Operating manual

iDM-MCU
Master Control Unit (MCU)

iDM System with LJU communication

Table of contents

1 Information on the description

1.1 Revision history

We reserve the right to make changes to the information present in this document, which result from our constant effort to improve our products.

Version	Date	Comment/reason for change
11	04.2019	Complete revision
12	06.2019	Added EtherCAT extension with media converters CU1521
13	09.2020	Structure of the chapters has changed
14	02.2021	New: MCU-4PN and MCU-4PN+ECR
15	03.2021	Adaptation of SyMa/Service interfaces
16	05.2021	Installation data corrected
17	08.2022	Conductix-Wampfler Automation GmbH

1.2 How to use and store the description

To work safely with the product, it is necessary to observe the safety notes and action instructions. All persons working with the product must have understood the user information in this description and apply it conscientiously. The operator must fulfil his duty of care and ensure that all persons working with the product have read and understood the user information and are implementing it.

This description forms part of the product and must be accessible to all persons working with the product at all times.

1.3 Applicable documents

The documents contained in the project documentation also apply if the device / system is part of a project-specific system plan.

Their own documentation applies to connected devices and components.

1.4 Copyright protection

The contents, texts, drawings, pictures and other illustrations of this description are protected by copyright and subject to intellectual property rights. Any misuse is punishable by law.

Reproduction in whole or in part of this description is only permitted within the limits of the legal provisions of the copyright law. Any modification or shortening of the text is prohibited without the explicit written consent of Conductix-Wampfler Automation GmbH.

1.5 Illustrations

The illustrations that accompany this description have been purposely selected. They are provided for basic understanding and may differ from the actual design. No claims shall be accepted for possible discrepancies.

1.6 Picture credits and brands

Picture credits   Pictures marked with [BN]:

- Source: Beckhoff Automation GmbH & Co. KG
- Partly edited pictures

Trademarks   The popular names, trade names, production descriptions, etc. used in this description may constitute trademarks even without special designations and as such may be subject to legal requirements.

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

2 Warranty and liability

2.1 Warranty

The warranty only covers production defects and faulty components.

The manufacturer assumes no responsibility for damages caused during transport or unpacking. In no case and under no circumstances will the manufacturer be liable for defects or damages caused by misuse, incorrect installation or inadequate environmental conditions or from dust or corrosive substances.

Consequential damages are excluded from the warranty.

Should you have further questions regarding the warranty, please contact the supplier.

2.2 Limitation of liability

All information and notes in this description have been compiled taking into account the applicable standards and regulations, the state of the art and our many years of knowledge and experience.

Conductix-Wampfler Automation GmbH assumes no liability for damage and malfunctions during operation due to:

- Failure to comply with the description
- Non-intended use
- Use by untrained personnel
- Unauthorised alteration or modification
- Use of the product, despite negative transport inspection

Furthermore, Conductix-Wampfler Automation GmbH's warranty obligation will cease to exist in case of a failure to comply with the description.

3 Safety instructions

This section contains information on all safety aspects for optimum protection of personnel and for safe operation without malfunctions.

To prevent dangers, these notes must be read and followed by personnel. Only then can safe operation be guaranteed.

Of course, all legally applicable general safety and accident prevention regulations must be complied with.

Conductix-Wampfler Automation GmbH assumes no liability for damage or accidents that were caused by non-observance of these safety notes.

3.1 Warning concept

This description contains notes that must be observed for your own personal safety and to avoid property damage. Notes regarding your personal safety are highlighted by a warning triangle; notes regarding property damage do not have a warning triangle.

When several hazard levels occur, the warning always refers to the highest level. If a warning of injury to persons is indicated with a warning triangle, the same warning might include an additional warning of property damage.

3.1.1 Arrangement of warnings

If warnings refer to an entire section, they are placed at the beginning of the section (e.g. chapter start).

If warnings refer to a specific action instruction, they are placed in front of the respective action instruction.

3.1.2 Structure of warnings

- ■ **SIGNAL WORD**
- ■ ↳ Type of danger and its source
- ■ ↳ Possible consequences, if not observed
- ■ ↳ Danger avoidance measures
- ■ ↳ Preventive measures

3.1.3 Signal words

Warnings are indicated using signal words based on hazard levels.

Signal word		Meaning
⚠️	⚠️**WARNING!**	This combination of symbol and signal word indicates a possible dangerous situation that can result in death or serious injury if it is not avoided.
!	**NOTICE!**	This combination of symbol and signal word indicates a possible dangerous situation that can result in material damage if it is not avoided.
🜊	**ENVIRONMENT!**	This combination of symbol and signal word indicates a possible dangerous situation that can result in environmental damage if it is not avoided.

3.1.4 Hazard symbols

Warnings of the groups 'danger' and 'warning' are content-based. They are presented with clear danger symbols.

Warnings of the 'caution' group do not have a specific danger symbol.

Warning signs	Type of danger
⚡	Warning – high-voltage.
⚠️	Warning – danger zone.

3.1.5 Suggestions and recommendations

ℹ️ | *This symbol indicates important information to help you handle the product.*

3.2   Intended use

The Master Control Unit (MCU) has been designed and constructed exclusively for the intended use described below.

The Master Control Unit (MCU)

- is a device for industrial and commercial systems.
- is used exclusively for the central system administration of an iDM system.
- regulates, controls and manages all components and vehicles within an installed iDM system.
- forms the interface between the system controller and the iDM system.

Intended use assumes compliance with all information in this manual and the applicable documents.

Any use beyond the intended use or other ways of use are considered misuse.

3.3   Foreseeable incorrect use

Any use that goes beyond this description is forbidden.

> ## ⚠ WARNING!
>
> **Hazard from non-intended use!**
> Any use of the device other than and/or beyond the intended use can cause hazardous situations.
>
> - Only use the device as intended.
> - It is paramount to comply with all the specifications and permitted conditions at the place of use.
> - Do not use the device in potentially explosive atmospheres.
> - Do not operate the device in environments with harmful oils, gases, vapours, dusts, radiation, etc.

3.4   Modifications and alterations

For the purpose of avoiding hazards and for ensuring optimum performance, any modifications, additions, or alterations to the device require Conductix-Wampfler Automation GmbH's express consent.

3.5 Responsibility of the operator

The device is used in an industrial environment. The operator of the device is therefore subject to statutory obligations regarding work safety.

In addition to the work safety instructions in this description, the safety, accident prevention and environmental regulations applicable to the area where the device is used must be complied with.

The following applies in particular:

- The operator must familiarise with the applicable work safety regulations and must also determine the dangers that are posed by the particular work conditions at the location of use by means of a risk assessment. This must be realised in the form of operating instructions for operating the device.
- This description must be kept within easy reach of the device and be accessible to those persons charged with working both on and with the device at all times.
- The specifications of the description must be adhered to fully and unconditionally!
- The device may only be operated when in a perfect and operationally safe condition. The device must be checked for detectable defects prior to each time it is put into service.
- The system operator must ensure that the responsibilities for activities on the system are unambiguously defined and only adequately qualified personnel familiar with the operating and safety regulations are working on and with the device.

3.6 Personnel and qualifications

The product / system belonging to this description may only be handled by personnel qualified for the respective task. This is done taking into account the descriptions associated with the particular task, especially the safety and warning information contained therein.

Due to their training and experience, qualified personnel are able to recognize risks and avoid possible hazards when dealing with this product / system.

> ⚠ **WARNING!**
>
> **Injury hazard from insufficient qualification!**
> Improper handling can cause substantial bodily harm or material damage.

3.7 Special hazards

> ### ⚠ WARNING!
>
> **Live parts**
>
> The device is intended for installation in control cabinets and switch boxes. Contact with live parts poses an immediate danger to life.
>
> ▪ When performing any work on the device, disconnect the control cabinet or switch box from the power supply and secure it against being switched on again.
>
> ▪ Works on electric components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with the electro-technical regulations.

4 The iDM system with LJU communication

4.1 iDM system overview

The iDM system is an intelligent data management system for automatic vehicle and communication management in driver-less transport systems. The iDM system regulates, controls and manages all components and vehicles within the system under the directions of the higher-level system controller (PLC) or an independent soft PLC, in case of smaller systems.
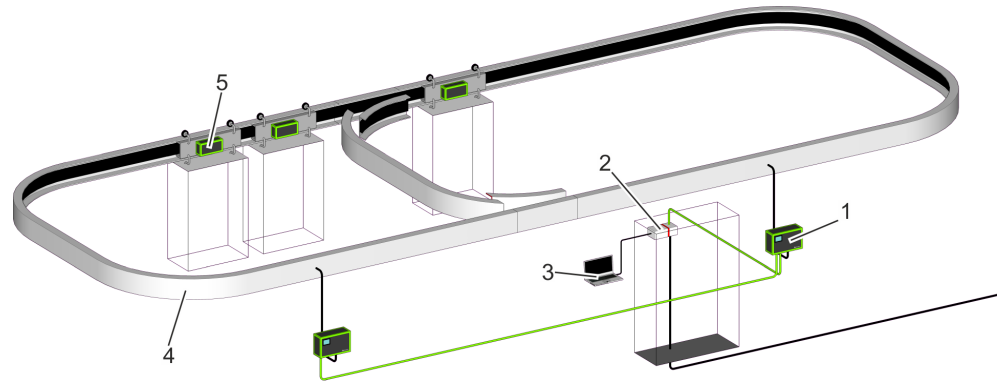
Fig. 1: iDM system overview

1 TCU - Track Control Unit
2 MCU - Master Control Unit
3 SyMa - System Manager
4 Driving route with installed data bus
5 Vehicle with vehicle control

TCU   **Track Control Unit**

Communication interface between the MCU and vehicle controls in a TCU area.

MCU   **Master Control Unit**

Central processing unit that regulates, controls and manages all components and vehicles within the installed iDM system. Interface between the system controller and the iDM system.

SyMa   **System Manager**

Configuration and simulation software to set up, test, and visualise the iDM system in real-time on-site, remotely or offline on a PC.

4.2 System architecture

Bus system

The iDM system is a bus system, in which multiple communication buses are used.

Fig. 2: Bus system

1 Field bus - TCP/IP, PROFINET or EtherNet/IP
2 EtherCAT
3 Rail bus or inductive wire bus

Connection variants

The following connection variants between PLCs, MCUs and TCUs are possible:

Connection variant	Illustration
Line (standard)	
Ring (redundancy)	
Line (standard) with a connection for an additional PLC not more than four PLCs on one MCU (type-dependent)	
Ring (redundancy) with a connection for an additional PLC not more than four PLCs on one MCU (type-dependent)	

4.3 Performance capabilities and properties

General information

Total route length per MCU	14000 m max. in the rail bus system (SB)
	6300 m max. in the inductive wire bus system (iDB)
Manageable number of vehicles per MCU	999 max.
Protocol MCU - PLC [1]	TCP/IP (10/100/1000 Mbps)
	PROFINET (100 Mbps)
	EtherNet/IP (100 Mbps)
MCU interfaces to external PLCs	4 max. [1]
TCU areas per MCU	70 max.
MCU protocol - TCUs	EtherCAT (100 Mbps)
MCU bus architecture - TCUs [1]	Line
	Ring (redundancy)
MCU - TCU cable length	100 m max. [2]
TCU - TCU cable length	100 m max. [2]

[1] depending on the MCU
[2] can be extended with optional hardware

TCU area

TCU area length	200 m max. in the rail bus system (SB)
	90 m max. in the inductive wire bus system (iDB)
Number of vehicles per TCU area	TCU area without Safety Controller SCS: 30 max. (can be extended to 45 max.)
	TCU area with Safety Controller SCS: 15 max.
Couplings (crossovers) to adjacent TCU areas	20 max.
Number of segments per TCU area	72 max. (can be extended to 84 max.)
Bus TCU - vehicles	SB or iDB [3]
Bus TCU - vehicles	LJU bus
Transfer rate	500 kbps max. in the rail bus system (SB) [4]
	31.25 kbps max. in the inductive wire bus system (iDB)

[3] depending on system used
[4] max. transfer rate depending on the vehicle control system series used

5 Product description

5.1 Function

The Master Control Unit (MCU) is the central processing unit that regulates, controls and manages all components and vehicles within the installed iDM system. It forms the interface between the system controller and the iDM system.

The MCU controls, regulates and monitors the vehicles on each route segment by receiving, processing and sending vehicle data records via the Track Control Units (TCUs). The operational flow is defined from the specified route, block and vehicle commands from the soft PLC or a higher-level PLC.

5.2 Structure

The MCU consists of modules by Beckhoff Automation GmbH.

The main unit consists of the Embedded PC and a PSU module that supplies power to the module chain. Ethernet modules, PROFINET modules, EtherNet/IP modules and EtherCAT modules are used as interface modules, depending on the application.

All modules are internally connected to each other via bus systems without additional cabling.
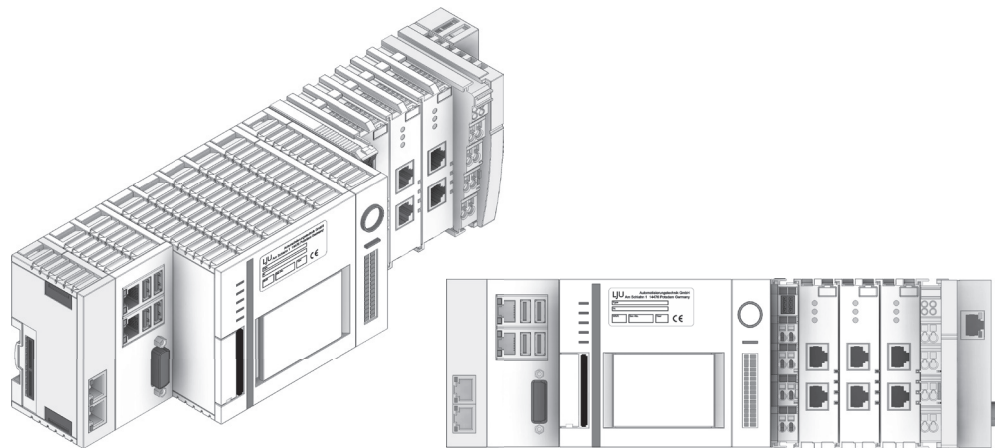
Fig. 3: Example: MCU-3PN+ECR

A description of the used modules can be found in ⮑ *Chapter 'MCU modules' on page 22*

An overview of the available MCU variants together with the modules used can be found in ⮑ *Chapter 'MCU variants' on page 23*

5.3 MCU modules

Embedded PC CX2030-0125
The Embedded PC is the computer unit of the MCU and is designed as an industrial PC. The operating system and all software required for operation are installed on the Embedded PC. The Embedded PC is used to configure, manage and control the connected iDM system.

PSU module CX2100-0004
The PSU module is used to supply power to all individual modules of the MCU used in the module chain. The configurable LCD display of the PSU module shows status information about the MCU.

Ethernet module CX2500-0060
If the MCU is intended for connection to PLCs via TCP/IP, this interface module is installed in the MCU. Up to two PLCs can be connected to the MCU via this module.

This module is also installed in MCUs with EtherCAT redundancy (+ECR). In this case, the redundancy circuit is implemented by the module.

> ***Retrofitting the redundancy circuit***
>
> *If an MCU is to be upgraded without a redundancy circuit, you have to install the licenses and update the software.*
>
> *Any retrofitting of Ethernet modules must be coordinated with Conductix-Wampfler Automation GmbH.*

PROFINET module EL6631-0010
If the MCU is intended for connection to PLCs via PROFINET, these interface modules are installed in the MCU. A maximum of four modules can be installed in one MCU. This allows the connection of up to four PLCs to one MCU. The connections in these modules are switchable.

EtherNet/IP module EL6652-0010
If the MCU is intended for connection to PLCs via EtherNet/IP, these interface modules are installed in the MCU. A maximum of three modules can be installed in one MCU. This allows the connection of up to three PLCs to one MCU. The connections in these modules are switchable.

EtherCAT module EK1110
The MCU communicates with the TCUs in the iDM system via the EtherCAT module.

5.4 Type label

The following figure shows the layout of a device type label.
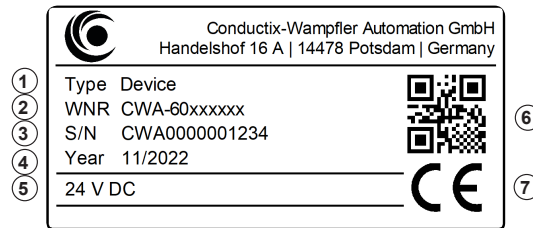
Fig. 4: Device type label

1 Designation/type
2 WNR item number
3 Serial number
4 Year of construction (month/year)
5 Technical specifications (e.g. supply voltage)
6 QR-Code (serial number)
7 CE marking

5.5 MCU variants

The number of installed modules is type-dependent, and not every module is installed in every MCU variant.

The following figure shows a maximum configured MCU.
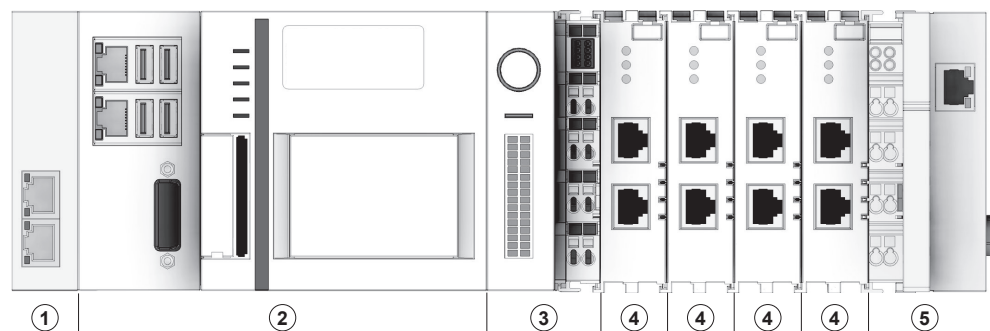
Fig. 5: Maximum configured MCU

1 Ethernet module CX2500-0060
2 Embedded PC CX2030-0125
3 PSU module CX2100-0004
4 PROFINET module EL6631-0010 or EtherNet/IP module EL6652-0010
5 EtherCAT module EK1110

Overview   The following table shows the available MCU variants/types, their configuration and the modules used in each case.

Field bus interface	Designation Type	Item number	WNR	Connectable PLCs max.	EtherCAT redundancy	Ethernet module CX2500-0060	Embedded PC CX2030-0125	PSU module CX2100-0004	PROFINET module EL6631-0010	EtherNet/IP module EL6652-0010	EtherCAT module EK1110
TCP/IP	MCU-TCP	3230490	CWA-60068102	2	-	1 ×	1 ×	1 ×	-	-	1 ×
PROFINET	MCU-1PN	3233696	CWA-60068113	1	-	-	1 ×	1 ×	1 ×	-	1 ×
	MCU-1PN+ECR	3233697	CWA-60068114	1	Yes	1 ×	1 ×	1 ×	1 ×	-	1 ×
	MCU-2PN	3245004	CWA-60068119	2	-	-	1 ×	1 ×	2 ×	-	1 ×
	MCU-2PN+ECR	3248245	CWA-60068122	2	Yes	1 ×	1 ×	1 ×	2 ×	-	1 ×
	MCU-3PN	3246944	CWA-60068121	3	-	-	1 ×	1 ×	3 ×	-	1 ×
	MCU-3PN+ECR	3244705	CWA-60068120	3	Yes	1 ×	1 ×	1 ×	3 ×	-	1 ×
	MCU-4PN	3270959	CWA-60068136	4	-	-	1 ×	1 ×	4 ×	-	1 ×
	MCU-4PN+ECR	3270971	CWA-60068137	4	Yes	1 ×	1 ×	1 ×	4 ×	-	1 ×
EtherNet/IP	MCU-1EIP	3248247	CWA-60068123	1	-	-	1 ×	1 ×	-	1 ×	1 ×
	MCU-1EIP+ECR	3248249	CWA-60068124	1	Yes	1 ×	1 ×	1 ×	-	1 ×	1 ×
	MCU-2EIP	3249464	CWA-60068125	2	-	-	1 ×	1 ×	-	2 ×	1 ×
	MCU-2EIP+ECR	3249465	CWA-60068126	2	Yes	1 ×	1 ×	1 ×	-	2 ×	1 ×
	MCU-3EIP	3249466	CWA-60068127	3	-	-	1 ×	1 ×	-	3 ×	1 ×
	MCU-3EIP+ECR	3249467	CWA-60068128	3	Yes	1 ×	1 ×	1 ×	-	3 ×	1 ×

MCU renaming   In the course of introducing new MCU variants, the type designations of some MCUs were replaced by new designations. The following table lists the new names.

Item number	WNR	Old designation	New designation
3230490	CWA-60068102	MCU-Set-CX2030	MCU-TCP
3233696	CWA-60068113	MCU-Set-CX2030	MCU-1PN
3233697	CWA-60068114	MCU-Set-CX2030-Red.	MCU-1PN+ECR
3245004	CWA-60068119	MCU-Set-CX2030-2EL	MCU-2PN
3244705	CWA-60068120	MCU-Set-CX2030-3EL	MCU-3PN+ECR

5.6 Scope of delivery

Scope of delivery

The MCUs are delivered as sets with the following content:

- 1 × MCU, as a fully assembled module block
- 1 × connector set comprising
  - Connectors of HARTING RJI 10G RJ45-type plug connection Cat6, 8p IDC straight (amount is type-dependent)
- 1 × USB stick with Software suite and documentation
- 1 × software license certificate

MCU sets

The following table lists the available MCU sets.

Designation Type	Item number	WNR	Set for	Number of supplied RJ45 connectors
Set MCU-TCP	3252668	CWA-60768102	MCU-TCP (WNR CWA-60068102)	4 ×
Set MCU-1PN	3242000	CWA-60768113	MCU-1PN (WNR CWA-60068113)	3 ×
Set MCU-1PN+ECR	3245051	CWA-60768114	MCU-1PN+ECR (WNR CWA-60068114)	4 ×
Set MCU-2PN	3245005	CWA-60768119	MCU-2PN (WNR CWA-60068119)	4 ×
Set MCU-2PN+ECR	3248246	CWA-60768122	MCU-2PN+ECR (WNR CWA-60068122)	5 ×
Set MCU-3PN	3246945	CWA-60768121	MCU-3PN (WNR CWA-60068121)	5 ×
Set MCU-3PN+ECR	3244952	CWA-60768120	MCU-3PN+ECR (WNR CWA-60068120)	6 ×
Set MCU-4PN	3270960	CWA-60768136	MCU-4PN (WNR CWA-60068136)	6 ×
Set MCU-4PN+ECR	3270972	CWA-60768137	MCU-4PN+ECR (WNR CWA-60068137)	7 ×
Set MCU-1EIP	3248248	CWA-60768123	MCU-1EIP (WNR CWA-60068123)	3 ×
Set MCU-1EIP+ECR	3248250	CWA-60768124	MCU-1EIP+ECR (WNR CWA-60068124)	4 ×
Set MCU-2EIP	3249468	CWA-60768125	MCU-2EIP (WNR CWA-60068125)	4 ×
Set MCU-2EIP+ECR	3249469	CWA-60768126	MCU-2EIP+ECR (WNR 60068126)	5 ×
Set MCU-3EIP	3249470	CWA-60768127	MCU-3EIP (WNR CWA-60068127)	5 ×
Set MCU-3EIP+ECR	3249541	CWA-60768128	MCU-3EIP+ECR (WNR CWA-60068128)	6 ×

6 Transport and storage

6.1 Transport

> **NOTICE!**
>
> **Transport**
>
> Incorrect or improper transport may cause damage to the device.
>
> - Only trained personnel are allowed to transport the device.
> - If necessary, use suitable transport aids.
> - Transport the devices with utmost care.
> - Observe the symbols on the packaging.
> - Do not remove packaging and transport securing devices until you are ready to start with the installation.

6.2 Transport inspection

Check the delivery for completeness and transport damage upon receipt.

Proceed as follows in case of any apparent damage:

- Refuse to accept the delivery or accept it only conditionally. Take note of the extent of the damage and write it down on the carrier's transport documents or delivery note.
- Initiate a complaints process and report the incident to the supplier. If Conductix-Wampfler Automation is your direct supplier you will find our contact information in this document.

> **Claims for damages**
>
> *Claim any defect as soon as it becomes apparent. Damages can only be claimed within the applicable claim periods.*

6.3 Storage

> **NOTICE!**
>
> **Storage**
>
> Incorrect or improper storage may cause damage to the device.
>
> - Cover connections with protective caps during storage.
> - Avoid mechanical stress and vibrations.
> - Store in a dry and dust-free location.
> - Regularly check the condition of the stored device.
> - Keep environmental conditions as specified in the technical information.
> - Keep the storage temperature as specified in the technical information.

7 Mechanical installation

Objective   This section provides details on the mechanical installation. Electrical installation is possible following successful mechanical installation.

Responsible party   The system integrator (e.g. system builder, operator) is responsible for trouble-free and safe installation. As the contact person, he responds to all the fitter's queries regarding safe-to-use equipment; e.g.:

- Fire protection
- Electrical equipment
- Ladders and scaffolding
- Requirements for assembly tools
- Lifting and transportation

Required personnel   Due to their training and experience, only qualified and appropriately instructed personnel are able to correctly assess the respective initial situation, identify risks and avoid hazards.

Personnel required for installation:

- Adequately qualified fitter

Safety in the work area
- Note the safety signs in the area around the system.
- Pay attention to the safety notes in additional applicable documentation (supplier documents).

⚠ WARNING!

Live parts

The device is intended for installation in control cabinets and switch boxes. Contact with live parts poses an immediate danger to life.

- When performing any work on the device, disconnect the control cabinet or switch box from the power supply and secure it against being switched on again.
- Works on electric components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with the electro-technical regulations.

Work safety

Pay attention to company and task-specific work safety regulations, as well as the country-specific legal and safety regulations applicable at the location of use.

iDM-MCU
Conductix-Wampfler Automation GmbH / 08/2022

7.1 Installation location and position

Installation location

The device is designed for installation on a top-hat rail in a control cabinet or switch box.

■ **Top-hat rail type:** TS35/7.5 or TS35/15 in accordance with DIN EN 60715

Installation position

To ensure sufficient ventilation, the MCU must be mounted horizontally on the top-hat rail.

■ Vents are located at the bottom and on top of the devices; terminals and connections face forward.
■ A clearance of at least 30 mm must be present above and below the MCU.
■ A clearance of at least 20 mm to the left and right of the MCU is recommended.
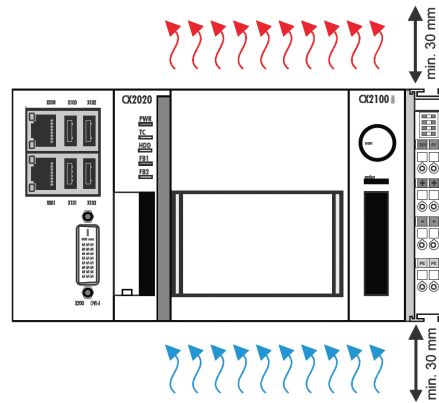
Fig. 6: Permitted installation position of the MCU [BN]

7.2 Installation on top-hat rail

The following illustrations show the principle installation.
Not all modules are shown.

Mounting the MCU

Attach the MCU as a complete module block on a top-hat rail (type TS35/7.5 or TS35/15 in accordance with DIN EN 60715), as follows:

1. Unlock all safety latches on the top and bottom of the MCU and unlock the EtherCAT module latch on the right side.
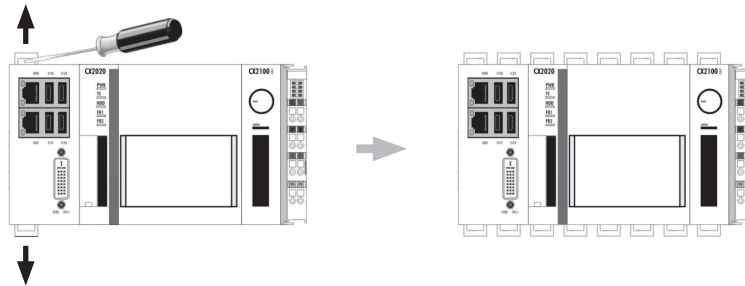
Unlocking the MCU (BN)

2. Place the MCU on the top-hat rail and press lightly until the MCU engages audibly.

3. Finally re-engage all the safety catches and lock the latch on the right side of the EtherCAT module.
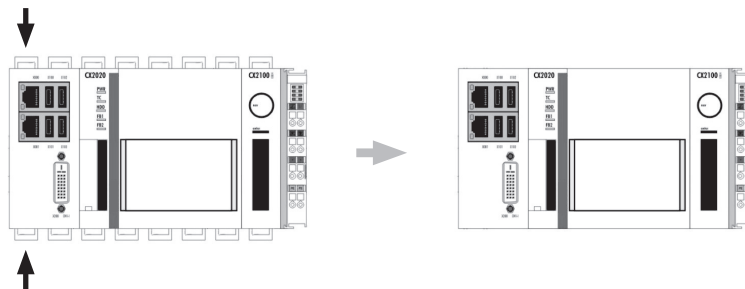
Locking the MCU (BN)

⇨ The engaging of the safety catch is acknowledged by an audible click.

8 Electrical installation

Objective
This section provides details on the electrical installation. Commissioning is possible following successful electrical installation.

Responsible party
The system integrator (e.g. system builder, operator) is responsible for trouble-free and safe electrical installation. As the contact person, he responds to all the fitter's queries regarding safe-to-use equipment; e.g.:

- Fire protection
- Electrical equipment
- Ladders and scaffolding
- Requirements for assembly tools

Required personnel
Due to their training and experience, only qualified and appropriately instructed personnel are able to correctly assess the respective initial situation, identify risks and avoid hazards.

Personnel required for electrical installation:

- Qualified electrician
- Adequately qualified fitter under the direction and supervision of a qualified electrician

Safety in the work area
- Note the safety signs in the area around the system.
- Pay attention to the safety notes in additional applicable documentation (supplier documents).

⚠ WARNING!

Live parts

The device is intended for installation in control cabinets and switch boxes. Contact with live parts poses an immediate danger to life.

- When performing any work on the device, disconnect the control cabinet or switch box from the power supply and secure it against being switched on again.
- Works on electric components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with the electro-technical regulations.

Work safety

Pay attention to company and task-specific work safety regulations, as well as the country-specific legal and safety regulations applicable at the location of use.

8.1   Requirements for the voltage supply

8.1.1   General requirements

> ### NOTICE!
>
> **"PE" power contacts and PE connections**
>
> "PE" power contacts and PE- connections may not be used for other potentials.
>
> "PE" and "0V" must be on the same potential (connected in the control cabinet).

> ### NOTICE!
>
> **Wiring in the control cabinet**
>
> The wiring in the control cabinet must be laid out in accordance with the EN 60204-1:2006 standard regarding Protective Extra Low Voltage (PELV).
>
> EN 60204-1:2006 Section 6.4.2:b): *One end of the electrical circuit or a point of the energy source of this electrical circuit must be connected to the protective earth system.*

> ### NOTICE!
>
> **Interruption of the power supply / switching off**
>
> The devices should **only** be switched off by isolating the 24 V supply!
>
> Do not isolate the earth connection to switch off devices! Current might still flow through the screen, depending on the device.

> ### NOTICE!
>
> **Devices that have their own power supply**
>
> The potential for "PE" and "GND" of connected devices that have their own power supply (e.g. a panel) must be identical to that of the system devices (no potential difference). Otherwise, the devices and peripherals could get damaged.

8.1.2 UL requirements

> **NOTICE!**
>
> **Requirements for the supply voltage**
> - Voltage source corresponds to NEC class 2
> - Voltage source is isolated
> - Voltage source with a fuse of max. 4 A according to UL248

> **NOTICE!**
>
> **Connecting voltage sources**
> A voltage source corresponding to NEC class 2 may not be connected in series or in parallel with another voltage source corresponding to NEC class 2!

> **NOTICE!**
>
> **Connecting devices with voltage sources**
> Do not connect devices to unlimited voltage sources!

8.1.3 Connection according to low-voltage directive

> **NOTICE!**
>
> **Connection according to low-voltage directive**
> In order to comply with the low-voltage directive, the devices must be powered by a safety extra low voltage (SELV) or protective extra low voltage (PELV) compatible power source.

8.2 Connection overview

8.2.1 Connections on MCUs with TCP/IP
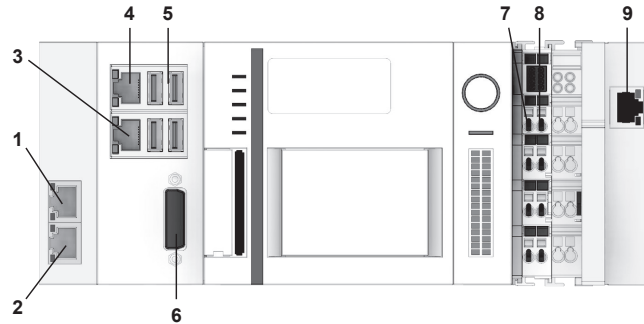
Fig. 7: Connection overview for MCUs with TCP/IP

Module	Connection	Connection type	Connect to
Ethernet module	/1 *[X600]*	RJ45	External PLC 1 TCP/IP server
	/2 *[X601]*	RJ45	External PLC 2 TCP/IP server
Embedded PC	/3 *[X001]*	RJ45	SyMa/Service (dynamic IP address)
	/4 *[X000]*	RJ45	SyMa/Service (static IP address)
	/5 *[X100 - X103]*	4 × USB 2.0 500 mA max. each	Mouse Keyboard External data storage device
	/6 *[X200]*	DVI-I	Monitor
PSU module	/7	Spring-loaded terminal	Power supply
	/8	Spring-loaded terminal	
EtherCAT module	/9	RJ45	TCU

8.2.2 Connections on MCUs with PROFINET

The following figure shows a maximum configured MCU.
Not every MCU has all the connections.

Fig. 8: Connection overview for MCUs with PROFINET

Module	Connection	Connection type	Connect to
Ethernet module (only MCU with ECR EtherCAT redundancy)	/1 *[X600]*	RJ45	TCU (EtherCAT redundancy)
	/2 *[X601]*	RJ45	Not used
Embedded PC	/3 *[X001]*	RJ45	SyMa/Service (dynamic IP address)
	/4 *[X000]*	RJ45	SyMa/Service (static IP address)
	/5 *[X100 - X103]*	4 × USB 2.0 500 mA max. each	Mouse Keyboard External data storage device
	/6 *[X200]*	DVI-I	Monitor
PSU module	/7	Spring-loaded terminal	Power supply
	/8	Spring-loaded terminal	
PROFINET module 1	/9 *[X1]*	RJ45	External PLC 1
	/10 *[X2]*	RJ45	PROFINET slave switched
PROFINET module 2 (only MCU with 2PN / 3PN / 4PN)	/11 *[X1]*	RJ45	External PLC 2
	/12 *[X2]*	RJ45	PROFINET slave switched
PROFINET module 3 (only MCU with 3PN / 4PN)	/13 *[X1]*	RJ45	External PLC 3
	/14 *[X2]*	RJ45	PROFINET slave switched
PROFINET module 4 (only MCU with 4PN)	/15 *[X1]*	RJ45	External PLC 4
	/16 *[X2]*	RJ45	PROFINET slave switched
EtherCAT module	/17	RJ45	TCU

8.2.3 Connections on MCUs with EtherNet/IP

*The following figure shows a maximum configured MCU.
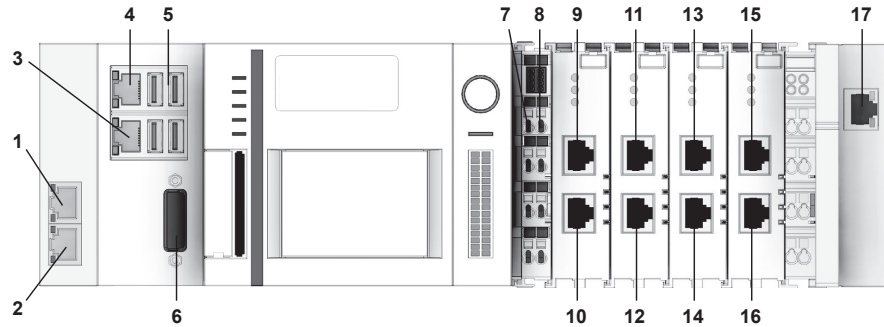Not every MCU has all the connections.*
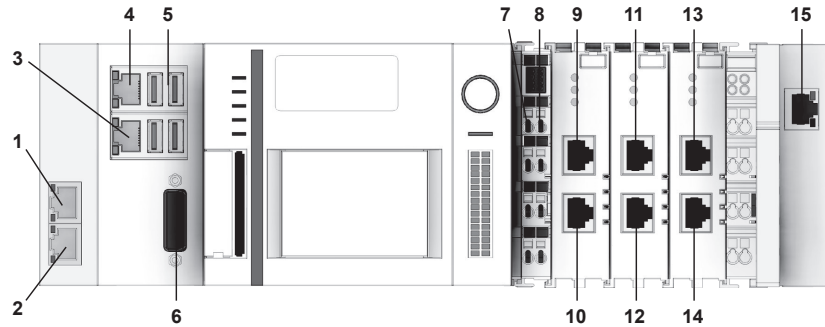
Fig. 9: Connection overview for MCUs with EtherNet/IP

Module	Connection	Connection type	Connect to
Ethernet module (only MCU with ECR EtherCAT redundancy)	/1 *[X600]*	RJ45	TCU (EtherCAT redundancy)
	/2 *[X601]*	RJ45	Not used
Embedded PC	/3 *[X001]*	RJ45	SyMa/Service (dynamic IP address)
	/4 *[X000]*	RJ45	SyMa/Service (static IP address)
	/5 *[X100 - X103]*	4 × USB 2.0 500 mA max. each	Mouse Keyboard External data storage device
	/6 *[X200]*	DVI-I	Monitor
PSU module	/7	Spring-loaded terminal	Power supply
	/8	Spring-loaded terminal	
EtherNet/IP module 1	/9 *[X1]*	RJ45	External PLC 1
	/10 *[X2]*	RJ45	EtherNet/IP slave switched
EtherNet/IP module 2 (only MCU with 2EIP or 3EIP)	/11 *[X1]*	RJ45	External PLC 2
	/12 *[X2]*	RJ45	EtherNet/IP slave switched
EtherNet/IP module 3 (only MCU with 3EIP)	/13 *[X1]*	RJ45	External PLC 3
	/14 *[X2]*	RJ45	EtherNet/IP slave switched
EtherCAT module	/15	RJ45	TCU

8.3 Connection instructions

> **NOTICE!**
>
> **Damage to the device**
> Improper device connection may result in damage.
>
> ■ De-energise the device prior to working on it!

> **NOTICE!**
>
> **Malfunctions due to improper device connection**
> Improper device connection may lead to malfunctions during operation.
>
> ■ Always follow the connection instructions.

8.4 Electrical connection procedure

To connect the MCU to the electrical supply, perform the following steps:

1. ▶ Connect the power supply.

2. ▶ Connect the external PLCs.
   - ■ MCU with TCP/IP
   - ■ MCU with PROFINET
   - ■ MCU with EtherNet/IP

3. ▶ Connect MCU with TCUs.

4. ▶ Connect EtherCat redundancy (only MCU with ECR).

5. ▶ Extending the EtherCAT connection (optional).

8.5   Connecting the power supply

Requirements for the 24 V PSU

To ensure the MCU functions properly each time, the external PSU must supply 4 A at 24 V DC.

The power supply of the MCU is connected to the spring-loaded terminals labelled *24 V* and *0 V* on the PSU module.
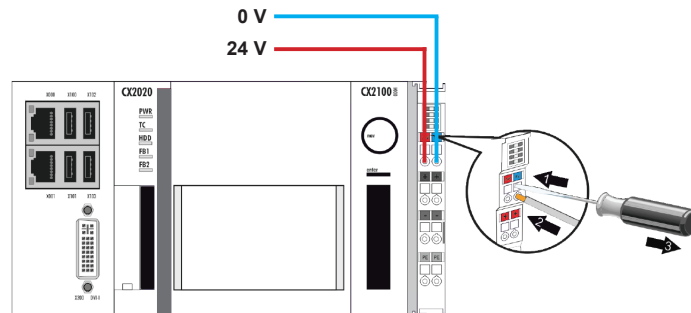
Fig. 10: MCU power supply (BN)

Connect the cables as follows:

1. Use a screwdriver or a pointed object to gently press in the square opening above the terminal to open the spring-loaded terminal.

2. Insert the stripped wire in the round, underlying terminal opening.

3. Remove the screwdriver or pointed object. The terminal closes and holds the connected cable securely and permanently.

⇨ If the power supply is properly connected and turned on, the LEDs in the terminal prism at the top left of the PSU module light up and the Power LED "PWR" of the Embedded PC lights up green.

Cable requirements for power supply

Cable type	isolated single-core
Conductor cross section	0.5 … 2.5 mm^2
Stripping length	8 to 9 mm

8.6 Connecting external PLCs

8.6.1 Connecting external PLCs (MCU with TCP/IP)

The MCU is connected to external system controllers (PLCs) via TCP/IP connections. Up to two PLCs be connected to the MCU via the two independent TCP/IP interfaces on the Ethernet module.

Fig. 11: TCP/IP, connecting the external PLCs [BN]

Connect the cables as follows:

▶ Connect the external system controllers to the RJ45 sockets *[X600]* and *[X601]* of the Ethernet module using network cables.

⇨ The top LED of the RJ45 socket used in the Ethernet module lights up green when the port is connected to a network.

RJ45 pin assignment

Device connection diagram	Pin	Signal
	1	TD + (Transmit +)
	2	TD - (Transmit -)
	3	RD + (Receive +)
	4	*Not used*
	5	*Not used*
	6	RD - (Receive -)
RJ45 socket	7	*Not used*
	8	*Not used*

Network cable line regulation

Cable type	Network cable min. Cat. 5 in accordance with DIN EN 50173-1
Cable length	100 m max.

8.6.2 Connecting external PLCs (MCU with PROFINET)

The MCU is connected to external system controllers (PLCs) via PRO-FINET connections. One PLC can be connected to each PROFINET module of the MCU. Up to four PLCs can be connected to one MCU, depending on the MCU used.
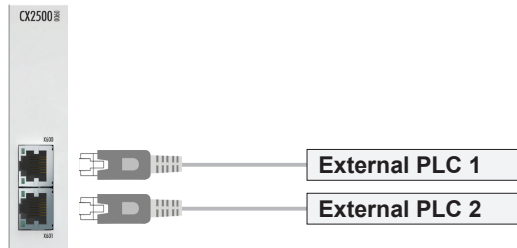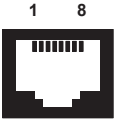

Fig. 12: PROFINET, connecting the external PLCs [BN]

Connect the cables as follows:

▶ Connect an external system controller to the upper RJ45 socket *[X1]* of the PROFINET module using a network cable.

⇨ The upper LED of the RJ45 socket *[X1]* lights up green when the PROFINET link is active.

RJ45 pin assignment

Device connection diagram	Pin	Signal
	1	TD + (Transmit +)
	2	TD - (Transmit -)
	3	RD + (Receive +)
	4	*Not used*
	5	*Not used*
	6	RD - (Receive -)
	7	*Not used*
RJ45 socket	8	*Not used*

Network cable line regulation

Cable type	Network cable min. Cat. 5 in accordance with DIN EN 50173-1
Cable length	100 m max.

8.6.3 Connecting external PLCs (MCU with EtherNet/IP)

The MCU is connected to external system controllers (PLCs) via EtherNet/IP connections. One PLC can be connected to each EtherNet/IP module of the MCU. Up to three PLCs can be connected to one MCU, depending on the MCU used.
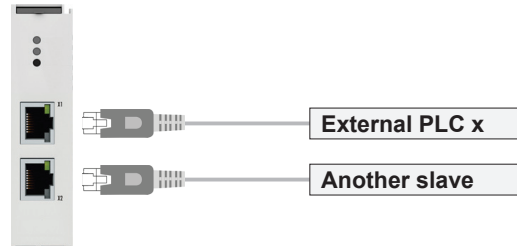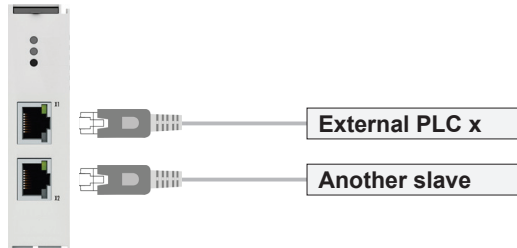

Fig. 13: EtherNet/IP, connecting the external PLC [BN]

Connect the cables as follows:

▶ Connect an external system controller to the upper RJ45 socket *[X1]* of the EtherNet/IP module using a network cable.

⇨ The upper LED of the RJ45 socket *[X1]* lights up green when the EtherNet/IP link is active.

RJ45 pin assignment

Device connection diagram	Pin	Signal
	1	TD + (Transmit +)
	2	TD - (Transmit -)
	3	RD + (Receive +)
	4	*Not used*
	5	*Not used*
	6	RD - (Receive -)
	7	*Not used*
	8	*Not used*

Network cable line regulation

Cable type	Network cable min. Cat. 5 in accordance with DIN EN 50173-1
Cable length	100 m max.

8.7   Connecting TCUs

The TCUs are connected to the MCU via EtherCAT. The TCUs are connected in series to the MCU via the EtherCAT module.
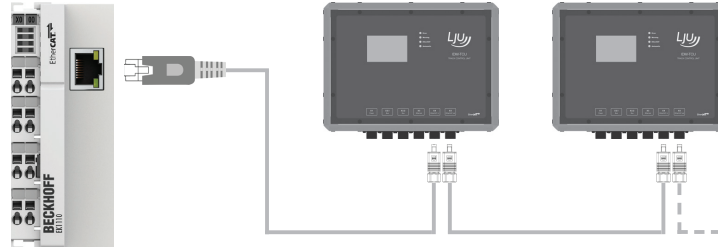
Fig. 14: TCU connection to the MCU [BN]
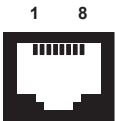
Connect the cables as follows:

→ Connect the *[X4 EtherCAT in]* input of the first TCU in the series connection to the RJ45 socket of the EtherCAT module using a network cable.

⇨ The operating condition of the EtherCAT module is indicated by the LED at the top left of the module's terminal prism. In a normal operating condition, it is lit green continuously.

The bottom LED of the RJ45 socket is lit green when an EtherCAT device is connected. The LED flashes if there is ongoing communication with an EtherCAT device.

RJ45 pin assignment

Device connection diagram	Pin	Signal
 RJ45 socket	1	TD + (Transmit +)
	2	TD - (Transmit -)
	3	RD + (Receive +)
	4	*Not used*
	5	*Not used*
	6	RD - (Receive -)
	7	*Not used*
	8	*Not used*

Network cable line regulation

Cable type	Network cable min. Cat. 5 in accordance with DIN EN 50173-1
Cable length	100 m max.

8.8 Connect EtherCat redundancy (only MCU with ECR)

If the MCU is redundant (with ECR), the TCUs are connected to the MCU in a ring. This means that the EtherCAT is routed from the last TCU in the series connection back to the MCU. The EtherCAT redundancy is connected to the Ethernet module of the MCU.
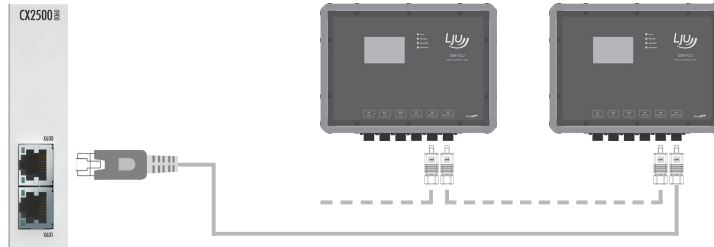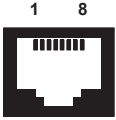
Fig. 15: Connecting EtherCAT redundancy [BN]

Connect the cables as follows:

▶ Connect the *[X5 EtherCAT out]* of the last TCU in the series connection to the upper RJ45 socket *[X600]* of the Ethernet module using a network cable.

⇨ The top LED of the RJ45 socket in the Ethernet module lights up green when the port is connected to the EtherCAT.

RJ45 pin assignment

Device connection diagram	Pin	Signal
	1	TD + (Transmit +)
	2	TD - (Transmit -)
	3	RD + (Receive +)
	4	*Not used*
	5	*Not used*
	6	RD - (Receive -)
RJ45 socket	7	*Not used*
	8	*Not used*

Network cable line regulation

Cable type	Network cable min. Cat. 5 in accordance with DIN EN 50173-1
Cable length	100 m max.

8.9 Extending the EtherCAT connection (optional)

8.9.1 Overview

EtherCAT connections are limited to 100 m in length. By using active bus couplers or media converters, which are installed decentrally in the system, it is possible to extend EtherCAT connections between EtherCAT devices.

> **NOTICE!**
>
> **Bus couplers or media converters not configured in the system!**
>
> Improper installation of bus couplers and media converters can lead to system malfunctions. Bus couplers and media converters that have not been configured cause the communication path to be interrupted and disrupt access to all EtherCAT devices downstream from the bus coupler that has not been configured.
>
> ■ Bus couplers and media converters must be entered in the hardware configuration of the system. This requires a change in the MCU system software. The use of bus couplers and media converters must therefore be coordinated with Conductix-Wampfler Automation GmbH.
> ■ Positions of configured bus couplers and media converters in the system can be found within the project-specific system layout for laying the rail or inductive data bus.

EtherCAT connections can be extended as follows:

■ with Beckhoff EK1100 type bus couplers and network cables.
The EtherCAT connection between two EtherCAT devices can be extended by not more than 100 m.
⮱ Chapter 'Extending EtherCAT using a EK1100 bus coupler' on page 48
■ with Beckhoff media converters type CU1521-0000 using network cables and fibre optic cables.
The EtherCAT connection between two EtherCAT devices can be extended by not more than 2100 m.
⮱ Chapter 'Extending the EtherCAT using CU1521 media converters' on page 53

8.9.2 Extending EtherCAT using a EK1100 bus coupler

8.9.2.1 EK1100 bus coupler installation and connection data

> ### ⚠ WARNING!
>
> **Live parts**
>
> The device is intended for installation in control cabinets and switch boxes. Contact with live parts poses an immediate danger to life.
>
> - When performing any work on the device, disconnect the control cabinet or switch box from the power supply and secure it against being switched on again.
> - Works on electric components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with the electro-technical regulations.

Fig. 16: EK1100 bus coupler [(BN)]

General

Type	EK1100
Name	EtherCAT coupler

Installation data

Place of installation	Control cabinet / switch box
Fixing	on 35 mm top-hat rail Type: TS35/7.5 or TS35/15 in accordance with DIN EN 60715
Installation position	any Recommended: horizontal
Dimensions W × H × D	44 mm × 100 mm × 68 mm
Protection class	IP 20
Ambient temperature	-25 ºC … +55 ºC
Relative humidity	95 % (no condensation)
Storage temperature	-25 ºC … +85 ºC

Electrical connection data

Connections	Spring-loaded terminals
Supply type	External supply 24 V DC / 1 A min.
Supply voltage	24 V DC (-15/+20 %)

Interface data

Connections	2 x RJ45 socket
Protocol	EtherCAT
Transfer rate	100 Mbps

8.9.2.2   Connection variants

EtherCAT connections between two EtherCAT devices can be extended by not more than 100 m. The extension is done by means of network cables.
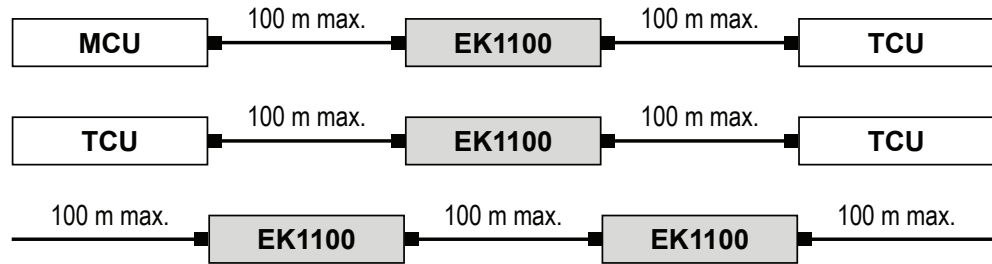

Fig. 17: Extending EtherCAT connections using EK1100 bus couplers

8.9.2.3 Installing the EK1100 bus coupler

Installation location

The device is designed for installation on a top-hat rail in a control cabinet or switch box.

■ **Top-hat rail type:** TS35/7.5 or TS35/15 in accordance with DIN EN 60715

Installation position

It is recommended to install the bus coupler on the top-hat rail as follows:

■ Connections point forward.
■ Clearances of 20 mm remain above, below, to the right and to the left of the bus coupler.

Fig. 18: Recommended installation position of the EK1100 bus coupler [BN]

Installing the EK1100

Fit the bus coupler on the top-hat rail as follows:

1. ▸ Unlock the latch of the bus coupler on the left side of the bus coupler

2. ▸ Place the bus coupler on the top-hat rail and press lightly until the right side engages audibly.

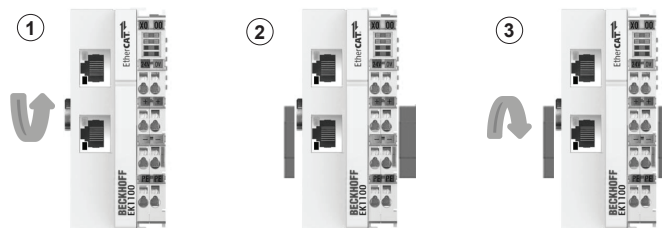3. ▸ Finally, lock the latch on the left side of the bus coupler.

Fig. 19: Installing the EK1100 bus coupler [BN]

8.9.2.4 Connecting the EK1100 bus coupler

Connecting the power supply

The power supply of the EK1100 bus coupler is connected to the spring-loaded terminals labelled *24 V* and *0 V*.
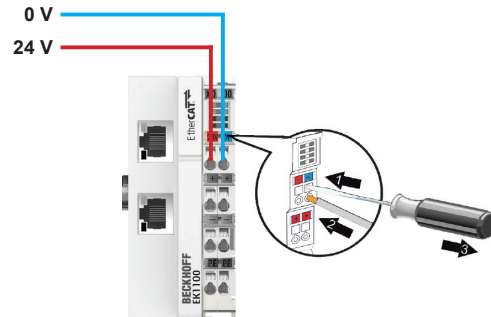

Fig. 20: Power supply of the EK1100 bus coupler ([BN])

Connect the cables as follows:

1. ▸ Use a screwdriver or a pointed object to gently press in the square opening above the terminal to open the spring-loaded terminal.

2. ▸ Insert the stripped wire in the round, underlying terminal opening.

3. ▸ Remove the screwdriver or pointed object. The terminal closes and holds the connected cable securely and permanently.

⇨ When properly installed and the power supply is switched on, the LED at the top left in the terminal prism of the bus coupler is lit green.

Cable requirements for power supply

Cable type	isolated single-core
Conductor cross section	0.5 … 2.5 mm^2
Stripping length	8 to 9 mm

Connecting EtherCAT devices

The bus coupler is switched to the connection between two EtherCAT devices in order to extend them. This requires the two RJ45 interfaces on the bus coupler to be used.
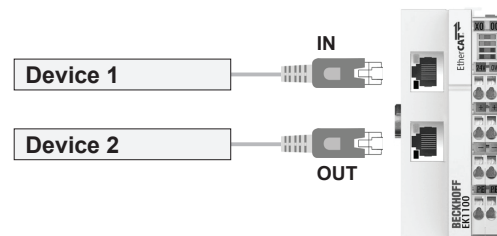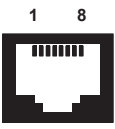

Fig. 21: Connecting EtherCAT devices ([BN])

Connect the cables as follows:

1. ▸ Connect EtherCAT device 1 to the upper RJ45 socket *[IN]* of the bus coupler using a network cable.

2. ▸ Connect EtherCAT device 2 to the lower RJ45 socket *[OUT]* of the bus coupler using a network cable.

⇨ The upper LEDs of the RJ45 sockets light up green when an EtherCAT device is connected. The LEDs flash if there is ongoing communication with an EtherCAT device.

RJ45 pin assignment

Device connection diagram	Pin	Signal
	1	TD + (Transmit +)
	2	TD - (Transmit -)
	3	RD + (Receive +)
1 8	4	*Not used*
	5	*Not used*
	6	RD - (Receive -)
RJ45 socket	7	*Not used*
	8	*Not used*

Network cable line regulation

Cable type	Network cable min. Cat. 5 in accordance with DIN EN 50173-1
Cable length	100 m max.

8.9.3 Extending the EtherCAT using CU1521 media converters

8.9.3.1 CU1521 media converter installation and connection data

> **⚠ WARNING!**
>
> **Live parts**
>
> The device is intended for installation in control cabinets and switch boxes. Contact with live parts poses an immediate danger to life.
>
> ■ When performing any work on the device, disconnect the control cabinet or switch box from the power supply and secure it against being switched on again.
>
> ■ Works on electric components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with the electro-technical regulations.
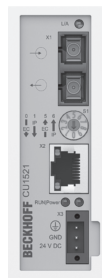
Fig. 22: CU1521 media converter [BN]

General

Type	CU1521-0000
Name	EtherCAT media converter

Installation data

Place of installation	Control cabinet / switch box
Fixing	on 35 mm top-hat rail Type: TS35/7.5 or TS35/15 in accordance with DIN EN 60715
Installation position	any Recommended: horizontal
Dimensions W × H × D	34 mm × 98 mm × 77 mm
Protection class	IP 20
Ambient temperature	-25 ºC … +60 ºC
Relative humidity	95 % (no condensation)
Storage temperature	-45 ºC … +85 ºC

Electrical connection data

Connections	Three-pole spring-loaded terminal (+, -, PE)
Supply type	External supply 24 V DC / 1 A min.
Supply voltage	24 V DC (-15/+20 %)

Interface data

X1 connection	2 x SC duplex / 100BASE-FX
X2 connection	RJ45 / 10BASE-T/100BASE-TX
Protocol	EtherCAT
Transfer rate	100 Mbps

8.9.3.2 Connection variants

An EtherCAT connection between two EtherCAT devices can be extended by not more than 2100 m. The extension is done by means of network cables and fibre optic cables. Two media converters are required to extend the EtherCAT connection.
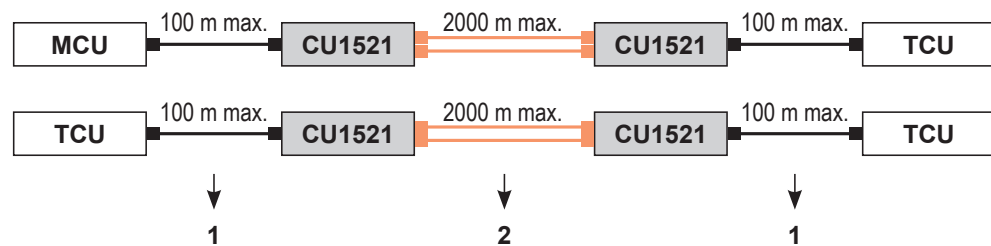

Fig. 23: Extending the EtherCAT connections using CU1521 media converters

1   Network cable
2   Fibre optic cable

8.9.3.3 Installing CU1521 media converters

Installation location

The device is designed for installation on a top-hat rail in a control cabinet or switch box.

■ **Top-hat rail type:** TS35/7.5 or TS35/15 in accordance with DIN EN 60715

Installation position

It is recommended to install the media converters on the top-hat rail as follows:

■ Connections point forward.
■ Clearances of 20 mm remain above, below, to the right and to the left of the media converters.

Fig. 24: Recommended installation position of the CU1521 media converters [BN]

Installing the CU1521

Fit the media converters on the top-hat rail as follows:

1. Hang the media converter into the top-hat rail from the spring on the upper side of its snap-in flange.

2. Press the lower side of the media converter against the installation surface until it snaps into place on the top hat rail.
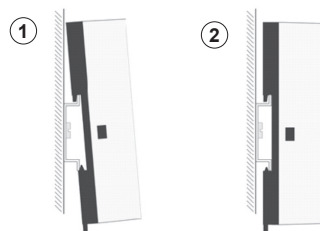
Fig. 25: Installing the CU1521 media converters [BN]

8.9.3.4 Connecting CU1521 media converters

Connecting the power supply

The power supply of the CU1521 media converter is connected to the X3 port of the media converter using the supplied connector.
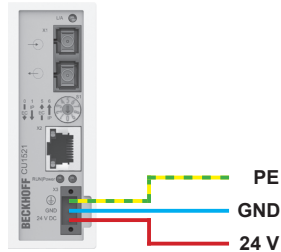

Fig. 26: Power supply of the CU1521 media converter (BN)

Connect the power supply to the media converter as follows:

1. ▸ Disconnect the connector from the media converter.

2. ▸ Place a screwdriver or a pointed object in the connector and gently press in the square opening next to the terminal to open the spring-loaded terminal.

3. ▸ Insert the stripped wire in the adjacent terminal opening.

4. ▸ Remove the screwdriver or pointed object. The terminal closes and holds the connected cable securely and permanently.

5. ▸ Check the wiring of the connector and plug the connector into the X3 port of the media converter.

6. ▸ Then, secure the connector to the media converter using the fastening screw.

   ⇨ When properly installed and the power supply is switched on, the "Power" LED on the media converter is lit green.

Cable requirements for power supply

Cable type	isolated single-core
Conductor cross section	0.5 … 2.5 mm^2
Stripping length	8 to 9 mm

Connecting the media converter

The two CU1521 media converters, which are required for extending the EtherCAT connection, are connected to each other with a multimode fibre optic cable. The multimode fibre optic cable is connected to the SC duplex connections of the media converters.
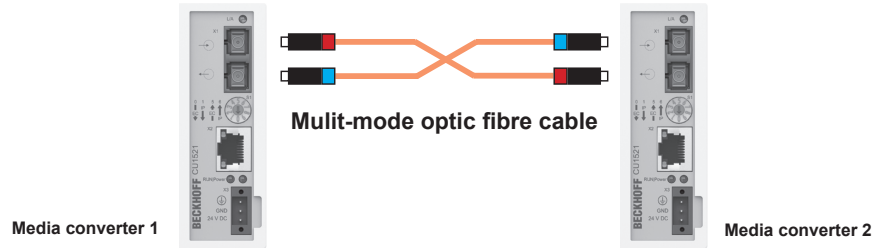

Fig. 27: Connecting the fibre optic cable [BN]

Connect the fibre optic cable as follows:

1. Attach the SC connectors on both sides of the multimode fibre optic cable.

2. Plug the SC connectors into the *[X1]* ports of the media converters.

Note about connection:

During connection, make sure that you connect the conductors of the multimode fibre optic cable in a crosswise manner between media converters 1 and 2. This is the only way to ensure that the light output from the first converter does not meet the light of the other converter when the fibre optic cable is plugged in, and that a connection can be established. Fig. 27

Hint: The infrared light in the connector plug can be made visible with a digital or mobile phone camera. Point the camera at the connector to see it.

Connector plug requirement

Connector type	SC duplex connector
Version	SC/PC (physical contact)

Cable requirements for fibre optic cable

Cable type	Duplex multimode
Core diameter (inside/outside)	50/125 µm or 62.5/125 µm recommended: 50/125 µm
Cable length	Max. 2000 m

Connecting EtherCAT devices

The media converters are switched to the connection between two EtherCAT devices. The EtherCAT devices are connected to the RJ45 interfaces of the media converters using network cables.
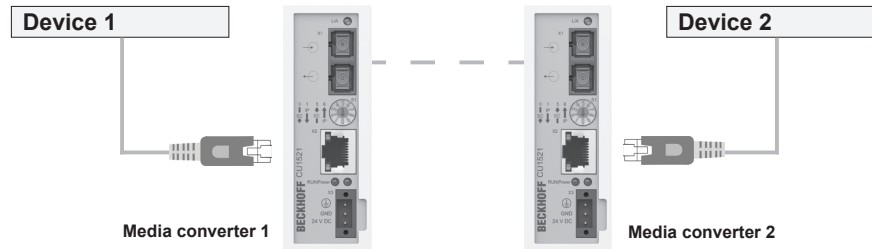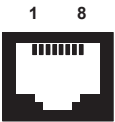

Fig. 28: Connecting EtherCAT devices [BN]

Connect the cables as follows:

1. ▶ Connect EtherCAT device 1 to the RJ45 socket *[X2]* of media converter 1 using a network cable.

2. ▶ Connect EtherCAT device 2 to the RJ45 socket *[X2]* of media converter 2 using a network cable.

⇨ The upper LEDs of the RJ45 sockets light up green when an EtherCAT device is connected. The LEDs flash if there is ongoing communication with an EtherCAT device.

RJ45 pin assignment

Device connection diagram	Pin	Signal
	1	TD + (Transmit +)
	2	TD - (Transmit -)
	3	RD + (Receive +)
	4	*Not used*
	5	*Not used*
	6	RD - (Receive -)
RJ45 socket	7	*Not used*
	8	*Not used*

Network cable line regulation

Cable type	Network cable min. Cat. 5 in accordance with DIN EN 50173-1
Cable length	100 m max.

9 Commissioning

Objective
This section provides details on correct commissioning. Daily operation can start following successful commissioning.

Responsible party
The system integrator (e.g. system builder, operator) is responsible for trouble-free and safe commissioning. As the contact person, he responds to all the commissioner's queries regarding safe-to-use equipment; e.g.:

- Fire protection
- Electrical equipment
- Ladders and scaffolding

Required personnel
Due to their training and experience, only qualified and appropriately instructed personnel are able to correctly assess the respective initial situation, identify risks and avoid hazards.

Personnel required for commissioning:

- Staff of Conductix-Wampfler Automation GmbH
- Sufficiently trained specialist personnel

Safety in the work area
- Note the safety signs in the area around the system.
- Pay attention to the safety notes in additional applicable documentation (supplier documents).

⚠ WARNING!

Live parts

The device is intended for installation in control cabinets and switch boxes. Contact with live parts poses an immediate danger to life.

- When performing any work on the device, disconnect the control cabinet or switch box from the power supply and secure it against being switched on again.
- Works on electric components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with the electro-technical regulations.

Work safety
Pay attention to company and task-specific work safety regulations, as well as the country-specific legal and safety regulations applicable at the location of use.

9.1 Commissioning procedure

To commission the MCU, perform the following steps:

1. ▸ Establish access to the MCU.

2. ▸ Configure the interfaces.

- ■ Configure the SyMa interface.
- ■ Configure the TCP/IP interfaces to connect the PLCs (MCU with TCP/IP).
- ■ Configure the PROFINET interfaces to connect the PLCs (MCU with PROFINET).
- ■ Configure the EtherNet/IP interfaces to connect the PLCs (MCU with EtherNet/IP).

3. ▸ Transfer the system configuration to the MCU with SyMa.

- ⇨ The MCU is ready for operation.

9.2 Establishing access to the MCU

The "Windows 7 Embedded" operating system of the MCU must be accessed for commissioning and configuration.

The MCU can be accessed as follows:

- ■ via **remote desktop connection**
  or alternatively
- ■ via **direct access**.

Remote desktop connection

The MCU can be optionally configured via remote desktop connection.

Through a remote desktop connection, the MCU can be accessed from an external computer connected to the MCU directly or via network. The connection to the MCU is established on the SyMa/Service interfaces *[X000]* or *[X001]*.

- ■ *For details on how to establish a remote desktop connection, please refer to the Microsoft documentation.*
- ■ *For default properties and default login details to establish a remote desktop connection to the MCU, see the following points.*
- ■ *The default properties can be changed.*

> **NOTICE!**
>
> ■ **SyMa/Service interface *[X000]***
>   □ This interface is intended for service.
>   □ Settings should only be changed in exceptional cases.
>
> ■ **SyMa/Service interface *[X001]***
>   □ DHCP mode is activated for this interface. IPv4 settings are automatically retrieved from a server.
>   □ This interface can be customised by the user/customer.

MCU default properties:

■ Remote desktop server activated

■ *Internet Protocol Version 4 (TCP/IPv4)* of the SyMa/Service interface *[X000]* is set to a static IP address
  □ IP address: *192.168.0.100*
  □ Subnet mask: 255.255.255.0

Default login data:

■ User: `Administrator`

■ Password: `1`

Direct access   The MCU's operating system can be alternatively accessed directly by means of externally connected peripherals, i.e. monitor, mouse and keyboard.

Connect external peripherals as follows:

1. ▸ Connect the mouse and keyboard to the USB ports *[X100 - X103]* of the MCU.

2. ▸ Connect the monitor to the monitor port *[X200]* of the MCU.

  ⇨ Plug&Play compatible devices are automatically installed and can then be used.
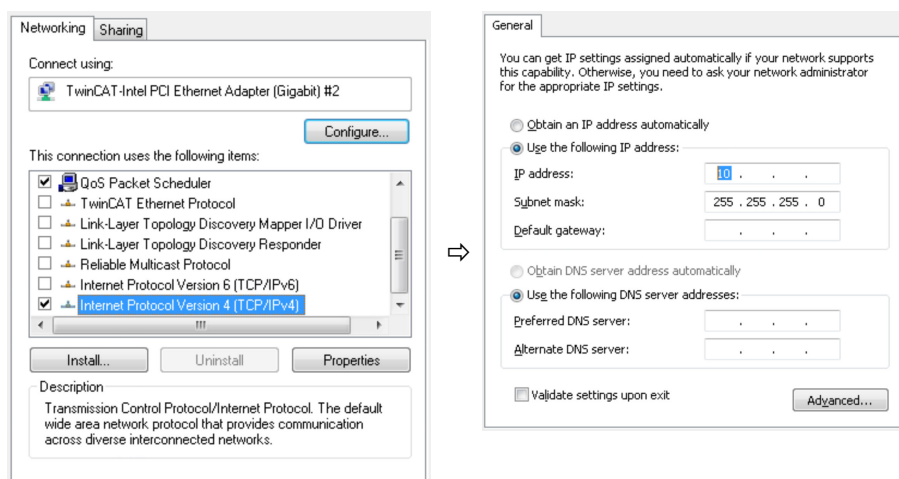
9.3 Configuring the interfaces

9.3.1 Configuring the SyMa interface

The properties of the SyMa/Service interface *[X001]* can be changed as follows:

1. ▶ Establish a remote desktop connection with the MCU.

2. ▶ Open the window to change adapter properties in Windows.

'Start ➜ *Control Panel* ➜ *Network and Sharing Centre* ➜ *Change adapter settings'*

3. ▶ Select the SyMa/Service interface *[X001]* and *"Properties"* using the right mouse button.

4. ▶ Highlight *"Internet Protocol Version 4 (TCP/IPv4)"* and press the *"Properties"* button.

In the properties window that opens:

■ assign a new IP address under *"Use the following IP address"* or

■ select *"Obtain an IP address automatically"* to automatically obtain an IP address.

⇨ The IP address properties of the SyMa interface have been changed.

### 9.3.2   Configuring TCP/IP interfaces for the PLCs

- *The TCP/IP interfaces of the Ethernet module only need to be config-ured if they are used as a connection for external PLCs.*
- *The interfaces on the Ethernet module do not need to be configured in MCUs with EtherCAT redundancy (+ECR).*
- *The SyMa program must be used for the final configuration of the TCP/IP interfaces.*

If external system controllers (PLCs) are connected to the MCU via the TCP/IP interfaces *[X600]* and *[X601]* on the Ethernet module, the interfaces must be configured as follows:

1. Establish a remote desktop connection with the MCU.

2. Open the window to change adapter properties in Windows.

'Start ➔ Control Panel ➔ Network and Sharing Centre ➔ Change adapter settings'

3. Select the TCP/IP interface *[X600]* or *[X601]* to be configured and open *"Properties"* using the right mouse button.

4. Highlight *"Internet Protocol Version 4 (TCP/IPv4)"* and press the *"Properties"* button.

In the properties window that opens:

- assign a new IP address under *"Use the following IP address"* or
- select *"Obtain an IP address automatically"* to automatically obtain an IP address.
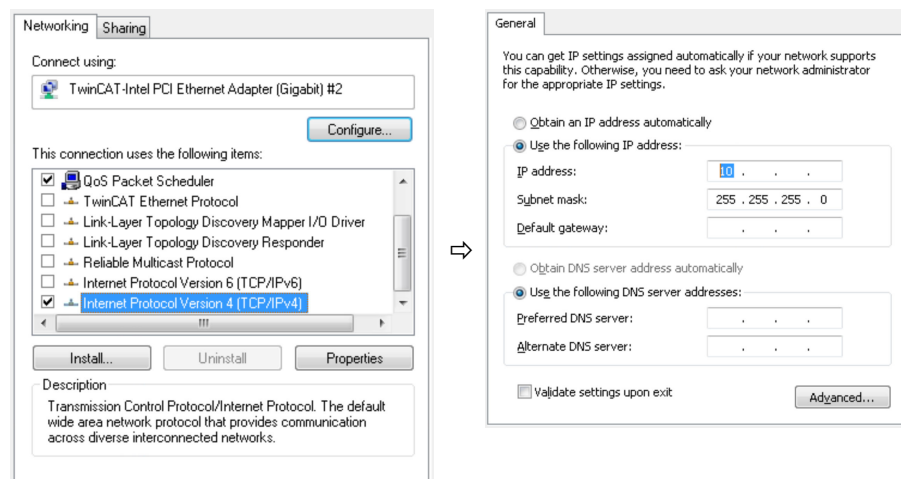
5. ▸ Finally, transfer the configuration of the TCP/IP interface to the MCU software through the connection properties in the *"SyMa"* program.

■ Start the *"SyMa"* program.
■ Open a new or existing SyMa project.
■ Open the connection properties in *"SyMa"*.
  'Project ➔ Project properties ➔ Tab connection'
■ Enter IP addresses.
  □ Enter the IP address of the MCU's configured interface *[X000]* or *[X001]* in the "IP address" box.
  □ Enter the assigned IP address of the TCP/IP interface in the *"PLC 1 - IP"* or *"PLC 2 - IP"* boxes.
  □ Confirm entries with *"OK"*

■ Connect *"SyMa"* to the MCU.
  'MCU ➔ Connect to MCU'
■ Transfer the connection properties to the MCU.
  'MCU ➔ Send data to MCU'
⇨ The TCP/IP interface has been configured.

9.3.3 Configuring PROFINET interfaces for the PLCs

If external system controllers (PLCs) are connected to the MCU through the PROFINET interfaces *[X1]* on the PROFINET modules, the interfaces must be configured.

Each PROFINET interface (each PROFINET module separately) must be assigned a PROFINET name. A PROFINET name is assigned using a SIEMENS development environment or other suitable programs (e.g. the SIEMENS "SINEC PNI" software).

9.3.4 Configuring EtherNet/IP interfaces for the PLCs

■ *The SyMa program must be used for the configuration of the EtherNet/IP interfaces.*

If external system controllers (PLCs) are connected to the MCU via the EtherNet/IP interfaces *[X1]* of the EtherNet/IP modules, the interfaces must be configured.

To do this, you have to assign network properties for each EtherNet/IP module. The assignment is performed using the *"SyMa"* program.

Configure the EtherNet/IP interfaces as follows:

1. ▸ Connect the computer with the *"SyMa"* program to the configured interface *[X000]* or *[X001]* of the MCU.

2. ▸ Start the *"SyMa"* program.

3. ▸ Open a new or existing SyMa project.

4. ▸ Open the connection properties in *"SyMa"*.

  'Project ➜ *Project properties* ➜ *Tab connection'*

5. ▸ Enter the IP address of the MCU's interface *[X000]* or *[X001]* in the "IP address" box and press *"OK"* to confirm.

6. ▸ Connect *"SyMa"* to the MCU.

  'MCU ➜ *Connect to MCU'*

7. ▸ Open the connection properties again and press the *"EtherNet/IP"* button.

8. ▸ Select the EtherNet/IP interface *"Interface number"* to be configured and change or assign the IP properties of the interface. Then press "Save" to save the properties.

Note: If *"0.0.0.0"* is entered in the *"IP address"*, *"Subnet mask"* and *"Interface number"* boxes, the IP address is obtained automatically.

  ⇨ The EtherNet/IP interface has been configured.

9.4 Transferring the system configuration to the MCU with SyMa

■ *The "SyMa" program is required for transferring the system configuration.*

■ *You can find detailed information on the program in the corresponding operating manual "SWB_0005_iDM-SyMa".*

To finish commissioning the MCU, the project-specific system configuration (the system-specific SyMa project) must be transferred to the MCU together with all the properties required for operating the system.

Transfer the system configuration to the MCU as follows:

1. ▸ Start the *"SyMa"* program.

2. ▸ Open a system-specific SyMa project.

3. ▸ Connect *"SyMa"* to the MCU.

  'MCU ➜ Connect to MCU'

4. ▸ Transfer the SyMa project to the MCU.

  'MCU ➜ Send data to MCU'

  ⇨ The system configuration has been transferred to the MCU.

10 Operation

Objective   This section explains the work steps required by the operator.

Responsible party   The operator, or supervisory personnel appointed by him, is responsible for a safe and seamless workflow. As the contact person, he responds to all the personnel's queries regarding safe-to-use equipment; e.g.:

- Fire protection
- Electrical equipment

Required personnel   Due to their training and experience, only qualified and appropriately instructed personnel are able to correctly assess the respective initial situation, identify risks and avoid hazards.

Personnel required for everyday operation:

- Qualified and appropriately instructed operating personnel
- Qualified and appropriately instructed maintenance personnel

Safety in the work area
- Note the safety signs in the area around the system.
- Pay attention to the safety notes in additional applicable documentation (supplier documents).

> *Work safety*
>
> *Pay attention to company and task-specific work safety regulations, as well as the country-specific legal and safety regulations applicable at the location of use.*

10.1 Switching ON and OFF the MCU

10.1.1 Switching on the MCU

▸ The MCU is switched on by switching on the external power supply of the PSU module.

⇨ The operating system starts, and the hardware configuration of the MCU and the project-specific system configuration load.

The MCU is ready for operation when the *"TC"* LED in the Embedded PC is lit green.

Start-up time

The average start-up time until the system is ready for operation is approx. 1 minute.

10.1.2 Switching off the MCU

▸ The MCU is switched off by switching off the external power supply of the PSU module.

Switching off the MCU

The MCU can be hard-switched off. No data is lost.

10.2 MCU messages

The MCU has several indicators that provide the user with information about the status of the MCU.

Indicators

The following chapters describe the operating indicators for the respective module. The error and diagnostic indicators of the modules can be found in the manufacturer's documentation. www.beckhoff.com

10.2.1 MCU status LEDs

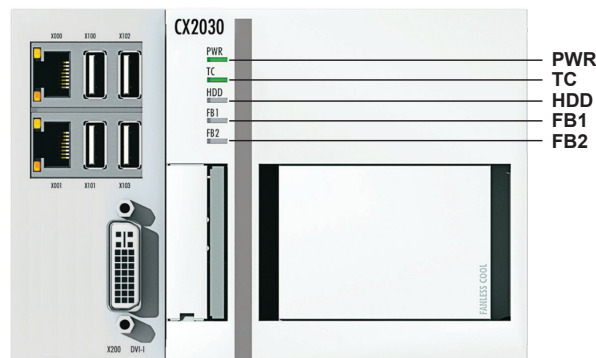The status of the MCU is indicated by 5 LEDs in the Embedded PC.

Fig. 29: MCU status LEDs [BN]

LED	Meaning
PWR	Power supply: ■ lit green: power supply switched on
TC	MCU status: ■ lit blue: MCU started but no program / no hardware configuration loaded / missing licenses ■ lit green: MCU in run mode / MCU started ■ lit red: MCU in error mode
HDD	Read/write CFast card: ■ lit red: access
FB1	*Not used*
FB2	*Not used*

10.2.2 PSU module status LEDs

PROFINET modules, EtherNet/IP modules and the EtherCAT module are connected to the PSU module and thus to the Embedded PC via the terminal bus (E-Bus). The terminal bus is monitored by the PSU module and the status is indicated by LEDs.

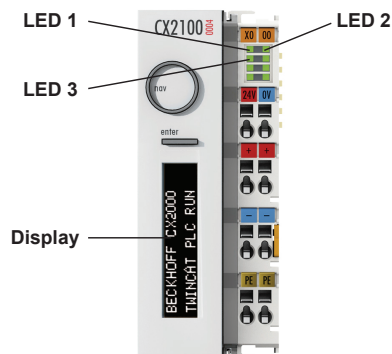Information about the MCU is shown on the display of the PSU module.

Fig. 30: Indicators of the PSU module [BN]

Indicator	Meaning
LED 1	Power supply for the Embedded PC: ■ lit green: correct power supply
LED 2	Power supply for the terminal bus: ■ lit green: correct power supply
LED 3	E-Bus monitoring: ■ OFF: E-Bus not connected ■ ON: E-Bus connected/no data traffic. ■ flashing: E-Bus connected/data traffic on the E-Bus.
Display	MCU information: ■ during the start-up process: progress indicator ■ during operation: indication of device type, system software version and MCU host name

10.2.3   PROFINET module status LEDs

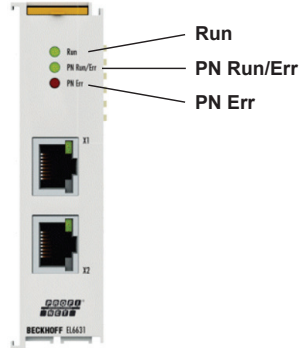The status of the PROFINET module is indicated by 3 LEDs in the module.

Fig. 31: PROFINET module status LEDs [BN]

LED	Meaning
Run	EtherCAT Run: ◼ lit green: OP, normal operating condition
PN Run/Err	PROFINET Run/Err: ◼ lit green: module parameters configured ◼ lit red: module started
PN Err	PROFINET Err: ◼ lit green: data exchange ◼ lit red: module starts up (should turn off after approx. 10 s)

> ⓘ   ***Error and diagnostic indicators***
>
> *The table above describes the general operating indicators of the module. Detailed information on the indicators (e.g. additional error and diagnostic indicators) can be found in the manufacturer's documentation of the module. www.beckhoff.com*

10.2.4 EtherNet/IP module status LEDs

The status of the EtherNet/IP module is indicated by 3 LEDs in the module.
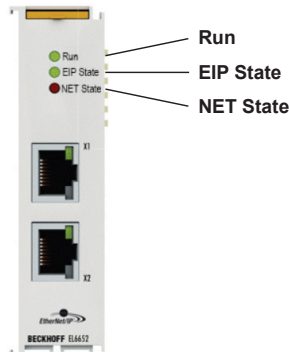

Fig. 32: EtherNet/IP module status LEDs [BN]

LED	Meaning
Run	EtherCAT Run: ■ lit green: OP, normal operating condition
EIP State	EtherNet/IP State: ■ lit green: EtherNet/IP slave is exchanging data with the EtherNet/IP master. All connections are in Run state ■ lit red: Error
NET State	NET State: ■ lit green: EtherNet/IP slave detected a link and configured it correctly ■ lit red (200 ms ON / 1 s OFF): general error on the EtherNet/IP slave

Error and diagnostic indicators

The table above describes the general operating indicators of the module. Detailed information on the indicators (e.g. additional error and diagnostic indicators) can be found in the manufacturer's documentation of the module. www.beckhoff.com

10.2.5 EtherCAT module status LEDs

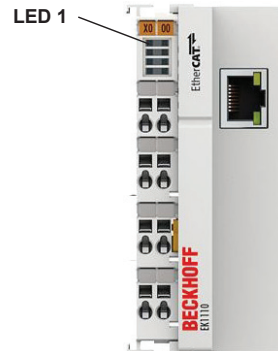The status of the EtherCAT module is indicated by an LED in the terminal bus of the module.

Fig. 33: EtherCAT module status LEDs [BN]

Indicator	Meaning
LED 1	Run: ■ OFF: initialising the module ■ lit green: OP, normal operating condition; mailbox and process data communication are possible ■ flashes green: function for mailbox communication and deviating default properties is set

*** Error and diagnostic indicators***

The table above describes the general operating indicators of the module. Detailed information on the indicators (e.g. additional error and diagnostic indicators) can be found in the manufacturer's documentation of the module. www.beckhoff.com

11   Service and maintenance

11.1   Updating system software using the MCU Software Update

Changes in the system software, such as the addition of new features, require you to update the system software of the MCU. This chapter describes how to update the system software of the MCU using the "MCU Software Update" program.

ⓘ   ***Updating the MCU system software***

The MCU system software is only updated upon instruction by Con-ductix-Wampfler Automation GmbH. The system software is provided specifically for each project.

ⓘ   ***Updating the software during operation***

The MCU will be restarted during the update. All running processes will be interrupted. It is not recommended to update the MCU during opera-tion.

Requirement   An external computer that is connected directly to the MCU by means of a network cable or via network and on which the "MCU Software Update" program is installed. The connection to the MCU is established on the con-figured interface *[X000]* or *[X001]*.

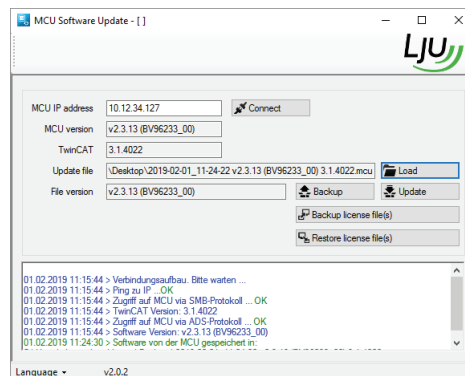The "MCU Software Update" program is part of the iDM software suite.

Fig. 34: "MCU Software Update" program

Updating the system soft-ware   Update the MCU system software as follows:

1. ▹ Save the project-specific system configuration (SyMa project).

2. ▹ Start the "MCU Software Update" program.

3. ▸ Press the *[Connect]* button.

Preset IP address of the MCU is retrieved.

⇨ Program is connected to the MCU.

4. ▸ Press the *[Load]* button.

In the next dialogue, select and confirm the storage location of the new MCU system software.

5. ▸ Press the *[Update]* button.

In the next dialogue, select and confirm the update version.

- Update with a backup of the currently used MCU system software (recommended)
- Update without a backup

6. ▸ Confirm the dialogue to overwrite the MCU configuration.

⇨ MCU system software will be updated, and the MCU will restart automatically.

7. ▸ Load the saved project-specific system configuration (SyMa project) or a new SyMa project.

⇨ The MCU is ready for operation.

11.2 Backing up the MCU license data

How to handle license files

Each Beckhoff CFast card with pre-installed Windows 7 Embedded has license files saved on it.

These license files should be backed up in case a fault occurs in the memory card, so that the license data can be run from a spare memory card.

> *The license data is hardware-bound. The MCU cannot be operated if a valid license is not available.*

License data can be backed up and restored as follows:

■ Using the "MCU Software Update" program
The "MCU Software Update" program is used to back up and restore license data of the MCU or to transfer new license data to the MCU.

or

■ otherwise manually to an external storage medium
An external storage medium (e.g. USB stick) is used to back up and restore license data of the MCU or to transfer new license data to the MCU.

11.2.1 Backing up and restoring license data using the MCU Software Update

Requirement

An external computer that is connected directly to the MCU by means of a network cable or via network and on which the "MCU Software Update" program is installed. The connection to the MCU is established on the configured interface *[X000]* or *[X001]*.

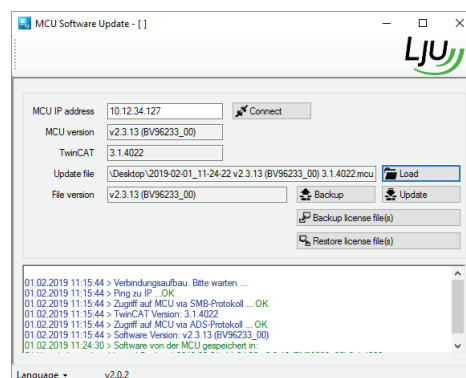The "MCU Software Update" program is part of the iDM software suite.

Fig. 35: "MCU Software Update" program

Backing up MCU license data	Back up the license data using the "MCU Software Update",as follows:

1. ▸ Start the "MCU Software Update" program.

2. ▸ Press the *[Connect]* button.

    Preset IP address of the MCU is retrieved.

    ⇨ Program is connected to the MCU.

3. ▸ Press the *[Backup license file]* button.

    In the next dialogue, select and confirm the storage location for the license files.

    ⇨ The license files will be backed up.

Restoring MCU license data	Restore the license data using the "MCU Software Update" as follows:

1. ▸ Start the "MCU Software Update" program.

2. ▸ Press the *[Connect]* button.

    Preset IP address of the MCU is retrieved.

    ⇨ Program is connected to the MCU.

3. ▸ Press the *[Restore license file]* button.

    In the next dialogue, select and confirm the storage location of the license files to be restored or the new license files.

    ⇨ The license data will be transferred to the MCU.

11.2.2 Manually backing up and restoring license data

Requirement	■ Remote desktop connection to an external computer that can access the MCU. or ■ The MCU has a monitor and input devices, such as a mouse and keyboard, connected to it.

Backing up MCU license data	Back up the license data manually as follows:

1. ▸ Plug the external storage medium into a free USB port on the MCU or the external computer.

2. ▸ Go to the directory *'C:* ➜ *TwinCat* ➜ *3.1* ➜ *Target:* ➜ *License'* of the MCU.

3. ▸ Copy license files from the directory to the external storage medium.

    ⇨ License data is saved.

**Restoring MCU
license data**

Restore the license data manually as follows:

1. ▸ Plug the external storage medium containing the license files to be restored or the new license files into a free USB port on the MCU or the external computer.

2. ▸ Go to the directory *'C: ➜ TwinCat ➜ 3.1 ➜ Target: ➜ License'* of the MCU.

3. ▸ Copy license files from the external storage medium into the directory.

   ⇨ License files are restored or reinstalled.

11.3 Dismantling/replacing the MCU

> ### ⚠ WARNING!
>
> **Live parts**
>
> The device is intended for installation in control cabinets and switch boxes. Contact with live parts poses an immediate danger to life.
>
> - When performing any work on the device, disconnect the control cabinet or switch box from the power supply and secure it against being switched on again.
> - Works on electric components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with the electro-technical regulations.

11.3.1 Dismantling the MCU

Dismantle the MCU as follows:

1. ▸ Make sure that the system is in a de-energised state.

2. ▸ Disconnect all electrical connections to the MCU.

3. ▸ Unlock all safety latches on the top and bottom of the MCU and unlock the EtherCAT module latch on the right side.
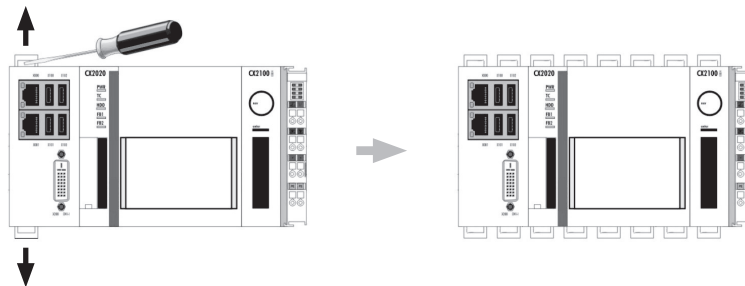
Unlocking the MCU (BN)

4. ▸ Remove the MCU from the top-hat rail as a complete module block.

5. ▸ If the MCU is to be disposed of afterwards:

   - Remove the battery from the MCU and dispose of it separately.
     ⮥ *Chapter 'Disposal of batteries and rechargeable batteries' on page 83*
   - Disassemble the module chain and dispose of the modules individually.
     ⮥ *Chapter 'Information on disposal and environmental regulations' on page 83*

11.3.2 Replacing the MCU

Important notes on replacing an MCU:

■ *Unless otherwise specified, a configured MCU must be replaced as a complete module block. Replacing individual modules can lead to malfunctions.*

■ *The license data of an MCU is hardware-bound, therefore, a new license file is required for a new MCU. If the license file of the new MCU is missing, please contact the service department of Conductix-Wampfler Automation GmbH.*

Replace the MCU as follows:

1. ▸ Dismantle the old MCU.
↳ *Chapter 'Dismantling the MCU' on page 80*

2. ▸ Check the new MCU for transport damage.

3. ▸ Physically install the new MCU.
↳ *Chapter 'Mechanical installation' on page 29*

4. ▸ Plug in the electrical connections of the new MCU.
↳ *Chapter 'Electrical installation' on page 33*

5. ▸ Switch on the power supply.

6. ▸ Commission the new MCU.
↳ *Chapter 'Commissioning' on page 59*

7. ▸ Start the system in automatic mode and keep it under observation.

11.4 Repairing the MCU

If you need to repair the device, please refer to your closest service partner or contact Conductix-Wampfler Automation GmbH directly.

↳ *Chapter 'Customer service and addresses' on page 89*

Repairs

Faulty devices may only be repaired by Conductix-Wampfler staff or specialists trained by Conductix-Wampfler.

In the event of repairs by unauthorised persons, all warranty claims against Conductix-Wampfler Automation GmbH are invalidated.

12 Disposal

12.1 Information on disposal and environmental regulations

If no return or disposal agreements exist, the individual components are to be properly dismantled and then separated and disposed of pursuant to current regulations or taken for recycling.

The device comprises electric and electronic components. Separate and dispose of them according to applicable provisions.

Follow the hazardous materials directive, in particular the regulations on handling hazardous materials.

♲ Materials designated for recycling are to be disposed of as per the respective recycling procedure.

12.2 Disposal of batteries and rechargeable batteries

The device contains batteries or rechargeable batteries. Dispose of them according to the national regulations currently in force.

ENVIRONMENT!

Environmental damage from batteries/rechargeable batteries!

Batteries or rechargeable batteries may contain harmful substances which may pose a threat to the environment or your health unless stored or disposed of properly.
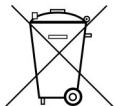
The symbol of a crossed-out dustbin on batteries and rechargeable batteries indicates that they must be disposed of separately.

The following applies to consumers in European countries:

■ Batteries and rechargeable batteries, whether marked with the crossed-out dustbin symbol or not, must be disposed of separately.

■ You are legally obliged to return used batteries and rechargeable batteries.

■ Do not dispose of batteries and rechargeable batteries in the household waste.

■ Take batteries and rechargeable batteries to communal battery collection points or ask a professional company to dispose of them.

■ Used batteries and rechargeable batteries supplied by us can be returned to us for proper disposal. Send the used batteries and rechargeable batteries with sufficient postage paid in advance to:
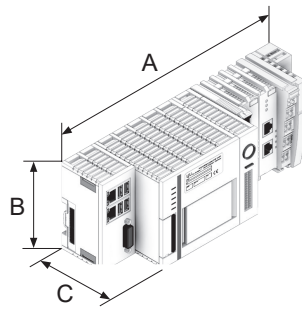
13 Technical Data

This chapter contains a list of general and connection-relevant informa-tion of the MCU.

Additional information can be found in the documentation for the indi-vidual components of Beckhoff Automation GmbH. www.beckhoff.com

Installation data

Place of installation	Control cabinet / switch box	
Fixing	on 35 mm top-hat rail Type: TS35/7.5 or TS35/15 in accordance with DIN EN 60715	
Installation position	horizontal	
Dimensions W *[A]* × H *[B]* × D *[C]*	MCU-TCP	250 mm × 99 mm × 93 mm
	MCU-1PN	250 mm × 99 mm × 93 mm
	MCU-1PN+ECR	274 mm × 99 mm × 93 mm
	MCU-2PN	274 mm × 99 mm × 93 mm
	MCU-2PN+ECR	298 mm × 99 mm × 93 mm
	MCU-3PN	298 mm × 99 mm × 93 mm
	MCU-3PN+ECR	322 mm × 99 mm × 93 mm
	MCU-4PN	322 mm × 99 mm × 93 mm
	MCU-4PN+ECR	346 mm × 99 mm × 93 mm
	MCU-1EIP	250 mm × 99 mm × 93 mm
	MCU-1EIP+ECR	274 mm × 99 mm × 93 mm
	MCU-2EIP	274 mm × 99 mm × 93 mm
	MCU-2EIP+ECR	298 mm × 99 mm × 93 mm
	MCU-3EIP	298 mm × 99 mm × 93 mm
	MCU-3EIP+ECR	322 mm × 99 mm × 93 mm
Clearance around the MCU	above	min. 30 mm
	below	min. 30 mm
	left	min. 20 mm
	right	min. 20 mm
Protection class	IP 20	
Weight	approx. 2000 g max.	

Environmental conditions

Ambient temperature	-25 ºC … +55 ºC
Relative humidity	95 % (no condensation)
Storage temperature	-25 ºC … +85 ºC

Electrical connection data

Supply type	External supply 24 V DC / 4 A min.
Supply voltage	24 V DC (-15/+20 %)
Power consumption	approx. 50 W
Supply cable	Isolated single-core, 0.5 … 2.5 mm^2

Interface data

Ethernet interfaces	TCP/IP protocol Transfer rates:10/100/1000 Mbps
PROFINET interfaces	PROFINET RT Device Protocol: PROFINET Transfer rates:10/100 Mbps
EtherNet/IP interfaces	EtherNet/IP slave Protocol: EtherNet Industrial Protocol Transfer rates:10/100 Mbps
EtherCAT interfaces	Protocol: EtherCAT Transfer rate: 100 Mbps
USB interfaces	USB 2.0
monitor	DVI-I

Cable requirements for power supply

Cable type	isolated single-core
Conductor cross section	0.5 … 2.5 mm^2
Stripping length	8 to 9 mm

Network cable line regulation

Cable type	Network cable min. Cat. 5 in accordance with DIN EN 50173-1
Cable length	100 m max.

Memory

Type	CFast card suitable for industrial use
Slot	CFast card slot
Memory capacity	4 GB or 8 GB
Special feature	increased number of write cycles elevated temperature range (+85°C)

Battery

Function	Time and date buffers
Type	CR2032
Voltage	3.0 V
Capacity	225 mAh
Replacement interval	5 years

Software

MCU operating system	Microsoft Windows Embedded Standard 7 P 32 bit
Beckhoff control software	TwinCAT-3 runtime (XAR)
PLC program	project-specific MCU hardware and software configuration BV.....
additionally required software	■ iDM System Manager (SyMa) ■ MCU software update Both programs are part of the *"Software Suite"*. Available from *www.conductix.com*

14 Customer service and addresses

Customer service

Our service team is available to provide technical information.

■ **Conductix-Wampfler Automation - Service**
Phone: +49 331 887344-15 | Fax: +49 331 887344-19
E-mail: service.potsdam@conductix.com

> *Service forms*
>
> *Service forms are available for download under www.conductix.com.*
>
> *Please send completed service forms to service.potsdam@conductix.com.*

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■ *www.conductix.com*

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