

CC612 EV charge controller

Charge controller for electric vehicle charging stations, wall boxes and street light charging points



Charge Controller CC612



CC612

Device features (depending on the variant)

- Charge controller in accordance with IEC 61851-1 (mode 3 charging)
- Master and slave operation configurable
- Can be integrated in single- or three-phase systems up to 80 A
- Smart Grid enabled using standard OCPP functionality
- OCPP 1.5 and OCPP 1.6 compliant with JSON, SOAP and Binary implementation
- Supported mobile networks: 4G (LTE), 3G (UMTS) and 2G (GSM) with an integrated 4G modem
- 2 USB interfaces:
 - 1 CONFIG for local configuration
 - Extension port for peripheral USB devices (Ethernet/WiFi home applications)
- Master/slave hardware configuration
- Control Pilot and Proximity Pilot signal management
- Universal charge plug control (support for different vendors of sockets)
- Configurable support for one additional household socket
- Can connect to eHZ or Modbus meters and to meters with an S0 interface
- User interface board for customer-specific applications
- Configurable 3-channel input/output extension interface for additional functionality
- Only an external RCD type A is required.
- Continuous monitoring of AC and DC fault currents using the patented DC fault current monitoring module
- Internal temperature sensors
- Dynamic load management to optimally distribute the available power among all charging points and signal the maximum power to the vehicle
- ISO/IEC 15118 power line communication (PLC) for plug & charge and load management systems

Product description

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

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



Please refer to the manual to check in which countries devices with an integrated 4G modem may be operated.


Functional description

As well as the charge controller, a charging system also consists of a type A RCD, a relay contactor, which is directly connected to a type 1 or type 2 socket, or to an attached cable with a type 1 or type 2 plug.

General functions

- A charging system may also consist of a meter, and if the meter should be read digitally, either a smart digital meter (EMH eHZ) or a digital Modbus meter is required.
- The charge controller reads the digital eHZ meter readings using a standard optical reader attached to the charge controller via an RJ10 cable.
- If the Modbus version is used, the Modbus wires are attached directly to the charge controller.
- Alternatively, any meter with an S0 interface can be attached to one of the available inputs.
- A 12 V power supply is needed to operate the charge controller and an RFID module can be used to facilitate simple user interaction. The RFID module is a separate PCB and is connected to the charge controller using a standard RJ45 cable.
- Power flow toward the vehicle is controlled by the contactor (using a signal voltage of up to 30 V), which is itself controlled by the the charge controller via a relay in the charge controller.
- The SIM card slot (available on charge controller Master variants only) is positioned on the charge controller front panel. The SIM card can have a PIN number which can be configured via an internal configuration web interface. The APN settings for the card can also be configured via an internal configuration web interface.
- Also positioned on the front panel are two USB interfaces:
 - The interface known as CONFIG is used to configure the charge controller. Optionally, this interface can also be used to apply software updates.
 - The USB Type-A interface allows the connection of peripheral USB devices.
- Only the front panel of data gateways with 4G modem variants features a connection for a 4G antenna.
- 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 EV and the charging system is possible via ISO 15118 compliant Powerline Communication (PLC).
- If a malfunction occurs, a report is sent to the backend system using the OCPP protocol.

- Data management and control functionality of the charge controller:
 - Termination of the charging process after tripping of the residual current device (RCD) due to a residual current.
 - Detection of critical fault currents by the RCM sensor. For the vehicle owner, this can be an early warning, provided that the charge controller is connected to an energy management system and that it supports this function.
 - Load current and cooling control (via a temperature sensor)
The charge controller has internal temperature sensors (on the inside of the controller housing) that allow the temperature in the ambient 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 an ambient temperature within the permissible range of the components used in a charging system. Two temperature thresholds can be set on the manufacturer configuration tab and are based on measurements in common housing scenarios. The first threshold reduces the charging current to the configured value if it is exceeded. The second threshold will suspend charging.

 *The temperature measurement is an estimation based on temperature sensors positioned on the inside of the controller housing where the actual temperature is affected by heat generated by the controller itself. Because the threshold values are based on measurements in common housing scenarios, each charging system vendor should undertake practical measurement experiments to validate the correctness of these thresholds and add offsets if necessary.*

- Dynamic load management (DLM):
The charge controller comes with a DLM software, which is fully usable independent of a backend connection. It detects which charging current is applied to which phase and thus avoids the occurrence of peak loads and unbalanced loads. Maximum number of charging points in a network: 250.
- Remote:
 - Software updates
 - Temperature and residual current monitoring
 - Remote login allows for remote maintenance options that reduce the number of maintenance personal deployments per charger
 - Load management through Modbus TCP, SMA SEMP, EEBUS, ASKI

Standards

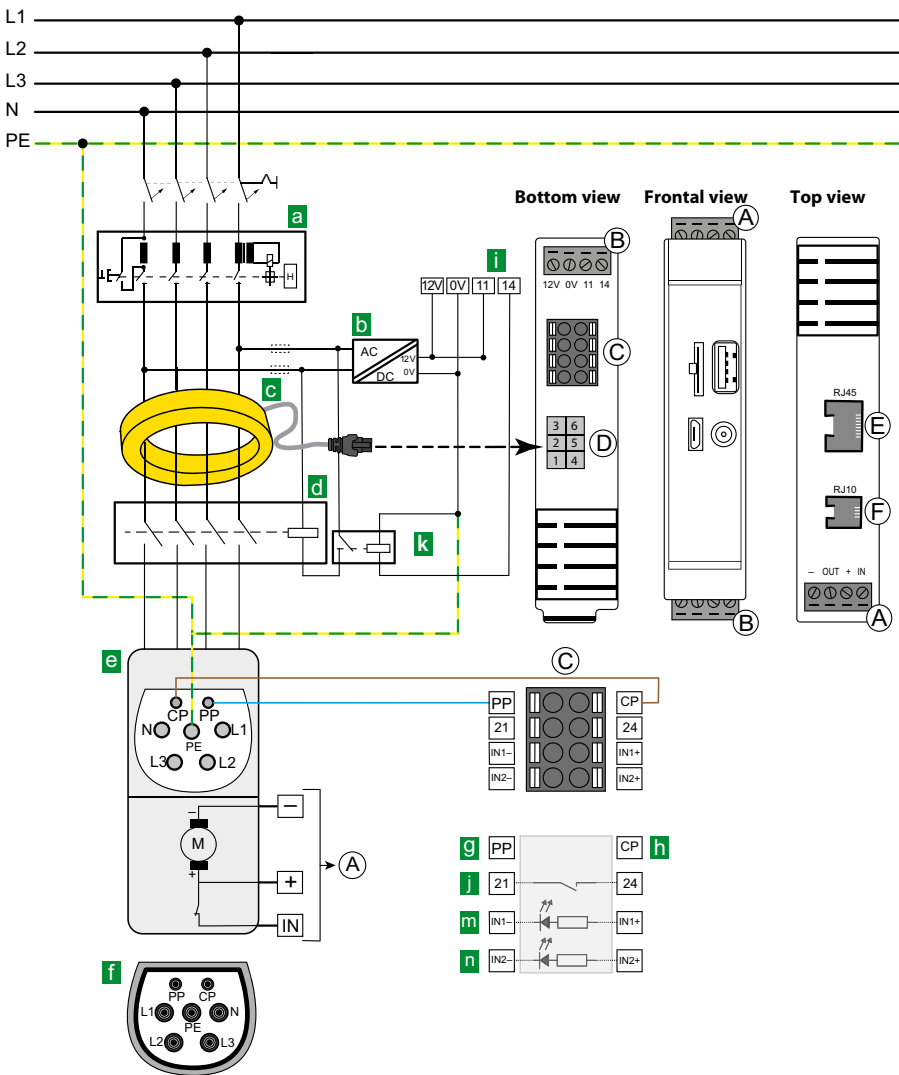
The charge controller has been developed in compliance with the following standards:

- EN 50581: 2012
- EN 61851-1: 2011
- EN 301 489-1: V2.2.0 Draft
- EN 301 511 V12.5.1
- EN 301 908-13 V11.1.2
- EN 62311: 2008
- EN 61851-22: 2002
- EN 301 489-52 V1.1.0 Draft
- EN 301 908-1 V11.1.1
- EN 301 908-2 V11.1.2

Certifications



Charging system with a type 2 socket and an intermediate relay



- A Connection locking engine
- B Connection socket User Interface
- C Connection socket
- D Connection Current Transformer (CT)
- E Terminal User Interface (RJ45)
- F Terminal Modbus/eHZ meter (RJ10)
- a RCD Type A
- b Voltage supply DC 12 V
- c Current Transformer (CT) with plug
- d Contactor
- e Type 2 socket ¹⁾
- f Type 2 plug ¹⁾
- g Connection Proximity Pilot
- h Connection Control Pilot
- i Relay 1: Control pin contactor
- j Output relay 2
- k Intermediate relay
- m Optocoupler input 1
- n Optocoupler input 2

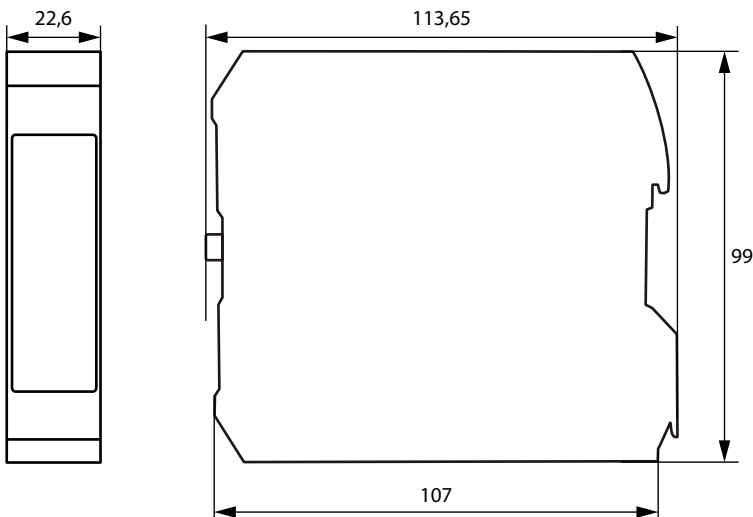
¹⁾ Mennekes Typ-2-socket

Assignment of the terminals

A1	IN	C1	PP
A2	+	C2	CP
A3	OUT	C3	21
A4	-	C4	24
B1	12V	C5	IN1-
B2	0 V	C6	IN1+
B3	11	C7	IN2-
B4	14	C8	IN2+

Dimension diagram

Dimensions in mm



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

Rated voltage	12.5 V
Overvoltage category/Pollution degree	III/3
Rated impulse withstand voltage	800 V
Altitude	≤ 2000 m AMSL

Supply voltage

Nominal voltage	DC 12 V
Operating range of the supply voltage	DC 11.4...12.6 V
Nominal current	1 A

Residual direct current monitoring module*

Measuring range	100 mA
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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
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* patented 6 mA DC residual current tripping
(Patents: EP 2 571 128 / US 9,397,494 / ZL 201210157968.6 / CN 103001175, EP 2 813 856)

Wireless parameters (Optional for data gateways with 4G modem only)

Frequency bands	800 MHz/850 MHz/900 MHz/1800 MHz/2100 MHz/2600 MHz
Impedance	50 Ω
Data rate	GSM:

GPRS: UL 85.6 kBit/s; DL 107 kBit/s
EDGE: UL 236.8 kBit/s; DL 296 kBit/s

UMTS:

WCDMA: UL 384 kBit/s; DL 384 kBit/s
DC-HSDPA: DL 42 MBit/s
HSUPA: UL 5.76 MBit/s

LTE:

LTE FDD: UL 5 MBit/s; DL 10 MBit/s
LTE TDD: UL 3.1 MBit/s; DL 8.96 MBit/s

Required antenna	Panorama Antennas B4BE-7-27-05SP
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Inputs/outputs and display

LED ALARM	yellow
LED READY	green
LED PLC	green
USB Extension interface (Ethernet, WLAN, ...)	USB socket type A
CONFIG (Configuration interface)	Micro socket type AB
SIM card (For data gateways with 4G modem only)	micro SIM

Terminal A:

IN	Actuator IN
+	Actuator +
OUT	Actuator pul-up output
-	Actuator -

Terminal B:

12V	+12 V IN*
OV	0 V IN
11	Relay 1 NO
14	Relay 1 NO

Terminal C:

PP	Proximity Pilot
CP	Control Pilot (Powerline Communication PLC acc. to ISO/IEC 15118)
Maximum cable length (PP, CP)	< 15 m
21	Relay 2 NO
24	Relay 2 NO
IN1-	Input 1-
IN1+	Input 1+
IN2-	Input 2-
IN2+	Input 2+
CT	Current transformer

Input 1 and Input 2:

Input voltage	DC 11.4...25.2 V
Input current	1.7...3.8 mA
Meter	Meter interface
User interface	User interface RJ45
Max. cable length to RFID module	< 3 m

Switching elements

Relay 1	configurable
Relay 2	charging contactor
Switching elements	2 x 1 N/O contacts
Operating principle	N/C operation
Electrical service life	10.000 switching cycles

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

Rated operational voltage U_e	30 V
Rated operational current I_e	1 A
Minimum contact rating	1 mA ≥ 10 V
Rated voltage U_i	32 V

Environment/EMC

EMC	see CE declaration in the manual
Operating temperature	-30...+70°C

Climatic conditions acc. to IEC 60721:

Stationary use (IEC 60721-3-3)	3K23 (except condensation, water and formation of ice)
Transport (IEC 60721-3-2)	2K11
Long-term storage (IEC 60721-3-1)	1K21

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

Connection cable	RJ45
Maximum cable length	< 3 m

Connection type (terminal block C)
push-wire terminal

Connection specifications:	
rigid /flexible	0.2...1.5 mm ² (AWG 24...16)
flexible with ferrule without plastic sleeve	0.25...1.5 mm ² (AWG 24...16)
flexible with ferrule with plastic sleeve	0.25...0.75 mm ² (AWG 24...20)
Stripping length	10 mm
Opening force	0.5 - 0.6 Nm (4 - 5 lb-in)

Connection type (terminal block A and B)
push-wire terminal

Connection specifications:	
rigid /flexible	0.2...1.5 mm ² (AWG 24...16)
flexible with ferrule without plastic sleeve	0.25...1.5 mm ² (AWG 24...16)
flexible with ferrule with plastic sleeve	0.25...0.75 mm ² (AWG 24...20)
Stripping length	10 mm
Maximum cable length	250 m

Connection type (terminal block H)
push-wire terminal

Connection specifications:	
rigid /flexible	0.2...1.5 mm ² (AWG 24...16)
flexible with ferrule without plastic sleeve	0.25...1.5 mm ² (AWG 24...16)
flexible with ferrule with plastic sleeve	0.14...0.75 mm ² (AWG 24...20)
Stripping length	7 mm

Other

Operating mode	continuous operation
Degree of protection	IP20
DIN rail mounting	IEC 60715
Documentation number	D00325
Weight	160 g

* Surge test is carried out at Phoenix power supply STEP-PS/1AC/12DC/1.5.
The 12V cable length is less than 1 meter.

Ordering information

User interface	RDC-MD ²⁾	Modem	PLC ¹⁾	LEDs	Meter	Type	Art. No.
■	■	4G	■	Ready, Alarm, PLC	eHZ- and SO interface	CC612 -1M4PR	B94060011
					Modbus and SO interface	CC612 -2M4PR	B94060013
			-	Ready, Alarm	Modbus and SO interface	CC612 -2M4R	B94060015
		-	■	Ready, Alarm, PLC	eHZ- and SO interface	CC612 -1S0PR	B94060005
					Modbus and SO interface	CC612 -2S0PR	B94060007
			-	Ready, Alarm	Modbus and SO interface	CC612 -2S0R	B94060010

¹⁾ Powerline Communication acc. to ISO/IEC 15118

²⁾ 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.

Accessories

Designation	Art. No.
RFID114 with RJ45 cable (length 500 mm)	B94060114
RFID117-L1 with RJ45 cable (length 500 mm)	B94060117
Measuring current transformer CTBC17 (PCB variant) ¹⁾	B98080070
Measuring current transformer CTBC17 (cable variant, cable length 325 mm) ¹⁾	B98080071
Connection cable CTBC17-Cable1470 incl. clip housing (cable length 1470 mm)	B98080542
Connection cable CTBC17-Cable 325 incl. clip housing (cable length 325 mm)	B98080541
Connection cable CTBC17-Cable 180 incl. clip housing (cable length 180 mm)	B98080540
DPM2x16FP (display module)	B94060120

¹⁾ The measuring current transformer has an internal diameter of 17 mm.



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