

Manual | EN

C5240-0030

Industrial PC



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1 Notes on the documentation

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

The documentation and the following notes and explanations must be complied with when installing and commissioning the components.

The trained specialists must always use the current valid documentation.

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

Disclaimer

The documentation has been compiled with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without notice.

Claims to modify products that have already been supplied may not be made on the basis of the data, diagrams, and descriptions in this documentation.

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2 For your safety

The signal words and their meanings are explained in the chapter on safety. They contain fundamental safety instructions that are essential for preventing personal injuries and damage to property.

Exclusion of liability

Beckhoff shall not be held liable in the event that this documentation is not complied with and the devices are therefore not used in line with the documented operating conditions.

2.1 Signal words

The signal words used in the documentation are classified below.

Warning on personal injuries

 DANGER
High-risk hazard that will result in death or serious injury.
 WARNING
Medium-risk hazard that may result in death or serious injury.
 CAUTION
Low-risk hazard that may result in minor injury.

Warning on property and environmental damage

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

2.2 Intended use

The device is intended for use as a control system for automation, visualization and communication in machine and system engineering.

The front of the device is designed for an IP50 working environment. There is complete protection against contact and dust in harmful quantities. It is not protected against water.

The rear of the device is designed for an IP20 working environment. It is protected against the penetration of fingers and solid foreign bodies of 12.5 mm in diameter or larger in size. It is not protected against water. Operation of the device in wet and dusty environments is not permitted.

The specified limits for technical data must be adhered to.

The device can be used within the documented operating conditions.

Improper use

Do not use the device outside the documented operating conditions.

2.3 Fundamental safety instructions

The following safety instructions must be observed when handling the device.

Application conditions

- Do not use the device under extreme environmental conditions.
- Do not use the device in hazardous areas.
- Never plug or unplug connectors during thunderstorms. There is a risk of electric shock.
- Ensure that the device has a protective and functional earth connection.

Damage to property, loss of data and impairment of functions

- If you change the hardware and software configurations, you must keep within the specified limits of power consumption and power loss (please refer to the respective data sheet).
- Ensure that only trained specialists with a control and automation engineering background, operate the device. Use by unauthorized persons can lead to damage to property and loss of data.
- Fuse the power supply line to protect the supply line in the event of a short circuit according to its cross-section.
- In case of fire, extinguish the device with powder or nitrogen.

2.4 Operator's obligation to exercise diligence

The operator must ensure that

- the products are used only for their intended purpose (see Chapter 2.2 [Intended use](#) [► 6]).
- the products are only operated in sound condition and in working order.
- the products are operated only by suitably qualified and authorized personnel.
- the personnel is instructed regularly about relevant occupational safety and environmental protection aspects, and is familiar with the operating instructions and in particular the safety instructions contained herein.
- the operating instructions are in good condition and complete, and always available for reference at the location where the products are used.

2.5 Notes on information security

The products of Beckhoff Automation GmbH & Co. KG (Beckhoff), insofar as they can be accessed online, are equipped with security functions that support the secure operation of plants, systems, machines and networks. Despite the security functions, the creation, implementation and constant updating of a holistic security concept for the operation are necessary to protect the respective plant, system, machine and networks against cyber threats. The products sold by Beckhoff are only part of the overall security concept. The customer is responsible for preventing unauthorized access by third parties to its equipment, systems, machines and networks. The latter should be connected to the corporate network or the Internet only if appropriate protective measures have been set up.

In addition, the recommendations from Beckhoff regarding appropriate protective measures should be observed. Further information regarding information security and industrial security can be found in our <https://www.beckhoff.com/secguide>.

Beckhoff products and solutions undergo continuous further development. This also applies to security functions. In light of this continuous further development, Beckhoff expressly recommends that the products are kept up to date at all times and that updates are installed for the products once they have been made available. Using outdated or unsupported product versions can increase the risk of cyber threats.

To stay informed about information security for Beckhoff products, subscribe to the RSS feed at <https://www.beckhoff.com/secinfo>.

3 Product overview

The device is a powerful industrial PC for installation in a 19-inch rack. The device is suitable for various applications and requirements.

You can use the industrial PC for the following applications, among others:

- various automation and visualization tasks
- a wide range of IoT tasks with data preprocessing
- complicated HMI applications
- extensive axis controllers
- short cycle times
- high-volume data handling

In its basic configuration, the device includes the following features:

- ATX motherboard
- Intel® processor
- DRAM SODIMM
- NVMe™-M.2-SSD
- 100-240 V AC power supply unit

3.1 Structure

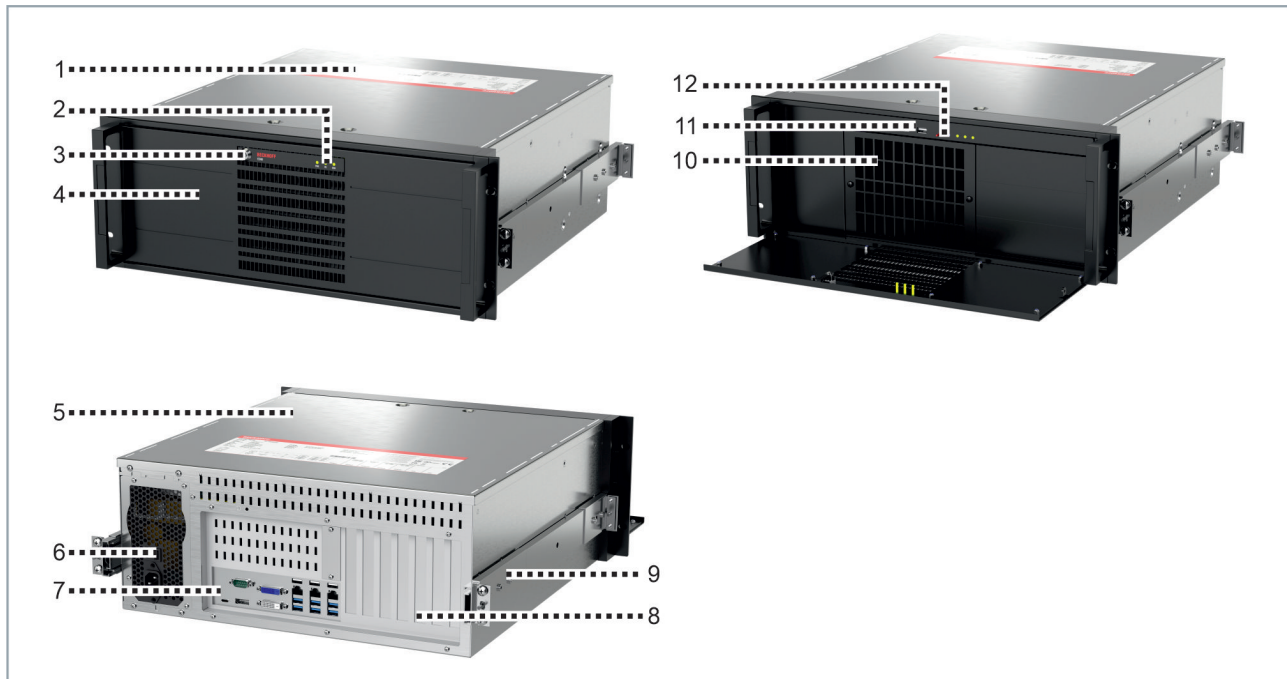


Fig. 1: Structure

Table 1: Legend structure

No.	Component	Description
1	Name plate	Information on the equipment of the industrial PC
2	Status LEDs	Status display for hard disk, fieldbus and power
3	Front flap lock	Opening the front flap
4	Front flap	Access to ATX and reset button, USB interfaces, drives, removable frame, front fan filter mat
5	Housing cover	Access to exchangeable device components
6	Power supply	Power supply connection
7	Connection section	Access to interfaces of the industrial PC
8	Plug-in card slots	Additional optional plug-in cards
9	Optional telescopic rails	Pull-out rails for installation in 19-inch racks
10	Front fan with filter mat	Cooling the device
11	USB interfaces (X212, X213)	Connection of peripheral devices
12	ATX and reset button	Starting and shutting down the operating system, restarting the industrial PC

3.2 Interface description

The basic version of the device includes the following interfaces:

- Power supply (X101)
- USB-C (X102)
- RS232 (X103)
- DisplayPort (X104)
- DVI (X105, X106)
- Ethernet RJ45 (X107, X110, X113)
- USB (X108, X109, X111, X112, X114, X115, X212, X213)

Most of the interfaces are located on the rear side of the industrial PC in the connection section (section A). The two USB interfaces X212 and X213 are located in the front of the industrial PC behind the front flap (section B).

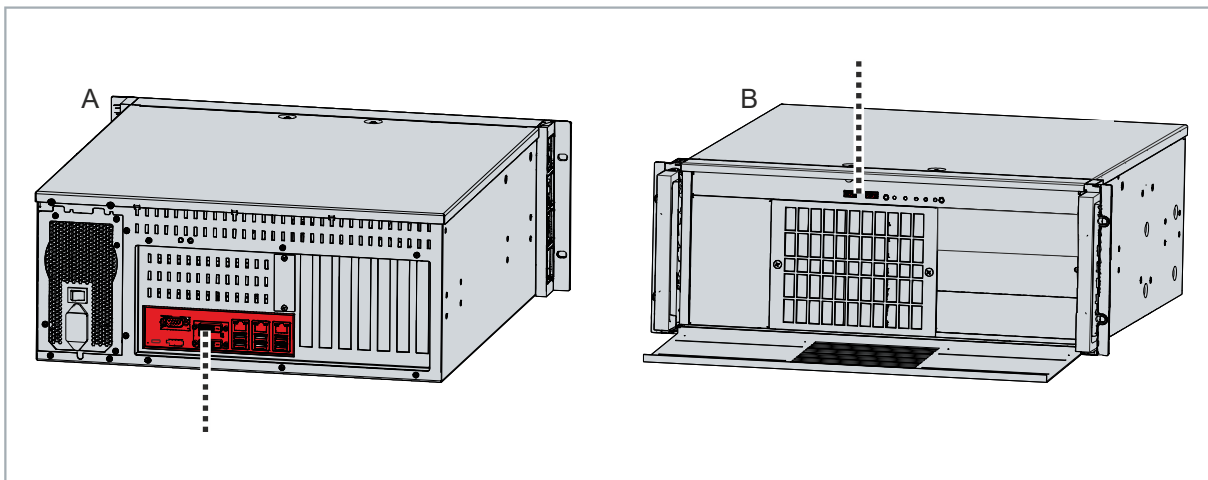


Fig. 2: Position interfaces

The following figure shows the assignment of the interfaces in the connection section on the back of the device.

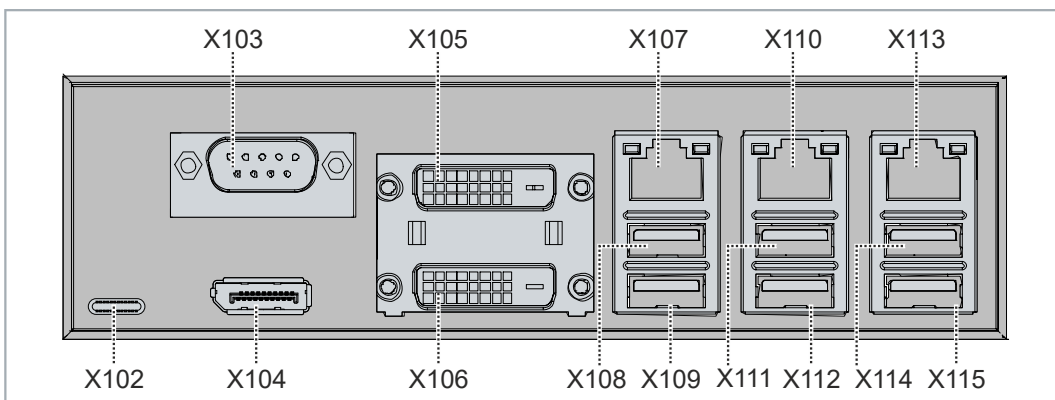


Fig. 3: Interfaces connection section rear side

To access the USB interfaces in the front, you first have to open the front flap. Your device comes with a red accessory cover that contains keys. To open the front flap, use the pair of keys with the black key cover. The key for the front flap should only be accessible to administrative personnel who are authorized to connect USB devices to the PC, change drives and press reset buttons or ATX buttons.

To open the front flap, follow these steps:

1. Unlock the front flap with the corresponding key (section A).
2. Turn the front flap down (section B).

⇒ You now have access to the USB interfaces.

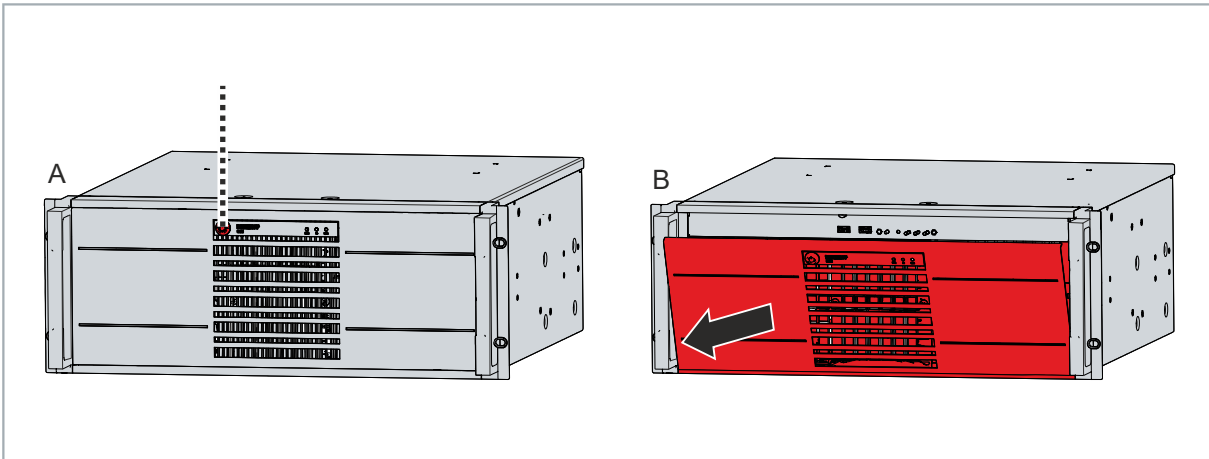


Fig. 4: Opening the front flap

3.2.1 Power supply

In its basic configuration, the industrial PC is equipped with a 100-240 V AC, 50-60 Hz full range power supply.

Table 2: Current carrying capacity power supply unit

Output voltages power supply unit	Current load 100-240 V AC power supply unit max.
+3.3 V	20 A
+5 V	20 A
+12 Total	45.5 A
-12 V	0.3 A
+5 V stand by	2.5 A

The power supply is connected via the IEC socket (X101) on the rear side of the industrial PC. The assignment includes a protective conductor (1), a neutral conductor (2) and an outer conductor (2).

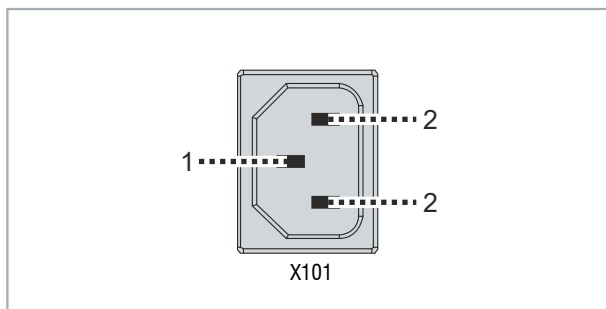


Fig. 5: IEC socket of the 100...240 V power supply

Optionally, you can order the industrial PC with a 24 V DC power supply. In this case, the industrial PC is supplied with a nominal voltage of 24 V. A 3-pin socket is used for the connection of the power supply (X101) as well as the external wiring (X102) of the industrial PC.

The main supply voltage is applied between PIN 1 (24 V) and PIN 3 (0 V) of the voltage socket (X101).

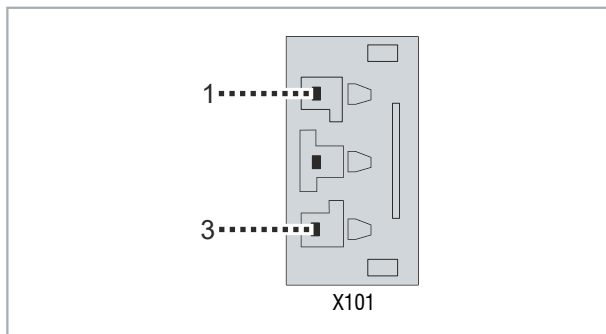


Fig. 6: Power supply socket pin numbering

Table 3: Power supply socket (X101) pin assignment

Pin	Signal	Description
1	+24 V	24 V supply voltage, positive pole
2	⊕	Protective earth
3	-	24 V supply voltage, negative pole

The positive pole of the supply voltage at PIN 1 of the voltage socket (X101) is looped through to PIN 3 of the socket (X102). PIN 3 thus serves as the positive pole for PC-ON.

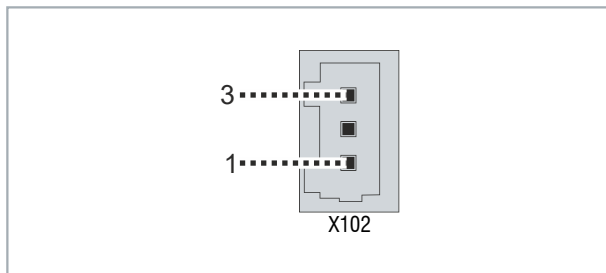


Fig. 7: Socket external wiring pin numbering

Table 4: Socket external wiring (X102) pin assignment

Pin	Signal	Description
1	P-S	Output power status, minus is the negative pole of the power supply (X101)
2	PC-ON	Input PC-ON
3	+24 V	Supply voltage and positive pole for PC-ON

The plug for the power supply can accommodate wire cross-sections up to 4 mm². Always use 4 mm² and a maximum length of 10 m for the supply cable in order to achieve a low voltage drop on the supply cables. At least 22 V should be present at the power supply plug of the device so that the device remains switched on in the event of voltage fluctuations. The connector for external wiring with PC-ON input and power status output can accommodate wire cross-sections of up to 1.5 mm². Both connectors are included in the scope of delivery. Replacement plugs are available from your Beckhoff sales representative using the following ordering options:

- C9900-P962 (power supply connector)
- C9900-P922 (connector external wiring)

3.2.2 USB-C

The device has a USB-C interface (X102) with two USB 3.2 Gen 2 channels (2 x 10 Gbit/s). The interface is used to connect peripheral devices with USB-C connection.

For both USB channels together, 3 A at 5 V can be supplied. This is a 24-pin USB connector system with point-symmetrical pin assignment. This means that the USB-C plug can also be inserted rotated by 180°.

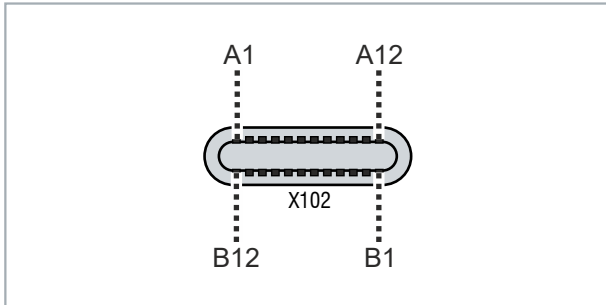


Fig. 8: USB-C interface pin numbering

Table 5: USB-C interface pin assignment

Pin	Connection	Pin	Connection
A1	GND	B1	GND
A2	TX1+	B2	TX2+
A3	TX1-	B3	TX2-
A4	VBUS1	B4	VBUS4
A5	CC1	B5	Vconn/CC2
A6	D0+	B6	D1+
A7	D0-	B7	D1-
A8	SBU1	B8	SBU2
A9	VBUS2	B9	VBUS3
A10	RX2-	B10	RX1-
A11	RX2+	B11	RX1+
A12	GND	B12	GND

3.2.3 USB

The industrial PC has six USB-A interfaces (X108, X109, X111, X112, X114, X115) USB 3.2 Gen 2 (10 Gbit/s) on the rear side of the device and two USB interfaces (X212, X213) USB 2.0 behind the front flap. They are used to connect peripheral devices with USB connector.

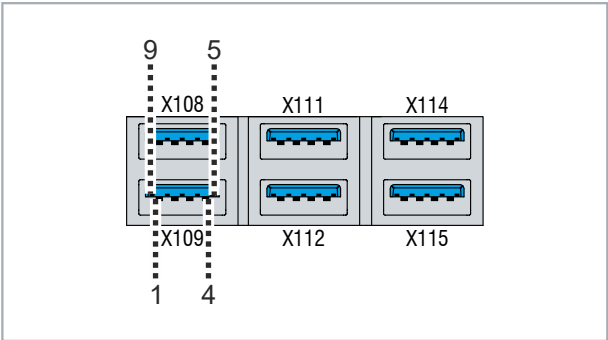


Fig. 9: USB interface pin numbering

Table 6: USB interface pin assignment

Pin	Connection	Typical assignment
1	Vbus	Red
2	D -	White
3	D +	Green
4	GND	Black
5	StdA_SSRX -	Blue
6	StdA_SSRX +	Yellow
7	GND_DRAIN	N/A
8	StdA_SSTX -	Purple
9	StdA_SSTX +	Orange

Only pins 1 to 4 and the shield are relevant for USB 2.0.

3.2.4 Ethernet RJ45

The industrial PC has three Gigabit LAN ports (X107, X110, X113). The Ethernet standards 100Base-T and 1000Base-T allow for X107 (LAN 1) the connection of corresponding network components and data rates of 100/1000 Mbit/s. The Ethernet standards 100Base-T, 1000Base-T and 2500Base-T allow for X110 and X113 (LAN2, LAN3) the connection of corresponding network components and data rates of 100/1000/2500 Mbit/s. The required speed is selected automatically.

The RJ45 connection technology with twisted-pair cables is used. The maximum length of the cable connection is 100 m. The industrial PC may only be connected to internal Ethernet networks and not to external telecommunication networks.

Intel® i219 (PHY) is used as the controller for LAN 1 and Intel® i226 for LAN 2 and LAN 3.

The Ethernet ports connected via PCIe® (X110 and X113, LAN 2 and LAN 3) with the i226 controller are generally suitable for cycle times ≤ 1 ms and for distributed clock applications with EtherCAT.

The Ethernet port (X107, LAN 1) integrated in the chipset with the i219 controller is generally suitable for EtherCAT and real-time Ethernet applications with cycle times > 1 ms (without distributed clocks).

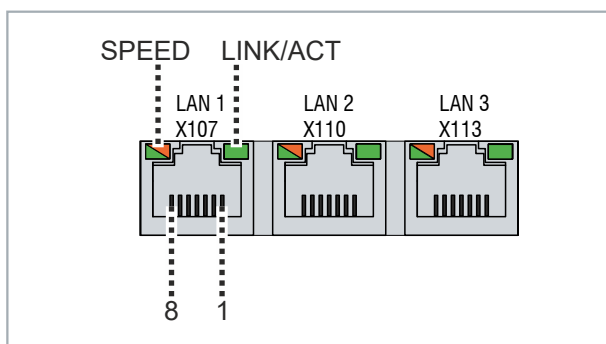


Fig. 10: Ethernet interface pin numbering

Table 7: Ethernet interface pin assignment

Pin	Signal	Description
1	T2 +	Pair 2
2	T2 -	
3	T3 +	Pair 3
4	T1 +	Pair 1
5	T1 -	
6	T3 -	Pair 3
7	T4 +	Pair 4
8	T4 -	

The LEDs of the LAN interfaces indicate the activity and the data transmission rate (Mbit/s). The LED shown completely green in the figure indicates whether the interface is connected to a network. If this is the case, the LED lights up green. The LED flashes when data transmission is in progress on the interface.

The green/orange LED shown in the figure indicates the data transmission rate. The meanings of the LEDs at LAN 1 and LAN2-LAN3 differ due to the possible data transmission rate as follows:

Table 8: Meaning of LEDs

Interface	Mbit/s	LED
LAN 1	100	Lights up orange
	1000	Lights up green
LAN 2, LAN 3	100	Off
	1000	Lights up orange
	2500	Lights up green

3.2.5 DVI

The industrial PC has two DVI connections (X105, X106), to which a DVI-capable monitor can be connected. Only digital signals are transmitted.

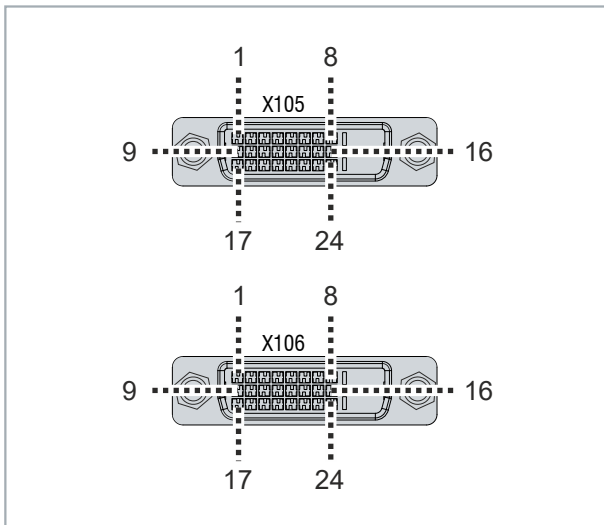


Fig. 11: DVI interface pin numbering

Table 9: DVI interface pin assignment

Pin	Connection	Pin	Connection	Pin	Connection
1	TMDS Data 2 -	9	TMDS Data 1 -	17	TMDS Data 0 -
2	TMDS Data 2 +	10	TMDS Data 1 +	18	TMDS Data 0 +
3	TMDS Data 2/4 Shield	11	TMDS Data 1/3 Shield	19	TMDS Data 0/5 Shield
4	not connected	12	not connected	20	not connected
5	not connected	13	not connected	21	not connected
6	DDC Clock	14	+ 5 V Power	22	TMDS Clock Shield
7	DDC Data	15	Ground (+ 5 V, Analog H/V Sync)	23	TMDS Clock +
8	Analog Vertical Sync	16	Hot Plug Detect	24	TMDS Clock -

3.2.6 RS232

The serial interface COM1 (X103) is led out via a 9-pin standard DSUB connector. The signals comply with the RS232 standard. The port address and the used interrupt are configured automatically, but can also be set manually with the help of the BIOS setup if required.

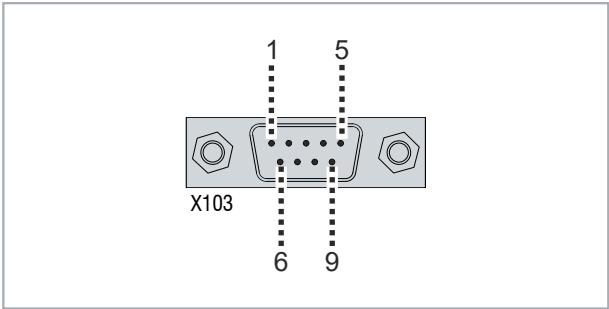


Fig. 12: RS232 interface pin numbering

Table 10: COM1 interface pin numbering

Pin	Name	Description
1	DCD	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear to Send
9	RI	Ring Indicator

3.2.7 DisplayPort

The industrial PC has a DisplayPort (X104) that enables connection of devices with DisplayPort. Additionally, DVI signals can be transmitted via an adapter cable. The following ordering option is available to you for this purpose:

- C9900-Z468: adapter cable DisplayPort to DVI, 40 cm

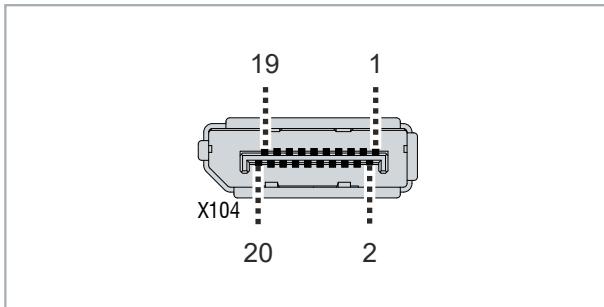


Fig. 13: DisplayPort pin numbering

Table 11: Pin assignment of DisplayPort

Pin	Connection	Pin	Connection
1	LVDS lane 0 +	2	Ground
3	LVDS lane 0 -	4	LVDS lane 1 +
5	Ground	6	LVDS lane 1 -
7	LVDS lane 2 +	8	Ground
9	LVDS lane 2 -	10	LVDS lane 3 +
11	Ground	12	LVDS lane 3 -
13	Config 1	14	Config 2
15	AUX channel +	16	Ground
17	AUX channel -	18	Hot-plug detection
19	Power supply: ground	20	Power supply: 3.3 V / 500 mA

3.3 Optional interfaces

Interface options are available to extend your industrial PC with additional interfaces beyond the basic configuration:

Table 12: Interface option

Ordering option	Description	Link to option
C9900-E203	Serial interface RS232	https://www.beckhoff.com/c5240-0030
C9900-E209	Module for electrical isolation of an RS232 interface	Select the “Options” tab at the bottom of the website.
C9900-E210	Module for converting an RS232 interface to RS485	
C900-E211	Module for converting an RS232 interface to RS422	

You need a bracket to use the interfaces.

3.3.1 C9900-E203 with 1 serial interface RS232

The serial interface RS232 is led out via a standard 9-pin D-sub connector in a slot bracket. The port address and the used interrupt are configured automatically, but can also be set manually with the help of the BIOS setup if required.

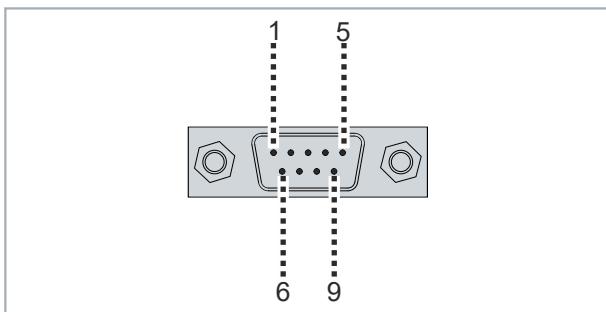


Fig. 14: RS232 interface pin numbering

Table 13: RS232 interface pin numbering

Pin	Name	Description
1	DCD	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear to Send
9	RI	Ring Indicator

3.3.2 C9900-E209 with RS232 interface

The module for electrical isolation of an RS232 interface of the motherboard is led out via a 9-pin standard DSUB connector in a bracket. The interface features overvoltage protection. If an overvoltage occurs, the channel is switched off.

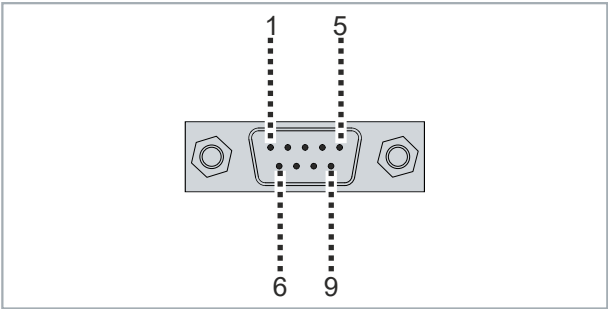


Fig. 15: RS232 interface pin numbering

Table 14: RS232 interface pin numbering

Pin	Name	Description
1	DCD	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear to Send
9	RI	Ring Indicator

3.3.3 C9900-E210 with RS485 interface

The module for converting an RS232 interface of the motherboard into RS485 is led out via a 9-pin standard DSUB connector in a bracket. The interface is electrically isolated and protected by overvoltage protection. If an overvoltage occurs, the channel is switched off.

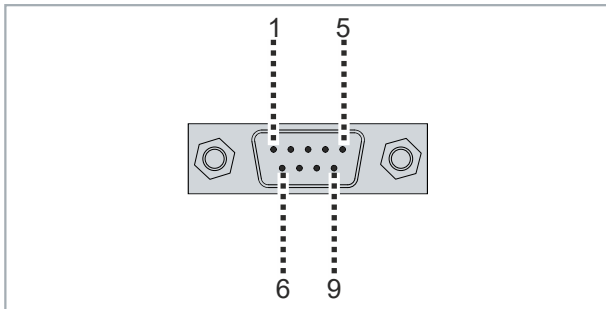


Fig. 16: RS485 interface pin numbering

Table 15: RS485 pin assignment

Pin	Signal	Type	Description
1	-	-	-
2	TxD +	Data-Out +	Transmit 485
3	RxD +	Data-In +	Receive 485
4	-	-	-
5	GND	Ground	Ground
6	VCC	VCC	+5 V
7	TxD-	Data-Out -	Transmit 485
8	RxD-	Data-In -	Receive 485
9	-	-	-

On delivery the interface is configured as a half-duplex endpoint without echo as standard:

Table 16: RS485 standard configuration

Function	Status
Echo	off
Auto send	on
Always send	off
Auto receive	on
Always receive	off
Termination	on

3.3.4 C9900-E211 with RS422 interface

The module for converting an RS232 interface of the motherboard into RS422 is led out via a 9-pin standard DSUB connector in a bracket. The interface is electrically isolated and protected by overvoltage protection. If an overvoltage occurs, the channel is switched off.

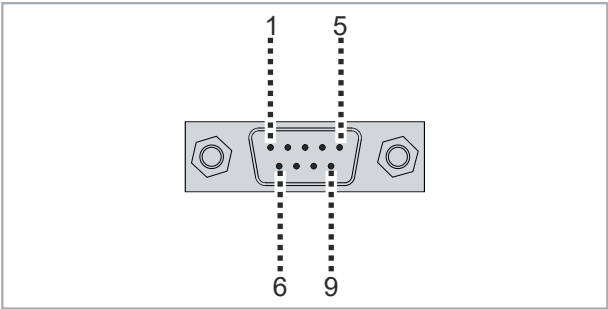


Fig. 17: RS422 interface pin numbering

Table 17: RS422 pin assignment

Pin	Signal	Type	Description
1	-	-	-
2	TxD +	Data-Out +	Transmit 422
3	RxD +	Data-In +	Receive 422
4	-	-	-
5	GND	Ground	Ground
6	VCC	VCC	+5 V
7	TxD-	Data-Out -	Transmit 422
8	RxD-	Data-In -	Receive 422
9	-	-	-

On delivery the interface is configured as a full duplex endpoint as standard:

Table 18: RS422 standard configuration

Function	Status
Echo	on
Auto send	off
Always send	on
Auto receive	off
Always receive	on
Termination	on

3.4 Status LEDs

The industrial PC has three status LEDs: PWR, FB, HDD. They provide information on the following aspects:

- the status of the power controller
- the fieldbus status
- the hard disk activity

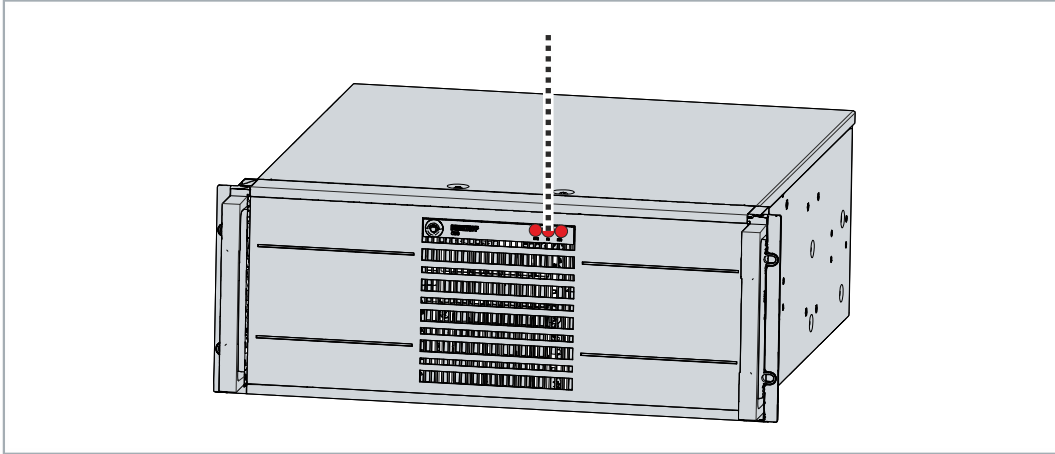


Fig. 18: Status LEDs

Table 19: Meaning of the Status LEDs

LED	Color/flashing interval	Meaning
PWR (Power)	green off	Computer on Computer off
FB (fieldbus)	-	no function
HDD (hard disk)	flashing red	Access to storage medium (HDD/NVMe™)

3.5 Name plate

The name plate provides information on the equipment fitted to the industrial PC. The name plate shown here serves only as an example.

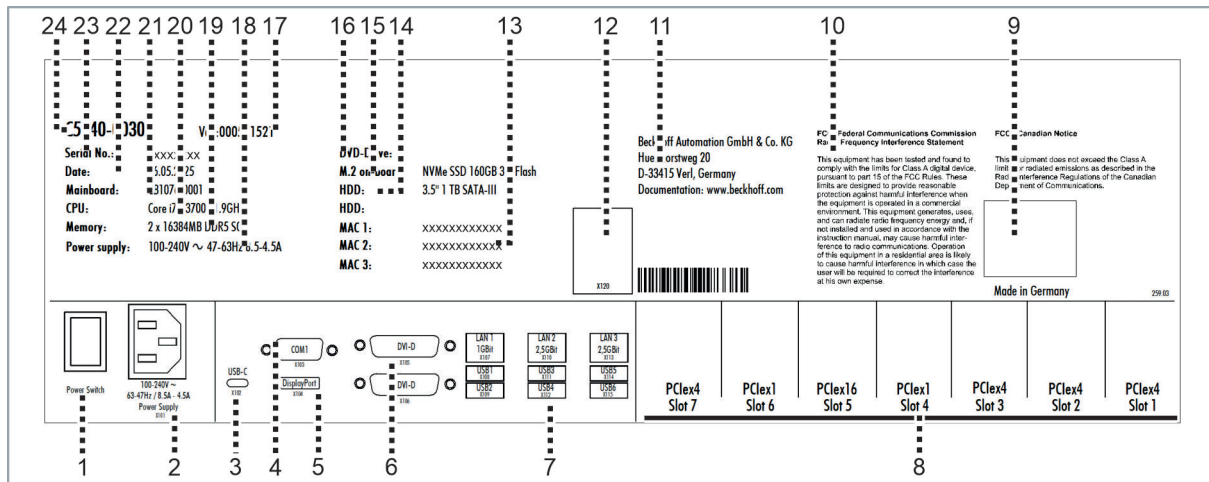


Fig. 19: Name plate

Table 20: Name plate legend

No.	Description
1	Main switch for switching the device on and off
2	Power supply connection (X101)
3	USB-C interface (X102)
4	Serial interface RS232 (X103)
5	DisplayPort (X104)
6	DVI interfaces (X105, X106)
7	Ethernet interfaces (X107, X110, X113) and USB interfaces (X108, X109, X111, X112, X114, X115)
8	Plug-in card slots for options
9	Symbols
10	FCC approvals
11	Address of the vendor
12	Optional interface led out in a slot bracket
13	MAC addresses of the Ethernet interfaces (X107, X110, X113)
14	Hard disk
15	NVMe™ SSD
16	DVD drive
17	Variant number: commercial number of the order code including ordering options

No.	Description
18	Power supply
19	Main memory
20	CPU
21	Mainboard
22	Date of manufacture
23	Serial number = Beckhoff Traceability Number (BTN)
24	Model: The last four digits indicate the device generation.

3.6 TwinCAT version

To ensure optimal performance and access to all the functions of your device when using the TwinCAT control software, Beckhoff recommends using the latest version of TwinCAT. In addition, you should never go below the minimum requirement for the TwinCAT version. This consists of the hardware requirements and the general TwinCAT system requirements. The general TwinCAT system requirements can be found [here](#). The following table shows the minimum TwinCAT version according to the device generation based on the hardware requirements:

Table 21: Minimum TwinCAT version hardware-based

Device generation	Minimum TwinCAT version hardware-based
C5240-0030	3.1 build 4024.60

4 Commissioning

In order to use the device, you must first commission it. The first step is to transport the device to its operating location and unpack it. This is followed by installing the device in the 19-inch rack, connecting the cables and the power supply and finally switching on the device.

4.1 Transport and unpacking

Note the specified transport and storage conditions (see Chapter 9 Technical data).

Despite the robust design of the unit, the components are sensitive to strong vibrations and impacts. During transport the device must therefore be protected from mechanical stress. Appropriate packaging of the device, such as the original packaging, can improve the vibration resistance during transport.

NOTICE

Hardware damage due to condensation

Unfavorable weather conditions during transport can cause damage to the device.

- Protect the device against moisture (condensation) during transport in cold weather or in case of extreme temperature fluctuations.
- Do not put the device into operation until it has slowly adjusted to the room temperature.
- Should condensation occur, wait for about 12 hours before switching the device on.

Unpacking

4.2 Rack installation

NOTICE

Extreme environmental conditions

Extreme environmental conditions can cause damage to the device.

- Avoid extreme environmental conditions.
- Protect the device against dust, moisture and heat.

NOTICE

Incorrect installation

Mounting the device in a way that deviates from the documentation can impair its functionality.

- Only install the device with the connection section facing backwards.

The industrial PC is designed for installation in 19-inch racks in machine and plant engineering. The environmental conditions specified for operation must be observed (see chapter 9 [Technical data](#) [► 57]).

Dimensions

The dimensions of the industrial PC are used to prepare the rack. All dimensions are in mm.

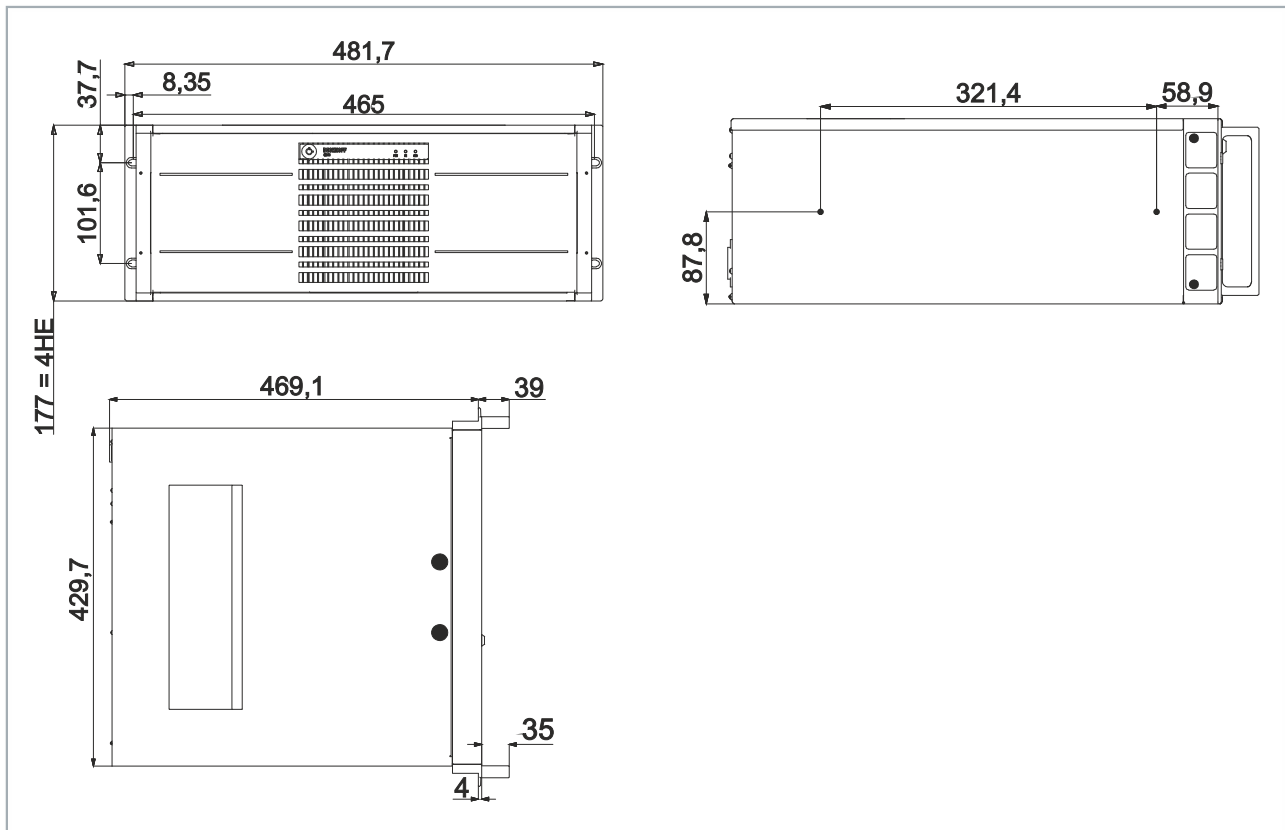


Fig. 20: Device dimensions

Beckhoff provides the following ordering option C9900-M712 with telescopic rails and brackets:

- C9900-M712: telescopic rails for C5210 and C5240, rails including bracket set for 19-inch rack assembly

The telescopic rails and brackets allow you to pull the industrial PC out of the rack. This makes it easier to open or connect the industrial PC, for example.

Instructions for mounting the C9900-M712 ordering option are provided in the following document:

[https://download.beckhoff.com/download/technical drawings/Industrial PC/Control cabinet Industrial PCs/C52xx/C5240_C9900-M712.pdf](https://download.beckhoff.com/download/technical%20drawings/Industrial%20PC/Control%20cabinet%20Industrial%20PCs/C52xx/C5240_C9900-M712.pdf)

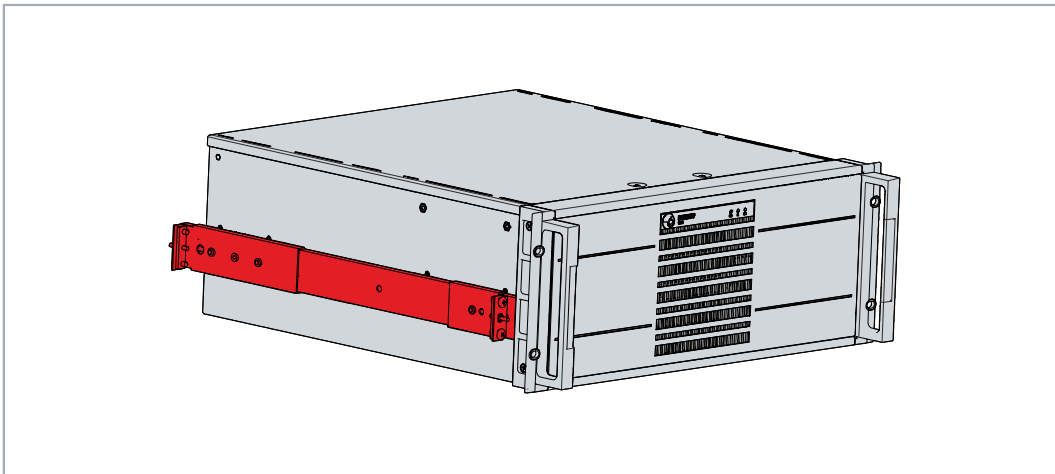


Fig. 21: Telescopic rails mounted

4.3 Connecting the Industrial PC

⚠ CAUTION

Risk of electric shock

Dangerous touch voltages can lead to electric shock. To avoid electric shock, observe the following:

- Never connect or disconnect the device cables during a thunderstorm.
- Provide protective earthing for handling the device.

To prepare the industrial PC for operation, it must be connected. The first step is to ground the device. Then you can connect the cables and the power supply.

In its basic configuration, the industrial PC is equipped with a 100-240 V AC, 50-60 Hz full-range power supply unit. Alternatively, the following ordering option is available:

- C9900-P229: 24 V DC power supply unit

If you have ordered the PC with a 24 V DC power supply unit, wire the industrial PC in the control cabinet in accordance with the standard EN 60204-1:2006 Protective Extra Low Voltage (PELV):

- The PE conductor (protective earth) and the "0 V" conductor of the voltage source must be on the same potential (connected in the control cabinet).
- Standard EN 60204-1:2006, section 6.4.1:b stipulates that one side of the circuit, or a point of the energy source for this circuit must be connected to the protective conductor system.

Devices connected to the industrial PC with their own power supply must have the same potential for the PE and "0 V" conductors as the industrial PC (no potential difference).

4.3.1 Grounding of the industrial PC

Potential differences are minimized and electrical currents are diverted to the ground through grounding or potential equalization of electronic devices. This is to prevent dangerous touch voltages and electromagnetic interference.

The protection provided by the devices may be impaired by non-intended use.

All connected devices must be in SELV (Safety Extra Low Voltage)/PELV (Protective Extra Low Voltage) circuits.

The protective grounding of a device serves to avoid dangerous touch voltages. According to the EN 60204-1 standard (Chapter 8 Potential equalization), protective grounding is required if:

- the device exceeds dimensions of 50 mm x 50 mm,
- the device can be touched or encompassed over a large area,
- contact between the device and active parts is possible,
- an insulation fault may occur.

A protective conductor is included in the industrial PC's IEC socket for connecting the power supply. Establish the low-resistance protective earth of the industrial PC via the voltage connection, thus avoiding dangerous touch voltages.

If you have ordered the industrial PC with a 24 V power supply unit, a pin for protective earthing (PE) of the device is included in the power supply socket. Establish the low-resistance protective earth of the industrial PC via the voltage connection, thus avoiding dangerous touch voltages.

EMC

NOTICE

Hardware damage due to electromagnetic interference

The use of the device without a functional earth can lead to material damage due to electromagnetic interference.

- Only use the device with functional earth.

Electromagnetic compatibility (EMC) of the device includes on the one hand not affecting other devices and equipment by electromagnetic interference and on the other hand not being disturbed by electrical or electromagnetic effects itself.

To do this, the device must comply with certain protection requirements. The device has EMC interference immunity according to EN 61000-6-2. The EMC interference emission of the device meets the requirements of EN 61000-6-4.

The functional earth is necessary for the EMC of the device. The functional earthing is established via the ground connection between the threaded hole above the connection section and the central grounding point of the rack in which the PC is installed.

If you have ordered the industrial PC with a 24 V power supply unit, you can choose between two grounding points for functional earthing. Use either the threaded hole above the connection section or the grounding bolt in the sheet metal on the power supply unit. Again, make the ground connection to the central grounding point of the rack.

Use cables with the largest possible cross-section, at least 4 mm², or a flat conductor for the ground connection, as the conductor's circumference should be as large as possible.

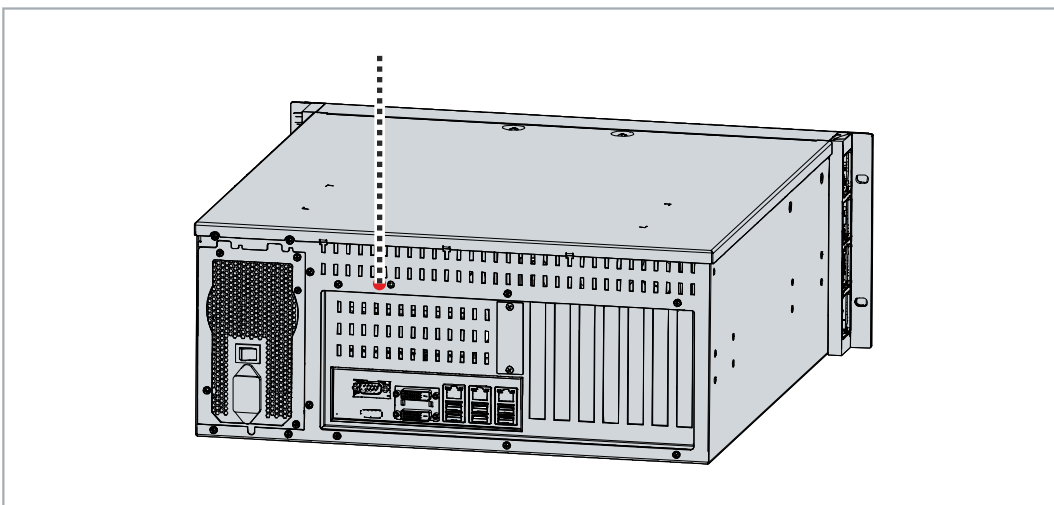


Fig. 22: Threaded hole Functional earthing

4.3.2 Connecting cables and power supply

NOTICE

Incorrect connection procedure

Incorrect procedure when connecting the cables and the power supply can cause hardware damage.

- Follow the documented procedure for connecting the cables and the power supply.
- Always connect the cables first and only then switch on the power supply.
- Please read the documentation for the external devices prior to connecting them.

Connecting cables

The connections are located on the front and rear side of the industrial PC. They are documented in chapter 3.1 Structure.

Make sure that you first connect the functional earth (see chapter 4.3.1 [Grounding of the industrial PC](#) [► 30]) and then plug in all data transmission cables.

Connect power supply via 100-240 V AC power supply unit

For the connection of the power supply, there is an IEC socket in the connection compartment on the rear side of the device. To connect the industrial PC to the power supply, use the supplied IEC power cable with a German Schuko plug at the end.

In the USA and Canada, the connection cable must meet the following specifications depending on the power supply:

- Separable supply cable of a max. length of 4.5 m (14.76 ft.) of type SJT or SVT (min. 125 V, 10 A), plug with ground connection according to NEMA 5-15P/-20P or IEC plug on the device side.
- Separable supply cable of a max. length of 4.5 m (14.76 ft.) of type SJT or SVT (min. 250 V, 10 A), plug with ground connection according to NEMA 6-15P/-20P or IEC plug on the device side.

Proceed as follows to connect the 100-240 V AC power supply unit:

1. Check that the mains voltage is correct.
2. Plug the corresponding IEC power cable into the IEC socket of the industrial PC.
3. Connect the industrial PC to a Schuko socket.

⇒ You have connected the industrial PC to the power supply.

4.3.3 Connecting the 24 V power supply

As an alternative to the 100-240 V AC power supply unit in the basic configuration, you can order the industrial PC with a 24 V DC power supply unit. The C9900-P229 option is available for this purpose.

Connect power supply via 24 V DC power supply

To connect the power supply, you must use cables with a wire cross-section of 4 mm² and a maximum length of 10 m in order to achieve a low voltage drop on the supply line. There should be at least 22 V at the power supply connector of the industrial PC, so that the PC remains switched on during voltage fluctuations.

Proceed as follows to connect the 24 V DC power supply:

1. Install the power supply cable (see the following section "Mounting the supply line").
2. Plug the power supply cable into the power supply socket of the industrial PC.
3. Connect the industrial PC to your external 24 V power supply.
4. Switch on the 24 V power supply.

⇒ You have connected the device to the power supply.

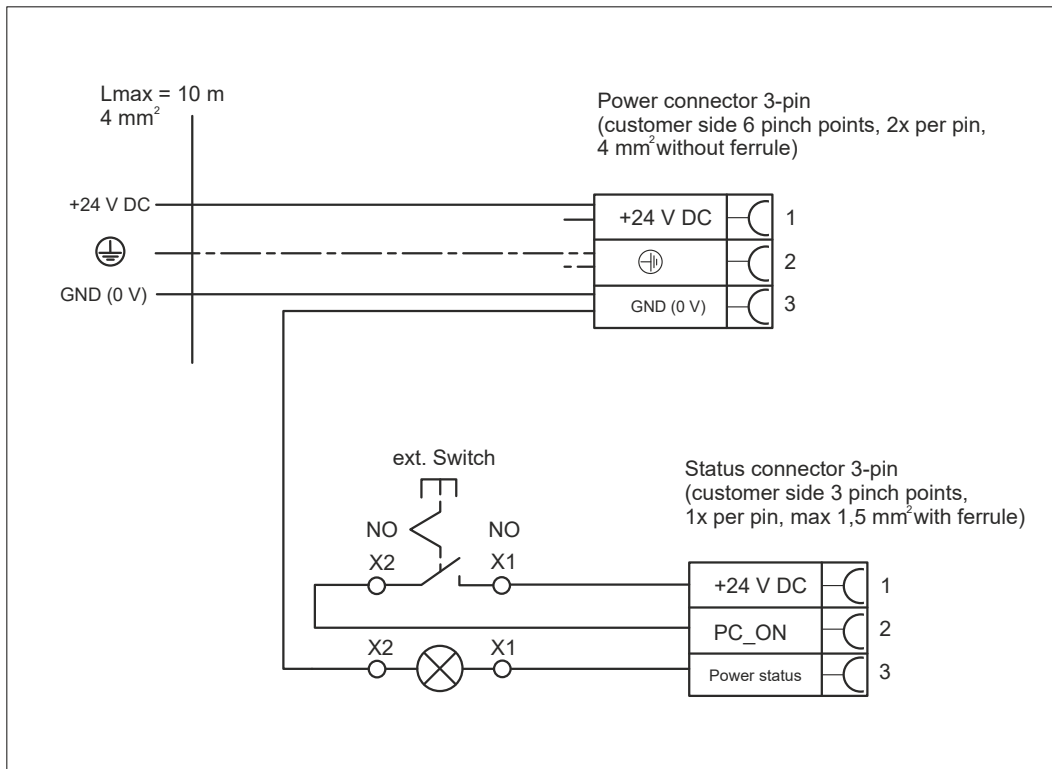


Fig. 23: Wiring diagram

Before you can connect the power supply, you must install the power supply line yourself. For this purpose, use the supplied material for connector assembly. This consists of the 3-pin connector and the strain relief housing.

Mounting the supply line

First mount the plug on the cable as follows:

1. Remove the insulation from the cable ends (8-9 mm).
2. Plug the cable ends into the connection strip by simply pressing them in. For the pin assignment of the connector, see Chapter Power supply.

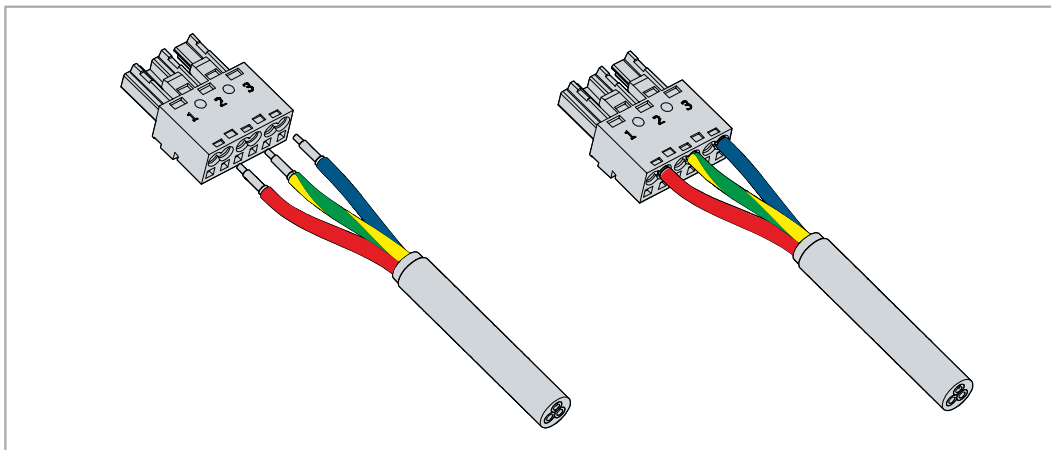


Fig. 24: Mounting the supply line

⇒ You have fitted the supply line to the plug.

Assembly of strain relief housing

Now fit the strain relief housing to the already connected plug and supply line:

1. Insert the plug into the open strain relief housing with the cable leading up to the edge. Make sure that the pin numbering on the plug points in the same direction as the sticker on the strain relief housing (section A).

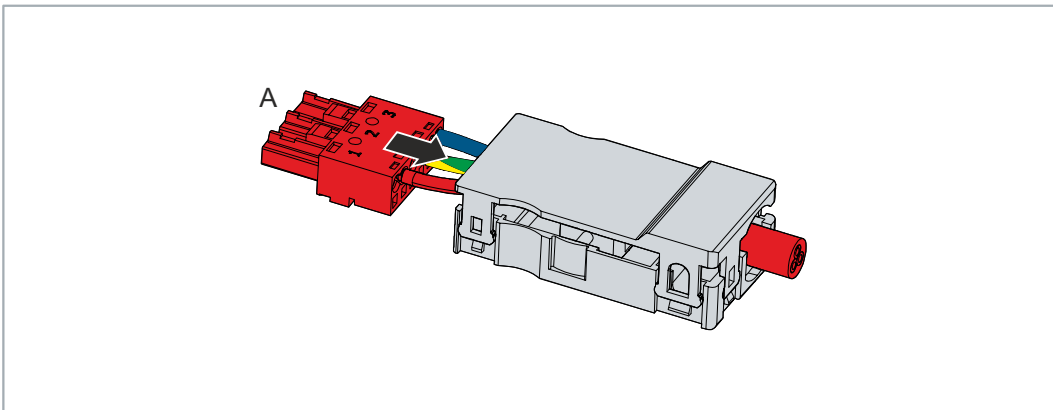


Fig. 25: Insert plug

2. Press the plug against the underside of the strain relief housing until it clicks into place.
3. Press the top of the strain relief housing onto the lower part until the tabs have slipped over the latching lugs (section B).
4. Tighten the M2 screw on the side (section C).

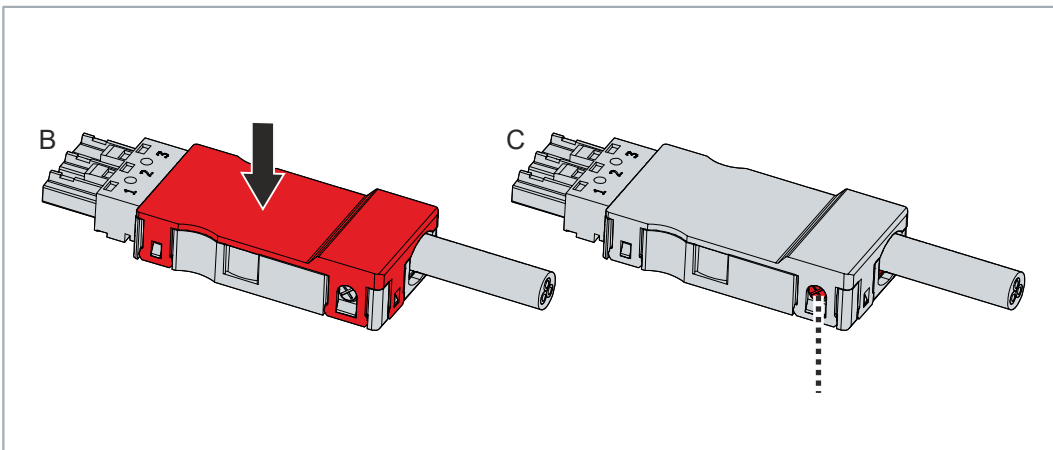


Fig. 26: Close the strain relief housing

⇒ You have mounted the strain relief housing.

To dismantle the strain relief housing, proceed as follows:

1. Release the M2 screw on the side (section A).
2. Use your fingers to bend the five tabs slightly outwards (section B).

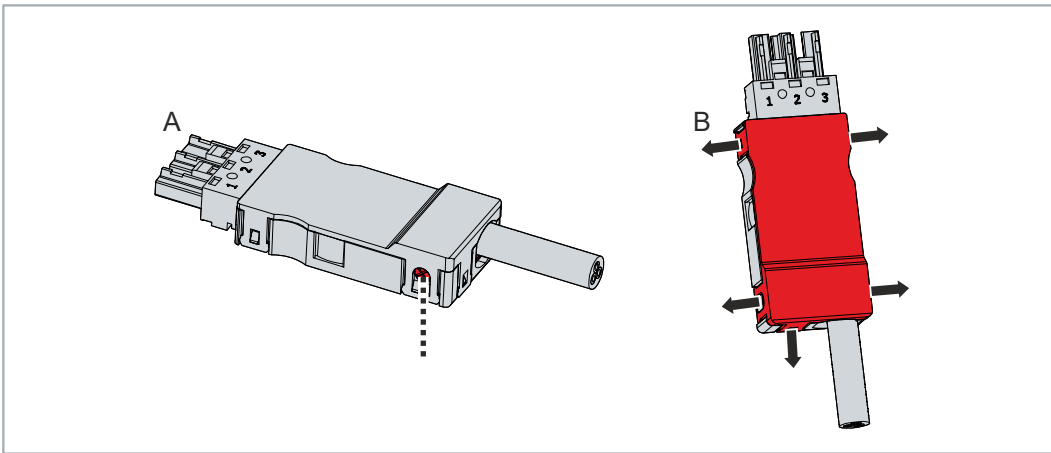


Fig. 27: Loosen the strain relief housing

3. Pull the upper section off the lower section until the tabs slide over the latching lugs (section C).
4. Pull the plug out of the strain relief housing (section D).

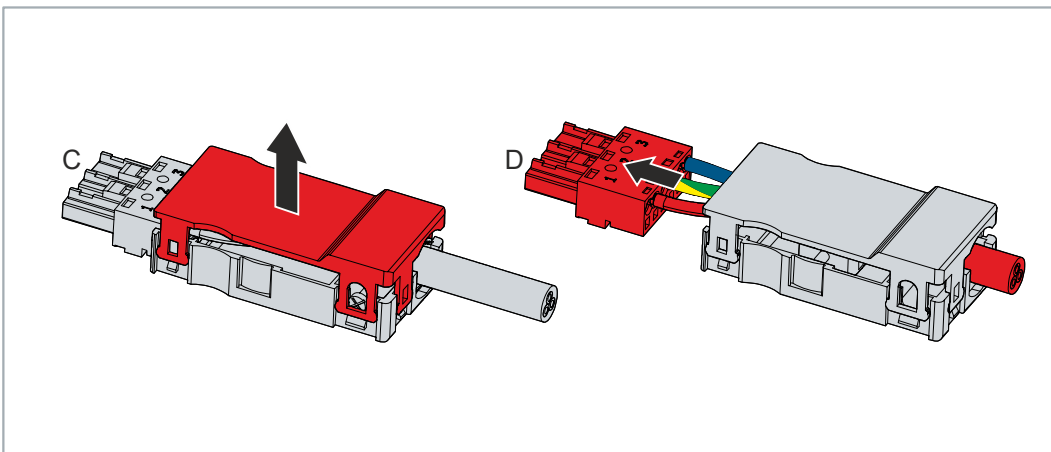


Fig. 28: Remove the strain relief housing

⇒ You have dismantled the strain relief housing.

4.4 Switching the industrial PC on and off

NOTICE

Public networks

Connecting the device to public networks without additional protective measures can compromise the safety of the device.

- Protect the device before connecting it to public networks.

NOTICE

Data loss due to switching off the device while the software is running

Switching off the device before the running software is terminated and the operating system is shut down can lead to data loss.

- Quit the running software and shut down the operating system before switching off the device.

Switch on and off with 100-240 V power supply

The industrial PC is started or switched off when the system is switched on or off or when the power supply to the industrial PC is connected or disconnected.

Switching on and off with 24 V power supply

If you have ordered your industrial PC with a 24 V power supply instead of a 100-240 V power supply, the industrial PC has a power supply socket (X101) and a socket for external wiring (X102). The socket for external wiring contains an input PC-ON and an output Power Status.

You can use the PC-ON input of the PC to control the startup and shutdown of the operating system. The PC-ON signal is inverted, which is why the operating system boots up at 0 V at the input and shuts down at 24 V. During operation, 0 V must therefore be permanently applied to the input. If you want to shut down the operating system, you must apply 24 V to the PC-ON input. Once the operating system has shut down, the PC power supply unit sets the Power Status output from 24 V to 0 V. This indicates that the shutdown is complete. You can then switch off the power supply. If you remove the 24 V from the PC-ON input before you have switched off the power supply, the operating system restarts. Therefore, 24 V must be applied to the input until you have switched off the power supply.

Besides the main switch of the machine, you can also install an additional ON/OFF switch to turn the machine on and off. The main switch can thus remain switched on in principle and thus ensures that the PC is still supplied with power during the shutdown of the operating system. Via the Power Status output, you can switch, for example, a contactor that switches off the entire system. The load capacity of the Power Status output is limited to max. 0.5 A. No fuse protection is required.

Driver installation

When you switch on the device for the first time, the optionally pre-installed operating system will be started. For any additional hardware you have connected, you have to install the drivers yourself afterwards. In addition, the Beckhoff Device Manager starts automatically. The Device Manager is a software from Beckhoff that supports you in configuring the device.

If you have ordered the device without an operating system, you must install this and the driver software for the additional hardware you have connected and for the components inside the device. Please follow the instructions in the documentation for the operating system and the additional components.

5 Beckhoff Device Manager

The Beckhoff Device Manager enables detailed system diagnostics with uniform secure access to the existing hardware and software components. System data is recorded, analyzed and evaluated during operation. The data helps to detect deviations at an early stage and prevent device downtimes.

The user interface screenshots shown in this chapter are examples only and do not represent the actual state of your device.

The Beckhoff Device Manager always starts automatically after the device has been booted. In addition, you have the option of manually starting the previously closed Device Manager at any time.

The device is supplied with predetermined access data by default:

- User name: Administrator
- Password: 1

You also have the option of using the Beckhoff Device Manager to remotely configure the device via a web browser. More detailed information is available in the Beckhoff Device Manager [manual](#).

First start of Beckhoff Device Manager

When your device is booted for the first time, the Beckhoff Device Manager also starts automatically for the first time. The Security Wizard opens. It informs you that you should reset the default password set by Beckhoff. Proceed as follows:

1. Click **Next** on the Security Wizard start page.
⇒ This will take you to the **Change Passwords** page:

BECKHOFF Device Manager

Change Passwords

Your Beckhoff IPC is delivered with default user accounts and related default passwords! It is strongly recommended to change the default passwords to prohibit unauthorized access to your Beckhoff IPC. Please note that these passwords are valid for the access to the Beckhoff Device Manager, too.

Change the default password of the user account(s) to prohibit unauthorized access to your Beckhoff IPC.

Local Users	Administrator
Password	
New Password	
New Password (confirm)	

Auto Logon Enabled ☒

<< Back Next >>

Fig. 29: Beckhoff Device Manager – Change passwords

2. Enter the access data of the Device Manager on delivery.
 3. Choose a secure new password. Instructions for choosing a secure password are given below.
 4. Confirm the changes by clicking on the tick in the red box on the right.
 5. Exit the Security Wizard.
- ⇒ You have reached the Device Manager start page.

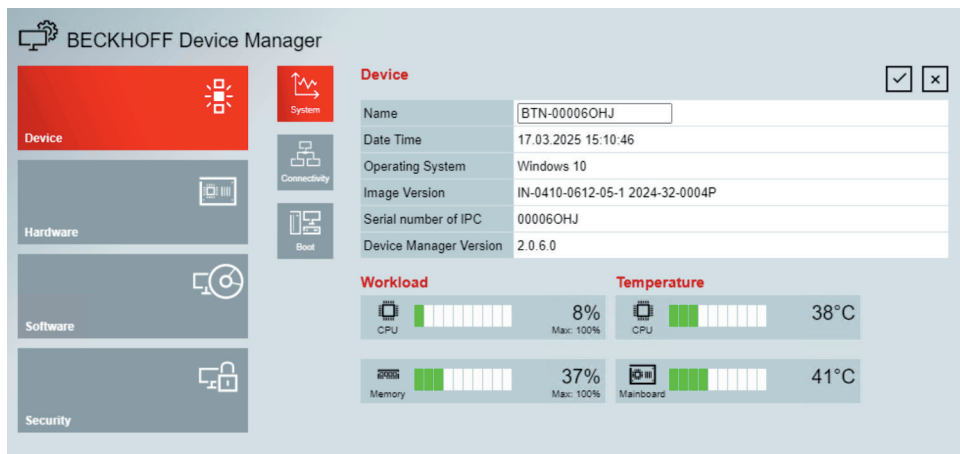


Fig. 30: Beckhoff Device Manager – Start page

Continue to navigate in the menu and to configure the device. Note that modifications only become active once they have been confirmed.

Manual start of Beckhoff Device Manager

To start the Beckhoff Device Manager manually, proceed as follows:

1. Open a web browser locally on the device.
 2. Enter *localhost/config* in the web browser to start the Beckhoff Device Manager.
- ⇒ The Beckhoff Device Manager starts. The Security Wizard appears.

Secure passwords

Strong passwords are an important prerequisite for a secure system.

Beckhoff supplies the device images with standard user names and standard passwords for the operating system. It is imperative that you change these.

Controllers are shipped without a password in the UEFI/BIOS setup. Beckhoff recommends assigning a password here as well.

Please note the following:

- Passwords should be unique for each user and service.
- Only change passwords after an incident in which passwords have become known without authorization.
- Train the device users in the use of passwords.

A secure password has the following characteristics:

- Password complexity: The password should contain capital and lower-case letters, numbers, punctuation marks and special characters.
- Password length: The password should be at least 10 characters long.

6 Decommissioning

NOTICE

Hardware damage due to power supply

A connected power supply can cause damage to the device during disassembly.

- Disconnect the power supply from the device before starting to disassemble it.

When taking the industrial PC out of operation, you must first disconnect the power supply and cables. You can then remove the device from the 19-inch rack.

If you do not want to continue using the industrial PC, Chapter 6.2 [Disassembly and disposal](#) [► 40] provides information on the correct disposal of the device.

6.1 Disconnecting the power supply and cables

⚠ CAUTION

Risk of electric shock

Dangerous touch voltages can lead to electric shock. To avoid electric shock, observe the following:

- Never connect or disconnect the device cables during a thunderstorm.
- Provide protective earthing for handling the device.

Before you remove the industrial PC from the 19-inch rack, you must disconnect the cables and the power supply.

Disconnect the power supply

Proceed as follows to disconnect the 100-240 V AC power supply:

1. Disconnect the device from your power supply.
 2. Pull the IEC plug out of the IEC socket of the device.
- ⇒ You have disconnected the power supply from the device.

Proceed as follows to disconnect the 24 V DC power supply:

1. Disconnect the device from your power supply.
 2. Press the latches on the voltage connector together and pull it out of the device.
 3. Remove the power supply cable if the connector is to remain with the device.
- ⇒ You have disconnected the power supply from the device.

Disconnecting cables

1. Make a note of the wiring of all data transmission cables if you want to restore the cabling with another device.
 2. Disconnect the data transmission cables from the industrial PC.
 3. Finally, disconnect the ground connection.
- ⇒ You have disconnected the cables from the device.

6.2 Disassembly and disposal

Before you can remove the industrial PC from the 19-inch rack, you must first disconnect the power supply and the cables (see chapter 6.1 [Disconnecting the power supply and cables](#) [► 39]).

You can pull the industrial PC out of the rack using the telescopic rails mounted on the device (https://www.beckhoff.com/de-de/support/downloadfinder/suchergebnis/?download_group=527329127&download_item=527329138).

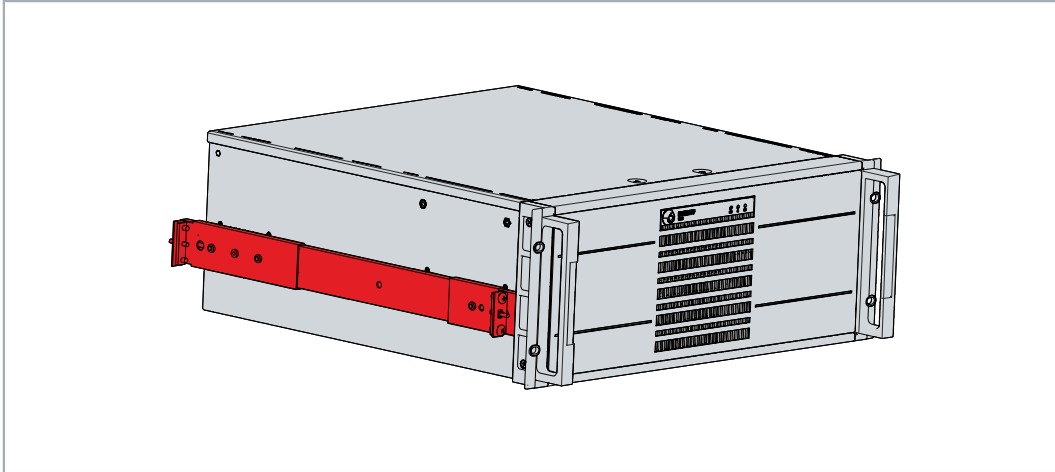


Fig. 31: Disassembly via telescopic rails

Disposal of the device

When disposing of the device follow the national electronic scrap regulations. In order to dispose of the device, it must be removed and fully dismantled. Dispose of the components in the following way:

- Send plastic parts (polycarbonate, polyamide (PA6.6)) for plastics recycling.
- Take metal parts to the metal recycling collection point.
- Electronic parts such as fans and circuit boards must be disposed of in accordance with national electronic scrap regulations.
- Stick insulating tape over the poles of the CR2032 battery on the motherboard and dispose of the battery via the local battery recycling.

7 Maintenance

⚠ CAUTION

Risk of electric shock

Working on the device when live can lead to electric shock.

- Switch off the power supply before replacing device components. This does not apply to the replacement of hard disks in a RAID configuration.

Maintenance measures increase the efficiency of the device by ensuring long-term functionality. Cleaning and maintenance by replacing certain device components contribute to this.

7.1 Cleaning

NOTICE

Unsuitable cleaning agents

The use of unsuitable cleaning agents can damage the device.

- Clean the device only as specified.

It is essential to observe the following aspects when cleaning the industrial PC:

- Observe to the boundary conditions of protection rating IP50/IP20.
- Only use a vacuum cleaner to clean the PC. The industrial PC does not have to be switched off for this.
- Never use compressed air to clean the PC.
- Maintain an ambient temperature range of 0 °C to 55 °C.

7.2 Maintenance

NOTICE

Use of incorrect spare parts

The use of spare parts not ordered from Beckhoff Service can lead to unsafe and faulty operation.

- Only use spare parts that you have ordered from Beckhoff Service.

Beckhoff devices are manufactured from components of the highest quality and robustness. They are selected and tested for best interoperability, long-term availability and reliable function under the specified environmental conditions.

Nevertheless, some components of the devices may be subject to a limited service life if they are operated under certain conditions, such as at increased ambient temperatures during operation or during storage or during long periods of storage out of operation.

Beckhoff therefore recommends replacing some of the components of the devices after the time after which predictions of the remaining service life of such components can no longer be reliably calculated.

The following table provides recommendations for the regular, precautionary replacement of the device components:

Table 22: Device component replacement recommendations

Component	Recommendation for replacement intervals (years)
UPS battery pack	5 years
2.5-inch hard disk	5 years or after 20,000 operating hours at more than 40 °C or after 30,000 operating hours at less than 40 °C
3.5-inch hard disk	5 years, irrespective of the operating hours
Fan	7 years
CFast, SSD, MicroSD, Compact Flash	10 years
Motherboard battery	5 years

Beckhoff is excluded from liability in the event of possible damage occurring during maintenance work. In order to avoid damage caused by electrostatic discharge when replacing device components, protective measures are recommended. Below are some suggestions.

ESD protection

NOTICE

Electrostatic discharge

The replacement of device components without ESD protection can lead to functional impairment and destruction of the device.

- If possible, apply ESD protection measures during maintenance work.

When working on electronic devices, there is a risk of damage due to ESD (electrostatic discharge), which can impair the function or destroy the device.

Protect the device and create an ESD-protected environment in which existing electrostatic charges are safely discharged to ground and charging is prevented.

An ESD-protected environment can best be created by setting up ESD protection zones. The following measures serve this purpose:

- ESD-compliant floors with sufficient conductivity to the reference potential PE;
- ESD-compatible work surfaces such as tables and shelves;
- Wrist grounding strap, especially for sedentary activities;
- grounded and electrostatically dissipating equipment and operating materials (e.g. tools) within the ESD protection zone.

If it is not possible to create an ESD protection zone, you can still protect the device against ESD damage. For example, the following measures can be used:

- Use conductive mats connected to the ground potential as underlays.
- Dissipate possible charges from your own body by touching grounded metal (e.g. control cabinet door).
- Wear a wrist grounding strap.
- Only remove new electronic components from the ESD packaging (tinted plastic bag) after putting on the wrist grounding strap.
- Do not walk around with electronic components in your hand if they are not in ESD packaging.

7.2.1 Access to device components

Be sure to shut down and power off the device before replacing PC components such as plug-in cards or NVMe™ M.2 SSDs.

To be able to replace certain device components, you must first gain access to the interior of the industrial PC. Follow the steps below:

1. Loosen and remove the two M4 screws from the housing cover (section A).
2. Push the housing cover 1 cm backwards (section B).

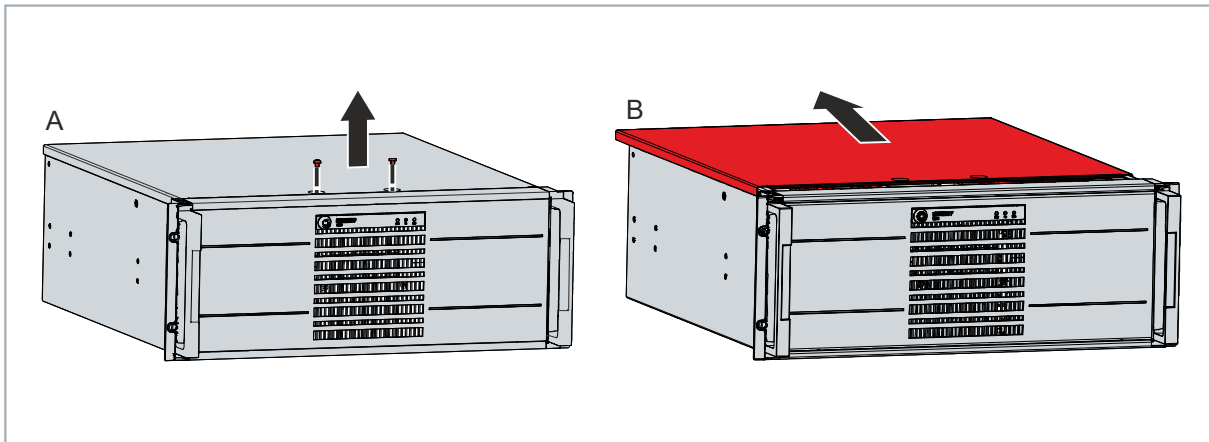


Fig. 32: Open the housing cover

3. Remove the housing cover upwards (section C).
4. Loosen and remove the six M4 screws from the card locating holder (section D).

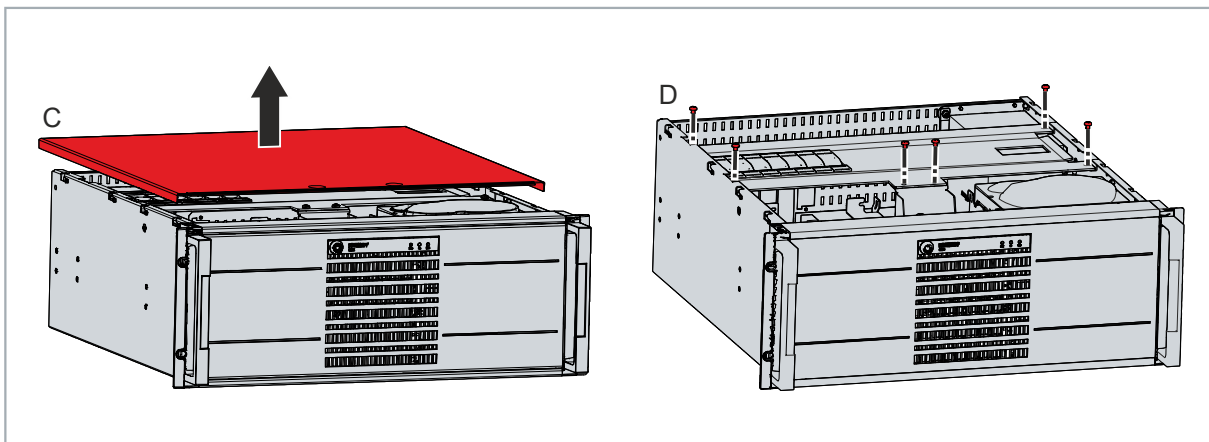


Fig. 33: Access to the interior

5. Lift the card locating holder on the right side (section E).
6. Remove the card locating holder to the right of the device (section F).

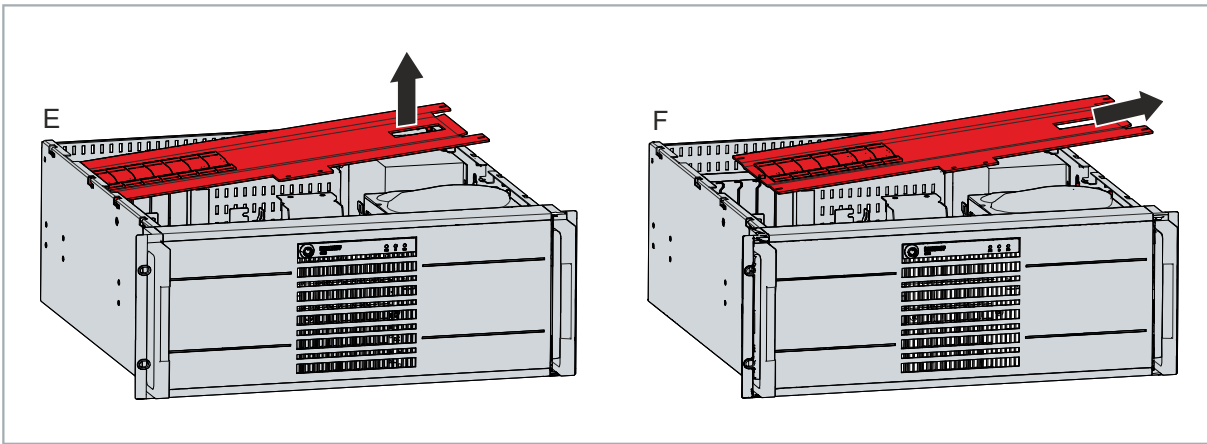


Fig. 34: Removing card locating holders

⇒ You now have access to the interior of the industrial PC.

To reinstall the card locating holder, follow the steps below:

1. Release all plastic elements of the card locating holder (section A).

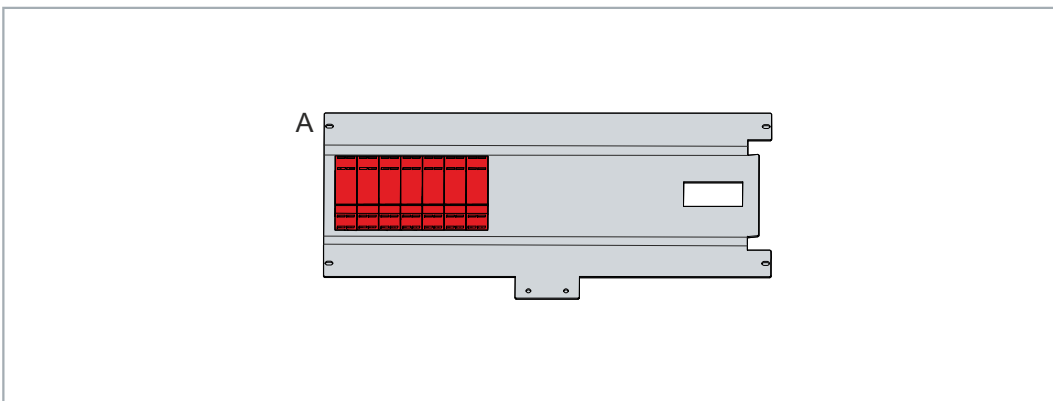


Fig. 35: Release card locating holder

2. Insert the holder back into the industrial PC with the left side first (section B).
3. Fasten the card locating holder again with the six M4 screws (section C).

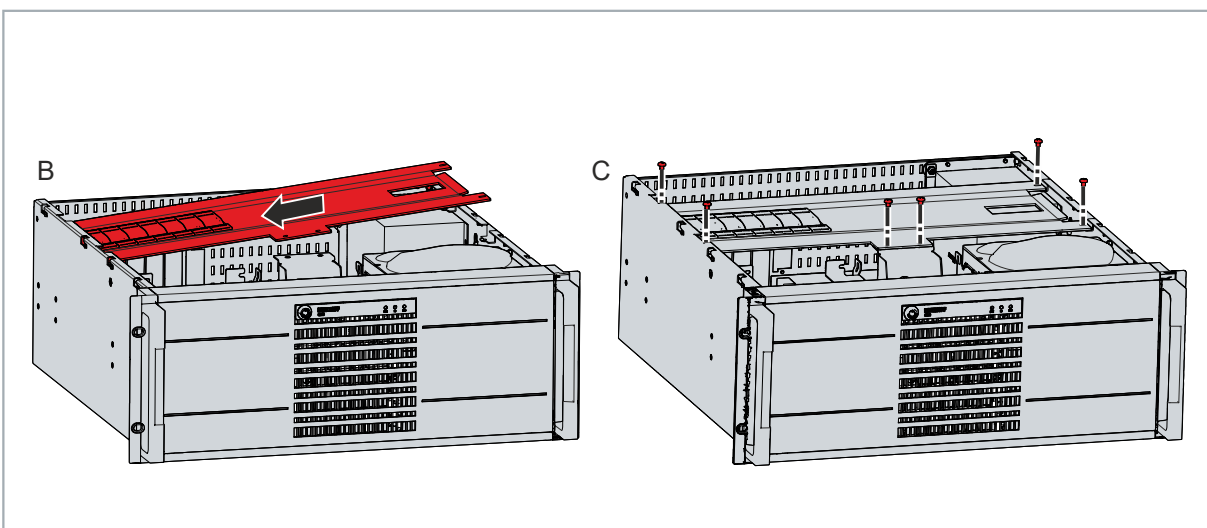


Fig. 36: Mounting the card locating holder

4. For each plug-in card, press down the associated plastic element of the card locating holder until the plug-in card is firmly seated in its slot.

⇒ You have mounted the card locating holder.

To remount the housing cover on the PC, follow the steps below:

1. Place the housing cover on the housing 1 cm before the target position (section A).
2. Slide the housing cover 1 cm forward (section B).

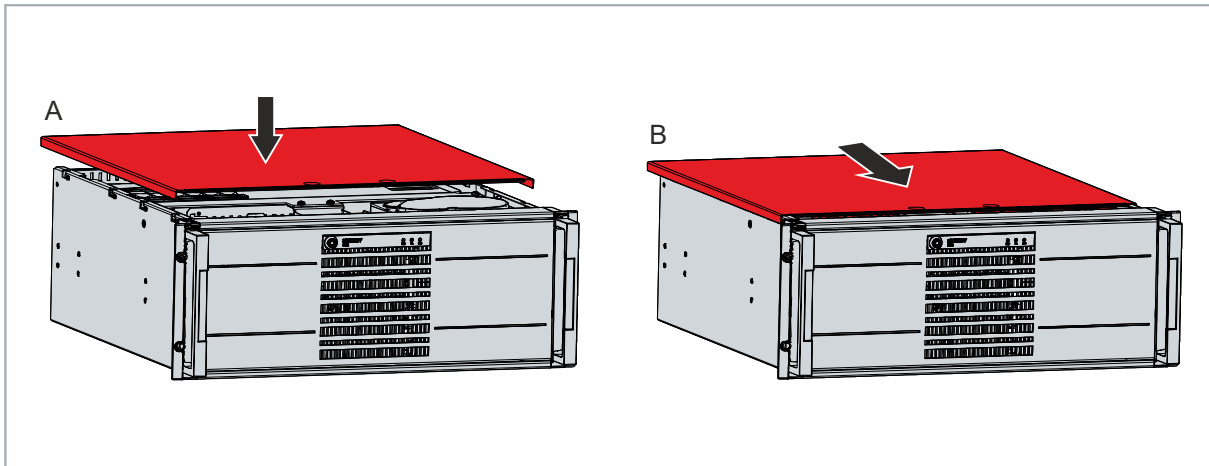


Fig. 37: Inserting the housing cover

3. Fasten the cover with the two M4 screws (section C).

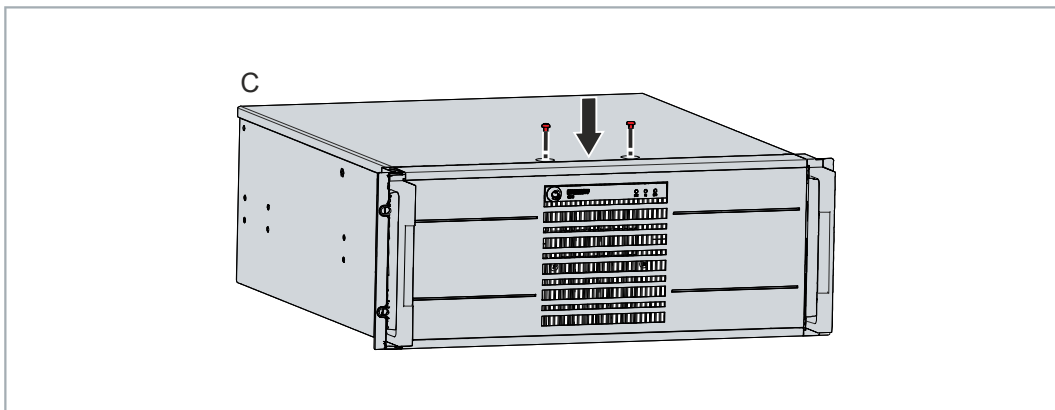


Fig. 38: Insert M4 screws

⇒ You have mounted the housing cover again.

7.2.2 Replacing the battery

⚠ DANGER

Incorrect battery type

Using a different type of battery can lead to a fire or explosion.

- Only replace the battery with a type R/C (BBCV2) battery, article number RC2032, nominal voltage 3 V.
- When replacing the battery, make sure that the polarity is correct.

⚠ DANGER

Incorrect handling of the battery

Handling the motherboard battery incorrectly can cause an explosion.

- Do not recharge the battery.
- Do not take the battery apart.
- Do not dispose of the battery in fire.
- Do not open the battery.
- Protect the battery against direct sunlight and moisture.

NOTICE

Failure of the electronics due to mechanical damage

Scratches or damaged components on PCBs can cause the electronics to fail.

- Be very careful when replacing the battery and avoid mechanical damage to the electronics.

The device does not contain a lithium-ion battery. The motherboard battery is a CR2032 lithium-metal cell. It is used to supply power to the clock integrated on the motherboard. If the battery is depleted or missing, the date and time are displayed incorrectly.

Table 23: Technical data of the battery

Battery type	Electrical properties (at 20 °C)		Dimensions		
	Nominal voltage	Nominal capacity	Diameter	Height	Weight
CR2032	3.0 V	225 mAh	20.0 mm	3.20 mm	3.1 g

Chapter 7.2.1 [Access to device components](#) [► 43] shows how to access the battery.

You may only replace the battery when the industrial PC is switched off.

To change the battery, proceed as follows:

1. Bend the hook on the battery holder slightly outward (section A).
2. Pull the battery out of the holder (section B).

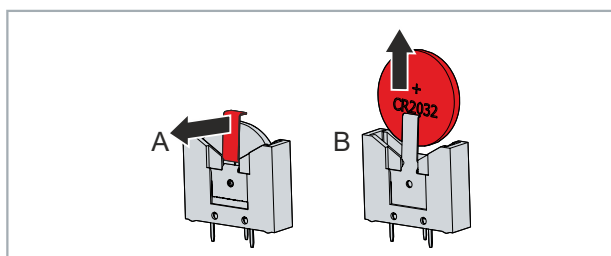


Fig. 39: Replacing the battery

3. Insert the new battery into the holder. Make sure that the polarity is correct, as shown.

⇒ You have successfully replaced the battery.

Battery disposal

To dispose of the battery, remove it, tape off the poles and put it in the battery disposal.

7.2.3 Replacing the storage media

Disposal of storage media

Delete confidential or technologically important data from the storage media before disposing of it. If a storage medium is defective, you must destroy it mechanically to prevent access to the data.

The old storage media must be disposed of in accordance with the national electronic waste regulations.

For new storage media, please contact your Beckhoff Sales only. Hard disks from Beckhoff are optimized for industrial applications. SSDs from Beckhoff have a considerably higher lifetime expectancy than commercially available SSDs.

Data transmission before replacement

If you want to exchange a storage medium according to Beckhoff's recommendation, you must copy the data from the old to the new storage medium. You can use the Beckhoff Service Tool (BST) for this purpose. BST is a graphical backup and restore program for devices with a Windows operating system. You can create an image of your operating system and use it to back up the operating system. Then you can restore the created image to a new data carrier. The BST is available on a bootable BST USB flash drive. This includes Windows and a backup tool. Select the size of the BST USB flash drive according to the size of the backup copy of your operating system. You can then keep the flash drive as a backup copy. For this purpose, the BST USB flash drives are designed for particularly long data preservation by means of special flash. For more information on the function of the BST, please refer to the corresponding [manual](#).

If your storage medium is defective and there is no backup, Beckhoff Service can provide you with a fresh Windows image. For this to be possible, your Beckhoff device must already have been delivered with a valid operating system license. After installing the fresh image, the applications must be reinstalled.

Chapter 7.2.1 [Access to device components](#) [► 43] shows how to access the storage media. Before replacing an NVMe™ M.2 SSD, you must shut down and power off the device.

Hard disks that are located in a removable frame and a RAID array can also be replaced during operation. In this case, you do not need to switch off the industrial PC before replacing it. Your device comes with a red accessory cover that contains keys. Use the key pair without the black key cover to open a removable frame. For the replacement of hard disks in a mounting adapter, contact Beckhoff Service.

Replacing the NVMe™ M.2 SSD

The basic configuration includes a 160 GB NVMe™ M.2 SSD on the motherboard of your device. Alternatively, you can order your device with one of the following on-board SSDs:

Table 24: Ordering options on-board NVMe™ M.2 SSD

Ordering option	Memory size
C9900-H824	320 GB
C9900-H825	640 GB
C9900-H843	1280 GB

You can also install additional NVMe™ M.2 SSDs as PCIe® plug-in cards in your device. The following ordering options are available:

Table 25: Ordering options PCIe® plug-in cards with NVMe™ M.2 SSD

Ordering option	Memory size
C9900-H814	160 GB
C9900-H815	320 GB
C9900-H816	640 GB
C9900-H839	1280 GB

You can mirror the NVMe™ M.2 SSD on your device's motherboard to another NVMe™ M.2 SSD in a RAID 1 array. The prerequisite for this is that you have inserted an SSD with the same size as the on-board SSD as a PCIe® plug-in card. The following figure shows the numbering of the plug-in card slots.

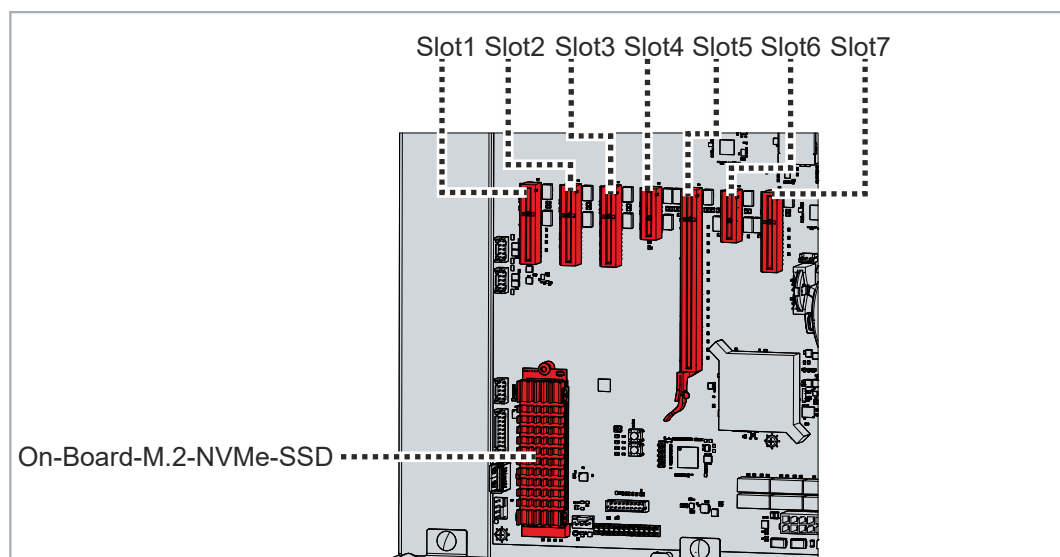


Fig. 40: Numbering of PCIe® plug-in card slots

The plug-in card slots are always fitted in the following order:

1. On-board M.2 NVMe™ (basic equipment)
2. Slot 1 (PCIe® x4 Gen4)
3. Slot 2 (PCIe® x4 Gen4)
4. Slot 5 (PCIe® x16 Gen4)
5. Slot 3 (PCIe® x4 Gen3)
6. Slot 7 (PCIe® x4 Gen3)

To replace the NVMe™ M.2 SSD on your motherboard, follow the steps below:

1. Remove the M3 screw (section A).
2. Place the SSD in an inclined upward position (section B).
3. Remove the SSD (section B).

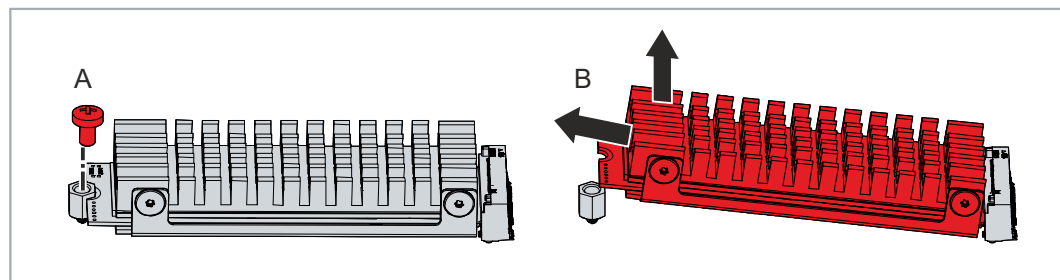


Fig. 41: Replacing the NVMe™ M.2 SSD

4. Insert the new SSD in an inclined position.
5. Press the SSD down.

6. Retighten the M3 screw.

⇒ You have replaced the NVMe™ M.2 SSD on the motherboard.

Hard disk replacement

You can optionally equip your device with hard disks. To replace a hard disk on the drive tower, proceed as follows:

1. Loosen and remove the four UNC 3.5x6.35 screws from the mounting adapter (section A).
2. Remove the hard disk upwards from the mounting adapter (section B).

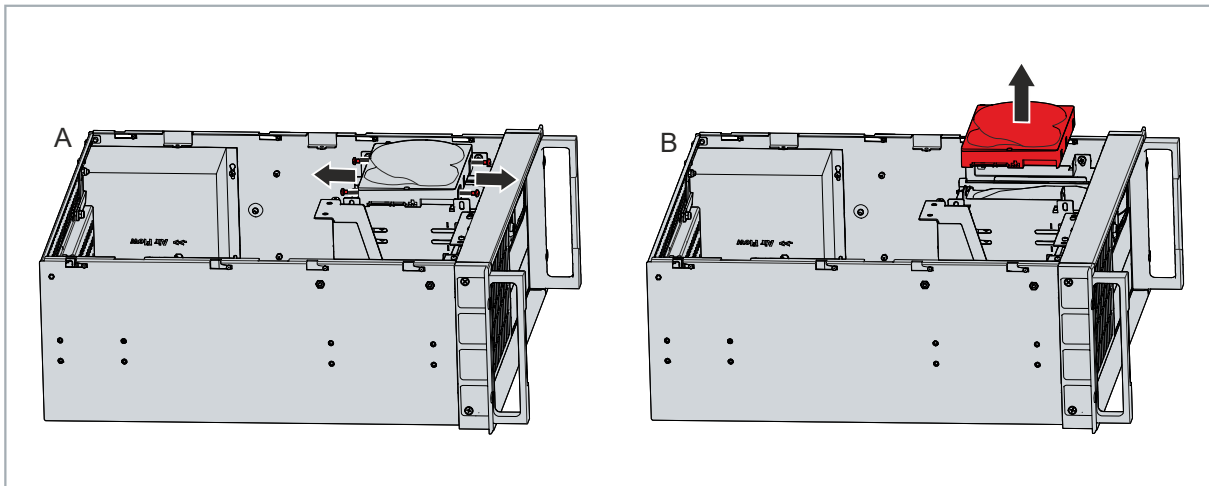


Fig. 42: Hard disk removal

⇒ You have removed the hard disk.

3. Insert the new hard disk into the mounting adapter from above. The manufacturer's sticker must be facing upwards.
4. Screw the four UNC 3.5x6.35 screws on the mounting adapter again.

⇒ You have replaced the hard disk.

To replace a hard disk in the removable frame, proceed as follows:

1. Open the front flap (see chapter 3.2 [Interface description](#) [► 11]).
2. Unlock the removable frame with the corresponding key (section A).
3. Pull the key of the removable frame to unlock it (section B).

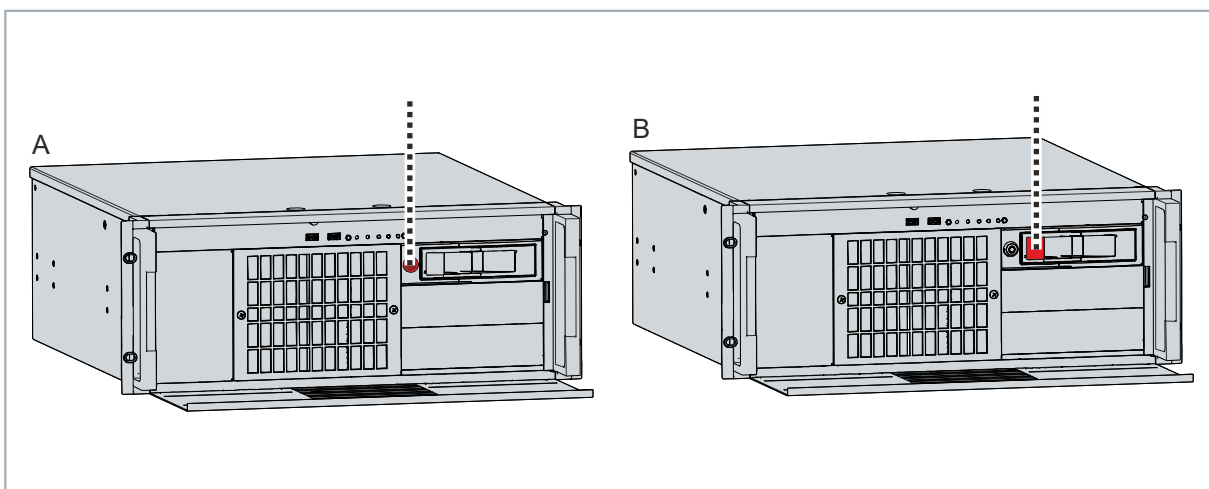


Fig. 43: Unlocking removable frame

4. Open the removable frame (section C).
- ⇒ The hard disk is pushed out of the removable frame.

5. Pull the hard disk out of the removable frame (section D).

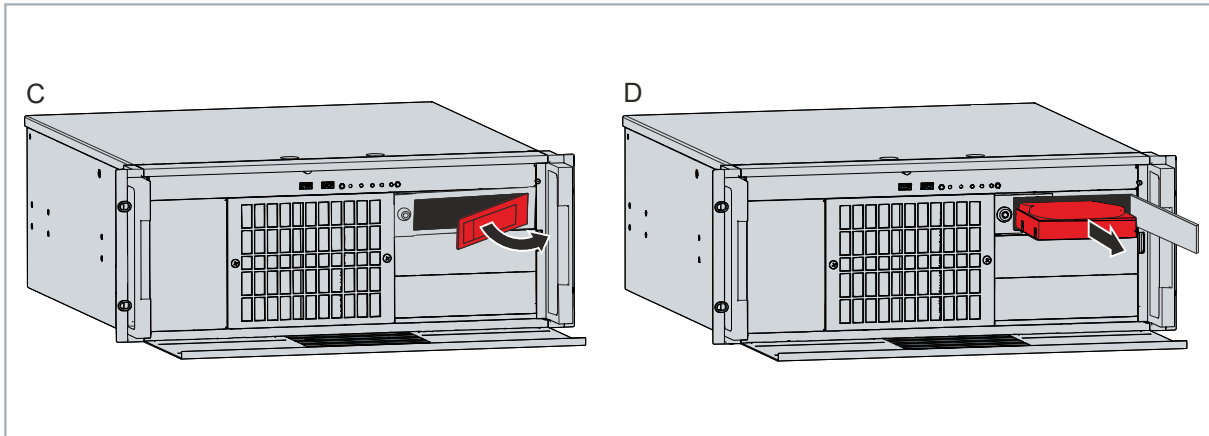


Fig. 44: Hard disk removal

6. Insert the new hard disk into the removable frame with the manufacturer's sticker facing upwards.
 7. Close the removable frame again.
 8. Lock the removable frame again.
- ⇒ You have replaced the hard disk.

7.2.4 Exchange filter mat

NOTICE

Risk of overheating

An air-impermeable filter mat leads to overheating of the industrial PC.

- Make sure that the filter mat is always well permeable to air.
- Replace the filter mat as soon as it no longer allows the air to pass through well.

NOTICE

Risk of contamination of the PC

If you change the filter mat of the fan while the industrial PC is in operation, the dust from the filter mat will be sucked into the interior of the PC.

- Only replace the filter mat when the industrial PC is switched off.

You must always ensure that sufficient air can flow into the industrial PC to prevent the device from overheating. The filter mat, which is located in front of the fan, can get dirty faster depending on the environment and thus let too little air through.

If you want to replace the filter mat, use the following ordering options for a replacement mat:

- C9900-Z326: Filter mat for fans in C5240 with three 5¼-inch slots, 5 pcs

Follow these steps to replace the filter mat:

1. Loosen and remove the two M4 screws of the filter cover (section A).
2. Remove the filter cover (section B).

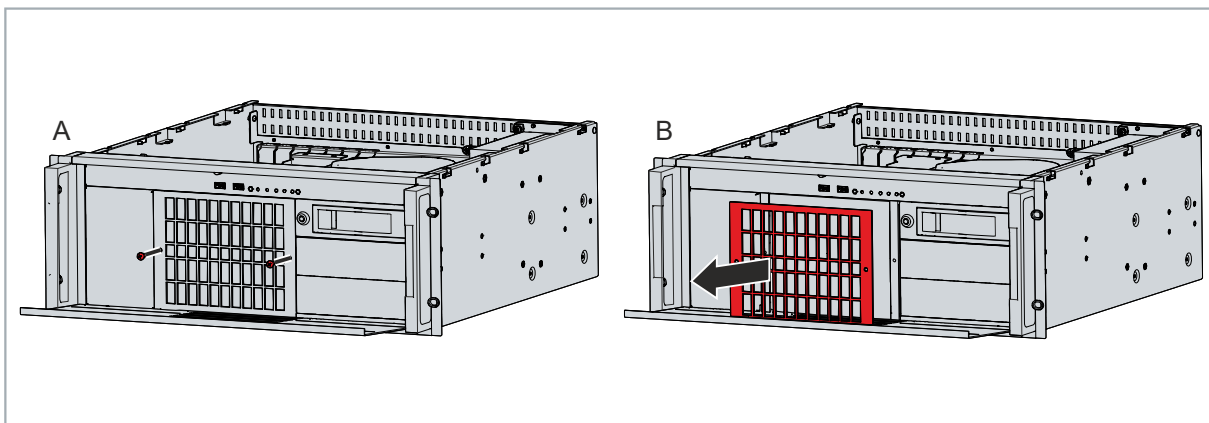


Fig. 45: Removing the filter cover

3. Remove the filter mat (section C).

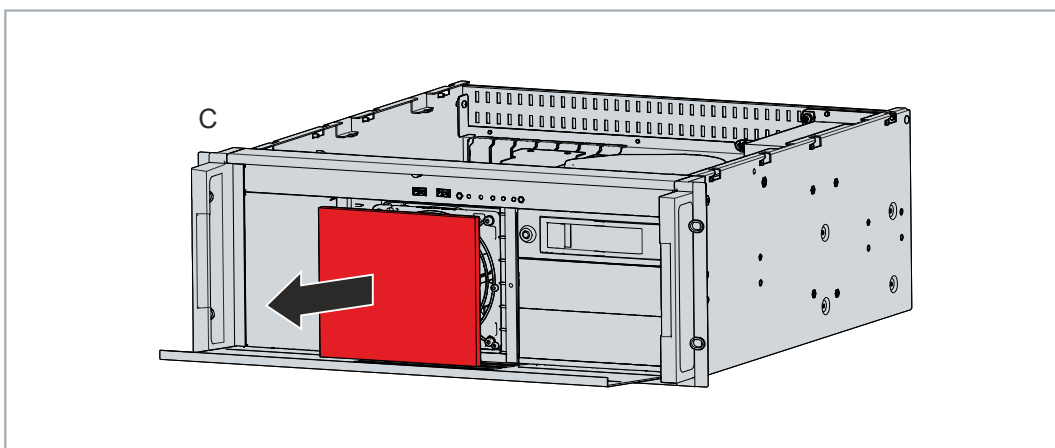


Fig. 46: Removing the filter mat

4. Insert the new filter mat.
 5. Reinstall the filter cover.
 6. Fasten the filter cover with the four M4 screws.
- ⇒ You have replaced the filter mat.

If you use the industrial PC in a low-dust environment that complies with protection rating IP20, you can operate it without a filter mat. As a result, the front of the PC is also only suitable for a working environment corresponding to protection rating IP20.

7.2.5 Replacing the fan

NOTICE

Incorrect fan type

The device may be damaged if the wrong type of fan is installed.

- Only replace the fans with replacement fans from Beckhoff Service.

The fans ensure optimal cooling of the device. Order replacement fans only from Beckhoff. Please get in touch with your Beckhoff sales contact.

Before you can replace the fan and CPU cooler, you must gain access to the interior of the industrial PC (see chapter 7.2.1 [Access to device components](#) [► 43]). You must switch off the industrial PC before you can replace the fan or CPU cooler.

In the basic configuration, there is a 120 x 120 x 25 mm fan behind the front of the industrial PC.

The following table provides information about the assignment of the fan connectors on the motherboard and the respective fan options.

Table 26: Fan connection assignment

Fan	Connection
CPU cooler	FAN2/CPU
Standard fan 120 x 120 x 25	FAN4

Follow these steps to replace the fans:

1. Loosen and remove the two M4 screws of the filter cover (section A).
2. Remove the filter cover (section B).

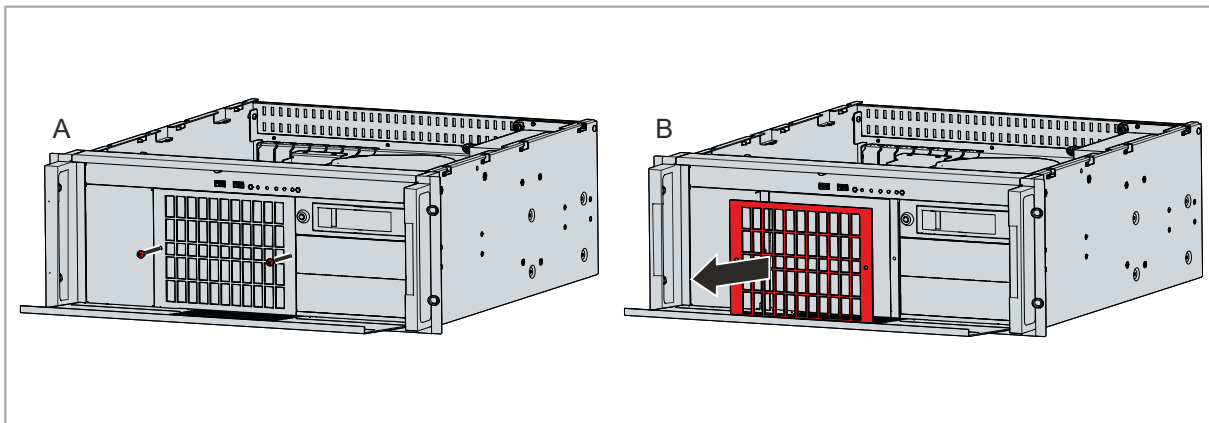


Fig. 47: Removing the filter cover

3. Remove the filter mat (section C).
4. Loosen and remove the four M4 screws of the fan (section D).

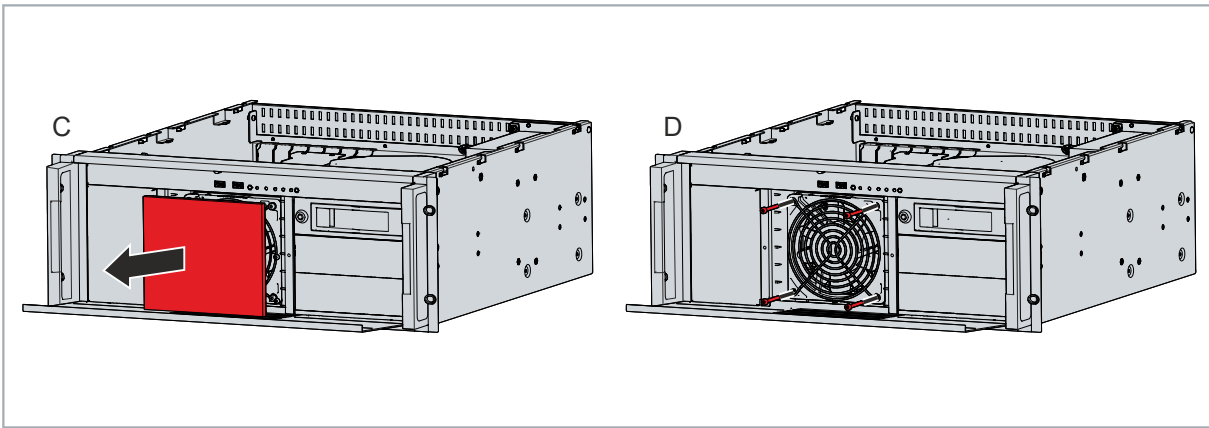


Fig. 48: Fan access

5. Disconnect the power supply cable of the fan from the motherboard.
6. Remove the fan (section E).

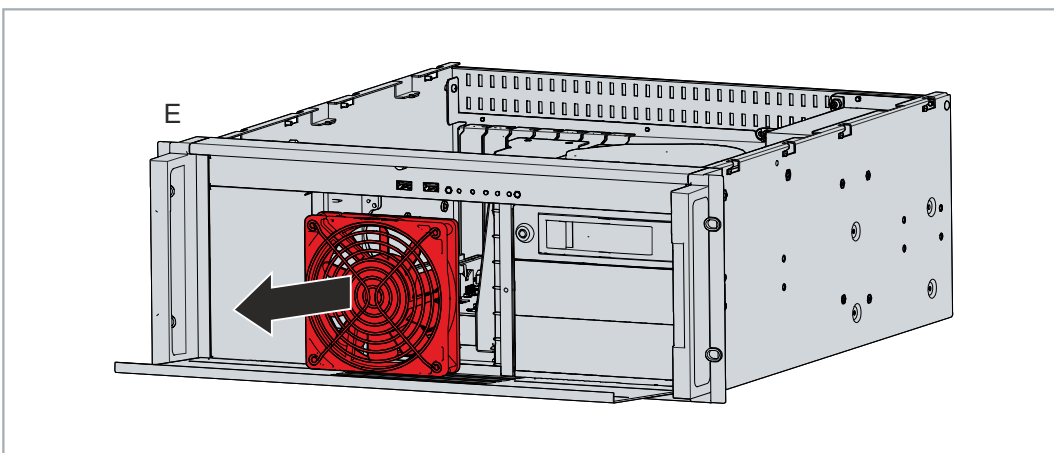


Fig. 49: Fan removal

7. Insert the new fan into the industrial PC.
 8. Connect the power supply cable to the motherboard.
 9. Fasten the four M4 screws again.
 10. Reinsert the filter mat. Alternatively, you can order a new filter mat from Beckhoff Sales and insert it.
 11. Reinstall the filter cover.
 12. Fasten the filter cover with the two M4 screws.
- ⇒ You have successfully replaced the fan.

The fans in the power supply unit cannot be replaced separately. Instead, you will need to have the entire power supply unit replaced. Please contact Beckhoff Service for this.

Exchange CPU cooler

The CPU cooler on the motherboard consists of a heat sink and a fan mounted on top of it. You can replace this fan yourself. Please contact your Beckhoff sales for a new cooler.

To replace the CPU cooler fan, follow these steps:

1. Loosen and remove the four M3 screws that secure the fan to the heat sink.
2. Disconnect the fan's power supply cable from the motherboard.
3. Remove the fan from the heat sink.

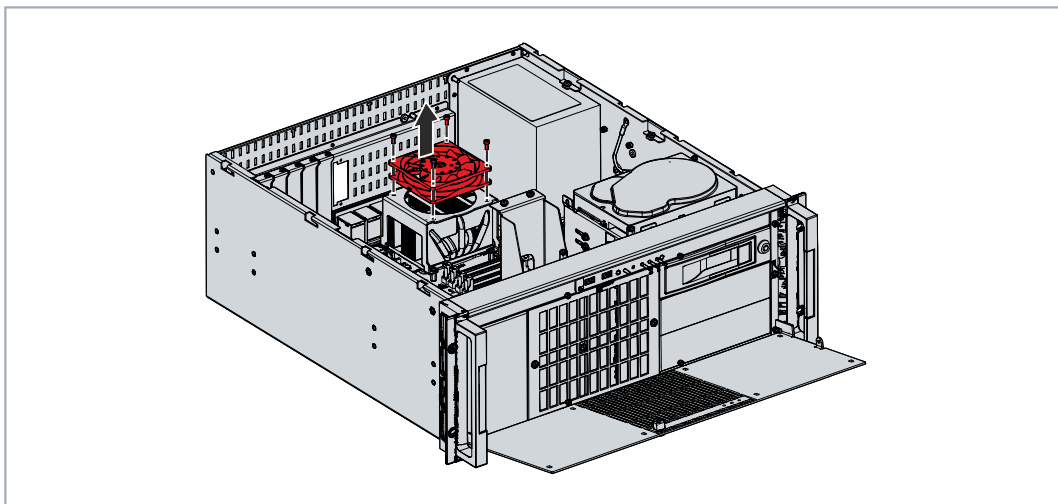


Fig. 50: Exchange CPU cooler

4. Place the new fan on the heat sink.
 5. Connect the power supply cable to the motherboard.
 6. Insert and tighten the four M3 screws.
- ⇒ You have replaced the CPU cooler fan.

The old fan must be disposed of in accordance with the national electronic waste regulations.

8 Troubleshooting

Table 27: Troubleshooting

Fault	Cause	Measures
No function of the device	No power supply to the device Other cause	Check the power supply cable Call Beckhoff Service
The device does not boot fully	BIOS setup settings are incorrect Other causes	Check BIOS setup settings (load defaults) Call Beckhoff Service
The device boots, software starts, but control does not operate correctly	The cause of the error is the software or plant parts outside of the device	Call the machine and software manufacturer
USB error during access with TwinCAT via USB	Cycle times in TwinCAT set to 10 ms (default)	Increase the cycle times to between 50 ms and 80 ms

9 Technical data

Table 28: Technical data

Product designation	C5240
Dimensions (W x H x D)	482 x 177 x 511 mm, mounting depth 469 mm
Weight of the basic configuration	Approx. 17 kg
Supply voltage	100–240 V _{AC} , max. 4.5 A, 50 – 60 Hz 22-30 V _{DC} (24 V _{DC} power supply), max. 23 A
Power consumption	Data sheet for power consumption and power loss in the download finder: https://www.beckhoff.com/en-en/support/download-finder/search-result/?download_group=691754572
Secure element	fTPM 2.0 activated (see TPM documentation)
Protection rating	Front IP50, rear IP20
Vibration resistance (sinusoidal vibration)	EN 60068-2-6: 10 to 58 Hz: 0.035 mm 58 to 500 Hz: 0.5 G (approx. 5 m/s ²) During reading of CD/DVD: EN 60068-2-6: 10 to 58 Hz: 0.019 mm 58 to 500 Hz: 0.25 G (approx. 2.5 m/s ²)
Shock resistance (shock)	EN 60068-2-27: 5 G (approx. 50 m/s ²), duration: 30 ms During reading of CD/DVD: 5 G (approx. 50 m/s ²), duration: 11 ms
EMC interference immunity	conforms to EN 61000-6-2
EMC interference emission	conforms to EN 61000-6-4
Permissible ambient temperature	0 °C...+55 °C (operation) -20 °C ... +65 °C (transport / storage)
Permissible air humidity	Maximum 95 %, no condensation
Transport and storage	The values for air humidity and shock resistance are to be observed during transport and storage and in operation. The shock resistance during transport can be improved by means of suitably packing the industrial PC.

10 Appendix

In the appendix you will find information for servicing and details of the approvals that your device has.

10.1 Service and support

Beckhoff and its worldwide subsidiaries offer comprehensive service and support, providing fast and competent assistance for all issues relating to Beckhoff products and system solutions.

Beckhoff Service

The Beckhoff Service Center provides support in all forms of after-sales service:

- on-site service
- repair service
- spare parts service
- hotline service

Hotline: + 49 5246/963-460

email: service@beckhoff.com

If your device requires attention, please state its serial number, which you can find on the name plate.

Beckhoff Support

Support offers you comprehensive technical assistance to help you with the application of individual Beckhoff products, and also with other extensive services:

- world-wide support
- design, programming, and commissioning of complex automation systems
- extensive training program for Beckhoff system components

Hotline: + 49 5246/963-157

email: support@beckhoff.com

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The addresses of the worldwide Beckhoff branches and agencies can be found on our website at <http://www.beckhoff.com/>.

You can also find further documentation for Beckhoff components there.

10.2 Approvals

Your device has at least the following approvals:

- CE
- FCC

You will find all other applicable approvals on the name plate of your device.

FCC approvals for the United States of America

FCC: Federal Communications Commission Radio Frequency Interference Statement

This device was tested and complies with the limits for a digital device of class A, according part 15 of the FCC regulations. These limits are designed to provide adequate protection against adverse interference, if the device is used in a commercial environment. This device generates, uses and may emit radio frequency energy and may cause adverse interference with radio communications, if it is not installed and used in accordance with the operating instructions. If this device is used in a residential area it is likely to cause adverse interference, in which case the user must take appropriate countermeasures in order to eliminate the interference at his own expense.

FCC approvals for Canada

FCC: Canadian Notice

This device does not exceed the class A limits for radiation, as specified by the Radio Interference Regulations of the Canadian Department of Communications.

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