.

To prevent this from happening, the axis can calculate (interpolate) intermediate values if it knows the controller cycle. The application inverter can be set to different cycle times of higher-level controllers.

FCB 09 Position control

FCB 09 is used to allow travel to the target position by using a position profile parameterized by the profile generator during positioning.

In addition, the application inverter has several positioning modes that are described in the following section:

Absolute positioning:

The position setpoint in user units is interpreted as an absolute target and is converted and executed in system units.

The travel range in system units is -2^{31} – 2^{31} -1 (2147483647). If the travel range is exceeded after calculation, the FCB issues a fault

Relative positioning:

The position setpoint in user units is interpreted as the offset for the last setpoint that was transferred. After it has been converted into system units, it is added to the last setpoint.

If the time calculated in system units is outside the travel range of -2^{31} – 2^{31} -1 (2147483647), the FCB issues a fault.

Modulo in positive direction with absolute position specification:

The position setpoint in user units is interpreted as the absolute position. It must be within the modulo range of the active drive:

Lower limit = "Modulo min."

Upper limit = "Modulo max."

If the position setpoint is outside this range, a fault is issued. The drive always turns in a positive direction to reach the position.

Modulo in negative direction with absolute position specification:

The position setpoint in user units is interpreted as the absolute position. It must be within the modulo range of the active drive:

Lower limit = "Modulo min."

Upper limit = "Modulo max."

If the position setpoint is outside this range, a fault is issued. The drive always turns in a negative direction to reach the position.

Modulo with shortest distance with absolute position specification:

The position setpoint in user units is interpreted as the absolute position. It must be within the modulo range of the active drive:

Lower limit = "Modulo min."

28487486/EN – 02/2019

Upper limit = "Modulo max."

If the position setpoint is outside this range, a fault is issued.

The direction of the drive is determined using the last setpoint position (= current actual position after activation without an "In position" message) and the current setpoint position. This value is used to determine the shortest possible route and, therefore, the direction of rotation for positioning.

FCB 10 Interpolated position control

FCB 10 is used for cyclic preselected position setpoints of higher-level controllers.

In multi-axis applications, a higher-level controller usually calculates a track profile for several drive axes. The axis is only assigned setpoints (position, speed, torque, torque limits, precontrol values, inertia) that it has to follow. The axis limits the setpoints using the application limits. The course of the profile of the path curve is controlled by the controller.

The setpoint cycle of the controller does usually not correspond to the setpoint cycle of the axis. If the axis were to "see" the same setpoint for several cycles, a step-shaped actual value would result. To prevent this from happening, the axis can interpolate intermediate values. To do so, the setpoint cycle of the controller has to be known.

FCB 12 Reference travel

To perform positioning operations, a drive has to be referenced to a defined start or reference position within the permitted travel distance.

From this reference position, positions such as the machine zero can be specified and approached. With each restart of the inverter, referencing the position encoders is always necessary if position encoders do not have an absolute position detection. When using absolute encoders, the absolute position is immediately known upon the start of the system. An absolute encoder still has to be referenced to match the displayed position with the plant's reference system. Several reference travel types are available for referencing and for finding the reference point.

FCB 13 Stop at application limits

When FCB 13 is activated, the drive stops with speed control using the preset application limit deceleration.

28487486/EN – 02/2019

FCB 14 Emergency stop

When FCB 14 is activated, the drive stops with the preset emergency stop deceleration.

FCB 18 Rotor position identification

For the operation of permanent magnet synchronous motors, the exact position information of the rotor is required for closed-loop control.

FCB 18 is required for the encoder calibration of rotary and linear synchronous motors with encoder. FCB 18 requires an electrical startup of the drive.

The drive must be disconnected from the load, which means also from the gear unit.

FCB 19 Position hold control

When FCB 19 is activated, the drive stops with speed control. After the standstill of the drive, the position is kept with position control as long as FCB 19 is active.

FCB 20 Jog mode

FCB 20 is used for setup mode when a higher-level controller is used.

FCB 20 can only be activated in operating modes with encoder feedback.

FCB 20 allows the user to move an axis in positive and negative direction.

Control is performed via control signals that are specified by means of control words, via digital inputs of a higher-level controller or via input terminals.

For startup or for setup mode without higher-level controller, use the manual mode of the MOVISUITE® engineering software, see "FCB 04" (→ 🗎 20).

FCB 21 Brake test

FCB 21 is used to check the braking capability of a brake connected to the motor. A test torque is applied electrically via the motor when the brake is applied.

Even when the brake has passed the brake test, it does not take on any drive safety functions as far as machine safety is concerned in combination with the application inverter.

The brake is only tested in accordance with the set brake test torque. The actual breakaway torque of the brake is not measured. The actual brake breakaway torque is not measured.

There are 4 test modes:

- A higher-level controller provides the setpoints and monitoring function for the test.
- The application inverter performs a check in both directions compared to the set limit torques.
- The application inverter performs a check in positive direction compared to the set limit torques.
- The application inverter performs a check in negative direction compared to the set limit torques.

The test torque, test time and the direction of rotation of the test can be set. If a test is not passed, the breakaway torque is documented.

The braking torque is limited by the set "Torque" application limit.

Notice: The application torque must be considered for calculating the test torque, e.g. hoist test "downward".

28487486/EN – 02/2019

FCB 25 Motor parameter measurement

FCB 25 is used for determining the necessary parameters from the electric equivalent wiring diagram during startup.

The nameplate data of the connected motor is required for the motor parameter measurement.

After the motor parameter measurement has been completed, the motor is completely started up electrically. Values that are not yet final at this stage, such as maximum speed and maximum torque, are estimated. The values have to be corrected at a later time to reach the full performance of the motor.

Calling FCB 25 is generally recommended for third-party motors. FCB 18 must be executed afterward for encoder calibration with synchronous motors, if required.

FCB 26 Stop at user limits

FCB 26 is used for stops at user limits. The user limits are either available as local setpoints or initiate the deceleration ramp set via the fieldbus.

You can choose between a speed-controlled ramp and a position-controlled ramp. In contrast to other stop FCBs (FCB 13/FCB 14), the FCB 26 has a very low priority.

This allows you to select FCB 26 as standard (e.g. bit in the control word that selects this FCB is always TRUE). If all other FCBs are deactivated, FCB 26 always becomes active. This makes it possible to always stop with position control.

FCB 26 has lag fault monitoring in position-controlled mode.

28487486/EN – 02/2019

1.5.2 Setpoints and limits in the FCBs

	Index		FCB													
			02	04	05	06	07	08	09	10	12	13	14	19	20	26
Setpoint buffer	8376															
Position		.4							x	x						
Rotational speed		.14			x	x				x					x	
Torque		.24					x	x								
Acceleration precontrol		.34[1)]				x				x						
Mass moment of inertia		.44[1)]				x		x		x						
Torque precontrol		.54[1)]				x		x		x						
Correcting value of external position controllers		.64				x										
Profile value buffer	8377															
Maximum positive velocity		.4					x	x	x							
Maximum negative velocity		.14					x	x	x							
Maximum acceleration		.24			x				x						x	
Maximum deceleration		.34	x		x				x						x	x
Jerk time		.44			x		x		x						x	x
Maximum torque Q1 – Q4		.54 – .84[1)]			x	x	x	x	x	x						
Application limits	8357															
Velocity, positive/negative		.10, .11		x	x	x	x	x	x	x	x				x	
Acceleration		.12		x	x				x		x			x	x	
Deceleration		.13	x	x	x				x		x	x		x	x	x
Jerk time		.14	x	x	x		x		x		x	x	x	x	x	x
Torque		.15[1)]	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Apparent output current		.16	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Voltage		.17	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Emergency stop deceleration		.20											x			
Other parameters																
Behavior at standstill	8563/8564		x									x	x			
Lag error window	8509	.4 .14							x							x
Setpoint deviation response	8622	.3							x	x						x

1) These variables are not relevant in the U/f control mode

x = relevant in the FCB

1.6 Control mode

The following control modes are available for MOVIDRIVE® application inverters:

- U/f
- VFC^{PLUS}
- CFC
- ELSM®

1.6.1 Description of the control modes

The characteristics of the motor connected to the application inverter are influenced by the control modes used.

U/f

U/f control is intended for easy controlled operation of asynchronous motors without encoder feedback. The procedure operates an asynchronous machine on a parameterizable voltage/frequency characteristic. To keep the magnetizing current on a constant level, the voltage (U) is adjusted in proportion to the frequency (f).

The actual slip is estimated and can be compensated.

U/f control is suitable for applications with a limited speed setting range, where no dynamic step changes in load occur and where there are small requirements regarding the control characteristics.

U/f control is suitable for group drives. A group drive is an electrical parallel connection of several identical or different motors at one inverter. The motors do not have a rigid mechanical connection.

Speed control

The U/f mode is an encoder-less mode and calculates the actual speed value. The calculation is always based on the electrical values of the motors. Therefore, information from a potentially existing encoder system is not used.

If an encoder is parameterized in the encoder assignment as "Actual speed source", the speed measured by this encoder is issued as the actual speed by the inverter. Otherwise, the model speed calculated by the U/f method based on stator frequency and slip, is issued as the actual speed.

The U/f mode does not have a higher-level speed controller, speed controller parameterization is therefore not possible. An acceleration and torque precontrol is also not possible.

28487486/EN – 02/2019

VFC^PLUS^

VFC^PLUS^ is a high-performance control mode that is able to operate asynchronous motors with very high torque dynamics with or without rotary encoder.

The control mode can be operated as speed or torque control.

This control mode calculates all important state variables for controlling the motor by using a motor model. As a result, optimal magnetic conditions are always achieved for the motor.

For applications with a large speed setting range (especially for low speeds through to standstill) and high requirements regarding the control characteristics or for drives with high dynamic step changes in load, a rotary encoder is absolutely necessary.

For applications with low requirements regarding the control characteristics and the torque dynamics, an encoder is not necessary. Without a rotary encoder, the electric rotor frequency is calculated in a model. In this case, stable stationary operation of the mode at < 0.5 Hz is not possible.

Due to the good torque dynamics, the VFC^PLUS^ control mode remains stable even in the event of load changes and has a high torque accuracy. Typical applications for the VFC^PLUS^ control mode are speed-controlled asynchronous machines with high demands on the speed and torque stability.

Speed control

A higher-level speed control loop that has to be parameterized accordingly is always used for speed control.

If the control mode is operated without an encoder, the actual speed of the motor is calculated by the control mode.

If an encoder is used, the angle information of this encoder is used for the control mode. The actual speed of the motor is calculated from this encoder. The maximum dynamics of the control loop are reached with a high-resolution encoder.

Torque control

The torque control operating mode can be selected independently of an encoder and does not need an encoder. With an encoder, however, stable stationary operation at stator frequency 0 Hz is also possible.

Position control

Position-controlled operation is only possible with an encoder as the actual position is calculated from the parameterized encoder. This encoder can either be mounted on the track or on the motor.

The accuracy of the position control can be increased with a motor encoder.

28487486/EN – 02/2019

CFC

The CFC control mode is a current-controlled control mode. The CFC control mode allows the operation of asynchronous and synchronous motors with maximum torque dynamics. For this purpose, the current components for the magnetic flux and for the torque generation are controlled separately.

The control mode requires information about the rotor angle and the motor speed. For this reason, an encoder feedback (motor encoder) is always necessary.

For asynchronous motors, only the relative rotor angle is necessary. Thus, an incremental encoder is sufficient.

The control mode requires the absolute position for synchronous motors. In the case of encoder types that do not provide an absolute value, a commutation must be performed before every first release after booting the system (FCB 18).

The advantage of the CFC control mode is the very high dynamics that can be achieved, as a control reserve for reaching the dynamic maximum torque is always available. For this reason, the CFC control mode is suitable for drives with highly dynamic motion control.

ELSM®

The ELSM® control mode allows the operation of permanent-field synchronous servomotors without encoder.

This procedure is exclusively intended for applications in horizontal materials handling technology with one single motor. It is not permitted to use it in vertical drives, inclining tracks or as a group drive.

Make sure that the inverter provides at least 150% I_0 of the motor throughout the alignment process.

The maximum motor torque is limited to 1.5 M_0 with this procedure.

Switching to a rotating motor is possible (flying start function). Continuous operation is only permitted above a transition speed of approx. 2% of the nominal motor speed.

Rotor adjustment/rotor position measurement

When the inverter is enabled in ELSM® control mode, the rotor position of the permanent-field synchronous motors is unknown. For this reason, the rotor position has to be determined first or the rotor has to be adjusted by turning so that its angular position is defined.

Measuring the rotor position:

The rotor position of the synchronous motor is measured with test pulses for each enable. This occurs at standstill. If a brake is used, this brake remains applied. The measurement is finished after a maximum of 50 ms. After the measurement is completed, the synchronous motor accelerates to the setpoint speed. A prerequisite for the measurement is the one-time determination of the complete motor parameters with the FCB 25 motor parameter measurement.

SEW-EURODRIVE recommends measuring the rotor position.

Adjusting the rotor:

If the complete motor data is not known, the rotor is moved to a defined position at each enable. A small motor movement depending on the motor pole number takes place during the adjustment. If a brake is used, this brake is released. The adjustment is completed after 1 s.

28487486/EN – 02/2019

Speed control

The speed control operating mode can be activated in the ELSM® control mode. The control mode has to be distinguished speed-dependent in two different operating ranges:

- Open-loop control

  and
- speed-controlled operation.

Open-loop control takes place when starting from standstill and below a transition speed. This transition speed is calculated and set depending on the inverter and motor parameters during motor startup. It is about 2% of the nominal speed.

Above this transition speed, the speed control without encoder works.

Torque control

The ELSM® control mode enables the "Torque control" operating mode; however, only above the transition speed.

Practical meaning: The FCB 07 "Torque control" can only be activated when the flying start function is active and above the transition speed (example: winding drive). If the speed is too low, the system shuts down with a fault message.

Flying start function

If it cannot be ensured that the motor is at standstill during the start, the flying start function has to be activated. This way, the ELSM® control mode can also be enabled for a turning motor.

If the speed can be calculated plausibly, the control mode proceeds to speed-controlled operation. If this is not the case, the drive proceeds to the "rotor adjustment" or "rotor measurement" function and then to controlled operation.

28487486/EN – 02/2019

1.6.2 Characteristics of the control modes

Overview of the control modes

	U/f	VFC^PLUS		CFC		ELSM®
Principle	Voltage controlled according to characteristic curve	Field-oriented, voltage-controlled, stator flux controller, torque controller		Field-oriented, current controller		Field-oriented, current controller
Motor	ASM/LSPM	ASM	ASM	ASM	SM	SM
Encoder	without	without	with	with	with	without
Dynamics	+	+++	++++	+++++	+++++	++
Energy efficiency	+	+++	+++	++	+++++	++++++
Speed control	yes[1]	yes		yes		yes
Torque control	no	yes		yes		yes
Positioning	no	no	yes	yes		no
Flying start	no[2]	yes		yes		yes
Typical applications	Group drive, multi-motor drives	General materials handling technology, horizontal drives, vertical drives, pumps/fans, winding drives		Packaging technology, handling technology, highly-dynamic positioning		Horizontal materials handling technology
Marking	Maximum robustness	Maximum precision		Maximum dynamics		Maximum energy efficiency

1) Open-loop speed control
2) DC braking

ASM	Asynchronous motors
LSPM	Motors with LSPM technology (Line Start Permanent Magnet)
SM	Synchronous motors

Characteristic values for dynamics

	U/f	VFC^PLUS	CFC	ELSM®
Torque control time	–	Approx. 2 ms[1]	Approx. 150 µs	Approx. 150 µs
Time constant speed controller	–	Approx. 3 – 6 ms	Approx. 0.5 ms	Approx. 6 ms
Speed ripple	Is mainly determined by the total mass moment of inertia, the torque ripple and the mechanical structure. It is therefore not possible to specify a general value.			

1) Valid in voltage control range, in field weakening range < 5 ms.

Characteristic values for setpoint resolution

	U/f	VFC^PLUS	CFC	ELSM®
Torque	—	32 bits 0.001% M_{NMot}	32 bits 0.001% M_{NMot}	32 bits 0.001% M_{NMot}

	U/f	VFC^{PLUS}	CFC	ELSM®
Rotational speed	32 bits 0.0001 1/min	32 bits 0.0001 1/min	32 bits 0.0001 1/min	32 bits 0.0001 1/min
Position (increment/revolution)	—	16 bits	16 bits	—
Position (absolute increment)	—	32 bits	32 bits	—

Characteristic values for accuracy of torque and speed

	VFC^{PLUS} without encoder	VFC^{PLUS} with encoder	CFC	ELSM®
Speed accuracy	Depending on motor parameters, typically: $0.2 \times f_{Nominal\ slip}$	Is mainly determined by the encoder resolution, approx. 1% of n	Is mainly determined by the total mass moment of inertia, the torque ripple and the mechanical structure. It is therefore not possible to specify a general value.	
Torque accuracy	$< 10\%\ M_N$ for $n > 0.2 \times n_N$	$< 5\ \%\ M_N$	-	

Maximum output frequency

f_{PWM}	U/f	VFC^{PLUS}	CFC	ELSM®
	Operation is possible up to an output frequency of:			
2.5 kHz	250 Hz	250 Hz	250 Hz	250 Hz
4 kHz	400 Hz	250 Hz	400 Hz	400 Hz
≥ 8 kHz	599 Hz	250 Hz	500 Hz	500 Hz

FCBs that can be activated for selected control mode

FCB no.	Designation	U/f	VFC^PLUS	CFC	ELSM®
01	Output stage inhibit	+	+	+	+
02	Default stop	+	+	+	+
04	Manual mode	+	+	+	+
05	Speed control	+	+	+	+
06	Interpolated speed control	+	+	+	+
07	Torque control	-	+	+	+
08	Interpolated torque control	-	+	+	+
12	Reference travel	+	+	+	+
13	Stop at application limits	+	+	+	+
14	Emergency stop	+	+	+	+
25	Motor parameter measurement	+	+	+	+
26	Stop at user limits	+	+	+	+
FCBs requiring a position encoder					
09	Position control	-	+	+	-
10	Interpolated position control	-	+	+	-
19	Position hold control	-	+	+	-
20	Jog	-	+	+	-
21	Brake test	-	+	+	-
18	Rotor position identification	-	-	+	+

28487486/EN – 02/2019

1.7 Energy-saving functions

1.7.1 Flux optimization

Flux optimization is a function that allows for operating an asynchronous motor in control mode VFC^{PLUS} with minimal losses. The magnetic flux is lead depending on the torque setpoint, so that the motor is operated with minimum current and thus with minimized losses. In partial load operation, as well as in case of overload, the total losses of the motor can be significantly reduced. This function has no influence in the range of the nominal torque or a bit below, as the motor is usually operated at almost optimum conditions.

For system-related reasons, the torque control times are longer with flux optimization than without flux optimization, due to necessary changes in flux. The flux optimization is especially suitable for applications with little dynamics, such as fans, pumps, escalators, and conveyor systems with constant speed.

The flux optimization can reduce magnetization losses in the motor by up to 70%.

1.7.2 Standby mode

The standby operation is designed for times in which the operation is paused. The significant difference between disconnection of the DC 24 V supply voltage and standby operation is that switching from standby operation to operation only takes approx. 500 ms, and that the bus communication is maintained. This allows for reducing the energy consumption even in short pauses.

The following functions are deactivated in standby operation:

- 7-segment display
- STO function
- Digital outputs at the basic device and cards
- Analog outputs at the card
- Power section controller
- Fan in power section
- Optional: Encoder supply and encoder evaluation in the basic device and the card.

Standby operation can be activated via a digital input or via a control word bit.

The bus communication is active without restrictions in standby operation.

Energy consumption in standby operation

MOVIDRIVE® system/technology	DC 24 V power consumption in standby operation
MDX9_A-0020 – 0320-5_3..	3.6 W
MDX9_A-0070 – 0290-2_3..	
MDX9_A-0460 – 0750-5_3..	4.1 W
MDX9_A-0420 – 0570-2_3..	
MDX91A-0910 – 1490-5_3..	10.6 W
MDX91A-0840 – 1080-2_3..	

The energy-saving function "standby operation" can reduce the DC 24 V power consumption by 89%.

28487486/EN – 02/2019

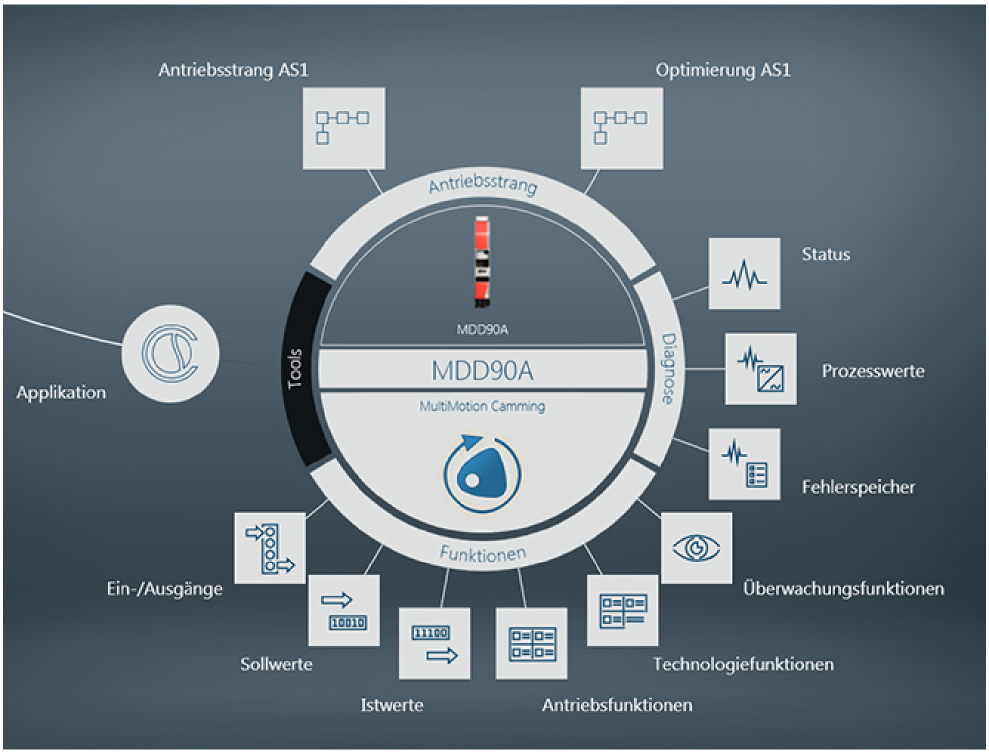
1.8 MOVISUITE® engineering software

MOVISUITE® is the new engineering software from SEW-EURODRIVE.

The engineering software excels thanks to a new design of the user interface and user guidance. This new interface concept allows for the users to configure, parameterize, and start up their applications intuitively.

Using the various views, the users can switch to the suitable display mode depending on their requirements. In the circle view for example, single components can be edited in a clear structure.

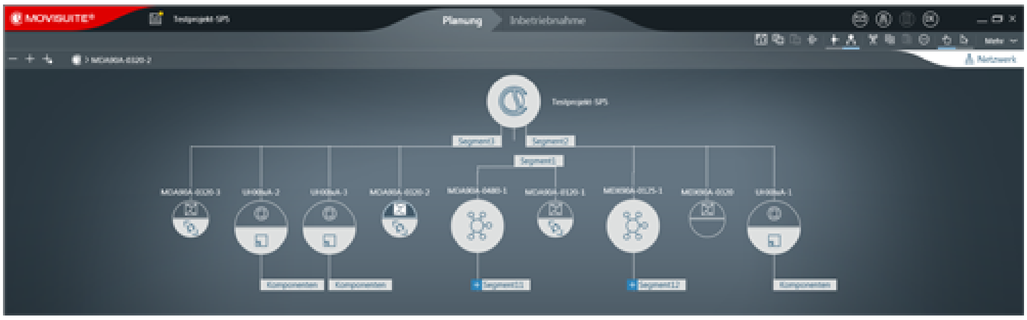
Circle view



24502901643

The tree view provides an overview of the entire network.

Tree view



9007218526745867

The view can be selected depending on application and personal preferences; the functionality is identical in both views.

The interface concept of MOVISUITE® makes it possible to visualize the system structure using structure nodes that can be named according to user preference. These structure nodes are displayed with a varying level of detail in the views mentioned above.

The data management has clearly marked transfer directions, and thus is clearly structured during data transmission.

28487486/EN – 02/2019

The scan function enables the reading of available devices, and the creation of these devices as projects in MOVISUITE®.

The drive train can be built from motor to gear unit using the product catalog. Furthermore, encoders, brakes, control modes, and user units can be selected and parameterized.

The data required for the drive train can typically be read off the nameplates of the motor and gear unit and entered, or selected via a catalog function in the engineering software.

Another variant is automatic identification of the gear unit motor data by output of the electronic nameplate stored in the motor encoder. During startup, the engineering software checks whether an electronic nameplate is present in the encoder and suggests the use of this data.

The recording function Scope is available for diagnostic purposes. This enables a diagnostics overview of connected devices and functions. Long-term data acquisition on the engineering PC hard disk is also possible.

Manual operation can be intuitively used for each application via the new interface.

The startup is functionally divided into segments. The following steps illustrate in exemplary fashion the startup procedure for an application inverter.

Drive train segment

Drive train		Configuring drive trains.

Interfaces segment

Standard		Basic settings of the installed interfaces • Basic device • Encoder 1
Optional		Basic settings of the options • Fieldbus • I/O card • Encoder 2 • MOVISAFE® CS..

Functions segment

Inputs/outputs		• Basic device • I/O card
Setpoints	10010	• Process data • PO data • Setpoint buffer • Fixed setpoints • Control word 1 – 3
Actual values	11100	• PI data • Status word 1 – 3

Drive functions		• FCB 01 Output stage inhibit • FCB 05 Speed control • FCB 06 Interpolated speed control • FCB 08 Interpolated torque control • FCB 09 Positioning • FCB 10 Interpolated position control • FCB 12 Reference travel • FCB 08 Rotor position identification • FCB 20 Jog mode • FCB 21 Brake test • FCB 26 Stop at user limit
Monitoring functions		• Reference signals 1 • Reference signals 2 • Limit values 1 • Limit values 2 • Monitoring functions 1 • Monitoring functions 2 • Output stage
Extended functions		• Parameter set • Auto reset • Standby mode • Touchprobe 1 • Touchprobe 2 • Cam switch

Information on the application inverter

Device data		• Device identification • Main component • Subcomponents • Production data
Overview of fault responses		• Axis module • Power supply monitoring • Functions
Setup		• Permissions • Reset device parameters • Select memory source

For further information, refer to the "MOVISUITE® standard Engineering Software" manual.

28487486/EN – 02/2019

2 Technical data

The following technical data applies to MOVIDRIVE® system and MOVIDRIVE® technology.

2.1 Markings

2.1.1 Basic device

The application inverter complies with the following directives and guidelines:

Marking	Definition
CE	The CE marking states the compliance with the following European guidelines: • Low Voltage Directive 2014/35/EU • EMC Directive 2014/30/EU • Machinery Directive 2006/42/EC • Directive 2011/65/EU for limiting the use of hazardous substances in electric and electronic equipment
EAC	The EAC marking states compliance with the requirements of the technical regulations of the Customs Union of Russia, Kazakhstan, and Belarus.
	The RCM marking states compliance with the technical regulations of the Australian Communications and Media Authority ACMA.
50	The China RoHS marking states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment.
c UL US LISTED	The UL and cUL marking state the UL approval.[1)] cUL is equivalent to CSA approval.

1) The UL and cUL marking for the following devices are still in preparation at the time of publication of this document: MDX9_A-0460 – 1490-5_3-.., MDX9_A-0420 – 1080-2_3-..

28487486/EN – 02/2019

2.1.2 Accessories

Braking resistors BR..

Marking	Definition
	The CE marking states the compliance with the following European guidelines: • Low Voltage Directive 2014/35/EU • Directive 2011/65/EU for limiting the use of hazardous substances in electric and electronic equipment
	The China RoHS marking states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment.
	The cUR marking states the UL approval for this component.

TCB thermal circuit breaker

Mark	Definition
	The CE mark states the compliance with the following European guidelines: • Low Voltage Directive 2014/35/EU • Directive 2011/65/EU for limiting the use of hazardous substances in electric and electronic equipment
	The China RoHS mark states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment.
	The cUR mark states the UL approval for this component.

NF.. line filter

Mark	Definition
	The CE mark states the compliance with the following European guidelines: • Directive 2011/65/EU for limiting the use of hazardous substances in electric and electronic equipment
	The China RoHS mark states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment.
	The cUR mark states the UL approval for this component.

ND.. line choke

Marking	Definition
	The CE marking states the compliance with the following European guidelines: • Low Voltage Directive 2014/35/EU • Directive 2011/65/EU for limiting the use of hazardous substances in electric and electronic equipment

Marking	Definition
	The China RoHS marking states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment.
c UR us	The cUR marking states the UL approval for this component.

Output filter

Marking	Definition
	The China RoHS marking states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment.
c UR us	The cUR marking states the UL approval for this component.

Output choke

Marking	Definition
CE	The CE marking states the compliance with the following European guidelines: • Low Voltage Directive 2014/35/EU • Directive 2011/65/EU for limiting the use of hazardous substances in electric and electronic equipment
	The China RoHS marking states compliance with directive SJ/T 11364-2014 for limiting the use of hazardous substances in electric and electronic equipment.
c UR us	The cUR marking states the UL approval for this component.

2.2 General technical data

The following table lists the technical data for all application inverters independent of

- Type
- Design
- Size
- Performance

General specifications	
Interference immunity	Meets EN 61800-3; 2. Environment
Interference emission	Limit value class C2 to EN 61800-3 The interference suppression level can be improved with relevant measures. Refer to the chapter "EMC-compliant installation according to EN 61800-3" in the product manual for further information.
Ambient temperature ϑ_{amb}	0 °C to +40 °C without derating 40 °C to +60 °C with derating[1)] For further information, refer to the chapter "Selection of an application inverter > Derating" in the product manual.
Type of cooling	Increased air cooling due to an installed, temperature-controlled fan.
Climatic conditions	• Long-term storage (weatherproof): EN 60721-3-1 class 1K2 temperature -25 °C to +70 °C (in contrast to the standard) Non-condensing, no moisture condensation • Transport (weatherproof): EN 60721-3-2 class 2K3 temperature -25 °C to +70 °C Non-condensing, no moisture condensation • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3K3 temperature 0 °C to +45 °C (in contrast to the standard) Non-condensing, no moisture condensation
Chemically active substances	• Long-term storage (weatherproof): EN 60721-3-1 class 1C2, no corrosive gases, no salt mist (in contrast to the standard) • Transport (weatherproof): EN 60721-3-2 class 2C2, no corrosive gases, no salt mist, no sea water (in contrast to the standard) • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3C2, no corrosive gases, no salt mist
Mechanically active substances	• Long-term storage (weatherproof): EN 60721-3-1 class 1S1, no conductive dust • Transport (weatherproof): EN 60721-3-2 class 2S1 • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3S1, no conductive dust

1) When using a CS.A card the ambient temperature is limited to a maximum of 55 °C.

Degree of protection according to EN 60529	
MDX9_A-0020-... – MDX9_A-0320-5_3-... MDX9_A-0070-... – MDX9_A-0290-2_3-...	IP20
as of MDX9_A-0460-... as of MDX9_A-0420...	IP10, optional IP20
Pollution class	2 in accordance with IEC 60664-1
Overvoltage category	III in accordance with IEC 60664-1
Installation altitude	Up to h ≤ 1000 m without restrictions. The following restrictions apply to altitudes > 1000 m: • From 1000 m to max. 3800 m: I_N reduction by 1% per 100 m • From 2000 m to max. 3800 m: To maintain protective separation and the air gaps and to comply with creepage distances according to EN 61800-5-1, an overvoltage protection device must be connected upstream to reduce the overvoltages from category III to category II.

28487486/EN – 02/2019

2.3 Technical data of basic device

2.3.1 Performance data 3 × AC 400 V

	Unit	MDX9_A-...-5_3-4-..								
Type		**0020**	**0025**	**0032**	**0040**	**0055**	**0070**	**0095**	**0125**	**0160**
Size		1				2			3	
Nominal output current I_N f_{PWM} = 4 kHz	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16
Input										
Nominal line voltage (to EN 50160) AC U_{line}		3 × 380 – 500 V								
Nominal line current AC I_{line}	A	1.8	2.25	2.88	3.6	4.95	6.3	8.55	11.3	14.4
Line frequency f_{line}	Hz	50 – 60 ± 10%								
Controlled rectifier		No								
X1 connection contacts		Plug connector – 1 core: 0.25 – 4 mm^2 – 2 cores: 0.25 – 2.5 mm^2 (twin AEH)[1)]								
Output										
Output voltage U_{out}	V	0 – U_{line}								
Motor power ASM P_{Mot}	kW	0.55	0.75	1.1	1.5	2.2	3	4	5.5	7.5
Nominal output current I_N f_{PWM} = 4 kHz	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16
Overload capacity		200%: 3 s at f_{PWM} = 4 kHz								
Continuous output current at f = 0 Hz		100% × I_N at f_{PWM} = 4 kHz								
Apparent output power S_N	kVA	1.9	2.3	2.9	3.7	5	6.5	8.8	11.6	14.9
Nominal DC link voltage U_{NDCL}	V	DC 560								
Frequency f_{PWM}	kHz	4, 8, 16 (adjustable)								
Max. output frequency f_{max}	Hz	U/f: 599 VFC^{PLUS}: 250 CFC: 500 ELSM®: 500								
X2 connection contacts		Plug connector – 1 core: 0.25 – 4 mm^2 – 2 cores: 0.25 – 2.5 mm^2 (twin AEH)[1)]								
General										
Nominal power loss 24 V	W	20								
Power section nominal power loss	W	16	20	27	34	45	58	83	112	147
Permitted number of times power may be switched on/off	min-1	1								
Minimum switch-off time for Power off	s	10								
EMC variant of power section		EMC filter limit value category C2 to EN 61800-3								
Mass	kg	4.1				4.4			5.7	
Brake chopper and braking resistor										
Minimum braking resistance value R_{BRmin}	Ω	100				47			27	
Brake chopper continuous power	kW	1.9	2.3	2.9	3.7	5	6.5	8.8	11.6	14.9
Brake chopper peak power		200% × apparent output power S_N × 0.9								
Connection contacts		Plug connector – 1 core: 0.25 – 4 mm^2 – 2 cores: 0.25 – 2.5 mm^2 (twin AEH)[1)]								
Dimensions										
Width	mm	95				105			105	
Height with shield plates	mm	479				479			494	
Depth	mm	215				215			260	

1) AEH: Conductor end sleeve

	Unit	MDX9_A-...-5_3-4-..							
Type		**0240**	**0320**	**0460**	**0620**	**0750**	**0910**	**1130**	**1490**
Size		4		5			6		
Nominal output current I_N f_{PWM} = 4 kHz	A	24	32	46	62	75	91	113	149

	Unit	MDX9_A-...-5_3-4-..							
Type		**0240**	**0320**	**0460**	**0620**	**0750**	**0910**	**1130**	**1490**
Input									
Nominal line voltage (to EN 50160) AC U_{line}		3 × 380 – 500 V							
Nominal line current AC I_{line}	A	21.6	28.8	41.4	55.8	67.5	81.9	102	134
Line frequency f_{line}	Hz	50 – 60 ± 5%							
Controlled rectifier		Yes							
X1 connection contacts		Plug connector – 1 core: 0.5 – 16 mm^2 – 2 cores: 0.25 – 6 mm^2 (twin AEH)[1]		M8			M10		
Output									
Output voltage U_{out}	V	0 – U_{line}							
Motor power ASM P_{Mot}	kW	11	15	22	30	37	45	55	75
Nominal output current I_N f_{PWM} = 4 kHz	A	24	32	46	62	75	91	113	149
Overload capacity		200%: 3 s at f_{PWM} = 4 kHz							
Continuous output current at f = 0 Hz		100% × I_N at f_{PWM} = 4 kHz							
Apparent output power S_N	kVA	15.3	19.8	28.8	38.7	46.8	56.7	70.2	92.7
Nominal DC link voltage U_{NDCL}	V	DC 560							
Frequency f_{PWM}	kHz	4, 8, 16 (adjustable)							
Max. output frequency f_{max}	Hz	U/f: 599 VFC^{PLUS}: 250 CFC: 500 ELSM®: 500							
X2 connection contacts		Plug connector – 1 core: 0.5 – 16 mm^2 – 2 cores: 0.25 – 6 mm^2 (twin AEH)[1]		M8			M10		
General									
Nominal power loss 24 V	W	30		15			20		
Power section nominal power loss	W	202	282	419	600	760	931	968	1332
Permitted number of times power may be switched on/off	min-1	1							
Minimum switch-off time for Power off	s	10							
EMC variant of power section		Basic interference suppression integrated							
Mass	kg	6.6		12.1			24.1		
Brake chopper and braking resistor									
Minimum braking resistance value R_{BRmin}	Ω	15		10	6		4.7		3.6 at 149 A
Brake chopper continuous power	kW	15.3	19.8	28.8	38.7	46.8	56.7	70.2	92.7
Brake chopper peak power		200% × apparent output power S_N × 0.9							
Connection contacts		Plug connector – 1 core: 0.5 – 16 mm^2 – 2 cores: 0.25 – 6 mm^2 (twin AEH)[1]		M8			M10		
Dimensions									
Width	mm	135		196			240		
Height with shield plates	mm	494		471			544		
Depth	mm	260		293			328		

1) AEH: Conductor end sleeve

	Unit	MDX9_A-...-5_3-4-..						
Type		**1770**	**2200**	**2500**	**3000**	**3800**	**4700**	**5880**
Size		7				8		

	Unit	MDX9_A-...-5_3-4-..						
Type		**1770**	**2200**	**2500**	**3000**	**3800**	**4700**	**5880**
Nominal output current I_N f_{PWM} = 4 kHz	A	177	220	250	300	380	470	588
Input								
Nominal line voltage (to EN 50160) AC U_{line}		3 × 380 – 500 V						
Nominal line current AC I_{line}	A	159	198	225	270	342	423	529
Line frequency f_{line}	Hz	50 – 60 ± 5%						
Controlled rectifier		Yes						
X1 connection contacts		M12						
Output								
Output voltage U_{out}	V	0 – U_{line}						
Motor power ASM P_{Mot}	kW	90	110	132	160	200	250	315
Nominal output current I_N f_{PWM} = 4 kHz	A	177	220	250	300	380	470	588
Overload capacity		200% at f_{PWM} = 4 kHz	200% at f_{PWM} = 2.5 kHz		150% at f_{PWM} = 2.5 kHz	150% at f_{PWM} = 2.5 kHz		
Continuous output current at f = 0 Hz		100% × I_N at f_{PWM} = 2.5 kHz						
Apparent output power S_N	kVA	110.7	136.8	230	277	350	434	541
Nominal DC link voltage U_{NDCL}	V	DC 560						
Frequency f_{PWM}	kHz	4, 8		2.5, 4, 8		2.5, 4		
Max. output frequency f_{max}	Hz	U/f: 599 VFC^{PLUS}: 250 CFC: 500 ELSM®: 500						
X2 connection contacts		M12						
General								
Nominal power loss 24 V								
Power section nominal power loss								
Permitted number of times power may be switched on/off								
Minimum switch-off time for Power off								
EMC variant of power section		Basic interference suppression integrated						
Mass								
Brake chopper and braking resistor								
Minimum braking resistance value R_{BRmin}	Ω	2.3				1		
Brake chopper continuous power	kW	110.7	136.8	230	277	350	434	541
Brake chopper peak power		200% × apparent output power S_N × 0.9						
Connection contacts		M12						
Dimensions								
Width	mm							
Height	mm							
Depth	mm							

2.3.2 Performance data 3 × AC 230 V

	Unit	MDX9_A-...-2_3-4-..		
Type		**0070**	**0093**	**0140**
Size		2		3
Nominal output current I_N f_{PWM} = 4 kHz	A	7	9.3	14
Input				
Nominal line voltage (to EN 50160) AC U_{line}		3 × 200 – 240 V		
Nominal line current AC I_{line}	A	6.3	8.37	12.6
Line frequency f_{line}	Hz	50 – 60 ± 10%		
Controlled rectifier		No		
X1 connection contacts		Plug connector – 1 core: 0.25 – 4 mm² – 2 cores: 0.25 – 2.5 mm² (twin AEH)[1)]		
Output				
Output voltage U_{out}	V	0 – U_{line}		
Motor power ASM P_{Mot}	kW	1.5	2.2	3.7
Nominal output current I_N f_{PWM} = 4 kHz	A	7	9.3	14
Overload capacity		200%: 3 s at f_{PWM} = 4 kHz		
Continuous output current at f = 0 Hz		100% × I_N at f_{PWM} = 4 kHz		
Apparent output power S_N	kVA	3.7	4.9	7.5
Nominal DC link voltage U_{NDCL}	V	DC 325		
Frequency f_{PWM}	kHz	4, 8, 16 (adjustable)		
Max. output frequency f_{max}	Hz	U/f: 599 VFC^{PLUS}: 250 CFC: 500 ELSM®: 500		
X2 connection contacts		Plug connector – 1 core: 0.25 – 4 mm² – 2 cores: 0.25 – 2.5 mm² (twin AEH)[1)]		
General				
Nominal power loss 24 V	W	20		
Power section nominal power loss	W	51	72	105
Permitted number of times power may be switched on/off	min-1	1		
Minimum switch-off time for Power off	s	10		
EMC variant of power section		EMC filter limit value category C2 to EN 61800-3		
Mass		4.4		5.7
Brake chopper and braking resistor				
Minimum braking resistance value R_{BRmin}	Ω	27		15
Brake chopper continuous power	kW	3.7	4.9	7.5
Brake chopper peak power		200% × apparent output power S_N × 0.9		
Connection contacts		Plug connector – 1 core: 0.25 – 4 mm² – 2 cores: 0.25 – 2.5 mm² (twin AEH)[1)]		
Dimensions				
Width	mm	105		105
Height with shield plates	mm	479		494
Depth	mm	215		260

1) AEH: Conductor end sleeve

	Unit	MDX9_A-...-2_3-4-..					
Type		**0213**	**0290**	**0420**	**0570**	**0840**	**1080**
Size		4		5		6	
Nominal output current I_N f_{PWM} = 4 kHz	A	21.3	29	42	57	84	108
Input							
Nominal line voltage (to EN 50160) AC U_{line}		3 × 200 – 240 V					

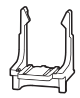
28487486/EN – 02/2019

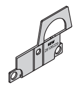
	Unit	MDX9_A-...-2_3-4-..					
Type		**0213**	**0290**	**0420**	**0570**	**0840**	**1080**
Nominal line current AC I_{line}	A	19.2	26.1	37.8	51.3	75.6	97.2
Line frequency f_{line}	Hz	50 – 60 ± 10%					
Controlled rectifier		Yes					
X1 connection contacts		Plug connector – 1 core: 0.5 – 16 mm^2 – 2 cores: 0.25 – 6 mm^2 (twin AEH)[1]		M8		M10	
Output							
Output voltage U_{out}	V	0 – U_{line}					
Motor power ASM P_{Mot}	kW	5.5	7.5	11	15	22	30
Nominal output current I_N f_{PWM} = 4 kHz	A	21.3	29	42	57	84	108
Overload capacity		200%: 3 s at f_{PWM} = 4 kHz					
Continuous output current at f = 0 Hz		100% × I_N at f_{PWM} = 4 kHz					
Apparent output power S_N	kVA	11.3	15.4	22.2	30.2	44.6	50.4
Nominal DC link voltage U_{NDCL}	V	DC 325					
Frequency f_{PWM}	kHz	4, 8, 16 (adjustable)					
Max. output frequency f_{max}	Hz	U/f: 599 VFC^{PLUS}: 250 CFC: 500 ELSM®: 500					
X2 connection contacts		Plug connector – 1 core: 0.5 – 16 mm^2 – 2 cores: 0.25 – 6 mm^2 (twin AEH)[1]		M8		M10	
General							
Nominal power loss 24 V	W	30		15		20	
Power section nominal power loss	W	152	218	315	459	729	764
Permitted number of times power may be switched on/off	min-1	1					
Minimum switch-off time for Power off	s	10					
EMC variant of power section		Basic interference suppression integrated					
Mass		6.6		12.1		24.1	
Brake chopper and braking resistor							
Minimum braking resistance value R_{BRmin}	Ω	7.5		4.7		2.3	
Brake chopper continuous power	kW	11.3	15.4	22.2	30.2	44.6	50.4
Brake chopper peak power		200% × apparent output power S_N × 0.9					
Connection contacts		Plug connector – 1 core: 0.5 – 16 mm^2 – 2 cores: 0.25 – 6 mm^2 (twin AEH)[1]		M8		M10	
Dimensions							
Width	mm	135		196		240	
Height with shield plates	mm	494		471		544	
Depth	mm	260		293		328	

1) AEH: Conductor end sleeve

2.4 Technical data of accessories

2.4.1 Installation accessories

Type designation	Part number	Plastic cover	Number	Scope of delivery	Description
MDX9_A-0460 – 0750-5_3-..	28243625		10	Not included in scope of delivery	(→ 🗎 228)
MDX9_A-0420 – 0570-2_3-..					
MDX91A-0910 – 1490-5_3-..	28244540				
MDX91A-0840 – 1080-2_3-..					

Type designation	Part number	Lifting eye	Number	Scope of delivery	Description
MDX91A-0910 – 1490-5_3-..	28106229		1	Included in the scope of delivery	(→ 🗎 212)
MDX91A-0840 – 1080-2_3-..					

28487486/EN – 02/2019

2.5 Electronics data – signal terminals

	Terminal designation	Specification
General		
Design		According to IEC 61131-2
Supply voltage		
Port	X5	External power supply 24 V according to IEC 61131
Connecting contacts		Plug connector - 1 core: 0.25 – 2.5 mm^2 - 2 cores: 0.5 – 1.5 mm^2 (Twin-AEH)[1)]

1) AEH: Conductor end sleeve

Digital inputs		
Cycle time input		1 ms / 500 µs
Quantity		• 6 with MOVIDRIVE® system • 8 with MOVIDRIVE® technology
Response time		100 µs plus cycle time
Assignment	X20: 1 – 6	DI00: "Output stage enable" fixedly assigned. DI01 – DI05: Selection option, see parameter menu. All inputs are suitable for touchprobe function. Latency period < 100 µs, max. 2 simultaneously. DI04, DI05: HTL low-resolution encoder connection. DI05: Primary frequency input.
	X20: 7 – 8	Reserved
	X20: 9	GND
Connecting contacts		Plug connector - 1 core: 0.25 – 2.5 mm^2 - 2 cores: 0.5 – 1.5 mm^2 (Twin-AEH)[1)]

1) AEH: Conductor end sleeve

Digital outputs		
Cycle time output		1 ms / 500 µs
Quantity		4
Response time		175 µs plus cycle time
Output current		I_{max} = 50 mA
Short-circuit protection		Yes
Assignment	X21: 1	+24 V supply voltage Maximum output current = 50 mA
	X21: 2 – 5	DO00 – DO03: Selection option, see parameter menu.
	X21: 6	GND
Connecting contacts		Plug connector - 1 core: 0.25 – 2.5 mm^2 - 2 cores: 0.5 – 1.5 mm^2 (Twin-AEH)[1)]

1) AEH: Conductor end sleeve

Brake control		
Assignment	X10:DB0	DB00: - Brake control - Control braking contactor DC 24 V, max. 150 mA
	X10:GND	GND
	X10:TF1	Sensor input for temperature evaluation of the motor
Connecting contacts		Plug connector MDX9_A-0020 – 0320-5_3-.. MDX9_A-0070 – 0290-2_3-..: - One core: 0.25 – 2.5 mm^2 MDX9_A-0460-5_3-.. and newer MDX9_A-0420-2_3-..: and newer - One core: 0.25 – 2.5 mm^2 - Two cores: 0.5 – 1 mm^2 (Twin-AEH)[1)]

1) AEH: Conductor end sleeve

Encoder input		
	X15:13	X15:13 DC 24 V, I_{max} = 500 mA
	X15:15	X15:15 DC 12 V, I_{max} = 500 mA

28487486/EN – 02/2019

2.6 Electronics data – drive safety functions

The table below shows the technical data of the application inverter relating to the integrated safety technology.

The safety-related digital inputs comply with type 3 in accordance with IEC 61131-2.

Reference potential for the F_STO_P1 and F_STO_P2 is STO_M (contact at terminal X6:2).

		Terminal designation	General electronics data		
Safety contact STO		X6			
Electrical data of inputs F_STO_P1, F_STO_P2			**Minimum**	**Typical**	**Maximum**
Input voltage range		X6:1 and X6:3	DC -3 V	DC 24 V	DC 30 V
Input capacitance against STO_M			–	300 pF	500 pF
Input capacitance against GND			–	300 pF	500 pF
Power consumption at DC 24 V	F_STO_P1		–	150 mW	200 mW
	F_STO_P2		–	150 mW	200 mW
	Sum[1)]		–	300 mW	400 mW
Input voltage for ON status (STO)			DC 11 V	–	–
Input voltage for OFF status (STO)			–	–	DC 5 V
Permitted leakage current of the external safety controller			–	–	1 mA
Technical data					
Time from disconnecting the safety voltage until the deactivation of the rotating field			–	1.5 ms	10 ms 2 ms[2)]
Time from connecting the safety voltage until the activation of the rotating field			–	–	110 ms
Connection contacts			Plug connector – 1 core: 0.25 – 1.5 mm² – 2 cores: 0.25 – 0.5 mm² (twin AEH)[3)]		

1) Each drive unit always requires a power consumption of 300 mW

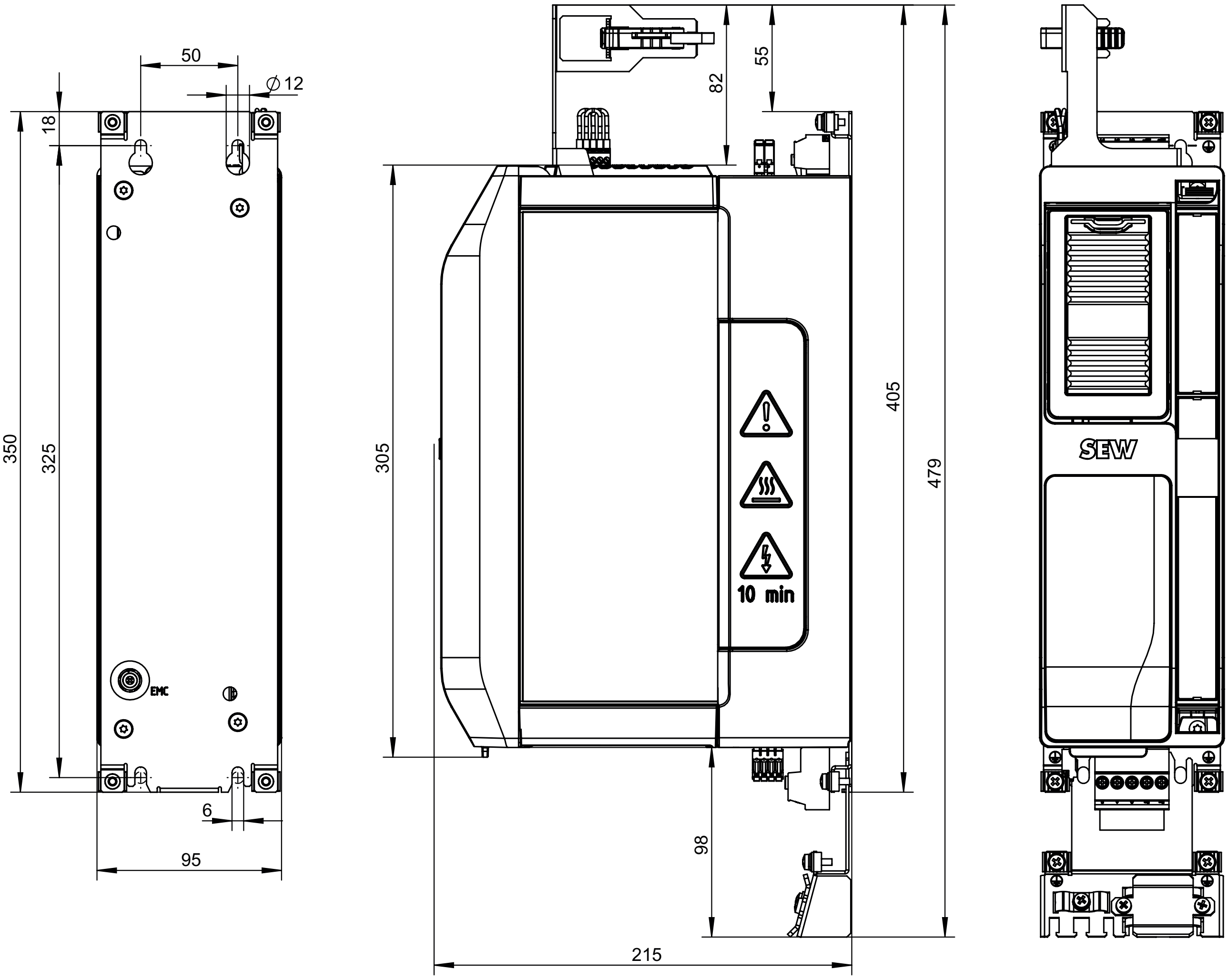
2) Only when the STO is used and controlled via a MOVISAFE® CS.A card

3) AEH: Conductor end sleeve

28487486/EN – 02/2019

2.7 Dimension drawings

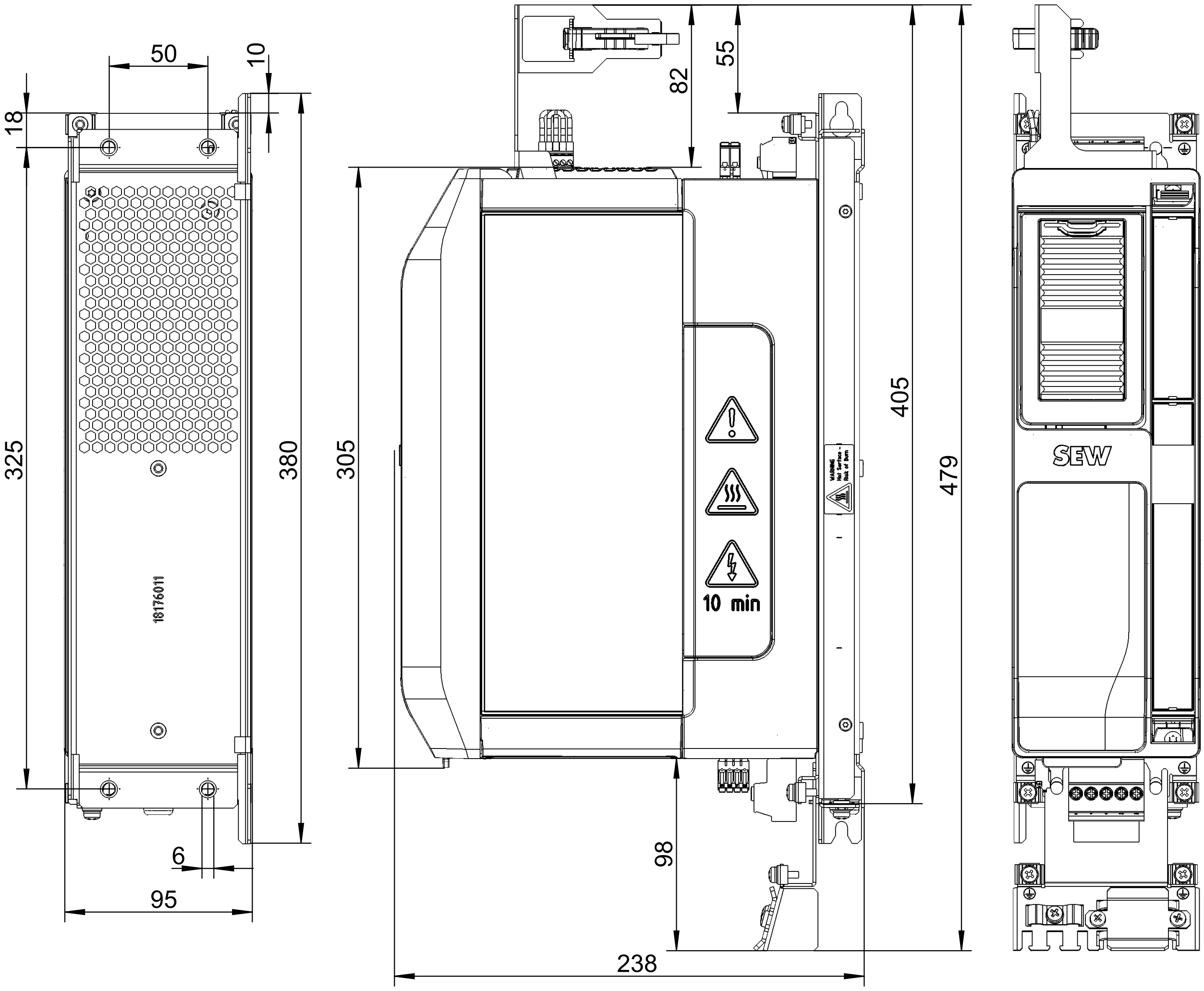
2.7.1 MDX9_A-0020 – 0040-5_3-..



20367245579

28487486/EN – 02/2019

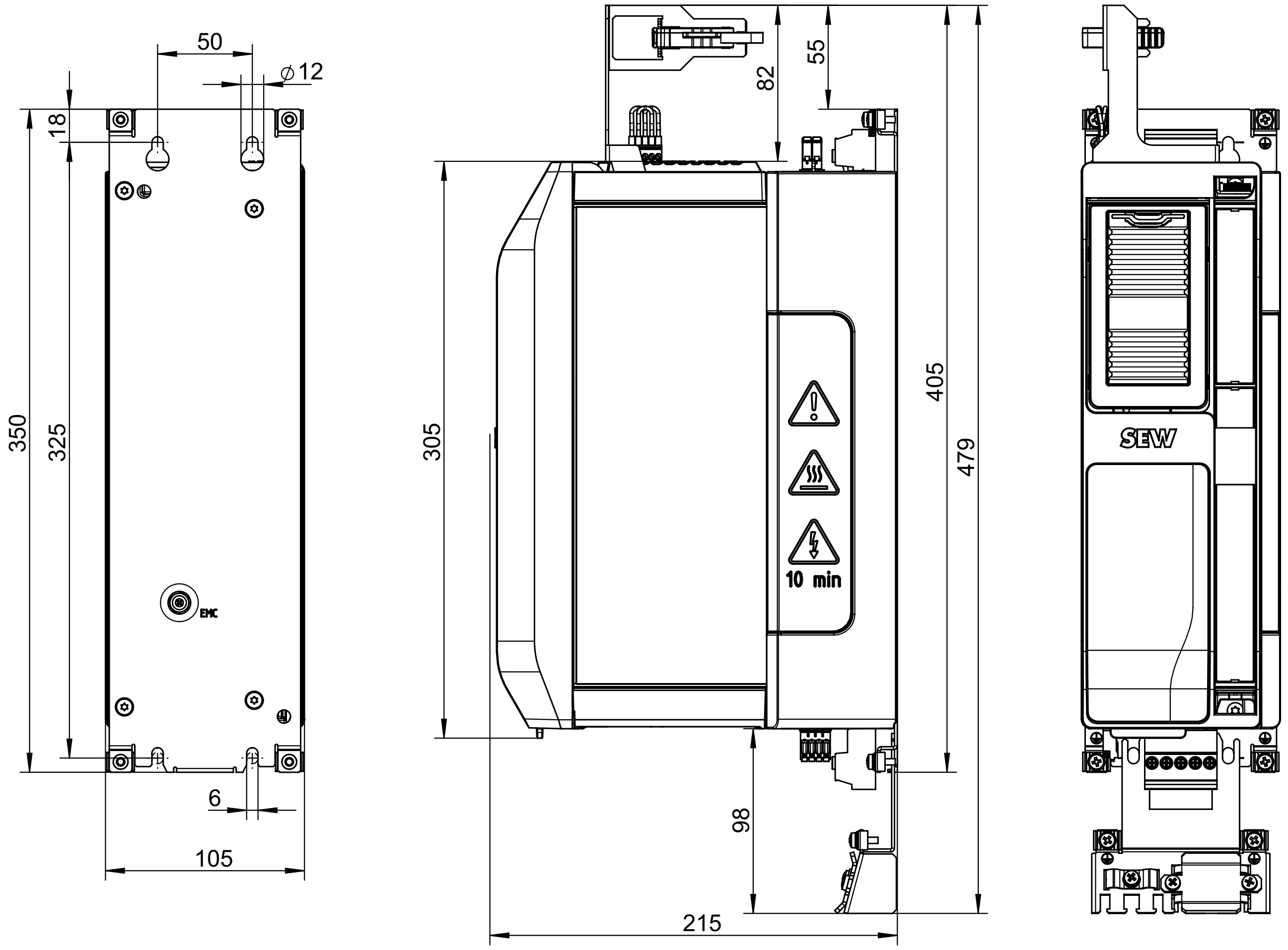
2.7.2 MDX9_A-0020 – 0040-5_3-.. , MDX9_A-0070 – 0093-2_3-.. with braking resistor



20367243147

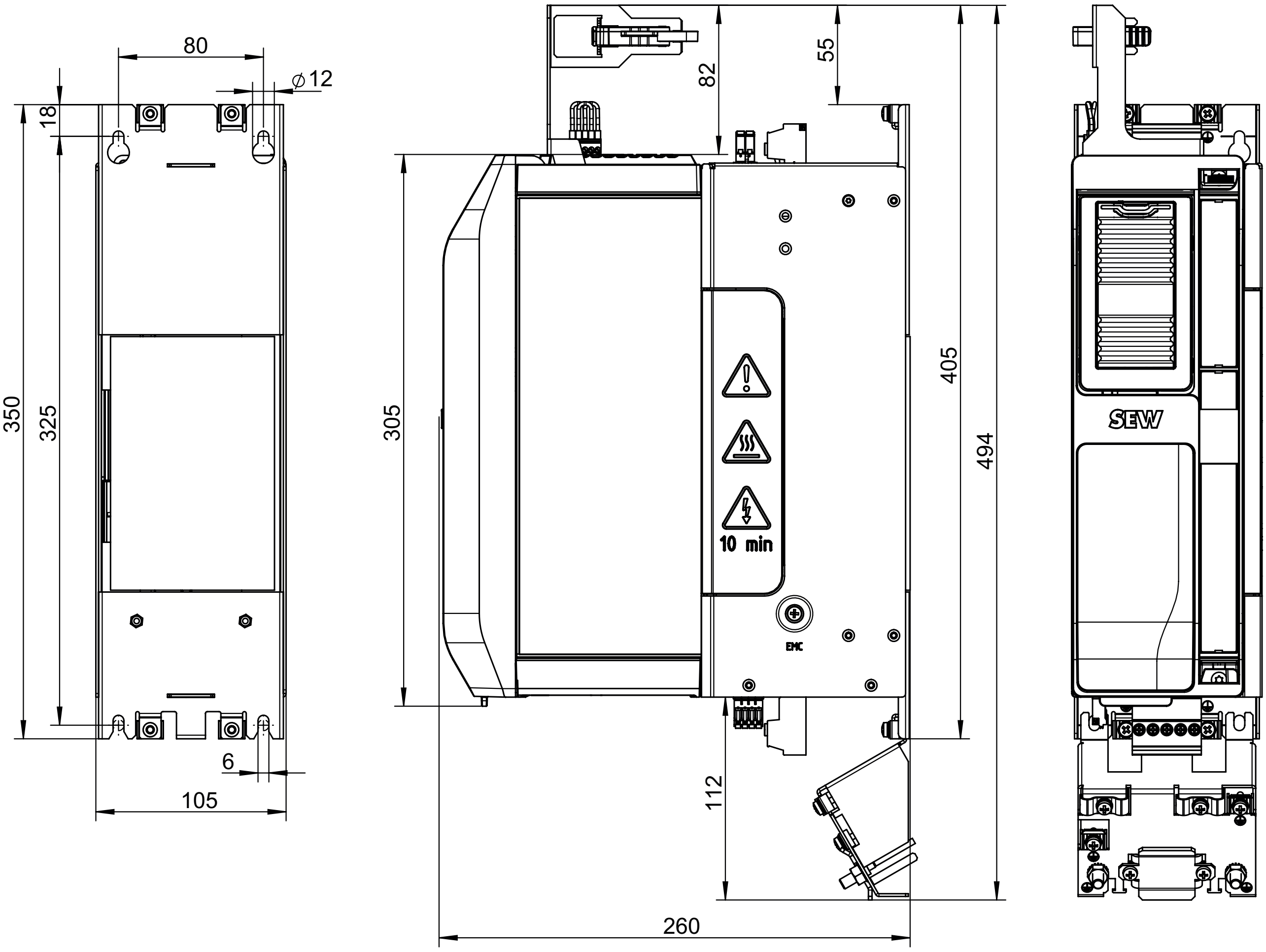
28487486/EN – 02/2019

2.7.3 MDX9_A-0055 – 0095-5_3-.. , MDX9_A-0070 – 0093-2_3-..



20367250443

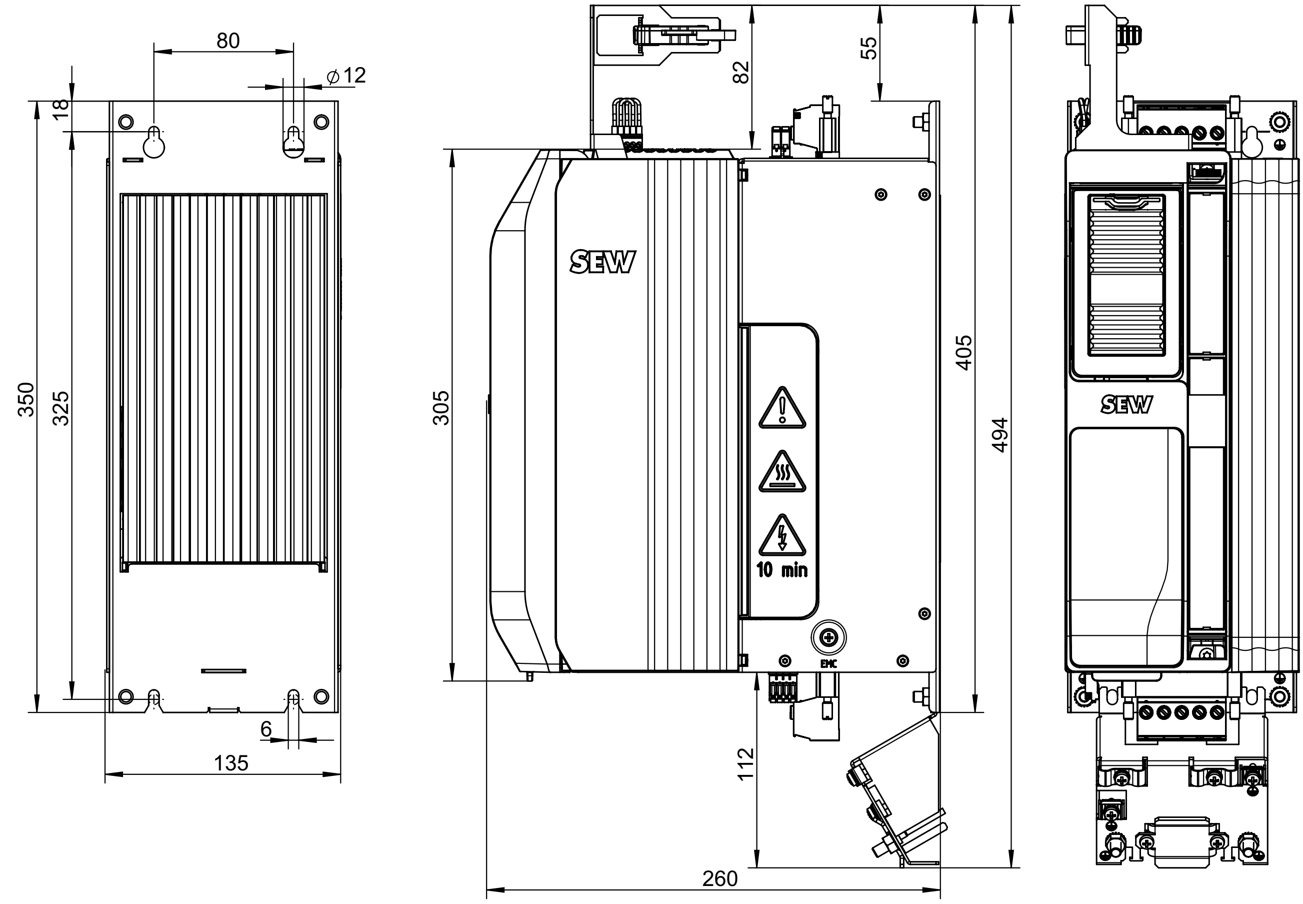
2.7.4 MDX9_A-0125 – 0160-5_3-.. , MDX9_A-0140-2_3-..



20367252875

28487486/EN – 02/2019

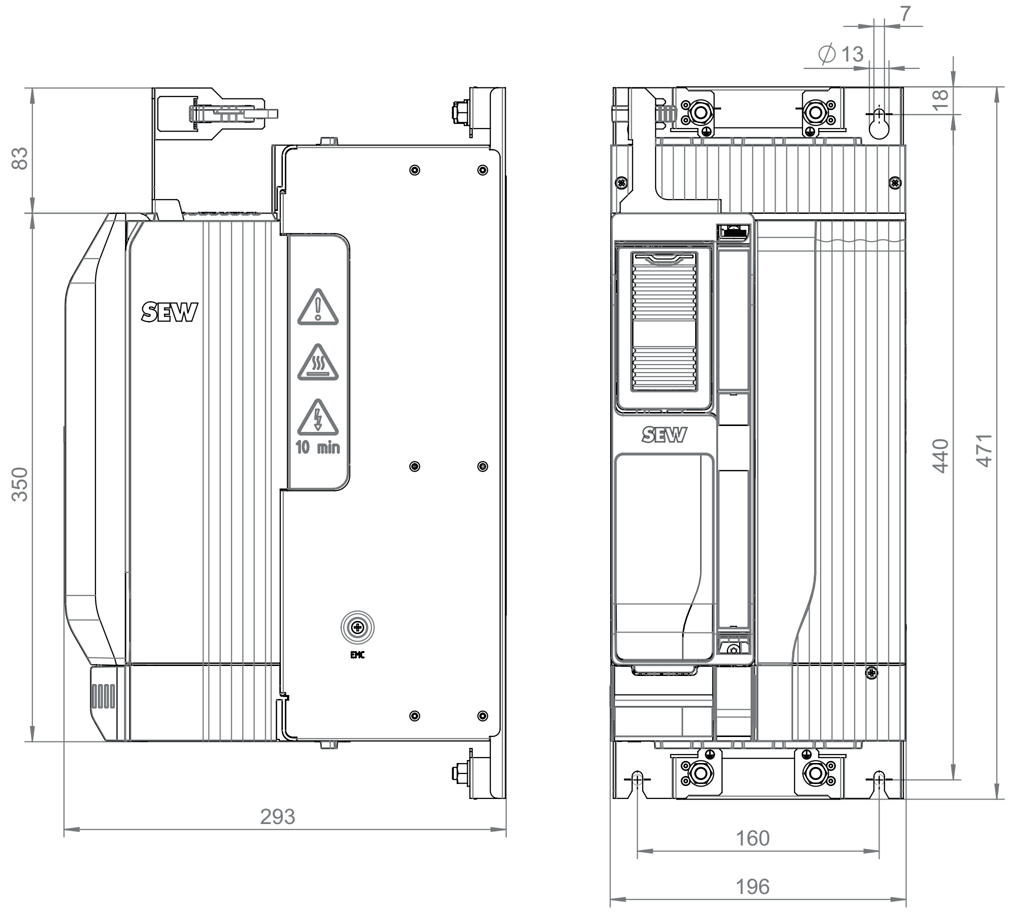
2.7.5 MDX9_A-0240 – 0320-5_3-.. , MDX9_A-0213 – 0290-2_3-..



20367248011

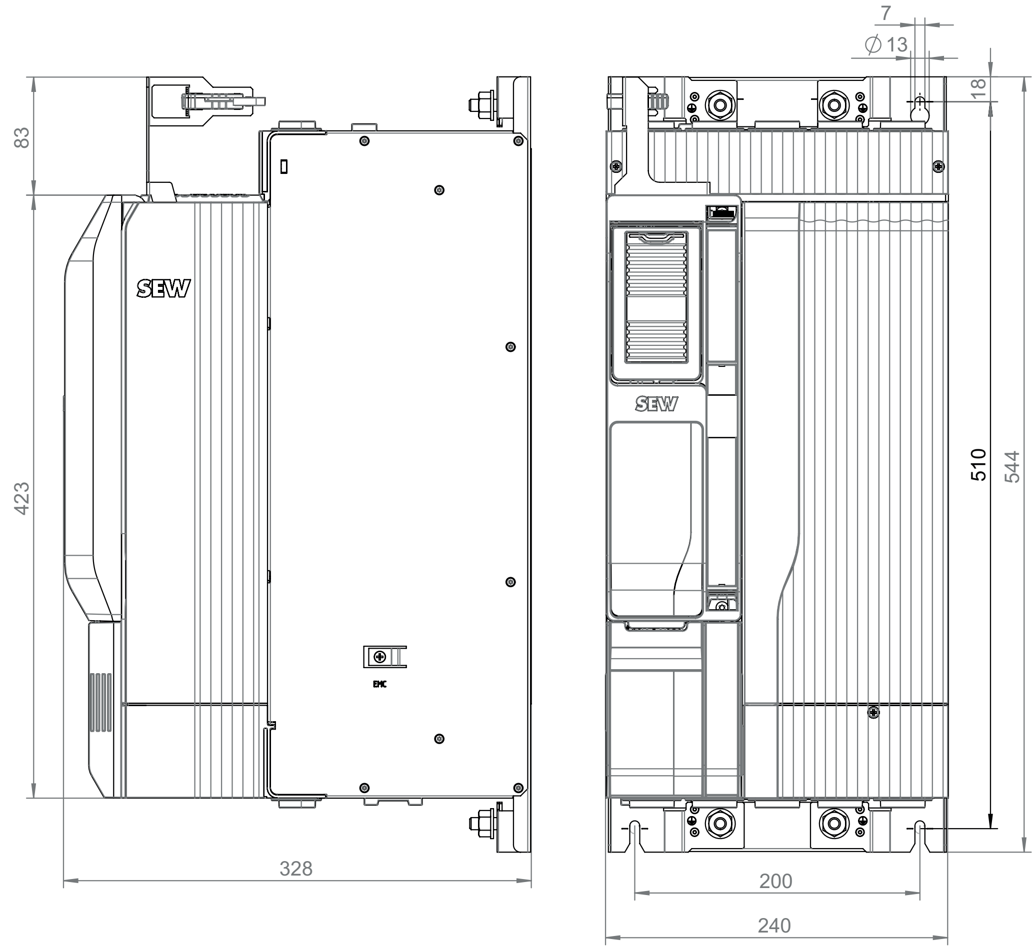
28487486/EN – 02/2019

2.7.6 MDX9_A-0460 – 0750-5_3-.. , MDX9_A-0420 – 0570-2_3-..



20968151179

2.7.7 MDX91A-0910 – 1490-5_3-.., MDX91A-0840 – 1080-2_3-..



23543938443

28487486/EN – 02/2019

2.8 Technical data of the cards

2.8.1 CIO21A and CID21A input/output cards

The CIO21A input/output card provides digital/analog inputs and outputs; the CID21A cards provide digital inputs and outputs.

	Terminal designation/ specification		Specifications
	CIO21A	CID21A	
Part number	28229495	28229487	
General			
Design			In accordance with IEC 61131-2 (type 3 for digital inputs)
Cycle time			1 ms
Power consumption	1.2 W	0.4 W	Base load (exclusively total power at outputs)
Connection contacts			Plug connector – 1 core: 0.25 – 0.5 mm^2 Shield terminals for control lines available
Digital inputs			
Number			4
Response time			160 µs plus cycle time
Assignment	X52: 1 – 4		DI10 – DI13: For the selection option, see parameter menu
	X52: 5		GND
Digital outputs			
Number			4
Response time			175 µs plus cycle time
Output current			I ≤ 50 mA
Capacitive load			≤ 300 nF
Inductive load			Not permitted
Protection device			Short-circuit proof, protected against external voltage DC 0 – 30 V
Assignment	X52: 6 – 9		DO10 – DO13: For the selection option, see parameter menu
	X52: 10		GND
Analog inputs			
Number			2
Type			Differential Switchable to current input
Range of values			0 to +10 V, -10 V to +10 V 0(4) – 20 mA
Assignment	X50:2 X50:3		Analog input AI21 Reference of analog input AI21
	X50:4 X50:7		GND
	X50:5 X50:6		Analog input AI31 Reference of analog input AI31
Voltage input			
Resolution			0 to +10 V (11 bit), -10 V to +10 V (12 bit)
Tolerance			± 0.5%
Overvoltage immunity			DC -20 V to DC +20 V
Input resistance			≥ 10 kΩ
Current input			
Resolution			0(4) – 20 mA (11 bit)
Tolerance			± 2%
Load impedance			(Internal) 250 Ω
Overvoltage immunity			DC -10 V to DC +10 V
Analog outputs			
Number			2
Short-circuit protection			Yes

28487486/EN – 02/2019

	Terminal designation/ specification		Specifications
	CIO21A	CID21A	
Assignment	X51:1 X51:4		Analog voltage output AOV2/AOV3
	X51:2 X51:5		Analog current output AOC2/AOC3
	X51: 3, 6		GND
Voltage output			
Tolerance			± 5%
Capacitive load			≤ 300 nF
Inductive load			≤ 500 µH
Load resistance			≥ 1 kΩ
Resolution			12 bit
Reset state			0 V
Output value			-10 V to +10 V ≤ 10 mA
Current output			
Tolerance			± 3 %
Capacitive load			≤ 300 nF
Inductive load			None
Load resistance			≤ 500 Ω
Resolution			11 bit
Reset state			0 mA
Measuring range			0(4) – 20 mA
Reference voltage output			
Short-circuit protection			Yes
Output voltage			DC -10 V, DC +10 V
Tolerance			± 0.5 %
Noise			≤ 10 mA
Output current			≤ 3 mA
Capacitive load			≤ 300 nF
Inductive load			≤ 500 µH
Assignment	X50: 1		REF1 (DC +10 V)
	X50: 8		REF2 (DC -10 V)

NOTICE

Connection of inductive loads to digital outputs

Destruction of digital outputs.

If inductive loads are connected to digital outputs, you must install an external protective element (freewheeling diode).

2.8.2 CES11A multi-encoder card

Voltage supply

The multi-encoder card is supplied by the basic device.

Technical data of encoder supply

	Terminal designation	Specifications
Part number		28229479
Power consumption		
Nominal power loss 24 V		0.8 W
Maximum power consumption 24 V (card including encoder supply)		12.8 W
Encoder supply		
12 V	X17:15	DC 12 V ± 10%
24 V	X17:13	DC 24 V -10%, +20% in accordance with EN 61131[1)]
Nominal output current 12 V or 24 V		500 mA
Peak current I_{max} for 150 µs		1000 mA
Capacitive load		< 220 µF
Inductive load		< 500 µH
Short-circuit protection of 12 V supply		Yes, but a permanent short circuit is not permitted.
Short-circuit protection of 24 V supply		Yes, but a permanent short circuit is not permitted.
Evaluable temperature sensor		TF / TH / KTY84-130 / Pt1000

1) Note the restricted tolerance range

Encoder connection

Encoder connection	Specification
Connection on encoder card end	15-pin socket
Maximum encoder cable length	- HTL encoder ES7C and EG7C: 300 m - Standard HTL encoder: 200 m - Other encoders: 100 m

2.8.3 Safety cards CS..A

General technical data

	Value
Ambient temperature for storage of the safety card	≥ -25 °C – ≤ 85 °C
Ambient temperature of MOVIDRIVE® system/ technology, all sizes (For derating, see the "MOVIDRIVE® system" and "MOVIDRIVE® technology" operating instructions)	• 0 °C – 40 °C without derating • 40 °C – 55 °C with derating
Ambient temperature of MOVIDRIVE® modular, all sizes	0 °C – 45 °C without derating
Installation altitude	Maximum 3800 m above sea level

Safe digital inputs

F-DI00 – F-DI03	Value/description
Properties	DC 24 V input pursuant to EN 61131-2, type 3
Signal level	• Logic "0" = LOW input: ≤ 5 V or ≤ 1.5 mA • Logic "1" = HIGH input: ≥ 11 V and ≥ 2 mA
Reference ground	GND
Power demand (typical)	0.21 W at DC 24 V
Input current	≤ 15 mA
Input resistance	≤ 4 kΩ at DC 24 V
Input filter time, parameterizable	4 ms – 250 ms
Permitted cable length	30 m
Error response time with single-pole connection	No greater than the response time without error.
Edge steepness of input signal	> 120 V/s
Input capacitance	< 500 pF

Sensor supply

F-SS0, F-SS1	Value/description
Properties	• DC 24 V output pursuant to EN 61131-2 • Short circuit and overload protection • No galvanic isolation
Rated current	150 mA
Inrush current (≤ 10 ms)	300 mA
Short-circuit protection	1.2 A

F-SS0, F-SS1	Value/description
Internal voltage drop	< DC 1.3 V
Pulsed voltage supply (if activated)	• 2 ms open (LOW) • Period duration, pulsed voltage supply: 8 ms
Permitted cable length	30 m (per sensor)
Leakage current (F-SSx blocked)	< 0.1 mA

Safe digital outputs

F-DO00_P/M, F-DO01_P/M	Value/description
Features	• DC 24 V output in accordance with EN 61131-2 • Short circuit and overload protection
Rated current	150 mA
Inrush current (≤ 10 ms)	300 mA
Leakage current (F-DOx blocked)	< 0.1 mA
Maximum switching frequency	• 10 Hz during operation < 1 minute • 0.5 Hz during operation > 1 minute
Overload protection	210 mA
Minimum current for wire break monitoring	15 mA
Permitted cable length	30 m
Load capacitance (max. test pulse duration)	≤ 300 nF
Load capacitance (1 ms test pulse duration)	50 nF
Capacitance to GND/PE (sourcing output only)	≤ 10 nF
Load capacitance with diode de-coupling	≤ 12 µF
Load inductance	≤ 100 µH
Load inductance with freewheeling diode	≤ 40 H
Minimum load resistance	> 130 Ω

Part numbers of the safety cards

Safety card	Part number
MOVISAFE® CSB21A	28233360
MOVISAFE® CSS21A	28233379
MOVISAFE® CSB31A	28233387
MOVISAFE® CSS21A	28233395

28487486/EN – 02/2019

2.9 Technical data of encoder interfaces

2.9.1 Basic device

	Terminal designation	Specification
Encoder interface	X15:1 – 15	Supported encoders
		Resolver
		SIN/COS
		TTL/HTL
		HIPERFACE®
		Encoders with RS422 signals
Connecting contacts		15-pin socket
Encoder supply		
Nominal output voltage U_{S24VG} according to IEC 61131		DC 24 V
Nominal output voltage U_{S12VG} according to IEC 61131		DC 12 V
I_{max}		500 mA
I_{peak} for 150 µs		1000 mA
Short-circuit protection of 12 V supply		Yes, but a permanent short circuit is not permitted.
Short-circuit protection of 24 V supply		Yes, but a permanent short circuit is not permitted.

2.9.2 CES11A multi-encoder card

	Terminal designation	Specification
encoder interface	X17:1 – 15	Supported encoders
		SIN/COS
		TTL/HTL
		HIPERFACE®
		EnDat2.1 with sin/cos signals
		SSI
		CANopen
		Encoders with RS422 signals
Connecting contacts		15-pin socket
Encoder supply		
Nominal output voltage U_{S24VG} according to IEC 61131		DC 24 V
Nominal output voltage U_{S12VG} according to IEC 61131		DC 12 V
I_{max}		500 mA
I_{peak} for 150 µs		1000 mA

28487486/EN – 02/2019

2.10 Technical data of braking resistors, filters, and chokes

2.10.1 Braking resistors type BR.../BR...-T

General

The BR.../BR...-T braking resistors are adapted to the technical characteristics of the application inverter.

Braking resistors with different continuous and peak braking powers are available.

The braking resistors can be protected against overload and overtemperature by the customer when a thermal overload relay is used. The tripping current is set to the value I_F; for this, see the following tables "Technical data and assignment to an inverter".

The braking resistors of the series BR...-T are equipped with an integrated temperature switch that monitors the temperature. If the nominal operating temperature is exceeded, the temperature switch triggers a signal contact. The temperature switch does not switch off the braking resistor. This is why the temperature switch must be evaluated to avoid thermal overload of the braking resistor.

Another possibility to protect the braking resistor is the TCB thermal circuit breaker. The TCB thermal circuit breaker protects the braking resistor against continuous overload and against power peaks over short periods.

A PTC resistor protects itself (reversible) against regenerative overload by changing abruptly to high resistance and no longer consuming any more energy. The inverter then switches off and signals a "brake chopper" fault.

A flat-type resistor has internal thermal protection (fuse cannot be replaced) that interrupts the current circuit in the event of overload. The project planning guidelines and the documented assignments of the drive inverter and braking resistor must be adhered to.

INFORMATION

Use of protection devices

Use only the protection devices listed in the following section:

- TCB thermal circuit breaker
- Internal temperature switch T
- External bimetallic relay

→ See also the chapter "Protection of the braking resistor against thermal overload"

28487486/EN – 02/2019

UL and cUL approval

The listed braking resistors have a cRUus approval independent of the application inverter.

Parallel connection of braking resistors

Identical braking resistors must be connected in parallel for some inverter/resistor combinations.

In this case, protect each braking resistor against overload and overtemperature using a thermal overload relay.

The temperature switches must be connected in series for braking resistors of the BR...-T series.

28487486/EN – 02/2019

Technical data and assignment to an inverter

Technical data

Braking resistor	Unit	BR120-001	BR100-001	BR100-002	BR100-006-T
Part number		18176011	08281718	08281653	18204198
Current-carrying capacity at 100% cdf	kW	0.03	0.1	0.2	0.6
Resistance value R_{BR}	Ω	117	100 ± 10%		
Tripping current I_{trip}	A		0.8	1	2.4
Design		PTC submounting resistor	Flat-type resistor		Wire resistor
Power connections		Single conductors			Ceramic terminal 2.5 mm²
Tightening torque	Nm	–			0.5
PE connection		–			M4
Tightening torque PE	Nm	–			1.8
Degree of protection in accordance with EN 60529		IP20	IP65		IP20
Ambient temperature ϑ_{amb}			-20 °C to +40 °C (Reduction 4% P_N/10 K to +60 °C)		
Mass	kg	0.95	0.3	0.6	3

Assignment to an inverter

The assignment considers the maximum peak braking power of the inverter.

Braking resistor	BR120-001	BR100-001	BR100-002	BR100-006-T
MDX9_A-...-5_3-..	0020 0025 0032 0040	0020 0025 0032 0040		

Technical data

Braking resistor	Unit	BR047-010-T	BR147-T	BR247-T
Part number		17983207	18201342	18200842
Current-carrying capacity at 100% cdf	kW	1	1.2	2
Resistance value R_{BR}	Ω	47 ± 10%		
Tripping current I_{trip}	A	4.6	5.1	6.5
Design		Wire resistor		
Power connections		Ceramic terminal 2.5 mm²		
Tightening torque	Nm	0.5		
PE connection		M4		
Tightening torque PE	Nm	1.8		
Degree of protection		IP20		
Ambient temperature ϑ_{amb}		-20 °C to +40 °C		
Mass	kg	4	4.9	6.7

Assignment to an inverter

The assignment considers the maximum peak braking power of the inverter.

Braking resistor	BR47-010-T	BR147-T	BR247-T
MDX9_A-...-5_3-..	0055 0070 0095		

Technical data

Braking resistor	Unit	BR027-016-T	BR027-024-T	BR027-042-T
Part number		17983215	17983231	19155301
Current-carrying capacity at 100% cdf	kW	1.6	2.4	4.2

Braking resistor	Unit	BR027-016-T	BR027-024-T	BR027-042-T
Resistance value R_{BR}	Ω	27 ± 10%		
Tripping current I_{trip}	A	7.7	9.4	12.5
Design		Wire resistor		Frame resistor
Power connections		Ceramic terminal 2.5 mm²		
Tightening torque	Nm	0.5		
PE connection		M4		M5
Tightening torque PE	Nm	1.8		2.5
Degree of protection		IP20		
Ambient temperature ϑ_{amb}		-20 °C to +40 °C		
Mass	kg	5.8	8	10

Assignment to an inverter

The assignment considers the maximum peak braking power of the inverter.

Braking resistor	BR027-016-T	BR027-024-T	BR027-042-T
MDX9_A-...-5_3-..	0125 0160		
MDX9_A-...-2_3-..	0070 0093		

Technical data

Braking resistor	Unit	BR015-016	BR015-042-T	BR015-075-T	BR915-T
Part number		17983258	19155328	19155271	18204139
Current-carrying capacity at 100% cdf	kW	1.6	4.2	7.5	16
Resistance value R_{BR}	Ω	15 ± 10%			
Tripping current I_{trip}	A	10.3	16.7	22.4	32.7
Design		Wire resistor	Frame resistor	Grid resistor mounting position 1	
Power connections		Ceramic terminal 2.5 mm²	Ceramic terminal 4 mm²	M8 stud	
Tightening torque	Nm	0.5	0.9	6	
PE connection		M4	M5	M6 stud	
Tightening torque PE	Nm	1.8	2.5	3	
Degree of protection		IP20			
Ambient temperature ϑ_{amb}		-20 °C to +40 °C			
Mass	kg	5.8	10	12	32

Assignment to an inverter

The assignment considers the maximum peak braking power of the inverter.

Braking resistor	BR015-016	BR015-042-T	BR015-075-T	BR915-T
MDX9_A-...-5_3-..	0240 0320 0620 (Parallel connection of 2 braking resistors) 0750 (Parallel connection of 2 braking resistors)			
MDX9_A-...-2_3-..	0140 0213 (Parallel connection of 2 braking resistors) 0290 (Parallel connection of 2 braking resistors)			

Technical data

Braking resistor	Unit	BR010-024	BR010-050-T	BR010-108-T
Part number		17983266	17983274	19155298
Current-carrying capacity at 100% cdf	kW	2.4	5	10.8
Resistance value R_{BR}	Ω	10 ± 10%		
Tripping current I_{trip}	A	15.5	22.4	32.9
Design		Wire resistor	Grid resistor mounting position 1	
Power connections		Ceramic terminal 2.5 mm²	M8 stud	

28487486/EN – 02/2019

Braking resistor	Unit	BR010-024	BR010-050-T	BR010-108-T
Tightening torque	Nm	0.5	6	
PE connection		M4 stud	M6 stud	
Tightening torque PE	Nm	1.8	3	
Degree of protection		IP20		
Ambient temperature ϑ_{amb}		-20 °C to +40 °C		
Mass	kg	8	11	17.5

Assignment to an inverter

The assignment considers the maximum peak braking power of the inverter.

Braking resistor	BR010-024	BR010-050-T	BR010-108-T
MDX9_A-...-5_3-..	0460 0910 (Parallel connection of 2 braking resistors) 1130 (Parallel connection of 2 braking resistors)		
MDX9_A-...-2_3-..	0213 0290 0420 (Parallel connection of 2 braking resistors)		

Technical data

Braking resistor	Unit	BR006-025-01	BR006-050-01	BR106-T	BR206-T
Part number		18200117	18200125	18200834	18204120
Current-carrying capacity at 100% cdf	kW	2.5	5	13.5	18
Resistance value R_{BR}	Ω	6 ± 10%			
Tripping current I_{trip}	A	20.4	28.9	47.4	54.8
Design		Grid resistor			
Power connections		M8 stud			
Tightening torque	Nm	6			
PE connection		M6 stud			
Tightening torque PE	Nm	3			
Degree of protection		IP20			
Ambient temperature ϑ_{amb}		-25 °C to +40 °C			
Mass	kg	7.5	12	30	40

Assignment to an inverter

The assignment considers the maximum peak braking power of the inverter.

Braking resistor	BR006-025-01	BR006-050-01	BR106-T	BR206-T
MDX9_A-...-5_3-..	0620 0750 1490 (Parallel connection of 2 braking resistors)			
MDX9_A-...-2_3-..	570 (Parallel connection of 2 braking resistors)			

Technical data

Braking resistor	Unit	BR005-070	BR005-170-T	BR004-050-01	BR004-070-01
Part number		17983282	17983290	18200133	17967678
Current-carrying capacity at 100% cdf	kW	7	17	5	7
Resistance value R_{BR}	Ω	4.7 ± 10%		3.6 ± 10%	
Tripping current I_{trip}	A	38.6	60.1	32.6	38.6
Design		Grid resistor mounting position 1			
Power connections		M8 stud			
Tightening torque	Nm	6			
PE connection		M6 stud			
Tightening torque PE	Nm	3			
Degree of protection		IP20			
Ambient temperature ϑ_{amb}		-20 °C to +40 °C			
Mass	kg	13	33	13	

28487486/EN – 02/2019

Assignment to an inverter

The assignment considers the maximum peak braking power of the inverter.

Braking resistor	BR005-070	BR005-170-T	BR004-050-01	BR004-070-01
MDX9_A-...-5_3-..	0910 1130 1770 (Parallel connection of 2 braking resistors) 2200 (Parallel connection of 2 braking resistors) 2500 (Parallel connection of 2 braking resistors)		1490	
MDX9_A-...-2_3-..	0420 0840 (Parallel connection of 2 braking resistors) 1080 (Parallel connection of 2 braking resistors)		570	

Technical data

Braking resistor	Unit	BR003-420-T	BR002-070
Part number		13302345	17983304
Current-carrying capacity at 100% cdf	kW	42	7
Resistance value R_{BR}	Ω	2.5	2.3 ± 10%
Tripping current I_{trip}	A	135.1	55.2
Design		Grid resistor mounting position 2	Grid resistor mounting position 1
Power connections		M12 stud	M8 stud
Tightening torque	Nm	15.5	6
PE connection		M10 stud	M6 stud
Tightening torque PE	Nm	10	3
Degree of protection		IP20	
Ambient temperature ϑ_{amb}		-20 °C to +40 °C	
Mass	kg	93	33

Assignment to an inverter

The assignment considers the maximum peak braking power of the inverter.

Braking resistor	BR003-420-T	BR002-070
MDX9_A-...-5_3-..	1770 2200 2500 3000 (Parallel connection of 2 braking resistors) 3800 (Parallel connection of 2 braking resistors) 4700 (Parallel connection of 2 braking resistors) 5880 (Parallel connection of 2 braking resistors)	
MDX9_A-...-2_3-..	0840 1080	

Technical data

Braking resistor	Unit	BR1.0-170
Part number		17985455
Current-carrying capacity at 100% cdf	kW	17
Resistance value R_{BR}	Ω	1 ± 10%
Tripping current I_{trip}	A	130.4
Design		Grid resistor mounting position 2
Power connections		M12 stud
Tightening torque	Nm	15.5
PE connection		M10 stud
Tightening torque PE	Nm	10
Degree of protection		IP20
Ambient temperature ϑ_{amb}		-25 °C to +40 °C

Braking resistor	Unit	BR1.0-170
Mass	kg	45

Assignment to an inverter

The assignment considers the maximum peak braking power of the inverter.

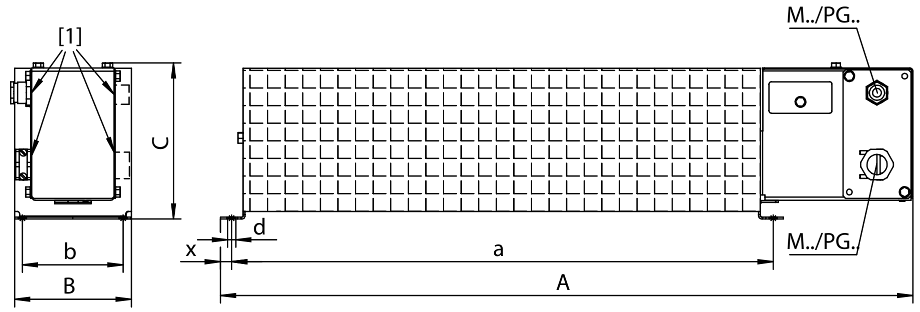
Braking resistor	BR1.0-170
MDX9_A-...-5_3-..	3000 3800 4700 5880

Technical data of BR..-T

Specifications for BR..-T	Design
Signal contact connection cross section	1 × 2.5 mm^2
Tightening torque signal contact	1 Nm
Switching capacity signal contact	DC 2 A / DC 24 V (DC11) AC 2 A / AC 230 V (AC11)
Switch contact (NC contact)	According to EN 60730

Dimension drawings and dimensions

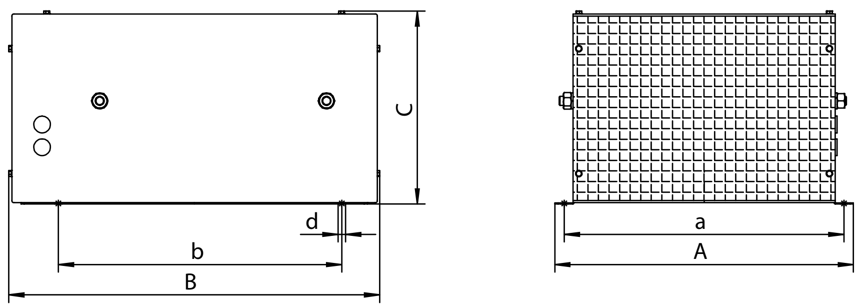
Wire resistor



18874863883

Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BR100-006-T	549	92	125	430	80	6.5	8	M25 + M12
BR47-010-T	749	92	125	630	80	6.5	8	M25 + M12
BR147-T	549	185	125	430	150	6.5	8	PG16 + M12
BR247-T	749	185	125	630	150	6.5	8	PG16 + M12
BR027-016-T	649	185	125	530	150	6.5	8	M25 + M12
BR027-024-T	649	275	125	530	240	6.5	8	M25 + M12
BR015-016	649	185	125	530	150	6.5	8	M25
BR010-024	649	275	125	530	240	6.5	8	M25

Grid resistor mounting position 1

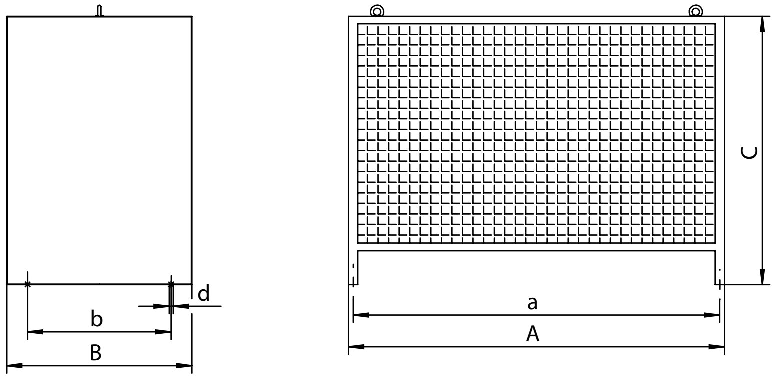


18874868747

Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BR015-075-T	415	500	270	395	380	9	—	—
BR106-T	795	490	270	770	380	10.5	—	—
BR206-T	995	490	270	970	380	10.5	—	—
BR915-T	795	490	270	770	380	10.5	—	—
BR010-050-T	395	490	260	370	380	10.5	—	—
BR010-108-T	525	500	270	505	380	9	—	—
BR004-050-01	395	490	260	370	380	10.5	—	—
BR005-070	395	490	260	370	380	10.5	—	—
BR002-070	395	490	260	370	380	10.5	—	—
BR005-170-T	490	795	270	380	770	10.5	—	—
BR006-025-01	295	490	260	270	380	10.5	—	—
BR006-050-01	395	490	260	370	380	10.5	—	—

28487486/EN – 02/2019

Grid resistor mounting position 2

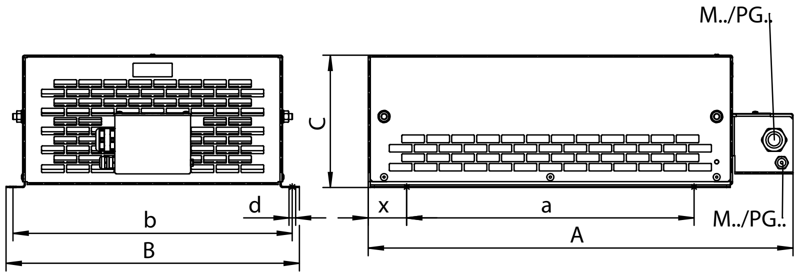


18874876043

Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BR003-420-T	995	490	710	970	380	10.5	—	—
BR1.0-170	490	795	490	380	770	10.5	—	—

28487486/EN – 02/2019

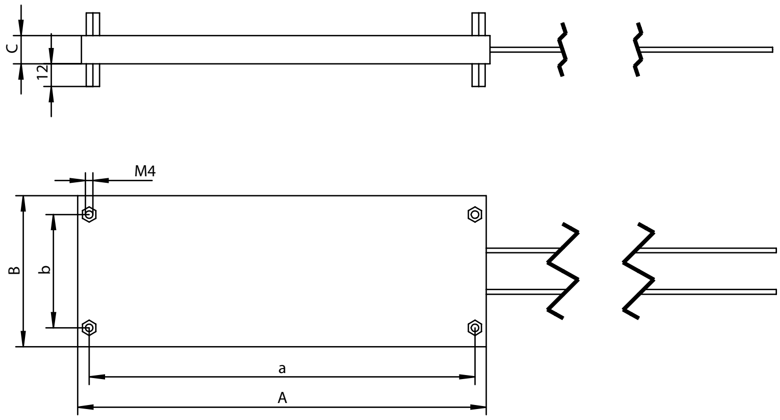
Frame resistor



18874873611

Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BR027-042-T	570	390	180	380	370	6.5	55	M25 + M12
BR015-042-T	570	390	180	380	370	6.5	55	M25 + M12

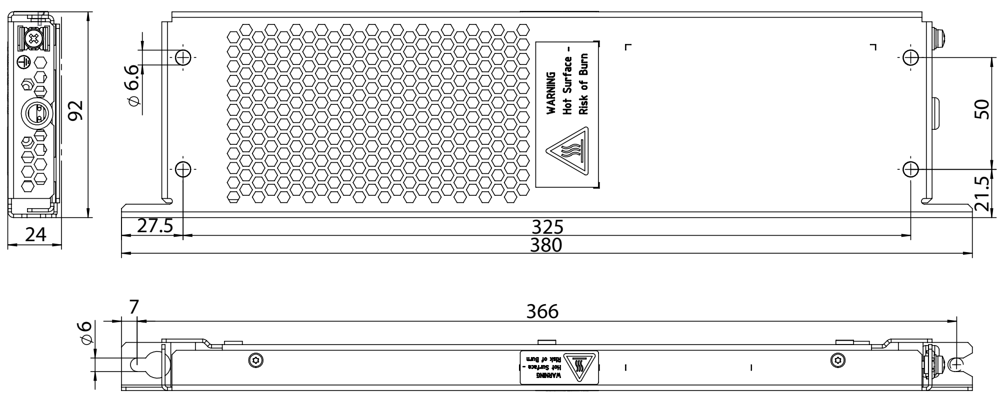
Flat type resistor



18874878475

Braking resistor	Main dimensions in mm			Mounting dimensions in mm				Cable gland
	A	B	C	a	b	d	x	
BR100-001	110	80	15	98	60	—	—	—
BR100-002	216	80	15	204	60	—	—	—

Submounting resistor BR120-001



19506873227

2.10.2 TCB thermal circuit breaker option

General

The TCB thermal circuit breaker protects the braking resistor from constant overload and protects in case of a short circuit in the cable or the braking resistor.

The setting range of the thermal circuit breaker has to be selected in such a way that it corresponds to the tripping current I_F of the braking resistor.

The switch reacts to the following events:

- Thermal overload via current monitoring device.
- Short circuit.

In the event of a fault, the thermal circuit breaker switches off the braking resistor. The present fault is signaled via isolated NO and NC contacts.

After fault elimination, the thermal circuit breaker can be reconnected like a normal miniature circuit breaker.

The thermal circuit breaker is installed on DIN rails (TS35).

UL and cUL approval

The thermal circuit breaker has the cRUus approval, independent of the application inverter.

Technical data

Circuit breaker type	Unit	TCB0040	TCB0063	TCB0100
Part number		19170424	19170432	19170440
Setting range	A	2.5 – 4	4 – 6.3	6.3 – 10
Connection cross section main contact	mm²	1.5 – 16		
Tightening torque	Nm	2.5		
Signal contact connection cross section	mm²	0.5 – 1.5		
Tightening torque	Nm	0.8		
Mechanical service life		20000 switching cycles		

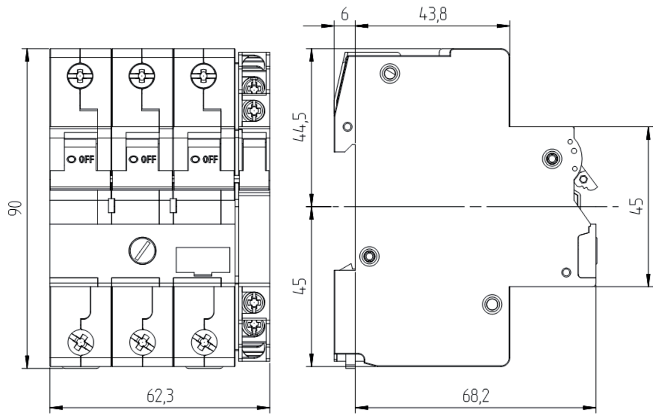
Circuit breaker type	Unit	TCB0160	TCB0200	TCB0250	TCB0320	TCB0400
Part number		19170459	19148658	19170467	19170475	19170483
Setting range	A	10 – 16	16 – 20	20 – 25	25 – 32	32 – 40
Connection cross section main contact	mm²	2.5 – 16	4 – 16		6 – 16	10 – 16
Tightening torque	Nm	2.5				
Signal contact connection cross section	mm²	0.5 – 1.5				
Tightening torque	Nm	0.8				
Mechanical service life		20000 switching cycles				

Technical data of signal contact

Specifications of the signal contacts	Design
Connecting contacts	0.5 – 1.5 mm²
Tightening torque	0.8 Nm
Switching capacity	DC 5 A / DC 24 V AC 10 A / AC 230 V

28487486/EN – 02/2019

Dimension drawing



17195255435

2.10.3 Line filter

Line filters are used to suppress interference emission on the line side of inverters.

INFORMATION:

- Do not switch between the NF... line filter and inverter.

UL and cUL approval

The listed line filters have cRUus approvals independent of the application inverter.

Technical data

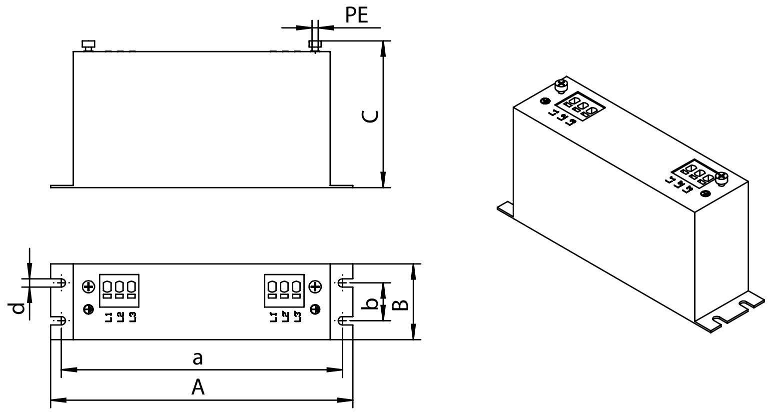
Line filter	NF0055-503	NF0120-503	NF0220-503	NF0420-513	NF0910-523	NF1800-523
Part number	17984319	17984270	17984300	17983789	17987504	17987865
Nominal line voltage V_N	3 × AC 230 V - 500 V, 50/60 Hz					
Nominal current I_N	5.5 A	12 A	22 A	42 A	91 A	180 A
Nominal power loss	4 W	6 W	9 W	30 W	51.5 W	89 W
Ambient temperature ϑ_{amb}	0 to 45 °C (reduction: x% I_N up to max. 60 °C)					
Connecting contacts L1/L2/L3 - L1'/L2'/L3'	Spring-loaded terminals max. 6 mm²			2.5 – 16 mm²	25 – 50 mm²	16 – 120 mm²
Tightening torque L1/L2/L3 - L1'/L2'/L3'	—			2 – 4 Nm	6 – 8 Nm	12 – 20 Nm
PE terminal contacts	M4		M5	M6	M8	M10
Tightening torque PE	1.5 Nm		3 Nm	6 Nm	12 Nm	23
Degree of protection	IP20 according to EN 60529					
Mass	1 kg	1 kg	1.4 kg	3 kg	5 kg	9 kg

Assignment to an inverter

Line filter	NF0055-503	NF0120-503	NF0220-503	NF0420-513	NF0910-523	NF1800-523
MDX9_A-...-5_3-..	0020 – 0040	0055 – 0095	0125 – 0160	0240 – 0320	0460 – 0750	0910 – 1490
MDX9_A-...-2_3-..	—	0070 – 0093	0140	0213 – 0290	0420 – 0570	0840 – 1080

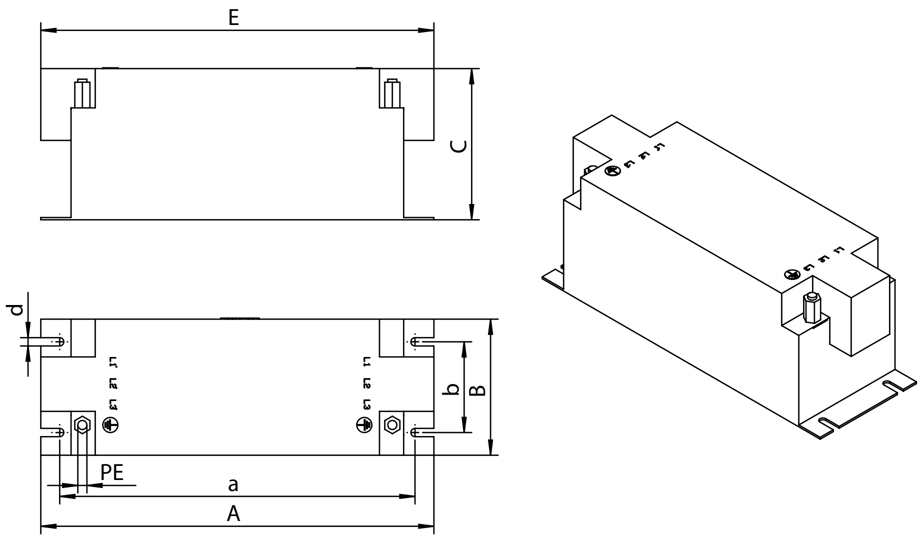
28487486/EN – 02/2019

Dimension drawings and dimensions



18891135115

Line filter	Main dimensions in mm				Mounting dimensions in mm			Port
	A	B	C	E	a	b	d	PE
NF0055-503	200	50	97	—	186	25	5.5	M4
NF0120-503	200	50	97	—	186	25	5.5	M4
NF0220-503	230	55	102	—	216	30	5.5	M4



9007218145873675

Line filter	Main dimensions in mm				Mounting dimensions in mm			Port
	A	B	C	E	a	b	d	PE
NF0420-513	250	88	97	255	235	60	5.5	M6
NF0910-523	270	100	152	320	255	65	6.5	M8
NF1800-523	380	132	185	465	365	102	6.5	M10

2.10.4 Line choke

Using line chokes is optional:

- To support overvoltage protection
- To smoothen the line current, to reduce harmonics
- Protection in the event of distorted line voltage
- To limit the charging current when several inverters are connected together in parallel on the input end with shared line contactors (nominal current of line choke = total of inverter currents).

UL and cUL approval

The listed line chokes have cRUus approvals independent of the application inverter.

Technical data

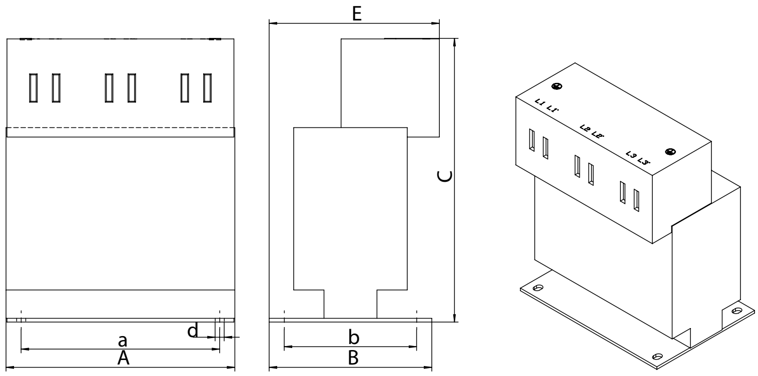
Line choke	ND0070-503	ND0160-503	ND0300-503	ND0420-503	ND0910-503	ND1800-503
Part number	17984173	17984181	17983800	17983819	17987520	17987539
Nominal line voltage U_N	3 × AC 230 V – 500 V, 50/60 Hz					
Nominal current I_N	7 A	16 A	30 A	42 A	91 A	180 A
Nominal inductance	0.36 mH	0.2 mH	0.1 mH	0.045 mH	0.035 mH	0.018 mH
Nominal power loss	4 W	9 W	11 W	13 W	53 W	116 W
Ambient temperature ϑ_{amb}	-10 °C to 45 °C (reduction: 3% I_N up to maximum 60 °C)					
Connection contacts L1/L2/L3 – L1'/L2'/L3'	0.2 – 4 mm²		0.2 – 10 mm²	2.5 – 16 mm²	25 – 50 mm²	16 – 120 mm²
Tightening torque L1/L2/L3 – L1'/L2'/L3'	0.5 – 1 Nm		1.2 – 2 Nm	2.5 Nm	3 – 6 Nm	12 – 20 Nm
PE connection contact	M4		M5		M8	M10
Tightening torque PE	1.5 Nm		3 Nm		12 Nm	20 Nm
Degree of protection	IPXXB in accordance with EN 60529				IPXXA in accordance with EN 60529	
Mass	0.5 kg	1.3 kg	1.95 kg	1.82 kg	4.6 kg	10 kg

Assignment to an inverter

Line choke	ND0070-503	ND0160-503	ND0300-503	ND0420-503	ND0910-503	ND1800-503
MDX9_A-...-5_3-..	0020 – 0040	0055 – 0095	0125 – 0160	0240 – 0320	0460 – 0750	910 – 1400
MDX9_A-...-2_3-..	-	0070 – 0093	0140	0213 – 0290	0420 – 0570	0840 – 1080

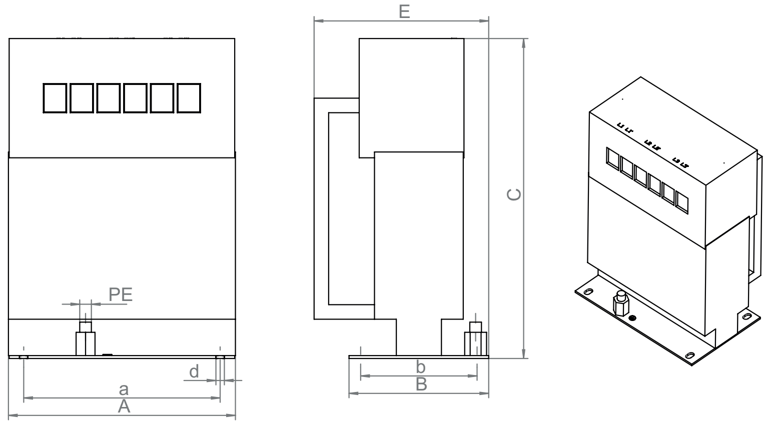
28487486/EN – 02/2019

Dimension drawings and dimensions



18891130251

Line choke	Main dimensions in mm				Mounting dimensions in mm			Port
	A	B	C	E	a	b	d	PE
ND0070-503	78	57	105	56	65	40	4.8	M4
ND0160-503	96	70	120	65	71	54	4.8	M4
ND0300-503	121	86	145	86	105	70	4.8	M5
ND0420-503	121	86	150	90	105	70	4.8	M5



20917778571

Line choke	Main dimensions in mm				Mounting dimensions in mm			Port
	A	B	C	E	a	b	d	PE
ND0910-503	156	96	220	120	135	80	5.8	M8
ND1800-503	187	121	260	153	166	93	6.2	M10

2.10.5 Output filter

Description of the output filter

HF.. type output filters are sine filters used to smooth the output voltages of inverters.

- Discharge currents in the motor cables are suppressed.
- Motor winding insulations of third-party motors that are not suitable for inverters are protected.
- For long motor cables (> 100 m), overvoltage peaks are prevented.

UL and cUL approval

The listed output filters have cRUus approvals independent of the application inverter.

Technical data

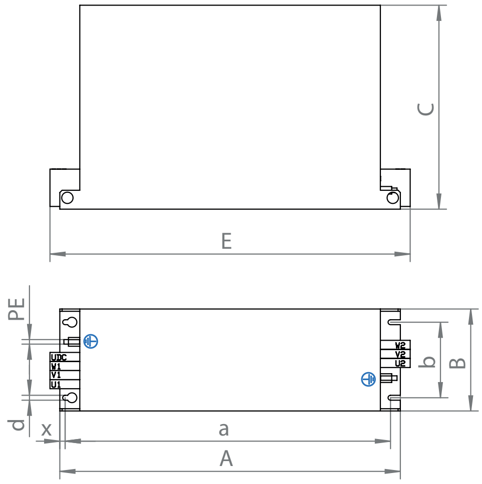
Output filter	HF0055-503	HF0125-503	HF0240-503	HF0460-503	HF0650-503	HF1150-503
Part number	17985110	17985129	17985137	17985145	17991277	17991269
Nominal voltage U_N	3 × AC 230 V – 500 V, 50/60 Hz					
Nominal current I_N	5.5 A	12.5 A	24 A	46 A	65 A	115 A
Nominal power loss	80 W	120 W	200 W	400 W		
Ambient temperature ϑ_{amb}	0 °C to 45 °C (reduction: 3% I_N/K up to maximum 60 °C)					
Connection contacts U1/V1/W1/UDC – U2/V2/W2	0.2 – 10 mm²		2.5 – 16 mm²		16 – 50 mm²	16 – 95 mm²
Tightening torque U1/V1/W1/UDC – U2/V2/W2	1.2 – 2 Nm		2 – 4 Nm		3 – 6 Nm	12 – 20 Nm
PE connection contacts	M6 stud				M8 stud	M10 stud
Tightening torque PE	6 Nm				12 Nm	23 Nm
Degree of protection in accordance with EN 60529	IP20				IPXXA	
Mass	8 kg	18 kg	25 kg	40 kg	48 kg	70 kg

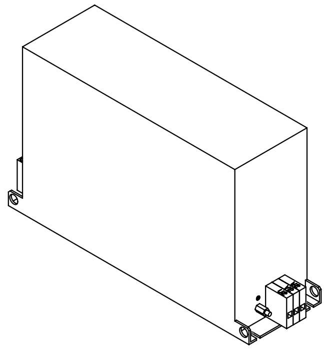
Assignment to an inverter

Output filter	HF0055-503	HF0125-503	HF0240-503	HF0460-503	HF0650-503	HF1150-503
MDX9_A-...-5_3-..	0020 – 0040	0055 – 0095	0125 – 0160	0240 – 0320	0460 0910 (Parallel connection of 2 filters)	0620 – 0750 1130 – 1490 (Parallel connection of 2 filters)
MDX9_A-...-2_3-..	–	0070 – 0093	0140	0213 – 0290	0420	0570

28487486/EN – 02/2019

Dimension drawings and dimensions





9007218523812619

Output filter	Main dimensions in mm				Mounting dimensions in mm				Connection
	A	B	C	E	a	b	d	x	PE
HF0055-503	310	105	160	–	290	75	6.5	7	M6
HF0125-503	390	120	215	–	370	90	6.5	7	M6
HF0240-503	450	135	270	–	430	100	6.5	7	M6
HF0460-503	450	160	310	–	430	120	6.5	7	M6
HF0650-503	635	210	285	637	610	174	8.5	10	M8
HF1150-503	725	260	273	751	700	224	8.5	10	M8

2.10.6 Output choke

Description of output choke

HD.. type output chokes suppress interference emitted from unshielded motor cables.

UL and cUL approval

The listed output chokes have cRUus approvals independent of the application inverter.

Technical data

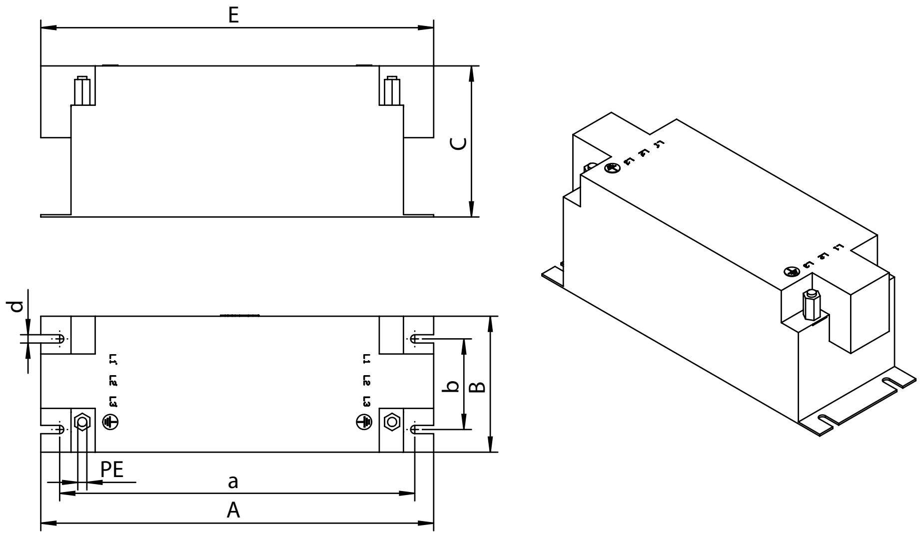
Output choke	HD0125-503	HD0240-503	HD0460-503	HD1000-503	HD2000-503
Part number	17985153	17985188	17985161	17991307	17991250
Nominal voltage U_N	3 × AC 230 V – 500 V, 50/60 Hz				
Nominal current I_N	12.5 A	24 A	46 A	100 A	200 A
Nominal power loss	2.9 W	6 W	14 W	37 W	83 W
Ambient temperature ϑ_{amb}	0 °C to 45 °C (reduction: 3% I_N/K up to maximum 60 °C)				
Connection contacts U1/V1/W1/UDC – U2/V2/W2	0.2 – 10 mm^2	2.5 – 16 mm^2		16 – 50 mm^2	16 – 150 mm^2
Tightening torque U1/V1/W1/UDC – U2/V2/W2	1.2 – 2 Nm	2 – 4 Nm		6 – 8 Nm	12 – 20 Nm
PE connection contact	M6			M8	M10
Tightening torque PE	6 Nm			12 Nm	23 Nm
Degree of protection in accordance with EN 60529	IPXXB			IPXXA	
Mass	0.85 kg	1.46 kg	2.35 kg	3 kg	6.5 kg

Assignment to an inverter

Output choke	HD0125-503	HD0240-503	HD0460-503	HD1000-503	HD2000-503
MDX9_A-...-5_3-..	0020 – 0095	0125 – 0160	0240 – 0320	0460 – 0750	0910 – 1490
MDX9_A-...-2_3-..	0070 – 0093	0140	0213 – 0420	0420 – 0840	1080

28487486/EN – 02/2019

Dimension drawings and dimensions



9007218145873675

Line filter	Main dimensions in mm				Mounting dimensions in mm			Connection
	A	B	C	E	a	b	d	PE
HD0125-503	153	65	73	151	138	40	5.5	M6
HD0240-503	173	95	83	178	158	65	5.5	M6
HD0460-503	185	125	113	189	170	90	5.5	M6
HD1000-503	255	116	143.5	265	240	82	6.5	M8
HD2000-503	300	152.5	160.5	330	286	120	6.5	M10

3 Configuration

3.1 SEW-Workbench

The SEW-Workbench is the central configuration software for inverters from SEW-EURODRIVE.

All necessary configurations can be processed, from entering the application to gear unit, motor and inverter calculations. Other features are optimization of the various axis cycles including the selection of accessories and a fault check of the entire drive system configuration.

Of course, the Workbench can also be used to select and dimension all other products from SEW-EURODRIVE (such as decentralized drives and gearmotors). This means the SEW-Workbench allows for specifying drive solutions from the entire range of products from SEW-EURODRIVE. The straightforward operation saves a great deal of time and minimizes complexity.

The key features of the SEW-Workbench are:

- Selection of the application
- Calculation of gear unit and motor
- Price-optimized configuration
- Comparison of different solutions
- Inverter calculation
- Multi-axis optimization
- Parameterization of cable and accessories selection
- Dimensioning error check
- Parts list generation
- Electronic catalog with all products

The planning and configuration software SEW-Workbench is available for download from the official SEW-EURODRIVE website.

To use SEW-Workbench, all you need to do is to register via the Online Support once you have downloaded and installed the software or received the data DVD. An Internet update service ensures that the products and functions are always up to date.

28487486/EN – 02/2019

3.2 Schematic workflow for project planning

The following flow diagram illustrates the drive selection procedure for a positioning drive. The drive consists of a gearmotor that is supplied by an application inverter.

Necessary information regarding the machine to be driven
- Technical data and ambient conditions.
- Positioning accuracy.
- Speed setting range.
- Travel cycle calculation.

↓

Calculation of the relevant application data
- Travel diagram.
- Speeds.
- Static, dynamic torques.
- Regenerative power.

↓

Gear unit selection
- Defining gear unit type, gear unit size, gear unit ratio, and gear unit design.
- Checking the positioning accuracy.
- Checking the gear unit load.
- Checking the input speed.

↓

Motor selection
- Maximum torque.
- With dynamic drives: effective torque at medium speed.
- Maximum speed.
- Observe dynamic and thermal torque curves.
- Motor equipment (brake, plug connector, thermal motor protection, etc.).

↓

Selection of application modules
- Determining the control mode.
- Motor/inverter assignment.
- Checking if the application inverters fulfill the duration and overload requirements.

↓

Braking resistor selection
- Checking if the braking resistor fulfills the duration and overload requirements.
- Observe braking resistor assignment.

↓

Selection of other system components
- Option cards.
- Motor and power supply cables.
- Signal and encoder cables.
- EMC measures.

↓

24 V voltage supply selection
- Determining the current demand of the 24 V voltage supply.
- Observing the requirements for the voltage tolerance.

↓

Make sure that all requirements have been met.

28487486/EN – 02/2019

3.3 Drive selection

For drive selection, in addition to the travel diagram that describes the exact travel cycle, a large number of additional specifications must be made about the operating and ambient conditions.

It is first necessary to have data for the machine to be driven such as mass, setting range, speed, information about the mechanical design and so on in order to select the drive correctly. The appropriate drive can be determined with the calculated torques and speeds of the drive while taking other mechanical requirements such as environmental and operating conditions into account.

For selecting the drive, a decision is to be taken if an asynchronous motor or a synchronous motor is to be used. The extensive product range of SEW-EURODRIVE is available for this purpose.

3.3.1 General requirements for motors

Motors that can be connected

- Asynchronous motors with squirrel-cage rotor.
- Permanent-field synchronous motors.

When third-party motors are operated with inverters, SEW-EURODRIVE cannot ensure that the specified performance data is reached.

Dielectric strength of the motor

The operation of an AC motor with a frequency inverter places a much greater load on the motor winding than in the case of operation on the supply system. All AC motors by SEW-EURODRIVE have the required voltage endurance.

At a line voltage of AC 3 x 400 V, the nominal DC link voltage is DC 560 V. In regenerative operation, the DC link voltage can rise to 970 V.

For operation of third-party motors at SEW-EURODRIVE's application inverters, their suitability has to be checked.

28487486/EN – 02/2019

Requirements for third-party motors

The connected third-party motor has to be designed in inverter mode for these DC link voltages.

The inverters pulse the DC voltage of the DC link U_{DC} to the supply cables to the motor. At SEW-EURODRIVE, the pulsed voltage supply is available with 2.5 kHz, 4 kHz, 8 kHz, or 16 kHz. As a result, the motor is loaded with voltage peaks, high amplitude and very short rise times.

The technical data of the motors must lie within the following ranges:

Nominal motor speed	0 – 30 000 min-1
Nominal motor current	0 – 500 A
Nominal motor torque	0 – 50 000 Nm
Rated motor frequency[1)]	0 – 500 Hz
Number of pole pairs asynchronous/synchronous motor	1 – 64

1) The maximum output frequency depends on the selected control mode

Thermal motor protection

Thermal motor protection avoids overheating and, therefore, prevents irreparable damage from being caused to the motor. For this purpose, temperature sensors detect the winding temperature. As standard, the MOVIDRIVE® application inverters can evaluate the following temperature sensors:

Motor protection	Number of sensors:	SEW-EURODRIVE designation
PTC thermistor	3	TF
Bimetallic temperature switch	3	TH
Semiconductor temperature sensor KTY84-130	1	KY/KTY
Platinum temperature sensor Pt1000	1	PK

Motor series	Temperature sensor	Motor protection
CM..	TF, KTY84-130, Pt1000	Comprehensive protection
DR..	TF, TH	Comprehensive protection
DR..	KTY84-130	Limited protection[1)] off
Third-party motors	PTC thermistor, Bimetallic temperature switch	Comprehensive protection
Third-party motors	KTY84-130, Pt1000	Limited protection[1)]

1) If the temperature measured by the temperature sensor exceeds the limit temperature of the set thermal class of the motor, the application inverter issues an error message

For additional information on the thermal motor protection, refer to the documentation of the motors.

28487486/EN – 02/2019

3.3.2 Group drive and multi-motor drive

Group drive of asynchronous motors

A group drive is a group of asynchronous motors of any power rating. The motors do not have a rigid mechanical connection or only a connection that is subject to slip and are connected to an electrically parallel inverter.

After a suitable startup, operation in U/f control mode is possible.

If motors with different power ratings are operated at the inverter in parallel, the motor with the largest power rating has to be set up.

- The total of the motor currents must not exceed the nominal output current of the inverter.
- Note the permitted length of all motor leads connected in parallel:

  $I_{tot} \leq I_{max}/n$

  I_{tot} = Maximum total length of the motor leads connected in parallel

  I_{max} = Permitted motor lead length

  n = Number of motors connected in parallel

Temperature evaluation of the motors in group drives

- It is preferable to use TH winding thermostats for group drives on one inverter.
- The series connection of the TH contacts (normally closed) is not subject to any restriction if joint monitoring is provided.
- If TF temperature sensors are available in motors that are intended for a group drive, the temperature sensors of a maximum of 3 motors may be connected in parallel.

Multi-motor drive of asynchronous motors

Multi-motor drive means the electrical parallel connection of several identical asynchronous motors at 1 inverter, that are rigidly and mechanically coupled and drive a load.

Parallel operation of several identical asynchronous motors is possible provided the strict compliance with the following conditions.

- Only use gearmotors of the same type and with the same winding data.
- The rotor position of the individual motors must not differ in more than the following mechanical angle:

  $Z_p \times \Delta\varphi_{mech\_max} < 20°$

  Z_p = Number of motor pole pairs

  $\Delta\varphi_{mech\_max}$ = Maximum torsion angle of the shaft connection in regard of the motor shaft

  This must be ensured by the mechanics even for maximally different torque loads of the motor shafts. The motor has to be equipped with an encoder for the encoder feedback.

28487486/EN – 02/2019

- Note the permitted length of all motor leads connected in parallel:

  $l_{tot} \leq l_{max}/n$

  l_{tot} = Maximum total length of the motor leads connected in parallel

  l_{max} = Permitted motor lead length

  n = Number of motors connected in parallel
- Make sure the speed sensor is installed on the gearmotor which has the greatest clearance or elasticity with respect to the load inertia.

3.3.3 Connecting explosion-proof AC motors

Observe the following instructions when connecting explosion-proof AC motors to application inverter:

- The inverter must be installed outside of the potentially explosive atmosphere.
- Observe industry and country-specific regulations.
- Observe the regulations and information of the motor manufacturer with regard to operation on a frequency inverter, e.g. mandatory sine filter.
- All operating resources used in potentially explosive atmospheres must adhere to the relevant standards, such as Directive 94/9/EC (ATEX 100a) or IEC 60079.
- The sensor input of the motor's temperature monitoring must not be used in potentially-explosive areas. For thermal monitoring use a monitoring device approved for potentially explosive atmospheres.
- In case of motors with speed feedback the speed sensor must also be approved for potentially explosive atmospheres. The speed sensor can be directly connected to the inverter.

INFORMATION

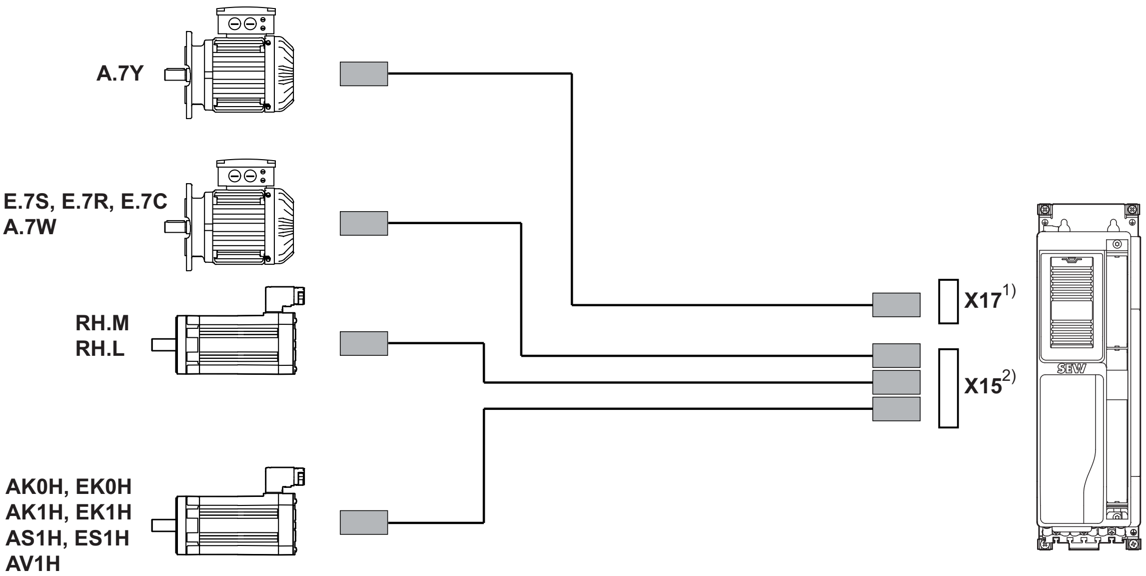
For more information on the operation of explosion-proof AC motors, refer to the "Explosion-Proof AC Motors, Asynchronous Servomotors" operating instructions. You can order the operating instructions from SEW-EURODRIVE.

28487486/EN – 02/2019

3.3.4 General requirements for encoders

Valid motor encoders from SEW-EURODRIVE

The following overview shows the motor encoders from SEW-EURODRIVE that are valid for use with MOVIDRIVE®. For information on the respective encoder cables, refer to the chapter "Prefabricated cables" (→ 🗎 154).



9007216142031115

1) X17 is located on the inserted card
2) X15 is located on the basic device

3.3.5 General requirements for the brake control

Refer to the motor catalogs for extensive information and technical data regarding the brakes.

Brake control

Brakes may only be controlled via the digital output X10: (DB0; DB00) at the application inverter. It is not permitted to control them via other electronic devices or via controllers.

The digital output (DB0; DB00) is designed as output for operating a relay with protection circuit with a DC 24 V control voltage, a maximum current of 150 mA and a power rating of 3.6 W.

With this, a power contactor with DC 24 V coil voltage or a suitable brake rectifier from SEW-EURODRIVE can be controlled. This power contactor is used to switch the brake.

Direct switch of the brake via (DB0; DB00) is not permitted.

Permitted load of brake control and brake

One complete switching sequence (opening and closing) must not be repeated more often than a maximum of every 2 seconds. SEW-EURODRIVE brakes must remain switched off for at least 100 ms before it can be switched on again.

28487486/EN – 02/2019

3.4 Recommendations for motor and inverter selection

The basis for motor selection are the limit characteristic curves of the motors in inverter operation. The limit characteristic curve states the torque characteristic of the motor depending on the speed.

The dynamic and thermal limits must be observed when selecting the motor.

3.4.1 Thermal limit characteristic curve

The mean motor speed and the effective torque are calculated during drive selection to determine the thermal utilization of the motor. The operating point of the motor must lie below the thermal limit characteristic curve of the motor; otherwise the motor will be thermally overloaded.

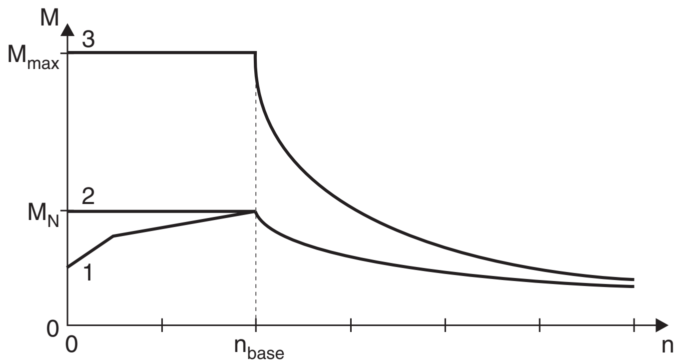
3.4.2 Dynamic limit characteristic curve

The dynamic limit characteristic curve depicts the maximum torque the motor can generate at a certain speed. Note that the inverter must supply sufficient current for the motor to reach its maximum torque.

The base speed is especially important for configuration. The base speed is the available speed up to the maximum motor torque. In inverter operation, the base speed indicates the beginning of field weakening. The motor torque is limited by the voltage limit characteristic curve in the field-weakening range, and decreases with increasing speed.

M_N is determined by the motor. M_{max} and n_{base} depend on the motor/inverter combination. For the values for M_{max} and n_{base} in control modes VFC^{PLUS}, CFC, and ELSM®, refer to the motor selection tables in the chapter "Motor/inverter assignment" (→ 🗎 94).

Typical characteristic curve of asynchronous motors



24537317259

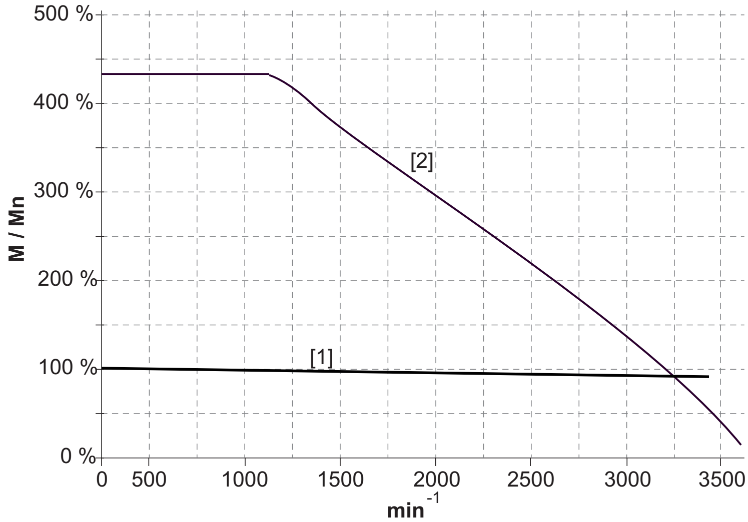
[1] S1 operation with self-cooling

[2] S1 operation with external cooling

[3] Mechanical limit for gearmotors

28487486/EN – 02/2019

Typical characteristic curve of synchronous motors



9007217201768843

[1] Thermal limit characteristic curve S1 operation

[2] Dynamic limit torque

3.4.3 Motor selection for asynchronous motors

The mechanical resistance of the motor against the overload, which might exceed the permitted limit values, must be strictly checked.

M_{pk} and n_{base} depend on the motor/inverter combination, as well as on the used control mode.

Asynchronous motors are mainly operated in control mode VFC^{PLUS}. The control mode efficiently adjusts the motor magnetization to the respective operating point. It simultaneously allows for dynamic responses to load shocks at the drive train.

3.4.4 Asynchronous motors in control mode VFC^{PLUS}

The control mode VFC^{PLUS} without encoder allows dynamic use of the entire speed range of the drive. Reversing and moving through the speed 0 are also possible.

However, continuous operation of asynchronous motors without encoder at low speeds is not possible. The minimum speeds that must not be permanently undercut during operation without encoder are:

- Motor mode: 1% of the asynchronous motor nominal speed.
- Regenerative operation: 10% of the asynchronous motor nominal speed.

INFORMATION

Lifting application with encoder

The control must be designed in such a way that the direction of rotation of the drive can only be reversed when it is at a standstill (with the brake applied).

If the direction of rotation should be changed without standstill, a motor encoder must be used.

28487486/EN – 02/2019

The described restrictions do not apply in control mode VFC^{PLUS} with encoder. In comparison to operation without encoder, higher dynamic properties can be achieved with an encoder.

When determining the maximum speed, observe that the breakdown torque M_K is reduced in an quadratic relationship in the field weakening range.

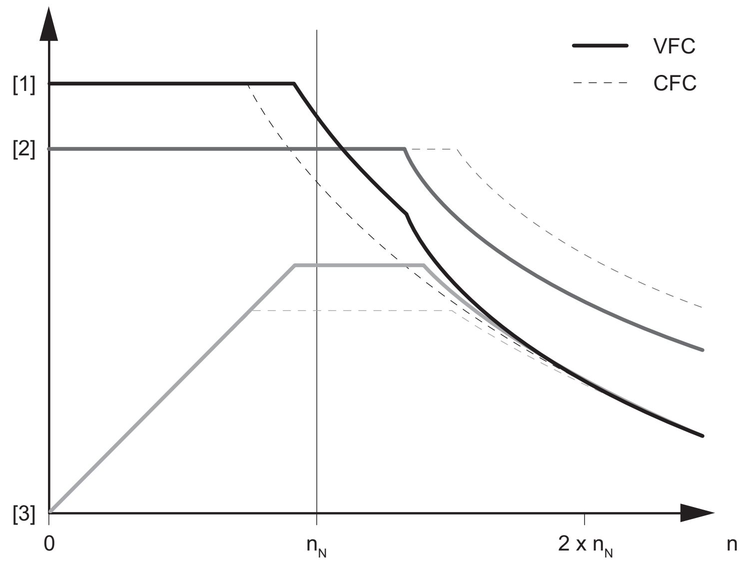
3.4.5 Asynchronous motors in control mode CFC

Either standard asynchronous motors (e.g. DRN.. motors) or asynchronous servomotors (e.g. DRL.. motors) can be used in control mode CFC. SEW-EURODRIVE recommends using asynchronous servomotors to achieve optimum benefit from the advantages of the control mode CFC.

Standard asynchronous motors in control mode CFC

In comparison to control mode VFC^{PLUS}, higher dynamic properties can be achieved using CFC. The full motor magnetization is maintained in each operating state, so that the highest requirements for dynamics are met. Due to the voltage reserves required for this, standard asynchronous motors are operated with a lower base speed in this operating mode than in operating mode VFC^{PLUS}. Power yield and energy efficiency are thus lower.

Speed/torque characteristic for VFC^{PLUS} and CFC in comparison.



19531895051

[1] Torque [2] Current [3] Power rating

Asynchronous servomotors in control mode CFC

The high-quality mechanic design of the DRL.. series asynchronous AC servomotors allows for dynamic overload values that exceed the values of the standard asynchronous motors in line or inverter operation. Due to these characteristics, the values of a synchronous servomotor are almost reached.

SEW-EURODRIVE provides the DRL.. motors in two dynamics packages:

Package	Overload capacity in relation to the nominal torque
Dynamics 1 (D1)	190% – 220%

28487486/EN – 02/2019

Package	Overload capacity in relation to the nominal torque
Dynamics 2 (D2)	300% – 350%

To obtain an optimal adjustment of the motor speed to the required controller output limit of the application, SEW-EURODRIVE offers DRL.. servomotors with the following 4 rated speeds:

- 1200 min-1
- 1700 min-1
- 2100 min-1
- 3000 min-1

28487486/EN – 02/2019

3.4.6 Synchronous servomotors in control mode CFC

In general, synchronous servomotors and the corresponding inverters are designed for a high short-time overload capacity. This allows a multiple of the nominal torque.

When using the following CMP.. motors in the higher speed ranges, it is recommended to only set the PWM frequencies 8 kHz or 16 kHz.

- CMP40 – 63 for speed class 6000 min-1,
- CMP71 – 100 for speed classes 4500 min-1 and 6000 min-1.

SEW-EURODRIVE recommends the use of the following temperature sensors:

- KTY84 – 130 (SEW-EURODRIVE designation: KY/KTY)
- Pt1000 (SEW-EURODRIVE designation: PK)

3.4.7 Synchronous servomotors in control mode ELSM®

The control mode ELSM® allows dynamic use of the entire speed range of the drive. Reversing and moving through the speed 0 are also possible. The speed must not permanently drop below the minimum speed of approx. 2% of the nominal motor speed.

When the control mode ELSM® is operated without encoder, the maximum motor torque is 150% M_0 of the connected motor.

The nominal output current of the inverter must not be lower than 1.5 × I_0 of the connected motor.

The maximum speed must not be dimensioned higher than the rated speed of the motor.

SEW-EURODRIVE recommends the use of the following temperature sensors:

- KTY84 – 130 (SEW-EURODRIVE designation: KY/KTY)
- Pt1000 (SEW-EURODRIVE designation: PK)

Using the ELSM® control mode for hoists and inclining tracks is not permitted.

3.5 Motor-inverter assignments

The following motor-inverter assignments apply to MOVIDRIVE® system and MOVIDRIVE® technology.

3.5.1 Technical data DRN.. motors

Key

P_N	Rated power
M_N	Rated torque
n_N	Rated speed
I_N	Rated current
cosφ	Power factor
IE	Short for "International Efficiency" (international efficiency classes IE1 – IE4)
$\eta_{50\%}$	Efficiency at 50% of the rated power
$\eta_{75\%}$	Efficiency at 75% of the rated power
$\eta_{100\%}$	Efficiency at 100% of the rated power
I_A/I_N	Starting current ratio
M_A/M_N	Starting torque ratio
M_H/M_N	Ramp-up torque ratio
M_K/M_N	Breakdown torque ratio
m	Mass of the motor
J_{Mot}	Mass moment of inertia of the motor
BE..	Brake used
Z_0 BG	Starting frequency for operation with BG brake control
Z_0 BGE	Starting frequency for operation with BGE brake control
M_B	Braking torque
m_B	Mass of the brakemotor
J_{MOT_BE}	Mass moment of inertia of the brakemotor

28487486/EN – 02/2019

IE3 DRN.. motors, 400 V, 50 Hz, 4-pole

Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRN63MS4	0.12	0.83	1380	0.4	0.64	58.3	63.9	64.8	3.6	2.7 2.6	2.7
DRN63M4	0.18	1.25	1375	0.57	0.65	65.1	69.4	69.9	3.7	2.6 2.6	2.6
DRN71MS4	0.25	1.7	1405	0.72	0.66	70.1	73.5	73.5	4.3	2.5 2.3	2.5
DRN71M4	0.37	2.5	1415	1.02	0.66	74.3	77.3	77.3	4.8	2.8 2.4	2.8
DRN80MK4	0.55	3.65	1435	1.29	0.75	78.6	81.0	80.8	6.1	2.7 2.1	3.1
DRN80M4	0.75	4.95	1440	1.75	0.74	80.7	82.9	82.9	6.7	3.1 2.7	3.4
DRN90S4	1.1	7.2	1455	2.55	0.73	83.5	85.0	84.5	6.9	2.7 2.1	3.3
DRN90L4	1.5	9.8	1461	3.4	0.74	84.6	86.1	85.6	7.5	2.7 2.0	3.3
DRN100LS4	2.2	14.5	1450	4.75	0.76	86.4	87.5	86.9	7.1	2.9 2.2	3.3
DRN100L4	3	19.7	1456	6.4	0.76	87.3	88.3	87.8	8.2	3.4 2.3	3.7
DRN112M4	4	26	1464	7.9	0.81	88.6	89.4	88.7	8.2	2.4 1.6	3.6
DRN132S4	5.5	36	1461	10.5	0.84	90.6	90.6	89.6	8.3	2.8 2.2	3.5
DRN132M4	7.5	49	1468	15.2	0.78	90.8	91.1	90.4	7.8	3.1 2.4	3.3
DRN132L4	9.2	60	1470	18.7	0.77	90.8	91.6	91.0	8.4	3.7 1.8	3.7
DRN160M4	11	71	1473	21	0.81	91.1	91.7	91.4	7.3	2.6 2.2	3.0
DRN160L4	15	97	1474	29	0.80	91.9	92.5	92.1	8.0	3.0 2.0	3.4
DRN180M4	18.5	120	1478	33.5	0.85	92.8	93.1	92.6	9.5	3.6 2.9	3.6
DRN180L4	22	142	1477	38.5	0.87	93.4	93.6	93.0	9.6	3.5 2.1	3.4
DRN200L4	30	194	1480	56	0.82	93.3	93.9	93.6	8.2	2.9 2.5	3.3
DRN225S4	37	240	1482	64	0.88	94.3	94.4	93.9	8.4	3.0 2.3	2.7
DRN225M4	45	290	1482	81	0.85	94.1	94.5	94.2	8.8	3.0 2.2	2.7
DRN250M4	55	355	1482	104	0.80	94.4	94.8	94.6	8.2	4.0 2.5	2.9
DRN280S4	75	485	1482	143	0.79	94.9	95.3	95.0	7.6	3.7 2.6	2.9
DRN280M4	90	580	1481	161	0.84	95.4	95.6	95.2	7.7	3.6 2.0	2.7
DRN315S4	110	710	1488	189	0.87	95.4	95.7	95.5	6.7	2.9 2.1	3.1
DRN315M4	132	850	1487	230	0.87	95.6	95.9	95.6	6.5	2.7 2.0	2.9
DRN315L4	160	1030	1486	275	0.87	95.9	96.1	95.9	6.5	2.7 2.0	2.8
DRN315H4	200	1280	1489	355	0.84	95.4	96.0	96.0	8.1	3.7 2.8	3.8

28487486/EN – 02/2019

Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min-1	kg	10^{-4} kgm²		h-1	Nm	kg	10^{-4} kgm²
DRN63MS4	0.12	0.83	1380	4.9	2.95	BE03	1000 1000	1.7	6.8	3.63
DRN63M4	0.18	1.25	1375	5.8	3.76	BE03	1000 1000	2.7	7.6	4.44
DRN71MS4	0.25	1.7	1405	6.8	5.42	BE03	6200 9700	3.4	8.6	6.11
DRN71M4	0.37	2.5	1415	8	7.14	BE05	5000 9000	5	10	8.44
DRN80MK4	0.55	3.65	1435	11	17.1	BE1	3500 8500	7	14	18.6
DRN80M4	0.75	4.95	1440	14	24.7	BE1	3200 8200	10	18	26.2
DRN90S4	1.1	7.2	1455	20	54	BE2	2300 6000	14	24	58.7
DRN90L4	1.5	9.8	1461	23	67.2	BE2	2200 5800	20	27	71.9
DRN100LS4	2.2	14.5	1450	27	81.4	BE5	– 6100	28	33	87.4
DRN100L4	3	19.7	1456	34	112	BE5	– 3700	40	40	118
DRN112M4	4	26	1464	45	178	BE5	– 2900	55	52	183
DRN132S4	5.5	36	1461	56	241	BE11	– 2100	80	71	251
DRN132M4	7.5	49	1468	73	381	BE11	– 1100	110	91	403
DRN132L4	9.2	60	1470	81	439	BE20	– 980	150	110	490
DRN160M4	11	71	1473	115	817	BE20	– 900	150	145	877
DRN160L4	15	97	1474	130	1040	BE20	– 800	200	165	1100
DRN180M4	18.5	120	1478	155	1630	BE30	– 510	300	195	1770
DRN180L4	22	142	1477	170	1950	BE30	– 470	300	210	2090
DRN200L4	30	194	1480	280	2660	BE32	– 500	400	335	2890
DRN225S4	37	240	1482	310	4350	BE32	– 230	500	365	4580
DRN225M4	45	290	1482	310	4350	BE32	– 200	600	365	4580
DRN250M4	55	355	1482	460	7360	BE62	– 180	800	550	7960
DRN280S4	75	485	1482	520	8940	BE62	– 150	1000	600	9530
DRN280M4	90	580	1481	630	12000	BE62	– 79	1200	720	12600
DRN315S4	110	710	1488	870	23400	BE122	– 53	1600	1000	24400
DRN315M4	132	850	1487	890	24800	BE122	– 46	2000	1020	25800
DRN315L4	160	1030	1486	1020	28600	BE122	– 34	2000	1150	29600
DRN315H4	200	1280	1489	1140	35200	BE122	– 23	2000	1270	36200

3.5.2 Motor-inverter assignments DRN.. motors, f_{PWM} = 4 kHz

Key

I_N	Nominal output current of the inverter
I_{max}	Maximum output current of inverter
M_{pk}	Peak torque of the motor
n_{base}	Base speed of the motor

MOVIDRIVE® system/technology – 400 V, 50 Hz, VFC^{PLUS}

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRN80M4	M_{pk}	Nm	14.1	16.9												
	n_{base}	min-1	1069	1009												
	I_{max}	%	200	200												
DRN90S4	M_{pk}	Nm	13.5	17.6	23.3	23.8										
	n_{base}	min-1	1253	1196	1117	1149										
	I_{max}	%	200	200	200	171										
DRN90L4	M_{pk}	Nm			22.4	28.8	32.4									
	n_{base}	min-1			1214	1150	1152									
	I_{max}	%			200	200	169									
DRN100LS4	M_{pk}	Nm				27.8	39.7	47.8								
	n_{base}	min-1				1233	1149	1105								
	I_{max}	%				200	200	190								
DRN100L4	M_{pk}	Nm					38.8	50.8	69.3							
	n_{base}	min-1					1242	1187	1101							
	I_{max}	%					200	200	197							
DRN112M4	M_{pk}	Nm						50.6	70.5	81.3						
	n_{base}	min-1						1261	1199	1165						
	I_{max}	%						200	200	174						
DRN132S4	M_{pk}	Nm							70.6	94.5	110					
	n_{base}	min-1							1252	1196	1161					
	I_{max}	%							200	200	180					
DRN132M4	M_{pk}	Nm								87.1	114	120				
	n_{base}	min-1								1291	1254	1245				
	I_{max}	%								200	200	141				
DRN132L4	M_{pk}	Nm									110	144				
	n_{base}	min-1									1295	1260				
	I_{max}	%									200	171				
DRN160M4	M_{pk}	Nm									116	177	196			
	n_{base}	min-1									1316	1270	1256			
	I_{max}	%									200	200	166			
DRN160L4	M_{pk}	Nm										174	235	273		
	n_{base}	min-1										1313	1283	1264		
	I_{max}	%										200	200	161		

28487486/EN – 02/2019

MOVIDRIVE® system/technology – 230 V, 50 Hz, VFC^{PLUS}

Motor			0070	0093	0140	0213	0290	0420	0570
	I_N	A	7	9.3	14	21.3	29	42	57
	I_{max}	A	14	18.6	28	42.3	58	84	114
DRN90S4	M_{pk}	Nm	23.8						
	n_{base}	min-1	1149						
	I_{max}	%	170						
DRN90L4	M_{pk}	Nm	29	32.4					
	n_{base}	min-1	1148	1152					
	I_{max}	%	200	174					
DRN100LS4	M_{pk}	Nm	28	38.5	47.8				
	n_{base}	min-1	1232	1157	1105				
	I_{max}	%	200	200	165				
DRN100L4	M_{pk}	Nm		37.5	59.1	69.3			
	n_{base}	min-1		1248	1149	1101			
	I_{max}	%		200	200	153			
DRN112M4	M_{pk}	Nm			59	81.3			
	n_{base}	min-1			1235	1165			
	I_{max}	%			200	178			
DRN132S4	M_{pk}	Nm			59	92.5	110		
	n_{base}	min-1			1279	1201	1161		
	I_{max}	%			200	200	173		
DRN132M4	M_{pk}	Nm				85.2	119	120	
	n_{base}	min-1				1293	1247	1245	
	I_{max}	%				200	200	140	
DRN132L4	M_{pk}	Nm					115	144	
	n_{base}	min-1					1290	1260	
	I_{max}	%					200	170	
DRN160M4	M_{pk}	Nm					121	179	196
	n_{base}	min-1					1312	1270	1256
	I_{max}	%					200	200	162
DRN160L4	M_{pk}	Nm						175	241
	n_{base}	min-1						1313	1280
	I_{max}	%						200	200
DRN180M4	M_{pk}	Nm						180	245
	n_{base}	min-1						1326	1298
	I_{max}	%						200	200
DRN180L4	M_{pk}	Nm							249
	n_{base}	min-1							1308
	I_{max}	%							200

28487486/EN – 02/2019

3.5.3 Technical data of DRL.. motors

Key to the technical data for asynchronous DRL.. servomotors

The following table lists the short symbols used in the "Technical data" tables.

n_N	Rated speed
M_N	Rated torque
I_N	Rated current
J_{Mot}	Mass moment of inertia of the motor
M_{pk} D1	Maximum limit torque (dynamics package 1)
M_{pk} D2	Maximum limit torque (dynamics package 2)
m	Mass of the motor
BE..	Brake used
m_B	Mass of the brake motor
J_{MOT_BE}	Mass moment of inertia of the brake motor
M_B D1	Braking torque (dynamics package 1)
M_B D2	Braking torque (dynamics package 2)

Asynchronous DRL.. servomotors

4-pole DRL.. servomotors for 400 V, 50 Hz

n_N	Motor type	M_N	I_N	I_{q_n}	I_{d_n}	c_T	M_{pk} D1	M_{pk} D2	m	J_{mot}
		Nm	A	A	A	Nm/A	Nm	Nm	kg	10^{-4} kgm^2
1200	DRL71S4	2.7	1.18	1.02	0.62	2.66	5	8.5	8.6	4.9
	DRL71M4	4	1.6	1.36	0.80	2.93	7	14	10	7.1
	DRL80S4	6.5	2.15	1.95	0.88	3.33	10	25	11.5	14.9
	DRL80M4	9.5	2.9	2.64	1.10	3.60	14	30	15.2	21.5
	DRL90L4	15	4.8	4.14	2.21	3.63	25	46	22.5	43.5
	DRL100L4	26	8.5	8.05	2.68	3.23	40	85	30	68
	DRL132S4	42	12.6	11.9	4.07	3.52	80	150	45.5	190
	DRL132MC4	56	17.6	15.4	7.50	3.63	130	200	65	340
	DRL160M4	85	25.5	24.2	8.05	3.51	165	280	93	450
	DRL160MC4	90	28	25.1	10.9	3.58	185	320	95	590
	DRL180S4	120	34.5	33.2	10.8	3.62	210	380	122	900
	DRL180M4	135	38	36.1	11.3	3.74	250	430	143	1110
	DRL180L4	165	47	44.9	14.8	3.67	320	520	154	1300
	DRL180LC4	175	52	46.8	17.1	3.74	420	600	163	1680
	DRL200L4	200	58.5	56.0	17.8	3.57	475	680	260	2360
	DRL225S4	250	72	68.1	23.4	3.67	520	770	295	2930
	DRL225MC4	290	89	78.6	29.2	3.69	770	1100	330	4330
1700	DRL71S4	2.7	1.63	1.40	0.86	1.92	5	8.5	8.6	4.9
	DRL71M4	4	2.2	1.90	1.11	2.11	7	14	10	7.1
	DRL80S4	6.5	2.96	2.71	1.22	2.40	10	25	11.5	14.9
	DRL80M4	9.5	4	3.65	1.52	2.60	14	30	15.2	21.5
	DRL90L4	15	6.6	5.67	3.02	2.65	25	46	22.5	43.5
	DRL100L4	26	11.4	11.00	3.66	2.36	40	85	30	68
	DRL132S4	42	17.8	16.9	5.75	2.49	80	150	45.5	190
	DRL132MC4	56	24.9	21.9	10.6	2.56	130	200	65	340
	DRL160M4	85	35	33.5	11.1	2.54	165	280	93	450
	DRL160MC4	90	36	32.3	14.0	2.78	185	320	95	590
	DRL180S4	120	47.5	45.6	14.8	2.63	210	380	122	900
	DRL180M4	135	52	50.1	15.7	2.70	250	430	143	1110
	DRL180L4	165	63	61.3	20.2	2.69	320	520	154	1300
	DRL180LC4	175	72	65.7	24.1	2.66	420	600	163	1680
	DRL200L4	200	80.6	78.4	25.0	2.55	475	680	260	2360
	DRL225S4	245	97	92	32.2	2.66	520	770	295	2930
	DRL225MC4	280	130	114	43.9	2.45	770	1100	330	4330

28487486/EN – 02/2019

n_N	Motor type	M_N	I_N	I_{q_n}	I_{d_n}	c_T	M_{pk}	M_{pk}	m	J_{mot}
							D1	D2		
		Nm	A	A	A	Nm/A	Nm	Nm	kg	10^{-4} kgm²
2100	DRL71S4	2.6	2	1.70	1.08	1.53	5	8.5	8.6	4.9
	DRL71M4	3.8	2.7	2.25	1.39	1.69	7	14	10	7.1
	DRL80S4	6.2	3.59	3.22	1.52	1.92	10	25	11.5	14.9
	DRL80M4	9.5	5	4.60	1.91	2.07	14	30	15.2	21.5
	DRL90L4	15	8.4	7.21	3.84	2.08	25	46	22.5	43.5
	DRL100L4	25	14	13.4	4.63	1.87	40	85	30	68
	DRL132S4	41	21.4	20.3	7.07	2.02	80	150	45.5	190
	DRL132MC4	52	28.8	25.0	13.0	2.08	130	200	65	340
	DRL160M4	85	44	42.1	14.0	2.02	165	280	93	450
	DRL160MC4	88	48	42.8	18.9	2.06	185	320	95	590
	DRL180S4	110	55.3	52.7	18.7	2.09	210	380	122	900
	DRL180M4	130	64	60.4	19.6	2.15	250	430	143	1110
	DRL180L4	160	78	75.8	25.8	2.11	320	520	154	1300
	DRL180LC4	170	87	79.1	29.8	2.15	420	600	163	1680
	DRL200L4	195	99	94.6	30.9	2.06	475	680	260	2360
	DRL225S4	235	119	111	40.6	2.11	520	770	295	2930
	DRL225MC4	265	142	125	50.8	2.12	770	1100	330	4330
3000	DRL71S4	2.5	2.68	2.26	1.49	1.11	5	8.5	8.6	4.9
	DRL71M4	3.6	3.55	2.96	1.93	1.21	7	14	10	7.1
	DRL80S4	6	4.82	4.32	2.10	1.39	10	25	11.5	14.9
	DRL80M4	8.8	6.5	5.86	2.63	1.50	14	30	15.2	21.5
	DRL90L4	14	11	9.19	5.25	1.52	25	46	22.5	43.5
	DRL100L4	21	16.6	15.4	6.35	1.36	40	85	30	68
	DRL132S4	35	25.5	24.4	10.0	1.43	80	150	45.5	190
	DRL132MC4	42	34.8	28.4	18.4	1.48	130	200	65	340
	DRL160M4	79	57	53.9	19.3	1.47	165	280	93	450
	DRL160MC4	83	59	51.8	24.3	1.60	185	320	95	590
	DRL180S4	100	70.1	65.9	25.7	1.52	210	380	122	900
	DRL180M4	105	73	67.6	27.2	1.55	250	430	143	1110
	DRL180L4	130	90	83.8	35.0	1.55	320	520	154	1300
	DRL180LC4	140	105	91	41.8	1.53	420	600	163	1680
	DRL200L4	165	118	112	43.3	1.47	475	680	260	2360
	DRL225S4	195	139	127	56.0	1.53	520	770	295	2930
	DRL225MC4	220	188	156	76	1.41	770	1100	330	4330

4-pole DRL.. servomotors/brakemotors for 400 V, 50 Hz

n_N	Motor type	M_N	I_N	BE..	M_B	M_B	m_B	J_{Mot_BE}
					D1	D2		
		Nm	A		Nm	Nm	kg[1)]	10^{-4} kgm²
1200	DRL71S4	2.7	1.18	BE05	5	5	11	6.2
	DRL71M4	4	1.6	BE1	7	10	12.6	8.4
	DRL80S4	6.5	2.15	BE2	10	20	15.2	19.4
	DRL80M4	9.5	2.9	BE2	14	20	18.9	26
	DRL90L4	15	4.8	BE5	20	40	28.5	49.5
	DRL100L4	26	8.5	BE5	40	55	36	74
	DRL132S4	42	12.6	BE11	80	110	60	200
	DRL132MC4	56	17.6	BE11	110	110	79	355
	DRL160M4	85	25.5	BE20	150	200	120	500
	DRL160MC4	90	28	BE20	150	200	122	640
	DRL180S4	120	34.5	BE30	200	300	162	1030
	DRL180M4	135	38	BE30	200	300	183	1250
	DRL180L4	165	47	BE30	300	300	194	1440
	DRL180LC4	175	52	BE32	400	400	210	1910
	DRL200L4	200	58.5	BE32	400	600	315	2590
	DRL225S4	250	72	BE32	500	500	350	3160
	DRL225MC4	290	89	BE32	600	600	385	4560
1700	DRL71S4	2.7	1.63	BE05	5	5	11	6.2
	DRL71M4	4	2.2	BE1	7	10	12.6	8.4
	DRL80S4	6.5	2.96	BE2	10	20	15.2	19.4
	DRL80M4	9.5	4	BE2	14	20	18.9	26
	DRL90L4	15	6.6	BE5	20	40	28.5	49.5
	DRL100L4	26	11.4	BE5	40	55	36	74
	DRL132S4	42	17.8	BE11	80	110	60	200
	DRL132MC4	56	24.9	BE11	110	110	79	355
	DRL160M4	85	35	BE20	150	200	120	500
	DRL160MC4	90	36	BE20	150	200	122	640
	DRL180S4	120	47.5	BE30	200	300	162	1030
	DRL180M4	135	52	BE30	200	300	183	1250
	DRL180L4	165	63	BE30	300	300	194	1440
	DRL180LC4	175	72	BE32	400	400	210	1910
	DRL200L4	200	80.6	BE32	400	600	315	2590
	DRL225S4	245	97	BE32	500	500	350	3160
	DRL225MC4	280	130	BE32	600	600	385	4560
2100	DRL71S4	2.6	2	BE05	5	5	11	6.2
	DRL71M4	3.8	2.7	BE1	7	10	12.6	8.4
	DRL80S4	6.2	3.59	BE2	10	20	15.2	19.4
	DRL80M4	9.5	5	BE2	14	20	18.9	26
	DRL90L4	15	8.4	BE5	20	40	28.5	49.5
	DRL100L4	25	14	BE5	40	55	36	74
	DRL132S4	41	21.4	BE11	80	110	60	200
	DRL132MC4	52	28.8	BE11	110	110	79	355
	DRL160M4	85	44	BE20	150	200	120	500
	DRL160MC4	88	48	BE20	150	200	122	640
	DRL180S4	110	55.3	BE30	200	300	162	1030
	DRL180M4	130	64	BE30	200	300	183	1250
	DRL180L4	160	78	BE30	300	300	194	1440
	DRL180LC4	170	87	BE32	400	400	210	1910
	DRL200L4	195	99	BE32	400	600	315	2590
	DRL225S4	235	119	BE32	500	500	350	3160
	DRL225MC4	265	142	BE32	600	600	385	4560

28487486/EN – 02/2019

n_N	Motor type	M_N	I_N	BE..	M_B D1	M_B D2	m_B	J_{Mot_BE}
		Nm	A		Nm	Nm	kg[1)]	10^{-4} kgm^2
3000	DRL71S4	2.5	2.68	BE05	5	5	11	6.2
	DRL71M4	3.6	3.55	BE1	7	10	12.6	8.4
	DRL80S4	6	4.82	BE2	10	20	15.2	19.4
	DRL80M4	8.8	6.5	BE2	14	20	18.9	26
	DRL90L4	14	11	BE5	20	40	28.5	49.5
	DRL100L4	21	16.6	BE5	40	55	36	74
	DRL132S4	35	25.5	BE11	80	110	60	200
	DRL132MC4	42	34.8	BE11	110	110	79	355
	DRL160M4	79	57	BE20	150	200	120	500
	DRL160MC4	83	59	BE20	150	200	122	640
	DRL180S4	100	70.1	BE30	200	300	162	1030
	DRL180M4	105	73	BE30	200	300	183	1250
	DRL180L4	130	90	BE30	300	300	194	1440
	DRL180LC4	140	105	BE32	400	400	210	1910
	DRL200L4	165	118	BE32	400	600	315	2590
	DRL225S4	195	139	BE32	500	500	350	3160
	DRL225MC4	220	188	BE32	600	600	385	4560

1) Applies for foot-mounted motor with brake (DRL...BE../FI..)

3.5.4 Motor-inverter assignments DRL.. motors, f_{PWM} = 4 kHz

Key

I_N	Nominal output current of the inverter
I_{max}	Maximum output current of inverter
M_{pk}	Peak torque of the motor
n_{base}	Base speed of the motor

MOVIDRIVE® system/technology – rated motor speed 1200 min^{-1}, dynamics package 1, CFC

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL71S4	M_{pk}	Nm	5													
	n_{base}	min^{-1}	737													
	I_{max}	%	103													
DRL71M4	M_{pk}	Nm	7													
	n_{base}	min^{-1}	903													
	I_{max}	%	142													
DRL80S4	M_{pk}	Nm	10													
	n_{base}	min^{-1}	876													
	I_{max}	%	171													
DRL80M4	M_{pk}	Nm	13.4	14												
	n_{base}	min^{-1}	939	985												
	I_{max}	%	200	198												
DRL90L4	M_{pk}	Nm				25	25									
	n_{base}	min^{-1}				1053	1168									
	I_{max}	%				200	195									
DRL100L4	M_{pk}	Nm						40	40							
	n_{base}	min^{-1}						1205	1371							
	I_{max}	%						200	199							
DRL132S4	M_{pk}	Nm							65	80						
	n_{base}	min^{-1}							1057	1065						
	I_{max}	%							200	200						
DRL132MC4	M_{pk}	Nm								79.6	105	130	130			
	n_{base}	min^{-1}								1252	1174	1299	1443			
	I_{max}	%								200	200	200	200			
DRL160M4	M_{pk}	Nm										165	165			
	n_{base}	min^{-1}										1090	1299			
	I_{max}	%										200	200			
DRL160MC4	M_{pk}	Nm										159	185	185		
	n_{base}	min^{-1}										1162	1274	1467		
	I_{max}	%										200	200	200		
DRL180S4	M_{pk}	Nm										171	210	210		
	n_{base}	min^{-1}										1136	1169	1294		
	I_{max}	%										200	200	195		
DRL180M4	M_{pk}	Nm											246	250		
	n_{base}	min^{-1}											1057	1336		
	I_{max}	%											200	200		
DRL180L4	M_{pk}	Nm											234	320	320	
	n_{base}	min^{-1}											1162	1160	1334	
	I_{max}	%											200	200	200	

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL180LC4	M_{pk}	Nm												336	420	
	n_{base}	min^{-1}												1101	1135	
	I_{max}	%												200	200	
DRL200L4	M_{pk}	Nm												339	474	475
	n_{base}	min^{-1}												1123	1034	1211
	I_{max}	%												200	200	200
DRL225S4	M_{pk}	Nm													469	520
	n_{base}	min^{-1}													1103	1204
	I_{max}	%													200	200
DRL225MC4	M_{pk}	Nm													429	539
	n_{base}	min^{-1}													1212	1144
	I_{max}	%													200	200

MOVIDRIVE® system/technology – rated motor speed 1700 min^{-1}, dynamics package 1, CFC

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL71S4	M_{pk}	Nm	5													
	n_{base}	min^{-1}	1312													
	I_{max}	%	156													
DRL71M4	M_{pk}	Nm	7													
	n_{base}	min^{-1}	1515													
	I_{max}	%	200													
DRL80S4	M_{pk}	Nm		10												
	n_{base}	min^{-1}		1502												
	I_{max}	%		200												
DRL80M4	M_{pk}	Nm			14											
	n_{base}	min^{-1}			1557											
	I_{max}	%			200											
DRL90L4	M_{pk}	Nm					25	25								
	n_{base}	min^{-1}					1583	1807								
	I_{max}	%					200	200								
DRL100L4	M_{pk}	Nm							40	40						
	n_{base}	min^{-1}							1793	2122						
	I_{max}	%							200	200						
DRL132S4	M_{pk}	Nm								59.9	79.2	80				
	n_{base}	min^{-1}								1624	1497	1884				
	I_{max}	%								200	200	200				
DRL132MC4	M_{pk}	Nm										112	130	130		
	n_{base}	min^{-1}										1703	1896	2259		
	I_{max}	%										200	200	200		
DRL160M4	M_{pk}	Nm										118	164	165		
	n_{base}	min^{-1}										1656	1515	1953		
	I_{max}	%										200	200	200		
DRL160MC4	M_{pk}	Nm										119	166	185	185	
	n_{base}	min^{-1}										1656	1515	1820	2024	
	I_{max}	%										200	200	200	200	
DRL180S4	M_{pk}	Nm											165	210	210	
	n_{base}	min^{-1}											1629	1732	1917	
	I_{max}	%											200	200	200	

28487486/EN – 02/2019

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL180M4	M_{pk}	Nm												250	250	
	n_{base}	min^{-1}												1559	1926	
	I_{max}	%												200	200	
DRL180L4	M_{pk}	Nm												249	320	320
	n_{base}	min^{-1}												1594	1628	1838
	I_{max}	%												200	200	200
DRL180LC4	M_{pk}	Nm													322	399
	n_{base}	min^{-1}													1612	1523
	I_{max}	%													200	200
DRL200L4	M_{pk}	Nm													324	405
	n_{base}	min^{-1}													1623	1534
	I_{max}	%													200	200
DRL225S4	M_{pk}	Nm														402
	n_{base}	min^{-1}														1610
	I_{max}	%														200

MOVIDRIVE® system/technology – rated motor speed 2100 min^{-1}, dynamics package 1, CFC

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL71S4	M_{pk}	Nm	5													
	n_{base}	min^{-1}	1874													
	I_{max}	%	200													
DRL71M4	M_{pk}	Nm	6.01	7												
	n_{base}	min^{-1}	2055	2063												
	I_{max}	%	200	200												
DRL80S4	M_{pk}	Nm		8.83	10											
	n_{base}	min^{-1}		2008	2086											
	I_{max}	%		200	200											
DRL80M4	M_{pk}	Nm				14	14									
	n_{base}	min^{-1}				2090	2371									
	I_{max}	%				200	200									
DRL90L4	M_{pk}	Nm						25	25							
	n_{base}	min^{-1}						2113	2520							
	I_{max}	%						200	200							
DRL100L4	M_{pk}	Nm							35.8	40	40	40				
	n_{base}	min^{-1}							2125	2452	2896	3354				
	I_{max}	%							200	200	200	200				
DRL132S4	M_{pk}	Nm									62.9	80	80			
	n_{base}	min^{-1}									2016	2209	2484			
	I_{max}	%									200	200	200			
DRL132MC4	M_{pk}	Nm										89.1	123	130	130	
	n_{base}	min^{-1}										2231	2074	2631	2962	
	I_{max}	%										200	200	200	200	
DRL160M4	M_{pk}	Nm											127	165	165	
	n_{base}	min^{-1}											2078	2225	2622	
	I_{max}	%											200	200	200	
DRL160MC4	M_{pk}	Nm											118	178	185	
	n_{base}	min^{-1}											2272	2069	2544	
	I_{max}	%											200	200	200	

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL180S4	M_{pk}	Nm												192	210	
	n_{base}	min^{-1}												1999	2323	
	I_{max}	%												200	200	
DRL180M4	M_{pk}	Nm												197	250	250
	n_{base}	min^{-1}												2043	2131	2428
	I_{max}	%												200	200	200
DRL180L4	M_{pk}	Nm													268	320
	n_{base}	min^{-1}													2025	2024
	I_{max}	%													200	200
DRL180LC4	M_{pk}	Nm													252	314
	n_{base}	min^{-1}													2149	2034
	I_{max}	%													200	200
DRL200L4	M_{pk}	Nm														315
	n_{base}	min^{-1}														2041
	I_{max}	%														200

MOVIDRIVE® system/technology – rated motor speed 3000 min^{-1}, dynamics package 1, CFC

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL71S4	M_{pk}	Nm	3.87	5												
	n_{base}	min^{-1}	3018	2747												
	I_{max}	%	200	200												
DRL71M4	M_{pk}	Nm		5.3	7	7										
	n_{base}	min^{-1}		3170	2945	3309										
	I_{max}	%		200	200	200										
DRL80S4	M_{pk}	Nm				10	10									
	n_{base}	min^{-1}				2979	3460									
	I_{max}	%				200	200									
DRL80M4	M_{pk}	Nm					14	14								
	n_{base}	min^{-1}					3087	3544								
	I_{max}	%					200	200								
DRL90L4	M_{pk}	Nm							25	25						
	n_{base}	min^{-1}							3005	3625						
	I_{max}	%							200	200						
DRL100L4	M_{pk}	Nm								33.9	40	40	40			
	n_{base}	min^{-1}								3065	3321	4471	5096			
	I_{max}	%								200	200	200	200			
DRL132S4	M_{pk}	Nm										67.3	80	80		
	n_{base}	min^{-1}										2886	3148	3775		
	I_{max}	%										200	200	200		
DRL132MC4	M_{pk}	Nm										61.1	83.2	125	130	130
	n_{base}	min^{-1}										3356	3268	3014	3766	4176
	I_{max}	%										200	200	200	200	200
DRL160M4	M_{pk}	Nm												133	165	165
	n_{base}	min^{-1}												2897	3099	3530
	I_{max}	%												200	200	200
DRL160MC4	M_{pk}	Nm												134	185	185
	n_{base}	min^{-1}												2880	2746	3223
	I_{max}	%												200	200	200

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL180S4	M_{pk}	Nm													188	210
	n_{base}	min^{-1}													2827	3028
	I_{max}	%													200	200
DRL180M4	M_{pk}	Nm													191	240
	n_{base}	min^{-1}													2897	2739
	I_{max}	%													200	200
DRL180L4	M_{pk}	Nm													183	232
	n_{base}	min^{-1}													3091	2906
	I_{max}	%													200	200
DRL180LC4	M_{pk}	Nm														212
	n_{base}	min^{-1}														3179
	I_{max}	%														200

MOVIDRIVE® system/technology – rated motor speed 1200 min^{-1}, dynamics package 2, CFC

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL71S4	M_{pk}	Nm	8.5													
	n_{base}	min^{-1}	272													
	I_{max}	%	162													
DRL71M4	M_{pk}	Nm	11.6	14												
	n_{base}	min^{-1}	517	361												
	I_{max}	%	200	189												
DRL80S4	M_{pk}	Nm	13.3	17.3	22.7	25										
	n_{base}	min^{-1}	658	446	200	102										
	I_{max}	%	200	200	200	175										
DRL80M4	M_{pk}	Nm	13.4	17.7	23.9	30										
	n_{base}	min^{-1}	939	775	587	431										
	I_{max}	%	200	200	200	198										
DRL90L4	M_{pk}	Nm				25.8	37.7	46								
	n_{base}	min^{-1}				1010	798	709								
	I_{max}	%				200	200	197								
DRL100L4	M_{pk}	Nm						49.2	68.7	85						
	n_{base}	min^{-1}						951	810	726						
	I_{max}	%						200	200	198						
DRL132S4	M_{pk}	Nm							65	88.2	115	150				
	n_{base}	min^{-1}							1057	949	841	768				
	I_{max}	%							200	200	200	192				
DRL132MC4	M_{pk}	Nm								79.6	105	164	200			
	n_{base}	min^{-1}								1252	1174	1008	1035			
	I_{max}	%								200	200	200	200			
DRL160M4	M_{pk}	Nm										171	233	280		
	n_{base}	min^{-1}										1030	933	983		
	I_{max}	%										200	200	200		
DRL160MC4	M_{pk}	Nm										159	219	320	320	
	n_{base}	min^{-1}										1162	1057	948	1091	
	I_{max}	%										200	200	200	199	
DRL180S4	M_{pk}	Nm										171	238	352	380	
	n_{base}	min^{-1}										1136	1013	872	914	
	I_{max}	%										200	200	200	194	

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL180M4	M_{pk}	Nm											246	364	430	
	n_{base}	min^{-1}											1057	951	994	
	I_{max}	%											200	200	200	
DRL180L4	M_{pk}	Nm											234	359	493	520
	n_{base}	min^{-1}											1162	1013	925	994
	I_{max}	%											200	200	200	200
DRL180LC4	M_{pk}	Nm												336	467	568
	n_{base}	min^{-1}												1101	1004	960
	I_{max}	%												200	200	200
DRL200L4	M_{pk}	Nm												339	474	577
	n_{base}	min^{-1}												1123	1034	1000
	I_{max}	%												200	200	200
DRL225S4	M_{pk}	Nm													469	582
	n_{base}	min^{-1}													1103	1048
	I_{max}	%													200	200
DRL225MC4	M_{pk}	Nm													429	539
	n_{base}	min^{-1}													1212	1144
	I_{max}	%													200	200

MOVIDRIVE® system/technology – rated motor speed 1700 min^{-1}, dynamics package 2, CFC

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL71S4	M_{pk}	Nm	7.44	8.5												
	n_{base}	min^{-1}	892	763												
	I_{max}	%	200	180												
DRL71M4	M_{pk}	Nm	7.88	10.3	13.6	14										
	n_{base}	min^{-1}	1339	1127	881	856										
	I_{max}	%	200	200	200	168										
DRL80S4	M_{pk}	Nm		11.7	15.8	20.4	25									
	n_{base}	min^{-1}		1280	1022	787	582									
	I_{max}	%		200	200	200	177									
DRL80M4	M_{pk}	Nm			16.2	21.3	30									
	n_{base}	min^{-1}			1327	1127	889									
	I_{max}	%			200	200	200									
DRL90L4	M_{pk}	Nm					26	34.7	46							
	n_{base}	min^{-1}					1503	1327	1193							
	I_{max}	%					200	200	200							
DRL100L4	M_{pk}	Nm							48.7	65.9	85	85				
	n_{base}	min^{-1}							1432	1292	1182	1333				
	I_{max}	%							200	200	200	189				
DRL132S4	M_{pk}	Nm								59.9	79.2	122	150			
	n_{base}	min^{-1}								1624	1497	1301	1298			
	I_{max}	%								200	200	200	200			
DRL132MC4	M_{pk}	Nm										112	154	200	200	
	n_{base}	min^{-1}										1703	1566	1640	1859	
	I_{max}	%										200	200	200	200	
DRL160M4	M_{pk}	Nm										118	164	243	280	
	n_{base}	min^{-1}										1656	1515	1365	1503	
	I_{max}	%										200	200	200	200	

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	**A**	**2**	**2.5**	**3.2**	**4**	**5.5**	**7**	**9.5**	**12.5**	**16**	**24**	**32**	**46**	**62**	**75**
	I_{max}	**A**	**4**	**5**	**6.4**	**8**	**11**	**14**	**19**	**25**	**32**	**48**	**64**	**92**	**124**	**150**
Motor																
DRL160MC4	M_{pk}	Nm										119	166	248	320	320
	n_{base}	min^{-1}										1656	1515	1365	1362	1511
	I_{max}	%										200	200	200	200	200
DRL180S4	M_{pk}	Nm											165	250	345	380
	n_{base}	min^{-1}											1629	1435	1303	1354
	I_{max}	%											200	200	200	200
DRL180M4	M_{pk}	Nm												257	354	430
	n_{base}	min^{-1}												1497	1400	1346
	I_{max}	%												200	200	200
DRL180L4	M_{pk}	Nm												249	354	436
	n_{base}	min^{-1}												1594	1444	1374
	I_{max}	%												200	200	200
DRL180LC4	M_{pk}	Nm													322	399
	n_{base}	min^{-1}													1612	1523
	I_{max}	%													200	200
DRL200L4	M_{pk}	Nm													324	405
	n_{base}	min^{-1}													1623	1534
	I_{max}	%													200	200
DRL225S4	M_{pk}	Nm														402
	n_{base}	min^{-1}														1610
	I_{max}	%														200

MOVIDRIVE® system/technology – rated motor speed 2100 min^{-1}, dynamics package 2, CFC

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	**A**	**2**	**2.5**	**3.2**	**4**	**5.5**	**7**	**9.5**	**12.5**	**16**	**24**	**32**	**46**	**62**	**75**
	I_{max}	**A**	**4**	**5**	**6.4**	**8**	**11**	**14**	**19**	**25**	**32**	**48**	**64**	**92**	**124**	**150**
Motor																
DRL71S4	M_{pk}	Nm	5.73	7.4	8.5											
	n_{base}	min^{-1}	1632	1362	1229											
	I_{max}	%	200	200	182											
DRL71M4	M_{pk}	Nm	6.01	7.89	10.6	13.6	14									
	n_{base}	min^{-1}	2055	1820	1550	1315	1322									
	I_{max}	%	200	200	200	200	160									
DRL80S4	M_{pk}	Nm		8.83	12.1	15.8	22.6	25								
	n_{base}	min^{-1}		2008	1714	1468	1115	1006								
	I_{max}	%		200	200	200	200	175								
DRL80M4	M_{pk}	Nm				16.1	23.7	30								
	n_{base}	min^{-1}				1796	1479	1323								
	I_{max}	%				200	200	200								
DRL90L4	M_{pk}	Nm						26.1	37.6	46						
	n_{base}	min^{-1}						1996	1738	1710						
	I_{max}	%						200	200	200						
DRL100L4	M_{pk}	Nm							35.8	51.1	66.7	85	85			
	n_{base}	min^{-1}							2125	1867	1750	1840	2027			
	I_{max}	%							200	200	200	200	200			
DRL132S4	M_{pk}	Nm									62.9	98.7	133	150		
	n_{base}	min^{-1}									2016	1791	1644	1816		
	I_{max}	%									200	200	200	200		
DRL132MC4	M_{pk}	Nm										89.1	123	183	200	
	n_{base}	min^{-1}										2231	2074	1879	2218	
	I_{max}	%										200	200	200	200	

28487486/EN – 02/2019

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL160M4	M_{pk}	Nm											127	191	262	280
	n_{base}	min^{-1}											2078	1876	1752	1944
	I_{max}	%											200	200	200	200
DRL160MC4	M_{pk}	Nm											118	178	248	303
	n_{base}	min^{-1}											2272	2069	1911	1823
	I_{max}	%											200	200	200	200
DRL180S4	M_{pk}	Nm												192	270	331
	n_{base}	min^{-1}												1999	1814	1726
	I_{max}	%												200	200	200
DRL180M4	M_{pk}	Nm												197	281	342
	n_{base}	min^{-1}												2043	1858	1805
	I_{max}	%												200	200	200
DRL180L4	M_{pk}	Nm													268	335
	n_{base}	min^{-1}													2025	1902
	I_{max}	%													200	200
DRL180LC4	M_{pk}	Nm													252	314
	n_{base}	min^{-1}													2149	2034
	I_{max}	%													200	200
DRL200L4	M_{pk}	Nm														315
	n_{base}	min^{-1}														2041
	I_{max}	%														200

MOVIDRIVE® system – rated motor speed 3000 min^{-1}, dynamics package 2, CFC

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL71S4	M_{pk}	Nm	3.87	5.1	6.8	8.5										
	n_{base}	min^{-1}	3018	2677	2325	2088										
	I_{max}	%	200	200	200	200										
DRL71M4	M_{pk}	Nm		5.3	7.15	9.35	13.4	14								
	n_{base}	min^{-1}		3170	2865	2571	2160	2288								
	I_{max}	%		200	200	200	200	199								
DRL80S4	M_{pk}	Nm				10.6	15.6	20.6	25							
	n_{base}	min^{-1}				2771	2337	2020	1874							
	I_{max}	%				200	200	200	199							
DRL80M4	M_{pk}	Nm					16	21.5	30	30						
	n_{base}	min^{-1}					2665	2372	2098	2311						
	I_{max}	%					200	200	200	199						
DRL90L4	M_{pk}	Nm							25.9	36	46	46				
	n_{base}	min^{-1}							2877	2571	2452	2829				
	I_{max}	%							200	200	200	197				
DRL100L4	M_{pk}	Nm								33.9	47	73.4	85	85		
	n_{base}	min^{-1}								3065	2748	2501	2757	3332		
	I_{max}	%								200	200	200	200	200		
DRL132S4	M_{pk}	Nm										67.3	92.7	136	150	
	n_{base}	min^{-1}										2886	2681	2476	2788	
	I_{max}	%										200	200	200	200	
DRL132MC4	M_{pk}	Nm										61.1	83.2	125	174	200
	n_{base}	min^{-1}										3356	3268	3014	2808	2953
	I_{max}	%										200	200	200	200	200

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
DRL160M4	M_{pk}	Nm												133	186	229
	n_{base}	min^{-1}												2897	2677	2571
	I_{max}	%												200	200	200
DRL160MC4	M_{pk}	Nm												134	188	232
	n_{base}	min^{-1}												2880	2668	2554
	I_{max}	%												200	200	200
DRL180S4	M_{pk}	Nm													188	234
	n_{base}	min^{-1}													2827	2668
	I_{max}	%													200	200
DRL180M4	M_{pk}	Nm													191	240
	n_{base}	min^{-1}													2897	2739
	I_{max}	%													200	200
DRL180L4	M_{pk}	Nm													183	232
	n_{base}	min^{-1}													3091	2906
	I_{max}	%													200	200
DRL180LC4	M_{pk}	Nm														212
	n_{base}	min^{-1}														3179
	I_{max}	%														200

28487486/EN – 02/2019

3.5.5 Technical data of CMP.. motors

Key to the technical data

n_N	Rated speed
M_0	Standstill torque (thermal continuous torque at low speeds)
I_0	Standstill current
M_{pk}	Dynamic limit torque
I_{max}	Maximum permitted motor current
M_{0VR}	Standstill torque with forced cooling fan
I_{0VR}	Standstill current with forced cooling fan
J_{mot}	Mass moment of inertia of the motor
J_{bmot}	Mass moment of inertia of the brakemotor
$M_{1m,100°C}$	Maximum dynamic braking torque in case of emergency off
M_{1max}	Minimal averaged dynamic braking torque in case of emergency off at 100 °C
$M_{2,\ 20\ °C}$	Nominal torque for slipping brake disk (relative speed between brake disk and friction surface: 1 m/s) at 20 °C
$M_{4,100\ °C}$	Minimum holding torque at 100 °C
W_{max1}	Maximum permitted braking work per braking operation
W_{max2}	Maximum permitted braking work per braking operation with optional braking torque
L_1	Inductance between connection phase and star point
R_1	Resistance between connection phase and star point
V_{p0} cold	Internal voltage at 1000 min^{-1}
m_{mot}	Mass of the motor
m_{bmot}	Mass of the brakemotor

CMP40 to CMP112, 400 V system voltage

n_N min^{-1}	Motor	M_0 Nm	I_0 A	M_{pk} Nm	I_{max} A	M_{0VR} Nm	I_{0VR} A	m_{mot} kg	J_{mot} $10^{-4}kgm^2$	L_1 mH	R_1 Ω	U_{p0} cold V
2000	CMP71S	6.4	3.4	19.2	17	8.7	4.6	7	3.13	33.5	3.48	128
	CMP71M	9.4	5	30.8	26	13.7	7.3	8.4	4.17	21.6	1.87	127
	CMP71L	13.1	6.3	46.9	39	21	10.1	11.4	6.27	16.2	1.2	142
	CMP80S	13.4	6.9	42.1	33	18.5	9.5	12.8	9	15.3	1.1	133
	CMP80M	18.7	9.3	62.6	48	27	13.4	16.5	12.1	10.5	0.689	136
	CMP80L	27.5	12.5	107	72	44	20	21.4	18.3	7.58	0.438	149
	CMP100S	25.5	13.3	68.3	49	36	18.8	19.8	20.3	8.51	0.439	130
	CMP100M	31	14.7	108	69	47	22.3	24.8	27.2	6.63	0.302	141
	CMP100L	47	21.8	178.8	113	70	32.5	34.6	40.9	4.17	0.169	145
	CMP112S	30	14.3	88	51	43	21	38.4	74	8.63	0.38	143
	CMP112M	45	21	136	74	68	32	46.2	103	5.82	0.212	147
	CMP112L	69	33	225	124	109	52	62.6	163	3.33	0.105	145
	CMP112H	83	38	270	148	123	57	70.4	193	2.85	0.0846	149
	CMP112E	95	44.5	320	175	150	71	78.2	222	2.34	0.066	146
3000	CMP40S	0.5	1.2	1.9	6.1	-	-	1.3	0.1	23	11.9	27.5
	CMP40M	0.8	0.95	3.8	6	-	-	1.6	0.15	45.9	19.9	56.3
	CMP50S	1.3	0.96	5.2	5.1	1.7	1.25	2.3	0.42	71.2	22.5	86.3
	CMP50M	2.4	1.68	10.3	9.6	3.5	2.45	3.3	0.67	38.3	9.96	90.3
	CMP50L	3.3	2.2	15.4	13.6	4.8	3.2	4.1	0.92	30.4	7.42	98.2
	CMP63S	2.9	2.15	11.1	12.9	4	3	4	1.15	36.4	6.8	90.1
	CMP63M	5.3	3.6	21.4	21.6	7.5	5.1	5.7	1.92	21.8	3.56	100
	CMP63L	7.1	4.95	30.4	29.7	10.3	7.2	7.5	2.69	14.2	2.07	99.9
	CMP71S	6.4	4.9	19.2	25	8.7	6.7	7	3.13	15.7	1.48	87.5
	CMP71M	9.4	7.5	30.8	39	13.7	10.9	8.4	4.17	9.72	0.809	85.3
	CMP71L	13.1	9.4	46.9	58	21	15.1	11.4	6.27	7.34	0.559	95.7
	CMP80S	13.4	10	42.1	47	18.5	13.8	12.8	9	7.2	0.544	91.1
	CMP80M	18.7	13.4	62.6	69	27	19.3	16.5	12.1	5.03	0.344	94.3
	CMP80L	27.5	18.7	107	107	44	30	21.4	18.3	3.37	0.21	99.2
	CMP100S	25.5	19.6	68.3	73	36	27.5	19.8	20.3	3.91	0.214	88
	CMP100M	31	21.8	108	102	47	33	24.8	27.2	3.04	0.142	95.5
	CMP100L	47	32.3	178.8	167	70	48	34.6	40.9	1.9	0.0809	98
	CMP112S	30	21	88	74	43	30.5	38.4	74	4.04	0.177	97.5
	CMP112M	45	32	136	113	68	49	46.2	103	2.49	0.0896	96.1
	CMP112L	69	49	225	183	109	77	62.6	163	1.53	0.048	98
	CMP112H	83	57	270	220	123	84	70.4	193	1.29	0.0388	100
	CMP112E	95	65	320	255	150	104	78.2	222	1.09	0.031	99.8

28487486/EN – 02/2019

n_N min^{-1}	Motor	M_0 Nm	I_0 A	M_{pk} Nm	I_{max} A	M_{0VR} Nm	I_{0VR} A	m_{mot} kg	J_{mot} $10^{-4}kgm^2$	L_1 mH	R_1 Ω	U_{p0} cold V
4500	CMP40S	0.5	1.2	1.9	6.1	-	-	1.3	0.1	23	11.9	27.5
	CMP40M	0.8	0.95	3.8	6	-	-	1.6	0.15	45.9	19.9	56.3
	CMP50S	1.3	1.32	5.2	7	1.7	1.7	2.3	0.42	37.2	11.6	62.4
	CMP50M	2.4	2.3	10.3	13.1	3.5	3.35	3.3	0.67	20.7	5.29	66.3
	CMP50L	3.3	3.15	15.4	19.5	4.8	4.6	4.1	0.92	14.6	3.57	68
	CMP63S	2.9	3.05	11.1	18.3	4	4.2	4	1.15	18.3	3.35	63.9
	CMP63M	5.3	5.4	21.4	32.4	7.5	7.6	5.7	1.92	9.79	1.48	67
	CMP63L	7.1	6.9	30.4	41.4	10.3	10	7.5	2.69	7.21	1.07	71.1
	CMP71S	6.4	7.3	19.2	38	8.7	9.9	7	3.13	7.07	0.719	58.7
	CMP71M	9.4	10.9	30.8	57	13.7	15.9	8.4	4.17	4.54	0.384	58.3
	CMP71L	13.1	14.1	46.9	87	21	22.5	11.4	6.27	3.26	0.241	63.8
	CMP80S	13.4	15.3	42.1	73	18.5	21	12.8	9	3.06	0.221	59.4
	CMP80M	18.7	20.1	62.6	103	27	29	16.5	12.1	2.24	0.148	62.9
	CMP80L	27.5	27.8	107	159	44	44.5	21.4	18.3	1.54	0.0855	67
	CMP100S	25.5	30	68.3	111	36	42.5	19.8	20.3	1.68	0.0857	57.7
	CMP100M	31	33.1	108	154	47	50	24.8	27.2	1.32	0.065	62.9
	CMP100L	47	48.4	178.8	251	70	72	34.6	40.9	0.844	0.038	65.3
	CMP112S	30	31.5	88	112	43	45.5	38.4	74	1.78	0.0801	64.7
	CMP112M	45	47	136	168	68	72	46.2	103	1.14	0.0412	65
	CMP112L	69	73	225	275	107	114	62.6	163	0.68	0.0213	65.3
	CMP112H	83	86	270	335	123	128	70.4	193	0.557	0.0165	65.9
	CMP112E	95	98	320	385	150	156	78.2	222	0.484	0.0134	66.5
6000	CMP40S	0.5	1.2	1.9	6.1	-	-	1.3	0.1	23	11.9	27.5
	CMP40M	0.8	1.1	3.8	6.9	-	-	1.6	0.15	34	15	48.5
	CMP50S	1.3	1.7	5.2	9	1.7	2.2	2.3	0.42	22.5	7.11	48.5
	CMP50M	2.4	3	10.3	17.1	3.5	4.4	3.3	0.67	12	3.21	50.5
	CMP50L	3.3	4.2	15.4	26	4.8	6.1	4.1	0.92	8.2	1.91	51
	CMP63S	2.9	3.9	11.1	23.4	4	5.4	4	1.15	11.2	2.1	50
	CMP63M	5.3	6.9	21.4	41.4	7.5	9.8	5.7	1.92	5.9	0.92	52
	CMP63L	7.1	9.3	30.4	55.8	10.3	13.5	7.5	2.69	4	0.62	53
	CMP71S	6.4	9.6	19.2	50	8.7	13.1	7	3.13	4.13	0.395	44.9
	CMP71M	9.4	14.7	30.8	76	13.7	21.5	8.4	4.17	2.53	0.206	43.5
	CMP71L	13.1	18.8	46.9	115	21	30	11.4	6.27	1.84	0.145	47.9
	CMP80S	13.4	20	42.1	95	18.5	27.5	12.8	9	1.8	0.136	45.6
	CMP80M	18.7	26.4	62.6	135	27	38	16.5	12.1	1.3	0.0873	47.9
	CMP80L	27.5	37.6	107	215	44	60	21.4	18.3	0.843	0.0507	49.6

CMP40 – 100, 230 V system voltage

n_N min^{-1}	Motor	M_0 Nm	I_0 A	M_{pk} Nm	I_{max} A	M_{0VR} Nm	I_{0VR} A	m_{mot} kg	J_{mot} $10^{-4}kgm^2$	L_1 mH	R_1 Ω	U_{p0} cold V
3000	CMP40S	0.5	1.2	1.9	6.1	-	-	1.3	0.1	23	11.9	27.5
	CMP40M	0.8	1.5	3.8	9	-	-	1.6	0.15	18.4	7.85	35.7
	CMP50S	1.3	1.64	5.2	9.8	-	-	2.3	0.42	24.3	7.39	50.4
	CMP50M	2.4	2.84	10.3	17.05	-	-	3.3	0.67	13.5	3.41	53.7
	CMP50L	3.3	3.84	15.4	23.1	-	-	4.1	0.92	9.79	2.34	55.7
	CMP63S	2.9	3.61	11.1	21.65	-	-	4	1.15	13	2.56	54
	CMP63M	5.3	6.35	21.4	38.1	-	-	5.7	1.92	7.09	1.12	57
	CMP63L	7.1	8.76	30.4	52.59	-	-	7.5	2.69	4.47	0.655	56
	CMP71S	6.4	8.7	19.2	44	8.7	11.8	7	3.13	5.03	0.483	49.5
	CMP71M	9.4	13.1	30.8	68	13.7	19.1	8.4	4.17	3.17	0.26	48.7
	CMP71L	13.1	16.8	46.9	103	21	27	11.4	6.27	2.31	0.163	53.7
	CMP80S	13.4	17.7	42.1	83	18.5	24.5	12.8	9	2.3	0.166	51.5
	CMP80M	18.7	23.5	62.6	121	27	34	16.5	12.1	1.64	0.113	53.9
	CMP80L	27.5	32.5	107	186	44	52	21.4	18.3	1.11	0.0728	57
	CMP100S	25.5	34.2	68.3	127	-	-	19.8	20.3	1.29	0.0664	50.5
	CMP100M	31	40	108	187	-	-	24.8	27.2	0.904	0.0445	52.1
4500	CMP40S	0.5	1.2	1.9	6.1	-	-	1.3	0.1	23	11.9	27.5
	CMP40M	0.8	1.5	3.8	9	-	-	1.6	0.15	18.4	7.85	35.7
	CMP50S	1.3	2.29	5.2	13.75	-	-	2.3	0.42	12.3	3.73	35.9
	CMP50M	2.4	4.025	10.3	24.2	-	-	3.3	0.67	6.75	1.68	37.9
	CMP50L	3.3	5.53	15.4	33.2	-	-	4.1	0.92	4.73	1.14	38.7
	CMP63S	2.9	5.25	11.1	31.5	-	-	4	1.15	6.18	1.09	37.1
	CMP63M	5.3	9.78	21.4	58.7	-	-	5.7	1.92	2.99	0.462	37
	CMP63L	7.1	12.01	30.4	72.07	-	-	7.5	2.69	2.38	0.339	40.9
	CMP71S	6.4	12.8	19.2	67	8.7	17.4	7	3.13	2.29	0.226	33.4
	CMP71M	9.4	19.2	30.8	101	13.7	28	8.4	4.17	1.46	0.127	33.1
	CMP80S	13.4	27	42.1	129	18.5	37	12.8	9	0.983	0.0698	33.7
	CMP80M	18.7	35	62.6	180	27	51	16.5	12.1	0.73	0.051	35.9
	CMP100S	25.5	54.5	68.3	200	-	-	19.8	20.3	0.509	0.0268	31.7
6000	CMP40S	0.5	1.36	1.9	6.8	-	-	1.3	0.1	17.9	9.19	24.3
	CMP40M	0.8	1.91	3.8	11.5	-	-	1.6	0.15	11.2	4.83	27.8
	CMP50S	1.3	3.07	5.2	18.45	-	-	2.3	0.42	6.85	2	26.8
	CMP50M	2.4	5.25	10.3	31.5	-	-	3.3	0.67	3.97	1.03	29
	CMP50L	3.3	7.6	15.4	45.4	-	-	4.1	0.92	2.53	0.596	28.3
	CMP63S	2.9	6.78	11.1	40.7	-	-	4	1.15	3.69	0.668	28.7
	CMP63M	5.3	12.06	21.4	72.36	7.5	17.04	5.7	1.92	1.96	0.296	30
	CMP71S	6.4	17	19.2	89	8.7	23	7	3.13	1.32	0.124	25.3
	CMP80S	13.4	35.5	42.1	168	18.5	48.5	12.8	9	0.575	0.0416	25.7

28487486/EN – 02/2019

3.5.6 Motor-inverter assignments CMP.. motors, 400 V, f_{PWM} = 4 kHz

Key

I_N	Nominal output current of the inverter
I_{max}	Maximum output current of inverter
M_{pk}	Peak torque of the motor
n_{base}	Base speed of the motor

MOVIDRIVE® system/technology – 400 V, rated speed 2000 min-1, f_{PWM} = 4 kHz, non-ventilated

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP71S	M_{pk}	Nm	7.67	9.34	11.5	13.6	16.5	18.2	19.2							
	n_N	min-1	2000	2000	2000	2000	2000	2000	2000							
	I_{max}	%	200	200	200	200	200	200	180							
CMP71M	M_{pk}	Nm			11.8	14.5	19	22.6	26.8	30.1	30.8					
	n_N	min-1			2000	2000	2000	2000	2000	2000	2000					
	I_{max}	%			200	200	200	200	200	200	164					
CMP71L	M_{pk}	Nm				16.3	22.1	27.4	34.8	41	44.7	46.9				
	n_N	min-1				2000	2000	2000	2000	2000	2000	2000				
	I_{max}	%				200	200	200	200	200	200	161				
CMP80S	M_{pk}	Nm					21.1	26.2	32.9	37.9	41.7	42.1				
	n_N	min-1					2000	2000	2000	2000	2000	2000				
	I_{max}	%					200	200	200	200	200	136				
CMP80M	M_{pk}	Nm						27.8	36.6	45.4	53	62.6				
	n_N	min-1						2000	2000	2000	2000	2000				
	I_{max}	%						200	200	200	200	197				
CMP80L	M_{pk}	Nm							40.6	52.3	64.7	87.2	102	107		
	n_N	min-1							2000	2000	2000	2000	2000	2000		
	I_{max}	%							200	200	200	200	200	157		
CMP100S	M_{pk}	Nm							35.9	45.5	54.6	67.5	68.3			
	n_N	min-1							2000	2000	2000	2000	2000			
	I_{max}	%							200	200	200	200	154			
CMP100M	M_{pk}	Nm							40	52	65	88.8	104	108		
	n_N	min-1							2000	2000	2000	2000	2000	2000		
	I_{max}	%							200	200	200	200	200	150		
CMP100L	M_{pk}	Nm									69	100	127	161	179	
	n_N	min-1									2000	2000	2000	2000	2000	
	I_{max}	%									200	200	200	200	182	
CMP112S	M_{pk}	Nm							39.7	51.4	63.6	85.1	88			
	n_N	min-1							2000	2000	2000	2000	2000			
	I_{max}	%							200	200	200	200	158			
CMP112M	M_{pk}	Nm								55.5	69.9	99.2	123	136		
	n_N	min-1								2000	2000	2000	2000	2000		
	I_{max}	%								200	200	200	200	161		
CMP112L	M_{pk}	Nm										103	133	180	224	225
	n_N	min-1										2000	2000	2000	2000	2000
	I_{max}	%										200	200	200	200	167
CMP112H	M_{pk}	Nm										104	137	190	240	270
	n_N	min-1										2000	2000	2000	2000	2000
	I_{max}	%										200	200	200	200	198

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP112E	M_{pk}	Nm											137	193	248	286
	n_N	min-1											2000	2000	2000	2000
	I_{max}	%											200	200	200	200

MOVIDRIVE® system/technology – 400 V, rated speed 3000 min-1, f_{PWM} = 4 kHz, non-ventilated

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP40S	M_{pk}	Nm	1.46	1.7	1.9											
	n_N	min-1	3000	3000	3000											
	I_{max}	%	200	200	189											
CMP40M	M_{pk}	Nm	2.96	3.44	3.8											
	n_N	min-1	3000	3000	3000											
	I_{max}	%	200	200	187											
CMP50S	M_{pk}	Nm	4.48	5.13	5.2											
	n_N	min-1	3000	3000	3000											
	I_{max}	%	200	200	160											
CMP50M	M_{pk}	Nm	5.42	6.54	7.93	9.26	10.3									
	n_N	min-1	3000	3000	3000	3000	3000									
	I_{max}	%	200	200	200	200	174									
CMP50L	M_{pk}	Nm	5.92	7.25	9	10.8	13.6	15.4								
	n_N	min-1	3000	3000	3000	3000	3000	3000								
	I_{max}	%	200	200	200	200	200	193								
CMP63S	M_{pk}	Nm	5.16	6.17	7.42	8.62	10.3	11.1								
	n_N	min-1	3000	3000	3000	3000	3000	3000								
	I_{max}	%	200	200	200	200	200	185								
CMP63M	M_{pk}	Nm		7.41	9.2	11.1	14.2	16.9	20.1	21.4						
	n_N	min-1		3000	3000	3000	3000	3000	3000	3000						
	I_{max}	%		200	200	200	200	200	200	173						
CMP63L	M_{pk}	Nm			9.26	11.4	15	18.4	23.2	27.8	30.4					
	n_N	min-1			3000	3000	3000	3000	3000	3000	3000					
	I_{max}	%			200	200	200	200	200	200	185					
CMP71S	M_{pk}	Nm			8.33	10.1	13	15.3	17.7	19.2						
	n_N	min-1			3000	3000	3000	3000	3000	3000						
	I_{max}	%			200	200	200	200	200	200						
CMP71M	M_{pk}	Nm					13.5	16.7	21.2	25.2	28.2	30.8				
	n_N	min-1					3000	3000	3000	3000	3000	3000				
	I_{max}	%					200	200	200	200	200	163				
CMP71L	M_{pk}	Nm						19.1	25.4	31.9	37.8	44.8	46.9			
	n_N	min-1						3000	3000	3000	3000	3000	3000			
	I_{max}	%						200	200	200	200	200	180			
CMP80S	M_{pk}	Nm						18.5	24.7	30.8	35.8	42.1				
	n_N	min-1						3000	3000	3000	3000	3000				
	I_{max}	%						200	200	200	200	198				
CMP80M	M_{pk}	Nm							26.3	33.8	41.5	54.1	61	62.6		
	n_N	min-1							3000	3000	3000	3000	3000	3000		
	I_{max}	%							200	200	200	200	200	149		
CMP80L	M_{pk}	Nm								35.9	45.3	64.7	80.7	99.7	107	
	n_N	min-1								3000	3000	3000	3000	3000	3000	
	I_{max}	%								200	200	200	200	200	174	

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP100S	M_{pk}	Nm								32.3	40.4	55.2	64.6	68.3		
	n_N	min-1								3000	3000	3000	3000	3000		
	I_{max}	%								200	200	200	200	158		
CMP100M	M_{pk}	Nm									45.4	65.8	82.7	103	108	
	n_N	min-1									3000	3000	3000	3000	3000	
	I_{max}	%									200	200	200	200	164	
CMP100L	M_{pk}	Nm										69.8	91.3	124	152	169
	n_N	min-1										3000	3000	3000	3000	3000
	I_{max}	%										200	200	200	200	200
CMP112S	M_{pk}	Nm									45.4	65	80.3	88		
	n_N	min-1									3000	3000	3000	3000		
	I_{max}	%									200	200	200	161		
CMP112M	M_{pk}	Nm										68.7	88.6	118	136	
	n_N	min-1										3000	3000	3000	3000	
	I_{max}	%										200	200	200	182	
CMP112L	M_{pk}	Nm											93.3	130	168	195
	n_N	min-1											3000	3000	3000	3000
	I_{max}	%											200	200	200	200
CMP112H	M_{pk}	Nm												133	174	205
	n_N	min-1												3000	3000	3000
	I_{max}	%												200	200	200
CMP112E	M_{pk}	Nm												135	179	212
	n_N	min-1												3000	3000	3000
	I_{max}	%												200	200	200

MOVIDRIVE® system/technology – 400 V, rated speed 4500 min-1, f_{PWM} = 4 kHz, non-ventilated

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP40S	M_{pk}	Nm	1.46	1.7	1.9											
	n_N	min-1	4500	4500	4500											
	I_{max}	%	200	200	189											
CMP40M	M_{pk}	Nm	2.96	3.44	3.8											
	n_N	min-1	4500	4500	4500											
	I_{max}	%	200	200	187											
CMP50S	M_{pk}	Nm	3.53	4.18	4.91	5.2										
	n_N	min-1	4500	4500	4500	4500										
	I_{max}	%	200	200	200	177										
CMP50M	M_{pk}	Nm	4.11	5.03	6.21	7.43	9.32	10.3								
	n_N	min-1	4500	4500	4500	4500	4500	4500								
	I_{max}	%	200	200	200	200	200	186								
CMP50L	M_{pk}	Nm	4.19	5.17	6.5	7.94	10.4	12.5	15.2	15.4						
	n_N	min-1	4500	4500	4500	4500	4500	4500	4500	4500						
	I_{max}	%	200	200	200	200	200	200	200	156						
CMP63S	M_{pk}	Nm	3.84	4.66	5.71	6.79	8.48	9.79	11.1							
	n_N	min-1	4500	4500	4500	4500	4500	4500	4500							
	I_{max}	%	200	200	200	200	200	200	192							
CMP63M	M_{pk}	Nm			6.45	7.88	10.4	12.6	15.8	18.8	21.3	21.4				
	n_N	min-1			4500	4500	4500	4500	4500	4500	4500	4500				
	I_{max}	%			200	200	200	200	200	200	200	134				

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP63L	M_{pk}	Nm				8.31	11.1	13.8	17.9	22.2	26.2	30.4				
	n_N	min-1				4500	4500	4500	4500	4500	4500	4500				
	I_{max}	%				200	200	200	200	200	200	173				
CMP112S	M_{pk}	Nm										45.2	58.7	77.8	88	
	n_N	min-1										4500	4500	4500	4500	
	I_{max}	%										200	200	200	180	
CMP112M	M_{pk}	Nm											62.4	86.5	110	126
	n_N	min-1											4500	4500	4500	4500
	I_{max}	%											200	200	200	200
CMP112L	M_{pk}	Nm												89.7	118	140
	n_N	min-1												4500	4500	4500
	I_{max}	%												200	200	200
CMP112H	M_{pk}	Nm													118	141
	n_N	min-1													4500	4500
	I_{max}	%													200	200
CMP112E	M_{pk}	Nm													121	146
	n_N	min-1													4500	4500
	I_{max}	%													200	200

3.5.7 Motor-inverter assignments CMP.. motors, 400 V, f_{PWM} = 8 kHz

Key

I_N	Nominal output current of the inverter
I_{max}	Maximum output current of inverter
M_{pk}	Peak torque of the motor
n_{base}	Base speed of the motor

MOVIDRIVE® system/technology – 400 V, rated speed 2000 min-1, f_{PWM} = 8 kHz, non-ventilated

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP71S	M_{pk}	Nm	7.67	9.34	11.5	13.6	16.5	18.2	19.2							
	n_N	min-1	2000	2000	2000	2000	2000	2000	2000							
	I_{max}	%	200	200	200	200	200	200	180							
CMP71M	M_{pk}	Nm			11.8	14.5	19	22.6	26.8	30.1	30.8					
	n_N	min-1			2000	2000	2000	2000	2000	2000	2000					
	I_{max}	%			200	200	200	200	200	200	164					
CMP71L	M_{pk}	Nm				16.3	22.1	27.4	34.8	41	44.7	46.9				
	n_N	min-1				2000	2000	2000	2000	2000	2000	2000				
	I_{max}	%				200	200	200	200	200	200	161				
CMP80S	M_{pk}	Nm					21.1	26.2	32.9	37.9	41.7	42.1				
	n_N	min-1					2000	2000	2000	2000	2000	2000				
	I_{max}	%					200	200	200	200	200	136				
CMP80M	M_{pk}	Nm						27.8	36.6	45.4	53	62.6				
	n_N	min-1						2000	2000	2000	2000	2000				
	I_{max}	%						200	200	200	200	197				
CMP80L	M_{pk}	Nm							40.6	52.3	64.7	87.2	102	107		
	n_N	min-1							2000	2000	2000	2000	2000	2000		
	I_{max}	%							200	200	200	200	200	157		
CMP100S	M_{pk}	Nm							35.9	45.5	54.6	67.5	68.3			
	n_N	min-1							2000	2000	2000	2000	2000			
	I_{max}	%							200	200	200	200	154			
CMP100M	M_{pk}	Nm							40	52	65	88.8	104	108		
	n_N	min-1							2000	2000	2000	2000	2000	2000		
	I_{max}	%							200	200	200	200	200	150		
CMP100L	M_{pk}	Nm									69	100	127	161	179	
	n_N	min-1									2000	2000	2000	2000	2000	
	I_{max}	%									200	200	200	200	182	
CMP112S	M_{pk}	Nm							39.7	51.4	63.6	85.1	88			
	n_N	min-1							2000	2000	2000	2000	2000			
	I_{max}	%							200	200	200	200	158			
CMP112M	M_{pk}	Nm								55.5	69.9	99.2	123	136		
	n_N	min-1								2000	2000	2000	2000	2000		
	I_{max}	%								200	200	200	200	161		
CMP112L	M_{pk}	Nm										103	133	180	224	225
	n_N	min-1										2000	2000	2000	2000	2000
	I_{max}	%										200	200	200	200	167
CMP112H	M_{pk}	Nm										104	137	190	240	270
	n_N	min-1										2000	2000	2000	2000	2000
	I_{max}	%										200	200	200	200	198

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP112E	M_{pk}	Nm											137	193	248	286
	n_N	min-1											2000	2000	2000	2000
	I_{max}	%											200	200	200	200

MOVIDRIVE® system/technology – 400 V, rated speed 3000 min-1, f_{PWM} = 8 kHz, non-ventilated

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP40S	M_{pk}	Nm	1.46	1.7	1.9											
	n_N	min-1	3000	3000	3000											
	I_{max}	%	200	200	189											
CMP40M	M_{pk}	Nm	2.96	3.44	3.8											
	n_N	min-1	3000	3000	3000											
	I_{max}	%	200	200	187											
CMP50S	M_{pk}	Nm	4.48	5.13	5.2											
	n_N	min-1	3000	3000	3000											
	I_{max}	%	200	200	160											
CMP50M	M_{pk}	Nm	5.42	6.54	7.93	9.26	10.3									
	n_N	min-1	3000	3000	3000	3000	3000									
	I_{max}	%	200	200	200	200	174									
CMP50L	M_{pk}	Nm	5.92	7.25	9	10.8	13.6	15.4								
	n_N	min-1	3000	3000	3000	3000	3000	3000								
	I_{max}	%	200	200	200	200	200	193								
CMP63S	M_{pk}	Nm	5.16	6.17	7.42	8.62	10.3	11.1								
	n_N	min-1	3000	3000	3000	3000	3000	3000								
	I_{max}	%	200	200	200	200	200	185								
CMP63M	M_{pk}	Nm		7.41	9.2	11.1	14.2	16.9	20.1	21.4						
	n_N	min-1		3000	3000	3000	3000	3000	3000	3000						
	I_{max}	%		200	200	200	200	200	200	173						
CMP63L	M_{pk}	Nm			9.26	11.4	15	18.4	23.2	27.8	30.4					
	n_N	min-1			3000	3000	3000	3000	3000	3000	3000					
	I_{max}	%			200	200	200	200	200	200	185					
CMP71S	M_{pk}	Nm			8.33	10.1	13	15.3	17.7	19.2						
	n_N	min-1			3000	3000	3000	3000	3000	3000						
	I_{max}	%			200	200	200	200	200	200						
CMP71M	M_{pk}	Nm					13.5	16.7	21.2	25.2	28.2	30.8				
	n_N	min-1					3000	3000	3000	3000	3000	3000				
	I_{max}	%					200	200	200	200	200	163				
CMP71L	M_{pk}	Nm						19.1	25.4	31.9	37.8	44.8	46.9			
	n_N	min-1						3000	3000	3000	3000	3000	3000			
	I_{max}	%						200	200	200	200	200	180			
CMP80S	M_{pk}	Nm						18.5	24.7	30.8	35.8	42.1				
	n_N	min-1						3000	3000	3000	3000	3000				
	I_{max}	%						200	200	200	200	198				
CMP80M	M_{pk}	Nm							26.3	33.8	41.5	54.1	61	62.6		
	n_N	min-1							3000	3000	3000	3000	3000	3000		
	I_{max}	%							200	200	200	200	200	149		
CMP80L	M_{pk}	Nm								35.9	45.3	64.7	80.7	99.7	107	
	n_N	min-1								3000	3000	3000	3000	3000	3000	
	I_{max}	%								200	200	200	200	200	174	

28487486/EN – 02/2019

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP100S	M_{pk}	Nm								32.3	40.4	55.2	64.6	68.3		
	n_N	min-1								3000	3000	3000	3000	3000		
	I_{max}	%								200	200	200	200	158		
CMP100M	M_{pk}	Nm									45.4	65.8	82.7	103	108	
	n_N	min-1									3000	3000	3000	3000	3000	
	I_{max}	%									200	200	200	200	164	
CMP100L	M_{pk}	Nm										69.8	91.3	124	152	169
	n_N	min-1										3000	3000	3000	3000	3000
	I_{max}	%										200	200	200	200	200
CMP112S	M_{pk}	Nm									45.4	65	80.3	88		
	n_N	min-1									3000	3000	3000	3000		
	I_{max}	%									200	200	200	161		
CMP112M	M_{pk}	Nm										68.7	88.6	118	136	
	n_N	min-1										3000	3000	3000	3000	
	I_{max}	%										200	200	200	182	
CMP112L	M_{pk}	Nm											93.3	130	168	195
	n_N	min-1											3000	3000	3000	3000
	I_{max}	%											200	200	200	200
CMP112H	M_{pk}	Nm												133	174	205
	n_N	min-1												3000	3000	3000
	I_{max}	%												200	200	200
CMP112E	M_{pk}	Nm												135	179	212
	n_N	min-1												3000	3000	3000
	I_{max}	%												200	200	200

MOVIDRIVE® system/technology – 400 V, rated speed 4500 min-1, f_{PWM} = 8 kHz, non-ventilated

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP40S	M_{pk}	Nm	1.46	1.7	1.9											
	n_N	min-1	4500	4500	4500											
	I_{max}	%	200	200	189											
CMP40M	M_{pk}	Nm	2.96	3.44	3.8											
	n_N	min-1	4500	4500	4500											
	I_{max}	%	200	200	187											
CMP50S	M_{pk}	Nm	3.53	4.18	4.91	5.2										
	n_N	min-1	4500	4500	4500	4500										
	I_{max}	%	200	200	200	177										
CMP50M	M_{pk}	Nm	4.11	5.03	6.21	7.43	9.32	10.3								
	n_N	min-1	4500	4500	4500	4500	4500	4500								
	I_{max}	%	200	200	200	200	200	186								
CMP50L	M_{pk}	Nm	4.19	5.17	6.5	7.94	10.4	12.5	15.2	15.4						
	n_N	min-1	4500	4500	4500	4500	4500	4500	4500	4500						
	I_{max}	%	200	200	200	200	200	200	200	156						
CMP63S	M_{pk}	Nm	3.84	4.66	5.71	6.79	8.48	9.79	11.1							
	n_N	min-1	4500	4500	4500	4500	4500	4500	4500							
	I_{max}	%	200	200	200	200	200	200	192							
CMP63M	M_{pk}	Nm			6.45	7.88	10.4	12.6	15.8	18.8	21.3	21.4				
	n_N	min-1			4500	4500	4500	4500	4500	4500	4500	4500				
	I_{max}	%			200	200	200	200	200	200	200	134				

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP63L	M_{pk}	Nm				8.31	11.1	13.8	17.9	22.2	26.2	30.4				
	n_N	min-1				4500	4500	4500	4500	4500	4500	4500				
	I_{max}	%				200	200	200	200	200	200	173				
CMP71S	M_{pk}	Nm					9.43	11.5	14.4	16.8	18.5	19.2				
	n_N	min-1					4500	4500	4500	4500	4500	4500				
	I_{max}	%					200	200	200	200	200	155				
CMP71M	M_{pk}	Nm						11.9	15.6	19.6	23.3	28.5	30.8			
	n_N	min-1						4500	4500	4500	4500	4500	4500			
	I_{max}	%						200	200	200	200	200	179			
CMP71L	M_{pk}	Nm							17.4	22.5	28	37.8	43.3	46.9		
	n_N	min-1							4500	4500	4500	4500	4500	4500		
	I_{max}	%							200	200	200	200	200	188		
CMP80S	M_{pk}	Nm								21.4	26.7	35.4	39.8	42.1		
	n_N	min-1								4500	4500	4500	4500	4500		
	I_{max}	%								200	200	200	200	158		
CMP80M	M_{pk}	Nm								23.2	29.3	41.5	50.7	60	62.6	
	n_N	min-1								4500	4500	4500	4500	4500	4500	
	I_{max}	%								200	200	200	200	200	166	
CMP80L	M_{pk}	Nm										45.8	59.2	79	95.1	104
	n_N	min-1										4500	4500	4500	4500	4500
	I_{max}	%										200	200	200	200	200
CMP100S	M_{pk}	Nm										39.8	50.3	62.9	68.3	
	n_N	min-1										4500	4500	4500	4500	
	I_{max}	%										200	200	200	179	
CMP100M	M_{pk}	Nm										44.9	58.7	79.5	96.7	107
	n_N	min-1										4500	4500	4500	4500	4500
	I_{max}	%										200	200	200	200	200
CMP100L	M_{pk}	Nm											62.3	87.8	114	132
	n_N	min-1											4500	4500	4500	4500
	I_{max}	%											200	200	200	200
CMP112S	M_{pk}	Nm										45.2	58.7	77.8	88	
	n_N	min-1										4500	4500	4500	4500	
	I_{max}	%										200	200	200	180	
CMP112M	M_{pk}	Nm											62.4	86.5	110	126
	n_N	min-1											4500	4500	4500	4500
	I_{max}	%											200	200	200	200
CMP112L	M_{pk}	Nm												89.7	118	140
	n_N	min-1												4500	4500	4500
	I_{max}	%												200	200	200
CMP112H	M_{pk}	Nm													118	141
	n_N	min-1													4500	4500
	I_{max}	%													200	200
CMP112E	M_{pk}	Nm													121	146
	n_N	min-1													4500	4500
	I_{max}	%													200	200

MOVIDRIVE® system/technology – 400 V, rated speed 6000 min-1, f_{PWM} = 8 kHz, non-ventilated

Inverter			0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
	I_N	A	2	2.5	3.2	4	5.5	7	9.5	12.5	16	24	32	46	62	75
	I_{max}	A	4	5	6.4	8	11	14	19	25	32	48	64	92	124	150
Motor																
CMP40S	M_{pk}	Nm	1.46	1.7	1.9											
	n_N	min-1	6000	6000	6000											
	I_{max}	%	200	200	189											
CMP40M	M_{pk}	Nm	2.64	3.12	3.64	3.8										
	n_N	min-1	6000	6000	6000	6000										
	I_{max}	%	200	200	200	173										
CMP50S	M_{pk}	Nm	2.88	3.46	4.16	4.83	5.2									
	n_N	min-1	6000	6000	6000	6000	6000									
	I_{max}	%	200	200	200	200	166									
CMP50M	M_{pk}	Nm	3.2	3.94	4.92	5.96	7.7	9.14	10.3							
	n_N	min-1	6000	6000	6000	6000	6000	6000	6000							
	I_{max}	%	200	200	200	200	200	200	180							
CMP50L	M_{pk}	Nm		3.94	4.98	6.13	8.16	10	12.7	15.1	15.4					
	n_N	min-1		6000	6000	6000	6000	6000	6000	6000	6000					
	I_{max}	%		200	200	200	200	200	200	200	163					
CMP63S	M_{pk}	Nm		3.77	4.67	5.61	7.17	8.46	10.1	11.1						
	n_N	min-1		6000	6000	6000	6000	6000	6000	6000						
	I_{max}	%		200	200	200	200	200	200	186						
CMP63M	M_{pk}	Nm				6.27	8.34	10.3	13.1	16	18.7	21.4				
	n_N	min-1				6000	6000	6000	6000	6000	6000	6000				
	I_{max}	%				200	200	200	200	200	200	173				
CMP63L	M_{pk}	Nm					8.5	10.6	13.9	17.6	21.4	28.1	30.4			
	n_N	min-1					6000	6000	6000	6000	6000	6000	6000			
	I_{max}	%					200	200	200	200	200	200	175			
CMP71S	M_{pk}	Nm					7.44	9.21	11.9	14.5	16.7	19.1	19.2			
	n_N	min-1					6000	6000	6000	6000	6000	6000	6000			
	I_{max}	%					200	200	200	200	200	200	152			
CMP71M	M_{pk}	Nm							12	15.4	18.9	24.9	28.5	30.8		
	n_N	min-1							6000	6000	6000	6000	6000	6000		
	I_{max}	%							200	200	200	200	200	167		
CMP71L	M_{pk}	Nm								17.2	21.7	30.9	37.8	44.3	46.9	
	n_N	min-1								6000	6000	6000	6000	6000	6000	
	I_{max}	%								200	200	200	200	200	185	
CMP80S	M_{pk}	Nm								16.6	21.1	29.8	35.8	41.4	42.1	
	n_N	min-1								6000	6000	6000	6000	6000	6000	
	I_{max}	%								200	200	200	200	200	153	
CMP80M	M_{pk}	Nm									22.6	33	42	53.3	60.6	62.6
	n_N	min-1									6000	6000	6000	6000	6000	6000
	I_{max}	%									200	200	200	200	200	180
CMP80L	M_{pk}	Nm										34.5	45.3	62.5	78.9	89.4
	n_N	min-1										6000	6000	6000	6000	6000
	I_{max}	%										200	200	200	200	200

28487486/EN – 02/2019

3.5.8 Motor-inverter assignments CMP.. motors, 230 V, f_{PWM} = 4 kHz

MOVIDRIVE® system/technology – 230 V, rated speed 4500 min-1, non-ventilated

Motor			0070	0093	0140	0213	0290	0420	0570
	I_N	A	7	9.3	14	21.3	29	42	57
	I_{max}	A	14	18.6	28	42.3	58	84	114
CMP50S	M_{pk}	Nm	5.2						
	n_N	min-1	4500						
	I_{max}	%	176						
CMP50M	M_{pk}	Nm	7.43	9.11	10.3				
	n_N	min-1	4500	4500	4500				
	I_{max}	%	200	200	163				
CMP50L	M_{pk}	Nm	7.92	10.1	13.7	15.4			
	n_N	min-1	4500	4500	4500	4500			
	I_{max}	%	200	200	200	161			
CMP63S	M_{pk}	Nm	6.88	8.39	10.6	11.1			
	n_N	min-1	4500	4500	4500	4500			
	I_{max}	%	200	200	200	147			
CMP63M	M_{pk}	Nm	7.64	9.79	13.6	18.2	21.3	21.4	
	n_N	min-1	4500	4500	4500	4500	4500	4500	
	I_{max}	%	200	200	200	200	200	139	
CMP63L	M_{pk}	Nm	8.35	10.9	15.6	21.8	26.9	30.4	
	n_N	min-1	4500	4500	4500	4500	4500	4500	
	I_{max}	%	200	200	200	200	200	172	

28487486/EN – 02/2019

3.5.9 Motor-inverter assignments CMP.. motors, 230 V, f_{PWM} = 8 kHz

MOVIDRIVE® system/technology – 230 V, rated speed 3000 min-1, non-ventilated

Motor			0070	0093	0140	0213	0290	0420	0570
	I_N	A	7	9.3	14	21.3	29	42	57
	I_{max}	A	14	18.6	28	42.3	58	84	114
CMP40S	M_{pk}	Nm	1.9						
	n_N	min-1	3000						
	I_{max}	%	110						
CMP40M	M_{pk}	Nm	3.8						
	n_N	min-1	3000						
	I_{max}	%	171						
CMP50S	M_{pk}	Nm	5.2						
	n_N	min-1	3000						
	I_{max}	%	159						
CMP50M	M_{pk}	Nm	8.06	9.49	10.3				
	n_N	min-1	3000	3000	3000				
	I_{max}	%	200	200	173				
CMP50L	M_{pk}	Nm	8.81	10.7	13.3	15.4			
	n_N	min-1	3000	3000	3000	3000			
	I_{max}	%	200	200	200	170			
CMP63S	M_{pk}	Nm	7.57	8.88	10.4	11.1			
	n_N	min-1	3000	3000	3000	3000			
	I_{max}	%	200	200	200	154			
CMP63M	M_{pk}	Nm	9.04	11.1	13.9	18.3	21.4		
	n_N	min-1	3000	3000	3000	3000	3000		
	I_{max}	%	200	200	200	200	178		
CMP63L	M_{pk}	Nm	8.95	11.2	14.4	20.1	27	30.4	
	n_N	min-1	3000	3000	3000	3000	3000	3000	
	I_{max}	%	200	200	200	200	200	182	
CMP71S	M_{pk}	Nm	8.12	10	12.6	16.4	19	19.2	
	n_N	min-1	3000	3000	3000	3000	3000	3000	
	I_{max}	%	200	200	200	200	200	152	
CMP71M	M_{pk}	Nm			13.1	18.6	24.9	28.6	30.8
	n_N	min-1			3000	3000	3000	3000	3000
	I_{max}	%			200	200	200	200	163
CMP71L	M_{pk}	Nm				21.3	30.7	38.2	44.6
	n_N	min-1				3000	3000	3000	3000
	I_{max}	%				200	200	200	200
CMP80S	M_{pk}	Nm				20.8	29.9	36.2	42.1
	n_N	min-1				3000	3000	3000	3000
	I_{max}	%				200	200	200	200
CMP80M	M_{pk}	Nm					33	42.6	54.1
	n_N	min-1					3000	3000	3000
	I_{max}	%					200	200	200
CMP80L	M_{pk}	Nm					35.2	47	65
	n_N	min-1					3000	3000	3000
	I_{max}	%					200	200	200
CMP100S	M_{pk}	Nm					31.7	41.8	55.3
	n_N	min-1					3000	3000	3000
	I_{max}	%					200	200	200
CMP100M	M_{pk}	Nm						44.9	63.2
	n_N	min-1						3000	3000
	I_{max}	%						200	200

28487486/EN – 02/2019

Motor			0070	0093	0140	0213	0290	0420	0570
	I_N	A	7	9.3	14	21.3	29	42	57
	I_{max}	A	14	18.6	28	42.3	58	84	114
CMP100L	M_{pk}	Nm							67.9
	n_N	min-1							3000
	I_{max}	%							200

MOVIDRIVE® system/technology – 230 V, rated speed 4500 min-1, non-ventilated

Motor			0070	0093	0140	0213	0290	0420	0570
	I_N	A	7	9.3	14	21.3	29	42	57
	I_{max}	A	14	18.6	28	42.3	58	84	114
CMP40S	M_{pk}	Nm	1.9						
	n_N	min-1	4500						
	I_{max}	%	110						
CMP40M	M_{pk}	Nm	3.8						
	n_N	min-1	4500						
	I_{max}	%	171						
CMP50S	M_{pk}	Nm	4.88	5.2					
	n_N	min-1	4500	4500					
	I_{max}	%	200	176					
CMP50M	M_{pk}	Nm	6.12	7.43	9.11	10.3			
	n_N	min-1	4500	4500	4500	4500			
	I_{max}	%	200	200	200	163			
CMP50L	M_{pk}	Nm	6.37	7.92	10.1	13.7	15.4		
	n_N	min-1	4500	4500	4500	4500	4500		
	I_{max}	%	200	200	200	200	161		
CMP63S	M_{pk}	Nm	5.71	6.88	8.39	10.6	11.1		
	n_N	min-1	4500	4500	4500	4500	4500		
	I_{max}	%	200	200	200	200	147		
CMP63M	M_{pk}	Nm	6.15	7.64	9.79	13.6	18.2	21.3	21.4
	n_N	min-1	4500	4500	4500	4500	4500	4500	4500
	I_{max}	%	200	200	200	200	200	200	139
CMP63L	M_{pk}	Nm		8.35	10.9	15.6	21.8	26.9	30.4
	n_N	min-1		4500	4500	4500	4500	4500	4500
	I_{max}	%		200	200	200	200	200	172
CMP71S	M_{pk}	Nm			9.12	12.7	16.6	18.6	19.2
	n_N	min-1			4500	4500	4500	4500	4500
	I_{max}	%			200	200	200	200	156
CMP71M	M_{pk}	Nm				13.3	19.1	23.7	28.4
	n_N	min-1				4500	4500	4500	4500
	I_{max}	%				200	200	200	200
CMP71L	M_{pk}	Nm					21.9	28.7	37.7
	n_N	min-1					4500	4500	4500
	I_{max}	%					200	200	200
CMP80S	M_{pk}	Nm					20.7	27.3	35.2
	n_N	min-1					4500	4500	4500
	I_{max}	%					200	200	200
CMP80M	M_{pk}	Nm					22.6	30.2	41.5
	n_N	min-1					4500	4500	4500
	I_{max}	%					200	200	200
CMP80L	M_{pk}	Nm							44.6
	n_N	min-1							4500
	I_{max}	%							200
CMP100S	M_{pk}	Nm							38.5
	n_N	min-1							4500
	I_{max}	%							200
CMP100M	M_{pk}	Nm							43.4
	n_N	min-1							4500
	I_{max}	%							200

28487486/EN – 02/2019

MOVIDRIVE® system/technology – 230 V, rated speed 6000 min-1, non-ventilated

Motor			0070	0093	0140	0213	0290	0420	0570
	I_N	A	7	9.3	14	21.3	29	42	57
	I_{max}	A	14	18.6	28	42.3	58	84	114
CMP40S	M_{pk}	Nm	1.9						
	n_N	min-1	6000						
	I_{max}	%	125						
CMP40M	M_{pk}	Nm	3.62	3.8					
	n_N	min-1	6000	6000					
	I_{max}	%	200	172					
CMP50S	M_{pk}	Nm	4.01	4.72	5.2				
	n_N	min-1	6000	6000	6000				
	I_{max}	%	200	200	177				
CMP50M	M_{pk}	Nm	4.87	6	7.54	9.96	10.3		
	n_N	min-1	6000	6000	6000	6000	6000		
	I_{max}	%	200	200	200	200	140		
CMP50L	M_{pk}	Nm	4.76	5.97	7.72	10.9	14.6	15.4	
	n_N	min-1	6000	6000	6000	6000	6000	6000	
	I_{max}	%	200	200	200	200	200	162	
CMP63S	M_{pk}	Nm	4.62	5.63	7.02	9.22	11.1		
	n_N	min-1	6000	6000	6000	6000	6000		
	I_{max}	%	200	200	200	200	190		
CMP63M	M_{pk}	Nm		6.33	8.16	11.5	15.9	19.2	21.4
	n_N	min-1		6000	6000	6000	6000	6000	6000
	I_{max}	%		200	200	200	200	200	171
CMP71S	M_{pk}	Nm				10.2	14.1	16.8	19.1
	n_N	min-1				6000	6000	6000	6000
	I_{max}	%				200	200	200	200
CMP71M	M_{pk}	Nm					14.8	19.1	24.7
	n_N	min-1					6000	6000	6000
	I_{max}	%					200	200	200
CMP80S	M_{pk}	Nm						21.6	29.6
	n_N	min-1						6000	6000
	I_{max}	%						200	200
CMP80M	M_{pk}	Nm						23.1	32.6
	n_N	min-1						6000	6000
	I_{max}	%						200	200
CMP80L	M_{pk}	Nm							33.3
	n_N	min-1							6000
	I_{max}	%							200

28487486/EN – 02/2019

3.6 Selection of an application inverter

The selection of the application inverter is based on the course of the output current over time. The required current has to be determined from the required torque characteristic of the connected motor.

The application inverters are dimensioned for a nominal output current I_N. In many applications, there is a demand for short-time overload operation. For this purpose, the application inverters can be operated with up to 200% of the nominal output current for a short period of time.

For overload operation, make sure that the application inverter is not thermally overloaded. For protection of the power components, application inverters have various monitoring mechanisms.

The following thermal monitoring functions are available:

- Dynamic utilization

  The periodic current load of the switching power semiconductors lets them heat and cool down cyclically. Due to the different thermal time constants, large temperature differences can occur between power semiconductor and heat sink. Dynamic utilization monitors the permitted temperature of the barrier layer of the power semiconductors.

- Thermal capacity utilization

  The power semiconductors are limited by the maximally permitted temperature during operation. Thermal utilization monitors the heat sink temperature of the power semiconductors.

- Electromechanical utilization (I^2t utilization)

  Electromechanical utilization protects the components that have a large thermal time constant compared to the power semiconductors.

Due to the complexity of the utilization curves, the calculation can only be performed using software. The SEW-Workbench software offers supports for dimensioning an application inverter.

For a rough selection of the application inverter without using software, characteristic load cycles are given in the following section.

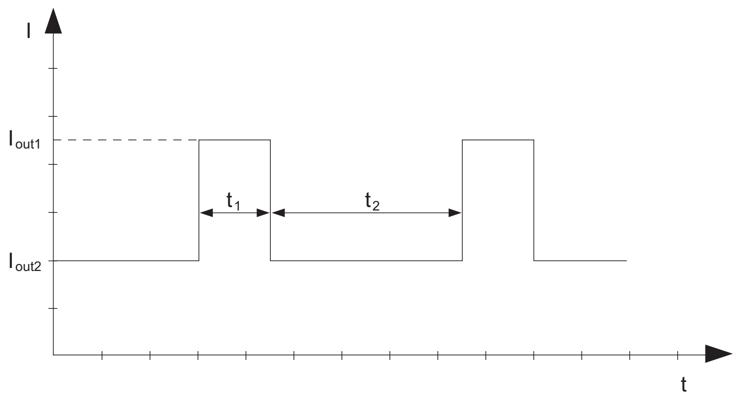
The characteristic load cycle consists of a load and a load relief period. In the load relief period, the output current must not exceed the specified value. After this load relief period, overload is possible again.

28487486/EN – 02/2019

3.6.1 Overload capacity

Load cycle with base load current – typical for the selection of asynchronous and servomotors

The characteristic load cycle consists of a load and a load relief period. In the load relief period, the output current must not exceed the specified value. After this load relief period, overload is possible again.



18014415982173963

Examples of permitted current profiles

Overload capacity at f_{PWM} = 4 kHz, f_A ≥ 3 Hz

This table applies to all inverters except for MDX9_A-0750-5_3-..

Overload current $I_{out\,1}/I_N$	Overload time t_1	Base load current $I_{out\,2}/I_N$	Required pause interval t_2
200%	3 s	50%	7 s
200%	3 s	100%	17 s
150%	60 s	100%	60 s
150%	60 s	50%	30 s

This table applies to the following inverters:

- MDX9_A-0750-5_3-...

Overload current $I_{out\,1}/I_N$	Overload time t_1	Base load current $I_{out\,2}/I_N$	Required pause interval t_2
200%	3 s	50%	7 s
200%	3 s	100%	17 s
150%	60 s	25%	60 s

3

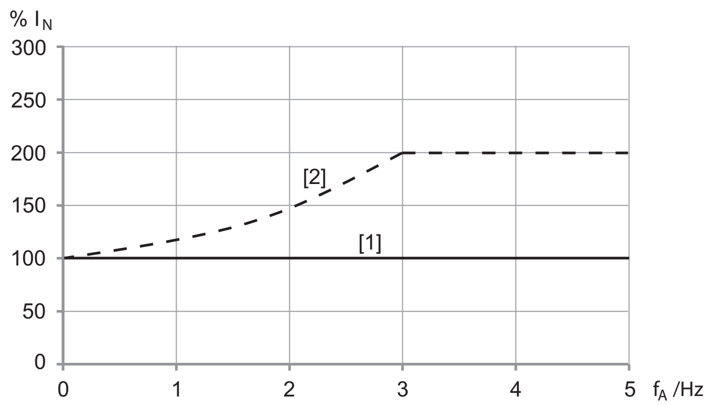
3.6.2 Derating

Due to the following operating and ambient conditions, a reduction of the output current may be necessary.

Derating due to the rotary field frequency

The specified nominal output current I_N of the application inverter is the rms value. The increased load on the power semiconductors has to be considered especially for slow rotating fields and rotating fields at standstill. In case of a rotating field at standstill, direct current that can correspond to the peak value of the sine current depending on the phase position is flowing.

It is particularly important to consider output frequencies f_2 < 3 Hz.



17414498315

[1] Continuous output current at f_{PWM} = 4 kHz

[2] Temporary overload current

Derating due to the installation altitude

SEW-EURODRIVE frequency inverters are designed for overvoltage category III and for altitudes up to 2000 m according to EN 61800-5-1. The air pressure and the air density decrease depending on the installation altitude. This leads to a reduced cooling capacity and to a reduced electrical isolation effect of the air.

Up to h < 1000 m: without restrictions.

The following restrictions apply to heights ≥ 1000 m:

- From 1000 m to max. 3800 m: I_N reduction by 1% per 100 m
- From 2000 m to max. 3800 m: To maintain protective separation and the air gaps and creepage distances according to EN 61800-5-1, you have to connect an overvoltage protection device in order to reduce the overvoltages from category III to category II.

28487486/EN – 02/2019

Derating due to line voltage and temperature

Derating depending on the line voltage V_{line} and the ambient temperature T:

Inverter	f_{PWM}	U_{line}: 3 × 400 V	U_{line}: 3 x 500 V
		Continuous current I_{cont}	
MDX9_A-0020 – 0040-...-5_3-..	4 kHz	I_{cont}/I_N = 125% – (T – 40 °C) × 2.5%	I_{cont}/I_N = 114% – (T – 40 °C) × 2.3%
	8 kHz	I_{cont}/I_N = 94% – (T – 40 °C) × 2.15%	I_{cont}/I_N = 81% – (T – 40 °C) × 1.85%
	16 kHz	I_{cont}/I_N = 63% – (T – 40 °C) × 1.5%	I_{cont}/I_N = 50% – (T – 40 °C) × 1.7%
MDX9_A-0055 – 0095-...-5_3-..	4 kHz	I_{cont}/I_N = 132% – (T – 40 °C) × 2.65%	I_{cont}/I_N = 128% – (T – 40 °C) × 2.55%
	8 kHz	I_{cont}/I_N = 99% – (T – 40 °C) × 2.25%	I_{cont}/I_N = 96% – (T – 40 °C) × 2.2%
	16 kHz	I_{cont}/I_N = 66% – (T – 40 °C) × 1.6%	I_{cont}/I_N = 64% – (T – 40 °C) × 1.55%
MDX9_A-0125 – 0160-...-5_3-..	4 kHz	I_{cont}/I_N = 128% – (T – 40 °C) × 2.55%	I_{cont}/I_N = 116% – (T – 40 °C) × 2.35%
	8 kHz	I_{cont}/I_N = 96% – (T – 40 °C) × 2.2%	I_{cont}/I_N = 83% – (T – 40 °C) × 1.9%
	16 kHz	I_{cont}/I_N = 64% – (T – 40 °C) × 1.55%	I_{cont}/I_N = 51% – (T – 40 °C) × 1.7%
MDX9_A-0240 – 0320-...-5_3-..	4 kHz	I_{cont}/I_N = 133% – (T – 40 °C) × 2.65%	I_{cont}/I_N = 121% – (T – 40 °C) × 2.45%
	8 kHz	I_{cont}/I_N = 100% – (T – 40 °C) × 2.25%	I_{cont}/I_N = 87% – (T – 40 °C) × 2%
	16 kHz	I_{cont}/I_N = 67% – (T – 40 °C) × 1.6%	I_{cont}/I_N = 53% – (T – 40 °C) × 1.8%
MDX9_A-0460 – 0750-...-5_3-..	4 kHz	I_{cont}/I_N = 121% – (T – 40 °C) × 2.4%	I_{cont}/I_N = 110% – (T – 40 °C) × 2.25%
	8 kHz	I_{cont}/I_N = 91% – (T – 40 °C) × 2.05%	I_{cont}/I_N = 79% – (T – 40 °C) × 1.85%
	16 kHz	I_{cont}/I_N = 51% – (T – 40 °C) × 1.6%	I_{cont}/I_N = 41% – (T – 40 °C) × 1.55%
MDX91A-0910 – 1490-5_3-..,	4 kHz	I_{cont}/I_N = 119% – (T – 40 °C) × 2.4%	I_{cont}/I_N = 108% – (T – 40 °C) × 2.2%
	8 kHz	I_{cont}/I_N = 89% – (T – 40 °C) × 2%	I_{cont}/I_N = 77% – (T – 40 °C) × 1.75%
	16 kHz	I_{cont}/I_N = 59% – (T – 40 °C) × 1.4%	I_{cont}/I_N = 48% – (T – 40 °C) × 1.65%

Inverter	f_{PWM}	U_{line}: 3 × 230 V
		Continuous current I_{cont}
MDX9_A-0070 – 0093-...-2_3-..	4 kHz	I_{cont}/I_N = 132% – (T – 40 °C) × 2.65%
	8 kHz	I_{cont}/I_N = 99% – (T – 40 °C) × 2.25%
	16 kHz	I_{cont}/I_N = 66% – (T – 40 °C) × 1.6%
MDX9_A-0140-...-2_3-..	4 kHz	I_{cont}/I_N = 128% – (T – 40 °C) × 2.55%
	8 kHz	I_{cont}/I_N = 96% – (T – 40 °C) × 2.2%
	16 kHz	I_{cont}/I_N = 64% – (T – 40 °C) × 1.55%
MDX9_A-0213 – 0290...-2_3-..	4 kHz	I_{cont}/I_N = 133% – (T – 40 °C) × 2.65%
	8 kHz	I_{cont}/I_N = 100% – (T – 40 °C) × 2.25%
	16 kHz	I_{cont}/I_N = 67% – (T – 40 °C) × 1.6%
MDX9_A-0420 – 0570...-2_3-..	4 kHz	I_{cont}/I_N = 121% – (T – 40 °C) × 2.4%
	8 kHz	I_{cont}/I_N = 91% – (T – 40 °C) × 2.05%
	16 kHz	I_{cont}/I_N = 51% – (T – 40 °C) × 1.6%
MDX91A-0840 – 1080...-2_3-..	4 kHz	I_{cont}/I_N = 119% – (T – 40 °C) × 2.4%
	8 kHz	I_{cont}/I_N = 89% – (T – 40 °C) × 2%
	16 kHz	I_{cont}/I_N = 59% – (T – 40 °C) × 1.4%

28487486/EN – 02/2019

3.7 Braking resistor selection

3.7.1 Tables of braking resistors

The following braking resistors are intended for use with MOVIDRIVE® system. The technical data is valid in the temperature range -20 °C to +40 °C.

Information on ambient temperature

For ambient temperatures of more than +40°C, the continuous power must be reduced by 4% for every 10 K. The tripping current must be reduced by 2% for every 10 K. Do not exceed a maximum ambient temperature of 80 °C.

Braking resistors

Braking resistor type BR..		Unit	BR120-001	BR100-001	BR100-002	BR100-006-T
Part number			18176011	08281718	08281653	18204198
Peak braking power		kW		6.9		
Continuous braking power	100% cdf	kW	0.1	0.1	0.2	0.6
Current-carrying capacity	50% cdf	kW	0.18	0.15	0.3	1.1
	25% cdf	kW	0.3	0.3	0.6	1.9
	12% cdf	kW	0.54	0.5	1	3.6
	6% cdf	kW	0.9	0.9	1.8	5.7
			Observe the regenerative power limit of the inverter. (See the chapter "Technical data of basic device" (→ 🗎 41): Peak power brake chopper 200% × apparent output power × 0.9)			
Resistance R_{BR}		Ω	117		100 ± 10%	
Tripping current I_{trip}		A	–	0.8	1	2.4

Braking resistor type BR..		Unit	BR047-010-T	BR147-T	BR247-T	BR027-016-T	BR027-024-T	BR027-042-T
Part number			17983207	18201342	18200842	17983215	17983231	19155301
Peak braking power		kW	14.6			25.4		
Continuous braking power	100% cdf	kW	1	1.2	2	1.6	2.4	4.2
Current-carrying capacity	50% cdf	kW	1.8	2.20	3.6	2.9	4.3	7.6
	25% cdf	kW	3.2	3.80	6.4	5.1	7.7	13.3
	12% cdf	kW	6	7.20	12.0	9.6	14.4	23.9
	6% cdf	kW	9.5	11.40	14.6	15.2	22.8	25.4
			Observe the regenerative power limit of the inverter. (See the chapter "Technical data of basic device" (→ 🗎 41): Peak power brake chopper 200% × apparent output power × 0.9)					
Resistance R_{BR}		Ω	47 ± 10%			27 ± 10%		
Tripping current I_{trip}		A	4.6	5.1	6.5	7.7	9.4	12.5

Braking resistor type BR..		Unit	BR015-016	BR015-042-T	BR015-075-T	BR915-T
Part number			17983258	19155328	19155271	18204139
Peak braking power		kW	45.7			
Continuous braking power	100% cdf	kW	1.6	4.2	7.5	16
Current-carrying capacity	50% cdf	kW	2.9	7.6	12.8	27.2
	25% cdf	kW	5.1	13.3	22.5	45.7
	12% cdf	kW	9.6	23.9	33.8	45.7
	6% cdf	kW	15.2	41.8	45.7	45.7
			Observe the regenerative power limit of the inverter. (See the chapter "Technical data of basic device" (→ 🗎 41): Peak power brake chopper 200% × apparent output power × 0.9)			
Resistance R_{BR}		Ω	15 ± 10%			
Tripping current I_{trip}		A	10.3	46.7	22.4	32.7

Braking resistor type BR..		Unit	BR010-024	BR010-050-T	BR010-108-T
Part number			17983266	17983274	19155298
Peak braking power		kW	57.2		
Continuous braking power	100% cdf	kW	2.4	5	10.8
Current-carrying capacity	50% cdf	kW	4.3	8.5	18.4
	25% cdf	kW	7.7	15.0	32.4
	12% cdf	kW	14.4	22.5	48.6
	6% cdf	kW	22.8	38.0	57.2
			Observe the regenerative power limit of the inverter. (See the chapter "Technical data of basic device" (→ 🗎 41): Peak power brake chopper 200% × apparent output power × 0.9)		
Resistance R_{BR}		Ω	10 ± 10%		
Tripping current I_{trip}		A	15.5	22.4	32.9

Braking resistor type BR..		Unit	BR006-025-01	BR006-050-01	BR106-T	BR206-T
Part number			18200117	18200125	18200834	18204120
Peak braking power		kW	114.3			
Continuous braking power	100% cdf	kW	2.5	5	13.5	18
Current-carrying capacity	50% cdf	kW	4.3	8.5	23.0	30.6
	25% cdf	kW	7.5	15.0	40.5	54.0
	12% cdf	kW	11.3	22.5	60.8	81.0
	6% cdf	kW	19.0	38.0	102.6	114.3
			Observe the regenerative power limit of the inverter. (See the chapter "Technical data of basic device" (→ 🗎 41): Peak power brake chopper 200% × apparent output power × 0.9)			
Resistance R_{BR}		Ω	6 ± 10%			
Tripping current I_{trip}		A	20.4	28.9	47.4	54.8

Braking resistor type BR..		Unit	BR005-070	BR005-170-T	BR004-050-01	BR004-070-01
Part number			17983282	17983290	18200133	17967678
Peak braking power		kW	146		190.6	
Continuous braking power	100% cdf	kW	7	17	5	7
Current-carrying capacity	50% cdf	kW	11.9	28.9	8.5	11.9
	25% cdf	kW	21.0	51.0	15.0	21.0
	12% cdf	kW	31.5	76.5	22.5	31.5
	6% cdf	kW	53.2	129.2	38.0	53.2
			Observe the regenerative power limit of the inverter. (See the chapter "Technical data of basic device" (→ 🗎 41): Peak power brake chopper 200% × apparent output power × 0.9)			
Resistance R_{BR}		Ω	4.7 ± 10%		3.6 ± 10%	
Tripping current I_{trip}		A	38.6	60.1	32.6	38.6

Braking resistor type BR..		Unit	BR003-420-T	BR002-070	BR1.0-170
Part number			13302345	17983304	17985455
Peak braking power		kW	274.4	298.3	686
Continuous braking power	100% cdf	kW	42	7	17
Current-carrying capacity	50% cdf	kW	71.4	11.9	28.9
	25% cdf	kW	126.0	21.0	51.0
	12% cdf	kW	189.0	31.5	76.5
	6% cdf	kW	274.4	53.2	129.2
			Observe the regenerative power limit of the inverter. (See the chapter "Technical data of basic device" (→ 🗎 41): Peak power brake chopper 200% × apparent output power × 0.9)		
Resistance R_{BR}		Ω	2.5 ± 10%	2.3 ± 10%	1 ± 10%
Tripping current I_{trip}		A	135.1	55.2	130.4

28487486/EN – 02/2019

3.7.2 Selection criteria

The selection of the braking resistor takes place via the SEW-Workbench. The necessary selection parameters for the braking resistor are calculated during the project planning procedure. Depending on these selection parameters, a braking resistor is selected from the table.

The following selection parameters are the basis for selecting the braking resistor.

Continuous braking power

The minimum required continuous braking power (braking power at 100% cdf) of the braking resistor for load cycles can be calculated using the relative cyclic duration factor cdf and the overload factor k.

If the cyclic duration factor cdf is unknown, it can be calculated from the cycle duration t_{tot} and the braking time t_B using the following formula.

$$ED = \frac{t_B}{t_{tot}}$$

ED	Cyclic duration factor
t_B	Braking time
t_{tot}	Cycle duration

INFORMATION

The cycle duration must not exceed 120 s.

The overload factor OF can be determined using the diagrams in the chapter "Overload factor OF" (→ 138) and the cyclic duration factor cdf.

The value of the average braking power P_B is taken from the project planning data of the application.

$$P_B = \frac{|P_1| \times t_1 + |P_2| \times t_2 + ... + |P_n| \times t_n}{t_1 + t_2 + ... + t_n}$$

P_B	Average braking power
P_n	Braking power section n
t_n	Braking time section n

The minimum required braking power at 100% cdf is calculated using the following formula:

$$P_{100\%ED} = \frac{P_B}{k}$$

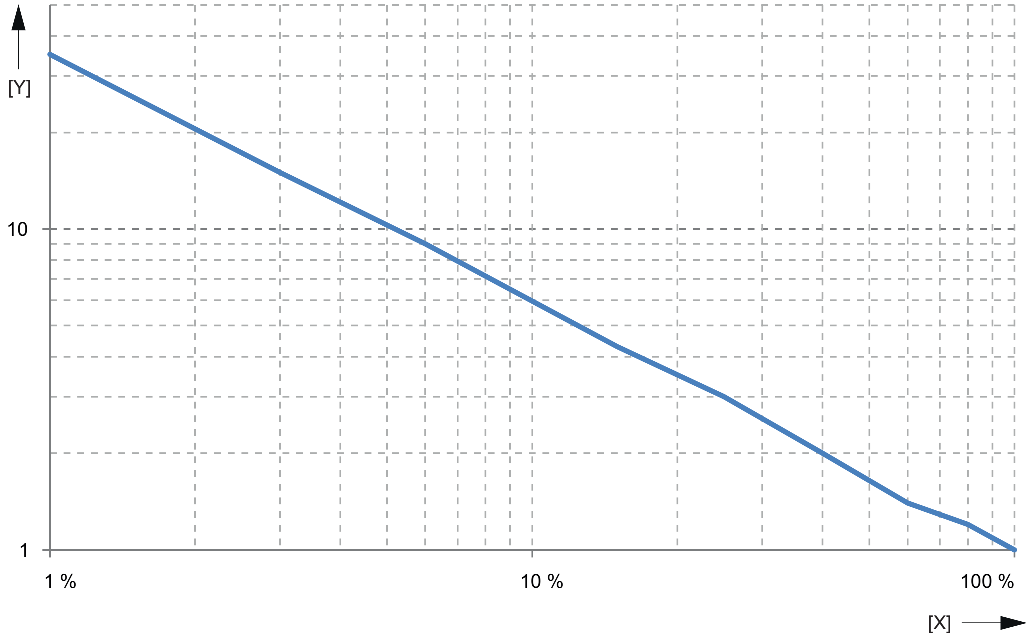
$P_{100\%cdf}$	Braking power at 100% cdf
P_B	Average braking power
k	Overload factor

The braking power required by the application at 100% cdf must be smaller than or equal to the typical braking power at 100% cdf (continuous braking power) of the braking resistor.

28487486/EN – 02/2019

Overload factor OF

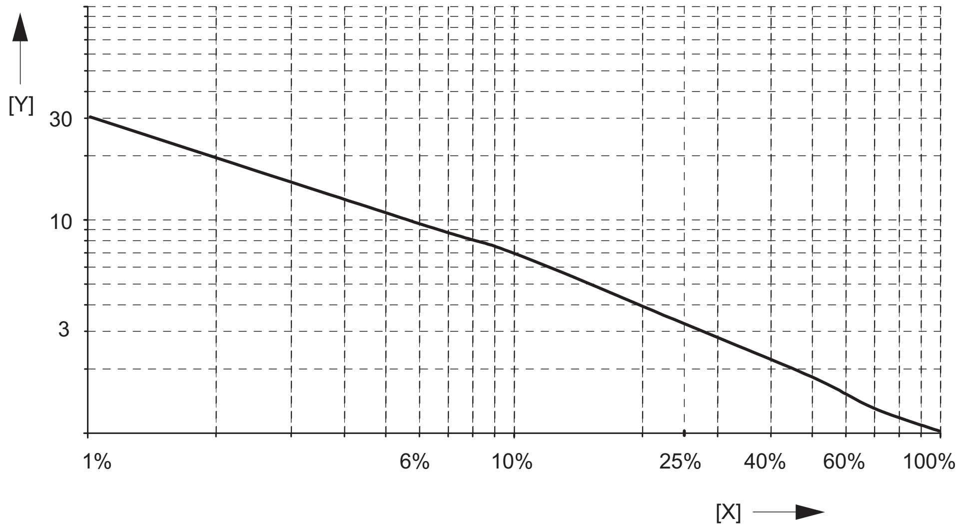
Flatpack resistors



20532478731

..% ED	1	3	6	15	25	40	60	80	100
OF	35	15	9	4.3	3	2	1.4	1.2	1

Wire resistors, frame resistors

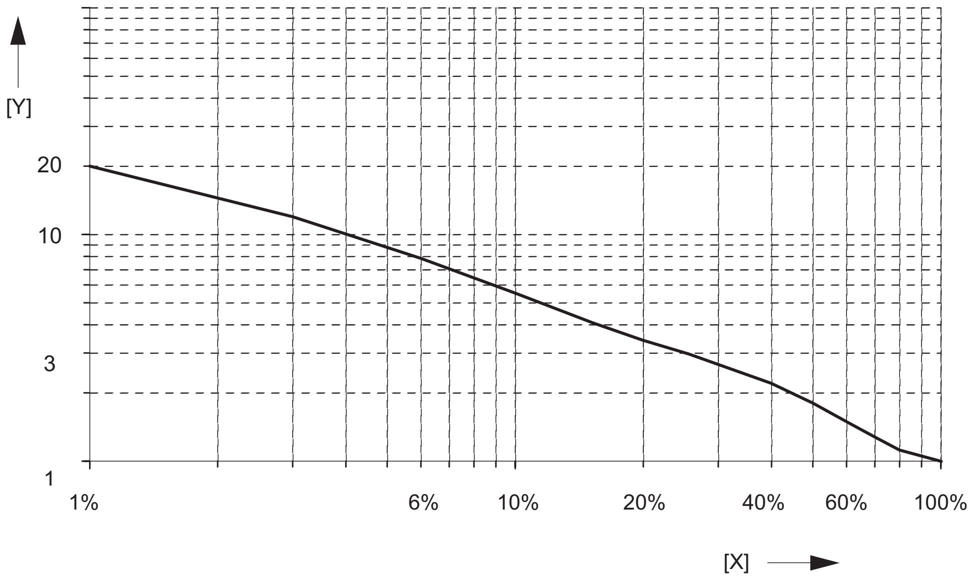


2990447883

..% ED	1	3	6	15	25	40	60	80	100
OF	30	15	9.5	5	3.2	2.2	1.5	1.12	1

28487486/EN – 02/2019

Grid resistors



2990530187

..% ED	1	3	6	15	25	40	60	80	100
OF	20	12	7.6	4	3	2.2	1.5	1.12	1

28487486/EN – 02/2019

Peak braking power

The maximum permitted peak braking power is specified by the resistance value and the DC link voltage.

The maximum peak braking power required by the application is calculated from the regenerative parts within a cycle.

The peak braking power required by the application must be lower than the maximum permitted peak braking power of the braking resistor.

The permitted peak braking power of the braking resistor is calculated as follows:

$$P_{\text{max}} = \frac{U_{ZK\,max}^2}{R \times 1.4}$$

P_{max}	Maximum peak braking power that the braking resistor can absorb
U_{ZK_max}	Maximum DC link voltage
R	Braking resistance value

The peak braking power for each braking resistor is specified in the chapter "Braking resistors".

Current-carrying capacity of the brake chopper

The resistance value of the braking resistor R_{BR} must not be lower than the minimum permitted braking resistance R_{BRmin}, see the chapter "Technical data of basic device" (→ 🗎 41). This ensures that the brake chopper is not damaged.

$R_{BR} \geq R_{BRmin}$

The continuous braking power toward the braking resistor must not exceed the apparent output power of the application inverter.

28487486/EN – 02/2019

3.7.3 Calculation example

Given: Peak braking power: 13 kW

Average braking power: 6 kW

Braking time: 7 s

Cycle duration: 28 s

Inverter used: MDX90A-0095-5-3-4-S00

Required: Braking resistor BR...

Calculation: 1) Determining the cyclic duration factor

Cyclic duration factor cdf = braking time/cycle duration

Cyclic duration factor cdf = (7 s/28 s) × 100% = 25%

When selecting the braking resistor, observe the assignment of inverter and braking resistor, see the chapter "Technical data and assignment to an inverter" (→ 🗎 64).

2) Determining the overload capacity

Determining the overload factor, e.g. for a wire resistor at a cyclic duration factor cdf of 25% from the respective diagram.

Overload factor OF = 3.2

3) Calculating the braking power at 100% cdf

Braking power 100% cdf = average braking power/overload factor

Braking power 100% cdf = 6 kW/3.2 = 1.88 kW

The braking power of the braking resistor at 100% cdf must be ≥ 1.88 kW.

4) Selecting the braking resistor

The minimum permitted braking resistance value is = 47 Ω for the MDX90A-0095-5-3-4-S00 inverter that is used, see the chapter "Technical data and assignment to an inverter" (→ 🗎 64).

Selected braking resistor: BR247-T.

Resistance value R_{BR} = 47 Ω

Peak braking power: 14.3 kW, see the chapter "Tables of braking resistors" (→ 🗎 135).

Current-carrying capacity at 100% cdf: 2 kW

3.7.4 Supply cable for braking resistor

Use only shielded cables.

The cable cross section depends on the tripping current I_F.

The rated voltage of the cable must amount to at least V_0/V = 300 V / 500 V.

The maximum permitted cable length between application inverter and braking resistor is 100 m.

28487486/EN – 02/2019

3.7.5 Protection against thermal overload of the braking resistor

To avoid thermal damage of the braking resistor as well as subsequent damage, the braking resistor has to be thermally monitored. SEW-EURODRIVE suggests the following options:

- TCB thermal circuit breaker

  The TCB thermal circuit breaker is installed in the control cabinet, connected to the supply cable to the braking resistor and set to the tripping current of the braking resistor. If the measured mean current exceeds the tripping current, an NC contact switches and reports an overload of the braking resistor. The connection of braking resistor and inverter is separated simultaneously, thus ending the generator mode.

- Integrated temperature switch –T

  Braking resistors with the label –T are equipped with an integrated temperature switch. The temperature switch is thermally coupled to the braking resistor and switches an NC contact in case of overtemperature of the braking resistor. The braking resistor-inverter connection is not interrupted. In case of thermal overload, the regenerative operation has to be terminated. SEW-EURODRIVE recommends shielding the connection cable of the temperature switch.

- Thermal overload relay

  A thermal overload relay is installed in the control cabinet, connected to the supply cable to the braking resistor and set to the tripping current of the braking resistor. If the measured mean current exceeds the tripping current, an NC contact switches and reports an overload of the braking resistor. The braking resistor-inverter connection is not interrupted. In case of thermal overload, the regenerative operation has to be terminated.

For wiring diagrams regarding the matters described above, refer to the chapter "Protection of the braking resistor against thermal overload".

3.7.6 Parallel connection of braking resistors

It is permitted to connect several identical braking resistors in parallel. The following applies:

- The power connections of the braking resistors must be connected to +R and –R in parallel.
- Each braking resistor requires a separate protection against thermal overload.
- The signal contacts (NC contacts) of the protection devices must be connected in series.

28487486/EN – 02/2019

3.8 Supply system cable and motor cable

3.8.1 Supply system cable

Dimensioning of the supply system cable generally takes place plant-specifically and depends on the design of the line connection. Line connection is shown in the chapter "Power connection" (→ 🗎 271). Observe the country-specific and plant-specific regulations when selecting the cross section of the supply system cable.

Recommended cross section for nominal operation

The cross section of the supply system cables must be dimensioned based on the nominal line current I_{line}.

SEW-EURODRIVE suggests the cable cross sections listed in the table. Cables with these cross sections can be used if the following conditions are met:

- The single-pole cables are made of copper with PVC insulation.
- The cables are routed in cable ducts according to IEC 60204-1 installation type C at 40 °C ambient temperature.

MDX9_A-…-5_3	0020	0025	0032	0040	0055	0070	0095	0125	0160	0240	0320	0460	0620	0750
Nominal line current AC I_{line}	1.9 A	2.3 A	2.9 A	3.6 A	5 A	6.3 A	8.6 A	11.3 A	14.4 A	22 A	32 A	42 A	56 A	68 A
Supply system cable L1/L2/L3	1.5 mm^2							2.5 mm^2		4 mm^2	6 mm^2	10 mm^2	16 mm^2	25 mm^2
Fuse/miniature circuit breaker	10 A							16 A		25 A	32 A	50 A	63 A	80 A

MDX9_A-…-2_3	0070	0093	0140	0213	0290	0420	0570
Nominal line current AC I_{line}	6.4 A	8.4 A	12.4 A	18.9 A	27.4 A	40.8 A	52 A
Supply system cable L1/L2/L3	1.5 mm^2		2.5 mm^2		6 mm^2	10 mm^2	16 mm^2
Fuse/miniature circuit breaker	10 A		16 A	20 A	32 A	50 A	63 A

INFORMATION

Recommended cross section

The values are only recommendations. They are no substitute for detailed project planning of the cables depending on the concrete application and considering the applicable regulations.

INFORMATION

Securing the supply system cable

Secure the supply system cable with appropriate safety elements.

When selecting the supply system cable, make sure that the selected cross section is in the range of the connectable cross section of the terminals.

3.8.2 Motor cable

Cable length

For MOVIDRIVE® system application inverters, a maximum motor cable length must not be exceeded.

The following configuration guidelines must be observed:

- When shielded motor cables are used, a capacitance core/shield of maximum 280 pF/m must not be exceeded.

MDX9_A...-5_3 With U_{line} = 3 × AC 400 V)	**0020 – 0040**	**0055**	**0070**	**0095**	**0125**	**0160**	**0240 – 1490**	**1770 – 2200**	**2500 – 3000**	**3800 – 5880**
	Maximum motor cable length in m									
	Shielded cable									
PWM frequency										
2.5 kHz	–	–	–	–	–	–	–	–	400	400
4 kHz	120	200	250	300	300	400	400	400	300	300
8 kHz	80	120	150	250	250	300	300	300	200	–
16 kHz	40	60	100	150	150	200	200	–	–	–
MDX9_A...-5_3 With U_{line} = 3 × AC 400 V)	**0020 – 0040**	**0055**	**0070**	**0095**	**0125**	**0160**	**0240 – 1490**	**1770 – 2200**	**2500 – 3000**	**3800 – 5880**
	Maximum motor cable length in m									
	Unshielded cable									
PWM frequency										
2.5 kHz	–	–	–	–	–	–	–	–	1200	1200
4 kHz	360	600	750	900	900	1200	1200	1200	900	900
8 kHz	240	360	450	750	750	900	900	900	600	–
16 kHz	120	180	300	450	450	600	600	–	–	–

MDX9_A...-2_3 With U_{line} = 3 × AC 230 V)	**0070**	**0093**	**0140**	**0213 – 0290**	**0420 – 1080**
	Maximum motor cable length in m				
	Shielded cable				
PWM frequency					
4 kHz	120	200	250	300	400
8 kHz	80	120	150	250	300
16 kHz	40	60	100	150	200
MDX9_A...-2_3 With U_{line} = 3 × AC 230 V)	**0070**	**0093**	**0140**	**0213 – 0290**	**0420 – 1080**
	Maximum motor cable length in m				
	Unshielded cable				
PWM frequency					
4 kHz	360	600	750	900	1200
8 kHz	240	360	450	750	900
16 kHz	120	180	300	450	600

INFORMATION

If the use of a residual current device is not mandatory according to the standards, SEW-EURODRIVE recommends not using a residual current device. Leakage currents caused by cable capacitances can lead to false tripping.

28487486/EN – 02/2019

Voltage drop

Select the cable cross section of the motor cable so the voltage drop is as small as possible. An excessively high voltage drop means that the full motor torque is not achieved.

Determine the expected voltage drop based on the following table. With shorter cables, you can convert the voltage drop proportionally.

Line cross section	Load with I in A =																				
	4	6	8	10	13	16	20	25	30	40	50	63	80	100	125	150	200	250	300	350	400
Copper	Voltage drop ΔV in V with length = 100 m and ϑ = 70 °C																				
1.5 mm^2	5.3	8	10.6	13.3	17.3	21.3	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
2.5 mm^2	3.2	4.8	6.4	8.1	10.4	12.8	16	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
4 mm^2	1.9	2.8	3.8	4.7	6.5	8.0	10	12.5	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
6 mm^2					4.4	5.3	6.4	8.3	9.9	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
10 mm^2						3.2	4.0	5.0	6.0	8.2	10.2	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)
16 mm^2								3.3	3.9	5.2	6.5	7.9	10.0	1)	1)	1)	1)	1)	1)	1)	1)
25 mm^2									2.5	3.3	4.1	5.1	6.4	8.0	1)	1)	1)	1)	1)	1)	1)
35 mm^2											2.9	3.6	4.6	5.7	7.2	8.6	1)	1)	1)	1)	1)
50 mm^2														4.0	5.0	6.0	1)	1)	1)	1)	1)
70 mm^2																	5.8	1)	1)	1)	1)
95 mm^2																	4.2	5.3	1)	1)	1)
150 mm^2																		3.3	4.0	1)	1)
185 mm^2																			3.2	3.8	1)
240 mm^2																			2.5	2.9	3.3

1) Load not permitted according to IEC 60364-5-52.

3.9 Signal lines

3.9.1 Encoder cables

Connection/Encoder	Cable length
HTL encoder ES7C and EG7C	300 m
Standard HTL encoder	200 m
Other encoders	100 m

3.9.2 Digital inputs/outputs and DC 24 V supply

The maximum cable length of connections on the inputs and outputs is 30 m.

3.10 EMC-compliant installation according to EN 61800-3

MOVIDRIVE® application inverters are designed as components for installation in machinery and systems. They comply with the EMC product standard EN 61800-3 "Variable-speed electrical drives".

Provided the EMC-compliant installation is observed, the appropriate requirements for a CE marking are met on the basis of the EMC Directive 2014/30/EU.

3.10.1 Interference emission

The cable length must be as short as possible for EMC-compliant installation.

SEW-EURODRIVE recommends using low-capacity cables.

To comply with limit classes C1 and C2 in accordance with EN 61800-3, the measures listed in the tables must be taken.

Limit class C1

Inverter	Measures		
	On the line side	On the motor side	
	NF line filter	HF output filter HD output choke	Shielded cables
MDX9_A-0020 – 0160-5_3-.. MDX9_A-0070 – 0140-2_3-..	NF	–	Yes

Limit class C2

Inverter	Measures		
	On the line side	On the motor side	
	NF line filter	HF output filter HD output choke	Shielded cables
MDX9_A-0020 – 0160-5E3-.. MDX9_A-0070 – 0140-2E3-..	–	–	Yes
MDX9_A-0240 – 1490-503-.. MDX9_A-0213 – 1080-203-..	NF	–	Yes
MDX9_A-0020 – 0320-503-..	NF	HD	No
MDX9_A-0070 – 0290-203-..	NF	HF	No

INFORMATION

No EMC limits are specified for interference emission in voltage supply systems without a grounded star point (IT systems).

28487486/EN – 02/2019

3.11 Line components

3.11.1 Line fuses and miniature circuit breakers

Line fuses and miniature circuit breakers are used for protecting the supply system cables. For fusing, use fuses and miniature circuit breakers with the following properties:

Type class	Prerequisite
Fuses in utilization categories gL, gG	Fusing voltage ≥ nominal line voltage
Miniature circuit breaker with characteristics B, C, D	Nominal miniature circuit breaker voltage ≥ nominal line voltage
	Nominal currents of the miniature circuit breaker must be 10% higher than the nominal line current of the application inverter

Adhere to the country-specific and system-specific regulations when carrying out the fusing. If required, observe the notes in the chapter "UL-compliant installation".

3.11.2 Line contactor

A line contactor is used to separate the application inverter from the supply system in the event of an error and to switch the power supply on and off.

For more information on operation with a line contactor, refer to the chapter "Line connection".

INFORMATION

If necessary, use a line contactor in utilization category AC-3 (IEC 158-1) or better.

The line contactor must be installed before the line filter and the line choke.

INFORMATION

Observe the documentation for electrical installation of a line contactor, see the chapter "Line contactor" (→ 🗎 230).

28487486/EN – 02/2019

3.11.3 NF line filter

A line filter reduces interference emission via the supply system cable, which is generated by the application inverter. The line filter mainly serves to meet interference voltage limit requirements in the frequency range from 150 kHz to 30 MHz at the line connection. In addition, a line filter dampens the interference from the supply system affecting the application inverter. The selection of the line filter depends on the nominal line current and the line voltage of the frequency inverter.

The line filter has to be selected according to the following table.

Technical data

Line filter	NF0055-503	NF0120-503	NF0220-503	NF0420-513	NF0910-523	NF1800-523
Part number	17984319	17984270	17984300	17983789	17987504	17987865
Nominal line voltage V_N	3 × AC 230 V - 500 V, 50/60 Hz					
Nominal current I_N	5.5 A	12 A	22 A	42 A	91 A	180 A
Nominal power loss	4 W	6 W	9 W	30 W	51.5 W	89 W
Ambient temperature ϑ_{amb}	0 to 45 °C (reduction: x% I_N up to max. 60 °C)					
Connecting contacts L1/L2/L3 - L1'/L2'/L3'	Spring-loaded terminals max. 6 mm^2			2.5 – 16 mm^2	25 – 50 mm^2	16 – 120 mm^2
Tightening torque L1/L2/L3 - L1'/L2'/L3'	—			2 – 4 Nm	6 – 8 Nm	12 – 20 Nm
PE terminal contacts	M4		M5	M6	M8	M10
Tightening torque PE	1.5 Nm		3 Nm	6 Nm	12 Nm	23
Degree of protection	IP20 according to EN 60529					
Mass	1 kg	1 kg	1.4 kg	3 kg	5 kg	9 kg

Assignment to an inverter

Line filter	NF0055-503	NF0120-503	NF0220-503	NF0420-513	NF0910-523	NF1800-523
MDX9_A-...-5_3-..	0020 – 0040	0055 – 0095	0125 – 0160	0240 – 0320	0460 – 0750	0910 – 1490
MDX9_A-...-2_3-..	—	0070 – 0093	0140	0213 – 0290	0420 – 0570	0840 – 1080

3.11.4 ND line choke

The main reason for using line chokes is the reduction of grid disturbances that may occur due to harmonic currents. In addition, line chokes improve the overvoltage protection.

The line choke has to be selected according to the following table.

Technical data

Line choke	ND0070-503	ND0160-503	ND0300-503	ND0420-503	ND0910-503	ND1800-503
Part number	17984173	17984181	17983800	17983819	17987520	17987539
Nominal line voltage U_N	3 × AC 230 V – 500 V, 50/60 Hz					
Nominal current I_N	7 A	16 A	30 A	42 A	91 A	180 A
Nominal inductance	0.36 mH	0.2 mH	0.1 mH	0.045 mH	0.035 mH	0.018 mH
Nominal power loss	4 W	9 W	11 W	13 W	53 W	116 W
Ambient temperature ϑ_{amb}	-10 °C to 45 °C (reduction: 3% I_N up to maximum 60 °C)					
Connection contacts L1/L2/L3 – L1'/L2'/L3'	0.2 – 4 mm^2		0.2 – 10 mm^2	2.5 – 16 mm^2	25 – 50 mm^2	16 – 120 mm^2
Tightening torque L1/L2/L3 – L1'/L2'/L3'	0.5 – 1 Nm		1.2 – 2 Nm	2.5 Nm	3 – 6 Nm	12 – 20 Nm
PE connection contact	M4		M5		M8	M10
Tightening torque PE	1.5 Nm		3 Nm		12 Nm	20 Nm
Degree of protection	IPXXB in accordance with EN 60529				IPXXA in accordance with EN 60529	
Mass	0.5 kg	1.3 kg	1.95 kg	1.82 kg	4.6 kg	10 kg

Assignment to an inverter

Line choke	ND0070-503	ND0160-503	ND0300-503	ND0420-503	ND0910-503	ND1800-503
MDX9_A-...-5_3-..	0020 – 0040	0055 – 0095	0125 – 0160	0240 – 0320	0460 – 0750	910 – 1400
MDX9_A-...-2_3-..	-	0070 – 0093	0140	0213 – 0290	0420 – 0570	0840 – 1080

28487486/EN – 02/2019

3.11.5 Residual current device

⚠ WARNING

No protection against electric shock if an incorrect type of residual current device is used.

Severe or fatal injuries.

- The product can cause direct current in the PE conductor. If a residual current device (RCD) or a residual current monitoring device (RCM) is used for protection in the event of a direct or indirect contact, only a type B RCD or RCM is permitted on the supply end of the product.

- If the use of a residual current device is not mandatory according to the standards, SEW-EURODRIVE recommends not to use a residual current device.

3.12 24 V supply voltage selection

The MDX90A-... application inverter requires an external 24 V voltage supply for the electronics.

The MDX91A-... application inverter has an internal 24 V voltage supply (80 W) that can also be supported externally.

3.12.1 Project planning for 24 V supply power

For dimensioning the 24 V supply voltage, it is necessary to know the power and current consumption of the application inverter.

INFORMATION

Commercially available switched-mode power supplies can reliably switch on the maximally occurring capacities.

3.12.2 Power consumption of the 24 V supply

Tables for the power demand of the 24 V supply depending on the used modules and the installed options.

Power consumption

Inverter 3 × AC 400 V	Power consumption (without I/O, motor encoder, motor brake) W
MDX90A-0020.. – ..0040-5_3-..	20
MDX90A-0055.. – ..0095-5_3-..	20
MDX90A-0125.. – ..0160-5_3-..	20
MDX90A-0240.. – ..0320-5_3-..	30
MDX90A-0460.. – ..0750-5_3-..	15
MDX91A-0910.. – ..1490-5_3-..	20

Inverter 3 × AC 230 V	Power consumption (without I/O, motor encoder, motor brake) W
MDX90A-0070.. – ..0093-2_3-..	20
MDX90A-0140-2_3-..	20
MDX90A-0213.. – ..0290-2_3-..	30
MDX90A-0420.. – ..0570-2_3-..	15
MDX91A-0840.. – ..1080-2_3-..	20

Power consumption of the cards

Card	Power consumption W
CIO21A	1.2
CID21A	0.4
CES11A	0.8
CSB21A	5.1 W

Card	Power consumption W
CSS21A	12.3 W
CSB31A	24.3 W
CSS31A	24.3 W

28487486/EN – 02/2019

3.12.3 Project planning example

The following example illustrates project planning of the 24 V voltage supply for the MOVIDRIVE® system application inverter MDX90B0040-5E3-4-00 with CES11A multi-encoder card and I/O expansion CID21A.

The DI00 digital input (output stage enable) is supplied with voltage by the inverter.

The motor brake is controlled via DB00. The coil of the brake relay requires DC 100 mA at DC 24 V.

The 4 outputs of the CID21A option are each subject to a load of DC 50 mA.

Power demand of the basic device: 20 W + 1 × motor encoder: 5 W

Power demand of the CES11A option without encoder: 0.8 W

1 × external encoder: 12 W

Power demand of the CID21A option without terminals: 0.4 A

Power demand of the inputs (basic device): 1 × 0.2 W = 0.2 W

Power demand of the brake control at DB00: 24 V × 0.1 A = 2.4 W

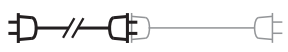
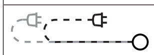
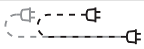
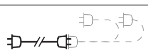
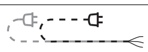
Power demand of the digital outputs: 4 × 24 V × 0.050 A = 4.8 W

The total power demand is 45.6 W

4 Prefabricated cables

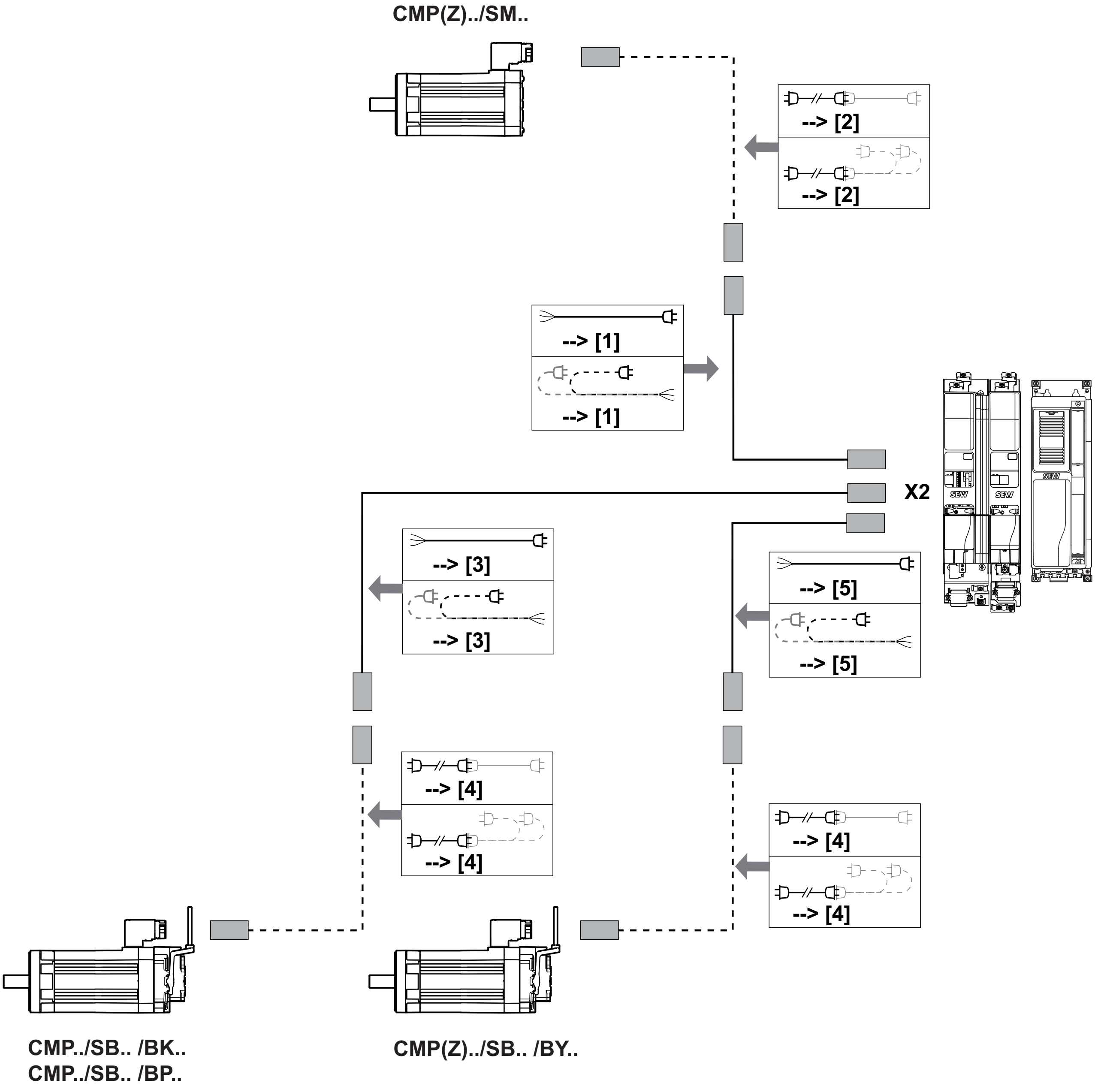
The overviews showing the assignment of the cables to the motors apply also to any motors of the respective motor type that can be used in areas subject to a risk of explosion.

4.1 Meaning of the symbols

Icon	Meaning
	Connection cables: Connector → connector for fixed installation
	Connection cable extension: Connector → connector for fixed installation
	Connection cables: Connector → encoder connection cover for fixed installation
	Connection cables: Connector → encoder connection cover for cable carrier installation
	Connection cables: Connector → connector for cable carrier installation
	Connection cable extension: Connector → connector for cable carrier installation
	Connection cables: Connector → open end for fixed installation
	Connection cables: Connector → open end for cable carrier installation

4.2 Power cables for CMP.. motors

4.2.1 Overview



9007214010255627

[1] Motor cable ../SM.. (→ 🗎 156)

[2] Motor extension cable ../SM.. (→ 🗎 157)

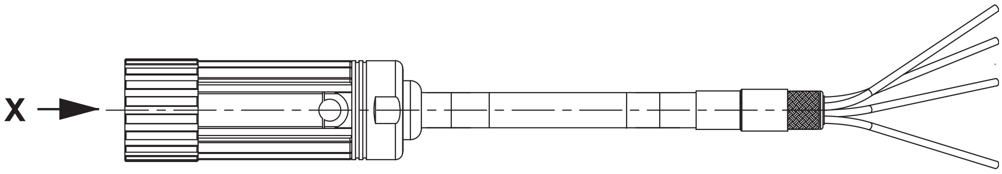
[3] Brakemotor cable ../SB.. for brake /BK and /BP (→ 🗎 158)

[4] Brakemotor extension cable ../SB.. for /BK, /BP and /BY brake (→ 🗎 160)

[5] Brakemotor cable ../SB.. for brake /BY (→ 🗎 159)

4.2.2 Motor cable with connector on motor end

Motor cable illustration



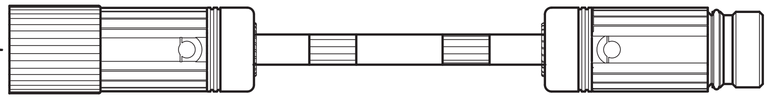
4818831115

Types of CMP.. motor cables

Plug connector	Number of cores and cable cross section	Part number	Installation type
SM11	4 × 1.5 mm²	05904544	Fixed installation
SM11	4 × 1.5 mm²	05906245	Cable carrier installation
SM12	4 × 2.5 mm²	05904552	Fixed installation
SM12	4 × 2.5 mm²	05906253	Cable carrier installation
SM14	4 × 4 mm²	05904560	Fixed installation
SM14	4 × 4 mm²	05904803	Cable carrier installation
SMB6	4 × 6 mm²	13350269	Fixed installation
SMB6	4 × 6 mm²	13350293	Cable carrier installation
SMB10	4 × 10 mm²	13350277	Fixed installation
SMB10	4 × 10 mm²	13350307	Cable carrier installation
SMB16	4 × 16 mm²	13350285	Fixed installation
SMB16	4 × 16 mm²	13350315	Cable carrier installation
SMC16	4 × 16 mm²	18148476	Fixed installation
SMC16	4 × 16 mm²	18148484	Cable carrier installation
SMC25	4 × 25 mm²	18148581	Cable carrier installation
SMC35	4 × 35 mm²	18148697	Cable carrier installation

28487486/EN – 02/2019

Illustration of motor extension cable



4818839179

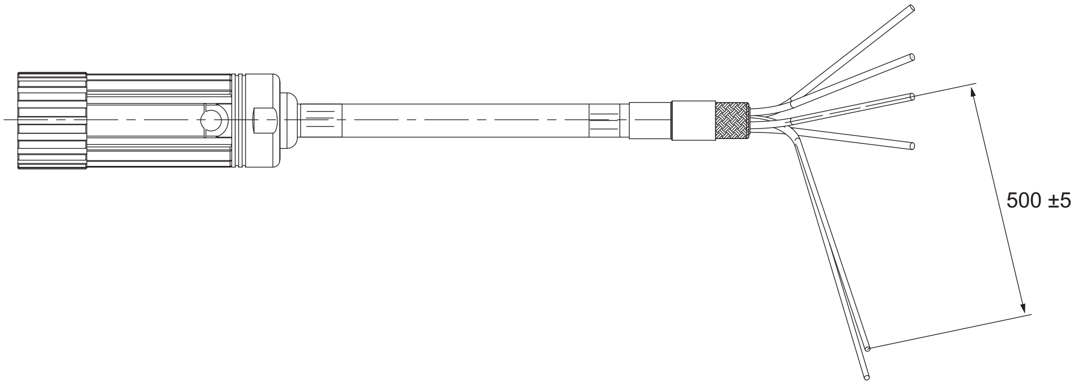
Types of CMP.. motor extension cables

Plug connector	Number of cores and cable cross section	Part number	Installation type
SM11	4 × 1.5 mm^2	13332457	Cable carrier installation
SM12	4 × 2.5 mm^2	13332465	Cable carrier installation
SM14	4 × 4 mm^2	13332473	Cable carrier installation
SMB6	4 × 6 mm^2	13350021	Cable carrier installation
SMB10	4 × 10 mm^2	13350048	Cable carrier installation
SMB16	4 × 16 mm^2	13350056	Cable carrier installation
SMC16	4 × 16 mm^2	18156819	Cable carrier installation
SMC25	4 x 25 mm^2	18156827	Cable carrier installation
SMC35	4 x 35 mm^2	18156835	Cable carrier installation

28487486/EN – 02/2019

4.2.3 Brakemotor cables for BP/BK brake with connector at motor end

Figure of CMP.. brakemotor cables



24323160075

Types of CMP.. brakemotor cables

Plug connector	Number of cores and cable cross section	Part number	Installation type
SB11	4 × 1.5 mm² + 3 × 1 mm²	13354345	Fixed installation
SB11	4 × 1.5 mm² + 3 × 1 mm²	13354388	Cable carrier installation
SB12	4 × 2.5 mm² + 3 × 1 mm²	13354353	Fixed installation
SB12	4 × 2.5 mm² + 3 × 1 mm²	13354396	Cable carrier installation
SB14	4 × 4 mm² + 3 × 1 mm²	13354361	Fixed installation
SB14	4 × 4 mm² + 3 × 1 mm²	13421603	Cable carrier installation
SBB6	4 × 6 mm² + 3 × 1.5 mm²	13350196	Fixed installation
SBB6	4 × 6 mm² + 3 × 1.5 mm²	13350234	Cable carrier installation
SBB10	4 × 10 mm² + 3 × 1.5 mm²	13350218	Fixed installation
SBB10	4 × 10 mm² + 3 × 1.5 mm²	13350242	Cable carrier installation
SBB16	4 × 16 mm² + 3 × 1.5 mm²	13350226	Fixed installation
SBB16	4 × 16 mm² + 3 × 1.5 mm²	13350250	Cable carrier installation

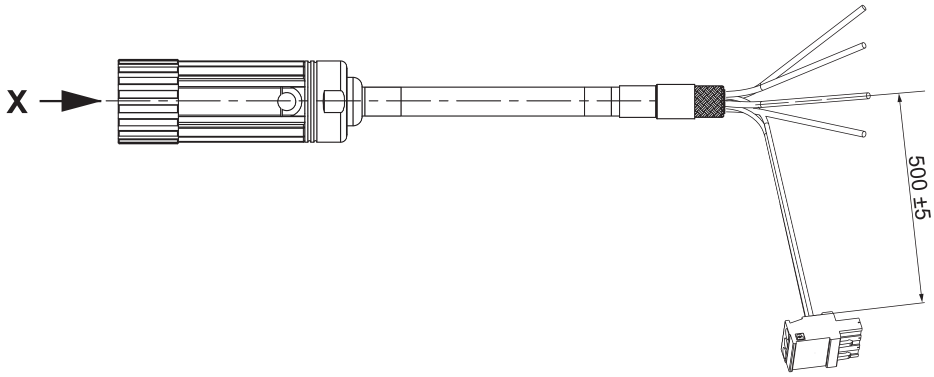
INFORMATION

As for the power cables for brakemotors with BP/BK brake only two signal cables are required, the third signal core is cut off during cable assembly.

28487486/EN – 02/2019

4.2.4 Brakemotor cables for BY brake with connector at motor end

Figure of CMP.. brakemotor cables



14824163467

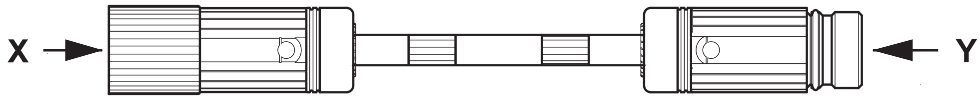
Types of CMP.. brakemotor cables

Plug connector	Number of cores and cable cross section	Part number	Installation type
SB11	4 × 1.5 mm^2 + 3 × 1 mm^2	13354272	Fixed installation
SB11	4 × 1.5 mm^2 + 3 × 1 mm^2	13354302	Cable carrier installation
SB12	4 × 2.5 mm^2 + 3 × 1 mm^2	13354280	Fixed installation
SB12	4 × 2.5 mm^2 + 3 × 1 mm^2	13354310	Cable carrier installation
SB14	4 × 4 mm^2 + 3 × 1 mm^2	13354299	Fixed installation
SB14	4 × 4 mm^2 + 3 × 1 mm^2	13354329	Cable carrier installation
SBB6	4 × 6 mm^2 + 3 × 1.5 mm^2	13350129	Fixed installation
SBB6	4 × 6 mm^2 + 3 × 1.5 mm^2	13350153	Cable carrier installation
SBB10	4 × 10 mm^2 + 3 × 1.5 mm^2	13350137	Fixed installation
SBB10	4 × 10 mm^2 + 3 × 1.5 mm^2	13350161	Cable carrier installation
SBB16	4 × 16 mm^2 + 3 × 1.5 mm^2	13350145	Fixed installation
SBB16	4 × 16 mm^2 + 3 × 1.5 mm^2	13350188	Cable carrier installation
SBC16	4 × 16 mm^2 + 3 × 1.5 mm^2	18148514	Fixed installation
SBC16	4 × 16 mm^2 + 3 × 1.5 mm^2	18148522	Cable carrier installation

28487486/EN – 02/2019

4.2.5 Extension cables BP/BK and BY brakes

Illustration of brakemotor extension cable



4818839179

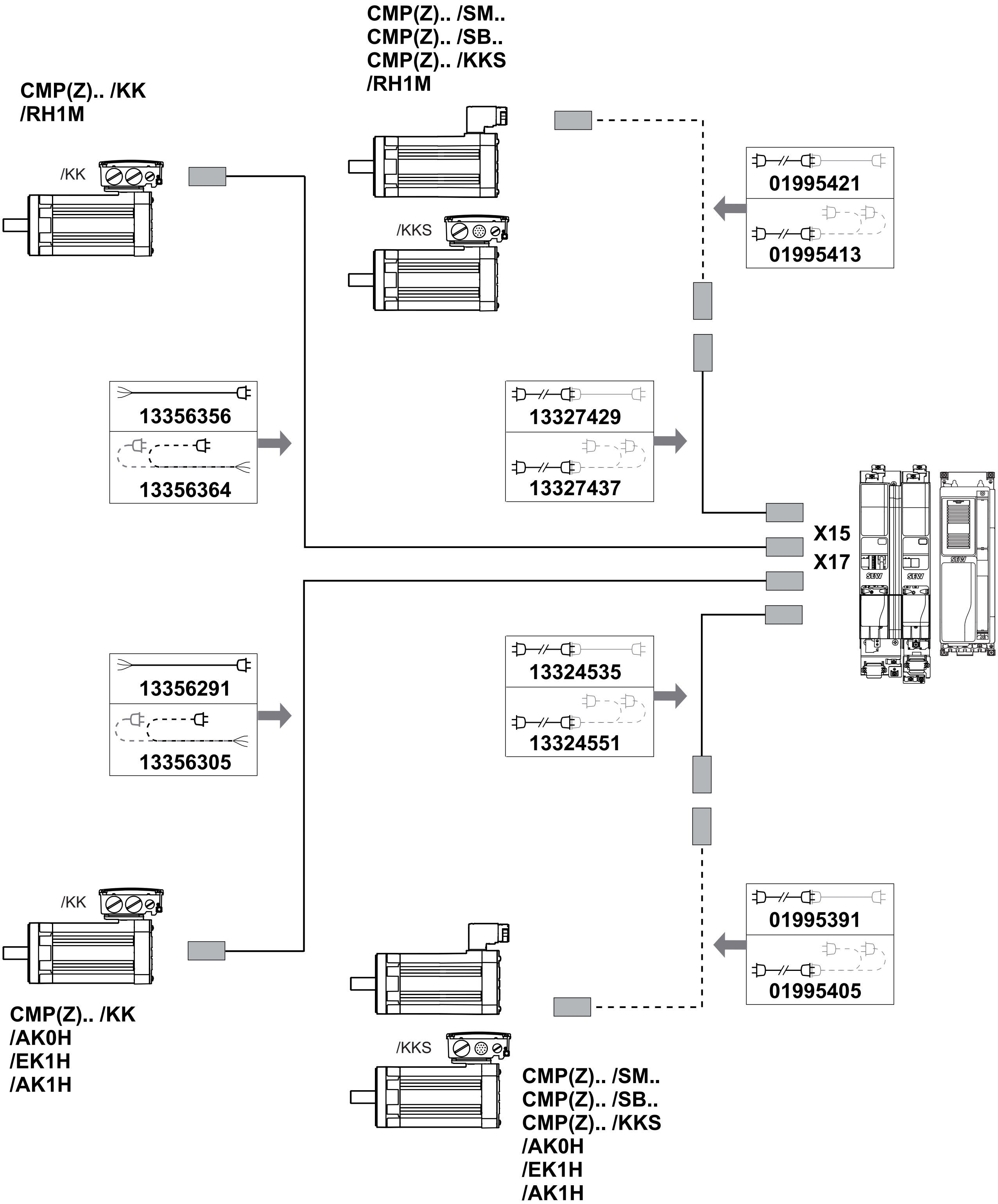
Types of CMP.. brakemotor extension cables

Plug connector	Number of cores and cable cross section	Part number	Installation type
SB11	$4 \times 1.5\ mm^2 + 3 \times 1\ mm^2$	13354221	Cable carrier installation
SB12	$4 \times 2.5\ mm^2 + 3 \times 1\ mm^2$	13354248	Cable carrier installation
SB14	$4 \times 4\ mm^2 + 3 \times 1\ mm^2$	13354337	Cable carrier installation
SBB6	$4 \times 6\ mm^2 + 3 \times 1.5\ mm^2$	13350099	Cable carrier installation
SBB10	$4 \times 10\ mm^2 + 3 \times 1.5\ mm^2$	13350102	Cable carrier installation
SBB16	$4 \times 16\ mm^2 + 3 \times 1.5\ mm^2$	13350110	Cable carrier installation
SBC16	$4 \times 16\ mm^2 + 3 \times 1.5\ mm^2$	18156843	Cable carrier installation

28487486/EN – 02/2019

4.3 Encoder cables for CMP.. motors

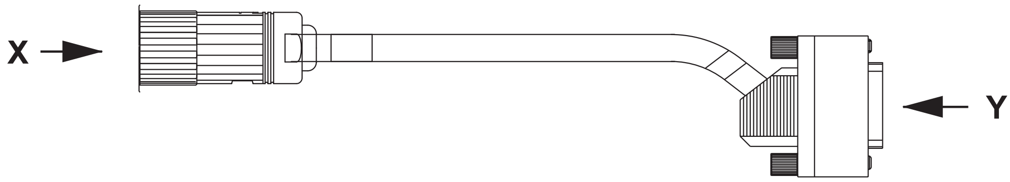
4.3.1 Overview



9007214015841035

4.3.2 Resolver

Illustration of RH1M resolver cable

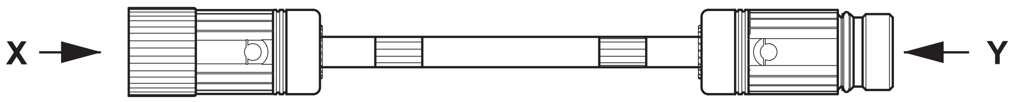


4819185931

Types of RH1M resolver cables

Number of cores and cable cross section	Part number	Installation type
5 × 2 × 0.25 mm²	13327429	Fixed installation
5 × 2 × 0.25 mm²	13327437	Cable carrier installation

Illustration of RH1M extension cable

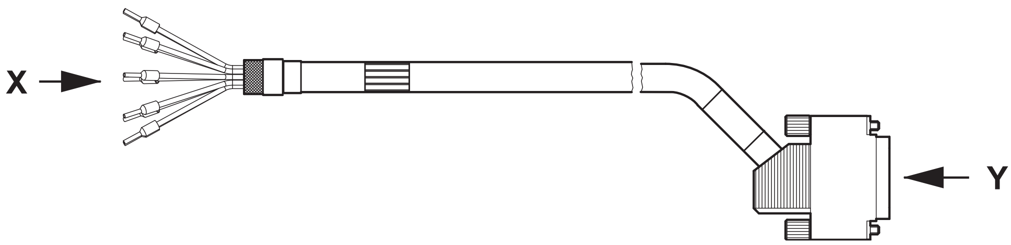


4819192715

Types of RH1M extension cables

Number of cores and cable cross section	Part number	Installation type
5 × 2 × 0.25 mm²	01995421	Fixed installation
5 × 2 × 0.25 mm²	01995413	Cable carrier installation

Illustration of RH1M resolver cable for terminal box



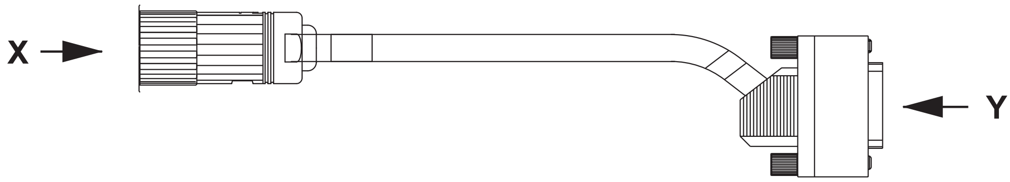
4838463371

RH1M resolver cables for terminal box

Number of cores and cable cross section	Part number	Installation type
5 × 2 × 0.25 mm²	13356356	Fixed installation
5 × 2 × 0.25 mm²	13356364	Cable carrier installation

4.3.3 HIPERFACE® encoders

Illustration of HIPERFACE® encoder cable

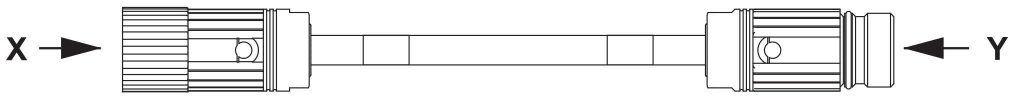


4819185931

Types of HIPERFACE® encoder cables

Number of cores and cable cross section	Part number	Installation type
4 × 2 × 0.25 mm² + 2 × 0.5 mm²	13324535	Fixed installation
4 × 2 × 0.25 mm² + 2 × 0.5 mm²	13324551	Cable carrier installation

Illustration of HIPERFACE® encoder extension cable

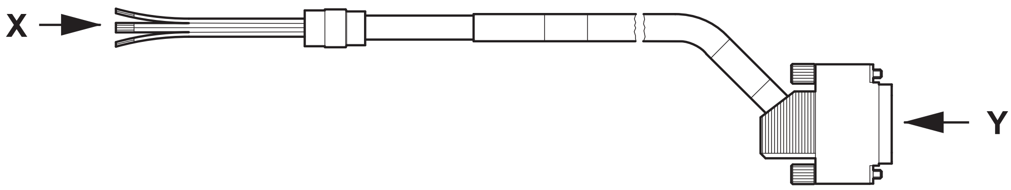


4819207051

Types of HIPERFACE® encoder extension cables

Number of cores and cable cross section	Part number	Installation type
6 × 2 × 0.25 mm²	01995391	Fixed installation
6 × 2 × 0.25 mm²	01995405	Cable carrier installation

Illustration of HIPERFACE® encoder cable for terminal box



4838486411

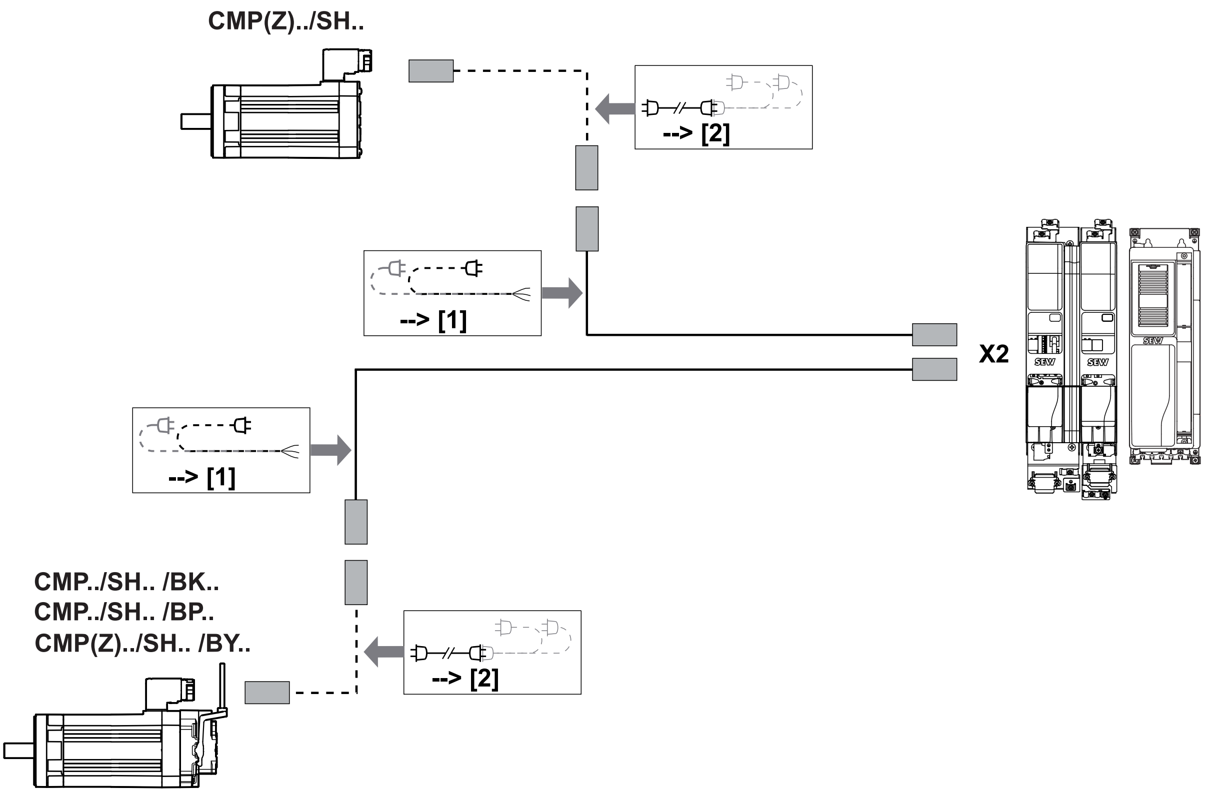
Types of HIPERFACE® encoder cables for terminal box

Number of cores and cable cross section	Part number	Installation type
6 × 2 × 0.25 mm²	13356291	Fixed installation
6 × 2 × 0.25 mm²	13356305	Cable carrier installation

28487486/EN – 02/2019

4.4 Single-cable technology for CMP.. motors

4.4.1 Overview



9007215244070283

[1] Motor/brakemotor cable [2] Extension cable

4.4.2 Types of motor/brakemotor cable

Plug connector	Number of cores and cable cross section	Part number	Installation type
SH11	4 × 1.5 mm^2 + 3 × 1 mm^2 + 4 × 0.34 mm^2	18177018	Cable carrier installation
SH12	4 × 2.5 mm^2 + 3 × 1 mm^2 + 4 × 0.34 mm^2	18177026	
SH14	4 × 4 mm^2 + 3 × 1 mm^2 + 4 × 0.34 mm^2	18177034	
SHB6	4 × 6 mm^2 + 3 × 1.5 mm^2 + 4 × 0.34 mm^2	18177042	
SHB10	4 × 10 mm^2 + 3 × 1.5 mm^2 + 4 × 0.34 mm^2	18177050	

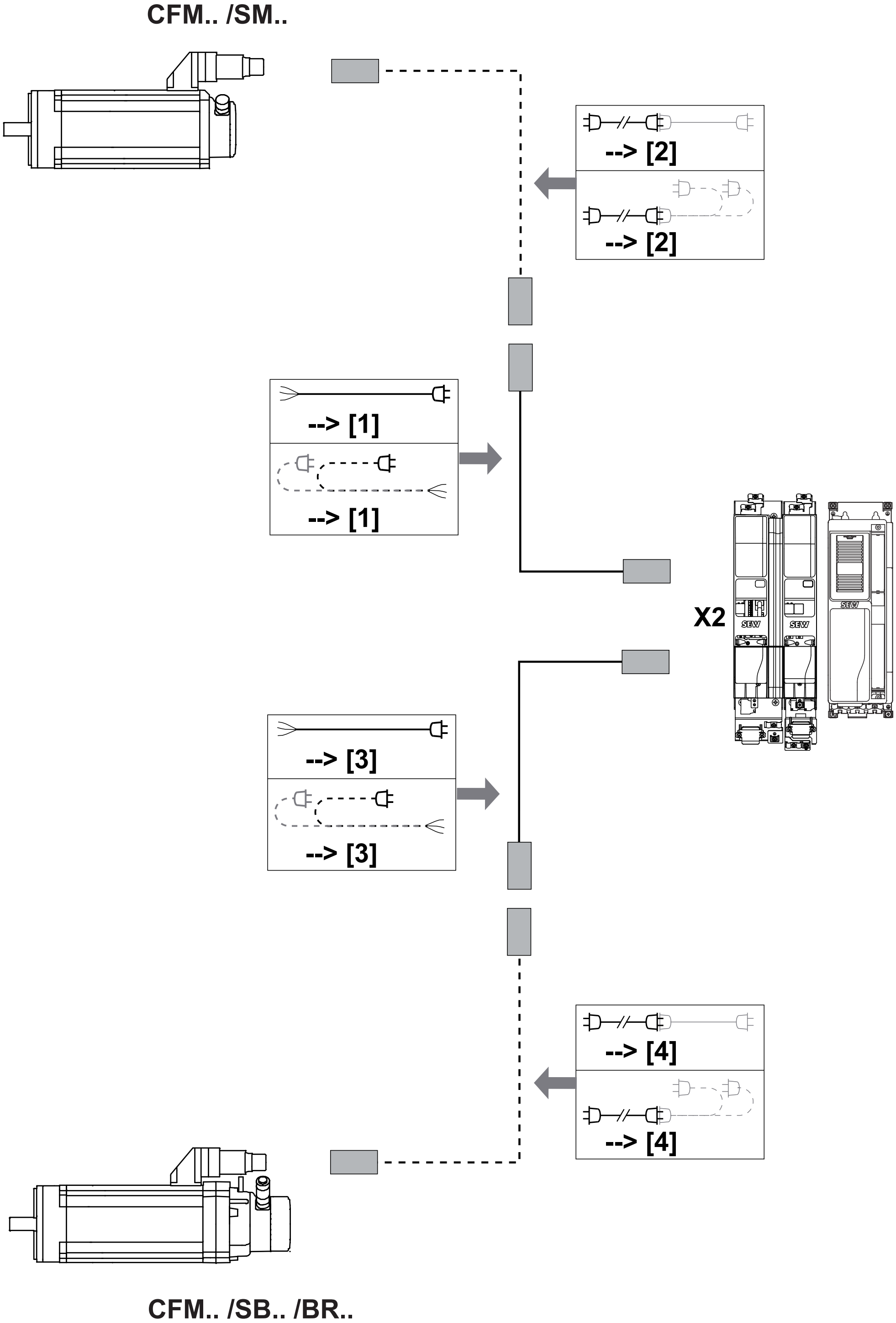
4.4.3 Types of extension cables

Plug connector	Number of cores and cable cross section	Part number	Installation type
SH11	4 × 1.5 mm^2 + 3 × 1 mm^2 + 4 × 0.34 mm^2	18177069	Cable carrier installation
SH12	4 × 2.5 mm^2 + 3 × 1 mm^2 + 4 × 0.34 mm^2	18177077	
SH14	4 × 4 mm^2 + 3 × 1 mm^2 + 4 × 0.34 mm^2	18177085	
SHB6	4 × 6 mm^2 + 3 × 1.5 mm^2 + 4 × 0.34 mm^2	18177093	
SHB10	4 × 10 mm^2 + 3 × 1.5 mm^2 + 4 × 0.34 mm^2	18177107	

28487486/EN – 02/2019

4.5 Power cables for CFM.. motors

4.5.1 Overview



9007214064524299

[1] Motor cable ../SM.. (→ 🗎 167)

[2] Motor extension cable ../SM.. (→ 🗎 168)

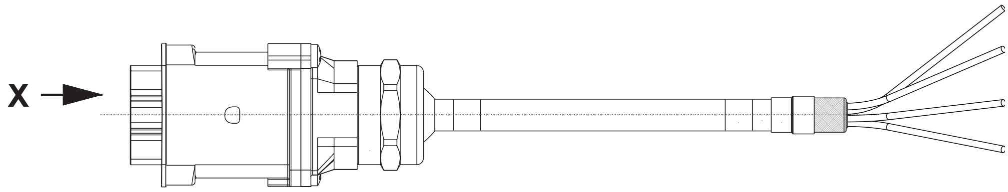
[3] Brakemotor cable ../SB.. /BR (→ 🗎 169)

[4] Brakemotor extension cable ../SB.. /BR (→ 🗎 170)

28487486/EN – 02/2019

4.5.2 Motor cable

Motor cable illustration



4836649099

Motor cable types

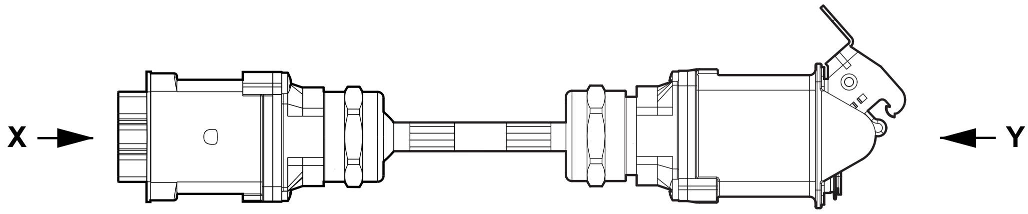
The cables are equipped with a connector for motor connection and conductor end sleeves for inverter connection.

Plug connector	Number of cores and cable cross section	Part number	Installation type
SM51/SM61	4 × 1.5 mm²	01991795	Fixed installation
SM51/SM61	4 × 1.5 mm²	13331140	Cable carrier installation
SM52/SM62	4 × 2.5 mm²	01991817	Fixed installation
SM52/SM62	4 × 2.5 mm²	13331159	Cable carrier installation
SM54/SM64	4 × 4 mm²	01991833	Fixed installation
SM54/SM64	4 × 4 mm²	01991841	Cable carrier installation
SM56/SM66	4 × 6 mm²	0199185X	Fixed installation
SM56/SM66	4 × 6 mm²	01991868	Cable carrier installation
SM59/SM69	4 × 10 mm²	01991876	Fixed installation
SM59/SM69	4 × 10 mm²	01991884	Cable carrier installation

28487486/EN – 02/2019

4.5.3 Motor extension cable

Illustration of motor extension cable



4838345099

Types of motor extension cables

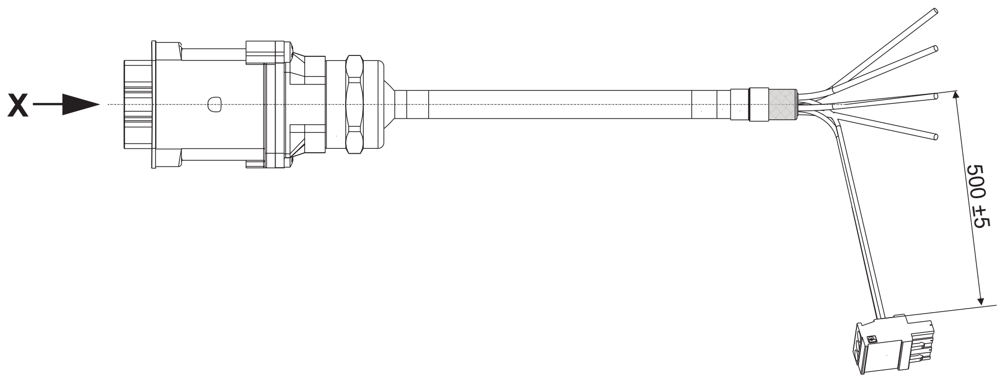
The cables are equipped with a connector and adapter for extending the CFM.. motor cable.

Plug connector	Number of cores and cable cross section	Part number	Installation type
SM51/SM61	4 × 1.5 mm²	01995499	Fixed installation
SM51/SM61	4 × 1.5 mm²	13331183	Cable carrier installation
SM52/SM62	4 × 2.5 mm²	01995510	Fixed installation
SM52/SM62	4 × 2.5 mm²	13331191	Cable carrier installation
SM54/SM64	4 × 4 mm²	01995537	Fixed installation
SM54/SM64	4 × 4 mm²	01995545	Cable carrier installation
SM56/SM66	4 × 6 mm²	01995553	Fixed installation
SM56/SM66	4 × 6 mm²	01995561	Cable carrier installation
SM59/SM69	4 × 10 mm²	0199557X	Fixed installation
SM59/SM69	4 × 10 mm²	01995588	Cable carrier installation

28487486/EN – 02/2019

4.5.4 Brakemotor cable

Illustration of brakemotor cable



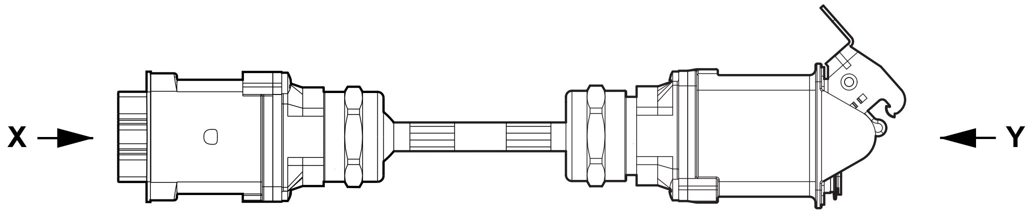
4838352907

Types of brakemotor cables

Plug connector	Number of cores and cable cross section	Part number	Installation type
SB51/SB61	4 × 1.5 mm² + 3 × 1.0 mm²	01991892	Fixed installation
SB51/SB61	4 × 1.5 mm² + 3 × 1.0 mm²	13331167	Cable carrier installation
SB52/SB62	4 × 2.5 mm² + 3 × 1.0 mm²	01991914	Fixed installation
SB52/SB62	4 × 2.5 mm² + 3 × 1.0 mm²	13331175	Cable carrier installation
SB54/SB64	4 × 4 mm² + 3 × 1.0 mm²	01991930	Fixed installation
SB54/SB64	4 × 4 mm² + 3 × 1.0 mm²	01991949	Cable carrier installation
SB56/SB66	4 × 6 mm² + 3 × 1.5 mm²	01991957	Fixed installation
SB56/SB66	4 × 6 mm² + 3 × 1.5 mm²	01991965	Cable carrier installation
SB59/SB69	4 × 10 mm² + 3 × 1.5 mm²	01991973	Fixed installation
SB59/SB69	4 × 10 mm² + 3 × 1.5 mm²	01991981	Cable carrier installation

4.5.5 Brakemotor extension cables

Illustration of brakemotor extension cable



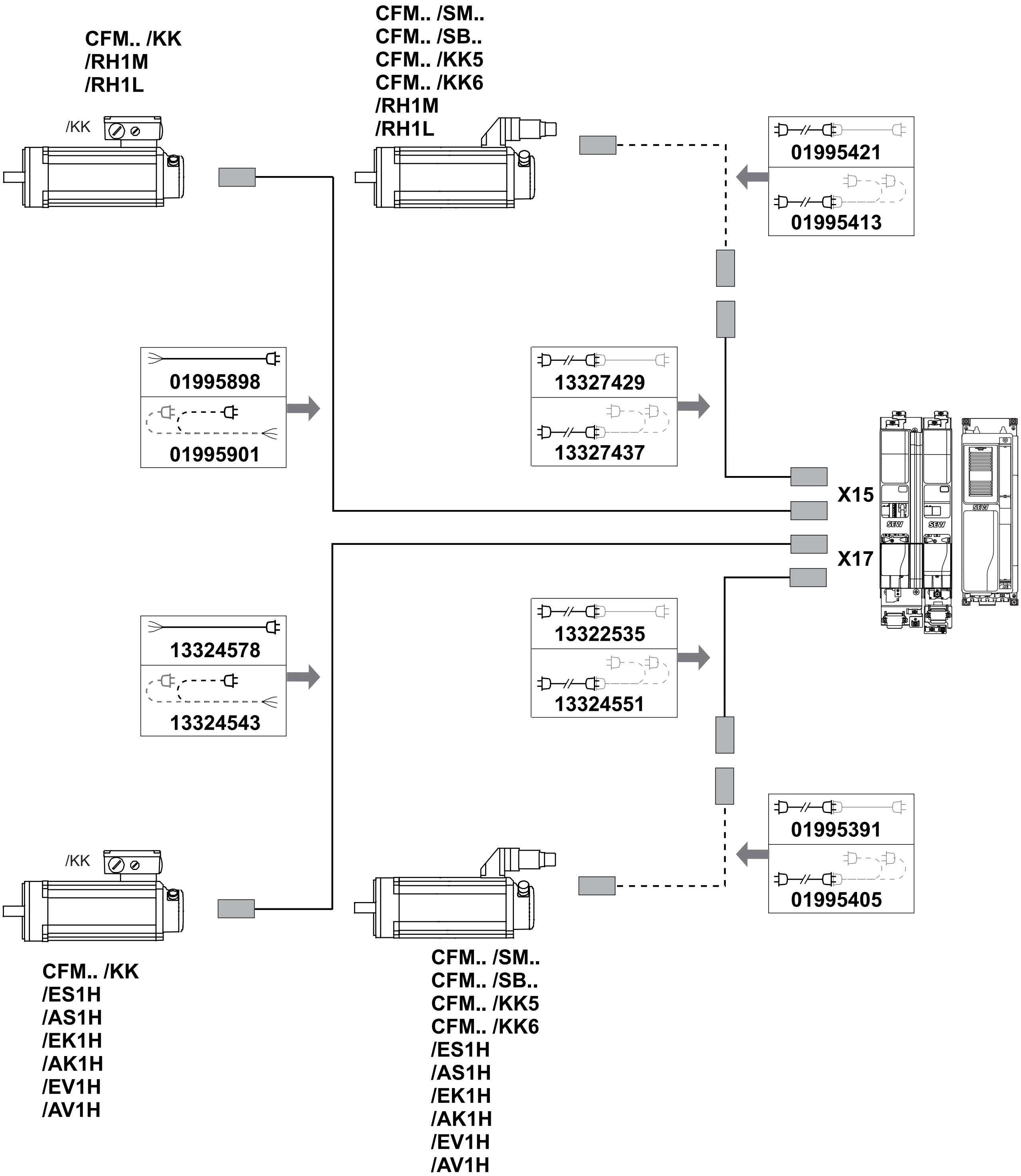
Types of brakemotor extension cables

Plug connector	Number of cores and cable cross section	Part number	Installation type
SK51/SK61	4 × 1.5 mm² + 3 × 1.0 mm²	0199199X	Fixed installation
SK51/SK61	4 × 1.5 mm² + 3 × 1.0 mm²	13331205	Cable carrier installation
SK52/SK62	4 × 2.5 mm² + 3 × 1.0 mm²	01992015	Fixed installation
SK52/SK62	4 × 2.5 mm² + 3 × 1.0 mm²	13331213	Cable carrier installation
SK54/SK64	4 × 4 mm² + 3 × 1.0 mm²	01992031	Fixed installation
SK54/SK64	4 × 4 mm² + 3 × 1.0 mm²	0199204X	Cable carrier installation
SK56/SK66	4 × 6 mm² + 3 × 1.5 mm²	01992058	Fixed installation
SK56/SK66	4 × 6 mm² + 3 × 1.5 mm²	01992066	Cable carrier installation
SK59/SK69	4 × 10 mm² + 3 × 1.5 mm²	01992074	Fixed installation
SK59/SK69	4 × 10 mm² + 3 × 1.5 mm²	01992082	Cable carrier installation

28487486/EN – 02/2019

4.6 Encoder cables for CFM.. motors

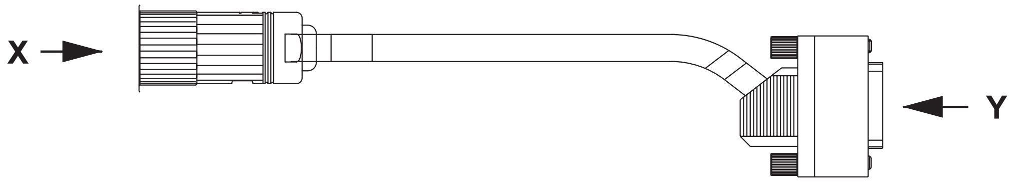
4.6.1 Overview



9007214064533131

4.6.2 Resolver

Illustration of RH1M/RH1L resolver cable

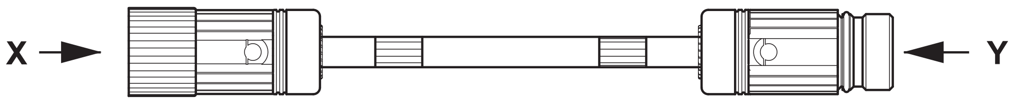


4819185931

Types of RH1M/RH1L resolver cables

Number of cores and cable cross section	Part number	Installation type
5 × 2 × 0.25 mm^2	13327429	Fixed installation
5 × 2 × 0.25 mm^2	13327437	Cable carrier installation

Illustration of RH1M/RH1L extension cable

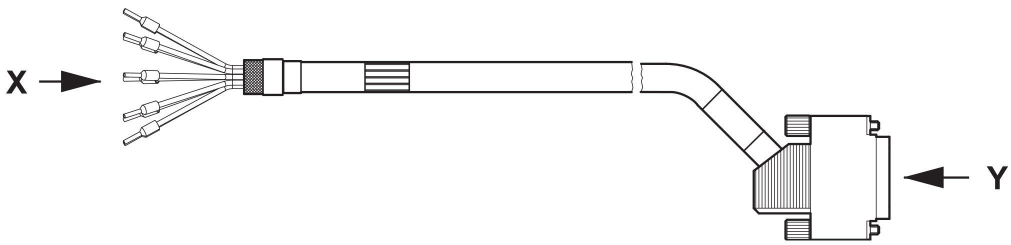


4819192715

Types of RH1M/RH1L extension cables

Number of cores and cable cross section	Part number	Installation type
5 × 2 × 0.25 mm^2	01995421	Fixed installation
5 × 2 × 0.25 mm^2	01995413	Cable carrier installation

Illustration of RH1M/RH1L resolver cable for terminal box



4838463371

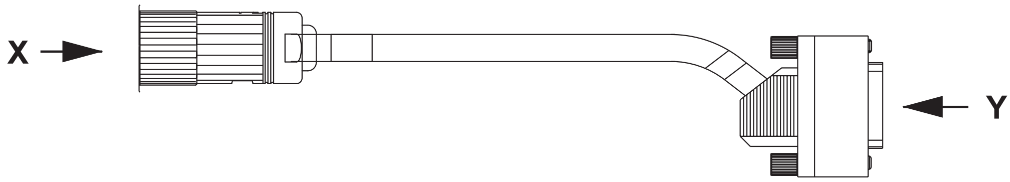
Types of RH1M/RH1L resolver cables for terminal box

Number of cores and cable cross section	Part number	Installation type
5 × 2 × 0.25 mm^2	13327623	Fixed installation
5 × 2 × 0.25 mm^2	13327631	Cable carrier installation

28487486/EN – 02/2019

4.6.3 HIPERFACE® encoders

Illustration of HIPERFACE® encoder cable

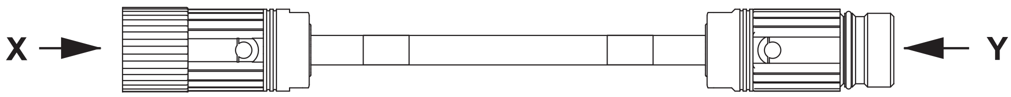


4819185931

Types of HIPERFACE® encoder cables

Number of cores and cable cross section	Part number	Routing
6 × 2 × 0.25 mm^2	13324535	Fixed installation
6 × 2 × 0.25 mm^2	13324551	Cable carrier installation

Illustration of HIPERFACE® encoder extension cable

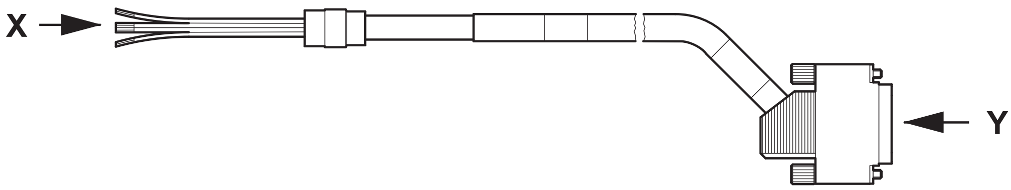


4819207051

Types of HIPERFACE® encoder extension cables

Number of cores and cable cross section	Part number	Routing
6 × 2 × 0.25 mm^2	01995391	Fixed installation
6 × 2 × 0.25 mm^2	01995405	Cable carrier installation

Illustration of HIPERFACE® encoder cable for terminal box



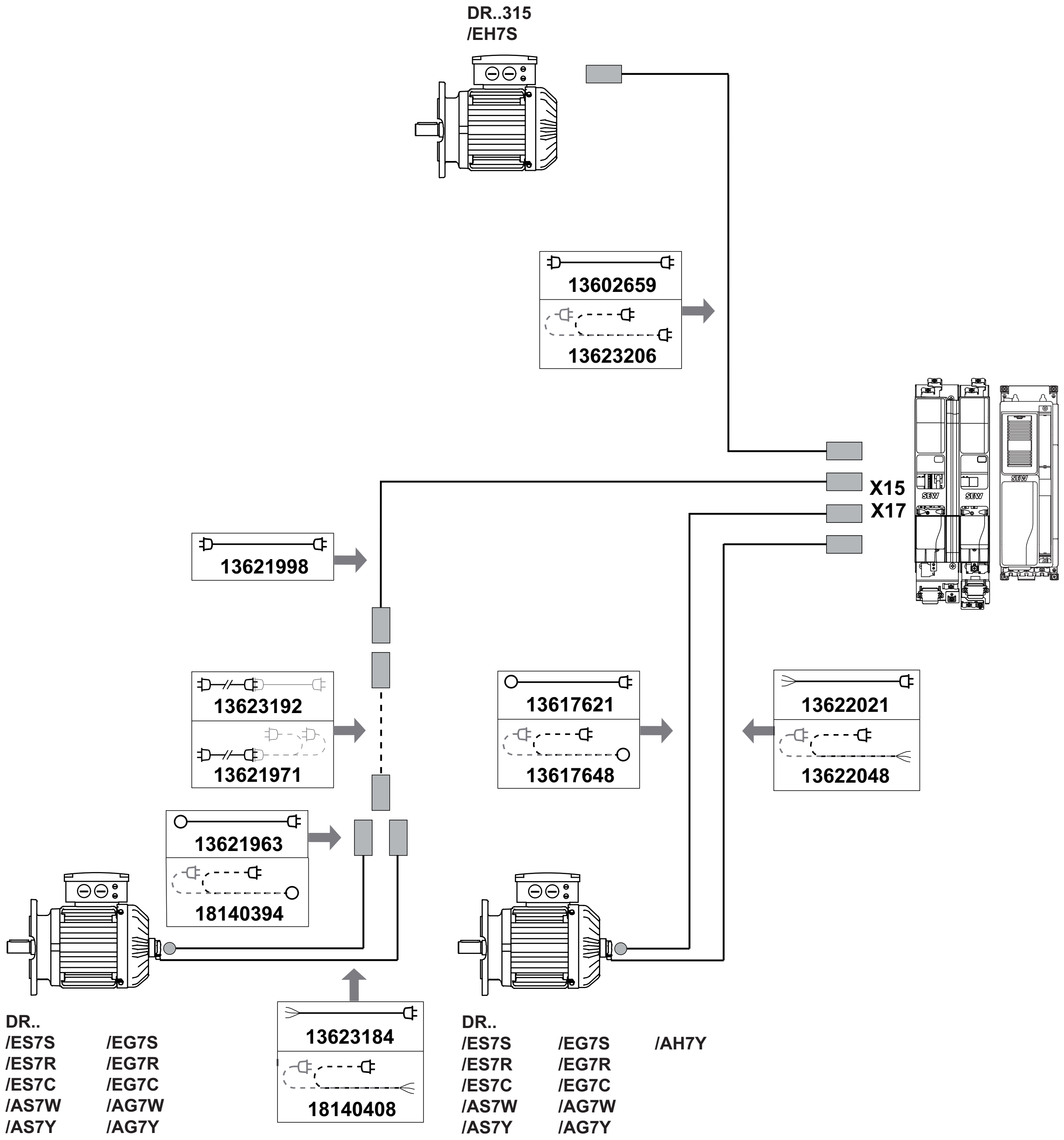
4838486411

Types of HIPERFACE® encoder cables for terminal box

Number of cores and cable cross section	Part number	Routing
5 × 2 × 0.25 mm^2	13356291	Fixed installation
5 × 2 × 0.25 mm^2	13356305	Cable carrier installation

4.7 Encoder cables for DR.. motors

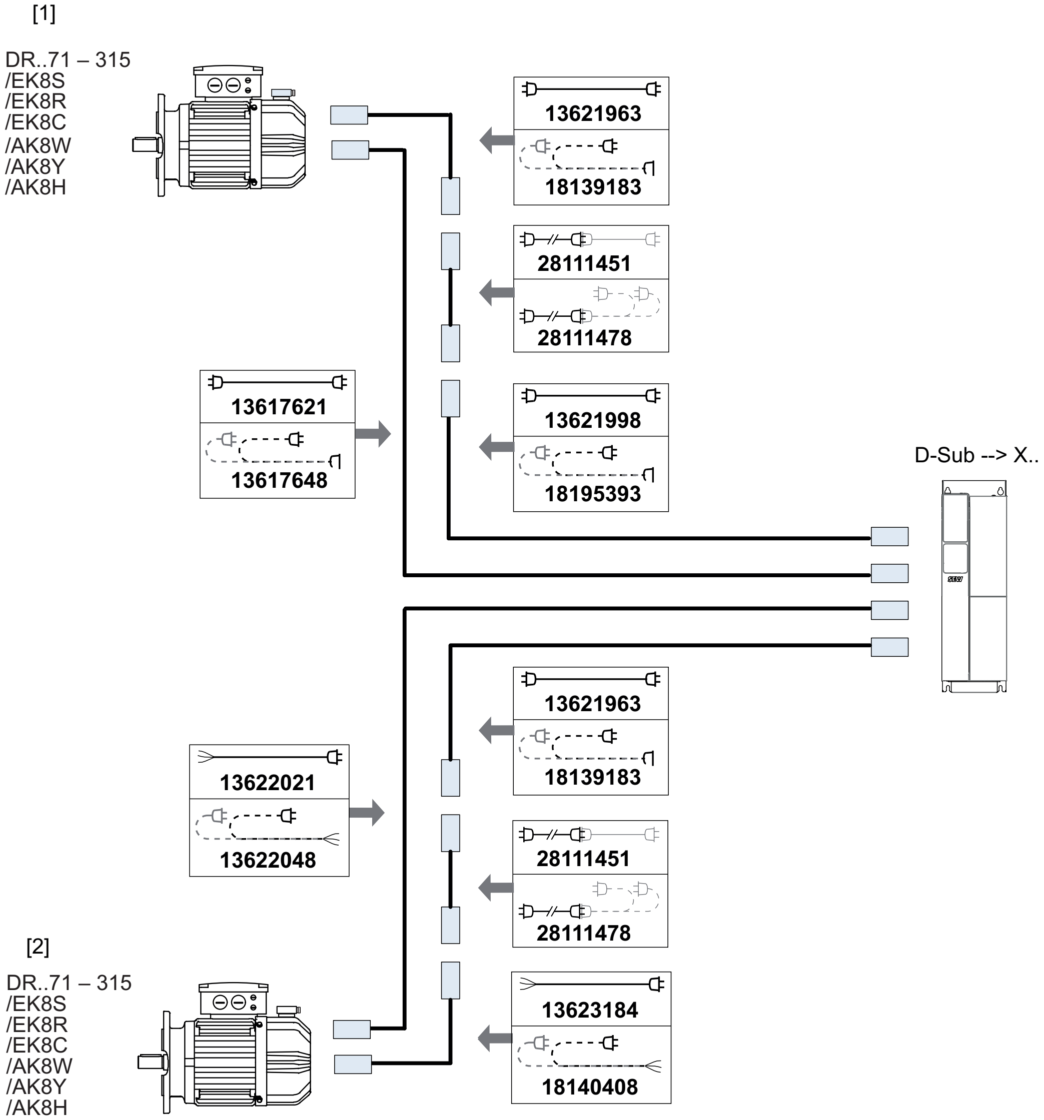
4.7.1 Overview



36028811835273611

28487486/EN – 02/2019

A.7Y encoders can be connected only to the CES11A (X17) multi-encoder card.

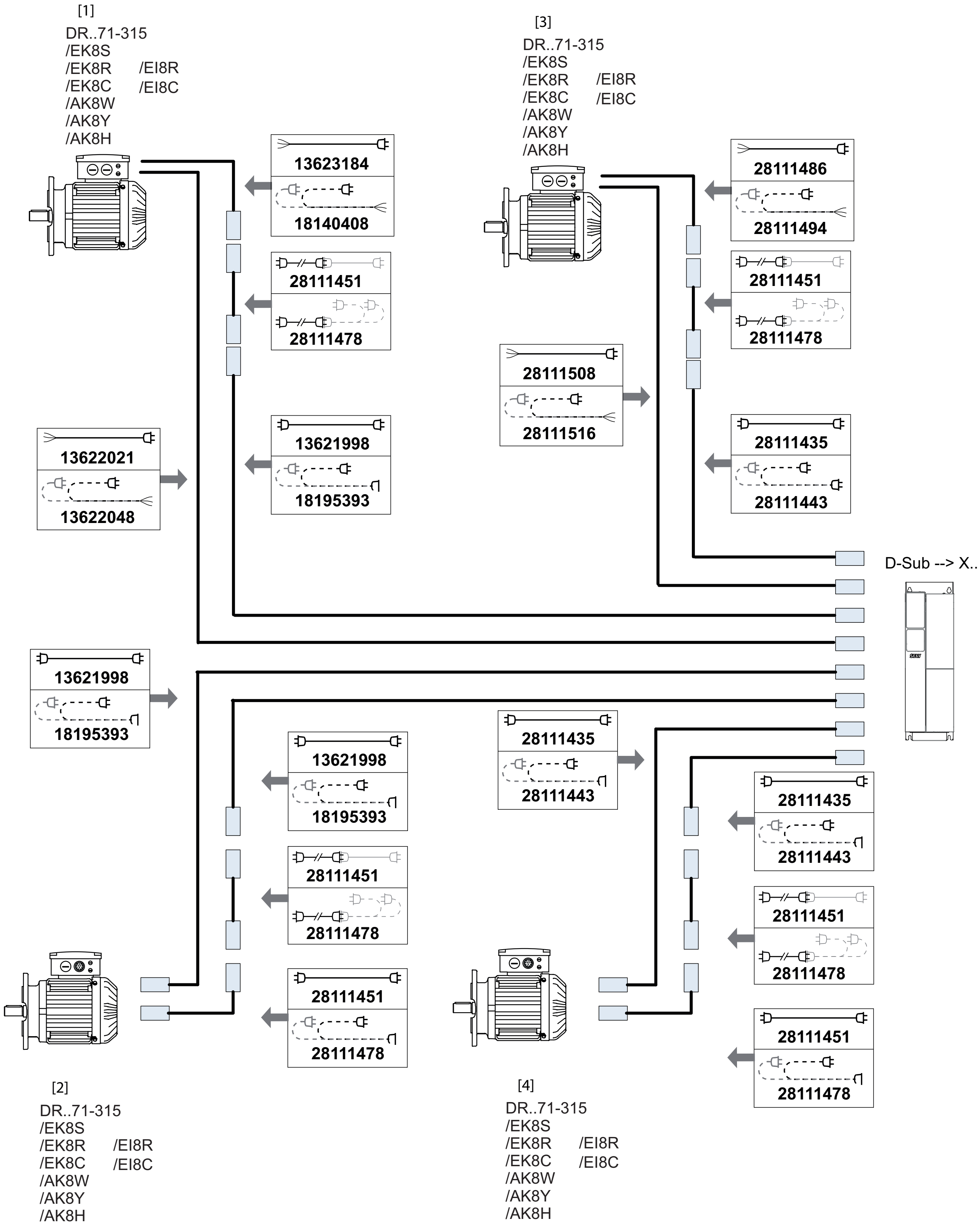


9007223738030731

D-Sub --> X.. MOVIDRIVE® modular/system/technology
Basic device: X15
CES11A multi-encoder card: X17
AK8Y encoders can be connected only to the CES11A multi-encoder card.

[1] Motors with integrated plug connector for encoder signals without connection cover, connection type A2GB.
The signals for thermal monitoring of the motor are not located in the encoder cable.

[2] Motors with integrated plug connector for encoder signals with connection cover, connection type A1GA.
The signals for thermal monitoring of the motor are not located in the encoder cable.



9007223738033163

D-Sub --> X.. MOVIDRIVE® modular/system/technology
Basic device: X15
CES11A multi-encoder card: X17
AK8Y encoders can be connected only to the CES11A multi-encoder card.

[1] Motors with terminal strip in the terminal box for encoder signals and thermal monitoring. The signals for thermal monitoring of the motor are not located in the encoder cable.

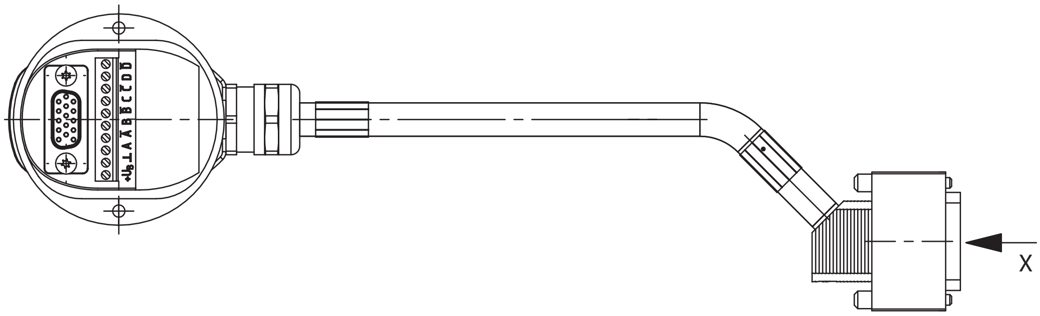
[2] Motors with M23 plug connector at terminal box for encoder signals, connection type AIGB. The signals for thermal monitoring of the motor are not located in the encoder cable.

[3] Motors with terminal strip in the terminal box for encoder signals and thermal monitoring. The signals for thermal monitoring of the motor are located in the encoder cable.

[4] Motors with an M23 plug connector at the terminal box for encoder signals and thermal monitoring, connection type AIGA.
The signals for thermal monitoring of the motor are located in the encoder cable.

4.7.2 Encoder cable with connection cover and D-sub

Illustration of encoder cable



14818281099

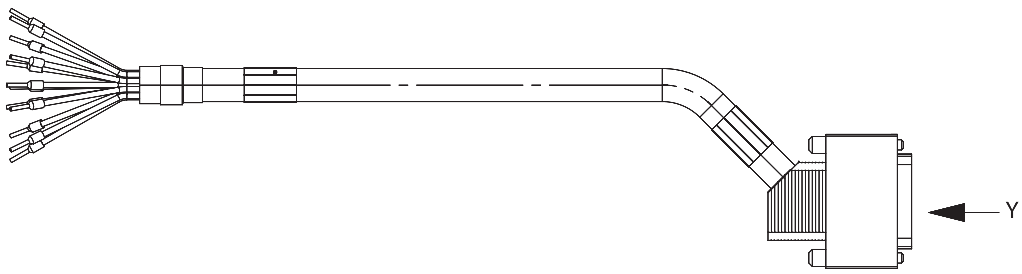
Types of encoder cables and encoders

Number of cores and cable cross section	Part number	Installation type
6 × 2 × 0.25 mm^2	13617621	Fixed installation
6 × 2 × 0.25 mm^2	13617648	Cable carrier installation

Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL	ES7R	EG7R
RS485	AS7W	AG7W

4.7.3 Encoder cable with conductor end sleeves and D-sub

Illustration of encoder cable



14818291467

Types of encoder cables and encoders

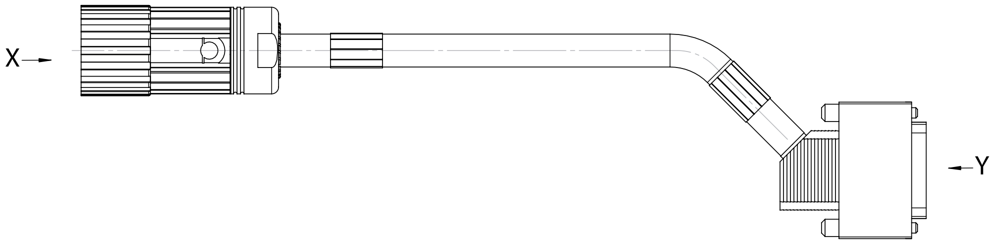
Number of cores and cable cross section	Part number	Installation type
6 × 2 × 0.25 mm^2	13622021	Fixed installation
6 × 2 × 0.25 mm^2	13622048	Cable carrier installation

Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL	ES7R	EG7R
RS485	AS7W	AG7W

28487486/EN – 02/2019

4.7.4 Encoder cable with M23 and D-sub

Illustration of encoder cable



14818370059

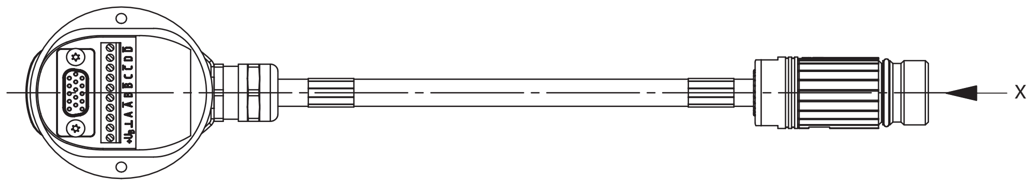
Types of encoder cables

Number of cores and cable cross section	Part number	Installation type
5 × 2 × 0.25 mm^2	13602659	Fixed installation
5 × 2 × 0.25 mm^2	13623206	Cable carrier installation

Encoder types	DR.315
Sine encoder	EH7S

4.7.5 Encoder extension cable with connection cover and M23

Illustration of encoder extension cable



14818380043

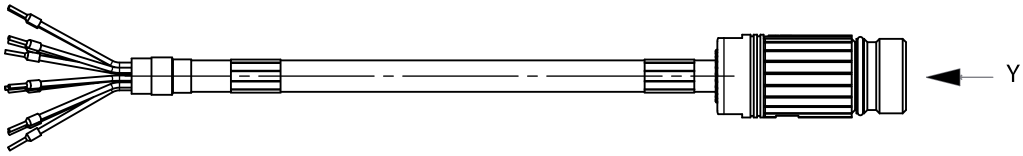
Types of encoder extension cables

Number of cores and cable cross section	Part number	Installation type
6 × 2 × 0.25 mm^2	13621963	Fixed installation

Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL	ES7R	EG7R
RS485	AS7W	AG7W

4.7.6 Encoder extension cable with conductor end sleeves and M23

Illustration of encoder extension cable



14818388875

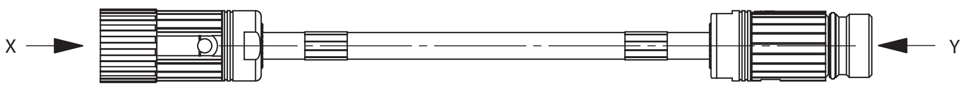
Types of encoder extension cables

Number of cores and cable cross section	Part number	Installation type
6 × 2 × 0.25 mm^2	13623184	Fixed installation

Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL	ES7R	EG7R
RS485	AS7W	AG7W

4.7.7 Encoder extension cable with two M23

Illustration of encoder extension cable



14818397963

Types of encoder extension cables

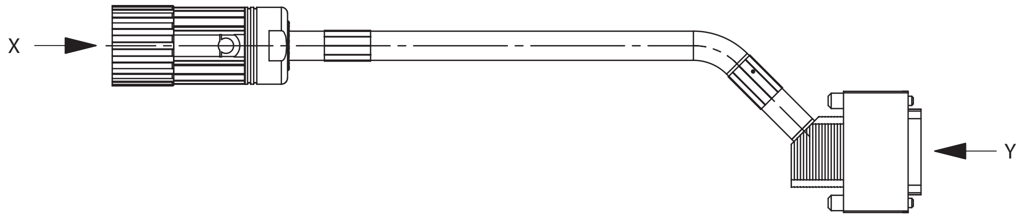
Number of cores and cable cross section	Part number	Installation type
6 × 2 × 0.25 mm^2	13623192	Fixed installation
6 × 2 × 0.25 mm^2	13621971	Cable carrier installation

Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL	ES7R	EG7R
RS485	AS7W	AG7W

28487486/EN – 02/2019

4.7.8 Encoder extension cable with M23 and D-sub

Illustration of encoder extension cable



14818406795

Types of encoder extension cables

Number of cores and cable cross section	Part number	Installation type
6 × 2 × 0.25 mm^2	13621998	Fixed installation

Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL	ES7R	EG7R
RS485	AS7W	AG7W

4.8 System bus and module bus cable

The RJ45 connectors of the system bus and module bus cables and the sockets in the application inverters have been checked for mechanical stability and contact reliability by SEW-EURODRIVE. SEW-EURODRIVE recommends using the system bus and module bus cables listed below. If other cables and connectors are used, SEW-EURODRIVE does not make any statements regarding the quality of the plug-in connection.

NOTICE

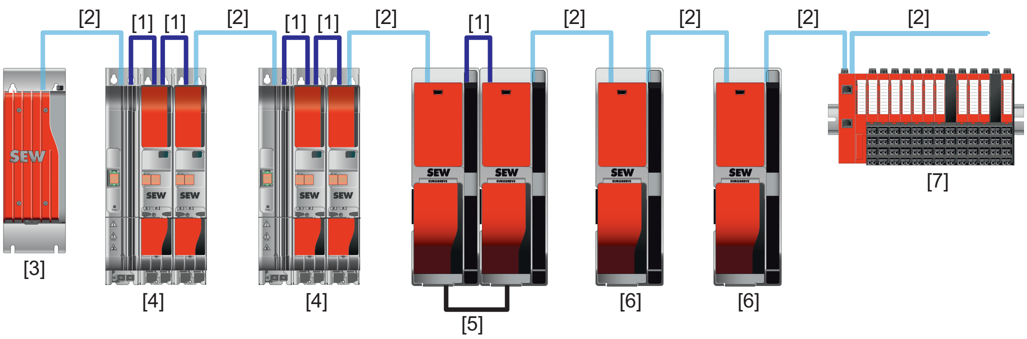
Use of wrong cables

Damage to the application inverter

Only 4-pole cables are permitted for use as system bus cables [2]. If an 8-pole cable is used, malfunctions or failures may occur at the connected devices.

4.8.1 System bus and module bus cabling

Example of a system bus and module bus cabling



9007217271733643

[1] Module bus cable: EtherCAT®/SBus^{PLUS} and internal signals, 8-pole, color: anthracite

[2] System bus cable: EtherCAT®/SBus^{PLUS}, 4-pole, color: light gray

[3] MOVI-C® CONTROLLER power UHX8x

[4] MOVIDRIVE® modular

[5] MOVIDRIVE® system/technology with DC link connection

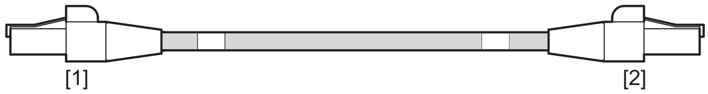
[6] MOVIDRIVE® system/technology

[7] Other EtherCAT® stations at the EtherCAT®/SBus^{PLUS}

28487486/EN – 02/2019

4.8.2 System bus cable

Figure of the cable



9007214291596811

[1] Connector, red

[2] Connector, red

The 4-pole system bus cable [2] for EtherCAT® and SBus^{PLUS} is used between the automation components; see figure (→ 🗎 182). Some of these components are listed here as examples:

- MOVI-C® CONTROLLER
- MOVIDRIVE® modular application inverter
- PC with MOVISUITE® engineering software
- MOVI-PLC® I/O system
- Other EtherCAT® stations at the EtherCAT®/SBus^{PLUS}

The following lengths of the system bus cable are available for fixed installation.

Cable length	Part number	Cable assignment for MOVIDRIVE® system
0.29 m	18179959	MDX9_A-0020 – 0160-.. with devices directly next to each other
0.75 m	18167039	MDX9_A-0460 – 1130-.. with devices directly next to each other
1.5 m	18179975	MDX9_A-.. with devices not directly next to each other
3.0 m	18167047	MDX9_A-.. with devices not directly next to each other
5 m	18179983	MDX9_A-.. with devices not directly next to each other
10 m	18179991	MDX9_A-.. with devices not directly next to each other

If you use system bus cables from other manufacturers, it is necessary to comply with the relevant requirements of the "EtherCAT® Technology Group" (ETG). On this subject, note the "EtherCAT® Installation Guideline" from the ETG

Pin assignment

The prefabricated system bus cables are assigned according to EIA/TIA-568A. Also use this assignment for prefabrication in the field.

Pin	Color coding
1	White/green
2	Green
3	White/orange
4	Reserved

28487486/EN – 02/2019

Pin	Color coding
5	Reserved
6	Orange
7	Reserved
8	Reserved

28487486/EN – 02/2019

4.8.3 Module bus cable

Figure

18027071371

[1] Connector, black

[2] Connector, red

For MOVIDRIVE® modular, the 8-pole module bus cable [1] for EtherCAT®/SBus^{PLUS} and internal signals connects the power supply module to the first axis module and the axis modules to each other; see figure (→ 🗎 182).

For MOVIDRIVE® system/technology, the module bus cable is used when 2 application inverters are connected in the DC link.

In the case of MOVIDRIVE® modular, in addition to the system bus communication, the module bus is routed in the cable for information inside the device. The module bus cable is delivered in the length required as part of the accessories for the axis modules.

A module bus cable for MOVIDRIVE® system/technology in the required length must be ordered separately.

If the module bus cable for MOVIDRIVE® modular is needed as a spare part, it can be ordered with the following part numbers.

Cable length	Part number	Replacement cable for MOVIDRIVE® modular	Cable assignment for MOVIDRIVE® system/ technology
0.23 m	18166989	MDA90A-0020 – 0120-.. MDD90A-0020 – 0040-..	–
0.26 m	18166997	MDA90A-0160 – 0240-.. MDD90A-0020 – 0080-..	–
0.29 m	18167004	MDP90A-0100-...-C00 MDA90A-0320 – 0480-..	MDX9_A-0020 – 0160-.. with devices directly next to each other
0.35 m	18167012	MDP90A-0500 – 0750-.. MDA90A-0640 – 1000-..	–
0.44 m	18167020	MDA90A-1400 – 1800-..	MDX9_A-0460 – 1130-.. with devices directly next to each other
1.6 m	18174205	–	MDX9_A-.. with devices not directly next to each other

5 General information

5.1 About this documentation

The current version of the documentation is the original.

This documentation is an integral part of the product. The documentation is intended for all employees who perform work on the product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the systems and their operation as well as persons who work on the product independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

5.2 Structure of the safety notes

5.2.1 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 product or its environment
INFORMATION	Useful information or tip: Simplifies handling of the product.	

5.2.2 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.

28487486/EN – 02/2019

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 about suspended load
	Warning of automatic restart

5.2.3 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.

5.3 Decimal separator in numerical values

In this document, a period is used to indicate the decimal separator.

Example: 30.5 kg

5.4 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the product.

5.5 Content of the documentation

This documentation contains additional safety-related information and conditions for operation in safety-related applications.

5.6 Other applicable documentation

Observe the corresponding documentation for all further components.

5.7 Product names and trademarks

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

5.7.1 Trademark of Beckhoff Automation GmbH

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

5.8 Copyright notice

28487486/EN – 02/2019

5.9 Device availability

This documentation also lists devices that are not yet available at the time of the publication of this document.

The following table lists the available application inverters. Accessories required for the inverter operation such as braking resistors, chokes, and filters are available.

Type designation
MDX9_A-0020-5E3-4-S00/E00
MDX9_A-0025-5E3-4-S00/E00
MDX9_A-0032-5E3-4-S00/E00
MDX9_A-0040-5E3-4-S00/E00
MDX9_A-0055-5E3-4-S00/E00
MDX9_A-0070-5E3-4-S00/E00
MDX9_A-0095-5E3-4-S00/E00
MDX9_A-0125-5E3-4-S00/E00
MDX9_A-0160-5E3-4-S00/E00
MDX9_A-0240-503-4-S00/E00
MDX9_A-0320-503-4-S00/E00
MDX9_A-0460-503-4-S00/E00
MDX9_A-0620-503-4-S00/E00
MDX9_A-0750-503-4-S00/E00
MDX91A-0910-503-4-S00/E00
MDX91A-1130-503-4-S00/E00
MDX91A-1490-503-4-S00/E00
MDX9_A-0070-2E3-4-S00/E00
MDX9_A-0093-2E3-4-S00/E00
MDX9_A-0140-2E3-4-S00/E00
MDX9_A-0213-203-4-S00/E00
MDX9_A-0290-203-4-S00/E00
MDX9_A-0420-203-4-S00/E00
MDX9_A-0570-203-4-S00/E00
MDX91A-0840-203-4-S00/E00
MDX91A-1080-203-4-S00/E00

28487486/EN – 02/2019

6 Safety notes

6.1 Preliminary information

The following general safety notes serve the purpose of preventing injury to persons and damage to property. They primarily apply to the use of products described in this documentation. If you use additional components, also observe the relevant warning and safety notes.

6.2 Duties of the user

As the user, you must ensure that the basic safety notes are observed and complied with. Make sure that persons responsible for the machinery and its operation as well as persons who work on the device independently have read through the documentation carefully and understood it.

As the user, you must ensure that all of the work listed in the following is carried out only by qualified specialists:

- Setup and installation
- Installation and connection
- Startup
- Maintenance and repairs
- Shutdown
- Disassembly

Ensure that the persons who work on the product pay attention to the following regulations, conditions, documentation, and information:

- National and regional safety and accident prevention regulations
- Warning and safety signs on the product
- All other relevant project planning documents, installation and startup instructions, and wiring diagrams
- Do not assemble, install or operate damaged products
- All system-specific specifications and conditions

Ensure that systems in which the product is installed are equipped with additional monitoring and protection devices. Observe the applicable safety regulations and legislation governing technical work equipment and accident prevention regulations.

6.3 Target group

Specialist for mechanical work

Any mechanical work may only be performed by adequately qualified specialists. Specialists in the context of this documentation are persons familiar with the design, mechanical installation, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualification in the mechanical area in accordance with the national regulations
- Familiarity with this documentation

28487486/EN – 02/2019

Specialist for electrotechnical work

Any electrotechnical work may only be performed by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualification in the electrotechnical area in accordance with the national regulations
- Familiarity with this documentation

Additional qualification

In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation. The persons must have the express authorization of the company to operate, program, parameterize, label, and ground units, systems, and circuits in accordance with the standards of safety technology.

Instructed persons

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately. The purpose of the instruction is that the persons are capable of performing the required tasks and work steps in a safe and correct manner.

6.4 Designated use

The product is intended for control cabinet installation in electrical plants or machines.

In case of installation in electrical systems or machines, startup of the product is prohibited until it is determined that the machine meets the requirements stipulated in the local laws and directives. For Europe, Machinery Directive 2006/42/EC as well as the EMC Directive 2014/30/EU apply. Observe EN 60204-1 (Safety of machinery - electrical equipment of machines). The product meets the requirements stipulated in the Low Voltage Directive 2014/35/EU.

The standards given in the declaration of conformity apply to the product.

The systems can be mobile or stationary.

The product can be used to operate the following motors in industrial and commercial systems:

- AC asynchronous motors with squirrel-cage rotor
- Permanent-field AC synchronous motors

Technical data and information on the connection conditions are provided on the nameplate and in the chapter "Technical data" in the documentation. Always comply with the data and conditions.

Unintended or improper use of the product may result in severe injury to persons and damage to property.

6.4.1 Hoist applications

To avoid danger of fatal injury due to falling hoists, observe the following points when using the product in lifting applications:

- Use mechanical protection devices.

Application in ELSM® control mode

When the inverter is operated in ELSM® control mode, using it in lifting applications is not permitted. In this control mode only applications of horizontal materials handling are permitted.

28487486/EN – 02/2019

6.5 Functional safety technology

The product must not perform any safety functions without a higher-level safety system, unless explicitly allowed by the documentation.

6.6 Transport

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product is damaged, it must not be assembled, installed or started up.

Observe the following notes when transporting the device:

- Ensure that the product is not subject to mechanical impact.

If necessary, use suitable, sufficiently dimensioned handling equipment.

Observe the information on climatic conditions in the chapter "Technical data" of the documentation.

28487486/EN – 02/2019

6.7 Installation/assembly

Ensure that the product is installed and cooled according to the regulations in this documentation.

Protect the product from excessive mechanical strain. Ensure that elements are not deformed or insulation spaces are maintained, particularly during transportation. Electric components must not be mechanically damaged or destroyed.

Observe the notes in the chapter "Mechanical installation".

6.7.1 Restrictions of use

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

- Use in potentially explosive atmospheres
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation
- Operation in applications with impermissibly high mechanical vibration and shock loads in excess of the regulations stipulated in EN 61800-5-1
- Use at an elevation of more than 3800 m above sea level

The product can be used at altitudes above 1000 m above sea level up to 3800 m above sea level under the following conditions:

- Taking the reduced continuous rated current into consideration, see the chapter "Technical data" of the documentation.
- Above 2000 m asl, the air and creeping distances are only sufficient for overvoltage class II according to EN 60664. If the installation requires overvoltage category III according to EN 60664 you have to reduce the overvoltages on the system side from category III to II using additional external overvoltage protection.
- If a protective electrical separation is required, then implement this outside the product at altitudes of more than 2000 m above sea level (protective separation in accordance with EN 61800-5-1 and EN 60204-1).

6.8 Electrical installation

Ensure that all of the required covers are correctly attached after carrying out the electrical installation.

Make sure that preventive measures and protection devices comply with the applicable regulations (e.g. EN 60204-1 or EN 61800-5-1).

6.8.1 Required preventive measure

Make sure that the product is correctly attached to the ground connection.

6.8.2 Stationary application

Necessary preventive measure for the product is:

Type of energy transfer	Preventive measure
Direct power supply	• Ground connection

6.8.3 Regenerative operation

The drive is operated as a generator due to the kinetic energy of the system/machine. Before opening the connection box, secure the output shaft against rotation.

6.9 Protective separation

The product meets all requirements for protective separation of power and electronics connections in accordance with EN 61800-5-1. To ensure protective separation, all connected circuits must also meet the requirements for protective separation.

6.10 Startup/operation

Observe the safety notes in the chapters Startup and Operation in this documentation.

Make sure the connection boxes are closed and screwed before connecting the supply voltage.

Depending on the degree of protection, products may have live, uninsulated, and sometimes moving or rotating parts, as well as hot surfaces during operation.

When the device is switched on, dangerous voltages are present at all power connections as well as at any connected cables and terminals. This also applies even when the product is inhibited and the motor is at standstill.

Risk of burns due to arcing: Do not disconnect power connections during operation. Do not connect power connections during operation.

If you disconnect the product from the voltage supply, do not touch any live components or power connections because capacitors might still be charged. Observe the following minimum switch-off time:

10 minutes.

Observe the corresponding information signs on the product.

The fact that the operation LED and other display elements are no longer illuminated does not indicate that the product has been disconnected from the supply system and no longer carries any voltage.

Mechanical blocking or internal protective functions of the product can cause a motor standstill. Eliminating the cause of the problem or performing a reset may result in the drive restarting automatically. If, for safety reasons, this is not permitted for the drive-controlled machine, first disconnect the product from the supply system and then start troubleshooting.

Risk of burns: The surface temperature of the product can exceed 60 °C during operation. Do not touch the product during operation. Let the product cool down before touching it.

6.10.1 Energy storage unit

Products with a connected energy storage unit are not necessarily de-energized when they have been disconnected from the supply system. Usually, the energy storage unit stores sufficient energy to continue operation of the connected motors for a limited period of time. It is not sufficient to observe a minimum switch-off time.

Perform a shutdown as described in the documentation in the chapter "Service" > "Shutdown".

28487486/EN – 02/2019

7 Device structure

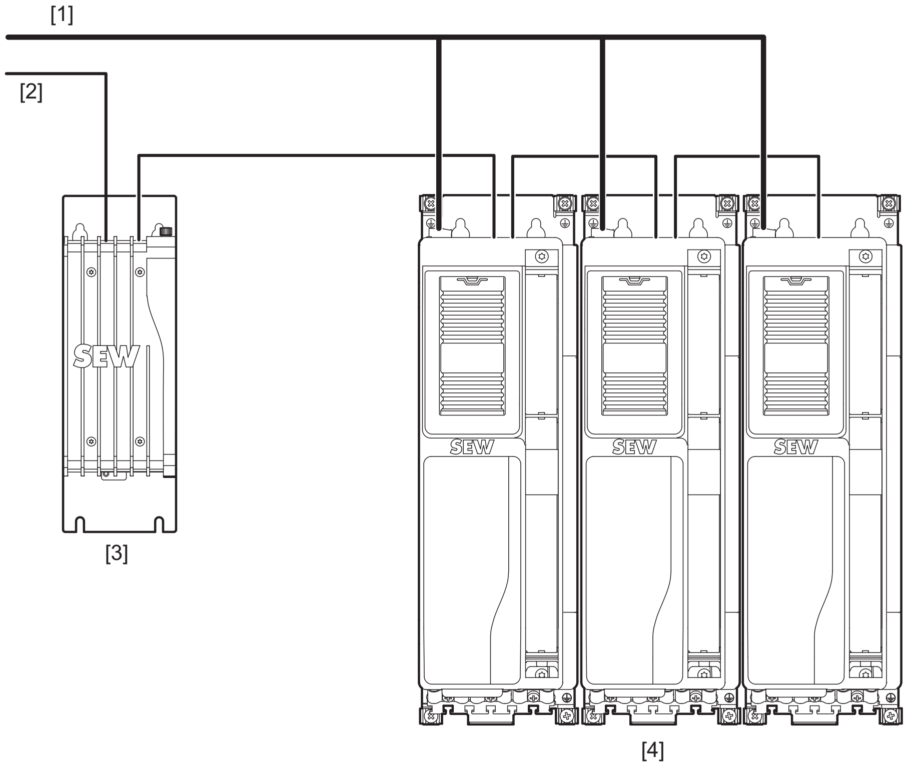
7.1 Connection variants

The MOVIDRIVE® system application inverter can be used in the following connection variants:

- As application inverter in connection with a MOVI-C® CONTROLLER power/power eco.
- As application inverter in connection with a MOVI-C® CONTROLLER advanced
- As application inverter in connection with a MOVI-C® CONTROLLER standard

7.1.1 Application inverter with MOVI-C® CONTROLLER power/power eco

MOVIDRIVE® system

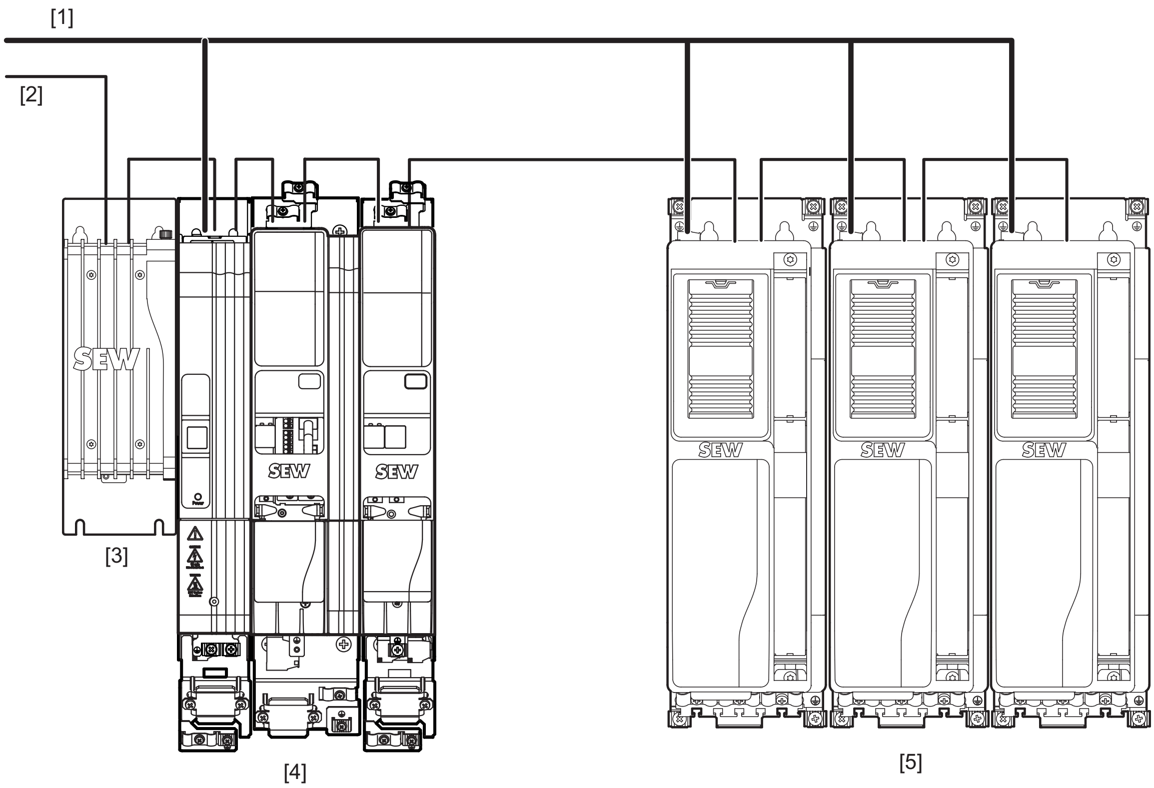


9007214102794635

[1] Line voltage
[2] Industrial communication
[3] MOVI-C® CONTROLLER
[4] MOVIDRIVE® system

28487486/EN – 02/2019

MOVIDRIVE® modular and MOVIDRIVE® system



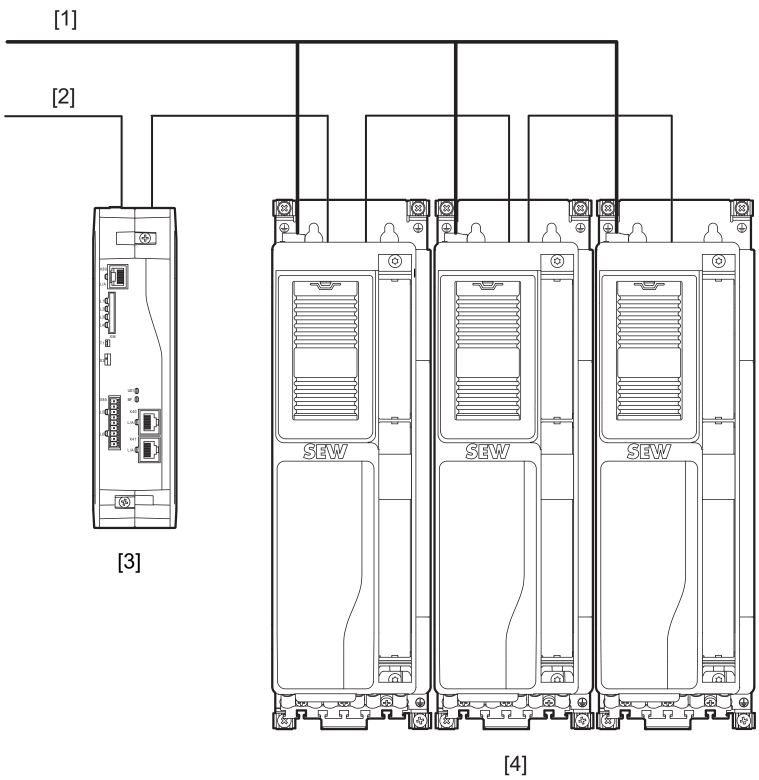
9007214127262859

[1] Line voltage
[2] Industrial communication
[3] MOVI-C® CONTROLLER
[4] MOVIDRIVE® modular axis system
[5] MOVIDRIVE® system

28487486/EN – 02/2019

7.1.2 Application inverter with MOVI-C® CONTROLLER advanced

MOVIDRIVE® system



20972835467

[1] Line voltage 3 × AC 380 – 500 V

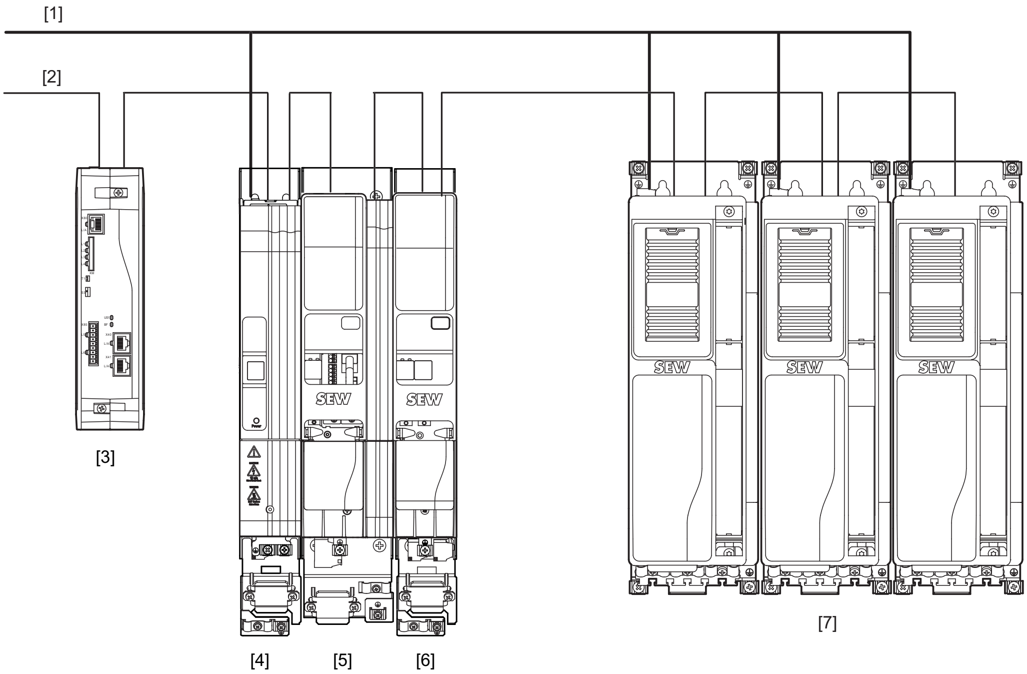
[2] Industrial communication

[3] MOVI-C® CONTROLLER advanced

[4] MOVIDRIVE® system

28487486/EN – 02/2019

MOVIDRIVE® modular and MOVIDRIVE® system



20840829579

[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial communication

[3] MOVI-C® CONTROLLER advanced

[4] MOVIDRIVE® modular power supply module MDP..

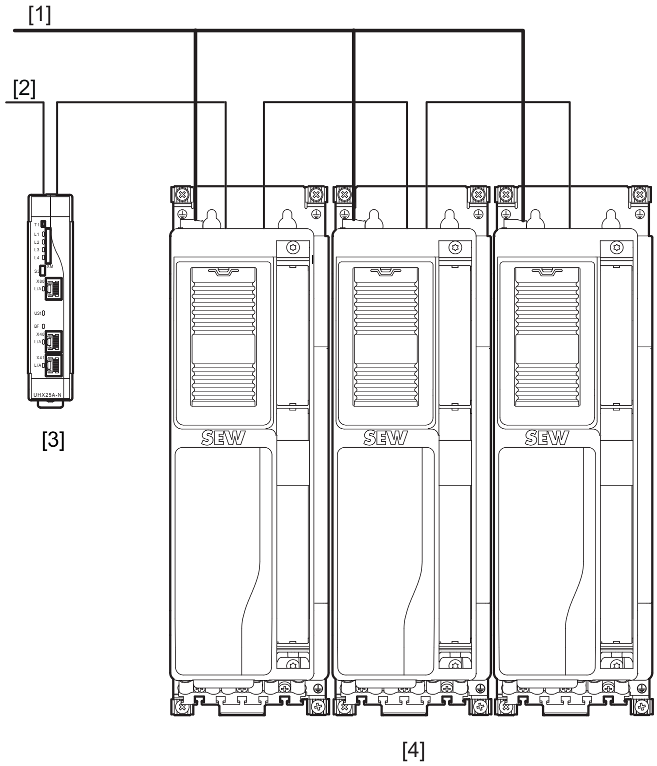
[5] MOVIDRIVE® modular single-axis module MDA.

[6] MOVIDRIVE® modular double-axis module MDD..

[7] MOVIDRIVE® system

7.1.3 Application inverter with MOVI-C® CONTROLLER standard

MOVIDRIVE® system



20972837899

[1] Line voltage 3 × AC 380 – 500 V

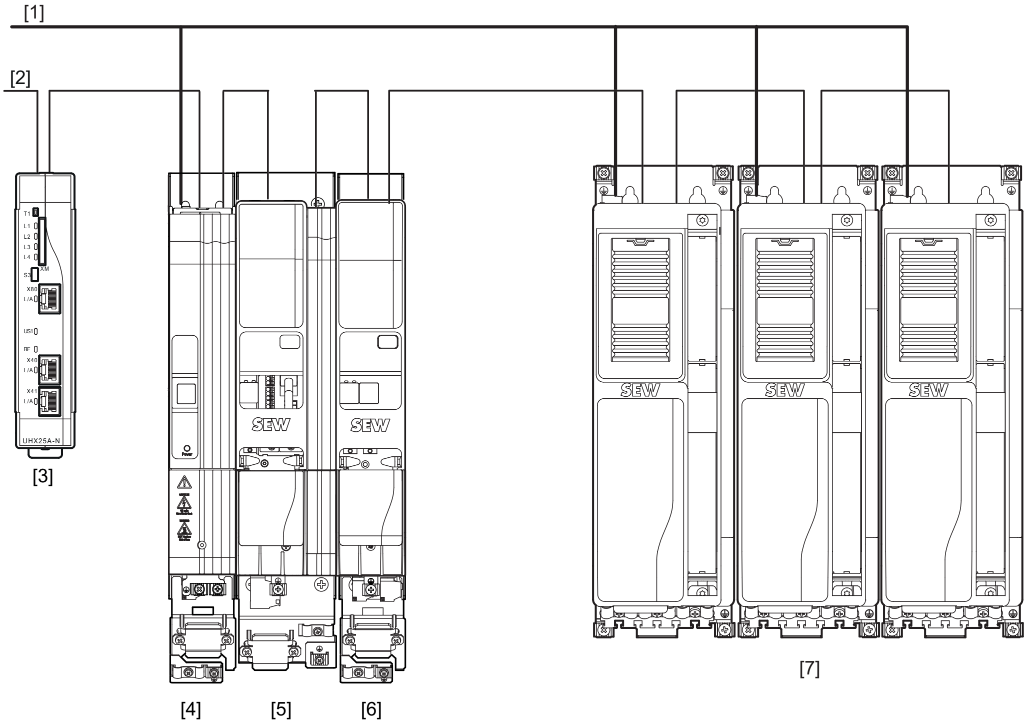
[2] Industrial communication

[3] MOVI-C® CONTROLLER standard

[4] MOVIDRIVE® system

28487486/EN – 02/2019

MOVIDRIVE® modular and MOVIDRIVE® system



20841203211

[1] Line voltage 3 × AC 380 – 500 V

[2] Industrial Communication

[3] MOVI-C® CONTROLLER standard

[4] MOVIDRIVE® modular power supply module MDP..

[5] MOVIDRIVE® modular single-axis module MDA.

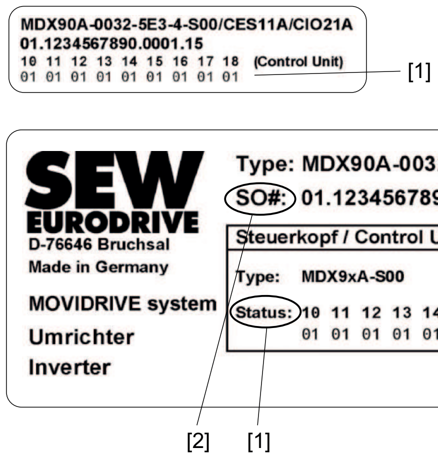
[6] MOVIDRIVE® modular double-axis module MDD..

[7] MOVIDRIVE® system

28487486/EN – 02/2019

7.2 MOVIDRIVE® system nameplate

7.2.1 System nameplate

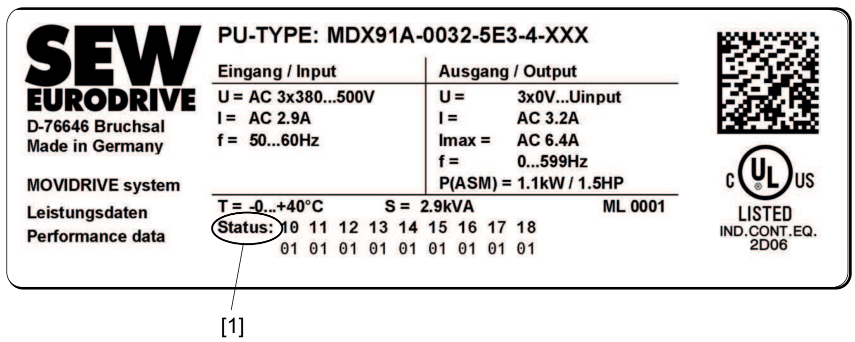


18014413567942667

[1] Device status

[2] Serial number

7.2.2 Performance data nameplate



23907979019

[1] Device status

28487486/EN – 02/2019

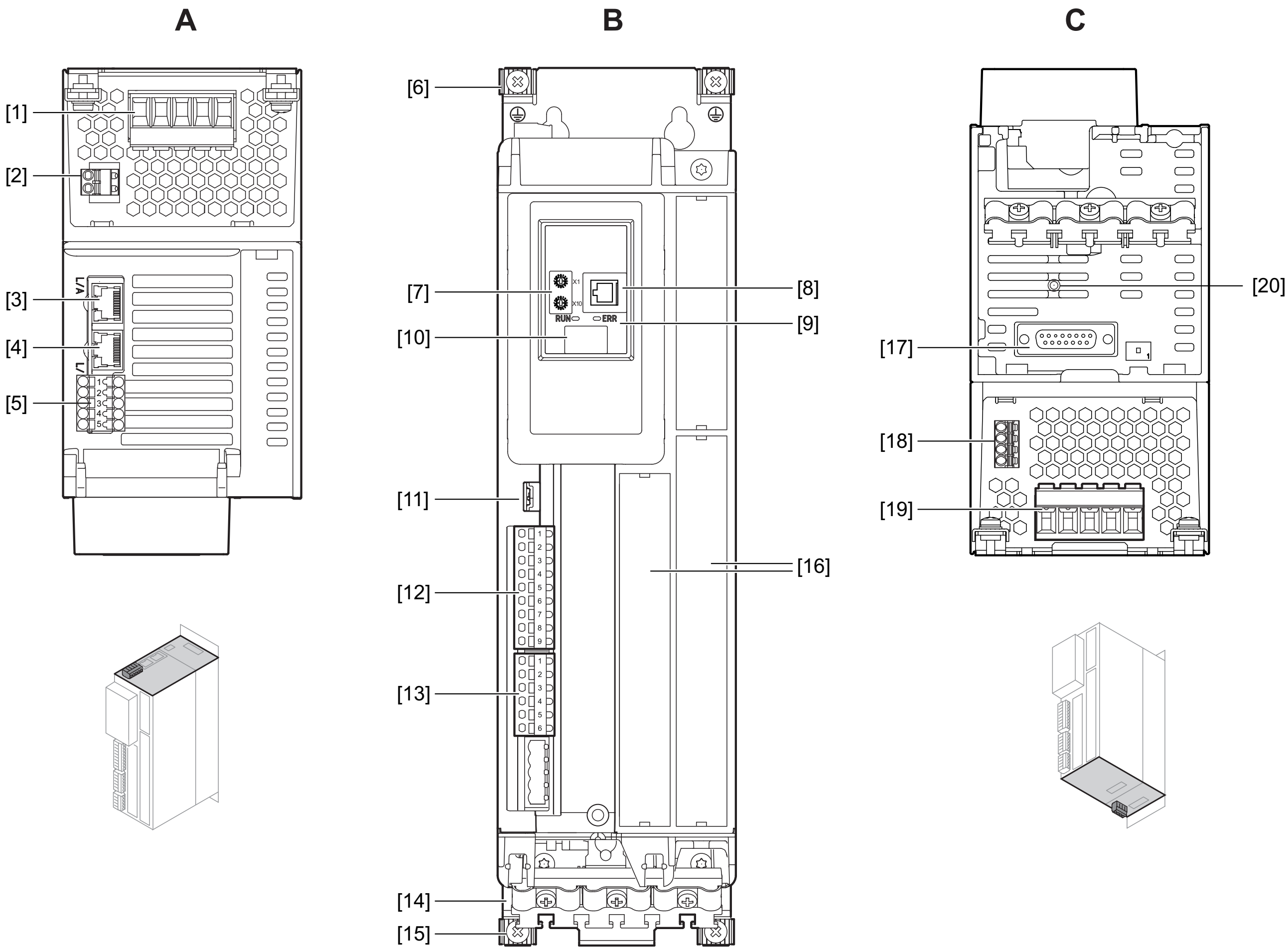
7.3 MOVIDRIVE® system type code

Example: MDX90A-0125-5E3-X-S00		
Product family	MD	MOVIDRIVE®
Device type	X	• X = Single-axis inverter
Series	90	• 90 = without DC 24 V switched-mode power supply • 91 = with DC 24 V switched-mode power supply
Version	A	• A = Version status of the device series
Performance class	0125	• 0125 = Nominal output current – e.g. 0125 = 12.5 A
Connection voltage	5	• 2 = AC 200 to 240 V • 5 = AC 380 to 500 V
Power section design EMC	E	• 0 = Basic interference suppression integrated • E = EMC filter limit value category C2 acc. to EN 61800-3
Connection type	3	• 3 = 3-phase connection type
Operating mode	X	• 4 = 4-quadrant operation • X = Not relevant
Device variant	S	• 0 = Not relevant • S = MOVIDRIVE® system: Control via MOVI-C® CONTROLLER • T = MOVIDRIVE® technology: Control via fieldbus • E = Inverter with device profile CiA402
Designs	00	• 00 = Standard design
Options		• /L = Design with coated printed circuit boards The following list serves as an example: • /CES11A = Multi-encoder card • /CID21A, /CIO21A = Input/output cards • /CS..A = Safety card MOVISAFE® CS..A

28487486/EN – 02/2019

7.4 Device structure of the application inverter

7.4.1 MDX9_A-0020 – 0040-5_3-..



27021612063583499

A: View from top

[1] X1: Line connection

[2] X5: +24 V supply voltage

[3] X30 OUT: System bus

[4] X30 IN: System bus

[5] X6: Connection for Safe Torque Off (STO)

W: View from front

[6] 2 × housing PE connection

[7] EtherCAT® ID switch

[8] X31: SEW-EURODRIVE Service interface

[9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERROR"

[10] 7-segment display

[11] S3: Switch for module bus operating mode

[12] X20: Digital inputs

[13] X21: Digital outputs

[14] Shield plate

[15] 2 × housing PE connection

[16] Card slot

C: View from bottom

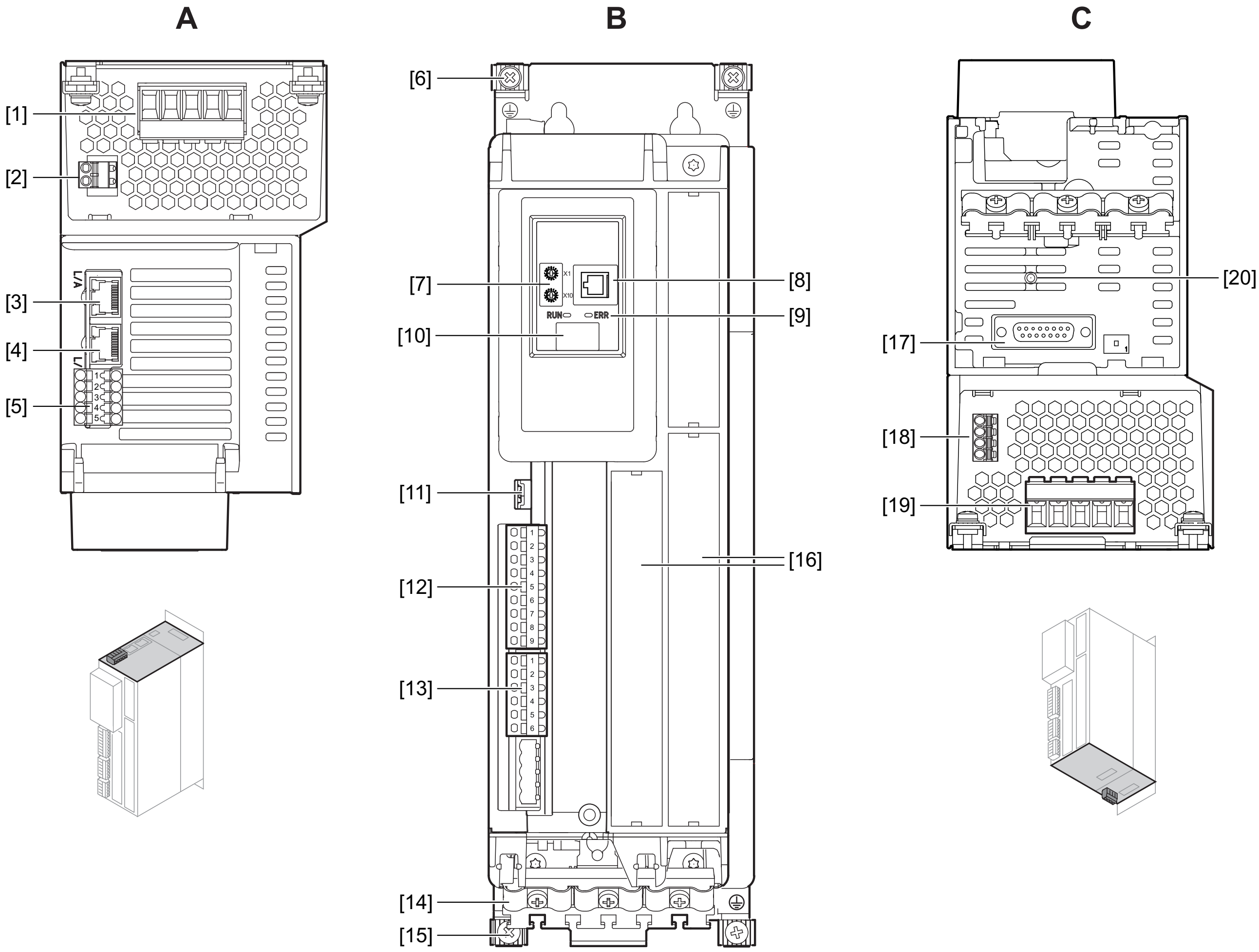
[17] X15: Motor encoder connection

[18] X10: Brake control and motor temperature monitoring

[19] X2: Motor and braking resistor connection

[20] X16: Connection for digital motor integration

7.4.2 MDX9_A-0055 – 0095-5_3-.. MDX9_A-0070 – 0093-2_3-..



27021612063593227

A: View from top

[1] X1: Line connection

[2] X5: +24 V supply voltage

[3] X30 OUT: System bus

[4] X30 IN: System bus

[5] X6: Connection for Safe Torque Off (STO)

W: View from front

[6] 2 × housing PE connection

[7] EtherCAT® ID switch

[8] X31: SEW-EURODRIVE Service interface

[9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERROR"

[10] 7-segment display

[11] S3: Switch for module bus operating mode

[12] X20: Digital inputs

[13] X21: Digital outputs

[14] Shield plate

[15] 2 × housing PE connection

[16] Card slot

C: View from bottom

[17] X15: Motor encoder connection

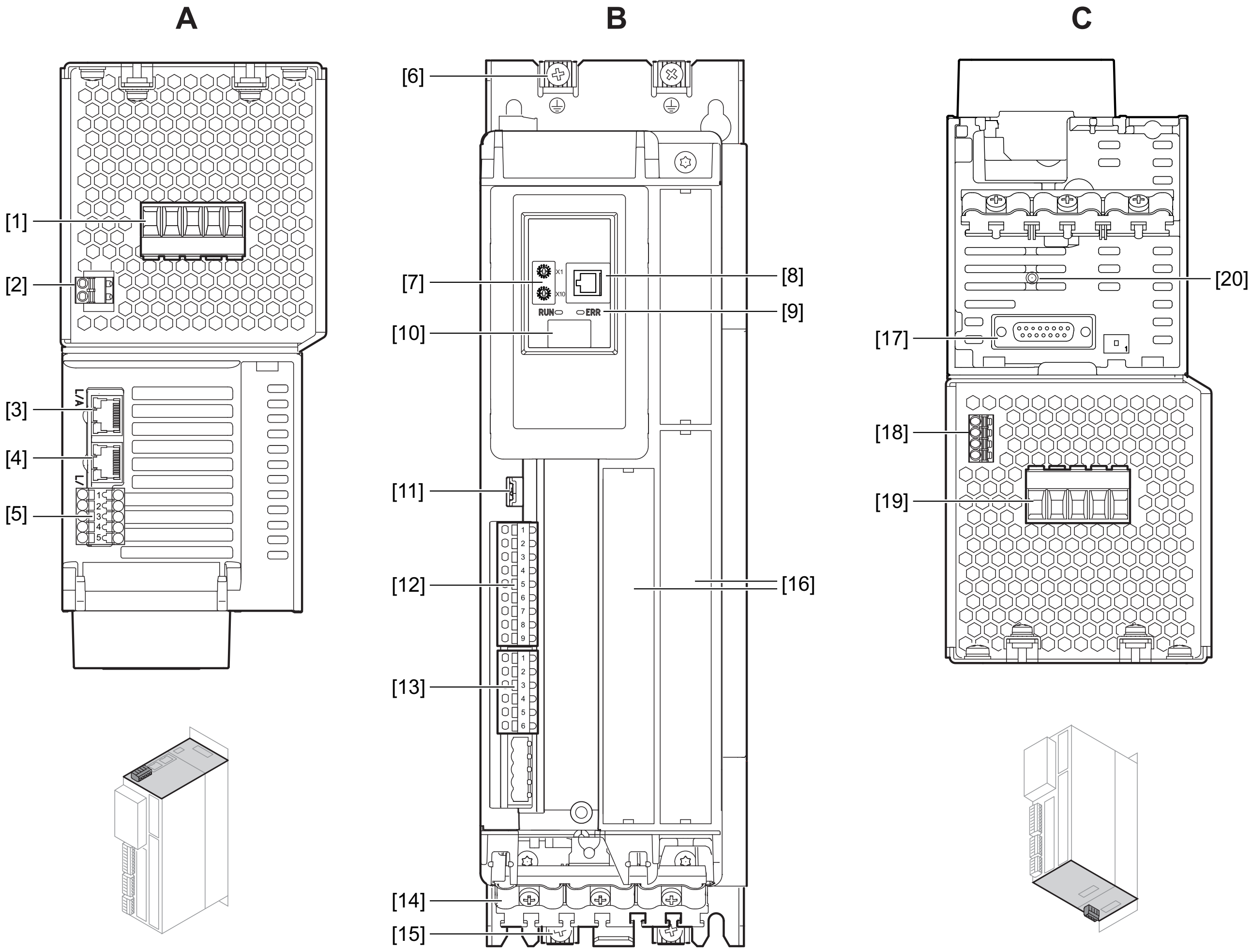
[18] X10: Brake control and motor temperature monitoring

[19] X2: Motor and braking resistor connection

[20] X16: Connection for digital motor integration

28487486/EN – 02/2019

7.4.3 MDX9_A-0125 – 0160-5_3-.. MDX9_A-0140-2_3-..



27021612063602955

A: View from top

[1] X1: Line connection

[2] X5: +24 V supply voltage

[3] X30 OUT: System bus

[4] X30 IN: System bus

[5] X6: Connection for Safe Torque Off (STO)

W: View from front

[6] 2 × housing PE connection

[7] EtherCAT® ID switch

[8] X31: SEW-EURODRIVE Service interface

[9] Status LEDs EtherCAT®/SBus^PLUS "RUN", "ERROR"

[10] 7-segment display

[11] S3: Switch for module bus operating mode

[12] X20: Digital inputs

[13] X21: Digital outputs

[14] Shield plate

[15] 2 × housing PE connection

[16] Card slot

C: View from bottom

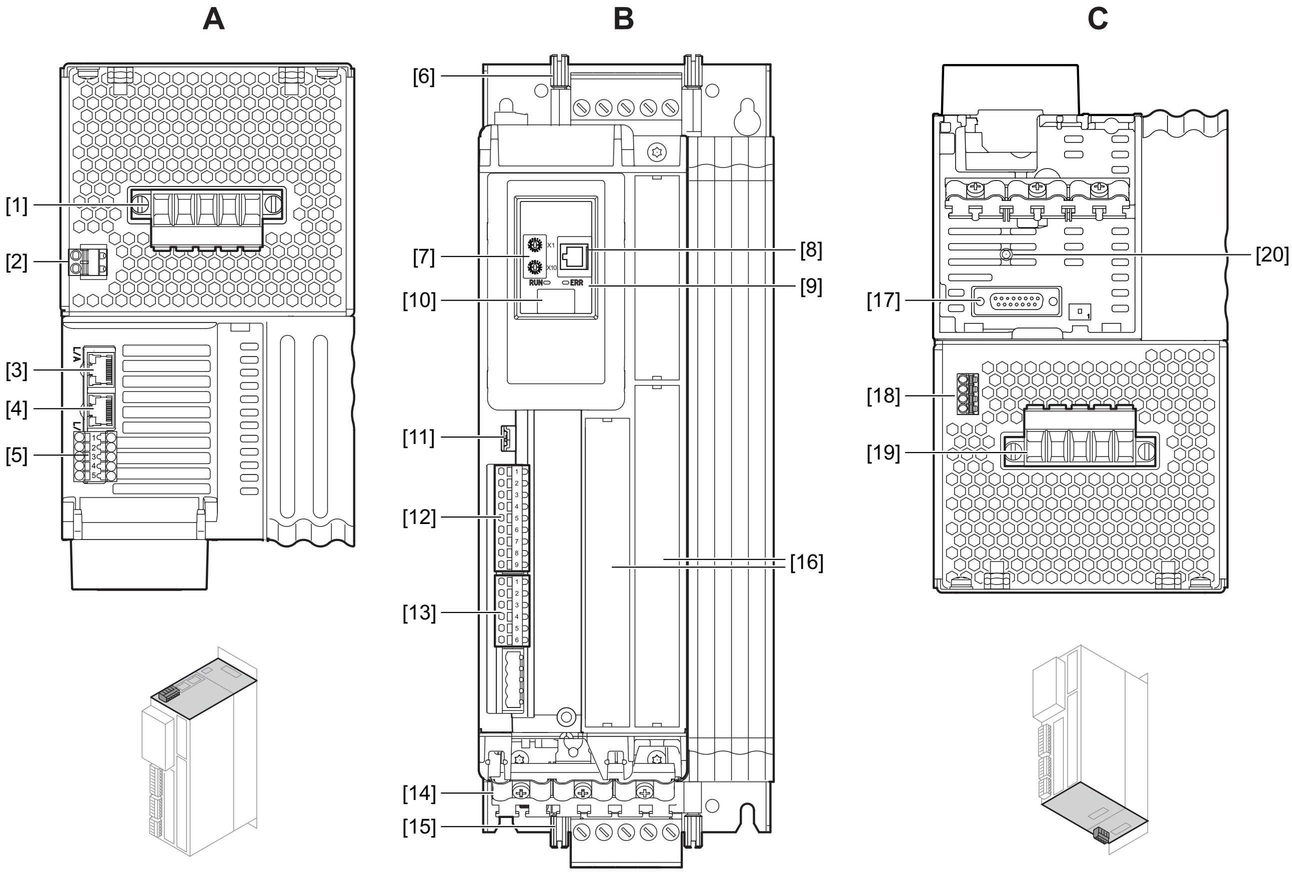
[17] X15: Motor encoder connection

[18] X10: Brake control and motor temperature monitoring

[19] X2: Motor and braking resistor connection

[20] X16: Connection for digital motor integration

7.4.4 MDX9_A-0240 – 0320-5_3-.. MDX9_A-0210 – 0290-2_3-..



27021612063612683

A: View from top

[1] X1: Line connection

[2] X5: +24 V supply voltage

[3] X30 OUT: System bus

[4] X30 IN: System bus

[5] X6: Connection for Safe Torque Off (STO)

W: View from front

[6] 2 × housing PE connection

[7] EtherCAT® ID switch

[8] X31: SEW-EURODRIVE Service interface

[9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERROR"

[10] 7-segment display

[11] S3: Switch for module bus operating mode

[12] X20: Digital inputs

[13] X21: Digital outputs

[14] Shield plate

[15] 2 × housing PE connection

[16] Card slot

C: View from bottom

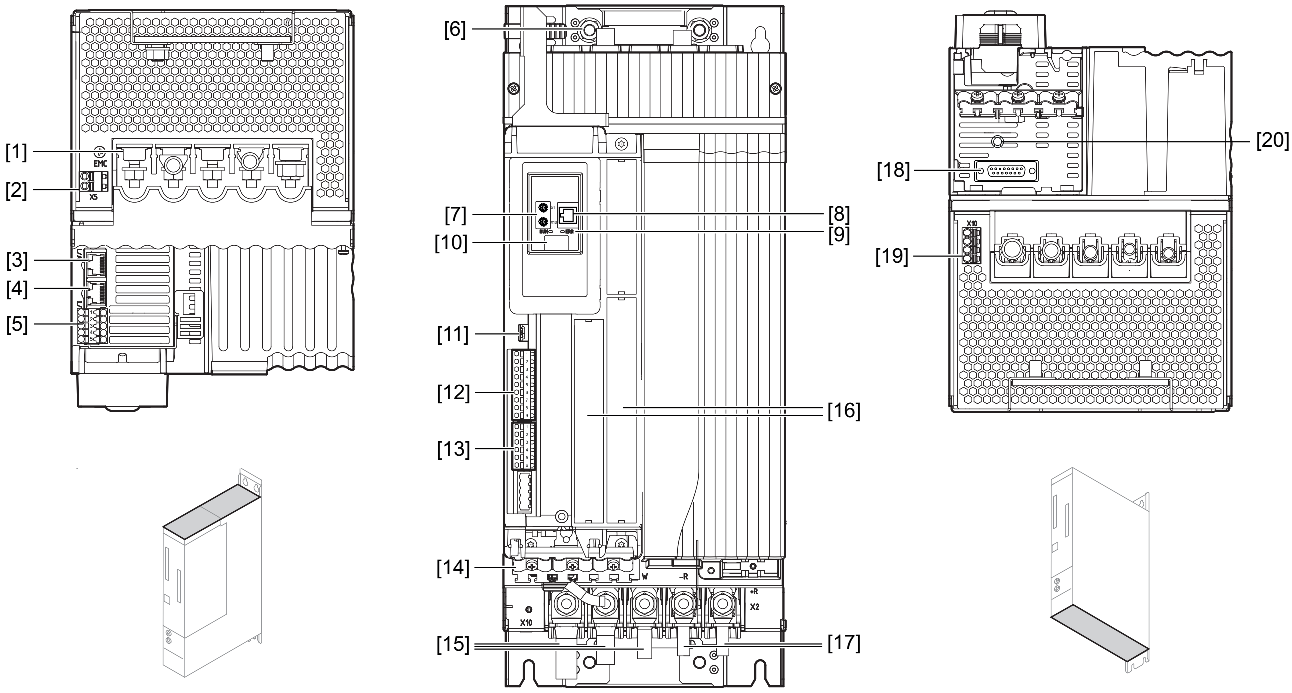
[17] X15: Motor encoder connection

[18] X10: Brake control and motor temperature monitoring

[19] X2: Motor and braking resistor connection

[20] X16: Connection for digital motor integration

7.4.5 MDX9_A-0460 – 0750-5_3-.. MDX9_A-0420 – 0570-2_3-..



9007220618454155

A: View from top

[1] X1: Line connection

[2] X5: +24 V supply voltage

[3] X30 OUT: System bus

[4] X30 IN: System bus

[5] X6: Connection for Safe Torque Off (STO)

W: View from front

[6] 2 × housing PE connection

[7] EtherCAT® ID switch

[8] X31: SEW-EURODRIVE Service interface

[9] Status LEDs EtherCAT®/SBus^PLUS "RUN", "ERROR"

[10] 7-segment display

[11] S3: Switch for module bus operating mode

[12] X20: Digital inputs

[13] X21: Digital outputs

[14] Shield plate

[15] X2: Motor connection

[16] Card slot

[17] X2: Braking resistor connection

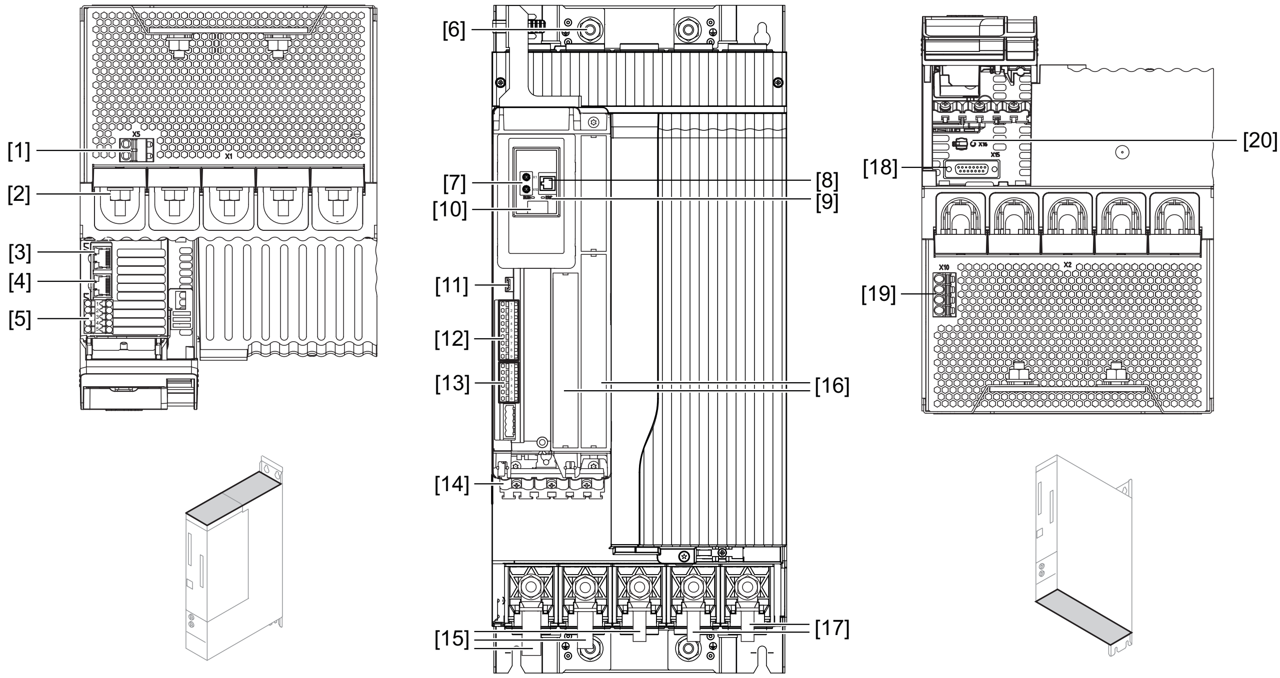
C: View from bottom

[18] X15: Motor encoder connection

[19] X10: Brake control and motor temperature monitoring

[20] X16: Connection for digital motor integration

7.4.6 MDX91A-0910 – 1490-5_3-.. MDX91A-0840 – 1080-2_3-..



9007222917489675

A: View from top

[1] X5: +24 V supply voltage
[2] X1: Line connection
[3] X30 OUT: System bus
[4] X30 IN: System bus
[5] X6: Connection for Safe Torque Off (STO)

W: View from front

[6] 2 × housing PE connection
[7] EtherCAT® ID switch
[8] X31: SEW-EURODRIVE Service interface
[9] Status LEDs EtherCAT®/SBus^{PLUS} "RUN", "ERROR"
[10] 7-segment display
[11] S3: Switch for module bus operating mode
[12] X20: Digital inputs
[13] X21: Digital outputs
[14] Shield plate
[15] X2: Motor connection
[16] Card slot
[17] X2: Braking resistor connection

C: View from bottom

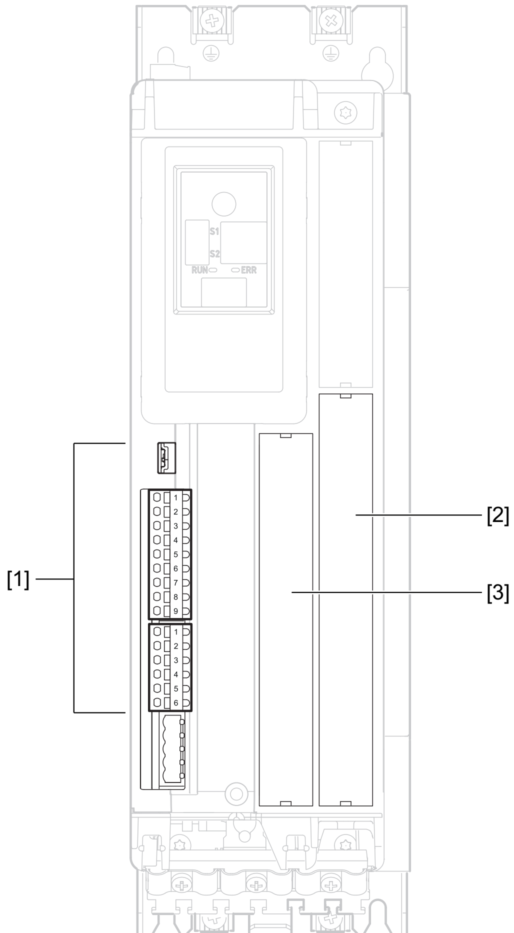
[18] X15: Motor encoder connection
[19] X10: Brake control and motor temperature monitoring
[20] X16: Connection for digital motor integration

28487486/EN – 02/2019

7.5 Card slots

The application inverters can have up to 2 cards installed. The following section describes the assignment of the slots and possible combinations of cards.

Type designation	Description	Slot
CES11A	Multi-encoder card	[2]
CS..A	MOVISAFE® safety card	[2]
CID21A, CIO21A	Input/output cards	[3]



[1] Connector panel of basic device

[2] Slot for safety card/multi-encoder card

[3] Slot for input/output cards

8 Installation

MOVIDRIVE® system application inverters are exclusively suitable for control cabinet installation according to the degree of protection.

8.1 Permitted tightening torques

MDX9_A-....-5_3-..		0020 – 0040	0055 – 0095	0125 – 0160	0240 – 0320	0460 – 0750	0910 – 1490	1770 – 2200	2500 – 3000	3800 – 47009
MDX9_A-....-2_3-..		-	**0070 – 0093**	**0140**	**0213 – 0290**	**0420 – 0570**	**0840 – 0950**	-	-	-
Screw connection		**Tightening torque in Nm**								
Line connection	X1	0.5 – 0.8			1.7 – 1.8	8.5 – 9.5	18 – 22			
Motor and braking resistor connection	X2	0.5 – 0.8			1.7 – 1.8	8.5 – 9.5	18 – 22			
Terminal screw for TN/IT systems	EMC	1 – 1.2								
PE connections - M4 - M6		1 – 1.2 3 – 4								
Fastening of the cards		0.6 – 0.8								

NOTICE

Non-compliance with the stipulated tightening torques.

Possible damage to the application inverter.

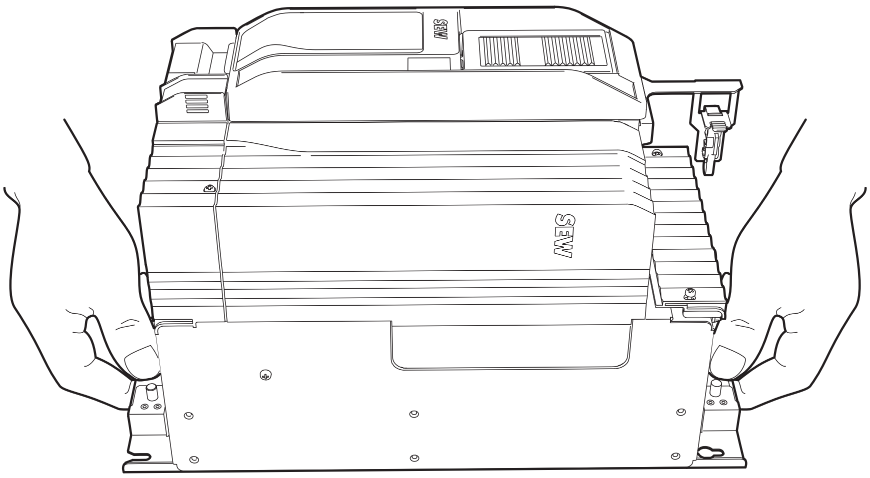
- Always adhere to the stipulated tightening torques. Otherwise, excessive heat can develop which would damage the application inverter.
- An excessively high tightening torque may cause damage.

28487486/EN – 02/2019

8.2 Special aspects when transporting the devices

The rear wall of the housing of the following devices is designed in such a way that you can grip them securely by hand to lift and transport the inverters without damaging them.

- MDX9_A-0460 – 1490-5_3-..
- MDX9_A-0420 – 1080-2_3-..



21435628299

NOTICE

Incorrect lifting and transporting of the inverter.

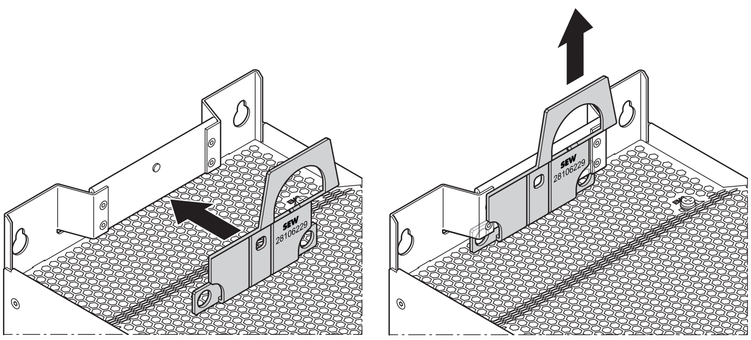
Inverter damage.

- When you lift or transport the inverter, use only the intended handling points for transportation at the rear wall of the housing to avoid any damage. Do not grip the inverter at any plastic parts or covers when lifting it.

The following devices must be transported with a lifting eye due to their weight:

- MDX91A-0910 – 1490-5_3-..
- MDX91A-0840 – 1080-2_3-..

The lifting eye is attached to the top of the housing; see the following figure.



24550948491

The lifting eye can be attached to hoists using suitable slings.

8.3 Mechanical installation

⚠ CAUTION

Risk of injury to persons and damage to property.

Never install defective or damaged products.

- Before installing any products, check them for external damage. Replace any damaged products.

NOTICE

Risk of damage to property due to mounting surfaces with poor conductivity.

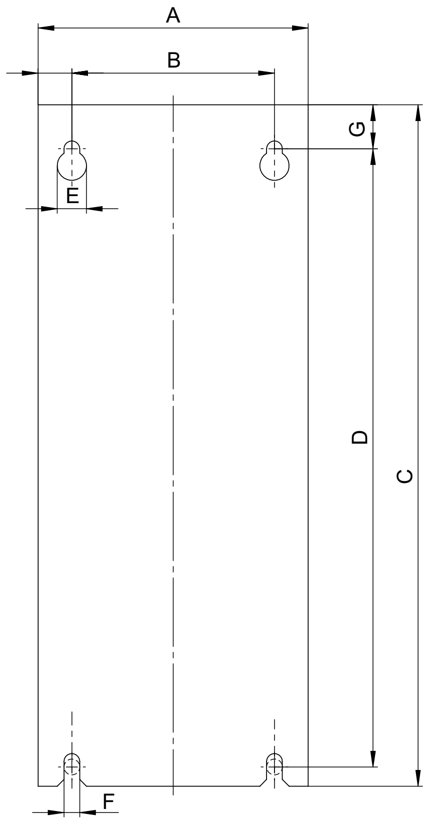
Damage to the application inverter.

- The mounting plate in the control cabinet must be conductive over a large area for the mounting surface of the application inverter (metallically pure, good conductivity). EMC-compliant installation of the application inverter can only be accomplished with a mounting plate that is conductive over a large area.

28487486/EN – 02/2019

8.3.1 Bore patterns

Inverter	Dimensions of the device base plate in mm						
	A	B	C	D	E	F	G
MDX9_A-0020 – 0040-5_3-..	95	50	350	325	12	6	18
MDX9_A-0055 – 0095-5_3-.. MDX9_A-0070 – 0093-2_3-..	105	50	350	325	12	6	18
MDX9_A-0125 – 0160-5_3-.. MDX9_A-0140-2_3-...	105	80	350	325	12	6	18
MDX9_A-0240 – 0320-5_3-.. MDX9_A-0213 – 0290-2_3-..	135	80	350	325	12	6	18
MDX9_A-0460 – 0750-5_3-.. MDX9_A-0420 – 0570-2_3-..	195	160	471	440	12	6	18
MDX91A-0910 – 1490-5_3-.. MDX91A-0840 – 1080-2_3-..	240	200	544	510	12	6	18



9007215129195275

28487486/EN – 02/2019

8.3.2 Minimum clearance and mounting position

When installing the application inverters in the control cabinet, observe the following:

- To ensure unobstructed cooling, leave a minimum clearance of 100 mm above and below the application inverter housings. Make sure air circulation in the clearance is not impaired by cables or other installation equipment.
- Make sure that the application inverters are not subjected to heated exhaust air from nearby components.
- Install the application inverters only vertically. You must not install them horizontally, tilted or upside down.

INFORMATION

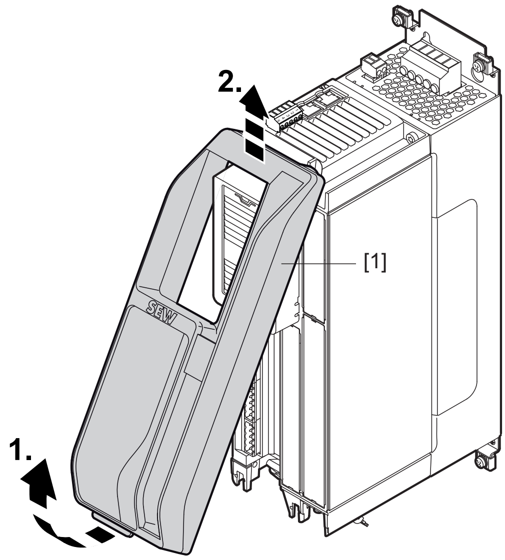
Special bending spaces are required according to EN 61800-5-1 for cables with a cross section of 10 mm^2 and larger. This means the clearance must be increased if required.

8.4 Covers

8.4.1 Covers

The application inverter is equipped with a safety cover [1].

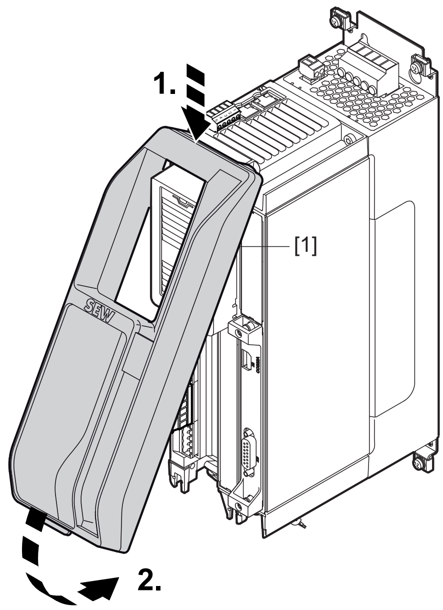
Removing the safety cover



14299394571

1. The safety cover [1] has a latching mechanism at the bottom. Pull the lower part of the safety cover away from the application inverter to unlatch it.
2. Pivot the safety cover forward and lift it to remove it from the application inverter.

Installing the safety cover



14578455307

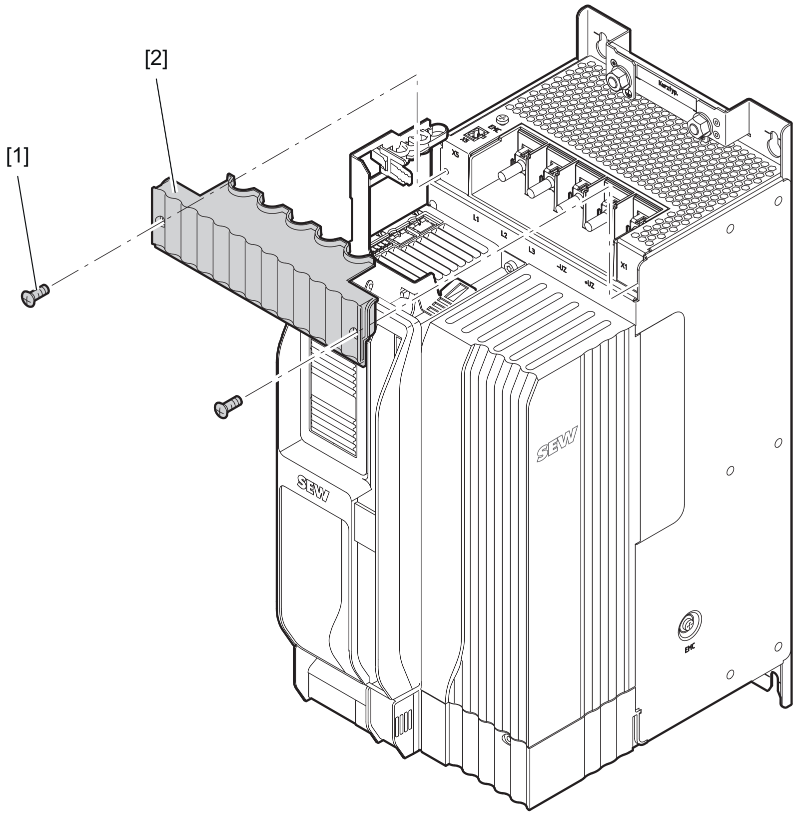
3. Place the safety cover [1] into the upper recess and move it towards the application inverter until it clicks into place.
4. Always install the safety cover [1] after having worked on the application inverter.

8.4.2 Touch guards

With the following devices, the touch guards must be removed for the line connection and the connection of the motor and the braking resistor:

- MDX9_A-0460 – 1490-5_3-..
- MDX9_A-0420 – 1080-2_3-..

Line connection

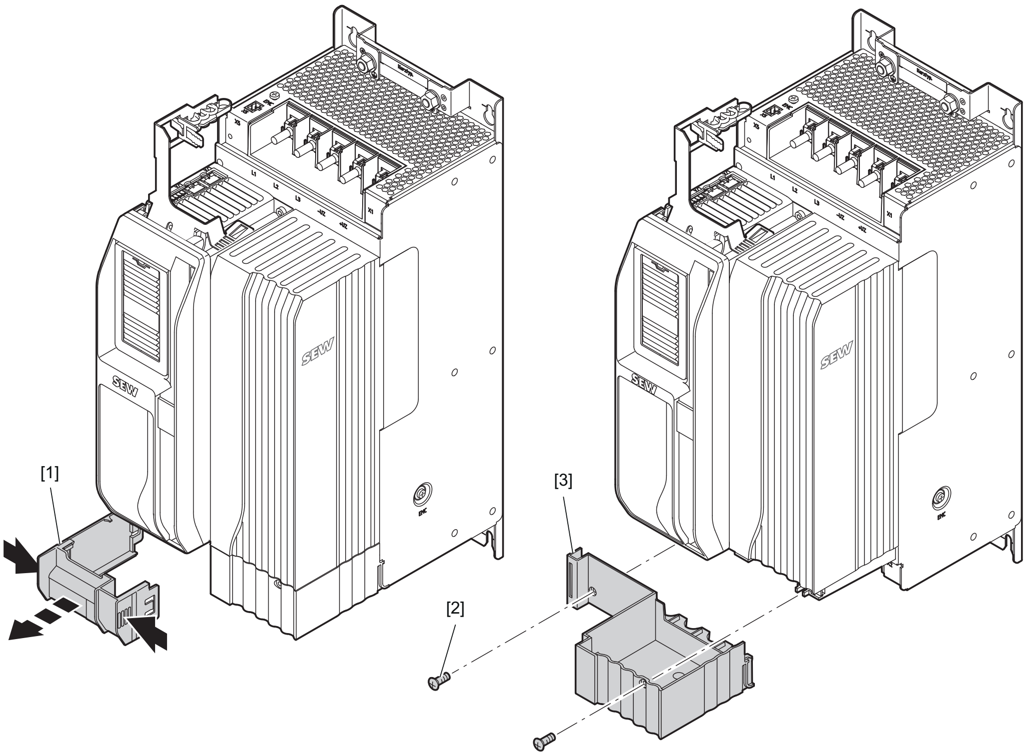


21425921035

1. Remove the 2 screws [1] on the upper touch guard [2].
2. Remove the touch guard [2].

28487486/EN – 02/2019

Connection motor/ braking resistor



21425950603

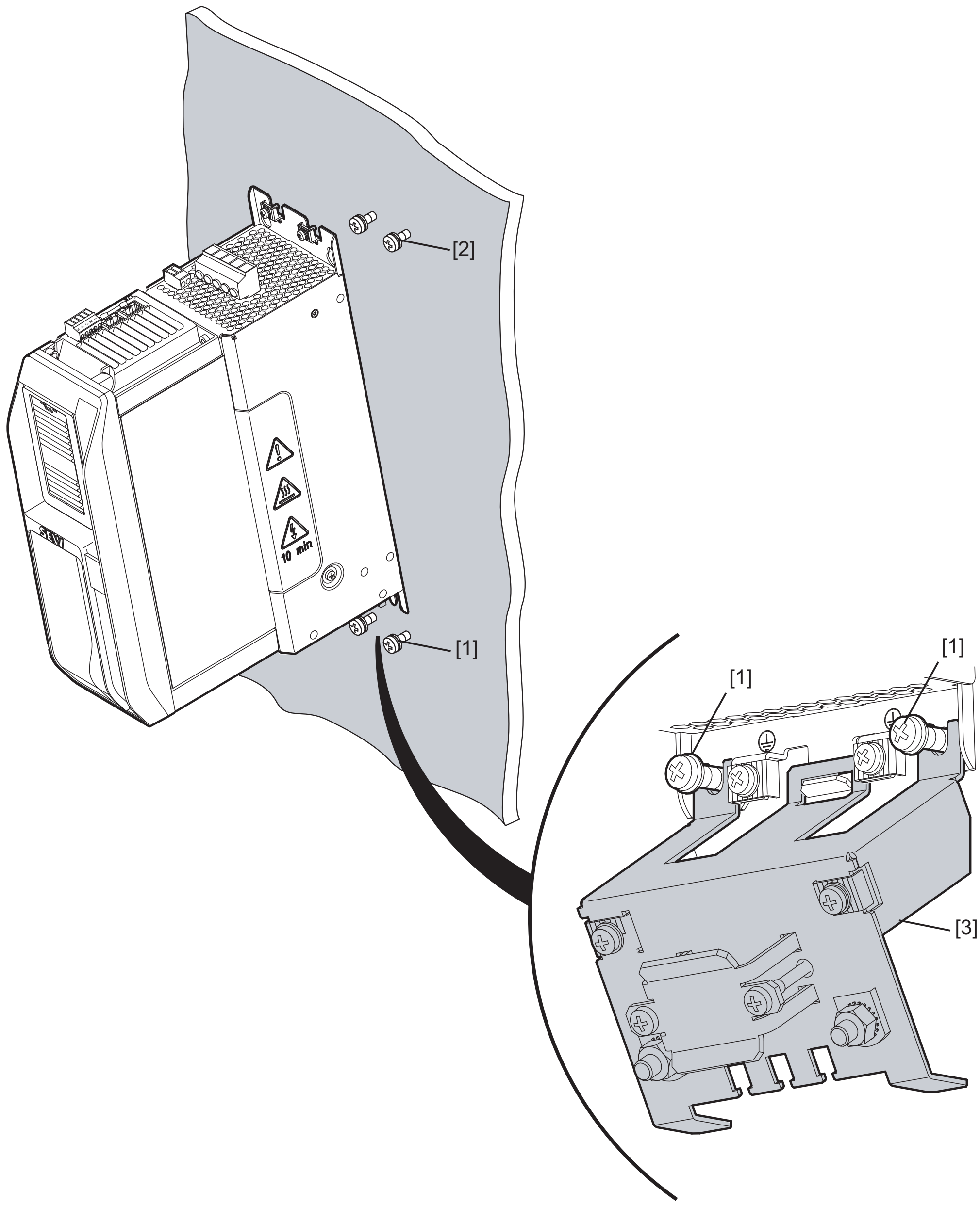
3. Push the plastic clips of the touch guard [1] to the inside and remove the touch guard [1] by moving it to the front.
4. Remove the 2 screws [2] and remove the touch guard [3] by moving it to the front.

8.5 Control cabinet installation

8.5.1 Inverter and bottom shield plate

The retaining screws [1] and [2] are screwed into the prepared tapped holes in the mounting plate in the control cabinet but not tightened.

1. Place the application inverter with the slotted holes in the device base plate onto the retaining screws [1] from the top.



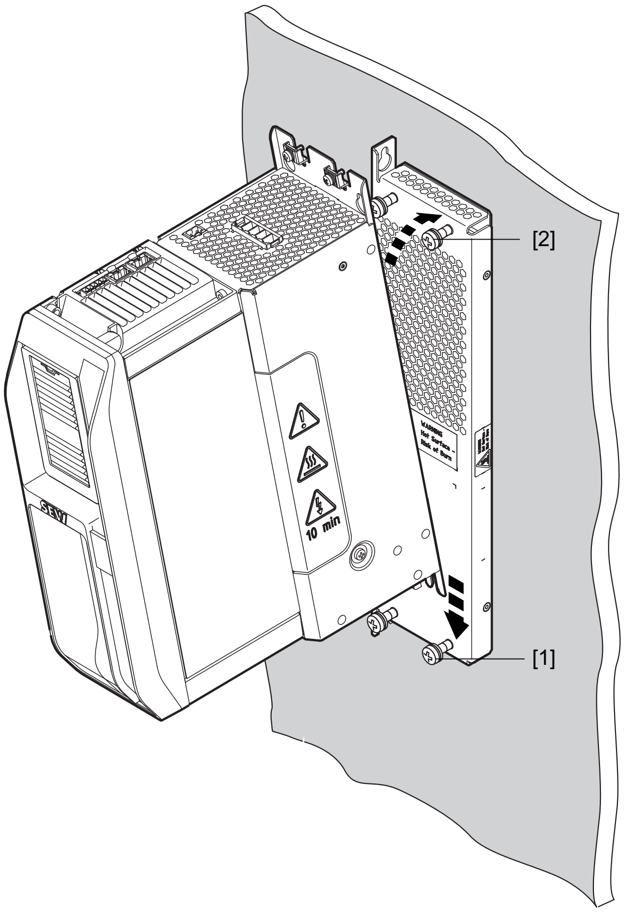
15026233355

2. Push the application inverter backwards to insert the retaining screws [2] into the upper holes in the device base plate.
3. Lower the application inverter.
4. Install the shield plate [3] as shown above. This work step applies to the inverters MDX9_A-0020 – 0320-5_3-.. and MDX9_A-0070 – 0290-2_3-..
5. Tighten the retaining screws [1] and [2].

8.5.2 Installation with submounting resistor BR120-001

The MDX90A-0020 – 0040-.. inverters can be installed in the control cabinet together with a braking resistor. The braking resistor is located at the back wall of the inverter and therefore it has the same mounting hole pattern as the inverter.

Observe that the retaining screws [1] and [2] must be 20 mm longer for installation with a braking resistor.



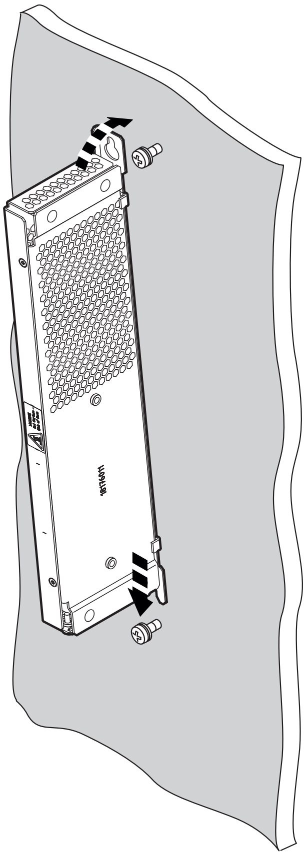
20363406219

1. Place the braking resistor at the desired position in the control cabinet as shown in the figure and screw in the 4 retaining screws [1] and [2] without tightening them.
2. Place the application inverter with the slotted holes in the device base plate onto the retaining screws [1] from the top.
3. Push the application inverter backwards to insert the retaining screws [2] into the upper holes in the device base plate.
4. Lower the application inverter.
5. Install the shield plate; see the chapter "Control cabinet installation" (→ 🗎 219). This work step applies to the inverters MDX9_A-0020 – 0320-5_3-.. and MDX9_A-0070 – 0290-2_3-..
6. Tighten the retaining screws [1] and [2].

The submounting resistor can be installed next to an application inverter; see the following figure.

28487486/EN – 02/2019

The hole distance of the submounting braking resistor must be larger than the hole distance of the application inverter.

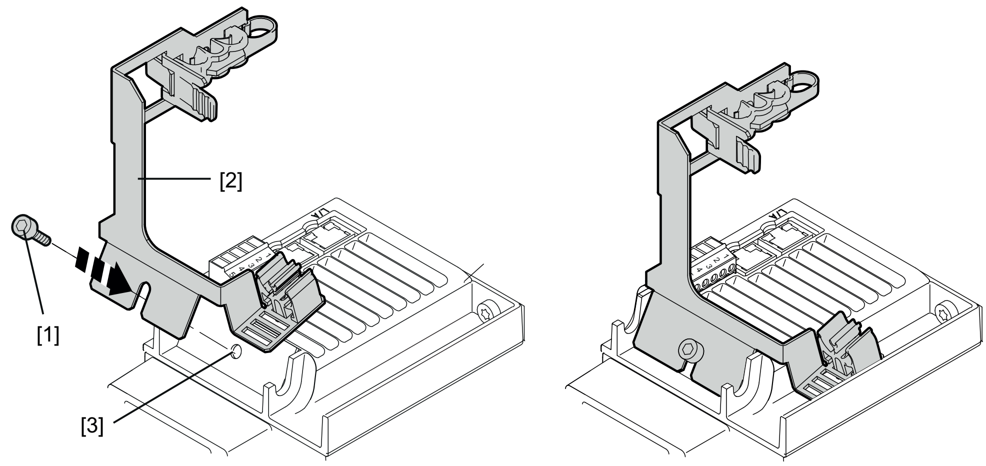


20363403787

28487486/EN – 02/2019

8.5.3 Top shield plate

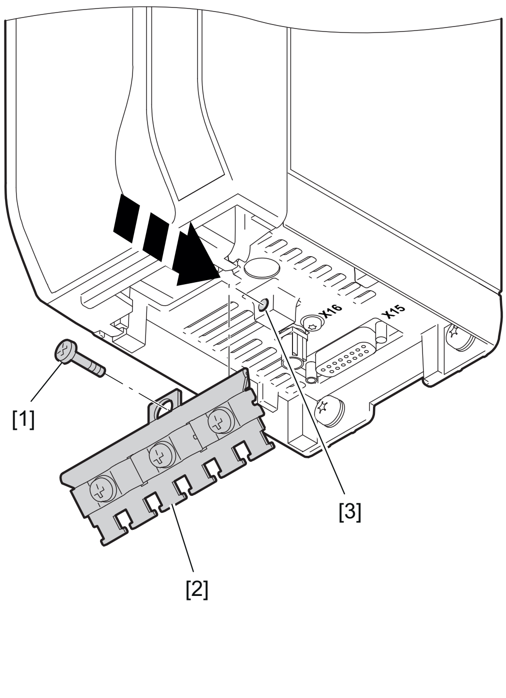
1. Insert the shield plate [2] so that you can fasten it to the device housing [3] with the screw [1].



27521510667

8.5.4 Shield plate at bottom of control unit

1. Insert the shield plate [2] so that you can fasten it with the screw [1] in the position [3] shown in the figure.



27521507083

8.6 Electrical installation

⚠ DANGER

Dangerous voltage levels may still be present inside the device and at the terminal strips up to 10 minutes after the application inverter has been disconnected from the power supply.

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- Disconnect the application inverter from the power supply and wait 10 minutes before removing the protective covers.

⚠ DANGER

A leakage current > 3.5 mA can occur during operation of the application inverter.

Severe or fatal injuries from electric shock.

To avoid dangerous shock currents in accordance with EN 61800-5-1, strictly observe the following:

- Supply system cable < 10 mm^2:
  - Route a second PE conductor with the cable cross-section of the supply system cable in parallel to the protective earth via separate terminals or use a copper PE conductor with a cable cross-section of 10 mm^2.
- Supply system cable 10 mm^2 – 16 mm^2:
  - Route a copper PE conductor with the cable cross-section of the supply system cable.
- Supply system cable 16 mm^2 – 35 mm^2:
  - Route a copper protective earth conductor with a cable cross-section of 16 mm^2.
- Supply system cable > 35 mm^2:
  - Route a copper protective earth conductor with half the cross-section of the supply system cable.
- If an earth leakage circuit breaker is used for protection against direct and indirect contact in isolated cases, it must be universal current-sensitive (RCD type B).

INFORMATION

Installation with protective separation.

The application inverter meets all requirements for protective separation of power and electronics connections in accordance with EN 61800-5-1. The connected signal circuits must meet requirements according to SELV (**S**afety **E**xtra **L**ow **V**oltage) or PELV (**P**rotective **E**xtra **L**ow **V**oltage) to ensure protective separation. The installation must meet the requirements for protective separation.

28487486/EN – 02/2019

8.6.1 General information

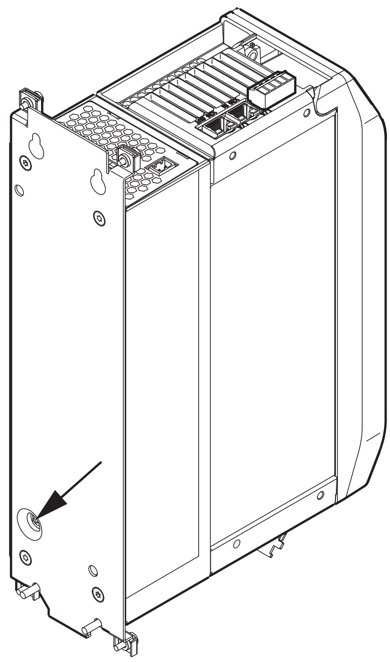
- Take suitable measures to prevent the motor starting up inadvertently, for example by removing the electronics terminal block X20. Take additional safety measures depending on the application to prevent possible injuries to people and damage to machinery.
- Only use closed cable lugs for connection to the screws in order to prevent litz strands from escaping.

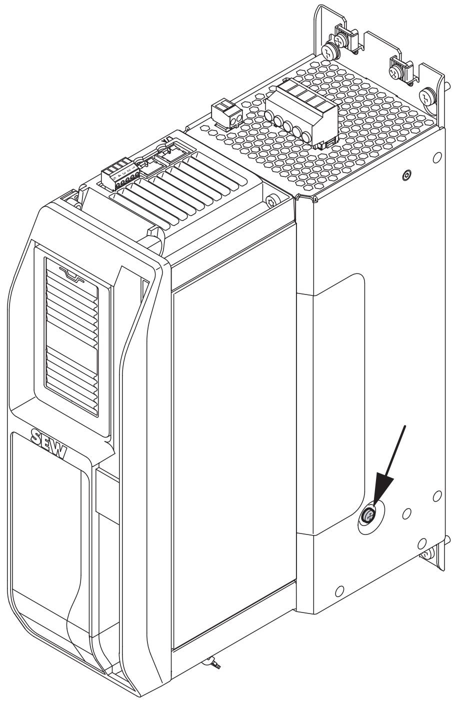
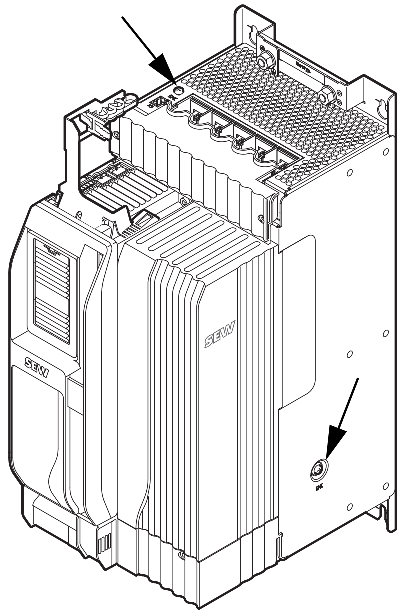
8.6.2 Permitted voltage systems

Information on the voltage systems	Information on permissibility
TN and TT systems – voltage systems with directly grounded star point.	Use is possible without restrictions.
IT systems – voltage systems with non-grounded star point.	Use is only permitted adhering to specific measures. The measures are described in the chapter "Use in IT systems" (→ 🗎 224).
Voltage systems with grounded outer conductor.	Use only for line voltages up to max. 240 V.

8.6.3 Use in IT systems

To ensure IT system capability, the terminal screw shown in the following figures must be removed from the application inverter.

Application inverter	Position of the terminal screw
MDX9_A-0020 – 0095-5_3-.. MDX9_A-0070 – 0093-2_3-..	On the back of the application inverter.  15144351755

Application inverter	Position of the terminal screw
MDX9_A-0125 – 0320-5_3-.. MDX9_A-0140 – 0290-2_3-.. MDX91A-0910 – 1490-5_3-.. MDX91A-0840 – 1080-2_3-..	On the right side of the application inverter.  9007214280971403
MDX9_A-0460 – 0750-5_3-.. MDX9_A-0420 – 0570-2_3-..	One screw on the top, another screw on the right side of the application inverter.  21425923467

INFORMATION

EMC limit values

No EMC limits are specified for interference emission in voltage supply systems without a grounded star point (IT systems). The effectiveness of line filters is severely limited.

28487486/EN – 02/2019

8.6.4 Line fuses, fuse types

Type class	Prerequisite
Fuses in utilization categories gL, gG	Fusing voltage ≥ nominal line voltage
Miniature circuit breaker with characteristics B, C, D	Nominal miniature circuit breaker voltage ≥ nominal line voltage
	Nominal currents of the miniature circuit breaker must be 10% higher than the nominal line current of the application inverter

8.6.5 Line connection

For the terminal assignment for line connection of the various sizes, refer to the chapter "Terminal assignment".

Observe a minimum switch-off time of 10 s for the application inverter. Do not turn power on or off more than once per minute.

NOTICE

Non-compliance with the minimum switch-on/switch-off times

Damage to the application inverter

The specified times and intervals must be observed.

- Observe the minimum switch-off time of 10 s before switching the power back on.
- Do not turn the power of the supply system on or off more than once per minute.

- The line contactor must always be located upstream of the line filter.
- Use only line contactors of utilization category AC-3 (EN 60947-4-1) or higher.
- Do not use the line contactor for jog mode, but only for switching the application inverter on and off. The FCB 20 "Jog" must be used for jog mode.
- Observe the required dimensioning of the cable cross-section for UL-compliant installing.

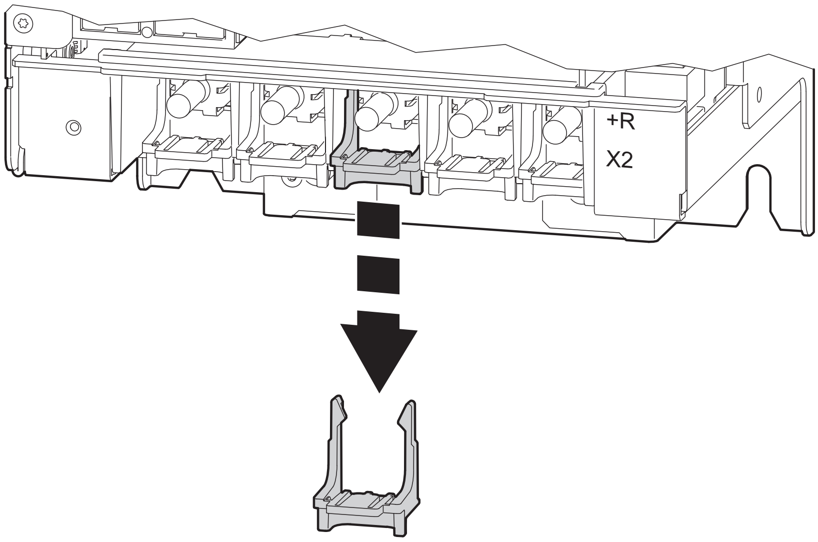
Special aspects for the line connection

Note that the IP20 degree of protection is achieved with the following devices only if the terminal studs are protected with special plastic covers against contact.

- MDX9_A-0460 – 1490-5_3-..
- MDX9_A-0420 – 1080-2_3-..

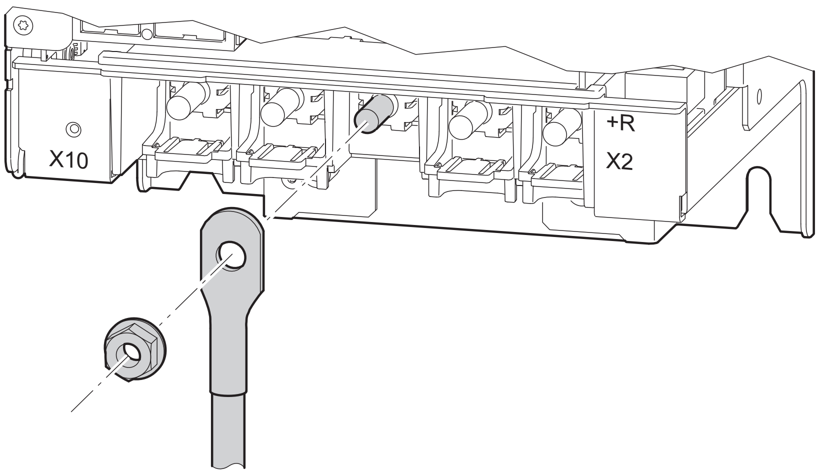
These covers must be ordered separately; see the chapter "Installation accessories" (→ 🗎 46).

1. Remove any plastic covers that are inserted in the connection block.



21439470475

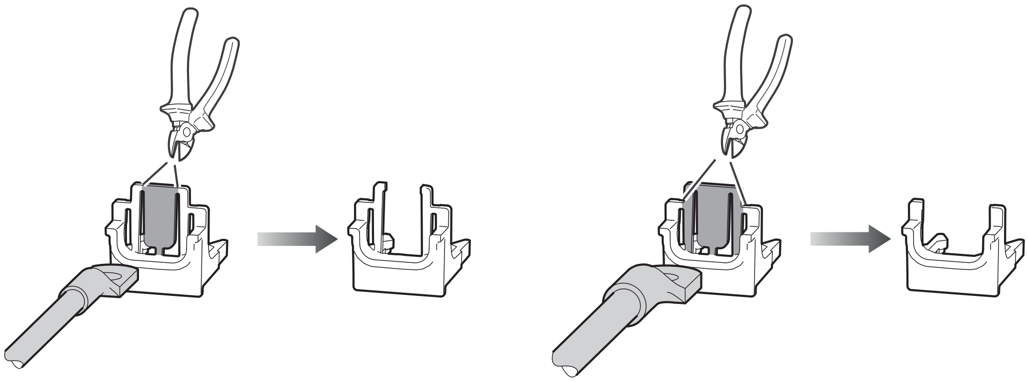
2. Connect the cables.



21439472907

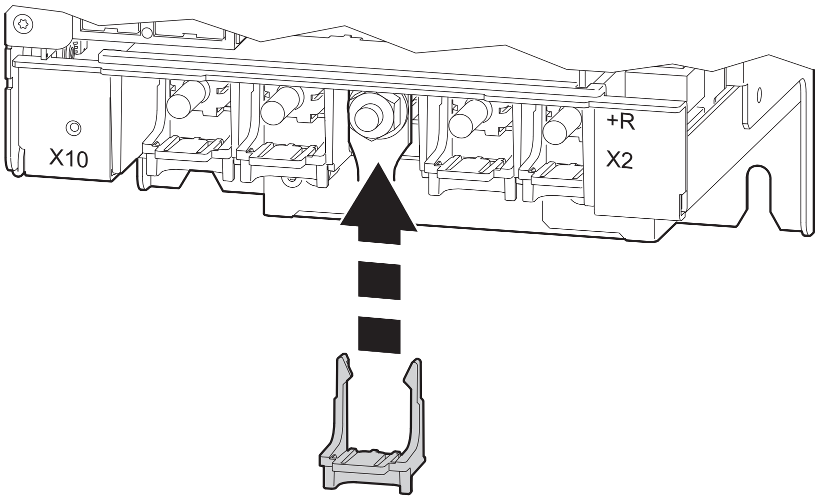
28487486/EN – 02/2019

3. The plastic covers must be removed in different ways depending on the used cross section.



21439477771

4. Attach the plastic covers at the individual connections.



21439475339

8.6.6 Motor connection

For the terminal assignment for motor connection of the various size, refer to the chapter "Terminal assignment" (→ 🗎 266).

8.6.7 Line contactor

The following table provides an overview of when a line contactor is required and what kind of preventive measures must be taken for the used braking resistor, see also the chapter "Protection against thermal overload of the braking resistor" (→ 🗎 250).

Inverter type	Braking resistor type	Protective element/preventive measure	Line contactor required?
MDX9_A-0020 – 0160-5_3-.. MDX9_A-0070 – 0140-2_3-..	No BR	–	No
	BR... flat design	–	No
	BR... as PTC	–	No
	BR...	External bimetallic relay	Yes
		TCB circuit breaker	No
	BR...-T	External bimetallic relay	Yes
		TCB circuit breaker	No
As of MDX9_A-0240-5_3-.. As of MDX9_A-0213-2_3-..	No BR	–	No
	BR... flat design	–	No
	BR... as PTC	–	No
	BR...	External bimetallic relay	No
		TCB circuit breaker	No
	BR...-T	Temperature contact evaluation	No
		External bimetallic relay	No
		TCB circuit breaker	No

When connecting a braking resistor, an external DC 24 V voltage supply must be provided for the application inverter with the following inverter types without line contactor:

- As of MDX9_A-0240-5_3-..
- As of MDX9_A-0213-2_3-..

28487486/EN – 02/2019

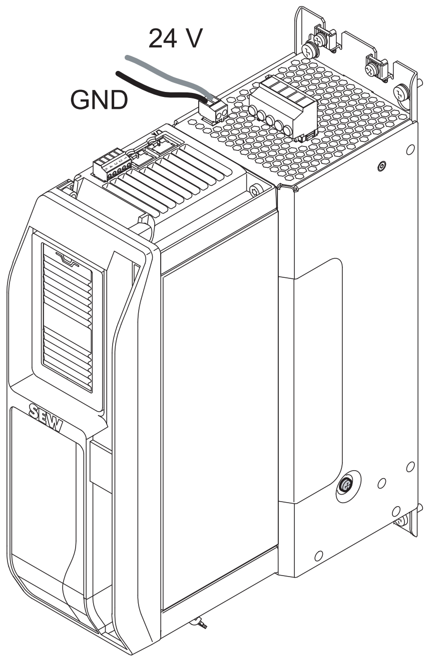
8.6.8 24 V supply voltage

MOVIDRIVE® **MDX90A**... must be connected to an external 24 V supply voltage.

MOVIDRIVE® **MDX91A** has an integrated 24 V power supply unit with a power rating of 80 W. An external power supply unit can be connected as well.

The maximum cable cross section is 2.5 mm^2.

Whether an external 24 V supply is required for MDX91A depends on the load e.g. the encoder supply and the outputs.



15027024779

Select the cross section of the supply cable according to the power demand of the devices to be supplied.

The maximally permitted length of the 24 V supply cable is 30 m.

8.6.9 Motor output

NOTICE

Connecting capacitive loads to the application inverter.

Destruction of the application inverter.

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

Special aspects for the motor connection

Note that the IP20 degree of protection is achieved with the following devices only if the terminal studs are protected with special plastic covers against contact.

- MDX9_A-0460 – 1490-5_3-..
- MDX9_A-0420 – 1080-2_3-..

For information on how to establish the connection and how to install the plastic covers, refer to the chapter "Special aspects for the line connection" (→ 🗎 228).

8.6.10 Output brake chopper

NOTICE

Connecting capacitive loads to the output of the brake chopper.
Connecting inductive loads to the output of the brake chopper.

Destruction of the application inverter.

- Only connect ohmic loads (braking resistors) to the output of the brake chopper.
- Never connect capacitive or inductive loads to the output of the brake chopper.

8.6.11 Temperature evaluation of the motor

The temperature evaluation can be connected in 2 ways:

- The encoder cable includes the cables of the temperature evaluation.
- The temperature evaluation is connected at terminal X10.

⚠ WARNING

Dangerous contact voltages at the terminals of the application inverter when connecting the wrong temperature sensors.

Severe or fatal injuries from electric shock.

- Connect only temperature sensors with protective separation from the motor winding to the temperature evaluation. Otherwise, the requirements for protective separation are not met. Dangerous contact voltages may occur at the terminals of the application inverter via the signal electronics in the event of a fault.

28487486/EN – 02/2019

8.6.12 Brake output

INFORMATION

- If the brake connection and the motor connection are combined in one power cable, the brake cable must be shielded separately. The shielding of the power cable and the brake cable must be connected to the motor and application inverter over a large area.
- SEW-EURODRIVE recommends to also use a shielded brake cable for separate brake cable routing.
- Note the different project planning criteria to determine the length of brake cable and motor cable.

8.6.13 Inputs and outputs

NOTICE

Damage to the digital inputs and digital outputs.

The digital inputs and digital outputs are not electrically isolated. Incorrectly applied voltages can damage the digital inputs and digital outputs.

- Do not apply external voltages to the digital inputs and digital outputs.
- The digital inputs and outputs are dimensioned according to IEC 61131-2.

If you route the cables outside the control cabinet, you have to shield them irrespective of the length.

When connecting the shielding, ensure equipotential bonding.

8.6.14 System bus EtherCAT®/SBus^PLUS

For connecting the EtherCAT®/SBus^PLUS system bus, SEW-EURODRIVE recommends using only prefabricated cables from SEW-EURODRIVE.

NOTICE

Use of wrong cables

Damage to the application inverter

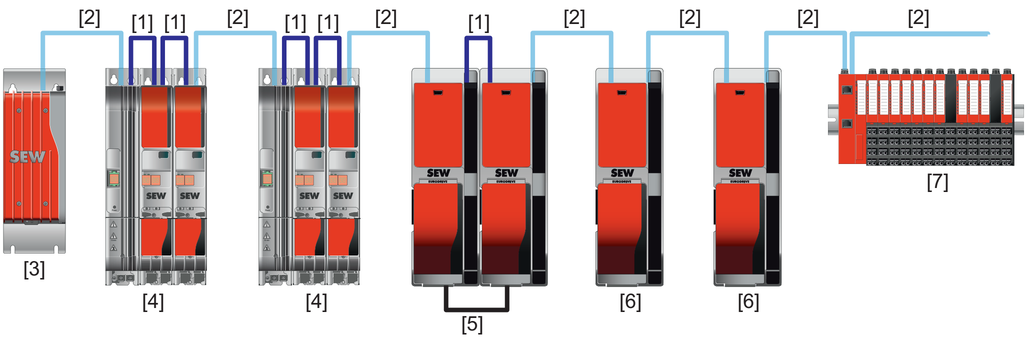
Only 4-pole cables are permitted to be used as system bus cables [2]. If an 8-pole cable is used, malfunctions or failures may occur at the connected devices.

INFORMATION

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

System bus and module bus cabling

Example of a system bus and module bus cabling



9007217271733643

[1] Module bus cable: EtherCAT®/SBus^PLUS and internal signals, 8-pole, color: anthracite

[2] System bus cable: EtherCAT®/SBus^PLUS, 4-pole, color: light gray

[3] MOVI-C® CONTROLLER power UHX8x

[4] MOVIDRIVE® modular

[5] MOVIDRIVE® system/technology with DC link connection

[6] MOVIDRIVE® system/technology

[7] Other EtherCAT® stations at the EtherCAT®/SBus^PLUS

Correct cabling

Module bus cable

In the case of MOVIDRIVE® modular, the 8-core module bus cable connects the power supply module to the first axis module and the axis modules to one another; see figure (→ 🗎 234).

In the case of MOVIDRIVE® modular, in addition to the system bus communication, the module bus is routed in the cable for information inside the device. The module bus cable is delivered in the length required as part of the accessories for the axis modules.

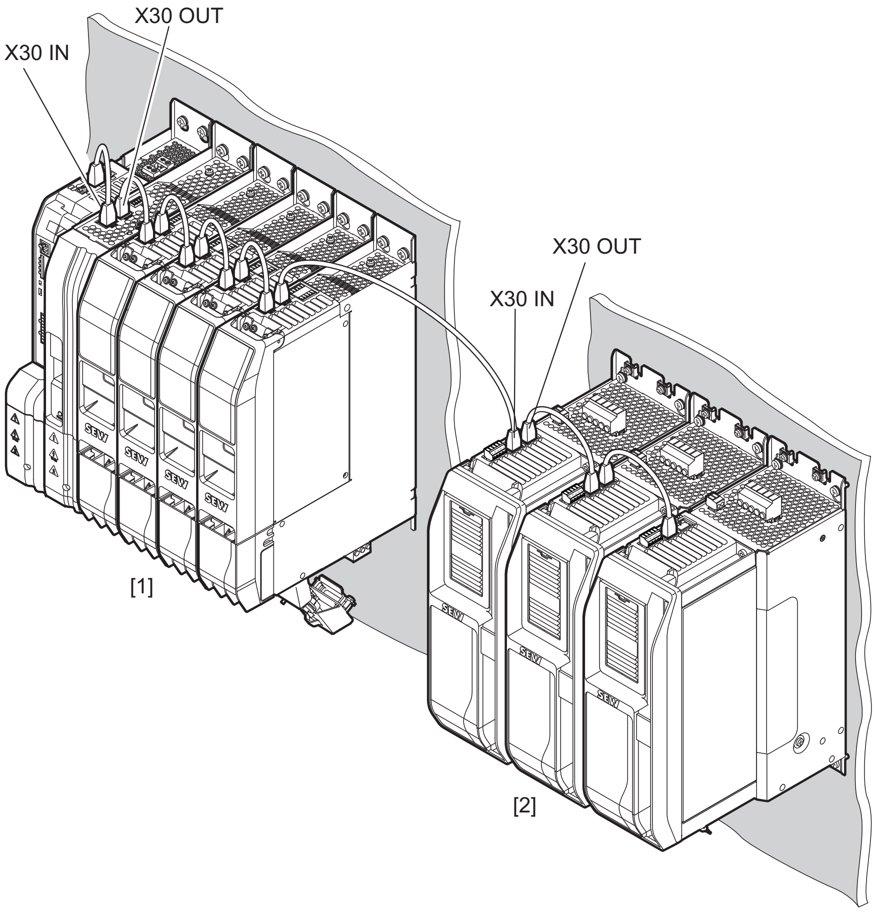
The connectors of the module bus cables are red and black to simplify correct attachment of the cables; see the following figure.

- The black connectors must be plugged into the bus input X30 IN.
- The red connectors must be plugged into the bus output X30 OUT.

System bus cable

The 4-pole system bus cable is used between automation components; see figure (→ 🗎 234). Some of these components are listed here as examples:

- MOVI-C® CONTROLLER
- MOVIDRIVE® modular/system application inverter
- PC with MOVISUITE® engineering software
- MOVI-PLC® I/O system
- Other EtherCAT® stations at the EtherCAT®/SBus^{PLUS}



9007220061843339

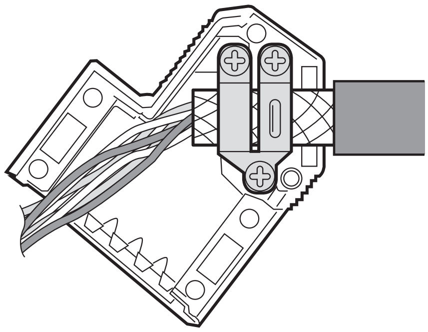
[1] MOVIDRIVE® modular [2] MOVIDRIVE® system

8.6.15 Encoders

Installation notes for encoder connection

Encoder cables

- 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,
  - To the application inverter in the housing of the D-sub connector.



13887834891

- Route the encoder cable separately from the power cables.
- Connect the shield on the inverter end in the housing of the D-sub connector over a large area.

On the encoder/resolver

- To ensure a flawless shield connection, an EMC screw fitting must be used for the cable entry of the signal line.
- For drives with a plug connector, connect the shield on the encoder plug.

Prefabricated cables

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

Encoder connection/cable lengths

Connection/encoder	Cable length
HTL encoder ES7C and EG7C	300 m
Standard HTL encoder	200 m
Other encoders	100 m

INFORMATION

The maximum cable length might be reduced depending on the technical data of the respective encoder. Observe the manufacturer specifications.

28487486/EN – 02/2019

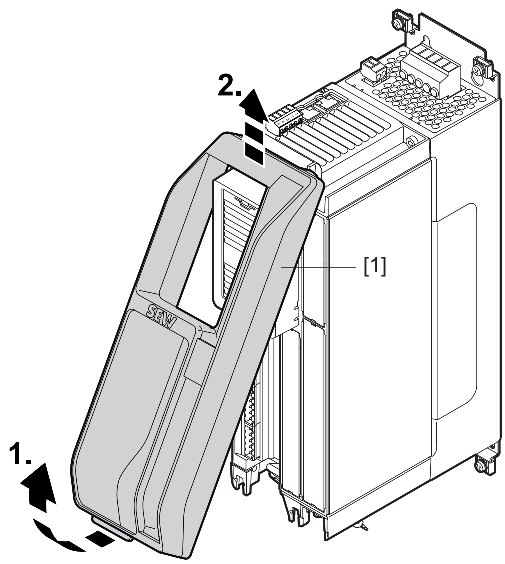
8.7 Installing options and accessories

8.7.1 Installing a card

Observe the safety notes in the chapter "Electrical installation" (→ 🗎 223).

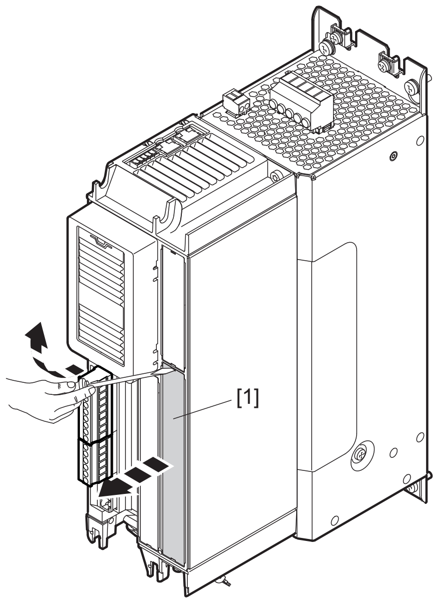
For information on which option card can be installed in which slot, refer to the chapter "Card slots".

1. Disconnect the application inverter from the power supply. Disconnect the DC 24 V supply and the line voltage.
2. Ensure electrostatic discharge with suitable measures before starting work. Suitable measures for equipotential bonding include, for example, the use of a discharge strap or wearing conductive shoes.
3. Remove the safety cover [1] from the front of the application inverter.



14299394571

4. Remove the plastic cover [1] of the card slot using a screwdriver.



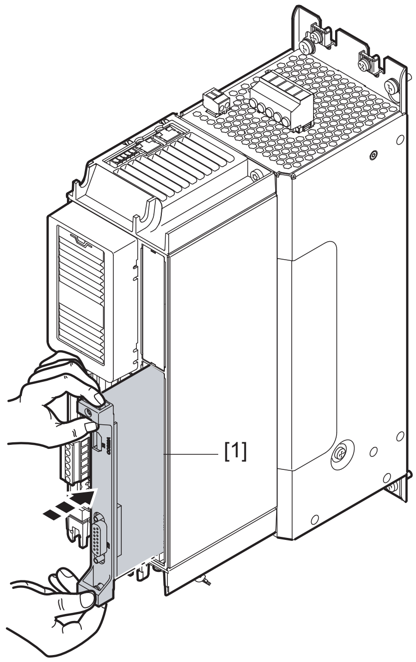
15160620811

28487486/EN – 02/2019

INFORMATION

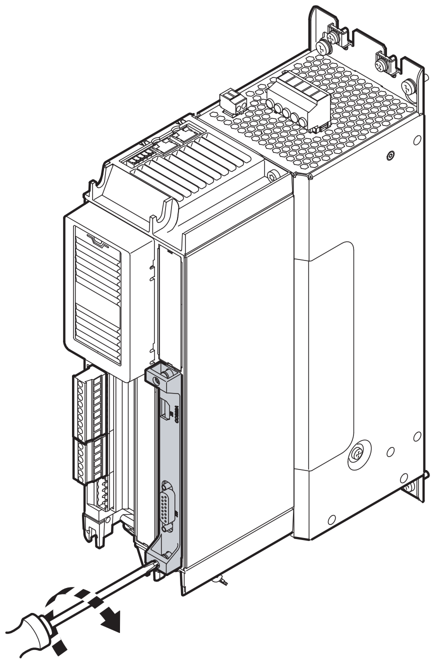
Hold the card by its edges only.

5. Take the card [1] and insert it in the slot with slight pressure.



15160623243

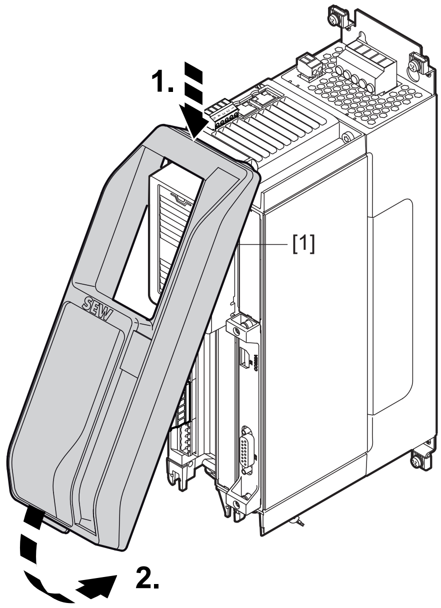
6. Screw in the card with the specified tightening torque (→ 🗎 211).



15160625675

28487486/EN – 02/2019

7. Install the safety cover [1] at the front of the application inverter.



14578455307

8.7.2 CIO21A and CID21A input/output card

INFORMATION

Technical data of the cards

For technical data and a detailed description of the encoder interface, refer to the chapter "Technical data of the cards".

Voltage supply

The I/O cards are supplied by the basic unit via the 24 V voltage supply.

Short-circuit behavior of digital outputs

The digital outputs are short-circuit-proof.

As soon as the short circuit is remedied, the target output voltage is output, meaning the output does not switch off.

Short circuit behavior of analog outputs

The analog outputs are short-circuit-proof.

In the event of a short circuit, the output current is limited to a maximum value of 30 mA. The short circuit current is not pulsating.

As soon as the short circuit is remedied, the target output voltage is output, meaning the output does not switch off.

Connecting inductive loads at digital outputs

For inductive loads an external protective element (e.g. freewheeling diode) is required.

Connecting 2 digital outputs in parallel

Connecting digital outputs in parallel is possible. The possible output current is doubled. Ensure identical parameterization of the digital outputs.

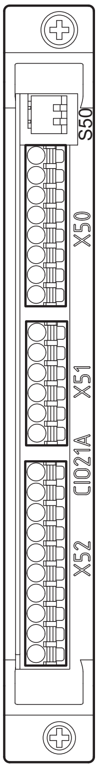
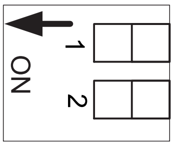
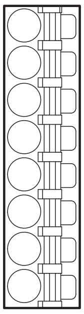
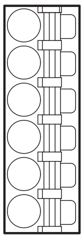
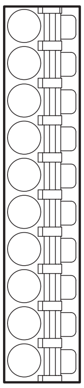
Cable lengths and shielding

The maximum cable length of connections on the inputs and outputs is 30 m.

Cables outside the control cabinet must be shielded.

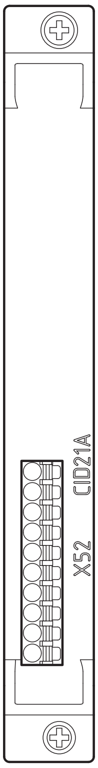
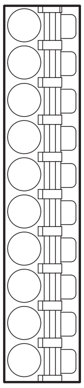
28487486/EN – 02/2019

CIO21A terminal assignment

	Terminal		Connection	Short description
				S50/1 on: Current input active for AI2x S50/2 on: Current input active for AI3x S50/1 off[1]: Voltage input active for AI2x S50/2 off[1]: Voltage input active for AI3x
		X50:1	REF1	+10 V reference voltage output
		X50:2	AI21	Analog current and voltage input
		X50:3	AI22	Analog current and voltage input, reference for AI21
		X50:4	GND	Reference potential
		X50:5	AI31	Analog current and voltage input
		X50:6	AI32	Analog current and voltage input, reference for AI31
		X50:7	GND	Reference potential
		X50:8	REF2	-10 V reference voltage output
		X51:1	AOV2	Analog voltage output 1, freely programmable
		X51:2	AOC2	Analog current output 1, freely programmable
		X51:3	GND	Reference potential for the outputs AOV2 and AOC2
		X51:4	AOV3	Analog voltage output 2, freely programmable
		X51:5	AOC3	Analog current output 2, freely programmable
		X51:6	GND	Reference potential for the outputs AOV3 and AOC3
		X52:1	DI10	Digital input 1, freely programmable
		X52:2	DI11	Digital input 2, freely programmable
		X52:3	DI12	Digital input 3, freely programmable
		X52:4	DI13	Digital input 4, freely programmable
		X52:5	GND	Reference potential for the digital inputs DI10 – DI13
		X52:6	DO10	Digital output 1, freely programmable
		X52:7	DO11	Digital output 2, freely programmable
		X52:8	DO12	Digital output 3, freely programmable
		X52:9	DO13	Digital output 4, freely programmable
		X52:10	GND	Reference potential for the digital outputs DO10 – DO13

1) Delivery state

CID21A terminal assignment

	Terminal		Connec-tion	Short description
		X52:1	DI10	Digital input 1, freely programmable
		X52:2	DI11	Digital input 2, freely programmable
		X52:3	DI12	Digital input 3, freely programmable
		X52:4	DI13	Digital input 4, freely programmable
		X52:5	GND	Reference potential for the digital inputs DI10 – DI13
		X52:6	DO10	Digital output 1, freely programmable
		X52:7	DO11	Digital output 2, freely programmable
		X52:8	DO12	Digital output 3, freely programmable
		X52:9	DO13	Digital output 4, freely programmable
		X52:10	GND	Reference potential for the digital outputs DO10 – DO13

28487486/EN – 02/2019

8.7.3 CES11A multi-encoder card

INFORMATION

Technical data of the cards

For technical data and a detailed description of the encoder interface, refer to the chapter "Technical data of the cards".

Overview of functions

The CES11A multi-encoder card expands the functionality of the application inverter in a way that an additional encoder can be evaluated. The encoder connected to the CES11A multi-encoder card can be used as motor encoder or external encoder.

Supported encoder types

The following encoder types can be evaluated by the CES11A multi-encoder card:

HTL 12/24 V (differential)
TTL (differential)
RS422
sin/cos 1 V_{SS} (differential)
HIPERFACE® with sin/cos signals 1 V_{SS}
SEW encoder (RS485) with sin/cos signals 1 V_{SS}, e.g. AS7W, AG7W
EnDat 2.1 with sin/cos signals 1 V_{SS}
SSI encoder with/without sin/cos signals 1 V_{SS}
CANopen encoder

Encoder connection/cable lengths

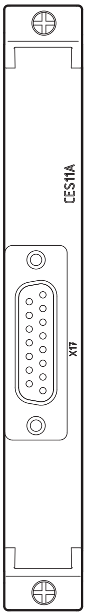
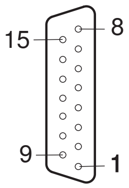
Connection/encoder	Cable length
HTL encoder ES7C and EG7C	300 m
Standard HTL encoder	200 m
Other encoders	100 m

INFORMATION

The maximum cable length might be reduced depending on the technical data of the respective encoder. Observe the manufacturer specifications.

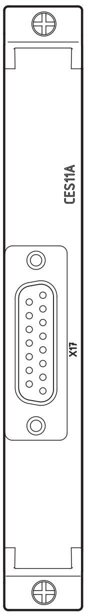
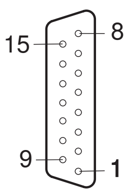
28487486/EN – 02/2019

Terminal assignment of TTL, HTL, sin/cos encoder

Card	Terminal		Connection	Brief description
		X17:1	A (cos+) (K1)	Signal track A (cos+) (K1)
		X17:2	B (sin+) (K2)	Signal track B (sin+) (K2)
		X17:3	C	Signal track C (K0)
		X17:4	DATA+[1)]	Data cable for electronic nameplate
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	$\overline{A}$ (cos-) ($\overline{K1}$)	Negated signal track $\overline{A}$ (cos-) ($\overline{K1}$)
		X17:10	$\overline{B}$ (sin-) ($\overline{K2}$)	Negated signal track $\overline{B}$ (sin-) ($\overline{K2}$)
		X17:11	$\overline{C}$	Negated signal track $\overline{C}$ ($\overline{K0}$)
		X17:12	DATA-[1)]	Data cable for electronic nameplate
		X17:13	U_{S24VG}	Encoder supply 24 V
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	U_{S12VG}	Encoder supply 12 V

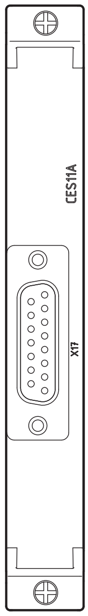
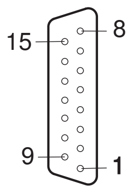
1) For encoders from SEW-EURODRIVE with electronic nameplate of type E.7S

Terminal assignment HIPERFACE® and SEW-EURODRIVE encoder (RS485)

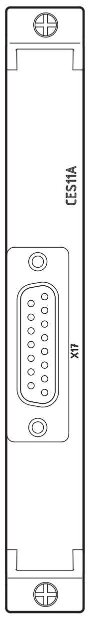
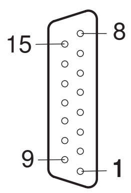
Card	Terminal		Connection	Brief description
		X17:1	A (cos+) (K1)	Signal track A (cos+) (K1)
		X17:2	B (sin+) (K2)	Signal track B (sin+) (K2)
		X17:3	Reserved	–
		X17:4	DATA+	Data line
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	$\overline{A}$ (cos-) ($\overline{K1}$)	Negated signal track $\overline{A}$ (cos-) ($\overline{K1}$)
		X17:10	$\overline{B}$ (sin-) ($\overline{K2}$)	Negated signal track $\overline{B}$ (sin-) ($\overline{K2}$)
		X17:11	Reserved	–
		X17:12	DATA-	Data line
		X17:13	U_{S24VG}	Encoder supply 24 V
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	U_{S12VG}	Encoder supply 12 V

28487486/EN – 02/2019

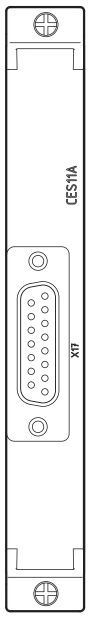
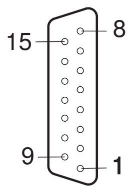
Terminal assignment EnDat encoder

Card	Terminal		Connection	Brief description
		X17:1	A (cos+)	Signal track A (cos+)
		X17:2	B (sin+)	Signal track B (sin+)
		X17:3	PULSE+	Clock signal
		X17:4	DATA+	Data line
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	$\overline{A}$ (cos-)	Negated signal track $\overline{A}$ (cos-)
		X17:10	$\overline{B}$ (sin-)	Negated signal track $\overline{B}$ (sin-)
		X17:11	PULSE-	Clock signal
		X17:12	DATA-	Data line
		X17:13	U_{S24VG}	Encoder supply 24 V
		X17:14	+TEMP_M	–
		X17:15	U_{S12VG}	Encoder supply 12 V

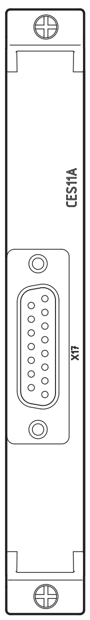
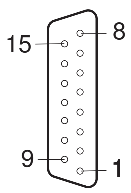
Terminal assignment SSI encoder

Card	Terminal		Connection	Brief description
		X17:1	Reserved	–
		X17:2	Reserved	–
		X17:3	PULSE+	Clock signal
		X17:4	DATA+	Data line RS485
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	Reserved	–
		X17:10	Reserved	–
		X17:11	PULSE-	Clock signal
		X17:12	DATA-	Data line
		X17:13	V_{S24VG}	24 V encoder supply
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	V_{S12VG}	12 V encoder supply

Terminal assignment SSI and sin/cos combination encoders

Card	Terminal		Connection	Brief description
		X17:1	A (cos+)	Signal track A (cos+)
		X17:2	B (sin+)	Signal track B (sin+)
		X17:3	PULSE+	Clock signal
		X17:4	DATA+	Data line
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	$\overline{A}$ (cos-)	Negated signal track $\overline{A}$ (cos-)
		X17:10	$\overline{B}$ (sin-)	Negated signal track $\overline{B}$ (sin-)
		X17:11	PULSE-	Clock signal
		X17:12	DATA-	Data line
		X17:13	U_{S24VG}	Encoder supply 24 V
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	U_{S12VG}	Encoder supply 12 V

Terminal assignment CANopen encoder

Card	Terminal		Connection	Brief description
		X17:1	Reserved	–
		X17:2	Reserved	–
		X17:3	Reserved	–
		X17:4	CAN_H	CAN high data cable
		X17:5	Reserved	–
		X17:6	-TEMP_M	Motor temperature evaluation
		X17:7	Reserved	–
		X17:8	GND	Reference potential
		X17:9	Reserved	–
		X17:10	Reserved	–
		X17:11	Reserved	–
		X17:12	CAN_L	CAN low data cable
		X17:13	V_{S24VG}	24 V encoder supply
		X17:14	+TEMP_M	Motor temperature evaluation
		X17:15	V_{S12VG}	12 V encoder supply

8.8 Braking resistors

The supply cables to the braking resistors carry a high pulsed DC voltage during nominal operation.

⚠ DANGER

Dangerous pulsed DC voltage of up to 970 V.

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- Disconnect the application inverter from the power supply and wait 10 minutes before working on a braking resistor or its supply cables.
- Never operate the application inverter without touch guards and installed closing covers.

Braking resistors get very hot during operation.

⚠ WARNING

The surfaces of the braking resistors will reach temperatures of up to 250 °C when the braking resistors are loaded with the nominal power.

Severe burns.

To prevent burns:

- Do not touch any hot braking resistor.
- Select a suitable installation location for the braking resistors such as the control cabinet roof.

28487486/EN – 02/2019

8.8.1 Permitted installation of braking resistors

The surfaces of the resistors become very hot if loaded with nominal power. Make sure that you select an installation site that will accommodate these high temperatures. For this reason, braking resistors are usually mounted on the control cabinet roof.

NOTICE

Braking resistors overheat

Non-permissible installation might lead to an accumulation of heat in the braking resistor due to reduced convection. A tripping temperature contact or an overheated braking resistor can lead to a system standstill.

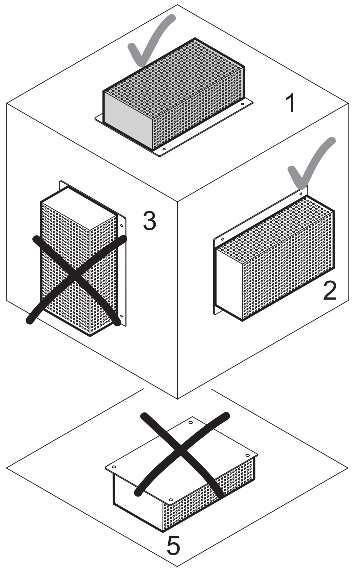
Adhere to the following minimum clearances:

- 200 mm to adjacent components and walls

- 300 mm to above components/ceilings

Observe the following permitted mounting positions when installing the resistors:

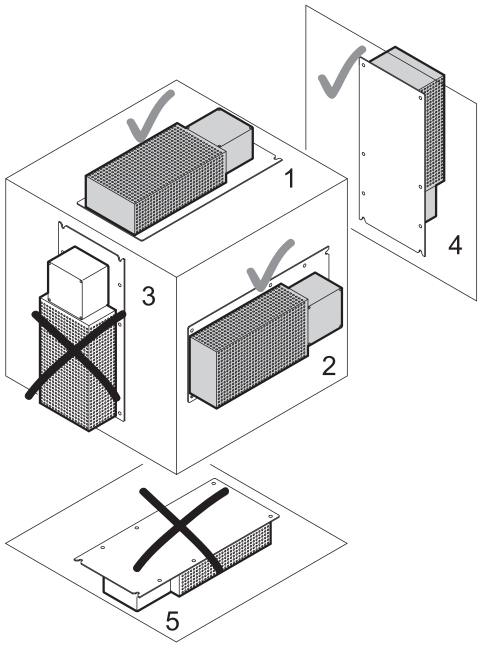
- Grid resistor



18014417021942155

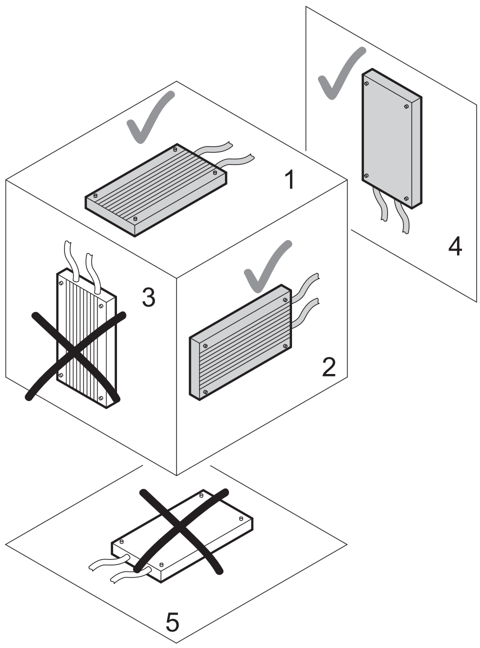
The brake resistors BR003-420-T and BR1.0-170 may be used only in position 1.

- Wire resistor



18512455307

- Flat type resistor



18512457739

8.8.2 Protection against thermal overload of the braking resistor

INFORMATION

PTC braking resistor.

A PTC braking resistor goes to high resistance in the event of overload.

INFORMATION

Flat-type resistor.

Flat-type resistors have internal thermal protection (fuse cannot be replaced) that interrupts the current circuit in the event of overload. The project planning guidelines and the documented assignments of drive inverter and braking resistor must be adhered to.

Parallel connection of braking resistors

It is permitted to connect several identical braking resistors in parallel. The following applies:

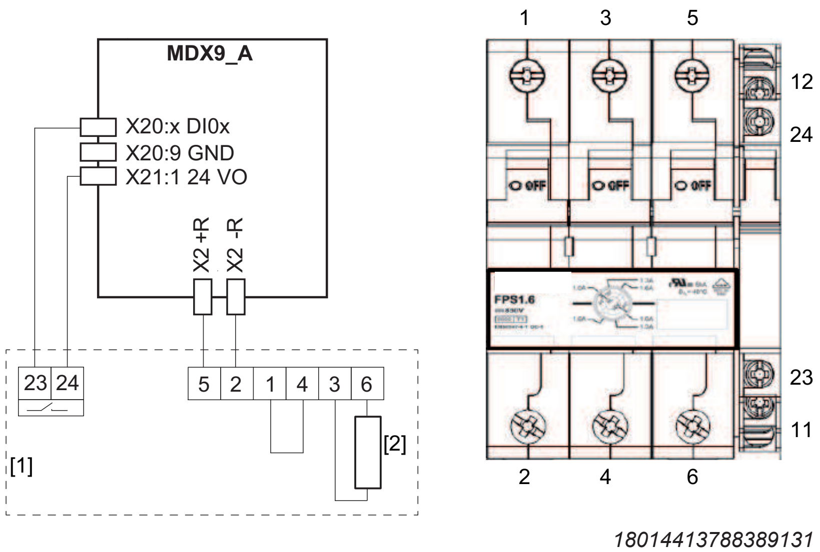
- The power connections of the braking resistors must be connected to +R and -R in parallel.
- Each braking resistor requires a separate protection against thermal overload.
- The signal contacts (NC contacts) of the protection devices must be connected in series.

28487486/EN – 02/2019

External thermal circuit breaker TCB

If an external TCB thermal circuit breaker is used for this application inverter, the following connection applies.

Connection



[1] TCB thermal circuit breaker

[2] Braking resistor

INFORMATION

The polarity of the connections 5 (+R) and 2 (-R) must be strictly adhered to during connection of the TCB circuit breaker to the inverter.

The digital input of the application inverter connected to the signal contact of the TCB thermal circuit breaker must be parameterized to the function "External braking resistor error".

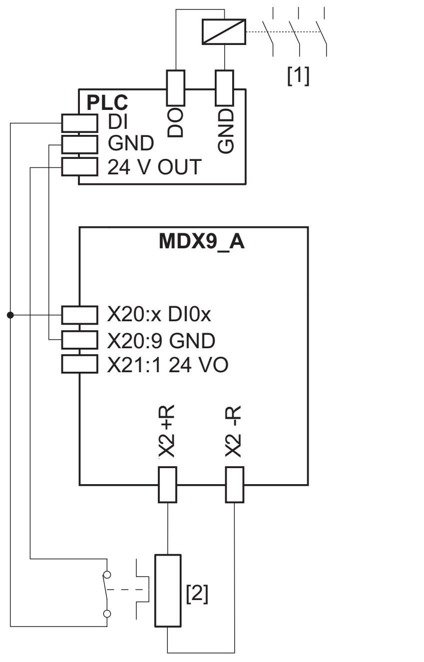
- If the thermal circuit breaker trips, the signal contact is set (connection 23-24 is opened) and evaluated in the application inverter.
- The connection between application inverter and braking resistor is disconnected.
- This does not require a response by the PLC.
- It is not required to disconnect the supply system connection with an external switching device.
- The following applies to application inverters as of MDX9_A-**0240**-5_3 and MDX9_A-**0213**-2_3: If an internal short circuit in the brake chopper is detected by the application inverter, the application inverter interrupts the energy supply by inhibiting the rectifier.
- If the thermal circuit breaker trips, the application inverter switches to "Output stage inhibit".
- Set the control knob of the thermal circuit breaker TCB to the tripping current I_F of the connected braking resistor. Use the scaling 40 °C.
- After all cables are connected, the 3 upper screw holes must be covered with 3 touch guard caps. The touch guard caps are included in the delivery.

Internal temperature switch -T

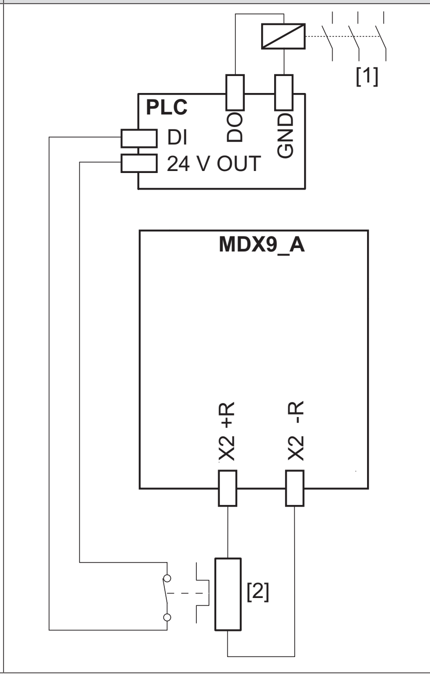
Application inverter: MDX9_A-0020 – 0160-5_3-.., MDX9_A-0070 – 0140-2_3-..

If a BR...-T braking resistor with internal temperature switch is used with these application inverters, there are 3 possible connections.

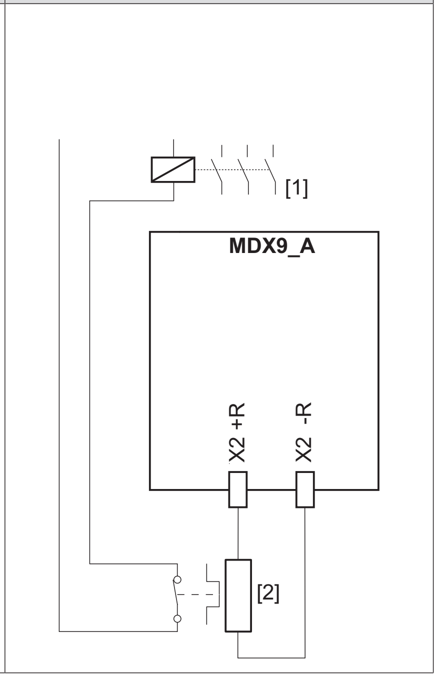
Connection 1



Connection 2



Connection 3



[1] Line contactor

[2] Braking resistor

Note that the reference potential GND of the digital input control must be the same as the reference potential of the application inverter when connection 1 is used.

- Connection 1

  The digital input of the application inverter connected to the signal contact of the internal temperature switch must be parameterized to the function "External braking resistor error".

  – If the thermal circuit breaker trips, the signal is evaluated in the application inverter and the PLC.

  – If the thermal circuit breaker trips, the PLC must interrupt the power supply.

  – If the thermal circuit breaker trips, the application inverter switches to "Output stage inhibit".

- Connection 2

  – If the thermal circuit breaker trips, the signal is evaluated only in the PLC.

  – If the thermal circuit breaker trips, the PLC must interrupt the power supply.

  – If the thermal circuit breaker trips, there is no direct response in the application inverter.

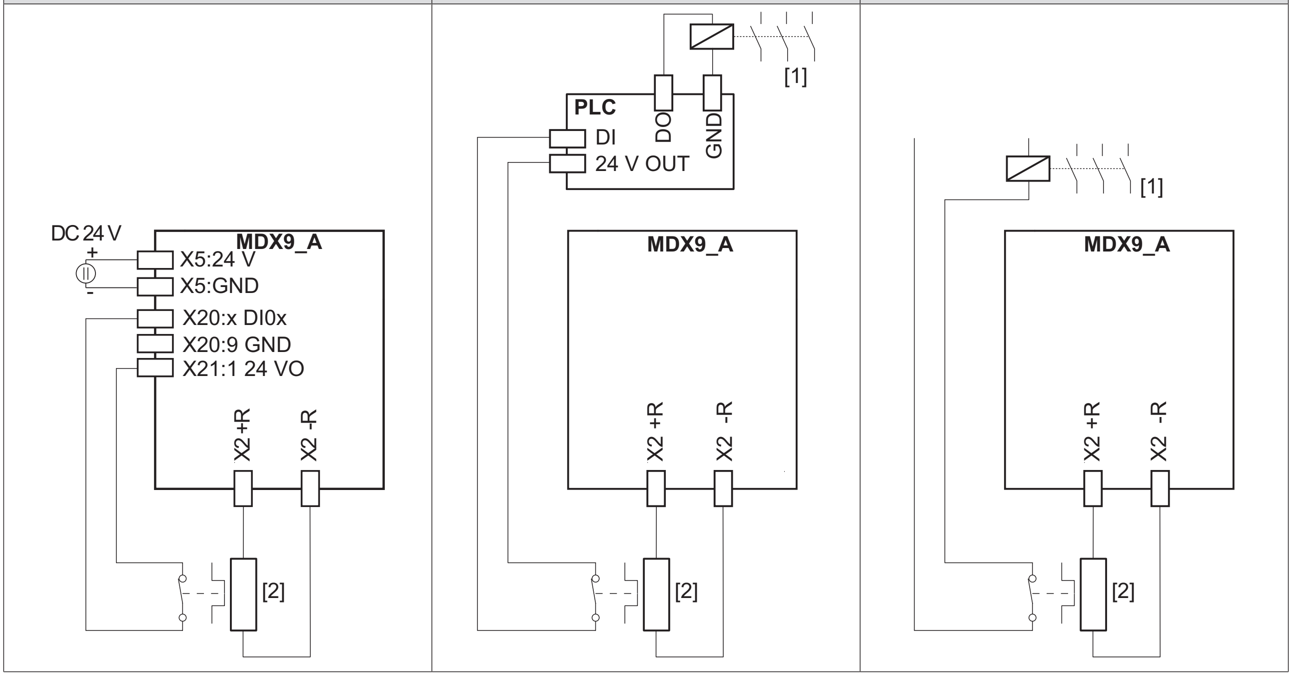
  - With connection 2, it is possible that the PLC finishes the current travel cycle although the thermal circuit breaker has tripped. Only then is the power supply disconnected. In this case, the residual braking energy $W_{Rest} = P_{BRnom} \times 20$ s must not be exceeded.
- Connection 3
  - If the thermal circuit breaker trips, the signal directly affects the line contactor.
  - This does not require a response by the PLC.
  - If the thermal circuit breaker trips, there is no direct response in the application inverter.

28487486/EN – 02/2019

Application inverter: as of MDX9_A-0240-5_3-.., as of MDX9_A-0213-2_3-..

If a BR...-T braking resistor with internal temperature switch is used with these application inverters, there are 3 possible connections.

Connection 1	Connection 2	Connection 3



[1] Line contactor

[2] Braking resistor

- Connection 1

  The digital input of the application inverter connected to the signal contact of the internal temperature switch must be parameterized to the function "External braking resistor error".

  – If the thermal circuit breaker trips, the signal is evaluated in the application inverter.

  – This does not require a response by the PLC.

  – It is not required to disconnect the supply system connection with an external switching device.

  – If an internal short circuit in the brake chopper is detected by the application inverter, the application inverter interrupts the energy supply by inhibiting the rectifier.

  – If the thermal circuit breaker trips, the application inverter switches all axis modules to "Output stage inhibit".

INFORMATION

When using connection variant 1 (connection of braking resistor without line contactor), the application inverter must be supplied with external DC 24 V.

- Connection 2

  – If the thermal circuit breaker trips, the signal is evaluated only in the PLC.

  – If the thermal circuit breaker trips, the PLC must interrupt the power supply.

28487486/EN – 02/2019

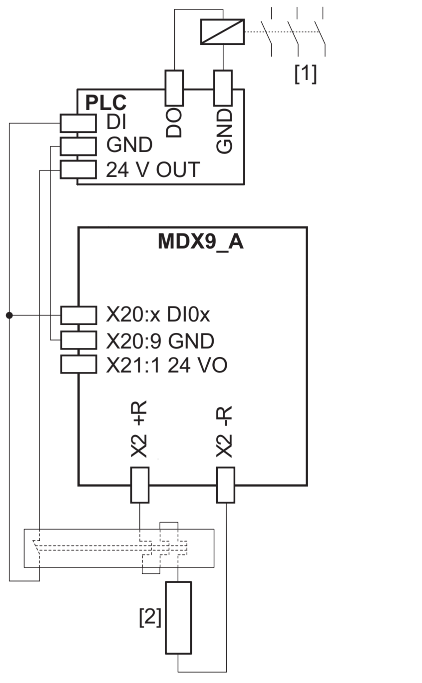
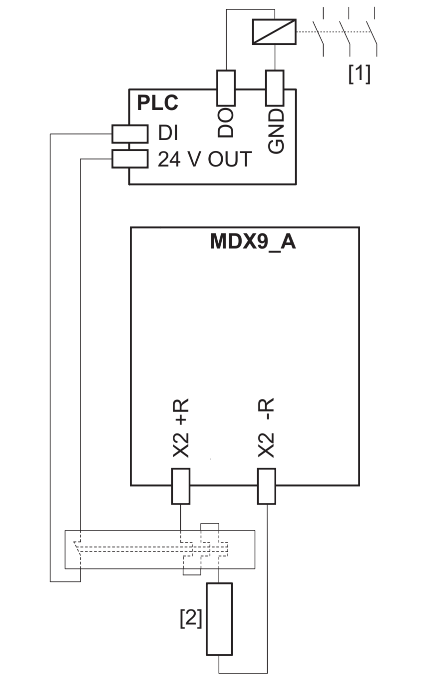
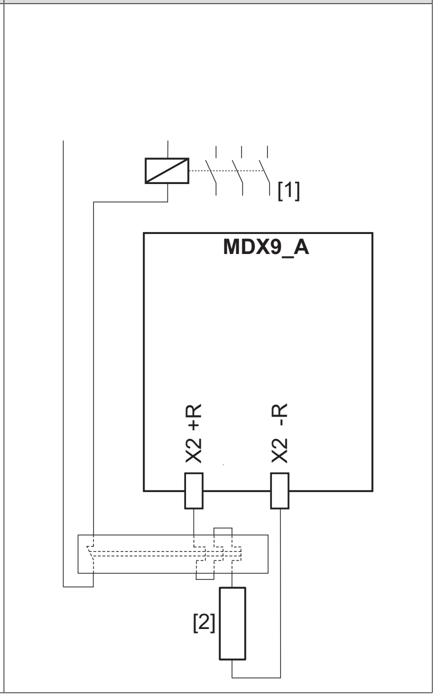
- If the thermal circuit breaker trips, there is no direct response in the application inverter.
- With connection 2, it is possible that the PLC finishes the current travel cycle although the thermal circuit breaker has tripped. Only then is the power supply disconnected. In this case, the residual braking energy $W_{Rest} = P_{BRnom} \times 20$ s must not be exceeded.

- Connection 3
  - If the thermal circuit breaker trips, the signal directly affects the line contactor.
  - This does not require a response by the PLC.
  - If the thermal circuit breaker trips, there is no direct response in the application inverter.

External bimetallic relay

Application inverter: MDX9_A-0020 – 0160-5_3-.., MDX9_A-0070 – 0140-2_3-..

If an external bimetallic relay is used with the application inverter, there are 3 possible connections.

Connection 1	Connection 2	Connection 3
		

[1] Line contactor

[2] Braking resistor

Note that the reference potential GND of the digital inputs on the controller must be the same as the reference potential of the application inverter when connection 1 is used.

- Connection 1

  The digital input of the application inverter connected to the signal contact of the external bimetallic relay must be parameterized to the function "External braking resistor error".

  – If the thermal circuit breaker trips, the signal is evaluated in the application inverter and the PLC.

  – If the thermal circuit breaker trips, the PLC must interrupt the power supply.

  – If the thermal circuit breaker trips, the application inverter switches to "Output stage inhibit".

- Connection 2

  – If the thermal circuit breaker trips, the signal is evaluated only in the PLC.

  – If the thermal circuit breaker trips, the PLC must interrupt the power supply.

  – If the thermal circuit breaker trips, there is no direct response in the application inverter.

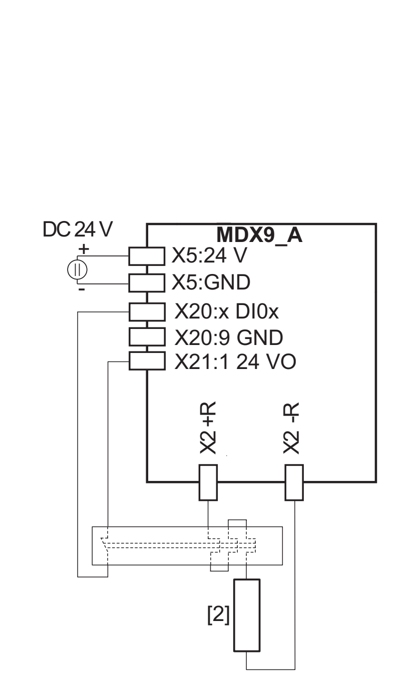
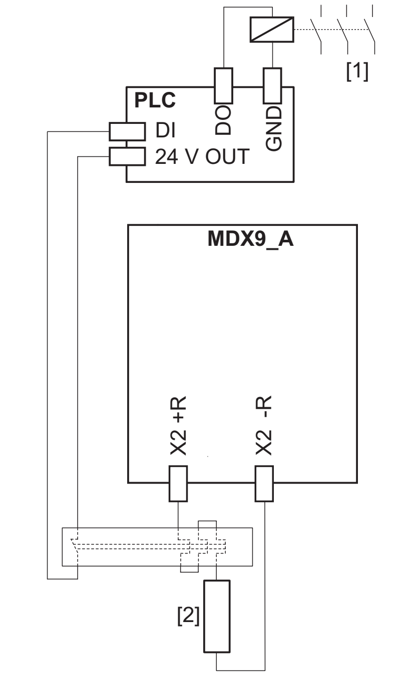
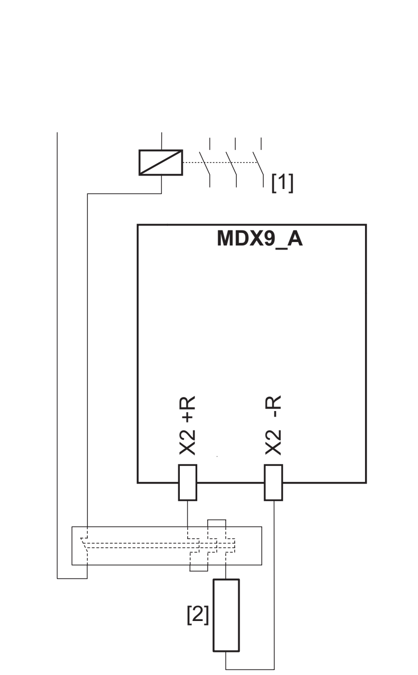
28487486/EN – 02/2019

- With connection 2, it is possible that the PLC finishes the current travel cycle although the thermal circuit breaker has tripped. Only then is the power supply disconnected. In this case, the residual braking energy $W_{Rest} = P_{BRnom} \times 20$ s must not be exceeded.

- Connection 3
  - If the thermal circuit breaker trips, the signal directly affects the line contactor.
  - This does not require a response by the PLC.
  - If the thermal circuit breaker trips, there is no direct response in the application inverter.

Application inverter: as of MDX9_A-0240-5_3-.., as of MDX9_A-0213-2_3-..

If an external bimetallic relay is used with the application inverter, there are 3 possible connections.

Connection 1	Connection 2	Connection 3
		

[1] Line contactor

[2] Braking resistor

- Connection 1

  The digital input of the application inverter connected to the signal contact of the external bimetallic relay must be parameterized to the function "External braking resistor error".

  – If the thermal circuit breaker trips, the signal is evaluated in the application inverter.

  – This does not require a response by the PLC.

  – It is not required to disconnect the supply system connection with an external switching device.

  – If the thermal circuit breaker trips, the application inverter switches to the operating state "Output stage inhibit".

  – If an internal short circuit in the brake chopper is detected by the application inverter, the application inverter interrupts the energy supply by inhibiting the rectifier.

INFORMATION

When using connection variant 1 (connection of braking resistor without line contactor), the application inverter must be supplied with external DC 24 V.

- Connection 2

  – If the thermal circuit breaker trips, the signal is evaluated only in the PLC.

  – If the thermal circuit breaker trips, the PLC must interrupt the power supply.

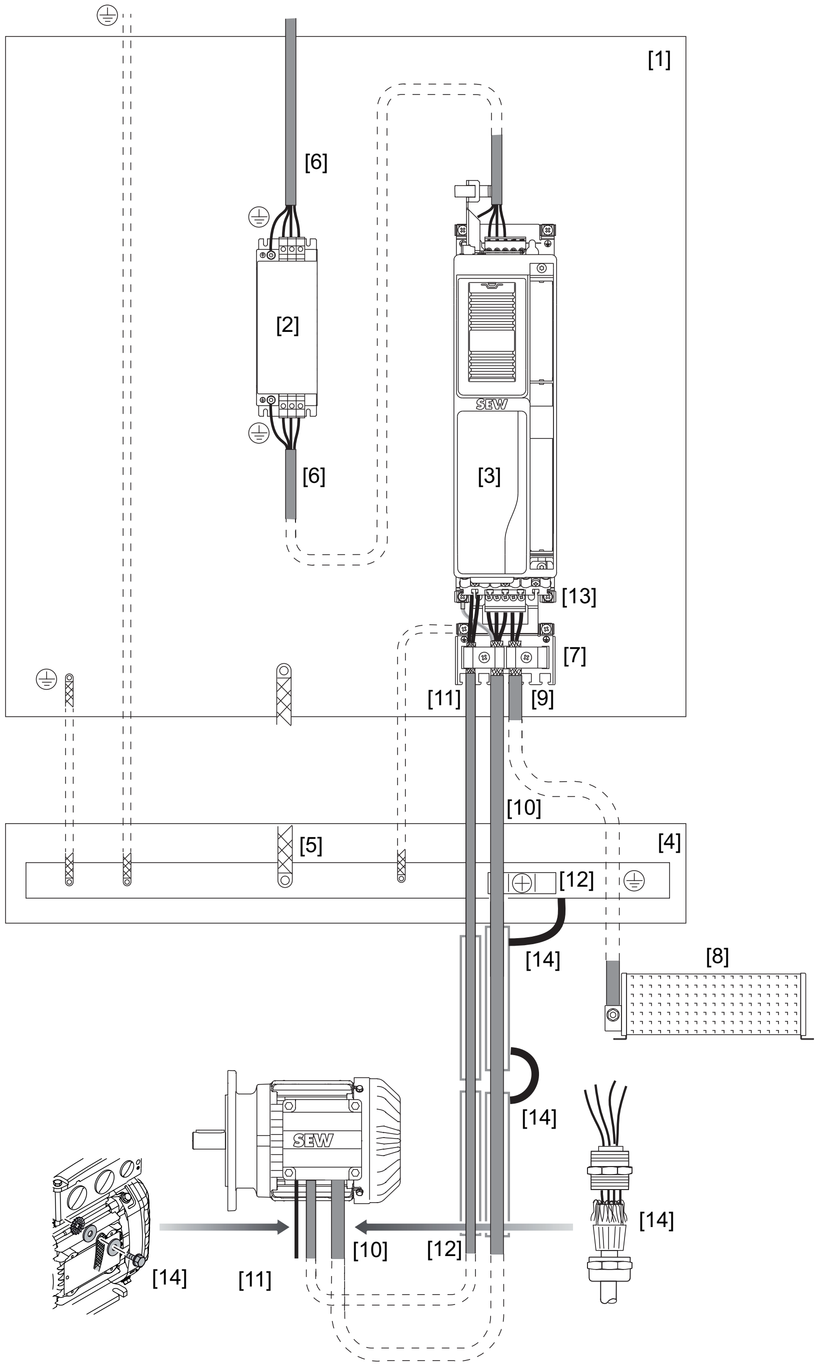
  - If the thermal circuit breaker trips, there is no direct response in the application inverter.
  - With connection 2, it is possible that the PLC finishes the current travel cycle although the thermal circuit breaker has tripped. Only then is the power supply disconnected. In this case, the residual braking energy $W_{Rest} = P_{BRnom} \times 20$ s must not be exceeded.
- Connection 3
  - If the thermal circuit breaker trips, the signal directly affects the line contactor.
  - This does not require a response by the PLC.
  - If the thermal circuit breaker trips, there is no direct response in the application inverter.

8.9 Line filter

- Install the line filter close to the application inverter but outside the minimum clearance for cooling. The line filter must not be heated by the exhaust air of the application inverter.
- Do not wire any other consumers between the line filter and the application inverter.
- The connection cable between line filter and application inverter does not have to be shielded.
- Limit the length of the cable between the line filter and the application inverter to the absolute minimum needed.
- Do not switch between the line filter and application inverter.

28487486/EN – 02/2019

8.10 EMC-compliant installation



19508519307

[1]	Galvanized mounting plate	[8]	Braking resistor
[2]	Line filter	[9]	Braking resistor cable
[3]	Inverter	[10]	Motor cable
[4]	PE busbar	[11]	Brake cable
[5]	HF connection of PE busbar/mounting plate	[12]	Grounding clamp
[6]	Supply system cable	[13]	Electronics shield plate
[7]	Power shield plate	[14]	HF connection

The information in this chapter will help you to optimize the system with respect to electromagnetic compatibility, or to eliminate already existing EMC interferences.

The notes in this chapter are not legal regulations, but rather recommendations for improving the electromagnetic compatibility of your plant.

For further notes on EMC-compliant installation, refer to the publication Drive Technology – Practical Implementation, edition "EMC in Drive Technology – Basic Theoretical Principles – EMC-Compliant Installation in Practice".

Compliance with limit classes C1 and C2 has been tested in a CE-typical drive system. SEW-EURODRIVE can provide detailed information on request.

8.10.1 Control cabinet

Use control cabinets with electrically conductive (galvanized) mounting plates. If several mounting plates are used, connect the plates together conductively over a large area.

Mount the line filter and inverter on a shared mounting plate if possible. Make sure they are connected over a large area and with good conductivity.

8.10.2 HF equipotential bonding in the system

Make sure that there is a suitable equipotential bonding between the system, the control cabinet, the machine structure, the cable ducts, and the drives.

Connect the individual sections together in an HF-capable manner.

From an electrical safety perspective, the PE busbar is the star point. The PE connection does not replace either the HF grounding or the shielding.

In terms of EMC, it is advantageous if the mounting plate is used as a star point with respect to HF equipotential bonding.

Perform the following measures for a suitable HF equipotential bonding:

- Connect the PE busbar to the mounting plate in an HF-compatible manner.
- Connect the sheet metal cable ducts to the control cabinet in an HF-compatible manner.
- Connect the cable ducts to the mounting plate in the control cabinet using an HF braid.
- Connect the parts of the sheet metal cable ducts together in an HF-compatible manner.
- Connect the sheet metal cable ducts to the gearmotor in an HF-compatible manner.

8.10.3 Cable installation

Route the power cables, such as the motor cable and the brake cable, separately from the supply system cable and the control cables.

Route all cables as closely to the reference potential as possible, e.g. the mounting plate.

Keep all cables as short as possible. Avoid spare loops.

28487486/EN – 02/2019

8.10.4 Supply system cable connection

The supply system cable can be connected to the line choke and/or line filter using twisted unshielded single conductors or using unshielded cables.

If necessary, shielded cables may improve EMC.

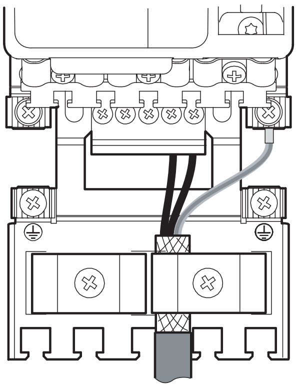
8.10.5 Line filter connection

Limit the length of the connection lead between the line filter and the inverter to the absolute minimum needed.

You must never route filtered and unfiltered cables together. For this reason, route incoming and outgoing line filter cables separately.

8.10.6 Braking resistor connection

For connecting braking resistors, use two closely twisted cores or a shielded power cable. In the case of shielded cables, connect the braided shields over the entire circumference. Use the designated shield plates at the basic device to connect the shield.



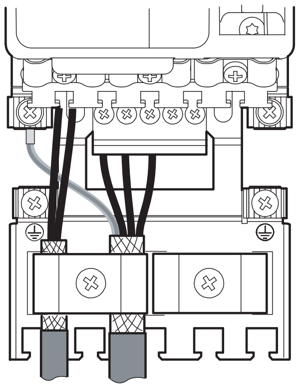
19508521739

8.10.7 Motor and brake connection

Use shielded motor cables only. Connect the braided shield of the motor cable at both ends over its entire circumference to the power shield plate at the inverter.

Provide shielded cables for the brake supply. The shield of the brake cable can be connected to the power shield plate at the inverter.

If the motor cable and brake cable are combined in a shared cable, the cable must have an inner shield separating the brake cables from the motor cores. The cables also possess an overall shield.



19508524171

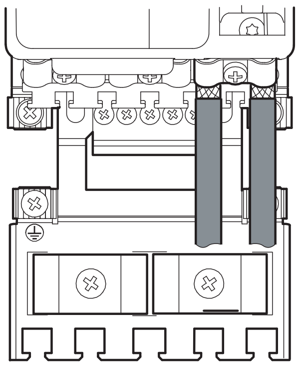
SEW-EURODRIVE recommends the use of prefabricated cables.

In the event of especially high EMC requirements, an additional connection point for the shield is recommended. To limit the emitted interference the motor shield can additionally be grounded to the control cabinet outlet using commercial installation materials (grounding clamps or EMC screw fittings).

8.10.8 Control cable connection

Ensure that the digital inputs are connected with unshielded individual cores. Shielded cables increase the EMC. Use the designated shield plates to connect the shield.

For routing outside of the control cabinet, you must use shielded cables.



19508526603

8.10.9 Encoder connection

SEW-EURODRIVE recommends the use of prefabricated encoder cables.

The shield of prefabricated cables from SEW-EURODRIVE is connected via the connector.

28487486/EN – 02/2019

8.10.10 Shielding connection

Ensure that there is an HF-compatible shield connection, e.g. by using grounding clamps or EMC cable glands, so that the braided shield has a large connection surface.

8.11 Terminal assignment

INFORMATION

Reference potentials inside the device:

The device internal reference potential is designated as GND in the following table.

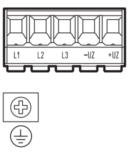
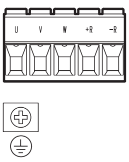
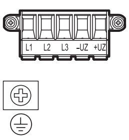
All reference potentials GND are internally connected to PE.

INFORMATION

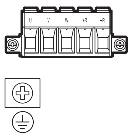
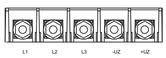
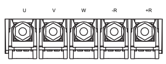
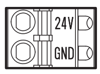
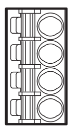
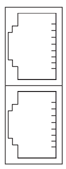
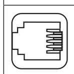
The assignment "Reserved" means that no cable may be connected to this connection.

INFORMATION

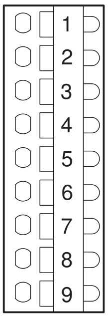
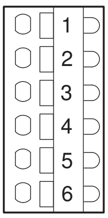
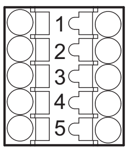
The technical data for the connection of power electronics and control electronics are listed in chapter "Technical data" (→ 🗎 37).

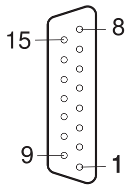
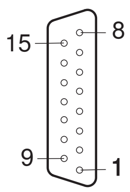
Representation	Terminal	Connection	Brief description
	X1:L1	L1	Line connection - MDX9_A-0020 – 0160-5_3-.. - MDX9_A-0070 – 0140-2_3-..
	X1:L2	L2	
	X1:L3	L3	
	X1:-U_Z	-U_Z	DC link connection
	X1:+U_Z	+U_Z	
	⏚	PE	PE connection
	X2:U	U	Motor connection - MDX9_A-0020 – 0160-5_3-.. - MDX9_A-0070 – 0140-2_3-..
	X2:V	V	
	X2:W	W	
	X2:+R	+R	Braking resistor connection
	X2:-R	-R	
	⏚	PE	PE connection
	X1:L1	L1	Line connection - MDX9_A-0240 – 0320-5_3-.. - MDX9_A-0213 – 0290-2_3-..
	X1:L2	L2	
	X1:L3	L3	
	X1:-U_Z	-U_Z	DC link connection
	X1:+U_Z	+U_Z	
	⏚	PE	PE connection

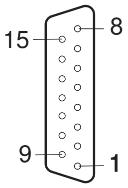
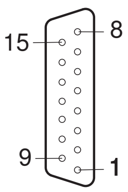
28487486/EN – 02/2019

Representation	Terminal	Connection	Brief description
	X2:U	U	Motor connection - MDX9_A-0240 – 0320-5_3-.. - MDX9_A-0213 – 0290-2_3-..
	X2:V	V	
	X2:W	W	
	X2:+R	+R	Braking resistor connection
	X2:-R	-R	
	⏚	PE	PE connection
	X1:L1	L1	Line connection - MDX9_A-0460 – 1490-5_3-.. - MDX9_A-0420 – 1080-2_3-..
	X1:L2	L2	
	X1:L3	L3	
	X1:-U_Z	-U_Z	DC link connection
	X1:+U_Z	+U_Z	
	⏚	PE	PE connection
	X2:U	U	Motor connection - MDX9_A-0460 – 1490-5_3-.. - MDX9_A-0420 – 1080-2_3-..
	X2:V	V	
	X2:W	W	
	X2:+R	+R	Braking resistor connection
	X2:-R	-R	
	⏚	PE	PE connection
	X5:24 V	V_I24 V	DC 24 V supply voltage
	X5:GND	GND	Reference potential
	X10:DB0	DB00	Brake control
	X10:GND	GND	Reference potential
	X10:TF1	TF1	Sensor input for temperature evaluation of the motor
	X10:GND	GND	Reference potential
	X30 OUT		System bus
	X30 IN		
	X31		SEW-EURODRIVE Service interface

28487486/EN – 02/2019

Representation	Terminal	Connection	Brief description
	X20:1	DI00	Digital input 1, with fixed assignment "Output stage enable"
	X20:2	DI01	Digital input 2, fixed setpoints – positive direction of rotation
	X20:3	DI02	Digital input 3, fixed setpoints – negative direction of rotation
	X20:4	DI03	Digital input 4, fixed speed setpoint bit 0
	X20:5	DI04	Digital input 5, fixed speed setpoint bit 1
	X20:6	DI05	Digital input 6, fault reset
	X20:7	Reserved	–
	X20:8	Reserved	–
	X20:9	GND	Reference potential
	X21:1	+24 V	DC 24 V voltage output
	X21:2	DO00	Digital output 1, operational
	X21:3	DO01	Digital output 2, output stage enable
	X21:4	DO02	Digital output 3, fault
	X21:5	DO03	Digital output 4, STO active
	X21:6	GND	Reference potential
	X6:1	F_STO_P1	DC +24 V input F_STO_P1
	X6:2	F_STO_M	DC 0 V input F_STO_M
	X6:3	F_STO_P2	DC +24 V input F_STO_P2
	X6:4	GND	Reference potential
	X6:5	24 V STO_OUT	U_{out} = DC 24 V supply of F_STO_P1 and F_STO_P2

Representation	Terminal	Connection	Brief description
	X15:1	S2 (sin+)	Signal track
	X15:2	S1 (cos+)	Signal track
	X15:3	Reserved	–
	X15:4	Reserved	–
	X15:5	R1 (REF+)	Supply voltage resolver
	X15:6	-TEMP_M	Motor temperature evaluation
	X15:7	Reserved	–
	X15:8	Reserved	–
	X15:9	S4 (sin-)	Signal track
	X15:10	S3 (cos-)	Signal track
	X15:11	Reserved	–
	X15:12	Reserved	–
	X15:13	R2 (REF-)	Supply voltage resolver
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	Reserved	–
	X15:1	A (cos+) (K1)	Signal track A (cos+) (K1)
	X15:2	B (sin+) (K2)	Signal track B (sin+) (K2)
	X15:3	C (K0)	Signal track C (K0)
	X15:4	DATA+[1]	Data cable for electronic nameplate
	X15:5	Reserved	–
	X15:6	-TEMP_M	Motor temperature evaluation
	X15:7	Reserved	–
	X15:8	GND	Reference potential
	X15:9	$\overline{A}$ (cos -) ($\overline{K1}$)	Negated signal track $\overline{A}$ (cos-) ($\overline{K1}$)
	X15:10	$\overline{B}$ (sin-) ($\overline{K2}$)	Negated signal track $\overline{B}$ (sin-) ($\overline{K2}$)
	X15:11	$\overline{C}$ ($\overline{K0}$)	Negated signal track $\overline{C}$ ($\overline{K0}$)
	X15:12	DATA-[2]	Data cable for electronic nameplate
	X15:13	U_{S24VG}	Encoder supply 24 V
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	U_{S12VG}	Encoder supply 12 V

Representa- tion	Terminal	Connection	Brief description
	X15:1	A (K1)	Signal track A (K1)
	X15:2	B (K2)	Signal track B (K2)
	X15:3	C (K0)	Signal track C (K0)
	X15:4	Reserved	–
	X15:5	Reserved	–
	X15:6	-TEMP_M	Motor temperature evaluation
	X15:7	Reserved	–
	X15:8	GND	Reference potential
	X15:9	$\overline{A}$ ($\overline{K1}$)	Negated signal track $\overline{A}$ ($\overline{K1}$)
	X15:10	$\overline{B}$ ($\overline{K2}$)	Negated signal track $\overline{B}$ ($\overline{K2}$)
	X15:11	$\overline{C}$ ($\overline{K0}$)	Negated signal track $\overline{C}$ ($\overline{K0}$)
	X15:12	Reserved	–
	X15:13	U_{S24VG}	Encoder supply 24 V
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	U_{S12VG}	Encoder supply 12 V
	X15:1	A (cos+) (K1)	Signal track A (cos+) (K1)
	X15:2	B (sin+) (K2)	Signal track B (sin+) (K2)
	X15:3	Reserved	–
	X15:4	DATA+	Data line RS485
	X15:5	Reserved	–
	X15:6	-TEMP_M	Motor temperature evaluation
	X15:7	Reserved	–
	X15:8	GND	Reference potential
	X15:9	$\overline{A}$ (cos -) ($\overline{K1}$)	Negated signal track $\overline{A}$ (cos-) ($\overline{K1}$)
	X15:10	$\overline{B}$ (sin-) ($\overline{K2}$)	Negated signal track $\overline{B}$ (sin-) ($\overline{K2}$)
	X15:11	Reserved	–
	X15:12	DATA-	Data line
	X15:13	U_{S24VG}	Encoder supply 24 V
	X15:14	+TEMP_M	Motor temperature evaluation
	X15:15	U_{S12VG}	Encoder supply 12 V

1) For encoders from SEW-EURODRIVE with electronic nameplate of type E.7S

8.12 Wiring diagrams

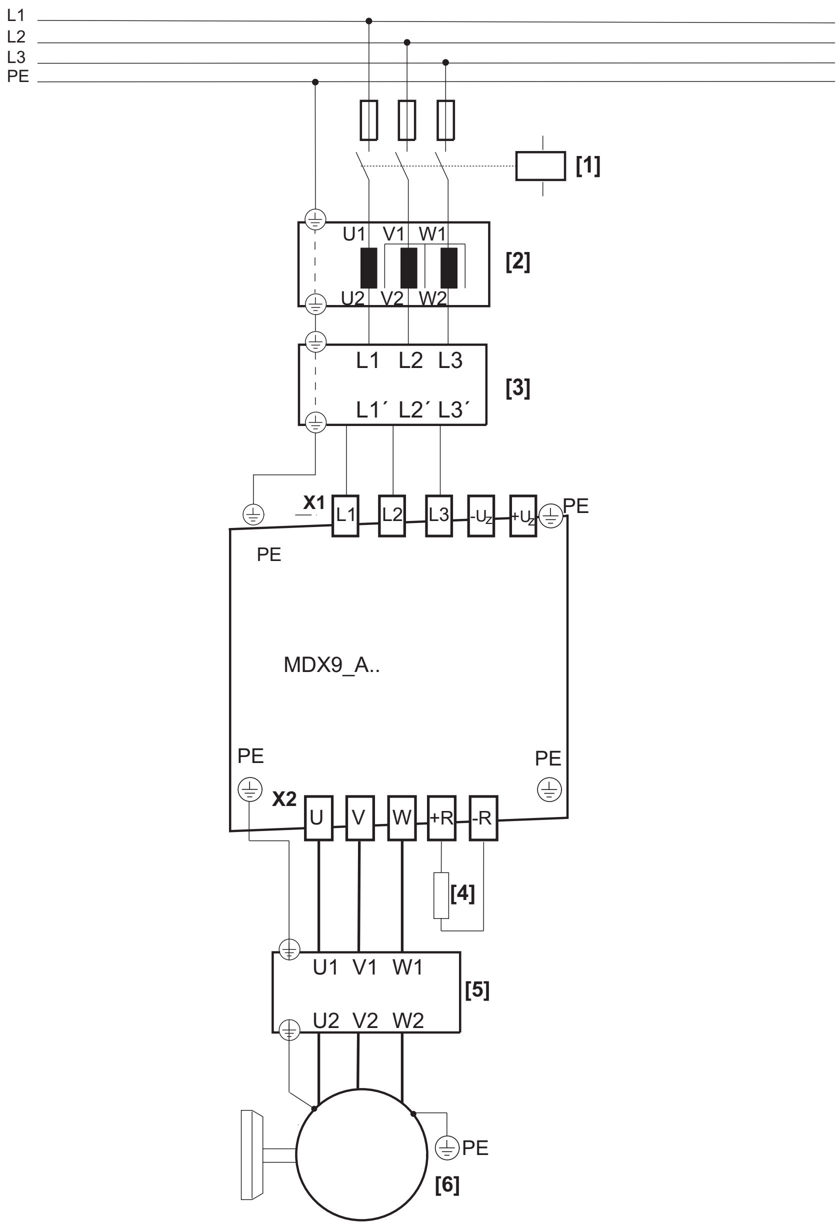
8.12.1 General information on the wiring diagrams

- For technical data of the power electronics and the control electronics, refer to chapter "Technical data" (→ 🗎 37).
- For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 266).

8.12.2 Power connection

8

Wiring of the power connections with line contactor, line choke, line filter, and output choke



36028810897869451

[1]	Line contactor	[4]	Braking resistor (optional)
[2]	Line choke (optional)	[5]	Output choke
[3]	Line filter (optional)	[6]	Motor

28487486/EN – 02/2019

Wiring of the power connections with line choke, line filter, output choke, without line contactor

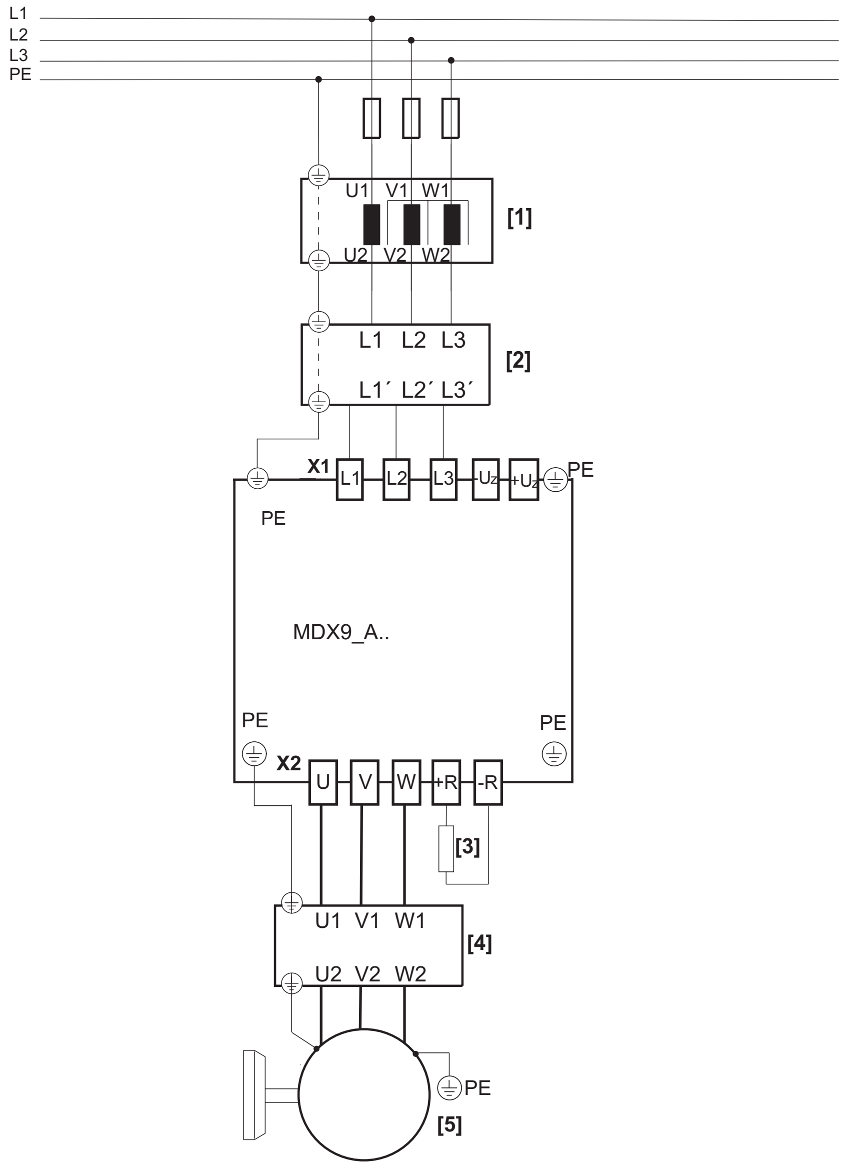
Refer to the table in the chapter "Line contactor" (→ 🗎 230) to find out which application inverters can be operated without a line contactor.

NOTICE

Operation without line contactor

If the required measures are not taken, operation of an application inverter with connected braking resistor without line contactor may result in severe damage to property.

Refer to the chapter "Line contactor" (→ 🗎 230) for the necessary measures.



36028810898214283

[1]	Line choke (optional)	[4]	Output choke
[2]	Line filter (optional)	[5]	Motor
[3]	Braking resistor (optional)		

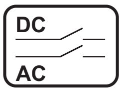
INFORMATION

In the event of a line connection without line contactor, the temperature evaluation of the braking resistor must be ensured via a digital input on the application inverter. The connected digital input must be parameterized for monitoring the braking resistor temperature evaluation.

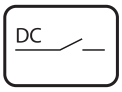
28487486/EN – 02/2019

8.12.3 Brake control

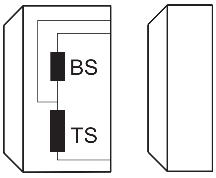
Legend:



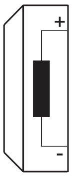
Cut-off in the DC and AC circuits
(rapid brake application)



Cut-off in the DC circuit



Brake
BS = Accelerator coil
TS = Coil section



DC brake with one brake coil

Auxiliary terminal strip in terminal box

Control cabinet limit

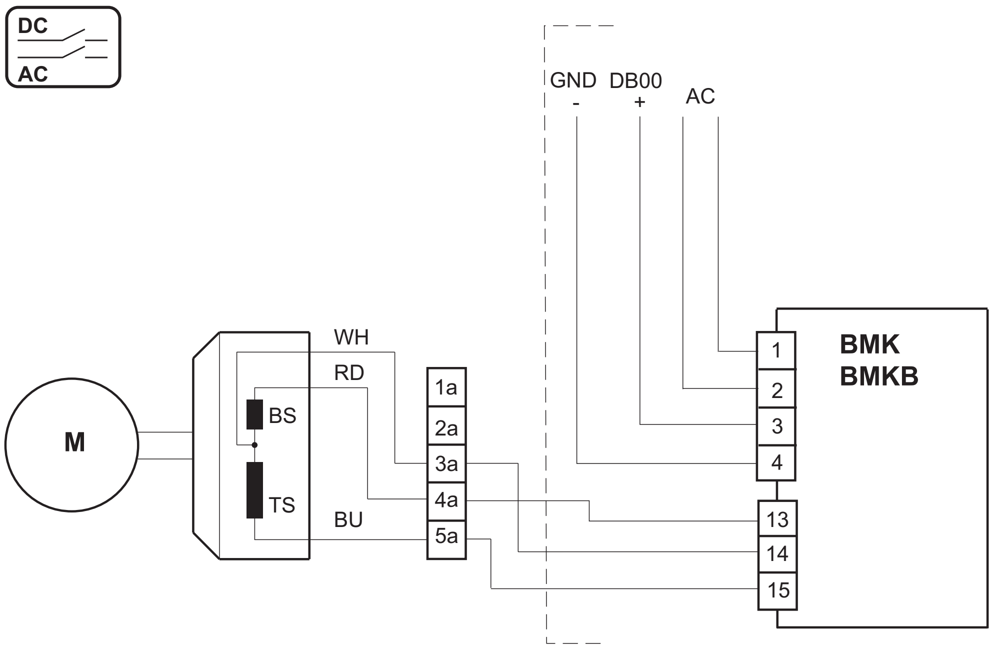
WH White
RD Red
BU Blue

INFORMATION

The selection of the brake control and the shown connection diagrams only represent one of the many possibilities. Observe the catalogs and operating instructions of the motors for more information and installation notes.

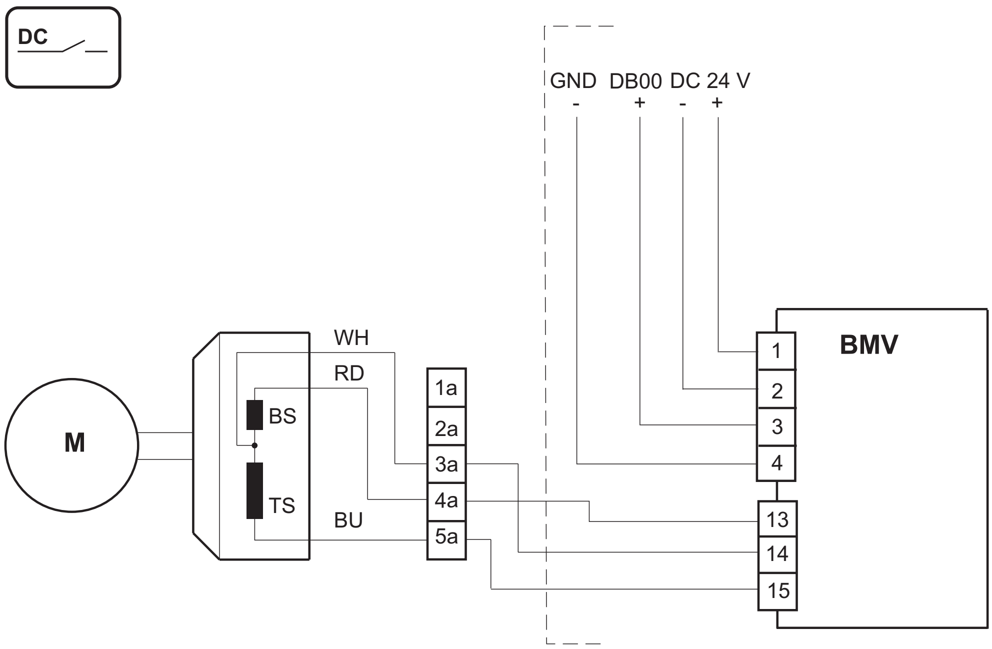
28487486/EN – 02/2019

BMK. brake control



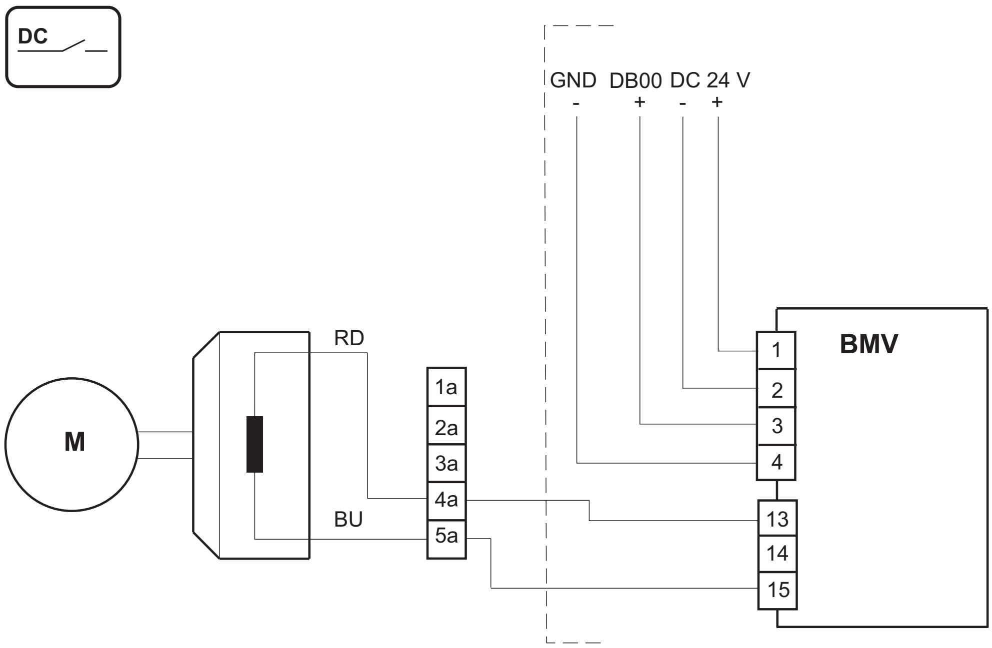
14324495755

BMV brake control – 2 coils



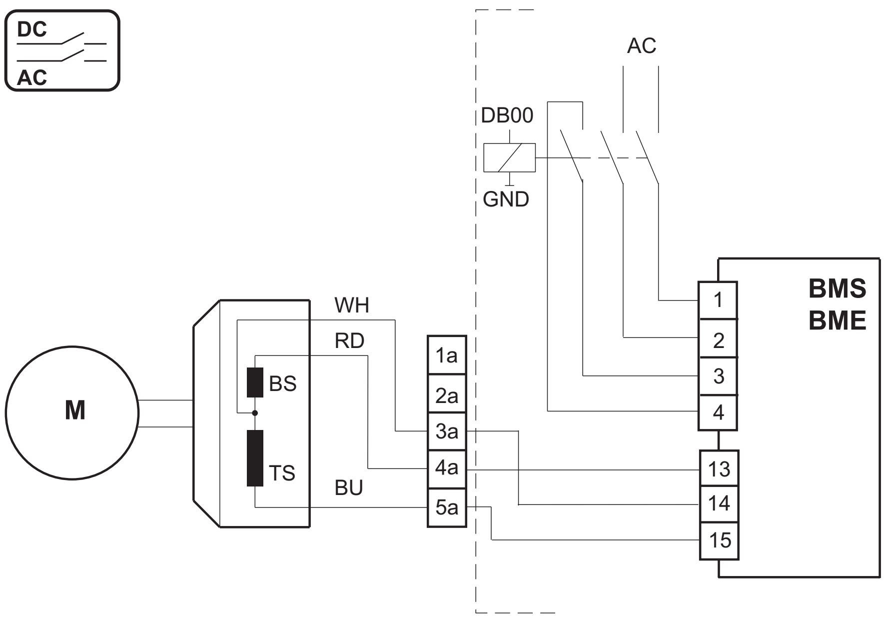
14373482507

BMV brake control – 1 coil



14373494923

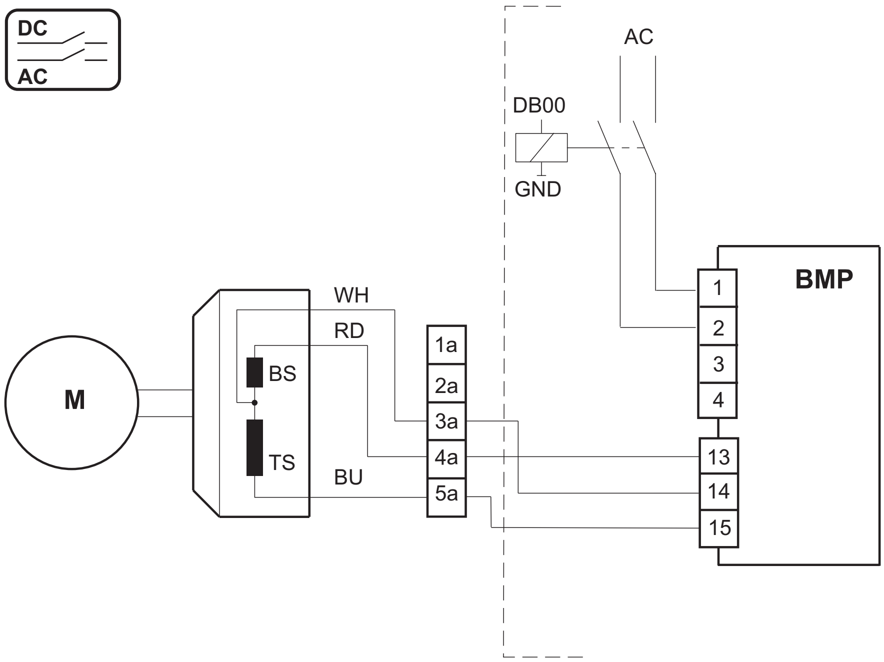
BMS, BME brake control



14324554891

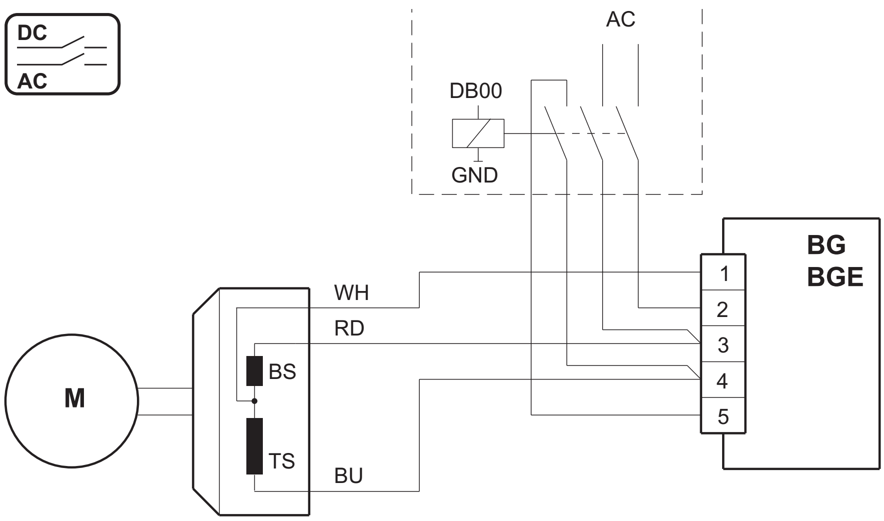
8

BMP brake control



14324544523

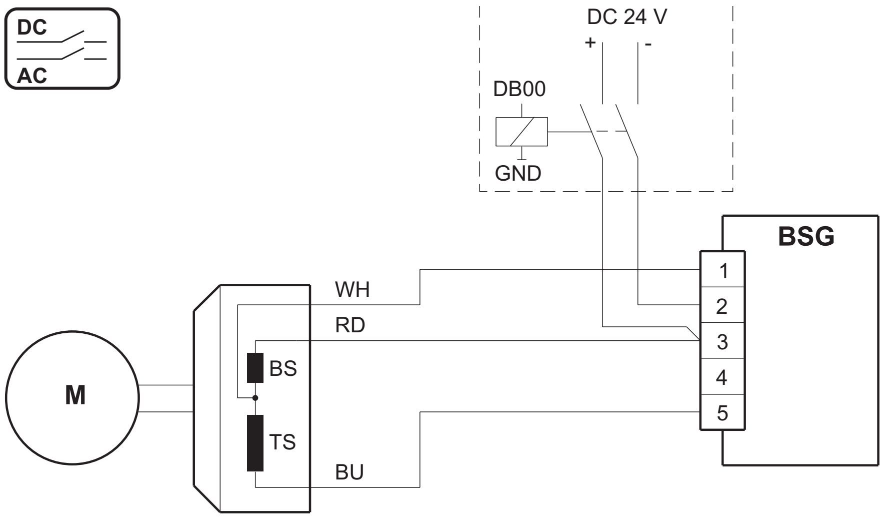
BG, BGE brake control



14324565259

28487486/EN – 02/2019

BSG brake control



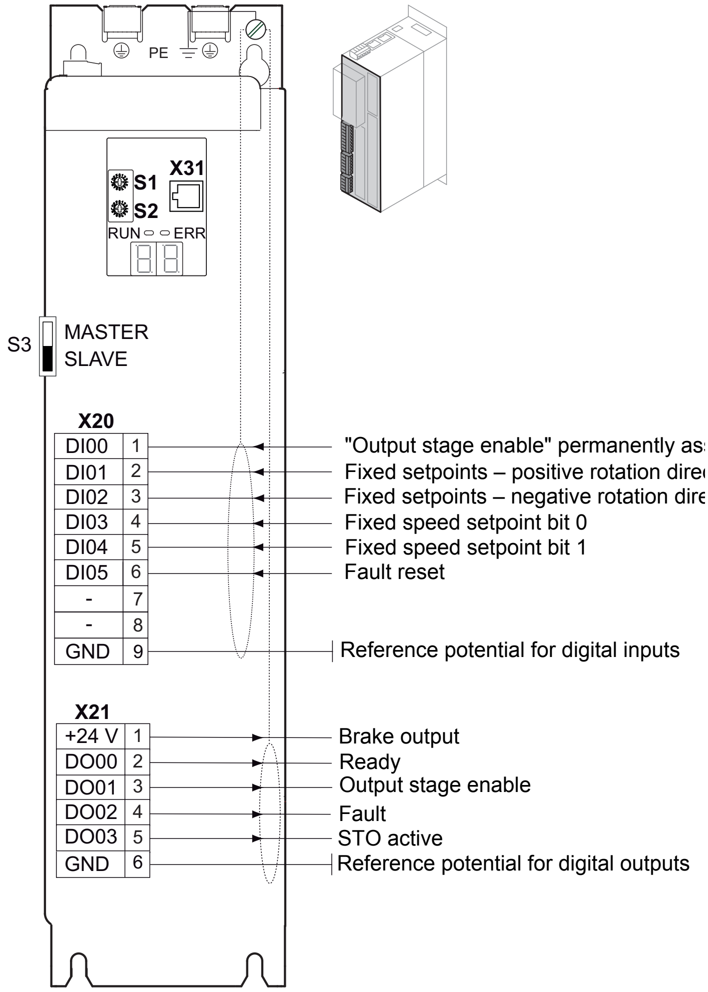
14324597131

8.12.4 Electronics connection

Wiring the control electronics

For the terminal assignment and connections, refer to chapter "Terminal assignment" (→ 🗎 266).

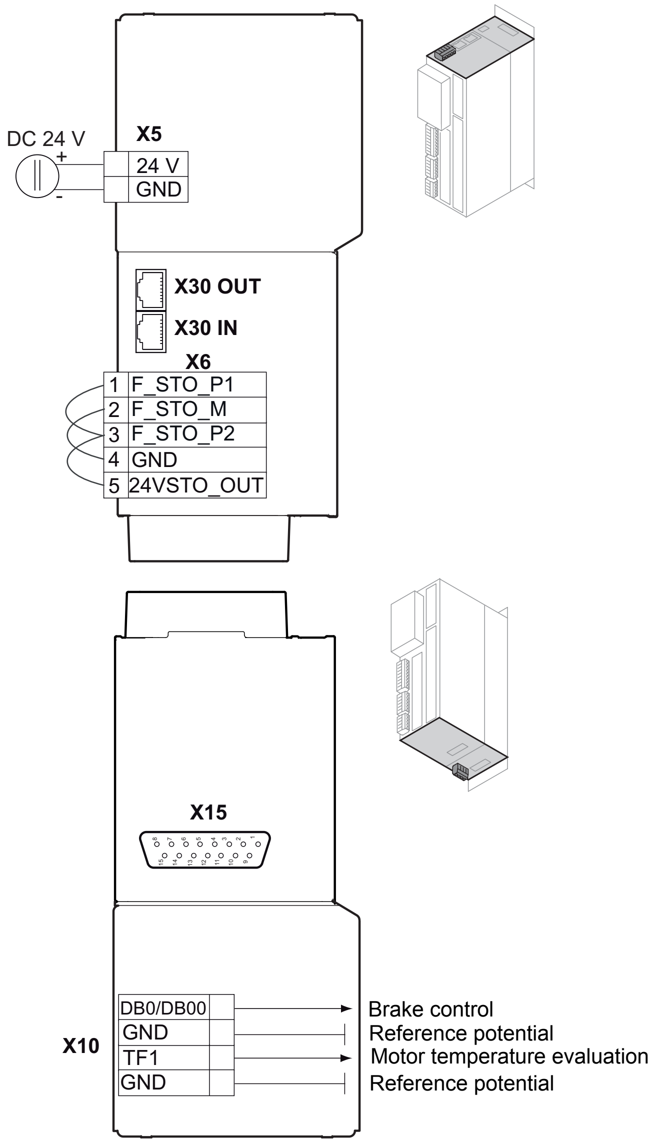
The assignment of the digital inputs and outputs shown here is the factory setting.



25606792715

S3 Module bus operating mode
X20 Digital inputs
X21 Digital outputs

28487486/EN – 02/2019

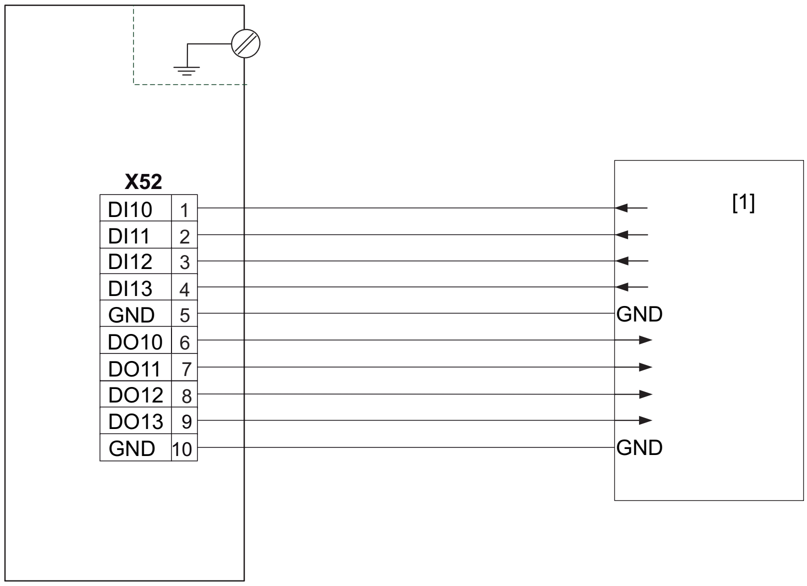


25606731275

X5 +24 V supply voltage
X6 Connection for Safe Torque Off (STO).
With installed CS.A card, the cable bridges are removed at the factory.
If no CS.A card is installed upon delivery, the cable bridges are installed at the factory.
X10 Brake control and motor temperature monitoring
X15 Motor encoder connection
X30 System bus

8.12.5 Connection diagram CIO21A and CID21A input/output card

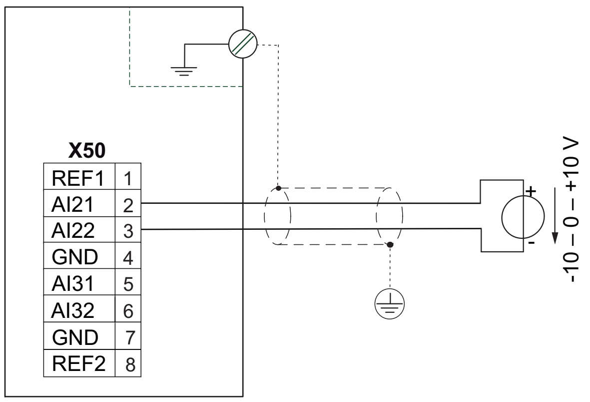
Digital inputs and outputs



18014412829087243

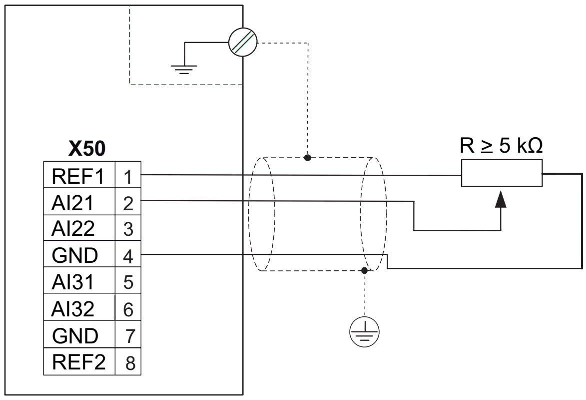
[1] Higher-level controller

Voltage input



9007213575393675

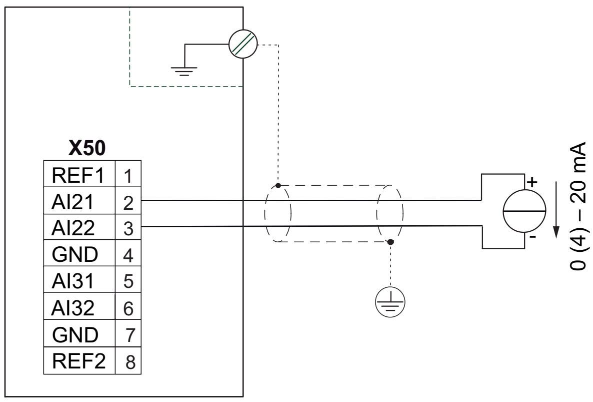
Connection to the terminals AI31 and AI32 is carried out analogously to the connection to the terminals AI21 and AI22 shown in the wiring diagrams.



18014412830137099

Connection to the terminals REF2 and AI31 is carried out analogously to the connection to the terminals REF1 and AI21 shown in the wiring diagrams.

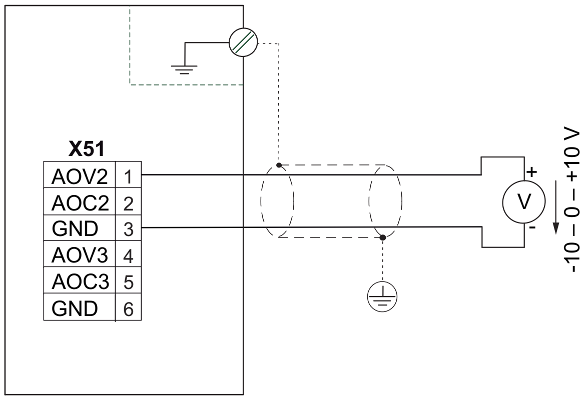
Current input



9007213575398539

Observe the switch position of "DIP switch S50" (→ 🗎 241) when activating the current input.

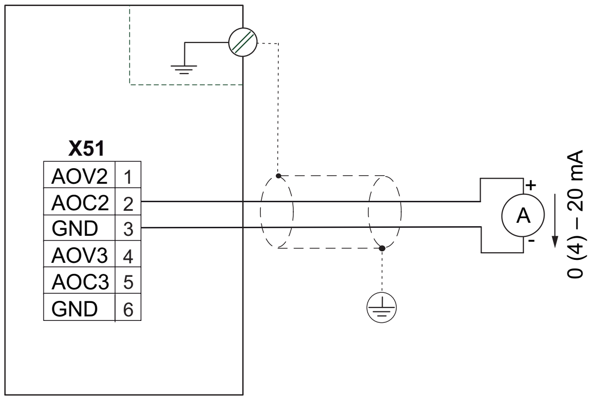
Voltage output



18014412830141963

Connection to the terminals AOV2 and GND is carried out analogously to the connection to the terminals AOV1 and GND shown in the wiring diagram.

Current output



18014412830272395

Connection to the terminals AOC2 and GND is carried out analogously to the connection to the terminals AOC1 and GND shown in the wiring diagram.

28487486/EN – 02/2019

8.13 Information regarding UL

INFORMATION

Due to UL requirements, the following chapter is always printed in English independent of the language of the documentation.

INFORMATION

The UL-certification does not apply to operation on voltage supply systems with a non-grounded star point (IT systems).

8.13.1 Field wiring power terminals

- Use 60/75 °C copper wire only.
- Tighten terminals to in-lbs (Nm) as follows:

	Tightening torque in-lbs (Nm)			
MDX9_A-...-5_3-..	Line connection		Motor and braking resistor terminals	
0020 - 0160	X1	4.43 – 7.08 (0.5 – 0.8) Wire sizes 14 – 12 AWG	X2	4.43 – 7.08 (0.5 – 0.8) Wire sizes 14 – 12 AWG
0240 - 0320	X1	15.05 – 15.93 (1.7 – 1.8)	X2	15.05 – 15.93 (1.7 – 1.8)
MDX9_A-...-2_3-..	Line connection		Motor and braking resistor terminals	
0070 - 0140	X1	4.43 – 7.08 (0.5 – 0.8) Wire sizes 14 – 12 AWG	X2	4.43 – 7.08 (0.5 – 0.8) Wire sizes 14 – 12 AWG
0213 - 0290	X1	15.05 – 15.93 (1.7 – 1.8)	X2	15.05 – 15.93 (1.7 – 1.8)
All modules	PE connection			
		M4: 8.85 – 10.62 (1.0 – 1.2) M6: 26.55 – 35.4 (3.0 – 4.0		

8.13.2 Short circuit current rating

Suitable for use on a circuit capable of delivering not more than

- 5,000 rms symmetrical amperes when protected by fuses and circuit breakers as described in the tables below.

8.13.3 Branch circuit protection

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes.

- If you use cable cross sections that are dimensioned for a smaller current than the rated current of the unit, make sure that the fuse is dimensioned for the used cable cross section.
- For information on selecting cable cross sections, refer to the project planning manual.
- Comply with the country-specific installation regulations in addition to the above notes.

AC 380 – 500 V devices

MDX9_A-..	SCCR: 5 kA/ 500 V		
	Non semiconductor fuses (currents are maximum values)	Inverse-time circuit breaker (currents are maximum values)	Type E Combination Motor Controller
0020 – 0040 (size 1)	50 A/600 V Class: K5	50 A/500 V min.	Siemens Sirius 3RV2021-4DA10 (20 – 25 A)
0055 – 0095 (size 2)	50 A/600 V Class: K5	50 A/500 V min.	Siemens Sirius 3RV2021-4DA10 (20 – 25 A)
0125 – 0160 (size 3)	50 A/600 V Class: K5	50 A/500 V min.	Siemens Sirius 3RV1031-4HA10 (40 – 50 A)
0240 – 0320 (size 4)	60 A/600 V Class: K5	60 A/500 V min.	Siemens Sirius 3RV1031-4HA10 (40 – 50 A)

AC 200 – 240 V devices

MDX9_A-..	SCCR: 5 kA/ 240 V		
	Non semiconductor fuses (currents are maximum values)	Inverse-time circuit breaker (currents are maximum values)	Type E Combination Motor Controller
0070 – 0093 (size 2)	50 A/250 V	–	Siemens Sirius 3RV1031-4HA10 (40 – 50 A)
0140 (size 3)	50 A/250 V	50 A/240 V min.	Siemens Sirius 3RV1031-4HA10 (40 – 50 A)
0213 – 0290 (size 4)	60 A/250 V	60 A/240 V min.	Siemens Sirius 3RV1031-4HA10 (40 – 50 A)

8.13.4 Motor overload protection

The units are provided with load and speed-sensitive overload protection and thermal memory retention upon shutdown or power loss.

The trip current is adjusted to 150 % of the rated motor current.

8.13.5 Ambient temperature

The units are suitable for a maximum surrounding air temperature of 40 °C, max. 60 °C with derated output current.

To determine output current rating at higher than 40 °C, the output current should be derated 2.0 % per °C between 40 °C and 60 °C.

INFORMATION

- Use only tested units with a **limited output voltage** (V_{max} = DC 30 V) and **limited output current** (I_{max} = 8 A) as an **external DC 24 V voltage source**.
- UL certification does not apply to operation in voltage supply systems with a non-grounded star point (IT systems).

8.13.6 Environmental conditions

The units are for use in pollution degree 2 environments.

28487486/EN – 02/2019

9 Startup

9.1 General

9.1.1 Lifting applications

⚠ WARNING

Danger of fatal injury if the hoist falls.

Severe or fatal injuries.

- The application inverter is not designed for use as a safety device in lifting applications. Use monitoring systems or mechanical protection devices to ensure safety.

9.1.2 Connecting power

NOTICE

Undercutting the minimum switch-off time of the line contactor.

Irreparable damage to the application inverter or unforeseeable malfunctions.

The specified times and intervals must be observed.

- After disconnection from the supply system, observe a minimum switch-off time of 10 s.
- Do **not** turn the power of the supply system on or off **more than once per minute**.

9.1.3 Connecting cables

NOTICE

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

Irreparable damage to the application inverter or unforeseeable malfunctions.

- De-energize the application inverter.

28487486/EN – 02/2019

9.2 Setting the EtherCAT® ID

An EtherCAT® ID can be permanently assigned to the application inverter using the hexadecimal switches S1 and S2. With these switches, you can set a decimal EtherCAT® ID between 1 and 255 in hexadecimal notation.

The ID serves as a unique device identification of the respective EtherCAT® slave for the EtherCAT® master. The EtherCAT® ID is not an EtherCAT® address.

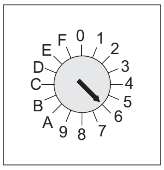
The EtherCAT® ID is always assigned by the EtherCAT® master. In the delivery state of the application inverter, the ID is set to 0 as standard (S1 = 0 and S2 = 0).

It is not strictly necessary to set one of the EtherCAT® IDs. The slaves are automatically addressed by the master as a standard.

The EtherCAT® ID must only be set at the application inverter if the use of EtherCAT® IDs was preset in the hardware configuration of the master.

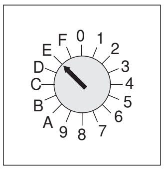
Required ID, decimal	ID, hexadecimal	Setting S1 (× 10)	Setting S2 (× 1)
3	03	0	3
18	12	1	2
25	19	1	9
100	64	6	4
110	6E	6	E
255	FF	F	F

S1 EtherCAT® ID (×10)



6

S2 EtherCAT® ID (×1)



E

The EtherCAT® ID "110" is set as an example in the illustration above.

9.3 Startup requirements

The following requirements apply to startup:

- You have installed the application inverter correctly, both mechanically and electrically.
- You have configured the application inverter and connected drives correctly.
- Safety measures prevent accidental drive startup.
- Safety measures prevent danger to persons or machines.

Required hardware components:

- PC or laptop with Ethernet interface.
- Commercially available Ethernet cable for connection between PC and MOVI-C® CONTROLLER.
- MOVI-C® CONTROLLER with completed startup.

Required software:

- MOVISUITE® standard engineering software from SEW-EURODRIVE.

28487486/EN – 02/2019

9.4 Startup procedure

The application inverters are put into operation using the MOVISUITE® engineering software from SEW-EURODRIVE.

15643252491

The startup is functionally divided into segments. The following steps illustrate in exemplary fashion the startup procedure for an application inverter.

Drive train segment

Drive train		Configuring drive trains.

Interfaces segment

Inputs/outputs		• Basic device • I/O card
Setpoints		• Process data • PO data • Setpoint buffer • Fixed setpoints • Control word 1 – 3
Actual values		• PI data • Status word 1 – 3

28487486/EN – 02/2019

Drive functions		• FCB 01 Output stage inhibit • FCB 05 Speed control • FCB 06 Interpolated speed control • FCB 08 Interpolated torque control • FCB 09 Positioning • FCB 10 Interpolated position control • FCB 12 Reference travel • FCB 08 Rotor position identification • FCB 20 Jog mode • FCB 21 Brake test • FCB 26 Stop at user limit
Monitoring functions		• Reference signals 1 • Reference signals 2 • Limit values 1 • Limit values 2 • Monitoring functions 1 • Monitoring functions 2 • Output stage
Extended functions		• Parameter set • Auto reset • Standby mode • Touchprobe 1 • Touchprobe 2 • Cam switch

Functions segment

Device data		• Device identification • Main component • Subcomponents • Production data
Overview of fault responses		• Axis module • Power supply monitoring • Functions
Setup		• Permissions • Reset device parameters • Select memory source

Information on the application inverter

Standard		Basic settings of the installed interfaces • Basic device • Encoder 1

Optional		Basic settings of the options • Fieldbus • I/O card • Encoder 2 • MOVISAFE® CS..

28487486/EN – 02/2019

9.4.1 Check list for startup

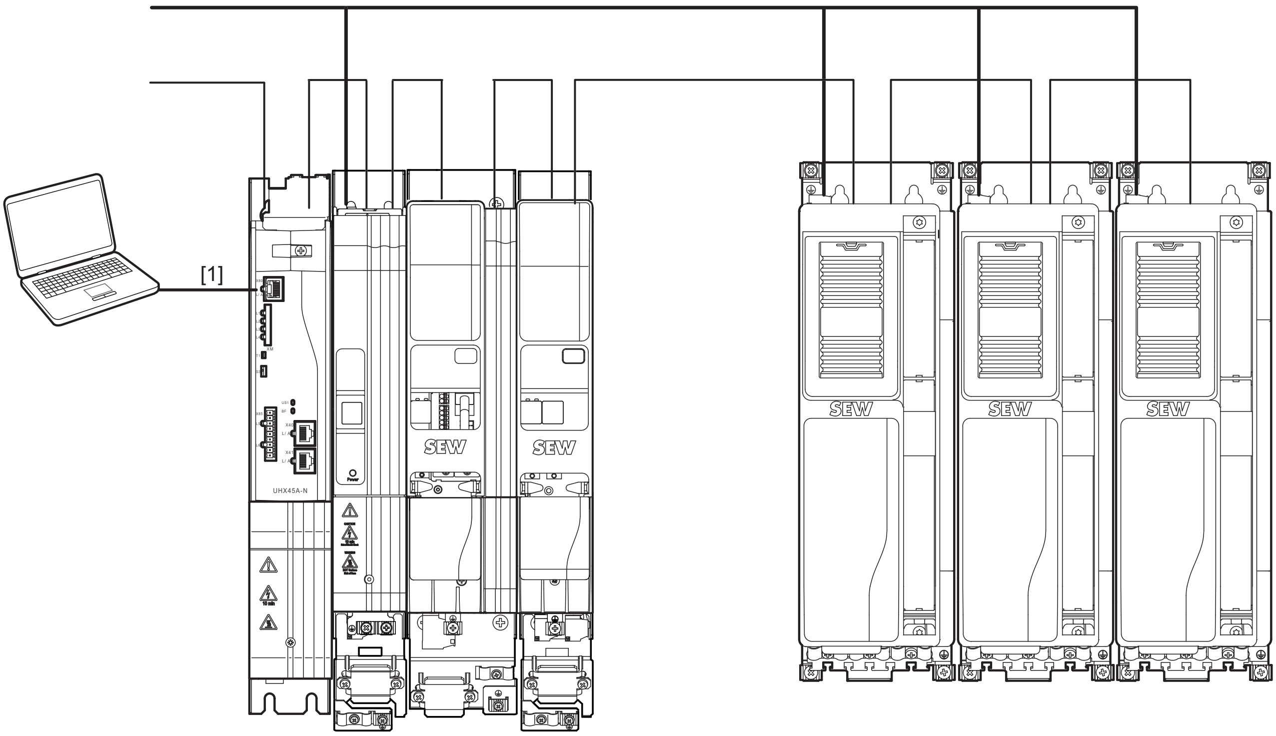
The following checklist lists the necessary steps for complete startup.

Step	Startup step	Done
1	Motor installation	
2	Install MOVI-C® component	
3	Start MOVISUITE®	
4	Start up the drive train	
5	Parameterize setpoints and FCBs	
6	Configure digital inputs and outputs	
7	Configure PD	
8	Configure software module (MOVIKIT®)	
9	Test drives/application	

28487486/EN – 02/2019

9.5 Connection to the engineering software

The following figure shows the connection of the application inverter to the MOVISUITE® engineering software using a PC.



18014413831237515

[1] Ethernet

10 Operation

10.1 General information

⚠ DANGER

Dangerous voltages present at cables and motor terminals

Severe or fatal injuries from electric shock.

- Dangerous voltages are present at the output terminals and the cables and motor terminals connected to them when the device is switched on. This also applies even when the device is inhibited and the motor is at standstill.
- The fact that the operation LED is no longer illuminated does not indicate that the application inverter has been disconnected from the power supply and no longer carries any voltage.
- Before you touch the power terminals, check that the application inverter has been disconnected from the power supply.
- Observe the general safety notes in the chapter "Safety notes" (→ 🗎 190) and the notes in the chapter "Electrical installation" (→ 🗎 223).

⚠ DANGER

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

- Ensure that the motor cannot start inadvertently, for example, by removing the electronics terminal block X20.
- Additional safety precautions must be taken, depending on the application, to avoid injury to personnel and damage to machinery.

NOTICE

Switching the motor output at the application inverter with enabled output stage.

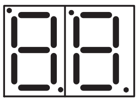
Damage to the application inverter.

- The motor output of the application inverter may be switched or disconnected only when the output stage is inhibited.

28487486/EN – 02/2019

10.2 7-segment display

10.2.1 Operating displays



- The two 7-segment displays indicate the operating state of the application inverter.

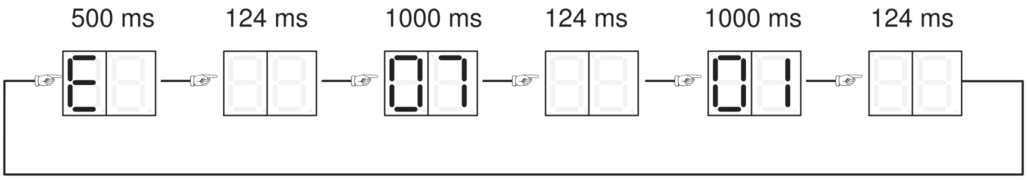
10.2.2 Fault display

The application inverter detects any faults that occur and displays them as fault code. Each fault is clearly defined by its fault code and corresponding attributes, as shown below:

- Fault response
- Final state after executing the fault response
- Type of reset response.

The fault codes are displayed as flashing numeric values in the application inverter.

The fault code is displayed in the following display sequence:



12082058123

In the example, a 2-digit fault code with subfault is shown, fault 07.01 in this example.

10.3 Operating displays

Display	Description	State	Comment/action
Displays during boot process			
b0 b1 b3 br	Device passes through several states when loading the firmware (boot) in order to become ready for operation.	• Status: Not ready. • Output stage is inhibited. • No communication possible.	• Waiting for boot process to finish. • Device stays in this condition: Device is defective.
Display	**Description**	**State**	**Comment/action**
Displays of different device statuses			
.	Energy-saving mode		Energy-saving mode active
00	DC link voltage missing	• Status: Not ready. • Output stage is inhibited. • Communication is possible.	Check the supply system.
C0 Flashing	Module bus is not ready		Check the module bus connection; see the chapter Setting the module bus operating mode.
C2 Flashing	STO active	• Status: Not ready. • Output stage is inhibited. • Communication is possible.	The function Safe Torque Off is active.
C3 Flashing	Synchronization with bus is incorrect. Process data processing not available		• Check the bus connection. • Check synchronization setting at device and controller. • Check process data settings at device and controller.
C4 Flashing	Encoder evaluation is not ready		• Encoders are being initialized. • Device stays in this condition: – No encoder selected. – "Source actual speed" or "Actual position" parameter shows an encoder that does not exist.
C5 Flashing	Motor management is not ready		
C6 Flashing	Internal device supply incomplete		
C7 Flashing	Power section not ready		
C8 Flashing	External device not ready		
C9 Flashing	Data flexibilization layer not ready		
Cd Flashing	Parameter download running		
Display	**Description**	**State**	**Comment/action**
Displays during initialization processes (parameters will be reset to default values)			
d0 Flashing	Basic initialization	• Status: Not ready. • Output stage is inhibited. • Communication is possible.	Waiting for initialization to finish.
d1 Flashing	Initialization at delivery state		
Display	**Description**	**State**	**Comment/action**
Displays in normal operation			
01	Output stage inhibit	• Output stage is inhibited.	The drive is not actuated by the output stage. The brake is applied; without the brake, the motor coasts to a halt. FCB 01 is permanently selected with terminal DI00. However, it can also be selected by other sources.

28487486/EN – 02/2019

Display	Description	State	Comment/action
02	Default stop	For further information, refer to the FCB description.	Drive function (FCB) "Default stop" active if no other FCB is selected and the system is ready.
04	Manual mode		Manual mode active.
05	Speed control		Speed control with internal ramp generator.
06	Interpolated speed control		Speed control with setpoints cyclically via bus. The ramp generator is located externally, e.g. in the higher-level controller.
07	Torque control		Torque control.
08	Interpolated torque control		Torque control with setpoints cyclically via bus.
09	Position control		Positioning mode with internal ramp generator.
10	Interpolated position control		Positioning mode with setpoints cyclically via bus. The ramp generator is located externally, e.g. in the higher-level controller.
12	Reference travel		The drive performs reference travel.
13	Stop at application limits		Deceleration at the application limit. FCB 13 is active if no other FCB is selected with the default FCB 02.
14	Emergency stop		Deceleration at the emergency stop limit.
18	Rotor position identification		Encoder commutation for synchronous motors.
19	Position hold control		Position control on current position.
20	Jog		Jog mode active.
21	Brake test		Brake is tested by applying a torque when the brake is applied.
25	Motor parameter measurement		Motor parameter measurement active.
26	Stop at user limits		Serves to stop at user limits.

28487486/EN – 02/2019

10.4 Fault description on basic device

10.4.1 Fault 1 Output stage monitoring

Subfault: 1.1
Description: Short circuit in motor output terminals

Response: Output stage inhibit

Cause	Measure
Overcurrent in output stage or faulty output stage control detected, and output stage inhibited by hardware.	Possible causes for overcurrent are short circuit at the output, excessive motor current, or a defective power output stage.

Subfault: 1.2
Description: Overcurrent in output stage

Response: Output stage inhibit

Cause	Measure
Motor current too high.	Connect a smaller motor.
Current supply	Check the current supply.
Current transformer	Check the current transformer.
Ramp limit deactivated and set ramp time too short.	Increase the ramp time.
Phase module defective.	Check the phase module.
DC 24 V supply voltage unstable.	Check the DC 24 V supply voltage.
Interruption or short circuit on signal lines of phase modules.	Check the signal lines.

10.4.2 Fault 3 Ground fault

Subfault: 3.1
Description: Ground fault

Response: Output stage inhibit

Cause	Measure
Ground fault in the motor lead.	Eliminate ground fault in motor lead.
Ground fault in the inverter.	Eliminate ground fault in inverter.
Ground fault in the motor.	Eliminate ground fault in motor.
Ground fault in line components.	Eliminate ground fault in line components.

10.4.3 Fault 4 Brake chopper

Subfault: 4.1
Description: Brake chopper overcurrent

Response: Output stage inhibit

Cause	Measure
Excessive regenerative power.	Extend the deceleration ramps.
Short circuit detected in braking resistor circuit.	Check supply cable to braking resistor.
Braking resistance too high.	Check the technical data of the braking resistor.

Subfault: 4.2
Description: Brake chopper defective

Response: Output stage inhibit

Cause	Measure
Output stage of brake chopper defective.	Replace the defective brake chopper.

10.4.4 Fault 6 Line fault

Subfault: 6.1
Description: Line phase failure

Response: Line phase failure

Cause	Measure
Missing line phase detected.	Check the supply system cable.
DC link voltage periodically too low.	Check the configuration of the supply system.
Inadequate line voltage quality.	Check supply (fuses, contactor).

28487486/EN – 02/2019

10.4.5 Fault 7 DC link

Subfault: 7.1 Description: DC link overvoltage		
	Response: Output stage inhibit	
	Cause	Measure
	Maximum permitted DC link voltage limit exceeded and output stage inhibited by hardware.	– Extend deceleration ramps. – Check supply cable to the braking resistor. – Check the technical data of the braking resistor.
Subfault: 7.2 Description: DC link discharge failed		
	Response: Warning	
	Cause	Measure
	DC link voltage level not dropped below discharge threshold within discharge time.	Contact SEW-EURODRIVE Service.

10.4.6 Fault 8 Speed monitoring

Subfault: 8.1 Description: Speed monitoring – motor mode		
	Response: Output stage inhibit	
	Cause	Measure
	Speed controller operates at setting limit (mechanical overload or phase failure in supply system or motor).	Increase the delay time set for speed monitoring, or reduce the load.
	Encoder not connected correctly.	Check encoder connection and direction of rotation. If necessary, increase current limiting or reduce acceleration values.
	Encoder has incorrect direction of rotation.	– Check encoder connection and direction of rotation. If necessary, increase current limiting or reduce acceleration values. – Check motor lead and motor, check line phases.
Subfault: 8.2 Description: Speed monitoring – generator mode		
	Response: Output stage inhibit	
	Cause	Measure
	Speed controller operates at setting limit (mechanical overload or phase failure in supply system or motor).	Increase the delay time set for speed monitoring, or reduce the regenerative load.
	Encoder not connected correctly.	Check encoder connection and direction of rotation. If necessary, increase current limiting or reduce deceleration values.
	Encoder has incorrect direction of rotation.	– Check encoder connection and direction of rotation. If necessary, increase current limiting or reduce deceleration values. – Check motor cable and motor. Check line phases.
Subfault: 8.3 Description: Maximum speed at motor shaft		
	Response: Output stage inhibit	
	Cause	Measure
	Actual speed exceeded "Maximum speed at motor shaft" limit value (index 8360.9 / 8361.9). This limit value is set at startup matching the motor and gear unit.	Reduce the maximum rotational speed.

10.4.7 Fault 9 Control mode

Subfault: 9.1 Description: Magnetization of motor not possible		
	Response: Output stage inhibit	
	Cause	Measure
	User-defined current limit or output stage monitoring reduced possible maximum current to such a degree that required magnetizing current cannot be set.	– Reduce output stage utilization, e.g. by reducing the PWM frequency or reducing the load. – Increase user-defined current limit.

Subfault	Response	Cause	Measure
Subfault: 9.2 **Description: Requested operating mode not possible with active control mode**	Response: Output stage inhibit	The current FCB activated an operating mode. The active control mode does not support this operating mode, for example "position control" or "torque control" with U/f control mode.	Start up control mode that supports the required operating mode. Connect encoder if necessary. Select an operating mode that is supported by the current control mode.
Subfault: 9.3 **Description: Absolute rotor position not available**	Response: Output stage inhibit	The current control mode requires an absolute rotor position. The encoder selected for "Source is actual speed" does not provide an absolute rotor position.	Use an absolute encoder, or identify the rotor position using FCB 18.
Subfault: 9.4 **Description: Correct current supply of motor not possible**	Response: Output stage inhibit	Failed to set required current during premagnetization.	Check the cabling, or disable the function "Current monitoring during premagnetization".
Subfault: 9.5 **Description: Maximum output frequency exceeded**	Response: Output stage inhibit	Maximum output frequency exceeded.	Reduce the maximum speed.
Subfault: 9.6 **Description: Maximum model speed exceeded**	Response: Output stage inhibit	Speed of drive calculated in ELSM® control mode too high for motor control.	If possible, minimize the "Speed/position controller sampling cycle", or reduce the speed.
Subfault: 9.8 **Description: Flux model error**	Response: Output stage inhibit	Rotor flux calculated by motor model not plausible, or calculated internal voltage too small.	– Check configuration data. – Check motor data. – Check machine: Idle state or speed too low. – Check the connection cable between inverter and motor – Contact SEW-EURODRIVE Service.
Subfault: 9.9 **Description: Parameter measurement not possible with active motor type**	Response: Output stage inhibit	Parameter measurement is possible only with "asynchronous" and "synchronous" motor types. No magnetic reluctance and LSPM motors.	Select the correct motor type.
Subfault: 9.10 **Description: Rotor stall monitoring**	Response: Output stage inhibit	The current control cannot hold the load torque. The deviation between stationary setpoint voltage and actual voltage is too large.	Reduce the load torque (hoist) in the controlled system.
Subfault: 9.11 **Description: Standstill current function**	Response: Output stage inhibit	With the ELSM method, the standstill current function is possible only in combination with rotor position measurement.	– Enable rotor position measurement. – Check motor data.

28487486/EN – 02/2019

10.4.8 Fault 10 Data Flexibility

Subfault: 10.1 **Description: Initialization**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Init task error.	The init task has issued a return code != 0. Check the program.
Subfault: 10.2 **Description: Illegal operation code**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Illegal opcode in Data Flexibility program.	Contact SEW-EURODRIVE Service.
Subfault: 10.3 **Description: Memory access**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Memory area violated while accessing array.	For example, an array access results in writing beyond the permitted memory range. Check the program.
Subfault: 10.4 **Description: Stack**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Overflow of Data Flexibility stack detected.	Check the program.
Subfault: 10.5 **Description: Division by 0**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Division by 0.	Check the program.
Subfault: 10.6 **Description: Runtime**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Runtime error/watchdog.	Check the program. The program execution time exceeds the permitted time.
	PDI or PDO tasks.	Check the program. The execution time of the PDI or PDO task exceeds the permitted time.
Subfault: 10.7 **Description: Calculation result of multiplication/division command too large**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Calculation result of multiplication/division command exceeds 32 bits.	Check the program.
	Failed to write calculation result of multiplication/division command into result variable.	Check the program.
Subfault: 10.8 **Description: Illegal connection**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Index used in connect not allowed.	Check the program. The index used either does not exist or is not permitted for access via process data; see parameter list.
Subfault: 10.9 **Description: CRC code**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Wrong CRC checksum of code.	Load the program again. The program memory is corrupt. An unauthorized write access has been carried out on the program memory.

Subfault: 10.10 Description: Setpoint cycle time not supported		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Non-supported setpoint cycle time parameterized.	Set the setpoint cycle time to the default value 1 ms.
Subfault: 10.11 Description: No application program loaded		
	Response: Output stage inhibit	
	Cause	Measure
	No Data Flexibility application program loaded.	Load the program or disable Data Flexibility.
Subfault: 10.99 Description: Unknown error		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Unknown Data Flexibility error.	Contact SEW-EURODRIVE Service.

10.4.9 Fault 11 Temperature monitoring

Subfault: 11.1 Description: Heat sink overtemperature		
	Response: Output stage inhibit	
	Cause	Measure
	Maximum permitted heat sink temperature exceeded. The capacity utilization is possibly too high.	– Reduce the load. – Reduce the rms value of the current. – Reduce the PWM frequency. – Ensure sufficient cooling. – Reduce the ambient temperature.
Subfault: 11.2 Description: Heat sink utilization – prewarning		
	Response: Heat sink utilization – prewarning	
	Cause	Measure
	High thermal load on heat sink of device, and prewarning threshold reached.	– Reduce the load. – Reduce the rms value of the output current. – Reduce the PWM frequency. – Ensure sufficient cooling. – Reduce the ambient temperature.
Subfault: 11.3 Description: Device utilization		
	Response: Output stage inhibit	
	Cause	Measure
	The temperature has reached or exceeded the switch-off threshold. Possible causes: Mean output current too high.	Reduce the load.
	PWM frequency too high.	Reduce the PWM frequency.
	Ambient temperature too high.	Ensure sufficient cooling.
	Unfavorable air convection.	Check air convection.
	Fan defective.	Check the fan and replace if necessary.
Subfault: 11.5 Description: Electromechanical utilization		
	Response: Output stage inhibit	
	Cause	Measure
	Electromechanical components of device overloaded by excessive continuous current.	Reduce the load. If necessary, reduce the rms value of the current.
Subfault: 11.6 Description: Electromechanical utilization – prewarning		
	Response: Electromechanical utilization – prewarning	
	Cause	Measure
	High load on electromechanical components of device due to high continuous current. Prewarning threshold reached.	– Reduce the load. – Reduce the PWM frequency. – Reduce the rms value of the current. – Reduce the ambient temperature.

28487486/EN – 02/2019

Subfault: 11.7 Description: Wire break at temperature sensor of heat sink		
	Response: Output stage inhibit	
	Cause	Measure
	Wire break at temperature sensor of heat sink.	Contact SEW-EURODRIVE Service.
Subfault: 11.8 Description: Short circuit at temperature sensor of heat sink		
	Response: Output stage inhibit	
	Cause	Measure
	Short circuit at temperature sensor of heat sink.	Contact SEW-EURODRIVE Service.

10.4.10 Fault 13 Encoder 1

Subfault: 13.1 Description: Position comparison check		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Faulty comparison between raw position and track counter of absolute encoders.	– Check the track signal wiring. – Check interference sources (e.g. from EMC). – Replace encoder. – Replace card. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.2 Description: Unknown encoder type		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder type not known and not supported by inverter.	– Check encoder type. – Contact SEW-EURODRIVE Service. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.3 Description: Invalid data		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Invalid encoder nameplate data (measuring steps/pulses per revolution/multi-turn).	– Check startup parameters. – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.4 Description: Track measurement error		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Error during track measurement.	– Switch the device off and on again. – Check the wiring. – Check interference sources (e.g. from EMC). – Check the encoder. Replace if necessary. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.5 Description: Internal warning		
	Response: Encoder – warning	
	Cause	Measure
	Encoder signaled warning.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Clean sensor.

Subfault: 13.6 Description: Signal level too low		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Vector below permitted limit during signal level monitoring.	– Check the wiring. – Check interference sources (e.g. from EMC). – Check the encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.7 Description: Signal level too high		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Vector exceeds permitted limit during signal level monitoring.	Check the gear ratio of the resolver in use. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.8 Description: Signal level monitoring		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Vector exceeds permitted limit during signal level monitoring.	Check the resolver mounting position. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.9 Description: Quadrant check		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Error checking quadrants (sine encoder).	– Switch the device off and on again. – Check the wiring. – Check interference sources (e.g. from EMC). – Check the encoder. Replace if necessary. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.10 Description: Position tolerance range monitoring		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Position outside tolerance range.	– Check startup parameters. – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.11 Description: Data timeout		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder process data timeout.	– Check interference sources (e.g. from EMC). – Check startup parameters. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

28487486/EN – 02/2019

Subfault: 13.12 Description: Emergency		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Encoder signaled emergency.	– Check interference sources (e.g. from EMC). – Check startup parameters. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.13 Description: Error during initialization		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Communication error during initialization.	– Check parameterization. – Check baud rate. – Ensure that the CANopen interface on the encoder (Node ID) is correctly adjusted. – Check the wiring. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.14 Description: Communication		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Faulty communication with encoder.	– Check voltage supply. – Check interference sources (e.g. from EMC). – Check the wiring. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.15 Description: System error		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	System error while evaluating encoder.	– Ensure that the multi-turn encoder is within the projected path range. – Check limits. – Check correct settings of encoder numerator/denominator factors. – Check interference sources (e.g. from EMC). – Check startup parameters. – Switch the device off and on again. – If the fault occurs repeatedly, contact SEW-EURODRIVE Service. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.16 Description: Permanent high level in data line – critical		
	Response: Encoder 1 – latest critical fault	
	Cause	Measure
	Permanent high level of data signal.	– Check the wiring. – Check the encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.17 Description: Permanent high level in data line		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Permanent high level of data signal.	– Check the wiring. – Check the encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.18 Description: Permanent low level in data line – critical	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Permanent low level of data signal.	– Check the wiring. – Check the encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.19 Description: Permanent low level in data line	
Response: Encoder 1 – latest fault	
Cause	Measure
Permanent low level of data signal.	– Check the wiring. – Check the encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.20 Description: SSI error bit – critical	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Error bit set in SSI protocol.	– Check startup parameters. – Check the settings at the SSI encoder (fault bit). – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive even with a fault in an external position encoder.

Subfault: 13.21 Description: SSI error bit	
Response: Encoder 1 – latest fault	
Cause	Measure
Error bit set in SSI protocol.	– Check startup parameters. – Check the settings at the SSI encoder (fault bit). – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive even with a fault in an external position encoder.

Subfault: 13.22 Description: Internal fault – critical	
Response: Encoder 1 – latest critical fault	
Cause	Measure
Encoder signaled internal fault.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 13.23 Description: Internal fault	
Response: Encoder 1 – latest fault	
Cause	Measure
Encoder signaled internal fault.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

28487486/EN – 02/2019

Subfault: 13.24 Description: Travel range exceeded		
	Response: Encoder 1 – latest fault	
	Cause	Measure
	Current position mode (index 8381.10) does not allow for larger travel range.	Check travel range. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 13.25 Description: Error during encoder startup		
	Response: Output stage inhibit	
	Cause	Measure
	Fatal error during encoder startup.	Switch the device off and on again. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

10.4.11 Fault 14 Encoder 2

Subfault: 14.1 Description: Position comparison check		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Faulty comparison between raw position and track counter of absolute encoders.	– Check the track signal wiring. – Check interference sources (e.g. from EMC). – Replace encoder. – Replace card. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.2 Description: Unknown encoder type		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Encoder type not known and not supported by inverter.	– Check encoder type. – Contact SEW-EURODRIVE Service. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.3 Description: Invalid data		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Invalid encoder nameplate data (measuring steps/pulses per revolution/multi-turn).	– Check startup parameters. – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.4 Description: Track measurement error		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Error during track measurement.	– Switch the device off and on again. – Check the wiring. – Check interference sources (e.g. from EMC). – Check the encoder. Replace if necessary. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

28487486/EN – 02/2019

Subfault: 14.5 Description: Internal warning		
	Response: Encoder – warning	
	Cause	Measure
	Encoder signaled warning.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Clean sensor.
Subfault: 14.6 Description: Signal level too low		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Vector below permitted limit during signal level monitoring.	– Check the wiring. – Check interference sources (e.g. from EMC). – Check the encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.7 Description: Signal level too high		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Vector exceeds permitted limit during signal level monitoring.	Check the gear ratio of the resolver in use. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.8 Description: Signal level monitoring		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Vector below permitted limit during signal level monitoring.	Check the resolver mounting position. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.9 Description: Quadrant check		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Error checking quadrants (sine encoder).	– Switch the device off and on again. – Check the wiring. – Check interference sources (e.g. from EMC). – Check the encoder. Replace if necessary. Note: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.10 Description: Position tolerance range monitoring		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Position outside tolerance range.	– Check startup parameters. – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

28487486/EN – 02/2019

Subfault: 14.11 Description: Data timeout		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Encoder process data timeout.	– Check interference sources (e.g. from EMC). – Check startup parameters. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.12 Description: Emergency		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Encoder signaled emergency.	– Check interference sources (e.g. from EMC). – Check startup parameters. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.13 Description: Error during initialization		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Communication error during initialization.	– Check parameterization. – Check baud rate. – Ensure that the CANopen interface on the encoder (Node ID) is correctly adjusted. – Check the wiring. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.14 Description: Communication		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Faulty communication with encoder.	– Check voltage supply. – Check interference sources (e.g. from EMC). – Check the wiring. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.15 Description: System error		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	System error while evaluating encoder.	– Make sure that multi-turn encoder is within the configured track area. – Check limits. – Check correct settings of encoder numerator/denominator factors. – Check interference sources (e.g. from EMC). – Check startup parameters. – Switch the device off and on again. – If the fault occurs repeatedly, contact SEW-EURODRIVE Service. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.16 Description: Permanent high level in data line – critical		
	Response: Encoder 2 – latest critical fault	
	Cause	Measure
	Permanent high level of data signal.	– Check the wiring. – Check the encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 14.17 Description: Permanent high level in data line	
Response: Encoder 2 – latest fault	
Cause	Measure
Permanent high level of data signal.	– Check the wiring. – Check the encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 14.18 Description: Permanent low level in data line – critical	
Response: Encoder 2 – latest critical fault	
Cause	Measure
Permanent low level of data signal.	– Check the wiring. – Check the encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 14.19 Description: Permanent low level in data line	
Response: Encoder 2 – latest fault	
Cause	Measure
Permanent low level of data signal.	– Check the wiring. – Check the encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

Subfault: 14.20 Description: SSI error bit – critical	
Response: Encoder 2 – latest critical fault	
Cause	Measure
Error bit set in SSI protocol.	– Check startup parameters. – Check the settings at the SSI encoder (fault bit). – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive even with a fault in an external position encoder.

Subfault: 14.21 Description: SSI error bit	
Response: Encoder 2 – latest fault	
Cause	Measure
Error bit set in SSI protocol.	– Check startup parameters. – Check the settings at the SSI encoder (fault bit). – Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive even with a fault in an external position encoder.

Subfault: 14.22 Description: Internal fault – critical	
Response: Encoder 2 – latest critical fault	
Cause	Measure
Encoder signaled internal fault.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

28487486/EN – 02/2019

Subfault: 14.23 Description: Internal fault		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Encoder signaled internal fault.	– Check the wiring. – Check interference sources (light beam interrupted, reflector, data cables, etc.). – Replace encoder. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.24 Description: Travel range exceeded		
	Response: Encoder 2 – latest fault	
	Cause	Measure
	Current position mode (index 8381.10) does not allow for larger travel range.	Check travel range. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.
Subfault: 14.25 Description: Error during encoder startup		
	Response: Output stage inhibit	
	Cause	Measure
	Fatal error during encoder startup.	Switch the device off and on again. Information: In "emergency mode" manual mode, you can move the drive using the motor encoder even if the external position encoder is faulty.

10.4.12 Fault 16 Startup

Subfault: 16.1 Description: Motor not started up		
	Response: Output stage inhibit	
	Cause	Measure
	Motor not started up or not started up completely.	Perform complete motor startup.
Subfault: 16.2 Description: Cannot calculate controller parameters		
	Response: Output stage inhibit	
	Cause	Measure
	Delay of encoder in use too long to calculate required filter coefficients.	Use an encoder with a shorter delay, or contact SEW-EURODRIVE Service.
Subfault: 16.3 Description: Thermal motor model not possible		
	Response: Output stage inhibit	
	Cause	Measure
	Invalid parameters for thermal motor model or for drive enable although starting up thermal model not yet completed.	Check the parameters of the thermal motor model, and perform startup.
Subfault: 16.5 Description: Current limit smaller than magnetizing current of the motor		
	Response: Output stage inhibit	
	Cause	Measure
	Current limit smaller than magnetizing current of the motor calculated by active control mode.	Increase current limit. Required magnetizing current: See diagnostics parameters of control mode.
Subfault: 16.6 Description: Control mode not possible		
	Response: Output stage inhibit	
	Cause	Measure
	Wrong control mode selected for the motor.	Choose a control mode that matches the selected motor.

Subfault: 16.7 Description: PWM frequency not possible		
	Response: Output stage inhibit	
	Cause	Measure
	Specified PWM frequency not allowed for this power output stage.	Select different PWM frequency. Possible PWM frequencies; see device configuration data.
Subfault: 16.8 Description: Temperature sensor motor 1		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty startup of temperature sensor of motor 1.	Perform startup again.
Subfault: 16.9 Description: Temperature sensor motor 2		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty startup of temperature sensor of motor 2.	Perform startup again.
Subfault: 16.10 Description: Actual position source not assigned		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Active control mode requires an encoder for position mode.	– Assign actual position source in encoder assignment of the active drive train (Index 8565.3 or 8566.3). – If no encoder is installed, activate the FCBs only using "torque control" or "speed control" operating mode.
Subfault: 16.11 Description: Motor data calculation error		
	Response: Output stage inhibit	
	Cause	Measure
	Motor startup not possible because of inconsistent motor data or wrong device configuration data.	Check the motor data for plausibility, or contact SEW-EURODRIVE Service.
Subfault: 16.12 Description: Motor data write sequence		
	Response: Output stage inhibit	
	Cause	Measure
	Subindex 1 not written to zero before writing electrical startup parameters (index 8357, 8360, 8394, 8420 or 8358, 8361, 8395, 8421).	Reset the fault. Set parameters 8360/1 or 8361/1 to "0" before writing additional parameters.
Subfault: 16.20 Description: Nominal speed too high or nominal frequency too low		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: Nominal speed too high or nominal frequency too low. The resulting number of pole pairs is 0.	Enter plausible motor data (nominal speed and nominal frequency).
Subfault: 16.21 Description: Nominal slip negative		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data, the calculated nominal slip is negative: Nominal frequency too low or nominal speed too high or number of pole pairs too high.	Enter plausible motor data (nominal frequency, nominal speed, number of pole pairs).
Subfault: 16.22 Description: Specify the number of pole pairs		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: It is not possible to calculate the number of pole pairs accurately from nominal frequency and nominal speed.	Enter the number of pole pairs.

28487486/EN – 02/2019

Subfault: 16.23 Description: Plausibility check failed		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: the estimated nominal power does not match the entered nominal power.	Check entered nameplate data for plausibility.
Subfault: 16.24 Description: Speed controller sampling cycle not possible with current PWM frequency or current control mode		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	At PWM frequency "2.5 kHz", only the speed controller sampling cycle of 2 ms is permitted. For the ELSM® control mode, the only permitted speed controller sampling cycles are 1 ms and 2 ms.	Increase PWM frequency or increase sampling cycle of speed controller to 2 ms. Set the sampling cycle to 1 ms or 2 ms for ELSM® control mode.
Subfault: 16.25 Description: User-defined current limit too low for standstill current		
	Response: Output stage inhibit	
	Cause	Measure
	User-defined current limit value too small for minimum standstill current.	Increase the user-defined current limit, or disable the standstill current function.
Subfault: 16.26 Description: Nominal values incomplete or implausible		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: Nominal voltage, nominal current, nominal speed or nominal torque are not entered or not plausible.	Enter or check nominal voltage, nominal current, nominal speed, and nominal torque.
Subfault: 16.27 Description: Maximum current or maximum torque not plausible		
	Response: Output stage inhibit	
	Cause	Measure
	During startup using nameplate data: Maximum current or maximum torque not entered, or maximum current and maximum torque not plausible.	Check the maximum current and maximum torque.
Subfault: 16.30 Description: Faulty EtherCAT® EEPROM configuration state		
	Response: Warning	
	Cause	Measure
	Faulty EtherCAT®/SBusPLUS EEPROM configuration status. EEPROM not loaded, binary file not loaded.	Contact SEW-EURODRIVE Service.
	Faulty EEPROM loading procedure.	Contact SEW-EURODRIVE Service.
	Faulty EEPROM checksum.	Contact SEW-EURODRIVE Service.

10.4.13 Fault 17 Internal processor fault

Subfault: 17.7 Description: Exception error		
	Response: Output stage inhibit	
	Cause	Measure
	Exception trap in CPU.	Contact SEW-EURODRIVE Service.

10.4.14 Fault 18 Software error

Subfault: 18.1 Description: Motor management		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Error detected at motor management interface.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.

Subfault: 18.3 **Description: Task system warning**		
	Response: Warning	
	Cause	Measure
	A fault was detected during the processing of the internal task system. This may be a timeout for cyclical tasks, for example.	– Acknowledge the warning. – Contact SEW-EURODRIVE Service if the warning occurs regularly.
Subfault: 18.4 **Description: Task system**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	A fault was detected during the processing of the internal task system. This may be a timeout for cyclical tasks, for example.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.
Subfault: 18.7 **Description: Fatal error**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Fatal software error.	– Switch the device off and on again. – If the fault occurs repeatedly, replace the device and send it together with the fault number to SEW-EURODRIVE. For further support, contact SEW-EURODRIVE Service.
Subfault: 18.8 **Description: Invalid fault code**		
	Response: Output stage inhibit	
	Cause	Measure
	Invalid fault code requested.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.
Subfault: 18.9 **Description: Internal software error**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	The software reports an unexpected event.	– Switch the device off and on again. – If the fault occurs repeatedly, replace the device and send it together with the fault number to SEW-EURODRIVE. For further support, contact SEW-EURODRIVE Service.
Subfault: 18.10 **Description: Watchdog**		
	Response: Output stage inhibit	
	Cause	Measure
	Software no longer operates within intended cycle time.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.
Subfault: 18.12 **Description: Configuration data**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Configuration data not plausible or cannot be interpreted by active firmware version.	Update the firmware or load valid configuration data.
Subfault: 18.13 **Description: Calibration data**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Calibration data not plausible.	Load valid calibration data.

28487486/EN – 02/2019

10.4.15 Fault 19 Process data

Subfault: 19.1 **Description: Torque setpoint violation**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Implausible values specified as torque setpoints.	Adjust torque setpoints.
Subfault: 19.2 **Description: Position setpoint violation**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Position setpoint outside software limit switches.	Check position setpoint.
	Position setpoint outside modulo range.	Check position setpoint.
	Position in user unit generates number overflow in the system unit.	Check position in user unit.
Subfault: 19.3 **Description: Speed setpoint violation**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Specified rotational speed setpoints not plausible.	Adjust rotational speed setpoints.
Subfault: 19.4 **Description: Acceleration setpoint violation**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The specified acceleration setpoints are not plausible. Only a value range of >= 0 is permitted.	Adjust acceleration setpoints.
Subfault: 19.5 **Description: Drive function does not exist**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Non-existing drive function (FCB) selected via process data.	Specify an existing FCB number for FCB activation via process data.
Subfault: 19.6 **Description: Mass moment of inertia setpoint violation**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Implausible values specified as mass moment of inertia setpoints. Only a value range of >= 0 is permitted.	Adjust the setpoints for the mass moment of inertia.
Subfault: 19.7 **Description: Referencing missing**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Activated function only permitted with referenced encoder.	Reference the encoder first, then activate the function.
Subfault: 19.8 **Description: Drive train changeover not allowed**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Drive train changeover requested while output stage is enabled.	Inhibit the output stage before changing to another drive train.
Subfault: 19.9 **Description: Jerk setpoint violation**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Jerk values not plausible.	Adjust jerk setpoints.

10.4.16 Fault 20 Device monitoring

Subfault: 20.1
Description: Supply voltage fault

Response: Output stage inhibit
System state: Fault acknowledgment with CPU reset

Cause	Measure
Internal electronics supply voltage or externally connected DC 24 V standby supply voltage outside permitted voltage range.	Check the voltage level of the external DC 24 V standby supply voltage and check for correct port. If required, correct. – Acknowledge the fault. – If fault occurs repeatedly, replace device. For further support, contact SEW-EURODRIVE Service.

Subfault: 20.2
Description: Supply voltage overload

Response: Output stage inhibit

Cause	Measure
For MOVIDRIVE® system, the current load of the current paths of the DC 24 V standby supply voltage inside the device is too high. The device signal output of the device was de-energized because of the fault message.	Identify consumers which are overloading the internal supply voltage: 1 Remove all external consumers: – At the digital outputs of the basic device. - At options that may be present. - At all encoder connections. - At other consumers at the DC 24 V output voltage terminals. 2 Acknowledge the fault. 3 Reconnect the consumers with the device, one after the other, until the fault message appears once again. 4 To eliminate the fault, connect a consumer with a lower current consumption or eliminate the short circuit.

Subfault: 20.7
Description: Internal hardware fault

Response: Output stage inhibit

Cause	Measure
Error in device hardware.	– Acknowledge the fault. – If fault occurs repeatedly, replace device. For further support, contact SEW-EURODRIVE Service.

Subfault: 20.8
Description: Fan warning

Response: Warning with self-reset

Cause	Measure
Fan function impaired.	Check fan for proper functioning.

Subfault: 20.9
Description: Fan fault

Response: Application stop + output stage inhibit

Cause	Measure
Fan defective.	Contact SEW-EURODRIVE Service.

Subfault: 20.10
Description: Fan supply voltage fault

Response: Emergency stop + output stage inhibit

Cause	Measure
Supply voltage of fan missing.	Check the connection or establish a connection.

Subfault: 20.11
Description: STO – switching delay

Response: Output stage inhibit

Cause	Measure
Switching delay between STO signals F-STO_P1 and F-STO_P2.	– Check STO wiring. – Check the STO wiring before acknowledging the fault, and make sure that both STO signals are switched to low level.

10.4.17 Fault 23 Power section

Cause	Measure
Subfault: 23.1 **Description: Warning**	
Response: Warning with self-reset	
Power section fault with fault response of the type "warning".	See also "Power section subcomponent" fault status.
Subfault: 23.2 **Description: Fault**	
Response: Emergency stop + output stage inhibit	
Power section fault with fault response of the type "standard".	See also "Power section subcomponent" fault status.
Subfault: 23.3 **Description: Critical fault**	
Response: Output stage inhibit	
Power section fault with fault response of the type "Critical fault".	See also "Power section subcomponent" fault status.
Subfault: 23.4 **Description: Hardware fault**	
Response: Output stage inhibit	
A fault occurred in a hardware component of the power section, e.g.: Overcurrent hardware comparator.	– Check current supply. – Increase ramp time. – Check for correct motor size (the motor current is too high). – Contact SEW-EURODRIVE Service.
Switched-mode power supply fault, hardware fault.	– Check current supply. – Check the DC 24 V supply voltage.
Fault at the gate driver of an IGBT.	Defect in the power output stage. Contact SEW-EURODRIVE Service.
Invalid process data configuration. Status of control section and power section are not compatible.	Contact SEW-EURODRIVE Service.
Subfault: 23.5 **Description: Invalid process data configuration**	
Response: Output stage inhibit	
Invalid process data configuration.	Contact SEW-EURODRIVE Service.
Subfault: 23.6 **Description: Process data timeout**	
Response: Emergency stop + output stage inhibit	
Power section communication interface detected process data timeout.	If the error occurs repeatedly, contact SEW-EURODRIVE Service.
Subfault: 23.7 **Description: Parameter communication timeout**	
Response: Emergency stop + output stage inhibit	
Power section communication interface detected timeout in parameter communication.	If the error occurs repeatedly, contact SEW-EURODRIVE Service.
Subfault: 23.8 **Description: Parameter communication error**	
Response: Emergency stop + output stage inhibit	
Power section communication interface detected error in parameter communication.	If the error occurs repeatedly, contact SEW-EURODRIVE Service.
Subfault: 23.9 **Description: Firmware of power section corrupt**	
Response: Output stage inhibit	
Failed to update firmware on power section.	Update the firmware again.

10.4.18 Error 24 Cam switch

Subfault: 24.1 Description: Cam window limits interchanged		
	Response: Warning	
	Cause	Measure
	Left cam window limit larger than right limit.	Check cam window limits and adjust.
Subfault: 24.2 Description: Cam window limit not within modulo range		
	Response: Warning	
	Cause	Measure
	Cam window limits outside modulo range.	Check cam window limits and adjust.
Subfault: 24.3 Description: Cam windows of a track overlap		
	Response: Warning	
	Cause	Measure
	Cam window limits of a track overlap.	Adjust the cam window limits in such a way that they are flush.
Subfault: 24.4 Description: Modulo limits swapped		
	Response: Warning	
	Cause	Measure
	The left limit of the modulo range is larger than the right limit.	Check the limits of the modulo range and adjust accordingly.

10.4.19 Fault 25 Parameter memory monitoring

Subfault: 25.2 Description: NV memory – runtime error		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Runtime error of non-volatile memory system.	– Reset the device. If this occurs repeatedly, replace device. Contact SEW-EURODRIVE Service.
Subfault: 25.6 Description: Incompatible device configuration		
	Response: Output stage inhibit	
	Cause	Measure
	The data set in the device was copied from another device, which differs from the current device in the device family, power, or voltage.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".
	Replaceable memory module used by another device. Power rating, device family, or voltage differs from the current device.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".
	The power section was replaced and differs in its power rating or voltage from the original power section.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".
Subfault: 25.7 Description: NV memory initialization – error		
	Response: Output stage inhibit	
	Cause	Measure
	Error initializing non-volatile memory system.	– Reset the device. If this occurs repeatedly, replace device. Contact SEW-EURODRIVE Service.

28487486/EN – 02/2019

Subfault: 25.10 **Description: Power section configuration data – version conflict**		
	Response: Output stage inhibit	
	Cause	Measure
	Wrong version of configuration data of power section.	Contact SEW-EURODRIVE Service.
Subfault: 25.12 **Description: Power section configuration data – CRC error**		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty configuration data of power section.	Contact SEW-EURODRIVE Service.
Subfault: 25.13 **Description: Control electronics configuration data – CRC error**		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty configuration data of control electronics.	Contact SEW-EURODRIVE Service.
Subfault: 25.14 **Description: Calibration data of power section – version conflict**		
	Response: Output stage inhibit	
	Cause	Measure
	Wrong version of calibration data of power section.	Contact SEW-EURODRIVE Service.
Subfault: 25.15 **Description: Calibration data of control electronics – version conflict**		
	Response: Output stage inhibit	
	Cause	Measure
	Wrong version of calibration data of control electronics.	Contact SEW-EURODRIVE Service.
Subfault: 25.16 **Description: Power section calibration data – CRC error**		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty calibration data of power section.	Contact SEW-EURODRIVE Service.
Subfault: 25.17 **Description: Control electronics calibration data – CRC error**		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty calibration data of control electronics.	Contact SEW-EURODRIVE Service.
Subfault: 25.18 **Description: Power section QA data – CRC error**		
	Response: Warning	
	Cause	Measure
	Faulty quality assurance data of power section.	Contact SEW-EURODRIVE Service.
Subfault: 25.19 **Description: Control electronics QA data – CRC error**		
	Response: Warning	
	Cause	Measure
	Faulty quality assurance data of control electronics.	Contact SEW-EURODRIVE Service.
Subfault: 25.20 **Description: Initialization error – basic device memory**		
	Response: Output stage inhibit	
	Cause	Measure
	Initialization error of the basic device memory.	Contact SEW-EURODRIVE Service.
Subfault: 25.21 **Description: Runtime error – basic device memory**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Runtime error in memory of basic device.	Contact SEW-EURODRIVE Service.

28487486/EN – 02/2019

Subfault: 25.30 Description: Initialization error – replaceable memory module		
	Response: Output stage inhibit	
	Cause	Measure
	The formatting of the replaceable memory module does not match.	Restore delivery state. NOTICE: All the data on the replaceable memory module will be reset to the default.
	Initialization error of replaceable memory module after delivery state.	Contact SEW-EURODRIVE Service.
Subfault: 25.31 Description: Runtime error – replaceable memory module		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Runtime error of replaceable memory module.	Contact SEW-EURODRIVE Service.
Subfault: 25.50 Description: Runtime error – replaceable safety memory module		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Runtime error of the replaceable safety memory module.	Contact SEW-EURODRIVE Service.
Subfault: 25.51 Description: Initialization error – replaceable safety memory module		
	Response: Warning	
	Cause	Measure
	Initialization error of the replaceable safety memory module.	Contact SEW-EURODRIVE Service.
Subfault: 25.61 Description: Error – restore point		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Failed to create restore point.	Delete restore point.
Subfault: 25.70 Description: Incompatible card configuration		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The current configuration of the cards does not match the state of the stored startup. For example, a card was removed that was still present during startup.	– Restore the original configuration of the cards. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".

10.4.20 Fault 26 External fault

Subfault: 26.1 Description: Terminal		
	Response: External fault	
	Cause	Measure
	Error message about external error source.	Programmable via 8622.5 (Default: Application stop (+ES)).
Subfault: 26.2 Description: Emergency shutdown		
	Response: Output stage inhibit	
	Cause	Measure
	Another module bus station requested external emergency shutdown.	Check other module bus stations for errors.
Subfault: 26.3 Description: Power section emergency shutdown		
	Response: Output stage inhibit	
	Cause	Measure
	Power section requested external emergency shutdown because it detected critical fault.	Contact SEW-EURODRIVE Service.

28487486/EN – 02/2019

Subfault: 26.4 Description: External braking resistor fault		
	Response: Response to external braking resistor fault	
	Cause	Measure
	External braking resistor's temperature switch connected to terminal tripped.	– Check the resistor mounting position. – Clean the resistor. – Check the configuration of the resistor. – Install a larger resistor. – Check the trip switch settings. – Optimize travel cycle so that less regenerative operation energy arises.

10.4.21 Fault 28 FCB drive functions

Subfault: 28.1 Description: FCB 11/12 – Timeout while searching zero pulse		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Failed to find zero pulse of encoder's C track within specified search time during reference travel.	Check the encoder wiring.
Subfault: 28.2 Description: FCB 11/12 – Hardware limit switch upstream of reference cam		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The hardware limit switch was reached during reference travel. The reference cam was not detected.	Make sure that the reference cam is not installed downstream of the hardware limit switch.
Subfault: 28.3 Description: FCB 11/12 – Hardware limit switch and reference cam not flush		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Hardware limit switch and reference cam not mounted flush.	Make sure that the reference cam and the hardware limit switch are mounted flush.
Subfault: 28.4 Description: FCB 11/12 – Reference offset error		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Error when determining reference offset.	– Make sure that the reference offset is not set to a larger value than the "Modulo maximum" limit value. When using a single-turn absolute encoder, make sure that the reference offset is not set to a larger value than one encoder revolution.
Subfault: 28.5 Description: FCB 11/12 – Referencing not possible		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	In the active drive train, the "Actual position source" parameter is set to "No encoder".	Assign "Actual position source", or do not carry out any referencing.
Subfault: 28.6 Description: FCB 11/12 – Limit switch/reference cam not flush/overlapping with fixed stop		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Hardware limit switch or reference cam that has not been selected was approached during reference travel to fixed stop.	Check whether the parameters set for reference travel are correct.
	During reference travel to fixed stop with selected hardware limit switch or reference cam, the fixed stop was reached without approaching the hardware limit switch or reference cam.	Check whether the parameters set for reference travel are correct.

Subfault: 28.7 **Description: FCB 21 – Test torque greater than maximum torque at motor shaft**		
	Response: Output stage inhibit	
	Cause	Measure
	The required test torque for the brake test is higher than the maximum torque. It cannot be generated by the motor/inverter combination.	Reduce the test torque.
Subfault: 28.8 **Description: FCB 21 – Test torque not reached**		
	Response: Output stage inhibit	
	Cause	Measure
	Test torque required for brake test exceeds valid limit values.	– Reduce the test torque. – Check limit values.
Subfault: 28.9 **Description: FCB 18 – Rotor position identification not possible**		
	Response: Output stage inhibit	
	Cause	Measure
	Rotor position identification started with incremental encoder but aborted prematurely.	– Restart the rotor position identification. – Check whether the encoder is connected correctly. – Check whether encoder is defective.
	Result of rotor position identification cannot be stored in encoder.	Select "inverter" as storage location.
	Combination of "Automatic" mode and "Encoder" storage location not permitted.	Set the operating mode to "Manual" or the storage location to "Inverter".
Subfault: 28.10 **Description: FCB 25 – Unbalanced motor phases**		
	Response: Output stage inhibit	
	Cause	Measure
	Significantly different values determined in the three phases while measuring stator resistances.	– Check whether the motor is connected correctly. – Check all contact points on the motor and inverter. – Check the motor and motor cable for damage.
Subfault: 28.11 **Description: FCB 25 – At least one phase with high resistance**		
	Response: Output stage inhibit	
	Cause	Measure
	At least one motor phase could not be measured during motor parameter measurement.	– Check whether the motor is connected correctly. – Check all contact points on the motor and inverter. – Check the motor and motor cable for damage.
Subfault: 28.12 **Description: FCB 25 – Timeout during stator resistance measurement**		
	Response: Output stage inhibit	
	Cause	Measure
	Motor parameter measurement activated while motor is turning.	– Stop motor. – Start motor parameter measurement when the motor is at standstill.
Subfault: 28.13 **Description: FCB 25 – Characteristic curve identification not possible**		
	Response: Output stage inhibit	
	Cause	Measure
	Motor parameter measurement does not allow for unique identification of the characteristic curve.	Contact SEW-EURODRIVE Service.
Subfault: 28.14 **Description: Modulo min. and max. swapped**		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	In the active data set, the value for "Modulo minimum" is greater than the value for "Modulo maximum"; see Monitoring functions\Limit values 1 or Monitoring functions\Limit values 2.	Swap the values for modulo minimum and modulo maximum.

28487486/EN – 02/2019

Subfault: 28.15 Description: FCB 25 – Timeout		
	Response: Output stage inhibit	
	Cause	Measure
	Measuring rotor resistance, LSigma, or stator inductance not completed.	Contact SEW-EURODRIVE Service.

10.4.22 Fault 29 HW limit switch

Subfault: 29.1 Description: Positive limit switch approached		
	Response: HW limit switch – current drive train	
	Cause	Measure
	Positive hardware limit switch approached.	– Check hardware limit switch wiring. – Check target position. – Move clear of hardware limit switch with negative speed.
Subfault: 29.2 Description: Negative limit switch approached		
	Response: HW limit switch – current drive train	
	Cause	Measure
	Negative hardware limit switch approached.	– Check hardware limit switch wiring. – Check target position. – Move clear of hardware limit switch with positive speed.
Subfault: 29.3 Description: Limit switch missing		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Both positive and negative hardware limit switches approached at the same time.	– Check hardware limit switch wiring. – Check the parameter setting of digital inputs. – Check the parameter setting of process output data.
Subfault: 29.4 Description: Limit switches swapped		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Positive hardware limit switch approached at negative speed, or negative hardware limit switch approached at positive speed.	Check whether hardware limit switch connections are swapped.

10.4.23 Fault 30 Software limit switch

Subfault: 30.1 Description: Positive limit switch approached		
	Response: SW limit switches – current drive train	
	Cause	Measure
	Positive software limit switch approached.	– Check software limit switch position. – Check target position. – Move clear of software limit switch with negative speed.
Subfault: 30.2 Description: Negative limit switch approached		
	Response: SW limit switches – current drive train	
	Cause	Measure
	Negative software limit switch approached.	– Check software limit switch position. – Check target position. – Move clear of software limit switch with positive speed.
Subfault: 30.3 Description: Limit switches swapped		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Position value of negative software limit switch greater than position value of positive software limit switch.	Check software limit switch positions.

10.4.24 Fault 31 Thermal motor protection

Subfault: 31.1 **Description: Temperature sensor wire break – motor 1**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Connection to temperature sensor of motor 1 interrupted.	Check the temperature sensor wiring.
Subfault: 31.2 **Description: Temperature sensor short circuit – motor 1**		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Short circuit in connection with temperature sensor of motor 1.	Check the temperature sensor wiring.
Subfault: 31.3 **Description: Temperature sensor overtemperature – motor 1**		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature sensor of motor 1 signals overtemperature.	– Allow motor to cool down. – Check for motor overload. – Check whether the correct temperature sensor KY (KTY) was parameterized instead of PK (Pt1000).
Subfault: 31.4 **Description: Temperature model overtemperature – motor 1**		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature model of motor 1 signals overtemperature.	– Allow motor to cool down. – Check for motor overload. – Check whether the correct temperature sensor KY (KTY) was parameterized instead of PK (Pt1000).
Subfault: 31.5 **Description: Temperature sensor prewarning – motor 1**		
	Response: Thermal motor protection 1 – prewarning threshold	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 1 exceeds prewarning threshold.	Check for motor overload.
Subfault: 31.6 **Description: Temperature model prewarning – motor 1**		
	Response: Thermal motor protection 1 – prewarning threshold	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 1 exceeds prewarning threshold.	Check for motor overload.
Subfault: 31.7 **Description: UL temperature monitoring**		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature model of active motor signals overtemperature.	Check for motor overload.
Subfault: 31.8 **Description: Communication timeout temperature sensor – motor 1**		
	Response: Output stage inhibit	
	Cause	Measure
	Communication with temperature sensor is disrupted, e.g. via MOVILINK® DDI.	Check the cabling.
Subfault: 31.9 **Description: Temperature too low – temperature sensor – motor 1**		
	Response: Warning with self-reset	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 1 below -50 °C.	– Check if a KTY temperature sensor is installed in the motor but the parameterization has been carried out for a Pt1000 temperature sensor. – Heat the motor.

28487486/EN – 02/2019

Subfault: 31.11 Description: Temperature sensor wire break – motor 2		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Connection to temperature sensor of motor 2 interrupted.	Check the temperature sensor wiring.
Subfault: 31.12 Description: Temperature sensor short circuit – motor 2		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Short circuit in connection with temperature sensor of motor 2.	Check the temperature sensor wiring.
Subfault: 31.13 Description: Temperature sensor overtemperature – motor 2		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature sensor of motor 2 signals overtemperature.	– Allow motor to cool down. – Check for motor overload. – Check whether the correct temperature sensor KY (KTY) was parameterized instead of PK (Pt1000).
Subfault: 31.14 Description: Temperature model overtemperature – motor 2		
	Response: Output stage inhibit	
	Cause	Measure
	Temperature model of motor 2 signals overtemperature.	– Allow motor to cool down. – Check for motor overload. – Check whether the correct temperature sensor KY (KTY) was parameterized instead of PK (Pt1000).
Subfault: 31.15 Description: Temperature sensor prewarning – motor 2		
	Response: Thermal motor protection 2 – prewarning threshold	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 2 exceeds prewarning threshold.	Check for motor overload.
Subfault: 31.16 Description: Temperature model prewarning – motor 2		
	Response: Thermal motor protection 2 – prewarning threshold	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 2 exceeds prewarning threshold.	Check for motor overload.
Subfault: 31.19 Description: Temperature too low – temperature sensor – motor 2		
	Response: Warning with self-reset	
	Cause	Measure
	Temperature signaled by temperature sensor of motor 2 below -50 °C.	– Check if a KTY temperature sensor is installed in the motor but the parameterization has been carried out for a Pt1000 temperature sensor. – Heat the motor.

10.4.25 Fault 32 Communication

Subfault: 32.2 Description: EtherCAT®/SBus^{PLUS} process data timeout		
	Response: Fieldbus – timeout response	
	Cause	Measure
	Process data timeout during EtherCAT®/SBusPLUS communication.	– Check the wiring of the system bus and module bus. – Check that the EtherCAT®/SBus^{PLUS} configuration is correctly set in the MOVI-C® CONTROLLER. – Check EtherCAT®/SBus^{PLUS} timeout configuration in the device.

Subfault: 32.3 **Description: Faulty synchronization signal**		
	Response: External synchronization	
	Cause	Measure
	Faulty synchronization signal period.	Check for correct setting of the EtherCAT®/SBus^{PLUS} configuration in the MOVI-C® CONTROLLER.
Subfault: 32.4 Description: No synchronization signal		
	Response: External synchronization	
	Cause	Measure
	No synchronization signal present.	Check for correct setting of the EtherCAT®/SBus^{PLUS} configuration in the MOVI-C® CONTROLLER.
Subfault: 32.5 Description: Synchronization timeout		
	Response: External synchronization	
	Cause	Measure
	Timeout while synchronizing to synchronization signal.	Check for correct setting of the EtherCAT®/SBus^{PLUS} configuration in the MOVI-C® CONTROLLER.
Subfault: 32.6 Description: Copy parameter set		
	Response: Output stage inhibit	
	Cause	Measure
	Error while downloading parameter set to device.	– Check the wiring of the system bus and module bus. – Restart download.
Subfault: 32.7 Description: Application heartbeat timeout		
	Response: Application heartbeat – timeout response	
	Cause	Measure
	Communication interrupted between IEC program in MOVI-C® CONTROLLER and device.	– Check status of the IEC program. – Restart IEC program.
Subfault: 32.8 Description: User-timeout timeout		
	Response: User timeout timeout response	
	Cause	Measure
	The timeout time of the user timeout function elapsed.	Write the parameter for triggering the user timeout function cyclically before the timeout time elapses.
Subfault: 32.12 Description: Manual mode timeout		
	Response: Manual mode – timeout response	
	Cause	Measure
	Communication connection to device interrupted in manual mode.	– Check whether too many programs are open on the operator PC. – Increase the timeout time in manual mode.
	New Scope project created.	– Reset fault. – Restart manual operation.
	Scope measurement loaded from device.	– Reset fault. – Restart manual operation.

10.4.26 Fault 33 System initialization

Subfault: 33.1 Description: Motor current measurement		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Motor current measurement detected an error.	Contact SEW-EURODRIVE Service.

28487486/EN – 02/2019

Subfault: 33.2 **Description: Firmware CRC check**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Error checking firmware.	Contact SEW-EURODRIVE Service.
Subfault: 33.6 **Description: FPGA configuration**		
	Response: Output stage inhibit	
	Cause	Measure
	Error checking FPGA configuration.	Contact SEW-EURODRIVE Service.
Subfault: 33.7 **Description: Function block compatibility error**		
	Response: Output stage inhibit	
	Cause	Measure
	Error checking compatibility of function block.	Contact SEW-EURODRIVE Service.
Subfault: 33.8 **Description: SW function block configuration**		
	Response: Output stage inhibit	
	Cause	Measure
	Error detected while checking configuration of software function block.	Contact SEW-EURODRIVE Service.
Subfault: 33.10 **Description: Boot timeout**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	Timeout during system boot.	Contact SEW-EURODRIVE Service.
Subfault: 33.11 **Description: Hardware compatibility error**		
	Response: Output stage inhibit	
	Cause	Measure
	Firmware does not match device.	Contact SEW-EURODRIVE Service.
Subfault: 33.12 **Description: Memory module plugged in**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	A plugged-in memory module was detected during device start. The setting for the device parameter source is set to "Internal memory".	– Switch off the device. Remove the memory module and restart the device. – Change the parameter "Non-volatile memory source" to "Arbitrary" or "Replaceable memory module". Switch the device off and on again.
Subfault: 33.13 **Description: Memory module removed**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	The device was started without a memory module. The setting for the device parameter source is set to "Replaceable memory module".	Switch off the device. Insert the memory module and restart the device.
	Replaceable memory module removed during ongoing operation.	Change parameter "Non-volatile memory source" to "Internal memory". Switch the device off and on again.
Subfault: 33.14 **Description: EtherCAT® slave controller cannot be accessed**		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	EtherCAT® slave controller cannot be accessed.	Contact SEW-EURODRIVE Service.

Subfault: 33.15 Description: Firmware configuration		
	Response: Output stage inhibit System state: Fault acknowledgment with CPU reset	
	Cause	Measure
	The Device Update Manager detected a modified version of the application firmware.	Acknowledge the fault. Doing so will update the configuration data of the Device Update Manager.
	The error occurs repeatedly several times. The Device Update Manager is outdated and cannot save the configuration.	Update the Device Update Manager.

10.4.27 Fault 34 Process data configuration

Subfault: 34.1 Description: Changed process data configuration		
	Response: Application stop + output stage inhibit	
	Cause	Measure
	Process data configuration changed during active process data operation.	– Stop the process data and make your changes. Then start the process data again. – Perform a reset. Doing so will stop the process data, apply the changes, and restart the process data.

10.4.28 Fault 35 Function activation

Subfault: 35.1 Description: Activation key – application level invalid		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The activation key was entered incorrectly.	Enter the activation key again.
	The activation key was not created for this device.	Check the activation key.
	When using a double axis, the activation key for the wrong instance was entered in the device.	Enter the activation key for the allocated instance.
	An activation key for a technology level was entered in the parameter "Application level – Activation key".	Enter the activation key in the correct parameter.
Subfault: 35.2 Description: Application level too low		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The activated software module requires a higher application level.	Enter an activation key for the required application level. You can find the required level in the parameter 8438.3 "Application level – Required level".
Subfault: 35.3 Description: Technology level too low		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	An activated technology function requires a higher technology level.	Enter an activation key for the required technology level. You can find the required level in the parameter 8438.13 "Technology level – Required level".
Subfault: 35.4 Description: Activation key – technology level invalid		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The activation key was entered incorrectly.	Enter the activation key again.
	The activation key was not created for this device.	Check the activation key.
	When using a double axis, the activation key for the wrong instance was entered in the device.	Enter the activation key for the allocated instance.
	An activation key for an application level was entered in the parameter "Technology level – Activation key".	Enter the activation key in the correct parameter.

28487486/EN – 02/2019

10.4.29 Fault 42 Lag error

Subfault: 42.1 Description: Positioning lag error		
	Response: Positioning lag error	
	Cause	Measure
	A lag error occurred during positioning. Incorrect encoder connection.	Check the connection of the encoder.
	Position encoder inverted or not installed correctly at the track.	Check the installation and connection of the position encoder.
	Wiring faulty.	Check the wiring of encoder, motor, and line phases.
	Acceleration ramps too short.	Extend acceleration ramps.
	P component of position controller too small.	Set P component of position controller to a larger value.
	Incorrectly set speed controller parameters.	Check controller parameters.
	Value of lag error tolerance too small.	Increase the lag error tolerance.
	Mechanical components cannot move freely or are blocked.	Make sure mechanical parts can move freely, and check whether they are blocked.
Subfault: 42.2 Description: Jog mode lag error		
	Response: Output stage inhibit	
	Cause	Measure
	A lag error occurred in jog mode (FCB 20). Incorrect encoder connection.	Check the connection of the encoder.
	Position encoder inverted or not installed correctly at the track.	Check the installation and connection of the position encoder.
	Wiring faulty.	Check the wiring of encoder, motor, and line phases.
	Acceleration ramps too short.	Extend acceleration ramps.
	P component of position controller too small.	Set P component of position controller to a larger value.
	Incorrectly set speed controller parameters.	Check controller parameters.
	Value of lag error tolerance too small.	Increase the lag error tolerance.
	Mechanical components cannot move freely or are blocked.	Make sure mechanical parts can move freely, and check whether they are blocked.
Subfault: 42.3 Description: Standard lag error		
	Response: Output stage inhibit	
	Cause	Measure
	A lag error has occurred outside a positioning process. Incorrect encoder connection.	Check the connection of the encoder.
	Position encoder inverted or not installed correctly at the track.	Check the installation and connection of the position encoder.
	Wiring faulty.	Check the wiring of encoder, motor, and line phases.
	Acceleration ramps too short.	Extend acceleration ramps.
	P component of position controller too small.	Set P component of position controller to a larger value.
	Incorrectly set speed controller parameters.	Check controller parameters.
	Value of lag error tolerance too small.	Increase the lag error tolerance.

10.4.30 Fault 46 Safety card

Subfault: 46.1 Description: No response		
	Response: Output stage inhibit	
	Cause	Measure
	Failed to synchronize with subcomponent.	– Check device assignment of basic device and option. – Check card slot and installation and correct if necessary. – Restart the device. – Contact SEW-EURODRIVE Service.

28487486/EN – 02/2019

Subfault: 46.2 Description: Invalid variant		
	Response: Output stage inhibit	
	Cause	Measure
	Plugged safety card design does not match inverter type.	– Remove safety card. – Use the correct safety card design.
	For double axes, only designs without encoder interface can be used.	– Remove option. – Use the design without encoder interface.
	For double axes, no encoder option must be plugged in.	Remove the option.
Subfault: 46.3 Description: Internal communication timeout		
	Response: Output stage inhibit	
	Cause	Measure
	Communication interrupted between inverter and safety card.	Check card slot and installation and correct if necessary. Contact SEW-EURODRIVE Service if the error is still present.
	Safety card signals subcomponent fault of the type "warning".	Check card slot and installation and correct if necessary. Contact SEW-EURODRIVE Service if the error is still present.
Subfault: 46.50 Description: Warning		
	Response: Warning with self-reset	
	Cause	Measure
	Safety card signals subcomponent fault of the type "warning".	For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3).
Subfault: 46.51 Description: Fault		
	Response: Emergency stop + output stage inhibit with self-reset	
	Cause	Measure
	Safety card signals subcomponent fault of the type "standard fault".	For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3).
Subfault: 46.52 Description: Critical fault		
	Response: Output stage inhibit with self-reset	
	Cause	Measure
	Safety card signals subcomponent fault of the type "critical fault".	– For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3). – If the jumper plug is plugged at terminal "X6", remove the jumper plug.

10.4.31 Fault 47 Supply unit

Subfault: 47.1 Description: Supply unit – warning		
	Response: Warning with self-reset	
	Cause	Measure
	The supply unit signals a fault with response type "warning". The fault is only displayed.	For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3).
Subfault: 47.2 Description: Supply unit – standard fault		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	The supply unit signals a fault with response type "standard". The fault response is determined by the driver implemented on the axis. The axis performs the fault response.	For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3).

Subfault: 47.3 Description: Supply unit – critical fault		
	Response: Output stage inhibit	
	Cause	Measure
	The supply unit signals a fault with response type "critical error". The fault response is determined by the driver implemented on the axis. The axis performs the fault response.	For the exact cause of the fault and for information on how to correct the cause of the problem, refer to the fault reported by the subcomponent (index 8365.3).

10.4.32 Fault 48 Module bus

Subfault: 48.1 Description: Incompatible		
	Response: Output stage inhibit	
	Cause	Measure
	Module bus slave and module bus master not compatible.	Update the firmware of the module bus at the supply unit or the axis modules to a compatible version.
Subfault: 48.2 Description: Timeout		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Timeout detected by module bus.	Check cable connections and voltage supply of module bus stations.
Subfault: 48.3 Description: Number of module bus slaves exceeded		
	Response: Output stage inhibit	
	Cause	Measure
	Too many module bus slaves.	Reduce the number of module bus slaves to a maximum of one module bus slave.
Subfault: 48.4 Description: CRC error		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	CRC error during module bus communication.	– Restart the device. – Reset the fault. – Contact SEW-EURODRIVE service if the fault reoccurs.

10.4.33 Fault 50 I/O card

Subfault: 50.1 Description: Boot synchronization timeout		
	Response: Output stage inhibit	
	Cause	Measure
	Card plugged in device but cannot be accessed.	– Check device assignment of basic device and option. – Check card slot and installation and correct if necessary. – Restart device.
Subfault: 50.2 Description: CRC error of FPGA driver		
	Response: Output stage inhibit	
	Cause	Measure
	Communication between FPGA and option card does not work, or is interrupted.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.
Subfault: 50.3 Description: CRC error of option card		
	Response: Output stage inhibit	
	Cause	Measure
	Option card signals CRC error on SPI bus.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.

28487486/EN – 02/2019

Subfault: 50.4 Description: Option card timeout error		
	Response: Output stage inhibit	
	Cause	Measure
	Option card signals timeout error on SPI bus.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.
Subfault: 50.5 Description: Option card watchdog error		
	Response: Output stage inhibit	
	Cause	Measure
	Microcontroller of option card signals a watchdog error.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.
Subfault: 50.6 Description: Ready signal timeout		
	Response: Output stage inhibit	
	Cause	Measure
	Card booted but cyclical communication not possible.	– Check card slot and installation and correct if necessary. – Check for EMC-compliant installation. – Restart device.
Subfault: 50.7 Description: Frame error of option card		
	Response: Output stage inhibit	
	Cause	Measure
	Faulty communication between option card and basic device.	–

10.4.34 Fault 51 Analog processing

Subfault: 51.1 Description: Analog current input 4 mA limit		
	Response: Warning with self-reset	
	Cause	Measure
	Input current below 4 mA.	Check input current.

10.4.35 Fault 52 Explosion protection function category 2

Subfault: 52.1 Description: Startup error		
	Response: Output stage inhibit	
	Cause	Measure
	No valid startup available.	Perform startup.
Subfault: 52.2 Description: Impermissible system function		
	Response: Output stage inhibit	
	Cause	Measure
	Impermissible system function activated.	Disable impermissible functions when Ex protection function is active, such as "Activate standstill current" = "On" in the active control mode.
Subfault: 52.3 Description: Inverter too large		
	Response: Output stage inhibit	
	Cause	Measure
	Ratio of inverter current to nominal motor current too large.	Check the assignment of motor and inverter, and check the dimensioning of the system.
Subfault: 52.4 Description: Parameterization of current limit characteristic		
	Response: Output stage inhibit	
	Cause	Measure
	Error setting parameters for current limit characteristic.	– Parameterize the current limit characteristic. – Perform startup again.

28487486/EN – 02/2019

Subfault: 52.5 Description: Time duration exceeded f < 5 Hz		
	Response: Emergency stop + output stage inhibit	
	Cause	Measure
	Duration of 60 s for f < 5 Hz exceeded.	Check the dimensioning of the system: If speed control = FCB05, increase the speed. If speed = 0, inhibit output stage / with stop FCBs, activate the brake function if a brake is installed.

28487486/EN – 02/2019

10.5 Power section fault description

10.5.1 Fault 7 DC link

Subfault: 7.1 Description: DC link overvoltage		
	Response: Remote – critical fault	
	Cause	Measure
	Maximum permitted DC link voltage limit exceeded and output stage inhibited by hardware.	– Extend deceleration ramps. – Check supply cable to the braking resistor. – Check the technical data of the braking resistor.

10.5.2 Fault 11 Temperature monitoring

Subfault: 11.7 Description: Wire break at temperature sensor of heat sink		
	Response: Remote – warning with self-reset	
	Cause	Measure
	Wire break at temperature sensor of heat sink.	Contact SEW-EURODRIVE Service.
Subfault: 11.8 Description: Short circuit at temperature sensor of heat sink		
	Response: Remote – warning with self-reset	
	Cause	Measure
	Short circuit at temperature sensor of heat sink.	Contact SEW-EURODRIVE Service.

10.5.3 Fault 17 Internal processor fault

Subfault: 17.6 Description: Watchdog		
	Response: Disable rectifier	
	Cause	Measure
	CPU watchdog responded.	
Subfault: 17.7 Description: Exception error		
	Response: Disable rectifier	
	Cause	Measure
	Exception trap in CPU.	Contact SEW-EURODRIVE Service.

10.5.4 Fault 18 Software error

Subfault: 18.7 Description: Fatal error		
	Response: Disable rectifier	
	Cause	Measure
	Fatal software error.	– Switch the device off and on again. – If the fault occurs repeatedly, replace the device and send it together with the fault number to SEW-EURODRIVE. For further support, contact SEW-EURODRIVE Service.
Subfault: 18.8 Description: Invalid fault code		
	Response: Remote – standard fault	
	Cause	Measure
	Invalid fault code requested.	– Switch the device off and on again. – Contact SEW-EURODRIVE Service if the fault persists.

10.5.5 Fault 20 Device monitoring

Subfault: 20.1 Description: Supply voltage fault		
	Response: Remote – critical fault	
	Cause	Measure
	Internal electronics supply voltage or externally connected DC 24 V standby supply voltage outside permitted voltage range.	Check the voltage level of the external DC 24 V standby supply voltage and check for correct port. If required, correct. – Acknowledge the fault. – If the fault occurs repeatedly, replace the device. For further support, contact SEW-EURODRIVE Service.
Subfault: 20.8 **Description: Fan warning**		
	Response: Remote – warning with self-reset	
	Cause	Measure
	Fan function impaired.	Check the fan for proper functioning.
Subfault: 20.9 **Description: Fan fault**		
	Response: Remote – standard fault	
	Cause	Measure
	Fan defective.	Contact SEW-EURODRIVE Service.

10.5.6 Fault 25 Parameter memory monitoring

Subfault: 25.2 Description: NV memory – runtime error		
	Response: Remote – standard fault	
	Cause	Measure
	Runtime error of non-volatile memory system.	– Reset the device. – If this occurs repeatedly, replace device. Contact SEW-EURODRIVE Service.
Subfault: 25.3 **Description: NV data import – error**		
	Response: Remote – standard fault	
	Cause	Measure
	Error importing non-volatile memory data from non-volatile memory.	– Reset the device. – If this occurs repeatedly, replace device. Contact SEW-EURODRIVE Service.
Subfault: 25.4 **Description: NV setup – fault**		
	Response: Remote – standard fault	
	Cause	Measure
	Error while performing delivery state or during basic initialization of the parameters.	– Reset the device. – If this occurs repeatedly, replace device. Contact SEW-EURODRIVE Service.
Subfault: 25.5 **Description: NV data fault**		
	Response: Remote – standard fault	
	Cause	Measure
	Faulty data detected in non-volatile memory system.	The data on the (mobile) non-volatile memory might have been formatted for another unit. You can rectify the fault by reformatting the data (basic initialization).

28487486/EN – 02/2019

Subfault: 25.6 Description: Incompatible device configuration		
	Response: Remote – standard fault	
	Cause	Measure
	The data set in the device was copied from another device, which differs from the current device in the device family, power, or voltage.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".
	Replaceable memory module used by another device. Power rating, device family, or voltage differs from the current device.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".
	The power section was replaced and differs in its power rating or voltage from the original power section.	– Check whether the configuration is correct and repeat the startup, if necessary. – Acknowledge the fault by manual reset with parameter set acceptance. Setting under [Diagnostics] > [Status] > [Fault status] parameter "Manual fault reset".
Subfault: 25.7 Description: NV memory initialization – error		
	Response: Remote – standard fault	
	Cause	Measure
	Error initializing non-volatile memory system.	– Reset the device. – If this occurs repeatedly, replace device. Contact SEW-EURODRIVE Service.
Subfault: 25.9 Description: NV memory hardware – fault		
	Response: Remote – standard fault	
	Cause	Measure
	Faulty access to non-volatile memory hardware.	– Reset the device. – If this occurs repeatedly, replace the device. Contact SEW-EURODRIVE Service.
Subfault: 25.10 Description: Power section configuration data – version conflict		
	Response: Remote – standard fault	
	Cause	Measure
	Wrong version of configuration data of power section.	Contact SEW-EURODRIVE Service.
Subfault: 25.12 Description: Power section configuration data – CRC error		
	Response: Remote – standard fault	
	Cause	Measure
	Faulty configuration data of power section.	Contact SEW-EURODRIVE Service.

10.5.7 Fault 32 Communication

Subfault: 32.6 Description: Copy parameter set		
	Response: Remote – standard fault	
	Cause	Measure
	Error while downloading parameter set to device.	– Check the wiring of the system bus and module bus. – Restart download.
Subfault: 32.13 Description: Process data timeout		
	Response: Remote – warning with self-reset	
	Cause	Measure
	Process data timeout.	– Switch the device off and on again. – If the fault occurs repeatedly, replace the safety card and send it together with the fault number to SEW-EURODRIVE. For further support, contact SEW-EURODRIVE Service.

28487486/EN – 02/2019

10.5.8 Fault 33 System initialization

Subfault: 33.2 **Description: Firmware CRC check**		
	Response: Disable rectifier	
	Cause	Measure
	Error checking firmware.	Contact SEW-EURODRIVE Service.
Subfault: 33.8 **Description: SW function block configuration**		
	Response: Remote – standard fault	
	Cause	Measure
	Error detected while checking configuration of software function block.	Contact SEW-EURODRIVE Service.
Subfault: 33.9 **Description: Power section hardware compatibility fault**		
	Response: Remote – critical fault	
	Cause	Measure
	Firmware does not match hardware of power section.	Contact SEW-EURODRIVE Service.

10.5.9 Fault 44 Subcomponent power section

Subfault: 44.1 **Description: Power section SMPS fault**		
	Response: Remote – critical fault	
	Cause	Measure
	The switched-mode power supply in power section is faulty. Hardware fault.	Contact SEW-EURODRIVE Service.
Subfault: 44.2 **Description: Overcurrent phase U**		
	Response: Remote – critical fault	
	Cause	Measure
	Overcurrent phase U.	– Rectify the short circuit. – Connect a smaller motor. – Increase the ramp time. – In the event of a defective output stage, contact SEW-EURODRIVE Service.
Subfault: 44.3 **Description: Overcurrent phase V**		
	Response: Remote – critical fault	
	Cause	Measure
	Overcurrent phase V.	– Rectify the short circuit. – Connect a smaller motor. – Increase the ramp time. – In the event of a defective output stage, contact SEW-EURODRIVE Service.
Subfault: 44.4 **Description: Overcurrent phase W**		
	Response: Remote – critical fault	
	Cause	Measure
	Overcurrent phase W.	– Rectify the short circuit. – Connect a smaller motor. – Increase the ramp time. – In the event of a defective output stage, contact SEW-EURODRIVE Service.
Subfault: 44.5 **Description: Faulty supply voltage for gate drivers**		
	Response: Remote – critical fault	
	Cause	Measure
	Faulty supply voltage for gate drivers for phases U, V, W.	Switch the power off and on again/perform a reset.
	Phase module not ready for operation.	If the fault is still present, replace the device. Contact SEW-EURODRIVE Service.

Subfault: 44.6 Description: Faulty supply voltage in gate drivers for brake chopper		
	Response: Remote – critical fault	
	Cause	Measure
	Faulty supply voltage in gate drivers for brake chopper.	Switch the power off and on again/perform a reset.
	Brake chopper not ready for operation.	If the fault is still present, replace the device. Contact SEW-EURODRIVE Service.
Subfault: 44.7 Description: Hardware error signal		
	Response: Remote – critical fault	
	Cause	Measure
	Power section hardware signals a fault. It is not possible to pinpoint the fault.	– Switch the power off and on again/perform a reset. – If the fault is still present, replace the device. Contact SEW-EURODRIVE Service.

10.6 Responses to fault acknowledgement

10.6.1 Fault acknowledgement

During fault acknowledgement, the final fault status determines which reset type will be executed, see following table.

Final fault status	Responses to fault acknowledgement
System blocked	System restart
System waiting	Warm start: Delete fault code
Only display fault	Warm start: Delete fault code

Software reset

Response	Effect
System restart with start of the CPU	Behavior equal to device start
	Reference is lost
	Fieldbus interface is restarted
	EtherCAT®/SBus^{PLUS} is restarted
	The active "fault message" is reset (digital output = 1, system status = 0).

Software restart

A software restart is **no** real reset of the micro controller.

Response	Effect
Software restart	The firmware will be restarted, without the boot loader becoming active (no display "b0"!).
	Reference positions of incremental encoder systems will be lost.
	Any existing fieldbus interfaces are not affected.
	The interface between options and firmware system is initialized again. A new boot synchronization to the fieldbus or control option takes place.
	The active "fault message" is reset (digital output = 1, system status = 0).

The ready signal is set again depending on the system state after the reset by the system state control.

Warm start

A warm start only resets the fault code.

Response	Effect
Warm start	The firmware system is not rebooted.
	All reference positions will be maintained.
	Communication is not interrupted.
	The active "fault message" is reset (digital output = 1, system status = 0).

Fieldbus timeout

After manual reset of a fault, the fault message is deleted. The system changes to the state "Waiting for data".

28487486/EN – 02/2019

10.7 Fault responses

10.7.1 Default – fault response

Fault response	Description
No response	The inverter ignores the event.
Warning with self-reset	The inverter sends a warning message with self-reset. The fault is automatically reset after the cause of fault is eliminated.
Warning	The inverter issues a warning message.
Application stop (with output stage inhibit)	The inverter stops with the deceleration set for the application limit. Parameter set 1 Index 8375.0-13 Parameter set 2 Index 8375.8-13 For n=0: Brake "applied" and output stage "off".
Application stop (with output stage inhibit) with self reset	
Emergency stop (with output stage inhibit)	The inverter stops with the set emergency stop deceleration. Parameter set 1 Index 8375.0-20 Parameter set 2 Index 8375.8-20
Emergency stop (with output stage inhibit) with self-reset	
Inhibit output stage with self reset	The output stage is deactivated and the brake is applied.
Inhibit output stage	

Self-reset means: Eliminating the cause of the fault acknowledges the fault. The inverter automatically resumes the operation performed before the fault. The drive restarts automatically.

10.7.2 Parameterizable faults

Parameterizable faults	Description	Index no.	Possible fault response
Manual mode – timeout response	This parameter is used to set the response to a bus timeout during manual mode.	8504.3	• Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Heat sink overtemperature – prewarning	Here, you can set the device response when the prewarning threshold for heat sink utilization is exceeded (index 8336.1).	8622.2	• No response • Warning
Positioning lag fault	This parameter is used to set the device response to a lag error (lag error window exceeded, index 8509.4).	8622.3	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Line phase failure	This parameter is used to set the device response to a line phase failure (values below threshold defined by the user, index 8351.5).	8622.4	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
External fault	This parameter is used to set the device response to an external fault (e.g. triggered by terminal or control word).	8622.5	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage

28487486/EN – 02/2019

Parameterizable faults	Description	Index no.	Possible fault response
Fieldbus – timeout	This parameter is used to set the device response to an EtherCAT®/SBus^{PLUS} timeout (timeout time, index 8455.3).	8622.6	• Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage • Warning with self reset • Application stop (with output stage inhibit) with self reset • Emergency stop (with output stage inhibit) with self reset • Inhibit output stage with self reset
External synchronization	This parameter is used to set the device response to loss of external synchronization.	8622.7	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage • Warning with self reset • Application stop (with output stage inhibit) with self reset • Emergency stop (with output stage inhibit) with self reset • Inhibit output stage with self reset
Motor temperature prewarning – current parameter set	Motor temperature active parameter set – prewarning.	8622.8	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Electromechanical utilization – prewarning	This parameter is used to set the device response to an exceeded prewarning threshold for electromechanical utilization (index 8336.2).	8622.10	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
HW limit switches – current parameter set		8622.11	• No response • Emergency stop (with output stage inhibit) • Emergency stop (with output stage inhibit) with self reset
SW limit switches – current parameter set		8622.12	• No response • Emergency stop (with output stage inhibit) • Emergency stop (with output stage inhibit) with self reset
Encoder – warning	This parameter is used to set the device response to an encoder warning.	8622.13	• Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Encoder – fault	This parameter is used to set the device response to an encoder fault.	8622.14	• Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Additional encoder	This parameter is used to set the device response to a fault of an encoder that is not used for control (speed or positioning control).	8622.15	• Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Encoder 1 – latest fault		8622.16	• No response
Encoder 2 – latest fault		8622.17	• No response

28487486/EN – 02/2019

Parameterizable faults	Description	Index no.	Possible fault response
Encoder 1 – latest critical fault		8622.18	• No response • Inhibit output stage
Encoder 2 – latest critical fault		8622.19	• No response • Inhibit output stage
Response to external braking resistor fault	External braking resistor fault	8622.20	• No response • Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage
Application heartbeat timeout	This parameter is used to set the device response to a timeout of the application heartbeat.	8622.21	• Warning • Application stop (with output stage inhibit) • Emergency stop (with output stage inhibit) • Inhibit output stage

11 Service

11.1 Electronics Service by SEW-EURODRIVE

If you are unable to rectify a fault, contact SEW-EURODRIVE Service. For the addresses, refer to www.sew-eurodrive.com.

When contacting SEW-EURODRIVE Service, always specify the following information so that our service personnel can assist you more effectively:

- Information on the device type on the nameplate (e.g. type designation, serial number, part number, product key, purchase order number)
- Brief description of the application
- Fault message on the status display
- Nature of the fault
- Accompanying circumstances
- Any unusual events preceding the problem

11.2 Extended storage

If the application inverters are stored in a temperature range of 5 °C to 40 °C, no measures are required.

The following table lists the application inverters, time intervals, and measures that are required if the application inverters are stored outside the abovementioned temperature range.

For all application inverters other than the ones listed, **no** measures are required.

<table>
<tr><th>Modules</th><th>Time interval</th><th>Measure</th></tr>
<tr><td>- MDX9_A-0020 – 5880-5_3-..
- MDX9_A-0070 – 1080-2_3-..</td><td rowspan="2">Every 2 years</td><td>Line connections: Connect the device to the line voltage for 5 minutes.</td></tr>
<tr><td>All application inverters</td><td>Connect the device to 24 V for 5 minutes.</td></tr>
</table>

11.2.1 Procedure in case maintenance has been neglected

If you have not performed maintenance regularly, SEW-EURODRIVE recommends that you increase the line voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview. After you have completed the regeneration process, the device can be used immediately or stored again.

The following graduations are recommended:

AC 400/500 V devices:

- Stage 1: 0 V to AC 350 V within a few seconds
- Stage 2: AC 350 V for 15 minutes
- Stage 3: AC 420 V for 15 minutes
- Stage 4: AC 500 V for 1 hour

28487486/EN – 02/2019

11.3 Shutdown

To shut down the application inverter, de-energize the application inverter using appropriate measures.

⚠ WARNING

Electric shock due to incompletely discharged capacitors.

Severe or fatal injuries.

- Observe a minimum switch-off time of 10 minutes after disconnecting the power supply.

11.4 Waste disposal

Observe the applicable national regulations.

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

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

This product falls within the scope of the European WEEE Directive 2012/19/EU on waste electrical and electronic equipment.

Under no circumstances may electrical and electronic equipment be placed in regular household waste. The product must be disposed of properly in accordance with the currently applicable statutory regulations of the respective EU Member State, Norway, Liechtenstein, and Iceland.

The aim of this is to ease the burden on natural resources and to protect the environment and human health from hazardous substances by bringing them to recycling.

28487486/EN – 02/2019

12 Functional safety

12.1 General information

12.1.1 Underlying standards

The safety assessment of the device is based on the following standards and safety classes:

Underlying standards	
Safety class/ underlying standard	• Performance level (PL) in accordance with ISO 13849-1:2015 • Safety Integrity Level (SIL) in accordance with IEC 61800-5-2:2016 • Safety Integrity Level Claim Limit (SILCL) in accordance with IEC 62061 2015

12.2 Integrated safety technology

The described safety technology of the device has been developed and tested in accordance with the following safety requirements:

- SIL 3 in accordance with IEC 61800-5-2:2016, IEC 61508:2010.
- PL e in accordance with ISO 13849-1:2015.

This was certified by TÜV Rheinland. Copies of the TÜV certificate and the corresponding report are available from SEW-EURODRIVE on request.

12.2.1 Safe condition

For safety-related operation of the device, Safe Torque Off is defined as safe state (see STO drive safety function). The safety concept is based on this definition.

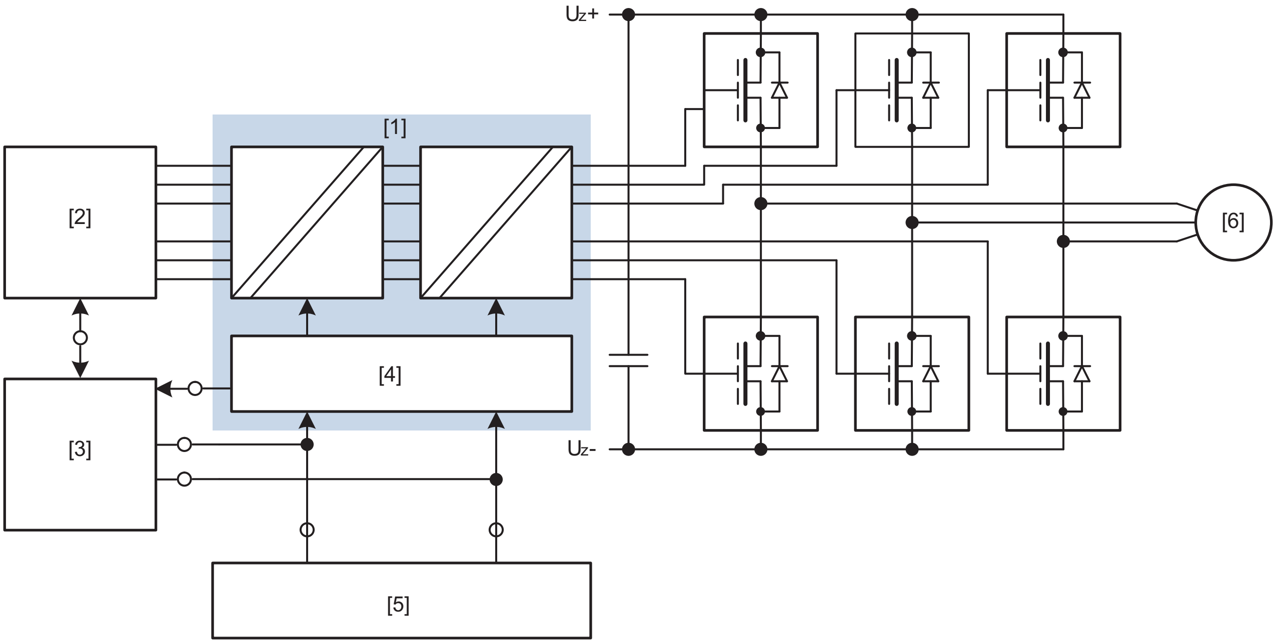
28487486/EN – 02/2019

12.2.2 Safety concept

The device is supposed to be able to perform the drive safety function "Safe Torque Off" in accordance with IEC 61800-5-2:

- Device is characterized by the optional connection of an external safety controller/ safety relay. This external safety controller/safety relay disconnects the safety-related STO input via a 2-pole 24 V switching signal (sourcing/sinking) when a connected command device (e.g. emergency stop button with latching function) is activated. This activates the STO function of the device. As an alternative to an external safety controller/safety relay, the STO function can also be implemented with the optional MOVISAFE® CS..A safety card.
- An internal, dual-channel structure with diagnostics prevents the generation of pulse trains at the power output stage (IGBT).
- Instead of a galvanic isolation of the drive from the supply system by means of contactors or switches, the disconnection of the STO input described here safely prevents the activation of the power semiconductors in the output stage. The rotary-field generation for the respective motor is deactivated even though the line voltage is still present.
- When the STO drive safety function is activated, the generated PWM signals from the device are interrupted by the STO circuit and not transmitted to the IGBTs.
- If the internal diagnostics of the STO circuit detects a discrepancy between the two channels, the PWM signals are locked, i.e. the STO is activated. This locking requires a reset by switching the DC 24 V supply voltage of the device or the DC 24 V switching signal at the STO inputs F_STO_P1 and F_STO_P2 off and on.

12.2.3 Schematic representation of the safety concept



23543720971

[1] STO function
[2] Drive controller
[3] Internal safety card/safety option (optional)
[4] Diagnostics and inhibiting unit
[5] External safety device (optional)
[6] Motor

28487486/EN – 02/2019

12.2.4 Drive safety functions

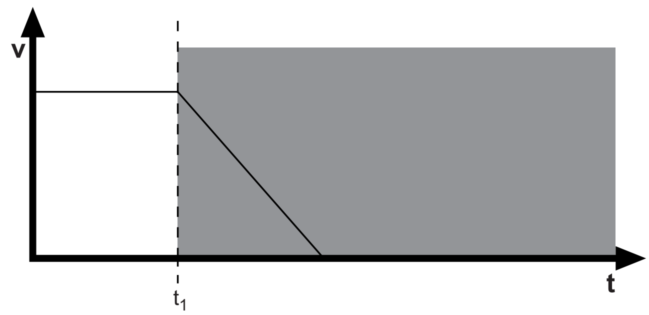
The following drive-related safety functions can be used:

- **STO** (Safe Torque Off in accordance with IEC 61800-5-2) by disconnecting the STO input.

  If the STO function is activated, the frequency inverter no longer supplies power to the motor for generating torque. This drive safety function corresponds to a non-controlled stop according to EN 60204-1, stop category 0.

  The STO input must be disabled by a suitable external safety controller/safety relay.

  The following figure shows the STO function:



2463228171

v	Speed
t	Time
t_1	Point of time when STO is triggered
	Disconnection range

- **SS1(c) (SS1-t)** (safe stop 1, function variant c in accordance with IEC 61800-5-2) by means of suitable external control (e.g. safety relay with delayed disconnection).

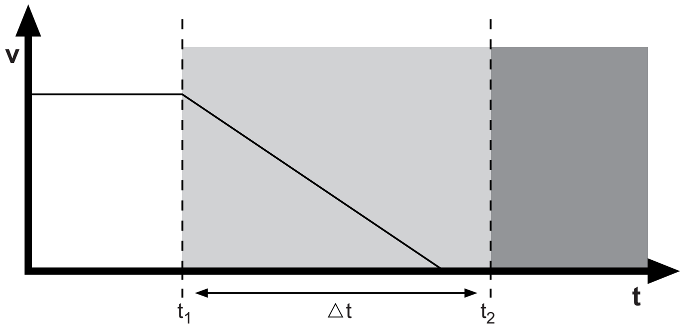
  The following sequence is mandatory:

  – Decelerate the drive using an appropriate brake ramp specified via setpoints.

  – Disconnect the STO input (= triggering the STO function) after a specified safety-related time delay.

  This drive safety function corresponds to a controlled stop in accordance with EN 60204-1, stop category 1.

  The following figure illustrates the SS1(c) (SS1-t) function:



2463226251

v	Speed
t	Time
t_1	Point of time when brake ramp is initiated
t_2	Point of time when STO is triggered
Δt	Delay time until STO is triggered
	Safe time delay range
	Disconnection range

28487486/EN – 02/2019

12.2.5 Restrictions

- Note that if the drive does not have a mechanical brake or if the brake is defective, the drive may coast to a halt (depending on the friction and mass moment of inertia of the system). In the event of regenerative loads or with axes that are loaded with gravitational forces or driven externally, the drive can even accelerate. This must be taken into account in a risk assessment of the system/machine. Additional safety measures might have to be implemented (e.g. safety brake system).

  In the case of application-related drive safety functions that require bringing the hazardous motion safely to a standstill, an additional safety brake system may be necessary on an application-specific basis.
- When using the function SS1(c) (SS1-t) as described in the chapter "Drive safety functions", the brake ramp of the drive is not monitored with respect to safety. In the event of a fault, deceleration may fail during the delay time or, in the worst-case scenario, there might be an acceleration. In this case, the STO function (see the chapter "Safety functions") is only activated after the set time delay elapsed. The resulting danger must be taken into account in the risk assessment of the system/machine. Additional safety measures might have to be implemented.
- The STO function cannot prevent a possible jerk or DC braking.

12

⚠ WARNING

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

When the STO signal is disconnected, the voltage is still present at the DC link of the device.

- Before working on the electric part of the drive system, disconnect it from the supply voltage using an appropriate external disconnecting device and secure it against unintentional reconnection.

⚠ WARNING

Electric shock due to incompletely discharged capacitors.

Severe or fatal injuries.

- Observe a minimum switch-off time of 10 minutes after disconnecting the power supply.

INFORMATION

In the event of a safety-related disconnection of the DC 24 V supply voltage at the STO connection, the brake controller is switched off. The brake control in the device is not safety-related.

28487486/EN – 02/2019

12.3 Safety conditions

The requirement for safe operation is that the drive safety functions of the application inverter are properly integrated into an application-specific, higher-level drive safety function. A system/machine-specific risk assessment must be carried out without fail by the system/machine manufacturer and taken into account for the use of the drive system with the device.

The system/machine manufacturer and the user are responsible for the compliance of the system/machine with the applicable safety regulations.

The following requirements are mandatory when installing and operating the device in safety-related applications:

- Use of the approved devices
- Installation requirements
- Requirements for external safety controllers and safety relays
- Startup requirements
- Operational requirements

12.3.1 Approved devices

The following device versions of MOVIDRIVE® system are permitted for safety-related applications:

Device	Size
MOVIDRIVE® system	All sizes

28487486/EN – 02/2019

12.3.2 Requirements for the installation

- The components must be protected against conductive dirt, e.g. by installing them in a control cabinet with degree of protection IP54 in accordance with IEC 60529.

  Assuming that the presence of conductive dirt can be excluded at the installation site, a control cabinet with a correspondingly lower degree of protection is also permitted if in accordance with the applicable standards (e.g. EN 60204-1).
- The wiring technology used must comply with the standard EN 60204-1.
- The STO control cables must be routed according to EMC guidelines and as follows:
  - Inside an electrical installation space: Single conductors can be routed.
  - Outside a closed installation space: Shielded cables must be routed permanently (fixed) and protected against external damage, or equivalent measures must be taken.
  - Adhere to the regulations in force for the application.
  - The sinking and sourcing cables from the external safety controller/safety relay to the device must be routed right next to each other with a cable length of ≤ 100 m.
  - The sinking and sourcing cables from the external safety device to the device must have the same cable length. A difference in length ≤ 3% of the two cables is permitted.
  - You must use suitable measures to ensure that STO control cables are routed separately from the power lines of the drive. This does not apply to cables approved by SEW-EURODRIVE specifically for this application case.
- The STO function does not detect short circuits or interference voltage in the supply line, so you must ensure the following:
  - No parasitic voltages can occur in the STO control cables
  - The external safety controller can detect a cross fault from an external potential to the STO control lines
- Observe without fail the values specified for safety components when designing the safety circuits.
- The STO signal (F_STO_P1, F_STO_P2, and F_STO_M) must not be used for feedback.
- For safety controller/safety relays, you must only use grounded voltage sources with protective electrical separation (PELV) in accordance with EN 61131-2 and EN 60204-1.
- If several voltage sources are used, each voltage source must be connected to a PE system.
- When planning the installation, observe the technical data of the devices.
- Do not use the port X6:5 (24 V_Out) of the device for safety-related applications. The voltage is only permitted to supply the port for the safe disconnection X6 when a jumper plug is plugged.
- For safety-related applications with the device, the jumper plug at the STO input X6 must be removed.

28487486/EN – 02/2019

12.3.3 Requirements for external safety controllers

A safety relay can be used as an alternative to a safety controller. The following requirements apply analogously.

- The safety controller and all other safety-related subsystems must be approved for at least that safety class which is required in the overall system for the respective, application-related drive safety function.

  The following table shows an example of the required safety class of the safety controller:

Application	Safety controller requirements
Performance level d in accordance with ISO 13849-1, SIL 2 in accordance with EN 62061	Performance level d in accordance with ISO 13849-1 SIL 2 in accordance with IEC 61508
Performance level e in accordance with ISO 13849-1, SIL 3 in accordance with EN 62061	Performance level e in accordance with ISO 13849-1, SIL 3 in accordance with EN 61508

- The wiring of the safety controller must be suitable for the required safety class (see manufacturer documentation). The STO input of the device can be switched with 2 poles (sourcing or sourcing/sinking) or with 1 pole (sourcing).
- The values specified for the safety controller must be strictly adhered to when designing the circuit.
- No electro-sensitive protective equipment (such as a light grid or scanner) in accordance with EN 61496-1 or emergency stop buttons may be connected directly to the STO input. The connection must be made via a safety controller or a safety relay.
- To ensure protection against an unintended startup in accordance with EN ISO 14118, the safe control system must be designed and connected in such a way that resetting the command device alone does not lead to a restart. This means that a restart may be carried out only after a manual reset of the safety circuit.
- If no fault exclusion is used for the STO wiring in accordance with ISO 13849-2 or IEC 61800-5-2, the external safety device must detect the following faults in the STO wiring within 20 s depending on the connection type:
  - 2-pole sourcing output:

    Short circuit of 24 V at F_STO_P1 or F_STO_P2 (Stuck-at 1)

    Crossfault between F_STO_P1 and F_STO_P2
  - 2-pole sourcing/sinking:

    Short circuit of 24 V at F_STO_P1 (Stuck-at 1)

    Short circuit of 0 V at F_STO_M (Stuck-at 0)
  - 1-pole sourcing output:

    In the case of a single-pole connection, a fault exclusion is necessary for the wiring between the safety relay and the STO input.

2-pole sourcing output:

- Test pulses can be present when the device is switched on or off:
  - The test pulses on both sourcing channels must be switched with a time delay. However, additional test pulses may occur simultaneously.
  - The test pulses in both sourcing channels must not exceed 1 ms.

28487486/EN – 02/2019

- The next test pulse in one sourcing channel must occur only after a 2 ms time period.
- A maximum package of 3 switch-on test pulses may be generated in sequence at an interval of 2 ms. Wait for at least 500 ms after any package before you generate another switch-on test pulse or another switch-on test pulse package.
- The test pulses must be monitored in the safety device. If a fault is detected, the safety device must initiate a suitable fault response.

2-pole sourcing/sinking:

- Test pulses can be present when the device is switched on or off:
  - The test pulses in the sourcing and sinking channel must not exceed 1 ms.
  - The next test pulse in the sourcing or sinking channel must only occur after a 2 ms time period at the earliest.
  - A maximum package of 3 switch-on test pulses may be generated in sequence at an interval of 2 ms. Wait for at least 500 ms after any package before you generate another switch-on test pulse or another switch-on test pulse package.
  - The test pulses must be monitored in the safety device. If a fault is detected, the safety device must initiate a suitable fault response.

1-pole sourcing output:

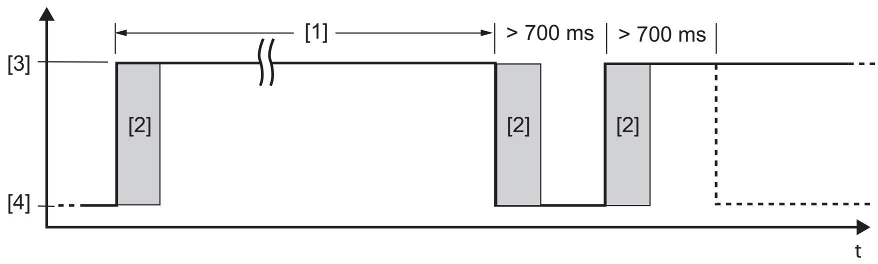
- In switched-off state, no switch-on test pulses must occur in the sourcing cable.
- In switched-on state:
  - The switch-off test pulse in the sourcing channel must not exceed 1 ms.
  - The next switch-off test pulse may only occur after a time period of 2 ms at the earliest.
  - A maximum package of 3 switch-on test pulses may be generated in sequence at an interval of 2 ms. Wait for at least 500 ms after any package before you generate another switch-on test pulse or another switch-on test pulse package.
  - The test pulses must be monitored in the safety device. If a fault is detected, the safety device must initiate a suitable fault response.

12.3.4 Requirements for startup

- To validate the implemented drive safety functions, they must be checked and documented after successful startup (functional test).
- Observe the restrictions for drive safety functions in the chapter "Restrictions". Non-safety-related parts and components that affect the result of the functional test (e.g. motor brake) must be deactivated, if necessary.
- For using the device in safety-relevant applications, it is essential that you perform and document startup checks for the disconnecting device and the correct electrical connection.

12.3.5 Requirements for operation

- Operation is permitted only within the limits specified in the corresponding documentation. This principle applies to the external safety controller as well as to the device and any approved options.
- The built-in diagnostic function is limited in the case of a permanently enabled or permanently disabled STO input. Advanced diagnostic functions are performed only upon a level change of the STO signal. This is why the STO input of the device must be requested with connected line voltage at least once every 12 months for PL d in accordance with ISO 13849-1 and SIL 2 IEC 61800-5-2 and at least once every 3 months for PL e in accordance with ISO 13849-1 and SIL 3 IEC 61800-5-2 to achieve complete test coverage. Adhere to the following test procedure.



15205932683

[1] Maximum 12 months with PL d/SIL 2
Maximum 3 months with PL e/SIL 3
[2] Internal diagnostics
[3] High: No STO
[4] Low: STO active

- To achieve complete test coverage after a device reset (e.g. after connecting the line voltage), the state transition (STO active → not active) can be started only > 700 ms later. The device signals "ready for operation" or "STO – Safe Torque Off" if it is not in fault state.
- A detected hardware fault in the internal switch-off channels for STO will lead to a locking fault state in the device. If the fault is reset (e.g. by switching the line voltage on/off or by a low level at the STO input for at least 30 ms), a complete test with internal diagnostics according to the abovementioned test procedure must be performed. If the fault occurs again, replace the device or contact SEW-EURODRIVE Service.

28487486/EN – 02/2019

12.4 Connection designs

12.4.1 General information

Generally, all the connection designs listed in this documentation are permitted for safety-relevant applications, insofar as the safety conditions arising from this documentation are satisfied. This means that you must ensure without fail that the DC 24 V safety inputs are activated by a safety controller or an external safety relay, so that an independent restart is not possible.

All the safety conditions stipulated in the chapters "Integrated safety technology", "Safety conditions", and "Connection variants" must be satisfied on a primary basis for the basic selection, installation, and application of the safety components, such as safety relay, emergency stop switch, and the approved connection variants.

The wiring diagrams are block diagrams whose only purpose is to show the drive safety function(s) with the relevant components. For reasons of clarity, circuit-related measures that usually always have to be implemented are not shown in the diagram. These measures are e.g.:

- Ensuring the availability of touch guards.
- Handling overvoltages and undervoltages.
- Avoiding installation errors.
- Detecting ground faults or short circuits in externally installed lines.
- Guaranteeing the required interference immunity against electromagnetic interference.

12.4.2 Requirements

Use of safety relays

The requirements of the manufacturers of safety relays (such as protecting the output contacts against welding) or of other safety components must be strictly observed. The basic requirements for cable routing apply as described in this documentation.

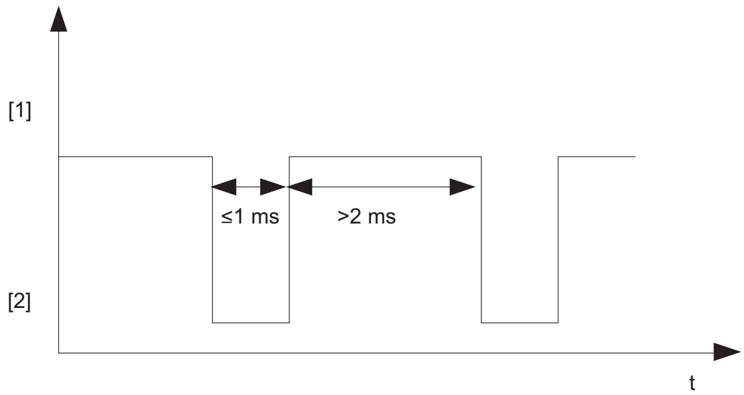
For connecting the device to the safety relays, observe the installation requirements in accordance with the chapter "Installation requirements".

All instructions by the manufacturer of the safety relay used in the particular application must be observed.

28487486/EN – 02/2019

Use of safety controllers

The switch-off test pulse of the used safe digital outputs (F-DO) must be ≤ 1 ms and another switch-off test pulse must only occur 2 ms later at the earliest.



15214338827

[1] High
[2] Low

INFORMATION

If the safety-related control voltage at X6 is switched off (STO activated), you must observe the chapter "Requirements for the external safety controller" with regard to the test pulses.

INFORMATION

If F_STO_P1, F_STO_P2 are connected to DC 24 V, and F_STO_M is connected to GND, STO is deactivated.

STO signal for group disconnection

For group drives, the STO signal may be provided for several devices by a single safety relay. The following requirements must be met:

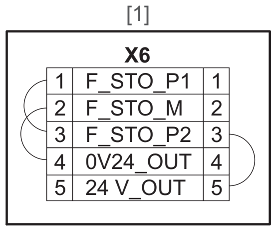
- The total cable length is limited to max. 100 m. Any other instructions published by the manufacturer on the use of the safety device (for the respective application) must also be observed.
- The maximum output current and the maximally permitted contact load of the safety device must be observed (see the chapter "Technical data" > "Electronic data – Drive safety functions").
- You must comply with the permitted signal levels at the STO input and all other technical data of the device. The respective routing of the STO control cables and the voltage drop must be considered.
- Other requirements of the safety device manufacturer (such as protecting the output contacts against welding) must be strictly observed. The basic requirements for cable routing also apply.
- A calculation based on the technical data of the device must be performed separately for each case of group drive disconnection.
- A maximum of 20 devices may be used in a group disconnection.

28487486/EN – 02/2019

12.4.3 Wiring diagrams

Delivery state

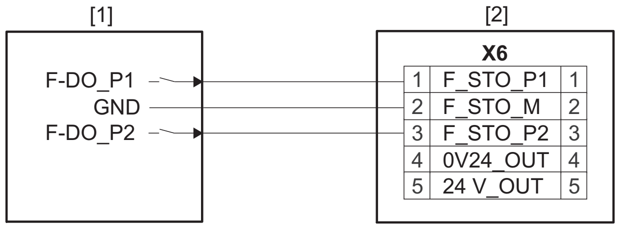
In the delivery state, the terminals at the port for safe disconnection X6 are jumpered.



27743538443

[1] STO terminal X6

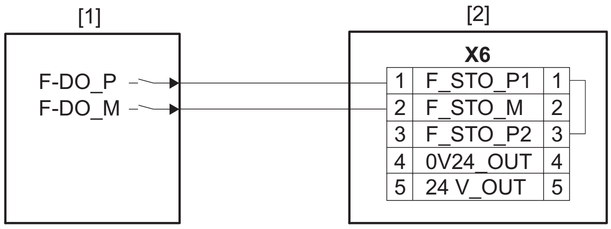
2-pole sourcing



27743543947

[1] External safety device
[2] STO terminal X6

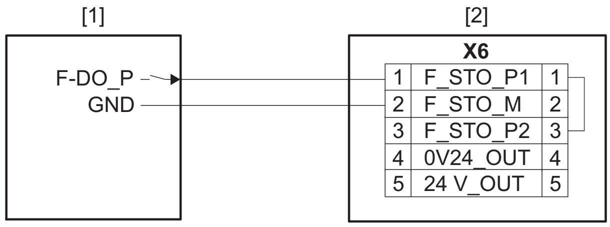
2-pole sourcing/sinking



27743625995

[1] External safety device
[2] STO terminal X6

1-pole sourcing

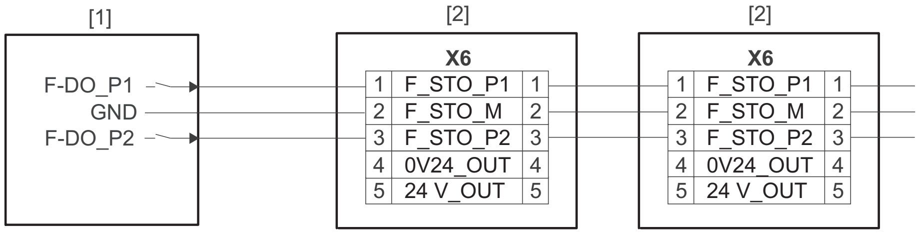


27743633163

[1] External safety device
[2] STO terminal X6

28487486/EN – 02/2019

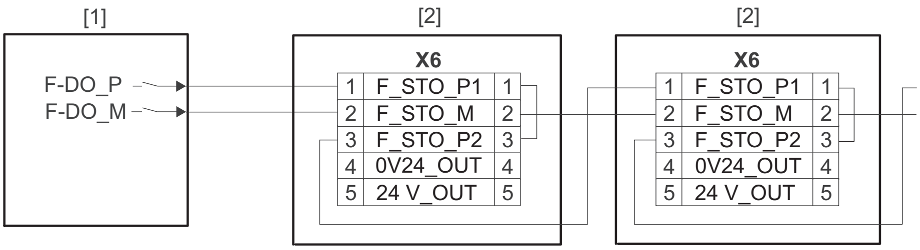
STO group disconnection, 2-pole, sourcing



27739017995

[1] External safety controller
[2] STO terminal X6

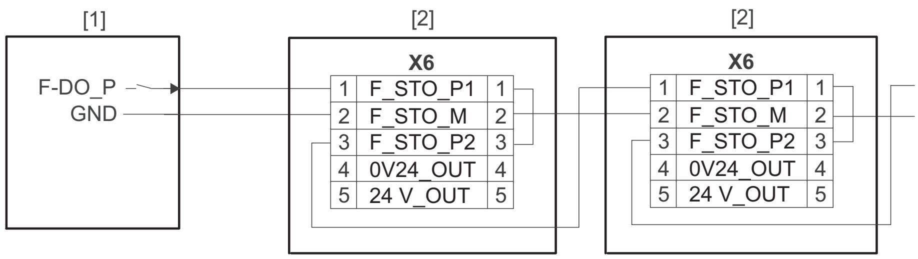
STO group disconnection, 2-pole, sourcing/sinking



27739021579

[1] External safety controller
[2] STO terminal X6

STO group disconnection, 1-pole, sourcing

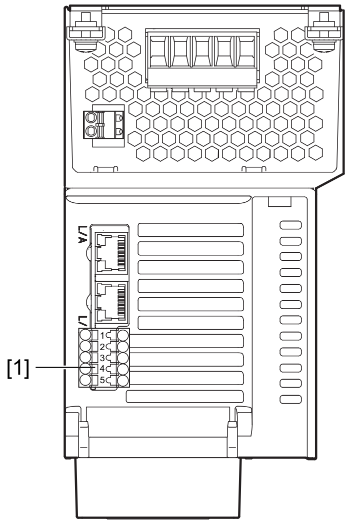


27738973707

[1] External safety controller
[2] STO terminal X6

12.4.4 Port X6 on the device

The following figure shows the X6 port on the top of the device.



17915451659

[1] X6: Connection for Safe Torque Off (STO)

12.5 Safety characteristics

	Characteristic values in accordance with	
	IEC 61800-5-2	**ISO 13849-1**
Tested safety class/underlying standards	Safety integrity level 3	Performance level e / category 3
Probability of a dangerous failure per hour (PFH value)	2.5×10^{-9} h-1	
Service life	20 years, after which the component must be replaced with a new one.	
Proof test interval	> 20 years	–
Safe state	Safe Torque Off (STO)	
Drive safety function	STO, SS1[1)] in accordance with IEC 61800-5-2	

1) With suitable external control

INFORMATION

In the case of 1-pole wiring, the achievable performance level in accordance with ISO 13849-1 is reduced to PL d, and the achievable Safety Integrity Level in accordance with IEC 61800-5-2 is reduced to SIL 2. A fault exclusion is necessary for the wiring between the safety relay and the STO input.

28487486/EN – 02/2019

13 Appendix

13.1 Abbreviation key

The following table lists the abbreviations that are used in this document together with their unit and meaning.

Abbreviation	Information on the nameplate	Unit	Meaning
ASM			Asynchronous motor
C	C	µF	Capacitance
f_{max}	f	Hz	Maximum output frequency
f_{line}	f	Hz	Line frequency
f_{PWM}		kHz	Frequency of the pulse width modulation
h		m	Installation altitude
I_{trip}		A	Tripping current (braking resistor)
I_{max}	Imax	A	Max. DC link current (specification on the nameplate)
I_{max}		A	Maximum output current (encoder cards)
I_{peak}		A	Output peak current (encoder cards)
$I_{A\ max}$		A	Max. output current
I_{Appl}		A	Total current of the application
I_N		A	Nominal output current/nominal current (filter, choke)
I_{line}	I	A	Nominal line current
I_{NDCL}	I	A	Nominal DC link current
L_N		mH	Inductance
LSPM			Line Start Permanent Magnet
P_{eff}		kW	Effective power (braking resistor)
P_{max}		kW	Maximum power (braking resistor)
P_{Mot}	P(ASM)	kW	Motor power of the asynchronous motor
P_N		kW	Nominal motor power (rated power)
P_V		W	Power loss
PWM			Pulse width modulation
R_{BR}		Ω	Value of the braking resistance
R_{BRmin}		Ω	Minimum value of the braking resistance
S_N	S	kVA	Apparent output power
SM			Synchronous motor
U_A	U	V	Motor output voltage
U_{BR}		V	Brake supply voltage
U_N		V	Nominal line voltage (filter, choke)
U_{line}	U	V	Connection voltage
U_{NDCL}	U	V	Nominal DC link voltage

Abbreviation	Information on the nameplate	Unit	Meaning
U_{out}		V	DC 24 V to supply STO_P1 and STO_P2
U_S		V	Supply voltage of encoders
U_{S12VG}		V	DC 12 V supply voltage of encoders
U_{S24VG}		V	DC 24 V supply voltage of encoders
U_{I24}		V	Voltage supply for electronics and brake
ϑ_{amb}	T	°C	Ambient temperature
(+ES)			... with output stage inhibit

28487486/EN – 02/2019

Index

U

V

W

14 Address list

Argentina			
Assembly Sales	Buenos Aires	SEW EURODRIVE ARGENTINA S.A. Ruta Panamericana Km 37.5, Lote 35 (B1619IEA) Centro Industrial Garín Prov. de Buenos Aires	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 http://www.sew-eurodrive.com.ar sewar@sew-eurodrive.com.ar
Australia			
Assembly Sales Service	Melbourne	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
Austria			
Assembly Sales Service	Vienna	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Straße 24 1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://www.sew-eurodrive.at sew@sew-eurodrive.at
Bangladesh			
Sales	Bangladesh	SEW-EURODRIVE INDIA PRIVATE LIMITED 345 DIT Road East Rampura Dhaka-1219, Bangladesh	Tel. +88 01729 097309 salesdhaka@seweurodrivebangladesh.com
Belarus			
Sales	Minsk	Foreign unitary production enterprise SEW-EURODRIVE RybalkoStr. 26 220033 Minsk	Tel. +375 17 298 47 56 / 298 47 58 Fax +375 17 298 47 54 http://www.sew.by sales@sew.by
Belgium			
Assembly Sales Service	Brussels	SEW-EURODRIVE n.v./s.a. Researchpark Haasrode 1060 Evenementenlaan 7 3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be
Service Competence Center	Industrial Gears	SEW-EURODRIVE n.v./s.a. Rue du Parc Industriel, 31 6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-IG@sew-eurodrive.be
Brazil			
Production Sales Service	São Paulo	SEW-EURODRIVE Brasil Ltda. Estrada Municipal José Rubim, 205 – Rodovia Santos Dumont Km 49 Indaiatuba – 13347-510 – SP	Tel. +55 19 3835-8000 sew@sew.com.br
Assembly Sales Service	Rio Claro	SEW-EURODRIVE Brasil Ltda. Rodovia Washington Luiz, Km 172 Condomínio Industrial Conpark Caixa Postal: 327 13501-600 – Rio Claro / SP	Tel. +55 19 3522-3100 Fax +55 19 3524-6653 montadora.rc@sew.com.br
	Joinville	SEW-EURODRIVE Brasil Ltda. Jvl / Ind Rua Dona Francisca, 12.346 – Pirabeiraba 89239-270 – Joinville / SC	Tel. +55 47 3027-6886 Fax +55 47 3027-6888 filial.sc@sew.com.br
Bulgaria			
Sales	Sofia	BEVER-DRIVE GmbH Bogdanovetz Str.1 1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@bever.bg

28487486/EN – 02/2019

Cameroon			
Sales	Douala	SEW-EURODRIVE S.A.R.L. Ancienne Route Bonabéri P.O. Box B.P 8674 Douala-Cameroun	Tel. +237 233 39 02 10 Fax +237 233 39 02 10 sew@sew-eurodrive-cm
Canada			
Assembly Sales Service	Toronto	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, ON L6T 3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.watson@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. Tilbury Industrial Park 7188 Honeyman Street Delta, BC V4G 1G1	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2001 Ch. de l'Aviation Dorval Quebec H9P 2X6	Tel. +1 514 367-1124 Fax +1 514 367-3677 n.paradis@sew-eurodrive.ca
Chile			
Assembly Sales Service	Santiago de Chile	SEW-EURODRIVE CHILE LTDA Las Encinas 1295 Parque Industrial Valle Grande LAMPA Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 2757 7000 Fax +56 2 2757 7001 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl
China			
Production Assembly Sales Service	Tianjin	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 78, 13th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 http://www.sew-eurodrive.cn info@sew-eurodrive.cn
Assembly Sales Service	Suzhou	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267922 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Develop-ment Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Taiyuan	SEW-EURODRIVE (Taiyuan) Co,. Ltd. No.3, HuaZhang Street, TaiYuan Economic & Technical Development Zone ShanXi, 030032	Tel. +86-351-7117520 Fax +86-351-7117522 taiyuan@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478388 Fax +86 27 84478389 wuhan@sew-eurodrive.cn
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 xian@sew-eurodrive.cn
Sales Service	Hong Kong	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk

28487486/EN – 02/2019

Colombia			
Assembly Sales Service	Bogota	SEW-EURODRIVE COLOMBIA LTDA. Calle 17 No. 132-18 Interior 2 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sew@sew-eurodrive.com.co
Croatia			
Sales Service	Zagreb	KOMPEKS d. o. o. Zeleni dol 10 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr
Czech Republic			
Assembly Sales Service	Hostivice	SEW-EURODRIVE CZ s.r.o. Floriánova 2459 253 01 Hostivice	Tel. +420 255 709 601 Fax +420 235 350 613 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz
	Drive Service Hotline / 24 Hour Service	+420 800 739 739 (800 SEW SEW)	Service Tel. +420 255 709 632 Fax +420 235 358 218 servis@sew-eurodrive.cz
Denmark			
Assembly Sales Service	Copenhagen	SEW-EURODRIVEA/S Geminivej 28-30 2670 Greve	Tel. +45 43 95 8500 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk
Egypt			
Sales Service	Cairo	Copam Egypt for Engineering & Agencies Building 10, Block 13005, First Industrial Zone, Obour City Cairo	Tel. +202 44812673 / 79 (7 lines) Fax +202 44812685 http://www.copam-egypt.com copam@copam-egypt.com
Estonia			
Sales	Tallin	ALAS-KUUL AS Reti tee 4 75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 http://www.alas-kuul.ee veiko.soots@alas-kuul.ee
Finland			
Assembly Sales Service	Hollola	SEW-EURODRIVE OY Vesimäentie 4 15860 Hollola	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Service	Hollola	SEW-EURODRIVE OY Keskikankaantie 21 15860 Hollola	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
	Tornio	SEW-EURODRIVE Oy Lossirannankatu 5 95420 Tornio	Tel. +358 201 589 300 Fax +358 3 780 6211 http://www.sew-eurodrive.fi sew@sew.fi
Production Assembly	Karkkila	SEW Industrial Gears Oy Santasalonkatu 6, PL 8 03620 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 http://www.sew-eurodrive.fi sew@sew.fi
France			
Production Sales Service	Hagenau	SEW-USOCOME 48-54 route de Soufflenheim B. P. 20185 67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Production	Forbach	SEW-USOCOME Zone industrielle Technopôle Forbach Sud B. P. 30269 57604 Forbach Cedex	Tel. +33 3 87 29 38 00
	Brumath	SEW-USOCOME 1 Rue de Bruxelles 67670 Mommenheim Cedex	Tel. +33 3 88 37 48 00

France			
Assembly Sales Service	Bordeaux	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan – B. P. 182 33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME 75 rue Antoine Condorcet 38090 Vaulx-Milieu	Tel. +33 4 74 99 60 00 Fax +33 4 74 99 60 15
	Nantes	SEW-USOCOME Parc d’activités de la forêt 4 rue des Fontenelles 44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20
	Paris	SEW-USOCOME Zone industrielle 2 rue Denis Papin 77390 Verneuil I'Étang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
Gabon			
Sales	Libreville	SEW-EURODRIVE SARL 183, Rue 5.033.C, Lalala à droite P.O. Box 15682 Libreville	Tel. +241 03 28 81 55 +241 06 54 81 33 http://www.sew-eurodrive.cm sew@sew-eurodrive.cm
Germany			
Headquarters Production Sales	Bruchsal	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 76646 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Production / Industrial Gears	Bruchsal	SEW-EURODRIVE GmbH & Co KG Christian-Pähr-Str. 10 76646 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-2970
Production	Graben	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 76676 Graben-Neudorf	Tel. +49 7251 75-0 Fax +49 7251-2970
	Östringen	SEW-EURODRIVE GmbH & Co KG, Werk Östringen Franz-Gurk-Straße 2 76684 Östringen	Tel. +49 7253 9254-0 Fax +49 7253 9254-90 oestringen@sew-eurodrive.de
Service Competence Center	Mechanics / Mechatronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 scc-mechanik@sew-eurodrive.de
	Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 scc-elektronik@sew-eurodrive.de
Drive Technology Center	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 30823 Garbsen (Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 dtc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 08393 Meerane (Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 dtc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 85551 Kirchheim (München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 dtc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 40764 Langenfeld (Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 dtc-west@sew-eurodrive.de
Drive Center	Berlin	SEW-EURODRIVE GmbH & Co KG Alexander-Meißner-Straße 44 12526 Berlin	Tel. +49 306331131-30 Fax +49 306331131-36 dc-berlin@sew-eurodrive.de
	Ludwigshafen	SEW-EURODRIVE GmbH & Co KG c/o BASF SE Gebäude W130 Raum 101 67056 Ludwigshafen	Tel. +49 7251 75 3759 Fax +49 7251 75 503759 dc-ludwigshafen@sew-eurodrive.de
	Saarland	SEW-EURODRIVE GmbH & Co KG Gottlieb-Daimler-Straße 4 66773 Schwalbach Saar – Hülzweiler	Tel. +49 6831 48946 10 Fax +49 6831 48946 13 dc-saarland@sew-eurodrive.de

Germany			
	Ulm	SEW-EURODRIVE GmbH & Co KG Dieselstraße 18 89160 Dornstadt	Tel. +49 7348 9885-0 Fax +49 7348 9885-90 dc-ulm@sew-eurodrive.de
	Würzburg	SEW-EURODRIVE GmbH & Co KG Nürnbergerstraße 118 97076 Würzburg-Lengfeld	Tel. +49 931 27886-60 Fax +49 931 27886-66 dc-wuerzburg@sew-eurodrive.de
Drive Service Hotline / 24 Hour Service			0 800 SEWHELP 0 800 7394357
Great Britain			
Assembly Sales Service	Normanton	SEW-EURODRIVE Ltd. DeVilliers Way Trident Park Normanton West Yorkshire WF6 1GX	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
	Drive Service Hotline / 24 Hour Service		Tel. 01924 896911
Greece			
Sales	Athens	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr
Hungary			
Sales Service	Budapest	SEW-EURODRIVE Kft. Csillaghegyí út 13. 1037 Budapest	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 http://www.sew-eurodrive.hu office@sew-eurodrive.hu
Iceland			
Sales	Reykjavik	Varma & Vélaverk ehf. Knarrarvogi 4 104 Reykjavík	Tel. +354 585 1070 Fax +354 585)1071 http://www.varmaverk.is vov@vov.is
India			
Registered Office Assembly Sales Service	Vadodara	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200 Fax +91 265 3045300 http://www.seweurodriveindia.com salesvadodara@seweurodriveindia.com
Assembly Sales Service	Chennai	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 saleschennai@seweurodriveindia.com
	Pune	SEW-EURODRIVE India Private Limited Plant: Plot No. D236/1, Chakan Industrial Area Phase- II, Warale, Tal- Khed, Pune-410501, Maharashtra	Tel. +91 21 35 628700 Fax +91 21 35 628715 salespune@seweurodriveindia.com
Sales Service	Gurgaon	SEW-EURODRIVE India Private Limited Drive Center Gurugram Plot no 395, Phase-IV, UdyogVihar Gurugram , 122016 Haryana	Tel. +91 99588 78855 salesgurgaon@seweurodriveindia.com
Indonesia			
Sales	Medan	PT. Serumpun Indah Lestari Jl.Pulau Solor no. 8, Kawasan Industri Medan II Medan 20252	Tel. +62 61 687 1221 Fax +62 61 6871429 / +62 61 6871458 / +62 61 30008041 sil@serumpunindah.com serumpunindah@yahoo.com http://www.serumpunindah.com
	Jakarta	PT. Cahaya Sukses Abadi Komplek Rukan Puri Mutiara Blok A no 99, Sunter Jakarta 14350	Tel. +62 21 65310599 Fax +62 21 65310600 csajkt@cbn.net.id

28487486/EN – 02/2019

Indonesia			
	Jakarta	PT. Agrindo Putra Lestari JL.Pantai Indah Selatan, Komplek Sentra Industri Terpadu, Pantai indah Kapuk Tahap III, Blok E No. 27 Jakarta 14470	Tel. +62 21 2921-8899 Fax +62 21 2921-8988 aplindo@indosat.net.id http://www.aplindo.com
	Surabaya	PT. TRIAGRI JAYA ABADI Jl. Sukosemolo No. 63, Galaxi Bumi Permai G6 No. 11 Surabaya 60111	Tel. +62 31 5990128 Fax +62 31 5962666 sales@triagri.co.id http://www.triagri.co.id
	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
Ireland			
Sales Service	Dublin	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 http://www.alperton.ie info@alperton.ie
Israel			
Sales	Tel Aviv	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il
Italy			
Assembly Sales Service	Milan	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 20020 Solaro (Milano)	Tel. +39 02 96 980229 Fax +39 02 96 980 999 http://www.sew-eurodrive.it milano@sew-eurodrive.it
Ivory Coast			
Sales	Abidjan	SEW-EURODRIVE SARL Ivory Coast Rue des Pêcheurs, Zone 3 26 BP 916 Abidjan 26	Tel. +225 21 21 81 05 Fax +225 21 25 30 47 info@sew-eurodrive.ci http://www.sew-eurodrive.ci
Japan			
Assembly Sales Service	Iwata	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp hamamatsu@sew-eurodrive.co.jp
Kazakhstan			
Sales Service	Almaty	SEW-EURODRIVE LLP 291-291A, Tole bi street 050031, Almaty	Tel. +7 (727) 350 5156 Fax +7 (727) 350 5156 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz
	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
	Ulaanbaatar	IM Trading LLC Olympic street 28B/3 Sukhbaatar district, Ulaanbaatar 14230	Tel. +976-77109997 Fax +976-77109997 imt@imt.mn
Latvia			
Sales	Riga	SIA Alas-Kuul Katlakalna 11C 1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.lv info@alas-kuul.com

Lebanon			
Sales (Lebanon)	Beirut	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
Sales (Jordan, Kuwait , Saudi Arabia, Syria)	Beirut	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 http://www.medrives.com info@medrives.com
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
Mexico			
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 Olympic street 28B/3 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 SUPPLIES CC 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

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. UI. 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
	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

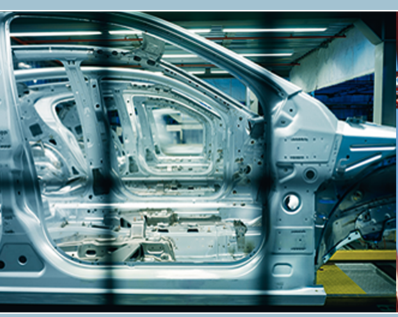
28487486/EN – 02/2019

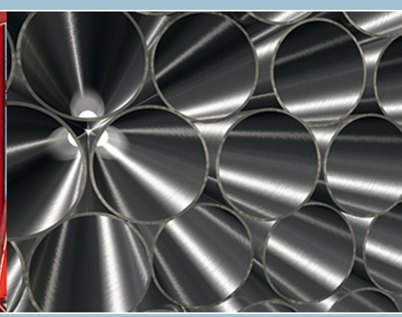
Spain			
Assembly Sales Service	Bilbao	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Sri Lanka			
Sales	Colombo	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981
Swaziland			
Sales	Manzini	C G Trading Co. (Pty) Ltd Simunye street Matsapha, Manzini	Tel. +268 7602 0790 Fax +268 2 518 5033 charles@cgtrading.co.sz www.cgtradingswaziland.com
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	SEW-EURODRIVE, LLC Robochya str., bld. 23-B, office 409 49008 Dnipro	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

28487486/EN – 02/2019

United Arab Emirates			
Drive Technology Center	Dubai	SEW-EURODRIVE FZE PO Box 263835 Jebel Ali Free Zone – South, P.O. Box Dubai, United Arab Emirates	Tel. +971 (0)4 8806461 Fax +971 (0)4 8806464 info@sew-eurodrive.ae
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	Tel. +1 864 439-7537 Fax +1 864 661 1167 IGOrders@seweurodrive.com
	Additional addresses for service provided on request!		
Vietnam			
Sales	Ho Chi Minh City	SEW-EURODRIVE PTE. LTD. RO at Hochiminh City Floor 8, KV I, Loyal building, 151-151 Bis Vo Thi Sau street, ward 6, District 3, Ho Chi Minh City, Vietnam	Tel. +84 937 299 700 huytam.phan@sew-eurodrive.com
	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
Zambia			
Representation: South Africa			

28487486/EN – 02/2019






SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Str. 42
76646 BRUCHSAL
GERMANY
Tel. +49 7251 75-0
Fax +49 7251 75-1970
sew@sew-eurodrive.com
→ www.sew-eurodrive.com