

**Ingeteam**

# **INGEREV RAPID ST**

**200 - 400**

Installation and Operation Manual

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01/2021

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# **INGEREV RAPID ST**

## Installation and Operation Manual

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# Important safety instructions

This section describes the safety warnings and the personal protective equipment and symbols used in the unit.

## Safety conditions

### General warnings

#### DANGER

Opening the enclosure does not imply there is no voltage inside.

The risk of electric shock exists even after disconnecting from the grid and from the Power inverters.

Only qualified personnel may open it, following the instructions in this manual.

It is strictly forbidden to gain access to the inside of the electrical panel through any other point than the access cover provided for this purpose. Always gain access when the unit is voltage-free.

#### CAUTION

The operations described in the manual may be performed only by qualified personnel.

The status of qualified personnel referred to in this manual will be, as a minimum, that which meets all the standards, regulations and laws regarding safety applicable to the tasks of installing and operating this unit.

The responsibility for designating qualified personnel will always fall to the company to which the personnel belong. It is necessary to decide which workers are suitable or not for carrying out specific work to preserve their safety at the same time as complying with occupational safety legislation.

These companies are responsible for providing appropriate training in electrical equipment to their personnel and for familiarizing them with the contents of this manual.

All applicable safety-related legislation for electrical work must be complied with. Danger of electric shock.

Compliance with the safety instructions set out in this manual or in the suggested legislation does not imply exemption from other specific standards for the installation, place, country or other circumstances that affect the unit.

You must consider the set of conditions listed throughout this document as minimum requirements. It is always preferable to shut off the AC and DC power supplies. There may be faults in the installation that cause the unwanted return of voltage. Danger of electric shock.

According to basic safety standards, the complete unit must be suitable to protect exposed workers against the risk of direct and indirect contact. In any case the electrical parts of the work equipment must comply with the provisions of the corresponding specific regulations.

According to basic safety standards, the electrical installation shall not entail a fire or explosion risk. Workers must be duly protected against the risk of accidents caused by direct or indirect contact. The electrical installation and protection devices must take into account the voltage, the external conditions and the competence of persons who have access to parts of the installation.

To check the absence of voltage, it is compulsory to use measurement devices with category III-1100 V.

#### INFO

These instructions must be easily accessible close to the unit and located within reach of all users.

Before installation and start-up, please read these safety instructions and warnings carefully as well as all the warning notices located on the unit. Ensure that all the warnings signs are perfectly legible and that those which are damaged or have disappeared are restored.

Protection against direct contact is by means of the enclosure.

The unit has been tested according to the applicable regulations to comply with the safety requirements, the values for insulation clearances and leakage paths for the voltages used.

## Potential hazards for people

### DANGER

Electric shock.

The equipment may remain charged after disconnecting the AC and DC power.

Carefully follow the mandatory steps in the manual for removing the voltage.

Explosion.

There is a very low risk of explosion in very specific cases of malfunction.

The casing will protect people and property from the explosion only if it is correctly closed.

Crushing and joint injuries.

Always follow the indications in the manual on moving and placing the unit.

The weight of this unit can cause serious injury and even death if not handled correctly.

High temperature.

The flow of outlet air can reach high temperatures which can cause injury to anybody exposed to it.

## Potential hazards for the equipment

### DANGER

Cooling.

The unit requires particle-free air flow while it is operating.

Keeping the unit in the upright position and the inlets free of obstacles is essential for this air flow to reach the inside.

Do not touch boards or electronic components. The more sensitive components can be damaged or destroyed by static electricity.

Do not disconnect or connect any terminal while the unit is operating. Disconnect and check for absence of voltage first.

With the aim of avoiding premature wear of the screwed joints on the unit's housing panels, removal and installation of the screws must be done manually.

## Personal Protective Equipment (PPE)

When working on the unit, use the following safety equipment recommended by Ingeteam as a minimum.

Name	Description
Safety footwear	In compliance with standard <i>UNE-EN-ISO 20345:2012 ANSI Z41.1-1991</i>
Helmet with face shield	In compliance with standard <i>UNE-EN 397:1995, ANSI Z89.1-2014</i> , provided there are elements with voltage directly accessible.
Working clothes	Close-fitting, non-flammable, 100% cotton
Dielectric gloves	In compliance with standard <i>EN 60903:2005 ASTM D 120-87</i>

Tools and / or equipment used in live work must have at least Category III-1100 Volts insulation.

Should the country's regulations demand another kind of personal protection, you should appropriately supplement the equipment recommended by Ingeteam.

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# 1. About this manual

The purpose of this manual is to describe the INGEREV RAPID ST units and to provide appropriate information for their correct reception, installation, start-up, maintenance and operation.

## 1.1. Scope and nomenclature

This manual is applicable to the following units:

Complete name	Abbreviation
INGEREV RAPID ST200 One	ST200 One
INGEREV RAPID ST200 Duo	ST200 Duo
INGEREV RAPID ST400 Duo	ST400 Duo

## 1.2. Recipients

This document is intended for qualified personnel.

The status of qualified personnel referred to in this manual will be, as a minimum, that which meets all the standards, regulations and laws regarding safety applicable to the tasks of installing and operating this unit.

The responsibility for designating qualified personnel will always fall to the company to which the personnel belong. It is necessary to decide which workers are suitable or not for carrying out specific work to preserve their safety at the same time as complying with occupational safety legislation.

These companies are responsible for providing appropriate training in electrical equipment to their personnel and for familiarizing them with the contents of this manual.

## 1.3. Symbols

Throughout this manual we include warnings to highlight certain information. Relative to the nature of the text, there are three types of warnings:



This indicates a hazard to personnel or the charger.



Indicates importance.



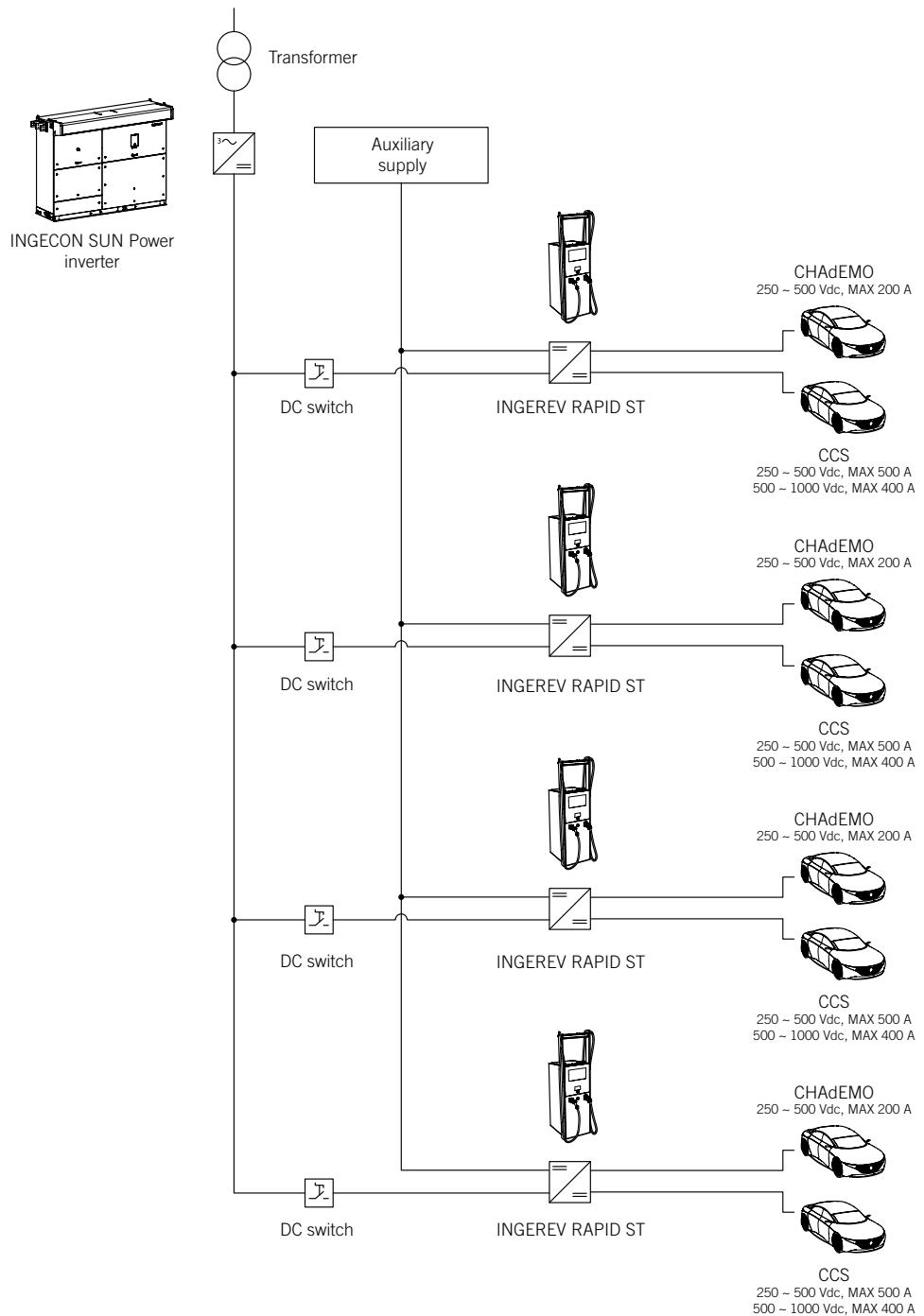
Additional information or references to other parts of the document or documents.

## 2. Unit description

### 2.1. Overview

The INGEREV RAPID ST are multi-standard ultra-fast charging chargers designed for the realization of large charging stations (combined power greater than 750 kW).

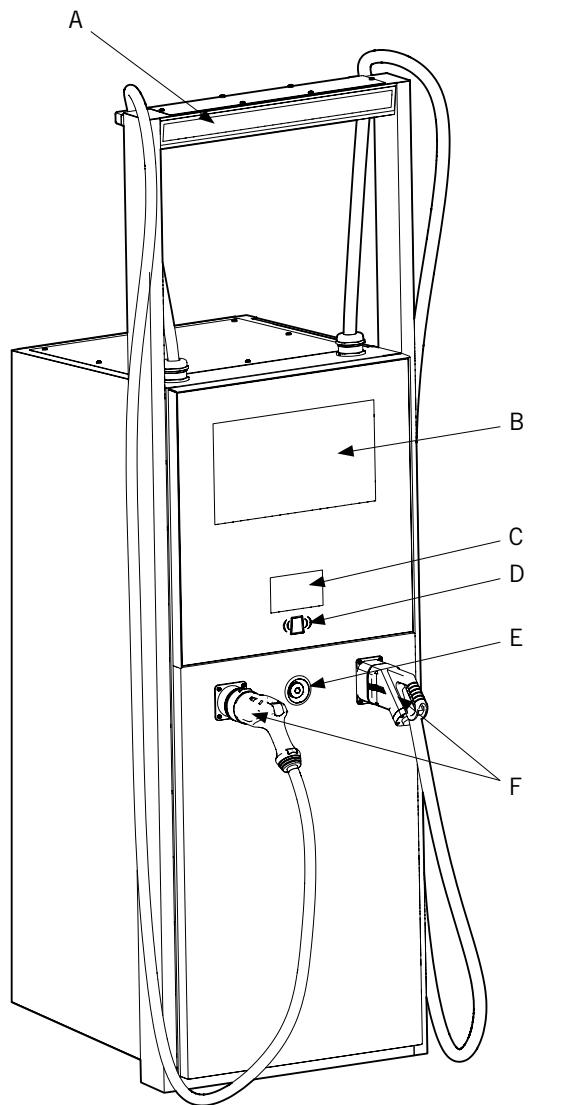
This recharging stations are characterized by making a distribution in direct voltage from a main rectifier equipment. This unit (-A1) is connected to the AC power grid through a dedicated transformation center and generates an internal DC voltage network that is distributed to all load terminals in the installation.



*Ultra fast charging installation type diagram*

The charging terminals include isolated DC / DC power converters (called *BPM*) that adapt the DC main voltage to the needs of the car at all times.

## 2.2. Main parts of the charging station

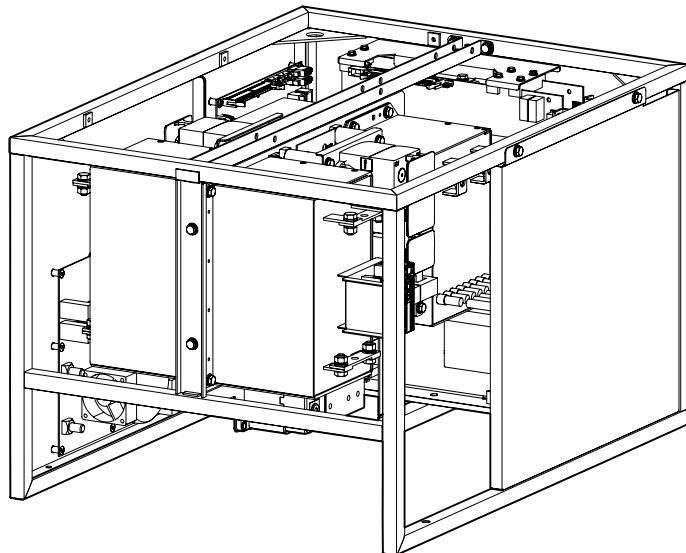


- A. Ambient LED lighting
- B. 21" screen with Full HD resolution for commercial purposes (optional)
- C. Interaction touch screen (*Human-Machine Interface, HMI*)
- D. RFID card reader
- E. Emergency button
- F. Charging connectors

The INGEREV RAPID ST family, with its different models, is compatible with mode 4 of the CHAdeMO and CCS standards in direct current.

## 2.3. Power modules (BPM)

The BPMs are the modules that include the power electronics in charge of transforming the energy supplied to the vehicle. They have been specifically designed for electric vehicle charging applications and incorporate the latest semiconductor technology. As a result of all this, it is possible to reduce the volume of the modules to the maximum, obtaining a high power density.

*Basic Power Module (BPM)*

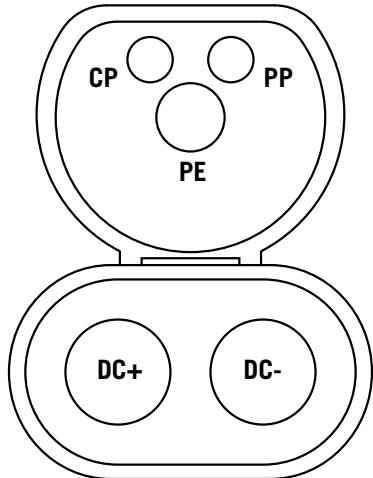
INGEREV RAPID ST chargers incorporate the DC/DC BPM since an external device generates the DC network and the charger only has to adapt the voltage level to the requirements of the car. The BPM DC/DC have two DC/DC converters in parallel.

BPM DC/DC	
<b>Auxiliary services entrance</b>	
Voltage	24 Vdc
Rated current	5 A
Rated power	200 kW
<b>DC power entrance</b>	
Voltage	575 ~ 750 V
Rated current	300 A
<b>Output (DC)</b>	
Voltage range	50 ~ 920 V
Maximum current	300 A (50 ~ 500 Vdc) / 200 A (600 ~ 920 Vdc)
<b>General information</b>	
Refrigeration system	Liquid cooling with quick shots without dripping
Galvanic isolation	Included by high frequency transformer
Semiconductors	Full SiC Technology
Stand-by consumption	< 10 W
Operating temperature	-25 °C ~ 60 °C
Humidity	0 ~ 95% (without condensation)
Weight	100 kg
Dimensions (Width x Depth x Height)	520 x 690 x 430 mm
Protection class	IP00

## 2.4. Charging standards

The INGEREV RAPID ST family of chargers is compatible with the two available DC charging standards (CCS and CHAdeMO).

### CCS



PP: Proximity Pilot

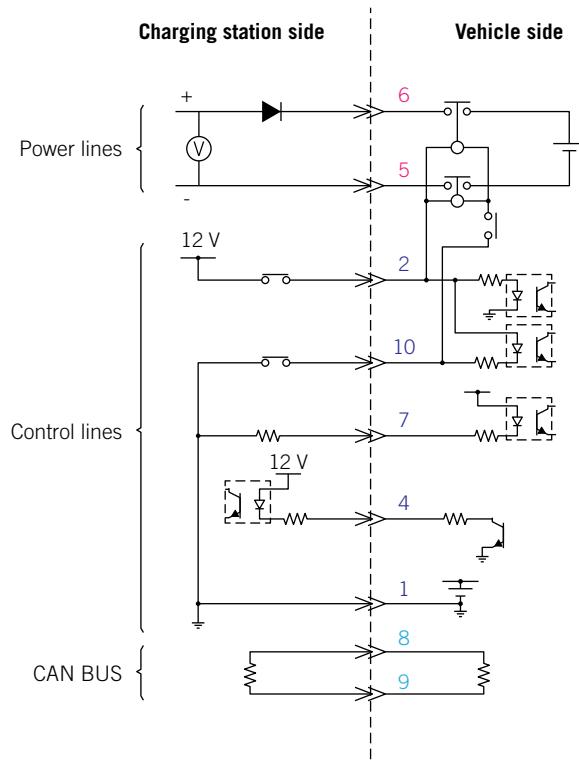
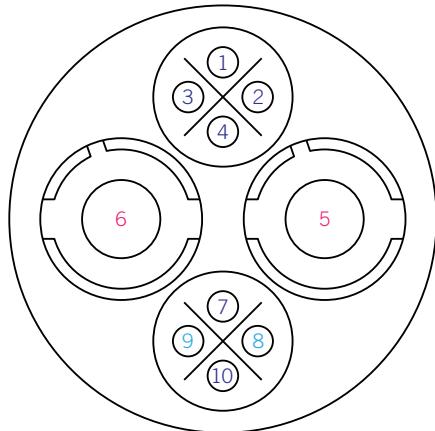
CP: Control Pilot

PE: Protective Earth

DC+

DC-

### CHAdeMO



## 2.5. Models

The INGEREV RAPID ST family of chargers comprises several models depending on the number of charging points, their available power and the charging standards.

The ST200 chargers include a single power unit (*BPM*) while the ST400 have two power units.

	Type and number of connectors		Simultaneous charging
	CCS	CHAdeMO	
INGEREV RAPID ST200 One	1	-	○
INGEREV RAPID ST200 Duo	1	1	○
INGEREV RAPID ST400 Duo	1	1	●
INGEREV RAPID ST400 Duo	2	-	●

● Available // ○ Not available

## 2.6. Enclosure opening

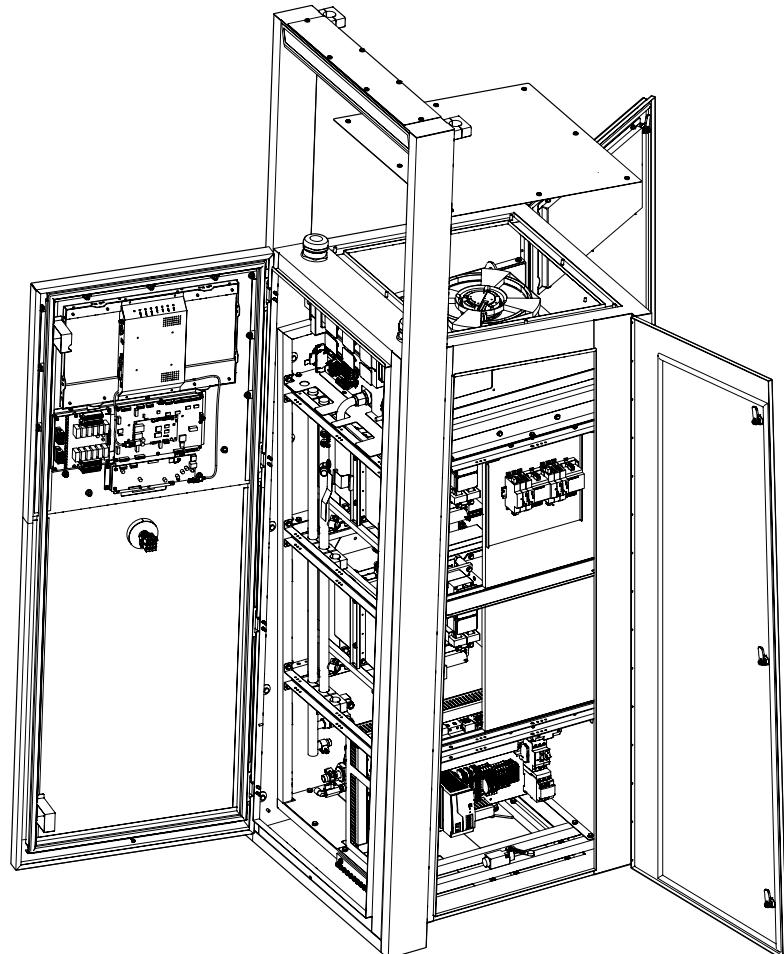


To access the interior of the station, it must be in a stopped state.

If the auxiliary system is powered, the fan or pump may start while the station is open.

There is a risk of burns due to the heating element, located at the bottom of the station.

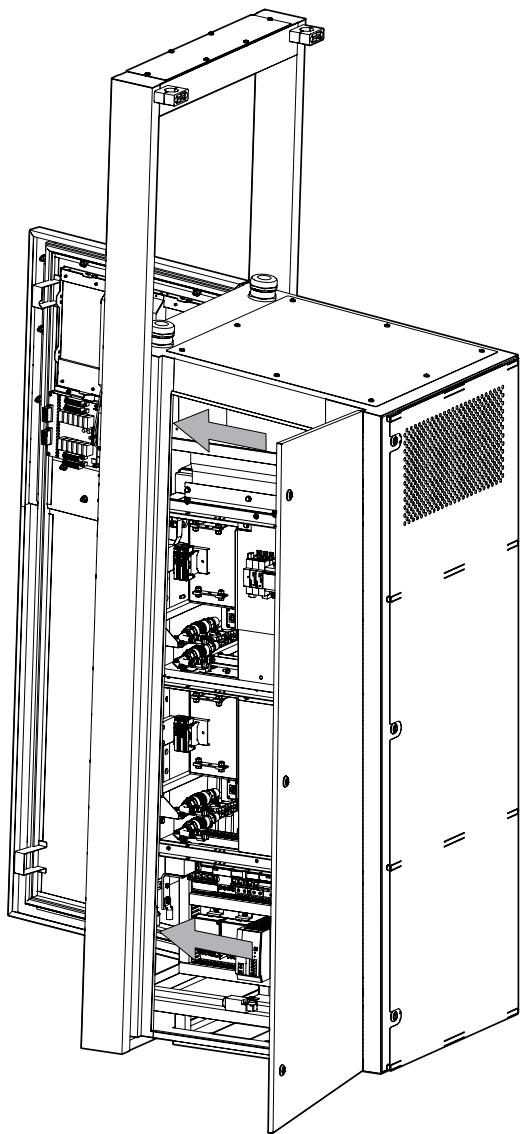
To gain access to the inside of the charging station, the enclosure has three doors (one on the side, front and rear) and an access from the top.



Opening of the different entrances to the charging station

The upper access is opened by screws. Side and rear doors with key lock and several quarter-turn locks.

To open the front door it is necessary to access two quarter-turn locks from inside the station, accessing these through the side door.



*Location of access to the two front door unlock latches*

## 2.7. Accessories fitted as standard

- Ethernet communication.
- Local communication with other INGEREV stations.
- OCPP support.
- Authentication through RFID/NFC cards.
- Screen interface.
- Highly resistant steel envelope against adverse environmental conditions.

## 2.8. Optional accessories

These units can incorporate the following optional accessories:

- 3G communication.
- Wi-Fi communication.
- 21 "screen with Full HD resolution for commercial purposes.

## 2.9. Electrical safety

Interesting design quantities for electrical safety are disclosed below.

### 2.9.1. Overvoltage Category (OVC)

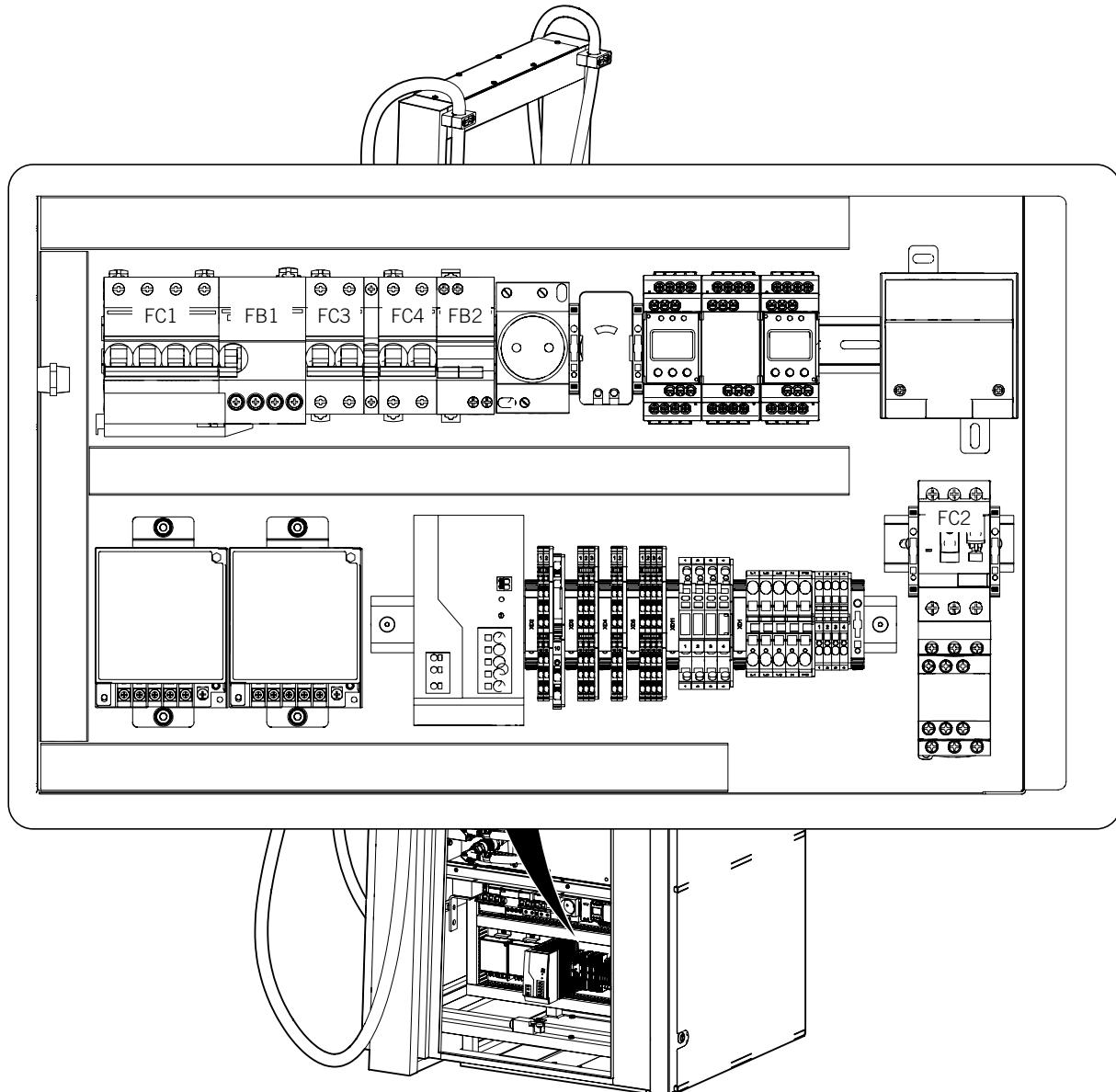
These units have been designed with an OVC III overvoltage category in AC.

## 2.10. Noise pollution

Operation of this unit generates a humming noise. Do not place them in an inhabited room, or on light supports that can amplify that hum. The mounting surface must be firm and suitable for the weight of the unit.

## 2.11. Electrical diagram of the auxiliary power supply

To supply the auxiliary services of the unit, it is necessary to supply a three-phase 400 V supply (AC) with neutral and protective conductor (PE). The protection elements of the auxiliary systems are described below.



**FC1** - Circuit breaker 16 A Curve C. Protects auxiliary systems.

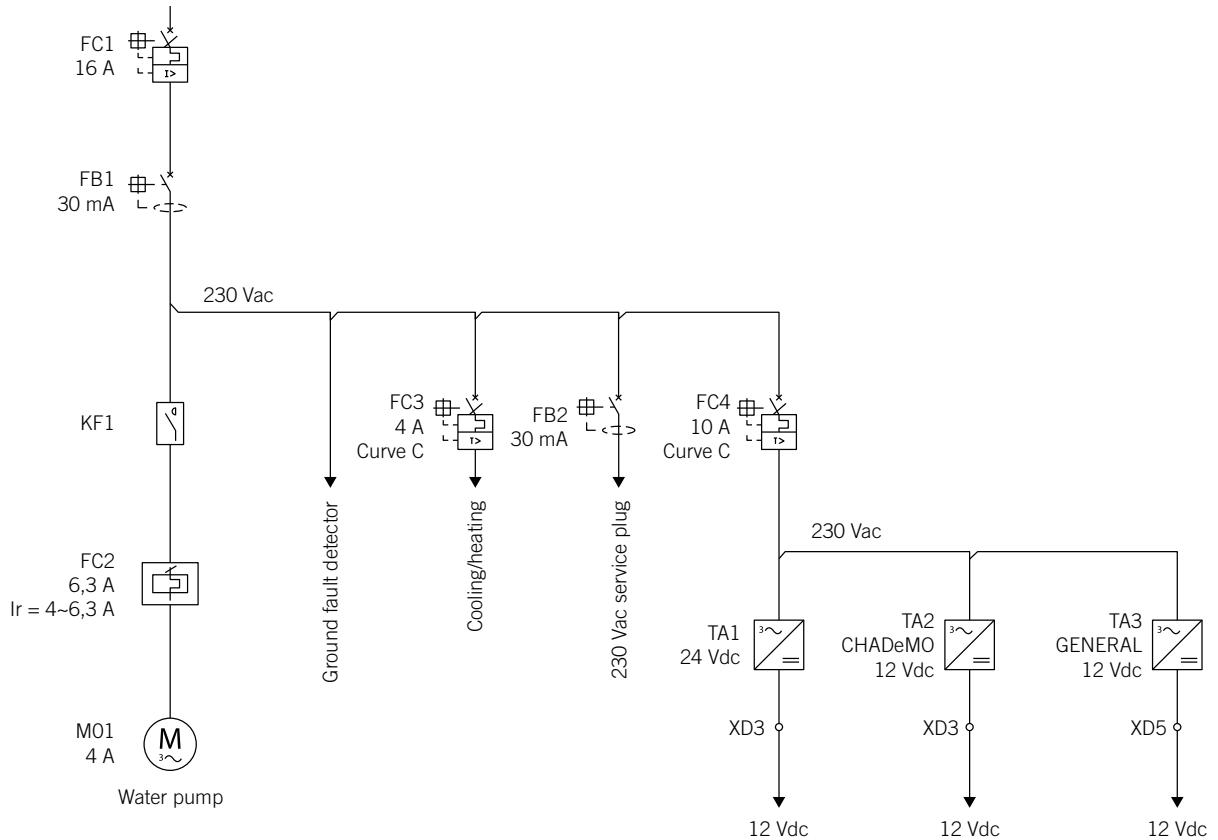
**FB1** - 30 mA 16 A Type B differential switch. Protects auxiliary systems.

**FC2** - 6.3 A motor protection switch. Protects the cooling pump circuit.

**FC3** - Circuit breaker 4 A Curve C. Protects the main fan circuit and the heating.

**FC4** - Circuit breaker 10 A Curve C. Protects DC power supplies.

**FB2** – 6 A magnetothermic switch and 30 mA differential that protects the Schuko socket.



## 2.12. Electrical diagram of the DC power circuit

The INGEREV RAPID ST family units are connected to a direct voltage (DC) distribution network. DC voltage isolating elements are located outside the unit and are part of the customer's installation.

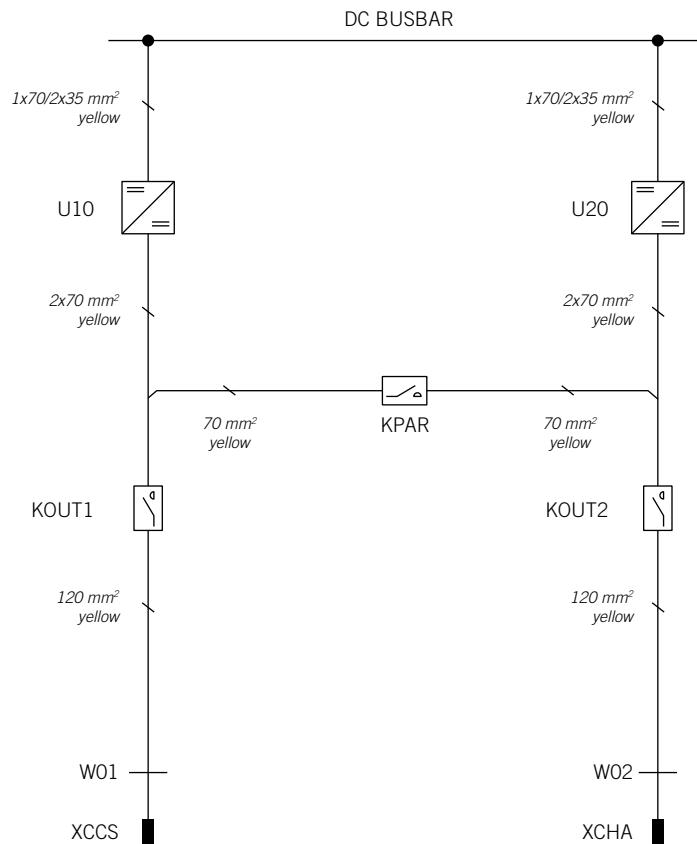
In order to avoid opening the unit without having disconnected the direct voltage, a limit switch is included whose contact must be wired with the minimum coil of the corresponding disconnector. In this way, in case of opening the unit door, the disconnector supplying said unit will trip, thus being isolated from the DC network.

**⚠ CAUTION**

Opening the unit enclosure does not imply the absence of dangerous voltages inside.

This applies mainly to the DC power circuit. Due to the presence of capacities, dangerous DC voltages can exist even several minutes after the supply has been disconnected. It is essential to wait 10 minutes between disconnecting the DC power and opening the unit door.

The power modules (-U10 and -U20) are connected to the DC distribution busbars (points 2 and 3). The output of the modules is connected to the hose selection contactors (-Kout1 and -Kout2) using high-density cables. Parallel contactors (-Kpar) allow both power modules to be connected to only one of the charging sockets.



Single line of the DC power circuit

## 2.13. Specification table

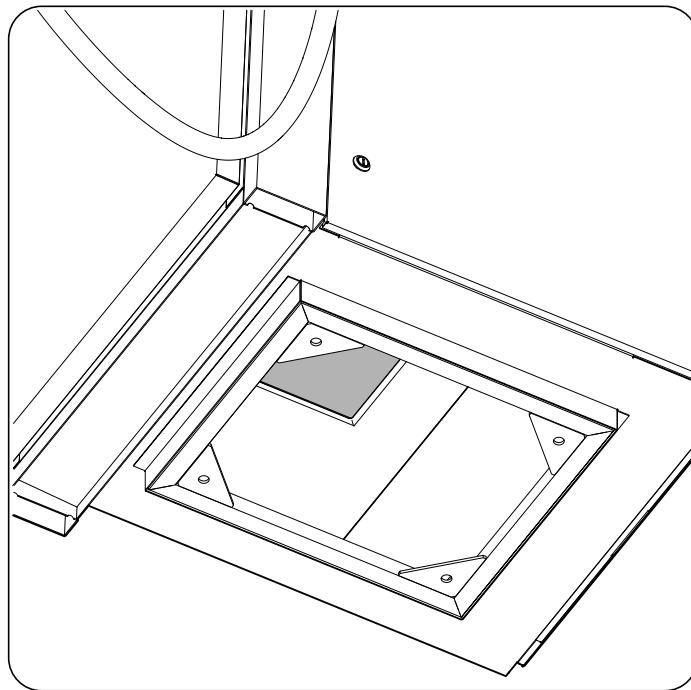
	INGEREV RAPID ST200	INGEREV RAPID ST400
<b>AC input (auxiliary services)</b>		
Voltage	380 ~ 440 V	
Frequency	50/60 Hz	
Rated current	6 A	
Rated power	3 kW	
<b>DC input (power)</b>		
Voltage	575 ~ 750 V	
Rated current	300 A	600 A
<b>DC output</b>		
Voltage range	50 ~ 920 V	
Maximum current	300 A	500 A
Maximum power	180 kW	360 kW
Charging connectors	One: CCS Tipo 2 Duo: CCS Tipo 2 + CHAdeMO	Duo: CCS Tipo 2 + CHAdeMO Duo: CCS Tipo 2 + CCS Tipo 2
<b>Regulations and safety compliance</b>		
Standards	IEC 61851-1, IEC 61851-23, IEC 61851-24, CHAdeMO 1.0.0, DIN 70121, ISO 15118, IEC 61000	
Overcurrent protection	16 A circuit breaker Curve C in auxiliary circuit	
Protection against indirect contacts	Differential 16 A 30 mA Type B	
Overvoltage protection	Type III surge arrester	
<b>General information</b>		
Cooling system	Integrated liquid cooling with heat evacuation to the outside environment	
Stand-by consumption	< 100 W	
Operating temperature	-25 °C ~ 60 °C	
Humidity	0 ~ 95% (without condensation)	
Weight	560 kg	460 kg
Dimensions (Width x Depth x Height)	774 x 904 x 2547 mm (including hose guide ring)	
Protection class	IP54 / IK10 (IK08 for display and vents)	
Markings	CE	
Maximum altitude	Up to 2000 m	

## 2.14. Cable inlets

**⚠ CAUTION**

The area for cable access must be sealed with polyurethane foam after installation of the charging station.

The wiring necessary for the correct operation of the charging station will be guided inside through the lower opening shaded in the following figure.



*View from the bottom of the wiring access*

### 3. Transportation and handling of the unit

The unit must be protected during transport from mechanical shocks, vibrations, water projections (rain) and any other product or situation that may damage or alter its behavior.

Failure to observe these instructions may result in the loss of the warranty on the product.

#### 3.1. Unpacking

Correct handling of the units is vitally important in order to:

- Prevent damage to the packaging which enables them to be kept in optimum condition from shipping until they are installed.
- Avoid knocks and/or falls which may harm the mechanical features of the units, e.g. cause incorrect closure of doors, loss of IP rating, etc.
- Avoid, as far as possible, vibrations which may cause subsequent malfunction.

If you observe any anomaly, please contact Ingeteam immediately.

#### Separating the packaging

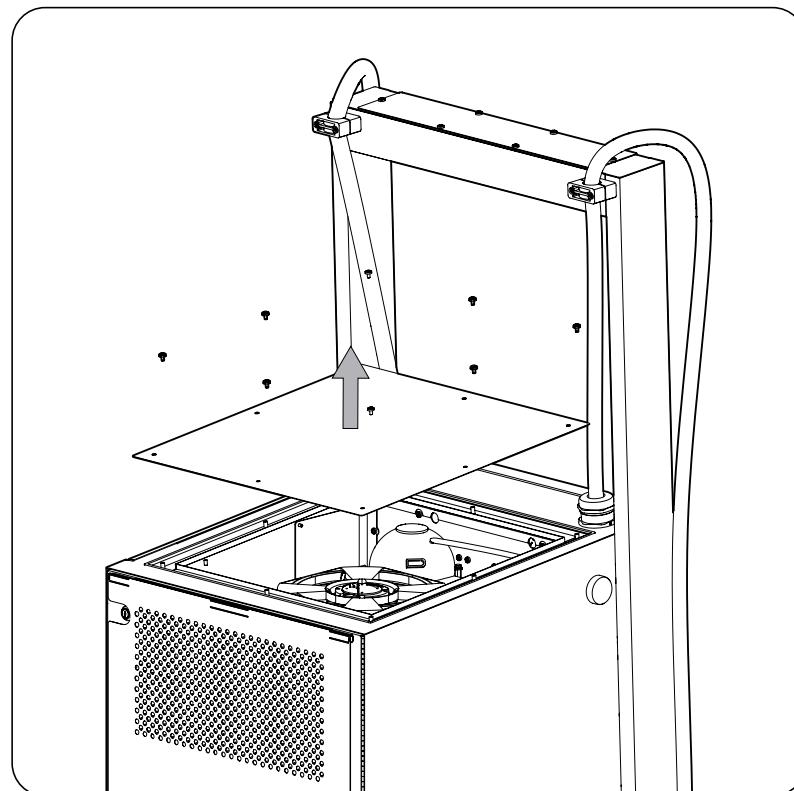
You can deliver all the packaging to an authorized non-hazardous waste management company.

In any event, each part of the packaging may be recycled as follows:

- Plastic (polystyrene, bag and bubble wrap): the appropriate container.
- Cardboard: the appropriate container.

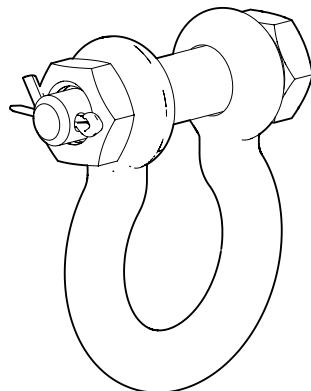
#### 3.2. Handling

INGEREV Rapid ST family charging stations are designed for handling from the top. For this, a removable cover has been fitted in the upper part of the enclosure that allows access to the four planned lifting points.



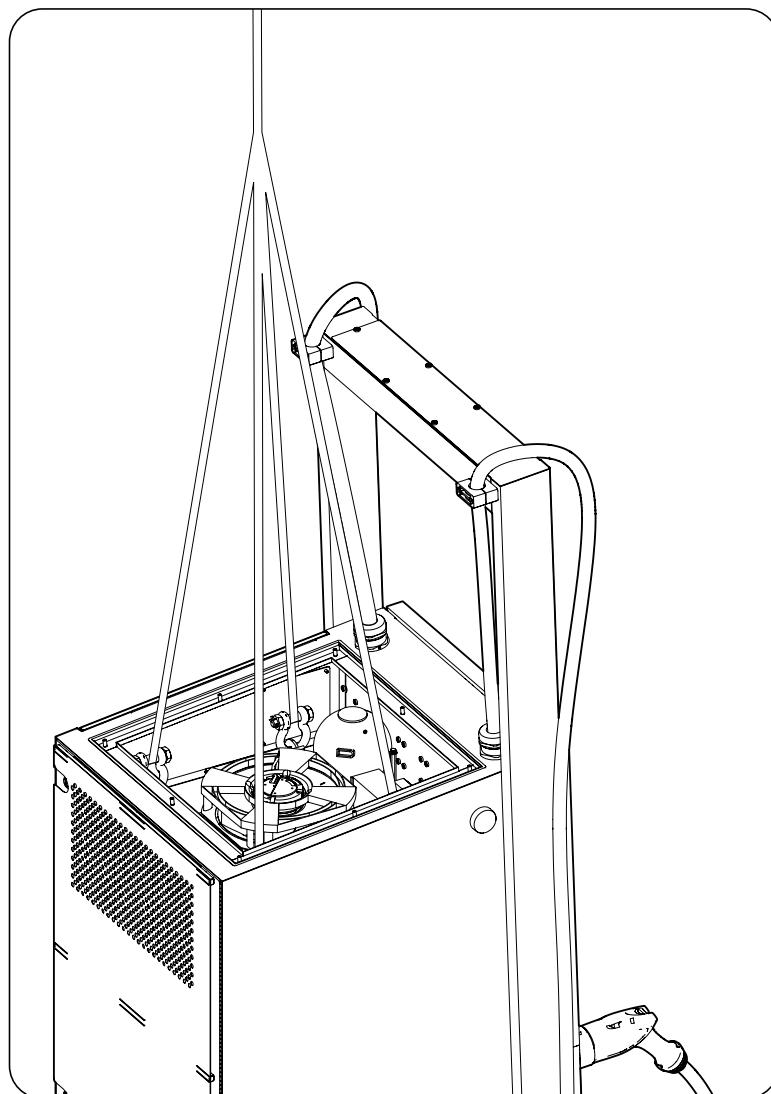
*Top station opening*

In order to avoid possible interference with attached components, it is essential to use straight or bow shackles of a maximum size of 1/2".



*Bow shackle*

Any handling of the unit must be carried out using the four available lifting points with chains (or textile slings) converging to a single point and with a minimum length of 1.5 m.



*Lifting using all four lifting points*

## 4. Unit reception and storage

### 4.1. Reception

Keep the unit in its packaging until immediately before installation.

### 4.2. Unit identification

The serial number of the unit is its unique identifier. You must quote this number in any communication with Ingeteam.

The unit's serial number is marked on the specifications plate.

### 4.3. Transport damage

If the unit has been damaged during transport, proceed as follows:

1. Do not proceed with the installation.
2. Notify the distributor immediately within five days of receipt of the unit.

If ultimately the unit has to be returned to the manufacturer, the original packaging must be used.

## Storage



Failure to follow the instructions in this section may lead to damage to the unit.

Ingeteam accepts no liability for damage resulting from the failure to follow these instructions.

If the unit is not installed immediately after reception, the following points should be taken into account in order to avoid damage:

- The unit must be stored in its original packaging.
- Keep the unit free of dirt (dust, shavings, grease, etc.) and away from rodents.
- Keep it away from water splashes, welding sparks, etc.
- Cover the unit with a breathable protective material in order to prevent condensation due to ambient humidity.
- Units in storage must not be subjected to weather conditions other than those indicated in section "[2.10. Specification table](#)".
- It is very important to protect the unit from chemical products which can cause corrosion, as well as from salty atmospheres.
- Do not store the unit outdoors.

### 4.4. Conservation

In order to permit correct conservation of the units, they must not be removed from their original packaging until it is time to install them.

In case of prolonged storage, use dry places, avoiding, as far as possible, sharp changes in temperature.

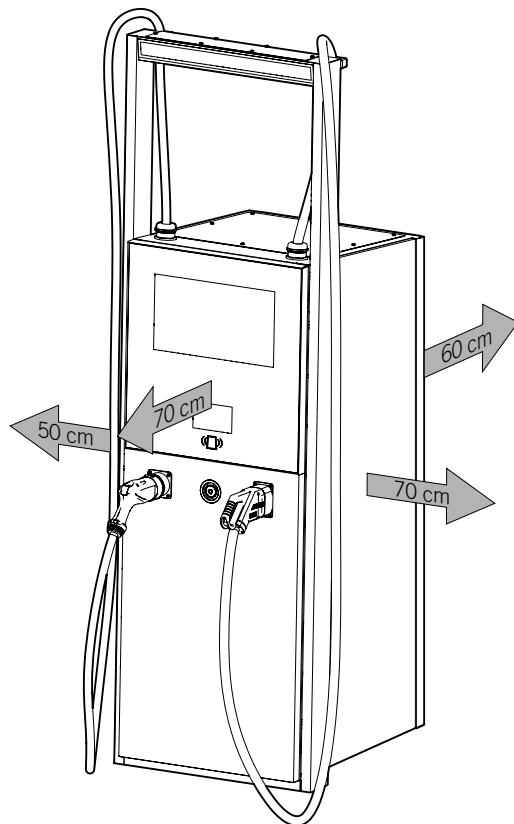
Deterioration of the packaging (tears, holes, etc.) prevents the units from being kept in optimum conditions before installation. Ingeteam accepts no liability in the case of failing to observe this condition.

## 5. Preparation for installing the unit

When deciding the location of the unit and planning your installation, you must follow a set of guidelines based on the specifications of the unit. These guidelines are summarized in this chapter.

### 5.1. Environment

- Situate the units in a place that is accessible for installation and maintenance work and which allows access to the control panel.
- The air vents and part of the power module can reach high temperatures. Do not place any material sensitive to high temperatures in its vicinity.
- Avoid corrosive environments that may affect its correct operation. Do not install the unit in areas classified as ATEX.
- It is strictly forbidden to leave any object on top of the unit.
- It is recommended to place the unit under a cover that protects it from direct irradiation, facing its front part to the north in the northern hemisphere and to the south in the southern hemisphere.
- Keep the following minimum distances free of obstacles.



*Minimum clear distances*

### 5.2. Environmental conditions

Environmental conditions must be taken into account when choosing the location of the unit.

Environmental conditions	
Minimum temperature	-20 °C
Minimum surrounding air temperature	-20 °C
Maximum operating temperature	60 °C <sup>(1)</sup>

Environmental conditions	
Maximum relative humidity without condensation	95%
Altitude	2000 m <sup>(2)</sup>

<sup>(1)</sup> The operation of the unit at temperatures greater than 50 °C should only occur occasionally and not permanently. Ingeteam is not responsible for the consequences to the unit resulting from operating it at temperatures higher than 50 °C.

<sup>(2)</sup> At altitudes higher than 1000 m, please contact Ingeteam.

It should be borne in mind that moderate condensation may occasionally occur as a consequence of temperature variations. For this reason, apart from the unit's own protection, it is necessary to monitor these units once they have been started up on sites where the conditions described above are not expected to be present.

In the event of condensation, never apply voltage to the unit. To remove condensation apply a flow of hot air at a maximum temperature of 60 °C.

 **INFO**

Ingeteam does not guarantee the proper operation of the unit if the operation conditions for which it has been designed are not fulfilled.

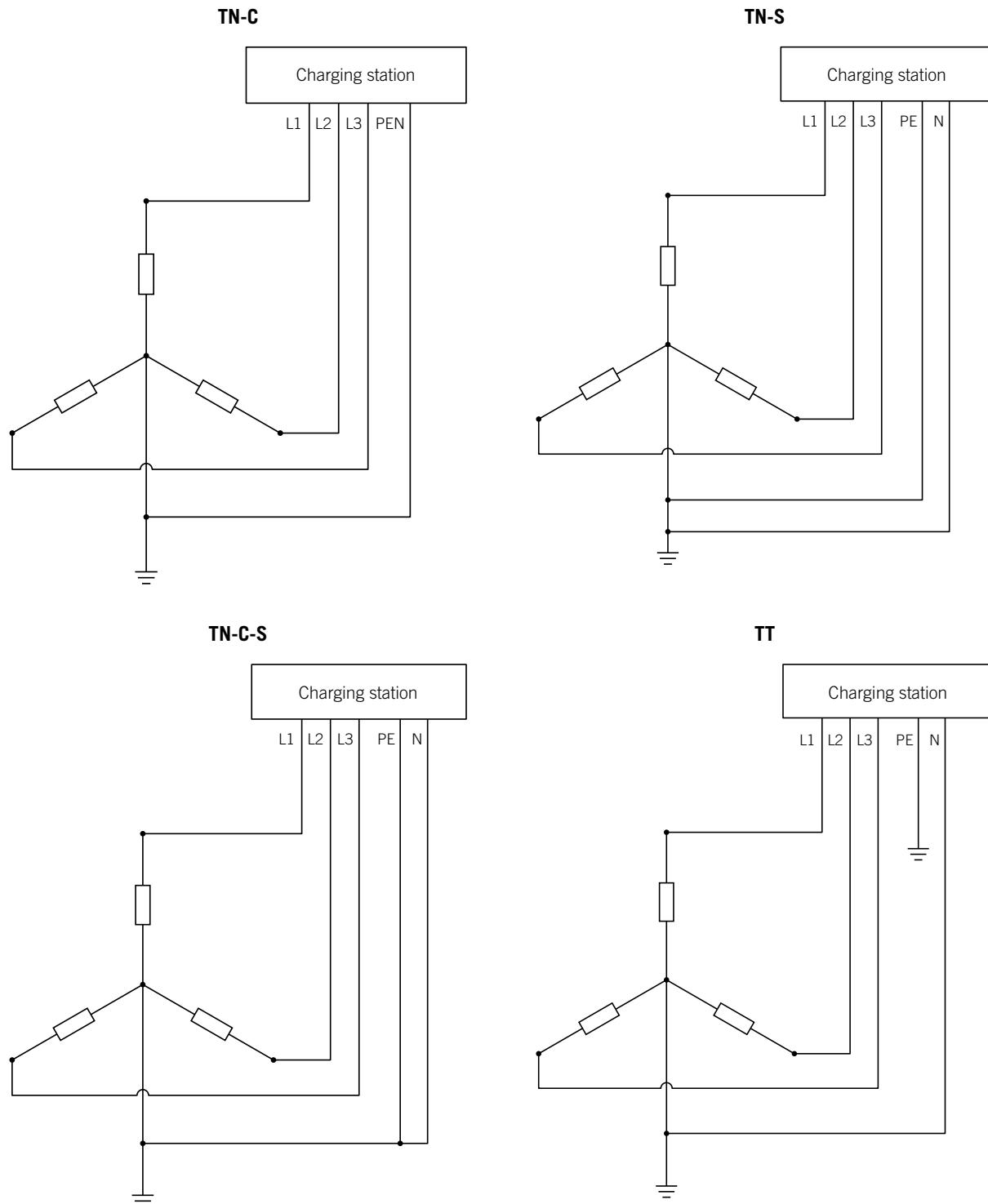
## 5.3. Type of grid for the AC auxiliary system

Through this connection the necessary energy is supplied to power all the auxiliary components of the unit (refrigeration, control, heating, etc.).

These units must be connected to a three-phase star network with grounded neutral. The permissible grounding systems are therefore TT and TN.

You cannot connect to IT networks or delta grounded grids on one of your lines.

It is necessary to bring the three-phase grid connections (L1, L2, L3 and N) and its earth (PE) to the unit.



## 5.4. External disconnection system

To inspect the unit, it is necessary to remove the AC supply voltage. For this, the installer must install an external disconnection system.

The isolating element must be sized for the DC input voltage and current of the load terminal (see section "[2.13. Specification table](#)").

It must also include the possibility of remote trigger (by means of a minimum coil) that allows its opening in the event that the door of the charging station is accidentally opened.

## 6. Installing the unit

Before installing the unit, the packaging must be removed, taking special care not to damage the housing (see section “[4.2. Unpacking](#)”).

Check that there is no condensation inside the packaging. If there are signs of condensation, the unit must not be installed until you are sure it is completely dry.

 **CAUTION**

All installation operations must comply with current regulations.

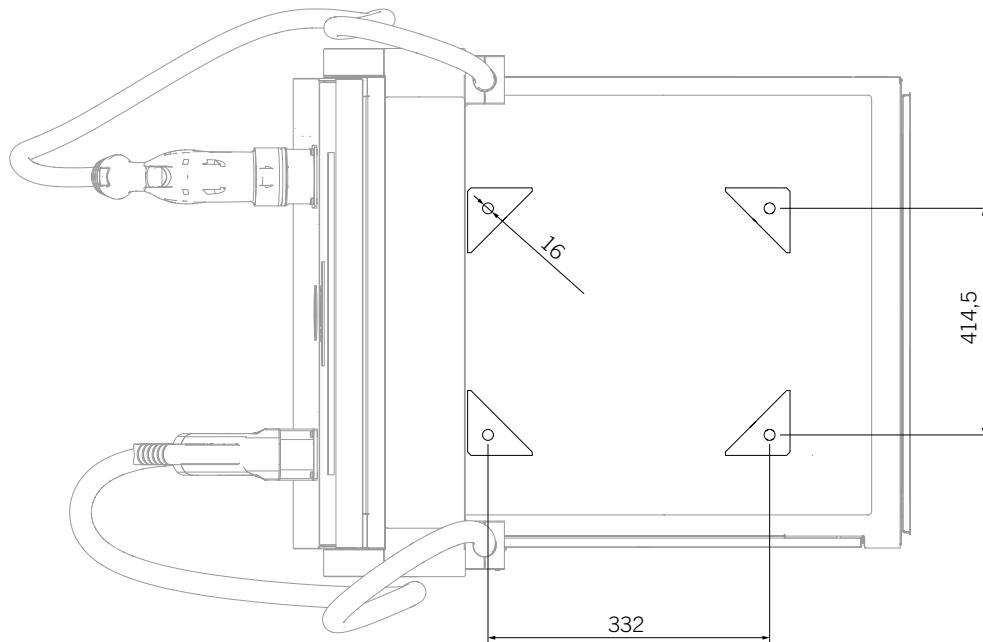
All operations involving moving heavy weights must be carried out using the required mechanical means (crane, hoist, etc.).

### 6.1. General requirements for installation

- The environment of the unit must be appropriate and meet the guidelines described in chapter “[5. Preparation for installing the unit](#)”. Additionally, the parts used in the rest of the installation must be compatible with the unit and comply with the applicable legislation.
- The ventilation and workspace must be suitable for maintenance tasks according to the applicable regulations in force.
- The external connection devices, which must be suitable and sufficiently close as set forth in current regulations.
- The feed cables must be of the appropriate gage for the maximum current.
- Special care must be taken to ensure that there are no external elements near the air inlets and outlets that obstruct proper cooling of the unit, respecting the distances indicated in section “[5.1. Environment](#)”.

### 6.2. Fastening the unit

The fixing points are designed to use threaded rods or screws (M12). In the case of using threaded rod, its length above the ground should be 20 to 30 mm.

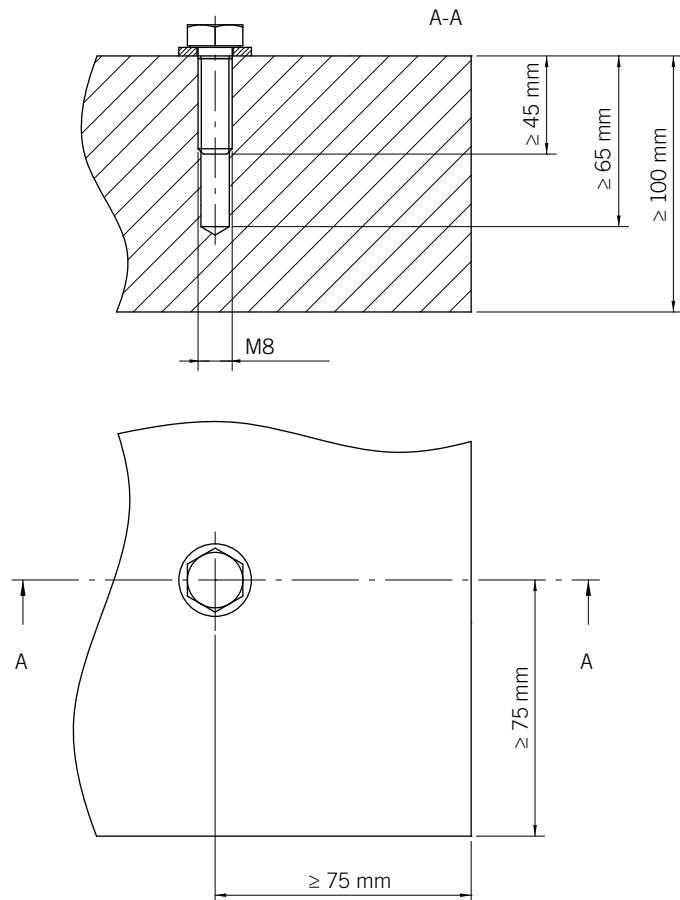


*Distances between the ground fixing points, top view*

The weight of the unit makes it necessary for the ground on which it rests to be firm, completely horizontal and level, ensuring the correct drainage of water and thus avoiding its stagnation.

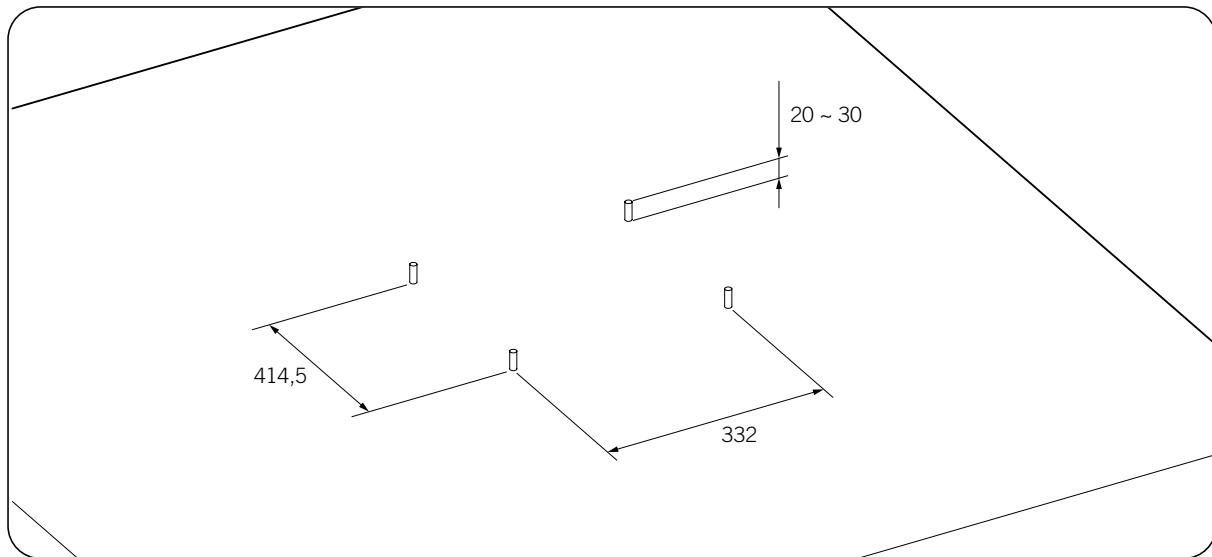
You must follow the following stipulations when choosing the place where the unit is to be bolted in:

- Minimum distance from the center of the bore to the edge of the concrete pad: 75 mm.
- Diameter of the hole drilled in the concrete pad: 8 mm.
- Minimum depth of the hole drilled in the concrete pad: 65 mm.
- Minimum thickness of the concrete pad: 100 mm.
- Minimum depth of anchoring bolt: 45 mm.
- Minimum tensile strength: 7.7 kN. Security coefficient 1.5.
- Minimum shear strength: 9.3 kN. Security coefficient 1.25.



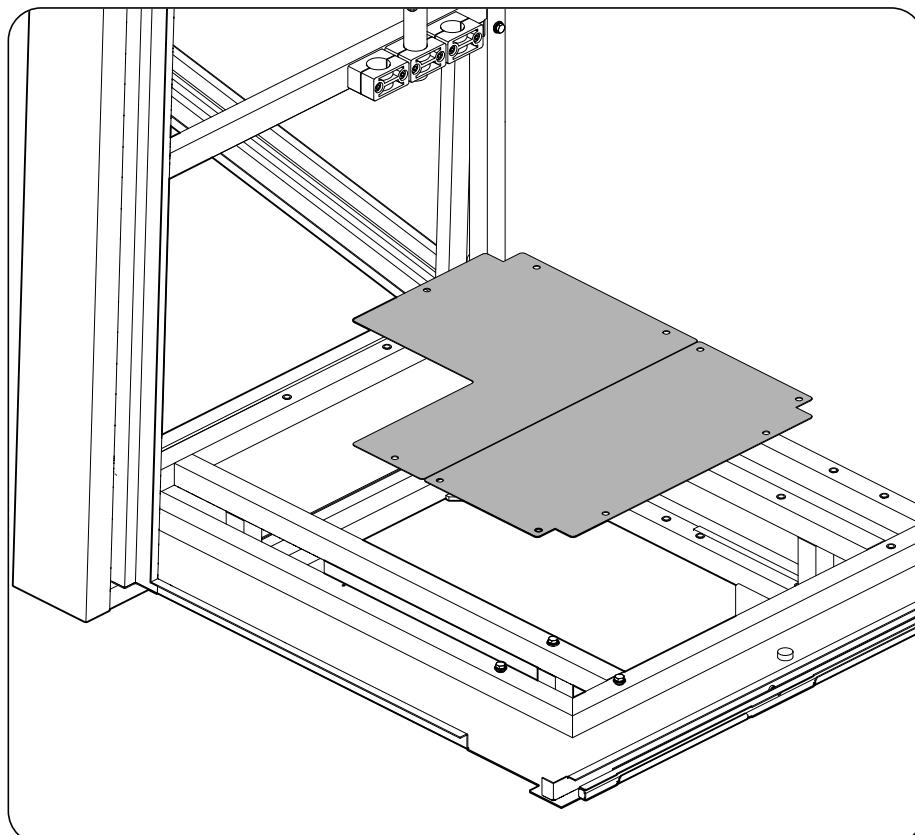
Follow these steps:

1. Mark the fixing points on the floor.
2. In case of fixing with screws, drill the ground with a suitable drill bit. If threaded rods are to be used, install these in the ground.



*Installation of threaded rods in the ground*

3. Before positioning the charging station in its final location, remove the two lower plates shown in the following figure. To gain access it is necessary to open the front, side and rear doors.



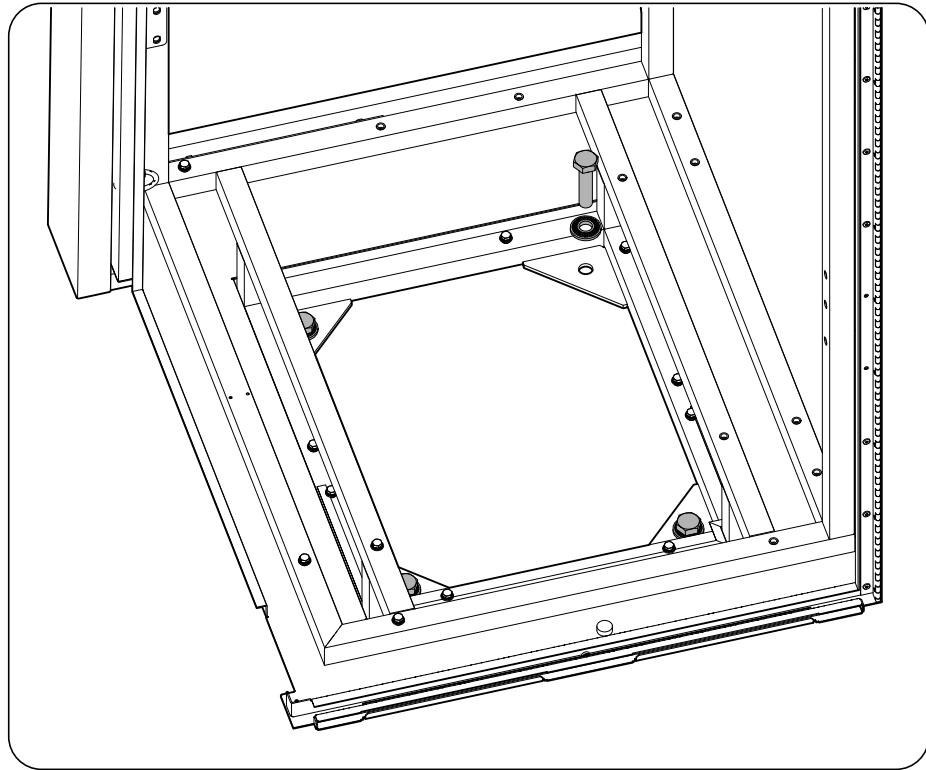
*Simplified view of the bottom of the station*

4. Once the lower plates have been removed, close the front and rear doors to make handling the station safer. The side door will remain open to facilitate the positioning of the station on its anchoring points to the ground.
5. With the help of a crane (see section "[3.2. Handling](#)") position the station at its anchoring points to the ground.

 **CAUTION**

The handling by crane of the station with the side door open must be the minimum possible, only to position it in its fixing points. Whenever possible, handling will be done with all doors closed.

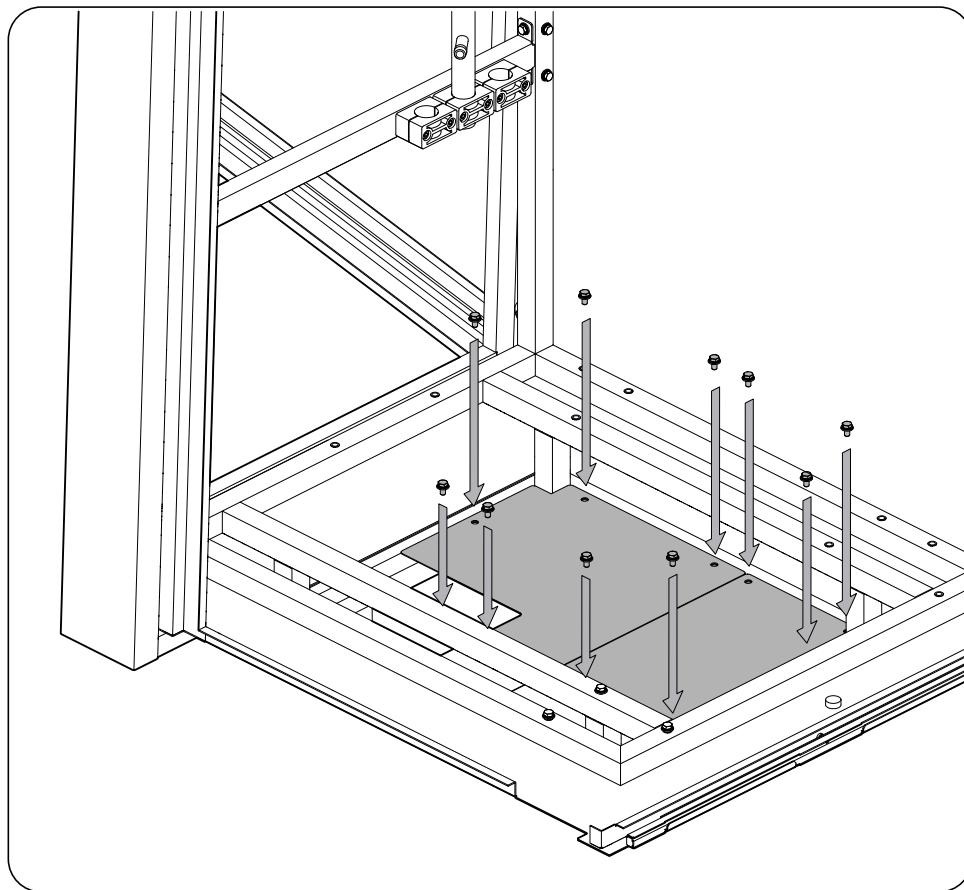
6. In case of executing the installation with threaded rods, secure the fixings with washers and nuts. If the installation is carried out with screws, install these screws together with the corresponding washers.



*Installation of screws and washers in the fixing points to the floor*

7. Verify that the unit has been properly installed.

8. Install the lower plates, opening the front and rear doors to have better access for fixing the screws and washers.



*Installation of the bottom plates, simplified view*

9. Pass the wiring from the ground into the station through the designated opening.

Once the unit has been installed correctly, the process of connecting it will begin.

Make the connections in the following order:

1. AC auxiliary circuit connection.
2. DC power circuit connection.

**⚠ CAUTION**

It is mandatory to follow the order described above. Do not switch on the power until you have made all the connections and closed the unit.

## 7. AC auxiliary circuit connection

Throughout this chapter, the requirements and the process for connecting the AC auxiliary circuit wiring to the unit are explained.

Through this connection the necessary energy is supplied to power all the auxiliary components of the unit (refrigeration, control, heating, etc.).

Read carefully before starting the connection process.

 **INFO**

Consult section "*Important safety instructions*" and the following instructions before working on the unit.

### 7.1. Safety instructions for the AC auxiliary circuit connection

 **DANGER**

Make sure there is no voltage present on the unit before starting the AC connection.

**Do not switch on the power** to the unit until you have successfully made the rest of the connections and the unit is closed.

Use the Personal Protective Equipment specified in section "*Personal Protective Equipment (PPE)*".

During the connection, make sure of the proper installation of the cables on the unit's terminals so that parts of accessible wires do not remain live.

Respect the polarity of the AC wiring.

 **CAUTION**

Ingeteam accepts no liability for any damages caused by an incorrect connection.

### 7.2. Wiring requirements for the AC auxiliary circuit connection

 **CAUTION**

If using aluminum cables, the installer must provide the necessary means to prevent galvanic coupling (bipolar terminals, bimetallic interfaces, etc.).

The sizing of the ground wiring will be the responsibility of the installer and must meet the regulatory requirements applicable in the installation.

To guarantee the safety of people, for the correct operation of the unit and to comply with the applicable regulations, the unit must be connected to the installation earth.

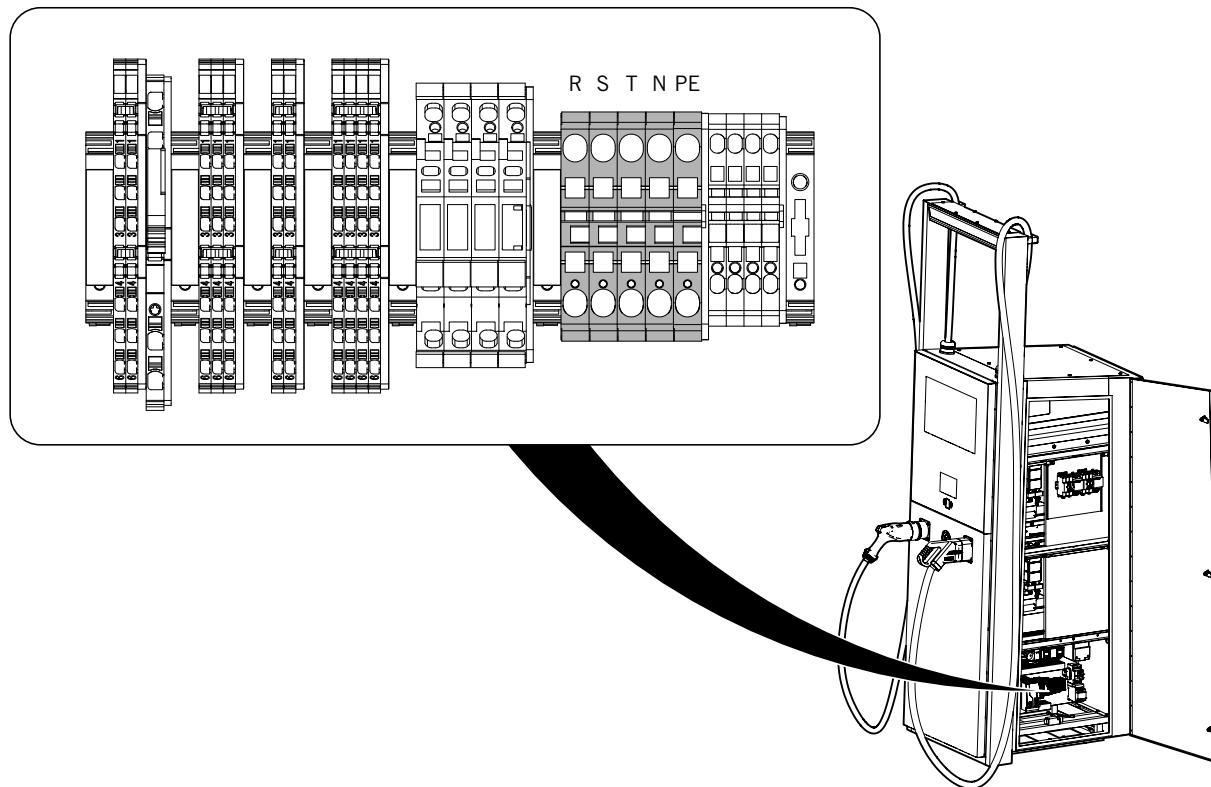
If the charger and the grid connection point are separated by a distance that requires the use of cables with a larger section, it is recommended to use an external distribution box, close to the charger, to carry out this section change.

Supported wiring sections		
Connection	Minimum section	Maximum section
R, S, T, N and PE terminals	2,5 mm <sup>2</sup> , with round ferrule according to <i>DIN 46228/1</i>	6 mm <sup>2</sup> , with round ferrule according to <i>DIN 46228/1</i>

### 7.3. AC auxiliary circuit connection process

1. Introduce the wiring through the cable inlets enabled on the bottom of the charger.

2. Using ferrules, connect the three phases, neutral and earth to the terminals marked R, S, T, N and PE, respecting the polarities.



*R, S, T, N and PE terminals for the connection of the auxiliary system. Access from the side door*

3. Check that the connection is secure and that the wiring is not taut.

## 8. DC power circuit connection

Throughout this chapter, the requirements and the process for connecting the DC power circuit wiring to the unit are explained.

Read carefully before starting the connection process.

**INFO**

Consult section "[Important safety instructions](#)" and the following instructions before working on the unit.

### 8.1. Safety instructions for the DC power circuit connection



Ensure the absence of voltage in the unit before starting the connection of the DC power circuit.

**Do not switch on the power** to the unit until you have successfully made the rest of the connections and the unit is closed.

Use the Personal Protective Equipment specified in section "[Personal Protective Equipment \(PPE\)](#)".

During the connection, the correct installation of the cables on the unit plates must be ensured so that live parts of this wiring are not accessible.

Respect the polarity of the AC wiring.



Ingeteam accepts no liability for any damages caused by an incorrect connection.

### 8.2. Wiring requirements for the DC power circuit connection



If using aluminum cables, the installer must provide the necessary means to prevent galvanic coupling (bipolar terminals, bimetallic interfaces, etc.).

The sizing of the ground wiring will be the responsibility of the installer and must meet the regulatory requirements applicable in the installation.

To guarantee the safety of people, for the correct operation of the unit and to comply with the applicable regulations, the unit must be connected to the installation earth.

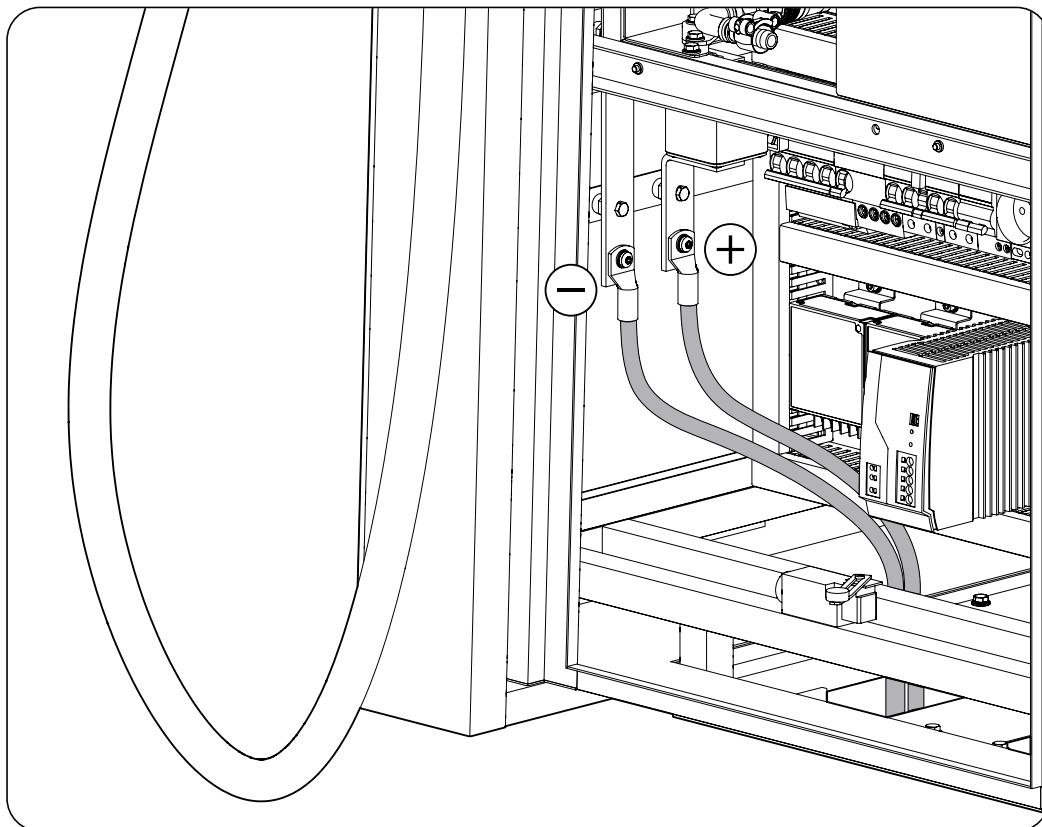
If the charger and the grid connection point are separated by a distance that requires the use of cables with a larger section, it is recommended to use an external distribution box, close to the charger, to carry out this section change.



If using aluminum cables, the installer must provide the necessary means to prevent galvanic coupling (bipolar terminals, bimetallic interfaces, etc.).

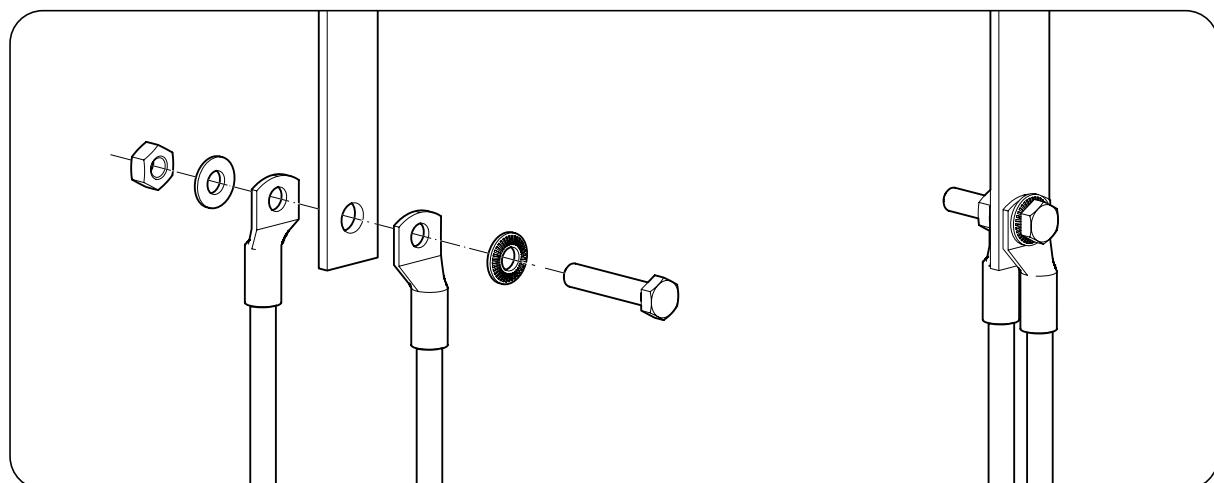
### 8.3. Proceso de conexión del circuito de potencia DC

1. Introduce the wiring through the cable inlets enabled on the bottom of the charger.
2. Connect respecting the polarities indicated in the following figure, using the screws, nuts and washers supplied by Ingeteam. A torque of 50 Nm must be applied (with lubrication).



*DC power circuit connection*

In the case of using two conductors per pole, it is essential to place the terminal of each conductor to one side of the plate to guarantee correct electrical contact.



*Configuration in case of using two terminals per pole*

3. Check that the connection is secure and that the wiring is not taut.

## 9. Start-up

Before performing the first energization of the unit, it is necessary to check a series of aspects in order to minimize the consequences of an error during installation or connection. It is convenient to carry out the sequence of checks in the order described below.

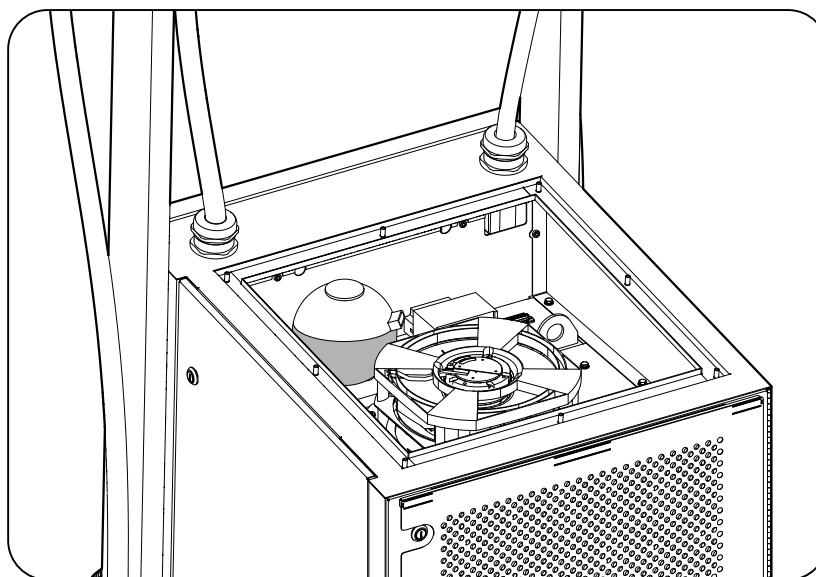
**⚠ CAUTION**

This start-up sequence must also be carried out whenever the unit is de-energized for more than 48 hours in a row or when any modification has been made to the installation that may affect the auxiliary power supply (for example, replacement of the auxiliary transformer) .

### 9.1. Visual inspection

The first thing to do is a visual inspection of all the unit and the installation to check that everything is in accordance with the regulations in force in the place of installation and as described in this manual. It is imperative to check the following points:

- Check that the power cables of the auxiliary circuit (the part coming from the outside) are correctly crimped with their corresponding ferrules and correctly inserted in the terminal block.
- Check that the DC power cables are correctly connected to the corresponding plates. Special attention must be paid to the correct alignment and position (one on each side of the plate) of the terminals in the case of using two cables per pole.
- Visually check that there is no condensed moisture. In case of condensation, carry out a manual drying process followed by aerothermal drying.
- Check that the refrigerant in the expansion vessel is near the middle. If the level is below, fill with a **special cooling fluid for aluminum circuits, based on ethylene glycol, with a minimum concentration of 40%**.



*Expansion vessel with adequate coolant level*

### 9.2. Checking the functional insulation of the DC power circuit

In order to ensure that the functional insulation in the unit has not been compromised during the installation process, the following check should be performed using a multimeter at the resistance measurement position:

- Check the insulation between the DC + and - connection plates. The multimeter measurement must give a resistance value greater than 100 kOhms. Given the existence of capacitors between the + and - strips, some polyimeters can give a wrong insulation measurement.
- Check the insulation between each plate and the ground. Again the value must be greater than 100 kOhms.

## 9.3. Auxiliary circuit energization

Before introducing external voltage in the auxiliary circuit, make sure that all the protection devices of the auxiliary circuit are tripped. Once the external voltage has been introduced, measure at the FC1 terminals and check (using a multimeter) that the voltages between the phases (400 V), and between phases and neutral (240 V) are correct.

Next, raise the FC1 protection and progressively raise the rest of the protections, observing any malfunction.

Once the central control of the charger has started, the HMI screen will show the charging sockets available on the charger with an alarm symbol. Pressing on any of them you enter the alarm panel, where codes 12 and/or 13 should be displayed, indicating that there is no DC voltage in the charger.

## 9.4. Checking the direction of rotation of the pump

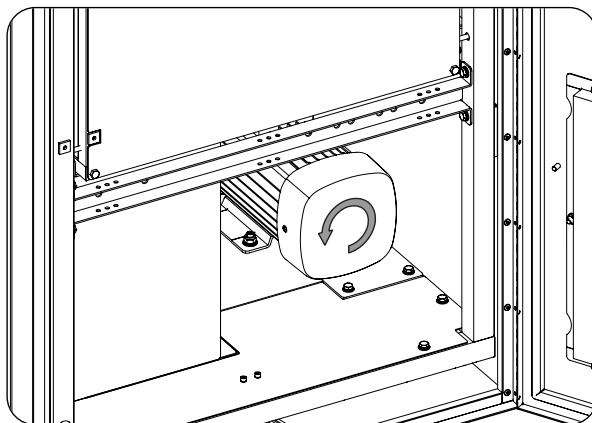
### **⚠ CAUTION**

Failure to ensure the correct direction of rotation of the pump can cause overheating at the charging terminal and, at one end, can cause a component to break.

If it is necessary to change the phases due to incorrect rotation of the pump, first make sure that the voltage in the auxiliary terminal block has been eliminated by means of the switch external to the charging terminal.

Once the auxiliary power supply circuit is connected, it is necessary to check that the direction of rotation of the cooling pump is correct. This can be done with a phaser or, failing that, by visual inspection. For the latter, the rear of the pump can be accessed through the rear door. With the pump activated, check that the direction of rotation is as indicated on the pump casing (a very thin flange can be slightly inserted through one of the fan holes to check the rotation).

If the direction of rotation is the opposite to that indicated, two of the phases (R and S, for example) must be exchanged in the auxiliary terminal block (see section “[7.3. AC auxiliary circuit connection process](#)”).



*Correct direction of rotation of the pump. Access from the rear door, bottom*

## 9.5. Energizing the DC power circuit

### **⚠ DANGER**

In case of energizing the DC power circuit with a wiring error or a damaged component, it can generate a deflagration that, if a door is open, could reach someone in the surroundings.

The energization of the DC power circuit can only be done with all the unit doors closed and interlocked by means of their corresponding locks.

To energize the circuit, it is necessary to close the external disconnector corresponding to the unit to be energized. In the event that the main rectifier is already energized and active (there is voltage in the DC distribution grid), the unit will start an automatic pre-charging and connection sequence to the DC network. Once this process is complete, the charging station display should not show an alarm.

## 10. Unit disconnection

This section details the procedure to disconnect the charging station. If you want to operate inside the unit, it is mandatory to follow these instructions in the same order in which they appear here to remove tension.

1. If there is an active charging process, end the charging session.
2. Press the emergency button.
3. Remove DC voltage from a means of disconnection external to the unit.
4. Remove AC voltage from a disconnecting means external to the unit.
5. Wait 10 minutes for the existing internal capacitances to discharge, for the internal elements to cool, and for the residual movement of the fan blades to stop.
6. Open the unit and, with the appropriate PPE, check the absence of voltage in the AC connection.
7. Mark the cutting area with a sign saying "*Attention, maneuvering prohibited...*". If necessary, delimit the work area.

## 11. Waste handling

These units use components that are harmful to the environment (electronic cards, batteries or cells, etc.).



At the end of the unit's life, the waste must be correctly processed by an authorized hazardous waste management company.

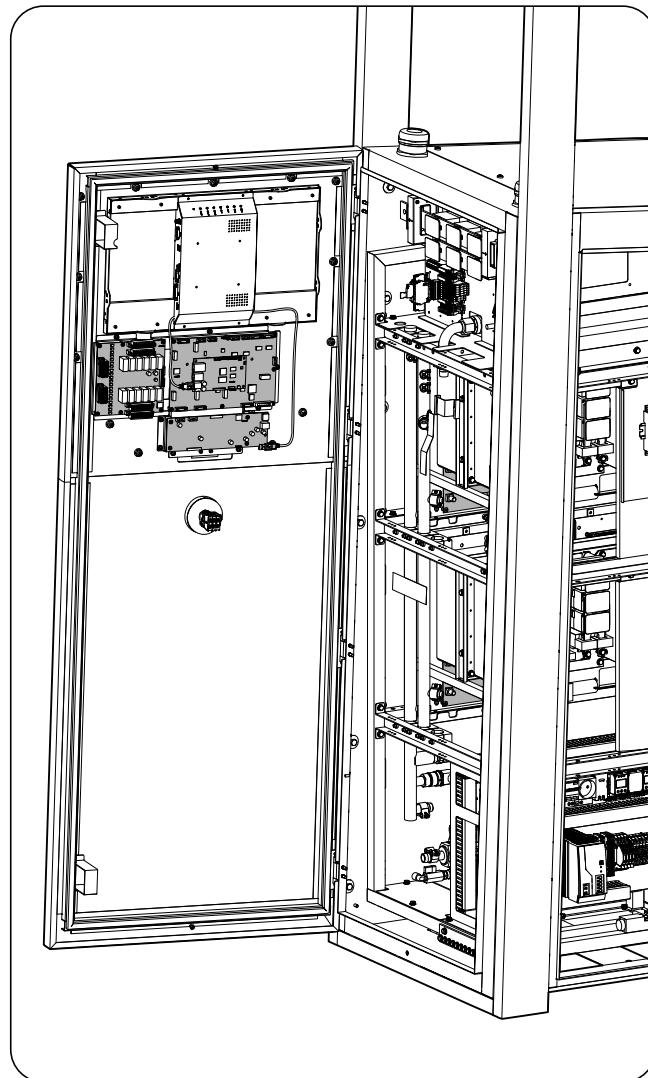
Ingeteam, in accordance with its policy of respect for the environment, will inform the authorized manager, via this section, of the location of components to be decontaminated.

The items listed below are hazardous waste at the end of their useful life and must be treated according to current legislation in the country:

- Printed circuit board cards.
- Electrolytic condensers.
- Liquid crystal displays.

### Printed circuit board cards

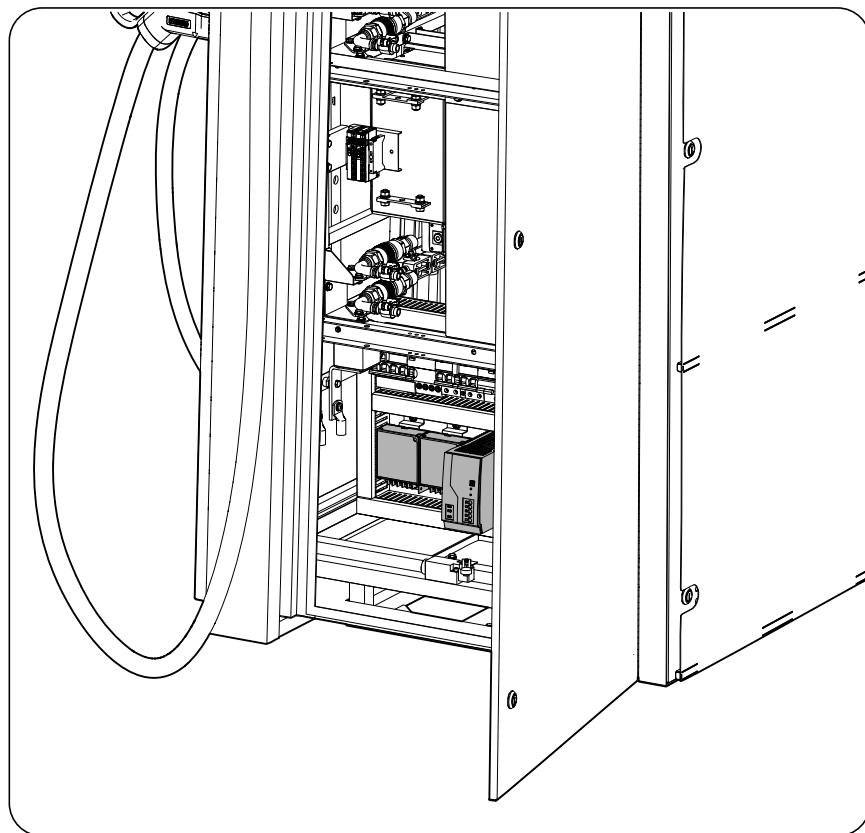
The following figure shows the printed circuit boards present in the unit and that must be treated after their useful life is shaded.



*Printed circuit board cards*

**Electrolytic condensers**

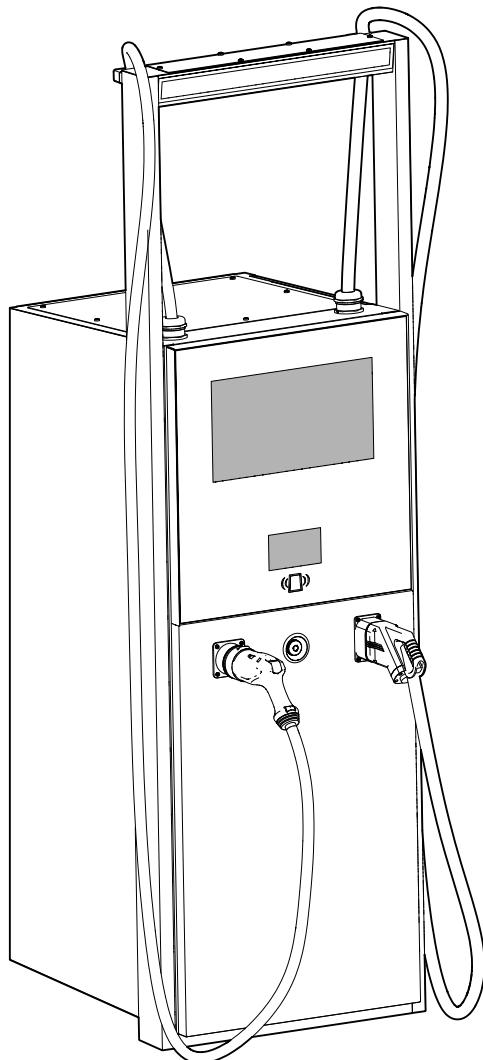
The following highlighted components include electrolytic condensers that need to be processed in accordance with applicable regulations after the end of their useful life. It is fundamentally about the power supplies.



*Main components with electrolytic condensers*

**Liquid crystal displays**

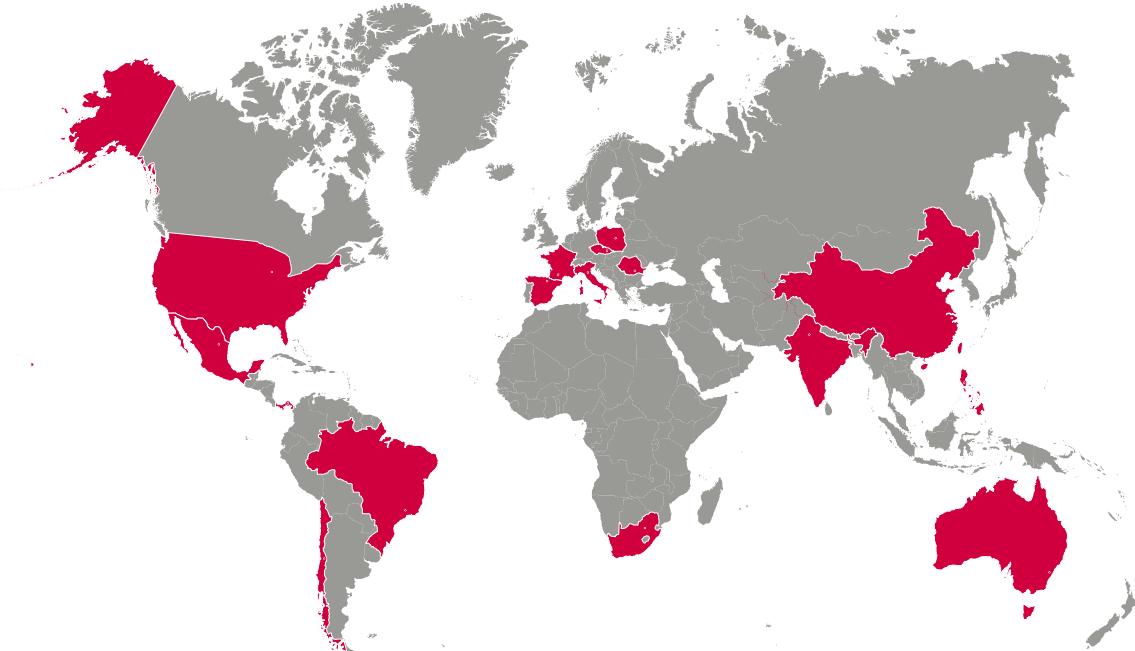
The unit may include several liquid crystal displays that must be processed properly after their useful life. In addition to the two front displays, the insulation monitoring devices incorporate small LCD displays that will need to be processed.



*Liquid crystal displays*

## Notes

## Notes



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