CC613 charge controller

Charge controller for use in electric vehicle charging stations, wallboxes or street light charging points

Table of contents

1 General instructions

1.1 How to use the manual

ADVICE
This manual is intended for qualified personnel working in electrical engineering and electronics! Part of the device documentation in addition to this manual is the enclosed supplement "Safety instructions for Bender products".

ADVICE
Read the operating manual before mounting, connecting and commissioning the device. Keep the manual within easy reach for future reference.

1.2 Indication of important instructions and information

DANGER
Indicates a high risk of danger that will result in death or serious injury if not avoided.

WARNING
Indicates a medium risk of danger that can lead to death or serious injury if not avoided.

CAUTION
Indicates a low-level risk that can result in minor or moderate injury or damage to property if not avoided.

Information can help to optimise the use of the product.

1.2.1 Signs and symbols


Disposal


Protect from moisture


Protect from dust


Temperature range


Recycling

RoHS directives

1.3 Service and Support

Information and contact details about customer service, repair service or field service for Bender devices are available on the following webside: Fast assistance | Bender GmbH & Co. KG.

1.4 Training courses and seminars

Regular face-to-face or online seminars for customers and other interested parties:

www.bender.de -> Fachwissen -> Seminare.

1.5 Delivery conditions

The conditions of sale and delivery set out by Bender GmbH & Co. KG apply. These can be obtained in printed or electronic format.

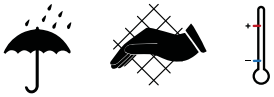
The following applies to software products:

"Software clause in respect of the licensing of standard software as part of deliveries, modifications and changes to general delivery conditions for products and services in the electrical industry"

1.6 Inspection, transport and storage

Check the shipping and device packaging for transport damage and scope of delivery. In the event of complaints, the company must be notified immediately, see "Technical support: Service and support".

The following must be observed when storing the devices:



1.7 Warranty and liability

Warranty and liability claims for personal injury and property damage are excluded in the case of:

- Improper use of the device.
- Incorrect mounting, commissioning, operation and maintenance of the device.
- Failure to observe the instructions in this operating manual regarding transport, commissioning, operation and maintenance of the device.
- Unauthorised changes to the device made by parties other than the manufacturer.
- Non-observance of technical data.
- Repairs carried out incorrectly.
- The use of accessories or spare parts that are not provided, approved or recommended by the manufacturer.
- Catastrophes caused by external influences and force majeure.
- Mounting and installation with device combinations not approved or recommended by the manufacturer.

This operating manual and the enclosed safety instructions must be observed by all persons working with the device. Furthermore, the rules and regulations that apply for accident prevention at the place of use must be observed.

1.8 Disposal of Bender devices

Abide by the national regulations and laws governing the disposal of this device.

For more information on the disposal of Bender devices, refer to

www.bender.de -> Service & Support.

1.9 Safety

If the device is used outside the Federal Republic of Germany, the applicable local standards and regulations must be complied with. In Europe, the European standard EN 50110 applies.

DANGER ***Risk of fatal injury due to electric shock!***

Touching live parts of the system carries the risk of:

- Risk of electrocution due to electric shock
- Damage to the electrical installation
- Destruction of the device

Before installing the device and before working on its connections, make sure that the installation has been de-energised. The rules for working on electrical systems must be observed.

2 Function

Local access to charge controller

Local access to the charge controller is possible either as the operator or as the manufacturer. Further details are described in chapter 5.1.1. Operator access is possible via the http://192.168.123.123/operator:

- *User name: operator*
- *Password: yellow_zone*

The Manufacturer can access the manufacturer area via the URL http://192.168.123.123/manufacturer:

- *User name: manufacturer*
- *Password: orange_zone*

The default passwords should be changed to prevent unauthorised access.

2.1 Intended use

The CC613 charge controller, hereinafter referred to as "charge controller", is the main component of a charging system. It is intended for use in electric vehicle charging stations, wallboxes or street light charging points. The charge controller controls type 1 and type 2 socket-outlets as well as attached cables. It enables a setup that complies with the requirements of current standards, e.g. IEC 61851-1 and IEC 62955.

2.2 Device features (depending on the variant)

- Charge controller in accordance with IEC 61851-1 (charging mode 3)
- Configurable master and slave operation
  Setting up charging stations with two charging points:
  - 1 charge controller as data gateway with 4G modem
  - 1 charge controller as slave without 4G modem
- Dynamic load management to optimally distribute the available power among all charging points and signal the maximum power available in each case to the vehicle
- Residual direct current monitoring module (external RCD type A required), different cable lengths can be selected
- Integrated emergency opener for actuator control (locking/unlocking) and monitoring of the 12 V supply voltage
- Can be integrated in single- or three-phase systems up to 80 A
- OCPP 1.5 and OCPP 1.6 compliant with JSON, SOAP
- Supported mobile networks: 4G (LTE), 3G (UMTS) and 2G (GSM) with an integrated 4G modem
- 3 USB interfaces:
  - 1 CONFIG interface for local configuration and installation of software updates
  - 2 USB host interfaces
- Control Pilot and Proximity Pilot communication
- Configurable support for additional SCHUKO socket-outlets
- Meter interface: Modbus TCP and RTU
- External Modbus interface (second meter for dynamic load management)
- User interface modules for customer-specific applications (e.g. RFID, LED, antenna)

- Configurable 2-channel input/output extension interface for additional functionality
- Internal temperature sensor to reduce the charging current depending on the ambient temperature
- ISO 15118 Powerline Communication (PLC) for plug & charge and load management systems
- ISO 15118 Powerline Communication (PLC) for plug & charge or autocharge
- Ethernet interface

2.3 Product description

The charge controller primarily controls the charging process of an electric vehicle and monitors the internal hardware of charging systems such as the meter, the user interface module or the socket-outlet. It can be operated as an "always-on system" that is always connected to a mobile network. The master variant supports 4G mobile networks.

Communication with a backend system is possible via the OCPP application protocol. All specified messages in OCPP are supported as well as some vendor-specific extensions based on the DataTransfer message. Integration tests with the backend implementations of providers (e.g. has-to-be, Virta and NewMotion) have been carried out successfully. See chapter "Ordering information".

2.4 Functional description

The charging system consists of an RCD type A and a contactor. These are directly connected to a type 1 or type 2 socket-outlet, or to a permanently mounted cable with a type 1 or type 2 plug (see chapter "Wiring diagram").

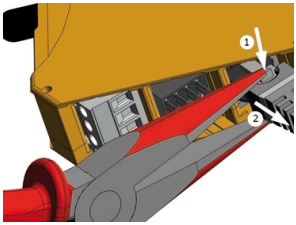
2.5 General functions (depending on the variant)

- The charging system can be equipped with a meter. A Modbus meter is required to digitally read the energy consumption. The Modbus RTU lines are attached directly to the device.
- A 12 V power supply is needed for operation.
- An RFID module can be used for easy user interaction.
- Current flow toward the vehicle is released by enabling the contactor via an integrated 230 V control relay in the charge controller.
- Using a micro SIM card (not included in the scope of delivery):
  The SIM card slot (available on data gateways with a 4G modem only) is located on the charge controller front panel. The SIM card can have a PIN number which can be configured via the **Operator** tab. The APN settings for the SIM card can also be configured via the **Operator** tab.
- Data gateways with a 4G modem feature a connection for a 4G antenna on the front panel.
- For residual current detection in an AC charging system, the charge controller features an integrated residual direct current monitoring module (RDC-M) which uses an externally connected measuring current transformer. With integrated monitoring of the DC residual current, only an RCD type A is required in the charging system.
- Data exchange between the electric vehicle and the charging system is possible via ISO 15118-compliant Powerline Communication (PLC).

- Dynamic load management (DLM):
  The charge controller comes with DLM software, which can be fully used, independent of a backend connection. It detects which charging current is applied to which phase and thus prevents the occurrence of peak loads and unbalanced loads. Maximum number of charging points in a network: 250.
- Data management and control functionality of the charge controller:
  – Termination of the charging process after tripping the residual current protective device (RCD) due to a residual current.
  – Detection of critical residual currents by the RCM sensor. For the vehicle owner, this can serve as an early warning, provided that the charge controller is connected to an energy management system and that it supports this function.
- External Modbus interface for advanced control of the controller via an energy management system, independent of a backend connection.

The charge controller with residual direct current monitoring module (RDC-M) only works in combination with the measuring current transformer (to be ordered separately).

WARNING
CAUTION! Risk of damage when pulling out the measuring current transformer plug! If the measuring current transformer plug is pulled out using too much force, the enclosure and the internal components may be damaged. Use needle-nose pliers to unlock the measuring current transformer plug.



2.6 Temperature monitoring - Load current and cooling monitoring

The charge controller is equipped with a temperature sensor, which allows the temperature in the environment of the charge controller to be estimated. Based on this estimation, it is possible to dynamically reduce the charging current or even suspend charging. This feature can serve to maintain the temperature inside the enclosure within the permissible range for the components used in a charging system. Basic settings can be made via the **Manufacturer** tab.

The actual temperature is affected by heat generated by the charge controller itself.

2.7 LED indications

STATUS LED

Front plate

Orange	Power on/system not ready for operation
Blue	System is starting
Green	System started, not yet ready for operation
Flashing green	System running, system ready for operation
Red	System error

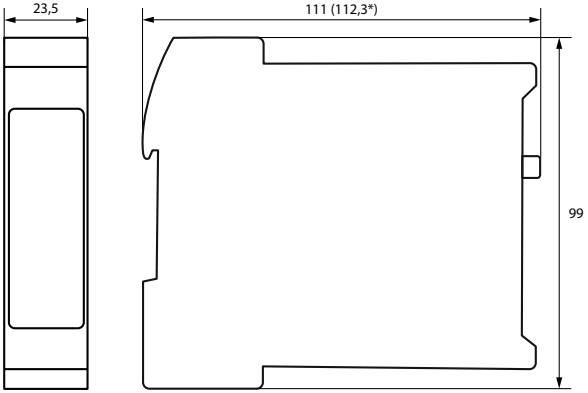
Ethernet

Terminal D

Off	No Ethernet connection
Steady green	Ethernet connection at 100 Mbit/s
Flashing green	Data exchange at 100 Mbit/s
Steady yellow	Ethernet connection at 10 Mbit/s
Flashing yellow	Data exchange at 10 Mbit/s

3 Dimensions and mounting

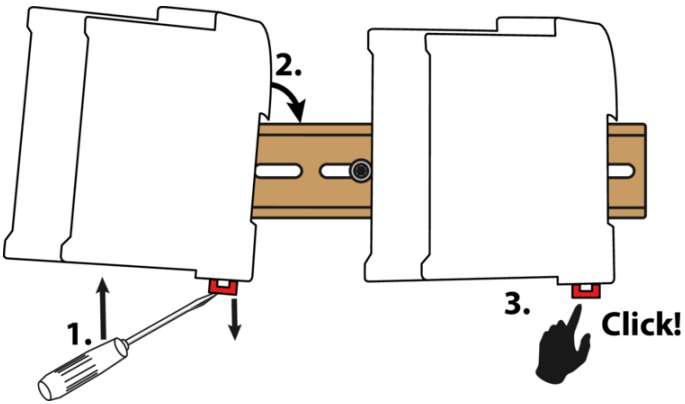
Dimension diagram



Dimensions in mm acc. to ISO 2768 - m
* Dimensions incl. antenna socket

Mounting

DIN rail mounting



Lateral distance to other equipment: 6 mm (self-heating)

In the horizontal mounting position, the max. operating temperature is reduced by 15 °C (refer to "Other" in chapter "Technical data").

4 Connection

Connection conditions

DANGER ***System parts may be live***
(charge controller terminals up to 230 V, charging station 400 V)
Electric shock
Before touching system parts, ensure that it has been de-energised.

CAUTION ***Sharp-edged terminals***
Cut injuries
Handle enclosure and terminals with care.

Information:

- *PE is connected to "0 V"; reference level for Control Pilot (CP communication) must be at the same level as the power supply (IEC 61851 series of standards).*
- *The Ethernet shield is directly connected to PE.*
- *The charge controller is supplied with power from a 12 V main voltage source at the +12 V and 0 V connections.*
- *Lay lines only inside the wallbox and not in parallel with power cables.*
- *Connect external Modbus to terminal block I using a shielded cable.*
- *External Modbus must be terminated by the customer with a terminating resistor of 120 Ω.*
- *Cable lengths (except Modbus, Ethernet, Power IN and charging cable): < 3 m.*
- *Maximum cable length Ethernet/Fast Ethernet: 100 m.*
- *Maximum cable length Modbus: 250 m.*

For further information on connection, refer to the manuals of the accessories (Example CTBC17P-03).

4.1 Connection plug connections

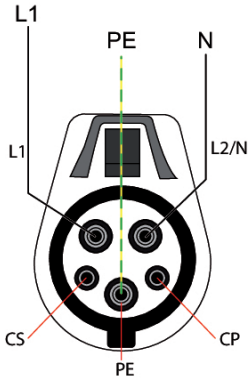


Image: Connection type 1 plug

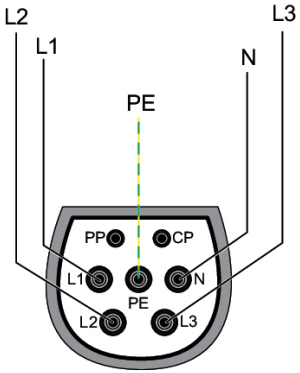
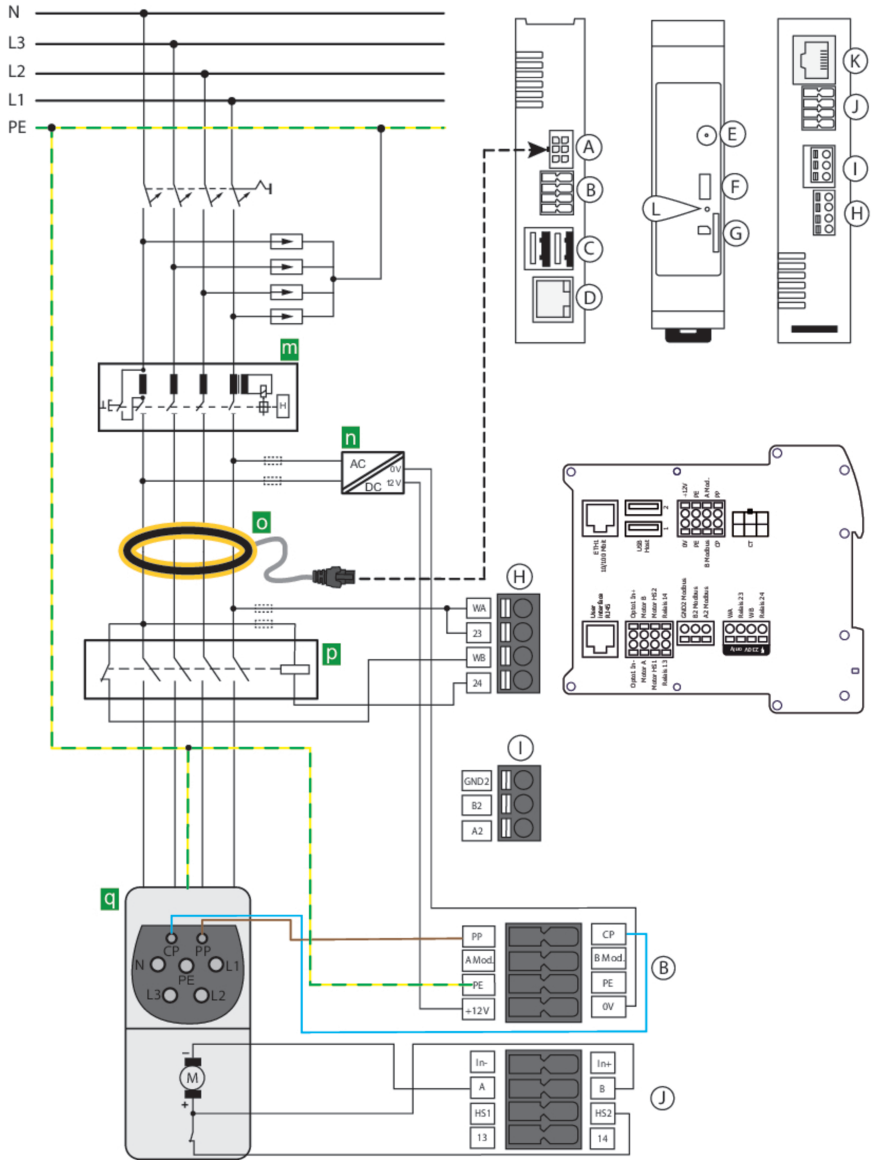


Image: Connection type 2 plug

4.2 Wiring diagram

Charging system with type 2 socket-outlet



Legend

A	Connection measuring current transformer (CT)	m	RCD type A
B	12 V supply, PE, Modbus meter, CP, PP	n	Supply voltage DC 12 V
C	2x USB type A (1, 2)	o	Measuring current transformer (CT) with plug
D	Connection Ethernet (ETH1)	p	Contactor
E	Antenna socket 4G (only available for variants with 4G modem[1])	q	Type 2 socket-outlet
F	Configuration interface		
G	Micro SIM card slot (only available for variants with 4G modem[1])		
H	Weld check, relay for contactor control rated for 230 V/4 A		
I	External Modbus (galvanic separation)		
J	Locking, control relay GPIO, optocoupler input		
K	Connection user interface (HMI) (not available with HEM-X2 variant)		
L	STATUS LED		

[1] Data gateways with 4G modem: CC613-ELM4PR-M and CC613-ELM4PR

Terminal assignment (depending on the variant)

B	0 V	Input 0 V
	+12 V	Supply voltage +12 V
	PE	Input PE
	PE	Input PE
	B Mod.	Modbus meter B
	A Mod.	Modbus meter A
	CP	Control Pilot
	PP	Proximity Pilot
H	WA	Weld check input L1
	23	Relay 23: Switching contact contactor
	WB	Weld check input N
	24	Relay 24: Switching contact contactor

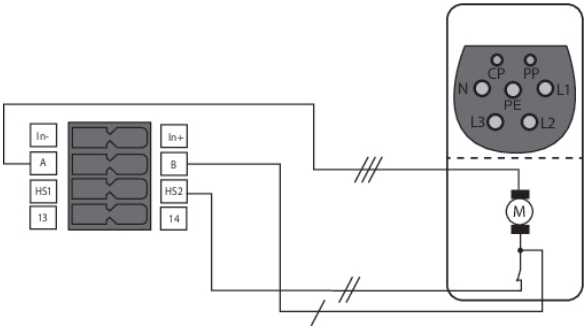
I	GND2	External Modbus GND (shield connected on one side)
	B2	External Modbus B (galvanic separation)
	A2	External Modbus A (galvanic separation)
J	In-	Opto 1 In-: Optocoupler input 12 V negative
	IN+	Opto 1 In+: Optocoupler input 12 V positive
	A	Actuator A: Locking actuator output negative
	B	Actuator B: Locking actuator output positive
	HS2	Actuator HS2: Locking input actuator switch
	HS1	Actuator HS1: Locking 12 V output actuator switch
	14	Relay 14: Relay contacts GPIO (12 V)
	13	Relay 13: Relay contacts GPIO (12 V)

ADVICE
CAUTION! Switching contact contactor and weld check at terminal H are only suitable for mains voltage (230 V)! Not permitted for SELV/PELV voltages.

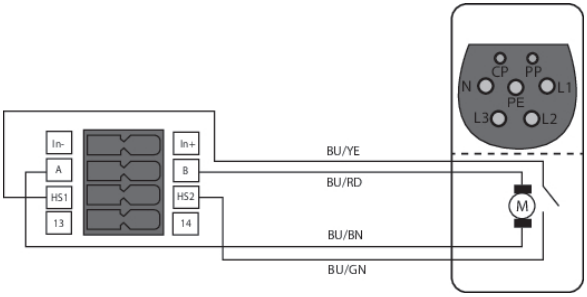
Connection locking actuators

Type 2 socket-outlets (actuator type)	Actuator	A	HS1	B	HS2
		Socket-outlet actuator wiring			
• Mennekes (31016, 31023, 31024, 31038) • Bals (801191-801195, 80300, 9743205000, 9743211000) • Walther Werke (9743211000) • Harting	Hella	Wire 3 (///)		Wire 1 (/)	Wire 2 (//)
• Walther Werke Eco Slim 32 A (9743205180) with connection cable (790000001)		Wire 1 (black)		Wire 3 (blue)	Wire 2 (red)
• Phoenix Contact (1624129)	Küster	BU/BN	BU/YE	BU/RD	BU/GN
• Phoenix Contact (EV-T2M3SM-E-LOCK12V)	Phoenix Contact	BU/BN	BU/YE	BU/RD	BU/GN

Example Hella actuator



Example Küster



4.3 Connectivity

4.3.1 Master/slave connection [1]

The charge controller serves as a data gateway. Master/slave operation requires the USB configuration interface (micro USB 2.0, master) to be connected to the USB type A interface (slave) via a USB cable. The master assumes the role of the OCPP backend for the slave. It connects each slave as an additional charging point to the backend.

The master or slave role is assigned to a charge controller within the **Manufacturer** configuration interface. A reboot can then be triggered and the devices can be connected via a micro USB cable (master: micro USB/ slave: USB type A). Usually, the devices connect automatically. Local access to the master/slave combination is then only possible via the slave device. The IP address of the master must be assigned to each slave as OCPP host name. Port 1600 must be used as an OCPP port to establish a connection with the master.

The additional IP address 192.168.125.124 is assigned to the master via the **Operator** tab (without assigning a default gateway). The slave uses the IP address 192.168.125.125 to establish a connection with the master. Master and slave configuration can be accessed via a selection page on the configuration website of the slave (e.g. http://192.168.123.123).

4.3.2 Interfaces

USB configuration interface (CONFIG)

The USB configuration interface (CONFIG) on the front panel of the charge controller can be connected to a conventional laptop, PC or tablet computer via a micro USB cable. This interface allows local configuration of the charge controller. In addition, it enables software updates to be installed. The web interface can be accessed via the IP address 192.168.123.123.

Ethernet interface (depending on the variant)

The charge controller can be connected to an existing Ethernet network via an Ethernet interface.

WiFi interface (via USB WiFi adaptor)

By using an USB WiFi adaptor, it is possible to set up a backend connection via WiFi network.

For further information on configuration descriptions and interfaces, see chapter "Configuration and testing".

4.3.3 Power contactor connection

Contactor connection

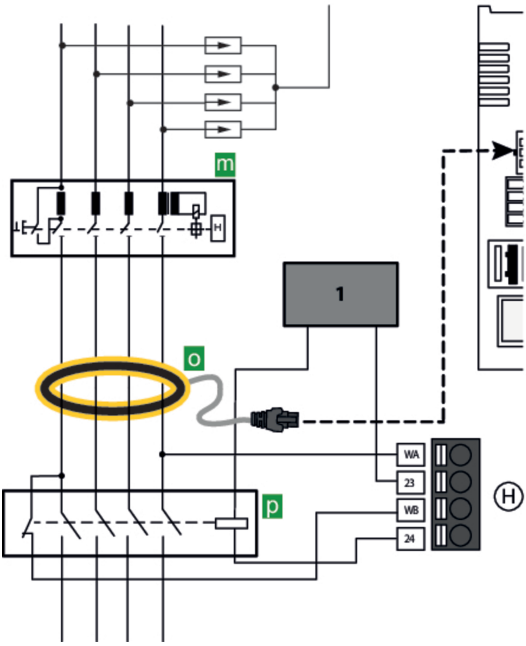
The charge controller controls the contactor, which in turn releases the current flow to the vehicle. The contactor is controlled via a relay in the charge controller, the contacts of which are rated for 230 V/4 A (see chapter "Wiring diagram").

1 Only for variants with OCPP (see ordering information)

Alternative connection for power contactor

Alternatively, the power contactor can be controlled via the customer's own AC or DC mains part in combination with the 230 V relay (terminal H: 23, 24).

Detail of wiring diagram chapter "Charging system with type 2 socket-outlet"



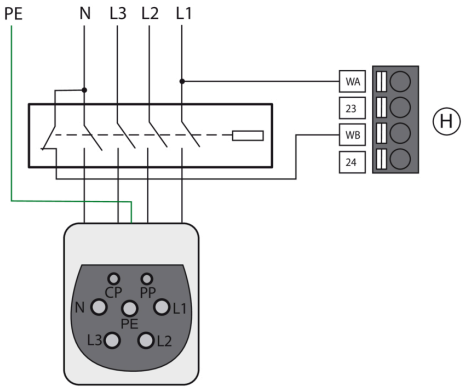
1 Customer mains part (AC/DC)

ADVICE
Caution: DC residual currents caused by the contactor or the control relay are not detected.

Weld check

By means of the measuring lines (terminal H: WA, WB) impermissible closing of the contactor contacts, e.g. welding/sticking, can be detected.

Wiring diagram



ADVICE

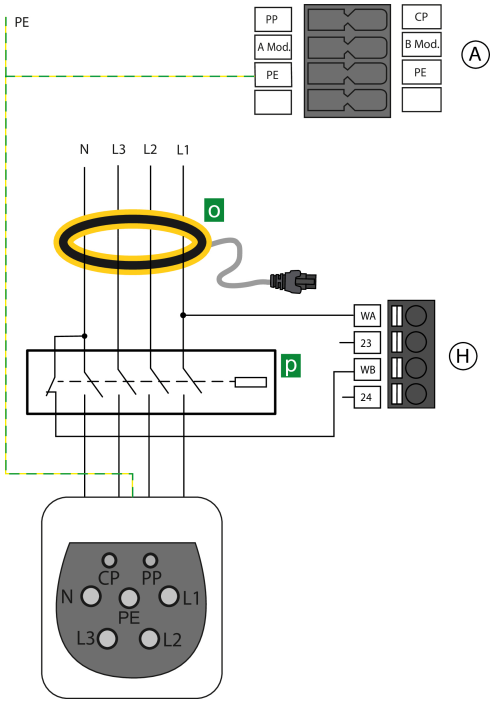
Risk of a short circuit! For the coupling of terminals WA and WB, devices for protection against a short circuit can be omitted in accordance with DIN VDE 0100-430 if the wiring is carried out in such a manner as to reduce the risk of a short circuit to a minimum. (Short-circuit-proof and earth-fault-proof wiring is recommended). The connecting lines WA and WB to the power supply system to be monitored must be designed as spur lines. No load current may be conducted through the terminals.

4.3.4 PE monitoring

PE monitoring

PE monitoring checks whether there is a connection from the charge controller to PE. For this purpose, WA must be connected to L1. Due to the capacitance of the supply line, the supply line length that can be checked is limited. To ensure correct functionality of the PE monitoring, L1 must be tapped behind the measuring current transformer and before the power contactor.

Wiring diagram



ADVICE
PE monitoring does not replace tests (e.g. protective earth resistance).

ADVICE
The Ethernet shield and the USB shield are directly connected to PE. This must be taken into account in the test!

ADVICE
HV test: WA is coupled to PE via a protective circuit and with approximately 140 kΩ.
Above 500 V, a leakage current flows to PE.

Test voltages above AC 1000 V/1 s are not permissible!

4.3.5 Control Pilot (CP) and Proximity Pilot connections (PP)

The PP contact identifies the connected charging cable and limits the maximum possible charging current. The CP contact enables communication with the vehicle (see IEC61851 series of standards).

PP is not required if the charging cable is permanently installed.

4.3.6 I/O extension [2] (depending on the variant)

The charge controller features a configurable, two-channel I/O interface consisting of an optocoupler input and a relay output (plug connector socket J: In-, In+, 13, 14).

- Parking management interface (the supported communication protocol is proprietary to Scheidt & Bachmann and is based on the available auxiliary relay and one available input)
- Additional control for SCHUKO socket-outlets
- Power outage monitoring function (e.g. RCD trip monitoring)
- Heating switch/cooling fan switch for overheating protection

4.3.7 Emergency opener

The emergency opener is integrated as a circuit group in the charge controller. In the event of a power failure, the plug of the charging cable is automatically unlocked so that it can be removed.

4.3.8 Residual direct current monitoring module (RDC-M)

For residual current detection in an AC charging system, an integrated residual direct current monitoring module (RDC-M) is used. This module uses an external, magnetically shielded measuring current transformer. This allows the use of a residual current protective device (RCD) type A instead of an RCD type B.

The relay in the charge controller is de-energised if, during the charging process, a residual current $I_{\Delta n} \geq$ DC 6 mA flows. The measured residual currents RMS/DC are made available to the backend system via an OCPP message.

4.3.9 Connectivity with Modbus meters

Connectivity with Modbus meters

The use of a meter is not mandatory. It is necessary if measured values are required during normal operation. The meter is connected to the Modbus meter interface (terminal B) of the charge controller. Various Modbus meters are currently supported: Supported energy meters

Meter Slave ID	Baud rate	Parity	Data bit	Stop bit
1	9600	N (none) (except Saia) -> even	8	1

Additional Modbus meters can be included in future software updates upon customer request. Refer to the **Manufacturer** tab on the web server for a list of supported Modbus meters.
The Modbus meter interface is terminated with a terminating resistor of 120 Ω.

4.3.10 Gateway variants with modem

Gateway variants with modem

The charge controller supports 4G mobile networks. A 4G modem is integrated into the device. It uses a wireless module which supports the following European frequency bands:

- LTE FDD: 800 MHz Band 20, 900 MHz Band 8, 1800 MHz Band 3, 2100 MHz Band 1, and 2600 MHz Band 7
- GSM: 900 MHz Band 8 and 1800 MHz Band 3
- WCDMA: 850 MHz Band 5, 900 MHz Band 8, and 2100 MHz Band 1
- The charge controller can be operated as an "always-on system" when connected to a mobile network.

2 For variants with I/O extension, see ordering information

- Connection is only possible when a micro SIM card is inserted in the SIM card slot located on the charge controller front panel.
- The SIM card can have a PIN number which can be configured via the **Settings** tab.
- The APN settings for the SIM card can also be configured via the **Settings** tab.

CAUTION ***Use of nano SIM cards with a corresponding SIM card adaptor***
SIM card slot can be damaged
It is recommended to use only micro SIM cards.

The SIM card can be removed via push-push.

Use in the EU and other countries

Operation of device variants with an integrated 4G modem is only possible in member states of the European Union, Lichtenstein, Iceland, Norway, Switzerland, Andorra, Monaco, San Marino, and the United Kingdom.

If 4G mobile networks are not supported, GSM mobile networks may also be used.

Antenna socket

The antenna socket enables connection to a 4G antenna (not included in the scope of delivery).

The following approved antenna type must be used: PSI-GSM/UMTS-QB-ANT.

ADVICE
Safeguard the antenna socket against ESD discharges!
If the antenna socket can be touched during operation, suitable measures must be implemented to protect against ESD discharges.

5 Configuration and testing

Cybersecurity
If cybersecurity vulnerabilities are identified in the software, they can be reported here: https://www.bender.de/cert

5.1 Configuration (depending on the variant)

The following options are available for configuring the charging system:

Access to web interface via the following interfaces:

- Micro USB configuration interface (CONFIG)
- Ethernet interface
- 4G modem
- Remote access - the ChangeConfiguration command of the OCPP protocol is used (depending on the backend system)

For more information on how to configure the charge controller, visit www.bender.de/controller-wiki

5.2 Local configuration of parameters

In order to locally configure the charging system via the charge controller, it is necessary to connect a micro USB cable to a laptop, PC or tablet computer with a standard USB host interface. Once connected, the charge controller is recognised as a USB network adapter. The charge controller can be automatically configured and updated with a newer software version via the CONFIG interface.

CAUTION ***Damage to the charge controller software when using automated configuration systems and software updates.***

Note the following:

- After copying the configuration files to the charge controller and before restarting/shutting down the charge controller, the *sync* command must be executed. This writes the configuration files to read-only memory without any loss of process reliability.
- When installing new charge controller software via the *opgk* command, the update script must be run completely. The charge controller can be restarted or switched off directly afterwards.
- Avoid restarting or switching off the charge controller during start-up. Shutdown is possible as soon as the controller can be accessed via the CONFIG interface or as soon as the LED indicator flashes green.

The USB configuration interface (CONFIG) emulates a Remote Network Driver Interface Specification (RNDIS) network when it is connected to a Windows, Linux or Mac computer. For Windows 10 and higher, Linux and Mac operating systems, this virtual network is automatically detected. No driver is required.

On a Windows host device with a different Windows operating system, the driver for the RNDIS network adaptor must be manually selected:

- Open the device manager on the control panel.
- Right-click on "RNDIS/Ethernet Gadget" [RNDIS accessory device] under "Other devices" and select "Update driver software...".

- Select the option "Browse my computer for driver software".
- Click on the option "Select from a list of device drivers on my computer".
- Select the category "Network adapters" from the list.
- A separate window will open. Select the manufacturer "Microsoft Corporation" and the network adapter "Remote NDIS-Compatible Device". The device driver is then installed, and the system recognises the charge controller as a network adapter.

The web interface for configuration can be accessed with an ordinary browser. The charge controller uses the local IP address 192.168.123.123 with the subnet mask 255.255.255.0 via the configuration interface. The connected device automatically receives a corresponding IP address via the Dynamic Host Configuration Protocol (DHCP) after the connection has been established. The communication with the charging system is based on this IP address.

Each parameter is adequately described on the respective web interface tab. For further information on the parameters, refer to the **State**, **Operator** and **Manufacturer** tabs.

The **State** tab of the charging system control interface can be accessed via the URL http://192.168.123.123. It only provides status information.

In addition to displaying status information, parameters of the **Operator** and **Manufacturer** tabs can be set: The **Operator** tab of the charging system control interface can be accessed via the URL http://192.168.123.123/operator.

To access this tab, a user name and password are required:

- User name: operator
- Password: yellow_zone

The **Manufacturer** tab of the charging system control interface can be accessed via the URL http://192.168.123.123/manufacturer.

To access this tab, a user name and password are required:

- User name: manufacturer
- Password: orange_zone

The default passwords should be changed to prevent unauthorised access. The manufacturer can also change the user passwords and parameters via the **Operator** *tab. The URL for the* **Manufacturer** *tab should not be shared with the operator.*

OCPP-specific parameters (only variants with OCPP)

Basic settings can be made via the **Settings** tab:

- OCPP Mode (e.g. OCPP-B 1.5, OCPP-J 1.6)
- SOAP OCPP URL from the backend (i.e. the HTTP URL of the OCPP backend system)
- Websockets JSON OCPP URL of the backend - only applicable if OCPP-J 1.6 mode has been selected.

The **Documentation** tab contains:

- Information on OCPP status display error messages (e.g. codes, activation and resolution messages, instructions and corrective measures)
- OCPP configuration key for OCPP 1.5 and 1.6 (e.g. key name and description)

Application of changed parameters

Parameter changes are not necessarily applied after submission. To submit all changed parameters, click the "Save & Restart" button at the bottom of the tab. A message indicating a necessary restart may appear.

ADVICE
Automatic reboot of the charge controller!
In order to ensure perfect functionality, the charge controller carries out a regular system reboot. If no SIM card is inserted or the configuration does not yet match the SIM card, a system reboot can be easily mistaken for a malfunction.

After the web configuration interface has been accessed or while a vehicle is connected to the charging system, the charging point will suppress system reboots for at least 2 minutes to allow all parameters to be configured successfully.

5.3 Remote configuration of parameters [3]

The charging system or charge controller enables the configuration of many parameters using the OCPP GetConfiguration and ChangeConfiguration commands. With these commands, locally configured communication parameters can be changed. An exception to this are SIM parameters, which require local intervention when changing the SIM card.

5.4 Factory settings

Resetting to factory settings deletes all settings except the serial number.

Operator tab

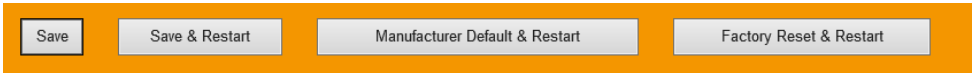
Click the "Operator Default & Restart" button on the **Operator** tab to reset changed parameters of the operator configuration to default.

Settings tab

Click the "Settings Default & Restart" button on the **Settings** tab to reset changed parameters to default.

Manufacturer tab

Click the "Manufacturer Default & Restart" button on the **Manufacturer** tab to reset changed parameters of the manufacturer configuration to default. Click the "Factory Reset & Restart" button to reset the charge controller to factory settings.



3 Only applies to variants with OCPP

5.5 Testing and system boot process

After completing the configuration, the charge controller must be tested for operability. This can be done using a vehicle simulator. The following must be checked:

- Successful boot process (for variants with OCPP: OCPP state - IDLE)
- If a backend connection is to be established, that this has been carried out (only for variants with OCPP: Connection State - CONNECTED)
- Connection to meter possible (meter configuration)
- Plug locking and unlocking functions properly.

Error messages are shown in the "Error list" on the **State** tab.

The boot process starts once the charge controller is supplied with voltage (12 V). After about 30 s, the "STATUS" LED on the charge controller front panel lights up. After a short time, the "STATUS" LED flashes green if the boot process was successful.

5.6 Connectivity to the backend [4]

Connection of the charge controller to the backend

Go to the **Settings** tab (http://192.168.123.123/operator/settings). To access this tab, enter the following user name and password:

- User name: operator
- Password: yellow_zone

The following options are available under "Connection Type":

- No backend
- GSM (4G modem)
- Ethernet
- USB
- WiFi

GSM (4G modem)

The "Access Point Name (APN)" of the mobile network to be used is required when a connection to the backend system is made via the integrated 4G modem.

A user name ("APN Username") and password ("APN Password") may be required to authenticate the access point.

APN information such as user name and password is provided by the selected mobile network operator. The system should be able to establish an online connection to the backend system after 20-120 seconds. In case of connection problems, the received signal strength (RSSI) can be checked via the **State** tab. If a SIM card PIN number is required, it must be configured via the **Operator** tab (http://192.168.123.123/operator) of the charging system. Otherwise, connection to the backend will not possible. With a data network connection established, the charging system is now available.

The connection to the mobile network (and thus to the backend system) usually lasts from 6 to 48 hours. After that, the connection may be terminated by the mobile network. The charging system detects the disconnection and automatically reconnects. During reconnection, the "STATUS" LED on the charge controller front panel flashes at regular intervals.

4 Only applies to variants with OCPP

Ethernet

If the charge controller is connected to a valid network via Ethernet during the boot process and there is a DHCP server in the network, the charge controller obtains an IP address from the DHCP server. This IP address, which is assigned to the charge controller, can be determined by assigning a fixed IP address at the DHCP server in your network. This IP address can then be used to establish a connection.

In addition, the charge controller uses a second IP address: 192.168.124.123 in the subnet mask 255.255.255.0 (at the Ethernet interface).

If there is no DHCP server, it is possible to assign a host address from the subnet 192.168.124.x. to a PC. The charge controller is accessed via the IP address 192.168.124.123.

The main settings for Ethernet/WLAN are made via the **Operator** tab (http://192.168.123.123/operator) and include:

- Network configuration mode (e.g. automatic or manual configuration with DHCP)
- Static IP address for network configuration (of the charging station)
- Static subnet mask for network configuration (i.e. 255.255.255.0)

5.7 Plug locking and unlocking

After boot-up and a successful online connection, plug locking and unlocking can be tested to see if the type 2 socket-outlet is correctly connected to the charge controller.

- Insert the plug of a vehicle charging system into the type 2 socket-outlet. The socket-outlet should automatically lock the plug. This locking action can normally be heard. Test by gently pulling on the plug.
- To unlock the plug, first disconnect the plug from the vehicle. This action automatically unlocks the socket-outlet of the charging system, allowing the cable to be removed.

ADVICE
Ensure the correct selection of the locking actuator used according to the table in chapter "".

CAUTION ***Removal of the already locked plug by force if the vehicle is not to be charged.***
Damage to the plug or the charging system socket
The plug should only be locked by the locking actuator after authorisation.

5.8 Authorisation and charging

Variants with user interface

The charging process can be initiated by holding an RFID card registered with the backend system or included in the whitelist close to the RFID module; the contactor is switched on and a current flow takes place. The charge controller enables two modes of operation.

- Authorisation BEFORE connecting
- Authorisation AFTER connecting

The modes of operation are briefly described in the respective RFID module manual, which can be downloaded from https://www.bender.de/en/service-support/download-area/

Variants without user interface

Charging is started as soon as the vehicle is connected or information to start charging is received via the Home Energy Management System (HEMS).

6 Technical data

Tabular data

Insulation coordination acc. to IEC 60664-1/IEC 60664-3

Rated voltage	250 V
Pollution degree	2
Overvoltage category II within terminal H	II
Overvoltage category III, terminal H and all other terminals	III
Rated impulse voltage, terminal H and all other terminals	6 kV
Rated impulse voltage within terminal H	2.5 kV
Double insulation between terminal H and all other terminals	OCV III
Basic insulation within terminal H	OCV II
Operating altitude AMSL	≤ 2000 m

Supply voltage (terminal B (0 V, +12 V))

Nominal voltage	DC 12 V
Operating range of the nominal voltage	DC 11.4 V…12.6 V
Max. nominal current	750 mA
Max. nominal current without USB load	400 mA
Max. nominal current with USB load	750 mA

Residual direct current monitoring module* (RDC-M, terminal A)

Measuring range	100 mA
Response values:	
Residual current $I_{\Delta n}$	DC 6 mA
Response tolerance $I_{\Delta n}$	-50…0 %
Measuring current transformers	
Max. connection cable length	≤ 1.47 m
Restart sequence value:	
DC 6 mA	< 3 mA

* Patented 6 mA DC residual current trip
(Patent: EP 2 571 128/US 9,397,494/ZL 201210157968.6/CN 103001175, EP 2 813 856)

SMA plug connector* for 4G antenna (optionally with 4G modem, terminal E)

Frequency bands	800 MHz/850 MHz/900 MHz/1800 MHz/2100 MHz/2600 MHz
Impedance	50 Ω
Data rate	**GSM:**
	GPRS: UL 85.6 kBit/s; DL 107 kBit/s
	EDGE: UL 236.8 kBit/s; DL 296 kBit/s
	UMTS:
	WCDMA: UL 384 kBit/s; DL 384 kBit/s
	DC-HSDPA: DL 42 MBit/s
	HSUPA: UL 5.76 MBit/s
	LTE:
	LTE FDD: UL 5 MBit/s; DL 10 MBit/s
	LTE TDD: UL 3.1 MBit/s; DL 8.96 MBit/s
Specified antenna	PSI-GSM/UMTS-QB-ANT

* SMA plug connector must be safeguarded against ESD discharges by the customer

Data interfaces

USB host 1 (terminal C1)*	USB port type A; USB 2.0 max. 250 mA
USB host 2 (terminal C2)*	USB port type A; USB 2.0 max. 250 mA
Ethernet (terminal D)	10/100 Mbit
CONFIG (configuration interface, terminal F)	micro USB port type AB
SIM card (only with 4G modem, front panel)	micro SIM
HMI (user interface, terminal K)	internal
Modbus meter (terminal B)	9.6 kBit
External Modbus (terminal I)	9.6 kBit
Control Pilot (terminal B (CP))	acc. to IEC 61851
Proximity Pilot (terminal B (PP))	acc. to IEC 61851

* USB host 1 and USB host 2: in total 500 mA

Inputs (depending on the variant)

Optocoupler (terminal J (Opto 1 In+, Opto 1 In-))	
Input voltage	DC 11.4 V…25.2 V
Input current	2.3…6.4 mA
Weld check (terminal H (WB, WA))	
Input voltage	AC 180 V…277 V
Input current	0.6…1.3 mA
Input PE (terminal B (PE, PE))	

Outputs (depending on the variant)

Contact data acc. to IEC 60947-5-1:	
Relays (12 V) (terminal J (relay 13, relay 14))	
Rated operational voltage U_e	DC 24 V
Rated operational current I_e	DC 1 A
Minimum contact rating	DC 1 mA at ≥ 10 V
Switching contact for contactor (terminal H (relay 23, relay 24))	
Rated operational voltage U_e	AC 230 V
Rated operational current I_e	AC 4 A
Minimum contact rating	AC 50 mA at ≥ 10 V

Environment/EMC

EMC	see CE declaration
Operating temperature	-30…70 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K23 (except condensation and formation of ice)
Transport (IEC 60721-3-2)	2K11
Long-term storage (IEC 60721-3-1)	1K21
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3M11
Transport (IEC 60721-3-2)	2M4
Long-term storage (IEC 60721-3-1)	1M12

Cable lengths/cable types

Cable	Shielded, one end of shield connected to PE
HMI (user interface, terminal K) (depending on the variant)	
Connection cable	RJ45, shielded
Max. connection cable length	internal 2 m
Ethernet (terminal D)	
Connection cable	CAT 6
Max. connection cable length	100 m
Connection type (terminal blocks B and J)	**push-wire terminal**
Connection specifications:	
Rigid/flexible	0.2…1.5 mm² (AWG 24…16)
Flexible with ferrule without plastic sleeve	0.25...1.5 mm² (AWG 24…16)
Flexible with ferrule with plastic sleeve	0.14...0.75 mm² (AWG 26…18)
Stripping length	10 mm
Max. connection cable length	2 m
Cross-section	≥ 0.5 mm²
Max. connection cable length (PE)	4 m
Cross-section (PE)	≥ 1 mm²
Connection type (terminal blocks I)	**push-wire terminal**
Connection specifications:	
Rigid/flexible	0.2…1.5 mm² (AWG 24…16)
Flexible with ferrule without plastic sleeve	0.25...1.5 mm² (AWG 24…16)
Flexible with ferrule with plastic sleeve	0.14...0.75 mm² (AWG 26…18)
Stripping length	10 mm
Max. connection cable length	2 m
Cross-section	≥ 0.5 mm²
Max. connection cable length (PE)	4 m
Cross-section (PE)	≥ 1 mm²

Other

Operating mode	Continuous operation
Mounting position	Orientated to front panel; air must pass through cooling slots vertically
Degree of protection	IP20
DIN rail	IEC 60715
Weight (depends on the variant)	max. 500 g

6.1 Declaration of conformity

Bender GmbH & Co. KG hereby declares that the device covered by the Radio Directive complies with Directive 2014/53/EU. The full text of the EU Declaration of Conformity is available at the following Internet address:

https://www.bender.de/fileadmin/content/Products/CE/CEKO_CC613-4G.pdf

6.2 Standards and approvals

CE UKCA

6.3 Ordering information

Type	Modem	Interface	RDC-M	External Modbus	OCPP-capable	PLC*	User interface	I/O extension	Article no.	Manual no.
CC613-ELM4PR-M	4G	Modbus, Ethernet	✓	✓	✓	✓	✓	✓	B94060020	D00381
CC613-ELPR-M	---			✓	✓		✓	✓	B94060021	
CC613-ELM4PR	4G				✓		✓	✓	B94060026	
CC613-ELPR	---				✓		✓	✓	B94060027	
CC613-HEM-X2	---								B94060028	

* Powerline Communication acc. to ISO/IEC 15118

The charge controller with residual direct current monitoring module (RDC-M) only works in combination with a measuring current transformer (to be ordered separately). Different cable lengths are available.

Accessory type	Article no.	Manual no.
RFID105-L1	B94060105	D00453
RFID114 with RJ45 cable (length 500 mm)	B94060114	D00328
Measuring current transformer CTBC17P-03-K0325 (cable variant, cable length 325 mm)[1]	B98080071	D00421
Measuring current transformer CTBC17P-03 (PCB variant)[1, 2]	B98080070	D00421
Connection cable CTBC17-Cable 1470 incl. clip housing (cable length 1470 mm)	B98080542	D00421
Connection cable CTBC17-Cable 600 incl. clip housing (cable length 600 mm)	B98080543	D00421
Connection cable CTBC17-Cable 325 incl. clip housing (cable length 325 mm)	B98080541	D00421
Connection cable CTBC17-Cable 180 incl. clip housing (cable length 180 mm)	B98080540	D00421
DPM2x16FP (display module)	B94060120	D00269

1 Internal diameter: 17 mm
2 The PCB-variant can be combined with the connection cables of different lengths.

Plug kit	Content/Quantity	Article no.
Plug kit (can be ordered separately)	3-pole (1 x), 4-pole (1 x), 8-pole (2 x)	B94060129
Plug kit bulk pack, ELM4PR-M, ELPR-M	3-pole (50 x), 4-pole (50 x), 8-pole (100 x)	B94060128
Plug kit bulk pack, ELM4PR, ELPR, HEM-X2	4-pole (50 x), 8-pole (100 x)	B94060126

6.4 Revision history

Date	Document version	Valid from software version	State/Modifications
10/2020	04		Added: Chapter 2: Local access charge controller Chapter 4.1: Ext. Modbus terminating resistor Chapter 4.2.2: Wiring diagram side view from right Chapter 4.2.2: Info on terminal I remote control Chapter 4.2.3: in table: Walther Werke Eco Slim 32 A Chapter 4.2.3: Connection Phoenix Contact (Küster) Chapter 4.3.14: Connection info terminal B Changed: Chapter 4.2.2: Wiring diagram terminal B
11/2020	05		Added: Chapter 4.3.4: WiFi interface Changed: Chapter 4.2.3: Wiring diagram Küster

Date	Document version	Valid from software version	State/Modifications
07/2021	06		Added: Chapter 1.9: Device-specific safety instructions Chapter 4.3.9: Wiring diagram changed Chapter 4.3.10: Wiring diagram added Chapter 4.3.15: Links to Modbus meters Chapter 4.3.17: Warning notice Chapter 5.1.8: Cybersecurity Chapter 6.1: Note on SMA plug connectors
02/2023	07		Manuals D00381 and D00423 were merged and transferred to the editorial system, resulting in a new chapter hierarchy. The above-mentioned chapters are therefore obsolete for this version 07.

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