ICC1624

Charge controller for charging systems for electric vehicle charging

Illustration similar

BENDER

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 for cost-optimised installation
- 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; provisioning with eSIMs possible from ex works
- 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 (in stock or customer-specific) (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

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.

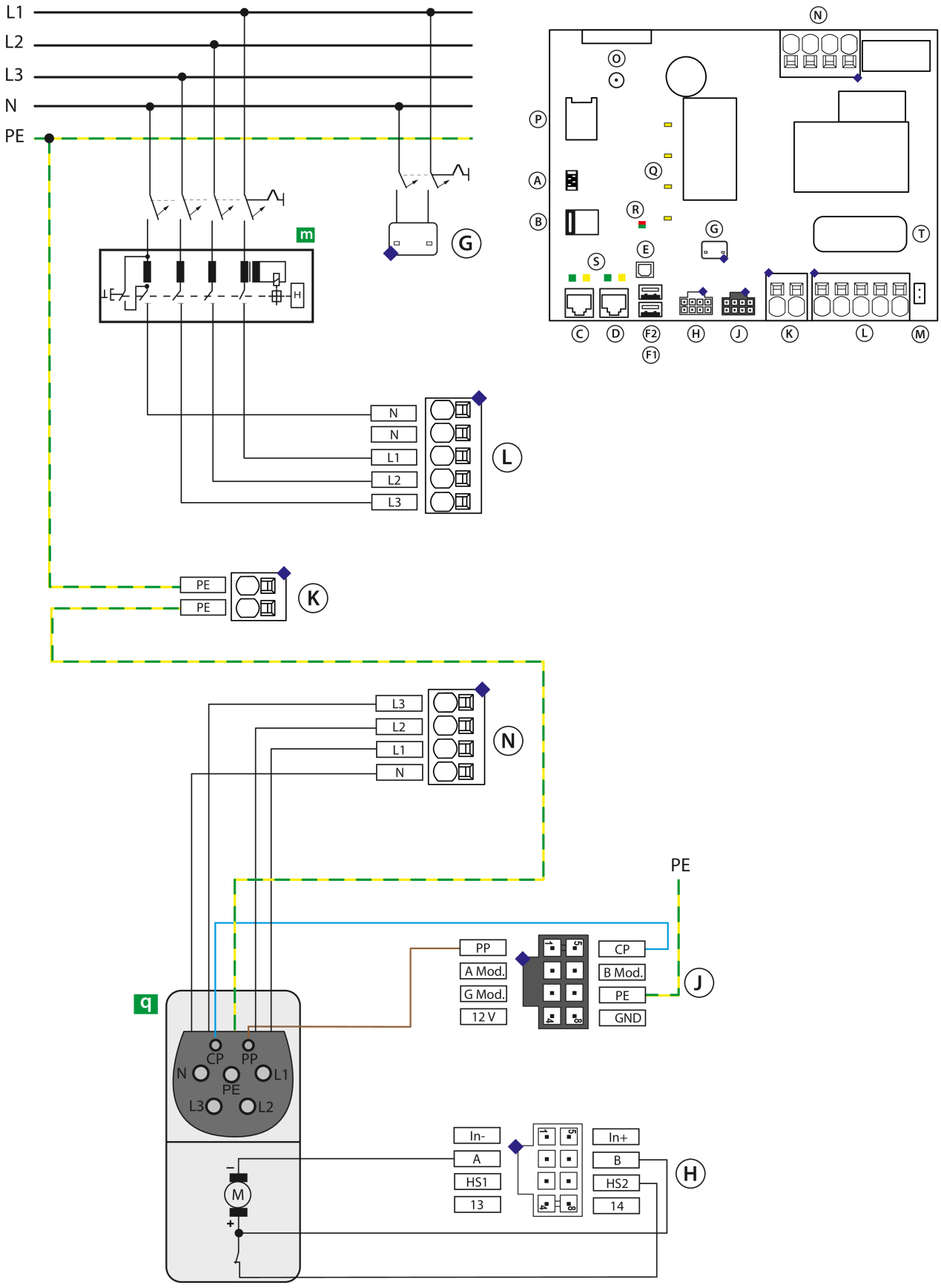
Functional description

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.

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

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

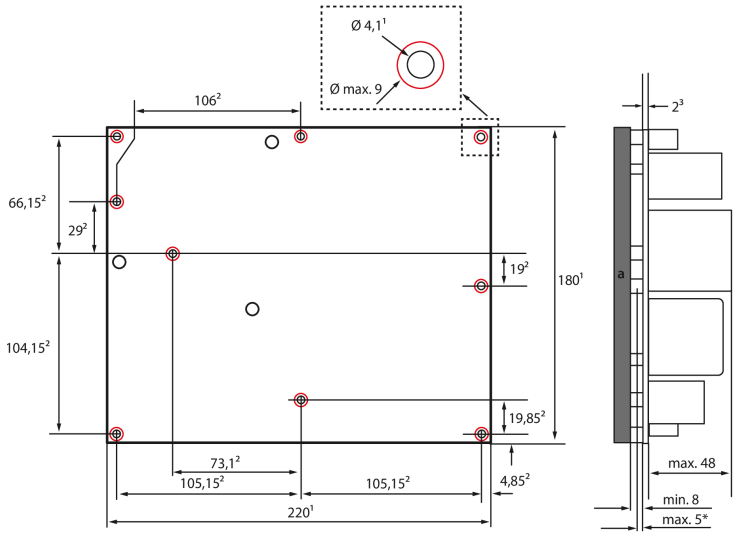
Usage variants of the USB type A interfaces (F)

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)*

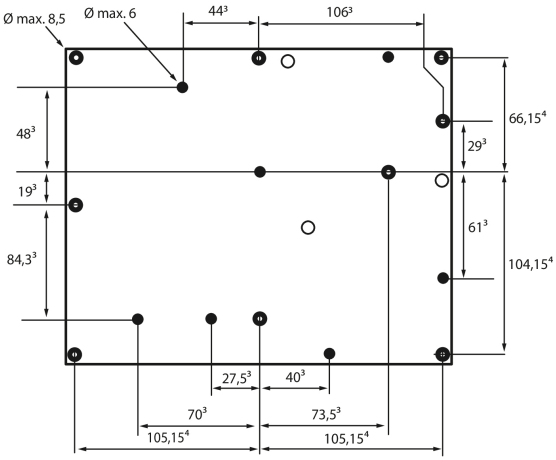
Dimension diagram

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*

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).

Technical 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 V / 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

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

Standards and approvals

CE UKCA

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

Bender GmbH & Co. KG

Londorfer Straße 65
35305 Grünberg
Germany

Tel.: +49 6401 807-707
emobility@bender.de
www.bender.de