



IPM1300

Integrated power module for charge controllers

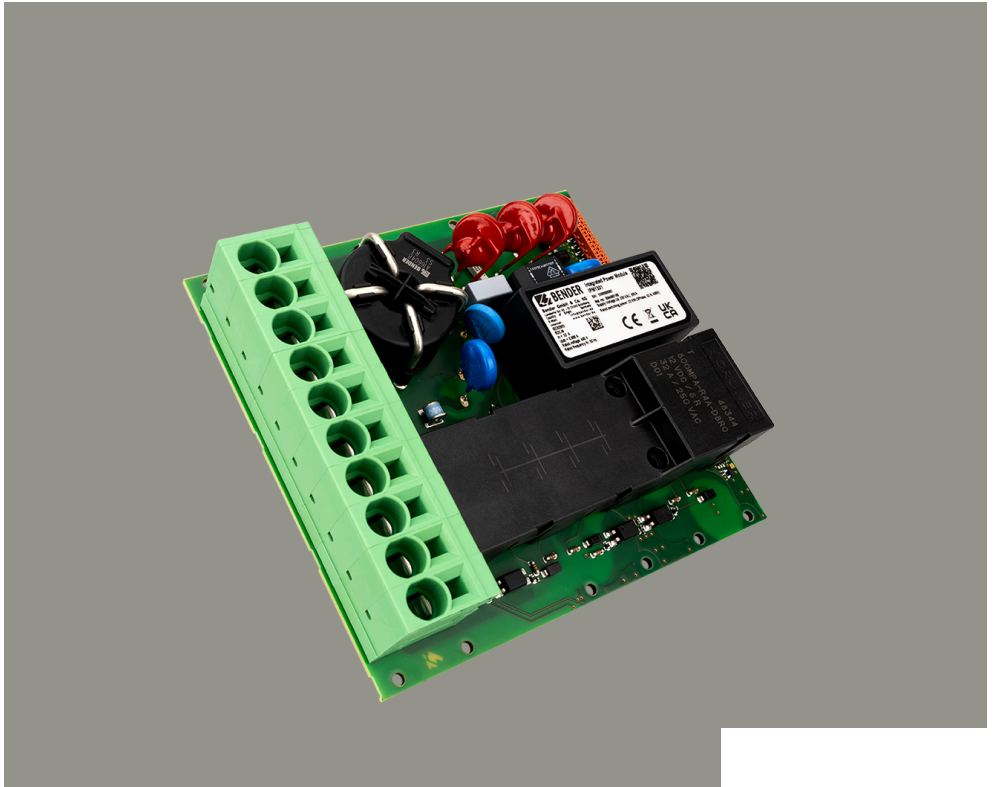


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1 General information

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: Fast assistance | Bender GmbH & Co. KG.

1.4 Training courses and seminars

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

www.bender.de > 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, see "www.bender.de > service & support".

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 www.bender.de > service & support.

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:

- 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 has been de-energised. The rules for working on electrical systems must be observed.

2 Function

2.1 Intended use

The IPM1300 integrated power module, referred to as power module in the following, is a component for the set-up of Mode 3 charging stations for electric vehicles (EV). It is intended exclusively for use with Bender charge controllers as an accessory. Any other use than that described in this manual is regarded as improper.

This document is to be used together with the manual D00520 for the following charge controllers:

Type	Part No.	Link to manual
ICC1314-Connect-Plus-G1	B94060030	
ICC1314- Companion-G1	B94060031	

2.2 Device features

- 22 kW power relay
- Surge Protection Device (SPD)
- Integrated DC power supply, including a ICC1314 charge controller
- Integrated residual current transformer for DC fault current monitoring
- integrated temperature sensors
- 20-pole flat band cable connector for connection to the charge controller by using a flat band cable
- PE monitoring

2.3 Functional description

The power module is an assembly that expands the functional range of the charge controller. The assembly combines many individual components of a Mode 3 charging unit.

A connection to the charge controller via a 20 pole flat band cable, enables the power module to combine important components of an AC charging system that are required by standards according to IEC 61851-1.

The integrated monitoring of the DC residual current means that an RCD type A in the charging system is sufficient.

2.4 General functions

- The IPM1300 contains an integrated DC voltage supply. It is supplied by the AC network connection. The ICC1314 charge controller is supplied with power via the flat band cable. No separate voltage supply is required.
- The device can be used for charging systems with up to 22 kW of charging capacity. The charge controller controls the charging process in the charging system and thereby the main relay of the power module.
- The signal of the integrated residual current transformer is evaluated by the charge controller. The measuring current transformer and charge controller together form a 6 mA DC residual current detecting device according to IEC 62955. (Reference to chapter "DC residual current monitoring module (RDC-M)" in the ICC1314 manual)
- The residual current transformer is connected in such a way that monitoring of the PE connection in the direction of the infrastructure is possible. No additional wiring is required on the charge controller. (see chapter "PE monitoring and Weld-Check", page 7)

- To monitor the 3-phase system, the power module provides the charge controller with information about faults in the rotating field. Further evaluation takes place in the charge controller.
- The device supplements the charge controller with additional temperature sensors for recording the current PCB temperature. Based on these, the charge controller can adjust the charge current depending on the temperature. (Reference to chapter "Load current and cooling control (temperature monitoring)" in the ICC1314 manual)
- The power module supplements the charge controller with a three-phase switching element. It is activated by a control signal from the charge controller.
- A normatively required monitoring of the Weld Check is integrated in the power module. The evaluation takes place in the charge controller. (see chapter "PE monitoring and Weld-Check", page 7)

2.4.1 PE monitoring and Weld-Check

PE monitoring

The PE monitoring checks whether there is a connection from the charge controller to PE using sensors on the integrated power module. For this purpose, N, PE, and at least L1 must be connected to the IPM. Due to the capacitance of the supply line, the supply line length that can be checked is limited.

When using the PE monitoring, the reduced input voltage range must be taken into account (see chapter "Tabular data", page 15).

**ADVICE**

PE monitoring does not replace tests (e.g. protective earth resistance).

**ADVICE**

The Ethernet shield and the USB shield of the charge controller ICC1314 are directly connected to PE. This must be taken into account in the test!

**ADVICE**

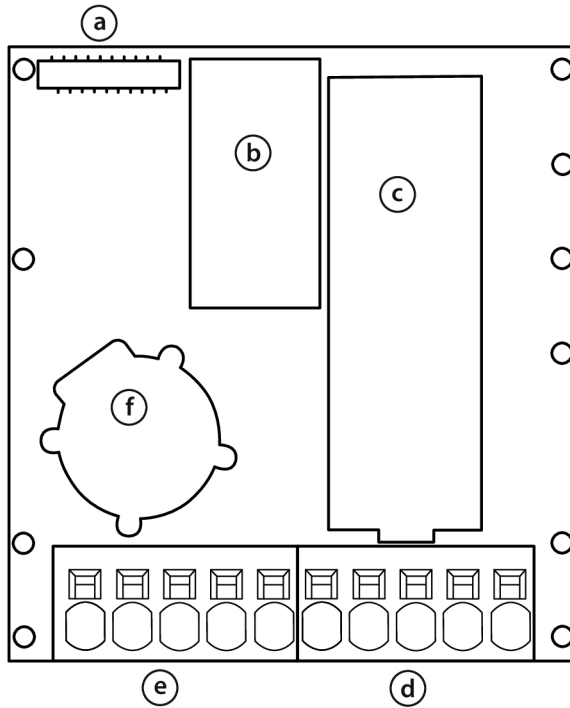
HV test: PE monitoring is coupled to PE via a protective circuit and with approximately 80 kΩ. Above 500 V, a leakage current flows to PE.

Test voltages above AC 1000 V/1 s are not permissible!

Weld-Check

By means of the measuring functions integrated on the IPM1300, impermissible closing of the relay contacts, e.g. due to welding or sticking, can be detected.

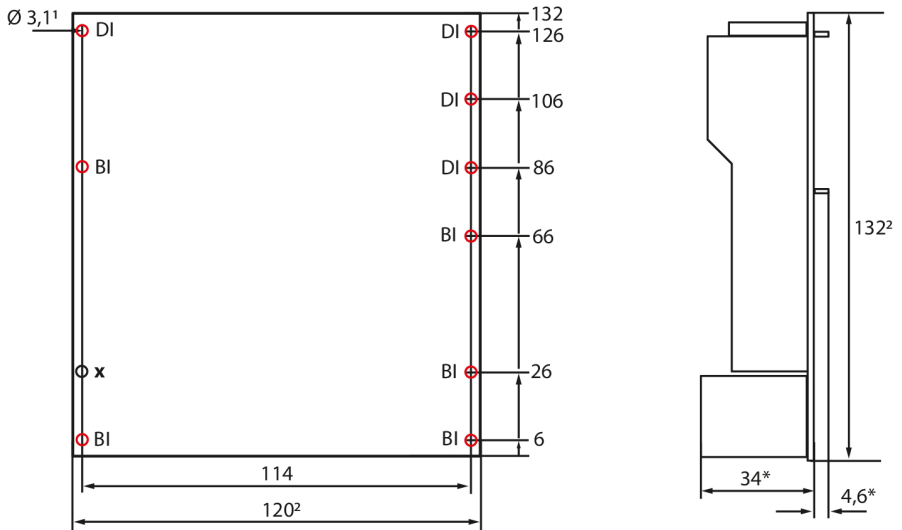
2.5 View of device



- a Charge controller connection, 20 pole
- b 12 V power supply unit
- c Main relay
- d Connection, type 2 connector
- e AC network connection
- f Measuring current transformer

3 Dimensions and mounting

Dimension diagram



Dimensions in mm

- * max.
- 1 ± 0.1 mm
- 2 ± 0.2 mm - or all other dimensions according to DIN ISO 2768-f
- x not recommended, only insulated

i Red markings: possible fixing points

i Recommendation for fastening:

- Pan head screws: 4 x M 2.5
- Torque: 0.36 Nm



CAUTION Wrong mounting of the PCB

Mechanical stress (tilting) of the PCB

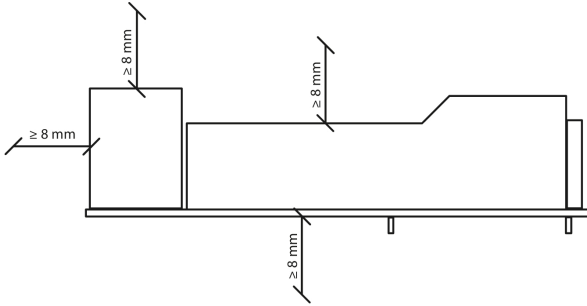
When mounting, ensure that the PCB is flush-mounted.



ADVICE

DI: screw connection point with **double insulation** (distance to other positions or devices > 8 mm)

BI: screw connection points with **basic insulation**

Recommended distances to other positions and devices

Minimum distance between this area of the charge controller and all other positions or devices in an IT or TN system.

4 Connection

4.1 Connection conditions



DANGER System parts may be live
(integrated power module and charging station up to 230 V / 400 V)

Electric shock

Before touching system parts, ensure that it has been de-energised.



CAUTION Sharp-edged terminals

Cut injuries

Handle enclosure and terminals with care.

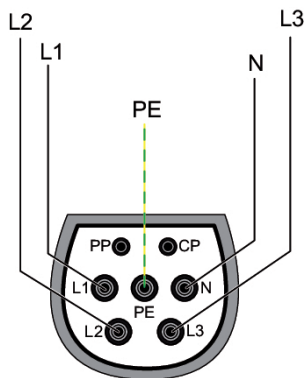


Information:

- PE is connected to "0 V"; 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, measuring current transformer and charging cable): < 3 m
- The flat band cable, included in the scope of delivery, must be used for connecting the charge controller to the power module
- A distance of ≥ 8 mm between live parts and the flat band cable must be maintained (for further information, see "Tabular data", page 15)
- The flat band cable only fits onto the connector in one direction; plug in the connector carefully
- CP and PP are not generated or provided by the power module. The relevant wires must be connected to the plug intended for this by the charge controller (terminal A on ICC1314)

4.2 Connection plug connections

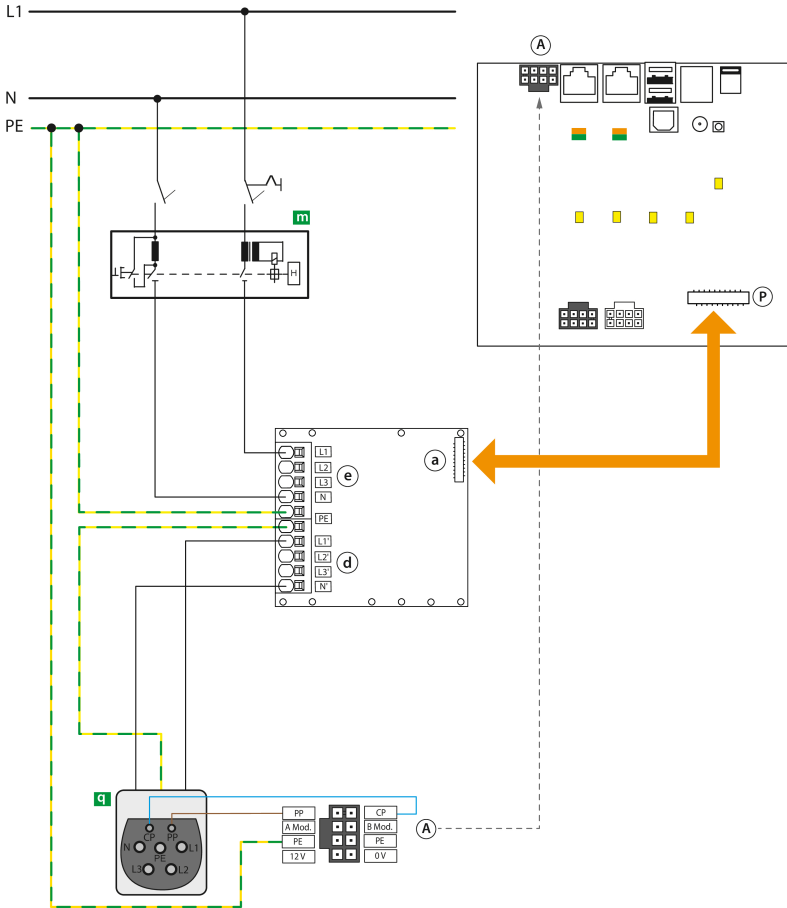
Type 2 plug



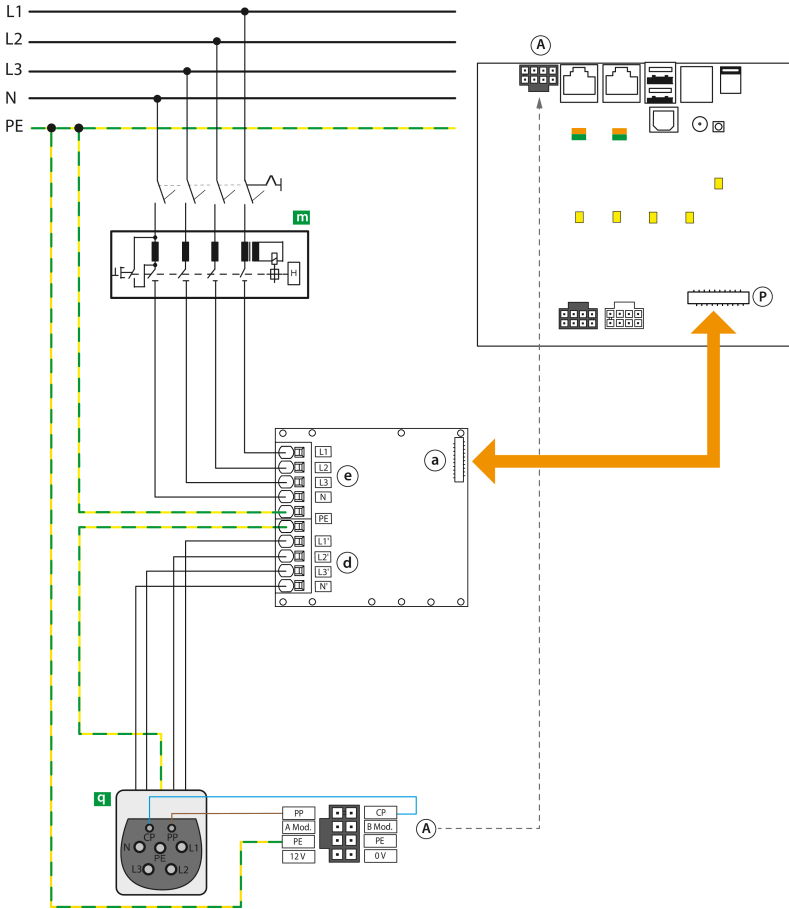
4.3 Connection type 2 plug

The following wiring diagrams illustrate the wiring options of the power module to the ICC1314 charge controller.

Single phase connection



Three phase connection



Legend for both connection options

A*	12 V, PE, Modbus meter, CP, PP (Molex Nano-Fit 105310-3508)	d	Connection type 2 connector
P*	Connection integrated power module (IPM) 20-pole	e	AC network connection
		m	RCD Type A
a	Charge controller connection 20 pole	q	Type 2 socket or fixed charging cable

* Refers to ICC1314

5 Commissioning

The power module must be connected to a suitable charge controller that supports the operation of the module. To avoid malfunctions and voltage failures, only use the approved connection cables (see chapter "Tabular data", page 15).

The following settings must be configured in the ICC1314 charge controller:

1. Selection of the power board
Subchapter Manufacturer → Power Board → IPM1300 (B94060198)
2. Main relay setting for welding detection
Subchapter Weld Check → Activate 230 V Weld-Check with PE-monitoring

6 Technical Data

6.1 Tabular data

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

Rated voltage	250 V
Overvoltage category (terminal e)	III
Pollution degree	2
Rated impulse voltage	4 kV
Operating altitude	≤ 2000 m above mean sea level

AC network connection, single-phase / three-phase (terminal block e (L1, L2, L3, N, PE))

Nominal voltage	220 ... 230 V / 400 V
Nominal voltage tolerance	198 ... 253 V / 343 ... 400 V
Nominal voltage tolerance*	208 ... 253 V / 361 ... 440 V
Charging current max.	1 x 32 A / 3 x 32 A
Charging power max.	7.3 kW / 22 kW
Frequency	50 Hz
Self-consumption max.	5.5 W

* when using PE monitoring

Connection, type 2-socket AC single-phase / three-phase (terminal block d (L1, L2, L3, N, PE))

Nominal voltage	230 V / 400 V
Charging current max.	1 x 32 A / 3 x 32 A
Charging power max.	7.3 kW / 22 kW
Frequency	50 Hz

Cable lengths/ cable types

Terminal blocks e and d

Connection type	Push-wire terminal
Connection data*	
Rigid/ flexible	2.5 ... 16 mm ²
Flexible with ferrule without plastic sleeve	2.5 ... 16 mm ²
Flexible with ferrule with plastic sleeve	2.5 ... 10 mm ²
Stripping length	18 mm

Charging cable length max. (terminal „d“)	< 10 m
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* Depends on the power capacity connected to the power module

Flat band cable connection a

Permissible connection plug/ connector system	Micromatch W+P 6990-5-20-1-PPTR
Flat band cable length	< 0.3 m

Environment

Operating temperature	-25 ... +65 °C
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Classification of climatic conditions acc. to IEC 60721

Stationary use (IEC 60721-3-3)	3K22
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)	1M2

Other

Protection class	IP00
Weight	ca. 470 g

6.2 Standards and approvals

The IPM1300 has been developed in compliance with the following standards:

- IEC 62955
- DIN EN IEC 61851-1
- DIN EN IEC 61851-21-2
- IEC 61439-1
- DIN EN 61439-7
- IEC 61439-7



6.3 Declarations of conformity

EU Declaration of conformity

The device is in compliance with the following directives:

- Low Voltage Directive (2014/35/EU)
- Directive on Electromagnetic Compatibility (2014/30/EU)

UK Declaration of Conformity

The device is in compliance with the following regulations:

- Electromagnetic Compatibility Regulations 2016
- Electrical Equipment (Safety) Regulations 2016

6.4 Ordering information

Type	Part number	Manual no.
IPM1300	B94060198	D00462



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