![CAT logo]

Interface Gateway

The original language of this document is German.
All translations are based on the German original.

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The document contains information that is necessary for maintenance and repair work on the product. When performing the work listed in the maintenance schedule, only original parts or parts and operating media approved by the manufacturer may be used.

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1 Safety information

1.1 General safety notes

General safety notes can be found in the Safety and Product Information Specification. You can retrieve the document from the Service Library.

Follow all information in this specification.

2 Technical data

2.1 Scope of delivery

The Interface Gateway consists of a controller, two TTY terminals, an analog output terminal, and a bus end terminal.

Part number	12530188
Voltage supply	24 V DC
Maximum power consumption	5 W
Maximum power consumption (with UPS charging)	9 W
Ambient temperature during operation	0 … +55 °C
Ambient temperature during storage	-25 … +85 °C
Degree of protection	IP20
Weight	approx. 700 g
IP address	10.0.0.103
Subnet mask	255.255.255.240
Default gateway	10.0.0.97
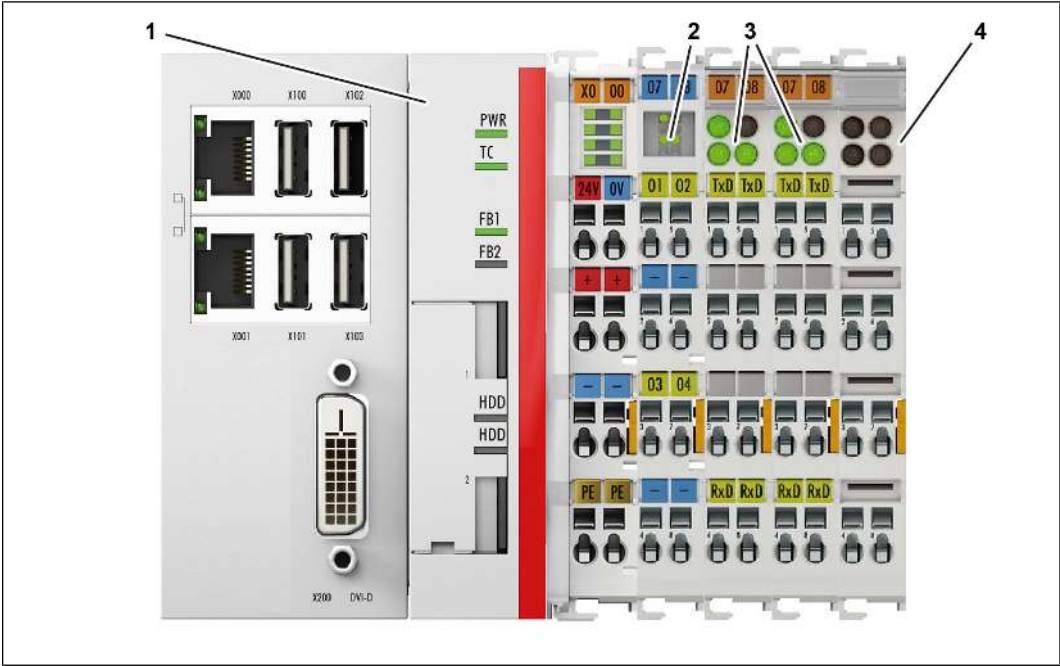
9007201198513163

1   Controller

2   Analog output terminal KL4424

3   Terminal TTY KL6011

4   Bus end terminal KL9010

2.2   Component dimensions

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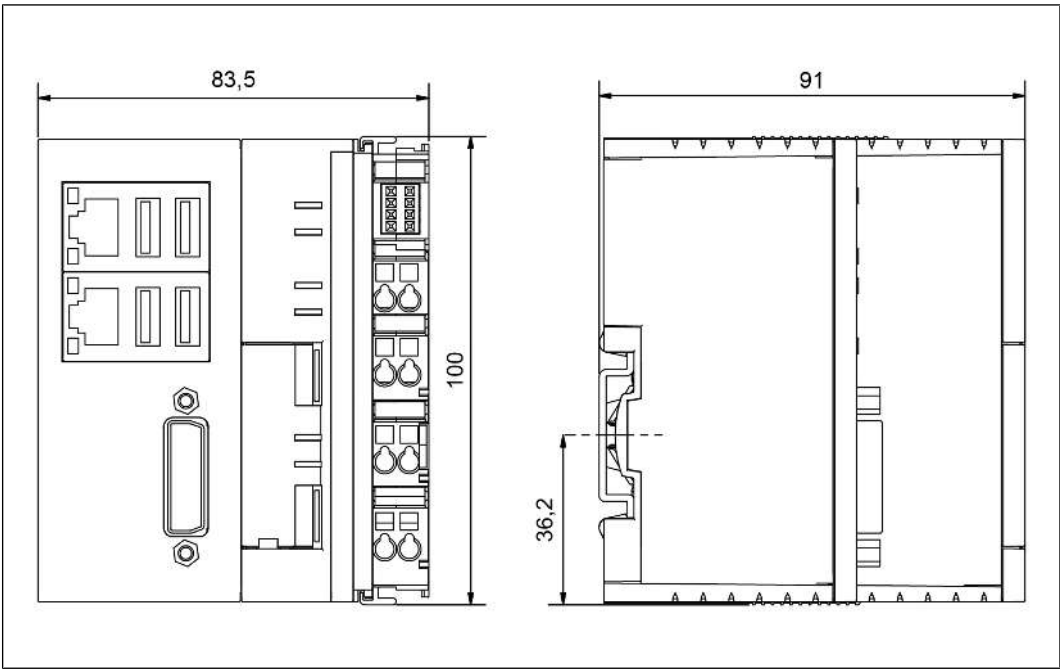
2.3   Rating plate

UL demands

The Gateway is UL certified. The corresponding UL label is located on the rating plate.
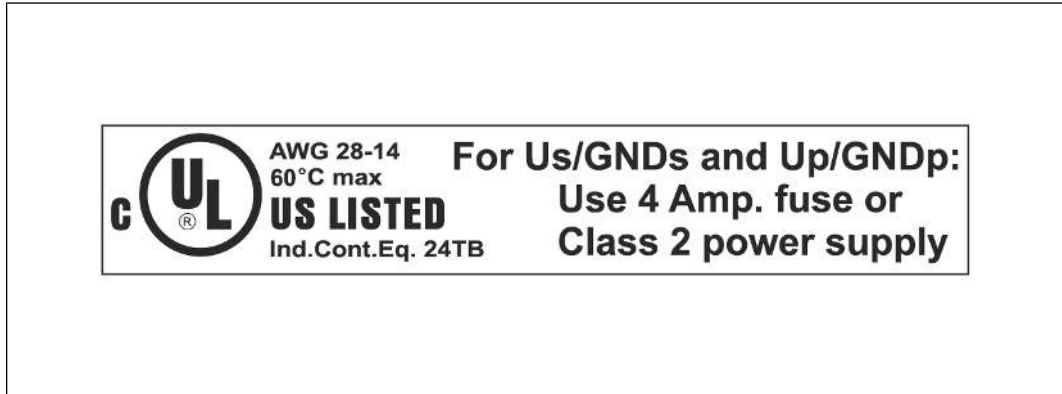
2393390859: UL demands

The Gateway can therefore be used in areas where special UL demands must be met. These demands apply to the system voltage (U_s) and to the power contacts (U_p). Application areas without special UL demands are not affected by the UL regulations.

UL demands:

*   The Gateway must not be connected to unlimited voltage sources.

*   The Gateway must be supplied only with a 24 V DC voltage source. The voltage source must be insulated and must be protected with a fuse (according to UL248) rated at max. 4 A.

*   Alternatively, the voltage supply must originate from a voltage source corresponding to NEC class 2. A voltage source corresponding to NEC class 2 must not be connected in series or parallel with another NEC class 2 voltage source.
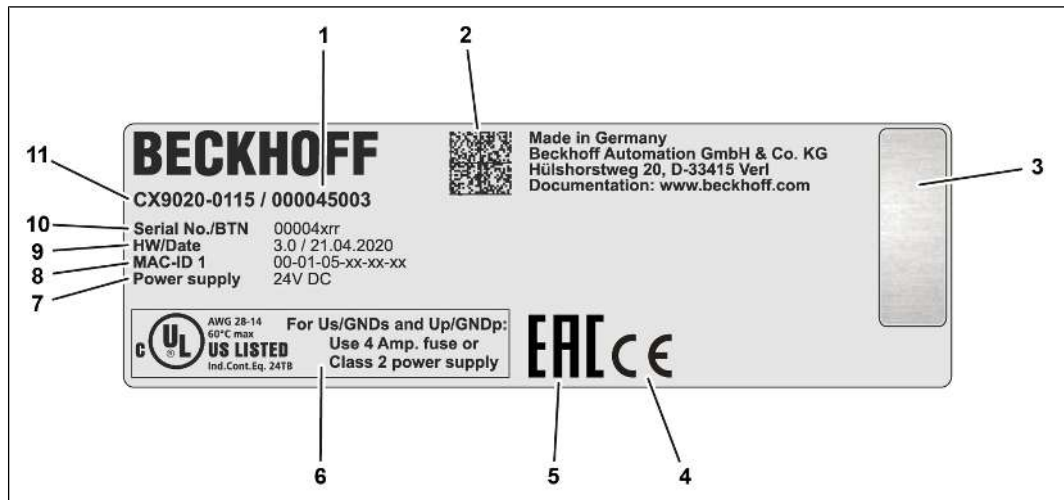
1943773195

1   Variant number

2   QR code for identification and management

3   License sticker for operating system (optional)

4   CE marking

5   EAC marking

6   UL marking with voltage supply, fuse, temperature and cable cross-sections

7   24 V DC voltage supply

8   MAC address of the installed Ethernet interface

9   Hardware version and date of manufacture

10   Serial number/ Beckhoff Traceability Number (BTN)

11   Product designation

3 Structure and function

3.1 Description

Interface Gateway TTY

The Interface Gateway expands a TTY interface by a ModbusTCP interface. The Interface Gateway can be incorporated into an existing TTY connection without affecting the register addresses of the existing connection.
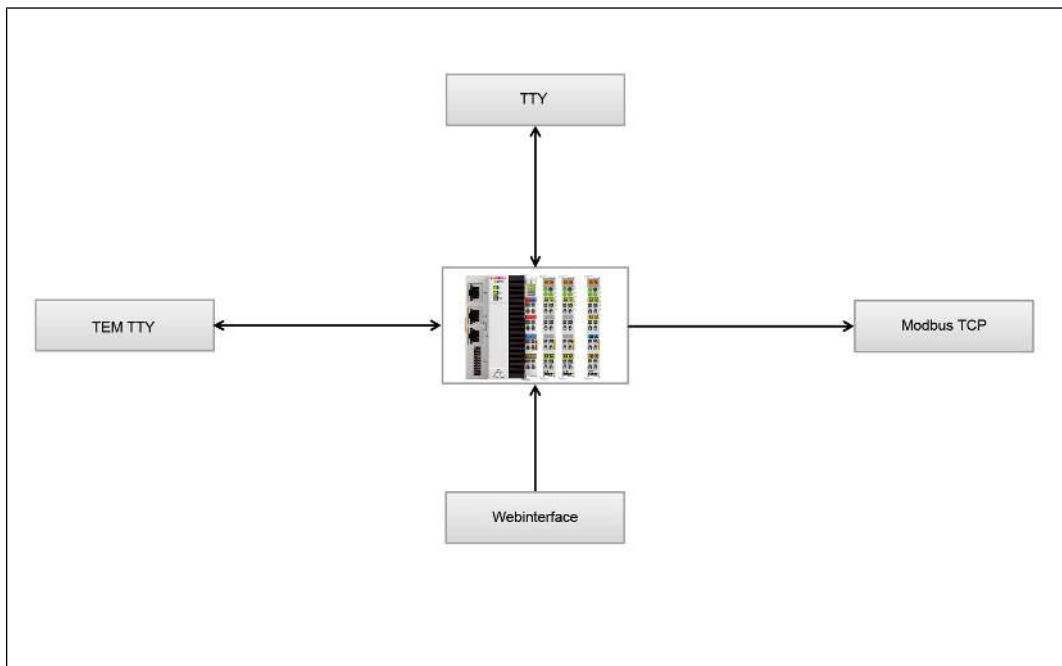
27021599707994123: Connection overview
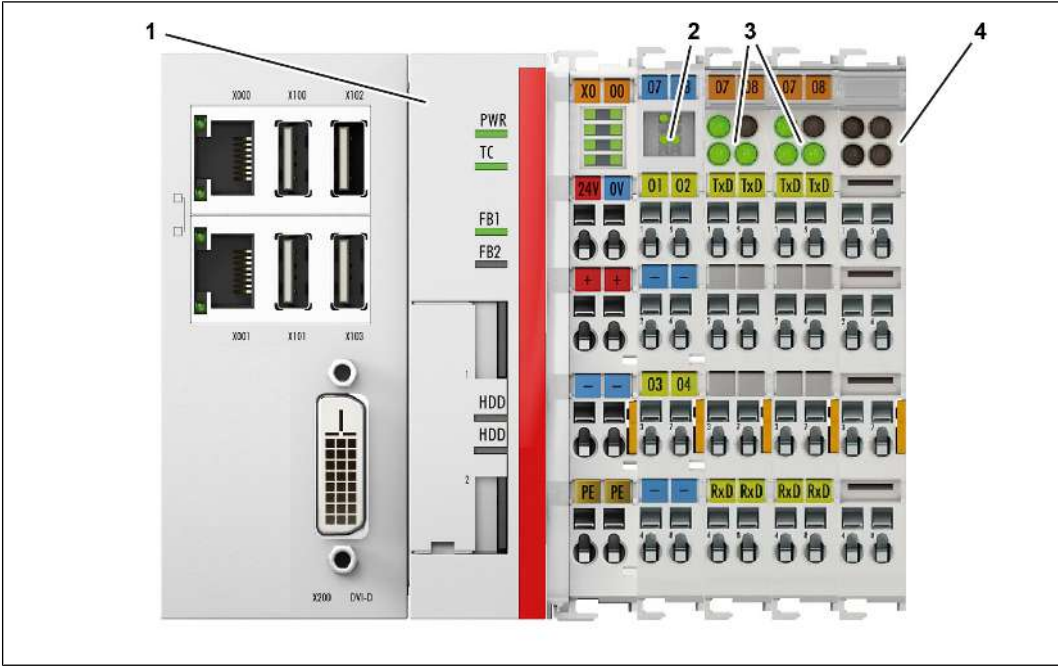
9007201198513163

1	Controller
2	Analog output terminal KL4424
3	Terminal TTY KL6011
4	Bus end terminal KL9010

Controller

The controller is a full-fledged industrial PC with various interfaces.

The controller is supplied with voltage via the voltage supply (3). In the event of a voltage failure, important data will be saved in a persistent data memory and will be available again after a restart. Bus terminals can be connected in a row to the power supply unit terminal on the right side of the controller.

Part number	12530151
Voltage supply	24 V DC
Maximum power consumption	5 W
Maximum power consumption (with UPS charging)	9 W
Power supply for I/O terminals	< 2 A
Current load on power contacts	< 10 A
Ambient temperature during operation	-25 … +60 °C

Ambient temperature during storage	–40 … +85 °C
Degree of protection	IP20
Weight	approx. 590 g
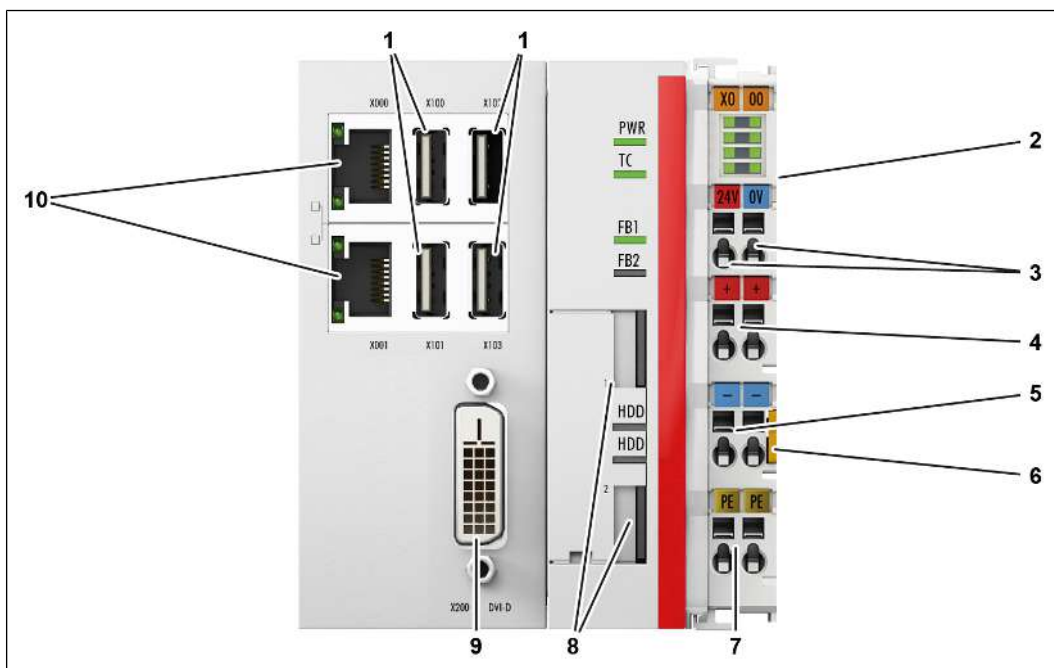
9007201198513675

1   USB interfaces

2   Terminal bus

3   Voltage supply, +24 V and 0 V

4   Voltage supply for bus terminals, +24 V

5   Voltage supply for bus terminals, 0 V

6   Power contacts for bus terminals, +24 V, 0 V, PE

7   Power contact PE

8   MicroSD card slots

9   DVI-D interface

10   Switched RJ45 Ethernet interfaces

LED display
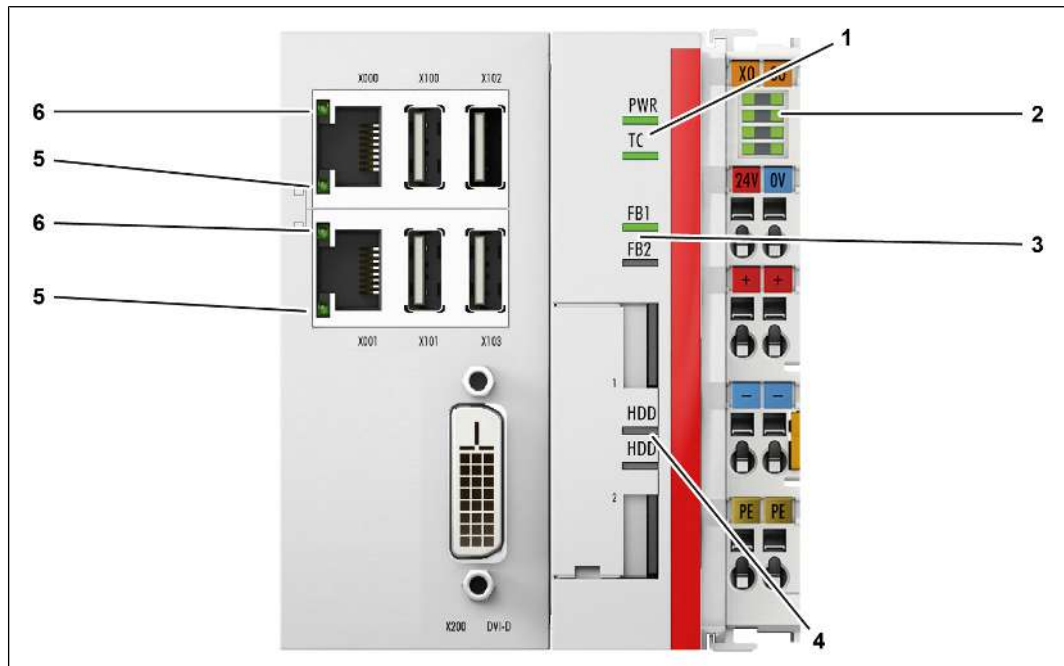
9007201204567563

1 Diagnostics LEDs

   Voltage supply (PWR) and TwinCAT (TC)

2 Diagnostics LED for voltage supply for embedded PC and terminal bus

   E-bus and K-bus communication status LEDs

3 Status LEDs for fieldbus

4 Status LEDs for MicroSD cards

5 Ethernet status LEDs (LINK/ACT)

6 Ethernet status LEDs (SPEED)
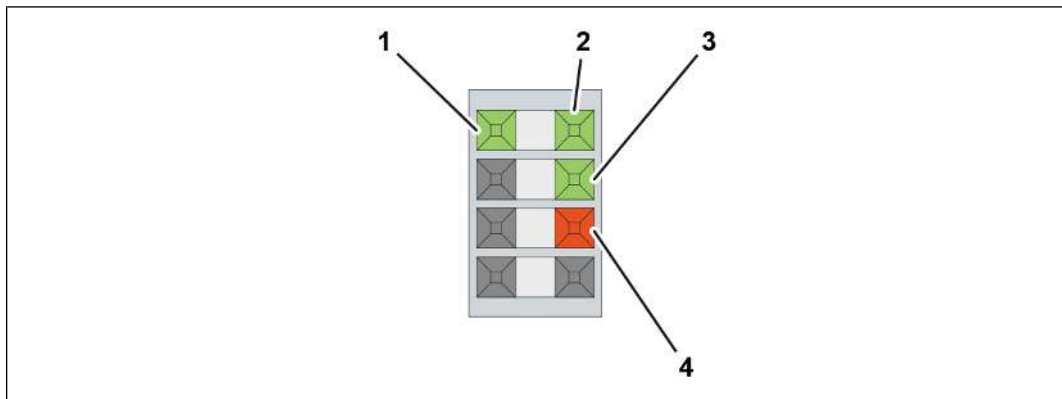
1945458827: K-bus

1	U_s 24 V, CPU base module voltage supply
2	U_p 24 V, terminal bus voltage supply
3	K-BUS RUN
4	K-BUS ERR

LED status

LED	Status	Description
Voltage supply (PWR)	LED lights up green	Connection to power supply unit with activated voltage supply
	LED flashes red 8 x per second	Voltage supply error
	LED flashes red 3 x per second	No or faulty MicroSD card inserted
TwinCAT (TC)	LED lights up green	TwinCAT in Run mode
	LED lights up red	TwinCAT in Stop mode
	LED lights up blue	Missing license; reload the backup
	LED lights up yellow (only TwinCat 3)	PLC error or crash
MicroSD card 1/2 (HDD 1/2)	LED flashes green	Read access to MicroSD card 1/2
	LED flashes yellow	Write access to MicroSD card 1/2

LED	Status	Description
K-bus mode	U_s 24 V, LED lights up green	Correct voltage supply for CPU base module
	U_p 24 V, LED lights up green	Correct voltage supply for terminal bus
	K-BUS RUN, diagnostics LED lights up green	Proper operation and communication with the field-bus system
	K-BUS ERR, diagnostics LED flashes red	Error display, frequency, and number of flashes indicate the error code and error argument

An error in K-bus mode is indicated in a fixed sequence by the "K-BUS ERR" LED.

Sequence	Meaning
Rapid flashing	Sequence start
First slow sequence	Error code
Not displayed	Pause; the LED is off
Second slow sequence	Error argument

Error code	Error argument	Description	Remedy
Continual, constant flashing		EMC problems	

Error code	Error argument	Description	Remedy
			• Check voltage supply for undervoltage or overvoltage peaks • Take EMC measures • A K-bus error can be localized by restarting (switching the power supply unit off and back on)
3 pulses	0	K-bus command error	• No bus terminal inserted • One of the bus terminals is faulty; halve the connected bus terminals and check whether the error is still present in the remaining bus terminals. Repeat this procedure until the faulty bus terminal has been localized
4 pulses	0	K-bus data error, break behind the power supply unit	Check whether bus end terminal 9010 is inserted
	n	Break behind bus terminal n	Check whether bus terminal n+1 behind the power supply unit is inserted correctly; exchange it if necessary
5 pulses	n	K-bus error in register communication with bus terminal n	Replace bus terminal at location n
6 pulses	0	Initialization error	Replace embedded PC
	1	Internal data error	Hardware reset of the embedded PC (switch off and back on)

Error code	Error argument	Description	Remedy
	8	Internal data error	Hardware reset of the embedded PC (switch off and back on)
7 pulses	0	Process data lengths of setpoint and actual configuration do not match	Check configuration and bus terminals for consistency

The "K-BUS ERR" LED does not go out with some errors, even though the error was corrected. Switch the voltage supply for the power supply unit off and back on to switch off the LED after correcting the error.

Terminal TTY KL6011

The KL6011 serial interface enables the connection of devices with a 20 mA current interface working in passive operation. The device connected to the terminal communicates with the automation device via the bus coupler. The current interface (TTY) ensures a high level of interference immunity due to electrically isolated signals with impressed current.
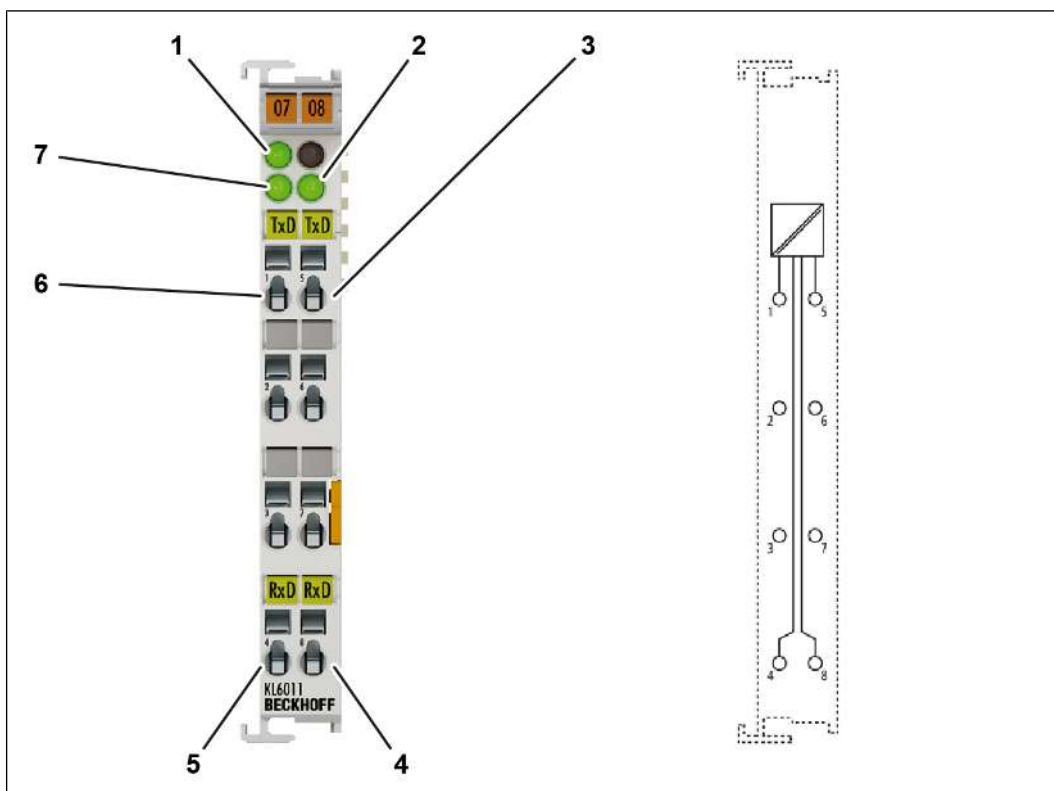
9007201200200331

1	Run LED
2	RxD LED
3	TxD-
4	RxD-
5	RxD+
6	TxD+
7	TxD LED

Part number	12530152
Ambient temperature during operation	0 … +55 °C
Ambient temperature during storage	-25 … +85 °C
Degree of protection	IP20
Current consumption	55 mA
Weight	approx. 60 g

Analog output terminal KL4424

Analog output terminal KL4424 produces signals in the range from 4 to 20 mA. The current is supplied (electrically isolated) to the process level with a resolution of 12 bits. The output stage is powered by the 24 V supply. The four outputs on the KL4424 are designed with 2-conductor technology.

The bus terminal has a common ground potential. The power contacts are connected through; the reference ground of the outputs is the power contact 0 V. Light-emitting diodes indicate data exchange with the bus coupler.

The analog output terminal implements an active TTY connection via the corresponding cabling on the output side toward the customer's system.

9007202090307851

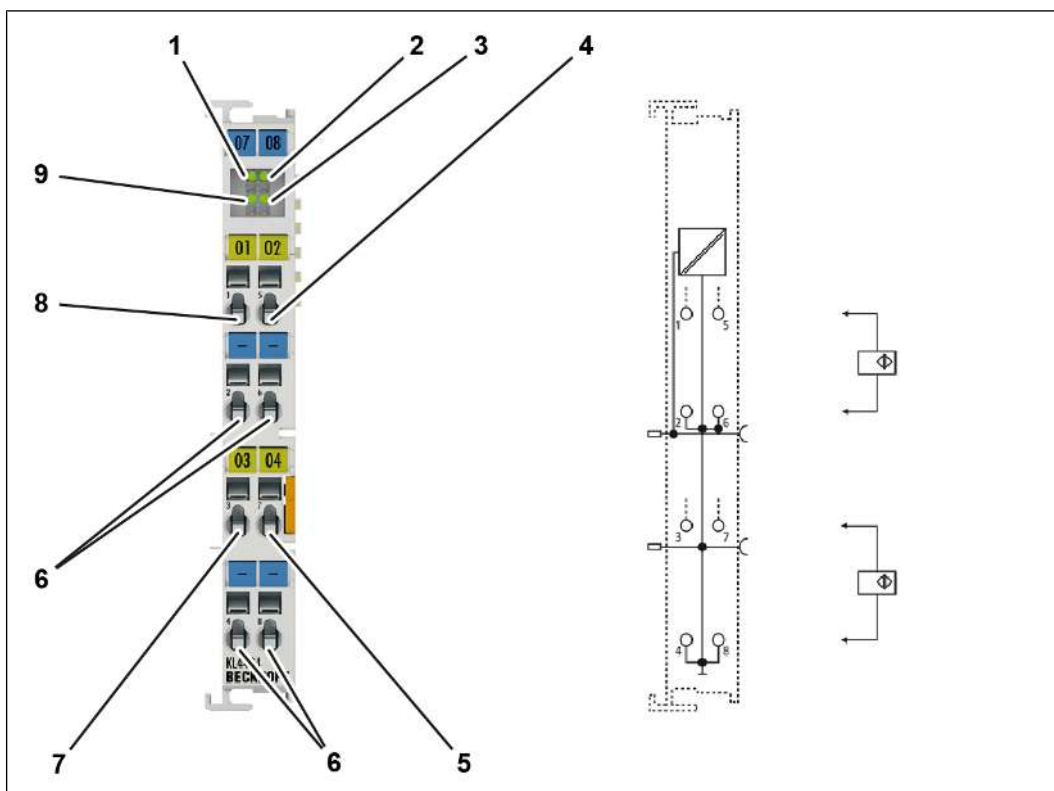| 1 | Run LED 1 |
2	Run LED 2
3	Run LED 3
4	Output 2
5	Output 4
6	Ground 0 V
7	Output 3
8	Output 1
9	Run LED 4

Part number	12530220
Ambient temperature during operation	0 ... +55 °C
Ambient temperature during storage	-25 ... +85 °C
Degree of protection	IP20
Current consumption	20 mA
Current consumption of power contacts	60 mA
Weight	approx. 75 g

LED status

LED	Color	Channel	Status	
			On	**Off**
Run LED 1	LED lights up green	1	Normal operation	A watchdog timer overflow occurred.
Run LED 2		2		The green LEDs will go out if there is no process-data transfer between the control system and the bus coupler within 100 ms.
Run LED 3		3		
Run LED 4		4		

Bus end terminal KL9010

Bus end terminal KL9010 is required for data exchange between the bus coupler and the bus terminals. Each terminal block must be terminated with an end terminal on the right side. Bus end terminal KL9010 does not have any other function or connection option.
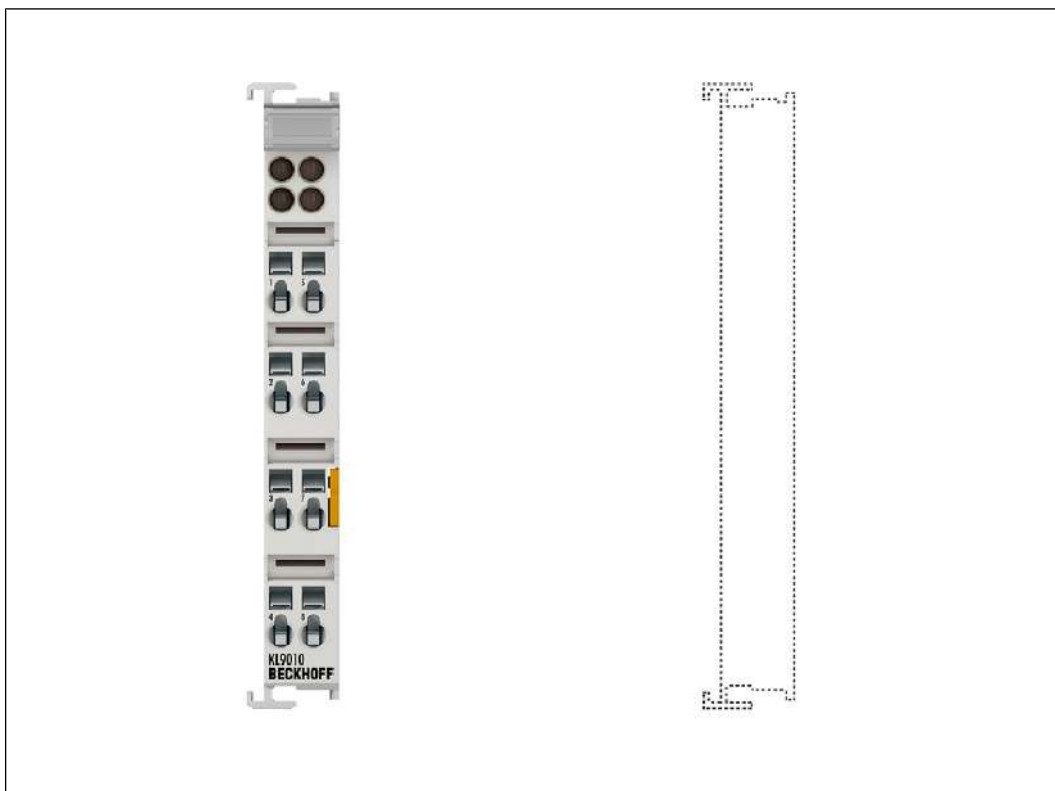
9007201200201355

Part number	12530154
Ambient temperature during operation	-25 ... +60 °C
Ambient temperature during storage	-40 ... +85 °C
Degree of protection	IP20
Weight	approx. 50 g

Connector and socket (optional)

If installation in the auxiliary cabinet (HAS) or master control cabinet (ZAS) is not possible, the Interface Gateway can be installed in the genset control cabinet (AGS). The connector and socket are required only for this purpose.

The connector and socket are designed as a tool-free, push-in connection with defined contact force for stable contact over an extended period.
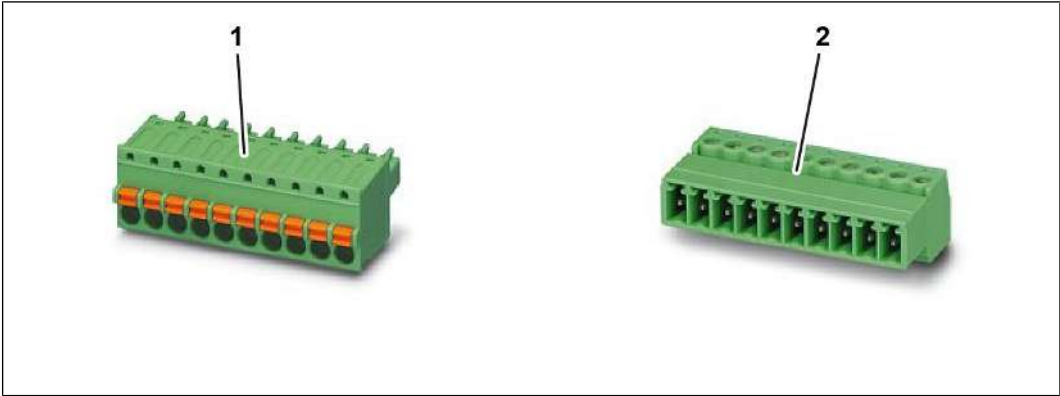
1949827083

1   Connector

2   Socket

Socket	12530186
Connector	12530187

4 Transport and storage

4.1 Transport and storage

Transport

NOTE

Short-circuit due to moisture

Large temperature differences or transport during cold weather can cause moisture to form and condense on the Interface Gateway.

- Slowly equalize the Interface Gateway to room temperature.

- If condensation forms, wait for 12 hours before switching on.

Despite their robust design, the installed components are sensitive to strong vibrations and impacts.

- Protect the Interface Gateway against high mechanical loads.

- Use the original packaging for shipping.

Storage

Remove the battery from the controller if storage temperatures exceed 60 °C. Store the battery separately from the controller, in a dry place at a temperature between 0 °C and 30 °C.

The preset date and time will be lost when the battery is removed.

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5 Assembly

5.1 Assembly

Permitted position for installation

**Risk of destruction of components**

Increased heat development

The Gateway can overheat if the selected position for installation is incorrect or if the minimum distances are not met.

- The Gateway may be operated only at ambient temperatures below 60 °C.

- Ensure sufficient ventilation.

- Select horizontal position for installation.

- Maintain at least 30 mm clearance above and below the Gateway.

Mount the Gateway horizontally on a support rail in the switchgear cabinet. The ventilation openings are located on the top and bottom sides of the housing. They result in an ideal, vertical air flow through the Gateway.

1. Operate the Gateway only at ambient temperatures from -25 °C to 60 °C. Measure the temperature under the Gateway at a distance of 30 mm from the cooling fins to determine the ambient temperature correctly.

2. Maintain the minimum clearances of 30 mm above and below the Gateway.

3. Additional electric devices influence heat development in the switchgear cabinet. Select a suitable switchgear cabinet size for the respective application or ensure that excess heat is conveyed out of the switchgear cabinet.
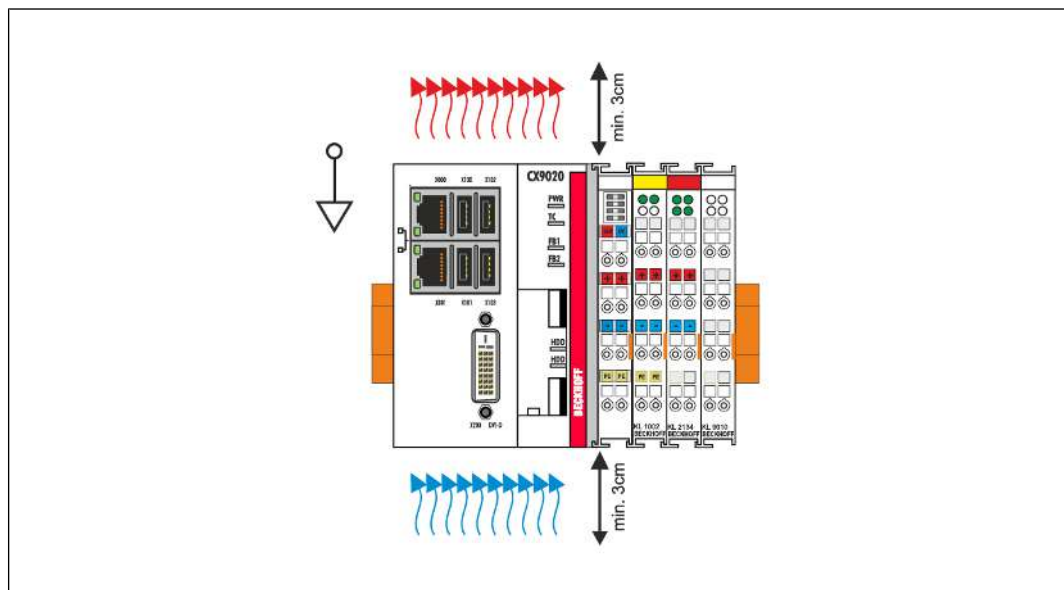
9007201198514699: Permitted position for installation

If vibrations and impacts occur in the same direction as the support rail, the Gateway must be additionally fixed with a holder to prevent it from shifting out of place.

Fastening on the support rail

The housing is designed such that the Gateway can be held on the support rail and snapped into place on it. The Gateway consists of several preassembled components. These are mounted first and then attached to the support rail together.
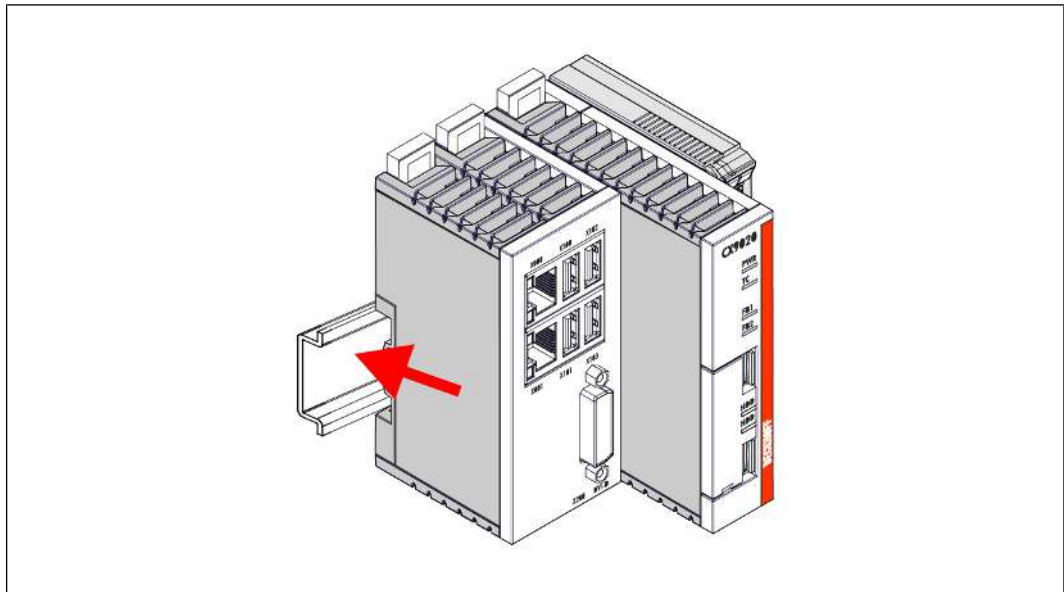
Fasten the Gateway on the support rail as follows:

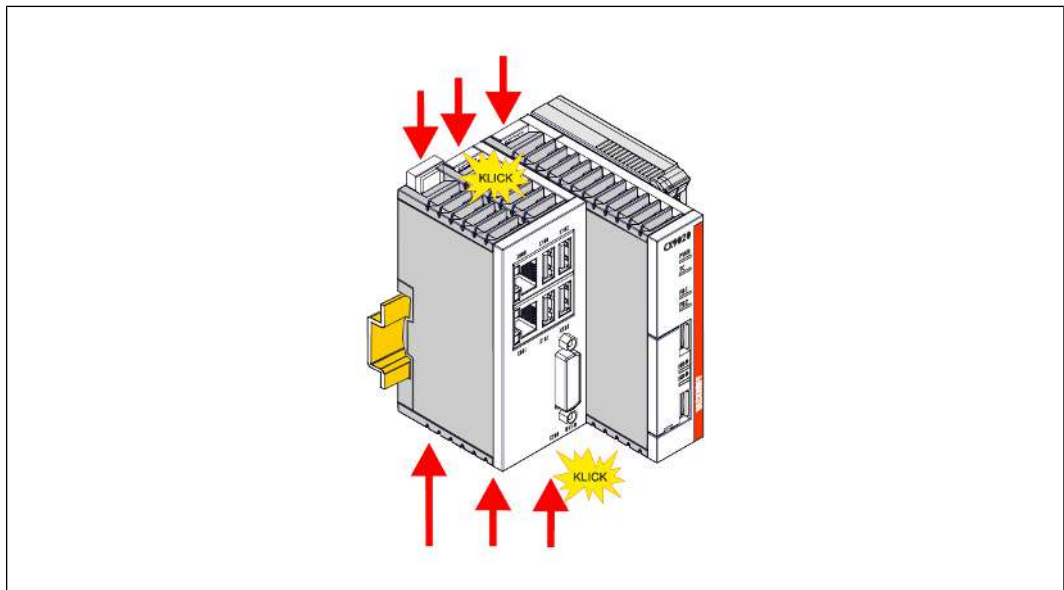1. Unlock the retaining bars at the top and bottom sides.
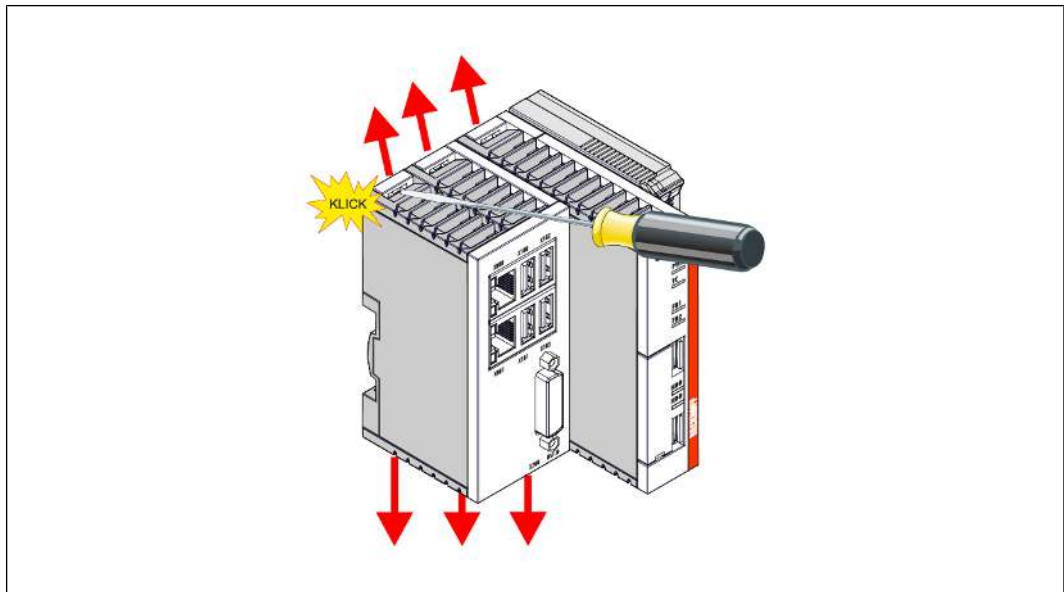
1949827595

2. Place the Gateway frontally on the support rail. Gently push the Gateway against the support rail until it snaps into place with a quiet click.

2390537611

3. Subsequently lock the retaining bars again.

2390538123

4. Recheck for correct assembly and whether the Gateway is correctly snapped into place on the support rail.

   – The Gateway has been mounted successfully.

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6 Commissioning

6.1 Commissioning

The associated circuit diagram can be downloaded from the Service Library.

Risk of destruction of components

Damage to the Gateway

The Gateway can be damaged during wiring.

- Connect the voltage supply lines only in a de-energized state.

An external voltage source that provides 24 V DC voltage (-15 %/+20 %) is required as the voltage supply for the power supply unit terminal. The power supply unit terminal must supply 4 A at 24 V to ensure Gateway operation in all cases.

Cable the Gateway in the switchgear cabinet in accordance with the standard EN 60204-1:2006, Protective Extra Low Voltage (PELV).

1. The "PE" and "0 V" conductors of the voltage source for a Gateway must be at the same potential (connected in the switchgear cabinet).

2. The standard EN 60204-1:2006, Section 6.4.1:b:, stipulates that one side of the circuit, or one point on the power source for this circuit, must be connected to the PE conductor system.

The lines of an external voltage source are connected to the power supply unit with spring terminals.

	Metric	Imperial
Conductor cross-section	0.5 ... 2.5 mm^2	AWG 20 ... AWG 14
Insulation stripping length	8 ... 9 mm	0.33 inch

Table 1: Required conductor cross-sections and insulation stripping lengths
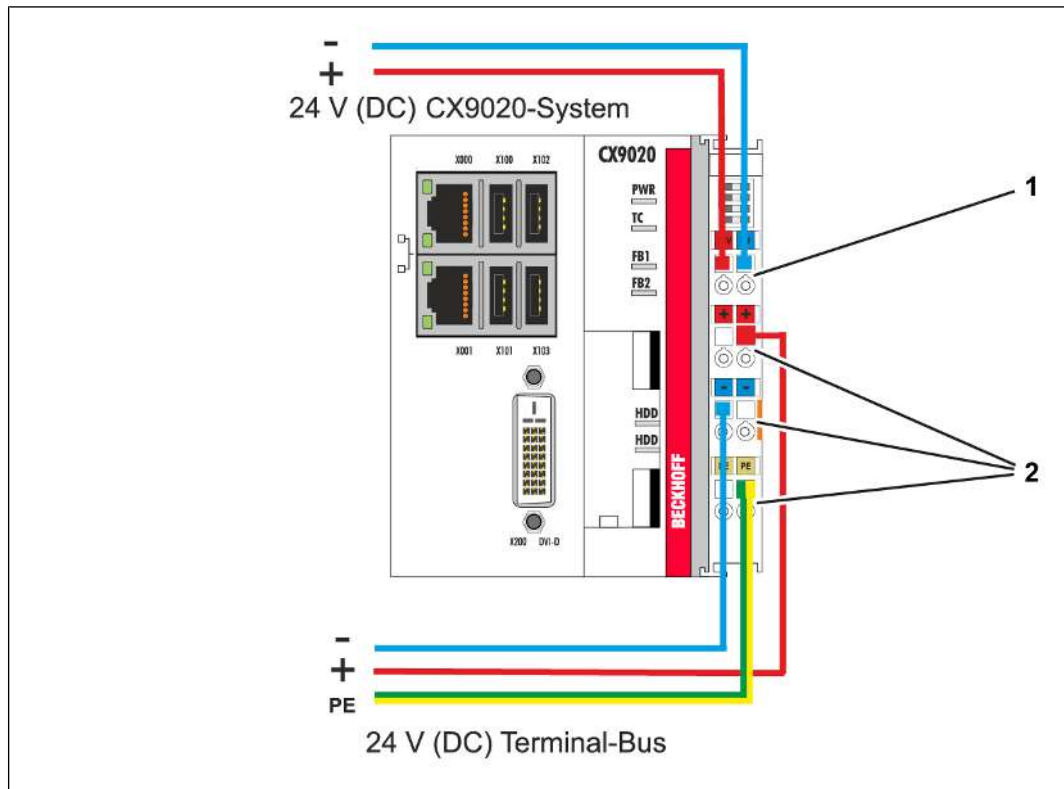
9007201198515211: Connection example

1   The upper spring terminals designated "24 V" and "0 V" supply voltage to the Gateway and the terminal bus (data transfer via K- or E-bus).

2   The spring terminals designated "+", "-", and "PE" supply the bus terminals with voltage via the power contacts.
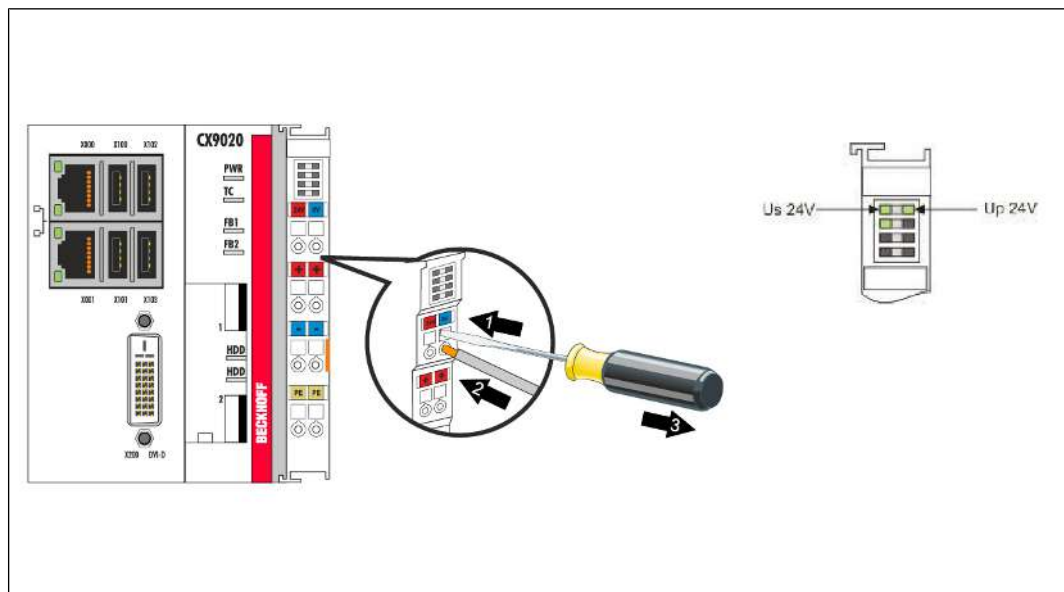
9007201198515723

You have successfully connected the voltage source to the power supply unit when the two upper LEDs of the power supply unit terminal light up green.

- The left LED (U_s) indicates supply of the Gateway and the terminal bus.

- The right LED (U_p) indicates supply of the bus terminals via the power contacts.

NOTE

Interrupting/switching off the voltage supply

Ground (0 V) must not be disconnected to switch off the Gateway because (depending on the device) the current will continue flowing through the screen and damage the Gateway or the peripheral equipment.

- Always disconnect the 24 V line. Devices with a separate power supply (such as a panel) that are connected to the Gateway must have the same potential for "PE" and "0 V" as on the Gateway (no potential difference).


Switching on

Perform the following steps to switch on the Gateway:

1. Check whether all expansion, system, and fieldbus modules are connected correctly.

2. Check whether you selected the suitable power supply unit and the correct position for installation.

3. Check whether the Gateway is fastened on the top-hat rail correctly and all required bus terminals are connected.

4. Only then switch on the external power supply for the power supply unit.

⇨ The Gateway starts automatically as soon as the external power supply for the power supply unit is switched on. The pre-installed operating system is started, and all connected expansion, system, and fieldbus modules are configured.

Initial commissioning

The Interface Gateway must be parametrized via the web browser for initial commissioning.

1. Connect the PC directly to the Interface Gateway using a network cable for this purpose.

 – Once the voltage supply has been established for the Interface Gateway, the Gateway will boot within approx. 60 seconds. For a system restart, the voltage supply must be interrupted for at least 5 seconds.

2. In order to establish a connection with the Interface Gateway, the PC must have the same subnet mask and a similar (not identical) IP address. For example, this could be:
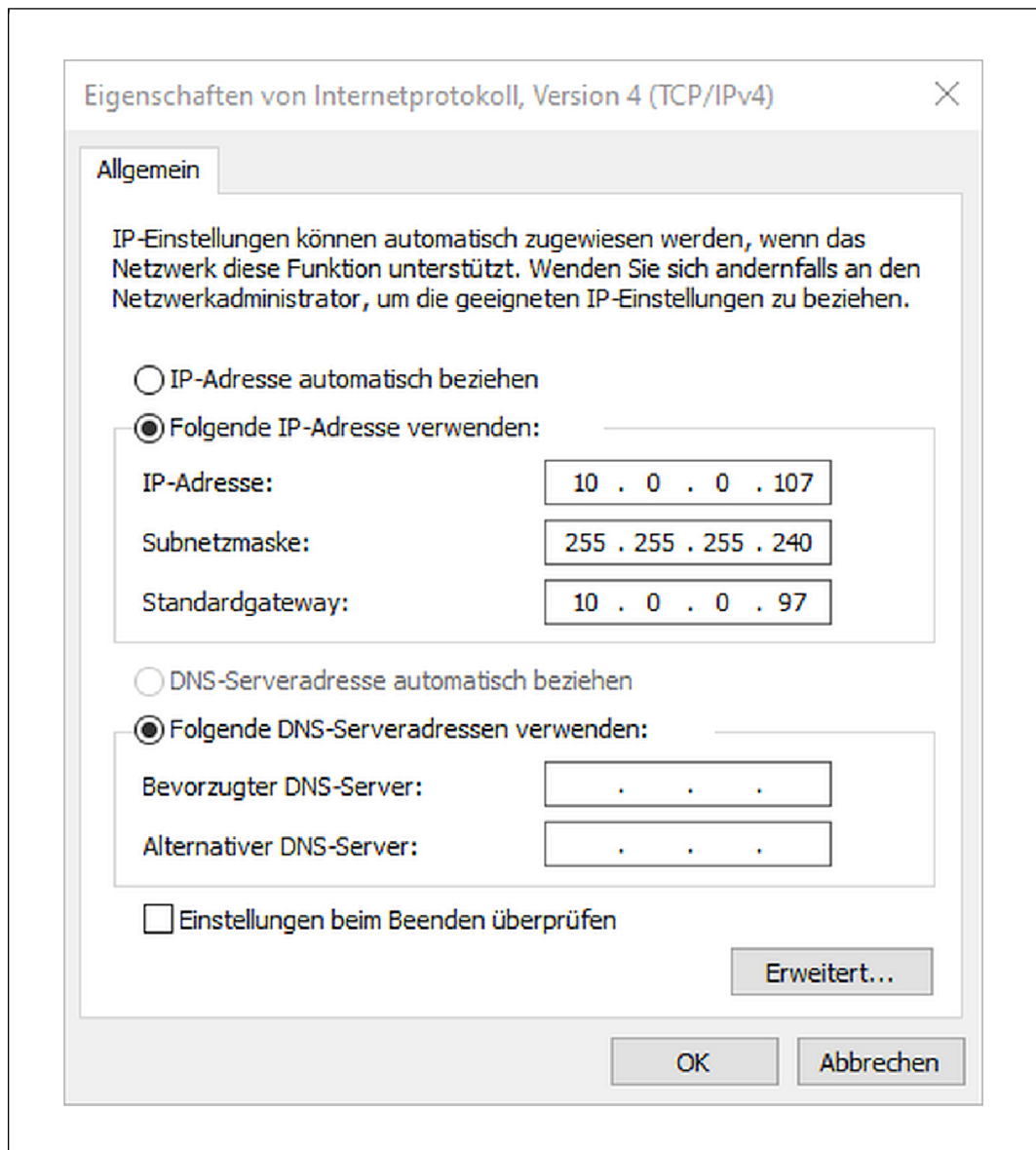
27021600856109323: IP address

3. Open a web browser on the PC. There, the web front end of the Interface Gateway can be accessed via the address http://10.0.0.103.

4. After successful commissioning of the Interface Gateway, a backup of the Interface Gateway must be created by backing up the SD card content.

Refer to the Technical data [▷ 7] for the default parameters of the Interface Gateway in the as-delivered state.

Switching off

Risk of destruction of components

Data loss

If the Gateway is switched off during operation, data on the CFast card or other hard drives can be lost.

•   Do not disconnect the Gateway from the power supply during operation.

Switch off the external power supply for the power supply unit to switch off the Gateway.

See also

📄 Scope of delivery [▶ 7]

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7   Operation

7.1   Web server user interface

The user interface consists of a toolbar at the upper edge, a tab with its name, the lower display area, and a sidebar with the functional groups for calling additional tabs with functions. The currently selected functional group is highlighted in light gray.

When the web browser starts, the user interface displays the `Overview` tab from the Functional group "Data".
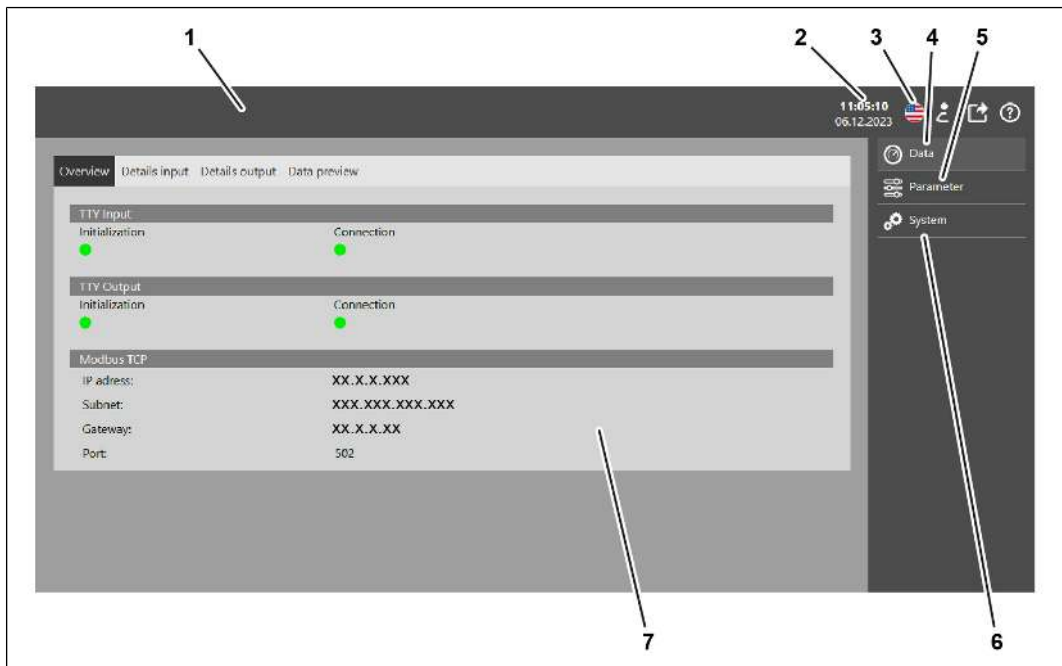
45035998832998667

1	Status bar
2	Date and time
3	Language
4	Functional group "Data"
5	Functional group "Parameters"
6	Functional group "System"
7	Tab with display and dialog area

Status bar

The status bar displays messages, warnings and alarms.

Date and time

This display area shows the current time and date.

Language

This display area shows the selected language.

Currently, German and English are available.

Functional group "Data"

This button displays the tab for the Functional group "Data".

The Overview tab with an overview of the Interface Gateway state is displayed, for example.

Functional group "Parameters"

This button displays the tab for the Functional group "Parameters".

Parameters required for operation are displayed, for example.

Functional group "System"

This button displays the tab for the Functional group "System".

Tabs with various functions relating to the product itself are displayed.

7.2 Functional group "Data"

The Functional group "Data" is subdivided into four tabs.

Overview tab

When the `Data` button on the sidebar or the `Overview` tab is selected, an overview of the Interface Gateway state will be displayed here.

A distinction is made here between TTY Input and TTY Output.

TTY Input stands for the data connection to the TEM system on the input side. TTY Output stands for the data connection to the customer's system on the output side.

Initialization is the basis for successful connection. The green LED displays the operating state. In case of a red LED, the hardware must be checked for proper functioning.

Connection uses a green and gray LED to indicate whether data can be polled successfully on the input and output sides.

The genset number and the IP address with subnet mask and the port used are displayed under Modbus TCP.
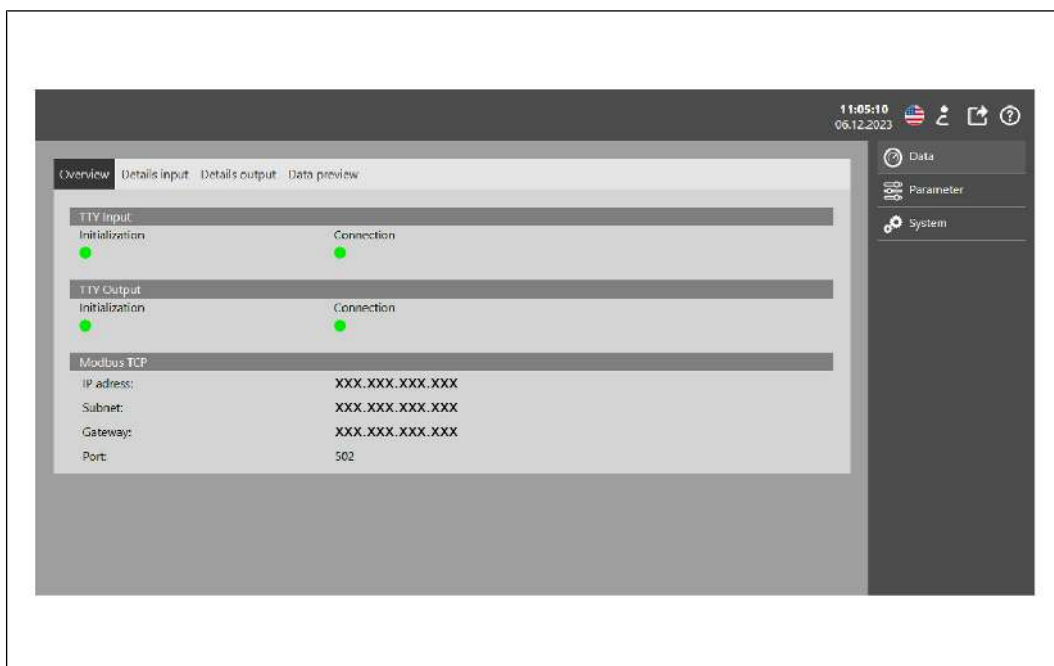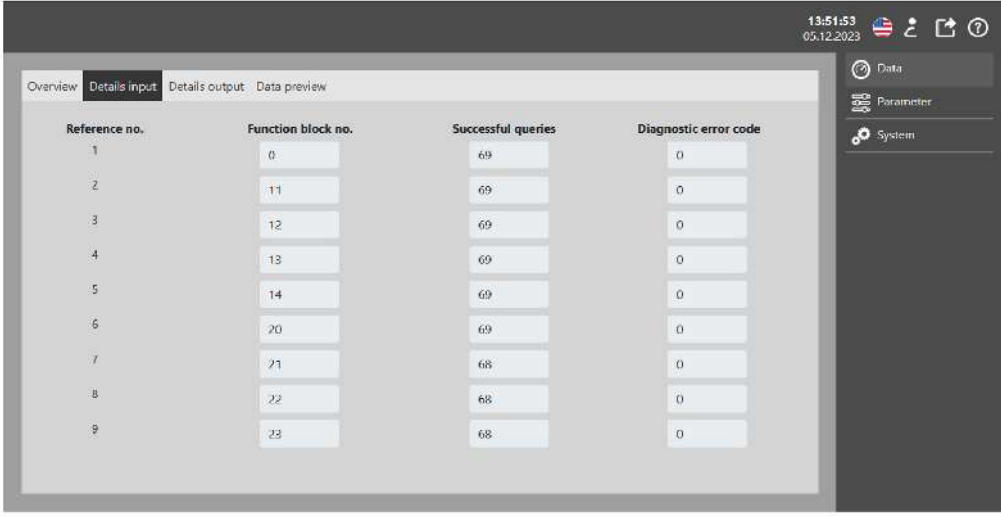
45035998826588555: Overview

Details Input tab

The `Details Input` tab provides more information about the data connection on the input side.

The **Call-off no.** column indicates the number of call-offs required to retrieve all data on the input side.

The data source is displayed under **Module number** (see specification: "Data exchange via Serial Communication, Telegram Specification Procedure 3964R with RK 512").

The **Successful call-offs** column indicates the number of successful data call-offs on the input side, numerically from 0 to 100. The active data input is visually displayed here.

If an error occurs during diagnostics, the number of the error during the specific data call-off will be displayed under **Diagnostics error number**. The fields display zero if there is no error.

27021600317106059: Details Input

Details Output tab

The `Details Output` tab provides more information about the data connection on the output side.

The **Call-off no.** column indicates the number of call-offs required to retrieve all data on the output side.

The data source is displayed under **Module number** (see specification: "Data Exchange via Serial Communication, Interface Description Fieldbus Interface Modbus RTU").

The **Successful call-offs** column indicates the number of successful data call-offs on the output side, numerically from 0 to 100. The active data output is visually displayed here.
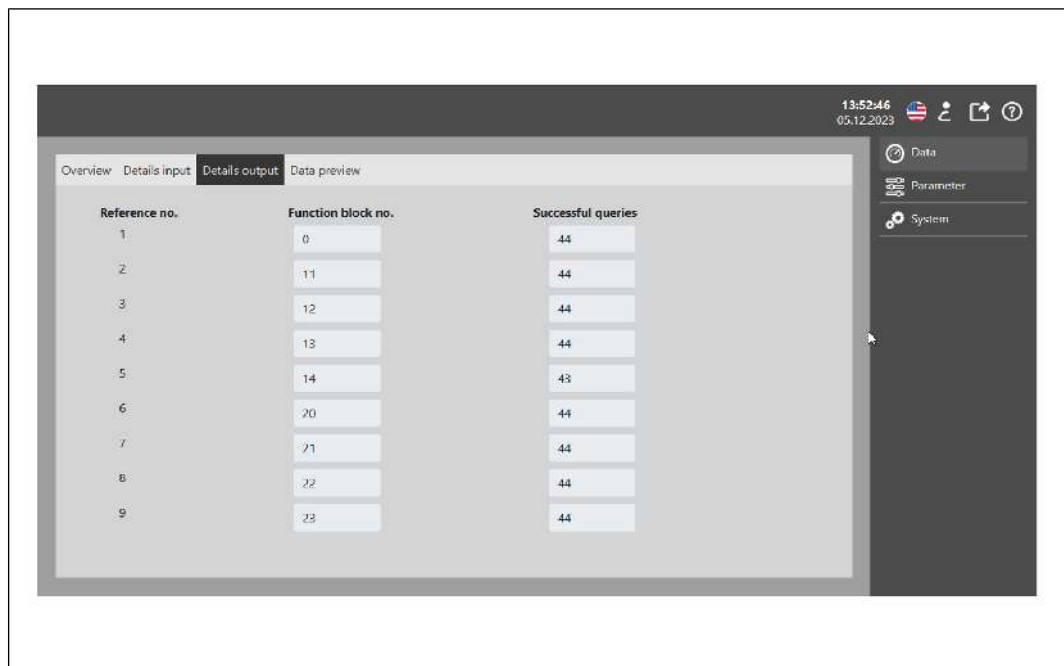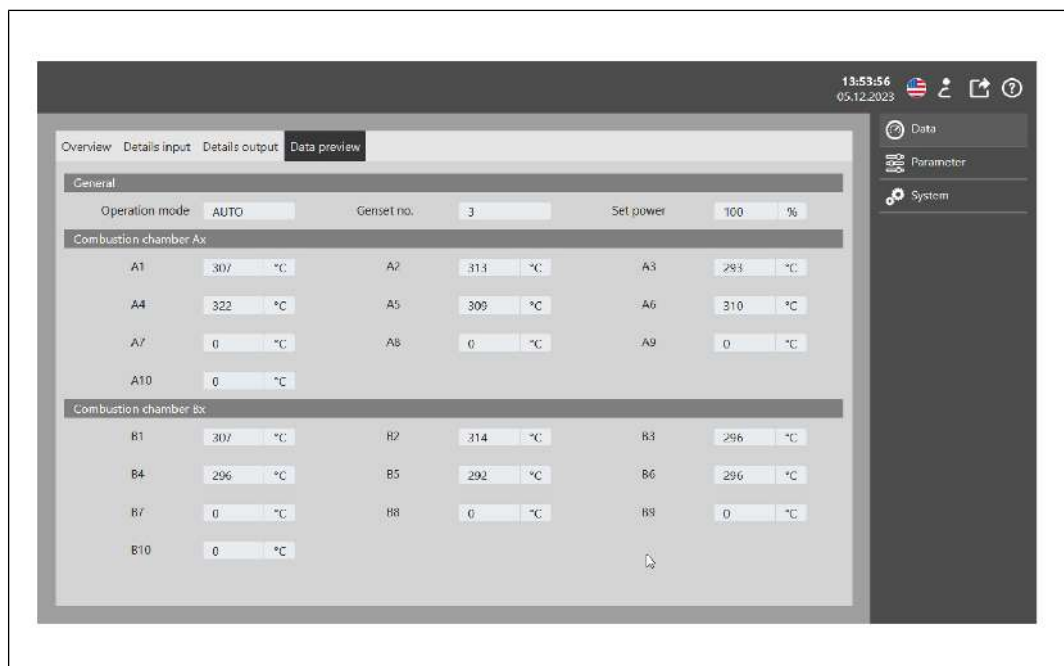
27021600317105547: Details Output

Data Preview tab

The `Data Preview` tab provides a content excerpt from the called-off data. The data validity can be checked at random here.

27021600317105035: Data preview

7.3 Functional group "Parameters"

General

The Functional group "Parameters" appears after the `Parameters` button on the sidebar is pressed. Various tabs required for operation are displayed.

The Functional group "Parameters" allows authorized specialist personnel to set parameters for system control.

The individual parameters are grouped in tabs according to type. Each tab has a display area in which parameters are grouped according to the scope of a function.

Modbus TCP tab

The `Modbus TCP` tab is used to manage the network connection.
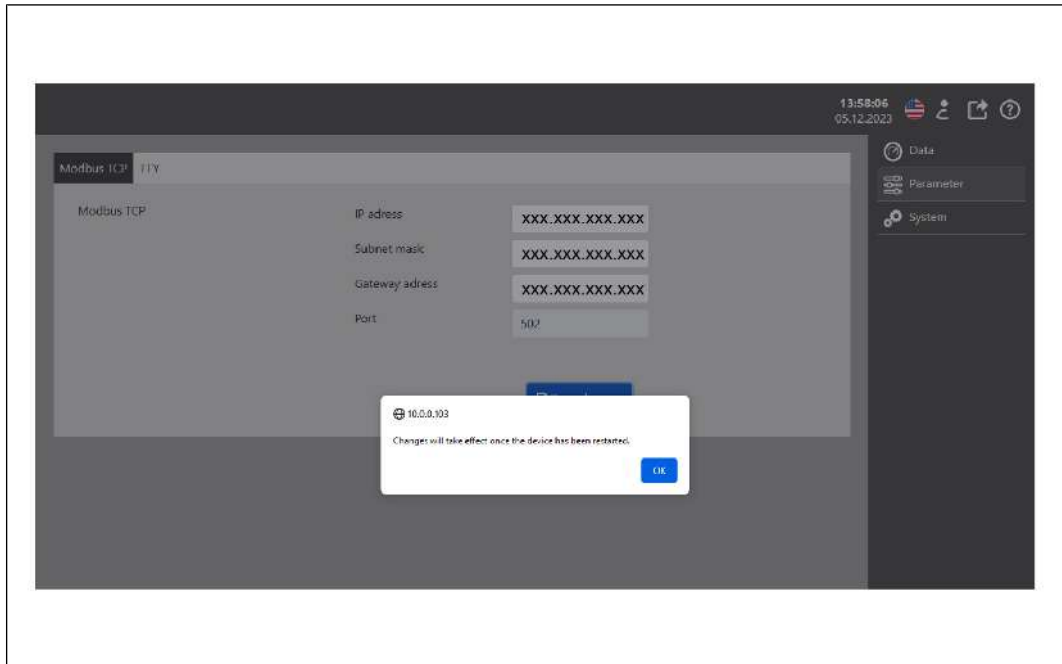
The input area enables manual entry of a fixed IP address:

- IP Address: A default IP address is entered here. It can be changed.

- Subnet Mask: A default subnet mask is entered here.

- Port: The port is displayed here.

- Save changes: to activate the entries.
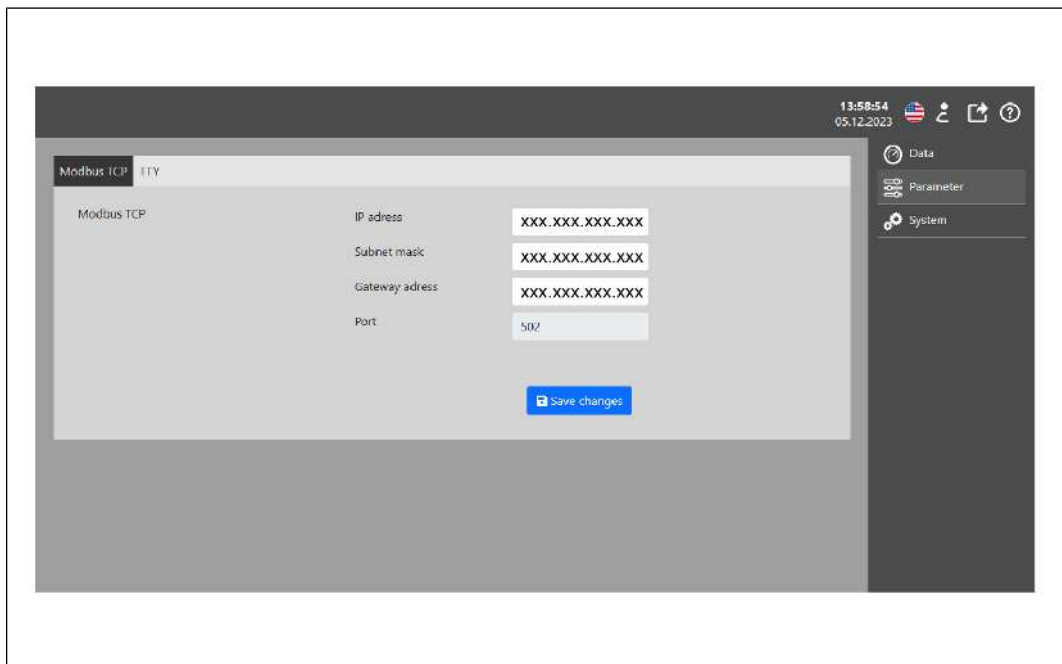
36028799788499339: Modbus TCP

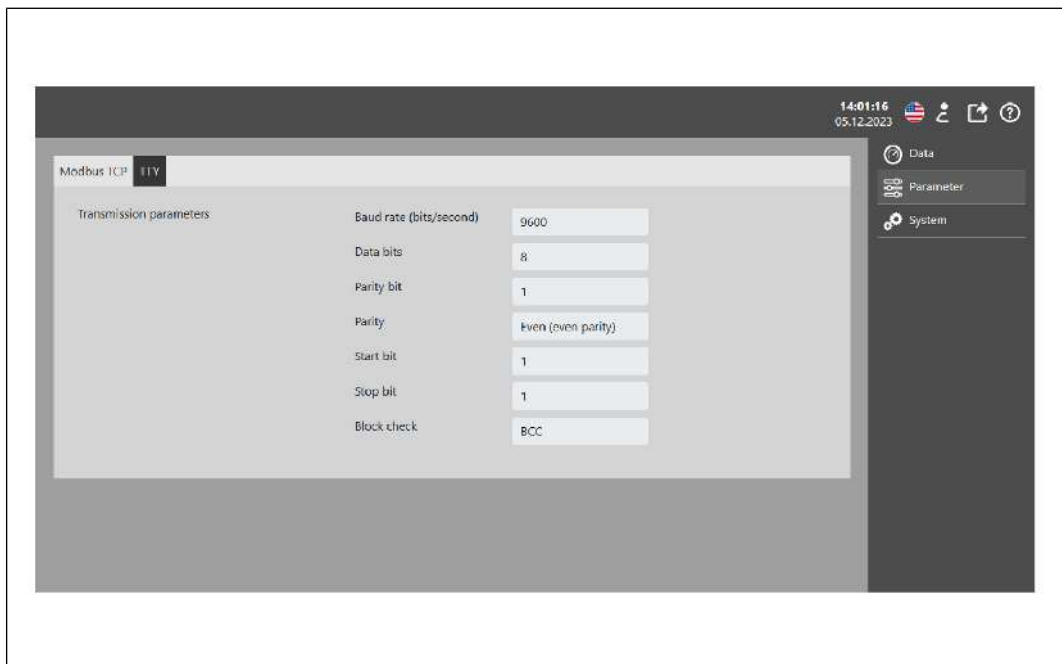- The user is prompted to restart the device to apply the new IP address.

27021600964519179: Restart prompt

TTY tab

The TTY tab displays the parameters requested by the TEM or in "Data exchange via Serial Communication, Telegram Specification Procedure 3964R with RK 512".

This is only a display and cannot be changed.

18014401279017867: TTY

7.4 Functional group "System"

General

The Functional group "System" appears after the `System` button on the sidebar is pressed. Various tabs relating to the product itself are displayed.

The Functional group "System" displays information about the Interface Gateway.

The individual pieces of system information are grouped in tabs according to type. Each tab has a display area in which pieces of information are grouped according to the scope of the system function.
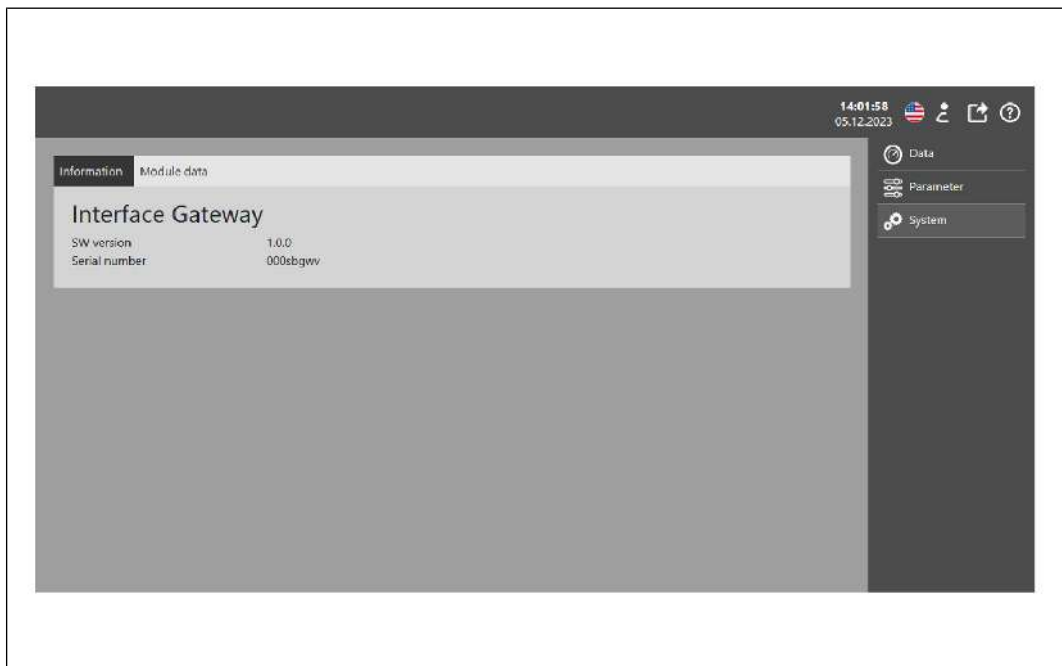
Information tab

The `Information` tab displays general system information.

The display area provides information about:

- SW version: version of the installed firmware

- Serial number: Interface Gateway's serial number

The serial number is required for warranty processing and support.

18014401279018379: System information

Module data tab

The `Module data` tab is used to manage the device data.

The input area provides:

- Engine name: Enter the correct name of the plant.

    – With multi-engine plants, also enter the name of the genset.

- Engine serial number: enter the serial number for unique identification

- Comment: Free text can be entered here if necessary.

- Display language: Select the language used on the displays

- Save changes: to activate the entries.

18014401279018891: Module data

18014401479311243: Confirmation

8 Decommissioning

8.1 Decommissioning and dismantling

### Removing lines

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Risk of destruction of components

Electric voltage

The Gateway can be damaged if the voltage supply is switched on during dismantling.
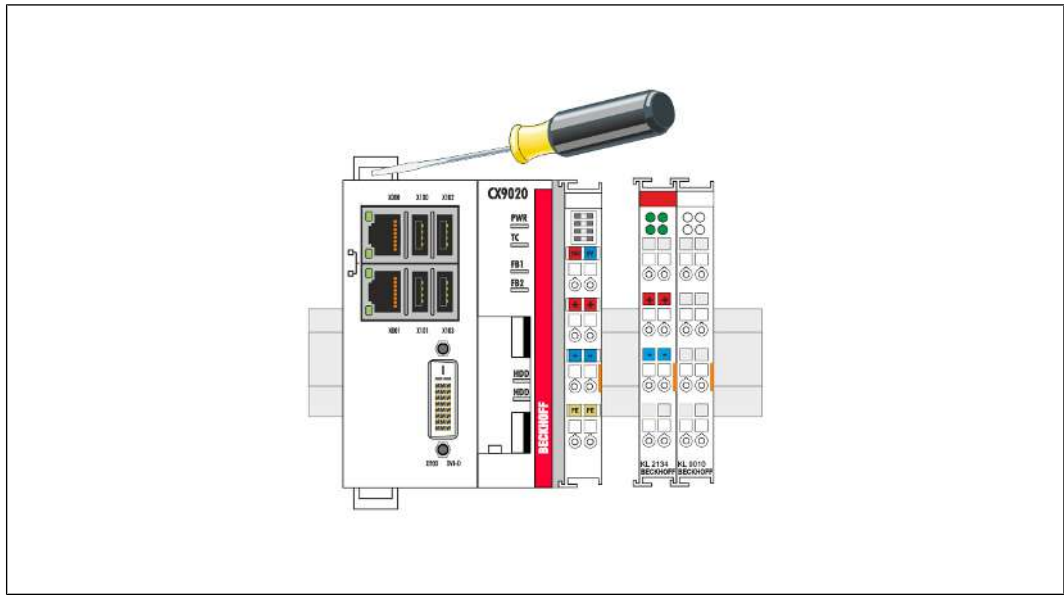
- Switch off the voltage supply for the Gateway during dismantling.

✓ Switch off the voltage supply.

1. Remove cabling from the Gateway.

2. Remove cabling from the first terminal next to the power supply unit terminal.

3. Pull the orange tab (1) to pull out the first terminal behind the power supply unit terminal in forward direction.
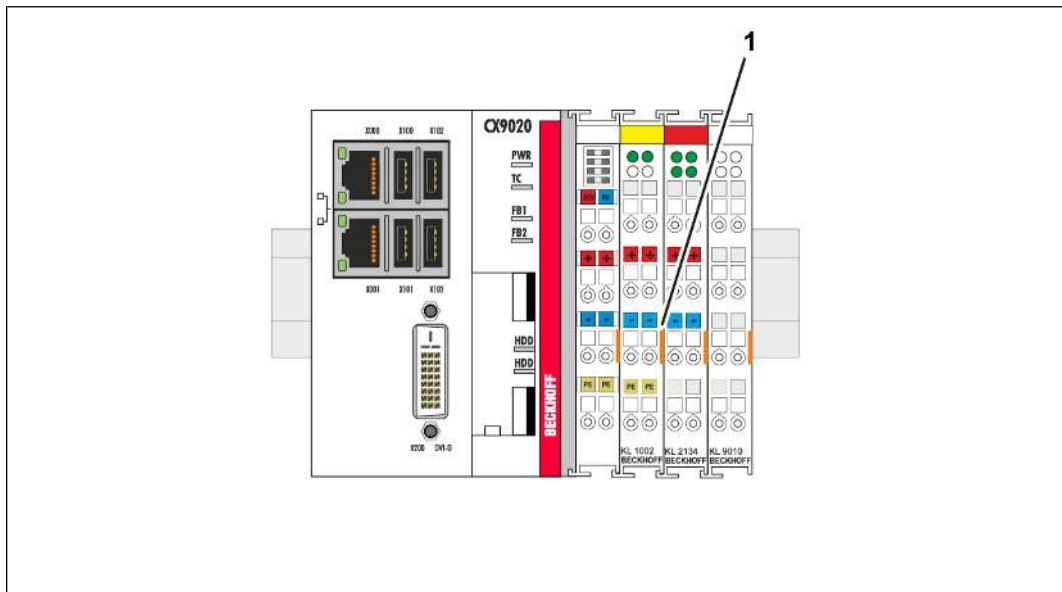
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⇨ The Gateway can be taken off the top-hat rail and dismantled in the next step.

9 Troubleshooting

9.1 Troubleshooting

Fault	Cause	Measures
No function after the controller starts	Missing controller power supply Other causes	1. Check fuse 2. Measure input voltage 3. Check pin assignment 4. Contact Product Support
The controller does not boot completely	Hard drive damage (e.g. due to switching off while the software is running) Incorrect setup settings Other causes	Check setup settings Contact Product Support
The computer boots, the software is started, but the control system does not function properly	The error is caused by the software or by plant parts outside the controller	Call the machine or software manufacturer.
Access error to MicroSD card	Faulty MicroSD card Faulty drawer	Check the drawer using a different MicroSD card Contact Product Support
Controller functions only partially or only at times	Components in the controller faulty	1. Re-record the SD card and repeat the test (software: Service Library) 2. Repeat commissioning/parameter setting 3. Contact Product Support

Please note down the following information before contacting Service or Support:

1. Exact device designation CXxxxx-xxxx
2. Serial number
3. Hardware version
4. Any available interfaces
5. Any other components/software used

Operating manual
Interface Gateway

10 Maintenance

10.1 Maintenance

Replacing the battery

DANGER

Explosion hazard

An incorrectly inserted battery can explode and damage the controller.

- Use only original batteries and ensure that the battery's positive and negative terminals are inserted correctly.

The battery must be replaced every five years. Replacement batteries can be ordered from CES Service. A type CR2032 battery is used in the controller.

Battery type	Voltage	Part number
CR2032	3.0 V	1221 9571

Table 2: Technical data of the battery

The battery compartment is located under the front flap. The battery backs up the time and date. The time and date are reset as soon as the battery is removed.

Observe this characteristic for your hardware and software configuration and reset the time and date after replacing the battery.
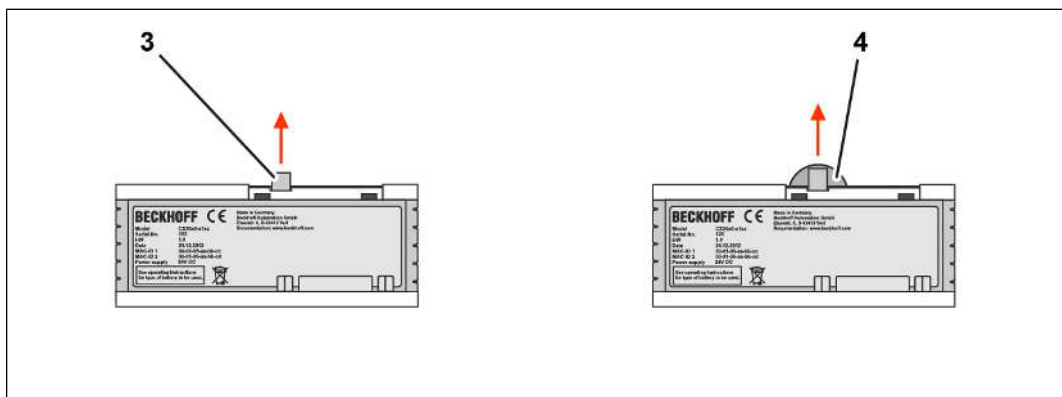
Proceed as follows to replace the battery:

✓ The controller is switched off.

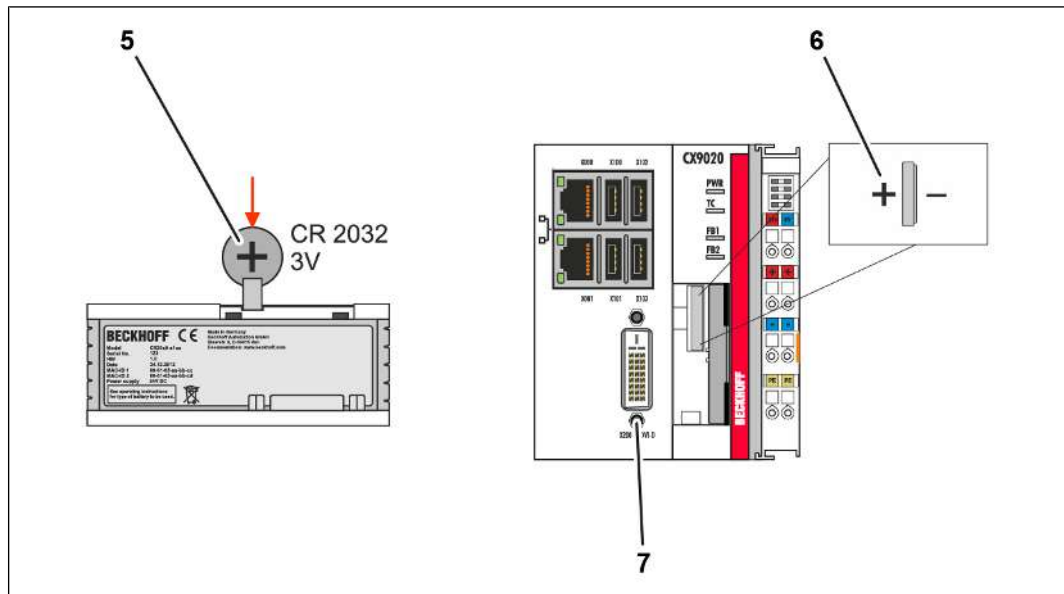1. Pry open the front flap (1) using a screwdriver and remove the front flap (2).
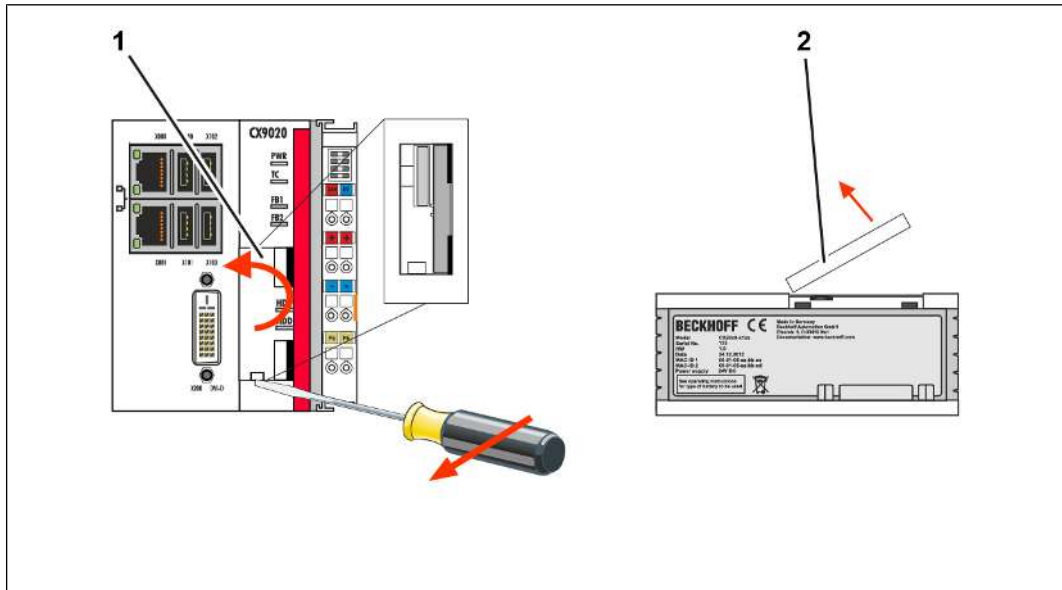
2393403403

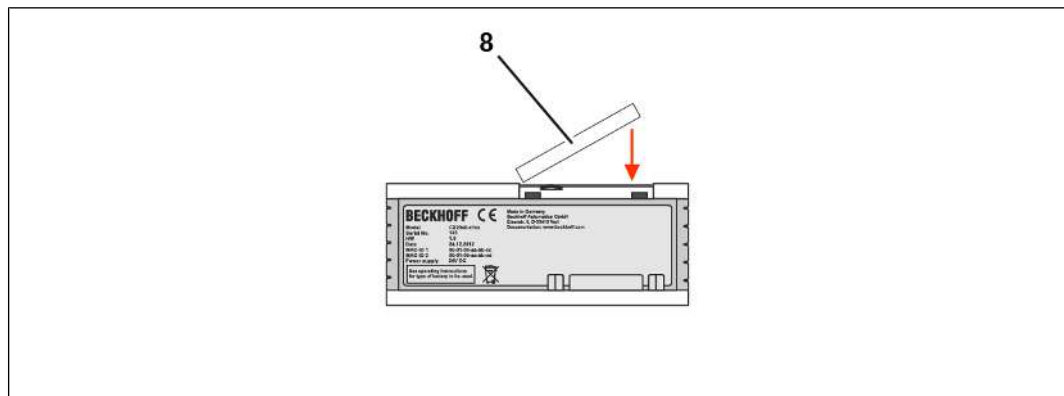2. Carefully pull the empty battery (4) out of the holder using the removal strap (3).

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3. Insert new battery (5) into the battery compartment. The positive terminal (6) points left toward the DVI-D interface (7).

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⇨   The battery has been replaced. Close the front flap (8) and reset the date and time.
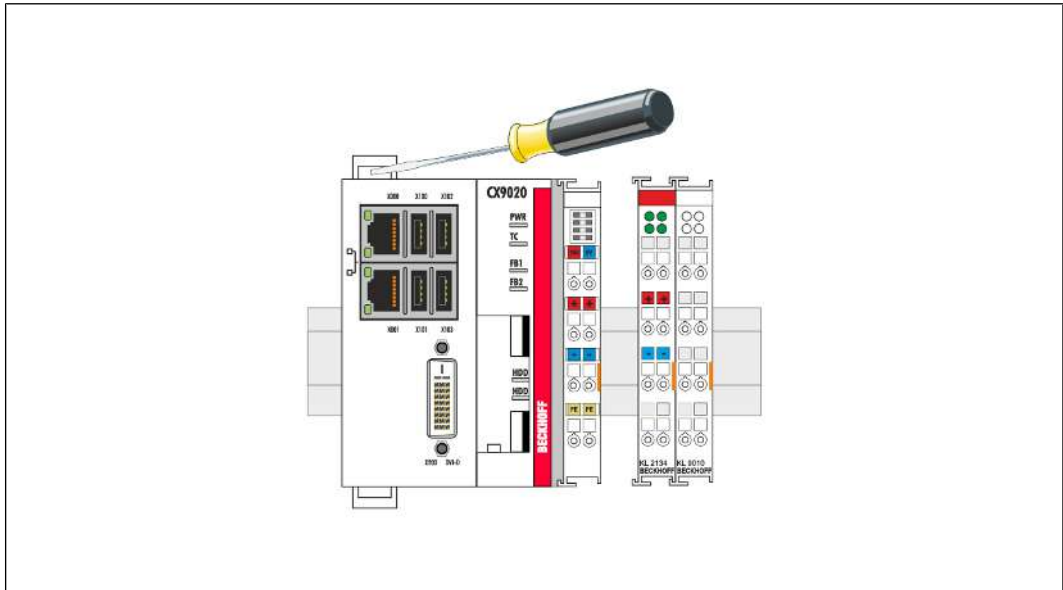

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11 Dismantling and disposal

11.1 Dismantling and disposal
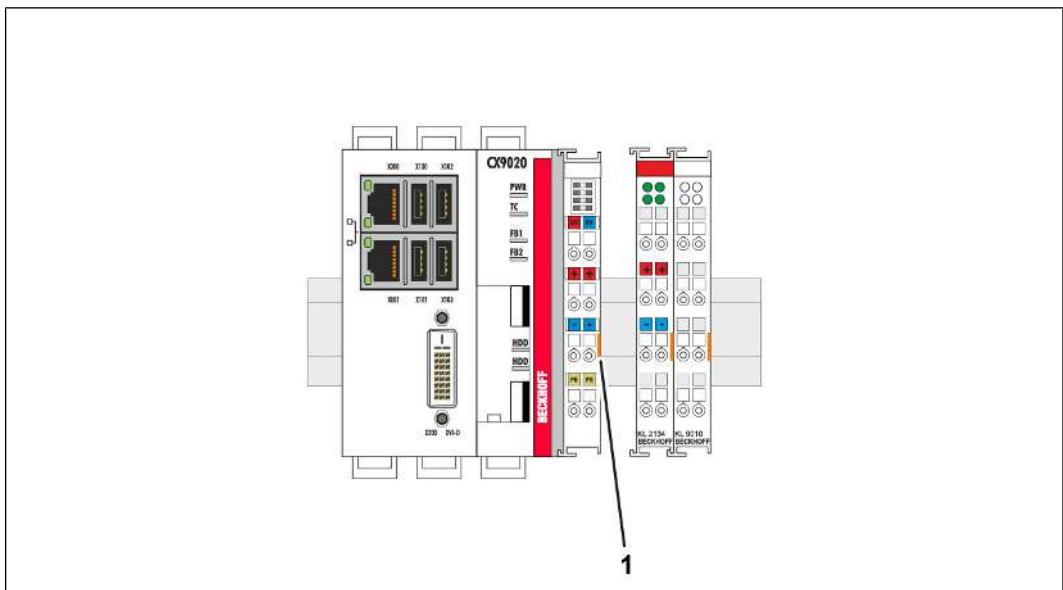
Dismantling the controller

✓ All lines were removed from the controller.

1. Push the hook outward using a screwdriver and release the top-hat rail fastening.

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2. Pull the orange strap (1) on the power supply unit terminal and carefully remove the device from the top-hat rail.

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⇨ The controller has been successfully dismantled.

Disposal

The device must be disassembled and fully dismantled for disposal. Electronic components must be disposed of in accordance with the national ordinance on electronic waste.
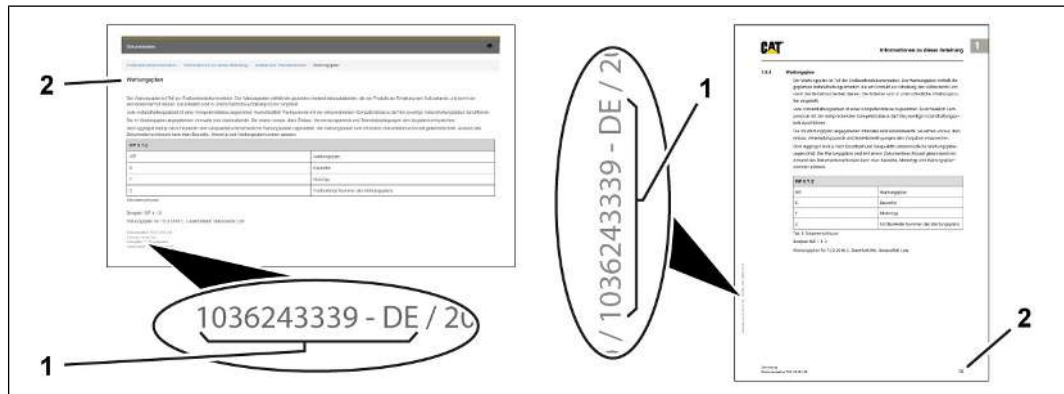
12 Feedback on documentation

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Describe your request as precisely as possible. So that we can categorize your feedback, please also provide the following information:

9007199541383307: Example document (HTML page in the Service Library on the left, and a PDF page on the right side)

- Document number and language (1)

- Page title or page number (2)

- Contact data (name, email) for potential further enquiries

Thank you for your support. We read all feedback carefully.

We look forward to hearing from you!