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e-Mail：sales@annren.com
TEL：+886-6-313-0155 FAX：+886-6-313-0225
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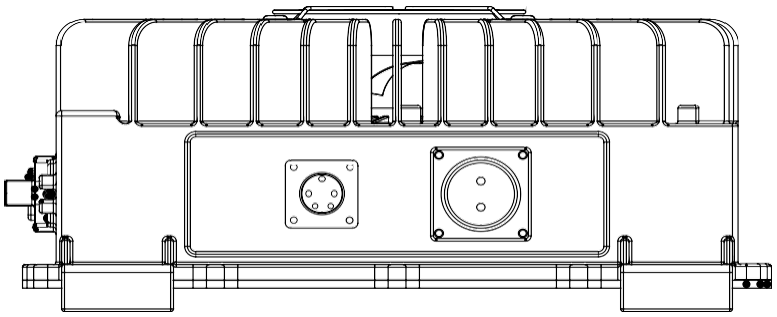
2.5KW & 3KW DC/DC Converter Fan Cooled System Model No.



1. ATD2K5-540S14F-RD2P5540
2. ATD2K5-360S14F-RD2P5360
3. ATD2K5-144S14F-RD2P5144
4. ATD3K-144S24F-RD3P0144-24
5. ATD3K-360S24F-RD3P0360-24
6. ATD3K-540S24F-RD3P0540-24

Contents

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Product Introduction

AT-RD2P5 & AT-RD3P0 series on-board DC-DC converter is a high-power, dense, high-efficiency DC-DC converter specially developed for new lithium electric vehicles, logistics vehicles, special vehicles, construction machinery and other new energy vehicles.

The module is designed with full digital control technology, with flexible and intelligent control, good protection characteristics and strong system robustness. The built-in microprocessor communicates with the monitoring unit, and the parameters in the machine can be set by the higher-level monitoring unit or adjusted by the higher-level monitoring unit through the CAN interface.

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

Key Specifications:

Model	Input voltage range	Rated output power	Rated output voltage	Output voltage/ current range	3D
AT-RD2P5540	**400~900VDC**	**2.5KW**	**14VDC**	**0-16VDC/0-178A**	**RD3P0540.V1.3**
AT-RD2P5360	**200~500VDC**	**2.5KW**	**14VDC**	**0-16VDC/0-178A**	
AT-RD2P5144	**80~200VDC**	**2.5KW**	**14VDC**	**0-16VDC/0-178A**	
AT-RD3P0144-24	**80~200VDC**	**3.0KW**	**27VDC**	**0-32VDC/0-109A**	
AT-RD3P0360-24	**200~500VDC**	**3.0KW**	**27VDC**	**0-32VDC/0-109A**	
AT-RD3P0540-24	**400~900VDC**	**3.0KW**	**27VDC**	**0-32VDC/0-109A**	

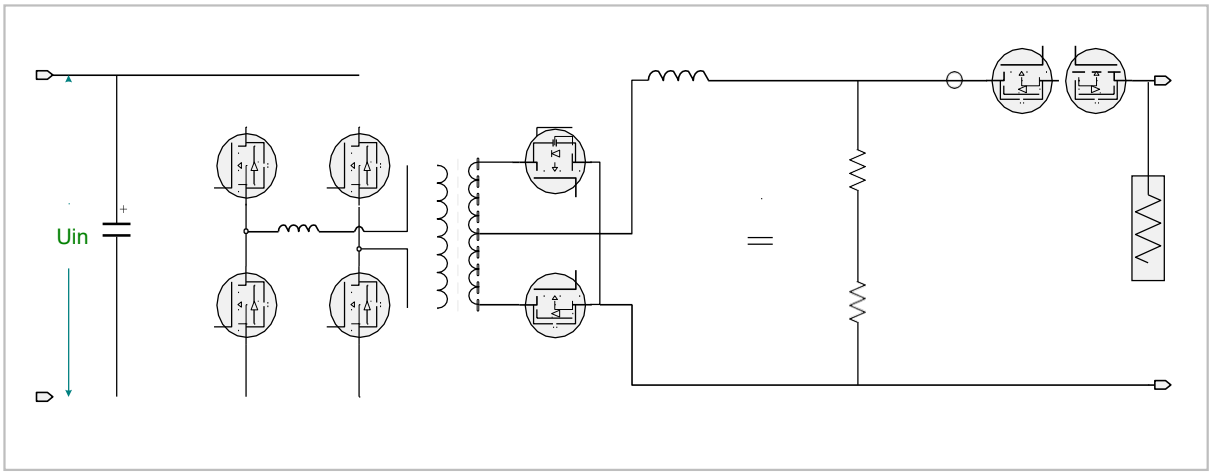
1. Electrical characteristics

1.1. Electrical characteristics

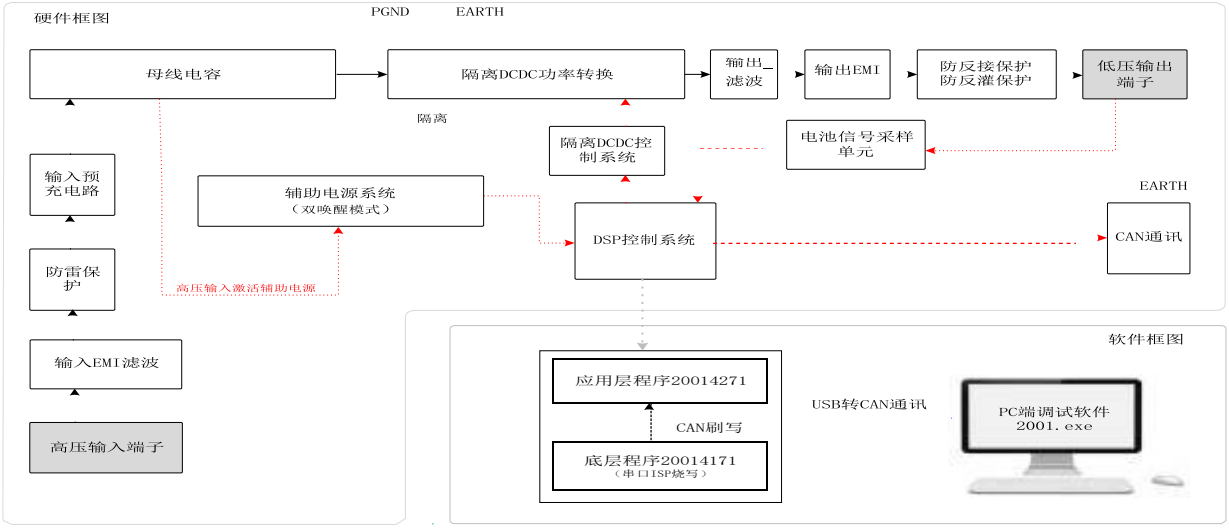
Model								
On-board power supply type	**Self-cooled automotive DC-DC converter**							
Model and part number	/	/	**AT-RD2P5540**	**AT-RD2P5360**	**AT-RD2P5144**	**AT-RD3P0144-24**	**AT-RD3P0360-24**	**AT-RD3P0540-24**
Enter the properties								
Rated input voltage	/	/	**540V**	**360V**	**144V**	**144V**	**360V**	**540V**
Input voltage range	/	/	**400-900V**	**200-500V**	**80-200V**	**80-200V**	**200-500V**	**400-900V**
Enter the pre-charge path	**Built**							
the pre-charge resistor	/	/	**120R**	**120R**	**30R**	**30R**	**120R**	**120R**
Start the inrush current	/	/	**≤11A**	**≤7.5A**	**≤12A**	**≤12A**	**≤7.5A**	**≤11A**
Bus capacitors	/	/	**22uF**	**42UF**	**42UF**	**22uF**	**12uF**	**22uF**
Output characteristics								
Rated output power	/		**2.5KW**			**3.0KW**		
Rated output voltage	/		**14V**			**27V**		
Output voltage range	/		**0～16V**			**0～32V**		

Output current range	/	**0～178A**	**0～109A**
Voltage regulation accuracy	**±0.1V（ LEAD ROOT TEST）**		**±0.2V（ LEAD ROOT TEST）**
Output response time	≤200mS		
Typical efficiency	/	**≥92%**	**≥93%**
Operating noise	≤60dB		
Protection characteristics			
Over- and under-voltage protection	The input over- and under-voltage shutdown can be self-recovering, and the output over-voltage and undervoltage shutdown can be self-recovering。		
Output reverse polarity and short-circuit protection	The output is powered off when it is short-circuited or reversed, and it can be self-recovering		
Over-temperature protection	When the heat sink temperature is higher than 75°C, the output power is reduced, when the temperature is higher than 95°C, the circuit is disconnected, and the charger resumes output when the charging temperature returns to below 85°C		
Environmental conditions			
Operating ambient temperature	**-40℃～+85℃**		
Storage temperature	**-40～95℃**		
Humidity	5%~95% no condensation, no condensation		
IP rating	IP67		
Cooling function	**Self-cooling**		
Communication features	CAN bus control		
Charging function	Receiving the charging command can charge normally; The no-command charger is in standby		
Safety & Reliability			
Safety & Reliability	**Primary edge — secondary edge 2000VAC**	**Primary Side—Chassis 1500VAC**	
Insulation resistance	Primary-secondary ≥50MΩ		
Vibration resistance	After the X, Y, Z three directions sweep vibration test, the parts are not damaged, and the fasteners are not loose		
Impact resistance	See the requirements of 6.5 in GB/T15139-1994		
Resistance to industrial solvents	Metal parts have a good anti-corrosion layer		
Anti-salt spray Performance	See GB/T 2423.17		
Durability	In accordance with the relevant provisions of not less than GB/T 24347-2009		
EMC features			
Electromagnetic immunity	Meet the provisions of Chapter 4 of GB/T17619-1998		
Electromagnetic harassment	See the limits set forth in Chapters 12 and 14 of GB18655-2002		

12. Electrical topology diagrams



13. System Block Diagram



14. Characteristic Curves

TBD

2.

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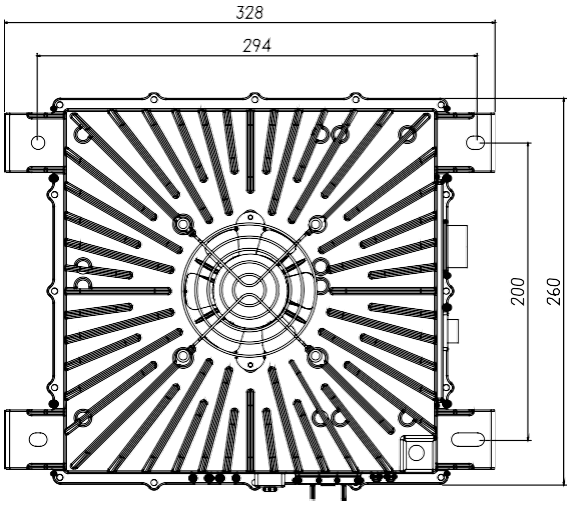
3. Dimensions and weight

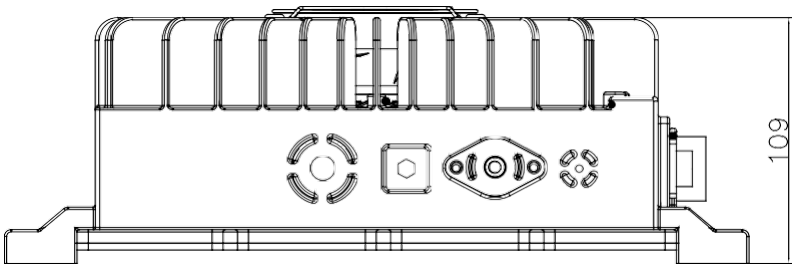
3.1. Product Dimensions

3DModel data：RD3P0540.STP.stp

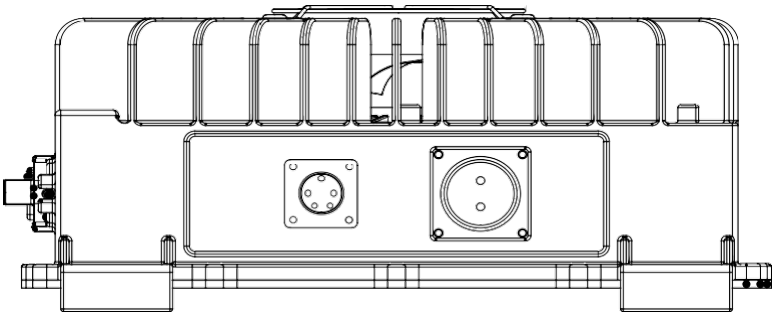
Top view



Side view



Front view

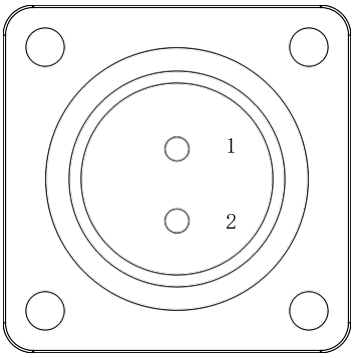
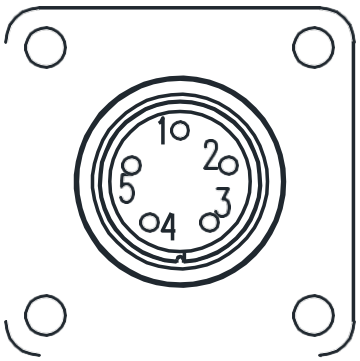
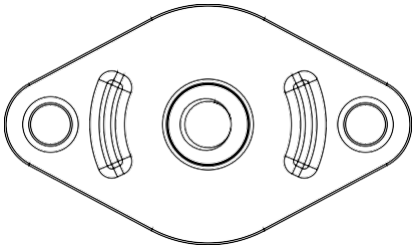


3.2. Product Weight

8.5Kg±0.5Kg

4. Definition of connectors and connecting terminals

4.1. Connector Model and Definition

Type	Connector definition		Connector drawings
In put WF20K2Z	Foot position	Definition	
	1	Input+	
	2	Input-	
	Connector manufacturer		Guangdong Weipu Electric Appliance Co., Ltd
	To the plug-in model		WF20J2TE
Signal WF16K5Z	Foot position	Definition	
	1	CANH	
	2	CANL	
	3	DC-Enble	
	4	/	
	5	/	
	Connector manufacturer		Guangdong Weipu Electric Appliance Co., Ltd
	To the plug-in model		WF16J5TE
Out put FST3388BN-IP67	Foot position	Definition	
	A	Out put+	
	Connector manufacturer		Hu zheng
	Connector manufacturer		M8

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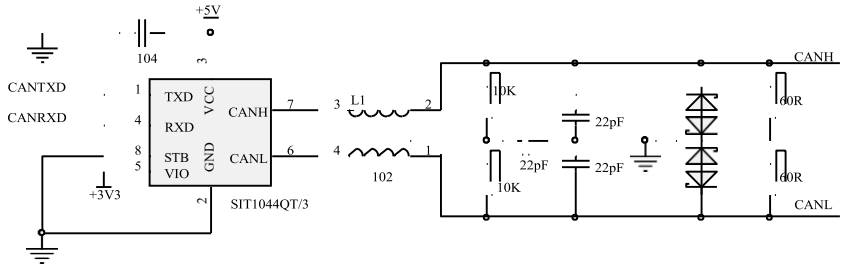
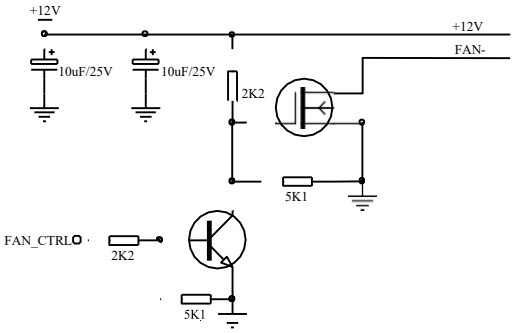
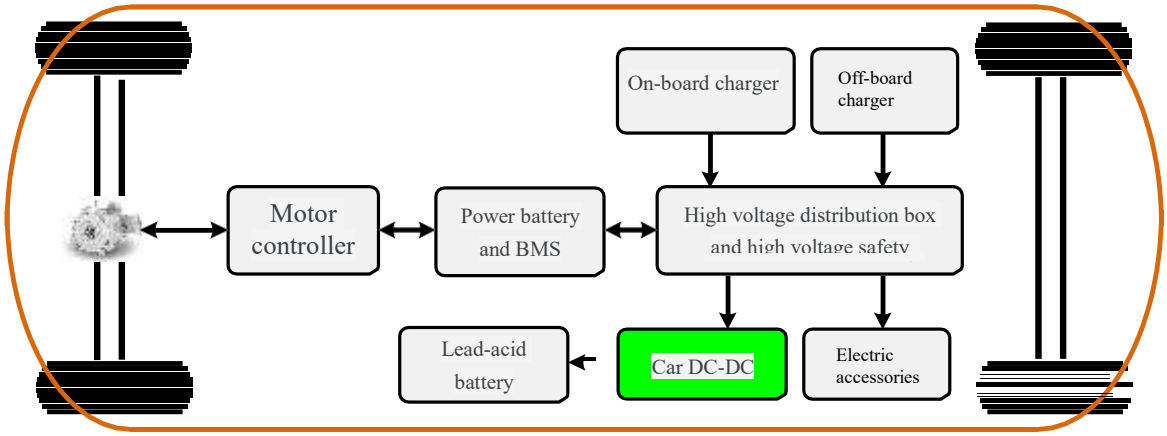
4.2. Signal Interface Schematic

Signal Interface	
CAN communication	
FAN DRIVE	

5. User Guide

5.1. Block diagram of electrical connections



5.2. Product Installation

Part number	RD3P0	
Product type	On-board DCDC	
Mounting screws	Mounting hole aperture	Φ10
	Number	4
	Screw modelrecommended	M10*20 Hexagon socket screws

Install and secure this product

Align the mounting holes, lock the fastening screws, and secure the power supply.

Tightening force distance requirements

When installing, according to the size of the screw, the connection method, etc., use the appropriate torque for installation, refer to the following table for details:

Specifications and models		Tightening torque (torque range: ±10%)/(unit: Kgf.cm)						
Categories	Sub-categories	Plastics - Plastics	Steel-plastic Copper - Copper	General connections		High-density connectivity		
				Steel - Steel	Copper-cast aluminum Steel-aluminium profiles Steel-copper	Steel - Steel	Steel - cast aluminum Steel-copper	Steel-aluminium profiles
Allen socket screws	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	-

53. CCAN communication protocol

Projects	Technical indicators	Remarks
Crystal oscillator tolerance	± 0.15%	within the operating temperature range
Communication rate	**It can be configured through the background software, and it will not be lost after power failure**	The tolerance is ±0.375 Kbit/s
Sampling points	The sampling point should be set close to but no later than 7/8 of the bit time	
Transceiver	The maximum transceiver "ring delay" (from send to receive) is 300 ns	CAN transceivers should comply with the ISO 11898-2 standard
Termination resistor	**The DC-DC CAN communication circuit has no 120 ohm termination resistor by default**	
Default CAN communication protocol	Vehicle DCDC default CAN control communication protocol V1	

54. Background Debugging Software Description

Product type	**On-board DCDC**

Background software coding	2001 Setup V2.0.exe	
Background software communication mode	CAN communication	Baud rate 125K/250K/500K adjustable
Installation and usage assistance		
Support CAN box Brand 1	1. Beijing Aitai USBCAN-2I 2. Beijing Aitai USBCAN-I	
Support CAN box Brand 2	TBD	

55. Troubleshooting and Confirmation

Fault phenomenon	Common causes of failures	Troubleshooting
The power supply has no output	High Voltage Input Exception (None or Reverse)	Check if the high-voltage input is normal
	12V voltage input port is abnormal (none, over/undervoltage, reverse connection)	Check whether the 12V voltage input port is normal
	The output is disconnected	Check whether the output connection is normal
No packets are sent from DC-DC	The signal connector is not properly connected	Reseat the signal connector
	The CAN cable is reversed	Adjust the CAN line sequence
	The communication protocol does not match	Compare whether the protocols match
	Baud rates don't match	Compare whether the protocols match
The distribution box high voltage input fuse is damaged The product reports a fault signal	Input short circuit	Check if the high-voltage input is normal
	Input over/undervoltage, output over/undervoltage, overtemperature, output short-circuit/overcurrent	Check the input voltage, output for overcurrent/short circuit, turn off the power, let stand for 10 minutes, if it still fails, contact the manufacturer.
Overtemperature failure	Air-cooled machines: The fan is stalled or the air duct is blocked	Check the fan and air duct
	Water-cooled machines: No coolant or too high coolant temperature	Check that the coolant is normal

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6. Notice and Precautions for Users

Please pay attention to the Warnings and Precautions section before using the product. Incorrect operation may result in damage to the power supply or cause a fire. Please confirm that you have read the warnings and precautions before using the product.

Warn:

It is strictly forbidden to disassemble the product for maintenance, debugging and modification without authorization;

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

There is high pressure and high temperature inside the product, please do not touch the internal components, which may cause electric shock or burns;

During use, if there is abnormal noise or odor in the power supply, please turn off the input immediately;

Connectors that meet the specifications must be used to ensure that the plugs and sockets are tightly connected, as loosening may cause local heating and fire;

Never charge a battery that has been damaged or cannot be charged;

Please use the power supply within the technical parameters, if it is used beyond the range, it may cause damage to the product;

When the battery is charged normally, please keep away from fire sources and flammable and explosive materials;

Please avoid leaving the product in a rainy location for a long time;

For AC power supply, choose a three-core cable with a grounding wire, and install the ground wire correctly;

Please confirm that the shell is intact before installation, if it is damaged, please replace it immediately or contact the manufacturer.

Notes:

Confirm that the product input/output terminal and signal terminal are connected correctly in accordance with the product manual; When wiring, please cut off the input power supply, and do not plug and unplug the connector with power;

The input/output of this power supply requires an external blown fuse or other overcurrent protection device;

It is necessary to consider the possible electrical hazards at the output end when the product is used to ensure that the end product user does not come into contact with the product; End equipment manufacturers must design protection schemes to ensure that operations are not hazardous due to accidental contact of engineering personnel or tools with power terminals;

Once the safety protection of the equipment is damaged, the equipment must stop working and be disposed of with reference to the relevant maintenance regulations.

When the power supply equipment is transferred from a cold environment to a warm environment, condensation may cause a leakage hazard problem, so the grounding requirements must be strictly enforced;

The device must be connected to a power source by a qualified person.

The power supply must be shut down for five minutes to allow the capacitor to have sufficient discharge time before the power supply equipment can be maintained.

Pay attention to the safety of use: where there are safety warning signs and high-voltage signs, avoid touching with your hands to avoid electric shock and burns.

7. Reference to Standards and Specifications

GB 14023-2011 Limits and measurement methods for radio disturbance characteristics of vehicles, boats and devices driven by internal combustion engines

GB/T 17626.2-2006 Electromagnetic compatibility test and measurement technology electrostatic discharge immunity test

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GB/T 17626.3-2006 Electromagnetic compatibility test and measurement technology: radio frequency electromagnetic field radiation immunity test

GB/T 17626.4-2008 Electromagnetic compatibility test and measurement technology electrical fast transient burst immunity test

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

GB/T 17619 1998 Limits and measurement methods for electromagnetic radiation immunity of electrical and electronic components of motor vehicles

GB/T 18384.3-2015 Electric vehicles -- Safety requirements -- Part 3: Protection against electric shock to personnel

GB/T 18387-2008 Limits and measurement methods for electromagnetic field emission intensity of electric vehicles, broadband, 9KHz~30MHz

GB/T 18487.2-2001 Conductive charging system for electric vehicles: Requirements for connection between electric vehicles and AC DC power supply (doc)

GB/T 18487.3-2001 Conductive charging system for electric vehiclesAC and DC chargers for electric vehicles (station) (doc)

GB/T 18488.1-2015 Drive motor systems for electric vehicles – Part 1: Technical specifications

GB/T 18655-2010 Limits and measurement methods for the protection of on-board receivers with radio disturbance characteristics of measurement, ship and internal combustion engines

GB/T 19826-2014 General technical conditions and safety requirements for DC power supply equipment for electric power engineering

GB/T 21437.2-2008 Electrical disturbance caused by conduction and coupling in road vehicles – Part 2: Electrical transient conduction along power lines

GB/T 2423.1-2008 Environmental test for electrical and electronic products Part 2: Test method Test A: low temperature

GB/T 2423.2-2008 Environmental tests for electrical and electronic products Part 2: Test methods Test B: High temperature

GB/T 2423.3-2006 Basic environmental test procedures for electrical and electronic products—Test Ca: Constant damp heat test method;

GB/T 2423.4-2008 Basic environmental test procedures for electrical and electronic products—Test Db: Alternating damp heat test method

GB/T 2423.5-1995 Environmental tests for electrical and electronic products, Part 2: Test methods/test Ea and guidelines: shock

GB/T 2423.6-1995 Environmental tests for electrical and electronic products, Part 2: Test methods/test Ea and guidelines: Collision

GB/T 2423.8-1995 Environmental test for electrical and electronic products, Part 2: Test method/test Ed: Free fall

GB/T 2423.10-2008 Environmental tests for electrical and electronic products, Part 2: Test methods/test Fc and guidelines: Vibration (sinusoidal)

GB/T 2423.22-2012 Environmental tests for electrical and electronic products, Part 2: Test N: temperature change

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

GB 4208-2008 Enclosure protection level (IP code)

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

GB 9254-2008 Radio nuisance limits and measurement methods for information technology equipment

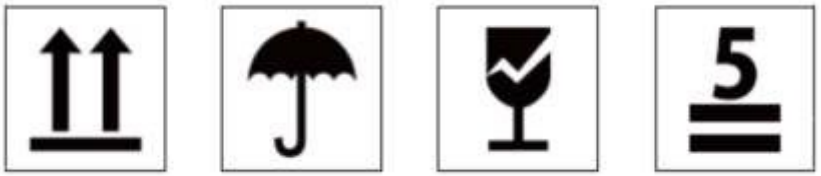
8. Packaging, transportation and storage

Packaging

The product packaging information is as follows:

Packing quantity and box information	The net weight of the single machine is Kg	**8.5Kg**
	The outer dimensions of the box are mm	**390*295*157**
	The number of complete machines in a single box	**1**
	The total weight after packaging is Kg	**10Kg**

There is a product name, product model, and manufacturer name on the packaging box; The technical documentation supplied with the product in the packing box should include the factory certificate of the product. When the product is transported, there should be a firm packaging box, and the box should be used outside the box to comply with the provisions of the relevant national standards and should have signs such as "care and care" and "moisture-proof". The boxes containing the products are allowed to be transported by various means of transport. Direct rain and snow and mechanical impact should be avoided during transportation. And attach the transportation mark, as shown in Figure 7-2 below:



Transport signs

Deposit

When the product is not in use, it should be stored in the packing box, the warehouse ambient temperature is -10-40 °C and the relative humidity is not more than 80%, the warehouse is not allowed to have harmful gases, flammable, explosive products and corrosive chemicals, and there is no strong mechanical vibration, impact and strong magnetic field, the packaging box should be at least 20cm high from the ground, 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 should be re-conducted after more than 2 years.

The product should be stored in a ventilated, dry place. At the same time, it is necessary to avoid high temperature sources, fire sources and chemicals. Store neatly and avoid throwing away.

9. Version Update History

Date	Version	Content	Reason for change	Remark
2021/03/13	V1.0	Initial release		
2021/11/07	V1.1	Update versions	Update the plugin	
2022/12/12	V1.2	Update versions	Update the shell	
2024/01/03	V1.3	Update versions	Update the plugin	