ElCon

Product Introduction

RD2P0 series integrated 2.0KW

On Board DC-DC converter

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Product Introduction

The RD2P0 series **in** car DC-DC converter is a high-power**,** high**-density, and** high-efficiency DC-DC converter developed specifically for new energy vehicle models **such as** lithium-ion electric vehicles, logistics vehicles, specialized **vehicles, and** construction machinery**. It is** designed **and** developed using modular, standardized, **and universal** design concepts.

The module is designed using fully 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 internal parameters can be set or adjusted by the higher-level monitoring unit through the CAN interface.

It has multiple protection functions such as input overvoltage protection, output overcurrent protection, output overvoltage protection, output short circuit protection, and over temperature protection.

Main specifications:

model	Input Voltage	Rated output power	rated output voltage	Output voltage and current range	three-dimensional model
RD2P0048	**40~80VDC**	**2.0KW**	**14VDC**	**0-16VDC/0-140A**	
RD2P0072	**50~100VDC**	**2.0KW**	**14VDC**	**0-16VDC/0-140A**	**RD2P0072.V1.3.stp**
RD2P4144	**80~200VDC**	**2.4KW**	**14VDC**	**0-16VDC/0-170A**	
RD2P4360	**200~450VDC**	**2.4KW**	**14VDC**	**0-16VDC/0-170A**	
RD2P4540	**400~700VDC**	**2.4KW**	**14VDC**	**0-16VDC/0-170A**	
RD2P0072-27	**50-100VDC**	**2.0KW**	**27VDC**	**0-32VDC/0-70A**	
RD2P4144-27	**80~200VDC**	**2.4KW**	**27VDC**	**0-32VDC/0-86A**	
RD2P4360-27	**200~450VDC**	**2.4KW**	**27VDC**	**0-32VDC/0-86A**	
RD2P4540-27	**400~700VDC**	**2.4KW**	**27VDC**	**0-32VDC/0-86A**	

1 Electrical characteristics

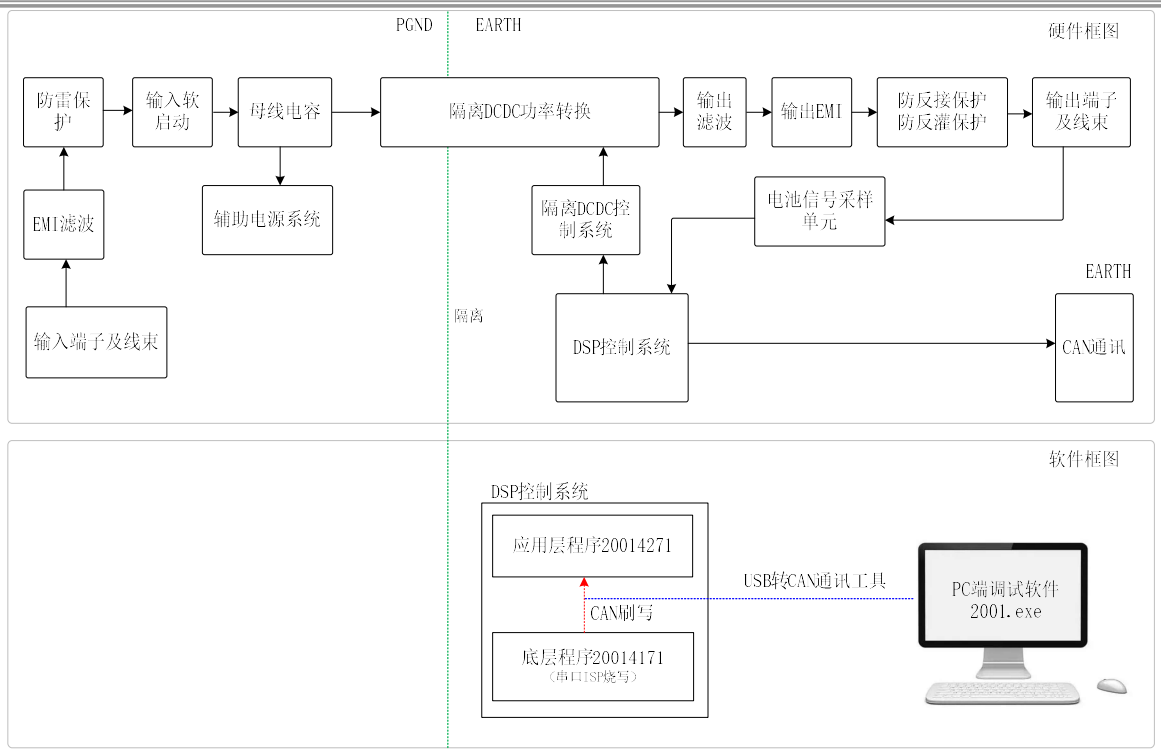
1. 1 Electrical characteristics

	model	
Vehicle power supply type		**Air cooled car DC-DC converter**
Model and supplier part number		**RD2P0**

	input/output characteristic								
model	RD2P0048	RD2P0072	RD2P4144	RD2P4360	RD2P4540	RD2[0072-27	RD2P4144-27	RD2P4360-27	RD2P4540-27
Rated input voltage	48VDC	72VDC	144VDC	360VDC	540VDC	72VDC	144VDC	360VDC	540VDC
Input Voltage	40-80 VDC	50-100 VDC	80-200 VDC	200-450 VDC	400-700 VDC	50-100 VDC	80-200 VDC	200-450 VDC	400-700 VDC
Input pre charging circuit		built-in							
Input pre charge resistor	30R	30R	30R	120R	120R	30R	30R	120R	120R
Start the impulse current	≤5A	≤5A	≤5A	≤5A	≤5A	≤5A	≤5A	≤5A	≤5A
Bus capacitor	20uF	20uF	20uF	10uF	7uF	20uF	20uF	10uF	7uF
Rated output power	2.0KW		2.4KW			2.0KW	2.4KW		
rated output voltage	14V		14V			27	27V		
Output voltage range	0～16V		0～16V			0-32V	0～32V		
Current range	0～140A		0～170A			0-70A	0～86A		
Voltage stabilization accuracy	± 0.2V (lead root test)					± 0.4V (lead root test)			
Output response time		≤200mS							
Typical Efficiency	≥90%		≥91%				≥92%		
work noise		≤60dB							
	Protection features								
Overvoltage and undervoltage protection		Input overvoltage shutdown can self recover, output overvoltage shutdown can self recover.							
Output reverse connection and short circuit protection		Shutdown in case of output short circuit or reverse connection, self recovering							
Over Temperature Protection		When the temperature of the heat sink is higher than 75 ℃, reduce the output power. When the temperature is higher than 95 ℃, disconnect the circuit. When the charging temperature returns to below 85 ℃, the charger will resume output							
	environmental condition								
Ambient Temperature		-40℃～+85℃							

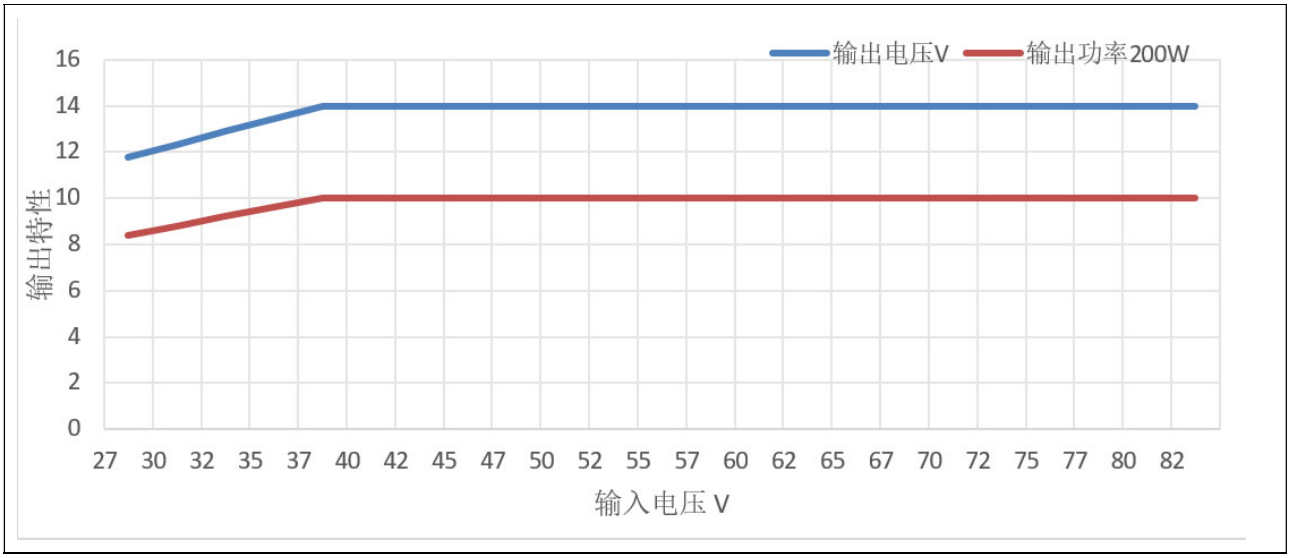
storage temperature		**-40～95℃**		
humidity		5% to 95% non condensing, non condensing		
IP GRADE		IP67		
Cooling function		**forced air cooling**		
communication		can-bus		
control mode		No enable control; Hard wired high-level enable control; CAN communication enables control		
	Safety characteristics			
dielectric strength	**Primary side - secondary side 2000VAC**			**Original Edge - Chassis 1500VAC**
insulation resistance		Primary side - secondary side ≥ 50M Ω		
Vibration resistance performance		After conducting frequency sweep vibration tests in X, Y, and Z directions, there was no damage to the components and no loosening of the fasteners		
impact resistance		Refer to the requirements of 6.5 in GB/T15139-1994		
Resistance to industrial solvents		Metal components have a good anti-corrosion layer		
Salt spray resistance performance		Refer to GB/T 2423.17		
durability		Not lower than the relevant provisions of GB/T 24347-2009		
	EMC characteristics			
electromagnetic immunity		Meet the requirements of Chapter 4 in GB/T17619-1998		
Electromagnetic disturbance		Refer to the limit values specified in Chapter 12 and Chapter 14 of GB18655-2002		

1. 2 System Block Diagram

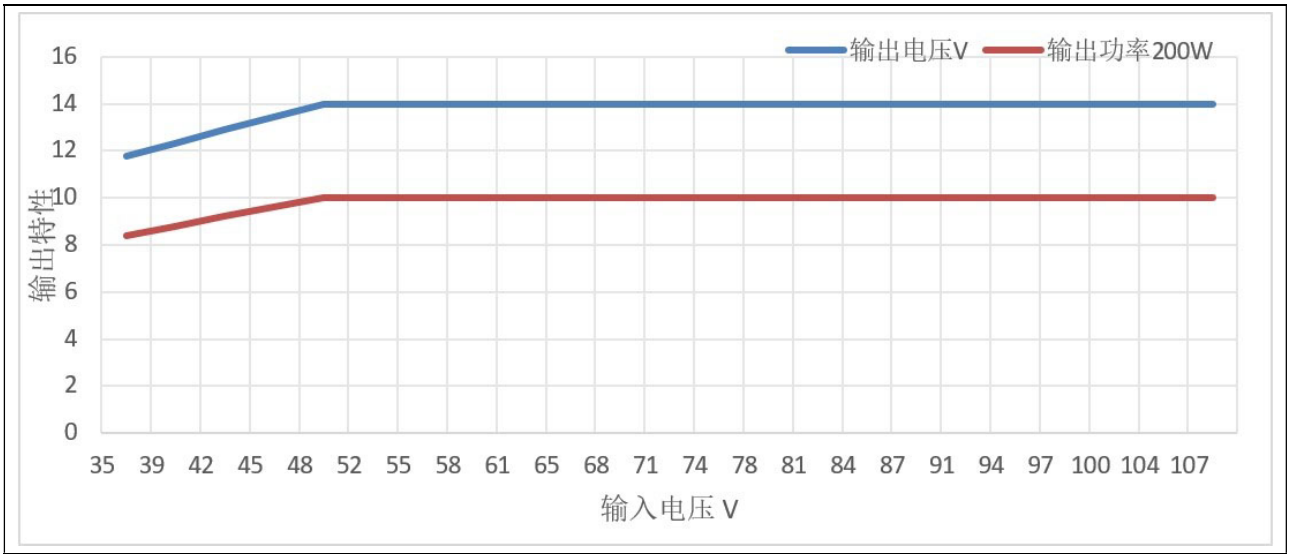

PGND
EARTH
硬件框图
防雷保护
输入软启动
母线电容
隔离DCDC功率转换
输出滤波
输出EMI
防反接保护
防反灌保护
输出端子及线束
EMI滤波
辅助电源系统
隔离DCDC控制系统
电池信号采样单元
EARTH
输入端子及线束
隔离
DSP控制系统
CAN通讯
软件框图
DSP控制系统
应用层程序20014271
CAN刷写
底层程序20014171
（串口ISP烧写）
USB转CAN通讯工具
PC端调试软件2001.exe

1. 3 Characteristic curve

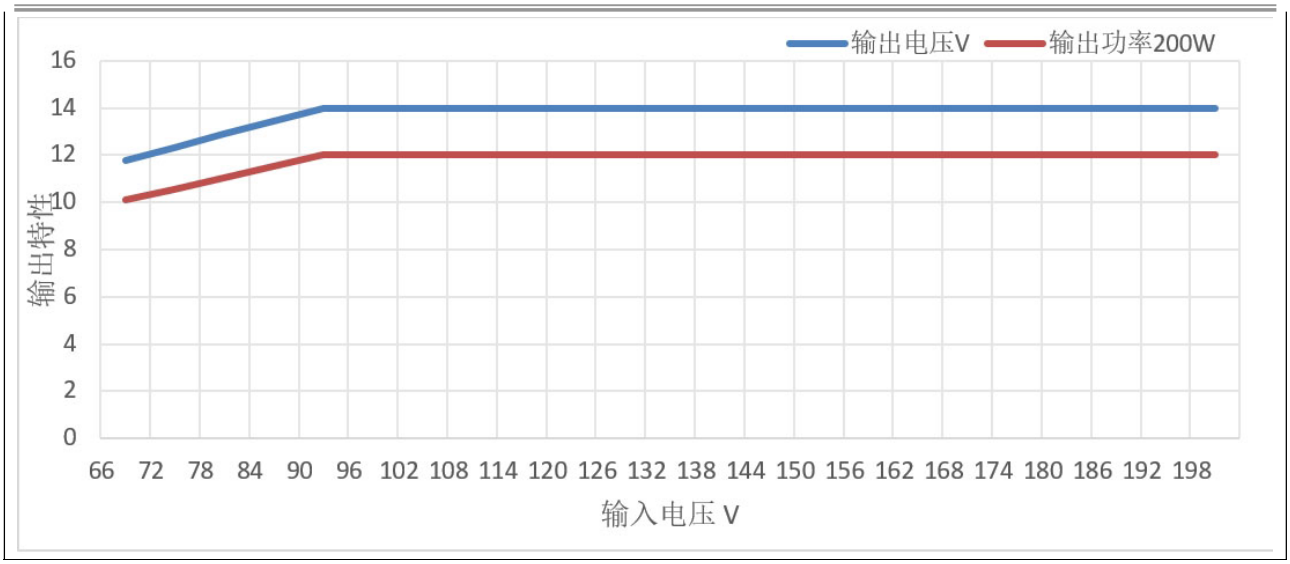
RD2P0048



RD2P0072



RD2P4144



RD2P4360

RD2P4540

RD2P4144-27

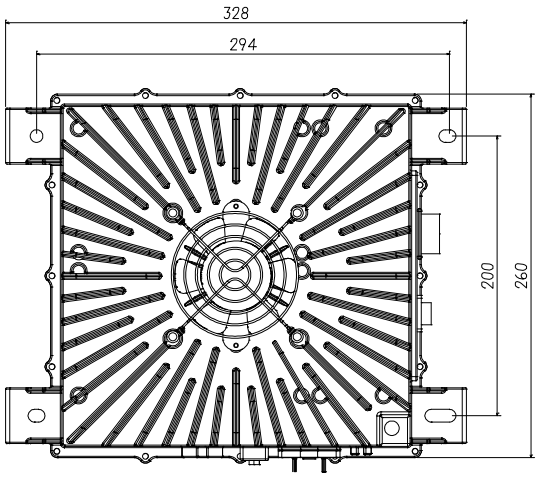
RD2P4360-27

RD2P4540-27

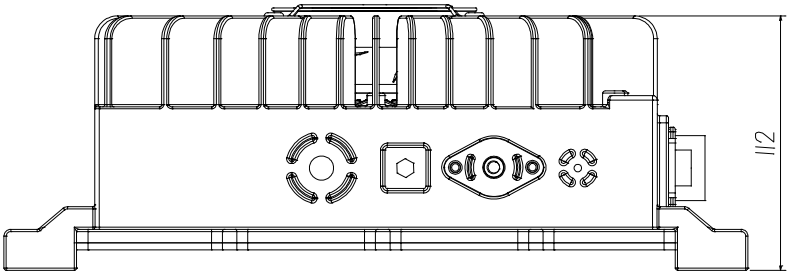
2 External dimensions and weight

2. 1 Product size

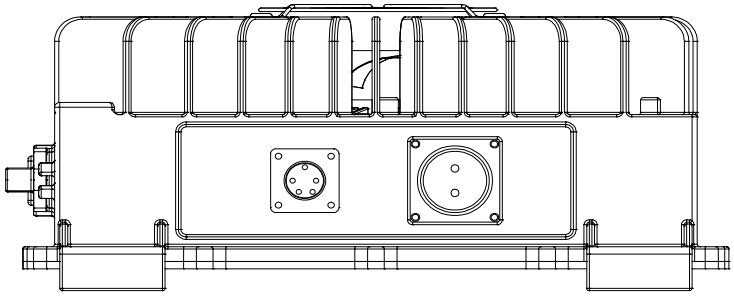
3D model data: RD2P00722 V1.2
vertical view



front view



side view

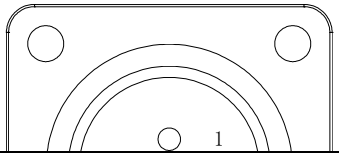


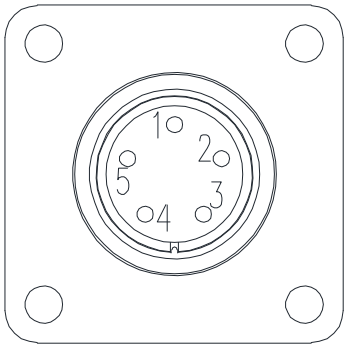
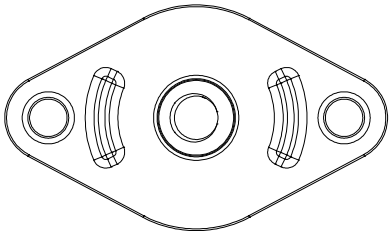
2. 2 Product weight

7.5Kg±0.3Kg

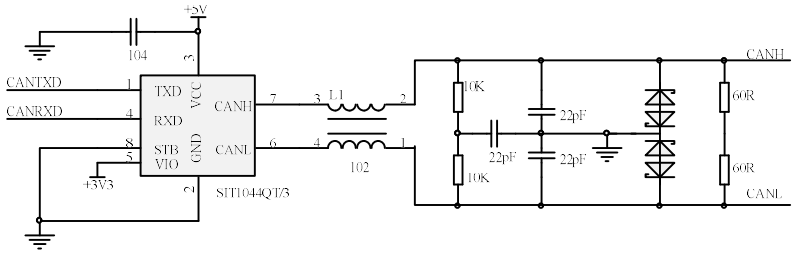
3 Definition of connectors and connection terminals

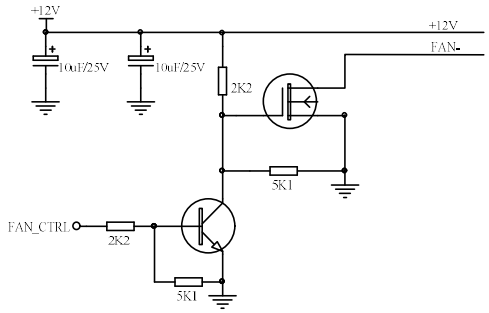
3. 1 Connector model and definition

type	Definition of connectors		Connector drawing
input WF28K2Z	Pin	definition	
	1	Input+	
	2	Input-	

<table>
<tr><td rowspan="2"></td><td colspan="2"></td><td></td></tr>
<tr><td colspan="2">Connector manufacturer</td><td>Guangdong Weipu Electric Appliance Co., Ltd</td></tr>
<tr><td></td><td colspan="2">Regarding the plugin model</td><td>WF28J2TE</td></tr>
<tr><td rowspan="7">signal
WF16K5Z</td><td>Pin</td><td>definition</td><td rowspan="6">  </td></tr>
<tr><td>1</td><td>CANH</td></tr>
<tr><td>2</td><td>CANL</td></tr>
<tr><td>3</td><td>12V+</td></tr>
<tr><td>4</td><td>GND</td></tr>
<tr><td>5-12</td><td>/</td></tr>
<tr><td colspan="2">Connector manufacturer</td><td>Guangdong Weipu Electric Appliance Co., Ltd</td></tr>
<tr><td></td><td colspan="2">Regarding the plugin model</td><td>WF16J5TE</td></tr>
<tr><td rowspan="8">output
FST5266BN-IP67</td><td>Pin</td><td>definition</td><td rowspan="6">  </td></tr>
<tr><td>A</td><td>Output positive pole</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td colspan="2">Connector manufacturer</td><td>Shanghai Huzheng Electronics Co., Ltd</td></tr>
<tr><td colspan="2">Regarding the plugin model</td><td>/</td></tr>
</table>

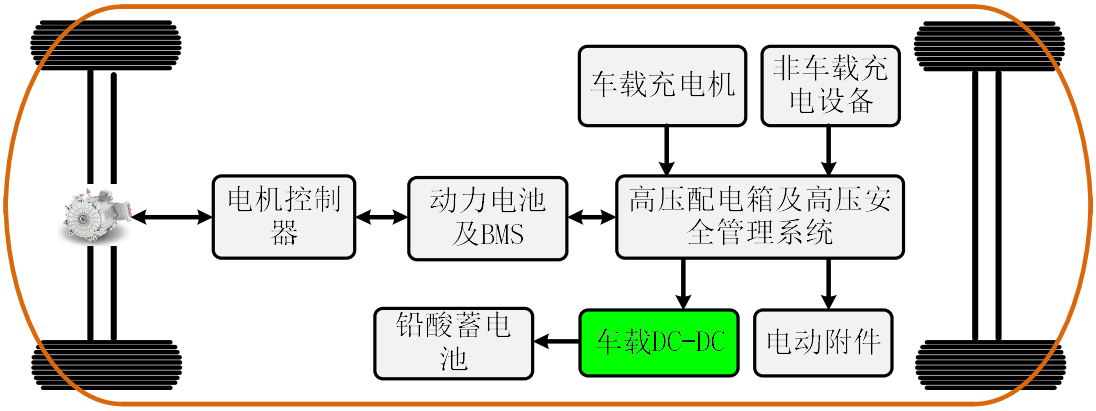
3. 2 Schematic diagram of signal interface

signal description	
can communication	

Fan drive	

4 User Guide

4. 1 Electrical connection diagram



4. 2 Product installation

Product part number	**RD2P0、RD2P4**	
product type	**Vehicle mounted DC-DC complete machine**	
mounting screw	Installation hole diameter	Φ10
	number	4
	Recommended screw models	M10 * 24 hexagonal combination screw

Install and fix this product

Align the installation holes, tighten the fastening screws, and secure the power supply.

Tightening distance requirements

During installation, use appropriate torque based on screw size, connection method, etc. Refer to the table below for details:

Specification and model		Tightening torque (torque range: ± 10%)/(unit: Kgf. cm)						
Large category	Subclass	Plastic - Plastic	Steel plastic Copper - Copper	General connection		High density connection		
				Steel - Steel	Copper cast aluminum	Steel - Steel	Steel cast aluminum	Steel aluminum

					Steel aluminum profiles Steel Copper		Steel Copper	profiles
Hexagon socket head cap 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	-

4. 3 CAN communication protocol

project	Technical indicators	remarks
Crystal oscillator tolerance	± 0.15%	Within the working temperature range
Communication speed	**Configurable through backend software to prevent loss in case of power failure**	Tolerance is ± 0.375 Kbit/s
Sampling point	The sampling point should be set at a location close to but no later than 7/8 of the bit time	
transceiver	The maximum transceiver "ring delay" (from transmission to reception) is 300 ns	CAN transceiver should comply with ISO 11898-2 standard
Termination resistor	**DC-DC CAN communication circuit communication defaults to no 120 ohm terminal resistance**	
Default CAN communication protocol	车载DCDC默认CAN控制通讯协议 V1.	

4. 4 Background Debugging Software Instructions

Product part number	**RD2P0、RD2P4**	
product type	**Vehicle mounted DC-DC complete machine**	
Backend software coding	2001 Setup V2.0.exe	
Communication method of backend software	can communication	Baud rate adjustable from 125K/250K/500K
Installation and usage assistance		上位机使用说明.pdf
Support CAN box Brand 1	1 Beijing Aitai USBCAN-2I	USBCAN Driver for Windows 10-amd64-1.0.1.exe

	2 Beijing Aitai USBCAN-I	
Support CAN box Brand 2	TBD	

4. 5 Troubleshooting and Confirmation

Fault phenomenon	Common causes of malfunctions	Troubleshooting
Power supply has no output	Abnormal high voltage input (none or reversed connection)	Check if the high voltage input is normal
	Abnormal 12V voltage input port (none, over/under voltage, reversed connection)	Check if the 12V voltage input port is normal
	Output circuit breaker	Check if the output connection is normal
DC-DC no message	The signal connector is not properly connected	Re plug and unplug the signal connector
	Reverse connection of CAN line	Adjust the CAN line sequence
	Communication protocol mismatch	Compare whether the protocol matches
	Baud rate mismatch	Compare whether the baud rate matches
The high-voltage input fuse of the distribution box is damaged Product reporting fault signal	Input short circuit	Check if the high voltage input is normal
	Input over/under voltage, output over/under voltage, over temperature, output short circuit/over-current	Check the input voltage and output for overcurrent/short circuit. Turn off the power and let it stand for 10 minutes. If the fault persists, please contact the manufacturer.
Overheating fault	Air cooled machine: Fan blockage or blocked air duct	Check the fan and air duct
	Water cooled machine: No coolant or coolant temperature too high	Check if the coolant is working properly

5 User Notice and Precautions

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

Warning:

It is strictly prohibited to disassemble the product for maintenance, debugging, or modification without authorization;

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

There is high voltage and high temperature inside the product. Please do not touch the internal components as it may cause electric shock or burns;

If there is any abnormal noise or odor from the power supply during use, please immediately turn off the input;

It is necessary to use connectors that meet the specifications to ensure that all plugs and sockets are securely connected. Loose connections may cause local heating and fire;

Please use the power supply within the technical parameter range. If used beyond the range, it may cause product damage;

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

Before installation, please confirm that the casing is intact and undamaged. If there is any damage, please replace it immediately or contact the manufacturer.

matters needing attention:

Confirm that the product input/output terminal and signal terminal are connected correctly according to the product manual; When wiring, please cut off the input power and do not plug or unplug connectors with power on;

This power input/output terminal requires an external fuse or other overcurrent protection device;

It is necessary to consider the potential electrical hazards at the output end of the product during use, to ensure that end product users do not come into contact with the product; Terminal equipment manufacturers must design corresponding protection schemes to ensure that there is no danger caused by accidental contact of power terminals by engineering personnel or tools during operation;

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

When power equipment is switched from a cold environment to a warm environment, condensation may cause leakage hazards, so grounding requirements must be strictly followed;

Only qualified personnel can connect the equipment to the power source.

Cut off the power supply and stop the machine for five minutes to allow sufficient discharge time for the capacitor before maintenance can be carried out on the power equipment.

Pay attention to safety: Avoid touching places with safety warning signs and high-voltage signs with your hands to prevent electric shock and burns.

6 Reference standards and specifications

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

GB/T 17626.2-2006 Electromagnetic Compatibility Testing and Measurement Techniques - Electrostatic Discharge Immunity Test

GB/T 17626.3-2006 Electromagnetic Compatibility Testing and Measurement Techniques - Radio Frequency Electromagnetic Field Radiation Immunity Test

GB/T 17626.4-2008 Electromagnetic compatibility - Testing and measurement techniques - Electrical fast transient burst immunity test

GB/T 17626.5-2008 Electromagnetic Compatibility - Testing and Measurement Techniques - Surge (Impulse) Immunity Test

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

GB/T 18384.3-2015 Safety Requirements for Electric Vehicles Part 3: Personnel Electric Shock Protection

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

GB/T 18487.2-2001 Conductive Charging System for Electric Vehicles - Connection Requirements between Electric Vehicles and AC/DC Power Sources (doc)

GB/T 18487.3-2001 Conductive Charging System for Electric Vehicles - AC/DC Chargers (Stations) for Electric Vehicles (doc)

GB/T 18488.1-2015 Drive Motor Systems for Electric Vehicles Part 1: Technical Conditions

GB/T 18655-2010 Measurement, ship and internal combustion engine radio disturbance characteristics - Limits and measurement methods for protecting on-board receivers

GB/T 19826-2014 General Technical Conditions and Safety Requirements for DC Power Supply Equipment in Power Engineering

GB/T 21437.2-2008 Road vehicles - Electrical disturbances caused by conduction and coupling - Part 2: Transient electrical conduction along power lines

GB/T 2423.1-2008 Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test A: Low Temperature

GB/T 2423.2-2008 Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test B: High Temperature

GB/T 2423.3-2006 Basic Environmental Testing Procedures for Electrical and Electronic Products - Test Ca: Constant Damp Heat Test Method;

GB/T 2423.4-2008 Basic Environmental Testing Procedures for Electrical and Electronic Products - Test Db: Alternating Damp Heat Test Method

GB/T 2423.5-1995 Environmental Testing for Electrical and Electronic Products, Part 2: Test Methods/Test Ea and Guidelines: Impact

GB/T 2423.6-1995 Environmental Testing for Electrical and Electronic Products, Part 2: Test Methods/Test Ea and Guidelines: Collision

GB/T 2423.8-1995 Environmental Testing for Electrical and Electronic Products, Part 2: Test Methods/Test Ed: Free Drop

GB/T 2423.10-2008 Environmental Testing for Electrical and Electronic Products, Part 2: Test Methods/Test Fc and Guidelines: Vibration (Sinusoidal)

GB/T 2423.22-2012 Environmental testing for electrical and electronic products, Part 2: Test N: Temperature variation

GB/T 24347-2009 Electric Vehicle DC/DC Converter

GB 4208-2008 Degrees of Protection Provided by Enclosures (IP Code)

QC/T 413-2002 Basic Technical Conditions for Automotive Electrical Equipment

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

7 Packaging, transportation, and storage

package

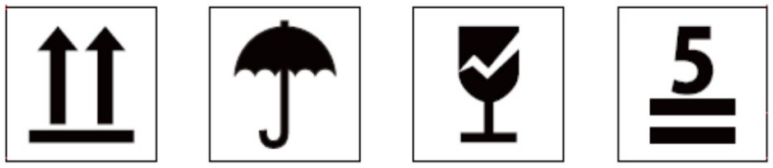
The product packaging information is as follows:

Packaging quantity and box information	Single unit net weight Kg	**7.5Kg**
	Outer dimensions of packaging box mm	**390*295*157**
	Quantity of complete machines per box	**1**

	Total weight after packaging Kg	**9Kg**

The packaging box has the product name, product model, and manufacturer name; The technical documents supplied with the product in the packaging box should include the product's factory certificate of conformity.

The product should be transported in a sturdy packaging box, and the outside of the box should comply with relevant national standards and have signs such as "Handle with Care" and "Moisture proof". The packaging box containing the product is allowed to be transported by various means of transportation. During transportation, direct rain, snow, and mechanical impact should be avoided. And attach the transportation mark, as shown in Figure 7-2 below:



shipping mark

keep in storage

When the product is not in use, it should be stored in the packaging box. The warehouse environment temperature should be -10-40 ℃ and the relative humidity should not exceed 80%. Harmful gases, flammable, explosive products, and corrosive chemicals are not allowed in the warehouse, and there should be no strong mechanical vibration, impact, or strong magnetic field effects. The packaging box should be placed at least 20cm above the ground and at least 50cm away from walls, heat sources, windows, or air inlets. The storage period under these regulations is generally 2 years, and re inspection should be conducted after exceeding 2 years.

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

8 Version Updated Record

date	version	Reason for Change	notes
2021/03/13	V1.0		
2021/11/07	V1.1	Update plugins	
2022/12/12	V1.2	Update the shell	
2024/05/06	V1.3	Update plugins	
2024/09/27	V1.4	Add characteristic curve	