BECKHOFF New Automation Technology

Manual | EN

CP29xx

Control Panel

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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 responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

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

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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 loss (please refer to the respective data sheet).

Currentness

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

Delivery conditions

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

2 For your safety

The signal words and their meanings are explained in the chapter on safety. 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 Signal words

The signal words used in the documentation are classified below.

Warning of personal injuries

⚠ DANGER
Hazard with high risk of death or serious injury.

⚠ WARNING
Hazard with medium risk of death or serious injury.

⚠ CAUTION
There is a low-risk hazard that can result in minor injury.

Warning of property and environmental damage

NOTICE
There is a possibility of damage to the environment, equipment or data.

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 CP29xx-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 CP29xx-0010 Control Panel enables the panel to be located up to 100 m away from the PC via a CP-Link 4 cable with optionally integrated or separate 24 V power supply, depending on the transmitter module.

The front of the device is designed for an IP65 working environment. It offers full protection against contact and against dust, as well as protection against water jets (nozzle) from any angle.

The rear side is designed for a working environment that meets the IP20 protection rating. It is protected against the penetration of fingers and solid foreign bodies of 12.5 mm in diameter or larger in size. It is not protected against water. Operation of the device in wet and dusty environments is not permitted.

The specified limits for technical data must be adhered to.

The device can be used within the documented operating conditions.

Improper use

Do not use the device outside the documented operating conditions.

2.3 Fundamental safety instructions

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

Application conditions

- Do not use the device under extreme environmental conditions.
- 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 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 Beckhoff Panel generation with industrially-compatible multi-touch display is designed for control cabinet installation. The devices offer suitable solutions for a variety of applications. The model variety ranges from different display sizes and formats to custom models. This Panel generation is also suited for single-touch applications.

The control panel has the following features:

- Different display sizes and resolutions, landscape and portrait mode:
  - 7-inch, 800 x 480 (5:3)
  - 12-inch, 800 x 600 (4:3)
  - 12.1-inch, 1280 x 800 (16:10)
  - 15-inch, 1024 x 768 (4:3)
  - 15.6-inch, 1366 x 768 (16:9)
  - 18.5-inch, 1366 x 768 (16:9)
  - 19-inch, 1280 x 1024 (5:4)
  - 21.5-inch, 1920 x 1080 (16:9)
  - 24-inch, 1920 x 1080 (16:9)
- Multi-finger touch screen (PCT): e.g. for 10-finger touch
- Aluminum housing with glass front, front IP65, rear IP20, the housing surface is electrically insulating
- Control cabinet installation via pull-out clamping levers for fast installation without loose parts

Push button extension

The following control panels are optionally available in landscape mode ex factory with a corresponding, C9900-G0xx push button extension:

- CP2912 (C9900-G002)
- CP2913 (C9900-G009)
- CP2915 (C9900-G003)
- CP2916 (C9900-G004)
- CP2918 (C9900-G005)
- CP2919 (C9900-G006)
- CP2921 (C9900-G008)
- CP2924 (C9900-G007)

Explanations of the push button extension and the functions can be found in the installation and operating instructions for the C9900-G0xx. Figure 1 shows an example of a control panel without (1) and with (2) push button extension.

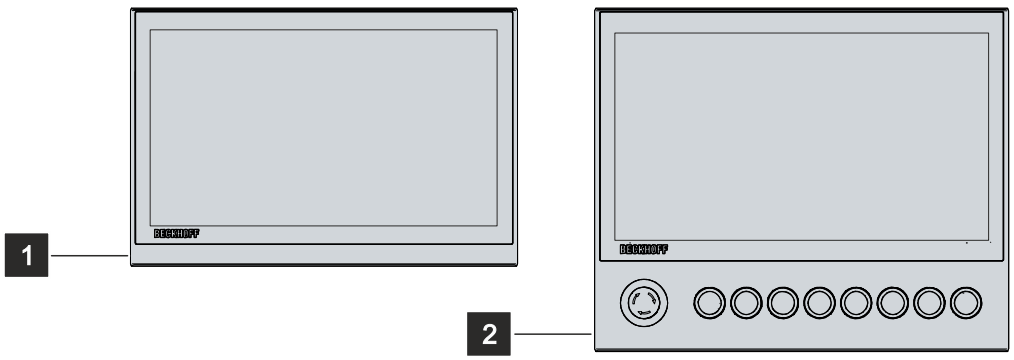


Fig. 1: Without and with push button extension

3.1 Structure

Figure 2 shows the device configuration as an example of all CP29xx versions.

Depending on the product version, the interfaces of the control panel on the connection block vary. Otherwise, there are no differences in the external design of the device.

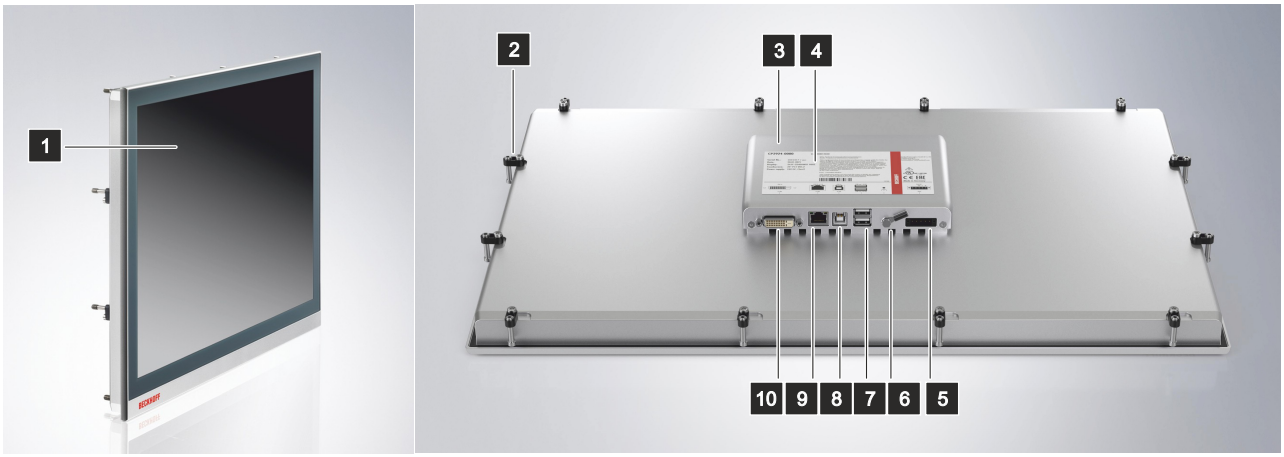


Fig. 2: Structure

Table 1: Legend structure

No.	Component	Description
1	Display and touch screen glass	Operating the control panel
2	Clamping lever	Mounting the control panel in the control cabinet
3	Connection block	Access to the interfaces
4	Name plate	Information on the control panel equipment
5	Power supply (X101)	Connection of the power supply and protective earth of the control panel
6	Grounding bolt	Functional earth of the control panel
7	USB output (X102, X103)	Connection of peripheral devices
8	USB input (X104)	Connection of control panel and industrial PC up to a maximum of 5 m
9	RJ45 for USB Extended (X105)	Connection of control panel and CU8801 USB-to-USB extended converter box over up to 50 m
10	DVI input (X106)	Transmission of DVI from industrial PC to control panel over up to 50 m

Optionally, you can order the following devices with a stainless steel front instead of an aluminum front. For this you need to order the device itself and the ordering option below:

- CP2907 (ordering option stainless steel front: C9900-F941)
- CP2913 (ordering option stainless steel front: C9900-F942)
- CP2916 (ordering option stainless steel front: C9900-F945)
- CP2918 (ordering option stainless steel front: C9900-F946)
- CP2921 (ordering option stainless steel front: C9900-F948)

The following figure shows the structure of a stainless steel device:

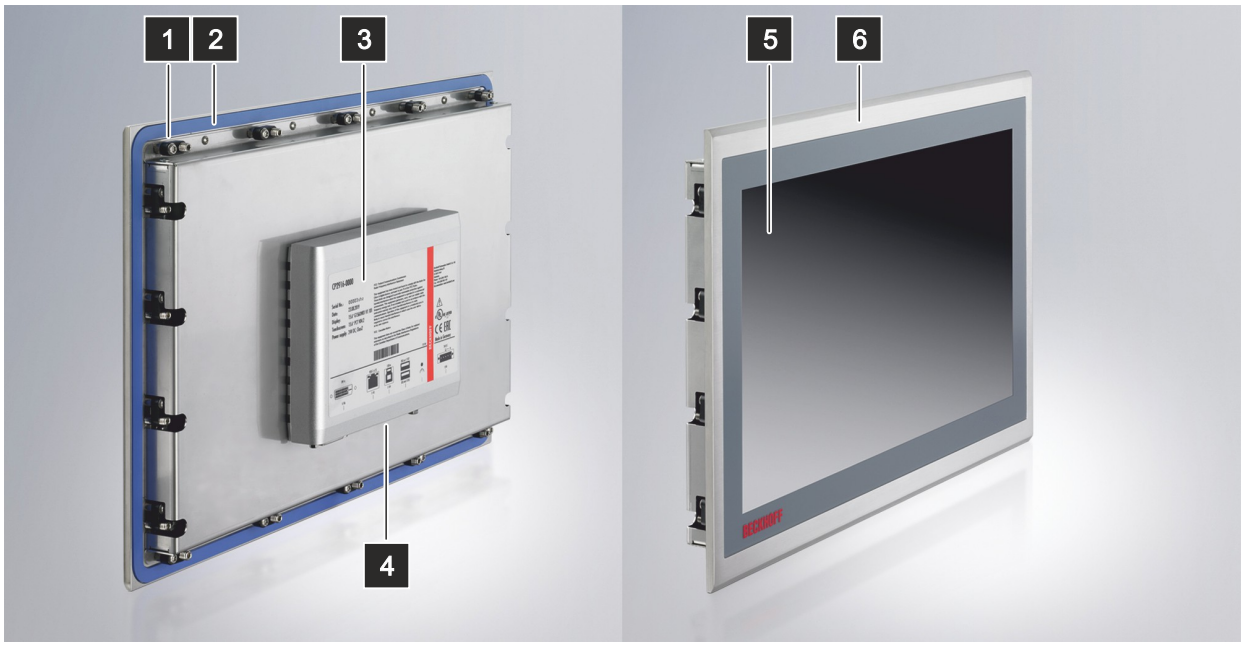


Fig. 3: Structure stainless steel device

Table 2: Legend structure CP29xx stainless steel device

No.	Component	Description
1	Clamping lever	Mounting the control panel in the control cabinet wall
2	Silicone seal	Protection of the connection section from moisture
3	Name plate	Information on the control panel equipment
4	Access to interfaces	Interfaces on the underside
5	Display and touch screen glass	Operating the control panel
6	Stainless steel front	Use in environments with higher hygiene requirements

3.2 CP29xx-0000 interface description

The CP29xx-0000 features the following interfaces, which are located at the back of the housing:

- Power supply (X101)
- USB output (X102, X103)
- USB input (X104)
- RJ45 for USB Extended (X105)
- DVI Extended input (X106)

3.2.1 Power supply

The control panel is supplied with a nominal input voltage of 24 V. The five-pin voltage socket (X101) is used for connection to the power supply and the protective earth of the control panel.

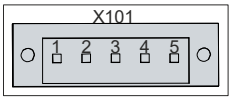


Fig. 4: Voltage socket pin numbering

Table 3: Voltage socket pin assignment

Pin	Signal	Description
1	NC	not used
2	NC	not used
3	⏚	Protective earth
4	-	Negative pole power supply 24 V
5	+ 24 V	24 V power supply, positive pole

The plug for the power supply is specified for 16 A and can accommodate wire 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 line. There should be at least 22 V at the power supply plug of the control panel, so that the control panel 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-P927: power supply connector for CP29xx, 5-pin connector with strain relief for the external supply cable

3.2.2 USB output

The CP29xx-0000 Control Panel has two USB outputs (X102, X103) with socket type A. The interfaces are used to connect peripheral devices with USB connection. USB specification 3.0 is supported for connection distances up to 3 m. USB specification 2.0 is supported for connection distances of more than 3 m or when USB-E is used.

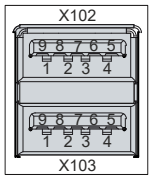


Fig. 5: USB interface pin numbering

Table 4: USB interface pin assignment

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

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

3.2.3 USB input

The CP29xx-0000 Control Panel has a USB input (X104) with socket type B. The USB input is used to connect the control panel to the industrial PC. USB specification 3.0 is supported for connection distances up to 3 m. USB specification 2.0 is supported for connection distances up to 5 m.

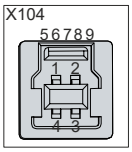


Fig. 6: USB input pin numbering

Table 5: USB interface pin assignment

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

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

3.2.4 USB Extended input

The CP29xx-0000 Control Panel has a USB Extended input (X105) in the form of an RJ45 socket. The interface is used to connect the control panel to the CU8801 USB-to-USB extended transmitter box. The connection is made via a standard RJ45 cable, not crossed. The interface transmits USB 2.0 at 480 Mbit/s. The socket does not represent an Ethernet port.

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.

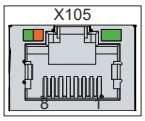


Fig. 7: USB-E input pin numbering

Table 6: USB-E input 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 -	

3.2.5 DVI Extended input

The CP29xx-0000 Control Panel has a DVI Extended input (X106). 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.

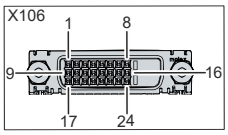


Fig. 8: DVI Extended input pin numbering

Table 7: DVI Extended interface pin assignment

Pin	Connection	Pin	Connection	Pin	Connection
1	TMDS Data 2 -	9	TMDS Data 1 -	17	TMDS Data 0 -
2	TMDS Data 2 +	10	TMDS Data 1 +	18	TMDS Data 0 +
3	TMDS Data 2/4 Shield	11	TMDS Data 1/3 Shield	19	TMDS Data 0/5 Shield
4	TMDS Data 4 -	12	TMDS Data 3 -	20	TMDS Data 5 -
5	TMDS Data 4 +	13	TMDS Data 3 +	21	TMDS Data 5 +
6	DDC Clock	14	+ 5 V Power	22	TMDS Clock Shield
7	DDC Data	15	Ground (+ 5 V, Analog H/V Sync)	23	TMDS Clock +
8	Analog Vertical Sync	16	Hot Plug Detect	24	TMDA Clock -

3.3 CP29xx-0010 interface description

The CP29xx-0010 features the following interfaces, which are located at the back of the housing:

- Power supply (X101)
- USB output (X102, X103)
- RJ45 for CP-Link 4 (X104)

3.3.1 Power supply

The control panel is supplied with a nominal input voltage of 24 V. The electrically isolated five-pin voltage socket (X101) is used for connection to the power supply and the protective earth of the control panel.

If the control panel is connected to an industrial PC via the CU8803 transmitter box, no additional power supply to the control panel is required via the voltage socket.

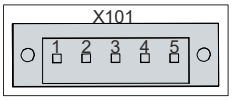


Fig. 9: Voltage socket pin numbering

Table 8: Voltage socket pin assignment

Pin	Signal	Description
1	NC	not used
2	NC	not used
3	⏚	Protective earth
4	-	24 V supply voltage, negative pole
5	+ 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 1.5 mm^2. 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 control panel, so that the control panel 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-P927: power supply connector for CP29xx, 5-pin connector with strain relief for the external supply cable

3.3.2 USB output

The CP29xx-0010 Control Panel has two USB outputs (X102, X103) with socket type A. The interfaces are used to connect peripheral devices with USB connection. USB specification 2.0 is supported.

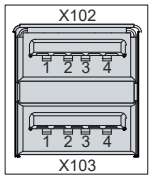


Fig. 10: USB interface pin numbering

Table 9: USB interface pin assignment

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

3.3.3 CP-Link 4

The CP29xx-0010 Control Panel has a CP-Link 4 input (X104) in the form of an RJ45 socket. This is not an Ethernet port. 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.

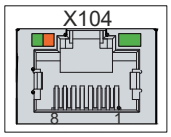


Fig. 11: CP-Link 4 interface pin numbering

Table 10: CP-Link 4 pin assignment

Pin	Signal	Description
1	0 +	Pair 0
2	0 -	
3	1 +	Pair 1
4	2 +	Pair 2
5	2 -	
6	1 -	Pair 1
7	3 +	Pair 3
8	3 -	

CP-Link 4 is available as a Two Cable Display Link on an industrial PC with PCIe module. 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. For the power supply of the CP29xx-0010 you have to connect an additional power supply (see Fig. 12).

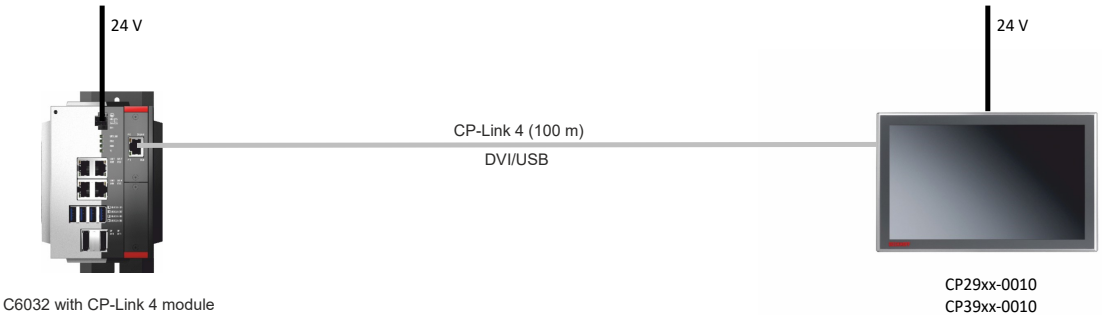


Fig. 12: CP-Link 4

CP-Link 4 with transmitter box

NOTICE

Material damage due to double voltage connection with CU8803

Connecting an additional power supply to the voltage socket of the control panel can cause damage to the panel.

- Power the control panel exclusively via One Cable Display Link through the CU8803 transmitter box.
- When using the CU8803 transmitter box, never connect an additional power supply to the voltage socket of the control panel.
- Only connect an additional power supply to the voltage socket of the control panel when using the CU8802 transmitter box.

If the industrial PC is not equipped with a PCIe module, a transmitter box is required for connecting a CP29xx-0010. The CU8802 transmitter boxes (Two Cable Display Link) and CU8803 (One Cable Display Link) are available for this purpose.

When installing the CP29xx-0010 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. For the power supply of the CP29xx-0010 you have to connect an additional power supply (Two Cable Display Link). Fig. 13 shows the wiring with the CU8802.

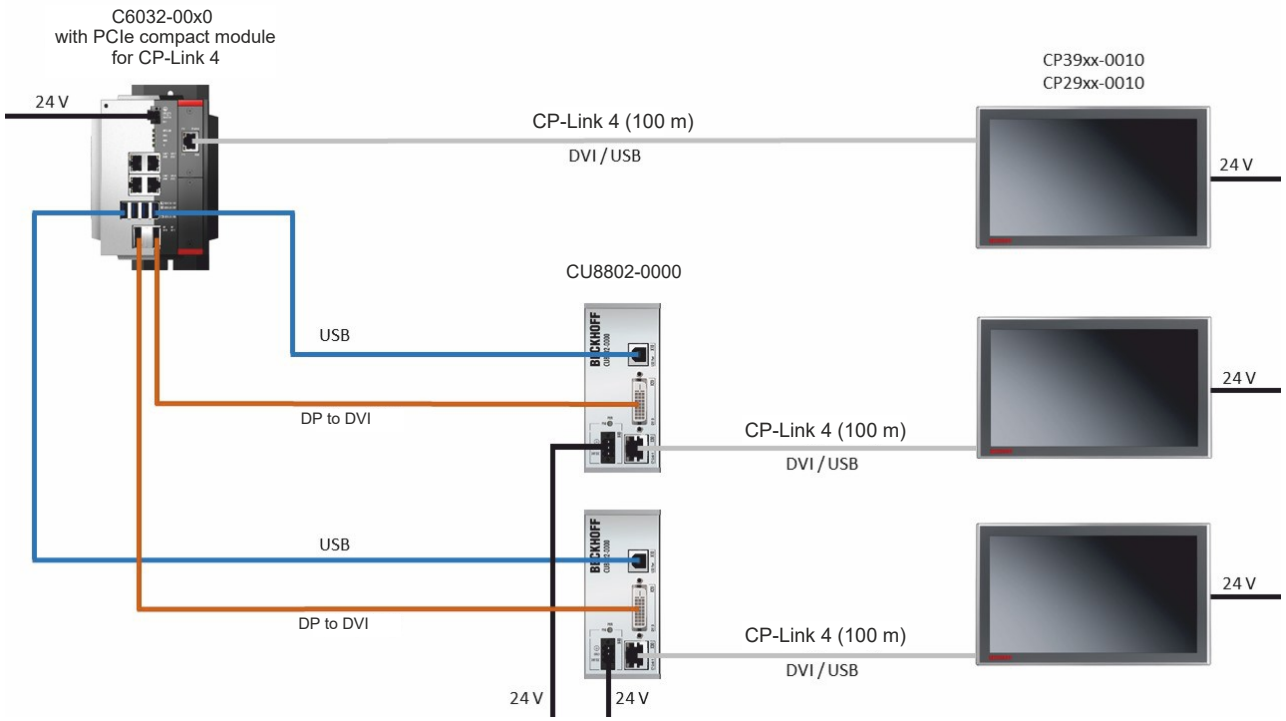


Fig. 13: CP-Link 4, CU8802

When installing the CP29xx-0010 with the CU8803 transmitter box, the industrial PC is likewise 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. With this box, USB, DP/DVI and power supply can be transmitted together via the cable (One Cable Display Link). Do not connect an additional power supply to the control panel to avoid damage. Fig. 14 shows the wiring with the CU8803.

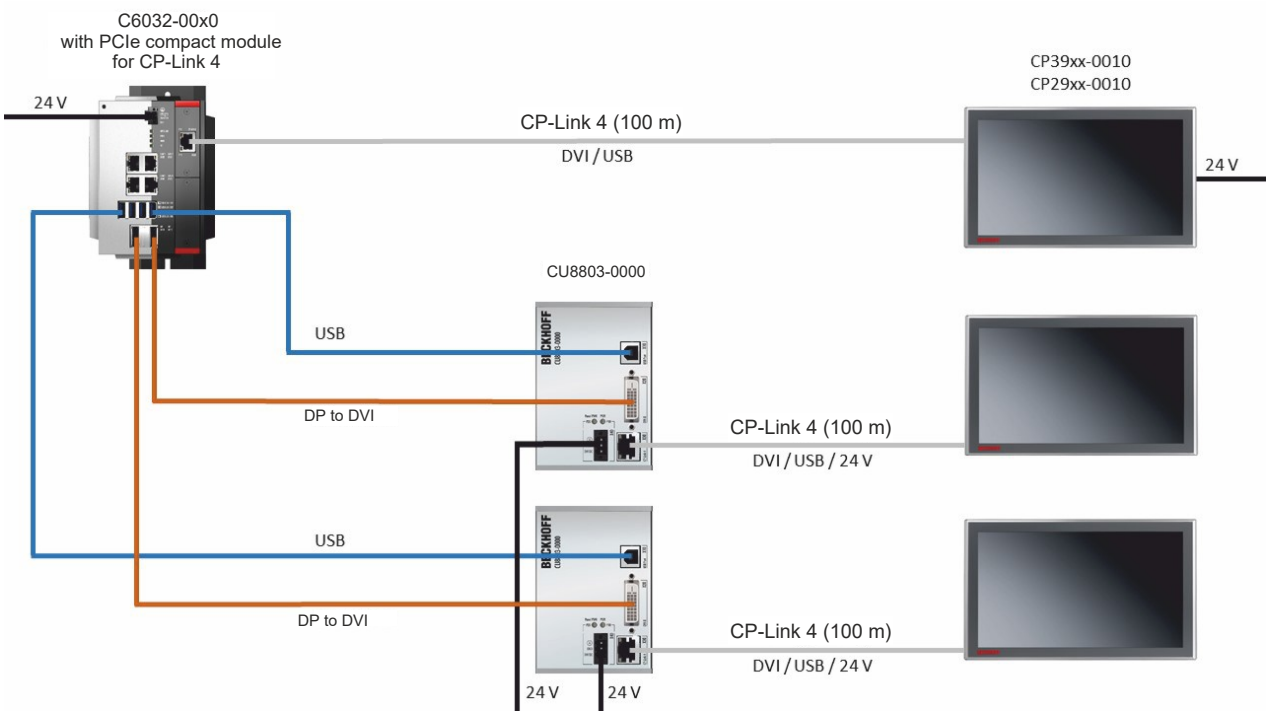


Fig. 14: CP-Link 4, CU8803

The following ordering options are available for the transmitter boxes:

- CU8802-0000: DVI-to-DVI cable included in the box
- CU8802-0001: DisplayPort to DVI cable included with box
- CU8803-0000: DVI-to-DVI cable included in the box
- CU8803-0001: DisplayPort to DVI cable included with box

3.4 Optional USB interface

You can expand the CP29xx beyond the basic configuration with an additional USB interface. The following ordering options are available:

- USB (order identifier: C9900-E268)

The ordering option is not available for the CP29xx in combination with a push button extension or a stainless steel front.

The interface is mounted ex factory. It is located at the bottom right in the front of the control panel behind a cover. To make the interface accessible, follow the steps below, shown in Figure 15:

1. Press against the bulge on the right side of the cover (section A).
   ⇨ The cover protrudes slightly from the left side of the device (section B).
2. Turn the cover down (section C).
   ⇨ The USB interface is now accessible (section D).

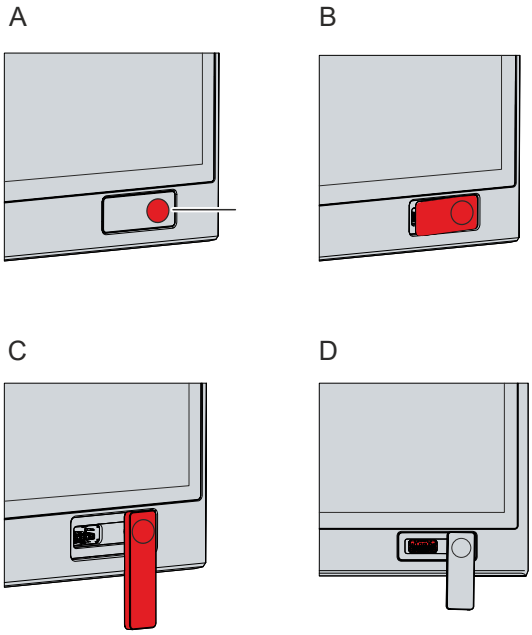


Fig. 15: Access optional interface

3. Turn the cover back again.
4. Press the bulge again.

⇨ The cover is locked again.

The interface is used to connect peripheral devices with USB connection. This is a USB-A socket according to IP65. The USB 2.0 specification is supported.

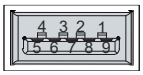


Fig. 16: Optional USB interface

Table 11: Optional USB interface pin assignment

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

3.5 Name plate

The name plate provides you with information on the equipment of the control panel. The name plate shown here is only an example.

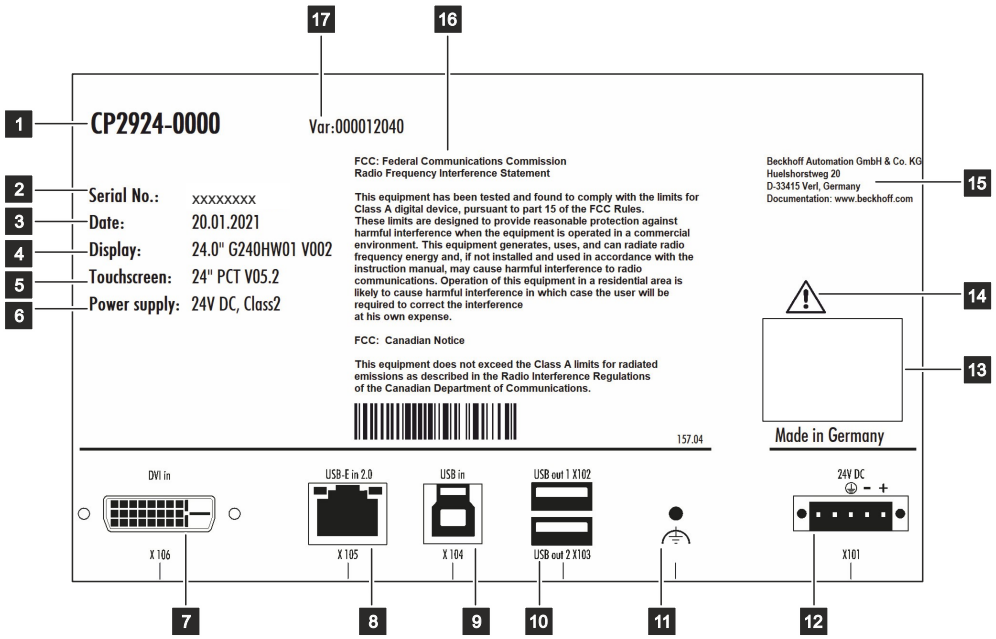


Fig. 17: Name plate example

Table 12: Legend name plate

No.	Description
1	Model: the last four digits indicate the product variant.
2	Serial number (BTN)
3	Date of manufacture
4	Display
5	Touch screen
6	Power supply: 24 V_{DC}, NEC class 2
7	DVI Extended interface (X106)
8	USB Extended Interface (X105)
9	USB input (X104)
10	USB output (X102, X103)
11	Ground connection for functional earthing of the control panel
12	Connection of the power supply and protective earth of the control panel (X101)
13	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.
14	Note: be sure to read the device manual.
15	Address of the vendor
16	FCC approval
17	Variant number: commercial number of the order code including ordering options

3.6 Connection cables/connection kits

Different connection cables or connection kits are available, depending on the product version.

3.6.1 CP29xx-0000 connection kits

The following connection kits are available for the CP29xx-0000:

Table 13: CP29xx-0000 connection kits

Connection kits	Description
C9900-K622	1 m connection kit for CP29xx-0000, consisting of: 1 m DVI cable, 1 m USB 3.0 cable
C9900-K623	3 m connection kit for CP29xx-0000, consisting of: 3 m DVI cable, 3 m USB 3.0 cable
C9900-K624	5 m connection kit for CP29xx-0000, consisting of: 5 m DVI cable, 5 m USB 2.0 cable
C9900-K686	7.5 m connection kit for CP29xx-0000, consisting of: 7.5 m DVI cable, 7.5 m CAT-5 cable for USB-E-2.0, CU8801 USB-to-USB-E-2.0 converter for DIN rail mounting next to the PC and 1 m USB cable for connecting the USB-to-USB-E-2.0 converter to the PC
C9900-K625	10 m connection kit for CP29xx-0000, consisting of: 10 m DVI cable, 10 m CAT-5 cable for USB-E-2.0, CU8801 USB-to-USB-E-2.0 converter for DIN rail mounting next to the PC and 1 m USB cable for connecting the USB-to-USB-E-2.0 converter to the PC
C9900-K683	15 m connection kit for CP29xx-0000, consisting of: 15 m DVI cable, 15 m CAT-5 cable for USB-E-2.0, CU8801 USB-to-USB-E-2.0 converter for DIN rail mounting next to the PC and 1 m USB cable for connecting the USB-to-USB-E-2.0 converter to the PC
C9900-K626	20 m connection kit for CP29xx-0000, consisting of: 20 m DVI cable, 20 m CAT-5 cable for USB-E-2.0, CU8801 USB-to-USB-E-2.0 converter for DIN rail mounting next to the PC and 1 m USB cable for connecting the USB-to-USB-E-2.0 converter to the PC
C9900-K627	30 m connection kit for CP29xx-0000, consisting of: 30 m DVI cable, 30 m CAT-5 cable for USB-E-2.0, CU8801 USB-to-USB-E-2.0 converter for DIN rail mounting next to the PC and 1 m USB cable for connecting the USB-to-USB-E-2.0 converter to the PC
C9900-K628	40 m connection kit for CP29xx-0000, consisting of: 40 m DVI cable, 40 m CAT-5 cable for USB-E-2.0, CU8801 USB-to-USB-E-2.0 converter for DIN rail mounting next to the PC and 1 m USB cable for connecting the USB-to-USB-E-2.0 converter to the PC
C9900-K629	50 m connection kit for CP29xx-0000, consisting of: 50 m DVI cable, 50 m CAT-5 cable for USB-E-2.0, CU8801 USB-to-USB-E-2.0 converter for DIN rail mounting next to the PC and 1 m USB cable for connecting the USB-to-USB-E-2.0 converter to the PC
C9900-K774	1 m connection kit for CP29xx-0000, consisting of: 1 m DisplayPort for DVI cable, 1 m USB 3.0 cable
C9900-K775	3 m connection kit for CP29xx-0000, consisting of: 3 m DisplayPort for DVI cable, 3 m USB 3.0 cable
C9900-K776	5 m connection kit for CP29xx-0000, consisting of: 5 m DisplayPort for DVI cable, 5 m USB 2.0 cable

3.6.2 CP29xx-0010 connection cables

The following connection cables are available for the CP29xx-0010:

Table 14: CP29xx-0010 connection cables

Connection cable	Description
C9900-K671	RJ45 connection cable CAT.6_A, 3 m
C9900-K672	RJ45 connection cable CAT.6_A, 5 m
C9900-K673	RJ45 connection cable CAT.6_A, 10 m
C9900-K674	RJ45 connection cable CAT.6_A, 20 m
C9900-K675	RJ45 connection cable CAT.6_A, 30 m
C9900-K676	RJ45 connection cable CAT.6_A, 40 m
C9900-K677	RJ45 connection cable CAT.6_A, 50 m
C9900-K678	RJ45 connection cable CAT.6_A, 60 m
C9900-K679	RJ45 connection cable CAT.6_A, 70 m
C9900-K680	RJ45 connection cable CAT.6_A, 80 m
C9900-K681	RJ45 connection cable CAT.6_A, 90 m
C9900-K682	RJ45 connection cable CAT.6_A, 100 m
C9900-K725	RJ45 connection cable CAT.6_A, 3 m, drag-chain suitable
C9900-K713	RJ45 connection cable CAT.6_A, 5 m, drag-chain suitable
C9900-K714	RJ45 connection cable CAT.6_A, 10 m, drag-chain suitable
C9900-K715	RJ45 connection cable CAT.6_A, 20 m, drag-chain suitable
C9900-K716	RJ45 connection cable CAT.6_A, 30 m, drag-chain suitable
C9900-K717	RJ45 connection cable CAT.6_A, 40 m, drag-chain suitable
C9900-K718	RJ45 connection cable CAT.6_A, 50 m, drag-chain suitable
C9900-K719	RJ45 connection cable CAT.6_A, 60 m, drag-chain suitable
C9900-K720	RJ45 connection cable CAT.6_A, 70 m, drag-chain suitable
C9900-K721	RJ45 connection cable CAT.6_A, 80 m, drag-chain suitable

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 installing the device in the control cabinet, connecting the cables and the 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 Beckhoff protective film. The film provides short-term protection for a few days.

You can either order a Beckhoff protective film individually and fit it yourself retrospectively, or you can order the film for fitting directly ex factory. Please refer to the price list for the available protective films according to the display size of your device.

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: //infosys-cdn.beckhoff.com/content/1033/panelconfigurationtools/11725543179.html?id=1863235424645236061.

4.1 Transport and unpacking

The specified storage conditions must be observed (see chapter 8 Technical Data [▶ 43]).

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).

4.2 Installation in the control cabinet

NOTICE

Extreme environmental conditions

Extreme environmental conditions can cause damage to the device.

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

NOTICE

Lack of air circulation

Incorrect installation of the device prevents air circulation in the device and thus causes overheating and impaired functioning.

- Only install the device in the corresponding wall in the orientation shown.

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

The dimensions of the control panel can be found in the download finder on the Beckhoff website under Technical drawings: https://www.beckhoff.com/downloadfinder.

Also see about this

Technical Data [▶ 43]

4.2.1 Installation in the control cabinet

Preparation of the control cabinet

The control cabinet must have the required installation cutout according to the device dimensions of the control panel. The wall thickness must be between 1 mm and 5 mm for installation. After installation, be sure to check the tightness between the control panel and the installation wall.

Please also note the following for installation in a control cabinet:

- Ensure that there is 5 cm of free space above and below the control panel for air circulation.
- Position the control panel such that reflections from light sources on the screen are avoided as far as possible.
- 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.

Installation in the control cabinet

Once you have made the required cutout in the control cabinet, you can install the control panel in the control cabinet. Clamping levers are provided at the rear side of the housing for mounting of the device. In the delivery state, the clamping levers are folded onto the device (see Fig. 18).

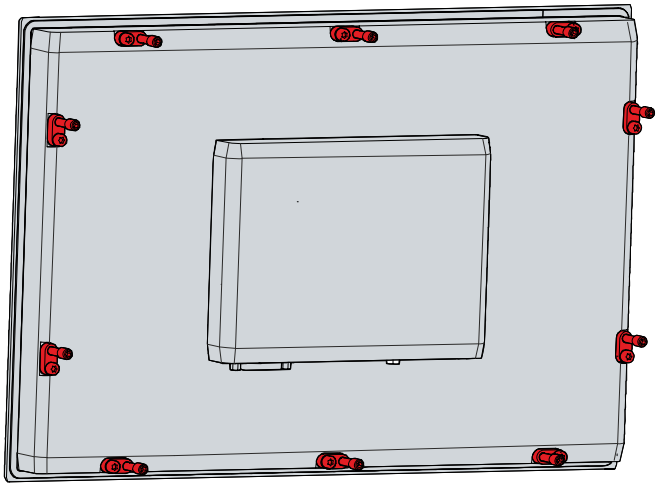


Fig. 18: Delivery state clamping lever

To install and secure the control panel in the control cabinet, follow the steps shown in Fig. 19 & 20:

1. Insert the control panel at the intended position in the control cabinet wall. Make sure that the device is secured against falling out until it is fastened properly.

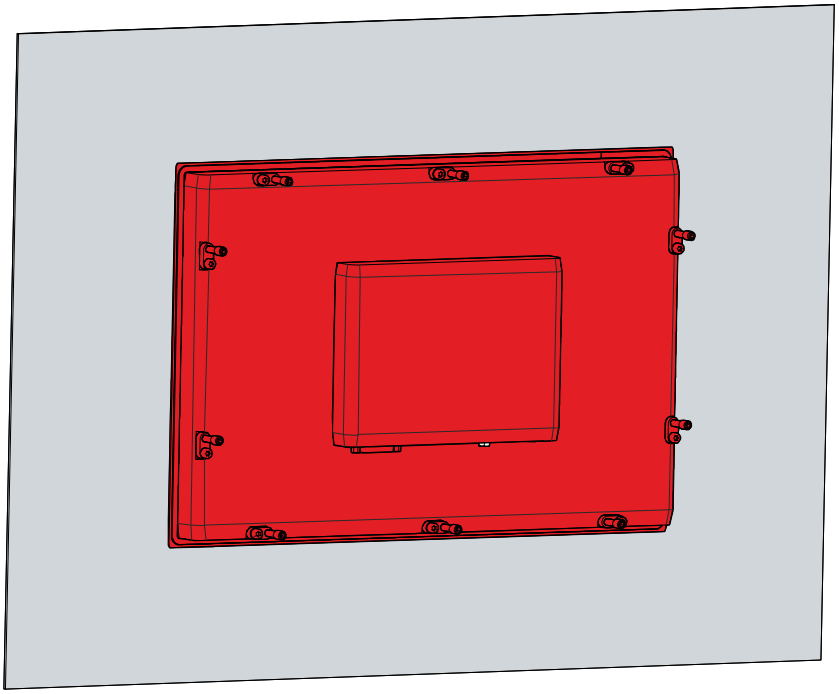


Fig. 19: Wall positioning

2. Turn the clamping levers 90° outwards (sections A and B).
3. Tighten the clamping levers with the Allen key 3.0 mm (section C).

⇨ You have mounted the control panel in the control cabinet.

A B C

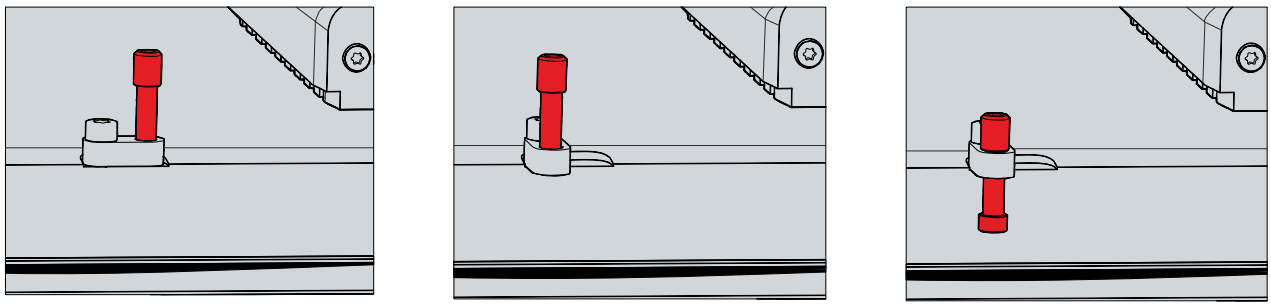


Fig. 20: Control cabinet installation

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 unit is required for the power supply, which supplies 24 V DC (-15%/+20%) from an isolated source. This must be protected by a fuse in accordance with UL 248 with a maximum nominal value of 4 A.

The cabling of the panel 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 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 as the control panel (no potential difference).

4.3.1 Installing power supply cable

Install the cable for the power supply of the control panel using the material supplied for connector assembly. It consists of a 5-pin connection strip and a strain relief housing with cable tie.

If you require a replacement for the voltage connector or the strain relief housing, you can order these from Beckhoff Sales using the following ordering option:

- C9900-P927: power supply connector for CP29xx multi-touch built-in Control Panel, 5-pin connector with strain relief for the external supply cable

Mounting power supply cable

First mount the plug on the cable as follows:

1. Remove a few centimeters of the cable sheath.
2. Remove the insulation from the cable ends (8-9 mm).
3. Crimp the ferrules onto the stripped wire ends.
4. Insert the cable ends with the ferrules into the 5-pin connection strip. For the pin assignment of the connector, see Chapter Power supply.
5. Screw the cable ends into the 5-pin connection strip.

⇨ You have fitted the plug to the power supply cable.

Assembly of strain relief housing

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

1. Thread the cable tie into the lower part of the strain relief housing (section A).
2. Insert the connection strip into the lower part of the strain relief housing (section B).
3. Tighten the cable tie and remove the plastic tab (section C).
4. Attach the upper part of the strain relief housing by snapping it onto the lower part (section D).

⇨ You have mounted the strain relief housing.

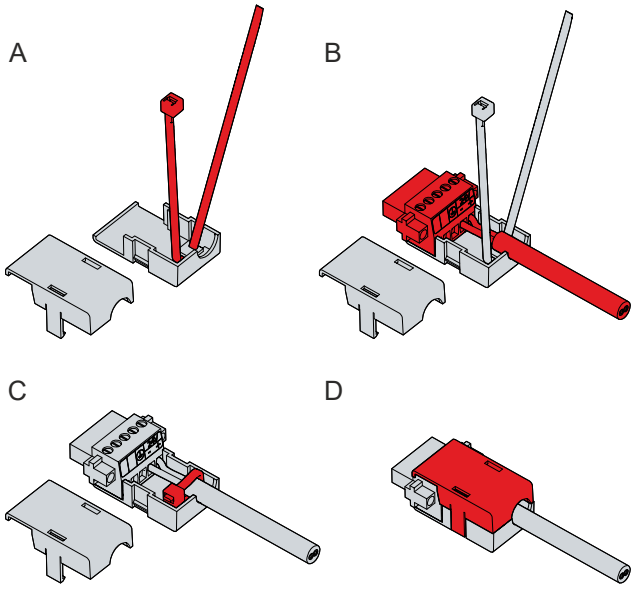


Fig. 21: Assembly of strain relief housing

To remove the strain relief housing, proceed as follows:

1. Use your fingers to bend the latching lugs on the lower part slightly outward (see Fig. 22).
2. Lever the upper part off the lower part.
3. Cut the cable tie.

⇨ You have removed the strain relief housing.

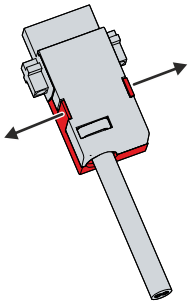


Fig. 22: Disassembly of the strain relief housing

4.3.2 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.

Protective earth

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

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

Establish low-resistance protective earth of the control panel via the voltage connection to avoid dangerous touch voltages. There is a pin in the voltage socket for the protective earth (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. You establish functional earthing via the grounding connection between the grounding bolt in the connection block on the rear side of the device (see Fig. 23) and the central grounding point of the control cabinet in which the Control panel is installed. Use wires with a cross-section of at least 4 mm^2 or a flat conductor for the ground connection, as the circumference of the conductor should be as large as possible.

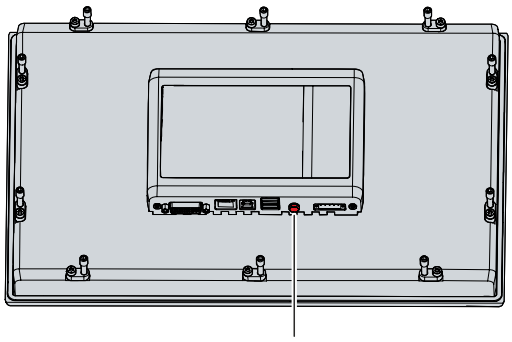


Fig. 23: Grounding bolt for functional earthing

4.3.3 Connecting cables and power supply

NOTICE

Incorrect connection procedure

Incorrect procedure when connecting the cables and the power supply can cause hardware damage.

- Follow the documented procedure for connecting the cables and the power supply.
- Always connect the cables first and only then switch on the power supply.
- Please read the documentation for the external devices prior to connecting them.

The connections are located at the rear of the control panel.

Connecting cables

Make sure that you first ground the panel (see chapter 4.3.2 Grounding the control panel [▶ 34]) 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 control panel, so that the panel remains switched on during voltage fluctuations.

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

1. First mount the power supply cable with the 5-pin connection strip without its strain relief housing.
2. Plug the voltage connector into the voltage socket on the panel.
3. Screw the voltage connector to the voltage socket.
4. Connect the panel to your external 24 V power supply.
5. Switch on the 24 V power supply.
6. Measure the voltage at the 5-pin connection strip of the panel.
7. Mount the strain relief housing on the 5-pin connection strip.

Also see about this

Structure [▶ 10]

5 Shutting down

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 remove the device from the control cabinet.

If you do not want to continue using the control panel, Chapter 5.2 Disassembly and disposal [▶ 37] 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.

NOTICE

Hardware damage due to power supply

Disconnecting the CP-Link 4 connection while the transmitter box power supply is switched on may cause damage to the transmitter box.

- Switch off the power supply to the CU8803 transmitter box before disconnecting the CP-Link 4 connection.

Before disassembling the control panel, you must disconnect the cables and the power supply. Follow the steps below:

1. Shut down the control panel.
2. Disconnect the control panel from the external 24 V power supply.
3. Unscrew the voltage connector and pull it out of the PC.
4. Disassemble the power cable (see chap. 4.3.1 Installing power supply cable [▶ 32]) if the connector is to remain with the panel.
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 transmission cables from the control panel.
7. Finally, disconnect the ground connection.

⇨ You have disconnected the cables and power supply.

Also see about this

Installing power supply cable [▶ 32]

5.2 Disassembly and disposal

Before you can remove the control panel from the control cabinet, you must first disconnect the power supply and the cables (see chapter 5.1 Disconnecting the power supply and cables [▶ 36]).

To remove the control panel from the control cabinet, follow the steps shown in Fig. 24:

1. Loosen the clamping levers with a 3.0 mm Allen key (sections A and B). Make sure that the device is secured against falling out until it is removed from the wall.
2. Fold the clamping levers back onto the housing by 90° (section C) and tighten them there again so that they do not fold out unintentionally.

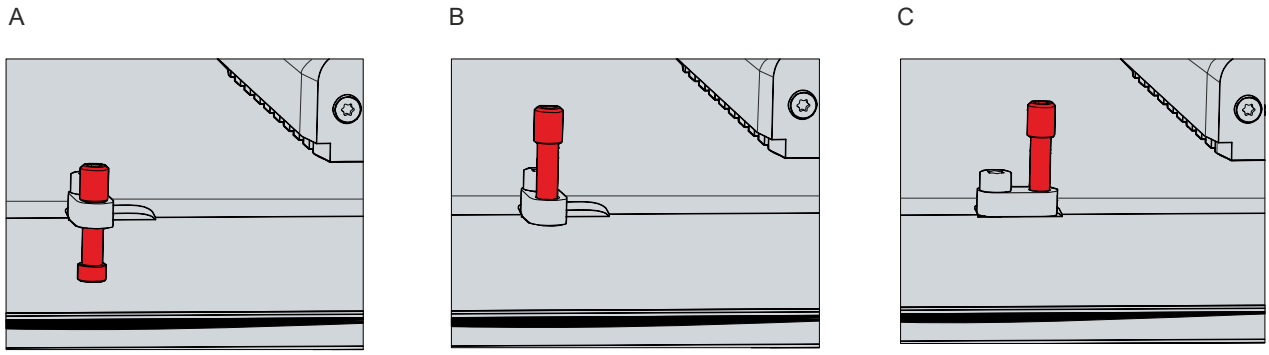


Fig. 24: Removal from the control cabinet

⇨ You can now remove the panel from the corresponding cutout in the control cabinet wall.

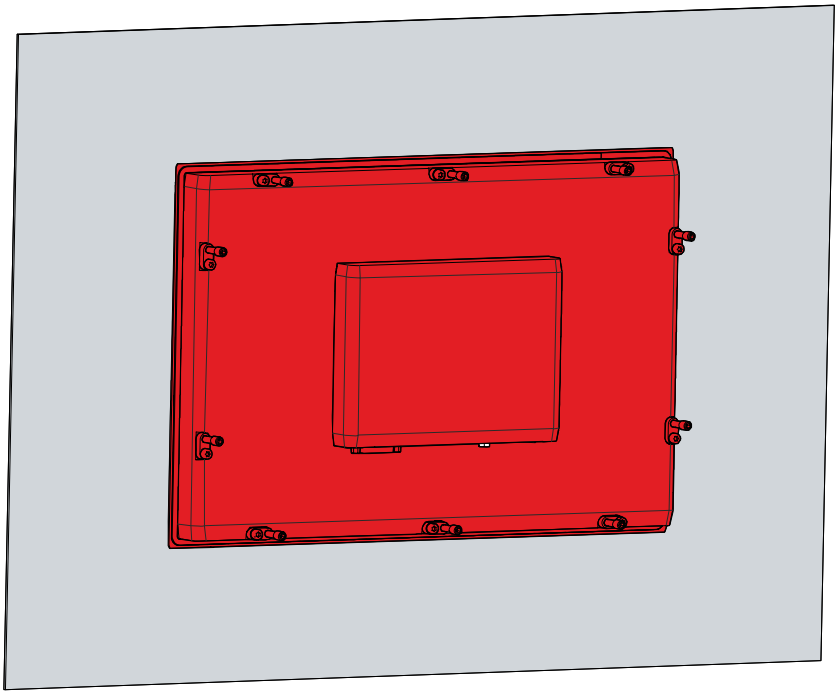


Fig. 25: Removal installation cutout

Disposal of the control panel

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

For disposal, you must remove the device from the control cabinet.

6 Servicing and 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/IP20.
- Never use compressed air to clean the control 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

Repair

Only the vendor may repair the device. If a repair should be necessary, contact Beckhoff Service (see Chapter 9.1 Service and Support [▶ 44]).

6.1 Cleaning the front screen

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

1. Go to the Beckhoff Control Tool 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.).

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

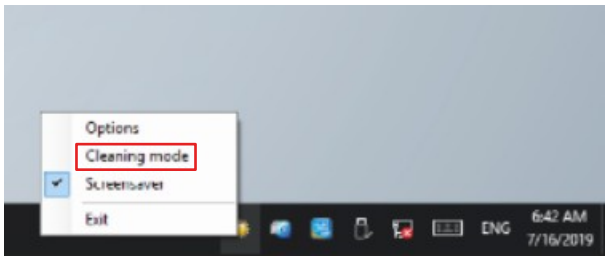


Fig. 26: Select "Cleaning Mode"

You can set the duration for which the panel PC 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.).

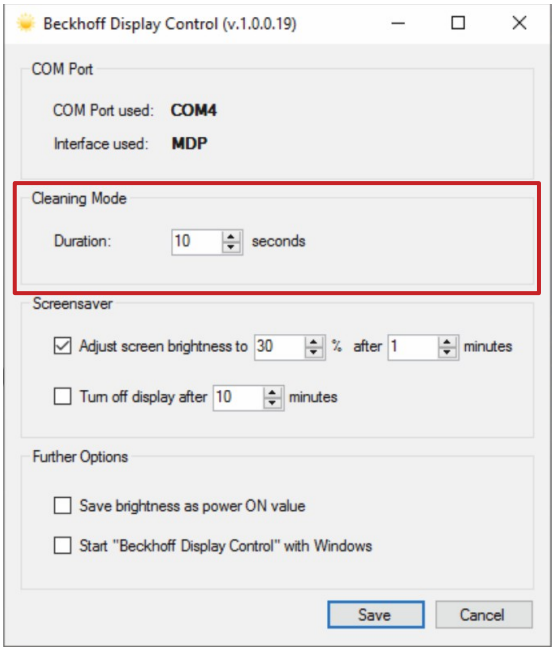


Fig. 27: Configuration "Cleaning Mode"

6.2 Exchange seal

If you have chosen to order your device with the option of a stainless steel front instead of an aluminum front, there is a seal on the rear of the unit to protect the connection section from moisture.

The silicone seal may become porous after a long operating time. In that case, you should replace the seal to continue protecting the connection section. You can order the following replacement seals from your Beckhoff sales department:

Table 15: Ordering options seal

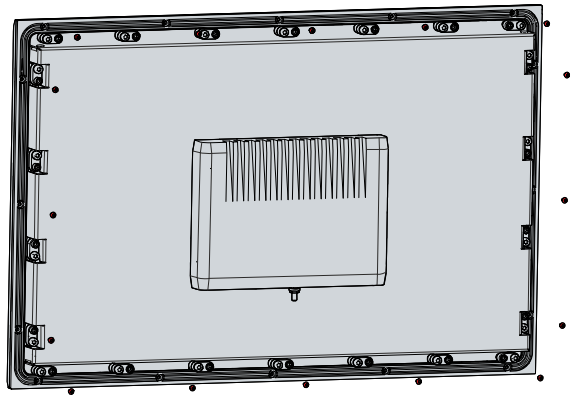
Ordering option	Description
C9900-Z520	Replacement seals for stainless steel built-in Panel CP2x07-00x0 (C9900-F941)
C9900-Z521	Replacement seals for stainless steel built-in Panel CP2x13-00x0 (C9900-F942)
C9900-Z522	Replacement seals for stainless steel built-in Panel CP2x16-00x0 (C9900-F945)
C9900-Z523	Replacement seals for stainless steel built-in Panel CP2x18-00x0 (C9900-F946)
C9900-Z524	Replacement seals for stainless steel built-in Panel CP2x21-00x0 (C9900-F948)

To replace the seal, follow the steps shown below in figure 28:

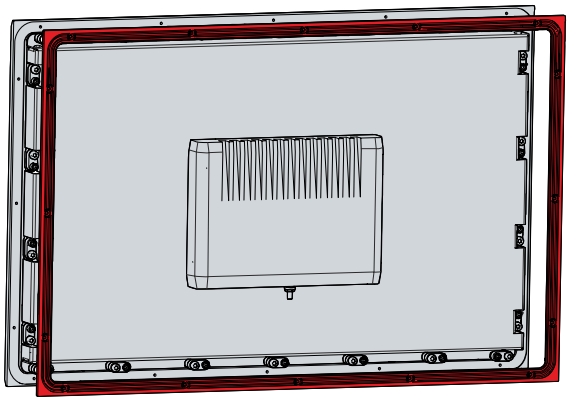
1. Loosen and remove the M2.5x4 screws (section A).
2. Remove the seal (section B).
3. Place the new seal in the circumferential sealing groove on the rear of the device (section C).
4. Press along the seal with your fingers until it is neatly in the sealing groove. Make sure that the seal does not make any waves.
5. Screw the seal back in place with the M2.5x4 screws.

⇨ You have replaced the seal.

A



B



C

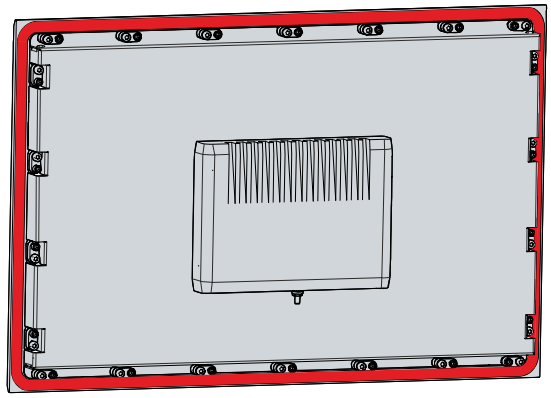


Fig. 28: Replacing silicone seal

7 Troubleshooting

Fault	Cause	Measures
No control panel function	Lack of power supply to the control panel Other cause	Check the power supply cable 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 Components in the control panel defective	Call Beckhoff Service Call Beckhoff Service
Malfunction of the touch screen	Poor or missing functional earth of the device Poor or missing ground connection of the user	Establish functional earth 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 16: Technical data

Product designation	CP29xx		
Weights aluminum front/stainless steel front	CP2907: 1.5 kg / 1.8 kg CP2912: 3.0 kg CP2913: 2.8 kg / 3.1 kg CP2915: 3.7 kg CP2916: 4.2 kg / 4.5 kg CP2918: 5.1 kg / 5.4 kg CP2919: 5.4 kg CP2921: 5.9 kg / 6.2 kg CP2924: 7.2 kg		
Supply voltage	22-30 V_{DC} (24 V_{DC} power supply unit, NEC class 2)		
Power consumption	Data sheet for calculating power consumption and power loss in the download finder - Data sheets: http://www.beckhoff.com/downloadfinder		
Protection rating	Front IP65, rear IP20		
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 CP29xx-0000: 0 °C ... +55 °C Operation CP29xx-0010: 0 °C ... +50 °C Transport / storage: -20 °C ... +65 °C		
Permissible relative 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. Suitable packaging of the control panel can improve the 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 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 Center supports you in all matters 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 service, please indicate the serial number, which you can find 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 sophisticated automation systems
- extensive training program for Beckhoff system components

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

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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 will 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.

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More Information:
www.beckhoff.com/cp29xx

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