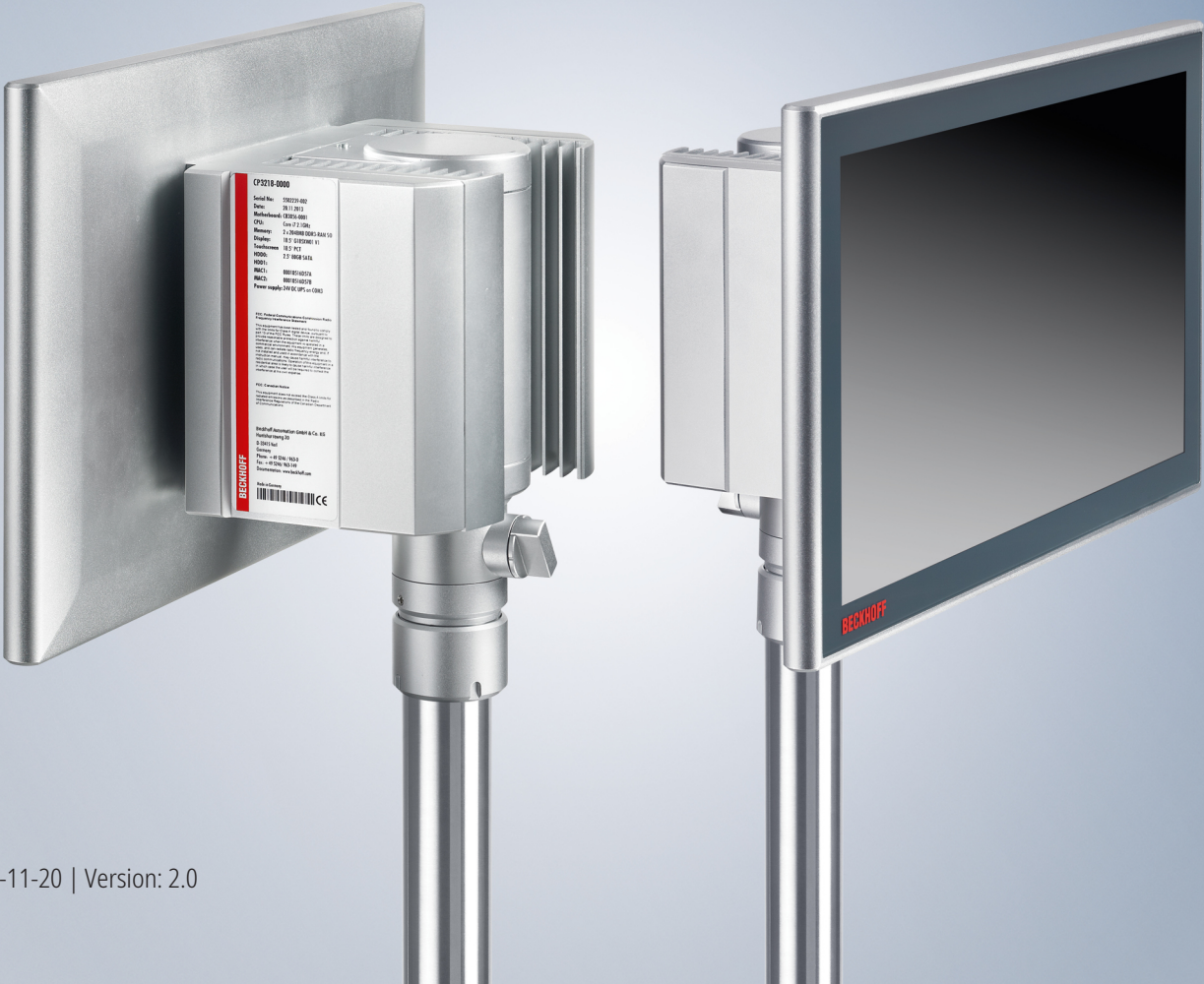


# BECKHOFF New Automation Technology

Manual | EN

# CP32xx

Panel PC





# Table of contents

<b>1</b>	<b>Notes on the documentation</b>	<b>5</b>
<b>2</b>	<b>For your safety</b>	<b>6</b>
2.1	Signal words	6
2.2	Intended use	6
2.3	Fundamental safety instructions	7
2.4	Operator's obligation to exercise diligence	7
2.5	Notes on information security	8
<b>3</b>	<b>Product overview</b>	<b>9</b>
3.1	Structure	10
3.2	Interface description	11
3.2.1	Power supply	12
3.2.2	Ethernet RJ45	13
3.3	Name plate	15
<b>4</b>	<b>Commissioning</b>	<b>17</b>
4.1	Transport and storage	18
4.2	Mounting	19
4.2.1	Mounting arm tube installation	20
4.2.2	Installing a toolboard and handle	21
4.3	Connecting the Panel PC	24
4.3.1	Grounding the Panel PC	24
4.3.2	Connecting cables and power supply	26
4.4	Switching the Panel PC on and off	28
<b>5</b>	<b>Configuration</b>	<b>30</b>
5.1	Beckhoff Device Manager	30
5.2	UPS configuration	31
<b>6</b>	<b>Decommissioning</b>	<b>34</b>
6.1	Disconnecting the power supply and cables	34
6.2	Disassembly and disposal	35
<b>7</b>	<b>Maintenance</b>	<b>38</b>
7.1	Cleaning	38
7.2	Maintenance	40
7.2.1	Access to device components	42
7.2.2	Replacing the storage media	43
7.2.3	Replacing the battery	45
<b>8</b>	<b>Troubleshooting</b>	<b>47</b>
<b>9</b>	<b>Technical data</b>	<b>48</b>
<b>10</b>	<b>Appendix</b>	<b>49</b>
10.1	Service and support	49
10.2	Approvals	50



# 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.

For installation and commissioning of the components, it is absolutely necessary to observe the documentation and the following notes and explanations.

The qualified personnel is obliged to always use the currently valid documentation.

The responsible staff must ensure that the application or use of the products described satisfies all requirements for safety, including all the relevant laws, regulations, guidelines, and standards.

## Disclaimer

The documentation has been prepared 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.

No claims to modify products that have already been supplied may be made on the basis of the data, diagrams, and descriptions in this documentation.

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The EtherCAT Technology is covered, including but not limited to the following patent applications and patents:

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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

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

### Warning on property and environmental damage

<b>NOTICE</b>
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 IP65 working environment. It offers full protection against contact (dust-tight) and against water jets (nozzle) from any angle.

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.
- Only use the device in hazardous areas if it is explicitly designed for this purpose.
- Do not carry out any work on the device while it is live. Always switch off the supply voltage for the device before mounting it, replacing device components or rectifying malfunctions. This does not apply to the replacement of hard disks in a RAID configuration.
- Never plug or unplug connectors during thunderstorms. There is a risk of electric shock.
- Ensure that the device has a protective and functional earth connection.

### Damage to property, loss of data and impairment of functions

- If you change the hardware and software configurations, you must keep within the specified limits of power consumption and power loss (please refer to the respective data sheet).
- Ensure that only trained specialists with a control and automation engineering background, operate the device. Use by unauthorized persons can lead to damage to property and loss of data.
- In the case of a 24 V DC power supply unit, fuse the power supply line according to its cross-section to protect the supply line in the event of a short circuit.
- 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

With the CP32xx series, you can use multitouch as a high-end panel PC directly in the field. The devices in the robust aluminum housing are designed for mounting arm installation. The connection cables are routed through the mounting arm.

Thanks to its processors, you can use the panel PC 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
- high-volume data handling
- other PC applications

The panel PC is available in the following display sizes with corresponding resolutions and formats:

- 12-inch (800 x 600) 4:3
- 15-inch (1024 x 768) 4:3
- 15.6-inch (1366 x 768) 16:9
- 18.5-inch (1366 x 768) 16:9
- 19-inch (1280 x 1024) 5:4
- 21.5-inch (1920 x 1080) 16:9
- 24-inch (1920 x 1080) 16:9

The device has a multi-touch screen and an aluminum housing with all-round IP65 protection. The housing surface is electrically insulating. The rotatable and tiltable mounting arm adapter for installation on the mounting arm is integrated.

In its basic configuration, the CP32xx includes the following features:

- Intel® processor
- DRAM
- 2.5-inch hard disk
- 24 V DC power supply unit

### 3.1 Structure

Figure 1 shows the structure of the device as an example for all CP32xx variants.

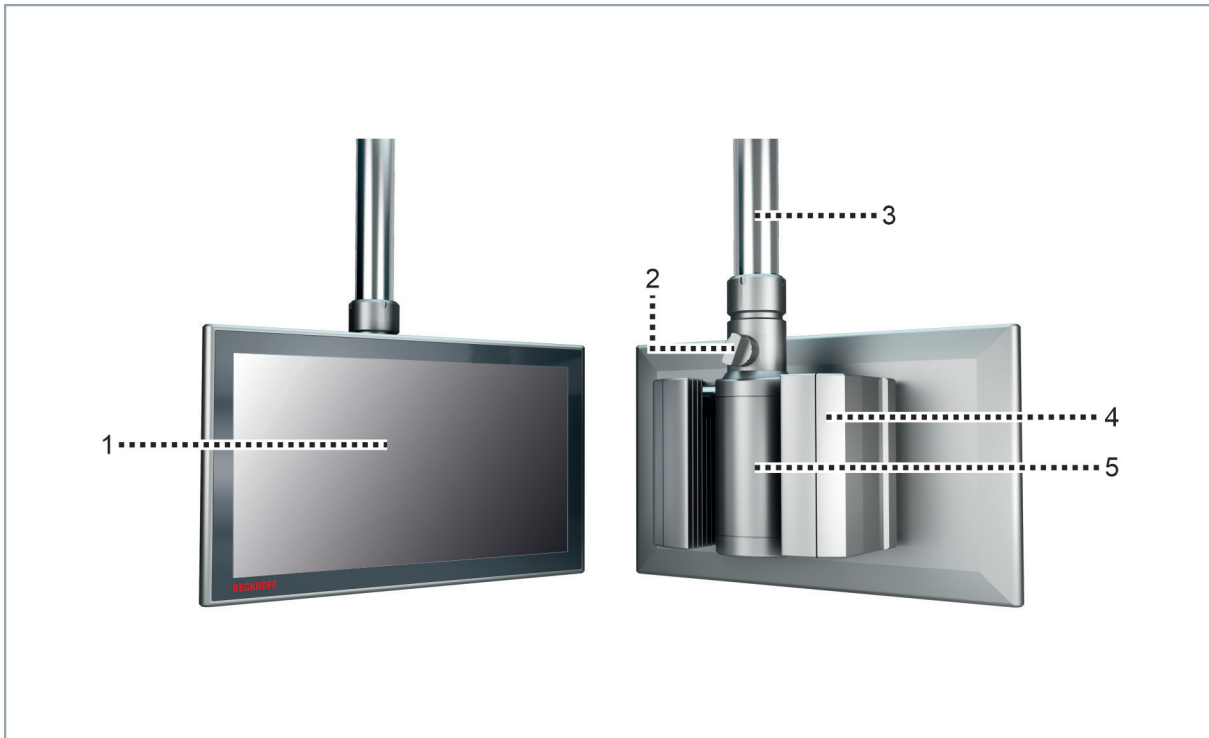


Fig. 1: Structure

Table 1: Legend structure

No.	Component	Description
1	Display and touch screen glass	Operation of the panel PC
2	Locking screw	Anti-twist protection of the mounting arm adapter
3	Mounting arm tube	Mounting arm tube for installation from below or above
4	Side cover	Access to battery and storage medium
5	Connection compartment cover	Access to interfaces

## 3.2 Interface description

In the basic configuration, the panel PC includes the following interfaces:

- Power supply (X101)
- Ethernet (X102)

The interfaces are located on the rear of the housing behind a cover. To access the interfaces, you must first remove the cover. Remove the M4 screw and pull the cover off the mounting arm adapter (see Fig. 2). Secure the cover to prevent it from falling down.

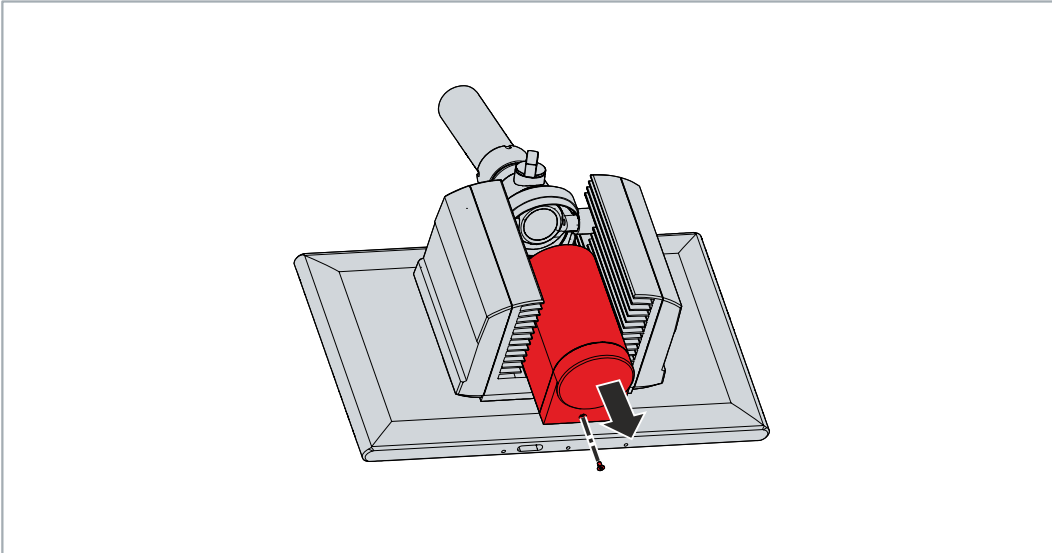


Fig. 2: Access to interfaces

### 3.2.1 Power supply

The panel PC is supplied with a nominal voltage of 24 V.

The power supply and the protective earth of the panel PC are connected via the 12-pin round connector (X101). The cable is routed through the mounting arm adapter. If the panel PC is equipped with an integrated uninterruptible power supply (UPS), an external battery can additionally be connected to PIN 1 and PIN 2. The Beckhoff battery pack C9900-U330 is available for this purpose.

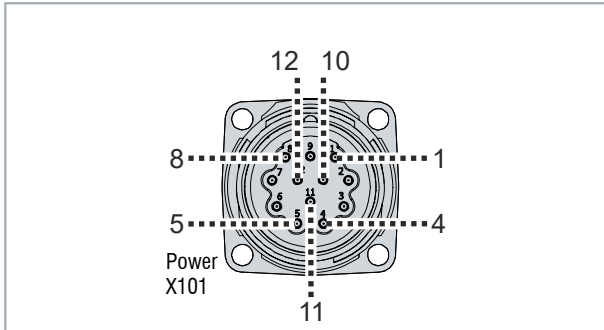


Fig. 3: Voltage socket pin numbering

Table 2: Wiring with 8-core cable

Pin	Core	Signal	Description
1	1	- BAT	Negative pole of the battery pack
2	2	+ BAT	Positive pole of the battery pack
3	3	NC	not used
4	yellow/green	⊕	Protective earth
5	4	-	24 V supply voltage, negative pole
6	5	+ 24 V	24 V supply voltage, positive pole
7	6	PC-ON	Input PC-ON
8	7	P-S	Power Status output, minus is the negative pole of the supply voltage
9	-	NC	not used
10	-	NC	not used
11	-	NC	not used
12	-	NC	not used

Table 3: Wiring with 12-core cable (C9900-K275/-K276/-K277)

Pin	Core	Signal	Description
1	1, 8	- BAT	Negative pole of the battery pack
2	2, 9	+ BAT	Positive pole of the battery pack
3	3	NC	not used
4	yellow/green	⊕	Protective earth
5	4, 10	-	24 V supply voltage, negative pole
6	5, 11	+ 24 V	24 V supply voltage, positive pole
7	6	PC-ON	Input PC-ON
8	7	P-S	Power Status output, minus is the negative pole of the supply voltage
9	-	NC	not used
10	-	NC	not used
11	-	NC	not used
12	-	NC	not used

### 3.2.2 Ethernet RJ45

The panel PC has an Ethernet RJ45 interface (X102) in the form of a push-pull Ethernet built-in socket. The Ethernet standards 100Base-T, 1000-Base-T and 2500Base-T 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 controller is used as follows, based on the device generation:

Table 4: Controller classification based on device generation

Device generation	Controller	Mbit/s
CP32xx-0020	Intel® i219	100/1000
CP32xx-0030	Intel® i219	100/1000
CP32xx-0040	Intel® i226	100/1000/2500

The Intel® i219 Ethernet port is suitable for real-time Ethernet applications with cycle times > 1 ms (without distributed clocks).

The Intel® i226 Ethernet port is suitable for cycle times ≤ 1 ms for distributed clock applications with EtherCAT.

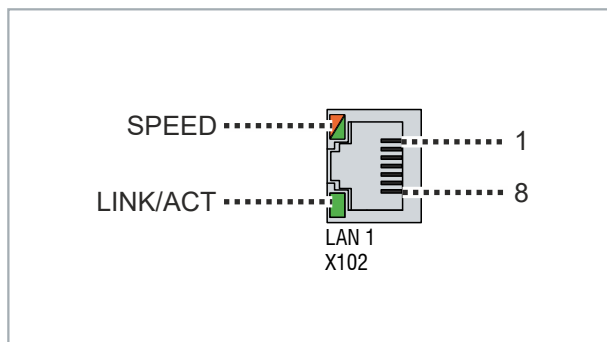


Fig. 4: Ethernet interface pin numbering

Table 5: Ethernet interface pin assignment

Pin	Signal	Description
1	T2 +	Pair 2
2	T2 -	
3	T3 +	Pair 3
4	T1 +	
5	T1 -	Pair 1
6	T3 -	
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) 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 (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 the LED meanings according to the possible data transmission rate.

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

<b>Mbit/s</b>	<b>LED</b>
100	Lights-up orange
1000	Lights up green

*Table 7: LED meaning speed 100/1000/2500 Mbit/s*

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

### 3.3 Name plate

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

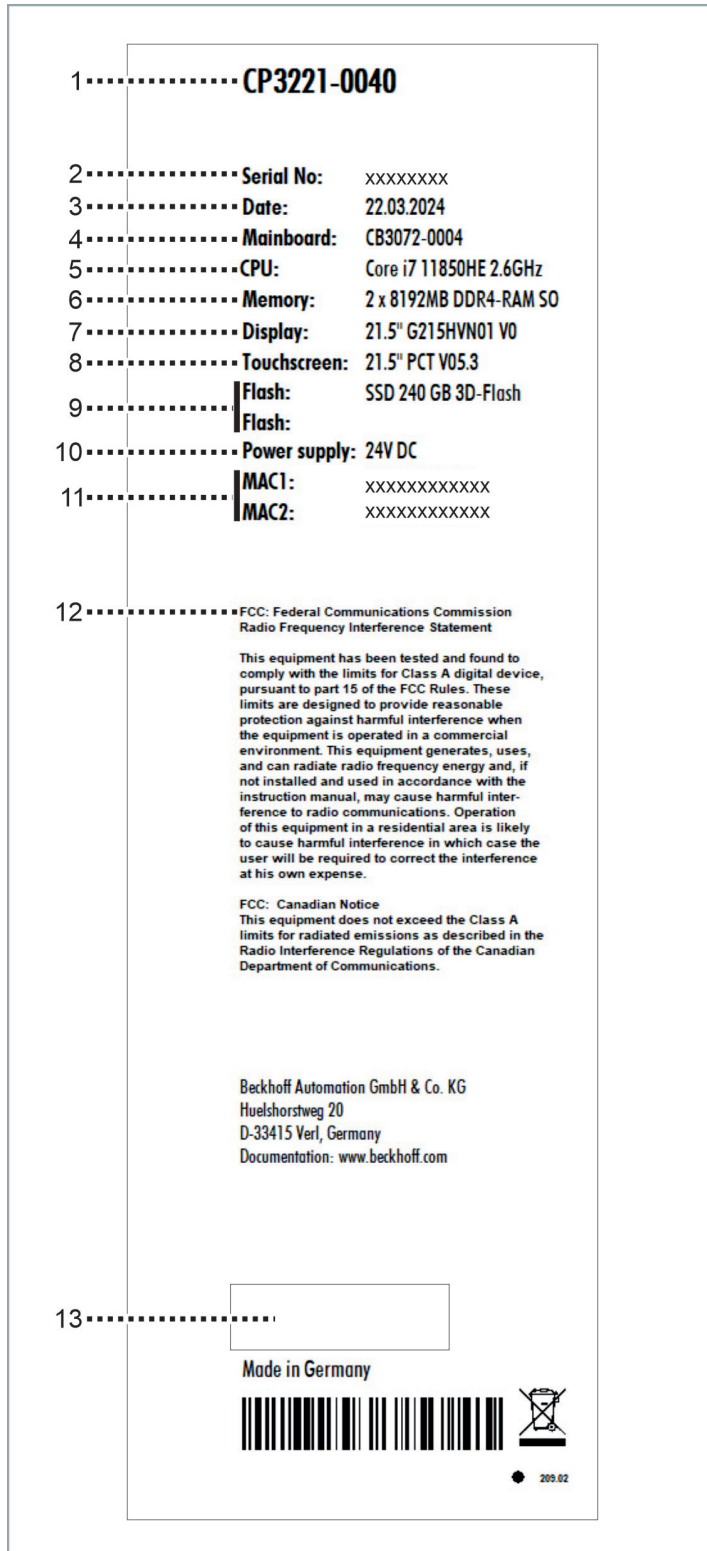




Fig. 5: Name plate

Table 8: Legend name plate

No.	Description
1	Model: The last four digits indicate the device generation

No.	Description
2	Serial number (BTN)
3	Date of manufacture
4	Mainboard
5	CPU
6	Main memory
7	Display
8	Touch screen
9	SSD or CFast
10	Power supply unit: 24 V <sub>DC</sub>
11	MAC addresses of the Ethernet interfaces
12	FCC approval
13	<p>Symbols</p> <p style="text-align: right;"></p> <p>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 [▶ 50].</p>



## 4 Commissioning

In order to use the panel PC, you must first commission it. The first step is to transport the device to its operating location and unpack it. This is followed by the installation of the device on the mounting arm, the connection of the cables and the power supply and finally the switching on of the panel PC.

### Operating the device

The device is operated via the touch screen.

#### NOTICE

##### Damage to the touch screen

Operating the touch screen with unsuitable objects may damage the touch screen.

- Operate the touch screen only with bare fingers or wearing suitable gloves.
- If you use gloves, make sure that no hard particles such as metal shavings, glass splinters or similar adhere to the glove.

If you, as the user, require additional protection for the touch screen against dirt and scratching, for example due to dirty hands, this can be achieved with a protective film. The film provides short-term protection for a few days.

You can either order a protective film individually and fit it yourself retrospectively, or you can order the film for fitting directly ex factory. The protective films available for the display size of your device can be found on the Beckhoff website.

Proceed as follows to attach the protective film to the touch screen:

1. Ensure that the environment is as dust-free as possible.
  2. Thoroughly clean the surface of the device to be fitted with the film and remove all grease residues.
  3. Detach the film from the backing at the short edge and place it on the surface.
  4. Gradually remove the film from the backing. At the same time, use a doctor blade or other object with a soft rubber or felt edge to apply the film.
  5. Brush away air bubbles towards the edge with a doctor blade or other object with a soft rubber or felt edge.
- ⇒ The film is now fitted.

You can use the Dimming, Screensaver and Cleaning mode functions with the Display Control Tool. The Beckhoff Information System provides more information about the tool: <https://infosys.beckhoff.com/content/1031/panelconfigurationtools/11725543179.html?id=7993182328699786200>.

## 4.1 Transport and storage

The specified storage conditions must be adhered to (see [Technical data \[▶ 48\]](#) chapter).

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

#### Also see about this

- 📖 [Service and support \[▶ 49\]](#)

## 4.2 Mounting

### NOTICE

#### Extreme environmental conditions

Extreme environmental conditions can cause damage to the device.

- Avoid extreme environmental conditions.
- Protect the device from moisture and heat.

The device is designed for installation on a mounting arm system. The environmental conditions specified for operation must be observed.

The panel PC is installed on the mounting arm system using the mounting arm adapter. By default, the panel PC is delivered with the mounting arm adapter for installation on the mounting arm tube from above. Alternatively, you can order the panel PC with the mounting arm adapter for installation from below. The following ordering option is available for this purpose:

- C9900-M184: mounting arm adapter on CP32xx Panel PC for Rittal and Rolec mounting arm systems with 48 mm tube from below instead of from above

Figure 6 shows the standard variant with mounting arm adapter from above (1) and the option with mounting arm adapter from below (2). Regardless of whether the mounting arm adapter is aligned upwards or downwards, it has a locking screw to prevent it from rotating and can be swiveled by  $\pm 165^\circ$ . The adapter adapts the panel PC with a 48 mm circular tube. The permissible tolerance of the pipe diameter is  $-0.1$  to  $+0.8$  mm.

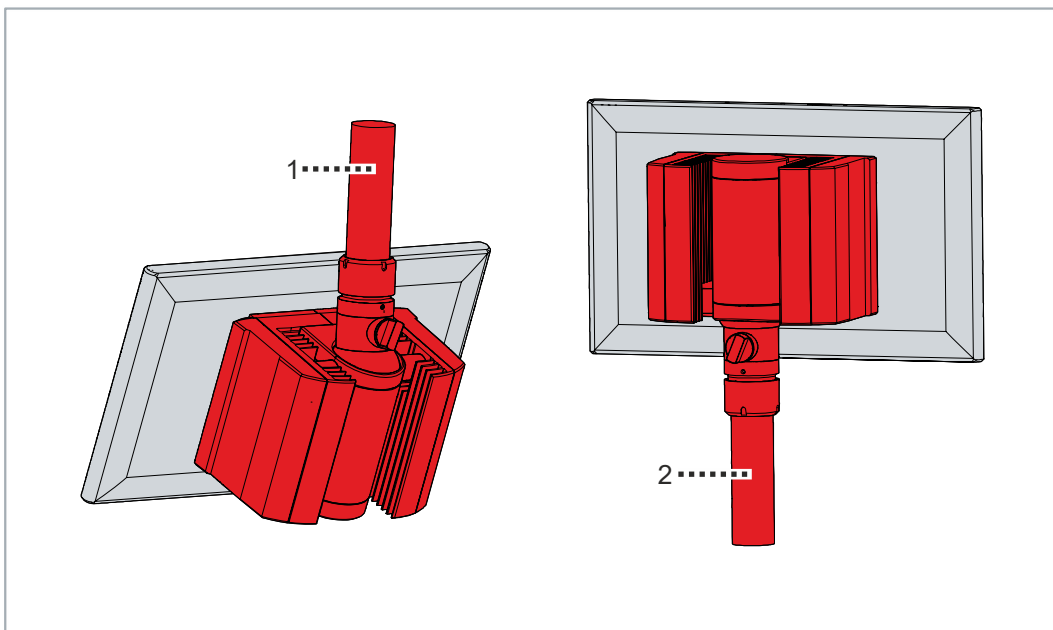


Fig. 6: Mounting arm adapter

#### Dimensions

The dimensions of the panel PC can be found in the download finder on the Beckhoff website: <https://www.beckhoff.com/en-en/support/download-finder/search-result/?c-1=27833209&search=cp32xx>

All dimensions are in mm.

## 4.2.1 Mounting arm tube installation

Observe the following points when installing the mounting arm tube on the mounting arm adapter:

- For the correct installation height, use the position of the screen for guidance. This should always be optimally visible to the user.
- Do not expose the panel PC to direct sunlight.

### Mounting arm tube installation

Regardless of the orientation of the mounting arm adapter, you must follow in the same procedure to install the mounting arm tube. Depending on whether you have oriented the mounting arm adapter upwards or downwards, the mounting arm tube has to be installed on the adapter in the same direction.

Among other tools you need a hook wrench for the installation. You can order this from your Beckhoff Sales using the following order identifier:

- C9900-Z263: Hook wrench size 58-62 for tightening and loosening the slotted nut of the C9900-M75x mounting arm adapter

Figure 7 shows an example of the procedure with the standard mounting arm adapter facing upwards.

To install the mounting arm tube on the mounting arm adapter, proceed as follows:

1. Unscrew the hexagon socket screw (1) a few turns with a 3 mm Allen key (section A).
2. Push the connecting cables of the panel PC through the mounting arm tube.
3. Insert the mounting arm tube 50.2 mm into the mounting arm adapter to the stop (section B).
4. Retighten the hexagon socket screw with a torque of 3 Nm to additionally secure the mounting arm tube.
5. Tighten the slotted nut of the mounting arm adapter with a hook wrench size 58-62 clockwise with a torque of 20 Nm (section C).

⇒ You have installed the mounting arm tube on the mounting arm adapter.

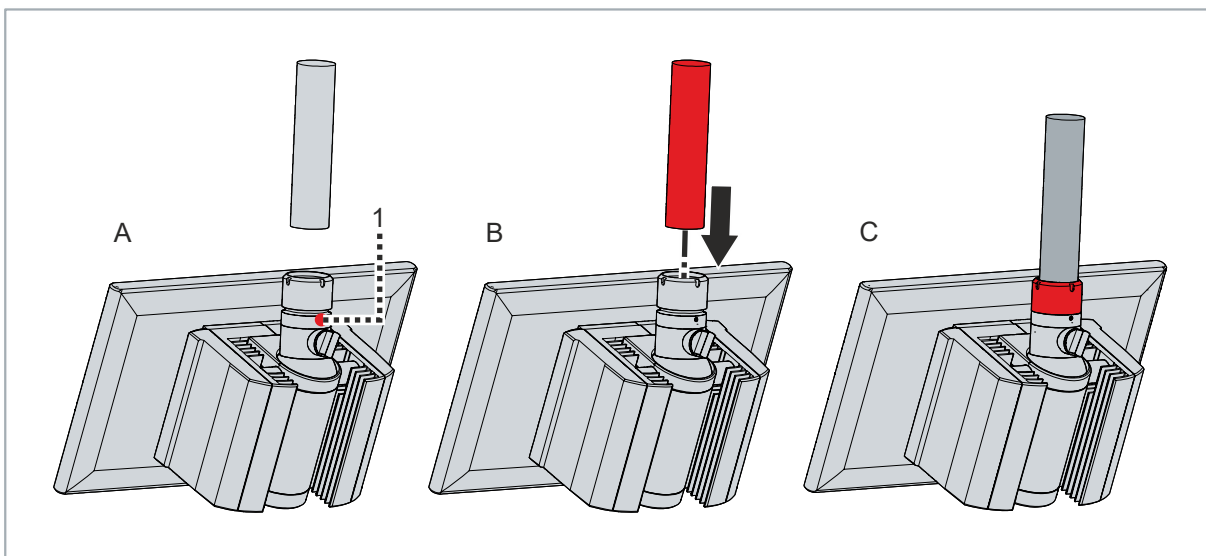


Fig. 7: Mounting arm tube installation

## 4.2.2 Installing a toolboard and handle

You have the option to mechanically extend your device. The following ordering options are available: Follow the links provided to get to the respective product pages with images of the ordering options:

Table 9: Mechanical extensions

Order identifier	Version
C9900-M406	Toolboard for keyboard or tools, mounted on the underside of a Control Panel or a Panel PC CP3x12 to CP3x24, with integrated IP65 USB socket at the rear, can only be ordered together with the panel PC <a href="http://www.beckhoff.com/c9900-m406">http://www.beckhoff.com/c9900-m406</a>
C9900-M423	Toolboard for keyboard and mouse or tools, mounted on the underside of a Control Panel or a Panel PC CP3x12 to CP3x24, with integrated 2-port USB A IP65 socket on the rear side and cable channel at the rear for mouse and keyboard cable, can only be ordered together with the panel PC <a href="http://www.beckhoff.com/c9900-m423">http://www.beckhoff.com/c9900-m423</a>
C9900-M419	Toolboard for keyboard or tools <ul style="list-style-type: none"> <li>• ex factory on CP3x12 to CP3x24, mounted on the bottom of a control panel or panel PC</li> <li>• for retrofitting for CP3xxx-1600</li> </ul> <a href="http://www.beckhoff.com/c9900-m419">http://www.beckhoff.com/c9900-m419</a>
C9900-M361	Handle, length = 386 mm, anodized aluminum <ul style="list-style-type: none"> <li>• ex factory on CP3x12 to CP3x24, mounted on the bottom of a control panel or panel PC</li> <li>• for retrofitting for CP3xxx-1600</li> </ul> <a href="http://www.beckhoff.com/c9900-m361">http://www.beckhoff.com/c9900-m361</a>

The ordered extensions are delivered with the device, you must install them yourself afterwards.

### Installing handle

Install the handle to the bottom of the device using the two M5 screws (see fig. 8).

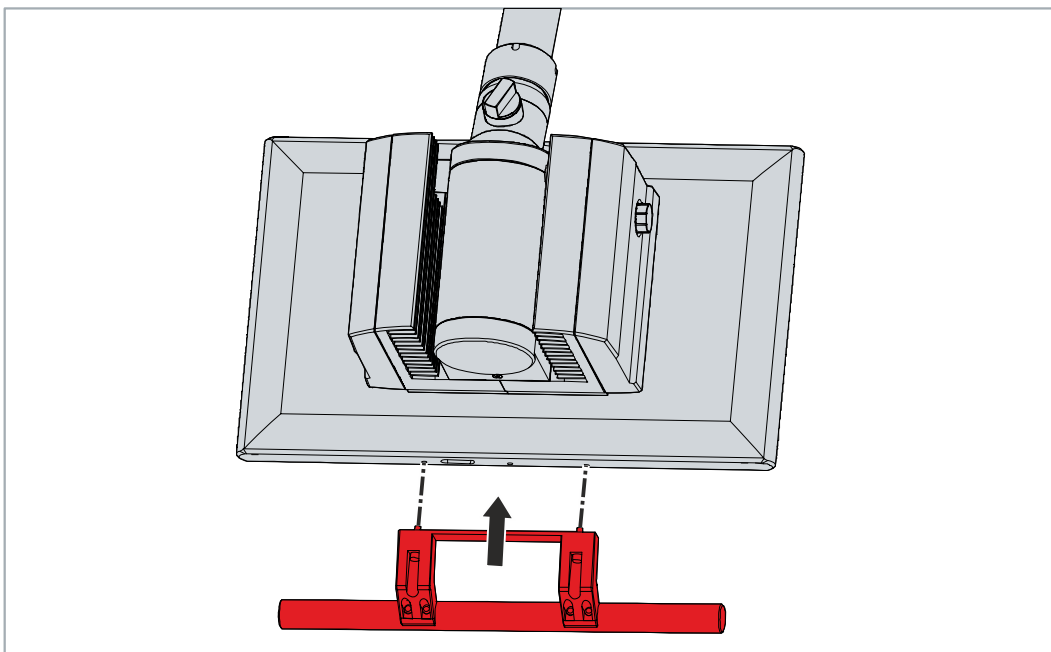


Fig. 8: Installing handle

## Installing toolboard

To mount a toolboard on the device, follow the steps below, which are shown in figures (9-11):

1. Screw the toolboard brackets to the bottom of the device using the three M5 screws.

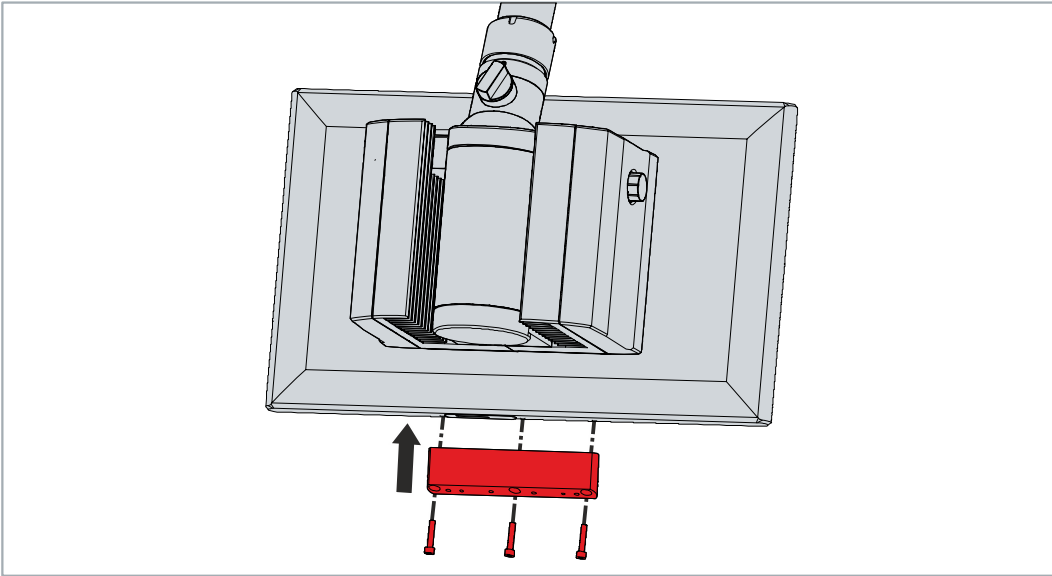


Fig. 9: Toolboard mounting brackets

2. Screw the toolboard to the bottom of the brackets using the four M5 screws.

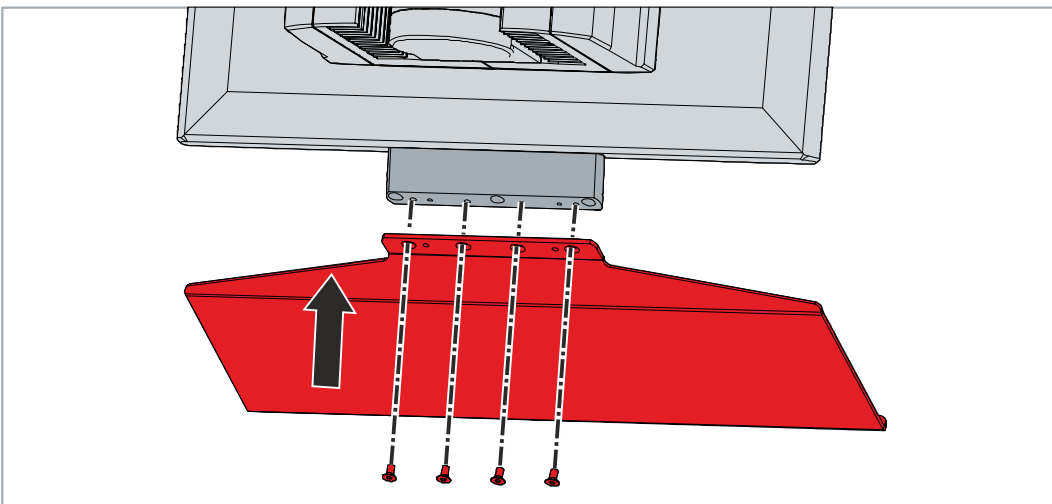


Fig. 10: Mounting the toolboard

3. Screw the two strain reliefs to the underside of the toolboard using the two M4 screws. You can secure the keyboard and mouse cables using the strain reliefs under the toolboard.

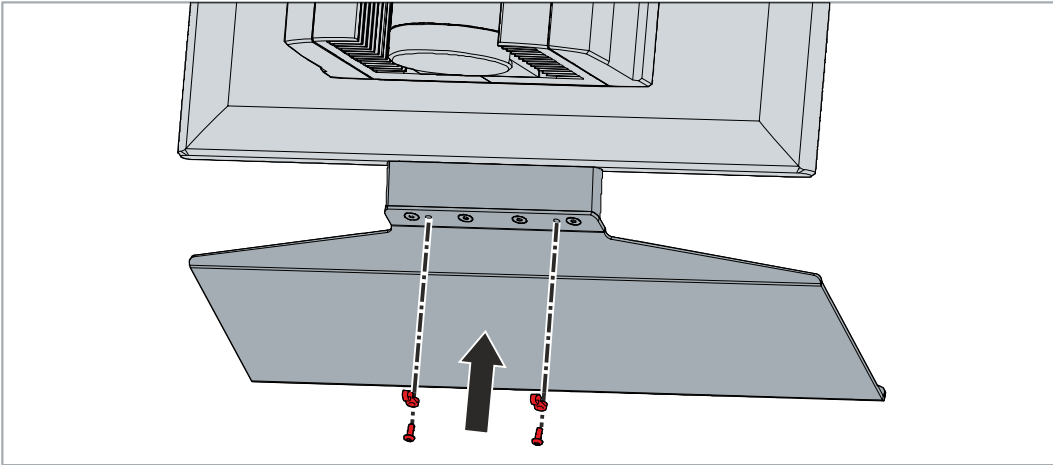


Fig. 11: Mounting strain relief

⇒ You have mounted the toolboard on the device.

## 4.3 Connecting the Panel 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 24 V DC power supply is required to operate the device. 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 panel PC 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 as the control panel (no potential difference).

### 4.3.1 Grounding the Panel 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 low-resistance protective earthing of the panel PC via the voltage connection to avoid dangerous touch voltages. There is a pin in the voltage socket for the protective earth (PE).

#### 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 earth is established via the connection of the grounding bolt in the connection section of the panel PC (see Fig. 12). Use cables with a minimum cross-section of 4 mm<sup>2</sup> for the ground connection.

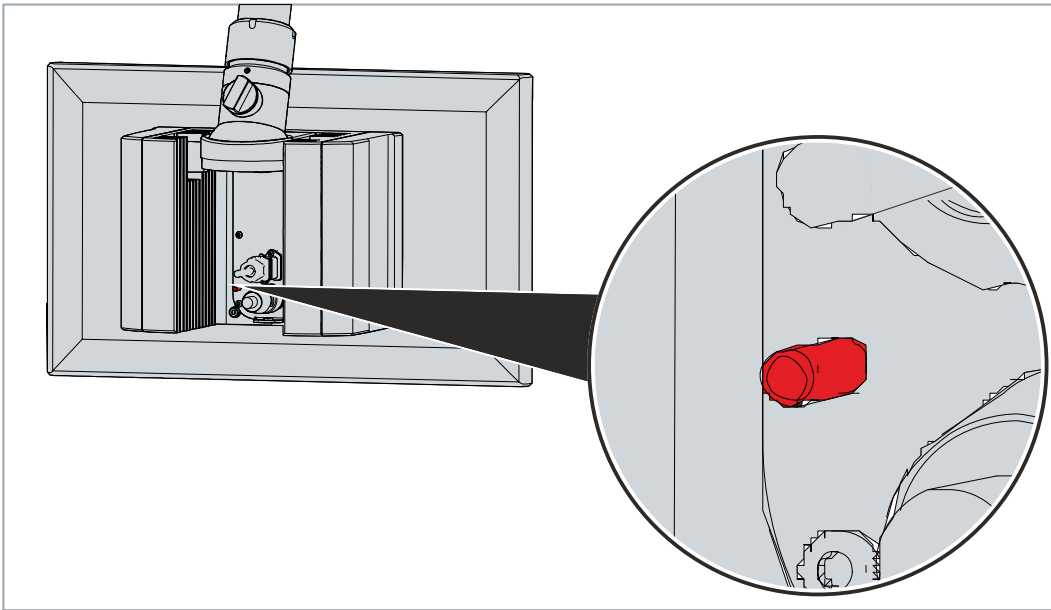


Fig. 12: Grounding bolt for functional earthing

For information on how to access the connection compartment, refer to chapter 3.2 [Interface description](#) [► 11].

## 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.

### NOTICE

#### Connection of incorrect battery packs

Connecting the wrong battery packs can cause damage to the device and the battery packs.

- Only connect the C9900-U330 Beckhoff battery pack.

The connections are located at the rear of the panel PC in the connection compartment. The interface cables are routed through the mounting arm tube. To gain access to the connection compartment, you must first remove the cover of the mounting arm adapter (see chapter 3.2 [Interface description](#) [▶ 11]).

### Connecting cables

Make sure that you ground the device first (see chapter 4.3.1 [Grounding the panel PC](#) [▶ 24]).

### Connecting the power supply

Cables with a maximum cable cross-section of 1.5 mm<sup>2</sup> can be used for connecting the power supply. For long supply lines, use 1.5 mm<sup>2</sup> cables to achieve a low voltage drop on the supply line. There should be at least 22 V at the voltage connector of the panel PC, so that the PC remains switched on during voltage fluctuations.

Proceed as follows to connect the 24 V<sub>DC</sub> power supply unit:

1. Plug the power supply cable into the power supply socket of the panel PC.
2. Connect the panel PC to your external 24 V power supply.
3. Switch on the 24 V power supply.

⇒ You have connected the power supply.

### External battery pack

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:

Table 10: Order identifier battery pack

Order identifier	Version
C9900-U330	Battery pack for PCs with 24 V power supply unit and integrated UPS C9900-P209 or C9900-U209, external for DIN rail mounting, 3.4 Ah, operating temperature 0...50 °C, contains two closed lead-acid batteries VRLA-AGM

PIN 4 and 5 of the battery pack are available for looping through a 24 V power supply. Accordingly, you can connect a three-core sheathed cable with plus and minus of the supply voltage as well as protective earth to the battery pack and then connect to the PC with a five-core sheathed cable. The method of connecting different components can be taken from the wiring diagram in fig. 13.

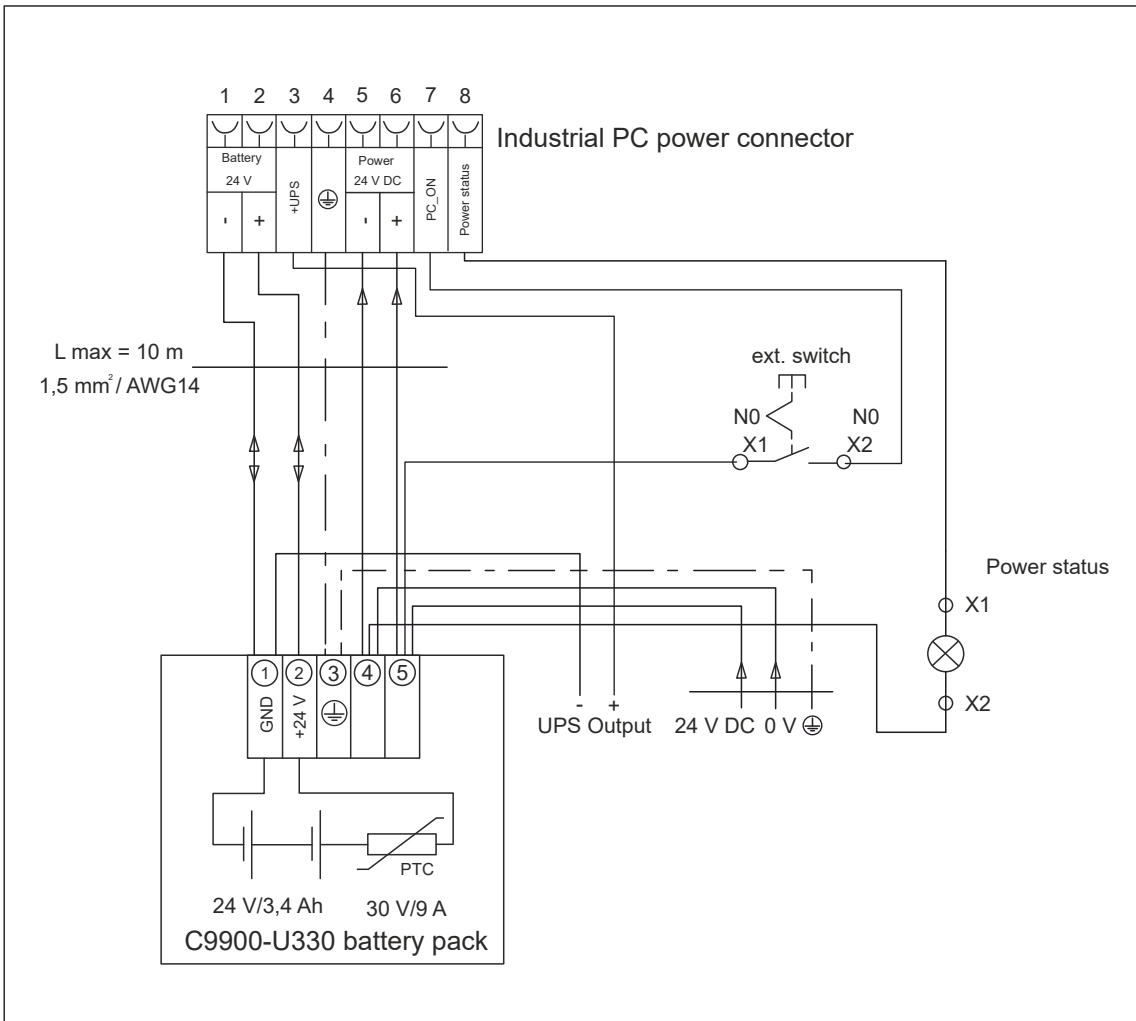


Fig. 13: Wiring diagram C9900-U330

Further information on the battery pack can be found in the corresponding manual in the download finder on the Beckhoff website [C9900-U330](https://www.beckhoff.com/C9900-U330).

## 4.4 Switching the Panel PC on and off

### NOTICE

#### Public networks

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

- Protect the PC 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

#### Data loss due to switching off the power supply when the UPS battery is empty

Switching off the power supply when the UPS battery is empty can lead to data loss, as the operating system cannot be shut down properly without battery power.

- Ensure that the UPS battery is charged in the event of a power failure.
- For UPS C9900-P209 and C9900-U209, charge the battery exclusively via the switched-on PC. Never connect a charger.

### 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 the following description) 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 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](mailto: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*.

## 5 Configuration

The configuration chapter gives you an insight into the Beckhoff Device Manager on the one hand and the UPS configuration on the other. The UPS configuration becomes relevant, if you have ordered your device with a UPS.

The Beckhoff Device Manager is a tool for detailed system diagnostics of hardware and software components. You will be shown the procedure for the first start of the Beckhoff Device Manager as well as for manual start.

In the UPS configuration, assign the appropriate UPS to the device.

### 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 PC downtime.

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

The industrial PC is delivered with predefined access data as standard:

- User name: Administrator
- Password: 1

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

#### First start Beckhoff Device Manager

When your industrial PC is booted for the first time, the Beckhoff Device Manager also starts automatically for the first time. The Security Wizard opens. This tells 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. 14: 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.

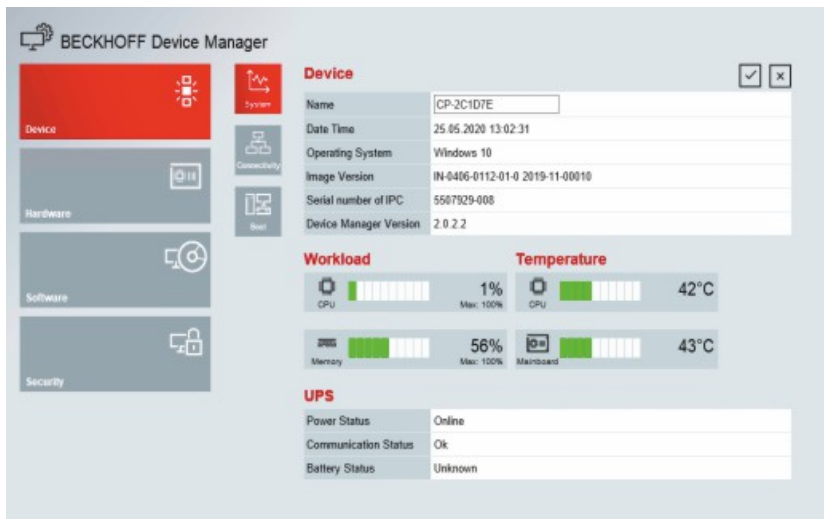


Fig. 15: Beckhoff Device Manager – Start page

Navigate forward in the menu and configure the industrial PC. Note that modifications only become active once they have been confirmed.

### Manual start Beckhoff Device Manager

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

1. Open a web browser locally on the industrial PC.
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 UPS configuration

Once you have installed the installation package with the UPS software components, you can configure the UPS. To start the configuration, go to *Start -> Beckhoff -> UPS Configuration*.

After starting the configuration, follow the steps below:

1. Click *Select*.

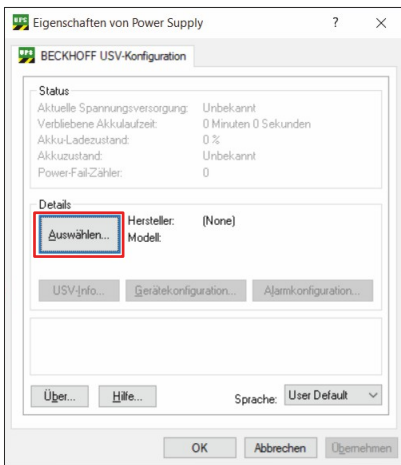


Fig. 16: Select UPS

2. Select the manufacturer *Beckhoff* from the drop-down menu.

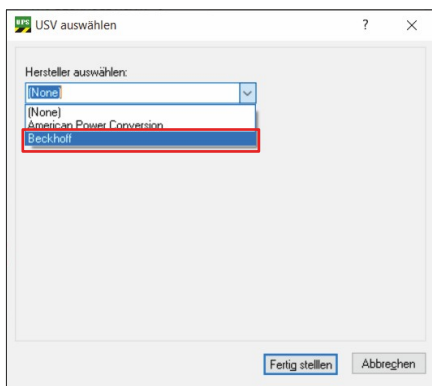


Fig. 17: Select manufacturer

3. Select at Model/Interface *Beckhoff P24Vxxxx*.
4. Select the port *COM4*.
5. Click *Finish*.

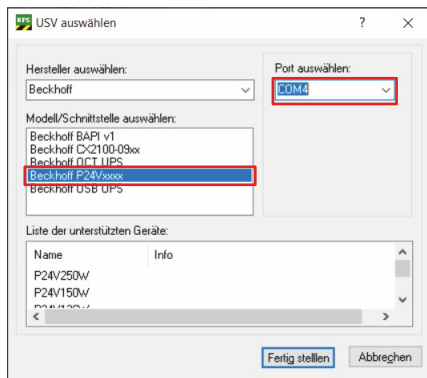


Fig. 18: Select model/interface & port

6. Click *Apply*.



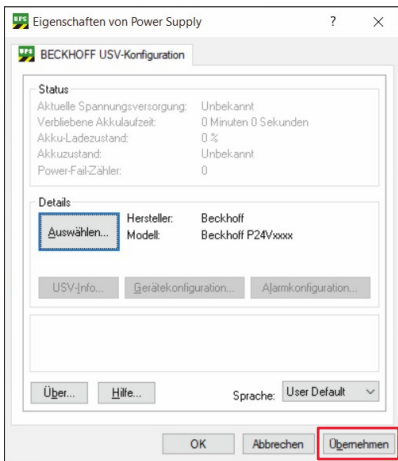


Fig. 19: Apply configuration

⇒ You have configured the UPS. The status of the connected UPS is displayed.

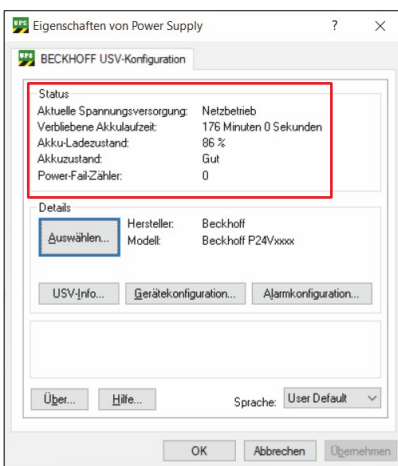


Fig. 20: UPS status

## 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 panel PC, you must first disconnect the power supply and cables. Afterwards, you can dismantle the device from the mounting arm.

If you do not want to continue using the panel PC, Chapter [Disassembly and disposal](#) [▶ 35] 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 disassembling the panel PC, disconnect the cables and the power supply. Follow the steps below:

1. Shut down the panel PC.
  2. Gain access to the connection compartment of the panel PC (see chapter 3.2 [Interface description](#) [▶ 11]).
  3. Disconnect the PC from your external 24 V power supply.
  4. Pull the power plug out of the power supply socket.
  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 transmission cables from the panel PC.
  7. Finally, disconnect the ground connection.
- ⇒ You have disconnected the cables and the power supply.

## 6.2 Disassembly and disposal

To be able to dismount the panel PC from the mounting arm, you must first have disconnected the power supply and the cables (see Chapter [Disconnecting the power supply and cables](#) [▶ 34]).

### Disassembly mounting arm tube

#### NOTICE

##### Damage to property due to falling down

If the panel PC is suspended from the ceiling and you undo the cap nut of the mounting arm adapter without securing it, the panel PC will fall down.

- Make sure the panel PC is secured against falling down before you undo the slotted nut of the mounting arm adapter.

To remove the panel PC from the mounting arm, follow the steps below, shown in Fig. 21:

1. Loosen the slotted nut of the mounting arm adapter with a hook wrench size 58-62 (C9900-Z263) in counterclockwise direction (section A).
  2. Unscrew the hexagon socket screw (1) a few turns with a 3 mm Allen key (section B).
  3. Pull the mounting arm tube out of the mounting arm adapter (section C).
  4. Pull the connecting cables out of the mounting arm tube.
  5. Screw in the hexagon socket screw until it no longer protrudes on the outside.
- ⇒ You have removed the mounting arm tube from the mounting arm adapter.

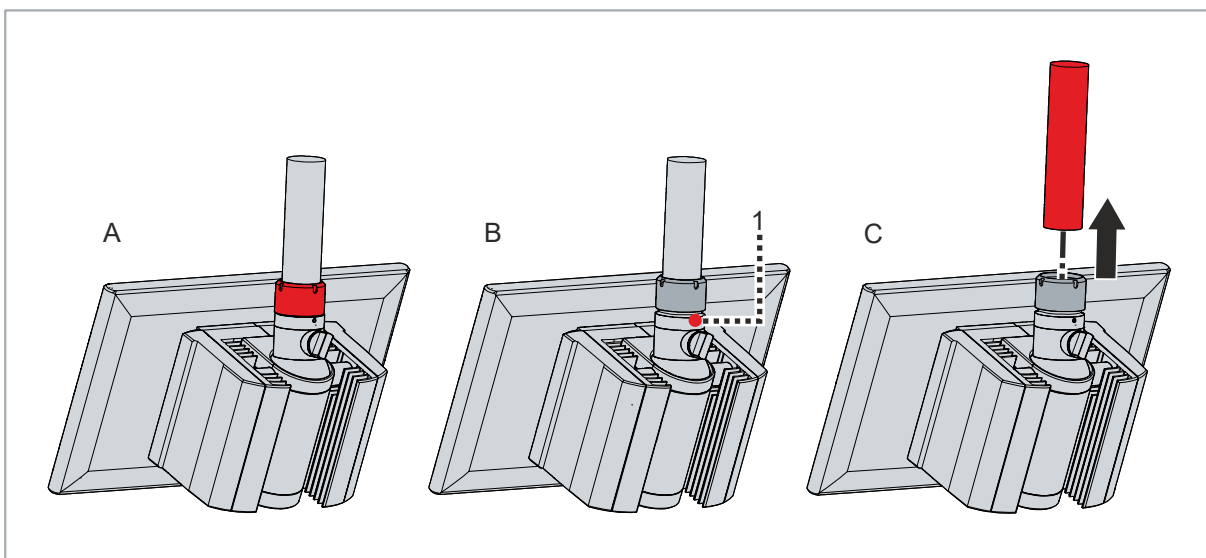


Fig. 21: Disassembly mounting arm tube

### Disassembly handle

To remove the handle from the device, loosen the two M5 screws on the bottom of the device (see Fig. 22). Make sure that the handle is secured against falling.

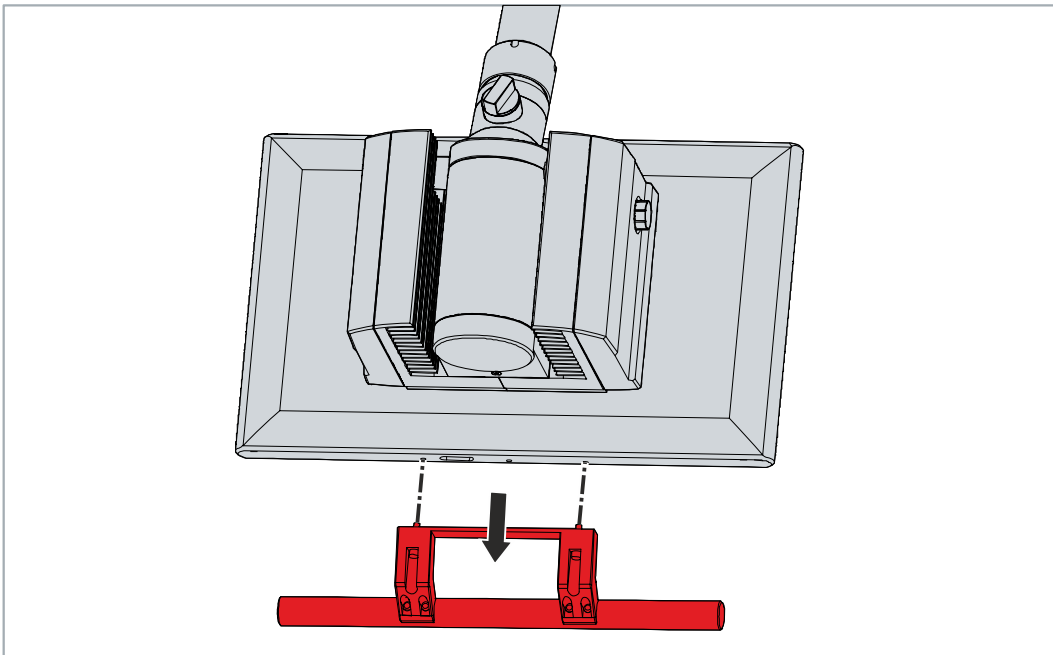


Fig. 22: Disassembly handle

### Disassembly toolboard

To remove a toolboard from the device, follow the steps shown in figures (23-25):

1. Loosen the two M4 screws of the strain relief.

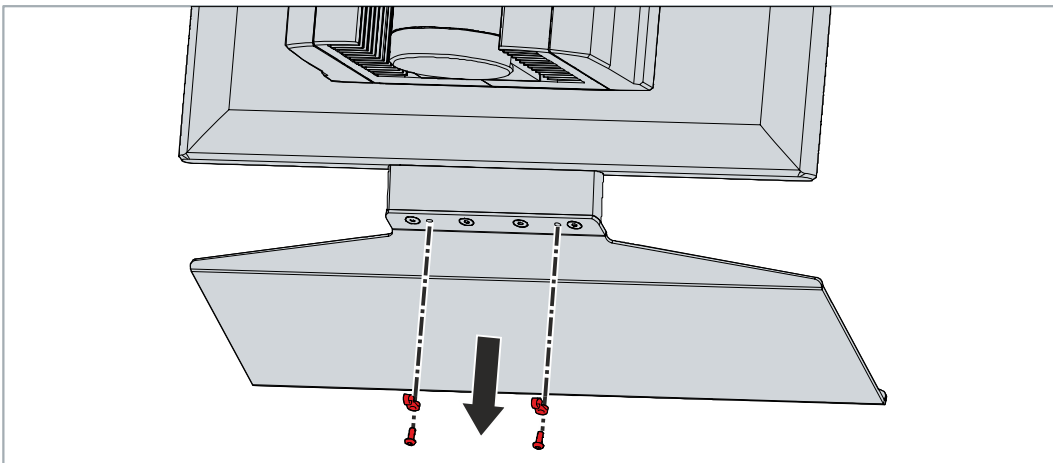


Fig. 23: Removing strain relief

2. Loosen the four M5 screws on the toolboard.

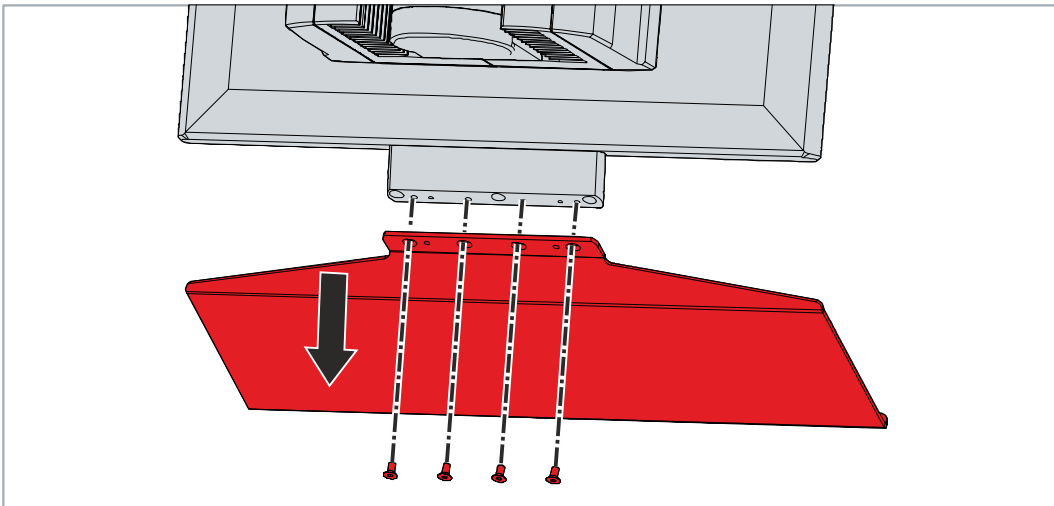


Fig. 24: Dismounting the toolboard

3. Loosen the three M5 screws of the toolboard brackets.

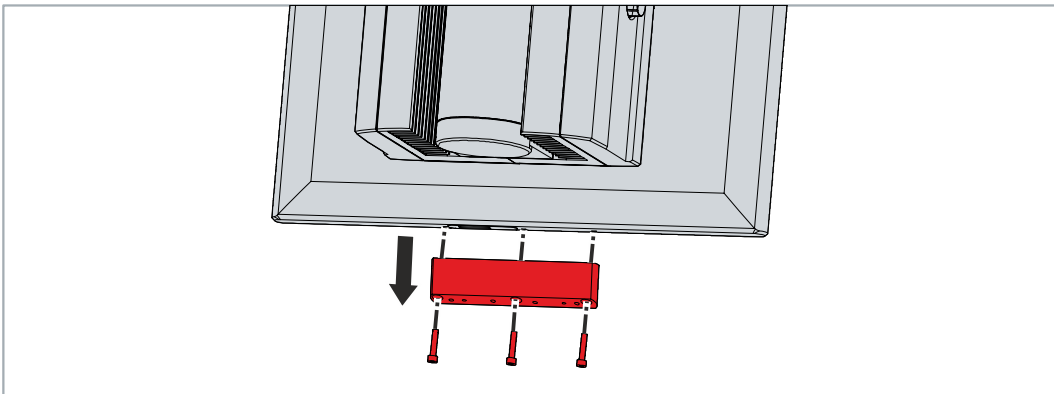


Fig. 25: Dismounting the toolboard brackets

- ⇒ You have dismantled the toolboard.

### Disposal of the panel PC

When disposing of the panel PC, be sure to observe the national electronic waste regulations.

## 7 Maintenance

### ⚠ CAUTION

#### Risk of electric shock

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

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

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

### 7.1 Cleaning

#### NOTICE

#### Unsuitable cleaning agents

The use of unsuitable cleaning agents can damage the device.

- Clean the device only as specified.

#### NOTICE

#### Faulty touch screen function

Cleaning the front screen without cleaning the edge of the glass screen can lead to faulty touch screen functions due to liquid residue.

- Always clean the front screen including the edge of the glass pane to avoid liquid residue.

It is essential to observe the following points when cleaning the panel PC:

- Keep to the boundary conditions of protection rating IP65.
- Never use compressed air to clean the PC.
- Observe the ambient temperature range of 0 °C to 45 °C, even for the temperature of cleaning fluids.

#### Cleaning agents

In order to avoid damage to the front of the panel PC during cleaning, you must use suitable cleaning agents. Examples include:

- benzine
- spirit
- glass cleaner

Avoid the following cleaning agents:

- detergents with scouring or abrasive components
- metal cleaning objects such as razor blades or steel spatulas
- steam jet cleaner or very hot water
- cold water with a heated device
- high water pressure, e.g. high-pressure cleaner

#### Cleaning the front screen

You can clean the front screen of the device during operation. In order to avoid inadvertent touch entries when doing this, you must first set the device to "Cleaning Mode" with the help of the Beckhoff Display Control Tool. Also make sure that you not only clean the display area, but also the edge of the glass pane. Impurities in the edge area or liquids that do not run down the glass pane as drops but as a long short-circuit bridge create an electrically conductive connection between the touch screen area and the metal housing of the device. This unintentionally triggers a touch event at the edge of the touch screen, which can lead to incorrect operation.

The Beckhoff Display Control Tool does not start automatically when the device starts up. Proceed as follows to activate the "Cleaning Mode" of the tool:

1. Click the Beckhoff Display Control Tool icon to start it.
  - ⇒ When the tool is started, a small sun symbol appears in the taskbar.
2. Right-click the sun symbol.
3. Select the "Cleaning Mode" (see Fig.).

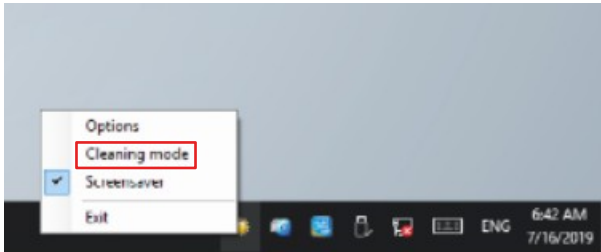


Fig. 26: Select "Cleaning Mode"

⇒ "Cleaning Mode" is activated. You can now clean the front panel.

You can set the duration for which the device should remain in "Cleaning Mode". The period can be set between 5 and 120 seconds. Right-click the sun symbol again and click "Options". Now select the appropriate duration (see Fig.).

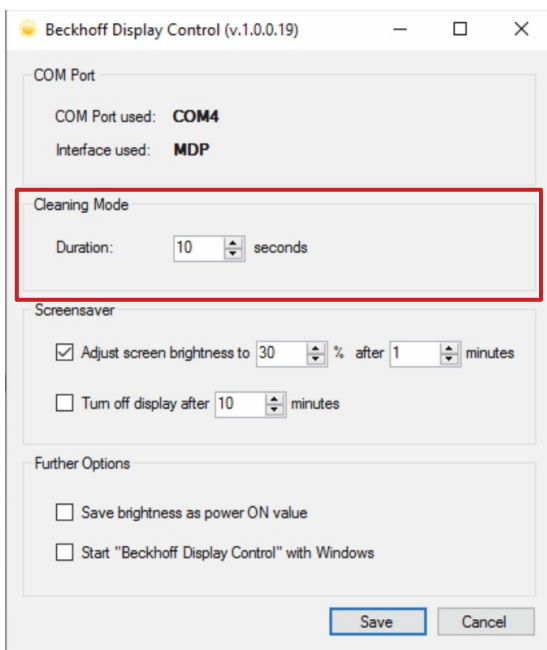


Fig. 27: Configuration "Cleaning Mode"

## 7.2 Maintenance

### NOTICE

#### Use of incorrect spare parts

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

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

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

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

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

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

Table 11: Device component replacement recommendations

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

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

#### ESD protection

### NOTICE

#### Electrostatic discharge

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

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

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

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

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

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



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

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

## 7.2.1 Access to device components

To be able to replace the battery and the storage medium, you must first gain access to these device components. Follow the steps below:

1. Loosen the four M3 screws (1) at the marked points (section A). Make sure that the cover is secured against falling down.
  2. Remove the cover (section B).
- ⇒ You now have access to the battery and the storage medium.

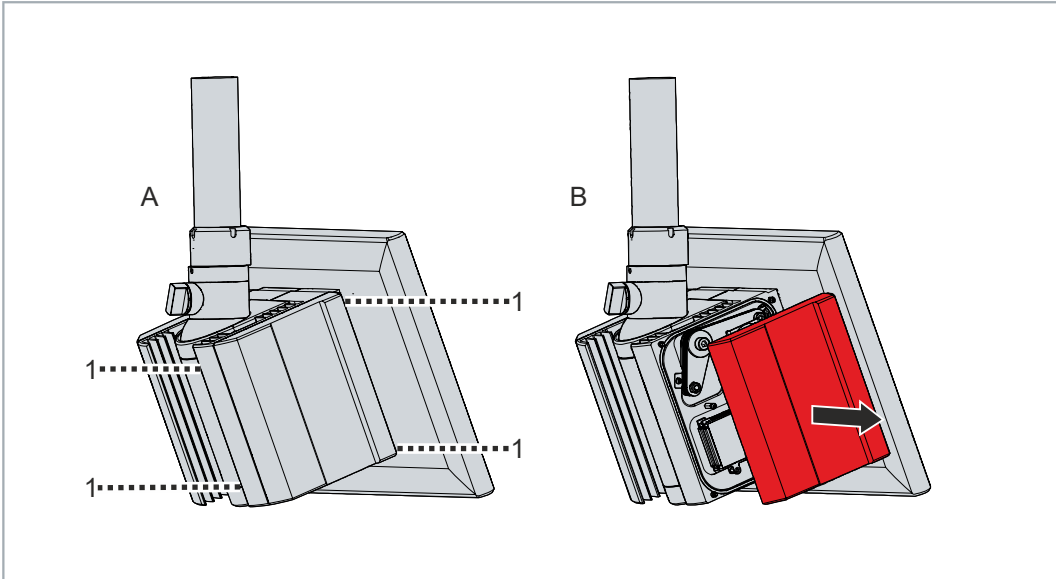


Fig. 28: Access to battery and storage medium

## 7.2.2 Replacing the storage media

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

### Data transmission before replacement

If you want to exchange a storage medium according to Beckhoff's recommendation, you must copy the data from the old to the new storage medium. You can use the Beckhoff Service Tool (BST) for this purpose. BST is a graphical backup and restore program for PCs 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 software. 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, the Beckhoff PC must already have been shipped with a valid operating system license. After installing the fresh image, the applications must be reinstalled.

### Exchange hard disk/SSD

To replace the hard disk or SSD, follow the steps below:

1. Pull the hard disk or SSD firmly out of the device using the protruding Beckhoff sticker (see Fig. 29).

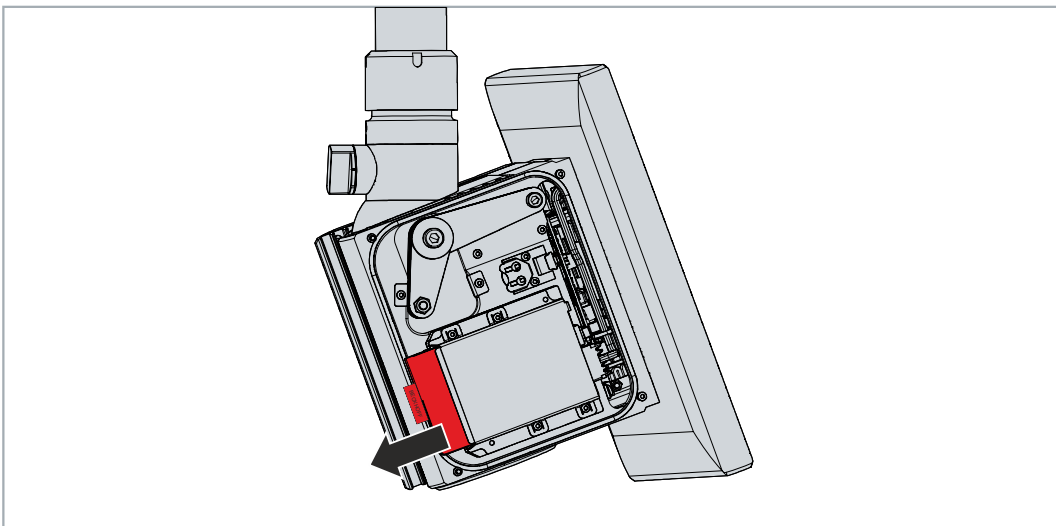


Fig. 29: Exchange hard disk/SSD

2. Insert the new hard disk or SSD into the device in the same orientation up to the stop. The sticker on the hard disk/SSD must face outwards.  
⇒ You have replaced the hard disk or SSD.

### Replacing the CFast

To replace the CFast, follow the steps shown below in Fig. 30:

1. Press lightly against the CFast, as if pressing a button.  
⇒ When you release the CFast, the push-pull mechanism guides the CFast out of the slot far enough for you to grab it.
2. Pull the CFast out of the device.

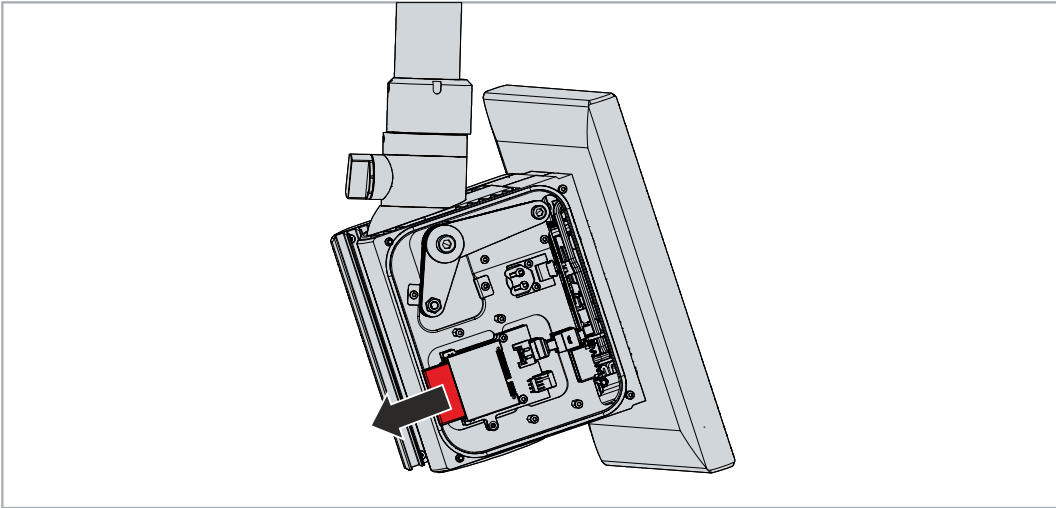


Fig. 30: Replacing the CFast

3. Insert the new CFast into the device in the same orientation until it protrudes just a bit from the device. The sticker with details of the CFast equipment must face outwards.
  4. Press the CFast into the device.
- ⇒ You have replaced the CFast.

#### Disposal of storage media

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

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

### 7.2.3 Replacing the battery

**NOTICE**

**Incorrect battery type**

Replace the battery with R/C (BBCV2), order number RC2032, nominal voltage 3 V. Using any other battery may cause fire or explosion.

- Only replace the battery with a replacement battery from Beckhoff Service.
- When replacing the battery, make sure that the polarity is correct.

**NOTICE**

**Battery damage**

Incorrect handling of the motherboard battery can damage it.

- Do not recharge the battery.
- Do not throw the battery on the fire.
- Do not open the battery.
- Protect the battery against direct sunlight and moisture.

**NOTICE**

**Failure of the electronics due to mechanical damage**

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

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

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

Table 12: Technical data of the battery

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

Chapter 7.2.1 [Access to device components](#) [► 42] shows how to access the battery.

To replace the battery, pull it out of the battery holder (see Fig. 31). Then insert the new battery into the battery holder. Make sure that the polarity is correct as shown in the illustration. The positive pole is located on the wider side of the battery and is also shown on the real battery.

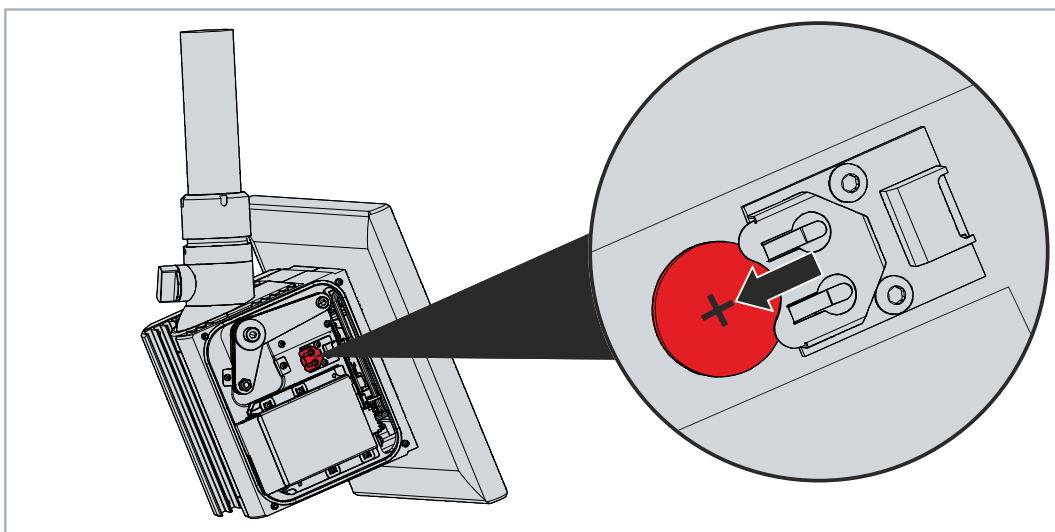


Fig. 31: Battery change

**Battery disposal**

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

## 8 Troubleshooting

<b>Fault</b>	<b>Cause</b>	<b>Measures</b>
No function of the panel PC	No power supply to the panel PC Other cause	Check the power supply cable Call Beckhoff Service
The panel PC does not boot fully	BIOS setup settings are incorrect Other causes	Check BIOS setup settings (load defaults) Call Beckhoff Service
Panel PC boots, software starts, but controller does not work properly	The cause of the error is the software or plant parts outside of the panel PC	Call the machine and software manufacturer
The panel PC only works partially or only temporarily (e.g. dark image or none at all)	Defective backlight in the display Components defective in the panel PC	Call Beckhoff Service Call Beckhoff Service
Malfunction of the touch screen	Poor or missing functional earth of the device Poor or missing ground connection of the user	Establish functional earth User must stand on the floor with normal shoes
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 13: Technical data

Product designation	CP32xx		
Weight	CP3212: 7.5 kg CP3215: 8.0 kg CP3216: 8.6 kg CP3218: 9.6 kg CP3219: 10.2 kg CP3221: 10.7 kg CP3224: 11.7 kg		
Supply voltage	22-30 V <sub>DC</sub> (24 V <sub>DC</sub> power supply unit)		
Power consumption	Data sheet power consumption and power loss in the download finder: <a href="https://www.beckhoff.com/en-en/support/download-finder/search-result/?download_group=691754572">https://www.beckhoff.com/en-en/support/download-finder/search-result/?download_group=691754572</a>		
Protection rating	IP65		
Vibration resistance (sinusoidal vibration)	EN 60068-2-6:	10 ... 58 Hz:	0.035 mm
		58 ... 500 Hz:	0.5 G (~ 5 m/ s <sup>2</sup> )
Shock resistance (shock)	EN 60068-2-27:	5 G (~ 50 m/s <sup>2</sup> ), duration: 30 ms	
EMC interference immunity	conforms to EN 61000-6-2		
EMC interference emission	conforms to EN 61000-6-4		
Permissible ambient temperature	Operation: 0 °C to +45 °C Transport / storage: -20 °C ... +65 °C		
Permissible relative 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 vibration resistance during transport can be improved by suitable packaging of the device.		



## 10 Appendix

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

### 10.1 Service and support

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

#### Beckhoff Service

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

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

Hotline: + 49 5246/963-460  
email: [service@beckhoff.com](mailto: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](mailto:support@beckhoff.com)

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

You can also find further documentation for Beckhoff components there.

## 10.2 Approvals

Your device has at least the following approvals:

- CE
- EAC
- UKCA
- 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.

# List of figures

Fig. 1	Structure.....	10
Fig. 2	Access to interfaces .....	11
Fig. 3	Voltage socket pin numbering.....	12
Fig. 4	Ethernet interface pin numbering .....	13
Fig. 5	Name plate.....	15
Fig. 6	Mounting arm adapter .....	19
Fig. 7	Mounting arm tube installation .....	20
Fig. 8	Installing handle .....	21
Fig. 9	Toolboard mounting brackets.....	22
Fig. 10	Mounting the toolboard .....	22
Fig. 11	Mounting strain relief.....	23
Fig. 12	Grounding bolt for functional earthing .....	25
Fig. 13	Wiring diagram C9900-U330.....	27
Fig. 14	Beckhoff Device Manager - Change passwords .....	30
Fig. 15	Beckhoff Device Manager – Start page .....	31
Fig. 16	Select UPS.....	32
Fig. 17	Select manufacturer .....	32
Fig. 18	Select model/interface & port .....	32
Fig. 19	Apply configuration.....	33
Fig. 20	UPS status .....	33
Fig. 21	Disassembly mounting arm tube.....	35
Fig. 22	Disassembly handle .....	36
Fig. 23	Removing strain relief .....	36
Fig. 24	Dismounting the toolboard .....	37
Fig. 25	Dismounting the toolboard brackets.....	37
Fig. 26	Select "Cleaning Mode" .....	39
Fig. 27	Configuration "Cleaning Mode" .....	39
Fig. 28	Access to battery and storage medium.....	42
Fig. 29	Exchange hard disk/SSD .....	43
Fig. 30	Replacing the CFast.....	44
Fig. 31	Battery change .....	45

## List of tables

Table 1	Legend structure .....	10
Table 2	Wiring with 8-core cable.....	12
Table 3	Wiring with 12-core cable (C9900-K275/-K276/-K277).....	12
Table 4	Controller classification based on device generation .....	13
Table 5	Ethernet interface pin assignment.....	13
Table 6	LED meaning speed 100/1000 Mbit/s .....	14
Table 7	LED meaning speed 100/1000/2500 Mbit/s .....	14
Table 8	Legend name plate .....	15
Table 9	Mechanical extensions.....	21
Table 10	Order identifier battery pack.....	26
Table 11	Device component replacement recommendations .....	40
Table 12	Technical data of the battery.....	45
Table 13	Technical data.....	48



More Information:  
[www.beckhoff.com/cp32xx](http://www.beckhoff.com/cp32xx)

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