CC613 charge controller

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

CC613_D00381_05_M_XXEN/11.2020

Manual EN

Service and support for Bender products

First-level support
Technical support
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Available on 365 days from 7.00 a.m. to 8.00 p.m. (MEZ/UTC +1)
* Landline German Telekom: Mon-Fri from 9.00 a.m. to 6 p.m.: 6.3 cents/30 sec.; remaining time: 6.3 cents/min.
Mobile phone: higher, depending on mobile phone tariff

Repair service
Repair, calibration and replacement service
Londorfer Strasse 65 • 35305 Grünberg • Germany
Telephone: +49 6401 807-780 (technical issues) or
+49 6401 807-784, -785 (commercial issues)
Fax: +49 6401 807-789
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Field service
On-site service
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Mon-Thu 7.00 a.m. to 4.00 p.m., Fri 7.00 a.m. to 1 p.m. (MEZ/UTC +1)

Table of content

1 General instructions

1.1 How to use this manual

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 "Safety instructions for Bender products".

Read the manual before mounting, connecting and commissioning the device. Always 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		Temperature range		Protect from dust
	Protect from moisture		Recycling	RoHS	RoHS directives

1.3 Training courses and seminars

www.bender.de > Know-how-> Seminars.

1.4 Delivery conditions

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

The following applies to software products:

"Softwareklausel zur Überlassung von Standard- Software als Teil von Lieferungen, Ergänzung und Änderung der Allgemeinen Lieferbedingungen für Erzeugnisse und Leistungen der Elektroindustrie" (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)

1.5 Inspection, transport and storage

Check the shipping and device packaging for transport damage and scope of delivery. The following must be observed when storing the devices:

1.6 Warranty and liability

Warranty and liability claims in the event of injury to persons or damage to property are excluded in 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.
- Use of accessories and spare parts not recommended by Bender.
- Catastrophes caused by external influences and force majeure.
- Mounting and installation with device combinations not 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.

1.7 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.

1.8 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 electrocution due to electric shock! *Touching live parts of the system carries the risk of:*

- A fatal electric shock
- Damage to the electrical installation
- Destruction of the device

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

2 Function

Local access to the charge controller
Local access to the charge controller is possible either as operator or as 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 Product features (depending on the variant)

- Charge controller in accordance with IEC 61851-1 (mode 3 charging)
- Master and slave operation configurable
  - Setting up charging stations with two charging points: 1 charge controller as data gateway with 4G modem and 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 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 (acc. to IEC 61851-1)
- Configurable support for additional SCHUKO socket-outlets
- Meter interface: Modbus TCP and RTU
- External Modbus interface for remote control via energy management systems
- 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

2.3 Product description

The charge controller 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.
Refer to "Ordering details" for product variants.

2.4 Functional description

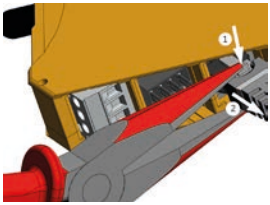
The charging system consists of an RCD type A and a contactor. These are directly connected to a type 1 or type 2 socket-outlet, or to an attached cable with a type 1 or type 2 plug (see chapter "Charging system with type 2 socket-outlet").

2.4.1 General functions

- The charging system can be equipped with a meter. A Modbus meter is required for digital reading of the energy consumption. The Modbus RTU wires are attached directly to the charge controller.
- A 12 V power supply is needed for operation.
- An RFID module can be used for easy user interaction.
- Power flow toward the vehicle is enabled 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 socket for a 4G antenna on the front panel.
- For fault 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 current transformer. With the integrated monitoring of the DC fault 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 a DLM software, which is fully usable independent of a backend connection. It detects which charging current is applied to which phase and thus avoids 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 of the residual current device (RCD) due to a residual current.
  - Detection of critical fault currents by the RCM sensor. For the vehicle owner, this can be 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).

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.*



2.4.2 Load current and cooling control (temperature 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. Two temperature thresholds for charging current reduction and charging interruption can be set via the **Manufacturer** tab.

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

3 Dimensions and mounting

3.1 Dimensions

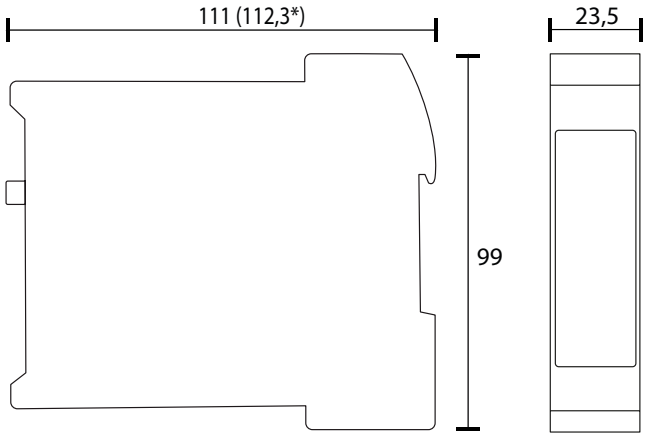
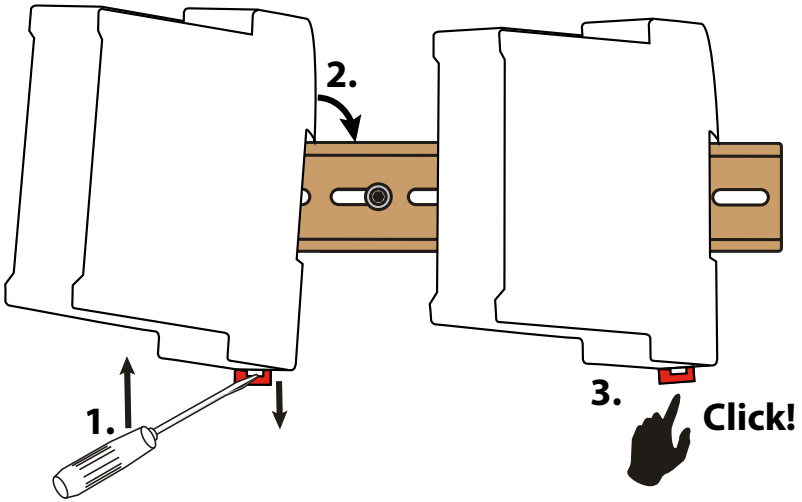


Abb. 3–1 Note: Dimensions in mm acc. to ISO 2768 - m
** Dimensions incl. antenna socket*

3.2 Mounting



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

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

4 Connection

4.1 Connection conditions

Risk of electric shock! *Parts of the system may be live (charge controller terminals up to 230 V, charging station 400 V). Before touching parts of the system, ensure that it has been de-energised.*

Caution! Risk of injury from sharp-edged terminals! *Handle enclosure and terminals with care.*

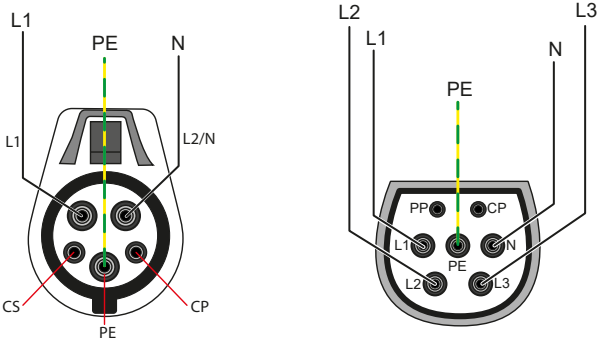
Information:

- PE is connected to "0V"; reference level for Control Pilot (CP communication) must be at the same level as the power supply (IEC 61851 series of standards).
- Lay cables only inside the wallbox/charging station 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.
- The Ethernet shield is directly connected to PE.

For further information on connection, refer to the manuals of the accessories (e.g. W15BS).

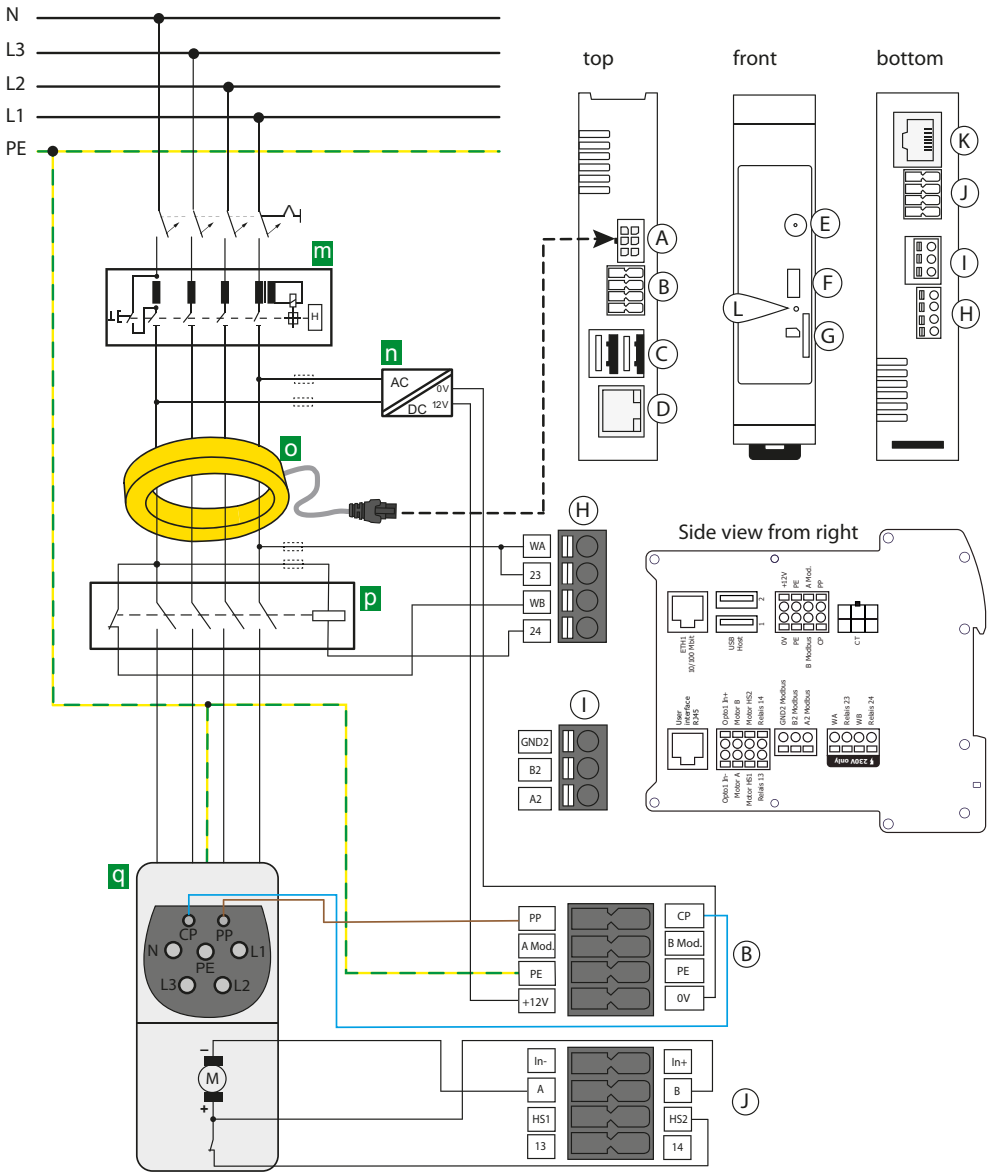
4.2 Connection to type 1/type 2 plugs

4.2.1 Connection plug connections



4.2.2 Charging system with type 2 socket-outlet

Wiring diagram



Legend

A	Connection measuring current transformer (CT)	m	RCD type A
B	12 V supply, PE, Modbus meter, CP, PP	n	Voltage supply 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)		
L	STATUS LED		

[1] *Data gateways with 4G modem: CC613-ELM4PR and CC613-ELM4R*

The external Modbus (terminal I) is only used for remote control of the CC613 via an energy management system and is not intended for connecting a meter.

Terminal assignment

B	0V	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

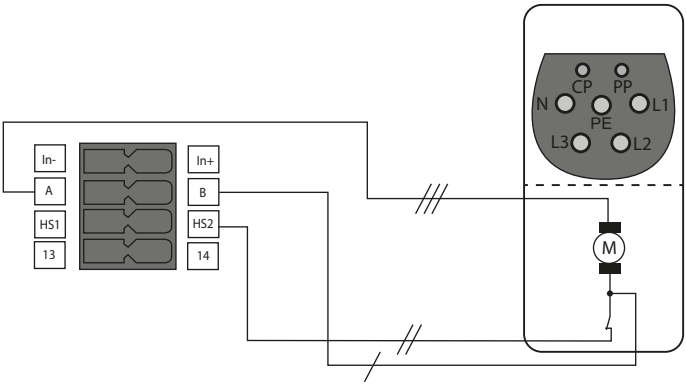
I	GND2	External Modbus GND (shield connected on one side)
	B2	External Modbus B (galvanic separation)
	A2	External Modbus A (galvanic separation)
J	In-	Opto 1 In-: Optocoupler input 12 V negative
	IN+	Opto 1 In+: Optocoupler input 12 V positive
	A	Actuator A: Locking actuator output negative
	B	Actuator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

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

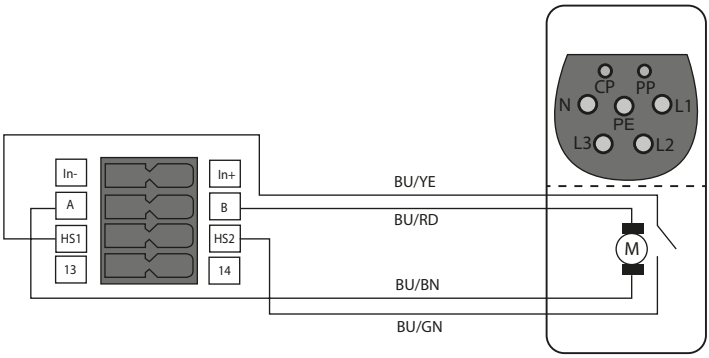
4.2.3 Connection locking actuators

Type 2 socket-outlet (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

Example Hella actuator:



Example Küster:



4.3 Connectivity

4.3.1 Master/slave connection

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 becomes 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 OCPP port for establishing the 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 USB configuration interface (CONFIG)

The USB configuration interface (CONFIG) on the front panel of the charge controller is 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 the installation of software updates (for a configuration description, refer to chapter "Configuration and testing"). The web interface can be accessed via the IP address 192.168.123.123.

4.3.3 Ethernet interface

The charge controller can be connected to an existing Ethernet network via an Ethernet interface. For further information, refer to chapter "Configuration and testing".

4.3.4 WiFi interface (via USB-WiFi adapter)

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

4.3.5 STATUS LED

The "STATUS" LED on the front panel indicates the following system states:

- Power on/system not ready for operation
- System is starting
- System started, not ready for operation yet
- System ready for operation
- System error

4.3.6 12 V power supply

The charge controller is supplied with power from a 12 V main voltage source at the +12V and 0V connections.

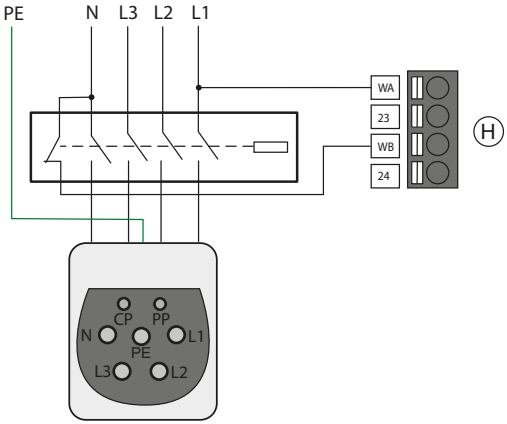
4.3.7 Contactor connection

The charge controller controls the contactor, which in turn controls the power flow toward the vehicle. The contactor is controlled via a relay in the charge controller, the contacts of which are rated for 230 V/4 A.

4.3.8 Weld check

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

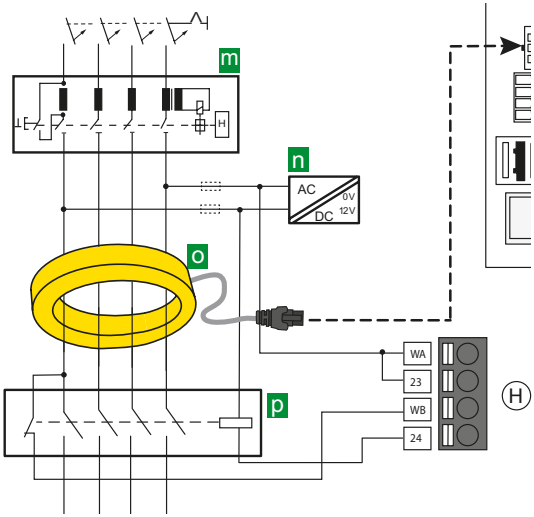
Wiring diagram



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

4.3.9 Alternative connection switching contact contactor

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



The control voltage of the contactor can alternatively be supplied directly via a common fuse of the 12-V power supply. For this purpose, the fuse must be selected accordingly.

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

4.3.10 PE monitoring

The PE monitoring checks whether there is a connection from the CC613 to PE. For this purpose, WA must be connected to L1. The cable length is limited by its capacitance per unit length.

PE monitoring does not replace tests (example: protective conductor resistance).

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

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 sec. are not permissible!*

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

The Control Pilot (CP) and Proximity Pilot (PP) contacts connect the charge controller to the socket-outlet, enabling it to communicate with the vehicle and the cable plug. The PP contact detects the presence of the plug and the CP contact exchanges control signals between the electric vehicle and the charging station (see IEC 61851).

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

4.3.12 I/O extension

The charge controller features a configurable, two-channel I/O interface consisting of an optocoupler input and a relay output (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 SCHUKO socket-outlet control
- Power outage monitoring function (e.g. RCD trip monitoring)
- Heating switch/cooling fan switch for overheating protection

4.3.13 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.

4.3.14 Residual direct current monitoring module (RDC-M)

For fault 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 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 fault current $I_{\Delta n} \geq$ DC 6 mA flows. The measured fault currents RMS/DC are made available to the backend system via OCPP message.

4.3.15 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, including:

- ABB B23 series
- B-Control EM300-LR/EM300-LR (TCP)
- Carlo Gavazzi EM200/EM340
- Eastron SDM120/SDM220/ SDM630 series
- Finder
- Garo EM270/GNM1D/GNM3D/GNM3T/ GM3T
- IME CE4DMID31
- inepro PRO1/PRO2/PRO380
- NZR EcoCount S85
- Optec
- Phoenix Contact EEM-MB371 (TCP)
- Saia ALE3
- Siemens 7KT1666/7KM2200 (TCP)

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.

4.3.16 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.
- Connection is only possible when a 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! Damage to the SIM card slot by nano SIM cards! *The use of nano SIM cards with a SIM card adapter may damage the SIM card reader. Therefore, it is recommended to use only micro SIM cards.*

The SIM card can be removed via push-push.

Use in the EU

The use of device variants with an integrated 4G modem is only possible in member states of the European Union.

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

4.3.17 Antenna socket

The antenna socket allows 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.

5 Configuration and testing

5.1 Configuration

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 (depends on the backend system).

For more information on how to configure the charge controller, see the following URL:
https://office.elinc.de/doku.php?id=start

5.1.1 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 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 adapter must be manually selected:

- Open the device manager on the control panel.
- Right click the "RNDIS/Ethernet Gadget" menu item located at "Other devices" and select "Update driver software".
- Select the option "Browse my computer for driver software".
- Then click on the option "Select from a list of device drivers on my computer".
- Select the category "Network adapters" from the list.
- In the window that appears, 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.

Besides displaying status information, parameters of the **Operator** and Manufacturer tab 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, 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, 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.

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)
- OCCP 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.

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, the charging point will suppress system reboots for at least 2 minutes to allow all parameters to be configured.

5.1.2 Remote configuration of parameters

The charging system or rather the 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 are the SIM parameters, which require local intervention when changing the SIM card.

5.1.3 Factory settings

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

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

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

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.

5.1.4 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 is checked:

- Successful boot process (OCPP state - IDLE).
- If intended, establishment of backend connection (connection state - CONNECTED).
- Connection to meter possible (meter configuration (OCPP)).
- Plug locking and unlocking works.

Fault 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 in case of a successful boot process.

5.1.5 Connectivity to the backend

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 at "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 back-end 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 your mobile network operator. The system should be able to establish an online connection to the backend system after 20 to 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, a 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. The connection may then 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.

Ethernet

If the charge controller is connected to a valid network via Ethernet during the boot process and a DHCP server exists 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 always 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/WiFi are made via the **Operator** tab (http://192.168.123.123/operator):

- 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)

5.1.6 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.
- If the locking actuator is not detected (error in error list: Could not detect type 2 locking actuator) or a similar error occurs, a new detection of the locking actuator can be initiated using the "Redetect actuator" function. To do this, the function is set to on via the **Manufacturer** tab and a restart is initiated.

5.1.7 Authorisation and charging

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 www.bender.de/en/service-support/downloads.

6 Technical data

6.1 Tabular data

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

Rated voltage ..... 250 V
Overvoltage category ..... II (within terminal H)
Overvoltage category ..... III (terminal H and all other terminals)
Rated impulse voltage ..... 6 kV (terminal H and all other terminals)
Rated impulse voltage ..... 2.5 kV (within terminal H)
Double insulation acc. to OVC III between ..... terminal H and all other terminals
Basic insulation acc. to OVC II ..... within terminal H
Operating altitude ..... ≤ 2000 m AMSL

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

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 max. 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 %

Restart sequence value:
DC 6 mA ..... < 3 mA

SMA 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

LED indications

STATUS (front plate) ..... orange: power on/system not ready for operation
..... blue: system is starting
..... green: system started, not ready for operation yet
..... 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

Data interface

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 (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

Inputs

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

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 ..... 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 ..... 50 mA at ≥ 10 V (AC)

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

HMI (terminal K)
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 block 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 ..... 0.25…0.75 mm² (AWG 24…18)
Stripping length ..... 10 mm
Max. connection cable length ..... 250 m
Connection type (terminal H) ..... 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 ..... 0.25…0.75 mm² (AWG 24…18)
Stripping length ..... 10 mm
Max. connection cable length ..... 2 m
Cross-section ..... ≥ 0.75 mm²

Other

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

6.2 Declaration of conformity

Bender GmbH & Co. KG
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CE

EU-Konformitätserklärung
EU-Declaration of Conformity

Hersteller: **Bender GmbH & Co. KG**
Manufacturer:

erklärt in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product

Produktbezeichnung: **Ladekontroller CC613-ELM4PR-M (siehe Anlage)**
Product name: *Charge Controller CC613-ELM4PR-M (see annex)*

auf das sich diese Erklärung bezieht, mit den Vorschriften folgender Europäischen Richtlinien übereinstimmt.
to which this declaration relates, is in conformity with the following European directives.

Richtlinien: *Directives:*	**2011/65/EU**	**RoHS-Richtlinie**	*RoHS directive*
	2014/53/EU	**RED-Richtlinie**	*RED directive*

Zur Beurteilung der Konformität wurden folgende Normen herangezogen:
The assessment of this product has been based on the following standards:

Angewandte Normen / *Applied standards:*

EN 50581	**:2012**	**EN 62311**	**:2008**
EN IEC 61851-1	**:2019**	**IEC 61851-21-2**	**:2018**
EN 301 489-1	**V2.2.3**	**ETSI EN 301 489-52**	**V1.1.0 Draft**
EN 301 511	**V12.5.1**	**EN 301 908-1**	**V13.1.1**
EN 301 908-13	**V11.1.2**	**EN 301 908-2**	**V11.1.2**
EN ISO 15118-2	**:2016**	**EN ISO 15118-3**	**:2016**
IEC 62955	**:2018**		

Grünberg, den 27.04.2020

(Winfried Moll, COO) (Alexander Dörr, Product Validation)

Anmerkung: Die Anlagen sind Bestandteil dieser EU-Konformitätserklärung.
*Evtl. Normen Einschränkungen sind gerätespezifisch in der Typenliste gekennzeichnet.

Remark: *The annexes are part of this EU declaration.*
**Limitation of standards are marked with a sign in the attached type list.*

6.3 Ordering details

Type	Modem	Inter-face	RDC-M	External Modbus	LED	PLC*	User interface	Art. No.	Manual No.
CC613-ELM4PR-M	4G	Modbus, Ethernet	✓	✓	STATUS	✓	✓	B94060020	D00381
CC613-ELPR-M	---		✓	✓		✓	✓	B94060021	D00381
CC613-ELM4PR	4G		✓			✓	✓	B94060026	D00381
CC613-ELPR	---		✓			✓	✓	B94060027	D00381

** Powerline Communication acc. to ISO/IEC 15118*

For further variants, refer to our website.

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

Accessory type	Art. No.	Manual No.
RFID110-L1 with RJ45 cable (length 500 mm)	B94060110	D00283
RFID114 with RJ45 cable (length 500 mm)	B94060114	D00328
RFID117-L1 with RJ45 cable (length 500 mm)	B94060117	D00422
Measuring current transformer W15BS (cable length 1450 mm)*	B98080065	D00371
Measuring current transformer W15BS-02 (cable length 180 mm)*	B98080067	D00371
Measuring current transformer W15BS-03 (cable length 300 mm)*	B98080068	D00371
Current transformer CTBC17 (PCB variant)**	B98080070	D00421
Connection cable CTBC17-Cable1470 incl. clip housing (cable length 1470 mm)	B98080542	D00421
Connection cable CTBC17-Cable325 incl. clip housing (cable length 325 mm)	B98080541	D00421
Connection cable CTBC17-Cable180 incl. clip housing (cable length 180 mm)	B98080540	D00421
DPM2x16FP (display module)	B94060120	D00296

**Internal diameter: 15 mm*

Plug kit	Content/Quantity	Art. 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	4-pole (50 x), 8-pole (100 x)	B94060126

6.4 Document revision history

Date	Document version	Valid from software version	State/Changes
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: Connection diagram terminal B
11/2020	05		Added: Chapter 4.3.4: WiFi-Interface Changed: Chapter: 4.2.3: Example Küster

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