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	Product model		Edition	A0.0


GB Liquid (oil)- cooled High-power DC Charging Connector Technical Specification

Edit / Date Liu Yongming, 2023.12.19

Review / Date

Approval / Date

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Changes and revisions

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1. Introduction of the high-power DC charging connector

1.1. Product model and interface standard:

The internal model of the product is YGC 1352A-EV-P9P-600XL1, and the interface standard of liquid (oil) cooled DC charging connector meets the requirements of GB / T 20234.3-2023 standard.

1.2. Introduction of product advantages

With the development of new energy vehicles, range and charging time has become the two key factors restricting the development of new energy vehicles, and with the increase of range, battery capacity, charging time will be extended, in order to improve the practicability of new energy vehicles in society and convenience in daily use, high-power charging will be an effective way to shorten the charging time.

Compared with the conventional national standard DC charging connector, the product has a rated voltage (1000V) and the current is larger (depending on the specific charging strategy, the continuous maximum current is 600A, the charging power is larger and the charging efficiency is higher, which can truly solve the charging anxiety of new energy vehicle users.


Compared with the conventional DC charging connector, YGC 1352A series high-power DC charging connector, the weight of the connector line is reduced by about 50% and the cable is softer, which can be easily operated with one hand, bringing users more extreme charging experience.

1.3. Technical parameters of the charging connector

1.3.1. Electrical parameters

Port definition	DC±	PE	A±	CC1	CC2	S±
Wiring specification (mm ²)	30	6	1.5	0.5	0.5	0.5
Contact Terminal Diameter (mm)	Φ12	Φ6	Φ3	Φ3	Φ3	Φ3
Rated Operating Voltage (DC)	1000V	0—30V	0—30V	0—30V	0—30V	0—30V
rated current	100A(when the	/	10A	2A	2A	2A

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	liquid cooling system is not working)					
Maximum continuous working current	600A (line length and thermal management capacity)					
outside diameter of cable	φ 30mm ± 0.6 (ground wire 6mm ² , auxiliary power supply 1.5mm ²)					
The weight of the connector	<1.1 Kg (without cable)					
insulation resistance	2000 MΩ between DC positive and negative terminal and PE terminal (test voltage 1000V D C)					
Pressure withstand (50Hz, AC)	Test after plug wiring: ① Resistance voltage between DC + and DC-4500 V DC 1min; ② DC +, DC-and PE, S +, S +, A +, A-resistance voltage 1500 V DC 1min; ③ PE, resistance voltage of 1500V D C 1min between S +, S-, A + and A-; ④ S +, S-, CC1, A +, A-two resistance voltage of 1500V D C 1min;					

Note: The outer diameter and the core area of the cable can be designed and customized according to the actual needs of customers

1.3.2. Mechanical properties

Service life: 10000 times

Plug and pull force: 120N

Lock-in force: 200N

1.3.3. Environmental parameters

Level of protection before insertion: IP54

Grade of protection after insertion: IP55

High-voltage electrical part: IP67

Ambient temperature: -30°C - - + 50°C


Flame retardant grade of insulation materials: UL94 V-0

1.3.4. Materials

Housing: engineering plastics (temperature resistant PA66 or temperature resistant PC)

Terminal: copper, surface silver-plated

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Seal parts: silicone rubber

1.4. Appearance of the charging connector



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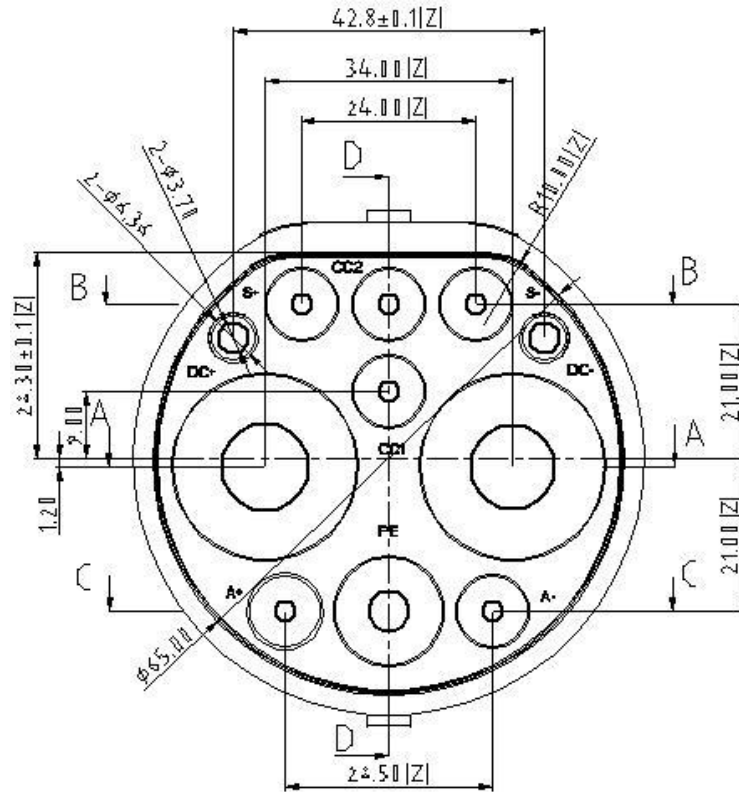



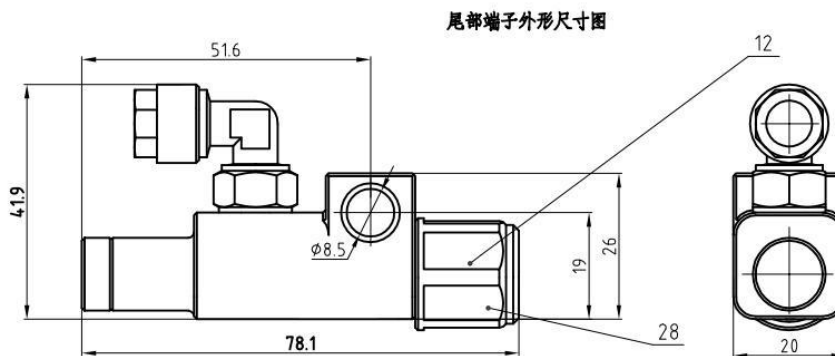
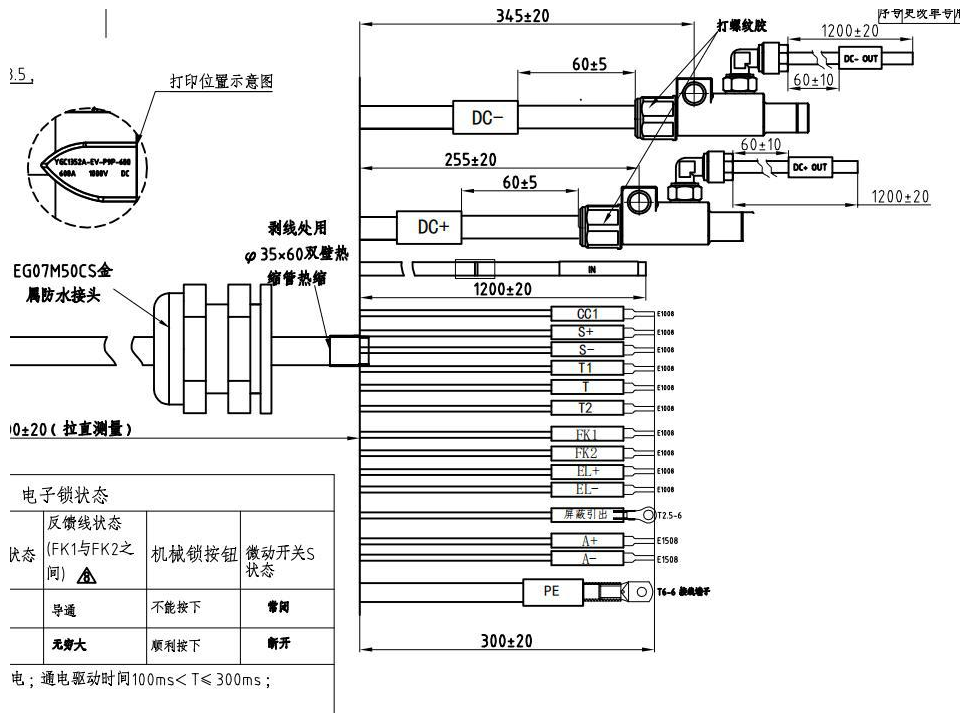
Figure 1.1 Appearance of interface liquid (oil) cooled DC charging connector (GB / T 20234-2023)

1.5 Interface definition

The following figure shows the diagram of the power copper row interface, signal wire harness interface and cooling line interface between the connector line and the pile end. The following structure is generally customized design.

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二、Liquid medium cooling unit (HPC cooling module assembly)

2.1.1 Overview

The HPC cooling module assembly (HPC-CU) is used for intelligent high-power charging (HPC) technology. The heat dissipation power of 3.0KW can bring the charging current up to 600A, while ensuring the safe and stable operation of the combined charging connection system (CCS). The core technology of this product is to provide coolant with appropriate temperature and flow to CCS under full working conditions, so as to ensure that the temperature of CCS relative to the ambient temperature is not more than 50K ($\Delta T_{max} = 50K$) during charging.

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2.1.2 Principle

HPC CCS Charging can transport more than 600A charging current, the use of conventional charging technology requires the use of heavy cables or often lead to CCS overheating, in order to facilitate charging operation, intelligent HPC charging technology adopts liquid cooling system, the system HPC cooling module assembly uses environmental protection cooling medium to provide cooled source to CCS, easy to maintain. The cooling medium can simultaneously cool the cable and the DC power terminal of the charging connector. Charging connector terminal has excellent thermal conductivity, so it can also act as a radiator in the charging process. A closed loop connecting the HPC cooling module assembly inlet and outlet tube to the CCS outlet tube and inlet tube, The cooling medium is driven by the circulating pump, CCS Transfer of the generated heat to the circulating cooling medium, The cooling medium then transfers the heat to the radiator, The radiator then achieves continuous heat dissipation through an electronic fan blower, In this process, The module collects real-time inlet and outlet liquid temperature through the sensor, Adjust the rotational speed of the pump and fan according to the collected temperature, Realize the real-time adjustment of the heat dissipation power, Put the CCS within a suitable working range, So as to ensure the safety and stability of HPC charging pile.

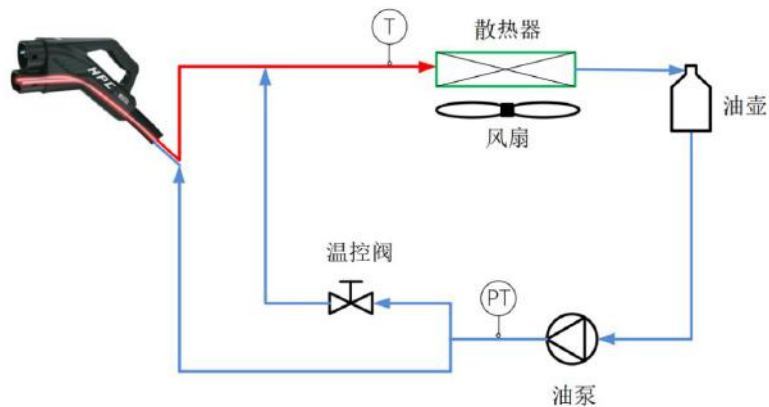


Figure 1. Schematic diagram of the high-power charging and cooling system

2.1.3 Product diagram of high-power charging liquid cooling system (W)



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Figure 2. Product diagram of the liquid-cooling system

2.2 Technical parameters

Table 1: Technical parameters table

size	435×155×410(mm)	Heat dissipation power	3.0KW@4L/min .700m3/h
input voltage	DC12V	power	≤200W
cooling medium	Dimethyl silicone oil Di-tert-butyl-p-methylphenol TF8016 Fuchs Coolant Shell E4 (-40~85°C)	Cooling flow	4L/min@450Kpa
Water supply pressure	0.6Mpa	working pressure	0~0.7MPa
working temperature	-40°C-50°C	Expansion pot volume	1.5 L
noise	≤60dB (A)	levels of protection	IP 68
weight	7Kg	communication mode	Based on the Modbus 485 / 232
control method	full-automation	life span	25000h

2.3 Installation dimensions

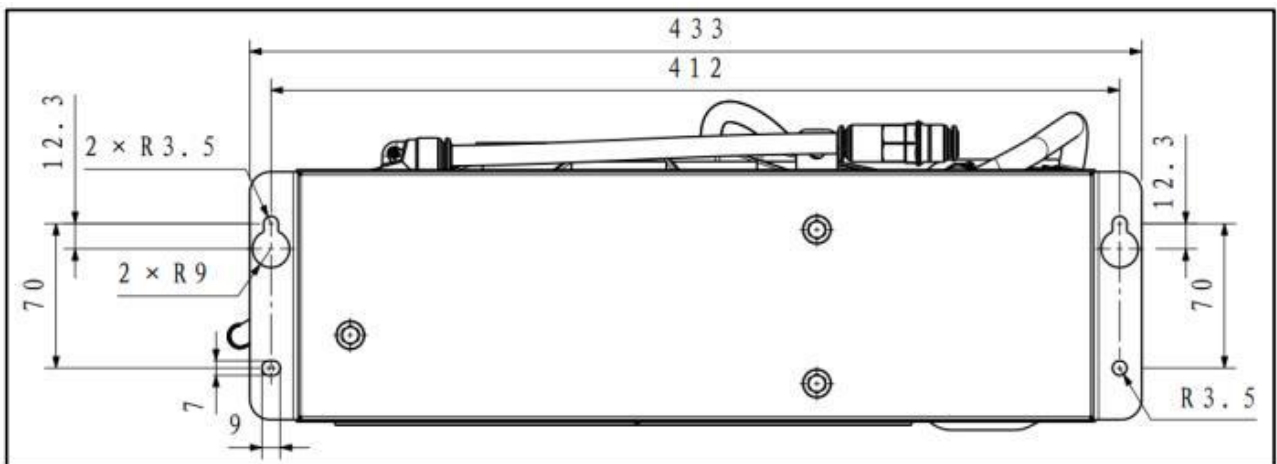



Figure 3 Installation dimensions of bottom plate (optional)

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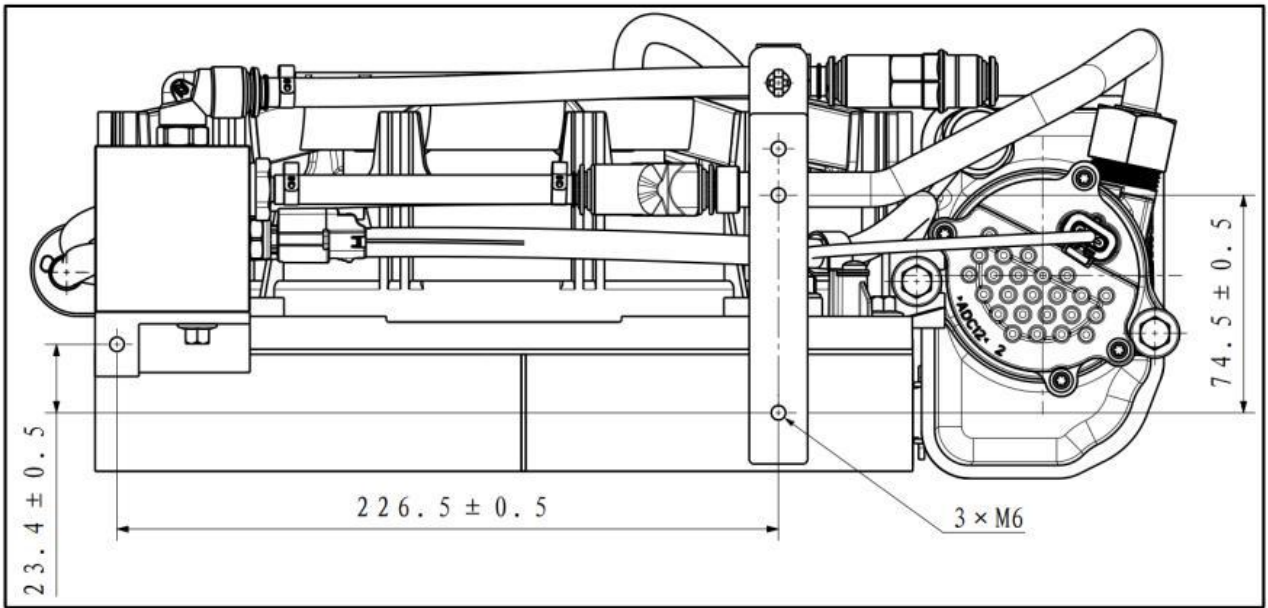


Figure 4 Installation dimensions of the bottom plate (customizable)

2.4 Functional features

4.1 Vehicle standard grade products

Design and development, component selection, experimental verification, manufacturing process and quality control are all developed in accordance with the vehicle specification level IATF16949 system.

4.2 IP68 protection

Fully prevent dust from entering the internal core components, in not more than 1 m deep water immersion, clean can work normally.

4.3 Miniaturization

Lightweight, integrated, and small in size.

4.4 Energy-saving


According to the charging condition, the output power of the fan and water pump is automatically adjusted to achieve energy saving.

4.5 Automation

Automatic control program (standby mode, automatic mode, sleep mode, fault mode, etc.), can prolong the life and save energy.

2.5 Block diagram of electrical control principle

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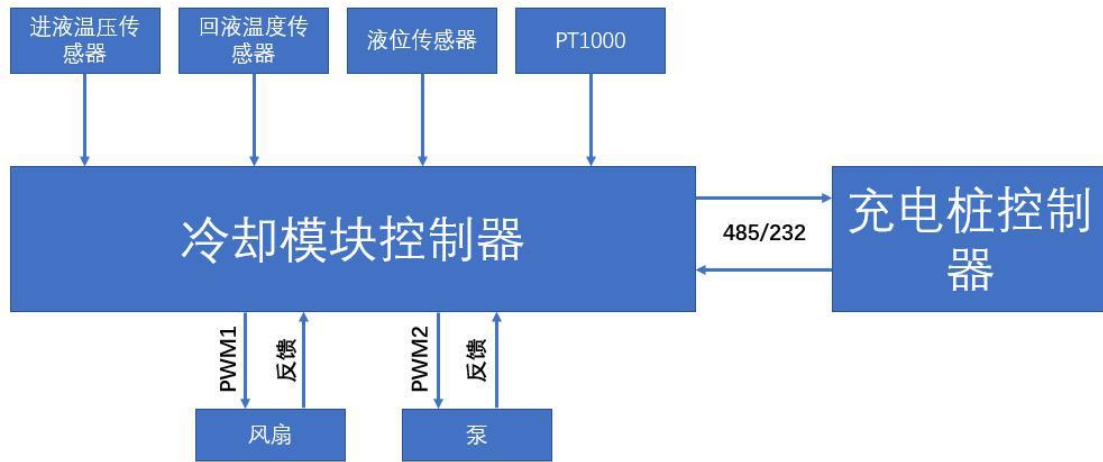


Figure 5 Schematic block diagram of electrical control

The functions of the controller include: collecting the sensor information, collecting the abnormal fault information, communicating with the charging pile end, and adjusting the pump and fan speed.

1) Collect the sensor information

The temperature and pressure of the inlet fluid and the temperature of the return fluid.

2) Collect the abnormal fault information

Collect fan fault, pump fault, temperature sensor fault, temperature and pressure sensor fault, high temperature, high pressure, low pressure, high level and low level.

3) Charging pile terminal communication

The controller sends the collected normal information and the abnormal information.


For example, receive information about "whether to be charging", "whether to limit current charging", "whether debugging and maintenance", and the temperature value of charging pile collection, etc.

4) Control the fan and the pump

The controller compares the collected current temperature with the set upper temperature limit (such as 90°C) (e. g., the current inlet liquid temperature and the current inlet liquid temperature upper limit), uses the control algorithm to obtain the target speed of the fan and pump, and then adjusts the pump speed and fan speed.

2.6 Definition of the wiring pin

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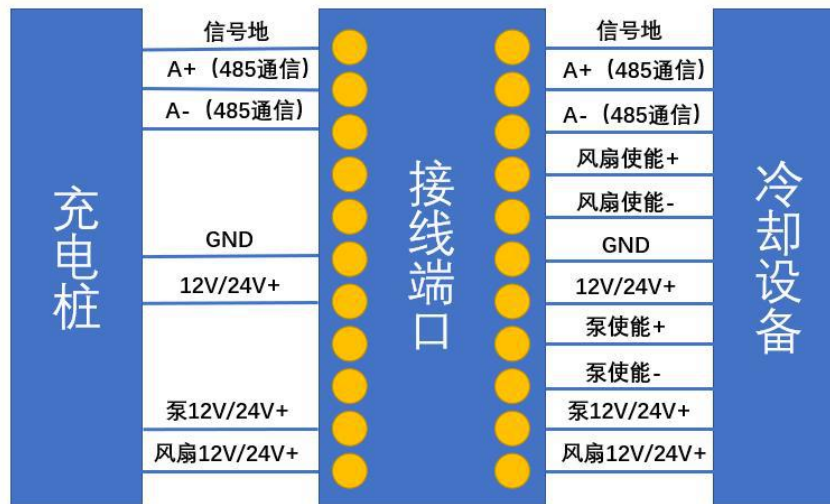


Figure 6. Definition diagram of the wiring pin


Table 2 Definitions of the wiring pins

order number	name	Cross-sectional area of the wire (mm ²)	Terminal model	remarks
1	Signal ground	0.5	E0508	CI
2	A + (485 communication) / 485-A	0.5	E0508	CI
3	A- (485 communication) 485-B	0.5	E0508	CI
4	Fan Enable +	0.5	E0508	Fan power control
5	Fan enabling-	0.5	E0508	Fan power control
6	12V/24V+	1.0	TVS1.25-4	Controller power supply
7	GND	2.5	TVS2-4	Controller power supply
8	Pump enabling +	0.5	E0508	Pump power control
9	Pump enabling-	0.5	E0508	Pump power control
10	Pump 12V / 24V +	1.0	TVS2-4	Pump power supply
11	Fan: 12V / 24V +	1.0	TVS2-4	Fan power supply

2.7 Safety precautions

This product takes the insulating liquid as the cooling medium, if unauthorized replacement may lead to the decline or damage of the sealing structure of the cooling module, or even cause the damage of the connector line.

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The lid of the expansion pot is filled with cooling medium and opened when necessary. In other cases, the lid is in a tight state to prevent dust, small particles, water and other substances from entering, so as to avoid blockage or safety accidents.

It is forbidden to touch the hand in the product work to prevent the fan from injuring the hand.

Do not touch the radiator during the product work to prevent scalding.

2.8 Cleaning and maintenance

Clean up only when the product is not energized.

Clean the electrical parts and the remaining parts with a dry cloth.

Do not use detergent, water connector, steam connector with corrosive effect for cleaning.

Most of the product parts are thermoplastic plastic, do not make the product is impacted by external force, so as not to affect the use.secret

During the use of the product, the expansion pot liquid level should be checked regularly to avoid the failure of the liquid level sensor

Product damage and safety accidents caused by the alarm. The recommended inspection period is once a quarter.

Check the product regularly for leakage.

3. Matters needing attention


3.1. Product supplementary description

1. The above test data do not represent the temperature rise data of all models of liquid-cooled charging connectors, but should be comprehensively considered according to the wire diameter, cable length, the power of the radiator matched by the system and the pump (the flow of coolant circulation) (our company will provide full technical support);
2. The product conforms to GB / T 20234.1-2023;
3. Liquid-cooled cable is customized cable, no standard cable, its performance (such as mechanical strength, etc.) can refer to the relevant provisions of GB / T 33594-2017, IEC 62893-4-1 / 2, but temporarily cannot pass the certification;

3.2. Notes for use

1. Charging connector coolant is recommended to choose insulating liquid such as Shell E4 and TF8016 Foss coolant;

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2. Unfixed accessories model of the heating management system (such as oil pump, radiator, etc.), conduct comprehensive analysis and experiment for power matching of the accessories according to the customer's current carrying requirements, charging curve, charging connector line length and other requirements;

3. It is recommended to use the connector line manufacturer to specify the thermal management system (pump, radiator, temperature sensor, control program, etc., integration), and also to provide the cooling system matching and selection support;

4. The rated working pressure of the connector line is 5Bar, meeting the minimum flow rate of thermal management is 4L / min;

5. Other cooling medium other than the coolant specified by the manufacturer is prohibited, and the mixing of the cooling medium is prohibited.

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