OBC + DC-DC Technical Manual

Model： CD-L

Name： 6.6KW OBC+2.0KW DC/DC Integrated

Version： V2.0

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1 Overview

1.1 Subject

CD-L series full-sealed on-board charger and DC/DC integrated is a product specially designed for new energy vehicles according to QC/T895-2011 《Conductive On-board Charger for Electric Vehicle》 and GB/T24347-2009 《Electrical Vehicle DC/DC Converter》, which functions as a battery charger plus providing the 12V low voltage DC power supply for low voltage devices in the vehicle. The output can be connected to the 12V back-up battery. The DC-DC converter will charge the back-up battery. This product not only has the advantages of high efficiency, small size, high stability, long-lifetime but also with the performance of high protection level, high reliability, more protection functions, it is an ideal solution for electrical vehicles. The built-in thermal sensor has the function of over-temperature and can auto-recover when temperature decreases. Fully sealed IP67 protection level ensures excellent working under complicated operating conditions.

1.2 Main Features

1.2.1 Supports UDS diagnosis, with CAN wake-up function

1.2.2 Fully sealed process, can reliably work in temperatures of -40℃~55℃

1.2.3 Built-in thermal sensor, shuts off when temperature goes up to 90℃

1.2.4 Protection level over IP55

2 Size and Appearance

2.1 Size and Weight

	Length（mm）	Width（mm）	Height（mm）	GW（KG）
Fan-cooled	373±3	281±3	115.37±1	＜10
Liquid-cooled	379.26±1	290.3±1	87±1	＜10

2.2 Appearance

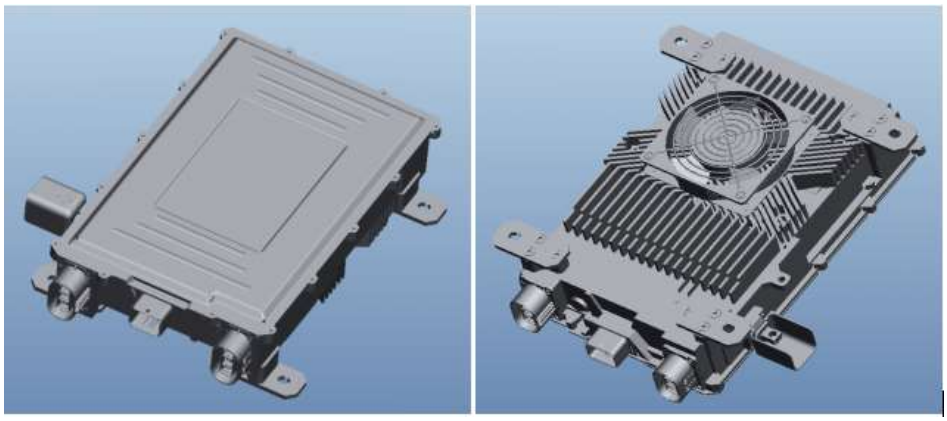


Chart 1 Fan-cooled Appearance

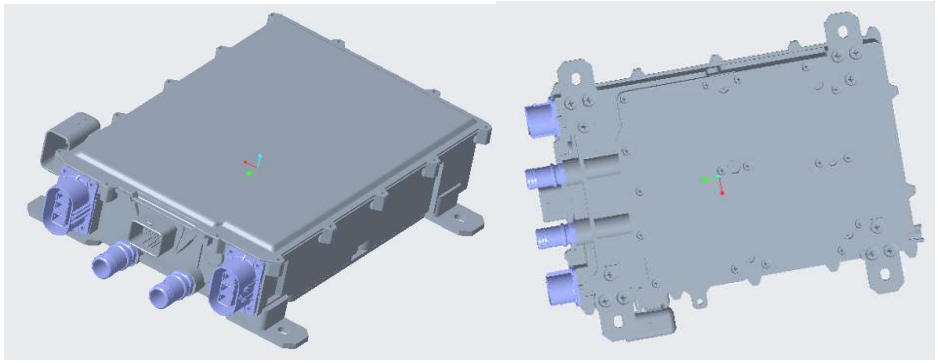


Chart 2 Liquid-cooled Appearance

3 Environmental Specification

▲Working environmental temperature

Area	Lowest Temperature	Highest Temperature
Global	-40℃	55℃

▲Storage environmental temperature

Area	Lowest Temperature	Highest Temperature
Global	-55℃	100℃

▲Humidity：relative humidity 5%~95%，no condensation

▲Altitude：≤5000m

▲Working noisy：max when working ≤65dB，meet China standard QTC 895-2011

4 Charger Technical Specification

4.1 Charger regulatory requirements and reference standards

The design and manufacture of this product must meet the related requirements of vehicle with applicable regulations and standards, reference standards as following:

No.	Standard Code	Standard Name	Remark
1	QC/T 895-2011	Conductive on-board charger of electrical vehicle	/
2	GB/T 30512-2014	Prohibited substances requirement	/
3	GB/T 18384-2015	Safety requirements of electrical vehicle	/
4	GB/T 18487-2015	Electric vehicle conductive charging system	/
5	GB/T 14023-2011	Limits and methods of measurement for radio disturbance characteristics of vehicles, ships and installations driven by internal combustion engines	/
21	GB/T 18655-2018	EMC technical requirements for electronic components and subsystems of passenger vehicles	/
22	GB/T 18655-	Limits and measurement methods for the radio disturbance	/

	2010	characteristics of vehicles, ships and internal combustion engines used to protect vehicle-mounted receivers	

4.2 Charger Safety Regulations Specification

	Condition	Requirement
Grounding resistance test	@25A/AC	≤100mΩ
Input insulation test	@1000V/DC	≥20MΩ
Output insulation test	@1000V/DC	≥20MΩ
Input withstand test	@2000V/AC 1min	Leak current≤10ma
Output withstand test	@2000V/AC 1min	Leak current≤10ma
Input to Output withstand test	@2000V/AC 1min	Leak current≤15ma

4.3 Charger Electrical Performance

4.3.1 Input

Input	Input voltage range	AC 90~265V
	Frequency	45~65Hz
	Input Current	≤32A
	Power Factor	≥0.98 @ ≥3300W
	Starting inrush current	≤48A

4.3.2 Output

Nominal Voltage		312V
Output	Output voltage range	200V~450V
	Max output current	20A
	Output power	6600W@220VAC；3300W@110VAC
	Output way	CV/CC
	Efficiency	≥94%
	CV accuracy	±1%
	CC accuracy	±2%
	Ripple voltage coefficient	±5%
	Output voltage rising time	＜5S，overshoot＜10%

	Shut off response time	Current decreased below 10% in 300ms, and decreased to 0A in 500ms
	Stand-by power consumption	⩽5W

4.3.3 Low Voltage Output

Low voltage Output	Output way	CV
	Output voltage	13.8V
	Nominal current	5A
	CV accuracy	±2%
	Output Power	⩾66W
	Ripple voltage coefficient	⩽1%

4.3.4 Low Voltage Interface

Signal Interface	CC signal detection	100Ω~10kΩ
	CP signal detection	1%~99%，5V~15V Vpp
	CC signal output	220 Ω or 680 Ω optional
	Temperature detection	Two-way input, supporting 1K and 10K
	12V wake-up input	⩽10mA
	12V wake-up signal output	Maximum 0.2A
	12V constant current	Sleep current ⩽ 1mA, peak current ⩽ 5A
	Electronic lock drive	Peak current 2.9A
	Electromagnetic lock in-position signal	Switching value
	CAN Communication	yes
	Baud rate	Optional for 125Kbps、250Kbps、500Kbps
	Terminal resistance	Not available

4.3.5 Other

Humidity Test	Meet QCT 895-2011 7.2.1
Low temperature working test	Meet QCT 895-2011 7.2.2.1
Low temperature storage test	Meet QCT 895-2011 7.2.2.2

High temperature working test	Meet QCT 895-2011 7.2.2.3
High temperature storage test	Meet QCT 895-2011 7.2.2.4
Salt spray test	Meet QCT 895-2011 7.8.5
EMI	Meet GB/T 18487.3-2001 11.3.1 and GB/T 18655-2018
EMD	Meet GB/T 18487.3-2001 11.3.2 and GB/T 18655-2018
Harmonic current	Meet GB 17625.1-2003 6.7.1.1
Protection level	IP67
Vibration resistance	10~25Hz swing 1.2mm，25 - 500Hz 30m/S^2，8 hours each direction
MTBF	150000H

4.3.6 Charger Protection Functions

Protection Functions	Input over-voltage protection	AC270±5V, Turn off output
	Input over-voltage recovery	AC265±5V, Return difference≥5Vac
	Input low-voltage protection	AC85±5V, Turn off output
	Input low-voltage recovery	AC95±5V, Return difference≥5Vac
	Input over-current protection	The input maintains an input current of no more than 32A and automatically adjusts the output power.
	Output over-voltage protection	320V
		455±5V, Turn off the high-voltage output, which can be restored after troubleshooting
	Output low-voltage protection	
		195±5V, Turn off the high-voltage output, which can be restored after troubleshooting
	Output over-current protection	Turn off the high-voltage output, which can be restored after troubleshooting
	Over-temperature protection	Power start to decrease when internal temperature rise to 85℃, shut off when rise to 90℃
	Output short circuit protection	Before entering the charging process, when an output short circuit is detected, charging will not be started. Output short circuit during charging, immediate shutdown
	Output polarity reverse protection	The output is reversed and the high-voltage output does not start. After troubleshooting, normal operation is restored.
	Grounding protection	≤100mΩ
	CAN Communication protection	When the charger does not receive BMS commands for 5 consecutive seconds, or a communication failure occurs during the operation of the charger, the charger will turn off the output.

	Power-off protection	Yes

5 DC/DC Converter Technical Specification

5.1 DC/DC Converter Regulations requirements and reference standards

No.	Standard Code	Standard Name	Remark
1	GB/T 24347-2009	Electric vehicle DC/DC converter	/
2	GB/T 18488.1-2015	Electric motors and their controllers for electric vehicles - part 1: technical conditions	/
3	GB/T 18384.2-2015	Safety requirements for electric vehicles - part 2: functional safety and fault protection	/
4	GB/T 18384.3-2015	Safety requirements for electric vehicles - part 3: protection against shock to personnel	/
5	GB/T 18387-2008	Limits and measurement methods for electromagnetic field emission intensity of electric vehicles	/
6	GB/T 31498-2015	Safety requirements for electric vehicles after collision	
7	GB 9254-2008	Limits and methods for measurement of radio harassment for information technology equipment	/
8	GB/T 18655-2010	Limits and measurement methods for radio disturbance characteristics of vehicles, ships and internal combustion engines used to protect vehicle-mounted receivers	/
9	GB 29743-2013	Motor vehicle engine coolant	/
10	GB 4208	Enclosure protection level (IP code)	/
11	GB/T 28046-2	Environmental conditions and tests for electrical and electronic equipment for road vehicles - part 2: electrical loads	/
12	GB/T 28046-3	Road vehicles - environmental conditions and tests for electrical and electronic equipment - part 3: mechanical loads	/
13	GB/T 28046-4	Environmental conditions and tests for electrical and electronic equipment for road vehicles - part 4: climatic loads	/
14	GB/T 2423.34-2012	Environmental test - part 2: test method test Z/AD: combined temperature/humidity cycle test	/
15	GB/T 2423.1-2008	Environmental testing of electrical and electronic products - part 1: test methods - test B: low temperature	/
16	GB/T 2423.2-2008	Environmental tests for electrical and electronic products - part 2: test methods - test B: high temperature	/

17	GB/T 2423.3-2008	Electrical and electronic products - environmental tests - part 2: test methods - Cab: constant heat and humidity test	/
18	GB/T 2423.17-2008	Environmental tests for electrical and electronic products - part 2: test methods : salt spray	/
19	GB/T 30512-2014	Prohibited substances requirements for automobiles	/
20	QC/T 413	Basic technical conditions of automotive electrical equipment	/

5.2 DC/DC Converter Safety Regulations Specification

	Condition	Requirement
Grounding resistance test	@25A/AC	≤100mΩ
Input insulation test	@1000V/DC	≥20MΩ
Input withstand test	@2000V/DC 1min	Lead current≤10ma

5.3 DC/DC Converter Electrical Performance

5.3.1 Input

Nominal Voltage	312V
Input voltage range	206V~454V

5.3.2 Output

Output	Nominal output voltage	14V±1%
	Output voltage range	9~15V
	Nominal output current	143A
	Peak current	172A
	Nominal power	2000W
	Peak power	2400W last 6 minutes
	Efficiency	≥94%
	Dynamic response time	＜50ms
	Voltage regulation	≤1%
	Load regulation	≤1%
	Voltage control accuracy	≤1%
	Current control accuracy	≤2%

	Quiescent current	≤1mA @14V
	Ripple voltage coefficient	≤2% @nominal working state

5.3.3 Other

Humidity test	Meet GB/T 24347-2009 6.1.2
Low temperature test	Meet GB/T 24347-2009 6.1.1.1
High temperature test	Meet GB/T 24347-2009 6.1.1.2
Salt-spray Test	Meet GB/T 24347-2009 6.1.3
EMI	Meet GB/T 17619-1998 article 4
EMD	Meet GB 18655-2002 article 12 and 14
IP level	IP67
Vibration resistance	10~25Hz swing 1.2mm，25 - 500Hz 30m/S^2，8 hours each direction
MTBF	150000H

5.3.4 DC/DC Converter Protection Functions

Protection Functions	Input over-voltage protection	320V
		＞459±5V
	Input low-voltage protection	320V
		＜201±5V
	Output over-voltage protection	Output voltage over-voltage protection threshold is 16±0.5V，working recovery after voltage back to ≤14±0.2V
	Output low-voltage protection	Output voltage low-voltage protection threshold is 7±1V，working recovery when voltage rise to≥9±0.2V
	Output over-current protection	Stop output when output current＞90A
	Over-temperature protection	Power start to decrease when internal temperature rise to 100℃, shut off when rise to 110℃, auto-recovery when power decreased
	Short circuit protection	Yes, auto-recovery

6 Interface

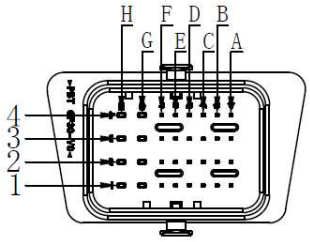
The interfaces in the charger can be grouped into two categories, one category is low voltage interface, the other is high voltage interface.

Low voltage interface includes signal connector and DC/DC output

High voltage interface includes AC220V input, OBC output and DC/DC input.

Connectors can be appointed by customer if quantity order is more than 5000pcs.

6.1 Low Voltage Connector and Pins Definition



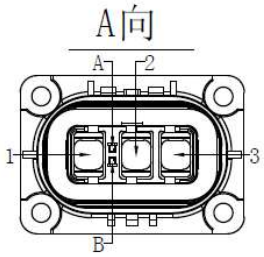
Pin No.	Definition	Name	Description
1A	Thermistor 1-1 (+)	AC charging station L-wire temperature sensor 1-1	Internal temperature detection resistance signal of AC charger, voltage 5V, current ＜ 5mA.
1B	Thermistor 1-2 (-)	AC charging station L-wire temperature sensor 1-2	
1C	Thermistor 2-1 (+)	AC charging station L-wire temperature sensor 2-1	
1D	Thermistor 2-2 (-)	AC charging station L-wire temperature sensor 2-2	
1E	LED-Green	Charging status indicator green light output +	
1F	LED-Red	Charging status indicator red light output +	
1G	RE_YL	Fast charging relay drive +	
1H	KL30 constant power supply input	constant power supply input +	constant power supply input 9-16V，peak current 3A（electronic lock locking），time 1.5S,sleep current≤1ma
2A	HW_wakeup_out	Output wake-up signal	Output a 12V controlled voltage signal to wake up external devices, with a maximum current capacity of 200mA.
2B	IN_wakeup_EN	Input wake-up signal	Input a 12V signal to wake up the sleeping OBC, with an internal resistance of 10K and a current of 1ma.
2C	N/A		
2D	N/A		
2E	N/A		

2F	CAN/GND		
2G	N/A		
2H	12V5A+	OBC low voltage power supply +	By controlled to output 13.8V，max output current capacity5.5A（long time）
3A	CC	Charging connection confirmation CC signal	Connect the confirmation signal to detect whether the charging station is connected to the vehicle, with a voltage of 5V and a current of<10ma
3B	CP	Charging connection confirmation CP signal	Used to detect the maximum current allowed by the charging station and to detect the reliability of the connection between the vehicle and the charging station.
3C	CC-OUT1	680R lock signal 1	Output CC resistance signal, maximum withstand current 10mA
3D	CC-OUT2	100R lock signal 2	Output CC resistance signal, with a maximum withstand current of 25mA.
3E	N/A		
3F	Feedback wire	Electric lock feedback wire	Electric lock in-position signal detection, voltage 12V, maximum current 1ma.
3G	N/A		
3H	Electronic lock power supply+	Electronic lock locking power supply + Electronic lock unlocking power supply -	Electronic lock drive, voltage 12V, peak current 2.9A.
4A	CAH-H	CAN H	
4B	CAN-L	CAN L	
4C	HVIL+	High voltage connector interlock signal 1	Can be detected by vehicle or by charger,max voltage 12V，current is lot more than 0.1A
4D	HVIL-	High voltage connector interlock signal 2	
4E	Electronic lock feedback wire - (K/E)	Electronic lock feedback wire	Electric lock in-position signal detection, maximum current 0.5ma.
4F	Electronic lock feedback wire+(C)	Electronic lock feedback wire	Electric lock in-position signal detection, maximum current 0.5ma.
4G	KL31 Constant power supply input-	Constant power supply input-	Can be connected with OBC grounding, voltage is 0V, peak current is 5A

4H	Electronic lock power supply-	Electronic lock locking power supply - Electronic lock unlocking power supply +	Electronic lock drive -, voltage 12V, maximum peak current 5A./

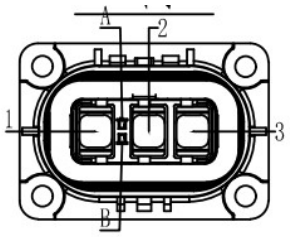
6.2 High Voltage Connectors and Pins Definition

6.2.1 AC Input



REM-Z3PCH-6-A AC Input			
Brand	Pin	Definition	Wire diameter（mm²）
Recodeal	1	火线（L）	Brwon/6
	2	地线（PE）	Yellow Green/6
	3	零线（N）	Blue/6
	A、B	HVIL	Black/0.5

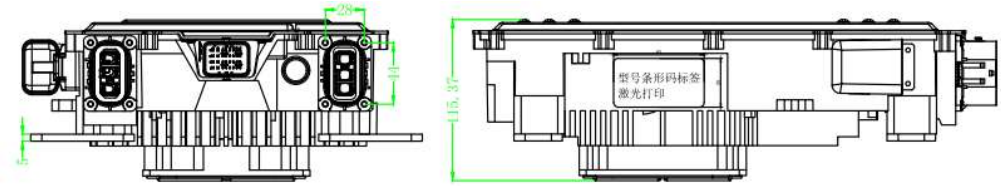
6.2.2 OBC Output and DC-DC Input

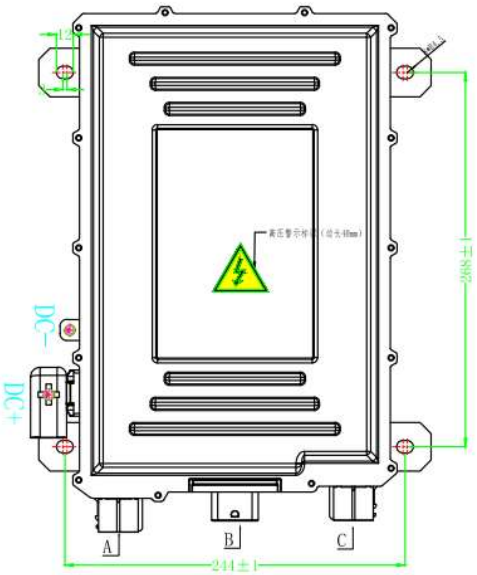


REM-Z3PAH-4-A OBC Output and DC/DC Input			
Brand	Pin	Definition	Wire diameter(mm²)
Recodeal	1	OBC output +	Red/4
	2	Sharing -	Black/4
	3	DC input +	Yellow/4
	A、B	HVIL	Black/0.5

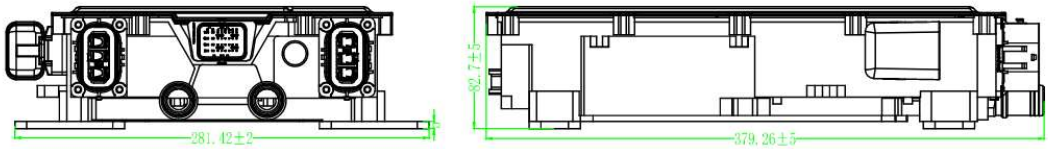
7. Mechanical Requirement

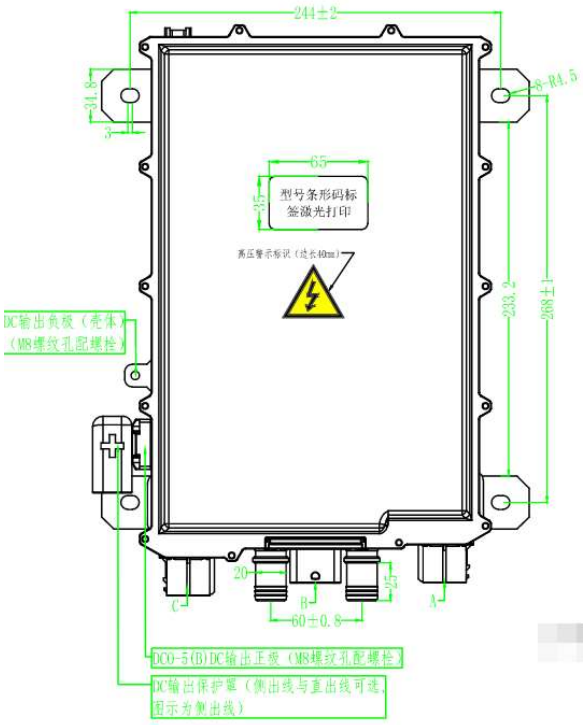
7.1 Air-cooled Drawing





7.2 Liquid-cooled Drawing





8. Label ,Package, Transport and Storage

8.1 Label

8.2 Package

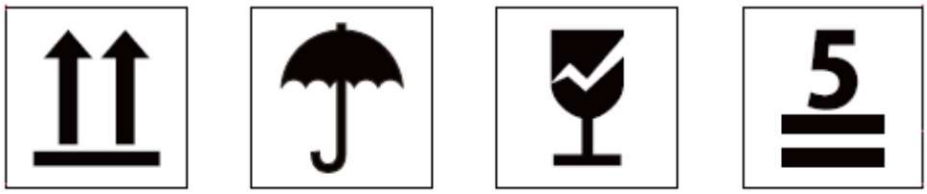
The packing box shall be provided with product name, model, manufacturer identification, inspection certificate of the manufacturer's quality department, manufacturing date, etc; There is a list of accessories in the packing box:

No.	Item	Qty	Unit	Remark
1	On-board Charger	1	pc	

2	Outboard bill	1	pc	

8.3 Transportation

The product shall be transported in a firm packing box, which shall comply with the provisions of relevant national standards and shall be marked with "handle with care" and "moisture-proof". The packaging box containing the product can be transported by various means of transportation. Direct rain and snow and mechanical impact shall be avoided during transportation.



The products shall be stored in the packing box when not in use. The ambient temperature of the warehouse shall be -10-40 ℃ and the relative humidity shall not be greater than 80%. There shall be no harmful gas, flammable, explosive products and corrosive chemicals in the warehouse, and there shall be no strong mechanical vibration, impact and strong magnetic field. The packing box shall be at least 20cm above the ground and at least 50cm away from the wall, heat source, window or air inlet, The storage period under the specified conditions is generally 2 years, and the inspection shall be carried out again after more than 2 years.

The product shall be stored in a ventilated and dry place. At the same time, high temperature sources, fire sources and chemicals must be avoided. Store neatly to avoid throwing.

8.5 Safe Guide

Warning: remind the user that the operation is dangerous

* It is strictly prohibited to disassemble and refit the on-board charger for repair or commissioning
* Do not place the parts in the rain
* Please confirm that the housing is intact before installation. If it is damaged, please replace it immediately or contact the after-sales service department
* All plugs and sockets shall be connected firmly. If they are damaged or loose, please replace them immediately
*It is strictly prohibited to plug and unplug the connector when the product is powered on, otherwise personal injury may be caused
*It is strictly prohibited to open the product shell during the power on operation of the product, otherwise personal injury may be caused
* It is strictly forbidden to touch the high-voltage live parts of the product with bare hands. Please wear insulating gloves, insulating shoes Insulating clothing, live maintenance and detection are strictly prohibited
*During the replacement of fuses and contactors, barbaric operation is strictly prohibited to avoid damaging the product and causing potential safety hazards
* Three core cable with grounding wire shall be selected for AC power supply, and the grounding wire

* Please unplug the power plug if there is abnormal sound or smell during the operation of the charger
* Please keep away from fire sources and inflammables and explosives when the battery is normally charged
* Do not charge damaged or non rechargeable batteries

Note: remind the user that the following operations are important operations of the product

* Do not block the air inlet and outlet of the charger to prevent overheating
* Please make sure that the output cable is not too long to avoid the impact of line voltage drop on charging
* Please disconnect the power cord and charging plug when moving the charger
* The battery voltage must be consistent with the nominal voltage of the charger
* Avoid collision, compression, pulling, twisting or shaking the charging cable
* The product should be placed in a safe, ventilated, dust-free and rain free environment
* Please pack and store if not used for a long time