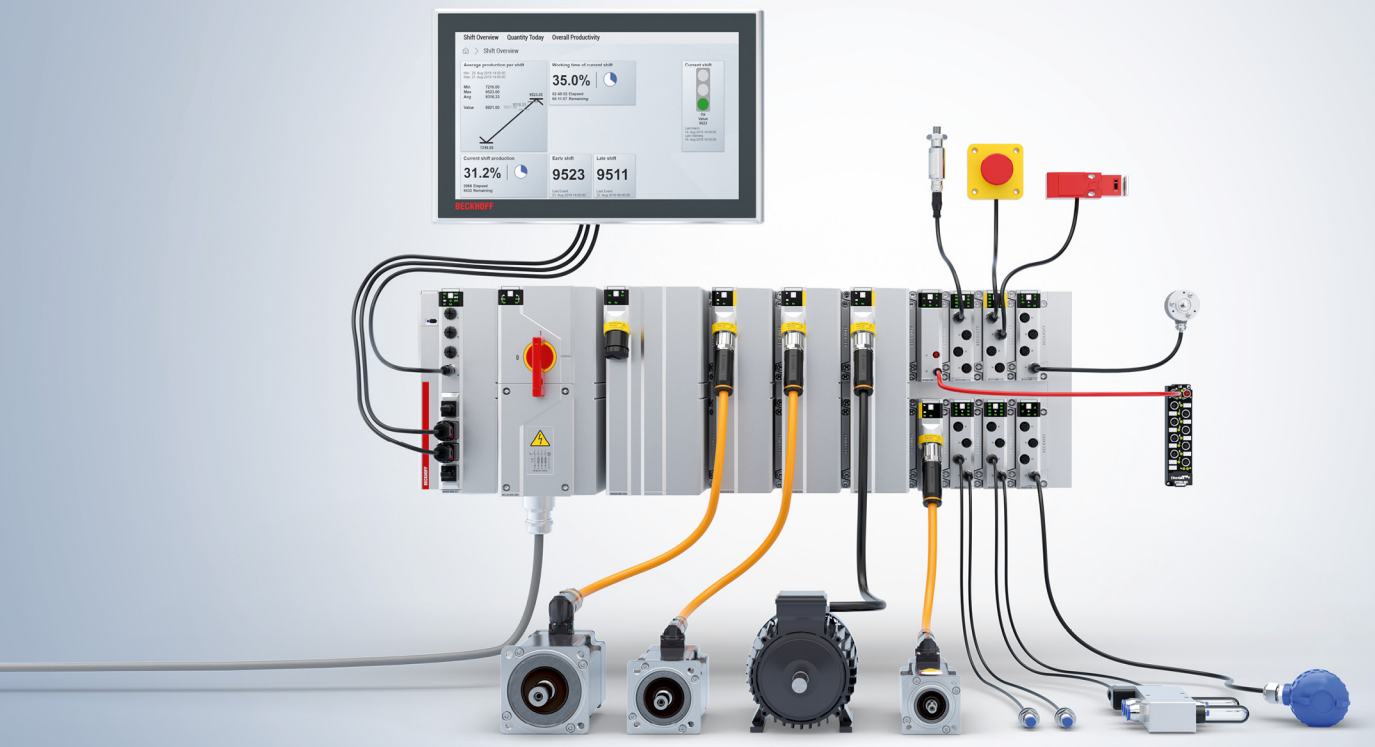
BECKHOFF New Automation Technology

Manual | EN

MD8206-0200-2254

2-channel servo drive, 600 V DC/6 A, OCT, Safe Motion, B17



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1 Foreword

1.1 Notes on the documentation

This description is intended exclusively for trained specialists in control and automation technology who are familiar with the applicable national standards.
The documentation and the following notes and explanations must be complied with when installing and commissioning the components.
The trained specialists must always use the current valid documentation.

The trained specialists must ensure that the application and use of the products described is in line with all safety requirements, including all relevant laws, regulations, guidelines, and standards.

Disclaimer

The documentation has been compiled with care. The products described are, however, constantly under development.
We reserve the right to revise and change the documentation at any time and without notice.
Claims to modify products that have already been supplied may not be made on the basis of the data, diagrams, and descriptions in this documentation.

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1.2 For your safety

Safety regulations

Read the following explanations for your safety.
Always observe and follow product-specific safety instructions, which you may find at the appropriate places in this document.

Exclusion of liability

All the components are supplied in particular hardware and software configurations which are appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation, and drive technology who are familiar with the applicable national standards.

Signal words

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

Personal injury warnings

⚠ DANGER
Hazard with high risk of death or serious injury.

⚠ WARNING
Hazard with medium risk of death or serious injury.

⚠ CAUTION
There is a low-risk hazard that could result in medium or minor injury.

Warning of damage to property or environment

NOTICE
The environment, equipment, or data may be damaged.

Information on handling the product

This information includes, for example:
recommendations for action, assistance or further information on the product.

1.3 Intended use

The module may only be installed on the mounted baseplate in electrical systems or machines and may only be put into operation as an integrated component of the system or machine. Single use of the module is not permitted.

The module is part of a multi-axis system whose DC link is fed by an MD6xxx DC link module. Only use the module in combination with an MD6xxx DC link power supply module or other suitable components of the MX-System. No other way of creating the DC link is permitted.

The servo drives of the MD8xxx series may only be operated for the purposes as defined in this documentation and under the specified environmental conditions.

Read the entire drive system documentation:

- These operating instructions
- The operating instructions for the MX8911 – TwinSAFE drive option card for MD8206 servo amplifier with Safe Motion
- The operating instructions for the accessories used
- All relevant system documentation for the MX-System
- The machine manufacturer's complete documentation for the machine

Intended use of an MX-System

Application in machines and systems in industrial environments and exclusively inside buildings.

The electrical wiring must be permanent wiring.

Improper use

Improper use is not permitted and will result in the exclusion of liability on the part of Beckhoff Automation GmbH & Co. KG.

1.3.1 Improper use

Any type of use that exceeds the permissible values from the technical data is regarded as inappropriate and is thus prohibited.

The modules are not suitable for use in the following areas:

- Operation as a single device without integration into an overall MX system
- Operation on a DC link that was not generated via a product from the MX-System
- ATEX zones without suitable housing
- Areas with aggressive environments, for example aggressive gases or chemicals

The relevant standards and directives for EMC interference emissions must be complied with in residential areas.

1.4 Safety instructions

1.4.1 Before operation

Protective equipment

Do not remove or bypass any protective devices. Check all protective devices before operation. Make sure that all emergency switches are present at all times and can be reached by you and other people. People could be seriously or fatally injured by unprotected machine parts.

Observe tightening torques

Mount and repeatedly check connections and components, complying with the prescribed tightening torques.

Correctly ground electrical components or modules

Prevent electric shocks due to incorrect grounding of electrical components or modules. Ground all conductive components according to the specifications in the chapter Electrical installation [▶ 29].

Keep the immediate environment clean

Keep your workplace and the surrounding area clean. Ensure safe working.

Shut down and secure the machine or plant

Shut down the machine or plant. Secure the machine or plant against being inadvertently started up.

1.4.2 During operation

Do not touch hot surfaces

Check the temperature of the surfaces with a thermometer. Do not touch the components during and immediately after operation. Allow the components to cool sufficiently after switching off.

Avoid overheating

Operate the components according to the technical specifications. Refer here to the chapter Technical data [▶ 21]. Provide for sufficient cooling. Switch the components off immediately if the temperature is too high.

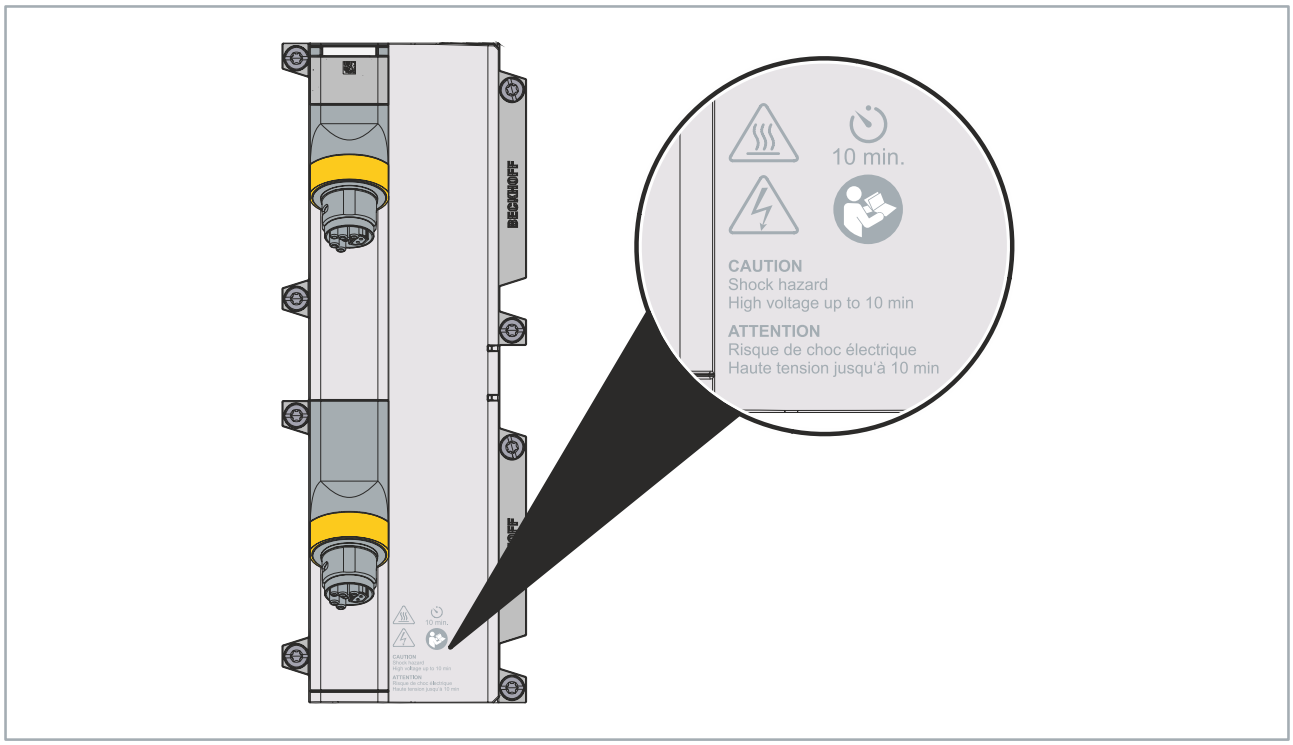
1.4.3 After operation

De-energize and switch off components before working on them

Check the functionality of all safety-relevant devices. Secure the working environment. Secure the machine or plant against being inadvertently started up. Observe the chapter Decommissioning.

1.5 Safety sign

You will find safety symbols on Beckhoff products and packaging. The symbols may be glued, printed, or lasered on and may vary depending on the product. They serve to protect people and to prevent damage to the products. Safety pictograms may not be removed and must be legible for the user.



Do not touch hot surfaces!
Check the temperature of the surface with a thermometer. Do not touch the components during and immediately after operation. Allow the components to cool sufficiently after switching off.

Warning of high voltage!
The DC link capacitors and power contacts on all modules may carry hazardous voltages up to 848 V_{DC}.

Observe the waiting time!
Dangerous voltages for 10 minutes after switching off all power connections.

Read the original operating instructions!
Familiarize yourself with the entire content of the operating instructions before commissioning. Always read the general safety instructions and the warnings in the individual chapters.

1.6 Dual Use

According to the published EU Regulation No. 2021/821, commercially available variable frequency drives are categorized as dual use items. This means that the Beckhoff Servo drive MD8xxx belongs to the category of goods that could be included in a dual use listing.

The goods list, "Annex 1" of the Dual Use regulation 2021/821 has been amended accordingly:

- Variable frequency drives (listed in goods list position 3A225) with a rotary field frequency of ≥ 600 Hz are subject to export control.
- Variable frequency drives (listed in goods list position 3A225) with a rotary field frequency of ≤ 599 Hz are not subject to export control.

Dual-use listing information

The type key of the Servo drive MD8xxx determines whether export control in accordance with a dual-use listing is required. In the type key of the Servo drive, the dual-use listing is indicated in the letter “d”.

MD8xyz–abcd–efgh

Ordering information	Description
d =	Dual Use
0	product not subject to authorization as the rotary field frequency is limited to 599 Hz during production.
8	product subject to export authorization, if applicable

MD8xxx–xxx0–xxxx

In the standard configuration and according to the current state of production, the Servo drive MD8xxx system is delivered with a maximum rotating field frequency of 599 Hz.

Ordering information	Description
MD81xx-xxx0-xxxx	1-channel servo drive, standard
MD82xx-xxx0-xxxx	2-channel servo drive, standard

MD8xxx–xxx8–xxxx

Under certain conditions, the Servo drive MD8xxx are suitable for operating high-frequency spindles with a maximum speed of up to 96,000 min^{-1}. In this version, the rotary field frequency is ≥ 600 Hz and the device is subject to export control.

Ordering information	Description
MD81xx-xxx8-xxxx	1-channel servo drive, Dual Use
MD82xx-xxx8-xxxx	2-channel servo drive, Dual Use

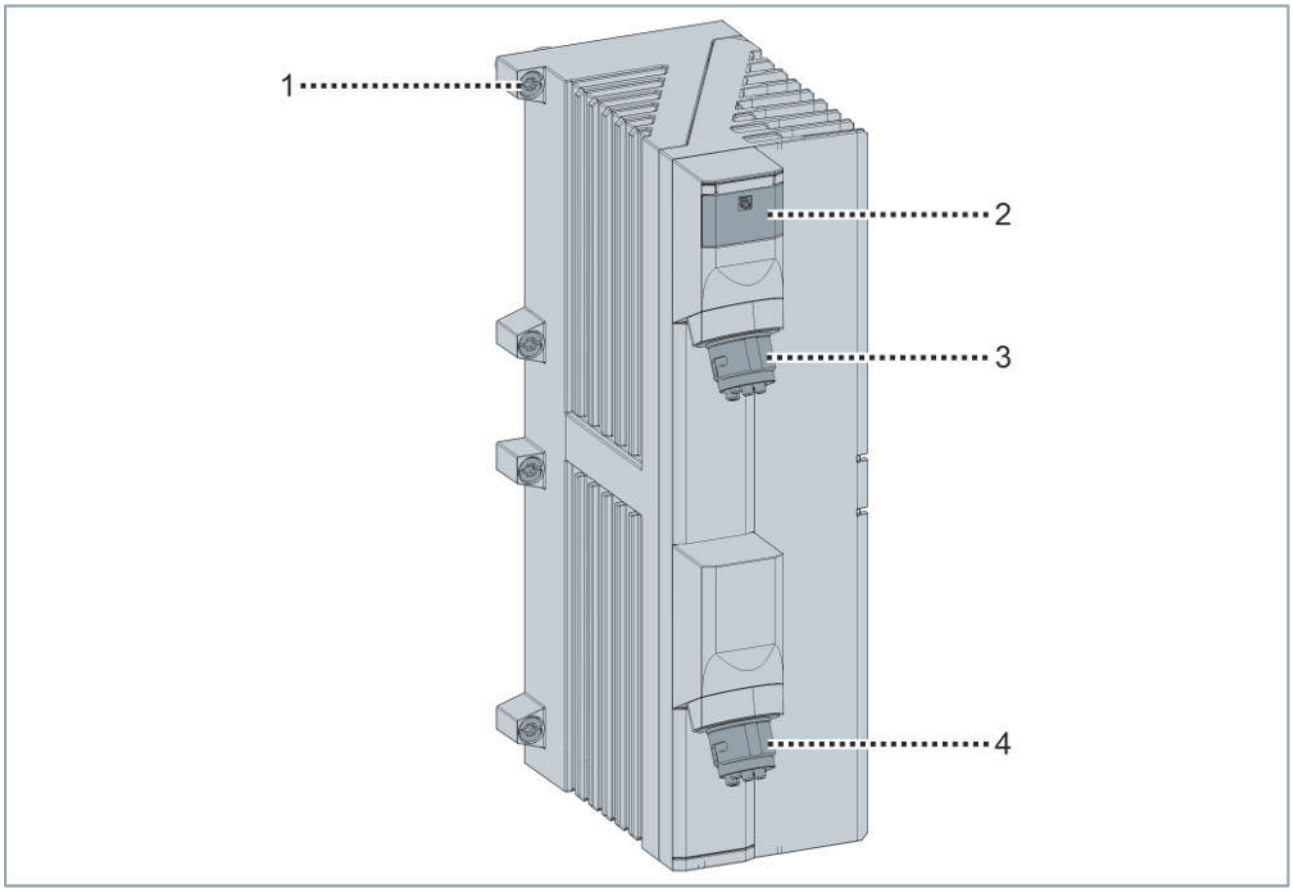
2 Product overview

The servo drives contain the voltage DC link and the inverter for supplying the motor. Depending on the required number of axes, the modules are mounted on the baseplate behind the DC link power supply, thus forming a multi-axis system. Modules with different ratings can be combined to enable the optimal design of the individual axes.

The MD8xxx series servo drives enable the operation of servomotors in the MX-System and are part of a multi-axis system whose DC link is fed from a DC link module (MD6xxx). The motor is connected via a B17 hybrid connector, which includes OCT feedback and brake control.

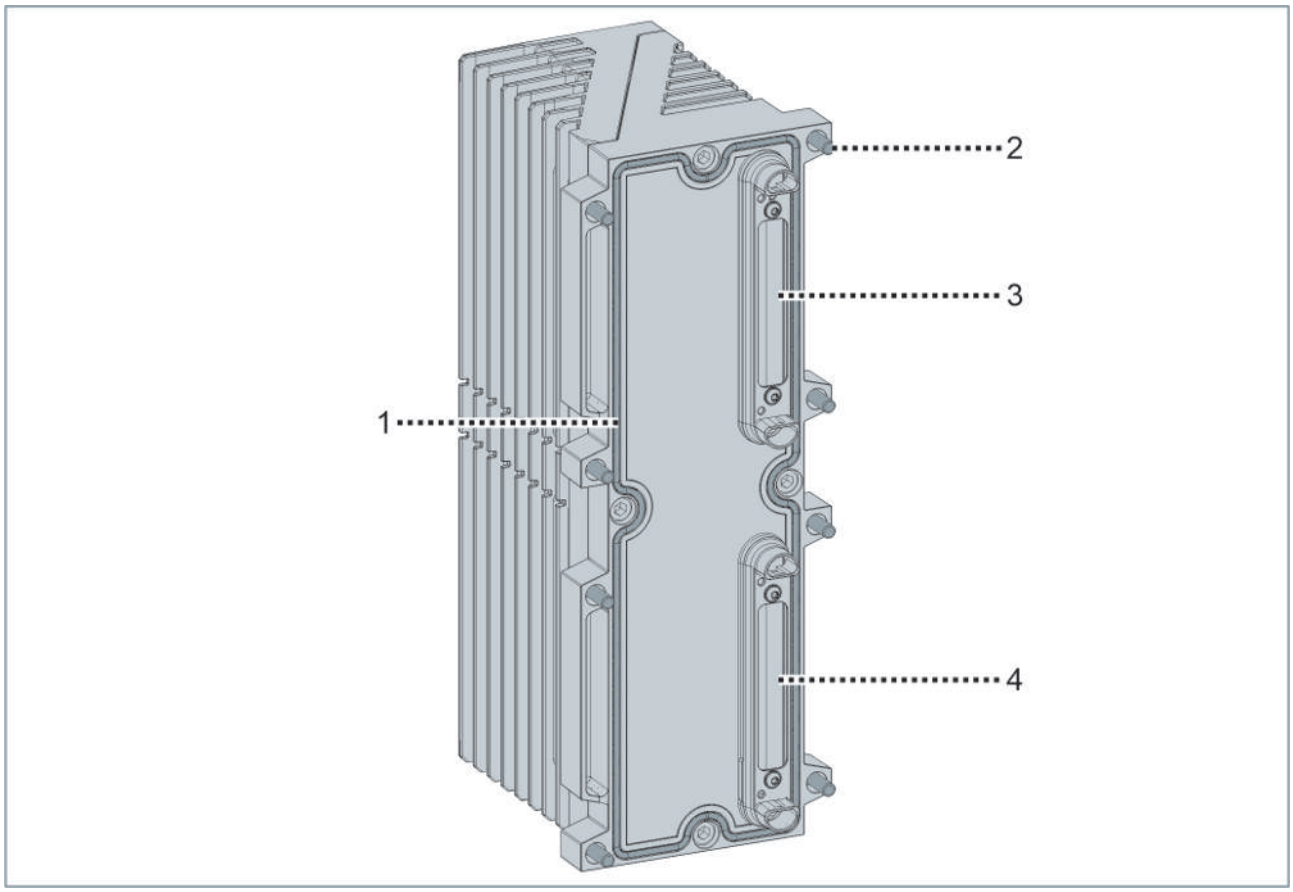
In addition, the servo drives feature integrated TwinSAFE logic and full Safe Motion functionality.

Front view



Item number	Description	Further information
1	Fastening screw	
2	Status display	Status display [▶ 17]
3	Motor output for channel A, X1	Connection [▶ 29]
4	Motor output for channel B, X2	Connection [▶ 29]

Rear view

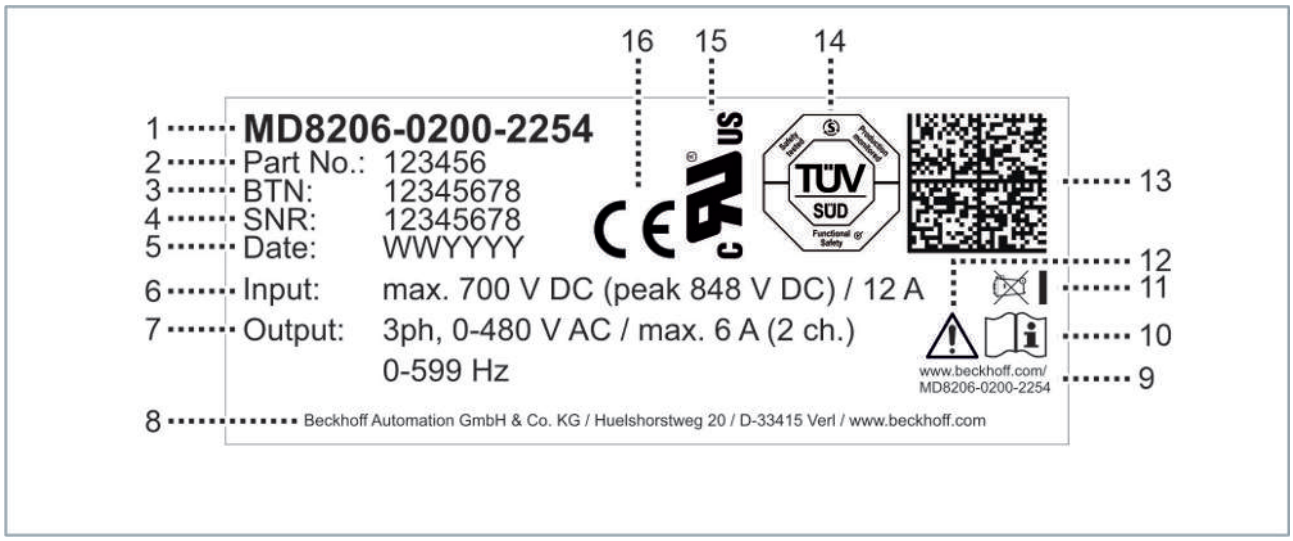


Item number	Description	Further information
1	Seal	
2	Fastening screw	
3	Data connector	
4	Connector supply voltage	

Also see about this

Connection [▶ 29]

2.1 Name plate



Position	Explanation
1	Product name
2	Order number
3	Beckhoff Traceability Number
4	Serial number
5	Date of manufacture
6	Input values: Voltage
7	Capacitance at max. ambient temperature
8	Contact details
9	Product address
10	Safety pictogram: Read operating instructions
11	Disposal according to WEEE directives
12	Safety pictogram: Caution
13	DataMatrix Code
14	TÜV certification
15	UL approval
16	CE approval

2.2 Product functions

Servo drives for controlling servomotors

The MD8xxx series servo drives enable the operation of servomotors in the MX-System and are part of a multi-axis system whose DC link is fed from a DC link module (MD6xxx). The motor is connected via a B17 hybrid connector, which includes OCT feedback and brake control.

Depending on the required number of axes, the modules are mounted on the baseplate behind the DC link power supply (MD6xxx), thus forming a multi-axis system. Modules with different ratings can be combined to enable the optimal design of the individual axes.

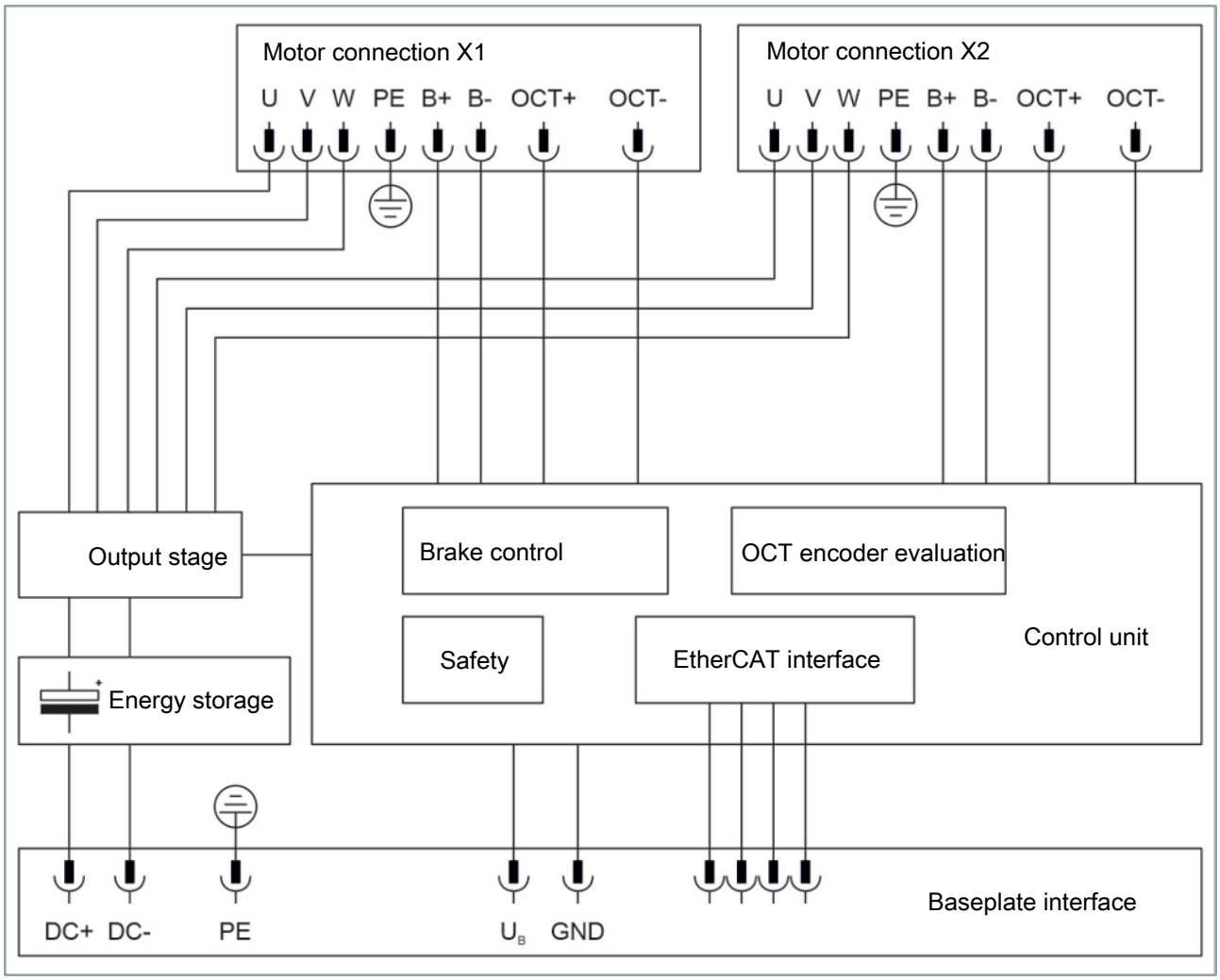
For more information, see Electrical data [▶ 21]

TwinSAFE drive-integrated safety technology

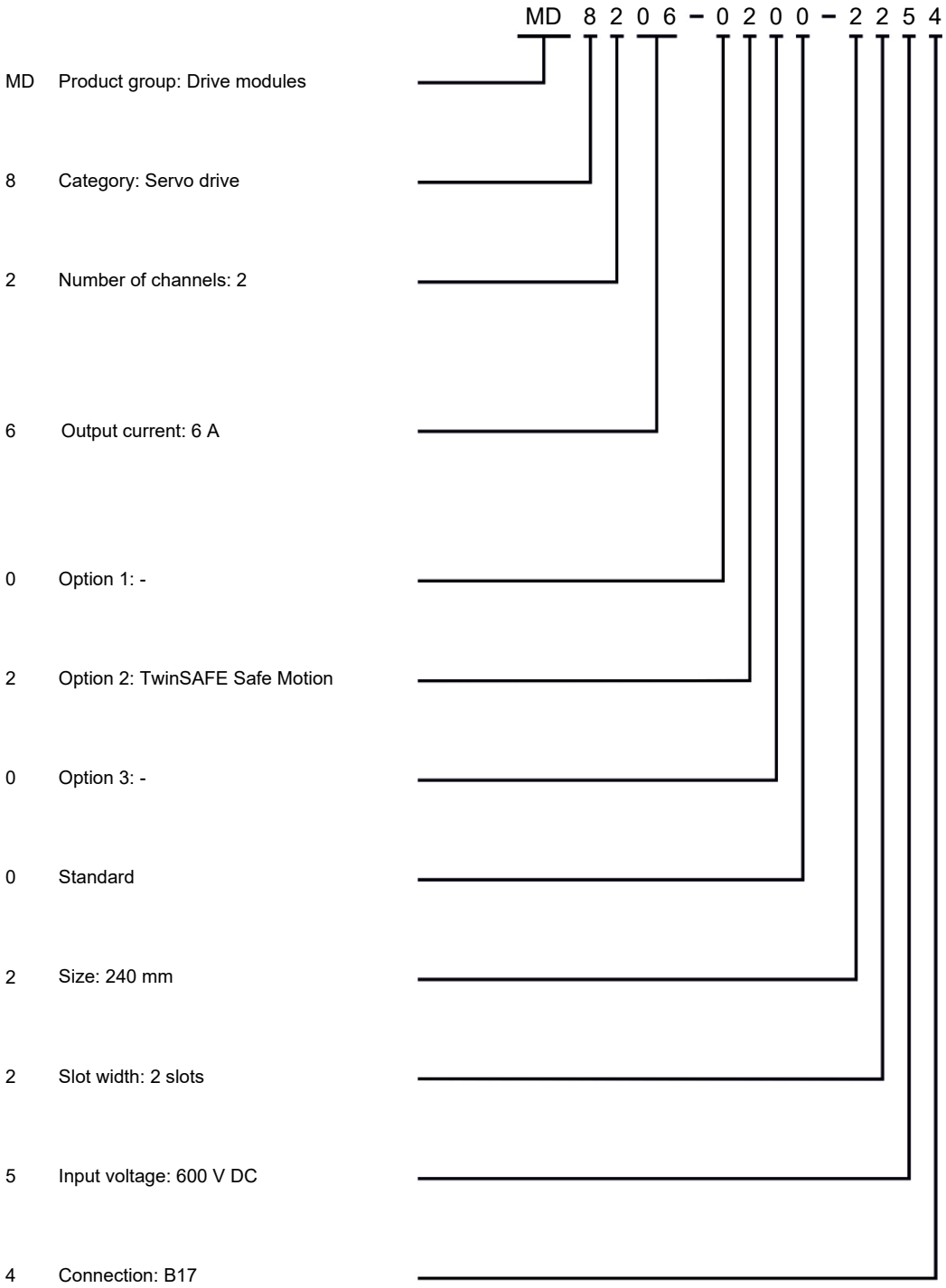
The TwinSAFE safe drive technology can be used to implement both basic functions (TwinSAFE STO/SS1) and sophisticated safety functions (TwinSAFE Safe Motion). Depending on the product, the functionality can be realized either via secure FSoE communication or locally in the Servo drive using the integrated TwinSAFE Logic.

For more information, see TwinSAFE safe drive technology [▶ 22]

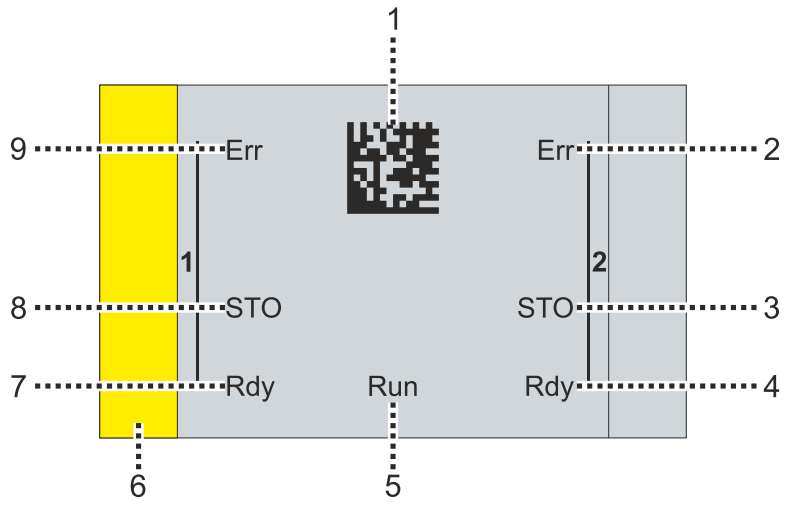
2.3 Block diagram



2.4 Type key


MD 8 2 0 6 – 0 2 0 0 – 2 2 5 4
MD Product group: Drive modules
8 Category: Servo drive
2 Number of channels: 2
6 Output current: 6 A
0 Option 1: -
2 Option 2: TwinSAFE Safe Motion
0 Option 3: -
0 Standard
2 Size: 240 mm
2 Slot width: 2 slots
5 Input voltage: 600 V DC
4 Connection: B17

2.5 Status display

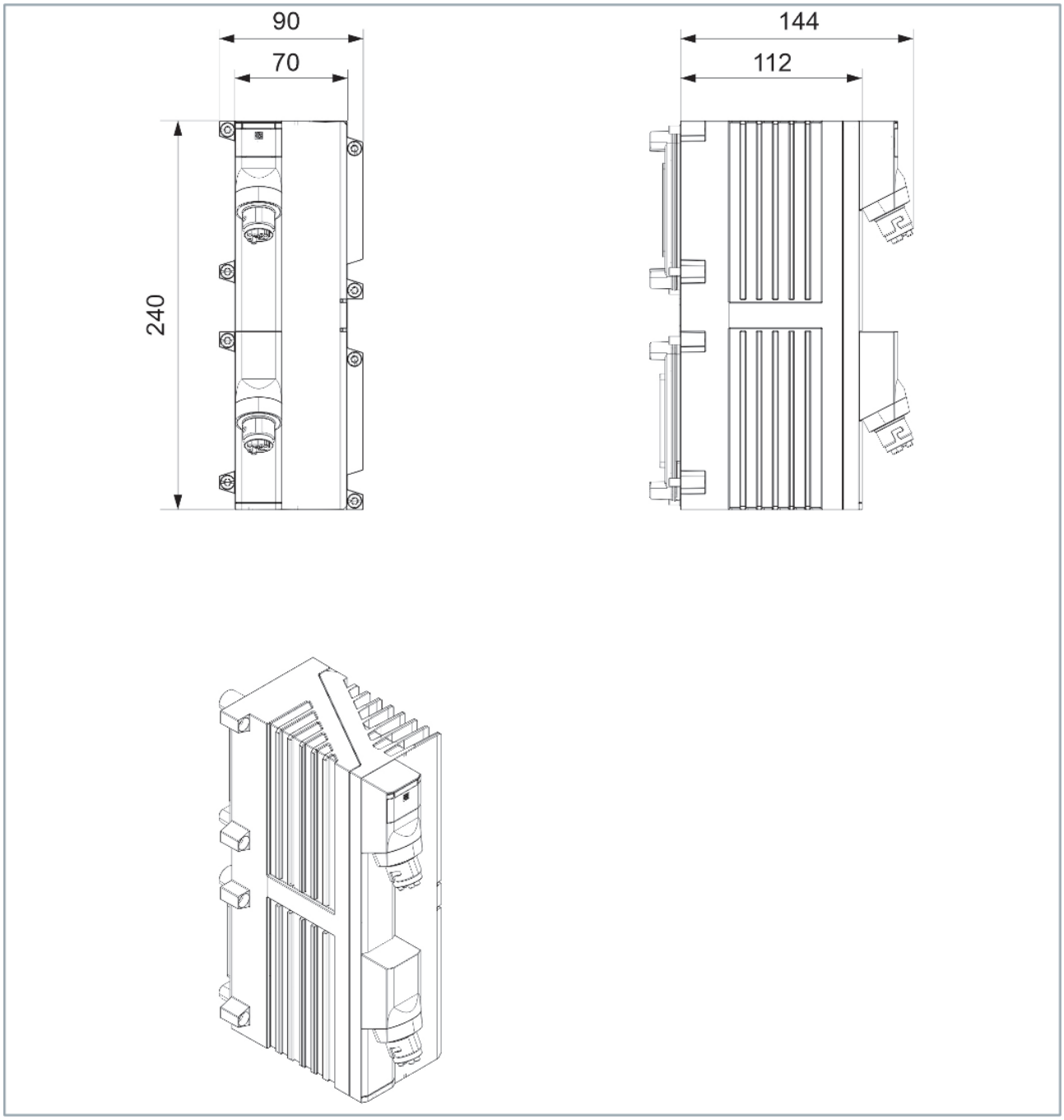


Position	Labeling	Meaning	Status	Explanation
1	-		-	Beckhoff Identification Code as Data Matrix code
2	Err	Error **Channel B**	lights up red	The module is in EtherCAT INIT status.
			flashes red	There is an error
			off	There is no error
3	STO	STO **Channel B**	lights up yellow	Axis B is in STO
			off	STO inactive
4	Rdy	Ready **Channel B**	lights up green	The axis is enabled and free from errors
			flashes green quickly	The axis is disabled and is being initialized.
			flashes green slowly	The axis is disabled and free from errors.
			off	The module is in EtherCAT INIT status.
5	Run			See system manual
6	-	-	-	TwinSAFE identification strips Safe Motion
7	Rdy	Ready **Channel A**	lights up green	The axis is enabled and free from errors
			flashes green quickly	The axis is disabled and is being initialized.
			flashes green slowly	The axis is disabled and free from errors.
			off	The module is in EtherCAT INIT status.
8	STO	STO **Channel A**	lights up yellow	Axis A is in STO
			off	STO inactive
9	Err	Error **Channel A**	lights up red	The module is in EtherCAT INIT status.
			flashes red	There is an error
			off	There is no error

If Err and Rdy flash simultaneously: the error reaction of the axis is active.

2.6 Dimensions

All dimensions in mm



3 Technical data

All values are typical values over the entire temperature range, unless stated otherwise.

3.1 Data for operation and environment

Beckhoff products are designed for operation under certain environmental conditions, which vary according to the product. The following specifications must be observed for operation and environment in order to achieve the optimum service life of the products.

Environmental conditions	
Parameter	**Value**
Ambient temperature during operation: Nominal range	0…40°C
Ambient temperature during operation: Extended temperature range **Observe derating**	40…50°C, 16 kHz switching frequency not permitted
Storage temperature	-25…+60°C
Air humidity	95%, no condensation
Protection rating	IP20 as a separate module
	IP65 / IP67 as part of a fully and correctly assembled MX-System
Pollution degree	2
Overvoltage category	III
Maximum installation altitude	2000 m

Operating ambient temperature dependent on switching frequency

Switching frequency	[kHz]	4	8	16
Nominal range	[°C]	0…40	0…40	0…40
Extended temperature range **Observe derating**	[°C]	40…50	40…50	–

Notice **Using a switching frequency of 16 kHz is not permitted in the extended temperature range**.

Derating dependent on ambient temperature and installation height

Influencing factor	Without derating	Derating	Factor
Ambient temperature during operation	0…40°C	40…50°C	5%/K
Installation height above sea level (NN)	up to 1000 m	1000…2000 m	1%/100 m

3.2 System data

Baseplate interface	
Connector	1 data connector 1 power connector
Hot Swap	No

Housing data	
Rows (height)	2
Slots (width)	2
Dimensions W × H × D	70 mm x 240 mm x 112 mm without connectors
Material	Zinc and aluminum die-cast
Cooling	Convection
Depth with connector	220 mm
Weight	2.8 kg
Installation position	Vertical. See system manual, chapter “Installation conditions”.

3.3 General technical data

General technical data	
Product group	Drive modules
Category/Version	Axis module for servo drives
Channels	2
DC link voltage	0…700 V DC*
Output current per channel	6 A
Output current as total device current	12 A
Drive profile	CiA402 according to IEC 61800-7-201 (CoE)
Motor connection	B17 connector
Feedback	OCT, EnDAT® 3
Safety functions	STO, SS1, Safe Motion, integrated TwinSAFE logic
Cable length	Total motor cable length: • 20 m per motor • 200 m per drive system

*) Modules are capable of operating at maximum dc link working voltage of temporarily 848 Vdc.

3.4 Electrical data

All values are typical values over the entire temperature range, unless stated otherwise.

Output currents		
Rated output current per channel	[A]	6

DC link		
Voltage range	[V DC]	0…700 V DC*
Capacitance	[µF]	8

*) Modules are capable of operating at maximum dc link working voltage of temporarily 848 Vdc.

up to 400 V AC mains connection voltage				
Valid at a switching frequency of	**[kHz]**	**4**	**8**	**16**
Rated output current per channel	[A]	6	6	3
Maximum rated output current per channel	[A]	8	8	3
Rated output current as total device current	[A]	12	12	4.4
Peak output current Irms for max. 5 seconds	[A]	15	15	4.4
Peak output current Irms for max. 5 seconds as total device current	[A]	24	24	8.8

at 480 V AC mains connection voltage				
Valid at a switching frequency of	**[kHz]**	**4**	**8**	**16**
Rated output current per channel	[A]	6	6	3
Maximum rated output current per channel	[A]	8	8	3
Rated output current as total device current	[A]	12	12	4.4
Peak output current Irms for max. 5 seconds	[A]	15	15	4.4
Peak output current Irms for max. 5 seconds as total device current	[A]	24	24	8.8

Output frequency		
Limited frequency of the standard version	[Hz]	0…599

24 V DC supply		
Current consumption 24 V DC without brake	[mA]	570
Max. output current of the brake	[mA]	1000

Determination of power loss

The TE5910 | TwinCAT 3 Motion Designer software is available for determining the power loss:

TE5910 | TwinCAT 3 Motion Designer

3.5 TwinSAFE safe drive technology

TwinSAFE Safe Motion

Technical data	
Function	Servo drive with TwinSAFE Logic
Implementation STO	through local TwinSAFE Logic or via FSoE
Safe stop functions	Safe Torque Off (STO), Safe Operating Stop (SOS), Safe Stop 1 (SS1), Safe Stop 2 (SS2)
Safe acceleration functions	Safe Maximum Acceleration (SMA), Safe Acceleration Range (SAR)
Safe brake functions	Safe Brake Control (SBC), Safe Brake Test (SBT)
Safe direction functions	Safe Direction positive (SDIp), Safe Direction negative (SDIn)
Safe speed functions	Safely Limited Speed (SLS), Safe Speed Range (SSR), Safe Speed Monitor (SSM), Safe Maximum Speed (SMS)
Safe position functions	Safely Limited Position (SLP), Safe CAM (SCA), Safely Limited Increment (SLI)
Safety standard	EN ISO 13849-1:2023 (Cat 4, PL e), EN 61508:2010 (SIL 3) and EN 62061:2005 + A1:2013/A2:2015 (SIL CL3)

MX8911 – TwinSAFE card for MD8xxx-x2xx servo drives (SafeMotion)

The MX8911 TwinSAFE drive option card is an optional extension for the MD8xxx servo drives and is permanently installed in them. The card enables you to define the safety functions by application. In the delivery state, a factory setting project with the safety function STO according to EN 61800-5-2 is integrated as an example. Further information can be found in the original operating instructions for the cards.

MDxxxx-x2xx – Servo drive with TwinSAFE Safe Motion

The servo drives are available with integrated safety functions. These conform to IEC 61800-5-2 and fulfill the following safety standards:

- DIN EN ISO 13849-1:2023, up to Cat 4, PL e
- EN 61508:2010, up to SIL 3
- EN 62061:2005 + A1:2013/A2:2015 up to SILCL3

Communication takes place via the FailSafe over EtherCAT protocol FSoE according to IEC 61784-3-12. When using the factory setting project, the safety function STO can be enabled via FSoE.

Operating instructions | MX8911 for MDxxxx-x2xx

Direct link to the operating instructions of the TwinSAFE drive option card for MDxxxx-x2xx servo drive

⚠ WARNING

Failure to observe the documentation for the TwinSAFE drive option card may compromise safety

Only operate the TwinSAFE drive option card for the intended activities defined in the corresponding documentation, taking into account the specified values.

- Refer primarily to the documentation for the TwinSAFE drive option card.

Encoder connection for safe encoders (functional safety)

The encoder of the Beckhoff synchronous servomotor feedback system must be at least SIL 2-capable in order to use TwinSAFE safe drive technology. Original Beckhoff OCT motor cables are available for connecting the motor for the implementation of TwinSAFE safety functions.

Notice Only OCT motor cables in which both the OCT wire pair and the brake wire pair are shielded separately may be used.

Third-party motors with safety encoders are not covered by the certification

The TÜV SÜD certificate applies to the list of approved components. Other components are not covered by the certificate. When using a third-party motor with safety encoder, you

- are responsible for the correct installation of the safety encoder and the correctly assembled encoder connection cable.
- must perform an FMEDA (Failure modes, effects and diagnostic analysis) as well as the necessary EMC and environmental tests.

3.5.1 Beckhoff synchronous servomotors

Feedback system SIL 2-capable or higher

The encoder of the servomotor's feedback system must be at least SIL 2-capable in order to use TwinSAFE safe drive technology. In the type key of the Beckhoff servomotors, the feedback system is indicated by the letter "y". The servomotors with feedback options G...L are suitable for TwinSAFE in accordance with the ordering information.

AM8tuv-wxyz-a00

Ordering information	Description
y =	Feedback system
G	One Cable Technology for power and feedback; [...] **Single-turn, absolute position within one revolution, 24-bit resolution, SIL 2-capable** […]
H	One Cable Technology for power and feedback; [...] **Multi-turn, absolute position within 4096 revolutions, 24-bit resolution, SIL 2-capable** [...]
I	EnDat® 3; One Cable Technology for power and feedback; [...] **Single-turn, absolute position within one revolution, 19-bit resolution, SIL 3-capable**[1)] […]
J	EnDat® 3; One Cable Technology for power and feedback; [...] **Multi-turn, absolute position within 4096 revolutions, 19-bit resolution, SIL 3-capable**[1)] [...]
L	One Cable Technology for power and feedback; [...] **Multi-turn, absolute position within 4096 revolutions, 24-bit resolution, SIL 2-capable** [...]; Beckhoff Smart System Diagnosis (B/SSD)

[1)] To achieve SIL 3 or PLe, the notes in the TwinSAFE Application Guide, chapter 7.2 *AdvPosMon with integrated EnDat® 3 encoder* must be observed.

3.5.2 Third-party motors and TwinSAFE

The MD8xxx servo drive modules can be used to implement safe drive technology with third-party motors. Please observe the following notes.

NOTICE

TwinSAFE STO/SS1

The basic TwinSAFE STO/SS1 functions can be used with third-party motors. The connected feedback is not relevant here.

NOTICE

TwinSAFE Safe Motion

The sophisticated TwinSAFE Safe Motion safety functions require the connection of a functional safety encoder (Safe Motion Encoder):

- Hiperface DSL (Functional Safety)
- EnDat® 3 (Functional Safety)

NOTICE

Non-observance may endanger product safety

If an external encoder is used, the machine builder is responsible for

- selecting the correct components
- installing the encoder correctly in accordance with the encoder operating instructions
- assembling and testing the required encoder connection cable in accordance with the encoder operating instructions
- FMEDA (Failure modes, effects and diagnostic analysis)

4 Mechanical installation

Required tools

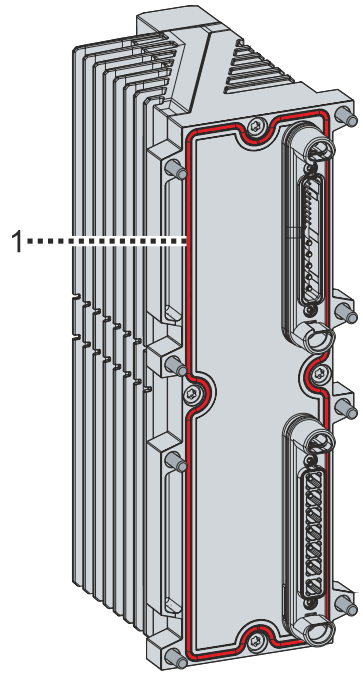
- Torx T25 screwdriver
- Torque wrench 5 Nm

4.1 Preparation

NOTICE

Check the module for damage

If the seal is worn or damaged, liquids and dirt can penetrate and damage the MX-System. The IP65/IP67 protection rating is not met if the seals are worn or damaged.



1. Check the seal [1] of the module for wear and damage
2. Replace worn and damaged seals

4.2 Placement of the module on the baseplate

The module can be plugged into the following areas marked in green:

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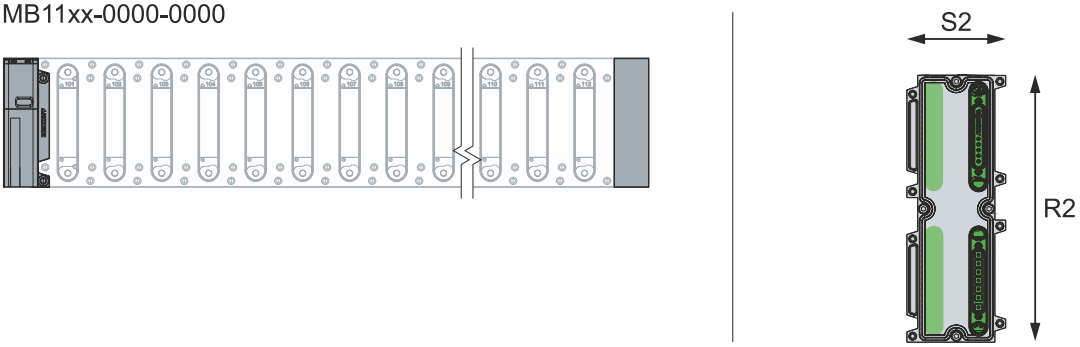

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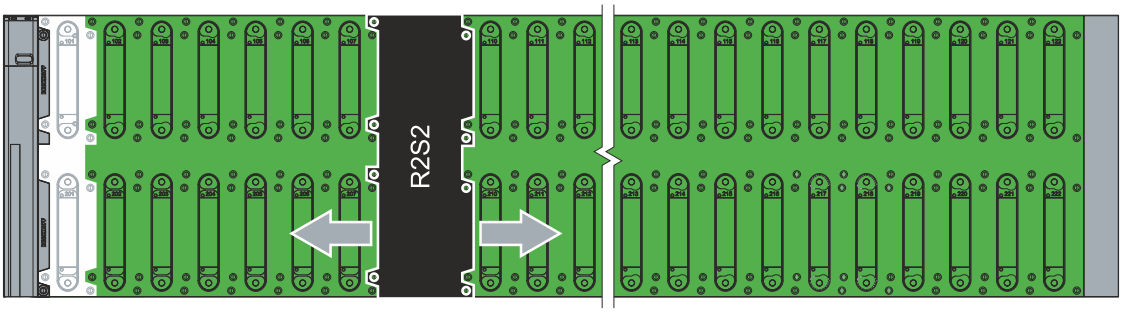

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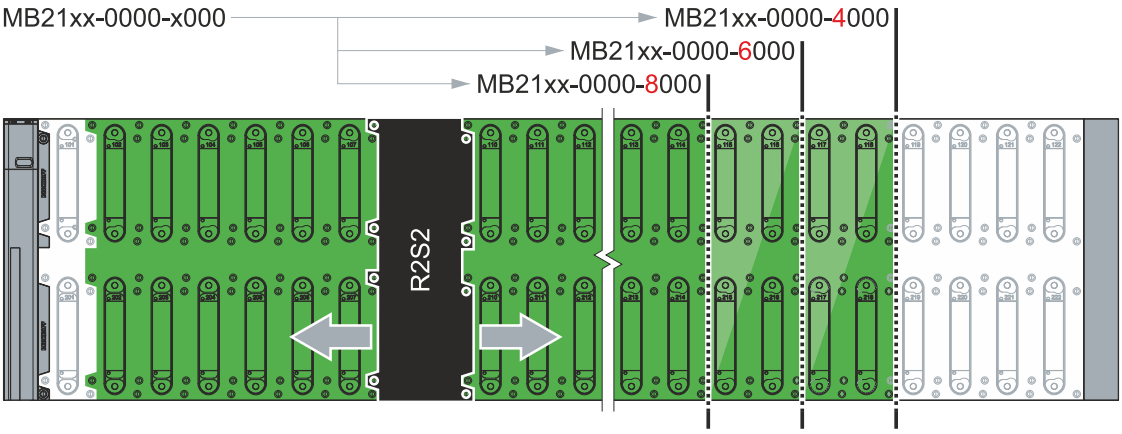

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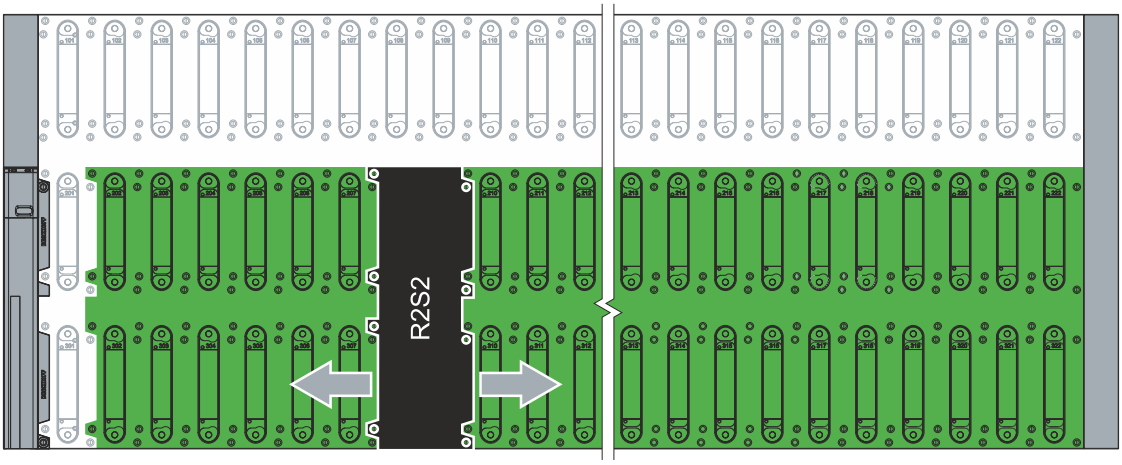


4.3 Mounting the module

⚠ CAUTION

Danger due to the high weight of an equipped baseplate

First mount the baseplate and then the modules to the baseplate. If you mount the modules on the baseplate first, the total weight of the MX-System will increase. Another person is required to transport and installation an equipped baseplate.

- Wear personal protective equipment.
- The equipped baseplate must be transported and mounted by two people.

NOTICE

Ensure correct installation

If the module is not installed correctly, liquids and dirt may enter and damage the MX-System. The IP65/IP67 protection rating is not met if the installation is incorrect.

NOTICE

Limited number of mating cycles

The module may be plugged in a maximum of 25 times to attach it to the baseplate. If the module is plugged into the baseplate more than 25 times, a secure connection between the module and the baseplate cannot be guaranteed.

- Observe the permissible number of mating cycles.
- Replace the module if the number of mating cycles is exceeded.
- Replace the baseplate if the number of mating cycles is exceeded.

Observe the mounting sequence on the baseplate!

1. MD60xx DC link power supply
2. Optional capacitor module MD9000
3. All other axis modules such as MD8xxx servo drives and MD3xxx variable frequency drives

1. Plug the module on the baseplate
2. Tighten all screws
3. Observe tightening torques:

Components	Tightening torque [Nm]
Screws	5

Further information on installation can be found in the system manual in the “Mounting” chapter.

5 Connection

Observe the GND concept described in the system manual.

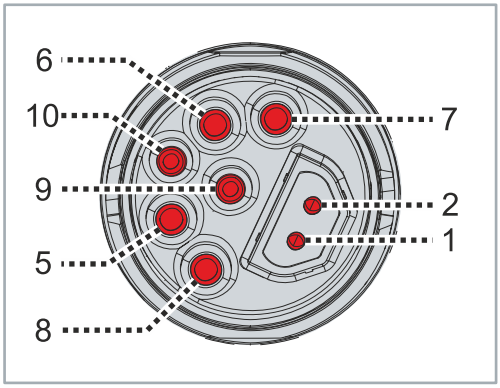
Checking the drive design in Motion Designer

1. Check that the DC link power supply is not overloaded by the connected servo drive.
2. Check whether the braking resistor is suitably dimensioned for your application.

5.1 Motor connection

X1 | Motor channel A connection

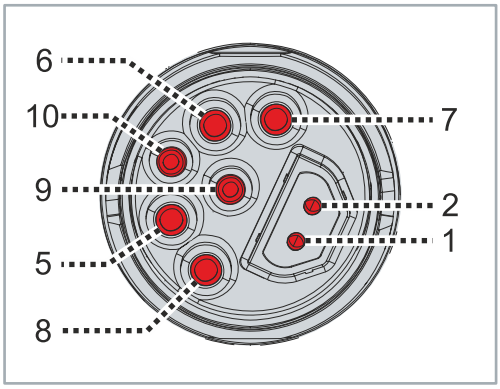
- Connection for a servomotor B17



Pin	Contact	Function
1	OCT+	OCT signal+
2	OCT-	OCT signal-
5	PE	Protective conductor
6	U	Phase U
7	V	Phase V
8	W	Phase W
9	Br-	Holding brake-
10	Br+	Holding brake+

X2 | Motor channel B connection

- Connection for a servomotor B17



Pin	Contact	Function
1	OCT+	OCT signal/temperature+
2	OCT-	OCT signal/temperature-
5	PE	Protective conductor
6	U	Phase U
7	V	Phase V
8	W	Phase W
9	Br-	Holding brake-
10	Br+	Holding brake+

6 Commissioning and operation

⚠ WARNING

Serious injuries due to residual voltage

Although a motor is no longer rotating, voltage on the control and power connections or a residual voltage in the capacitors of the Servo drive can lead to serious injuries.

- Switch off the main switch on the power infeed
- Secure the main switch of the power infeed against being switched on again
- Wait at least 10 minutes after switching off the main switch until the DC link voltage has been discharged before starting work.

6.1 Requirements

- Components show no signs of damage
- Screw connections of the components are correctly tightened
- Wiring and cables are installed correctly

NOTICE

Limited functionality due to unformed capacitors

The dielectric in the DC link capacitors decreases over a very long storage period and the capacitors lose their forming. This can lead to considerable functional restrictions and even a shortened service life of the device.

- If the storage period exceeds 5 years, form the capacitors [▶ 32]

Pay attention to the following points before commissioning:

1. Make sure that an emergency stop switch complying with the valid regulations is fitted to the control station
2. Check components for damage
3. Check that the modules are correctly seated on the baseplate and on the machine
4. Tighten screw connections correctly
5. Mount mechanical and electrical protective devices
6. Check the wiring, connection and proper grounding

6.1.1 Drivetrain

The application, servo drives, motors and gear units must be matched to one another so that sufficient safety is ensured for all components. Mechanical stiffness can occur after a while due to wear.
Make sure that the components in the working area of the system have adequate reserves so that the working life is not impaired and the necessary control quality can be maintained.
The Beckhoff software "TE5910 | TwinCAT 3 Motion Designer" is available for configuration of the drivetrain and selection of suitable components.

6.1.2 Forming the capacitors

During long storage periods, the installed DC link capacitors must be reformed. The following steps must be carried out:

1. Connecting the mains voltage to the drive system
2. Leave the drive system connected to the mains voltage for 60 minutes and do not operate under load

The device can then be used as usual.

The time interval at which the capacitors must be formed varies depending on the storage temperature.

Storage temperature	Forming interval
< 25 °C	5 years
> 25 °C	3 years

6.2 Commissioning

Exemplary commissioning

The procedure for commissioning is described as an example. A different method may be appropriate or necessary, depending on the application of the components.

NOTICE

The supply voltage activates the power supply

As soon as the external supply voltage is applied, the 24 V power supply of the power infeed is automatically active and outputs UB = 24 V DC to the baseplate. This behavior cannot be set.

- Switch on the external supply voltage
- Parameterize the module functions with the TwinCAT Drive Manager 2 (TE5950) if necessary

6.3 During operation

- Observe information for environment and operation
- Observe maintenance intervals
- Switch off the system if
  - unusual noise occurs
  - smoke develops
  - an atypical temperature development occurs

Pay attention to the following points during operation:

1. Monitoring noise levels
2. Control smoke development
3. Always check drive surfaces and cables for dirt or dust
4. Check temperature development
5. Check function of safety devices

7 Decommissioning

7.1 Disassembly

⚠ WARNING

Danger to life due to electric shock

After disconnecting from the supply voltage, a life-threatening voltage is still present at the contacts of the DC link voltage. Touching the contacts can lead to death or injury from electric shock.

- After disconnecting from the supply network, wait 10 minutes before starting disassembly.

⚠ CAUTION

Danger to life due to exposed contacts with dangerous voltages

After disassembling the module, the contacts of the power connectors in the baseplate are exposed. Touching the contacts can lead to death or injury from electric shock.

- Shutdown the input voltage before disassembly.
- Switch off the main switch on the power infeed
- Secure the main switch of the power infeed against being switched on again
- Wait at least 10 minutes after switching off the main switch until the DC link voltage has been discharged before starting work.

Further information on this can be found in the chapter in the system manual at Disassembly.

Disassembly may only be carried out by qualified and trained technical personnel.

✓ The supply voltage is shut down.

1. Remove cables.
2. Loosen all mounting screws of the module.
3. Take the module off the baseplate.

⇨ The module has been removed correctly.

7.2 Disposal

Products marked with a crossed-out wheeled bin shall not be discarded with the normal waste stream. The device is considered as waste electrical and electronic equipment. The national regulations for the disposal of waste electrical and electronic equipment must be observed.

8 Standards and guidelines

Standards

EN IEC 61800-5-1

"Adjustable speed electrical power drive systems"

Part 5-1: Safety requirements - Electrical, thermal and energy

Generic standards EN IEC 61000-6-2

"Immunity standard for industrial environments"

Generic standards EN IEC 61000-6-4

"Emission standard for industrial environments"

IEC 61800-5-3

"Adjustable speed electrical power drive systems”

Part 5-3: Safety requirements - Functional, electrical and environmental requirements for encoders

Product standard EN IEC 61800-3

"Adjustable speed electrical power drive systems. EMC requirements and specific test methods"

EN IEC 63000

"Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances"

Guidelines

2014/30/EU

EMC Directive

2014/35/EU

Low Voltage Directive

2011/65/EU

RoHS Directive

Regulation (EU) 2021/821

Dual-use regulation

9 Appendix

9.1 Manual version history

The following table shows the version history of this manual.

Version	Comment
1.0.0	• First release

9.2 Accessories

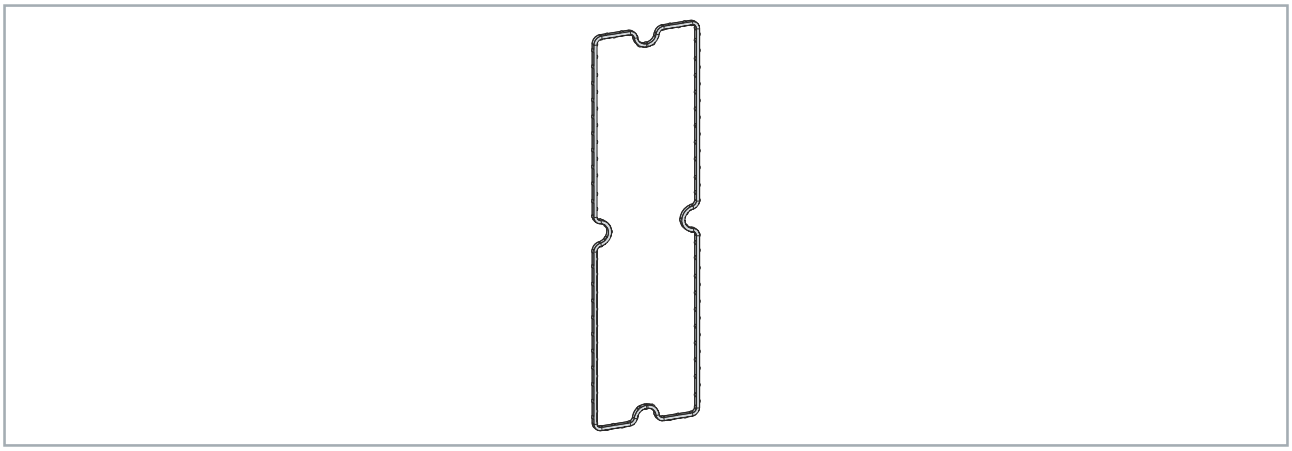
Suitable accessories can be found on the product website:

- https://www.beckhoff.com/md8206-0200-2254

Product	Description
ZMX1000-0010	M5x17.5 combi-TX25 replacement screws for module fastening (PU = 10 pcs.)
ZMX2000-0012	10.3 x 38 mm fuse, fine, 12 A, 600 V AC gRL (IEC/UL)
ZMX2000-0020	10.3 x 38 mm fuse, fine, 20 A, 600 V AC gRL (IEC/UL)
ZMX2000-0040	14 x 51 mm fuse, fine, 40 A, 500 V AC gG (IEC) gR (UL) (tested as gRL)
ZMX2000-0025	10.3 x 38 mm fuse, fine, 25 A, 600 V AC gRL (IEC/UL)
ZMX4001-0001	Replacement cover for potential equalization for 1-row baseplate with Beckhoff logo
ZMX4001-0002	Replacement cover for potential equalization for 2- and 3-row baseplate with Beckhoff logo

The following items are also available for replacing worn parts:

MX seal S2R2



The S2R2 seal is available to replace worn and damaged seals on a 2-row MX module with two slots.

9.3 Support and Service

Beckhoff Support and Service provides assistance with questions regarding Beckhoff products and system solutions, as well as with their planning, commissioning, and operation.

Beckhoff subsidiaries and representative offices

Please contact your Beckhoff subsidiary or your representative office for local support and service for Beckhoff products. You can find the addresses of Beckhoff subsidiaries and representative offices at: www.beckhoff.com/worldwide.

For Beckhoff products and technologies, we offer Training programs, tutorials, and webinars.

Beckhoff Support

Beckhoff Support provides assistance with technical questions regarding the use, planning, programming, and commissioning of Beckhoff products.

☎ Hotline:	+49 5246 963-157
✉ Email:	support@beckhoff.com, Support form
Web page:	www.beckhoff.com/support

Beckhoff Service

Our service specialists are here to assist you with any questions you may have regarding after-sales service processes, such as replacement parts, repairs, etc.

☎ Hotline:	+49 5246 963-460
✉ Email:	service@beckhoff.com, Service form
Web page:	www.beckhoff.com/service

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