

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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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).

Delivery conditions

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

2 For your safety

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

Exclusion of liability

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

2.1 Description of safety symbols

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

Warning of personal injuries:

DANGER

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

WARNING

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

CAUTION

Disregarding the safety notice may lead to minor injuries.

Warning of damage to property:

NOTE

Disregarding the notice may lead to damage to property.

2.2 Intended use

The CP29xx multi-touch built-in Control Panel is designed for industrial applications in machine and plant engineering. A display with multi-finger touch screen is installed in an aluminum housing. The Control Panel is installed in the front of control cabinets.

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 Control Panel is designed for an IP65 working environment. It offers full protection against contact and against water jets (nozzle) from any angle and against dust. The rear of the Control Panel is designed for an IP20 working environment. It is protected against the penetration of fingers and solid foreign bodies of 12.5 mm or larger in size. It is not protected against water. The specified limits for technical data must be adhered to.

The Control Panel 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. Protect the back of the device from dust, moisture and heat and keep the ventilation slots clear.
- Never use the device in potentially explosive atmospheres.
- 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 connect the device during a thunderstorm. 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 technology background, operate the device. Use by unauthorized persons can lead to damage to property and loss of data.
- Protect the power supply cable with a fuse with a max. rating of 16 A. The fuse serves to protect the supply line in the event of a short circuit.
- In case of fire, extinguish the 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, IP65 at the front, IP20 at the rear; the housing surface is electrically insulating
- CP29xx-0000 interfaces:
 - 2x USB output
 - 1x USB input
 - 1x RJ45 for USB Extended
 - 1x DVI input
- CP29xx-0010 interfaces:
 - 1x RJ45 for CP-Link 4
 - 2x USB output
- 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 works with a corresponding push button extension, C9900-G0xx:

- 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.

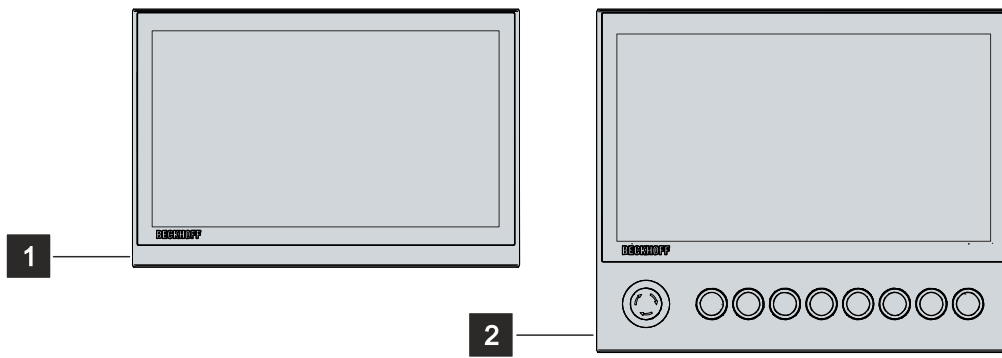


Fig. 1: CP29xx_without and with push button extension

3.1 Structure

Figure 2 shows an example of the device configuration for all CP29xx variants.

The Control Panel interfaces at the connection block vary, depending on the product version. Otherwise, there are no differences in the external design of the device.

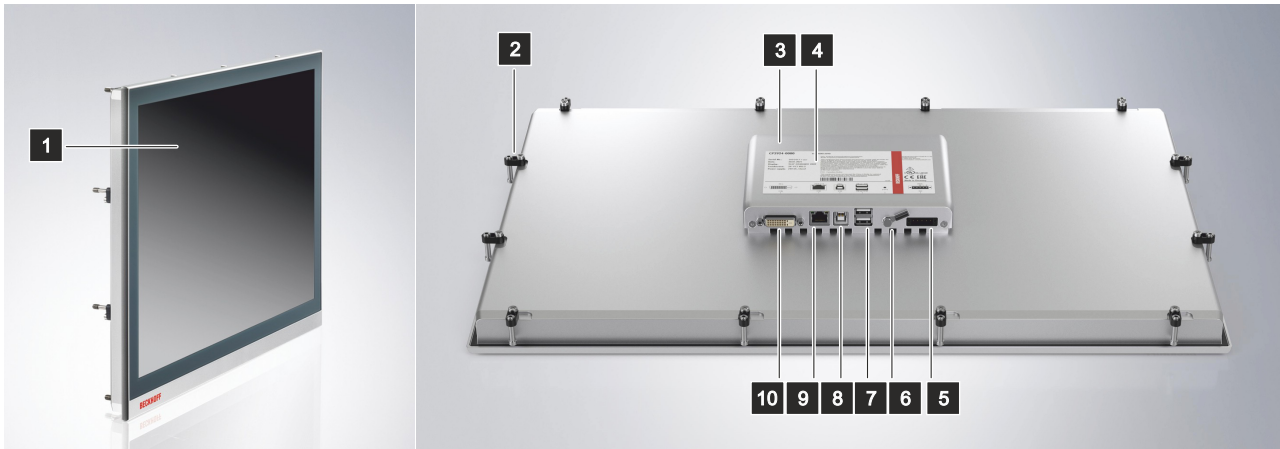


Fig. 2: CP29xx_configuration

Table 1: Legend for CP29xx configuration

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 up to 50 m distance
10	DVI input (X106)	Transmission of DVI from Industrial PC to Control Panel up to 50 m distance

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.

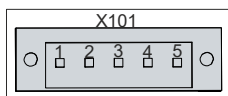


Fig. 3: CP29xx_voltage socket pin numbering

Table 2: Voltage socket pin assignment

Pin	Signal	Description
1	NC	not used
2	NC	not used
3	⊕	Protective earth
4	-	24 V power supply, negative pole
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 mm². For long supply lines, use 1.5 mm² 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 type A sockets. They are used to connect peripheral devices with USB interfaces. 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.

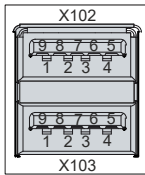


Fig. 4: CP29xx USB interface pin numbering

Table 3: USB interface pin assignment

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

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

3.2.3 USB input

The CP29xx-0000 Control Panel has a USB input (X104) with socket type B. The Control Panel is connected to the Industrial PC via the USB input. 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.

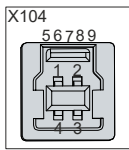


Fig. 5: CP29xx_USB input pin numbering

Table 4: USB interface pin assignment

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

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

3.2.4 USB Extended input

The Control Panel CP29xx-0000 has a USB Extended input (X105) in the form of an RJ45 socket. The Control Panel is connected to the CU8801 USB to USB Extended converter box via the interface. The connection is made via a standard RJ45 cable, i.e. not crossed. The interface transmits USB 2.0 with 480 Mbit/s. The socket does not represent an Ethernet connection.

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.

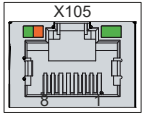


Fig. 6: CP29xx_USB-E input pin numbering

Table 5: 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.

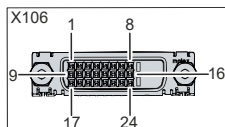


Fig. 7: CP29xx_DVI Extended input pin numbering

Table 6: DVI Extended interface pin assignment

Pin	Connection	Pin	Connection	Pin	Connection
1	TDMS Data 2 -	9	TDMS Data 1 -	17	TDMS Data 0 -
2	TDMS Data 2 +	10	TDMS Data 1 +	18	TDMS Data 0 +
3	TDMS Data 2/4 Shield	11	TDMS Data 1/3 Shield	19	TDMS Data 0/5 Shield
4	TDMS Data 4 -	12	TDMS Data 3 -	20	TDMS Data 5 -
5	TDMS Data 4 +	13	TDMS Data 3 +	21	TDMS Data 5 +
6	DDC Clock	14	+ 5V Power	22	TDMS Clock Shield
7	DDC Data	15	Ground (+ 5 V, Analog H/V Sync)	23	TDMS Clock +
8	Analog Vertical Sync	16	Hot Plug Detect	24	TDMA Clock -
				C5	GND

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. 8: CP29xx_voltage socket pin numbering

Table 7: Voltage socket pin assignment

Pin	Signal	Description
1	NC	not used
2	NC	not used
3	⊕	Protective earth
4	-	Negative pole Supply voltage 24 V
5	+ 24 V	Positive pole Supply voltage 24 V

The plug for the power supply is specified for 16 A and can accommodate wire cross-sections of up to 1.5 mm². For long supply lines, use 1.5 mm² 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 type A sockets. They are used to connect peripheral devices with USB interfaces. USB specification 2.0 is supported.

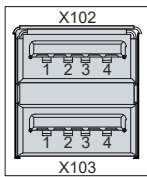


Fig. 9: CP29xx USB interface pin numbering

Table 8: USB interface pin assignment

Pin	Connection
Shield	GND
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 over 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.

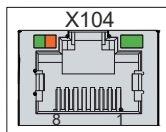


Fig. 10: CP29xx-0010_CP-Link 4 interface pin numbering

Table 9: 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 -	

On an Industrial PC with PCIe module, CP-Link 4 is available as a Two Cable Display Link. 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 CP29xx-0010 (see Fig. 11).

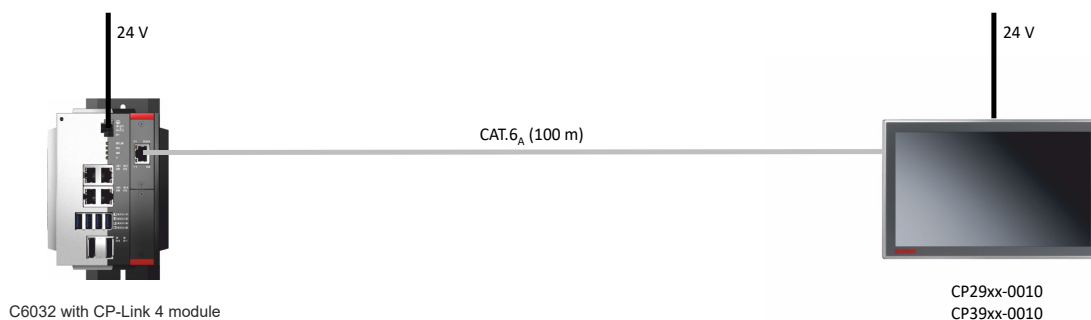


Fig. 11: CP29xx-0010_CP-Link 4

CP-Link 4 with transmitter box

If the Industrial PC is not equipped with a PCIe module, a transmitter box is required for connecting a CP29xx-0010. The transmitter boxes CU8802 (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. An additional power supply is required for the CP29xx-0010 (Two Cable Display Link). Fig. 12 shows the wiring with the CU8802.

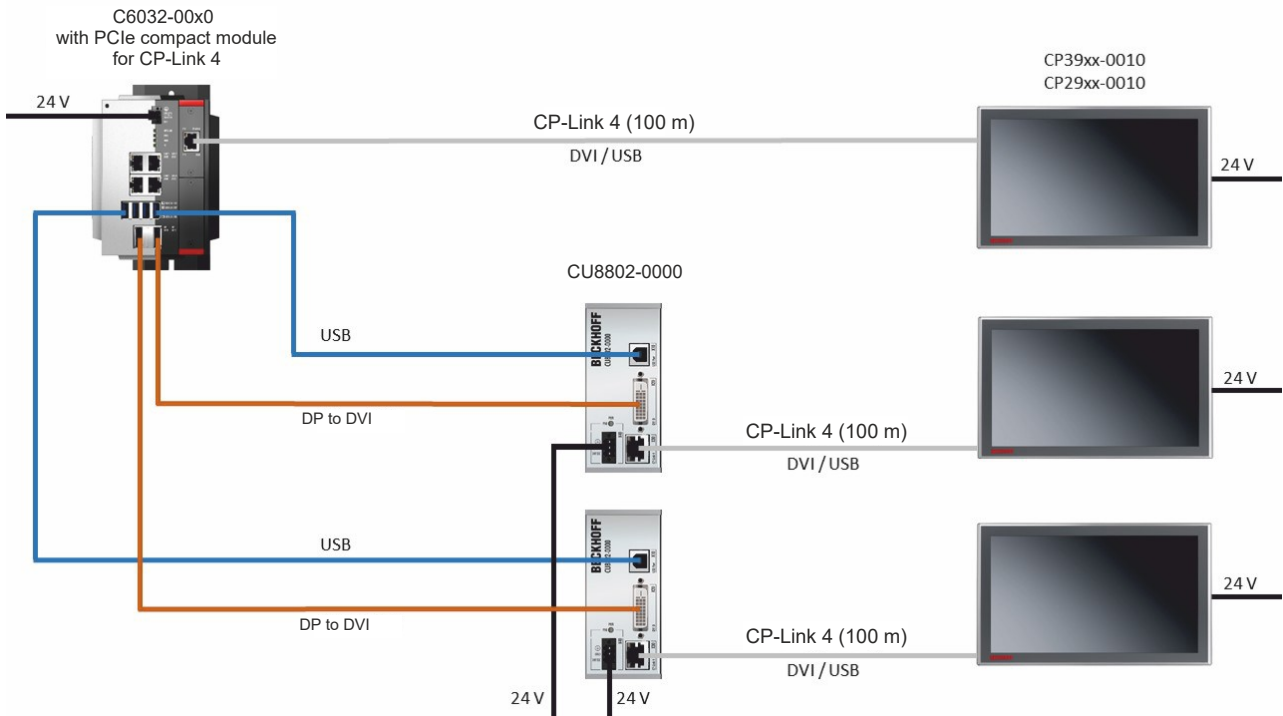


Fig. 12: CP29xx-0010_CP-Link 4, CU8802

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). No additional power supply is required for the CP29xx-0010. Fig. 13 shows the wiring with the CU8803.

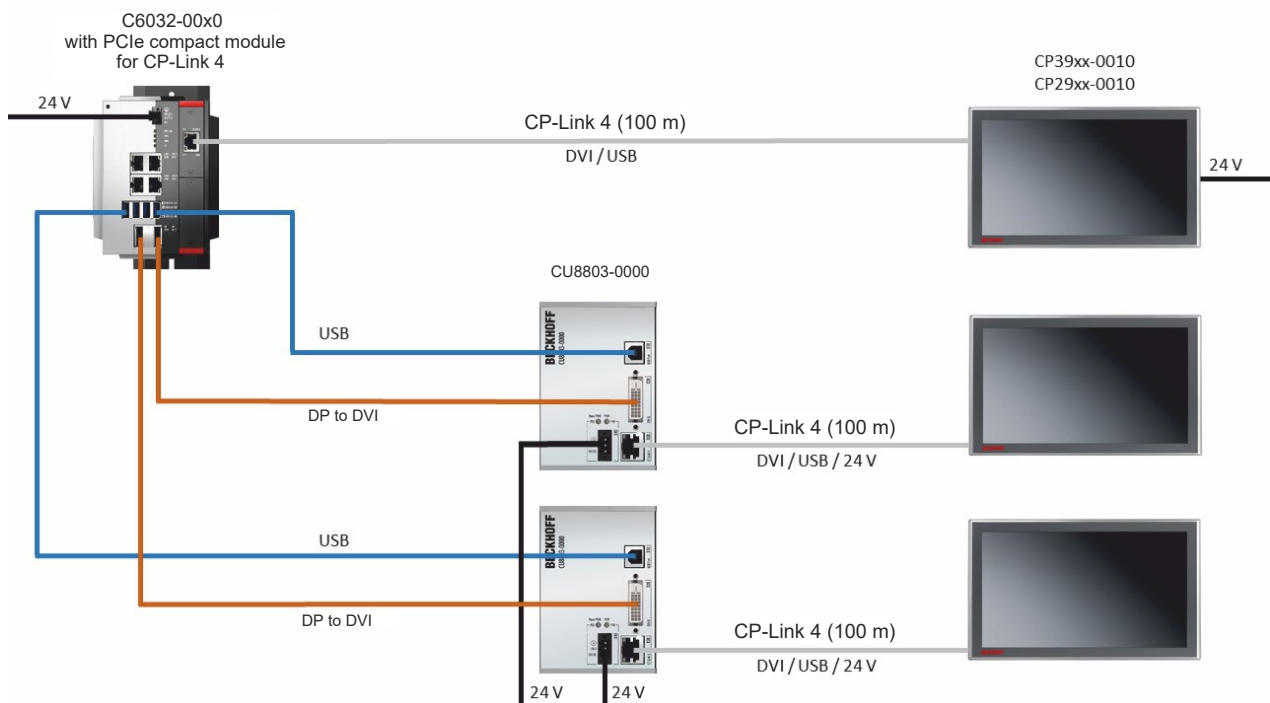


Fig. 13: CP29xx-0010_CP-Link 4, CU8803

The following ordering options are available for the transmitter boxes:

- CU8802-0000: The DVI-to-DVI cable is included with the box

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

3.4 Optional USB interface

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

- USB (order identifier: C9900-E268)

The ordering option is only available for the CP29xx without push button extension. The interface is mounted ex works. It is located at the bottom right at the front of the Control Panel behind a cover. To access the interface follow the steps below, as shown in Figure 14:

1. Press against the curved section 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 downwards (section C).
⇒ The USB interface is now accessible (section D).

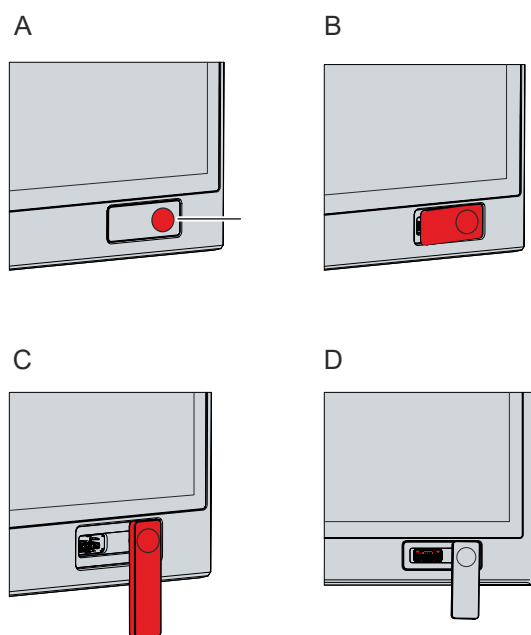


Fig. 14: CP29xx_access optional interface

3. Turn the cover back again.
4. Press the curved section again.
⇒ The cover is locked again.

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



Fig. 15: CP29xx_optional USB interface

Table 10: Optional USB interface pin assignment

Pin	Assignment
Shield	GND
1	Vbus
2	D -
3	D +
4	GND

3.5 Name plate

The name plate is shown as an example of all versions of the Control Panel.

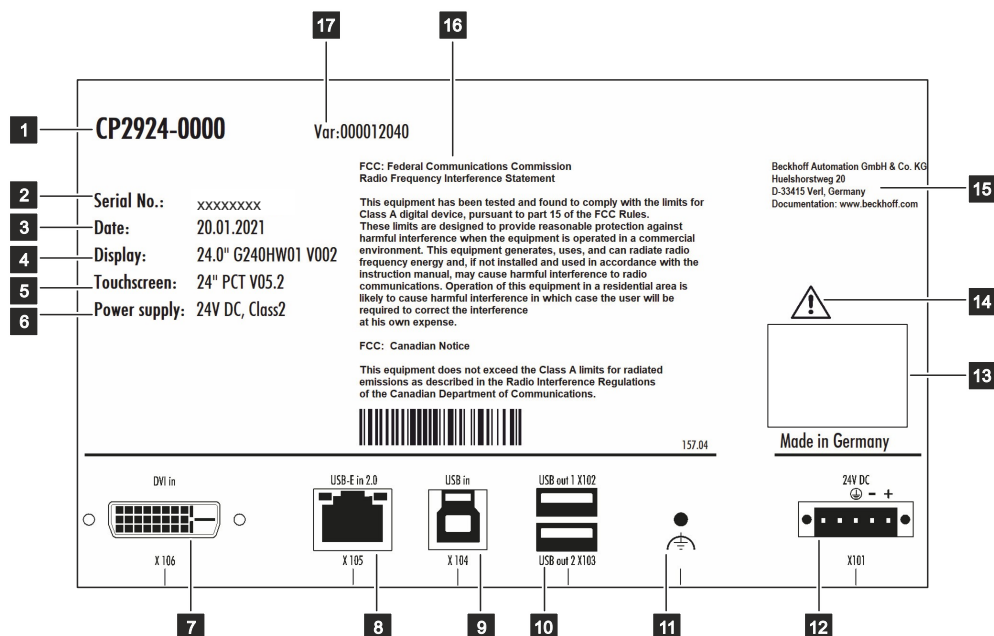


Fig. 16: CP29xx_Name plate example

Table 11: Legend for CP29xx 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 you will find the symbols that apply to the device: CE, EAC, UKCA, . The approvals of your device can be found on the name plate and in chapter 9.2 Approvals [► 43].
14	Note: be sure to read the manual of the device.
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 12: 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 13: 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

Operating the Control Panel

The Control Panel is operated via the touch screen.

NOTE

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 or 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 works.

The following ordering options are available:

Table 14: Ordering options: Film, individual

Ordering option	Description
C9900-T225	Adhesive protective film for Panel PCs and Control Panels with 7-inch display, for fitting onto the glass pane, 1 item
C9900-T226	Adhesive protective film for Panel PCs and Control Panels with 12-inch display, for fitting onto the glass pane, 1 item
C9900-T238	Adhesive protective film for Panel PCs and Control Panels with 12.1-inch display, for fitting onto the glass pane, 1 item
C9900-T227	Adhesive protective film for Panel PCs and Control Panels with 15-inch display, for fitting onto the glass pane, 1 item
C9900-T228	Adhesive protective film for Panel PCs and Control Panels with 15.6-inch display, for fitting onto the glass pane, 1 item
C9900-T229	Adhesive protective film for Panel PCs and Control Panels with 18.5-inch display, for fitting onto the glass pane, 1 item
C9900-T230	Adhesive protective film for Panel PCs and Control Panels with 19-inch display, for fitting onto the glass pane, 1 item
C9900-T231	Adhesive protective film for Panel PCs and Control Panels with 21.5-inch display, for fitting onto the glass pane, 1 item
C9900-T232	Adhesive protective film for Panel PCs and Control Panels with 24-inch display, for fitting onto the glass pane, 1 item

Table 15: Ordering options: Film fitted ex works

Ordering option	Description
C9900-T217	Adhesive protective film for Panel PCs and Control Panels with 7-inch display, for fitting onto the glass pane ex works
C9900-T218	Adhesive protective film for Panel PCs and Control Panels with 12-inch display, for fitting onto the glass pane ex works
C9900-T237	Adhesive protective film for Panel PCs and Control Panels with 12.1-inch display, for fitting onto the glass pane ex works
C9900-T219	Adhesive protective film for Panel PCs and Control Panels with 15-inch display, for fitting onto the glass pane ex works
C9900-T220	Adhesive protective film for Panel PCs and Control Panels with 15.6-inch display, for fitting onto the glass pane ex works
C9900-T221	Adhesive protective film for Panel PCs and Control Panels with 18.5-inch display, for fitting onto the glass pane ex works
C9900-T222	Adhesive protective film for Panel PCs and Control Panels with 19-inch display, for fitting onto the glass pane ex works
C9900-T223	Adhesive protective film for Panel PCs and Control Panels with 21.5-inch display, for fitting onto the glass pane ex works
C9900-T224	Adhesive protective film for Panel PCs and Control Panels with 24-inch display, for fitting onto the glass pane ex works

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

1. For fitting the film choose a location that 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.

Commissioning

To use the Control Panel, you must first put it into operation. The first step is to transport the device to its operating location and unpack it. This is followed by installing the device in the control cabinet, connecting the cables and the power supply and finally switching on the 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.

4.1 Transport and unpacking

The specified storage conditions must be adhered to (see chapter 8 [Technical Data](#) [► 41]).

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 Control Panel, in particular the original packaging, can improve the vibration resistance during transport.

NOTE

Hardware damage due to condensation

Unfavorable weather conditions during transport can cause damage to the device.

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

Unpacking

Proceed as follows to unpack the unit:

1. Check the packaging for transport damage.
2. Remove packaging.
3. Keep the packaging for possible future transport.
4. Check your delivery for completeness by comparing it with your order.
5. Check the contents for visible shipping damage.
6. In case of discrepancies between the package contents and the order, or in case of transport damage, please inform Beckhoff Service (see Chapter 9.1 [Service and support](#) [► 42]).

4.2 Installation in the control cabinet

The CP29xx Control Panel is designed for installation in control cabinets for machine and plant technology. Please observe the environmental conditions prescribed for the operation (see Chapter 8 [Technical Data](#) [► 41]).

4.2.1 Dimensions

The dimensions of the Control Panel are required for preparing the control cabinet.

For the installation of the Control Panel, the wall thickness must be between 1 mm and 5 mm. After installation, be sure to check the tightness between the Control Panel and the installation wall.

You can find the dimensions in the current drawings on our website at:

http://download.beckhoff.com/download/Technical_Drawings/Industrial_PC/Control_Panel/CP29xx

4.2.2 Installation in the control cabinet

Preparation of the control cabinet

The control cabinet must have the required installation cutout according to the device dimensions (see Chapter 4.2.1 [Dimensions](#) [► 29]) of the Control Panel.

NOTE

Extreme environmental conditions

Extreme environmental conditions can cause damage to the device.

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

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

- 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 back of the housing for final mounting of the device.

To install and secure the Control Panel in the control cabinet, follow the steps shown in Fig. 17:

1. Insert the Control Panel at the intended position in the panel of the control cabinet. Make sure that the device is secured against falling out until it is fastened properly.
2. Loosen the clamping levers with a 3.0 mm Allen key (sections A and B).
3. Fold out the clamping levers 90° (section C).
4. Retighten the clamping levers with the Allen key (section D).

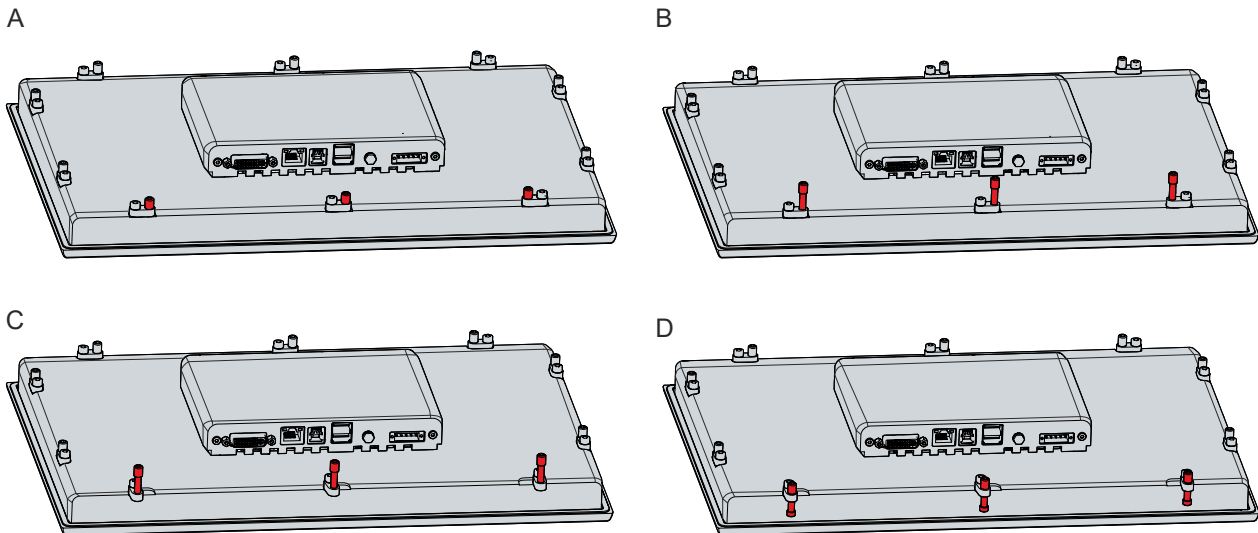


Fig. 17: CP29xx Control cabinet installation

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 prepare the Control Panel 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 to supply 24 V DC (-15 %/+20 %) for operating the device.

Connect the Control Panel in the control cabinet according to standard EN 60204-1:2006 Protective Extra Low Voltage (PELV):

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

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

4.3.1 Installing the 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 multi-touch built-in Control Panel CP29xx, 5-pin connector with strain relief for the external supply cable

Installing the supply cable

First mount the plug on the cable as follows:

1. Remove the insulation from the cable ends (8-9 mm).
2. Crimp the ferrules onto the stripped cable ends.
3. Insert the cable ends with the ferrules into the 5-pin connection strip. The pin assignment of the connector can be found in chapter 3.2.1 [Power supply](#) [► 12] (for CP29xx-0000) or chapter 3.3.1 [Power supply](#) [► 17] (for CP29xx-0010).
4. Screw the cable ends into the 5-pin connection strip.

Assembly of the strain relief housing

Now mount the strain relief housing on the previously connected plug and supply cable as shown in Fig. 18:

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).

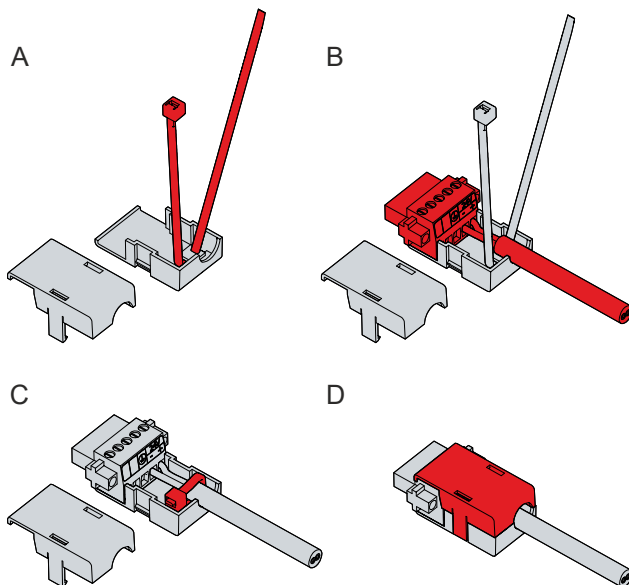


Fig. 18: CP29xx_assembly of strain relief housing

To remove the strain relief housing, proceed as follows:

1. Use your fingers to bend the latching lugs on the lower part slightly outwards (see Fig. 19).
2. Lever the upper part off the lower part.
3. Cut the cable tie.

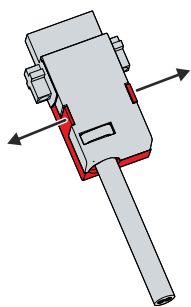


Fig. 19: CP29xx_Disassembly the strain relief housing

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

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

NOTE

Hardware damage due to electromagnetic interference

Using the Control Panel without functional earth can lead to hardware damage due to electromagnetic interference.

- Only use the device with functional earth.

Electromagnetic compatibility (EMC) of the Control Panel 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.

The Control Panel must comply with certain protection requirements. The Panel 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 established via the grounding screw on the connection block at the rear of the device. Connect this to the central grounding point of the control cabinet. Use cables with a minimum cross-section of 4 mm².

4.3.3 Connecting cables and power supply

NOTE

Incorrect connection procedure

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

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

Connecting cables

The connections are located at the connection block on the back of the housing and are documented in chapter 3.1 [Structure](#) [► 11].

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. For 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 mm² can be used for connecting the power supply. For long supply lines, use 1.5 mm² 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. Check the correct voltage of your external power supply.
2. Install the power cable.
3. Plug the voltage connector into the voltage socket on the Panel.
4. Screw the voltage connector to the voltage socket.
5. Connect the Panel to your external 24 V power supply.
6. Switch on the 24 V power supply.
7. Measure the voltage at the power supply plug of the Panel.

5 Shutting down

NOTE

Hardware damage due to power supply

A connected power supply can cause damage to the Control Panel 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

Disconnecting the Control Panel during a thunderstorm can lead to electric shock.

- Never disconnect the cables of the Control Panel during a thunderstorm.

NOTE

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 removing the Control Panel, you must follow the steps below:

1. Shut down the Control Panel.
2. Disconnect the Control Panel from the power supply (see below).
3. Disconnect the data transfer cables between the Control Panel and the connected devices (see below).

Disconnect the power supply

Proceed as follows to disconnect the power supply:

1. Disconnect the Control Panel from the external 24 V power supply.
2. Loosen the screw connection between the voltage socket and the voltage connector.
3. Remove the voltage connector from the voltage socket.
4. Remove the voltage cable (see chapter 4.3.1 [Installing the supply cable](#) [► 32]) if the connector is to remain with the Panel.

Disconnecting cables

To disconnect the cables from the Control Panel, proceed as follows:

1. Make a note of the wiring configuration, if you wish to restore it with another device.
2. Disconnect all data transfer cables from the Control Panel.
3. Finally, disconnect the ground connection.

5.2 Disassembly and disposal

Removal from the control cabinet

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. 20:

1. Loosen the clamping levers with a 3.0 mm Allen key (sections A and B).
2. Fold the clamping levers back by 90° onto the housing (section C).
⇒ You can now remove the Panel from the control cabinet.
3. To reattach the clamping levers to the housing, retighten them with the Allen key (section D).

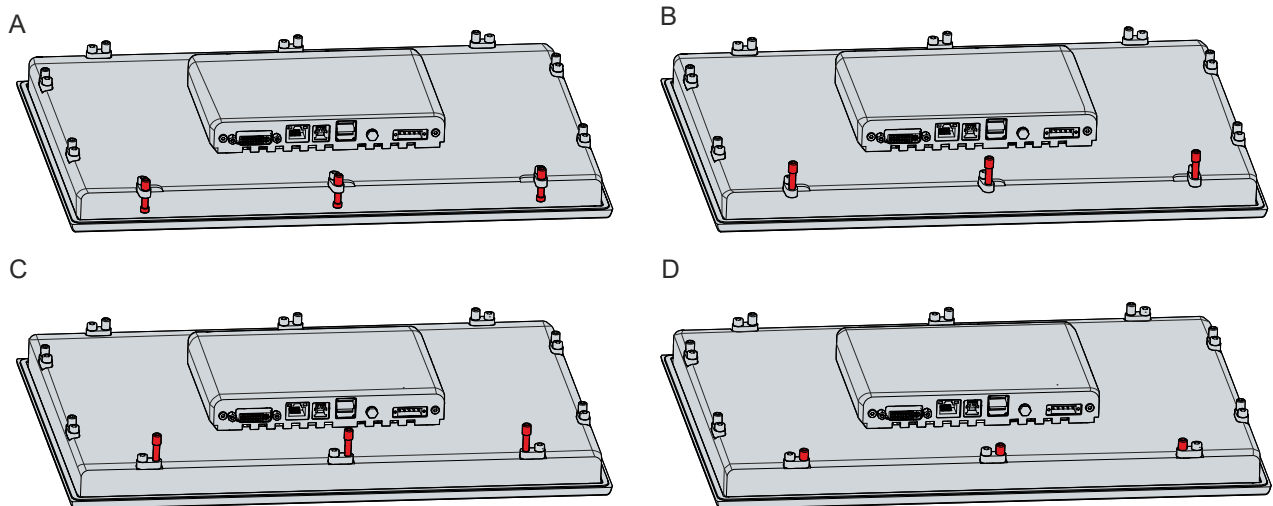


Fig. 20: CP29xx_Removal from the control cabinet

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

NOTE

Unsuitable cleaning agents

The use of unsuitable cleaning agents can damage the device.

- The Control Panel should only be cleaned as specified.

It is essential to observe the following aspects when cleaning the Control Panel:

- Ensure that no dust enters the Panel via the rear.
- 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 Control Panel during cleaning, you must use suitable cleaning agents. Examples include:

- benzine
- spirit
- acetone
- 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 or very hot water
- Cold water with a heated unit
- High water pressure, e.g. high-pressure cleaner

Cleaning the front screen

You can clean the front screen of the Control Panel 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.

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

1. Click 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. 21).
⇒ "Cleaning Mode" is activated. You can now clean the front panel.

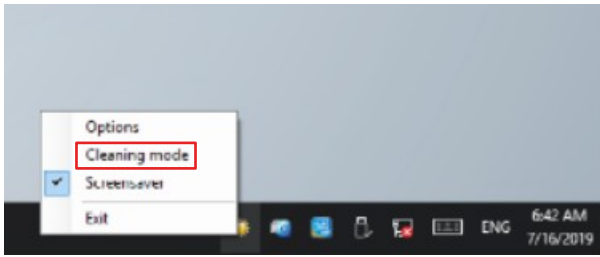


Fig. 21: CP29xx_Select Cleaning mode

You can set the duration for which the Panel 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 period (see fig. 22).

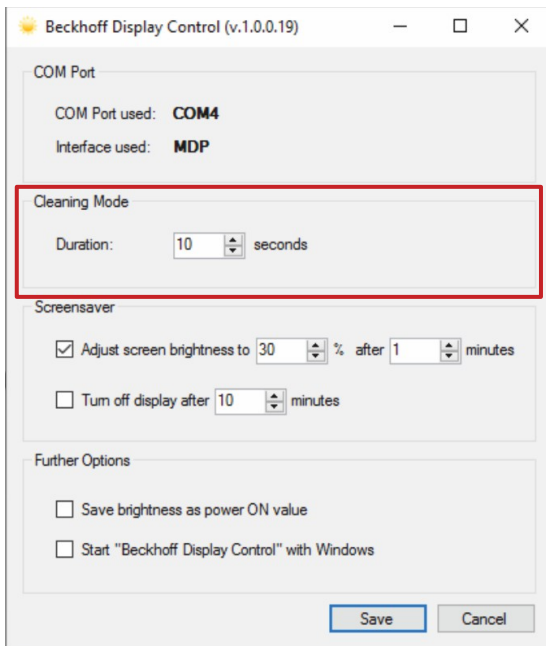


Fig. 22: CP29xx_Cleaning mode configuration

Repair

Only the manufacturer may repair the device. If a repair should be necessary, contact Beckhoff Service (see Chapter 9.1 [Service and support](#) [► 42]).

7 Troubleshooting

Table 16: Troubleshooting

Fault	Cause	Measures
No Control Panel function	No supply of power to the Control Panel Cable not connected CP29xx-0010: No supply of power to the CU880x	Check the power supply cable 1. Correctly connect the cable 2. Call Beckhoff Service Check the supply of power to the CU880x
Multi-touch screen does not react or only reacts sporadically	Poor or missing functional earth of the device Poor or missing ground connection of the user	Check potential equalization and grounding measures Touch the Control Panel frame and check the touch function at the same time
USB error during access with TwinCAT via USB	Cycle time in TwinCAT set to 10 ms (standard)	Increase the cycle time to between 50 ms and 80 ms
No picture/backlight	Problem with the cable connections	CP29xx-0000: Check the DVI cable connection CP29xx-0010: 1. Check the cable connections 2. Check the CU880x diagnostic LEDs 3. Check the power supply

Beckhoff recommends using Beckhoff connection cables and connection kits.

8 Technical Data

Table 17: Technical data

Product designation	CP29xx		
Weight	CP2907: 1.5 kg CP2912: 3.0 kg CP2913: 2.8 kg CP2915: 3.7 kg CP2916: 4.2 kg CP2918: 5.1 kg CP2919: 5.4 kg CP2921: 5.9 kg CP2924: 7.2 kg		
Supply voltage	24 V DC (20.4 – 28.8 V DC)		
Power consumption	CP2907: max. 12 W CP2912: max. 15 W CP2913: max. 9 W CP2915: max. 20 W CP2916: max. 22 W CP2918: max. 25 W CP2919: max. 25 W CP2921: max. 35 W CP2924: max. 45 W		
Protection class	Front side IP65, rear side IP20		
Vibration resistance (sinusoidal vibration)	EN 60068-2-6:	10 to 58 Hz:	0.035 mm
		58 to 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		
Permitted ambient temperature	Operation CP29xx-0000: 0 °C to +55 °C Operation CP29xx-0010: 0 °C to +50 °C Transport / storage: -20 °C to + 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

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

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

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

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

e-mail: service@beckhoff.com

If 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 complex automation systems
- extensive training program for Beckhoff system components

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

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

You will also find further documentation for Beckhoff components there.

9.2 Approvals

The following table shows the Control Panel approvals for the different product versions:

Table 18: CP29xx approvals

Product version	Approvals
CP29xx-0000	CE, EAC, UKCA, FCC
CP29xx-0010	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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