1. Safety Precautions

When installing, charging and maintaining our charging module products, please pay attention to the following safety regulations in order to avoid potential safety hazards.

1. Before using this product, please read the product manual carefully.
2. Personnel responsible for the installation and maintenance of our equipment must first be trained to understand various safety precautions;
3. This product should be placed and installed in an area far away from the liquid to prevent the liquid from entering the equipment and causing short circuit;
4. Ensure that there is no condensation in the equipment during the placement and use of the product;
5. In the process of product handling, pay attention to prevent scratches or falling injuries;
6. In the process of product power-on commissioning, please wear electrical insulation protection equipment to avoid the risk of electric shock;
7. It is forbidden to install or remove live modules or cables;
8. It is strictly prohibited to install, use and operate outdoor charging module equipment in bad weather such as thunder and lightning, rain, snow and strong wind;
9. It is forbidden to use charging module products in flammable and explosive areas;
10. Do not touch the product shell during or within 10 minutes after the operation of the product to avoid the risk of scalding or electric shock;
11. There is a nameplate on the charging module, which contains important parameter information related to the product. Artificial alteration and damage are strictly prohibited.
12. Non-professionals are not allowed to open the inside of the product to avoid the danger of internal high-voltage electric shock;

2. Introduction to Charging Module DA1EV404-380N130

2.1 Product Positioning

DA1EV404-380N130 charging module is a DC charging module specially developed by SmartPower for electric vehicle charging, which adopts three-phase AC input without neutral line and has the advantages of high efficiency, high power density, wide constant power range, low noise and low harmonic.

2.3 Structure

2.3.1 Appearance

The appearance of the charging module is shown in Figure 1 below.

Fig. 1 Charging module appearance diagram

2.3.2 Front Panel

The front panel of the charging module is shown in Figure 2 below.

Fig. 2 Schematic diagram of front panel of charging module

The indication information on the front panel is shown in Figure 3 below.

Fig. 3 Schematic diagram of information on the front panel of the template

Note: The dial code is in the form of binary 8421 code. The right side is the low bit (the number 6 at the bottom of the dial code diagram corresponds to the lowest bit), and the left side is the high bit (the number 1 at the bottom of the dial code diagram corresponds to the highest bit). Dial the dial code downward to indicate low, which means 0, and dial the dial code upward to indicate high, which means 1.

Table 1.1 Dial code

Corresponding address	Dial code information	Corresponding address	Dial code information	Corresponding address	Dial code information
0	000000	11	001011	22	010110
1	000001	12	001100	23	010111
2	000010	13	001101	24	011000
3	000011	14	001110	25	011001
4	000100	15	001111	26	011010
5	000101	16	010000	27	011011
6	000110	17	010001	28	011100
7	000111	18	010010	29	011101
8	001000	19	010011	30	011110
9	001001	20	010100	31	011111
10	001010	21	010101	32	100000

Corresponding address	Dial code information	Corresponding address	Dial code information	Corresponding address	Dial code information
33	100001	44	101100	55	110111
34	100010	45	101101	56	111000
35	100011	46	101110	57	111001
36	100100	47	101111	58	111010
37	100101	48	110000	59	111011
38	100110	49	110001	60	111100
39	100111	50	110010		
40	101000	51	110011		
41	101001	52	110100		
42	101010	53	110101		
43	101011	54	110110		

A description of the module status indicators is shown in Table 1.2.

Table 1.2 Description of Status Indicator of Charging Module

Indicator light	Normal state	Abnormal state	Cause of abnormality
Operation indicator (Green)	Bright	Kill	No input power
		Flicker	The background monitor operates the module.
Alert indicator (Yellow)	Kill	Bright	AC input overvoltage/undervoltage, internal overtemperature, abnormal bus voltage (automatic recovery)
		Flicker	Communications are down

Indicator light	Normal state	Abnormal state	Cause of abnormality
Fault indicator (Red)	Kill	Bright	Output overvoltage, output short circuit, address conflict, internal bus fault
		Flicker	Fan failure

2.3.3 Port Definition

The rear end of the charging module is provided with an AC input socket, a DC output socket, and communication and emergency stop control signal pins. The function definition of each pin is shown in Figure 4 below.

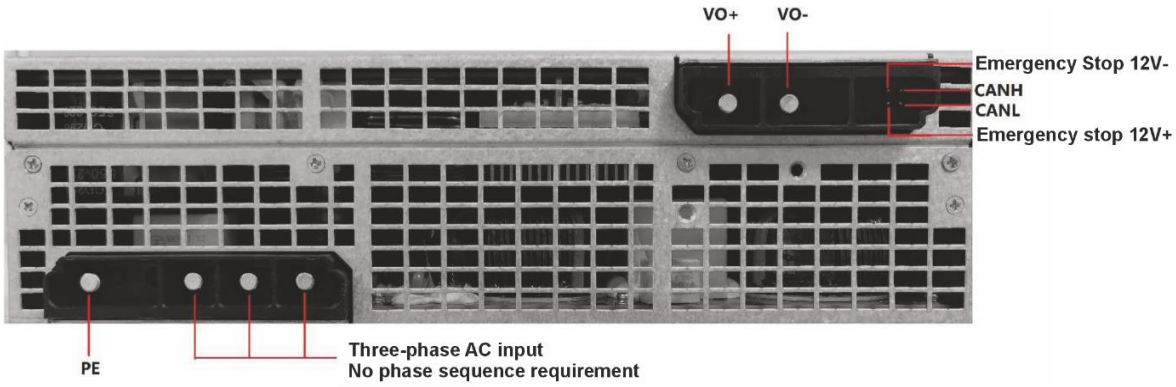


Fig. 4 Schematic diagram of module port definition

2.3.4 Nameplate Label

The upper cover of the charging module is affixed with a nameplate label, and the label information is shown in Figure 5 below.

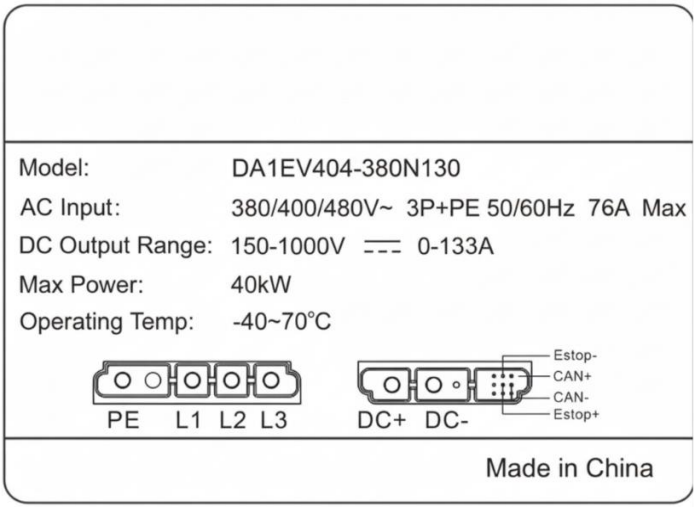


Fig. 5 Schematic Diagram of Module Nameplate Label

2.4 How the Module Works

DA1EV404-380N130 is a high-performance DC charging module, whose main function is to rectify the three- phase AC input of the grid into DC output, and provide fast DC charging current for the battery of the electric vehicle. The internal circuit of the module is mainly divided into two parts. The first part is responsible for rectifying a wide range of three-phase AC input voltage into an internal high-voltage bus, and completing the correction of PF, THD and other indicators. The second part is responsible for the internal high-voltage bus transformation, quarantine, rectification, according to different monitoring settings output pair DC voltage/current applied. The main principle block diagram is shown in Figure 6 below.

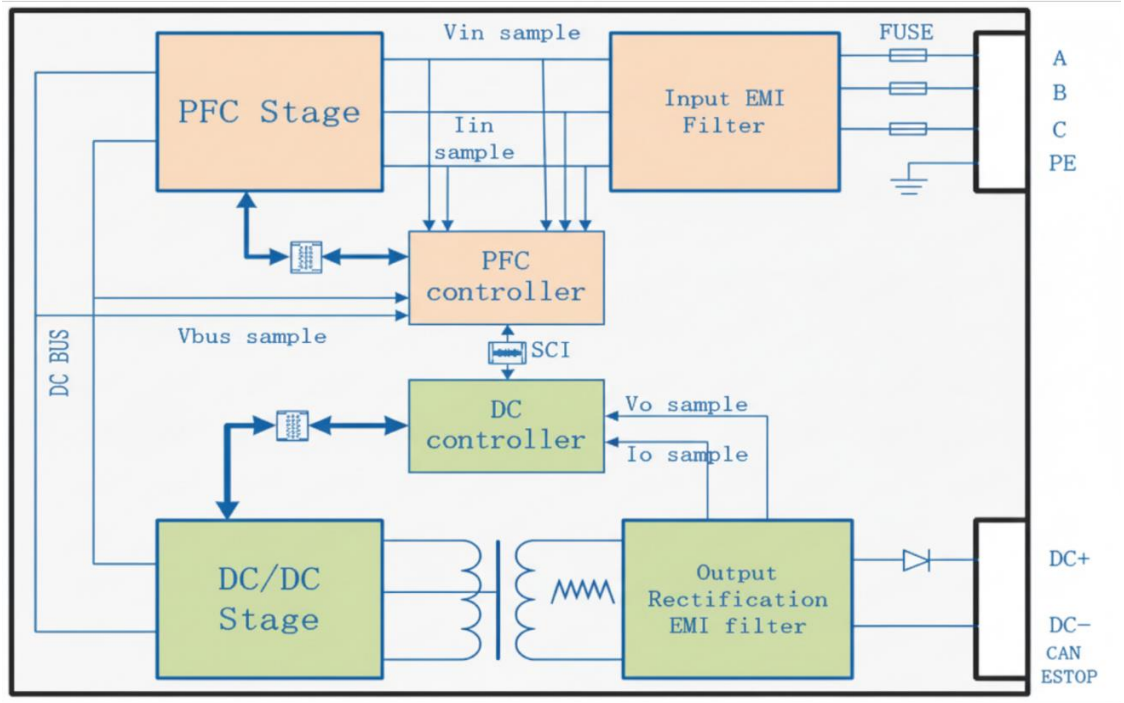


Fig. 6 Schematic Diagram of Module Working Principle

2.5 Module Operating Mode

In order to meet the charging requirements of different occasions such as wide output range and low noise, the output of DA1EV404-380N130 charging module is equipped with high voltage and low voltage modes. The noise control is equipped with standard, noise reduction and mute modes.

Table 2. High and low voltage mode information output by charging module

Working mode	Output voltage range	Max. current limit	Set the mode
Automatic switching	50V … 1000V	133A	Power-on default, or monitor the mode command word "0xA2"
High voltage mode		67A	Monitor and issue mode command word "0xA1"
Low voltage mode	50V … 500V	133A	Monitor and issue mode command word "0xA0"

Automatic switching mode: when the module is powered on, it works in the automatic switching mode by default. In this mode, the module can output up to 1000 V and the maximum output current is 133A. In this mode, when the set voltage issued by the monitor is lower than 500 V, the module automatically works in the low-voltage mode and the maximum output current is 133A. When the set voltage sent by the monitor is higher than 500 V, the module automatically works in the high voltage mode, and the maximum output voltage is 1000 V. If the set voltage exceeds 500 V during operation, the module will automatically shut down, restart and switch to the corresponding operating mode.
High voltage mode: when the monitoring module is set to high voltage mode, the module is fixed to work in high voltage mode. In this mode, the maximum output voltage is 1000 V and the maximum current limit is 67 A; In this mode, when the monitoring setting voltage crosses 500 V, the module will not be shut down and restarted for mode switching.
Low voltage mode: after the monitoring module is set to the low voltage mode, the module is fixed to work in the low voltage mode. In this mode, the maximum output voltage is 500V, and the maximum output current is 133A. When the voltage command sent by the monitoring module exceeds 500V, the module does not respond.

Table 3. Charging module noise mode information

Noise mode Type	Mode description	Set the mode
Standard	Power priority, the charging module can output up to 40 kW	Power-on default, or monitor to send noise command Word "0 xA0"
Noise reduction	Take into account both noise and fast charging needs	Noise command word "0xA1" under monitoring
Mute	Noise first, while maintaining sufficient charging power Noise is limited to a minimum	Noise command word "0xA2" under monitoring

Standard mode: When the module is powered on, it works in the standard mode by default. In this mode, the module does not actively limit the output power within the temperature derating range. When the charging power is very high or the temperature is very high, the module fan may be adjusted to run at full speed to ensure full power output and meet the demand of all-weather fast charging.
Noise reduction mode: In this mode, when the temperature is high, the module will limit the output power to avoid the fan running at full speed to ensure that the noise is not too high, while taking into account the demand for fast charging.
Quiet mode: In this mode, the priority is to meet the requirement of noise limitation, and the module will further limit the output power to ensure that the fan runs at a lower speed range to meet the requirement of quiet charging.
The high and low voltage operating modes and the corresponding noise mode combinations are shown in Table 4.

Table 4. Module Voltage Mode and Noise Mode Combination

High and low voltage operation mode	Noise pattern		
	Standard	Noise reduction	Mute
Automatic mode	Support	Support	Support
Set high voltage	Support	Support	Support
Set low voltage	Support	Support	Support

3. Specifications and Characteristics

3.1 Product Features

The DA1EV404-380N130 Charging Module Has the Following Features:

1. Energy saving and environmental protection: full load range, high efficiency operation and ultra-low standby power consumption, full load efficiency is higher than 95.5%
2. Ultra-wide input voltage range: AC 260Vac ... 530Vac normal operation, adapt to a variety of different power grid environment
3. Ultra-wide output voltage range: 50Vdc ... 1000Vdc, to meet the fast charging needs of various electric vehicles and battery packs
4. Wide constant power output range: 300Vdc ... 1000Vdc constant power output, meeting the fast charging requirements of various electric vehicles
5. Low voltage current does not retract: the maximum output of 133A can be maintained below 300Vdc to meet the fast charging needs of more equipment
6. High power density: more than 65W/in ^ 3, saving the space in the pile and reducing the area occupied by the charging pile
7. Emergency stop function: quick response system emergency stop action, safe and reliable
8. Noise mode setting: The noise mode of the module can be set in three levels to meet the noise control requirements in different environments.
9. Fan speed reporting: it is convenient for the user to adjust the fan speed of the whole pile according to the module fan speed to further optimize the noise
10. Intelligent detection of air duct: intelligently detect the fluency of the air duct of the system, and automatically limit the power and give an alarm when the air duct is not smooth.
11. High environmental reliability: key circuit glue pouring treatment, salt fog resistance, moisture resistance, mildew resistance, etc. Are significantly improved
12. Built-in discharge circuit: automatically discharge residual charge, simplify system design and improve system safety
13. Battery backfill protection function: effectively protect the battery and ensure the reliable and safe operation of the system.
14. Excellent electromagnetic compatibility: meet NB ClassA requirements, with small electromagnetic radiation and interference
15. Three-phase AC input without neutral wire: simplify the system design, eliminate the risk of large neutral current and reduce the system cost
16. Complete certification: certified by Cape/State Grid Electric Power Research Institute

3.2 Product Features

1. Hot swap

The charging module adopts plug-in technology, which is convenient for installation and maintenance. When the charging module is connected to or pulled out of the system in the standby state, the output voltage of the system will not be disturbed.

2. Advanced current sharing technology

Automatic current sharing is available between charging modules, and the current imbalance between modules is less than ± 5% of the rated current.

3. Input power limit control: The relationship between the output power of the charging module and the input voltage is shown in Figure 7. When the input voltage is between 320Vac and 530Vac (the return difference is less than 5V), the module can output the maximum power of 40 kW; when the input voltage is between 260Vac and 320Vac, the module is in the power limiting mode.
4. Output power limit: Under the rated input voltage, the maximum allowable output power of the charging module within the output range of 300Vdc ... 500Vdc and 600Vdc ... 1000Vdc is 40KW, and the maximum current limit of the module below 300Vdc is 133A. The relationship between the output voltage and the output current of the module is shown in Figure 8.
5. Temperature limited power: When the ambient temperature is below 55 ℃, the maximum power output of the charging module is 40 kW; For derating use above 55 ℃ ambient temperature, it is a piecewise linear power limit; The ambient temperature is 65 ℃, and the allowable output power of the charging module is greater than or equal to 20 kW; When the ambient temperature is 75 ℃, the output power of the charging module drops to 0. The detailed temperature-limited power curve is shown in Figure 9 below.
6. Output current limiting point adjustment: The charging module has the function of stepless current limiting. Through the external monitoring module, the current limiting point of the charging module can be adjusted within the range of 0 A ~ 133A. When the output voltage is between 150Vdc and 1000Vdc, the current limiting accuracy of the module is ± 0.3A (when the output current is less than 30 A) or ± 1% (when the output current is more than 30 A).
7. Output voltage regulation Through the external monitoring module, the output voltage of the charging module can be adjusted continuously, ranging from 100Vdc to 1000Vdc, and the minimum adjustment step is 0.1Vdc.
8. Fan control: The built-in processor of the charging module can automatically adjust the fan speed according to the ambient temperature, the internal temperature of the module and the output current of the module.
9. Input overvoltage/undervoltage protection: When the three-phase AC input voltage is less than 260Vac or greater than 530Vac, the protection indicator is on, and the module will stop working without output. In case of input overvoltage or undervoltage alarm, the module will report the alarm information to the monitoring module; When the input voltage returns to the normal range, the alarm disappears and the module returns to the standby state.
10. Output overvoltage protection: The output overvoltage protection point can be set through the monitoring module, with the setting range of 260Vdc ... 1036 Vdc and the factory default value of 1036 Vdc. After the overvoltage protection is triggered, manual intervention is required to restart the machine. Manual intervention method: The module can be reset through monitoring, or the module can be separated from the system to reset.
11. Over-temperature protection: The environmental over-temperature protection point is 80 ℃. When the internal temperature is too high, the module will also shut down; After the temperature is recovered, the module enters the standby state and needs to receive the power-on command to start working. 12. Internal bus fault protection When the internal bus voltage of the module exceeds the over-voltage/under-voltage protection point, the module will automatically shut down. At this time, the module has no output and the fault indicator is on.
13. Short circuit protection: When the module is short-circuited, the protection is shut down, and the red indicator light on the panel is on; And report the "module fault" to the monitor (the monitor can query the current alarm information of the module through the protocol). After the short circuit is eliminated, the module is in the standby state, and the monitor needs to issue the boot control module to boot again.
14. Communications are down: When the communication of the module is interrupted for more than 10 S, the module is shut down for protection, no voltage is output, and the protection indicator flashes. When the module communication is restored within 10S-20S, the protection indicator light is restored to normal, and the module is restored to work according to the default parameters; If the communication is interrupted for more than 20 seconds, the module returns to the standby state after the communication is restored.

15. Fan failure protection: When the fan fails, the module will generate a fan failure alarm, and the fault indicator will flash. At this time, the module is shut down and there is no voltage output. After the fault is eliminated, the module returns to the standby state, and it is necessary to monitor and issue the startup control module to start up again.

16. Emergency stop protection: When there is an emergency stop signal (9 ... 15 V voltage is added between the positive and negative of the emergency stop cable), the module is shut down, there is no voltage output, and the alarm indicator is always on. After the emergency stop signal is cancelled, the module returns to the standby state, and the startup control module needs to be monitored and sent to start up again.

17. Monitor performance: The charging module uses CAN bus communication. Table 5 shows the list of communication interaction information.

Table 5. List of module monitoring details

Module control commands/signals from system monitor	Charging module information collected by system monitoring
Module on/off Set the output current slow-start function Adjust the output current of the charging module Adjust module output voltage Set the working mode of high and low voltage of the module Set Module Noise Mode Set the module address assignment model Module control commands/signals from system monitor	Input voltage, output voltage, output current Charging module temperature DC switch status Fault alarm and protection alarm Power limited state High and low voltage operation mode Current maximum allowable output current Address Charging module information collected by system monitoring
	Version

3.3 Technical Parameters

3.3.1 Technical specifications

Table 6. Technical Specifications of Module

Parameters	Min.	Max.	Unit	Notes
Environmental conditions				
Operating temperature	-40	+70	℃	over 55 ℃, derating is required
Storage temperature	-40	+75	℃	
Relative humidity		95	% RH	RH, non-condensing
Cooling method				Forced air cooling
Altitude	2000		m	more than 2000 m need to be derated
Atmospheric pressure	79	106	kPa	
Degree of protection				IP20
AC input				
Input system				Three-phase + PE
Voltage range	260	530	V_{AC}	
Do not work to bear the most Static voltage	600		V_{AC}	
Rated voltage	380		V_{AC}	
Maximum current	76A		A	

Parameters	Min.	Max.	Unit	Notes
Grid frequency	45	65	Hz	Three-phase + PE
Rated frequency	50/60		V_{AC}	
DC output				
Voltage range	150	1000	V_{DC}	
Current range	0	133	A	Current limiting point can be set
Rated current	40A			Required to set the flow limit point
Voltage stabilization accuracy	-0.5	+0.5	%	150 … 1000V, 0 … 20MHz
Steady current accuracy	-1	+1	%	Output load 20% rated current -max. current
Load regulation	-0.5	+0.5	%	
Grid regulation rate	-0.1	+0.1	%	
Start overshoot	-3	+3	%	
Power factor and THD				
Power factor	0.95			@ 25% ... 50% full-load output power
	0.98			@ 50% ... 100% full-load output power
	0.99			@ 100% full load output power, nominal input voltage and frequency
THD	-5	+5	%	@ 50% ... 100% full-load output power
Ripple indicator				
Voltage ripple factor	-1	+1	%	150 … 1000V, 0 … 20MHz
EMC Metrics				
Surge EFT	Meet the general technical specification for off-board vehicle DC charger of electric vehicle, NB/T 33001 -1-2018, NB/T 33008 -1-2018			
	Input and output: 4kV; Signal line: 1 kV Reference standard: EN61000-4-6			
Voltage ripple factor	8kV/15kV		%	Reference standard: GB18487 _ 2015
Conducted immunity	3		Vrms	0.15 … 80MHz, reference standard: GB18487 _ 2015
Radiated immunity	10		V	80 … 2GHz, reference standard: GB18487 _ 2015
Power frequency magnetic field	30		A/m	Reference standard: GB18487 _ 2015
Conducted emission	Class A, meeting the general technical specifications of off-board vehicle DC charger for electric vehicle, NB/T 33001 -1-2018, NB/T 33008 -1-2018, IEC 61000 -6-3			
Radiation emission	Class A, meeting the general technical specifications of off-board vehicle DC charger for electric vehicle, NB/T 33001 -1-2018, NB/T 33008 -1-2018, IEC 61000 -6-1			
Other				
Safety requirements	Meet the electric vehicle General Technical Specification for Off-board Vehicle DC Charger, NB/T 33001 -1-2018, NB/T 33008 -1-2018, IEC61851-1, UL2202			
Efficiency	95.5		%	@ 1000V, full load
	94.5		%	@ 400-500V & 800-1000V, 50% … 100% load;
	94		%	@ 300-400V & 600-800V, 50% ... 100% load; Under rated three- phase input voltage

Parameters	Min.	Max.	Unit	Notes
Input rush current		91	A	
Conducted immunity	Under 10% ... 100% load, the current sharing error of the module is ≤ ± 5% of the rated output current			
Temperature coefficient (1/℃)	-0.01	0.01	%	
Start time	Normal startup mode: time delay from AC power-on to module output ≤ 3s			
	Output current slow start: the start time can be set by the monitoring module, default Starting time of output current: 3 ... 8s			
Noise		65	dB (A)	1m away from the front panel
Grounding resistance	Grounding resistance ≤ 0.1 Ohm, withstand current ≥ 80 A			
Leakage current		3.5	mA	1m away from the front panel
Insulation resistance	10		Mohm	Insulation resistance of DC part, AC part to enclosure and AC part to DC part
Insulation strength	AC input terminal to shell 3535 V DC voltage for 1 minute, no breakdown, no flashover, steady state leakage current less than 1mA; AC input terminal to DC output terminal 4242 V DC voltage for 1 minute, no breakdown, no flashover, steady state leakage current less than 1mA; DC output terminal to shell 3535 V DC voltage for 1 minute, no breakdown, no flashover, steady state leakage current less than 1mA; No breakdown or flashover occurs when the CAN applies 707 V DC voltage to the shell for 1 minute, and the steady-state leakage current is less than 1mA. AC input terminal to CAN 4242V DC voltage for 1 minute, no breakdown, no flashover, steady state leakage current less than 1mA; DC output terminal to CAN 4242V DC voltage for 1 minute, no breakdown, no flashover, steady state leakage current less than 1mA;			
ROHS	R10			
Certification	Cape/State Grid Electric Power Research Institute			
Mechanical parameters				
Size	84mm (H) × 300 mm (W) × 395 mm (D) (excluding handle and socket)			
Weight		16	kg	

3.3.2 Enter the Characteristics

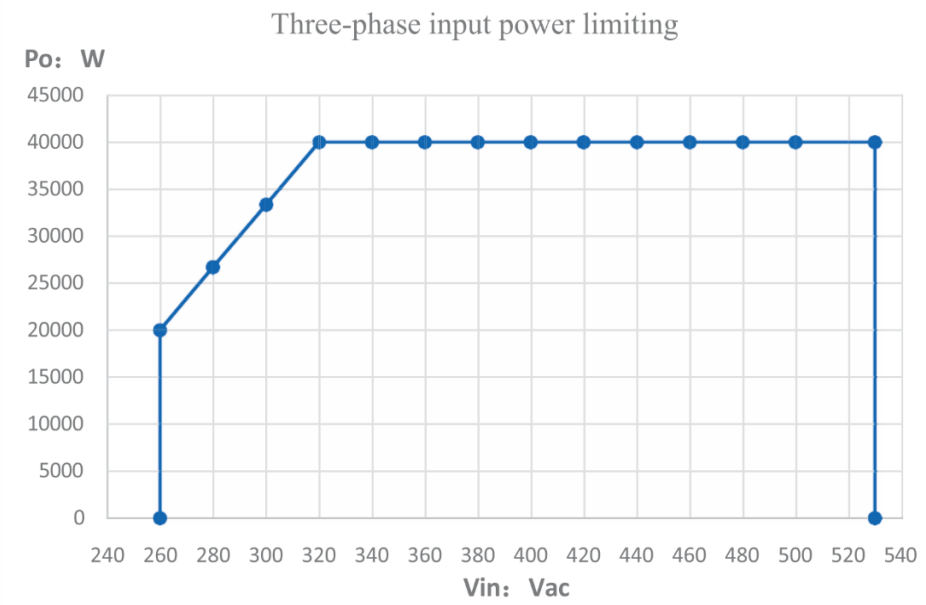


Fig. 7 Schematic diagram of module input power limit curve

3.3.3 Output Characteristics

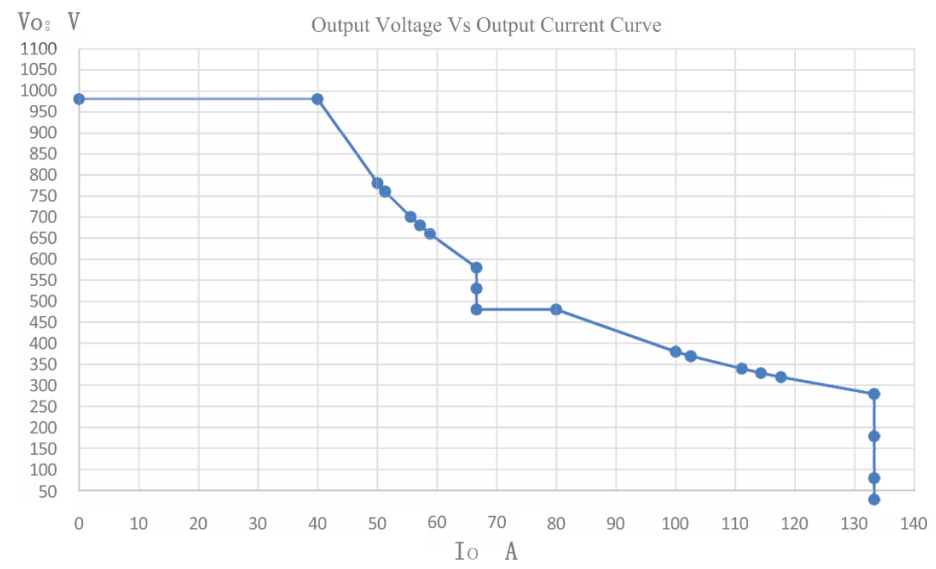


Fig. 8 Schematic Diagram of Output Power Limit Curve of Module

3.3.4 Temperature-Limited Power Characteristic

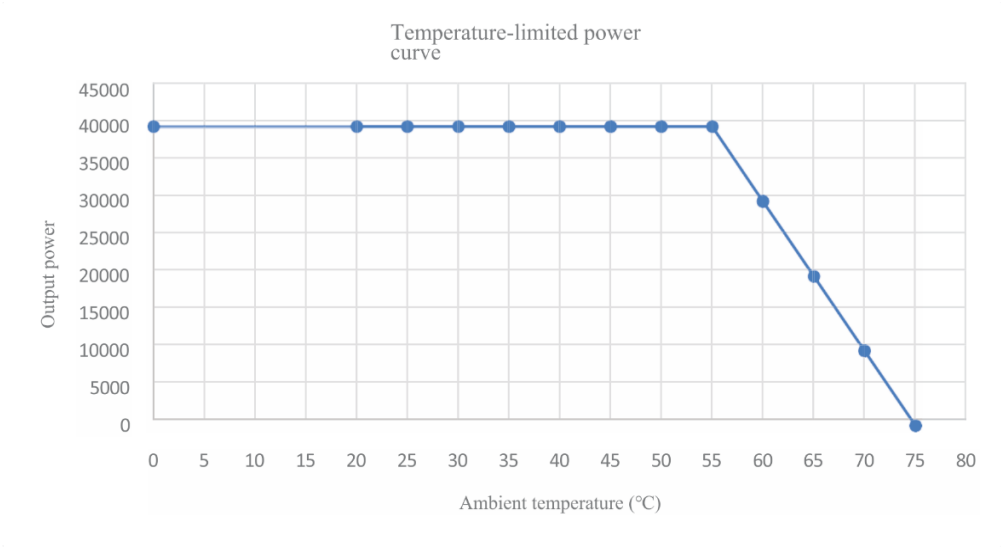


Fig. 9 Schematic diagram of module ambient temperature limit power curvee

4. Transportation and Storage

4.1 Transportation

The packaging of this product can be suitable for transportation by automobile, train, ship, plane, etc., and should be covered and rain-proof during transportation; Operate in strict accordance with the storage and transportation marks. When the ambient temperature is -40 ℃, it shall not be more than 72 hours, and when the ambient temperature is 70 ℃, it shall not be more than 72 hours.

4.2 Storage

This product should be placed in the original packaging box before use. The ambient temperature of the warehouse where the product is stored is -10 ℃ ... 40 ℃, and the relative humidity is not more than 75%. No harmful gas, inflammable, explosive and corrosive chemicals are allowed in the warehouse, and there should be no strong mechanical vibration, impact and strong magnetic field. It is not allowed to store in the open air.

5. Installation and Operation Instructions

5.1.1 Module installation instructions

The charging module is installed as follows.
1. Hold the charging module with both hands, and insert the charging module into the corresponding position of the cabinet;
2. Slowly push the charging module completely into the slot;
3. Tighten the two fixing screws on the charging module panel to fix it on the cabinet;
4. Install the charging modules into the cabinet in sequence from left to right;

5.1.2 Cable Assembly Instructions

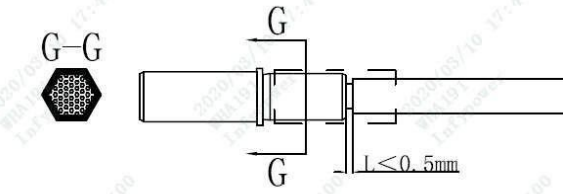
Main process:
1. Wire cutting/peeling;
2. Heat-shrinkable tube sleeving/crimping terminal;
3. Jack;
4. Inspection

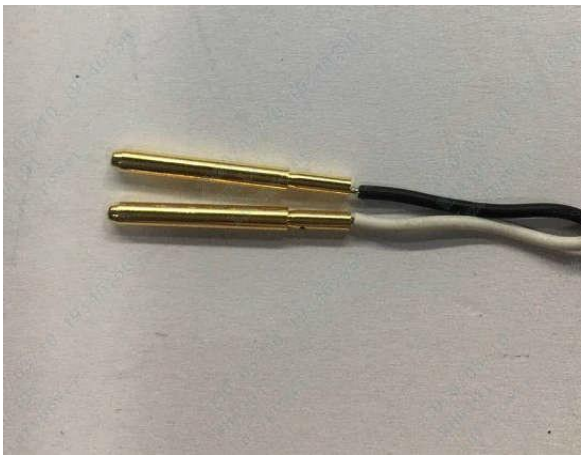
1.Cutting/Stripping

Operation process:
1. Select the corresponding wire according to the drawing requirements;
2. Peeling the cut wires according to the peeling size;

Caution:
1. Strictly control all dimensions within the tolerance range;
2. The wire shall not be scratched, crushed or broken, and the copper wire shall not be damaged by peeling.

2.Heat shrinkable sleeve/crimping terminal



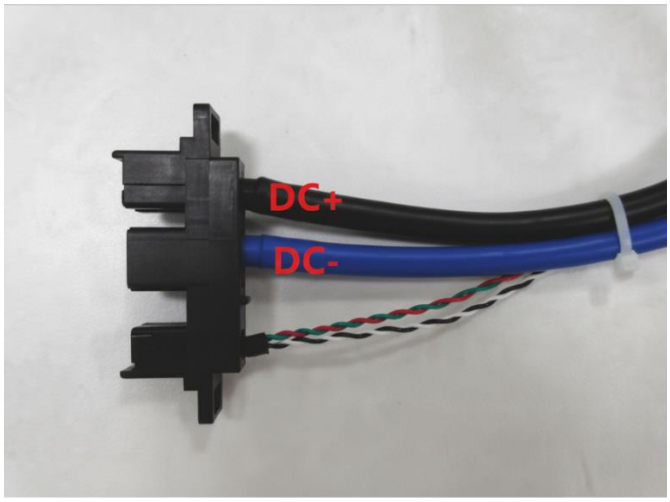


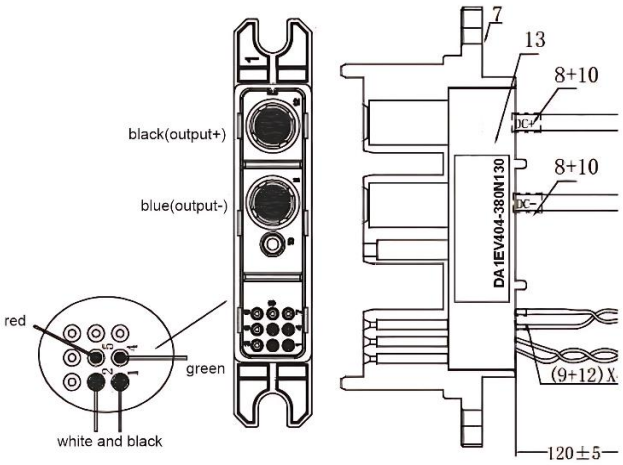
Conductor specification AWG/mm^2	30AWG	28AWG	26AWG	24AWG	22AWG	20AWG	18AWG	16AWG
	0.05mm^2	0.08mm^2	0.13mm^2	0.2mm^2	0.324mm^2	0.519mm^2	0.823mm^2	1.31mm^2
Minimum tensile force requirement (N)	6.7	8.9	13.4	22.3	35.6	57.9	89	133.5
Conductor specification AWG/mm^2	14AWG	12AWG	10AWG	8AWG	6AWG	4AWG	3AWG	2AWG
	2.08mm^2	3.31mm^2	5.261mm^2	8.367mm^2	13.2mm^2	21.15mm^2	26.67mm^2	33.62mm^2
Minimum tensile force requirement (N)	6.7	8.9	13.4	22.3	35.6	57.9	89	133.5
Conductor specification AWG/mm^2	1AWG	1/0AWG	2/0AWG	3/0AWG	4/0AWG	250kcmil	300kcmil	350kcmil
	42.41mm^2	53.49mm^2	67.43mm^2	85.01mm^2	107.2mm^2	127mm^2	156mm^2	177mm^2
Minimum tensile force requirement (N)	6.7	8.9	13.4	22.3	35.6	57.9	89	133.5
Conductor specification AWG/mm^2	400kcmil	500kcmil	600kcmil	700kcmil				
	203mm^2	253mm^2	304mm^2	355mm^2				
Minimum tensile force requirement (N)	6.7	8.9	13.4	22.3				

Operation process:
1. Thread the heat-shrinkable sleeve with the corresponding color and specification, and then thread the cable into the terminal hole for crimping;
2. The terminal crimping method is hexagonal crimping as shown in the figure. Check whether the terminal is free of deformation, fracturing, copper exposure, etc.
3. See the table in the figure for the minimum tension requirement of the terminal. See the figure for the exposed dimension after the terminal is crimped with the cable conductor. The distance between the stripped part and the terminal tail is < 0.5mm.
4. After the crimping is completed and confirmed to be qualified, blow the heat-shrinkable sleeve, and the heat-shrinkable sleeve covers about 5mm;

Caution:
1. After crimping, there shall be no relative rotation or axial rotation between the terminal and the cable;
2. Crimping can only be done once, not twice or more;
3. The coating shall not fall off and the terminal shall not be deformed (compared with the original terminal);
4. There should be a flare at the end of the terminal.

3.Jack





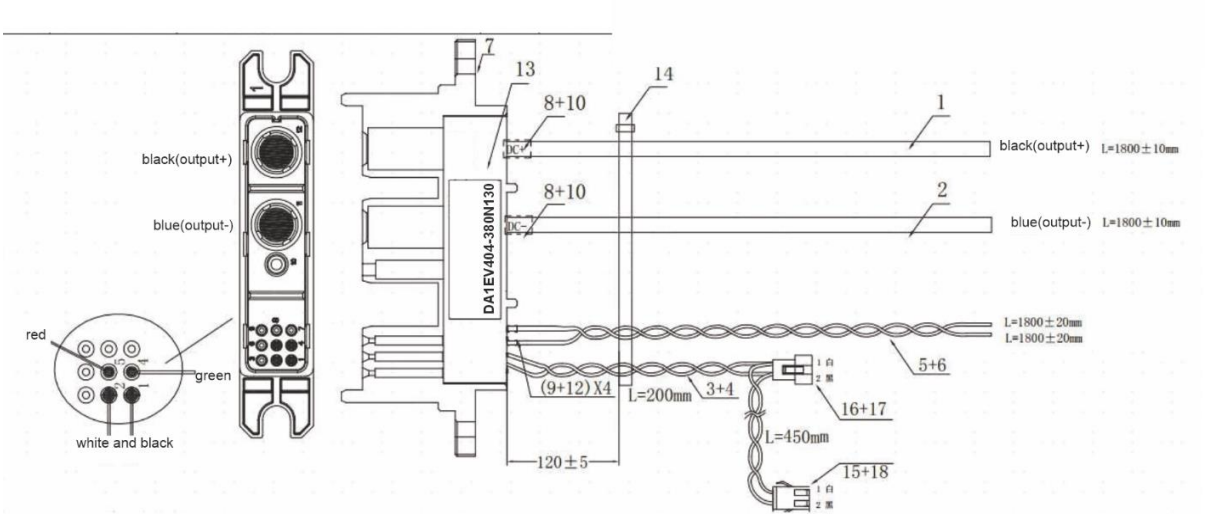
Operation process:
1. Insert the processed cable into the plastic shell according to the pin number as shown in the figure. When the "click" sound is heard, it indicates that the connection is in place, and pull back for confirmation;
2. Paste the label in the middle of the plug as shown in the figure, and there shall be no flash, warping, skew, etc.

Caution:
1. The wiring must be conducted according to the wiring relationship, and the wrong insertion is not allowed;
2. When the terminal is inserted into the rubber shell and a "click" sound is heard, it indicates that the terminal is inserted in place and pulled back for confirmation;
3. The crimping of signal line is the same as that of power line.

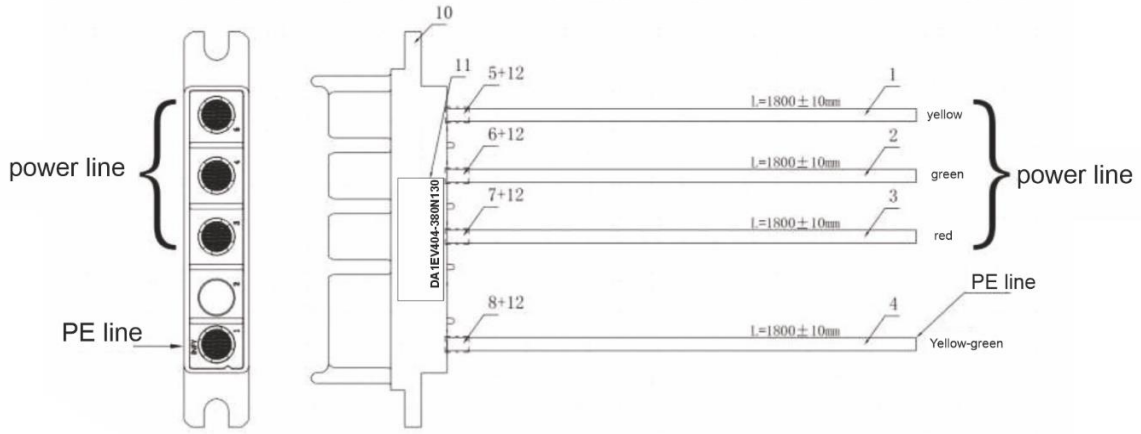
4. Inspection

1. Whether the wiring relationship conforms to the drawing requirements;
2. Check whether the specifications and models of terminals are correct;
3. The cut shall be neat, and the core wire of the cable shall not be damaged by peeling;
4. Check whether the heat-shrinkable sleeve is in place as required and whether the heat-shrinkable sleeve is in place;
5. The terminal shall be free of oxidation, crush, deformation, and improper crimping; The assembly method and steps of input and output cables are the same. Select the corresponding wire assembly according to the list in the cable drawing. The cable assembly list is shown in the drawing and table below.

Serial Number	Material coding	Specification	Amount	Remark
1	1102-01410	ULI032 3AWG 1000V 90℃ Tin Plating - Black	1	
2		UL1032 3AWG 1000V 90℃ Tin Plating - Blue	1	
3	1102-01023	UL1007 24AWG 300V 80℃ Tin Plating - Black	1	
4	1102-01025	UL1007 24AWG 300V 80℃ Tin Plating - White	1	
5	1102-01018	UL1007 24AWG 300V 80℃ Tin Plating - Green	1	
6	1102-01022	UL1007 24AWG 300V 80℃ Tin Plating - Red	1	
7		End Housing Assembly\RPS1113009N	1	214100106
8		3AWG Crimping (Socket)\DWR-23A-221-S50	2	214060064
9		20AWG Crimping (Socket)\DWR-237-012-G05	4	214060065
10		Φ12 White Sleeve	2	
11				
12	1107-01014	Heat shrink tubing - Φ 3 - Black	4	
13	1108-01004	Silver Dragon label - 30*15	1	
14	1111-03005	GT3. 6-150	1	
15		SMP_02V_BC 2.5nm 2P/SM female connector	1	214060052
16		SMR_02V_B 2. 5mm 2P/SM male connector	1	214060053
17		SMR_02V_B/2. 5nm/Matching SM male terminal	2	214060054
18		SMP_02V_BC/2. 3mm/Matching SM female terminal	2	214060055



Serial Number	Material coding	Specification	Amount	Remark
1		UL1015 6AWG 600V 105℃ Tin Plating - One Color	1	
2		UL1015 6AWG 600V 105℃ Tin Plating - 4 Colors	1	
3		UL1015 6AWG 600V 105℃ Tin Plating - Red	1	
4		UL1015 6AWG 600V 105℃ Tin Plating - Red	1	
5		Heat Shrink Tubing Φ10*25 Yellow	1	
6		Heat Shrink Tubing Φ10*25 Green	1	
7		Heat shrink tubing Φ10*25 (black)	1	
8		Heat shrink tubing Φ10*25 (yellow/green)	1	
9				
10		Penetrating socket\End housing assembly\RPSO513OO9,	1	
11		Silver Dragon label-30*15	1	
12		6AWG crimp terminal\1) i.e. 23A235s50BP	4	



Technical requirements:

1. Mark the production cycle on the **** position of the label, and affix the label to the middle of

5.2 Instructions for use

After the charging module is installed in the system cabinet, the system is powered up and ready for operation.
Use environment:

1.Overvoltage/Installation Category: Overvoltage Category II.
2. Pollution level: pollution level II.
3. Altitude: if the altitude is lower than 2000m and exceeds 2000m, the module needs to be derated. It is recommended that the output power of the module should be derated by 1% ~ 1.5% for every 100m of altitude increase.
4. AC input distribution system: TN or TT system.
5. Requirements for system exhaust air volume:
The exhaust air volume required by the system shall be calculated according to the thermal design formula.
According to the formula: Q = CMΔT (ΔT is the temperature difference between the air inlet and outlet of the system, 10 degrees is generally selected for the outdoor cabinet, if the air duct is not good, this value should be further reduced, if it is an indoor cabinet, this temperature difference can be increased appropriately), Through the efficiency of the system, the total loss Q of the system (the Q value of the strong sunshine area also needs to add the solar radiation) is obtained: M (the air mass required for heat dissipation) = Q/C/ΔT (C is the specific heat capacity of the air), V = M/ρ (mass/density) to obtain the air volume (m ^ 3/s), thus the air volume of the system can be obtained. However, this air volume is the air volume actually required by the system, and the fan should be selected according to 2 times of the actual air volume (nominal air volume In fact, the maximum air volume can not be achieved, and the actual working efficiency point is about 0.5 times the maximum air volume. To simplify the design, it can be concluded that the total exhaust air volume of the system should not be less than according to the air volume of 420 CFM of the single module fan.
N * 420CFM, where N is the number of modules

5.3 Recommendations for Cabinet Wiring

1. Cabinet power wiring and communication lines are routed separately to avoid mutual space coupling interference; Special attention shall be paid to that the CAN communication bus is not closely parallel to the power wiring.
2. The AC incoming line and DC outgoing line of the rectifier module inside the system shall be bundled on both sides of the module plug-in frame, and the air duct at the air outlet of the module shall not be blocked, as shown in Figure 10.
3. The AC input three-phase of the module is gray, black and brown (this is the default color, and the color may be different according to the requirements of different countries/regions), regardless of the phase sequence; the black of the DC output power cable is positive, and the blue is negative, as shown in Figure 11 and 12.
4. When installing the AC input and DC output terminals in the rectifier plug-in frame, the screws matched with the terminals must be used to ensure that there is enough tolerance floating allowance while tightening; Supplied with screws and cables.

5. The CAN communication bus must be connected in the form of bus, and a matching resistor of 100 ... 150 ohms shall be connected at the beginning and end of the bus respectively. The head end can be placed inside the monitor, and the recommended resistance value is 120 ohms. As shown in fig. 13.
6. CAN communication terminal on DC output cable, black for CAN _ H, white for CAN _ L; Pay special attention when wiring.
7. For the emergency stop control terminal on the DC output cable, the red is positive (+) and the green is negative (-). Pay special attention to the wiring. The schematic diagram of the system emergency stop wiring is as shown in Figure 14.

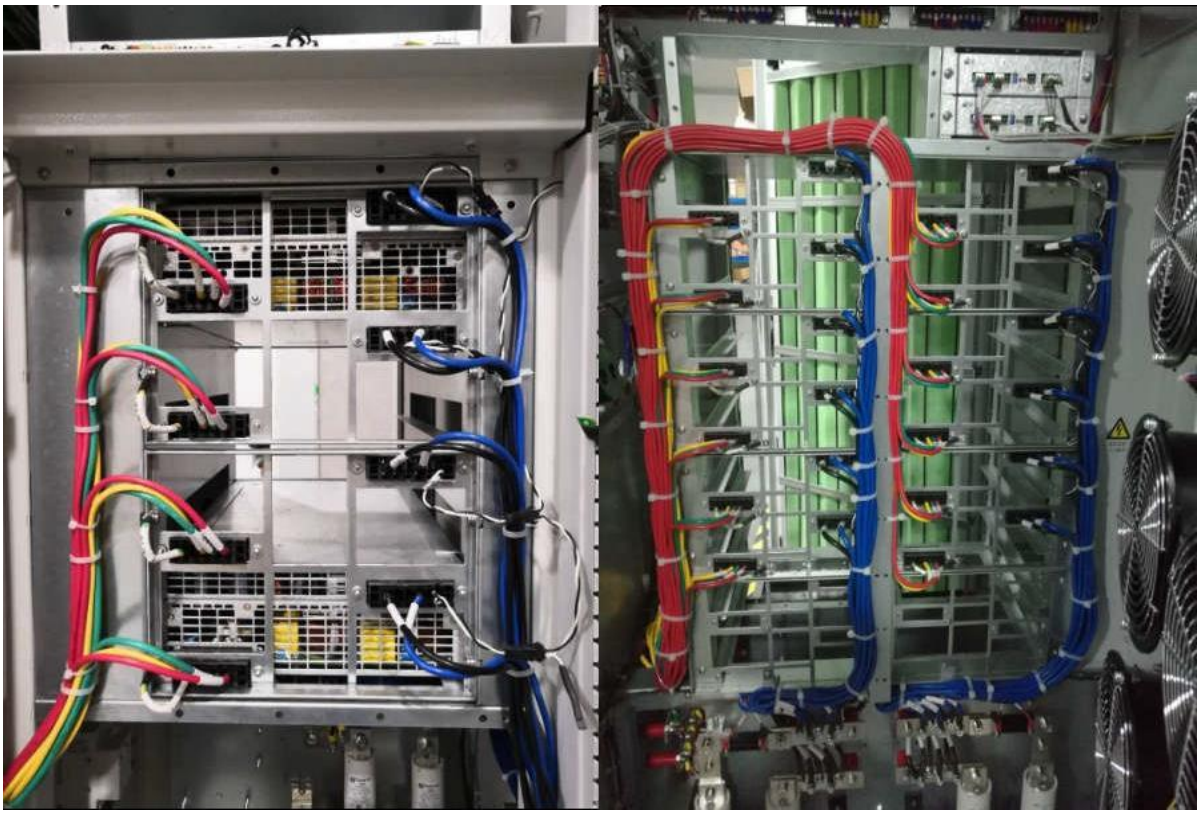


Figure 10 Schematic diagram of cabinet power and communication wiring

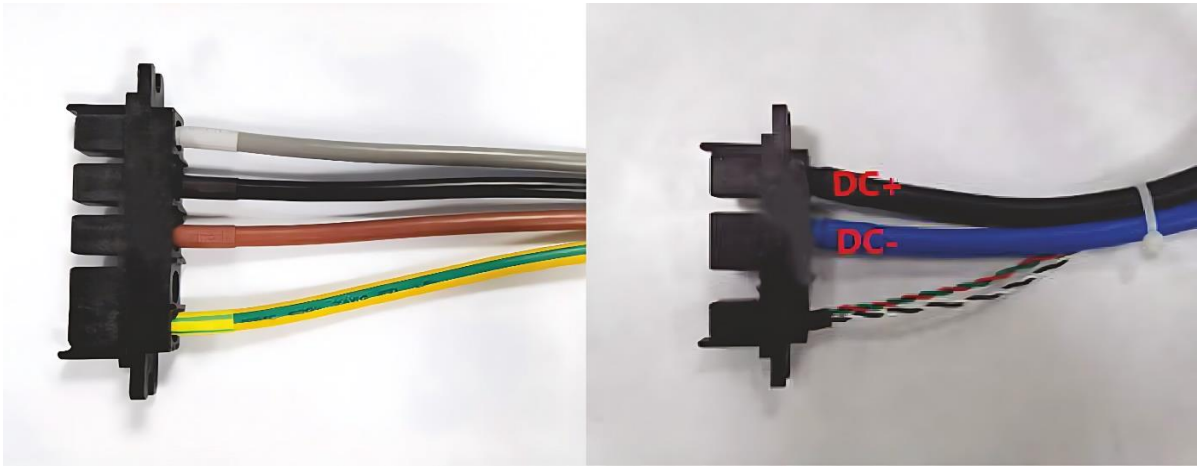


Fig. 11 Physical Diagram of Module Input Cable and Fig. 12 Physical Diagram of Module Output Cable (Definition of signal line: black for CANH, white for CANL; red for emergency stop control +, green for emergency stop control-)

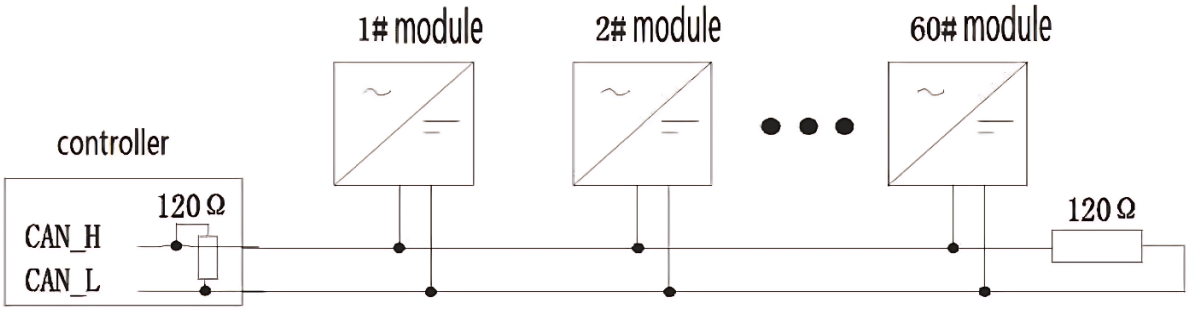


Fig. 13 Schematic Diagram of CAN Communication Bus Connection

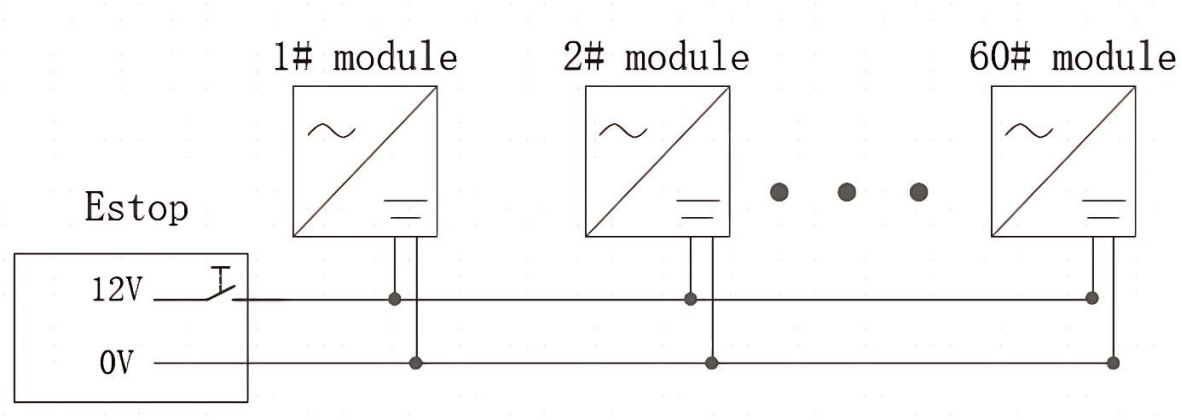


Fig. 14 Schematic diagram of system emergency stop signal connection

6. Maintenance Guide

6.1 Fault Symptoms and Troubleshooting Suggestions

If the protection indicator (yellow) is on or the fault indicator (red) is on, it indicates that the module is abnormal. The corresponding relationship between the indicator status and the module operation status is shown in the following table.

Table 7. Troubleshooting Suggestions

Anomaly	Related alarms	Cause analysis		Deal with suggestions
Operation indicator (Green) Off	No alarm	Input power is reversely connected or input fuse is disconnected/air switch is not closed		Reconnect the input power supply or replace an input fuse with the same capacity, or reset the air switch
Protection indicator (Yellow) bright	Module over-temperature protection	The main reasons for overheat protection of the module are	The fan is blocked	Remove objects that obstruct the operation of the fan
			The air duct is not smooth	Remove obstructions from the vent
			Ambient temp. too high	Lower the ambient temperature
			The charging module is not available Fully inserted into position	Reinsert the charging module
	Uneven module current	The deviation between the output current and the average current of the module is greater than 3A.		Check whether the communication of the charging module is normal and whether the connection of the communication line is normal; If the communication is normal but the system is still abnormal, replace with a new charging module
	Module protection	PFC Output Overvoltage Protection		Connect the abnormal charging module and the normal charging module; Replace the position. If the abnormal charging module still cannot work normally, replace it with a new one.
	Module protection	AC input voltage out of normal range Surround		Make sure that the AC input voltage is in the normal range
Protection indicator (Yellow) shiny	Module communication Interrupt	Module communication is interrupted		Check the communication line to ensure that the line is properly connected and that there is a 120 ohm matching resistor on the communication line.
Fault indicator (Red) On	Module failure	Module overvoltage or output short circuit or address conflict		Confirm whether there is short circuit at the DC output side and whether the module address is set correctly; Restart after pulling out the charging module. If the fault protection continues, replace the charging module with a new one;
Fault indicator (Red) Shiny	Fan failure	Fan failure		Replace the fan

6.2 Replace the Fan

The fan can be replaced as follows.
1. Power off and remove the module, remove the 8 screws fixing the front panel with a cross screwdriver, pull out the front panel, and pull out the lamp panel cable plug.
2. Unplug the power cable of the fan and remove the faulty fan.
3. Plug the fan power cable into the fan power socket, align the direction of the fan to the inside of the chassis, and install the new fan.
4. Install the front panel, and fix the front panel with 8 screws.
5. Verify that the new fan is operating properly. If it is, the fan has been successfully replaced.

6.3 Replace the Charging Module

If the charging module is faulty, replace it as follows:
1. The surface temperature of the charging module may be very high, so pay attention to scald when pulling it out;
2. Check whether the appearance of the new charging module is intact;
3. Disconnect the AC input air switch of the faulty charging module and loosen the fixing screw on the panel.
4. Grasp the faulty charging module by its handle and slowly pull it out of the cabinet.
5. Slowly push the new charging module into the cabinet to a secure position.
6. Tighten the retaining screws on the panel.
7. Close the AC input air switch of charging module.
8. Check whether the monitoring module can identify the new charging module and whether the new charging module can share the current with other charging modules.
If all items are normal, the operation is normal.

6.4 Routine Maintenance

1. Regularly check the fan rotation of the charging module;
2. Record the daily operation status of the charging module on time.
3. Regularly clean dust-proof cotton of the charging pile and maintain good ventilation and heat dissipation conditions;
4. Regularly check the sunshade and other external protection to avoid direct exposure to the sun and rain;
5. Regularly check the charging module and the ground wire of the whole pile to ensure good grounding.

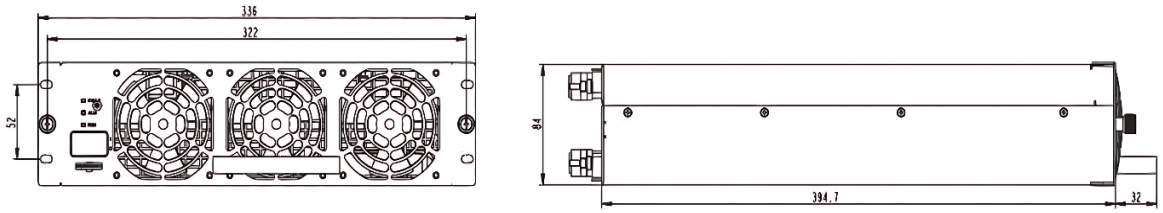
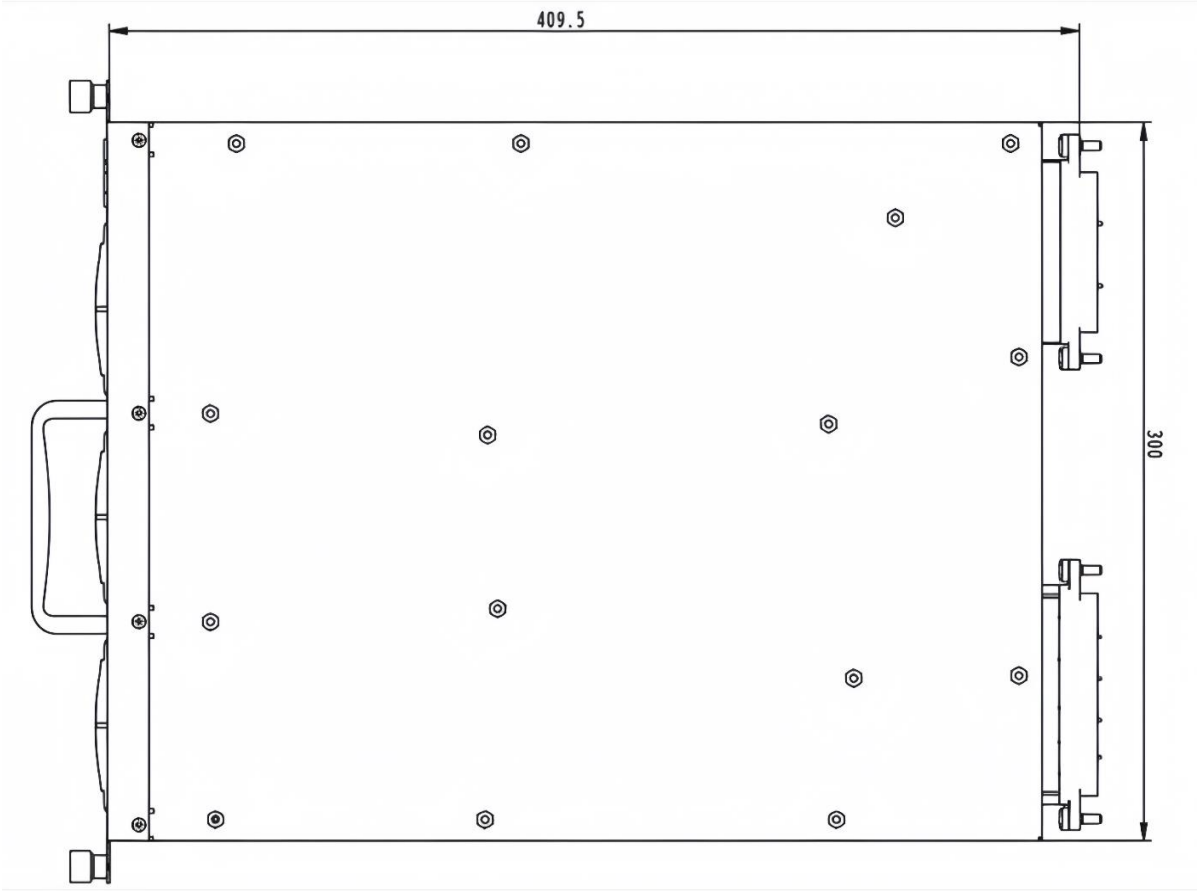
Appendix A Table of Identification of Toxic and Harmful Substances or Elements

Table 8. Identification of Toxic and Hazardous Substances or Elements

Name of the part	Poisonous or harmful substance or element					
	Lead	Mercury	Cadmium	Hexavalent chromium	Polybrominated biphenyls	Hexavalent chromium
	Pb	Hg	Cd	Cr^{6+}	PBB	PBDE
Fan	X	O	O	O	O	O
Board is made	X	O	O	O	O	O
Hardware	X	O	O	O	O	O

○: Indicates that the content of the toxic and hazardous substance in all homogeneous materials of the part is below the limit requirements specified in SJ/T-11363-2006.
×: Indicates that the content of the toxic and hazardous substance in at least one homogeneous material of the component exceeds the limit requirements specified in SJ/T11363-2006.

The toxic and harmful substances contained in the following components and applications cannot be replaced reliably due to the current technical level, or there is no mature technical scheme:
1. Solder contains lead
2. Lead in copper
3. High temperature solder containing lead

Description of environmental protection service life: The environmental protection service life of this product (marked on the product body) refers to the period when the toxic and harmful substances or elements contained in this product will not cause serious impact on the environment, personal and property from the date of production under normal use conditions and in accordance with the safety precautions of this product.

Appendix B Dimensions