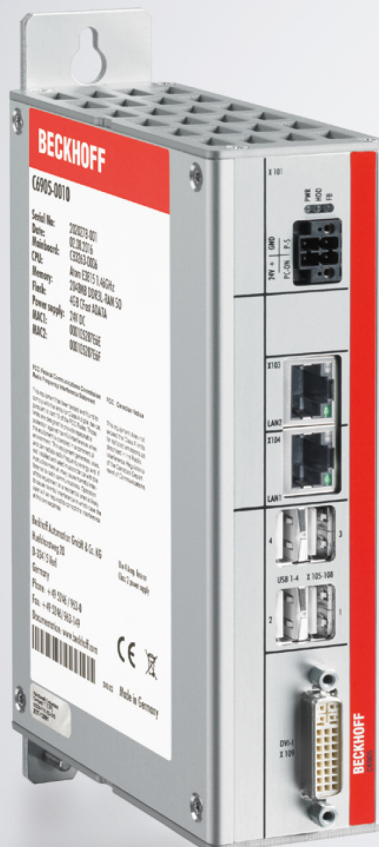


Manual | EN

## C6905

Industrial PC





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# 1 Notes on the documentation

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

The documentation and the following notes and explanations must be complied with when installing and commissioning the components.

The trained specialists must always use the current valid documentation.

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

## Disclaimer

The documentation has been compiled with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without notice.

Claims to modify products that have already been supplied may not be made on the basis of the data, diagrams, and descriptions in this documentation.

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## 2 For your safety

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

### Exclusion of liability

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

## 2.1 Signal words

The signal words used in the documentation are classified below.

### Warning on personal injuries

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

### Warning on property and environmental damage

|                                                     |
|-----------------------------------------------------|
| <b>NOTICE</b>                                       |
| The environment, equipment, or data may be damaged. |

## 2.2 Intended use

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

The device has been developed for an IP20 working environment. This involves finger protection and protection against solid foreign objects up to 12.5 mm. There is no protection against water. Operation of the devices in wet and dusty environments is not permitted.

The specified limits for technical data must be adhered to.

The device can be used within the documented operating conditions.

### Improper use

Do not use the device outside the documented operating conditions.

## 2.3 Fundamental safety instructions

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

### Application conditions

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

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

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

## 2.4 Operator's obligation to exercise diligence

The operator must ensure that

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

## 2.5 Notes on information security

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

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

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

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

### 3 Product overview

The C6905 Industrial PC belongs to the series of compact Industrial PCs for space-saving control cabinet installation. The device is suitable for various applications and requirements.

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

- diverse automation and visualization tasks
- wide range of IoT tasks, for example when used as an IoT gateway
- simple HMI applications
- axis control
- short cycle times
- high-volume data handling

The basic configuration of the C6905 includes the following aspects:

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

### 3.1 Structure

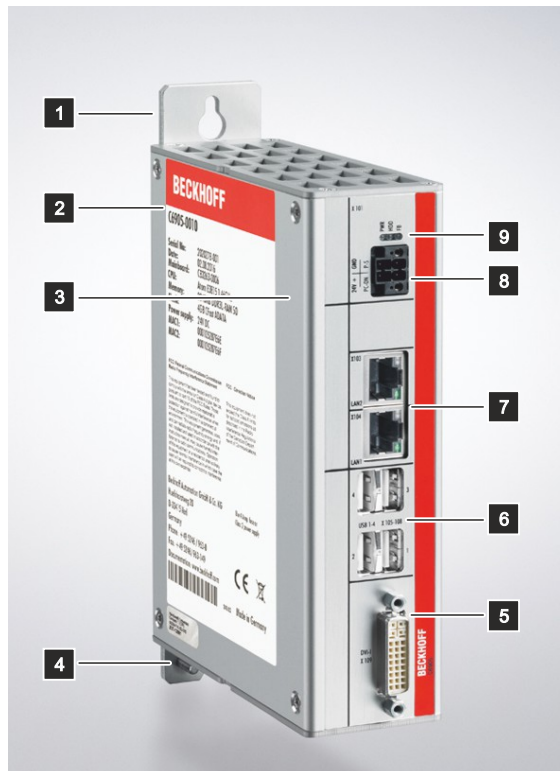


Fig. 1: Structure

Table 1: Key: C6905 structure

| No. | Component                             | Description                                                                      |
|-----|---------------------------------------|----------------------------------------------------------------------------------|
| 1   | Mounting plate                        | Plate for mounting the Industrial PC by its the rear side in the control cabinet |
| 2   | Name plate                            | Information on the equipment of the Industrial PC                                |
| 3   | Side cover                            | Access to battery and storage media                                              |
| 4   | Protective conductor connection PE    | Low-resistance protective earthing and functional earthing of the Industrial PC  |
| 5   | DVI interface (X109)                  | Connection of a DVI-capable monitor                                              |
| 6   | USB interfaces (X105 - X108)          | Connection of peripheral devices                                                 |
| 7   | Ethernet RJ45 interfaces (X103, X104) | Connection of the Industrial PC to a 100/1000BASE-T network                      |
| 8   | Power supply (X101)                   | Connection of the power supply and external wiring of the Industrial PC          |
| 9   | Status LEDs                           | Status display for power, hard disk, fieldbus                                    |

## 3.2 Interface description

In the basic equipment version, the C6905 includes the following interfaces:

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

### 3.2.1 Power supply

The industrial PC is supplied with a nominal voltage of 24 V. The 2x2-pin voltage socket (X101) is used for connection to the power supply and the external wiring of the industrial PC. The main supply voltage is applied between PIN 3 (0 V) and PIN 4 (24 V) of the socket. If the industrial PC is equipped with an internal, capacitive 1-second UPS (uninterruptible power supply), this is also supplied by the voltage. The 1-second UPS does not serve to back-up the operating system. Further information can be found in chapter 3.5 [1-second UPS](#) [► 18].

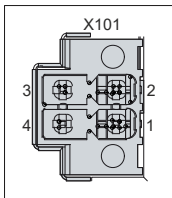


Fig. 2: Voltage socket pin numbering

Table 2: Voltage socket pin assignment

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

The plug for the power supply is specified for 8 A and can accommodate wire cross-sections of up to 1.5 mm<sup>2</sup>. For long supply lines, use 1.5 mm<sup>2</sup> cables to achieve a low voltage drop on the supply lines. There should be at least 22 V at the power supply plug of the industrial PC, so that the industrial PC remains switched on during voltage fluctuations. The plug is included in the delivery. You can obtain a replacement plug from your Beckhoff Sales using the following ordering option:

- C9900-P943: power supply connector for C6905 Industrial PC

### 3.2.2 Ethernet RJ45

The C6905 has two Gigabit LAN ports (X103, X104). The 100Base-T, 1000Base-T and 2500Base-T Ethernet standards enable the connection of corresponding network components and data rates of 100/1000/2500 Mbit/s. The required speed is selected automatically.

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

The controllers are used as follows, based on the device generations:

Table 3: Controller classification based on device generations

| Generation | Controller                    | Mbit/s        |
|------------|-------------------------------|---------------|
| C6905-0010 | Intel® i210 for LAN1 and LAN2 | 100/1000      |
| C6905-0020 | Intel® i210 for LAN1 and LAN2 | 100/1000      |
| C6905-0030 | Intel® i226 for LAN1 and LAN2 | 100/1000/2500 |

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

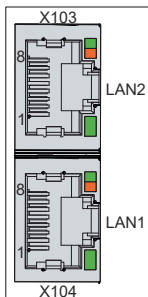


Fig. 3: Ethernet interfaces pin numbering

Table 4: Ethernet interface pin assignment

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

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

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

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

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

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

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

3.2.3 USB

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

The following table shows the interface assignment based on the device generation:

Table 7: USB interfaces based on device generation

| Generation | USB interfaces                  |
|------------|---------------------------------|
| C6905-0010 | 4x USB 2.0                      |
| C6905-0020 | 2x USB 3.0<br>2x USB 2.0        |
| C6905-0030 | 2x USB 3.1 Gen. 2<br>2x USB 2.0 |

Each of the four USB interfaces supplies up to 500 mA current and is electronically fused.

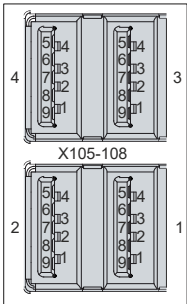


Fig. 4: USB interface pin numbering

Table 8: USB interface pin assignment

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

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

3.2.4 DVI

The industrial PC has a DVI connection (X109), to which a DVI-capable monitor can be connected. Only digital signals are transmitted.

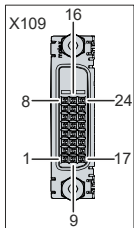


Fig. 5: DVI interface

Table 9: DVI interface pin assignment

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

### 3.3 Status LEDs

The industrial PC has three status LEDs: PWR, FB, HDD. They provide information on the following aspects:

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

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

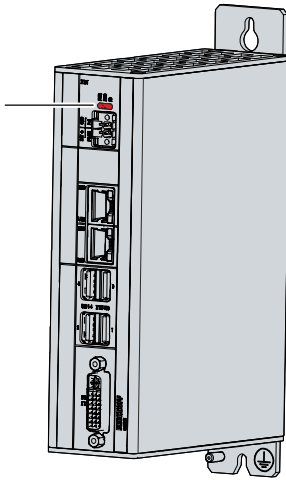


Fig. 6: Status LEDs

Table 10: Meaning of the Status LEDs

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

3.4 Name plate

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

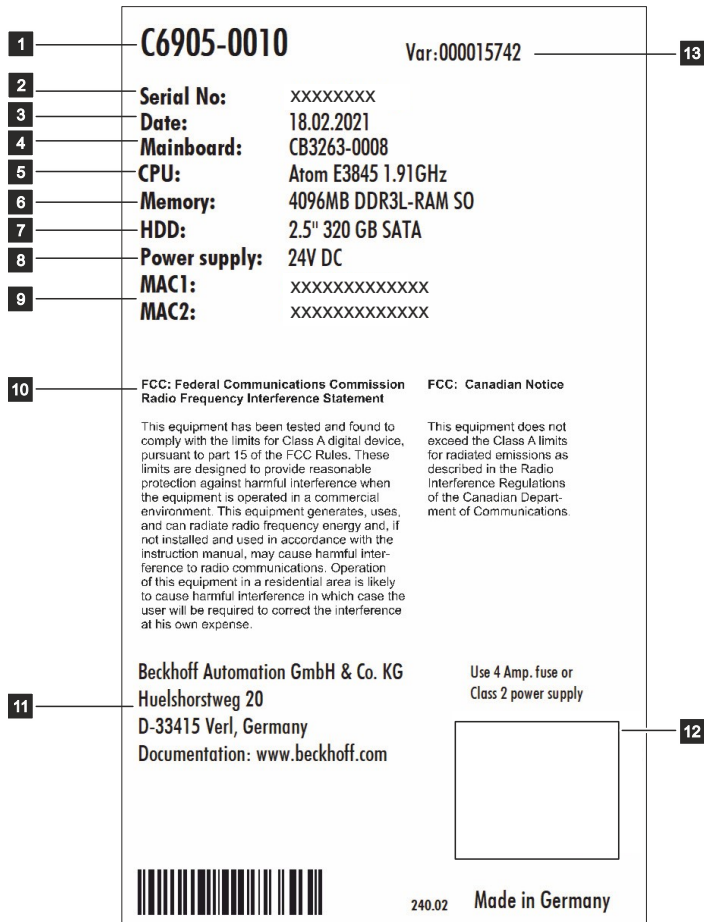


Fig. 7: Name plate example

Table 11: Key: name plate C6905

| 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   | RAM                                                                                                                                                                                                                                                                                                                                                                   |
| 7   | Storage media                                                                                                                                                                                                                                                                                                                                                         |
| 8   | Power supply unit: 24 V <sub>DC</sub>                                                                                                                                                                                                                                                                                                                                 |
| 9   | MAC addresses of the Ethernet interfaces (X103, X104)                                                                                                                                                                                                                                                                                                                 |
| 10  | FCC approval                                                                                                                                                                                                                                                                                                                                                          |
| 11  | Address of the vendor                                                                                                                                                                                                                                                                                                                                                 |
| 12  | Symbols<br><br><br>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. |
| 13  | Variant number: Commercial number of the order code including ordering options                                                                                                                                                                                                                                                                                        |

### 3.5 1-second UPS

#### NOTICE

##### Loss of data

Using the 1-second UPS beyond the documented possibilities can lead to data loss or corrupt data.

- Use only TwinCAT to control the 1-second UPS and save only persistent data with a maximum size of 1 MB.

There is an option to order the industrial PC with an internal uninterruptible power supply (UPS). This is a capacitive 1-second UPS for the reliable saving of persistent application data on the storage medium. This requires TwinCAT and Windows Embedded Compact 7, Windows Embedded Standard 7 or Windows IoT Enterprise.

You can order the industrial PC with internal UPS ex factory by specifying the order identifier C9900-U214.

The capacitive 1-second UPS continues to supply the processor with power if the power supply fails. During this time, the persistent data can be stored on the storage medium and will be available when the device is turned on again. The UPS only works for a few seconds.

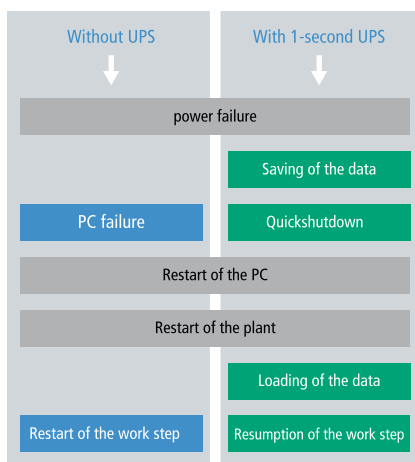


Fig. 8: UPS function

The UPS can be controlled from the PLC with the function block FB\_S\_UPS\_BAPI. For more information, please visit the Beckhoff Information System at the following link: [https://infosys.beckhoff.com/english.php?content=../content/1033/tcplclib\\_tc2\\_sup/s/3716524299.html&id=7162402166301276776](https://infosys.beckhoff.com/english.php?content=../content/1033/tcplclib_tc2_sup/s/3716524299.html&id=7162402166301276776)

### 3.6 TwinCAT version

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

Table 12: C6905-0010 Minimum TwinCAT version

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

Table 13: C6905-0020 Minimum TwinCAT version

| Operating system | Minimum TwinCAT version |
|------------------|-------------------------|
| Windows 10       | 3.1 build 4024.7        |

*Table 14: C6905-0030 Minimum TwinCAT version*

| Operating system | Minimum TwinCAT version |
|------------------|-------------------------|
| Windows 10       | 3.1 build 4024.67       |
| Windows 11       | 3.1 build 4026.17       |

## 4 Commissioning

To be able to use the Industrial 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 installing the device in the control cabinet, connecting the cables and the power supply and finally switching on the Industrial PC.

### 4.1 Transport and unpacking

Note the specified transport and storage conditions (see Chapter 9 [Technical data](#) [► 40]).

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

#### NOTICE

##### Hardware damage due to condensation

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

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

#### Unpacking

Proceed as follows to unpack the unit:

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

## 4.2 Installation in the control cabinet

### NOTICE

#### Extreme environmental conditions

Extreme environmental conditions can cause damage to the device.

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

### NOTICE

#### Incorrect installation

Incorrect installation in a control cabinet prevents air circulation in the device and causes impaired functioning.

- Only install the device in the orientation specified below.

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

Only install the device in the control cabinet with the power supply facing upwards.

With the standard mounting plate, you can mount the industrial PC in the control cabinet via the rear panel (see Chapter 4.2.2 [Installation in the control cabinet](#) [► 23]). The industrial PC is automatically delivered with the mounting plate already mounted (see fig. 9).

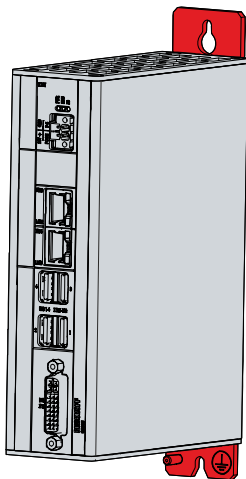


Fig. 9: Mounting plate

#### Also see about this

📄 Technical data [► 40]

### 4.2.1 Dimensions

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

All dimensions are in mm.

Figure 10 illustrates the dimensions of the industrial PC with the standard mounting plate.

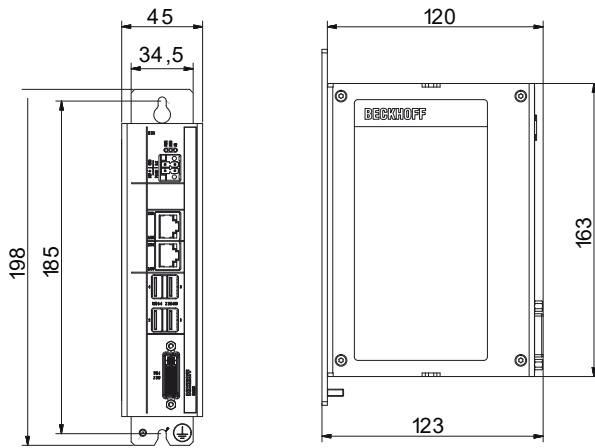


Fig. 10: Dimensions standard mounting plate

## 4.2.2 Installation in the control cabinet

When installing in the control cabinet, note that there must be 5 cm of free space above and below the device for ventilation.

### Mounting via mounting plates

In order to mount the Industrial PC with the standard mounting plate in the control cabinet, it must be furnished with the holes for the fastening screws according to the dimensions of the PC (see Chapter 4.2.1 [Dimensions](#) [► 22]). You need M4 screws for mounting.

After you have drilled the holes for the fastening screws in the control cabinet, you can mount the Industrial PC in the control cabinet with mounting plate.

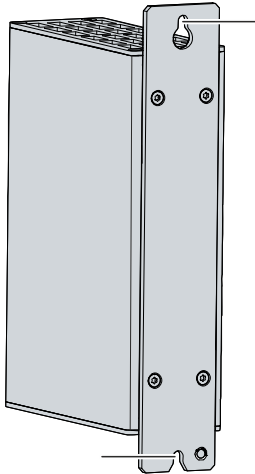


Fig. 11: Control cabinet installation

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

1. Place the fastening screws in the drill holes in the rear panel of the control cabinet.
2. Hang the PC on the screws at the marked points of the mounting plate (see Fig. 11).
3. Tighten the fastening screws.

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

## 4.3 Connecting the Industrial PC

### CAUTION

#### **Risk of electric shock**

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

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

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

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

### 4.3.1 Grounding of the Industrial PC

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

At the lower end of the Industrial PC mounting plate is the protective connector PE (see also chapter 3.1 [Structure](#) [► 10]), via which both the protective earth of the PC and the functional earth can be connected. Therefore, use cables with a cross-section of at least 4 mm<sup>2</sup> for the connection of the protective conductor.

#### Protective earth

By connecting the PE protective conductor connection to the central grounding point of the control cabinet panel in which the PC is installed, you establish low-resistance protective earthing of the Industrial PC and thus avoid dangerous touch voltages.

#### EMC

##### NOTICE

#### Hardware damage due to electromagnetic interference

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

- Only use the device with functional earthing.

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

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

The functional earth is necessary for the EMC of the device. The functional earth is established by connecting the grounding point on the PC mounting plate to the central grounding point of the control cabinet in which the PC is installed.

### 4.3.2 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.

##### Connecting cables

The connections are located in the front of the industrial PC and are documented in Chapter 3.1 [Structure](#) [► 10].

Make sure that you first ground the PC (see chapter [Grounding of the Industrial PC](#) [► 25]) and then plug in all data transmission cables.

##### Connecting the power supply

Cables with a maximum cable cross-section of 1.5 mm<sup>2</sup> must be used for connecting the power supply. To achieve the lowest possible voltage drop on the supply line, we recommend connecting the maximum possible cross-section. In case of larger distances between the power source and the PC, take into account the voltage drop in relation to the cable cross-section as well as fluctuations in your supply voltage in order to ensure that the voltage at the power supply unit does not fall below 22 V.

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

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

## 4.4 Switching the Industrial PC on and off

### NOTICE

#### Public networks

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

- Protect the device before connecting it to public networks.

### NOTICE

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

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

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

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. 12: 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.

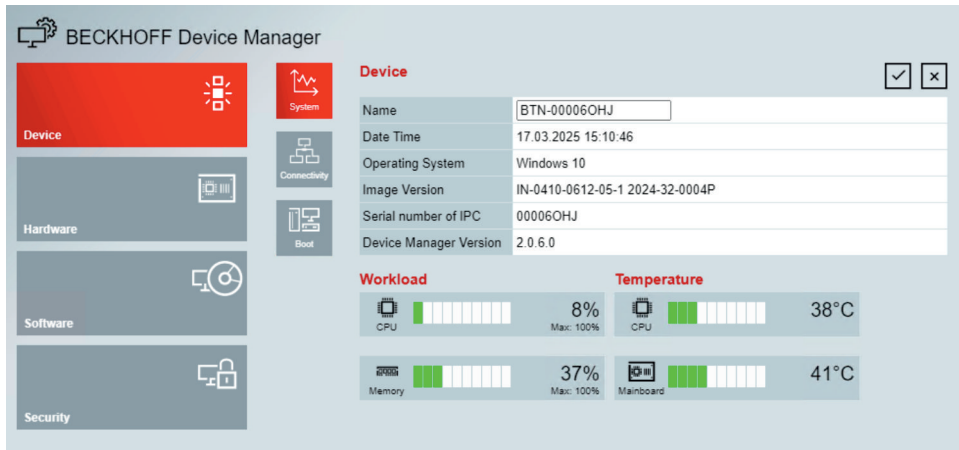


Fig. 13: Beckhoff Device Manager – Start page

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.

The following device does not support the WOL function:

- C6905-0020

## 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. Click 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**.

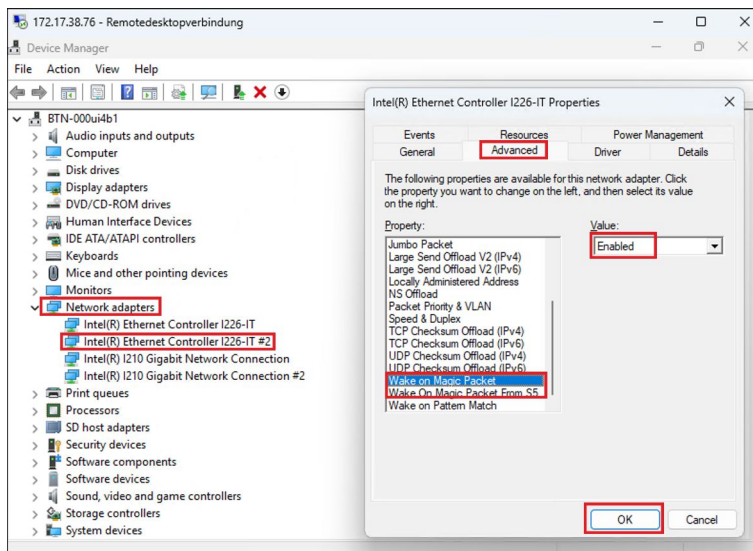


Fig. 14: Activate function

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

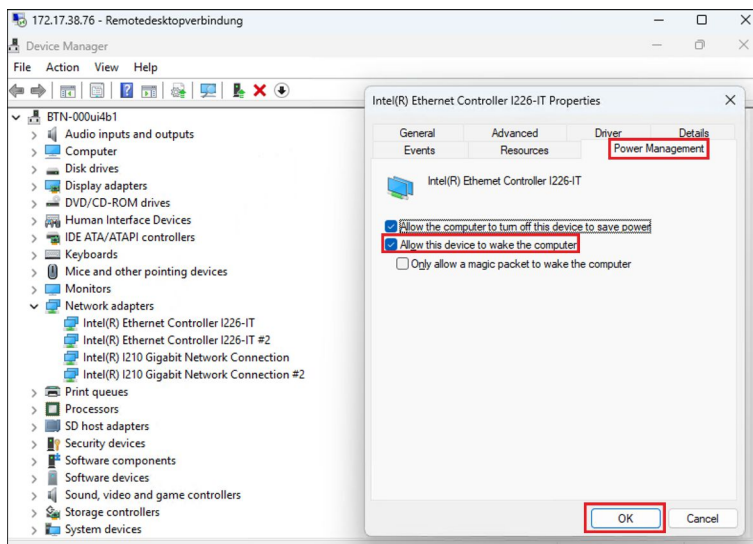


Fig. 15: Enable Function

⇒ You have configured the Wake on LAN function.

## 6 Decommissioning

### NOTICE

#### Hardware damage due to power supply

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

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

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

If you do not want to continue using the industrial PC, Chapter 6.2 [Disassembly and disposal](#) [► 32] provides information on the correct disposal of the device.

### 6.1 Disconnecting the power supply and cables

#### ⚠ CAUTION

#### Risk of electric shock

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

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

Before you remove the industrial PC from the control cabinet, you must disconnect the cables and the power supply. Follow the steps below:

1. Shut down the operating system.
  2. Disconnect the PC from your external 24 V power supply.
  3. Unscrew the voltage connector and pull it out of the PC.
  4. Remove the power supply cable if the connector is to remain with the PC.
  5. Make a note of the wiring of all data transmission cables if you want to restore the cabling with another device.
  6. Disconnect the data transmission cables from the industrial PC.
  7. Finally, disconnect the grounding strap.
- ⇒ You have disconnected the cables and the power supply.

## 6.2 Disassembly and disposal

Before you can remove the industrial PC from the control cabinet, you must first disconnect the power supply and the cables (see chapter 6.1 [Disconnecting the power supply and cables](#) [► 31]).

### Disassembly with mounting plates

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

1. Loosen the fastening screws just enough so that they remain attached to the control cabinet.
2. Lift the PC far enough so that the fastening screws slip into the keyholes (see fig. 14).
3. Remove the PC from the control cabinet.

⇒ You have successfully disassembled the PC.

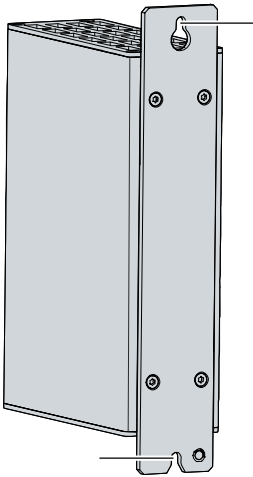


Fig. 16: Dismantling the control cabinet

### Disposal of the industrial PC

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

In order to dispose of the device, it must be removed and fully dismantled. Dispose of the components in the following way:

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

## 7 Maintenance

### ⚠ CAUTION

#### Risk of electric shock

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

- Switch off the power supply before replacing device components. Excluded from this is the replacement of hard disks and 2½" SSDs in RAID configuration as well as fan cartridges.

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

#### Repair

Only the vendor may repair the device. If a repair should be necessary, contact Beckhoff Service (see Chapter 10.1 [Service and Support](#) [► 41]).

## 7.1 Cleaning

### NOTICE

#### Unsuitable cleaning agents

The use of unsuitable cleaning agents can damage the device.

- Clean the device only as specified.

It is essential to observe the following aspects when cleaning the industrial PC:

- Make sure that no dust gets into the PC.
- Always keep the ventilation grilles free.
- Only use a vacuum cleaner to clean the PC. The industrial PC does not have to be switched off for this.
- Never use compressed air to clean the PC.

## 7.2 Maintenance

### NOTICE

#### Use of incorrect spare parts

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

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

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

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

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

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

Table 15: Device component replacement recommendations

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

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

#### ESD protection

### NOTICE

#### Electrostatic discharge

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

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

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

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

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

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

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

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

## 7.2.1 Access to device components

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

### Access to battery and CFast

You can access the battery and the CFast via the cover on the left-hand side. To do this, remove the four Torx TX10 screws and remove the cover (see fig. 15).

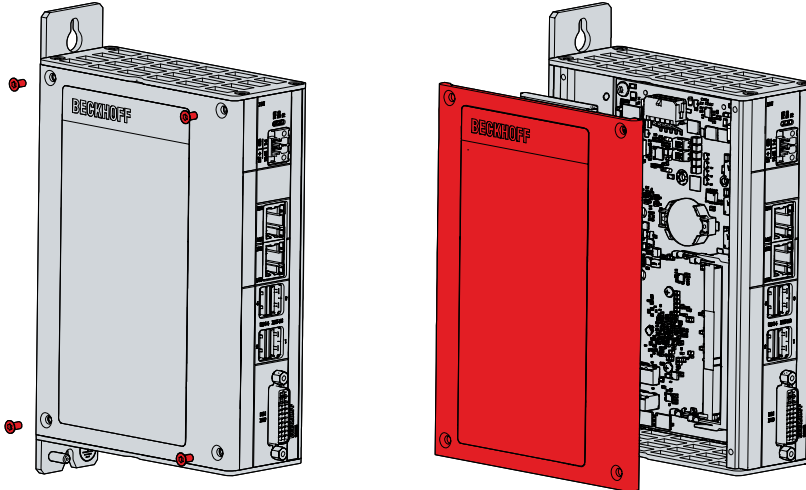


Fig. 17: Access to battery and storage medium

You now have access to the battery (1) and CFast (2) (see fig. 16).

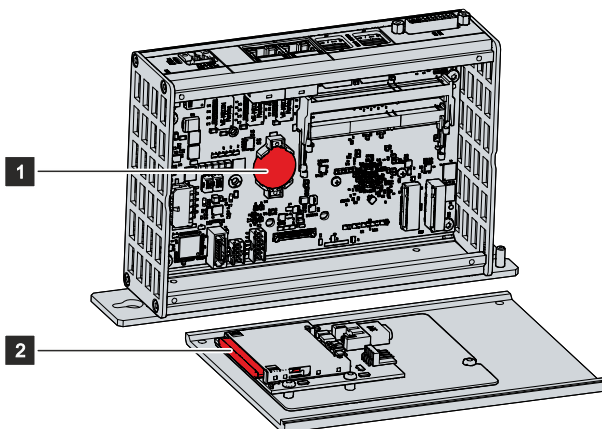


Fig. 18: Battery and CFast

## 7.2.2 Replacing the battery

### ⚠ WARNING

#### Incorrect battery type

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

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

### ⚠ WARNING

#### Incorrect handling of the battery

Handling the motherboard battery incorrectly can cause an explosion.

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

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

Table 16: Technical data of the battery

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

Chapter 7.2.1 [Access to device components](#) [► 36] shows how to access the battery.

To change the battery, proceed as follows:

1. Place a lever made on the negative pole of the battery holder below the battery.
  2. Lift the battery side out of the holder.
- ⇒ The battery is now in an oblique position (see fig. 17).

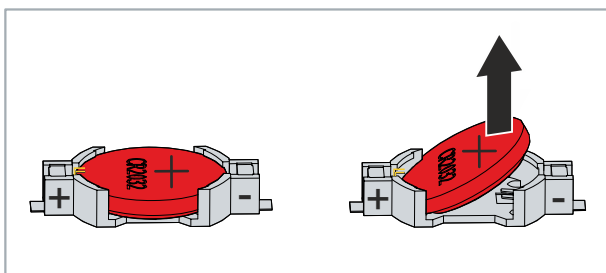


Fig. 19: Battery change

3. Remove the battery completely from the battery holder.
  4. Insert the new battery with the correct polarity back into the inclined position on the positive pole of the battery holder. The correct polarity is shown in the figure.
  5. Push the high side of the battery down into the battery holder (see fig. 17).
- ⇒ 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.

## 7.2.3 Replacing the storage media

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

### Disposal of storage media

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

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

### Data transmission before replacement

If you want to exchange a storage medium according to Beckhoff's recommendation, you must copy the data from the old to the new storage medium. You can use the Beckhoff Service Tool (BST) for this purpose. BST is a graphical backup and restore program for devices with a Windows operating system. You can create an image of your operating system and use it to back up the operating system. Then you can restore the created image to a new data carrier. The BST is available on a bootable BST USB flash drive. This includes Windows and a backup tool. Select the size of the BST USB flash drive according to the size of the backup copy of your operating system. You can then keep the flash drive as a backup copy. For this purpose, the BST USB flash drives are designed for particularly long data preservation by means of special flash. For more information on the function of the BST, please refer to the corresponding [manual](#).

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

### Replacing CFast

Chapter 7.2.1 [Access to device components](#) [► 36] shows how to access the CFast.

Proceed as follows to change the CFast:

1. Pull the CFast out of the holder (see fig. 18).
2. Insert the new CFast in the same direction back into the holder.

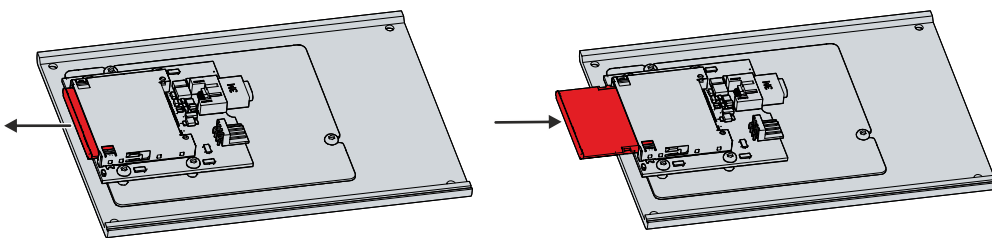


Fig. 20: Replacing the CFast

## 8 Troubleshooting

Table 17: Troubleshooting

| Fault                                                                     | Cause                                                                       | Measures                                                           |
|---------------------------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------|
| No function of the device                                                 | No power supply to the device<br>Other cause                                | Check the power supply cable<br>Call Beckhoff Service              |
| The device does not boot fully                                            | BIOS setup settings are incorrect<br>Other causes                           | Check BIOS setup settings (load defaults)<br>Call Beckhoff Service |
| The device boots, software starts, but control does not operate correctly | The cause of the error is the software or plant parts outside of the device | Call the machine and software manufacturer                         |
| USB error during access with TwinCAT via USB                              | Cycle times in TwinCAT set to 10 ms (default)                               | Increase the cycle times to between 50 ms and 80 ms                |

## 9 Technical data

Table 18: Technical data

| Product designation                         | C6905                                                                                                                                                                                                                                                                                  |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions (W x H x D)                      | 45 x 163 x 115 mm, without mounting plate                                                                                                                                                                                                                                              |
| Weight                                      | 900 g in basic configuration                                                                                                                                                                                                                                                           |
| Supply voltage                              | 22-30 V DC (24 V DC power supply unit)<br>NEC Class 2                                                                                                                                                                                                                                  |
| Power consumption                           | Data sheet for power consumption and power loss in the download finder:<br><a href="https://www.beckhoff.com/en-en/support/download-finder/search-result/?download_group=691754572">https://www.beckhoff.com/en-en/support/download-finder/search-result/?download_group=691754572</a> |
| Secure element                              | C6905-0010: fTPM 2.0 not enabled<br>C6905-0020: fTPM 2.0 enabled<br>C6905-0030: fTPM 2.0 enabled<br>(see TPM documentation)                                                                                                                                                            |
| Protection rating                           | IP20                                                                                                                                                                                                                                                                                   |
| Vibration resistance (sinusoidal vibration) | EN 60068-2-6: 10 to 58 Hz: 0.035 mm<br>58 to 500 Hz: 0.5 G (approx. 5 m/s <sup>2</sup> )                                                                                                                                                                                               |
| Shock resistance (shock)                    | EN 60068-2-27: 5 G (approx. 50 m/s <sup>2</sup> ), duration: 30 ms                                                                                                                                                                                                                     |
| EMC interference immunity                   | conforms to EN 61000-6-2                                                                                                                                                                                                                                                               |
| EMC interference emission                   | conforms to EN 61000-6-4                                                                                                                                                                                                                                                               |
| Permissible ambient temperature             | C6905-0010/0020: 0 °C to 55 °C; C6905-0030: 0 °C to 50 °C (operation)<br>-25 °C...+65 °C (transport/storage)                                                                                                                                                                           |
| Permissible air humidity                    | Maximum 95 %, no condensation                                                                                                                                                                                                                                                          |
| Transport and storage                       | The values for air humidity and shock resistance are to be observed during transport and storage and in operation. The shock resistance during transport can be improved by packing the industrial PC appropriately.                                                                   |

## 10 Appendix

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

### 10.1 Service and support

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

#### Beckhoff Service

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

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

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

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

#### Beckhoff Support

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

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

Hotline: + 49 5246/963-157  
email: [support@beckhoff.com](mailto:support@beckhoff.com)

#### Headquarters

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

You can also find further documentation for Beckhoff components there.

## 10.2 Approvals

Your device has at least the following approvals:

- CE
- 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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