BECKHOFF New Automation Technology

Manual | EN

CPX27xx

Multitouch Panel PC for application in hazardous areas, zone 2/22



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1 Notes on the documentation

This description is intended exclusively for trained specialists in control and automation technology who are familiar with the applicable national standards.
The documentation and the following notes and explanations must be complied with when installing and commissioning the components.
The trained specialists must always use the current valid documentation.

The trained specialists must ensure that the application and use of the products described is in line with all safety requirements, including all relevant laws, regulations, guidelines, and standards.

Disclaimer

The documentation has been compiled with care. The products described are, however, constantly under development.
We reserve the right to revise and change the documentation at any time and without notice.
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2 For your safety

The signal words and their meanings are explained in the chapter on safety. They contain fundamental safety instructions that are essential for preventing personal injuries and damage to property.

Exclusion of liability

Beckhoff shall not be held liable in the event that this documentation is not complied with and the devices are therefore not used in line with the documented operating conditions.

2.1 Signal words

The signal words used in the documentation are classified below.

Warning on personal injuries

⚠ DANGER
High-risk hazard that will result in death or serious injury.

⚠ WARNING
Medium-risk hazard that may result in death or serious injury.

⚠ CAUTION
Low-risk hazard that may result in minor injury.

Warning on property and environmental damage

NOTICE
The environment, equipment, or data may be damaged.

2.2 Intended use

The device is intended for use as a control system for automation, visualization and communication in machine and system engineering.

The Front side of the device is designed for an IP65 working environment. It offers full protection against contact and against dust, as well as protection against water jets (nozzle) from any angle.

The Rear side is designed for an IP20 working environment. It is protected against the penetration of fingers and solid foreign bodies of 12.5 mm in diameter or larger in size. It is not protected against water. Operation of the device in wet and dusty environments is not permitted.

The specified limits for technical data must be adhered to.

The device can be used within the documented operating conditions.

Potentially hazardous area

This device is only suitable for the following hazardous areas:

- For Zone 2 where gas is present as a combustible material. Zone 2 means that the environment is usually either not explosive or only for a short period of time.
- For Zone 22 where dust is present as a combustible material. Zone 22 means that the surrounding area in the form of a cloud is either not at risk of explosion or only for a short period of time.

Improper use

Do not use the device outside the documented operating conditions.

The device is not suitable for use in the following environments:

- The device may only be used in Zone 2 and only with a suitable housing.
- The device is not suitable for use in aggressive environments, for example with aggressive gases or chemicals.
- The device is not suitable for residential areas. Relevant standards regarding interference emissions must be observed. The device must be installed in a housing or a control cabinet with suitable shielding.

2.2.1 Special conditions (ATEX)

⚠ WARNING

Danger of explosion

Gases or dusts can be ignited in potentially explosive areas. Read and follow the safety instructions to prevent deflagration or explosions.

The Panel PC must be installed in a housing, which ensures protection rating IP54 for gas according to EN 60079-7.
A housing with protection class IP54 is required for fibers and particles, and for non-conductive dust. IP6X is required for conductive dust according to EN 60079-31.

Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 119 V.

If the temperatures during rated operation are higher than 70 °C at the feed-in points of cables, lines or pipes, or higher than 80°C at the wire branching points, then cables must be selected whose temperature data correspond to the actual measured temperature values.

Observe the permissible ambient temperature during operation in potentially explosive areas. The permissible ambient temperature range during operation is 0 °C to +55 °C.

The connections of the Panel PC may only be connected or disconnected if the supply voltage has been switched off or if a non-explosive atmosphere is ensured.

Switch off the power supply and ensure that no explosive atmosphere occurs when the CFast card is replaced.

Fix the USB cables with cable straps to the mounting bracket. Check tensile strength of the cables regularly and retightened the cable straps if necessary.

The Panel PC may only be mounted horizontally (see: Mounting).

2.2.2 Special conditions (IECEx)

⚠ WARNING

Danger of explosion

Gases or dusts can be ignited in potentially explosive areas. Read and follow the safety instructions to prevent deflagration or explosions.

The Panel PC must be installed in a housing, which ensures protection rating IP54 for gas according to IEC 60079-7. A housing with protection class IP54 is required for fibers and particles, and for non-conductive dust. IP6X is required for conductive dust according to IEC 60079-31.

Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 119 V.

If the temperatures during rated operation are higher than 70 °C at the feed-in points of cables, lines or pipes, or higher than 80°C at the wire branching points, then cables must be selected whose temperature data correspond to the actual measured temperature values.

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Switch off the power supply and ensure that no explosive atmosphere occurs when the CFast card is replaced.

Fix the USB cables with cable straps to the mounting bracket. Check tensile strength of the cables regularly and retightened the cable straps if necessary.

The Panel PC may only be mounted horizontally (see: Mounting).

2.3 Fundamental safety instructions

The following safety instructions must be observed when handling the device.

Application conditions

- Do not use the device under extreme environmental conditions.
- Do not use the device in hazardous areas.
- Never plug or unplug connectors during thunderstorms. There is a risk of electric shock.
- Ensure that the device has a protective and functional earth connection.

Damage to property, loss of data and impairment of functions

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

2.4 Operator's obligation to exercise diligence

The operator must ensure that

- the products are used only for their intended purpose (see Chapter 2.2 Intended use [▶ 6]).
- the products are only operated in sound condition and in working order.
- the products are operated only by suitably qualified and authorized personnel.
- the personnel is instructed regularly about relevant occupational safety and environmental protection aspects, and is familiar with the operating instructions and in particular the safety instructions contained herein.
- the operating instructions are in good condition and complete, and always available for reference at the location where the products are used.

2.5 Notes on information security

The products of Beckhoff Automation GmbH & Co. KG (Beckhoff), insofar as they can be accessed online, are equipped with security functions that support the secure operation of plants, systems, machines and networks. Despite the security functions, the creation, implementation and constant updating of a holistic security concept for the operation are necessary to protect the respective plant, system, machine and networks against cyber threats. The products sold by Beckhoff are only part of the overall security concept. The customer is responsible for preventing unauthorized access by third parties to its equipment, systems, machines and networks. The latter should be connected to the corporate network or the Internet only if appropriate protective measures have been set up.

In addition, the recommendations from Beckhoff regarding appropriate protective measures should be observed. Further information regarding information security and industrial security can be found in our https://www.beckhoff.com/secguide.

Beckhoff products and solutions undergo continuous further development. This also applies to security functions. In light of this continuous further development, Beckhoff expressly recommends that the products are kept up to date at all times and that updates are installed for the products once they have been made available. Using outdated or unsupported product versions can increase the risk of cyber threats.

To stay informed about information security for Beckhoff products, subscribe to the RSS feed at https://www.beckhoff.com/secinfo.

3 Product overview

The built-in panel PC is designed for installation in the front of a control cabinet and represents a powerful platform for use in machine and system engineering.

Thanks to its processors, you can use the panel PC for the following applications, among others:

- various automation and visualization tasks
- a wide range of IoT tasks with data preprocessing
- HMI applications
- axis control
- short cycle times
- high-volume data handling
- other PC applications

The panel PC is available in the following eight display sizes, with corresponding resolutions:

- 15-inch (1024 x 768) 4:3
- 19-inch (1280 x 1024) 5:4
- 21.5-inch (1920 x 1080) 16:9

The device has a multi-finger touch screen and an aluminum housing with glass front with IP65 on the front side and IP20 on the rear side.

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

- 3½-inch motherboard
- Intel® processor
- CFast
- 24 V DC power supply

3.1 Structure



Fig. 1: Structure

Table 1: Legend structure

No.	Component	Description
1	Display and touch screen glass	Operation of the panel PC
2	Clamping lever	Mounting the panel PC in the control cabinet wall
3	Access to interfaces	Interfaces on the underside
4	Name plate	Information on the equipment of the panel PC

3.2 Interface description

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

- DVI (X109)
- USB (X105-X108)
- Ethernet RJ45 (X103, X104)
- Power supply (X101)

The interfaces are located on the rear side of the panel PC at the bottom in the connection section.

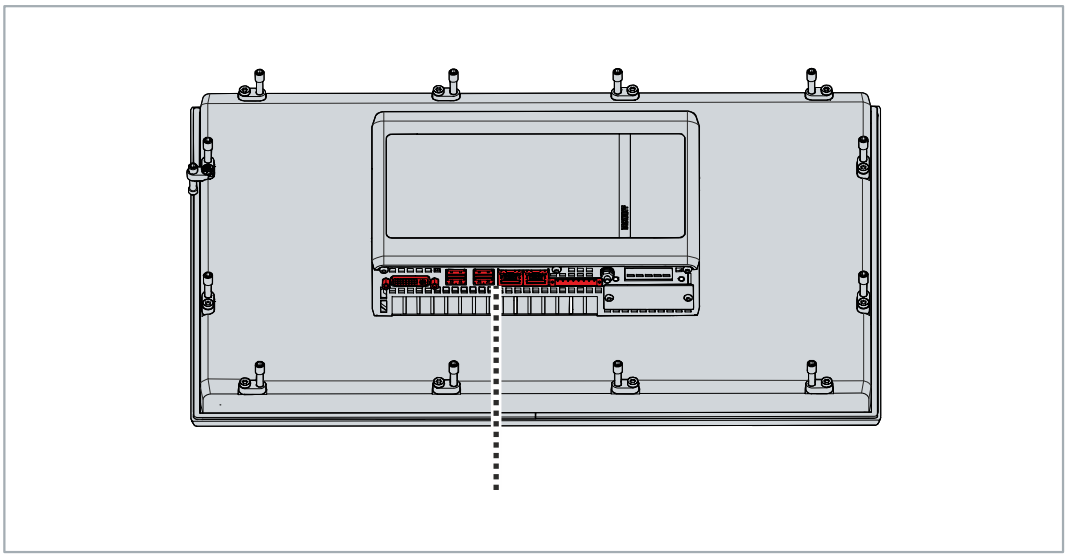


Fig. 2: Connection section

3.2.1 DVI

The panel PC is equipped with a DVI connector (X109), to which a DVI-capable monitor can be connected. Only digital signals are transmitted.

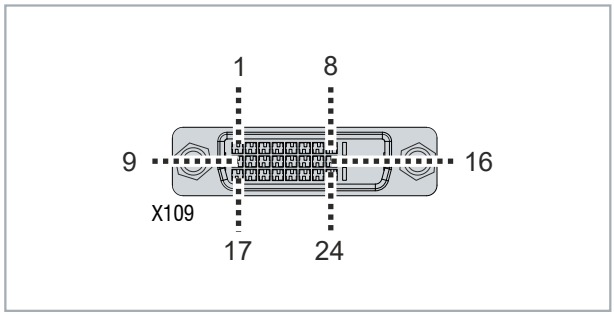


Fig. 3: DVI interface pin numbering

Table 2: DVI interface pin assignment

Pin	Connection	Pin	Connection	Pin	Connection
1	TMDS Data 2 -	9	TMDS Data 1 -	17	TMDS Data 0 -
2	TMDS Data 2 +	10	TMDS Data 1 +	18	TMDS Data 0 +
3	TMDS Data 2/4 Shield	11	TMDS Data 1/3 Shield	19	TMDS Data 0/5 Shield
4	not connected	12	not connected	20	not connected
5	not connected	13	not connected	21	not connected
6	DDC Clock	14	+ 5 V Power	22	TMDS Clock Shield
7	DDC Data	15	Ground (+ 5 V, Analog H/V Sync)	23	TMDS Clock +
8	Analog Vertical Sync	16	Hot Plug Detect	24	TMDA Clock -

3.2.2 USB

The panel PC has four USB interfaces (X105-X108). They are used to connect peripheral devices with USB interfaces.

The four interfaces comply with the USB 2.0 standard.

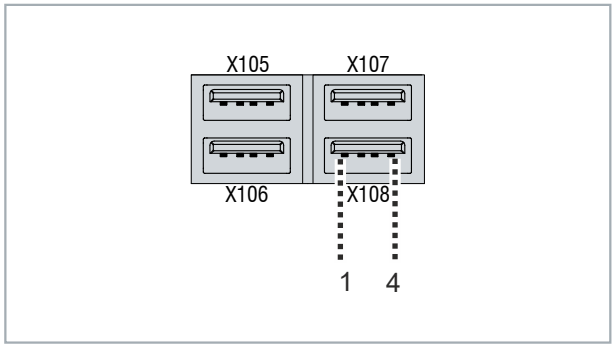


Fig. 4: USB interface pin numbering

Table 3: USB interface pin assignment

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

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

3.2.3 Ethernet RJ45

The panel PC has two Gigabit LAN ports (X103, X104).

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

If you use the Ethernet ports with EtherCAT or for Real-Time Ethernet applications, you must observe the following distinction:

The Ethernet port (X104, LAN2) connected via PCIe® with the i210 controller is generally suitable for cycle times <= 1 ms and for distributed clock applications with EtherCAT.

The Ethernet port (X103, LAN1) integrated in the chipset with the i219 controller is generally suitable for EtherCAT and real-time Ethernet applications with cycle times > 1 ms (without distributed clocks).

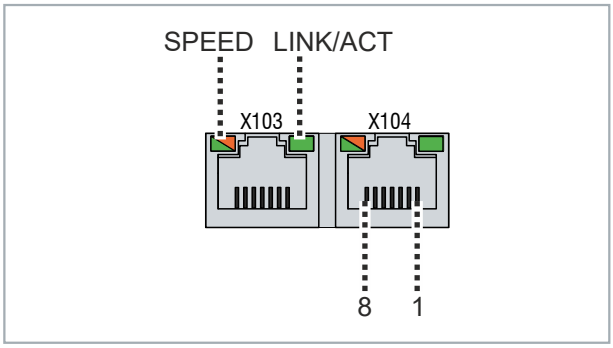


Fig. 5: Ethernet interface pin numbering

Table 4: Ethernet interface pin assignment

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

The LEDs of the LAN interfaces indicate the activity and the data transmission rate (Mbit/s). The LED (LINK/ACT) highlighted completely green in the figure indicates whether the interface is connected to a network. If this is the case, the LED lights up green. The LED flashes green when data transmission is in progress on the interface.

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

The following table shows the LED meaning according to the possible data transmission speed:

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

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

3.2.4 Power supply

The panel PC is supplied with a nominal voltage of 24 V. The power supply and the protective earth of the device are connected via the 4-pin voltage socket (X101). The main supply voltage is applied between PIN 5 (0 V) and PIN 6 (24 V) of the socket.

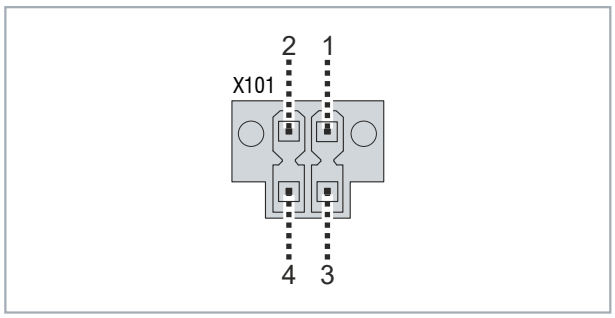


Fig. 6: Voltage socket pin numbering

Table 6: Voltage socket pin assignment

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

The plug for the power supply is specified for 16 A and can accommodate wire cross-sections of up to 1.5 mm^2. For long supply lines, use 1.5 mm^2 cables to achieve a low voltage drop on the supply line. At least 22 V should be present at the voltage connector of the panel PC so that the PC remains switched on in the event of voltage fluctuations. The plug is included in the scope of delivery.

3.3 Optional interfaces

Optionally, you can expand your device with an additional Ethernet interface. The following ordering option is available for this purpose:

- C9900-B415: Third on-board Ethernet adapter

The interface is led out on the connector panel in the connection section. 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 RJ45 connection technology with twisted-pair cables is used. The maximum length of the cable connection is 100 m.

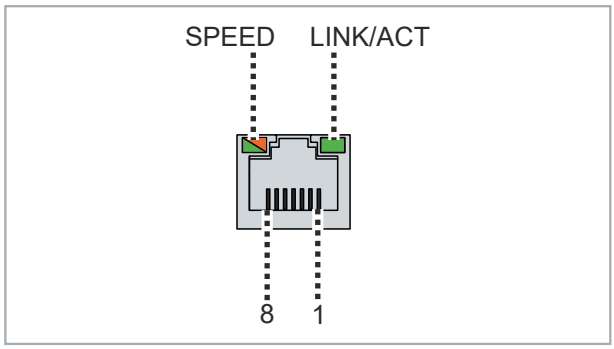


Fig. 7: Ethernet interface pin numbering

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 -	

The LEDs of the LAN interfaces indicate the activity and the data transmission rate (Mbit/s). The LED (LINK/ACT) highlighted completely green in the figure indicates whether the interface is connected to a network. If this is the case, the LED lights up green. The LED flashes when data transmission is in progress on the interface.

The green/orange LED (SPEED) shown in the figure indicates the data transmission rate. If the speed is 100 Mbit/s the LED is orange, at 1000 Mbit/s it is green.

3.4 Name plate

The name plate provides information about the equipment of the device and markings.

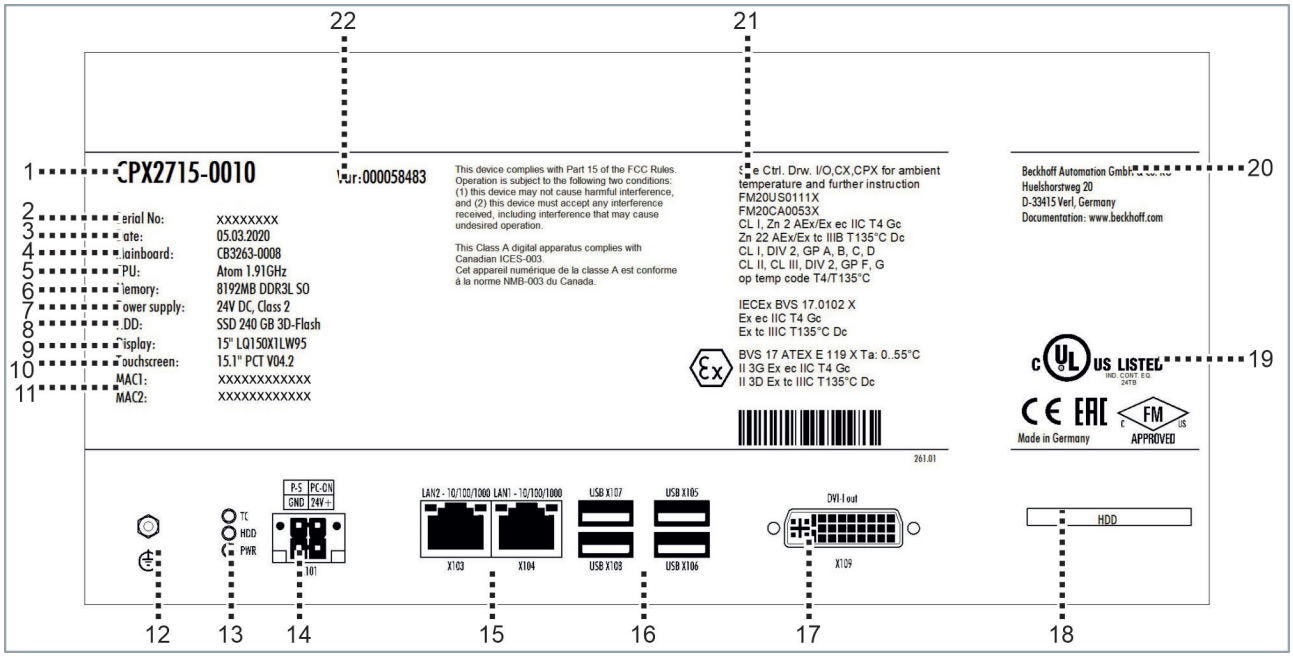


Fig. 8: Name plate

Table 8: Name plate legend

No.	Description
1	Model: The last four digits indicate the device generation.
2	Serial number (BTN)
3	Date of manufacture
4	Mainboard
5	CPU
6	Main memory
7	Power supply
8	Storage medium
9	Display
10	Touch screen
11	MAC addresses of the Ethernet interfaces (X103, X104)
12	Grounding bolt for protective and functional earthing of the panel PC
13	Status LEDs
14	Voltage socket (X101)
15	Ethernet interfaces (X103, X104)
16	USB interfaces (X105-X108)
17	DVI interface (X109)
18	Slot storage medium
19	Symbols, certifications
20	Address of the vendor
21	Markings for use in potentially explosive atmospheres
22	Variant number: commercial number of the order code including ordering options

The CPX27xx-0010 Panel PC is certified for potentially explosive atmospheres and bears the following markings:

ATEX:



BVS 17 ATEX E 119 X Ta: 0..55°C
II 3G Ex ec IIC T4 Gc
II 3D Ex tc IIIC T135°C Dc

IECEx:

IECEx BVS 17.0102 X
Ex ec IIC T4 Gc
Ex tc IIIC T135°C Dc

See Ctrl.See Ctrl. Drw.Drw. I/O,CX,CPX for ambient temperature and further instruction
FM20US0111X
FM20CA0053X
CL I, Zn 2 AEx/Ex ec IIC T4 Gc
Zn 22 AEx/Ex tc IIIB T135°C Dc
CL I, DIV 2, GP A, B, C, D
CL II, CL III, DIV 2, GP F, G
op temp code T4/T135°C

3.5 TwinCAT version

To ensure optimal performance and access to all the functions of your device when using the TwinCAT control software, Beckhoff recommends using the latest TwinCAT version. In addition, you should never go below the minimum requirement for the TwinCAT version. This consists of the hardware requirements and the general TwinCAT system requirements. The general TwinCAT system requirements can be found here. The following table shows the minimum TwinCAT version required for the different device generations, depending on the operating system and based on the hardware requirements:

Table 9: CP27Xx-0010 Minimum TwinCAT version

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

3.6 Status LEDs

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

- the TwinCAT status
- the hard disk activity
- the status of the power controller

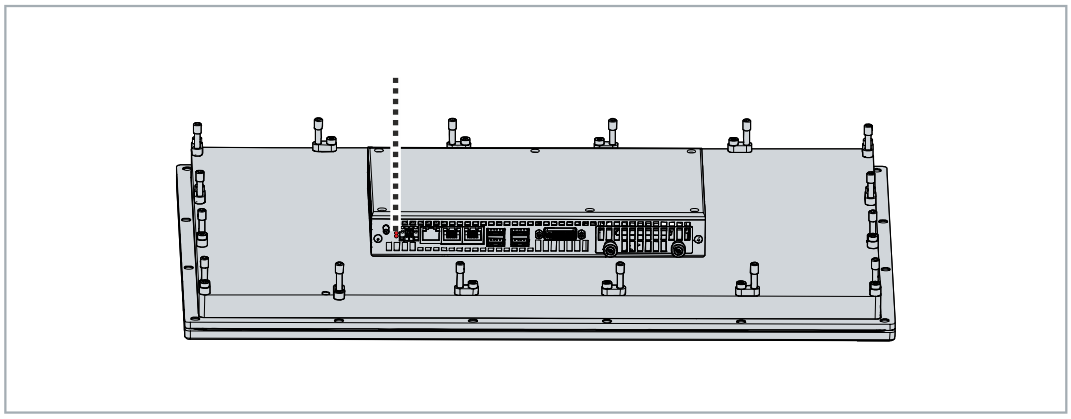


Fig. 9: Status LEDs

Table 10: Meaning of the Status LEDs

LED	Color/flashing interval	Meaning
TC (TwinCAT)	red	TwinCAT Stop
	blue	TwinCAT Config
	blue/red flashing	TwinCAT Config (fieldbus error)
	green	TwinCAT Run
	green/red flashing	TwinCAT Run (fieldbus error)
HDD (hard disk)	red	Accessing storage media
PWR (Power)	green	Computer on
	off	Computer off

4 Commissioning

In order to use the device, you must first commission it. The first step is to transport the device to is operating location and unpack it. The device is then installed in the control cabinet, the cables and power supply are connected, and finally the device is switched on.

Operating the device

The device is operated via the touch screen.

NOTICE

Damage to the touch screen

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

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

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

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

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

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

⇨ The film is now fitted.

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

4.1 Transport and unpacking

Note the specified transport and storage conditions (see Chapter 9 Technical data).

Despite the robust design of the unit, the components are sensitive to strong vibrations and impacts. During transport the device must therefore be protected from mechanical stress. Appropriate packaging of the device, such as the original packaging, can improve the vibration resistance during transport.

NOTICE

Hardware damage due to condensation

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

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

Unpacking

Proceed as follows to unpack the unit:

1. Check the packaging for transport damage.
2. Remove packaging.
3. Keep the packaging for possible future transport.
4. Check your delivery for completeness by comparing it with your order.
5. Check the contents for visible shipping damage.
6. Inform the Beckhoff Service Dept. in case of discrepancies between the packaging content and the order or in the event of transport damage.

⇨ You have unpacked the device.

4.2 Control cabinet installation

NOTICE

Extreme environmental conditions

Extreme environmental conditions can cause damage to the device.

- Avoid extreme environmental conditions.
- Protect the device against dust, moisture and heat.

NOTICE

Lack of air circulation

Incorrect installation of the device prevents air circulation in the device and thus causes overheating and impaired functioning.

- Only install the device in the corresponding wall in the orientation shown.

NOTICE

Incorrect installation

Mounting the device in a way that deviates from the documentation can impair its functionality.

- Mount the device only in the orientations shown in the documents.

The device is designed for installation in a control cabinet for machine and system engineering. The environmental conditions specified for operation must be observed.

Dimensions

For the device dimensions, please refer to the “Technical Drawings” section in the Download Finder on the Beckhoff website. Enter the desired device in the search bar.

All dimensions are in mm.

Preparation of the control cabinet

The control cabinet must have the required installation cutout according to the device dimensions of the panel PC.

The wall thickness must be between 1 mm and 5 mm for installation. After installation, be sure to check the tightness between the panel PC and the wall.

Please also note the following for installation in a control cabinet:

- Ensure that there is 5 cm of free space above and below the device for air circulation.
- Position the panel PC such that reflections from light sources on the screen are avoided as far as possible.
- 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.

Installation in the control cabinet

Once you have made the required cutout in the control cabinet, you can install the device in the control cabinet. Clamping levers are provided at the rear side of the housing for mounting of the device. When delivered, the clamping levers are folded down onto the device.

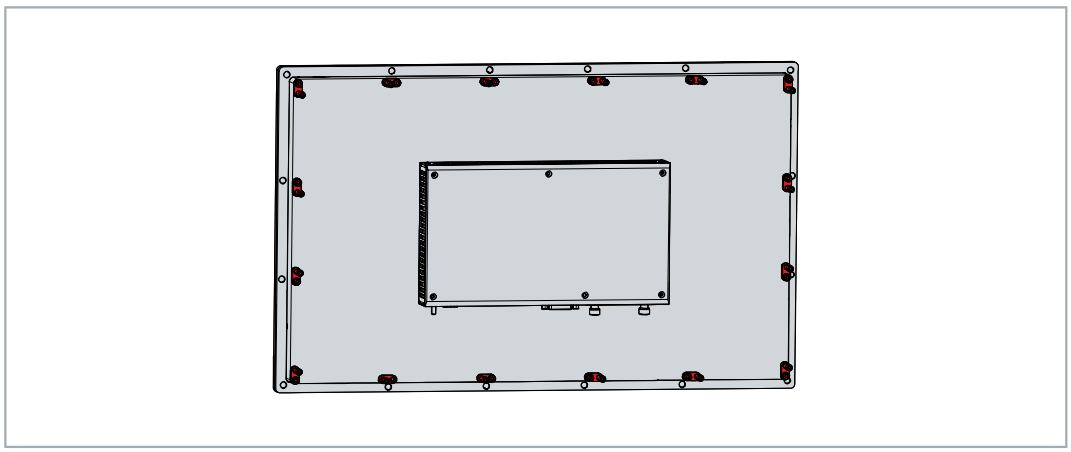


Fig. 10: Delivery state clamping lever

To mount the device in the control cabinet, follow the steps below:

1. Insert the device in the intended position in the control cabinet wall. Make sure that the device is secured against falling out until it is fastened properly.

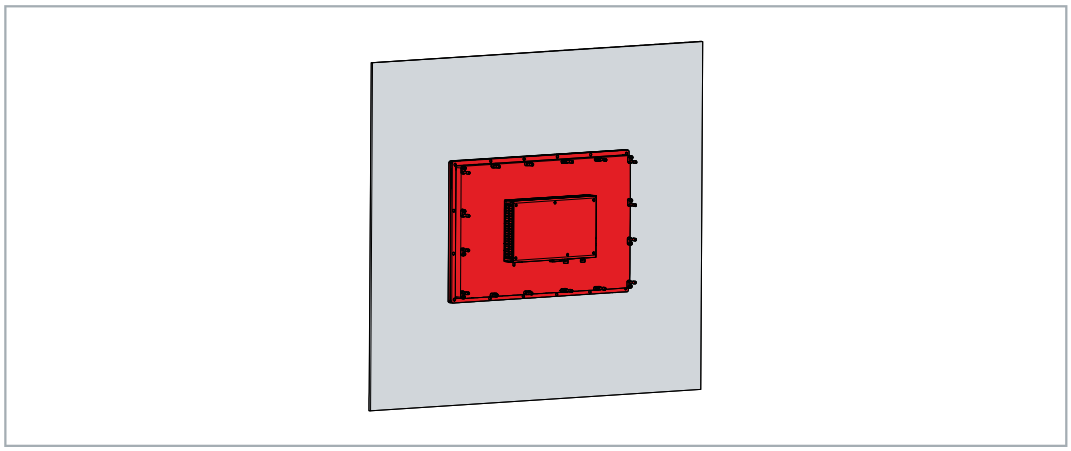


Fig. 11: Wall positioning

2. Turn the clamping levers 90° outwards (sections A and B).
3. Tighten the clamping levers with a 3.0 mm Allen key (section C).

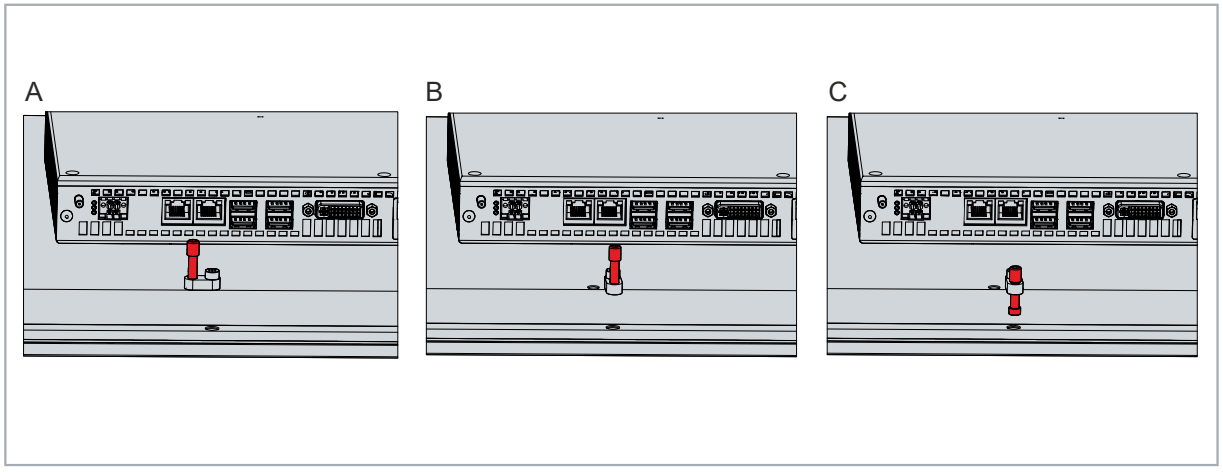


Fig. 12: Control cabinet installation

⇨ You have installed the device in the control cabinet.

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

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

- The PE conductor (protective earth) and the "0 V" conductor of the voltage source must be on the same potential (connected in the control cabinet).
- Standard EN 60204-1:2006, section 6.4.1:b stipulates that one side of the circuit, or a point of the energy source for this circuit must be connected to the protective conductor system.

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

4.3.1 Grounding the Panel PC

Potential differences are minimized and electrical currents are diverted to the ground through grounding or potential equalization of electronic devices. This is to prevent dangerous touch voltages and electromagnetic interference.

Protective earth

The protective grounding of a device serves to avoid dangerous touch voltages. According to the EN 60204-1 standard (Chapter 8 Potential equalization), protective grounding is required if:

- the device exceeds dimensions of 50 mm x 50 mm,
- the device can be touched or encompassed over a large area,
- contact between the device and active parts is possible,
- an insulation fault may occur.

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

EMC

NOTICE

Hardware damage due to electromagnetic interference

The use of the device without a functional earth can lead to material damage due to electromagnetic interference.

- Only use the device with functional earth.

Electromagnetic compatibility (EMC) of the device includes on the one hand not affecting other devices and equipment by electromagnetic interference and on the other hand not being disturbed by electrical or electromagnetic effects itself.

To do this, the device must comply with certain protection requirements. The device has EMC interference immunity according to EN 61000-6-2. The EMC interference emission of the device meets the requirements of EN 61000-6-4.

The functional earth is necessary for the EMC of the device. You establish functional earthing via the grounding connection between the grounding bolt in the connection section on the rear side of the panel PC and the central grounding point of the control cabinet in which the PC is installed. Use cables with a cross-section of at least 4 mm^2 or a flat conductor for the ground connection, as the circumference of the conductor should be as large as possible.

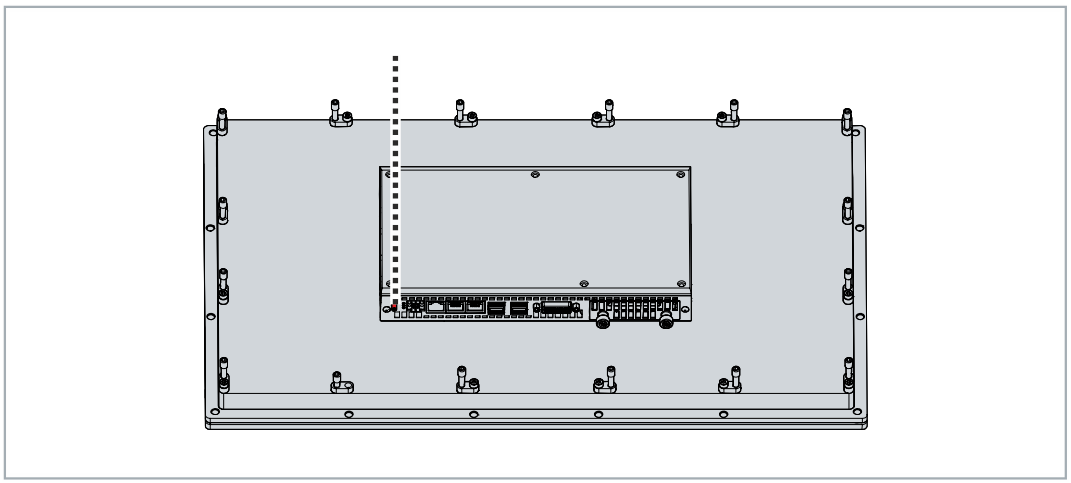


Fig. 13: Grounding bolt for functional earthing

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.

The connections are located at the rear side of the device.

Connecting cables

Make sure that you first ground the PC (see chapter Grounding the panel PC [▶ 27]) and then plug in all data transmission lines.

In potentially explosive atmospheres, USB plugs must not be able to come out of the sockets. Secure the cables to the mounting bracket with cable ties.

You need:

- Cable ties
- Pliers or side cutters

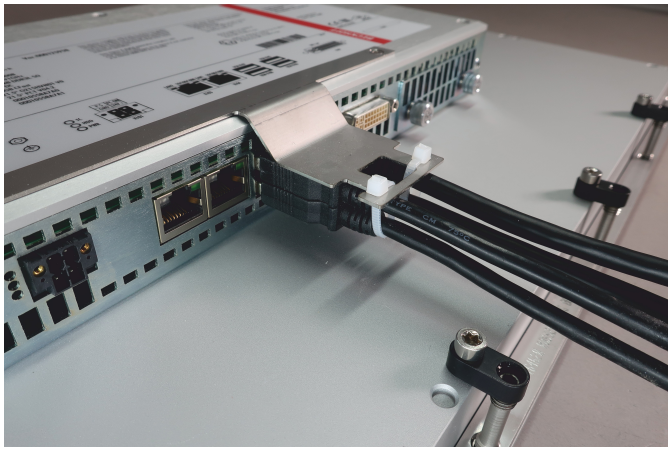


Fig. 14: Fixing USB cables

Connecting the power supply

Cables with a maximum cable cross-section of 1.5 mm^2 can be used for connecting the power supply. 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 device, so that the device remains switched on during voltage fluctuations.

Proceed as follows to connect the 24 V DC power supply:

1. First mount the power supply cable with the connection strip without its strain relief housing.
2. Plug the voltage connector into the voltage socket on the device.
3. Screw the voltage connector to the voltage socket.
4. Connect the device to your external 24 V power supply.
5. Switch on the 24 V power supply.
6. Measure the voltage at the 5-pin connection strip of the device.
7. Mount the strain relief housing on the 5-pin connection strip.

⇨ You have connected the power supply.

4.4 Switching the Panel PC on and off

NOTICE

Public networks

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

- Protect the device before connecting it to public networks.

NOTICE

Data loss due to switching off the device while the software is running

Switching off the device before the running software is terminated and the operating system is shut down can lead to data loss.

- Quit the running software and shut down the operating system before switching off the device.

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

You can use the PC-ON input of the PC to control the startup and shutdown of the operating system. The PC-ON signal is inverted, which is why the operating system boots up at 0 V at the input and shuts down at 24 V. During operation, 0 V must therefore be permanently applied to the input. If you want to shut down the operating system, you must apply 24 V to the PC-ON input. Once the operating system has shut down, the PC power supply unit sets the Power Status output from 24 V to 0 V. This indicates that the shutdown is complete. You can then switch off the power supply. If you remove the 24 V from the PC-ON input before you have switched off the power supply, the operating system restarts. Therefore, 24 V must be applied to the PC-ON input until you have switched off the power supply.

To shut down the operating system properly, you can install an additional ON/OFF switch next to the machine's main switch to turn the machine on and off. The main switch can thus remain switched on in principle and thus ensures that the PC is still supplied with power during the shutdown of the operating system. Via the Power Status output, you can switch, for example, a contactor that switches off the entire system. The load capacity of the Power Status output is limited to max. 0.5 A. No fuse protection is required.

Driver installation

When you switch on the device for the first time, the optionally pre-installed operating system will be started. For any additional hardware you have connected, you have to install the drivers yourself afterwards. In addition, the Beckhoff Device Manager starts automatically. The Device Manager is a software from Beckhoff that supports you in configuring the device.

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

5 Configuration

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

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

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

5.1 Beckhoff Device Manager

The Beckhoff Device Manager enables detailed system diagnostics with uniform secure access to the existing hardware and software components. System data is recorded, analyzed and evaluated during operation. The data helps to detect deviations at an early stage and prevent device downtimes.

The user interface screenshots shown in this chapter are examples only and do not represent the actual state of your device.

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

The device is supplied with predetermined access data by default:

- User name: Administrator
- Password: 1

You also have the option of using the Beckhoff Device Manager to remotely configure the device via a web browser. More detailed information is available in the Beckhoff Device Manager manual.

First start of Beckhoff Device Manager

When your device is booted for the first time, the Beckhoff Device Manager also starts automatically for the first time. The Security Wizard opens. It informs you that you should reset the default password set by Beckhoff. Proceed as follows:

1. Click **Next** on the Security Wizard start page.
   ⇨ This will take you to the **Change Passwords** page:

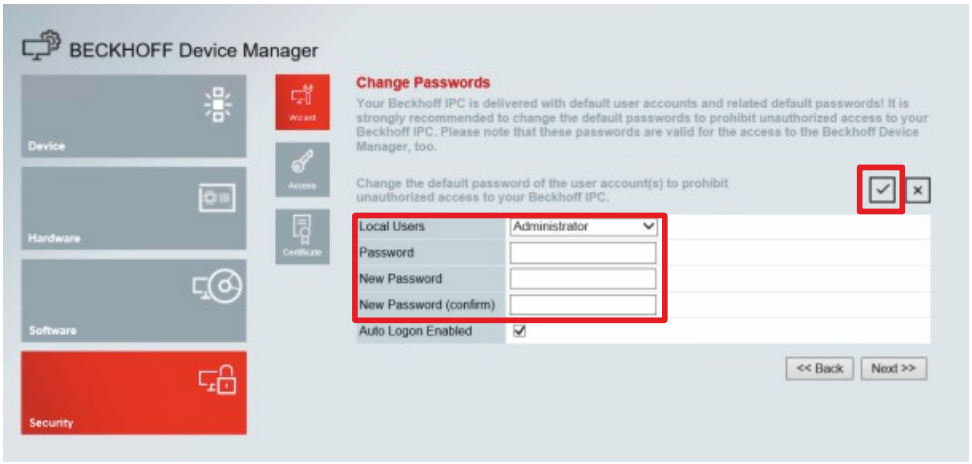


Fig. 15: Beckhoff Device Manager – Change passwords

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.

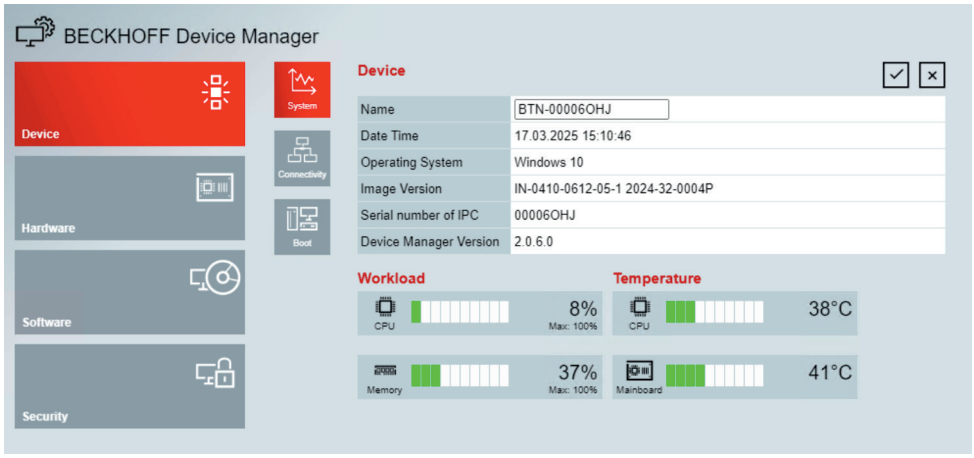


Fig. 16: Beckhoff Device Manager – Start page

Continue to navigate in the menu and to configure the device. Note that modifications only become active once they have been confirmed.

Manual start of Beckhoff Device Manager

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

1. Open a web browser locally on the device.
2. Enter *localhost/config* in the web browser to start the Beckhoff Device Manager.

⇨ The Beckhoff Device Manager starts. The Security Wizard appears.

Secure passwords

Strong passwords are an important prerequisite for a secure system.

Beckhoff supplies the device images with standard user names and standard passwords for the operating system. It is imperative that you change these.

Controllers are shipped without a password in the UEFI/BIOS setup. Beckhoff recommends assigning a password here as well.

Please note the following:

- Passwords should be unique for each user and service.
- Only change passwords after an incident in which passwords have become known without authorization.
- Train the device users in the use of passwords.

A secure password has the following characteristics:

- Password complexity: The password should contain capital and lower-case letters, numbers, punctuation marks and special characters.
- Password length: The password should be at least 10 characters long.

5.2 Wake on LAN (WOL)

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

Configuration under Windows

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

1. Open the Device Manager.
2. Navigate to the **Network adapters** section.
3. Double-click the appropriate Ethernet controller.
   ⇨ A window containing the Ethernet controller's properties will open.
4. Klick on the **Advanced** tab.
5. Set the **Wake on Magic Packet** and **Wake on Magic Packet from S5** properties to **Enabled**.
6. Confirm with **OK**.

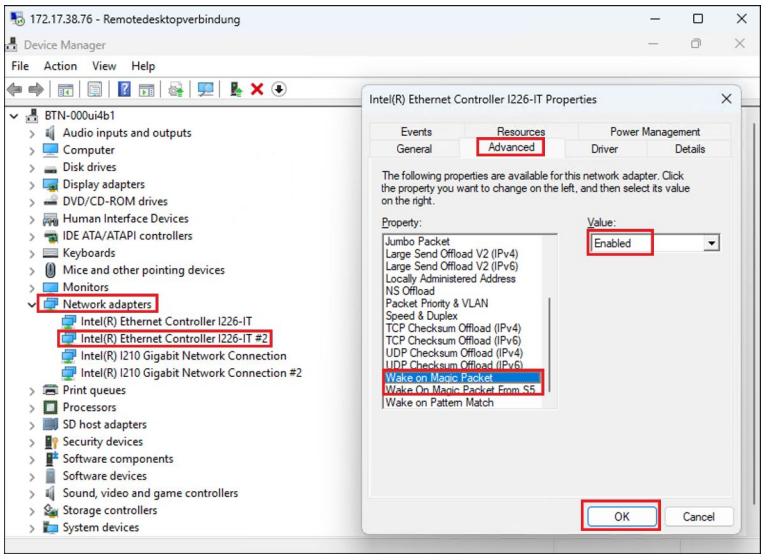


Fig. 17: Activate function

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

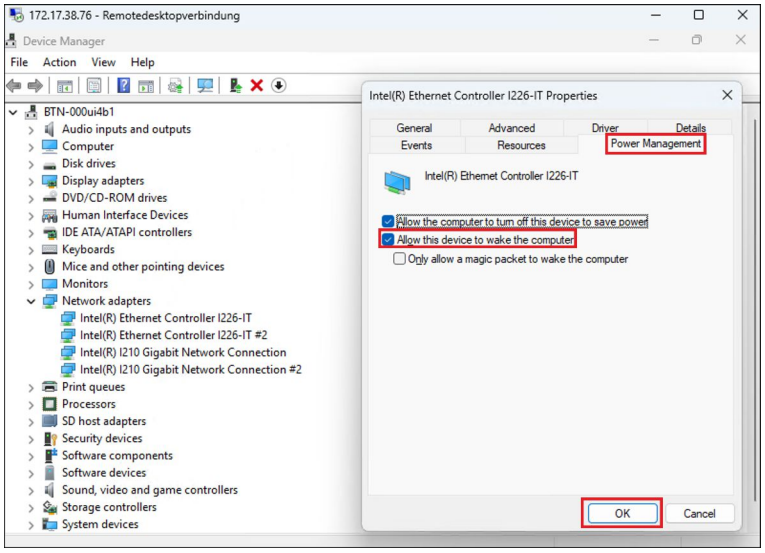


Fig. 18: Enable Function

⇨ You have configured the Wake on LAN function.

6 Decommissioning

NOTICE

Hardware damage due to power supply

A connected power supply can cause damage to the device during disassembly.

- Disconnect the power supply from the device before starting to disassemble it.

As part of the decommissioning of the device, you must first disconnect the power supply and cables. You can then remove the device from the control cabinet. If you do not wish to use the device any further, chapter Disassembly and disposal provides information on the correct disposal of the device.

6.1 Disconnecting the power supply and cables

⚠ CAUTION

Risk of electric shock

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

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

Proceed as follows to disconnect the power supply and lines:

1. Shut down the device.
2. Disconnect the device from your external 24 V power supply.
3. Remove the voltage connector from the voltage socket.
4. Make a note of the wiring of all data transmission cables if you want to restore the cabling with another device.
5. Disconnect all data transmission cables from the device.
6. Finally, disconnect the ground connection.

⇨ You have disconnected the power supply and the cables.

6.2 Disassembly and disposal

Before you can remove the device from the control cabinet, you must first disconnect the power supply and the cables (see Chapter Disconnecting the power supply and cables).

To remove the device from the control cabinet, follow the steps below:

1. Loosen the clamping levers with a 3.0 mm Allen key (sections A and B). Make sure that the device is secured against falling out until it is removed from the wall.
2. Turn the clamping levers by 90° onto the device (section C).

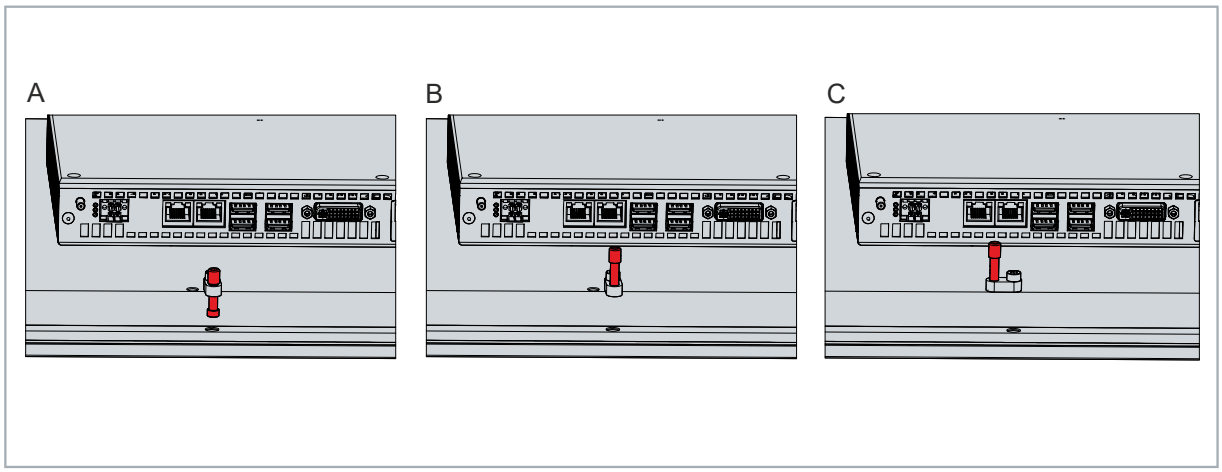


Fig. 19: Dismantling the control cabinet

3. Remove the device from the corresponding cutout in the control cabinet wall.

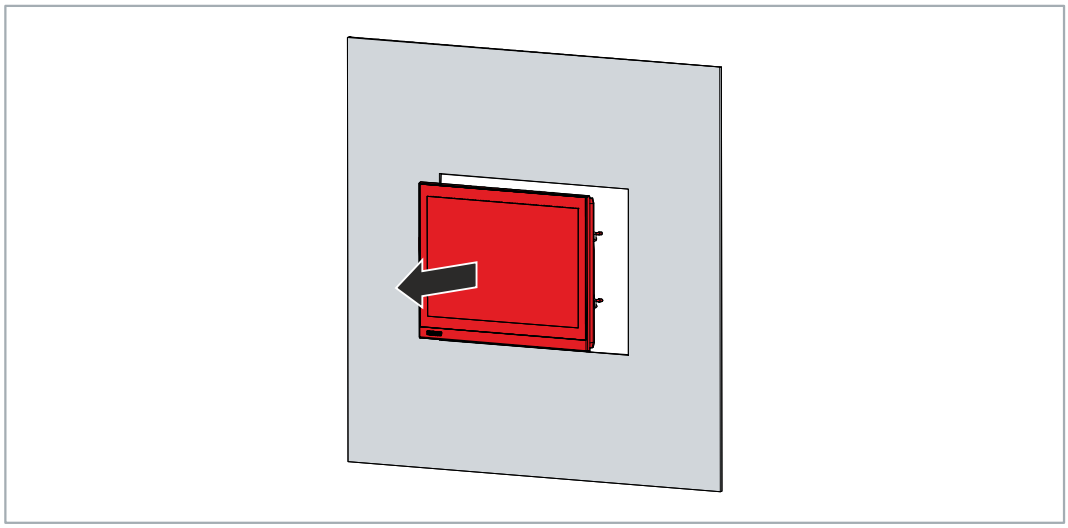


Fig. 20: Wall removal

⇨ You have successfully removed the device from the control cabinet.

Disposal of the panel PC

When disposing of the device follow the national electronic scrap regulations. In order to dispose of the device, it must be removed and fully dismantled. Dispose of the components in the following way:

- Send plastic parts (polycarbonate, polyamide (PA6.6)) for plastics recycling.
- Take metal parts to the metal recycling collection point.
- Electronic parts such as fans and circuit boards must be disposed of in accordance with national electronic scrap regulations.
- Stick insulating tape over the poles of the CR2032 battery on the motherboard and dispose of the battery via the local battery recycling.

7 Maintenance

⚠ CAUTION

Risk of electric shock

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

- Switch off the power supply before replacing device components. This does not apply to the replacement of storage media in a RAID configuration.

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

7.1 Cleaning

NOTICE

Unsuitable cleaning agents

The use of unsuitable cleaning agents can damage the device.

- Clean the device only as specified.

NOTICE

Faulty touch screen function

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

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

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

- Keep to the boundary conditions of protection rating IP65/IP20.
- Never use compressed air to clean the device.
- Maintain an ambient temperature range of 0°C…55°C.

Cleaning agents

You must use suitable cleaning agents to avoid damaging the front of the device during cleaning. Examples include:

- Benzine
- Spirit
- Glass cleaner

Avoid the following cleaning agents:

- Detergents with scouring or abrasive components
- Metal cleaning objects such as razor blades or steel spatulas
- Steam jet cleaner or very hot water
- Cold water with a heated device
- High water pressure, e.g. high-pressure cleaner

Cleaning the front screen

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

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

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

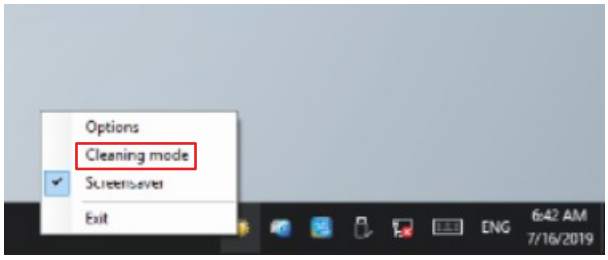


Fig. 21: Select "Cleaning Mode"

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

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

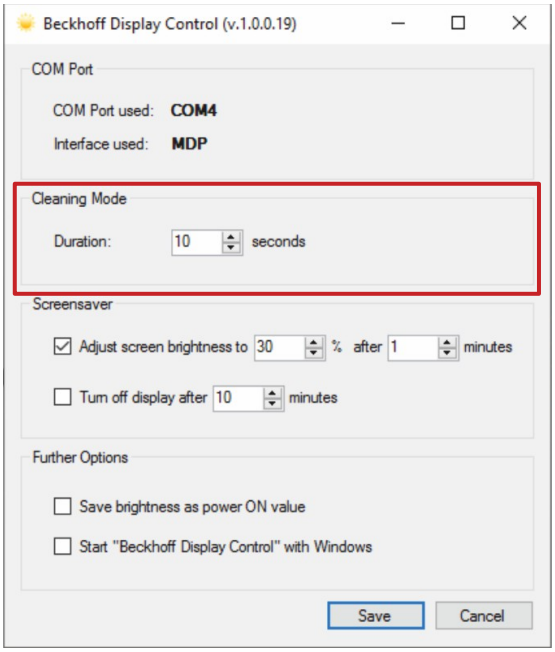


Fig. 22: Configuration "Cleaning Mode"

7.2 Maintenance

NOTICE

Use of incorrect spare parts

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

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

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

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

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

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

Table 11: Device component replacement recommendations

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

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

ESD protection

NOTICE

Electrostatic discharge

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

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

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

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

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

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

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

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

7.2.1 Replacing the battery

⚠ WARNING

Incorrect battery type

Using a different type of battery can lead to a fire or explosion.

- Only replace the battery with a type R/C (BBCV2) battery, article number RC2032, nominal voltage 3 V.
- When replacing the battery, make sure that the polarity is correct.

⚠ WARNING

Incorrect handling of the battery

Handling the motherboard battery incorrectly can cause an explosion.

- Do not recharge the battery.
- Do not disassemble the battery.
- Do not dispose of the battery in fire.
- Do not open the battery.
- Protect the battery against direct sunlight and moisture.

NOTICE

Failure of the electronics due to mechanical damage

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

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

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

Table 12: Technical data of the battery

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

To replace the battery, follow the steps below:

1. Remove the two UNC bolts from the DVI interface.

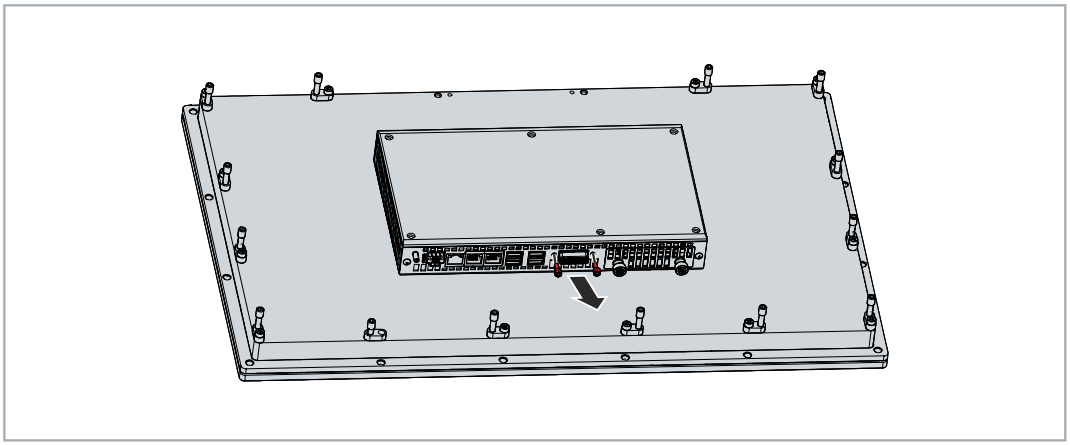


Fig. 23: Removal of UNC bolts

2. Remove the six M3 screws from the housing cover.
3. Remove the housing cover to the rear and turn it 180° upwards.

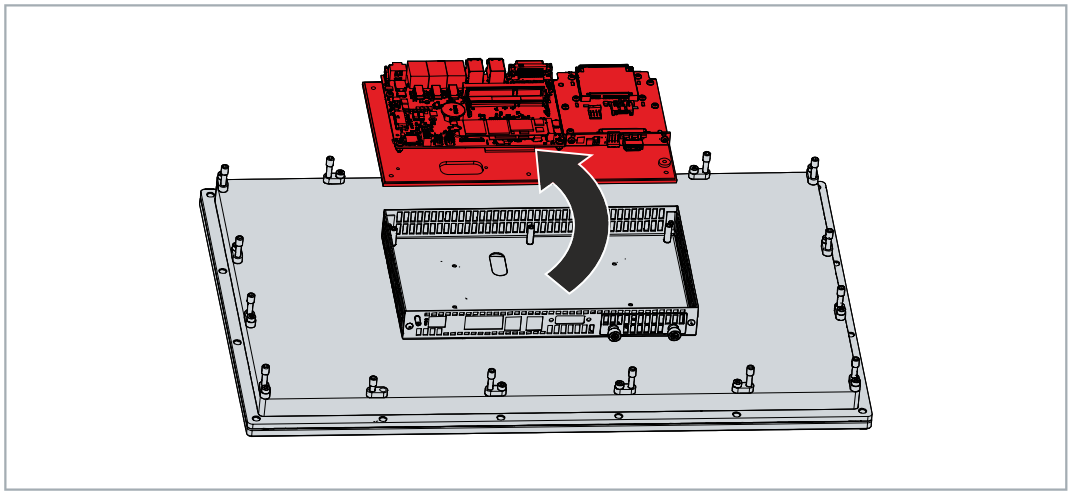


Fig. 24: Removing the housing cover

4. Place a lever made on the negative pole of the battery holder below the battery.
5. Lift the battery side out of the holder.
   ⇨ The battery is now in an inclined position.
6. Remove the battery completely from the battery holder.

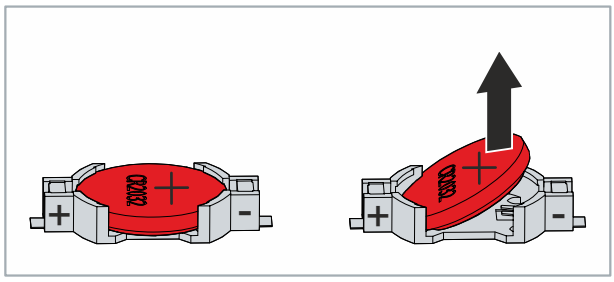


Fig. 25: Replacing the battery

7. Reinsert the new battery with the correct polarity as shown in the figure, in the inclined position on the positive pole of the battery holder.
8. Push the high side of the battery down into the battery holder.
9. Turn the housing cover 180° and place it back onto the housing.
10. Reinsert the six M3 screws into the housing cover.
11. Reinsert the two UNC bolts of the DVI interface.

⇨ You have successfully replaced the battery.

Battery disposal

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

7.2.2 Replacing the storage media

Data transmission before replacement

If you want to exchange a storage medium according to Beckhoff's recommendation, you must copy the data from the old to the new storage medium. You can use the Beckhoff Service Tool (BST) for this purpose. BST is a graphical backup and restore program for devices with a Windows operating system. You can create an image of your operating system and use it to back up the operating system. Then you can restore the created image to a new data carrier. The BST is available on a bootable BST USB flash drive. This includes Windows and a backup tool. Select the size of the BST USB flash drive according to the size of the backup

copy of your operating system. You can then keep the flash drive as a backup copy. For this purpose, the BST USB flash drives are designed for particularly long data preservation by means of special flash. For more information on the function of the BST, please refer to the corresponding manual.

If your storage medium is defective and there is no backup, Beckhoff Service can provide you with a fresh Windows image. For this to be possible, your Beckhoff device must already have been delivered with a valid operating system license. After installing the fresh image, the applications must be reinstalled.

Replacing CFast

Your device is equipped with a CFast by default. This is located on the back of the device in the connection section behind a cover.

To replace the CFast, follow the steps below:

1. Remove the two M3 screws and the cover (section A).
2. Press lightly against the CFast, as if pressing a button.
   ⇨ When you release the CFast, the push-pull mechanism guides the CFast out of the slot far enough for you to grab it.
3. Pull the CFast out of the device (section B).

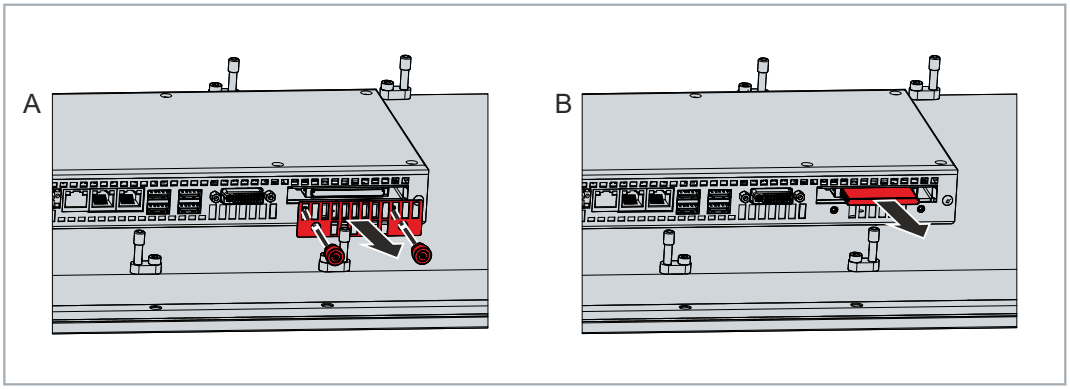


Fig. 26: Replacing CFast

4. Insert the new CFast into the device in the same orientation until it protrudes just a bit from the device. The
5. Press the CFast into the device.
6. Put the cover back in place.
7. Retighten the two M3 screws.

⇨ You have replaced the CFast.

Replacing the hard disk/SSD

As an alternative to CFast, you can also order your device with a 2½-inch hard disk or SSD. Please note that the maximum operating temperature of the device with a hard disk or SSD is reduced to 45 °C. Hard disks and SSDs are replaced in the same way. Follow the steps below:

1. Remove the two M3 screws and the cover (section A).
2. Remove the hard disk/SSD from the device by pulling on the protruding Beckhoff sticker (section B).

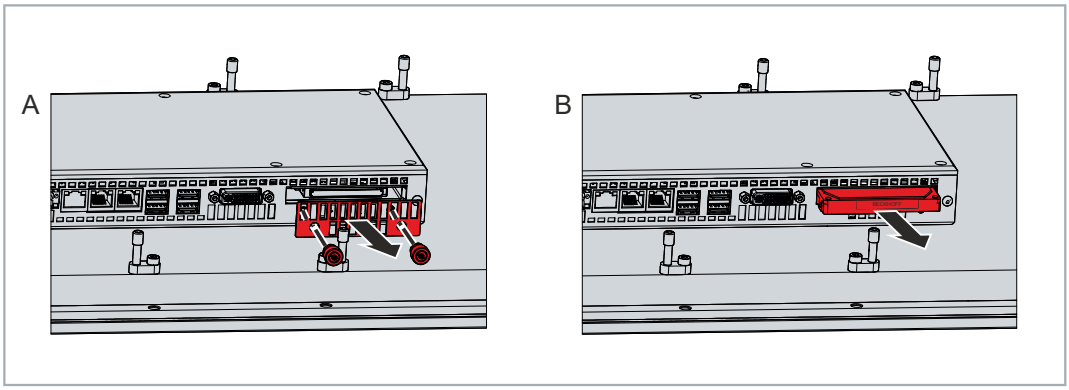


Fig. 27: Replacing the hard disk/SSD

3. Insert the new hard disk/SSD into the device in the same orientation.
4. Put the cover back in place.
5. Retighten the two M3 screws.

⇨ You have replaced the hard disk/SSD.

Disposal of storage media

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

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

8 Troubleshooting

Table 13: Troubleshooting

Fault	Cause	Measures
No function of the panel PC	No power supply to the panel PC	Check the power supply cable
	Other cause	Call Beckhoff Service
The panel PC does not boot completely	BIOS setup settings are incorrect	Check BIOS setup settings (load defaults)
	Other causes	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 screen image or none at all)	Defective backlight in the display	Call Beckhoff Service
	Defective components 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
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 14: Technical data

Product designation	CPX27xx		
Weights	CPX2715: 4.7 kg CPX2719: 6.6 8 g CPX2721: 7 kg		
Clamping lever: tightening torque of screws	1…1.2 Nm		
Supply voltage	22–30 V_{DC} (24 V_{DC} power supply unit, NEC class 2)		
Power consumption	CPX2715: max. 25 W CPX2719: max. 32 W CPX2721: max. 40 W		
UL conformity (under preparation)	Use power supply class 2 or fuse protection with 4 A, in accordance with UL 60950.2 chapter 2.5, table 2C		
Secure element	fTPM 2.0 activated (see TPM documentation)		
Protection rating	Front IP65, rear side IP20		
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 … +55°C Operation with 2½-inch hard disk/SSD: 0°C … +45°C Transport/storage: -20°C … +70°C		
Pollution degree	2		
Approved relative air humidity	maximum 95%, no condensation		
Transport and storage	The values for air humidity and shock resistance are to be observed during transport and storage and in operation. Suitable packaging of the panel PC can improve its shock resistance during transportation.		
Certificates	CE, ATEX, IECEx, cFMus		

10 Appendix

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

10.1 Service and support

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

Beckhoff Service

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

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

Hotline: + 49 5246/963-460
email: service@beckhoff.com

If your device requires attention, please state its serial number, which you can find on the name plate.

Beckhoff Support

Support offers you comprehensive technical assistance to help you with the application of individual Beckhoff products, and also with other extensive services:

- world-wide support
- design, programming, and commissioning of complex automation systems
- extensive training program for Beckhoff system components

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

Headquarters

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 can also find further documentation for Beckhoff components there.

10.2 Approvals

Your device has at least the following approvals:

- CE
- FCC

You will find all other applicable approvals on the name plate of your device.

FCC approvals for the United States of America

FCC: Federal Communications Commission Radio Frequency Interference Statement

This device was tested and complies with the limits for a digital device of class A, according part 15 of the FCC regulations. These limits are designed to provide adequate protection against adverse interference, if the device is used in a commercial environment. This device generates, uses and may emit radio frequency energy and may cause adverse interference with radio communications, if it is not installed and used in accordance with the operating instructions. If this device is used in a residential area it is likely to cause adverse interference, in which case the user must take appropriate countermeasures in order to eliminate the interference at his own expense.

FCC approvals for Canada

FCC: Canadian Notice

This device does not exceed the class A limits for radiation, as specified by the Radio Interference Regulations of the Canadian Department of Communications.

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Trademark statements

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More Information:
www.beckhoff.de/cpx27xx

Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl
Germany
Phone: +49 5246 9630
info@beckhoff.com
www.beckhoff.com