Operating manual

IC-CPD AC charging cable LAC.11-1

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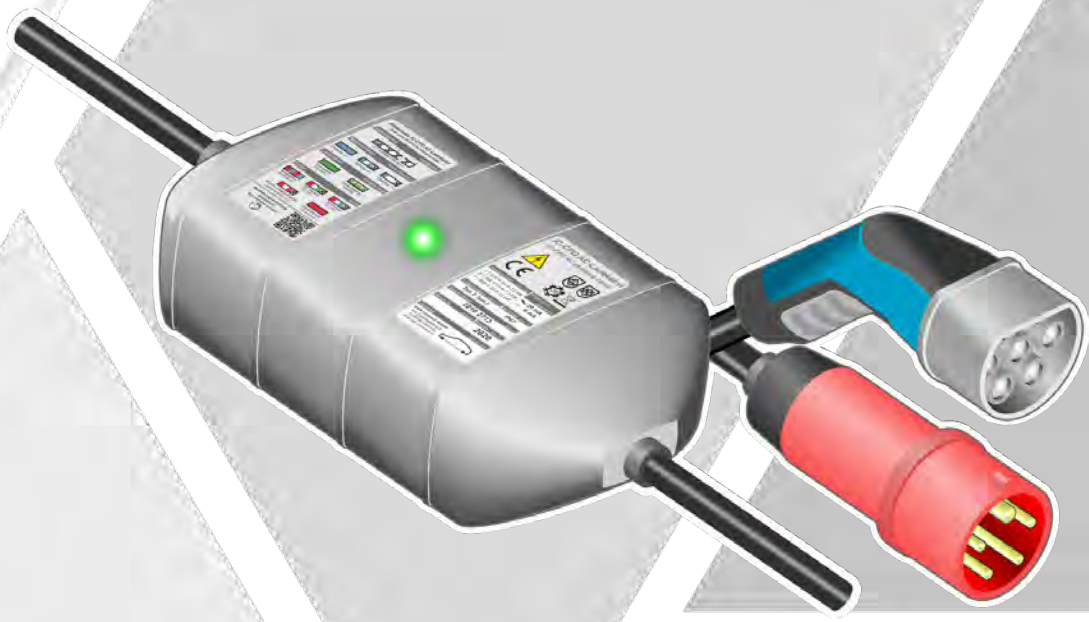

CAR-connect

Revision	Date	Reason
V00	13.10.2020	First edition
V01	12.01.2021	Adaptation to target group
V02	26.01.2021	Chapter revision: - “Technical data”

Legal notice

Legal notice

Manufacturer

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Image sources

Symbols for warnings, prohibitions, mandatory actions and standards are taken from publicly accessible sources, such as the Internet. CAD product images and product photos are provided by the manufacturer. Images showing the product in use are provided with a reference to the source.

Contents

Contents

1 Introduction

1.1 Preliminary information

Read through this operating manual carefully before using the product.

The product is delivered with a USB stick containing the operating manual in various languages. You can find the current version and additional languages on our homepage.

There is a QR code on the product. You can scan this QR code with a device that is connected to the internet to go directly to the download area for your product.

The operating manual is an essential part of the product and must be kept together with the product. If you sell or transfer ownership of the product, the operating manual must be handed over to the new operator.

In addition to this operating manual, all the relevant regulations for charging traction batteries in electric vehicles are binding. They include but are not limited to: instructions from the vehicle manufacturer and the operator, company-specific safety requirements and the latest engineering standards for working with electric vehicles.

1.2 Validity of the declaration of conformity

The declaration of conformity applies to the product described in the operating manual. Any changes, modifications or extensions shall void the declaration of conformity and the risk assessment.

1.3 Manufacturer specifications

CAR-connect GmbH

Since its founding, our company has focused on groundbreaking solutions for electromobility. CAR-connect develops and produces custom solutions for the automotive industry, repair shops and special vehicle fleets.

Our core business is developing and producing innovative high-voltage charging technology for electric vehicles. Our portfolio also includes measurement and diagnostic technology for the entire vehicle and battery analysis equipment.

With extensive experience in software and hardware development, CAR-connect is your dependable partner at every production stage, from prototyping to series production.

CAR-connect GmbH – Experience, Expertise and Innovation – MADE IN GERMANY

2 Safety

This safety chapter provides information about the following:

- The warning levels contained in this operating manual
- Important safety instructions for the product
- Intended use of the product
- Requirements for the target group

This operating manual is only valid for the following product:

Item number	22102713
Designation	IC-CPD AC charging cable LAC.11-1

2.1 Warning levels

This chapter provides information about the warning levels used in this operating manual.

DANGER

Failure to observe the safety instructions WILL result in death or serious injury!

WARNING

Failure to observe with the safety instructions CAN result in death or serious injury!

CAUTION

Failure to observe the safety instructions CAN result in minor physical injury!

CAUTION

Failure to observe the safety instructions can lead to damage to the product!

2.2 Important safety instructions

This chapter contains the safety instructions that must be observed when handling the product.

DANGER

Danger of fatal electric shock!

The electrical voltage in the product is lethal and will cause death by electric shock!

Liquids and moisture may cause short circuits!

- Observe the requirements of the product's protection class (see the "Technical data" section)
- Do not let the product come into contact with liquid chemicals!
- Do not attempt to open or damage the product!

WARNING

Risk of explosion!

Product components may produce sparks and electric arcs.

- Never disconnect high-voltage plug connections while under load!
- Do not use the product in potentially explosive atmospheres!
- Ensure that the product is at least 50 cm above the ground during operation!

WARNING

Danger of electric shock!

The electrical voltage in the product is dangerous and can cause serious injury from electric shock!

- Never attempt to power other devices with the product!

WARNING

Danger of fatal electric shock!

Defective and damaged products can no longer guarantee protection against electrical voltage!

- Do not let the product come into contact with chemicals!
- Replace a defective or damaged product immediately!
- Never attempt to repair or tamper with the product!

CAUTION

Overheating!

If excessive heat is produced, the product is automatically switched off!

- Do not expose the product to direct sunlight!
- Never operate the product in a closed container!
- Observe the permitted ambient temperatures (see the “Technical data” section)!

2.3 Intended use

The AC charging cable is an in-cord control and protection device (“IC-CPD” for short) that is used to recharge traction batteries in electric vehicles. The AC charging cable has been developed in accordance with the latest European regulations for cable-based charging systems and complies with the legal requirements for charging mode 2 (AC charging).

The AC charging cable has dynamic power adjustment and control and protection functions that make it suitable for all the conventional electric vehicles available on the market.

Use the AC charging cable only on the charging socket of your electric vehicle! Connect the AC charging cable only to fused power sockets!

Do not use extension cables. Use only adapters that the manufacturer has approved for the product!

Any use beyond what is listed here is prohibited!

2.4 Requirements for the target group

DANGER

Danger of fatal electric shock!

The electrical voltage in the product is lethal and will cause death by electric shock!

- Keep the product away from children and adolescents!

Only qualified personnel may work with this product!

In this operating manual, qualified personnel is defined as personnel meeting the following requirements:

- Personnel have received comprehensive training on working with electric vehicles.
- Personnel have received comprehensive training on working with charging mode 2.
- Personnel must not be under the influence of medication or drugs while using the equipment!

2.5 Duties of the operator

The operator is responsible for ensuring that all staff working with the AC charging cable fulfill the requirements for the target group.

Furthermore, the operator is responsible for ensuring the following:

- The AC charging cable is always in perfect working order.
- The regular inspection intervals for the AC charging cable are observed and recorded.

2.6 Note to the grid operator

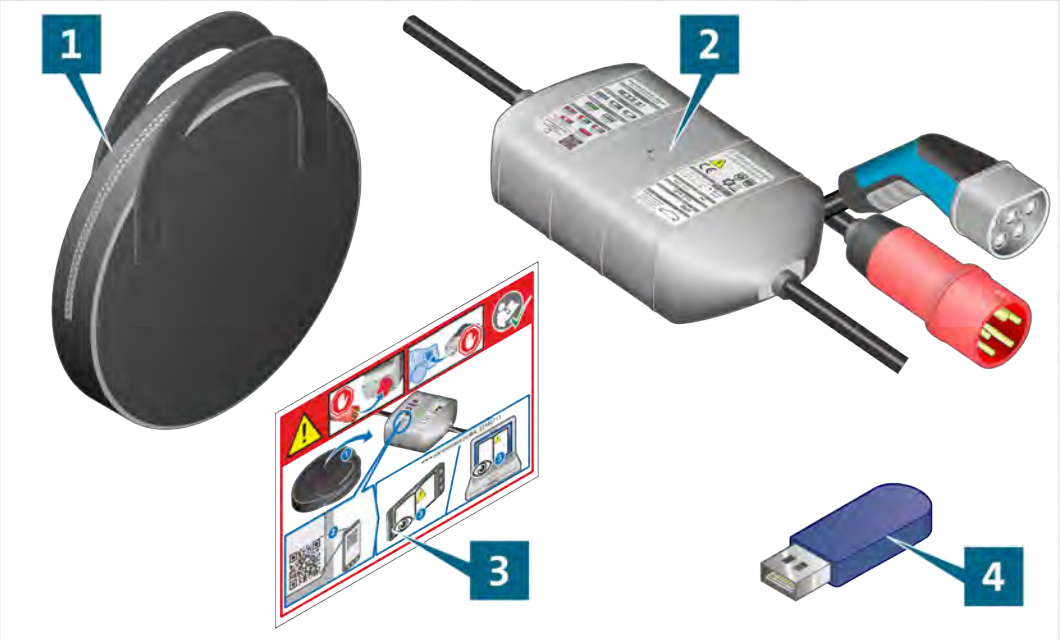
In some countries, you may require a permit from the energy utility to operate electric vehicle charging stations.

- Contact your grid operator before starting up the product.
- Have the grid operator or an electrician check your home's connection to see if it is suitable for operating an electric vehicle charging station.

3 Product description

3.1 Scope of delivery

Immediately check the condition of the product and the completeness of the delivery. If anything is missing or defective, please contact the manufacturer immediately.



(1) Carrying case

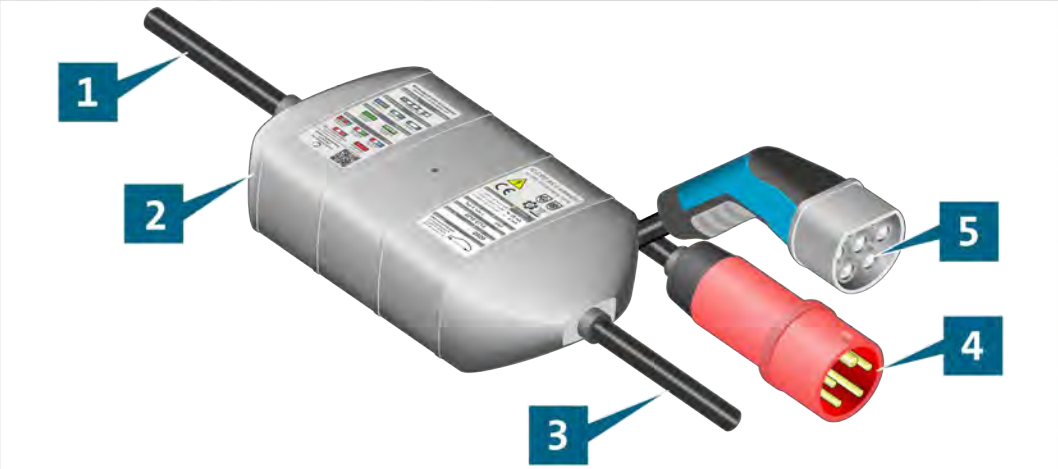
(2) AC charging cable

(3) Unpacking instructions

(4) USB stick with operating manual

3.2 Design

Product design:



(1) AC charging cable
(2) Control unit
(3) AC power supply cable
(4) Power supply plug, CEE 16 A, 5-pin
(5) AC charging plug, type 2

3.3 Symbols and connections

The following symbols and information are shown on the product stickers:

Symbol	Meaning
	Electrical hazard!
	Observe the operating manual!
AC / ~	The “AC” and “Phase (~)” markings indicate that the product must be connected only to alternating current sources.
	The disposal instruction prohibits disposal of the product with household waste. Always dispose of the product in accordance with all local disposal regulations.
	Frost protection notice: observe the permitted ambient conditions (see the “Technical data” section).
	Indicates that the product does not have a residual-current circuit breaker (RCCB).
	QR code for accessing the operating manual on mobile devices.
	The protective earth symbol indicates that the product’s power supply plug has a protective conductor.
	The CE marking certifies that the product complies with all applicable European regulations and has been subjected to the prescribed conformity assessment procedure.

3.3.1 Nameplate

The following information is shown on the nameplate (see also the “Technical data” section):

Information	Meaning
	The serial number is used in conjunction with the manufacturer part number to identify the product.
	The manufacturer part number is used in conjunction with the serial number to identify the product.

Information	Meaning
	This area shows the year in which the product was manufactured.
	This area shows the charging port equipped on the product.
	This area shows the required specification for the power supply.
	This area shows the maximum permissible fault current.
	This area shows the product’s protection class.
	This area shows information about the manufacturer of the product.

3.3.2 “Flash codes” sticker

The “flash codes IC-CPD AC-charging cable” sticker is divided into several sections. The areas are shown in chronological order. The meaning of the individual flash codes is described in the “Status display” section.

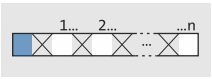
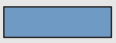
Area	Meaning
	This area shows the behavior of the status LED immediately after connecting to the power supply.
	This area shows the behavior of the status LED once the product has detected the existing power supply connection and signals that the product is ready for operation.
	This area shows the behavior of the status LED during charging.
	This area shows the behavior of the status LED when there is an error.

3.4 Status display

Immediately after connecting the AC charging cable to a power source, the product runs through a self-test. During this time, the status LED first flashes blue, then white. The number of white flashes indicates the product software version. The AC charging cable then indicates its operating state through a status LED. The operating states are shown as color signals and are broken down as follows:

- Standby (blue)
- Charging (green)
- Error (red)

The operating state is indicated by continuous illumination or flashing in one or more colors. The flashing codes are shown on the product housing and in the table below.

Flashing code	Description	Meaning
	Blue then white flashing	The number of white flashes indicates the product software version.
	Blue, continuously illuminated	Standby for three-phase power supply
	Blue, white, blue, pause	Standby for two-phase power supply
	Blue, white (long), pause	Standby for single-phase power supply
	Green, continuously illuminated	Communication has been established between the AC charging cable and the vehicle.
	Green, pulsing	The traction battery is charging.
	Alternately flashing red and blue	Temperature error
	Red, white, green, pause	DC error
	Red, white, blue, pause	AC error
	Red, white, red, pause	Communication error
	Red, continuously illuminated	Device error

You can find a description of how to eliminate individual errors in the “Troubleshooting” section.

3.5 Technical data

Rated data	Values
Manufacturer number	22102713
Power supply (CEE 16)	230 V/400 V ~, 50/60 Hz, 16 A per phase, plug: CEE 16 (red)
Internal protective devices	RCD, 30 mA AC, 6 mA DC
Output voltage and power	1~ 230 V, 3.7 kW 2~ 230 V, 7.4 kW 3~ 230 V, 11 kW
AC charging plug, vehicle side	Type 2
Weight	~ 5200 g
Dimensions L/H/W	~ 180 mm/120 mm/50 mm
Cable length	Power supply side: 1.7 m, vehicle side: 7.5 m
Protection class	**IP 67:** • The product provides protection against temporary immersion in clean water. • The product is dust-tight.

Ambient conditions	Operation	Storage	Transportation
Temperature	-25 °C to 45 °C	-25 °C to 80 °C	-25 °C to 55 °C
Elevation	Max. 2000 m	No limitation	
Humidity	Max. 95 % at 25° C		
	Condensation not permitted. Maximum permissible relative humidity: 60 % in environments with corrosive gas/air.		

4 Operation

This section provides information about the following activities:

- Checking the power supply connection
- Startup
- Starting charging
- Finishing charging
- Cleaning
- Disposal
- Maintenance

4.1 Checking the power supply connection

WARNING

Danger of fatal electric shock!

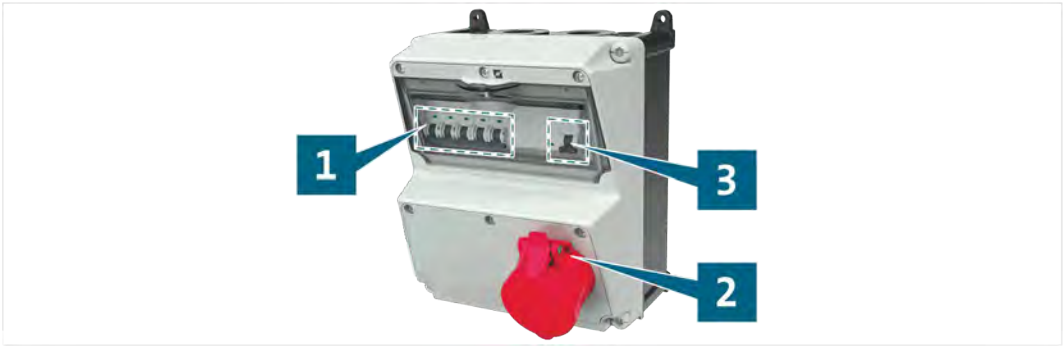
The electrical voltage in electrical installations is lethal and can cause death by electric shock!

Unprofessional and faulty electrical installations may result in short circuits and cable fires!

- Use only electrical installations that comply with the national guidelines for the installation of low-voltage systems!
- Connect the product only to grounded electrical installations with protective conductors!
- Do not use extension cables and use only adapters approved by the manufacturer to connect the product to the power supply!

A safe and suitable power supply connection that complies with the applicable standards is required to ensure that the traction battery can be charged safely.

The following illustration of a power supply connection is provided as an example and may differ from your particular situation. This has no effect on the steps to be performed.



(1) Miniature circuit breakers

(2) Three-phase power supply connection

(3) Residual-current device (RCD)

Ensure that the miniature circuit breakers and residual-current device comply with the product specifications and the latest engineering standards (see the “Technical data” section).

You cannot safely operate the product on this power supply until all the checks have been performed successfully.

4.2 Startup

This section provides you with information about starting up and operating the product.

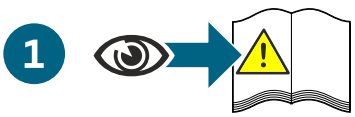
CAUTION

Tripping hazard!

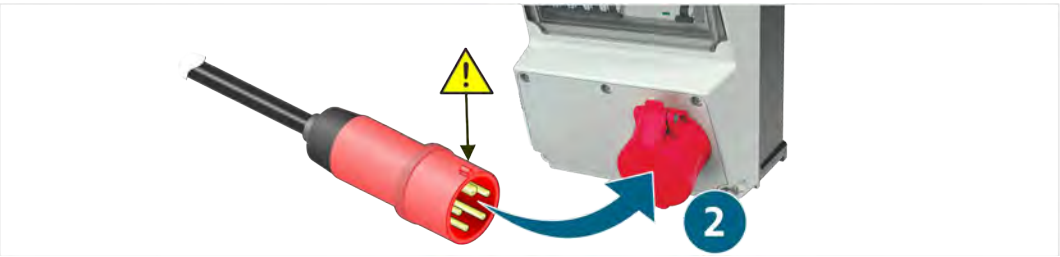
Tripping over exposed cables or the housing may result in physical injury!

- Warn other persons about exposed cables and the housing!
- Never block traffic or escape routes!
- Position the vehicle next to the power supply!
- Ensure that persons do not enter the area where the product is being used without due care!
- Take special care when entering the area where the product is being used!

1. Follow the general safety instructions.



2. Insert the power supply plug all the way into the three-phase socket. Observe the keying on the plug!



✓ Once you have connected it to the power supply, the product automatically performs a self-test, during which all safety functions are checked for proper functioning. The status LED flashes as follows:

   a. During the self-test, the status LED flashes blue once and then white. The number of white flashes indicates the product software version.

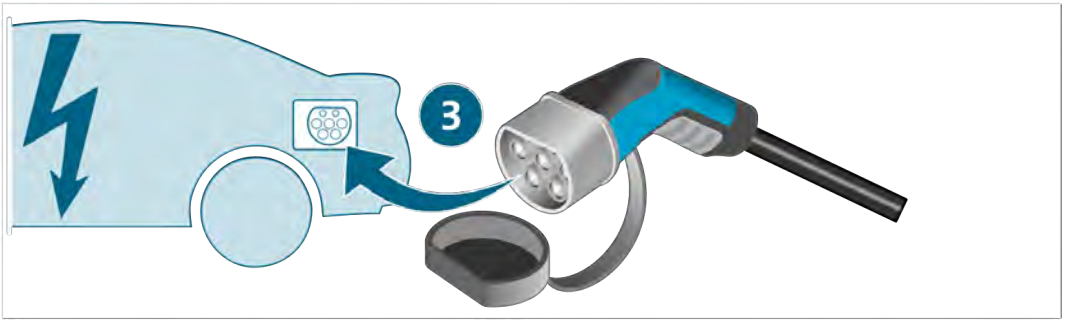
   b. The status LED then flashes or lights up blue, depending on the power supply (see the “Status display” section).

✓ You can now begin the charging process.

4.3 Starting charging

1. Observe the safety instructions.
2. Follow all the charging instructions that are included in the operating manual from the vehicle manufacturer.

3. Insert the AC charging plug all the way into the AC charging socket on your vehicle.



✓ Once the AC charging cable has established communication with the vehicle battery management system, the status LED lights up green.

4. If necessary, start the charging process on the vehicle as described in the operating manual from the vehicle manufacturer.

✓ Once charging begins, the status LED pulses green.

4.4 Finishing charging

WARNING

Danger of fatal electric shock!

Product components may produce sparks and electric arcs!

- Never disconnect high-voltage plug connections while under load!
- Finish the charging process before disconnecting the plug connections!

CAUTION

Risk of damage!

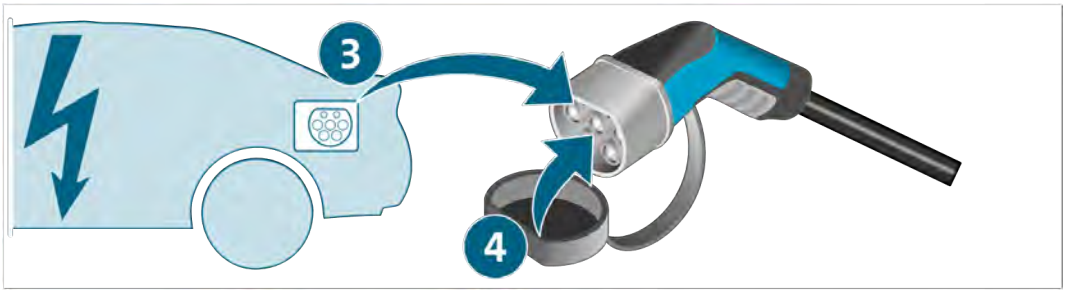
Disconnecting the power supply connection while under load may cause damage to electronic components and increased wear.

- Finish the charging process through the vehicle before disconnecting the power supply connection!

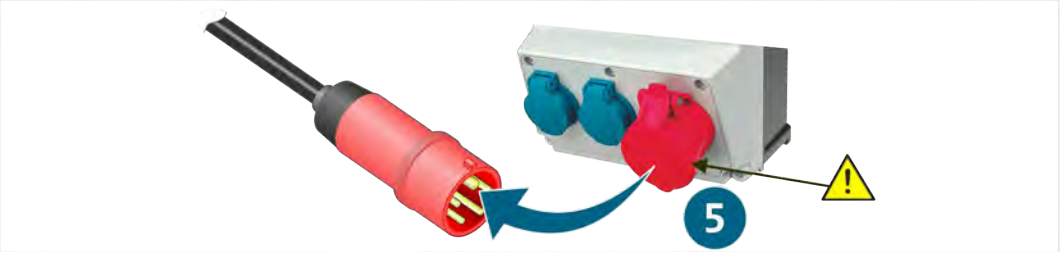
Once the status LED continuously lights up green and the charging status on the vehicle indicates that the traction battery is fully charged, charging is successfully completed. You should always finish an activate charging process through the vehicle.

1. Observe the safety instructions.
2. Follow all the instructions for finishing charging that are included in the operating manual from the vehicle manufacturer.

3. Remove the AC charging plug from the AC charging socket on the vehicle.
4. Close the AC charging plug with the protective cap.



5. Disconnect the power supply plug from the three-phase socket. Ensure that the protective cover snaps back into place and securely closes off the three-phase socket.



6. Pick up the control unit and wind up the cable. Ensure that the AC charging plug and the power supply plug do not drag along the floor or fall to the floor.
7. Store the AC charging cable in the carrying case.

✓ Charging is complete.

4.5 Troubleshooting

DANGER

Danger of fatal electric shock!

Defective and damaged products can no longer guarantee protection against electrical voltage!

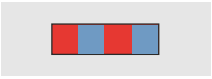
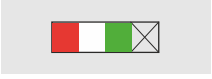
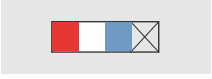
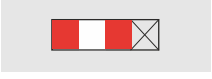
The electrical voltage in the product is lethal and will cause death by electric shock!

- Switch off the circuit breakers for all the connected sockets before you disconnect the product from the power supply!
- Replace a defective or damaged product immediately!
- Never attempt to repair or tamper with the product!

The AC charging cable is equipped with safety features that continuously monitor the charging process. Interruptions in the charging process may be caused by an error that can be resolved by the user.

The table below provides you with information about the steps you can take to resolve these errors.

Always finish the charging process before you resolve an error (see the “Finishing charging” section)!

Flashing code	Meaning	Corrective action
	Charging cable is overheating	8. Leave the AC charging cable to cool down for at least 15 minutes. 9. Reposition the AC charging cable if necessary. Observe the permitted ambient conditions (see the “Technical data” section) and the safety instructions (see the “Important safety instructions” section). 10. Restart the charging process.
	Direct current fault	Disconnect the product from the power supply for approx. 30 seconds and restart the charging process. If the fault persists, the vehicle isolation must be checked by a qualified professional repair shop.
	Alternating current fault	1. Switch off the circuit breaker for the power supply connected to the AC charging cable! This automatically ends the charging process.  2. Check the supply cable on the power supply side, starting from the power outlet to the AC charging cable. a. Replace the product if damaged. Contact the manufacturer. b. Contact an electrician to ensure that the AC supply is correct. 3. Disconnect the product from the power supply for approx. 30 seconds and restart the charging process. If the fault persists, the vehicle isolation must be checked by a qualified professional repair shop.
	Communication error	Restart the charging process.
	Device error	Contact the manufacturer.

4.6 Cleaning

DANGER

Danger of fatal electric shock!

The electrical voltage in the product is lethal and will cause death by electric shock!

- Disconnect the product from all power sources before cleaning the product!

Follow the safety instructions!

Use only a damp cloth to clean the product. Never use abrasive cleaning agents such as scouring agent, acids or alkali.

4.7 Disposal

Observe the safety instructions!

Always dispose of the product in accordance with all local disposal regulations.

4.8 Maintenance

Follow the safety instructions!

Test the product at regular intervals to ensure proper functioning.

4.9 Storage

When the product is not in use, keep it in the carrying case and store it in a dry and dust-free location.

5 Help

5.1 Warranty

CAR-connect GmbH grants a warranty period of 24 months from the date of purchase. The warranty is valid for demonstrable defects in functional material and workmanship.

Further information on the warranty conditions can be found in the terms and conditions on the manufacturer's website.

5.2 Customer service

Always include the serial number with any product queries. This number is found on the product.

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Translation of the original operating manual.

Subject to technical changes.