BECKHOFF New Automation Technology

Manual | EN

CP3921-151x

Control Panel

2025-02-07 | Version: 1.0

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Version: 1.0

1   Notes on the documentation

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

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

Disclaimer

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

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

Exclusion of liability

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

2.1   Signal words

The signal words used in the documentation are classified below.

Warning on personal injuries

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

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

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

Warning on property and environmental damage

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

2.2   Intended use

The control panel is designed for industrial application in machine and system engineering. It serves as the operating unit of the machine or plant.

The DVI/USB extension technology integrated in the CP3921-15xx-0000 Control Panel enables the panel to be located up to 50 m away from the PC.

The CP-Link 4 technology integrated in the CP3921-15xx-0010 Control Panel enables the panel to be located up to 100 m away from the PC via a CP-Link 4 cable. The 24 V power supply must be provided by a separate cable.

The device has been developed for an IP65 working environment. It offers full protection against contact (dust-tight) and against water jets (nozzle) from any angle.

The specified limits for technical data must be adhered to.

The device can be used within the documented operating conditions.

Improper use

Do not use the device outside the documented operating conditions.

2.3 Fundamental safety instructions

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

Application conditions

- Do not use the device under extreme environmental conditions.
- Only use the device in hazardous areas if it is explicitly designed for this purpose.
- Do not carry out any work on the device while it is live. Always switch off the supply voltage for the device before mounting it, replacing device components or rectifying malfunctions.
- 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

- Ensure that only trained specialists with a control and automation engineering background, operate the device. Use by unauthorized persons can lead to damage to property and loss of data.
- In the case of a 24 V DC power supply unit, fuse the power supply line according to its cross-section to protect the supply line in the event of a short circuit.
- In case of fire, extinguish the device with powder or nitrogen.

2.4 Operator's obligation to exercise diligence

The operator must ensure that

- the products are used only for their intended purpose (see Chapter 2.2).
- 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.

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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 Beckhoff Panel generation with industrial multi-touch display is designed for installation on the mounting arm. The devices offer suitable solutions for a variety of applications.

The control panel has the following features:

- 21.5-inch landscape mode, 1920 x 1080 (16:9)
- Multi-finger touch screen (PCT): e.g. for 10-finger touch
- Aluminum housing with glass front, IP65 all-round; the housing surface is electrically insulating
- Installation on an optional support arm system

Push-button extension

The control panel includes an angled push-button extension in a special CNC function design for CNC applications.
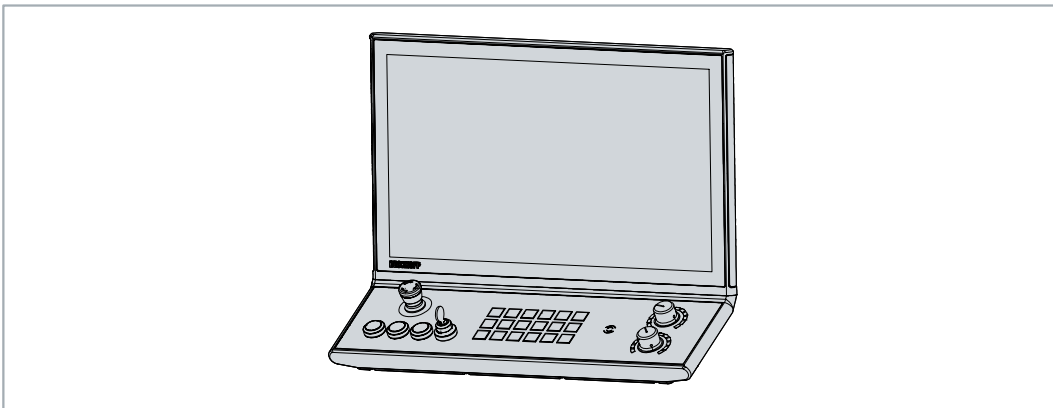

Fig. 1: Push-button extension

You can label the push buttons using the push-in strips. To access the push-in strips, you must open the push-button extension as follows:

1. Loosen and remove the eight M3x8 screws on the bottom of the push-button extension (section A). Make sure that the cover is secured against falling down.
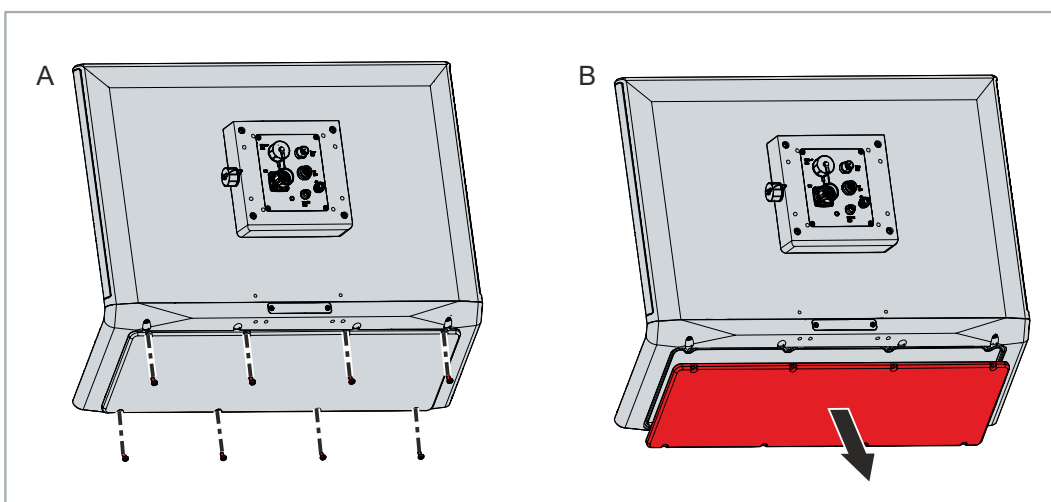2. Remove the cover (section B).

Fig. 2: Access push-in strips

   ⇨ You now have access to the push-in strips.

3. Place the cover back on the underside of the push-button extension. Make sure that it is secured against falling down.

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4. Insert and tighten the eight M3x8 screws.

⇨ You have closed the push-button extension again.

Below you will find an overview of the arrangement of the operating elements on the push-button extension.
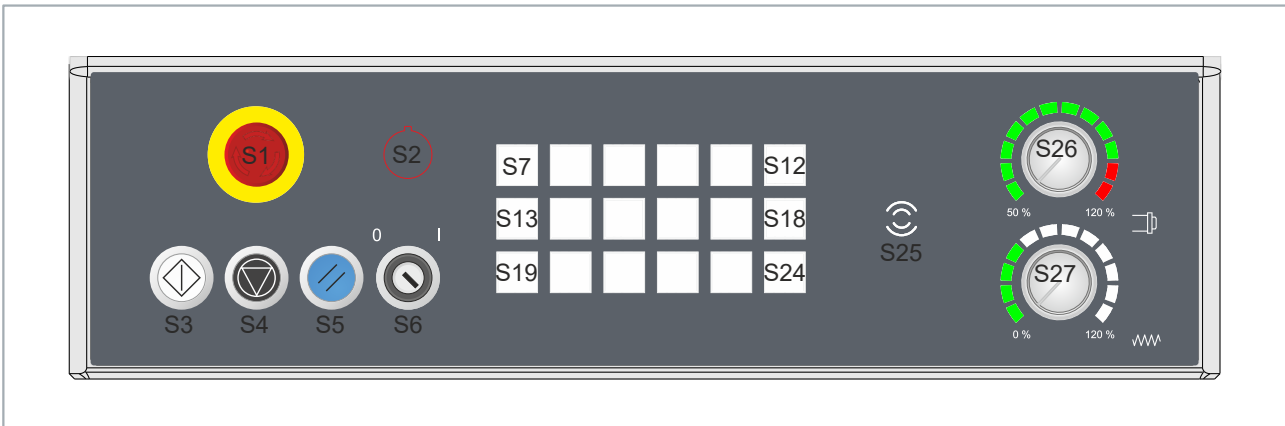

Fig. 3: Overview push buttons and switches

Table 1: Overview push buttons and switches

Position push but-tons/ switches	Type	Color	Contact via USB	Directly wired contact 2	Light source
S1	Emergency stop switch	yellow/red	Normally open contact	2 normally closed contacts	-
S2	Reserve	-	-	-	LED, white
S3	Illuminated push button	clear	Normally open contact	Normally open contact	LED, white
S4	Illuminated push button	black	Normally open contact	Normally closed contact	LED, white
S5	Illuminated push button	blue	Normally open contact	Normally open contact	LED, white
S6	Key switch	-	Normally open contact	Normally closed contact	-
S7-S24	Illuminated push button	clear	Normally open contact	-	RGBW LED
S25	Reserved for RFID	-	-	-	-
S26	Gray code, 24 positions	-	5 normally open contacts	-	12 LEDs
S27	Gray code, 24 positions	aluminum	5 normally open contacts	-	12 LEDs

3.1   Structure

The following figure shows an example of the structure of the device for all device versions.

The control panel connection interfaces vary, depending on the product version. The CP3921-1512-00x0 device also has a side-mounted LED status bar. The CP3921-1513-00x0 does not have an LED status bar. Otherwise, there are no other differences in the external design of the device.
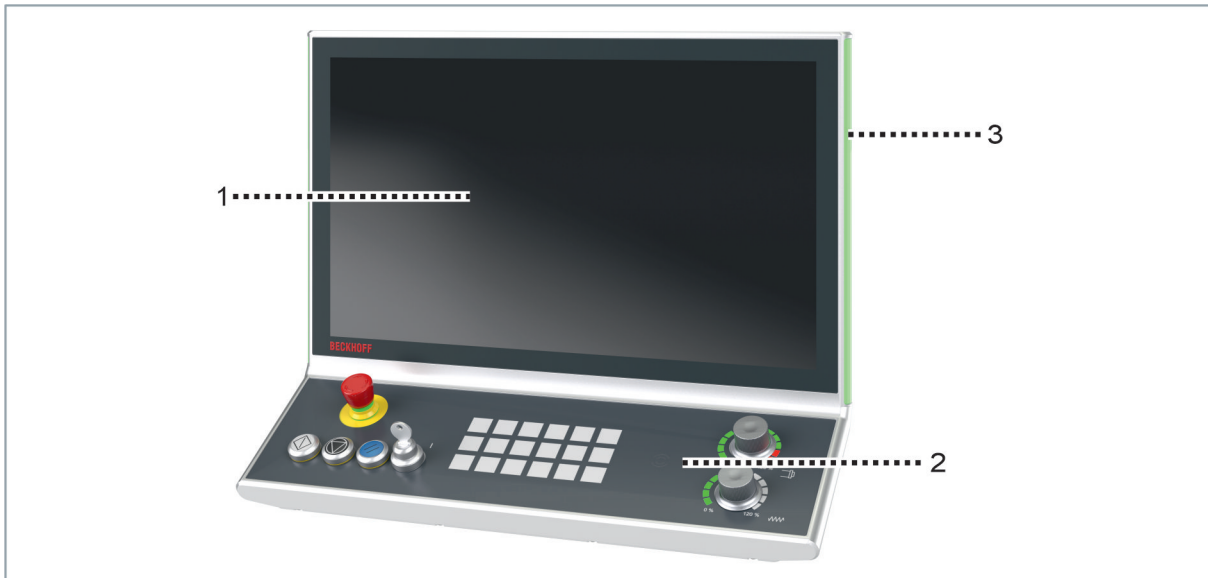

Fig. 4: Structure

Table 2: Legend structure

No.	Component	Description
1	Display and touch screen glass	Operating the control panel
2	Push-button extension	Control of central machine or system functions
3	Side LED status bar (only for CP3921-1512)	Status of the machine; exact meaning freely selectable

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3.2   Interface description -0000

In the basic configuration, the CP3921-151x-0000 includes the following interfaces:

- Power supply (XS01)
- DVI Extended input (X102)
- USB Extended input (X103)

The interfaces are located on the rear side of the control panel on the connection block. The interfaces are freely accessible.
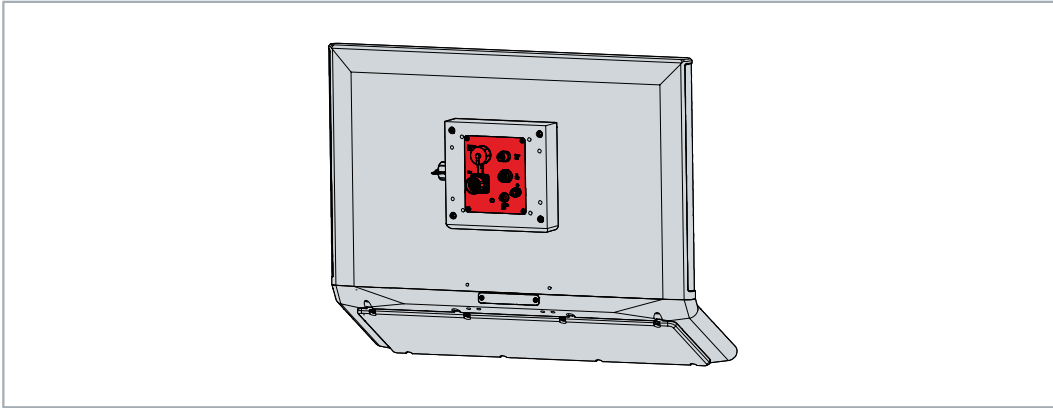

Fig. 5: Connection block

3.2.1   Power supply

The control panel is supplied with a nominal voltage of 24 V. The connection to the power supply as well as the connection of the push buttons S1-S5 of the push-button extension is made via the 19-pin voltage socket (XS01). The main supply voltage is applied between PIN 19 (24 V) and PIN 6 (0 V) of the socket.
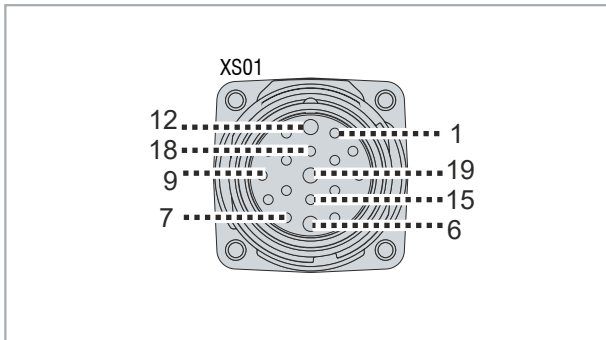

Fig. 6: Voltage socket pin numbering

Table 3: Voltage socket pin assignment

Pin	Signal	Description
1	S1	Emergency stop connection
2	S1	Emergency stop connection
3	S1	Emergency stop connection
4	S1	Emergency stop connection
5	S3	Connection illuminated push button clear
6	-	24 V supply voltage, negative pole
7	S3	Connection illuminated push button clear
8	S4	Connection illuminated push button black
9	S4	Connection illuminated push button black
10	S5	Connection illuminated push button blue
11	S5	Connection illuminated push button blue
12	⏚	Protective earth
13	S6	Connection key switch
14	S6	Connection key switch
15	NC	not used
16	NC	not used
17	NC	not used
18	NC	not used
19	+ 24 V	24 V supply voltage, positive pole

The plug for the power supply is specified for 16 A and can accommodate wire cross-sections of up to 1 mm². For long supply lines, use 1 mm² cables to achieve a low voltage drop on the supply line. There should be at least 22 V at the voltage connector of the control panel, so that the control panel remains switched on during voltage fluctuations.

3.2.2 DVI Extended input

The control panel has a DVI Extended input (X102). It is used to transmit the graphics signal from the industrial PC to the control panel.

The graphics signal is transferred directly via a DVI cable over a distance of 50 m max. Such a cable length leads to strong distortion of the graphics signal on arrival at the control panel. A signal processor is used in the control panel to fully restore the DVI signal. The industrial PC requires a conventional DVI output.
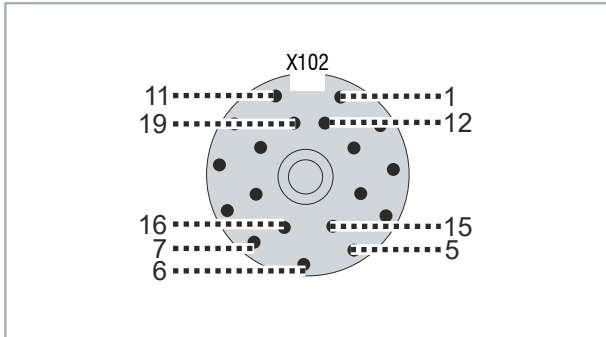

Fig. 7: DVI Extended input pin numbering

Table 4: DVI Extended interface pin assignment

Pin	Connection	Pin	Connection
1	Shield	11	IN_TMDS_C+
2	IN_TMDS_2+	12	GND
3	GND	13	IN_TMDS_2-
4	IN_TMDS_1-	14	IN_TMDS_1+
5	GND	15	GND
6	IN_TMDS_0-	16	IN_TMDS_0+
7	GND	17	HPD_DVI
8	+ 5 V_DVI	18	GND
9	DDC DAT	19	IN_TMDS_C-
10	I2C-CLK		

3.2.3   USB Extended input

The CP3921-151x-0000 Control Panel has a USB Extended input (X103). The interface is used to connect the control panel to the CU8801 USB-to-USB extended transmitter box.

To realize a distance of 50 m without hubs, USB Extended converts the USB signal so that it can be transmitted via a 50 m CAT 5 cable. In the control panel the signal is converted back to USB. This is not an Ethernet connection. No Ethernet switch or hub can be integrated in the USB-Extended cable.
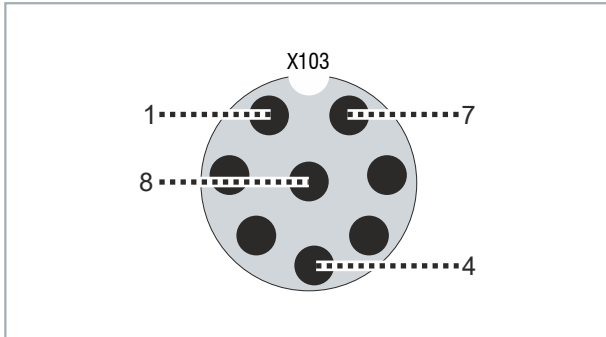

Fig. 8: USB-E input pin numbering

Table 5: USB-E input pin assignment

Pin	Signal
1	MX0-
2	MX1+
3	MX1-
4	MX2+
5	MX2-
6	MX3+
7	MX3-
8	MX0+

3.3   Interface description --0010

In the basic configuration, the CP3921-151x-0010 includes the following interfaces:

- Power supply (XS01)
- CP-Link 4 input (X102)

The interfaces are located on the rear side of the control panel on the connection block. The interfaces are freely accessible (see Fig. 9).
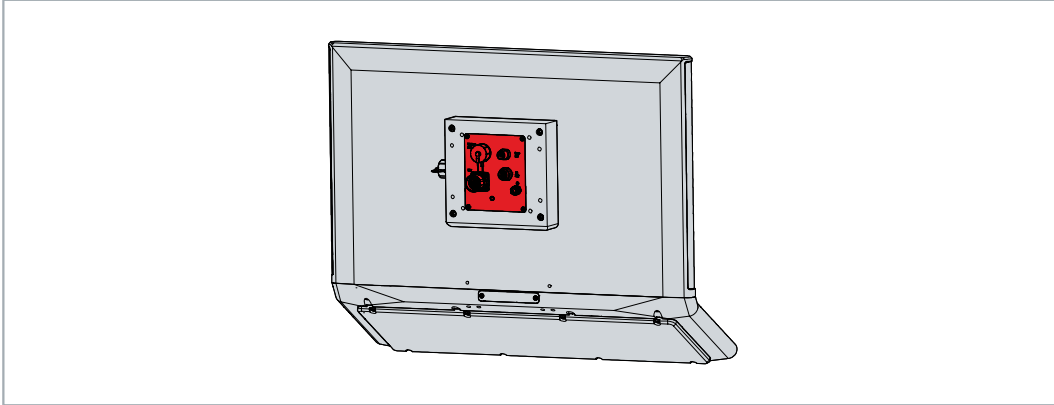
Fig. 9: Connection block

3.3.1   Power supply

The control panel is supplied with a nominal voltage of 24 V. The connection to the power supply as well as the connection of the push buttons S1-S5 of the push-button extension is made via the 19-pin voltage socket (XS01). The main supply voltage is applied between PIN 19 (24 V) and PIN 6 (0 V) of the socket.
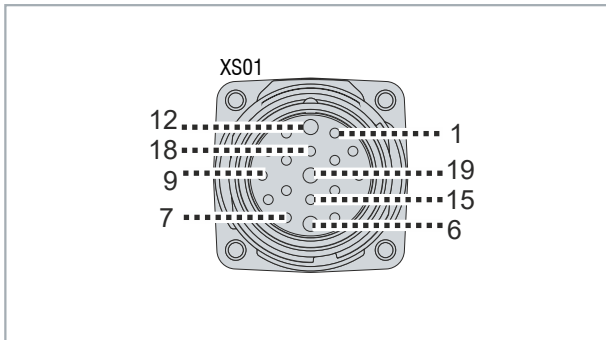

Fig. 10: Voltage socket pin numbering

Table 6: Voltage socket pin assignment

Pin	Signal	Description
1	S1	Emergency stop connection
2	S1	Emergency stop connection
3	S1	Emergency stop connection
4	S1	Emergency stop connection
5	S3	Connection illuminated push button clear
6	-	24 V supply voltage, negative pole
7	S3	Connection illuminated push button clear
8	S4	Connection illuminated push button black
9	S4	Connection illuminated push button black
10	S5	Connection illuminated push button blue
11	S5	Connection illuminated push button blue
12	⏚	Protective earth
13	S6	Connection key switch
14	S6	Connection key switch
15	NC	not used
16	NC	not used
17	NC	not used
18	NC	not used
19	+ 24 V	24 V supply voltage, positive pole

The plug for the power supply is specified for 16 A and can accommodate wire cross-sections of up to 1 mm². For long supply lines, use 1 mm² cables to achieve a low voltage drop on the supply line. There should be at least 22 V at the voltage connector of the control panel, so that the control panel remains switched on during voltage fluctuations.

3.3.2   CP-Link-4 input

The control panel has a CP-Link 4 input (X102) in the form of an 8-pin M12 socket. Via the interface, the control panel can be connected to an industrial PC at a distance of up to 100 m. The connection can be made either directly with an industrial PC with a corresponding PCIe module or indirectly via an intermediate transmitter box.
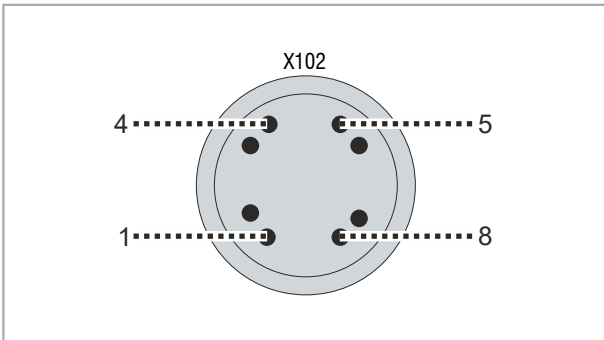
Fig. 11: CP-Link 4 pin numbering

Table 7: CP-Link 4 pin assignment

Pin	Signal	Pin	Signal
1	HDBT_0+	7	HDBT_2-
2	HDBT_0-	8	HDBT_2+
3	HDBT_1+	S1	Shield
4	HDBT_1-	S2	Shield
5	HDBT_3+	S3	Shield
6	HDBT_3-		

CP-Link 4 is available as a Two Cable Display Link on an industrial PC with PCIe module. The devices shown below are examples of all CP-Link 4-capable industrial PCs and control panels.

The control panel can be connected directly to the industrial PC via the module. USB 2.0 (100 Mbit/s) and DVI are transmitted together via a CP-Link 4 cable. An additional power supply is required for the control panel.
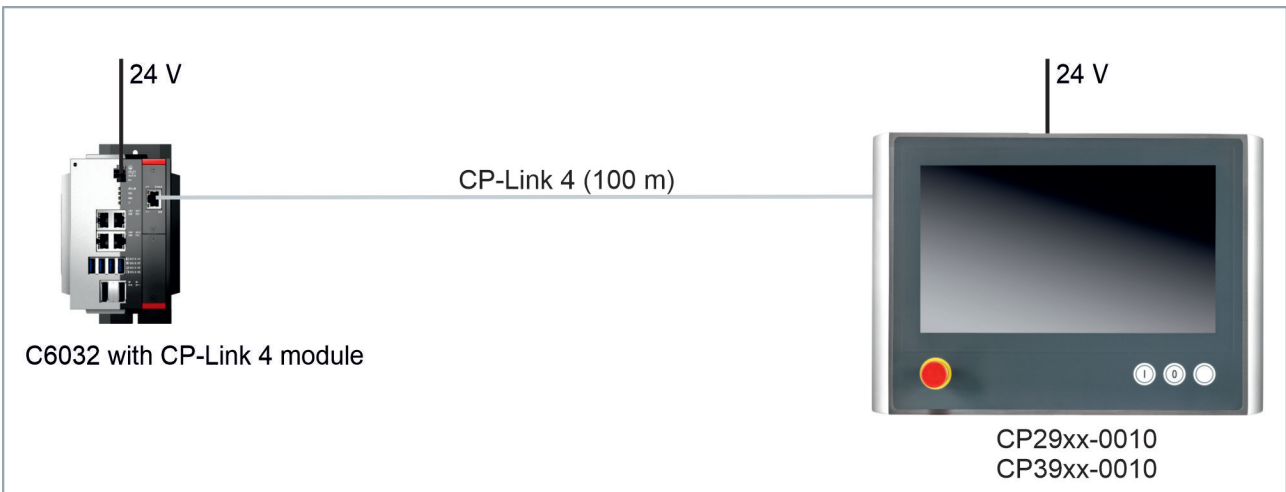
Fig. 12: CP-Link 4

CP-Link 4 with CU8802 transmitter box

If the industrial PC is not equipped with a PCIe module, a transmitter box is required for connecting the control panel.

When installing the control panel with the CU8802 transmitter box, the industrial PC is connected to the transmitter box via USB and DP/DVI. The transmitter box is then connected to the control panel via the CP-Link 4 connection of the transmitter box using a CP-Link 4 cable. USB and DVI are transmitted together via this cable. An additional power supply is required for the control panel (Two Cable Display Link). The following figure shows the wire connection to the CU8802-000x.
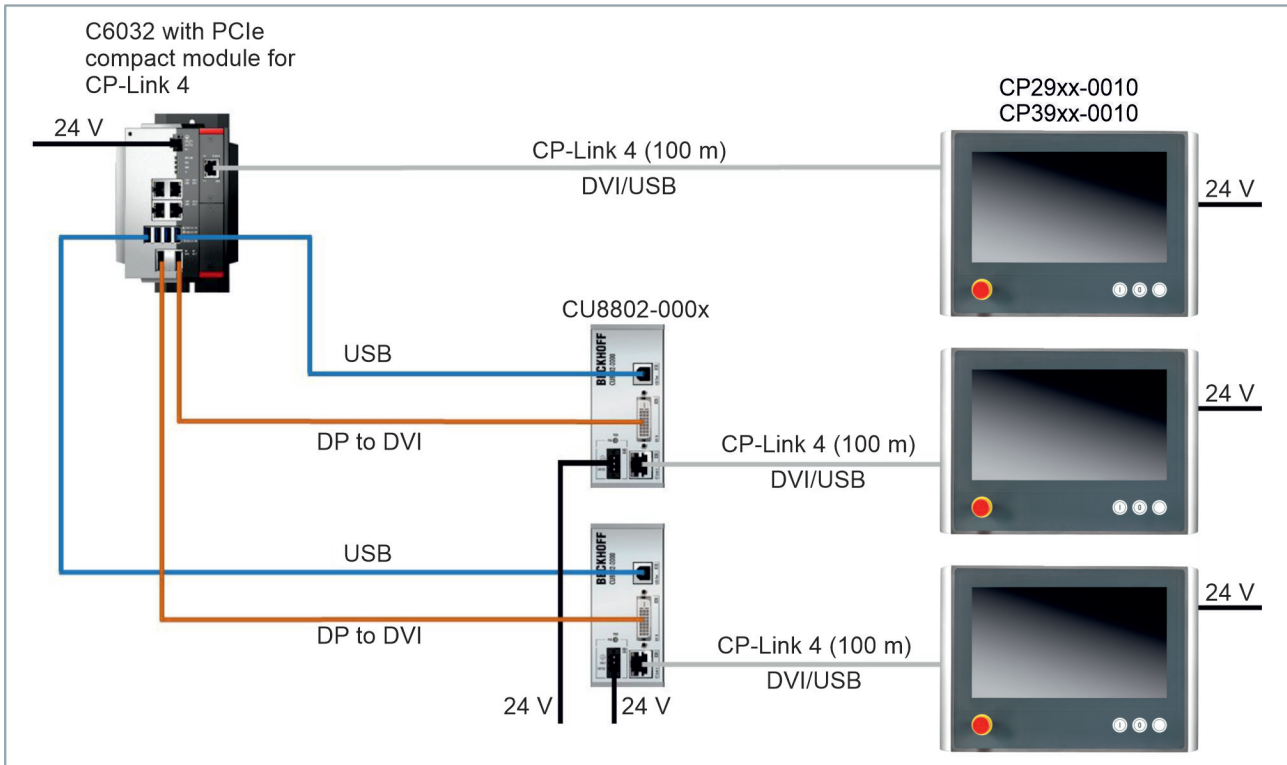

Fig. 13: CP-Link 4, CU8802-000x

The following ordering options are available for the transmitter boxes:

- CU8802-0000: DVI-to-DVI cable included in the box
- CU8802-0010: DisplayPort to DVI cable included with box

3.4   Name plate

The name plate provides information about the control panel equipment. The name plate shown here serves only as an example.
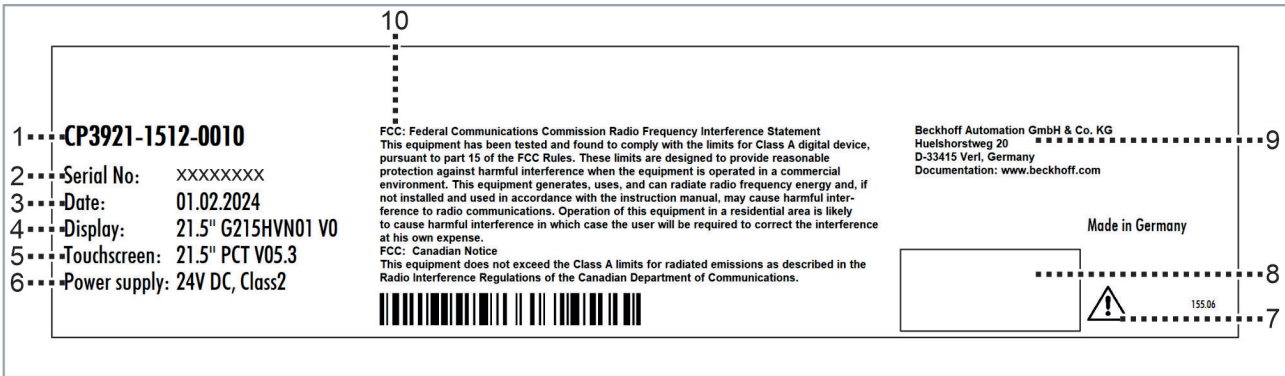

Fig. 14: Name plate

Table 8: Legend name plate

No.	Description
1	Model: the last four digits indicate the product version.
2	Serial number (BTN)
3	Date of manufacture
4	Display
5	Touch screen
6	Power supply: 24 V_{DC}, NEC class 2
7	Note: be sure to read the device manual.
8	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 9.2 Approvals [▶ 46].
9	Address of the vendor
10	FCC approval

4 Commissioning

To use the control panel, you must first put it into operation. The first step is to transport the device to is operating location and unpack it. This is followed by mounting the device on the mounting arm, connecting the cables and power supply, and finally switching on the control panel. Since the control panel does not have its own power switch, switching the power supply on and off also switches the control panel on and off.

Operating the device

The device is operated via the touch screen.

NOTICE
Damage to the touch screen
Operating the touch screen with unsuitable objects may damage the touch screen.   • Operate the touch screen only with bare fingers or wearing suitable gloves.   • If you use gloves, make sure that no hard particles such as metal shavings, glass splinters or similar adhere to the glove.

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

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

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

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

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

4.1 Transport and unpacking

The specified storage conditions must be observed (see chapter 8 Technical data [▶ 44]).

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

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

Unpacking

Proceed as follows to unpack the unit:

1. Check the packaging for transport damage.
2. Remove packaging.
3. Keep the packaging for possible future transport.
4. Check your delivery for completeness by comparing it with your order.
5. Check the contents for visible shipping damage.
6. In case of discrepancies between the package contents and the order, or in case of transport damage, please inform Beckhoff Service (see Chapter 9.1 Service and Support [▶ 45]).

4.2   Mounting

NOTICE

Extreme environmental conditions

Extreme environmental conditions can cause damage to the device.

- Avoid extreme environmental conditions.
- Protect the device from moisture and heat.

The device is designed for installation on a mounting arm system. The environmental conditions specified for operation must be observed.

The basic version includes a connection block with four M6 threaded holes at a distance of 70 x 130 mm and four M6 threaded holes at a distance of 100 x 100 mm on the rear of the housing. This can be used to install the control panel on a mounting arm system.

The following figure shows the dimensions of the device as an example for all CP3921-151x-00x0. Only the interfaces in the connection block change. All dimensions are in mm.
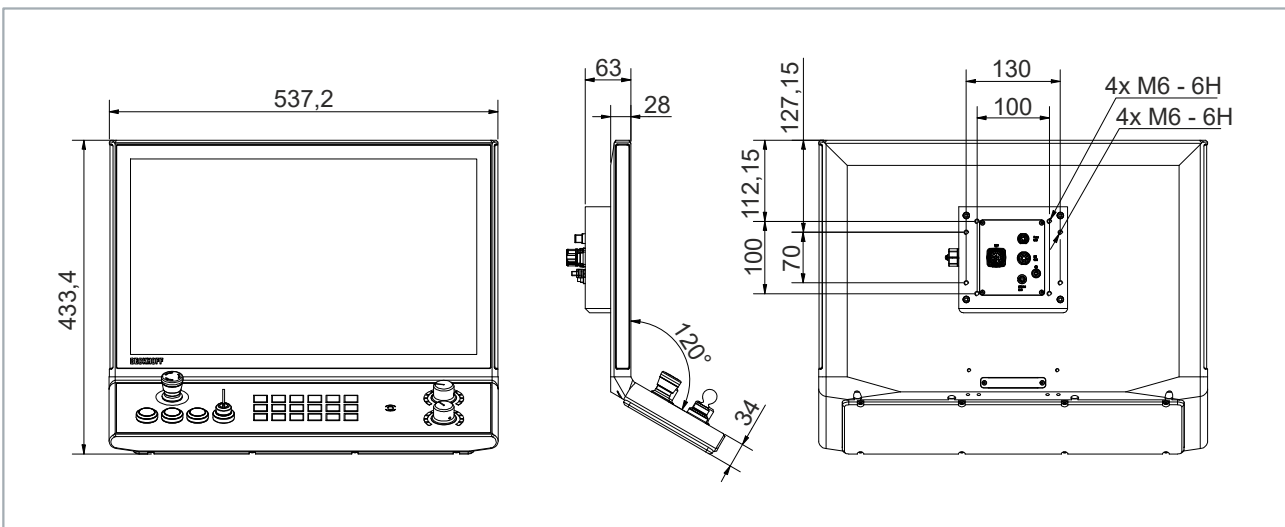

Fig. 15: Dimensions

You can optionally order a Beckhoff mounting arm adapter for your device. The following ordering options are available:

Table 9: Mounting arm adapter ordering options

Ordering option	Version
C9900-M761	Rotatable and tiltable mounting arm adapter, clamping lever to fix the tilt
C9900-M763	Rotatable and tiltable mounting arm adapter

The ordering option C9900-M761 (A) has a clamping lever to lock the tilt. You can mount both mounting arm adapters facing downwards or upwards. The following figure shows an example of both mounting arm adapters with the orientation facing downwards.
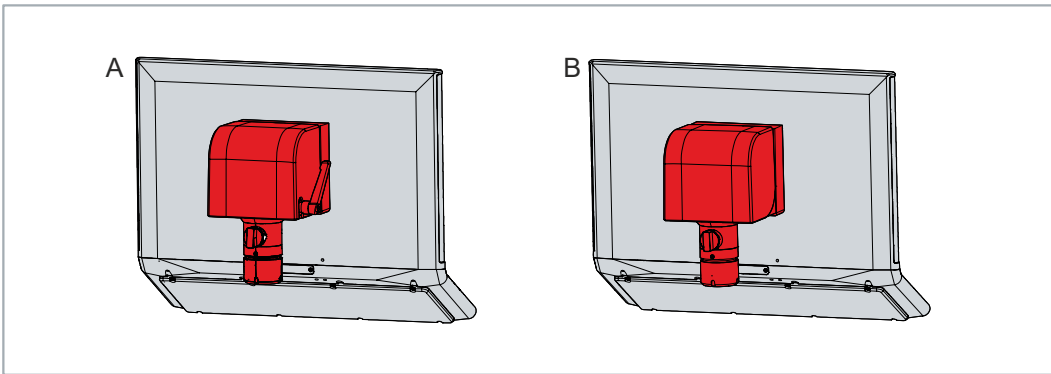
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Fig. 16: Options mounting arm adapter

4.2.1 Installing the mounting arm adapter

To mount the C9900-M761 or -M763 mounting arm adapters to the adapter plate on the rear of the device, follow the steps below:

1. Insert a screwdriver into the recesses on the bottom of the mounting arm adapter (section A).
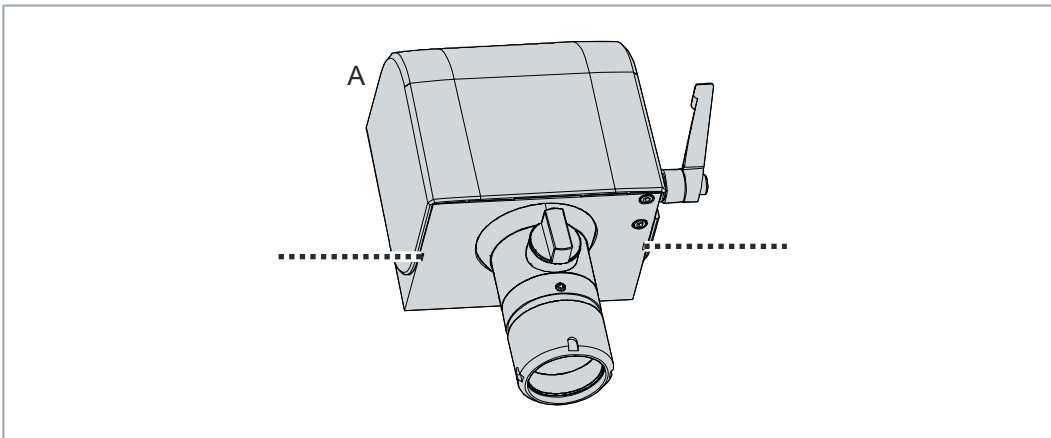
Fig. 17: Detaching the cover

2. Bend the cover slightly outwards so that you can push out the latching lugs.
3. Slide the cover upwards off the mounting arm adapter (section B).
4. Place the mounting arm adapter with the four M6 screws in front of the four M6 threaded holes on the adapter plate (section C).
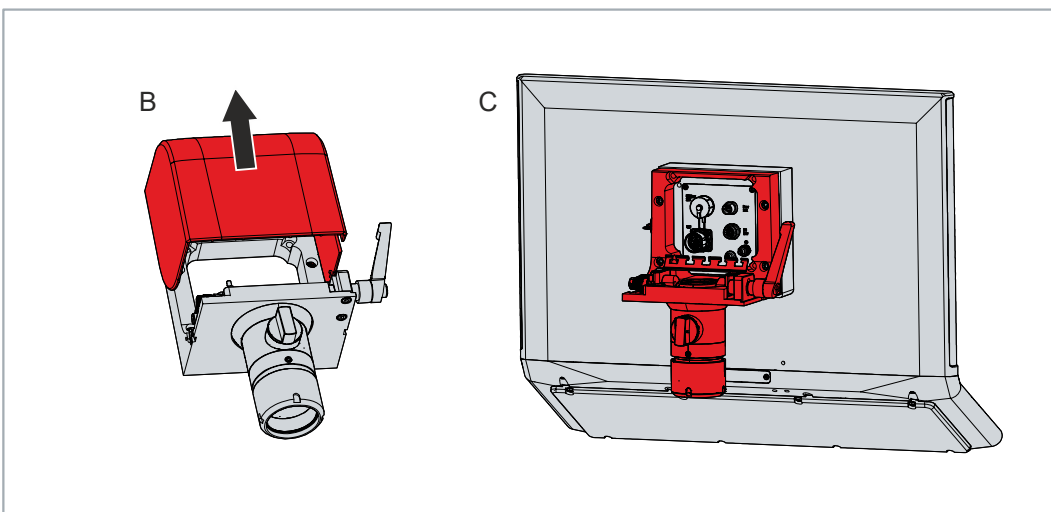
Fig. 18: Installing the mounting arm adapter

5. Tighten the four screws with a tightening torque of 6 Nm.
6. Replace the cover on the mounting arm adapter.
⇨ You have installed the mounting arm adapter on the adapter plate.

4.2.2   Mounting arm tube installation

Observe the following points when installing the control panel on the mounting arm tube:

- For the correct installation height, use the position of the screen for guidance. This should always be optimally visible to the user.
- Do not expose the control panel to direct sunlight.

The Beckhoff mounting arm adapters are designed for Rittal and Rolec mounting arm systems with 48 mm tubes. The tube diameter may have a maximum tolerance of -0.1 mm and +0.8 mm.

If you have chosen a device with a mounting arm adapter, you must fit the mounting arm tube yourself. The procedure for fitting the mounting arm adapters with upwards or downwards orientation is the same.

Among other tools you need a hook wrench for the installation. You can order this from your Beckhoff Sales using the following order identifier:

- C9900-Z263: hook wrench size 58-62 for tightening the slotted nut of the C9900-M75x mounting arm adapter

To install the mounting arm tube on the mounting arm adapter, proceed as follows:

1. Unscrew the hexagon socket screw (1) a few turns with a 3 mm Allen key (section A).
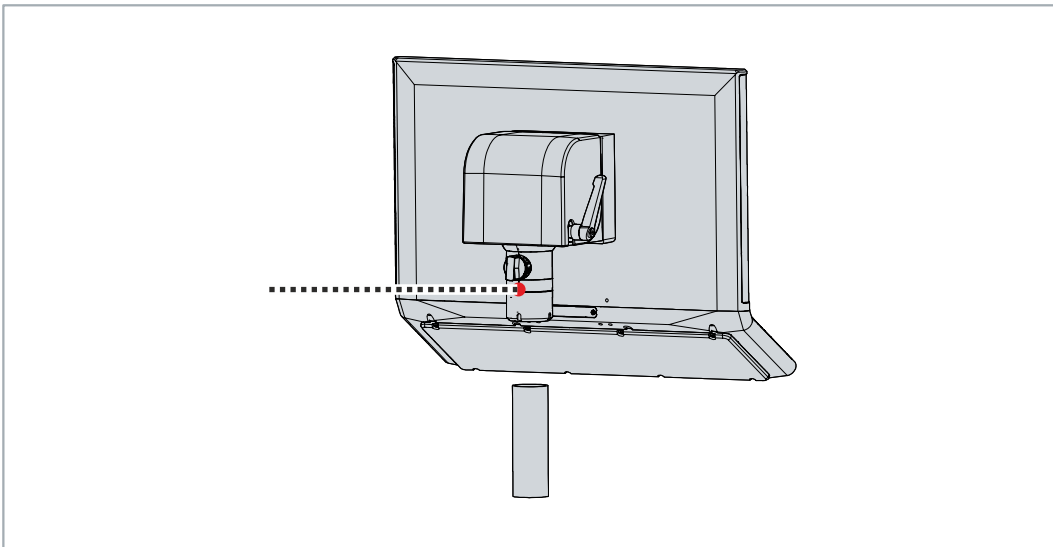
Fig. 19: Mounting arm tube installation

2. Push the connecting cables of the control panel through the mounting arm tube.
3. Insert the mounting arm tube 50.2 mm into the mounting arm adapter to the stop (section B).
4. Retighten the hexagon socket screw with a torque of 3 Nm (section C).
5. Tighten the slotted nut of the mounting arm adapter with a hook wrench size 58-62 clockwise with a torque of 20 Nm (section C).
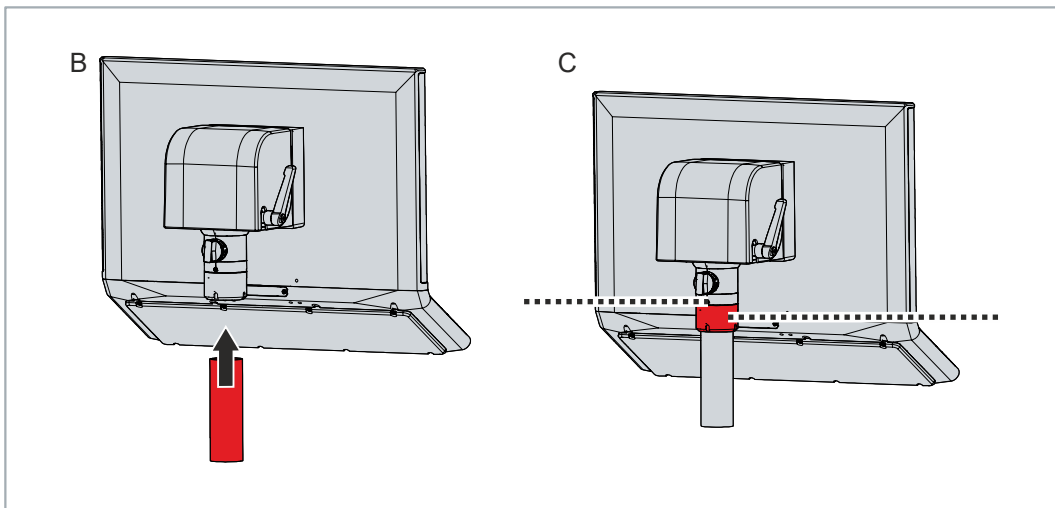
Fig. 20: Mounting arm tube installation

⇨ You have installed the mounting arm tube on the mounting arm adapter.

The mounting arm adapter facilitates tilting of the control panel fitted to the mounting arm tube by +/- 20 ° and rotate it by +/- 165 °.

4.3   Connecting the control panel

⚠ CAUTION
Risk of electric shock Dangerous touch voltages can lead to electric shock. To avoid electric shock, observe the following: • Never connect or disconnect the device cables during a thunderstorm. • Provide protective earthing for handling the device.

To make the device ready for operation, you have to connect it. The first step is to ground the device. Then you can connect the cables and the power supply.

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

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

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

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

4.3.1   Grounding the control panel

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

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

There is a PE protective conductor connection on the rear of the device on the connection block, which must be used to establish the low-resistance protective earthing and functional earthing of the device (see Fig. 21).
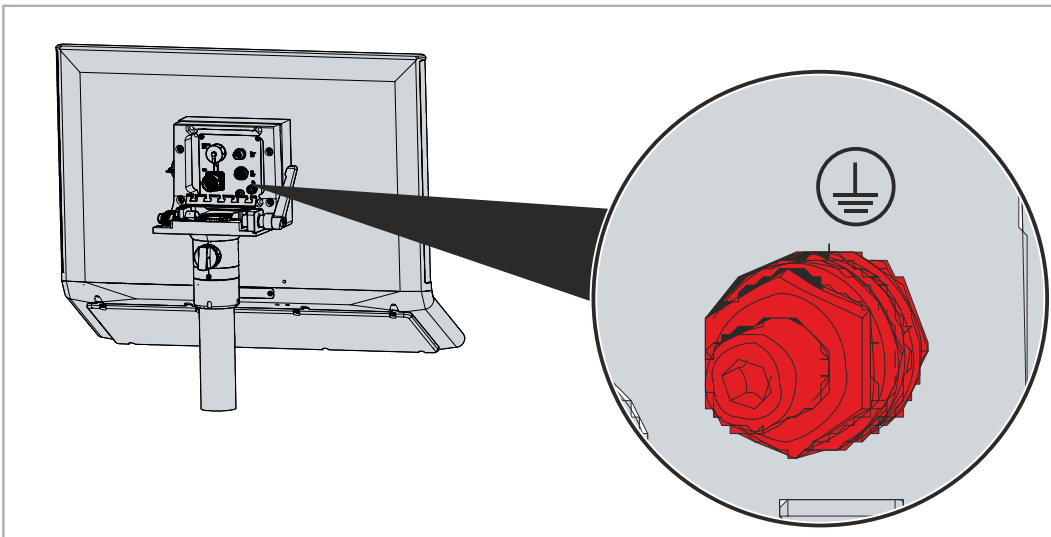

Fig. 21: Protective conductor connection PE

EMC

NOTICE
Hardware damage due to electromagnetic interference
The use of the device without a functional earth can lead to material damage due to electromagnetic interference. • Only use the device with functional earth.

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

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

The functional earth is necessary for the EMC of the device. Functional earth is also established via the PE protective conductor connection in the connection section of the control panel.

4.3.2   Connection cables and power supply

NOTICE
Incorrect connection procedure
Incorrect procedure when connecting the cables and the power supply can cause hardware damage.
• Follow the documented procedure for connecting the cables and the power supply.
• Always connect the cables first and only then switch on the power supply.
• Please read the documentation for the external devices prior to connecting them.

Connecting cables

Make sure that you first ground the panel (see chapter 4.3.1 Grounding the control panel [▶ 29]) and then plug in all data transmission cables.

When connecting the control panel to an industrial PC with UPS output, we recommend using this for the connection. In the case of CP-Link 4, we recommend connecting the CU880x transmitter boxes to the UPS output of the PC.

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 power supply plug of the panel PC, so that the panel remains switched on during voltage fluctuations.

Proceed as follows to connect the 24 V_{DC} power supply unit:

1. Plug the voltage connector into the voltage socket on the panel.
2. Connect the panel to your external 24 V power supply.
3. Switch on the 24 V power supply.
⇨ You have connected your device to the power supply.

4.4 Configuration push-button extension

To use a push-button extension, you must also commission it. This includes, on the one hand, the integration of the push-button extension in the TwinCAT System Manager and, on the other hand, the linking of I/O tasks.

4.4.1 TwinCAT System Manager connection

During commissioning you must connect the push-button extension in the TwinCAT System Manager. Follow the steps below:

1. Click at the top in the menu on **File > New > Project** and create a new **TwinCAT XAE Project.**
2. Click **I/O** on the left in the tree view, and then right-click **Devices**.
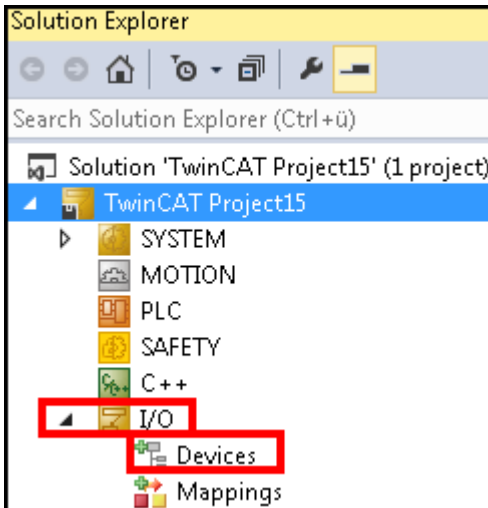
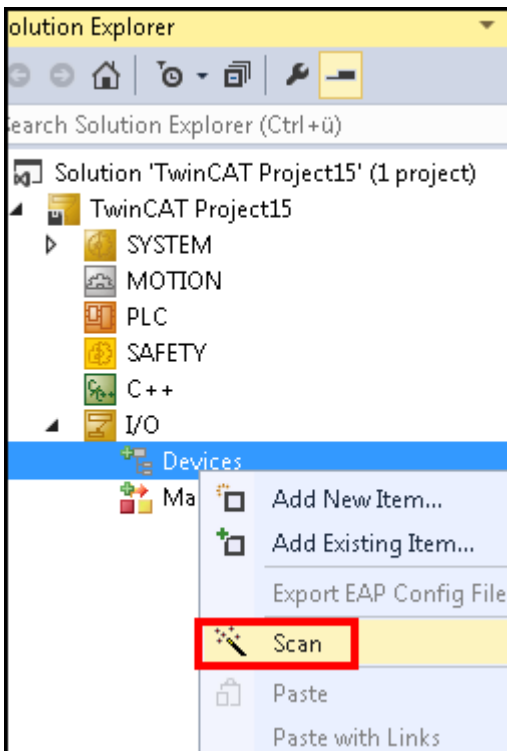Fig. 22: XAE Project

3. In the context menu click **Scan**.

Fig. 23: Scan device

4. Select the devices you want to use and confirm the selection with **OK**.
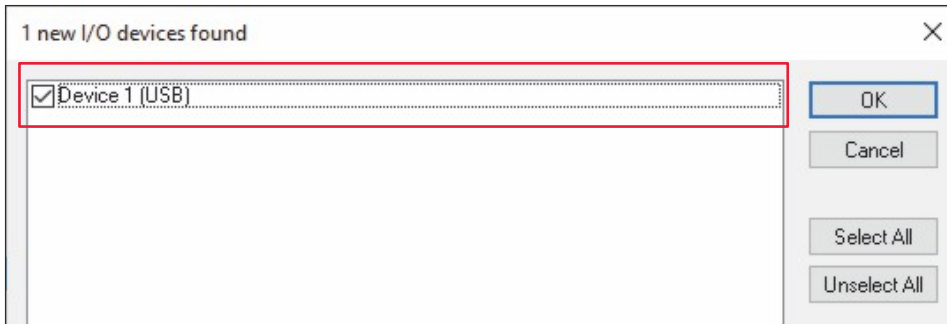
Fig. 24: Select device

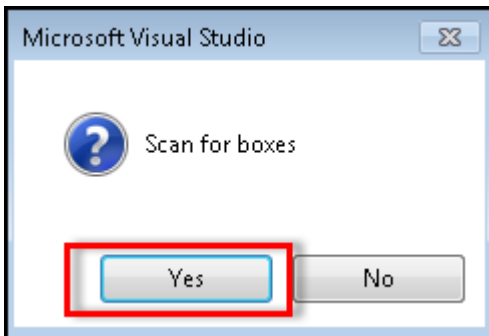5. Confirm the request with **Yes**, in order to scan for boxes.

Fig. 25: Scan for box modules

6. Confirm the request whether to enable **FreeRun** with **Yes**.
⇨ The device is inserted as a box in the tree view.

Renaming inputs and outputs

If you open your device (box) in the TwinCAT tree view, the contained terms are listed. Within these terms are channels with the inputs and outputs they contain. These are operating elements and LEDs. For better orientation, rename the inputs and outputs according to their function. The following table assigns the inputs and outputs to their functions:

Table 10: Assignment of inputs and outputs and function

Term	Inputs/outputs	Function	Term	Inputs/outputs	Function
Term 1 (KL1002)	1	S1	Term 6 (KL2408)	1	S19 LED red
	2	not used		2	S19 LED green
Term 2 (CPx9xx-8)	Key 1	S3		3	S19 LED blue
	Key 2	S4		4	S19 LED white
	Key 3	S5		5	S20 LED red
	Key 4	S6		6	S20 LED green
	Key 5-8	not used		7	S20 LED blue
	LED 1	S3		8	S20 LED white
	LED 2	S4	Term 7 (KL2408)	1	S21 LED red
	LED 3	S5		2	S21 LED green
	LED 4-8	not used		3	S21 LED blue
Term 3 (KL2408)	1	S7 LED red		4	S21 LED white
	2	S7 LED green		5-8	not used
	3	S7 LED blue	Term 8 (KL1408)	1	S7
	4	S7 LED white		2	S8
	5	S8 LED red		3	S9
	6	S8 LED green		4	S13
	7	S8 LED blue		5	S14
	8	S8 LED white		6	S15
Term 4 (KL2408)	1	S9 LED red		7	S19
	2	S9 LED green		8	S20
	3	S9 LED blue	Term 9 (KL1408)	1	S21
	4	S9 LED white		2-8	not used
	5	S13 LED red	Term 10 (KL2408)	1	S10 LED red
	6	S13 LED green		2	S10 LED green
	7	S13 LED blue		3	S10 LED blue
	8	S13 LED white		4	S10 LED white
Term 5 (KL2408)	1	S14 LED red		5	S11 LED red
	2	S14 LED green		6	S11 LED green
	3	S14 LED blue		7	S11 LED blue
	4	S14 LED white		8	S11 LED white
	5	S15 LED red			
	6	S15 LED green			
	7	S15 LED blue			
	8	S15 LED white			

Term	Inputs/outputs	Function	Term	Inputs/outputs	Function
Term 11 (KL2408)	1	S12 LED red	Term 17 (KL2408)	1	S26 LED500
	2	S12 LED green		2	S26 LED501
	3	S12 LED blue		3	S26 LED502
	4	S12 LED white		4	S26 LED503
	5	S16 LED red		5	S26 LED504
	6	S16 LED green		6	S26 LED505
	7	S16 LED blue		7	S26 LED506
	8	S16 LED white		8	S26 LED507
Term 12 (KL2408)	1	S17 LED red	Term 18 (KL2408)	1	S26 LED508
	2	S17 LED green		2	S26 LED512
	3	S17 LED blue		3	S26 LED513
	4	S17 LED white		4	S26 LED511
	5	S18 LED red		5-8	not used
	6	S18 LED green	Term 19 (KL1408)	1	not used
	7	S18 LED blue		2	S26 1
	8	S18 LED white		3	S26 2
Term 13 (KL2408)	1	S22 LED red		4	S26 4
	2	S22 LED green		5	S26 8
	3	S22 LED blue		6	S26 16
	4	S22 LED white		7, 8	not used
	5	S23 LED red	Term 20 (KL2408)	1	S27 LED500
	6	S23 LED green		2	S27 LED501
	7	S23 LED blue		3	S27 LED502
	8	S23 LED white		4	S27 LED503
Term 14 (KL2408)	1	S24 LED red		5	S27 LED504
	2	S24 LED green		6	S27 LED505
	3	S24 LED blue		7	S27 LED506
	4	S24 LED white		8	S27 LED507
	5-8	not used	Term 21 (KL2408)	1	S27 LED508
Term 15 (KL1408)	1	S10		2	S27 LED512
	2	S11		3	S27 LED513
	3	S12		4	S27 LED511
	4	S16		5-8	not used
	5	S17	Term 22 (KL1408)	1	not used
	6	S18		2	S27 1
	7	S22		3	S27 2
	8	S23		4	S27 4
Term 16 (KL1408)	1	S24		5	S27 8
	2-8	not used		6	S27 16
				7, 8	not used

To rename the inputs and outputs, follow the steps below:

1. Click on the arrow to the left of the relevant term.
   ⇨ The associated channels of the term are displayed.
2. Click on the arrow to the left of the corresponding channel.
   ⇨ The corresponding inputs and outputs of the channel are displayed.
3. Right-click on the corresponding input or output.
4. Click on **Rename**.

5. Enter the function of the input or output from the previous table as the new name.
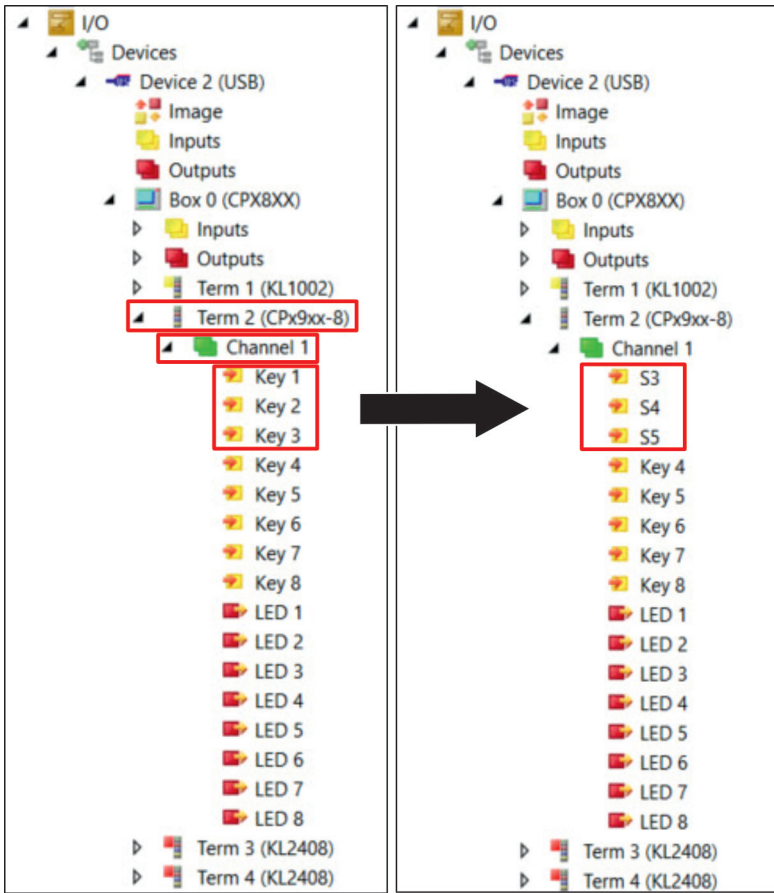
⇨ You have renamed the input or output.

Fig. 26: Renaming inputs and outputs

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4.4.2   I/O task linking

The free TwinCAT version is sufficient for reading push button extensions, you do not need an extra TwinCAT license. After reading in, you can extract the ADS info and use it as part of the ADS (Automation Device Specification) communication protocol. You can find more information about ADS here.

To cyclically address connected inputs and outputs (I/Os) without a PLC project, you must link the EtherCAT devices to an I/O task. Proceed as follows:

1. Click **Add New Item** under **SYSTEM > Tasks** on the left side of the tree view.
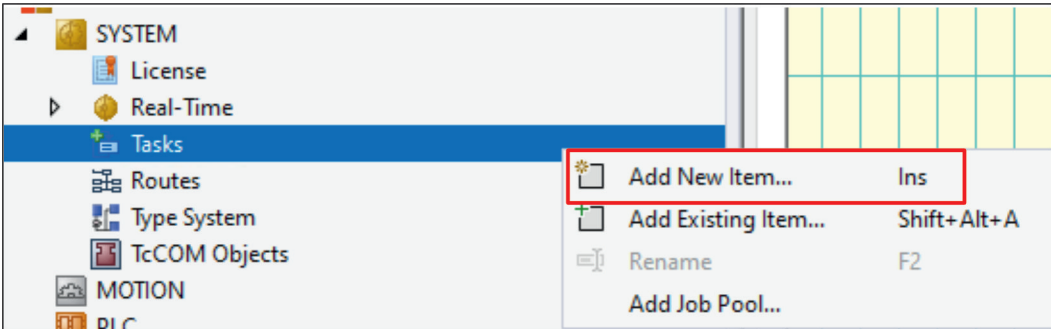
2. Give the task a name and select the **TwinCAT Task With Image** option.
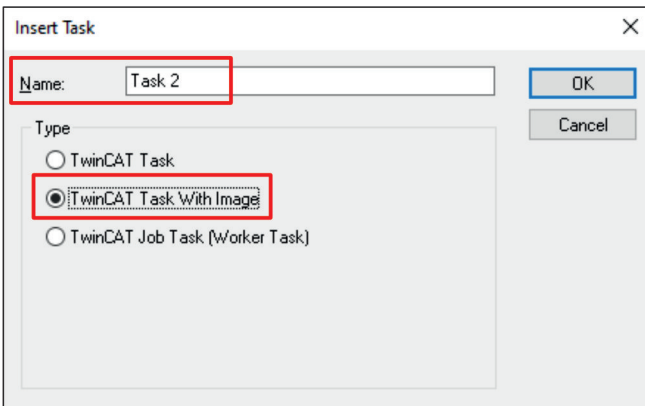
3. Accept the default values for the task.
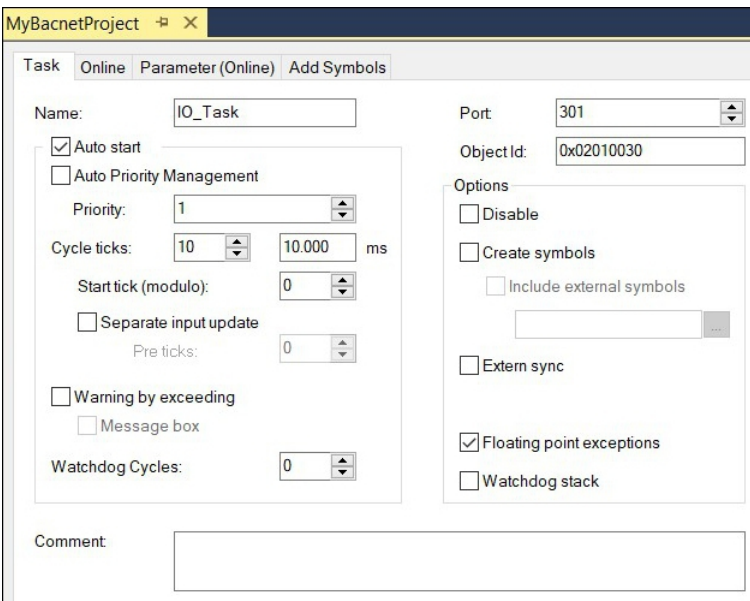
4. Right-click on **Inputs** on the left in the tree view and then click **Add New Item**.
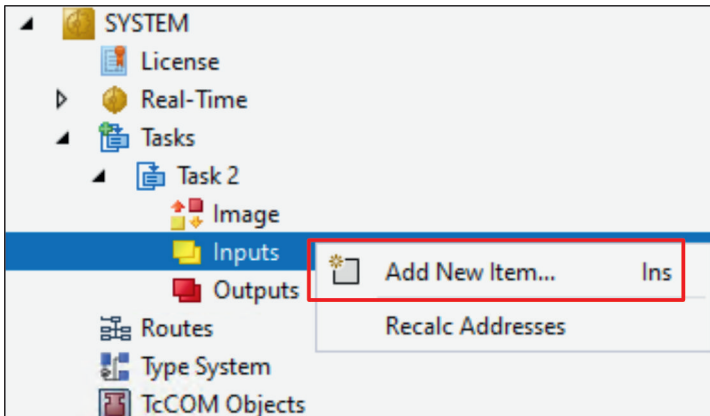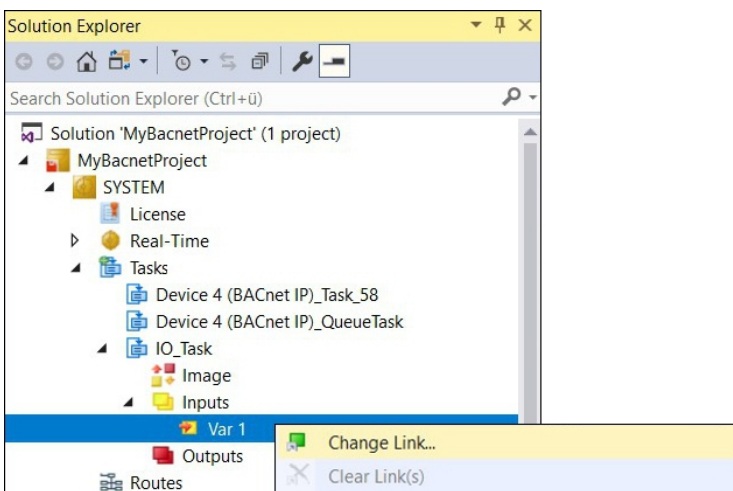

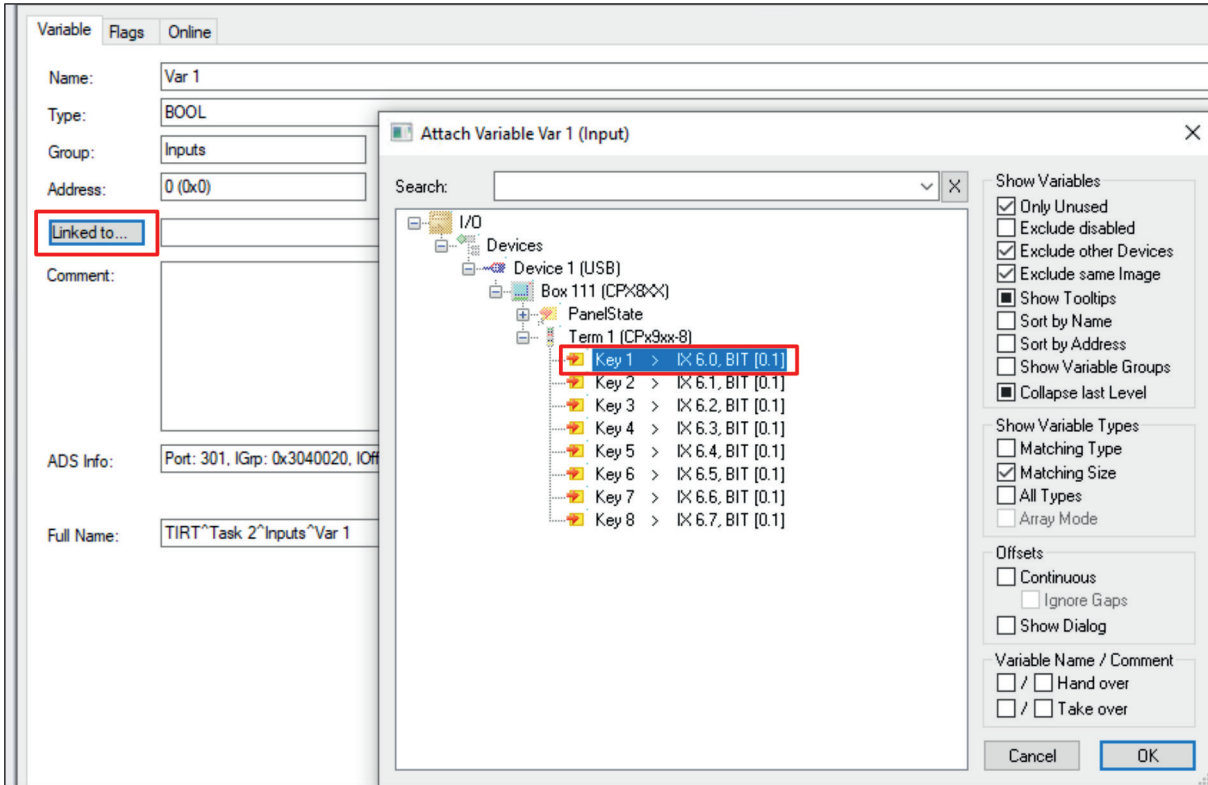5. Create a BOOL variable with a size of one byte.
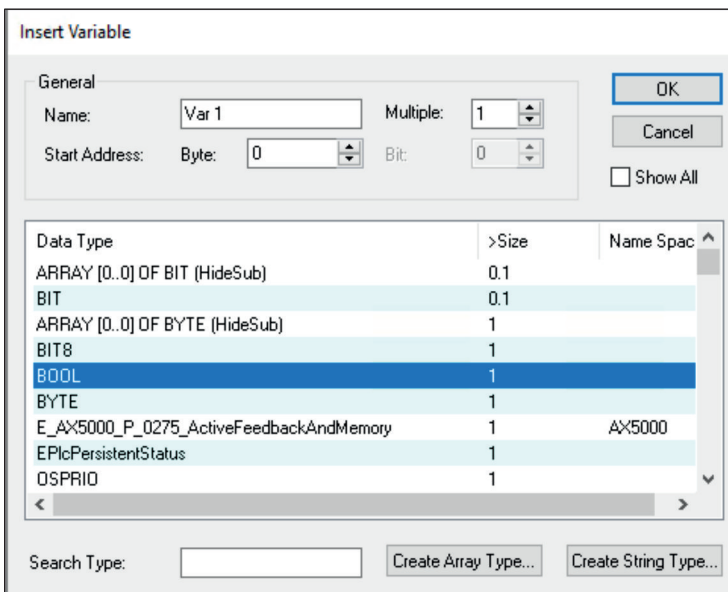
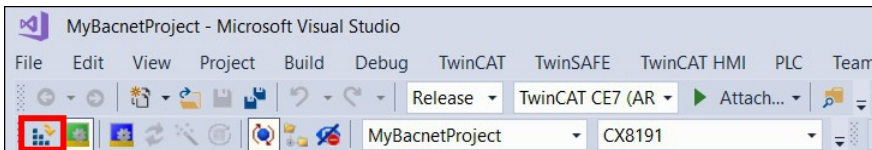6. Link the BOOL variable to the EtherCAT device.

7. To do this, right-click on the created BOOL variable in the tree view on the left, then click **Change Link.**
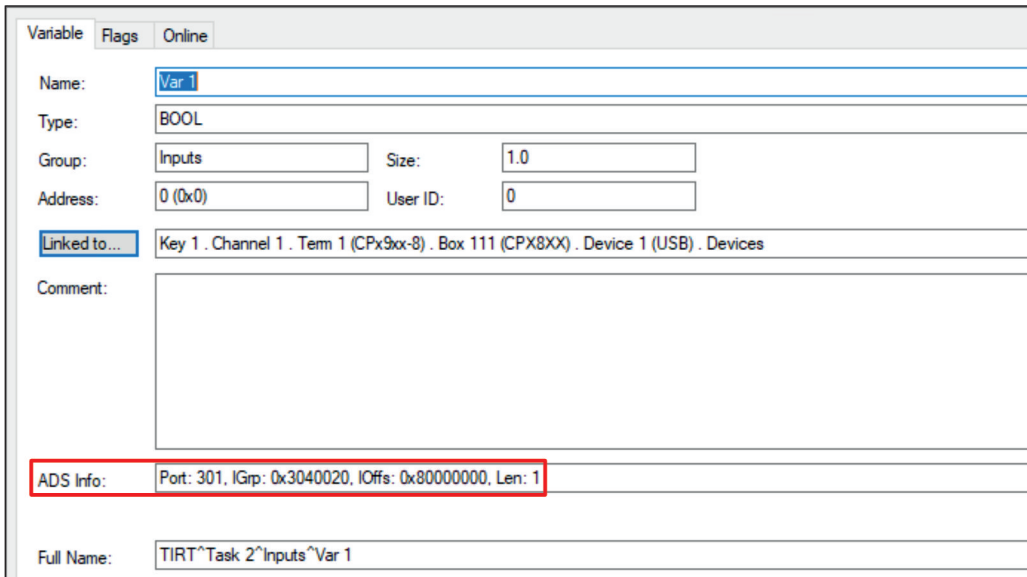
8. Connect the BOOL variable with a variable of the EtherCAT device, e.g. **Key 1.**

9. Activate the configuration and restart the TwinCAT system when requested.

10. Remove the ADS info from the variable in order to use it later in the ADS programming.

⇨ Configuration is now complete.

5   Decommissioning

NOTICE
Hardware damage due to power supply
A connected power supply can cause damage to the device during disassembly.
• Disconnect the power supply from the device before starting to disassemble it.

When taking the control panel out of operation, you must first disconnect the power supply and cables. You can then dismantle the device.

If you do not want to continue using the control panel, Chapter 5.2 Disassembly and disposal [▶ 40] provides information on the correct disposal of the device.

5.1   Disconnecting the power supply and cables

⚠ CAUTION
Risk of electric shock
Dangerous touch voltages can lead to electric shock. To avoid electric shock, observe the following:
• Never connect or disconnect the device cables during a thunderstorm.
• Provide protective earthing for handling the device.

Disconnecting the power supply and cables

Proceed as follows to disconnect the power supply and lines:

1. Shut down the control panel.
2. Disconnect the control panel from the external 24 V power supply.
3. Loosen the screw connection between the voltage socket and the voltage connector.
4. Remove the voltage connector from the voltage socket.
5. Make a note of the wiring of all data transmission cables if you want to restore the cabling with another device.
6. Disconnect all data transfer cables from the control panel.
7. Finally, disconnect the ground connection.
⇨ You have disconnected the power supply and the cables.

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5.2 Disassembly and disposal

Before you can remove the control panel from the mounting arm tube, you must first disconnect the power supply and the cables (see chapter 5.1 <u>Disconnecting the power supply and cables</u> [▶ 39]).

Disassembly mounting arm tube

NOTICE
Damage to property due to falling down
If the control panel is suspended from the ceiling and you undo the slotted nut of the mounting arm adapter without securing it, the control panel will fall down.
• Make sure the control panel is secured against falling down before you undo the slotted nut of the mounting arm adapter.

To remove the control panel from the mounting arm tube, follow the steps below:

1. Release the slotted nut of the mounting arm adapter with a hook wrench size 58-62 in counterclockwise direction (section A). The ordering option for the hook wrench can be found in chapter 4.2 <u>Mounting</u> [▶ 23]).
2. Unscrew the hexagon socket screw (1) a few turns with a 3 mm Allen key (section A).
3. Pull the mounting arm tube out of the mounting arm adapter (section B).
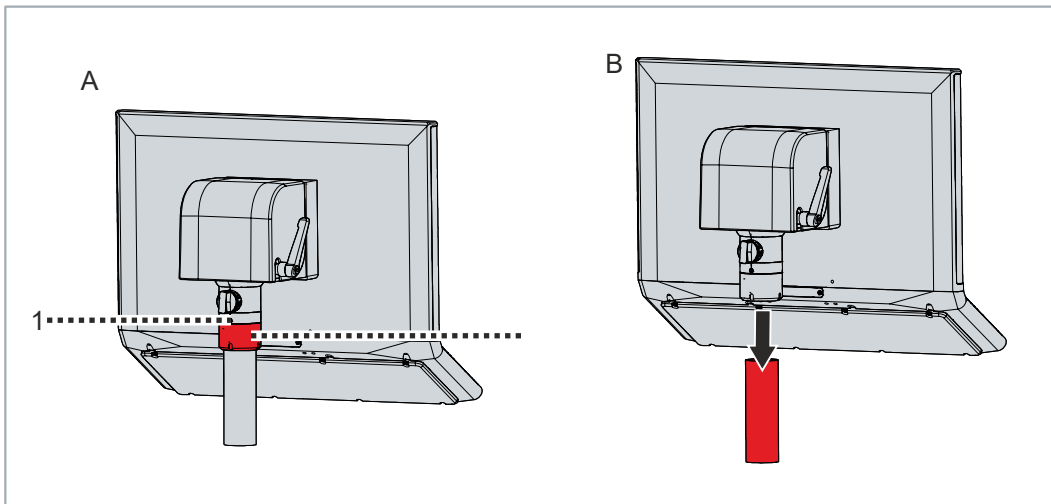

Fig. 27: Disassembly mounting arm tube

4. Pull the connecting cables out of the mounting arm tube.
5. Retighten the hexagon socket screw with a torque of 3 Nm.
⇨ You have dismantled the mounting arm tube.

Disposal of the control panel

When disposing of the control panel the national electronic waste regulations must be followed.

6   Maintenance

Maintenance measures increase the efficiency of the device by ensuring long-term functionality. Cleaning the device contributes to this.

Defective pixels in the TFT display are production-related and are not grounds for complaint.

Cleaning

NOTICE
Unsuitable cleaning agents
The use of unsuitable cleaning agents can damage the device.
• Clean the device only as specified.

It is essential to observe the following aspects when cleaning the control panel:

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

Cleaning agents

In order to avoid damage to the front of the panel PC during cleaning, you must use suitable cleaning agents. Examples include:

- benzine
- spirit
- glass cleaner

Avoid the following cleaning agents:

- detergents with scouring or abrasive components
- metal cleaning objects such as razor blades or steel spatulas
- steam jet cleaner or very hot water
- cold water with a heated device
- high water pressure, e.g. high-pressure cleaner

Cleaning the front screen

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

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

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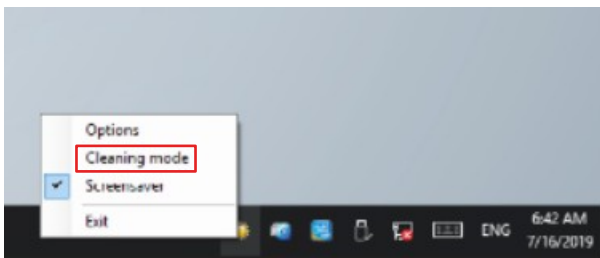3. Select the "Cleaning Mode" (see Fig.).

Fig. 28: Select "Cleaning Mode"

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

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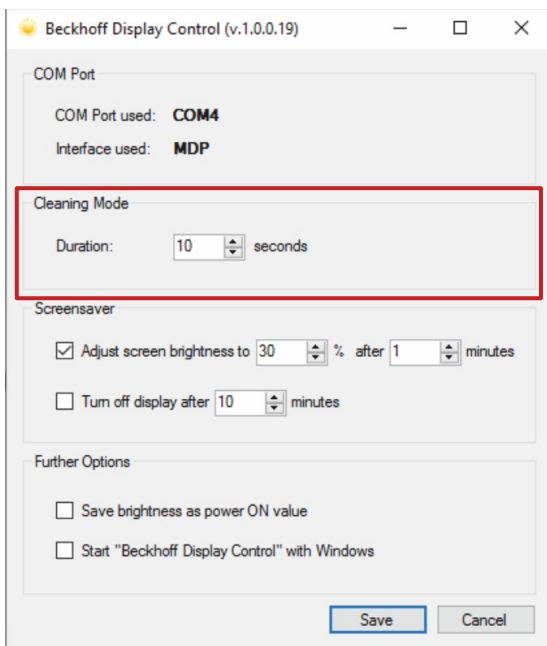

Fig. 29: Configuration "Cleaning Mode"

7 Troubleshooting

Fault	Cause	Measures
No control panel function	Lack of power supply to the control panel	Check the power supply cable
	Other cause	Call Beckhoff Service
The control panel only works partially or only temporarily (e.g. dark image or none at all)	Defective backlight in the display	Call Beckhoff Service
	Components in the control panel defective	Call Beckhoff Service
Malfunction of the touch screen	Poor or missing functional earth of the device	Establish functional earth
	Poor or missing ground connection of the user	User must stand on the floor with normal shoes
USB error during access with TwinCAT via USB	Cycle times in TwinCAT set to 10 ms (default)	Increase the cycle times to between 50 ms and 80 ms

8 Technical data

Table 11: Technical data

Product designation	CP3921-151x-0000		
Weight	10,3 kg		
Supply voltage	22-30 V_{DC} (24 V_{DC} power supply unit) NEC class 2		
Power consumption	Data sheet for power consumption and power loss in the download finder: https://www.beckhoff.com/en-en/support/download-finder/search-result/?download_group=691754572		
Protection rating	IP65		
Vibration resistance (sinusoidal vibration)	EN 60068-2-6:	10 ... 58 Hz:	0.035 mm
		58 ... 500 Hz:	0.5 G (~ 5 m/ s^2)
Shock resistance (shock)	EN 60068-2-27:	5 G (~ 50 m/s^2), duration: 30 ms	
EMC interference immunity	conforms to EN 61000-6-2		
EMC interference emission	conforms to EN 61000-6-4		
Permissible ambient temperature	Operation: 0 °C ... +50 °C Transport / storage: -20 °C ... +65 °C		
Permissible relative air humidity	Maximum 95%, no condensation		
Transport and storage	The values for air humidity and shock resistance are to be observed during transport and storage and in operation. Suitable packaging of the control panel can improve resistance to impact during transport.		

Product designation	CP3921-151x-0010		
Weight	10,3 kg		
Supply voltage	22-30 V_{DC} (24 V_{DC} power supply unit) NEC class 2		
Power consumption with CU8802	Data sheet for power consumption and power loss in the download finder: https://www.beckhoff.com/en-en/support/download-finder/search-result/?download_group=691754572		
Protection rating	IP65		
Vibration resistance (sinusoidal vibration)	EN 60068-2-6:	10 ... 58 Hz:	0.035 mm
		58 ... 500 Hz:	0.5 G (~ 5 m/ s^2)
Shock resistance (shock)	EN 60068-2-27:	5 G (~ 50 m/s^2), duration: 30 ms	
EMC interference immunity	conforms to EN 61000-6-2		
EMC interference emission	conforms to EN 61000-6-4		
Permissible ambient temperature	Operation: 0 °C ... +55 °C Transport / storage: -20 °C ... +65 °C		
Permissible relative air humidity	Maximum 95%, no condensation		
Transport and storage	The values for air humidity and shock resistance are to be observed during transport and storage and in operation. Suitable packaging of the control panel can improve resistance to impact during transport.		

9   Appendix

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

9.1   Service and support

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

Beckhoff Service

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

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

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

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

Beckhoff Support

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

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

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

Headquarters

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

Phone: + 49 5246/963-0
email: info@beckhoff.de

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

You can also find further documentation for Beckhoff components there.

9.2   Approvals

Your device has at least the following approvals:

- 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

List of tables

Trademark statements

More Information:
www.beckhoff.com/cp3921-151x