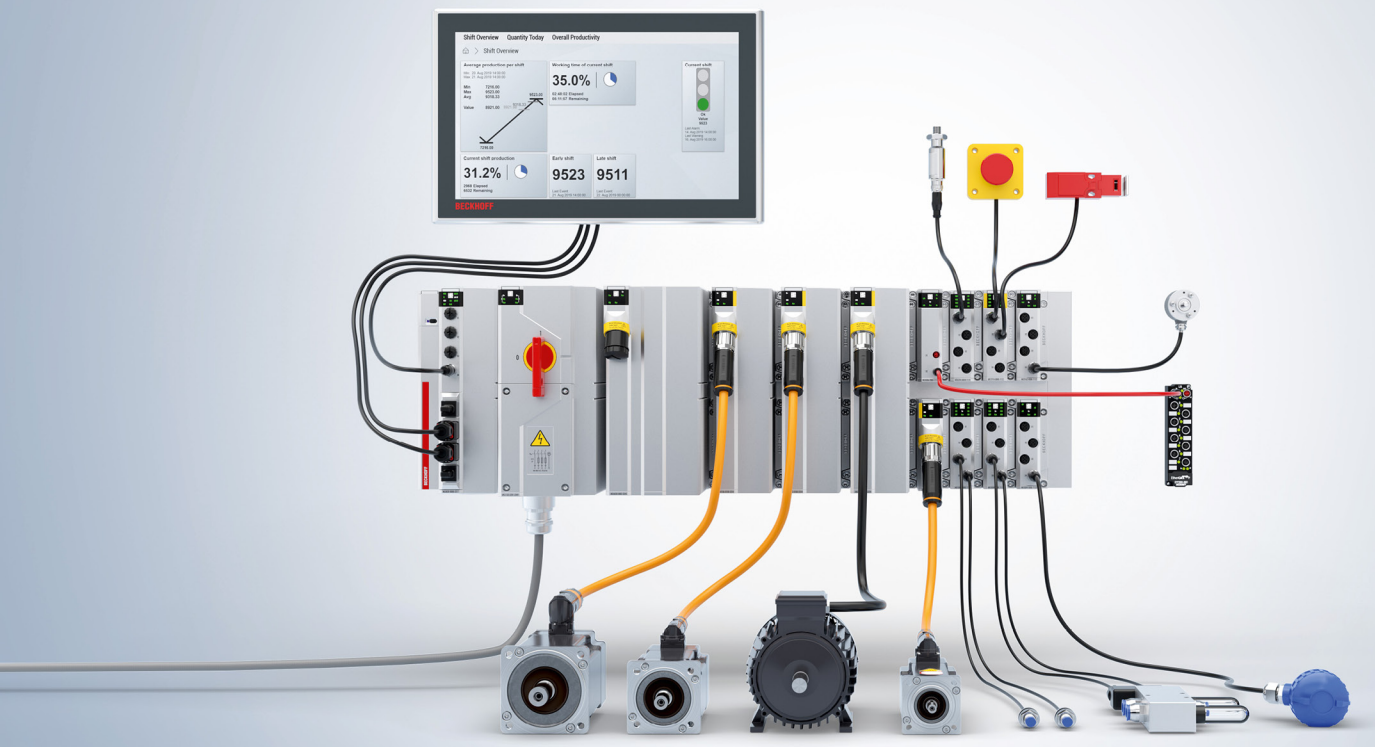
BECKHOFF New Automation Technology

Manual | EN

MO6224-0020-1112

4-channel communication interface, IO-Link, master, Class A, M12



2026-10-28 | Version: 1.0

Table of contents

1 Foreword 5
1.1 Notes on the documentation 5
1.2 For your safety 6
1.3 Intended use 7
2 Product overview 8
2.1 Product functions 10
2.2 Block diagram 11
2.3 Type key 12
2.4 Status display 13
2.5 Dimensions 14
3 Technical data 15
4 Software functions 16
5 Mechanical installation 19
5.1 Preparation 19
5.2 Placement of the module on the baseplate 20
5.3 Mounting the module 21
6 Connection 22
7 Commissioning and operation 23
8 Decommissioning 24
8.1 Disassembly 24
8.2 Disposal 24
9 Appendix 25
9.1 Manual version history 25
9.2 Accessories 25
9.3 Support and Service 26

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.

Trademarks

Beckhoff®, ATRO®, EtherCAT®, EtherCAT G®, EtherCAT G10®, EtherCAT P®, MX-System®, Safety over EtherCAT®, TC/BSD®, TwinCAT®, TwinCAT/BSD®, TwinSAFE®, XFC®, XPlanar® and XTS® are registered and licensed trademarks of Beckhoff Automation GmbH.
If third parties make use of the designations or trademarks contained in this publication for their own purposes, this could infringe upon the rights of the owners of the said designations.





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

Copyright

© Beckhoff Automation GmbH & Co. KG, Germany.
The distribution and reproduction of this document, as well as the use and communication of its contents without express authorization, are prohibited.
Offenders will be held liable for the payment of damages. All rights reserved in the event that a patent, utility model, or design are registered.

Third-party trademarks

Trademarks of third parties may be used in this documentation. You can find the trademark notices here: https://www.beckhoff.com/trademarks.

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

Intended use of an MX-System

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

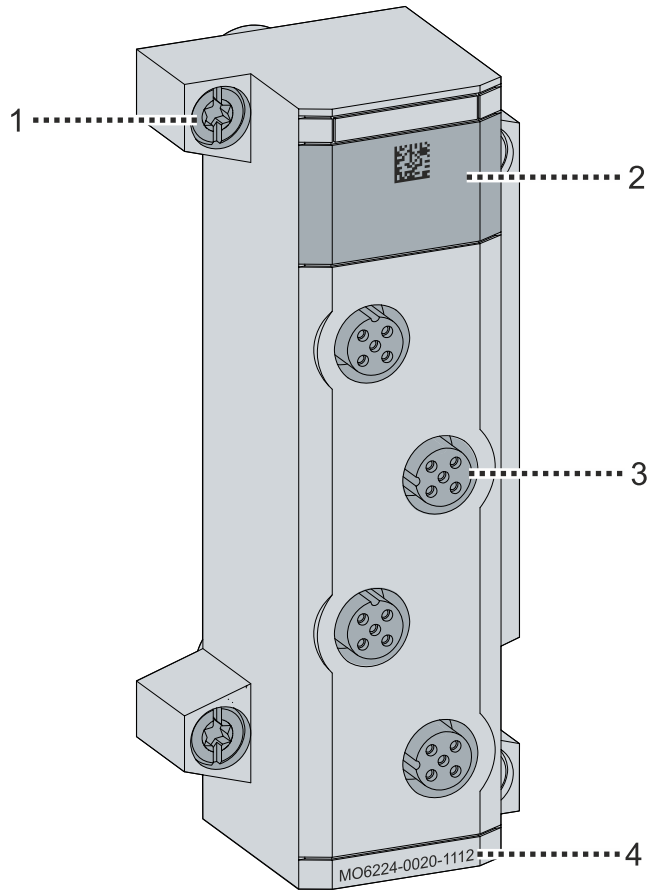
The electrical wiring must be permanent wiring.

Improper use

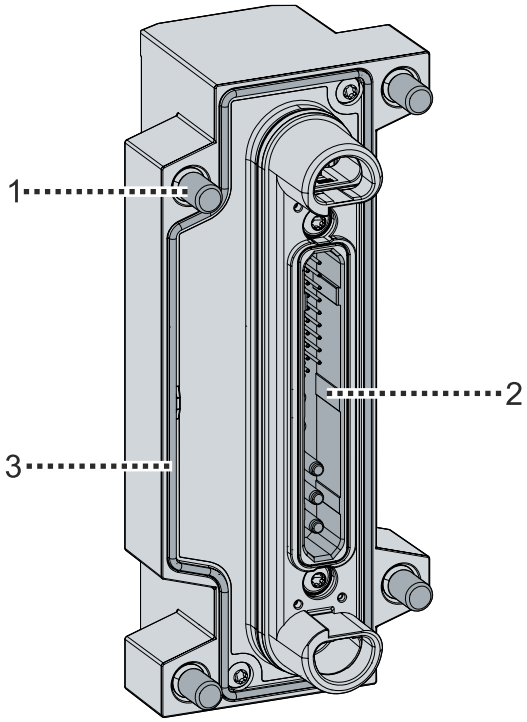
Improper use is not permitted and will result in the exclusion of liability on the part of Beckhoff Automation GmbH & Co. KG.

2 Product overview

The MO6224-0020-1112 enables the connection of up to four IO-Link devices. The parameterization of the IO-Link devices with service data can take place from within TwinCAT via ADS or, conveniently, via the integrated IO-Link configuration tool. The signal state is shown on the display and the IO-Link devices are connected via an M12 connector for each channel.



Position	Name
1	Fastening screw, captive, 4 x
2	Status display
3	IO-Link Class A connection, 4 x
4	Module name



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

2.1 Product functions

2.1.1 IO-Link Class A

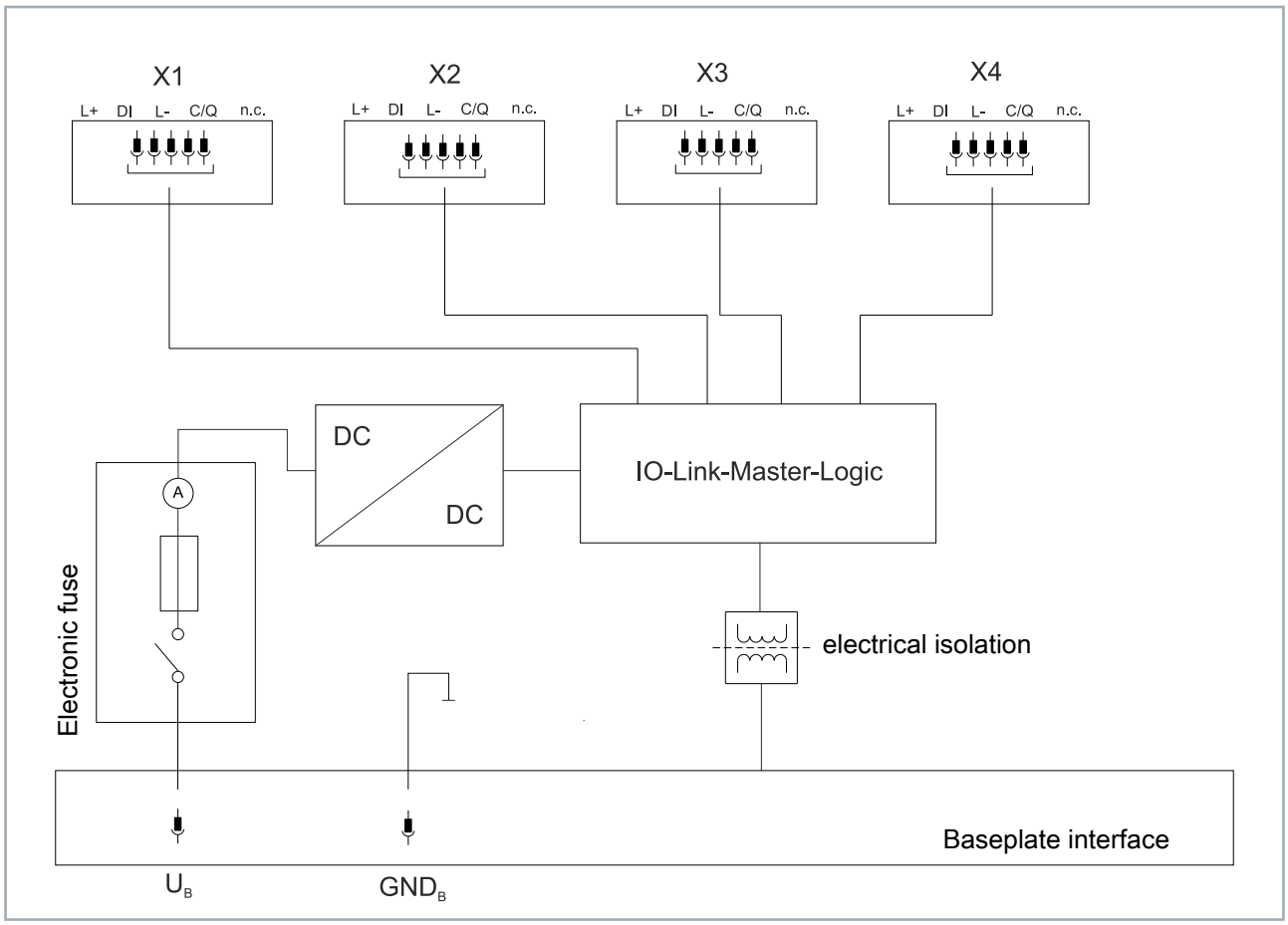
The four ports on the MO6224-0020-1112 conform to IO-Link port Class A. Each port provides both the power supply for the sensor electronics and an IO-Link communication channel. IO-Link communication takes place via the C/Q connection (pin 4).

Class A ports are particularly well-suited for IO-Link sensors and IO-Link devices with low power requirements. Class B ports are intended for devices that require an additional, separate actuator supply. The MO6224-0020-1112 does not provide this.

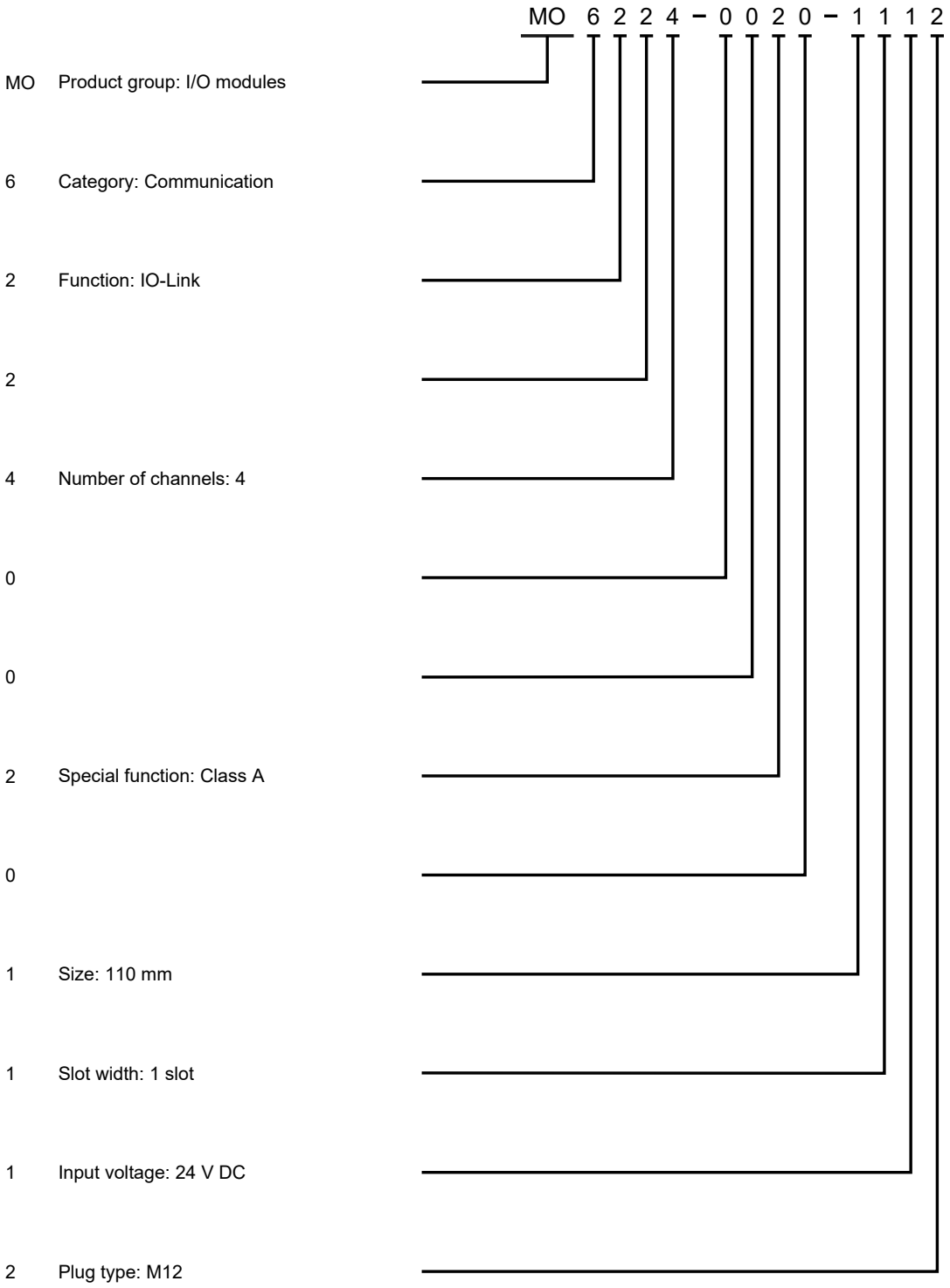
Port operation modes

Each of the four ports can be used to communicate with an IO-Link device. Depending on the configuration and the connected device, a port can alternatively be operated as a digital input or a digital output in standard I/O mode. IO-Link communication mode and standard I/O mode cannot be used simultaneously on the same port. The current operating and communication status of each port is provided via the process data **State Ch. 1** through **State Ch. 4**. In addition, digital inputs are available via **pin 2** on the four M12 connectors. The signal states are provided in the process image via the process data **Pin2 Ch1** through **Pin2 Ch4**.

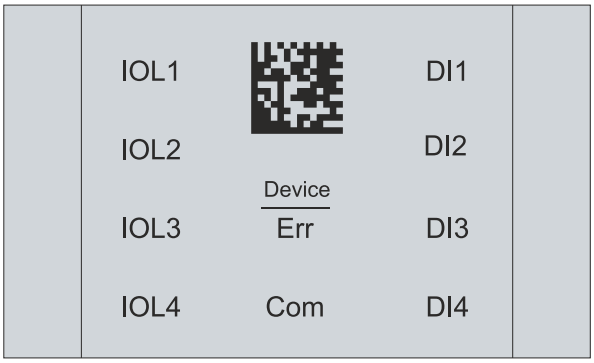
2.2 Block diagram



2.3 Type key


MO 6 2 2 4 – 0 0 2 0 – 1 1 1 2
MO Product group: I/O modules
6 Category: Communication
2 Function: IO-Link
2
4 Number of channels: 4
0
0
2 Special function: Class A
0
1 Size: 110 mm
1 Slot width: 1 slot
1 Input voltage: 24 V DC
2 Plug type: M12

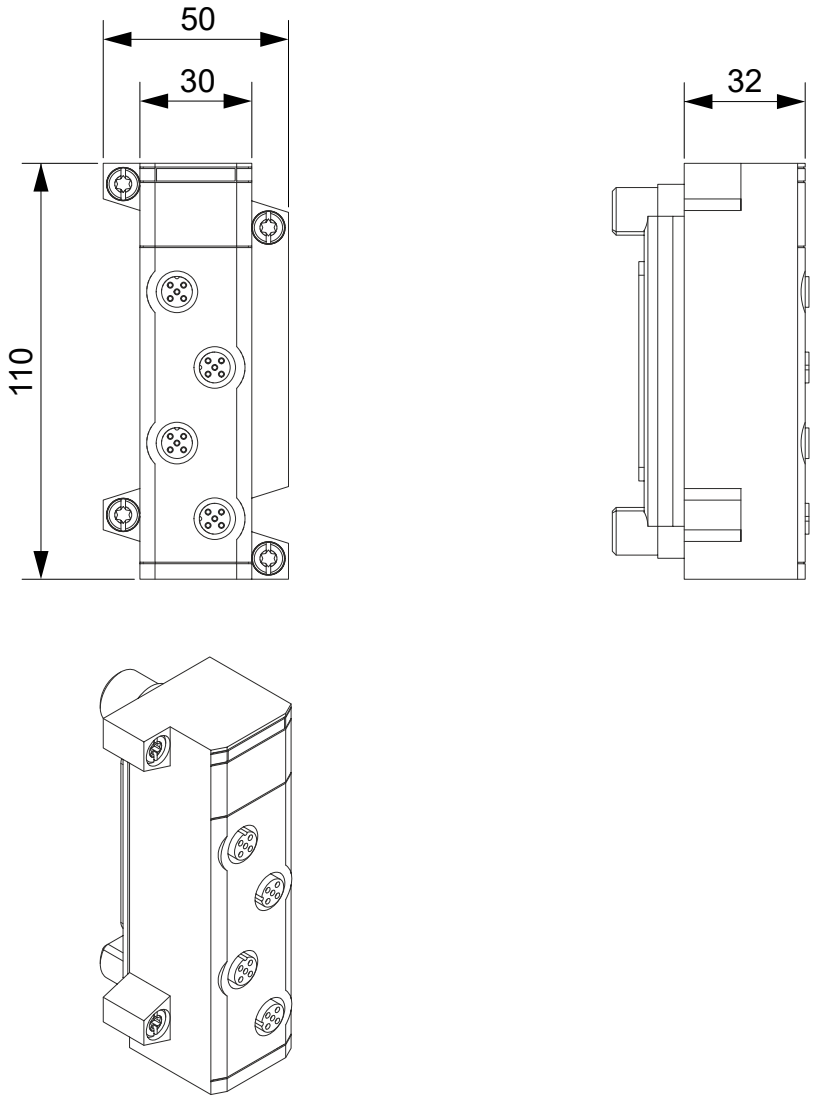
2.4 Status display



LED	State	Meaning
	-	Beckhoff Identification Code as Data Matrix code
IOL1…IOL4	off	Signal state 0 in standard input/output mode
	flashes green briefly 2x	Establishing IO-Link communication
	flashes green	IO-Link communication is established and in function
	lights up green	Signal state 1 in standard input/output mode
Device | Err	off	There are no active error messages.
	lights up red	There are active error messages. You can find more detailed information in TwinCAT.
Com	off	EtherCAT communication status: Initialization Initial state after switching on. The device is detected and initialized; no process data exchange is taking place yet.
	flashes green	EtherCAT communication status: Pre-Operational The device is configurable. Mailbox communication (e.g., CoE/ SDO accesses) is possible, but process data is not yet being transmitted.
	green single flash	EtherCAT communication status: Safe-Operational Configuration is now complete. The device receives and processes process data; however, the outputs remain in a safe state and are not yet activated.
	lights up green	EtherCAT communication status: Operational Normal operating state. Full cyclic process data exchange; inputs and outputs are active.
	flickers green	EtherCAT communication status: Bootstrap Special maintenance mode for firmware updates. Normal process data communication is not possible.
DI1…DI4	off	A low level is present at the digital inputs.
	lights up green	A high level is present at the digital inputs.

2.5 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
Fieldbus	EtherCAT
Distributed clocks	yes

IO-Link Master	
Connection	4 x M12 socket, A-coded
Rated output voltage	24 V DC (-15%…+20%)
Max. output current for the entire module	4 A
Max. output current per IO-Link port	0.5 A
Transmission type	serial
Transmission rate	4.8/38.4/230.4 kBaud
Cable length	Max. 20 m

Housing data	
Width (slots)	1
Height (rows)	1
Dimensions W × H × D	50 mm × 110 mm × 33 mm 50 mm × 110 mm × 32 mm (housing only)
Material	Zinc die-cast and aluminum die-cast
Cooling	Convection
Installation position	Vertical. See system manual, chapter "Installation conditions".
Weight	Approx. 320 g

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

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
Maximum installation altitude	2000 m

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.

Process data objects

Process data objects (PDOs) are used for the cyclic transmission of process data between the EtherCAT MainDevice and EtherCAT SubDevice. The data is exchanged at fixed intervals as part of the real-time cycle and serves as the basis for control and monitoring of field devices. PDOs typically contain input and output data required for the direct operation of a device. Cyclic transfer ensures a continuous and deterministic data exchange.

Inputs Profile Digital Inputs

Variable	Type	Description
Pin2 Chx	BIT	0 = A low level is present on the corresponding channel. 1 = A high level is present on the corresponding channel.

Inputs Profile EFU (Ux) Inputs (IO)

Variable	Type	Description
Warning	BIT	0 = No switch-on operation is in progress, and no triggering of the electronic fuse is currently reported. 1 = The electronic fuse is being switched on or has triggered. The bit is automatically reset (self-acknowledging).
Error	BIT	0 = No pending error in the electronic fuse that requires acknowledgment, and no watchdog error. 1 = The electronic fuse could not be reactivated after the configured auto-retry attempts were completed, or a watchdog error occurred. Reset via a rising edge at **Reset**.
Tripped	BIT	0 = The electronic fuse has not triggered. 1 = The electronic fuse has triggered due to the protection limit.
Enabled	BIT	0 = The electronic fuse is turned off; there is no output voltage. 1 = The electronic fuse is turned on and the output voltage is present.
Input Cycle Counter	BIT2	A 2-bit counter that increments when the TxPDO data is updated.
Current	REAL	Current in amperes flowing through the electronic fuse.

Inputs Profile DeviceState Inputs

Variable	Type	Description
State Chx	USINT	0x_0 = Port disabled 0x_1 = Port in standard Dig-In mode 0x_2 = Port in standard Dig-Out mode 0x_3 = Port in OP communication mode 0x_4 = Port in COMSTOP communication mode 0x1_ = Watchdog detected 0x2_ = Internal error 0x3_ = Invalid device ID 0x4_ = Invalid manufacturer ID 0x5_ = Invalid IO-Link version 0x6_ = Invalid frame capability 0x7_ = Invalid cycle time 0x8_ = Invalid PD input length 0x9_ = Invalid length of the PD output 0xA_ = No device detected 0xB_ = Error during pre-operation

Inputs Profile DeviceState Inputs_1

Variable	Type	Description
Device Diag	BIT	0 = No pending diagnostic messages. 1 = There are new diagnostic messages.
Device State	BIT	0 = Communication with all connected or configured IO-Link devices is working properly. Communication has not been interrupted. 1 = Communication with at least one IO-Link device has been interrupted, or device communication is not operational.

Outputs Profile EFU (Ux) Outputs (IO)

Variable	Type	Description
Enable	BIT	0 = The electronic fuse is disabled. 1 = The electronic fuse is activated. Becomes active only if the process data output is set to **Control via Process Data**.
Control via Process Data	BIT	0 = The output state is determined by the **Default State** parameter of the electronic fuse. The process data bit **Enable** is not evaluated. 1 = The output state is controlled via the process data bit **Enable**. **Enable** = 1 requests the output driver to turn on; **Enable** = 0 turns it off. The electronic fuse's protective function remains active.
Reset	BIT	0 = No error acknowledgment. 1 = An error is acknowledged on a rising edge.

WcState

WcState indicates whether an EtherCAT SubDevice correctly participated in the cyclic process data exchange during the last bus cycle.

Variable	Type	Description
WcState	BIT	0 = data is valid 1 = data is invalid
InputToggle	BIT	A 1-bit counter that increments after each cycle

InfoData

InfoData indicates which diagnostic and status information an EtherCAT SubDevice provides.

Variable		Type	Description
State		UINT	0x___1 = EtherCAT SubDevice in INIT state 0x___2 = EtherCAT SubDevice in PREOP state 0x___3 = EtherCAT SubDevice in BOOT state 0x___4 = EtherCAT SubDevice in SAFEOP state 0x___8 = EtherCAT SubDevice in OP state 0x001_ = EtherCAT SubDevice reports an error 0x002_ = Invalid vendor ID, product code x read 0x004_ = Initialization error occurred 0x008_ = EtherCAT SubDevice disabled 0x010_ = EtherCAT SubDevice not present 0x020_ = EtherCAT SubDevice reports a connection error 0x040_ = EtherCAT SubDevice reports no connection 0x080_ = EtherCAT SubDevice reports an unexpected connection 0x100_ = Communication Port A 0x200_ = Communication Port B 0x400_ = Communication Port C 0x800_ = Communication Port D
AdsAddr		AMSADDR	Full ADS address for accessing the EtherCAT SubDevice (mailbox)
	netId	AMSNETID	unique network address
	port	WORD	Internal ADS port number of the EtherCAT device
AoeNetId		AMSNETID	The EtherCAT SubDevice contains an ADS router with this NetId.

5 Mechanical installation

Required tools

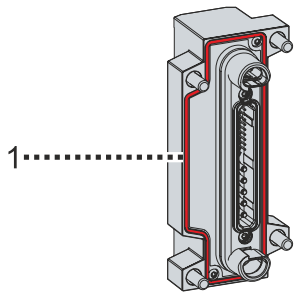
- Torx T25 screwdriver
- Torque wrench 5 Nm

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 IP65/IP67 protection rating is not met if the seals are worn or damaged.

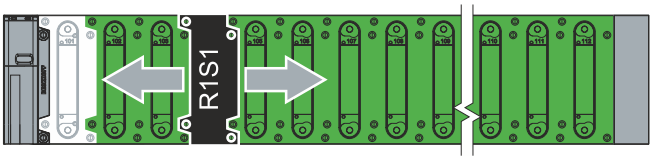


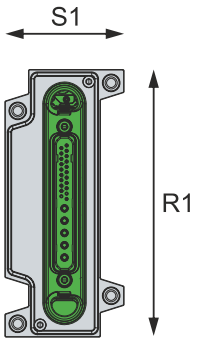
1. Check the seal [1] of the module for wear and damage
2. Replace worn and damaged seals

5.2 Placement of the module on the baseplate

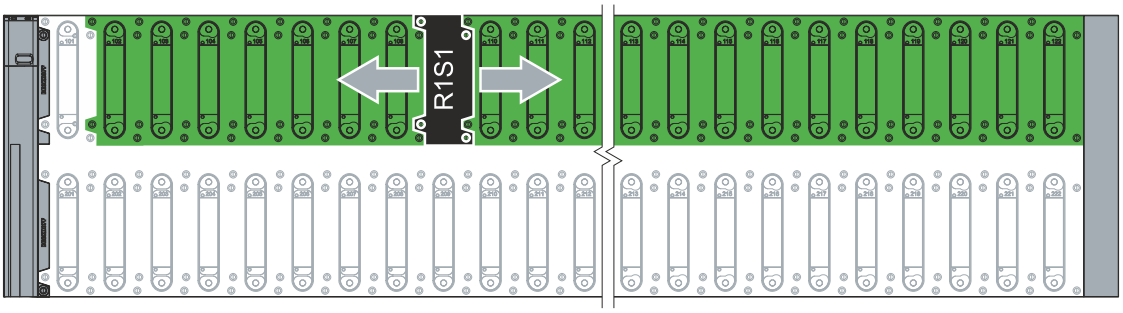
The module can be plugged into the following areas marked in green:

MB11xx-0000-0000

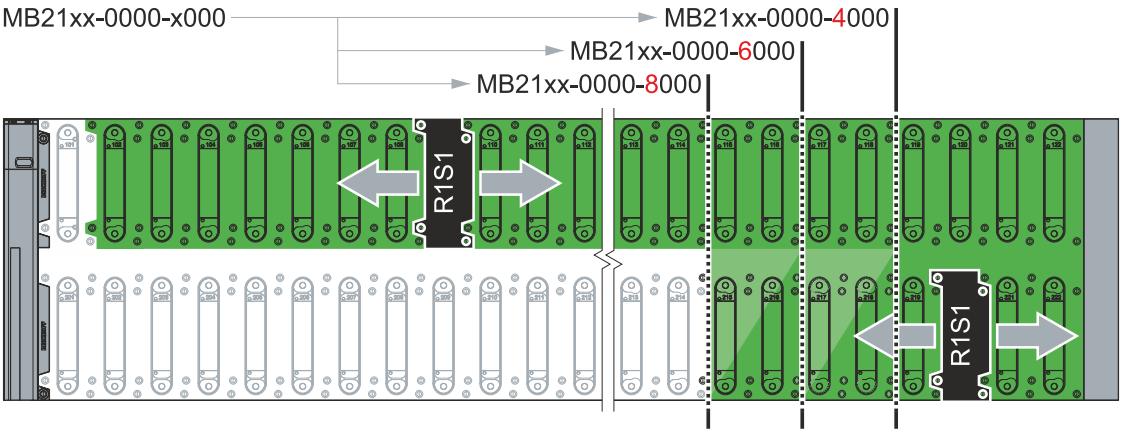




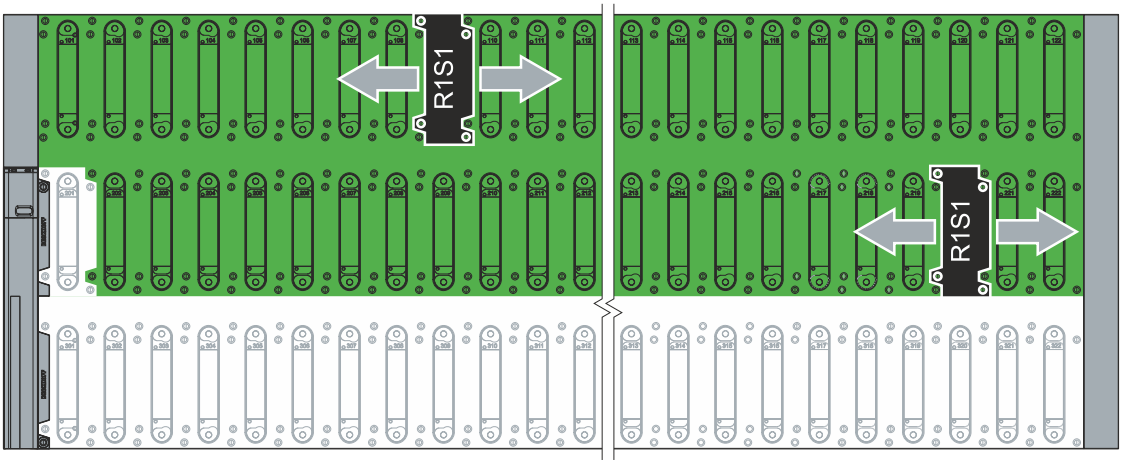
MB21xx-0000-0000



MB21xx-0000-x000



MB31xx-0000-0000



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 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.

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

PELV voltage source

The module must be powered by a PELV voltage source.

NOTICE

Use EtherCAT/Ethernet cables indoors only

EtherCAT or Ethernet cables must not be run outside buildings.

NOTICE

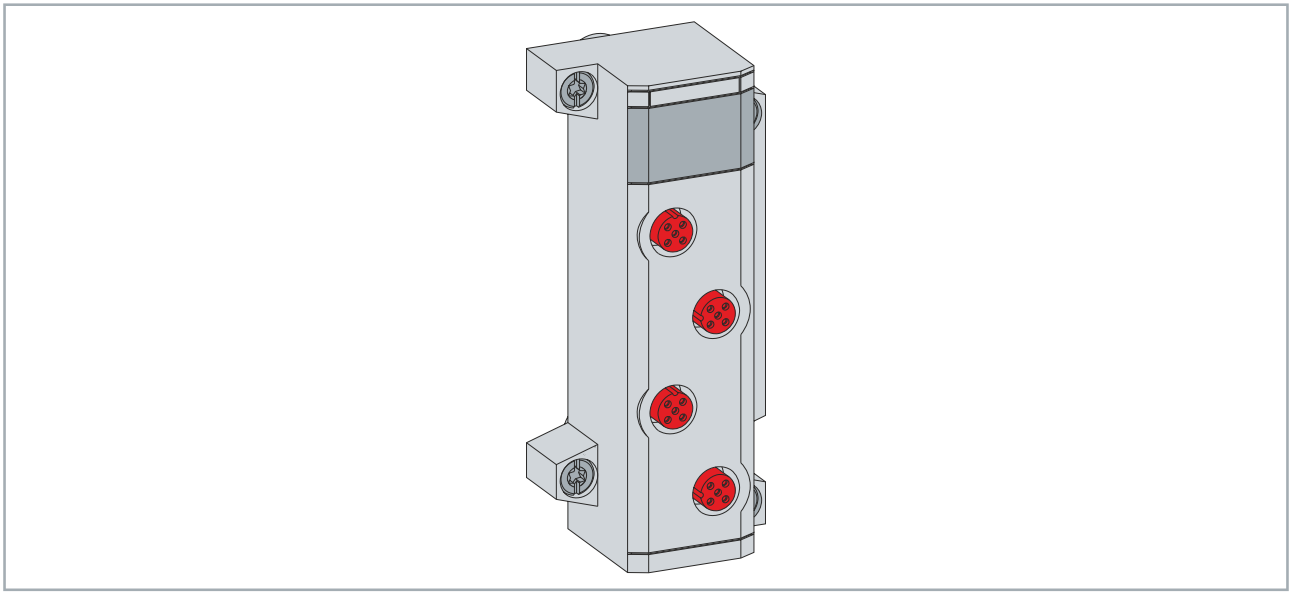
Cover unused sockets with protective caps

IP67 protection rating is only guaranteed if plugs are connected to all sockets and unused sockets are covered with protective caps.

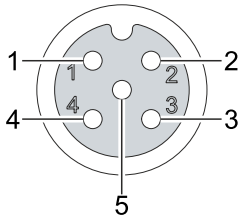
Tested with a UL-listed circuit breaker (without current limiting) rated at 20 A.

6.1 IO-Link Ports Class A

The IO-Link ports are 5-pin M12 sockets, A-coded, compatible with 4-pin and 5-pin M12 connectors.



Tightening torque: 0.6 Nm

M12 socket, A-coded	Pin	Symbol	Function
	1	L+	Logic supply Supply voltage
	2	DI	Digital input
	3	L-	GND to pin 1
	4	C/Q	IO-Link data cable
	5	n. c.	not used

7 Commissioning and operation

NOTICE

Damage to property due to operation in an unsuitable environment

Before commissioning, ensure that the environmental conditions at the place of commissioning and operation are complied with at all times.

1. Plug the module onto a baseplate.
2. Screw the module onto the baseplate.
3. Wire the module.
4. Switch on the external supply voltage.

8 Decommissioning

8.1 Disassembly

NOTICE

Damage to property due to electrical voltage

Disassembling this module under voltage can lead to material damage.

- Switch off the supply voltage before disassembling.

✓ 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.

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	• First release

9.2 Accessories

Suitable accessories can be found on the product website:

www.beckhoff.com/MO6224-0020-1112

Product	Description
ZMX1000-0010	M5x17.5 combi-TX25 replacement screws for module fastening (PU = 10 pcs.)
ZMX3001-0011	1-row, 1-slot replacement seal for module base
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
ZMX4001-0003	Replacement cover for MA6060 interface
ZS5000-0020	Protective cap for M12 socket, plastic, black, IP65/67

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

Download finder

The Download finder serves as a central source for downloadable documents and files related to Beckhoff products, such as application reports, technical documentation, drawings, and configuration files.

Beckhoff Information System

The Beckhoff Information System is the central online documentation resource for Beckhoff products and contains documentation on products and automation topics, as well as sample code.

Beckhoff Headquarters

Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl, Germany

☎ Phone:	+49 5246 963-0
✉ Email:	info@beckhoff.com
Web page:	www.beckhoff.com

Trademark statements

Beckhoff®, ATRO®, EtherCAT®, EtherCAT G®, EtherCAT G10®, EtherCAT P®, MX-System®, Safety over EtherCAT®, TC/BSD®, TwinCAT®, TwinCAT/BSD®, TwinSAFE®, XFC®, XPlanar® and XTS® are registered and licensed trademarks of Beckhoff Automation GmbH.

Third-party trademark statements

IO-Link is a registered trademark of PROFIBUS Nutzerorganisation e.V.

More Information:
www.beckhoff.com/MO6224-0020-1112

Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl
Germany
Phone: +49 5246 9630
info@beckhoff.com
www.beckhoff.com