BECKHOFF New Automation Technology

Manual | EN

C6015

Industrial PC

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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 qualified personnel must ensure that the application of the described products meets all safety requirements, including all applicable laws, specifications, regulations 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.

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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

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 dissipation (please refer to the respective data sheet).

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 Industrial PC is intended for control cabinet installation and use as a control system in machine construction and plant 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 or larger in size. It is not protected 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 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 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 dissipation (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.
- Protect the power supply cable with a fuse with a max. rating of 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 [▶ 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 C6015 Industrial PC supplements the Beckhoff entry-level products with an ultra-compact Industrial PC with high performance reserves for space-saving control cabinet installation.

Thanks to the existing processors, the Industrial PC has sufficient performance reserves for the following applications, among others:

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

The basic configuration of the C6015 includes the following aspects:

- Intel® processor
- 1 DisplayPort connection, graphic adapter integrated in the Intel® processor
- 2 x 100/1000BASE-T connection, on-board Ethernet adapter
- M.2-SSD
- 2 x USB

3.1 Structure

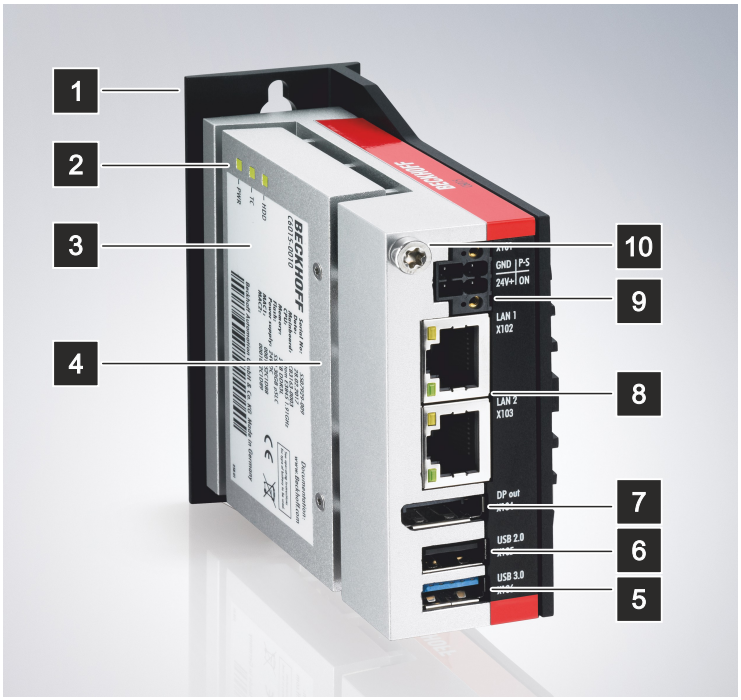

Fig. 1: C6015_Structure – basic configuration

Table 1: Key - C6015 structure

No.	Component	Description
1	Mounting plate	Plate for mounting the Industrial PC over the narrow sides in the control cabinet
2	Status LEDs	Status display for power, hard disk, TwinCAT
3	Name plate	Information on the equipment of the Industrial PC
4	Side cover	Access to battery and storage medium
5	USB interfaces (X106)	Connection of peripheral devices
6	USB interfaces (X105)	Connection of peripheral devices
7	DisplayPort (X104)	Transmission of the video signal
8	RJ45 Ethernet interfaces (X102, X103)	Connection of the Industrial PC to a 100/1000BASE-T network
9	Power supply (X101)	Connection of the power supply and external wiring of the Industrial PC
10	Protective conductor connection PE	Low-resistance protective earthing and functional earthing of the Industrial PC

3.2 Interface description

The basic version of the C6015 has the following interfaces:

- Power supply (X101)
- Ethernet RJ45 (X102, X103)
- DisplayPort (X104)
- USB (X105, X106)

3.2.1 Power supply

The Industrial PC is supplied with a rated voltage of 24 V. The 2x2-pin voltage socket (X101) is used for connection to the power supply and the external wiring of the Industrial PC. The main supply voltage is applied between PIN 3 (0 V) and PIN 4 (24 V) of the socket.

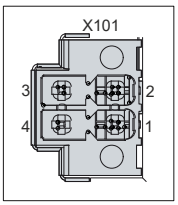

Fig. 2: C6015_Voltage socket pin numbering

Table 2: Voltage socket pin assignment

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

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

- C9900-P943: Power supply connector for Industrial PC C60xx

3.2.2 Ethernet RJ45

The C6015 has two Gigabit LAN ports (X102, X103). The Ethernet standards 100Base-T and 1000Base-T enable connection of corresponding network components with 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 Ethernet ports LAN1 and LAN2 are suitable for cycle times <= 1 ms and for distributed clock applications with EtherCAT.

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

Table 3: Controller classification based on device generation

Device generation	Controller
C6015-0010	Intel® i210 for LAN1 and LAN2
C6015-0020	Intel® i210 for LAN1 and LAN2

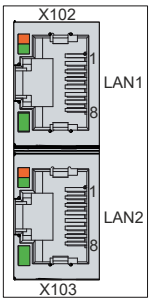

Fig. 3: C6015_Ethernet interface pin numbering

Table 4: Ethernet interface pin assignment

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

The LEDs of the LAN interfaces indicate the activity and the speed of the data transfer (Mbit/s). The LED shown in 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 transfer is in progress.

The LED shown in green/orange in the figure indicates the speed of the data transfer. If the speed is 100 Mbit/s the LED is orange, at 1000 Mbit/s it is green.

3.2.3 USB

The Industrial PC has two USB interfaces (X105, X106). They are used to connect peripheral devices with USB interfaces. The following table shows the interface assignment based on the device generation:

Table 5: USB interfaces based on device generation

Device generation	USB interfaces
C6015-0010	1x USB 2.0 (X105) 1x USB 3.0 (X106)
C6015-0020	2x USB 3.0 (X105, X106)

The two USB interfaces each supply up to 500 mA current and are electronically protected.

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

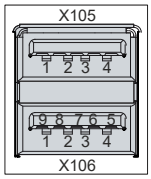

Fig. 4: C6015_USB interface pin numbering

Table 6: USB interface pin assignment

Pin	Assignment
Shield	GND
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 DisplayPort

The Industrial PC has a DisplayPort (X104) that enables connection of devices with DisplayPort. It facilitates transfer of image signals.

In addition, DVI signals can be transferred via an adapter. Please order it from your Beckhoff sales team, quoting order identifier C9900-Z468 adapter cable DisplayPort to DVI, 40 cm.

DisplayPort signals are led out via the interface by default. With the use of a level shifter cable the board switches the DisplayPort specification automatically to HDMI signals.

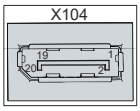

Fig. 5: C6015_DisplayPort pin numbering

Table 7: 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 Status LEDs

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

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

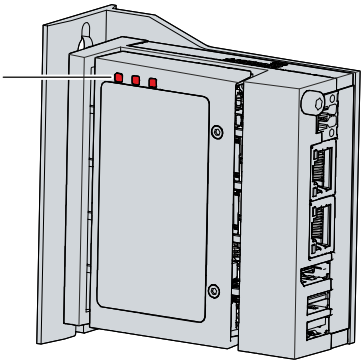

Fig. 6: C6015 Status LEDs

3.3.1 PWR LED

The PWR (power) LED indicates the status of the power controller. The colors and flashing intervals have the following meanings:

Table 8: Meaning of the PWR LED

Color	Flashing interval	Meaning
None	Steadily lit	PC is off
White	Steadily lit	VCC power fail
Magenta	Steadily lit	S UPS active (if existent)
Yellow	Steadily lit	Windows shut down, supply voltage still present
Green	Steadily lit	Normal operation
Red	Steadily lit	Reset/power fail
Green/yellow	Flashing	Bootloader running without error
Red/yellow	Flashing	Bootloader is starting (start sequence is being run through)
Magenta	Flashing (0.5 s)	S UPS capacitance test (if S UPS exists)
Red/magenta	Flashing	Checksum error during the I2C transmission in the bootloader
Cyan	Flashing (2 s)	contact Beckhoff Service

3.3.2 HDD LED

The HDD LED indicates the activity of the storage medium. The colors and flashing intervals have the following meanings:

Table 9: Meaning of the HDD LED

Color	Flashing interval	Meaning
Red	Flashing	Activity (access to storage medium)

3.3.3 TC LED

The TC LED indicates the TwinCAT status. The colors and flashing intervals have the following meanings:

Table 10: Meaning of the TC LED

Color	Flashing interval	Meaning
Green	Steadily lit	TwinCAT Run Mode
Blue	Steadily lit	TwinCAT Config Mode
Red	Steadily lit	TwinCAT Stop
-	-	TwinCAT not started

3.4 Name plate

The name plate provides information on the equipment fitted to the Industrial PC.

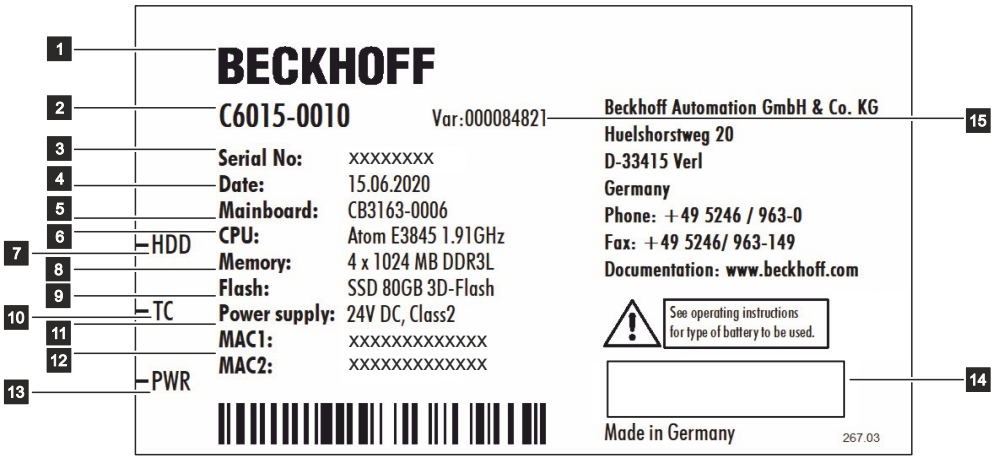

Fig. 7: C6015_Name plate

Table 11: Key - C6015 name plate

No.	Description
1	Manufacturer, including address
2	Model: The last four digits indicate the product variant
3	Serial number (BTN)
4	Date of manufacture
5	Mainboard
6	CPU
7	Hard disk LED
8	Main memory
9	Storage medium
10	TwinCAT LED
11	Power supply: 24 $V_{DC,}$ NEC class 2
12	MAC addresses of the Ethernet interfaces (X102, X103)
13	Power LED
14	Symbols Note: Here are the symbols applicable to the device such as CE, EAC, UKCA,  . The approvals of your device can be found on the name plate and in chapter 10.2 Approvals [▶ 43].
15	Variant number: Commercial number of the order code including ordering options

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 [▶ 41]).

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. Check the packaging for transport damage.
2. Remove packaging.
3. Keep the packaging for possible future transport.
4. Check your delivery for completeness by comparing it with your order.
5. Check the contents for visible shipping damage.
6. In case of discrepancies between the package contents and the order, or in case of transport damage, please inform Beckhoff Service (see Chapter 10.1 Service and support [▶ 42]).

4.2 Installation in the control cabinet

The C6015 Industrial PC is designed for installation in control cabinets in machine and plant technology. Please observe the environmental conditions prescribed for the operation (see Chapter 9 Technical data [▶ 41]).

Using different mounting plates, you can align the cable entry based on the application requirements.

Figure 8 shows the three available mounting plates: the standard mounting plate 1, the optional mounting plate 2 and the optional mounting plate 3 with DIN rail adapter. In all cases, the plate is attached to the right-hand side wall of the Industrial PC with four Torx TX10 screws and a tightening torque of approx. 0.5 Nm. You can turn all mounting plates before fastening them such that the PC can be mounted in the desired orientation for the cable entry in the control cabinet (see Chapter 4.2.1 Mounting options [▶ 20]).

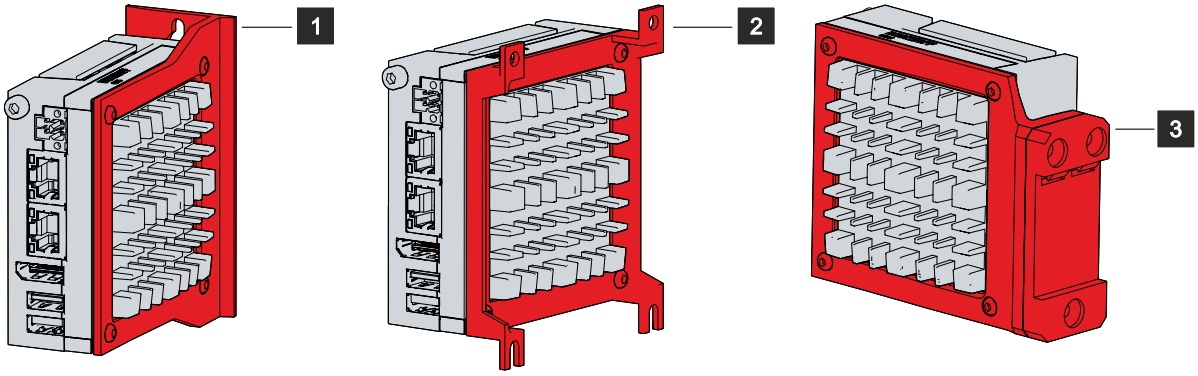

Fig. 8: C6015 _Mounting plates

In the basic configuration, the Industrial PC is delivered with a standard mounting plate 1 already mounted as shown in fig. 8. The scope of delivery does not include any further mounting plates. You can choose the following ordering options:

Table 12: Mounting plate ordering options

Order designation	Execution
C9900-M664	Mounting plate for C601x on the side wall, instead of the standard mounting plate
C9900-M665	Mounting plate for side mounting of the C601x, single part, not mounted
C9900-M666	Mounting plate with DIN rail adapter for C601x, instead of the standard mounting plate
C9900-M667	Mounting plate with DIN rail adapter for C601x, single part, not mounted

4.2.1 Mounting options

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.

Before attaching the mounting plates shown in Fig. 8 to the device, you have various options for aligning the device according to the desired cable entry. This results in various options for mounting the device in the control cabinet.

The following drawings show the possible mounting options.

With the standard mounting plate 1, you can mount the Industrial PC in the control cabinet using the narrow sides. You have the following mounting options, which are shown in Fig. 9:

- Mounting via the rear panel of the device (A)
- Mounting via the top of the device (B)
- Mounting via the bottom of the device (C)

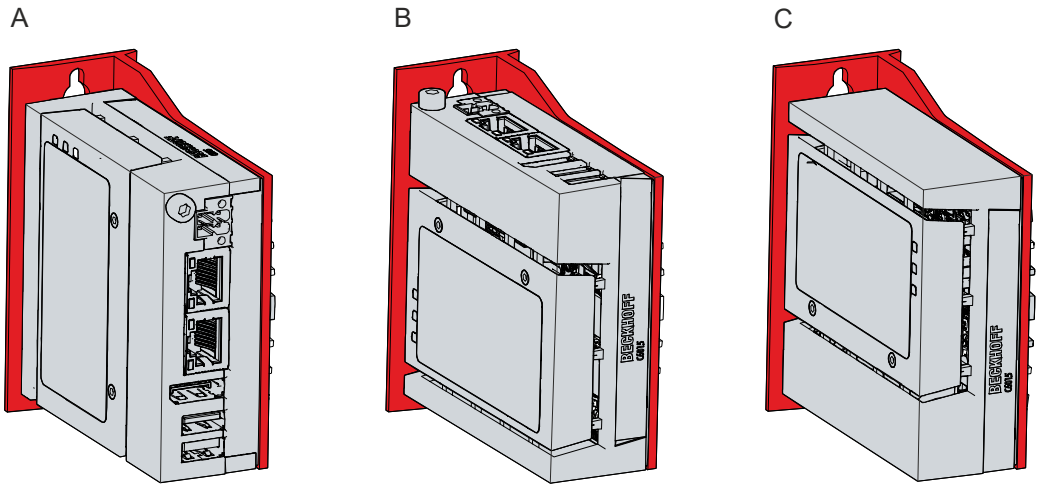

Fig. 9: C6015_Mounting options for mounting plate 1

With the optional mounting plate 2, you can mount the Industrial PC only via the right-hand side panel. You can rotate the PC as required to align the connections in the control cabinet. You have the following mounting options, which are shown in Fig. 10:

- Connections point upwards (A)
- Connections point downwards (B)
- Connections point to the right (C)
- Connections point to the left (D)

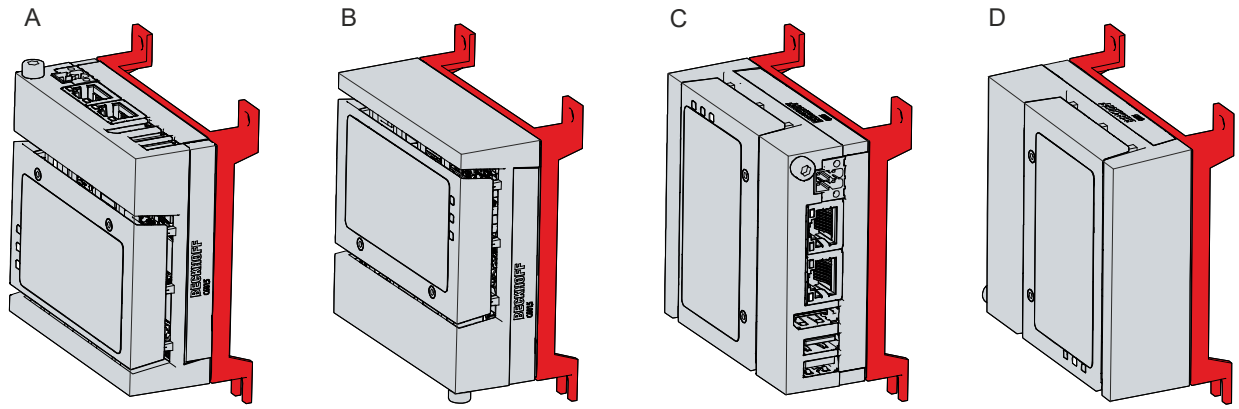

Fig. 10: C6015 _Mounting options for mounting plate 2

With the optional mounting plate 3 with DIN rail adapter, you can mount the Industrial PC on the DIN rail in the control cabinet via the narrow sides. You have the following mounting options, which are shown in Fig. 11:

- Mounting via the rear panel of the device (A)
- Mounting via the top of the device (B)
- Mounting via the bottom of the device (C)

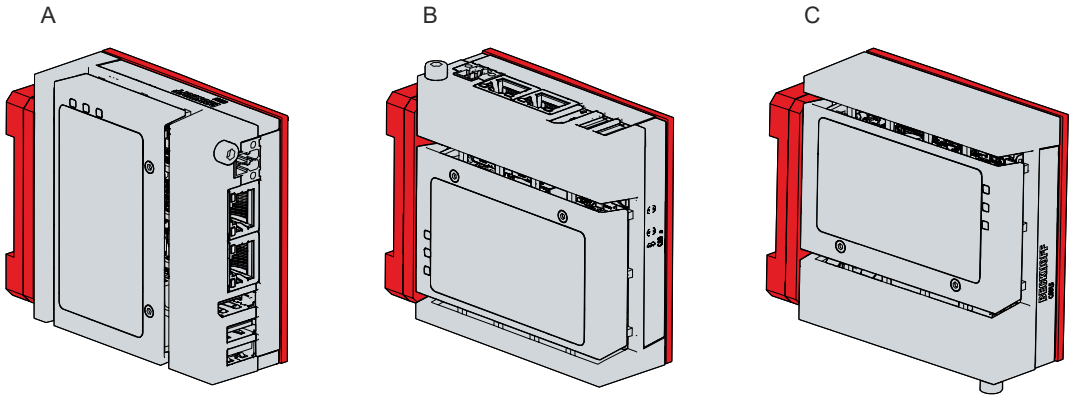

Fig. 11: C6015_Mounting options for mounting plate 3

4.2.2 Dimensions

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

All dimensions are in mm.

Fig. 12 gives an example of the dimensions using the mounting option via the rear of the device with mounting plate 1.

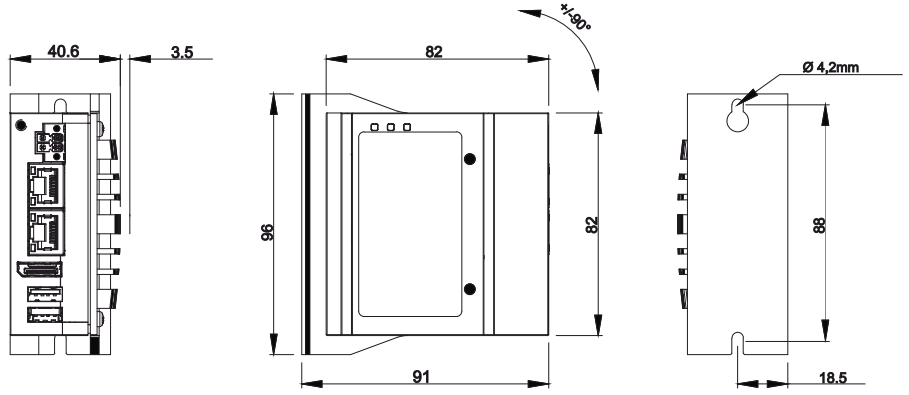

Fig. 12: C6015 _mounting plate rear panel

Fig. 13 shows the dimensions using the mounting option with the connections pointing to the right with mounting plate 2 as an example.

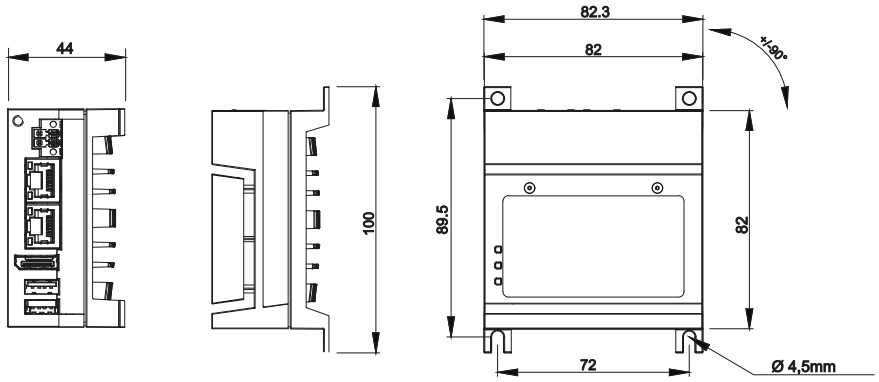

Fig. 13: C6015 _Mounting plate side panel

Fig. 14 illustrates the dimensions using the mounting options via the rear of the device with mounting plate 3 with DIN rail adapter as an example.

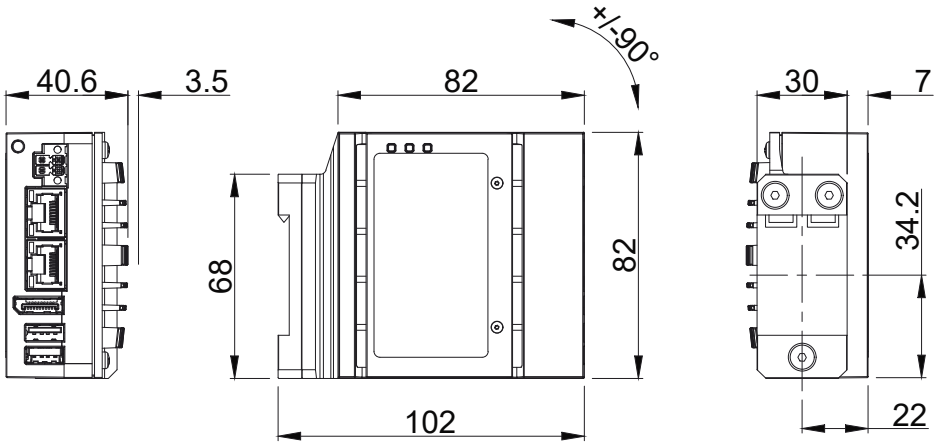

Fig. 14: C6015 _Mounting plate DIN rail adapter

4.2.3 Installation in the control cabinet

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 slits of the device.

When installing in the control cabinet, make sure that there is 5 cm free space above and below the device for air circulation and for opening the PC.

Mounting via mounting plates

In order to mount the Industrial PC with mounting plate 1 or 2 in the control cabinet, it must be furnished with the holes for the fastening screws according to the dimensions of the PC (see Chapter 4.2.2 Dimensions [▶ 22]). You need M4 screws for mounting.

After you have drilled the holes for the fastening screws in the control cabinet, you can mount the Industrial PC in the control cabinet with mounting plates 1 or 2.

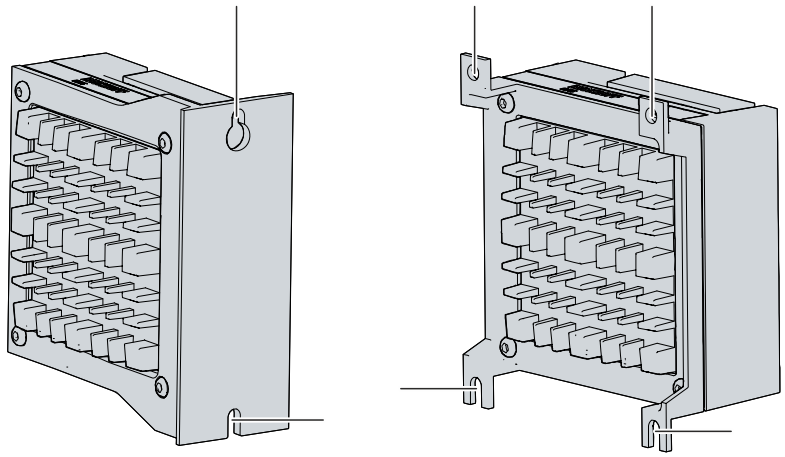

Fig. 15: C6015 _Mounting plates for control cabinet installation

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

1. Place the fastening screws in the drill holes in the rear panel of the control cabinet.
2. Hang the PC onto the screws at the marked points on the mounting plate (see Fig.15).
3. Tighten the fastening screws.

⇨ You have successfully installed the Industrial PC in the control cabinet.

Mounting via DIN rail adapter

If you want to install the Industrial PC in the control cabinet via the DIN rail adapter, no preparation of the control cabinet is necessary. All you need to do is attach the device to the DIN rail using the adapter. To do this, follow the steps shown in Fig. 16:

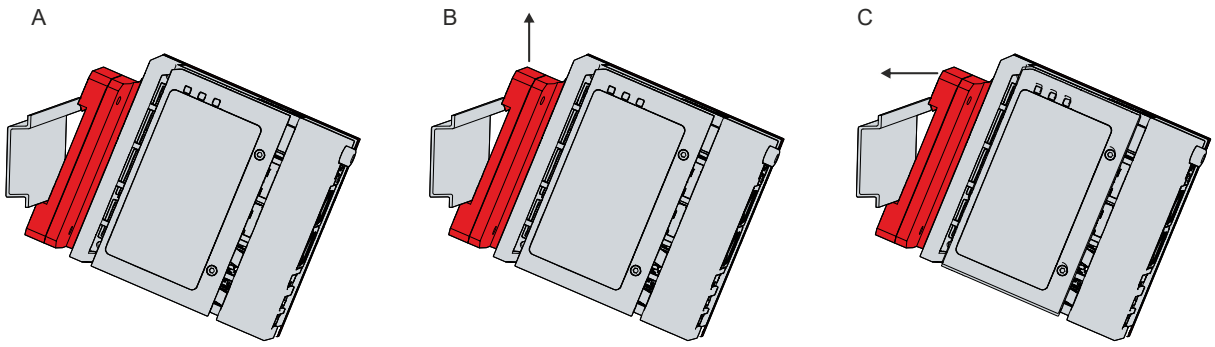

Fig. 16: C6015_DIN rail adapter for control cabinet installation

1. Hook the lower side of the adapter into the DIN rail (A).
2. Push the device upwards so that the spring contacts of the adapter are pressed in (B).
3. Keep the device pressed upwards and also hook the upper side of the adapter into the DIN rail (C).

⇨ You have successfully installed the Industrial PC on the DIN rail.

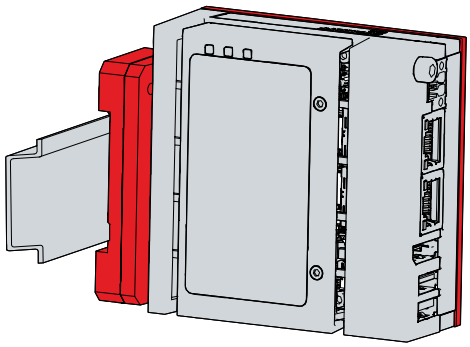

Fig. 17: C6015_DIN rail adapter mounted

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.

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

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

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

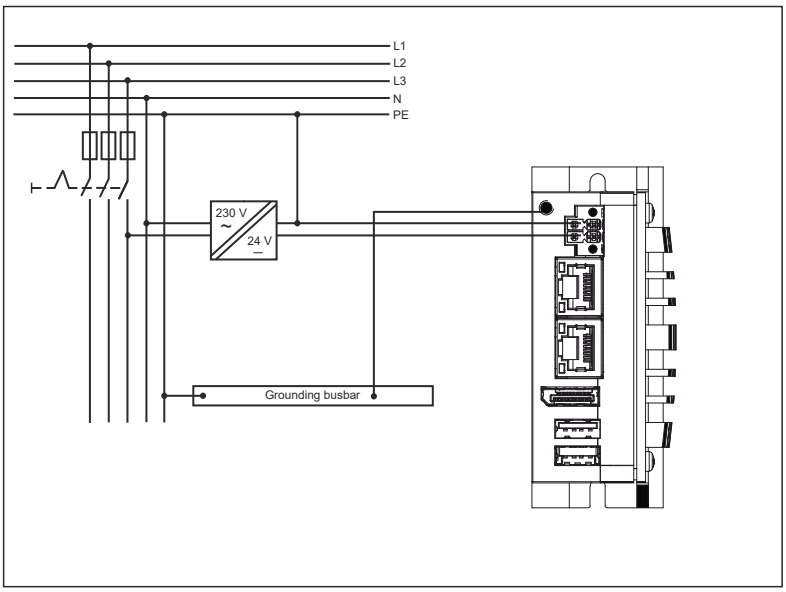

Fig. 18: C6015 _Wiring example

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 protective conductor connection PE is located on the housing of the Industrial PC (see also Chapter 3.1 Structure [▶ 10]), which ensures both the protective earthing of the PC and the functional earthing. Therefore, use cables with a cross-section of at least 4 mm^2 for the connection of the protective conductor.

Protective earth

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

EMC

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. The functional earthing is also established via the earthing connection between the protective conductor connection on the device and the central grounding point of the control cabinet in which the PC is installed.

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 all cables first and only then switch on the power supply.
- Please read the documentation for the external devices prior to connecting them.

Connecting cables

The connections are located in the front of the Industrial PC and are documented in Chapter 3.1 Structure [▶ 10].

Make sure that you first ground the PC (see Chapter 4.3.1 Grounding of the Industrial PC [▶ 27]) and then plug in all data transfer cables.

Connecting the power supply

Cables with a maximum cable cross-section of 1.5 mm^2 can be used for connecting the power supply. For long supply lines, use 1.5 mm^2 cables to achieve a low voltage drop on the supply line. There should be at least 22 V at the voltage connector of the 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. Check the correct voltage of your external power supply.
2. Install the power cable.
3. Plug the power cable into the four-pin voltage connector of the Industrial PC.
4. Fasten the power cable to the voltage connector of the Industrial PC.
5. Connect the PC to your external 24 V power supply.
6. Switch on the 24 V power supply.
7. Measure the voltage on the power supply plug of the PC.

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.

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.

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 maximum load for the Power Status output is 0.5 A and a suitable fuse should be provided.

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. A user who is not allowed to terminate the software should not be allowed to switch off the Industrial PC.

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:

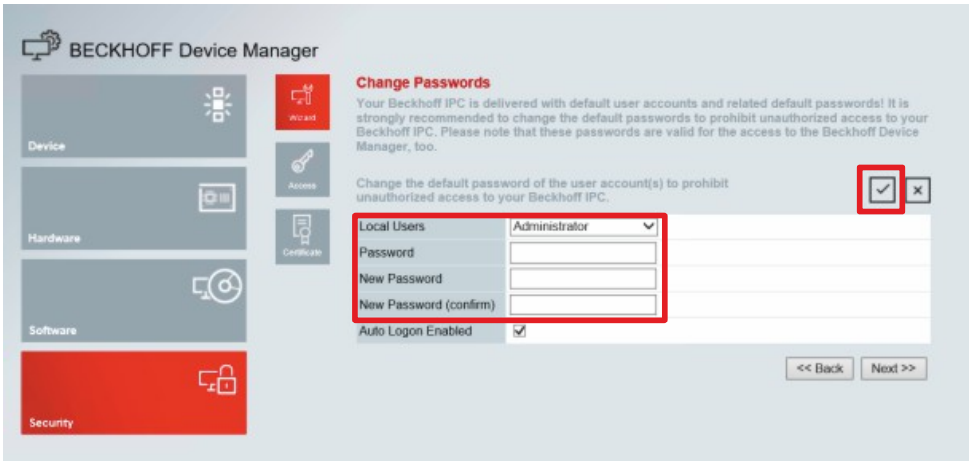

Fig. 19: Beckhoff Device Manager - Change passwords

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 to switch to the Device Manager start page:

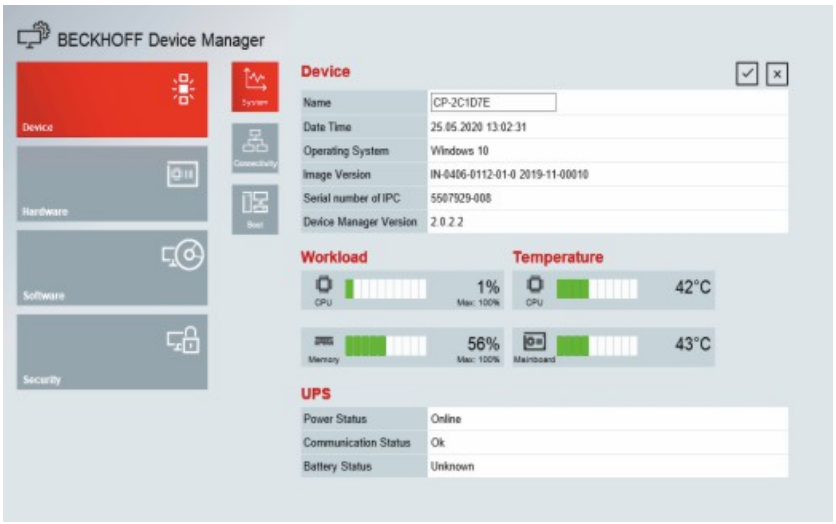

Fig. 20: Beckhoff Device Manager – Start page

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.

Starting the Beckhoff Device Manager manually

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 want to continue using the Industrial PC, Chapter 6.2 Disassembly and disposal [▶ 33] 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 transfer cables between the Industrial PC and the connected devices (see below).

Disconnect the power supply

Proceed as follows to disconnect the power supply:

1. Disconnect the PC from the external 24 V power supply.
2. Unscrew the four-pin voltage connector and pull it out of the PC.
3. Disassemble the power cable if the four-pin 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 all data transfer cables from the Industrial PC.
3. Finally, disconnect the ground connection.

6.2 Disassembly and disposal

Before you can remove the Industrial PC from the control cabinet, you must first disconnect the power supply and the cables (see Chapter 6.1 Disconnecting the power supply and cables [▶ 32]).

Disassembly via mounting plates

To remove the Industrial PC with the corresponding mounting plate 1 or 2 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 until the fastening screws slide into the keyholes (see Fig. 21).
3. Remove the PC from the control cabinet.

⇨ You have successfully disassembled the PC.

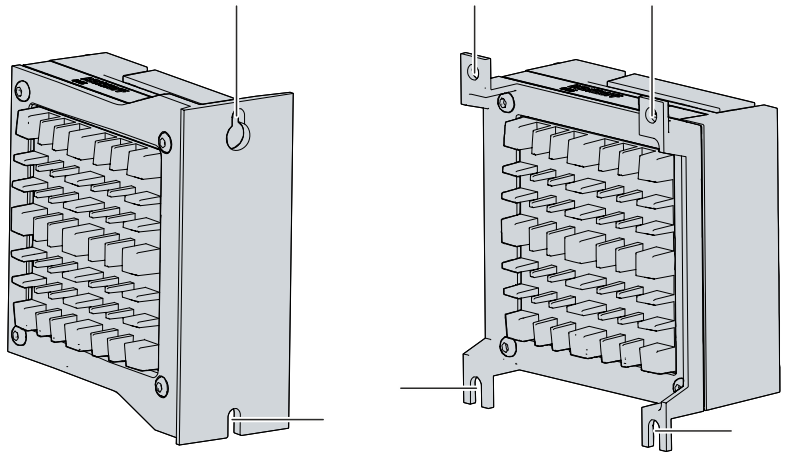

Fig. 21: C6015 _Position of the fastening screws

Disassembly via DIN rail adapter

To remove the Industrial PC from the control cabinet via mounting plate 3 with the DIN rail adapter, follow the steps below, which are shown in Fig. 22:

1. Push the PC upwards to press in the spring contacts on the DIN rail adapter (A).
2. Unhook the upper side of the adapter from the DIN rail (B).
3. Also unhook the lower side of the adapter from the DIN rail.

⇨ You have successfully removed the Industrial PC from the control cabinet.

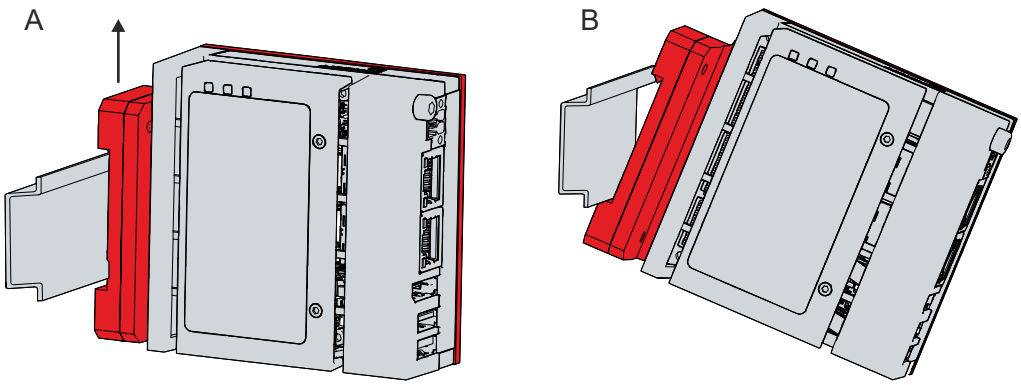

Fig. 22: C6015_Dismantling the DIN rail adapter

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 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.

Repair

Only the manufacturer may repair the device. If a repair should be necessary, contact Beckhoff Service (see Chapter 10.1 Service and support).

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 slots clear.
- 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 medium

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

Table 13: 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. Before working on the device, you should have established ESD protection to prevent damage to the device through electrostatic discharge.

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.

The best way to create an ESD-protected working environment is to set up ESD protection zones. The following measures serve this purpose:

- ESD-compliant floors with sufficient conductivity to the reference potential PE;

- ESD-compatible work surfaces such as tables and shelves;
- Wrist grounding strap, especially for sedentary activities;
- grounded and electrostatically dissipating equipment and operating materials (e.g. tools) within the ESD protection zone.

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

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

Access to exchangeable device components

You can access the device components to be replaced via the cover on the left-hand side. You gain access to the battery and the storage medium. To do this, remove the two Torx TX6 screws and take off the cover (see Fig. 23).

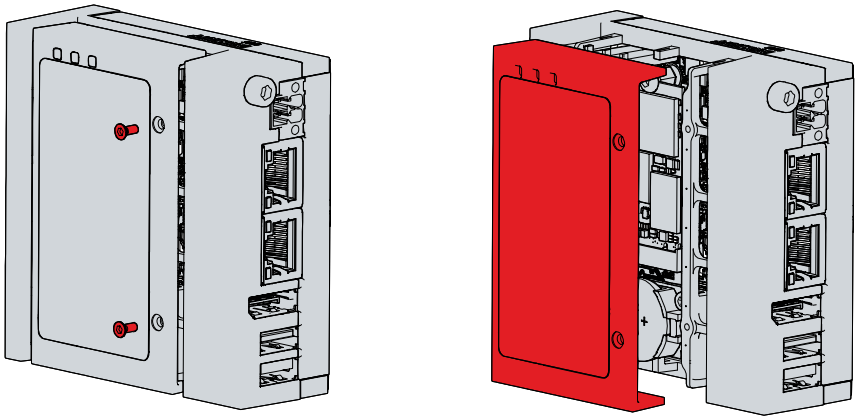

Fig. 23: C6015 _Access to battery and storage media

You now have access to the battery (1) and storage medium (2) (see Fig. 24).

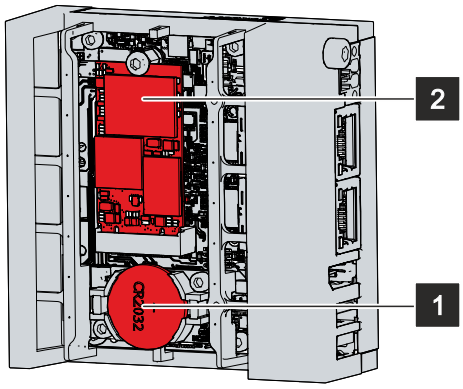

Fig. 24: C6015 _Battery and storage media

7.2.1 Replacing the battery

NOTE

Incorrect battery type

Replace battery with R/C (BBCV2), Part. No. C2032, rated 3 V only. Use of another battery may present a risk of fire or explosion.

- Only use the battery type specified below.

NOTE

Risk of explosion

Incorrect handling of the motherboard battery can cause the explosion of the battery.

- Do not recharge the battery.
- Do not throw the battery on the fire.
- Do not open the battery.

NOTE

Motherboard failure

Scratches on the motherboard may cause the motherboard to fail.

- Be very careful with the battery replacement lever and be sure to avoid scratching the motherboard.

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.

Replacement batteries should only be obtained from Beckhoff Service (see Chapter 10.1 Service and support).

Table 14: Technical data of the battery.

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

Chapter 7.2 Maintenance [▶ 36] shows how to access the battery. Pay attention to the correct polarity when replacing the battery.

To change the battery, proceed as follows:

1. Place a lever made of non-electrically conductive material on the negative pole of the battery holder below the battery.
2. Lift the battery side out of the holder.
   ⇨ The battery is now in an inclined position (see Fig. 25).

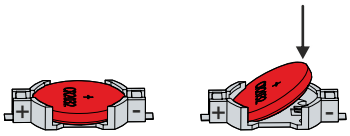

Fig. 25: C6015_Battery change

3. Remove the battery completely from the battery holder.
4. Insert the new battery with the correct polarity back into the inclined position on the positive pole of the battery holder. The correct polarity is shown in the figure.
5. Push the protruding side of the battery into the battery holder (see Fig. 25).

⇨ You have successfully replaced the battery.

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

7.2.2 Replacing the storage media

New storage media should only be obtained from Beckhoff Service (see Chapter 10.1 Service and support).

The C6015 contains one M.2 SSD.

Data transfer 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. You can then restore the images created in this way. 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 with SLC flash are designed for a particularly long data preservation. 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.

Replacing the SSD

Chapter 7.2 Maintenance [▶ 36] shows how to access the SSD.

To change an SSD, follow the steps below, which are shown in fig. 26:

1. Remove the Torx TX10 fastening screw and the SW5 bolt of the SSD you want to remove (section A).
   ⇨ The SSD automatically places itself in an inclined position (section B).
2. Pull the SSD out of the slot in the inclined position (section C).

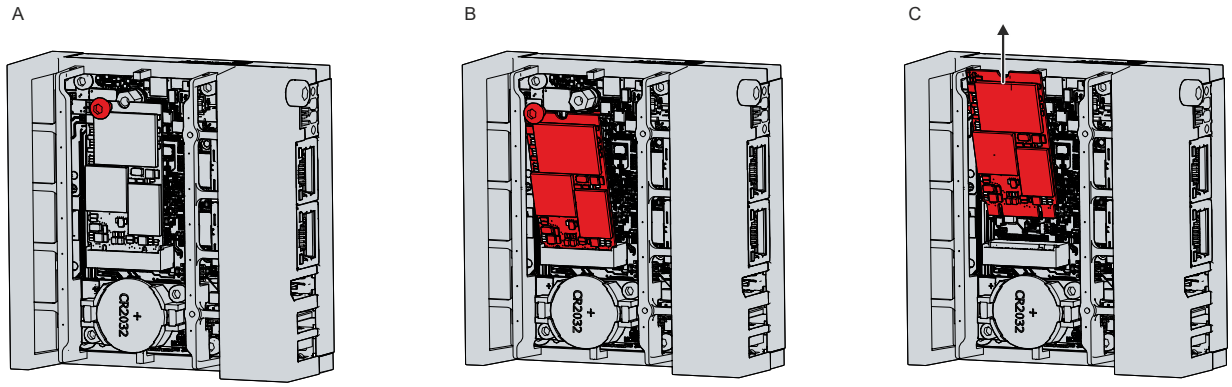

Fig. 26: C6015 _Replace storage media

3. Insert the new SSD into the slot in the same inclined position.
4. Push down the protruding side of the SSD.
5. Replace the bolt and the fastening screw and tighten them with a tightening torque of approx. 0.3 Nm.

⇨ You have replaced the SSD.

The old SSD must be disposed of in accordance with the national electronic scrap regulations.

8 Troubleshooting

Table 15: Troubleshooting

Fault	Cause	Measures
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 16: Technical data

Product designation	C6015
Dimensions (W x H x D)	82 x 82 x 40 mm, without mounting plate
Weight	approx. 400 g without mounting plate approx. 450 g with mounting plate
Supply voltage	20.4-30 V_{DC} (24 V_{DC} power supply unit, NEC class 2)
Power consumption	max. 14 W with basic configuration
Protection class	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^2)
Shock resistance (shock)	EN 60068-2-27: 5 G (approx. 50 m/s^2), duration: 30 ms
EMC interference immunity	conforms to EN 61000-6-2
EMC interference emission	conforms to EN 61000-6-4
Permissible ambient temperature	0 °C to +50 °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.

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

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

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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 17: C6015 approvals

Device generation	Approvals
C6015-0010	CE, EAC, UKCA, FCC
C6015-0020	CE, EAC, UKCA, FCC

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

FCC approvals for the United States of America

FCC: Federal Communications Commission Radio Frequency Interference Statement

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

FCC approvals for Canada

FCC: Canadian Notice

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

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