CHARGING STATION
USER MANUAL

Document no: **3-21-11.0042-Plug Charger Go 30_MAN_A_EN**

TYPE	Plug Charger Go 30
MANUFACTURE YEAR	2022
DOCUMENTATION VERSION	A

KEEP TO USE IN THE FUTURE

Zielona Góra 2022

Table of changes			
Revision No.	Date	Responsible for the change	Brief description
A	13.06.2022	Natalia Bukowiecka	Creation of documentation

Created	**Checked**	**Approved**
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1. SAFETY

1.1. Symbols meanings

Danger	
 Danger !	Not following these rules may lead to the threat of death or heavy health damage.
 Warning !	Potentially dangerous situations. Not following these rules may lead to the threat of death or heavy health damage.
 Caution !	Not following these rules may lead to heavy health damage.
 Beware !	Not following these rules may lead to the equipment damage.
	ATTENTION – Possibility of electric shock, pay specific attention.
Information	
 Note!	INFORMATION-ADVICE - We bring this specific detail to your attention.
	Before starting read the user manual.
	The device may be serviced only by the trained staff.

1.2. General information

- There are **high voltages** in the charging station. In case of not being cautious of it or not following the rules described in this manual a serious material damage may be encountered as well as heavy health damage or even death due to electric shock.

 Danger !

- The charging station may be serviced and operated only by a **qualified staff**. This staff must be familiarized with this manual and all technical documentation related to this equipment type.
- **Risk of electric shock!** The charging station includes a high capacity value, so the device can maintain a high voltage values even with the switch-off power.

- The device access must be prohibited for children and unauthorized persons.
- The device can be used only for the purpose specified by the manufacturer. Any modifications and the use of spare parts that are not sold or recommended by the manufacturer may cause electric shock or damage to the device.
- Correct device operation is related to the appropriate storage, transportation, installation, electrical connections and maintenance. The instructions on those matter are provided further in this manual.
- This manual should be kept near the device and all users should refer to this manual in case of necessity.

- In case of an absolute necessity of performing tests when the device is electrically live, the safety rules must be followed thoroughly and the used measurement equipment must be checked before connecting to the charging station.
- All equipment repairs have to be performed only the service personnel of Ekoenergetyka-Service sp. o.o. (contact: +48 690 23 23 23; service@ekoenergetyka-service.com) or another authorized by Ekoenergetyka-Poland staff. Unauthorized repairs may lead to the electric shock and/or significant material damage during both the repairs and subsequent operation.
- The device requires a review every 12 months, that is a condition of safe operation and guaranty maintaining.
- The device is equipped with an emergency switch-off button.
- The device is equipped with service door protections in the form of limit switches and a lock with a patent insert. Do not open the service door during the charging process as this will interrupt the charging of the accumulator batteries.

1.3. Systemy zabezpieczeń

The receiver socket that will be used to power the charging station must have a 63A fuse. According to the standard, additional protection of the charging station is a residual current device, which is used to protect people against electric shock in direct and indirect contact, and also reduces the effects of damage to the devices, including the possibility of fire.

On the side of the charging connector, an IT network system is used in which all active parts are isolated from ground. In such a system, one earth fault does not pose an immediate threat. Galvanic separation is performed by means of transformers. An additional safety device is the output system insulation resistance meter, which checks the level of insulation resistance between the "DC +" wire, the "DC-" wire and ground.

From the user's point of view, the basic protection is the enclosure made in protection class I, which is equipped with patent locks protecting against unauthorized access. The housing is made in the IP54 protection class, which ensures protection against external weather conditions.

Another element ensuring safety is the specialized charging connector. While charging, the plug is locked in the vehicle's socket, preventing it from being removed and providing protection against electric shock.

The communication protocol compliant with the ISO 15118 and DIN 70121 standards is responsible for the efficient and safe operation of the charging process. It has a number of implemented functions that enable quick disconnection of the vehicle in hazardous situations.

1.4. The 5 safety rules

1. Disconnect completely - meaning that the electrical installation must be disconnected from live parts on all poles.
2. Secure against re-connection - reliably prevent the accidental re-connection of an installation where work is in progress. This is achieved by replacing turned off fuses in the low-voltage system with lock-out devices.
3. Verify that the installation is dead - is the installation really dead now? Use suitable measuring / test equipment, such as a voltage detector, to verify the absence of operating voltage on all poles of the electrical installation. Check the correct function of the voltage detector prior to use.
4. Carry out earthing and short-circuiting - if the installation is dead, connect the cables and the earthing system with short-circuit-proof earthing and short-circuiting devices. Important: The relevant parts must be earthed before they are short-circuited!
5. Provide protection against adjacent live parts - according to the five safety rules, adjacent parts are parts located in the vicinity zone. If parts of an electrical installation in the vicinity zone of the work location cannot be disconnected, additional precautions must be taken before work starts. In this case use insulating protective shutters or covering material as protection against accidental contact.

2. INTRODUCTION

The instruction is a basic source of information related to the housings, employment areas, user's safety as well as charger operational conditions. Every user starting an installation, start-up and operation of the charger must familiarize himself/herself with this document and every time before starting using the equipment must check it's technical state.

3. FUNCTIONALITY

3.1. Description of the charging station

The mobile DC charging station is intended for charging electric vehicles equipped with a Combo-2 (Type2 / mode4) charging connector. The charging station is built on the basis of high-frequency converter systems, which are a regulated current-voltage source with the possibility of direct communication with the battery management system in the vehicle.

The device can charge the vehicle with a power of up to 30 kW.

3.2. Block scheme

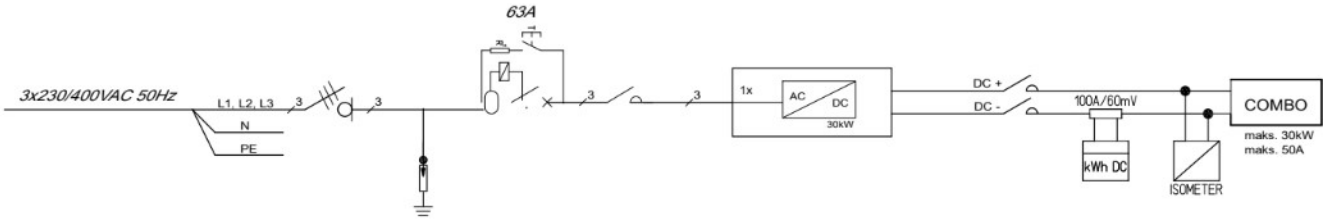

Figure 1 **Charging station block scheme**

3.3. User interface

The charging station has been equipped with a 7 '' touchscreen integrated with an RFID reader with a functional user interface, by means of which the basic operating states are signaled. From the interface level, it is possible to end the charging process using the "STOP" button on the screen and to turn off the charging station in an emergency using the safety button on the back of the charging station. In the rear part of the charging station there is also an ignition switch that activates the device and an Ethernet socket.

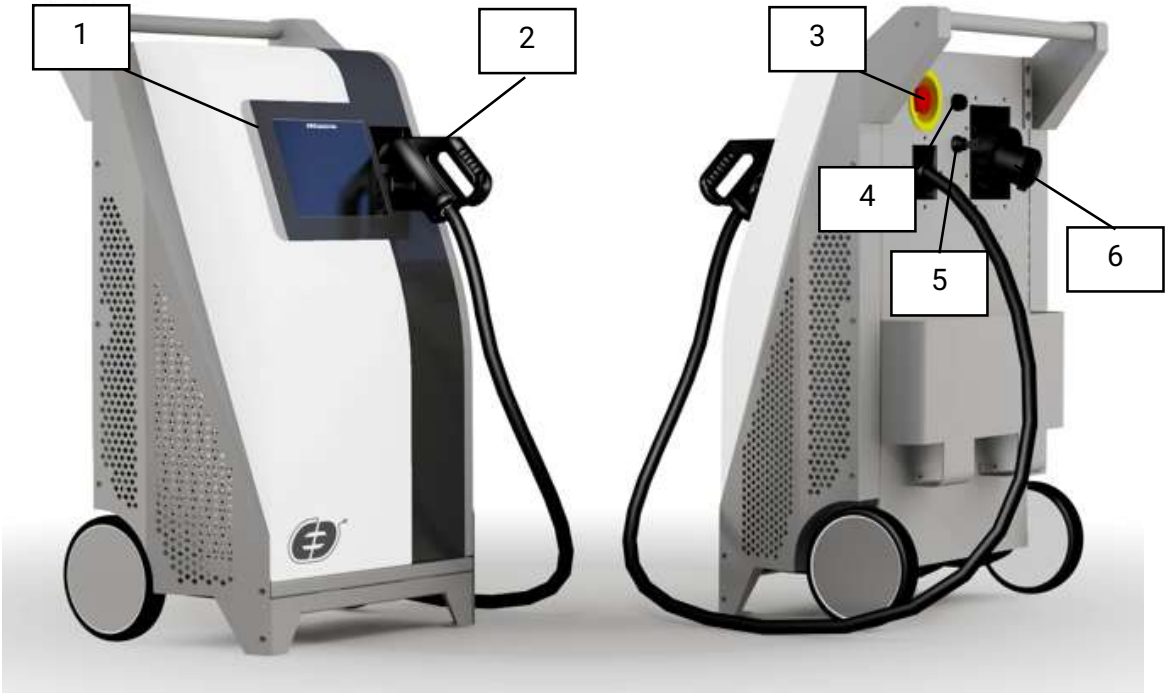

Figure 2 **Arrangement of the user interface elements on the charging station**

1. Touch screen integrated with RFID reader
2. Charging connector no. 1 (Combo-2 (Type2 / Mode4))
3. Safety switch
4. Ethernet socket
5. Ignition switch to start the charging station
6. Receiver socket 63A

3.4. Charging procedure

3.4.1. Charging process start

To start the charging process, start the charging station and use the key to set the ignition to position I. After starting the charging station, the display will show that the vehicle is ready to be connected to charging, to do this, hold the card against the RFID reader (Fig. 3) to identify the user. After successful user authorization, connect the charging connector to the vehicle (Fig. 4).

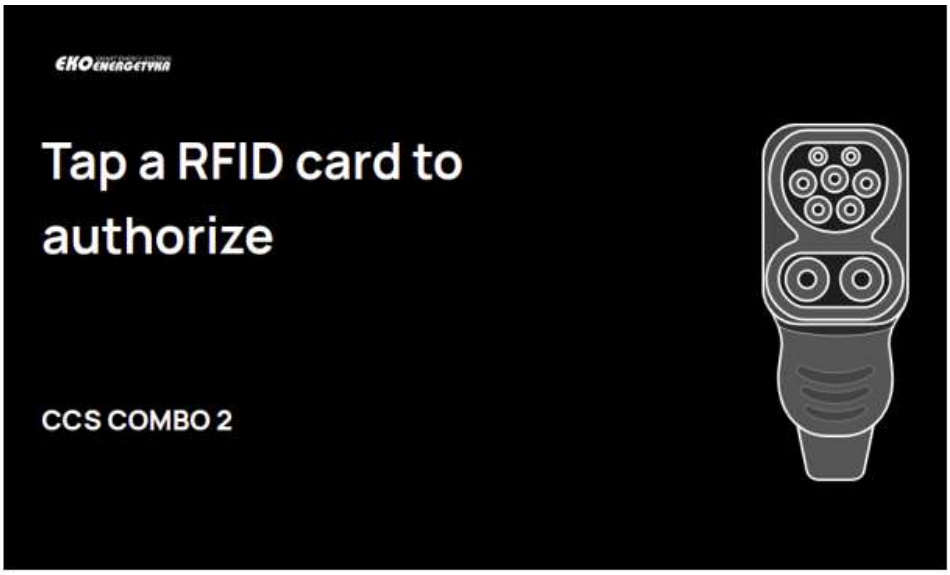

Figure 3 **View of the display before user authorization**

Figure 4 **View of the display after user authorization**

After the voltage-free information is signaled on the display on the screen where the tests took place, the resistance of the entire system, supervised by your communication and payment service systems, is measured (Fig. 5). When the process is introduced to connect the charger and the vehicle runs through the system, the system will automatically start charging, which is signaled by what (Fig. 6).

Figure 5 **Display during initialization**

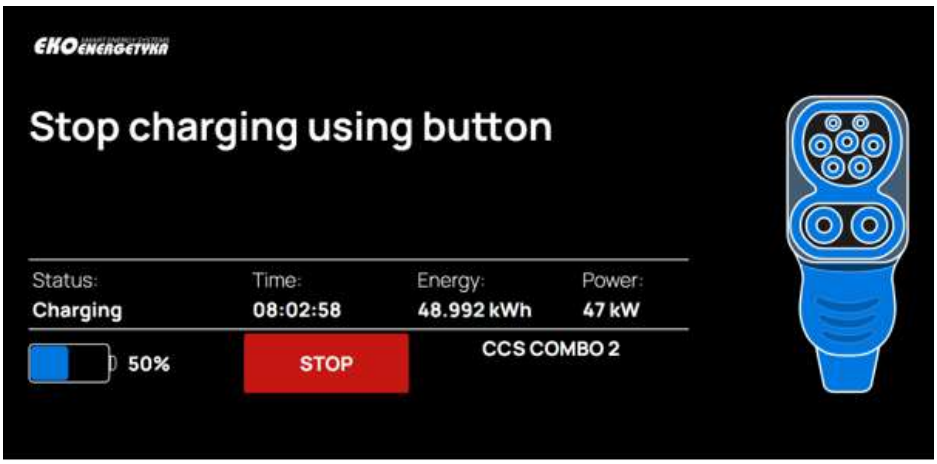

Figure 6 **Display during the charging process**

3.4.2. Charging proces

The charging system is based on the CCS (Combined Charging System) communication protocol in accordance with ISO 15118 and DIN 70121. The driver can see the charging status information on the dashboard of the electric vehicle. When an error (caused by infrastructure or bus) occurs during the charging process, charging stops immediately, which means that the DC contactors in the charging station and the bus are disconnected. An error message will appear on the screen.

3.4.3. Disconnection / charging stop

The readiness to disconnect the charging connector is signaled by the information on the charging status on the display. Charging can be completed at any time during the charging process. This will happen automatically as soon as the vehicle indicates that the battery is fully charged. Charging can also be terminated from the charging station by pressing the "STOP" button on the display screen (fig. 6) or in an emergency by pressing the S02 safety button. The emergency stop switch is released by turning it. Before that, however, make sure that the cause of the failure has been removed.

Note!

3.5. Combo-2(Type2/mode4) type charging connector

The charging connector consists of two main parts: charging connector with a cable, that is considered to be a part of the charging station and a socket that is located on a vehicle. The charging connector is characterized by an uncomplicated servicing as well as maximum safety for the user.

The plug has a built-in temperature sensor for the DC + and DC- terminals, which is used to monitor the contact temperature and in the event of its overheating, charging is terminated.

The charging connector has 5 contact pins: positive end (DC+), negative end (DC-), protective earth (PE), control pilot (CP) and proximity pilot (PP).

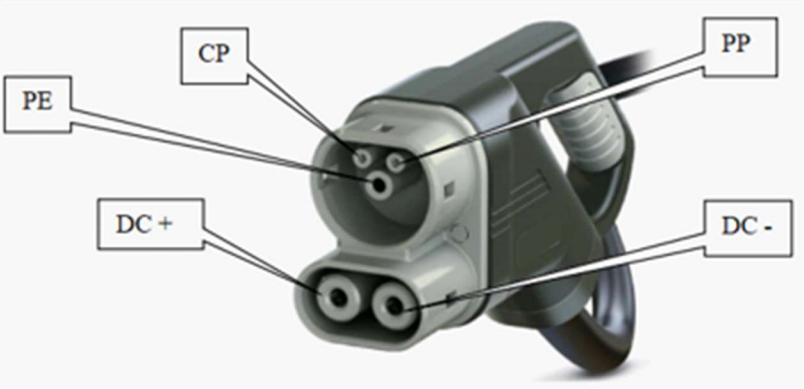

Figure 7 **Connector view Combo-2 (Type2/mode4)**

4. TECHNICAL DESCRIPTION

4.1. Technical specification of the device

Table 1 **Technical parameters**

Electrical parameters		
Input AC	The way of connecting the power supply	CEE 63 A receiver plug
	Network configuration	TNS (L1, L2, L3, N, PE)
	Nominal voltage	3 x 400V AC (+8% / -10%)
	Frequency	50 Hz (+/-5%)
	Connector power	33 kVA
	Efficiency	≥ 94%
	Input power factor	≥0.98 (for an output power> 20)
	THDi	≤ 5%
	Measuring circuit	-
	Residual current circuit	ΔI ≤ 30mA typ A
Output DC	Maximum charging power	30 kW (+/- 1.5%)
	Connector type	Combo-2 (Type2/mode4)
	Number of charging points	1
	Output voltage range	150 – 1000 V
	Maxiumum charging current	100 A (+/- 1.5%)
	Voltage ripple	≤±0.5% mVp-p
	Communication protocol	ISO 15118, DIN 70121
	Bidirectional current flow protection	Diode built - in the power modules
	Protection from electric shock	IT circuit; Monitoring Insulation Device
	Measuring circuit	Indirect
Power modules	The power of a single module	30 kW
	Number of modules	1 pcs.
Other	Insulation system	High frequency transformers
	Riso input-output	3,5kV – 1 min.
Mechanical parameters		
Housing	Dimensions (H x W x D)	~1003 x 630 x 449
	Weight	~50 kg
	IP protection degree	IP54
	IK protection degree	IK10
	Protection Class	I
	Cooling	Automatically turned on forced air cooling
	Paint finish	RAL 9016

	Sheathing	Powder coated aluminum
	Type of closure	Patent insert
User interface		
Control panel		Ignition key for starting the station, 7 '' touch display integrated with RFID, safety switch, Ethernet socket
Interface protection degree		IK08
RFID reader		Compliant with standards: NFC-A / ISO14443A up to 848 kbit/s – NFC-B / ISO14443B up to 848 kbit/s – NFC-F / FeliCa™ up to 424 kbit/s – NFC-V / ISO15693 up to 53 kb/s – NFC-A / ISO14443A and NFC-F / FeliCa
Remote communication		GPRS 3G/4G/LTE + OCPP 1.6-J
Other		
Certification		UE
Working temperature		-25°C /+55°C > 40 possible output power limitation
Ambient humidity		max. 95%
Noise emission level		max. 60 dB
Location of the charging station (WGS84)	Width:	Longitude:

4.2. Charging station output characteristic

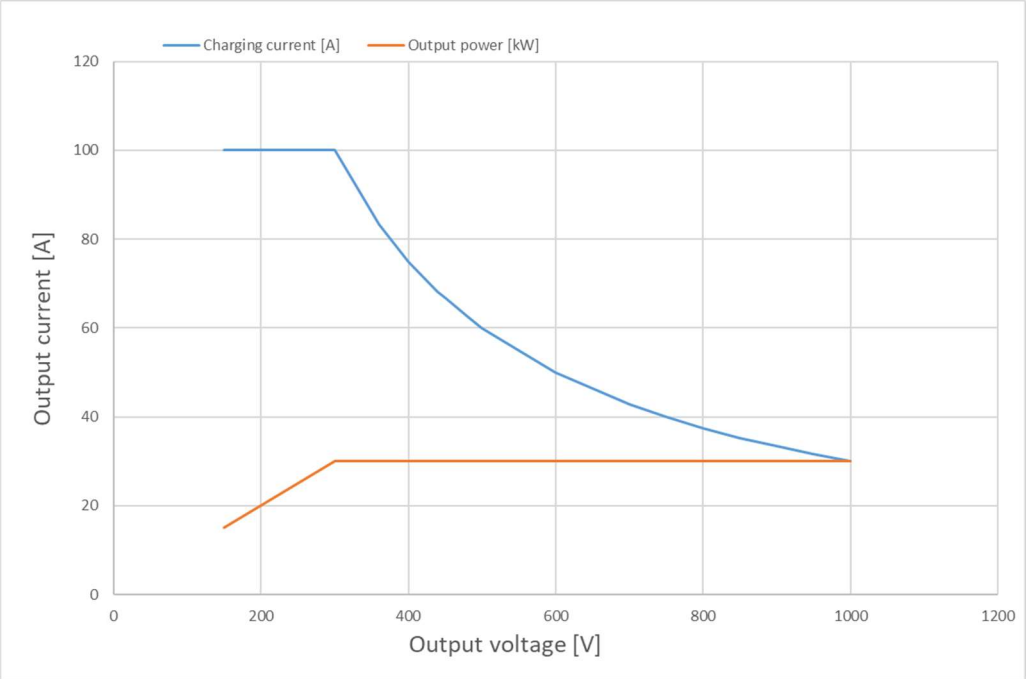

Figure 8 **Charging station output characteristic**

4.3. Housing design

The mobile charging station is characterized by a modular design. The housing of the charging station consists of two main parts, namely an aluminum front, a side cover and an aluminum supporting structure reinforced with aluminum profiles. Thanks to the rear handle, two wheels and a light aluminum structure, transporting the station is very easy. The charging station is divided into two parts, part with switching and protection circuits and part with power electronics.

Figure 9 **General view of the housing structure**

(details of execution may vary)

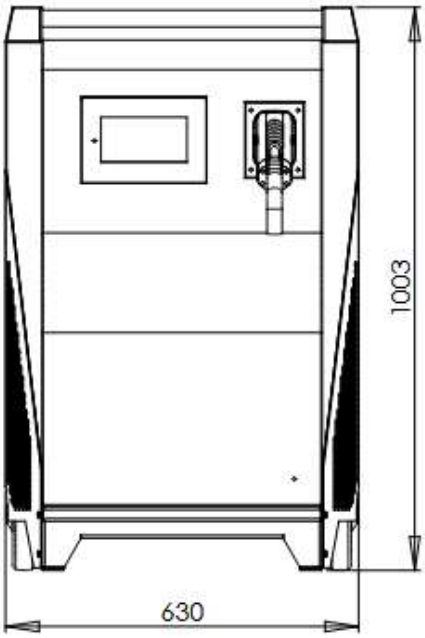

Figure 10 **Front view of the housing structure**

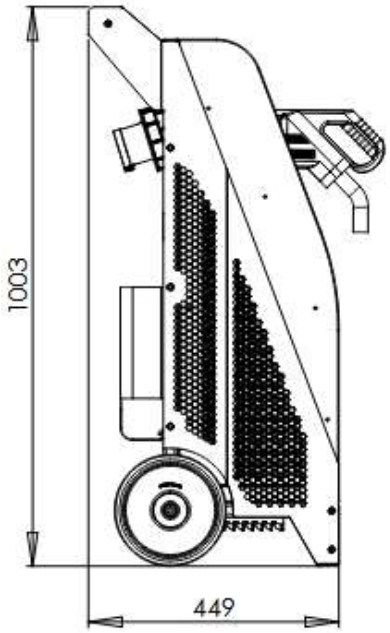

Figure 11 **Side view of the housing**

5. INSTALLATION AND START-UP

When installing the equipment, follow the procedure below and follow your local codes. The installation of the device can be divided into the following stages:

- Preparation of the workplace - the installation site should be properly secured against unauthorized access;
- Performing a visual inspection - check the inside of the station for mechanical damage that may arise during transport and check that there are no elements left in the station that do not belong to the charging station;
- Switching on the safety devices inside the station - make sure that all elements of the safety devices are in their working position;
- Connecting the power cord - connect the power cord to the receiver's connector, making sure that the socket is properly pressed against the plug. The receiver socket that will be used to power the charging station must have a 63A fuse;
- Attention! Before connecting to the network, make sure that the device is properly secured.

Figure 12 **Connecting the station to the power supply**

- Before the first start-up, check the tightening torques of the apparatus.

To start the charging station, press and pull out the safety button again, then turn the ignition switch to position I. Activation of the charging station will be confirmed by a message on the screen.

6. TRANSPORT, STORAGE, USE AND DISPOSAL

6.1. Information on transporting the charging station

This chapter lists the recommended methods of transporting the charging station. The warnings are intended for installers and operators of transport trucks.

It is forbidden to transport and install the charging station during rainfall, high humidity, strong gusts of wind and poor visibility.

In the interest of safety, follow the rules of transport and unloading specified in this manual.

The charging station must be transported in the working position. Attempting to transport and store in a different position may result in mechanical damage. The key must be removed before loading onto a transport vehicle.

The charging station is adapted to be transported with a forklift truck. To do this, insert the forks under the charging station, keeping the distance between the forks as wide as possible. Rappelling with a forklift can only be done from the rear or the front of the housing.

Remember to keep the lifting height as low as possible.

Workers should wear helmets and safety shoes when moving the handling equipment; in order to avoid crushing, loading and unloading should be performed in such a way that the worker does not find himself between the raised / lowered load and e.g. the side of the vehicle or other fixed structural element.

Roll up the charging cable carefully. The housing should be protected against mechanical damage by covering it with transport foil or corrugated cardboard (not less than two layers). The housing must always be firmly attached to the transporting vehicle.

6.2. Storage and disposal of the charging station

6.2.1. Storage

Store in a dry place and away from direct sunlight in the working position.

6.3. Package

The packaging material is 100% recyclable. During utilization, follow the applicable local regulations.

6.3.1. Utilization

1. The device has been made of recyclable materials. This device is marked with a crossed out waste bin icon, in accordance with the 2002/96/WE (WEEE) European directive on waste electrical and electronic equipment. By ensuring proper utilization of this device, you can help prevent potential negative consequences for the environment and human health.

2. Do not treat this device as ordinary household waste. Send it to a special facility for utilization and recycling of electrical and electronic waste. Utilize the device in accordance with the local regulations for waste utilization, taking it to a special collection point. You can find further details on utilization, scrapping and recycling of this device at the local municipal/commune office, specialist waste collection points in order to verify the logistical capabilities and the best available recovery technology in accordance with the WEEE directive, proclaiming priority of recovery over utilization.

6.4. Information on the maintenance of the charging station

To clean the charging station from the outside, use only soft industrial cleaners. Do not use cleaners that could damage the surface of the charger's housing.

Detergents used to clean the charging station must not have flammable or extremely flammable properties.

Figure 13 **Hazard pictogram on detergents prohibited for use**

Do not use flammable substances, such as gasoline, solvents, for cleaning!

Beware !

Be especially careful when cleaning the charging station.

7. RULES OF PROCEDURE IN CASE OF FAILURE OR INTERFERENCE IN THE OPERATION OF THE CHARGING STATION

A failure during charging is indicated by information on the display.

In the event of any failure, it is necessary to stop using the charging station and follow the instructions below.

In the event of a failure or disturbance in the operation of the charging station, follow the steps below:

- Remove the plug from the vehicle;
- Reset the vehicle;
- Connect the plug and test charging.

If the charging process does not run properly, repeat the above steps.

If the charging station is still not working properly:

- Pull out the plug;
- Reset the charger by pressing the emergency button and unlocking it;
- Retry charging after the device has booted up.

If the charging process does not start, repeat the steps above.

If the charging station is still not working properly after all the above steps have been taken, please contact the operator (contact on the charger).

8. HEALTH AND SAFETY REQUIREMENTS AND FIRE FIGHTING REGULATIONS

8.1. Necessary steps before charging

Before charging, the user should read the operating instructions and check that:

- There are no people nearby who could pose a risk,
- The charger does not send error or error messages,
- The charging connector cable or the connector itself are not damaged.

8.2. Rules for conducting a secure charging session

- The charging process must be carried out in accordance with the user manual,
- After completing the charging session, secure the charging connector by placing it in the blind socket located at the front of the charging station housing.

8.3. Correct placement of the charging connector

To properly put the charging connector back into the blind socket:

- Disconnect the connector from the vehicle;
- Insert the connector into the blind socket in the correct position and (if the charging station has a cable holder) roll the charging cable onto the holder.

Be careful not to damage the cable and the charging connector.

Incorrect replacement of the connector in the blind socket can damage the plug and the cable itself, which can lead to serious injury or death due to electric shock.

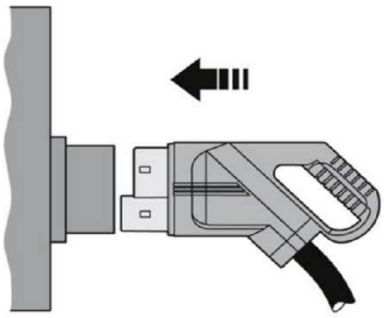

Figure 14 **Correct position of the charging connector in the socket**

8.4. Activities prohibited for users

- Unauthorized persons must not open the inside of the charger,
- It is forbidden to use the charging station for purposes for which it is not intended,
- It is forbidden to put the connector into the blind socket incorrectly,
- Any modifications or use of spare parts that are not sold or recommended by the charging station manufacturer may cause electric shock or damage to the device.

Failure to follow these instructions and instructions listed in the service may result in a substantial material damage and may result in a serious injury or even death due to electric shock.

8.5. Procedure in the event of a charging station fire

In the event of a fire at the charging station:

1. Take care of your own safety and the safety of people at the charging station;
2. If it is possible - press the **safety switch**, which will disable vehicle charging and disconnect the power track in the charging station;
3. Then turn off the charging station using the **main disconnector** located in the switchboard supplying the charging station;
4. If possible, use a fire extinguisher designed to extinguish electrical devices;
5. If necessary, notify the fire brigade of the situation;
6. After the fire is extinguished, the charging station must not be used until it is repaired or replaced;
7. The operator of the charging station must be notified of the situation.

It is recommended that there be a fire extinguisher near the charging station for extinguishing electrical appliances.

Extinguish the charging station only with equipment adapted for this purpose. **Do not extinguish with water!**

9. LIST OF FIGURES AND TABLES