

**BECKHOFF** New Automation Technology

Manual | EN

C6650

Industrial PC





# Table of contents

<b>1</b>	<b>Notes on the documentation</b>	<b>5</b>
<b>2</b>	<b>For your safety</b>	<b>6</b>
2.1	Description of safety symbols	6
2.2	Intended use	6
2.3	Fundamental safety instructions	7
2.4	Operator's obligation to exercise diligence	7
2.5	Notes on information security	8
<b>3</b>	<b>Product overview</b>	<b>9</b>
3.1	Structure	10
3.2	Interface description	11
3.2.1	Power supply	11
3.2.2	PS/2	13
3.2.3	USB	14
3.2.4	Ethernet RJ45	15
3.2.5	DVI	16
3.2.6	RS232	16
3.2.7	DisplayPort	17
3.2.8	Audio connections	18
3.3	Optional interfaces	19
3.4	Name plate	20
<b>4</b>	<b>Commissioning</b>	<b>21</b>
4.1	Transport and unpacking	21
4.2	Control cabinet installation	22
4.3	Connecting the industrial PC	24
4.3.1	Grounding of the industrial PC	25
4.3.2	Connecting cables and power supply	26
4.3.3	Connecting the 24 V power supply	27
4.4	Switching the industrial PC on and off	30
<b>5</b>	<b>Beckhoff Device Manager</b>	<b>32</b>
<b>6</b>	<b>Decommissioning</b>	<b>34</b>
6.1	Disconnecting the power supply and cables	34
6.2	Disassembly and disposal	35
<b>7</b>	<b>Maintenance</b>	<b>36</b>
7.1	Cleaning	36
7.2	Maintenance	37
7.2.1	Access to device components	39
7.2.2	Replacing the battery	41
7.2.3	Replacing the storage media	42
7.2.4	Replacing the fan	45
<b>8</b>	<b>Troubleshooting</b>	<b>47</b>
<b>9</b>	<b>Technical data</b>	<b>48</b>
<b>10</b>	<b>Appendix</b>	<b>49</b>

---

10.1 Service and support .....	49
10.2 Approvals .....	50

# 1 Notes on the documentation

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

The following instructions and explanations must be followed during installation and commissioning of the components. The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

## Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development. For that reason the documentation is not in every case checked for consistency with performance data, standards or other characteristics. In the event that it contains technical or editorial errors, we retain the right to make alterations at any time and without warning. No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams, and descriptions in this documentation. All illustrations shown are only examples. The configurations depicted may deviate from the standard.

## Trademarks

Beckhoff®, TwinCAT®, TwinCAT/BSD®, TC/BSD®, EtherCAT®, EtherCAT G®, EtherCAT G10®, EtherCAT P®, Safety over EtherCAT®, TwinSAFE®, XFC®, XTS® and XPlanar® are registered and licensed trademarks of Beckhoff Automation GmbH.

Other designations used in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owners.

## Patents

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702 and similar applications and registrations in several other countries.

## Copyright

© Beckhoff Automation GmbH & Co. KG. Publication of this document on websites other than ours is prohibited. Offenders will be held liable for the payment of damages. All rights reserved in the event of the grant of a patent, utility model or design.

## Delivery state

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

## Currentness

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

## Delivery conditions

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

## 2 For your safety

The Safety chapter first explains the safety symbols used in the documentation and their meanings. They contain fundamental safety instructions that are essential for the avoidance of personal injuries and damage to property.

### Exclusion of liability

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

## 2.1 Description of safety symbols

The following safety symbols are used in these operating instructions. In order to avoid personal injuries and damage to property, read and follow the safety and warning notices.

### Warning of personal injuries:

#### **DANGER**

Disregarding the safety notice will lead to death or serious injuries.

#### **WARNING**

Disregarding the safety notice may lead to death or serious injuries.

#### **CAUTION**

Disregarding the safety notice may lead to minor injuries.

### Warning of damage to property:

#### **NOTE**

Disregarding the notice may lead to damage to property.

## 2.2 Intended use

The ATX-based industrial PC is designed for control cabinet installation and for use as a control system in machine and system engineering for automation, visualization and communication.

The industrial PC has been developed for an IP20 working environment. It is protected against the penetration of fingers and solid foreign bodies of 12.5 mm in diameter or larger in size. There is no protection against dust and liquids. Operation of the device in wet and dusty environments is not permitted.

The specified limits for technical data must be adhered to.

The industrial PC can be used within the documented operating conditions.

### Improper use

Do not use the industrial PC outside the documented operating conditions.

## 2.3 Fundamental safety instructions

The following safety instructions must be observed when handling the industrial PC.

### Application conditions

- Do not use the industrial PC under extreme environmental conditions.
- Never use the industrial PC in potentially explosive atmospheres.
- Do not carry out any work on the industrial PC when 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 and SSDs 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 industrial PC. Use by unauthorized persons can lead to damage to property and loss of data.
- In the case of the 24 V<sub>DC</sub> power supply equipment, fuse the power supply line with max. 16 A. The fuse serves to protect the supply line in the event of a short circuit.
- In case of fire, extinguish the industrial PC 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).
- 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 C6650 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:

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

The basic configuration of the C6650 includes the following aspects:

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

### 3.1 Structure

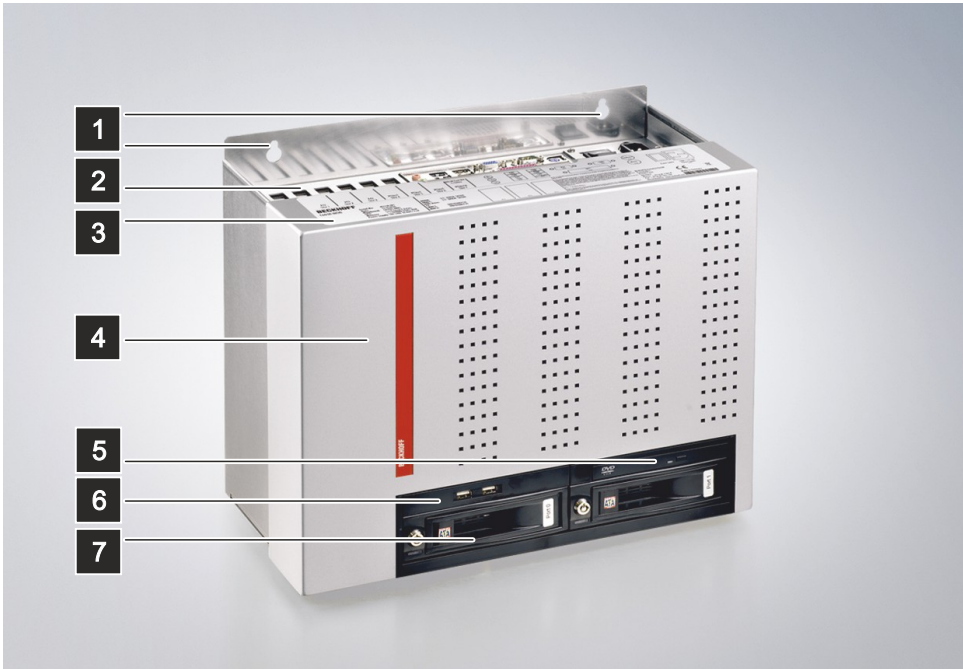


Fig. 1: C6650\_Structure

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)
- PS/2 mouse and keyboard (X103, X104)
- USB (X108-X111)
- Ethernet RJ45 (X112, X113)
- DVI (X114, X115)
- RS232 (X116)
- DisplayPort (X117)
- Audio connections (X120-X122)

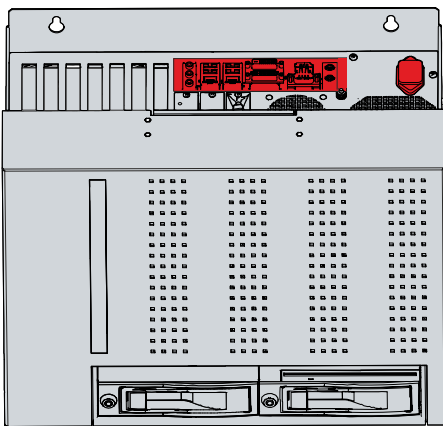


Fig. 2: C6650\_connection section

#### 3.2.1 Power supply

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

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	21 A
+5 V	15 A
+12 V1	11 A
+12 V2	8 A
-12 V	0.3 A
+5 V stand by	2.5 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) (see Fig. 3).

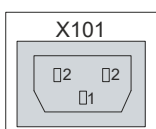


Fig. 3: C6650\_voltage socket 100-240 V

Optionally, you can order the industrial PC with a 24 V<sub>DC</sub> power supply unit. In this case, the industrial PC is supplied with a nominal voltage of 24 V. A 5-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 2 (0 V) of the voltage socket (X101). If the industrial PC is equipped with an integrated uninterruptible power supply (UPS), you can also connect an external battery pack to PIN 4 and 5.

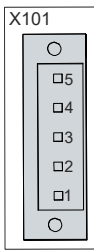


Fig. 4: C6650\_voltage socket pin numbering

Table 3: Voltage socket (X101) pin assignment

Pin	Signal	Description
1	+24 V	24 V supply voltage, positive pole
2	-	24 V supply voltage, negative pole
3	⊕	Protective earth
4	+BAT	Positive pole of the battery pack
5	-BAT	Negative pole of the battery pack

The positive pole of the supply voltage at PIN 1 of the voltage socket (X101) is looped through to PIN 5 of the socket (X102). PIN 5 thus serves as the positive pole for PC-ON.

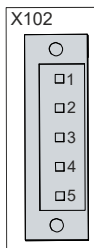


Fig. 5: C6650\_socket external wiring pin numbering

Table 4: Socket external wiring (X102) pin assignment

Pin	Signal	Description
1	-24 V UPS	Negative pole UPS output
2	+24 V UPS	24 V UPS output 2.5 A
3	P-S	Output power status, minus is the negative pole of the power supply (X101)
4	PC ON	Input PC-ON
5	+24 V	Supply voltage and positive pole for PC-ON

### 3.2.2 PS/2

The industrial PC has two PS/2 interfaces (X103, X104). The upper interface (X104) allows the connection of a PS/2 mouse, the lower interface (X103) allows the connection of a PC keyboard. The connection is made via standard MiniDIN connectors.

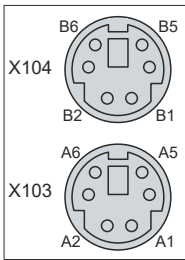


Fig. 6: C6650\_PS/2 mouse and keyboard

Table 5: PS/2 interface mouse pin assignment

Pin	Name	Description
B1	MDAT	Mouse Data
B2	N/C	Reserved
B3	GND	Ground
B4	(S)VCC	5 V supply voltage
B5	MCLK	Mouse Clock
B6	N/C	Reserved

Table 6: PS/2 interface keyboard pin assignment

Pin	Name	Description
A1	KDAT	Keyboard data
A2	MDAT	Mouse Data
A3	GND	Ground
A4	(S)VCC	5 V supply voltage
A5	KCLK	Keyboard Clock
A6	MCLK	Mouse Clock

### 3.2.3 USB

The industrial PC has four USB interfaces (X108-X111). They are used to connect peripheral devices with USB interfaces.

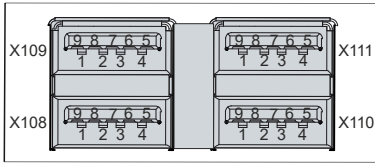


Fig. 7: C6650\_USB interface pin numbering

Table 7: USB interface pin assignment

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

### 3.2.4 Ethernet RJ45

The industrial PC has two Gigabit LAN ports (X112, X113). The 100Base-T and 1000Base-T Ethernet standards enable the connection of corresponding network components and data rates of 100/1000 Mbit/s. The required speed is selected automatically.

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

The industrial PC may only be connected to internal Ethernet networks and not to external telecommunication networks.

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

Table 8: Controller classification based on device generation

Generation	Controller
C6650-0050	Intel® i219 for LAN1 and i210 for LAN2
C6650-0060	Intel® i219 for LAN1 and i210 for LAN2

If you use the Ethernet ports with EtherCAT or for Real-Time Ethernet applications, you have to regard the following distinction:

The Ethernet port (X113, LAN2) connected via PCIe with the i210 controller is generally suitable for cycle times  $\leq 1$  ms and for distributed clock applications with EtherCAT.

The Ethernet port (X112, LAN1) integrated in the chipset with the i219 controller is generally suitable for EtherCAT and real-time Ethernet applications with cycle times  $> 1$  ms (without distributed clocks).

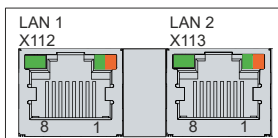


Fig. 8: C6650\_Ethernet interface pin numbering

Table 9: 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 speed of the data transmission (Mbit/s). The LED on the left 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 LED on the right in the figure indicates the speed of the data transmission. If the speed is 100 Mbit/s the LED is orange, at 1000 Mbit/s it is green.

### 3.2.5 DVI

The industrial PC has two DVI connections (X114, X115) to which a DVI-capable monitor can be connected. Only digital signals are transmitted.

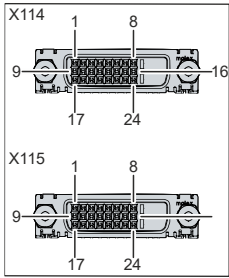


Fig. 9: C6650\_DVI interface pin numbering

Table 10: DVI interface pin assignment

Pin	Assignment	Pin	Assignment	Pin	Assignment
1	TDMS Data 2 -	9	TDMS Data 1 -	17	TDMS Data 0 -
2	TDMS Data 2 +	10	TDMS Data 1 +	18	TDMS Data 0 +
3	TDMS Data 2/4 Shield	11	TDMS Data 1/3 Shield	19	TDMS 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	TDMS Clock Shield
7	DDC Data	15	Ground (+ 5 V, Analog H/V Sync)	23	TDMS Clock +
8	Analog Vertical Sync	16	Hot Plug Detect	24	TDMA Clock -

### 3.2.6 RS232

The serial interface COM1 (X116) is fed 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.

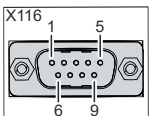


Fig. 10: C6650\_RS232 interface pin numbering

Table 11: 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



### 3.2.7 DisplayPort

The industrial PC has a DisplayPort (X117) 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

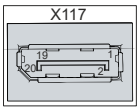


Fig. 11: C6650\_DisplayPort pin numbering

Table 12: 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

### 3.2.8 Audio connections

The industrial PC has three audio connections with the Line In (X122), Line Out (X121) and microphone input (X120) sockets.

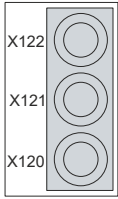


Fig. 12: C6650\_audio connections

The three sockets are brought out for 3.5 mm jack plugs. The pins of the jack plugs are assigned as follows:

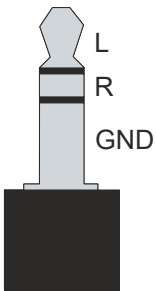


Fig. 13: C6650\_jack plug pin assignment

Table 13: Jack plug pin assignment

Pin	Connection
L	Left sound signal
R	Right sound signal
GND	Common ground (return)

### 3.3 Optional interfaces

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

*Table 14: Interface options*

Ordering option	Description
C9900-E195	2 USB ports of the motherboard, led out in a slot bracket
C9900-E216	2 USB ports of the motherboard led out in the front of a C66xx
C9900-E231	1 serial interface RS232 of the motherboard, led out with a D-sub-9 connector in a connector bracket on the top side of the C66xx in front of the ATX I/O plate
C9900-E166	2 serial interfaces RS232 of the motherboard, led out with 2 D-sub-9 connectors in a slot bracket
C9900-E203	1 serial interface RS232 of the motherboard, led out with a D-sub-9 connector in a slot bracket

*Table 15: Module options*

Ordering option	Description
C9900-E209	Module for electrical isolation of a RS232 interface of the motherboard, with overvoltage protection, D-sub, 9-pin, for mounting inside on slot bracket C9900-M568, C9900-M569 or in a C6640/C6650 on connector bracket C9900-M751. A slot bracket is required.
C9900-E210	Module to convert one serial RS232 interface of the motherboard into RS485, configured as an end point without echo, D-sub, 9-pin, overvoltage protection, electrical isolation, to be mounted inside the slot brackets C9900-M568, C9900-M569 or inside a C6640/C6650 at the connector bracket C9900-M751. A slot bracket is required.
C9900-E211	Module for conversion of a RS232 interface of the motherboard to RS422, configured as full duplex endpoint, D-Sub, 9-pin, overvoltage protection, electrical isolation, for mounting inside at slot bracket C9900-M568, C9900-M569 or in a C6640/C6650 at connector bracket C9900-M751. A slot bracket is required.

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

*Table 16: Slot options*

Ordering option	Description
C9900-M568	Slot bracket for a serial interface module C9900-E209, C9900-E210 or C9900-E211, can only be ordered together with module
C9900-M569	Slot bracket for two serial interface modules C9900-E209, C9900-E210 or C9900-E211, can only be ordered together with module
C9900-M571	Connector bracket for a serial interface module C9900-E209, C9900-E210, C9900-E211, for mounting in a C66xx in front of the ATX connector bracket, can only be ordered together with a module

### 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.

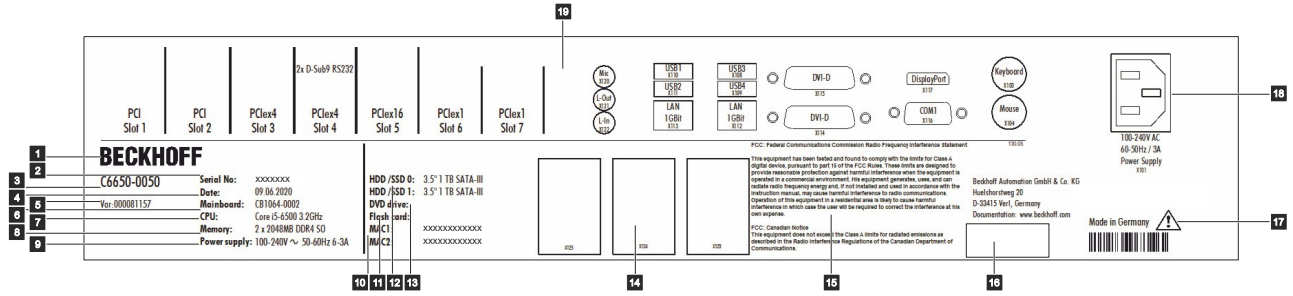




Fig. 14: C6650\_name plate

Table 17: Key - C6650 name plate

No.	Description
1	Manufacturer, including address
2	Serial number (BTN)
3	Model: The last four digits indicate the device generation
4	Date of manufacture
5	Variant number: commercial number of the order code including ordering options
6	Mainboard
7	CPU
8	Main memory
9	Power supply
10	MAC addresses of the Ethernet interfaces (X112, X113)
11	Storage media
12	Storage media
13	DVD drive
14	Optional interfaces
15	FCC approval
16	Symbols  <div style="text-align: right;">  </div> 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   50].
17	Note: be sure to read the device manual.
18	Power supply connection
19	Connection section with standard interfaces and optional PCI and PCIe interfaces

## 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](#) [► 48]).

Despite the robust design of the unit, the components are sensitive to strong vibrations and impacts. Transporting a control cabinet with a built-in PC can result in excessive impact on the industrial PC. During transport the device must therefore be protected from excessive mechanical stress. Appropriate packaging of the industrial PC, in particular the original packaging, can improve the vibration resistance during transport.

#### NOTE

##### 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](#) [► 49]).

## 4.2 Control cabinet installation

### NOTE

#### Extreme environmental conditions

Extreme environmental conditions can cause damage to the device.

- Avoid extreme environmental conditions.
- Protect the device against dust, moisture and heat.
- Do not block the ventilation slots of the device.

### NOTE

#### Incorrect installation

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

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

The C6650 Industrial PC is designed for mounting in control cabinets in machine and plant engineering applications. Please observe the environmental conditions prescribed for the operation (see Chapter 9 [Technical data](#) [► 48]).

You can use the mounting concept (see Fig. 15) to mount the industrial PC in the control cabinet.

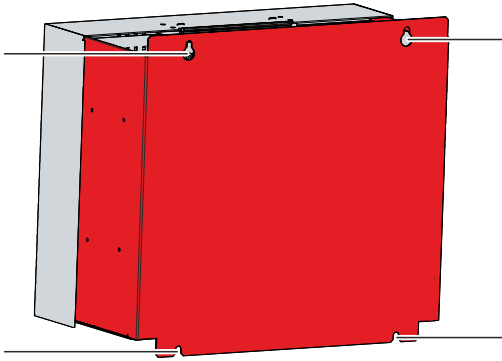


Fig. 15: C6650\_mounting concept

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.

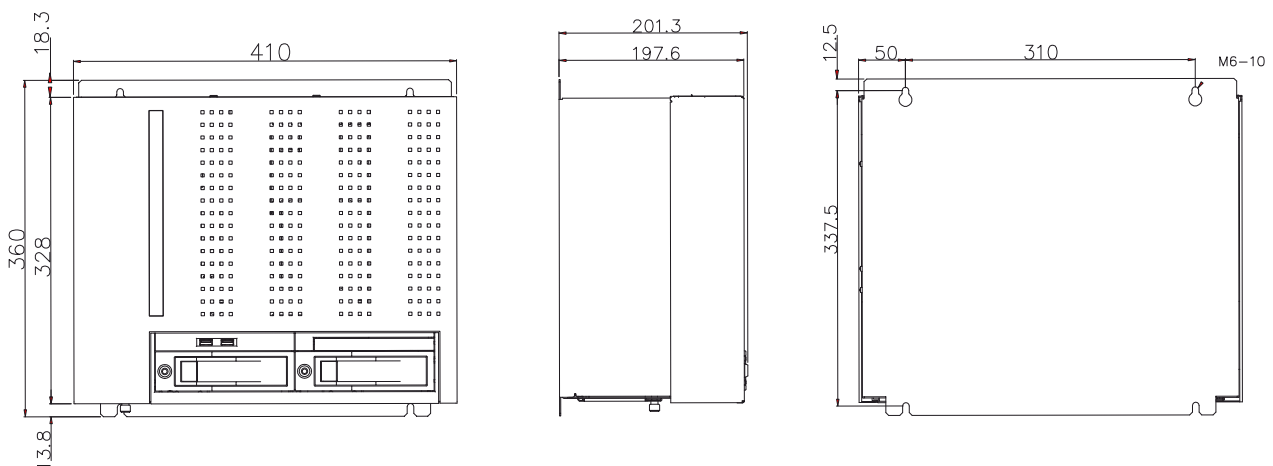


Fig. 16: C6650\_dimensions

### 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 provide it with the holes for the fastening screws according to 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.

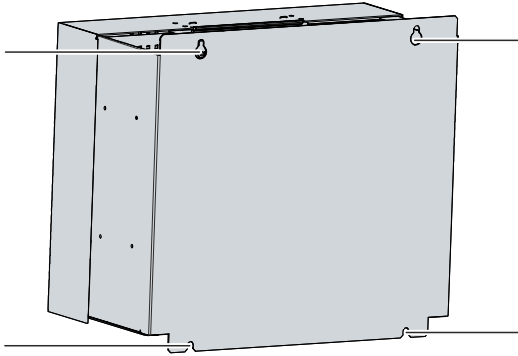


Fig. 17: C6650\_control cabinet installation

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 marked points of the mounting concept (see Fig. 17).
  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<sub>AC</sub>, 50-60 Hz full-range power supply unit. The following ordering options are available:

- C9900-P208: 24 V DC power supply unit, instead of 100-240 V AC full-range power supply unit, occupies one serial interface
- C9900-P209: 24 V DC power supply unit with integrated UPS, instead of 100-240 V AC full-range power supply unit, occupies one serial interface

If you have ordered the PC with one of the ordering options for a 24 V DC power supply unit, wire the industrial PC in the control cabinet in accordance with the EN 60204-1:2006 standard 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 devices maybe impaired, if they are used in a manner not specified by the manufacturer.

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

#### Protective earth

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

#### NOTE

##### 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 earth.

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. 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. 18) and the central grounding point of the control cabinet in which the PC is installed. Use either a wide, flat ground strap or a round conductor with a minimum cross-section of 10 mm<sup>2</sup> for the ground connection. In the case of a round conductor, also use a cable lug with a ring and place the ring over the grounding bolt.

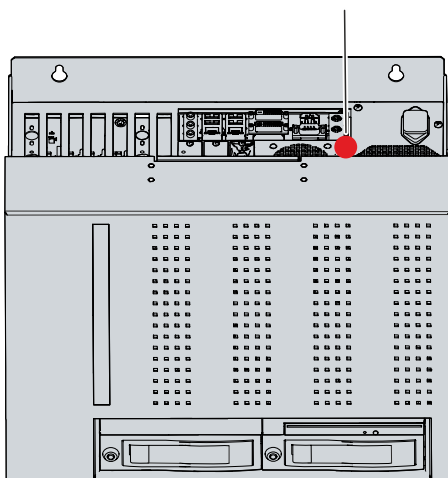


Fig. 18: C6650\_Grounding bolt for functional earthing

## 4.3.2 Connecting cables and power supply

### NOTE

#### 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<sub>AC</sub> 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:

- Separable supply cable of a max. length of 4.5 m (14.76 ft.) of type SJT or SVT (min. 125 V, 10 A), plug with ground connection according to NEMA 5-15P/-20P or IEC plug on the device side.
- Separable supply cable of a max. length of 4.5 m (14.76 ft.) of type SJT or SVT (min. 250 V, 10 A), plug with ground connection according to NEMA 6-15P/-20P or IEC plug on the device side.

Proceed as follows to connect the 100-240 V<sub>AC</sub> 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.

You have the option to order an external uninterruptible power supply (UPS) and connect it to your industrial PC:

- C9900-U120: external uninterruptible power supply UPS, 230 V
- C9900-U122: external uninterruptible power supply UPS, 115 V

For more information, please refer to the corresponding [manual](#).

### 4.3.3 Connecting the 24 V power supply

**NOTE**

**Connection of incorrect battery packs**

The connection of incorrect battery packs can lead to damage to the industrial PC with C9900-P209 power supply unit option and to the battery packs.

- Only connect the C9900-U330 Beckhoff battery pack to your industrial PC.

As an alternative to the 100-240 V<sub>AC</sub> power supply unit in the basic configuration, you can order the industrial PC with a 24 V<sub>DC</sub> power supply unit. The options C9900-P208 without integrated UPS and C9900-P209 with integrated UPS are available.

**Connect power supply via 24 V<sub>DC</sub> power supply unit**

Cables with a maximum cable cross-section of 1.5 mm<sup>2</sup> can be used for connecting the power supply. For long supply lines, use 1.5 mm<sup>2</sup> 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<sub>DC</sub> power supply unit:

1. Install the power cable (see p. 30).
2. Plug the power 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.
5. Measure the voltage at the voltage connector of the PC.

**External battery pack at C9900-P209**

If you ordered your device with the C9900-P209 power supply unit with an integrated UPS, then you can connect an external battery pack and install it on a DIN rail near to the PC. Use only Beckhoff battery packs for this:

*Table 18: Order identifier battery pack*

Order identifier	Version
C9900-U330	Battery pack for PCs with 24 V power supply unit and integrated UPS C9900-P209 or C9900-U209, external for DIN rail mounting, 3.4 Ah, operating temperature 0...50 °C, contains two closed lead-acid batteries VRLA-AGM

You can assign the UPS output of the PC (UPS Output). PIN 4 and 5 of the battery pack are available for looping through a 24 V power supply. Accordingly, you can connect a three-core sheathed cable with plus and minus of the supply voltage as well as protective earth to the battery pack and then connect to the PC with a five-core sheathed cable. The method of connecting different components can be taken from the wiring diagram in fig. 19.

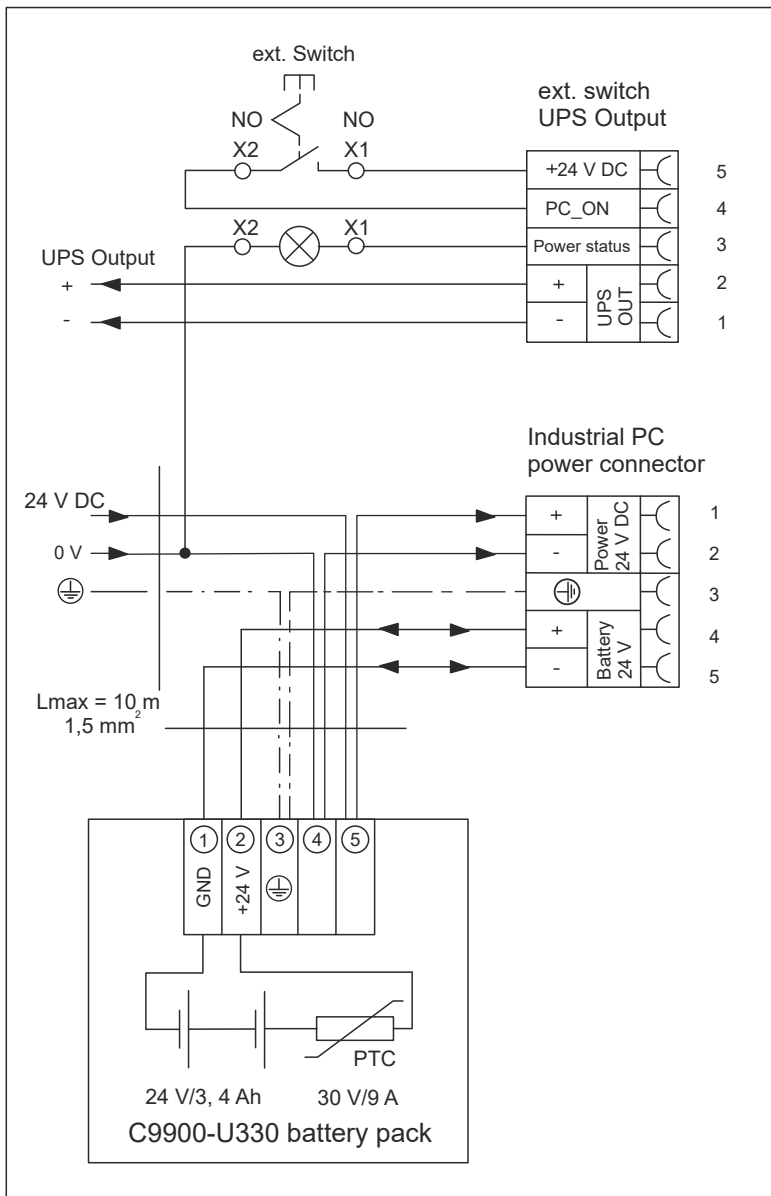


Fig. 19: C6650\_wiring diagram

So that the industrial PC still has a monitor output in case of a power failure, a control panel can be connected to the UPS output (UPS OUT). Even after a power failure, 27 V<sub>DC</sub> is available there. The maximum load is 1.4 A (max. 2.5 A from year of manufacture 2016). Without the battery pack, the industrial PC and control panel switch off directly in the event of a power failure.

If the power supply unit in the industrial PC switches off, the UPS OUT output is set to 0 V. As a result, a connected control panel is also switched off. For more information on the battery pack, please refer to the corresponding [manual](#).

### Assembly of the supply cable

Before you can connect the power supply, you must install the power cable yourself according to the preceding wiring diagram. For this purpose, use the supplied material for connector assembly. This consists of the 5-pin connector and the strain relief housing with cable clamp and fixing screws.

First mount the plug on the cable as follows:

1. Remove the insulation from the cable ends (8-9 mm strip length).
2. Plug the cable ends into the 5-pin connector by simply pressing them in according to the pin assignment sticker and wiring diagram (see p. 29). In the case of fine-core cables, you must use ferrules.

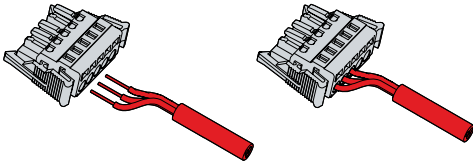


Fig. 20: C6650\_assembly supply cable

**Assembly of strain relief housing**

Now mount the strain relief housing on the previously connected plug and supply cable as shown in Fig. 21:

1. Press the lower part of the strain relief housing onto the connector until it engages (section A).
  2. Fasten the supply cable to the strain relief housing using the cable clamp and fastening screws (section B).
  3. Attach the upper part of the strain relief housing by snapping it onto the lower part (section C).
- ⇒ You have successfully mounted the supply cable and fitted it with a strain relief housing (section D).

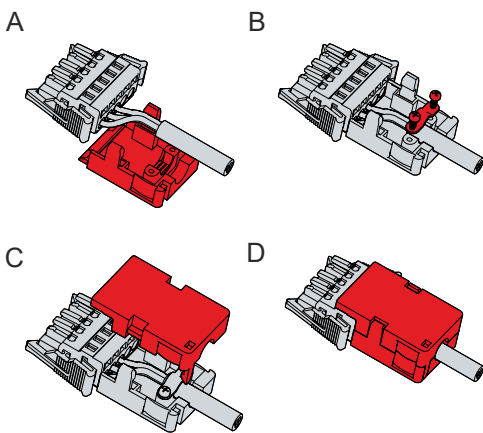


Fig. 21: C6650\_Assembly of strain relief housing

To remove the strain relief housing, proceed as follows:

1. Use your fingers to bend the latching lugs on the lower part slightly outwards (see Fig. 22).
  2. Lever the upper part off the lower part.
  3. Remove the cable clamp.
  4. Remove the lower part of the strain relief housing.
- ⇒ You have removed the strain relief housing.

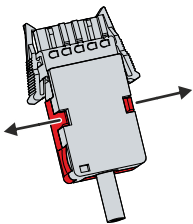


Fig. 22: C6650\_Disassembly of strain relief housing

## 4.4 Switching the industrial PC on and off

### First switching on and driver installation

#### NOTE

##### Public networks

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

- Protect the PC before connecting it to public networks.

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

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

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

### UPS software components

To operate the power supply unit as a UPS, the UPS software with the corresponding drivers must be installed on the industrial PC. The software and drivers are already installed on delivery of the PC with operating system. Otherwise, you will have to install them yourself. In this case, contact Beckhoff Service, who will provide you with software and drivers. The driver software comes with a detailed help function. Call up the help files either directly from the configuration register by clicking the Help button or start the file under *Start > Programs > Beckhoff > UPS software components*.

### Switching off the industrial PC

#### NOTE

##### Data loss due to running software

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

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

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

#### NOTE

##### Shortened battery life due to switching off the power supply

If the power supply is simply switched off, the operating system shuts down via the battery. With daily use, this significantly shortens the life of the battery.

- Avoid switching off the power supply before shutting down the operating system.
- Use the Beckhoff concept (see below) to shut down the operating system in a battery-friendly manner.

If you have ordered an industrial PC with 24 V power supply unit and integrated UPS and you simply switch off the power supply, the operating system shuts down via the battery. With frequent use, this shortens the life of the battery.

To shut down the operating system properly, you can install an additional ON/OFF switch next to the machine's main switch to turn the machine on and off. The main switch can thus remain switched on in principle and thus ensures that the PC is still supplied with power during the shutdown of the operating system.

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

Once the operating system has shut down, the PC power supply unit sets the output power status from 24 V to 0 V. This indicates that the shutdown is complete and you can turn off the power supply. Via the output, you can switch, for example, a contactor that switches off the entire system. The load capacity of the output power status is max. 0.5 A. In case of overload, the output is switched off.

You can assign different access rights to all users in the operating system and in the application software. Since there is a risk of data loss if the industrial PC is switched off incorrectly, assign the rights advisedly.

## 5 Beckhoff Device Manager

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

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

The industrial PC is delivered with predefined access data as standard:

- User name: Administrator
- Password: 1

You also have the option of using the Beckhoff Device Manager to remotely configure the industrial PC via a web browser. More detailed information is available in the Beckhoff Device Manager [manual](#).

### First start Beckhoff Device Manager

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

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

Fig. 23: 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.



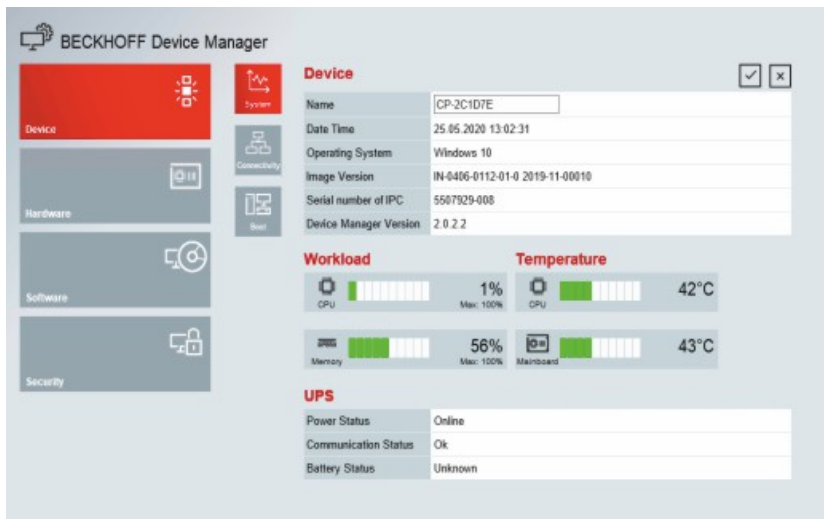


Fig. 24: Beckhoff Device Manager – Start page

Navigate forward in the menu and configure the industrial PC. Note that modifications only become active once they have been confirmed. It may be necessary to restart the industrial PC.

### Manual start Beckhoff Device Manager

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

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

The Beckhoff Device Manager starts. The Security Wizard appears.

### Secure passwords

Strong passwords are an important prerequisite for a secure system.

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

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

Please note the following:

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

A secure password has the following characteristics:

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

## 6 Decommissioning

### NOTE

#### Hardware damage due to power supply

A connected power supply can cause damage to the industrial PC 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

Disconnecting the industrial PC during a thunderstorm can lead to electric shock.

- Never disconnect the cables from the device during thunderstorms.

Before you remove the industrial PC from the control cabinet, you must follow the following steps:

1. Shut down the operating system.
2. Disconnect the industrial PC from the power supply (see below).
3. Disconnect the data transmission cables between the industrial PC and the connected devices (see below).

#### Disconnecting the power supply

Proceed as follows to disconnect the 100-240 V<sub>AC</sub> 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<sub>DC</sub> 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. Dismantle the power cable if the plug 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 (see fig. 25).
3. Remove the PC from the control cabinet.

⇒ You have successfully dismantled the industrial PC.

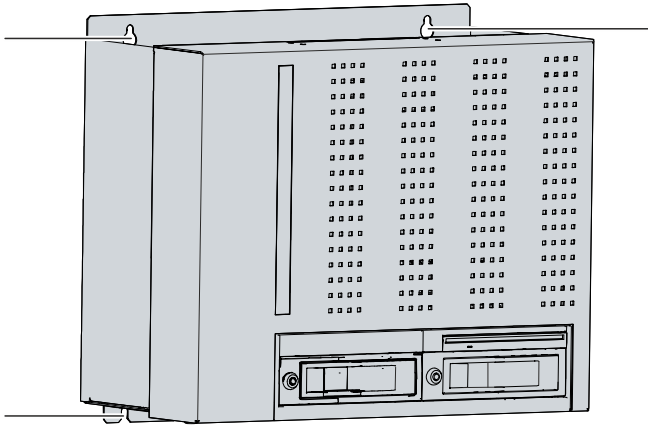


Fig. 25: C6650\_positions fastening screws

### 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 industrial PC while it is live can lead to electric shock.

- Turn off the supply voltage before cleaning the device or replacing device components. This does not apply to the replacement of hard disks and SSDs in a RAID configuration.

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

### 7.1 Cleaning

#### NOTE

#### Unsuitable cleaning agents

The use of unsuitable cleaning agents can damage the device.

- Only clean the industrial PC 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

**NOTE**

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

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

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

These are the following components:

- Battery
- Storage media
- Fan

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

Table 19: Replacement recommendations for PC components

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

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

**ESD protection**

**NOTE**

**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 industrial PC and create an ESD-protected environment in which any electrostatic charges are discharged to the ground in a controlled manner 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.

To do this, follow the steps below as shown in Figure 26:

1. Pull the release handle (1) 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.
  3. Guide the housing cover downwards out of the guides (section C).
  4. Loosen the knurled screw (2) of the card holder (3) (section D).
  5. Remove the card holder from the housing.
- ⇒ You now have access to the interior of the industrial PC (section E).

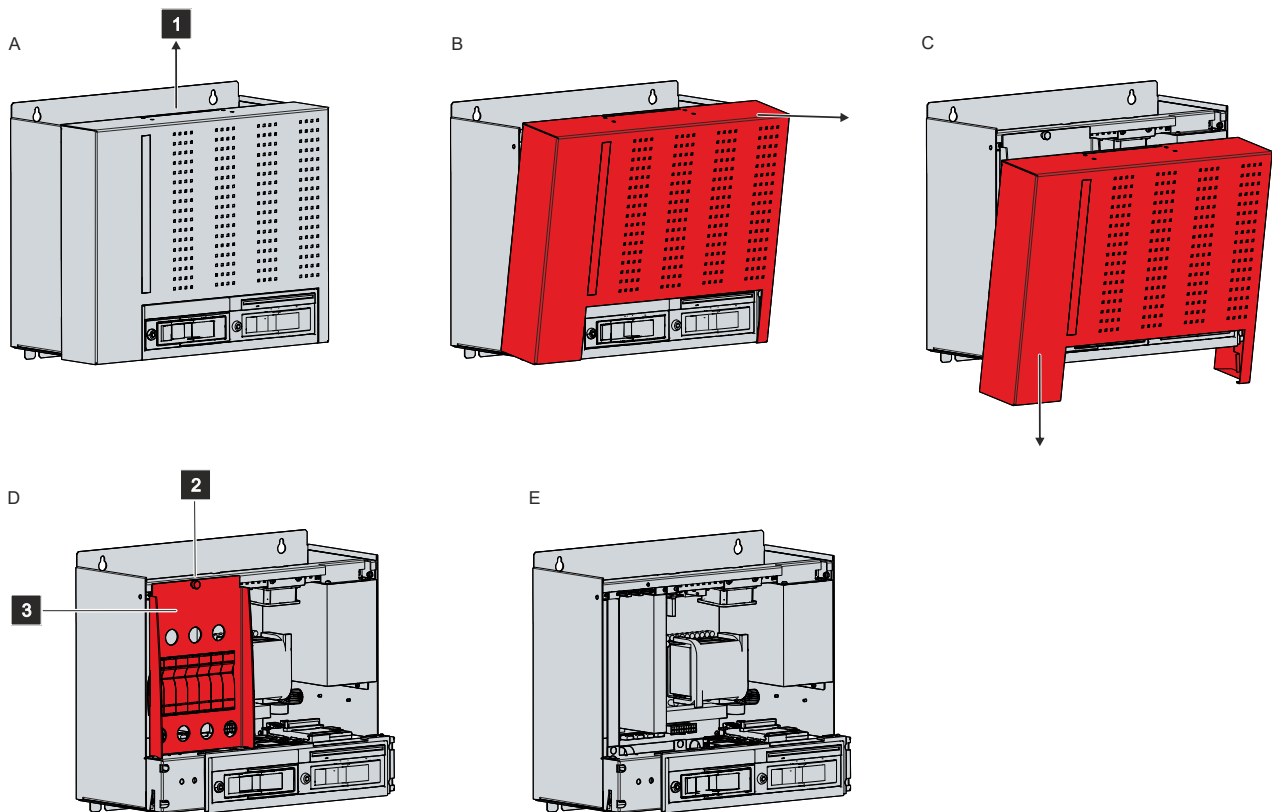


Fig. 26: C6650\_access device components

To reinstall the card holder afterwards, follow the steps below, shown in Figure 27:

1. Release all plastic elements of the card holder (section A).
  2. Place the card holder again in the slots provided in the industrial PC (section B).
  3. Keep the card holder pressed onto the edge of the industrial PC while tightening the knurled screw again (section C).
  4. For each plug-in card, press down the associated plastic element of the card holder until the plug-in card is firmly seated in its slot.
- ⇒ You have mounted the card holder.

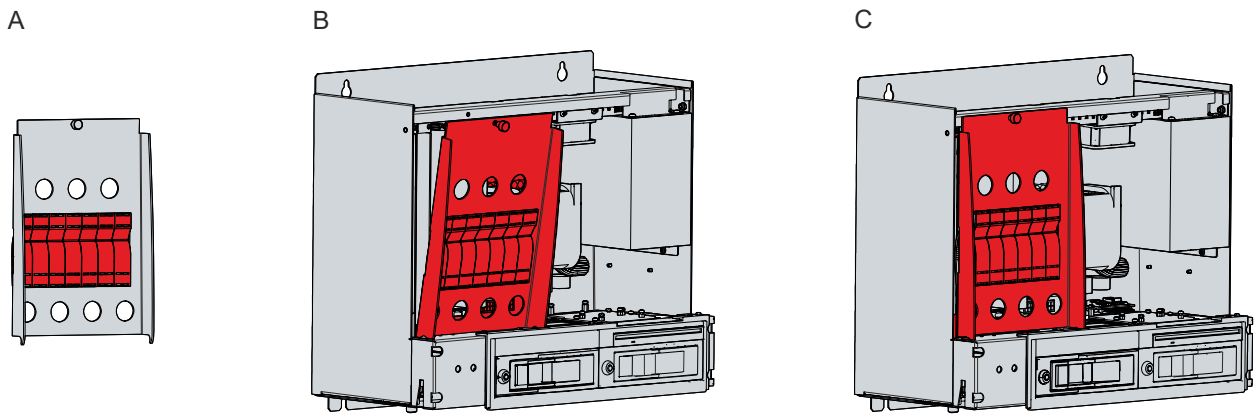


Fig. 27: C6650\_mounting card holder

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.

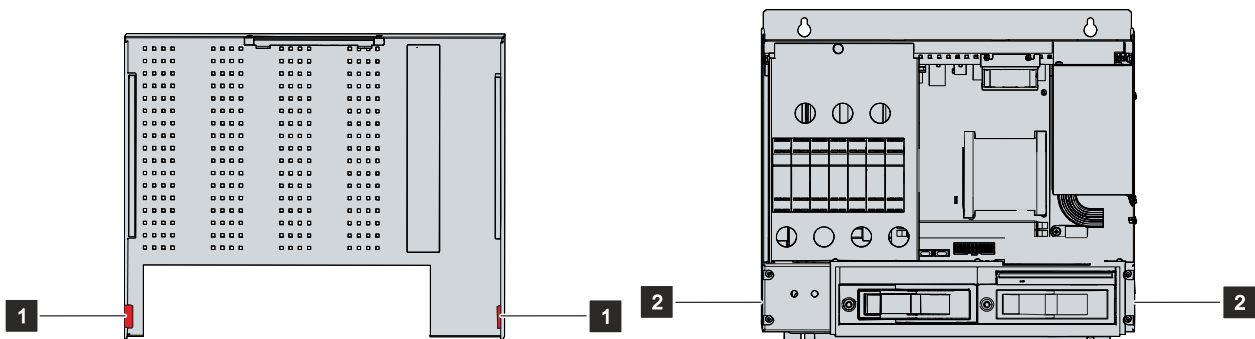


Fig. 28: C6650\_hooks and guides

To do this, follow the steps below as shown in Figure 29:

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.

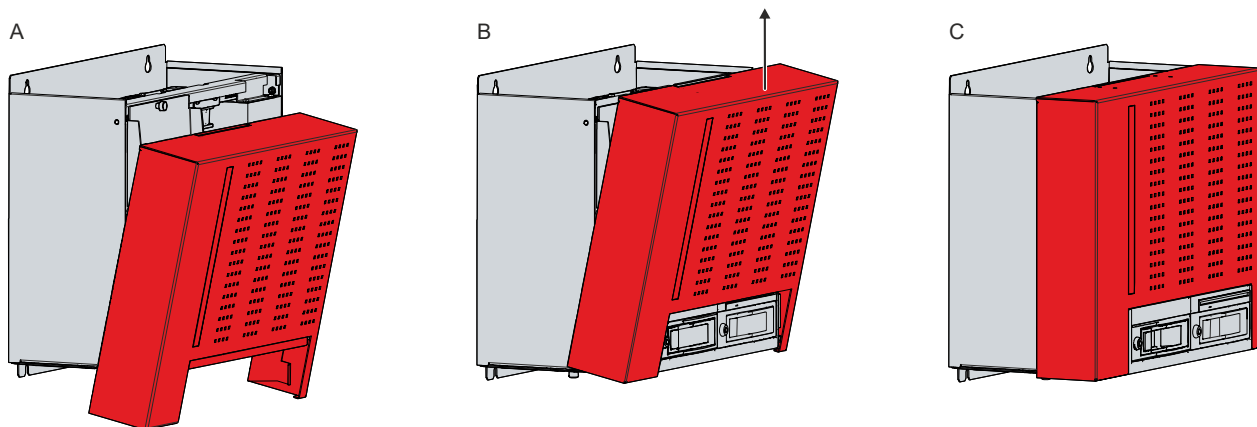


Fig. 29: C6650\_mounting housing cover



## 7.2.2 Replacing the battery

### NOTE

#### Incorrect battery type

Replace the battery with R/C (BBCV2), order number CR2032, nominal voltage 3 V. Using any other battery may cause fire or explosion.

- Contact Beckhoff Service exclusively for a replacement battery.
- When replacing the battery, make sure that the polarity is correct.

### NOTE

#### Battery damage

Incorrect handling of the motherboard battery can damage it.

- Do not recharge the battery.
- Do not throw the battery on the fire.
- Do not open the battery.
- Protect the battery against direct sunlight and moisture.

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

Table 20: 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).

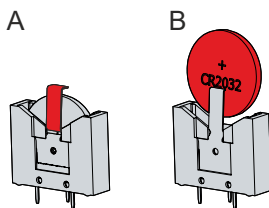


Fig. 30: C6650\_Replacing the battery

3. Insert the new battery into the holder. Make sure that the polarity is correct, as shown.  
⇒ You have successfully replaced the battery.

To dispose of the battery, remove it, stick insulating tape over the poles and take it to the local battery recycling.

### 7.2.3 Replacing the storage media

New storage media should only be obtained from Beckhoff Service (see Chapter 10.1 [Service and Support](#) [► 49]).

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. The BST is a graphical backup and restore program for industrial PCs with a Windows operating system. You can create an image of your operating system and use it to back up the operating system. Then you can restore the created image to a new data carrier. The BST is available on a bootable BST USB flash drive. This includes Windows and a backup software. Select the size of the BST USB flash drive according to the size of the backup copy of your operating system. You can then keep the flash drive as a backup copy. For this purpose, the BST USB flash drives are designed for particularly long data preservation by means of special flash. For more information on the function of the BST, please refer to the corresponding documentation.

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

#### Exchange hard disk

Proceed as follows to change 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).
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.

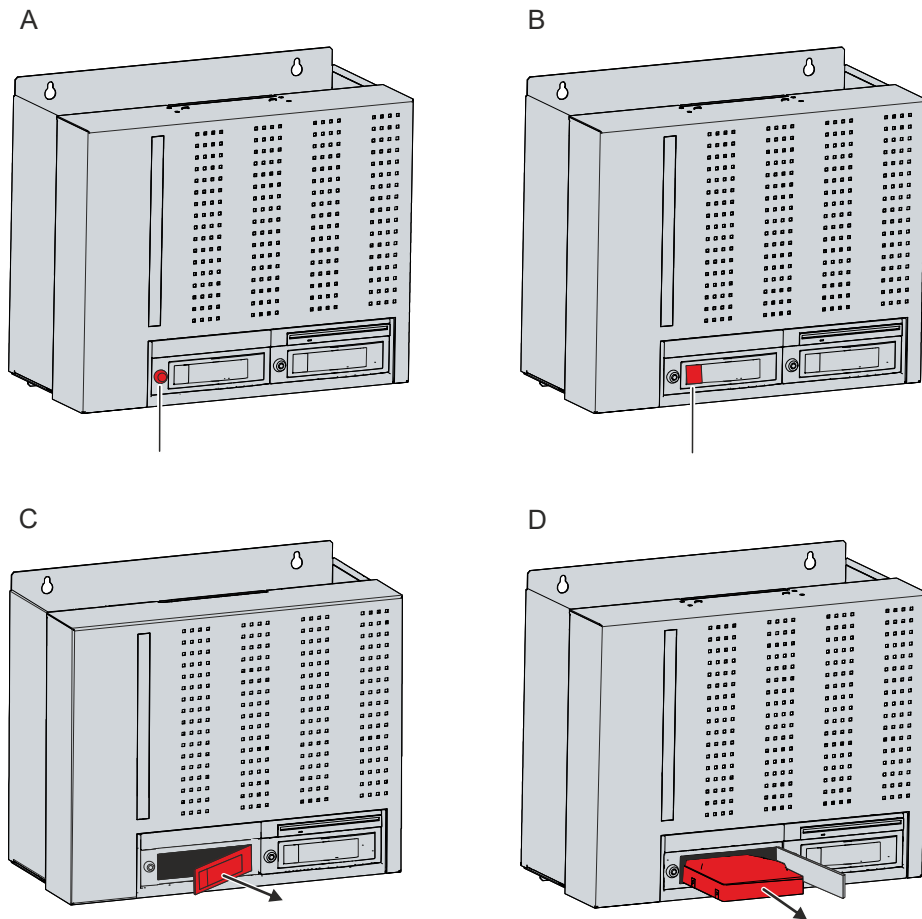


Fig. 31: C6650\_exchange hard disk

**Exchange SSD**

If you have ordered your device with an SSD instead of an HDD, you have to proceed as follows when replacing the SSD:

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).
  3. Open the hard drive caddy (section C).
  4. Pull the SSD out of the hard drive caddy by the protruding Beckhoff sticker (section D).
  5. Reinsert the new SSD in the same orientation.
  6. Close the hard drive caddy again.
  7. Lock the hard drive caddy again.
- ⇒ You have replaced the SSD.

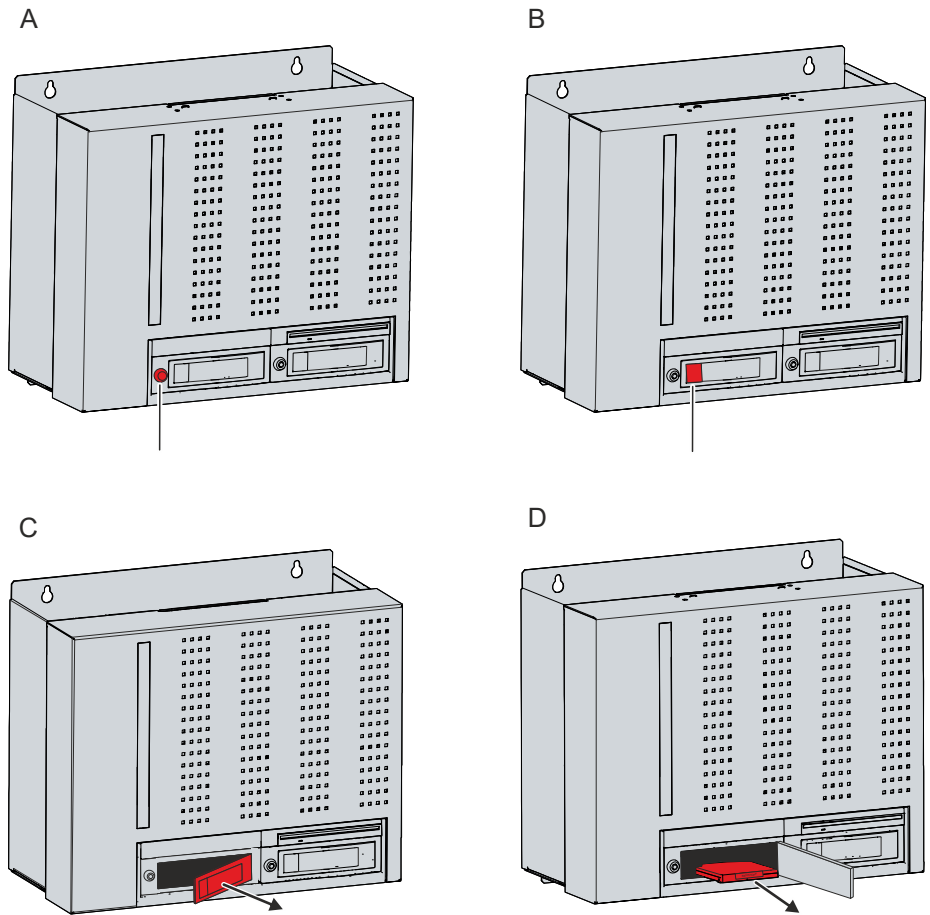


Fig. 32: C6650\_exchange SSD

## 7.2.4 Replacing the fan

### NOTE

#### Incorrect fan type

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

- Only replace the fans with a fan from Beckhoff Service.

The housing fans on the top and bottom of the industrial PC ensure optimum cooling of the device. Order a new fan only from Beckhoff. To do this, contact Beckhoff Service (see Chapter 10.1 [Service and support](#) [▶ 49]).

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 shown in figure 33:

1. Loosen the knurled screw on the underside of the PC (section A).
2. Flip the cartridge down (section B).
3. Disconnect the supply cable of the fan from the motherboard.
4. Remove the cartridge to the front (section C).

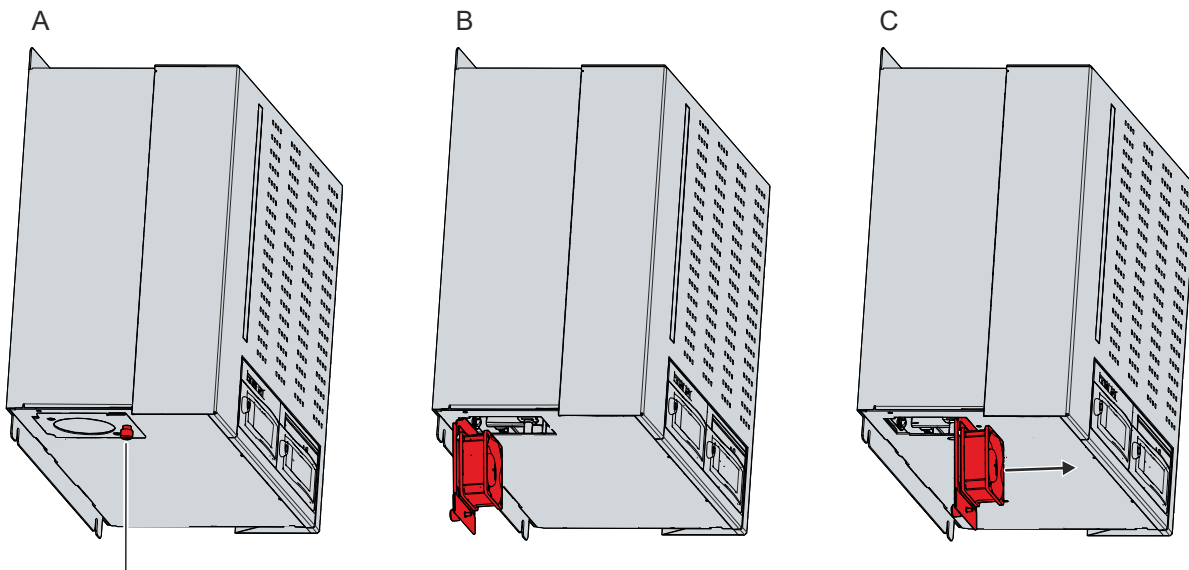


Fig. 33: C6650\_exchange fan bottom

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 fan on the top of the PC, follow the steps below shown in figure 34:

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

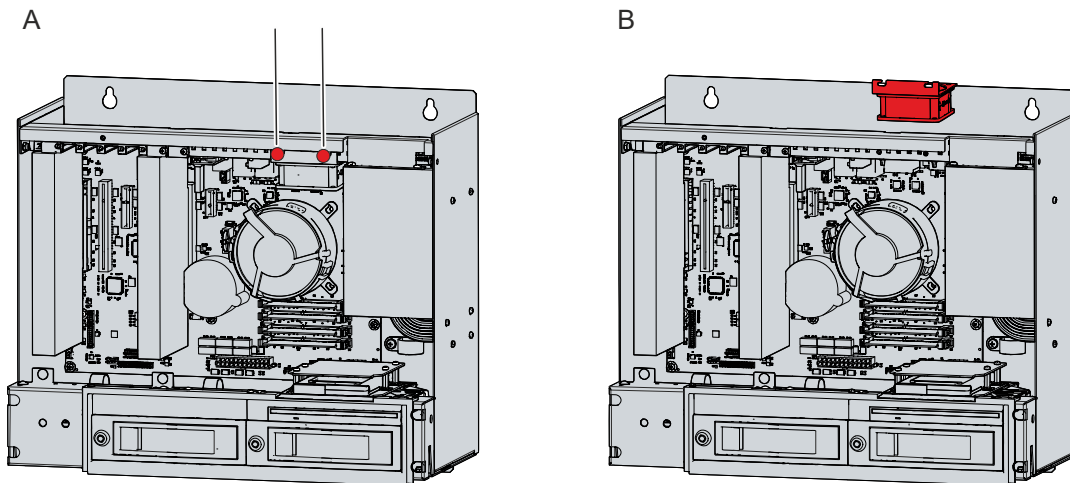


Fig. 34: C6650\_exchange fan top

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 as shown in Figure 35:

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

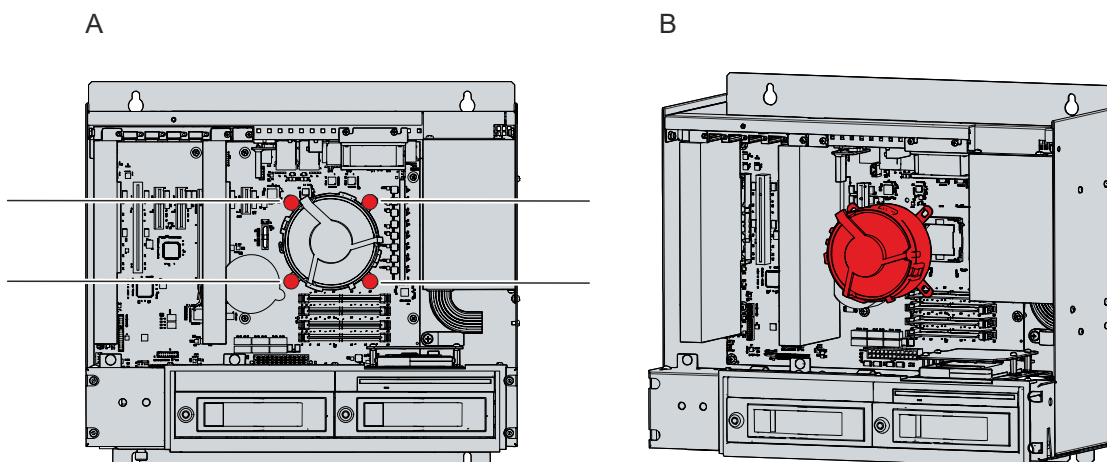


Fig. 35: C6650\_exchange CPU cooler

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

# 8 Troubleshooting

Table 21: Troubleshooting

<b>Fault</b>	<b>Cause</b>	<b>Measures</b>
Nothing happens after the Industrial PC has been switched on	Missing power supply of the Industrial PC  Other cause	Check the power supply cable  Call Beckhoff Service
The Industrial PC does not boot fully	Setup settings are incorrect  Other cause	Check the setup settings  Call Beckhoff Service
Computer boots, software starts, but control does not operate correctly	Cause of the fault is either in the software or in parts of the plant outside the Industrial PC	Call the machine and software manufacturer

## 9 Technical data

Table 22: Technical data

Product designation	C6650
Dimensions (W x H x D)	410 x 360 x 201 mm
Weight	12 kg basic configuration
Supply voltage	100-240 V <sub>AC</sub> , max. 3 A, 50-60 Hz Power consumption: 90 W (with basic configuration)  20.4-28.8 V <sub>DC</sub> (24 V <sub>DC</sub> power supply unit) Power consumption: 90 W (with basic configuration)
Protection rating	IP20
Vibration resistance (sinusoidal vibration)	EN 60068-2-6: 10 to 58 Hz: 0.035 mm 58 to 500 Hz: 0.5 G (approx. 5 m/ s <sup>2</sup> )  During reading of CD/DVD: EN 60068-2-6: 10 to 58 Hz: 0.019 mm 58 to 500 Hz: 0.25 G (approx. 2.5 m/ s <sup>2</sup> )
Shock resistance (shock)	EN 60068-2-27: 5 G (approx. 50 m/ s <sup>2</sup> ), duration: 30 ms  During reading of CD/DVD: 5 G (approx. 50 m/ s <sup>2</sup> ), 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 to +55 °C (operation) -25 °C to +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.

The power consumption of your device beyond the basic configuration can be found in the data sheet Power loss and power consumption. There you will find information on how the power consumption of your device changes according to the selected equipment, accessories and connected devices.



# 10 Appendix

## 10.1 Service and support

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

### Beckhoff Service

The Beckhoff Service Centre supports you in all matters of after-sales service:

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

Hotline: + 49 (0) 5246/963-460

Fax: + 49 (0) 5246/963-479

e-mail: [service@beckhoff.com](mailto:service@beckhoff.com)

If servicing is required, please quote the serial number of your Industrial PC, which can be found on the name plate.

### Beckhoff Support

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

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

Hotline: + 49 (0) 5246/963-157

Fax: + 49 (0) 5246/963-9157

e-mail: [support@beckhoff.com](mailto:support@beckhoff.com)

### Headquarters

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

Phone: + 49 (0) 5246/963-0

Fax: + 49 (0) 5246/963-198

e-mail: [info@beckhoff.de](mailto:info@beckhoff.de)

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

You will also find further documentation for Beckhoff components there.

## 10.2 Approvals

The following table shows the approvals of the industrial PC based on the device generation:

*Table 23: Approvals C6650*

Device generation	Approvals
C6650-0040	CE, EAC, UKCA, FCC
C6650-0050	CE, EAC, UKCA, FCC
C6650-0060	CE, EAC, UKCA, FCC

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

### FCC approvals for the United States of America

FCC: Federal Communications Commission Radio Frequency Interference Statement

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

### FCC approvals for Canada

FCC: Canadian Notice

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

# List of figures

Fig. 1	C6650_Structure .....	10
Fig. 2	C6650_connection section.....	11
Fig. 3	C6650_voltage socket 100-240 V .....	11
Fig. 4	C6650_voltage socket pin numbering.....	12
Fig. 5	C6650_socket external wiring pin numbering .....	12
Fig. 6	C6650_PS/2 mouse and keyboard .....	13
Fig. 7	C6650_USB interface pin numbering.....	14
Fig. 8	C6650_Ethernet interface pin numbering .....	15
Fig. 9	C6650_DVI interface pin numbering .....	16
Fig. 10	C6650_RS232 interface pin numbering .....	16
Fig. 11	C6650_DisplayPort pin numbering .....	17
Fig. 12	C6650_audio connections.....	18
Fig. 13	C6650_jack plug pin assignment .....	18
Fig. 14	C6650_name plate.....	20
Fig. 15	C6650_mounting concept .....	22
Fig. 16	C6650_dimensions .....	22
Fig. 17	C6650_control cabinet installation .....	23
Fig. 18	C6650_Grounding bolt for functional earthing .....	25
Fig. 19	C6650_wiring diagram .....	28
Fig. 20	C6650_assembly supply cable .....	29
Fig. 21	C6650_Assembly of strain relief housing.....	29
Fig. 22	C6650_Disassembly of strain relief housing.....	29
Fig. 23	Beckhoff Device Manager - Change passwords .....	32
Fig. 24	Beckhoff Device Manager – Start page .....	33
Fig. 25	C6650_positions fastening screws.....	35
Fig. 26	C6650_access device components .....	39
Fig. 27	C6650_mounting card holder.....	40
Fig. 28	C6650_hooks and guides .....	40
Fig. 29	C6650_mounting housing cover .....	40
Fig. 30	C6650_Replacing the battery.....	41
Fig. 31	C6650_exchange hard disk .....	43
Fig. 32	C6650_exchange SSD.....	44
Fig. 33	C6650_exchange fan bottom .....	45
Fig. 34	C6650_exchange fan top .....	46
Fig. 35	C6650_exchange CPU cooler.....	46

## List of tables

Table 1	Key - C6650 structure .....	10
Table 2	Current carrying capacity power supply unit .....	11
Table 3	Voltage socket (X101) pin assignment.....	12
Table 4	Socket external wiring (X102) pin assignment.....	12
Table 5	PS/2 interface mouse pin assignment.....	13
Table 6	PS/2 interface keyboard pin assignment.....	13
Table 7	USB interface pin assignment.....	14
Table 8	Controller classification based on device generation .....	15
Table 9	Ethernet interface pin assignment.....	15
Table 10	DVI interface pin assignment .....	16
Table 11	RS232 pin assignment .....	16
Table 12	Pin assignment of DisplayPort .....	17
Table 13	Jack plug pin assignment.....	18
Table 14	Interface options.....	19
Table 15	Module options .....	19
Table 16	Slot options .....	19
Table 17	Key - C6650 name plate .....	20
Table 18	Order identifier battery pack.....	27
Table 19	Replacement recommendations for PC components.....	37
Table 20	Technical data of the battery.....	41
Table 21	Troubleshooting .....	47
Table 22	Technical data.....	48
Table 23	Approvals C6650.....	50



More Information:  
[www.beckhoff.com/c6650](http://www.beckhoff.com/c6650)

Beckhoff Automation GmbH & Co. KG  
Hülshorstweg 20  
33415 Verl  
Germany  
Phone: +49 5246 9630  
[info@beckhoff.com](mailto:info@beckhoff.com)  
[www.beckhoff.com](http://www.beckhoff.com)

