

# Shijiazhuang Maxwell Technology Co.,Ltd

## **MXR100050B Charger Module User Manual**

**Version: V1.0**

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## Overview

This document describes the product in terms of the overview, transportation, storage, installation, maintenance, and technical specifications. Before operating the charger module, ensure that you are familiar with its features, functions, and safety precautions provided in this document.






Figures provided in this document are for reference only.

## Intended Audience

This document is intended for charger module operators and qualified electrical technicians.

## Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
 <b>DANGER</b>	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
 <b>NOTICE</b>	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
 <b>NOTE</b>	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

## Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in previous issues.

### Version 01 (2023-03-21)

This version is the first time official release.

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# 1 Safety Precautions

## General Safety

- Before installing, operating, or maintaining the company's equipment, please read this manual and follow all the safety instructions.
- When installing, operating, and maintaining the equipment, please follow all safety instructions on the equipment and in this document to prevent personal injury and equipment damage.
- The "DANGER", "WARNING", and "CAUTION" statements in this document do not cover all the instructions. They are only supplements to the safety instructions.
- Ensure that the equipment is used in an environment that conforms to its design specifications. Otherwise, the equipment may malfunction and resulting equipment failure, component damage, personal injury, or property damage will not be covered by the warranty.
- Follow all the safety precautions and instructions provided by the company. The safety notes given in this document do not cover all safety notes. The company is not responsible for any consequence caused by violation of the safety operating regulations and design, production, and usage standards.

## Declaration

In any of the following circumstances, the company will not bear any consequences:

- Damaged in transportation
- No barcode or incomplete barcode within the warranty period
- Storage conditions that do not meet the requirements specified in this document
- Incorrect storage, installation, or use
- Installation or use by unqualified personnel
- Failure to operate in accordance with the operating instructions and safety precautions on the product and in this document.
- Operation beyond the conditions specified in this document

- Operation outside the range of specified parameters
- Unauthorized modifications of the product or software code or removal of the product
- Equipment damage caused to force majeure (such as lightning, earthquakes, fire, and storms, etc.)
- The warranty expired will not be extended
- Installation or use in environments which are not specified in relevant international standards
- The charging module cannot prevent battery reverse connection, and needs to be detected by the charger. Module failure caused by battery reverse connection is not covered by the warranty.
- When installing the charging module, ensure that all mounting holes on the module panel are fixed with screws. Module failures caused by loose connections are not covered by the warranty.

## **Common Safety**

- Personnel who plan to install, operate, or maintain the equipment need to receive comprehensive training, obtain required job qualifications, understand all necessary safety precautions, and be able to perform all operations correctly.
- When installing, operating, or maintaining the equipment, please abide by local laws and regulations. The safety instructions in this document are only in addition to local laws and regulations.
- If there is a possibility of personal injury or equipment damage during the installation, stop the operations immediately, report to the owner and take feasible protective measures.
- Do not install, use, or operate the equipment outdoors (including but not limited to transporting equipment, installing cabinets, and installing power cables) in severe weather conditions such as thunderstorms, raining, snowing, or strong winds.
- Before installing, operating, or maintaining the equipment, please take off conductive items such as watches, bracelets, bangles, rings, and necklaces.
- When installing, operating, or maintaining the equipment, use insulated tools and wear insulated gloves, safety clothing, safety helmet, safety shoes and other personal protective equipment, as shown in the following figure.



- Installation, operation, and maintenance shall be carried out in accordance with the prescribed procedures.
- Before touching conductors or terminals, measure the contact point voltage with a multimeter to ensure that there is no danger of electric shock.
- Make sure that all slots are installed with boards or filler panels. Avoid exposing hazardous voltages or energy to circuit boards. Ensure that the air ducts are normal, control electromagnetic interference, and prevent foreign objects on the backplane, baseplate, and boards.
- After the equipment is installed, remove the packing materials such as cartons, foam, plastics, and cable ties from the equipment area.
- In the case of a fire, immediately leave the building or the equipment area and activate the fire alarm or call emergency services. Do not re-enter the building or affected area until deemed safe by qualified professionals.
- Do not stop protective devices. Heed the warnings, cautions, and precautions in this document and on the nameplate. Replace worn warning labels promptly.
- Keep irrelevant people far away from the equipment.
- Use insulated tools or tools with insulated handles.

## Personnel Requirements

- Personnel who plan to install, operate, or maintain the equipment need to be fully trained to understand all necessary safety precautions, and be able to perform all operations correctly.
- Only qualified professionals and trained personnel can install, operate, and maintain the equipment.
- Only qualified professionals can dismantle safety device and check the equipment.

- The personnel who operate the equipment, including operators, trained personnel, and professionals, should have special operation qualifications such as high-voltage operations, high-altitude operation, and special equipment operation stipulated by the local state.

 NOTE

- Professionals:  
Personnel who have been trained or have experience in equipment operation and are aware of the sources and degree of various potential hazards in equipment installation, operation, and maintenance.
- Trained personnel:  
Personnel who have received technical training, have the required experience, understand possible hazards in certain operations, and are able to take protective measures to minimize the hazards on themselves and others.
- Users or operators:  
Anyone except the trained personnel and professionals, including operators, customers, and common people who may come into contact with the equipment.

## Electrical Safety



- Do not perform non-standard or improper operations to prevent fire or electric shocks.
  - Do not install or remove cable core with power on. Momentary contact between the core of a power cable and a conductor may create an arc or spark, which may cause fire or eye injury.
- 
- If the power supply to the equipment is permanently connected, install an easily accessible circuit breaker outside the equipment.
  - Before making electrical connections, switch off the power supply by switching off the isolating switch on the upstream device if people may come into contact with live parts.
  - If the power supply terminal of the equipment is marked with “high leakage current”, the protective ground terminal on the equipment casing must be grounded before connecting the AC power supply; otherwise, electric shock may occur.
  - Before installing or removing a power cable, please turn off the power switch.
  - Before connecting a power cable, please check whether the label on the power cable is correct.
  - Before connecting the power supply, make sure electrical connections are correct.
  - If the equipment has multiple inputs, please disconnect all inputs before operating the equipment.

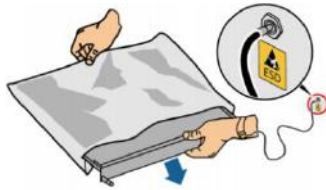
## ESD

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### NOTICE

The static electricity generated by human body may damage the static-sensitive components on circuit boards, for example, the large-scale integrated (LSI) circuits.

- 
- To prevent static-sensitive components from being damaged by static from human bodies, wear a grounded electrostatic discharge (ESD) wrist strap or anti-static gloves when touching circuit boards.



- Hold the board edge without touching any components, especially chips.

## Liquid Prevention

- Do not place the equipment in places prone to water leakage, such as under air conditioner vents, ventilation vents, or feeder windows of the equipment room. Ensure that there is no condensation or water inside the equipment. Otherwise, short circuits may occur.
- If any liquid is detected inside the equipment, please disconnect the power supply immediately and contact the administrator.

## Environment Requirements and Tool Insulation

- Do not operate the equipment or cables during thunderstorms or rains.
- In case of fire, immediately leave the building or the equipment area, and activate the fire alarm or call emergency services. Use dry powder extinguisher, not liquid extinguishers; Do not re-enter the building or affected area until it has been deemed safe by qualified professionals.
- Do not stop protective devices. Pay attention to the warnings, cautions, and precautions in this document and on the nameplates. Promptly replace worn warning labels.
- Keep irrelevant people far away from the equipment.
- Before operating the equipment, wear insulation shoes and gloves, and take measures to protect your eyes. Remove conductive objects such as jewelry and watches to avoid electric shock or burns.
- Use insulated tools or tools with insulated handles.

## Label Protection

- Do not tear off the warranty label or barcode on the charging module. Otherwise, product warranty will be forfeited.
- Do not scrawl or damage the nameplate on the back of the charging module, because it contains important product information.



# 2 Product Description

## 2.1 Overview

### Function

The MXR100050B is a high-power AC/DC charging module specially designed for high-end charging scenarios of electric vehicles. Rated output power is 50 kw, and supports 260VAC~530VAC three-phase four-wire system (A/B/C +PE) input, the output voltage range is 200VDC~1000VDC, the maximum output current is 167 A, supports silent mode setting, in silent mode, the noise is less than 55dB.

The charging module uses the isolated controller area network (CAN) communications port to communicate with the system monitoring module through the CAN protocol. The output voltage mode of the charging module can be set on the system monitoring module to perform voltage regulation, current limiting, and start-stop and other operations on the charging module.

**Figure 2-1** Model number

MXR-1 0 0 0 - 5 0 B

**Table 2-1** Model number description

No./Char	Meaning	Description
MXR	Company name	--
1000	Output voltage	1000 V DC
50	Rated output power	50 kW
B	Module version	ClassB

### Working Mode

The charging module works in standard mode by default. You can set it to silent mode on the system monitoring module based on the noise reduction requirements.

- Silent mode: Multiple levels (55 dB max, 60 dB max) are provided. In silent mode, the module output power is derated accordingly.

## Grouping and Address Allocation

- The hardware address of a charging module can be set to be consistent with the slot number of the charging station. The charging module saves the hardware address when it is powered off.
- Charging module groups can be set. A grouped of charging modules can automatically realize current sharing control.
- In address automatic assignment mode, software address is automatically assigned and the hardware address can not be set. Note that the software address may not be the same as the charger's slot number.

### NOTE

- After adding, reducing or replacing charging modules, the software address will be reassigned.
- If the charging module is moved from one charger to another, and an alarm occurs that the module hardware address is duplicated, please reset the hardware address first, and then reset the group number of the module.

## 2.2 Key Features

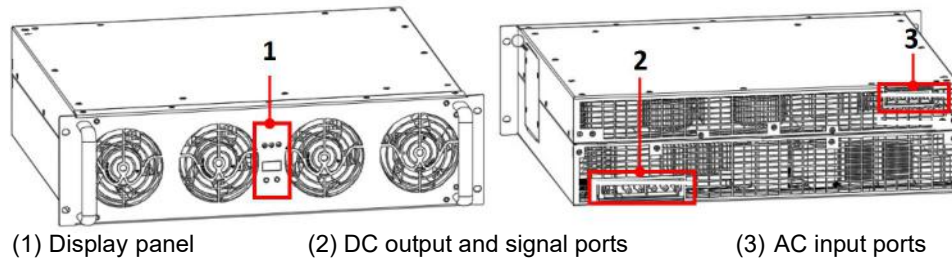
- Ultra-low noise: support silent mode setting, provide multiple levels (55dB, 60dB)
- High protection design, sensitive components are isolated from the air duct
- Wide working temperature range: -40°C~+80°C
- Wide input voltage range: 260VAC~530VAC
- Wide output voltage range: 200VDC~1000VDC
- Wide output constant power range: 300VDC~1000VDC@50kW
- Support hot swap function
- With perfect intelligent protection function
- Support output back-feed isolation
- Support CAN bus communication and group setting
- Support LED digital tube display and button setting
- Meet CE.EMI meets the CLASSB limit

## 2.3 Appearance

### NOTICE

Do not remove the warranty label or barcode. Otherwise, the product warranty will be forfeited.

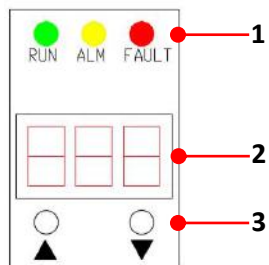
**Figure 2-2** Charging module



## 2.4 Display Panel

### 2.4.1 Display Panel

**Figure 2-3** Display panel



**Table 2-2** Display panel

No.	Item	Description
1	LED	RUN, Power indicator (green)
		ALM, Alarm indicator (yellow)
		FAULT, Fault indicator (red)
2	Nixie Tube	Left, High-end nixie tube
		Middle, Middle-range nixie tube
		Right, Low-level nixie tube
3	Button	▲ Up
		▼ Down

## 2.4.2 Indicators

**Table 2-3** Charging module indicators

Indicator	Status	Description
RUN Power indicator (green)	Steady on	Normal: The charging module has AC input.
	Off	The charging module has no AC input.
ALM Alarm indicator (yellow)	Steady on	<ul style="list-style-type: none"> <li>• DC output undervoltage.</li> <li>• Ambient over-temperature protection</li> <li>• Ambient under-temperature protection</li> <li>• AC input overvoltage, undervoltage, phase loss</li> <li>• Communication failure between the charging module and external devices</li> <li>• Fan fault</li> <li>• Current imbalance</li> <li>• Air filter blockage alarm</li> <li>• Other self-protections</li> </ul>
	Off	Normal: The charging module does not generate any protection alarms.
FAULT Fault indicator (red)	Steady on	<ul style="list-style-type: none"> <li>• Lockout due to output overvoltage</li> <li>• Output short-circuit lockout</li> <li>• Module hardware address is duplicated</li> <li>• Other fault</li> </ul>
	Off	Normal: The charging module is normal.

### NOTE

- If the charging module has no output due to mains failure (no AC input), the indicator light will be off.
- Indicators are not mutually exclusive. If the conditions are met, the three indicators can light up at the same time.

## 2.4.3 Nixie Tube Display

The nixie tubes display the output voltage by default (displayed 000 when there is no output). Displays an error code when a failure occurs.

**Table 2-4** Nixie tube description

No.	Display	Description
1	Output voltage	<ul style="list-style-type: none"> <li>• Voltage range from 0 V to 999 V.</li> <li>• Precision is 1 V.</li> <li>• Parameters can only be set by pressing buttons in the setting mode, and the settings will not be saved when the power is turned off.</li> </ul>
2	Output current	<ul style="list-style-type: none"> <li>• Current range from 0 A to 167 A.</li> <li>• Precision is 0.1 A (0~99.9A).</li> <li>• Precision is 1 A (100~167A).</li> <li>• Parameters can only be set by pressing buttons in the setting mode, and the settings will not be saved when the power is turned off.</li> </ul>
3	Hardware address	<ul style="list-style-type: none"> <li>• <b>00</b> is displayed by default.</li> <li>• The default hardware address <b>00</b> (decimal) can be restored.</li> <li>• The hardware address range is 0 - 62.</li> <li>• Parameters can be set by pressing buttons, and the settings are saved when the power is turned off.</li> </ul>
4	Group number	<ul style="list-style-type: none"> <li>• <b>001</b> is displayed by default.</li> <li>• The default group number 001 (decimal) can be restored.</li> <li>• The group number range is 001 - 060.</li> <li>• Parameters can be set by pressing buttons, and the settings are saved when the power is turned off.</li> </ul>
5	Error code	<ul style="list-style-type: none"> <li>• The high-end digital tube displays <b>F</b>, and the middle and low-digit digital tubes display numbers.</li> </ul>
6	Reserved	<ul style="list-style-type: none"> <li>• AAA</li> </ul>
7	Control mode	<ul style="list-style-type: none"> <li>• <b>-A-</b> is displayed by default.</li> <li>• <b>-A-</b>: Auto mode, <b>-C-</b>: Setting mode. <ul style="list-style-type: none"> <li>• Output voltage, output current, and on/off can only be set in setting mode. Settings are invalid after mode exiting.</li> <li>• In setting mode, the charging module can operate normally without connecting the system monitoring module.</li> </ul> </li> <li>• The Auto or Setting modes can be switched with a button.</li> </ul>

8	Startup/Shutdown	<ul style="list-style-type: none"> <li>• <b>ON</b>: startup; <b>OFF</b>: shutdown</li> <li>• Parameters can be set using buttons only in the setting mode but the settings are not saved upon power failure.</li> </ul>
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**Table 2-5** Status code mapping

Status Code	Status Description
<i>F01</i>	DC output undervoltage.
<i>F02</i>	The ambient temperature of the charging module is too high or too low
<i>F03</i>	AC input overvoltage, undervoltage, phase loss
<i>F04</i>	Communication failure between the charging module and external devices
<i>F05</i>	Lockout due to Output short-circuit
<i>F06</i>	Lockout due to DC output overvoltage.
<i>F07</i>	Duplicate module hardware address
<i>F08</i>	Fan fault
<i>F09</i>	Current imbalance
<i>F11</i>	Air filter blockage alarm

## 2.4.4 Button Operations

The buttons allow you to set the output voltage, output current, hardware address, and group number, and to start or shut down the charging module.

- Press the up or down button to scroll the displayed screen.
- In the parameter setting state, press the up or down button to increase or decrease digits.
- Press and hold the up or down button (at least 2.5s) to enter the parameter setting state or save the current settings.

### NOTE

Hold down the up or down button to enter the parameter setting state. If no operation is performed within 60s, the setting state is automatically exited and the parameter settings are not saved.

## Setting the Output Voltage

- The output voltage can only be set after switching the mode from **-A-**(Auto mode) to **-C-**(Setting mode).
- The voltage setting of the charging module will not be saved when power is off.

- If the mode is switched from **-C-** to **-A-**, the charging module outputs according to the system monitoring command.

**Table 2-6** Procedure description

Procedure	Operation	Nixie Tube Display
1	Press the up or down button to switch to the mode display state(page 7).	-A- (static)
2	Press and hold the up or down button to enter the setting state.	-A- (blinking)
3	Press the right button to switch to the -C- mode.	-C- (blinking)
4	Press and hold the up or down button to enter the display state.	-C- (static)
5	Press the up or down button to switch to the output voltage display state(page1).	Current output voltage (static)
6	Press and hold the up or down button to enter the setting state.	Current output voltage (nixie tube blinking)
7	Press the up or down button to increase or decrease voltage.	Adjusted output voltage (nixie tube blinking)
8	Press and hold the up or down button to save the settings.	Actual output voltage (static)

## Setting the Hardware Address

- The hardware address settings of the charging module is saved after power off.

**Table 2-7** Procedure description

Procedure	Operation	Nixie Tube Display
1	Press the up or down button to switch to the hardware address display screen (page3).	00(static). Displays the current hardware address.
2	Press and hold the up or down button to enter the hardware address setting interface.	nixie tube blinking (decimal).
3	Press the up or down button to adjust the value.	Adjusted hardware address.
4	Press and hold up or down button to save the settings.	Displays the new hardware address (static).

## Setting the Group Number

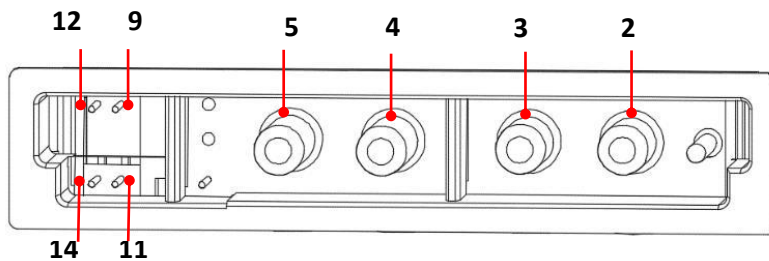
- The group number settings of the charging module is saved after power failure (only for the company protocol).

**Table 2-8** Procedure description

Procedure	Operation	Nixie Tube Display
1	Press the up or down button to switch to the group number display screen (page 4).	000(static). Displays the current group number.
2	Press and hold the up and down button to enter the hardware address setting screen.	nixie tube blinking (decimal).
3	Press the up or down button to adjust the value.	Adjusted group number.
4	Press and hold the up or down button to save the settings.	Displays the new group number (static).

## 2.5 Module Ports

**Figure 2-4** DC output and signal ports

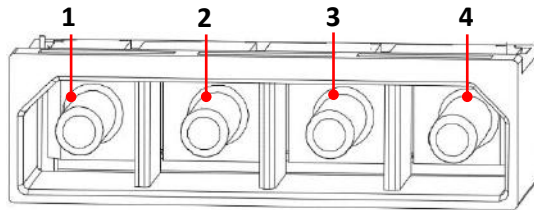


**Table 2-10** Output port definition

Pin	Item	Function
2, 3	1000V DC+	Positive output (pins 2 and 3 must be connected in parallel)
4, 5	1000V DC-	Negative output (pins 4 and 5 must be connected in parallel)
9, 12	Debug	Debug connector. Users do not connect cables
11	CANL	CAN low-level signal
14	CANH	CAN high-level signal



**Figure 2-5** AC input ports



**Table 2-11** Input port definition

Port	Item	Function
1	L1	AC input
2	L2	AC input
3	L3	AC input
4	PE	Connects to the ground terminal in the system.

## 2.6 Input and Output Connectors

### 2.6.1 Input Connector

Figure 2-6 show the AC input power cable interface. This product comes with a set of connectors.

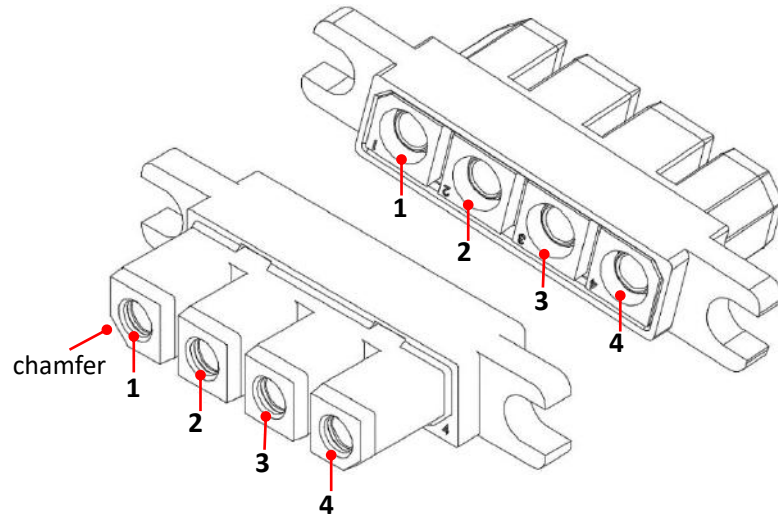
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#### NOTICE

Before connecting a cable, please pay attention to the direction of the connector, especially the silk screen on the front of the connector and the chamfer on the back to ensure that the cable is correctly connected.

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**Figure 2-6** Input connector



**Table 2-12** Input connector definition

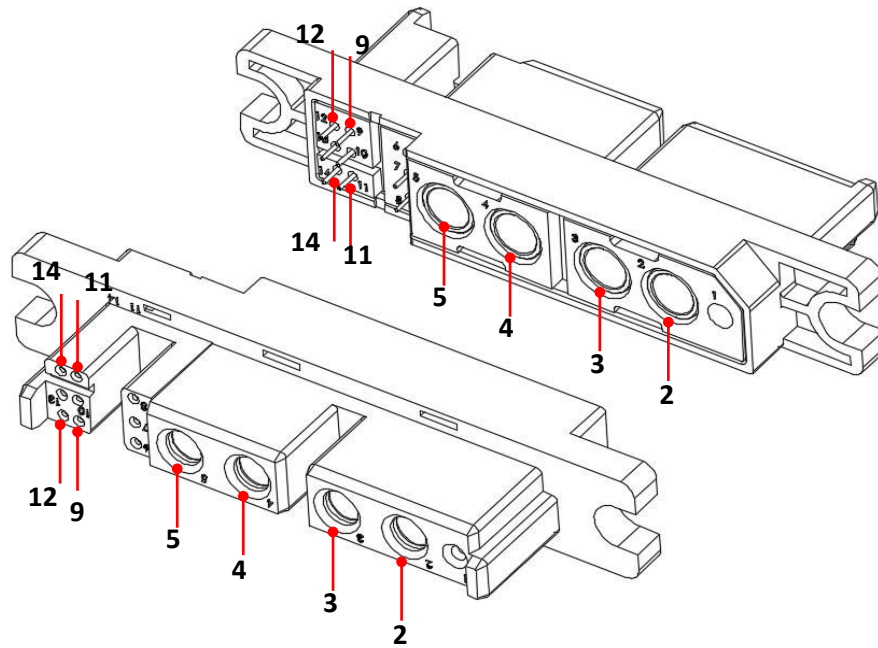
Port	Item	Function
1	L1	AC input
2	L2	AC input
3	L3	AC input
4	PE	Connects to the ground terminal in the system.

## 2.6.2 Output Connector

The DC output power cables can be connected in the following ways:

- Output connector with crimped cables on signal pins: The connector is as shown in **Figure 2-7**. Crimp the communications cable (customer supplied), connect the cable to the metal jack, and insert the cable into the corresponding pin of the output connector.

**Figure 2-7** Output connector (output connector with crimped cables on signal pins)



**Table 2-13** Output connector definition

Pin	Item	Function
2, 3	1000 V DC+	Positive output (pins 2 and 3 must be connected in parallel)
4, 5	1000 V DC-	Negative output (pins 4 and 5 must be connected in parallel)
9、12	Debug	Debug connector. Users do not connect cables
11	CANH	CAN high-level signal
14	CANL	CAN low-level signal

**⚠ CAUTION**

Empty pins or reserve pins are not allowed to be connected.

# 3 Transportation and Storage

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## Transportation

During shipping, the product must be securely placed in the case. The packing case must comply with related international standards and be printed with marks such as "Handle with care" and "Keep dry". The packing case must be protected from rains, snows, and mechanical shock during transportation.

## Storage

Unused products should be packed in packing cases and stored in a dry, well-ventilated warehouse with temperature range of  $-10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ . The relative humidity of no more than 80%, and no corrosive gases. This product can be stored for up to one year.

# 4 Installation



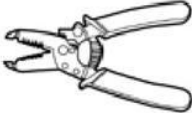






## 4.1 Installation Preparations

### Checking Before Installation

- Before unpacking the charging module, please check whether the outer packing materials are damaged, such as holes and cracks, and check the model of the charging module. If you find damage or the model does not meet your requirements, please do not unpack the charging module and contact the dealer as soon as possible.
- After unpacking the charging module, check whether the delivery is intact and complete. If any item is missing or damaged, please contact your dealer.

### Tools

Figure 4-1 Tools

 Phillips screwdriver	 Multimeter	 Wire stripper	 Power cable cutter
 Crimping tool	 Heat gun	 Heat shrink tubing	 Protective gloves
 Work shoes			

## Cables

### CAUTION

- According to the ambient temperature, determine the cable insulation material's temperature resistance level. Power cables and communication cables must be insulated with materials that can withstand their actual operating temperatures.
- Cables should be prepared by the user.

**Table 4-1** Cable requirements

Cable	Recommended Specifications	Remarks
DC output power cable	Recommendation: flame-retardant cable withstand voltage $\geq 1000$ V DC, temperature $\geq 90^{\circ}\text{C}$ , and conductor cross-sectional area of AWG 5 (for example: UL1032, AWG 5)	Two positive cables and two negative cables. If the cable surface temperature is higher than $80^{\circ}\text{C}$ , please use high temperature resistant cables.
AC input power cable	Recommendation: flame-retardant cable withstand voltage $\geq 600$ V AC, temperature $\geq 105^{\circ}\text{C}$ , and conductor cross-sectional area of AWG 5 (for example: UL1015, AWG 5)	
CAN	Recommendation: twisted-pair shielded flame-retardant cable withstand voltage $\geq 60$ V DC, temperature $\geq 105^{\circ}\text{C}$ , wire cross-sectional area of AWG 22	--

## 4.2 Installation Requirements

### NOTE

Application scope: charger (pile) or charging cabinet

- The charger (pile) or charging cabinet should meet the protection level requirements in section 10.5.1 of GB/T 18487.1-2015 and the environment protection requirements in section 7.3 of NB/T 33001-2018. The protection level of charger should be at least IP32 (indoor) or IP54 (outdoor).
- Avoid using this product in marine environments near heavy pollution sources or outdoor land environment (with simple shielding measures). Otherwise, the product may be corroded or penetrated by water. Malfunctions or component damage caused by this are not covered under the warranty.

Pollution sources refer to the following areas:

- Salt water areas such as sea water within 0.5km
- Within 3 km of serious pollution sources such as metallurgy, coal mines, and thermal power plants.
- Within 2 km of medium pollution sources, such as chemical factories, rubber plants, and electroplating factories, etc.
- Areas within 1 km of light pollution sources, such as food factories, tanneries, and heating boilers

- When used in offshore environment, the module casing may rust or shorten the service life of the whole system. Therefore, exercise caution and consult the technical support when using modules in such environment. The offshore area is 0.5 km to 3.7 km away from salt water (such as the sea).
- The charger (pile) should be equipped with an air filter or dust- proof cotton to prevent large particles or flocs from blocking the air duct of the component. The resulting abnormal function or component damage is not covered by the warranty.
- Requirements for system exhaust air volume and fan selection:

The exhaust air volume required by the system should be calculated according to the thermal design formula. According to the formula:  
 $Q=CM\Delta T$  ( $\Delta T$  is the temperature difference between the air inlet and outlet of the system, the outdoor cabinet generally chooses 10 degrees Celsius. If the air duct is not good, this value should be reduced. If it is an indoor cabinet, the temperature difference can be increased appropriately), the total loss  $Q$  of the system can be obtained through the system efficiency (the  $Q$  value of the strong sunshine area needs to be added to the solar radiation) to get:  $M$  (air quality required for heat dissipation) =  $Q/C/\Delta T$  ( $C$  is the specific heat capacity of the air),  $V= M/\rho$  (mass/density) can get the air volume ( $m^3/s$ ) , so that the air volume of the system can be obtained, but this air volume is the actual air volume required by the system, and corresponding to the fan selection, the fan should be selected according to 2 times of the actual air volume (the maximum air volume of the air volume is actually unreachable, and the actual working efficiency point is about 0.5 times the maximum air volume).

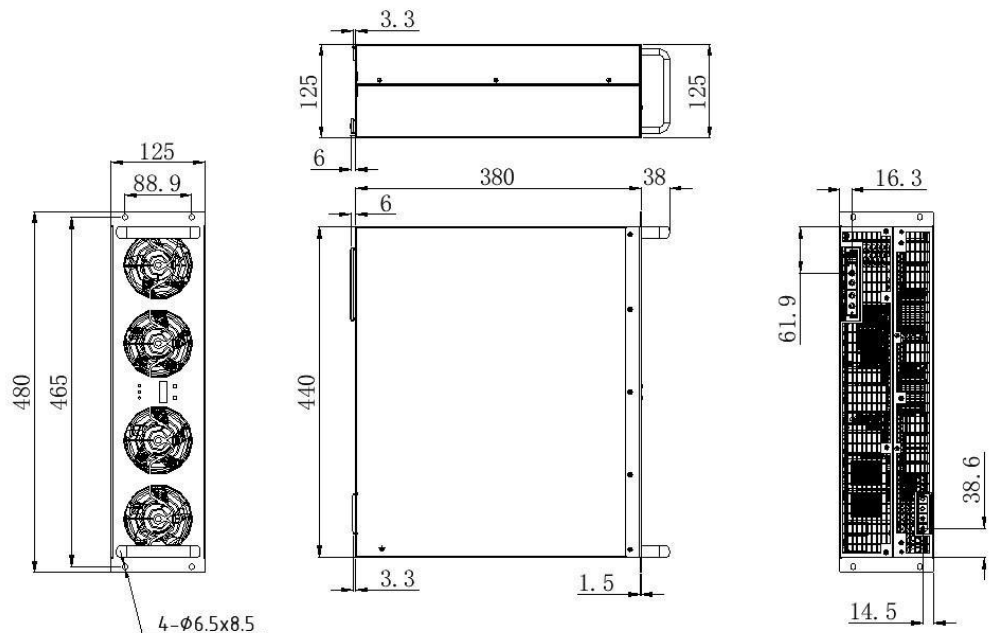
To simplify the design, based on the air volume of a single module fan is 378CFM, it can be concluded that the total air volume of the system should not be less than  $N \times 2 \times 378\text{CFM}$ , and N is the module quantity.

- It is recommended to reserve a space of at least 40mm and 85 mm for the air inlet and exhaust outlet of the charging module. Actual space depends on the system air duct.
- The installation environment must comply the environmental regulations. See "Technical Specifications" for details.

## 4.3 Installing Charging Module

### Installation Spacing

Figure 4-2 Installation clearances (unit: mm)



### Installation Procedure

**⚠ CAUTION**

Do not leave the installed charging module on standby or off for a long time.

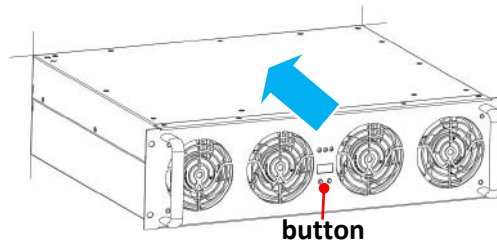


 NOTE

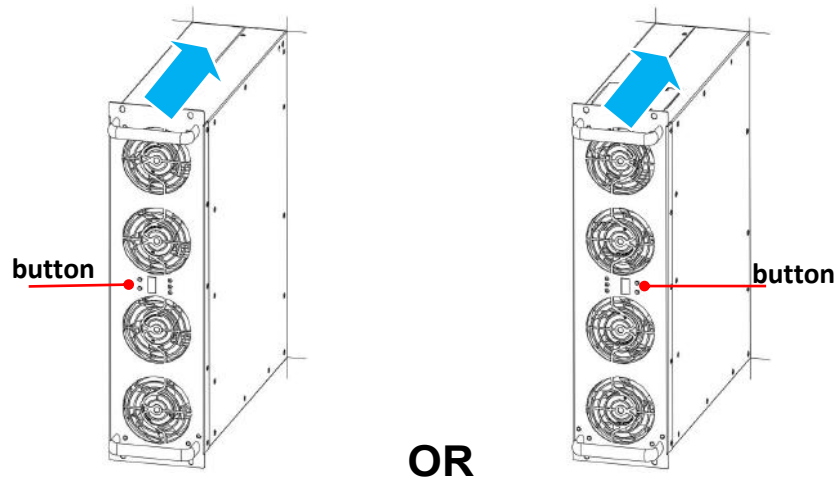
- Make sure that all the mounting holes on the panel are fixed with screws.
- When installing horizontally, make sure that the digital tube is above the button of the charging module.
- The charging module supports horizontal installation and side installation. Select the installation according to the actual situation. Horizontal installation is recommended.

**Step 1** Slowly push the charging module into the slot.

**Figure 4-3** Installing a charging module (horizontal mounting)

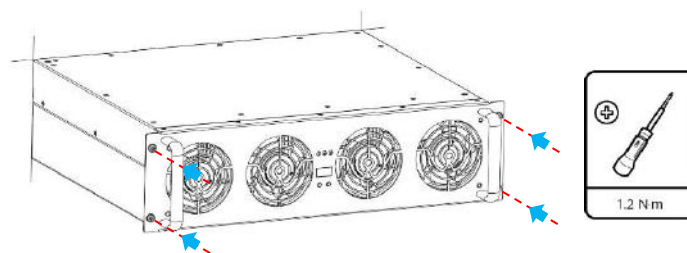


**Figure 4-4** Installing a charging module (vertical mounting)

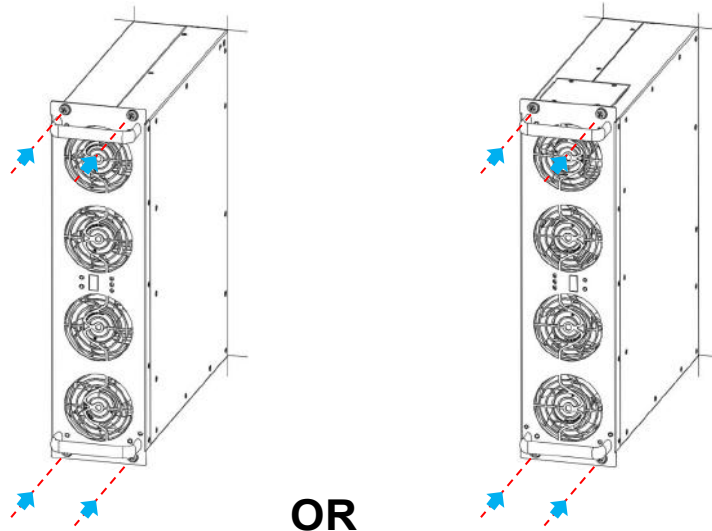


**Step 2** Install and tighten the screws on the upper and lower parts of the panel.

**Figure 4-5** Securing a charging module (horizontal mounting)



**Figure 4-6** Securing a charging module (vertical mounting)



## 4.4 Cable Connection

### 4.4.1 Connecting DC Output Power Cables

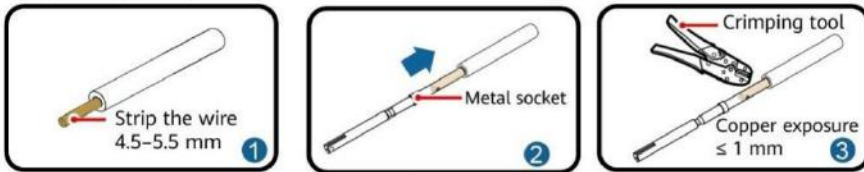
- The power metal socket and signal metal socket is delivered with the DC output connector.
- Check whether the power metal socket is reliably crimped. For a AWG 5 cable, the minimum pull-out force is 500 N.
- Check whether the signal metal socket is reliably crimped. For a AWG 22 cable or a cable with cross-section of  $0.3 \text{ mm}^2$ , the minimum pull-out force is 26 N.
- The front end of the heat shrinkable tube should not exceed the scale on the power metal socket. The outer diameter of the power metal socket covered with the heat shrinkable tube is  $\leq 10.5 \text{ mm}$ .
- The front end of the heat shrinkable tube should not exceed the scale on the signal metal socket. The outer diameter of the signal metal socket covered with the heat shrinkable tube is  $\leq 1.6 \text{ mm}$ .

**Figure 4-7** Connecting DC output cables and signal cables

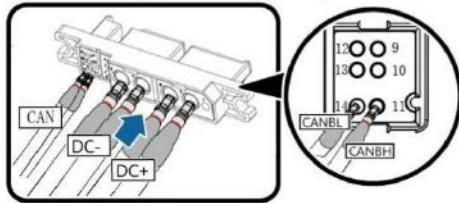
Preparing a power cable



Preparing a signal cable



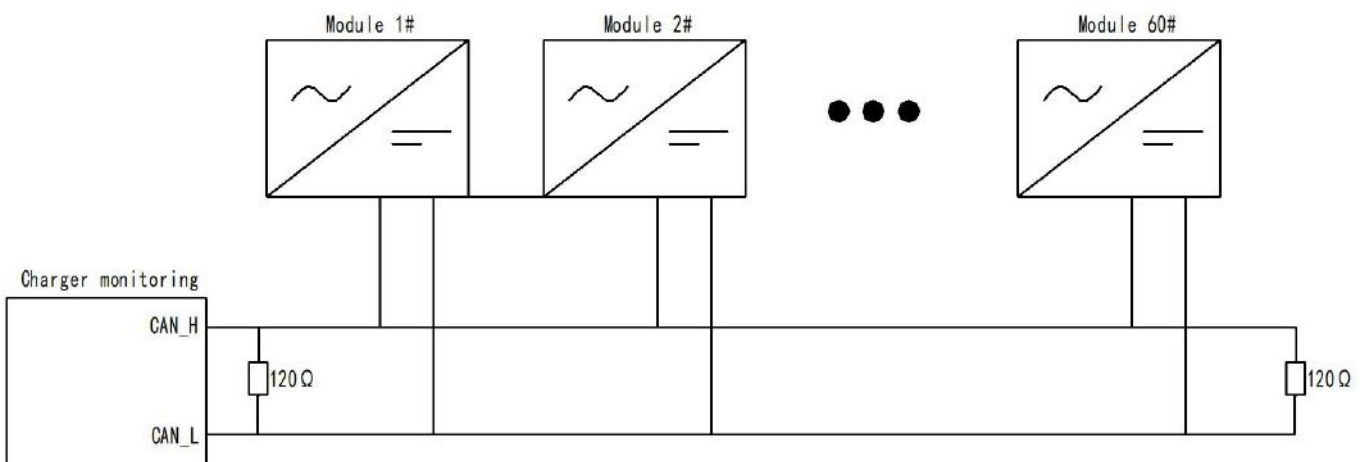
Connecting power and signal cables



NOTE

The CAN communication line must be connected to a bus type, and a matching resistance of 100 to 150 ohms should be connected at the head and tail ends of the bus. The recommended resistance value is 120 ohms.

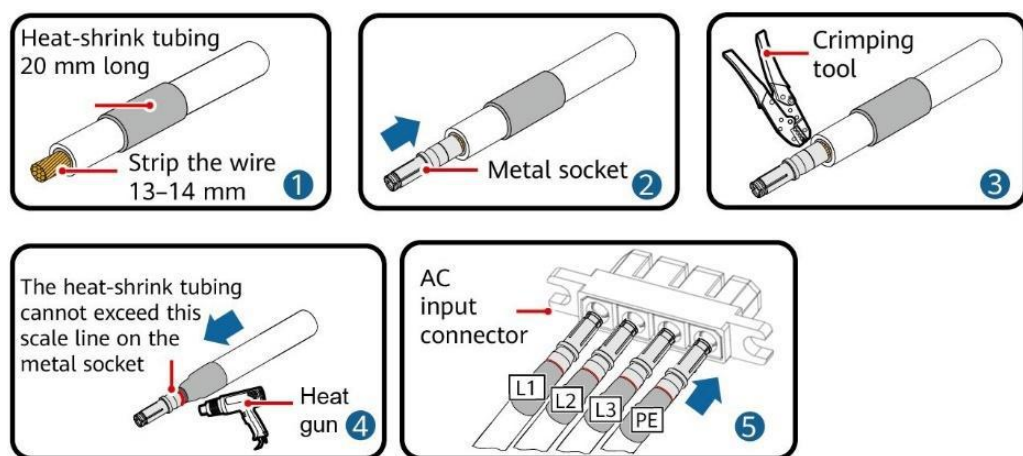
**Figure 4-8** Diagram of CAN bus connection



## 4.4.2 Connecting AC Input Power Cables

- The metal socket is delivered with the AC input connector.
- Check whether the metal socket is reliably crimped. For a AWG5 cable, the minimum pull-out force is 500 N.
- The front end of the heat shrinkable tube should not exceed the scale on the metal socket. The outer diameter of the metal socket covered with the heat shrinkable tube is  $\leq 8.0$  mm.

Figure 4-9 Connecting AC input power cables



# 5 Power on and setting parameter

- After the installation is complete, power on the charging module. Use a multimeter to check whether the voltage at the cabinet copper bar connected to the output connector of the charging module is within the normal range (200–1000 V DC).
- Check that the power indicator light on the charging module is always on and whether the voltage displayed by the digital tube is consistent with the voltage measured by the multimeter.
- Set the hardware address of the charging module.

# 6 Maintenance

## 6.1 Routine Maintenance

To ensure that the charging module can work normally for a long time, it is recommended to perform routine maintenance on it as described in this chapter.

- The charging module supports hot swapping, and should be replaced in time if it fails.
- The dust-proof net of the cabinet needs to be cleaned regularly to avoid dust accumulation at the air inlet. Dust will casue overheating inside the charging module.

## 6.2 Troubleshooting

- If the charging module fails, the fault can be debugged accroding to the error code displayed on the digital tubes.
- If no error code is displayed, locate the fault according to the indicator status.

**Table 6-1** List of error codes

Indicator	Error Code	Symptom	Measure
Alarm (yellow) Steady on	F01	DC output undervoltage	<ol style="list-style-type: none"><li>1. Check whether the output load of the charging module is too heavy and exceeds the maximum output current of the module or the setting current. If yes, please troubleshoot. If yes, troubleshoot please.</li><li>2. Check whether the output current of the charging module is set too low, resulting in the output voltage not rising to the normal range. If yes, troubleshoot please.</li></ol>

Indicator	Error Code	Symptom	Measure
Alarm (yellow) Steady on	F02	Charging Module Ambient overtemperature Or undertemperature	<ol style="list-style-type: none"> <li>1. Check whether the ambient temperature of the charging module is too high or too low. If yes, troubleshoot please.</li> <li>2. Check whether the air inlet of the charging module is blocked. If yes, troubleshoot please.</li> </ol>
	F03	Input overvoltage, undervoltage, or phase failure	<ol style="list-style-type: none"> <li>1. Check whether the input voltage of the charging module is normal. If not, troubleshoot please.</li> <li>2. Check whether the input cables and circuit breakers of the charging module are normal. If not, troubleshoot please.</li> </ol>
	F04	Communication failure between the charging module and external devices	<ol style="list-style-type: none"> <li>1. Check whether the CAN communications cable and external resistor are connected correctly. If not, troubleshoot please.</li> <li>2. Check whether the hardware address is set correctly. If not, troubleshoot please.</li> </ol>
	F08	Fan fault	<ol style="list-style-type: none"> <li>1. Check whether the fan is stuck by other objects. If yes, troubleshoot please.</li> </ol>
	F09	Current imbalance	<ol style="list-style-type: none"> <li>1. Check whether the preset voltages of different charging modules are the same. If not, troubleshoot please.</li> <li>2. Check whether the output cables and output circuit breakers of the charging module are connected correctly. If not, troubleshoot.</li> </ol>
	F11	Air filter blockage alarm	<ol style="list-style-type: none"> <li>1. Check whether the air duct of the charging module is seriously blocked. If yes, troubleshoot please.</li> <li>2. Replace the slot of the faulty module with the slot of a normal module. If the fault occurs only in the original slot, the slot is abnormal and needs to be handled.</li> </ol>
	---	Other self-protection	

Indicator	Error Code	Symptom	Measure
Fault indicator (red)	F05	Lockout due to output short circuit	1. Check whether the output port of the charging module is short-circuited. If yes, troubleshoot please. Repower on the charging module or reset the charging module through communication.
	F06	Lockout due to output overvoltage	1. Contact the technical support
	F07	Duplicate module hardware address	1. Reset the hardware address and group number of the module.
	---	Other internal fault	

 NOTE

- If the alarm or fault cannot be eliminated after the above processing, Try the following steps:
  1. Replace the slot of the faulty module with the good slot module. If the fault occurs only in the original slot, the slot is abnormal and needs to be handled.
  2. Replace the slot of the faulty module with the slot of a normal module. If the fault occurs again after the slot exchange, replace the faulty module or contact the technical support.

## 6.3 Replacement

Replace the product if an unrecoverable failure occurs.

### Prerequisites

- Prepare antistatic wrist strap, antistatic gloves, an antistatic box or bag, and required tools.
- The new charging module is intact.

#### NOTE

Before replacing the faulty module, record its hardware address and group number to ensure consistency after replacement.

### Procedure

**Step 1** Connect the ground cable of the ESD wrist strap, and wear ESD wrist strap and ESD gloves.

**Step 2** Take out the charging module.

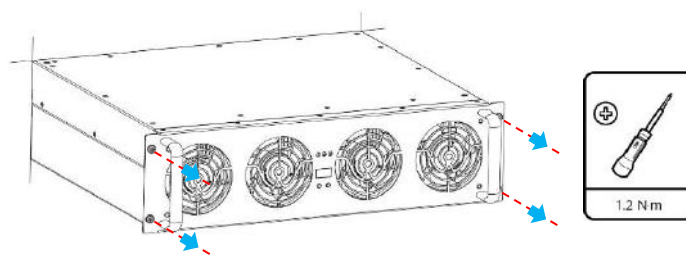
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#### DANGER

- Do not touch the terminals on the back of the charging module.
  - Avoid scalding due to module overheating.
- 

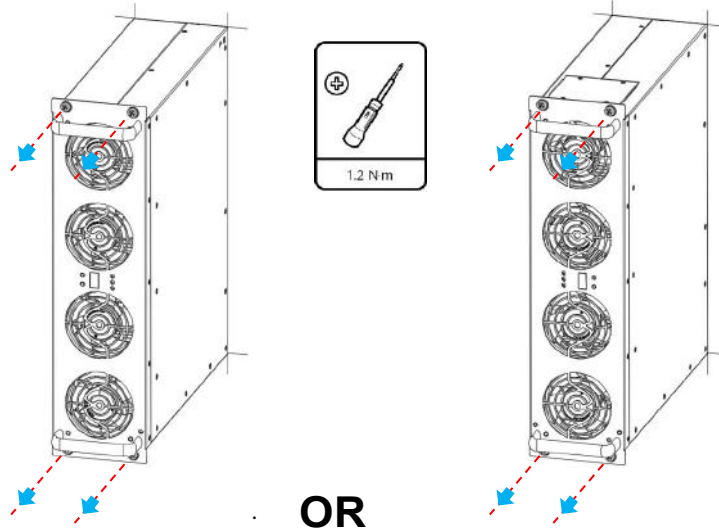
Remove the screws from the left and right sides of the panel.

**Figure 6-1** Loosening screws (horizontal mounting)

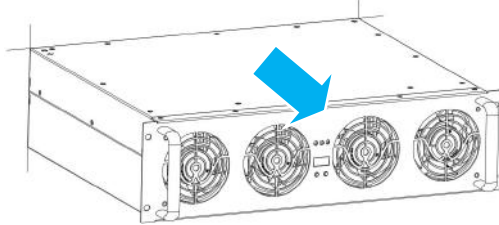




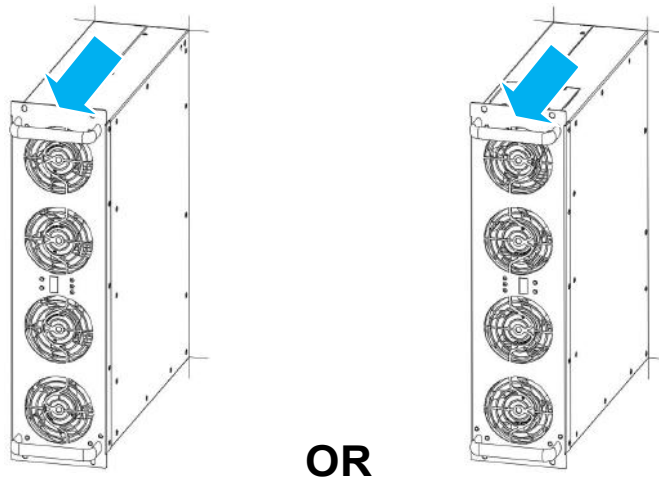
**Figure 6-2** Loosening screws (vertical mounting)



**Figure 6-3** Removing the charging module (horizontal mounting)

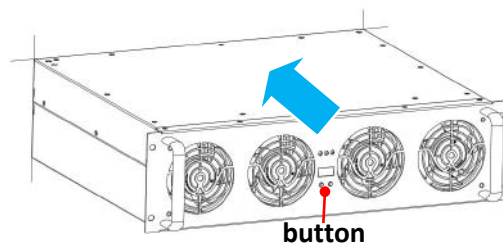


**Figure 6-4** Removing the charging module (vertical mounting)

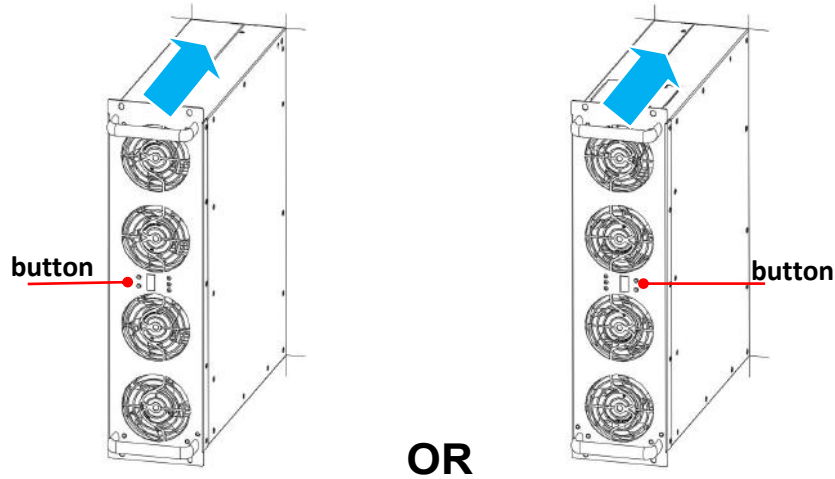


**Step 3** Replace the new charging module.  
Insert the charging module slowly.

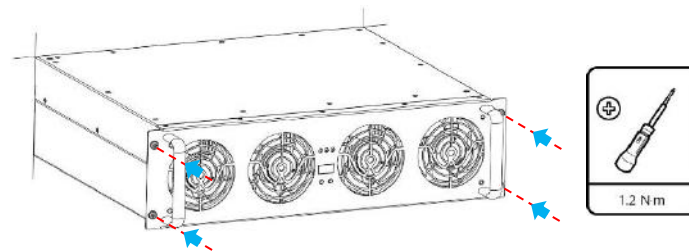
**Figure 6-5** Installing a charging module (horizontal mounting)



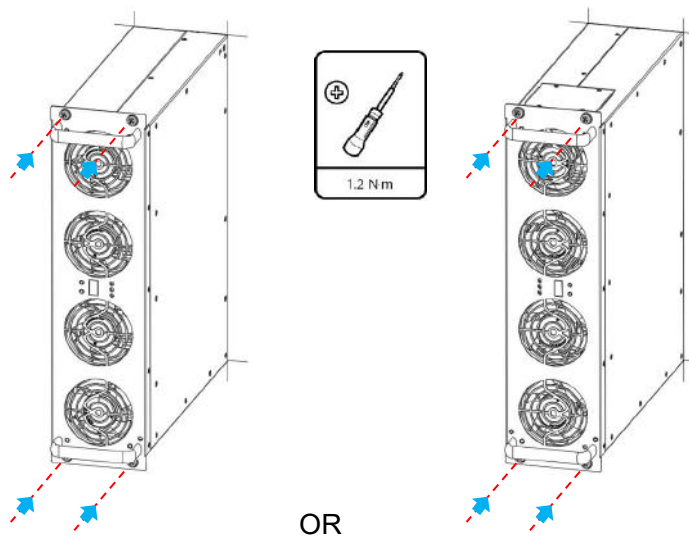
**Figure 6-6** Installing a charging module (vertical mounting)



Screw in the upper and lower panels and the mounting ear, and tighten the screws.  
**Figure 6-7** Securing a charging module (horizontal mounting)



**Figure 6-8** Securing a charging module (vertical mounting)



**Step 4** Disconnect the ground cable of the ESD wrist strap, and remove the ESD wrist strap and ESD gloves.

**Step 5** After installation, the system monitoring module sends the startup command to the charging module. Check whether the module green indicator is on, and make sure the normal running.

**Step 6** As described in " Operation instructions", set the hardware address of the module if grouping is required,  
----End

# 7 Technical Specifications

## 7.1 Structure

Table 7-1 Structure

Item	Specifications
Dimensions (H x W x D)	<ul style="list-style-type: none"><li>• 125 mm x 440 mm x 380mm (without packaging)</li></ul>
Weight	<ul style="list-style-type: none"><li>• ≤ 23 kg (without packaging)</li></ul>
IP rating	IP20

## 7.2 Environment

Table 7-2 Environment

Item	Specifications
Operating temperature	−40°C to +75°C (Output power derating at rated output voltage when the temperature is higher than 55°C.)
Relative humidity	5%–95% RH (non-condensing)
Altitude	≤2000m (When altitude is above 2000m, derating is required)

## 7.3 Input

**Table 7-3** Input

Item	Specifications
Input voltage	260–530 V AC (rated voltage: 380 V AC)
Voltage system	Three-phase four-wire (3W+PE)
Frequency	45-65 Hz; rated frequency: 50 Hz/60 Hz
Input current	≤ 100 A
Power factor	≥ 0.99 (load ≥ 50%)
THD	≤ 5% (load ratio ≥ 50%)

## 7.4 Output

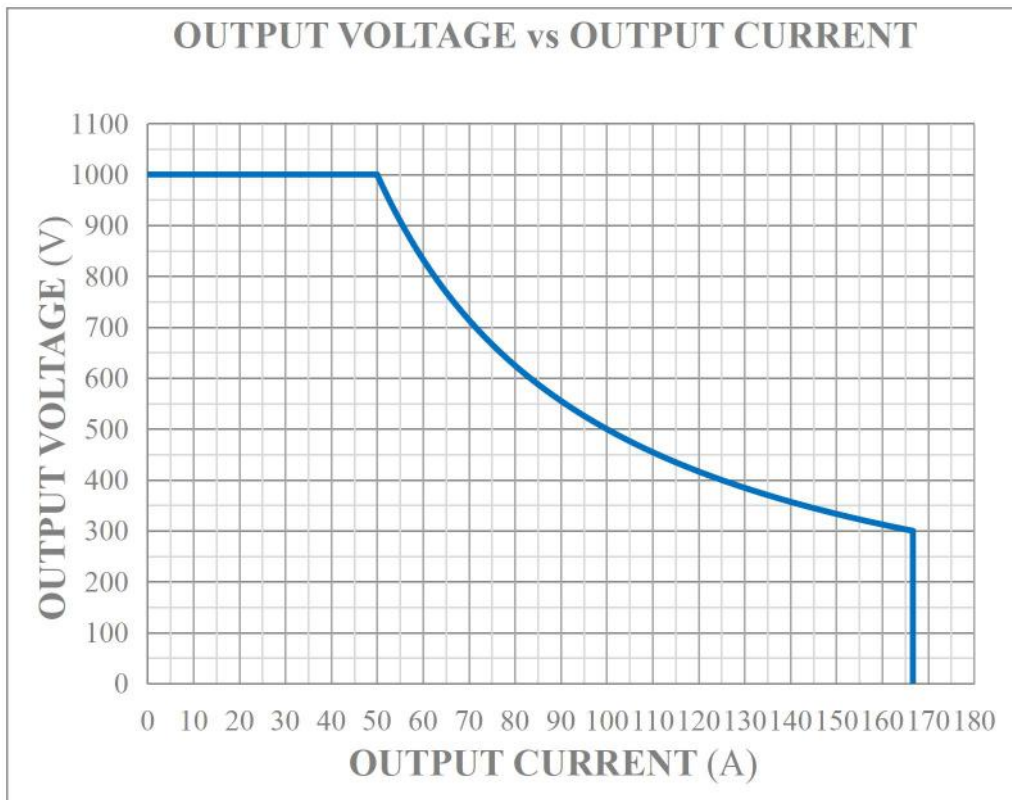
**Table 7-4** Output

Item	Specifications
Output voltage	200–1000 V DC
Rated output current	50 A
Output power	Rated power: 50 kW <ul style="list-style-type: none"> <li>• The output is linearly derated from full load to 29kW when the voltage ranges between 260Vac and the power conversion point.</li> <li>• Full load at the output voltage from the power conversion point to 530 V AC</li> </ul> Power conversion point 323 V AC
Output current limiting range	Maximum: 167 A
Full load efficiency	>95.5% (Rated output)
Soft start time	3–8s
Standby power consumption	≤ 13.5W (Average power consumption tested under rated input voltage 380 V AC at 25° C)
Hot swapping	Supported
Communications bus protocol	CAN

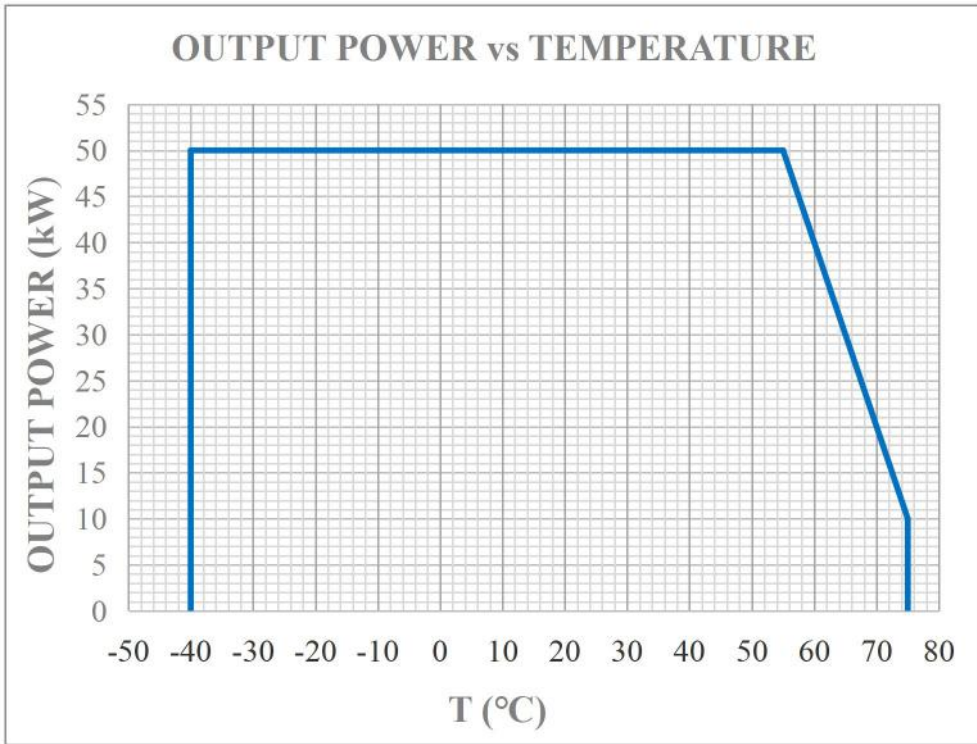
## 7.5 Protection

**Table 7-5** Protection

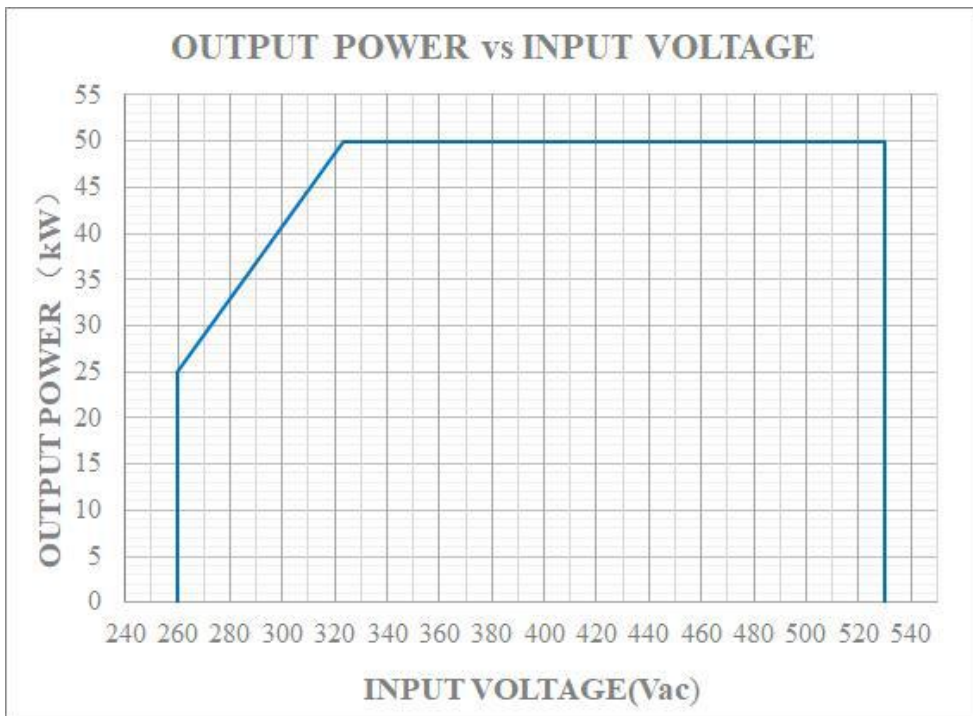
Item	Specifications
Input undervoltage protection	$\leq 260$ V AC (line voltage)
Input overvoltage protection	$\geq 535$ V AC (line voltage)
Output overvoltage protection threshold	$\geq 1025$ V DC
Overtemperature protection	Over $75^{\circ}\text{C}$ , shutdown protection will be triggered. Automatic recovery
Undertemperature protection	Lower than $-40^{\circ}\text{C}$ , shutdown protection is triggered. Automatic recovery



**Figure 7-1** Output characteristic curve



**Figure 7-2** Temperature derating curve



**Figure 7-3** AC input power limit curve