BECKHOFF New Automation Technology

Manual | EN

CP32xx-1600

Panel PC

Table of contents

1 Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.

The following instructions and explanations must be followed during installation and commissioning of the components. The responsible staff must ensure that the application or use of the products described satisfy all the 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. For that reason the documentation is not in every case checked for consistency with performance data, standards or other characteristics. In the event that it contains technical or editorial errors, we retain the right to make alterations at any time and without warning. No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams, and descriptions in this documentation. All illustrations shown are only examples. The configurations depicted may deviate from the standard.

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Delivery state

All the components are supplied in particular hardware and software configurations appropriate for the application. Changes to the hardware or software configuration are permitted, provided they are within the specified limits for power consumption and power loss (please refer to the respective data sheet).

Currentness

Please check whether you are using the current and valid version of this document. The current version is always available for download from the Beckhoff website. In case of doubt, contact Technical Support.

Delivery conditions

In addition, the general delivery conditions of the company Beckhoff Automation GmbH & Co. KG apply.

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 the avoidance of personal injuries and damage to property.

Exclusion of liability

Beckhoff shall not be liable in the event of non-compliance with this documentation and thus the use of the devices outside the documented operating conditions.

2.1 Signal words

The signal words used in the documentation are classified below.

Warning of personal injuries

⚠ DANGER
Hazard with high risk of death or serious injury.

⚠ WARNING
Hazard with medium risk of death or serious injury.

⚠ CAUTION
There is a low-risk hazard that can result in minor injury.

Warning of property and environmental damage

NOTICE
There is a possibility of damage to the environment, equipment or data.

2.2 Intended use

The the Panel PC 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 the Panel PC.

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-1600 series you can use multi-touch directly in the field. The devices in the robust aluminum housing are designed for mounting arm installation.

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
- simple HMI applications
- axis control
- short cycle times
- high-volume data handling
- other PC applications

The Panel PC is available in the following five display sizes, with corresponding resolutions in 5:4 and 16:9 formats:

- 15-inch (1024 x 768)
- 15.6-inch (1366 x 768)
- 18.5-inch (1366 x 768)
- 19-inch (1280 x 1024)
- 21.5-inch (1920 x 1080)
- 24-inch (1920 x 1080)

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

In its basic configuration, the CP32xx-1600 includes the following features:

- Intel$^®$ processor
- 1 x push-pull Ethernet 100/1000BASE-T connection
- 1 x USB
- Hard disk

Push button extension

The following Panel PCs are optionally available ex works with a corresponding push button extension, C9900-G05x:

- CP3216-1600 (C9900-G050, C9900-G051)
- CP3218-1600 (C9900-G052, C9900-G053)
- CP3221-1600 (C9900-G054, C9900-G055)
- CP3224-1600 (C9900-G056, C9900-G057)

For explanations of the push button extension and the functions, refer to the manual C9900-G05x. Figure 1 shows an example of a Panel PC without (1) and with (2) push button extension.

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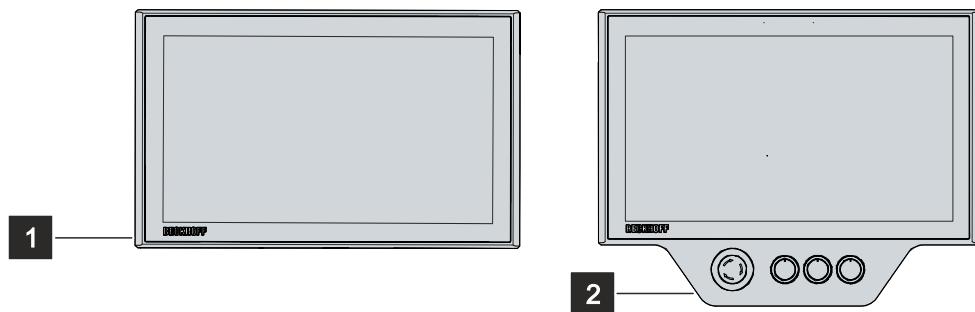
Fig. 1: CP32xx-1600_with and without push button extension

3.1   Structure
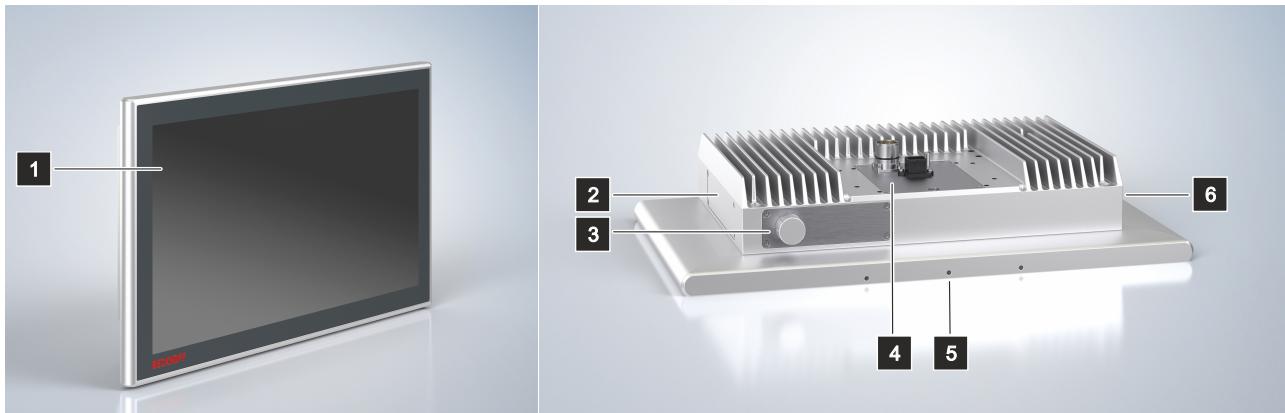
Fig. 2: CP32xx-1600_configuration

Table 1: Legend for CP32xx-1600 configuration

No.	Component	Description
1	Display and touch screen glass	Operation of the Panel PC
2	Battery and storage media cover	Access to battery and storage media
3	Extension plate with USB interface	Additional USB interface with up to two further optional USB interfaces
4	Connection compartment	Access to interfaces
5	Drill holes	For mounting mechanical extensions
6	Fan cartridge	Internal cooling of the Panel PC

3.2 Interface description

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

- Power supply (X101)
- Ethernet RJ45
- USB

The voltage socket and the Ethernet interface are located on the rear side in the connection compartment of the Panel PC (1). The USB interface is located behind a screw cap in the extension plate at the bottom rear of the housing (2). To access the USB interface, you must remove the screw cap.
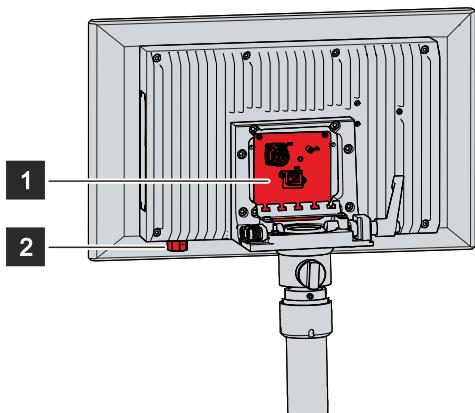

Fig. 3: CP32xx-1600_interfaces basic configuration

If you have installed a mounting arm adapter on the Panel PC, you first have to gain access to the connection compartment of the device. To do this, follow the steps below as shown in Figure 4:

1. Use a screwdriver to reach into the recesses on the underside of the mounting arm adapter (section A).
2. Bend the cover slightly outwards so that you can push out the latching lugs.
3. Slide the cover upwards off the mounting arm adapter (section B).
   ⇨ You now have access to the connection compartment of the Panel PC (section C).
4. Push the cover back onto the mounting arm adapter from top to bottom until the latching lugs snap back into place.
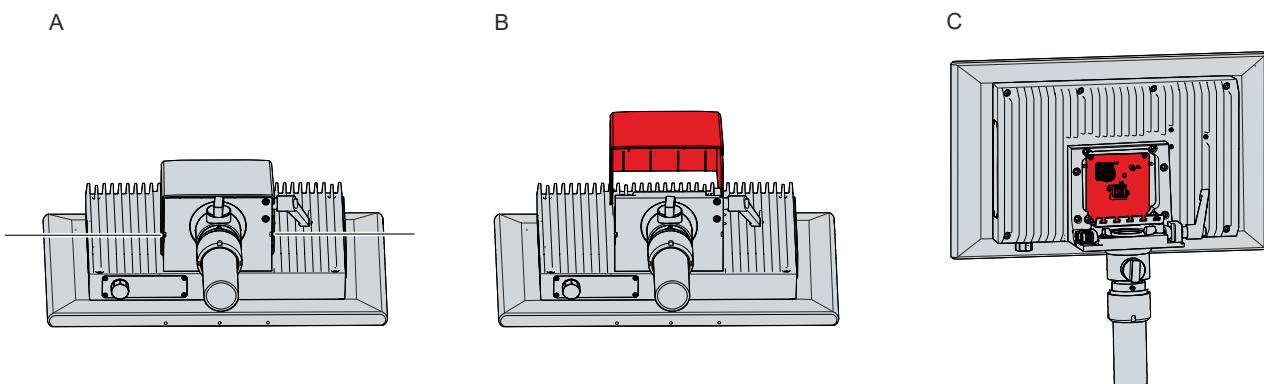
Fig. 4: CP32xx-1600_access connection compartment

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. The main supply voltage is applied between pins 5 (0 V) and 6 (24 V). 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 option C9900-U330 is available for this purpose.

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	ye/gn	⏚	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 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	ye/gn	⏚	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 basic version of the Panel PC has an Ethernet RJ45 interface in the form of a push-pull built-in socket. The 100Base-T and 1000Base-T Ethernet standards enable the connection of corresponding network components and data rates of 100/1000 Mbit/s. The required speed is selected automatically. The cable is routed through the mounting arm adapter.

The RJ45 connection technology with twisted-pair cables is used. The maximum length of the cable connection is 100 m.

The Ethernet port is suitable for cycle times <= 1 ms and for distributed clock applications with EtherCAT.

The Intel® i210 is used as controller.
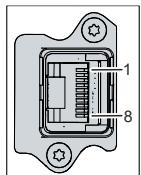
Fig. 5: CP32xx-1600_Ethernet interface pin numbering

Table 4: Ethernet interface pin assignment

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

3.2.3   USB

The Panel PC has a USB 3.0 interface according to IP65. This is used to connect peripheral devices with USB connection. The interface is located behind a screw cap. It supplies 900 mA current and is electronically fused.
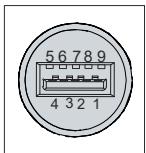
Fig. 6: CP32xx-1600_USB interface pin numbering

Table 5: 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 +

3.3   Optional interfaces

You can extend the Panel PC beyond the basic configuration by additional interfaces.

Extension connection compartment

Depending on the product version, different ordering options are available to add interfaces to the connection compartment:

Table 6: Ordering options by product version

Product version	Ordering option
CP32xx-1600-0020	Ethernet RJ45 (order identifier FC9071-0001, requires PCIe module slot C9900-B519)
	2 x Ethernet RJ45 (order identifier: C9900-E282, requires PCIe module slot C9900-B519)
	Ethernet RJ45 (order identifier: C9900-E185)
	Push pull USB 3.0 (order identifier: C9900-E283)
	USB 3.0 (order identifier: C9900-E283)
	USB 2.0 (order identifier: C9900-E190)
	USB 3.0 (order identifier: C9900-E304)
CP32xx-1600-0030	Ethernet RJ45 (order identifier FC9071-0001, requires PCIe module slot C9900-B519)
	2 x Ethernet RJ45 (order identifier: C9900-E282, requires PCIe module slot C9900-B519)
	Ethernet RJ45 (order identifier: C9900-E185)
	RS232 (order identifier: C9900-E186)
	RS422 (order identifier: C9900-E248)
	RS485 (order identifier: C9900-E261)
	Push pull USB 3.0 (order identifier: C9900-E283)
	USB 3.0 (order identifier: C9900-E283)
	USB 2.0 (order identifier: C9900-E190)
	USB 3.0 (order identifier: C9900-E304)
CP32xx-1600-0040	Ethernet RJ45 (order identifier FC9071-0001, requires PCIe module slot C9900-B519)
	2 x Ethernet RJ45 (order identifier: C9900-E282, requires PCIe module slot C9900-B519)
	Ethernet RJ45 (order identifier: C9900-E185)
	RS232 (order identifier: C9900-E186)
	RS422 (order identifier: C9900-E248)
	RS485 (order identifier: C9900-E261)
	Push pull USB 3.0 (order identifier: C9900-E283)
	USB 3.0 (order identifier: C9900-E283)
	USB 2.0 (order identifier: C9900-E190)
	USB 3.0 (order identifier: C9900-E304)

You can equip the connection compartment with a maximum of six interfaces. Any interfaces that are ordered are installed ex factory.

Extension plate

On the other hand, you can equip the extension plate with two additional USB 3.0 interfaces:

• C9900-E326: USB 3.0

Any interfaces that are ordered are installed ex factory.

In addition, you can order the Panel PC without interfaces in the extension plate. Under the following order option the PC is only equipped with a blank cover:

- C9900-E330: CP32xx-16xx-00x0 without 1-poert USB 3.0 connector in the bottom of the PC housing

Cover device components

You can order another interface option, which is located by the motherboard battery and storage device behind the cover:

- C9900-E329: 1-port USB 2.0 socket behind the CFast/HDD/SSD flap of the CP32xx-1600-00x0 or CP37xx-1600-00x0 for a TwinCAT 3.1 license key USB stick C9900-L100

You can access the interface by loosening the four M3x6 screws of the cover and then removing the cover (see Fig. 8).
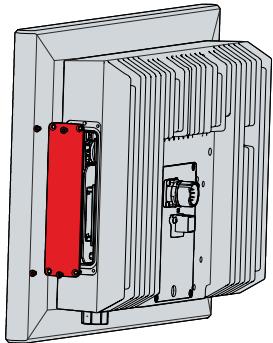

Fig. 7: CP32xx-1600_Access USB interface

The position of the interface is suitable for the use of a license key USB stick. It is equipped with a local data memory for saving TwinCAT 3.1 license files. The stick is not included in the USB interface ordering option.
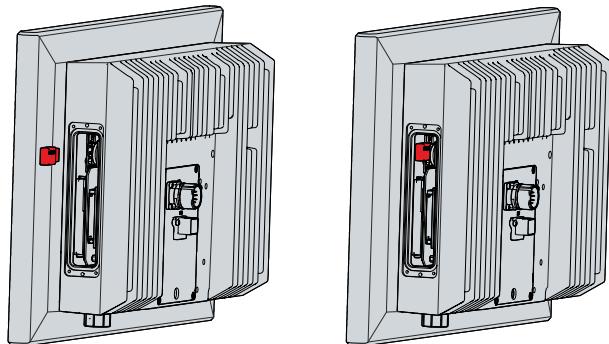

Fig. 8: CP32xx-1600_license key USB stick

3.3.1   Ethernet RJ45

The additional, optional Ethernet RJ45 interfaces in the form of push-pull built-in sockets enable the connection of appropriate network components with data rates of 100/1000 Mbit/s in accordance with the Ethernet standards 100Base-T and 1000Base-T. 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 Ethernet ports are suitable for cycle times <= 1 ms and for distributed clock applications in EtherCAT.

The Intel® i210 is used as controller.
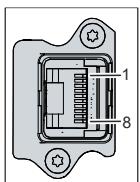
Fig. 9: CP32xx-1600_Optional Ethernet interfaces – pin numbering

Table 7: Ethernet interface pin assignment

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

3.3.2 RS232

The optional RS232 interface includes an M12 socket. The interface provides an asynchronous, serial communication method defined in the RS232 standard.
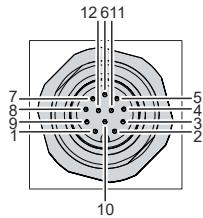

Fig. 10: CP32xx-1600_RS232 interface pin numbering

Table 8: RS232 pin assignment

Pin	Signal	Type	Description
1	DCD		Carrier recognized
2	RxD	Signal in	Receive Data
3	TxD	Signal out	Transmit Data
4	DTR		Data receiver ready
5	GND	Ground	Ground
6	DSR		Ready for operation
7	RTS	Signal out	Request to Send
8	CTS	Signal in	Clear to Send
9	RI	Signal in	Ring Indicator

3.3.3 RS422

The optional RS422 serial interface includes an electrically isolated M12 socket for high-speed serial data transmission.

The channel features overvoltage protection. If an overvoltage occurs, the channel is switched off.
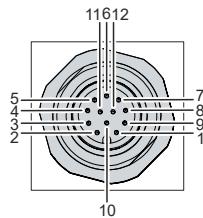
Fig. 11: CP32xx-1600_RS422 interface pin numbering

Table 9: RS422 pin assignment

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

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

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Table 10: RS422 standard configuration

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

3.3.4   RS485

The optional RS485 serial interface includes an electrically isolated M12 socket for high-speed serial data transmission.

The channel features surge voltage protection. If an overvoltage occurs, the channel is switched off.
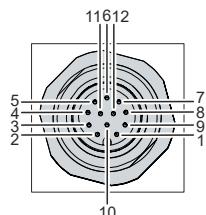

Fig. 12: CP32xx-1600_RS485 interface pin numbering

Table 11: RS485 pin assignment

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

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

Table 12: RS485 standard configuration

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

3.3.5   USB

The additional optional USB interfaces are used to connect peripheral devices with USB ports. Depending on the ordering option, the interfaces are located either in the connection compartment or in the extension plate. It supplies 900 mA current and is electronically fused.
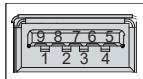
Fig. 13: CP32xx-1600_Optional USB interfaces – pin numbering

Table 13: 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.

3.4 Name plate

The name plate provides information on the equipment fitted to the Panel PC. The name plate shown here serves only as an example.
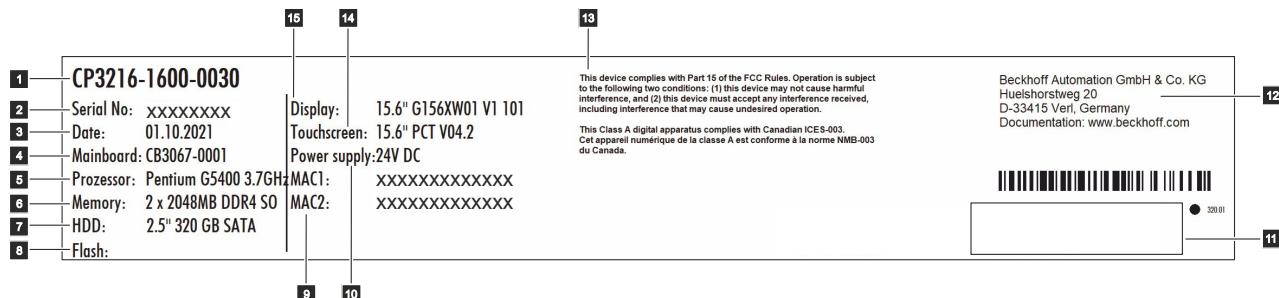
Fig. 14: CP32xx-1600_name plate

Table 14: Legend for CP32xx-1600 name plate

No.	Description
1	Model
2	Serial number (BTN)
3	Date of manufacture
4	Mainboard
5	CPU
6	Main memory
7	Storage media
8	Storage media
9	MAC addresses of the Ethernet interfaces
10	Power supply: 24 V_{DC}, NEC class 2
11	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. |
12	Address of the vendor
13	FCC approval
14	Touch screen
15	Display

3.5 Connection cable

Optionally, ready-made connection cables for all connections are available in various lengths. You can order them using the following article descriptions:

Table 15: Power supply cable

Connection cable	Power supply cable with IP65 plug
C9900-K271	Power supply cable IP 65 for CP32xx, CP37xx or CP72xx, length 5 m, pre-assembled, M23 socket, screw-type, 8-wire, second end open
C9900-K272	Power supply cable IP 65 for CP32xx, CP37xx or CP72xx, length 10 m, pre-assembled, M23 socket, screw-type, 8-wire, second end open
C9900-K275	Power supply cable IP 65 for CP32xx, CP37xx or CP72xx, length 5 m, 12-wire: 24 V minus, battery plus and battery minus each 2 x 1 mm^2 for low voltage drop, pre-assembled, M23 socket, screw-type, second end open
C9900-K276	Power supply cable IP 65 for CP32xx, CP37xx or CP72xx, length 10 m, 12-wire: 24 V minus, battery plus and battery minus each 2 x 1 mm^2 for low voltage drop, pre-assembled, M23 socket, screw-type, second end open
C9900-K277	Power supply cable IP 65 for CP32xx, CP37xx or CP72xx, length 20 m, 12-wire: 24 V minus, battery plus and battery minus each 2 x 1 mm^2 for low voltage drop, pre-assembled, M23 socket, screw-type, second end open

Table 16: Network cable

Connection cable	Network cable with IP65 plug
C9900-K281	Network cable for CP32xx, CP37xx and CP72xx, length 3 m, pre-assembled, push-pull Ethernet connector IP 65, second end RJ45, IP 20
C9900-K282	Network cable for CP32xx, CP37xx and CP72xx, length 5 m, pre-assembled, push-pull Ethernet connector IP 65, second end RJ45, IP 20
C9900-K283	Network cable for CP32xx, CP37xx and CP72xx, length 10 m, pre-assembled, push-pull Ethernet connector IP 65, second end RJ45, IP 20
C9900-K284	Network cable for CP32xx, CP37xx and CP72xx, length 15 m, pre-assembled, push-pull Ethernet connector IP 65, second end RJ45, IP 20
C9900-K285	Network cable for CP32xx, CP37xx and CP72xx, length 20 m, pre-assembled, push-pull Ethernet connector IP 65, second end RJ45, IP 20
C9900-K286	Network cable for CP32xx, CP37xx and CP72xx, length 30 m, pre-assembled, push-pull Ethernet connector IP 65, second end RJ45, IP 20
C9900-K287	Network cable for CP32xx, CP37xx and CP72xx, length 40 m, pre-assembled, push-pull Ethernet connector IP 65, second end RJ45, IP 20
C9900-K288	Network cable for CP32xx, CP37xx and CP72xx, length 50 m, pre-assembled, push-pull Ethernet connector IP 65, second end RJ45, IP 20

Table 17: USB cables

Connection cable	USB cable with IP 65 connector
C9900-K306	USB 3.0 cable for CP32xx, CP37xx or CP72xx, length 3 m, pre-assembled, push-pull USB 3.0 connector IP 65, second end USB B connector IP 20

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Table 18: Serial interface cable RS232

Connection cable	Serial interface cable RS232 with IP 65 connector
C9900-K295	Serial interface cable RS232 for CP32xx, CP37xx or CP72xx, length 3 m, pre-assembled, M12 plug connector IP 65, screw-type, 12-pin, second end D-Sub 9 connector
C9900-K296	Serial interface cable RS232 for CP32xx, CP37xx or CP72xx, length 5 m, pre-assembled, M12 plug connector IP 65, screw-type, 12-pin, second end D-Sub 9 connector
C9900-K297	Serial interface cable RS232 for CP32xx, CP37xx or CP72xx, length 10 m, pre-assembled, M12 plug connector IP 65, screw-type, 12-pin, second end D-Sub 9 connector

Version: 1.9 CP32xx-1600

4   Commissioning

Operation of the Panel PC

The Panel PC 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 Beckhoff protective film. The film provides short-term protection for a few days.

You can either order a Beckhoff protective film individually and fit it yourself retrospectively, or you can order the film for fitting directly ex factory.

The following ordering options are available:

Table 19: Ordering options: Film, individual

Ordering option	Description
C9900-T228	Adhesive protective film for Panel PCs and Control Panels with 15.6-inch display, for fitting onto the glass pane, 1 item
C9900-T229	Adhesive protective film for Panel PCs and Control Panels with 18.5-inch display, for fitting onto the glass pane, 1 item
C9900-T230	Adhesive protective film for Panel PCs and Control Panels with 19-inch display, for fitting onto the glass pane, 1 item
C9900-T231	Adhesive protective film for Panel PCs and Control Panels with 21.5-inch display, for fitting onto the glass pane, 1 item
C9900-T232	Adhesive protective film for Panel PCs and Control Panels with 24-inch display, for fitting onto the glass pane, 1 item

Table 20: Ordering options: Film fitted ex factory

Ordering option	Description
C9900-T220	Adhesive protective film for Panel PCs and Control Panels with 15.6-inch display, for fitting onto the glass pane ex factory
C9900-T221	Adhesive protective film for Panel PCs and Control Panels with 18.5-inch display, for fitting onto the glass pane ex factory
C9900-T222	Adhesive protective film for Panel PCs and Control Panels with 19-inch display, for fitting onto the glass pane ex factory
C9900-T223	Adhesive protective film for Panel PCs and Control Panels with 21.5-inch display, for fitting onto the glass pane ex factory
C9900-T224	Adhesive protective film for Panel PCs and Control Panels with 24-inch display, for fitting onto the glass pane ex factory

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

1. For fitting the film choose a location that 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.

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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.

Commissioning

In order to use the Panel 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 the mounting 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.

4.1   Transport and unpacking

The specified storage conditions must be adhered to (see chapter 9 Technical data [▶ 54]).

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 Panel PC, in particular 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 device:

1. Check the packaging for transport damage.
2. Remove packaging.
3. Keep the packaging for possible future transport.
4. Check your delivery for completeness by comparing it with your order.
5. Check the contents for visible shipping damage.
6. 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 Assembly

The Panel PC CP32xx-1600 is designed for installation on a mounting arm system. Please observe the environmental conditions prescribed for the operation (see Chapter 9 Technical data [▶ 54]).

The Panel PC is installed on the mounting arm system using a mounting arm adapter. At the rear of the Panel PC there are four M6 threaded holes spaced 100 x 100 mm apart and four M6 threaded holes spaced 70 x 130 mm apart for installing a mounting arm adapter. The following ordering options are available, if you require a Beckhoff mounting arm adapter for the installation:

Table 21: Mounting arm adapter ordering option

Order identifier	Version
C9900-M761	Rotatable and tiltable mounting arm adapter for CP32xx-16xxx, clamping lever to lock the tilt

Figure 16 shows the available mounting arm adapters. It has a locking screw to prevent twisting and a clamping lever with which you can lock the tilt. The mounting arm adapter can be rotated by +/- 165°. The adapter adapts the Panel PC with a 48.3 mm circular tube.
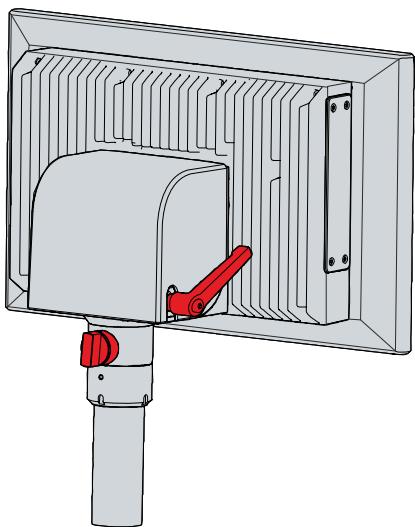

Fig. 15: CP32xx-1600_mounting arm adapter

You must install the adapter yourself. The procedure is shown below. The cable is routed through the mounting arm.

For more information on the mounting arm adapter, please refer to the corresponding data sheet.

Installing the mounting arm adapter

If you have chosen the above-mentioned mounting arm adapter from Beckhoff, you must decide before mounting whether you want to align the device upwards or downwards (see Fig. 17).
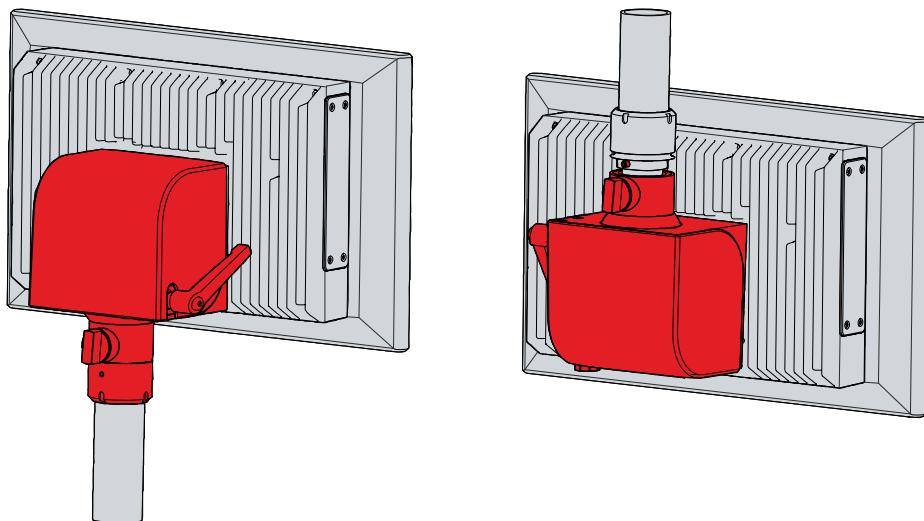
Fig. 16: CP32xx-1600_orientation of the mounting arm adapter

To fasten the mounting arm adapter to the Panel PC, follow the steps below, shown in Fig. 18:

1. Remove the cover of the mounting arm adapter (section A). For the exact procedure see chapter 3.2 Interface description [▶ 12].
2. Place the mounting arm adapter with the four M6 screws at a distance of 70 x 130 mm in front of the corresponding four M6 threaded holes on the rear side of the Panel PC (section B).

A   B
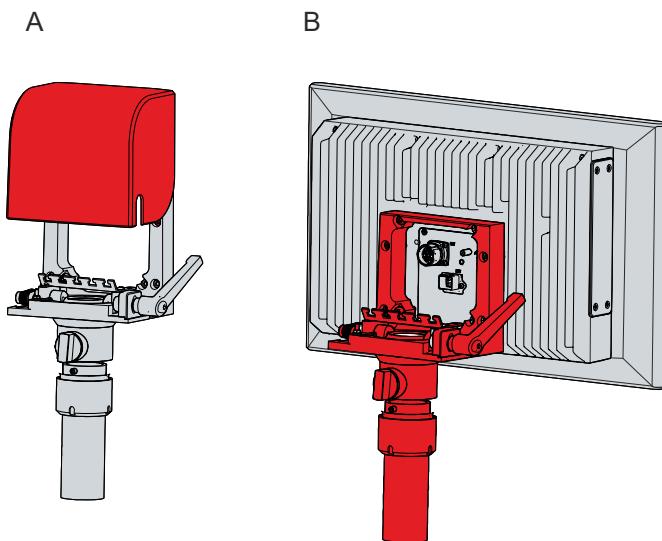
Fig. 17: CP32xx-1600_installing the mounting arm adapter

3. Tighten the four M6 screws with a tightening torque of 6 Nm.
4. Replace the cover on the mounting arm adapter.
⇨ You have installed the mounting arm adapter on the Panel PC.

A strain relief plate is located inside the mounting arm adapter. You can relocate this according to your requirements.

4.2.1 Dimensions

All dimensions are in mm.

Fig. 19 shows the dimensions of the 15-inch Panel PC.
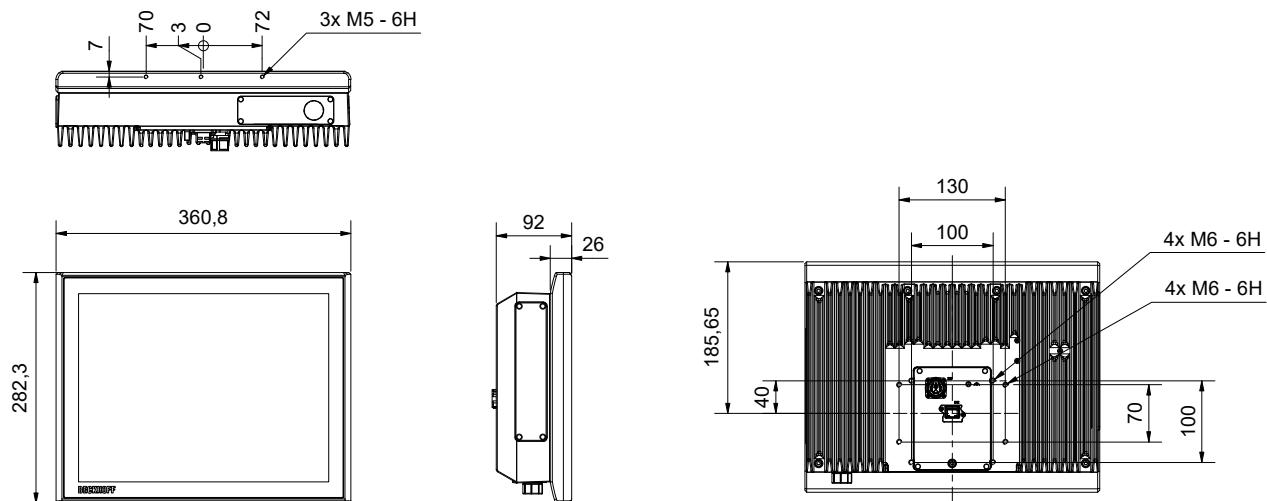
Fig. 18: CP32xx-1600_dimensions 15-inch

Fig. 20 shows the dimensions of the 15.6-inch Panel PC.
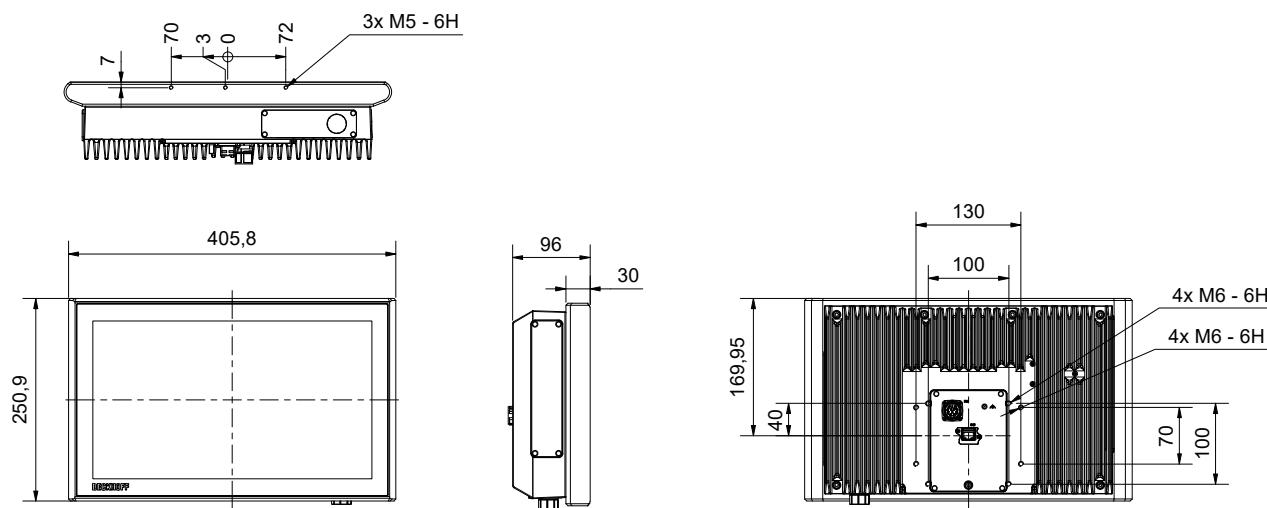
Fig. 19: CP3216-1600_dimensions 15,6-inch

Fig. 21 shows the dimensions of the 15.6-inch Panel PC with push button extension.
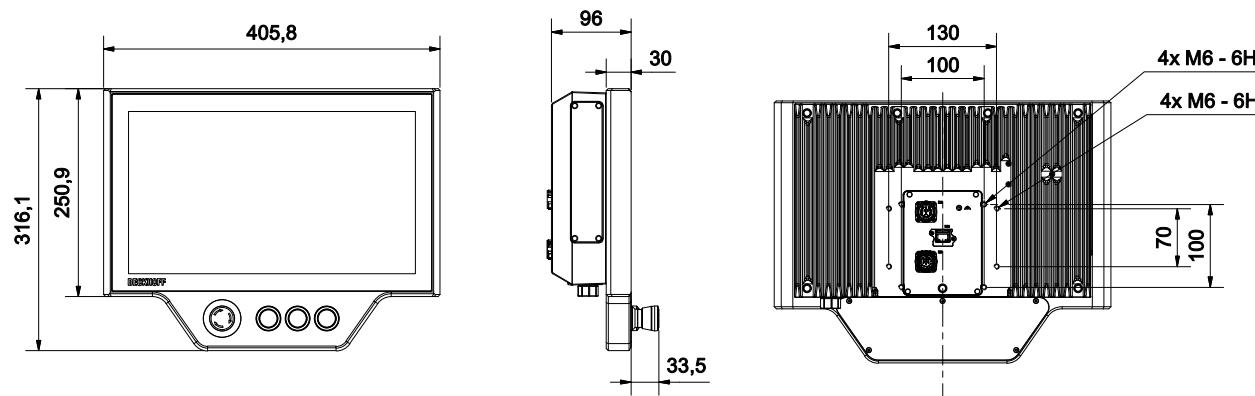
Fig. 20: CP3216-1600_dimensions 15.6-inch push button extension

Fig. 22 shows the dimensions of the 18.5-inch Panel PC.
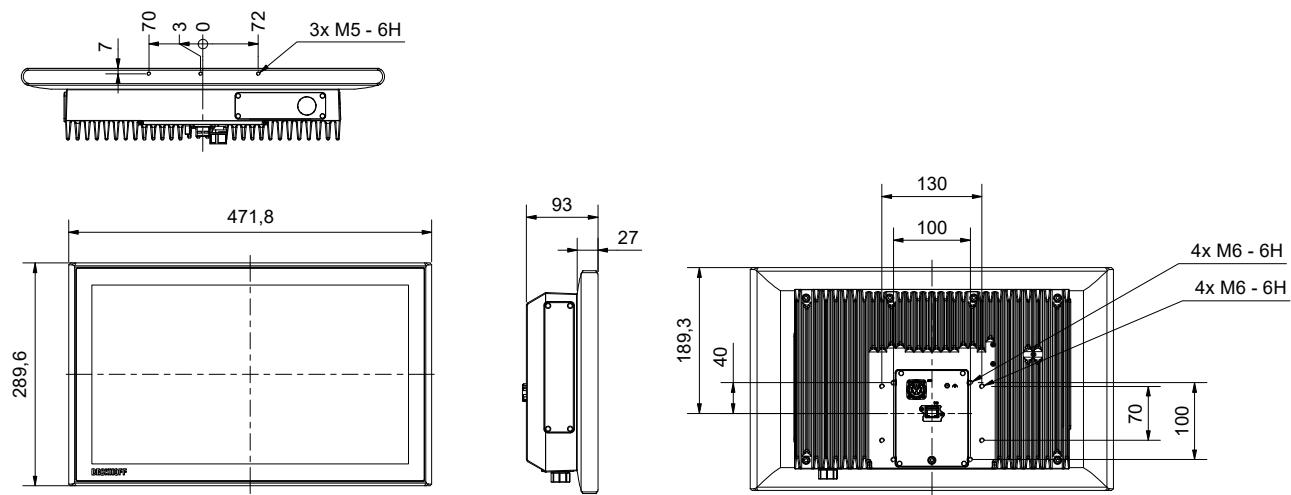
Fig. 21: CP3218-1600_dimensions 18.5-inch

Fig. 23 shows the dimensions of the 18.5-inch Panel PC with push button extension.
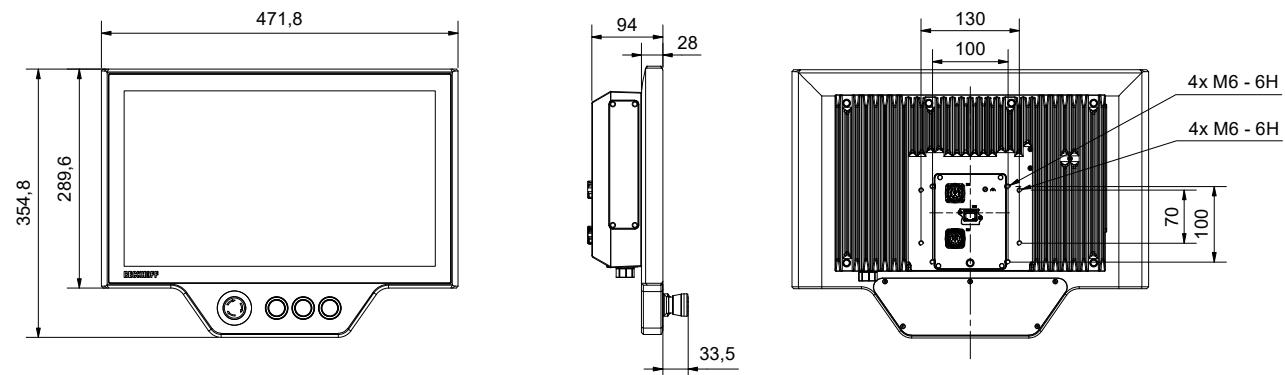
Fig. 22: CP3218-1600_dimensions 18.5-inch push button extension

Fig. 24 shows the dimensions of the 19-inch Panel PC.
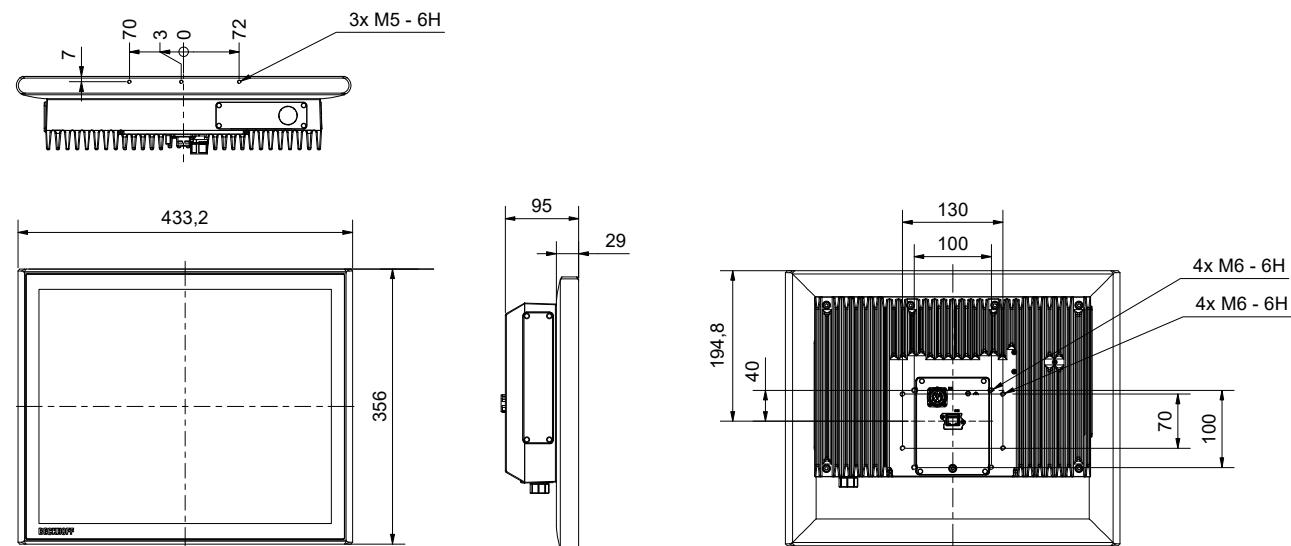
Fig. 23: CP3219-1600_dimensions 19-inch

Fig. 25 shows the dimensions of the 21.5-inch Panel PC.
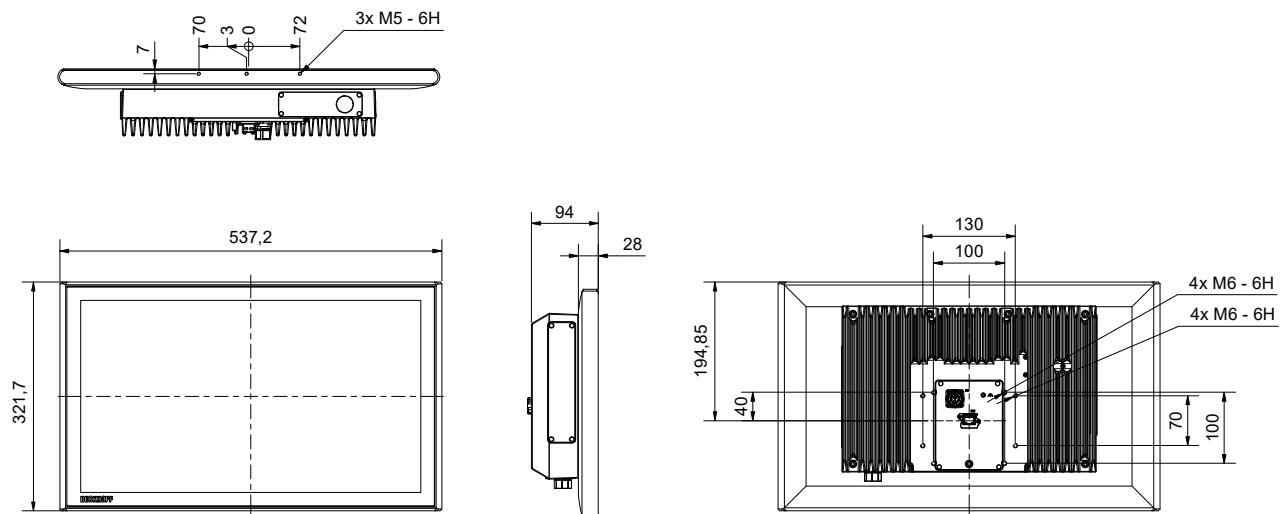
Fig. 24: CP3221-1600_dimensions 21.5-inch

Fig. 26 shows the dimensions of the 21.5-inch Panel PC with push button extension.
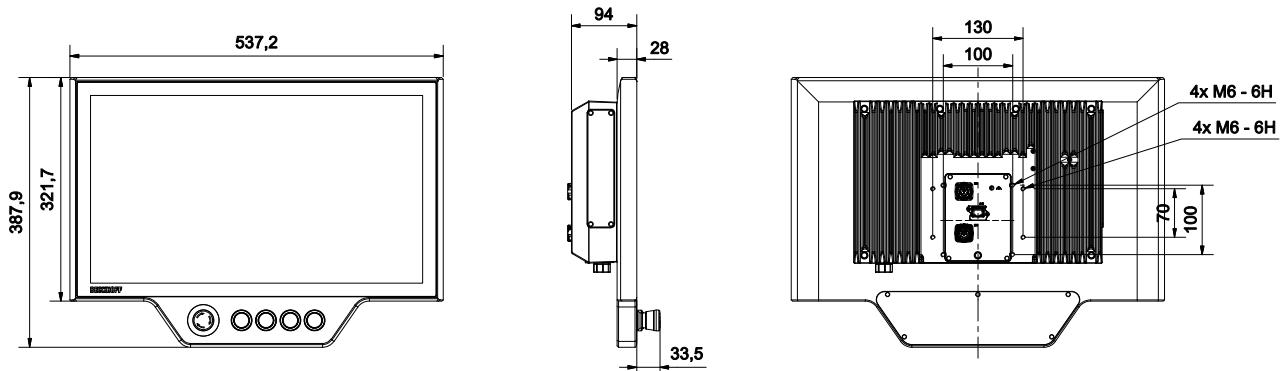
Fig. 25: CP3221-1600_dimensions 21.5-inch push button extension

Fig. 27 shows the dimensions of the 24-inch Panel PC.
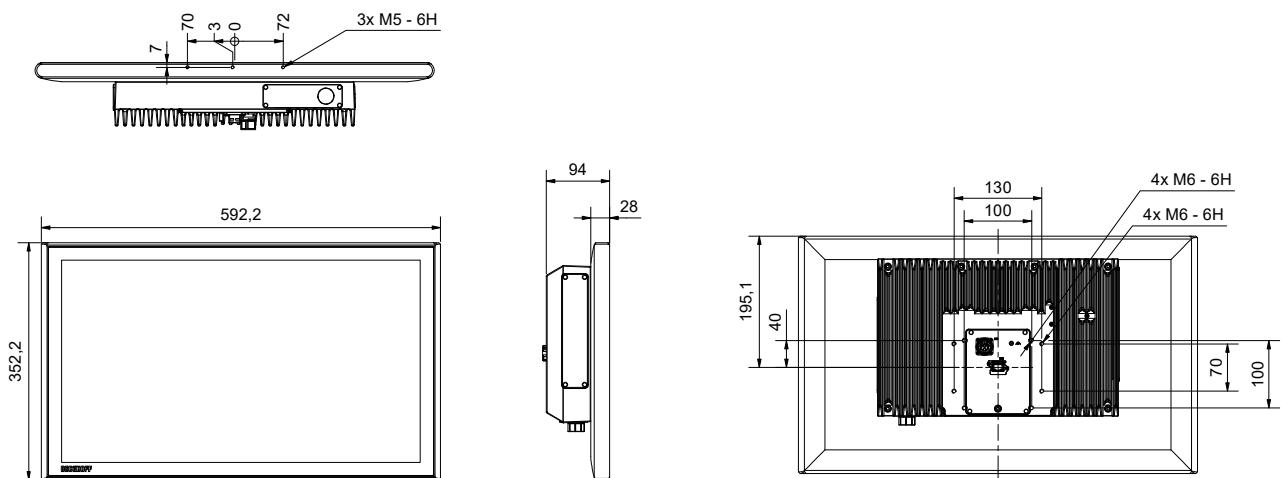
Fig. 26: CP3224-1600_dimensions 24-inch

Fig. 28 shows the dimensions of the 24-inch Panel PC with push button extension.

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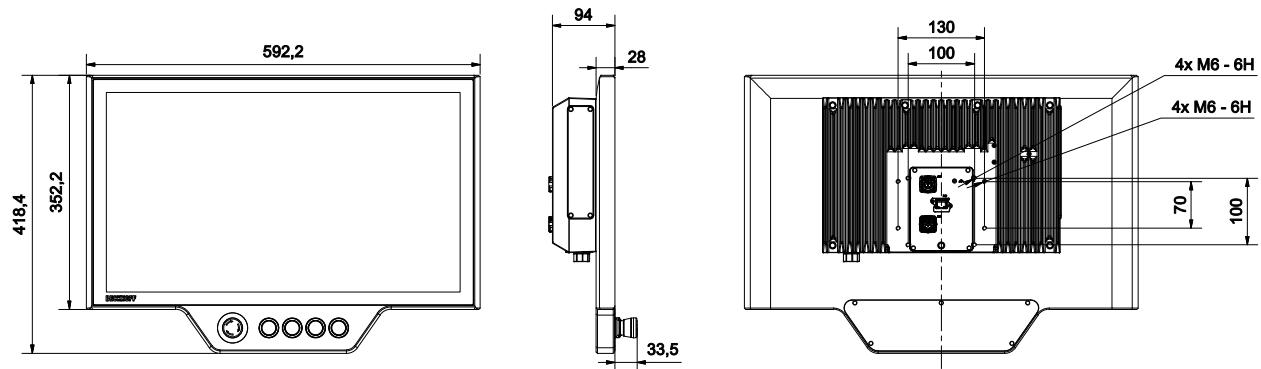
Fig. 27: CP3224-1600_dimensions 24-inch push button extension

4.2.2   Installing the mounting arm tube

NOTICE
Extreme environmental conditions
Extreme environmental conditions can cause damage to the device.
• Avoid extreme environmental conditions.
• Protect the device from moisture and heat.

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.

Installing 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 tying up the slotted nut of the C9900-M75x mounting arm adapter

Fig. 29 shows an example of the procedure with the mounting arm adapter facing downwards.

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 panel PC on the mounting arm tube.
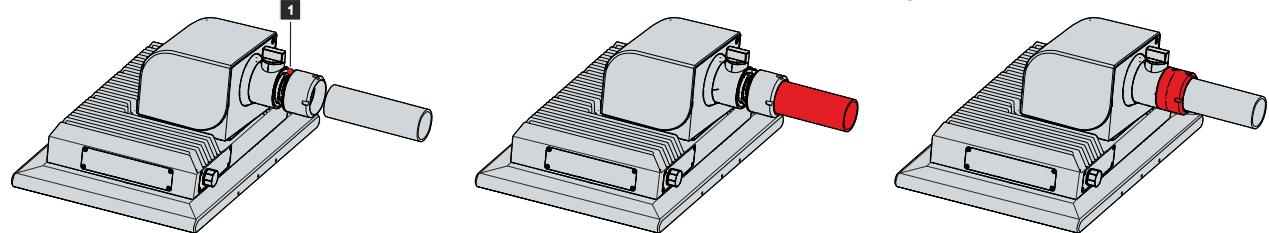
Fig. 28: CP32xx-1600_installing the mounting arm tube

4.2.3   Mounting accessories

You have the option of retrofitting extensions such as a handle, a toolboard or a cabinet dome to your Panel PC. The following ordering options are available to you:

Handle and toolboard

Table 22: Ordering options for handle and toolboard

Order identifier	Version
C9900-M361	Handle, length = 386 mm, anodized aluminum, mounted on the underside of a CP3xxx Control Panel or Panel PC
C9900-M419	Toolboard for keyboard or tools, mounted on the underside of a CP3xxx Control Panel or Panel PC, without integrated IP 65 USB socket at the rear

The handle (1) and the toolboard (2) are mounted on the underside of the Panel PC using three M5 screws. Three M5 threaded holes are provided for this purpose (see Fig. 30).
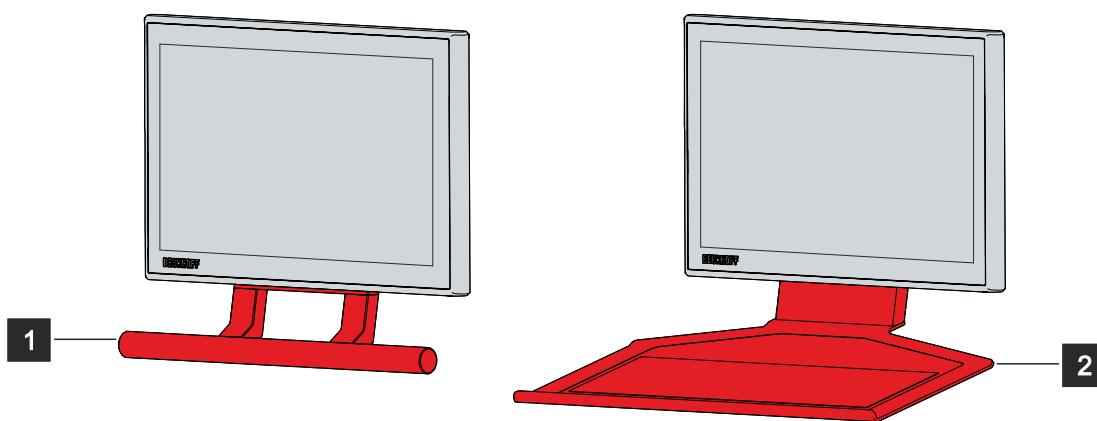
Fig. 29: CP32xx-1600_handle and tray

Cabinet dome

The CU8210-M002-0100 cabinet dome was developed for industrial WLAN and mobile communication components. You can use the dome in a working environment that meets the IP65 protection class. The inside of the dome is thus fully protected against accidental extraction, touch, dust and jet water. You can connect the dome to the Panel PC via USB.

To be able to mount the cabinet dome to your Panel PC, you need the following mounting set:

Table 23: Ordering option mounting set cabinet dome

Order identifier	Version
C9900-M172	Mounting set for lateral mounting of a CU8210-M002-0100 cabinet dome on a CP32xx-1600

To mount the cabinet dome to your PC using the mounting set, follow the steps below, which are shown in Figure 31:

1. Loosen the four M3x6 screws of the cover to remove the flap (section A).
2. Install the new cover by tightening the four M3x6 screws (section B).
3. Insert the USB cable into the cabinet dome and place it around the mounting bracket at the appropriate location (section C).
4. Loosen the protective cap of the USB interface on the underside of the Panel PC. The protective cap is attached to the PC with a wire so that the cap remains with the PC even after unscrewing (section D).
5. Place the mounting bracket with the cabinet dome in front of the cover at the appropriate position and tighten the two M4x8 screws (section E).
6. Plug the USB cable into the USB interface on the underside of the Panel PC.

⇨ You have now mounted the Panel PC to the cabinet dome.
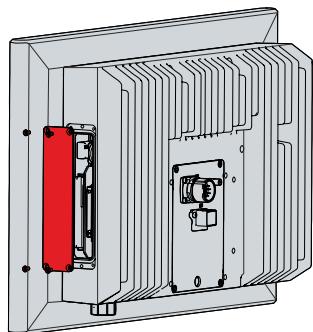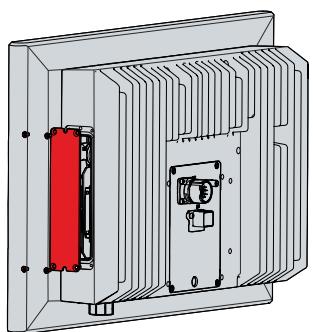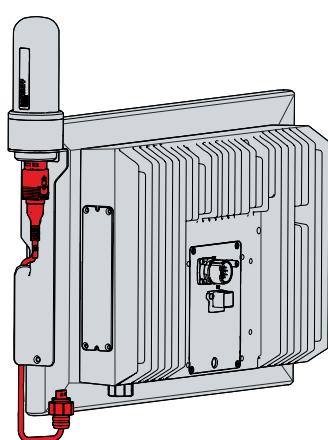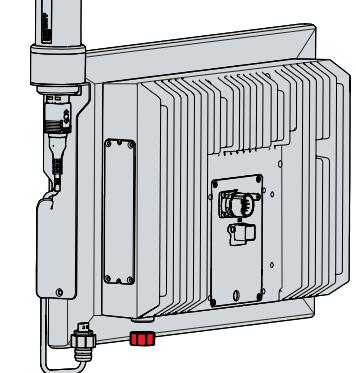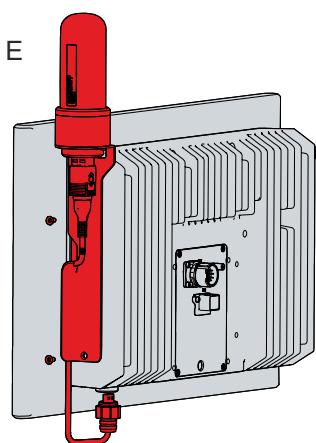
Fig. 30: CP32xx-1600_Mounting cabinet dome

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

An external power supply unit is required to supply 24 V DC (-15 %/+20 %) for operating the device.

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.

Devices connected to the panel PC 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.

The grounding bolt is located in the connection compartment of the Panel PC and is used to ensure the functional earthing of the PC (see Fig. 32). Use cables with a minimum cross-section of 4 mm^2 for the ground connection.
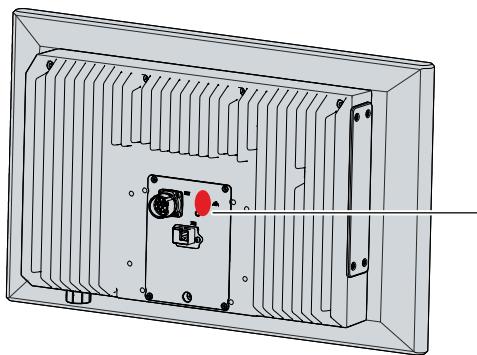
Fig. 31: CP32xx-1600_grounding bolt for functional earthing

For information on how to access the connection compartment, refer to chapter 3.2 Interface description [▶ 12].

Another grounding bolt is located inside the mounting arm adapter (see Fig. 33). You must establish a low-resistance connection via this bolt.
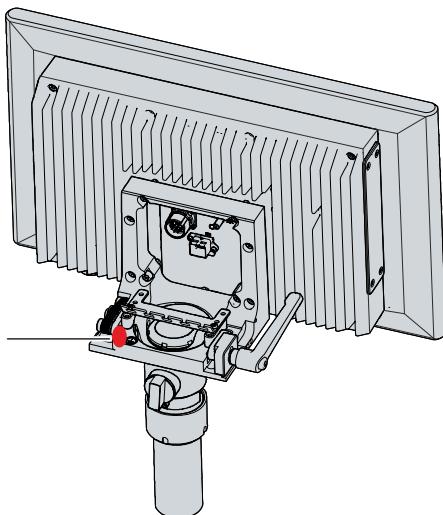
Fig. 32: CP32xx-1600_mounting arm adapter grounding bolt

Protective earth

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 Panel PC 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 Panel 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.

To do this, the Panel PC must comply with certain protection requirements. The Panel 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.

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 all cables first and only then switch on the power supply.
• Please read the documentation for the external devices prior to connecting them.

The connections are located at the rear of the Panel PC in the connection compartment. The only exception is the separate USB interface behind the screw cap. The interface cables in the connection compartment are routed through the mounting arm tube. To gain access to the connection compartment, first remove the cover of the mounting arm adapter (see chapter 3.2 Interface description [▶ 12]).

Connecting cables

Make sure that you first ground the PC (see chapter 4.3.1 Grounding the Panel PC [▶ 36]) and then plug in all data transmission lines.

Connecting the power supply

Cables with a maximum cable cross-section of 1.5 mm^2 can be used for connecting the power supply. For long supply lines, use 1.5 mm^2 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_{DC} power supply unit:

1. Check the correct voltage of the external power supply.
2. Plug the voltage connector into the voltage socket on the Panel PC.
3. Connect the PC to your external 24 V power supply.
4. Switch on the 24 V power supply.
5. Measure the voltage on the power supply plug of the PC.

After you have connected all data transmission lines and the power supply, you can fix the cables with cable ties to the strain relief plate inside the mounting arm adapter.

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:

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

4.4   Switching the Panel PC on and off

First switching on and driver installation

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.

The panel PC starts up when the system is switched on or when the power supply is connected.

When you switch on the panel PC for the first time, the optional pre-installed operating system starts. 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 PC.

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

Switching off the panel PC

NOTICE
Data loss due to switching off the PC while the software is running
Switching off the PC 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 PC.

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.

When the system is switched off or disconnected from its own power supply, the panel PC is also switched off.

If you have a panel PC with UPS and simply switch off the power supply, the operating system shuts down via the battery. With frequent use, this shortens the life of the battery.

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.

If 24 V is then applied to the input PC_ON via a switch, the operating system shuts down properly. The PC_ON signal is inverted, i.e. the operating system shuts down when 24 V is applied.

Once the operating system has shut down, the PC power supply unit sets the output power status from 24 V to 0 V. This indicates that the shutdown is complete and you can turn off the power supply. Via the output, you can switch, for example, a contactor that switches off the entire system. The maximum load for the Power Status output is 0.5 A and a suitable fuse should be provided.

You can assign different access rights to all users in the operating system and in the application software. Since there is a risk of data loss if the panel PC is switched off incorrectly, assign the rights advisedly. A user who is not allowed to terminate the software should not be allowed to switch off the panel PC.

Driver installation

When you switch on the PC 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 PC.

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

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 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 <u>manual</u>.

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:
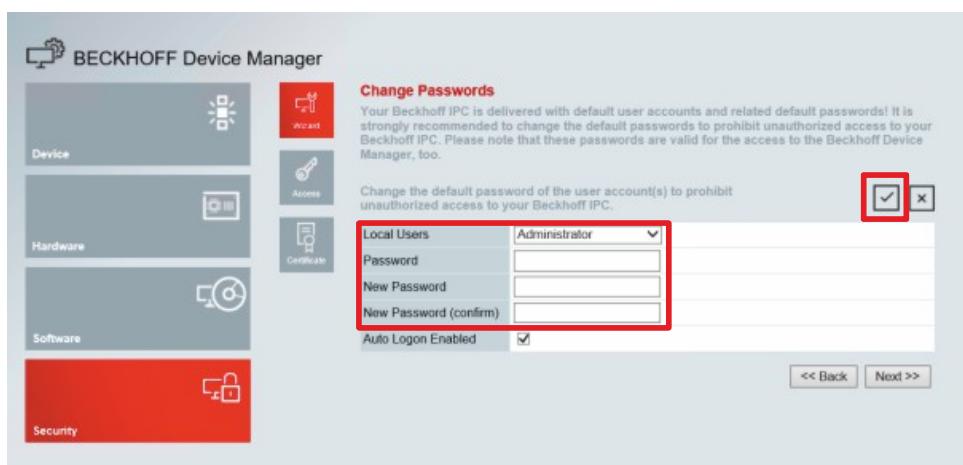
Fig. 33: Beckhoff Device Manager - Change passwords

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.

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Fig. 34: 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.

6   Decommissioning

NOTICE
Hardware damage due to power supply
A connected power supply can cause damage to the Panel PC 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 dismount the device from the mounting arm.

If you do not wish to use the Panel PC any further, chapter 6.2 <u>Disassembly and disposal [▶ 44]</u> provides information on the correct disposal of the device.

6.1   Disconnecting the power supply and cables

⚠ CAUTION
Risk of electric shock
Disconnecting the panel PC during a thunderstorm can lead to electric shock.
• Never disconnect the cables of the panel PC during a thunderstorm.

Before removing the panel PC, follow the steps below:

1. Shut down the panel PC.
2. Gain access to the connection compartment of the PC (see chapter 3.2 <u>Interface description [▶ 12]</u>).
3. Disconnect the PC from your external 24 V power supply.
4. Pull the power cable out of the M23 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 power supply and the cables.

6.2   Disassembly and disposal

In order 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 6.1 Disconnecting the power supply and cables [▶ 43]).

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 tube, follow the steps below, shown in Fig. 36:

1. Release the slotted nut of the mounting arm adapter with a hook wrench size 58-62 in counterclockwise direction (section A). The ordering option for the hook wrench can be found in chapter 4.2.2 Mounting arm tube installation [▶ 33].
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. Retighten the hexagon socket screw with a torque of 3 Nm.
⇨ You have dismantled the mounting arm tube.
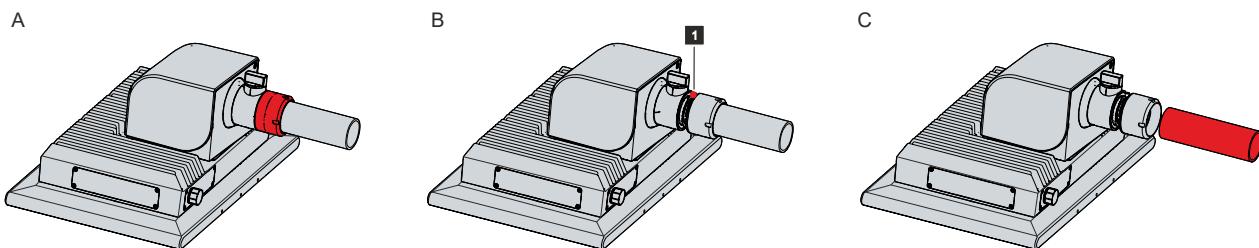
Fig. 35: CP32xx-1600_removing the mounting arm tube

Disassembly toolboard and handle

To remove the toolboard or handle from the panel PC, remove the three M5 screws from the three M5 threaded holes on the underside of the housing.

Removing the mounting arm adapter

If you have installed a Beckhoff mounting arm adapter on your panel PC, follow the steps below to remove it (see Fig. 37):

1. Remove the cover of the mounting arm adapter (section A). For the exact procedure see chapter 3.2 Interface description [▶ 12].
2. Loosen the four M6 screws securing the mounting arm adapter to the panel PC (section B).
3. Remove the mounting arm adapter from the PC housing.

A   B
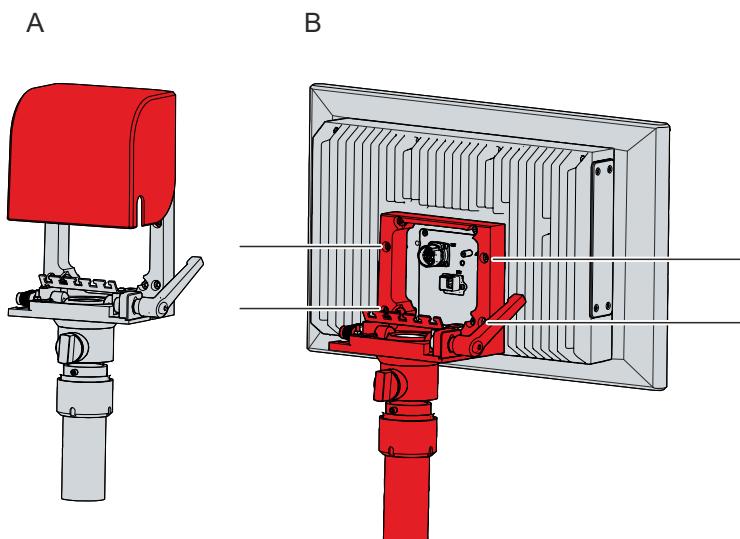
Fig. 36: CP32xx-1600_removing the mounting arm adapter

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 Panel PC when live can lead to electric shock.
>
> - Switch off the power supply before replacing device components. This does not apply to the replacement of hard disks in a RAID configuration.

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

Repair

Only the manufacturer may repair the device. If a repair should be necessary, contact Beckhoff Service (see Chapter 10.1 <u>Service and support [▶ 55]</u>).

7.1 Cleaning

> *NOTICE*
>
> **Unsuitable cleaning agents**
>
> The use of unsuitable cleaning agents can damage the device.
>
> - Clean the Panel PC only as specified.

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

- Keep to the boundary conditions of protection rating IP65.
- Never use compressed air to clean the PC.
- Maintain an ambient temperature range of 0 °C to 45 °C.

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 Panel PC 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 Control Tool.

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

1. Click the Beckhoff Control Tool 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. 38).

⇨ "Cleaning Mode" is activated. You can now clean the front panel.
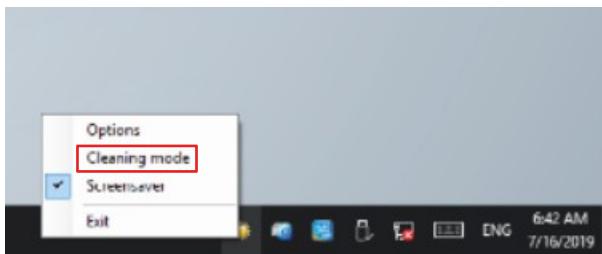
Fig. 37: CP32xx-1600_selection "Cleaning Mode

You can set the duration for which the PC 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 period (see fig. 39).
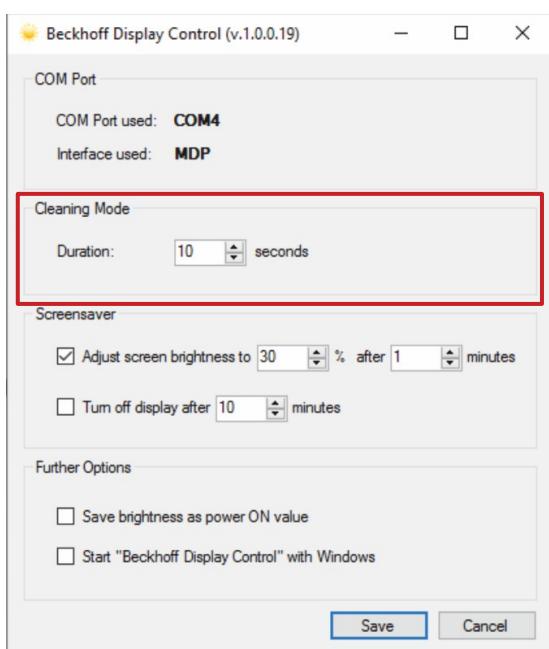
Fig. 38: CP32xx-1600_configuration "Cleaning Mode

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 Panel PCs 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 Panel PC may be subject to a limited service life if they are operated under certain conditions, such as more demanding ambient conditions during operation or during storage, or if they are out of service for long periods of storage.

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

These are the following components:

• Storage media

- Battery and battery pack
- Fan

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

Table 24: Replacement recommendations for PC components

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
Compact Flash, CFast or SSD	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 Panel PC and create an ESD-protected environment in which existing electrostatic charges are safely discharged to ground and charging is prevented.

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

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

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

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

Access to battery and storage medium

To be able to replace the battery and the storage medium, you must first gain access to these device components. Access is gained to the battery and storage medium from the back of the Panel PC. If you look at the device from the back, the battery and storage medium are located behind the side cover on the left side. Loosen the four M3x6 screws of the cover to remove it (see Fig. 40).
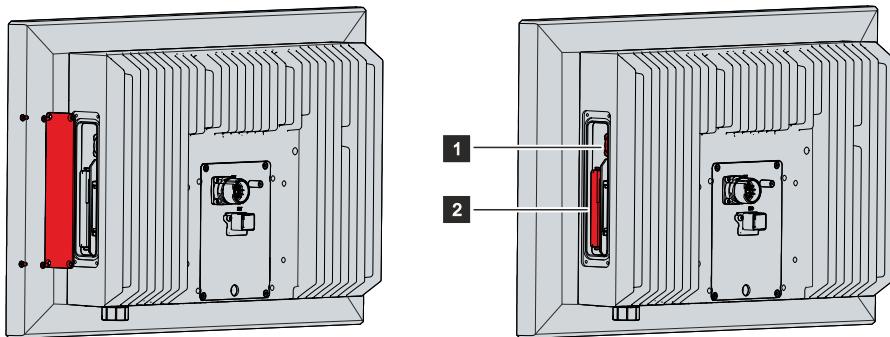
Fig. 39: CP32xx-1600_access to battery and storage medium

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

7.2.1   Replacing the battery

NOTICE
Incorrect battery type
Inserting the wrong type of battery can damage the device.
• 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
Motherboard failure
Scratches on the motherboard may cause the motherboard to fail.
• Be very careful when replacing the battery and be sure to avoid scratches on the motherboard.

The Panel PC 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 25: 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 shows how to access the battery.

To change the battery, proceed as follows:

1. Pull the battery out of the Panel 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 face the display (see Fig. 41).
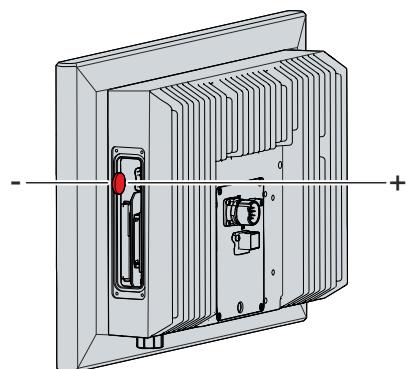
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Fig. 40: CP32xx-1600_replacing the battery

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

7.2.2   Replacing the storage media

For new storage media, please contact your Beckhoff Sales only.

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

Chapter 7.2 Maintenance [▶ 47] shows how to access the hard disk.

To change the hard disk, follow the steps below:
1. Pull the hard disk out of the PC (see Fig. 42).
2. Insert the new hard disk into the PC with the same orientation.
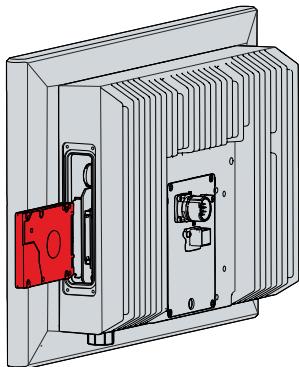
Fig. 41: CP32xx-1600_exchange storage medium

The old hard disk must be disposed of in accordance with the national electronic scrap regulations.

7.2.3 Fan cartridge replacement

NOTICE
Incorrect fan type
The Panel PC may be damaged if the wrong type of fan cartridge is installed.
• Replace the fan cartridge exclusively by a cartridge from Beckhoff.

The fan cartridge ensures optimum cooling of the Panel PC. Only order a new fan cartridge from your Beckhoff Sales.

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

If you look at the device from the back, the fan cartridge is located in the right side of the PC. To replace the fan cartridge, follow the steps below as shown in Figure 43:

1. Loosen the four M3x6 screws of the fan cartridge (section A).
2. Remove the fan cartridge (section B).
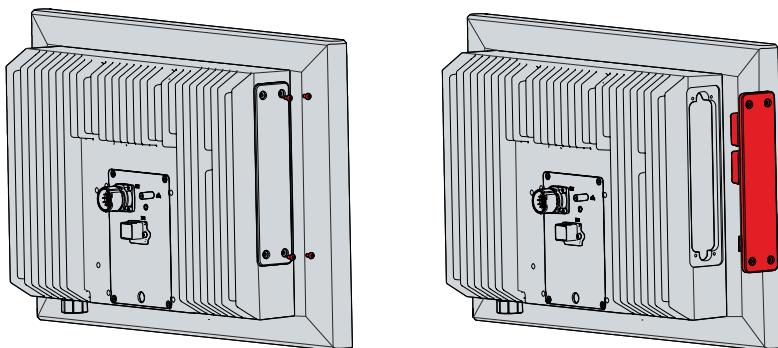
Fig. 42: CP32xx-1600_exchange fan cartridge

3. Insert the new fan cartridge.
4. Retighten the four M3x6 screws.
⇨ You have now replaced the fan cartridge.

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

8 Troubleshooting

Table 26: Troubleshooting

Fault	Cause	Measures
No function of the Panel PC	No power supply to the Panel PC	Check the power supply cable
	Cable not connected	1. Correctly connect the cable 2. 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 or software manufacturer
The Panel PC only works partially or only temporarily, e.g. dark image or none at all	Defective backlight in the display	Call Beckhoff Service
	Components defective in the Panel PC	Call Beckhoff Service
Malfunction of the touch screen	Poor or missing functional earth of the device	Establish functional earth
	Poor or missing ground connection of the user	User must stand on the floor with normal shoes

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9   Technical data

Table 27: Technical data

Product designation	CP32xx-1600		
Weight	CP3215: 8.3 kg		
	CP3216: 9 kg		
	CP3218: 10.1 kg		
	CP3219: 10.8 kg		
	CP3221: 11.3 kg		
	CP3224: 12.3 kg		
Supply voltage	22-30 V_{DC} (24 V_{DC} power supply unit)		
Power consumption	Data sheet power consumption and power loss in the download finder:		
	https://www.beckhoff.com/de-de/support/downloadfinder/ suchergebnis/?c-1=40717316		
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^2)
Shock resistance (shock)	EN 60068-2-27:	5 G (~ 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	Operation: 0 °C ... +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 shock resistance during transport can be improved by means of suitably packing the panel PC.		

10 Appendix

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

10.1 Service and support

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

Beckhoff Service

The Beckhoff Service Center supports you in all matters 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 service, please indicate the serial number, which you can find on the name plate.

Beckhoff Support

Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:

- World-wide support
- Design, programming and commissioning of sophisticated automation systems
- extensive training program for Beckhoff system components

Hotline: + 49 5246/963-157
email: support@beckhoff.com

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Hülshorstweg 20
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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 will also find further documentation for Beckhoff components there.

10.2 Approvals

Your device has 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 CP32xx-1600_with and without push button extension 10

Fig. 2 CP32xx-1600_configuration 11

Fig. 3 CP32xx-1600_interfaces basic configuration 12

Fig. 4 CP32xx-1600_access connection compartment 12

Fig. 5 CP32xx-1600_Ethernet interface pin numbering 14

Fig. 6 CP32xx-1600_USB interface pin numbering 15

Fig. 7 CP32xx-1600_Access USB interface 17

Fig. 8 CP32xx-1600_license key USB stick 17

Fig. 9 CP32xx-1600_Optional Ethernet interfaces – pin numbering 18

Fig. 10 CP32xx-1600_RS232 interface pin numbering 19

Fig. 11 CP32xx-1600_RS422 interface pin numbering 19

Fig. 12 CP32xx-1600_RS485 interface pin numbering 20

Fig. 13 CP32xx-1600_Optional USB interfaces – pin numbering 21

Fig. 14 CP32xx-1600_name plate 22

Fig. 15 CP32xx-1600_mounting arm adapter 27

Fig. 16 CP32xx-1600_orientation of the mounting arm adapter 28

Fig. 17 CP32xx-1600_installing the mounting arm adapter 28

Fig. 18 CP32xx-1600_dimensions 15-inch 29

Fig. 19 CP3216-1600_dimensions 15,6-inch 29

Fig. 20 CP3216-1600_dimensions 15.6-inch push button extension 29

Fig. 21 CP3218-1600_dimensions 18.5-inch 30

Fig. 22 CP3218-1600_dimensions 18.5-inch push button extension 30

Fig. 23 CP3219-1600_dimensions 19-inch 30

Fig. 24 CP3221-1600_dimensions 21.5-inch 31

Fig. 25 CP3221-1600_dimensions 21.5-inch push button extension 31

Fig. 26 CP3224-1600_dimensions 24-inch 31

Fig. 27 CP3224-1600_dimensions 24-inch push button extension 32

Fig. 28 CP32xx-1600_installing the mounting arm tube 33

Fig. 29 CP32xx-1600_handle and tray 34

Fig. 30 CP32xx-1600_Mounting cabinet dome 35

Fig. 31 CP32xx-1600_grounding bolt for functional earthing 36

Fig. 32 CP32xx-1600_mounting arm adapter grounding bolt 37

Fig. 33 Beckhoff Device Manager - Change passwords 41

Fig. 34 Beckhoff Device Manager – Start page 42

Fig. 35 CP32xx-1600_removing the mounting arm tube 44

Fig. 36 CP32xx-1600_removing the mounting arm adapter 45

Fig. 37 CP32xx-1600_selection "Cleaning Mode 47

Fig. 38 CP32xx-1600_configuration "Cleaning Mode 47

Fig. 39 CP32xx-1600_access to battery and storage medium 49

Fig. 40 CP32xx-1600_replacing the battery 50

Fig. 41 CP32xx-1600_exchange storage medium 51

Fig. 42 CP32xx-1600_exchange fan cartridge 52

List of tables

More Information:
www.beckhoff.com/cp32xx-1600