BECKHOFF New Automation Technology

Manual | EN

C6670-0020

Industrie-Server



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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.
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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 device has been developed for an IP20 working environment. This involves finger protection and protection against solid foreign objects up to 12.5 mm. There is no protection against water. Operation of the devices 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.
- Do not carry out any work on the device while it is live. Always switch off the supply voltage for the device before mounting it, replacing device components or rectifying malfunctions. This does not apply to the replacement of hard disks in a RAID configuration.
- 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 C6670-0020 is a powerful industrial server for control cabinet installation. The device is suitable for various applications and requirements. You can use the industrial server 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

The device is equipped with a server motherboard for two Intel® Xeon® CPUs and an NVMe™ SSD, a 100-240 V AC power supply, a graphics card and two hard drive caddies for hard disks. To further configure the device, you must select a CPU, main memory and SSD from the following options ex factory. It is essential to select from these options:

Table 1: CPU options, Intel® Xeon®

Order number	Performance	Link to option
C9900-C593	2 processors, 2.4 GHz, 12 cores per processor	https://www.beckhoff.com/c6670-0020 Select the “Options” tab at the bottom of the website.
C9900-C594	2 processors, 2.0 GHz, 16 cores per processor	
C9900-C595	2 processors, 2.8 GHz, 16 cores per processor	
C9900-C596	2 processors, 2.2 GHz, 24 cores per processor	
C9900-C597	2 processors, 2.2 GHz, 28 cores per processor	
C9900-C598	2 processors, 2.1 GHz, 32 cores per processor	

Table 2: DRAM options, DDR5 RAM

Order number	Storage capacity	Link to option
C9900-R291	128 GB	https://www.beckhoff.com/c6670-0020 Select the “Options” tab at the bottom of the website.
C9900-R292	256 GB	
C9900-R293	384 GB	
C9900-R294	512 GB	
C9900-R295	768 GB	
C9900-R296	1024 GB	

Table 3: SSD options, NVM Express™

Order number	Storage capacity	Link to option
C9900-H823	160 GB	https://www.beckhoff.com/c6670-0020 Select the “Options” tab at the bottom of the website.
C9900-H824	320 GB	
C9900-H825	640 GB	

In addition to the necessary configuration ex factory, further options are available at a later date, which you can select as required. The selection of these options is not necessarily required:

Table 4: Additional options

Order number	Description	Link to option
C9900-H814	160 GB NVMe™ SSD, PCIe® x4 plug-in card	https://www.beckhoff.com/c6670-0020 Select the “Options” tab at the bottom of the website.
C9900-H815	320 GB NVMe™ SSD, PCIe® x4 plug-in card	
C9900-H816	640 GB NVMe™ SSD, PCIe® x4 plug-in card	
C9900-H152	3½-inch hard disk 1 TB	
C9900-H203	3½-inch hard disk 2 TB	
C9900-H204	3½-inch hard disk 4 TB	
C9900-D118	Multi DVD drive Slimline	

The following fieldbus cards are not compatible with the industrial server:

- FC1121
- FC312x
- FC512x
- FC532x

3.1 Structure

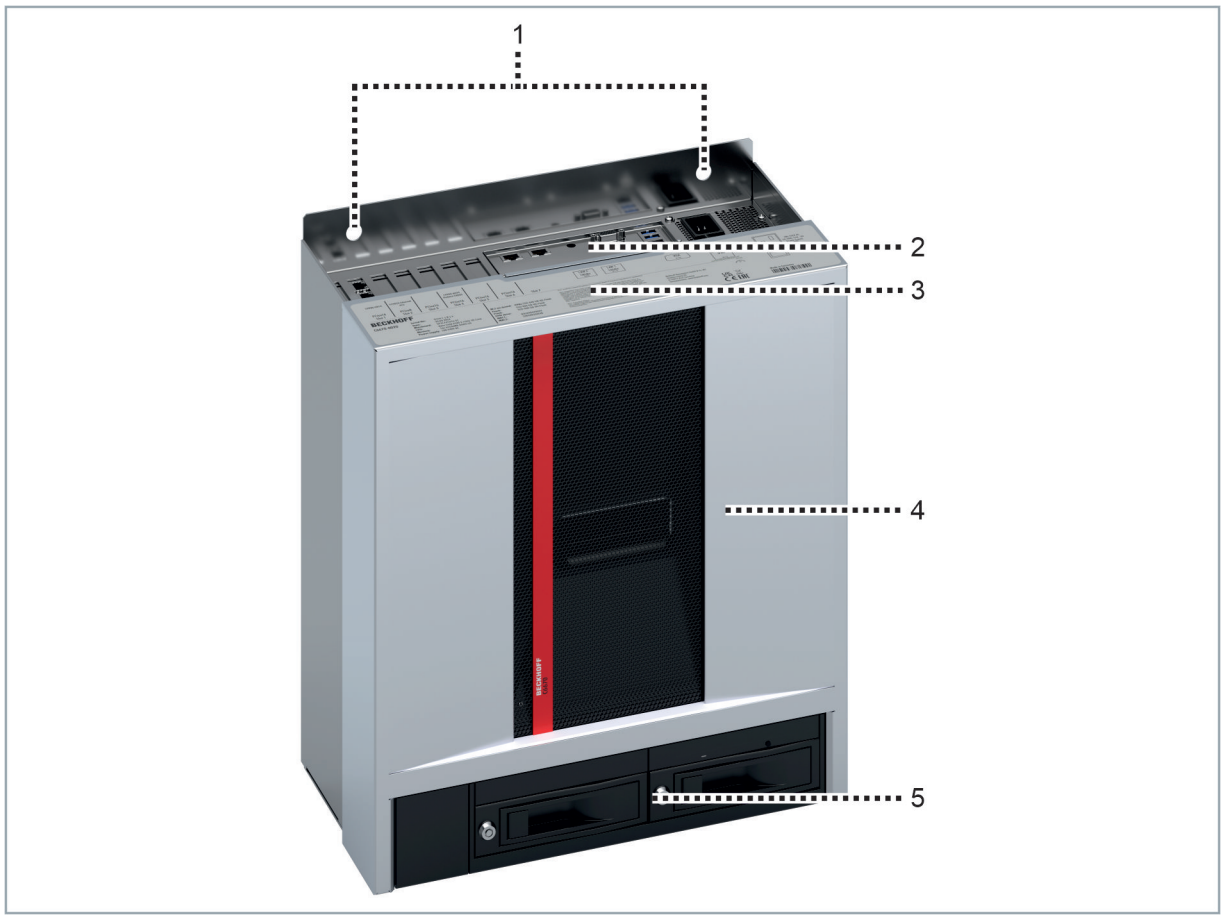


Fig. 1: Structure

Table 5: Legend structure

No.	Component	Description
1	Mounting concept	Holes for mounting the industrial server in the control cabinet
2	Connection compartment	Access to interfaces of the industrial server
3	Name plate	Information on the equipment of the industrial server
4	Housing cover	Access to exchangeable device components
5	Two hard drive caddies	For one hard disk each

3.2 Interface description

The basic version of the device includes the following interfaces:

- Power supply (X101)
- USB (X110, X111)
- IPMI (X112)
- VGA (X113)
- Ethernet RJ45 (X114, X115)
- DVI

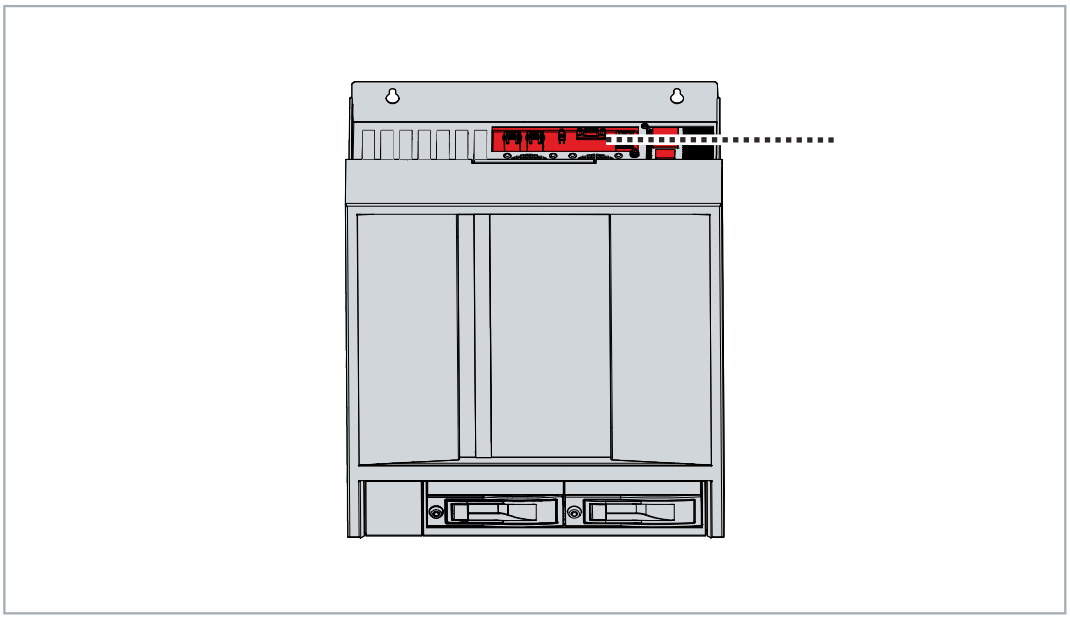


Fig. 2: Connection section

3.2.1 Power supply

The device is equipped with a 100-240 V AC, 50-60 Hz full range power supply.

Table 6: Current carrying capacity power supply unit

Output voltages power supply unit	Maximum current load of power supply unit
+3.3 V	24 A
+5 V stand by	3 A
+5 V	24 A
+12 V	80 A
-12 V	0.7 A

The total load of +5 V and +3.3 V must not exceed 135 W.

The power supply is connected via the IEC socket (X101) on the top of the device. This is an IEC C20 socket. The connection cable supplied has an IEC C19 coupling. The assignment includes a protective conductor (1), a neutral conductor (2) and an outer conductor (2).

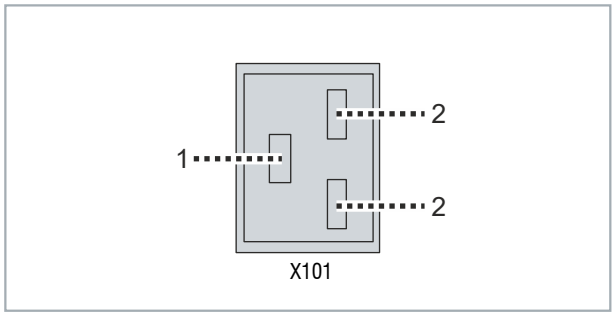


Fig. 3: IEC socket

3.2.2 USB

The device has two USB 2.0 interfaces (X110, X111). They are used to connect peripheral devices with USB interfaces. The current output of the interfaces is limited to 500 mA.

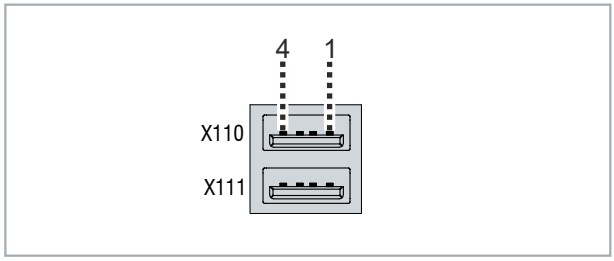


Fig. 4: USB interface pin numbering

Table 7: USB interface pin assignment

Pin	Connection
1	Vbus
2	D -
3	D +
4	GND

3.2.3 IPMI

The Intelligent Platform Management Interface (IPMI) (X112) enables remote management of both a device in a switched-off state and a device without an operating system. The interface is standardized in computer hardware and firmware. It is used for remote monitoring and management of the device at hardware level.

3.2.4 VGA

The device has a VGA interface (X113). Do not use this interface and use the two DVI connectors on the graphics card instead (see chapter 3.2.6 DVI [▶ 15]).

3.2.5 Ethernet RJ45

The device has two 10 Gigabit Ethernet ports (X114, X115). The Ethernet standard 10GBase-T enables the connection of corresponding network components and data rates of up to 10 Gbit/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 device may only be connected to internal Ethernet networks and not to external telecommunication networks. The interfaces are not EtherCAT-capable.

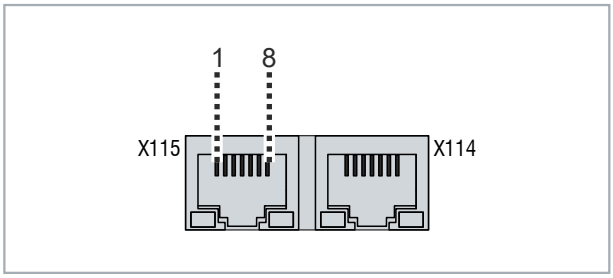


Fig. 5: Ethernet interface pin numbering

Table 8: 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 -	

3.2.6 DVI

The device has a graphics card with two DVI ports. The graphics card occupies a PCIe®-x16 slot. You can connect a DVI-capable monitor to the DVI ports. Only digital signals are transmitted. The current output is limited to 1000 mA.

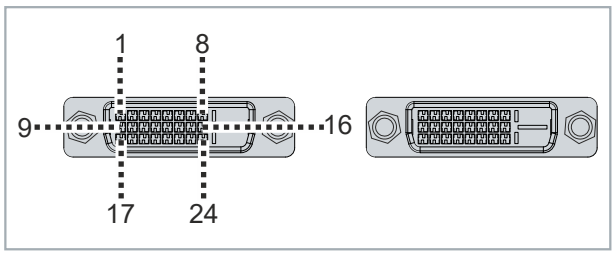


Fig. 6: DVI interface pin numbering

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	TMDA Clock -

3.3 Name plate

The name plate provides information about the equipment of your device. The name plate shown here serves only as an example.

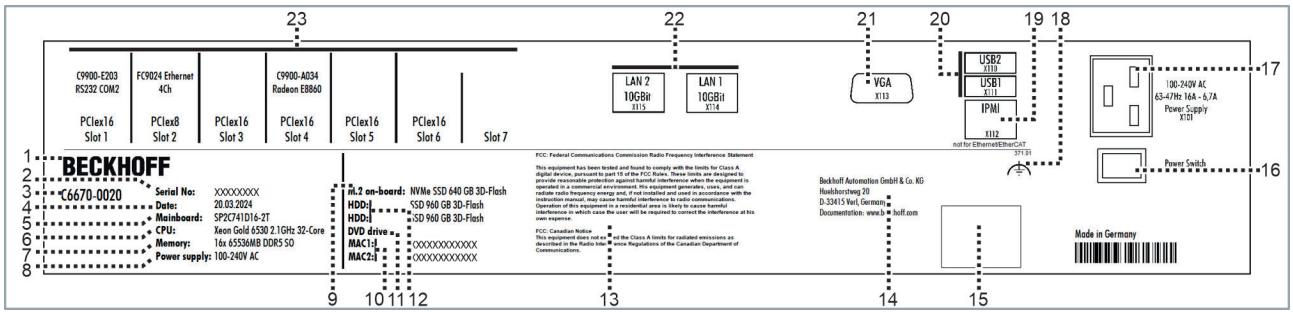


Fig. 7: Name plate

Table 10: Legend name plate

No.	Description
1	Vendor
2	Serial number = Beckhoff Traceability Number (BTN)
3	Model: The last four digits indicate the device generation.
4	Date of manufacture
5	Mainboard
6	CPU
7	Main memory
8	Power supply
9	NVMe™ SSD
10	MAC addresses of the Ethernet interfaces (X114, X115)
11	DVD drive
12	Hard disks
13	FCC approval
14	Address of the vendor
15	Symbols Note: Here are the symbols applicable to the device such as CE, EAC, UKCA,  . The approvals of your device can be found on the name plate and in chapter 10.2 Approvals [▶ 40].
16	Main switch for switching the device on and off
17	Power supply connection
18	Grounding bolt for functional earthing of the device
19	IPMI (X112)
20	USB interfaces (X110, X111)
21	VGA connection (X113)
22	Ethernet interfaces (X114, X115)
23	Plug-in card slots for options

4 Commissioning

In order to use the device, you must first commission it. The first step is to transport the device to is operating location and unpack it. The device is then installed in the control cabinet, the cables and power supply are connected and finally the device is switched on.

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

Proceed as follows to unpack the unit:

1. Check the packaging for transport damage.
2. Remove packaging.
3. Keep the packaging for possible future transport.
4. Check your delivery for completeness by comparing it with your order.
5. Check the contents for visible shipping damage.
6. Inform the Beckhoff Service Dept. in case of discrepancies between the packaging content and the order or in the event of transport damage.

⇨ You have unpacked the device.

4.2 Control cabinet 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

Incorrect installation in a control cabinet prevents air circulation in the device and causes impaired functioning.

- Only install the device in the orientation specified below.

The device is designed for installation inside a control cabinet in machine and system engineering. The environmental conditions specified for operation must be observed.

Only install the device in the control cabinet with the interfaces facing upwards.

You can use the mounting concept (see figure) to mount the device in the control cabinet.

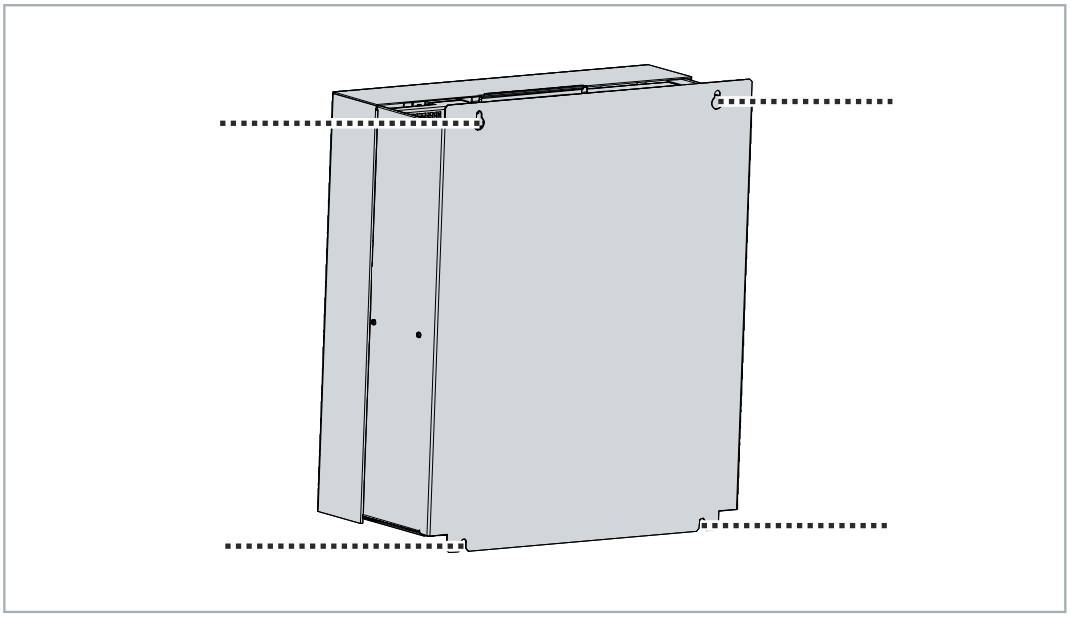


Fig. 8: Mounting concept

The dimensions of the device are used to prepare the control cabinet and ensure correct installation in the control cabinet. All dimensions are in mm.

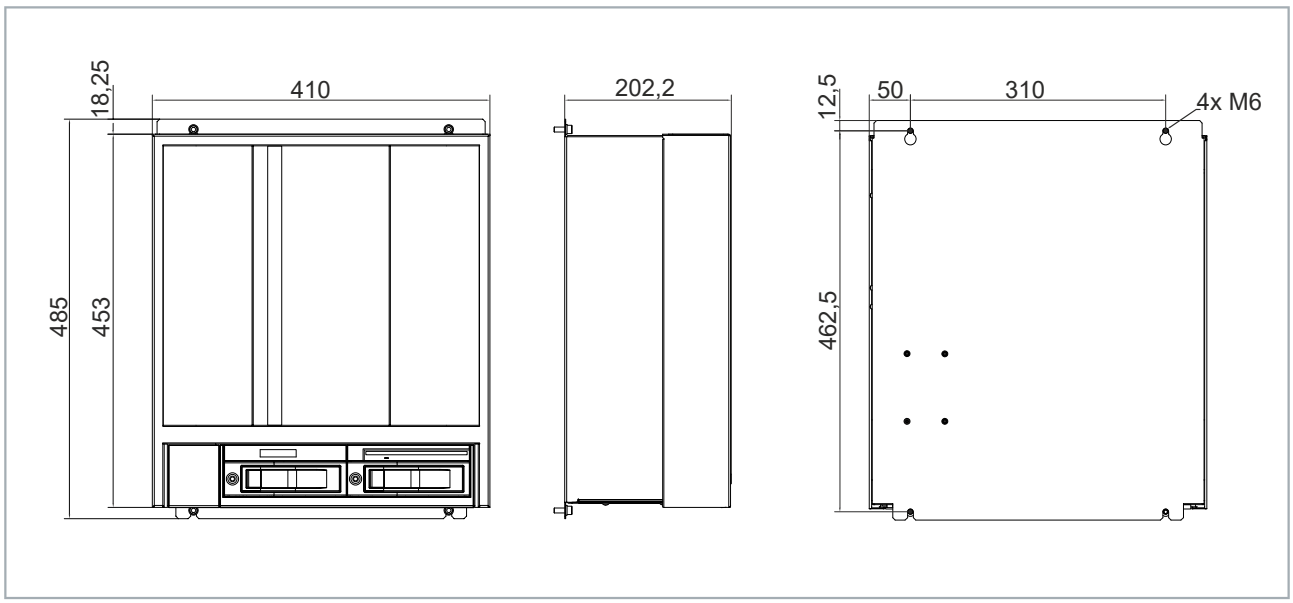


Fig. 9: Dimensions

Installation in the control cabinet

When installing in the control cabinet, note that there must be 5 cm of free space above and below the device for ventilation.

To mount the device in the control cabinet, you must provide it with the holes for the fixing screws in accordance with the device dimensions. You need M4 screws for mounting.

After you have drilled the holes for the fastening screws in the control cabinet, you can mount the device in the control cabinet. Follow the steps below:

1. Insert the fastening screws into the drill holes in the control cabinet.
2. Hang the device on the screws at the points marked of the mounting concept.

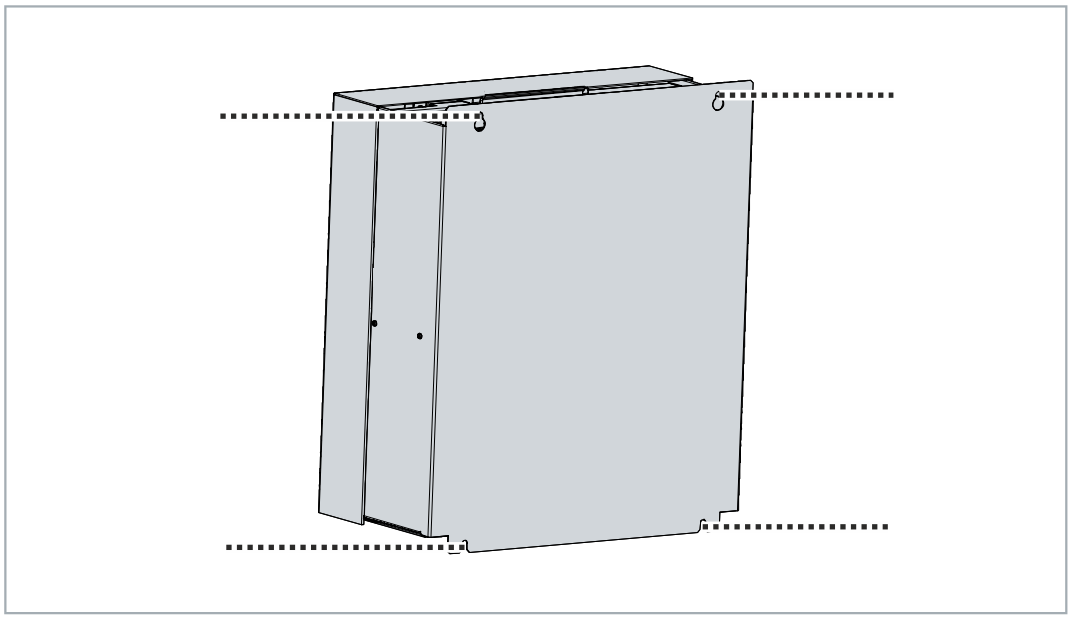


Fig. 10: Control cabinet installation

3. Tighten the fastening screws.

⇨ You have installed the device in the control cabinet.

4.3 Connecting the industrial server

⚠ 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 make the device ready for operation, you have to connect it. The first step is to ground the device. Then you can connect the cables and the power supply.

The device is equipped with a 100-240 V AC, 50-60 Hz full range power supply.

4.3.1 Grounding of the industrial server

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.

Protective earth

A protective conductor is included in the device's IEC socket for connecting the power supply. Establish low-resistance protective earthing of the device via the voltage connection to avoid 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. You establish functional earthing via the grounding connection between the grounding bolt in the connection section on the top of the device (see figure) and the central grounding point of the control cabinet in which the device is installed. Use either a wide, flat ground strap or a round conductor with a minimum cross-section of 10 mm^2 for the ground connection. In the case of a round conductor, also use a cable lug with a ring and place the ring over the grounding bolt.

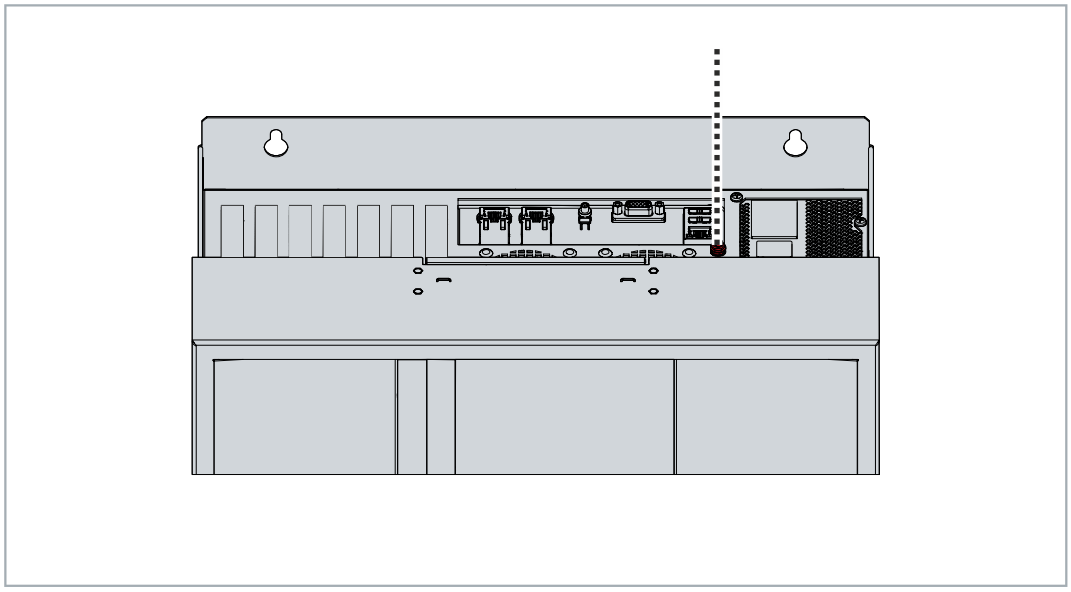


Fig. 11: Grounding bolt for functional earthing

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 top of the device. They are documented in chapter 3.2 Interface description [▶ 12].

Make sure that you first establish the functional earthing at the grounding bolt of the device (see chapter 4.3.1 Grounding of the industrial server [▶ 20]) and then plug in all data transmission cables.

Connecting the power supply

For the connection of the power supply, there is an IEC socket in the connection compartment on the top of the device. To connect the device 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, 16 A), plug with ground connection according to NEMA 5-20P 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, 16 A), plug with ground connection according to NEMA 6-20P 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 device.
3. Connect the device to a Schuko socket.

⇨ You have connected the power supply.

4.4 Switching the industrial server 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.

The industrial server has its own power switch. Switching the system on or off or connecting or disconnecting the power supply to the device starts or switches it off. To avoid data loss, close the running software and shut down the operating system properly before switching off the device.

Starting the device with a USB stick inserted when using TwinCAT is not possible. The TwinCAT System ID changes. If you sometimes need to start your device with a USB stick inserted, you can integrate a TC license terminal into an EtherCAT terminal strip.

There is a UID (Unit Identification Purpose) button with LED in the connection section of the device. You can use this button to check whether the device is in operation or switched off. If you press the UID button, the blue UID LED lights up when the device is running. If you press the button again, the display is disabled.

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:

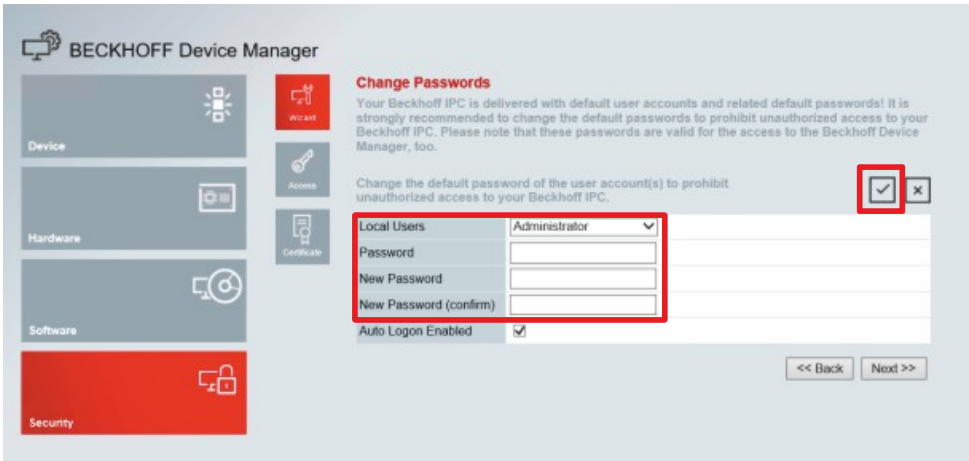


Fig. 12: Beckhoff Device Manager – Change passwords

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.

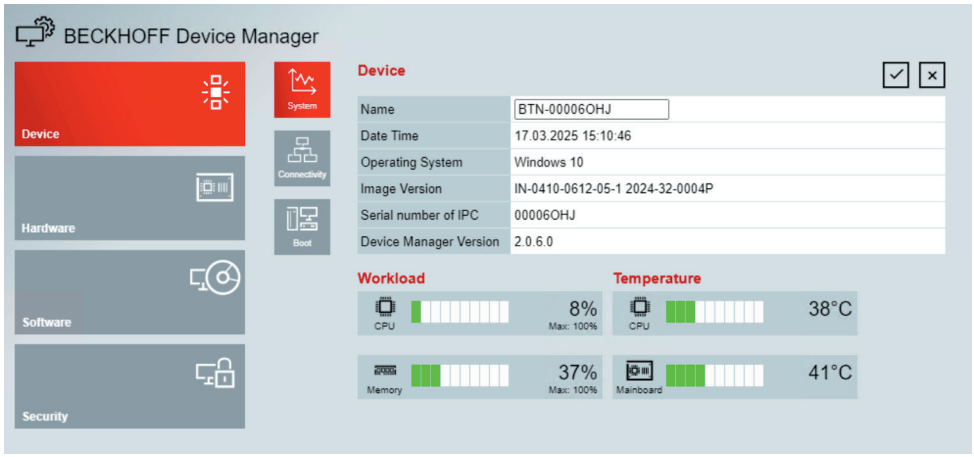


Fig. 13: Beckhoff Device Manager – Start page

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.

As part of the decommissioning of the device, you must first disconnect the power supply and cables. You can then remove the device from the control cabinet.

If you no longer wish to use the device, please refer to chapter 6.2 for information on how to dispose of the device correctly.

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 device from the control cabinet, you must disconnect the power supply and the cables.

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 voltage connector out of the IEC socket of the device.

⇨ You have disconnected the power supply.

Disconnecting cables

Proceed as follows to disconnect the cables from the device:

1. Make a note of the wiring configuration, if you wish to restore it with another device.
2. Disconnect all data transmission cables from the device.
3. Finally, disconnect the grounding strap.

⇨ They have disconnected the cables.

6.2 Disassembly and disposal

Before you can remove the device from the control cabinet, you must first disconnect the power supply and the cables (see chapter 6.1 Disconnecting the power supply and cables [▶ 25]).

Proceed as follows to remove the device from the control cabinet:

1. Loosen the fastening screws just enough so that they remain attached to the control cabinet.
2. Lift the device far enough so that the fastening screws slip into the keyholes.

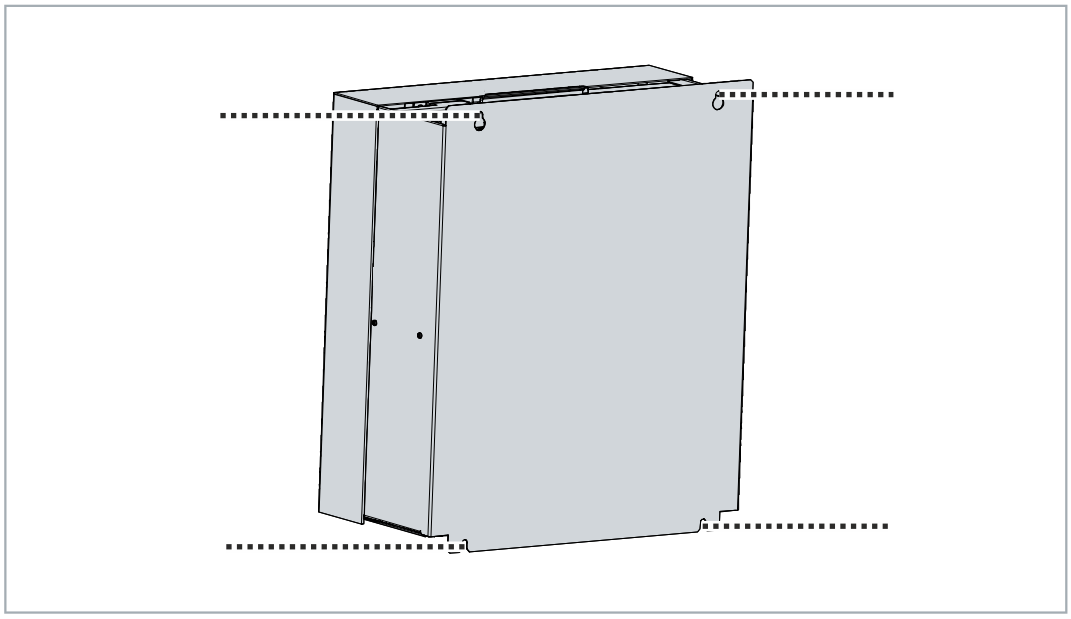


Fig. 14: Positions of the fastening screws

3. Remove the device from the control cabinet.

⇨ You have disassembled the device.

Disposal of the industrial server

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. Excluded from this is the replacement of hard disks in RAID configuration and fan cartridges.

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.

When cleaning the device, be sure to observe the following aspects:

- Make sure that no dust gets into the device.
- Always keep the ventilation grilles free.
- Only use a vacuum cleaner to clean the device. The device does not have to be switched off for this.
- Never use compressed air to clean the device.

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 11: 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

Component	Recommendation for replacement intervals (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

To replace the motherboard battery and the NVMe™ SSD, you must first gain access to the inside of the device. Only replace the components when the device is switched off. You can find the SSD options in chapter 3 Product overview [▶ 9].

To open the housing, follow the steps shown in the figures below:

1. Pull the release handle (1) upward to release the housing cover lock (section A).
2. Pull the housing cover forward by the release handle until it moves freely at the bottom. Hold the cover firmly to prevent it from falling (section A).
3. Guide the housing cover downwards out of the guides (section B).

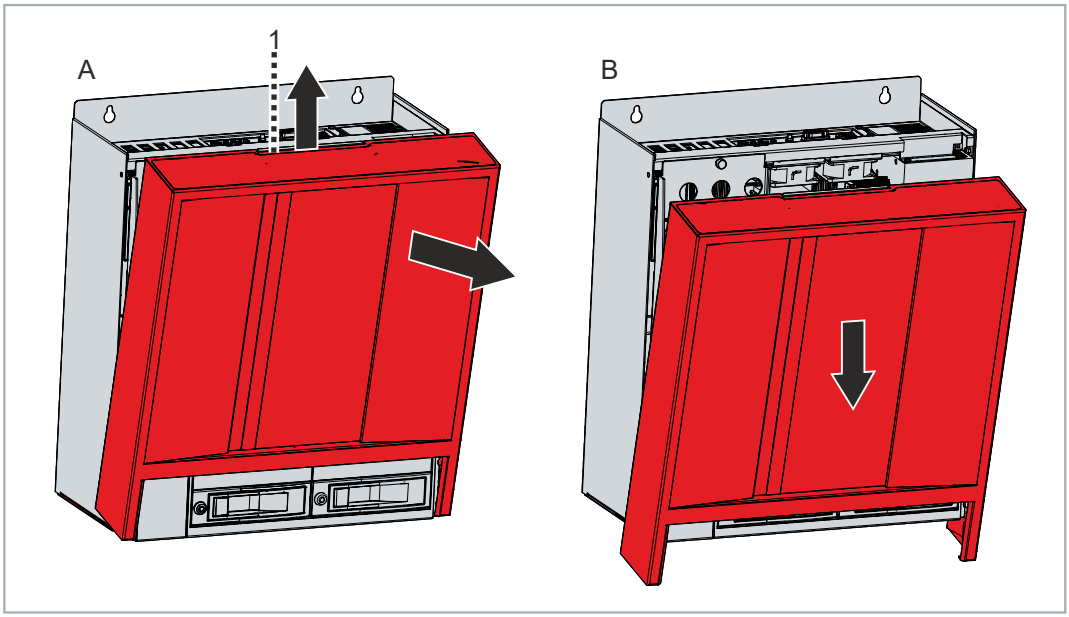


Fig. 15: Open the housing cover

4. Loosen the knurled screw (2) of the card locating holder (3).

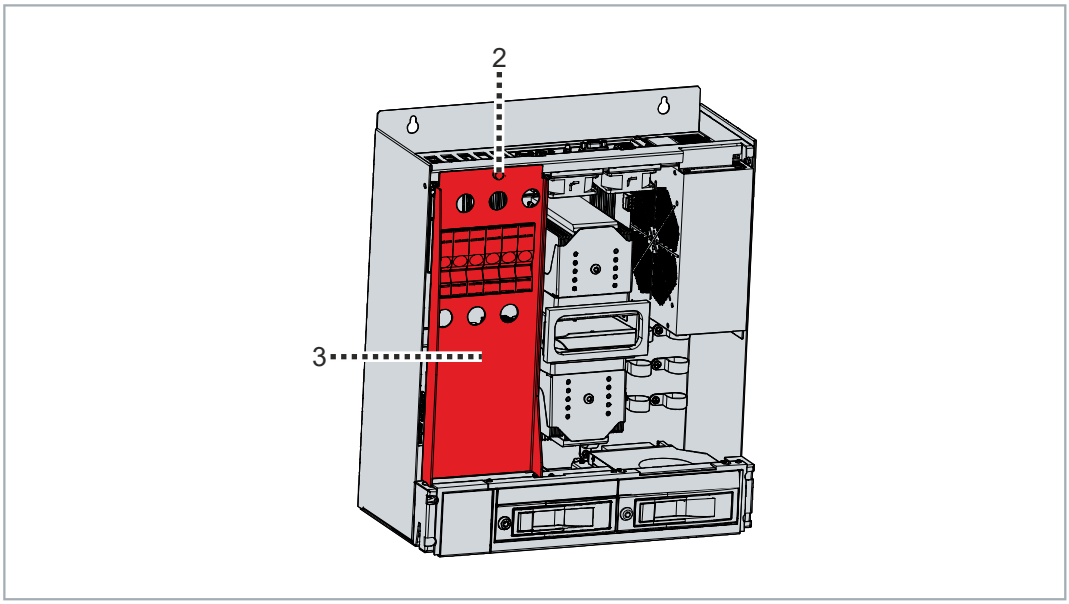


Fig. 16: Remove card locating holder

5. Remove the card locating holder from the housing.

⇨ You now have access to the interior of the device.

The motherboard battery (1) and the NVMe™ SSD (2) are located inside the device.

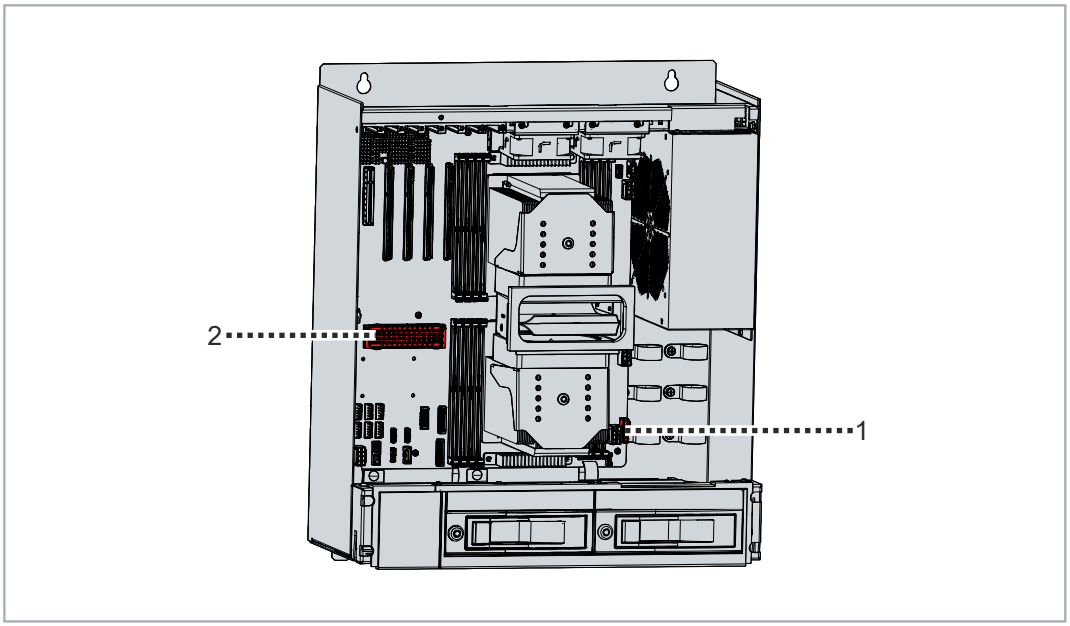


Fig. 17: Battery and NVMe™ SSD

Mounting the card locating holder

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

1. Release all plastic elements of the card locating holder (section A).
2. Place the card locating holder again in the slots provided in the device (section B).
3. Keep the card locating holder pressed onto the edge of the device while tightening the knurled screw again (section C).

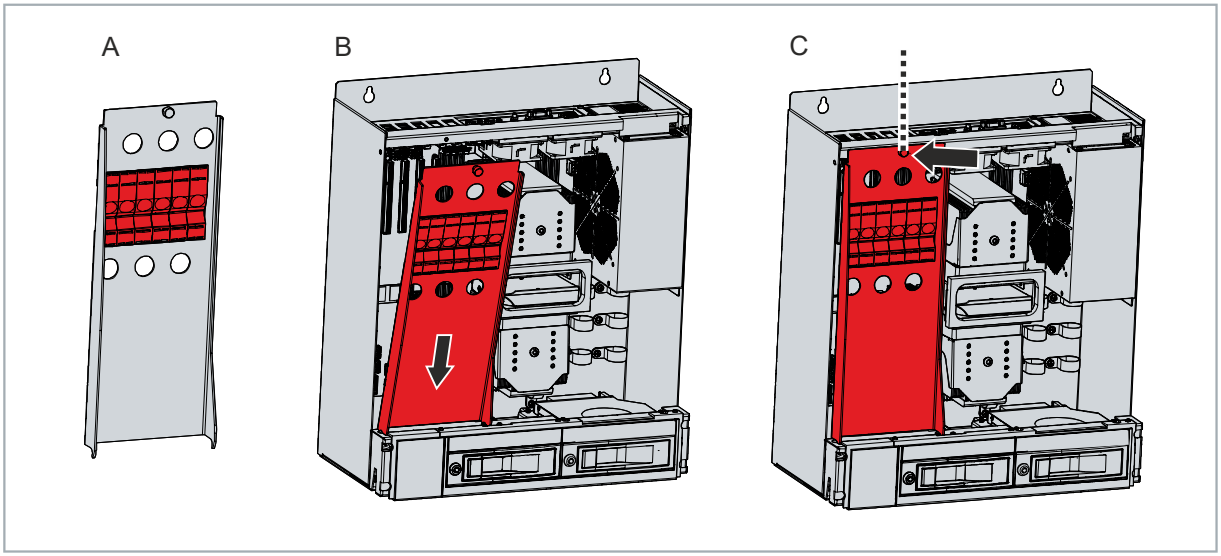


Fig. 18: Mounting the card locating holder

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.

Mounting the housing cover

To refit the housing cover to the device, you must push the inner hooks (1) of the housing cover into the guides (2) of the housing.

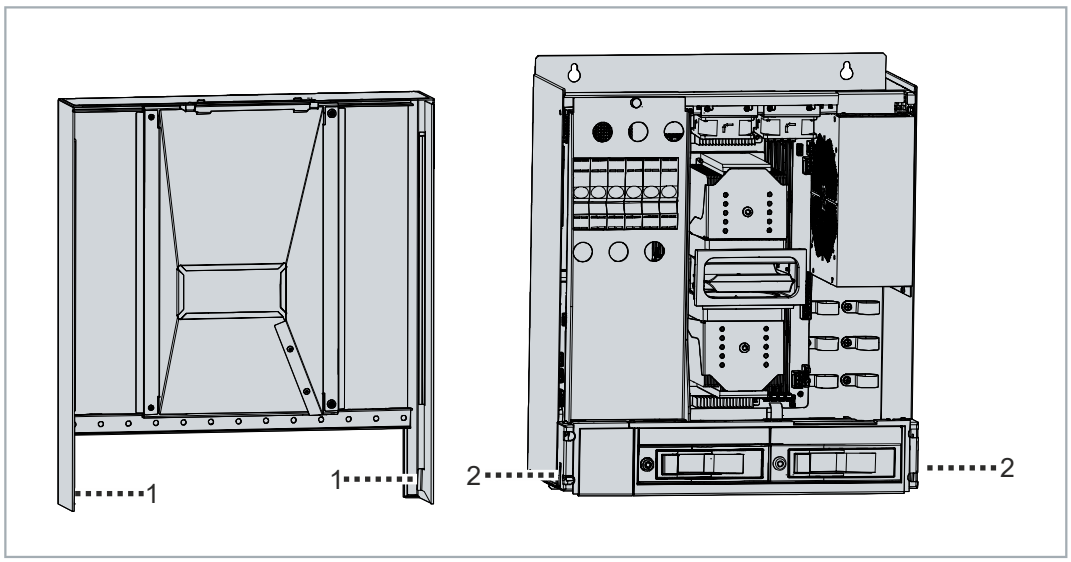


Fig. 19: Hooks and guides

Follow the steps below:

1. Hold the cover inclined and place it below the housing (section A).
2. Push the cover up as far as possible, inserting the hooks of the cover into the guides of the housing (section A).
3. Place the cover into a straight position against the housing until the release handle snaps back into place (section B).

⇨ You have mounted the cover on the housing.

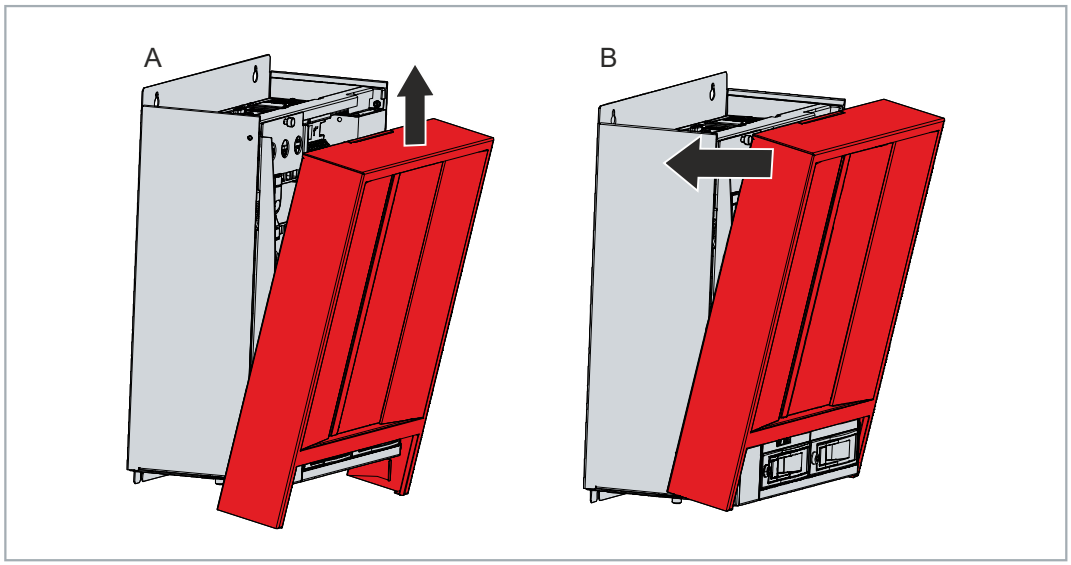


Fig. 20: Inserting the housing cover

7.2.2 Replacing the battery

⚠ WARNING

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.

⚠ WARNING

Incorrect handling of the battery

Handling the motherboard battery incorrectly can cause an explosion.

- Do not recharge the battery.
- Do not disassemble the battery.
- 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 12: 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

The motherboard battery is located inside the device. Chapter 7.2.1 Access to device components [▶ 29] shows how to open the device.

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 with needle-nose pliers (section B).

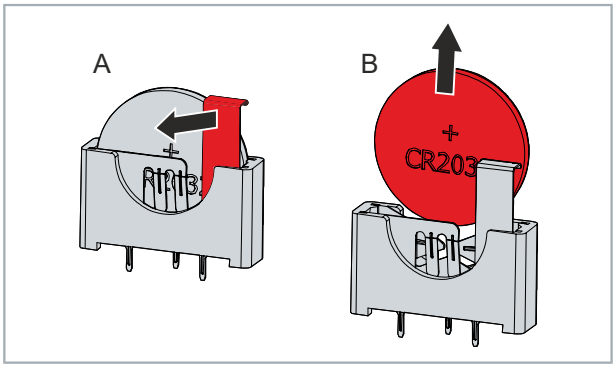


Fig. 21: Replacing the battery

3. Insert the new battery into the holder. Make sure that the positive pole points towards the hook.

⇨ 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

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.

Replacing the NVMe™ SSD

You must select an NVMe™ SSD for the configuration of the device (see chap. 3 Product overview [▶ 9]). The NVMe™ SSD you have selected is located on the motherboard. Shut down the device and switch it off before replacing an NVMe™ SSD.

To replace the SSD, proceed as follows:

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

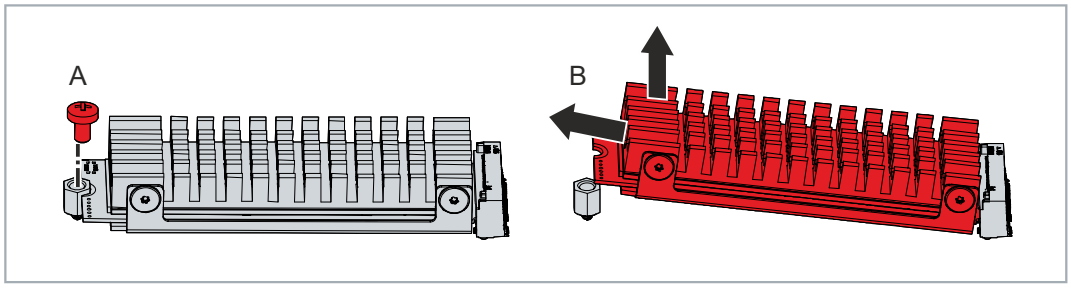


Fig. 22: Replacing the NVMe™ SSD

4. Insert the new SSD in an inclined position.
5. Press the SSD down.
6. Reinsert the M3 screw.

⇨ You have replaced the SSD.

Replacing the hard disks

To replace the optional hard disks in the 3.5-inch hard drive caddy, proceed as follows:

1. Unlock the hard drive caddy with the supplied key (section A).
2. Pull the button on the hard drive caddy to unlock and open it (section B).
   ⇨ The hard disk is pushed out of the hard drive caddy.
3. Pull the hard disk out of the hard drive caddy (section C).

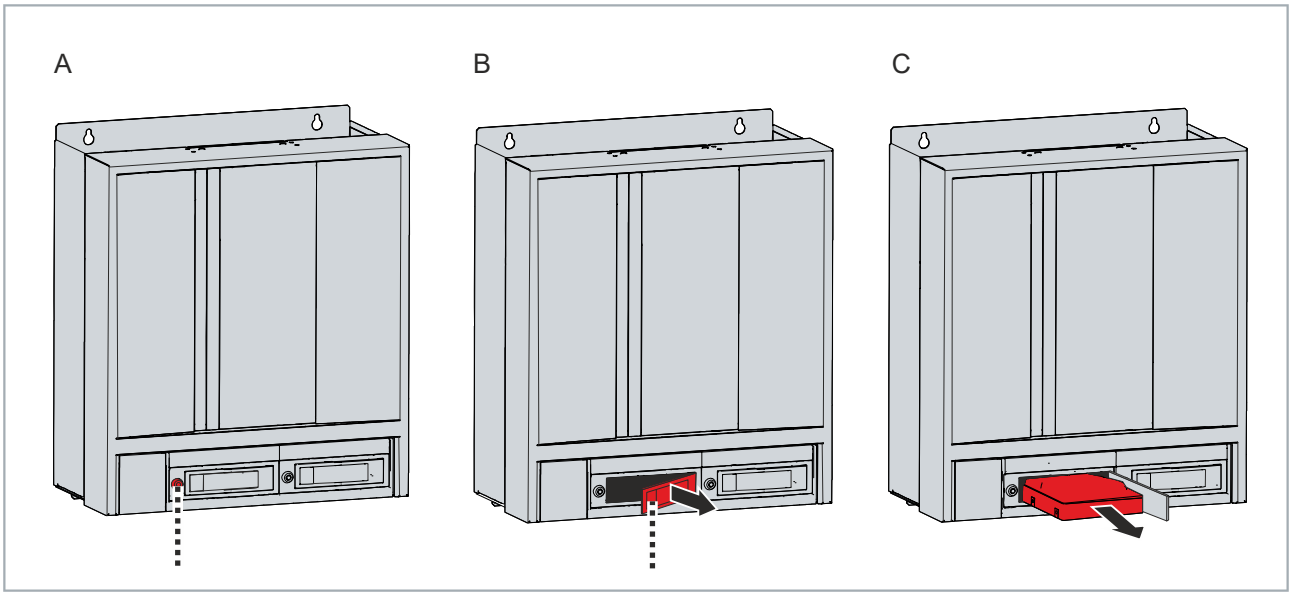


Fig. 23: Replacing the hard disk

4. Insert the new hard disk into the hard drive caddy with the manufacturer's sticker facing upwards.
5. Close the hard drive caddy again.
6. Lock the hard drive caddy again.

⇨ You have replaced the hard disk.

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.

7.2.4 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.

First remove the housing cover of the device to gain access to the fans inside the device (see section 7.2.1 Access to device components [▶ 29]).

Replacing the fan on the top of the device

To replace the fans on the top of the device, follow the steps below:

1. Remove the two M3 screws from the fan holders. Secure the holders to prevent them from falling down.

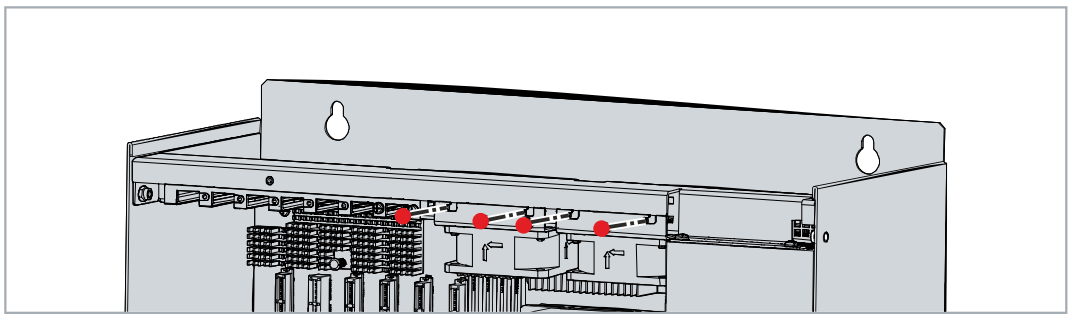


Fig. 24: Removal of M3 screws

2. Disconnect the fan supply cables from the motherboard.
3. Remove the fan holders with the fans.

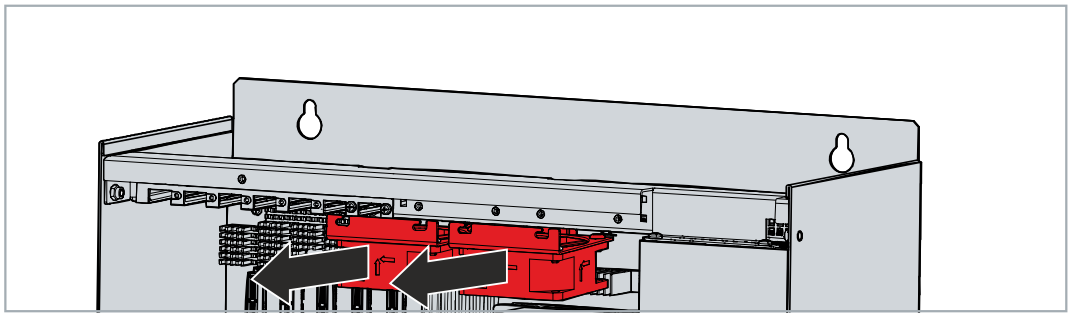


Fig. 25: Removal of fan holders

4. Insert the new fan holders with fans again.
5. Connect the power supply cables to the motherboard.
6. Reinsert the two M3 screws.

⇨ You have now replaced the fans.

Replacing the fans on the bottom of the device

To replace the fan cartridge on the bottom of the device, follow the steps below:

1. Loosen the knurled screw on the bottom of the device (section A).
2. Turn the cartridge downwards (section B).
3. Disconnect the supply cable of the fan from the motherboard.
4. Remove the cartridge to the front (section C).

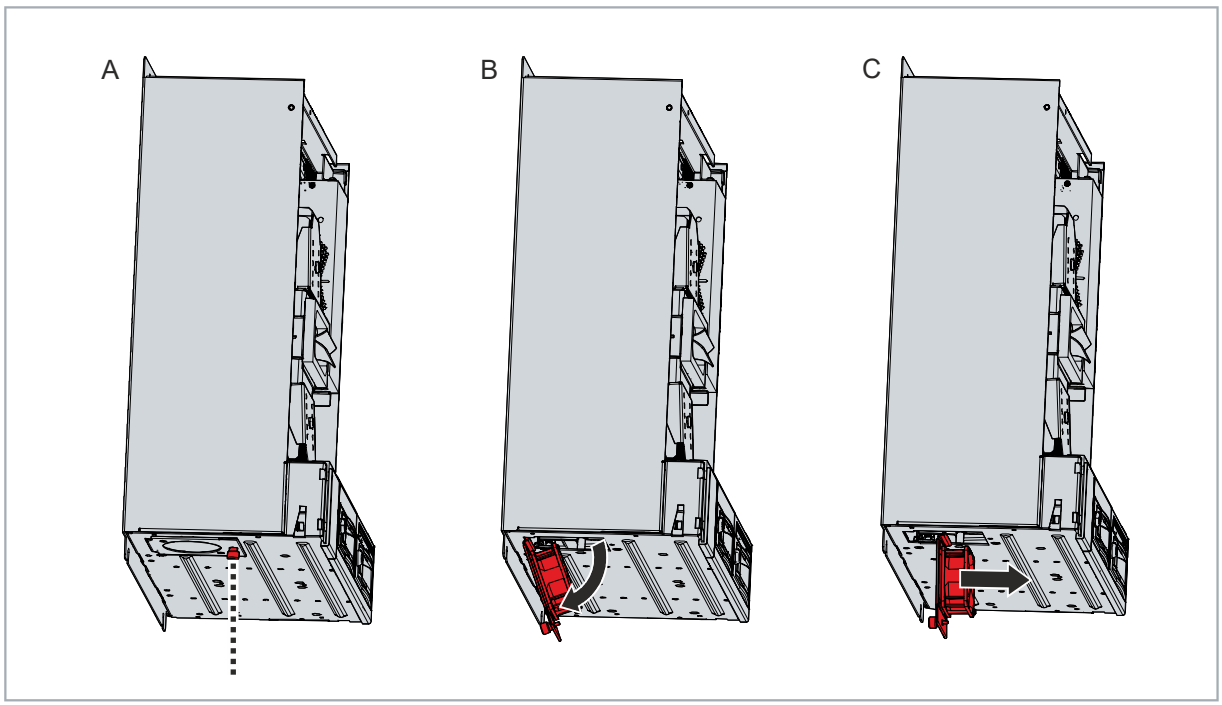


Fig. 26: Replacing the fans on the bottom of the device

5. Insert the new fan cartridge.
6. Connect the supply cable to the motherboard.
7. Flip the cartridge up.
8. Tighten the knurled screw.

⇨ You have now replaced the fan cartridge.

Replacing the CPU fans

The two CPU fans are located inside the device. To replace them, follow the steps below:

1. Pull out the fan duct between the CPU fans (section A).
2. Remove the M6 screws on the retaining plates (section B).
3. Pull the CPU fans including holders off the CPUs (section C).

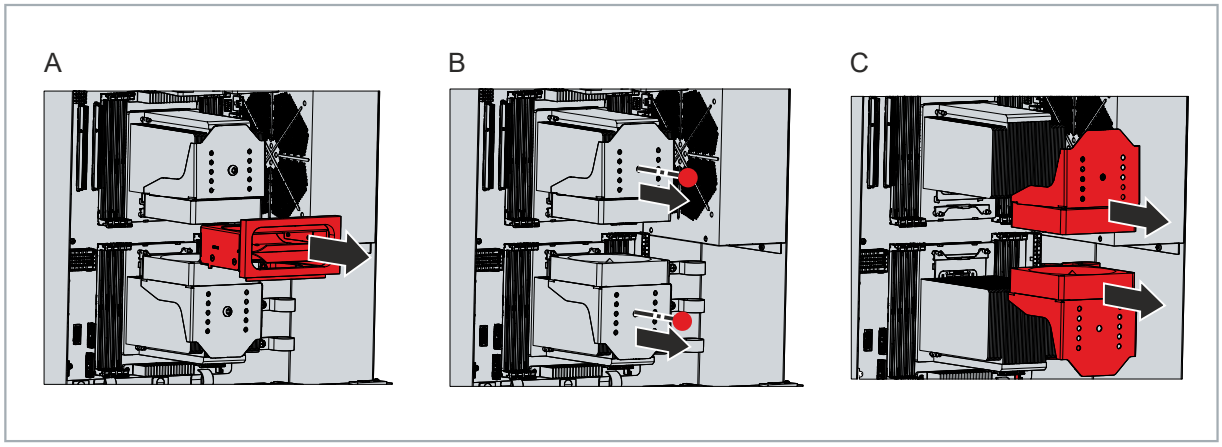


Fig. 27: Replacing the CPU fans

4. Disconnect the CPU fan supply cables from the motherboard.
5. Press against the expanding rivets to separate the fan holder from the CPU fan.
6. Connect the new fan to the fan holder by reinserting the expanding rivets using round nose pliers.

8 Troubleshooting

Table 13: 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 14: Technical data

Product designation	C6670-0020
Dimensions (W x H x D)	410 x 480 x 201 mm
Weight	17 kg
Supply voltage	100-240 V_{AC}, 50-60 Hz, max. 16 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
Protection rating	IP20
Pollution degree	2
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)
Shock resistance (shock)	EN 60068-2-27: 5 G (approx. 50 m/s^2), duration: 30 ms
EMC interference immunity	conforms to EN 61000-6-2
EMC interference emission	conforms to EN 61000-6-4
Permissible ambient temperature	+0 °C...+50 °C (operation) -25 °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 vibration resistance during transport can be improved by suitable packaging of the device.

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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Germany

Phone: + 49 5246/963-0
email: info@beckhoff.de

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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