Shijiazhuang Maxwell Technology Co.,Ltd.

MXR100020 Charging Module
User Manual
Data version V1.0
Archiving time 2021-6-9

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Chapter1 MXR100020 Charging Module Overview

1.1Technical Parameters

Table1-1 Charging module technical parameters

Name	Parameter
Basic Index	
Size	84mm（H）×218mm（W）×459mm（D）
Weight	≤12kg
Efficiency (Full Load)	>95.5%
Standby Consumption	8.5W+/-0.5W
Cooling Method	Forced air cooling
Communication	CAN bus
Number of Parallel	≤60
Indicator light	Green: Normal operation Yellow: Protection alram Red: Fault alarm LED digital
Input characteristics	
Input Voltage	285Vac～475Vac,three-phase + PE
Input Current	＜40A
Grid Frequency	45Hz～65Hz
Power Factor	≥0.95(4KW≤Output Power≤10KW)；≥0.98(10KW≤Output Power≤20KW)
ITHD	≤5％(10KW≤Output Power≤20KW)
Output Characteristics	
Voltage Range	50Vdc～1000Vdc
Current Range	0A～67A Continuous adjustable
Rated Current	20A
Voltage Accuracy	≤±0.5 %(regulated state,input voltage 323Vac～456Vac,output voltage 200Vdc～1000Vdc，Ouput current 0～Rated Current value)
Current accuracy	≤±1% (steady current state,input voltage 323Vac～456Vac,output voltage 200Vdc～1000Vdc,output current 20% rated current～100％ rated current value)
current unbalance	≤±5 %
Ripple Factor (Peak to Peak)	≤1%(regulated state,input voltage 323～456Vac,output voltage 200Vdc～1000Vdc, output current 0～rated current)
Environment Conditions	
Operating Temperature	－40 ℃ ～ ＋75 ℃，derating should be used above 60 ℃
Storage Temperature	－40℃～＋75℃
Relative humidity	≤95％RH, no condensation
Altitude	≤2000m without derating，>2000m , the working temperature decrease by 1℃ for every 100 meters
MTBF	>500,000 hours
EMC	
Surge	Line-Line:±2kV, Line-Ground:±4kV grade: 4 Reference Standard: GB/T18487.2-2017
EFT	±4kV Grade: 4 Reference Standard: GB/T18487.2-2017

ESD	±6kV/±8kV Grade: 3 Reference Standard: GB/T18487.2-2017
Voltage sag and short-term interruption immunity	Voltage dip meets GB18487.2-2017 criterion B; Short-term interruption complies with GB18487.2-2017 criterion C; Reference standard: GB/T18487.2-2017
Power frequency magnetic field immunity	100A/m Grade: 5 Reference Standard: GB/T18487.2-2017
Radio frequency electromagnetic field radiation immunity	10V/m Grade: 3 Reference Standard: GB/T18487.2-2017
Conducted immunity induced by RF field	Meet the standard limit @0.15～80MHz Reference standard: GB/T18487.2-2017
Harmonic current emission	Complied with the restrictions specified in GB/T18487.2-2017 Reference standard: GB/T18487.2-2017
Voltage fluctuation and flicker	Complied with the restrictions specified in GB/T18487.2-2017 Reference standard: GB/T18487.2-2017
Conducted emission	Class A,Complied with the restrictions specified in GB/T18487.2-2017 Reference standard: GB/T18487.2-2017
Radiation	Class A,Complied with the restrictions specified in GB/T18487.2-2017 Reference standard: GB/T18487.2-2017
Other	
Emergency stop protection	External input 12V, low level operation, high level shutdown (enable high level range: 9V ~ 15V)
Safety requirements	Meet the general technical specifications of non-vehicle DC chargers for electric vehicles, NB / T 33001-2018, NB / T 33008-1-2018
Start time	Output start time 3 ~ 8s
Insulation resistance	Insulation resistance between the DC part, the AC part to the housing and the AC part to the DC part ≥10MΩ
Dielectric strength	3500V DC voltage from AC input terminal to the case for 1 minute, no breakdown, no arcing phenomenon, steady state leakage current is less than 10mA; AC input terminal to DC output terminal 3500V DC voltage for 1 minute, no breakdown, no arcing phenomenon, steady state leakage current is less than 10mA; 3500V DC voltage from the DC output terminal to the case for 1 minute, no breakdown, no arcing phenomenon, steady-state leakage current is less than 10mA;
ROHS	R5

1.2 Detailed function

1.2.1 Hot swap

The charging module uses plug-in technology, which is convenient for installation and maintenance.

1.2.2 Current sharing

The charging modules can automatically share current, and the unbalance is less than 3%.

1.2.3 Input limited power control

The relationship between the output power of the charging module and the input voltage is shown in Figure 1-1. When the input voltage is between 323Vac ~ 475Vac (return difference is less than 15V), the module can output the maximum power.

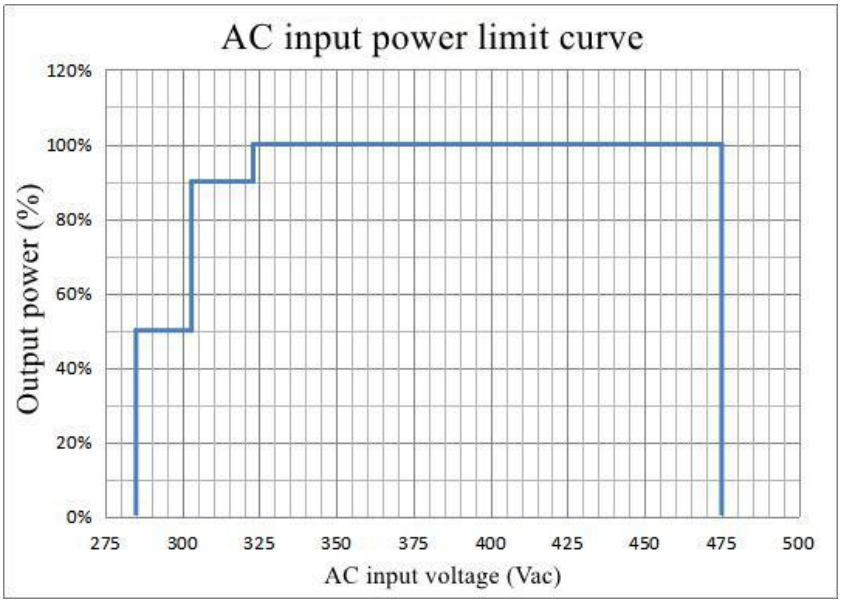

Figure 1-1 AC input power limit curve

1.2.4 Output constant power control

When the MXR100020 is rated for input voltage,the module allows an output power of 20kW.The Relationship between the module output voltage and output current is shown in Figure1-2.

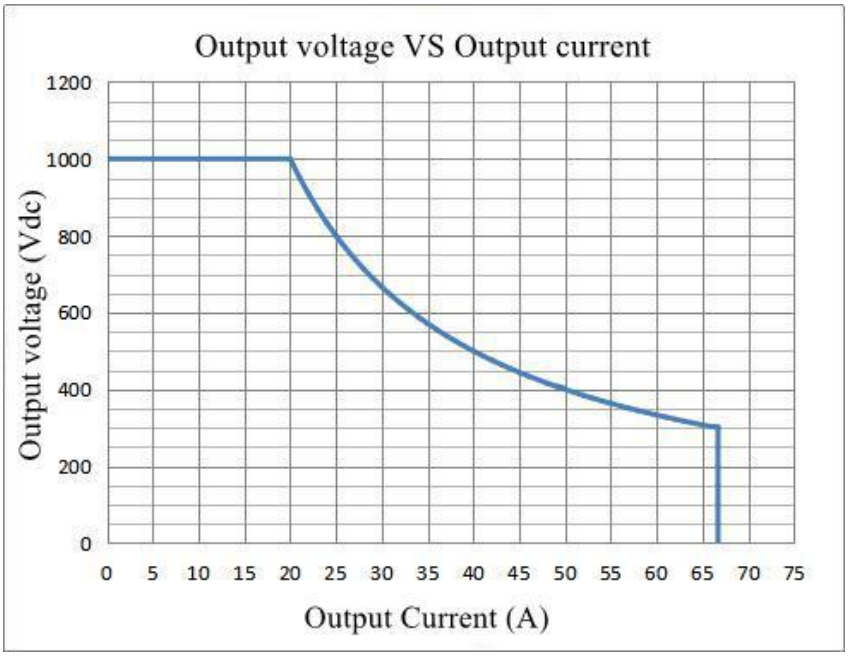

Figure 1-2 MXR100020 output voltage vs Output current

1.2.5 Temperature limit power

Below 60°C ambient temperature, the module has full power output;
Derating for use above 60°C ambient temperature is a piece-wise linear power limit;
At an ambient temperature of 75°C, the output power of the module drops to 25%;
Above 75°C ambient temperature, the output power of the module drops to 0.

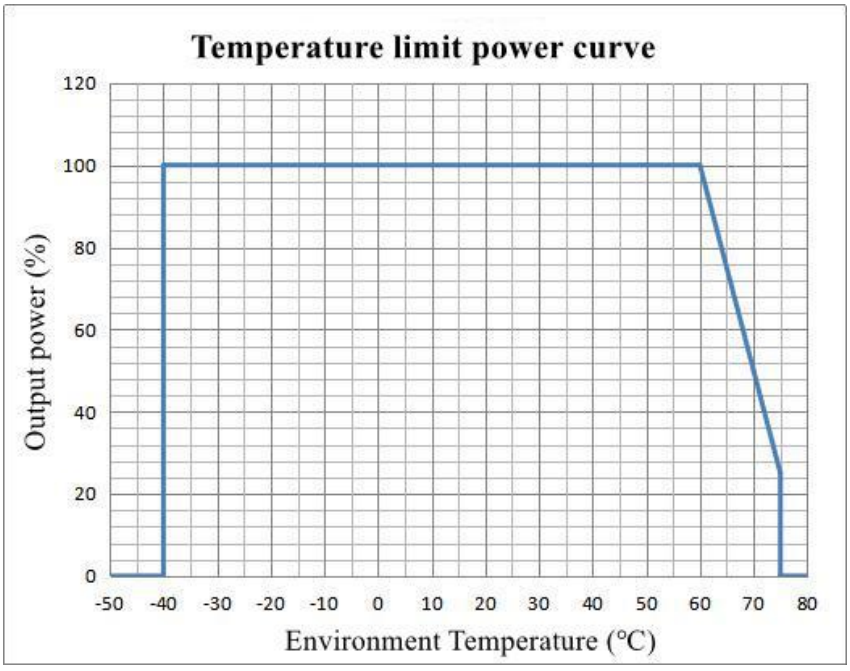

Figure 1-3 Temperature limit power curve

1.2.6 Output current adjustment

Through the external monitoring module, the current of the module is continuously adjustable in the range of 0A～67A.

1.2.7 Output voltage adjustment

Through the external monitoring module, the output voltage of the module can be adjusted continuously, the adjustment range is 50Vdc-1000Vdc, and the minimum adjustment step is 0.1Vdc.

1.2.8 Input over/under voltage protection

When the input voltage of the module is less than 270Vac or greater than 490Vac, the yellow indicator light on the panel will be on, and the module will stop working and no output. When an over-voltage or under-voltage alarm occurs, the module will report the alarm information to the monitor, and the LED digital tube will display the fault code E03. When the input voltage returns to the normal range, it keeps shutting down, and the host computer controls the output.

1.2.9 Output over/under voltage protection

MXR100020 has a fixed over-voltage protection point of 1025Vdc and a fixed output under-voltage protection point of 45Vdc. The software over-voltage protection point can be set through the monitoring module, the range of which can be set is 50Vdc～1025Vdc, and the factory default value is 1025Vdc.

After the over-voltage protection, the red indicator light on the panel is on, and the LED digital tube displays the fault code E06. You need to disconnect the module from the system to reset before it can be turned on. The over-voltage protection is triggered 4 times within 5 minutes, and the module is automatically locked.

After the under-voltage protection, the yellow indicator light on the panel is on, the LED digital tube displays the fault code E01, and the under-voltage alarm is automatically cleared and restarted after 5s.

1.2.10 Over temperature protection

The ambient temperature over-temperature protection point is 75°C. When the ambient temperature is greater than 75°C, the module will automatically shut down and the yellow indicator light on the panel will be on.The LED digital tube displays the fault code E02.

When the ambient temperature returns to the normal range, it keeps shutting down, and the host computer controls the output.

1.2.11 Internal bus fault protection

When the internal bus voltage of the module exceeds the over/under voltage protection point or is unbalanced, the module will automatically shut down. At this time, the module has no output and the yellow indicator light on the panel is on.

1.2.12 Short circuit protection

When the module is short-circuited, the protection shuts down, the red indicator light on the panel is on, and the "module failure" is reported for monitoring, and the LED digital tube displays the fault code E05.

1.2.13 Background communication is interrupted

The factory default value of the communication timeout time of the MXR100020 module i s5s. The communication timeout time can be set by the monitoring module,
and the settingrange is 5s ～ 120s.

When the module has a communication interruption and the time
exceeds the set communication timeout time, the module is shut down and protected without voltage output. At the same time, the yellow indicator light on the panel is on. When the communication of the module is restored, the yellow indicator light on the panel is off, and the module returns to the default state to work.

Chapter 2 Structure and Installation

2.1 Structure

1) Front Panel

There are indicator lights, LED digital tubes and buttons on the front panel of the charging module, as shown in Figure 2-1 and 2-2.

Figure 2-1 Front panel

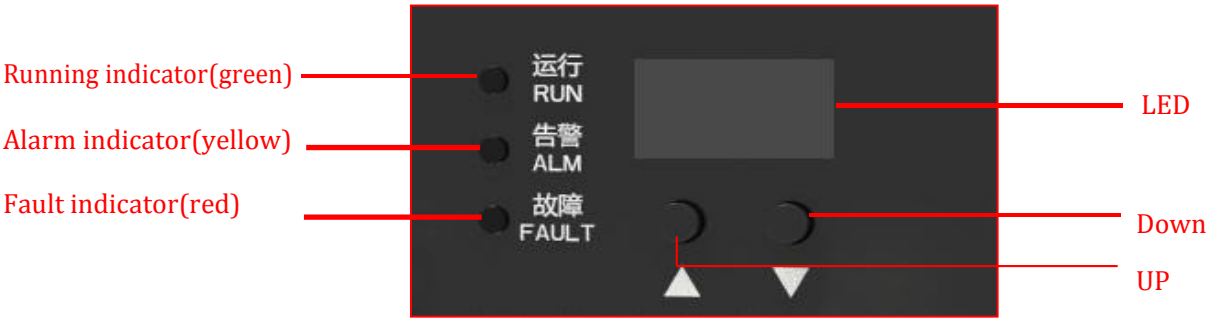

Figure 2-2 front panel Schematic diagram

There are 3 indicators on the front panel, See Table 2-1 for the indicator description.

Table 2-1 The indicator instruction

Indicator light	Normal Status	Abnormal State	Abnormal reason
Running indicator (green)	Bright	Extinguish	No input power
Alarm indicator(yellow)	Extinguish	Bright	AC input fault, module over temperature, abnormal bus voltage, output under voltage, severe uneven current, communication interruption
Fault indicator(red)	Extinguish	Bright	Output over-voltage, internal address,conflict,output short circuit

The LED digital tube can display information such as module output voltage, output current, module address, module group number, fault code, module version, grouping mode, operating mode, switch machine status, etc.

The module has two buttons, the up button (▲) and the down button (▼). By pressing the button, you can view the module information, and pressing (▲) or (▼) will display in sequence as shown in Figure 2-3.

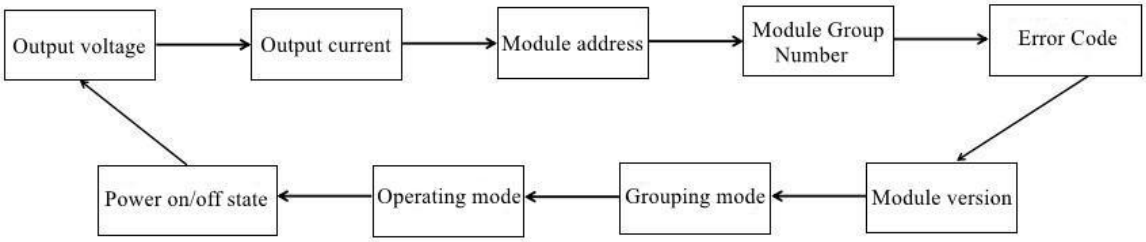

Figure 2-3 Module information display sequence

The module parameters can also be set through the buttons: module output voltage, output current, module address, module group number, grouping mode, operating mode, switch machine status. Among them, only when the module is in the standby state and the grouping mode is dynamic grouping, the group number of the module can be changed by pressing the button. When the module's operating mode is the debugging mode, you can start, shut down, and adjust parameters by pressing the keys.The steps for setting module parameters are as follows:

1. Press (▲) or (▼) to switch the current display to the information interface to be changed.

2. Press (▲) or (▼) for about 2.5 seconds and then release, you can see the display flashing.

3. Press (▲) or (▼) to change the setting value.

4. Press (▲) or (▼) for about 2.5 seconds and release to save the data.

When the module leaves the factory, the default grouping mode is fixed allocation, the default address is 0x80, and the address range is 0x60~0x9E. The grouping mode can be set to dynamic allocation through the panel buttons or the fixed value setting command issued by the monitor, and the address range can be set to 0x20~0x9E.

2.1.1.1 Set module address

Take the modification of the module address from 0x80 to 0x84 as an example to illustrate the module address setting method. First press (▲) or (▼) until the interface appears, press (▲) or (▼) for about 2.5 seconds to release, the interface flashes, and then press continuously short press (▲), when the interface appears, press (▲) or (▼) Approximately 2.5 seconds to save.

2.1.1.2 Set the module to enter debug mode

After the module is powered on, it is in the standby state, and the operating mode defaults to the normal mode. First press (▲) or (▼) until the interface appears, press (▲) or (▼) for about 2.5 seconds to release, the interface flashes, then short press (▲), when the interface appears, press (▲) or (▼) Approximately 2.5 seconds to save.

2.1.1.3 Set the module on/off in manual mode, and adjust the parameters

Take setting the module to turn on and output 210V/28A as an example to illustrate how to control the module to turn on and off and adjust the parameters in the debugging mode.
Press (▲) or (▼) until the interface appears, press (▲) or (▼) for about 2.5 seconds to release, the interface flashes, then short press (▲), after the interface appears, press (▲) or (▼) for approximately 2.5 seconds to save.

At this time, the module is turned on with the default voltage of 200V, press (▲) or (▼) to adjust

to the output voltage page, press (▲) or (▼) to release for about 2.5 seconds, the interface flashes, the displayed value is the default voltage value, and then it continues for a short period of time Press (▲), after the interface appears, press (▲) or (▼) for about 2.5 seconds to save, and the module sets the output voltage to 210V. After long press to save, the set voltage value will take effect.

Press (▲) or (▼) to adjust to the output current page, press (▲) or (▼) to release for about 2.5 seconds, the interface flashes, and the displayed value is the default set current value, and then continuously short press (▲), after the interface appears, Press (▲) or (▼) to save for about 2.5 seconds, and the module sets the output current to 28A. After long press to save, the set current value will take effect.

2.1.1.4 Set module grouping mode

Take the modification of the module grouping mode from fixed grouping to dynamic grouping as an example to illustrate how to set the module grouping mode. First press (▲) or (▼) until the interface appears, press (▲) or (▼) for about 2.5 seconds to release, the interface flashes, then short press (▲), when the interface appears, press (▲) or (▼) Approximately 2.5 seconds to save.

When the module grouping mode is switched from fixed grouping to dynamic grouping, the module group number is set to zero. When the module grouping mode is switched from dynamic grouping to fixed grouping, if the address is between 0x20~0x5F, the address of the module will be switched to the default address 0x80.

When the address allocation method of the module is fixed allocation, the group number of the module cannot be set by pressing the button. The group number and address of the module have a one-to-one mapping relationship, see Figure 2-2

Figure 2-2 The mapping relationship between the communication address of the charging module in the fixed group mode and the group code

Address range	Grouping Number
0x80 ～ 0x87	1
0x88 ～ 0x8F	2
0x90 ～ 0x97	3
0x98 ～ 0x9E	4
0x60 ～ 0x67	5
0x68 ～ 0x6F	6
0x70 ～ 0x77	7
0x78 ～ 0x7F	8

When the module fails, the module panel will jump to the fault code display page, and the module alarm information will be displayed on the LED digital tube in the form of the fault code. The fault code is shown in Figure 2-3.

Figure2-3 Meaning of fault code display

Error Code	Code meaning
E01	Output under-voltage
E02	Module over temperature (Including the over-temperature of the ambient temperature and the over-temperature inside the module caused by the poor air duct)
E03	AC over/under voltage and AC phase loss
E05	Output short circuit
E06	Output over-voltage
E07	Duplicate address
E08	Fan failure
E09	Current sharing alarm

2.1.2 Module interface definition

There are AC input sockets and DC output sockets at the back of the charging module, as shown in Figure 2-4

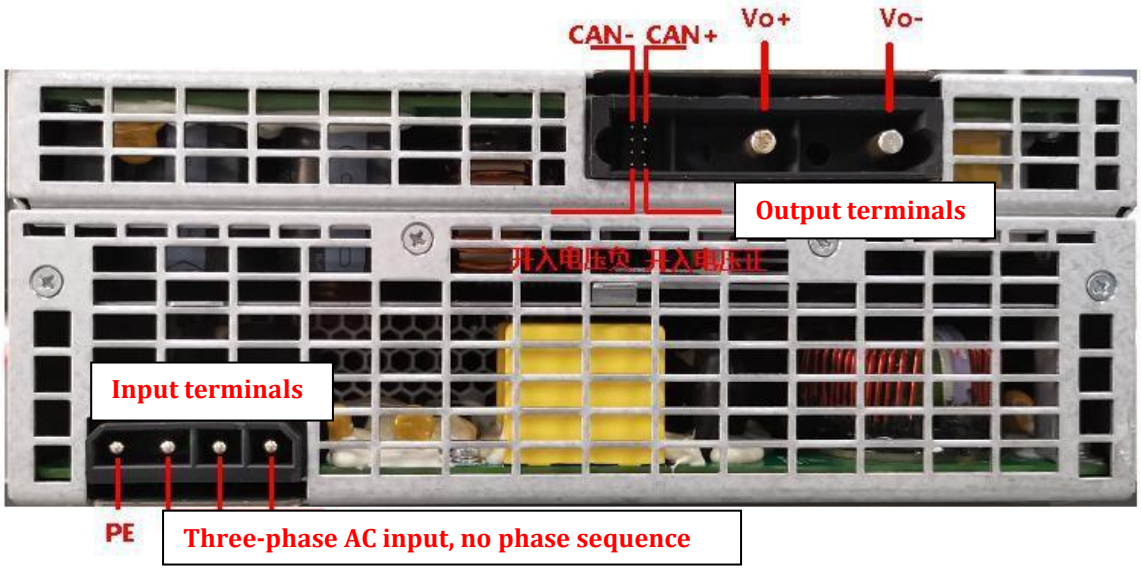

Figure 2-4 Definition of input and output ports

2.2 Module Size

2.2.1 The installation dimensions of MXR100020 module are shown in Figure2-5.

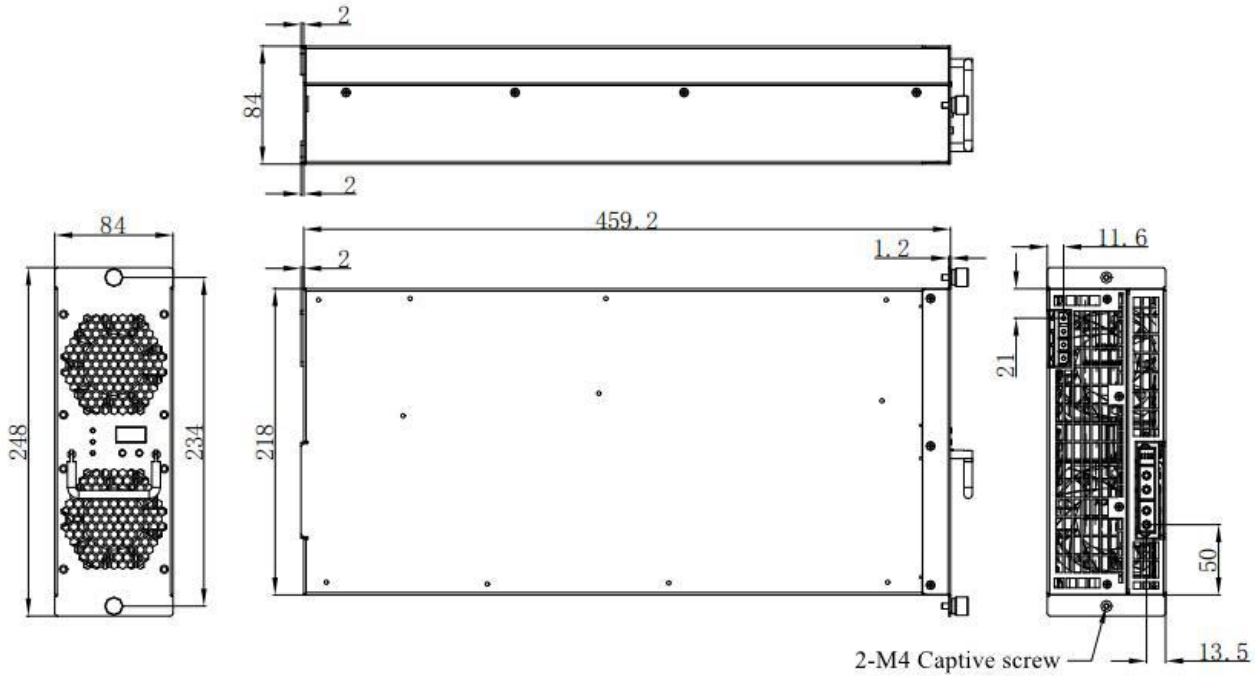

Figure 2-5 Module dimension (mm)

2.2.2 MXR100020 module system terminal assembly specifications:

1) The system terminals (input cable terminals and output cable terminals) are installed on the mounting plate of the pile, as shown in Figure 2-6.

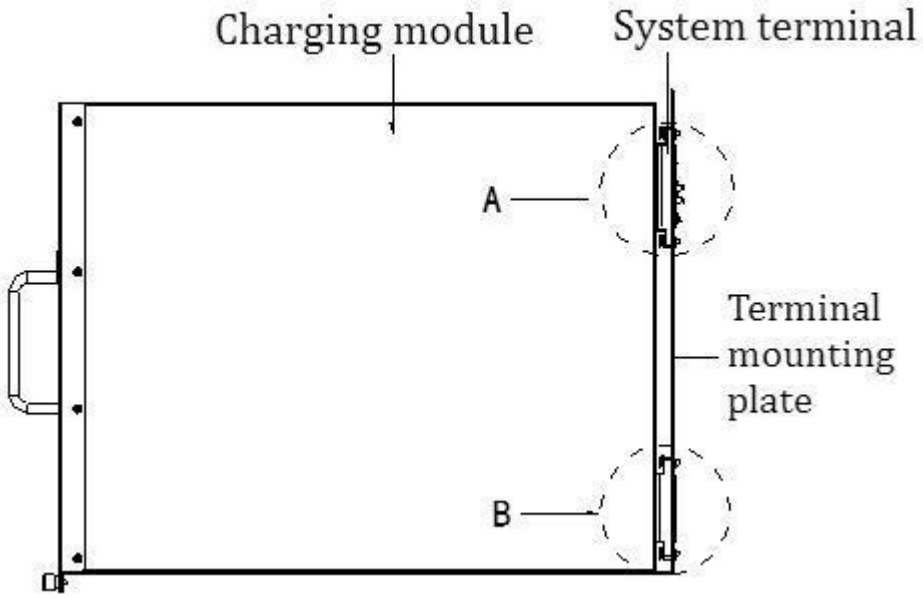

Figure 2-6 system terminal installation

2)After the module is assembled on the pile, the module terminals are required to be in close contact with the system terminals, and there should be no gaps. Ensure that the system terminal and the module terminal plug-in contact are reliable, as shown in Figure 2-7.

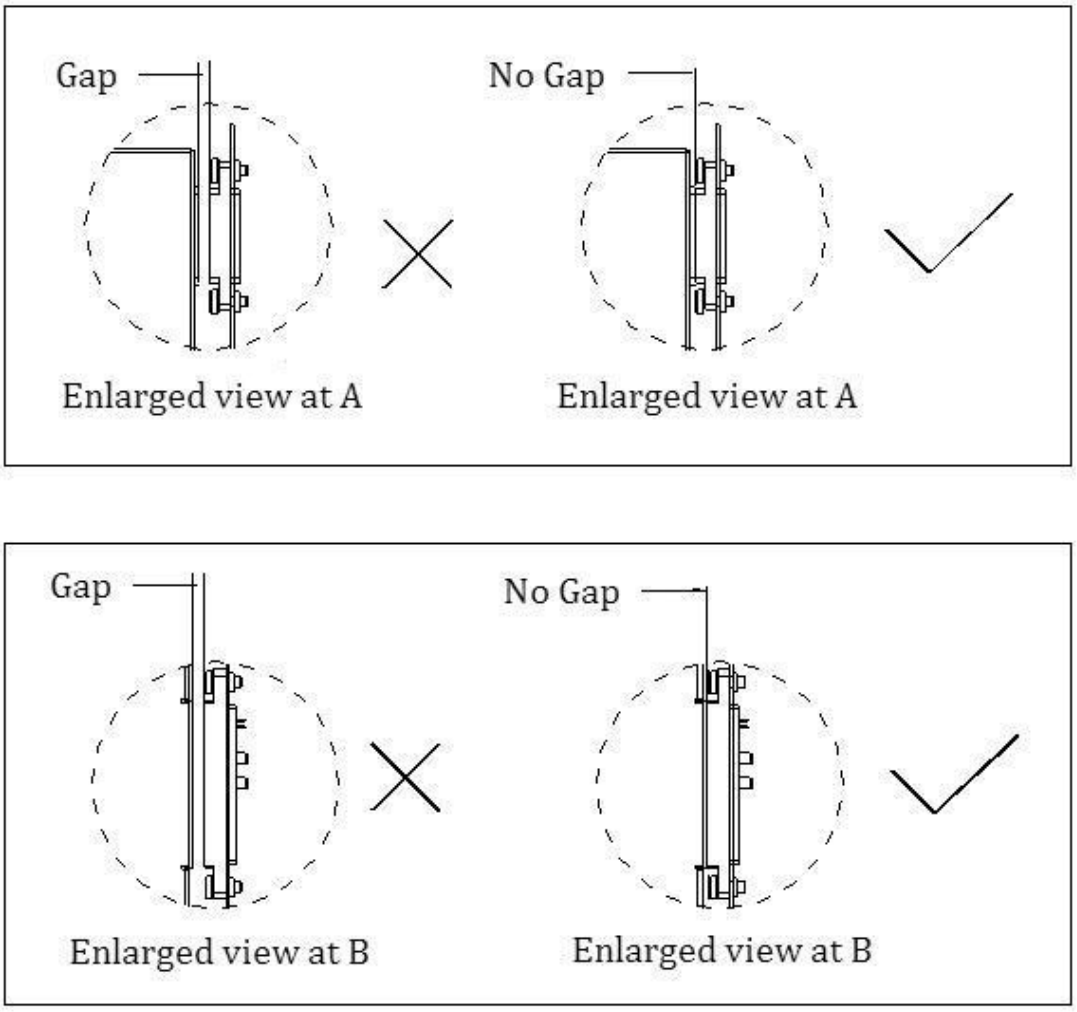

Figure 2-7 Assembly instruction diagram of module terminal and system terminals

2.3 Use

After the charging module is installed in the system cabinet, the system can run after power on. Use environment

1. Over-voltage/installation category: over-voltage category Ⅱ.
2. Pollution degree: Pollution degree III.
3. Altitude: ≤2000m without derating, >2000m, the working temperature will decrease by 1℃ for every 100 meters.
4. AC input power distribution system: TN or TT system.
5. System exhaust volume requirements:

(1) Calculation of system air volume, there are two methods for system air volume calculation:

Method 1: Calculate according to the total loss of the system

Calculate according to the thermal formula, according to the formula: V=Q/(CP*ρ*ΔT), CP is the current temperature air specific heat (kJ/(kg*K), ρ is the current temperature air density (kg / m3),

the current The temperature is the average temperature of the inlet and outlet wind, the temperature difference between the inlet and outlet of the ΔT system (outdoor cabinets generally choose 13 degrees), Q is the total loss of the system (unit kw) (the Q value in strong sunshine areas also needs to add solar radiation), this formula The system air volume V (m3/s) can be calculated.
Method 2: Calculate according to the air volume of the module

System air volume V=n*v, n is the number of system modules, v is the maximum air volume of a single module, v=131CFM (0.0618m3/s).

(2) System fan selection

The system fan selection is determined according to the system air volume V. Its parameters are mainly the maximum air volume and air pressure of the fan. Under the premise that the fan air pressure matches the system impedance, the maximum air volume of the system fan is equal to 1.5 to 2 times the system air volume, namely (1.5～2)*V, if the wind pressure of the fan is high and the system impedance is small, it can be close to 1.5 times; if the wind pressure of the fan is low and the system impedance is large, it can be doubled or even greater than 2 times. Under normal circumstances, the fan's air pressure is not less than 200Pa, and it can be calculated by 2 times.

6. Suggestions for the use of charging modules
The charging module is used in the charging pile system. The temperature difference ΔT between the module air inlet and the air outlet (including the air inlet and outlet of the pile body) is recommended to not exceed 25°C. The specific test points are shown in the following figure: