BECKHOFF New Automation Technology

Manual | EN

C6920

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.
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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.
- 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 C6920 Industrial PC belongs to the series of compact Industrial PCs for space-saving control cabinet installation. The device is suitable for various applications and requirements.

Thanks to the available processors, the Industrial PC can be used for the following applications, among others:

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

The basic configuration of the C6920 includes the following aspects:

- Intel® processor
- 1 DVI connection, graphic adapter integrated in the Intel® processor
- 2 x 100/1000BASE-T connections, on-board dual Ethernet adapter
- Hard disk
- 4 x USB
- 1 x RS232

3.1 Structure

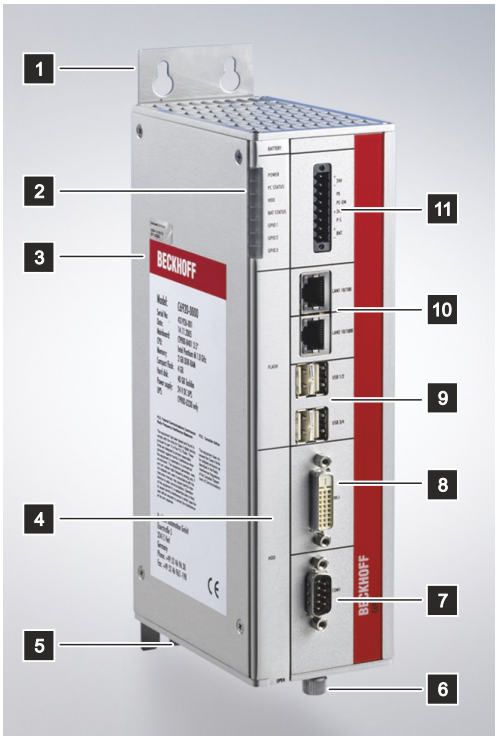


Fig. 1: Structure

Table 1: Key: C6920 structure

No.	Component	Description
1	Mounting plate	Plate for mounting the Industrial PC by its the rear side in the control cabinet
2	Status LEDs	Status display for power, TwinCAT, hard disk, fan, User LED, fieldbus activity, fieldbus error
3	Name plate	Information on the equipment of the Industrial PC
4	Front flap	Access to battery and storage media
5	Grounding screw	Functional earthing of the Industrial PC
6	Fan cartridge	tool-less access with knurled screw
7	RS232 interface (X109)	Serial interface according to RS232 standard
8	DVI interface (X108)	Connection of a DVI-capable monitor
9	USB interfaces (X104 - X107)	Connection of peripheral devices
10	RJ45 Ethernet interfaces (X102, X103)	Connection of the Industrial PC to a 100/1000BASE-T network or EtherCAT
11	Power supply (X101)	Connection of the power supply, protective earth and external wiring

3.2 Interface description

The basic version of the C6920 has the following interfaces:

- Power supply (X101)
- Ethernet RJ45 (X102, X103)
- USB (X104 - X107)
- DVI (X108)
- RS232 (X109)

3.2.1 Power supply

The industrial PC is supplied with a nominal voltage of 24 V. The 8-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 5 (-24 V) and PIN 6 (+24 V) of the socket. If the industrial PC is equipped with an integrated uninterruptible power supply (UPS), an external battery pack can additionally be connected to PIN 1 and PIN 2.

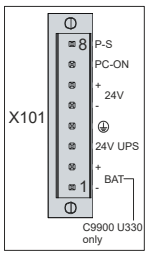


Fig. 2: Voltage socket pin numbering

Table 2: Voltage socket pin assignment

Pin	Signal	Description
8	P-S	Power Status output, minus is the negative pole of the supply voltage
7	PC-ON	Input PC-ON
6	+ 24 V	24 V supply voltage, positive pole
5	-	24 V supply voltage, negative pole
4	⏚	Protective earth
3	24 V UPS	24 V UPS output 2.5 A, minus is – BAT
2	+ BAT	Positive pole of the battery pack
1	- BAT	Negative pole of the battery pack

To operate the buffered 24 V output, you must use PIN 1 (-) and PIN 3 (+).

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-P926: power supply connector for C69xx Industrial PC, 8-pin connector with strain relief for the external supply cable

3.2.2 Ethernet RJ45

The C6920 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 generations:

Table 3: Controller classification based on device generations

Generation	Controller	Mbit/s
C6920-0060	Intel® i219 for LAN1 and i210 for LAN2	100/1000
C6920-0070	Intel® i219 for LAN1 and i210 for LAN2	100/1000
C6920-0080	Intel® i219 for LAN1 and i226 for LAN2	LAN1 100/1000 LAN2 100/1000/2500

The Ethernet port i210/i226 connected via PCIe is usually suitable for cycle times <= 1 ms and for distributed clock applications with EtherCAT.

The Ethernet port i219 integrated in the chipset is usually suitable for real-time Ethernet applications with cycle times > 1 ms (without distributed clocks).

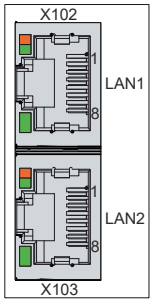


Fig. 3: Ethernet interfaces pin numbering

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 shown completely green in the figure indicates whether the interface is connected to a network. If this is the case, the LED lights up green. The LED flashes green when data transmission is in progress on the interface.

The green/orange LED shown in the figure indicates the data transmission rate. The device generations differ in terms of the possible speed. The following tables show the LED lighting according to the possible speed.

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

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

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

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

With the device generation C6920-0080, the two interfaces differ in the possible data transmission rate. The speed for LAN1 is 100/1000 Mbit/s and for LAN2 100/1000/2500 Mbit/s.

3.2.3 USB

The industrial PC has four USB interfaces (X104-X107). 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

Generation	USB interfaces
C6920-0060	4x USB 3.0
C6920-0070	4x USB 3.0
C6920-0080	4x USB 3.2 Gen. 2

Each of the four USB interfaces supplies up to 900 mA current and is electronically fused.

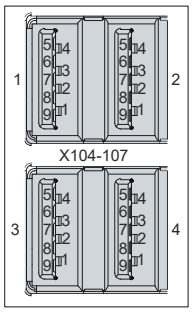


Fig. 4: USB interface pin numbering

Table 8: USB interface pin assignment

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

For USB 2.0, only pins 1 to 4 are relevant.

3.2.4 DVI

The industrial PC has a DVI connection (X108), to which a DVI-capable monitor can be connected. Only digital signals are transmitted.

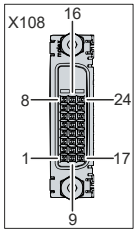


Fig. 5: DVI interface

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 -

3.2.5 RS232

The serial interface (X109) is fed out via a 9-pin standard DSUB connector. The signals comply with the RS232 standard. The port address and the interrupt used are set with the help of the BIOS setup.

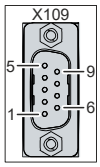


Fig. 6: RS232 interface pin numbering

Table 10: RS232 pin assignment

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

3.3 Optional interfaces

A variety of interface options are available to you for extending your industrial PC beyond the basic equipment level with additional interfaces. The following table provides information on the available interfaces:

Table 11: C6920 interface options

Ordering option	Description	Device generation
FC9071-0000	Gigabit-Ethernet PC network card 10/100/1000 Mbit/s, 1-channel, PCIe interface, covers the fieldbus connection section	C6920-0060 C6920-0070 C6920-0080
C9900-E238	Additional DVI-D socket led out on a slot bracket, only for PCs with plug-in card slots	C6920-0060 C6920-0070 C6920-0080
C9900-E294	Additional DisplayPort interface, occupies the fieldbus connection section, max. resolution 1920 x 1080, can only be ordered once per PC and not in combination with a second DVI connection	C6920-0060 C6920-0070 C6920-0080
C9900-E308	Serial interface, RS232, electrical isolation, D-sub, 9-pin, PCIe interface covers the fieldbus connection section	C6920-0060

PCI and PCIe plug-in card slots

In addition, you have the option to order the industrial PC with additional PCI and PCIe plug-in card slots. In this case you can extend the device by additional fieldbus interfaces and Ethernet ports. The following plug-in card slots are available to you:

Table 12: Ordering options – plug-in card slots

Order identifier	Description
C9900-B506	2 PCIe-x1 plug-in card slots on passive backplane, integrated in the C6920, for the insertion of PCIe-x1 plug-in cards up to 190 mm in length
C9900-B510	2 PCI plug-in card slots on passive backplane, integrated in the C6920, for the insertion of PCI plug-in cards up to 190 mm in length
C9900-B514	1 PCI and 1 PCIe-x1 plug-in card slot on passive backplane, integrated in the C6920, for the insertion of 1 PCI and 1 PCIe-x1 plug-in card up to 190 mm in length

The plug-in card slots are located behind the flap next to the connection section of the industrial PC. In order to mount plug-in cards, you have to loosen the Philips screw and open the flap (see fig. 7).

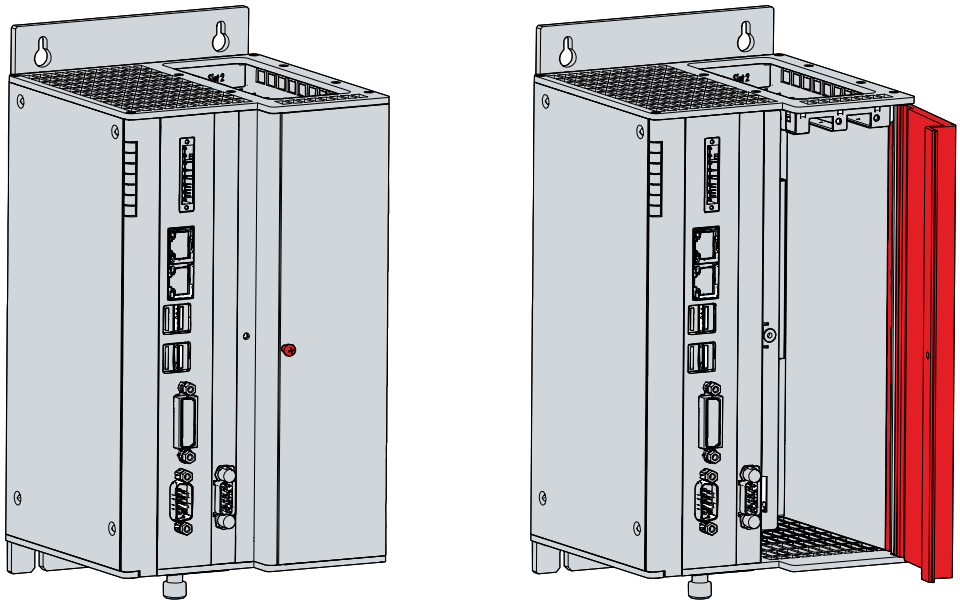


Fig. 7: Access to plug-in card slots

When you have inserted the plug-in cards, the card connections are located on the right on the top side of the PC (see fig. 8).

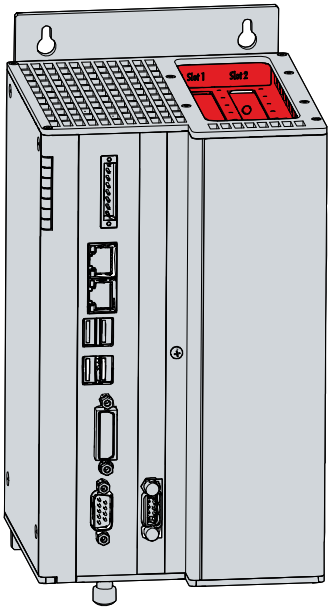


Fig. 8: Plug-in card connections

The additional plug-in card slots change the dimensions of the industrial PC. The width of the device increases by 70 mm and the depth by 18 mm.

3.4 Status LEDs

The industrial PC has seven status LEDs: PWR, TC, IDE, FAN, USR, FB RUN, FB ERR. They provide information on the following aspects:

- the status of the power controller
- the TwinCAT status
- the hard disk activity
- the fan status
- the user
- the fieldbus activity
- the fieldbus status

The figure shows where the LEDs are located on the industrial PC.

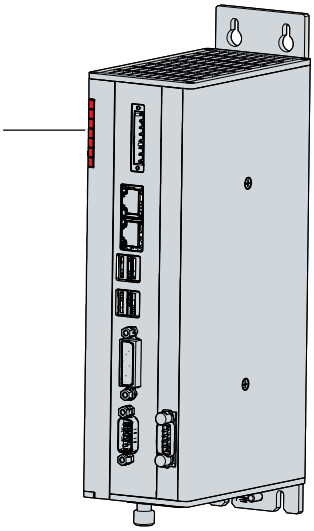


Fig. 9: Status LEDs

Table 13: Meaning of the Status LEDs

LED	Color/flashing interval	Meaning
PWR (Power)	green	Operation
	green flashing	Standby
TC (TwinCAT)	red	Stop Mode
	green	Run Mode
	blue	Configuration mode
IDE/HDD	red	Access to storage medium
FAN	green	Fans running
	red	Fans failed
USR (user)		programmable
FB RUN (fieldbus active)	green	active
	red	not active
FB Error (fieldbus error)	red	Error

3.5 Name plate

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

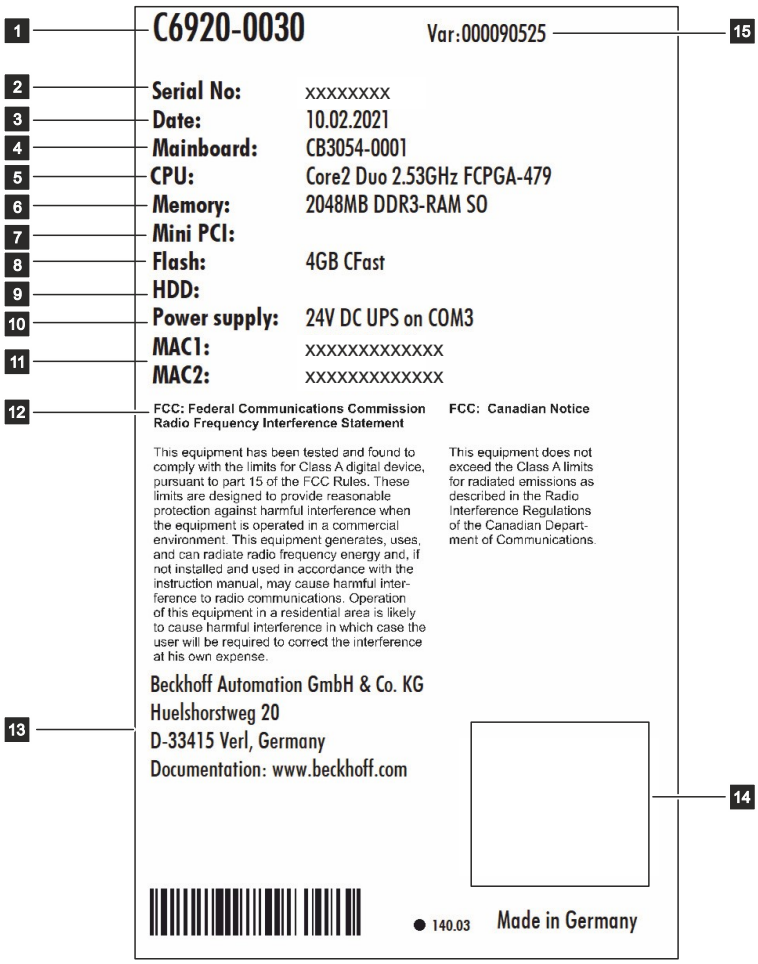


Fig. 10: Name plate example

Table 14: Legend C6920 name plate

No.	Description
1	Model: the last four digits indicate the device generation.
2	Serial number (BTN)
3	Date of manufacture
4	Mainboard
5	CPU
6	Main memory
7	Mini PCI slot
8	SSD or CFast
9	Storage media
10	Power supply unit: 24 V_{DC}
11	MAC addresses of the Ethernet interfaces (X102, X103)
12	FCC approval
13	Address of the vendor
14	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.
15	Variant number: commercial number of the order code including ordering options

3.6 TwinCAT version

To ensure optimal performance and access to all the functions of your device when using the TwinCAT control software, Beckhoff recommends using the latest 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 15: C6920-0060 Minimum TwinCAT version

Operating system	Minimum TwinCAT version
Windows 7 32-bit	3.1 build 4022.0, 2.11 b2259(x86)
Windows 10 32-bit	3.1 build 4022.0, 2.11 b2259(x86)
Windows 7 64-bit	3.1 build 4022.0
Windows 10 64-bit	3.1 build 4022.0
Windows Server 2016	3.1 build 4022.0

Table 16: C6920-0070 Minimum TwinCAT version

Operating system	Minimum TwinCAT version
Windows 10 64-bit	3.1 build 4024.12
Windows Server 2019	3.1 build 4024.12
Windows 11 64-bit	3.1 build 4026.16

Table 17: C6920-0080 Minimum TwinCAT version

Operating system	Minimum TwinCAT version
Windows 10 64-bit	3.1 build 4024.50
Windows Server 2022	3.1 build 4026.14
Windows 11 64-bit	3.1 build 4026.16

4 Commissioning

To be able to use the Industrial PC, you must first commission it. The first step is to transport the device to is operating location and unpack it. This is followed by installing the device in the control cabinet, connecting the cables and the power supply and finally switching on the Industrial PC.

4.1 Transport and unpacking

Note the specified transport and storage conditions (see Chapter 9 Technical data [▶ 48]).

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. Remove packaging.
2. Keep the packaging for possible future transport.
3. Check your delivery for completeness by comparing it with your order.
4. Check the contents for visible shipping damage.
5. In case of discrepancies between the package contents and the order, or in case of transport damage, please inform Beckhoff Service (see Chapter 10.1 Service and support).

4.2 Installation in the control cabinet

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 power supply facing upwards.

Using different mounting plates, you can align the cable entry based on the application requirements.

Figure 11 shows the two available mounting plates: the standard mounting plate 1 and the optional mounting plate 2. Mounting plate 1 is mounted on the rear panel of the industrial PC and mounting plate 2 on the right-hand side panel. In both cases, four M4x8 countersunk head Philips screws are used for mounting.

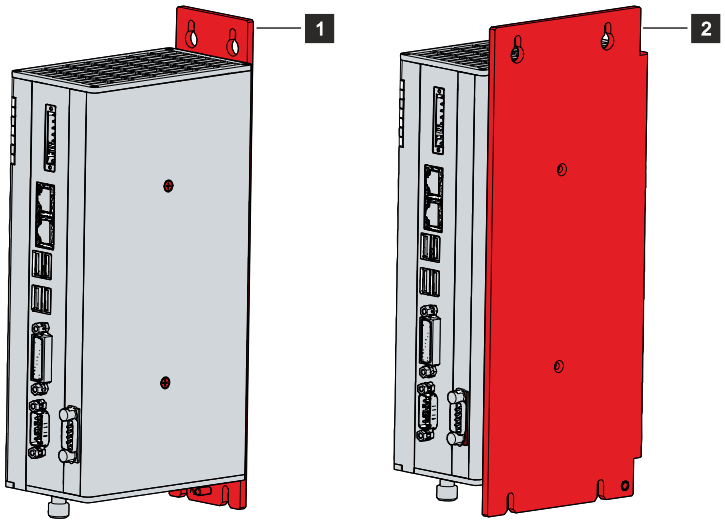


Fig. 11: Mounting plates

The basic version of the industrial PC is supplied with the mounting plate 1 already mounted as shown in Fig. 11. Mounting plate 2 is not included in the scope of delivery. You can choose the following ordering options:

- C9900-M653: Mounting plate on the side panel instead of the rear panel

Also see about this

Technical data [▶ 48]

4.2.1 Dimensions

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

All dimensions are in mm.

Figure 12 shows the dimensions of the industrial PC with mounting plate 1.

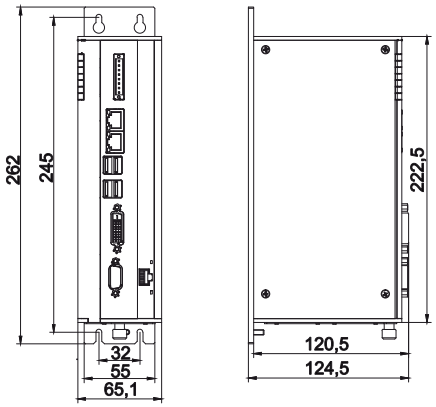


Fig. 12: Dimensions of mounting plate 1

Figure 13 shows the dimensions of the industrial PC with mounting plate 2.

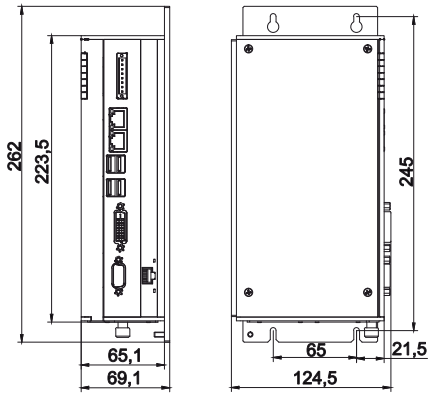


Fig. 13: Dimensions of mounting plate 2

If you have chosen the ordering option for the device with additional PCI and PCIe plug-in card slots, the dimensions of the device will change as a result. In this case you must use mounting plate 3 or 4 to mount the device.

Figure 14 shows the dimensions of the industrial PC with mounting plate 3 and the additional plug-in card slots.

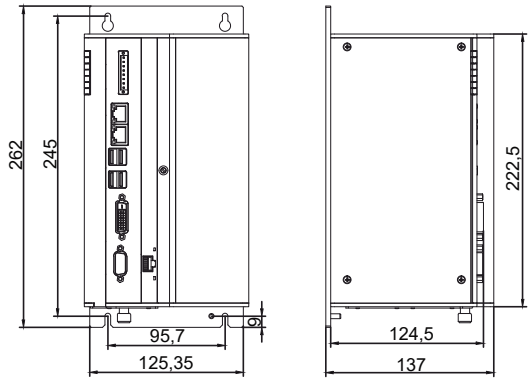


Fig. 14: Dimensions of mounting plate 3 plug-in card slots

Figure 15 shows the dimensions of the industrial PC with mounting plate 4 and the additional plug-in card slots.

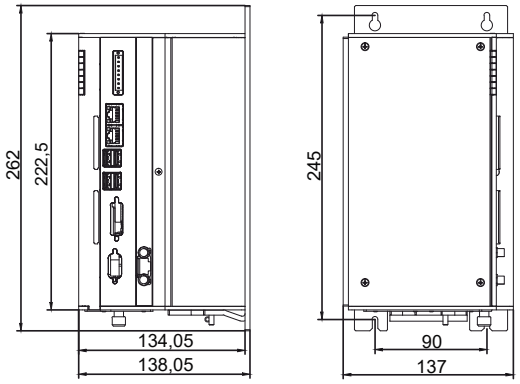


Fig. 15: Dimensions of mounting plate 4 plug-in card slots

4.2.2 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.

Mounting via mounting plates

In order to mount the Industrial PC by its rear or side panel in the control cabinet using the mounting plates, the control cabinet must be equipped with drill holes for the fastening screws corresponding to the dimensions of the PC (see chapter 4.2.1 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 with the mounting plates. If your device is equipped with additional plug-in card slots, the device and thus the mounting plates are wider. However, the mounting procedure is the same.

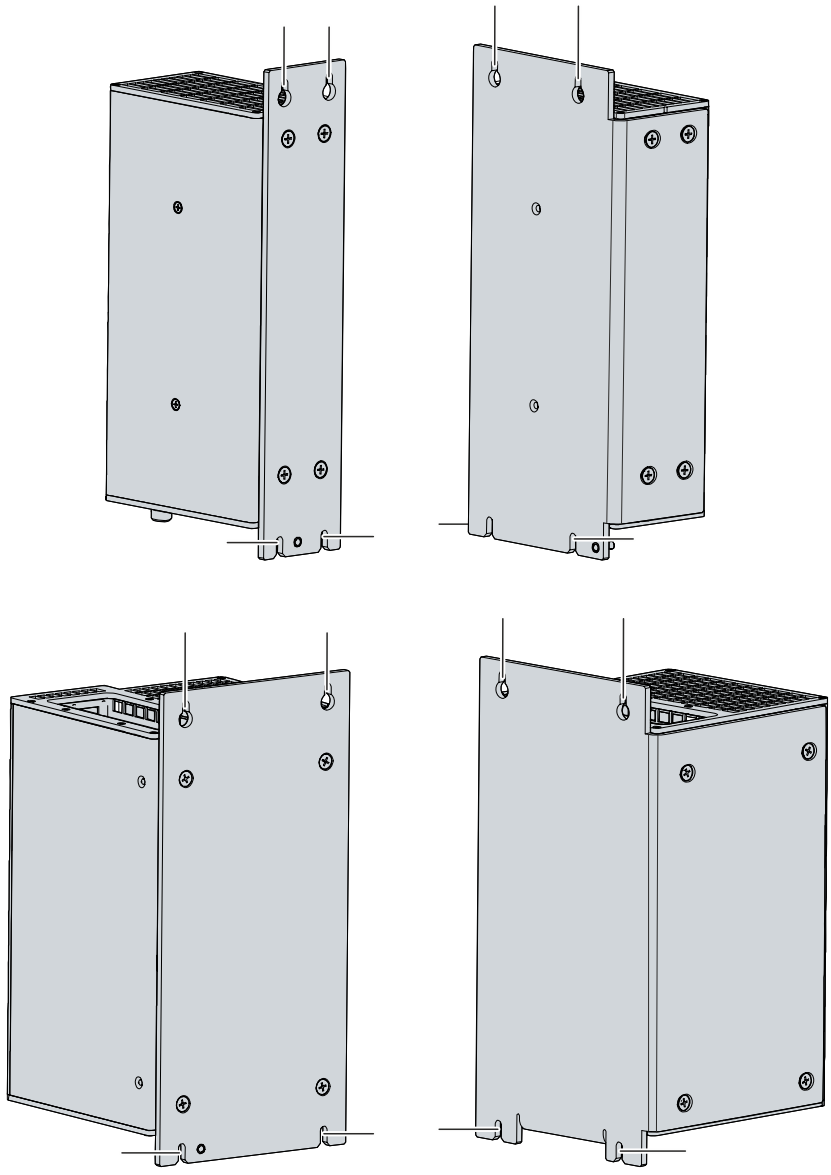


Fig. 16: Control cabinet installation

To install the industrial PC in the control cabinet, follow the steps below:

1. Place the fastening screws in the drill holes in the rear panel of the control cabinet.
2. Hang the PC on the screws at the marked points of the mounting plate (see Fig. 16).
3. Tighten the fastening screws.

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

4.3 Connecting the Industrial PC

⚠ CAUTION

Risk of electric shock

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

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

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

Wire the industrial PC in the control cabinet in accordance with the EN 60204-1:2006 standard on Protective Extra Low Voltage (PELV) so that one side of the circuit or a point on the power source of this circuit is connected to the protective conductor system.

4.3.1 Installing the supply cable

Mount the cable for the power supply to the industrial PC using the material provided for the connector assembly. It consists of an 8-pin connection strip and a strain relief housing with cable tie.

Assembly of the supply cable

First mount the plug on the cable as follows:

1. Remove the insulation from the cable ends (8-9 mm).
2. Screw the cable ends into the 8-pin connection strip. For the pin assignment of the connector, see Chapter 3.2.1 Power supply [▶ 11].

Assembly of strain relief housing

Now mount the strain relief housing on the previously connected plug and supply cable as shown in Fig. 17:

1. Thread the cable tie into the lower part of the strain relief housing (section A).
2. Insert the connection strip into the lower part of the strain relief housing (section B).
3. Tighten the cable tie and remove the plastic tab (section C).
4. Attach the upper part of the strain relief housing by snapping it onto the lower part (section D).

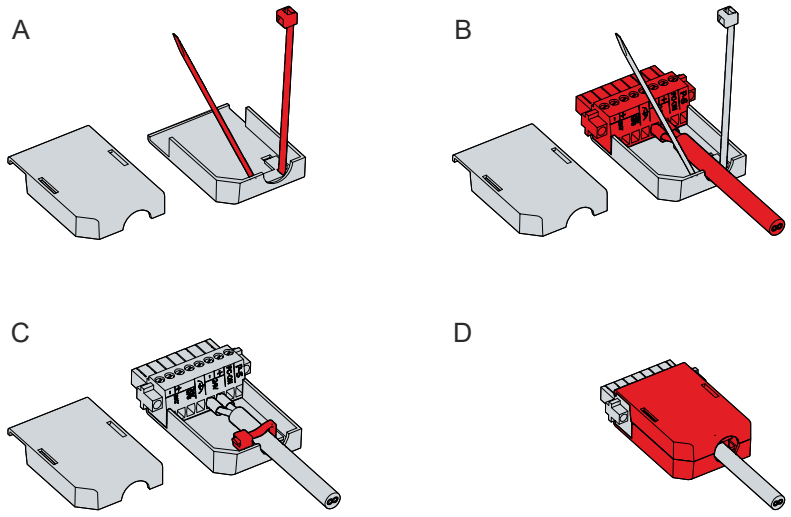


Fig. 17: Assembly of strain relief housing

4.3.2 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.

At the lower end of the Industrial PC mounting plate there is an grounding screw (see also chapter 3.1 Structure [▶ 10]), via which the functional earth of the PC can be connected. Use cables with a cross-section of at least 4 mm^2 to connect the protective conductor.

Protective earth

Establish the low-resistance protective earth of the Industrial PC via the voltage connection, thus avoiding dangerous contact voltages. There is a pin in the voltage socket for the protective earth (PE).

EMC

NOTICE

Hardware damage due to electromagnetic interference

Using the Industrial PC without functional earthing can lead to hardware damage due to electromagnetic interference.

- Only use the device with functional earthing.

Electromagnetic compatibility (EMC) of the industrial PC 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.

For this purpose, the Industrial PC must comply with certain protection requirements. The Industrial PC 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 earth is established by connecting the grounding point on the PC mounting plate to the central grounding point of the control cabinet in which the PC is installed.

4.3.3 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.

NOTICE

Connection of incorrect battery packs

The connection of incorrect battery packs can lead to damage to the Industrial PC and to the battery packs.

- Connect only Beckhoff battery packs to your Industrial PC.

Connecting cables

The connections are located in the front of the industrial PC and are documented in Chapter 3.1 Structure [▶ 10].

Make sure that you first ground the PC (see chapter 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 must be used for connecting the power supply. To achieve the lowest possible voltage drop on the supply line, we recommend connecting the maximum possible cross-section. In case of larger distances between the power source and the PC, take into account the voltage drop in relation to the cable cross-section as well as fluctuations in your supply voltage in order to ensure that the voltage at the power supply unit does not fall below 22 V.

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

1. Check the correct voltage of your external power supply.
2. Install the power cable.
3. Plug the power cable into the voltage socket of the industrial PC.
4. Screw the power cable to the voltage socket of the industrial PC.
5. Connect the PC to your external 24 V power supply.
6. Switch on the 24 V power supply.

External battery pack and UPS output

If you ordered your device with an integrated UPS, then you can connect an external battery pack and install it on a DIN rail near to the PC. Use only Beckhoff battery packs for this:

- C9900-U330: universal battery pack for PCs and panel PCs in any configuration

When using the C9900-U330 battery pack, you can use the UPS output of the power supply unit (UPS Output). The method of connecting different components can be taken from the wiring diagram in Fig. 18.

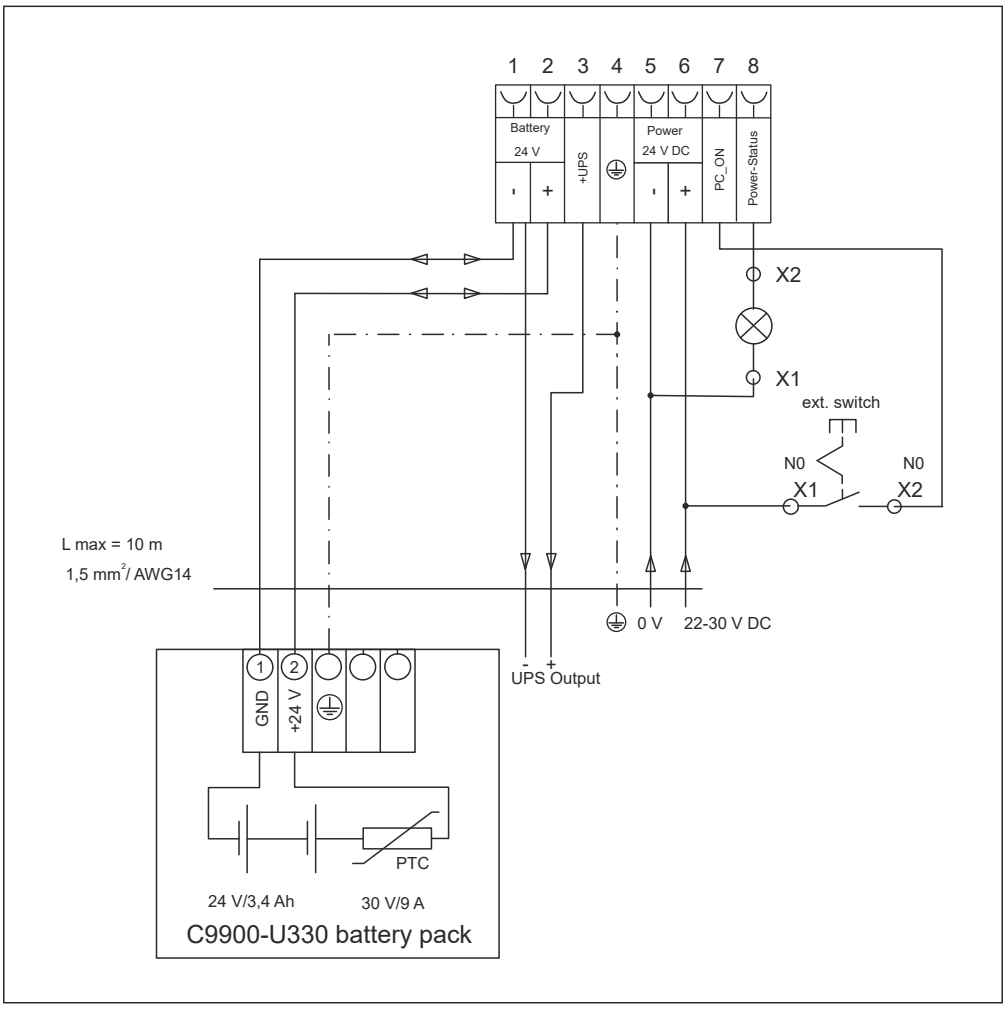


Fig. 18: Wiring diagram

So that the industrial PC still has a monitor output in case of a power failure, a control panel can be connected to the UPS output of the power supply unit. 24 V_{DC} is present between the UPS output and the negative pole of the battery pack even after a power failure. The maximum load is 1.4 A (max. 2.5 A from year of manufacture 2016).

Once the PC has been de-energized via the UPS software, the UPS output is switched to 0 V. A connected panel is switched off.

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.

NOTICE

Shortened battery life due to switching off the power supply

If the power supply is simply switched off, the operating system shuts down via the battery. With daily use, this significantly shortens the life of the battery.

- Avoid switching off the power supply before shutting down the operating system.
- Use the PC-ON input (see below) to shut down the operating system in a battery-friendly manner.

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 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. Otherwise, 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 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:

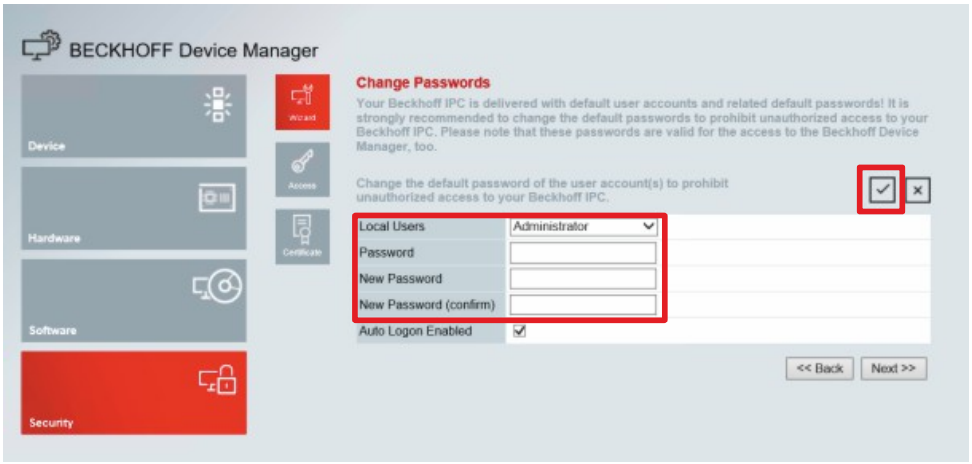


Fig. 19: Beckhoff Device Manager – Change passwords

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.

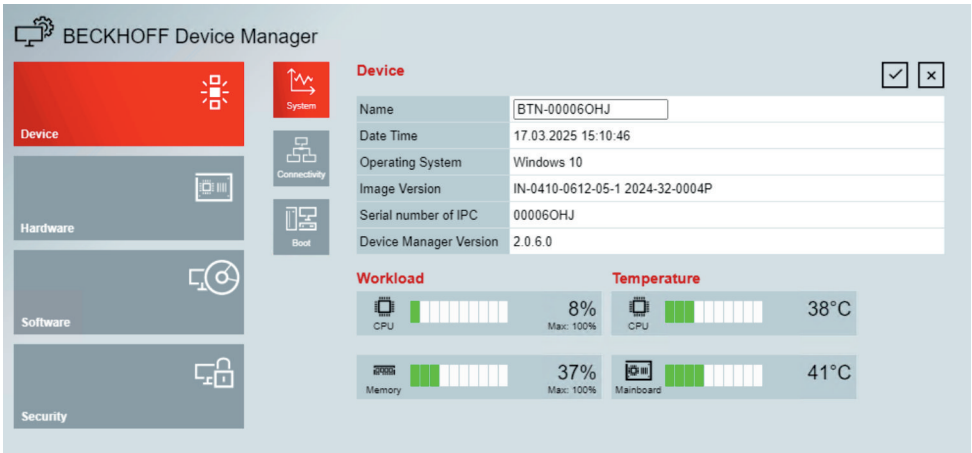


Fig. 20: Beckhoff Device Manager – Start page

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.

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**.
6. Confirm with **OK**.

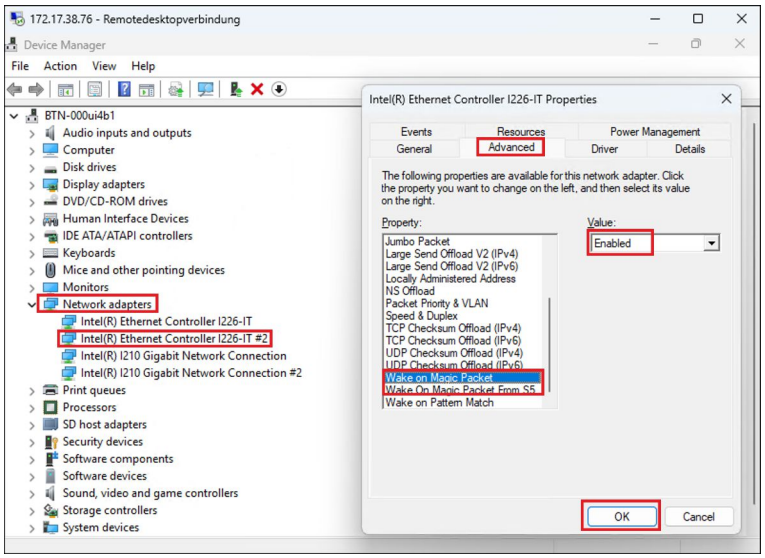


Fig. 21: Activate function

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

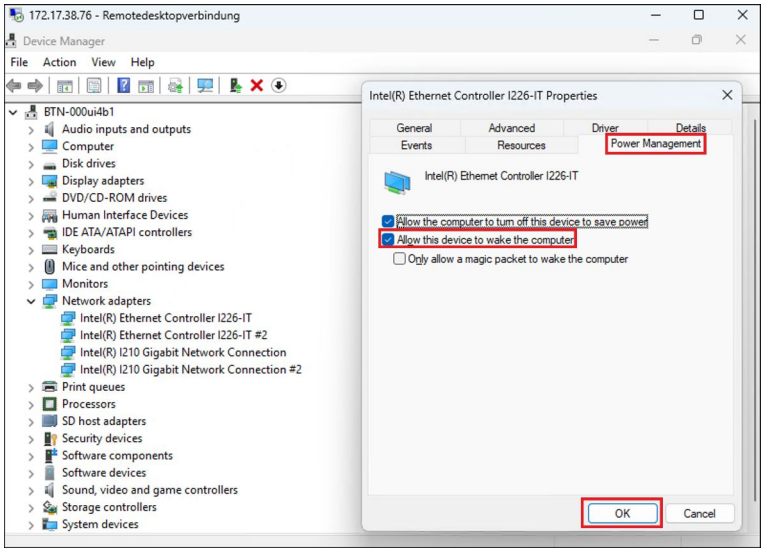


Fig. 22: Enable Function

⇨ 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.

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

If you do not want to continue using the industrial PC, Chapter 6.2 Disassembly and disposal [▶ 37] 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 operating system.
2. Disconnect the PC from your external 24 V power supply.
3. Unscrew the voltage connector and pull it out of the PC.
4. Remove the power supply cable if the 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 the data transmission cables from the industrial PC.
7. Finally, disconnect the grounding strap.

⇨ You have disconnected the cables and the power supply.

6.2 Disassembly and disposal

Before you can remove the industrial PC from the control cabinet, you must first disconnect the power supply and the cables (see chapter 6.1 Disconnecting the power supply and cables [▶ 36]).

Disassembly with mounting plates

Proceed as follows to remove the industrial PC with the corresponding mounting plate from the control cabinet:

1. Loosen the fastening screws just enough so that they remain attached to the control cabinet.
2. Lift the PC far enough so that the fastening screws slip into the keyholes (see fig. 21).
3. Remove the PC from the control cabinet.

⇨ You have successfully disassembled the PC.

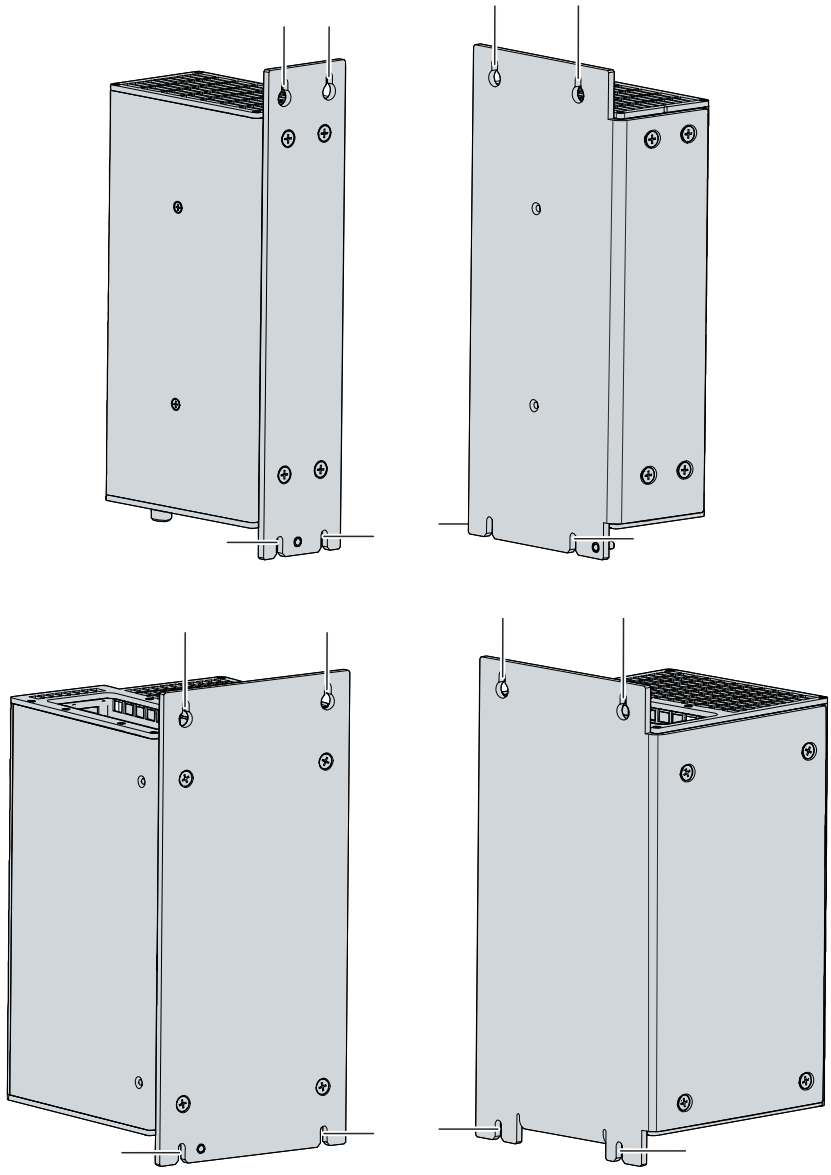


Fig. 23: Dismantling the control cabinet

Disposal of the industrial PC

Be sure to observe the national electronic scrap regulations when disposing of the industrial PC.

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 and 2½" SSDs in RAID configuration as well as 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.

Repair

Only the vendor may repair the device. If a repair should be necessary, contact Beckhoff Service (see Chapter 10.1 Service and Support [▶ 49]).

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:

- Make sure that no dust gets into the PC.
- Always keep the ventilation grilles free.
- 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.

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.

7.2.1 Access to device components

In order to be able to replace certain device components, you must first gain access to these components.

Access to battery and storage media

To access the battery and the storage media, open the front flap (see Fig. 22).

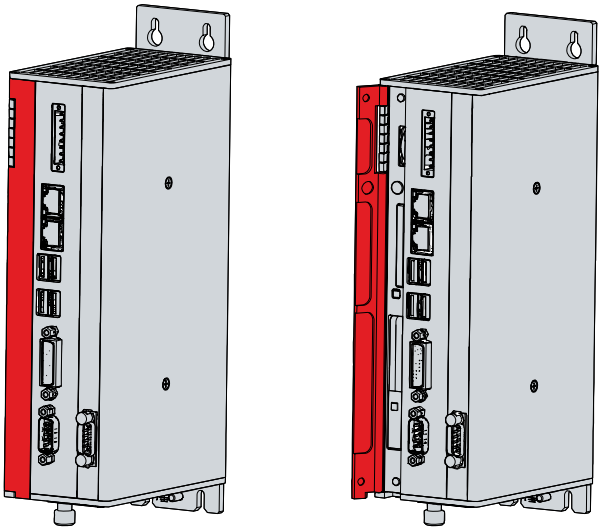


Fig. 24: Tool-free access to battery and storage media

You now have access to the battery (1) and storage media (2) (see fig. 23).

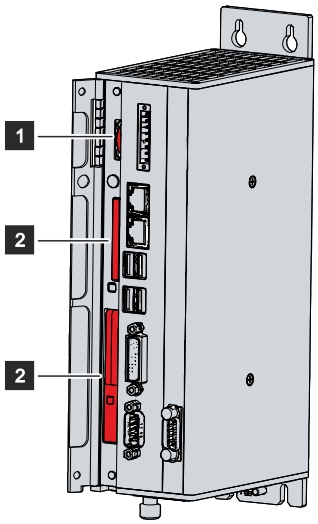


Fig. 25: Battery and storage media

Fan access

You can access the fan cartridge from the underside of the Industrial PC.

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.

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 7.2.1 Access to device components [▶ 42] shows how to access the battery.

To change the battery, proceed as follows:

1. Pull the battery out of the industrial PC with needle-nose pliers.
2. Insert the new battery into the PC by hand. Pay attention to the correct polarity. The negative pole of the battery must point towards the voltage socket of the industrial PC (see Fig. 24).

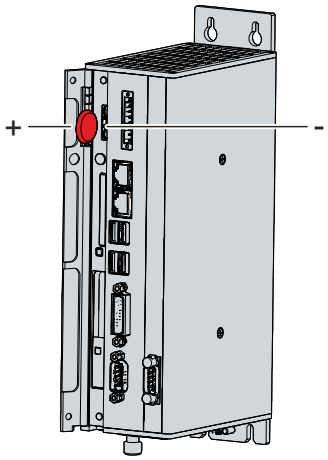


Fig. 26: Battery change

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.

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.

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 CFast

Chapter 7.2.1 Access to device components [▶ 42] shows how to access the CFast.

To replace the CFast, follow the steps shown below in Figure 25:

1. Press frontally against the CFast (section A).
   ⇨ The CFast now protrudes from the PC (section B).
2. Pull the CFast out of the PC (section C).

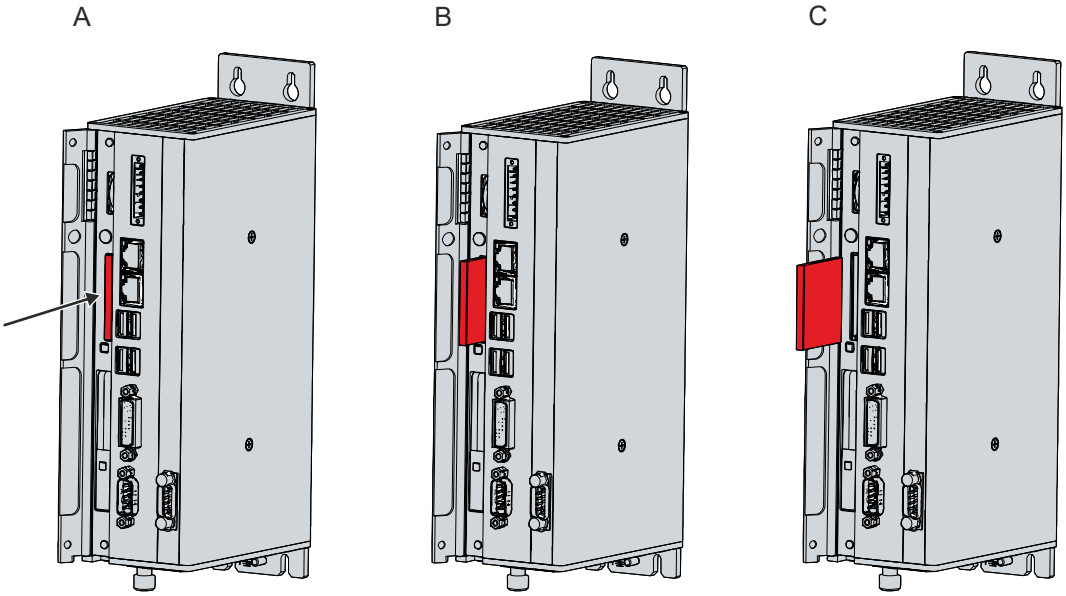


Fig. 27: Replacing the CFast

3. Insert the new CFast into the PC.
4. Press frontally against the protruding CFast.

⇨ The CFast is now fully inserted in the PC. You have replaced the CFast.

Exchange SSD

Chapter 7.2.1 Access to device components [▶ 42] shows how to access the SSD.

Proceed as follows to change the SSD:

1. Remove the SSD from the PC by pulling forcefully on the protruding Beckhoff sticker (see fig. 27).

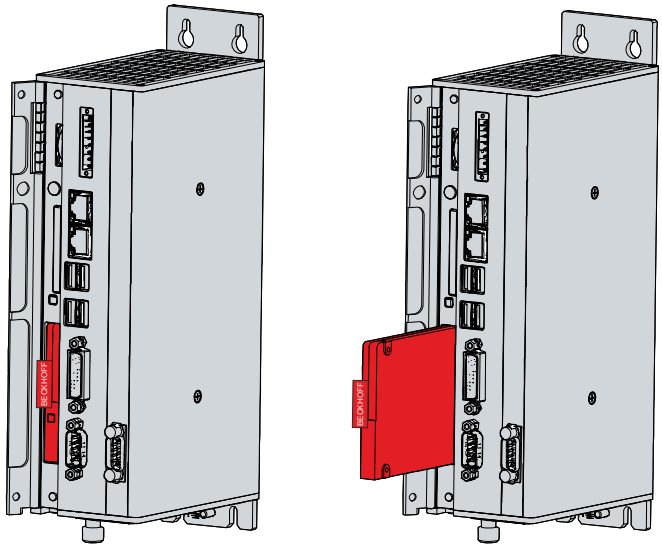


Fig. 28: Exchange SSD

2. Insert the new SSD into the PC in the same orientation up to the stop.

⇨ You have replaced the SSD.

7.2.4 Replacing the fan

NOTICE

Incorrect fan type

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

- Replace the fan cartridge exclusively by a cartridge from Beckhoff Service.

The fan cartridge with the two fans ensures optimal cooling of the industrial PC. Order a new fan cartridge exclusively from Beckhoff. To do this, contact Beckhoff Service (see Chapter 10.1 Service and support).

You can replace the fan cartridge while the PC is running. Insert the new cartridge immediately after removing the old one.

To replace the fan cartridge, follow the steps below as shown in Figure 27:

1. Loosen the knurled screw on the underside of the PC (section A).
2. Flip the cartridge down (section B).
3. Remove the cartridge in the upward direction (section C).

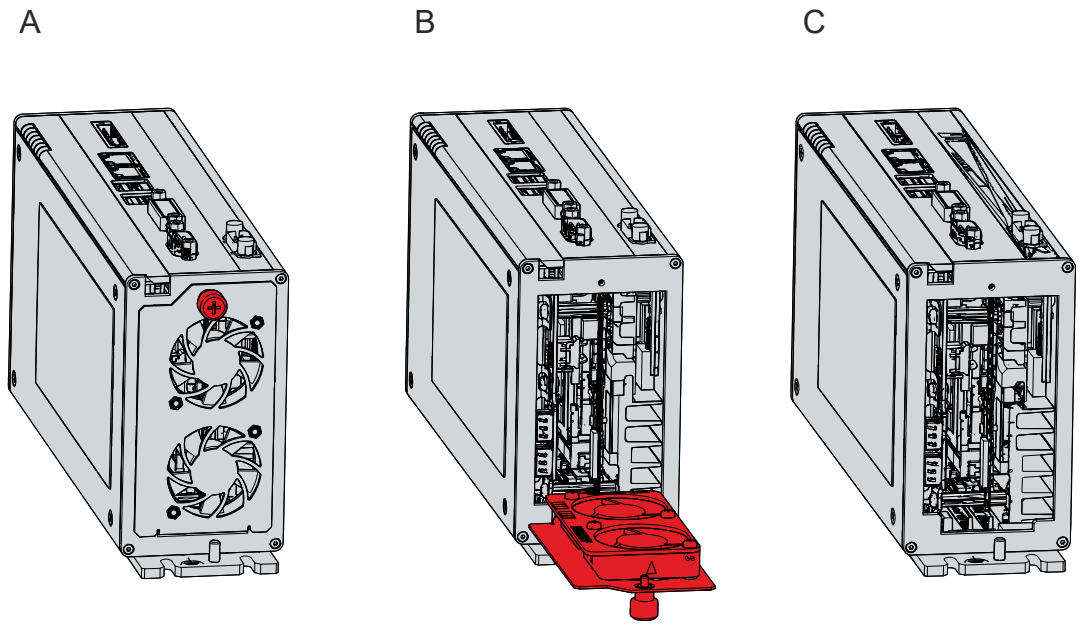


Fig. 29: Fan cartridge replacement

4. Insert the new fan cartridge.
5. Flip the cartridge back up.
6. Tighten the knurled screw firmly again.

⇨ You have now replaced the fans.

The old fan cartridge must be disposed of in accordance with the national electronic scrap regulation.

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	C6920
Dimensions (W x H x D)	65 x 235 x 121, without mounting plate, without plug-in card slots
Weight	1900 g in basic configuration
Supply voltage	22-30 V DC (24 V DC power supply unit)
Power consumption	Data sheet for power consumption and power loss in the download finder: https://www.beckhoff.com/en-en/support/download-finder/search-result/?download_group=691754572
Secure element	fTPM 2.0 enabled (see TPM documentation)
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 55 °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 shock resistance during transport can be improved by packing the industrial PC appropriately.

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

Headquarters

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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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