BECKHOFF New Automation Technology

Manual | EN

C6015

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.
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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.
- 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 C6015 Industrial PC supplements the Beckhoff entry-level products with an ultra-compact industrial PC with high performance reserves for space-saving control cabinet installation.

The industrial PC has sufficient performance reserves for the following applications, among others:

- various automation and visualization tasks
- wide range of IoT tasks, for example when used as an IoT gateway
- simple HMI applications
- axis control
- short cycle times
- high-volume data handling
- other PC applications

The basic configuration of the C6015 includes the following aspects:

- Intel® processor
- DRAM
- M.2-SSD
- 24 V DC power supply unit

3.1 Structure

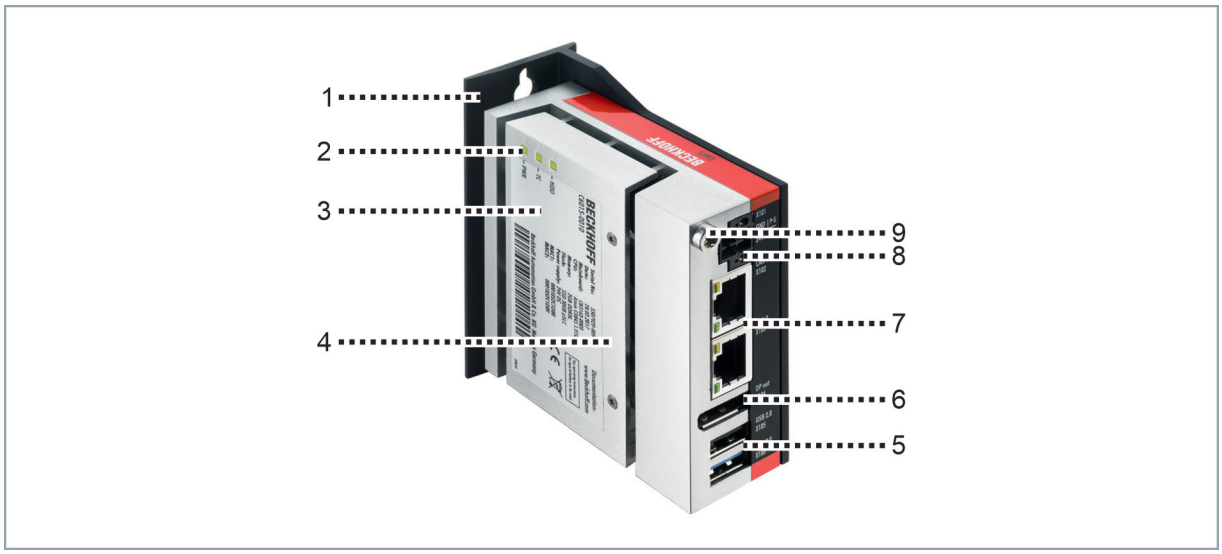


Fig. 1: Structure

Table 1: Legend - Structure

No.	Component	Description
1	Mounting plate	Plate for mounting the industrial PC over the narrow sides in the control cabinet
2	Status LEDs	Status display for power, mass storage device, TwinCAT
3	Name plate	Information on the equipment of the industrial PC
4	Side cover	Access to battery and storage medium
5	USB interfaces (X105, X106)	Connection of peripheral devices
6	DisplayPort (X104)	Transmission of the video signal
7	Ethernet interfaces RJ45 (X102, X103)	Connection of the industrial PC to a 100/1000/2500BASE-T network
8	Power supply (X101)	Connection of the power supply and external wiring of the industrial PC
9	Protective conductor connection PE	Low-resistance protective earthing and functional earthing of the industrial PC

3.2 Interface description

In the basic configuration, the C6015 includes the following interfaces:

- Power supply (X101)
- Ethernet RJ45 (X102, X103)
- DisplayPort (X104)
- USB (X105, X106)

3.2.1 Power supply

The industrial PC is supplied with a nominal voltage of 24 V. The 2x2-pin voltage socket (X101) is used for connection to the power supply and the external wiring of the industrial PC. The main supply voltage is applied between PIN 3 (0 V) and PIN 4 (24 V) of the socket.

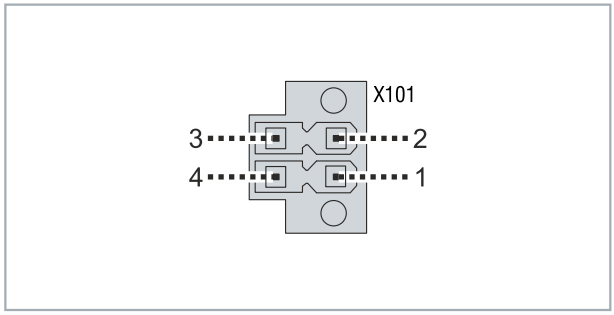


Fig. 2: Voltage socket pin numbering

Table 2: Voltage socket pin assignment

Pin	Signal	Description
1	PC-ON	Input PC-ON
2	P-S	Power status output
3	GND	0 V
4	24 V	Power supply

The plug for the power supply is specified for 8 A and can accommodate wire cross-sections of up to 1.5 mm^2. For long supply lines, use 1.5 mm^2 cables to achieve a low voltage drop on the supply lines. There should be at least 22 V at the power supply plug of the industrial PC, so that the industrial PC remains switched on during voltage fluctuations. The plug is included in the delivery. You can obtain a replacement plug from your Beckhoff Sales using the following ordering option:

- C9900-P943: power supply connector for C60xx Industrial PC

3.2.2 Ethernet RJ45

The C6015 has two Gigabit LAN ports (X102, X103). The 100Base-T, 1000Base-T, and 2500Base-T Ethernet standards enable 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 controllers are used as follows, based on the device generation:

Table 3: Controller classification based on device generation

Device generation	Controller	Mbit/s
C6015-0010	Intel® i210 for LAN1 and LAN2	100/1000
C6015-0020	Intel® i210 for LAN1 and LAN2	100/1000
C6015-0030	Intel® i226 for LAN1 and LAN2	100/1000/2500

The Ethernet ports i210/i226 connected via PCIe® are suitable for cycle times <= 1 ms and for distributed clock applications with EtherCAT.

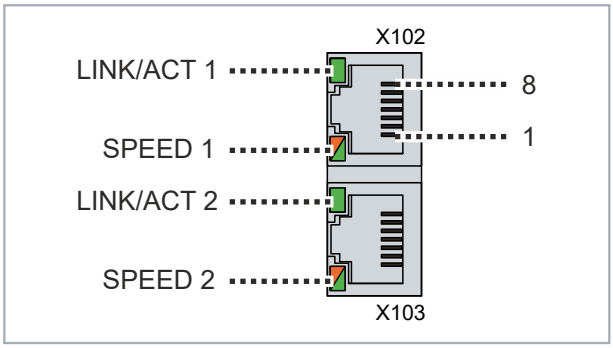


Fig. 3: Ethernet interface pin numbering

Table 4: 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 (LINK/ACT) highlighted 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 green when data transmission is in progress on the interface.

The green/orange LED (SPEED) shown in the figure indicates the data transmission rate.

The device generations differ in terms of the possible data transmission rate. The following tables show what the LEDs mean with regard to the potential data transmission rate.

Table 5: LED meaning: speed 100/1000 Mbit/s

Mbit/s	LED
100	Lights up orange
1000	Lights up green

Table 6: LED meaning: speed 100/1000/2500 Mbit/s

Mbit/s	LED
100	Off
1000	Lights up orange
2500	Lights up green

3.2.3 USB

The industrial PC has two USB interfaces (X105, X106). They are used to connect peripheral devices with USB interfaces.

The following table shows the interface assignment based on the device generation:

Table 7: USB interfaces based on device generation

Device generation	USB interfaces
C6015-0010	1x USB 2.0 (X105) 1x USB 3.0 (X106)
C6015-0020	2x USB 3.0 (X105, X106)
C6015-0030	2x USB 3.1 Gen 2 (X105, X106)

In the case of the device generation -0010, the two USB interfaces each supply up to 500 mA of current. In the case of the device generations -0020 and -0030, the two USB interfaces each supply up to 900 mA of current.

The interfaces are electronically protected. Only pins 1 to 4 and the shield are relevant for USB 2.0.

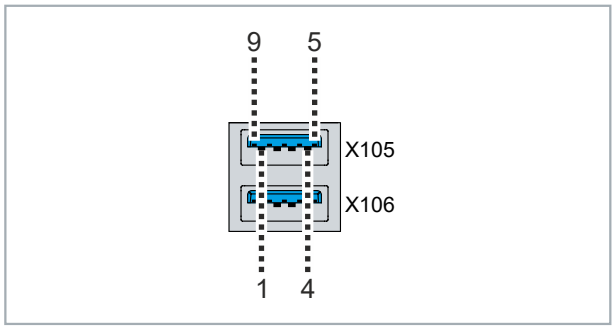


Fig. 4: USB interface pin numbering

Table 8: USB interface pin assignment

Pin	Assignment
1	Vbus
2	D -
3	D +
4	GND
5	StdA_SSRX -
6	StdA_SSRX +
7	GND_DRAIN
8	StdA_SSTX -
9	StdA_SSTX +

3.2.4 DisplayPort

The industrial PC has a DisplayPort (X104) that enables connection of devices with DisplayPort. It facilitates transfer of image signals.

In addition, DVI signals can be transferred via an adapter. Please order it from your Beckhoff sales team, quoting order identifier C9900-Z468 adapter cable DisplayPort to DVI, 40 cm.

DisplayPort signals are led out via the interface by default. With an appropriate adapter cable, the card automatically switches to HDMI signals according to the DisplayPort specification.

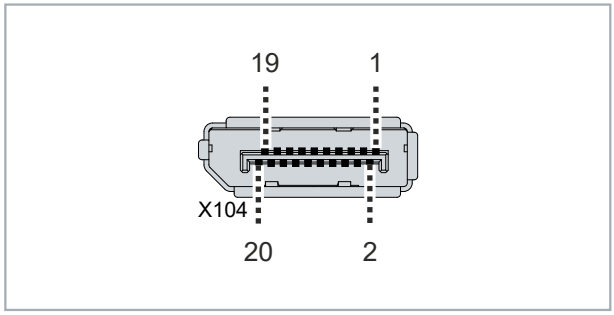


Fig. 5: DisplayPort pin numbering

Table 9: 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 Status LEDs

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

- the status of the power controller
- the TwinCAT status
- the SSD activity

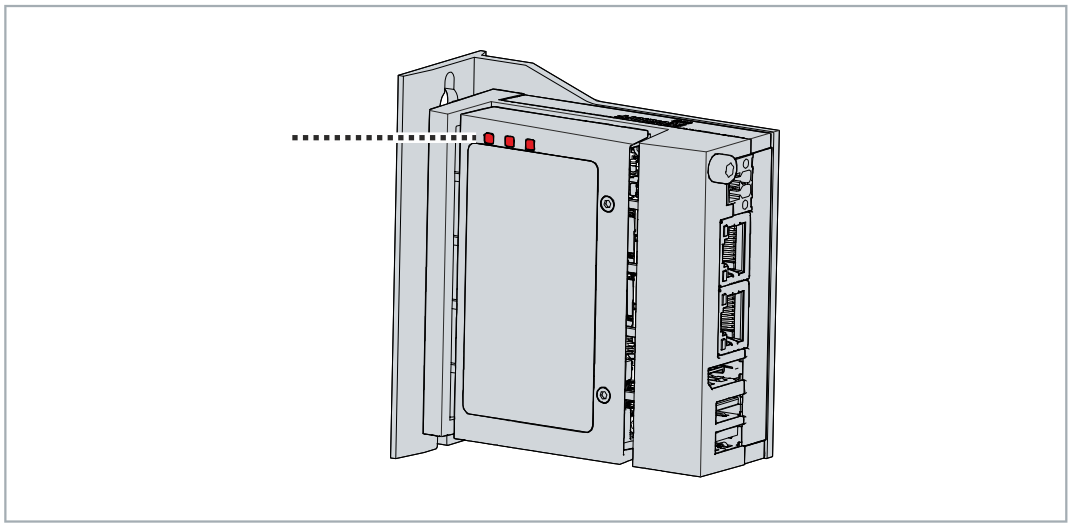


Fig. 6: Status LEDs

3.3.1 PWR LED

The PWR (power) LED indicates the status of the power controller. The colors and flashing intervals have the following meanings:

Table 10: Meaning of the PWR LED

Color	Flashing interval	Meaning
None	Steadily lit	PC is off
White	Steadily lit	VCC power fail
Magenta	Steadily lit	S UPS active (if existent)
Yellow	Steadily lit	Windows shut down, supply voltage still present
Green	Steadily lit	Normal operation
Red	Steadily lit	Reset/power fail
Green/yellow	Flashing	Bootloader running without error
Red/yellow	Flashing	Bootloader is starting (start sequence is being run through)
Magenta	Flashing (0.5 s)	S UPS capacitance test (if S UPS exists)
Red/magenta	Flashing	Checksum error during the I2C transmission in the bootloader
Cyan	Flashing (2 s)	contact Beckhoff Service

3.3.2 HDD LED

The HDD LED indicates the activity of the storage medium. The colors and flashing intervals have the following meanings:

Table 11: Meaning of the HDD LED

Color	Flashing interval	Meaning
Red	Flashing	Activity (access to storage medium)

3.3.3 TC LED

The TC LED indicates the TwinCAT status. The colors and flashing intervals have the following meanings:

Table 12: Meaning of the TC LED

Color	Flashing interval	Meaning
Green	Steadily lit	TwinCAT Run Mode
Blue	Steadily lit	TwinCAT Config Mode
Red	Steadily lit	TwinCAT Stop
-	-	TwinCAT not started

3.4 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.

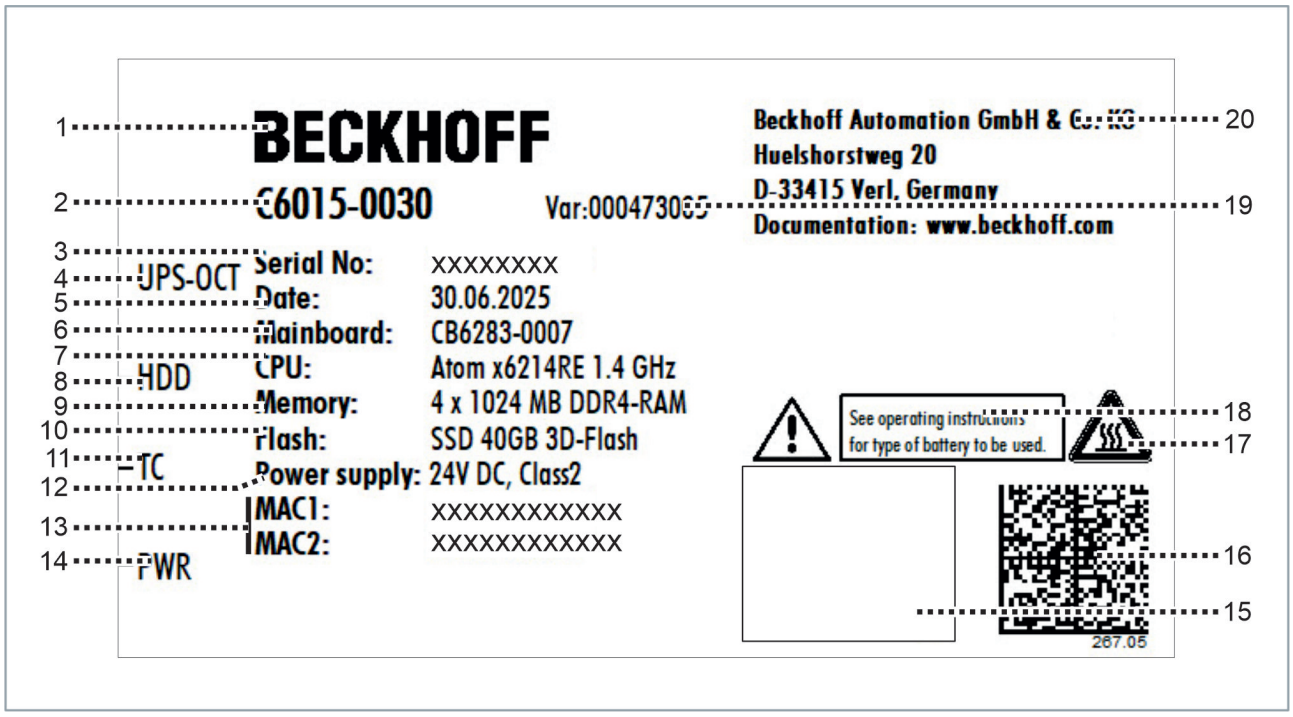


Fig. 7: Name plate

Table 13: Legend for C6015 name plate

No.	Description
1	Vendor
2	Model: The last four digits indicate the device generation
3	Serial number = Beckhoff Traceability Number (BTN)
4	UPS-OCT LED
5	Date of manufacture
6	Mainboard
7	CPU
8	HDD LED
9	Main memory
10	SSD
11	TC LED
12	Power supply: 24 V_{DC}, NEC class 2
13	MAC addresses of the Ethernet interfaces (X102, X103)
14	Power LED
15	Symbols Note: The symbols applicable to the device such as CE, EAC, UKCA,  are located here. The approvals of your device can be found on the name plate and in chapter 10.2 Approvals.

16	BIC
17	Warning: Hot surfaces!
18	Note: Be sure to read the device manual.
19	Variant number: commercial number of the order code including ordering options
20	Manufacturer’s address

3.5 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 TwinCAT version. 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 required for the different device generations, depending on the operating system and based on the hardware requirements:

Table 14: C6015-0010 Minimum TwinCAT version

Operating system	Minimum TwinCAT version
Windows 7	2.11 build 2254 or 3.1 build 4020.0
Windows 10	2.11 build 2254 or 3.1 build 4020.0

Table 15: C6015-0020 Minimum TwinCAT version

Operating system	Minimum TwinCAT version
Windows 10	3.1 build 4024.12

Table 16: C6015-0030 Minimum TwinCAT version

Operating system	Minimum TwinCAT version
Windows 10	3.1 build 4024.50

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

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.

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.

The following figure shows the three available mounting plates: standard mounting plate 1, optional mounting plate 2, and optional mounting plate 3 with DIN rail adapter. In all cases, the plate is attached to the right-hand side panel of the industrial PC with four Torx TX10 screws and a tightening torque of approx. 0.5 Nm. You can turn all mounting plates before fastening them such that the PC can be mounted in the desired orientation for the cable entry in the control cabinet (see Chapter 4.2.1 Mounting options [▶ 21]).

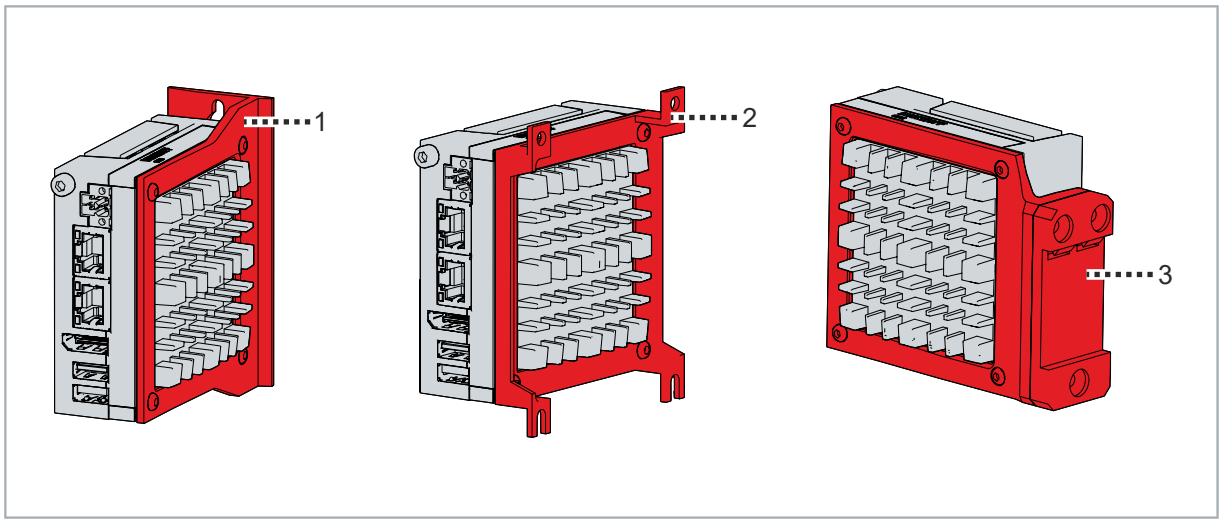


Fig. 8: Mounting plates

The basic version of the industrial PC is supplied with the standard mounting plate 1 already mounted. The scope of delivery does not include any further mounting plates. You can choose the following ordering option:

Table 17: Mounting plate ordering options

Order identifier	Version
C9900-M664	Mounting plate for C601x on the side wall, instead of the standard mounting plate
C9900-M665	Mounting plate for lateral mounting of the C601x, single part, not mounted
C9900-M666	Mounting plate with DIN rail adapter for C601x, instead of the standard mounting plate
C9900-M667	Mounting plate with DIN rail adapter for C601x, single part, not mounted

4.2.1 Mounting options

Only install the device in the control cabinet in the described orientations.

Before attaching one of the specified mounting plates (see chapter 4.2 Control cabinet installation [▶ 20]) to the device, you have various options for aligning the device according to the desired cable entry. This results in various options for mounting the device in the control cabinet.

The following drawings show the possible mounting options.

With the Standard mounting plate 1, you can mount the industrial PC in the control cabinet using the narrow sides. You have the following mounting options:

- Mounting via the rear panel of the device (A)
- Mounting via the top of the device (B)
- Mounting via the bottom of the device (C)

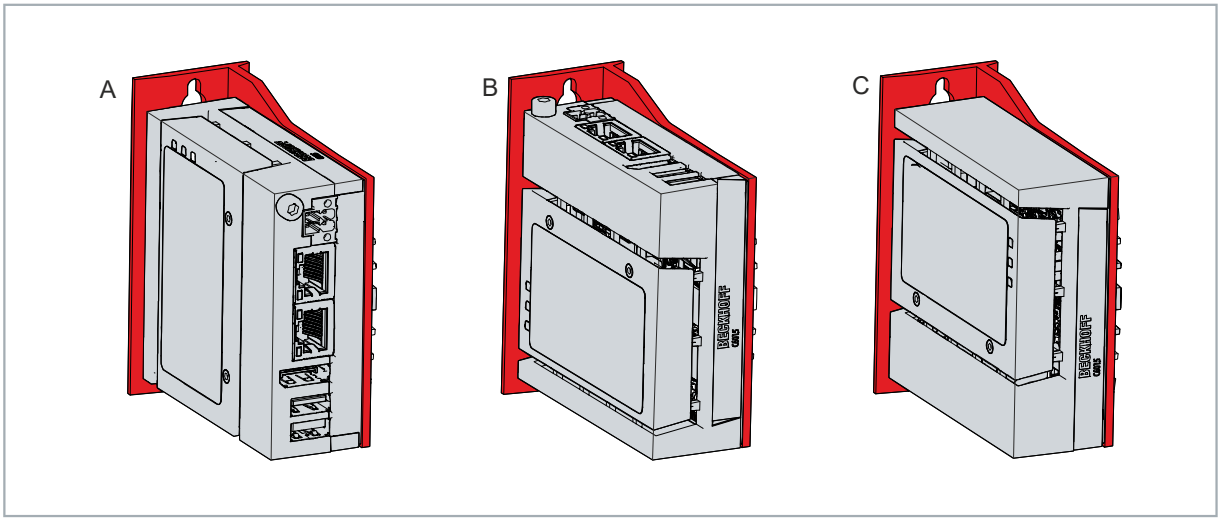


Fig. 9: Mounting options Standard mounting plate 1

With the optional mounting plate 2, you can mount the industrial PC only via the right-hand side panel. You can rotate the PC as required to align the connections in the control cabinet. You have the following mounting options:

- Connections point upwards (A)
- Connections point downwards (B)
- Connections point to the right (C)
- Connections point to the left (D)

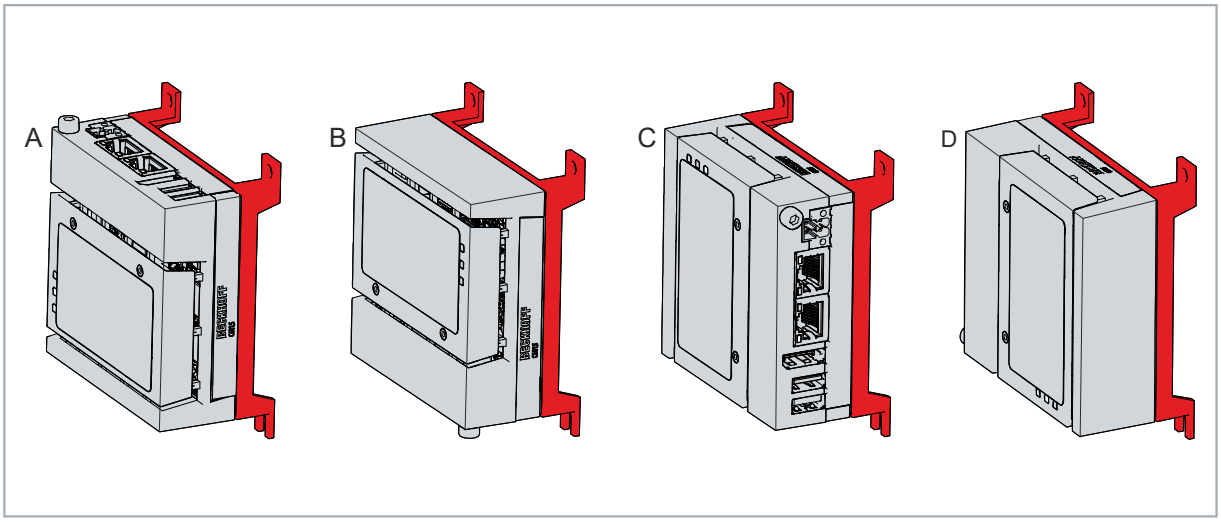


Fig. 10: Mounting options optional mounting plate 2

With the optional mounting plate 3 with DIN rail adapter, you can mount the industrial PC on the DIN rail in the control cabinet via the narrow sides. You have the following mounting options:

- Mounting via the rear panel of the device (A)
- Mounting via the top of the device (B)
- Mounting via the bottom of the device (C)

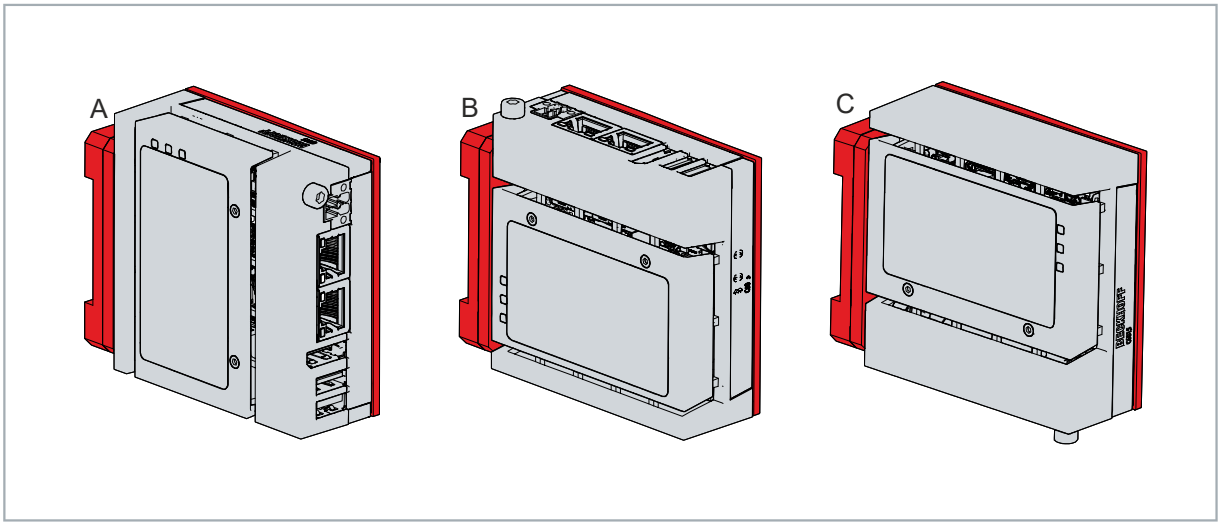


Fig. 11: Mounting options optional mounting plate 3

4.2.2 Dimensions

The dimensions of the industrial PC and the mounting plates are used to prepare the control cabinet and to mount the device correctly in the control cabinet.

All dimensions are in mm.

The following figure gives an example of the dimensions using the Standard mounting plate 1 with mounting via the rear panel of the device.

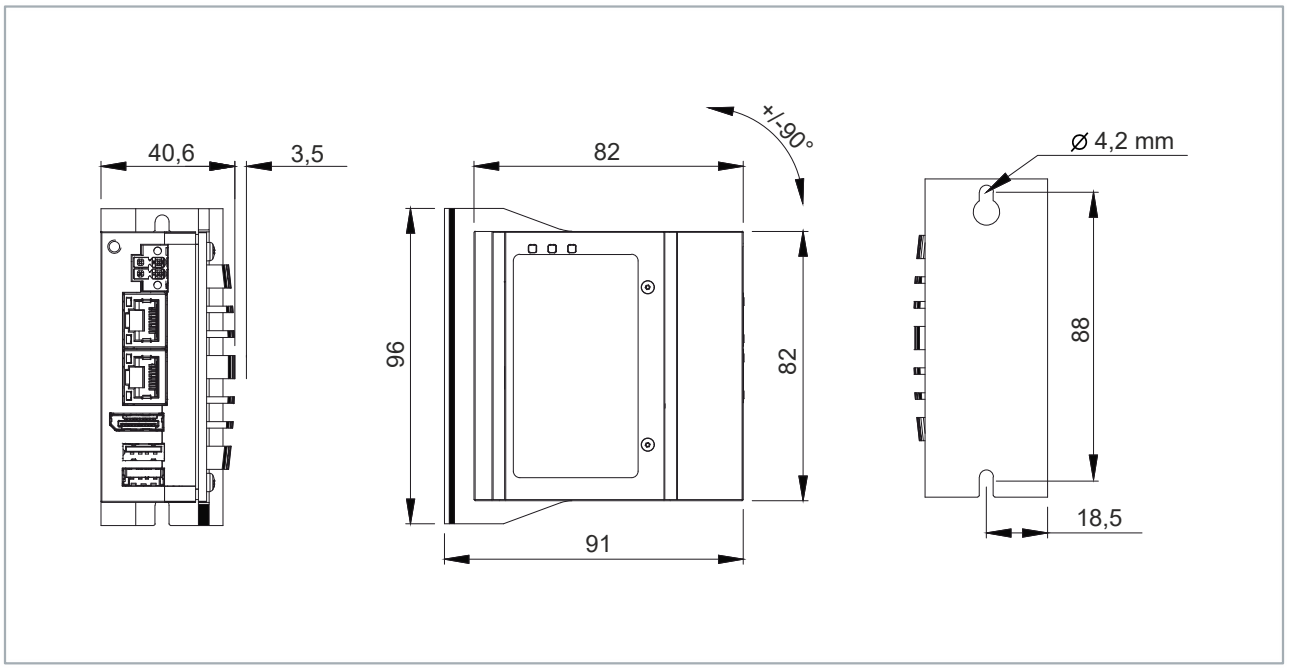


Fig. 12: Dimensions with mounting plate, rear panel

The following figure gives an example of the dimensions using the optional mounting plate 2 with the connections pointing to the right.

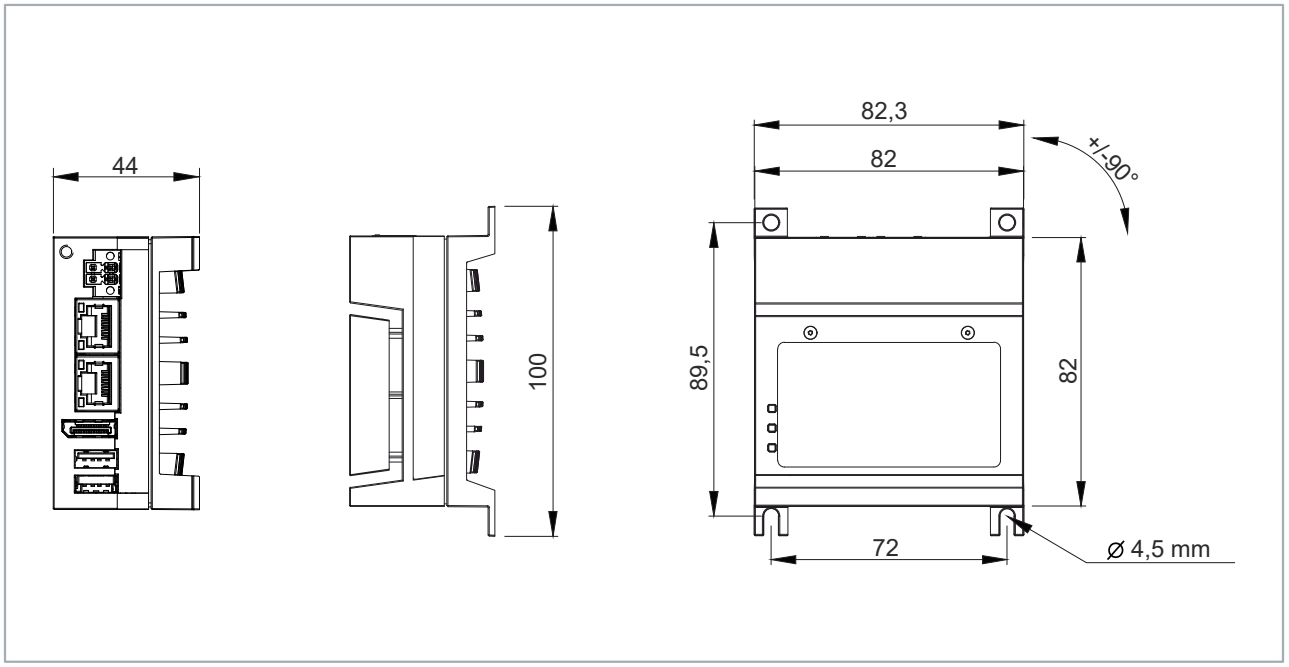


Fig. 13: Dimensions with mounting plate, side panel

The following figure gives an example of the dimensions using the optional mounting plate 3 with mounting via the rear of the device with DIN rail adapter.

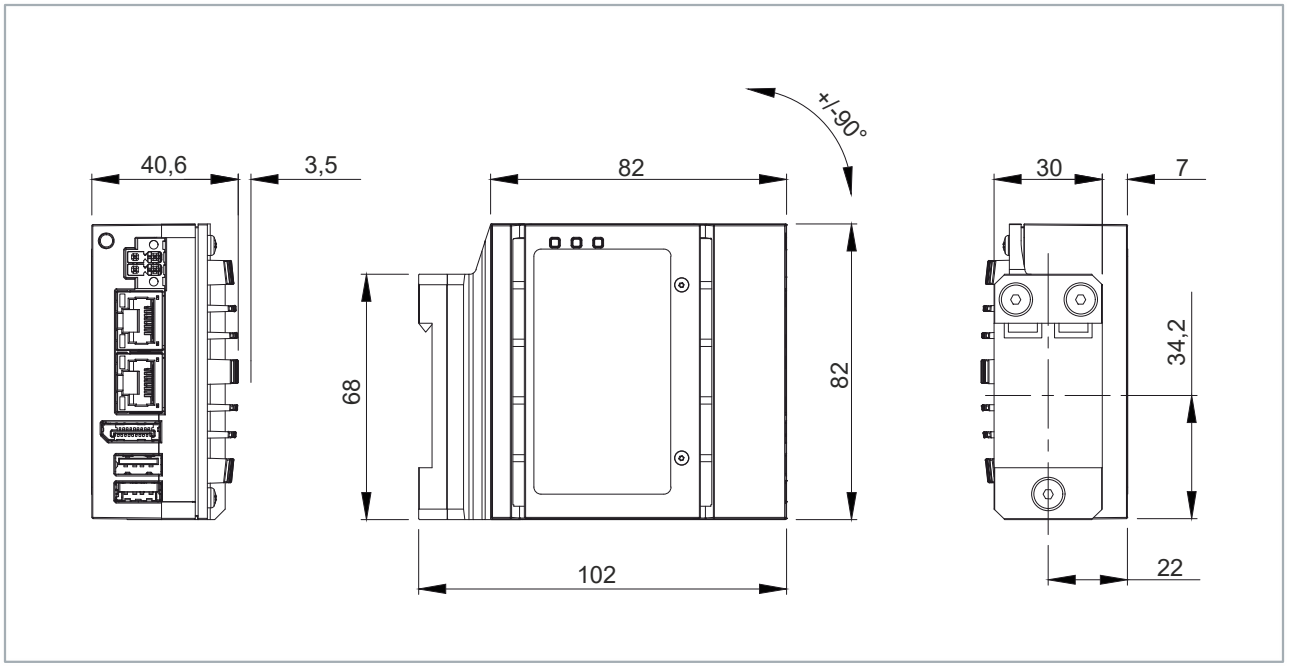


Fig. 14: Dimensions with mounting plate, DIN rail adapter

4.2.3 Installation in the control cabinet

Observe the following information when installing in the control cabinet to ensure sufficient air circulation:

- 5 cm free space above and below the device
- 2 cm free space on the side of the device where the name plate is attached

Mounting via mounting plates

In order to mount the industrial PC with Standard mounting plate 1 or optional mounting plate 2 in the control cabinet, it must be furnished with the holes for the fastening screws according to the dimensions of the PC (see Chapter 4.2.2 Dimensions [▶ 23]). You need M4 screws for mounting.

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

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

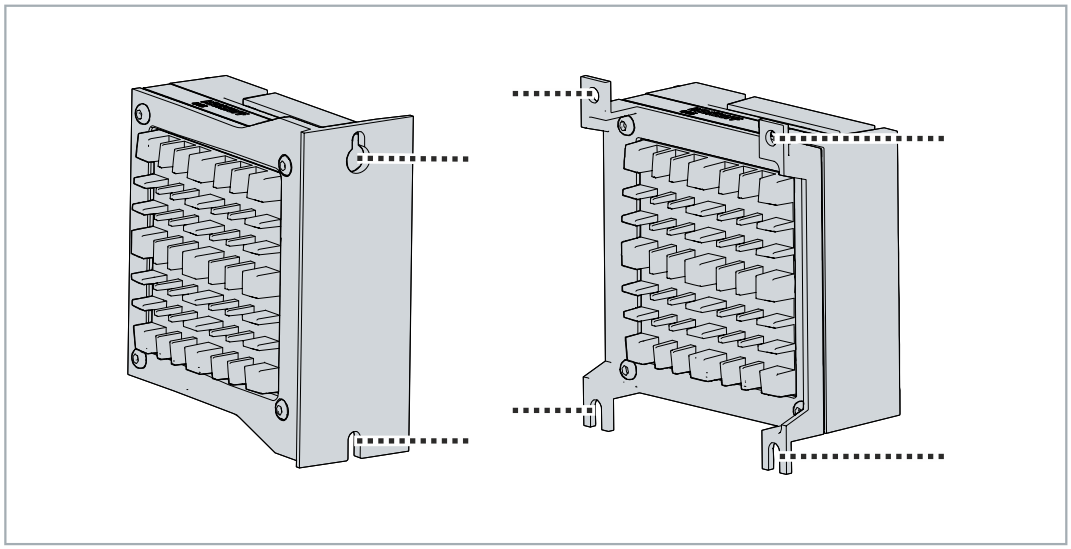


Fig. 15: Mounting plates for control cabinet installation

3. Tighten the fastening screws.

⇨ You have successfully installed the industrial PC in the control cabinet.

Mounting via DIN rail adapter

If you want to install the industrial PC in the control cabinet with the DIN rail adapter, no preparation of the control cabinet is necessary. All you need to do is attach the device to the DIN rail using the adapter. Follow the steps below:

1. Hook the lower side of the adapter into the DIN rail (A).
2. Push the device upwards so that the spring contacts of the adapter are pressed in (B).
3. Keep the device pressed upwards and also hook the upper side of the adapter into the DIN rail (C).

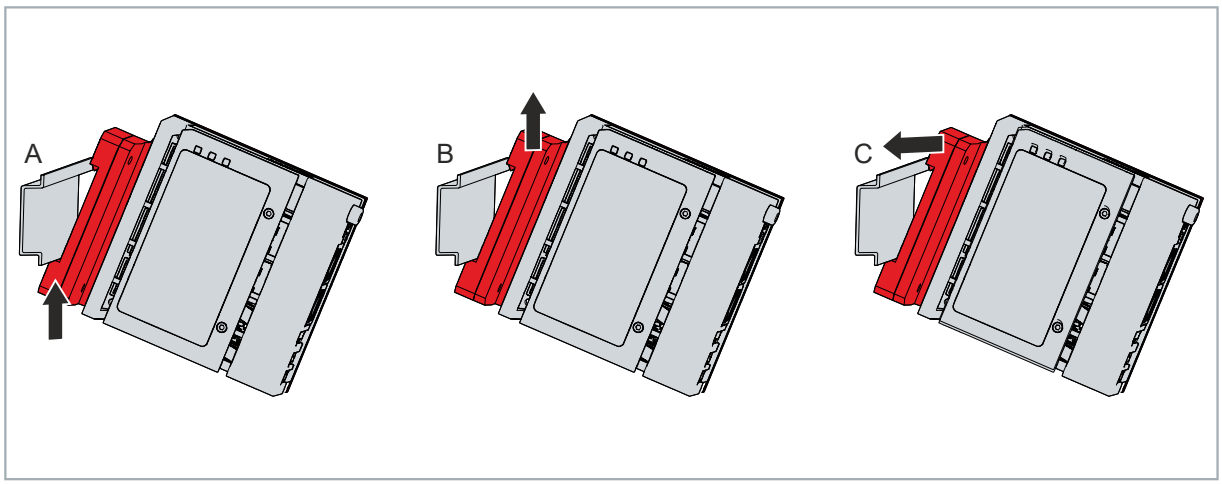


Fig. 16: DIN rail adapter for control cabinet installation

⇨ You have successfully installed the industrial PC on the DIN rail.

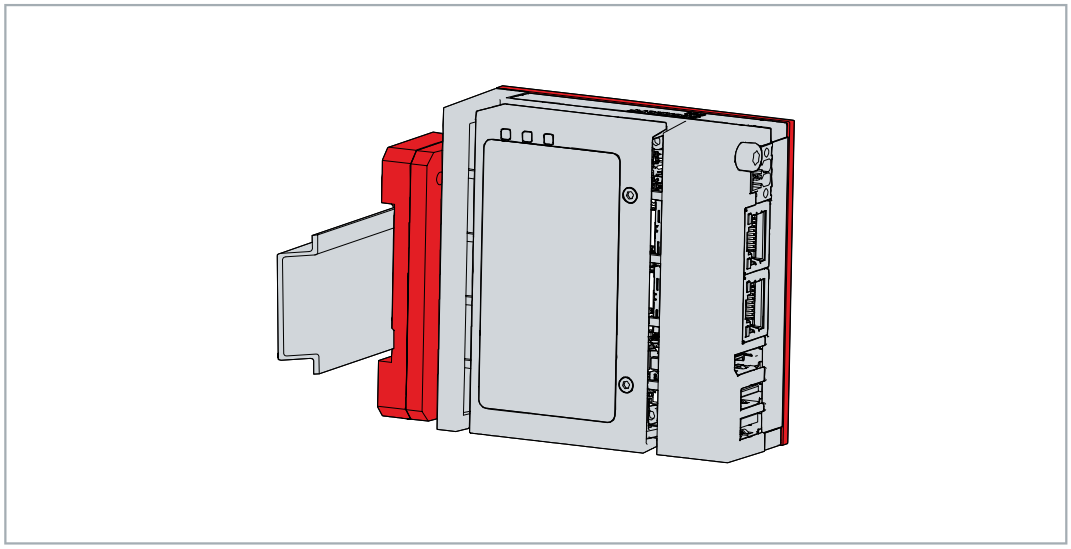


Fig. 17: DIN rail adapter mounted

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 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.

An external power supply providing 24 V DC from an isolated source is required. This must be protected by a fuse in accordance with UL 248 with a maximum nominal value of 4 A. A nominal voltage of at least 22 V must be applied to the power supply plug of the device at all times.

The cabling of the device in the control cabinet must be done in accordance with the standard EN 60204-1:2006 PELV = Protective Extra Low Voltage:

- 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.

Peripheral devices connected to the device with their own power supply must have the same potential for the PE and "0 V" conductors (no potential difference).

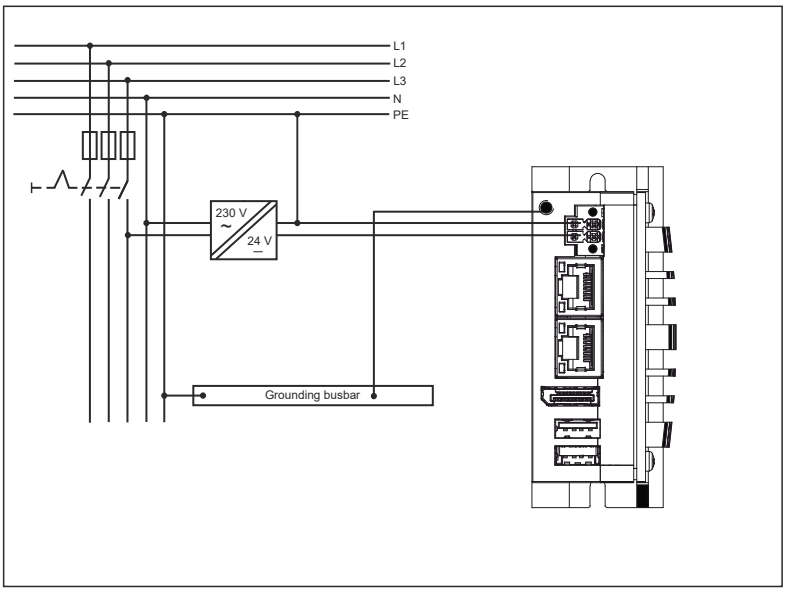


Fig. 18: Wiring example

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.

Protective earth

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.

Establish the low-resistance protective grounding via the PE protective conductor connection on the housing of the industrial PC (see also chapter 3.1 Structure [▶ 10]) and thus 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. The functional earthing is also established via the earthing connection between the protective conductor connection on the device and the central grounding point of the control cabinet in which the PC is installed. Use wires with a cross-section of at least 4 mm^2 or a flat conductor for the ground connection, as the circumference of the conductor should be as large as possible.

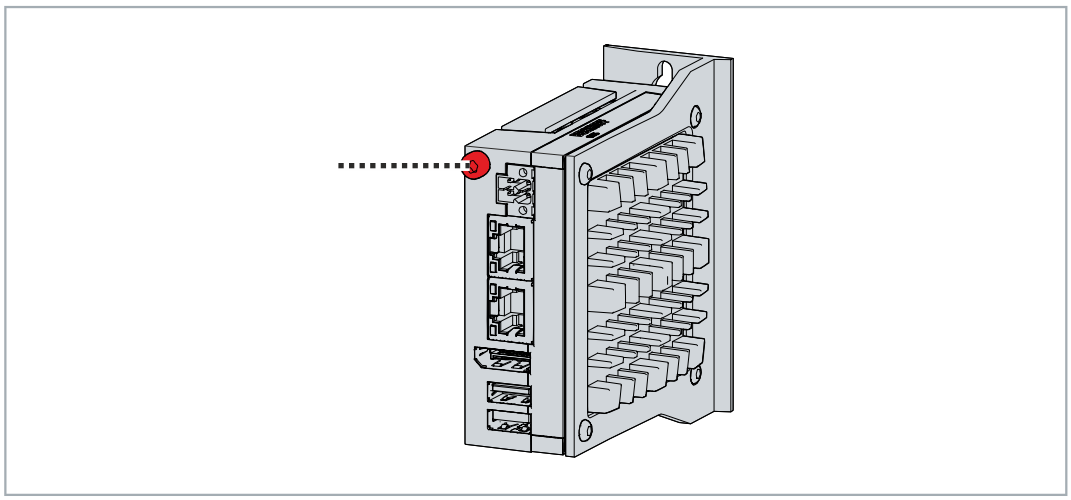


Fig. 19: Protective conductor connection PE

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 in the front of the industrial PC and are documented in Chapter 3.2 Interface description [▶ 11].

Make sure that you first ground the PC (see chapter 4.3.1 Grounding of the Industrial PC [▶ 28]) and then plug in all data transmission cables.

Connecting the power supply

Cables with a maximum cable cross-section of 1.5 mm^2 can be used for connecting the power supply. Always use 1.5 mm^2 to achieve a low voltage drop on the supply cable. A nominal voltage of at least 22 V must always be applied to the voltage connector of the industrial PC so that the industrial PC remains switched on even during voltage peaks and voltage fluctuations.

Proceed as follows to connect the 24 V_{DC} power supply unit:

1. Install the power supply cable on the power supply plug.
2. Plug the power supply cable into the four-pin power supply socket of the industrial PC.
3. Screw the power supply plug to the power supply socket of the industrial PC.
4. Connect the PC to your external 24 V power supply.
5. Switch on the 24 V power supply.

⇨ You have connected the power supply.

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.

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

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 PC-ON input until you have switched off the power supply.

To shut down the operating system properly, you can install an additional ON/OFF switch next to the machine's main 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.

UPS software components

The UPS software components with the corresponding drivers must be installed on the PC in order to operate the power supply unit as a UPS. The software components and drivers are already installed on delivery of the PC with operating system. If they are not, you have to install the installation package *Beckhoff UPS* yourself.

You can obtain the installation package from Beckhoff Service (service@beckhoff.com). You then use the installation package to install the UPS software components. The UPS software components come with a detailed help function. Call up the help files either directly from the configuration register by clicking the Help button or start the file under *Start > Programs > Beckhoff > UPS software components.*

The communication between your PC and the UPS takes place via the BIOS API. In addition to the UPS driver, you also need the Beckhoff Automation Device Driver.

5 Configuration

The configuration chapter provides an overview of the Beckhoff Device Manager and the Wake on LAN (WOL) function.

The Beckhoff Device Manager is a tool for detailed system diagnostics of hardware and software components. The procedure after the first start and after manually starting the Beckhoff Device Manager is explained.

Using the Wake on LAN (WOL) function, you can switch on your device remotely.

5.1 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:

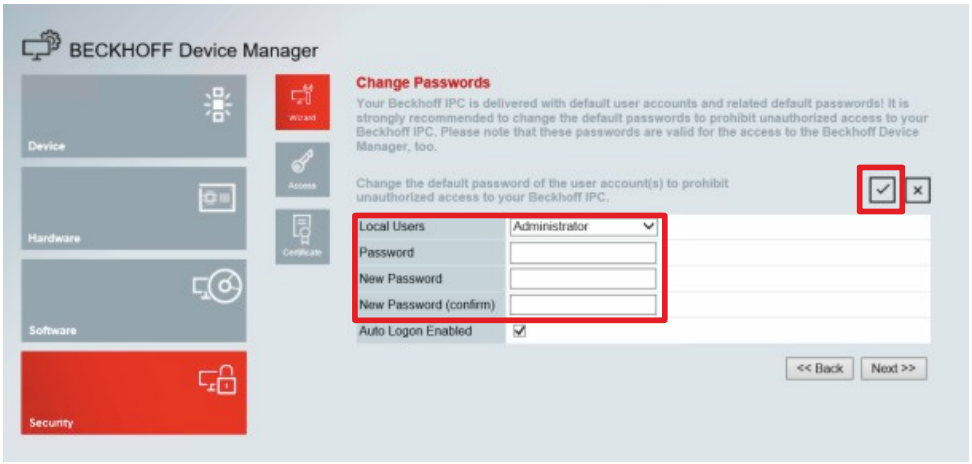


Fig. 20: Beckhoff Device Manager – Change passwords

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.

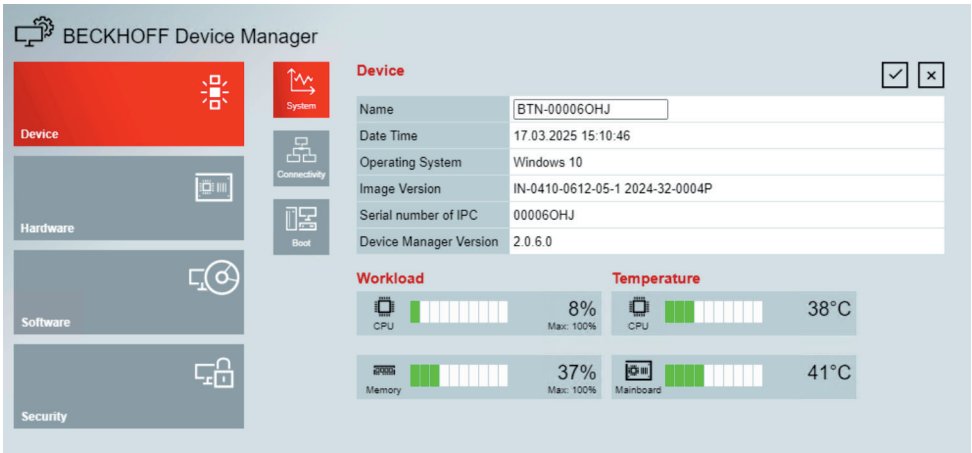


Fig. 21: Beckhoff Device Manager – Start page

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.

5.2 Wake on LAN (WOL)

Wake on LAN (WOL) allows you to turn on your device remotely when it receives a special network signal. WOL is enabled by default in Beckhoff standard images. You can configure this function in the operating system.

The following devices do not support the WOL function:

- C6015-0010
- C6015-0020

Configuration under Windows

To configure the Wake on LAN function, follow these steps:

1. Open the Device Manager.
2. Navigate to the **Network adapters** section.
3. Double-click the appropriate Ethernet controller.
   ⇨ A window containing the Ethernet controller's properties will open.
4. Klick on the **Advanced** tab.
5. Set the **Wake on Magic Packet** and **Wake on Magic Packet from S5** properties to **Enabled**. If the installed controller has the **Enable PME** property, it must also be set to **Enabled**
6. Confirm with **OK**.

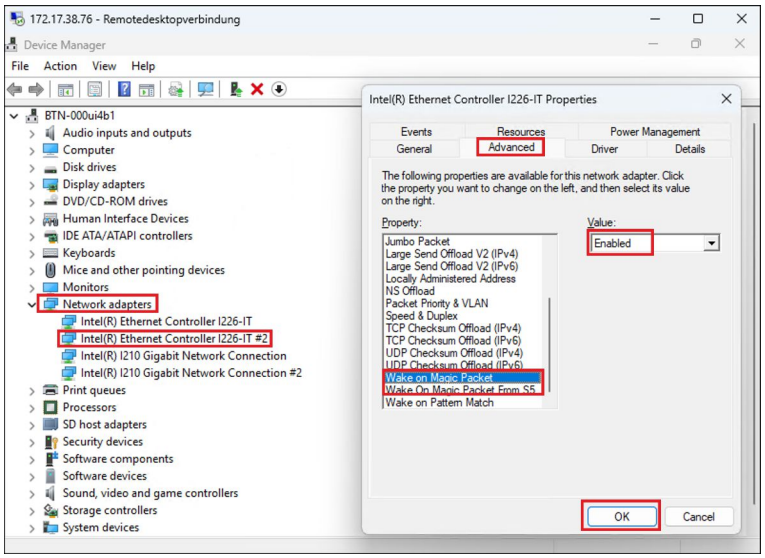


Fig. 22: Activate function

7. Click the **Power Management** tab.
8. Check the box next to **Allow this device to wake the computer**.
9. Confirm with **OK**.

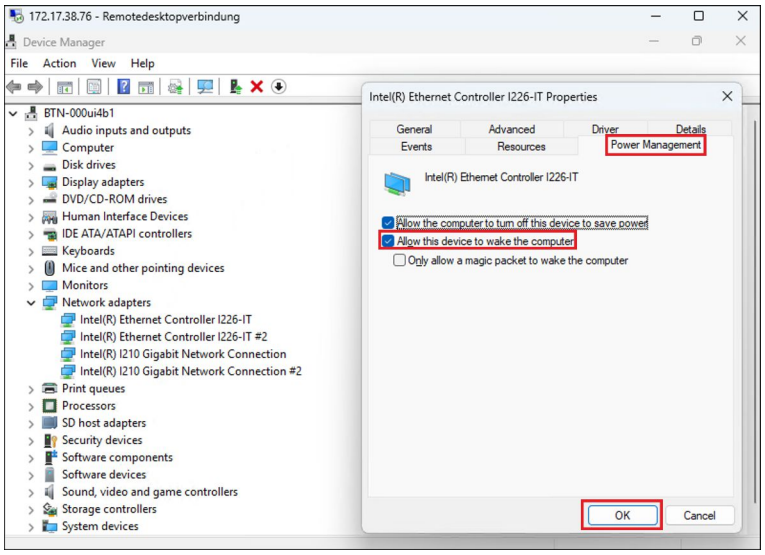


Fig. 23: Enable Function

⇨ You have configured the Wake on LAN function.

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 do not wish to use the device any further, chapter Disassembly and disposal 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 control cabinet, you must disconnect the cables and the power supply. Follow the steps below:

1. Shut down the industrial PC.
2. Disconnect the PC from your external 24 V power supply.
3. Unscrew the four-pin power supply connector and pull it out of the PC.
4. Remove the power supply cable if the four-pin connector is to remain with the PC.
5. Make a note of the wiring of all data transmission cables if you want to restore the cabling with another device.
6. Disconnect all data transfer cables from the industrial PC.
7. Finally, disconnect the ground connection.

⇨ You have disconnected the cables and the power supply.

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 Disconnecting the power supply and cables).

Disassembly with mounting plates

To remove the industrial PC from the control cabinet via Standard mounting plate 1 or optional mounting plate 2, proceed as follows:

1. Loosen the fastening screws just enough so that they remain attached to the control cabinet.
2. Lift the PC until the fastening screws slide into the keyholes.

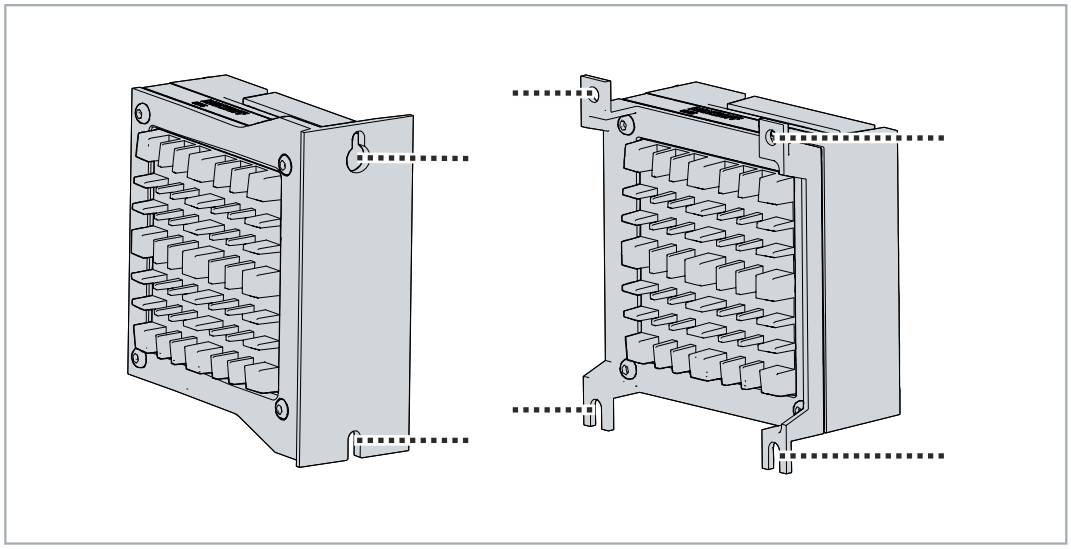


Fig. 24: Positions of the fastening screws

3. Remove the PC from the control cabinet.

⇨ You have successfully disassembled the PC.

Disassembly with DIN rail adapter

To remove the industrial PC from the control cabinet via optional mounting plate 3 with the DIN rail adapter, follow the steps below:

1. Push the PC upwards to press in the spring contacts on the DIN rail adapter (A).
2. Unhook the upper side of the adapter from the DIN rail (B).
3. Also unhook the lower side of the adapter from the DIN rail.

⇨ You have successfully removed the industrial PC from the control cabinet.

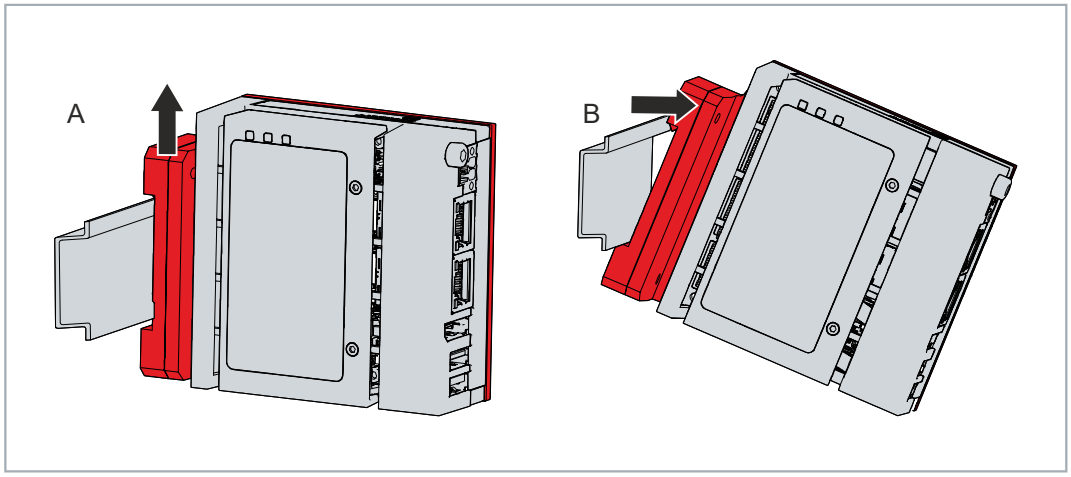


Fig. 25: Disassembly of the DIN rail adapter

Disposal

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.

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:

- Keep to the boundary conditions of protection rating 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 +50 °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 18: 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.

Access to exchangeable device components

You can access the device components to be replaced via the cover on the left-hand side. You gain access to the battery and the storage medium. To do this, remove the two Torx TX6 screws and remove the cover.

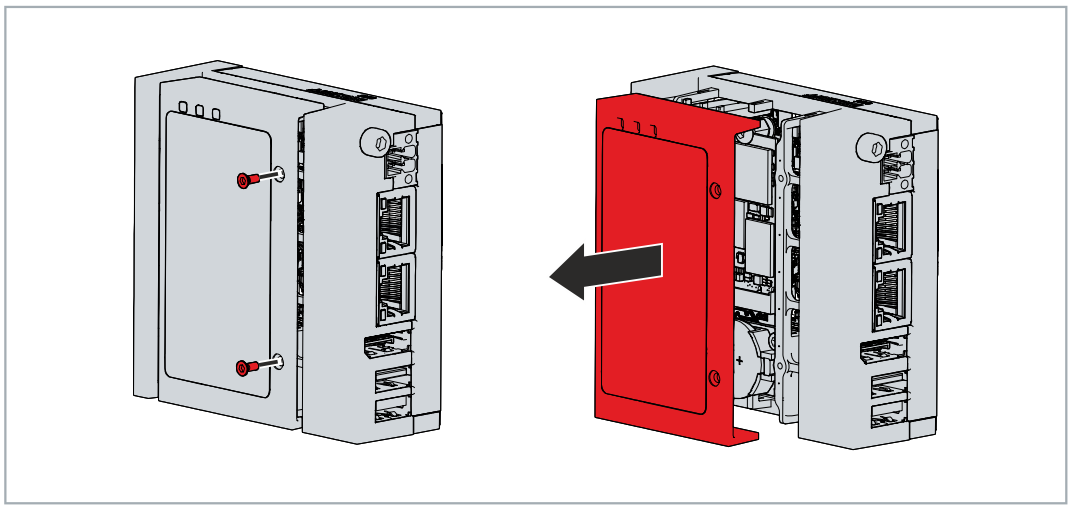


Fig. 26: Access to battery and storage media

You now have access to the battery (1) and storage medium (2).

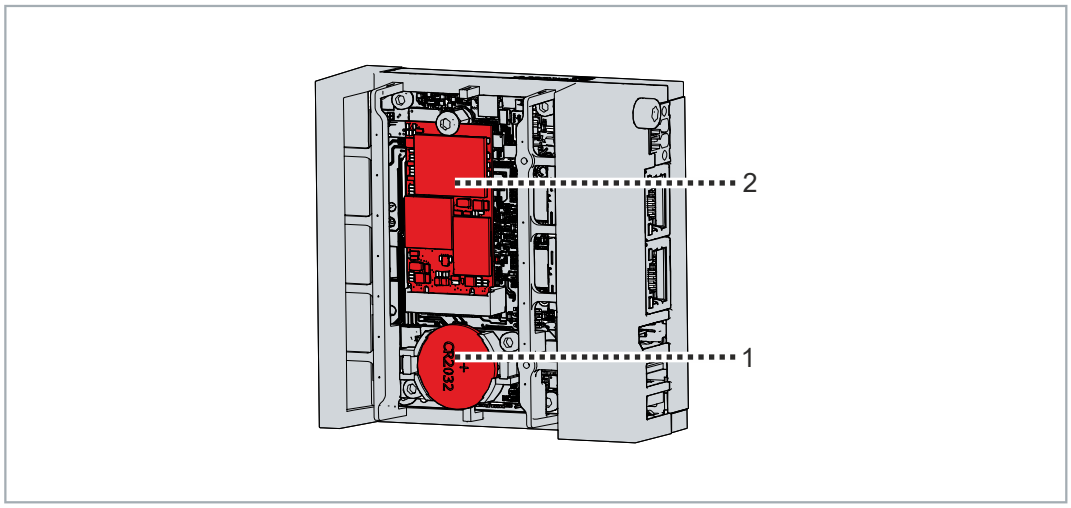


Fig. 27: Battery and storage media

7.2.1 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 19: 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 Maintenance [▶ 38] shows how to access the battery. When replacing the battery, make sure that the polarity is correct.

To change the battery, proceed as follows:

1. Place a lever made on the negative pole of the battery holder below the battery.
2. Lift the battery side out of the holder.
   ⇨ The battery is now in an inclined position.

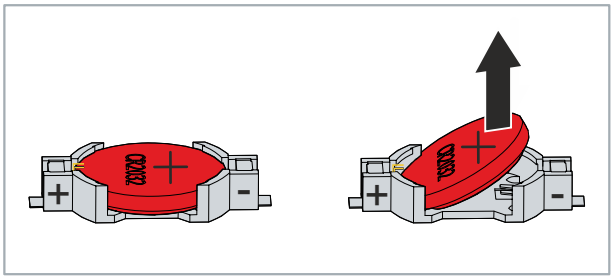


Fig. 28: Battery change

3. Remove the battery completely from the battery holder.
4. Insert the new battery with the correct polarity back into the inclined position on the positive pole of the battery holder. The correct polarity is shown in the figure.

5. Push the high side of the battery down into the battery holder.

⇨ 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.

7.2.2 Replacing the storage media

For new storage media, please contact your Beckhoff Sales only. SSDs from Beckhoff have a considerably higher lifetime expectancy than commercially available SSDs.

Be sure to shut down and power off the device before replacing 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.

SSD replacement

Chapter 7.2 Maintenance [▶ 38] shows how to access the SSD.

To replace an SSD, follow the steps below:

1. Remove the Torx TX10 fastening screw of the SSD you want to remove (section A).
   ⇨ The SSD automatically tilts in an inclined position (section B).
2. Pull the SSD out of the slot in the inclined position (section C).

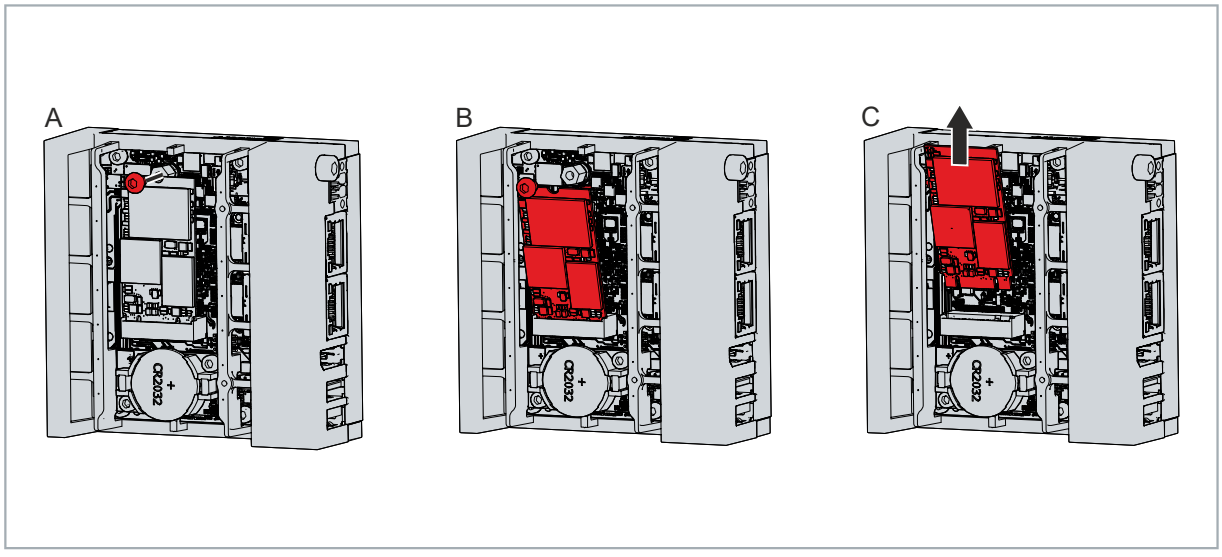


Fig. 29: Replacing the storage media

3. Insert the new SSD into the slot in the same inclined position.
4. Press the SSD completely against the device on the protruding side.

5. Replace the fixing screw and tighten it to a tightening torque of approx. 0.5 Nm.

⇨ You have replaced the SSD.

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.

8 Troubleshooting

Table 20: 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 21: Technical data

Product designation	C6015
Dimensions (W x H x D)	82 x 82 x 40 mm, without mounting plate
Weight	approx. 400 g without mounting plate approx. 450 g with mounting plate
Supply voltage	22-30 V_{DC} (24 V_{DC} power supply unit) NEC Class 2
Power consumption	Data sheet 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 enabled (see TPM manual)
Protection rating	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)
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 to +50 °C (operation) -25 °C...+65 °C (transport / storage)
Permissible air humidity	Maximum 95 %, no condensation
Transport and storage	The same values for air humidity and shock resistance are to be observed during transport and storage as 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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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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