ICC1324 charge controller

Charge controller for charging systems for electric vehicle charging

Image similar

Service and support for Bender products

First-level support
Technical support
Carl-Benz-Strasse 8 • 35305 Grünberg • Germany
Telephone: +49 6401 807-760
0700BenderHelp *
Fax: +49 6401 807-629
E-mail: support@bender-service.de
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
E-mail: repair@bender-service.de

Field service
On-site service
Telephone: +49 6401 807-752, -762 (technical issues) or
+49 6401 807-753 (commercial issues)
Fax: +49 6401 807-759
E-mail: fieldservice@bender-service.de
Mon-Thu 7.00 a.m. to 4.00 p.m., Fri 7.00 a.m. to 1 p.m. (MEZ/UTC +1)

Inhaltsverzeichnis

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, are 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.

i   *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 directives

1.3 Training courses and seminars

www.bender.de/en -> 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:

ZVEI:
Die Elektroindustrie

"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:
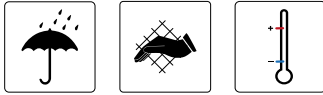
1.6   Warranty and liability

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/en -> 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 series of standards EN 50110 applies.

⚠ *DANGER! Risk of fatal injury 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

i   *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

i   *The default passwords should be changed to prevent unauthorised access.*

2.1   Intended use

The ICC1324 charge controller, hereinafter referred to as "charge controller", is the main component of a charging system. It is intended for use in charging systems for electric vehicle charging. 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 ssystems 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
- Patented residual direct current monitoring module (external RCD type A required), different cable lengths can be selected
- Integrated emergency opener for actuator control (locking/unlocking)
- Can be integrated in single- or three-phase systems up to 3x 32 A
- OCPP 1.5 and OCPP 1.6 compliant with JSON, SOAP
- Integrated 4G modem
- 3 USB interfaces:
  - 1 CONFIG interface (type B) for local configuration and installation of software updates
  - 2 USB host interfaces (type A)
- Control Pilot and Proximity Pilot communication (acc. to IEC 61851-1)
- Additional SCHUKO socket-outlet control
- Meter interface: Modbus TCP and RTU
- External Modbus interface for remote control via energy management systems
- Additional inputs and outputs for extended control of the charge controller
- Internal temperature sensor to reduce the charging current depending on the ambient temperature
- ISO 15118 Powerline Communication (PLC) for plug & charge, autocharge and load management systems

- Integrated WiFi module and two Ethernet interfaces
- Integrated DC 15 V voltage source for customer-specific applications
- Supply voltage AC 230 V

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 variants with a 4G modem support the 4G mobile phone standard.

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. Alternatively, a meter can be connected to an Ethernet interface via Modbus TCP.
- An AC 230 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 printed circuit board (terminal E) of the charge controller. 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 an SMA connector for a 4G antenna on the printed circuit board.
- 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 in the mains supply. 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 DC fault current ≥ 6 mA.
  - 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.

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

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 charging system 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.

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

3 Dimensions and installation
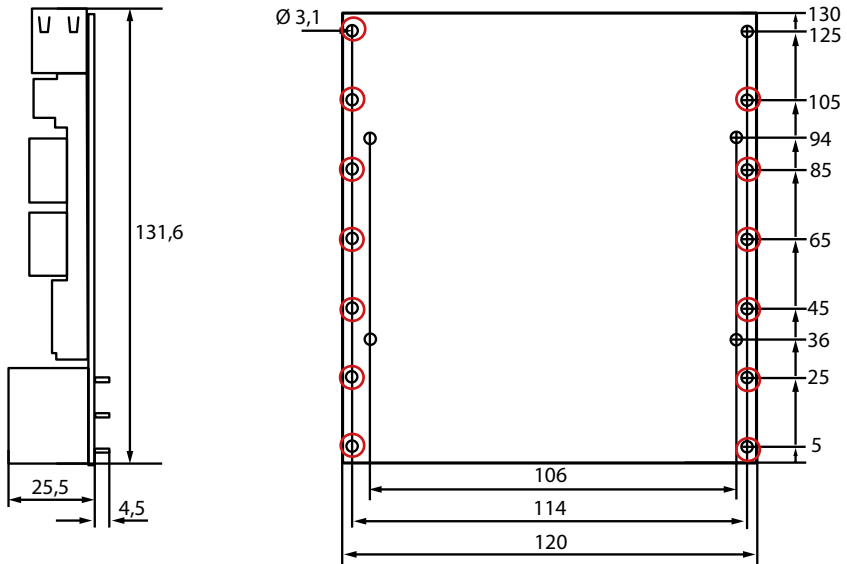
Abb. 3–1 Dimensions in mm

ⓘ *Red marks: Possible fastening points*

ⓘ *Fastening recommendation:*
Fillister head screws: 4 x M 2.5
Torque specification: 0.36 Nm

⚠ **Caution! To avoid surface stress (jamming) in the PCB, make sure that it is mounted flush with the surface.**

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 system 400 V). Before touching parts of the system, ensure that it has been de-energised.

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

ℹ️ Information:

- 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 charging system and not in parallel with power cables.
- 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 ground shield of the Ethernet connection at the RJ45 socket is directly connected to PE.

ℹ️ For further information on connection, refer to the manuals of the accessories (e.g. CTBC17).

4.2 Connection to type 1/type 2 plugs

4.2.1 Connection plug connections
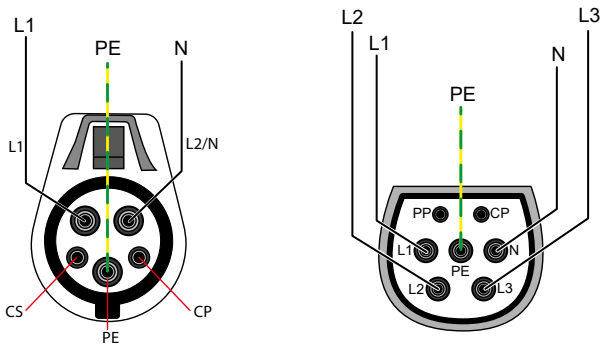
4.2.2   Charging system with type 2 socket-outlet

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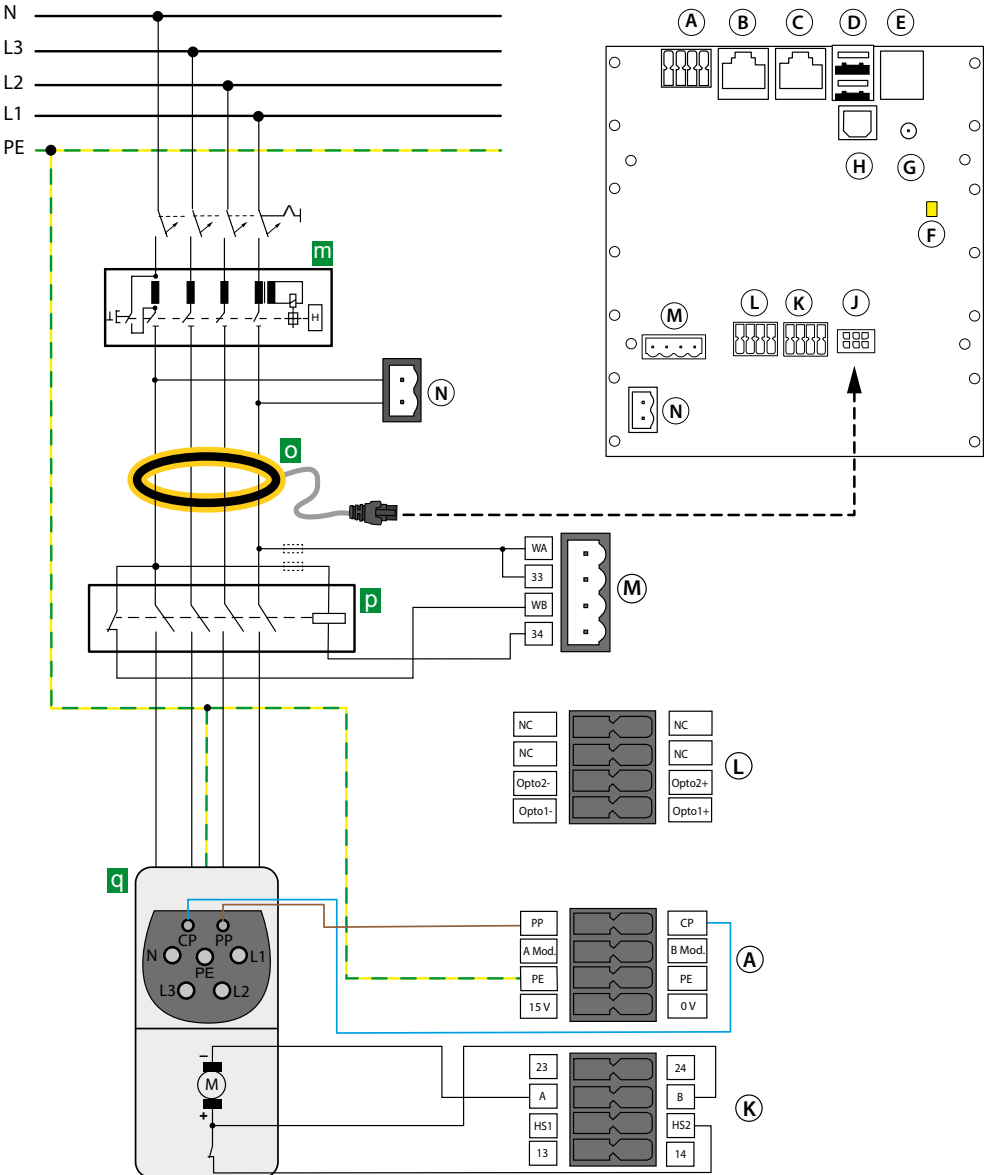
CAUTION! Switching contact contactor and weld check at terminal M are only suitable for mains voltage (230 V)! *Not permitted for SELV/PELV voltages.*

Legend

A	PE, Modbus meter, CP, PP	K	Locking, control relay GPIO
B	Connection Ethernet (ETH2)	L	Optocoupler input
C	Connection Ethernet (ETH1)	M	Weld check, relay for contactor control rated for 230 V/4 A
D	2x USB type A (1, 2)	N	Power supply AC 230 V
E	Micro SIM card slot (only available for variants with 4G modem)[1]	m	RCD type A
F	LED service		
G	Antenna socket 4G (only available for variants with 4G modem[1])	o	Measuring current transformer (CT) with plug
H	Configuration interface USB type B	p	Contactor
		q	Type 2 socket-outlet
J	Connection measuring current transformer (CT)		

[1] *Data gateways with 4G modem: ICC1324-Connect Plus and ICC1324-Connect.*

Terminal assignment

A	0 V	DC 15 V voltage source for customer-specific application	K	23	Relay 23: Relay contacts GPIO (12 V)
	15 V			24	Relay 24: Relay contacts GPIO (12 V)
	PE	Input PE		A	Actuator A: Locking actuator output negative
	PE	Input PE		B	Actuator B: Locking actuator output positive
	B Mod.	Modbus meter B		HS2	Actuator HS2: Locking input actuator switch
	A Mod.	Modbus meter A		HS1	Actuator HS1: Locking 12 V output actuator switch
	CP	Control Pilot		14	Relay 14: Relay contacts GPIO (12 V)
	PP	Proximity Pilot		13	Relay 13: Relay contacts GPIO (12 V)

M	WA	Weld check input L1	L	Opto1-	Optocoupler input 1 12 V negative
	33	Relay 33: Switching contact contactor		Opto1+	Optocoupler input 1 12 V positive
	WB	Weld check input N		Opto2-	Optocoupler input 2 12 V negative
	34	Relay 34: Switching contact contactor		Opto2+	Optocoupler input 2 12 V positive

			N	N	Neutral conductor
				L1	230 V supply (phase 1)

i   *The 230 V supply (terminal N), the weld check input (terminal M, WA) and the switching contact contactor (terminal M, 33) must be connected to the same phase (L1) to ensure protection against overvoltage!*

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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 connecting 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:
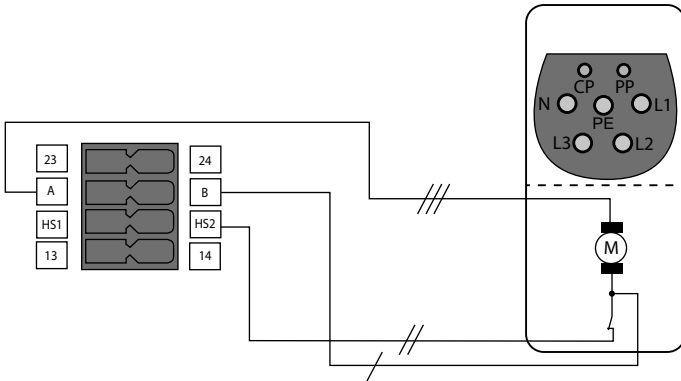
Example Küster:
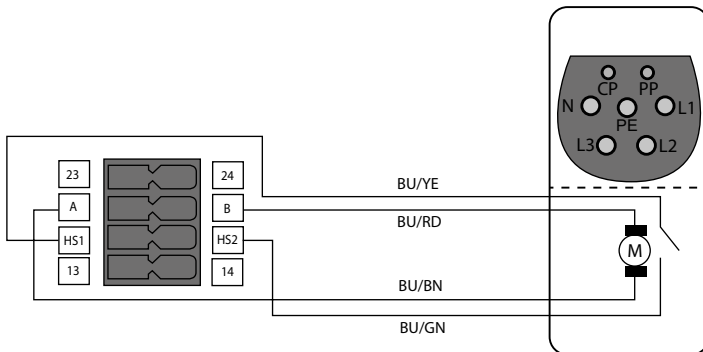
4.3 Connectivity

4.3.1 Master/slave connection

The charge controller serves as a data gateway. 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 USB cable (master: USB type B / 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 PCB (terminal H) of the charge controller is connected to a conventional laptop or PC via USB cable (type B). 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 when the charge controller has fully booted.

4.3.3 Ethernet interfaces

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

i *Use a shielded Ethernet cable.*

4.3.4 WiFi interface (depending on the variant)

The integrated WiFi module makes it possible to set up a WiFi network. It also enables a connection to the backend. For further information, refer to chapter "Configuration and testing".

4.3.5 LED service

The service LED on the PCB (terminal F) can be used for service purposes and indicates the following system states:

🔵 System is starting

🟢 System started, not ready for operation yet

⚙️ System ready for operation

🔴 System error

4.3.6 230 V power supply

The charge controller is supplied with power by means of an AC 230 V power supply via an integrated power supply unit.

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
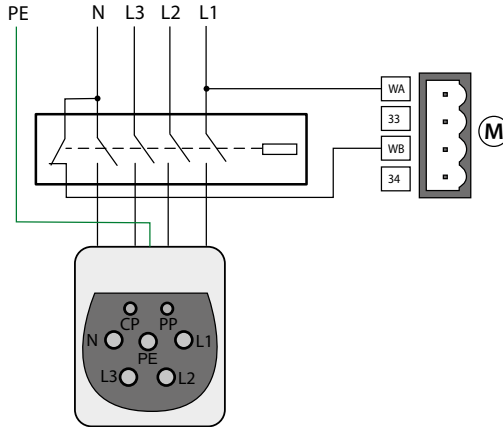
⚠️ ***Risk of a short circuit!*** *According to DIN VDE 0100-430, devices for protection against a short circuit can be omitted for the coupling of terminals WA and WB if the wiring is carried out in such a manner as to reduce the risk of a short circuit to a minimum. (A short-circuit-proof and earth-fault-proof 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"
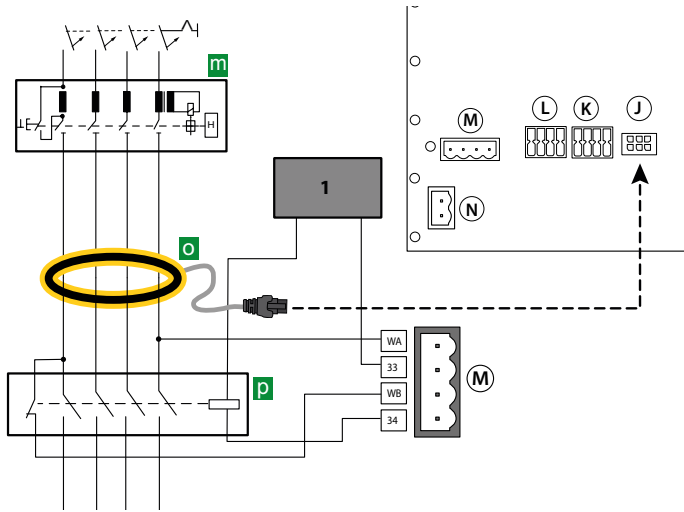
1: AC Power supply unit provided by customer

Alternatively, the power contactor can be controlled via an AC power supply provided by the customer in combination with the 230 V relay (terminal M: 33, 34).

⚠ **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 charge controller to PE. For this purpose, WA must be connected to L1. The cable length is limited by its capacitance per unit length. To ensure proper functionality of the PE monitoring, L1 must be tapped downstream of the measuring current transformer and upstream of the power contactor (see wiring diagram).
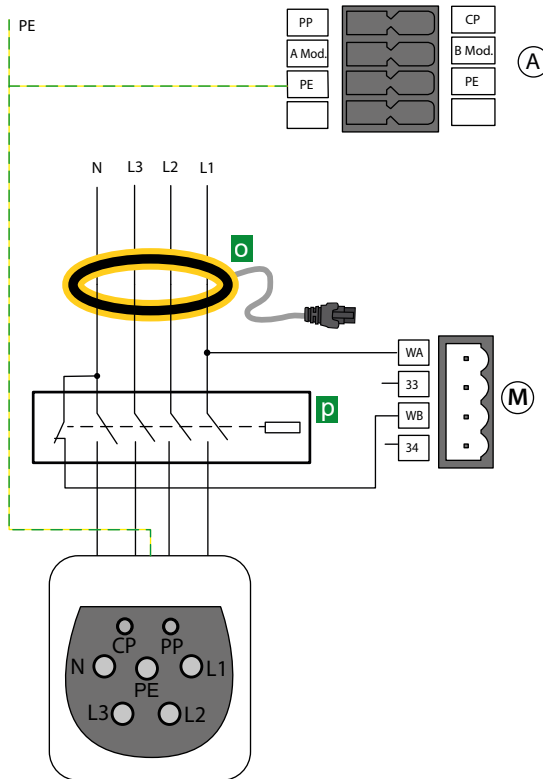
> ⚠️ *PE monitoring does not replace tests (example: protective conductor resistance).*

> ⚠️ *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 80 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. The PP contact detects the current load capacity of the charging cable and the CP contact exchanges control signals between the electric vehicle and the charging system (see IEC 61851).

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

4.3.12 I/O extension

The charge controller features two configurable, two-channel I/O interfaces each consisting of an optocoupler input and a relay output (connector sockets K and L).

- 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 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 device (RCD) type A instead of an RCD type B. The charging current relay in the charge controller is de-energised if, during the charging process, a fault current $I_{dc} \geq$ 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 (e.g. in the DLM). The meter is connected to the Modbus meter interface (terminal A) of the charge controller. Various Modbus meters are currently supported, including:

www.bender.de/unterstuetzte-energiezaehler

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 can be integrated into the device (see „6.1 Tabular data" on page 26):

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 PCB (terminal E) of the charge controller.

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.*

ℹ️ *The SIM card can be inserted/removed via the hinged insertion & ejection mechanism.*

Use in the EU and other countries

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

ℹ️ *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).

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:

- USB type B configuration interface (CONFIG)
- Ethernet and WiFi interface
- 4G modem
- Remote access - the ChangeConfiguration command of the OCPP protocol is used (depends on the backend system).

i *For more information on how to configure the charge controller, see the following URL:*
   www.bender.de/controller-wiki

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 type B 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 upgraded to a newer software version via the CONFIG interface.

The following must be observed: After copying the configuration files to the charge controller and before restarting/switching off the charge controller, the *sync* command must be executed. This command writes the configuration files to the read-only memory in a process-reliable manner.

i *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 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.

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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

i *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)
- OCPP configuration key for OCPP 1.5 and 1.6 (e.g. key name and description)
- Information about the REST API and the Modbus TCP Slave Register

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.

⚠️ *Aᴜᴛᴏᴍᴀᴛɪᴄ 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.*

i *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 (according to IEC 61851-1). 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

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

Save	Save & Restart	Operator Default & Restart

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.

Save	Save & Restart	Settings Default & Restart

Click the "Manufacturer Default & Restart" button on the **Manufacturer** tab to reset changed parameters of the manufacturer configuration to

Save	Save & Restart	Manufacturer Default & Restart	Factory Reset & Restart

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.

As soon as the charge controller is supplied with voltage, the boot process is started. After approx. 30 s, the charge controller is ready for operation.

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
- WLAN

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 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.

i   *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.*

Ethernet and WiFi

If the charge controller is connected to a valid network via Ethernet or WiFi 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).

i   *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):

- Network configuration mode (e.g. automatic or manual configuration with DHCP)
- Static IP address for network configuration (of the charging system)
- 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.

5.1.8   Cybersecurity

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

6 Technical data

6.1 Tabular data

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

Rated voltage / Pollution degree .... 250 V / 2
Overvoltage category .... II (within terminal M)
Overvoltage category .... III (terminal M and all other terminals)
Rated impulse voltage ....6 kV (terminal M and all other terminals)
Rated impulse voltage .... 2.5 kV (within terminal M)
Double insulation acc. to OVC III between ....terminal M and all other terminals
Basic insulation acc. to OVC II...within terminal M
Operating altitude .... ≤ 2000 m AMSL

Supply voltage AC 230 V (terminal N (L1, N))

Supply voltage range U_S... 184 V . . . 264 V
Frequency of U_S ....50 Hz
maximum Power consumption .... 12 W
average Power consumption .... 6 W
External circuit breaker recommended B6A

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

Measuring range... 100 mA

Response values:
Residual current I_{dc} .... DC 6 mA
Response tolerance I_{dc} ....-50...0 %

Measuring current transformer:
Max. Length of the connection cable .... ≤1,47 m

Restart sequence value:
DC 6 mA .... < 3 mA
* patented 6 mA DC fault current tripping
(Patents: EP 2 571 128 / US 9,397,494 / ZL 201210157968.6 / CN 103001175, EP 2 813 856)

SMA connector for 4G antenna (for ICC1324-Connect Plus variant only, terminal G)

Modem LTE Cat 1 & GSM
Frequency bands..800 MHz/850 MHz/900 MHz/1800 MHz/2100 MHz/2600 MHz
.... LTE-FDD: B1/B3/B7/B8/B20/B28; WCDMA: B1/B8; GSM: B3/B8
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
Recommended antenna .... TC ANT MOBILE WALL 0.5M - 2702274
Max. length of the antenna cable .... < 3 m

Max. output power GSM850/EGSM900: 33dBm
.... DCS1800/PCS1900: 30dBm
.... WDMA: 24dBm
.... LTE: 23dBm

SMA connector for LTE-M1 antenna & LTM-NB1/2 antenna (for ICC1324-Connect variant only, terminal G)

Modem LTE CAT M1/NB1 & GSM

Frequency bands .... Cat M1/Cat NB1: LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/
.... B19/B20/B25/B26*/B28 LTE TDD: B39 (For Cat M1 Only)
Impedance .... 50 Ω
Data rate .... **GSM:**
.... 850/900/1800/1900MHz
.... **GPRS:**
.... UL 85,6 kBit/s; DL 107 kBit/s
.... **GSM:**
.... UL 236,8 kBit/s; DL 296 kBit/
.... **LTE-M1**:
.... Max. 375Kbps (DL), max. 375Kbps (UL)
.... **LTE-NB:**
.... Max. 32Kbps (DL), max. 70Kbps (UL)
Recommended antenna .... TC ANT MOBILE WALL 0.5M - 2702274
Max. length of the antenna cable .... < 3 m
Max. output power GSM850/EGSM900: 33dBm
.... DCS1800/PCS1900: 30dBm
.... LTE: 23dBm

WiFi

Standards .... IEEE 802.11b/g/n
Frequency bands .... 2.4 GHz Kanäle 1-13 (2.412 GHz - 2.472)
Channel band width .... 20 MHz
Data rate .... 802.11b1, 2, 5.5 and 11 Mbps
.... 802.11g 6, 9, 12, 18, 24, 36, 48 and 54 Mbps
.... 802.11n MCS0-MCS7 (max 72.2Mbps)
max. output power: .... 19 dBm EIR

LED indications

Service .... blue: system is starting
.... green: system started, not ready for operation yet
.... flashing green: system running, system ready for operation
.... red: system error
Ethernet (terminals B, C) .... off: no Ethernet connection
.... steady green: active Ethernet connection
.... flashing green: data exchange
.... steady yellow: transmission rate 100 Mbit/s
.... yellow off: transmission rate 10 Mbit/s

Data interface

USB host 1 (terminal D1). .... USB port type A; USB 2.0 max. 250 mA
USB host 2 (terminal D2) ....USB port type A; USB 2.0 max. 250 mA
Ethernet (terminal B, C) ....10/100 Mbit
CONFIG (configuration interface, terminal H) ....USB port type B
SIM card (only with 4G modem, terminal E) ....micro SIM
Modbus meter (terminal A) .... 9.6 kBit
Control Pilot (terminal A (CP)) ....acc. to IEC 61851
Proximity Pilot (terminal A (PP)) ....acc. to IEC 61851

Inputs

Optocoupler 1 (terminal L (Opto 1 In+, Opto 1 In-))
Input voltage (HIGH).. DC 11.4 V. . .25.2 V
Input voltage (LOW) .... DC 0 V
Input current..2.3 mA. . .6.4 mA

Optocoupler 2 (terminal L (Opto 2 In+, Opto 2 In-))
Input voltage (HIGH).. DC 11.4 V. . .25.2 V
Input voltage (LOW) .... DC 0 V
Input current..2.3 mA. . .6.4 mA
Potential difference to PE/GND ....max. 100 V*

Weld check (terminal M (WB, WA))
Input voltage .... AC 184 V. . .264 V
Input current ....0.6 mA. . .1.3 mA
Potential difference to PE/GND ....max. 100 V*
* The potential difference between the optocoupler inputs and other inputs/outputs must be less than 100 V.

Input PE (terminal A (PE, PE))

Outputs

Contact data acc. to IEC 60947-5-1:

DC 15 V voltage source (terminal A (15 V, 0 V))
Output voltage... DC 15 V
maximum load capacity...0,4 A / 4.8 VA
Tolerance .... DC ± 0.75 V

Relay 1 (12 V) (terminal K (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

Relay 2 (12 V) (terminal K (relay 23, relay 24))
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 M (relay 33, relay 34))
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 .... -25...+65 ℃

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

Ethernet (terminals B, C)
Cable .... shielded on one side, shield on charge controller side to PE
Connection cable .... CAT 6
Max. connection cable length .... 100 m

Connection type (terminal blocks A, K and L) .... **push-wire terminal**
Connection specifications:
rigid /flexible .... 0.2 mm^2...1.5 mm^2 (AWG 24...16)
flexible with ferrule without plastic sleeve .... 0.25 mm^2...1.5 mm^2 (AWG 24...16)
flexible with ferrule with plastic sleeve .... 0.14 mm^2... 0.75 mm^2 (AWG 26...18)
Stripping length .... 10 mm
Max. connection cable length .... < 3 m
Cable (Modbus) .... shielded and twisted in pairs, shield on both sides to PE
Max. connection cable length (Modbus) .... 250 m
Cross section (Modbus) .... ≥ 0.5 mm^2
Max. connection cable length (PE) .... < 3 m
Cross-section (PE) .... ≥ 1 mm^2
Connection type (terminal block M) .... **push-wire terminal**
Connection specifications:
rigid /flexible .... 0.75 mm^2...2.5 mm^2 (AWG 24...16)
flexible with ferrule without plastic sleeve .... 0.75 mm^2...2.5 mm^2 (AWG 24...16)
flexible with ferrule with plastic sleeve .... 0.75 mm^2...2.5 mm^2 (AWG 24...18)
Stripping length .... 10 mm
Max. connection cable length .... < 3 m
Connection type (terminal block N) .... **push-wire terminal**
Connection specifications:
rigid /flexible .... 0.2 mm^2...2.5 mm^2 (AWG 24...12)
flexible with ferrule without plastic sleeve .... 0.25 mm^2...2.5 mm^2 (AWG 24...12)
flexible with ferrule with plastic sleeve .... 0.25 mm^2...2.5 mm^2 (AWG 24...12)
Stripping length .... 10 mm

Other

Operating mode .... continuous operation
Mounting position .... standing
Degree of protection IP20
Weight .... max. 500 g (depends on variant)

BENDER

6.2 EU-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: EU-Konformitätserklärung ICC1324

6.3 Ordering information

Type	4G modem	Interface	WiFi	PLC*	Insulated input	12 V relay output	Art. No.	Manual No.
ICC1324-Connect Plus	✓ (Cat 1)	USB, Modbus meter, Ethernet, RFID	✓	✓	2x	2x	B94060080	D00436
ICC1324-Connect	✓ (Cat M1/ NB1)		---	✓	1x	---	B94060079	
ICC1324-Con-nect SP	---		✓	✓	1x	1x	B94060074	
ICC1324-Home Plus	---		✓	✓	1x	---	B94060078	
ICC1324-Home	---	USB	---	---	1x	---	B94060077	

* Powerline Communication acc. to ISO/IEC 15118

i   *For further variants, refer to our website.*

i   *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.
HMI150	B94060150	D00456
HMI 145	B94060151	D00456
HMI 140	B94060152	D00456
Measuring current transformer CTBC17 (cable variant, cable length 325 mm)[1]	B98080071	D00421
Measuring current transformer CTBC17 (PCB variant)[1, 2]	B98080070	D00421
Connecting cable CTBC17 cable 1470 incl. clip enclosure (cable length 1470 mm)	B98080542	D00421
Connecting cable CTBC17 cable 600 incl. clip enclosure (cable length 600 mm)	B98080543	D00421
Connecting cable CTBC17 cable 325 incl. clip enclosure (cable length 325 mm)	B98080541	D00421
Connecting cable CTBC17 cable 180 incl. clip enclosure (cable length 180 mm)	B98080540	D00421

[1] *Internal diameter: 17 mm*
[2] *The PCB variant can be combined with connecting cables of different lengths.*

Plug kit	Content/Quantity	Art. No.
Plug kit (can be ordered separately)	2-pole (1 x), 4-pole (1 x), 8-pole (3 x)	B94060125
Plug kit bulk pack Connect Plus, Connect, Connect SP, Home Plus	2-pole (50 x), 4-pole (50 x), 8-pole (150 x)	B94060124
Plug kit bulk pack Home	2-pole (50 x), 4-pole (50 x), 8-pole (100 x)	B94060123

6.4 Document revision history

Date	Document version	State/Changes
05/2022	00	New
08/2022	01	added: technical data after EMV review
12/2022	02	changed: voltage source 15 V added: Link to EU Declaration of Conformity