CUB100 Controller Unit Building Module
Installation instructions
Edition 05/2019 EN

1 Introduction

⚠📖 These installation instructions contain important information that should be followed when installing the CUB100 Controller Unit Building module.

► Read all the instructions carefully before installing and commissioning the CUB100 Controller Unit Building module to avoid possible risks and mistakes.
► Keep the installation instructions in a safe place for future reference.

2 Safety instructions

These instructions contain notes that you must follow for your own personal safety and to avoid injury and damage to property. They are highlighted by warning triangles and are shown as follows according to the level of danger.

2.1 Hazard classification

⚠ **DANGER**

The signal word designates a hazard with a **high** degree of risk which, if it is not avoided, will result in death or severe injury.

⚠ **WARNING**

The signal word designates a hazard with a **medium** degree of risk which, if it is not avoided, will result in death or severe injury.

⚠ **CAUTION**

The signal word designates a hazard with a **low** degree of risk which, if it is not avoided, could result in minor or moderate injury.

NOTE

A note as used in these instructions contains important information about the product or about a part of the manual to which particular attention should be paid.

2.2 Notes on installation

⚠ **WARNING**

► **Follow ALL danger and warning instructions and notes on precautionary measures.**
► **Read section 2 „Safety instructions" carefully.**

2.3 Notes on using the module safely

⚠ **DANGER**

Danger of death by electric shock.

Only safety extra low voltages (SELV) may be connected to the CUB100 module. Components of other TQ-Automation modules on the same DIN rail do carry potentially fatal voltages, however.

► Install the TQ-Automation modules only in approved housings or distribution boards so that the connections for the outer and neutral conductors are located behind a cover or guard to prevent accidental contact.
The housing or distribution board must be accessible only with a key or suitable tool in order to limit access to authorised personnel.
► Before starting any installation or maintenance work, switch off the input voltage and secure it to prevent it being switched on again accidentally.
► Install the CUB100 module only in a dry environment.
► Protect the CUB100 module against moisture and wet conditions.

⚠ **WARNING**

► Install an additional electrical isolating device upstream of every line of connected TQ-Automation modules so that every TQ-Automation module in the line can be electrically disconnected.

NOTE

► Always run data and mains cables separately or in separate conduits. Refer to EN 50174-2.
► Protect the CUB100 module against damage by transient overvoltages by installing additional overvoltage protection elements conforming to SPD type 1 (coarse protection) and SPD type 2 (medium protection) upstream of the POW100 mains adapter.
► Make sure that the POW100 mains adapter that powers the CUB100 can be isolated from the supply, e.g. with a type C2 or B6 line circuit breaker. This must be identified as the isolating device for the POW100 and must be easily accessible.
► Make sure that the CUB100 module is adequately ventilated. Make sure that the ventilation slots are not covered to prevent the CUB100 module from overheating.
► The CUB100 module requires no maintenance.

3 Target group

The activities described in this manual must only be carried out by technicians with the following qualifications:

— Training in the installation and commissioning of electrical devices
— Training in electrical hazards and the local safety requirements
— Knowledge of the relevant standards and directives
— Knowledge and observance of this document and all the safety instructions

4 Description

The CUB100 module is an I/O unit for building automation. The Ethernet interfaces of the CUB100 module allow control units to be networked across a building, e.g. between floors. The CUB100 module is made up of two parts - the backplane and the electronic module, which is electrically connected to the backplane via contacts. The backplane latches into place on a DIN rail with two snap locks. All the cables from interfaces, actuators and sensors are connected to the backplane with push-in terminals. The CAB bus cables are integrated into the backplane. These are connected to backplanes of other TQ-Automation modules, such as MIO100 or POW100, with backplane connectors. The backplane has a mechanical housing encoding to prevent any confusion between different modules of the same width. The electronic module is plugged into the backplane and locked to the backplane with a snap lock. In the event of a fault, the electronic module can be easily replaced without having to detach any wiring. The POW100 mains adapter provides the 24 V supply voltage for the CUB100 module. The supply voltage is supplied to the CUB100 module via the CAB bus.

5 Intended usage

— The CUB100 module may only be operated when it is installed on the DIN rail in the distributor box and the protective covers are attached.
— The CUB100 module is approved only for use in dry interior areas.
— Only use the CUB100 module as specified in the documentation provided. Any other usage may result in injury or damage to property.
— For safety reasons, no changes may be made to the CUB100 module, including the software, unless they are expressly approved for the product by TQ-Automation.
— The intended usage also includes compliance with all the notes in these instructions.

NOTE

Any types of usage other than those specified in section 5 „Intended usage" are regarded as contrary to the intended usage and will invalidate the warranty.
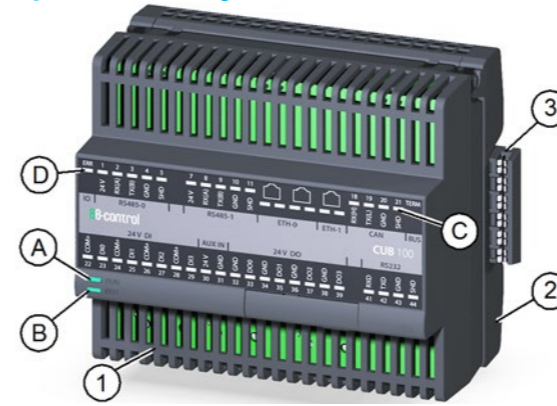
6 Scope of delivery

Fig. 1: View of the CUB100 controller unit building module

Item	Designation	Quantity
1	CUB100 Controller Unit Building module	1x
2	Backplane	1x
3	Backplane connector*	1x
-	Installation instructions	1x

* The backplane connector is used to connect adjacent backplanes of other modules.

7 Technical data

Input data	
Supply voltage	24 V DC
Power consumption	Max. 13.2 W
Outputs	
RS485 supply for ext. devices	
— Output voltage	24 V DC ± 10 % (SELV)
— Total load	Max. 100 mA
24 V digital outputs DO0 to DO3	See group guidelines 1 and 2 in Fig. 3
Inputs	
24 V digital inputs DI0 to DI3	See group guideline 2 in Fig. 3
COM+ 24 V	See group guidelines 3 and 4 in Fig. 3
AUX IN (optional 24 V aux. supply)	24 V DC / 1800 mA
Fieldbuses	
CAN	1x CAN2.0B
RS485	2x (half-duplex)
Other interfaces	
RS232	1x
Ethernet switch ETH-0	100 Mbit/s
Ethernet ETH-1	100 Mbit/s
Line connections	
Connection cross section	0.5 mm² to 1.5 mm²
Housing protection	
IP code	IP20
Protection class	III
Overvoltage category	I (EN 61010)
Ambient conditions	
Ambient temperature	
— Operation	0 °C to 50 °C
— Storage	-25 °C to 60 °C
Relative humidity (non condens.)	50 % to 95 %
Air pressure during operation	790 hPa to 1070 hPa
Dimensions/weight	
Dimensions (W x H x D)	105 mm x 95 mm x 67 mm, width equals 6 DIN units
Weight	0.36 kg
Handling	
Max. altitude during operation	2000 m above sea level
DIN rail system	TS 35 (35 mm x 7.5 mm, 1 mm thick)

8 Controls

There are three pushbuttons and a USB port beneath the service flap (item 5 in Fig. 2) on the CUB100 module.
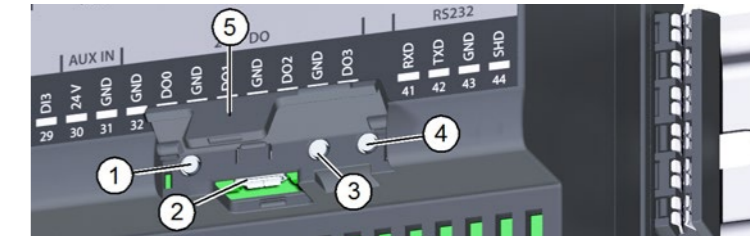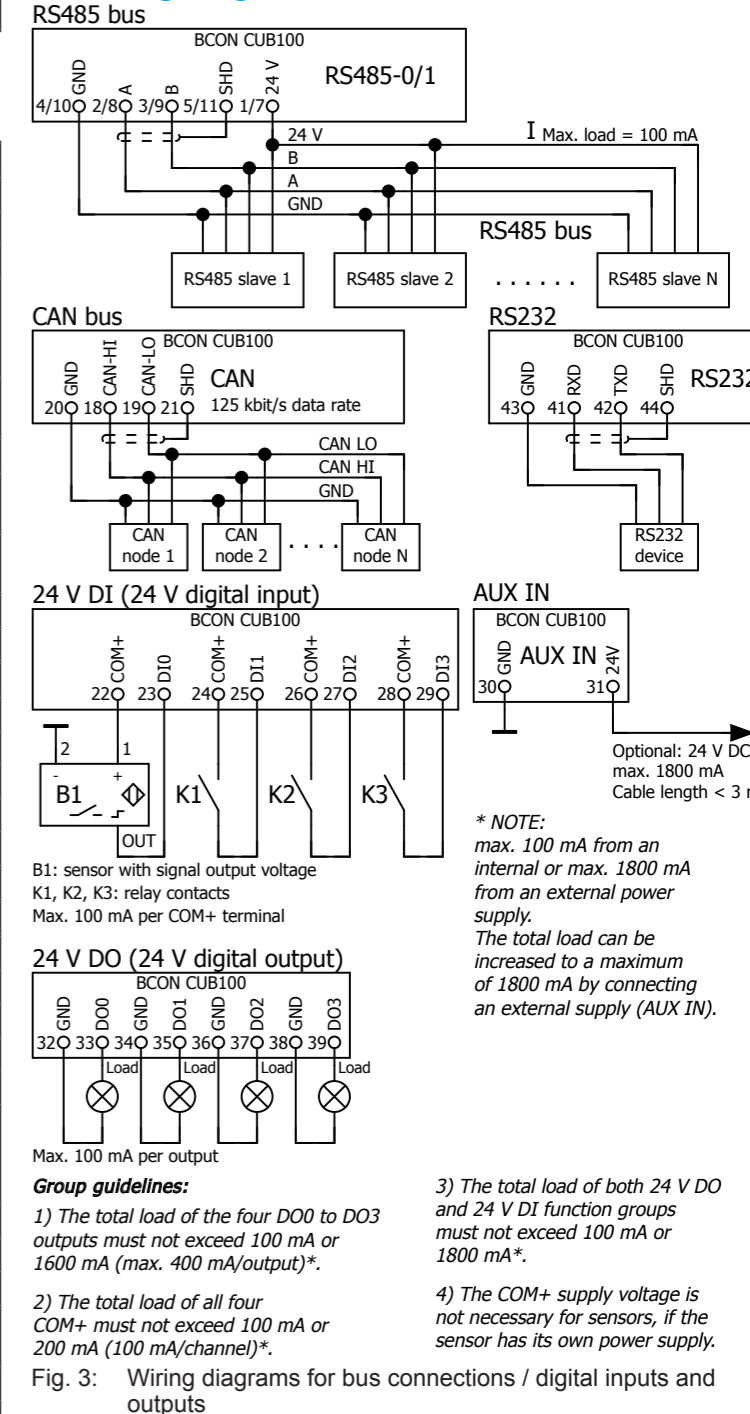

Fig. 2: Controls

Item	Control	Function
1	RESET button	Restarts the CUB100 module
2	USB port (Micro-B)	For software and firmware updates or manually controlling the module
3	BTN1 button	Assigned to a software function
4	BTN2 button	Assigned to a software function

9 Wiring diagrams for the connections

Group guidelines:

1) The total load of the four DO0 to DO3 outputs must not exceed 100 mA or 1600 mA (max. 400 mA/output)*.

2) The total load of all four COM+ must not exceed 100 mA or 200 mA (100 mA/channel)*.

3) The total load of both 24 V DO and 24 V DI function groups must not exceed 100 mA or 1800 mA*.

4) The COM+ supply voltage is not necessary for sensors, if the sensor has its own power supply.

Fig. 3: Wiring diagrams for bus connections / digital inputs and outputs

10 LED status displays

There is an overview of the LED status displays in Table 1 and Table 2 on the back of these installation instructions.
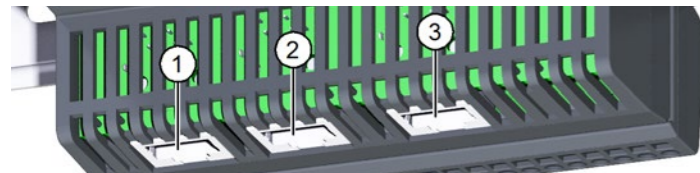
11 Connection of the Ethernet interfaces

Fig. 4: Ethernet interfaces on the CUB100 module

There are three Ethernet interfaces on the underside of the CUB100 module:

— ETH-0.1 (item 1 in Fig. 4)
— ETH-0.2 (item 2 in Fig. 4)
— ETH-1 (item 3 in Fig. 4)

Ethernet interfaces ETH-0.1 and ETH-0.2 are used to network the CUB100 modules with other CUB100 modules or for connection to the automation level. The two interfaces are connected internally with a switch, enabling multiple modules to be wired in series / daisy-chained.

Ethernet interface ETH1 is used to activate different Ethernet-based fieldbus protocols (e.g. EtherCAT).

The three Ethernet interfaces are **not** approved for connection to general office or company networks. They may only be used to connect to a TQ-Automation building network.

12 Installation

> ⚠ **DANGER**

Danger of death by electric shock.

Only safety extra low voltages (SELV) may be connected to the CUB100 module. Components of other TQ-Automation modules on the same DIN rail do carry potentially fatal voltages, however.

► Disconnect the connection points from the power supply.
► Secure the fuses to prevent switching on again.
► Make sure that the conductors to be connected are voltage-free.

12.1 Tools and equipment

— Screwdriver, insulated, size 1, max. blade width 3 mm
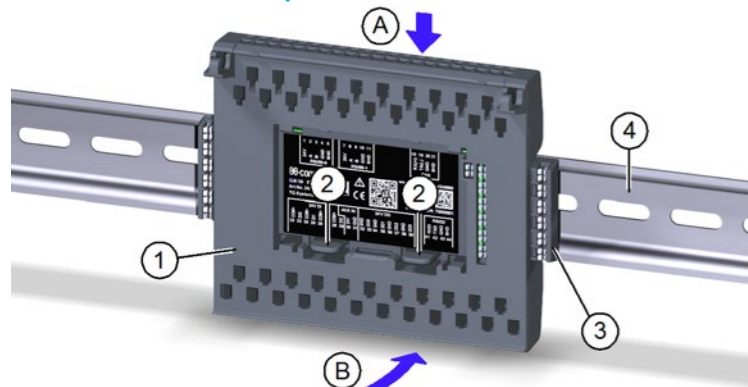— Voltmeter

12.2 Install the backplane

Fig. 5: Place the backplane on the DIN rail

► Arrange the backplane (item 1 in Fig. 5) so that the two tabs (item 2 in Fig. 5) are underneath.
► Holding the backplane at an angle, engage it from above (item A in Fig. 5) in the top edge of the DIN rail (item 4 in Fig. 5).
► Carefully press the backplane (item 1 in Fig. 5) against the DIN rail (item 4 in Fig. 5) until it snaps into place (item B in Fig. 5).

> **NOTE**

— There must be no backplane connector (item 3 in Fig. 5) inserted on the last module of a row of DIN rails or on the last module of the entire installation.
— To detach the backplane from the DIN rail, press the two tabs (item 2 in Fig. 5) down lightly and swivel the backplane up.

12.3 Wire the backplane

► Wire the backplane as described in the installation specifications. The openings for the push-in terminals (item 1 in Fig. 6) are at the top and bottom of the backplane. The label on the backplane shows the terminal assignments.
► Strip the insulation from the end of the hook-up wire:
— Rigid wire 0.5 to 1.5 mm², stripped length 10 mm
— Strand 0.5 to 1.5 mm², ferrule, length 10 mm
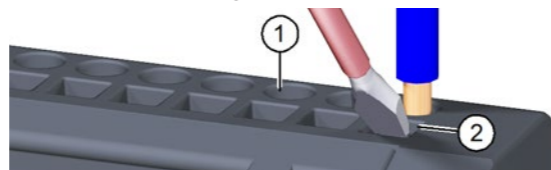
> **NOTE**

► Note the length of the ferrule (10 mm).

Fig. 6: Wire the backplane

► Insert the rigid wire or ferrule into the round opening of the push-in terminal (item 1 in Fig. 6) as far as it will go.

> **NOTE**

For small hook-up wire cross-sections:
► Insert the screwdriver from the front into the square opening (item 2 in Fig. 6) at a 45° angle.
► Press the screwdriver lightly against the terminal and insert the hook-up wire into the round opening as far as it will go.
► Pull on the hook-up wire to make sure that it is seated firmly in the push-in terminal.

> **NOTE**

To release the hook-up wire from the terminal:
► Insert the screwdriver from the front into the square opening (item 2 in Fig. 6) at a 45° angle.
► Press the screwdriver lightly against the terminal and pull the hook-up wire out.

12.4 Terminate interfaces

On the back of the electronic module there is a switch with six slide contacts. These switch the terminating resistors for the CAN and RS485 interfaces.
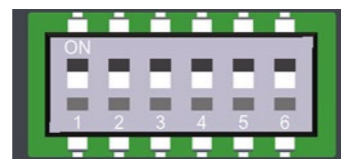

Fig. 7: Switches on the back of the electronic module

> **NOTE**

► Make sure that the two slide contacts for each interface are always in the same position (ON or OFF).

Bus	Slide contact	Interfaces, terminated	Interfaces, not terminated
CAN	1	ON	OFF
	2	ON	OFF
RS485-0	3	ON	OFF
	4	ON	OFF
RS485-1	5	ON	OFF
	6	ON	OFF

12.5 Install the electronic module

Fig. 8: Install the electronic module

► Insert the pivot axes (item 4 in Fig. 8) of the electronic module (item 1 in Fig. 8) into the hooks (item 3 in Fig. 8) of the backplane (item 2 in Fig. 8).
► Tilt the electronic module down and press it carefully against the backplane until it latches into place.

12.6 Connect the Ethernet cable

► Connect the Ethernet interfaces (see Fig. 4) to suit your planned topology.

Function	Labelling	LED position	LED colour	Status if LED is off	Status if LED is on	Status if LED is flashing
Module status	RUN	Item A in Fig. 1	red/ yellow/ green	The module is switched off or the status is not OK if the module is switched on	– red: the module is switched on, but the processor is not responding or the module is in the boot-loader state – yellow: the module has booted up, but there is no runtime active – green: the module is ready-to-operate	– red (250 ms interval): runtime in ERROR/STOP mode – yellow (1 s interval): Linux is booting up – green (1 s interval): runtime in RUN mode – green (250 ms interval): runtime in DEPLOY mode
CAB bus status	BUS	Item B in Fig. 1	red/ yellow/ green	CAB bus is inactive	– red: baud rate synchronisation is active – yellow: CAB bus in Init mode – green: CAB bus is ready-to-operate	– red (500 ms interval): bus in scan mode – red (1 s interval): bus in position detection mode – yellow (250 ms interval): bus in PREOP mode – yellow (1 s interval): bus in SAFEOP mode
Bus termination	TERM	Item C in Fig. 1	yellow	Termination is inactive	Termination is active	-
I/O error	ERR	Item D in Fig. 1	red	Module is switched off or is working normally	An I/O error has occurred (e.g. overload)	-

Table 1: LED status displays for module functions

Function	Labelling	LED pos.	LED colour	Status if LED is off	Status if LED is on	Status if LED is flashing
RS485-0/ RS485-1	24 V	1/7	red	Module switched off / auxiliary supply operating normally	Module switched on and auxiliary supply is overloaded	-
	A	2/8	yellow	-	-	Data byte received
	B	3/9	green	-	-	Data byte sent
ETH-0 (0.1 / 0.2)	-	12/14 13/15	green orange	No 100 Mbit link No link, no activity	100 Mbit link present Link present, no activity	- Activity
ETH-1	-	16 17	green orange	No 100 Mbit link No link, no activity	100 Mbit link present Link present, no activity	- Activity
CAN	HI LO	18 19	yellow green	- -	- -	Data package received Data package sent
24 V DI	DI0 to DI3	23, 25, 27, 29	green	Input level LOW	Input level HIGH	-
AUX IN	24 V	30	green	External supply not connected, off or faulty	External supply available and OK	-
24 V DO	DO0 to DO3	33, 35, 37, 39	green	Output level LOW	Output level HIGH	-
RS232	RXD TXD	41 42	yellow green	- -	- -	Data byte received Data byte sent

Table 2: LED status displays for interfaces

12.7 Start up the CUB100 module

> **NOTE**

► Carry out an insulation measurement before starting up.
► Switch on the POW100 mains adapter. The L LED on the POW100 module and the RUN LED on the POW100 and CUB100 modules light up green.
► Check the LED statuses according to Table 1 and Table 2.

12.8 Uninstalling the electronic module

To uninstall the electronic module from the backplane:

Fig. 9: Uninstalling the electronic module

► Insert the screwdriver into the two gaps (item 1 in Fig. 9) on the underside of the electronic module one after the other in order to detach the module from its fixing.
► Tilt the electronic module upwards and lift it away from the backplane.

> **NOTE**

► Once you have removed the module from the backplane, reattach the protective film to the backplane. This will protect the contacts against soiling by dust on site, for example.

13 Environmentally-friendly disposal

🗑 The CUB100 module must not be disposed of in the residual waste bin.

► Dispose of the CUB100 module in accordance with the electronic waste disposal regulations that apply on site.

14 Fault finding

— The RUN LED does not light up: fault in the electronic module. Contact Customer Service.
— The RUN LED flashes red: a fault has occurred. Contact Customer Service.
— The RUN LED lights up red: the module is in the bootloader state or a software update is in progress.

15 Software licence

This product also contains open source software that was developed by third parties. You will find the licence texts and associated notes on our home page www.tq-automation.com.

16 Contact

If you have technical problems with the product, contact TQ-Automation Customer Service. We will need the following information to be able to give you specific help:

— Serial number of the CUB100 module
— Description of the fault

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