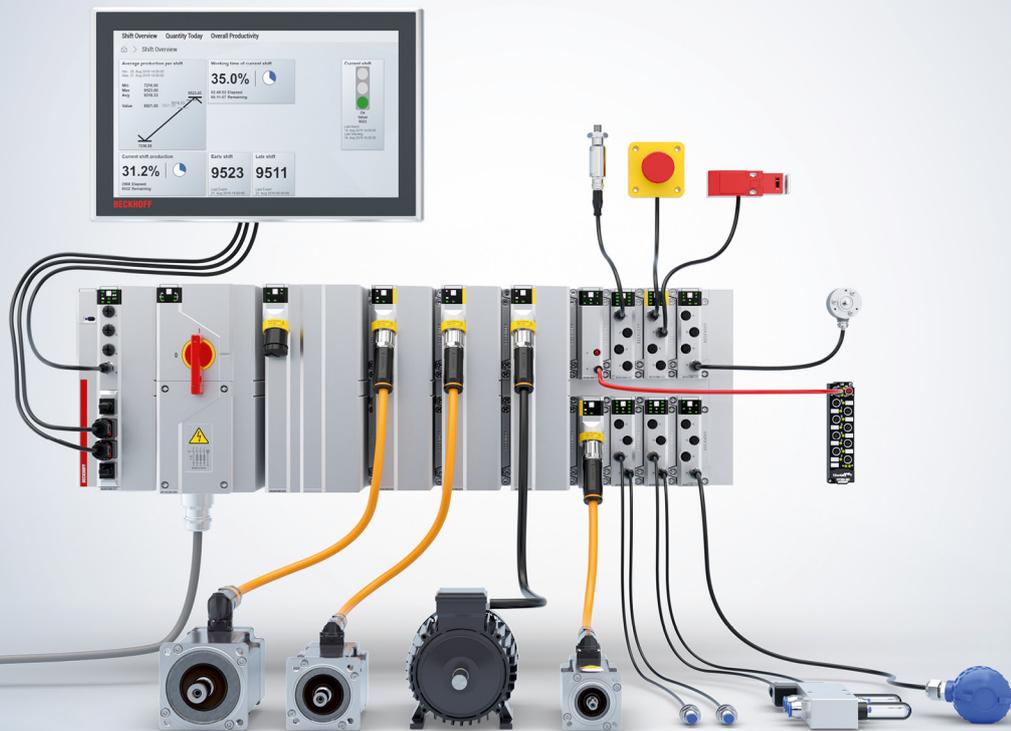


Manual | EN

## MS4306-2003-1111

2-channel EtherCAT power output, EtherCAT P, 24 V DC/2 x 3 A, switchable, M8





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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 MS4306-2003-1111 may only be operated if it is mounted on a baseplate in accordance with the installation instructions in this manual. It is designed for the integration of external EtherCAT P SubDevices into an MX-System.

### **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.

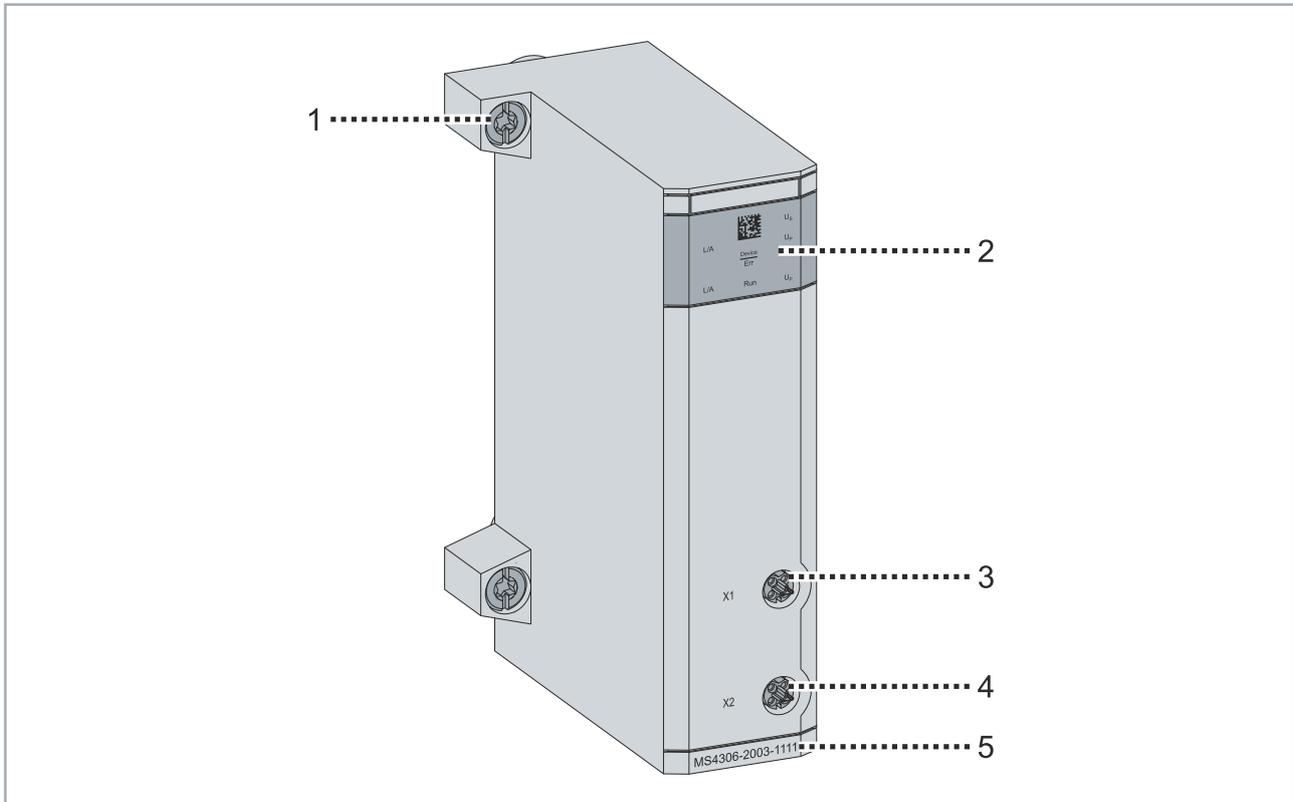
### **Improper use**

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

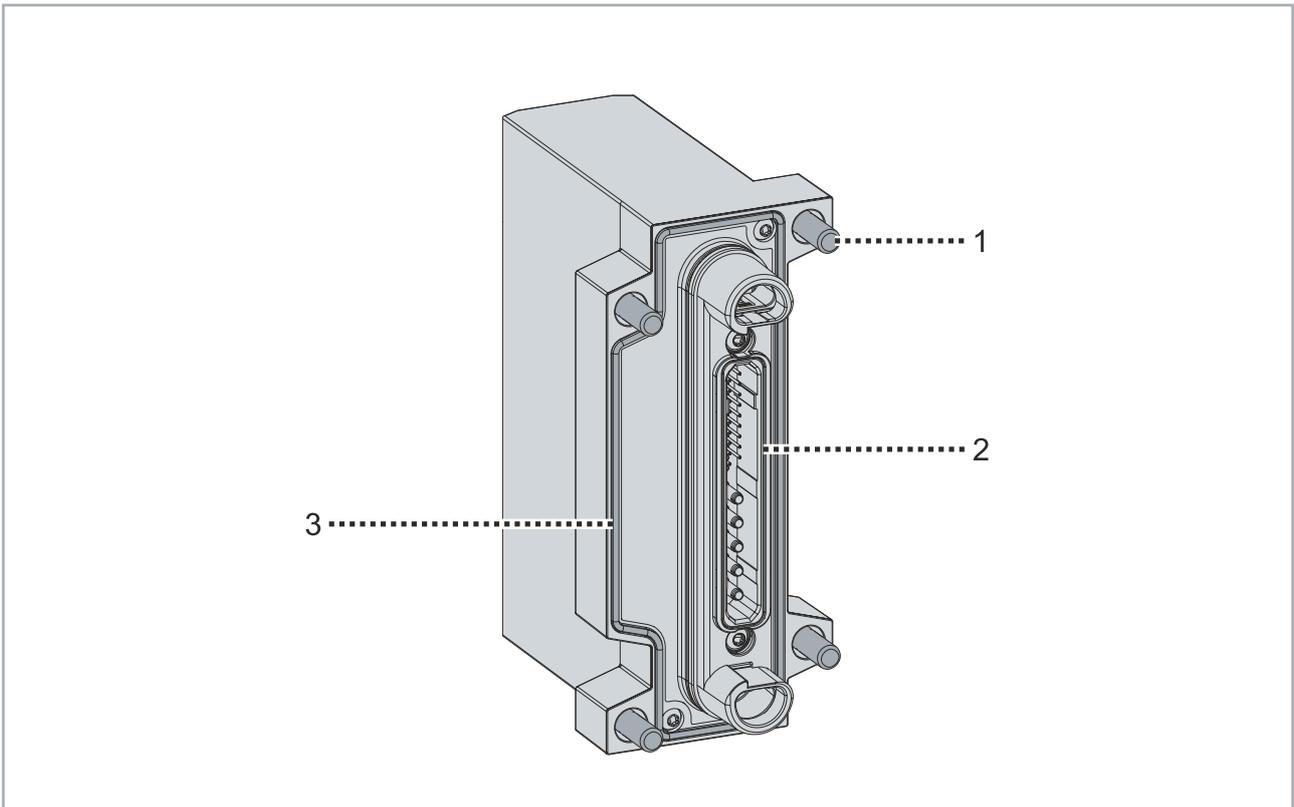
## 2 Product overview

The MS4306-2003-1111 EtherCAT power output module provides 24 V DC for the control voltage  $U_s$  and the load voltage  $U_p$  via two EtherCAT P outputs, as well as EtherCAT P for additional consumers. Both voltages are protected by integrated electronic fuses; the load voltage  $U_p$  can also be switched.

The integration of an EtherCAT power output module allows MX-System stations to be expanded to include EtherCAT P Box modules as well as any other EtherCAT P devices.



Position	Name
1	Fastening screw, captive, 4 x
2	Status display
3	EtherCAT P output X1
4	EtherCAT P output X2
5	Module name



Position	Name
1	Fastening screw, captive, 4 x
2	Data connector
3	Seal

## 2.1 Product functions

### 2.1.1 EtherCAT P output ports

You can connect one or more EtherCAT P SubDevices to each EtherCAT P output port. Observe the maximum permissible cable length and the maximum permissible number of EtherCAT P SubDevices per port. For more information, refer to chapter [Technical data](#) [► 17].

All output voltages are branched off from the baseplate voltage  $U_B$ .

A graphical representation of the current circuits can be found in the chapter [Block diagram](#) [► 12].

The output voltages  $U_S$  and  $U_P$  of the output ports are protected by electronic fuses as follows:

- a common electronic fuse for  $U_S$  of both ports.
- one electronic fuse per port for  $U_P$ .

The electronic fuses can also be used to selectively switch the output voltages on or off.

For more information on the software functions, see chapter [Electronic fuse](#).

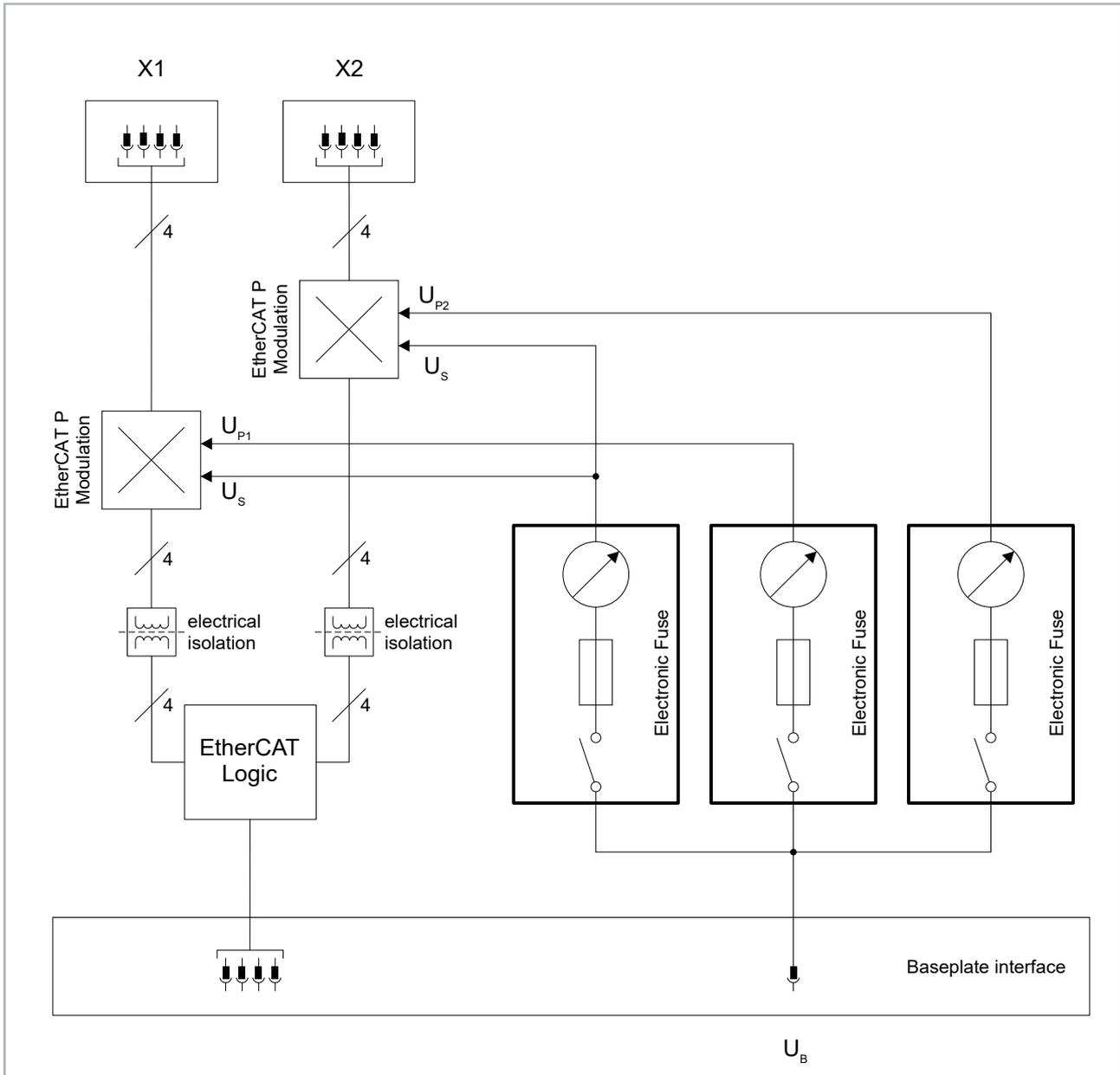
## **2.2 Delivery state**

This chapter describes the default settings for basic product functions on delivery.

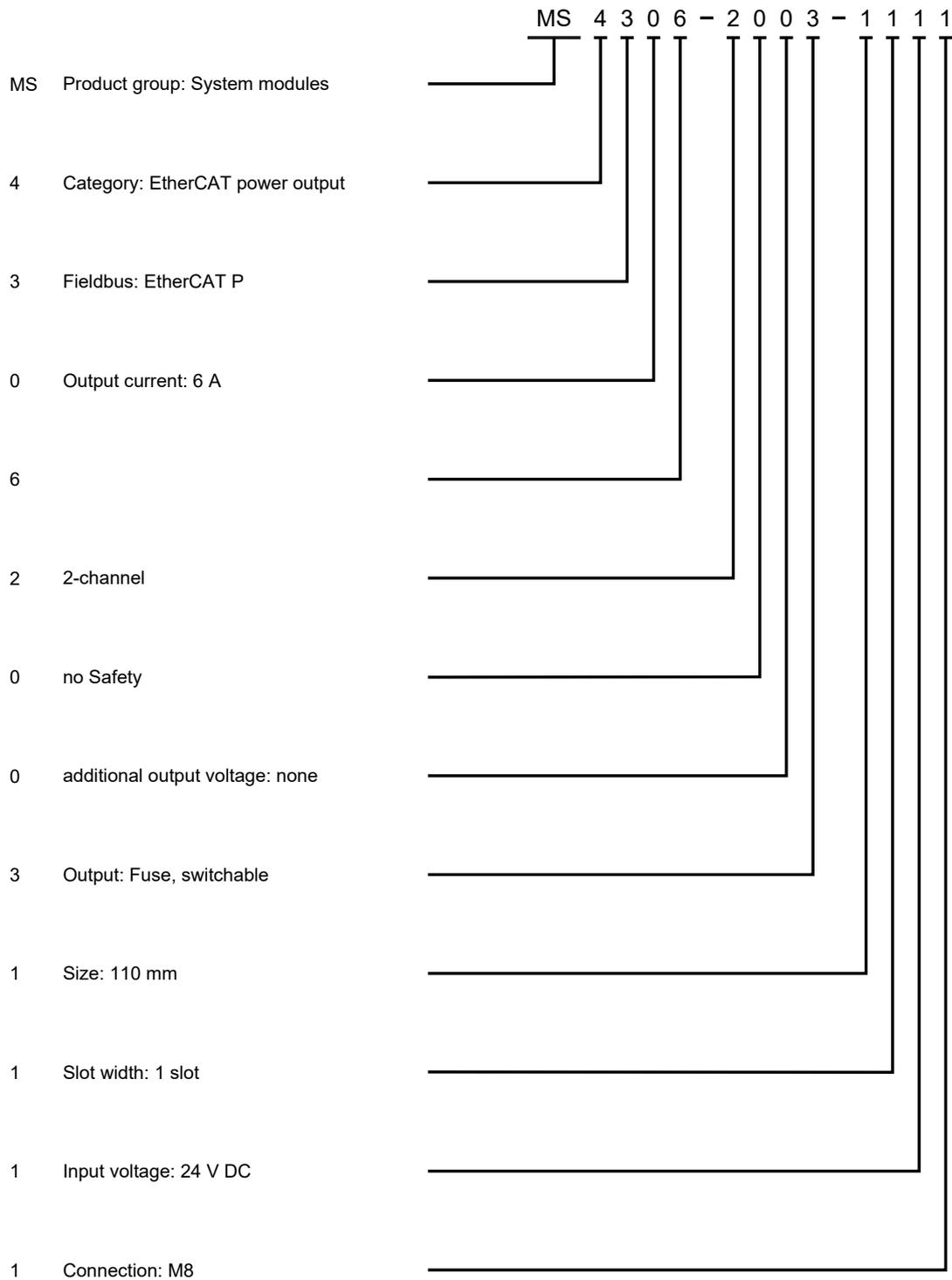
### **2.2.1 Switching state of the EtherCAT P output voltages**

On delivery, all output voltages are switched on.

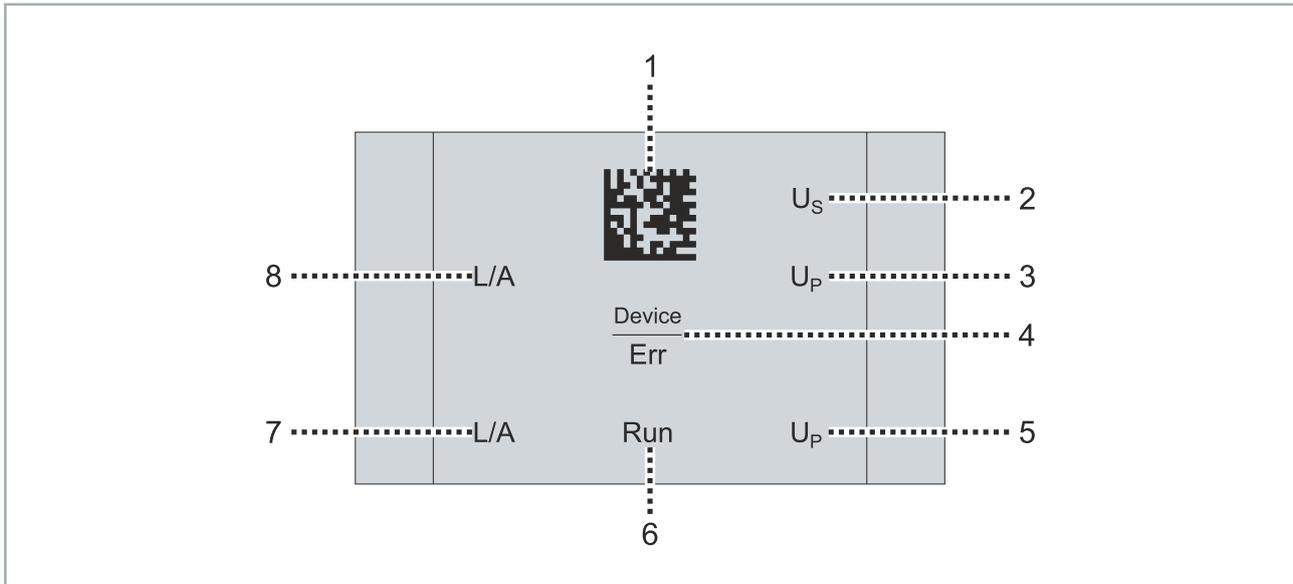
## 2.3 Block diagram



## 2.4 Type key



## 2.5 Status display

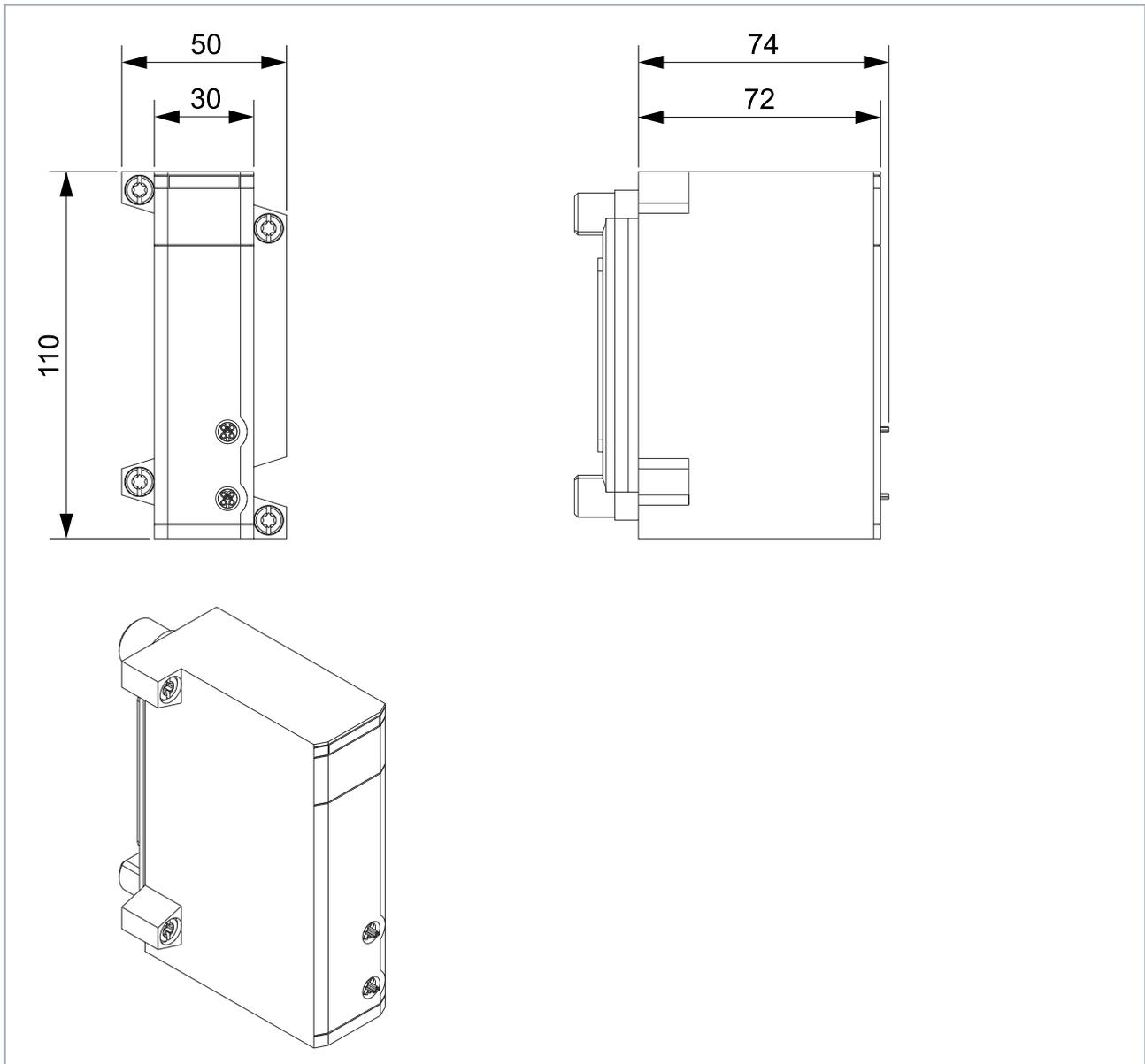


Position	Status display	Status	Explanation
1	-	-	Beckhoff Identification Code as DataMatrix code
2	$U_S$	off	No output voltage available at both ports
		green illuminated	Output voltage available at both ports
3	$U_P$	off	No output voltage available at X1
		green illuminated	Output voltage X1 switched on
4	Device   Err	off	No error exists
		red illuminated	Error collection LED
5	$U_P$	off	No output voltage available at X2
		green illuminated	Output voltage X2 switched on
6	Run	off	The EtherCAT State Machine of the module is in the initialization state
		flashing green	The EtherCAT State Machine of the module is in the <i>Pre-Operational</i> state
		single flash green	The EtherCAT State Machine of the module is in the <i>Safe-Operational</i> state
		green illuminated	The EtherCAT State Machine of the module is in the <i>Operational</i> state
		flickers green	Firmware is being loaded

Position	Status display	Status	Explanation
7	L/A	off	No connection on the incoming EtherCAT segment at X1
		green illuminated	Preceding EtherCAT device connected to X1
		flashing green	Communication with preceding EtherCAT device at X1
8	L/A	off	No connection on the incoming EtherCAT segment at X2
		green illuminated	Preceding EtherCAT device connected to X2
		flashing green	Communication with preceding EtherCAT device at X2

## 2.6 Dimensions

All dimensions in mm



### 3 Technical data

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

Baseplate interface	
Connector	1 data connector
Hot Swap	No

EtherCAT	
Distributed Clocks	No
Current consumption via E-bus	330 mA

EtherCAT P outputs	
Connection	2 x M8 socket, 4-pin, P-coded, shielded
Cable length per port	max. 75 m
Output current	U <sub>S</sub> : max. 3 A sum current for both ports U <sub>P</sub> : max. 3 A per port
Output current limitation	U <sub>S</sub> : 3.3 A sum current for both ports U <sub>P</sub> : 3.3 A U <sub>P</sub> per port
Output power limitation	U <sub>S</sub> : 100 W in total for both ports U <sub>P</sub> : 100 W per port

Environmental conditions	
Operating temperature	0 ... 50 °C
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 300 V
Maximum installation altitude	2000 m

Standards, approvals	
Device safety	conforms to EN 61010-2-201
EMC immunity/emission	conforms to EN IEC 61000-6-2 / EN IEC 61000-6-4
Vibration/shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27
Approvals	CE, UL in preparation

Housing data	
Width (slots)	1
Height (rows)	1
Dimensions W × H × D	50 mm × 110 mm × 74.5 mm 50 mm × 110 mm × 72 mm (housing only)
Material	Zinc die-cast and aluminum die-cast
Cooling	Convection
Weight	510 g
Installation position	Vertical. See system manual, chapter "Installation conditions".

## 4 Software functions

Software functions are the functions of a module's firmware that a controller can access via EtherCAT.

### Functionality

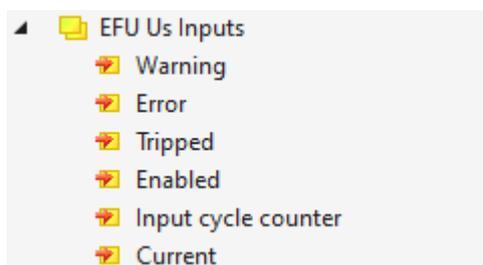
The following descriptions document the full range of software functions at the time of publication of this manual. The range of functions that can actually be used depends on the firmware version of a module.

## 4.1 Electronic fuse

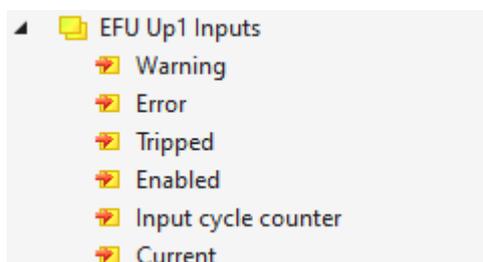
### 4.1.1 Process data objects EFU inputs

Some process data objects may be disabled in the delivery state. You can enable them via the Predefined PDO Assignments.

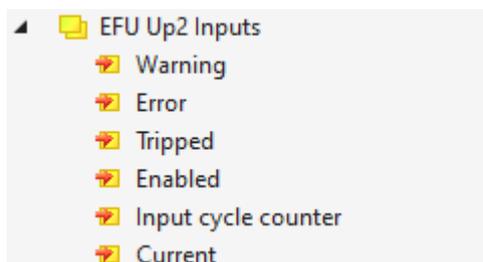
#### EFU Us Inputs



#### EFU Up1 Inputs



#### EFU Up2 Inputs



**EFU Device Inputs**

- ▲  EFU Device Inputs
  -  Error
  -  Warning
  -  Undervoltage Us
  -  Undervoltage Up
  -  Overtemperature Warning
  -  Diag
  -  Input cycle counter
  -  Total Current

**EFU Device Info Data**

- ▲  EFU Device Info Data
  -  Temperature
  -  Voltage Us
  -  Voltage Up

## 4.1.2 Process data objects EFU Outputs

Some process data objects may be disabled in the delivery state. You can enable them via the Predefined PDO Assignments.

### EFU Us Outputs

- ▲  EFU Us Outputs
  -  Enable
  -  Control via Process Data
  -  Reset

### EFU Up1 Outputs

- ▲  EFU Up1 Outputs
  -  Enable
  -  Control via Process Data
  -  Reset

### EFU Up2 Outputs

- ▲  EFU Up2 Outputs
  -  Enable
  -  Control via Process Data
  -  Reset

### EFU Device Outputs

- ▲  EFU Device Outputs
  -  Global Reset

## 4.2 Process data objects WcState and InfoData

### WcState



### InfoData



## 5 Mechanical installation



### Required tools

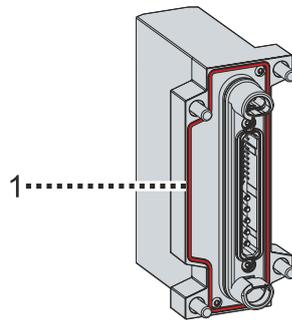
- Torx T25 screwdriver
- Torque wrench 5 Nm

### 5.1 Preparation

#### NOTICE

#### Check the module for damage

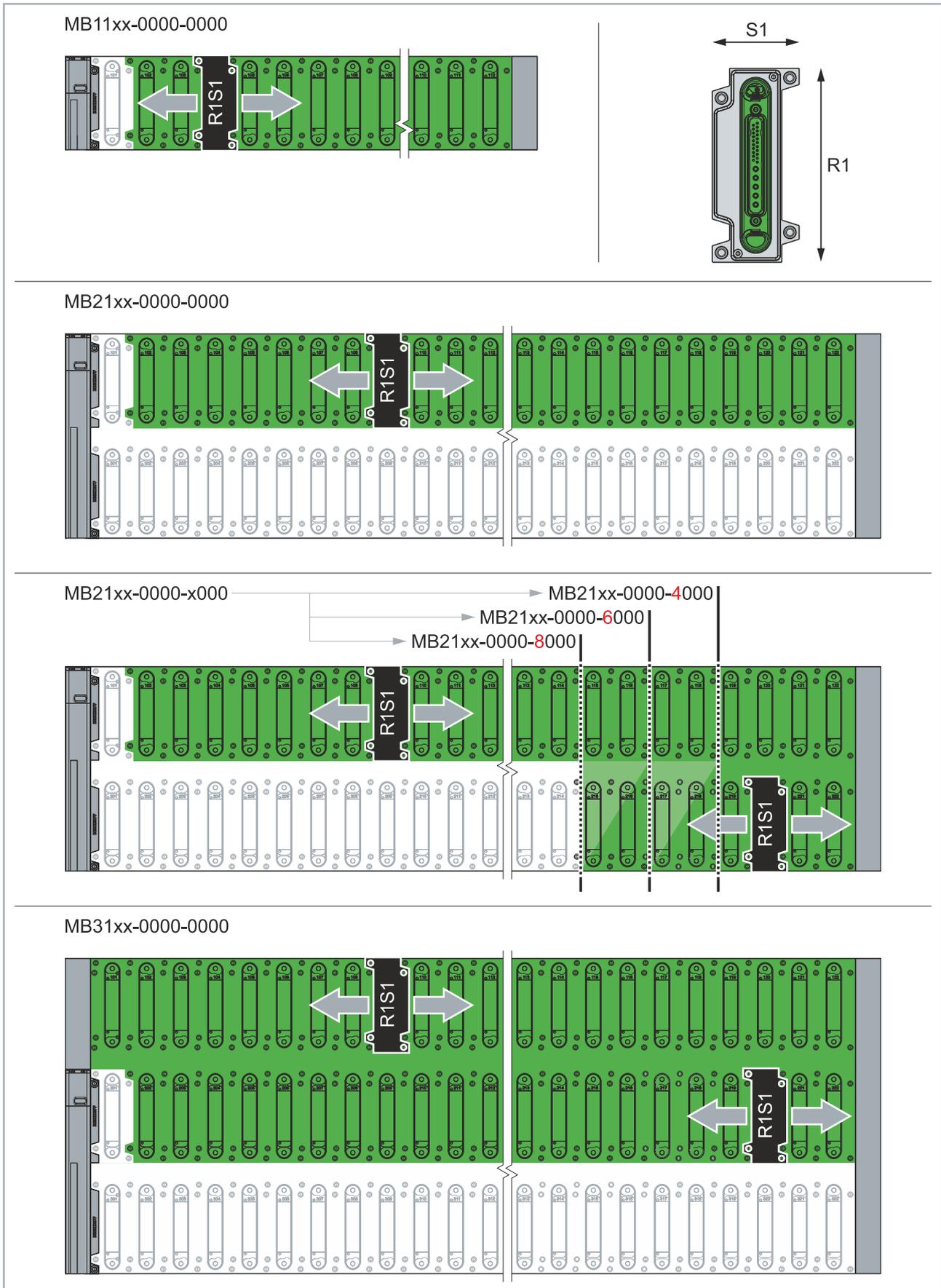
If the seal is worn or damaged, liquids and dirt can penetrate and damage the MX-System. The IP67 protection rating is not met if the seals are worn or damaged.



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

## 5.2 Placement of the module on the baseplate

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



## 5.3 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 assemble 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 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.

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.

## 6 Connection

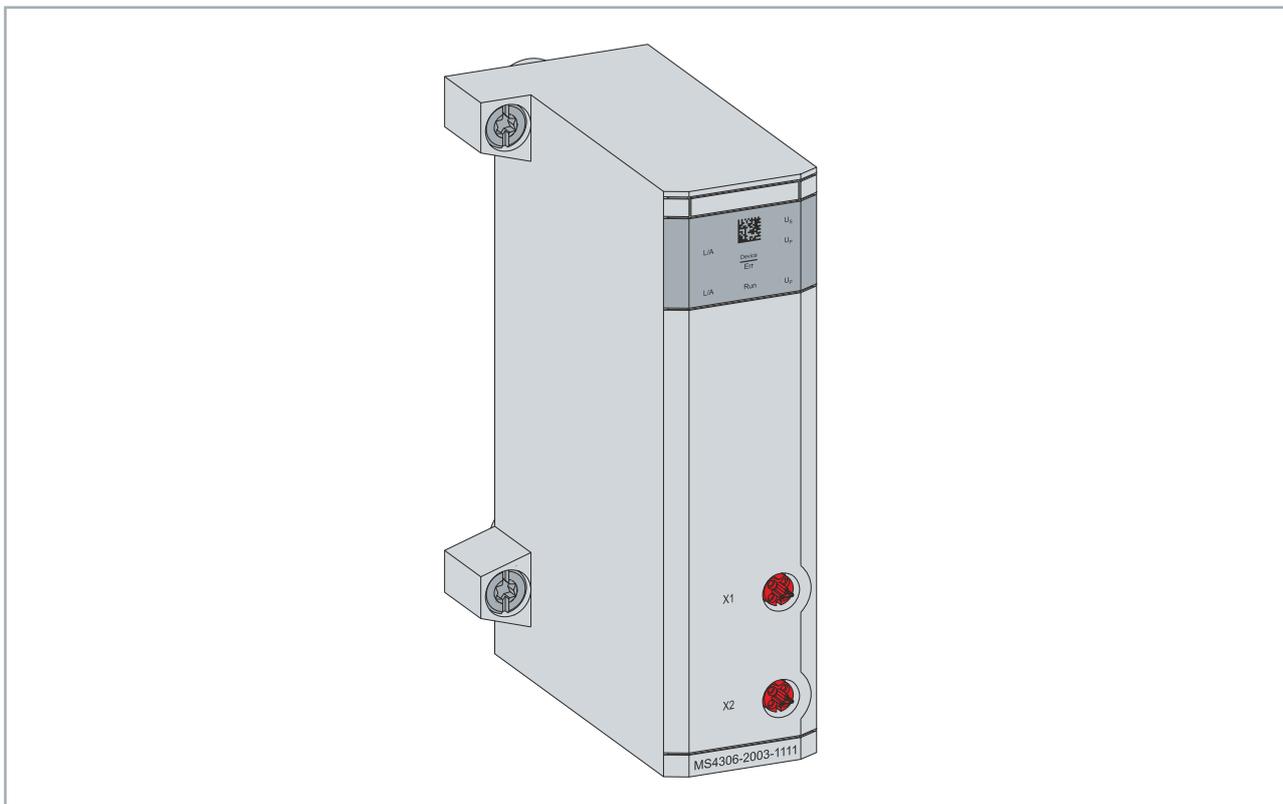
### NOTICE

#### Defect caused by hot plug

If cables are connected or disconnected during operation, damage to property is possible.

- Only connect or disconnect cables when all supply voltages have been shutdown.

#### Power output



The EtherCAT P outputs are 4-pin P-coded M8 connectors.

#### Pin assignment X1, X2

M8 connector	Pin	Signal	Function
	1	Rx+ / GNDS	--
	2	Tx+ / GNDP	--
	3	Tx- / UP	--
	4	Rx- / US	--

The cable shield is connected via the thread.

**Required tools**

- Torque wrench, e.g. ZB8801 [ + ] Torque wrench for hexagonal plugs, adjustable 0.4...1.0 Nm

**Connector**

1. Lock the M8 connector
2. Observe tightening torques:

Components	Tightening torques [Nm]
M8 connector	0.4

**Protective caps****NOTICE****Defect due to unsealed connectors**

The IP67 protection rating is only guaranteed if connectors are connected to all M8 connectors and unused M8 connectors are closed with protective caps.

- Cover unused connectors with protective caps.

1. Close unused connectors with a protective cap

## 7 Commissioning and operation

### NOTICE

#### Danger if operated in an unsuitable environment

Material damage is possible.

- Before commissioning, ensure that the environmental conditions at the place of commissioning and operation are complied with at all times. See environmental conditions in the chapter [Technical data](#) [▶ 17].

### 7.1 Requirements

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

### 7.2 Commissioning

- Switch on the external supply voltage
- Parameterize the functions of the module if required

### 7.3 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



## 8 Decommissioning

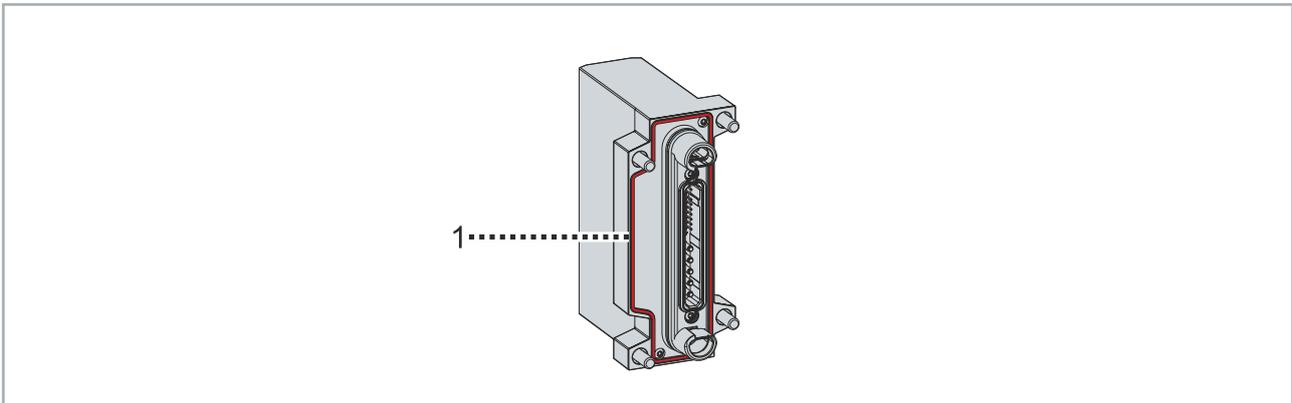
### 8.1 Disassembly

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

Further information can be found in chapter [Notes on the documentation](#) [► 5].

1. Remove Cables
2. Loosen all mounting screws of the module
3. Take the module off the baseplate
4. Transport the module to the workplace or storage place

Further information can be found in the chapter [Technical data](#) [► 17] and in the system manual in the chapter "Disassembly".



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

Further information can be found in chapter [Accessories](#) [► 32].

### 8.2 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.

## 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 Support and Service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

### Download finder

Our [download finder](#) contains all the files that we offer you for downloading. You will find application reports, technical documentation, technical drawings, configuration files and much more.

The downloads are available in various formats.

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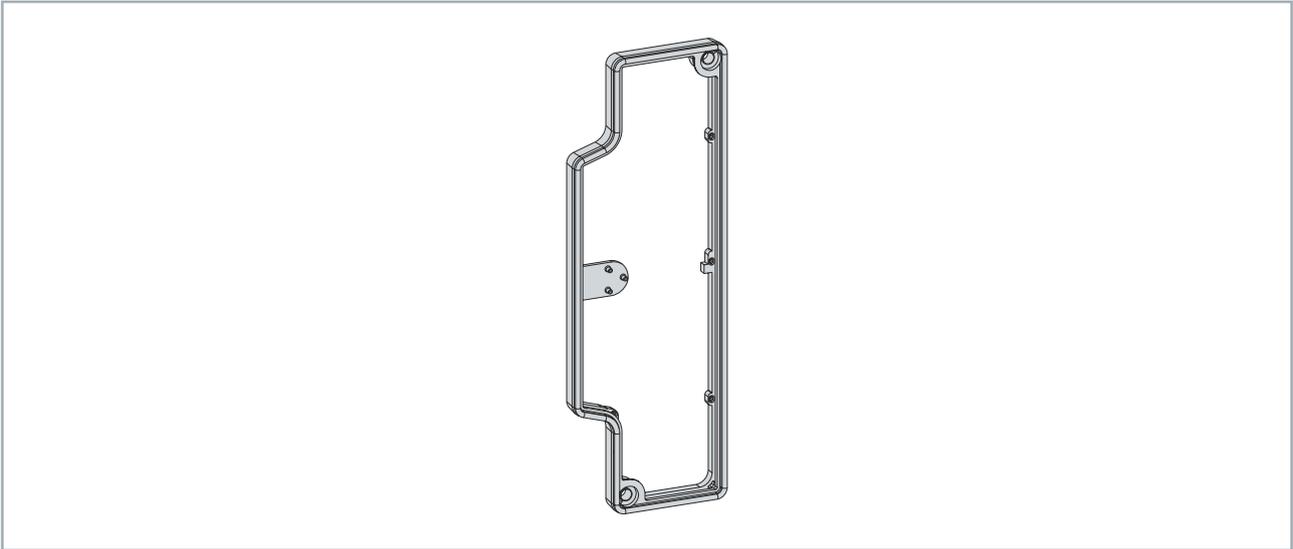
## 9.3 Accessories

Suitable accessories can be found on the product website:

<https://www.beckhoff.com/ms4306-2003-1111>

The following items are also available for replacing worn parts:

### **MX module base S1R1 with seal**



The module base S1R1 with seal is available for replacing worn and damaged seals on a 1-row MX module with one slot.

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[www.beckhoff.com/ms4306-2003-1111](http://www.beckhoff.com/ms4306-2003-1111)

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