KEMPOWER

Charging equipment for electric vehicles

MAINTENANCE MANUAL

Kempower Power Unit, Station Charger & Satellite

REV. 2.10 EN 12-2023

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CONTENTS

1 INTRODUCTION

These instructions are for persons who have completed the Kempower certification training. Do not share these instructions with other parties without prior written permission of the copyright holder.

These instructions are for the maintenance and servicing of the following products manufactured by Kempower:

- Power Unit
- Station Charger
- Satellite
- Satellite Version 2
- Liquid Cooled Satellite
- AC Satellite
- AC Satellite with charging cables

For individual components not covered in these instructions, refer to the component manufacturer's specifications and instructions.

1.1 Disclaimer on products and services

Kempower's electric vehicle (EV) charging equipment deliveries typically consist of charging power unit(s), charging points, and connectivity tools. Charging hardware and software, together with the power grid, data communication network, various electric vehicles, charging operators and users, form a complex entity.

Kempower is not liable for incidental or consequential damages arising from the use of any software or hardware.

Kempower reserves the right to change the specification of the product described at any time without prior notice.

Kempower constantly develops the software in terms of vehicle support, new features, and improvement of user interface experience. Kempower offers software updates upon request or periodically as part of a service contract.

1.2 Information about the warranty

When you replace parts under warranty, keep the faulty part until you have made sure that Kempower does not need to inspect it.

You must complete the Kempower certification training before you do installation, commissioning, service or maintenance tasks. Installation, commissioning, service or maintenance tasks done by an unapproved partner will void the warranty.

The warranty period is defined in your warranty policy. If you have purchased extended warranty, the warranty period is defined in your purchase agreement. For detailed information about the terms and conditions, see your warranty policy or purchase agreement. You can view the general warranty terms at *kempower.com/kempower-terms-and-conditions*.

The warranty only covers the product and its parts delivered by Kempower. The warranty does not cover consumable parts such as cables and connectors, any other materials, labor, accommodation, or travel costs.

1.3 Information about the manufacturer

Manufacturer	Kempower Oyj
Address	Ala-Okeroistentie 29 15700 Lahti, Finland
Phone	+358 29 0021900
Contact	*kempower.com/support*
Website	kempower.com

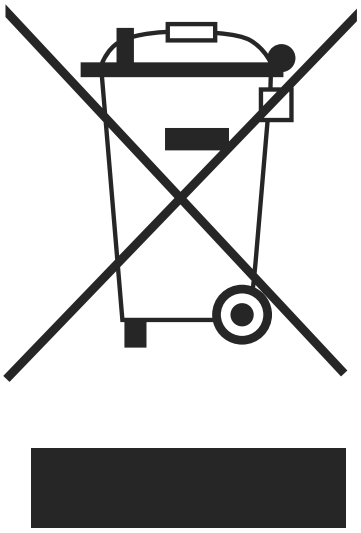
1.4 Environment

See the product datasheets for specifications. Product datasheets are available at *mediabank.kempower.com*.

- The environment of the charging unit must conform with its IP classification.
- The airflow to and from the charging unit must be unrestricted.

1.5 Recycling

- The product labeled with this symbol reminds that the product contains electrical and electronic parts and batteries which must be recycled in compliance with the **2012/19/EU on waste electrical and electronic equipment (WEEE) directive**.
- Comply with local laws. Always return packaging materials to dedicated collection points in accordance with the symbols on the packaging. After end of the product's working life, the product must be delivered to the local waste management company, which handles the recycling of the product in accordance with the law and regulations.
- When you make sure that the product is correctly reused and recycled, you protect the environment.
- When waste treatment operations are carried out on a professional level, the product is almost fully recyclable.



2 SAFETY

2.1 Symbols used in the instructions

DANGER

Indicates a hazardous situation which, if not avoided, will cause death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, may cause death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may cause moderate or minor injury.

Indicates a situation which, if not avoided, may cause property damage or an undesirable result or state.

Indicates advice and recommendations for the safe and efficient use of the product or highlights unusual points.

2.2 Common risks

DANGER

Make sure that the units are correctly isolated when necessary during installation, service or maintenance work. Know and obey general and local safety regulations and procedures. Use adequate personal protection equipment (PPE).

WARNING

You must be authorized to do electrical work. The instructions are for persons who know electrical work and the applicable electrical safety requirements.

WARNING

You must complete the Kempower certification training before you do installation, commissioning, service or maintenance tasks.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

WARNING

Do not use the charging unit if the unit, its cables or vehicle connectors are damaged. Risk of electrical shock or fire.

WARNING

The AC Satellite is still connected to the power supply when you disconnect the power supply to the charging power unit.

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

CAUTION

Do not use running water or pressure washing equipment to clean the charging unit. Use a pH neutral detergent if necessary.

Changes or modifications to the charging equipment, unless specifically agreed upon with Kempower, are prohibited and will void the warranty.

Make sure that you have enough working space and that it is safe. Direct traffic accordingly. Weatherproof the working space if you do tasks that make it necessary.

Only use spare parts approved by Kempower.

3 KEMPOWER CHARGING EQUIPMENT FOR ELECTRIC VEHICLES

As the design of Kempower electric vehicle charging equipment is modular, the charging site can be expanded when necessary. The charging equipment is connected to the Internet and the Kempower ChargEye system via a cellular or Wi-Fi network.

- *The Kempower Power Unit* is a charging power unit that receives power from the electric power distribution network and distributes it to 1–8 DC charging points. The Power Unit can be a single, double, or triple cabinet unit. Each cabinet can be equipped with 1–4 power modules (C500/500 V and C800/800 V). Charging power management can be dynamic or static, see *3.1 Charging power management*.
- *The Kempower Station Charger* consists of a charging power unit, 1–2 DC vehicle connectors per cabinet, and a user interface. The Station Charger can be a single or double cabinet unit. Depending on the configuration, the Station Charger can also be connected to 1–2 Satellites.
- *The Kempower Satellite* is the charging point connected to the charging power unit.
- *The Kempower Liquid Cooled Satellite* is a high-power charging point connected to the charging power unit.
- *The Kempower AC Satellite* is a standalone AC charging point that is not connected to a charging power unit but directly to the main power supply.

3.1 Charging power management

The charging power management method of the charging power unit can be dynamic or static. Dynamic charging power management is one of the key elements in optimizing the charging of electric vehicles. While it is possible to later expand the modular configuration, the type of charging power management cannot be changed from static to dynamic after installation unless you order a dynamic-ready configuration.

The charging power unit can have 1–12 power modules (1–4 per cabinet) that each have two independent power channels (2 x 25 kW). The power distribution module can distribute charging power to 1–8 charging points. The available charging power depends on the maximum charging power level that the electric vehicle can accept, the output capacity of the charging points, and the power capacity of the charging site.

In dynamic charging power management, the power distribution module routes and re-routes the power channels to the charging points during the charging session.

In static (S2, S4, S8) charging power management, a fixed amount of charging power is routed to the charging point(s).

Table 4. Example of dynamic and static charging power management

Charging power unit with 4 x 50 kW power modules (200 kW)	**Output to 4 charging points**
Dynamic output (Ds4) @ 400 V	25–200 kW
Dynamic output (Ds4, adaptive voltage) @ 800 V	50–200 kW
Dynamic output (Ds4) @ 667 V	25–200 kW
Static output (S4) @ 500 V/800 V	50 kW

Dynamic charging can operate in two modes:

- Democratic mode where the charging power is distributed evenly to all charging points in use. See *Figure 1.*
- Priority mode where charging power is distributed in order of priority. The priority type is set in Kempower ChargEye and can be customized to your needs. For example, arrival priority (FIFO, first in first out) is where the first arrival gets the most charging power (as requested by the vehicle). When the first vehicle leaves, the freed capacity is shared in arrival priority with the remaining vehicles. See *Figure 2.*

Figure 1. Example of dynamic charging in democratic mode

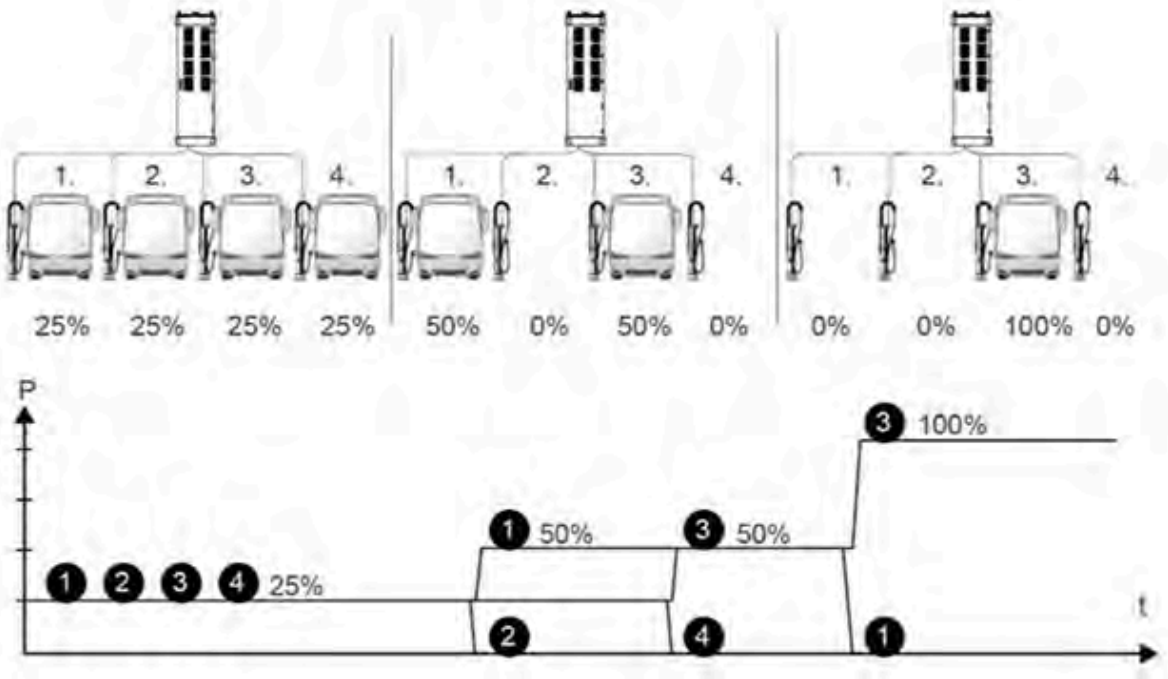
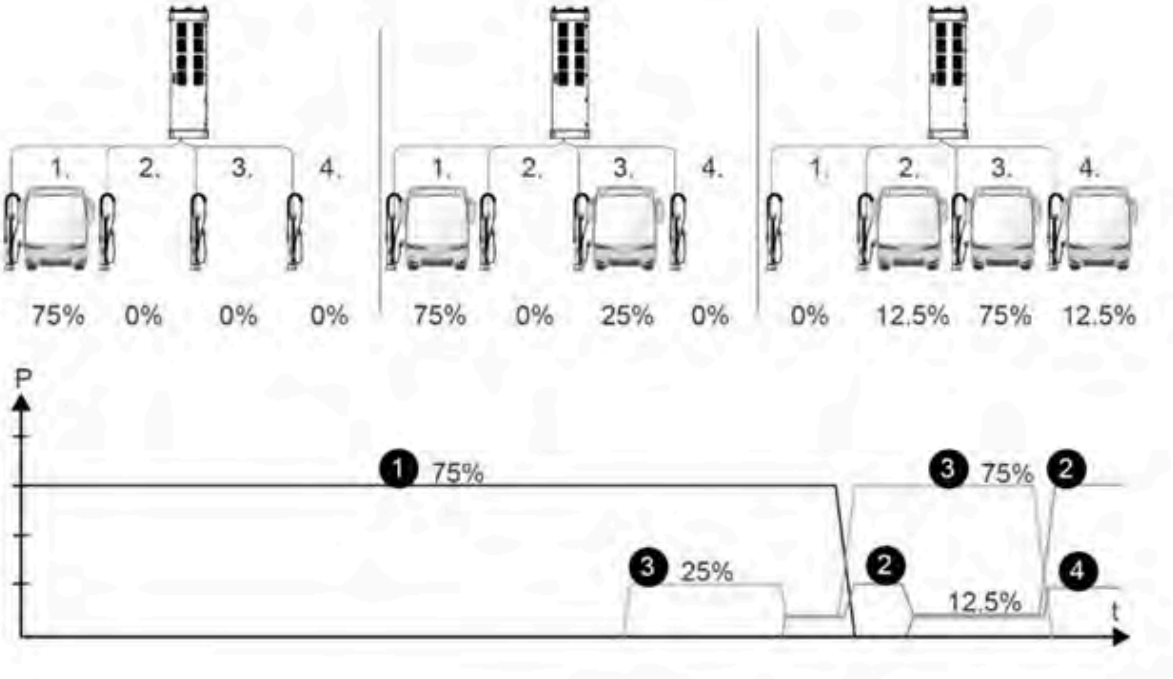


Figure 2. Example of dynamic charging in arrival priority mode (in this example the first vehicle requests only 75% of the available power)



3.2 Identificators

Serial number

The serial number of the unit is given on the rating plate. The correct serial number is important when you order spare parts or repair the unit.

Quick response (QR) code or barcode

The serial number and other information about the unit can also be given as a QR code or barcode on the unit's rating plate. Use a mobile phone with a QR application or a code reader to access the information.

Rating plate

Information about the unit is marked on the rating plate. If the unit is upgraded, Kempower adds a retrofit sticker to the unit. The location of the rating plate on the units:

- **Power Unit:** On the left side of the cabinet, in the top right corner.
- **Station Charger**: On the left side of the cabinet, in the top right corner.
- **Satellite**: On the rear side of the unit, in the top right corner.
- **Satellite Version 2:** On the rear side of the unit, in the top right corner.
- **Liquid Cooled Satellite:** On the rear side of the unit, in the top right corner.
- **AC Satellite:** On the rear side of the unit, in the top right corner.
- **AC Satellite with charging cables:** On the rear side of the unit, in the top right corner.

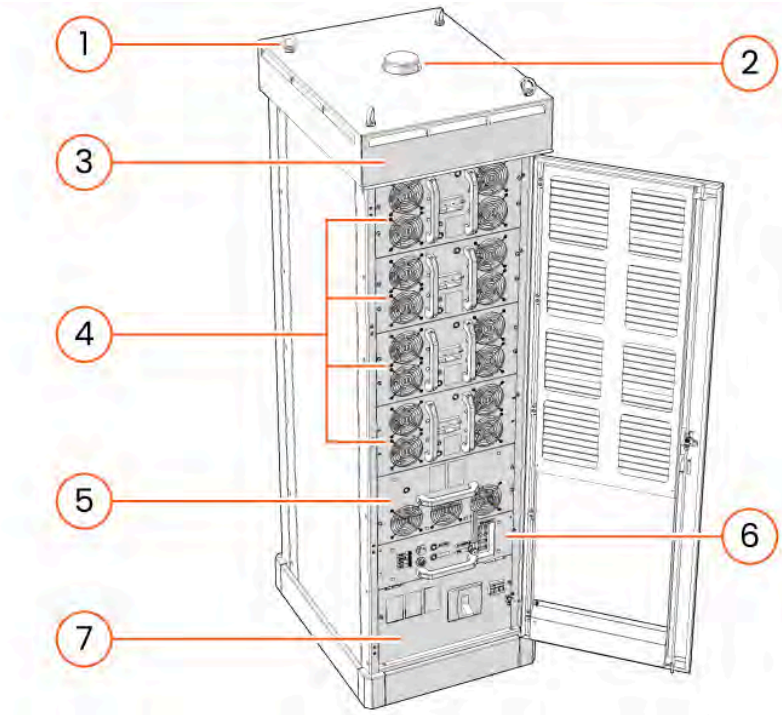
3.3 Kempower charging power units

3.3.1 Power Unit

The Kempower Power Unit is a charging power unit that receives power from the electric power distribution network and distributes it to 1–8 DC charging points. The Power Unit can be a single, double, or triple cabinet unit.

Charging power management can be dynamic or static.

Figure 3. Kempower Power Unit overview (single cabinet, dynamic)

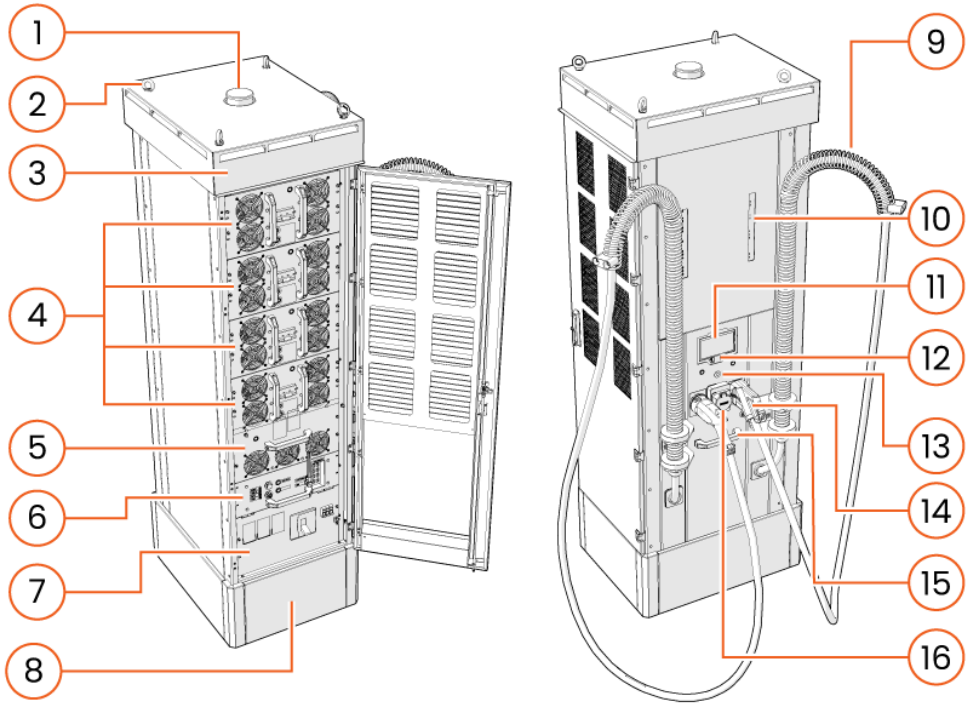


1 Lifting lugs
2 Cellular/Wi-Fi antenna
3 Unit roof with cooling outlets
4 Power modules (1–4 per cabinet)
5 Power distribution module
6 Control module
7 Mains module

3.3.2 Station Charger

The Kempower Station Charger consists of a charging power unit, 1–2 DC vehicle connectors per cabinet, and a user interface. The Station Charger can have an additional AC charging socket (option). See the product datasheet for the available charging cable and vehicle connector types. The Station Charger can be a single or double cabinet unit. Depending on the configuration, the Station Charger can also be connected to 1–2 Kempower Satellites.

Figure 4. Kempower Station Charger overview (single cabinet, two DC vehicle connectors and optional AC charging socket)



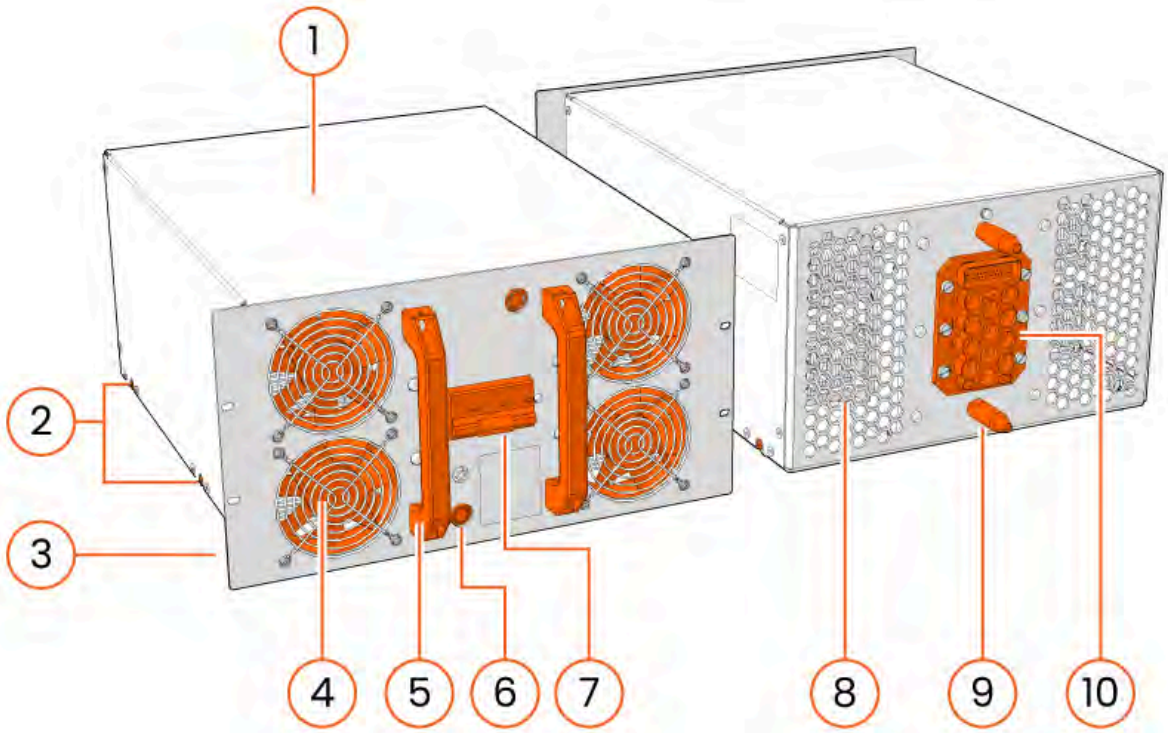
1	Cellular/Wi-Fi antenna	9	Charging cable support springs
2	Lifting lugs	10	Charging status indicators
3	Unit roof with cooling outlets	11	Touch screen
4	Power modules (1–4 per cabinet)	12	RFID reader
5	Power distribution module	13	Function buttons
6	Control module	14	Vehicle connectors and holders
7	Mains module	15	Front panel
8	Steel base	16	AC charging socket (option)

3.4 Modules of the charging power unit

3.4.1 Power module

The power module (C500/500 V and C800/800 V) provides the power for the charging power unit. The power module has two channels (2 x 25 kW), A on the right and B on the left.

Figure 5. Power module overview



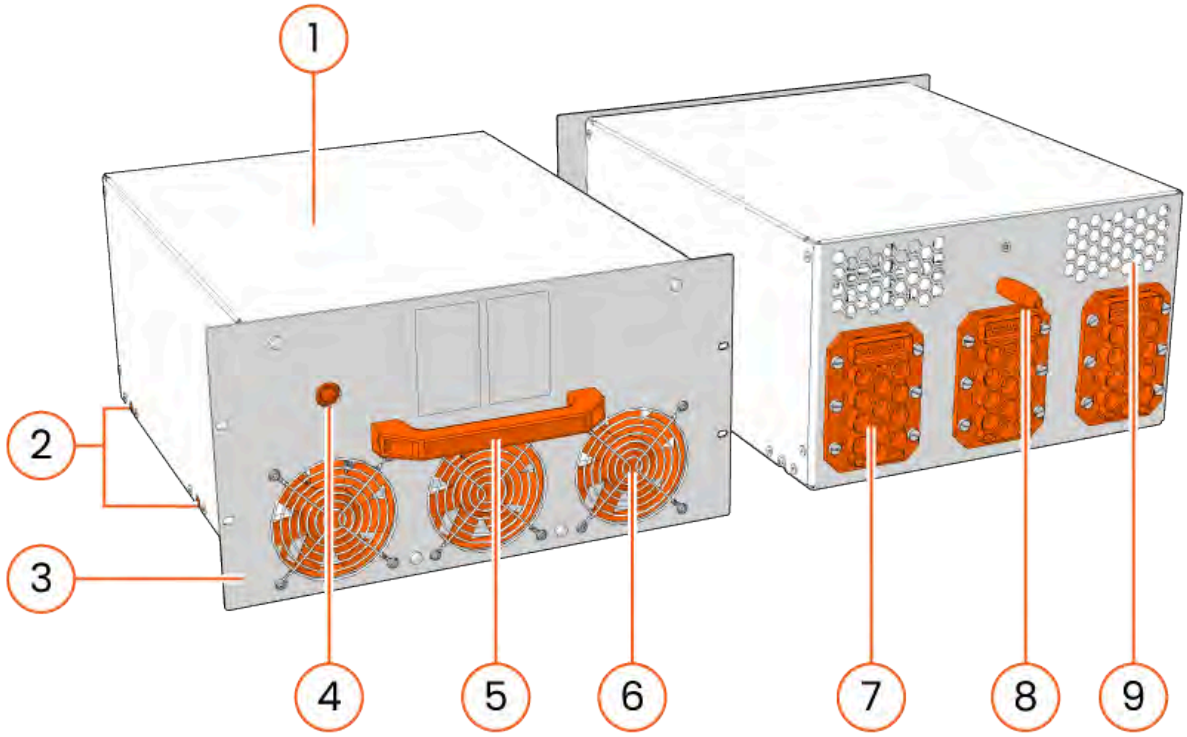
1	Cover	6	Channel status indicators*
2	Rollers	7	Circuit breaker
3	Front panel	8	Cooling outlets
4	Cooling fans	9	Guide pins
5	Handles	10	Multi-quick connector

* *Green: OK, ready for operation. Blue: operation. Red: error.*

3.4.2 Dynamic power distribution module

The dynamic power distribution module of the charging power unit routes and re-routes the power channels to the charging points during the charging session.

Figure 6. Dynamic power distribution module overview



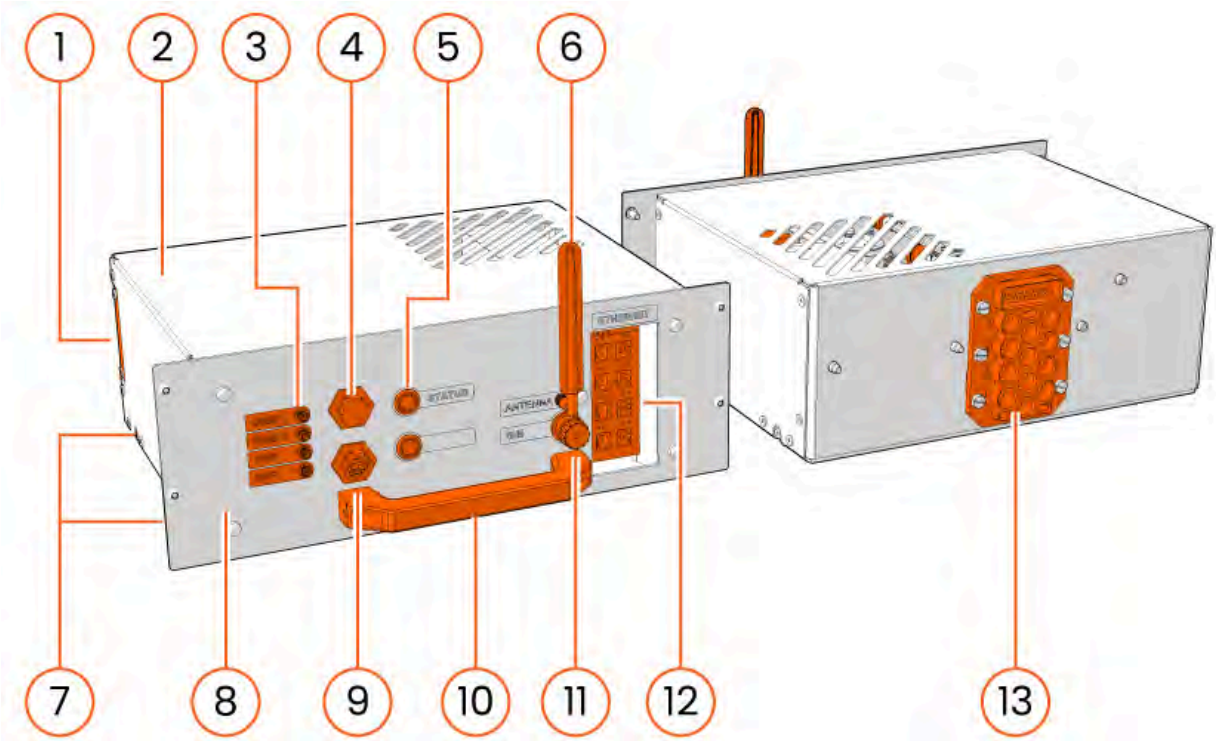
1	Cover	6	Cooling fans
2	Rollers	7	Multi-quick connectors
3	Front panel	8	Guide pin
4	Status indicator*	9	Cooling outlets
5	Handle		

* *Green: OK, ready for operation. Blue: operation. Red: error.*

3.4.3 Control module

The control module handles the communication in the charging power unit.

Figure 7. Control module overview

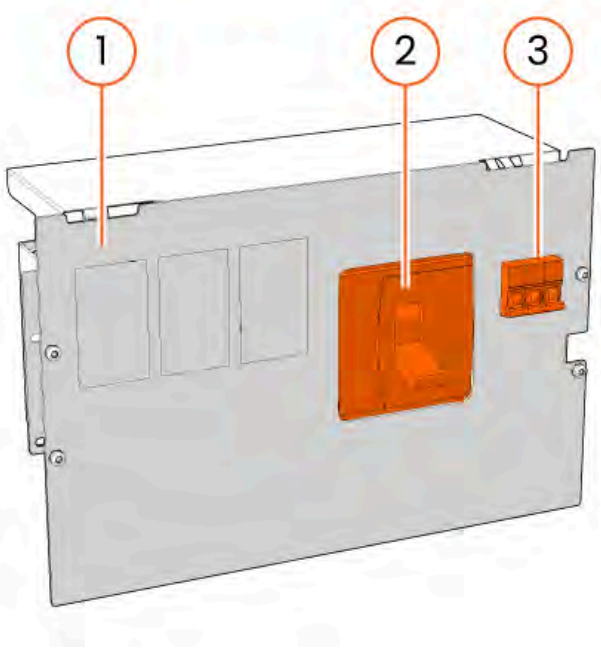


1	Mounting plate for printed circuit boards	8	Front panel
2	Cover	9	Ethernet port (external)
3	Antenna cable connectors	10	Handle
4	USB port	11	SIM card adapter (for customer SIM)
5	Status indicator*	12	Ethernet switch (internal)
6	Antenna (for customer modem)	13	Multi-quick connector
7	Rollers		

* *Green: OK, ready for operation. Blue: operation. Red: error.*

3.4.4 Mains module

The mains module of the charging power unit houses the terminal blocks for the main AC supply power cables, the main switch for the cabinet, and the miniature circuit breaker (MCB) for the auxiliary circuit.



1 Front panel
2 Main switch (circuit breaker)
3 Miniature circuit breaker (MCB) for the control voltage

3.4.5 Terminal blocks (charging power units manufactured before 6/2023)

If the Station Charger has an optional AC charging output, it requires a neutral wire (TN-C-S network).

We recommend connecting the Liquid Cooled Satellite to a Power Unit manufactured after 6/2023 with max. DC output terminal blocks 150 mm^2.

The terminal blocks for the AC mains power cables and protective earth (PE) are located in the front of the cabinet, next to the main switch.

The neutral wire is only used in the Station Charger if it has an optional AC charging output (TN-C-S network). Connect the neutral wire to the cabinet's neutral wire terminal block (N) that is located on a DIN rail behind the terminal blocks for the AC supply power cables.

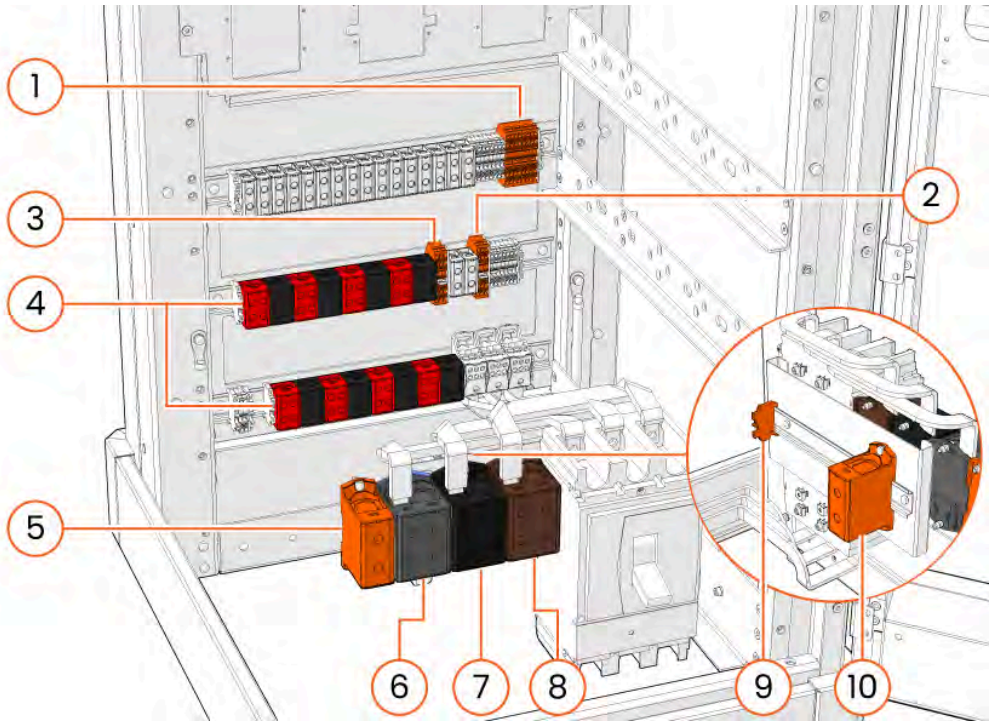
If your network cable has a neutral wire but the Station Charger does not have an AC charging output (TN-C network), connect the neutral wire to the cabinet's neutral wire terminal block (N) to keep the wire securely in place. Do not connect the neutral wire to earth in the cabinet.

The neutral wire is not used in the Power Unit (TN-C network). If your network cable has a neutral wire, connect it to the cabinet's neutral wire terminal block (N) to keep the wire securely in place. Do not connect the neutral wire to earth in the cabinet.

The fasteners for the Ethernet terminals are located on a DIN rail next to the neutral wire terminal block behind the terminal blocks for the AC supply power cables.

The terminal blocks for the DC output power cables (max. 50 mm^2) and control cable wires are located on DIN rails at the back of the cabinet.

Figure 9. Terminal blocks in the charging power unit (max. DC output 50 mm^2)



1	Control cable signal wires	6	AC supply power cable phase 1 (L1)
2	Control cable ground wires (0 V)	7	AC supply power cable phase 2 (L2)
3	Control cable auxiliary power wires (+24 V)	8	AC supply power cable phase 3 (L3)
4	DC output power cables (red +, black -)	9	Fasteners for Ethernet terminal blocks
5	Protective earth (PE)	10	Neutral (N)

3.4.6 Terminal blocks (charging power units manufactured after 6/2023)

If the Station Charger has an optional AC charging output, it requires a neutral wire (TN-C-S network).

The terminal blocks for the AC mains power cables and protective earth (PE) are located in the front of the cabinet, next to the main switch.

The neutral wire is only used in the Station Charger if it has an optional AC charging output (TN-C-S network). Connect the neutral wire to the cabinet's neutral wire terminal block (N) that is located on a DIN rail behind the terminal blocks for the AC supply power cables.

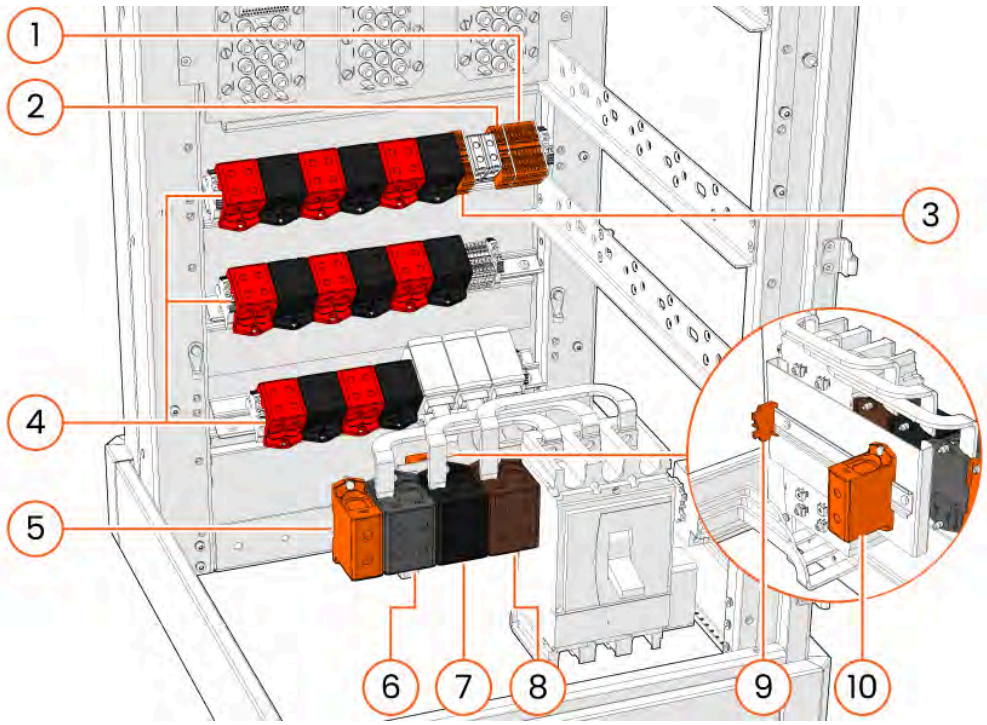
If your network cable has a neutral wire but the Station Charger does not have an AC charging output (TN-C network), connect the neutral wire to the cabinet's neutral wire terminal block (N) to keep the wire securely in place. Do not connect the neutral wire to earth in the cabinet.

The neutral wire is not used in the Power Unit (TN-C network). If your network cable has a neutral wire, connect it to the cabinet's neutral wire terminal block (N) to keep the wire securely in place. Do not connect the neutral wire to earth in the cabinet.

The fasteners for the Ethernet terminals are located on a DIN rail next to the neutral wire terminal block behind the terminal blocks for the AC supply power cables.

The terminal blocks for the DC output power cables (max. 150 mm^2) and control cable wires are located on DIN rails at the back of the cabinet.

Figure 10. Terminal blocks in the charging power unit (max. DC output 150 mm^2)



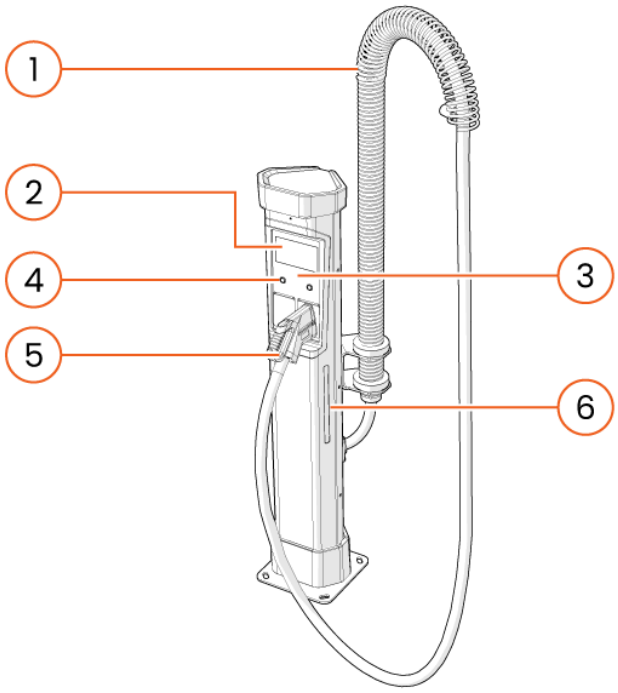
1	Control cable signal wires	6	AC supply power cable phase 1 (L1)
2	Control cable ground wires (0 V)	7	AC supply power cable phase 2 (L2)
3	Control cable auxiliary power wires (+24 V)	8	AC supply power cable phase 3 (L3)
4	DC output power cables (red +, black -)	9	Fasteners for Ethernet terminal blocks
5	Protective earth (PE)	10	Neutral (N)

3.5 Kempower DC Satellites

3.5.1 Satellite Version 1

The Kempower Satellite is the charging point connected to the charging power unit. The single Satellite has one vehicle connector and the double has two. See the product datasheet for the available charging cable and vehicle connector types.

Figure 11. Kempower Satellite overview (single)



1	Charging cable support spring	4	Function buttons
2	Touch screen	5	Vehicle connector and holder
3	RFID reader	6	Charging status indicator LEDs*

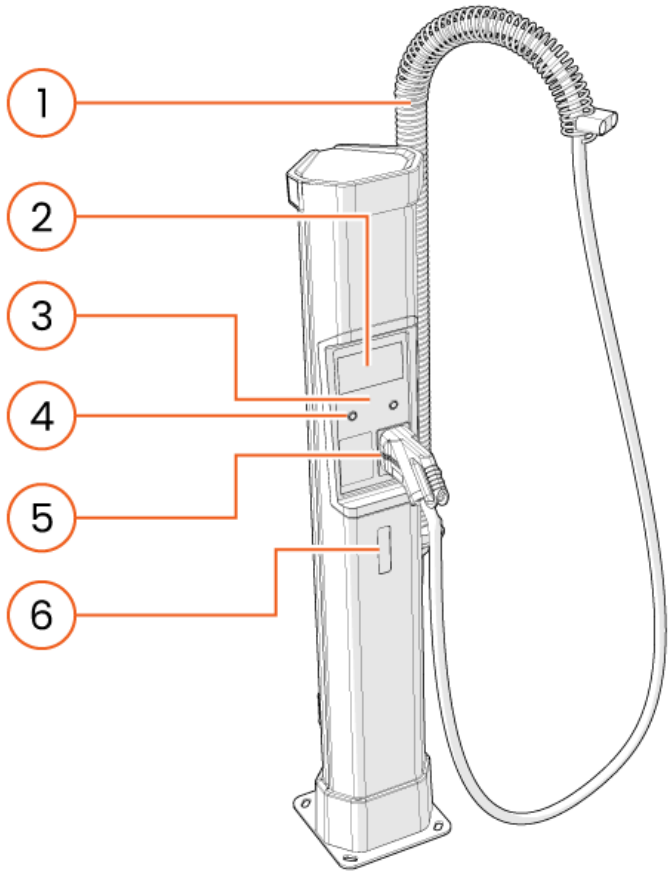
* *Green: OK, ready to charge. Blue: charging. Red: error.*
The height of the charging status indicator light-emitting diode (LED) bar indicates the state of charge (SoC) of the vehicle being charged.

3.5.2 Satellite Version 2

The Satellite Version 2 does not have charging status indicator LEDs.

The Kempower Satellite is the charging point connected to the charging power unit. The single Satellite has one vehicle connector and the double has two. See the product datasheet for the available charging cable and vehicle connector types.

Figure 12. Kempower Satellite overview (single, with integrated energy meter)



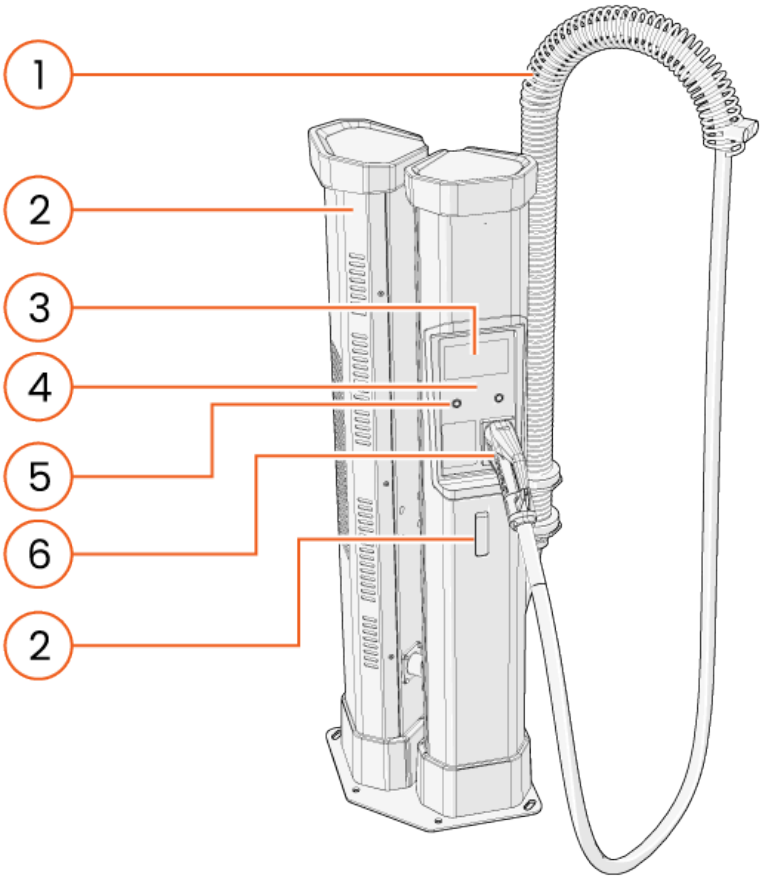
1	Charging cable support spring	4	Function buttons
2	Touch screen	5	Vehicle connector and holder
3	RFID reader	6	Integrated energy meter

3.5.3 Liquid Cooled Satellite

The Liquid Cooled Satellite does not have charging status indicator LEDs.

The Kempower Liquid Cooled Satellite is the high-power charging point connected to the charging power unit. See the product datasheet for the available charging cable and vehicle connector types.

Figure 13. Kempower Liquid Cooled Satellite overview (single)

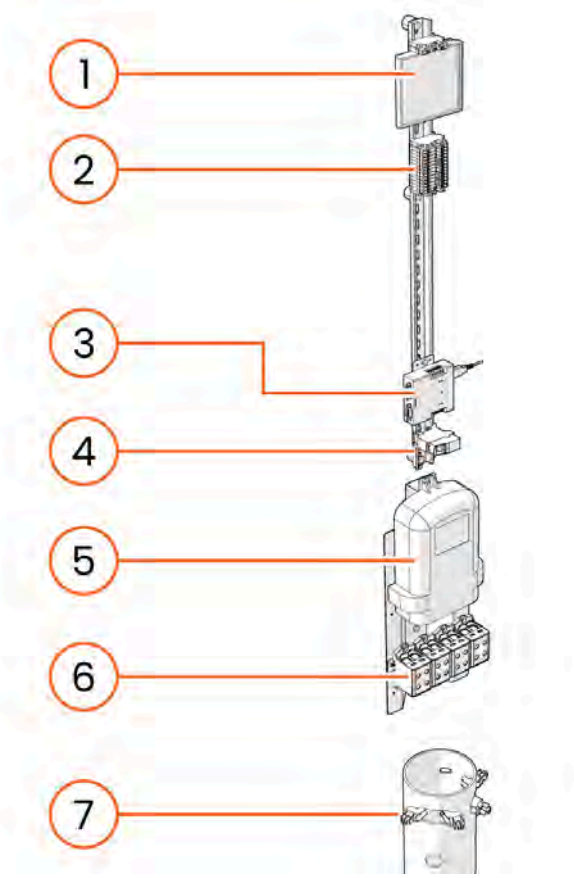


1	Charging cable support spring	5	Function buttons
2	Liquid cooling unit	6	Vehicle connector and holder
3	Touch screen	7	Energy meter window
4	RFID reader		

3.5.4 Terminal blocks (Satellite Version 2)

See also and *7 Examples of connecting cables to the Satellites*.

Figure 14. Terminal blocks in the single Satellite Version 2



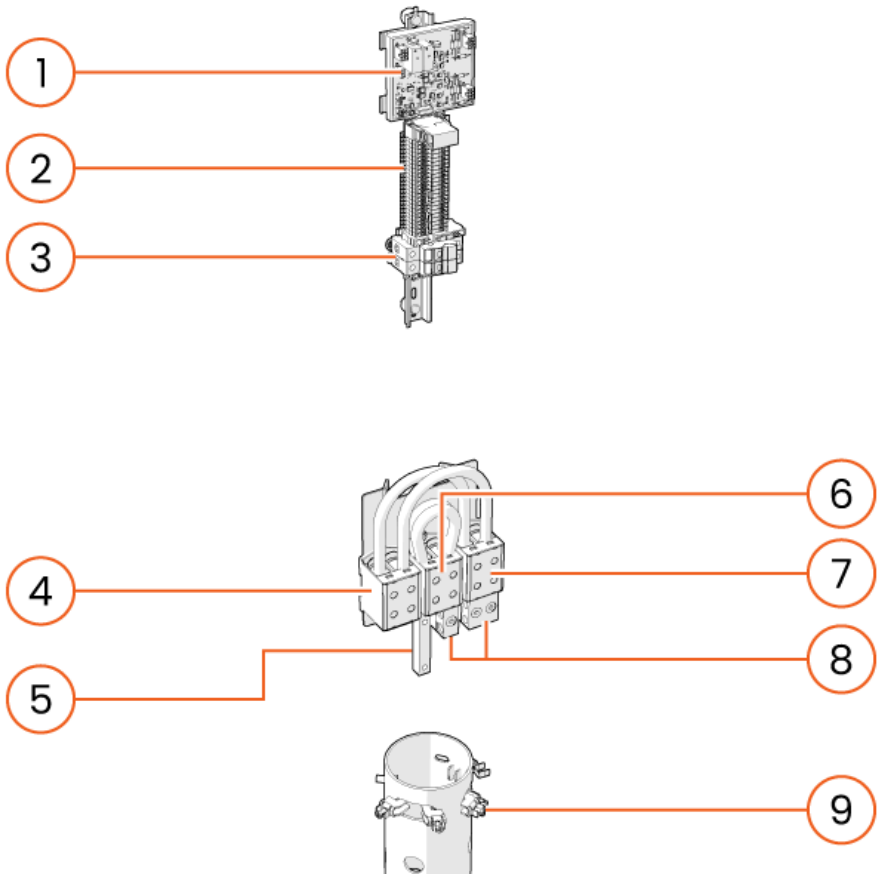
1	Voltage and insulation monitor	5	kWh meter
2	Terminal blocks for control cable	6	Terminal blocks for DC power cables*
3	USB converter	7	Protective earth (PE) clamps
4	Terminal block RJ45		

* *Input left, output right*

3.5.5 Terminal blocks (Liquid Cooled Satellite)

See also and *7 Examples of connecting cables to the Satellites*.

Figure 15. Terminal blocks in the Liquid Cooled Satellite



1	Voltage and insulation monitor	6	DC- IN and DC- OUT for charging cable
2	Terminal blocks for control cable	7	DC+ OUT for charging cable
3	Charging voltage measurement fuse block (1000 VDC)	8	Connection wiring cooling blocks
4	DC+ IN from Power Unit (2 x 240 mm^2 screw terminal)	9	Protective earth (PE) clamps
5	DC- IN from Power Unit (copper terminal bar with D10 mm holes)		

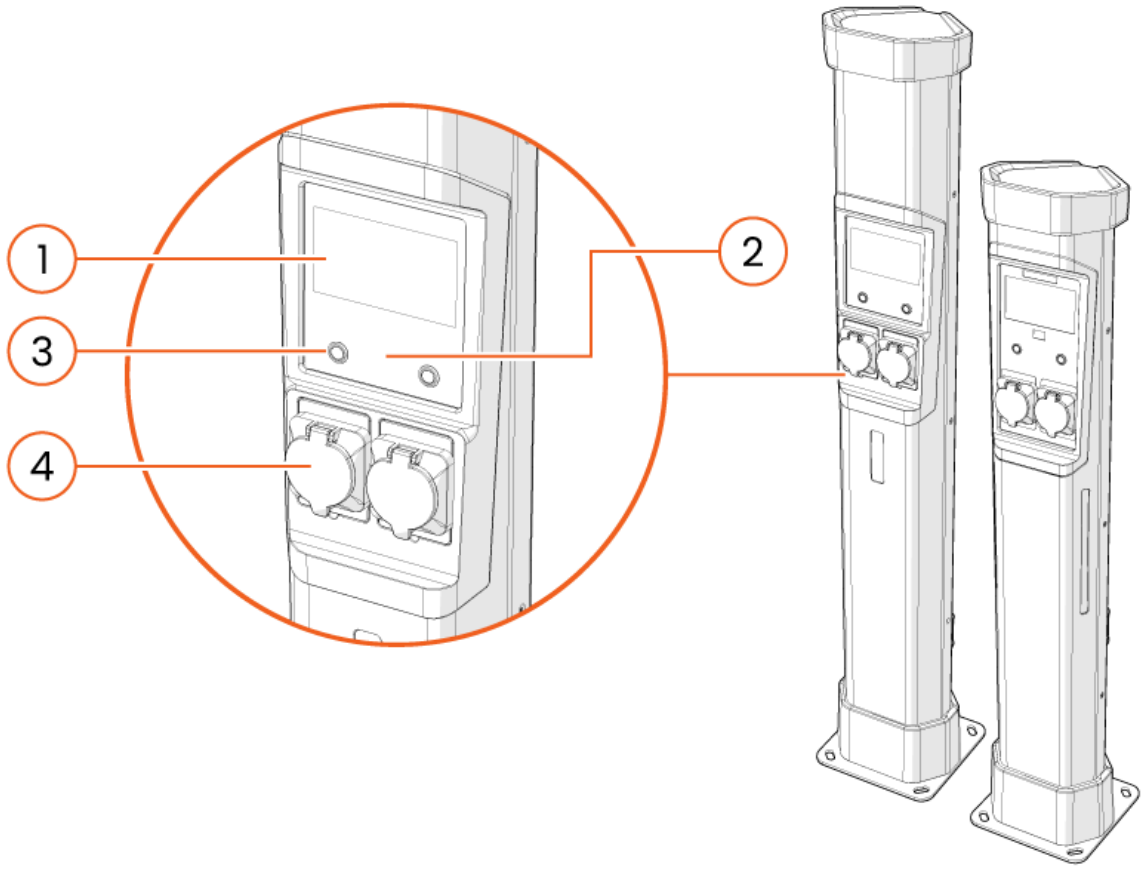
3.6 Kempower AC Satellites

3.6.1 AC Satellite

The Kempower AC Satellite does not have charging status indicator LEDs.

The Kempower AC Satellite is a standalone AC charging point that is not connected to a charging power unit but directly to the main power supply. The single AC Satellite has one charging socket and the double has two.

Figure 16. Kempower AC Satellite overview



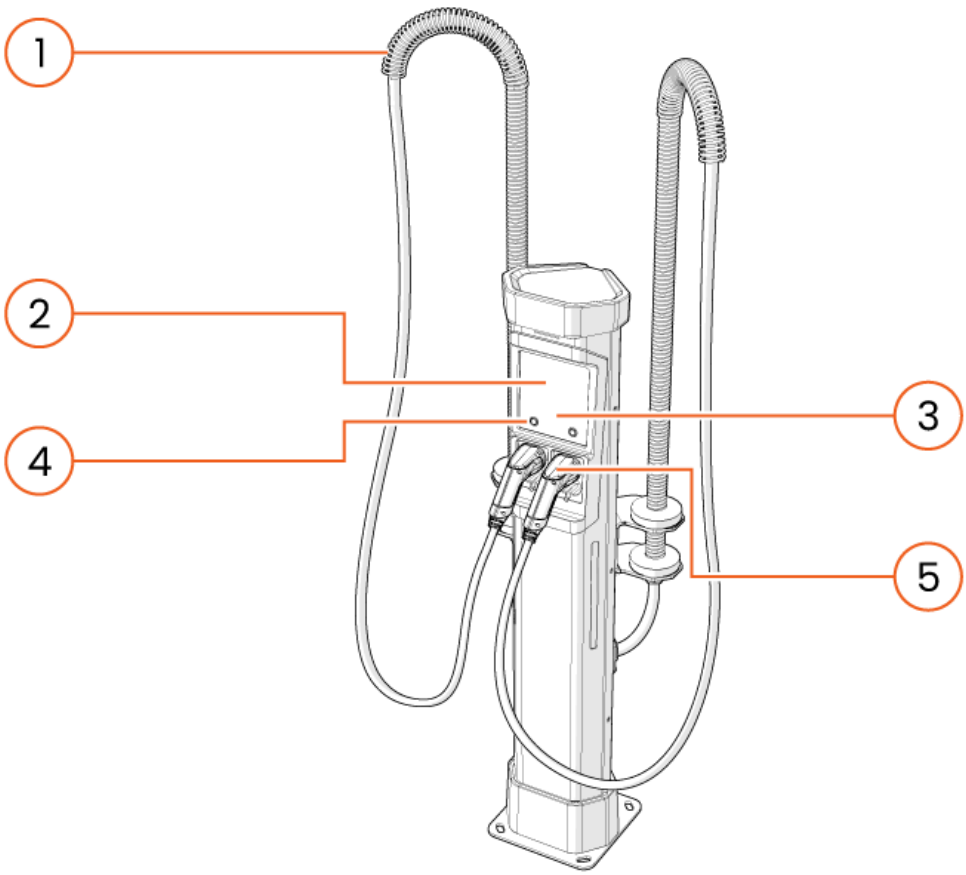
1 Touch screen
2 RFID reader
3 Function buttons
4 Charging sockets

3.6.2 AC Satellite Version 1 with charging cables

The Kempower AC Satellite Version 1 does not have charging status indicator LEDs.

The Kempower AC Satellite is a standalone AC charging point that is not connected to a charging power unit but directly to the main power supply. The single AC Satellite has one AC vehicle connector and the double has two.

Figure 17. Kempower AC Satellite with charging cables overview



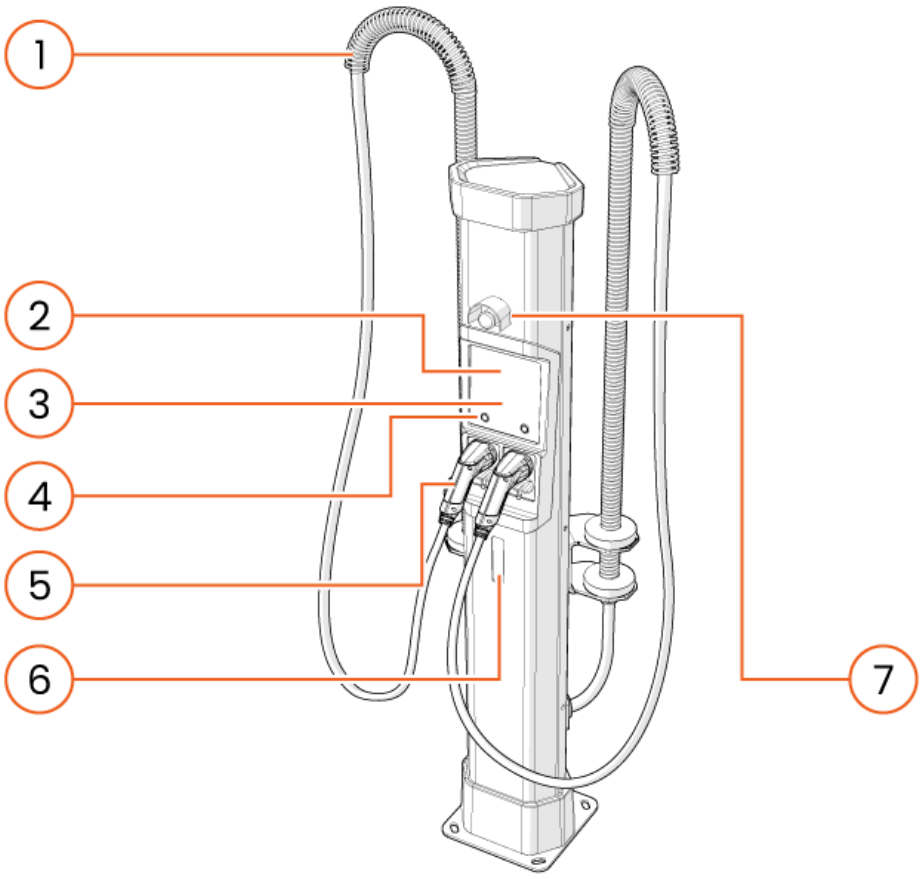
1 Charging cable support spring
2 Touch screen
3 RFID reader
4 Function buttons
5 Vehicle connectors and holders

3.6.3 AC Satellite Version 2 with charging cables

The Kempower AC Satellite Version 2 does not have charging status indicator LEDs.

The Kempower AC Satellite is a standalone AC charging point that is not connected to a charging power unit but directly to the main power supply. The single AC Satellite has one AC vehicle connector and the double has two.

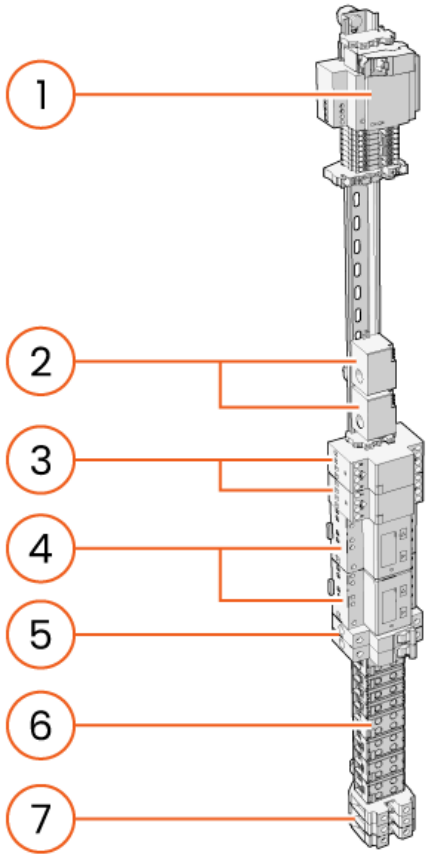
Figure 18. Kempower AC Satellite with charging cables overview



1	Charging cable support spring	5	Vehicle connectors and holders
2	Touch screen	6	Energy meter window
3	RFID reader	7	Emergency stop button (option)
4	Function buttons		

3.6.4 Terminal blocks (AC Satellite with charging cables)

Figure 19. Terminal blocks in the double AC Satellite with charging cables



1	Power supply	5	Circuit breaker
2	Residual current monitor (RCM)	6	Terminal blocks for AC supply power cables
3	Contactor	7	Terminal blocks for PE wires
4	kWh meter		

4 PREVENTIVE MAINTENANCE

WARNING

You must complete the Kempower certification training before you do installation, commissioning, service or maintenance tasks.

CAUTION

Do not use running water or pressure washing equipment to clean the charging unit. Use a pH neutral detergent if necessary.

Obey the preventive maintenance plan to ensure the optimal performance of the electric vehicle charging system. Failure to obey the preventive maintenance plan and report the completed tasks to ChargEye is cause to void the warranty.

The preventive maintenance schedule for cleaning and replacing components and consumable parts gives the indicative minimum intervals. Monitor the condition of the electric vehicle charging system and its wearing parts regularly. Adjust the intervals as necessary.

4.1 Preventive maintenance tasks and intervals

Increase frequency in dusty, humid or salty conditions or when the temperature is outside the recommended range for the product.

For additional information, see Kempower's preventive maintenance plan.

The preventive maintenance plan gives indiciative minimum intervals for maintenance tasks. By completing the maintenance tasks according to the schedule, you can extend the lifetime of the product and prevent the need for more extensive maintenance action. The design life for the main components (excluding wear parts) of the Kempower products is 15 years.

As site-specific conditions have an effect on the intervals, select the program that best suits your site:

- **Clean indoor environment:** clean indoor spaces where the charging units are sheltered from the weather as well as dirt or dust. For example, inside a container.
- **Standard environment:** outdoor spaces where the charging units are exposed to normal weather conditions as well as some dust and dirt.
- **Demanding environment:** outdoor spaces where the charging units are exposed harsh conditions as well as as lots of dirt and dust. For example mines, near heavy machinery and near heavy traffic.

Make sure to monitor the condition of the charging units regularly and increase the frequency of the intervals as necessary.

Task	Persons needed[1]	Power Unit	Station Charger	Satellite	Liquid Cooled Satellite	Intervals/environment		
						Clean indoor	Standard	Demanding
Examining the unit for dirt or damage	1	√	√	√	√	2 yr.	1 yr.	3 mo.
Cleaning the outside of the charging equipment	1	√	√	√	√	As necessary	As necessary	As necessary
Examining the condition of the filter elements	1	√	√		√	2 yr.	1 yr.	3 mo.
Cleaning the filter elements	1	√	√			As necessary	As necessary	As necessary
Replacing the filter elements	1	√	√		√	As necessary	As necessary	As necessary
Examining the condition of the power module	2	√	√			3 yr.	2 yr.	1 yr.
Cleaning the power module	2	√	√			As necessary	As necessary	As necessary
Replacing the power module's cooling fan	2	√	√			3 yr.	3 yr.	3 yr.
Replacing the power module	2	√	√			After failure/ 10 yr.[2]	After failure/ 10 yr.[2]	After failure/ 10 yr.[2]
Examining the condition of the power distribution module	2	√	√			5 yr.	5 yr.	5 yr.
Cleaning the power distribution module	2	√	√			As necessary	As necessary	As necessary
Replacing the power distribution module's cooling fan	2	√	√			3 yr.	3 yr.	3 yr.
Replacing the power distribution module	2	√	√			10 yr.	10 yr.	10 yr.
Examining the condition of the control module	1	√	√			3 yr.	3 yr.	3 yr.
Cleaning the control module	1	√	√			As necessary	As necessary	As necessary
Replacing the control module	1	√	√			As necessary	As necessary	As necessary
Examining the tightness of the terminal blocks	1	√	√	√	√	3 yr.	1 yr.	1 yr.

Task	Persons needed[1]	Power Unit	Station Charger	Satellite	Liquid Cooled Satellite	Intervals/environment		
						Clean indoor	Standard	Demanding
Examining the charging cables & vehicle connectors	1		√	√	√	1 yr.	1 yr.	1 yr.
Replacing the charging cable & vehicle connector	2		√	√	√	10.000 uses	10.000 uses	10.000 uses
Replacing the AC charging cable & vehicle connector, units with AC charging output	2			√		10.000 uses	10.000 uses	10.000 uses
Replacing the AC socket, units with AC charging output	1		√	√		10.000 uses	10.000 uses	10.000 uses
Testing the residual current monitor (RCM), units with AC charging output[3]	1		√	√		1 yr.	1 yr.	1 yr.
Examining the condition of the X-satellite relay[4]	1			√		5 yr.	5 yr.	5 yr.
Replacing the X-satellite relay[4]	1			√		As necessary	As necessary	As necessary
Replacing the radiator fan, Liquid Cooled Satellite 75 min.	1				√	3 yr.	3 yr.	3 yr.
Examining the condition of the coolant, Liquid Cooled Satellite 10 min.	1				√	1 yr.	1 yr.	1 yr.
Replacing the coolant, Liquid Cooled Satellite 75 min.	1				√	As necessary	As necessary	As necessary

[1] Does not impact the estimated service labor times.

[2] A failed power module does not stop the operation of the system. The dynamic system redirects the power of the other modules and channels as necessary.

[3] Kempower's recommendation. Do more frequently if required by local regulations.

[4] The product code of the X-satellite starts with SX. Units manufactured before 11/2022 have 2 or 4 contactors per Satellite, units manufactured after 11/2022 have a relay card.

5 MAINTENANCE

5.1 Required tools and equipment

To do maintenance tasks, make sure that you have the necessary tools and equipment.

Personal protective equipment (PPE)

- Protective gloves
- Protective eyewear

Access

- Charging power unit door key
- Access to the main AC power supply point
- Triangle key

Required tools

- H3, H4, H5, H6 and H8 key
- T25 and T30 bit
- Security T30 bit
- Screwdriver
- Electrician's crosshead screwdriver
- Electrician's flathead screwdriver
- 1/4 ratchet wrench (or your preferred tool, to use the Allen keys)
- Torque Wrench 1-50 Nm
- 100 mm extension (50 mm and 200 mm also recommended)
- Multimeter, capable of insulation tests up to 1000 V

Recommended tools

- Long nose pliers
- Side cutters
- Electric tape, multiple colors
- Work light
- Digital camera or mobile phone with camera

Some task-specific additional tools may also be needed. These are found in the task instructions.

5.2 General inspection and cleaning

CAUTION

Do not use running water or pressure washing equipment to clean the charging unit. Use a pH neutral detergent if necessary.

Needed for the task

The estimated labor time for the individual task is 10 min.

- Step ladder or equivalent for inspecting the roof of the charging unit
- Water
- Nonlinting cloth
- Mild, pH neutral detergent

For tools, see *5.1 Required tools and equipment*.

Task

Do a visual inspection of all units of the electric vehicle charging system from all sides, including the roof. Inspect the charging cables and vehicle connectors.

Clean the outsides of the units with a damp cloth and detergent.

Clean the screens of the units and, if necessary, external parts of the payment terminal(s) with a damp cloth.

If you notice any mechanical damages, document them by taking a picture. Make a note to repair or replace damaged parts as necessary.

5.3 Updating the software

Kempower performs software updates remotely upon request or periodically as part of a service contract. You can also update the software directly from ChargEye.

5.4 Power Unit and Station Charger

5.4.1 Cleaning the filter elements

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

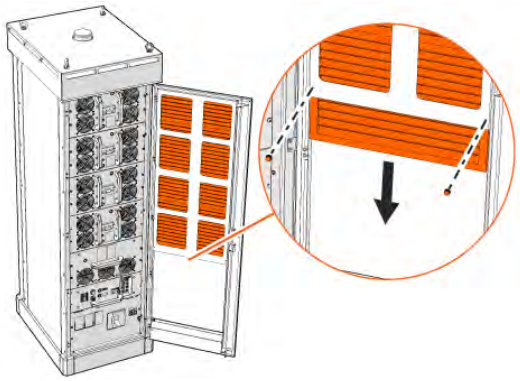
Needed for the task

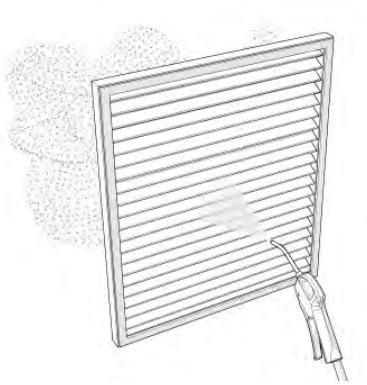
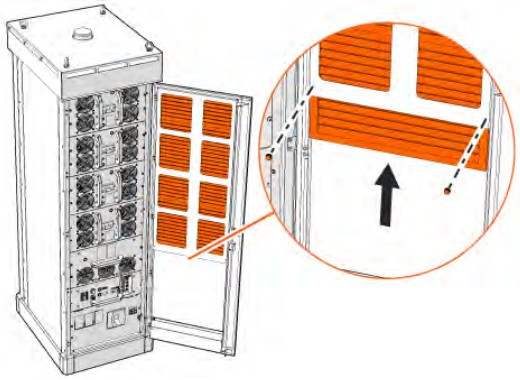
The estimated labor time for the individual task is 10 min.

- Clean and dry compressed air (max. 4 bar)
- Fine brush (optional)

For tools, see *5.1 Required tools and equipment*.

Task

	Unlock and open the door of the unit. The two filter elements are located in the filter housing on the inside of the door of the unit. Remove the two retaining screws located at the bottom corners of the filter housing with your hand. Pull the filter elements down from the filter housing.

	Clean the filter elements with a fine brush or clean and dry compressed air (max. 4 bar). If the filter elements cannot be cleaned adequately, replace them.
	Push the filter elements back into the filter housing. Install the two retaining screws back to the bottom corners of the filter housing with your hand. Lock the door of the unit.

5.4.2 Replacing the filter elements (Power Unit or Station Charger)

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Only use spare parts approved by Kempower.

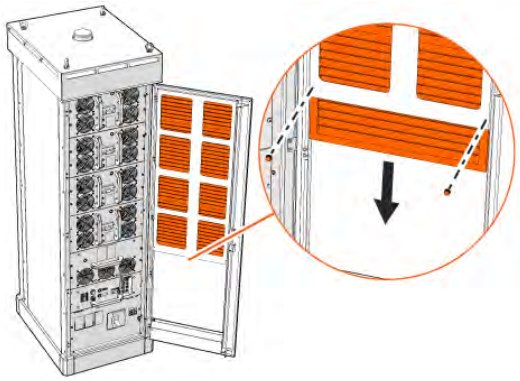
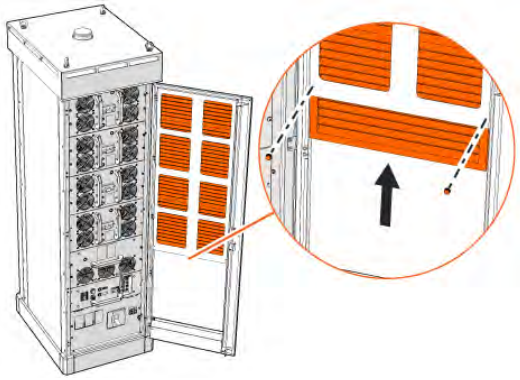
Needed for the task

The estimated labor time for the individual task is 10 min.

- Clean and dry compressed air (max. 4 bar)
- Fine brush (optional)
- Replacement filter elements, product code SP9901143 FILTER AQUA RES (optional)

For tools, see *5.1 Required tools and equipment*.

Task

	Unlock and open the door of the unit. The two filter elements are located in the filter housing on the inside of the door of the unit. Remove the two retaining screws located at the bottom corners of the filter housing with your hand. Pull the filter elements down from the filter housing.
	Order replacement filters from Kempower. (product code SP9901143 FILTER AQUA RES, includes 2 filters, sufficient for one cabinet door). Push the replacement air filters into the filter housing. Install the two retaining screws back to the bottom corners of the filter housing with your hand. Lock the door of the unit.

5.4.3 Replacing the power module

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

Two persons are needed for this task. The power module weighs 43 kg.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

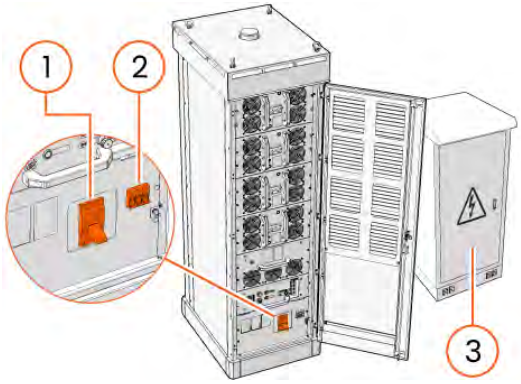
Needed for the task

The estimated labor time for the individual task is 30 min.

- Contact cleaner spray

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

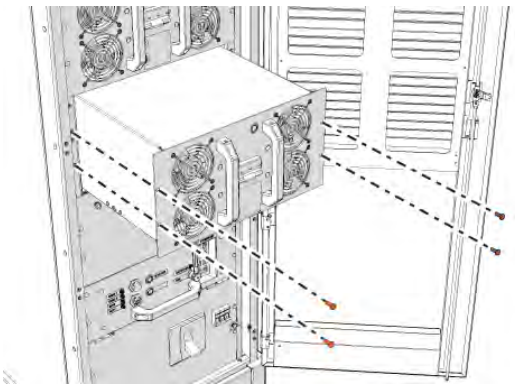
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Set the power module's circuit breakers in OFF position (down).

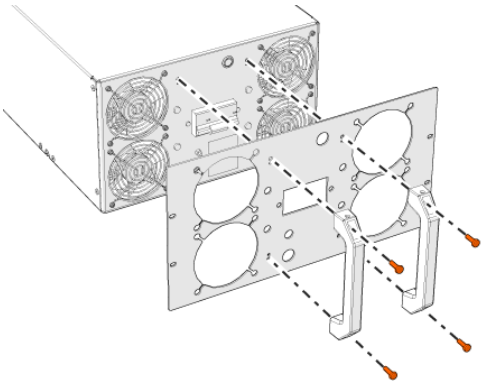
Remove the four T30 fixing screws on the edges of the module's front panel.

The module moves on its rollers on the rack. Use the handles to carefully pull out the module.

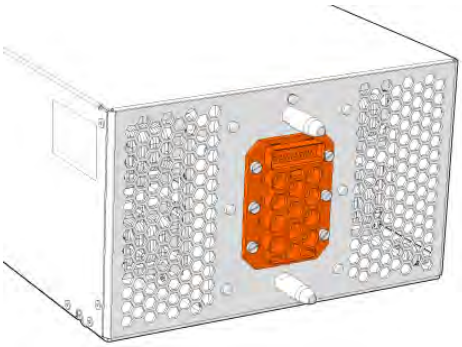
Protect the components that are installed back into the unit from dirt.

The power module has two guide pins at the back end.

Do not lift the power module from its guide pins.

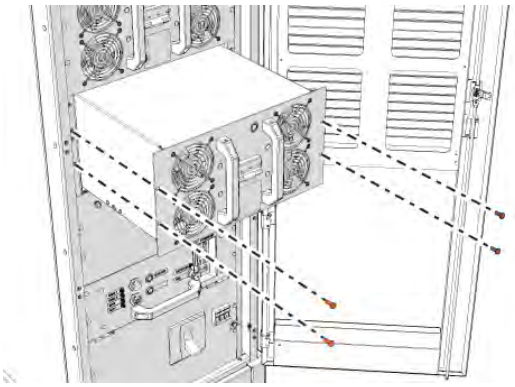


Remove the four T30 fixing screws of the handles from the old module. Install the new front panel to the new module with the handles and screws.



Make sure that the module's connectors and connector pins are in good operating condition. When you push the module into the unit, be very careful not to damage the connector pins.

If necessary, clean the connectors with a vacuum cleaner. Spray the connectors with contact cleaner spray. If necessary, lightly apply electrical joint compound.

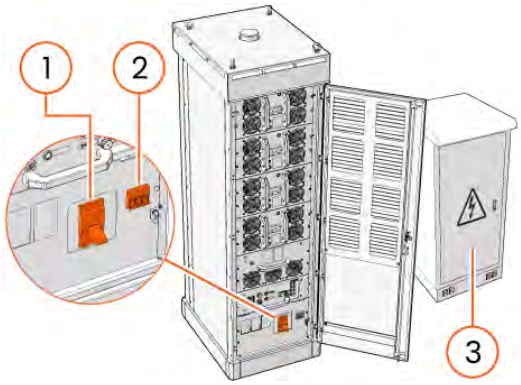


Do not lift the power module from its guide pins.

Push the power module into the unit. Make sure that you do not damage the module.

Install the fixing screws to the edges of the module's front panel.

Set the module's circuit breakers in ON position (up).



Connect the AC power supply to the unit from the main supply point (3).

In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position.

Lock the door(s) of the unit.

5.4.4 Cleaning the power module

CAUTION

When you have completed the task, do an insulation resistance test and a protective earth continuity test.

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Two persons are needed for this task. The power module weighs 43 kg.

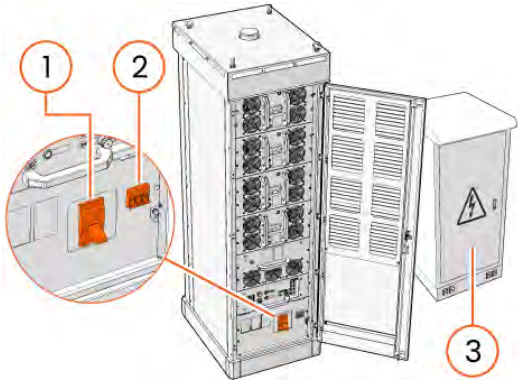
Needed for the task

The estimated labor time for the individual task is 60 min.

- Vacuum cleaner
- Clean and dry compressed air (max. 4 bar)
- Protective film or equivalent for the middle compartment
- Soft, nonlinting cloth
- Antistatic plastic brush (optional)
- Contact cleaner spray

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

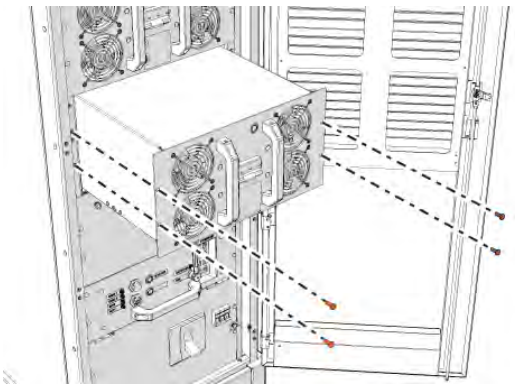
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

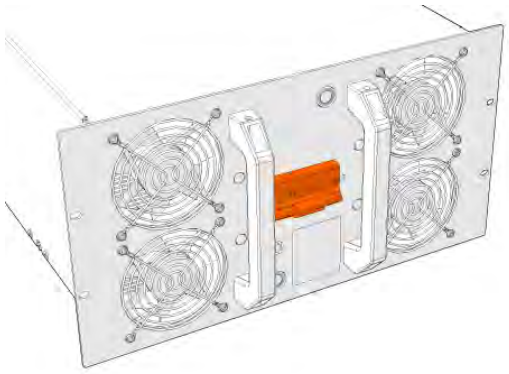
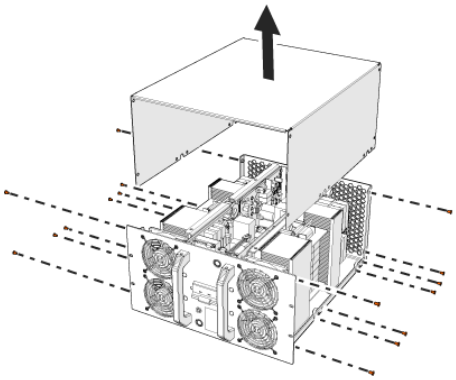


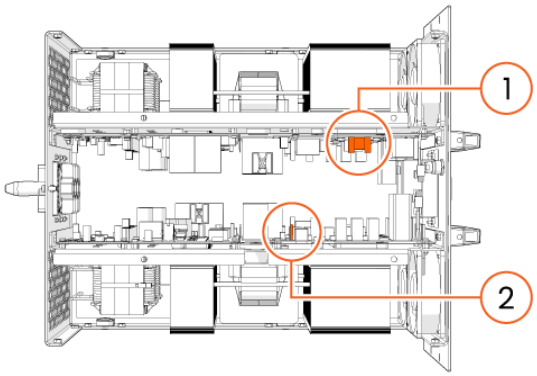
Set the power module's circuit breakers in OFF position (down).

Remove the four T30 fixing screws on the edges of the module's front panel.

The module moves on its rollers on the rack. Use the handles to carefully pull out the module.

Protect the components that are installed back into the unit from dirt.

	The power module has two guide pins at the back end. Do not lift the power module from its guide pins.
	If the module's circuit breakers are stuck, clean them. If necessary, replace the circuit breakers. Contact *Kempower Technical Support.* Do not connect if If you see signs that the device has short circuited. Contact *Kempower Technical Support*.
	Clean the cover and both ends of the module with the vacuum cleaner. Also use a brush if needed.
	Remove the sixteen H3 fixing screws of the module's cover. Remove the cover. Do not remove the fixing screws of the module's rollers.



DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

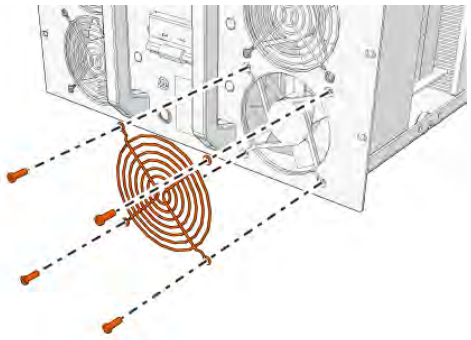
Measure the voltage between:

1. Terminals X5 and X6 of channel A (right side)
2. Terminal X1 of channel B (left side)

Examine all components, cables and terminals. Make sure that:

- All cables are connected
- Cable connections are tight
- There is no unusual smell, visible damage, or discoloration

If the internal components are visibly damaged or discolored, or if there is an unusual smell, contact *Kempower Technical Support*.

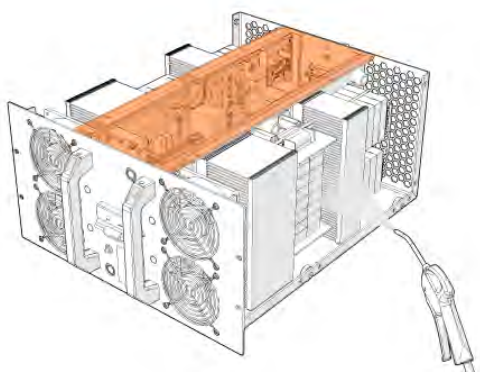


Remove the four T25 fixing screws of the cooling fan grille. Remove the grille.

Clean the fan blades with a soft cloth.

Make sure that the fans rotate freely and without unusual sounds.

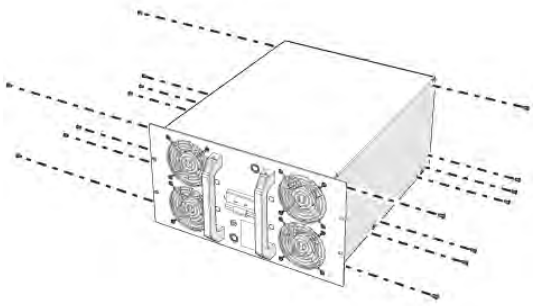
Install the grille with its fixing screws.



Cover the middle compartment with protective film or equivalent to protect the sensitive components.

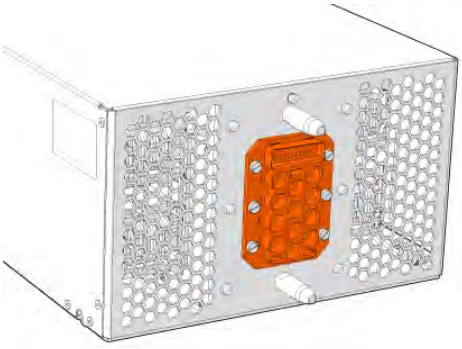
Carefully clean all components in channel A and B with a vacuum cleaner. If necessary, carefully remove impurities with a small, antistatic plastic brush.

Remove the protective film from the middle compartment.



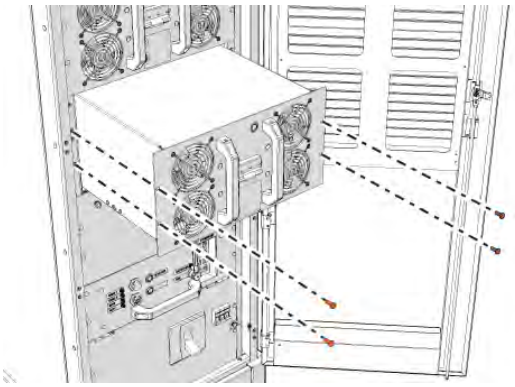
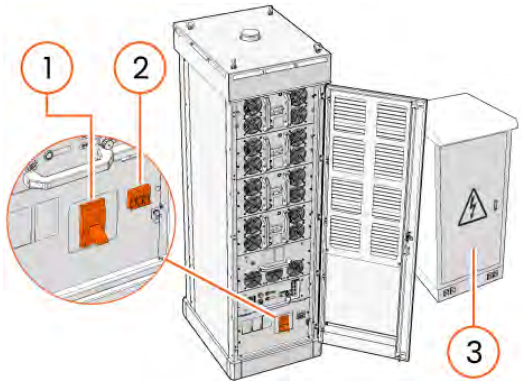
Install the module's cover with its fixing screws.

Do not overtighten the fixing screws.



Make sure that the module's connectors and connector pins are in good operating condition. When you push the module into the unit, be very careful not to damage the connector pins.

If necessary, clean the connectors with a vacuum cleaner. Spray the connectors with contact cleaner spray. If necessary, lightly apply electrical joint compound.

	Do not lift the power module from its guide pins. Push the power module into the unit. Make sure that you do not damage the module. Install the fixing screws to the edges of the module's front panel. Set the module's circuit breakers in ON position (up).
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.5 Replacing the cooling fan of the power module

CAUTION

When you have completed the task, do an insulation resistance test and a protective earth continuity test.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Two persons are needed for this task. The power module weighs 43 kg.

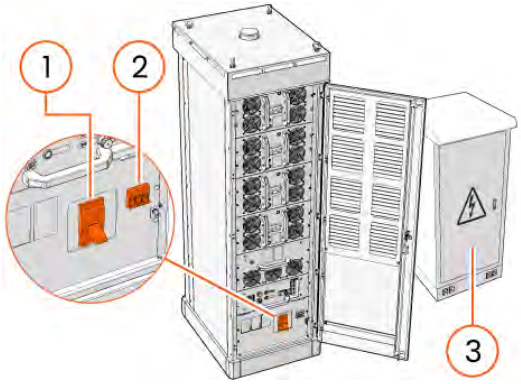
Needed for the task

The estimated labor time for the individual task is 40 min.

- Cable ties
- Wire cutters
- Long nose pliers
- Contact cleaner spray

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

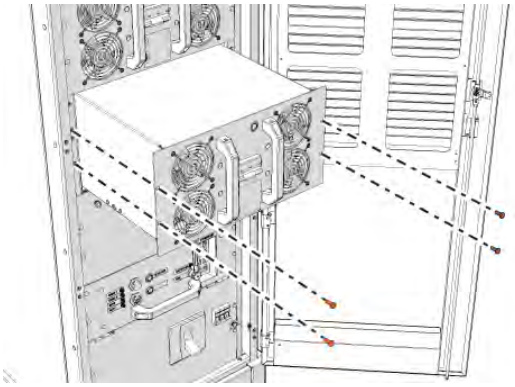
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Set the power module's circuit breakers in OFF position (down).

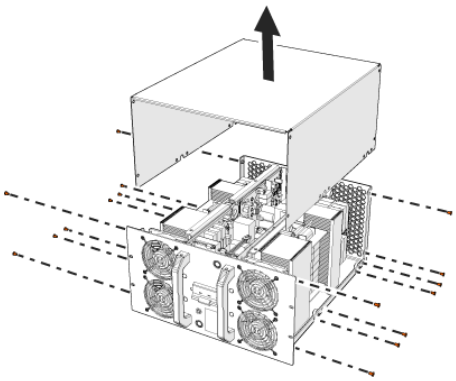
Remove the four T30 fixing screws on the edges of the module's front panel.

The module moves on its rollers on the rack. Use the handles to carefully pull out the module.

Protect the components that are installed back into the unit from dirt.

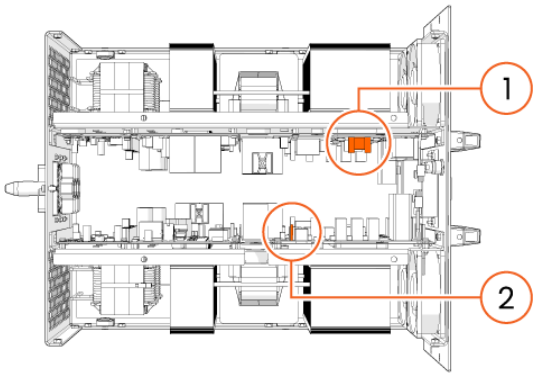
The power module has two guide pins at the back end.

Do not lift the power module from its guide pins.



Remove the sixteen H3 fixing screws of the module's cover. Remove the cover.

Do not remove the fixing screws of the module's rollers.

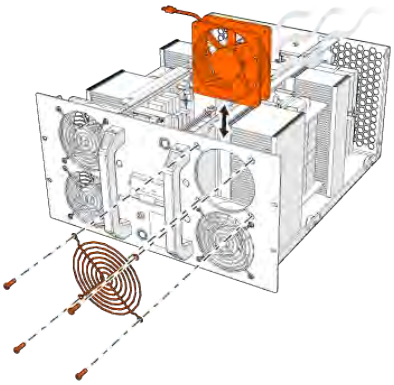
<table>
<tr>
<td> 
</td>
<td>DANGER
Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

Measure the voltage between:

1. Terminals X5 and X6 of channel A (right side)
2. Terminal X1 of channel B (left side)</td>
</tr>
<tr>
<td></td>
<td>Examine all components, cables and terminals. Make sure that:

• All cables are connected
• Cable connections are tight
• There is no unusual smell, visible damage, or discoloration

If the internal components are visibly damaged or discolored, or if there is an unusual smell, contact Kempower Technical Support.</td>
</tr>
</table>



Remove the four T25 fixing screws of the grille and cooling fan assembly. Remove the grille and move the cooling fan assembly out of the way.

In the middle compartment of the power module, find the protective sleeve of the fan's power supply wire connector.

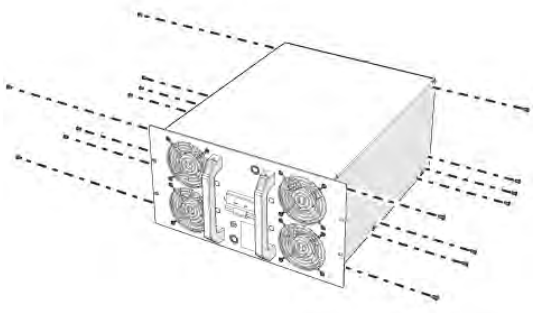
Carefully remove the cable ties that hold the protective sleeve in place. Slide the sleeve out of the way.

Use long nose pliers to detach the connector.

Be careful not to damage the circuit boards and other sensitive components near the connector.

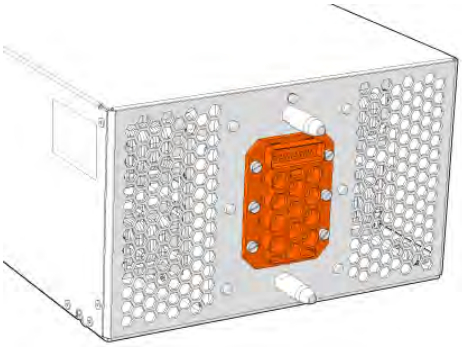
Assemble in the reverse order.

Make sure that the orientation of the grille and the cooling fan is correct.



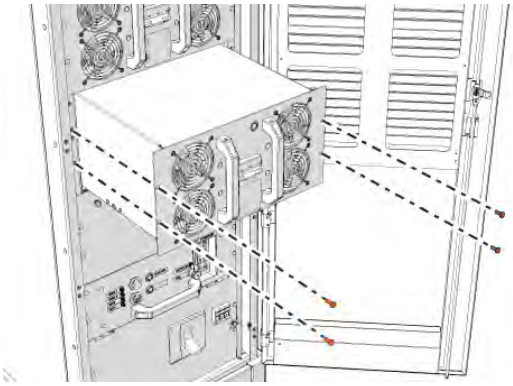
Install the module's cover with its fixing screws.

Do not overtighten the fixing screws.



Make sure that the module's connectors and connector pins are in good operating condition. When you push the module into the unit, be very careful not to damage the connector pins.

If necessary, clean the connectors with a vacuum cleaner. Spray the connectors with contact cleaner spray. If necessary, lightly apply electrical joint compound.

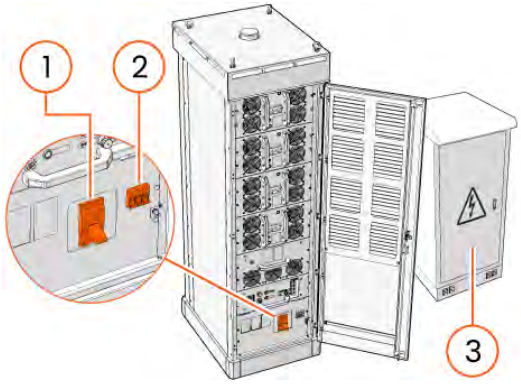


Do not lift the power module from its guide pins.

Push the power module into the unit. Make sure that you do not damage the module.

Install the fixing screws to the edges of the module's front panel.

Set the module's circuit breakers in ON position (up).



Connect the AC power supply to the unit from the main supply point (3).

In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position.

Lock the door(s) of the unit.

5.4.6 Replacing the power distribution module

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

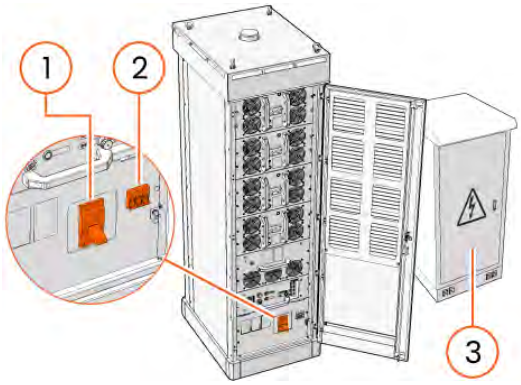
Needed for the task

The estimated labor time for the individual task is 20 min.

- Contact cleaner spray

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

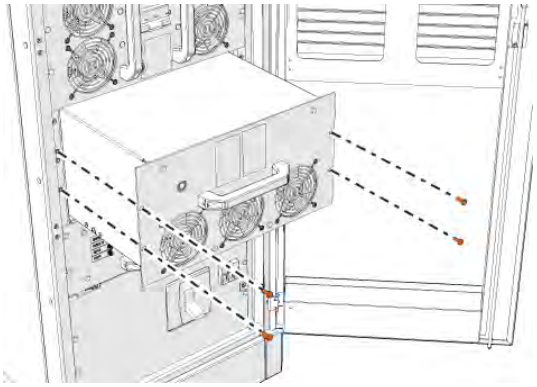
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

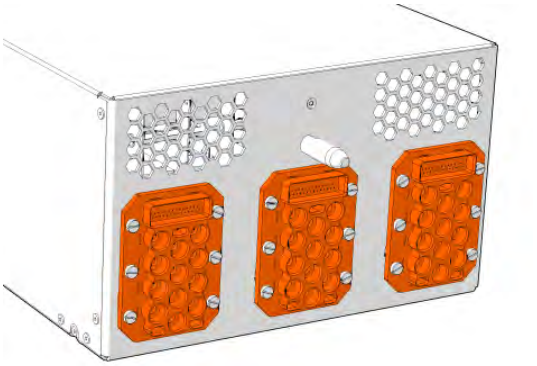
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the four T30 fixing screws on the edges of the power distribution module's front panel.

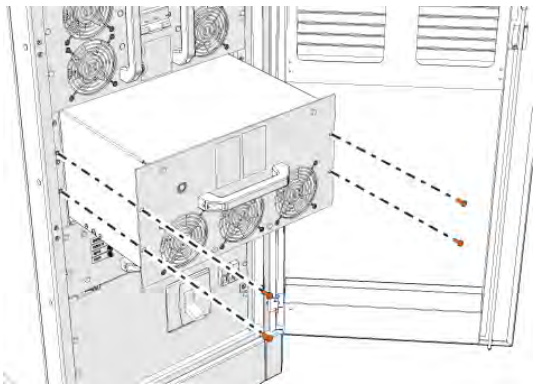
The module moves on its rollers on the rack. Use the handle to carefully pull out the module.

Protect the components that are installed back into the unit from dirt.



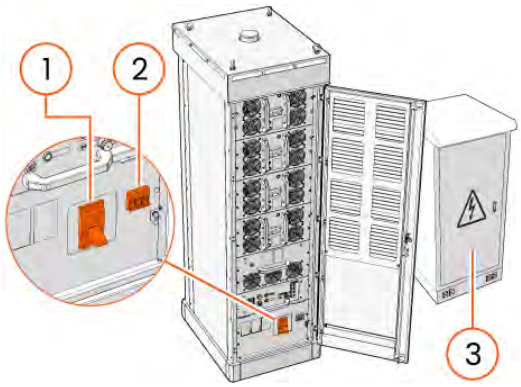
Make sure that the module's connectors and connector pins are in good operating condition. When you push the module into the unit, be very careful not to damage the connector pins.

If necessary, clean the connectors with a vacuum cleaner. Spray the connectors with contact cleaner spray. If necessary, lightly apply electrical joint compound.



Push the power distribution module into the unit. Make sure that you do not damage the module.

Install the fixing screws to the edges of the module's front panel.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.7 Cleaning the power distribution module

CAUTION

When you have completed the task, do an insulation resistance test and a protective earth continuity test.

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

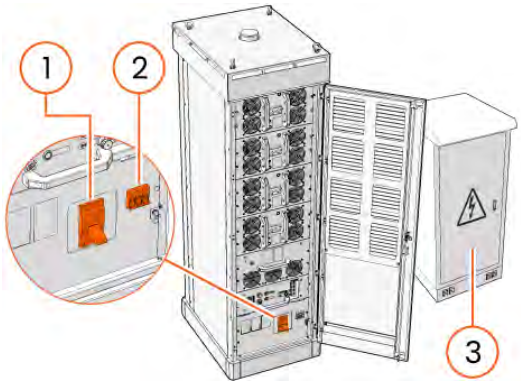
Needed for the task

The estimated labor time for the individual task is 40 min.

- Vacuum cleaner
- Clean and dry compressed air (max. 4 bar)
- Soft, nonlinting cloth
- Antistatic plastic brush (optional)
- Contact cleaner spray

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

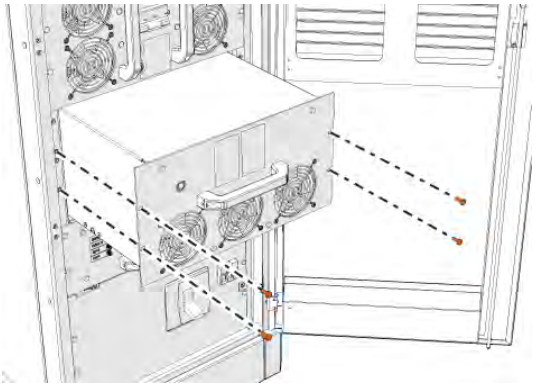
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

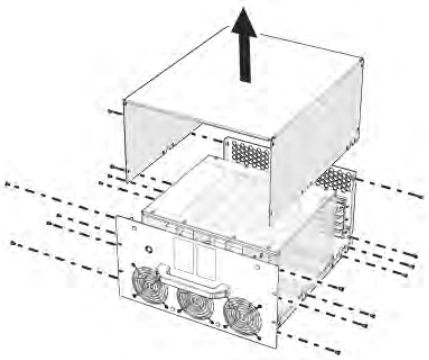
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

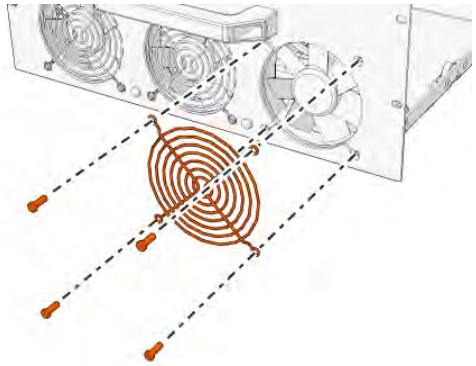


Remove the four T30 fixing screws on the edges of the power distribution module's front panel.

The module moves on its rollers on the rack. Use the handle to carefully pull out the module.

Protect the components that are installed back into the unit from dirt.

	Remove the sixteen H3 fixing screws of the module's cover. Remove the cover. Do not remove the fixing screws of the module's rollers.
	Examine all components, cables and terminals. Make sure that: • All cables are connected • Cable connections are tight • There is no unusual smell, visible damage, or discoloration If the internal components are visibly damaged or discolored, or if there is an unusual smell, contact *Kempower Technical Support*.
	Carefully clean all components with instrument air or a gas duster. If necessary, carefully remove dirt with a small, antistatic plastic brush.

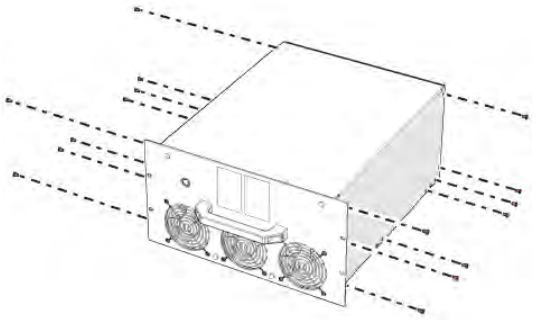


Remove the four T25 fixing screws of the cooling fan grille. Remove the grille.

Clean the fan blades with a soft cloth.

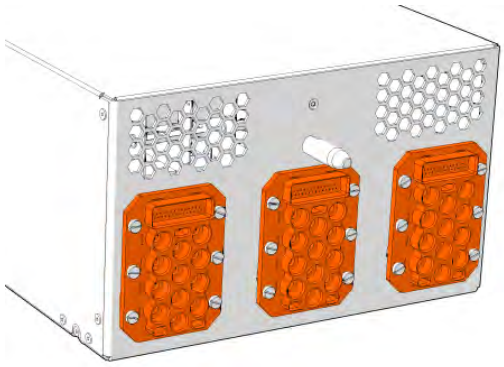
Make sure that the fans rotate freely and without unusual sounds.

Install the grille with its fixing screws.



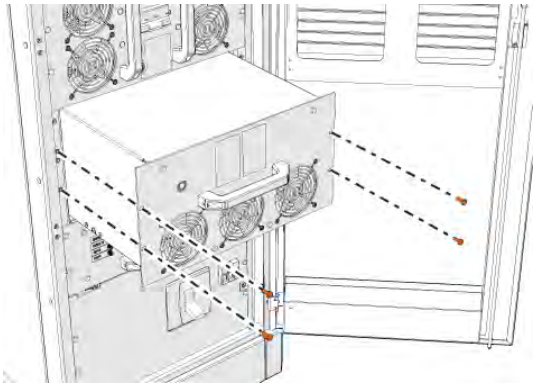
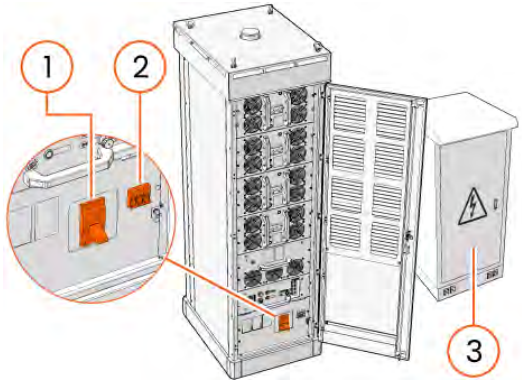
Install the module's cover with its fixing screws.

Do not overtighten the fixing screws.



Make sure that the module's connectors and connector pins are in good operating condition. When you push the module into the unit, be very careful not to damage the connector pins.

If necessary, clean the connectors with a vacuum cleaner. Spray the connectors with contact cleaner spray. If necessary, lightly apply electrical joint compound.

	Push the power distribution module into the unit. Make sure that you do not damage the module. Install the fixing screws to the edges of the module's front panel.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.8 Replacing the control module

CAUTION

When you have completed the task, do an insulation resistance test and a protective earth continuity test.

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Make sure that you replace the same serial number card to the same cabinet when you install or replace control modules. Each cabinet is identified with its unique serial number in ChargEye.

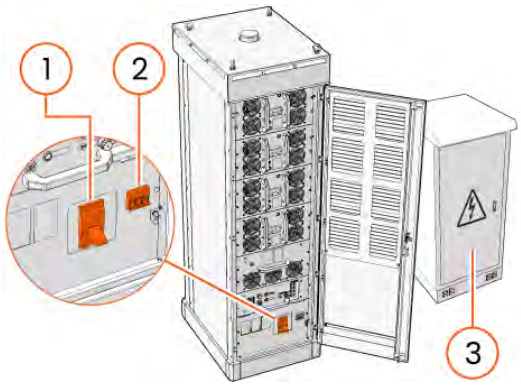
Needed for the task

The estimated labor time for the individual task is 40 min.

- Contact cleaner spray

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

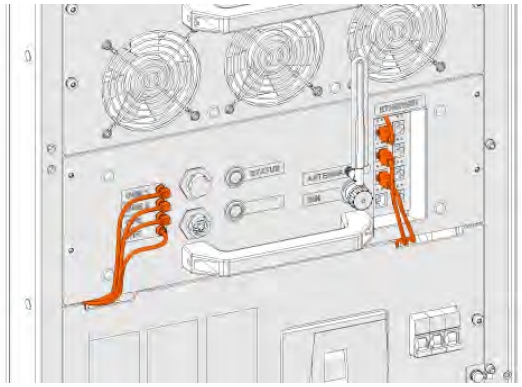
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

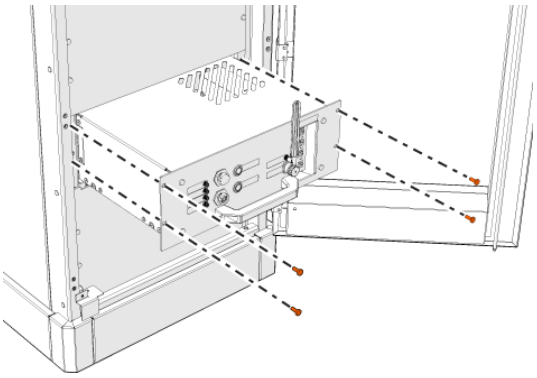
WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Before you detach wires, cables, or connectors, take a photograph of them.

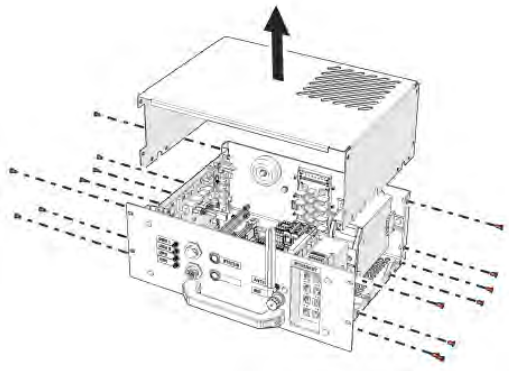
Detach all cables or wires connected to the control module's front panel.



Remove the four T30 fixing screws on the edges of the module's front panel.

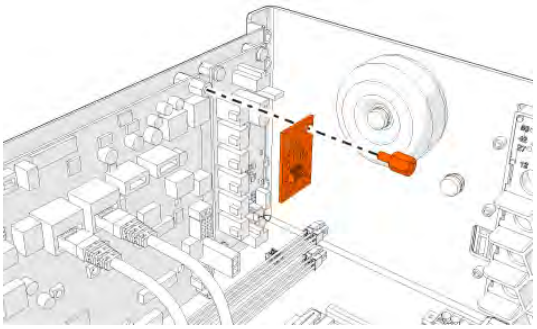
The module moves on its rollers on the rack. Use the handle to carefully pull out the module.

Protect the components that are installed back into the unit from dirt.



Remove the sixteen H3 fixing screws of the module's cover. Remove the cover.

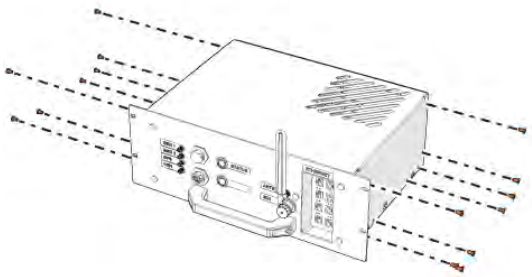
Do not remove the fixing screws of the module's rollers.



Remove the serial number card with your hand from the control board of the old control module.

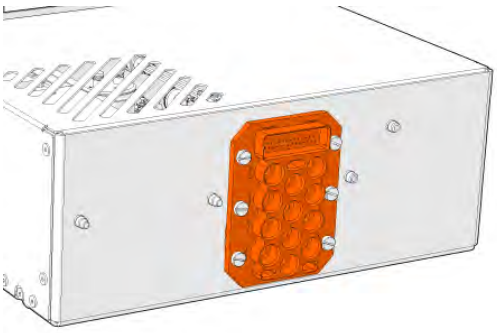
Attach the serial number card to the control board of the new control module.

Using Maintenance Tool, make sure that the information is transferred correctly. If necessary, contact *Kempower Technical Support*.



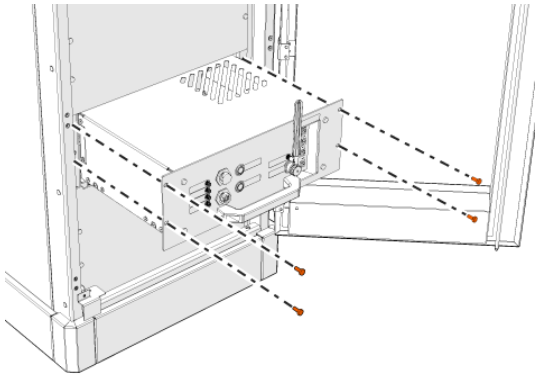
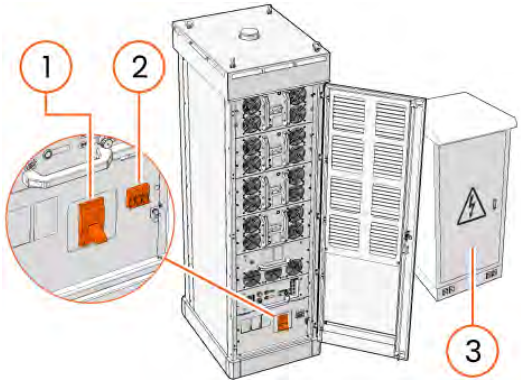
Install the module's cover with its fixing screws.

Do not overtighten the fixing screws.



Make sure that the module's connectors and connector pins are in good operating condition. When you push the module into the unit, be very careful not to damage the connector pins.

If necessary, clean the connectors with a vacuum cleaner. Spray the connectors with contact cleaner spray. If necessary, lightly apply electrical joint compound.

	Carefully push the control module into the unit. Install the fixing screws to the edges of the module's front panel. Attach the cables or wires. Make sure that all cables are correctly connected and locked.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.9 Cleaning the control module

CAUTION

When you have completed the task, do an insulation resistance test and a protective earth continuity test.

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Make sure that you replace the same serial number card to the same cabinet when you install or replace control modules. Each cabinet is identified with its unique serial number in ChargEye.

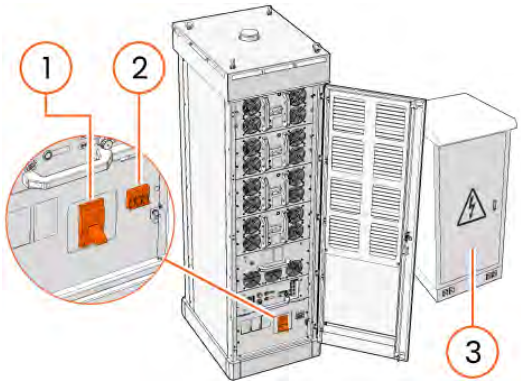
Needed for the task

The estimated labor time for the individual task is 40 min.

- Vacuum cleaner
- Clean and dry compressed air (max. 4 bar)
- Antistatic plastic brush (optional)
- Contact cleaner spray
- Electrical contact lubricant

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

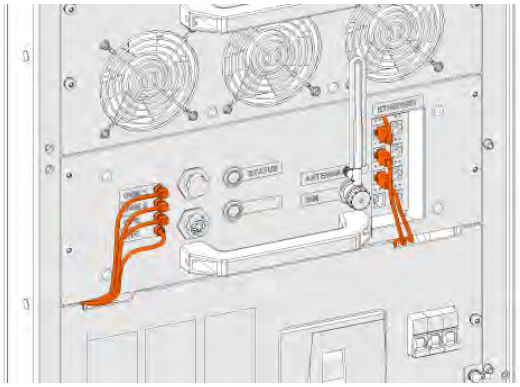
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

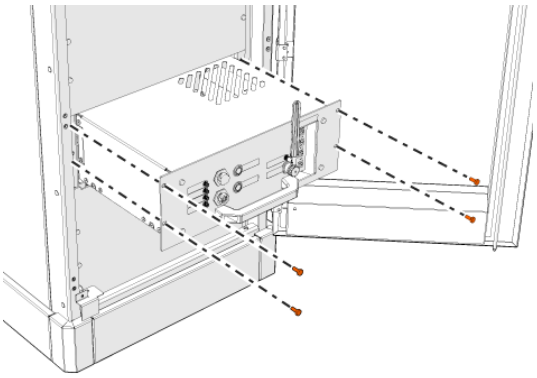
WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Before you detach wires, cables, or connectors, take a photograph of them.

Detach all cables or wires connected to the control module's front panel.

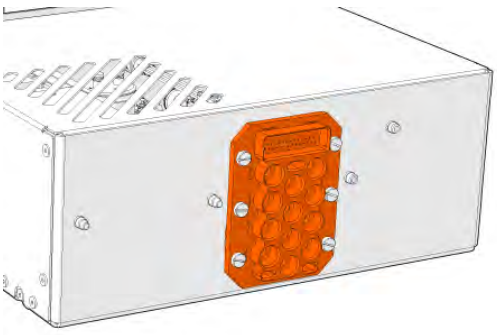


Remove the four T30 fixing screws on the edges of the module's front panel.

The module moves on its rollers on the rack. Use the handle to carefully pull out the module.

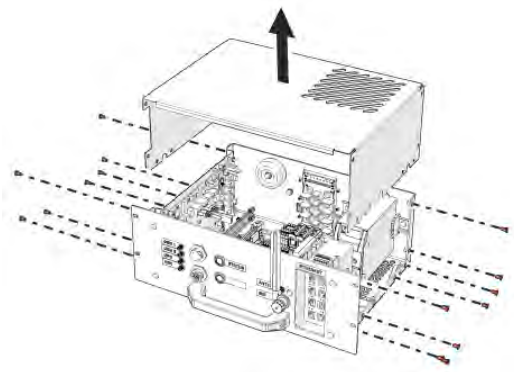
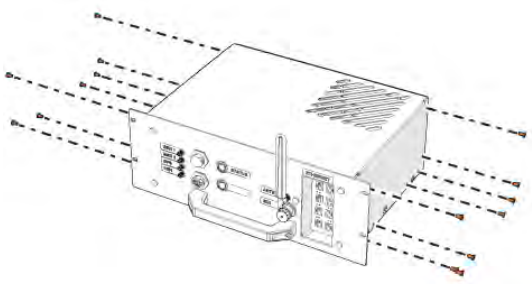
Protect the components that are installed back into the unit from dirt.

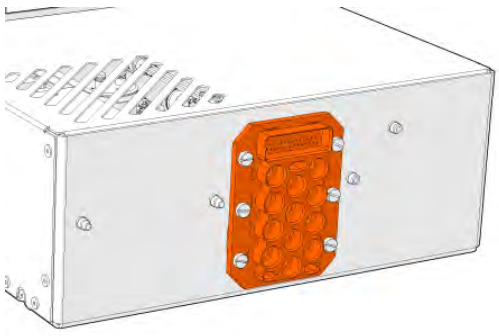
Clean the cover and both ends of the module with the vacuum cleaner. Also use a brush if needed.



If necessary, clean the cable terminals and connectors with clean and dry compressed air (max. 4 bar). Spray the connectors with contact cleaner spray.

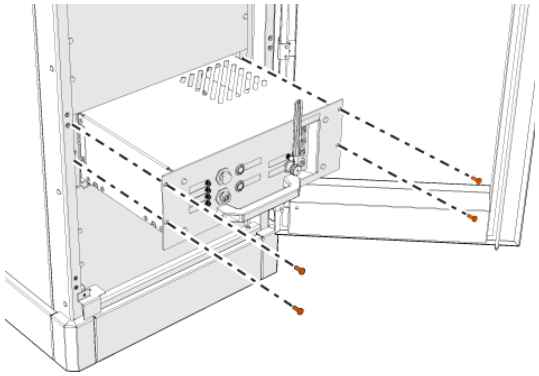
When the connectors are dry, apply a small amount of electrical contact lubricant to each connector.

	Remove the sixteen H3 fixing screws of the module's cover. Remove the cover. Do not remove the fixing screws of the module's rollers.
	Examine all components, cables and terminals. Make sure that: • All cables are connected • Cable connections are tight • There is no unusual smell, visible damage, or discoloration If the internal components are visibly damaged or discolored, or if there is an unusual smell, contact *Kempower Technical Support*.
	Carefully clean all components with instrument air or a gas duster. If necessary, carefully remove dirt with a small, antistatic plastic brush.
	Install the module's cover with its fixing screws. Do not overtighten the fixing screws.



Make sure that the module's connectors and connector pins are in good operating condition. When you push the module into the unit, be very careful not to damage the connector pins.

If necessary, clean the connectors with a vacuum cleaner. Spray the connectors with contact cleaner spray. If necessary, lightly apply electrical joint compound.

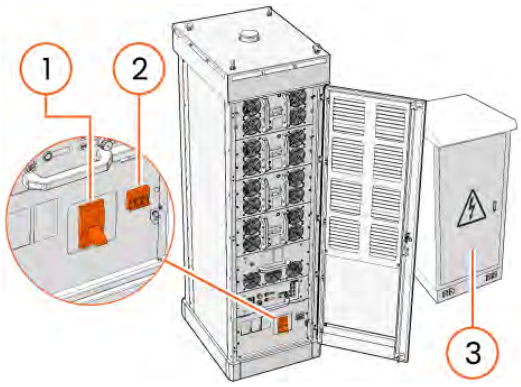


Carefully push the control module into the unit.

Install the fixing screws to the edges of the module's front panel.

Attach the cables or wires.

Make sure that all cables are correctly connected and locked.



Connect the AC power supply to the unit from the main supply point (3).

In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position.

Lock the door(s) of the unit.

5.4.10 Replacing the control board of the control module

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Make sure that you replace the same serial number card to the same cabinet when you install or replace control modules. Each cabinet is identified with its unique serial number in ChargEye.

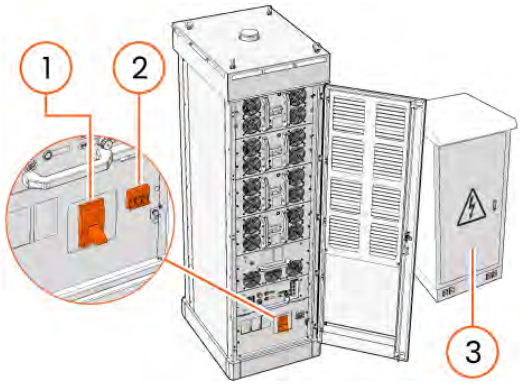
Needed for the task

The estimated labor time for the individual task is 40 min.

- Contact cleaner spray

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

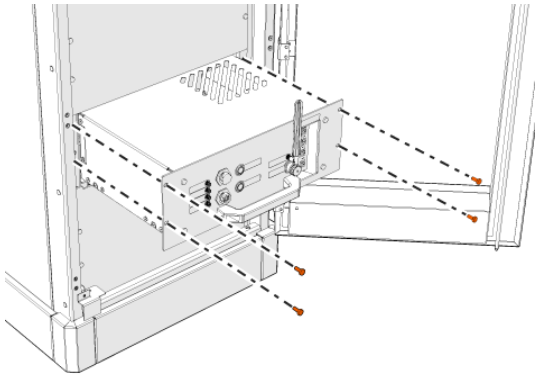
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

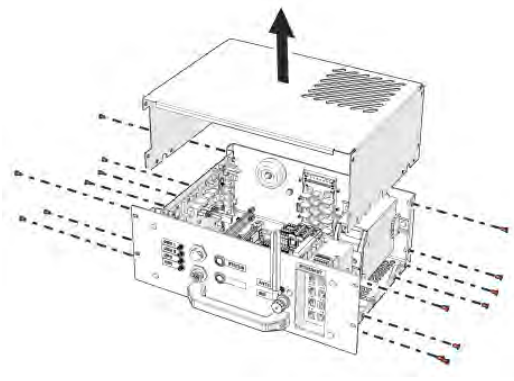
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

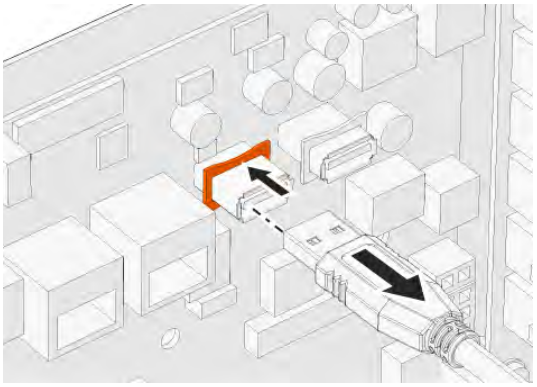
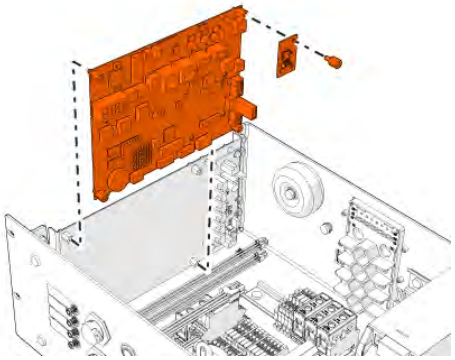


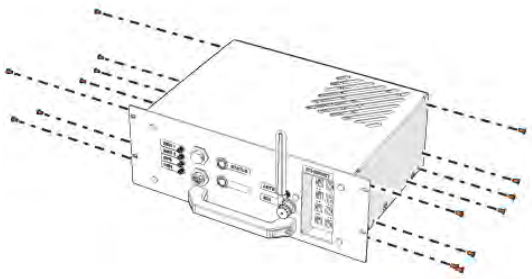
Remove the four T30 fixing screws on the edges of the module's front panel.

The module moves on its rollers on the rack. Use the handle to carefully pull out the module.

Protect the components that are installed back into the unit from dirt.

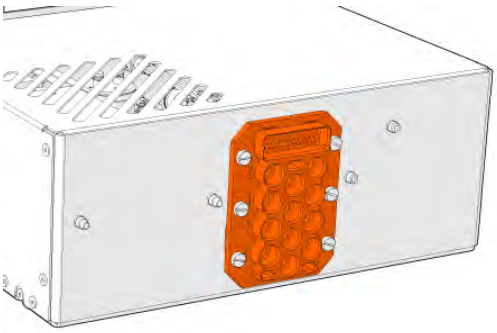
	Remove the sixteen H3 fixing screws of the module's cover. Remove the cover. Do not remove the fixing screws of the module's rollers.
	Examine all components, cables and terminals. Make sure that: • All cables are connected • Cable connections are tight • There is no unusual smell, visible damage, or discoloration If the internal components are visibly damaged or discolored, or if there is an unusual smell, contact *Kempower Technical Support*.
	Before you detach wires, cables, or connectors, take a photograph of them. Detach all connectors from the control board.

	If a USB cable is connected to the control board, unlock the USB connector before you detach the USB cable. Push the lock down to release the USB cable.
	Remove the fixing nut of the serial number card with your hand. Remove the serial number card. Remove the four fixing nuts of the control board with your hand. Remove the control board.
	Install the new control board in the reverse order. Attach the serial number card again. Connect all cables to the control board. Make sure that all cables are correctly connected and locked.



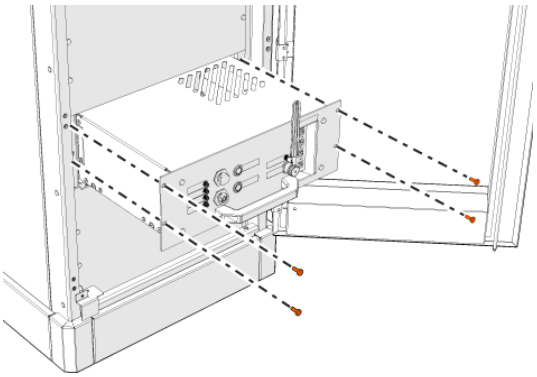
Install the module's cover with its fixing screws.

Do not overtighten the fixing screws.



Make sure that the module's connectors and connector pins are in good operating condition. When you push the module into the unit, be very careful not to damage the connector pins.

If necessary, clean the connectors with a vacuum cleaner. Spray the connectors with contact cleaner spray. If necessary, lightly apply electrical joint compound.

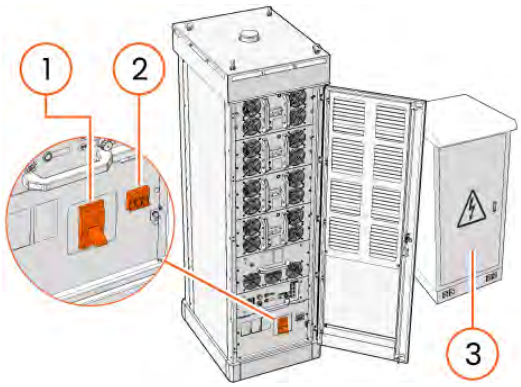


Carefully push the control module into the unit.

Install the fixing screws to the edges of the module's front panel.

Attach the cables or wires.

Make sure that all cables are correctly connected and locked.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.11 Examining the tightening torques of terminal blocks

WARNING

Loose cable terminal connections are dangerous. Risk of death, electric shock, and fire.

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

If the spring terminals are loose, replace them. Only screw terminals can be tightened.

For an overview of the terminal blocks, see *3.4.5 Terminal blocks (charging power units manufactured before 6/2023)*.

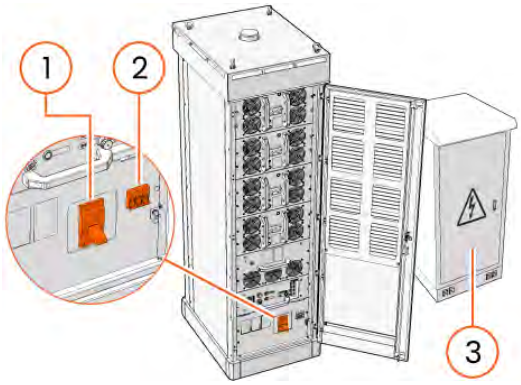
Needed for the task

The estimated labor time for the individual task is 60 min.

- Contact cleaner spray

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

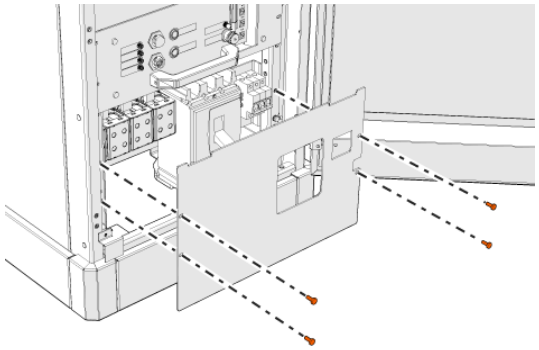
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

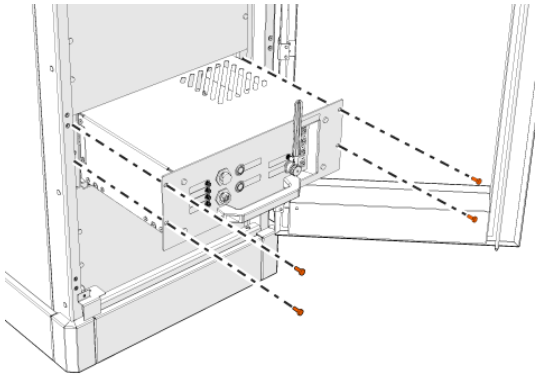
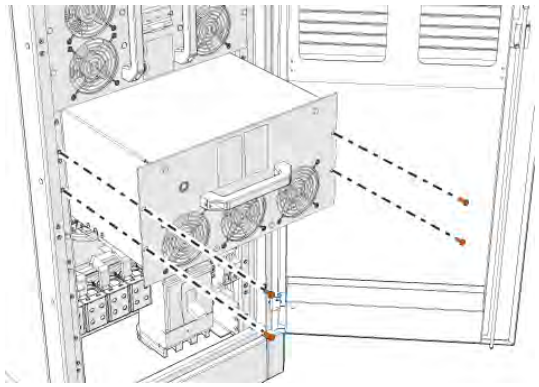
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the four T30 fixing screws of the main module's front panel.

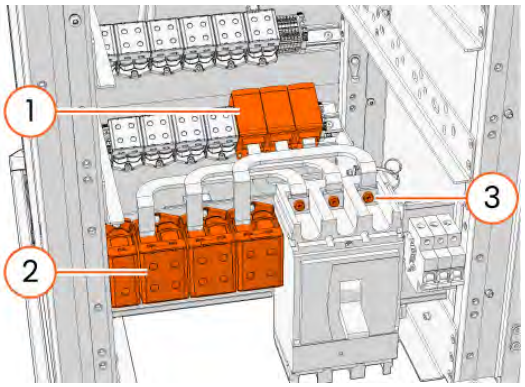
Remove the front panel.

Protect the components that are installed back into the unit from dirt.

	Remove the four T30 fixing screws on the edges of the module's front panel. The module moves on its rollers on the rack. Use the handle to carefully pull out the module. Protect the components that are installed back into the unit from dirt.
	If necessary, also remove the power distribution module to make more space for the task. See *5.4.6 Replacing the power distribution module*.

DANGER

Measure the power terminals to make sure that no voltage remains before you continue. Risk of death.



Use the torque wrench to inspect the tightening torques of the AC power terminal blocks, bus bars and the main switch.

Tighten each screw terminal to the correct torque as necessary.

Busbars (1):

- 13.5 Nm
- 16 mm^2: 3.5 Nm

AC terminal blocks (2):

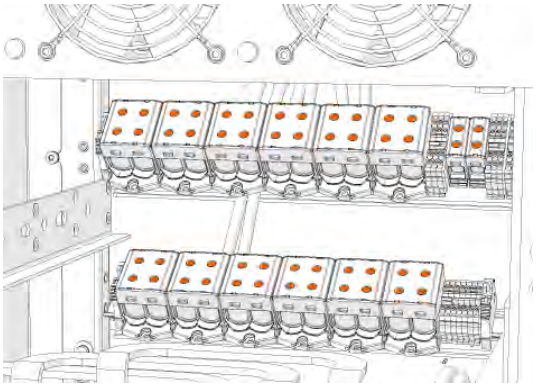
- 35–120 mm^2: 26 Nm
- 150–240 mm^2: 40 Nm

Main switch (3):

- 50 Nm

The size of the cable fixing screws is H6.

The tightening torque is also marked on the terminal block.



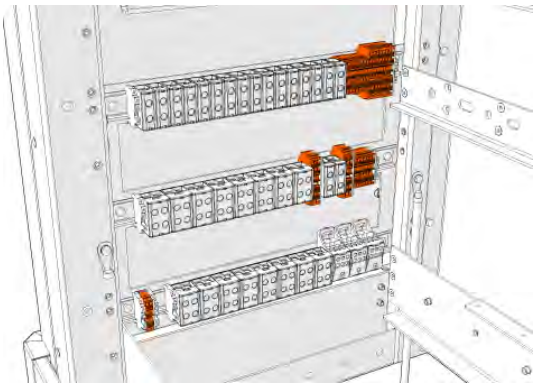
Use the torque wrench to inspect the tightening torques of the DC power terminal blocks.

Tighten each screw terminal to the correct torque as necessary.

- 6-95 mm^2 OTL:
  - 6-25 mm^2: 12 Nm
  - 35-95 mm^2: 22 Nm
- 25-150 mm^2 OTL:
  - 25-60 mm^2: 14 Nm
  - 70-150 mm^2: 30 Nm
- 16-50 mm^2: 10 Nm

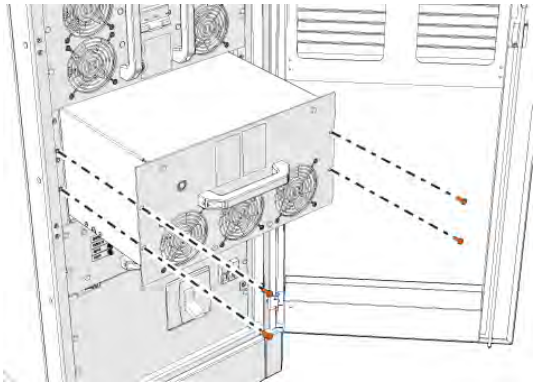
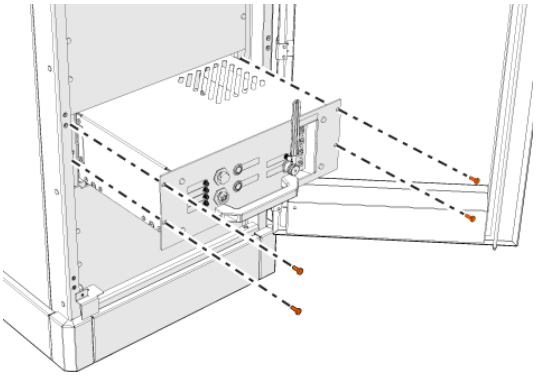
The size of the cable fixing screws is H6.

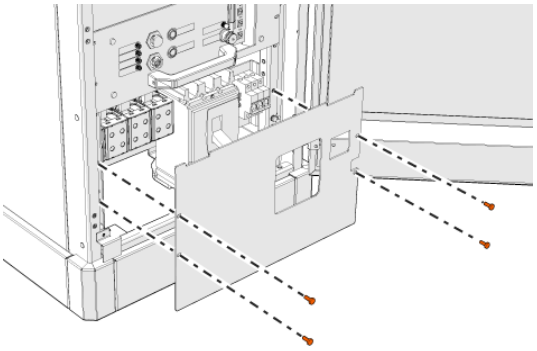
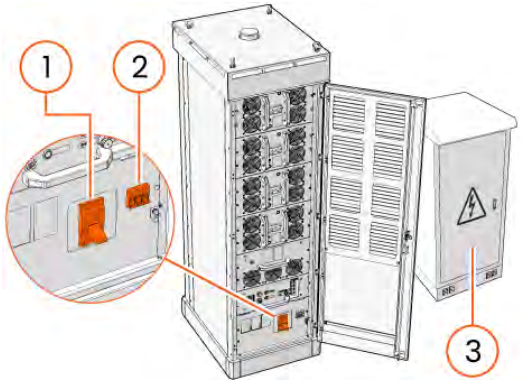
The tightening torque is also marked on the terminal block.



Inspect the tightness of the spring terminal blocks.

If the connections are loose, replace the terminal block. See *5.4.12 Replacing a terminal block*.

	Make sure that the module's connectors and connector pins are in good operating condition. When you push the module into the unit, be very careful not to damage the connector pins. If necessary, clean the connectors with a vacuum cleaner. Spray the connectors with contact cleaner spray. If necessary, lightly apply electrical joint compound.
	If you removed the power distribtion module, install it again. See *5.4.6 Replacing the power distribution module*.
	Carefully push the control module into the unit. Install the fixing screws to the edges of the module's front panel. Attach the cables or wires. Make sure that all cables are correctly connected and locked.

	Install the main module's front panel with its fixing screws.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.12 Replacing a terminal block

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

For an overview of the terminal blocks, see *3.4.5 Terminal blocks (charging power units manufactured before 6/2023)*.

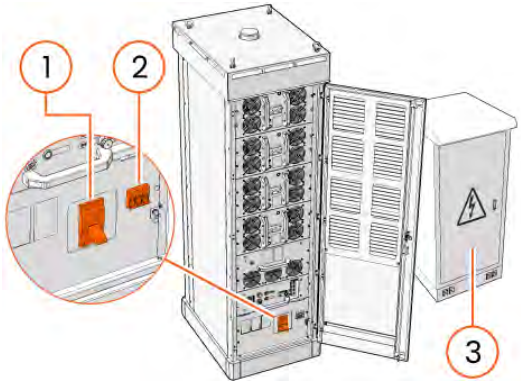
Needed for the task

The estimated labor time for the individual task is 60 min.

- Contact cleaner spray

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

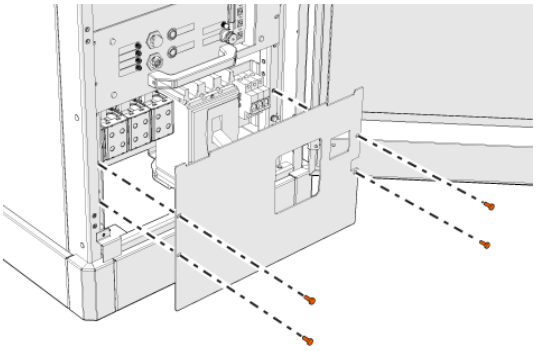
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

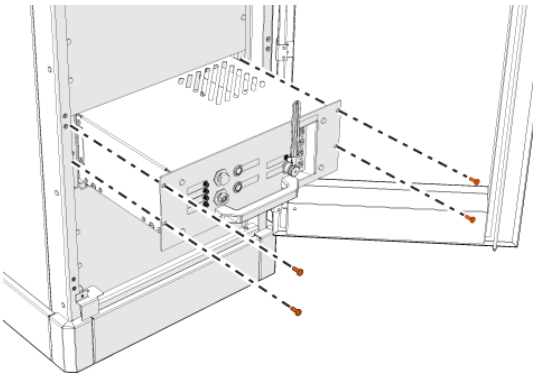
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the four T30 fixing screws of the main module's front panel.

Remove the front panel.

Protect the components that are installed back into the unit from dirt.



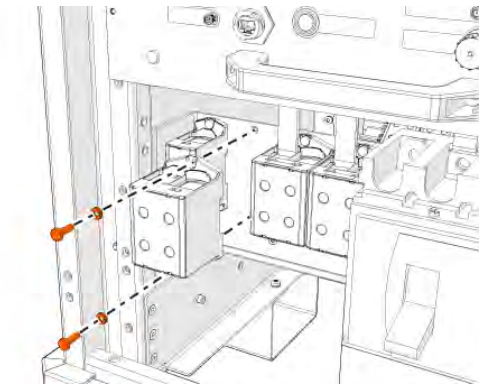
Remove the four T30 fixing screws on the edges of the module's front panel.

The module moves on its rollers on the rack. Use the handle to carefully pull out the module.

Protect the components that are installed back into the unit from dirt.

DANGER

Measure the power terminals to make sure that no voltage remains before you continue. Risk of death.

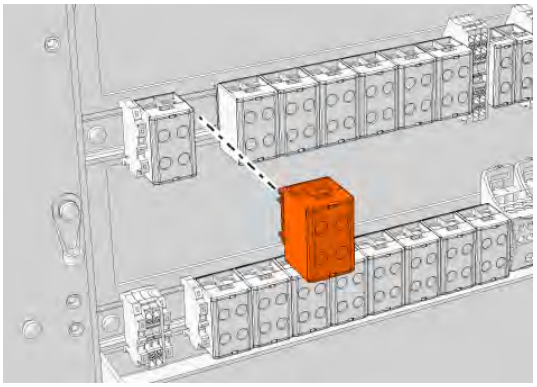


Before you detach wires, cables, or connectors, take a photograph of them.

Detach the AC supply power cables from the terminal block. The size of the cable fixing screws is H6.

Remove the T25 fixing screws of the terminal block. Replace the terminal block. Connect the cables again.

Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.

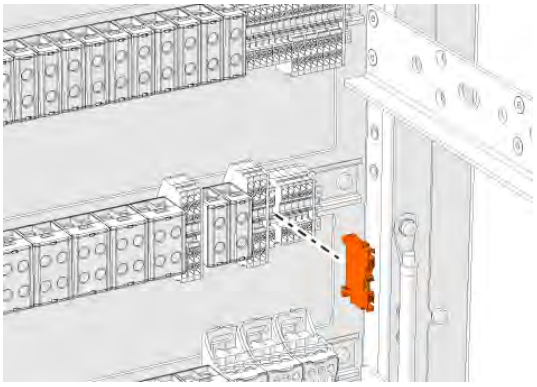


Before you detach wires, cables, or connectors, take a photograph of them.

Detach the DC output power cables from the terminal block. The size of the cable fixing screws is H6.

Replace the clip-type terminal block. Connect the cables again.

Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.



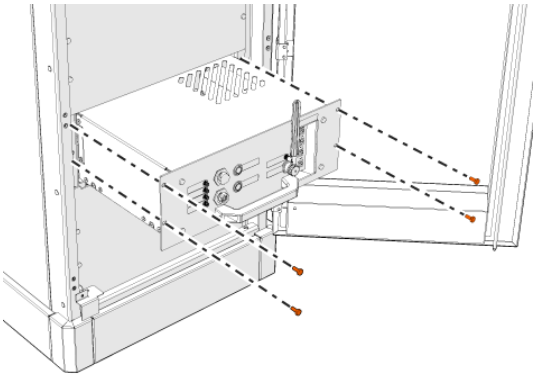
Before you detach wires, cables, or connectors, take a photograph of them.

Detach the control signal cable wires from the spring terminal block.

Replace the clip-type terminal block. Connect the control signal cable wires again.

Make sure that the module's connectors and connector pins are in good operating condition. When you push the module into the unit, be very careful not to damage the connector pins.

If necessary, clean the connectors with a vacuum cleaner. Spray the connectors with contact cleaner spray. If necessary, lightly apply electrical joint compound.

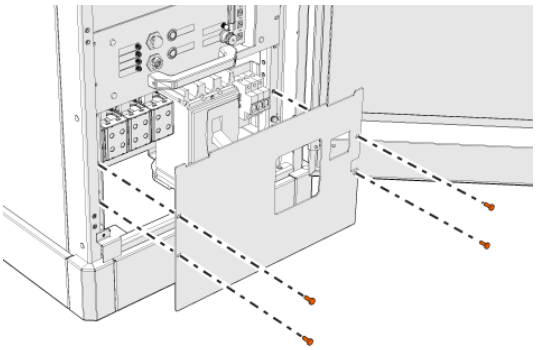


Carefully push the control module into the unit.

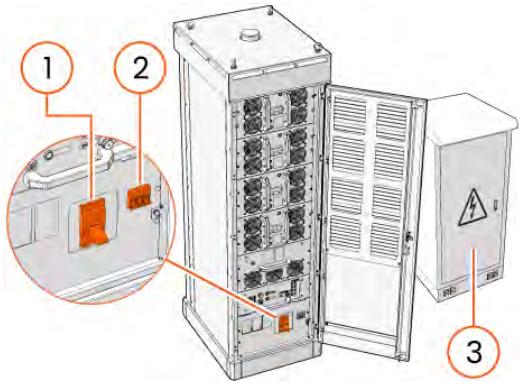
Install the fixing screws to the edges of the module's front panel.

Attach the cables or wires.

Make sure that all cables are correctly connected and locked.



Install the main module's front panel with its fixing screws.



Connect the AC power supply to the unit from the main supply point (3).

In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position.

Lock the door(s) of the unit.

5.4.13 Replacing the charging cable (Station Charger)

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Two persons are needed for this task.

Do not remove the packaging of the vehicle connector before installation. It protects the vehicle connector from damages.

For tasks related to the vehicle connector, read the vehicle connector manufacturer's instructions.

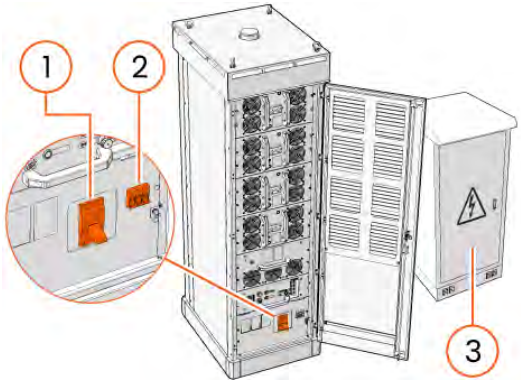
Needed for the task

The estimated labor time for the individual task is 60 min.

- Draw tape and lubricant
- Ratchet and socket 15 mm
- Adjustable wrench or equivalent for cable bushing (55–68 mm)
- Contact cleaner spray
- Polyurethane sealant (optional)

For tools, see *5.1 Required tools and equipment*.

Removing the charging cable



Unlock and open the door(s) of the charging power unit.

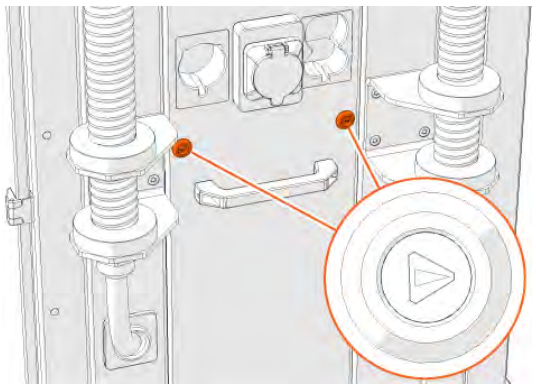
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

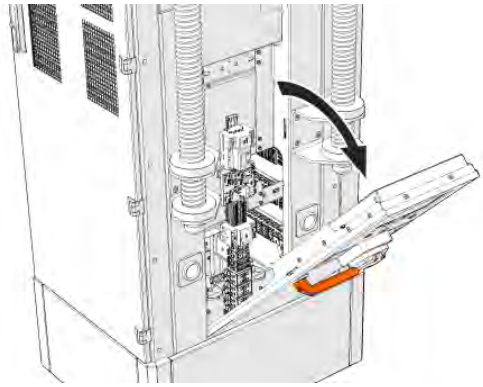
Complete the lockout-tagout (LOTO) procedure.

WARNING

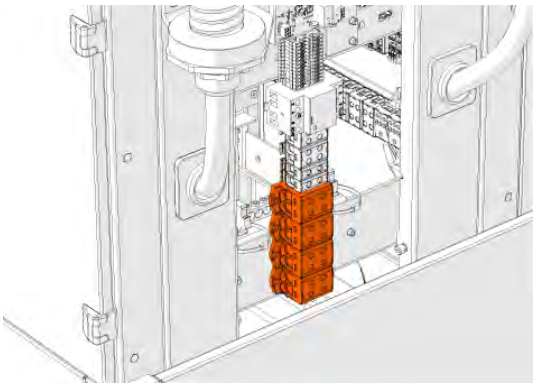
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Unlock the front panel with the triangle key.



Hold the handle and pull open the front panel.

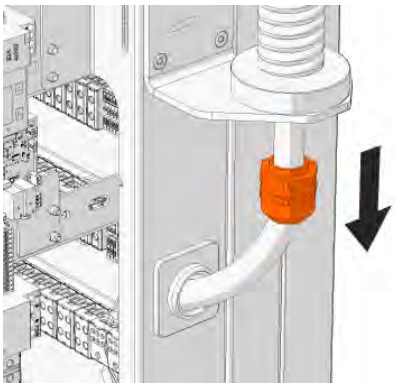


DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

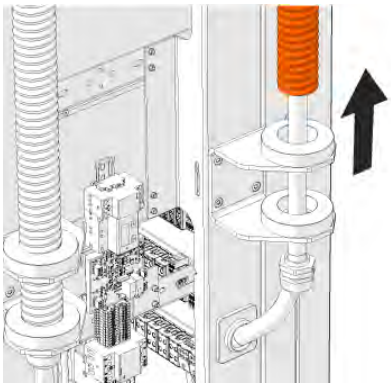
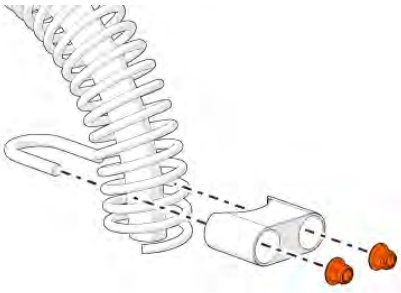
Before you detach wires, cables, or connectors, take a photograph of them.

Detach the charging cable wires from the terminals.

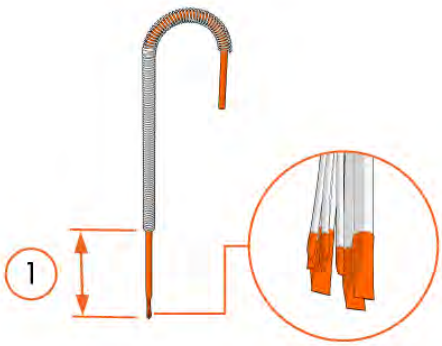


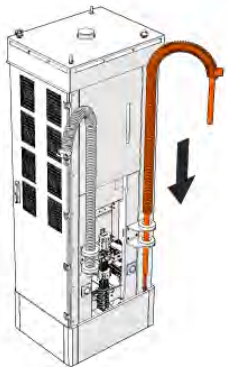
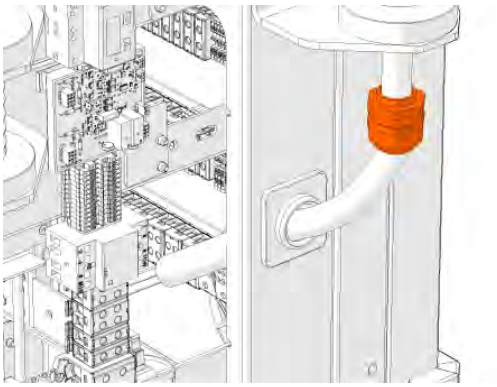
Loosen the cable bushing below the spring holder.

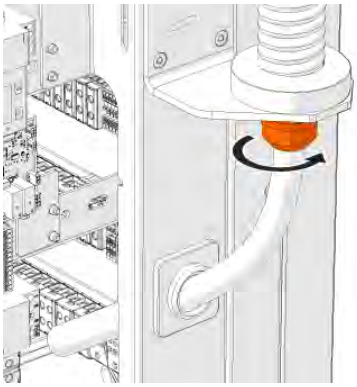
Depending on the charging cable, the size of the cable bushing is 55–68 mm.

	Pull the charging cable out of the rubber grommet. Remove the cable bushing and hose clamp and set them aside to be installed to the new charging cable. Lift the support spring and charging cable out of the spring holder.
	With the ratchet and 15 mm socket, remove the cable clamp from the end of the support spring. Pull the charging cable out of the support spring. The size of the cable clamp's nuts is M10.

Installing the charging cable

	Tape the wire ends of the charging cable to avoid fraying. Pull the charging cable through its support spring until approximately 400–600 mm (1) of the charging cable remains outside of the support spring. If necessary, use the draw tape and lubricant to pull the cable.

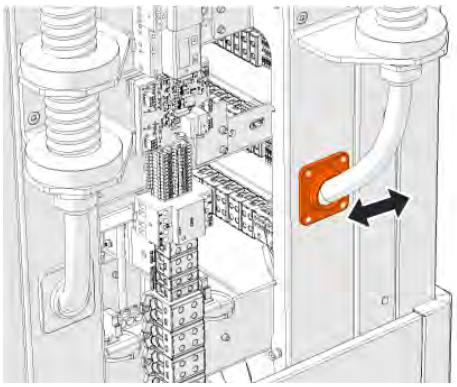
	To make the handling of the charging cable and support spring easier during installation, you can temporarily lock the charging cable inside its support spring. The size of the cable clamp's nuts is M10.
	Lift the support spring with the charging cable into the spring holder.
	First install the cable bushing and then the hose clamp on the charging cable. Route the charging cable inside the unit through the rubber grommet. Make sure that the part of the charging cable inside the unit has: • Approximately 50 mm of insulation • Approximately 350–550 mm of stripped wire



Make sure that the wires reach the terminals.

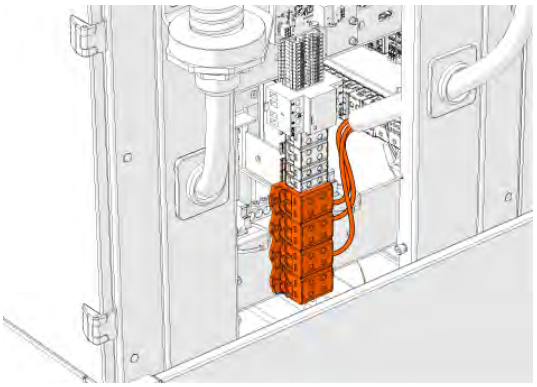
Tighten the cable bushing of the charging cable below the spring holder.

Depending on the charging cable, the size of the cable bushing is 55–68 mm.



Make sure that the rubber grommet's seal sets correctly on the charging cable.

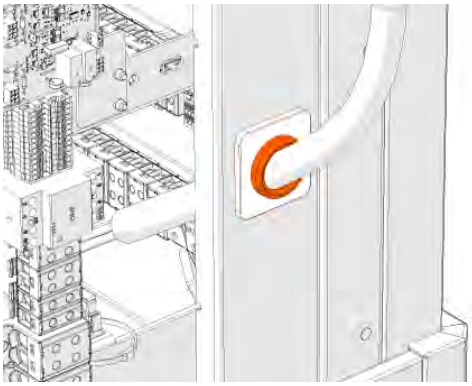
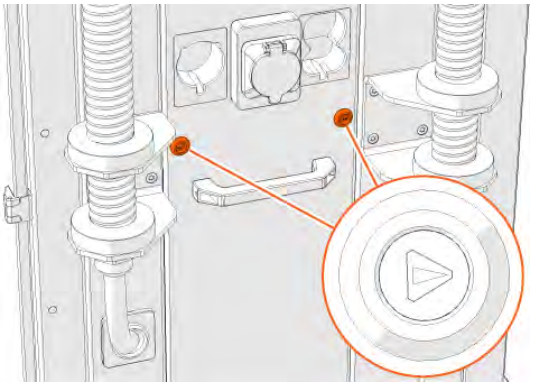
1. Push the charging cable slightly inside the unit so that the seal goes inside the unit.
2. Pull the charging cable slightly out so that the seal folds correctly on the charging cable on the outside of the unit. Tighten the seal in place with the hose clamp.

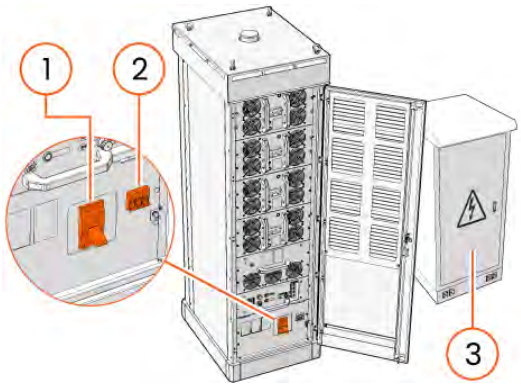


Connect the wires to the terminals.

Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.

For the control signal wire colors of different charging cables, see *8 Control signal wires of the charging cable*.

	With the ratchet and 15 mm socket, tighten the cable clamp to lock the charging cable in place inside its support spring. See *5.5.1.4 Locking the charging cable inside its support spring*. The size of the cable clamp's nuts is M10. Do not overtighten the cable clamp. Overtightening damages the charging cable.
	Examine the seal of the charging cable in the rubber grommet. If necessary, apply flexible polyurethane sealant to waterproof the opening.
	Lock the front panel with the triangle key.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.14 Replacing the vehicle connector holder (Station Charger)

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

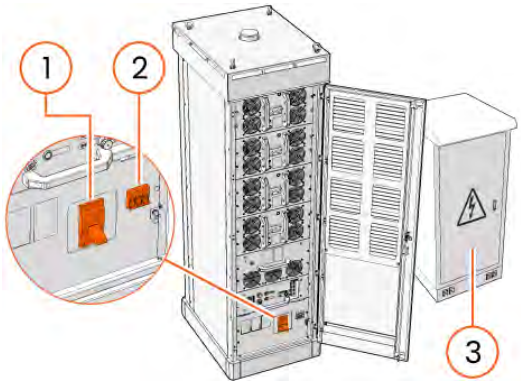
Needed for the task

The estimated labor time for the individual task is 15 min.

- Screwdriver T20, T40

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

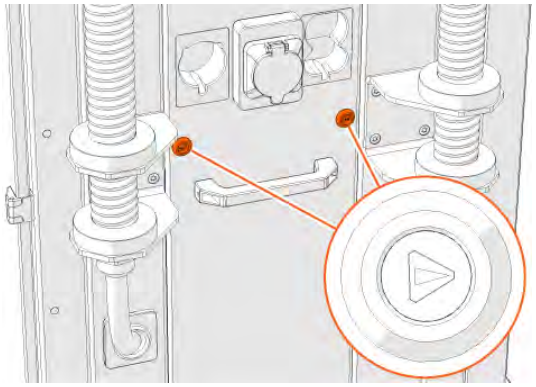
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

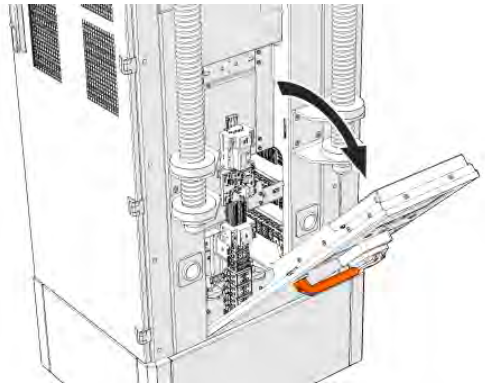
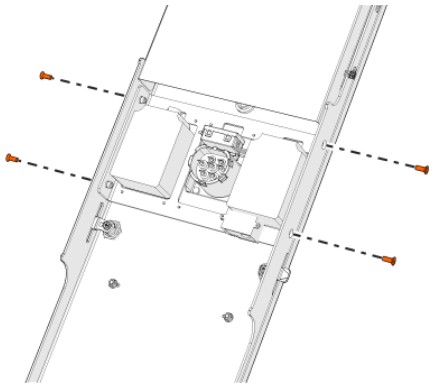
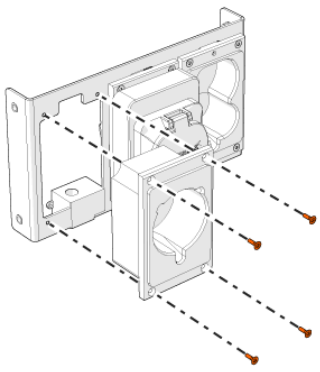
Complete the lockout-tagout (LOTO) procedure.

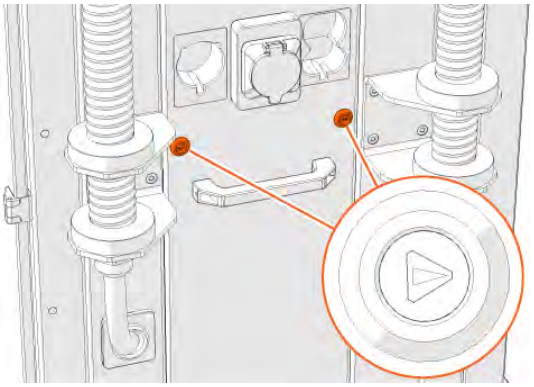
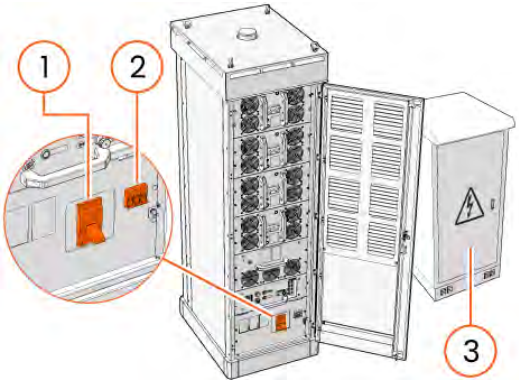
WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Unlock the front panel with the triangle key.

	Hold the handle and pull open the front panel.
	Remove the four T40 fixing screws and nuts of the vehicle connector holder frame. Remove the vehicle connector holder frame.
	Remove the four T20 screws of the vehicle connector holder.
	Assemble in the reverse order.

	Lock the front panel with the triangle key.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.15 Replacing the control board of the display screen (Station Charger)

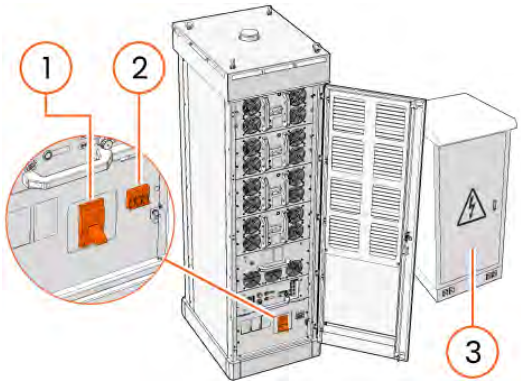
In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Needed for the task

The estimated labor time for the individual task is 30 min.

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

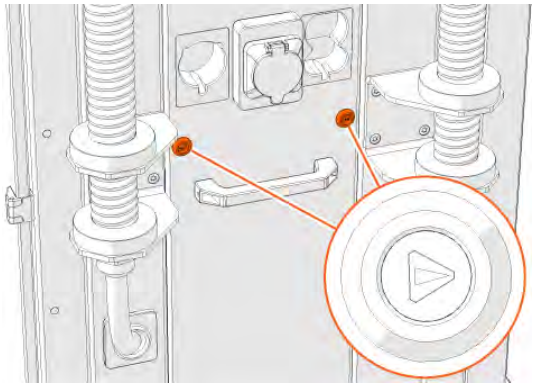
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

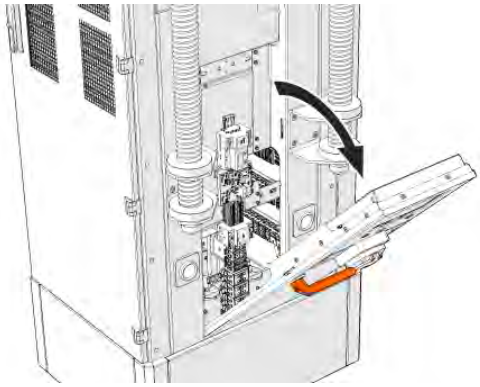
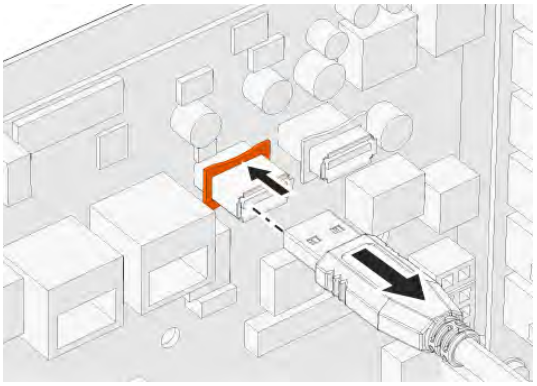
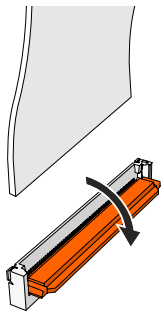
Complete the lockout-tagout (LOTO) procedure.

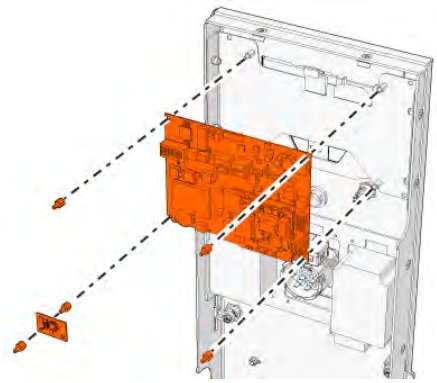
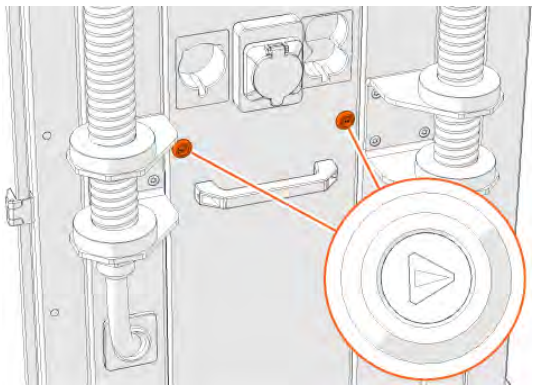
WARNING

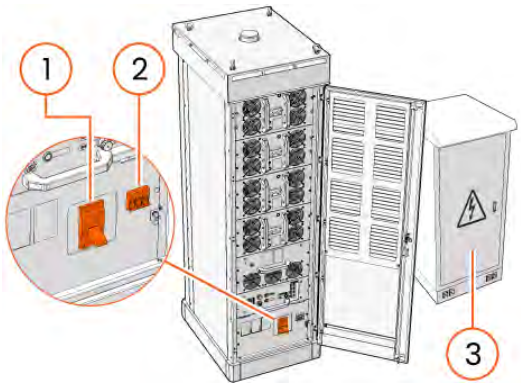
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Unlock the front panel with the triangle key.

	Hold the handle and pull open the front panel.
	Before you detach wires, cables, or connectors, take a photograph of them. Detach all connectors from the control board.
	If a USB cable is connected to the control board, unlock the USB connector before you detach the USB cable. Push the lock down to release the USB cable.
	Carefully unlock the locking lever of the flat cable connector before you detach the flat cable. The connector type is zero insertion force (ZIF).

	Remove the fixing nut of the serial number card with your hand. Remove the serial number card. Remove the four fixing nuts of the control board with your hand. Remove the control board.
	Install the new control board in the reverse order. Attach the serial number card again. Connect all cables to the control board. Make sure that all cables are correctly connected and locked. Make sure that the flat cables are correctly connected. Lock the connectors.
	Lock the front panel with the triangle key.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.16 Replacing the display screen (Station Charger)

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

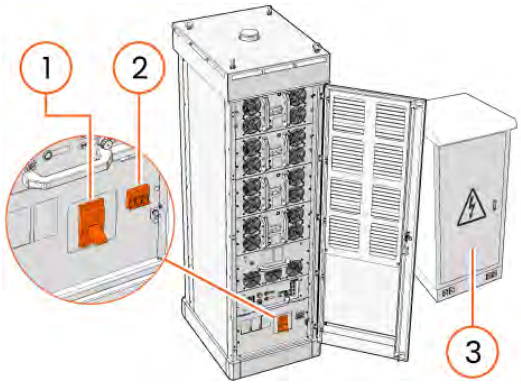
Needed for the task

The estimated labor time for the individual task is 30 min.

- Working surface protected with foam or fabric to avoid scratching the display screen
- Soft, nonlinting cloth

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

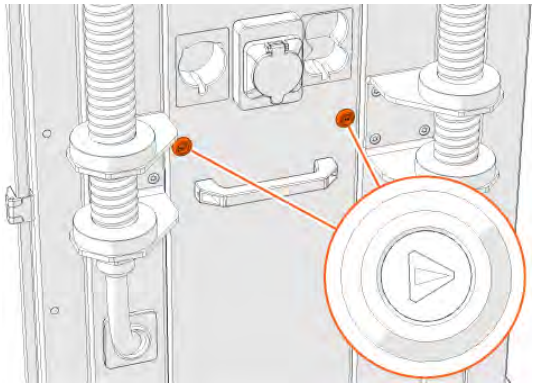
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

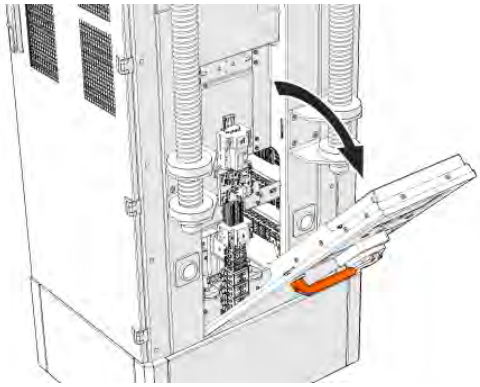
Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



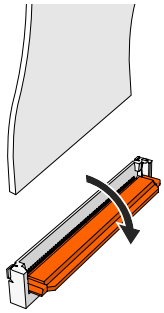
Unlock the front panel with the triangle key.



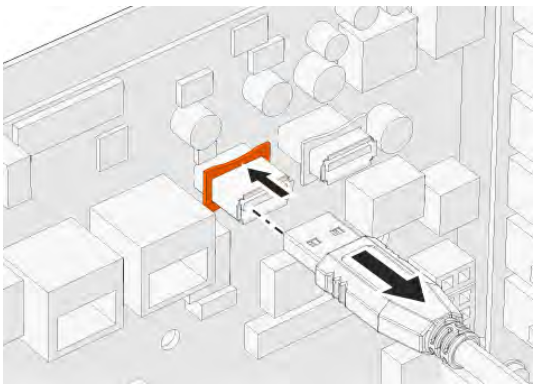
Hold the handle and pull open the front panel.

Before you detach wires, cables, or connectors, take a photograph of them.

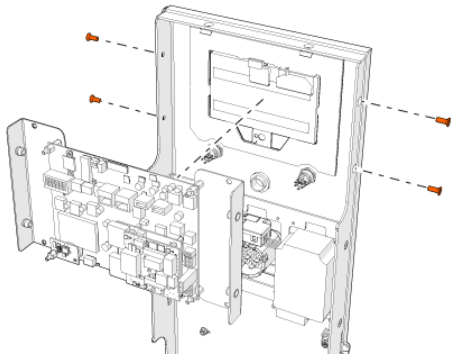
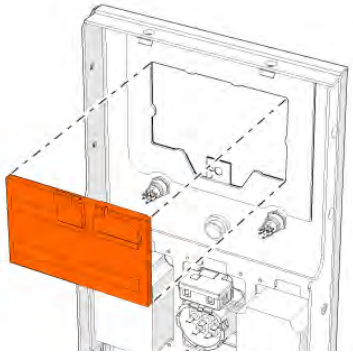
Detach all connectors from the control board.

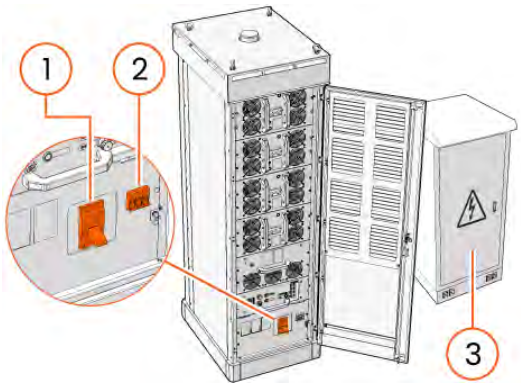


Carefully unlock the locking lever of the flat cable connector before you detach the flat cable. The connector type is zero insertion force (ZIF).



If a USB cable is connected to the control board, unlock the USB connector before you detach the USB cable. Push the lock down to release the USB cable.

	Remove the four T30 fixing screws and nuts of the control board assembly. Remove the control board assembly.
	Detach the old display screen from its holders. Replace the display screen. Make sure to remove the protective film. Be careful not to scratch the display screen. Make sure that there is no dirt or moisture between the display screen and the protective cover. Clean both surfaces with a soft, nonlinting cloth. Make sure that the flat cables are correctly connected. Lock the connectors.
	Assemble in the reverse order. Make sure that all cables are correctly connected and locked.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.17 Replacing the charging status indicator LED panel (Station Charger)

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

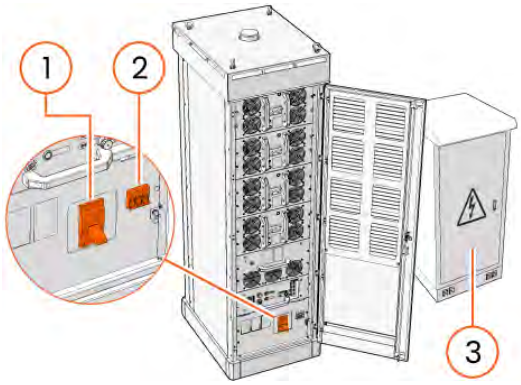
Needed for the task

The estimated labor time for the individual task is 30 min.

- Screwdriver T20, T30
- Contact cleaner spray
- Electrical contact lubricant

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

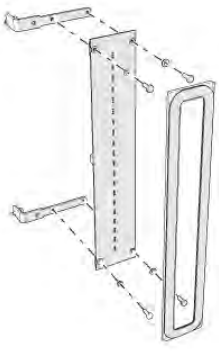
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

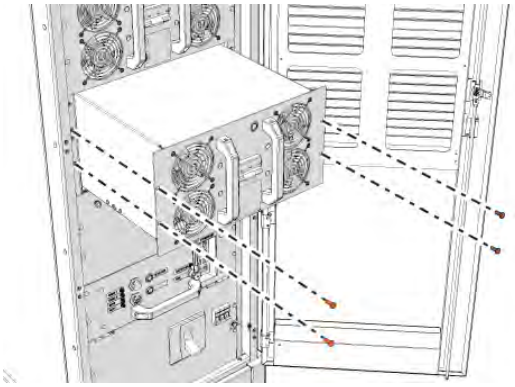


The LED panel consists of light-emitting diodes (LED) soldered to a printed circuit board (PCB).

The LED panel is attached to the unit frame and the LED cover.

Note the orientation of the LED panel. The parts are not symmetrical. Replace one LED panel at a time.

Remove as many power modules as necessary to make space for removing the LED panel.



Set the power module's circuit breakers in OFF position (down).

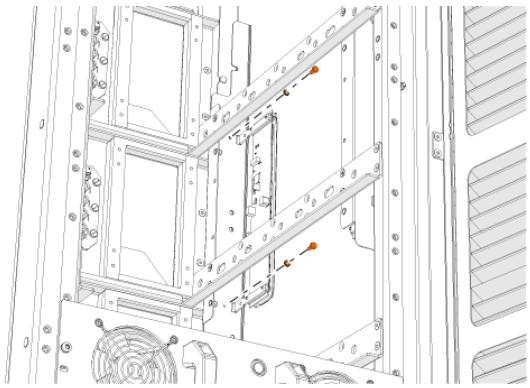
Remove the four T30 fixing screws on the edges of the module's front panel.

The module moves on its rollers on the rack. Use the handles to carefully pull out the module.

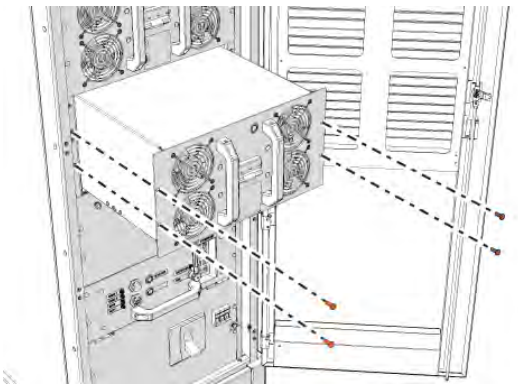
Protect the components that are installed back into the unit from dirt.

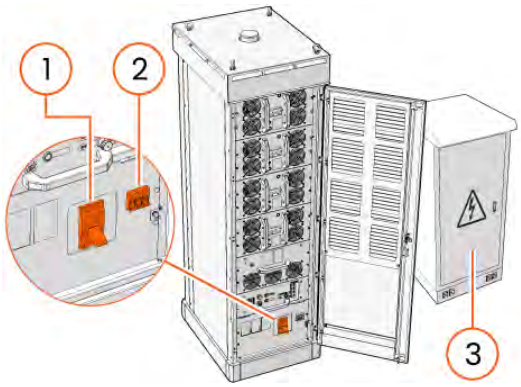
The power module has two guide pins at the back end.

Do not lift the power module from its guide pins.



Remove the two T20 fixing screws of the LED panel.

	Do not remove the LED cover. It is glued to the unit frame. Before you detach wires, cables, or connectors, take a photograph of them. Carefully turn the LED panel to remove it. Detach the wires from the LED panel.
	Examine the condition of the LED cover's gluing. If necessary, apply weatherproof glue to the seam.
	Assemble in the reverse order. Make sure that all wires are correctly connected.
	Do not lift the power module from its guide pins. Push the power module into the unit. Make sure that you do not damage the module. Install the fixing screws to the edges of the module's front panel. Set the module's circuit breakers in ON position (up).

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.18 Replacing the main switch and miniature circuit breaker (MCB) of the charging power unit

DANGER

Make sure that the units are correctly isolated when necessary during installation, service or maintenance work. Know and obey general and local safety regulations and procedures. Use adequate personal protection equipment (PPE).

CAUTION

Allow the charging power unit to cool before you remove modules. The internal surfaces can be hot during operation.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

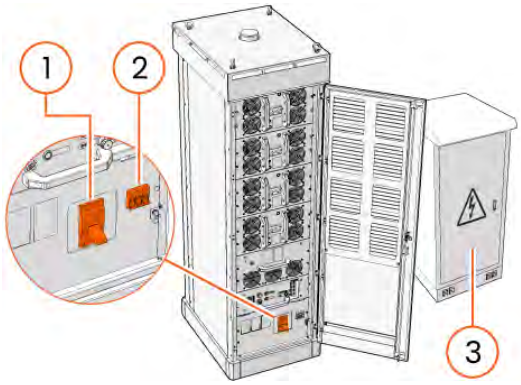
Needed for the task

The estimated labor time for the individual task is 40 min.

- Allen key M5, M12
- Contact cleaner spray

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

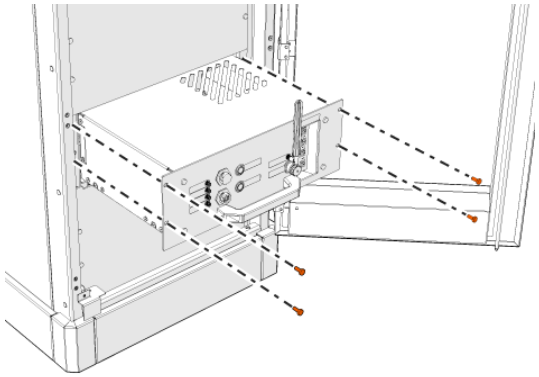
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

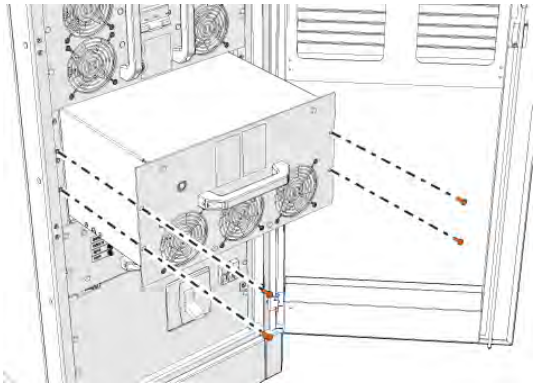
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the four T30 fixing screws on the edges of the module's front panel.

The module moves on its rollers on the rack. Use the handle to carefully pull out the module.

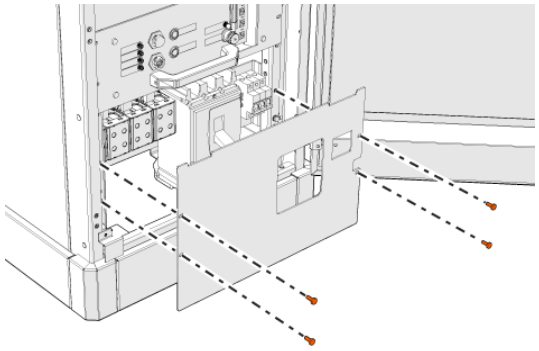
Protect the components that are installed back into the unit from dirt.



Remove the four T30 fixing screws on the edges of the power distribution module's front panel.

The module moves on its rollers on the rack. Use the handle to carefully pull out the module.

Protect the components that are installed back into the unit from dirt.



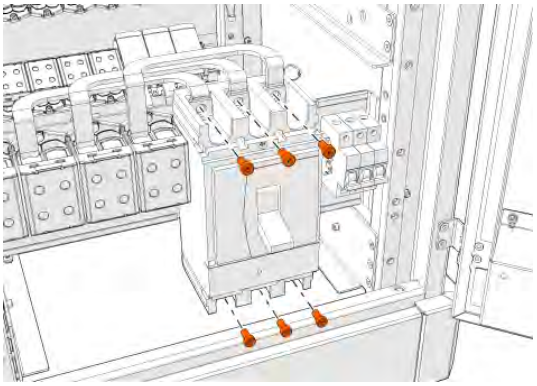
Remove the four T30 fixing screws of the main module's front panel.

Remove the front panel.

Protect the components that are installed back into the unit from dirt.

DANGER

Measure the power terminals to make sure that no voltage remains before you continue. Risk of death.

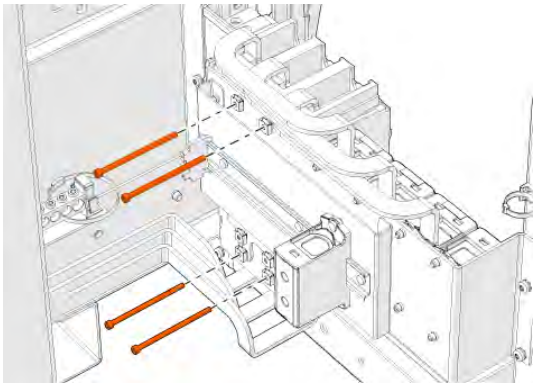


Replacing the main switch

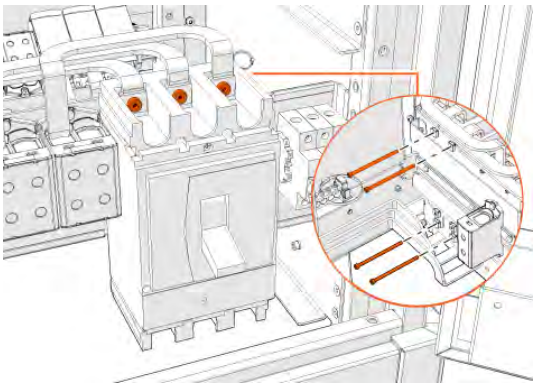
Remove the six M12 connection screws of the busbars on the main switch.

Detach the three busbars from above and the three busbars from below the main switch.

Make sure that you know how to connect each busbar to the correct terminal.



Remove the four M5 fixing screws of the main switch. Remove the main switch.



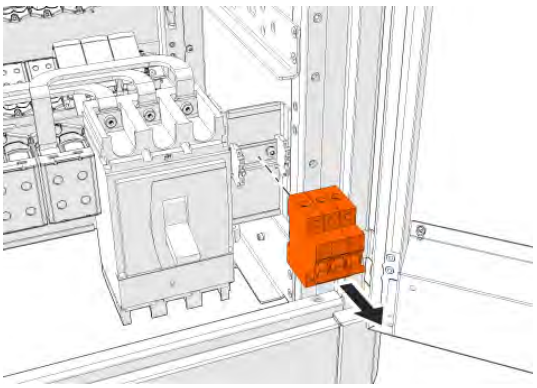
Install the new main switch with its fixing screws. Tightening torque 3 Nm.

Attach the busbars to the terminals. Tighten the M12 connection screws of the busbars. Tightening torque 50 Nm.

Make sure that you connect the busbars to the correct terminals.

DANGER

Measure the power terminals to make sure that no voltage remains before you continue. Risk of death.

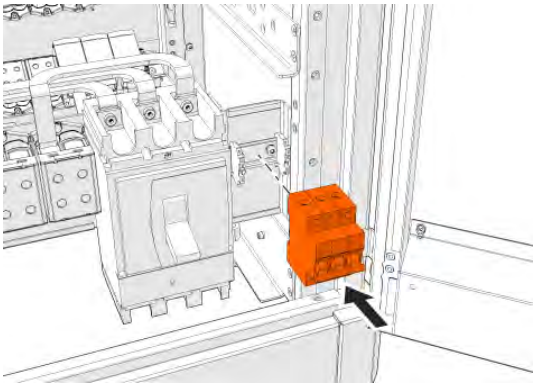


Replacing the miniature circuit breaker (MCB)

The clip-type miniature circuit breaker (MCB) is located next to the main switch.

Loosen the screws and detach the wires from the MCB. Remove the MCB.

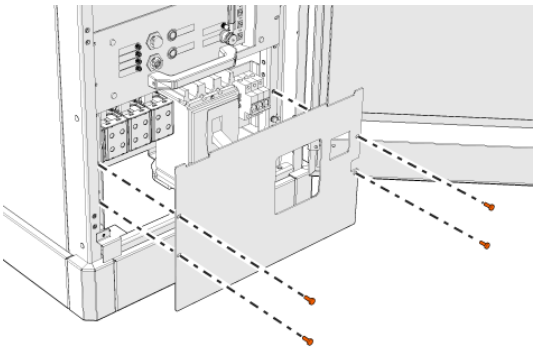
Before you detach wires, cables, or connectors, take a photograph of them.



Install the new MCB.

Attach the wires to the terminals. Tighten the screws. Tightening torque 2.5 Nm.

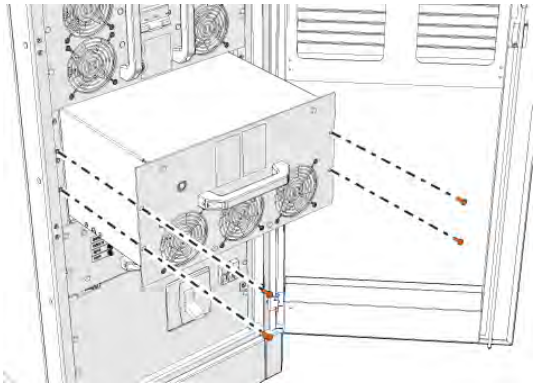
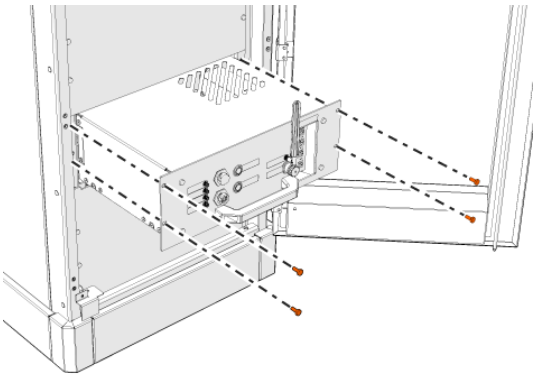
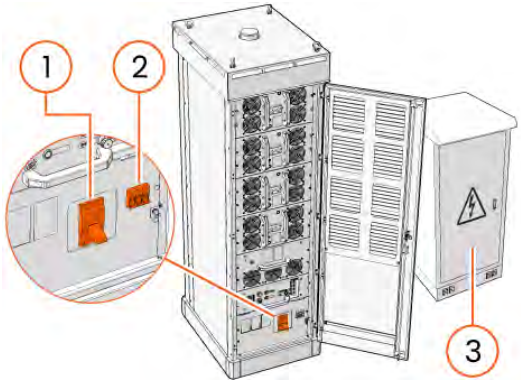
Make sure that all wires are correctly connected.



Install the main module's front panel with its fixing screws.

Make sure that the module's connectors and connector pins are in good operating condition. When you push the module into the unit, be very careful not to damage the connector pins.

If necessary, clean the connectors with a vacuum cleaner. Spray the connectors with contact cleaner spray. If necessary, lightly apply electrical joint compound.

	Push the power distribution module into the unit. Make sure that you do not damage the module. Install the fixing screws to the edges of the module's front panel.
	Carefully push the control module into the unit. Install the fixing screws to the edges of the module's front panel. Attach the cables or wires. Make sure that all cables are correctly connected and locked.
	When you have replaced the main switch, configure its settings. See *5.4.19 Configuring the main switch of the charging power unit*.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.4.19 Configuring the main switch of the charging power unit

DANGER

Make sure that the units are correctly isolated from the main power supply before you do this task. Know and obey general and local safety regulations and procedures. Use adequate personal protection equipment (PPE).

CAUTION

Make sure that selectivity requirements are fulfilled in accordance with local laws and regulations.

Configure the settings for the main switch of each cabinet on the site:

1. Set the unit's main switch and the miniature circuit breaker (MCB) to OFF position (down).
2. If the front panel of the mains module is in place, remove it.
3. Identify the manufacturer of the main switch and see the respective instructions:
    - *5.4.19.1 ABB circuit breaker*
    - *5.4.19.2 Chint circuit breaker*
    - *5.4.19.3 Schneider circuit breaker*
4. When you finish configuring the main switch, push the circuit breaker's test button and make sure that the unit trips.
5. Make sure that the rating of the supply side circuit breaker is higher than that of the cabinet's main switch.

5.4.19.1 ABB circuit breaker

Adjust the switches according to the number of power modules in the cabinet.

Use the appropriate factor to include the short circuit value in the selected settings.

Adjust the DIP switches carefully to avoid damaging them.

Select the correct values on the DIP switch panel marked *L* at the bottom of the circuit breaker.

Table 209. ABB circuit breaker (product code ABB 1SDH002011A1002_XT5S)

Number of power modules	Value	DIP switch setting (L)			
		0.04	0.08	0.16	0.32
4	368 A	ON	OFF	ON	ON
3	272 A	ON	ON	ON	OFF
2	192 A	OFF	ON	OFF	OFF
1	160 A	OFF	OFF	OFF	OFF

ON = up, OFF = down

5.4.19.2 Chint circuit breaker

- Adjust the switches according to the number of power modules in the cabinet.
- Use the appropriate factor to include the short circuit value in the selected settings.
- Adjust the DIP switches carefully to avoid damaging them.

Select the correct values on the DIP switch panel marked *Ir* at the bottom of the circuit breaker.

Table 211. Chint circuit breaker (product code NM8N-400QEN4003P)

Number of power modules	Value	DIP switch setting (Ir)		
		Left	Middle	Right
4	360 A	ON	OFF	ON
3	280 A	OFF	ON	ON
2	200 A	OFF	OFF	ON
1	160 A	OFF	OFF	OFF

ON = up, OFF = down

5.4.19.3 Schneider circuit breaker

- Adjust the switches according to the number of power modules in the cabinet.
- Use the appropriate factor to include the short circuit value in the selected settings.

Turn the rotary switch carefully with a flat screwdriver. Do not rotate the switch 360 degrees.

Select the correct values on the left-hand side rotary switch at the bottom of the circuit breaker. You should feel when the switch engages on the setting.

Table 213. Schneider circuit breaker (product code NLJF36400U31XTW)

Number of power modules	Rotary switch setting (left-hand side)
4	400 A
3	300 A
2	200 A
1	125 A

5.5 Satellite

5.5.1 Satellite Version 1

5.5.1.1 Examining the tightening torques of terminal blocks

WARNING

Loose cable terminal connections are dangerous. Risk of death, electric shock, and fire.

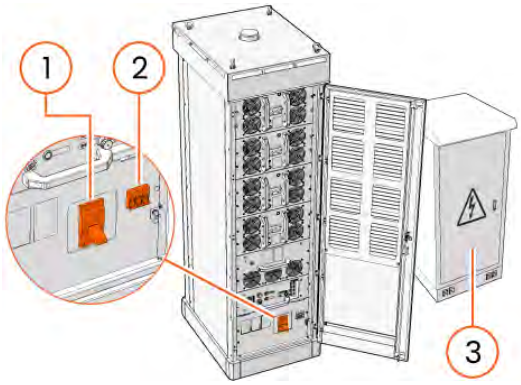
If the spring terminals are loose, replace them. Only screw terminals can be tightened.

Needed for the task

The estimated labor time for the individual task is 35 min.

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

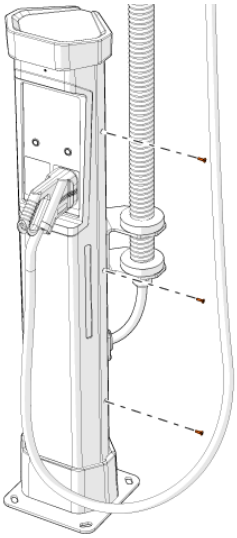
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

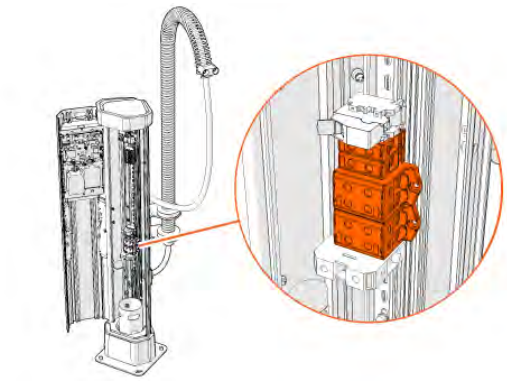
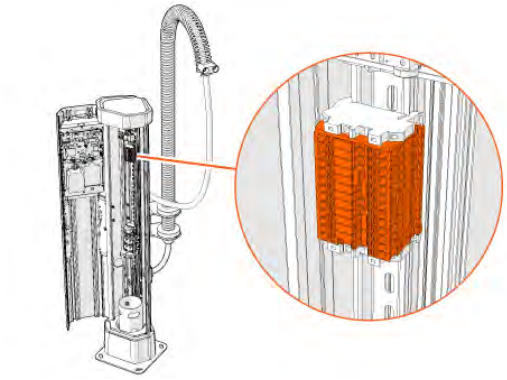


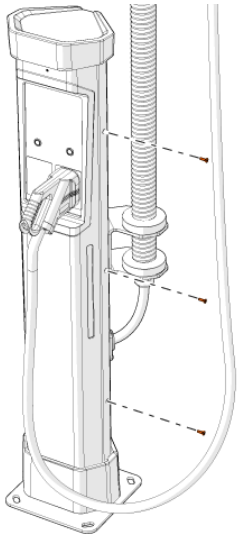
Remove the three security T30 screws. Open the front panel of the unit.

In older models, the size of the front panel's screws is H3.

DANGER

Measure the power terminals to make sure that no voltage remains before you continue. Risk of death.

	Use the torque wrench to inspect the tightening torques of the DC power terminal blocks. The size of the cable fixing screws is H6. Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.
	Inspect the tightness of the spring terminal blocks. If the connections are loose, replace the terminal block. See *5.5.1.2 Replacing a terminal block* .

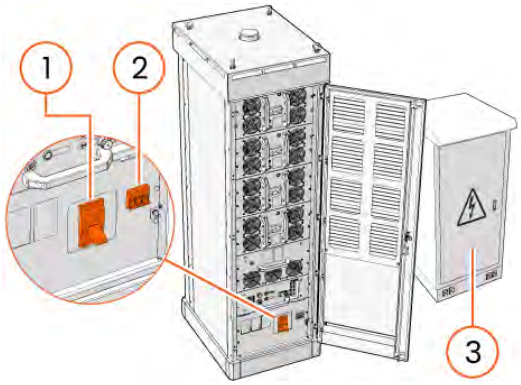


Close the front panel of the unit. Install the three security T30 screws.

In older models, the size of the front panel's screws is H3.

Make sure that no cables are caught between the front panel and the frame of the unit.

Make sure that no cables push against the LED panel on the front panel of the unit.



Connect the AC power supply to the unit from the main supply point (3).

In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position.

Lock the door(s) of the unit.

5.5.1.2 Replacing a terminal block

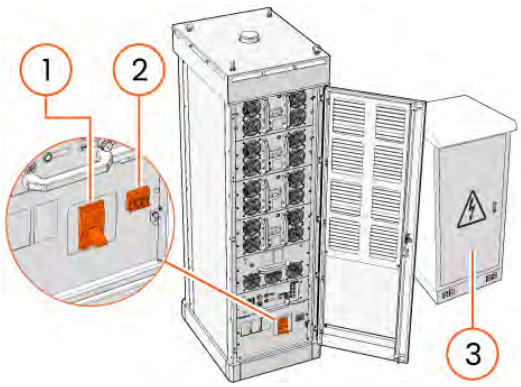
In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Needed for the task

The estimated labor time for the individual task is 35 min.

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

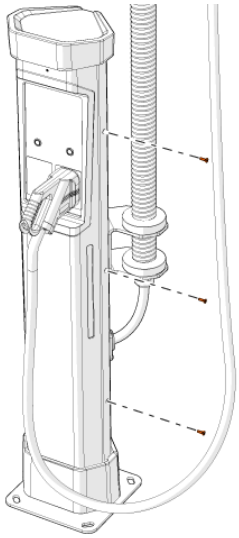
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

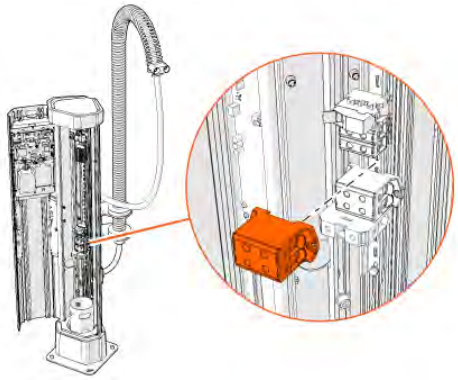


Remove the three security T30 screws. Open the front panel of the unit.

In older models, the size of the front panel's screws is H3.

DANGER

Measure the power terminals to make sure that no voltage remains before you continue. Risk of death.

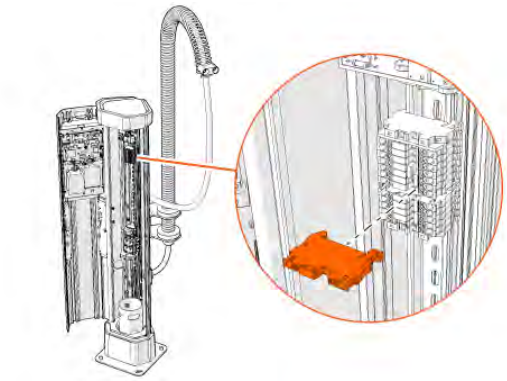


Before you detach wires, cables, or connectors, take a photograph of them.

Detach the DC power cables from the terminal block. The size of the cable fixing screws is H6.

Replace the clip-type terminal block. Connect the cables again.

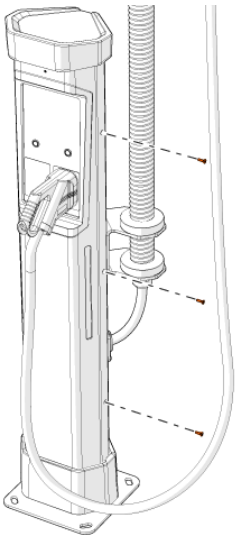
Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.



Before you detach wires, cables, or connectors, take a photograph of them.

Detach the control signal cable wires from the spring terminal block.

Replace the clip-type terminal block. Connect the control signal cable wires again.

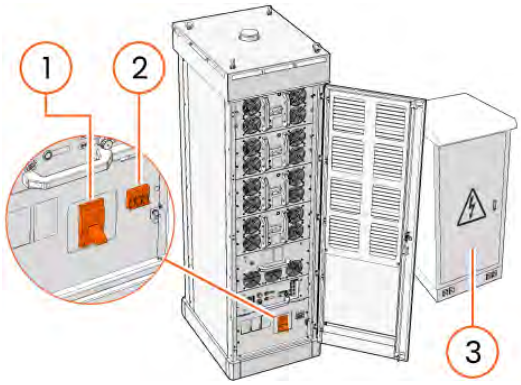


Close the front panel of the unit. Install the three security T30 screws.

In older models, the size of the front panel's screws is H3.

Make sure that no cables are caught between the front panel and the frame of the unit.

Make sure that no cables push against the LED panel on the front panel of the unit.



Connect the AC power supply to the unit from the main supply point (3).

In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position.

Lock the door(s) of the unit.

5.5.1.3 Replacing the charging cable

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Two persons are needed for this task.

Do not remove the packaging of the vehicle connector before installation. It protects the vehicle connector from damages.

For tasks related to the vehicle connector, read the vehicle connector manufacturer's instructions.

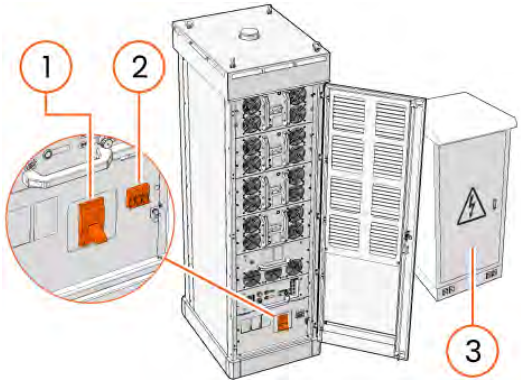
Needed for the task

The estimated labor time for the individual task is 60 min.

- Draw tape and lubricant
- Ratchet and socket 15 mm
- Adjustable wrench or equivalent for cable bushing (55–68 mm)
- Polyurethane sealant (optional)

For tools, see *5.1 Required tools and equipment*.

Removing the charging cable



Unlock and open the door(s) of the charging power unit.

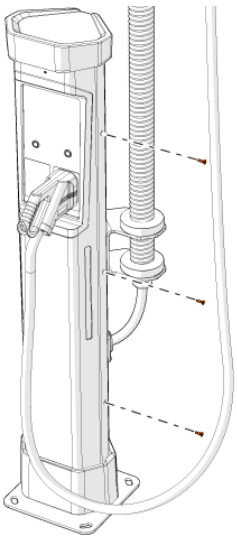
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

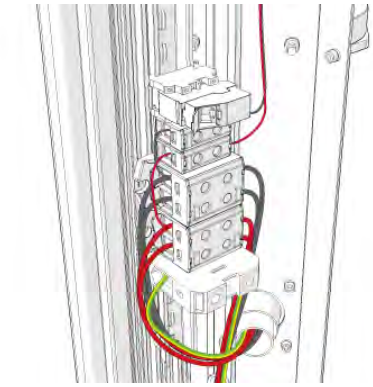
WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the three security T30 screws. Open the front panel of the unit.

In older models, the size of the front panel's screws is H3.

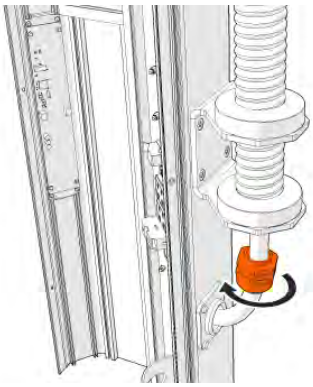


DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

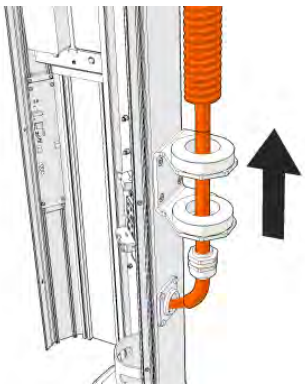
Before you detach wires, cables, or connectors, take a photograph of them.

Detach the charging cable wires from the terminals.



Loosen the cable bushing below the spring holder.

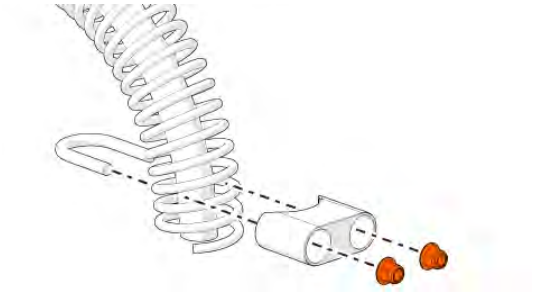
Depending on the charging cable, the size of the cable bushing is 55–68 mm.



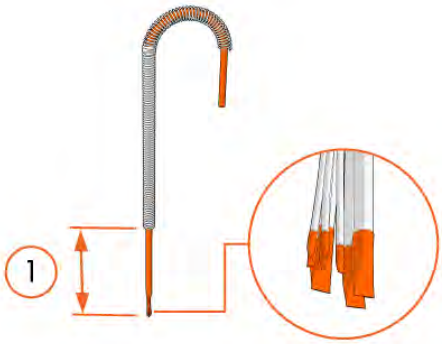
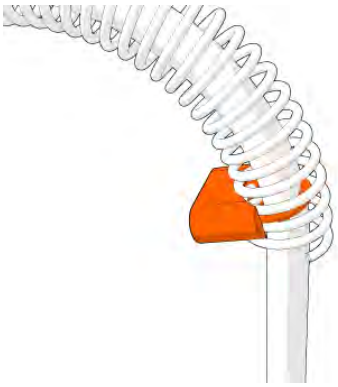
Pull the charging cable out of the rubber grommet.

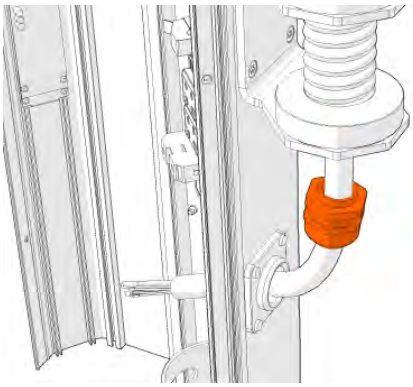
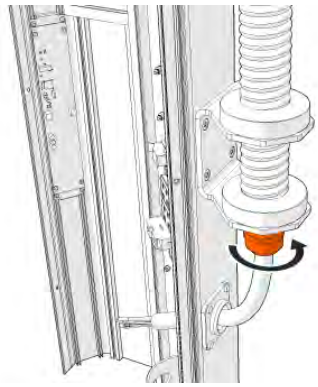
Remove the cable bushing and hose clamp and set them aside to be installed to the new charging cable.

Lift the support spring and charging cable out of the spring holder.

	With the ratchet and 15 mm socket, remove the cable clamp from the end of the support spring. Pull the charging cable out of the support spring. The size of the cable clamp's nuts is M10.

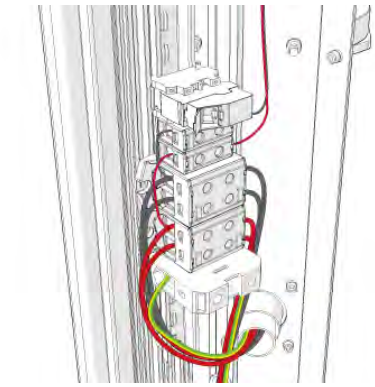
Installing the charging cable

	Tape the wire ends of the charging cable to avoid fraying. Pull the charging cable through its support spring until approximately 400–600 mm (1) of the charging cable remains outside of the support spring. If necessary, use the draw tape and lubricant to pull the cable.
	To make the handling of the charging cable and support spring easier during installation, you can temporarily lock the charging cable inside its support spring. The size of the cable clamp's nuts is M10.

	Lift the support spring with the charging cable into the spring holder.
	First install the cable bushing and then the hose clamp on the charging cable. Route the charging cable inside the unit through the rubber grommet. Make sure that the part of the charging cable inside the unit has: • Approximately 50 mm of insulation • Approximately 350–550 mm of stripped wire
	Make sure that the wires reach the terminals. Tighten the cable bushing of the charging cable below the spring holder. Depending on the charging cable, the size of the cable bushing is 55–68 mm.

Make sure that the rubber grommet's seal sets correctly on the charging cable.

1. Push the charging cable slightly inside the unit so that the seal goes inside the unit.
2. Pull the charging cable slightly out so that the seal folds correctly on the charging cable on the outside of the unit. Tighten the seal in place with the hose clamp.



Connect the wires to the terminals.

Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.

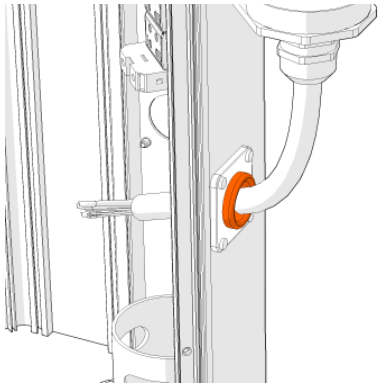
For the control signal wire colors of different charging cables, see *8 Control signal wires of the charging cable*.

With the ratchet and 15 mm socket, tighten the cable clamp to lock the charging cable in place inside its support spring.

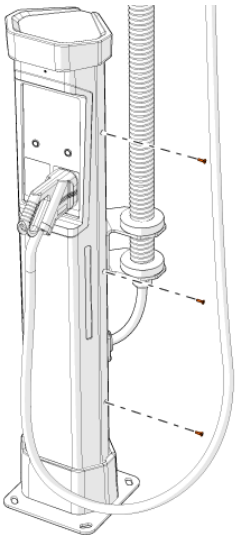
See *5.5.1.4 Locking the charging cable inside its support spring*.

The size of the cable clamp's nuts is M10.

Do not overtighten the cable clamp. Overtightening damages the charging cable.



Examine the seal of the charging cable in the rubber grommet. If necessary, apply flexible polyurethane sealant to waterproof the opening.

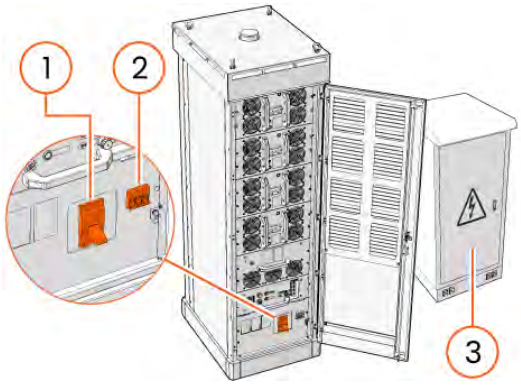


Close the front panel of the unit. Install the three security T30 screws.

In older models, the size of the front panel's screws is H3.

Make sure that no cables are caught between the front panel and the frame of the unit.

Make sure that no cables push against the LED panel on the front panel of the unit.



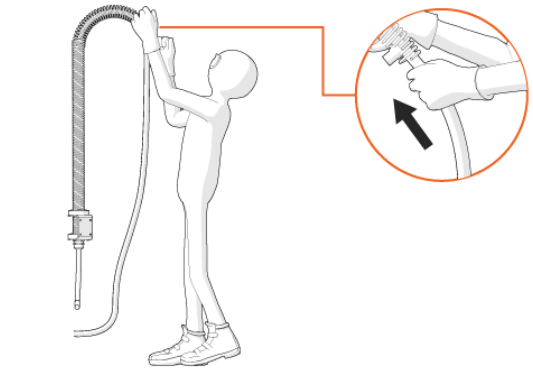
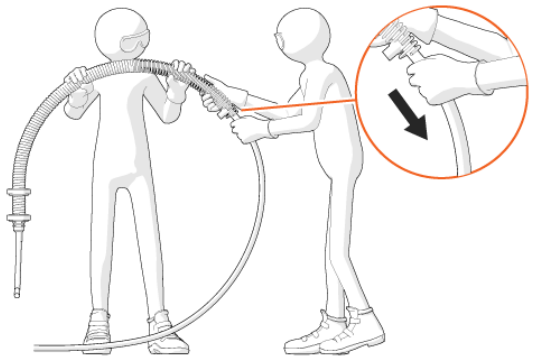
Connect the AC power supply to the unit from the main supply point (3).

In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position.

Lock the door(s) of the unit.

5.5.1.4 Locking the charging cable inside its support spring

Use method A or method B to lock the charging cable in place inside its support spring.

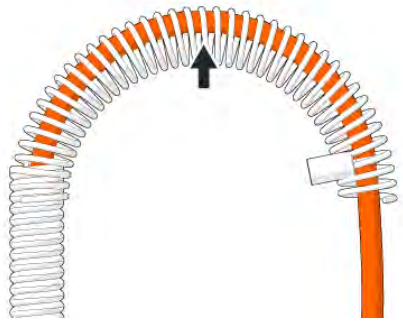
	**Method A** Make sure that the cable bushing below the spring holder is correctly tightened. Push the charging cable into its support spring so that it touches the top side of the support spring.
	**Method B** Make sure that the cable bushing below the spring holder is correctly tightened. Have another person hold the support spring in an extended position. Pull the charging cable from the support spring.

Tighten the cable clamp to lock the charging cable in place inside its support spring.

The size of the cable clamp's nuts is M10.

Have the cable clamp's locking part face toward the inside bend of the charging cable to avoid it hitting the vehicle during charging.

Do not overtighten the cable clamp. Overtightening damages the charging cable.



Make sure that the charging cable is in contact with the top part of its support spring when it is not in use.

This protects the charging cable from chafing against its support spring or the cable gland when it is extended.

5.5.1.5 Replacing the control board of the display screen

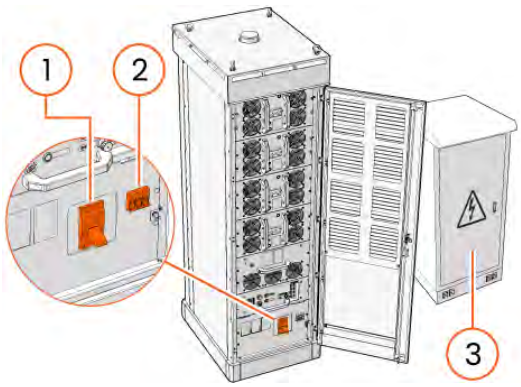
In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Needed for the task

The estimated labor time for the individual task is 30 min.

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

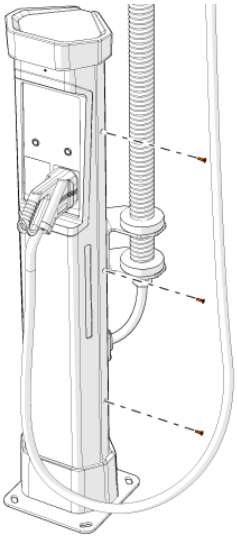
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

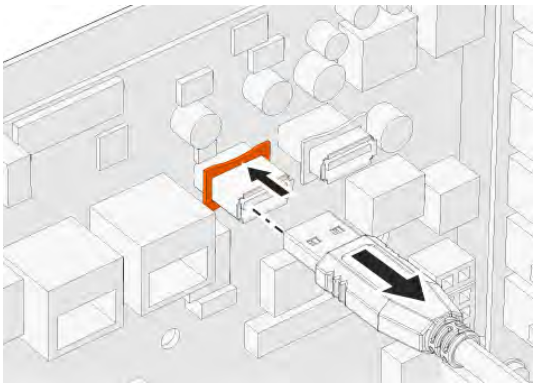
WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

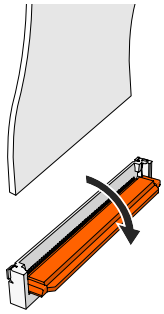


Remove the three security T30 screws. Open the front panel of the unit.

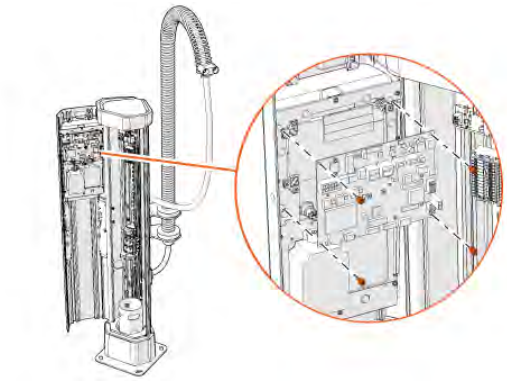
In older models, the size of the front panel's screws is H3.



If a USB cable is connected to the control board, unlock the USB connector before you detach the USB cable. Push the lock down to release the USB cable.



Carefully unlock the locking lever of the flat cable connector before you detach the flat cable. The connector type is zero insertion force (ZIF).



Remove the four fixing nuts of the control board with your hand. Remove the control board.

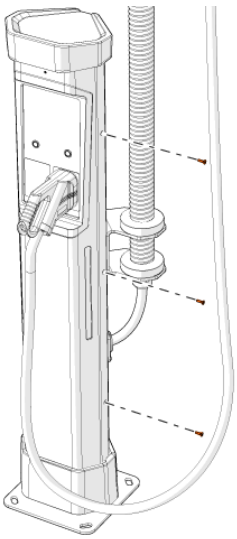
The serial number card is attached to the cables with a zip tie. If you replace cables, make sure to attach the serial number card again.

Install the new control board. Attach the serial number card again.

Connect all cables to the control board.

Make sure that all cables are correctly connected and locked.

Make sure that the flat cables are correctly connected. Lock the connectors.

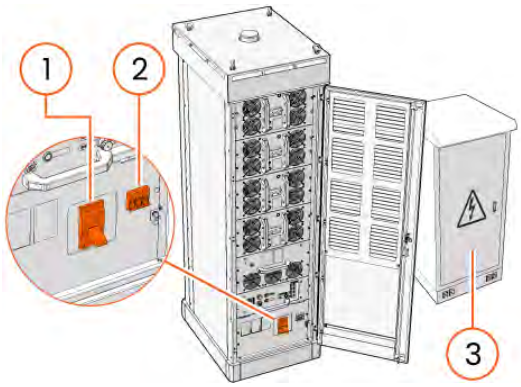


Close the front panel of the unit. Install the three security T30 screws.

In older models, the size of the front panel's screws is H3.

Make sure that no cables are caught between the front panel and the frame of the unit.

Make sure that no cables push against the LED panel on the front panel of the unit.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.1.6 Replacing the display screen

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

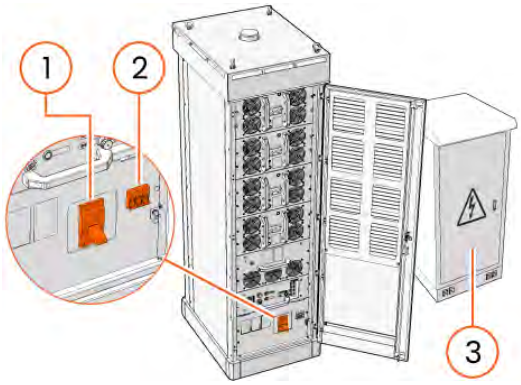
Needed for the task

The estimated labor time for the individual task is 30 min.

- Working surface protected with foam or fabric to avoid scratching the display screen
- Screwdriver T20
- Soft, nonlinting cloth

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

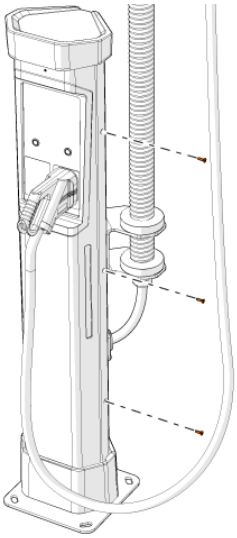
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

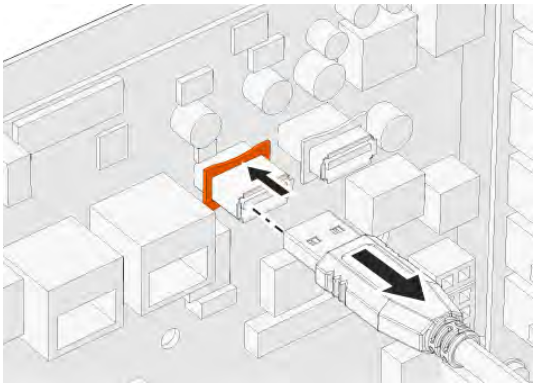
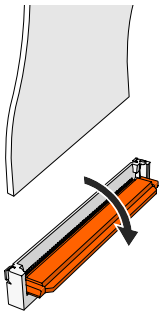
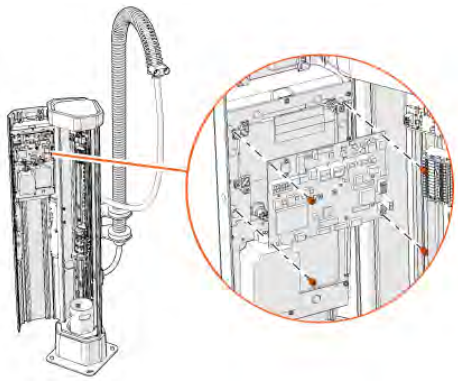
WARNING

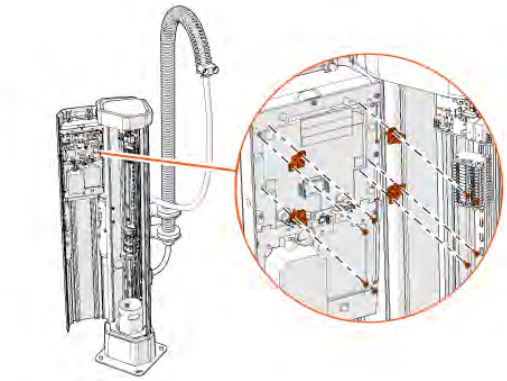
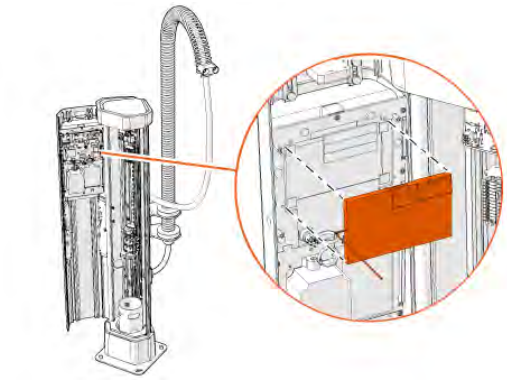
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

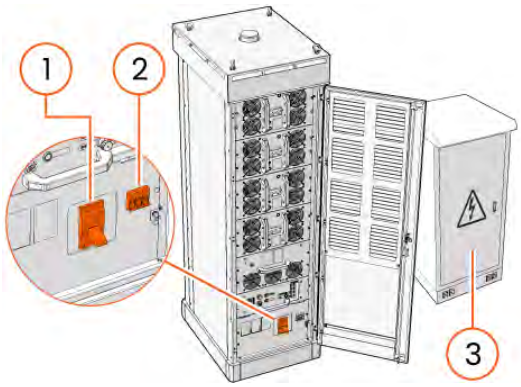


Remove the three security T30 screws. Open the front panel of the unit.

In older models, the size of the front panel's screws is H3.

	If a USB cable is connected to the control board, unlock the USB connector before you detach the USB cable. Push the lock down to release the USB cable.
	Carefully unlock the locking lever of the flat cable connector before you detach the flat cable. The connector type is zero insertion force (ZIF).
	Remove the four fixing nuts of the control board with your hand. Remove the control board. The serial number card is attached to the cables with a zip tie. If you replace cables, make sure to attach the serial number card again.

	Remove the two T20 fixing screws of each display holder. Remove the four display holders.
	Replace the display screen. Make sure to remove the protective film. Be careful not to scratch the display screen. Make sure that there is no dirt or moisture between the display screen and the protective cover. Clean both surfaces with a soft, nonlinting cloth. Make sure that the flat cables are correctly connected. Lock the connectors.
	Assemble in the reverse order. Make sure that all cables are correctly connected and locked.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.1.7 Replacing the charging status indicator LED panel

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

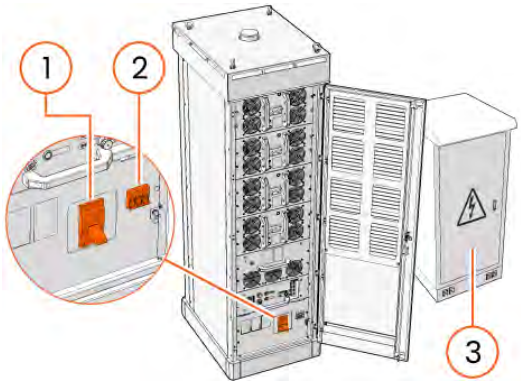
Needed for the task

The estimated labor time for the individual task is 20 min.

- Screwdriver T20

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

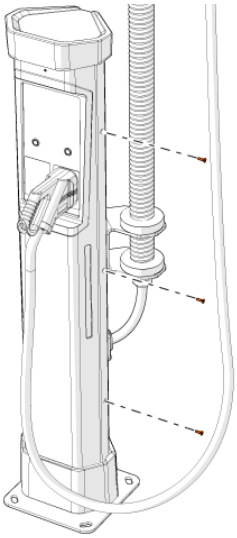
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

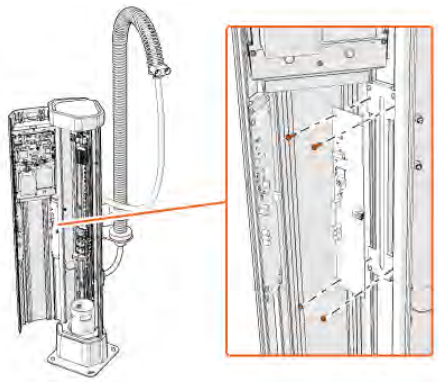
WARNING

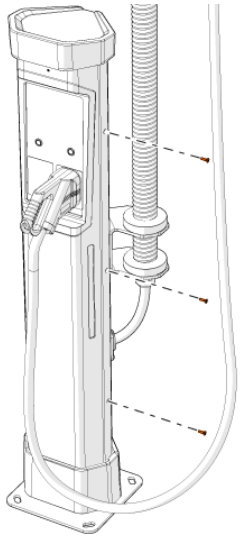
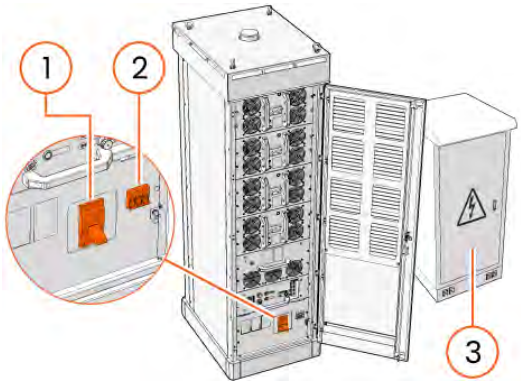
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the three security T30 screws. Open the front panel of the unit.

In older models, the size of the front panel's screws is H3.

	The LED panel consists of light-emitting diodes (LED) soldered to a printed circuit board (PCB). The LED panel is attached to the unit frame and the LED cover. Note the orientation of the LED panel. The parts are not symmetrical. Replace one LED panel at a time.
	Do not remove the LED cover. It is glued to the unit frame. Before you detach wires, cables, or connectors, take a photograph of them. Remove the four T20 fixing screws of the LED panel. Carefully remove the LED panel. Detach the wires from the LED panel.
	Examine the condition of the LED cover's gluing. If necessary, apply weatherproof glue to the seam.
	Assemble in the reverse order. Make sure that all wires are correctly connected.

	Close the front panel of the unit. Install the three security T30 screws. In older models, the size of the front panel's screws is H3. Make sure that no cables are caught between the front panel and the frame of the unit. Make sure that no cables push against the LED panel on the front panel of the unit.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.2 Satellite Version 2

5.5.2.1 Examining the tightening torques of terminal blocks

WARNING

Loose cable terminal connections are dangerous. Risk of death, electric shock, and fire.

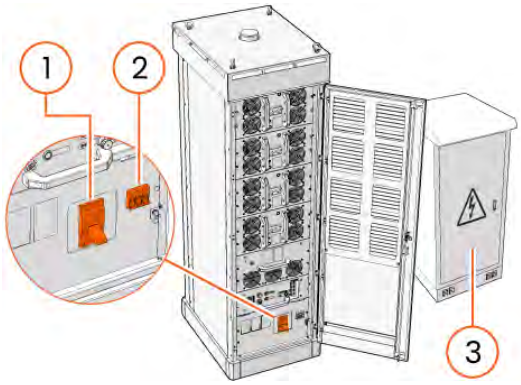
If the spring terminals are loose, replace them. Only screw terminals can be tightened.

Needed for the task

The estimated labor time for the individual task is 35 min.

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

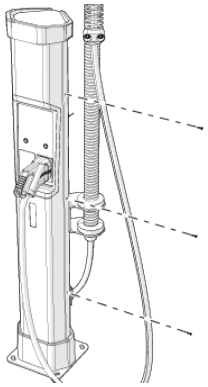
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

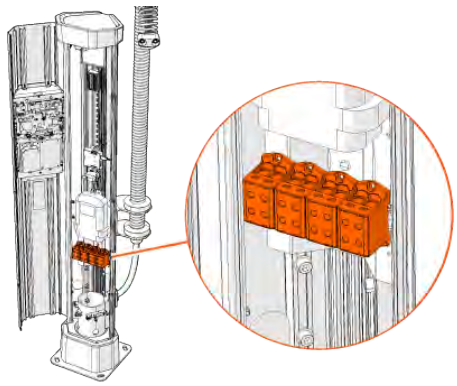
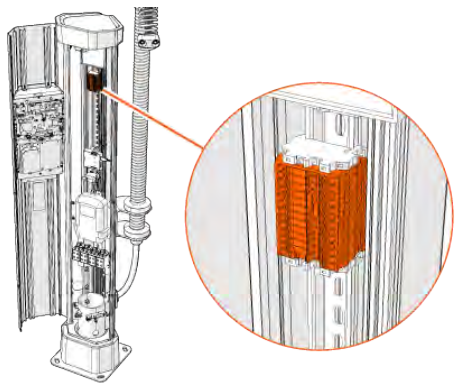
WARNING

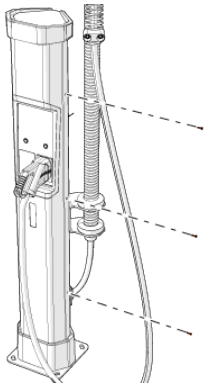
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

	Remove the three security T30 screws. Open the front panel of the unit. In older models, the size of the front panel's screws is H3.

DANGER

Measure the power terminals to make sure that no voltage remains before you continue. Risk of death.

	Use the torque wrench to inspect the tightening torques of the DC power terminal blocks. The size of the cable fixing screws is H6. Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.
	Inspect the tightness of the spring terminal blocks. If the connections are loose, replace the terminal block. See *5.5.2.2 Replacing a terminal block* .

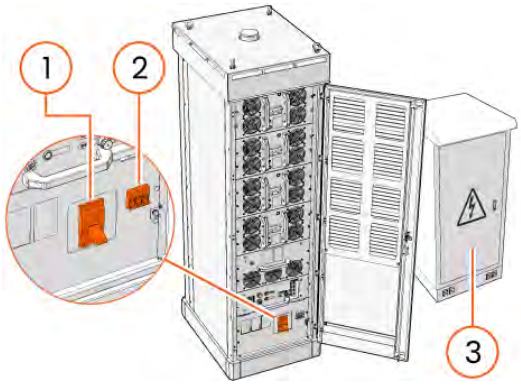


Close the front panel of the unit. Install the three security T30 screws.

In older models, the size of the front panel's screws is H3.

Make sure that no cables are caught between the front panel and the frame of the unit.

Make sure that no cables push against the LED panel on the front panel of the unit.



Connect the AC power supply to the unit from the main supply point (3).

In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position.

Lock the door(s) of the unit.

5.5.2.2 Replacing a terminal block

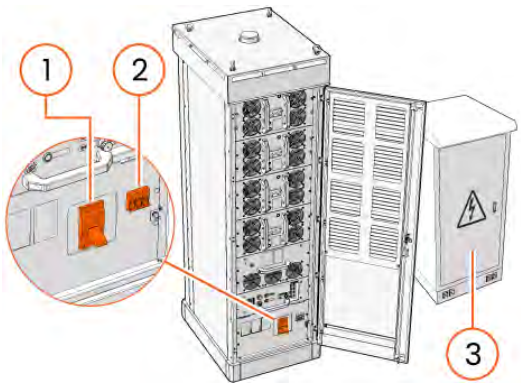
In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Needed for the task

The estimated labor time for the individual task is 35 min.

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

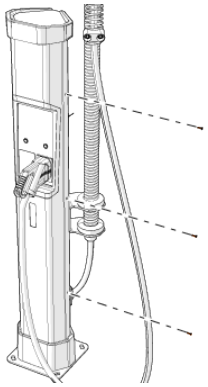
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

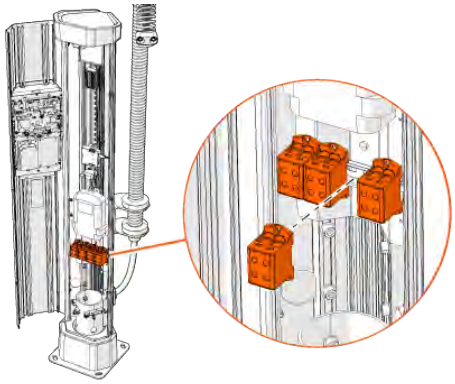


Remove the three security T30 screws. Open the front panel of the unit.

In older models, the size of the front panel's screws is H3.

DANGER

Measure the power terminals to make sure that no voltage remains before you continue. Risk of death.

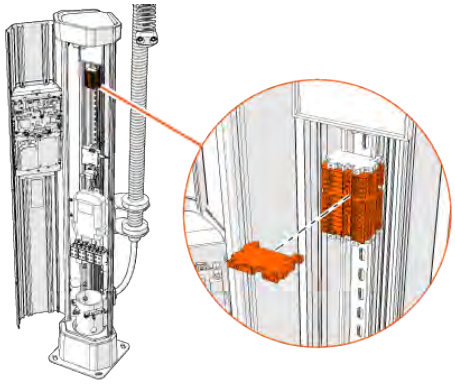


Before you detach wires, cables, or connectors, take a photograph of them.

Detach the DC power cables from the terminal block. The size of the cable fixing screws is H6.

Replace the clip-type terminal block. Connect the cables again.

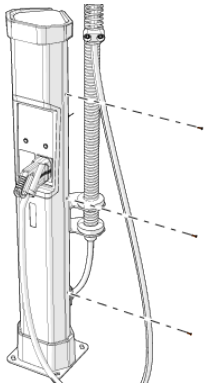
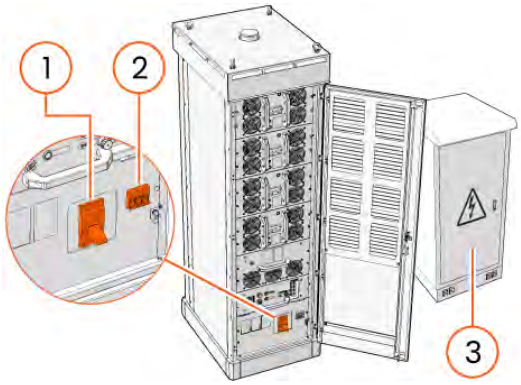
Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.



Before you detach wires, cables, or connectors, take a photograph of them.

Detach the control signal cable wires from the spring terminal block.

Replace the clip-type terminal block. Connect the control signal cable wires again.

	Close the front panel of the unit. Install the three security T30 screws. In older models, the size of the front panel's screws is H3. Make sure that no cables are caught between the front panel and the frame of the unit. Make sure that no cables push against the LED panel on the front panel of the unit.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3 Liquid Cooled Satellite

5.5.3.1 Examining the tightening torques of terminal blocks

WARNING

Loose cable terminal connections are dangerous. Risk of death, electric shock, and fire.

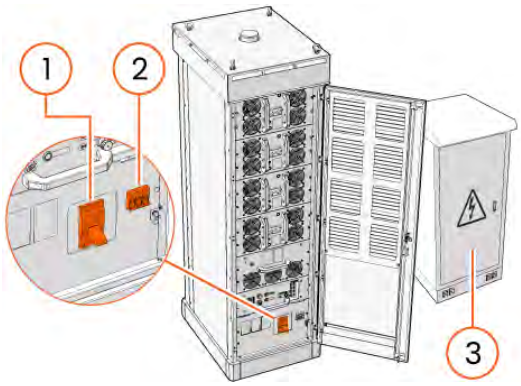
If the spring terminals are loose, replace them. Only screw terminals can be tightened.

Needed for the task

The estimated labor time for the individual task is 35 min.

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

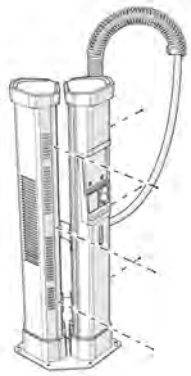
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



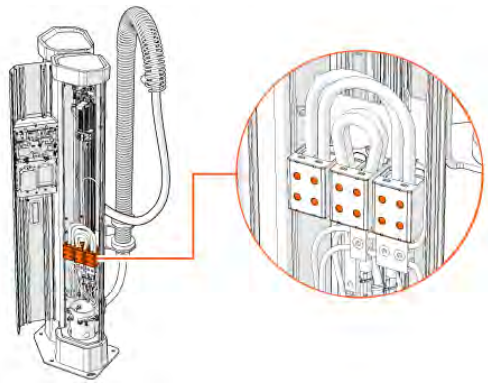
Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

DANGER

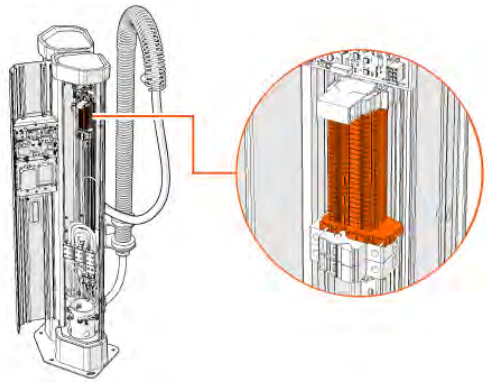
Measure the power terminals to make sure that no voltage remains before you continue. Risk of death.



Use the torque wrench to inspect the tightening torques of the DC power terminal blocks.

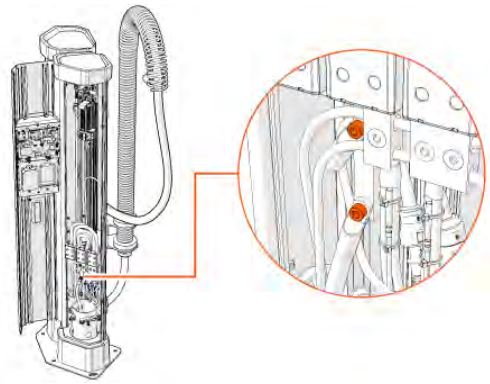
The size of the cable fixing screws is H6.

Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.



Inspect the tightness of the spring terminal blocks.

If the connections are loose, replace the terminal block. See *5.5.3.2 Replacing a terminal block* .

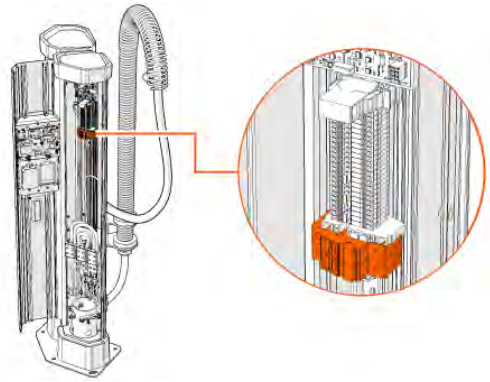


Inspect the tightness of the cable lugs.

Tighten each screw terminal to the correct torque as necessary.

- 28 Nm

The tightening torque is also marked on the terminal block.

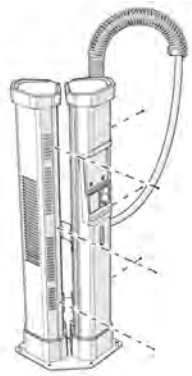


Inspect the tightess of the charging voltage measurement fuse block.

Tighten each screw terminal to the correct torque as necessary.

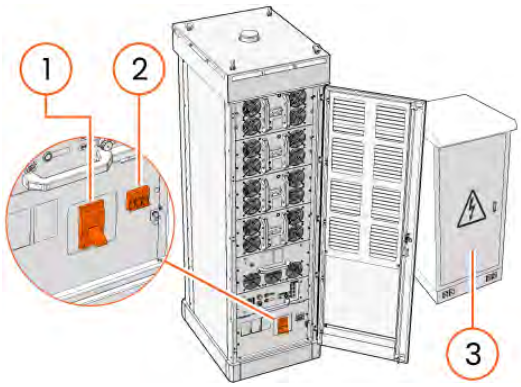
- 1 x 0.75...25mm^2: 2.0...2.5 Nm
- 2 x 0.75...10 mm^2: 2.0...2.5 Nm

The tightening torque is also marked on the terminal block.



Close the front panel of the unit. Install the three security T30 screws to each frame.

Make sure that no cables are caught between the front panel and the frame of the unit.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3.2 Replacing a terminal block

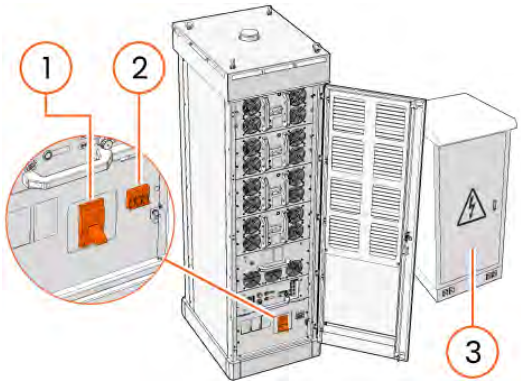
In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Needed for the task

The estimated labor time for the individual task is 35 min.

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

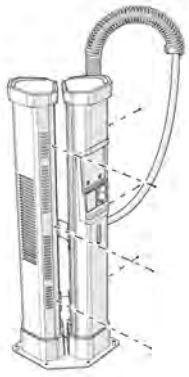
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



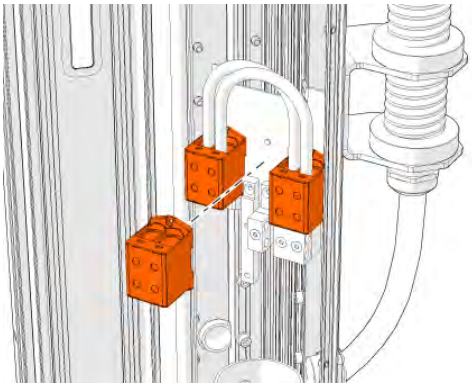
Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

DANGER

Measure the power terminals to make sure that no voltage remains before you continue. Risk of death.

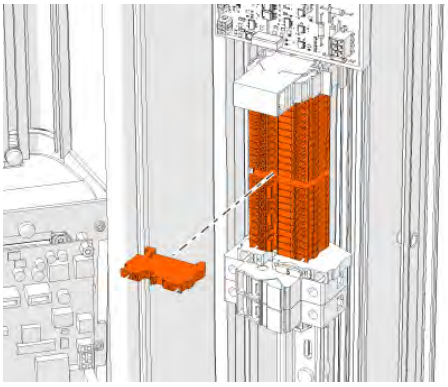


Before you detach wires, cables, or connectors, take a photograph of them.

Detach the DC power cables from the terminal block. The size of the cable fixing screws is H6.

Replace the clip-type terminal block. Connect the cables again.

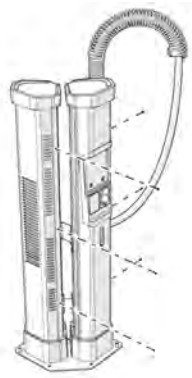
Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.



Before you detach wires, cables, or connectors, take a photograph of them.

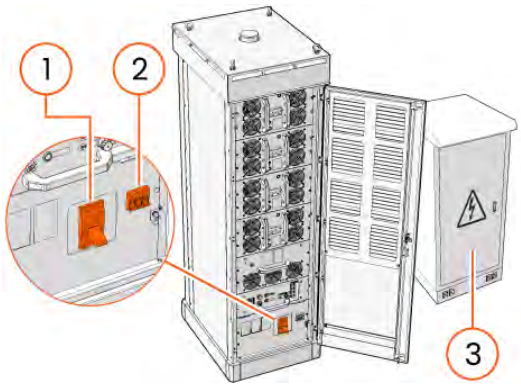
Detach the control signal cable wires from the spring terminal block.

Replace the clip-type terminal block. Connect the control signal cable wires again.



Close the front panel of the unit. Install the three security T30 screws to each frame.

Make sure that no cables are caught between the front panel and the frame of the unit.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3.3 Replacing the charging cable

WARNING

The coolant is harmful to the environment. Do not spill the coolant. Dispose of the coolant according to local laws and regulations.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

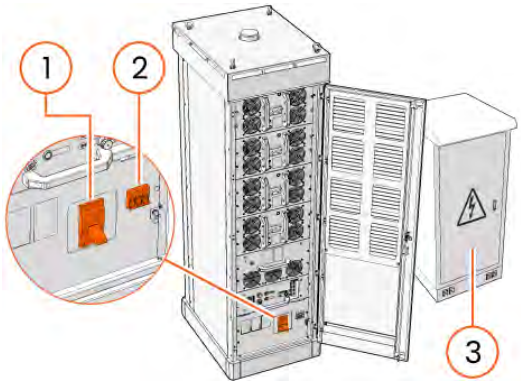
Needed for the task

The estimated labor time for the individual task is 120 min.

- Open-end wrench
- Cable ties
- Replacement Glysofor N (2.5 L)
- Replacement charging cable, SP9901597

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

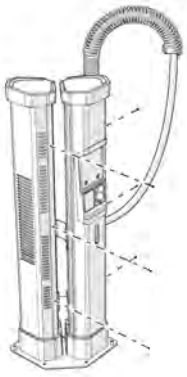
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

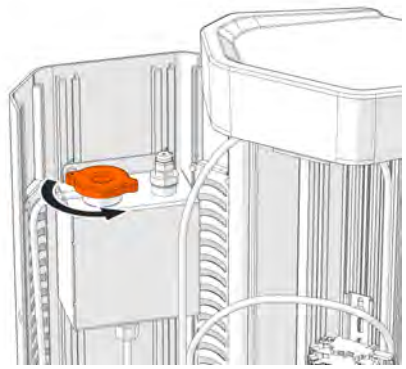
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

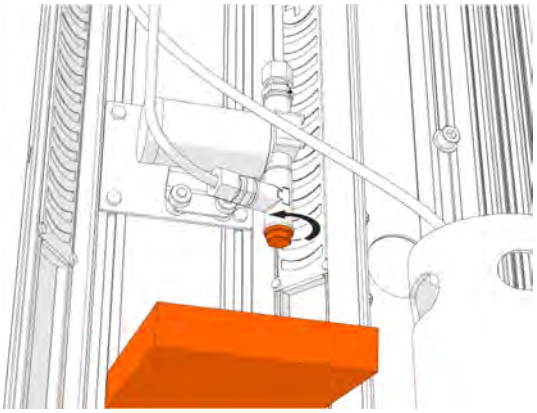


WARNING

If used recently, the coolant can be hot. Do a temperature test by touching the side of the expansion tank before releasing the pressure. If necessary, use a thermometer to measure the temperature of the coolant after opening the cap.

Carefully open the expansion tank cap to release the pressure. Listen for the click sound from the cap.

After releasing the pressure, fully open the cap.

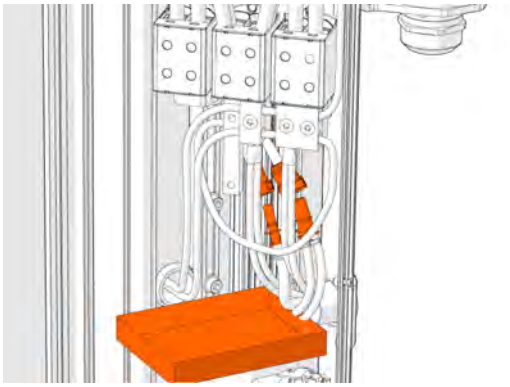


Position a drain pan large enough to collect the coolant (total volume: 2.5 L) under the drain bolt on the radiator side.

Open the drain bolt to empty the coolant.

WARNING

The coolant is harmful to the environment. Do not spill the coolant.



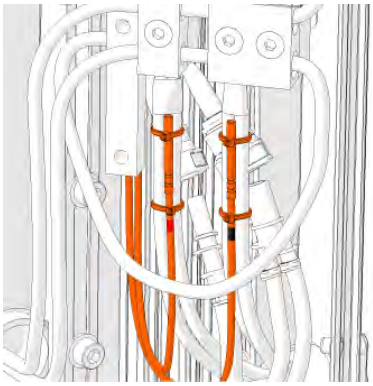
Position the drain pan under the coolant hose connectors.

Open the connectors to empty the coolant. You can also use clean and dry compressed air from the radiator side to empty the charging cable side.

WARNING

The coolant is harmful to the environment. Do not spill the coolant.

If necessary, disconnect the cooling blocks from the terminals for access to the connectors.

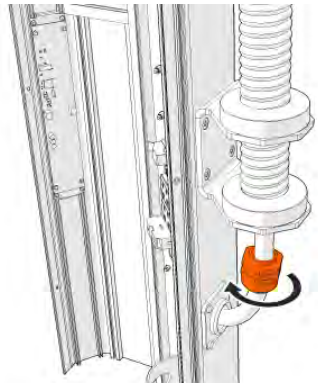
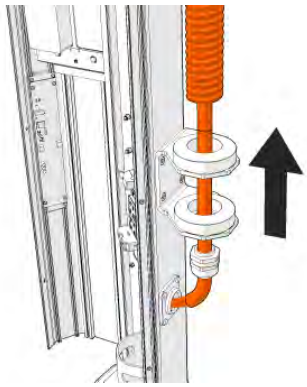
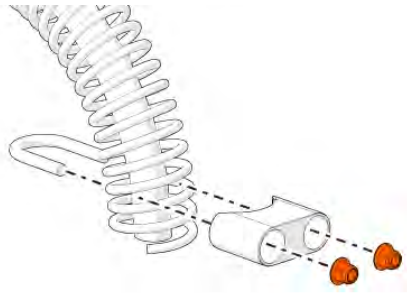


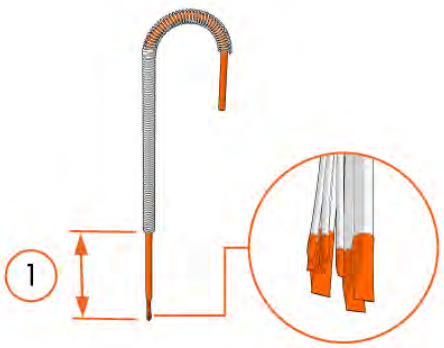
Remove the cable ties from the charging cable temperature sensors. Mark the sensors with red and black electrical tape make it easier to identify them later.

Before you detach wires, cables, or connectors, take a photograph of them.

Detach the charging cables from the cooling blocks.

Detach the charging cable control wires from the green control connector.

	Loosen the cable bushing below the spring holder. The size of the cable bushing is 68 mm.
	Pull the charging cable out of the rubber grommet. Remove the cable bushing and hose clamp and set them aside to be installed to the new charging cable. Lift the support spring and charging cable out of the spring holder.
	With the ratchet and 15 mm socket, remove the cable clamp from the end of the support spring. Pull the charging cable out of the support spring. The size of the cable clamp's nuts is M10.



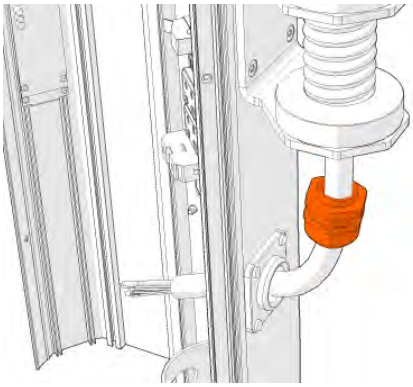
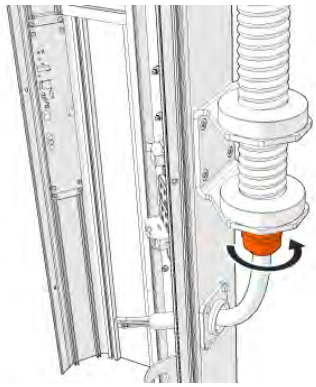
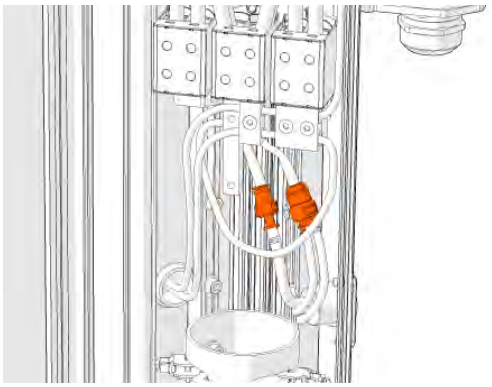
Tape the wire ends of the charging cable to avoid fraying.

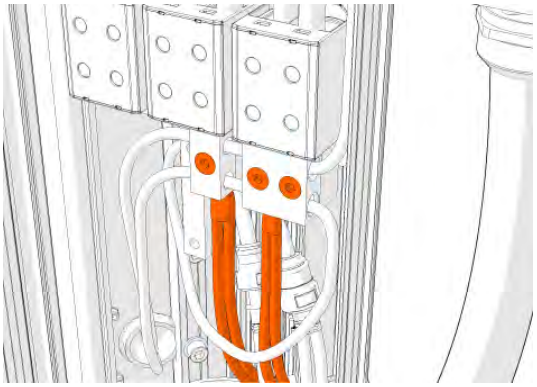
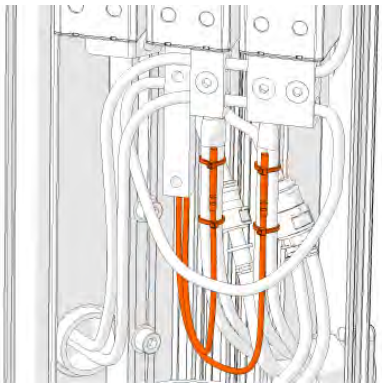
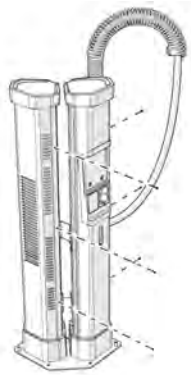
Pull the charging cable through its support spring until approximately 400–600 mm (1) of the charging cable remains outside of the support spring.

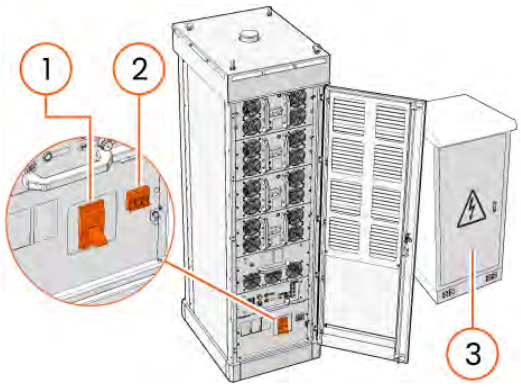
If necessary, use the draw tape and lubricant to pull the cable.

To make the handling of the charging cable and support spring easier during installation, you can temporarily lock the charging cable inside its support spring. The size of the cable clamp's nuts is M10.

Lift the support spring with the charging cable into the spring holder.

	First install the cable bushing and then the hose clamp on the charging cable. Route the charging cable inside the unit through the rubber grommet. Make sure that the part of the charging cable inside the unit has: • Approximately 50 mm of insulation • Approximately 350–550 mm of stripped wire
	Make sure that the wires reach the terminals. Tighten the cable bushing of the charging cable below the spring holder. The size of the cable bushing is 68 mm.
	Connect the coolant pipes.

	Connect the wires to the terminals. Tighten the cooling block terminals to 26 Nm.
	Use cable ties to connect the temperature sensors to the charging cables. Make sure that the sensors are positioned 25–40 mm from the cooling blocks. Use the electrical tape marking you made earlier as references for connecting the sensors.
	Lock the charging cable into place. See *5.5.1.4 Locking the charging cable inside its support spring*.
	Close the front panel of the unit. Install the three security T30 screws to each frame. Make sure that no cables are caught between the front panel and the frame of the unit.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3.4 Replacing the charging cable temperature sensor

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

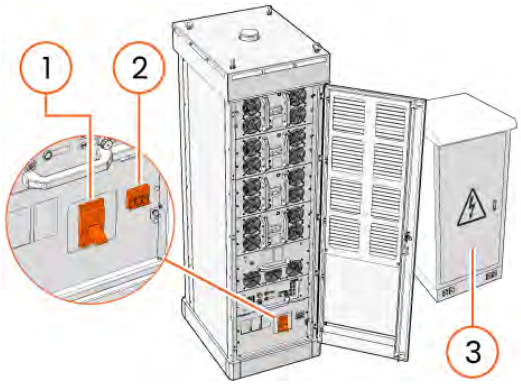
Needed for the task

The estimated labor time for the individual task is 30 min.

- Cable ties
- Replacement temperature sensor

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

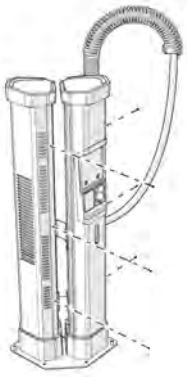
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

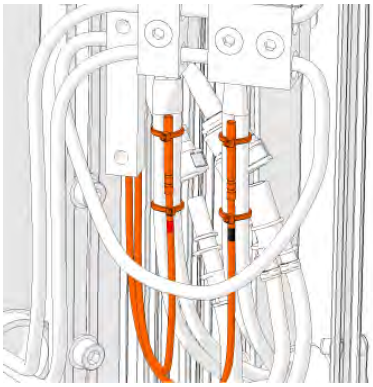
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



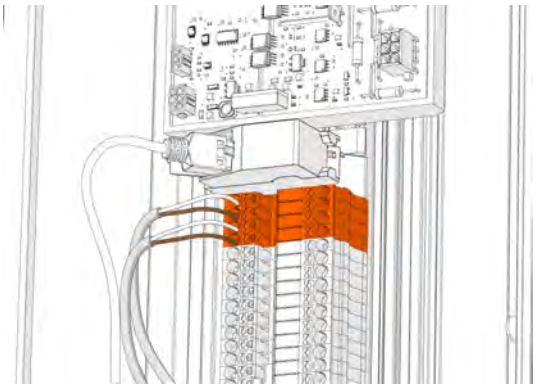
Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

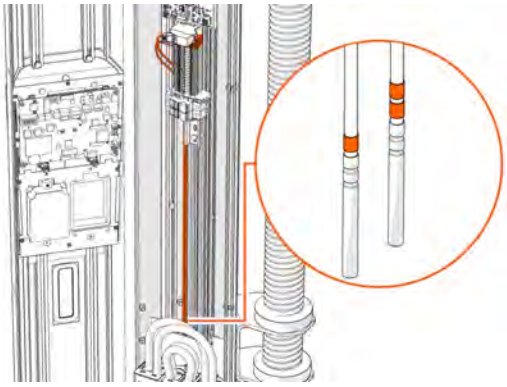


Remove the cable ties to release the temperature sensors.



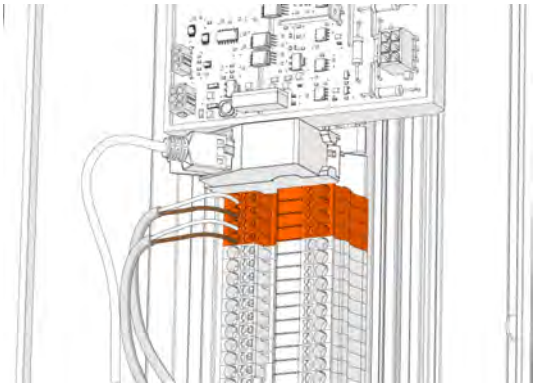
Disconnect the temperature sensors from the terminal block.

T1 is for the positive and T2 is for the negative side of the charging cable.



Route the replacement temperature sensors along the back panel of the frame with the user interface.

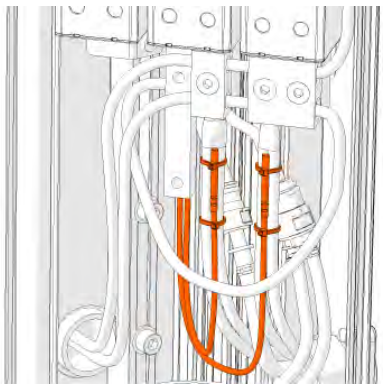
Make sure to mark the sensors if installing both sensors simultaneously.



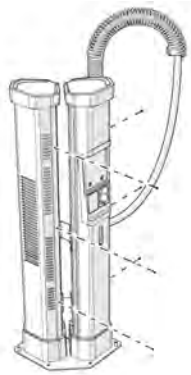
Connect the sensor wires to the terminal block.

- White: negative wire
- Brown: positive wire

T1 is for the positive and T2 is for the negative side of the charging cable.

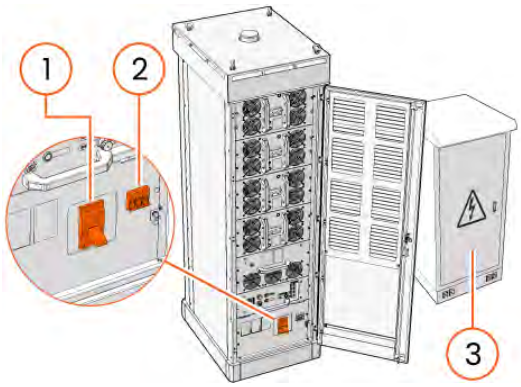


Secure the sensors to the charging cables using cable ties. Position the sensors 25–40 mm from the cooling blocks.



Close the front panel of the unit. Install the three security T30 screws to each frame.

Make sure that no cables are caught between the front panel and the frame of the unit.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3.5 Examining the condition of the coolant

WARNING

The coolant is harmful to the environment. Do not spill the coolant. Dispose of the coolant according to local laws and regulations.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

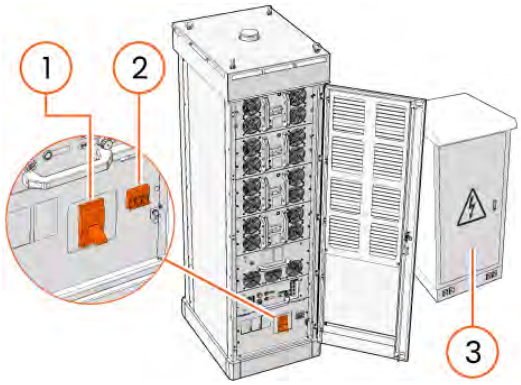
Needed for the task

The estimated labor time for the individual task is 10 min.

- Open-end wrench
- Cable ties
- Coolant tester
- Funnel

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

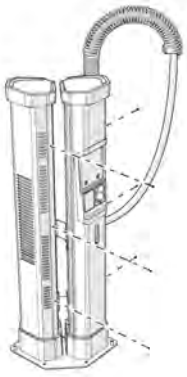
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

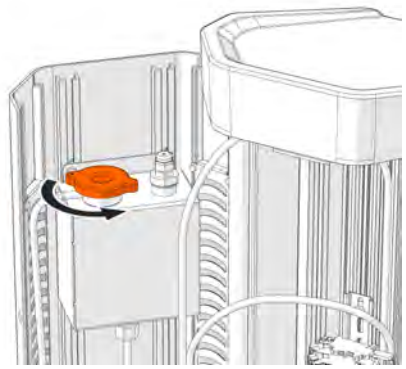
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

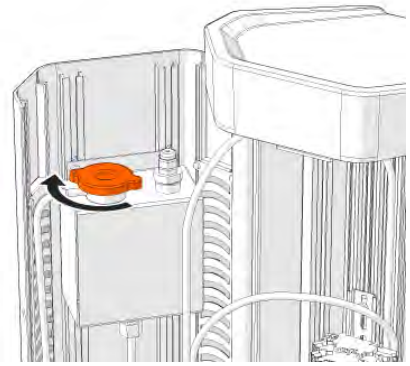
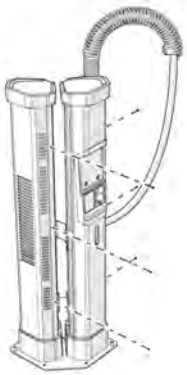
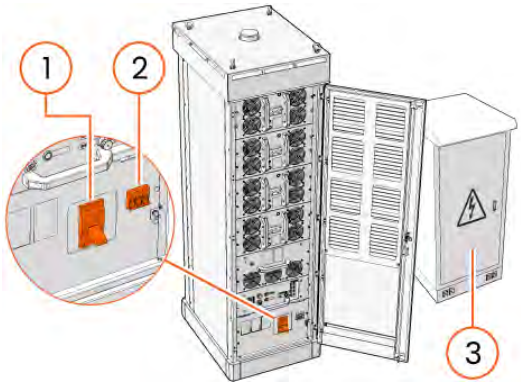


Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

	**WARNING** If used recently, the coolant can be hot. Do a temperature test by touching the side of the expansion tank before releasing the pressure. If necessary, use a thermometer to measure the temperature of the coolant after opening the cap. Carefully open the expansion tank cap to release the pressure. Listen for the click sound from the cap. After releasing the pressure, fully open the cap.
	Use an coolant tester to examine the condition of the coolant. Make sure that the freezing point is a minimum of -36 °C.
	Do a visual inspection of the the coolant. Make sure that there are no visible particles such as rust in the coolant and that there is no discoloration of the coolant. If necessary, replace the coolant. See *5.5.3.6 Replacing the coolant* .

	Close the expansion tank cap.
	Close the front panel of the unit. Install the three security T30 screws to each frame. Make sure that no cables are caught between the front panel and the frame of the unit.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3.6 Replacing the coolant

WARNING

The coolant is harmful to the environment. Do not spill the coolant. Dispose of the coolant according to local laws and regulations.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

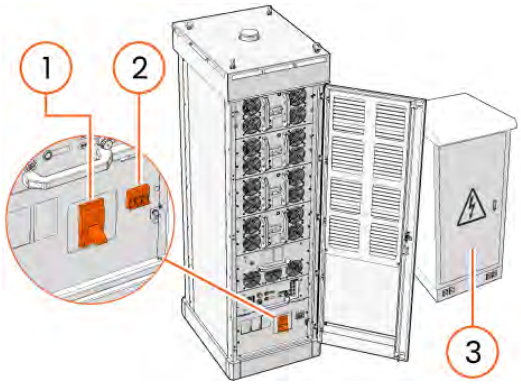
Needed for the task

The estimated labor time for the individual task is 75 min.

- Open-end wrench
- Cable ties
- Funnel
- Replacement Glysofor N (2.5 L)

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

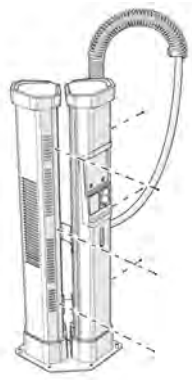
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

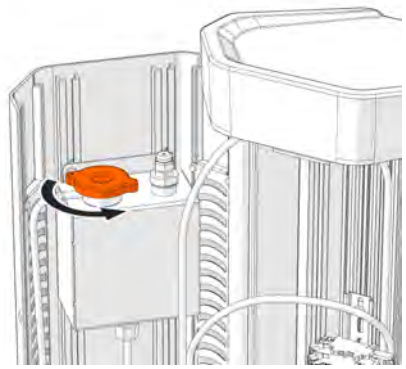
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

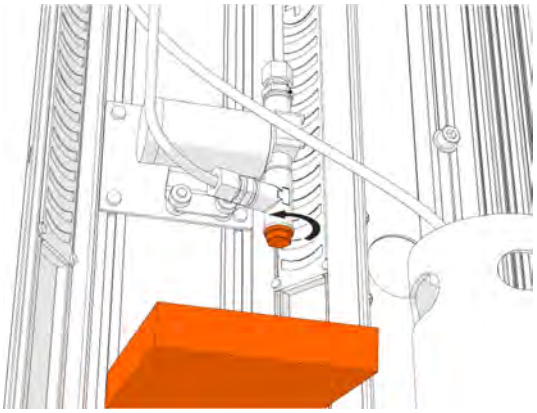


WARNING

If used recently, the coolant can be hot. Do a temperature test by touching the side of the expansion tank before releasing the pressure. If necessary, use a thermometer to measure the temperature of the coolant after opening the cap.

Carefully open the expansion tank cap to release the pressure. Listen for the click sound from the cap.

After releasing the pressure, fully open the cap.

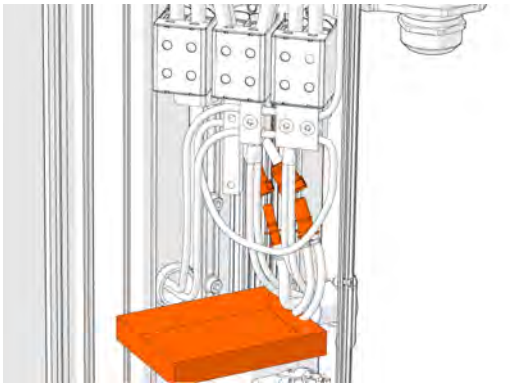


Position a drain pan large enough to collect the coolant (total volume: 2.5 L) under the drain bolt on the radiator side.

Open the drain bolt to empty the coolant.

WARNING

The coolant is harmful to the environment. Do not spill the coolant.



Position the drain pan under the coolant hose connectors.

Open the connectors to empty the coolant. You can also use clean and dry compressed air from the radiator side to empty the charging cable side.

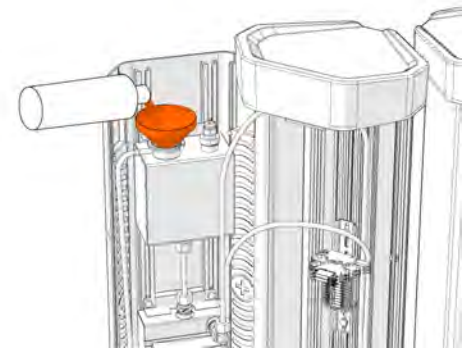
WARNING

The coolant is harmful to the environment. Do not spill the coolant.

If necessary, disconnect the cooling blocks from the terminals for access to the connectors.

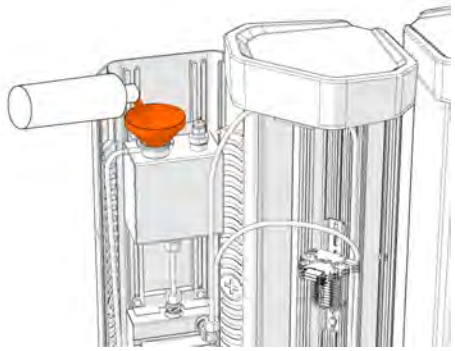
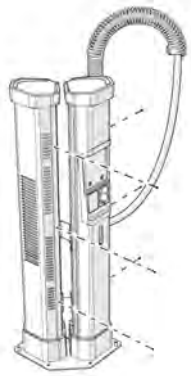
Connect all the hose connectors and tighten the drain bolt.

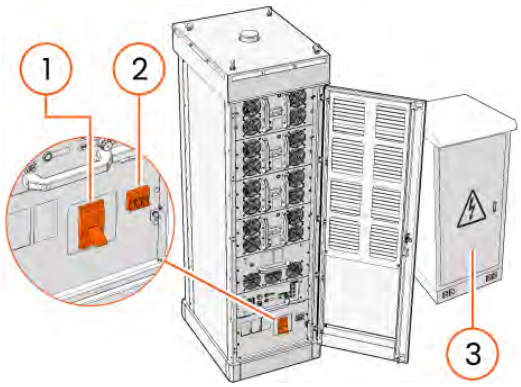
If you disconnected the cooling blocks from the terminals, connect them again. Tighten to the correct torque.



Use a funnel to fill the expansion tank to 1/2 full with the replacement coolant.

For non-transparent expansion tanks, use a dip stick to measure the level of the coolant.

	Operate the pump to bleed the air out of the system. Make sure that there are no leaks in the system.
	Use a funnel to fill the expansion tank to 1/3 full. For non-transparent expansion tanks, use a dip stick to measure the level of the coolant.
	Do a sensory inspection. Make sure that: • There are no coolant leaks • Every connector has been installed again and tightened correctly
	Close the front panel of the unit. Install the three security T30 screws to each frame. Make sure that no cables are caught between the front panel and the frame of the unit.

	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3.7 Replacing the coolant pump

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

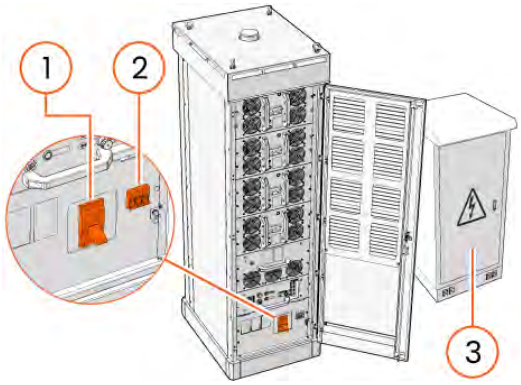
Needed for the task

The estimated labor time for the individual task is 90 min.

- Open-end wrench
- Cable ties
- Funnel
- Replacement Glysofor N (2.5 L)
- Replacement pump, SPW025032 PUMP 3BAR 24VDC ASSY (includes 9902004 PRESSURE SWITCH)

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

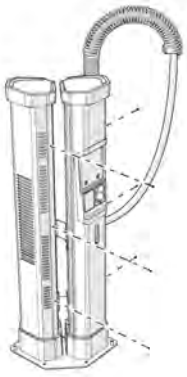
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

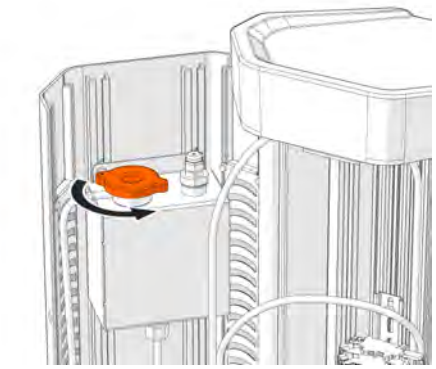
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

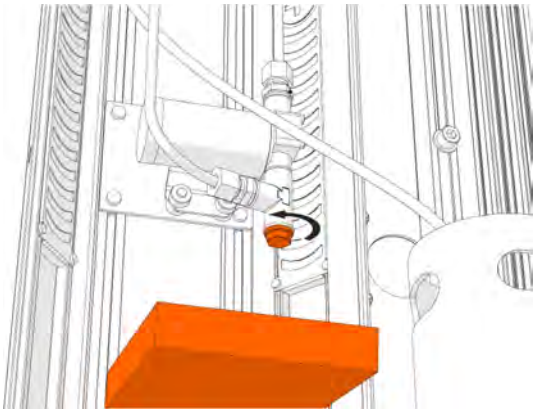


WARNING

If used recently, the coolant can be hot. Do a temperature test by touching the side of the expansion tank before releasing the pressure. If necessary, use a thermometer to measure the temperature of the coolant after opening the cap.

Carefully open the expansion tank cap to release the pressure. Listen for the click sound from the cap.

After releasing the pressure, fully open the cap.

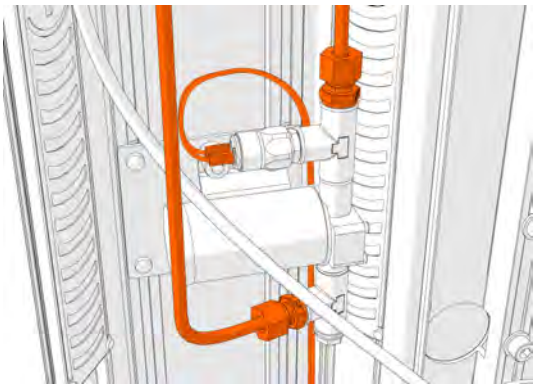


Position a drain pan large enough to collect the coolant (total volume: 2.5 L) under the drain bolt on the radiator side.

Open the drain bolt to empty the coolant.

WARNING

The coolant is harmful to the environment. Do not spill the coolant.

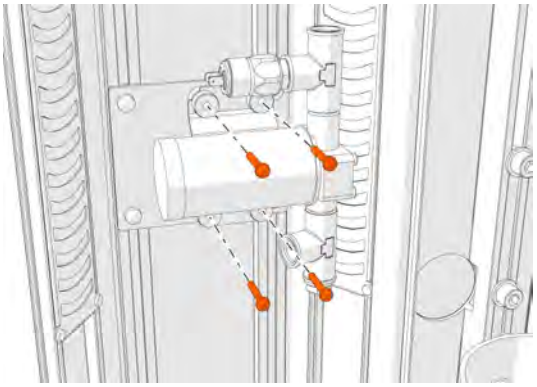
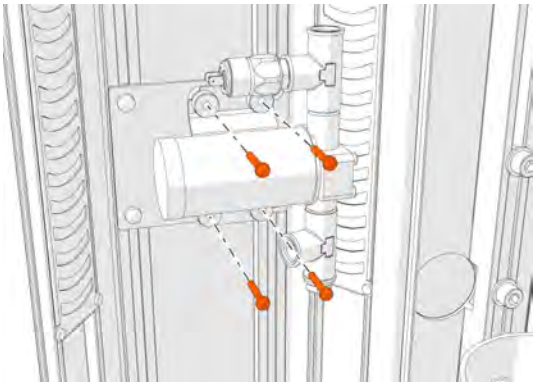
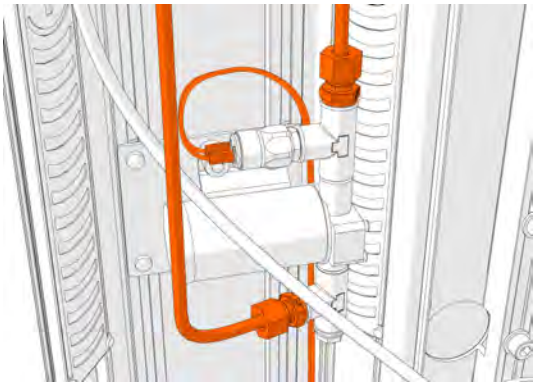


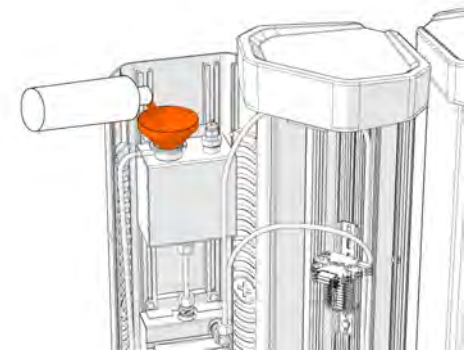
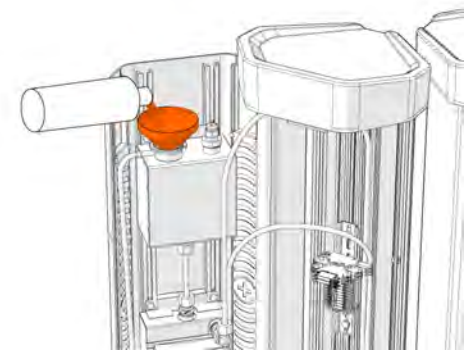
Before you detach wires, cables, or connectors, take a photograph of them.

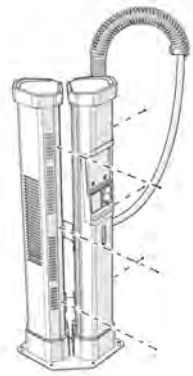
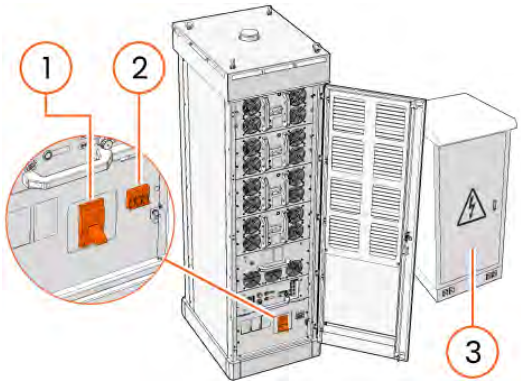
Position a drain pan under the disconnected pipes to catch any catch any left over coolant.

Disconnect the coolant hoses from the pump assembly.

Disconnect the electrical connectors from the pressure switch.

	Remove the four T25 screws to remove the pump.
	Install the replacement pump. Tighten the four T25 screws.
	Connect the pressure swtich connectors again. Connect the coolant hoses again.

	Use a funnel to fill the expansion tank to 1/2 full with the replacement coolant. For non-transparent expansion tanks, use a dip stick to measure the level of the coolant.
	Operate the pump to bleed the air out of the system. Make sure that there are no leaks in the system.
	Use a funnel to fill the expansion tank to 1/3 full. For non-transparent expansion tanks, use a dip stick to measure the level of the coolant.

	Close the front panel of the unit. Install the three security T30 screws to each frame. Make sure that no cables are caught between the front panel and the frame of the unit.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3.8 Replacing the expansion tank

WARNING

The coolant is harmful to the environment. Do not spill the coolant. Dispose of the coolant according to local laws and regulations.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

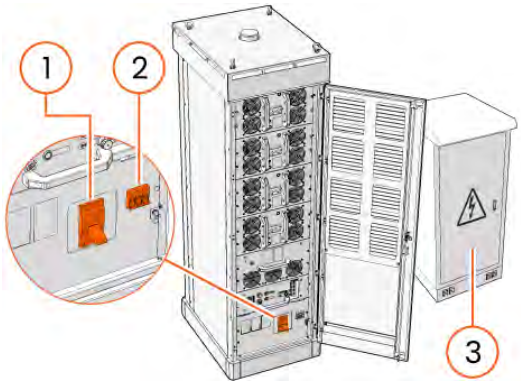
Needed for the task

The estimated labor time for the individual task is 60 min.

- Open-end wrench
- Cable ties
- Needle nose pliers
- Replacement Glysofor N (2.5 L)
- Replacement expansion tank, SP9901411 EXPANSION TANK

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

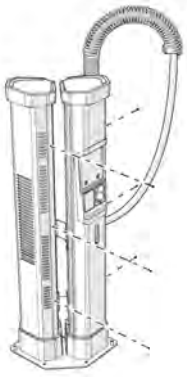
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

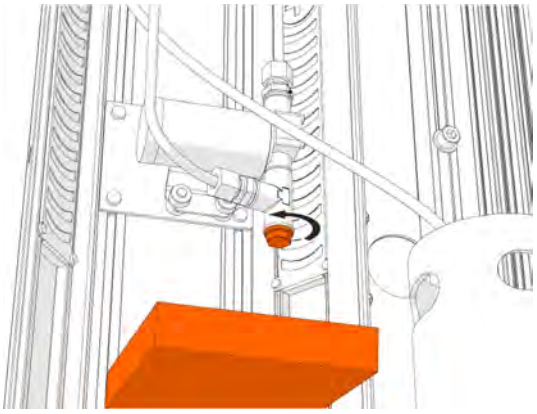
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

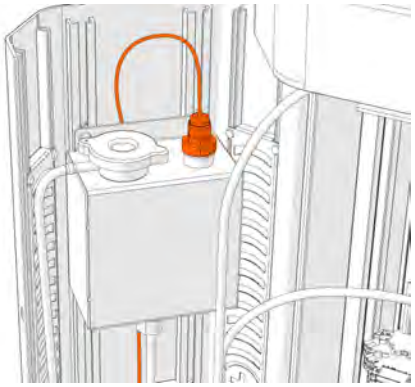


Position a drain pan large enough to collect the coolant (total volume: 2.5 L) under the drain bolt on the radiator side.

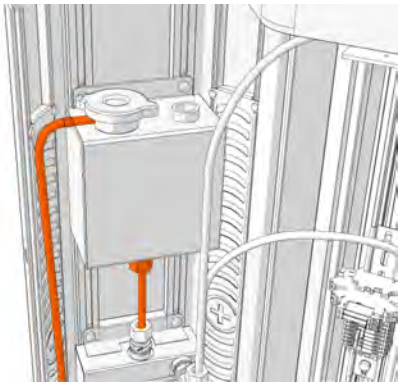
Open the drain bolt to empty the coolant.

WARNING

The coolant is harmful to the environment. Do not spill the coolant.

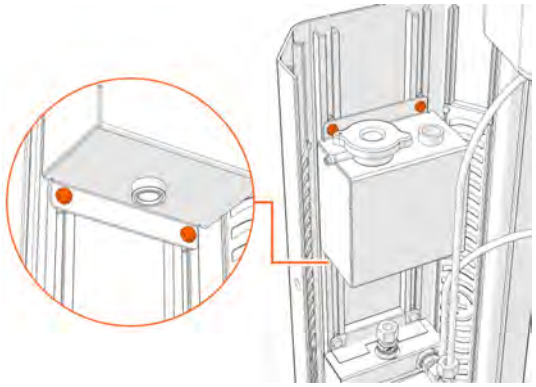
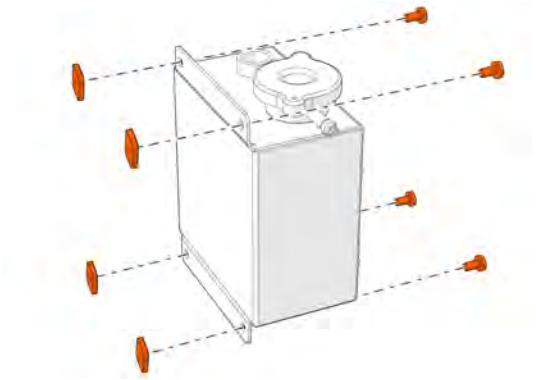
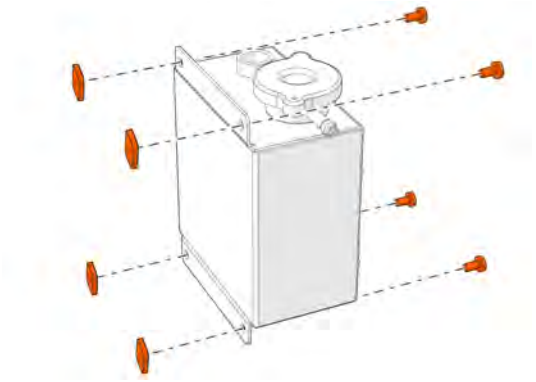


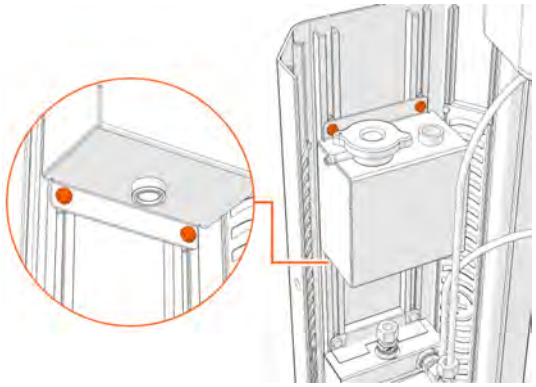
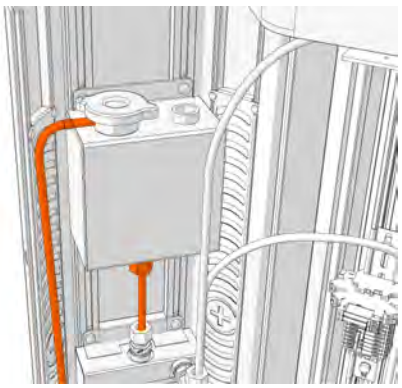
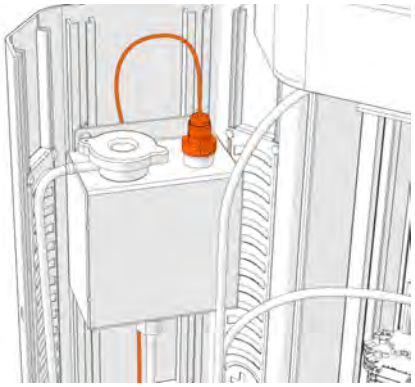
Remove the float switch. Use a 27 mm open-ended wrench.

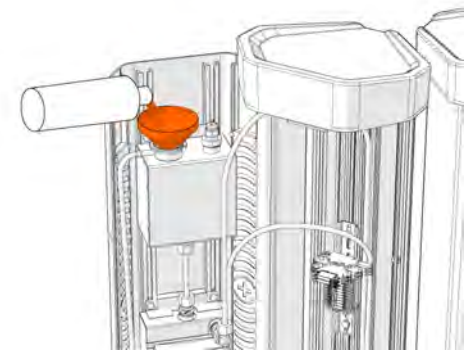
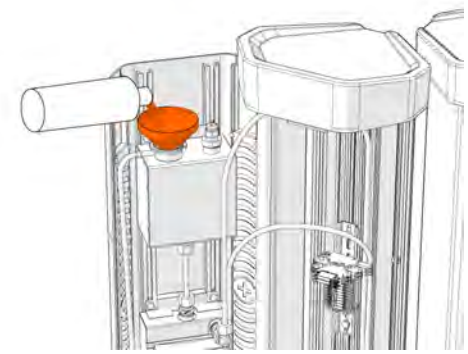


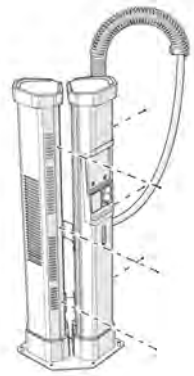
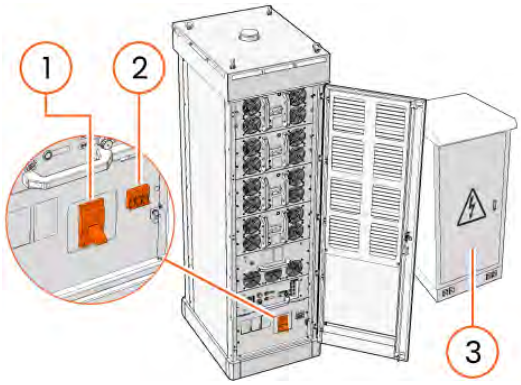
Disconnect the coolant pipe from the bottom of the tank. Use a 22 mm open-ended wrench.

Disconnect the overflow pipe. Use needle nose pliers.

	Hold the expansion tank in place as you loosen the four screws holding it in place. Slide the tank up along the rails to remove it.
	Remove the four screws and the brackets from the expansion tank.
	Install the brackets and the four screws to the replacement expansion tank.

	Slide the replacement expansion tank into place. Use the radiator pipe for reference. Tighten the four screws to hold it in place.
	Connect the coolant pipe to the bottom of the tank again. Connect the overflow pipe again.
	Install the float switch. Use a 27 mm open-ended wrench.

	Use a funnel to fill the expansion tank to 1/2 full with the replacement coolant. For non-transparent expansion tanks, use a dip stick to measure the level of the coolant.
	Operate the pump to bleed the air out of the system. Make sure that there are no leaks in the system.
	Use a funnel to fill the expansion tank to 1/3 full. For non-transparent expansion tanks, use a dip stick to measure the level of the coolant.

	Close the front panel of the unit. Install the three security T30 screws to each frame. Make sure that no cables are caught between the front panel and the frame of the unit.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3.9 Replacing the float switch

WARNING

The coolant is harmful to the environment. Do not spill the coolant. Dispose of the coolant according to local laws and regulations.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

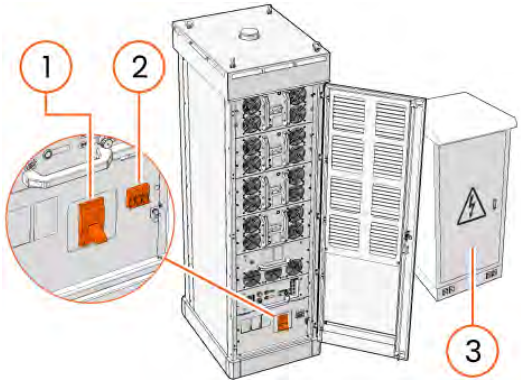
Needed for the task

The estimated labor time for the individual task is 30 min.

- Open-end wrench
- Cable ties
- Replacement Glysofor N (2.5 L)
- Replacement float switch, SP9902003 FLOAT SWITCH

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

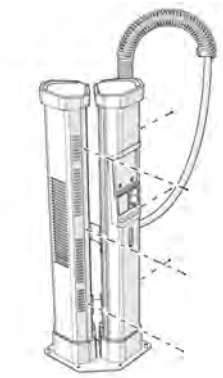
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

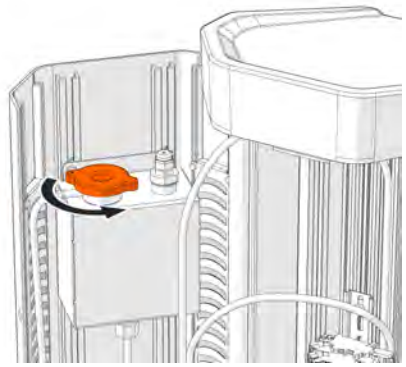
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

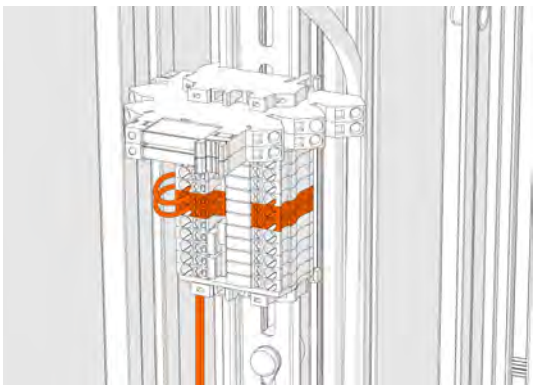


WARNING

If used recently, the coolant can be hot. Do a temperature test by touching the side of the expansion tank before releasing the pressure. If necessary, use a thermometer to measure the temperature of the coolant after opening the cap.

Carefully open the expansion tank cap to release the pressure. Listen for the click sound from the cap.

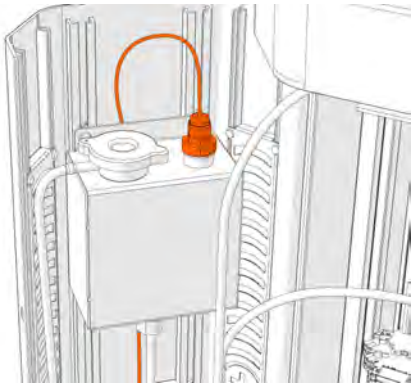
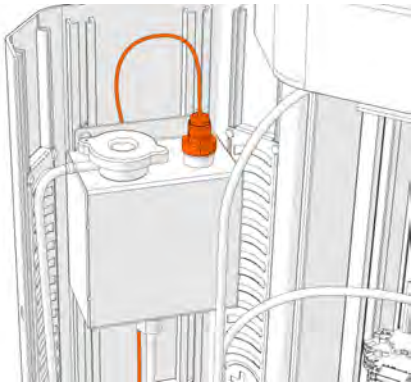
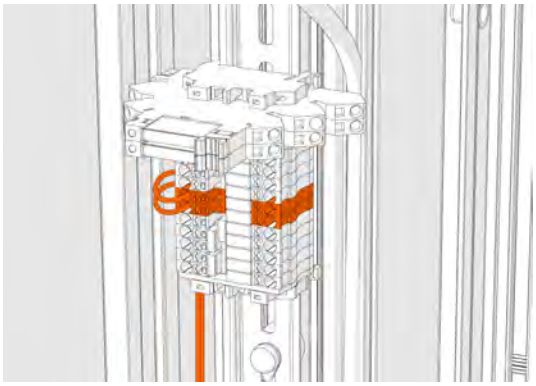
After releasing the pressure, fully open the cap.

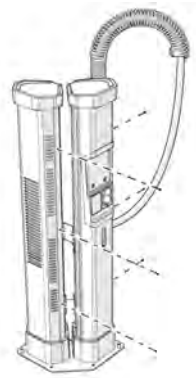
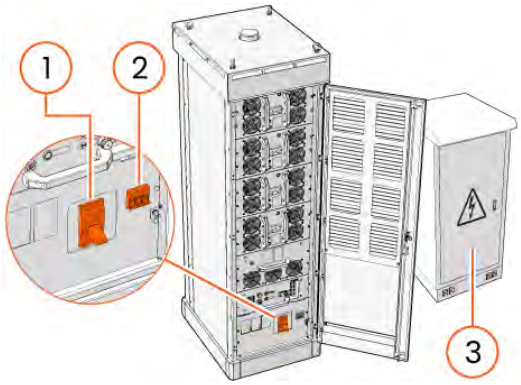


Before you detach wires, cables, or connectors, take a photograph of them.

Disconnect the float switch from the terminal block.

- White wire: SEN-B
- Brown wire: XCON

	Remove the float switch. Use a 27 mm open-end wrench.
	Install the replacement float switch. Use a 27 mm open-end wrench to tighten it into place.
	Connect the float switch to the terminal block. • White wire: SEN-B • Brown wire: XCON

	Close the front panel of the unit. Install the three security T30 screws to each frame. Make sure that no cables are caught between the front panel and the frame of the unit.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3.10 Replacing the filter elements

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

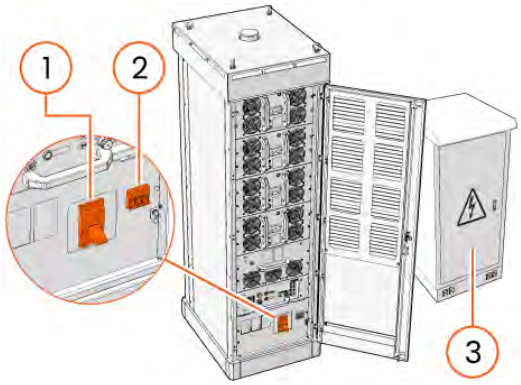
Needed for the task

The estimated labor time for the individual task is 30 min.

- Replacement radiator air filter, SPW023572 FILTER FOR LC SATELLITE (item includes 4 filters)

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

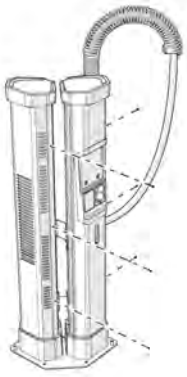
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

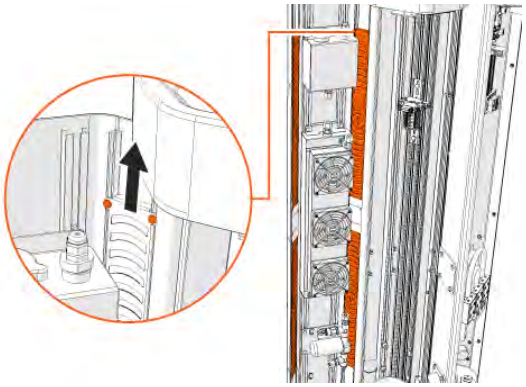
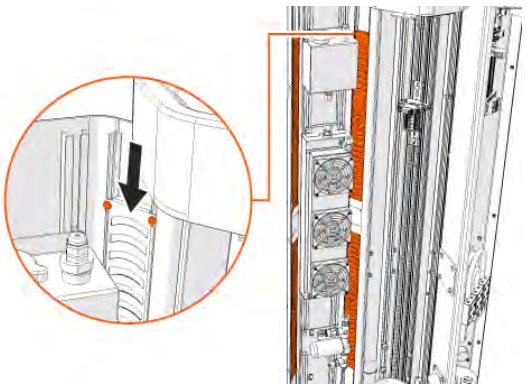
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

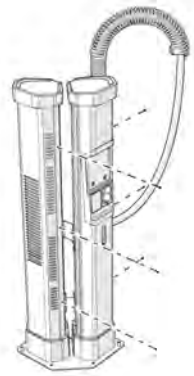
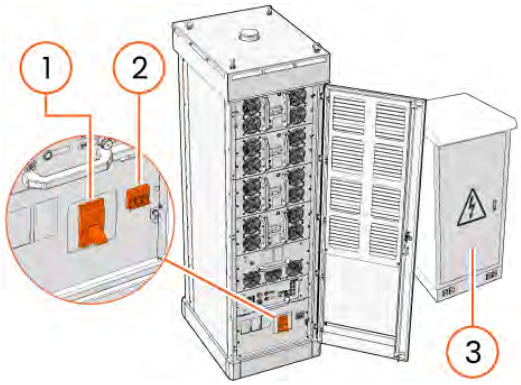


Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

	Remove the two T20 screws from the filter holder. Slide the filter holder along the rails the remove it. Repeat for all four filter holders.
	Remove the filter elements from the filter holder.
	Push the replacement filter elements into the filter holder.
	Install the filter holder again. Tighten the two T20 screws for each filter holder.

	Close the front panel of the unit. Install the three security T30 screws to each frame. Make sure that no cables are caught between the front panel and the frame of the unit.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3.11 Replacing the rubber duct

WARNING

The coolant is harmful to the environment. Do not spill the coolant. Dispose of the coolant according to local laws and regulations.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

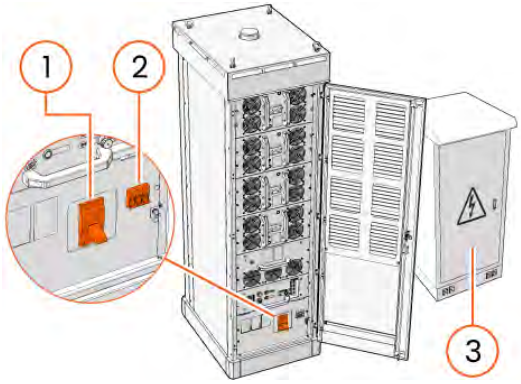
Needed for the task

The estimated labor time for the individual task is 105 min.

- Open-end wrench
- Cable ties
- Replacement Glysofor N (2.5 L)

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

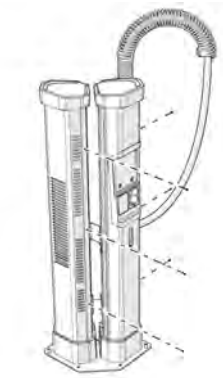
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

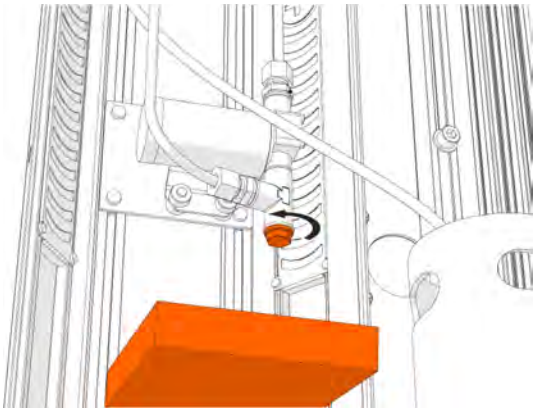
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

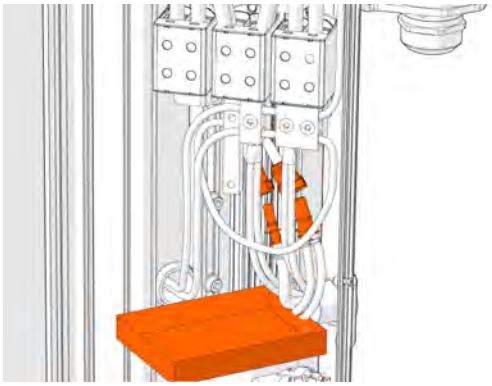


Position a drain pan large enough to collect the coolant (total volume: 2.5 L) under the drain bolt on the radiator side.

Open the drain bolt to empty the coolant.

WARNING

The coolant is harmful to the environment. Do not spill the coolant.



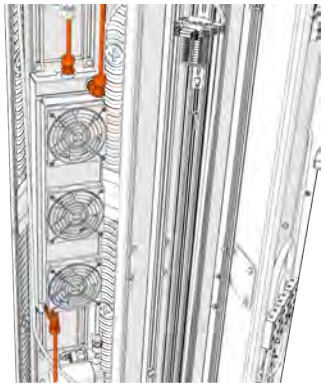
Position the drain pan under the coolant hose connectors.

Open the connectors to empty the coolant. You can also use clean and dry compressed air from the radiator side to empty the charging cable side.

WARNING

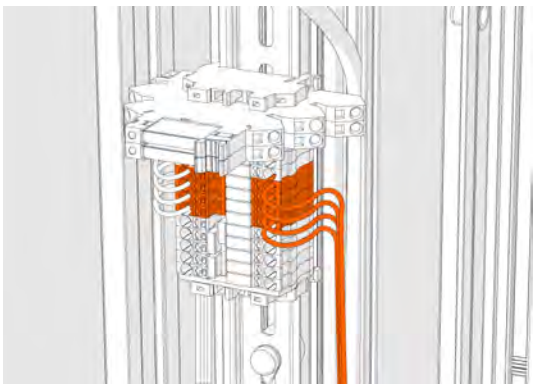
The coolant is harmful to the environment. Do not spill the coolant.

If necessary, disconnect the cooling blocks from the terminals for access to the connectors.



Before you detach wires, cables, or connectors, take a photograph of them.

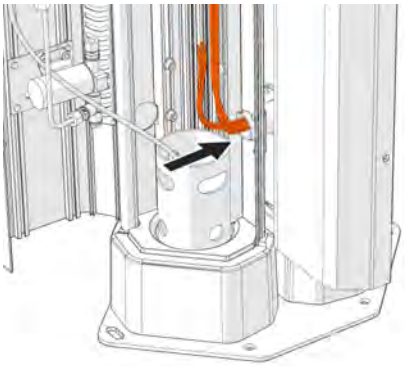
Disconnect the coolant pipes that go through the duct on the cooling unit side.



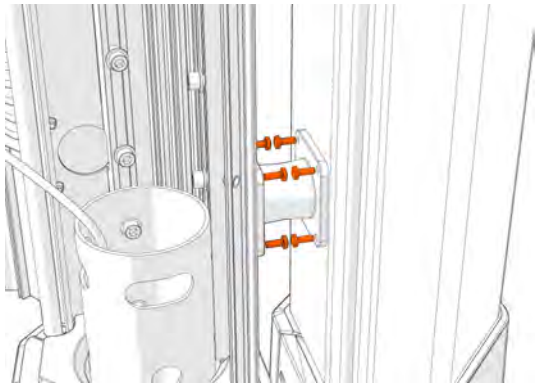
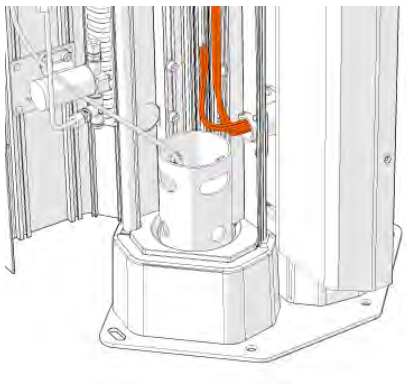
Before you detach wires, cables, or connectors, take a photograph of them.

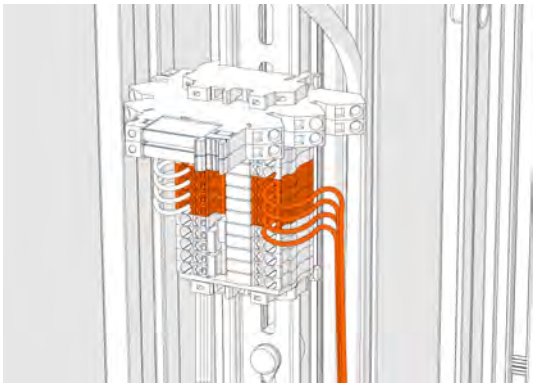
Disconnect the four wires.

- Green: FAN-B
- Yellow: PUM-B
- Grey: SEN-B
- Black: XCON



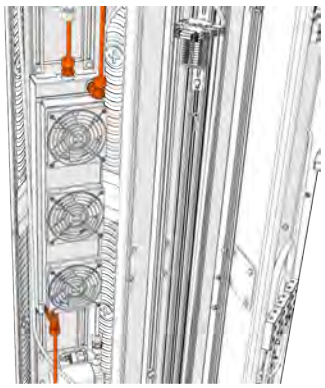
Pull the pipes and the wires through the passage.

	Remove the eight T30 screws to remove the rubber duct.
	Install the replacement rubber duct. Use the eight T30 screws to secure it.
	Route the two hoses and four wires to the radiator's side of the unit.

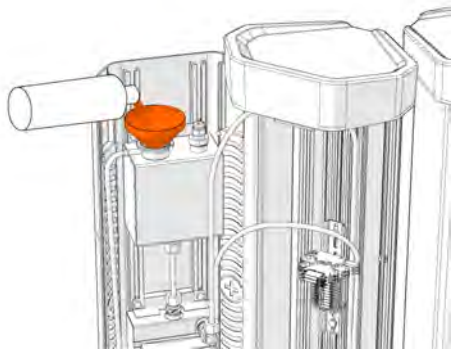


Connect the electrical wires.

- Green: FAN-B
- Yellow: PUM-B
- Grey: SEN-B
- Black: XCON



Connect the coolant pipes.

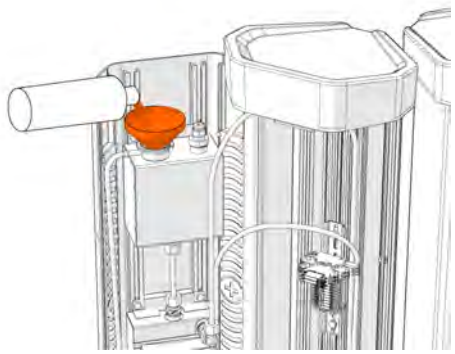


Use a funnel to fill the expansion tank to 1/2 full with the replacement coolant.

For non-transparent expansion tanks, use a dip stick to measure the level of the coolant.

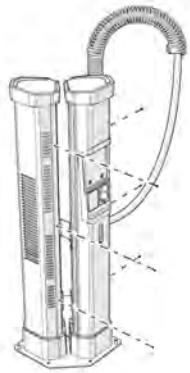
Operate the pump to bleed the air out of the system.

Make sure that there are no leaks in the system.



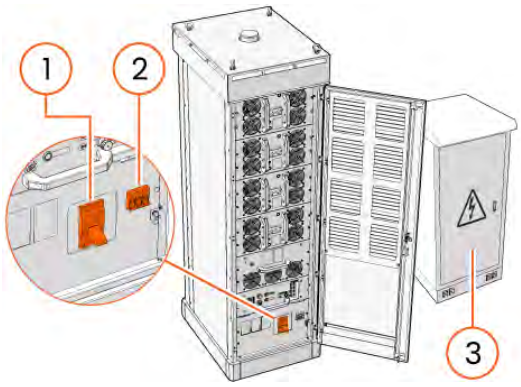
Use a funnel to fill the expansion tank to 1/3 full.

For non-transparent expansion tanks, use a dip stick to measure the level of the coolant.



Close the front panel of the unit. Install the three security T30 screws to each frame.

Make sure that no cables are caught between the front panel and the frame of the unit.



Connect the AC power supply to the unit from the main supply point (3).

In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position.

Lock the door(s) of the unit.

5.5.3.12 Replacing the radiator fan

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

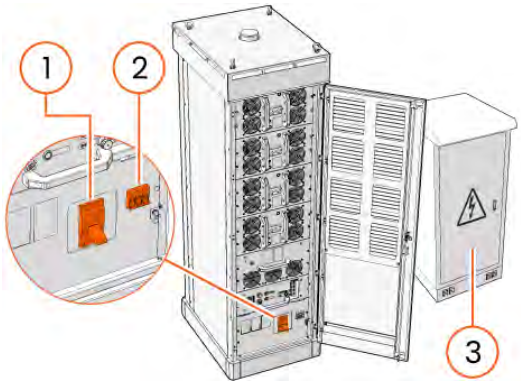
Needed for the task

The estimated labor time for the individual task is 75 min.

- Cable ties
- Replacement fan, SPW009321 DPDM AXIAL FAN ASSY

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

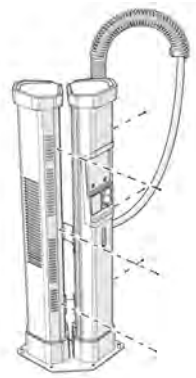
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

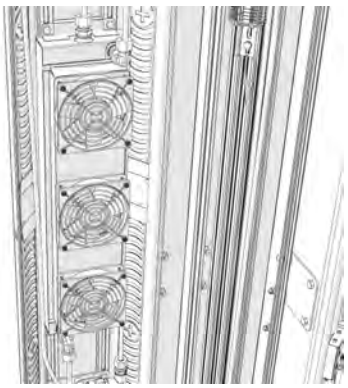
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



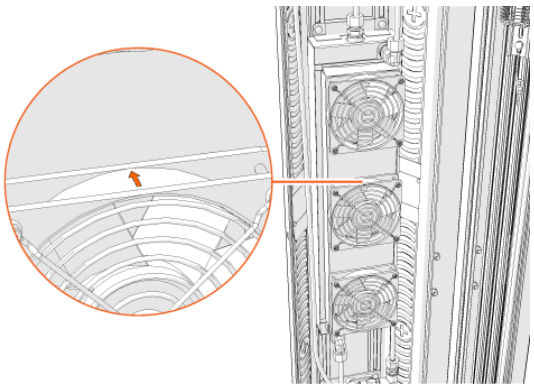
Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

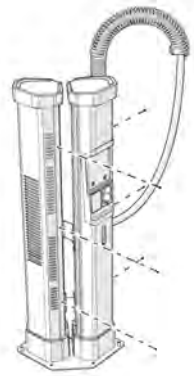
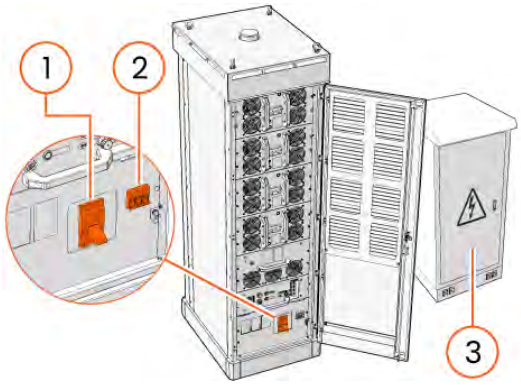


Remove the four H3 fixing screws and the electrical connector of the radiator fan. Remove the fan.



Install the replacement radiator fan. Make sure that:

- The orientation is correct, with the arrow pointing towards the radiator
- The electrical connector is connected
- The four fixing screws are tightened

	Close the front panel of the unit. Install the three security T30 screws to each frame. Make sure that no cables are caught between the front panel and the frame of the unit.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.3.13 Replacing the radiator

WARNING

The coolant is harmful to the environment. Do not spill the coolant. Dispose of the coolant according to local laws and regulations.

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

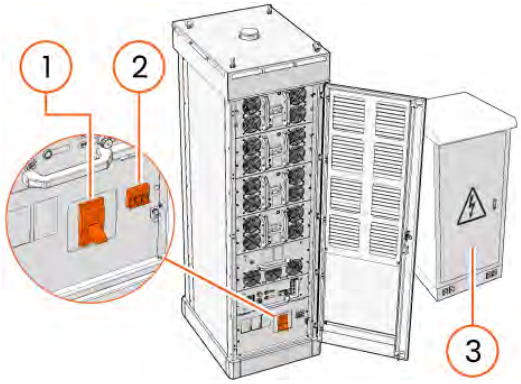
Needed for the task

The estimated labor time for the individual task is 90 min.

- Open-end wrench
- Cable ties
- Replacement Glysofor N (2.5 L)
- Replacement radiator, SP9901410

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

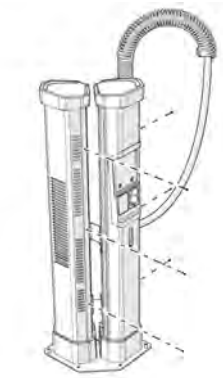
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

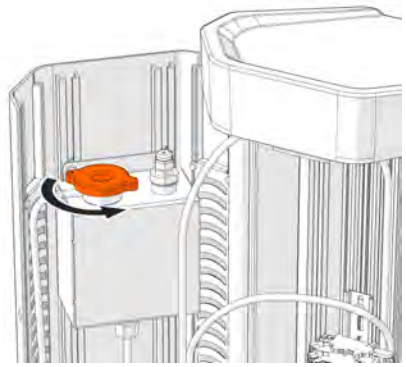
After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.



Remove the three security T30 screws from each frame. Open the front panels of both frames.

DANGER

Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

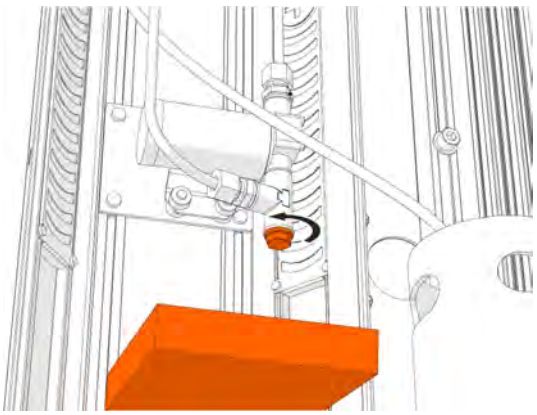


WARNING

If used recently, the coolant can be hot. Do a temperature test by touching the side of the expansion tank before releasing the pressure. If necessary, use a thermometer to measure the temperature of the coolant after opening the cap.

Carefully open the expansion tank cap to release the pressure. Listen for the click sound from the cap.

After releasing the pressure, fully open the cap.

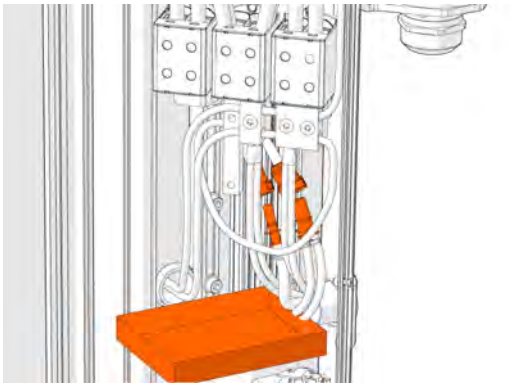


Position a drain pan large enough to collect the coolant (total volume: 2.5 L) under the drain bolt on the radiator side.

Open the drain bolt to empty the coolant.

WARNING

The coolant is harmful to the environment. Do not spill the coolant.



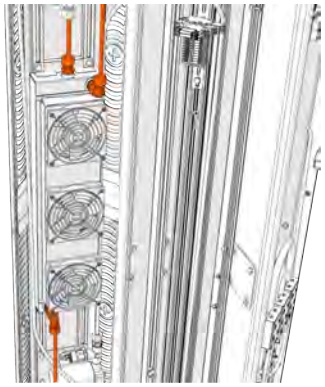
Position the drain pan under the coolant hose connectors.

Open the connectors to empty the coolant. You can also use clean and dry compressed air from the radiator side to empty the charging cable side.

WARNING

The coolant is harmful to the environment. Do not spill the coolant.

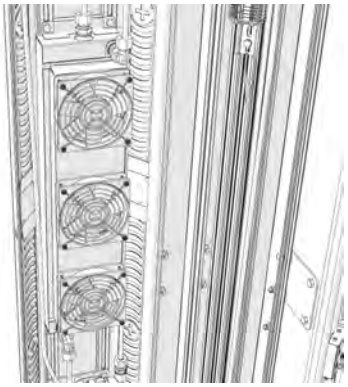
If necessary, disconnect the cooling blocks from the terminals for access to the connectors.



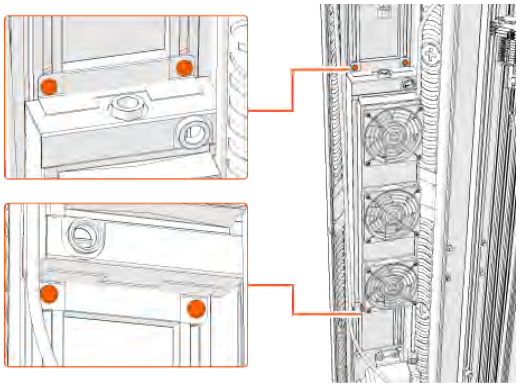
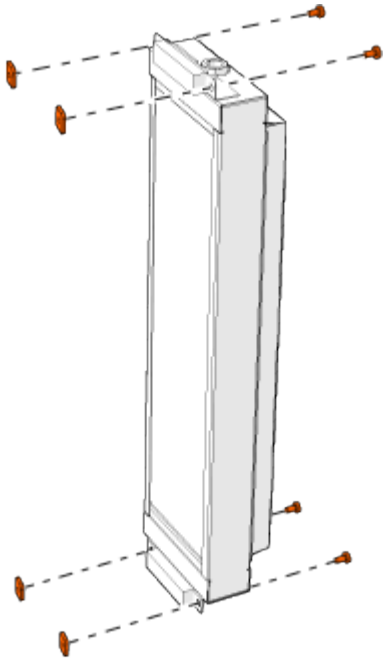
Disconnect the coolant hoses from the radiator.

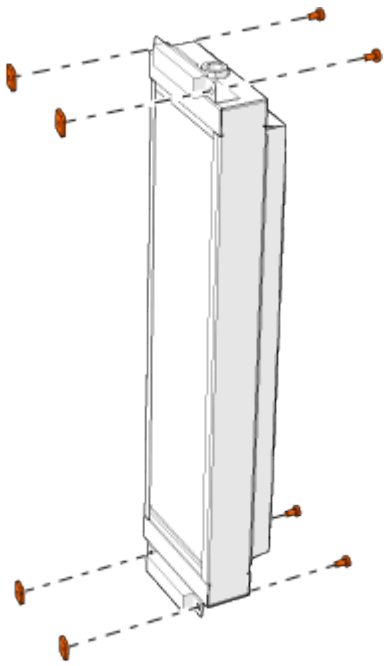
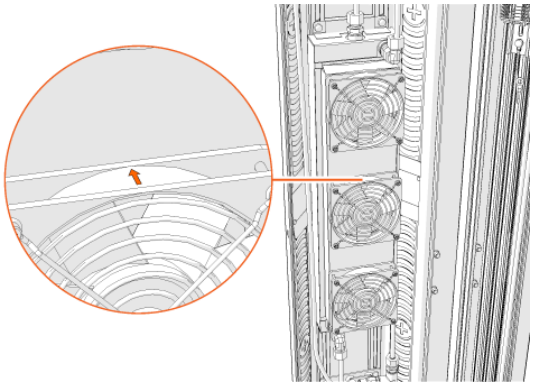
Open the hose connectors on top of the drain pan as the hoses might still contain a small amount of coolant.

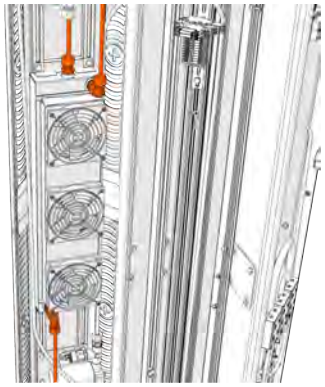
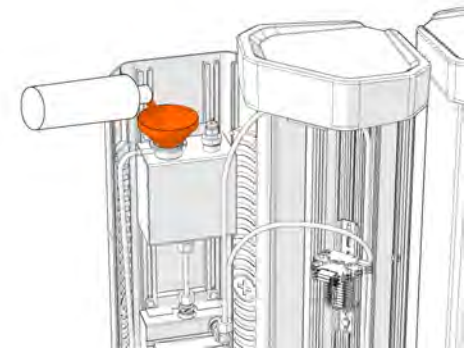
Cut the cable ties that hold the overflow pipe to the fans.

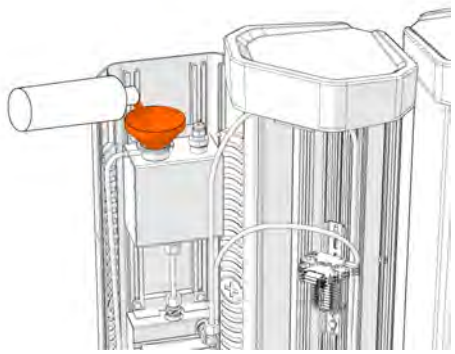


Remove the four H3 fixing screws and one electrical connector for each of the three fans. Remove all of the radiator fans.

	Hold the radiator in place as you loosen the four screws holding it in place. Do not completely remove the screws. Slide the radiator down to the end of the inside rail and tilt the top brackets out of the rails. Slide the radiator up to the top of the inside rail to remove the bottom brackets from the rails.
	Remove the four screws and brackets from the old radiator.

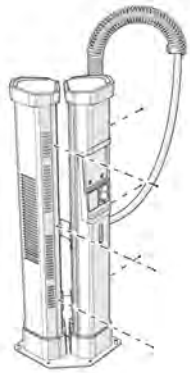
	Install the brackets using the four screws to the replacement radiator.
	Slide the radiator brackets into the rails from the widening and tighten the screws. Position the radiator so that the tank's coolant pipe reaches the radiator.
	Install the radiator fans. Make sure that: • The orientation is correct, with the arrow pointing towards the radiator • The electrical connector is connected • The four fixing screws are tightened

	Connect the coolant hoses. Use cable ties to fix the overflow pipe to the fan bolts.
	Use a funnel to fill the expansion tank to 1/2 full with the replacement coolant. For non-transparent expansion tanks, use a dip stick to measure the level of the coolant.
	Operate the pump to bleed the air out of the system. Make sure that there are no leaks in the system.



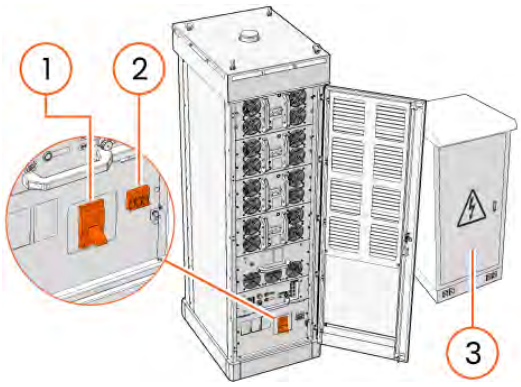
Use a funnel to fill the expansion tank to 1/3 full.

For non-transparent expansion tanks, use a dip stick to measure the level of the coolant.



Close the front panel of the unit. Install the three security T30 screws to each frame.

Make sure that no cables are caught between the front panel and the frame of the unit.



Connect the AC power supply to the unit from the main supply point (3).

In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position.

Lock the door(s) of the unit.

5.5.4 X-Satellite

5.5.4.1 Replacing the contactor (units manufactured before 11/2022)

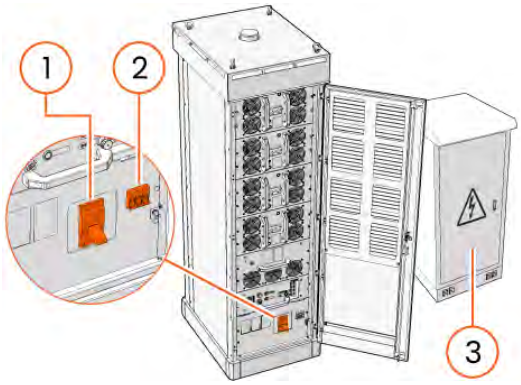
In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Needed for the task

The estimated labor time for the individual task is 15 min.

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

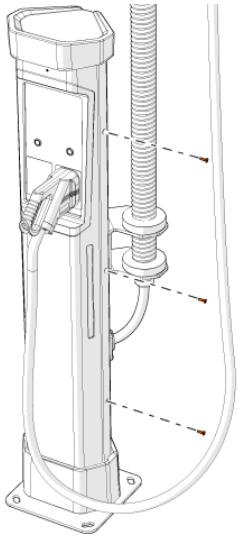
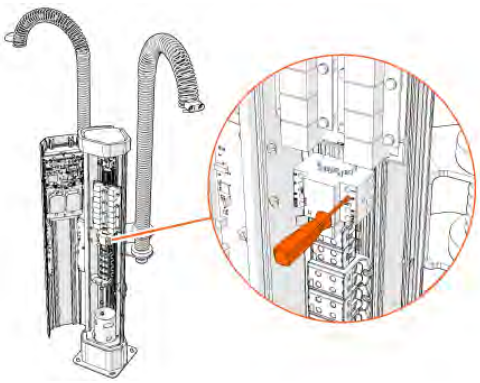
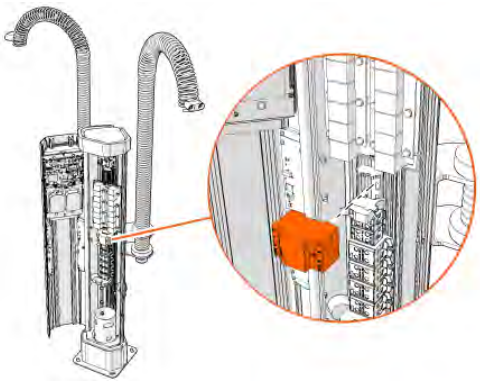
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

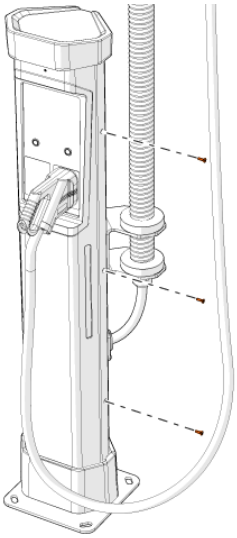
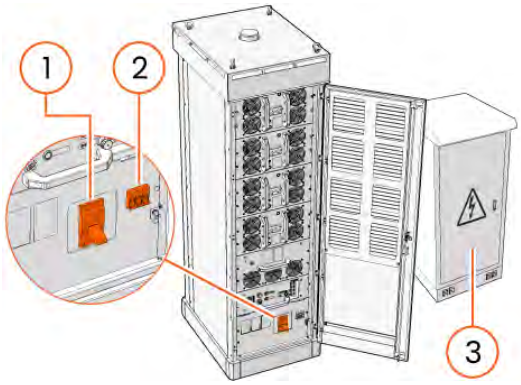
Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

	Remove the three security T30 screws. Open the front panel of the unit. In older models, the size of the front panel's screws is H3.
	Remove the PZ1 screws to release the cables from the contactors (2 or 4 contactors per Satellite). Before you detach wires, cables, or connectors, take a photograph of them.
	Remove the contactors from the Satellite.
	Install the new contactors.

	Connect the cables to the new contactors. Make sure that all cables are correctly connected and locked.
	Close the front panel of the unit. Install the three security T30 screws. In older models, the size of the front panel's screws is H3. Make sure that no cables are caught between the front panel and the frame of the unit. Make sure that no cables push against the LED panel on the front panel of the unit.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.4.2 Replacing the relay card (units manufactured after 11/2022)

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

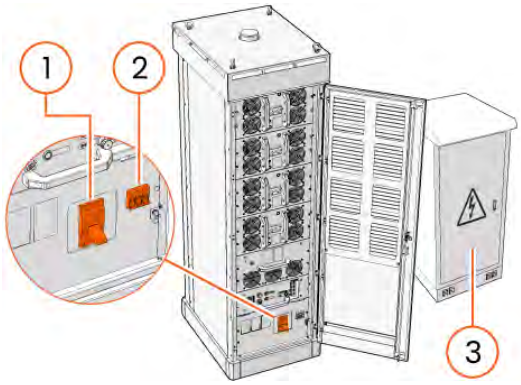
Needed for the task

The estimated labor time for the individual task is 45 min.

- Wide flathead screwdriver

For tools, see *5.1 Required tools and equipment*.

Task



Unlock and open the door(s) of the charging power unit.

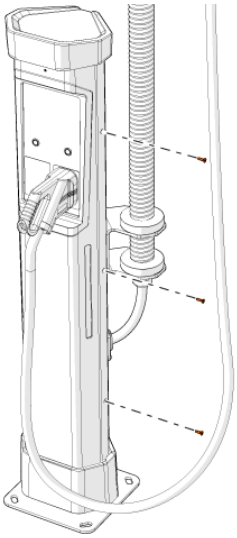
In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to OFF position.

Disconnect the AC power supply to the unit from the main supply point (3).

Complete the lockout-tagout (LOTO) procedure.

WARNING

After you disconnect the power supply, wait at minimum two minutes for the capacitors of the power module(s) to discharge before you continue. Before you start work, measure the voltage of the electrical circuits to make sure that no dangerous voltage remains.

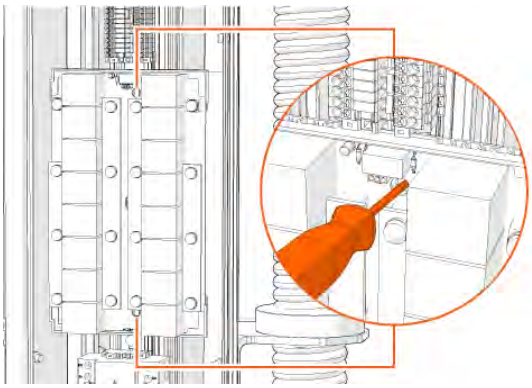


Remove the three security T30 screws. Open the front panel of the unit.

In older models, the size of the front panel's screws is H3.

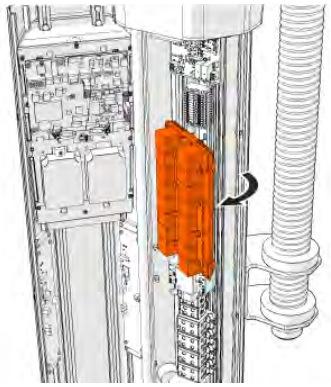
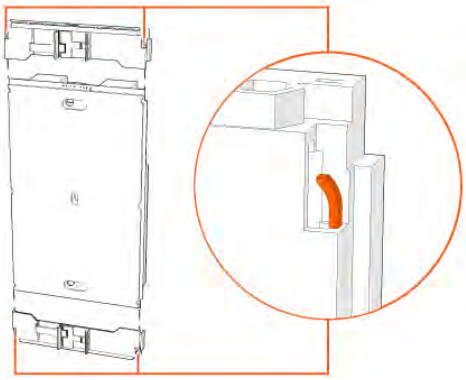
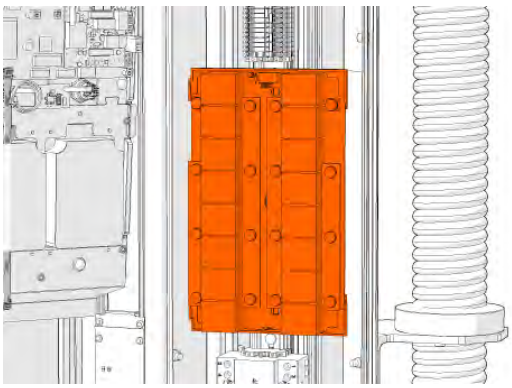
Before you detach wires, cables, or connectors, take a photograph of them.

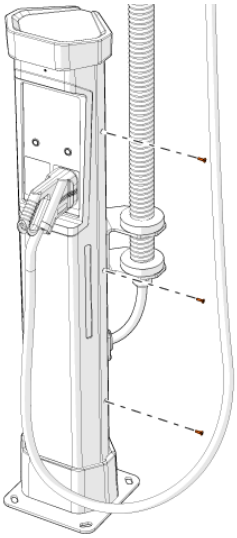
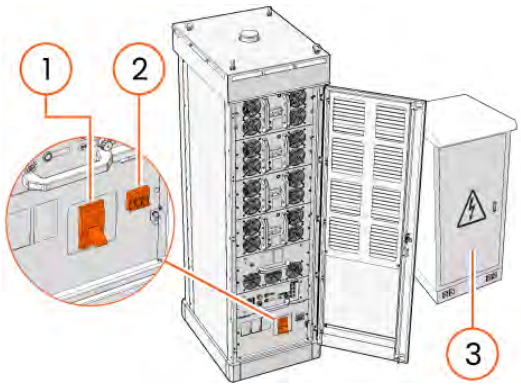
Detach all cables or wires connected to the relay card. The size of the cable fixing screws is T30.



Use a wide flathead screwdriver to carefully release the two relay card holders (1) from the Satellite. Carefully twist the screwdriver to release the relay card holder's latch.

Using too much force damages the relay card holder. Be very careful not to damage the relay card holder.

	Remove the relay card from the Satellite, start from the right side.
	Remove the relay card holders from the relay card. Use a flathead screwdriver to release the two latches (one in each corner) and then carefully pull the holder away from the relay card. Repeat for the second holder.
	Carefully attach the relay card holders to the new relay card. Be careful not to damage the relay card or the holders.
	Install the new relay card onto the unit frame. Make sure that the relay card is installed the correct way up.

	Connect all cables and wires to the relay card. Make sure to place the cables neatly inside the frame so that they do not push against the front panel. Tighten each screw terminal to the correct torque (9.8 Nm).
	Close the front panel of the unit. Install the three security T30 screws. In older models, the size of the front panel's screws is H3. Make sure that no cables are caught between the front panel and the frame of the unit. Make sure that no cables push against the LED panel on the front panel of the unit.
	Connect the AC power supply to the unit from the main supply point (3). In each cabinet, set the miniature circuit breaker (MCB) for control voltage (2) and main switch (1) to ON position. Lock the door(s) of the unit.

5.5.5 AC Satellite

5.5.5.1 Examining the tightening torques of terminal blocks

WARNING

Loose cable terminal connections are dangerous. Risk of death, electric shock, and fire.

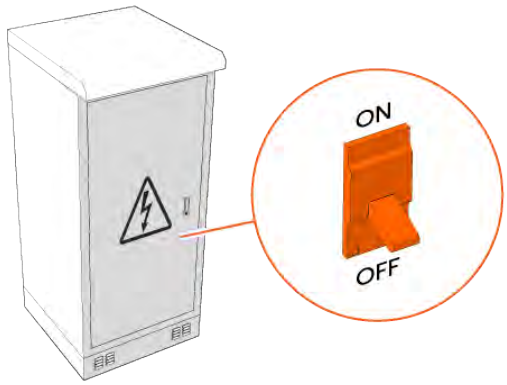
If the spring terminals are loose, replace them. Only screw terminals can be tightened.

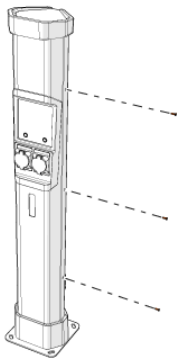
Needed for the task

The estimated labor time for the individual task is 35 min.

For tools, see *5.1 Required tools and equipment*.

Task

	Disconnect the AC power supply to the unit from the main supply point. Lock the main switch in OFF position.



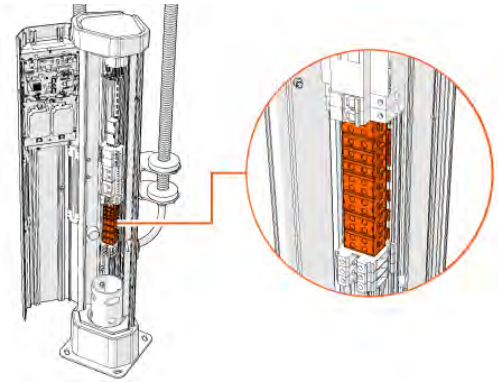
Remove the three security T30 screws. Open the front panel of the unit.

In older models, the size of the front panel's screws is H3.

Turn off the main circuit breaker of the AC Satellite.

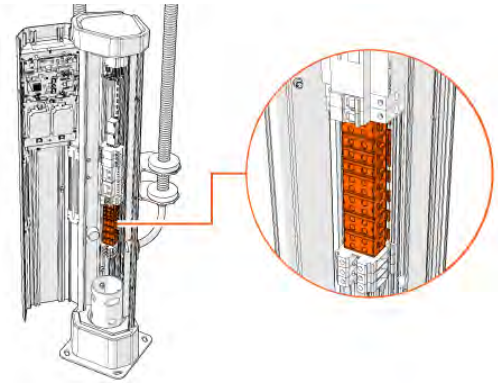
WARNING

Make sure that the AC supply is disconnected and the Satellite is de-energized.



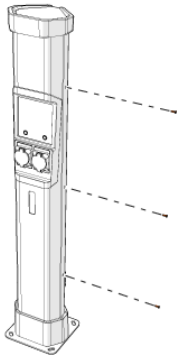
Use the torque wrench to inspect the tightening torques of the AC power terminal blocks.

Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.



Inspect the tightness of the spring terminal blocks.

If the connections are loose, replace the terminal blocks. See *5.5.5.2 Replacing a terminal block* .

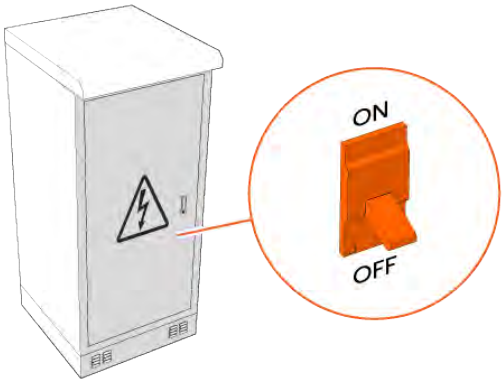


Close the front panel of the unit. Install the three security T30 screws.

In older models, the size of the front panel's screws is H3.

Make sure that no cables are caught between the front panel and the frame of the unit.

In older models, make sure that no cables push against the LED panel on the front panel of the unit.



Connect the AC power supply to the unit from the main supply point.

Lock the door(s) to the power supply.

5.5.5.2 Replacing a terminal block

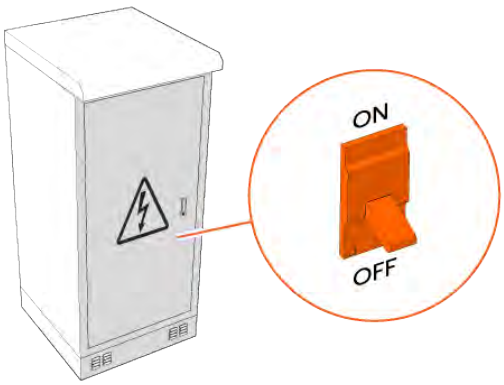
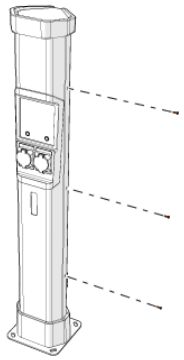
In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

Needed for the task

The estimated labor time for the individual task is 35 min.

For tools, see *5.1 Required tools and equipment*.

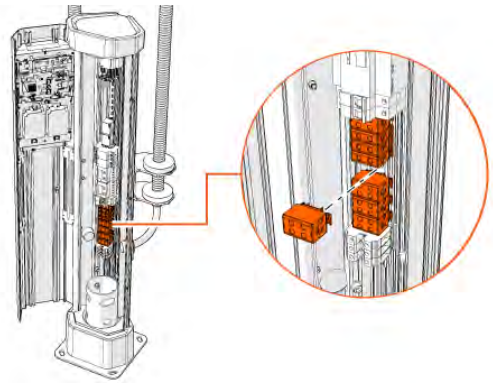
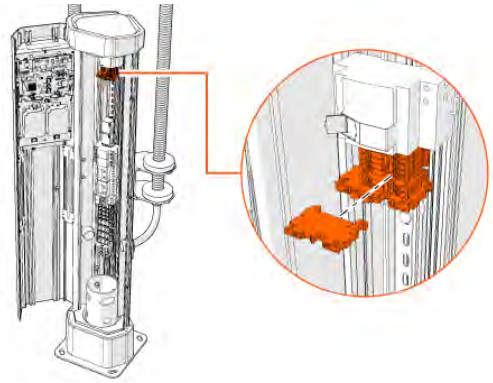
Task

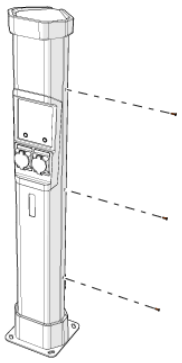
	Disconnect the AC power supply to the unit from the main supply point. Lock the main switch in OFF position.
	Remove the three security T30 screws. Open the front panel of the unit. In older models, the size of the front panel's screws is H3.

	Turn off the main circuit breaker of the AC Satellite. **WARNING** Make sure that the AC supply is disconnected and the Satellite is de-energized.

DANGER

Measure the power terminals to make sure that no voltage remains before you continue. Risk of death.

	Before you detach wires, cables, or connectors, take a photograph of them. Detach the DC power cables from the terminal block. The size of the cable fixing screws is H6. Replace the clip-type terminal block. Connect the cables again. Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.
	Before you detach wires, cables, or connectors, take a photograph of them. Detach the control signal cable wires from the spring terminal block. Replace the clip-type terminal block. Connect the control signal cable wires again.

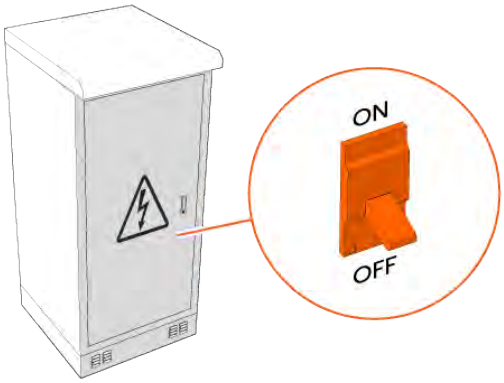


Close the front panel of the unit. Install the three security T30 screws.

In older models, the size of the front panel's screws is H3.

Make sure that no cables are caught between the front panel and the frame of the unit.

In older models, make sure that no cables push against the LED panel on the front panel of the unit.



Connect the AC power supply to the unit from the main supply point.

Lock the door(s) to the power supply.

5.5.5.3 Replacing the charging cable

DANGER

Make sure that the AC satellites are correctly isolated when necessary during installation, service or maintenance work. Know and obey general and local safety regulations and procedures. Use adequate personal protection equipment (PPE).

In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

The AC Satellite is not connected to a charging power unit. It is connected directly to the main power supply.

Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.

Needed for the task

The estimated labor time for the individual task is 60 min.

For tools, see *5.1 Required tools and equipment*.

Task

1. Disconnect the AC power supply to the unit from the main supply point. Lock the main switch in OFF position.
2. Remove the three security T30 screws of the Satellite. Open the front panel of the unit.

   In older models, the size of the front panel's screws is H3.

3. Detach the charging cable wires from the terminals.

   DANGER

   Make sure that the power supply is disconnected when energy isolation is necessary. Measure to make sure that no voltage remains before you continue.

   Before you detach wires, cables, or connectors, take a photograph of them.

4. Loosen the cable bushing below the spring holder. Depending on the charging cable, the size of the cable bushing is 55–68 mm.

5. Pull the charging cable out of the rubber grommet. Remove the cable bushing and set it aside to be installed to the new charging cable. Lift the charging cable out of the spring holder.
6. Tape the wire ends of the charging cable to avoid fraying. Pull the charging cable through its support spring.

   If necessary, use the draw tape and lubricant to pull the cable.

7. To make the handling of the charging cable and support spring easier during the task, you can temporarily lock the charging cable inside its support spring. The size of the cable clamp's nuts is M10.
8. First install the cable bushing and then the hose clamp on the charging cable. Route the charging cable inside the unit through the rubber grommet. Make sure that the part of the charging cable inside the unit has:
   - Approximately 50 mm of insulation
   - Approximately 600–900 mm of stripped wire
9. Make sure that the wires reach the terminals. Tighten the cable bushing of the charging cable below the spring holder. Depending on the charging cable, the size of the cable bushing is 55–68 mm.
10. Make sure that the rubber grommet's seal sets correctly on the charging cable.
    - Push the charging cable slightly inside the unit so that the seal goes inside the unit.
    - Pull the charging cable slightly out so that the seal folds correctly on the charging cable on the outside of the unit. Tighten the seal in place with the hose clamp.
11. Route each charging cable through the residual current monitor (RCM) before you connect it to the contactor (K4, K5).
12. Connect the wires to the terminals.

    Tighten each screw terminal to the correct torque. The tightening torque is marked on the terminal block.

    For the control signal wire colors of different charging cables, see *8 Control signal wires of the charging cable*.

    - Connect L1, L2, L3, N and PE to the correct terminal blocks:

- Connection to charging socket/vehicle connector 1 to the terminal blocks labelled L1, L2, ...
- Connection to charging socket/vehicle connector 2 to the terminal blocks labelled L1.2, L2.2, ...
- PE wire to the terminal block on the DIN rail. Do not connect the PE wire to the front panel of the unit.

◦ Connect only the white CP signal wire of the charging cable to the unit connector (X4 right, X5 left).

13. Examine the seal of the charging cable in the rubber grommet. If necessary, apply flexible polyurethane sealant to waterproof the opening.
14. Close the front panel ofthe unit. Install the three security T30 screws.

In older models, the size of the front panel's screws is H3.

Make sure that no cables are caught between the front panel and the frame of the unit.

Make sure that no cables push against the LED panel on the front panel of the unit.

15. Connect the AC power supply to the unitfrom the main supply point.
16. Test the RCM.

5.5.5.4 Replacing the AC charging socket

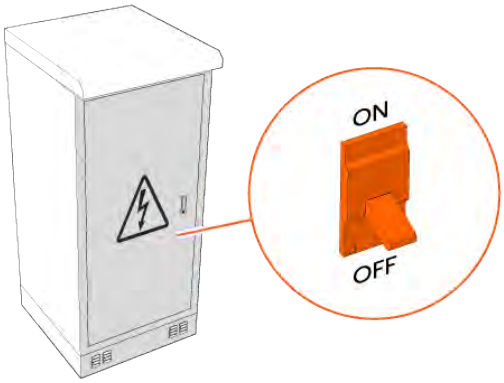
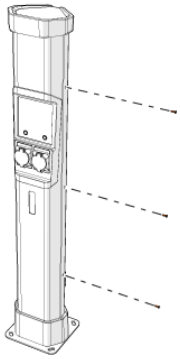
In wet conditions, weatherproof the working area before you open any doors, panels or covers of the unit.

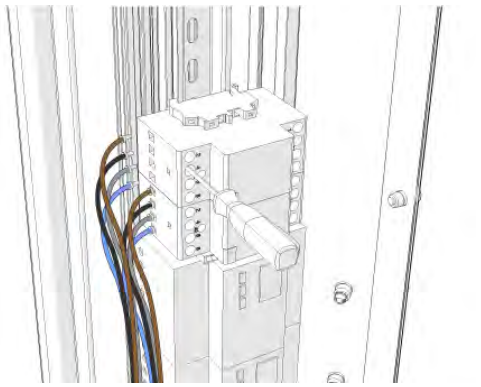
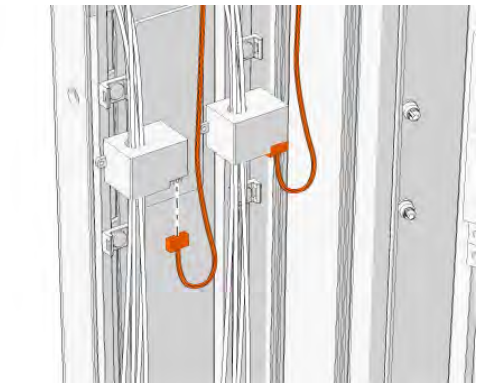
Needed for the task

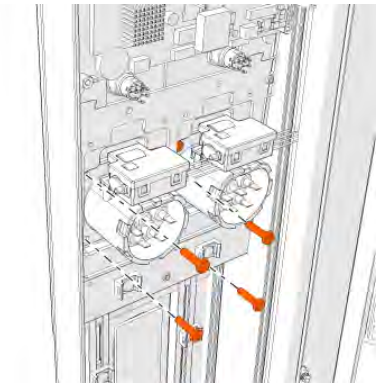
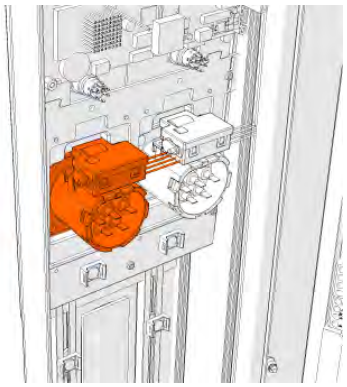
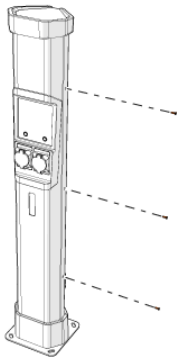
The estimated labor time for the individual task is 30 min.

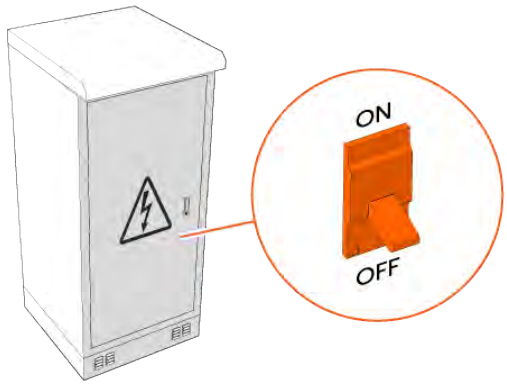
For tools, see *5.1 Required tools and equipment*.

Task

	Disconnect the AC power supply to the unit from the main supply point. Lock the main switch in OFF position.
	Remove the three security T30 screws. Open the front panel of the unit. In older models, the size of the front panel's screws is H3.
	Cut the cable ties that are holding the AC socket cable ties together using side cutters.

	Remove the T30 screw to open the earthed contact.
	Loosen the PZ1 screws to release the four socket cables from the contactor. The cables are marked with the colors black, blue, gray, and brown. Make sure that you select the cables for the AC socket that you are replacing.
	Unplug the residual current monitor (RCM) connector. Slide the RCM module aways from the harness.
	Unplug connector X4.

	Remove the four screws (two on each side) of the connector.
	Remove the old AC socket, including the wiring harness.
	Assemble in reverse order.
	Close the front panel of the unit. Install the three security T30 screws. In older models, the size of the front panel's screws is H3. Make sure that no cables are caught between the front panel and the frame of the unit. In older models, make sure that no cables push against the LED panel on the front panel of the unit.

	Connect the AC power supply to the unit from the main supply point. Lock the door(s) to the power supply.

6 AFTER EVERY MAINTENANCE OR REPAIR TASK

Report the completed tasks to ChargEye.

When you replace parts under warranty, keep the faulty part until you have made sure that Kempower does not need to inspect it.

Complete the following procedure after every maintenance or repair task.

1. Complete the Kempower field visit report. Submit the completed document to Kempower ChargEye. For additional information, contact *Kempower Technical Support*.
2. Do a visual inspection before you connect the main power supply and set the main switch of the charging power unit to ON position. Make sure that:
    - All cables are intact and cable connections are tight
    - All parts, panels, and cables are correctly in place
    - No cables are caught between the unit frame and the panels
3. Connect the main power supply and set the main switch of the charging power unit to ON position. Make sure that the system operates correctly.
4. Make sure that the internet connection operates correctly.
5. Do all required electrical safety tests according to local laws, regulations and requirements.
6. Do the required inspections for the units:

6.1 Sensory inspection

The electrical contractor does the sensory inspection. Its purpose is to verify that the installation obeys the local laws, regulations, and requirements. Make sure that:

- Fire safety is inspected and approved.
- The voltage-carrying conductors are correctly touch-protected.
- The bending of cables does not exceed the minimum bending radius specified by the cable manufacturer.
- All components and cables are in place, correctly installed, and protected.
- All units are in operating condition and have no visible damages.
- All charging cables, vehicle connectors, and possible charging sockets are in operating condition and have no visible damages.
- All units are firmly secured to their installation surface.
- All labels on the units are clear and obey the electrical design documentation.
- If the configuration has an equipment stop button (option), it is in place and operates correctly.
- If the configuration requires an emergency stop circuit, it is in place and operates correctly.

6.2 Electrical installation and safety inspection

CAUTION

Make sure that the electrical safety tests have been done according to local laws and regulations.

CAUTION

If you remove touch protection for the inspection, install it back again.

Note the name, number and revision of the electrical design documentation.

The electrical contractor does the electrical installation and safety inspection. Its purpose is to verify that the installation obeys the local laws, regulations, and requirements.

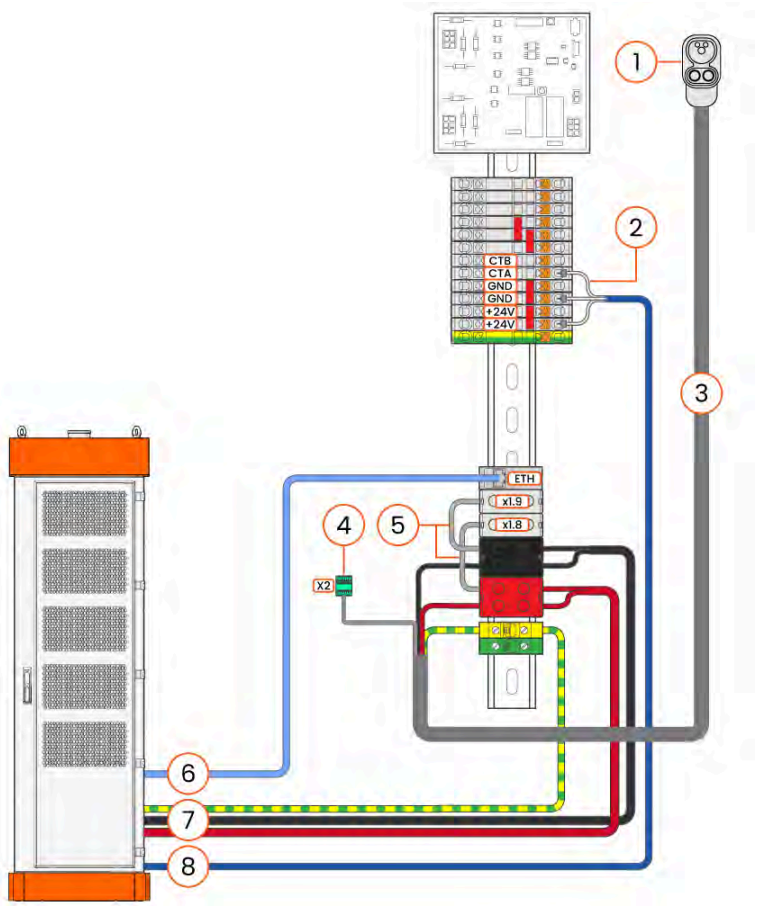
Item to inspect	Power Unit	Station Charger	Satellite	Satellite Version 2	Liquid Cooled Satellite	AC Satellite	AC Satellite with charging cables
Phase order of AC supply power cable connections correct	•	•				•	•
Tightening torques of AC supply power cable connections correct	•	•				•	•
DC output power cables correctly labeled at both ends	•	•	•	•	•		
Tightening torques of DC output power cable connections correct	•	•	•	•	•		
Control cables correctly labeled at both ends	•	•	•	•	•		
Charging cable wires connected to correct terminals		•	•	•		•	•
Cable bushings of charging cables correctly tightened		•	•	•	•	•	•
Ethernet cables tested with LAN tester	•	•	•	•	•	•	•
AC supply wires correctly labeled (L1–L2–L3)						•	•
AC supply phases correctly reordered (multiple AC satellites)						•	•
Ethernet cable connected to EXT port of control board (option)						•	•

7 EXAMPLES OF CONNECTING CABLES TO THE SATELLITES

7.1 Satellite with one CCS vehicle connector

Grounding of the Ethernet shield at one end only, charging power unit or Satellite.

Figure 20. Satellite with one combined charging system (CCS) vehicle connector

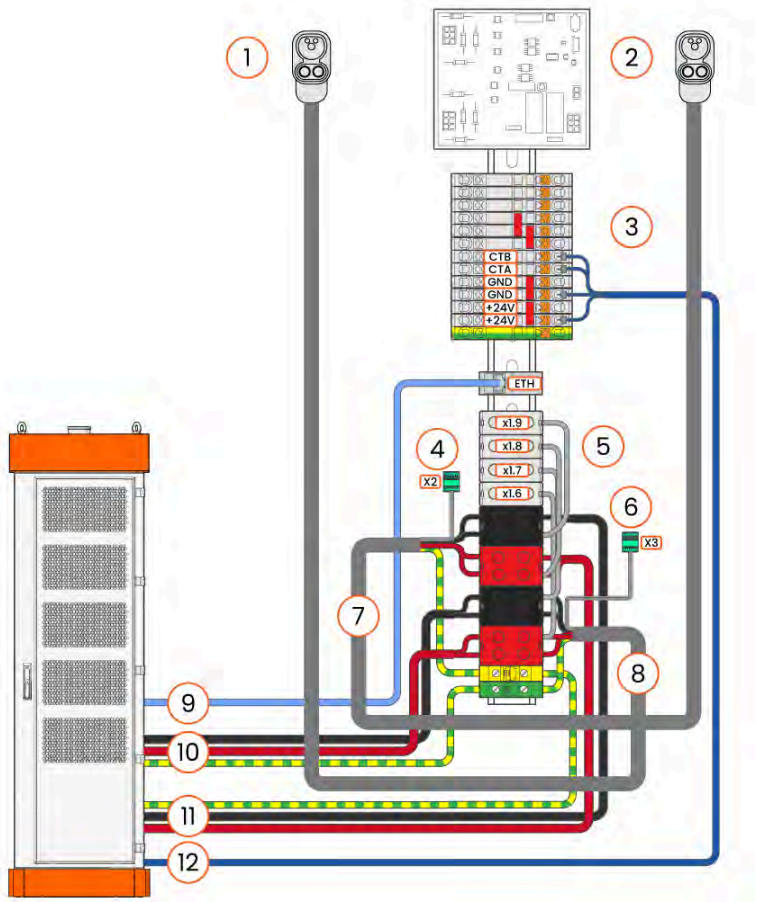


1	Configuration tag (right vehicle connector)	5	Voltage measurement wires
2	CT line signal wires	6	Communication cable
3	Charging cable	7	DC output power cables + PE
4	Vehicle connector signal wires	8	Control cable (CT line)

7.2 Satellite with two CCS vehicle connectors

Grounding of the Ethernet shield at one end only, charging power unit or Satellite.

Figure 21. Satellite with two combined charging system (CCS) vehicle connectors

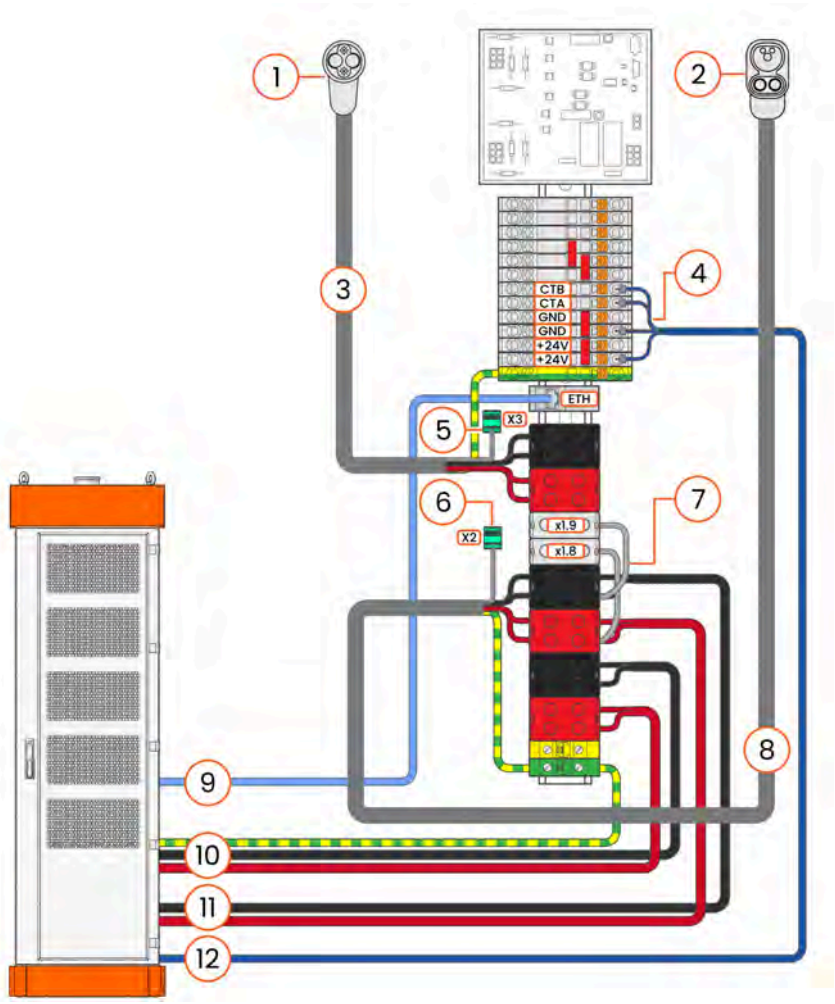


1	Configuration tag (left vehicle connector)	7	Charging cable (right)
2	Configuration tag (right vehicle connector)	8	Charging cable (left)
3	CT line signal wires	9	Communication cable
4	Vehicle connector signal wires (right)	10	DC output power cables + PE (left)
5	Voltage measurement wires	11	DC output power cables + PE (right)
6	Vehicle connector signal wires (left)	12	Control cable (CT line)

7.3 Satellite with one CCS and one CHAdeMO vehicle connector

Grounding of the Ethernet shield at one end only, charging power unit or Satellite.

Figure 22. Satellite with one combined charging system (CCS) and one CHAdeMO vehicle connector

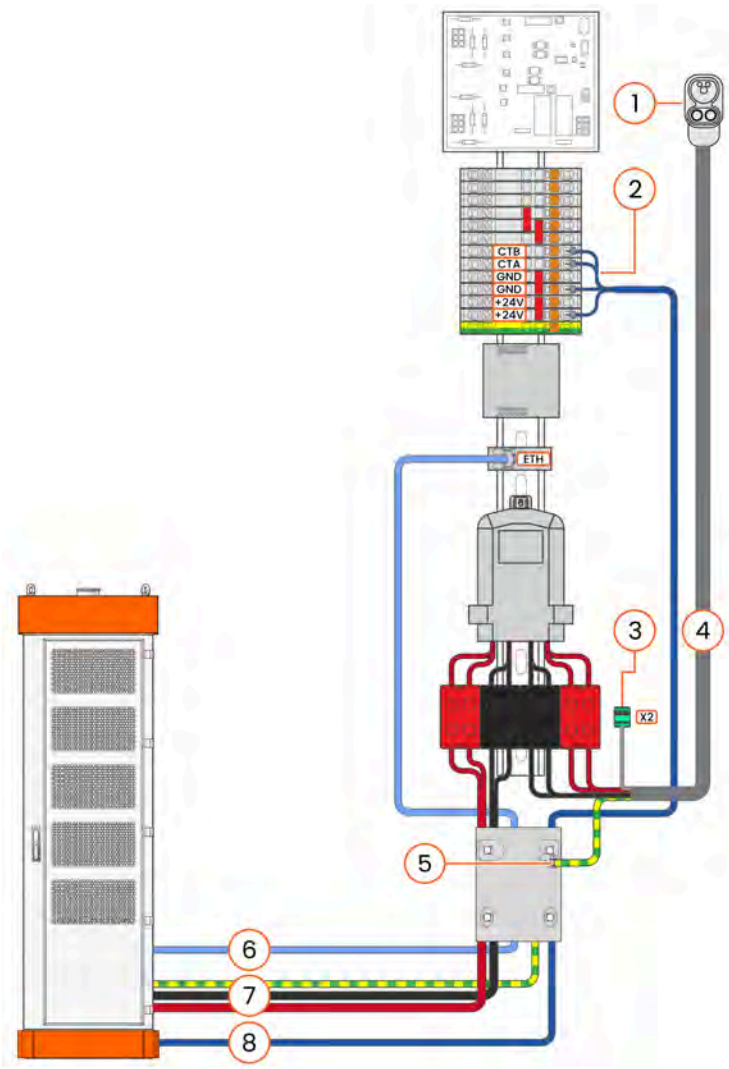


1	Configuration tag (left vehicle connector)	7	Voltage measurement wires
2	Configuration tag (right vehicle connector)	8	Charging cable (right)
3	Charging cable (left)	9	Communication cable
4	CT line signal wires	10	DC output power cables + PE (left)
5	Vehicle connector signal wires (left)	11	DC output power cables + PE (right)
6	Vehicle connector signal wires (right)	12	Control cable (CT line)

7.4 Satellite Version 2 with one CCS vehicle connector

Grounding of the Ethernet shield at one end only, charging power unit or Satellite.

Figure 23. Satellite with one combined charging system (CCS) vehicle connector

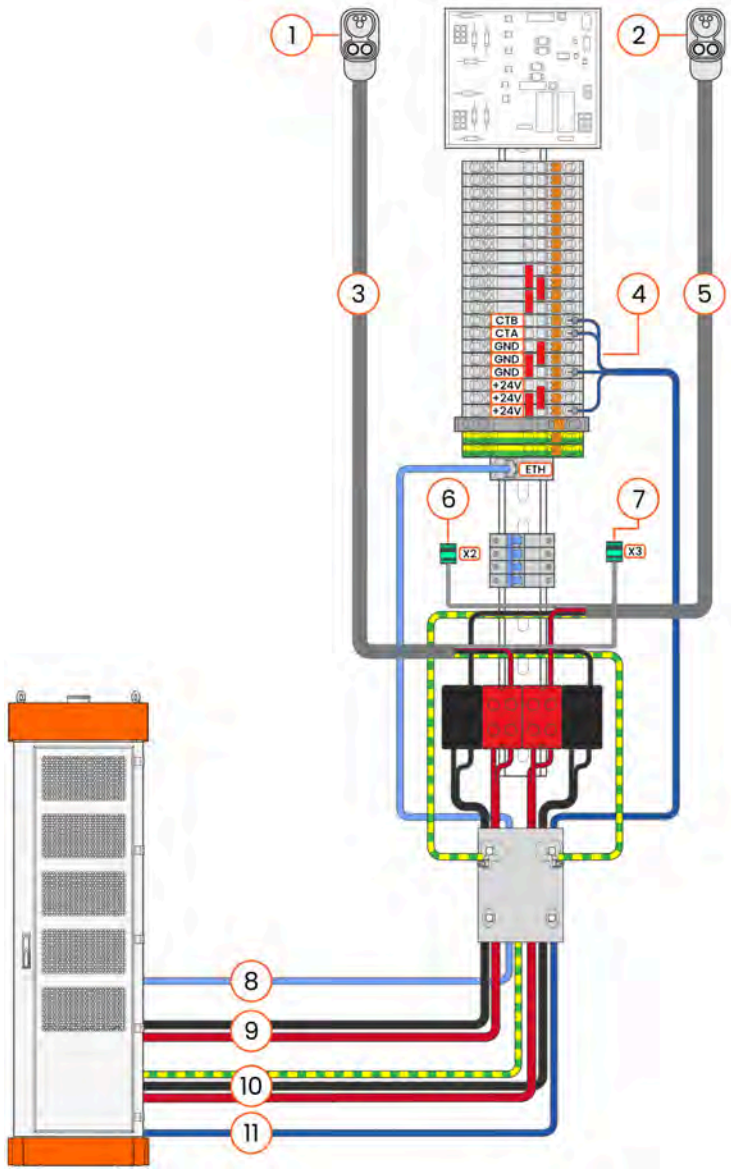


1	Configuration tag (right vehicle connector)	5	Connect PE wire to Satellite installation flange with wire clamp
2	CT A line signal wires (CT B not connected)	6	Communication cable
3	Vehicle connector signal wires	7	DC output power cables + PE
4	Charging cable	8	Control cable (CT line)

7.5 Satellite Version 2 with two CCS vehicle connectors

Grounding of the Ethernet shield at one end only, charging power unit or Satellite.

Figure 24. Satellite Version 2 with two combined charging system (CCS) vehicle connectors

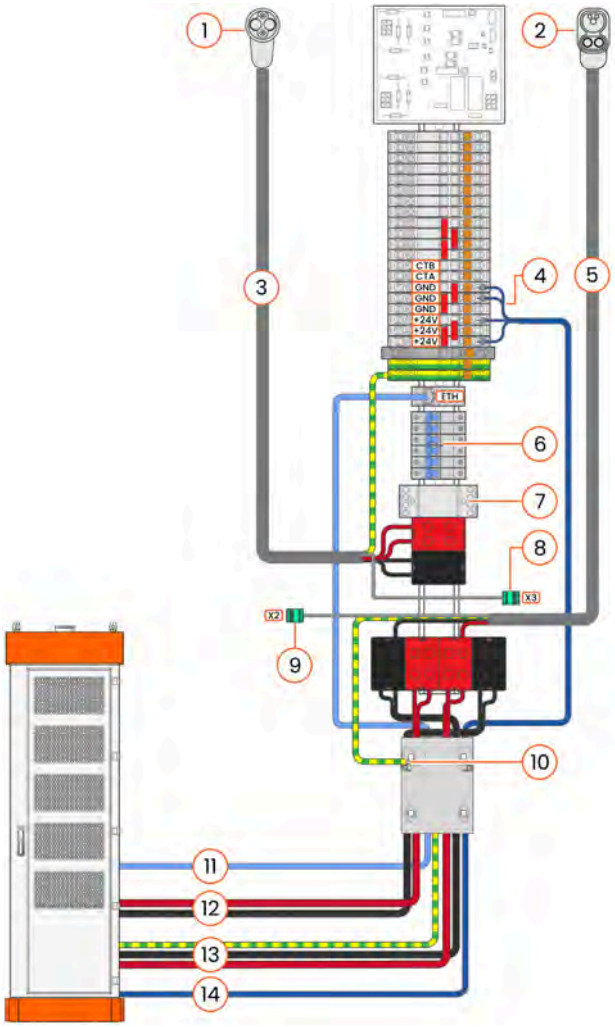


1 Configuration tag (left vehicle connector)
2 Configuration tag (right vehicle connector)
3 Charging cable (left)
4 CT line signal wires
5 Charging cable (right)
6 Vehicle connector signal wire (left)
7 Vehicle connector signal wire (right)
8 Communication cable
9 DC output power cables (left)
10 DC output power cables + PE (right)
11 Control cable (CT line)

7.6 Satellite Version 2 with one CCS and one CHAdeMO vehicle connector

Grounding of the Ethernet shield at one end only, charging power unit or Satellite.

Figure 25. Satellite Version 2 with one combined charging system (CCS) and one CHAdeMO vehicle connector

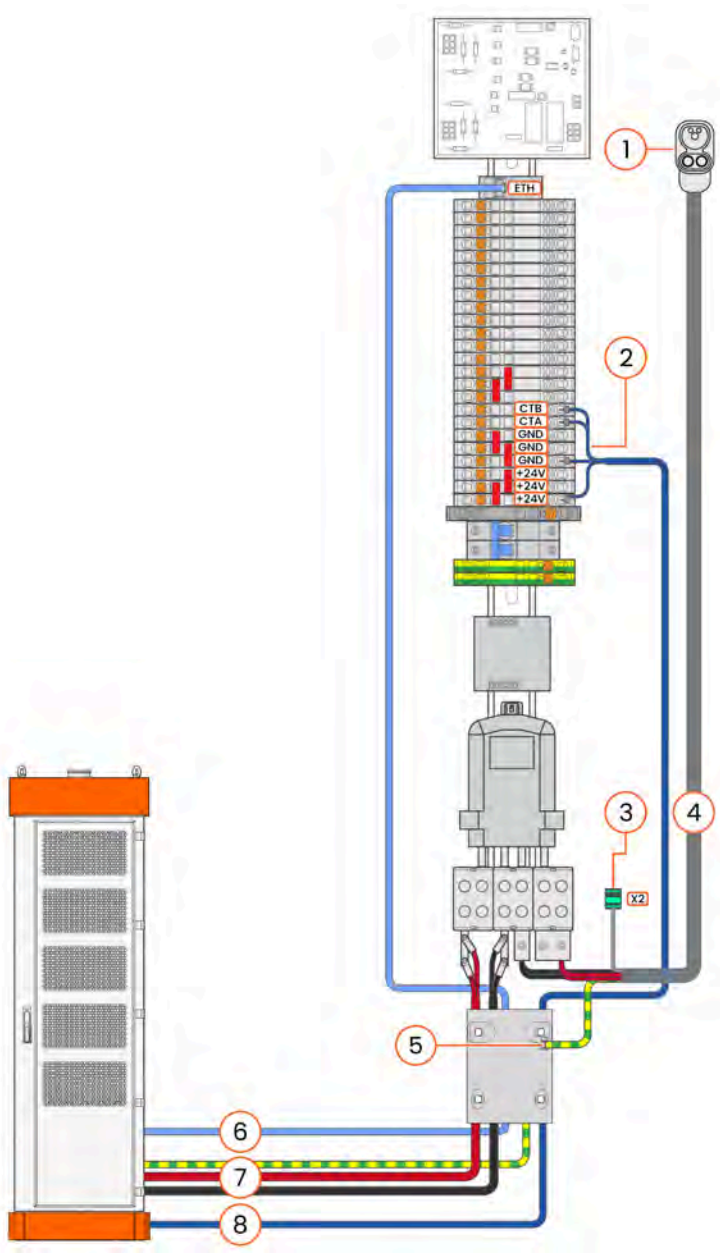


1	Configuration tag (left vehicle connector)	8	Vehicle connector signal wire (left)
2	Configuration tag (right vehicle connector)	9	Vehicle connector signal wire (right)
3	Charging cable (left)	10	Connect PE wire to Satellite installation flange with wire clamp
4	CT line signal wires	11	Communication cable
5	Charging cable (right)	12	DC output power cables (left)
6	Voltage measurement fuses	13	DC output power cables + PE (right)
7	Contactor for CHAdeMO	14	Communication cable

7.7 Liquid Cooled Satellite with one CCS vehicle connector

Grounding of the Ethernet shield at one end only, charging power unit or Satellite.

Figure 26. Liquid Cooled Satellite with one combined charging system (CCS) vehicle connector



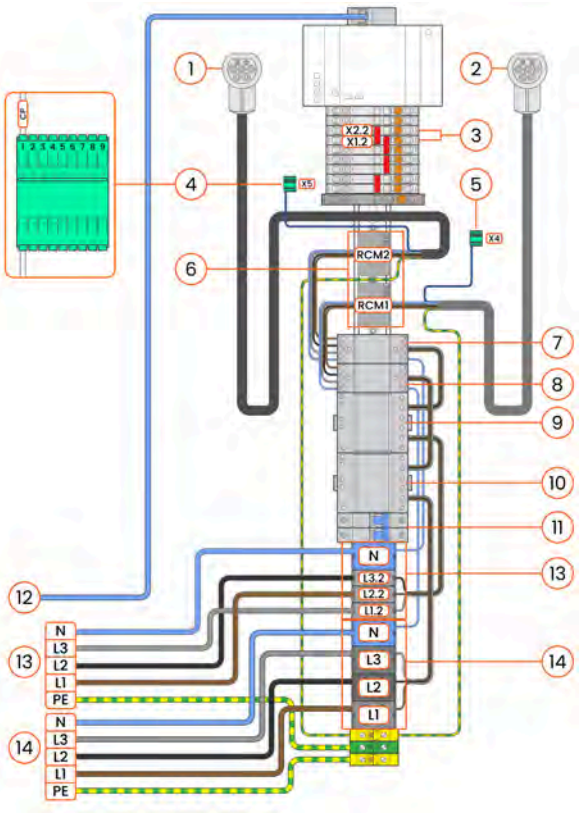
1	Configuration tag (right vehicle connector)	5	PE wire connected to installation flange with wire clamp
2	CT A line signal wires (CT B not connected)	6	Communication cable
3	Vehicle connector signal wires	7	DC output power cables + PE
4	Charging cable	8	Configuration tag (right vehicle connector)

7.8 AC Satellite Version 2 with two vehicle connectors

The AC Satellite is not connected to the charging power unit. It requires only AC supply cables that are connected to the main AC supply.

If the optional communication cable is used, grounding of the Ethernet shield at one end only, AC Satellite or network connection switch.

Figure 27. AC Satellite Version 2 with vehicle connectors



1	Configuration tag (left vehicle connector)	8	Contactor (right)
2	Configuration tag (right vehicle connector)	9	kWh meter (left)
3	Connection for equipment stop (option)	10	kWh meter (right)
4	Socket signal wires (left)	11	Operating power circuit breaker
5	Socket signal wires (right)	12	Ethernet (public LAN) communication cable(option)
6	Residual current monitoring sensors	13	AC input 2[1]
7	Contactor (left)	14	AC input 1

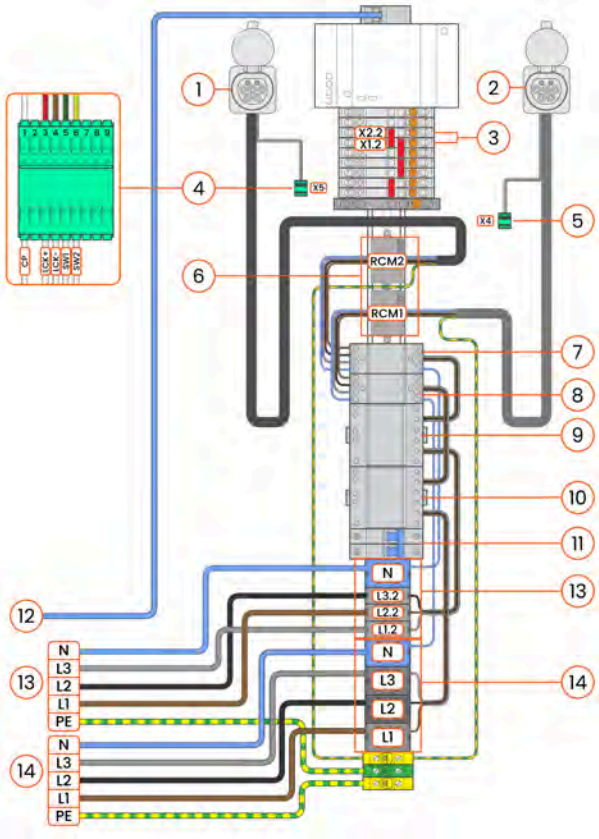
[1] *If the site has multiple AC Satellites, we recommend shifting the phase order L1→L2.2 | L2→L3.2 | L3→1.2 to balance the power consumption in the grid.*

7.9 AC Satellite Version 2 with two sockets

The AC Satellite is not connected to the charging power unit. It requires only AC supply cables that are connected to the main AC supply.

If the optional communication cable is used, grounding of the Ethernet shield at one end only, AC Satellite or network connection switch.

Figure 28. AC Satellite Version 2 with two sockets



1	Configuration tag (left socket)	8	Contactor (right)
2	Configuration tag (right socket)	9	kWh meter (left)
3	Connection for equipment stop (option)	10	kWh meter (right)
4	Socket signal wires (left)	11	Operating power circuit breaker
5	Socket signal wires (right)	12	Ethernet (public LAN) communication cable(option)
6	Residual current monitoring sensors	13	AC input 2[1]
7	Contactor (left)	14	AC input 1

[1] *If the site has multiple AC Satellites, we recommend shifting the phase order L1→L2.2 | L2→L3.2 | L3→1.2 to balance the power consumption in the grid.*

8 CONTROL SIGNAL WIRES OF THE CHARGING CABLE

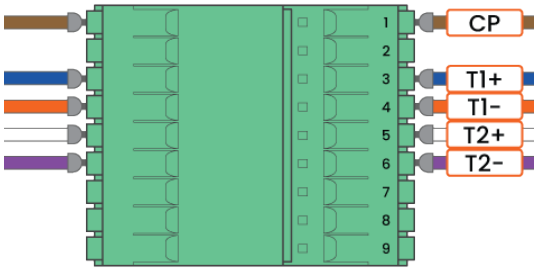
The units have pre-installed wiring harnesses with mating connectors for the control signal wires of the charging cable.

8.1 CCS charging cables

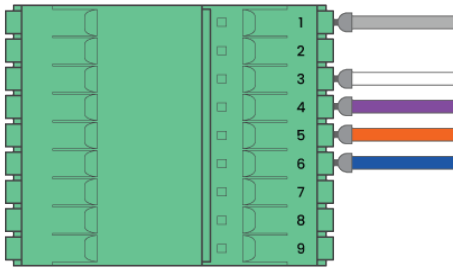
Connect the five control signal wires of the CCS charging cable to the mating connector:

- X2 for the charging cable on the right hand side
- X3 for the charging cable on the left hand side

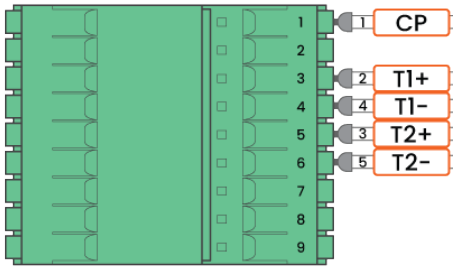
Unit wiring



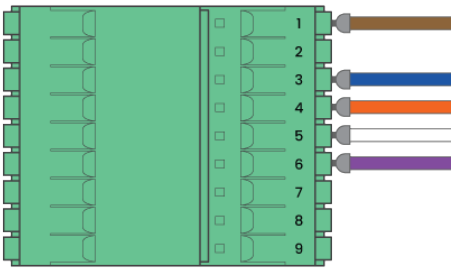
Amphenol charging cable



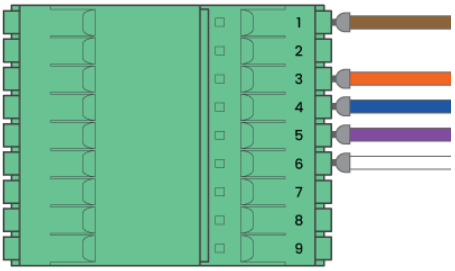
Amphenol charging cable (numbered wires)



Brugg/Phoenix charging cable



REMA charging cable

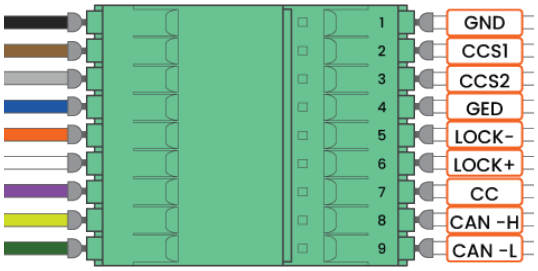


8.2 CHAdeMO charging cables

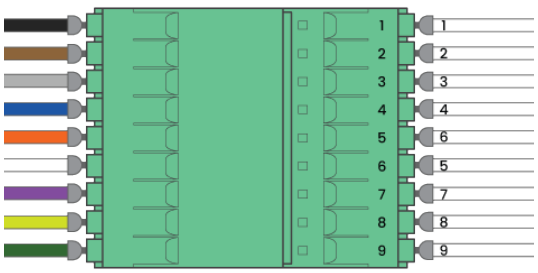
Connect the nine control signal wires of the CHAdeMO charging cable to the mating connector:

- X2 for the charging cable on the right hand side
- X3 for the charging cable on the left hand side

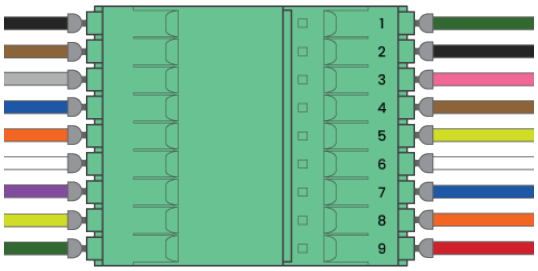
Unit wiring



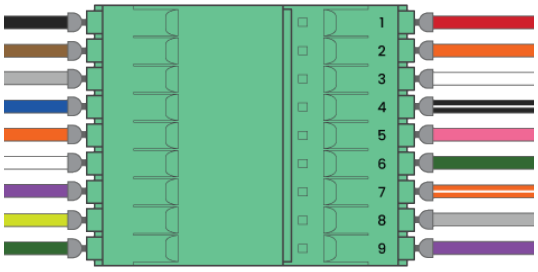
CHAdeMO 40142
DC+ BROWN
DC- BLUE



CHAdeMO 40147
DC+ WHITE
DC- BLACK



CHAdeMO 40222
DC+ BLACK
DC- BLUE



9 TROUBLESHOOTING

9.1 On-site troubleshooting

Problem	Possible cause	Possible solution
Display screen is black and does not activate when touched	No power	Reboot the charging unit. Make sure that: • The main switch is ON • The main AC supply is ON (fuses, switches)
	Defective charging unit	Reboot the charging unit. Repair or replace damaged parts.
Charging session does not start	Bad contact between vehicle connector and socket	Remove the vehicle connector and try again.
	User cannot be authorized	Reboot the charging unit and try again. Use different RFID tags if possible. Make sure that the customer's backend is connected.
	Vehicle communication error	Remove the vehicle connector and try again. Lock/unlock the vehicle and try again.

Problem	Possible cause	Possible solution
	Vehicle's timer blocks charging	The vehicle can limit repetitive charges. Check the vehicle's settings/alarms. Wait a few minutes and try again.
	Vehicle connector overheated	Remove the vehicle connector. Allow to cool. Long charging sessions on a warm day can overheat the vehicle connector.
	Vehicle battery overheated	Allow to cool. Long distance driving on a warm day can overheat the battery. Check the vehicle's temperature alarms.
	Vehicle connector wet/icy/dirty/ damaged	Dry, defrost or clean the vehicle connector. Repair or replace damaged parts.
Vehicle is not fully charged Charging session takes too long	Reduction of charging power	When the ambient temperature is not in the nominal temperature range (-30...+50 °C/CHAdeMO +40 °C), the charging unit may reduce the charging current.
		When the ambient temperature is not in the nominal temperature range (-30...+50 °C/CHAdeMO +40 °C), the vehicle may reduce the charging current to protect its battery. When state of charge (SoC) is > 80% the vehicle usually reduces charging power to protect its battery.
		Make sure that the air channels and air filters are clean. Clean or replace as necessary.
Vehicle connector stays locked in the vehicle's socket	Vehicle did not end charging session	The vehicle connector stays locked for the duration of the charging session. Obey the vehicle's instructions to end the charging session. Push the **start** button of the vehicle for several seconds to try to release the lock.
	Tensioned charging cable prevents release of vehicle connector	Support the cable to release the tension and pull out the vehicle connector.
	Power cut during charging session	Reboot the charging unit.

Problem	Possible cause	Possible solution
Charging session ends unexpectedly	Charging session ends before battery is fully charged	The battery or the vehicle connector is overheated. Allow to cool and try again.
		If the problem continues, contact *Kempower support*.
	Power cut during the charging session	Reboot the charging unit.

9.2 Remote troubleshooting

Problem	Possible cause	Possible solution
Power is on but the display does not respond or is blank	Selftest failed	Reboot the charging unit.
	Software problem	Reboot the charging unit.
The charging session does not start	User authorization problem	Read ChargEye error messages. If necessary, contact *Kempower support* .
	External authorization service problem	Make sure that the charging unit is online. Reboot the charging unit. If necessary, contact *Kempower support*.
	Problem with vehicle authorization or vehicle communication fails	Read ChargEye error messages. Try again a few times. If necessary, contact *Kempower support*.
Low charging power	Connector overheated	Check the connector temperature from ChargEye. Allow to cool and try again.

9.3 Fault and alarm messages

If the suggested solutions do not help, contact *Kempower support*.

Message	Possible cause	Possible solution
CONNECTOR_ENABLE_LINE_CONTROL_ERROR	Control signal line of satellite disconnected	Make sure that the control signal lines are correctly connected in the charging power unit and the satellite(s).
CONNECTOR_MISSING_PMC	No power modules assigned to satellite	On the configuration page, add power outputs to the satellite(s).
CONNECTOR_NOT_REGISTERED	Connector not registered Another device with IP .200 in the same network	Make sure that the IP address of each satellite is unique.
CONNECTOR_OUTPUT_LINE_RELAY_ERROR	Relay malfunction Problem with relay module Problem with X contactor Problem with wiring	Make sure that the power distribution module operates correctly. Make sure that the X contactor is in operating condition. Make sure that the wiring is connected correctly.
CONNECTOR_VOLTAGE_MEASUREMENT_TYPE_UNKNOWN	System unable to detect voltage measurement card type in satellite	Restart the charger.
CONNECTOR_VOLTAGE_MISSING	Not able to measure voltage Problem with voltage measurement board DC voltage missing	Make sure that the voltage measurement board operates correctly. Make sure that the cabling is connected correctly.

Message	Possible cause	Possible solution
CONNECTOR_VOLTAGE_UNEXPECTED	Self-test unsuccessful High voltage DC cabling connected incorrectly	Make sure that the configuration is correct.
ERROR_CURRENT_MISMATCH	Mismatch between requested and measured current Problem with sensor	If necessary, replace the power module.
ERROR_FAN_CURRENT	Problem with fan Current out of range for power module	Make sure that the fan operates correctly. If necessary, replace the power module.
ERROR_GROUND_FAULT	Ground fault in power module	Make sure that the vehicle operates correctly. Make sure that there is no moisture inside the charger, all cables are correctly connected, and the power module operates correctly.
ERROR_KEEPALIVE_TIMER	Problem with controller area network (CAN) connection	Make sure that the CAN bus operates correctly.
ERROR_NO_CALIBRATION	Power module not calibrated	Replace the power module.
ERROR_OUTPUT_OVERVOLTAGE	Output overvoltage Vehicle opened its contactors during charging	Restart charging. If the problem occurs repeatedly, contact *Kempower support*.
ERROR_PHASE_ALARM	Missing phase in power module	Make sure that the input fuses operate correctly.
ERROR_PRIMARY_OVERVOLTAGE	Mains overvoltage	Make sure that the mains voltage is correct. Make sure that the input fuses operate correctly. If necessary, replace the power module.

Message	Possible cause	Possible solution
ERROR_PRIMARY_UNDERVOLTAGE	Mains undervoltage Missing phase in power module	Make sure that the input fuses operate correctly. Make sure that the power module operates correctly.
ERROR_SHORTCIRCUIT	Short circuit in output	Make sure that the cabling is connected correctly. Make sure that the cabling is in operating condition.
ERROR_TRANSFORMER_OVERHEAT_NTC	Transformer overheated Hardware failure or environment too hot	Make sure that the environment conforms with the specifications. Make sure that ventilation operates correctly.
ERROR_TRANSFORMER_OVERHEAT	Transformer overheated Hardware failure or environment too hot	Make sure that the environment conforms with the specifications. Make sure that ventilation operates correctly.
EVSE_OCCUPIED	Electric vehicle supply equipment (EVSE): all channels occupied Exceeded maximum amount of parallel sessions	Make sure that the power module operates correctly.
NO_BUS	Problem with Ethernet connection to satellite(s) Mismatch of software between charging power unit and satellite(s)	Make sure that the Ethernet connection operates correctly. Make sure that the software of the charging power unit and the satellite(s) match.

Message	Possible cause	Possible solution
NO_CONNECTORS	Connectors missing No satellites configured/connected to charging power unit	On the configuration page, complete the configuration process.
NO_HEARTBEAT	No connection to satellite(s) Faulty Ethernet connection Problem with power	Reboot the charging power unit. Make sure that 24 V power is available. Make sure that the Ethernet connection operates correctly. Make sure that the IP address of each satellite is unique.
PARTIALLY_OK	Charger partially in operating condition Satellite(s) failed self-test	Make sure that 24 V power is available. Make sure that the Ethernet connection operates correctly. Make sure that the control signal lines and DC input cables are correctly connected. Make sure that the cables are in operating condition.
PILOT	State of control pilot is "E" Problem with omega controller board or its power line communication module Problem with piggyback board Problem with grounded control pilot (CP) line	Make sure that the omega controller board operates correctly. Make sure that the CP line is not grounded.
PILOT_INIT	Pilot software of satellite did not start Pilot software updating	If the error message does not disappear in 5 minutes, update the software or replace the omega controller board.

Message	Possible cause	Possible solution
PMC_FAN_CURRENT	Problem with fan(s) of power module Current of fan(s) out of range	Make sure that the fan(s) are in operating condition. If necessary, replace the power module fan(s).
PMC_MISSING_ON_BOOT	Configured system setup did not match the setup discovered during startup Some of power modules configured in system structure not reachable	Make sure that the configuration matches the physical setup. Try restarting the charging system.
PMC_SERIAL_RELAY_BROKEN	With adaptive voltage dynamic module: power channel interconnecting relay detected as broken (not conducting) during system startup check	Restart the charging system. If the problem persists, replace the dynamic module.
PMC_SERIAL_RELAY_WELD	With adaptive voltage dynamic module: power channel interconnecting relay detected as broken (always conducting) during system startup check	Restart the charging system. If the problem persists, replace the dynamic module.
PMC_UNTESTABLE_ON_SERIAL_SYSTEM	With adaptive voltage dynamic module: power channel disabled because unable to test interconnecting relay of dynamic module during system startup check	Restart the charging system. If the problem persists, replace the dynamic module.
PMC_VOLTAGE_MISSING	Power module does not have power Power module's circuit breaker tripped If error appears during commissioning, problem with configuration (ChargEye)	If necessary, reset the circuit breaker. Make sure that the DC power cables to satellites are connected as in the ChargEye configuration. Do a cabling cross check test.

Message	Possible cause	Possible solution
PMC_VOLTAGE_NOT_DROPPING	During self-check found that voltages cannot be discharged properly from the system Problem with discharge resistors of power module	Replace the power module.
PMC_VOLTAGE_UNEXPECTED	During self-check found voltage in power module channel (PMC) that should not have voltage Incorrect connections Problem with dynamic power distribution module Incorrect configuration of static satellite fields	Make sure that the wiring is connected correctly. Make sure that the dynamic power distribution module operates correctly.
RCM_BAD	Ground fault Problem with residual current monitoring (RCM) device	Make sure that the RCM device operates correctly. If necessary, replace the RCM device.
RCM_RESET_FAILED	Ground fault Problem with residual current monitoring (RCM) device	Make sure that the RCM device operates correctly. If necessary, replace the RCM device.
RELAYCARD_FAN_ERROR	Problem with dynamic module fans	Restart the charging system. If the problem persists, replace the dynamic module.
RELAYCARD_SHIFTREGISTER_ERROR	Problem with internal dynamic module operation	Restart the charging system. If the problem persists, replace the dynamic module.
RELAYCARD_VOLTAGE_ERROR	Problem with internal dynamic module operation	Restart the charging system. If the problem persists, replace the dynamic module.

Message	Possible cause	Possible solution
RUNTIME_CONNECTOR_PMC_ERROR	Power failure during charging	Check the error code and proceed accordingly.
RUNTIME_PMC_CONTINUOUS_ATTACH_FAILURES	Continuous failure of dynamically adding specific power channel to ongoing charging sessions, channel blacklisted and not used	Restart the charging system to see if the problematic channel passes the complete startup check. If the problem persists, replace the dynamic module.
RUNTIME_PMC_CONTINUOUS_INSULATION_FAILURES	Continuous failure of insulation/cable test in specific power channel, channel blacklisted and not used	Restart the charging system to see if the problematic channel passes the complete startup check. If the problem persists, replace the dynamic module.
RUNTIME_PMC_OUTPUT_CONTROL_ERROR	Adaptive voltage system entered unconsistent state Power module temporarily disabled	Restart the charging system.
RUNTIME_PMC_TEMPERATURE_SENSOR_BROKEN	Power module derated Problem with transformer temperature measurement sensor	Contact *Kempower support*.
RUNTIME_PMC_VOLTAGE_NOT_DROPPING	Adaptive voltage system: possible problem with serial interconnection relay All systems: possible problem with DC voltage discharge resistors of power module	Restart the charging system.
RUNTIME_RELAYCARD_MISSING	Charger inoperable Communication bus cannot find relay card	Make sure that the Ethernet connection operates correctly.

Message	Possible cause	Possible solution
RUNTIME_TROLLEY_C_CONTACTOR_BROKEN	Problem with power channel interconnect contactor of charging unit	Contact *Kempower support*.
SATELLITE_X_CONNECTOR_BROKEN	Satellite inoperable Voltage measured from wrong output of satellite Measurements not received during cable check	Make sure that the Ethernet connection operates correctly.
SELFTEST_INTERNAL_ERROR	Self-test unsuccessful Problem with relay module Problem with wiring	Make sure that the power distribution module operates correctly.

10 CHANGE LOG

Charging equipment for electric vehicles Owner's Manual v. 2.10 12-2023	Changes
3 Kempower charging equipment for electric vehicles	Added Satellite Version 2, Liquid Cooled Satellite and AC Satellite. Added overviews for the charging unit modules. Updated terminal blocks.
4 Preventive maintenance	Updated Preventive Maintenance tasks and intervals.
5 Maintenance	Updated maintenance tasks. Updated illustrations. Added maintenance tasks for Satellite Version 2, X-Satellite, Liquid Cooled Satellite and AC Satellite.
6 After every maintenance or repair task	Added information about sensory and electrical safety inspections.
7 Examples of connecting cables to the Satellites	Updated illustrations.
8 Control signal wires of the charging cable	Updated illustrations.
9 Troubleshooting	Updated format of troubleshooting.

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