BECKHOFF New Automation Technology

Manual | EN

# C6650-0070

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

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

- If you change the hardware and software configurations, you must keep within the specified limits of power consumption and power loss (please refer to the respective data sheet).
- Ensure that only trained specialists with a control and automation engineering background, operate the device. Use by unauthorized persons can lead to damage to property and loss of data.
- 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 industrial PC belongs to the series of powerful industrial PCs for control cabinet installation with ATX motherboard. 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:

- various automation and visualization tasks
- a wide range of IoT tasks with data preprocessing
- complicated HMI applications
- extensive axis controllers
- short cycle times
- high-volume data handling

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

- ATX motherboard
- Intel® processor
- DRAM SODIMM
- NVMe™ M.2 SSD
- 2 x hard drive caddy for a 3½-inch hard disk
- 100-240 V AC power supply unit

## 3.1 Structure

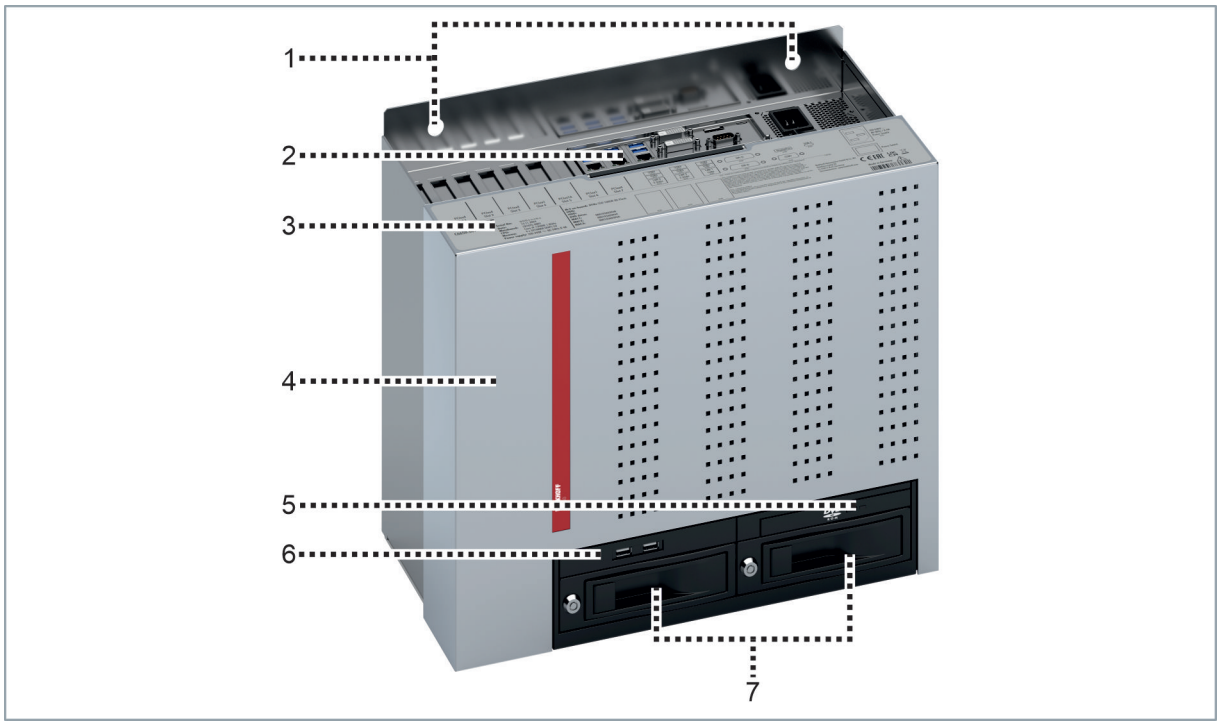



Fig. 1: Structure

*Table 1: Key - C6650 structure*

| No. | Component | Description |
|---|---|---|
| 1 | Mounting concept | Holes for mounting the industrial PC in the control cabinet |
| 2 | Connection compartment | Access to interfaces of the industrial PC |
| 3 | Name plate | Information on the equipment of the industrial PC |
| 4 | Housing cover | Access to exchangeable device components |
| 5 | Optional multi DVD drive | Read and write CDs and DVDs |
| 6 | Optional USB interface | Connection of peripheral devices |
| 7 | Two hard drive caddies | For one 3½-inch hard disk each, optional for SSDs |

## 3.2 Interface description

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

- Power supply (X101)
- USB-C (X102)
- RS232 (X103)
- DisplayPort (X104)
- DVI (X105, X106)
- Ethernet RJ45 (X107, X110, X113)
- USB (X108, X109, X111, X112, X114, X115)

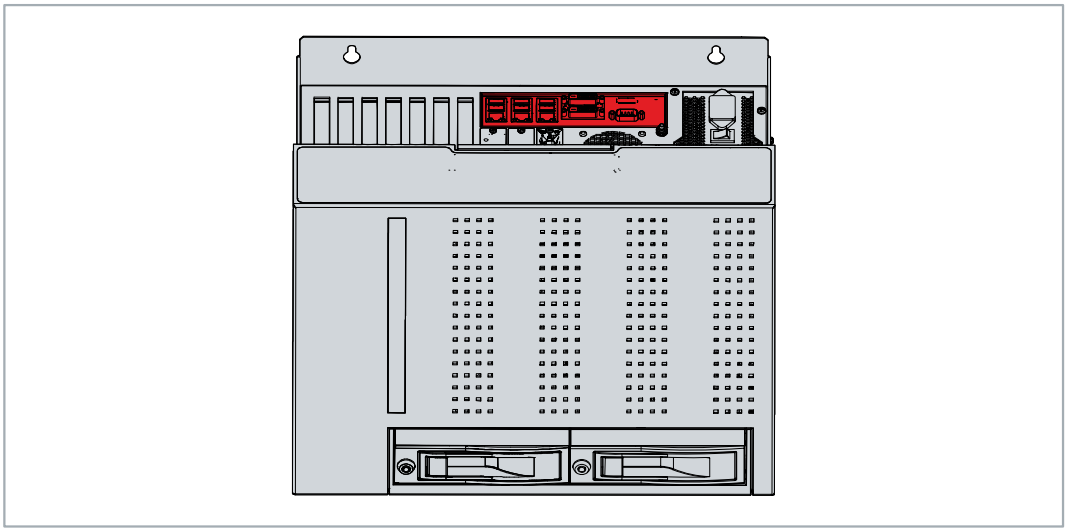


Fig. 2: Connection section

### 3.2.1 Power supply

In its basic configuration, the industrial PC is equipped with a 100-240 V AC, 50-60 Hz full range power supply unit.

The following table lists the maximum current carrying capacity of the 100–240 V AC power supply:

*Table 2: Current carrying capacity power supply unit*

| Output voltages power supply unit | Current load 100-240 V AC power supply unit max. |
|---|---|
| +3.3 V | 20 A |
| +5 V | 20 A |
| +12 Total | 45.5 A |
| -12 V | 0.3 A |
| +5 V stand by | 2.5 A |

The total power output of the +3.3 V and +5 V lines must not exceed 100 W. The maximum total current for the +12 V outputs must not exceed 50 A.

The power supply is connected via the IEC socket (X101) on the top of the industrial PC. The assignment includes a protective conductor (1), a neutral conductor (2) and an outer conductor (2).

Optionally, you can order the industrial PC with a 24 V DC power supply unit. In this case, the industrial PC is supplied with a nominal voltage of 24 V. A 3-pin socket is used for the connection of the power supply (X101) as well as the external wiring (X102) of the industrial PC.

The main supply voltage is applied between PIN 1 (24 V) and PIN 3 (0 V) of the voltage socket (X101).

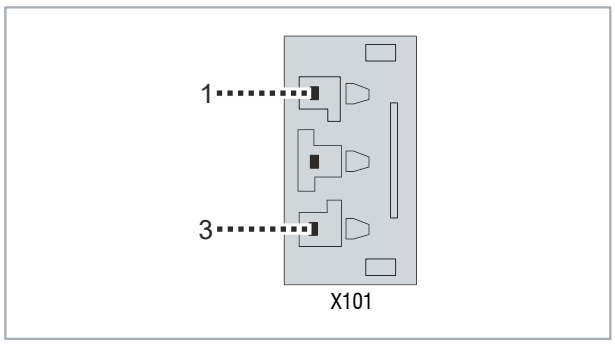



Fig. 3: Voltage socket pin numbering

*Table 3: Voltage socket (X101) pin assignment*

| Pin | Signal | Description |
|---|---|---|
| 1 | +24 V | 24 V supply voltage, positive pole |
| 2 | ⏚ | Protective earth |
| 3 | - | 24 V supply voltage, negative pole |

The positive pole of the supply voltage at PIN 1 of the voltage socket (X101) is looped through to PIN 3 of the socket (X102). PIN 3 thus serves as the positive pole for PC-ON.

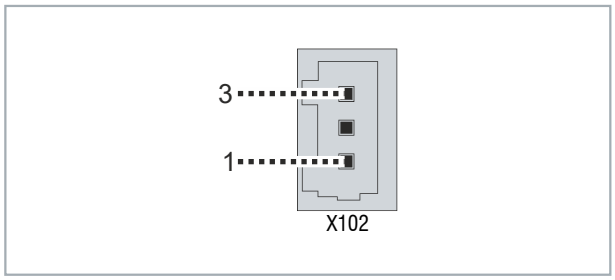



Fig. 4: Socket external wiring pin numbering

*Table 4: Socket external wiring (X102) pin assignment*

| Pin | Signal | Description |
|---|---|---|
| 1 | P-S | Output power status, minus is the negative pole of the power supply (X101) |
| 2 | PC-ON | Input PC-ON |
| 3 | +24 V | Supply voltage and positive pole for PC-ON |

The plug for the power supply can accommodate wire cross-sections of up to 4 $mm^2$. The plug for the external wiring can accommodate wire cross-sections of up to 1,5 $mm^2$. For long supply lines, use 4 $mm^2$ or 1,5 $mm^2$ 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 device, so that the device remains switched on during voltage fluctuations. The plugs are included in the delivery. You can obtain replacement plugs from your Beckhoff Sales using the following ordering options:

- C9900-P962: Plug for power supply
- C9900-922: Plug for external wiring

## 3.2.2 USB

The industrial PC has six USB interfaces (X108, X109, X111, X112, X114, X115). The USB standard 3.2 Gen. 2 is supported. The interfaces are used to connect peripheral devices with a USB connection. Each of the interfaces supplies 900 mA current and is electronically protected.

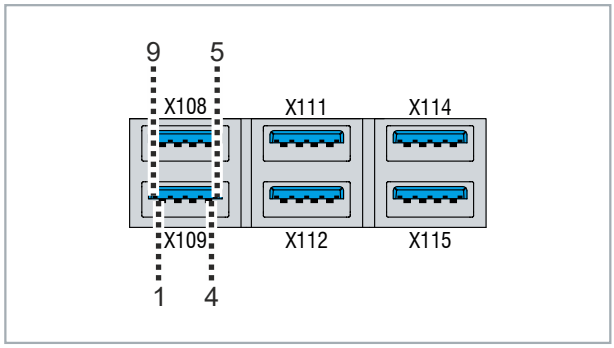



Fig. 5: USB interface pin numbering

*Table 5: USB interface pin assignment*

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

### 3.2.3 Ethernet RJ45

The industrial PC has three Gigabit LAN ports (X107, X110, X113). The Ethernet standards 100Base-T and 1000Base-T allow for X107 (LAN 1) the connection of corresponding network components and data rates of 100/1000 Mbit/s. The Ethernet standards 100Base-T, 1000Base-T and 2500Base-T allow for X110 and X113 (LAN2, LAN3) 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 industrial PC may only be connected to internal Ethernet networks and not to external telecommunication networks.

Intel® i219 (PHY) is used as the controller for LAN 1 and Intel® i226 for LAN 2 and LAN 3.

The Ethernet ports connected via PCIe® (X110 and X113, LAN 2 and LAN 3) with the i226 controller are generally suitable for cycle times <= 1 ms and for distributed clock applications with EtherCAT.

The Ethernet port (X107, LAN 1) 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).

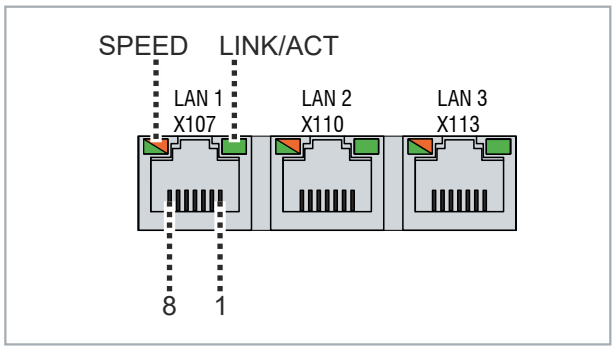



Fig. 6: Ethernet interface pin numbering

*Table 6: 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 when data transmission is in progress on the interface.

The green/orange LED shown in the figure indicates the data transmission rate. The meanings of the LEDs at LAN 1 and LAN2-LAN3 differ due to the possible data transmission rate as follows:

*Table 7: Meaning of LEDs*

| Interface | Mbit/s | LED |
|---|---|---|
| LAN 1 | 100 | Lights up orange |
| | 1000 | Lights up green |
| LAN 2, LAN 3 | 100 | Off |
| | 1000 | Lights up orange |
| | 2500 | Lights up green |

## 3.2.4 DVI

The industrial PC has two DVI connections (X105, X106), to which a DVI-capable monitor can be connected. Only digital signals are transmitted.

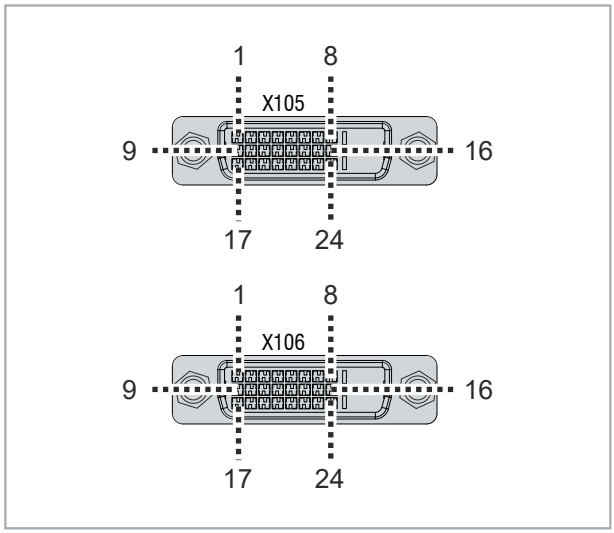



Fig. 7: DVI interface pin numbering

*Table 8: 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 - |

## 3.2.5 RS232

The serial interface COM1 (X103) is led out via a 9-pin standard DSUB connector. The signals comply with the RS232 standard. The port address and the used interrupt are configured automatically, but can also be set manually with the help of the BIOS setup if required.

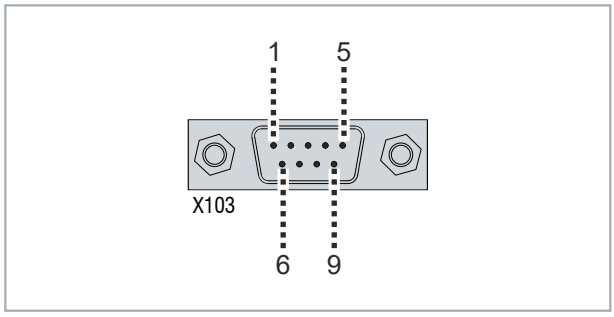



Fig. 8: RS232 interface pin numbering

*Table 9: RS232 pin assignment*

| Pin | Signal | Description |
|---|---|---|
| 1 | DCD | Data Carrier Detect |
| 2 | RxD | Receive Data |
| 3 | TxD | Transmit Data |
| 4 | DTR | Data Terminal Ready |
| 5 | GND | Ground |
| 6 | DSR | Data Set Ready |
| 7 | RTS | Request to Send |
| 8 | CTS | Clear to Send |
| 9 | RI | Ring Indicator |

## 3.2.6 DisplayPort

The industrial PC has a DisplayPort (X104) that enables connection of devices with DisplayPort. Additionally, DVI signals can be transmitted via an adapter cable. The following ordering option is available to you for this purpose:

- C9900-Z468: adapter cable DisplayPort to DVI, 40 cm

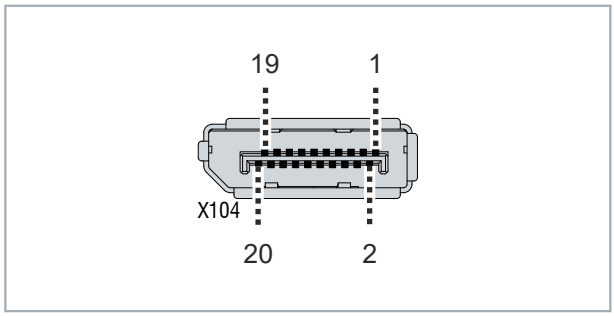



Fig. 9: DisplayPort pin numbering

*Table 10: Pin assignment of DisplayPort*

| Pin | Connection | Pin | Connection |
|---|---|---|---|
| 1 | LVDS lane 0 + | 2 | Ground |
| 3 | LVDS lane 0 - | 4 | LVDS lane 1 + |
| 5 | Ground | 6 | LVDS lane 1 - |
| 7 | LVDS lane 2 + | 8 | Ground |
| 9 | LVDS lane 2 - | 10 | LVDS lane 3 + |
| 11 | Ground | 12 | LVDS lane 3 - |
| 13 | Config 1 | 14 | Config 2 |
| 15 | AUX channel + | 16 | Ground |
| 17 | AUX channel - | 18 | Hot-plug detection |
| 19 | Power supply: ground | 20 | Power supply: 3.3 V / 500 mA |

## 3.3 Optional interfaces

Interface options are available to extend your industrial PC with additional interfaces beyond the basic configuration.

*Table 11: Interface options*

| Ordering option | Description | Link to option |
|---|---|---|
| C9900-E216 | 2 USB ports | https://www.beckhoff.com/c66xx<br>Select a PC, then the product variant, and then the “Options” tab at the bottom of the website. |
| C9900-E231 | 1 RS232 serial interface | |
| C9900-E203 | 1 RS232 serial interface | |

You can only order one serial interface as an option for your device.

*Table 12: Module options*

| Ordering option | Description | Link to option |
|---|---|---|
| C9900-E209 | Module for electrical isolation of an RS232 interface | https://www.beckhoff.com/c66xx<br>Select a PC, then the product variant, and then the “Options” tab at the bottom of the website. |
| C9900-E210 | Module for converting an RS232 interface to RS485 | |
| C9900-E211 | Module for converting an RS232 interface to RS422 | |

To be able to use the listed modules, you also need suitable slot or connector brackets. The corresponding bracket can only be ordered in combination with one of the modules.

*Table 13: Slot options*

| Ordering option | Description | Link to option |
|---|---|---|
| C9900-M568 | Slot bracket for a serial interface module | https://www.beckhoff.com/c66xx<br>Select a PC, then the product variant, and then the “Options” tab at the bottom of the website. |
| C9900-M571 | Plug cover for a serial interface module | |

### 3.3.1 C9900-E216 with 2 USB ports

The option includes two USB 2.0 interfaces. They are used to connect peripheral devices with USB connector.

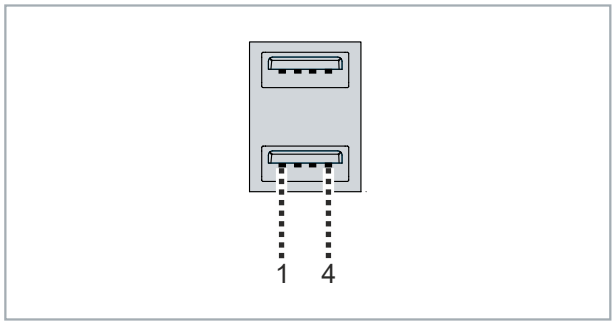



Fig. 10: USB interface pin numbering

*Table 14: USB interface pin assignment*

| Pin | Connection |
|---|---|
| 1 | Vbus |
| 2 | D - |
| 3 | D + |
| 4 | GND |

### 3.3.2 C9900-E231 with 1 serial interface RS232

The serial interface contains an electrically isolated socket. It is led out via a 9-pin standard DSUB connector. The interface provides an asynchronous, serial communication method defined in the RS232 standard.

The channel features overvoltage protection.

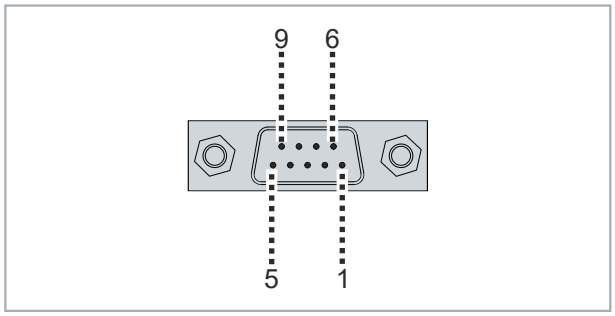



Fig. 11: RS232 interface pin numbering

*Table 15: RS232 interface pin numbering*

| Pin | Name | Description |
|---|---|---|
| 1 | DCD | Data Carrier Detect |
| 2 | RXD | Receive Data |
| 3 | TXD | Transmit Data |
| 4 | DTR | Data Terminal Ready |
| 5 | GND | Ground |
| 6 | DSR | Data Set Ready |
| 7 | RTS | Request to Send |
| 8 | CTS | Clear to Send |
| 9 | RI | Ring Indicator |

### 3.3.3 C9900-E203 with 1 serial interface RS232

The serial interface contains an electrically isolated socket. It is led out via a 9-pin standard DSUB connector. The interface provides an asynchronous, serial communication method defined in the RS232 standard.

The channel features overvoltage protection.

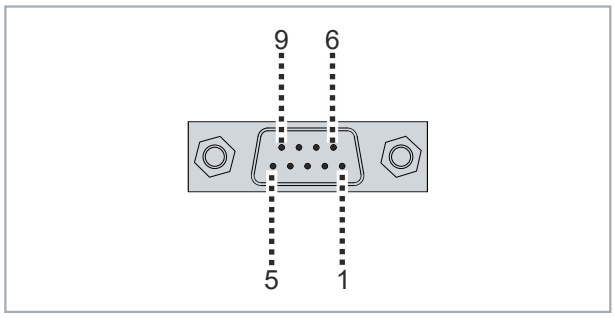



Fig. 12: RS232 interface pin numbering

*Table 16: RS232 interface pin numbering*

| Pin | Name | Description |
|---|---|---|
| 1 | DCD | Data Carrier Detect |
| 2 | RXD | Receive Data |
| 3 | TXD | Transmit Data |
| 4 | DTR | Data Terminal Ready |
| 5 | GND | Ground |
| 6 | DSR | Data Set Ready |
| 7 | RTS | Request to Send |
| 8 | CTS | Clear to Send |
| 9 | RI | Ring Indicator |

## 3.4 Name plate

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

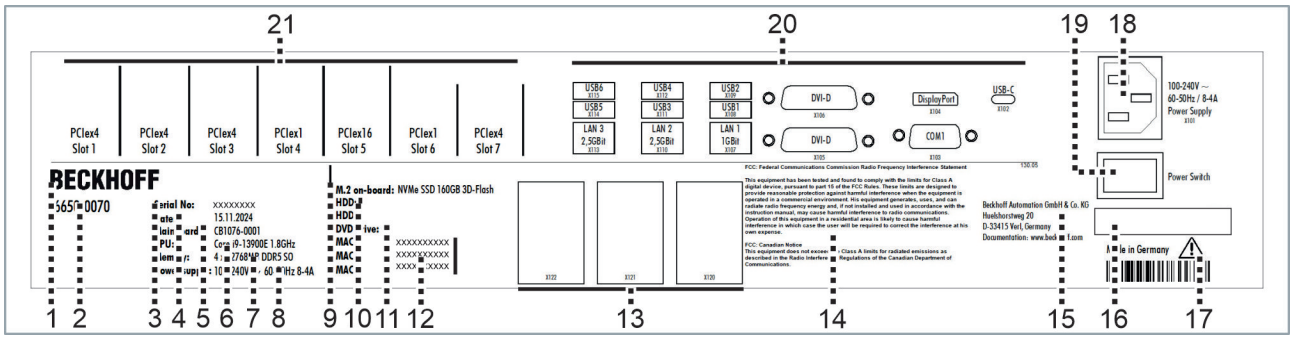



Fig. 13: Name plate

*Table 17: Legend C6650 name plate*

| No. | Description |
|---|---|
| 1 | Vendor |
| 2 | Model: The last four digits indicate the device generation |
| 3 | Serial number = Beckhoff Traceability Number (BTN) |
| 4 | Date of manufacture |
| 5 | Mainboard |
| 6 | CPU |
| 7 | Main memory |
| 8 | Power supply |
| 9 | M.2 on-board |
| 10 | Storage media |
| 11 | DVD drive |
| 12 | MAC addresses of the Ethernet interfaces (X107, X110, X113) |
| 13 | Optional interfaces |
| 14 | FCC approval |
| 15 | Address of the vendor |
| 16 | Symbols<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. |
| 17 | Note: be sure to read the device manual. |
| 18 | Power supply connection |
| 19 | Main switch for switching the device on and off |
| 20 | Connection section standard interfaces |
| 21 | Plug-in card slots for options |

## 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 18: C6650-0070 Minimum TwinCAT version*

| Operating system | Minimum TwinCAT version |
|---|---|
| Windows 10 64-bit | 3.1 build 4026.12<br>3.1 build 4024.60 |
| Windows 11 64-bit | 3.1 build 4026.16 |
| Windows Server 2025 | 3.1 build 4026.19 |

# 4 Commissioning

To be able to use the industrial PC, you must first commission it. The first step is to transport the device to is operating location and unpack it. This is followed by 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 [▶ 50]).

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.

## 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**

**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.

You can use the mounting concept on the back side of the industrial PC to mount the device in the control cabinet. Only install the device in the control cabinet with the interfaces facing upwards.

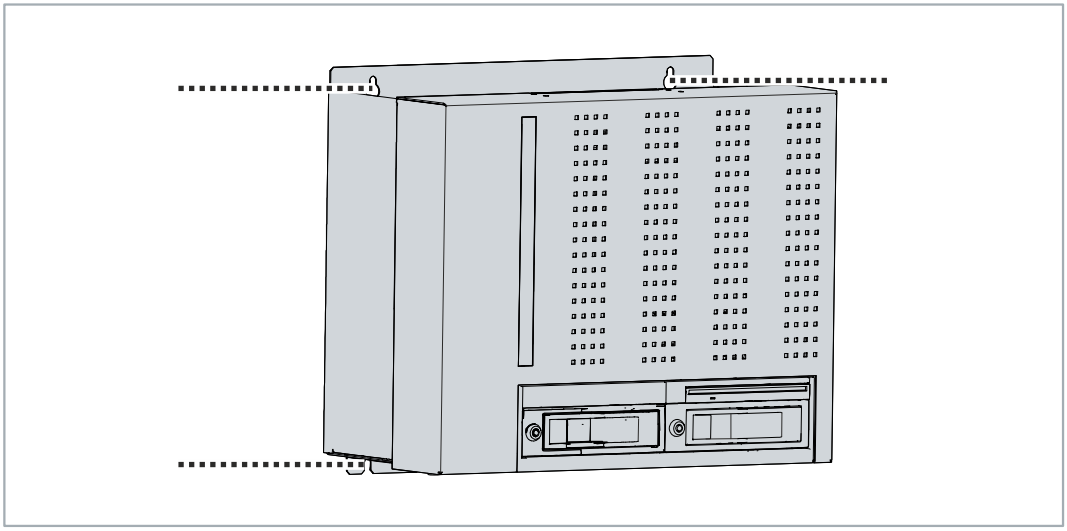


Fig. 14: Mounting concept

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

All dimensions are in mm.

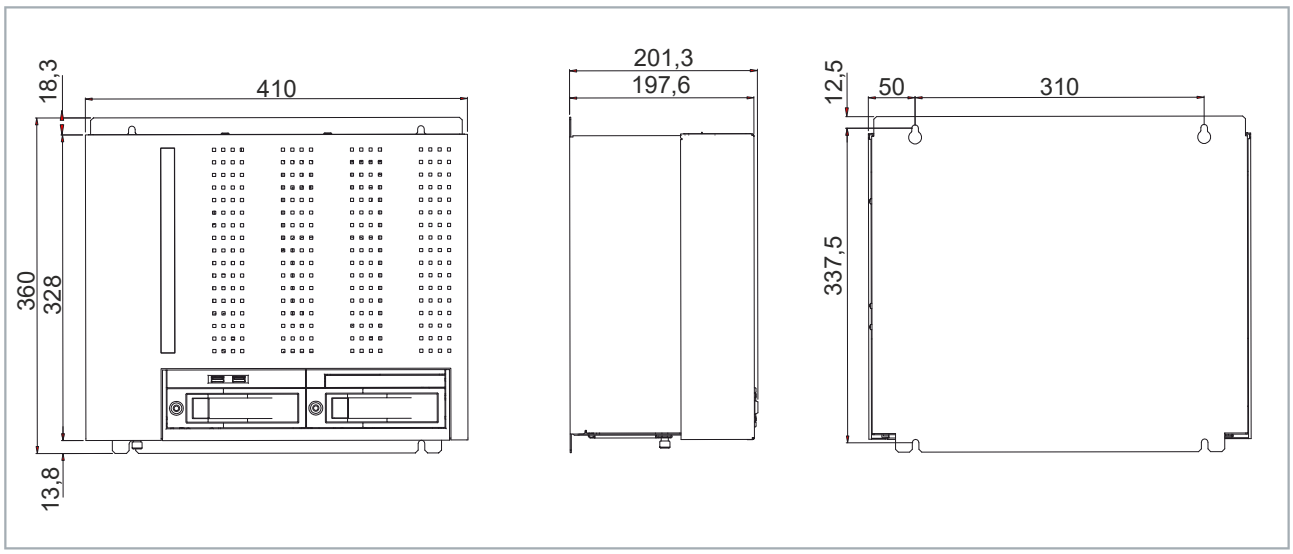



Fig. 15: Dimensions

**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.

To mount the industrial PC in the control cabinet, you must make sure that there are holes for the fastening screws in the control cabinet that fit the device dimensions of the PC (see above). 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.

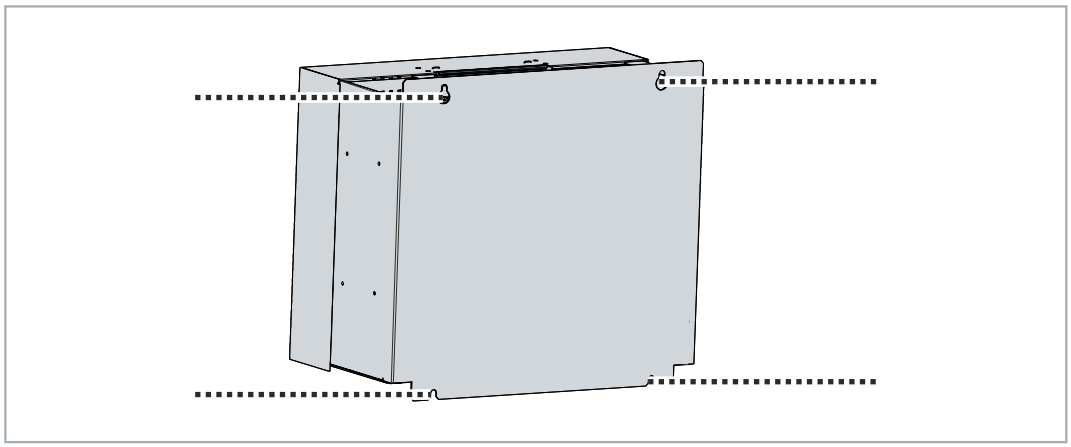


Fig. 16: Control cabinet installation

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

1. Insert the fastening screws into the drill holes in the control cabinet.
2. Hang the PC on the screws at the points marked of the mounting concept.
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.

In its basic configuration, the industrial PC is equipped with a 100-240 V AC, 50-60 Hz full-range power supply unit. Alternatively, the following ordering option is available:

- C9900-P229: 24 V DC power supply unit

If you have ordered the PC with a 24 V DC power supply unit, wire the industrial PC in the control cabinet in accordance with the standard EN 60204-1:2006 Protective Extra Low Voltage (PELV):

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

Devices connected to the industrial PC with their own power supply must have the same potential for the PE and "0 V" conductors as the industrial PC (no potential difference).

### 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.

The protection provided by the devices may be impaired by non-intended use.

All connected devices must be in SELV (Safety Extra Low Voltage)/PELV (Protective Extra Low Voltage) circuits.

#### 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.

A protective conductor is included in the industrial PC's IEC socket for connecting the power supply. Establish the low-resistance protective earth of the industrial PC via the voltage connection, thus avoiding dangerous touch voltages.

If you have ordered the industrial PC with a 24 V power supply unit, a pin for protective earthing (PE) of the device is included in the voltage socket. Establish the low-resistance protective earth of the industrial PC via the voltage connection, thus avoiding dangerous touch voltages.

### 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 top of the industrial PC (see Fig.) and the central grounding point of the control cabinet in which the PC is installed. Use either a wide, flat earthing strap or a round conductor with a minimum cross-section of 10 $mm^2$ for the earth connection. In the case of a round conductor, also use a cable lug with a ring and place the ring over the earthing bolt.

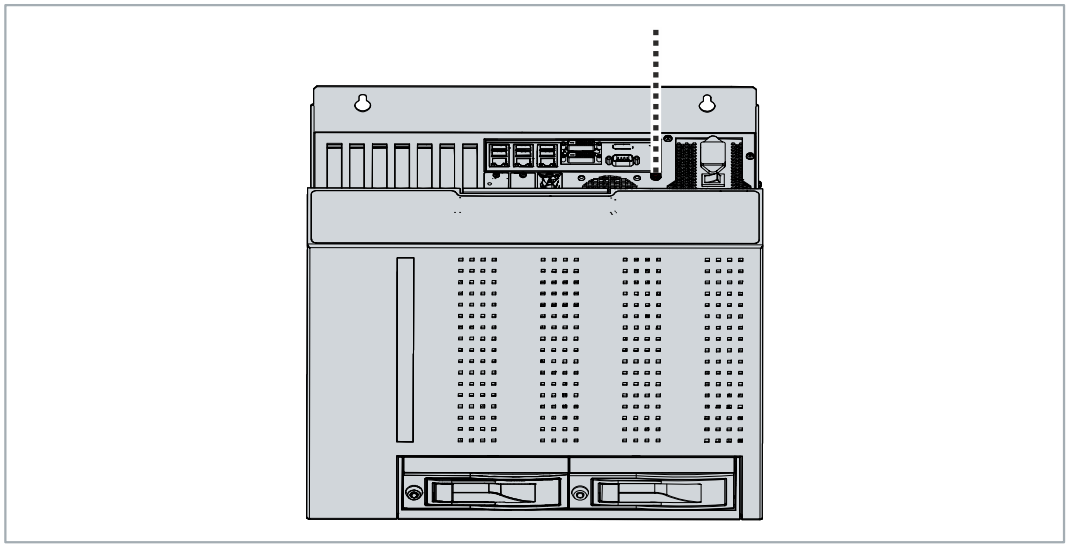


Fig. 17: Grounding bolt for functional earthing

## 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.

### Connecting cables

The connections are located on the top side of the industrial PC. They are documented in chapter 3.1 Structure [▶ 10].

Make sure that you first connect the functional earth to the grounding bolt of the PC (see chapter 4.3.1 Grounding the industrial PC [▶ 25]) and then plug in all data transmission lines.

### Connect power supply via 100-240 V AC power supply unit

For the connection of the power supply, there is an IEC socket in the connection compartment on the top of the device. To connect the industrial PC to the power supply, use the supplied IEC power cable with a German Schuko plug at the end.

In the USA and Canada, the connection cable must meet the following specifications depending on the power supply:

Proceed as follows to connect the 100-240 V AC power supply unit:

1. Check that the mains voltage is correct.
2. Plug the corresponding IEC power cable into the IEC socket of the industrial PC.
3. Connect the industrial PC to a Schuko socket.

## 4.3.3 Connecting the 24 V power supply

As an alternative to the 100-240 V AC power supply in the basic configuration, you can order the industrial PC with a 24 V DC power supply. The options C9900-P229 are available to you.

The following table lists the maximum current carrying capacity of the 24 V DC power supply:

*Table 19: Current carrying capacity power supply*

| Output voltage power supply | Maximum current load 24 V DC power supply |
|---|---|
| +3.3 V | 15 A |
| +5 V | 15 A |
| +12 V total | 30 A |
| +5 V stand by | 2 A |

The continuous maximum total power is 400 W; the maximum peak power is 500 W.

### Connect power supply via 24 V DC power supply unit

Cables with a maximum cable cross-section of 4 mm² can be used for connecting the power supply. For long supply lines, use 4 mm² cables to achieve a low voltage drop on the supply line. There should be at least 22 V at the voltage connector of the industrial PC, so that the PC remains switched on during voltage fluctuations.

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

1. Install the power supply cable (see the following section "Mounting the supply line").
2. Plug the power supply cable into the voltage socket of the industrial PC.
3. Connect the industrial PC to your external 24 V power supply.
4. Switch on the 24 V power supply.

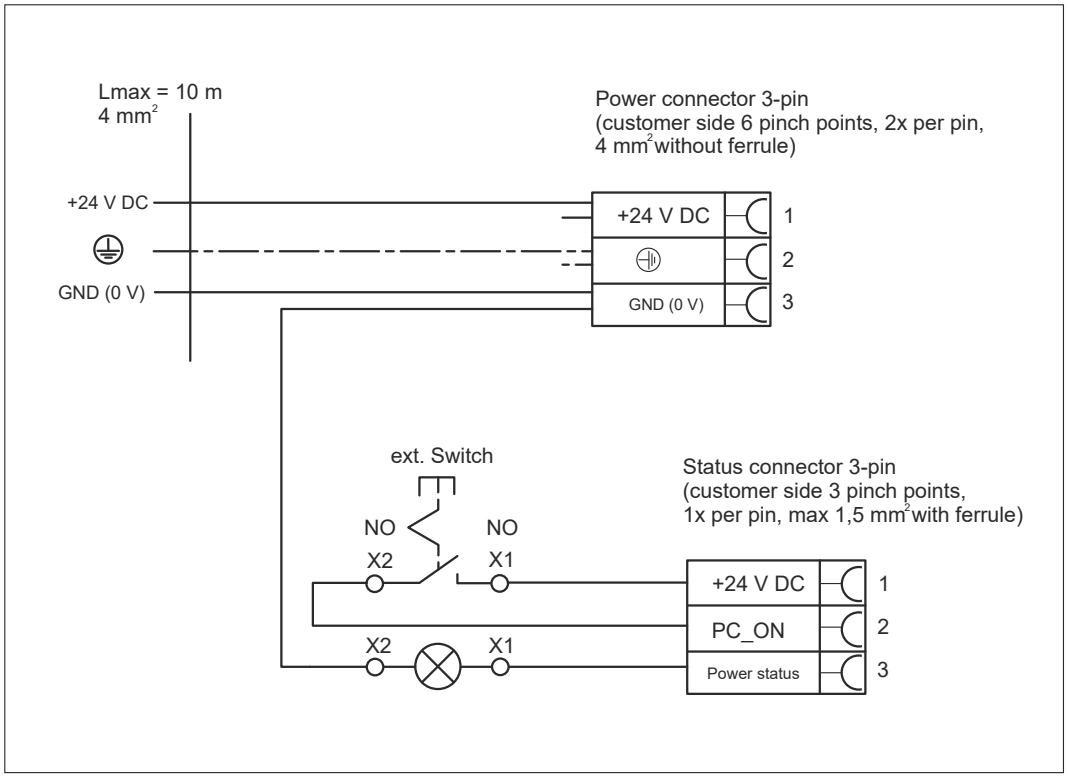



Fig. 18: Wiring diagram

Before you can connect the power supply, you must install the power supply line yourself. For this purpose, use the supplied material for connector assembly. This consists of the 3-pin connector and the strain relief housing.

### Mounting the supply line

First mount the plug on the cable as follows:

1. Remove the insulation from the cable ends (8-9 mm).
2. Plug the cable ends into the connector strip by simply pressing them in. For the pin assignment of the connector, see Chapter Power supply. In the case of fine-core cables, you must use ferrules.

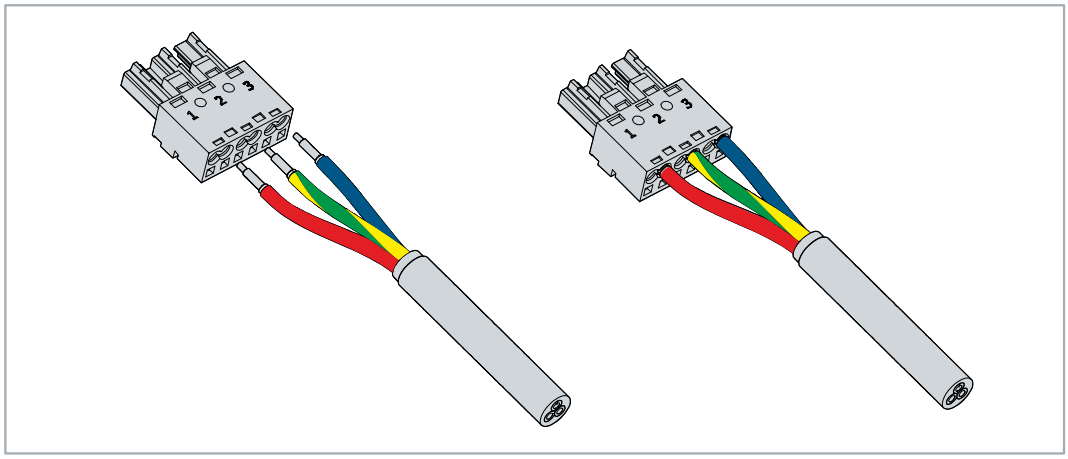


Fig. 19: Mounting the supply line

⇨ You have fitted the supply line to the plug.

### Assembly of strain relief housing

Now fit the strain relief housing to the already connected plug and supply line:

1. Insert the plug into the open strain relief housing with the cable leading up to the edge. Make sure that the pin numbering on the plug points in the same direction as the sticker on the strain relief housing (section A).

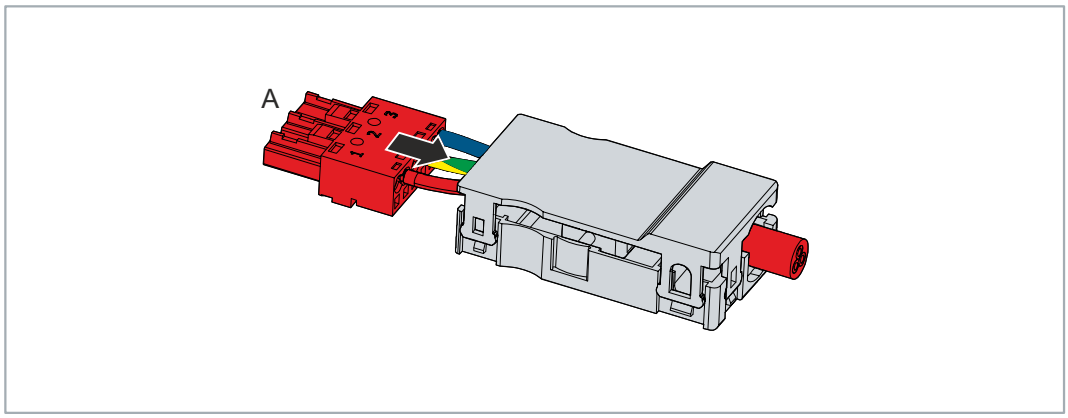



Fig. 20: Insert plug

2. Press the plug against the underside of the strain relief housing until it clicks into place.
3. Press the top of the strain relief housing onto the lower part until the tabs have slipped over the latching lugs (section B).
4. Tighten the M2 screw on the side (section C).

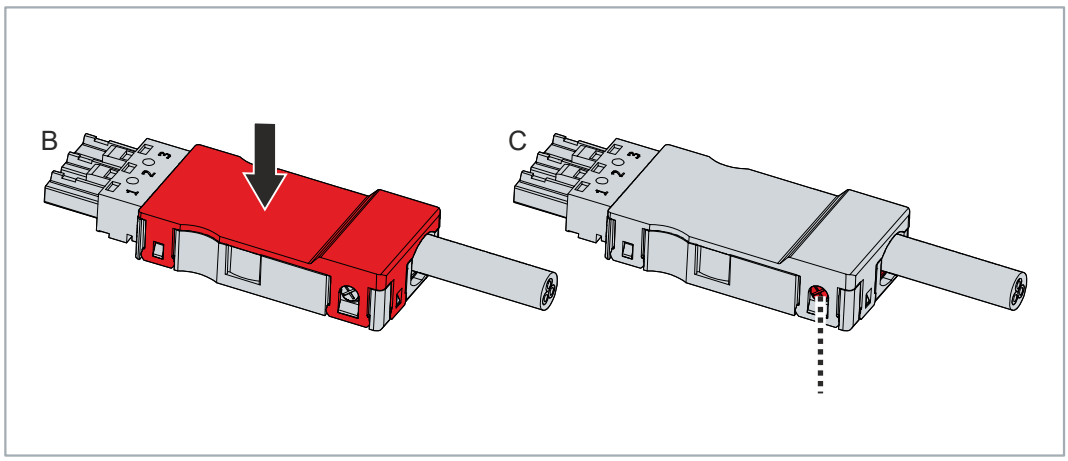



Fig. 21: Close the strain relief housing

⇨ You have mounted the strain relief housing.

To dismantle the strain relief housing, proceed as follows:

1. Release the M2 screw on the side (section A).
2. Use your fingers to bend the five tabs slightly outwards (section B).

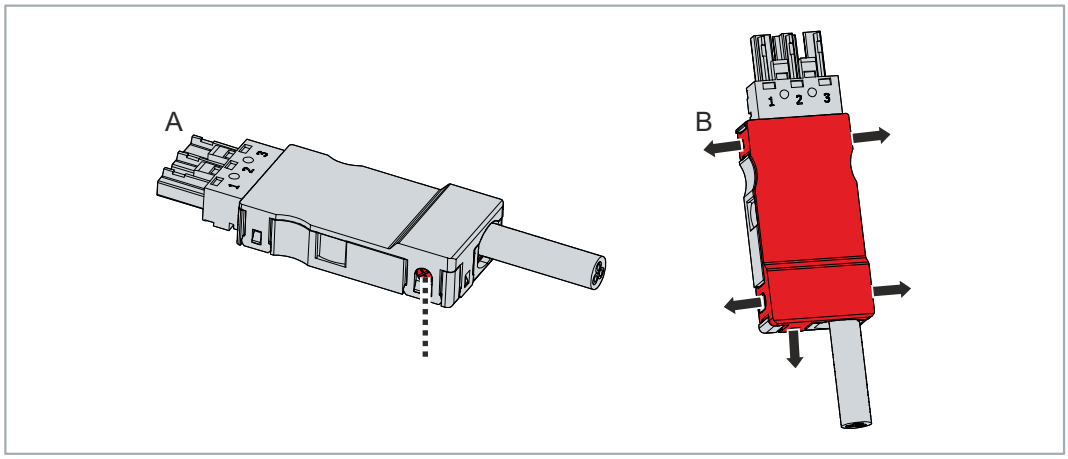



Fig. 22: Loosen the strain relief housing

3. Pull the upper section off the lower section until the tabs slide over the latching lugs (section C).
4. Pull the plug out of the strain relief housing (section D).

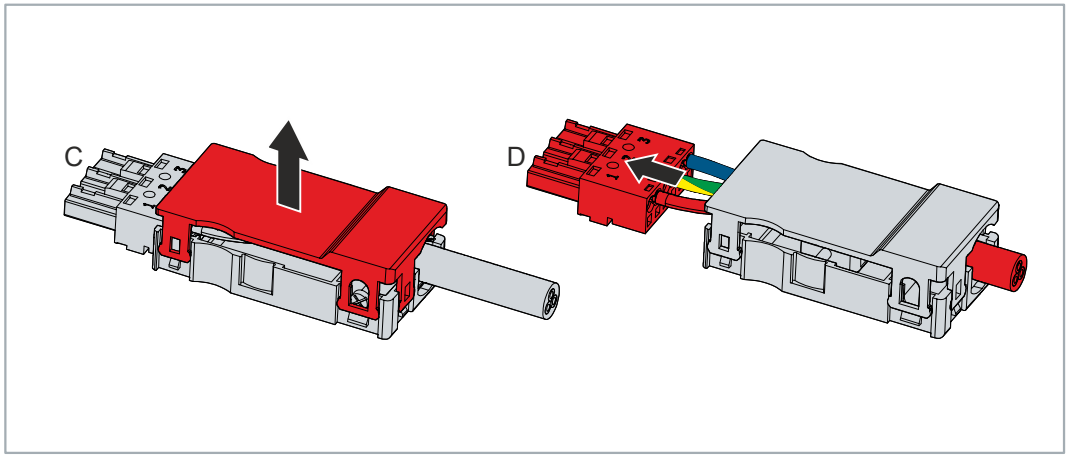



Fig. 23: Remove the strain relief housing

⇨ You have dismantled the strain relief housing.

# 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:

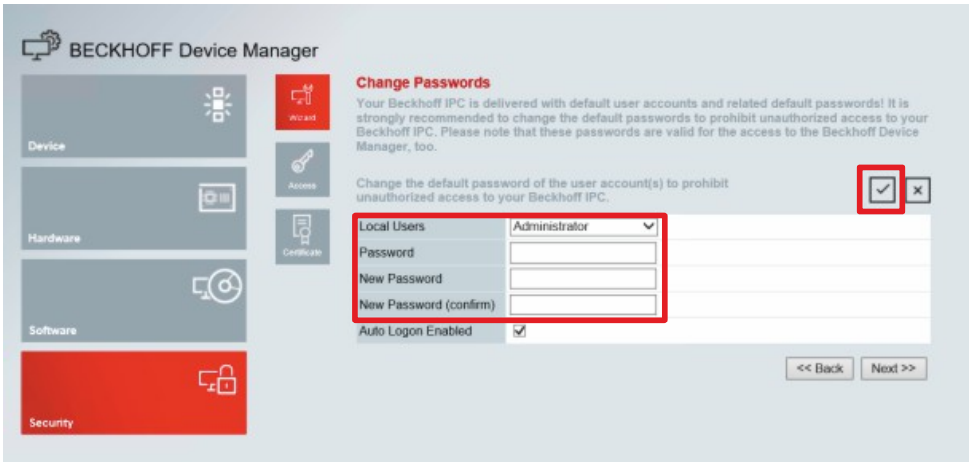



Fig. 24: Beckhoff Device Manager – Change passwords

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.

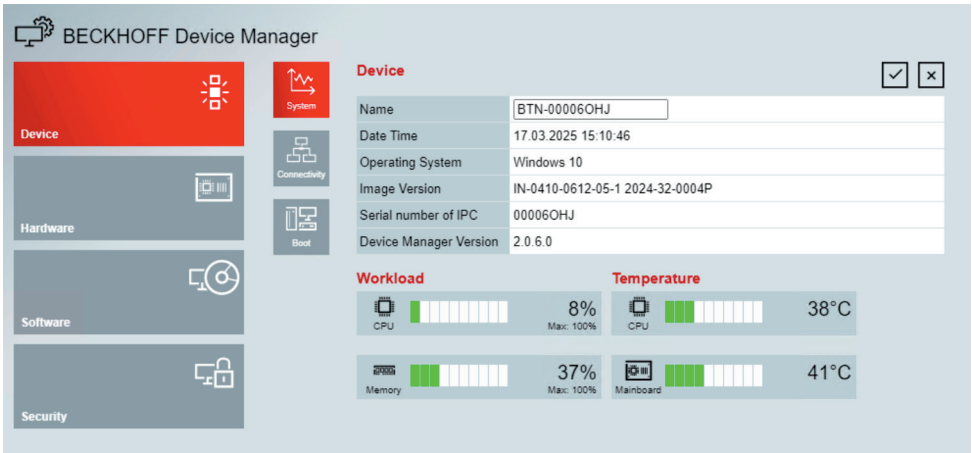



Fig. 25: Beckhoff Device Manager – Start page

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**.

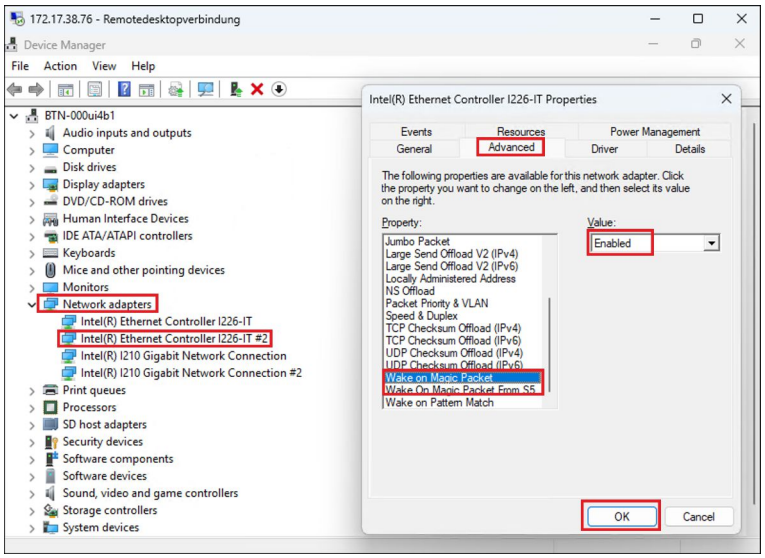



Fig. 26: Activate function

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

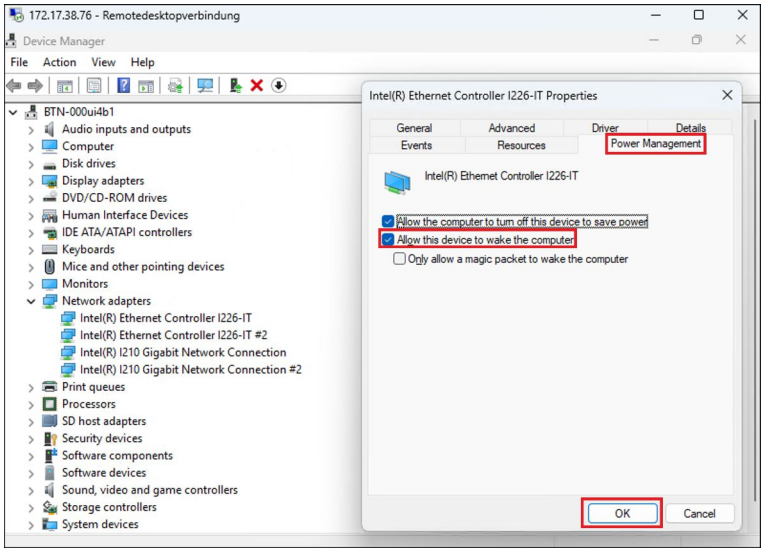



Fig. 27: Enable Function

⇨ 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 wish to use the industrial PC any further, chapter 6.2 Disassembly and disposal [▶ 35] provides information on the correct disposal of the device.

## 6.1 Disconnecting the power supply and cables

**⚠ CAUTION**

**Risk of electric shock**

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

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

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

### Disconnecting the power supply

Proceed as follows to disconnect the 100-240 V AC power supply:

1. Disconnect the PC from your power supply.
2. Pull the voltage connector out of the IEC socket of the PC.

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

1. Disconnect the PC from your power supply.
2. Press the latches on the voltage connector together and pull it out of the PC.
3. Remove the power supply cable if the connector is to remain with the PC.

### Disconnecting cables

To disconnect the cables from the industrial PC, proceed as follows:

1. Make a note of the wiring configuration, if you wish to restore it with another device.
2. Disconnect the data transmission cables from the industrial PC.
3. Finally, disconnect the grounding strap.

## 6.2 Disassembly and disposal

In order to be able to dismount the industrial PC from the control cabinet, you must first have disconnected the power supply and the cables (see Chapter 6.1 Disconnecting the power supply and cables [▶ 34]).

To remove the industrial PC from the control cabinet, proceed as follows:

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.
3. Remove the PC from the control cabinet.

⇨ You have successfully dismounted the industrial PC.

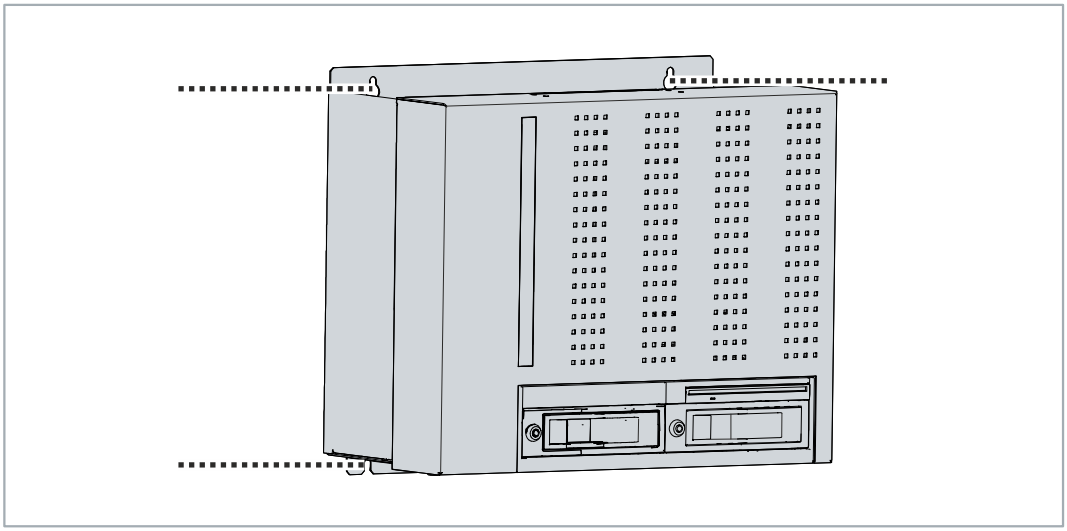


Fig. 28: Positions of the fastening screws

**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. This does not apply to the replacement of hard disks in a RAID configuration.

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

## 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 20: Device component replacement recommendations*

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

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

### ESD protection

**NOTICE**

**Electrostatic discharge**

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

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

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

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

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

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

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

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

## 7.2.1 Access to device components

To be able to replace certain device components, you must first gain access to the interior of the industrial PC.

Be sure to shut down the device and switch it off before replacing NVMe™ M.2 SSDs.

To do this, follow the steps:

1. Pull the release handle upward to release the housing cover lock (section A).
2. Pull the housing cover forward by the handle until it moves freely at the bottom (section B). While doing so, hold the cover firmly so that it does not fall off.

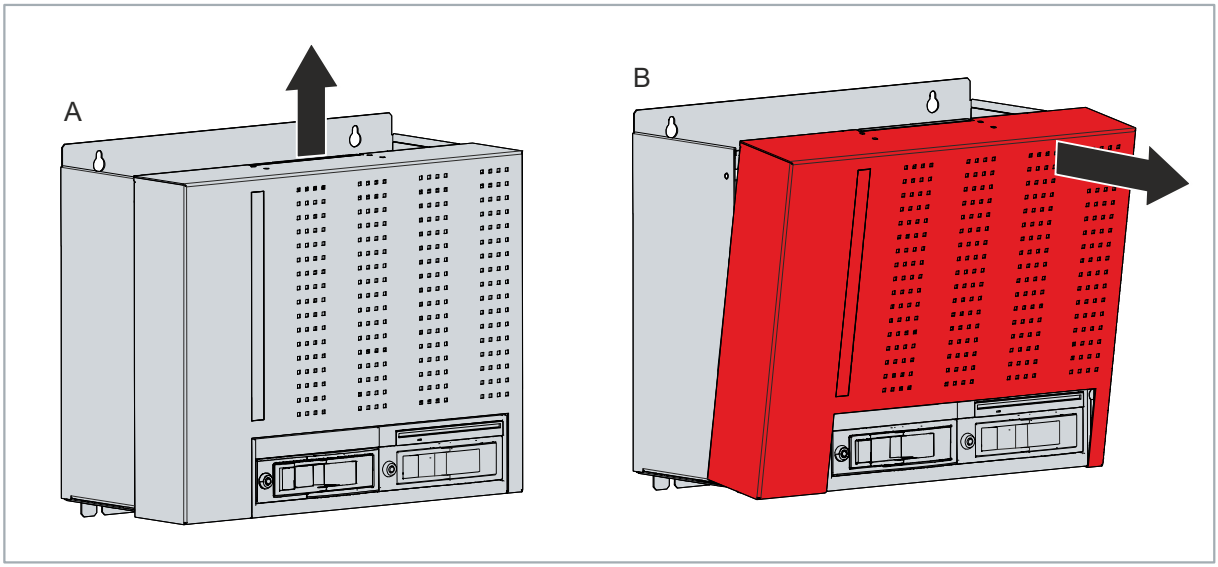



Fig. 29: Unlocking the housing cover

3. Guide the housing cover downwards out of the guides (section C).
4. Loosen the knurled screw (1) of the card locating holder (2) (section D).

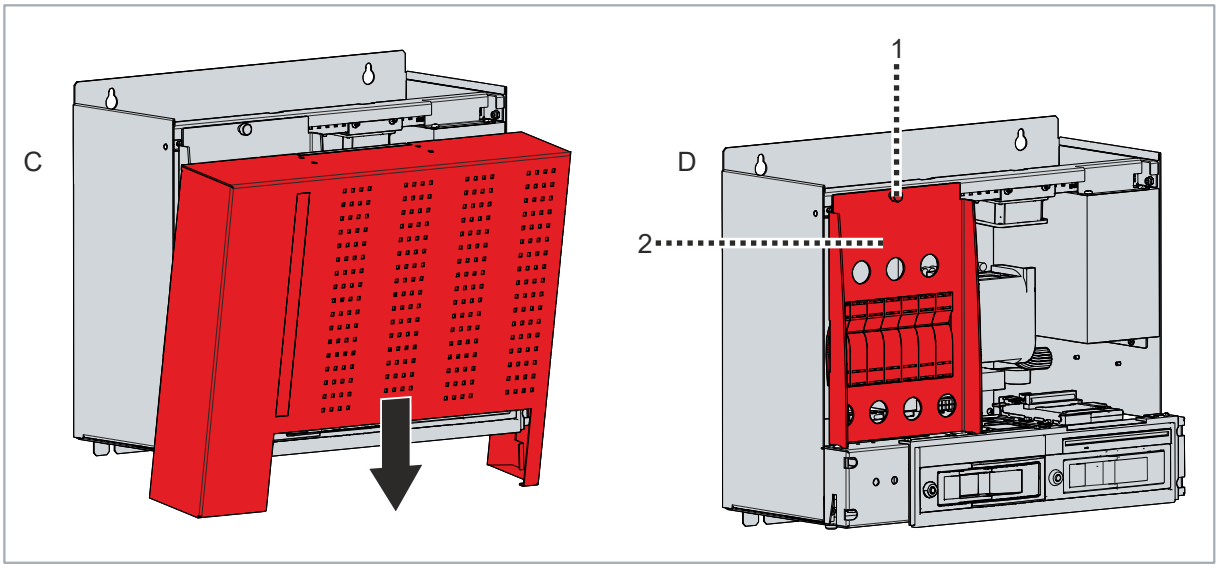



Fig. 30: Access to the interior of the device

5. Remove the card locating holder from the housing.

⇨ You now have access to the interior of the industrial PC.

To reinstall the card locating holder afterwards, follow the steps below:

1. Release all plastic elements of the card locating holder (section A).

2. Place the card locating holder again in the slots provided in the industrial PC (section B).
3. Keep the card locating holder pressed onto the edge of the industrial PC while tightening the knurled screw again (section C).

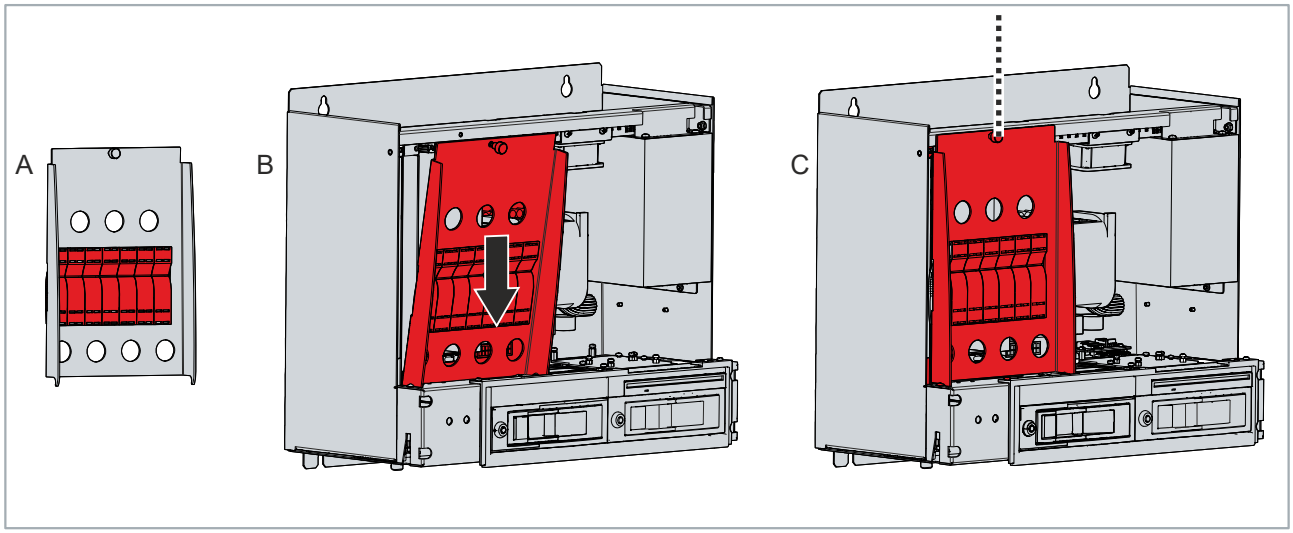



Fig. 31: Mounting the card locating holder

4. For each plug-in card, press down the associated plastic element of the card locating holder until the plug-in card is firmly seated in its slot.

⇨ You have mounted the card locating holder.

To reassemble the housing cover to the PC, you must push the inner hooks (1) of the housing cover into the guides (2) of the housing.

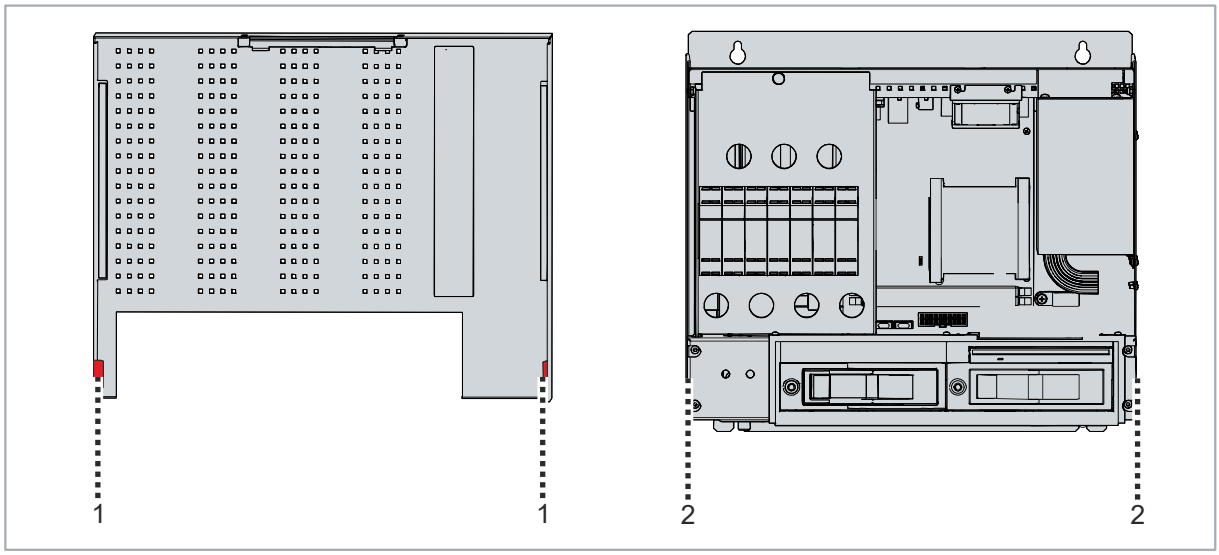



Fig. 32: Hooks and guides

To do this, follow the steps below:

1. Hold the cover inclined and place it below the housing (section A).
2. Push the cover up as far as possible, inserting the hooks of the cover into the guides of the housing (2) (section B).
3. Place the cover into a straight position against the housing until the release handle snaps back into place (section C).

⇨ You have mounted the cover on the housing.

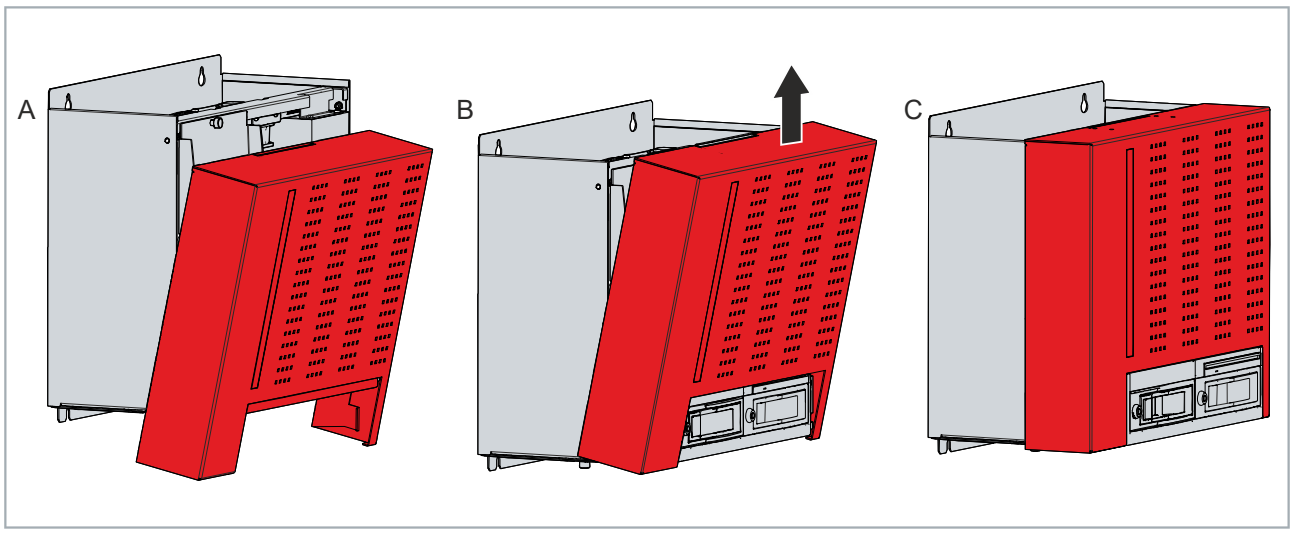



Fig. 33: Mounting the housing cover

## 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.

***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 21: 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 [▶ 39] shows how to access the battery.

To change the battery, proceed as follows:

1. Bend the hook on the battery holder slightly outward (section A).
2. Pull the battery out of the holder with needle-nose pliers (section B).

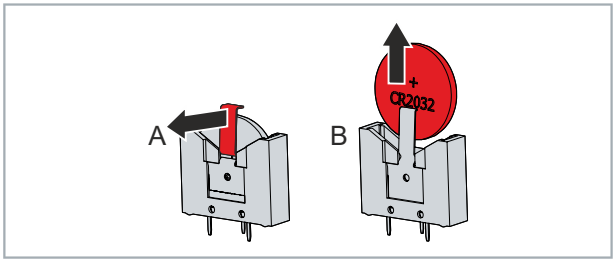



Fig. 34: Replacing the battery

3. Insert the new battery into the holder. Make sure that the polarity is correct, as shown.

⇨ 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

### 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.

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

### Data transmission before replacement

If you want to exchange a storage medium according to Beckhoff's recommendation, you must copy the data from the old to the new storage medium. You can use the Beckhoff Service Tool (BST) for this purpose. BST is a graphical backup and restore program for 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.

Chapter 7.2.1 Access to device components [▶ 39] shows how to access the storage media. Shut down the device and switch it off before replacing an NVMe™ M.2 SSD.

### NVMe™ M.2 SSD

The basic configuration includes a 160 GB NVMe™ M.2 SSD on the motherboard of your device. Alternatively, you can order your device with one of the following on-board SSDs:

*Table 22: Ordering options on-board NVMe™ M.2 SSD*

| Ordering option | Memory size |
|---|---|
| C9900-H678 | 320 GB |
| C9900-H679 | 640 GB |
| C9900-H840 | 1280 GB |

You can also install additional NVMe™ M.2 SSDs as PCIe® plug-in cards in your device. The total number of SSDs is limited to a maximum of six. The following ordering options are available:

*Table 23: Ordering options PCIe® NVMe™ M.2 SSD*

| Ordering option | Memory size |
|---|---|
| C9900-H814 | 160 GB |
| C9900-H815 | 320 GB |
| C9900-H816 | 640 GB |
| C9900-H839 | 1280 GB |

You can mirror the NVMe™ M.2 SSD on your device's motherboard to another NVMe™ M.2 SSD in a RAID 1 array. The prerequisite for this is that you have inserted an SSD with the same size as the on-board SSD as a PCIe® plug-in card. This determines which PCIe® plug-in card slot is occupied. The following figure shows the numbering of the plug-in card slots.

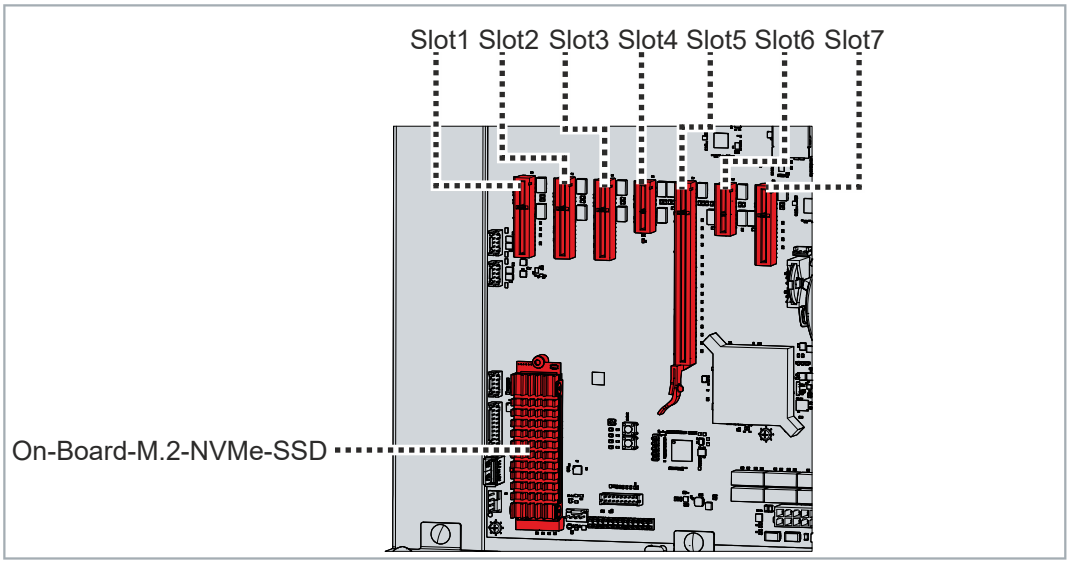



Fig. 35: Numbering of PCIe® plug-in card slots

The plug-in card slots are always fitted in the following order:

1. On-board M.2 NVMe™ (basic equipment)
2. Slot 1 (PCIe® x4 Gen4)
3. Slot 2 (PCIe® x4 Gen4)
4. Slot 5 (PCIe® x16 Gen4)
5. Slot 3 (PCIe® x4 Gen3)
6. Slot 7 (PCIe® x4 Gen3)

If you want to mirror the on-board NVMe™ SSD to a PCIe® NVMe™ SSD in a RAID 1 array, the number of SSDs determines the assembly sequence.

*Table 24: Assembly sequence of NVMe™ SSDs*

| Number of NVMe™ SSDs | Assembly sequence |
|---|---|
| Max. 3 NVMe™ SSDs, 2 of which are RAID-capable | 1. On-Board-M.2-NVMe™ (NVMe #1)<br>2. Slot 1 (NVMe #2) |
| Min. 4 NVMe™ SSDs, 2 of which are RAID-capable | 1. On-Board-M.2-NVMe™ (NVMe #1)<br>2. Slot 5 (NVMe #2) |

To replace the NVMe™ M.2 SSD on your motherboard, follow the steps below:

1. Remove the M3 screw (section A).
2. Place the SSD in an inclined upward position (section B).
3. Remove the SSD (section B).

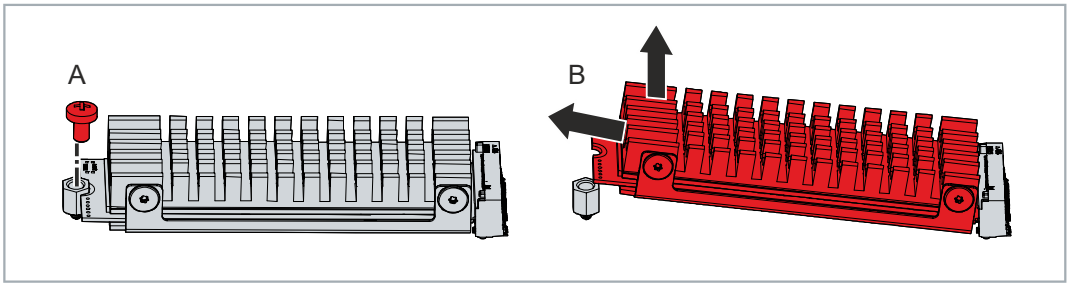



Fig. 36: NVMe™ M.2 SSD replacement

4. Insert the new SSD in an inclined position.
5. Press the SSD down.
6. Retighten the M3 screw.

⇨ You have replaced the NVMe™ M.2 SSD on the motherboard.

### Hard disk replacement

You can optionally add hard disks to your device by inserting them into the hard drive caddies on the front of the device. The following hard disks are available:

*Table 25: Hard disk ordering options*

| Ordering option | Memory size |
|---|---|
| C9900-H152 | 1 TB |
| C9900-H203 | 2 TB |
| C9900-H204 | 4 TB |

Proceed as follows to replace the hard disk:

1. Unlock the hard drive caddy with the corresponding key (section A).
2. Pull the key of the hard drive caddy to unlock it (section B).

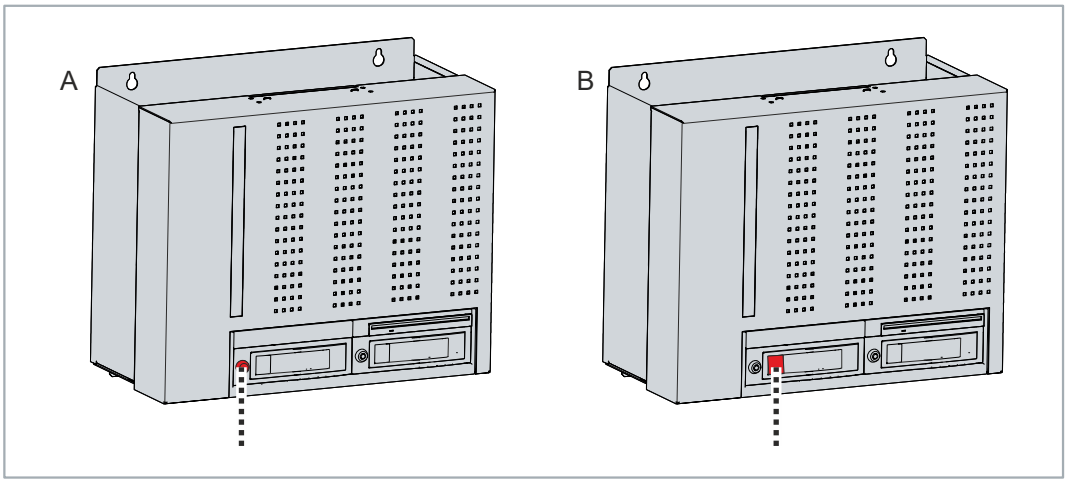



Fig. 37: Open hard drive caddy

3. Open the hard drive caddy (section C).
   ⇨ The hard disk is pushed out of the hard drive caddy.
4. Pull the hard disk out of the hard drive caddy (section D).
5. Reinsert the new hard disk in the same orientation.
6. Close the hard drive caddy again.
7. Lock the hard drive caddy again.

⇨ You have replaced the hard disk.

## 7.2.4 Replacing the fan

**NOTICE**

**Incorrect fan type**

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

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

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

Remove the housing cover of the industrial PC in advance to gain access to the fans (see chapter 7.2.1 Access to device components [▶ 39]).

To replace the fan cartridge on the bottom of the PC, follow the steps below:

1. Loosen the knurled screw on the underside of the PC (section A).
2. Turn the cartridge downwards (section B).

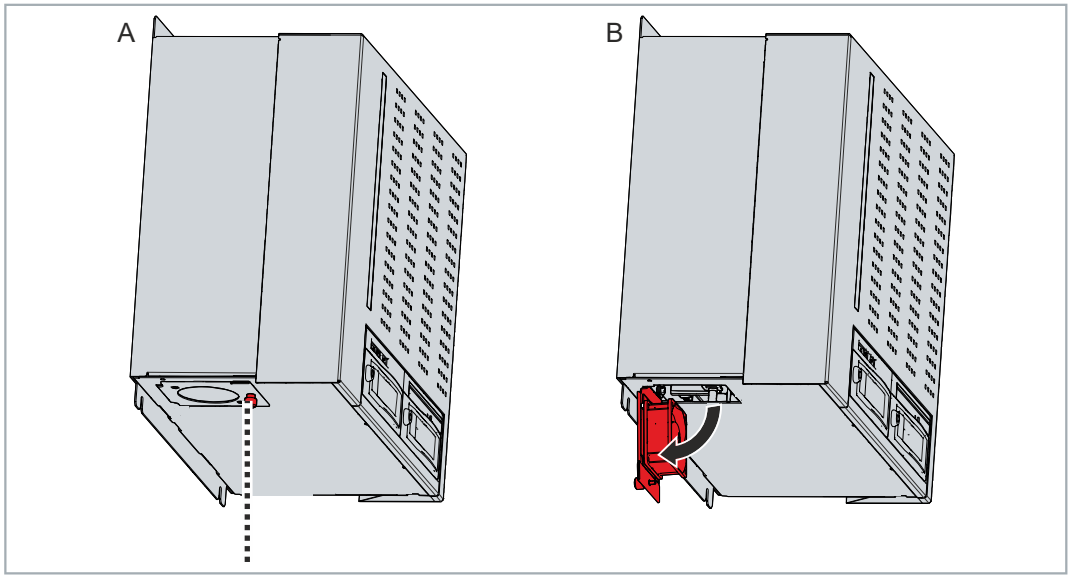



Fig. 38: Loosen the fan cartridge

3. Disconnect the supply cable of the fan from the motherboard.
4. Remove the cartridge to the front (section C).

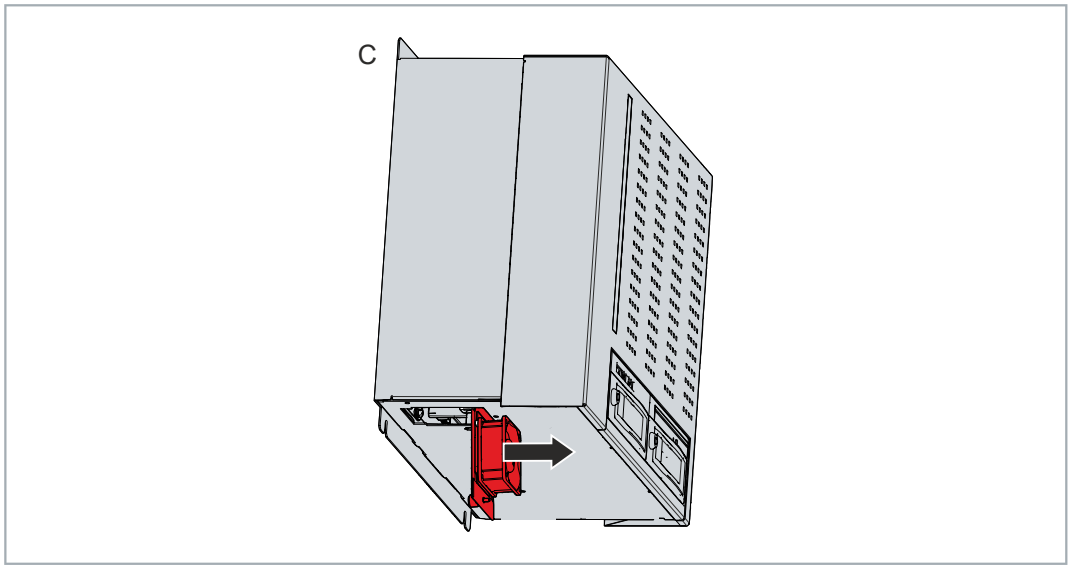



Fig. 39: Removal of fan cartridge

5. Insert the new fan cartridge.
6. Connect the supply cable to the motherboard.
7. Flip the cartridge up.
8. Tighten the knurled screw.

⇨ You have now replaced the fan cartridge.

To replace the fans on the top of the PC, follow the steps below:

1. Loosen the two M3x4 screws of the fan holder (section A). Hold the holder tightly while doing this so that it does not fall off.

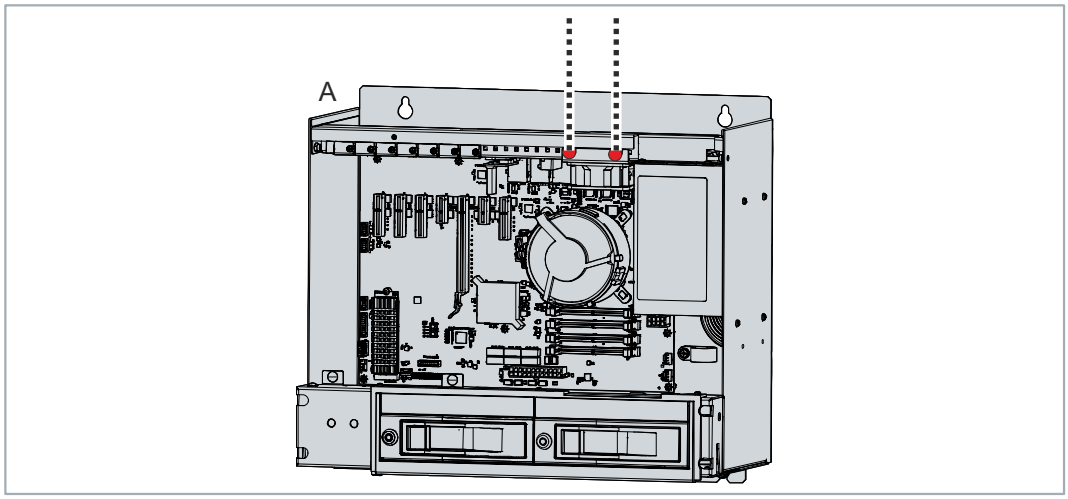



Fig. 40: Loosen the fan holder

2. Disconnect the supply cable of the fan from the motherboard.
3. Remove the fan holder with the fan (section B).

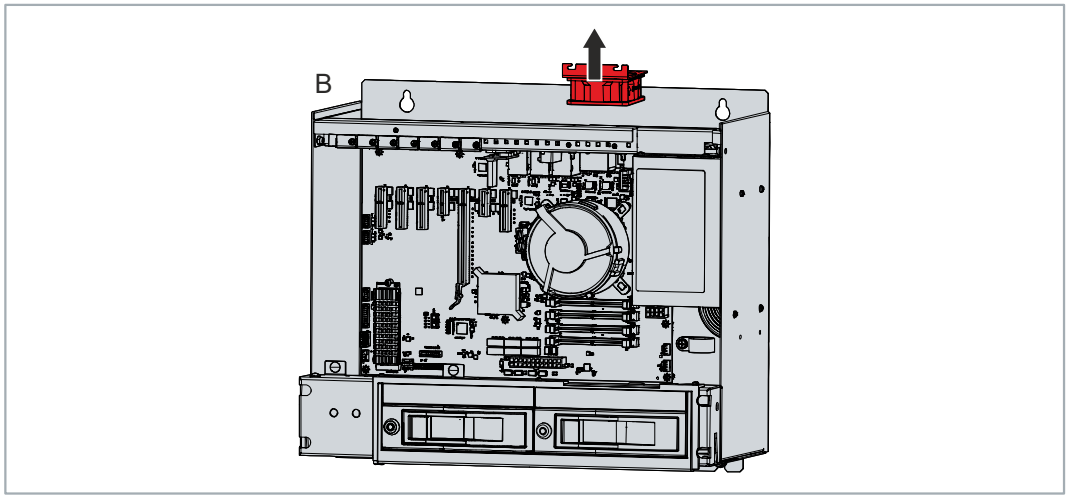



Fig. 41: Remove the fan holders with fan

4. Insert the new fan holder with fan again.
5. Connect the supply cable to the motherboard.
6. Retighten the two M3x4 screws.

⇨ You have successfully replaced the fan.

The fans in the power supply unit cannot be replaced separately. Instead, you will need to have the entire power supply unit replaced. Please contact Beckhoff Service for this.

**Exchange CPU cooler**

You can also replace the CPU cooler on the motherboard. Contact Beckhoff Service for a new cooler.

To replace the CPU cooler, follow the steps below:

1. Turn the four locking elements in the direction of the arrow shown on them to unlock the cooler from the motherboard. (section A).

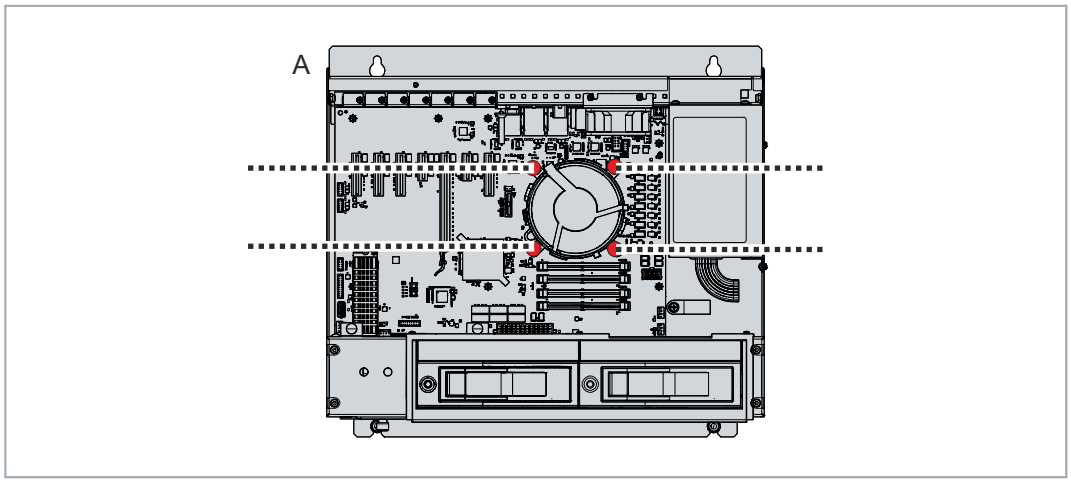



Fig. 42: CPU cooler unlocking

2. Disconnect the supply cable of the cooler from the motherboard.
3. Pull the cooler off the motherboard while pulling the locking elements out of the holes in the motherboard (section B).

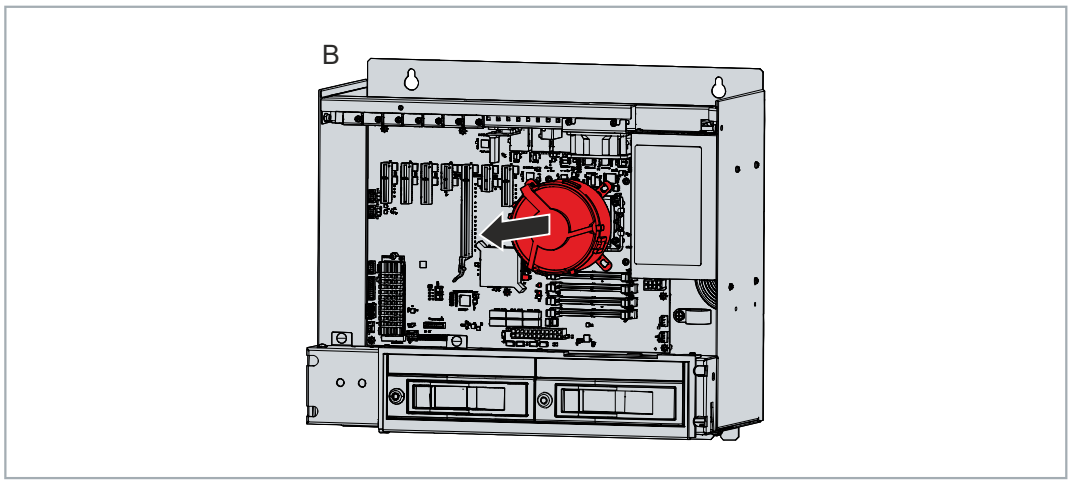



Fig. 43: CPU cooler removal

4. Remove the residues of the old thermal compound from the surface of the CPU. Use a paper towel moistened with alcohol for this purpose. Avoid ESD damage by never using a textile cloth.
5. Place the new cooler with the locking elements into the holes provided on the motherboard. Make sure that you press the locking elements down into the holes as far as they will go.
6. Connect the supply cable to the motherboard.
7. Turn the locking elements in the opposite direction of the arrows shown on them to lock the cooler onto the motherboard.

⇨ You have replaced the CPU cooler.

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

# 8 Troubleshooting

*Table 26: 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 27: Technical data*

| Product designation | C6650 |
|---|---|
| Dimensions (W x H x D) | 410 x 360 x 201 mm |
| Weight | 12 kg with basic configuration |
| Supply voltage | 100-240 $V_{AC}$, max. 3 A, 50-60 Hz<br><br>22-30 $V_{DC}$ (24 $V_{DC}$ power supply unit) |
| Power consumption | Data sheet power consumption and power loss in the download finder:<br>https://www.beckhoff.com/en-en/support/download-finder/search-result/?download_group=691754572 |
| Secure element | fTPM 2.0 enabled (see TPM manual) |
| 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/ $s^2$)<br><br>During reading of CD/DVD:<br>EN 60068-2-6: 10 to 58 Hz: 0.019 mm<br>58 to 500 Hz: 0.25 G (approx. 2.5 m/ $s^2$) |
| Shock resistance (shock) | EN 60068-2-27: 5 G (approx. 50 m/$s^2$), duration: 30 ms<br><br>During reading of CD/DVD:<br>5 G (approx. 50 m/ $s^2$), duration: 11 ms |
| EMC interference immunity | conforms to EN 61000-6-2 |
| EMC interference emission | conforms to EN 61000-6-4 |
| Permissible ambient temperature | 0 °C ... +55 °C (operation)<br>-25 °C...+65 °C (transport / storage) |
| Permissible air humidity | Maximum 95 %, no condensation |
| Transport and storage | The same values for air humidity and shock resistance are to be observed during transport and storage as in operation. The shock resistance during transport can be improved by means of suitably packing the industrial PC. |

# 10 Appendix

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

## 10.1 Service and support

Beckhoff and its worldwide 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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