



LADEmini
Installation and
Operating Instructions

for HW version
Charger 1.0
IO module 1.0





Original manual EN

Hardware version: Charger 1.0, IO module 1.0

Firmware version: Charger 1.0.0 / IO module 1.0.0

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LADE GmbH hereby declares that the device is in compliance with the essential requirements and the relevant standards and directives. The specific standards to which the product has been tested can be found in the CE Declaration of Conformity.

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1. General information

These operating instructions apply to LADEmini (hereinafter also referred to as "product", "device" or "charging point"). The document contains information for different target groups:

Target group	Activities
Installer / Qualified electrician	• Overall responsibility for commissioning the device • Setting up the machine • Connecting the device to the electrical connection • Commissioning and decommissioning • Instruction of persons using the product
Operator	• Responsibility for the intended and safe use of the device • Compliance with maintenance intervals • Troubleshooting
Users	• General use of the device for charging electric vehicles

For information on installing accessories, please refer to the respective accessory instructions.

1.1 Warning signs

This document contains warnings that identify hazards to people, pets, property and the environment. The hazard prevention measures described in the warnings must be observed.



DANGER

Hazard with a high degree of risk which, if not avoided, will result in death or serious injury.



WARNING

Hazard with a medium degree of risk which, if not avoided, may result in death or serious injury.



CAUTION

Hazard with a low degree of risk which, if not avoided, may result in a minor or moderate injury.



ATTENTION

Important information which, if ignored, may result in property damage, errors or loss of data.

1.2 Safety information that must be read

Failure to follow the information in this document may result in personal injury or death and property damage. To ensure safety, all persons handling the device must have read and understood the following parts of this document before starting any work:

- Chapter 2 *For your safety*.
- The sections describing the activity to be carried out.

1.3 Symbols and highlighting



Activities in chapters and sections with this symbol may only be carried out by a qualified electrician.

Format	Explanation
[C4]	Position number in illustrations
✓	Prerequisite that must be fulfilled for the following work steps
▶	Individual work step
•	Enumeration

2. For your safety

2.1 Types of person

This document contains information for qualified electricians, persons trained in electrical engineering and users / laypersons. Some of the activities described may only be carried out by qualified electricians.

Electrician

A qualified electrician can assess the work assigned to him and recognise possible hazards based on his technical training, knowledge and experience as well as knowledge of the relevant regulations.

Electrotechnically instructed person

An electrically instructed person must be sufficiently informed and supervised by a qualified electrician in order to carry out certain electrotechnical work. The instructed person must thus be competent to recognise risks and to avoid hazards, including those caused by electricity.

Layman

The product may be operated by laypersons if they have read and understood the operating instructions, in particular the safety instructions, or have been instructed by the operator. If special technical knowledge is required for an activity, the operator is responsible for commissioning a specialist.

Field of activity	Minimum education, qualification or competency
Transport	Transport professionals
Installation	Electrician
Commissioning	Examination-experienced electrician
Operation	Layman
Cleaning	Electrotechnically instructed person
Conversion, expansion	Electrician
Troubleshooting	Electrician
Repair	Qualified electrician of a certified partner company of LADE GmbH
Inspection and maintenance	Experienced electrician
Decommissioning	Electrician
Disposal	Electrician Electrotechnically instructed person



2.2 General safety instructions

This product corresponds to the current state of the art and complies with all existing safety requirements, directives and standards. The safety instructions in this manual are intended to ensure proper installation at the place of use and safe operation. Non-compliance or failure to observe the safety information and instructions in these operating instructions may result in electric shock, fire and/or serious injury.

LADE GmbH accepts no liability for damage to property or personal injury resulting from failure to observe the operating instructions, from modifications to the device, from the use of non-approved spare parts or accessories or from the use of unqualified specialist personnel.

Installation, commissioning, maintenance and repair of the product may only be carried out by qualified electricians.

The product may only be operated after technically flawless installation and subsequent acceptance by an electrician experienced in testing. Faults that affect the safety of persons, connected consumers or the device itself may only be rectified by an authorised or qualified electrician.

Installation must be in accordance with all state and federal laws and regulations, as well as local utility and government regulations and other relevant codes.

Take all safety measures indicated in this document and on the device. In particular, use the prescribed personal protective equipment.

2.3 Intended use

The product is electrical equipment for charging batteries of electrically powered vehicles. For charging these vehicles, plug-in devices according to EN 62196 2 Type2 are used. The device is suitable for indoor and outdoor use.

The product has been built according to the state of the art and the recognised safety rules. Nevertheless, its use may result in danger to life and limb of the operator or third parties or impairment of the product and other material assets. Intended use therefore also includes observing the operating instructions and complying with the maintenance requirements.

Only use the product when it is in perfect technical condition, for its intended purpose and in a safety-conscious manner. Ensure regular proper maintenance and refrain from using the product if maintenance is not carried out. Have faults and damage that may affect safety rectified immediately by LADE GmbH or a certified electrician.



2.4 Misuse

Any use deviating from the intended use is considered misuse. LADE GmbH is not liable for damage resulting from misuse.

The device must not be put into operation in a loose (not firmly mounted) state, as in this case the protection class is not complied with.

- Dismantling, manipulating or deactivating the safety devices is prohibited.
- No technical modifications may be made to the product without consulting LADE GmbH or a certified electrician.
- The product may only be operated under the operating conditions specified in the documentation.

Danger due to electric shock or arc fault in case of misuse



Misuse can result in high voltages and high currents, which can lead to dangerous situations. Serious injuries or even death can be the result.

- Use the product only in areas for which the product is designed.
- Never operate the product outside the specifications given in the technical data.
- Always observe the requirements for the qualification of the personnel.

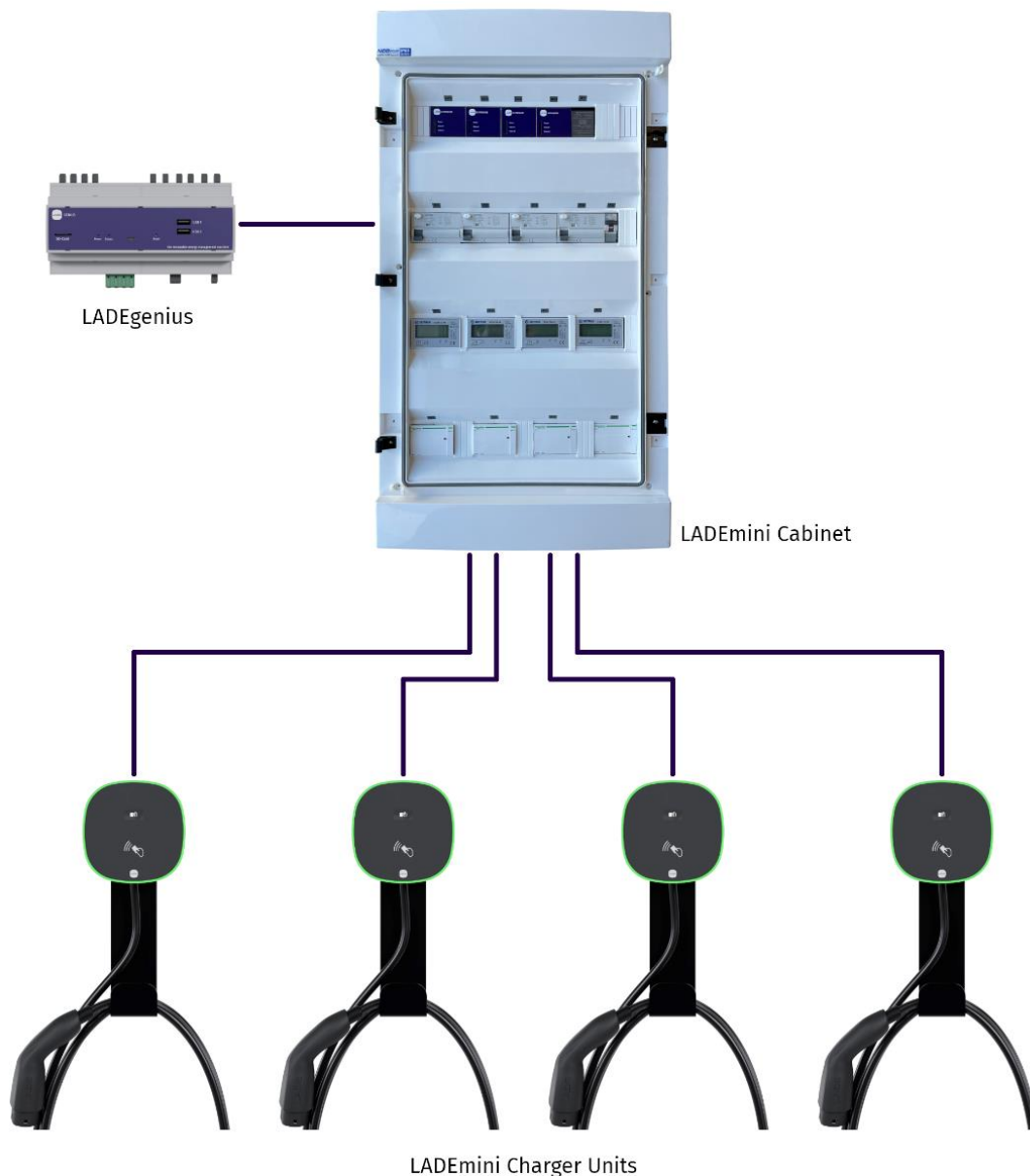
3. Product description

LADEmini is a compact and flexible system for the installation of charging -infrastructure including energy management. The main features of the product are:

- Space-saving installation
- Less cabling necessary
- More charging points with low connected loads
- Simple implementation of complex scenarios

A LADEmini installation consists of:

- LADEmini Cabinet (one or more)
- LADEmini Charger Unit (1 x per charging point)
- LADEgenius (1 x per installation)



Schematic installation example for 4 charging points



LADEmini Cabinet

Control cabinet with power electronics for 1-12 charging points, pre-wired



LADEmini Charger Unit

Compact charging point with charging cable



Illustrations exemplary



LADEgenius

LADEgenius is the central measuring and control unit. The unit enables dynamic load management as well as internet-based functions such as intelligent charging, user management, billing and administration without complex network installation.

3.1 Scope of delivery

- LADEmini Cabinet (quantity according to order)
- Metal holder (quantity according to order)
- Charger Unit (quantity according to order)
- Charging cable (quantity according to order)
- LADEgenius (1 x per installation)
- Additional installation accessories (quantity according to order)
- RFID access card

3.2 LADEmini Cabinet

The LADEmini Cabinet is a surface-mounted control cabinet that contains all the power electronics for 1 to 12 charging points. It is supplied fully pre-wired. All that is required on site is the routing of the supply and control cable(s).

The supply line can be laid from any meter cabinet. Several cabinets can be wired both with their own supply line and in parallel. The data line between the LADEgenius and the cabinet can be up to 400 metres long.

If the supply line is longer than 10 metres, a surge protector is required. This can be ordered as an accessory. The installation is done on site, either in the cabinet or in the charger unit.

A cabinet contains

- Per charging point
 - IO module (communication and switching module)
 - FI type B
 - MID counter
 - Contactor (1 x 4-pole or 2 x 2-pole)
 - LS switch for charging current 3P x 16/32 A (optional)
- LS switch for control electronics
- Power supply unit for control electronics



Pre-installed circuit breaker

On request, a circuit breaker can be installed in the cabinet ex works for each charging point. This makes it possible to implement installation scheme 2, which combines high charging power with low installation



Phase rotation

The components in the cabinet are pre-wired in a phase-rotating manner. This helps to reduce unbalanced loads.

Example: In a cabinet for three charging points, the first is connected in the order L1, L2, L3, the second L2, L3, L1 and the third L3, L1, L2.



Contactor

The variation with one four-pole contactor allows a minimum charging power of 4.2 kW. The variation with two 2-pole contactors enables a minimum charging power of 1.4 kW. This is advantageous for

- optimised PV surplus charging for small systems below 10 kW_p.
- optimised load management with more than one charging point per installation.

3.3 LADEmini Charger Unit

The LADEmini Charger Unit includes all components needed for communication and interaction with the vehicle and the users.

The supply and data lines are laid in a star configuration from the cabinet. A Charger Unit can be installed up to 400 metres from the Cabinet.

Equipment variations

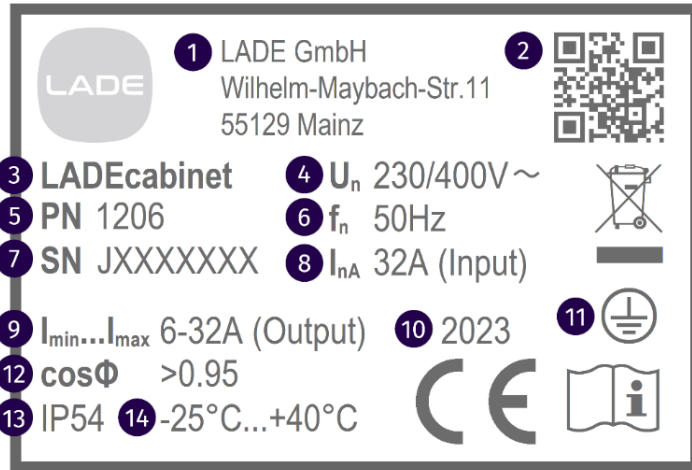
- Charging cable: 4 m / 7 m
- Charging power: 11 kW / 22 kW
- Colour: white / black
- Metal holder: with / without cable holder





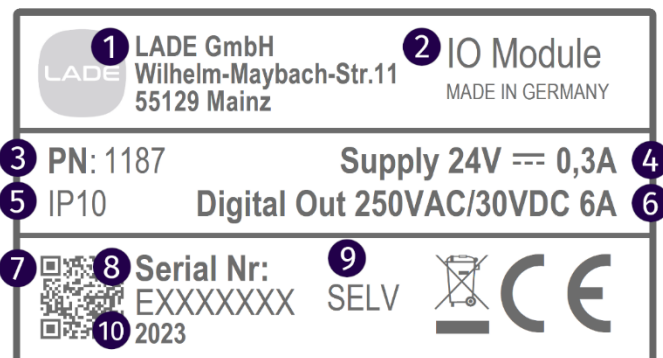
3.4 Type plates

Cabinet



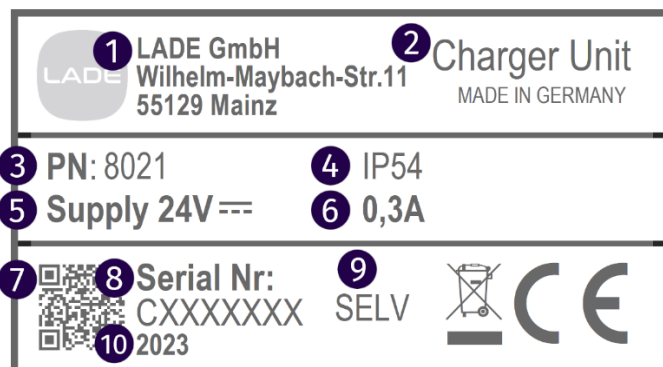
- 1 Manufacturer
- 2 QR code
- 3 Product name
- 4 Voltage input side
- 5 Product number
- 6 Frequency
- 7 Serial number
- 8 Current range on the input side
- 9 Current range on the output side
- 10 Year of manufacture
- 11 Protection class
- 12 Power factor
- 13 Protection class
- 14 Temperature range

IO module



- 1 Manufacturer
- 2 Product name
- 3 Product number
- 4 Voltage and current consumption
- 5 Protection class
- 6 Load capacity of the Digital outputs (relay)
- 7 QR code
- 8 Serial number
- 9 Protection class
- 10 Year of manufacture

Charger Unit



- 1 Manufacturer
- 2 Product name
- 3 Product number
- 4 Protection class
- 5 Voltage
- 6 Power consumption
- 7 QR code
- 8 Serial number
- 9 Protection class
- 10 Year of manufacture



4. Technical data

Cabinet

Dimensions (H x W x D in mm)	
1 charging point	260 x 435 x 138
2 charging points	420 x 435 x 138
3 charging points	580 x 435 x 138
4 charging points	780 x 435 x 138
Weight	7-15 kg, depending on variation
Protection class	IP65
Mounting option	Wall

Charger Unit

Material	Plastic, safety glass, metal
Colour	white or black
Dimensions (H x W x D in mm) with cable holder	150 x 150 x 88 355 x 150 x 88
Display	1.2" OLED display
Lighting	LED ring with animation
Charging cable length	4 m / 7 m
Weight Charger Unit	
4 m charging cable, 11 kW	approx. 3 kg
7 m charging cable, 11 kW	approx. 3.75 kg
4 m charging cable, 22 kW	approx. 3.9 kg
7 m charging cable, 22 kW	approx. 5.5 kg
Enclosure protection class	IP64
Protection class	I
Impact resistance	IK 08
Type	Wall mounting Floor or ceiling mounting (with stele)



Safety & Environmental Conditions

Personal protection (FI)	Type B integrated
Fuse protection (LS)	On-site or optional in the cabinet
Control fuse (LS)	6 A, tripping characteristic B
Lightning and overvoltage protection	Optional: - Without lightning and overvoltage protection - Type I and II - Type III
Rated insulation voltage	4 kV
Rated impulse withstand voltage	4 kV
Rated current of a charging point	35 A - 3 ph
Design load factor RDF	Dynamic 0 - 0.91
Lightning and overvoltage protection Ethernet/LADEbus	Fine protection
Temperature range	-25...+45 °C
Average temperature in 24 hours	< 35 °C
Insulation class	III
Relative humidity	5 to 95 % non-condensing
Altitude	max. 2000 m a.s.l.
Pollution level	Open 2, Closed 3
EMC classification	A + B

Power & Charging

Possible mains form and Mains voltage	TN / TT
Supply line	
Cabinet	3 x 2.5 mm ² to 5 x 35 mm ²
Charger Unit	5 x 2.5 mm ² to 5 x 6 mm ²
Backup fuse	Depending on equipment



Rated voltage	230 / 400 V +- 10 %
Rated current	16 / 32 A
Max. Charging current	16 / 32 A
Nominal frequency	50 Hz
Charging mode	single-phase and three-phase
Charging power	1.4 - 7.36 kW (single-phase) 4.2 - 22 kW (three-phase)
Max. Charging power	7.36 kW (single-phase) 11 kW / 22 kW (three-phase)
Phase balancing	Charging points in the cabinet phase-rotating pre-wired
Energy metering	MID-calibrated meter integrated
Load management	Dynamic house current overload protection integrated with LADEgenius

Communication & Interfaces

Communication always takes place via LADEgenius. For more information, see the *LADEgenius operating instructions*.

Connection technology / interface	Cable with type 2 plug (EN 62196-2)
Vehicle communication	IEC 61851-1/22, Mode 3
User communication	Display, LED, App
Authorisation	RFID Mifare Classic iOS / Android App Web portal
Communication LADEgenius charging points	RS485
Integration of PV, CHP, wind, storage, SmartHome	ModbusTCP, RTU



Standards

- EN/IEC 61851-1
- EN/IEC 61439
- EN/IEC 62196-2 (2017)
- RoHS Directive 2011 /65/EU
- CE conformity

5. Storage and transport

5.1 Storage conditions

When storing or temporarily storing the product, the following conditions must be observed to protect the system components from damage:

-  The equipment must be firmly secured on a stable, firm base and, if necessary, secured by fixing to prevent it from falling over. The weight and centre of gravity of the equipment must be considered.
- The device is protected from external damage

Environment of the devices

- Storage temperature between -25 °C and 40 °C
- Relative humidity less than 95 % (non-condensing)
- Prescribed nature of the storage location
 - Dry, clean, well ventilated interior
 - Protection from direct sunlight
 - Protection from rain, moisture, condensation
 - Protection against dust, sand, chemicals

5.2 Precautions before transport

- ▶ Check the components or their packaging for obvious damage such as cracks, crushes, etc.
- ▶ Observe the general instructions for safe transport.

5.3 Transport

WARNING



In the event of improper transport, persons may be trapped by the product's own weight. If the device is lifted without a means of transport, injuries may occur, e.g. to the back.

ATTENTION



Collisions and impacts can damage the product.

- ▶ Always transport the product charging point using suitable means of transport.
- ▶ Observe the local conditions as well as regulations for accident prevention.
- ▶ Do not step under suspended loads.
- ▶ Only place the device on level ground.
- ▶ Leave the product in the packaging provided or on the transport pallet until the place of installation.
- ▶ Place the device on a soft surface.

6. Installation



The installation activities described in this chapter may only be carried out by a qualified electrician. Please also refer to chapter 2 *For your safety*.



ATTENTION

Discharge yourself statically (e.g. by touching earthed metal parts) before touching PCB components, otherwise the components may be damaged.

6.1 Precautions before installation

- ▶ Carry out a visual inspection for foreign objects left behind.
- ▶ Check the strength of the components.
- ▶ Clean all components.
- ▶ Remove moisture and condensation if necessary.
- ▶ Check the insulation.

6.2 Required tools and material

Tools and materials not included in the scope of delivery are required for installation.

Tool

- Drill or cordless screwdriver
- Drill Ø 6-8 mm for the respective mounting surface
- Drill Ø 6-8 mm for the plastic rear wall of the cabinet (e.g. metal drill)
- Screwdriver, Phillips, German etc.
- LSA tool, if applicable
- Spirit level if necessary

Material

Supply lines

- Supply cable to the cabinet: max. 5 x 25 mm².



- Supply cable Cabinet to Charger Unit: max. 5 x 6 mm².

Data lines

- LADEgenius supply cable to cabinet:
 - min. 2 cores 0.6 mm², twisted pairs, ideally shielded
 - recommended: CAT 7 (laying cable or pre-assembled with RJ45 plugs)
- Supply cable Cabinet to Charger Unit:
 - CAT 7 (laying cable or pre-assembled with RJ45 plugs)

Installation Cabinet

- 4 screws Ø 6-8 mm with matching plastic dowels Ø 6-8 mm
- Cable glands according to the cable cross-sections and the required number

Installation Charger Unit

- Screws and dowels, suitable for the conditions at the installation site
- If necessary, cable glands to match the cable cross-section (1 x supply line and 1 x data line per charger unit).

When installing indoors, the cables can simply be routed through the membranes of the junction box. This provides a lower degree of protection (IP44) than if cable glands are used.



ATTENTION

When installing outdoors, cable glands must be used to ensure the required IP protection rating IP64.



6.3 Installation site

LADEmini Cabinet and LADEmini Charger Unit are designed for indoor and outdoor use.

Observe the following specifications for proper operation:

- Take into account all local regulations for electrical installations, fire prevention and accident prevention.
- All specifications for the installation of low-voltage systems according to IEC 60364-1 and IEC 60364-5-52 apply.
- Sufficiently dimensioned supply lines for the power supply as well as data lines must be provided at the mounting position of the Cabinet and the Charger Unit(s) (see section 6.4).

LADEmini Cabinet

- Make sure that the wall is load-bearing and dry.
- The LADEmini Cabinet must be protected from direct sunlight.
- For load management, intelligent charging, etc., a data connection (RS485 bus) to the LADEgenius is required. This can be up to 400 metres long. In a cluster of several cabinets installed in parallel, this specification refers to the *last* cabinet in the string.
- The LADEmini Cabinet should not be installed in high traffic areas or along thoroughfares.
- When closed and using appropriate cable glands, the cabinet meets IP 65.

For more information on the environmental conditions, see the technical data.

LADEmini Charger Unit

The LADEmini Charger Unit is mounted on a wall at the parking area.

- Make sure that the wall is load-bearing and dry.
- The charging point should be easily accessible and close enough to the parking space of the vehicle. Make sure that passers-by or walkways are not obstructed by the charging cables.
- The cables can be routed to the Charger Unit from the rear, top, right or left.

6.4 Wiring and protection devices

The required number and thickness of the cables results from the selected installation scheme.

Protective devices

- Observe the locally applicable regulations regarding earth leakage circuit breakers and fusing of the supply line (e.g. IEC 60364-7-722, in Germany DIN VDE 0100-722).
- The supply line to the cabinet must be designed in accordance with the line length, charging power and the type plate of the cabinet.
- The supply line to the cabinet may be fused with a maximum of 63 A.



Since a type B RCD is installed in the cabinet, you do not need any additional RCD protection at the outlet.

Supply lines

- ▶ Depending on the installation scheme, lay one or more supply lines to the cabinet and secure them accordingly.



WARNING

Make sure that the fuse protection does not exceed the specification on the type plate of the respective cabinet.

- ▶ Lay the supply lines according to the installation diagram
 - from the fused outlets to the installation location of the cabinet;
 - if several cabinets are installed in parallel, also between the installation locations of the individual cabinets.
- ▶ Lay a supply line for each Charger Unit from the Cabinet to the installation location of the Charger Unit.

Data lines

- ▶ Lay a data line from the installation location of the LADEgenius to the installation location of the cabinet. The cable must not be longer than 400 metres.
- ▶ If several cabinets are installed in parallel, lay the corresponding data lines between the cabinets. The *total length* of the data line between a cabinet and LADEgenius must not exceed 400 metres.



- ▶ For each Charger Unit, lay a data line from the Cabinet to the installation location of the respective Charger Unit. The cable may be a maximum of 400 metres long.

6.5 Mounting LADEmini Cabinet

Step 1 - Fastening to the wall

- ▶ Remove the front cover of the cabinet. Drill through the pre-punched wall mounting holes on the back of the cabinet, e.g. with a 6 mm metal drill.
- ▶ Mark the drilling points on the wall to match the mounting holes on the cabinet.
- ▶ Drill the holes and fit them with suitable dowels.
- ▶ Drill the required number of cable entries into the sides of the enclosure using a suitable drill (e.g. step drill) and insert the cable glands.
- ▶ Screw the cabinet to the wall with suitable screws.

ATTENTION



The holes for the cable glands should *not be* pierced (e.g. with a screwdriver), as this may damage components in the already pre-assembled cabinet. Instead, it is recommended to drill the holes. Be careful not to damage any cables or other components.

Step 2 - Connecting the cables



The activities described in this section for connecting the cables may only be carried out by a qualified electrician. Please also refer to chapter 2 For *your safety*.



ATTENTION

When connecting the cables, make sure that the IO module, contactor and charger unit each belong to the same charging point.

Cut the lines to length so that the supply lines reach the FI switches and the data lines reach the IO modules.

- ▶ Strip the sheathing from the cables and insert them into the cabinet. The sheathing should reach about 1 cm behind the cable gland. Close the cable gland.
- ▶ Remove the insulation from all line cores.
- ▶ Connect the wires of the supply line to the FI switch (optional LS switch-) on the input side. Note the assignment L1, L2, L3.
- ▶ Run the data line coming from the LADEgenius behind the top-hat rails to the first IO module. Attach the wire pair to the connection terminal [E6]. Make sure that the polarity of the RS485-BUS wire pair AB is correct.
- ▶ *Connect the outgoing supply line to the Charger Unit to the outgoing feeder of the corresponding contactor and the earthing strip.*
- ▶ *Connect the outgoing data line to the Charger Unit to the RJ45 socket [E1] of the corresponding IO module. If you do not use a pre-assembled cable, strip the installation cable and connect it with the RJ45 adapter supplied.*
- ▶ If necessary, repeat the last two steps for each additional Charger Unit.

IO module

- E1 RJ45 jack
- E2 Power supply 24 V
- E3 Normally open contacts
- E4 Switching outputs
- E5 DIP switch
- E6 Terminals Data line
- E7 Modbus counter connection terminals



Top



Bottom

Optional: Parallel installation of several cabinets

This step is only necessary if several cabinets are supplied via the same outlet.

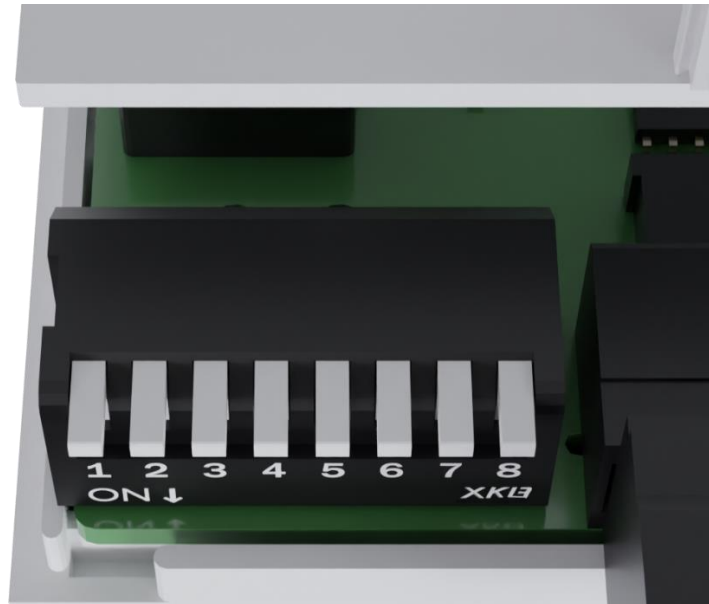
- Connect the wires of the supply line that goes to the next cabinet to free RCD terminals. Note the assignment L1, L2, L3.
- Connect the data line that goes out to the next cabinet to the terminal [E6] of the last IO module.

Step 3 - Setting the DIP switches

Each IO module has eight DIP switches [E5]. These can be used to make various settings.

DIP switch IO module

- 1-3 Hardware settings
- 4-7 Setting RS485 address
- 8 Scheduling



View from diagonally below on the DIP switches [E5]

- Off / 0 Switch points vertically downwards*
- On / 1 Switch points diagonally towards the wall*

- ▶ Place pins 1-3 in the correct position using the following table.
- ▶ Set the RS485 address of the charge point with pins 4-7 using the corresponding table.
- ▶ Set the termination at the last charging point within a cluster via pin 8.
- ▶ Finally, attach the front cover to the cabinet.



Hardware settings

Pin	Function / Meaning	A	From
1	Which contactor was installed?	2 x 2-pole	1 x 4-pole
2	Is an additional meter available?	yes	no
3	Is there an additional contactor?	yes	no
8	Scheduling / Last charging point in the cluster	yes	no

RS485 addresses

The pins on positions 4-7 are used for addressing the charging points. In each cluster, 16 addresses (0-15) can be assigned in binary format. Each address may only be assigned once per cluster.

RS485 address	Pen 4	Pen 5	Pen 6	Pen 7
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

6.6 Mounting LADEmini Charger Unit



The activities described in this section for installing the LADEmini Charger Unit may only be carried out by a qualified electrician. Please also refer to chapter 2 *For your safety*.

Step 1 - Fastening the bracket and junction box



Metal holder



*Junction box
with colour markings*

- ▶ If the supply lines are to be led into the box from behind, lead the supply lines through the openings [H2] provided in the metal bracket.
- ▶ Mark the drill holes and drill the holes.
- ▶ Attach the metal bracket to the desired location.
- ▶ Attach the supplied screw connection for the charging cable to the underside of the junction box (yellow marking).
- ▶ If the supply lines are also to be inserted with screw connections, screw them in as far as they will go at one of the points marked in blue using a suitable tool. The diaphragm will be pierced automatically, so the opening does not have to be cut free.
- ▶ Place the junction box in the correct orientation on the five threaded rods [H1] and [H3] and secure the box with threaded sleeves.
- ▶ Attach the supplied earthing cable to the earthing bolt [H3].



The earthing bolt [H3] is guided through the lower membrane on the back of the junction box when the junction box is put on. To do this, first place the junction box on the bolt with slight pressure. It may help to lightly (!) score the membrane to make it easier to push through. Make sure that the slit is not too large so that the protection class of the junction box is maintained.

Step 2 - Connect the Charger Unit

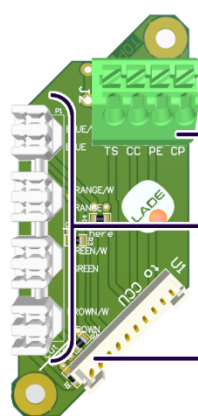


ATTENTION

Discharge yourself statically (e.g. by touching earthed metal parts) before touching PCB components, otherwise the components may be damaged.

Adapter board

- A1 RJ45 jack
- A2 Push-in clamp
- A3 LSA terminals
- A4 Flat ribbon connector



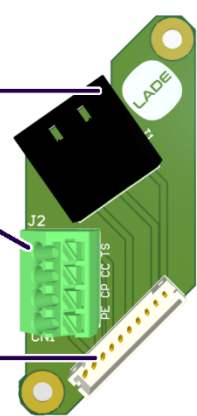
Variation a: LSA terminals

A1

A2

A3

A4



Variation b: RJ45

- Fix the adapter board with two screws in one of the corners of the junction box. The choice of corner depends on the side from which the cables are inserted into the box.
- Insert the stripped cables (charging cable, supply cable, data cable) and tighten the screw connections.



ATTENTION

If a surge protector is installed in the charger unit, the wires of the supply line should be kept as short as possible to save space.

- ▶ Connect the data line coming from the cabinet to the adapter board.
 - Variation a: Connect the installation cable to the LSA terminals [A3] using an LSA tool. Use colour coding A or the labelling on the board.
 - Variation b: Connect the pre-assembled network cable to the RJ45 socket [A1].
- ▶ Connect the wire for the temperature sensor (T1+) to terminal TS of the push-in terminals [A2] on the adapter board.
- ▶ Connect the charge pilot (CP) wire of the charge cable to the CP terminal of the push-in terminal [A2].
- ▶ Connect one wire of the earth cable to the push-in terminal [A2] marked PE on the adapter board.
- ▶ Connect the second wire of the earthing cable -to the earthing cables of the charging cable and the supply cable using the -3-wire clamp provided.
- ▶ Connect the remaining wires of the supply line (L1, L2, L3, neutral) to the -corresponding wires of the charging cable using the 2-wire -terminals.- Make sure that the connection is in phase.
- ▶ Connect the supplied cable bridge to the flat ribbon connector [A4] on the adapter board.

Step 3 - Assemble the Charger Unit

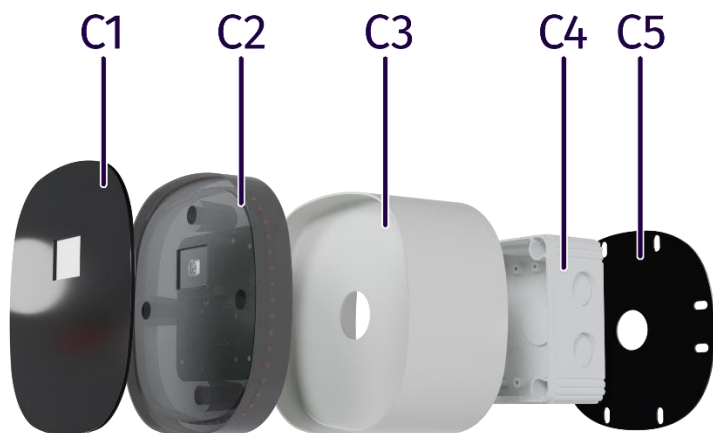


ATTENTION

Discharge yourself statically (e.g. by touching earthed metal parts) before touching PCB components, otherwise the components may be damaged.

Charger Unit

- C1 Safety glass pane
- C2 LED ring with charger board and display
- C3 Cover
- C4 Junction box
- C5 Metal holder



- ▶ Guide the cable bridge through the opening of the cover [C3].
- ▶ Make sure that the locking bolts are in position 0. Place the cover on the junction box and turn the locking bolts to position 1 with a suitable slotted screwdriver.

Optional: 22 kW charging power

If charging points with 22 kW charging power have been ordered, jumpers are supplied for the corresponding setting on the Charger Unit.

DANGER



This setting may only be set if the charging point (charging cable and contactor) and the connected load are designed for 22 kW charging power. Check all components for this before setting the jumper.

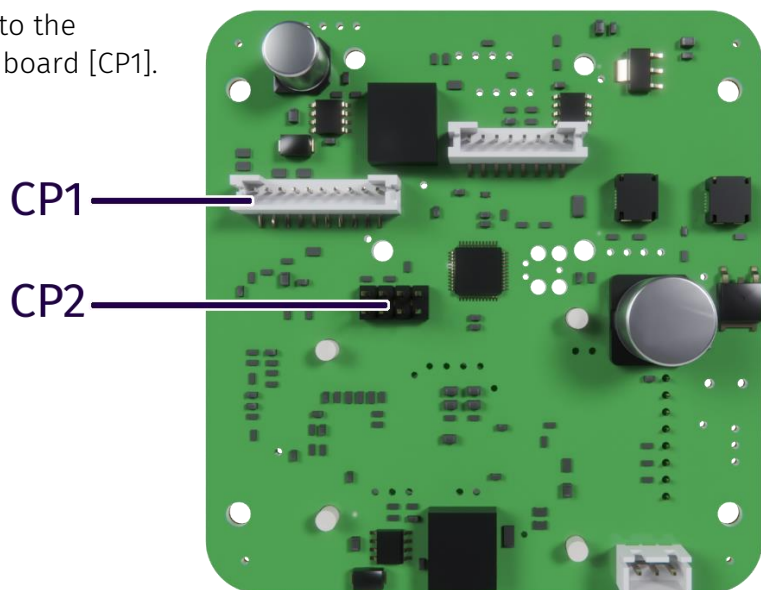
- ▶ Place the supplied jumper on the pin marked "22 kW" [CP2] on the charger board.
- ▶ For safety reasons, the charging power of 22 kW must also be set in the LADEcloud. This may only be done by the installing electrician. The system must be connected to the Internet for the setting to be accepted.



ATTENTION

Do not make any adjustment to the remaining pins [CP2]. This may destroy the device.

- ▶ Connect the cable bridge to the connector on the charger board [CP1].



- ▶ Place the LED ring [C2] in the recess of the cover and fix the ring with four screws.
- ▶ Finally, place the glass disc [C1] on the LED ring.

7. Commissioning



The commissioning activities described in this chapter may only be carried out by a qualified electrician experienced in testing. Please also refer to chapter 2 *For your safety*.

7.1 Precautions before commissioning

- ▶ Check the device for foreign objects.
- ▶ Check the strength of the components.
- ▶ Clean all components.
- ▶ Remove moisture and condensation if necessary.
- ▶ Check the insulation.

7.2 Requirements

Before commissioning, make sure that the following requirements are met:

- ✓ There is no damage to the product.
- ✓ The product has been correctly installed according to the specifications of LADE GmbH and the applicable national regulations.
- ✓ Necessary protective devices are installed and comply with the national regulations on electrical installations.
- ✓ The charging point has been tested in accordance with national regulations. In Germany, DIN VDE 0100-600 and VDE 0100-722 apply here.
- ✓ The product is connected to the power supply in accordance with the specifications of LADE GmbH and the applicable national regulations.
- ✓ LADEgenius is connected to the Internet.



LADEgenius

LADEgenius is set to DHCP by default. A common DHCP server -automatically assigns an IP address to the device. No further configuration is necessary.

7.3 Switch on and check

- ▶ Switch on the LS switch in the cabinet.
 -  LED ring of the Charger Unit lights up in a colourful rotating way.
 - The following information is shown in the display:

D1	Version numbers	D1	H-0XA S-Y.Y.Y	11 kW	D4
D2	Product name	D2	LADEmini	V1	D5
D3	Cluster address		SN: 0A12XF040000C		D6
D4	11 kW / 22 kW	D3	RS485: 0		
D5	Software version				
D6	Serial number				

- ▶ Check that each Charger Unit has a unique RS485 address.
 - ▶ If not, switch off all circuit breakers in the cabinet.
 - ▶ Set a unique RS485 address on the IO module (see section 6.5, step 3).
 - ▶ Switch the LS switches back on.
- ▶ Make a note of the serial number displayed for each Charger Unit. This helps with the later configuration and allocation of the individual charging points in the LADEcloud.
- ▶ For each Charger Unit, check whether the information on the charging power (11 or 22 kW) matches the order.
 - ▶ If not, switch off all circuit breakers in the cabinet.
 - ▶ Adjust the jumper setting on the Charger Unit (see section 6.6, step 3).
 - ▶ Switch the LS switches back on.
- ▶ Switch on the fuse of the power supply unit of the LADEgenius.
 - After a few minutes, the LED ring of the Charger Unit lights up constantly green.
 -     LADEcloud, the devices are displayed in the partner area.
- ▶ Transfer the values for the maximum currents of the installed lines to the LADEcloud.

ATTENTION



Please note that without transferring these values to the LADEcloud, the maximum total power of the system is limited to 16 A per phase for safety reasons.

8. Operation

Before each charging process, check the product for external damage, for example to the housing, connections, charging cable and charging plug (if applicable) and charging socket (if applicable). Make sure that no components are missing or defective. Only use the product when it is ready for use.

8.1 Encoding and approval of RFID cards

The encoding and authorisation of RFID cards for authentication is only possible in connection with the LADEcloud. Further information on this can be found in the LADEcloud.

8.2 Standard charging process

- At the beginning, no vehicle is connected.
 - The LED ring lights up green.
 - The display shows the prompt to connect a vehicle.
- 
 - If authentication via RFID or app is required, a corresponding prompt is displayed alternately.
- 
- Connect the plug to a vehicle. If necessary, authenticate yourself with an RFID card or via app.
- The device is ready to charge and is waiting for confirmation from the vehicle.
 - The LED ring pulses blue.
- The charging process is started according to the set charging mode.
 - The LED ring shows blue running lights.
 - The display shows that charging is in progress.
- 
 - If smart charging is set, the charging process can also be started at a later time..



- Power to the car is terminated when the car stops charging without an error status, e.g. because the battery has been fully charged.
 - The display shows that the charging process has stopped.



- The charging process can be viewed in the LADEcloud and the LADEapp.

8.3 Colour signals of the LED ring

The LED ring indicates the current status of the device via different colours and modes.

Colour and mode	Meaning
Green	Charging point is free and functional
Yellow pulsating	Action required by the user, details are shown in the display.
Yellow rotating	Authentication process in progress
Blue, pulsating	Device is ready for charging and waiting for confirmation from the vehicle
	Charging paused
	Charging process is finished
Blue, double-sided running light downwards	Charging in progress
Red	Charging point is reserved
Flashing red	Error message, details are shown in the display
Colourful rotating	Boot process
	No or faulty connection to LADEgenius

8.4 Display

The display shows information about the current status of the device.

	Charging point goes up		Current charging mode: single-phase charging
	Charging point is free and ready for authentication		Current charging mode: Sustainable charging
	Authenticate yourself via RFID card		Charging point is reserved
	Connect the vehicle		Note / error, details see error code
	Charging in progress		Maintenance required
	Charging process successfully completed		Maintenance required
	Charging paused		Charging point out of service
	Charging power is currently being reduced		

9. Maintenance

Regular cleaning and maintenance ensures the longevity of the product. We recommend concluding a maintenance contract with a specialist electrical company to guarantee regular maintenance of the device.

The intervals for cleaning and maintenance depend on the installation site, environmental influences, intensity of use and the age and condition of the device. Please note that the legislator may prescribe more frequent maintenance in your case. Carry out this maintenance accordingly.

Document work performed in cleaning and maintenance logs and keep them in accordance with legal guidelines.

The legislator requires regular performance of various tests on charging stations. We recommend the annual performance of a periodic inspection in accordance with IEC 60364-6 (in Germany DIN VDE 0105-100) by a qualified electrician experienced in testing, an inspection in accordance with the charging station ordinance (LSV) as well as the inspection and safety analysis for the state of the art in accordance with BetrSichV in Germany. Please observe the applicable national regulations in other countries.

DANGER



Check the product for any damage before each cleaning and maintenance. Damaged products pose a risk of electric shock. In the event of damage, have the product repaired or taken out of service by a qualified electrician.

ATTENTION



Before cleaning and maintenance, stop charging and disconnect the charging cable from any connected vehicle.

9.1 Cleaning



DANGER

Improper cleaning can cause an electric shock, which can result in serious injury or even death.



ATTENTION

Improper cleaning may cause damage to the device and may result in electric shock.

Interval: Half-yearly to at least annually

Required tools / material: Dry cloths made of cotton or microfibre

Required qualification: Electrotechnically instructed person (EuP)

Instructions:

- ▶ Only wipe the outside of the device's component housings with a dry or soft cloth slightly moistened with water. Do not use running water or other devices (e.g. high-pressure cleaners) for cleaning.
- ▶ You can remove stubborn dirt with a mild, solvent-free and non-abrasive cleaning agent. Do not use chemical, corrosive or abrasive cleaning agents as these may cause damage to the charging station.
- ▶ Do not remove any attached labels or stickers.

9.2 Maintenance and maintenance schedule



The maintenance activities described in this section may only be carried out by a qualified electrician. Please also refer to chapter 2 *For your safety*.

Check the device at least once a year for cleanliness, function and safety. Record the maintenance activities carried out and adjust the maintenance interval if necessary.

Carry out maintenance immediately after serious events such as flooding and lightning strikes. Observe the necessary minimum training, qualification or competence of the person(s) carrying out the maintenance.



Support with the maintenance plan

In the LADEcloud you can be automatically reminded of due maintenance dates.

Maintenance task	Accessories	Interval
Outer casing		
Clean the charging station or have it cleaned by a person trained in electrical engineering (see section 9.1 <i>Cleaning</i>).	Cloths	12 months
Carry out a visual inspection for defects and damage to the device components. Check the function of all locks and interlocks.		12 months
Check the display of the Charger Units for function and legibility.		12 months
Check that the prescribed markings on the device components are present and legible.		12 months
Fastening		
Check the fastening of the device components for stability.		12 months
Charging cable and charging plug		
Carry out a visual inspection for defects and damage.		12 months
Check the charging plug for contamination and ingress of foreign bodies and clean the charging plug.	Dry cloths, brush, insulated tweezers	12 months
Inner housing		
Carry out a visual inspection for defects, damage and contamination as well as ingress of foreign bodies and clean the device components.	Dry cloths, brush, insulated tweezers	12 months



Check the connection of the earthing system.

Check the connection terminals of the supply lines.

Check all cable glands for supply lines and charging cables for correct fit.

Residual current circuit breaker

Check the function of the residual current circuit breaker.

12 months

Periodic inspection

Carry out a periodic inspection (in Germany according to DIN VDE 0105-100).

12 months

9.3 Software and firmware updates

Software and firmware updates may only be carried out by the manufacturer or by specialist partners certified by the manufacturer.

9.4 Spare parts

Spare parts can be ordered by the specialist company in the LADEcloud.

10. Troubleshooting and repair

10.1 Troubleshooting



The troubleshooting activities described in this chapter may only be carried out by a qualified electrician. Please also refer to chapter 2 For *your safety*.

Boot-up error

If the start screen is permanently displayed when booting up, this can have various reasons:

- ▶ Is shown in the display RS485: NONE:
 - ▶ Switch off the LS switch for the control electronics in the cabinet and switch it on again after ten seconds.
- ▶ If a correct RS485 address is shown in the display:
 - ▶ Switch the LADEgenius off and on again.
 - ▶ Switch off the LS switch for the control electronics in the cabinet and switch it on again after ten seconds.
- ▶ If the error persists, contact your LADE specialist partner.

Charging does not start

- ▶ Check whether all fuses and RCD switches are switched on. If necessary, switch on the fuses or RCD switches again.
- ▶ Check if the MID counter display, the Charger Unit display and the LED ring are working. If not, contact your LADE specialist partner.

RFID card is not recognised

- ▶ Check that LADEgenius has a working internet connection.
- ▶ Check whether the selected RFID card complies with the *Mifare Classic* standard. If you are unsure whether your card supports this standard, use one of the enclosed original RFID cards from LADE or order one from your LADE specialist partner.
- ▶ Check in the LADEcloud whether the RFID card is registered for the activation of the charging point.
- ▶ If the charging process does not start despite a suitable RFID card, switch off the LS switch for the control electronics in the cabinet and switch it on again after ten seconds.
- ▶ If the error persists, contact your LADE specialist partner.



Error during the charging process

If an error occurs during the charging process (e.g. due to a disturbance of the vehicle's CP signal), the charging point changes to an error state and the charging process is stopped.

- ▶ Switch off the LS switch of the control electronics in the cabinet and switch it on again after ten seconds.
- ▶ If the problem persists, contact your LADE dealer and transmit the error code shown on the display.

Power failure of the charging electronics

In the event of a power failure of the charging electronics and the extension, the mains contactors are automatically opened by spring-loaded switches. This automatically terminates the charging process.

- ▶ Switch off the LS switch of the control electronics in the cabinet and switch it on again after ten seconds.
- ▶ If the problem persists, contact your LADE specialist partner.

Ground fault circuit interrupter trips

If the RCD is tripped, the power to the meter and to the vehicle fails. This also interrupts the communication with the meter. After a few seconds, the charger detects the meter failure and responds with an error status. If the RCD is triggered during start-up, the system goes directly into the error state.

- ▶ Disconnect the charging plug from the vehicle. Check the plug for mechanical damage and moisture.
- ▶ Switch off the circuit breaker of the control electronics in the cabinet.
- ▶ Switch the RCD back on.
- ▶ Switch the LS switch on again.
- ▶ If the problem persists, contact your LADE specialist partner.

LS switch of the control electronics triggers

- ▶ Switch on the LS switch of the control electronics in the cabinet again.
- ▶ If the problem persists, contact your LADE specialist partner.

Charging cable cannot be detached after the charging process

- ▶ LADEmini cannot remotely control the unlocking of the charging plug in the vehicle. In this case, consult the operating instructions of the vehicle.

10.2 Error codes

If an error occurs that cannot be corrected automatically, an error code is shown in the display. This provides further information on the type of error and where it occurred.

If a repair to the charging station is necessary, the error code can help to resolve the problem more quickly. You can also find more information in the LADEcloud.

Example:



Error code	Meaning
D	A lead-gel battery is installed in the vehicle, so the charging process cannot be started for safety reasons. This usually only affects older e-vehicles and special vehicles such as forklift trucks.
E	Defect in the area of the charging cable
F	The connected vehicle reports an error, this must usually be rectified on the vehicle.
I	Error in the internal signal circuit triggered by a fault in the connected vehicle.
J	Error in the internal signal circuit
O	Error in the internal signal circuit
S	Too high temperature in the area of the cable or the socket
T	Temperature too high in the area of the charger board
U	Error in the internal signal circuit
W	Software error

10.3 Repairs



Repairs may only be carried out by a qualified electrician from a certified partner of LADE GmbH. Please also refer to chapter 2 *For your safety*.

11. Decommissioning and disposal



The decommissioning and disposal activities described in this chapter may only be carried out by a qualified electrician. Please also refer to chapter 2 *For your safety.*

11.1 Safety during decommissioning



DANGER - Danger to life due to electric shock or fault arcs

Faults in the switchgear can lead to electric shock or arcing faults. Life-threatening injuries or even death can be the result.

- Secure the danger area of the switchgear. Persons who are not involved in the switching must leave the danger area.
- Ensure that decommissioning is carried out by an experienced electrician.
- Restore the de-energised state and secure against being switched on again.
- Determine the absence of voltage.
- Ground and then close briefly.

Additional safety measures

Protect yourself by taking additional safety measures when working near parts that are live. Suitable measures are e.g.:

- Cover protection
- Protection through distance

11.2 Disposal and recycling

Dispose of components and equipment

The product and the packaging must not be disposed of in household waste. When disposing of the product, please observe the nationally applicable guidelines on environmental protection and disposal (in Germany, the Electronic Devices Act (ElektroG)).



Incorrect disposal of environmentally hazardous substances can result in significant hazards to the environment. To protect the environment, the following points must be observed:

- Observe the locally applicable regulations for recycling.
- Dispose of properly and in an environmentally friendly manner:
 - electrical equipment and electrical components,
 - Metal parts, rubber and plastic parts
 - Lacquers and coating material
- Observe the notes on disposal and recycling in the instructions for the operating equipment.

Recycle fuses

Spent NH fuses still contain recyclable materials after they have been switched off.

Therefore, you can systematically recycle used NH fuse-links. For example, the NH/HH recycling system in Germany or similar systems in other countries are suitable for this.

You can also hand in small quantities free of charge for environmentally friendly recycling. Check where you can hand in your used NH fuses.



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