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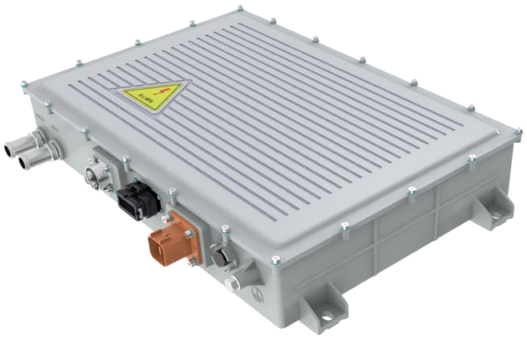
19.8KW On-board Charger
Model No. AT-TR3610 Series



1. Product Introduction

AT-TR3610 series vehicle on-board-charger is designed for new lithium electric logistics vehicles, buses, construction machinery and other new energy models research and development of a high-power dense and high-efficiency charger, using modular, standardized, universal ideas to design and develop.

The charger supports three-phase AC input, and the DC output voltage is adjustable in the full range.

The charger is designed with full digital control technology, which has flexible and intelligent control, good protection characteristics and strong system robustness. Its own microprocessor communicates with the monitoring unit, and the parameters in the machine CAN be set or adjusted by the upper monitoring unit through the CAN interface.

It has multiple protection functions such as input over-voltage protection, output over-current protection, output over-voltage protection, output short-circuit protection, and over-temperature protection.

Main specification：

Model number	Input Voltage Range	Rated Output Power	Rated Output Voltage	Output Voltage/Current Range	3D data model
AT-TR3611	90~265VAC	19.8KW	80VDC	0-105VDC/0-240A	TBD
AT-TR3612	90~265VAC	19.8KW	108VDC	0-135VDC/0-180A	TBD
AT-TR3613	90~265VAC	19.8KW	144VDC	0-180VDC/0-132A	TBD
AT-TR3614	90~265VAC	19.8KW	360VDC	0-500VDC/0-54A	902.36150000.00
AT-TR3615	90~265VAC	19.8KW	540VDC	0-720VDC/0-36A	902.36150000.00
AT-TR3616	90~265VAC	19.8KW	700VDC	0-850VDC/0-27A	902.36150000.00

2. Electrical Characteristics

2.1. Electrical Characteristics

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Model Number						
Charger Type	Water-cooled isolation on board charger					
Model Number	AT-TR3611	AT-TR3612	AT-TR3613	AT-TR3614	AT-TR3615	AT-TR3616
Input Characteristic						
Rated Input Voltage	220VAC					
Input Voltage Range	90～265VAC					
Rated AC frequency	50Hz					
Input frequency range	45～65Hz					
Starting Impulse Current	≤80A					
Input power factor	≥0.99（@220Vin,Pomax）					
Output Characteristic						
Rated Output Power	19.8KW					
Output Voltage Range(V)	0-105	0-135	0-180	0-500	0～720	0-850
Output Current Range(A)	0-240	0-180	0-132	0-54	0～36	0-27
Voltage regulation accuracy	±1%					
Current regulation accuracy	±0.5A（Io≤10A）&≤±5%（Io>10A）					
ripple coefficient of voltage	≤1%					
Output Response Time	≤200mS					
Typical Efficiency	≥90%	≥90%	≥92%	≥94%	≥94%	≥94%
Operating Noise	-					
Protective Characteristic						
Over and Under Voltage Protection	Input over and under voltage shutdown can be self-recovery, output over and under voltage shutdown can be self-recovery.					
Output Reverse Connection and Short Circuit Protection	Output short circuit and reverse connection shutdown can be self-recovery					
Over Temperature Protection	When the heat sink temperature is higher than 75 ° C, it will reduce the output power. And it will disconnect the circuit when the temperature is higher than 95 ° C. It will restore the output when the charging temperature is lower than 85 ° C.					
Environmental Condition						
Operating Ambient Temperature	Liquid temperature of the liquid-cooled system≤65℃					
Storage temperature	-40～95℃					
Humidity	5%～95%					
IP Grade	IP67					
Cooling Function	liquid-cooled					
Communication Function	CAN					

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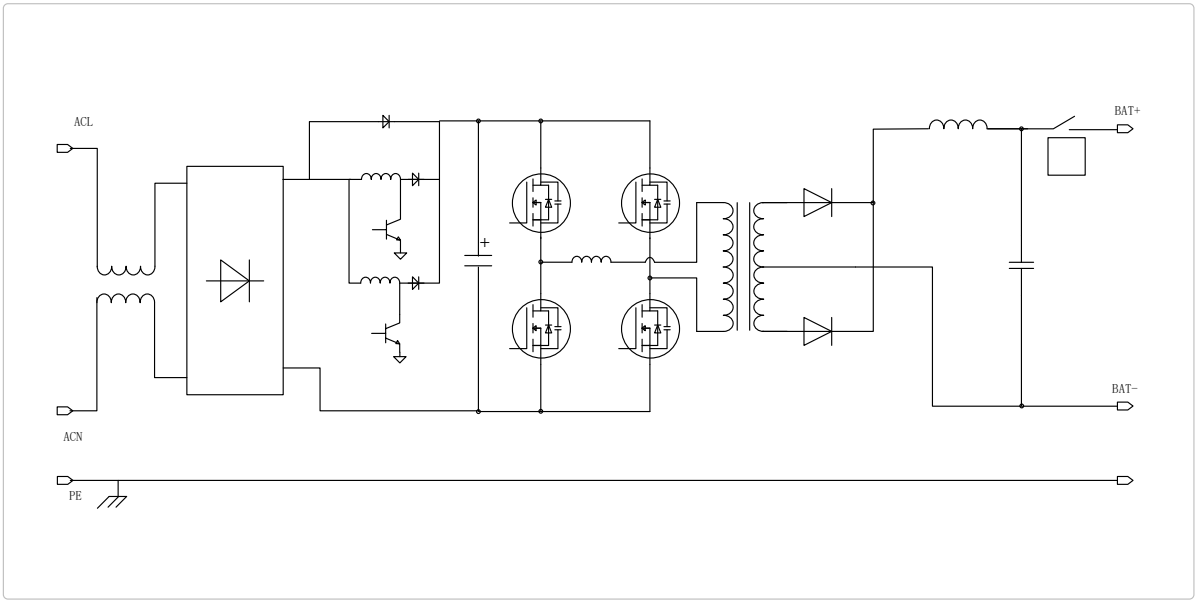
Charging Function	Receive charging instructions to charge normally; No command charger is in standby state	
Safety Characteristic		
Dielectric strength	Primary side - secondary side 2000VAC	Original side - Housing 1500VAC
Insulation resistance	Primary side - secondary side ≥50MΩ	
Harmonic current	Meet the requirements of 6.7.3.1 in GB17625.1-2003	
Vibration Resistance	After X,Y,Z three directions of sweep frequency vibration testing, no damage for parts , no loose for fastening piece	
Impact Resistance	See Requirements 6.5 in GB/T15139-1994	
Resistance to Industrial solvents	Metal parts have a good corrosion protection layer	
Salt Spray Resistance	See GB/T 2423.17	
Durability	Not less than GB/T 24347-2009	
EMC characteristics		
Electromagnetic	Meet the requirements of 11.3.1 in GB/T 18487.3	
Electromagnetic disturbance	Meet the requirements of 11.3.2 in GB/T 18487.3	

2.2. System Block Diagram

2.2.1. Topographic map



2.2.2. Principle block diagram

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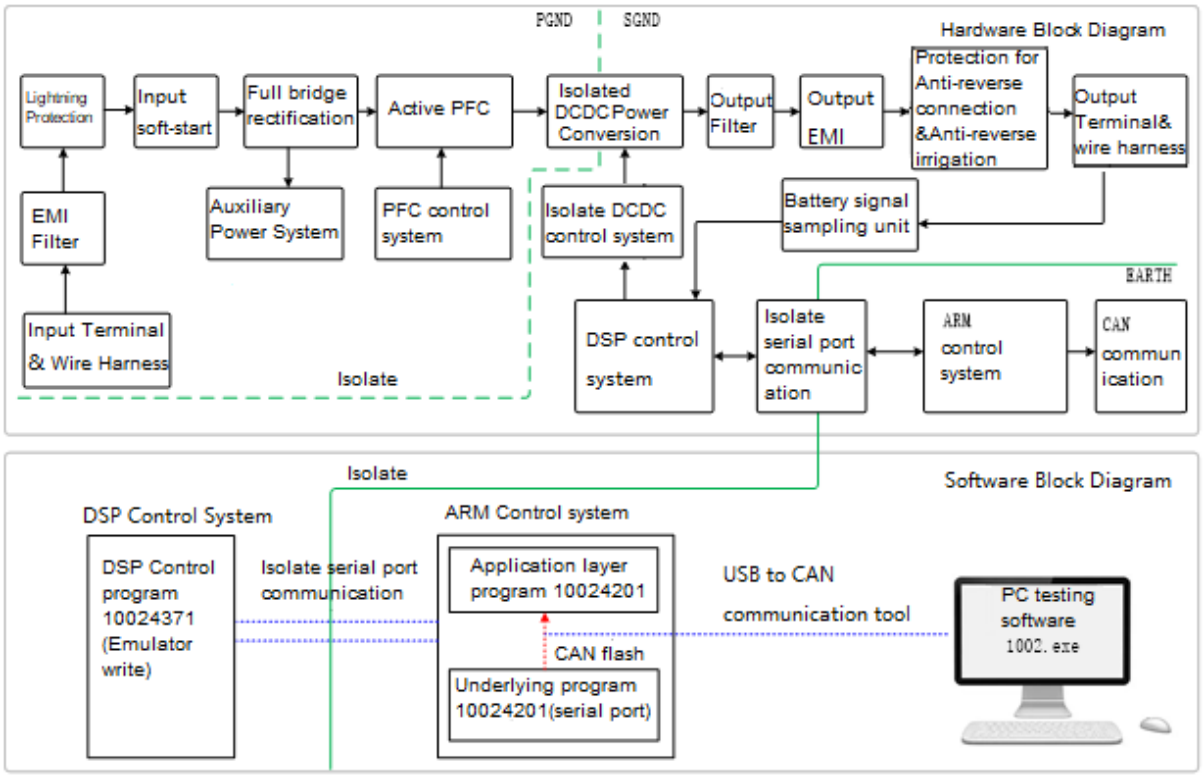
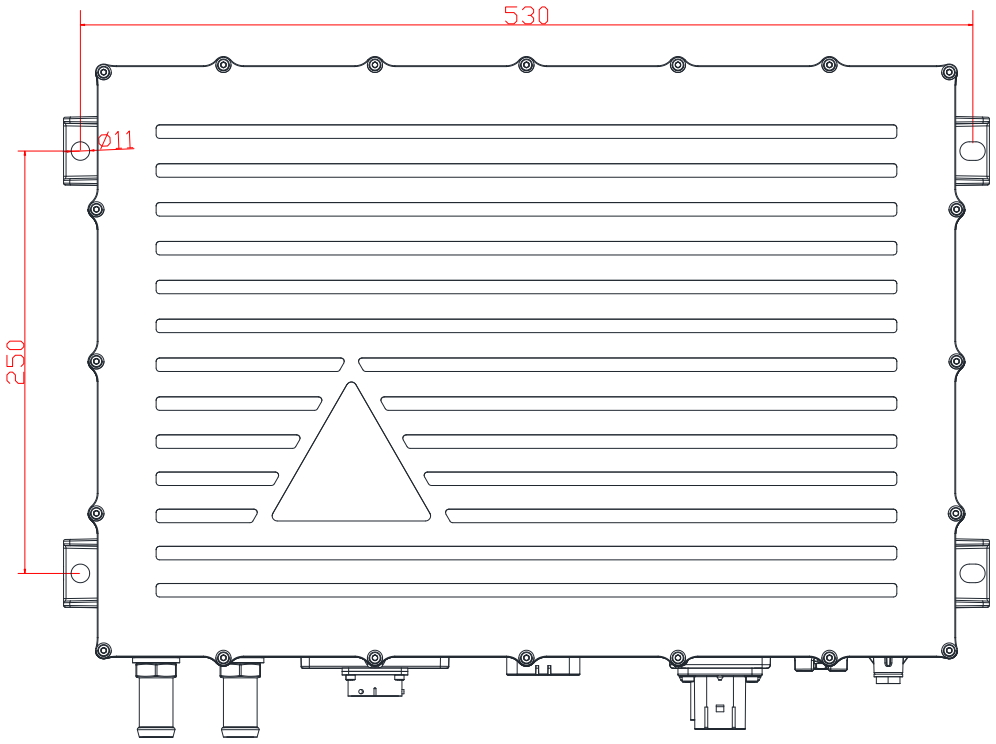


3. Dimensions and Weight

3.1. Product size

Top View



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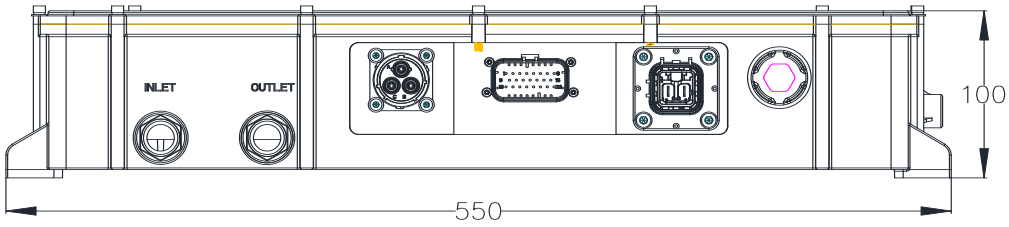
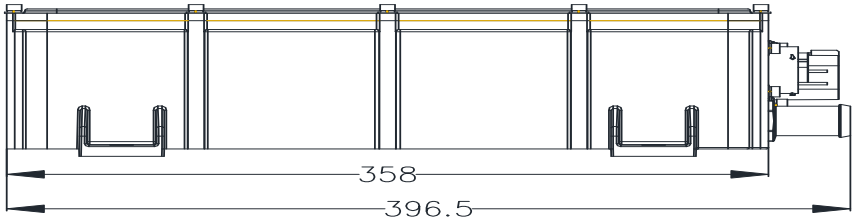
Front View



The connector section is for informational purposes only

Side View



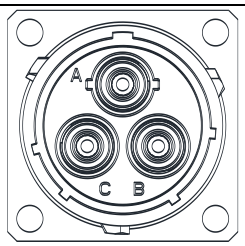
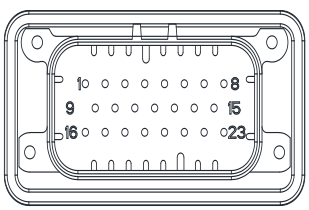
3.2. Product Weight: 25Kg±0.5Kg

4. Define Connectors and Connection Terminals

4.1. Designed for AT-TR3611 AT-TR3612 AT-TR3613

TBD

4.2. Designed for AT-TR3614 AT-TR3615 AT-TR3616

No.	Model	Define		
1	RTHP0203SNH-16C Terminal：MP6ARS8S	A	L	
		B	N	
		C	G	
		Factory		Amphenol (www.amphenol.com)
		Cable side		RTHP6203SNH-16S2-SZ
2	1-776228-1	1	Liquid Pump Control	
		2	Liquid Fan Control	
		3	Alarm	
		4	Enable Key (KL15)	
		5	Control Pilot(CP)	
		6	Proximity Detection	
		7	LV Battery always hot (KL30)	

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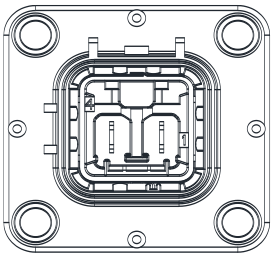
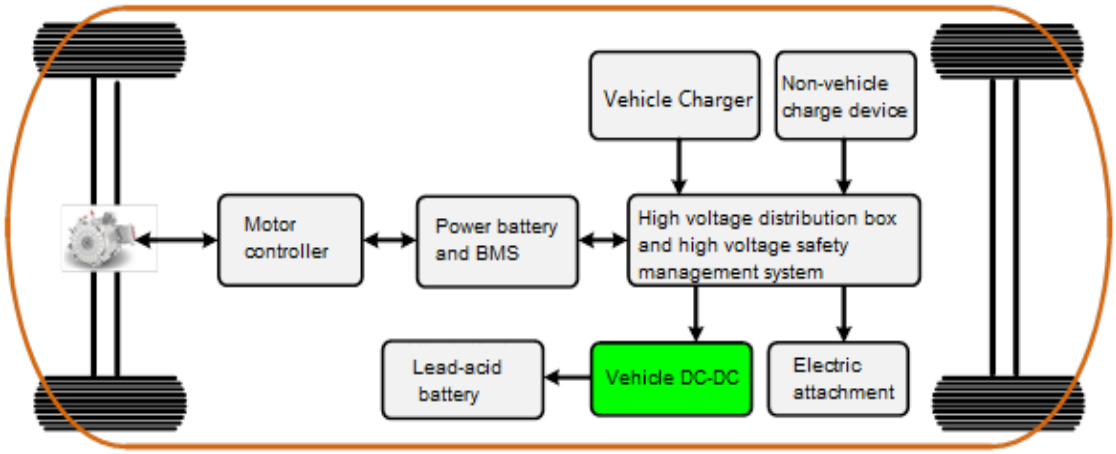
		8	Digital I/O	
		9	BMS Wake-Up	
		10	Led	
		11	HVIL 1	
		12	HVIL 2	
		13-15	Ground (KL31)	
		16	Supply Fan - Negative	
		17	Supply Fan–Positive	
		18	Temperature sensor	
		19	CAN Shield	
		20.22	CAN L	
		21.23	CAN H	
		Factory		TE
		Cable side		770680-1
3	1-2141272-1 Terminal：5-1418758-3	1	Positive	
		2	Negative	
		3	Interlock	
		4	Interlock	
		Factory		TE
		Cable side		YHVA630-2PHM-6MM-A

5. Operating Guide

5.1. Electrical Connection Diagram



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5.2. Product installation

Mounting Screw	Mounting hole aperture	11mm
	number	4
	Screw model recommendation	M10 hex head screw

Install and fix the product

Align the mounting holes, tighten the screws, and fix the power supply.

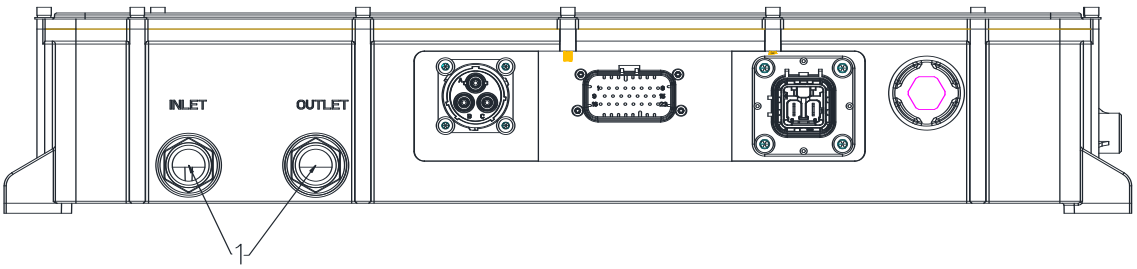
Tighten torque requirements.

Install with appropriate torque according to screw size, connection mode, etc.

Refer to the following table for details:

Specification and model		Tightening torque (torque range: ±10%)/(Unit: Kgf.cm)						
Sub Category	Plastic - Plastic	Sub Category	Plastic - Plastic	General Connection		High Density Connection		
				Steel-Steel	Copper - Cast Aluminum Steel-Aluminum Profiles Steel-Copper	Steel-Steel	Copper - Cast Aluminum Steel-Aluminum Profiles Steel-Copper	Steel-Aluminum Profiles
Hexagon socket screw	M2		0.8	1.5	1.5	2.5	2.5	1.5
	M2.5		1.6	3	3	5.5	4.5	3
	M3	1.5	3	5.5	5	10	8	6
	M4		6	12	10	16	14	12
	M5		10	20	13	30	28	20
	M6		15	30	28	50	48	30
	M8					80	80	-
	M10					100	100	

5.3. Water-cooled system Guide



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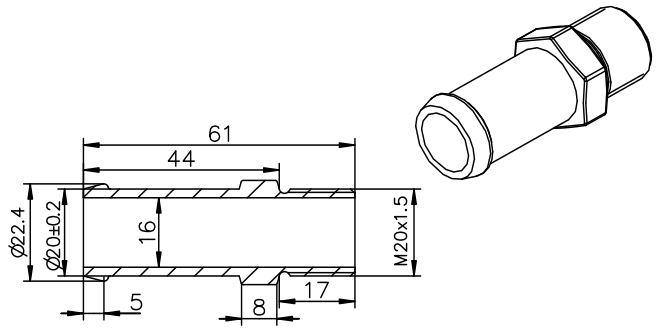
No.	Type	Size
1		

Thermal / Cooling system	AT-TR3610	Unit
Amount of coolant in device	1.6	L
External diameter of cooling water connection pieces	20	mm
Minimum coolant temperature at inlet	-25	℃
Maximum coolant temperature at inlet	50	℃
Coolant pressure drop @ 5l/min, Tcoolant = 25℃ (with a water to glycol mixture ratio of 50 / 50)	0.4	bar
Maximum cooling system pressure	1	bar
Cooling water flow rate	6 to 20	l/min
Ambient temperature range for storage	- 40 to + 95	℃
Ambient temperature range for extreme storage (less than 12 hours at a time)	- 40 to + 125	℃
Ambient temperature range in operation	- 40 to + 85	℃
Power stage temperature range full operation	- 40 to + 110	℃
Control stage temperature range full operation	- 40 to + 80	℃

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5.4. CAN Communication Protocol

Item	Technical Indicator	Remark
Crystal vibration Tolerance	± 0.15%	Within the operating temperature range
Communication rate	You can use the background software to ensure that the configuration is not lost after power failure	Tolerance ±0.375 Kbit/s
Sampling point	The sampling point should be set near but not later than 7/8 of the bit time	
Transceiver	The maximum transceiver "loop delay" (from send to receive) is 300 ns	CAN transceivers shall conform to ISO 11898-2
Terminal resistance	The Charger CAN communication circuit without a 120 ohm terminal resistance by default	
Default CAN communication protocol		TBD

5.5. Background Debugging Software Description

Background software coding	3610.exe	
Background software communication method	CAN communication	Baud rate 125K/250K/500K adjustable
Installation and use help		
CAN box support Brand 1	1.Beijing AiTai USBCAN-2I 2.Beijing Aitai USBCAN-I	
CAN box support Brand 2	TBD	

5.6. Troubleshooting and confirmation

Fault Phenomenon	Common failure causes	Troubleshooting
The charger is not powered on	AC gun has no AC input	Check the input circuit breaker or socket
	The AC connector is not inserted properly	Unplug and plug the connector
	Charge guidance signal connector is not plugged in	Unplug and plug the signal connector
Charger No message	The signal connector is not connected properly	Unplug and plug the signal connector
	CAN cables are connected inversely	Adjust the CAN line sequence
	The communication protocol does not match	Check whether protocols match each other
	The baud rate does not match	Check whether the baud rate match
No high voltage output	The high voltage output is not connected well to the battery	Check the high voltage connectors and cable harnesses
	The charger did not receive the BMS command	Check message
	The positive and negative battery terminals are connected in reverse	Check the high voltage connectors and cable harnesses

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Over temperature fault	Air-cooled machine: The fan is blocked or the air duct is blocked	Check fans and air ducts
	Water-cooled machine: no coolant or coolant's temperature is too high	Check if the coolant is normal

6. User Notices and Cautions

Please note the Warnings and cautions section before using the product. Incorrect operation may cause damage to the power supply or cause a fire. Make sure you have read the warnings and cautions before using the product.

Warning:

It is strictly forbidden to disassemble the product for maintenance, debugging and modification;

When powered on, keep hands and face away from the product to avoid accidental injury;

There are high voltage and high temperature inside the product, please do not touch the internal components, may cause electric shock or burn;

During use, if the power supply has abnormal sound or odor, please turn off the input immediately;

Use compliant connectors to ensure that plugs and sockets are tightly connected. Loose connectors may cause part heat and fire.

Please use the power supply according to technical parameters, if it is used wrong power supply, it may cause product damage;

When the battery is charging normally, keep away from fire sources and inflammable and explosive materials;

Please avoid placing the product in a rain for a long time;

Ac power supply should choose a three-core cable with a ground wire, and install the ground wire correctly;

Before installation, ensure that the shell is kept well. If it is damaged, replace it immediately or contact the manufacturer.

Note:

Confirm that the product input/output terminal and signal terminal are connected correctly according to the product instructions; When connecting cables, please cut off the input power supply and do not plug or unplug the connector with power on.

The input/output of the power supply should be supplemented with a blown fuse or other overcurrent protection device;

The possible electrical hazards at the output end of the product must be considered to ensure that the end product user will touch the product; The manufacturer of the terminal equipment must design the appropriate protection scheme to ensure that the operation will not cause danger due to accidental touching the terminal of power supply;

Once the safety protection of the equipment is damaged, the equipment must stop working and refer to the relevant maintenance regulations.

When the power supply device is switched from a cold environment to a warm environment, condensation may cause leakage hazards, so the grounding requirements must be strictly implemented.

Only a qualified person can connect the equipment to the power supply.

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The power supply must be shut down for five minutes, so that the capacitor has sufficient discharge time before repairing power supply equipment.

Pay attention to the use of safety: do not touching safety warning signs and high pressure signs, to avoid electric shock, burns.

7. Reference standards and specifications

QC/T 413-2002 Basic technical conditions for automotive electrical equipment

QC/T 895-2011 Conduction on-board charger for electric vehicles

GB/T 2423.1-2001 Environmental tests for electrical and electronic Products-Part 2: Test methods/Test A: Low temperature

GB/T 2423.2-2001 Environmental tests for electrical and electronic Products-Part 2: Test methods/Test B: High temperature

GB/T 2423.3-1993 Basic environmental test procedure for electrical and electronic Products-Test Ca: constant wet heat test method;

GB/T 2423.4.1993 Basic environmental test procedure for electrical and electronic Products-Test Db: alternating wet heat test method

Environmental tests for electrical and electronic Products-Part 2: Test methods/test Ea and guidelines: shock

Environmental testing of electrical and electronic Products-Part 2: Test methods/test Ea and guidelines: collision

Environmental testing of electrical and electronic Products-Part 2: Test methods/tests Ed: free drop

Environmental testing of electrical and electronic products - Part 2: Test methods/test Fc and guidelines: Vibration (sinusoidal)

Environmental tests for electrical and electronic Products-Part 2: Test methods/test Fd: wide-band random vibration

GB/T 2423.22-2002 Environmental tests for electrical and electronic Products-Part 2: Test N: Temperature change

GB/T 14508-93 grade road cargo transport machinery environmental conditions

GB/T 18384.3-2001 Safety requirements for electric vehicles - Part 3: Protection against personal electric shock

GB/T 17619 Electromagnetic radiation immunity limits and measurement methods for electronic and electrical components of motor vehicles

GB/T 18488.1-2006 Drive motor systems for electric vehicles - Part 1: Technical requirements

GB/T 24347-2009 DC/DC converter for electric vehicles

GB/T 18655-2010 Measurement, ship and internal combustion engine radio disturbance characteristics Limits and measurement methods for the protection of in-vehicle receivers

Q/FT B102-2005 Requirements for Traceability marking of components of vehicle products

GB/T 17626.2-2006 Electromagnetic compatibility test and measurement techniques Electrostatic discharge immunity test

GB/T 17626.3-2006 Electromagnetic compatibility test and measurement techniques Radio frequency electromagnetic field radiation immunity test

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GB/T 17626.4-2008 Electromagnetic compatibility test and measurement technology Electrical fast transient pulse group immunity test

GB/T 17626.5-2008 Electromagnetic compatibility test and measurement technology Surge (shock) immunity test

GB4943-2001Security of information technology equipment

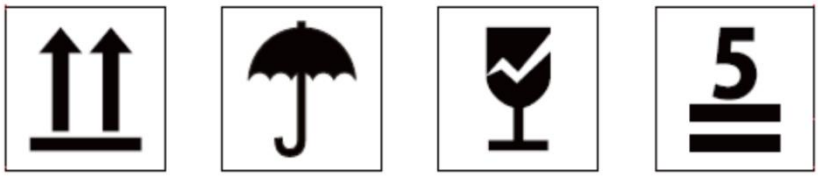
8. Package & Transportation & Storage

Product packaging information:

Packing Quantity and Carton Information	The net weight of one module : Kg	**25Kg**
	Carton size: mm	**620*485*165**
	Qty/Carton	**1**
	Total weight of product and carton : Kg	**25.7Kg**

The product name, model and the name of the manufacturer are shown on the packing carton; The technical documents including certificate of product are supplied in the carton.

The product should be firmly packed when transported, and the external use of the carton should be in accordance with the relevant national standards and should be marked "handle with care" and " maintain dryness". Containers containing products are allowed to be transported by various of transport. Direct rain and snow and mechanical impact should be avoided during transportation. Transport marks should be attached, as shown in pictures 7-2 below:



Transport Mark

Storage

Products should be stored in the packing carton when not in use, the ambient temperature of the warehouse is -10-40 ℃ and the relative humidity is not more than 80%, harmful gases, flammable, explosive products and corrosive chemicals are not allowed in the warehouse, and there is no strong mechanical vibration, impact and strong magnetic field, the packing carton should be padded at least 20cm high from the ground. At least 50cm away from the wall, heat source, window or air inlet, the storage period under these conditions is generally 2 years, if more than 2 years the products should be re-tested.

Products should be stored in a ventilated, dry place. At the same time, to avoid high temperature sources, fire sources and chemicals. Store neatly to avoid throwing.