

BECKHOFF New Automation Technology

Manual | EN

CP32xx-1600

Panel PC



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1 Notes on the documentation

This description is intended exclusively for trained specialists in control and automation technology who are familiar with the applicable national standards.

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:

EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702

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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 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 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-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) 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-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 factory 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.

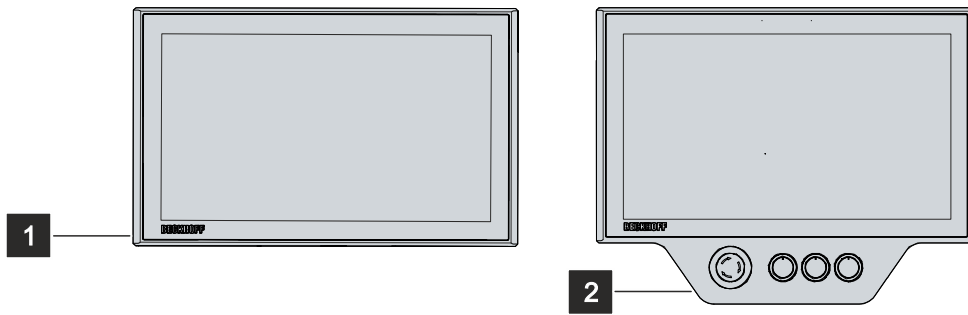


Fig. 1: Without and with push button extension

3.1 Structure

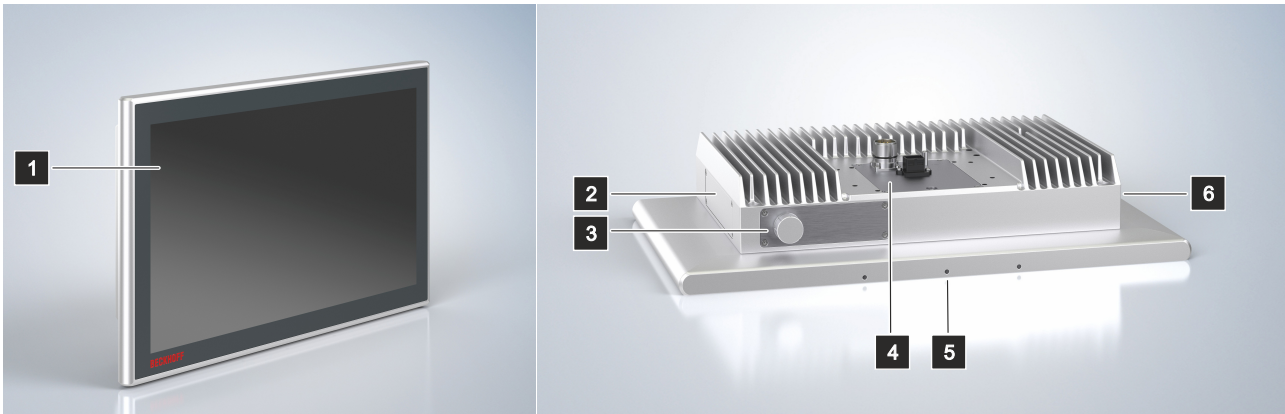


Fig. 2: Structure

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.

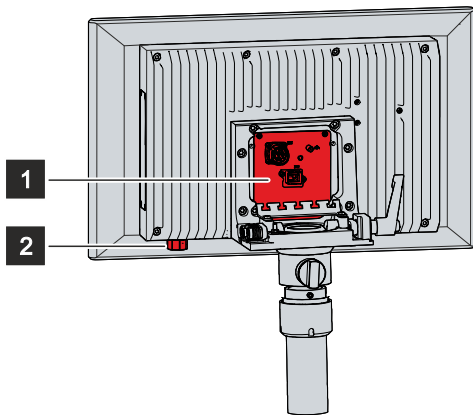


Fig. 3: Interfaces basic configuration

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.

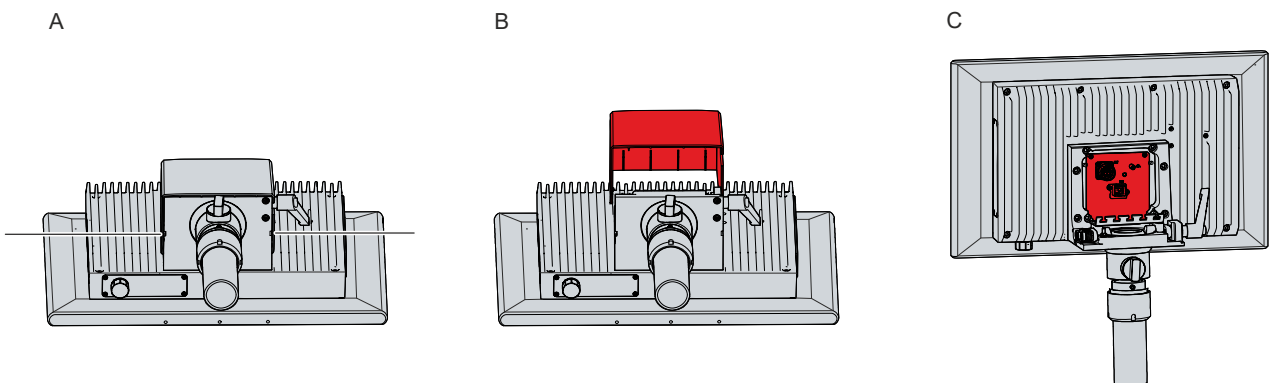


Fig. 4: Access connection compartment

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.

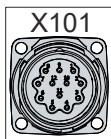


Fig. 5: Voltage socket pin numbering

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 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 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.

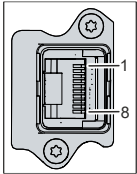


Fig. 6: Ethernet interface pin numbering

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.

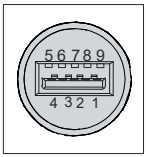


Fig. 7: USB interface pin numbering

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.

You can also order the panel PC without interfaces in the extension plate. With the following ordering option, the PC is only equipped with a blank cover:

- C9900-E330: CP32xx-16xx-00x0 without 1-port USB 3.0 socket below 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).

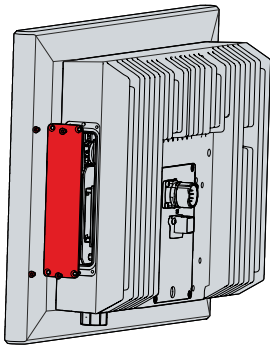


Fig. 8: Access USB interface

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.

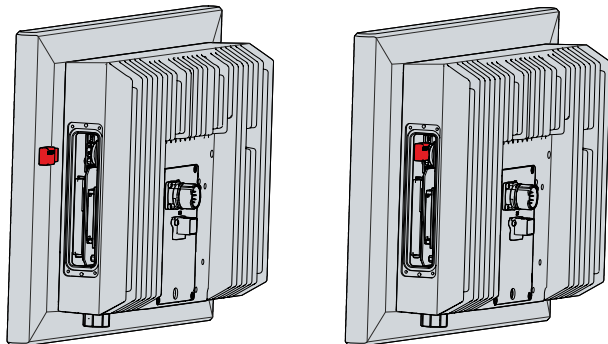


Fig. 9: License key USB stick

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.

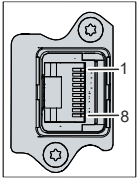


Fig. 10: Optional Ethernet interface pin numbering

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.

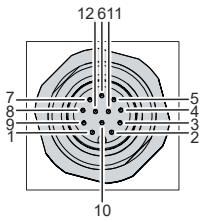


Fig. 11: RS232 interface pin numbering

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 serial data transmission.

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

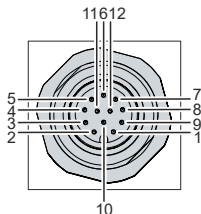


Fig. 12: RS422 interface pin numbering

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:

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 serial data transmission.

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

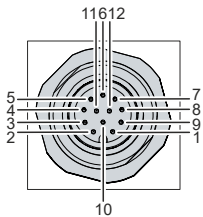


Fig. 13: RS485 interface pin numbering

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. They supply 900 mA current and are electronically fused.

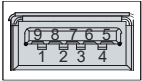


Fig. 14: Optional USB interface pin numbering

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 about the panel PC equipment. The name plate shown here serves only as an example.

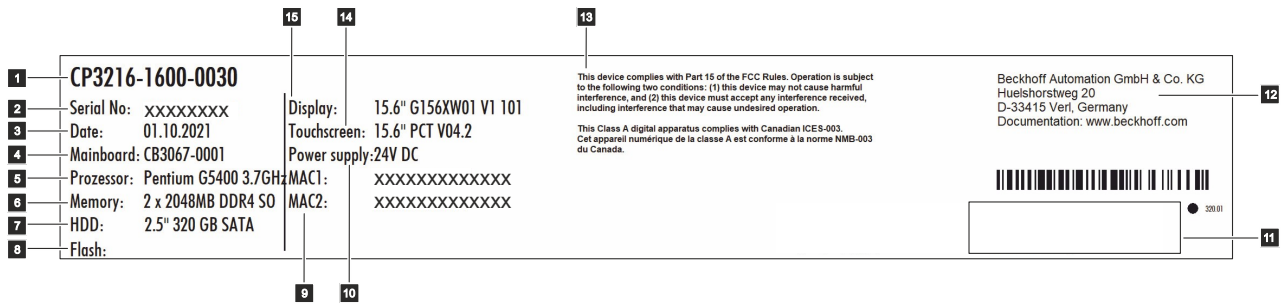



Fig. 15: CP32xx-1600_name plate

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	SSD or CFast
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 connecting cables for all connections are available in various lengths. You can order them using the following article descriptions:

Table 15: Power supply cable

Connecting cable	Power supply cable with IP65 plug
C9900-K271	Power supply cable IP65 for CP32xx, CP37xx or CP72xx, length 5 m, pre-assembled, M23 socket, screwable, 8-wire, second end open
C9900-K272	Power supply cable IP65 for CP32xx, CP37xx or CP72xx, length 10 m, pre-assembled, M23 socket, screwable, 8-wire, second end open
C9900-K275	Power supply cable IP65 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, screwable, second end open
C9900-K276	Power supply cable IP65 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, screwable, second end open
C9900-K277	Power supply cable IP65 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, screwable, second end open

Table 16: Network cable

Connecting cable	Network cable with IP65 plug
C9900-K281	Network cable for CP32xx, CP37xx and CP72xx, length 3 m, pre-assembled, push-pull Ethernet connector IP65, second end RJ45, IP20
C9900-K282	Network cable for CP32xx, CP37xx and CP72xx, length 5 m, pre-assembled, push-pull Ethernet connector IP65, second end RJ45, IP20
C9900-K283	Network cable for CP32xx, CP37xx and CP72xx, length 10 m, pre-assembled, push-pull Ethernet connector IP65, second end RJ45, IP20
C9900-K284	Network cable for CP32xx, CP37xx and CP72xx, length 15 m, pre-assembled, push-pull Ethernet connector IP65, second end RJ45, IP20
C9900-K285	Network cable for CP32xx, CP37xx and CP72xx, length 20 m, pre-assembled, push-pull Ethernet connector IP65, second end RJ45, IP20
C9900-K286	Network cable for CP32xx, CP37xx and CP72xx, length 30 m, pre-assembled, push-pull Ethernet connector IP65, second end RJ45, IP20
C9900-K287	Network cable for CP32xx, CP37xx and CP72xx, length 40 m, pre-assembled, push-pull Ethernet connector IP65, second end RJ45, IP20
C9900-K288	Network cable for CP32xx, CP37xx and CP72xx, length 50 m, pre-assembled, push-pull Ethernet connector IP65, second end RJ45, IP20

Table 17: USB cable

Connecting cable	USB cable with IP65 connector
C9900-K306	USB 3.0 cable for CP32xx, CP37xx or CP72xx, length 3 m, pre-assembled, push-pull USB 3.0 connector IP65, second end USB B connector IP20

Table 18: Serial interface cable RS232

Connecting cable	Serial interface cable RS232 with IP65 connector
C9900-K295	Serial interface cable RS232 for CP32xx, CP37xx or CP72xx, length 3 m, pre-assembled, M12 connector IP65, screwable, 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 connector IP65, screwable, 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 connector IP65, screwable, 12-pin, second end D-sub 9 connector

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 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. Please refer to the price list for the available protective films according to the display size of your device.

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-cdn.beckhoff.com/content/1033/panelconfigurationtools/11725543179.html?id=1863235424645236061>.

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 device, such as the original packaging, can improve the vibration resistance during transport.

NOTICE

Hardware damage due to condensation

Unfavorable weather conditions during transport can cause damage to the device.

- Protect the device against moisture (condensation) during transport in cold weather or in case of extreme temperature fluctuations.
- Do not put the device into operation until it has slowly adjusted to the room temperature.
- Should condensation occur, wait for about 12 hours before switching the device on.

Unpacking

Proceed as follows to unpack the 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 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 19: 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.

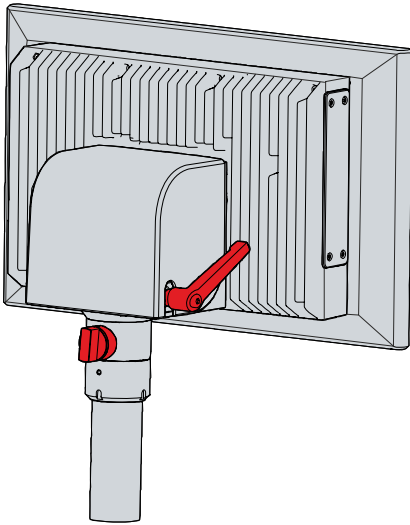


Fig. 16: Mounting arm adapter

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).

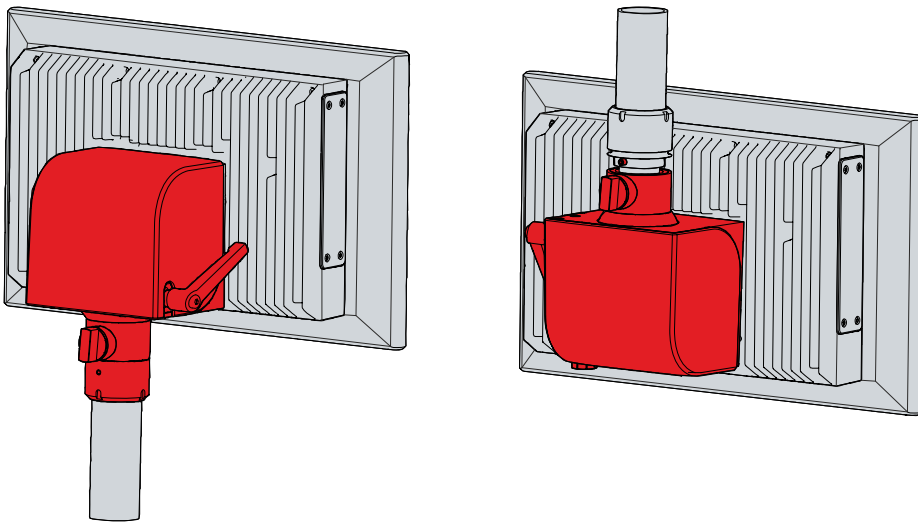


Fig. 17: Orientation of the mounting arm adapter

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

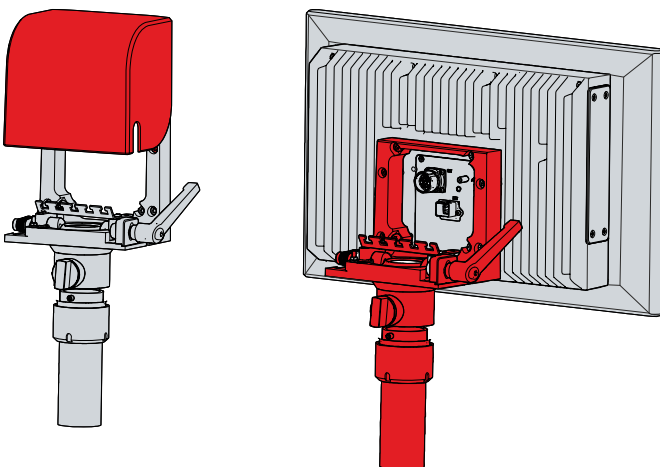


Fig. 18: Installing the mounting arm adapter

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.

Also see about this

📄 [Technical data](#) [► 54]

4.2.1 Dimensions

All dimensions are in mm.

Fig. 19 shows the dimensions of the 15-inch Panel PC.

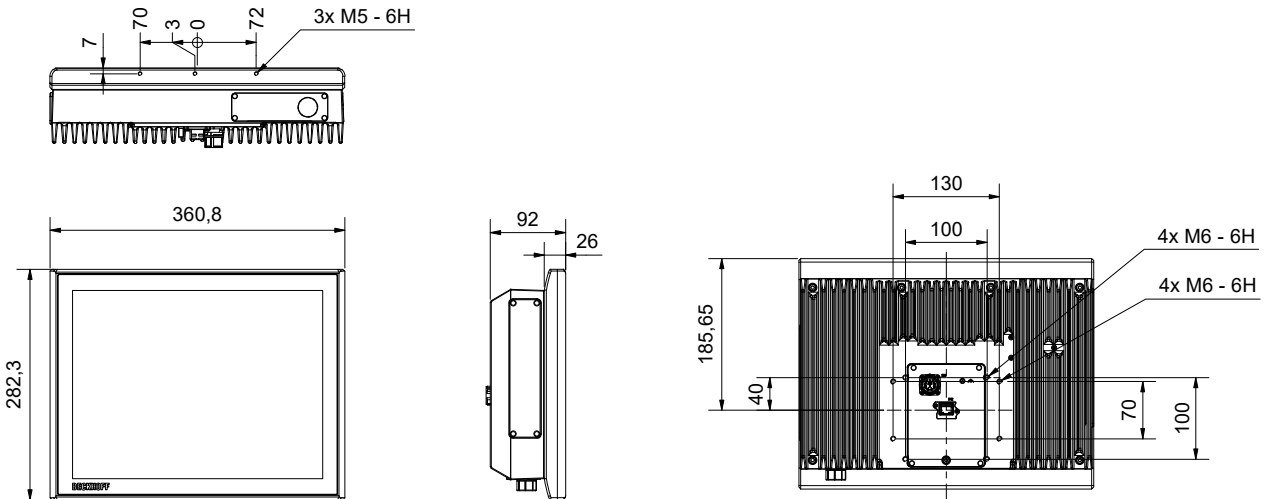


Fig. 19: CP32xx-1600_dimensions 15-inch

Fig. 20 shows the dimensions of the 15.6-inch Panel PC.

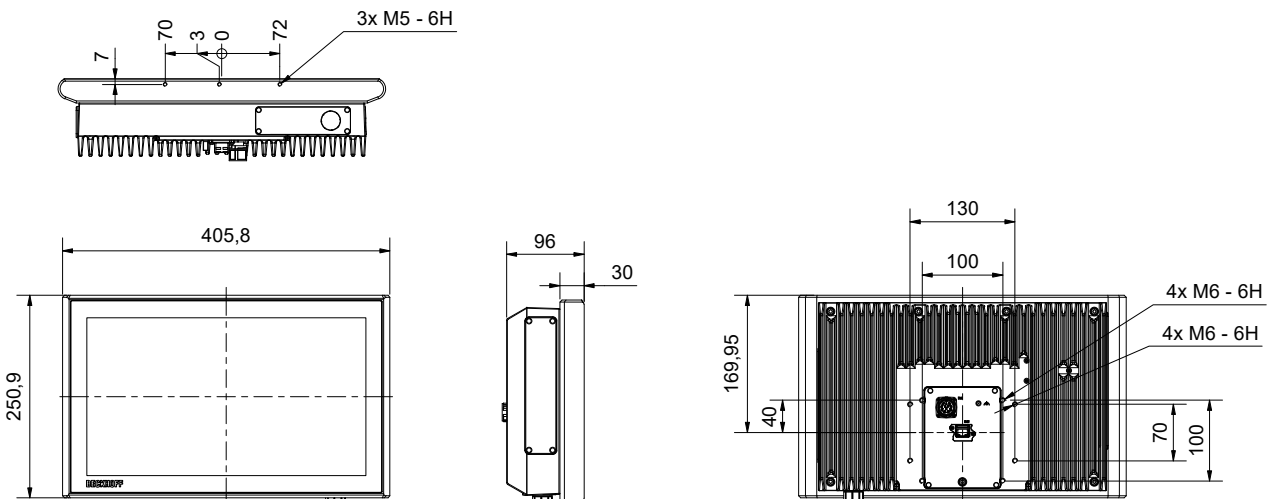


Fig. 20: CP3216-1600_dimensions 15,6-inch

Fig. 21 shows the dimensions of the 15.6-inch Panel PC with push button extension.

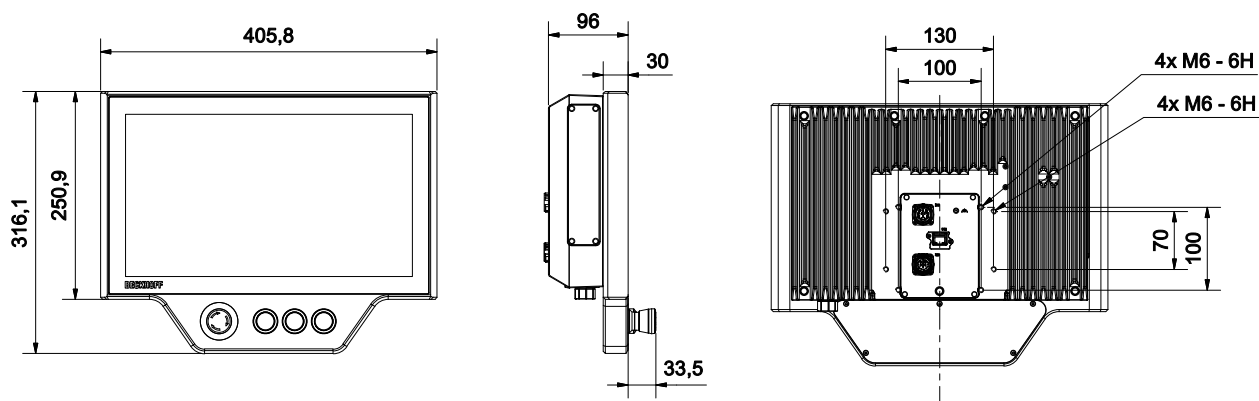


Fig. 21: CP3216-1600_dimensions 15.6-inch push button extension

Fig. 22 shows the dimensions of the 18.5-inch Panel PC.

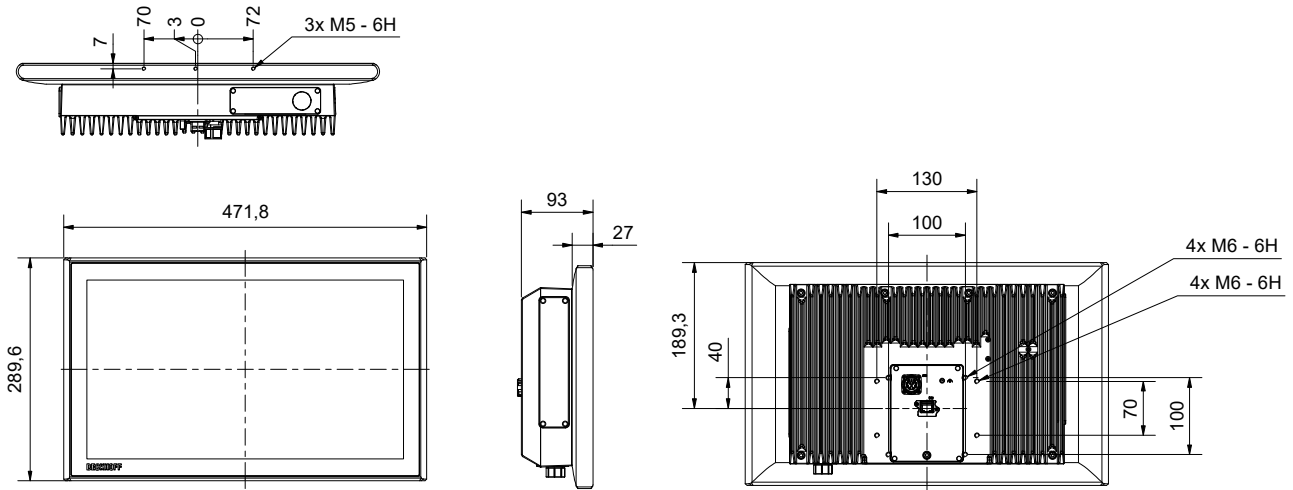


Fig. 22: CP3218-1600_dimensions 18.5-inch

Fig. 23 shows the dimensions of the 18.5-inch Panel PC with push button extension.

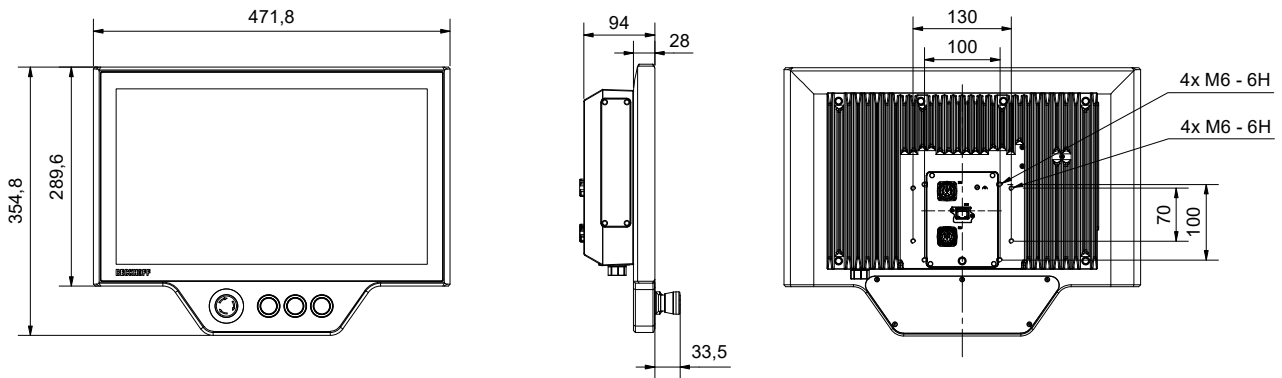


Fig. 23: CP3218-1600_dimensions 18.5-inch push button extension

Fig. 24 shows the dimensions of the 19-inch Panel PC.

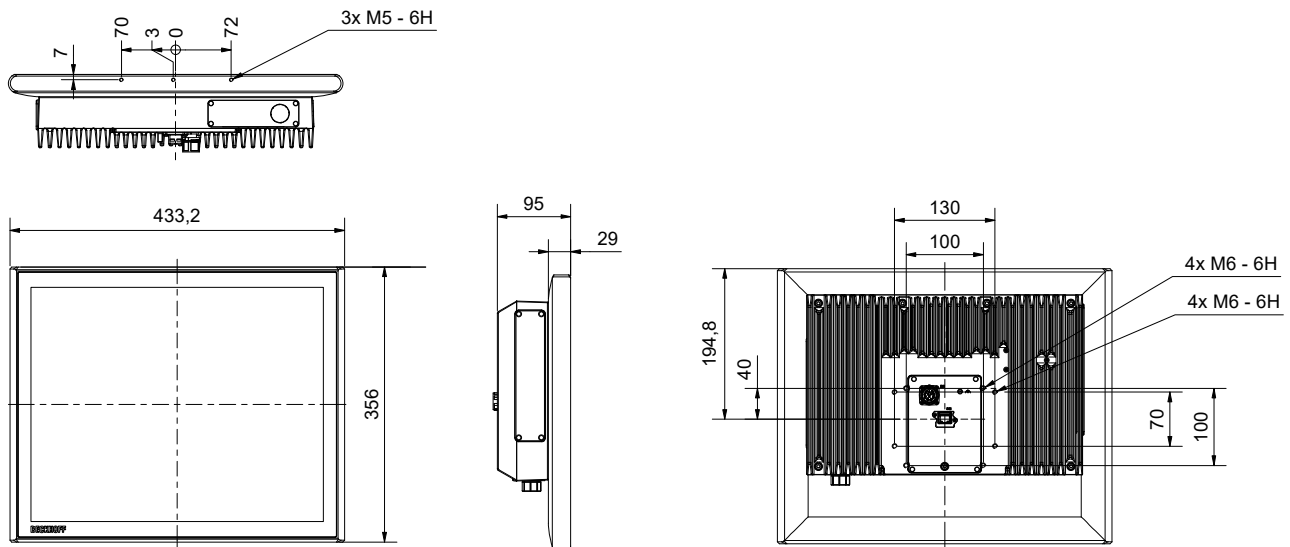


Fig. 24: CP3219-1600_dimensions 19-inch

Fig. 25 shows the dimensions of the 21.5-inch Panel PC.

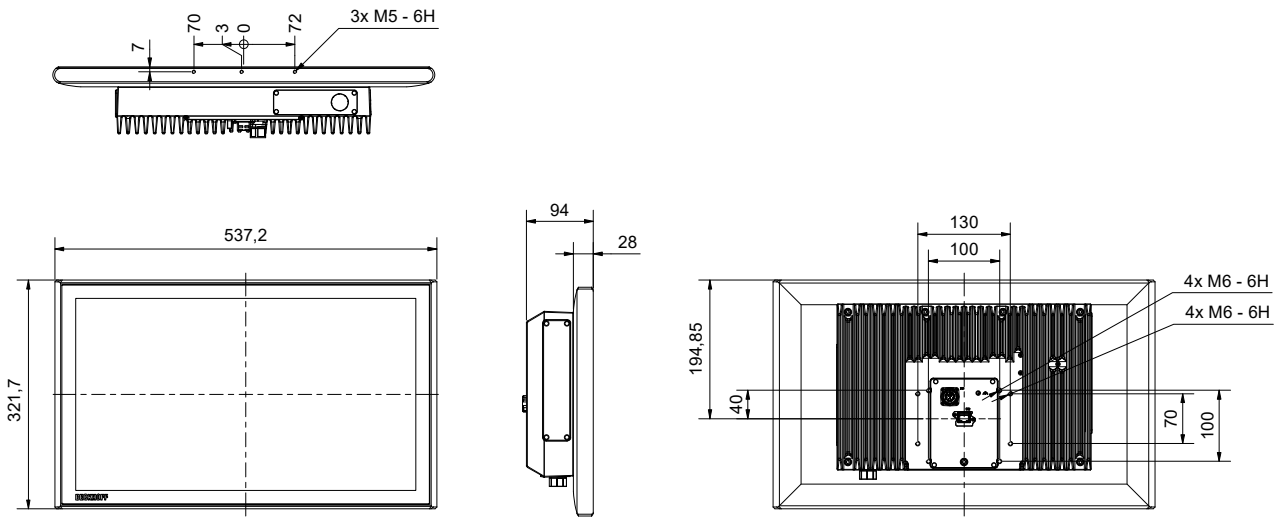


Fig. 25: CP3221-1600_dimensions 21.5-inch

Fig. 26 shows the dimensions of the 21.5-inch Panel PC with push button extension.

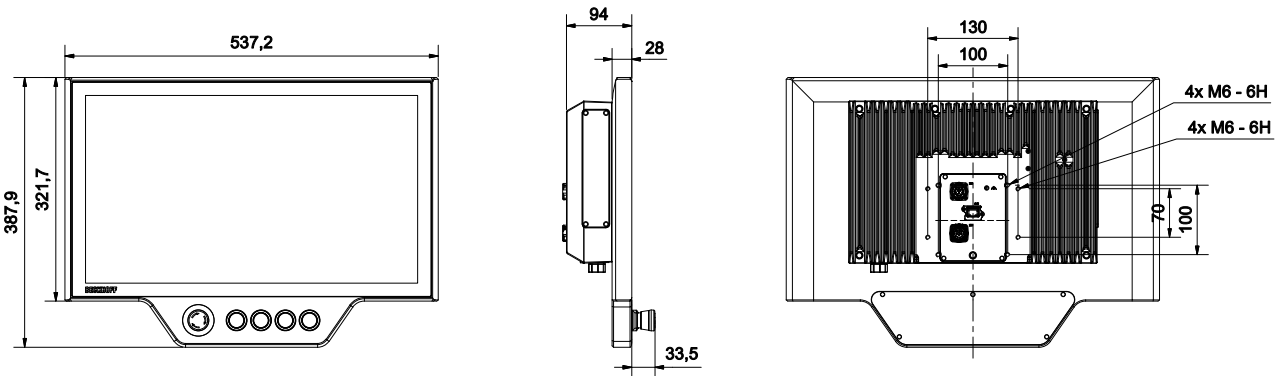


Fig. 26: CP3221-1600_dimensions 21.5-inch push button extension

Fig. 27 shows the dimensions of the 24-inch Panel PC.

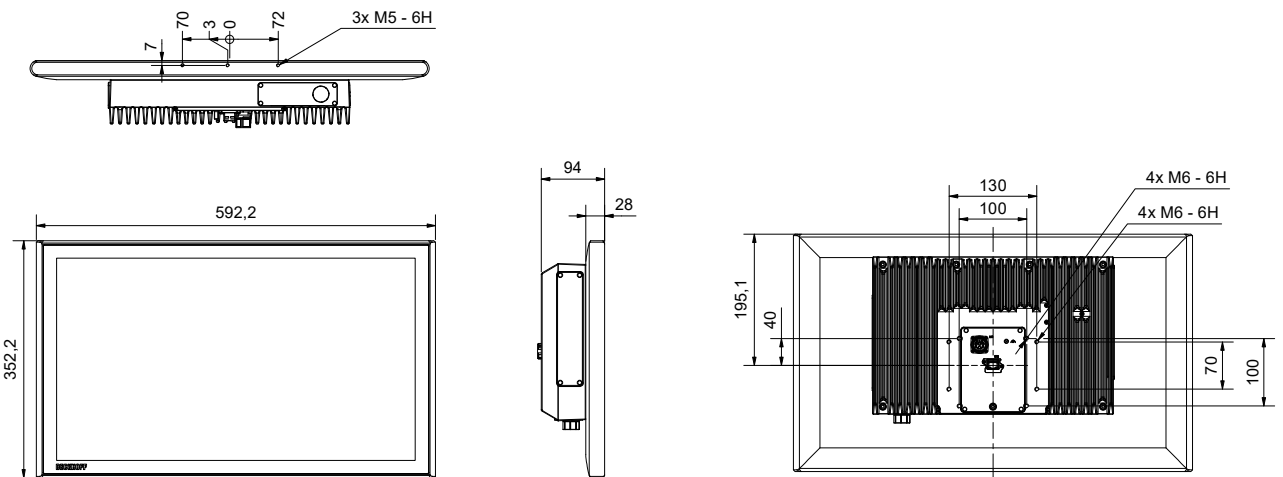


Fig. 27: CP3224-1600_dimensions 24-inch

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

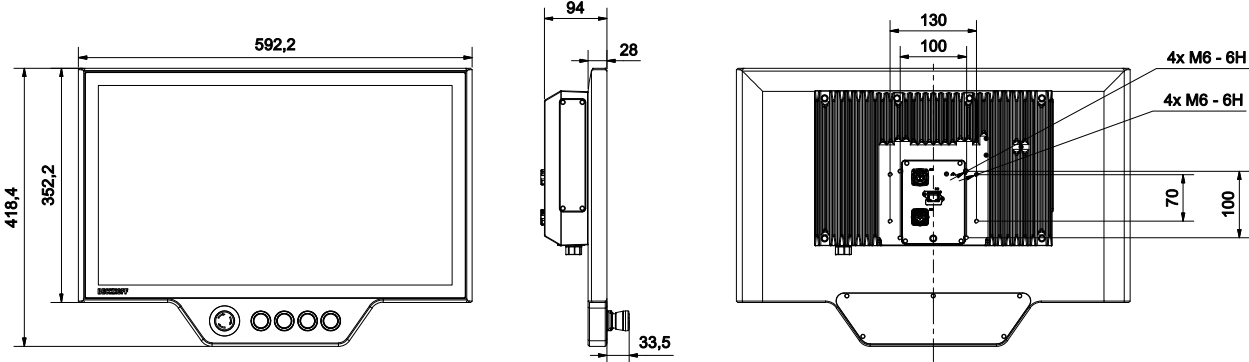


Fig. 28: CP3224-1600_dimensions 24-inch push button extension

4.2.2 Installing the mounting arm tube

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.

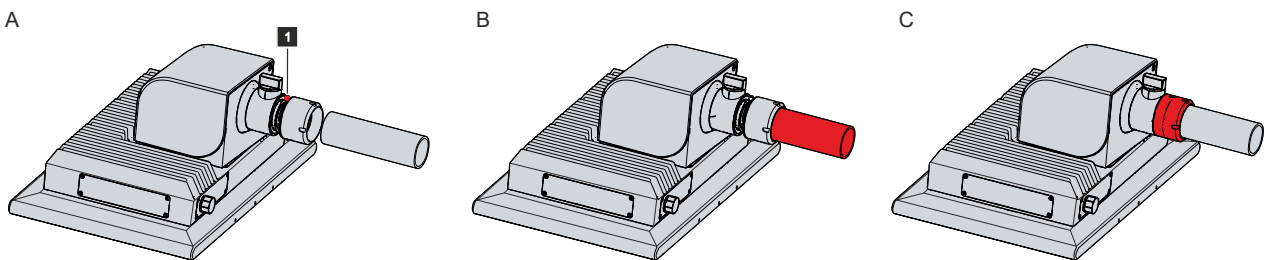


Fig. 29: Installing the mounting arm tube

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 20: 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 IP65 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).

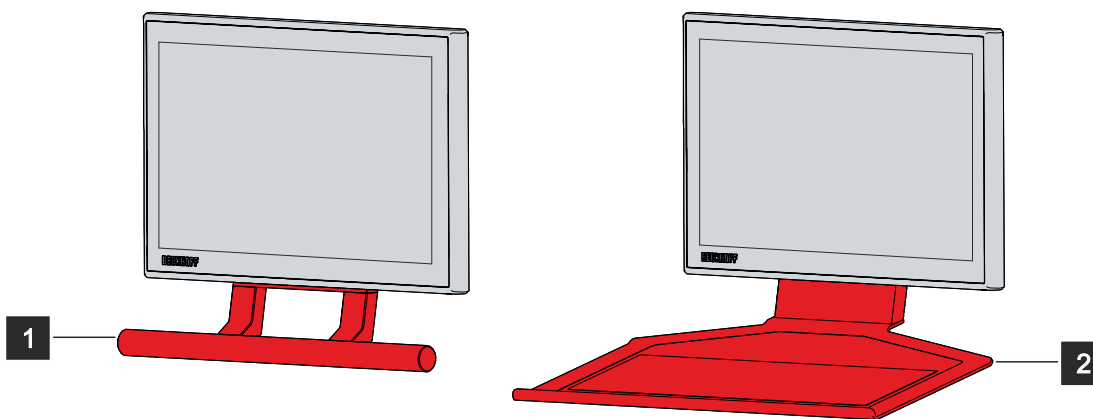


Fig. 30: Handle and toolboard

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 21: 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.

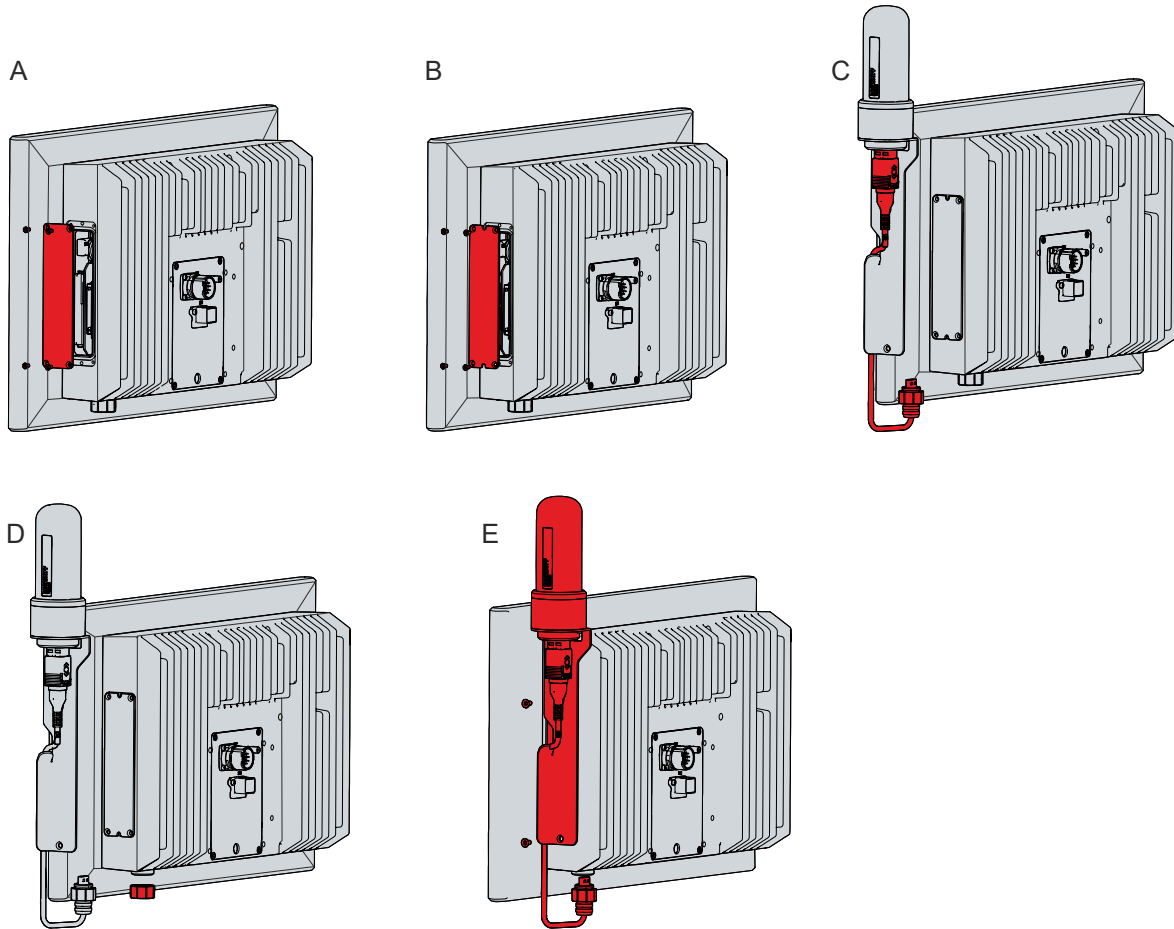


Fig. 31: Mounting cabinet dome

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

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

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.

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. Establish the functional earthing via the earthing bolt in the connection compartment of the panel PC (see Fig. 32). Use cables with a minimum cross-section of 4 mm² for the ground connection.

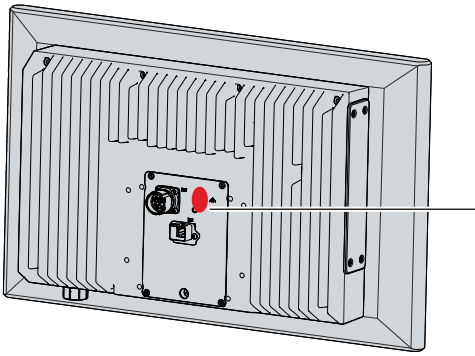


Fig. 32: Grounding bolt for functional earthing

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.

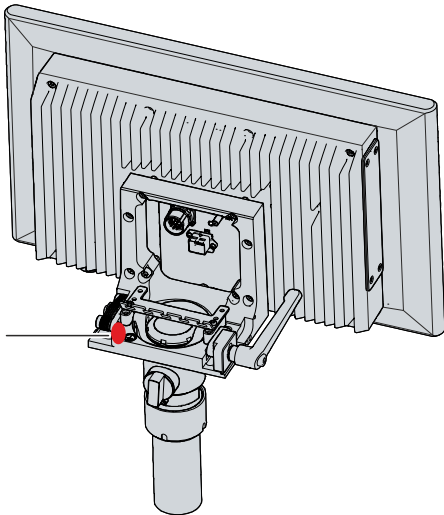


Fig. 33: Mounting arm adapter grounding bolt

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 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](#) [▶ 35]) and then plug in all data transmission lines.

Connecting the power supply

Cables with a maximum cable cross-section of 1.5 mm² can be used for connecting the power supply. For long supply lines, use 1.5 mm² 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: 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

You can use the UPS output of the power supply unit and connect a Beckhoff control panel as a second display. If the supply voltage fails and the panel PC is only supplied by the battery pack, the control panel remains in operation. Second display operators can use it to read the power failure notification, back up data, and shut down the operating system.

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.

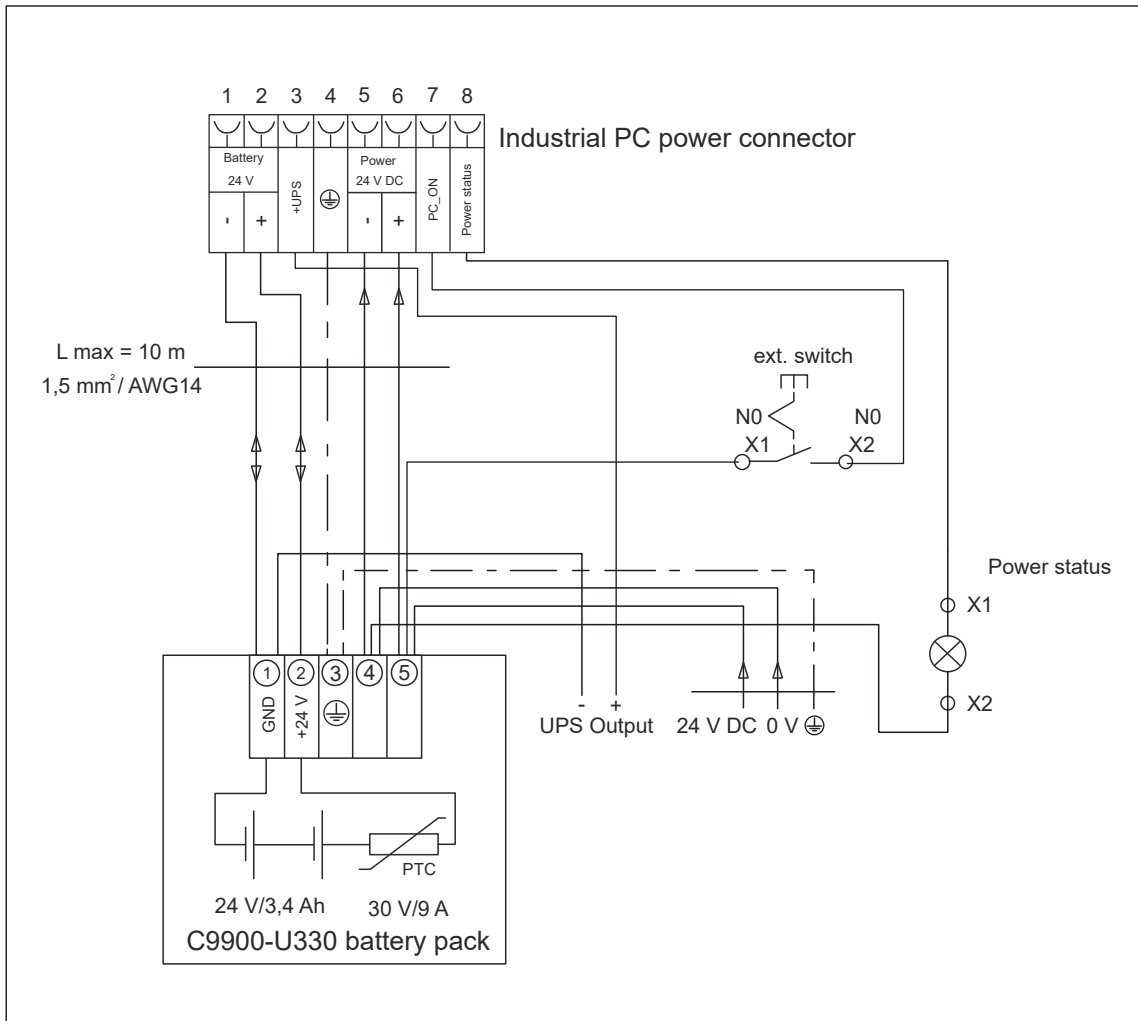


Fig. 34: Wiring diagram C9900-U330

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 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

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 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.

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.

UPS software components

The UPS software components with the corresponding drivers must be installed on the PC to operate the power supply unit as a UPS. The software components and drivers are already installed on delivery of the PC with operating system. Otherwise, you have to install the installation package *Beckhoff UPS* yourself.

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

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

5 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:

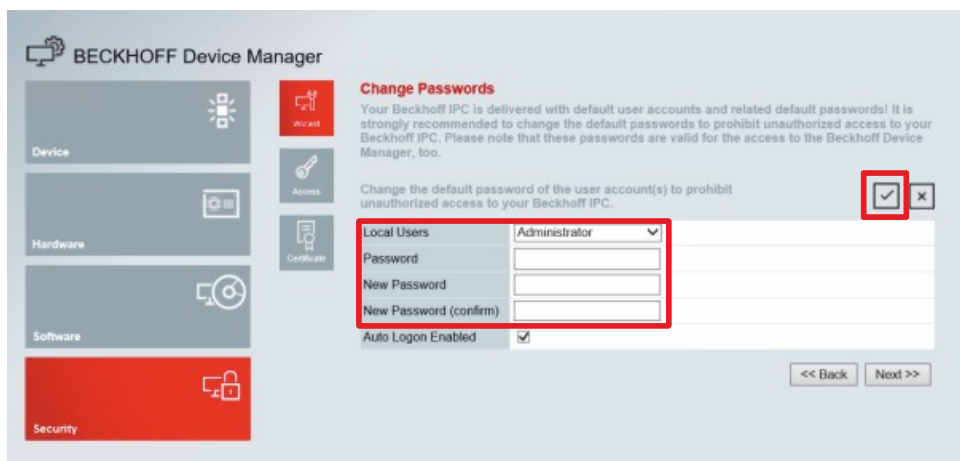


Fig. 35: Beckhoff Device Manager - Change passwords

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.

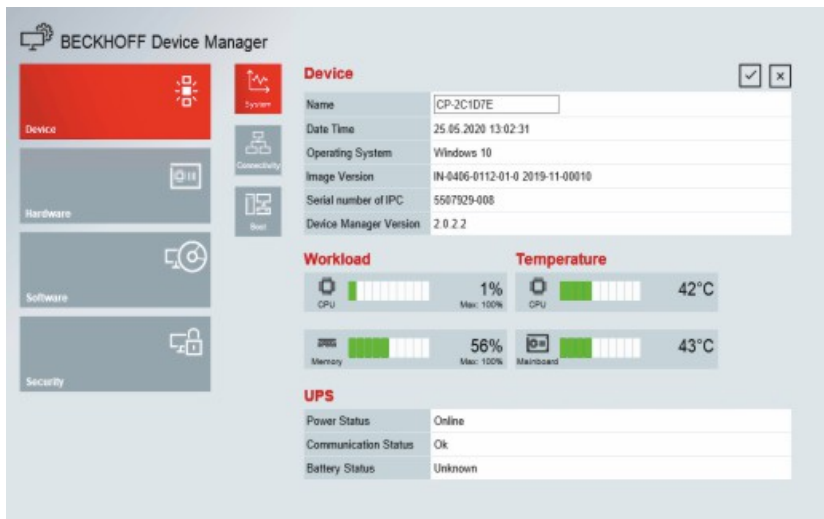


Fig. 36: Beckhoff Device Manager – Start page

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 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 dismount the device from the mounting arm.

If you do not wish to use the panel PC any further, chapter 6.2 [Disassembly and disposal \[► 44\]](#) 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 PC (see chapter 3.2 [Interface description \[► 12\]](#)).
 3. Disconnect the PC from your external 24 V power supply.
 4. Pull the power supply 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](#) [▶ 32].
 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.

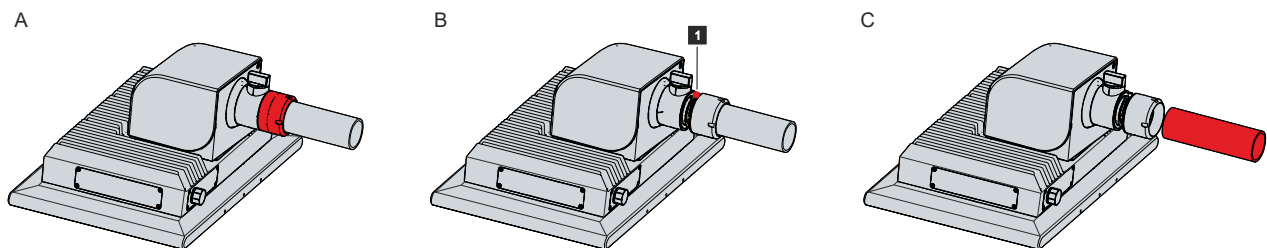


Fig. 37: CP32xx-1600_removing the mounting arm tube

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.

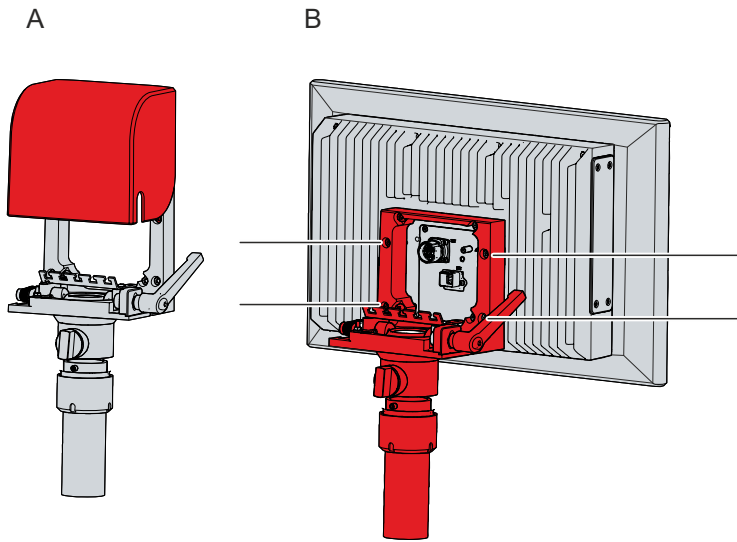


Fig. 38: CP32xx-1600_removing the mounting arm adapter

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 device when live can lead to electric shock.

- Switch off the power supply before replacing device components. Excluded from this is the replacement of hard disks and SSDs in RAID configuration as well as fan cartridges.

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

Also see about this

📖 Service and support [▶ 55]

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 except for the edge of the glass pane may result in touch screen malfunction 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 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 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 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 Control Tool does not start automatically when the device starts up. Proceed as follows to activate the "Cleaning Mode" of the Beckhoff Control Tool:

1. Go to 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.).
 - ⇒ "Cleaning Mode" is activated. You can now clean the front panel.

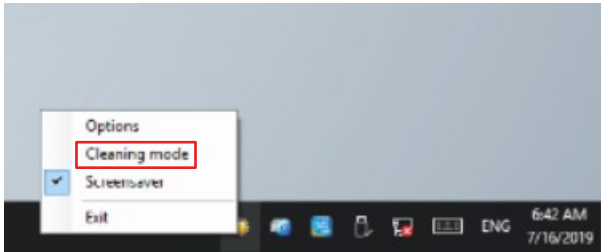


Fig. 39: Select "Cleaning Mode"

You can set the duration for which the panel 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 duration (see Fig.).

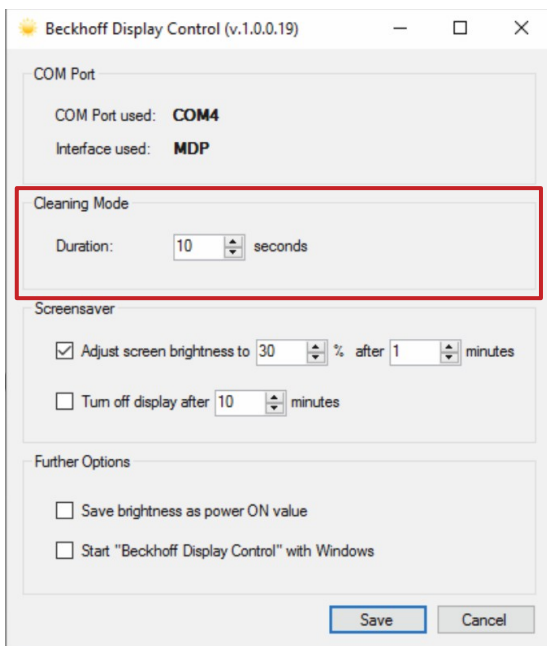


Fig. 40: Configuration "Cleaning Mode"

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.

These are the following components:

- Storage media
- Battery and battery pack
- Fan

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

Table 22: 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
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 device and create an ESD-protected environment in which existing electrostatic charges are safely discharged to ground and charging is prevented.

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

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

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

- Use conductive mats connected to the ground potential as underlays.

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

Access to 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 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).

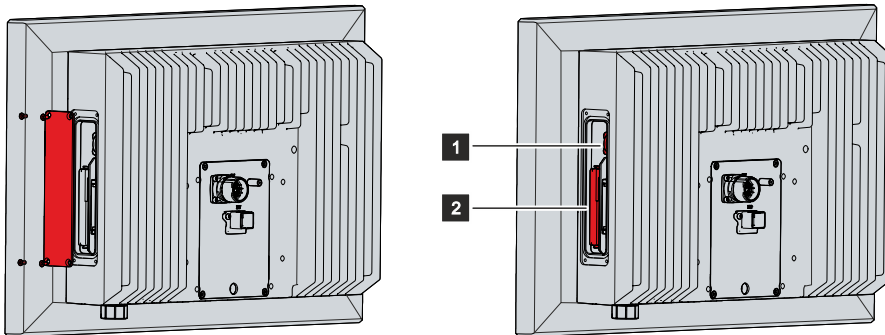


Fig. 41: Access to battery and storage medium

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

7.2.1 Replacing the battery

NOTICE

Incorrect battery type

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 23: Technical data of the battery

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

Chapter 7.2 [Maintenance](#) [▶ 47] 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).

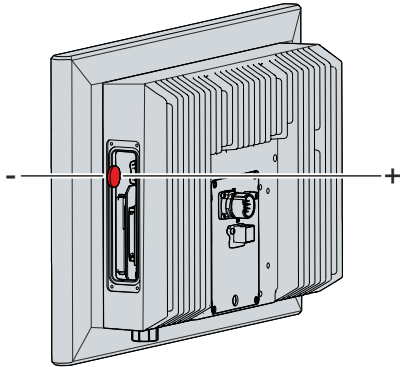


Fig. 42: Replacing the battery

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.

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

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.

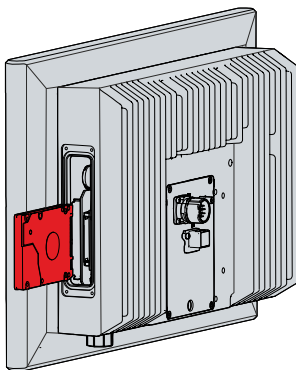


Fig. 43: Replacing the storage medium

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

7.2.3 Fan cartridge replacement

NOTICE

Incorrect fan type

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

- Only replace the fans with replacement fans from Beckhoff Service.

The fans ensure optimal cooling of the device. Order replacement fans only from Beckhoff. Please get in touch with your Beckhoff sales contact.

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).

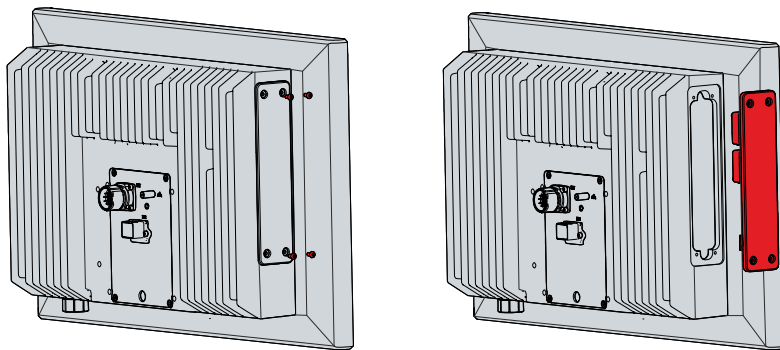


Fig. 44: Fan cartridge replacement

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

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

8 Troubleshooting

Fault	Cause	Measures
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 24: 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 for calculating power consumption and power loss in the download finder - Data sheets: http://www.beckhoff.com/downloadfinder		
Protection rating	IP65		
Vibration resistance (sinusoidal vibration)	EN 60068-2-6:	10 to 58 Hz:	0.035 mm
		58 to 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 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. Suitable packaging of the panel PC can improve its shock resistance during transportation.		

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

Headquarters

Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl
Germany

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

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

You will 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.

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