ICC1624

Charge controller for charging systems for electric vehicle charging

Illustration similar

ICC1624_D00500_00_M_XXEN / 01.2026

BENDER

Table of contents

1 General information

1.1 How to use the manual

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

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

1.2 Indication of important instructions and information

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

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

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

ADVICE
Indicates important facts that do not result in immediate injuries. They can lead to malfunctions if the device is handled incorrectly.

Information can help to optimise the use of the product.

1.3 Service and Support

Information and contact details about customer service, repair service or field service for Bender devices are available on the following website: https://www.bender.de/en/service-support.

1.4 Training courses and seminars

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

https://www.bender.de/en/know-how/seminars

1.5 Delivery conditions

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

1.6 Inspection, transport and storage

Check the shipping and device packaging for transport damage and scope of delivery. In the event of complaints, the company must be notified immediately. Please use the contact form at the following address: https://www.bender.de/en/service-support/take-back-of-old-devices/.

When storing the devices, observe the information under Environment / EMC in the technical data.

1.7 Warranty and liability

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

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

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

1.8 Disposal of Bender devices

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

Bender GmbH & Co. KG is registered in the waste from electrical and electronic equipment (WEEE) register under the WEEE number: DE 43 124 402. For more information on the disposal of Bender devices, refer to https://www.bender.de/en/service-support/take-back-of-old-devices/

1.9 Safety

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

DANGER

Risk of fatal injury due to electric shock!

Touching live parts of the system carries the risk of:

- *Electrocution due to electric shock*
- *Damage to the electrical installation*
- *Destruction of the device*

Before installing the device and before working on its connections, make sure that the installation is de-energised.

Observe the rules for working on electrical systems.

2 Device-specific safety instructions

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

WARNING
Relay contacts can heat up to 100 °C
Burns
Only touching the charge controller when it is de-energised and has cooled down.

ADVICE
To ensure protection against high surface temperatures, charging cables in accordance with DIN EN 50620 must be used.

The maximum permissible contact temperature of the housing and the supply cables must be designed in accordance with DIN EN IEC 61439-1. Tests must be carried out to determine the surface temperatures to be expected during operation.

Cable cross-sections must be specified in accordance with DIN EN IEC 61851-1 and DIN IEC 62955 in order to avoid overtemperatures.

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

ADVICE
HV test: L1 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 s are not permissible!

3 Function

Detailed information on how the functions work is available in the Bender Charge Controller software documentation (https://www.bender.de/docs/charge-controller)

Local access to charge controller

Local access via USB CONFIG to the charge controller is possible either as the operator or as the manufacturer. Further details are described in chapter "Local configuration of parameters", page 23 Operator access is possible via the URL http://192.168.123.123:

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

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

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

The default passwords should be changed to prevent unauthorised access. The login details for the user Manufacturer should not be shared with the operator.

3.1 Intended use

The ICC1624 charge controller, hereinafter referred to as "charge controller", is the main component of a charging system for charging electric vehicles. It is intended for use in electric vehicle charging systems. The charge controller controls type 2 socket-outlets and permanently installed cables.

It enables an installation in accordance with the requirements of current standards, e.g. IEC 61851-1 and IEC 62955.

Any other use than that described in this manual is regarded as improper.

3.2 Product description

The charging system consists of a RCD type A, a charge controller, a type 2 socket-outlet and a permanently mounted cable with a type 1 or type 2 plug. These are directly connected to the charge controller.

3.2.1 Device features

- Charge controller in accordance with IEC 61851-1 (charging mode 3)
- integrated WiFi module for configuration and connection with other charging systems
- can be integrated in single- or three-phase systems up to 32 A
- integrated residual direct current monitoring module with residual current transformer for DC residual current monitoring (external RCD type A required)
- USB interfaces
  - 1 CONFIG interface (type B) for configuration and maintenance as well as for connecting two charge controllers for dual charging systems
  - 2 USB host interfaces (type A), one of them can be used as an alternative to the CONFIG interface

- Meter interface
  - Modbus RTU for internal energy meters, suitable for Eichrecht-compliant billing
  - Modbus TCP for connecting meters for load management
- 2 x Ethernet interfaces including daisy chain function
- suitable for the installation of dual charging systems using two charge controllers
- suitable for the installation of charging systems with two alternatively usable plug systems (e.g. type 2 and protective contact sockets)
- integrated emergency opener of the charging socket actuator in the case of a power blackout
- integrated 2G / 4G modem with router function
- 1 optocoupler input and 1 relay output for additional functions
- integrated DC 12 V voltage supply with a maximum current carrying capacity of 250 mA for customised applications
- Support for HMI module and RFID reader (more details: https://www.bender.de/docs/charge-controller/Accessories/hmi)
- Support for OCPP 1.6-J
- ISO 15118 Powerline Communication (PLC) with support of plug & charge authorisation, load management and autocharge
- dynamic load management for optimised distribution of the available power to connected vehicles, including PV charging optimisation and prioritisation function
- Support for the EEBUS profiles: overload protection, optimisation of PV charging, cost-optimised charging and load specification by electricity grid operators
- Support for the Bender app for home loading and API for customer-specific apps
- Tool support for configuring and testing charging systems in production
- Control Pilot and Proximity Pilot communication
- internal temperature sensor to reduce the charging current depending on the ambient temperature
- integrated phase cut-in and phase cut-out for optimised solar charging
- Relay contact for controlling a shunt release (terminal M)
- internal 230 V power supply
- Tilt sensor
- integrated 230V load relay with mirror contact

3.3 Functional description

The charge controller controls and monitors all functions of private, industrial or public charging stations. Core function is the release and regulation of the charging current. The charge controller can be integrated into a variety of energy management systems and OCPP backends and is operated as an always-on system. The compatibility of the charge controller with backends, vehicles or energy management systems is ensured in periodic integration tests.

3.3.1 General functions

- The charging system can be equipped with an electricity meter. Modbus RTU meters can be connected directly to the device. In addition, a second meter can be connected for energy management via Modbus TCP using an Ethernet or WiFi interface.
- An AC 230 V power supply is needed for operation.
- Option to use an HMI module with RFID reader and LED field allow easy user interaction.
- Current flow towards the vehicle is released by enabling the integrated main relay.

- Current flow toward the vehicle is released by enabling the contactor via an integrated 230 V control relay in the charge controller.
- Using a Mini 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 menu item **Network**.
- A 4G antenna is integrated on the circuit board.
- For residual current detection in an AC charging system, the charge controller features an integrated residual direct current monitoring module (RDC-M). With integrated monitoring of the DC residual current, only an RCD type A is required in the charging system.
- Data exchange between the electric vehicle and the charging system is possible via ISO 15118 compliant Powerline Communication (PLC).
- Dynamic load management (DLM):
  – The charge controller comes with DLM function, which can be fully used, independent of a backend connection. It detects which charging current is applied to which phase and thus prevents the occurrence of peak loads and unbalanced loads. It is also possible to control the system based on the solar feed-in and prioritise charging points in the DLM. Maximum number of charging points in a network: 250.
- Data management and control functionality of the charge controller:
  – Termination of the charging process after tripping the residual current protective device (RCD) due to a residual current
  – Detection of critical residual currents by the RCM sensor

3.4 Temperature monitoring - Load current and cooling monitoring

The charge controller has two temperature sensors that monitor the temperature of the circuit board and relay. If the fixed and unchangeable limit values are exceeded, the charging current is first reduced and, if necessary, the charging process is also paused until the temperature has dropped to an acceptable level.

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

3.5 LED indications

Status-LED

PCB

Red + Green	System is starting
Fast flashing red + green	Software update is running
Green	System started, not yet ready for operation
Flashing green	System running, system ready for operation
Red	System error

Ethernet

Terminal

Off	No Ethernet connection
Steady green	Ethernet connection
Flashing green	Ethernet connection, data transfer is running
Glowing yellow	Ethernet connection with 100 Mbit/s
Yellow off	Ethernet connection with 10 Mbit/s

WARNING
Very bright RGB LEDs
Vision impairment!
Care must be taken to avoid looking directly into the RGB LEDs.

3.6 Surge Protection

Surge Protection Device (SPD)

The input circuit is equipped with integrated protection against transient surge voltages (SPD). The proper functioning of this protection is continuously monitored. In the event of a failure, an error is reported.

ADVICE
In the event of an error, repair by qualified personnel is required.

3.7 Relay contact monitoring

The charge controller has internal monitoring of the switching states of the main relay and the two phase switching relays. This allows it to detect when the contacts do not close or are welded or stuck in the open state. In such cases, an error is reported.

ADVICE
In the event of an error, repair by qualified personnel is required.

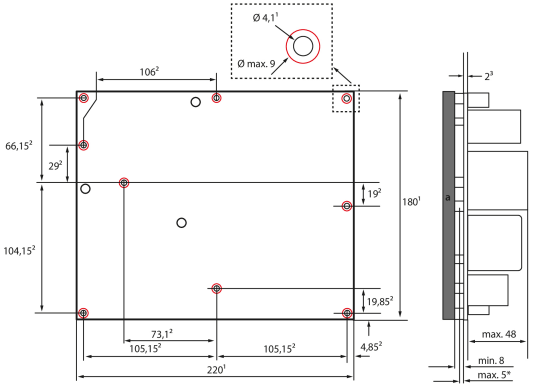
3.8 Phase switching

Integrated phase switching relays allow the charging power to be distributed to single or multiple phases (in the case of multi-phase connection). Phase switching is controlled by the energy management and solar DLM functions. The configuration of phase switching is described here: https://www.bender.de/docs/charge-controller/Load-Management/DLM/dlm-solar .

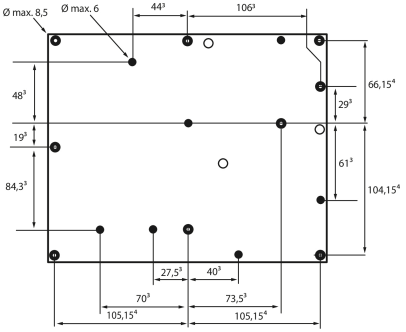
4 Dimensions and mounting

Dimensions diagram

Top



Bottom with Support pins



Dimensions in mm

* Solder pin protrusion

[1] ± 0.5, [2] ± 0.1, [3] ± 0.2, [4] ± 0.15

Red markings: possible fixing points

Recommendation for fastening:

- *Pan head screws: 6 x M 3.0 or max. Ø 3.5 mm*

CAUTION

Incorrect mounting of the PCB

Mechanical stresses (tilting) of the PCB

When mounting, ensure that the PCB is mounted flush with the surface.

ADVICE

A minimum distance of 12 mm between the charge controller and other components or the enclosure of the charging system is recommended.

CAUTION

Use of cleaning products

Device damage

Do not use cleaning products to clean the circuit board.

When manufacturing the charging station, ensure that an enclosure with protection class IP44 is used (DIN EN IEC 61439-7).

5 Connection

5.1 Connection conditions

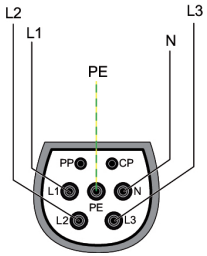
DANGER
System parts may be live
(charge controller terminals up to 400 V)
Electric shock
Before touching system parts, ensure that it has been de-energised.

Information:

- *PE is connected to "GND"; reference level for Control Pilot (CP communication) must be at the same level as the power supply (IEC 61851 series of standards)*
- *lay lines only inside the charging system*
- *do not lay lines parallel to power lines*
- *Cable lengths (except Modbus, Ethernet, Power IN, residual current transformer and charging cable): < 3 m*
- *maximum cable length Ethernet / Fast Ethernet: 100 m*
- *maximum cable length Modbus: 250 m*
- *the network connection must be protected by a residual current device (RCD type A) that is correctly dimensioned for the possible and desired charging power*
- *the network connection must be equipped with overcurrent protection device that are correctly dimensioned for the possible and desired charging power.*
- *the ground shield of the Ethernet connection at the RJ45 socket is directly connected to PE*

5.2 Connection plug connections

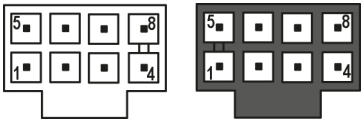
Type 2 plug



ADVICE
When the charging cable is firmly connected, the connection to PP and to an actuator is not required.

5.3 Charging system with type 2 socket-outlet

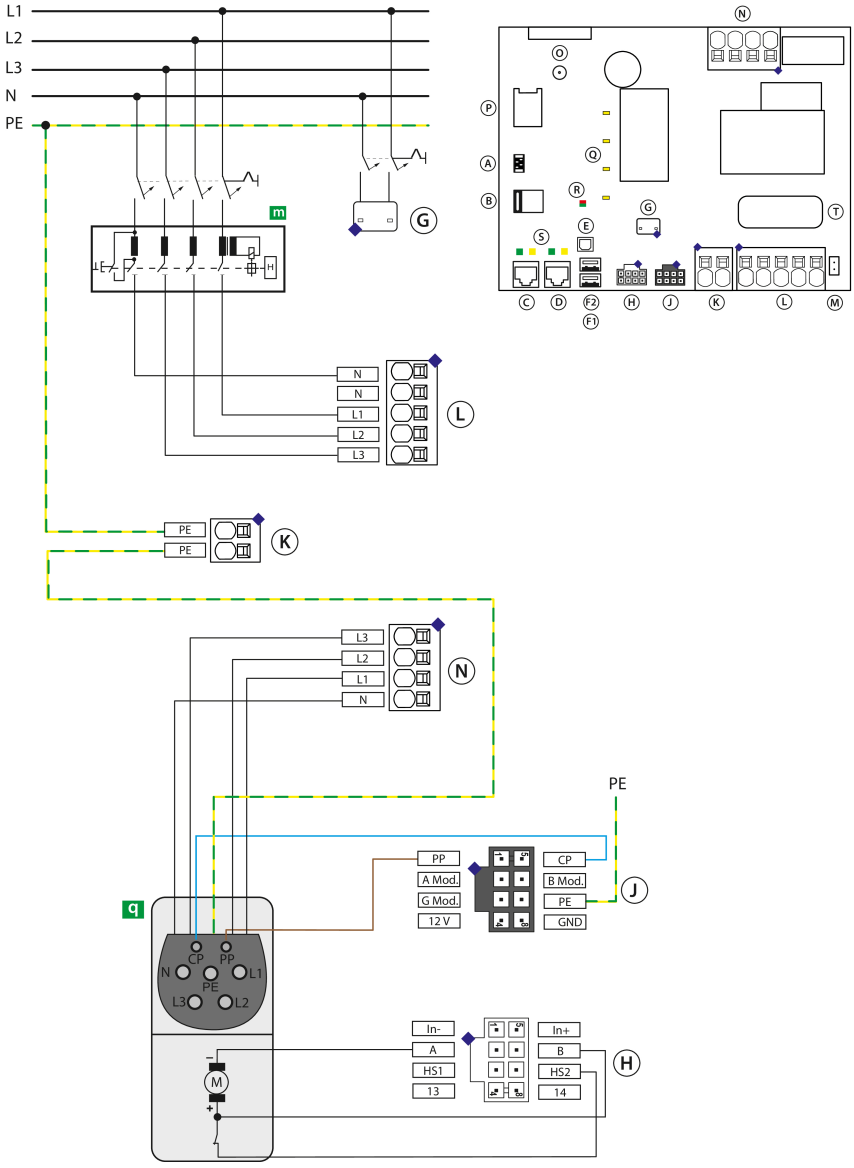
ADVICE
For the connections H and J a Molex Nano- Fit, series 105310, 8-pin, plating: tin (Sn) is used. For the connector assemblies, models with plating tin (Sn) are also to be used. The J connection is colour-coded black, the H connection is colour-coded natural (beige). The pins are numbered as shown in the following diagram:



Terminal assignment

G	L	Power supply AC 230 V	K	PE	Protective conductor (Input)
	N			PE	Protective conductor (Type 2 connector)
H	13	Relay 13: Relay contacts GPIO (12…24 V)	L	N	Neutral conductor input
	14	Relay 14: Relay contacts GPIO (12…24 V)		N	
	HS1	Actuator HS1: Locking 12 V output actuator switch		L1	AC 230 V Input phase 1
	HS2	Actuator HS2: Locking 12 V input actuator switch		L2	AC 230 V Input phase 2
	A	Actuator A: Locking actuator output negative		L3	AC 230 V Input phase 3
	B	Actuator B: Locking actuator output positive	M	23	Relay 23: Shunt release
	IN-	Optocoupler input (12 V negative)		24	Relay 24: Shunt release
	IN+	Optocoupler input (12 V positive)	N	N	Neutral conductor output
J	12 V	DC 12 V voltage source for customised applications		L1	AC 230 V Output phase 1
	GND				
	G Mod.	Modbus GND		L2	AC 230 V Output phase 2
	PE	Input functional earth (FE)		L3	AC 230 V Output phase 3
	A Mod.	Modbus meter A			
	B Mod.	Modbus meter B			
	PP	Proximity Pilot			
	CP	Control Pilot			

Wiring diagram



Legend

A	RFID connection	L	AC 230 V input (3 phases)
B	integrated WiFi antenna	M	Shunt release AC/DC 230 V
C	Connection Ethernet (ETH1)	N	AC 230 V output (Typ 2 socket)
D	Connection Ethernet (ETH2)	O	Connection for external LTE antenna
E	Configuration interface (USB type B)	P	SIM card slot (Mini)
F1, F2[1]	Extension connection (USB-type A)	Q[3]	4x RGB-LED (State charging station)
G[2]	Power supply AC 230 V	R	RG-LED state charging station
H	Relay output, locking actuator, optocoupler input	S	LEDs state ethernet
J	DC 12 V output, PE, Modbus, PP, CP, GND	T	Residual current transformer
K	PE terminal	m	RCD type A
		q	Typ 2 socket

1 The USB interface may only be used to connect two charge controllers, to a computer for service purposes, or for a USB data carrier.

2 The power supply can optionally be connected to the main fuse. If the main fuse triggers, the charge controller and charging station will be disconnected from the power supply.

3 Further information see https://www.bender.de/docs/charge-controller/Accessories/hmi/?controller=ICC

ADVICE

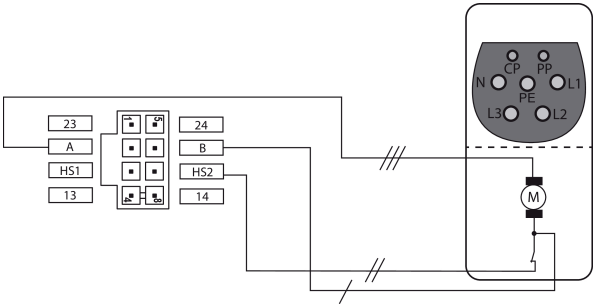
Usage variants of the USB type A interfaces (F)

1. *both USB type A sockets (F1 and F2)*
2. *external USB type A socket with the USB type B configuration interface (F1 and E)*

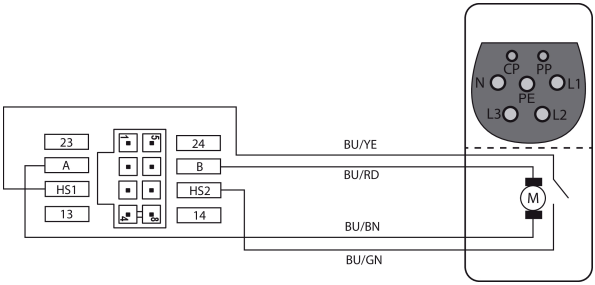
5.4 Connection locking actuators

Type 2 socket-outlets (actuator type)	Actuator	A	HS1	B	HS2
		Socket-outlet actuator wiring			
• Mennekes (31016, 31023, 31024, 31038) • Bals (801191-801195, 80300, 9743205000, 9743211000) • Walther Werke (9743211000) • Harting	Hella	Wire 3 (///)		Wire 1 (/)	Wire 2 (//)
• Walther Werke Eco Slim 32 A (9743205180) with connection cable (790000001)		Wire 1 (black)		Wire 3 (blue)	Wire 2 (red)
• Phoenix Contact (1624129)	Küster	BU/BN	BU/YE	BU/RD	BU/GN
• Phoenix Contact (EV-T2M3SM-E-LOCK12V)	Phoenix Contact	BU/BN	BU/YE	BU/RD	BU/GN
• any type 2 socket-outlet	Küster LSV Gen2	BU/BN	BU/YE	BU/RD	BU/GN

Example Hella actuator



Example Küster



5.5 Connectivity

5.5.1 Dual charging system

For dual charging systems two charge controllers can be combined.

One charge controller is configured as the master and coordinates the communication with an OCPP backend or with connected energy management systems. The second charge controller is configured as a slave and communicates with the master charge controller.

For data communication between the master and slave charge controllers, a USB connection must be used between the USB-CONFIG interface of the master charge controller and the USB type A interface of the slave charge controller. The necessary settings for dual charging systems can be made with the manufacturer role on the configuration interface.

5.5.2 Interfaces

USB configuration interface (CONFIG)

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

Ethernet interface

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

WiFi interface

With the help of the integrated WiFi module, it is possible to integrate the charge controller into a local WiFi network and configure the charge controller via the hotspot function.

For further information on configuration descriptions and interfaces, see chapter “Configuration and testing”, page 23.

5.5.3 Checking via PE-Monitoring

The PE monitoring function can be used to check whether there is a continuous connection between the charge controller and the PE of the supply network. If the monitoring function is activated in the manufacturer settings, an error is issued in the event of PE interruptions and charging processes are prevented.

ADVICE
Capacitive line coatings limit the length of the supply line that can be checked.

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

The PP contact identifies the connected charging cable and limits the maximum possible charging current. The CP contact enables communication with the vehicle (see IEC 61851 series of standards).

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

5.5.5 I/O extension

The charge controller features a configurable, two-channel I/O interface consisting of an optocoupler input and a relay output (terminal H).

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

5.5.6 Emergency opener

The emergency opener is integrated as a circuit group in the charge controller. In the event of a power failure, the type 2 socket lock is automatically opened so that the charging cable plug can be removed.

5.5.7 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 uses a residual current transformer located on the charge controller. This allows the use of a residual current protective device (RCD) type A.

The mainrelay in the charge controller is de-energised if, during the charging process, a residual current $I_{\Delta n} \geq$ DC 6 mA flows.

5.5.8 Connectivity with Modbus RTU meters

The charge controller supports the use of external devices, such as Modbus meters, if measured values are required during normal operation. The meter is connected to the Modbus meter interface (terminal J) of the charge controller. Various Modbus meters are currently supported:

https://www.bender.de/docs/charge-controller/Metering/

Meter Slave ID	Baud rate	Parity	Data bit	Stop bit
1	9600	N (none)	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.

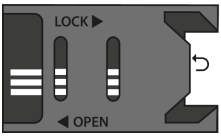
5.5.9 Gateway variants with modem (depends on the variant)

The charge controller has a router function that makes the mobile data connection available to other charging systems or other devices.

SIM card

- For the connection a mini SIM card must be inserted in the SIM card holder component P.
- The SIM card can have a PIN number which can be configured via the **Network** tab.
- The APN settings for the SIM card can also be configured via the **Network** tab.

Handling SIM card slot

	1. Unlock
	2. Open
	3. insert SIM card*
	4. Close and lock

* The presence of the SIM card is only checked during the start-up process of the charge controller.

Use in the EU and other countries

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

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

Antenna socket

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

Approved or recommended antenna types can be found in the tabular data (see chapter "Tabular data", page 28).

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

6 Configuration and testing

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

6.1 Configuration

The following options are available for configuring the charging system:

Access to web interface via the following interfaces:

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

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

https://www.bender.de/docs/charge-controller/hcc/

6.1.1 Local configuration of parameters

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

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

Note the following:

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

The 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.

Every parameter accessible to the user operator in the web interface is described by an explanatory text in the tooltip.

OCPP-specific parameters

Basic settings can be made via the menu item **Settings**:

- OCPP Mode (e.g. OCPP-J 1.6)
- Websockets JSON OCPP URL of the backend

The menu item **Documentation** in the web interface for the user operator contains:

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

Application of changed parameters

Parameter changes are not necessarily applied after submission. To save all changed parameters, click the "Save & Restart" button in the web interface. A message indicating a necessary restart may appear.

ADVICE
Automatic reboot of the charge controller!
In order to ensure perfect functionality, the charge controller carries out a regular system reboot at 30-day intervals outside of charging processes.

After accessing the web interface, the charge controller will not perform a system reboot for at least two minutes to allow all parameters to be successfully configured.

6.1.2 Remote configuration of parameters

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

6.1.3 Factory settings

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

Menu item Operator

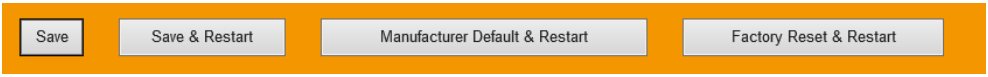
Clicking the "Operator Default & Restart" button on the menu item **Operator** resets changed parameters of the operator configuration to default.

Menu item Settings

Clicking the button "Settings Default & Restart" on the menu item **Settings** resets changed parameters to default.

Menu item Manufacturer

Clicking the "Manufacturer Default & Restart" button on the menu item **Manufacturer** resets changed parameters of the manufacturer configuration to default. Clicking the "Factory Reset & Restart" button resets the charge controller to factory settings.



Views of the web interface vary

6.1.4 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 must be checked:

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

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

The boot process starts once the charge controller is supplied with voltage (230 V) and is complete when the status LED on the circuit board flashes green. Further status LED displays see chapter “LED indications ”, page 12.

6.1.5 Connectivity to the backend

Connection of the charge controller to the backend

The settings for connecting to a backend are configured by the user operator via the web interface in the Backend menu.

The Connection Type must be set to the network interface that enables the connection to the OCPP backend.

Next, in the OCPP section, the OCPP ChargeBoxIdentity, the URL of the Backend, and, if necessary, the Basic Authorization password are configured.

After saving the settings, the charge controller must be restarted to establish the connection to the backend.

Depending on the Connection Type, additional settings may be required in the Network menu before restarting.

GSM

The name of the access point (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") and a SIM-PIN may be required to authenticate the access point.

APN information such as user name, password and PIN is provided by the selected mobile network operator. The system should be able to establish an online connection to the backend system after 20-120 seconds.

In case of connection problems, the received signal strength (RSSI) can be checked in the menu item **Diagnostics** under GSM status information.

The connection to the mobile network (and thus to the backend system) usually lasts from 6 to 48 hours. After that, the connection may be terminated by the mobile network. The charge controller detects the disconnection and automatically reconnects.

Ethernet

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

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

If required, it is possible to assign a host address from the subnet 192.168.124.x. to the PC.

The main settings for Ethernet/WLAN are made via the menu item **Network** and include:

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

6.1.6 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.

ADVICE
Ensure the correct selection of the locking actuator used according to the table in chapter "Connection locking actuators", page 18.

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

6.1.7 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 HMI 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 module manual, which can be downloaded from https://www.bender.de/en/service-support/download-area/.

7 Technical data

7.1 Tabular data

Definitions

Designation	Abbreviation	Terminals
Input circuit/supply network	EK	L1 IN, L2 IN, L3 IN, N IN, PE
Supply circuit/power supply unit	VK	L, N
Output circuit/vehicle	AK	L1 Out, L2 Out, L3 Out, N Out, PE
Shunt release	AS	23, 24
Control circuit/electronics	SK	PE (as FE*) and all other terminals

* Functional earth

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

Rated voltage	230 / 400 V
Pollution degree	2
Overvoltage category AK	II
Overvoltage category EK, VK, AS	III
Rated impulse voltage between EK, VK, AK, AS, SK	6 kV
Rated impulse voltage within EK, VK, AS	4 kV
Rated impulse voltage within AK	2.5 kV
Rated insulation voltage within VK, AS	250 V
Rated insulation voltage within EK, AK	250 V / 400 V
Rated insulation voltage between EK, VK, AK, AS, SK	250 V / 400 V
reinforced insulation between EK, VK, AK, AS, SK	ÜK III
Basic insulation within AK	ÜK II
Basic insulation within EK, VK, AS	ÜK III
Operating altitude AMSL	≤ 2000 m

Supply circuit (terminal G: L, N)

Supply voltage range U_s	198...253 V
Frequency of U_s	50 Hz
max. power consumption	17 W
average power consumption	6 W
External circuit breaker recommended	B6A

Load circuit single-phase / three-phase (terminal L, K: L1, L2, L3, N, PE)

Nominal voltage range	198...253 V / 343...438 V
Frequency range	50 Hz
max. charging current	1 x 32 A / 3 x 32 A
max. power consumption	7.3 kW / 22 kW
Current carrying capacity in the event of a short circuit	
I_{nc}	3 kA
I^2t	≥ 50 kA^{2}s
I_p (IEC 62955)	1.85 kA
I^2t (IEC 62955)	4.5 kA^{2}s
Recommended type for external circuit breaker (depending on operating conditions)	B16A or B32A or C16A or C32A

Residual direct current monitoring module* in accordance with DIN EN 62955 (RDC-M, terminal J)

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

* 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 LTE antenna (terminal O)

Modem LTE CAT 1 & GSM

Frequency bands	700/800/850/900/1800/2100/2600 MHz LTE-FDD: B1/B3/B5/B7/B8/B20/B28; GSM: B8
Impedance*	50 Ω
Data rate	**GSM:**
	GPRS: (UL) 85.6 kBit/s; (DL) 85.6 kBit/s
	LTE:
	LTE-FDD: 5 Mbit/s (UL); 10 Mbit/s (DL)
recommended antenna*	on request
max. length of the antenna cable*	< 3 m
max. output power	EGSM900: 31 dBm EIRP (±2 dB) LTE: 22 dBm EIRP (±2 dB)

recommended torque*	1 Nm

* only with external antenna

WiFi

WiFi standard	IEEE 802.11b/g/n
Frequency bands	2.4 GHz channels 1-13 (2.412 GHz - 2.472 GHz)
Channel bandwidth	20 MHz
Data rates	802.11b: 1, 2, 5.5 and 11 Mbit/s 802.11g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbit/s 802.11n: MCS0-MCS7 (max. 72.2 Mbit/s)
max. output power	15 dBm EIRP

Data interface

USB host 1 / HMI (terminal F1)*	USB port type A; USB 2.0 max. 250 mA
USB host 2 (terminal F2)*	USB port type A; USB 2.0 max. 250 mA
Ethernet (terminal C, D)	10/100 Mbit/s
CONFIG (configuration interface, terminal E)	USB connection type B
SIM card (only with 4G modem, terminal P)	Mini SIM and/or eSIM
Modbus counter (terminal J: A Mod, B Mod., G Mod)	9.6 kbit/s
Control Pilot (terminal J: CP)	according to IEC 61851
Proximity Pilot (terminal J: PP)	according to IEC 61851

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

Inputs

Optocoupler (terminal H: IN+, IN-)	
Input voltage (HIGH)	DC 11.4...25.2 V
Input voltage (LOW)	DC 0 V
Input current (HIGH)	2.3...5.8 mA
Max. potential difference to PE/GND	50 V*
PE input (terminal A K: PE, PE)	

* The potential difference between the optocoupler input and other inputs/outputs must be less than 50 V .

Outputs

Contact data acc. to IEC 60947-5-1:	
DC 12 V voltage source (terminal J: 12 V, GND)	
Output voltage	DC 12 V
max. load capacity	0.25 A / 3 W
Tolerance	DC +0.4 V /- 1.2 V
Relay output (terminal H: contact 13/14)	
Rated operating voltage U_e	DC 24 V
Rated operating current I_e	DC 1 A
minimum contact rating	DC 1 mA at ≥ 10 V
Shunt release (terminal M: contact 23/24)	
Rated operating voltage U_e	AC 230 V
Rated operating current I_e	AC 4 A
minimal contact rating	AC 50 mA at ≥ 10 V

Environment / EMC

EMC	see CE declaration
Operating temperature	-25...+65 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K22 (except air temperature)
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

Connection lengths / cable types

Ethernet (terminal C, D)*	
Cable	shieldedat one end, shield to PE
Connection cable	CAT 6 or higher, shielded

max. length of connection cable	100 m

* • Integrated surge protection for indoor applications
• An additional surge protection device (SPD) is required for outdoor applications.

Relay output, interlock, optocoupler input, DC 12 V output, PE, Modbus, PP, CP (terminal blocks H, J)	
Connection data:	
Plug connector	Molex, NANO-FIT series 8x2.5 H:1053104508 J:1053103508, tin-plated
max. length of connection cable	< 3 m
Cable (Modbus)	shielded and twisted in pairs, shield on PE on both sides
max. length of connection cable (Modbus)	250 m
Cross-section (Modbus)	≥ 0.5 mm²
max. length of connection cable (PE)	< 3 m
Cross-section (PE)	≥ 0.5 mm²

PE, AC 230 V input / output (3 phases) (terminal blocks K, L, N)	**Push-in spring connection**
Connection data:	
Rigid/flexible	2.5...16 mm²
flexible with ferrule without plastic sleeve	2.5...16 mm²
flexible with ferrule with plastic sleeve	2.5...10 mm²
Stripping length	18 mm

Power supply AC 230 V (terminal block G)	
Connection data:	
Plug connector	JST, series VA 2x7.92 B2P3-VH(LF)(SN), tin-plated*

* min. Observe the connection cross-section of the circuit breaker

Shunt release (terminal block M)	
Connection data:	
Plug connector	Degson 8EDGVC-5.0-02P 10030002886, tin-plated

RFID connection (terminal block A)	
Connection data:	
Plug connector	Micro-MaTch 4x1.27 SMD Top Entry 7-338069-4, tin-plated
max. length of connection cable	< 300 mm

Other

Operating mode	continuous operation
Mounting position	vertical
Degree of protection	IP00
Weight	760 g

7.2 Declaration of conformity

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

https://www.bender.de/fileadmin/content/Products/CE/CEKO_ICC1624.pdf

7.3 Standards and approvals

CE UK CA

7.4 Ordering information

Type	4G modem	Interface type	WiFi	PLC*	Shunt release	12 V relay output	Article no.	Manual no.
ICC1624- Connect Plus	x	USB, Modbus counter, Ethernet, RFID, HMI	x	x	x	1x	B94060041	D00500

* Powerline communication in accordance with ISO/IEC 15118

Accessory type	Article no.	Manual no.
HMI150 (RFID reader, 11x RGB LED, 2-port USB hub, buzzer and WiFi)	B94060150	D00481
HMI145 (RFID reader, 11x RGB LED, 2-port USB hub and buzzer)	B94060151	
HMI140 (RFID reader and 11x RGB LED)	B94060152	

Plug kit	Contents/ quantity	Article no.
Plug kit (can be ordered separately)	2-pin (2 x), 8-pin (2 x)	on request

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