

Manual | EN

C9900-G00x and C9900-G02x

Push button extension



Table of contents

1	Notes on the documentation.....	5
2	For your safety	6
2.1	Signal words.....	6
2.2	Intended use	6
2.3	Fundamental safety instructions	7
2.4	Operator's obligation to exercise diligence.....	7
2.5	Notes on information security.....	8
3	Product overview	9
3.1	Ordering options.....	10
3.1.1	CP2xxx ordering options	10
3.1.2	CP39xx ordering options.....	12
3.2	Description of the boards	14
3.2.1	USB and direct wiring.....	15
3.2.2	Direct wiring	18
3.3	Board combinations	21
3.4	Circuit diagrams	21
3.5	CP configurator	24
4	Commissioning	28
4.1	Transport and unpacking	28
4.2	Access to boards.....	29
4.3	Mounting push button caps and label	30
4.4	Wiring	33
4.5	Configuration push-button extension	36
4.5.1	TwinCAT System Manager connection.....	36
4.5.2	I/O task linking.....	41
5	Decommissioning	44
6	Maintenance	45
7	Technical data	46
8	Appendix.....	47
8.1	Service and support	47
8.2	Approvals	48

1 Notes on the documentation

This description is intended exclusively for trained specialists in control and automation technology who are familiar with the applicable national standards.

The documentation and the following notes and explanations must be complied with when installing and commissioning the components.

The trained specialists must always use the current valid documentation.

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

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2 For your safety

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

Exclusion of liability

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

2.1 Signal words

The signal words used in the documentation are classified below.

Warning on personal injuries

 DANGER
High-risk hazard that will result in death or serious injury.
 WARNING
Medium-risk hazard that may result in death or serious injury.
 CAUTION
Low-risk hazard that may result in minor injury.

Warning on property and environmental damage

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

2.2 Intended use

The push button extensions C9900-G00x and C9900-G02x enable the application-specific arrangement of electromechanical illuminated push buttons directly on the operating unit of a CP2xxx or CP39xx Control Panel. It enables precise adaptation of the control panel to the machine control requirements. The push button extensions are mounted ex factory.

The specified limits for technical data must be adhered to.

The push button extensions can be used within the documented operating conditions.

Improper use

Do not use the push button extension outside the documented operating conditions.

2.3 Fundamental safety instructions

The following safety instructions must be observed when handling the push button extensions.

Application conditions

- Do not use the push button extensions in extreme environmental conditions.
- Never use the push button extensions in hazardous areas.
- Never carry out any work on the push button extensions when they are live. Always switch off the supply voltage for the device before 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 functional earth connection.

Damage to property, loss of data and impairment of functions

- Ensure that only technical personnel trained in control and automation engineering operate the push button extensions. 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.
- If it should catch fire, extinguish the push button extensions 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.

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3 Product overview

The C9900-G00x and C9900-G02x push button extensions can be used to control the central functions of a machine or system such as emergency stop, start or stop by means of electromechanical keys. The push button extensions are designed for the CP2xxx or CP39xx Control Panels and are already mounted ex factory. For the specific ordering options available, see chapter 3.1 [Ordering options](#) [► 10].

Figure 1 shows an example of a C9900-G02x push button extension for a CP39xx. Apart from the number of push buttons, the push button extensions do not differ visually.



Fig. 1: Structure with CP39xx

Table 1: Legend structure

No.	Component	Description
1	Emergency stop	Safe state of the connected machine
2	Illuminated push button, green	Any function
3	Illuminated push button Red	Any function
4	Illuminated push button White	Any function

3.1 Ordering options

You have different ordering options for the CP2xxx and CP39xx Control Panels. The options are adapted to the available display sizes of the control panels.

As specified in the individual order options, the indicator lights are basically controlled via USB. Once you use the CP configurator (see chapter 3.5 [CP configurator](#) [► 24]) for your push button extension, you can choose between USB and direct wiring.

3.1.1 CP2xxx ordering options

The following ordering options are available in combination with a CP2xxx built-in Control Panel:

Table 2: CP2xxx ordering options

Ordering option	Description
C9900-G002	Push button extension for CP2x12 with horizontal 12-inch display • Push button extension below • 4 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • All indicator lamps are controlled exclusively via USB
C9900-G009	Push button extension for CP2x13 with horizontal 12.1-inch display • Push button extension below • 4 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • All indicator lamps are controlled exclusively via USB
C9900-G003	Push button extension for CP2x15 with horizontal 15-inch display • Push button extension below • 7 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact All indicator lamps are controlled exclusively via USB

C9900-G004	Push button extension for CP2x16 with horizontal 15.6-inch display • Push button extension below • 8 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact All indicator lamps are controlled exclusively via USB
C9900-G005	Push button extension for CP2x18 with horizontal 18.5-inch display • Push button extension below • 10 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • All indicator lamps are controlled exclusively via USB
C9900-G006	Push button extension for CP2x19 with horizontal 19-inch display • Push button extension below • 9 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • All indicator lamps are controlled exclusively via USB
C9900-G008	Push button extension for CP2x21 with horizontal 21.5-inch display • Push button extension below • 12 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • All indicator lamps are controlled exclusively via USB
C9900-G007	Push button extension for CP2x24 with horizontal 24-inch display • Push button extension below • 13 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • All indicator lamps are controlled exclusively via USB

3.1.2 CP39xx ordering options

The following ordering options are available in combination with a CP39xx mounting arm Control Panel:

Table 3: CP39xx ordering options

Ordering option	Description
C9900-G022	Push button extension for CP3912 with horizontal 12-inch display • Push button extension below • 4 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • Aluminum cable channel to the mounting arm adapter on the rear side • All indicator lamps are controlled exclusively via USB
C9900-G029	Push button extension for CP3913 with horizontal 12.1-inch display • Push button extension below • 4 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • Aluminum cable channel to the mounting arm adapter on the rear side • All indicator lamps are controlled exclusively via USB
C9900-G023	Push button extension for CP3915 with horizontal 15-inch display • Push button extension below • 7 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • Aluminum cable channel to the mounting arm adapter on the rear side • All indicator lamps are controlled exclusively via USB
C9900-G024	Push button extension for CP3916 with horizontal 15.6-inch display • Push button extension below • 8 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • Aluminum cable channel to the mounting arm adapter on the rear side • All indicator lamps are controlled exclusively via USB

C9900-G025	Push button extension for CP3918 with horizontal 18.5-inch display • Push button extension below • 10 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • Aluminum cable channel to the mounting arm adapter on the rear side • All indicator lamps are controlled exclusively via USB
C9900-G026	Push button extension for CP3919 with horizontal 19-inch display • Push button extension below • 9 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • Aluminum cable channel to the mounting arm adapter on the rear side • All indicator lamps are controlled exclusively via USB
C9900-G028	Push button extension for CP3921 with horizontal 21.5-inch display • Push button extension below • 12 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • Aluminum cable channel to the mounting arm adapter on the rear side • All indicator lamps are controlled exclusively via USB
C9900-G027	Push button extension for CP3924 with horizontal 24-inch display • Push button extension below • 13 illuminated push buttons, type RAFI RAFIX 22FS+, round, 30 mm • 1 emergency stop, type RAFI RAFIX 22FS+ • Labels for the push button caps allow each push button to be labeled individually • All push buttons are queried with a normally open contact via USB • Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact • Aluminum cable channel to the mounting arm adapter on the rear side • All indicator lamps are controlled exclusively via USB

3.2 Description of the boards

NOTICE

Material damage due to excessive switching voltage

An excessively high switching voltage can lead to damage to property.

- Supply the push buttons with a maximum of 24 V and a maximum switching capacity per push button of 250 mW.

This section describes and explains the PCBs for the buttons and their connections. Each PCB has connection strips that allow you to use the push buttons and the emergency stop. The pin numbering of the connection strips is shown on each PCB. The connector designations (CONxxx) can be found in the circuit diagrams in Chapter 3.4 [Circuit diagrams](#) [► 21].

You can do the wiring either via a combination of USB and direct wiring or exclusively direct wiring. In the [CP configurator](#) you may choose between the two options. Further information on the configurator can be found in chapter 3.5 [CP configurator](#) [► 24].

The boards of the two options mentioned differ slightly. The following chapters describe the corresponding boards.

3.2.1 USB and direct wiring

In addition, all push buttons with a normally open contact are queried via USB. Additionally, all push buttons can be directly wired via a terminal strip using a second normally open contact.

A918 emergency stop board

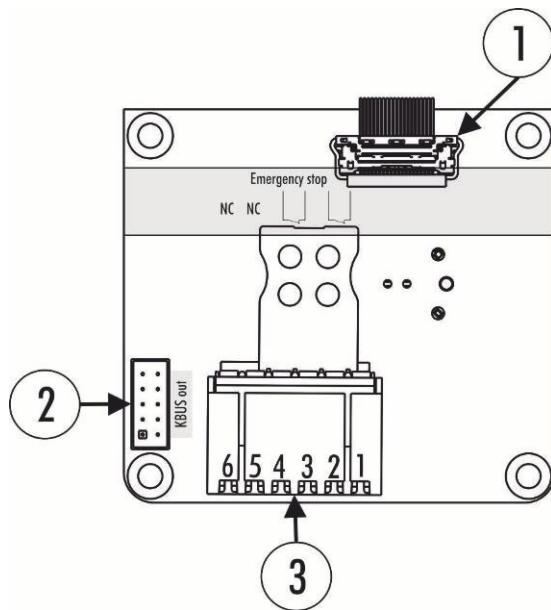


Fig. 2: A918 emergency stop board

The emergency stop board A918 has a USB interface CON500 (Fig. 2, No. 1) and a K-bus interface CON400 (No. 2). Both interfaces are used for signal transfer and are assigned ex factory. A USB-to-KBUS coupler controls the inputs and outputs of the push buttons. In addition, a connection strip CON402 (No. 3) is available for you to use the two additional normally closed contacts of the emergency stop. There is a normally open contact on the KBUS. This operates on a pulse basis and does not establish a permanent contact.

Table 4: Connection strip assignment - A918 emergency stop board

Connection strip	Terminal point	Description
3	1	Input normally closed contact 1
	2	Output normally closed contact 1
	3	Input normally closed contact 2
	4	Output normally closed contact 2
	5	Not used
	6	Not used

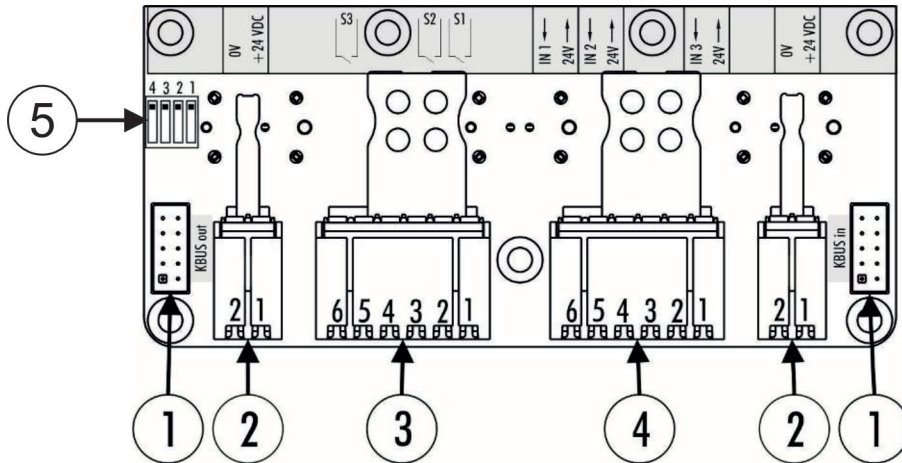
A919 3-push button board

Fig. 3: A919 3-push button board

The 3-push button board A919 has two K-bus interfaces CON400 and CON401 (Fig. 3, No. 1), which are assigned ex factory. "KBUS IN" connects the board to the USB-to-KBUS coupler and transmits one normally open contact and the LED for each push button. A jumper must be set as a terminating resistor on "KBUS OUT".

The external connection strips CON600 and CON601 (No. 2) are used to supply power to the indicator lamps. You can also use the connection strips on connection strip 4.

The bridges between the PCBs are assigned ex factory, you have to take care of the power supply. You can additionally use one of the two normally open contacts per push button via a CON603 connection strip (No. 3).

Three digital inputs are available at the connection strip CON602 (No. 4), which are transmitted via the K-bus.

You can use the dip switch (No. 5) to loop the 24 V supply of the PCB directly via the second N/O contact of a button. In this way you reduce the cabling effort at the pin contact strip.

Table 5: Assignment of connection strips 3-push button board A919

Connection strip	Terminal point	Description
2	1	24 V DC
	2	0 V
3	1	Input normally open contact 1
	2	Output normally open contact 1
	3	Input normally open contact 2
	4	Output normally open contact 2
	5	Input normally open contact 3
	6	Output normally open contact 3
4	1	24 V output
	2	Digital input 1
	3	24 V output
	4	Digital input 2
	5	24 V output
	6	Digital input 3

A920 4-push button board

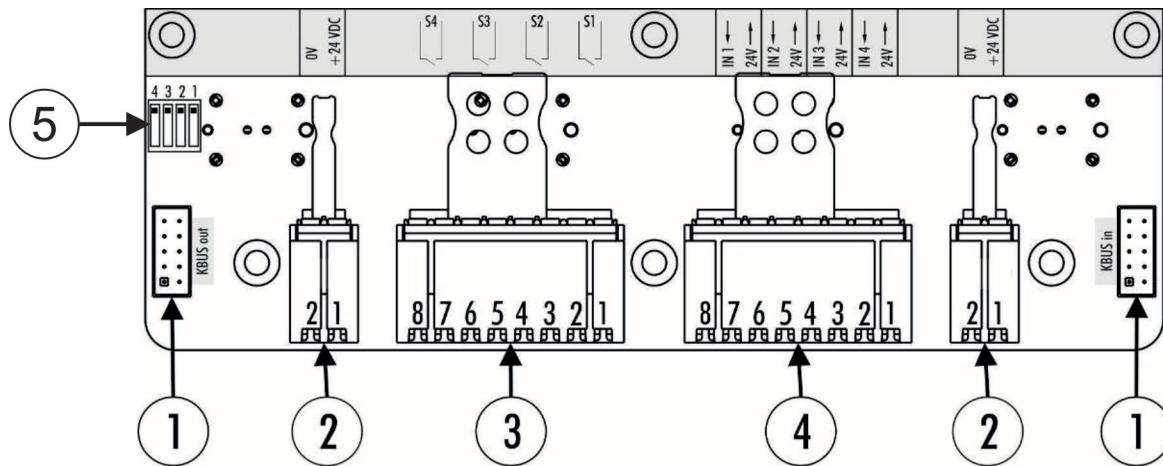


Fig. 4: A920 4-push button board

The 4-push button board A920 has two K-bus interfaces CON400 and CON 401 (Fig. 4, No. 1), which are assigned ex factory. “KBUS IN” connects the board to the USB-to-KBUS coupler and transmits one normally open contact and the LED for each push button. A jumper must be set as a terminating resistor on “KBUS OUT”.

The external connection strips CON600 and CON601 (No. 2) are used to supply power to the indicator lamps. You can also use the connection strips on connection strip 4.

The bridges between the PCBs are assigned ex factory, you have to take care of the power supply. You can additionally use one of the two normally open contacts per push button via a CON603 connection strip (No. 3).

Four digital inputs are available at the connection strip CON604 (No. 4), which are transmitted via the K-bus.

You can use the dip switch (No. 5) to loop the 24 V supply of the PCB directly via the second N/O contact of a button. In this way you reduce the cabling effort at the pin contact strip.

Table 6: Assignment of connection strips 4-push button board A920

Connection strip	Terminal point	Description
2	1	24 V DC
	2	0 V
3	1	Input normally open contact 1
	2	Output normally open contact 1
	3	Input normally open contact 2
	4	Output normally open contact 2
	5	Input normally open contact 3
	6	Output normally open contact 3
	7	Input normally open contact 4
	8	Output normally open contact 4
4	1	24 V output
	2	Digital input 1
	3	24 V output
	4	Digital input 2
	5	24 V output
	6	Digital input 3
	7	24 V output
	8	Digital input 4

3.2.2 Direct wiring

You can wire all push buttons of the push button extensions directly via a terminal strip with two normally open contacts.

A971 emergency stop board

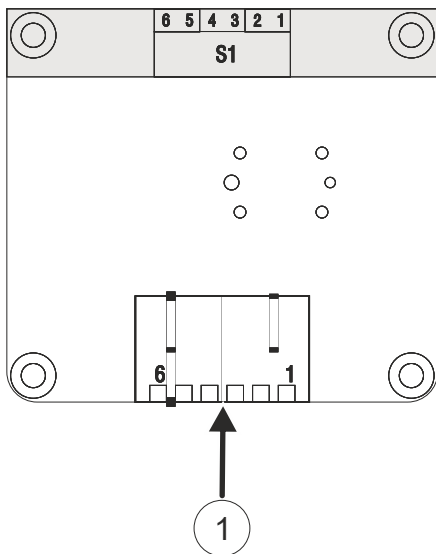


Fig. 5: A971 emergency stop board

The emergency stop board A971 has a connection strip CON402 (Fig. 5, No. 1), via which you can use the two additional normally closed contacts of the emergency stop. In addition, there is a normally open contact on the connection strip. This operates on a pulse basis and does not establish a permanent contact.

Table 7: Connection strip assignment - A971 emergency stop board

Connection strip	Terminal point	Description
1	1	Input normally closed contact 1
	2	Output normally closed contact 1
	3	Input normally closed contact 2
	4	Output normally closed contact 2
	5	Input normally open contact 1
	6	Input normally open contact 1

A972 3-push button board

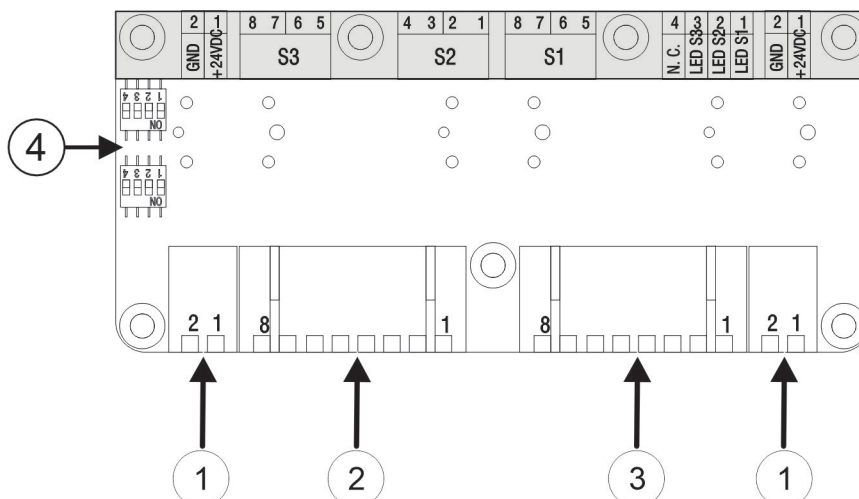


Fig. 6: A972 3-push button board

The 3-push button board A972 has two external connection strips CON600 and CON604 (Fig. 6, No. 1). They are used to supply power to the board. Use the connection strip CON602 (No. 3) to wire the LEDs 1-3 and the push button S1. Use the connection strip CON603 (No. 2) to wire the push buttons S2 and S3.

You can use the dip switches (No. 4) to loop the 24 V supply of the PCB directly via the second N/O contact of a button. In this way you reduce the cabling effort at the pin contact strip.

Table 8: Assignment of connection strip - A972 3-push button board

Connection strip	Terminal point	Description
1	1	24 V DC
	2	0 V
2	1	Input normally open contact 2.1
	2	Output normally open contact 2.1
	3	Output normally open contact 2.2
	4	Input normally open contact 2.2
	5	Input normally open contact 3.1
	6	Output normally open contact 3.1
	7	Output normally open contact 3.2
	8	Input normally open contact 3.2
3	1	LED S1
	2	LED S2
	3	LED S3
	4	Not used
	5	Input normally open contact 1.1
	6	Output normally open contact 1.1
	7	Output normally open contact 1.2
	8	Input normally open contact 1.2

A973 4-push button board

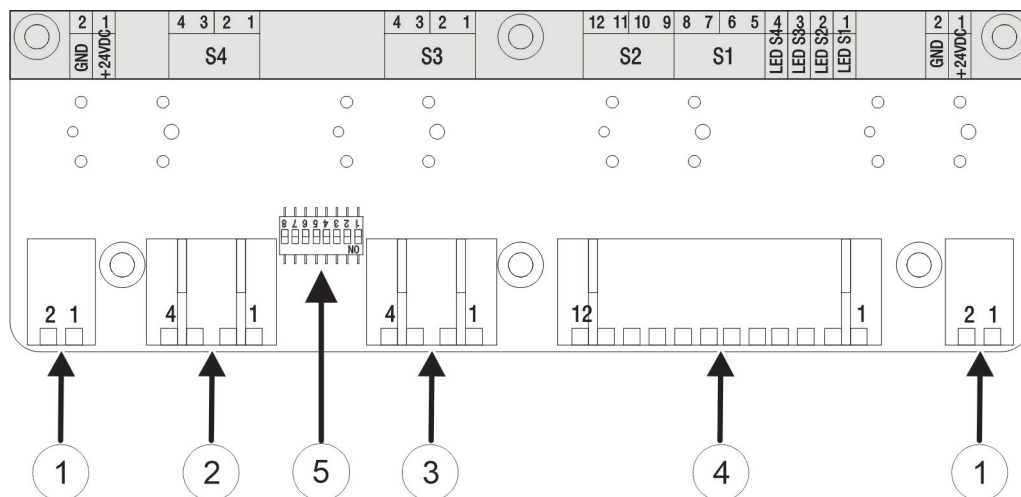


Fig. 7: A973 4-push button board

The 4-push button board A973 has two external connection strips CON600 and CON601 (Fig. 7, No. 1). They are used to supply power to the board. Use the connection strip CON602 (No. 4) to wire the LEDs 1-4 and the push buttons S1 and S2. Use the connection strip CON603 (No. 3) to wire push button S3 and the connection strip CON604 (No. 2) to wire push button S4.

You can use the dip switch (No. 5) to loop the 24 V supply of the PCB directly via the second N/O contact of a button. In this way you reduce the cabling effort at the pin contact strip.

Table 9: Assignment of connection strip - A973 4-push button board

Connection strip	Terminal point	Description
1	1	24 V DC
	2	0 V
2	1	Input normally open contact 4.1
	2	Output normally open contact 4.1
	3	Output normally open contact 4.2
	4	Input normally open contact 4.2
3	1	Input normally open contact 3.1
	2	Output normally open contact 3.1
	3	Output normally open contact 3.2
	4	Input normally open contact 3.2
4	1	LED S1
	2	LED S2
	3	LED S3
	4	LED S4
	5	Input normally open contact 1.1
	6	Output normally open contact 1.1
	7	Output normally open contact 1.2
	8	Input normally open contact 1.2
	9	Input normally open contact 2.1
	10	Output normally open contact 2.1
	11	Output normally open contact 2.2
	12	Input normally open contact 2.2

3.3 Board combinations

An emergency stop board is always used in each setup. In addition, the 3 or 4-push button boards are combined depending on the option number. The following table lists all board combinations.

Table 10: Board combinations

Control panel	Option number	Number of push buttons	Emergency stop board	Number 3-push button board	Number 4-push button board
CP2xxx	C9900-G002	4	1	-	1
	C9900-G003	7	1	1	1
	C9900-G004	8	1	-	2
	C9900-G005	10	1	2	1
	C9900-G006	9	1	3	-
	C9900-G007	13	1	3	1
	C9900-G008	12	1	-	3
CP39xx	C9900-G022	4	1	-	1
	C9900-G023	7	1	1	1
	C9900-G024	8	1	-	2
	C9900-G025	10	1	2	1
	C9900-G026	9	1	3	-
	C9900-G027	13	1	3	1
	C9900-G028	12	1	-	3

3.4 Circuit diagrams

This section shows the circuit diagrams for the boards used in the push button extensions. The figures show the boards with USB and direct wiring as well as the boards with direct wiring only, which are compared in chapter 3.2 [Description of the boards](#) [► 14].

Circuit diagram emergency stop boards

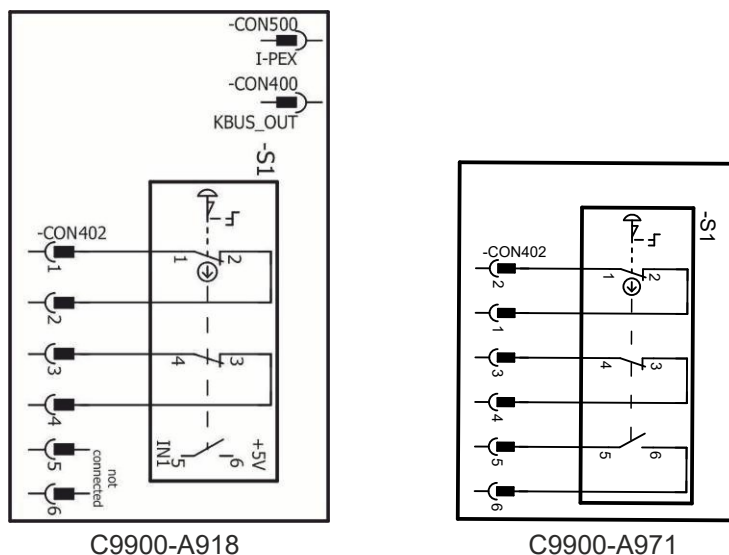


Fig. 8: Circuit diagram emergency stop boards

Circuit diagram 3-push button boards

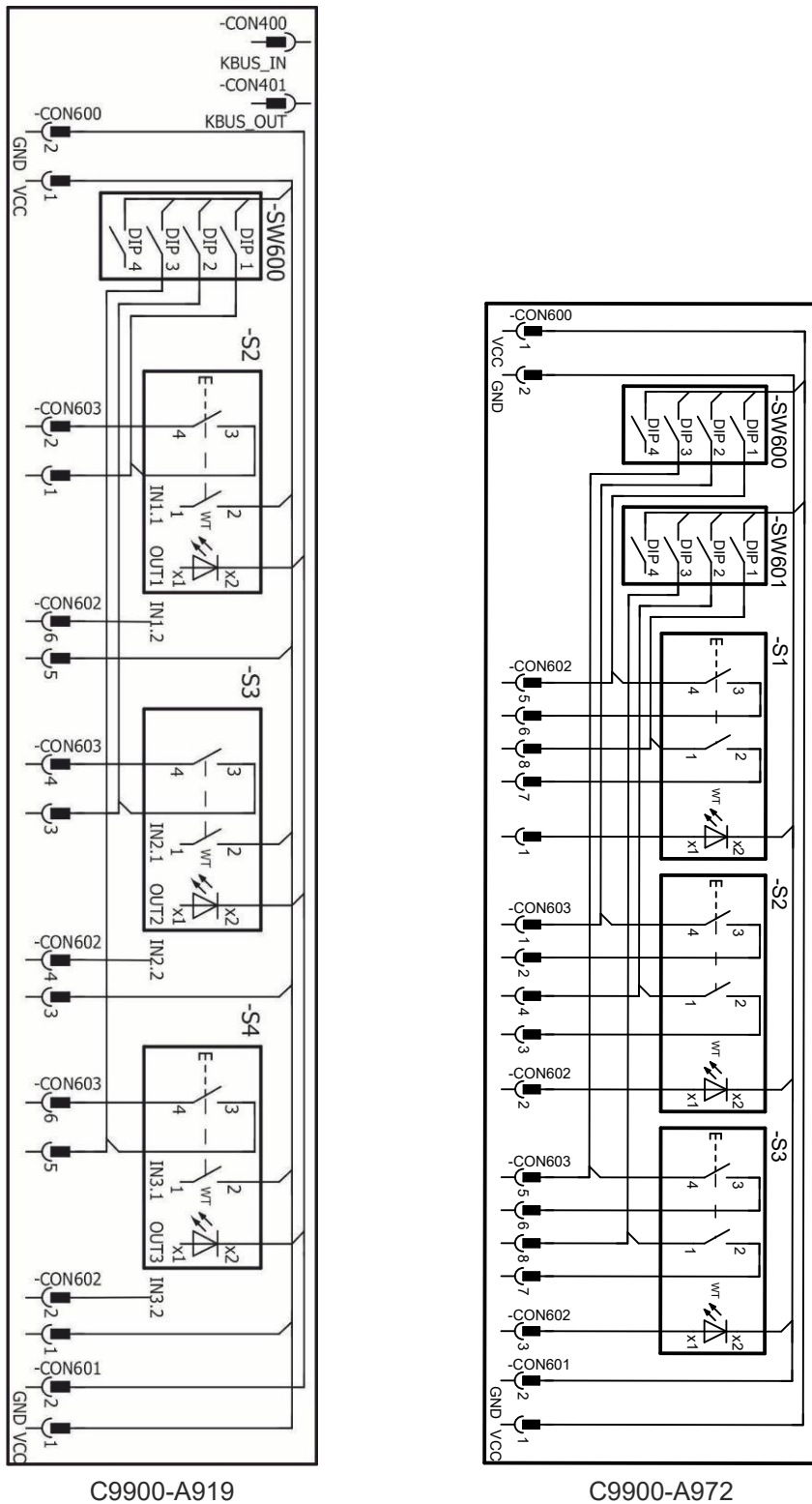


Fig. 9: Circuit diagram 3-push button boards

Circuit diagram 4-push button boards

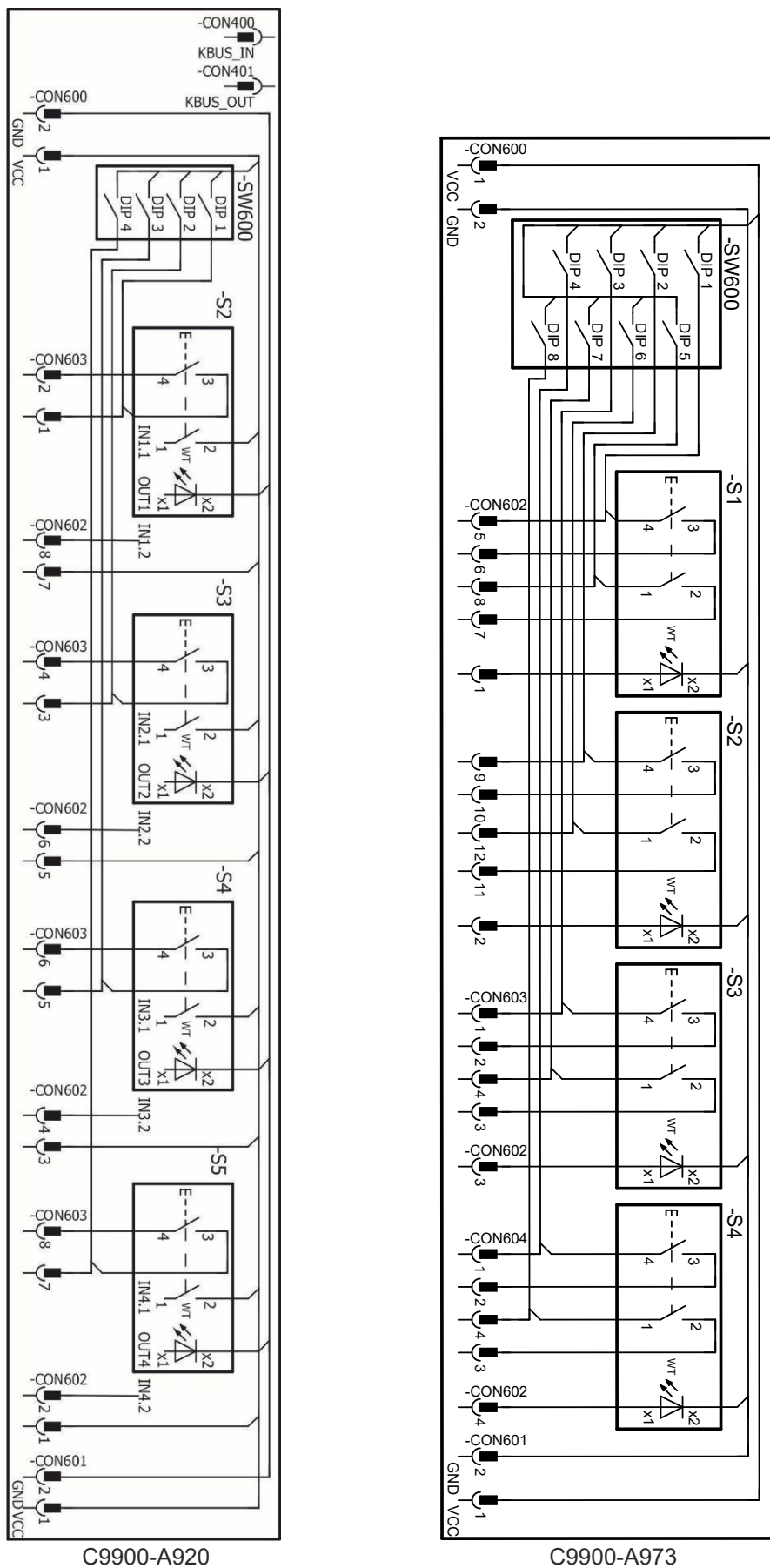


Fig. 10: Circuit diagram 4-push button boards

3.5 CP configurator

If you order your control panel with a push button extension under the corresponding ordering option, this is standardized. Alternatively you have the possibility to make customer specific adjustments to the push button extension by means of the CP configurator. You can customize the arrangement, functionality, color, sequence and wiring type of the push buttons.

In the following the handling of the CP configurator is explained.

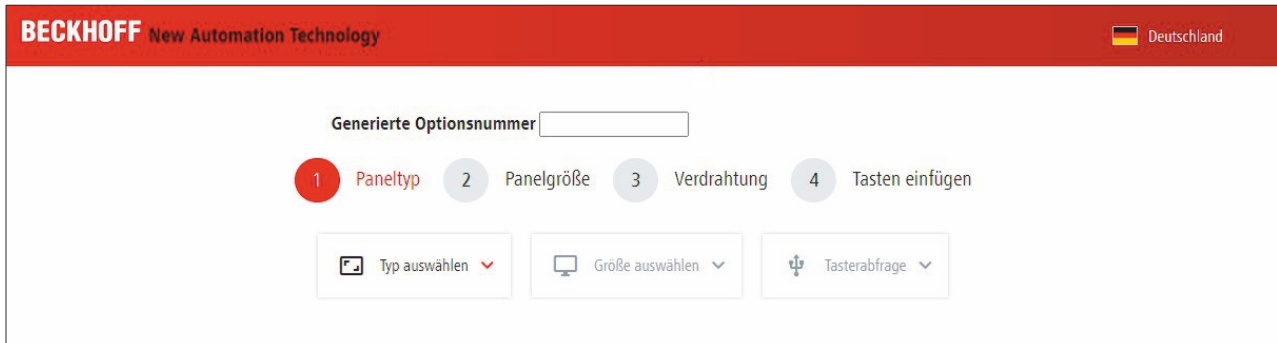


Fig. 11: Home page CP configurator

1. Open the drop-down menu **Select type**.
2. Select your control panel.

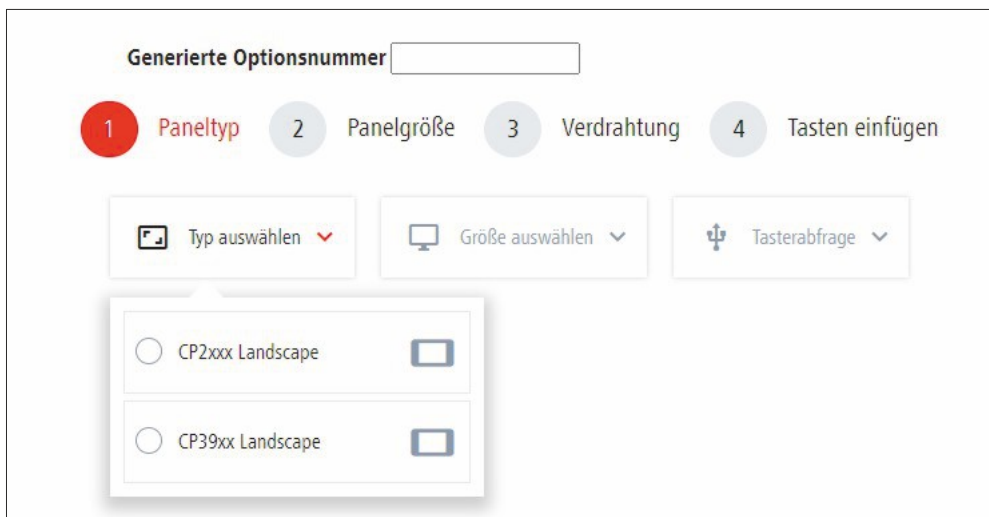


Fig. 12: Select control panel

3. Open the drop-down menu **Select size**.
4. Select the display size of your control panel.

Fig. 13: Select display size

5. Open the drop-down menu **Push button query**.
6. Select the wiring type of the push buttons of your push button extension. If you hold the mouse over the fields without clicking, info texts about the wiring types appear (see also chapter 3.2 [Description of the boards](#) [► 14]).

Fig. 14: Select wiring type

7. Click on the unassigned push buttons in the control panel image.
8. Select the push button type.

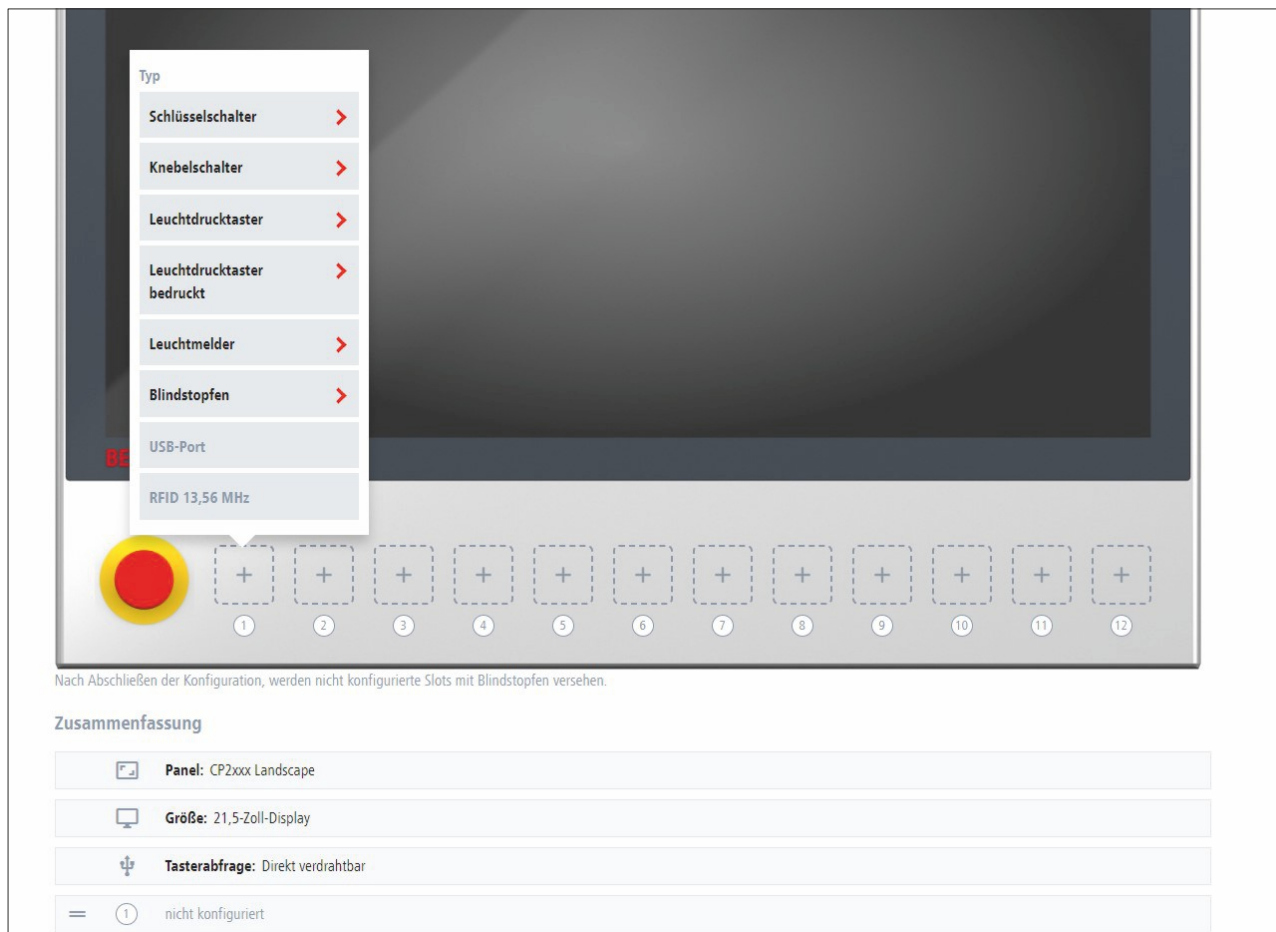


Fig. 15: Select push button type

- Click through the configuration of the push button until you reach the end.
- When you have configured all the desired push buttons, click on **Finalize configuration**.

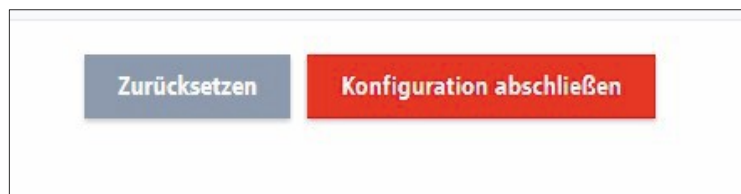


Fig. 16: Completing the configuration

- Enter your mail address and password or register if you do not have access data yet.

in: Ta

Konfiguration abschließen

E-Mail Adresse

Passwort

[Passwort vergessen?](#)

Optionsnummer anlegen

Registrieren

Fig. 17: Log in/Register

12. Click **Create option number**.

⇒ You will receive a confirmation email of your configuration with the corresponding generated option number.

If you have already configured a push button extension and therefore have an associated generated option number, you can enter this in the configurator and plan further push button extensions based on the configuration.

BECKHOFF New Automation Technology Deutschland

Generierte Optionsnummer

1 Paneltyp 2 Panelgröße 3 Verdrahtung 4 Tasten einfügen

Typ auswählen Größe auswählen Tasterabfrage

Fig. 18: Enter generated option number

4 Commissioning

To be able to use the push button extensions, you must first commission it. The first step involves transporting and unpacking the control panel to which the push button extensions are mounted ex factory. You will then need to access and wire the push button extension boards. Finally, commissioning takes place in the TwinCAT System Manager.

4.1 Transport and unpacking

Note the specified transport and storage conditions (see Chapter 8 [Technical data](#) [► 46]).

Despite the robust design of the unit, the components are sensitive to strong vibrations and impacts. Transporting a control cabinet with a panel installed can place too high an impact load on the control panel and the mounted push button extension. During transport the device must therefore be protected from excessive mechanical stress. Appropriate packaging of the panel, in particular 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:

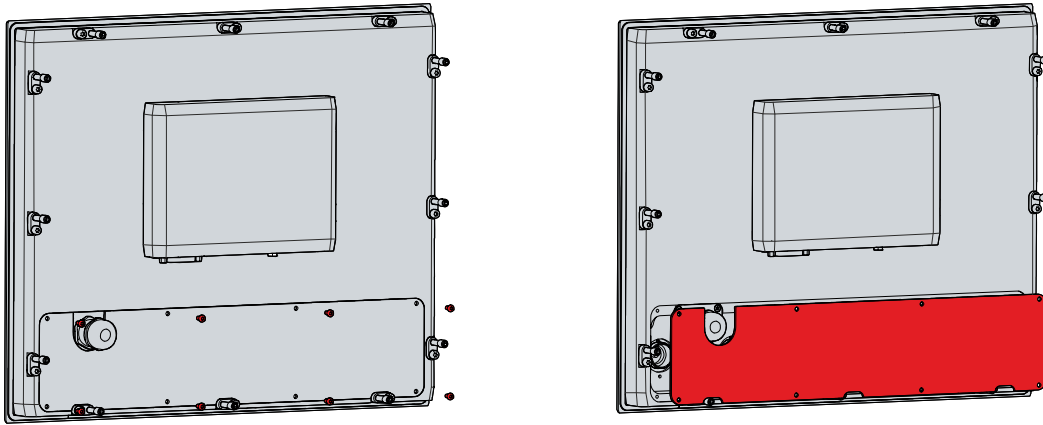
1. Check the packaging for transport damage.
2. Remove packaging.
3. Keep the packaging for possible future transport.
4. Check your delivery for completeness by comparing it with your order.
5. Check the contents for visible shipping damage.
6. In case of discrepancies between the package contents and the order, or in case of transport damage, please inform Beckhoff Service (see Chapter 9 [Service and Support](#) [► 47]).

4.2 Access to boards

Before you can wire the push button extensions, you must gain access to the boards. The procedures differ slightly according to the device.

For the CP2xxx and CP39xx Control Panels with connection block, you only have to remove the cover for access. To do this, first loosen the M3 screws and then remove the cover (see Fig. 19).

CP2xxx



CP39xx

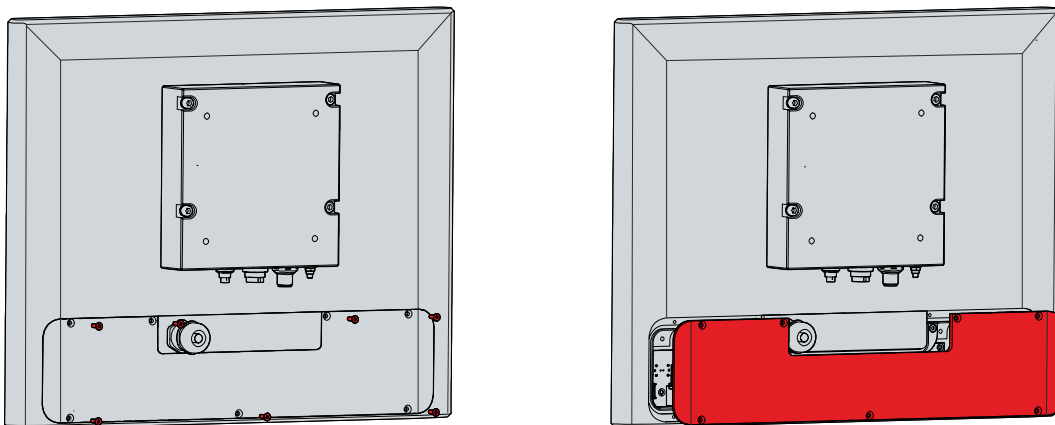


Fig. 19: Access boards CP2xxx and CP39xx

For a CP39xx with mounting arm adapter you can also reach the boards by removing the cover of the push button extensions. For further cable routing, you must also open the cable channel in this case. To do this, follow the steps below as shown in Figure 20:

1. Loosen and remove the M3 screws on the rear side of the push button extension (section A).
 2. Remove the cover of the push button extension (section B).
 3. Loosen and remove the M3 screws from the cable channel (section C).
 4. Remove the cover of the cable channel (section D).
- ⇒ You can now wire the push button extension.

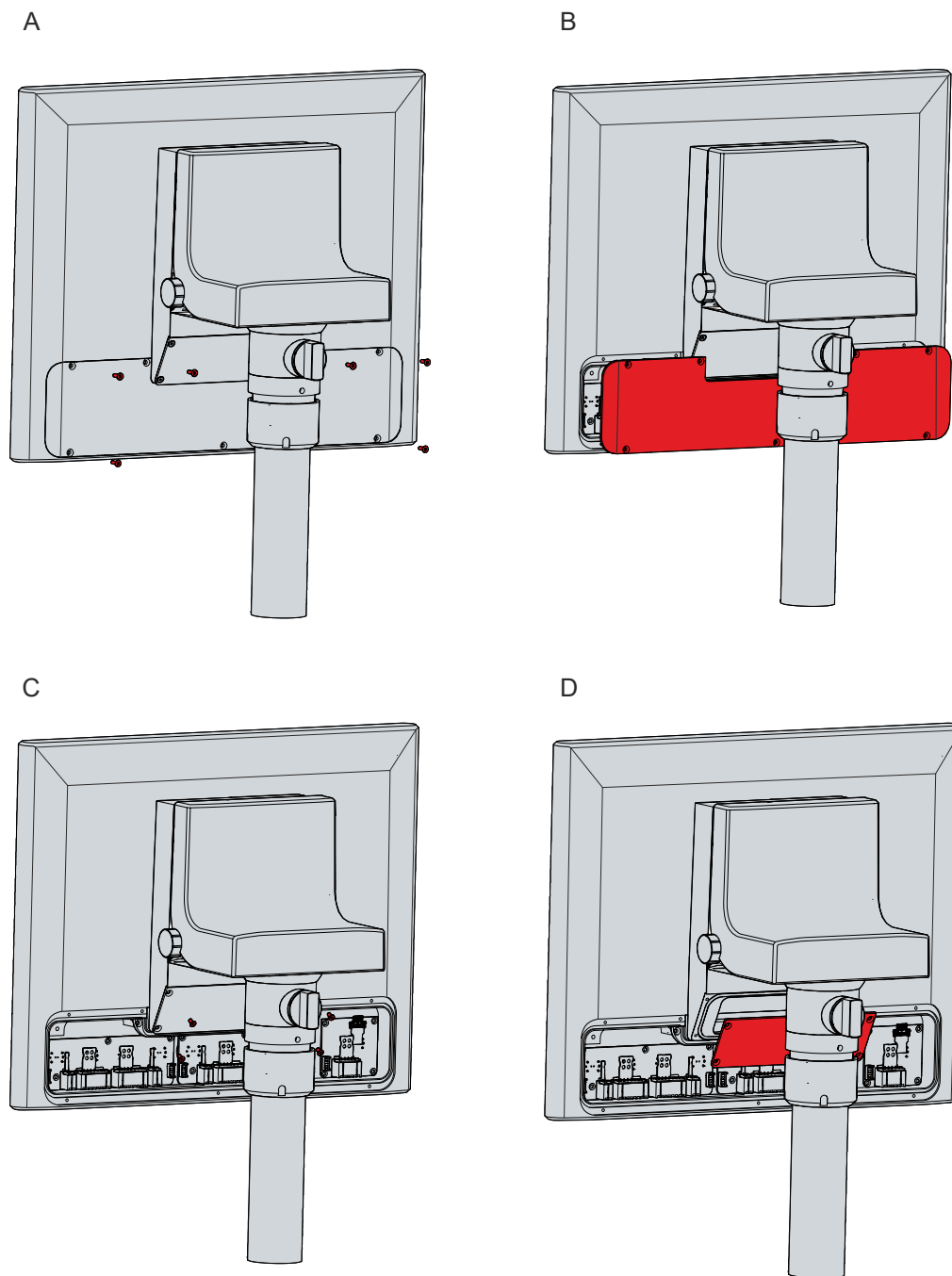


Fig. 20: Access boards CP39xx mounting arm adapter

4.3 Mounting push button caps and label

You have the possibility to exchange the push button caps of your push button extension and thus change the color. In addition, you can individually label the push buttons by means of a transparent foil. The following ordering options are available to you:

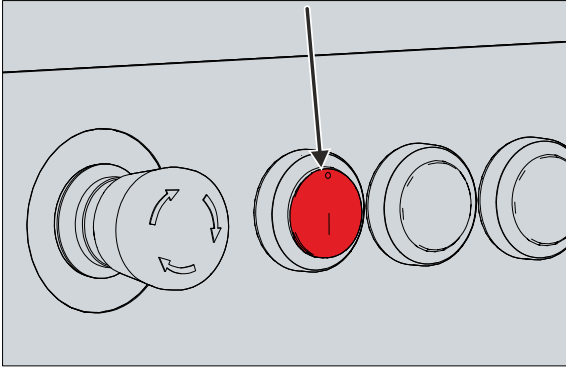
Table 11: Push button caps and label

Options	Description
C9900-Z255	Blue push button cap for individual application to a pushbutton extension C9900-G0xx, type Rafi FS+, diameter: 22.3 mm, 5 pcs
C9900-Z256	Yellow push button cap for individual application to a push button extension C9900-G0xx, type Rafi FS+, diameter: 22.3 mm, 5 pcs
C9900-Z257	Green push button cap for individual application to a push button extension C9900-G0xx, type Rafi FS+, diameter: 22.3 mm, 5 pcs
C9900-Z258	Red push button cap for individual application to a push button extension C9900-G0xx, type Rafi FS+, diameter: 22.3 mm, 5 pcs
C9900-Z259	Clear push button cap for individual application to a push button extension C9900-G0xx, type Rafi FS+, diameter: 22.3 mm, 5 pcs
C9900-Z290	Orange push button cap for individual application to a push button extension C9900-G0xx, type Rafi FS+, diameter: 22.3 mm, 5 pcs
C9900-Z495	Black push button cap for individual application to a push button extension C9900-G0xx, type Rafi FS+, diameter: 22.3 mm, 5 pcs
C9900-Z496	Gray push button cap for individual application to a push button extension C9900-G0xx, type Rafi FS+, diameter: 22.3 mm, 5 pcs
C9900-Z260	Transparent film for individual labeling of a C9900-G0xx- push button extension, type Rafi FS+, diameter: 22.3 mm, 1 sheet DIN A4, 54 pcs

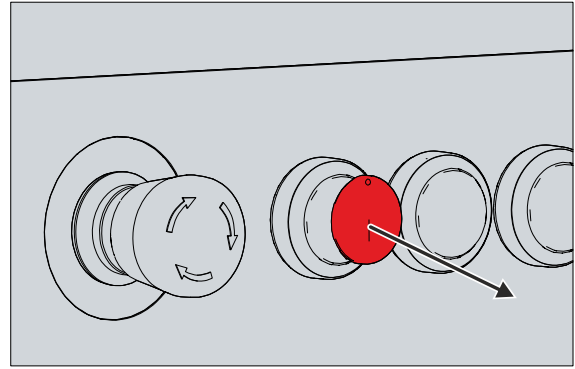
To replace the push button caps and insert the labeled foils, follow the steps below, shown in Figure 21:

1. Insert a screwdriver under the push button cap and pry it out (section A and B).
 2. Replace the removed push button cap with a new one if necessary.
 3. Insert the foil into the removed or exchanged push button cap. The nose on the front of the push button cap indicates the top of the push button (section C).
 4. Insert the push button cap into the push button (section D).
 5. Press the push button cap into the push button until you hear a “click”.
- ⇒ You have replaced the push button cap and labeled it if necessary.

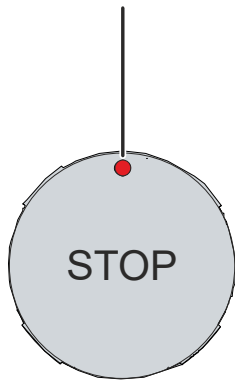
A



B



C



D

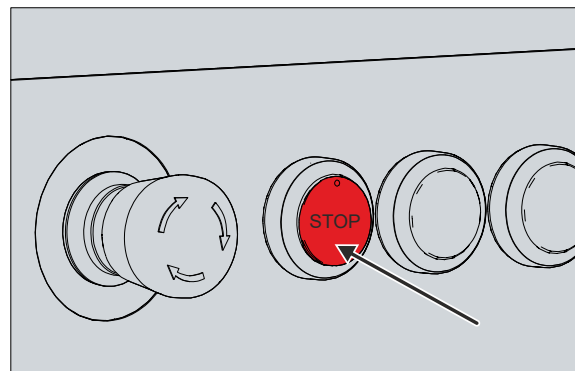


Fig. 21: Push button cap and label

4.4 Wiring

⚠ CAUTION

Risk of electric shock

Dangerous touch voltages can lead to electric shock. To avoid electric shock, adhere to the following points:

- Never connect or disconnect the device cables during a thunderstorm.
- Provide protective earthing for handling the device.

After you have gained access to the push button extension boards, you can wire the push button extension. The female connectors on the boards are plugged into the corresponding male connectors. You can carry out the wiring both when the female connector is plugged in and when it is unplugged.

The following table provides information on which conductors and wire cross-sections you can use for the connections.

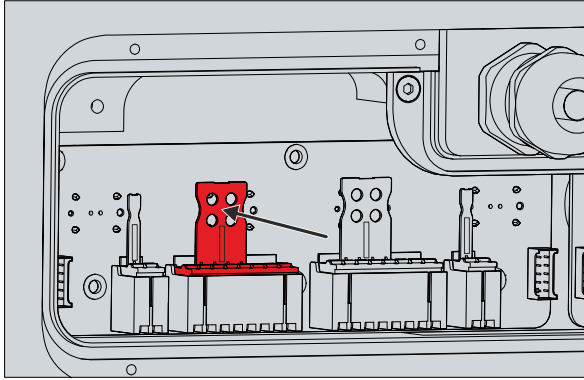
Table 12: Overview conductors

Conductor	Wire cross-section
Solid conductor	0,2 to 1,5 mm ²
Stranded conductor, with ferrules, with plastic collar	0,25 to 0,75 mm ²
Stranded conductor, with ferrules, without plastic collar	0,25 to 1,5 mm ²

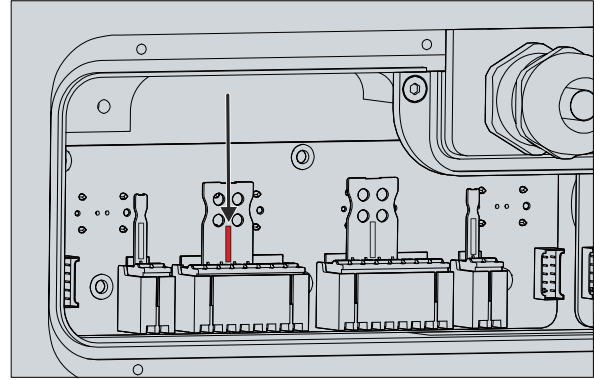
If you want to carry out the wiring in the unplugged state, you must first release the female connector from the male connector. To do this, follow the steps below as shown in Figure 22:

1. Press the grip plate of the female connector backwards against the board and hold this position (section A).
 2. Use a screwdriver to slide down the release slide on the grip plate and hold this position (section B).
 3. Pull the female connector on the grip plate out of the male connector (section C).
- ⇒ You can now connect the cables to the unplugged female connector.

A



B



C

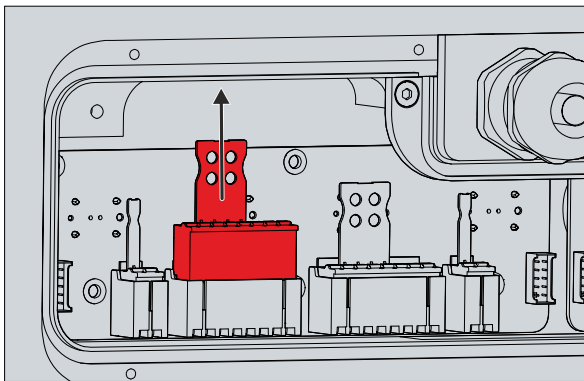


Fig. 22: Releasing the female connector

Regardless of whether you want to carry out the wiring when the female connector is plugged in or unplugged, you must proceed as follows:

1. Insert the cables into the round terminal opening.
2. Pull lightly on the cable to check that it is firmly seated in the female connector.

⇒ You have wired the female connector.

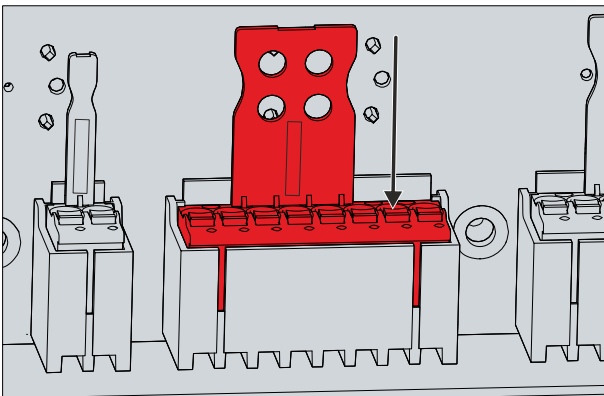


Fig. 23: Connecting cables

You can lead the wiring out of the push button extension through an M20 gland. For a CP2xxx and a CP39xx with connection block, the M20 gland is located on the rear side of the panel at the push button extension (see Fig. 24). The clamping-range of the M20 gland is 8.0-13.0.

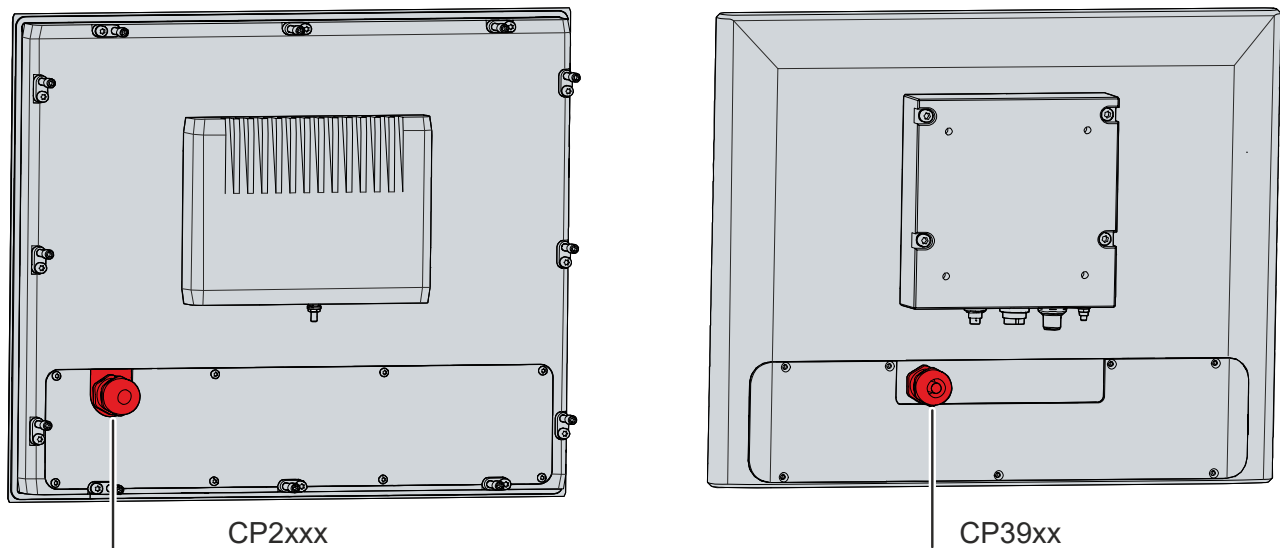


Fig. 24: M20 gland CP2xxx & CP39xx with connection block

For a CP39xx with mounting arm adapter, the M20 screw connection is located inside the mounting arm adapter. The clamping-range of the M20 gland is 8.0-13.0. The position of the gland within the mounting arm adapter varies slightly according to the device connections and mounting arm adapter option. The cable is routed from the push button extension through the cable channel and then out of the device through the M20 gland. Follow the steps below to open the mounting arm adapter:

1. Insert a flat-blade screwdriver in the recesses on the underside of the mounting arm adapter (section A).
 2. Bend the cover slightly outwards so that the latching lugs on the cover release the cover to allow it to be removed.
 3. Carefully release the latching lugs (see marking in section A) using a flat-blade screwdriver as a lever.
 4. Slide the cover upwards off the mounting arm adapter (section B).
- ⇒ You now have access to the M20 gland (section C).

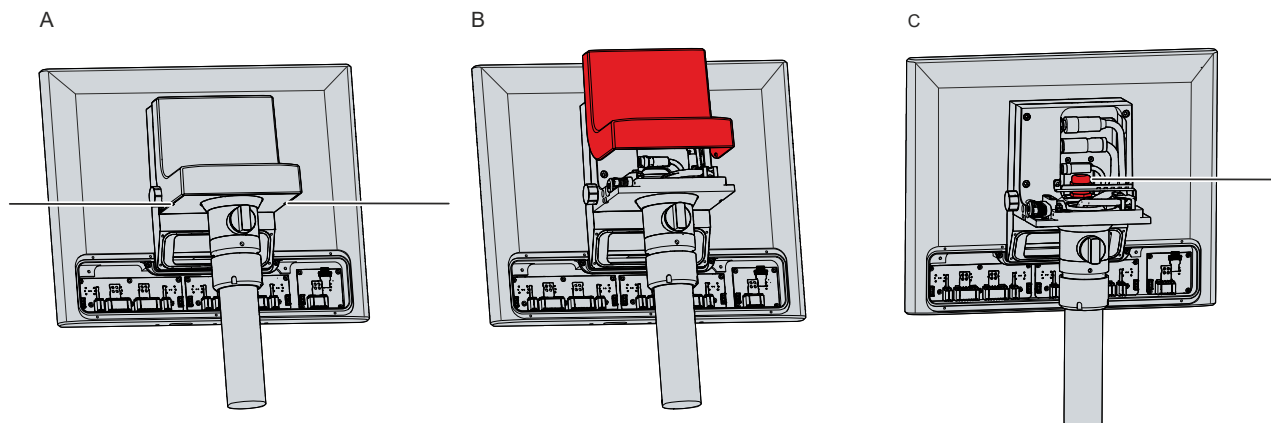


Fig. 25: M20 gland CP39xx with mounting arm adapter

4.5 Configuration push-button extension

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

4.5.1 TwinCAT System Manager connection

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

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

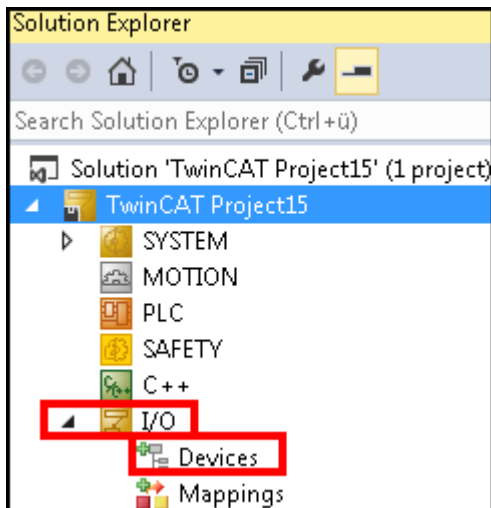


Fig. 26: XAE Project

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

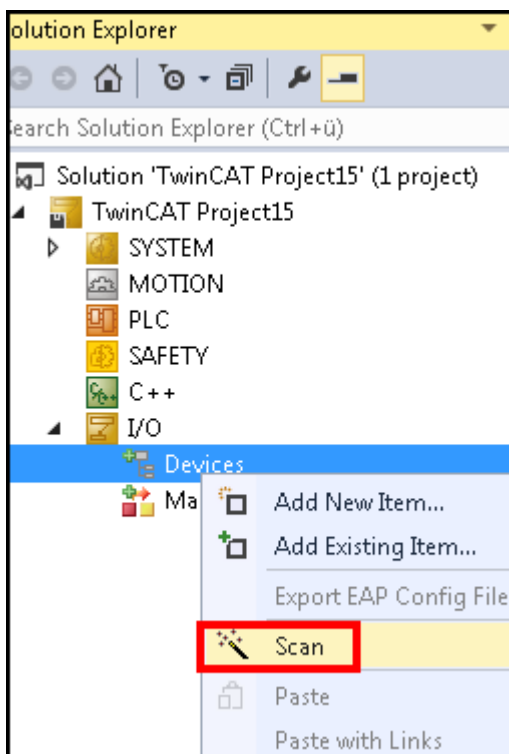


Fig. 27: Scan device

4. Select the devices you want to use and confirm the selection with **OK**.

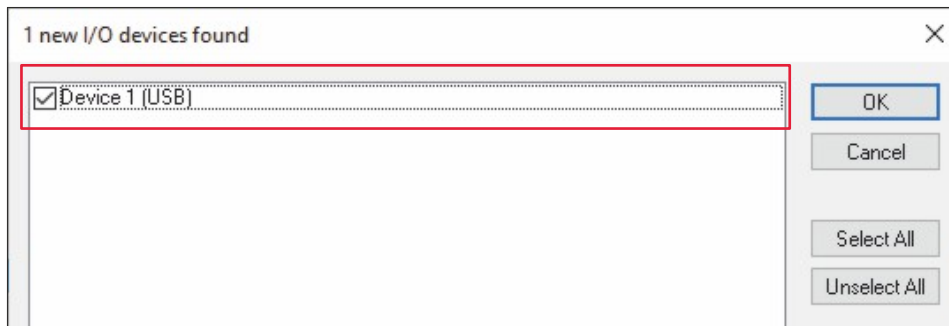


Fig. 28: Select device

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

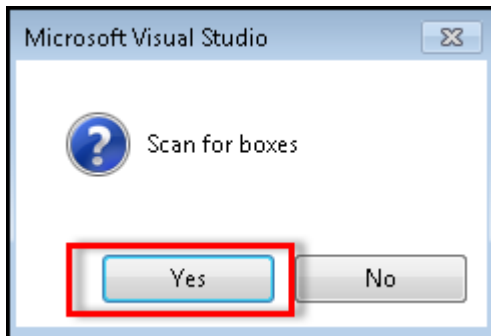


Fig. 29: Scan for box modules

6. Confirm the request whether to enable **FreeRun** with **Yes**.

⇒ The device is inserted as a box in the tree view.

Renaming inputs and outputs

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

Table 13: Assignment of inputs and outputs and function

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

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

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

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

5. Enter the function of the input or output from the previous table as the new name.

⇒ You have renamed the input or output.

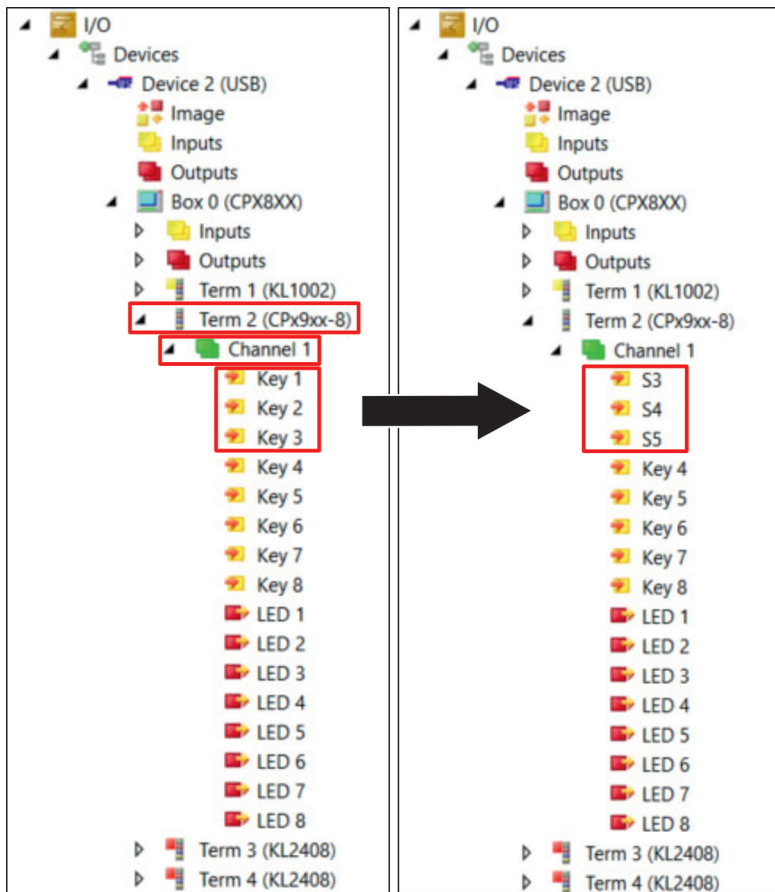


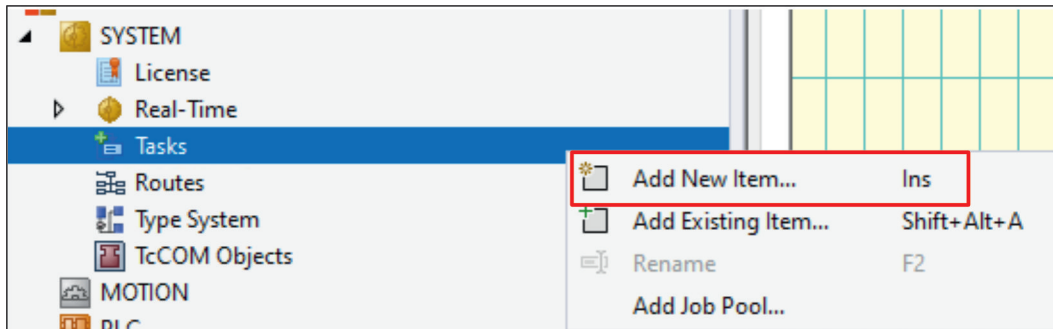
Fig. 30: Renaming inputs and outputs

4.5.2 I/O task linking

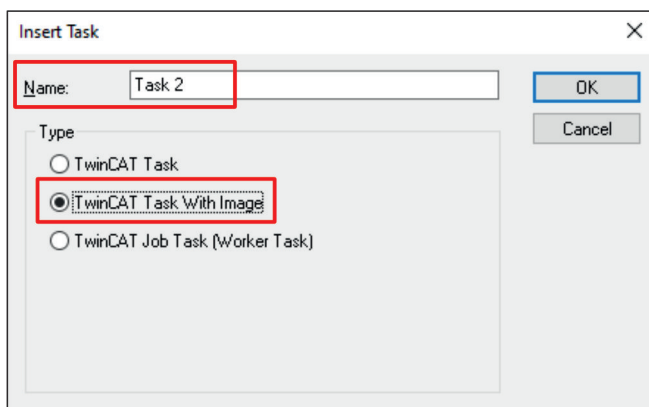
The free TwinCAT version is sufficient for reading push button extensions, you do not need an extra TwinCAT license. After reading in, you can extract the ADS info and use it as part of the ADS (Automation Device Specification) communication protocol. You can find more information about ADS [here](#).

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

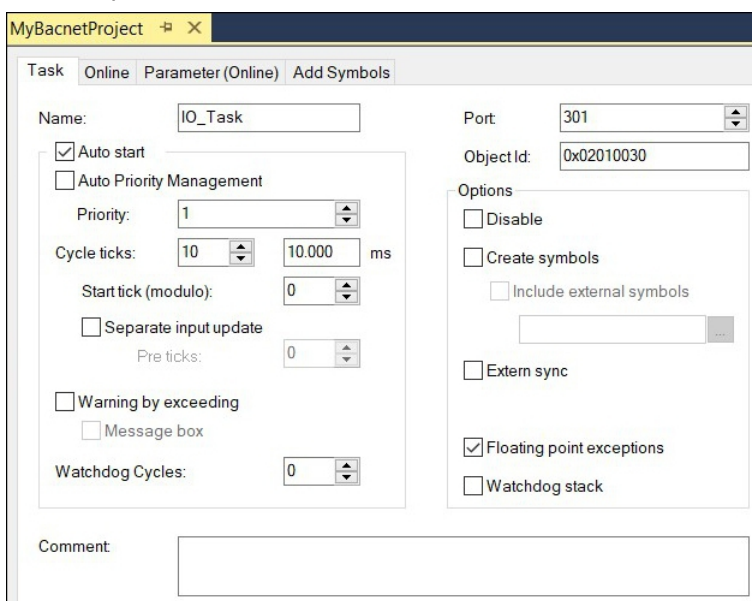
1. Click **Add New Item** under **SYSTEM > Tasks** on the left side of the tree view.



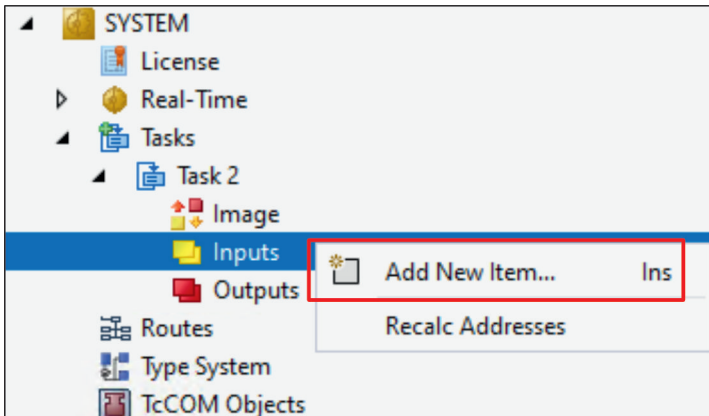
2. Give the task a name and select the **TwinCAT Task With Image** option.



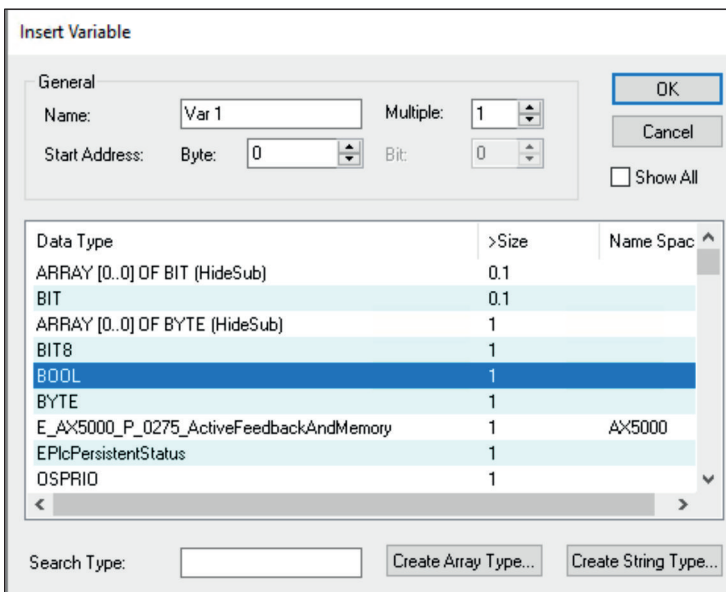
3. Accept the default values for the task.



4. Right-click on **Inputs** on the left in the tree view and then click **Add New Item**.

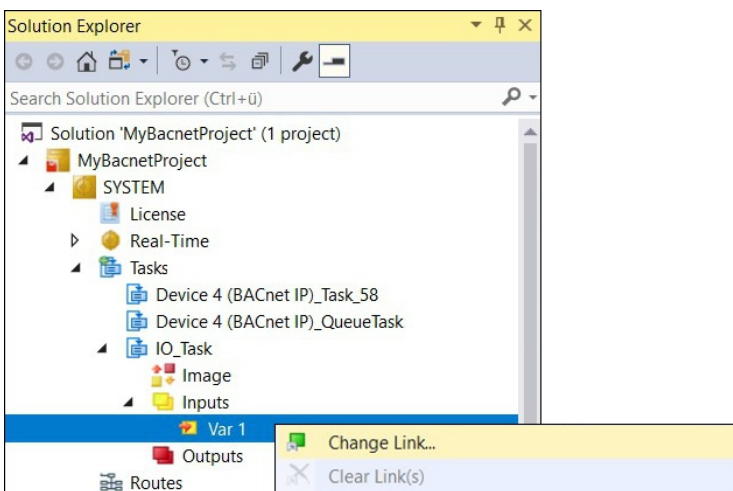


5. Create a BOOL variable with a size of one byte.

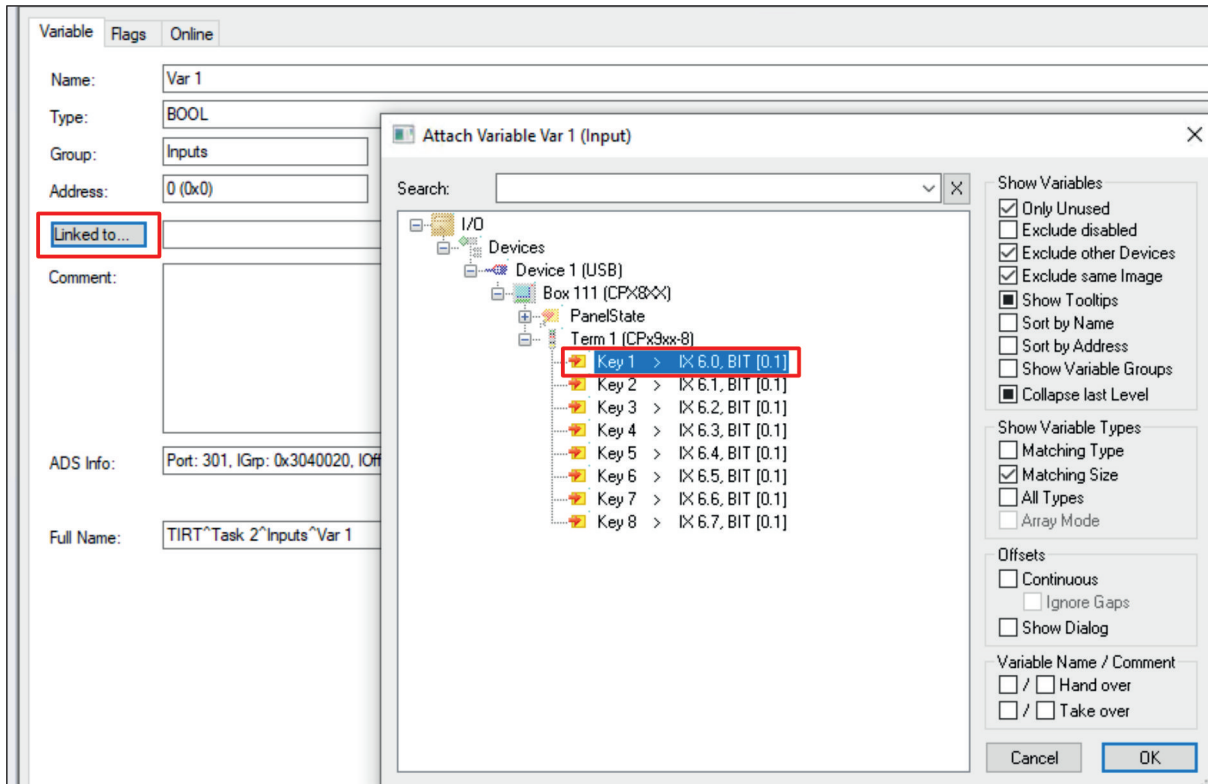


6. Link the BOOL variable to the EtherCAT device.

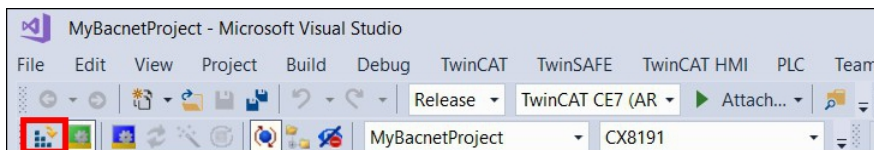
7. To do this, right-click on the created BOOL variable in the tree view on the left, then click **Change Link**.



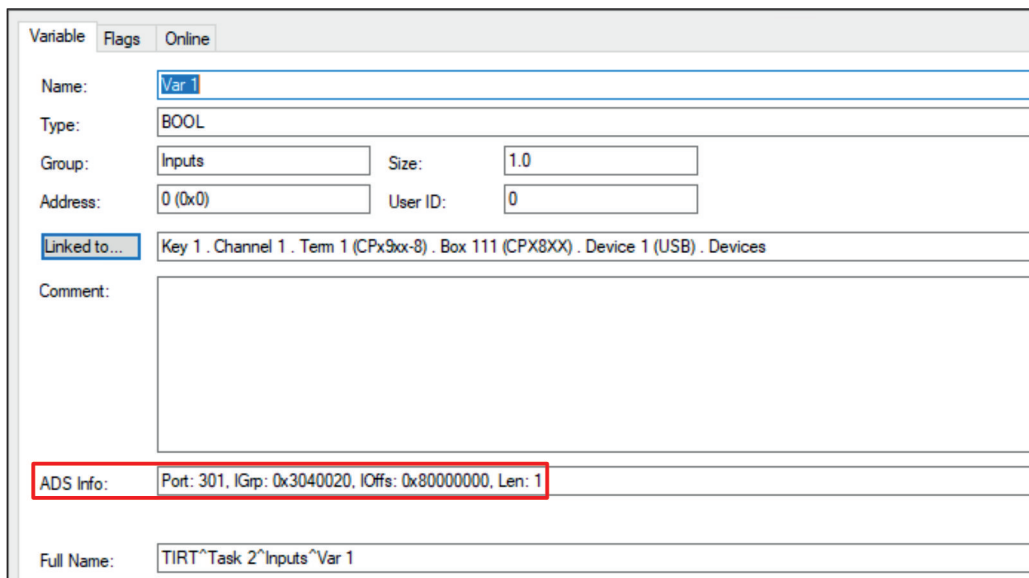
8. Connect the BOOL variable with a variable of the EtherCAT device, e.g. **Key 1**.



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



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



⇒ Configuration is now complete.

5 Decommissioning

⚠ CAUTION

Risk of electric shock

Disconnecting the push button extension during a thunderstorm can cause electric shock.

- Never disconnect the wiring during a thunderstorm.

As part of the decommissioning of the push button extension, you must first gain access to the boards of the push button extension again. Subsequently, you can disconnect the cables.

How to gain access to the boards is described in chapter 4.2 [Access to boards](#) [► 29].

Proceed as follows to disconnect the cables:

1. Use a screwdriver to press lightly into the respective square opening on the connection strip (see Fig. 31).
⇒ The corresponding terminal opening of the connection strip is unlocked.
2. Pull the cable out of the connection strip.
⇒ They have disconnected the cables.

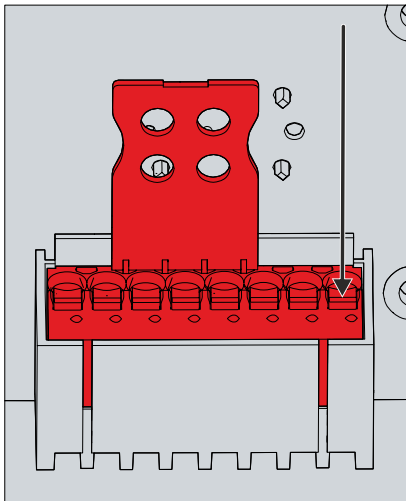


Fig. 31: Disconnecting cables

Disposal

The push button extension is disposed of together with the respective control panel to which the push button extension is mounted ex factory. When disposing of the devices follow the national electronic scrap regulations.

6 Maintenance

Maintenance measures increase the efficiency of the device by ensuring long-term functionality. The cleaning of the push button extension contributes to this.

Cleaning

NOTICE

Unsuitable cleaning agents

The use of unsuitable cleaning agents can damage the device.

- Clean the push button extension only as indicated.

It is essential to observe the following aspects when cleaning the push button extension:

- Adhere to the general conditions of the protection rating of the control panel to which the push button extension is mounted.
- Never use compressed air to clean the push button extension.
- Observe the ambient temperature range of the control panel to which the push button extension is mounted.

When cleaning, be sure to 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
- high water pressure, e.g. high-pressure cleaner

7 Technical data

Table 14: Characteristics of the respective push button extensions

Product designation	C9900-G00x & C9900-G02x	
Shock 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
Supply voltage	24 V _{DC} (20.4 – 28.8 V _{DC})	
Min. operating voltage AC/DC	5 V	
Max. operating voltage AC/DC	35 V	
Min. operating current AC/DC	1 mA	
Max. operating current AC/DC	100 mA	
Switching capacity max.	250 mW	
EMC interference immunity	Conforms to EN 61000-6-2	
EMC interference emission	Conforms to EN 61000-6-4	
Permissible relative air humidity	Maximum 95%, no condensation	
Max. cable length	30 m	

Table 15: Characteristic values emergency stop and push buttons

Properties	Description	
Min. operating current AC/DC	1 mA	
Max. operating current AC/DC	100 mA	
Switching capacity max.	250 mW	
Protection rating	IP65	
Emergency stop type	1.30.273.512/0030 Rafi 22FS+	
	The emergency stop is reset by rotating.	
	Lifetime	50,000 cycles
	B10 value	65,000 cycles
Switching element (emergency stop)	1.20.126.414/0000 Rafi FS	
	1 x normally open contact / 2 x normally closed contact	
	Lifetime	1 million cycles at 10 mA / 24 V DC
	B10 value	65,000 cycles
Illuminated push button type	9.30.270.027/1500 Rafi 22FS+	Green
	9.30.270.027/1300 Rafi 22FS+	Red
	9.30.270.027/1600 Rafi 22FS+	Blue
	9.30.270.027/1000 Rafi 22FS+	Clear
	Lifetime	1,000,000 cycles
	B10 value	1,300,000 cycles
Switching element (buttons)	1.20.126.003/9000	
	1 x normally open contact / 1 x normally closed contact	
	1.20.126.005/9000	
	2 x normally open contact	
	1.20.126.004/9000	
	2 x normally closed contact	
	Lifetime	1,000,000 cycles
	B10 value	1,300,000 cycles

8 Appendix

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

8.1 Service and support

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

Beckhoff Service

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

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

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

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

Beckhoff Support

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

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

Hotline: + 49 5246/963-157
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The addresses of the worldwide Beckhoff branches and agencies can be found on our website at <http://www.beckhoff.com/>.

You can also find further documentation for Beckhoff components there.

8.2 Approvals

The push button extension is CE and EAC certified.

FCC approvals for the United States of America

FCC: Federal Communications Commission Radio Frequency Interference Statement

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

FCC approvals for Canada

FCC: Canadian Notice

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

List of figures

Fig. 1	Structure with CP39xx.....	9
Fig. 2	A918 emergency stop board	15
Fig. 3	A919 3-push button board.....	16
Fig. 4	A920 4-push button board.....	17
Fig. 5	A971 emergency stop board	18
Fig. 6	A972 3-push button board.....	18
Fig. 7	A973 4-push button board.....	19
Fig. 8	Circuit diagram emergency stop boards	21
Fig. 9	Circuit diagram 3-push button boards	22
Fig. 10	Circuit diagram 4-push button boards	23
Fig. 11	Home page CP configurator.....	24
Fig. 12	Select control panel.....	24
Fig. 13	Select display size.....	25
Fig. 14	Select wiring type	25
Fig. 15	Select push button type.....	26
Fig. 16	Completing the configuration	26
Fig. 17	Log in/Register	27
Fig. 18	Enter generated option number	27
Fig. 19	Access boards CP2xxx and CP39xx.....	29
Fig. 20	Access boards CP39xx mounting arm adapter.....	30
Fig. 21	Push button cap and label.....	32
Fig. 22	Releasing the female connector.....	34
Fig. 23	Connecting cables.....	34
Fig. 24	M20 gland CP2xxx & CP39xx with connection block.....	35
Fig. 25	M20 gland CP39xx with mounting arm adapter	35
Fig. 26	XAE Project.....	36
Fig. 27	Scan device.....	36
Fig. 28	Select device	37
Fig. 29	Scan for box modules	37
Fig. 30	Renaming inputs and outputs	40
Fig. 31	Disconnecting cables	44

List of tables

Table 1	Legend structure	9
Table 2	CP2xxx ordering options	10
Table 3	CP39xx ordering options.....	12
Table 4	Connection strip assignment - A918 emergency stop board	15
Table 5	Assignment of connection strips 3-push button board A919.....	16
Table 6	Assignment of connection strips 4-push button board A920.....	17
Table 7	Connection strip assignment - A971 emergency stop board	18
Table 8	Assignment of connection strip - A972 3-push button board	19
Table 9	Assignment of connection strip - A973 4-push button board	20
Table 10	Board combinations	21
Table 11	Push button caps and label.....	31
Table 12	Overview conductors.....	33
Table 13	Assignment of inputs and outputs and function	38
Table 14	Characteristics of the respective push button extensions	46
Table 15	Characteristic values emergency stop and push buttons.....	46

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