Hudson Company eBOLD Pure Electric Series Product Repair Manual

2024.2

Catalogue

Power battery system

This description is applicable to the normal operation and daily maintenance of the energy storage device of the CATL power battery system installed in the eBOLD model.

Read the operating manual for the battery energy storage system unit before operating it. When using the battery energy storage system unit, the attention should be paid to the following matters. If the following use conditions are violated, the energy storage device of the battery system may be damaged or dangerous by the tested battery system.

a) The energy storage unit of the battery system is selected according to the heating or independent cooling system configuration, and the available ambient temperature is -35℃ ~55℃;
b) Before using the battery system energy storage device, check whether all the high and low voltage cables are in good condition. If damaged, they should be replaced before use;
c) Before using the battery system energy storage device, must confirm whether the assembly is installed in place and whether the contact is good;
d) If the energy storage device in the battery system is assembled or repaired, it is prohibited;
e) Non-designated maintenance authorized personnels are forbidden to remove the energy storage device of the battery system to avoid danger.

Note
● The legend in this manual for use may differ from the product you order. ● Due to product upgrades or specification changes and to improve the convenience and accuracy, the content of this manual will be timely changed ● To order the manual for use due to damage or loss, please contact the nearest office or directly contact the department of customer service center. ● If you still have some unknown problems when use, please contact our customer service center.

Catalogue

1. Safety information and precautions

1.1 Note for battery system energy storage device installation

a) Operators must pay attention to safety, and must wear insulation gloves before installation to avoid electric shock.

b) The installation tools must be insulated, during the installation process, it is important to avoid short circuits caused by connecting tools, wires, and conductive objects to the battery or battery energy storage system.

c) During the installation process, attention should be paid to the polarity of the battery, positive (+) identifying the battery positive electrode, negative (-) identifying the battery negative electrode, and ensure the energy storage device pole of the battery system is correctly connected to the whole vehicle equipment.

d) Connector must be safe and reliable to not loosen.

e) All connection points must be ensured without contact with the outer box or other parts.

f) Measure and record the total voltage of the energy storage system and confirm that the energy storage system is connected to the vehicle equipment.

g) After the connection is completed, it must be measured and confirmed point by point.

h) Note all warning signs on the battery and do not tear or damage the warning labels.

i) Do not knock or throw, trample the battery or directly weld the battery or puncture the battery with nails or other sharp tools.

01

It is strictly prohibited to touch the positive and negative poles of the battery box with both hands at any time.

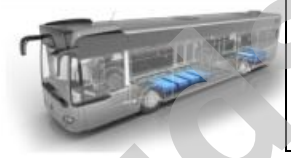
02

Require maintenance personnel from CATL authorized maintenance agencies to hold local low-voltage electrician certificates and CATL authorized maintenance certificates in order to carry out maintenance operations

03

When operating and maintaining the battery system, it is necessary to wear insulated gloves and it is strictly prohibited to wear metal accessories such as watches

04



When cleaning vehicles, high voltage components should be avoided to avoid adverse consequences from contact with water

05

It is strictly prohibited to engage in behaviors such as squeezing, piercing, or burning batteries that damage the battery system

06

The working environment of the battery system should be free of corrosive, explosive, and insulating gases or conductive dust, and kept away from heat sources

2. Storage, Repair and Maintenance of Battery Energy Storage System

1.2.1 Basic Requirements for Storage, Repair And Maintenance

a) According to the battery characteristics, the battery pack should meet the environmental conditions during the storage process to maximize the protection of the battery.

b) During battery pack storage and transportation, there should be appropriate protection to maintain the 60% SOC level to ensure no short circuit and no liquid will enter the box and ensure that the battery pack is not immersed in the liquid (such as water, oil, etc.).

c) The battery pack shall be stored under incomplete charging condition. Part of the capacity will be lost due to self-discharge during transportation or storage period, please charge the battery before use.

d) During the long-term storage, in order to make up for the self-discharge during the period, please replenish the electricity. Store at room temperature and charge once for half a year.

e) If not in use, store at-20℃ ~45℃ (short term 1 month) or 0~35℃ (long term greater than 3 months) and dry (storage humidity ≤70%), in a clean and well-ventilated warehouse.

f) f) During battery pack storage, the charged amount should be: 25% ≤ charged amount ≤ 60%. If the battery level is below 25%, it needs to be recharged. During storage, supplementary electro activation should be performed at least once every 6 months. The activation steps are as follows:

- Constant current charging, constant current 0.5C, upper limit voltage n*3.65V (n indicates the number of series, single cell protection voltage is 3.65V);
- Leave it aside for 30 minutes;
- Constant current discharge, constant current 0.5C, the lower limit voltage n*2.5V (n indicates the number of series or the protection lower limit voltage according to the BMS system);
- Leave it aside for 30 minutes;
- Constant current charge, constant current 0.5C, upper limit voltage n*3.65V (n indicates the number of series, single cell protection voltage is 3.65V); charge for 1h.

g) Check the total pressure and the highest and lowest pressure difference levels of the energy storage device in the battery system once every six months. Find problems and instant maintenance processing.

h) During the loading and unloading process of the battery system energy storage device, it should be handled gently and strictly prevented from falling, rolling, and heavy pressure. Inventory battery packs should not be inverted or placed horizontally, and mechanical impact or heavy pressure should be avoided. It is strictly prohibited to expose the battery energy storage system to direct sunlight or rain. To ensure the normal operation of the battery energy storage system, daily maintenance and upkeep must be carried out. In order to ensure the performance and lifespan of the battery system energy storage device, in addition to maintenance and upkeep, it is necessary to regularly inspect the operating vehicles. And carry out repair and maintenance according to the corresponding form record.

.2.2.1. Repair and Maintenance

In order to ensure the normal operation of the energy storage of the battery system, it is necessary to repair and maintain the operating vehicles regularly, park the vehicles in a spacious, smooth and safe site, and make records according to the corresponding form.

a) everyday use

- Observe the instrument before leaving the car every day to confirm that the battery system is normal, no alarm information, and the power is less than 30% should be charged in time.
- It is recommended that the daily cumulative charging power should not exceed 1.5 times the rated power, and automatic full charging should be performed at least once every three days.
- For vehicles with natural cooling battery system, the less the charging frequency in summer, the better. It is suggested that one charging can meet the operation requirements of one day.
- Before not using for a long time (continuous parking for more than 15 days), the SOC should not be lower than 40%, maintain ventilation, dryness, avoid direct sunlight, rain, and keep away from heat sources. And ensure that the battery is fully charged once a month.
- Must use charging stations that comply with national standards, and when using the "automatic charging" function during charging, the use of "manual charging" is strictly prohibited, and it is strictly prohibited to pull the charging gun when carrying a load.

b) Battery energy storage system monthly repair and maintenance

Number	Maintenance content	Method of Operation	Note
1	Maintenance, repair, and cleaning	Clean the outside of the battery pack (mainly connector and connector) to keep the battery pack in a dry environment to the maximum extent.	When cleaning stains, avoid the nozzle and avoid water or liquid entering the battery pack.
2	Check wiring terminals, connectors, and MSD	Wear insulation gloves to check whether the wiring terminals (connector) and MSD of the battery pack are loose, or the locking mechanism fails	Be careful not to directly contact the conductive core of the connector with both hands, and try to avoid touching the metal parts of the car body
3	Information troubleshooting of battery energy storage system	Check whether the total battery voltage, individual temperature extreme value, individual voltage extreme value, total current, and SOC information are normal and record them in the combination instrument menu interface	If any abnormal display of voltage, temperature, current, SOC, etc. is found, it must be dealt with in a timely manner, and the vehicle cannot be operated with defects

4	Check if there are any fault codes in the system	Key ON gear, under the normal working interface of the instrument combination, check whether the instrument displays the fault code	If any code is found, the corresponding module fault should be checked according to the code table in time, and the vehicle should not be allowed to run with disease
5	Fully charge the vehicle	SOC value is below 20% (reasonable arrangement before maintenance), fully charge the vehicle at once	Check whether the charging and SOC calibration are normal

c) Annual repair and maintenance of battery energy storage system device

order number	Maintenance content	method of operation	Note
1	High and low wire harness and connector	The high and low voltage wiring harness and connector of the battery system shall not be bruised, damaged or loose.	1. Before performing the inspection action, to ensure personal safety, please be sure to wear insulated shoes, insulated gloves, protective goggles, and protective equipment. 2. If any abnormality is found in the inspection, please contact our after-sales service department. Do not remove the box for repair without authorization.
2	Battery box, high and low voltage box	Battery box and high and low pressure box should be free of sludge, crack, deformation, peculiar smell, and swelling.	
3	Battery box protection safety valve	The appearance of the air pressure balance valve or explosion-proof valve in the battery box should be undamaged	
4	Manual Service Disconnect MSD	Manual Service Disconnect MSD handle and the inside and outside of the base shall be free of ash layer and stains.	

5	Fixing battery box and high and low voltage box	The fixing bolts shall be fastened without loosening.	
6	Cooling system water tank liquid level (if equipped)	Check whether the liquid level of the expansion tank is normal. If insufficient, please fill fluid, and then check whether the water circulation is normal	For models equipped with water-cooled unit, if the average battery temperature is 52℃ for 1h, which is an abnormal situation, please check the water-cooled unit as required.
7	Cooling unit fan (if equipped)	Check whether the entrance of the air duct of the unit is blocked with garbage. If foreign matter is found, clean up in time and wipe the filter with a clean cloth	

d) For the 10-year warranty period project, the battery system must be fully tested for the air tightness test in the fifth and eighth years of the use period. Please contact CATL after-sales service department or the service agent for help.

■ If users do not perform regular and comprehensive maintenance as required, there may be potential hazards such as box deformation, sealing failure, fastener connection failure, wire harness damage, and poor battery consistency caused by improper use or other uncontrollable factors that have not been detected and dealt with in a timely manner, leading to shorter driving mileage, functional failure, and even safety accidents, causing greater property losses to users.

1.3 Disclaimer

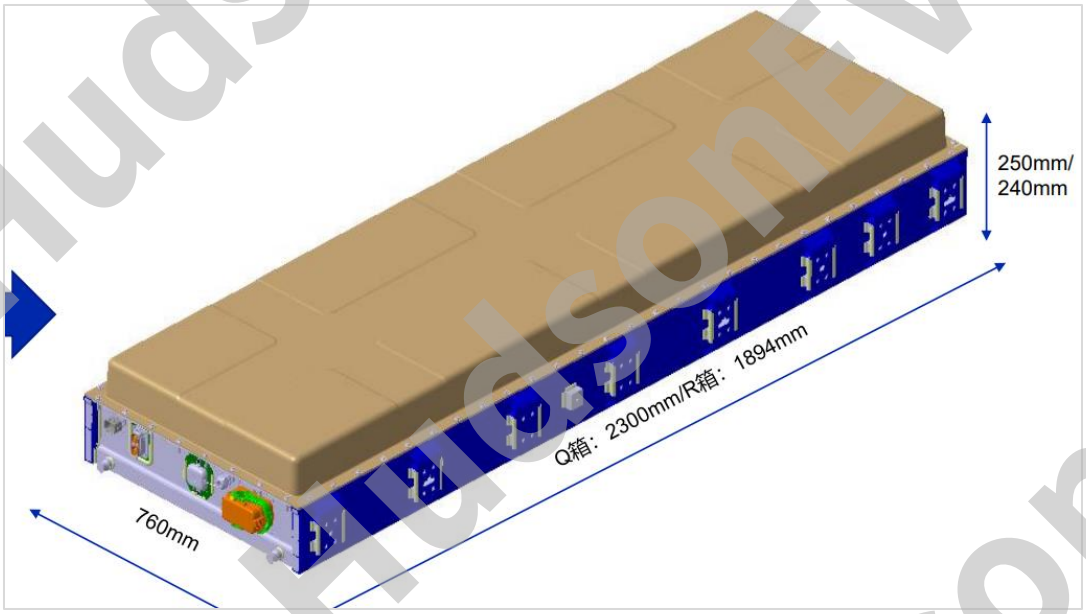
The battery system energy storage device belongs to high-voltage energy storage equipment and hazardous materials. Nonprofessionals and improper operation and use may cause serious consequences such as electric shock, combustion, and explosion. The installation and maintenance of battery system energy storage devices must be operated by professional technical personnel, and their use must strictly comply with relevant safety regulations. Nonprofessionals are strictly prohibited from installing and repairing battery system energy storage devices, as well as excessive abuse. The installation of battery system energy storage devices must be carried out under the guidance of our after-sales professionals, otherwise our company will not be responsible for any consequences such as battery system energy storage device failure.

We are not responsible for any damages caused by fire, uncontrollable natural accidents, intentional or negligent use by users, misuse, or other abnormal conditions of use.

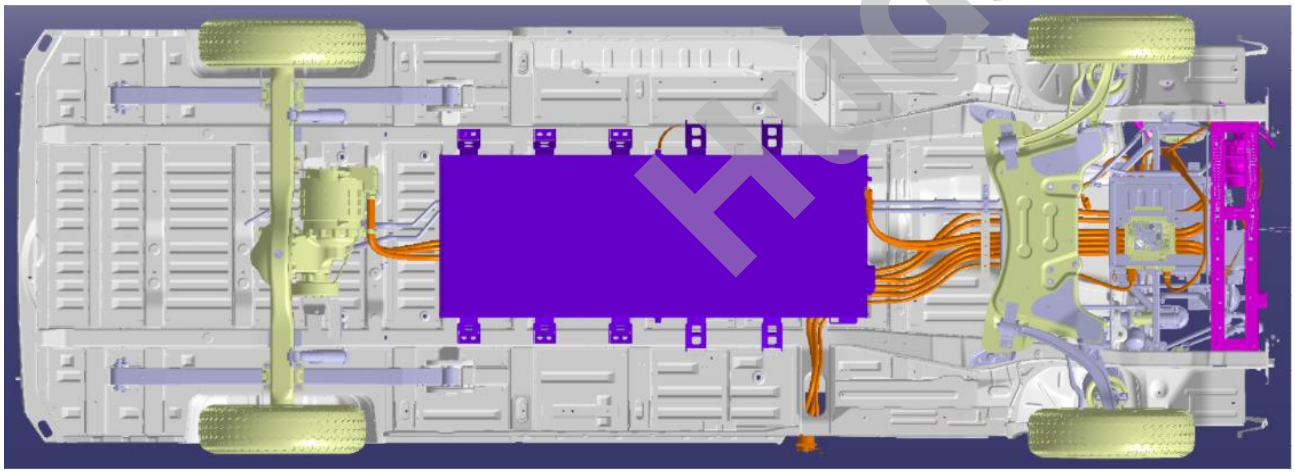
2. Product information

1.2 Product profile

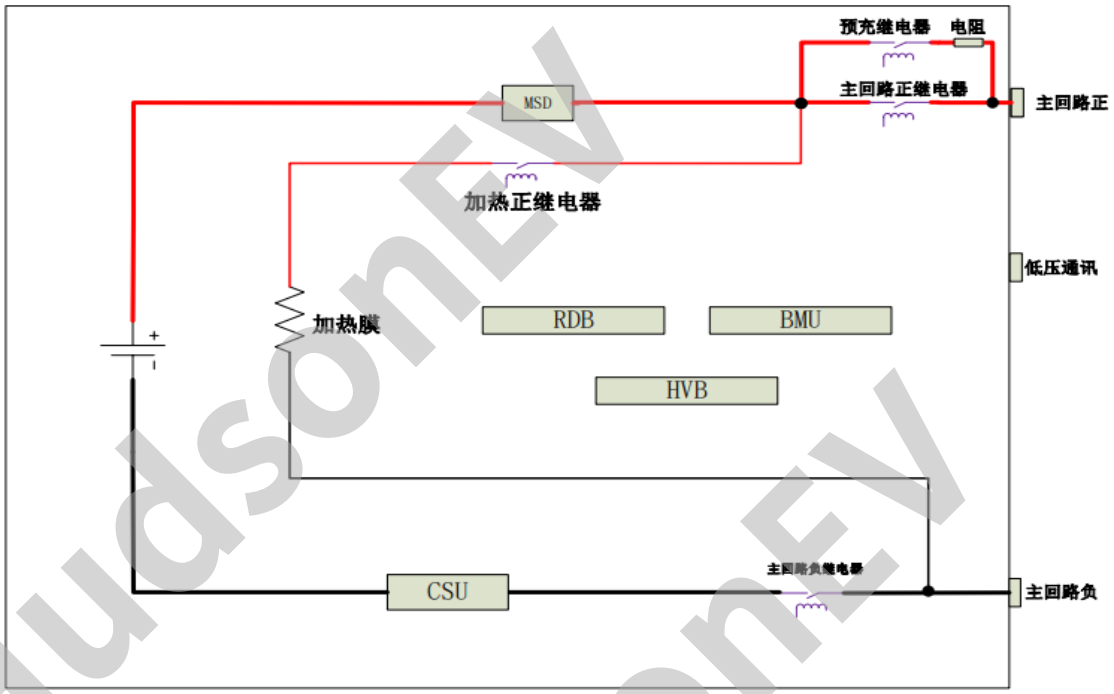
The energy storage device of the Hudson eBOLD battery system has two types of electricity: 77.28KWH/100.96KWH, with a rated capacity of 200A. h and a rated total voltage of 386.4V. The battery system includes one battery box, which integrates BMS, main negative/positive contactors, and heating contactors in addition to the battery cell module. The battery system is equipped with natural cooling and heating film heating. The battery system uses a module composed of CATL 200Ah battery cells, in series and parallel mode: 1P120S. The external dimensions of the electrical box are 1894 * 760 * 250mm, and the total weight of the electrical box is about 510KG. Battery working temperature: -35 ℃~65 ℃, storage environment temperature: -35 ℃~55 ℃, optimal charging and discharging temperature: 20 ℃~35 ℃.



Schematic diagram of the battery box products



Schematic diagram of the battery case in the chassis



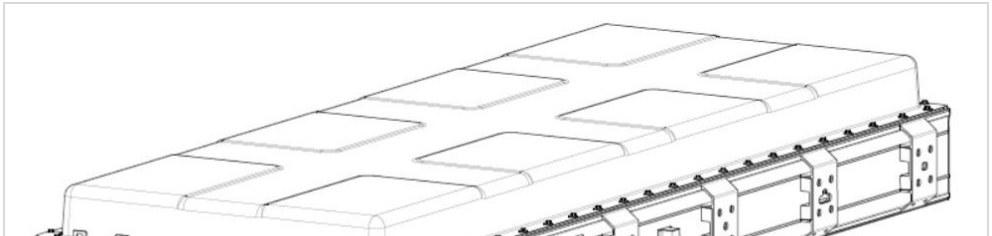
High and low voltage topology diagram of the battery box

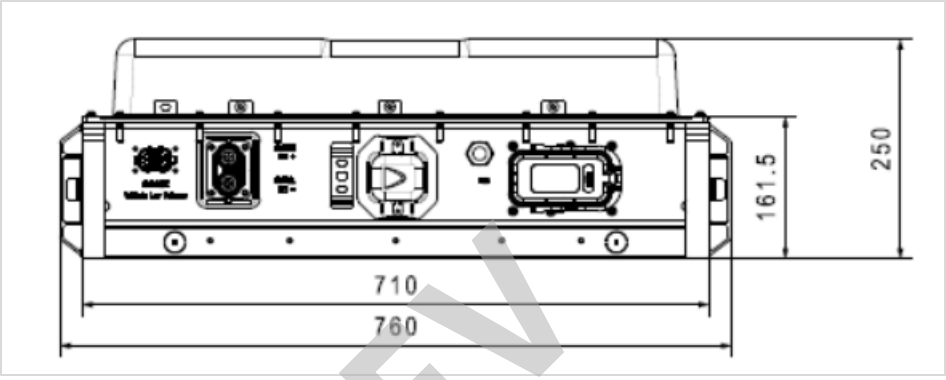
2.2 Product technical specifications

Product technical parameter table:

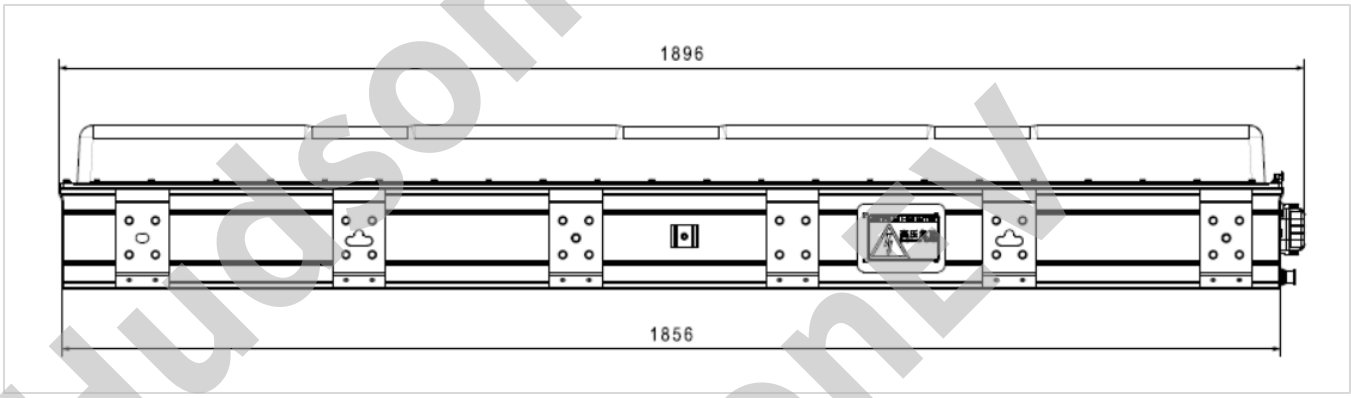
electricity box model	burst mode	rated voltage (V)	voltage range (V)	Total capacity (Ah)	quantity of electricity (kWh)	energy density (W·h/kg)	gross mass (kg)	size (mm)
L200R01	1P120S	386.4V	300V~438V	200	77.28	153.425	510	1894*760*250
L 268Q01	1P117S	376.74	300V -438V	268	100.96	170	649.1	2300*760*250

Product size schematic diagram:

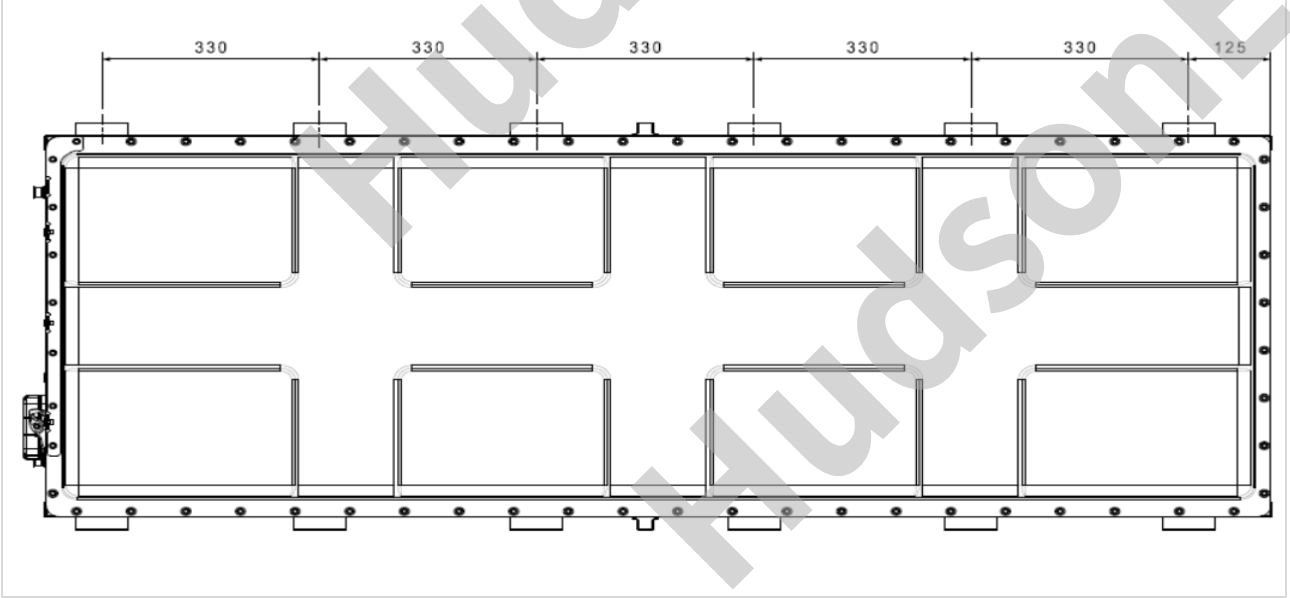




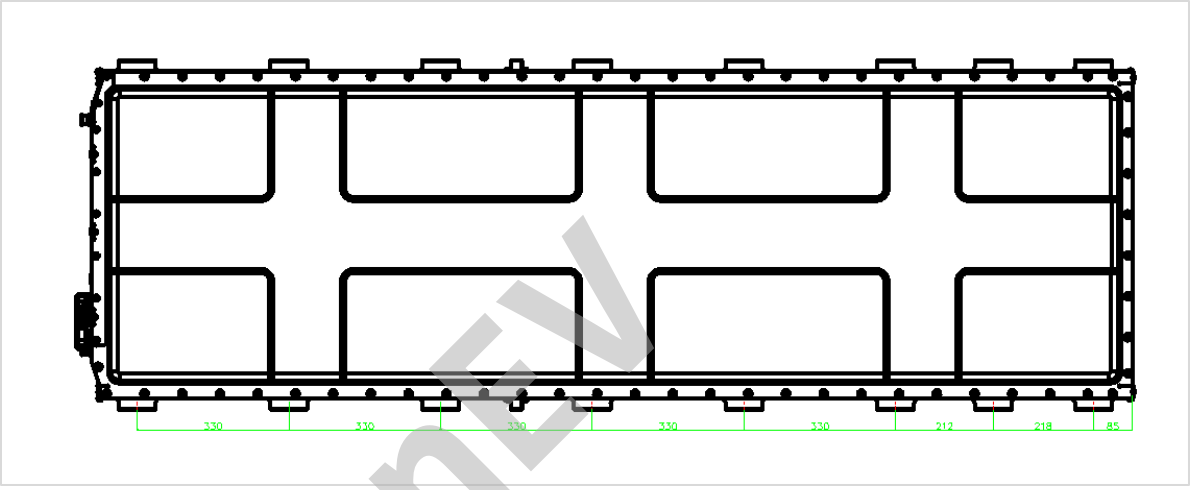
Forward view



Side view



Top view (77.28kWh)



Top view (100.96k W h charge battery pack)

2.3 Battery management system

a) Description of the BMS function

order number	functional classification	function	explanation
1	Battery status monitoring	Battery cell voltage monitoring	Monitor the monomer voltage value in real time
2		Total battery voltage monitoring	Monitor the total voltage value of the system in a real-time manner
3		Charge and discharge current monitoring	Monitor the battery pack charge and discharge current
4		4-way charging socket temperature detection	
5		Battery temperature monitoring	Monitor the battery module temperature
6		Insulation resistance monitoring	The BMS driving status continuously monitors the insulation resistance value of the power battery on the car body, and the charging status is implemented according to the national standard definition
7		Other signal monitoring	Other high-and low-level signals were monitored
8	Battery status analysis	SOC、SOP、SOH	Accurately calculate the residual charge value of the power battery
9	control function	relay control	Charge, discharge, heating and other relays are controlled, and realize their adhesion and other state detection
10	energy management	Battery charging and discharge control and management	Charge and discharge control according to traction system requirements and battery status
11		Balanced function	Passive equilibrium
12	Battery safety protection	Fault diagnosis and handling	Determine the fault level according to the fault definition and take corresponding measures
13		The HVIL high-voltage interlock loop detection	Provide a one-road HVIL high-voltage interlock loop detection function
14	information management	CAN communication	In accordance with the requirements of the vehicle communication protocol, the CAN line should be twisted pair
15		Update of the diagnostic calibration and procedures	
16	Data storage records	Store history fault information (7 days)	

b) Nameplate information

nominal voltage	386.4
Nominal energy	77.28
Box weight	510
Electric box model	L200R01
material number	
Product batch	Subject to reality
date of manufacture	Subject to reality
nominal voltage	376.74
Nominal energy	100.96
Box weight	649.1
Electric box model	L 268Q 01
material number	
Product batch	Subject to reality
date of manufacture	Subject to reality

Electric box nameplate

system voltage	386.4
system capacity	200
System energy	77.28
System weight	510
Software model	A0BMU
Hardware model	ELT-B70H

System nameplate

system voltage	376.74
system capacity	268
System energy	100.96
System weight	649.1
Software model	A0BMU
Hardware model	ELT-B70H

System nameplate

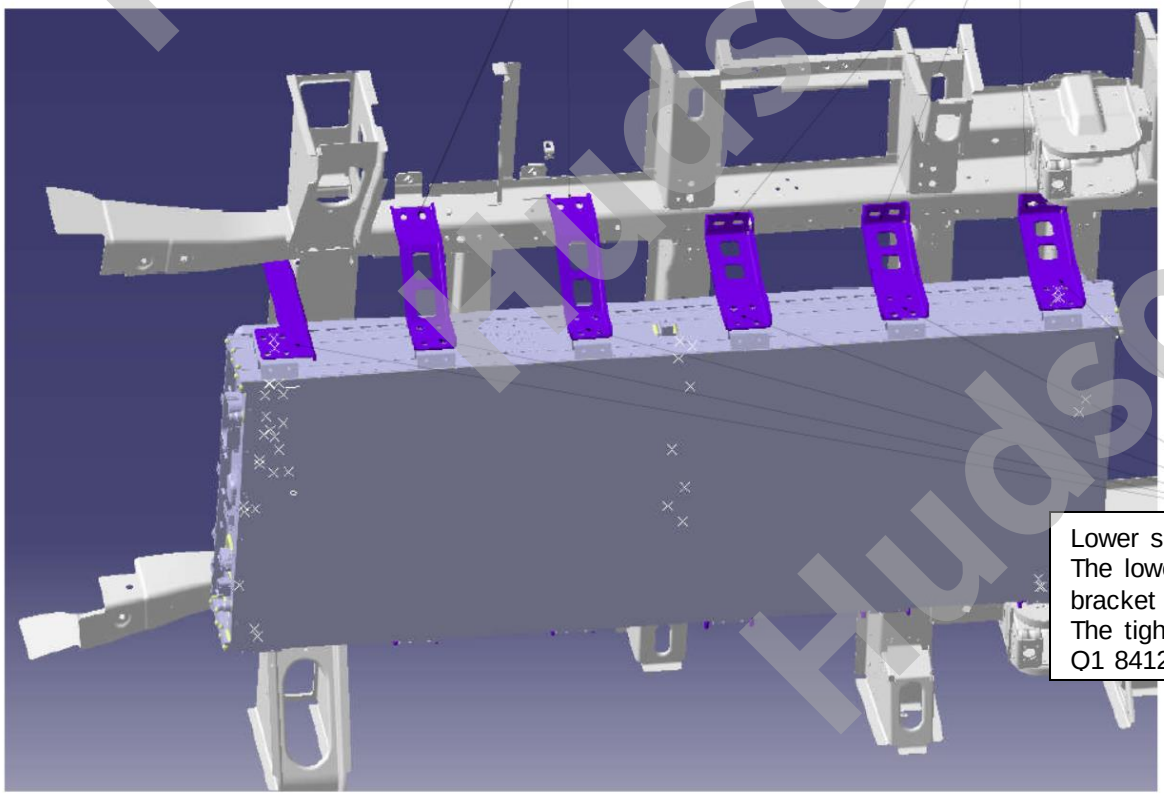
3. Installation and wiring of the battery box

3.1 Installation process

Arrival inspection →Installation preparation→ Battery installation →Battery system connection →Protective measures → Measure the open circuit voltage of a single box battery and the total system voltage →connect battery system with the equipment.

3.2 Torque requirements

Tightening torque of the connection bracket between the battery box and the box: 100-120N. M (Bolted Q1841225-0ZD); tightening torque at the left and right longitudinal beams of the chassis: 88-107N. M (Bolted Q1841235-0ZD);



3.3 Installation and removal of the Manual Service Disconnect

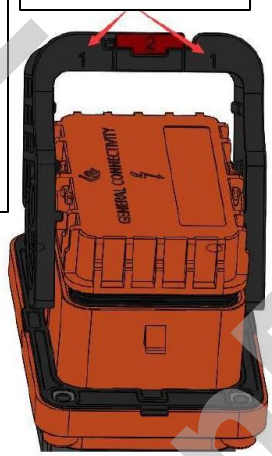
The Manual Service Disconnect (MSD) shall be inserted after the assembly of the battery case, and the Manual Service Disconnect plug needs to be plugged out during the maintenance. Please read the following safety precautions carefully before disassembly, and detail the disassembly method of Manual Service Disconnect

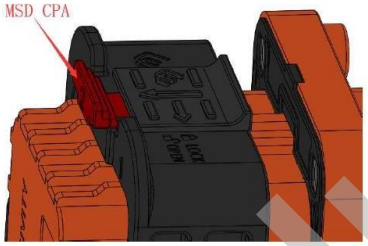
- Before removing the Manual Service Disconnect, ensure that the battery energy storage system is powered down for more than 5 minutes;
- It is prohibited to disassemble the Manual Services Disconnect with electricity, otherwise there will be a risk of electric shock;
- Avoid screws, liquid or metal debris from entering the battery pack, otherwise it may cause short circuit blast;

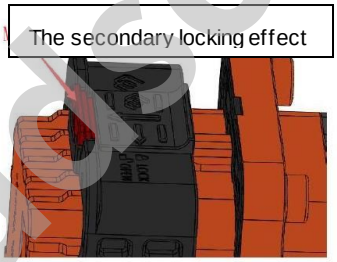
Assembly of the Manual Service Disconnect plug

CPA operation method:

- Locking: 1. The MSD plug and socket should be matched in the correct direction, and the MSD handle should be pressed down at the same time. At position "1" (as shown in the right figure), when a "click" sound is heard, the handle is completely locked;
- 2: After the handle is fully locked, press down on MSDCPA and push the CPA at the handle surface level, achieving the secondary locking effect of MSD CPA (as shown in the figure below)



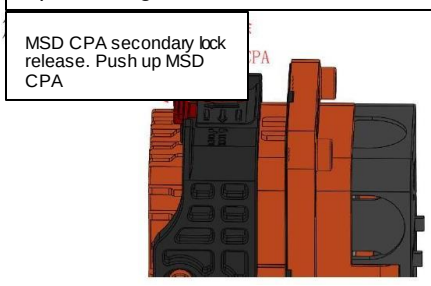


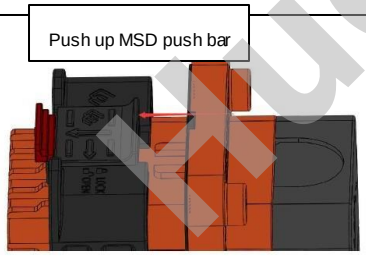


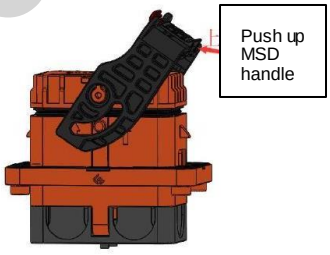
Check if MSD is assembled after assembly!

Removal of the Manual Services Disconnect plug

Unlock: Push up the MSDCPA until the MSDCPA secondary lock is released; Push the MSD push bar upwards again to unlock the MSD handle.



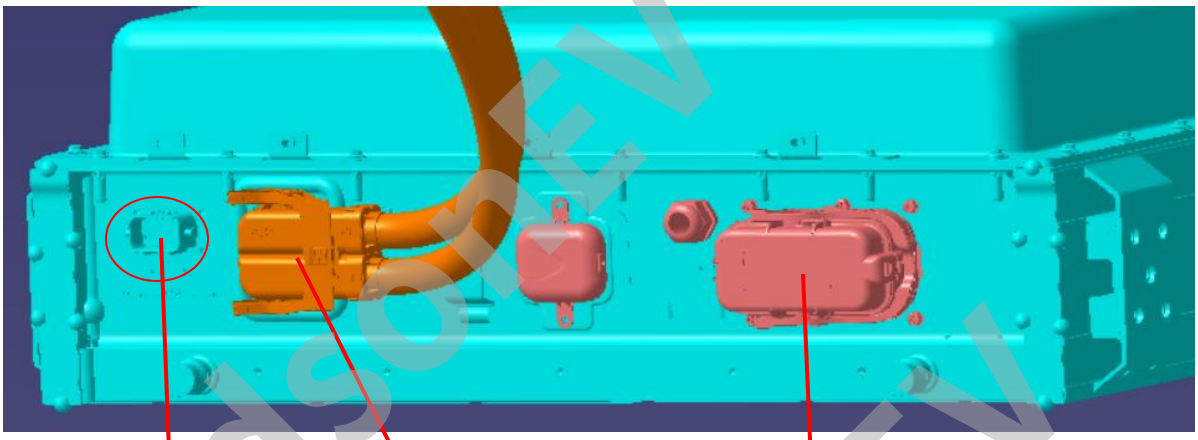




■ There are differences in the appearance of MSDs of different models (there are two directions for the handle: left and right, up and down), and their disassembly methods

and requirements are the same.

3.4 Interface and definition of high and low voltage wiring harness of battery box



Vehicle low voltage interface High voltage interface MSD services disconnect

order number	Connector name	Box body socket model	Vehicle wiring harness plug model	remarks
1	High voltage connector	Amphenol: HVMC2P12M269	Angle head 70 square: HVMC2P12FV270 Straight head of 70 square meters: HVMC2P12FS270	1 Negative 2 positive
2	Low voltage connector	Amphenol: MPS 02-BSMA0320	Amphenol: MPS 02-BSFA032S	
3	MSD	R3.663.180368/Recodeal	R3.653.191075/Recodeal	

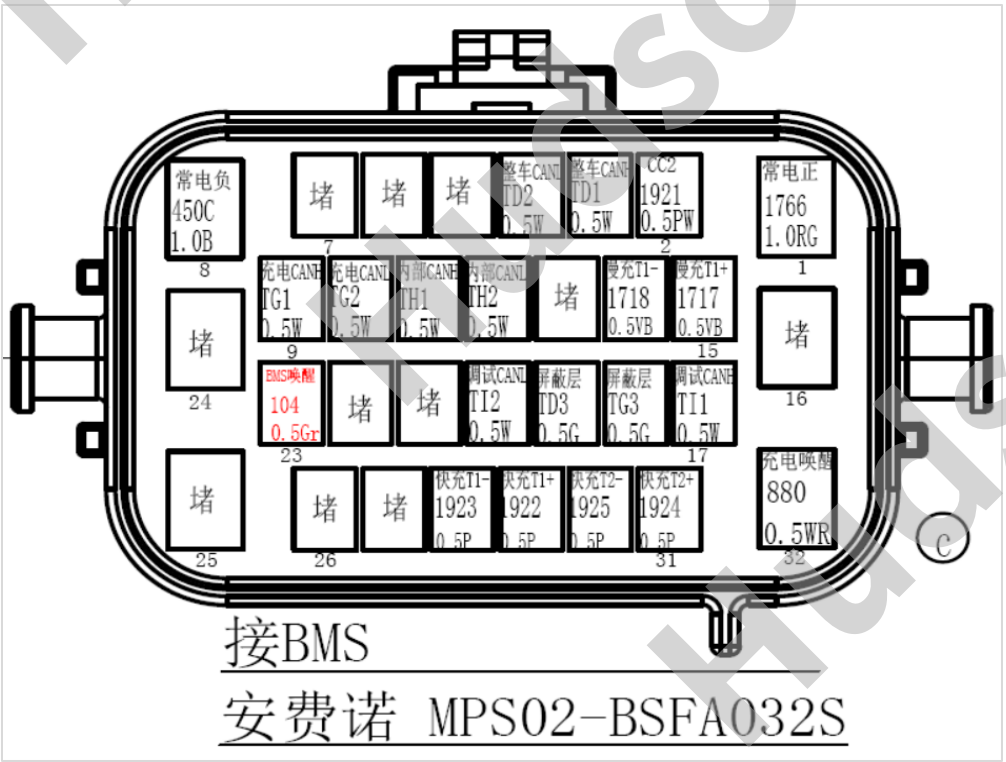
Definition of the vehicle low-voltage interface pin:

The pin number	Electrical schematic diagram name	Signal type	Line diameter (mm)	function definition	remarks
1	KL30	power supply	1	Vehicle lead-acid power supply positive	
2	DC_CC2	communication	0.5	National standard DC charging connection confirmation signal	
3	ACAN_H	communication	0.5	The vehicle CAN high	
4	ACAN_L	communication	0.5	The vehicle CAN low	
5					Blind

					blocking
6					Blind blocking
7					Blind blocking
8	GND	Power supply	1	Vehicle lead-acid power supply ground	
9	CH_CAN_H	communication	0.5	Charging CAN high	
10	CH_CAN_L	communication	0.5	Charging CAN low	
11	DCAN_L	communication	0.5	BMS internal CAN low, used for diagnosis, need to connect the vehicle OBD	
12	DCAN_H	communication	0.5	BMS internal CAN high, used for diagnosis, need to connect the whole vehicle OBD	
13					Blind blocking
14	Temperature detection of AC charging cradle-		0.5	Temperature detection of AC charging cradle-	
15	Temperature detection of AC charging cradle+		0.5	Temperature detection of AC charging cradle+	
16					Blind blocking
17	SCANH	communication	0.5	Used to bootloader software, and need to connect to the vehicle OBD	
18	Charging the CAN shielding line	communication	0.5		
19	Vehicle CAN shielding line	communication	0.5		
20	SCANL	communication	0.5	Used to bootloader software, and need to connect to the vehicle OBD	
21					Blind blocking
22					Blind blocking
23					Blind blocking
24	Vehicle wake-up signal	communication	1	Driving wake-up signal	
25					Blind blocking
26	AC_CP		0.5	National standard AC	

				charging CP signal	
27	AC_CC		0.5	National standard AC charging connection confirmation signal	
28	Temperature detection ground for fast charging negative electrode socket	signal	0.5	Temperature detection ground for fast charging negative electrode socket	
29	Fast charging negative electrode socket temperature detection positive	signal	0.5	Fast charging negative electrode socket temperature detection positive	
30	Fast charging positive electrode socket temperature detection ground	signal	0.5	Fast charging positive electrode socket temperature detection ground	
31	Fast charge positive electrode socket temperature detection positive	signal	0.5	Fast charge positive electrode socket temperature detection positive	
32	A +	signal	1	National standard DC charging wake-up signal	

Vehicle wiring harness BMS connector interface pin (wire number) matching comparison view:



3.5 Battery energy storage system wiring precautions

a) Positive and negative electrodes of the battery energy storage system

- Wear insulated gloves and connect the positive and negative cables of the vehicle's multiple in one battery to the positive and negative sockets of the battery system's energy storage device according to the connection circuit diagram of the battery system's energy storage device. Otherwise, there will be a risk of electric shock.
    - Remove the insurance of the MSD manual maintenance switch before connecting the positive and negative electrode high voltage line harness, otherwise there will be a risk of electric shock.
- The positive and negative polarity cannot be reversed, otherwise it may cause damage to the battery pack components or even fire
- The specifications and installation methods of the main circuit wiring should comply with local regulations and relevant IEC standards.

b） Battery system energy storage device heating input, heating output (-for a separate high pressure box system)

- Wear insulated gloves and connect the heating output and input cables of the high-voltage box to the heating output and input sockets of the battery energy storage system according to the connection circuit diagram of the battery energy storage system. Otherwise, there will be a risk of electric shock.

c） The definition of low-voltage terminal socket sub cables needs to be connected according to the definition. If connected incorrectly, it will result in abnormal communication and the inability of the battery energy storage system to power on and other faults.

d） Grounding terminal (PE)

- Do not share the housing ground terminal and the power supply negative terminal.
- The impedance of the protective grounding conductor must meet the requirements of bearing the possible large short-circuit current in case of failure.
- After grounding and fixation, anti-rust paint should be used for anti-rust treatment.

4. Emergency treatment scheme for the battery system

In the use of power lithium ion battery, the battery system may appear the following abnormal situation, please organize professional engineering and technical personnel according to the necessary processing, if any questions about the cognition of abnormal state or processing method, please contact the relevant technical department or after-sales service department to obtain professional technical support.

1. If abnormal phenomena such as shell expansion, rupture, melting deformation are found in the battery pack during installation, maintenance or use, please stop using the battery pack immediately, unplug the battery pack, disconnect the MSD according to the above method, disconnect the high voltage circuit, and store it separately. Contact the after-sales service department immediately to replace the

problem battery pack.

2. If the insulation layer of the main loop wire of the battery pack is damaged during installation, repair or use; the connector is loose and ablated; the vehicle insulation alarm, please stop using the battery pack immediately, determine whether the insulation of the battery pack is abnormal, and immediately contact the after-sales service department to replace the problem battery pack.

3. If the battery pack catches fire or smoke during installation, maintenance, or use, please immediately disconnect the high-voltage circuit and low-voltage power supply, evacuate personnel, and use sand to bury the battery pack or car mounted fire extinguisher to isolate the source point. Call the alarm number according to the fire situation and contact the after-sales service department for technical support.

4. If there is a thermal runaway fault during use, and the battery temperature exceeds 85 ℃, the use should be stopped immediately and the high-voltage circuit should be disconnected. Observe under the premise of ensuring safety, and in case of danger, handle according to the above three measures depending on the situation.

5. In case of sudden rainstorm, try to avoid the road section with accumulated water. If it is impossible to avoid the road section with accumulated water, slow down. If the accumulated water exceeds 25cm, avoid forced passage. Otherwise, it may lead to parking or damage to the energy storage device of the battery system.

5. Battery system fault code table

Fault content	fault code	Fault content	fault code
Single OR total voltage overvoltage level 1 alarm	174	BMS low voltage supply voltage abnormal alarm	197
Single OR total voltage overvoltage level 2 alarm	175	Heating membrane heating circuit fault	209
Single OR total voltage overvoltage level 3 alarm	176	Driving insulation is too low level alarm	183
Single OR total voltage undervoltage level 1 alarm	177	Driving insulation is too low secondary alarm	184
Unit OR total voltage undervoltage level 2 alarm	178	Driving insulation is too low for the three-level alarm	196
Unit OR total voltage undervoltage level 3 alarm	179	Charging insulation resistance value is low	196
Cell over-discharge	211	ACAN communication failure	200
Cell high temperature level 1 alarm	180	BMS internal communication failure	201

Cell high temperature level 2 alarm	181	High-voltage interlock fault alarm	193
Cell high temperature level 3 alarm	182	Heating contactor unable to close/disconnect	209
Cell low temperature alarm	171	Main positive/negative contactor unable to close fault	204
First level alarm for excessive temperature difference	189	Main positive/negative contactor unable to disconnect fault	203
Excessive temperature difference level 2 / 3 level alarm	190	Abnormal signal of gun insertion connection	216
Battery pack smoke detection alarm	212	Rechargeable energy storage system mismatch fault report	208
Discharge current first/second level	187	Charge current overlimit alarm	213
Discharge current level 3 over-limit alarm	188	Charging socket NTC fault	215
Back to charge flow level 1 overlimit alarm	185	Over-temperature alarm of the charging socket	210
Back-charge flow level II / 3 over-limit alarm	186	Poor consistency of battery cells	172
Current sensor fault	219	Charging shake hands fault	206
The main positive state conflicts with the charging gun signal	207	Wake up signal lost	214
Slow charging communication timeout	168	Continuous charging overcurrent alarm during driving	194/195
Continuous discharge and overcurrent alarm	194/195		

.6 Listings of vulnerable parts

Due to the limitations of their own material characteristics and lifespan degradation mechanisms, some components cannot ensure that their lifespan characteristics are synchronized with the design lifespan of the entire battery system; At the same time, its lifespan reliability is easily affected by external environmental conditions, usage and maintenance habits, and other factors. After reliability life analysis, it is defined as a vulnerable part in the battery system. The list of vulnerable parts is as follows:

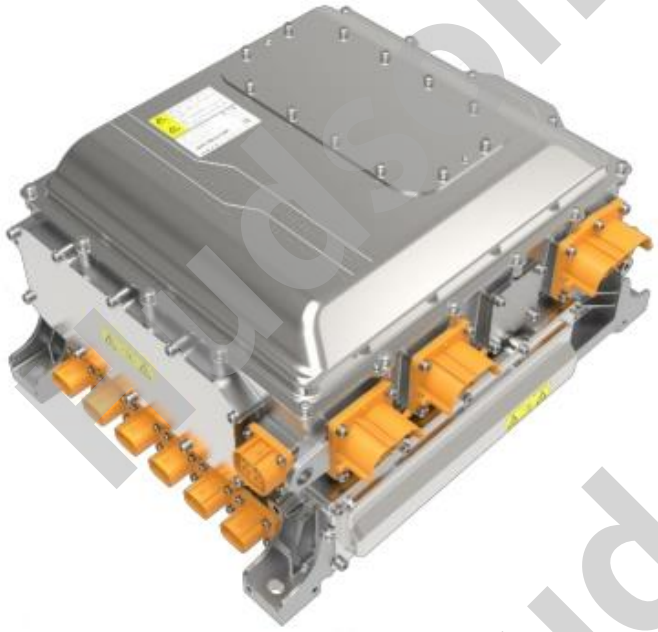
order	Part name	remarks
1	High/low voltage wiring harness and connectors outside the box	

2	Manual Service Disconnect	
3	BMU/CSC/HVB/RDB	
4	current sensor	
5	electric relay	
6	fuse	

Multi-in-one Controller

This instruction applies to the normal operation and daily maintenance of the V9E model equipped with Suzhou Huichuan Multi-in-One Controller.

The multi-in-one control must be installed and maintained by professional electrical personnel certified by relevant departments. By reading this manual in detail, the installation personnel can correctly and quickly install the multi-in-one controller, and can conduct troubleshooting and understand and build the communication system. If you have any problems during the installation and maintenance process, please contact our after-sales service department in time.



Catalogue

. 1. Safety precautions

.1 1 The Meaning of Warning Icon

In order to ensure the personal and property safety of the use and maintenance of the product, or the efficient and safe use of the product, the manual provides relevant information and highlights it with appropriate symbols.

Sign	description
 Danger	Danger indicates that if not operated according to regulations, it is highly likely to result in death or serious injury.
 Attention	Attention indicates that if not operated according to regulations, it may lead to moderate or minor injuries, as well as equipment damage.
	This symbol indicates that there is high voltage inside the body, which can cause electric shock hazards when touched.
	This symbol indicates that the protective grounding (PE) end needs to be firmly grounded to ensure the safety of operators.
	This sign indicates that do not touch the controller or there is a risk of electric shock.
	This symbol indicates that operation and installation require reference to the relevant instructions in the manual.
	Pay attention to fire prevention.
	DC voltage (DC)
	AC voltage (AC)
	CE sign
	After use until the end of the scrap period, it will be handled by a professional organization

1.2 Safety matters

Before installation

危险

◆ If the control system water, missing or damaged, do not install!

◆ When the packing list does not comply with the physical name, do not install!

注意

◆ It should be lifted lightly when handling, otherwise there is a danger of damage to the equipment!

◆ Do not use the controller with damage or missing parts, with the risk of injury!

◆ Do not touch the components of the control system by hand, otherwise there is a danger of static damage!

When installing

危险

◆ Please install on flame retardant objects such as metal, away from combustible, otherwise it may cause fire!

◆ Do not unscrew the fixing bolts of the equipment components, especially the bolts with red marks!

注意

◆ The installed base should have shock absorption treatment, using the controller specified 4-hole position and the frame fixed, strong vibration is easy to cause damage to the controller!

◆ The installation position of the controller in the installation cabin should be conducive to ventilation and heat dissipation, to ensure the heat dissipation effect when driving, and at the same time should avoid the overtemperature caused by sun exposure!

◆ Avoid rain spray, resulting in insulation performance decline!

◆ Do not let the terminal seat or screw loose, wire head or other foreign body fall into the controller, otherwise it may cause controller damage!

◆ When installing the cover plate, confirm that the sealant is not damaged and falls off!

When wiring

危险

◆ Please be sure to follow the guidance of this manual, and by professional electrical engineering personnel construction, otherwise there will be unexpected danger!

◆ There must be a contactor (or circuit breaker) between the controller and the power supply, otherwise a fire may occur!

◆ Before wiring, please confirm that the power supply is in a zero-energy state, otherwise there is a risk of electric shock!

◆ Please ground the controller correctly according to the standard, otherwise there is a risk of electric shock!

◆ When connecting the cable, pay attention to all the wiring terminals and the definition of each navigation plug (engraved on the shell), do not connect the wrong line, otherwise the damage of the controller will be caused!

注意

◆ Ensure that the current carrying capacity of the conductor meets the temperature rise requirements of the controller, refer to the recommendations in the manual, otherwise an accident may occur!

◆ The encoder must use the shielding line, and the shielding layer must ensure the single end reliable grounding!

Before the electricity

危险

◆ The controller must cover the cover plate before the power is turned on, otherwise it may cause electric shock!

◆ The wiring of all peripheral accessories must follow the instructions of this manual and follow the circuit connection method provided in this manual correctly, otherwise cause an accident!

注意

◆ Please confirm whether the voltage level of the input power supply is consistent with the rated voltage level of the controller, the power input terminal (+, -), output terminal (U, V, W), electric air conditioning (+, -), electric heating, electric defrosting, EHP S, ACM and DCDC wiring position is correct, and pay attention to check whether there is a short circuit in the peripheral circuit connected with the controller, whether the connected line is fastened, otherwise the controller is damaged!

◆ Any part of the controller is not subject to pressure resistance test, otherwise it may cause damage!

After the electricity

危险

◆ It is forbidden to power on when the cover plate is opened, or open the cover plate when the cover plate has been powered on, otherwise there is a risk of electric shock!

◆ Do not touch the controller and the peripheral circuits, otherwise there is a risk of electric shock!

◆ Do not touch any input and output terminals of the controller, otherwise there is a danger of electric shock!

◆ At the beginning of the power-on, the controller automatically detects the safety of the external strong electric circuit. At this time, it is forbidden to touch all the terminals of the controller, otherwise there is a risk of electric shock!

◆ After the controller is powered on, do not force off the external high and low voltage power supply, the vehicle and the controller should be powered on in accordance with the normal power order!

注意

◆ If parameter identification is required, please pay attention to the danger of injury in motor rotation, otherwise it may cause accidents!

◆ Do not change the controller manufacturer parameters, otherwise it may cause damage to the equipment!

in operation

危险

◆ Do not touch the controller housing to test the temperature, otherwise it may cause burns!

◆ Non-professional technical personnel do not detect the signal in operation, otherwise it may cause personal injury or equipment damage!

注意

◆ Do not use the contactor on-off method to control the start and stop of the controller, otherwise cause equipment damage!

◆ In operation, the user should properly monitor the load operation situation, and stop in time when the abnormal situation occurs!

Maintenance

危险

◆ Only professional trained personnel can repair and maintain the controller, prohibit users to remove the internal components of the machine, otherwise cause personal injury or equipment damage!

◆ When repairing and detecting the controller, please operate after 10 minutes of power off, and confirm that the voltage is below the safety voltage with the multimeter to maintain and repair the controller, otherwise the residual charge on the capacitor will cause harm to people!

◆ For repair and maintenance, I must be sure that the strong vehicle power has been disconnected, and the ultracapacitor or battery directly connected to the controller has been discharged to the safe voltage. Otherwise, there is a danger of electric shock!

◆ For vehicles undergoing maintenance, please must hang the corresponding safety indication warning plate!

◆ All plug and plug parts must be plugged in the case of power failure, parameters must be set after replacing the controller!

注意

◆ For daily maintenance, please pay attention to whether the plug is loose, whether the fastening screws is loose or off, whether the power terminal waterproof plug is loose water risk, test whether the terminal cap is intact and tightened!

◆ Please clean up the dust on the machine surface regularly to prevent excessive dust from affecting the heat dissipation of the machine!

◆ Non-professionals do not modify the machine parameters without authorization, otherwise it may cause machine damage!

◆ Electrical fire extinguishing please must use carbon dioxide fire extinguisher, dry powder fire extinguisher, do not use foam fire extinguisher!

1.3 Operator Requirements

All operations defined in this product specification should be carried out by qualified professionals!

Professional personnel need to be electrical engineers with the following abilities:

1) Having received professional training;

2) Having knowledge and experience in the field of electrical engineering;

3) Having a sense of danger.

In addition, professionals should be able to independently complete designated tasks, detect potential hazards, and establish necessary protective measures.

2. Product Information

Hudson eBOLD model code K08-071 project is equipped with Suzhou Huichuan L D35-1 model multi-in-one controller, integrated motor controller (TM), electric hydraulic power steering (EHPS), D CDC, high voltage power distribution (air conditioning compressor, electric defrosting PTC, high pressure oil pump, fast and slow charging) module functions. The bus input voltage is 250V-450V, applicable ambient temperature-40℃ - + 85℃, coolant temperature-40℃ - + 65℃, maximum altitude of 3000 m.

2.1 Technical Parameters

a）.Controller

Technical Parameter	TM controller
Controller Input voltage range (VDC)	250-450V
Rated Input Voltage (VDC)	336V
Rated output current (A)	210（600A IGBT）
Peak output current (A)	420A,60s（600A IGBT）
Peak blocking current (A)	350A,60s（600A IGBT）
Peak current running time (s)	60S
carrier-frequency range (Hz)	1~8k (normal 6k)
Highest controller efficiency of (%)	≥99
Output frequency (Hz)	＜800
Speed response time (ms)	200
Speed accuracy of (%)	± 1% above rated speed; ± 30rpm below rated speed
Torque response time (ms)	50
Torque accuracy of (%)	Control accuracy is ± 3% above the rated torque and ± 5 N below the rated torque.m
coolant temperature	-40~65℃
operating ambient temperature	-40~85℃
height	3000 Meters
Technical parameter	**EHPS controller**
Controller Input voltage range (VDC)	250~450V
Rated Input Voltage (VDC)	336V
Rated output current (A)	11A
Peak output current (A)	25A
Maximum load frequency (Hz)	8k (default 6K)
Highest controller efficiency of (%)	≥97
Technical parameter	**DCDC controller**
Full load Input voltage range (VDC)	260~450V
Output Voltage (VDC)	≥13.5V

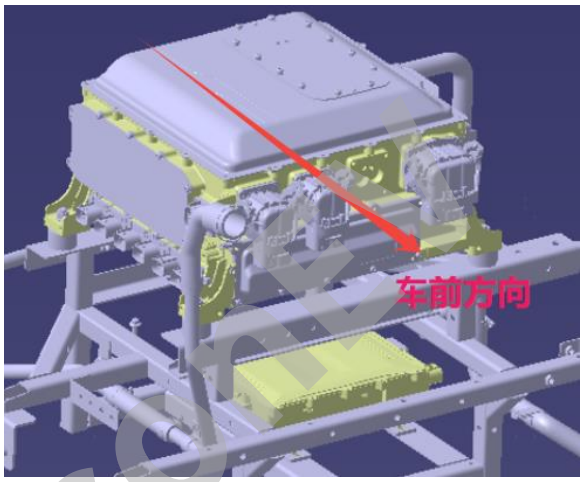
Output voltage accuracy	≤±1%
rated current	110A
power	Rated at 1.5KW / peak value of 2kW

b ）. High voltage distribution function

		type	Control description	remarks
Vehicle distribution control		ON gear wake up	Main drive, DCAC, and DCDC work	Internal to complete the distribution of low-voltage electricity
		Charging wake up	DCDC work	Internal to complete the distribution of low-voltage electricity
		Pre-filled contactor	The VCU sends the high pressure command on the main drive and completes the precharging logic internally	
		Main drive contactor		
		Fast charge contactor	The CAN enables the internal drive	
		Electric defrost contactor 1	The CAN enables the internal drive	
		Electric defrost contactor 2	The CAN enables the internal drive	
		Auxiliary drive pre-charge contactor	The VCU sends the high pressure command on the auxiliary drive, and completes the precharging logic internally	Share of oil pump, DCDC and air conditioner
		Auxiliary drive main contactor		
		Slow charging contactor	The CAN enables the internal drive	
Power distribution function and port requirements	Pre-charge	The main drive	After the total negative battery is closed and there is a high pressure command, the internal precharging	
		Electric accessories	After the total negative battery is closed, there is a high voltage command on the electric accessories, and the internal precharging is completed by itself	Share of oil pump, DCDC and air conditioner
	Fast charge		have	
	air-conditioning		have	
	Electric defrosting		have	
	trickle charge		have	
	oil pump		have	
	Battery input is positive and negative		have	
	Electric drive output three-phase UVW		have	
	DCDC output		have	

2.2 Installation, appearance structure and interface description

a). The multiple-in-one controller is installed at the top layer in the hood cabin.

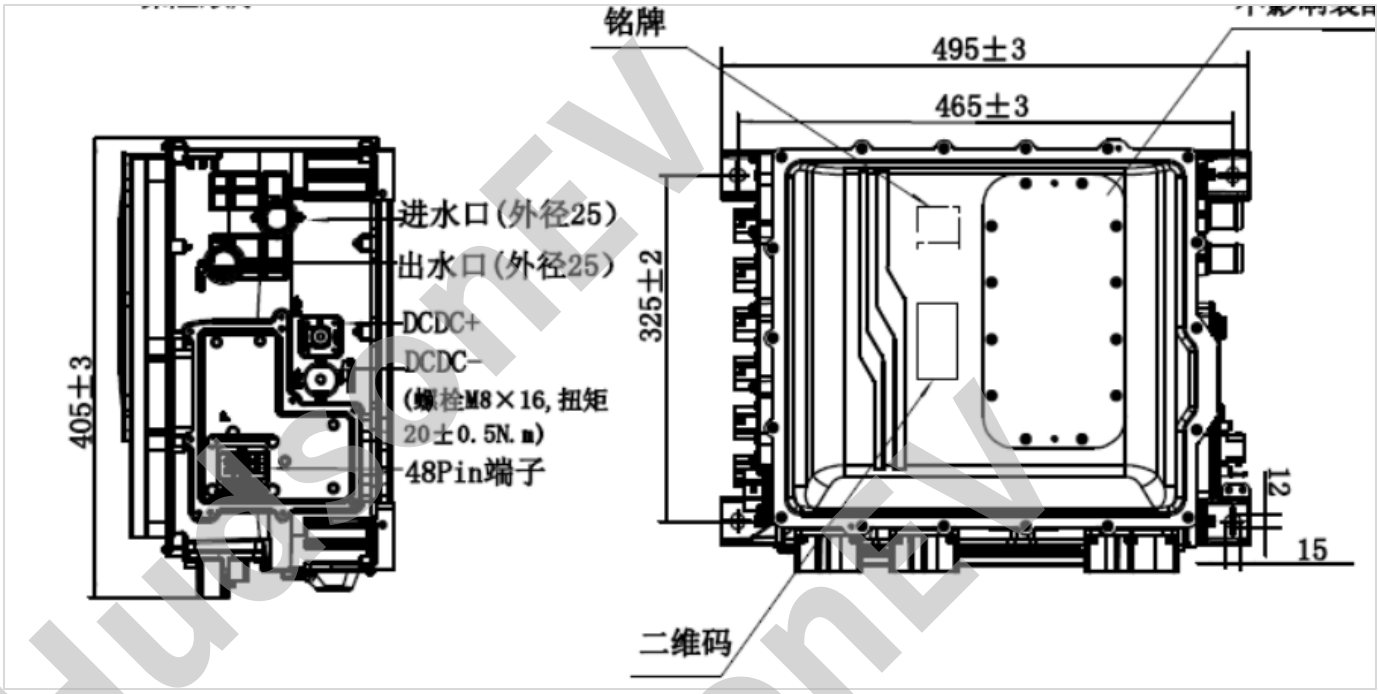


A schematic diagram of the installation position

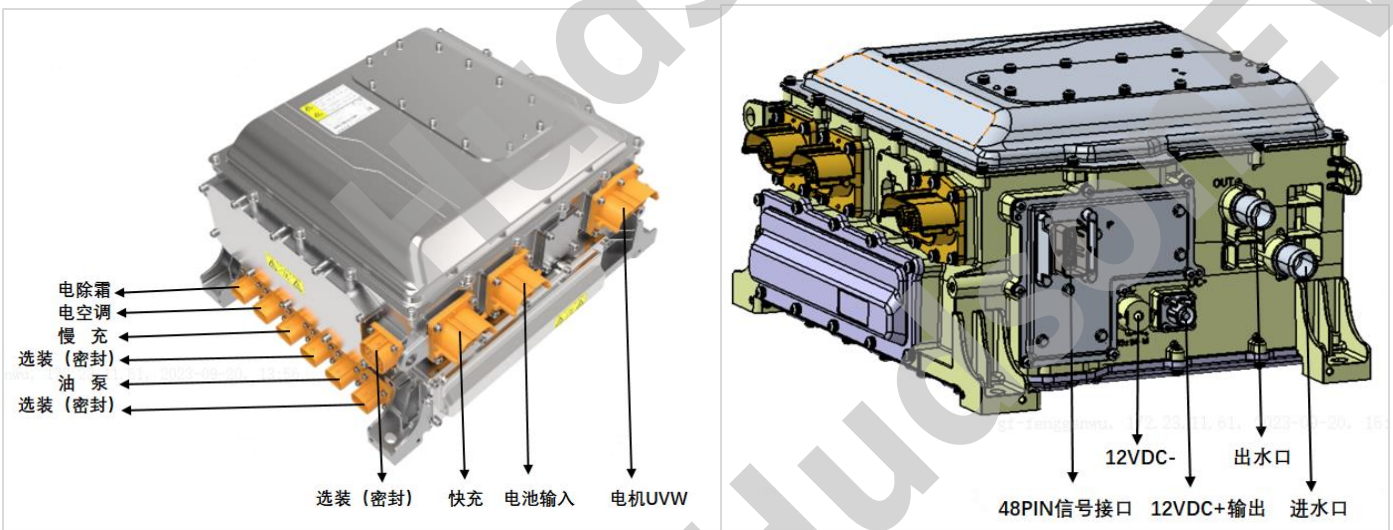
b). Appearance structure

1) Overall size (die-casting box): 495 * 405 * 247mm (including bracket)

2) Weight: about 31kg

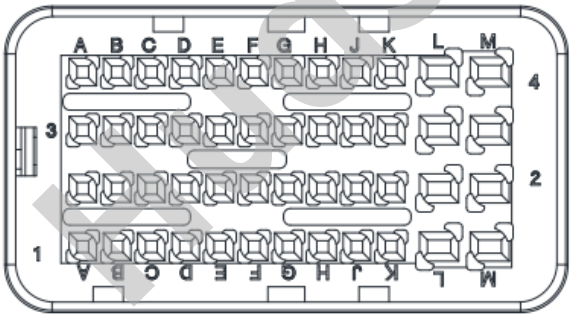


c). Interface Description



The interface name	vender	Machine end model	High voltage line end model	Line diameter section area	Needle foot definition
Fast charge	TE Connectivity	2355198-2	1-2310922-2	50mm²	Definition: 1-, 2 +
Battery input	TE Connectivity	2-2355198-1	1-2310922-1	50mm²	Definition: 1 +, 2-
Motor UVW	TE Connectivity	2355203-1	1-2325010-1	50mm²	Definition: 1-U, 2-V, and 3-W
Electric defrosting	TE Connectivity	2310541-1	2310538-1	2.5 mm²	Definition: 1-electric defrost contactor 1 +, 2-electric defrost contactor 2 +, 3 negative electrode
Electric air conditioning	TE Connectivity	2310540-4	2310537-4	2.5 mm²	Definition: 1 +, 2-
trickle charge	TE Connectivity	2310540-2	2310537-2	2.5 mm²	Definition: 1 +, 2-
oil pump	TE Connectivity	2310541-4	2310538-4	2.5 mm²	Definition: 1-U, 2-V, and 3-W
DCDC+	Amphenol	HVSC1P80MV104	HVSC1P80FV135	35mm²	Definition: DCDC + output
DCDC-	/	OT terminal	M8-35	35mm²	Definition: DCDC- Output ground

48 Pin vehicle signal terminal definition: Controller end: 560083-4801 (Molex) Harness end: 64320-1311 (Molex)



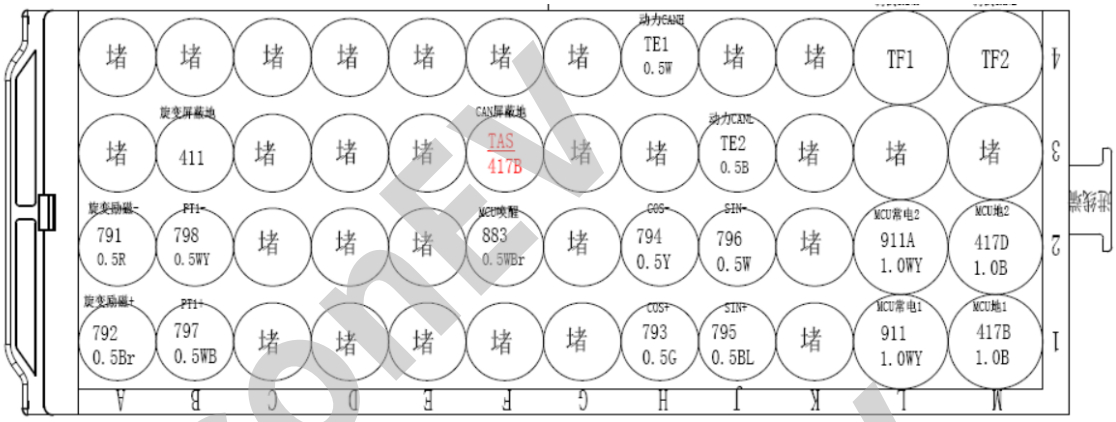
48 Schematic diagram of the PIN vehicle wiring harness end connector

Plug in the	Signal name	Controller interface	specifications	remarks
A1	EXC_P	Spinning excitation +	10kHz, AC7Vrms	
A2	EXC_N	Spinning excitation-		
A3	reserve			
A4	reserve			
B1	PT+	Main motor temperature detection	N TC100	
B2	PT-	Main motor temperature detection		
B3	COM	Digital ground / rotary shield		

B4	reserve			
C1	reserve			
C2	reserve			
C3	reserve			
C4	reserve			
D1	reserve			
D2	reserve			
D3	reserve			
D4	reserve			
E1	reserve			
E2	reserve			
E3	reserve			
E4	reserve			
F1	reserve			
F2	IGN ON	Key ON gear signal	High-effective, 9-16V	
F3	COM	Digital ground / CAN shielded ground		
F4	reserve			
G1	reserve			
G2	reserve			
G3	reserve			
G4	reserve			
H1	COS_N	Variation recovery signal cos-		
H2	COS_P	Rotary change recovery signal cos +		
H3	reserve			
H4	CAN_H	drive CANH	With a 120-euro terminal resistance	250KB
J1	SIN_N	Variation recovery signal sin-		
J2	SIN_P	Variation recovery signal sin +		
J3	CAN_L	drive CANL	With a 120-euro terminal resistance	250KB
J4	reserve			
K1	reserve			
K2	reserve			
K3	reserve			
K4	reserve			
L1	12V+	Normal power supply is	12V system: 9-16V	
L2	12V+	Normal power supply is	12V system: 9-16V	
L3	reserve			
L4	CANAH	shakedown test CANH		500KB
M1	12V-	Normal power supply negative		
M2	12V-	Normal power supply negative		

M3	reserve			
M4	CANAL	shakedown test CANL		500KB

Vehicle wiring harness multi-in-one controller connector interface pin (line number) matching control view:



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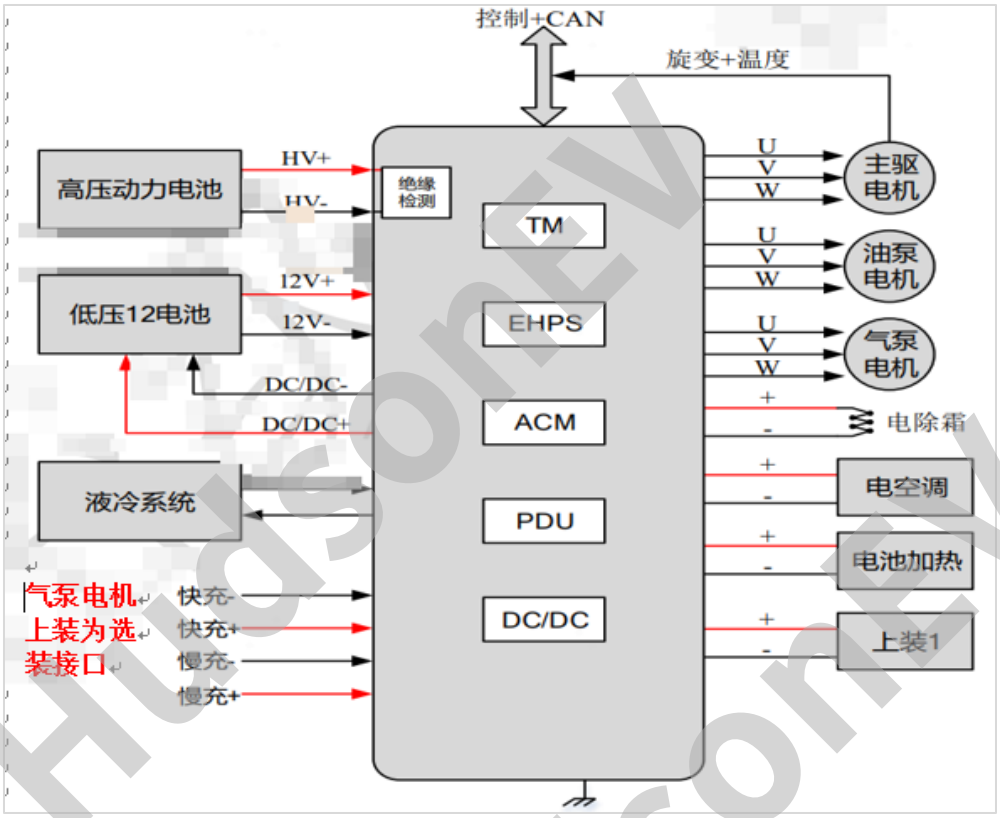
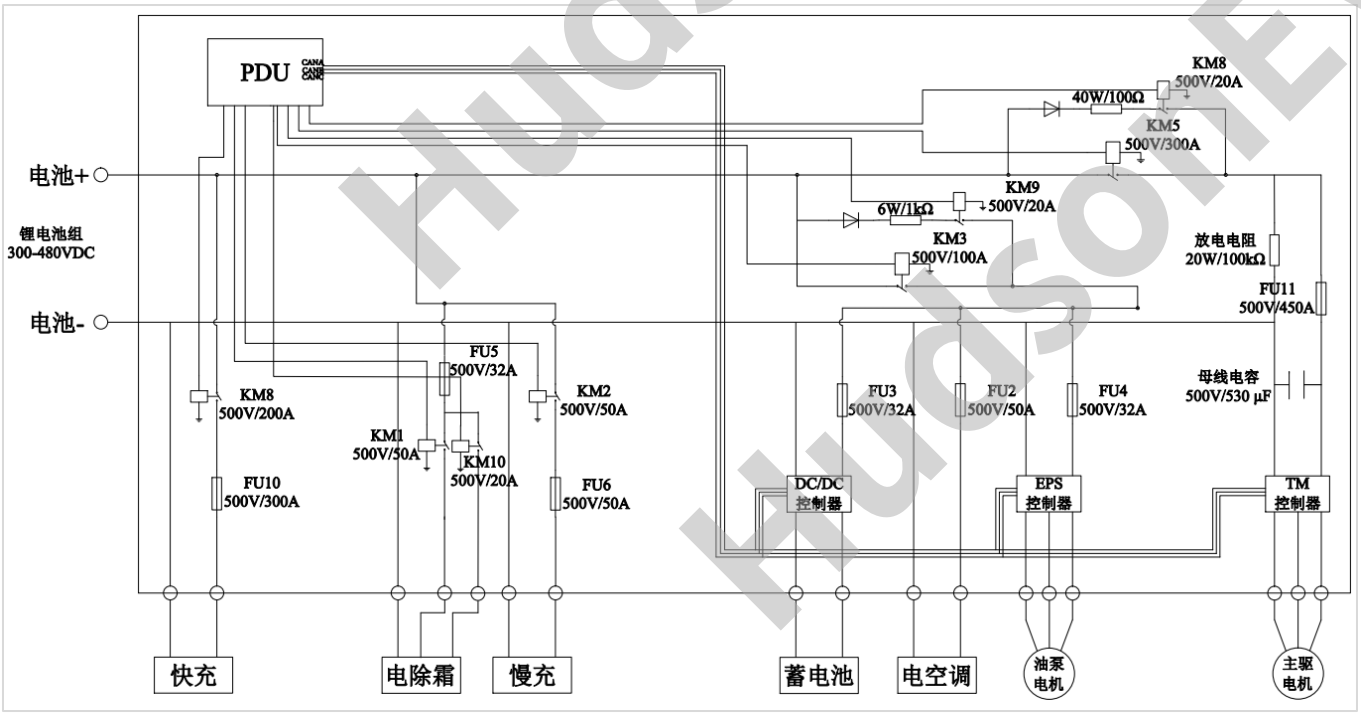
2.3 High-voltage topology diagram and electrical schematic diagram

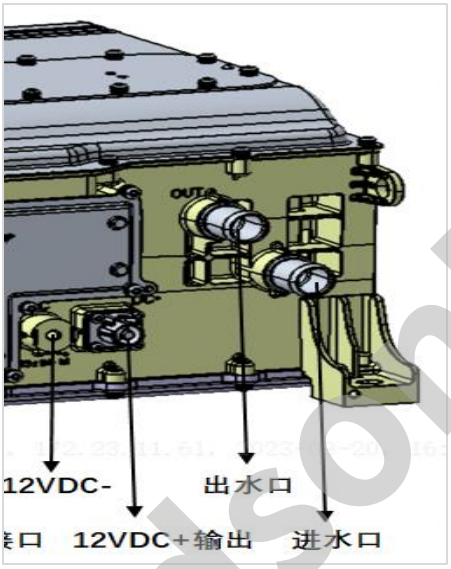
Multi-in-one high-pressure topology map



Multi-in-one electrical schematic diagram



2.4 Cooling System



Water volume	1.053L
Demand heat dissipation	Rated working condition: 2,200 W Peak working condition is 4380W
water resistance	20L @65℃ 17.2kpa
Water inlet temperature limit	≤65℃
Water outlet temperature limit	\
Coolant flow rate requirements	≥20L
Maximum pressure limit for waterways	2.5bar

. 3. The multi-in-one fault code list

Fault content	fault code	Fault content	fault
Main forward contactor adhesion	1	phase fault	34
Reverse pressure difference of the main loop	2	Hardware overvoltage failure	35
Power timeout fault on the	3	Output lack of phase	36
Input overpressure is too	4	Drive circuit failure	37
Power-up fault with rotational speed	5	Control power supply under-voltage fault	38
Auxiliary drive circuit main contactor adhesion fault	6	Bus overvoltage fault	39
Reverse pressure difference of the auxiliary circuit	7	Bus undervoltage fault	40
Power timeout fault on the auxiliary circuit	8	Controller overtemperature fault	41
Electric defrosting contactor adhesion fault	9	Motor overtemperature failure	42
Charging contactor adhesion fault	12	Motor temperature sensor fault	43
Battery voltage is not in the controller range	14	Controller overload	44
12V undervoltage fault	16	Motor speeding	45
12V overvoltage fault	17	The speed deviation is	46
EEPROM Read and write fault	18	EEPROM Failure	47
Internal CAN network	19	Active discharge	48
External CAN network	20	Bus underpressure	49

KL 30 voltage low fault	25	Bus overpressure	50
Main contactor closure	26	Controller over-	51
TM other faults	30	Motor overtemperature	52
Output overflow	31	Internal CAN network	53
Output current Hall fault	32	The CAN communication	54
Three-phase current	33	Bad power supply	55

Fault content	fault code	Fault content	fault
Turnover failure	56	P6.5V Abnormal power	91
E HPS System failure		**DCDC, a system failure**	
Output overflow	71	DCDC other faults	116
EPS Hall failure	72	The DCDC input	117
Three-phase current	73	The DCDC input is	118
phase fault	74	The DCDC input is	119
Overvoltage fault of bus	75	The DCDC output	120
Output phase absence	76	DCDC output is	121
Control power supply under-	77	The DCDC output is	122
Overvoltage fault of bus	78	DCDC substrate is	123
Bus underpressure failure	79	DCDC MOS Over-	124
Controller overtemperature	80	DCDC output	125
EPS motor overtemperature	81	The DCDC output is a	126
Unnormal temperature sensor	82	DCDC output overload	127
Controller overload fault	83	DCDC overtemperature	128
Overspeed failure	84	Temperature sensor	129
Excessive speed deviation	85	DCDC CAN Failure	130
EEPROM hitch	86	The DCDC soft start	131
Active discharge timeout	87		
Internal CAN network	88		
External CAN network	89		
Controller overheating	90		

.4. List of vulnerable parts

order	component name	order	component name	order	component name
1	Main drive contactor	7	Electric defrosting 1 gear contactor	13	Electric defrosting fuse
2	Primary drive precharge contactor	8	Electric defrosting 2 gear contactor	14	Fast charging fuse
3	Fast charge contactor	9	Main drive fuse	15	Slow charging fuse

4	Attached contactor	10	Oil pump fuse		
5	Attach the controlled pre-charged contactor	11	DCDC fuse		
6	Slow charging contactor	12	Air conditioning fuse		

Vehicle Controller

Catalogue

.1. Main technical parameters

1). Mechanical parameters:

External size: 207×148×41

Installation hole size: 6- Φ 7 Installation hole distance: 192×60

Installation moment of fixing bolt: 15-20 Nm

Protection level: IP67

2). Electrical parameters:

Rated working voltage: 12V DC

Operating voltage range: 9V~32V DC

Working power consumption: less than 150W

Static current: less than 3mA

The CAN channel: the 3rd channel

Hard line wake-up source: 3

Diagnostic protocol: UDS

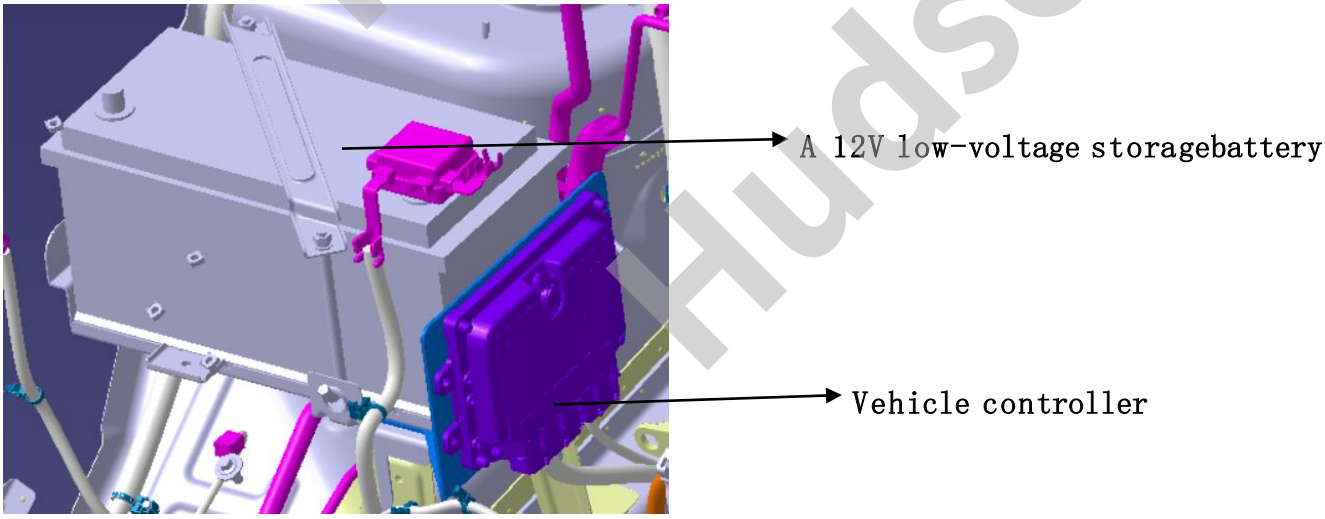
3) Use environment conditions:

Operating temperature: -40~85℃

Storage temperature: -40~105℃

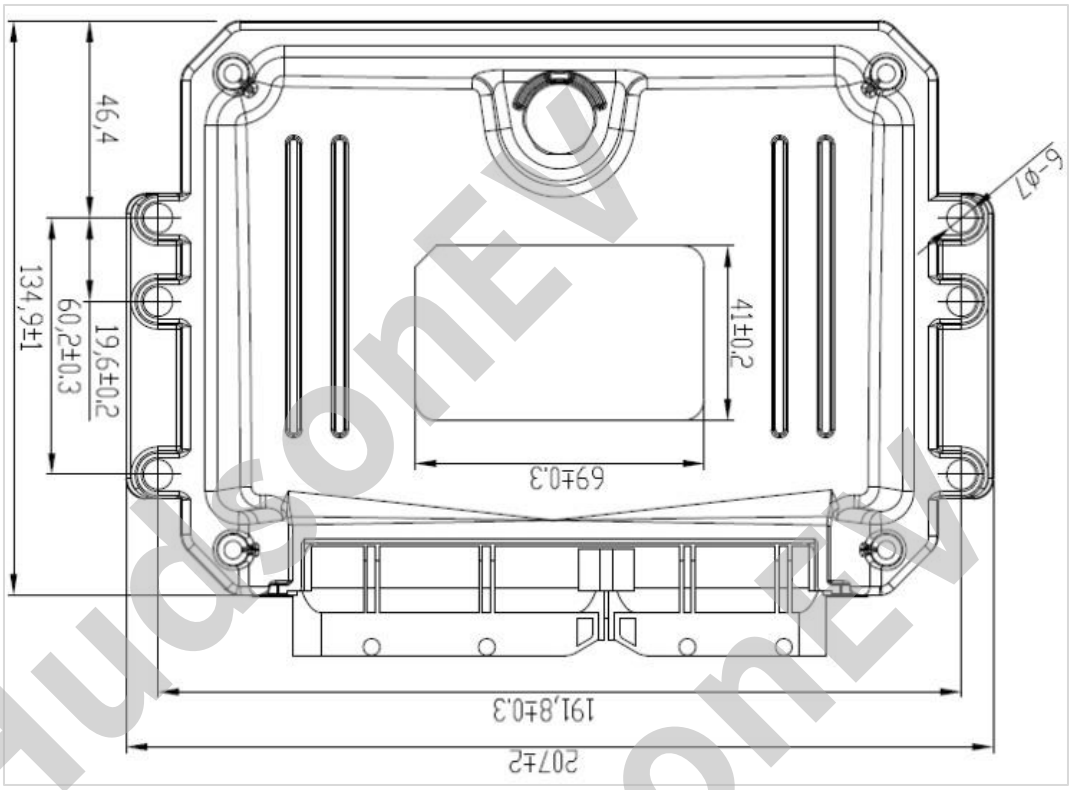
.2 Installation schematic diagram and external dimensions

The vehicle controller is installed next to the 12V low-voltage battery in the engine compartment and is side-mounted.

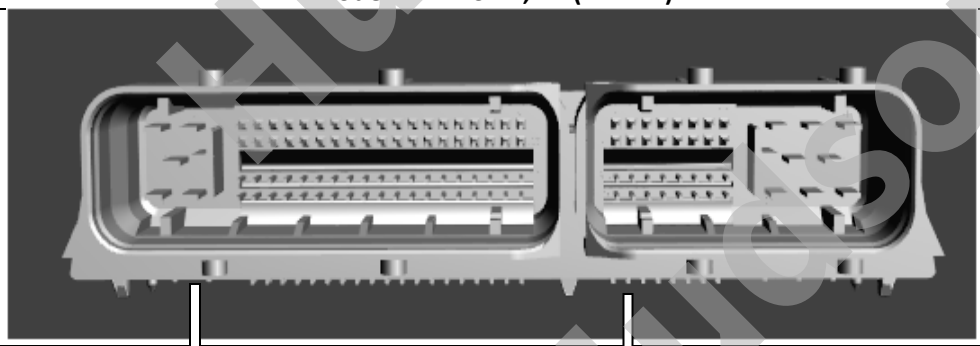
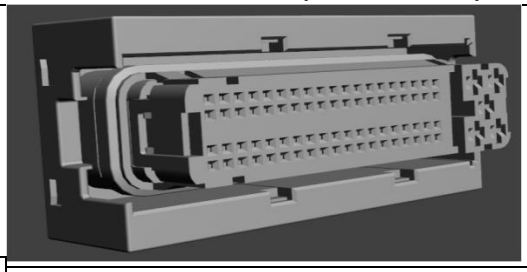
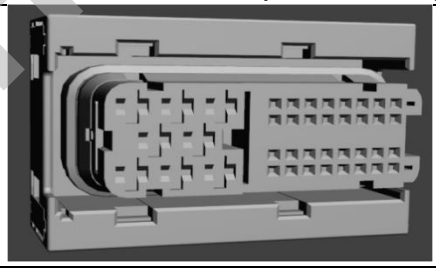


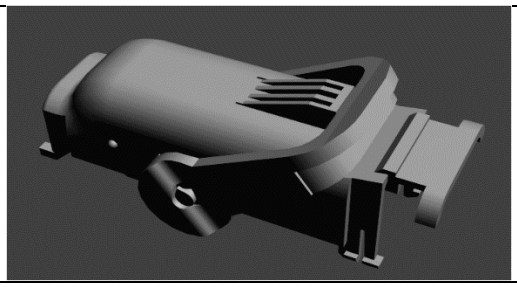
Installation diagram of the vehicle controller

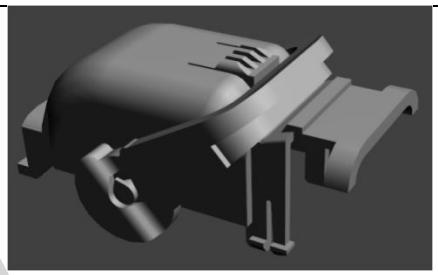
The overall dimensions of the vehicle controller may vary slightly due to multiple route changes during development. The following are for reference only



.3 Connector description and interface function definition

Vehicle controller end connector	
Model: 1241434-1, TE (121 Pin)	
	
Vehicle wiring harness, end connector	
Model: 1473244-1, TE (Zone A, 81 Pin)	Model: 1473252-1, TE (Zone B, 40 Pin)
	
Jacket model: 1473247-1	Jacket model: 1473255-1





The VCU hardware interface definition table					
signal sorting	Signal name	The pin definition	Signal type	electrical character	explain
Enter the power supply	Power is	4、5	source		
	Power to	1、3、114	the earth		
Output power supply	Accelerator pedal channel 1 power supply	13	Sensor power supply	5V	
	Accelerator pedal channel 2 power supply	16	Sensor power supply	5V	
	Accelerator pedal passage 1 ground	12	Sensor power supply ground	GND	
	Accelerator pedal passage, 2 ground	14	Sensor power supply ground	GND	
CAN	CANC_H	17	CAN	EXT_CANB_H	Drive CAN, with 120 Euro resistance
	CANC_L	18	CAN	EXT_CANB_L	
	CANA_H	21	CAN	EXT_CANA_H	Vehicle CAN, with 120 euro resistance
	CANA_L	22	CAN	EXT_CANA_L	
Switch quantity signal input	D gear		Message signal	EXT_DI_IN6_HS	
	R gear		Message signal	EXT_DI_IN9_HS	
	Brake switch signal 1	67	High edge input	EXT_DI_IN5_HS	
	Key ON gear signal	2	High edge input	EXT_DI_IN7_HS	

	Key-START-gear signal	43	High edge input	EXT_DI_IN2_HS	
	Charging wake up signal	40	High edge input	EXT_DI_IN8_HS	
	PTC start-stop request signal low-speed gear	75	Low edge input	EXT_DI_IN4_LS	Either contactor is effectively associated with a PTC working indicator signal (101 high side output)
	PTC start-stop request signal high-speed gear	47	Low edge input	EXT_DI_IN8_LS	
	Air-conditioning start request signal	66	Low edge input	EXT_DI_IN2_LS	
	Driving mode switching signal		Low edge input	EXT_DI_IN7_LS	Message signal
	Hand brake signal	80	Low edge input	EXT_DI_IN6_LS	
	cruise OFF	56	Low edge input	EXT_DI_IN9_LS	
	cruise V-	62	Low edge input	EXT_DI_IN1_LS	
	cruise RES	63	Low edge input	EXT_DI_IN5_LS	
	cruise ON/V+	64	Low edge input	EXT_DI_IN3_LS	
	Install the electric switch	103	PWM import	EXT_PO_PWM_IN 2	reserve
	Charge the electronic lock to unlock the signal	24	High edge input	EXT_DI_IN1_HS	
	Brake lamps control the output	118	High edge output	EXT_DO_OUTPUT8_HS	
	Overlamp lamp control signal	117	High edge output	EXT_DO_OUTPUT7_HS	Output when the R file is valid
Switch volume signal output	The MCU wake-up signal	116	High edge output	EXT_DO_OUTPUT3_HS	
	Fan low speed gear control signal	96	High edge output	EXT_DO_OUTPUT4_HS	
	The BMS arousal signal	92	High edge output	EXT_DO_OUTPUT1_HS	

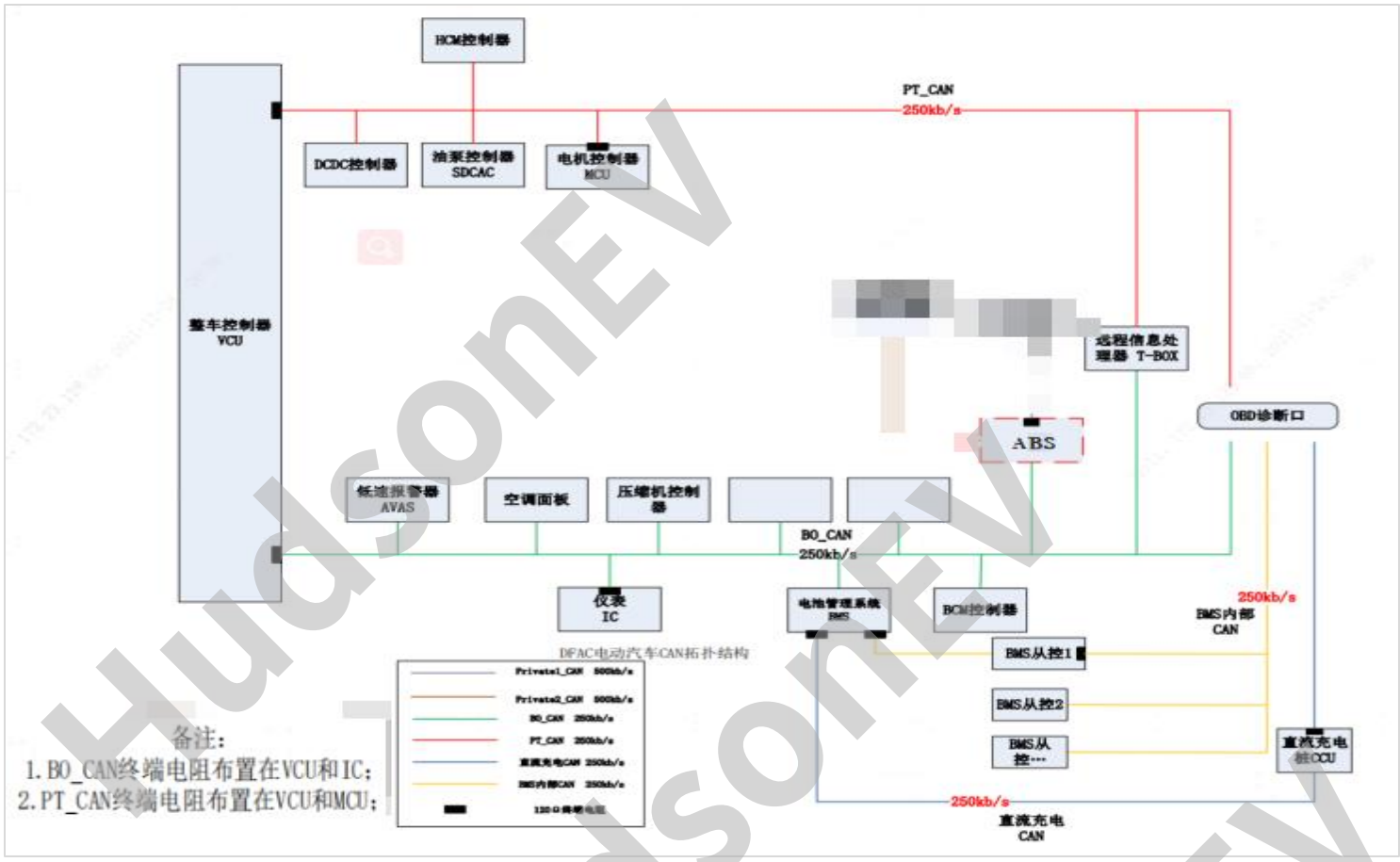
	Perperthe signal working signal	99	Low edge output	EXT_DO_OUTPUT8_LS	reserve
	Fan high-speed gear control signal	97	Low edge output	EXT_DO_OUTPUT4_LS	
	The PTC working indication signal	101	High edge output		
	Start-stop control signal	109	Low edge output	EXT_DO_OUTPUT15_LS	
read analogue input	Accelerator pedal signal # 1	31	analog input	EXT_AI_Anolog_IN1	0-5V
	Accelerator pedal signal # 2	15	analog input	EXT_AI_Anolog_IN2	0-5V
PWM import	Water pump fault feedback signal	112	PWM import	EXT_PO_PWM_IN1	reserve
PWM output	Pump control signal	84	PWM output	EXT_PO_PWM_OUT1	

Vehicle wiring harness Vehicle controller connector interface pin (line number) matching control view:

1473244-1

1473252-1

.4. Vehicle controller, CAN topology architecture



1. VCU has the function of gateway forwarding message.
2. The CAN Baud rate is 250 kbs;
3. A 120 euro terminal resistance on each CAN, a total of two ways;
4. CAN uses extended frames.

5. Main functions and control strategy of the vehicle controller

(1) Power-on timing management

a. Low voltage power function, as long as any of the following situations appear, VCU will perform the corresponding low voltage power strategy.

Low-voltage on the ignition key:

1). The VCU detects the IGN ON signal, and the VCU is awakened.

2). VCU conducts self-test. If the self-test fails, store fault, prohibit high voltage power and wait for low voltage power again.

3). VCU self-test passed, VCU wake up BMS, multiple integration, power to complete, and send VCU self-test status and key status.

Charging activation:

1). After inserting the gun, the fast charging pile detects the effective CC2 signal, the output Charge Active high level, and through the low voltage distribution

Box, to activate the VCU.

2). After the VCU is awakened, conduct a self-test. If the self-test fails to store the fault, prohibit the high voltage power and wait for the low voltage power on again.

3). If the self-test passes, VCU will wake up BMS, multi-one, and power on.

b . High voltage electric function

1). High voltage on key

2). Fast charge / slow charge request on the high pressure

(2) Power generation timing management

a. Low voltage power function: after the high voltage power is completed or not, it is allowed to enter the low voltage power treatment

The following steps:

1). Key under electricity

After the key ON signal is invalid, the VCU waits for the main negative break or the main negative break to time out. Then the VCU controls the BMS and closes the low voltage power.

2). Charge to wake up the electricity

After the charging wake-up signal is invalid, the VCU waits for the main negative disconnect or the main negative disconnect to timeout, and the VCU controls the BMS and closes the low voltage power.

b . Lower high voltage electric function

1). Key OFF under high pressure

2). Charging completes the down high voltage

3). High pressure under fault

(3) Gear management

The VCU receives the message signal from the gear controller and analyzes the current gear signal based on the current vehicle speed and brake pedal status. When the VCU determines that the R gear is valid, it outputs a hard wire signal for the reverse light control. The D/R/N gears of the gear controller are all message signal inputs.

The shift logic is as follows:

N gear to D gear, (driving high voltage power & & brake signal effective & & gear detection is D & & speed) (Note: braking first, then at the same time), do not need to brake when N gear to D gear.

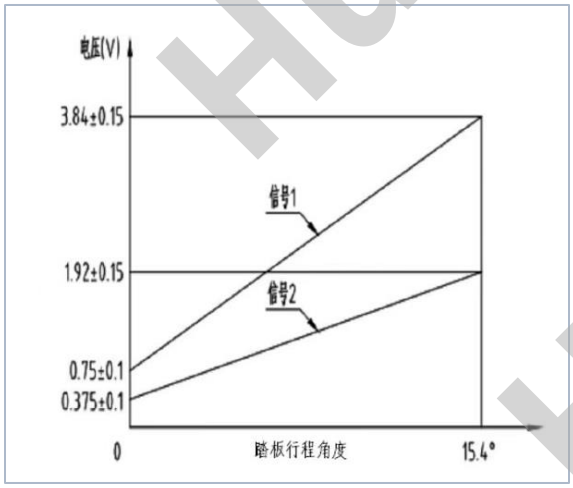
D gear to N gear, gear detection is N

N to R (the high voltage power & & brake signal is R & & speed 3 km/h) (Note: braking first, then gear)

(4) Accelerator pedal signal analysis function

Filter the sampled values of the two pedal opening sensors to filter out jitter and small changes.

Based on whether the power status of the accelerator pedal sensor is normal and whether the two pedal opening signals are proportional, determine whether the pedal opening value is valid and handle the fault. When the accelerator fails, the vehicle enters limp limited power mode, and the relevant CAN signal flag is located at position 1



(5) Brake pedal signal resolution function

The VCU determines whether the brake pedal signal is valid according to the brake switch input and sends the corresponding CAN signal state.

(6) The MCU drive management

a. Normal drive

Under READY driving, the VCU controls the MCU to drive the vehicle through the target torque. Calculate the target torque and rate of change based on the changes in the accelerator pedal. The MCU provides real-time feedback on the current maximum allowable output torque to the VCU. The VCU combines the maximum allowable output torque of the MCU with the maximum allowable charging and discharging battery value of the BMS and the required torque corresponding to the throttle pedal opening to output the target torque to the MCU; When VCU controls the discharge current, it determines the working status of high-voltage auxiliary components and includes them in the working current; Control the discharge current to not exceed the BMS allowable value during full throttle acceleration and cruise control.

Through actual calibration and optimization of parameters, the VCU provides a stable target torque without significant fluctuations, responds quickly to the throttle and brake pedals, and avoids vehicle shaking during starting and driving. The vehicle starts smoothly without slipping with small throttle on icy and snowy roads.

b. Brake first

When driving READY, the VCU simultaneously detects input signals from the accelerator pedal and brake pedal. If both acceleration and braking inputs are detected to be effective, the braking function takes priority, and the VCU only responds to braking requests, sending a torque demand of 0.

c. Driving is prohibited when charging

When the CC / CC2 / A + force is detected and the speed ≤(3KM), the VCU target torque control is always 0.

d. Motor system torque / direction control

R gear

The VCU sends positive torque, negative speed, drives the wheel in reverse motion, and the vehicle reverses.

N gear

The VCU sends a zero torque.

D gear

Drive: The VCU sends positive torque to drive the wheels forward and move the vehicle forward.

Feedback: the current rotation direction of the motor is positive, and the VCU sends negative torque to recover the electric braking energy.

Note: D/R VCU sends a pipe opening command to MCU, but does not open the pipe in N gear

(7) Torque parsing function

a. Torque coordination

The main function of the torque coordination is to coordinate all the torque demand output, including:

Status 1: Driver demand torque

Status 2: constant cruise speed torque

State 3: energy recovery torque

b. Torque limit

1) Non-Ready torque limit

The torque output is limited to 0 in non-Ready cases.

2) Mechanical restrictions

The rear axle allows maximum drive torque limit (standard quantification) of 320 NM.

The rear axle allows a maximum back drag torque limit (standard) of 320 NM.

3) Static limitation of battery / motor

4) Dynamic restrictions

c. Torque smooth

The VCU should smooth-filter the changes in the torque required by the driver, aiming to avoid the drastic changes in the torque and make the driving smooth.

d. Energy distribution

1). Pure electric energy distribution

Battery heating 3kW (distributed when heating)

PTC heating 1 gear 1.5 KW, 2 gear 3.5 KW (PTC on)

Air conditioning refrigeration without air conditioning controller configuration value of 2KW;

DCDC DCDC, The input power

Turn to DCAC oil pump DCAC, input voltage * Oil pump DCAC, input current

Upper reserved 6kW (assigned when upper open)

2). External characteristics of motor

Test the data according to the motor bench

Peak value was at 320 NM

e. Lameness

After the vehicle enters limp mode, the VCU controls the vehicle speed to not exceed 20Km/h and controls the MCU output power to not exceed 50% of the maximum power. In this mode, if there is no throttle pedal malfunction, the vehicle responds to the throttle pedal opening for driving. If there is a malfunction in the accelerator pedal, the VCU will automatically control the vehicle speed to stabilize around 20Km/h, and the priority of braking still needs to be ensured. Malfunctions in implementing the limp home strategy include:

1) The accelerator pedal fails

2)、/

Limp is entered if all the following conditions are met, if any condition cannot be met:

1), READY state;

2), D or R; (if there is a difference between maximum speed at R and lame top speed, take the smaller value of 2, currently =20)

3) The handbrake signal is invalid;

4) The brake signal is invalid;

5) No level 3 or above fault;

f. Top speed limit function

When the current gear is R gear, adjust the current output torque value to limit the speed of not greater than 20 km/h (error + 5%). When the current gear is D gear, adjust the current output torque value to limit the speed of no more than 100 km/h (error + 5%).

g. Regenerative braking energy recovery

Brake energy recovery

Gliding energy recovery

Vehicle energy feedback allowable conditions:

1), the vehicle READY & & current gear D gear

2) Non-constant cruise state

3) Allowable charging power> 5kW (TBD) & & SOC <95% (TBD)

4), ABS function is not activated ABSActive=0 (not activated)

5) Speed> 10KM / H & & speed <90KM / H

(8) . PTC (electric defrosting) control function

The PTC 1 is turned on when the following conditions are met simultaneously

1. Electric defrost 1 to open the request is valid

2. Attachment contactor engagement

Exit: Close PTC 1 when any of the above conditions are not met

The PTC 2 is enabled when the following conditions are met simultaneously

1. Electric defrost 2 to open the request is valid

2. Attachment contactor engagement

Exit: Close PTC 2 when any of the above conditions are not met

(9) . DCDC control function

DCDC for charging the low-voltage batteries:

DCDC when any of the following conditions are met

1) . The IGN _ ON is valid and the auxiliary drive contactor is closed

2) . The charging wake-up signal is valid and the auxiliary drive contactor is closed

Stop to enable DCDC if any of the following conditions are met

1) . The IGN _ ON is invalid and the actual motor speed is <300rpm

2) . Charging end

(10) . Oil pump DCAC control function

Oil pump enabling conditions:

When the vehicle is in the following state, the transmission pump DCAC enables boot, otherwise the transmission DCAC shutdown

1. HCM " Main loop main relay is closed

In the oil pump capacity case:

① After high voltage power-on, the VCU initially sends the rotating pump motor speed of 900rpm (75Hz);

② VCU detects the output current value I of DCAC over 1.2A, adjust the motor speed of the pump motor to 1280rpm (107Hz);

③ When the VCU detects that the output current effective value I of DCAC is less than 1.2A for more than 10 seconds, control the speed of the rotary pump motor back to 900rpm (75Hz).

Oil pump stop enabling conditions:

Send DCAC enables downtime 20ms before sending HCM "drive circuit relay" to the VCU.

(11) . Electronic water pump control function

Drive the system water pump 1

The electronic water pump is endless speed regulating, and three gears are set here.

Stop gear: water pump control signal PWM output duty cycle of 0%,

Low speed working gear: PWM output duty cycle 48% (TBD),

High speed working gear: 98% (TBD).

1) .(VCU, receiving key ON signal or charging wake signal) and the accessory contactor is powered on, control the water pump to operate at low speed

2) . If any of the following conditions are met, the VCU control water pump switches from the low speed to the high speed

Motor temperature (MCU _ MotorTemp)> 90℃ (TBD)

MCU temperature (MCU _ CtllerTemp)> 48℃ (TBD)

DCDC （DCDC_Temp ）＞55℃（TBD ）

3) . At the same time, the VCU control pump switches from high speed to low speed.

Motor temperature (MCU _ MotorTemp) <80℃ (TBD)

Electrically controlled temperature (MCU _ CtllerTemp) <40℃ (TBD)

DCDC （DCDC_Temp ）＜45℃（TBD ）

4) .(VCU keyless ON signal and no charging wake-up signal) or the accessory contactor is disconnected, and the control pump delay will stop working for 10s.

Water pump fault judgment condition:

1) . The pump fault feedback signal is low level duration of 1 second (± 0.2 seconds, within 0.8~1.2 seconds), detected for three consecutive times,

Determine the dry turn fault, fault code 239.

2) . The pump fault feedback signal is low level duration 1.5 seconds (± 0.2 seconds, within 1.3~1.7 seconds), continuous detection three

Second, determine the blocking bypass fault, fault code 240.

3) . The pump fault feedback signal is the low level duration of 2 seconds (± 0.2 seconds, within 1.8 to 2.2 seconds), detected for three consecutive times,

Overtemperature fault, fault code 241.

(12) . Details of the fan control function

a. Drive motor and multi-in-one controller temperature control fan

(VCU, key ON signal or charge wake up signal) and the accessory contactor,

1) . If any of the following conditions, close the low speed fan relay and disconnect the high speed fan relay.

Motor temperature (MCU _ MotorTemp) 92℃ (TBD)

MCU temperature (MCU _ CtllerTemp) 50℃ (TBD)

DCDC Temperature (DCDC _ Temp) 50℃ (TBD)

2) . At the same time, disconnect the low speed fan relay and the high speed fan relay when the following conditions are met.

Motor temperature (MCU _ MotorTemp) 89℃ (TBD)

MCU temperature (MCU _ CtllerTemp) 47℃ (TBD)

DCDC Temperature (DCDC _ Temp) 45℃ (TBD)

3）. If any of the following conditions is met, disconnect the low speed fan relay and close the high speed fan relay after 5s.

Motor temperature (MCU _ MotorTemp) 105℃ (TBD)

MCU temperature (MCU _ CtllerTemp) 58℃ (TBD)

DCDC Temperature (DCDC _ Temp) 60℃ (TBD)

4）. At the same time, when the following conditions are met, disconnect the high speed fan relay and close the low speed fan relay.

Motor temperature (MCU _ MotorTemp) 102℃ (TBD)

MCU temperature (MCU _ CtllerTemp) 55℃ (TBD)

DCDC Temperature (DCDC _ Temp) 55℃ (TBD)

b. Air-conditioner start-stop control fan

When the thermal management system controller requests to start the air conditioning or compressor, the low-speed fan is turned on for 5 seconds, and the high-speed fan is turned on. When the air conditioning start stop request signal becomes valid but invalid, the high-speed relay of the fan is disconnected after a delay of 30 seconds. If the request becomes valid within a delay of 30 seconds, the high-speed relay of the fan is maintained to be engaged.

(13) . Cruise control function

a. Cruise entry at fixed speed

Conditions for entering the cruise mode are as follows:

1). Current speed 40 km/h (TBD) Speed 100 km/h (TBD)

2). The VCU detects that the endurance switch request signal is enabled and is not currently in cruise mode

3). The brake pedal signal was not detected in the VCU

4). No ABS activation signal was received from the VCU

5). The gear is in D gear

6). No vehicle secondary or above fault (power limit & prohibited driving & PRA OFF fault)

When the VCU determines that the above conditions are met simultaneously, the VCU enters the cruise control mode and sends the current vehicle speed as the cruise speed. The required torque is calculated and sent to the MCU, which drives the motor to work at a certain speed. The VCU receives the current motor speed and actual vehicle speed, adjusts the output torque of the driving motor in real time, and forms a closed-loop control mode to ensure that the vehicle travels at a constant speed.

b. Cruise exit at fixed speed

The conditions for the system to exit the cruise mode are as follows:

1). The VCU detection gear is in the non-D gear.

2). Currently on cruise, the VCU detects the cruise OFF signal.

3). Vehicle level II and above fault.

After the VCU determines that any of the above conditions are met, it exits the cruise mode and returns to the normal drive management mode.

c. Battery life function pause and re-entry

During the cruise, when the brake pedal or VCU is pressed, the ABS Active activation signal will temporarily exit the cruise. In order to restore the cruise control function, the following conditions must be met:

1）. The VCU detects a cruise RES signal

2）. Speed is increased to above 40KM / H

When the above conditions are met, the VCU controls the cruise speed set by the vehicle at the above time.

If the system completely stops the cruise system, the previously set cruise speed will be cancelled. If you want to re-enter the cruise system, press the cruise mode Formula condition re-operation.

d. Cruise speed setting

The driver may previously set the vehicle speed between 40 km/h (TBD) and 90 km/h (TBD).

You can change the preset cruise speed using any of the following methods:

1). VCU receives the speed increase signal cruise ON / V +, responds to increase the speed demand, each time the signal effectively increases 2 km/h on the original basis (TBD);

2). The VCU receives the cruise speed V-signal, responds to reduce the vehicle speed demand, each time the signal is effectively reduced by 2km / h on the original basis;

3). Step on the accelerator pedal, when the speed increases to the required speed, the cruise ON / V + signal is effective;

4). Gently press the brake pedal, release the pedal when the speed decreases to the required speed, and the cruise ON / V + signal is valid.

e. Cruise and overtake at fixed speed

During cruising, the VCU detects the rate of change in the accelerator pedal to determine whether it is currently in an accelerating overtaking state. If it is determined that the vehicle is in an accelerating overtaking state, the cruise control function will be temporarily disabled, and the VCU will calculate the output torque based on the actual throttle depth. When no throttle depth signal is detected and the cruise entry conditions are met, the cruise mode is activated again, and the VCU maintains the pre acceleration cruise set torque output.

f. Cruise feedback at fixed speed

Release the accelerator pedal, after the vehicle enters cruise control, the VCU will not enter the slide feedback.

(14) . Range range and power consumption calculation

The average energy consumption of VCU per 100 km is calculated =35, and it is updated every 10 Km according to the mileage.

VCU test BMS _ 20 power message: 0x1820E2F4, if 0x1820E2F4 is not detected, the range is pressed as follows:

77 Kwh * SO C/V CU _ 3 (0xC0328D0) * 100 calculation,

If 0x1820E2F4 is detected, it is calculated according to the actual total power sent by BMS and the average energy consumption of the total power * SO C/V CU _ 3 (0xC0328D0).

(15) . Vehicle troubleshooting

	Error Level Specification **Fault grade description**		
Hudson car Fault level definition	***Fault grade Error Level***	*The INV fault response description* ***Specification***	*Description of the VCU fault response* ***Specification***
	0		No faulty
	1		Alarm, unlimited torque
	2		Limit the torque to 50% of the peak torque, and limit the speed of 60 km/h
	3		Limit the twist to 0% of the peak torque

	4		Lower high pressure, broken main positive contactor, broken main negative contactor

Note: Both multi in one and VCU will generate fault levels, and VCU will handle them according to the fault level. BMS did not generate any fault levels, but level 1-3 faults have already undergone current limiting treatment. For level 4 extreme faults, BMS requests high voltage from VCU.

(16) .UDS diagnose

ISO14229

UDS supports two CAN, power and vehicle can can communicate.

(17) . ECO, mode control

a. Go into the ECO Mode

The default of the key is in ECO mode. When VCU, the S file signal is detected, the Normal standard mode is sent, and the S file signal is the gear controller message signal.

b.ECO Mode

Upon entering the ECO Mode, the acceleration is smaller than the Normal mode. In the ECO mode, the VCU performs the following tasks:

1). Send the VCU _ ECO Mode mode indication signal to the IC;

2). Increase the vehicle energy recovery strength, recovery torque according to the vehicle speed check table;

3) . The torque increase slope will be slower than the normal D-gear driving situation to achieve energy saving effect, this parameter should be set to be calibrated online;

4). The torque output of ECO mode should be different from Normal mode, and the torque is less than Normal mode at the same opening.

c. Quit the ECO Mode

In ECO runs, ECO mode is withdrawn if any of the following conditions are met:

1) It is currently in ECO mode and the input signal is valid.

(18) .AC control function

When the following conditions are met, send the message VCU _ ACCompressorWorkEnCmd = 1.

. 1) Suction of the accessory contactor

. 2) SOC ≥25%

3). BMS allows a surplus of maximum discharge power, namely the discharge power of the battery pack-the power of the oil pump DCAC -Power> 5KW for the DCDC

The above conditions are met and the AC start request is valid, and the hard wire can control the air conditioning compressor start and stop control signal- - -the output is valid

When any of the following conditions are met, send the message VCU _ ACCompressorWork En Cmd = 0.

1) . 500ms before the VCU request disconnects the accessory loop contactor

2) .SOC ＜20%

3) . BMS allows the maximum discharge power without surplus, that is, the discharge power of the battery pack-the power of the oil pump DCAC-the power of DCDC 5KW

When any of the following conditions are met, the hard wire stops and enables the air conditioning compressor- -the output is invalid

1) . 500ms before the VCU request disconnects the accessory loop contactor

2) . The AC open request is invalid

3) .SOC ＜20%

4) . BMS allows the maximum discharge power without surplus, that is, the discharge power of the battery pack-the power of the oil pump DCAC-the power of DCDC 5KW

6. The vehicle controller fault code table

Fault content	fault code	Fault content	fault code
The CAN bus B USOFF fault	220	Limp fault	236
The MCU communication is	221	The HCM communication	237
The BMS communication is lost	222	DCDC / dynamic turn, air pump, vacuum pump	238
The gear signal is abnormal	223	Water pump dry turn	239
Brake switch failure	224	The pump has a blocked	240
Accelerated pedal anomaly	225	Water pump	241
Battery voltage is abnormal	226	An ABS / ESC	247
Vehicle level 1 failure	232	The ON gear high	248
Grade II failure of the	233	The STA high voltage	249
Vehicle level 3 failure	234	Uploading system	252
Vehicle level 4 failure	235		

Slow charging charger

Catalogue

1. Main technical parameters

1）. Working environment temperature: -40~60℃

2）. Storage temperature: -40~105℃

3）. Rated output voltage is 312VDC, and output voltage range: 200-450VDC

4). Maximum output current is 20A ± 1%

5). Protection level: IP67

6）. Maximum output power: 6.6KW

7) . Input voltage range: 90~265VAC, 50-60 HZ

8）. Insulation resistance: 1000VDC, meet the output and input to the case

Insulation resistance of 20 megohms

9). Ground resistance: under test current 25 ADC, the resistance between AC PE and the ground point is less than 100 mu

10). Power factor: 0.98

11）. Maximum efficiency: 93%

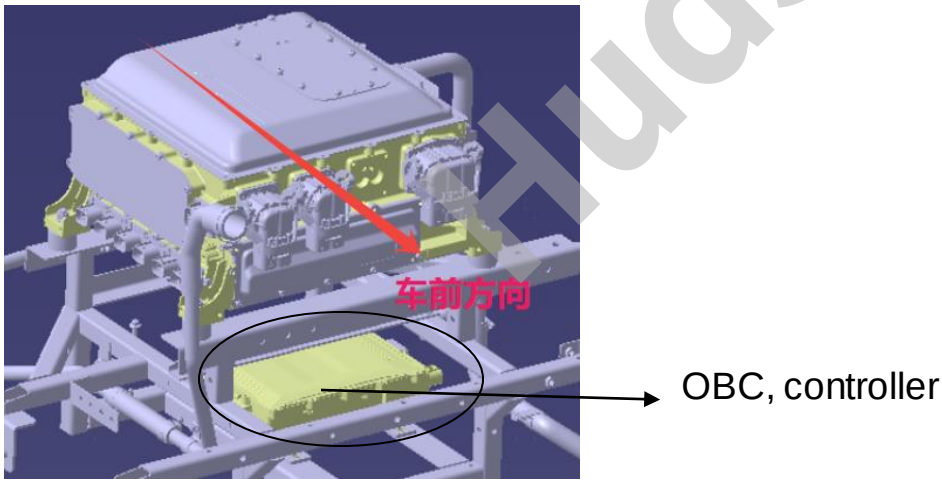
12）. Heat dissipation form: air cooling

13）. The charger has the protection functions of short circuit, undervoltage, overvoltage and overheating

14). The wake-up port has the reverse power supply shock protection function

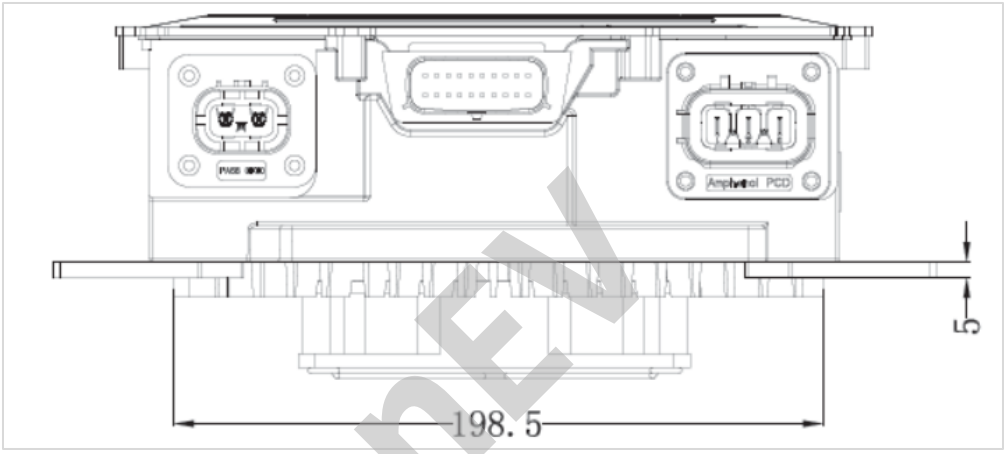
.2 Installation schematic diagram and external dimensions

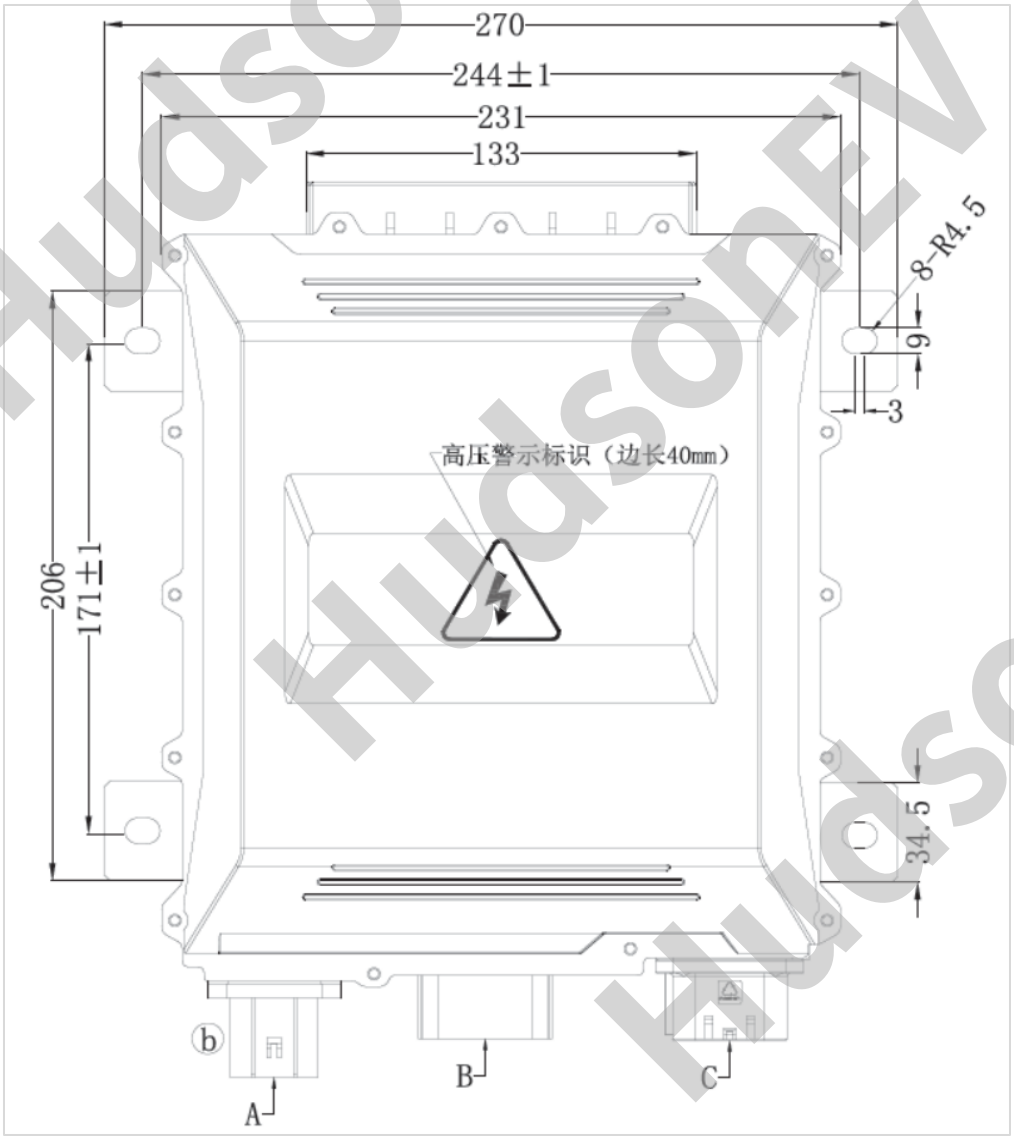
The slow-charger (OBC) is installed directly below the all-in-one controller in the engine cabin.



A Schematic diagram of the installation position

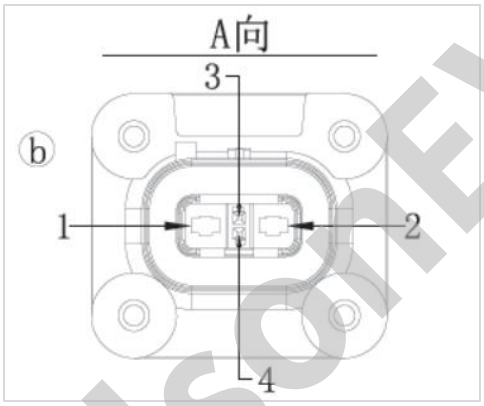
Overall structure dimensions:



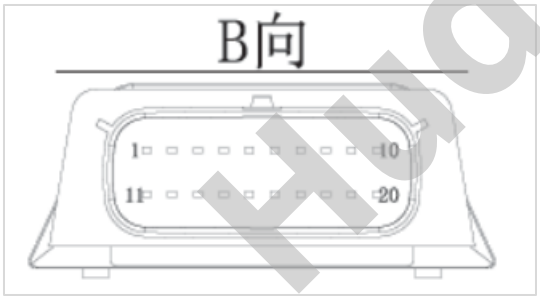


3. Connector description and interface function definition

Combined with the shape structure view, the functions of each connector pin and interface are described as follows:

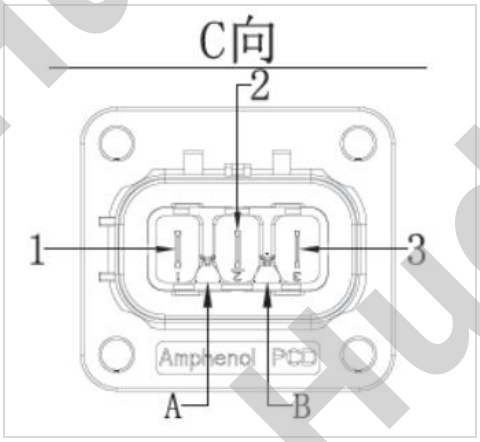


2310540-5 charger outlet terminal			
brand	PIN foot	definition	Line color and line diameter (mm^2)
TE Connectivity	1	positive pole	Red / 4
	2	negative electrode	Black / 4
	3、4	High-pressure interlock (unused)	Black / 0.5



348302001 Low-voltage signal end of the battery charger			
brand	PIN foot	definition	remarks
Molex	5	CC	
	6	C P	
	7	Regular electricity input	
	8	Electronic lock power supply is positive	
	9	12V /0.2A+	Convert the output from normal current input
	10	12V/5A+	unused

	11	CANH	
	12	CANL	
	13	High-voltage interlock signal # 1	unused
	14	High-voltage interlock signal # 2	unused
	15	Electronic lock feedback (K / E)	
	17	GND	
	18	The electronic lock power supply is negative	
	the others	N C	unused



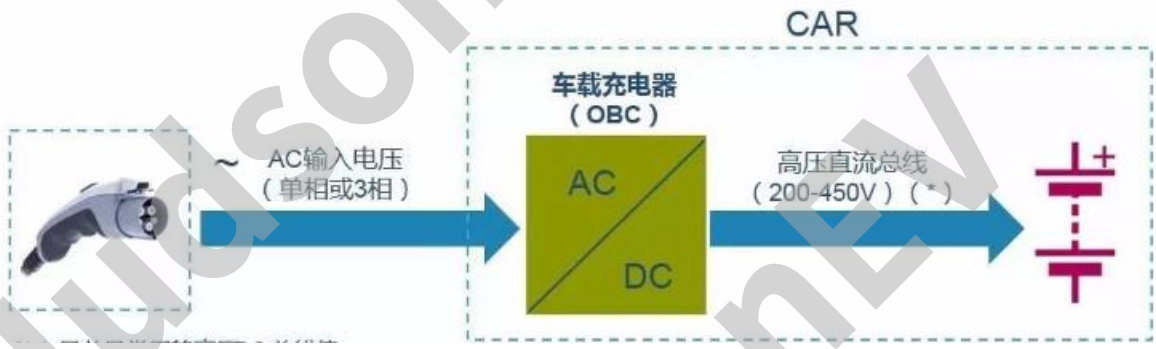
HVSL633023A (SP01A023A) charger 220V input socket end			
brand	PIN foot	definition	Line color and line diameter (mm^2)
Amphenol	1	null line (N)	Blue / 6
	2	earth wire (PE)	Yellow green / 6
	3	battle line (L)	Brown / 6

The connector information on the harness side of the above A \ B \ C interface is as follows:

Supporting pair connector information on vehicle harness side (reference)			
Port name	Match the plug-in model	Supporting terminal	Remarks accessories
	HVSL633063A106I	C310003623	keep in the mouth

Charger input port C	(SP01A063A106I)	(SP01N 63001S)	
Charger output port A	2310537-5	Contains the terminal	keep in the mouth
Signal port B	334722006	330122002	The remaining (including) 343450001 (blind blocking)

4. Block diagram of connecting the OBC system



5. Slow charge control strategy

1). After OBC, monitor the CC, CP and slow charge electronic lock signals are effective, and send the CC connection status to BMS is connected (CCS_CCSts =1)

CP signal value (CCS_CPSts =x%), slow charge electronic lock is locked state (CCS_ElockSts =1), at the same time output Charge Active high level, through the low-voltage distribution box, activate VCU, BMS, multi-in-one, instrument;

2). OBC, VCU, multi-one and BMS conduct self-test, BMS controls the main negative engagement, VCU controls auxiliary drive suction, and sends DCDC drive ability;

3). BMS sends the current vehicle maximum allowable charging voltage to OBC (BMS _ CCS _ MaxChargVolt = x) and the feedback slow charging signal is valid （BMS_CCS_CC =1）;

4). The BMS sends the CC charging connection confirmation signal to the instrument (BMS _ CC = 1), when the instrument lights on the charging connection indicator light;

5). The BMS sends the VCU (BMS _ ACChgRelay _ Req = 1), and the VCU receives it to the high pressure power controller

Send the allowable slow charging connector closing instruction (VCU _ ACChgRelay _ CMD

1). After the slow contactor closes, the high pressure power controller feedback to the current slow contactor has been closed (HCM _ ACChgRelaySts = 1), and the VCU reports to the BMS that the current slow contactor is closed (VCU _ SlowChargeRelaySts = 1);

6). After the slow charge contactor suction, BMS feeds back to the instrument and VCU during the current identification charging process (BMS _ ChrgSts = 1, CC / CC2 effective & charging connection

Touch state is closed), then the instrument displays as the battery charging and charging state icon;

7). BMS sends the CCS control open command to OBC (BMS _ CCS _ ACChargMode = 1), and OBC is in preparation;

8). BMS combines the current power battery state and OBC output capability to charge the OBC (BMS _ CCS _ MaxChargVolt = x)

And the maximum charging power limit (BMS _ CCS _ ChargPW = x);

9). After OBC receives 8), combined with the CP value (determine the power supply current value of the power supply equipment) and the CC value (determine the rated capacity of the cable), through the data of the three

Take the minimum value as the output current value;

10). OBC detects the battery voltage, that is, the slow charging contact is absorbed and combined with 9) to start the inverter output, and the instrument displays the slow charging interface.

6. OBC fault code table

fault	Fault name	Description of fault content
156	OBC hardware malfunction	All hardware errors of the charger, such as output relay error, voltage detection hardware error, current detection hardware error, internal temperature detection hardware error, internal 12v power supply error, output short circuit error, etc
157	Overtemperature protection	The temperature inside the charger is above 90 degrees Celsius
	AC input voltage error	Input voltage is below 85V or greater than 265V
	Start the battery voltage error	At the beginning, the BMS does not close the relay between the charger and the battery, so the charger will report the fault after the charging 1. If the heating mode command sent by the BMS, the battery is considered to be normal even if there is no battery voltage
	Communication error	The charger 5s has not received the control message
	CC wrong	Abnormal cc, infinite CC resistance or CC resistance of 3.3K ohms
	CP wrong	The cp value is abnormal, the duty cycle is no longer allowed within the charging range, and the PWM wave frequency is not 1 KHZ
158	Electronic lock error	The electronic lock state is not consistent with the electronic lock feedback signal, and it is still not consistent for three times

Electric drive bridge assembly

Catalogue

1. Main technical parameters

1）. Rated load 3000 Kg, rim mounting spacing 1835mm, spacing 1703mm; bridge shell section 100 * 100 * 6 mm.

2）. Total speed ratio of motor & reducer 15.58, rated power 60KW, maximum speed 12000rpm and maximum torque 320N.m 。

Permanent magnet synchronous motor, rated voltage of 380VDC (DC side of motor controller).

3）. Brake type oil brake, drum type, specification Φ 300 * 75, brake two-way double collar hoof type, cylinder specification Φ 26.99, tubing interface size

M10*1-6H 。

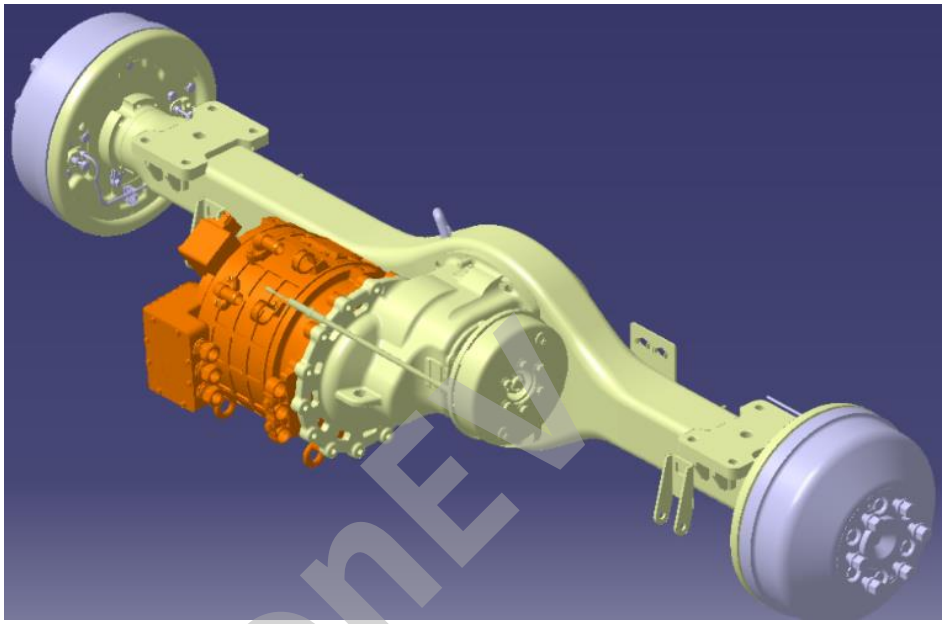
4). Automatic gap adjustment arm, ABS tooth ring tooth number 48, sensor swing line interface form 4497110600.

5). Assembly manufacturer: Dongfeng Dana Dongfeng DanBridge Co., Ltd., electric drive bridge product platform E P5; drive motor model TZ228XS015.

6). Brake torque of a single brake at 0.6Mpa is 2900 N. And m, rim 6J * 16, tire 215 / 75R16C.

7). Wheel installation form of stop positioning, stop diameter Φ 84 mm, wheel bolt 6-M14 * 1.5, distribution round Φ 130 mm.

2. Parts, schematic diagram and precautions



Schematic diagram of parts

matters need attention

Pay attention to the following precautions during repair:

●Please work in areas with low levels of dust and dust.

●Before major repairs, please clean the exterior of the parts.

●Please keep the working position clean and keep the parts away from contamination and foreign objects.

●Please confirm reassembling the disassembled parts in the correct order. If work must be temporarily interrupted, please cover the parts with clean covers.

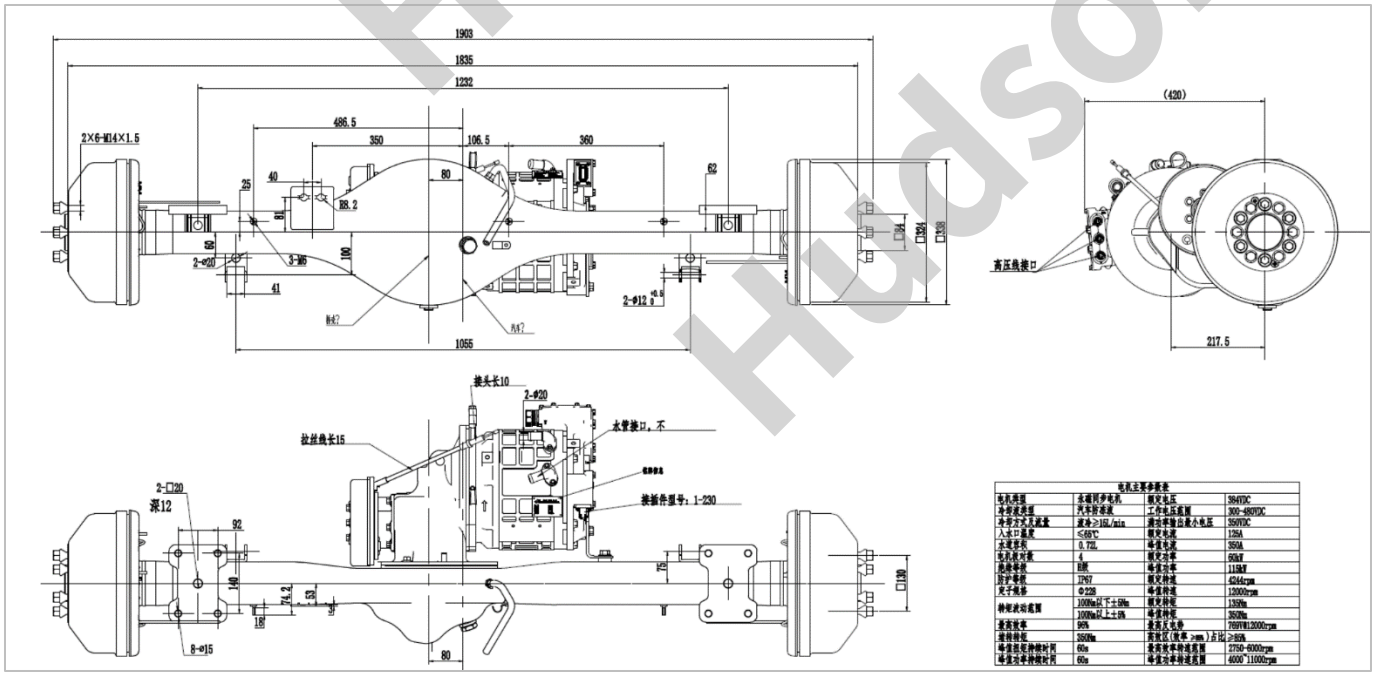
●Please use absorbent paper. If using a cloth thread, it may stick to the parts. Do not use fabric.

●Clean the decomposed parts (excluding rubber parts) with kerosene and blow air to drain the oil or absorb it with absorbent paper.

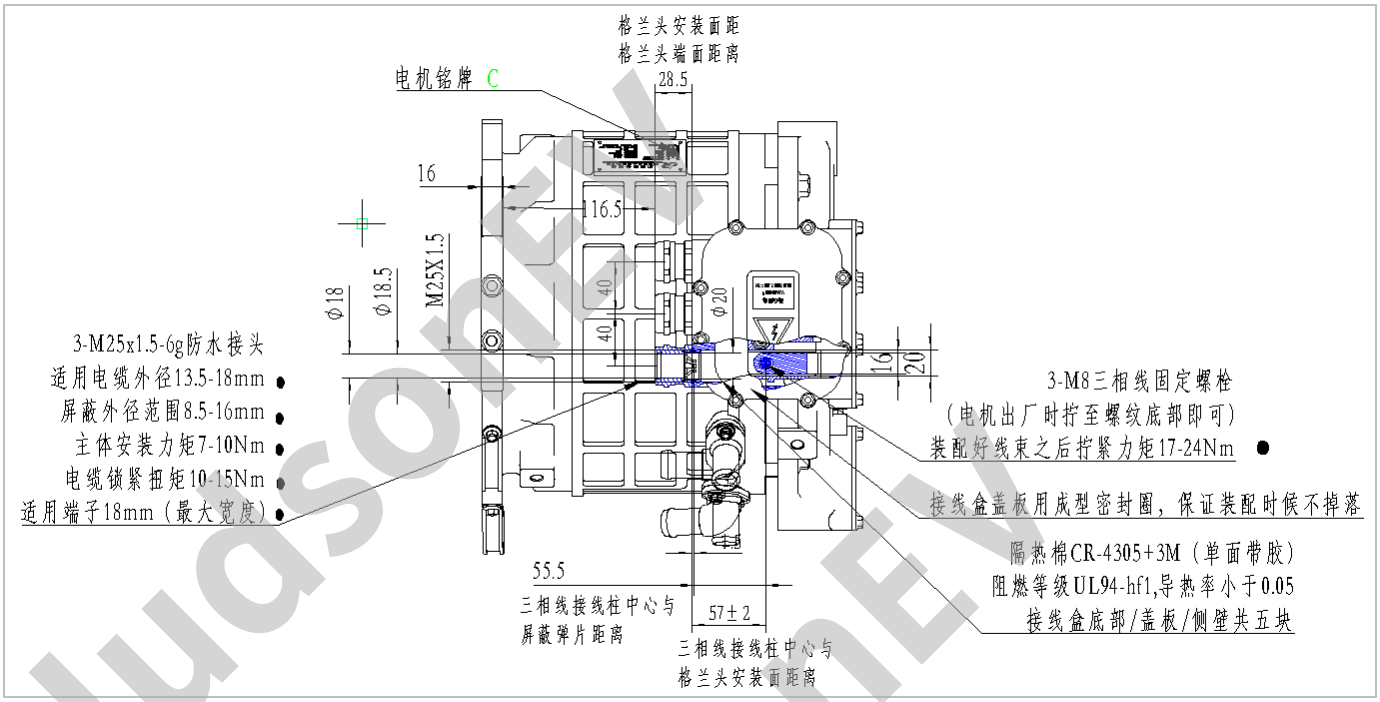
●Gear oil requirements: mineral oil type, quality grade API GL-5, viscosity grade 85W-90, filling amount 4.5L, filling position on the back cover side.

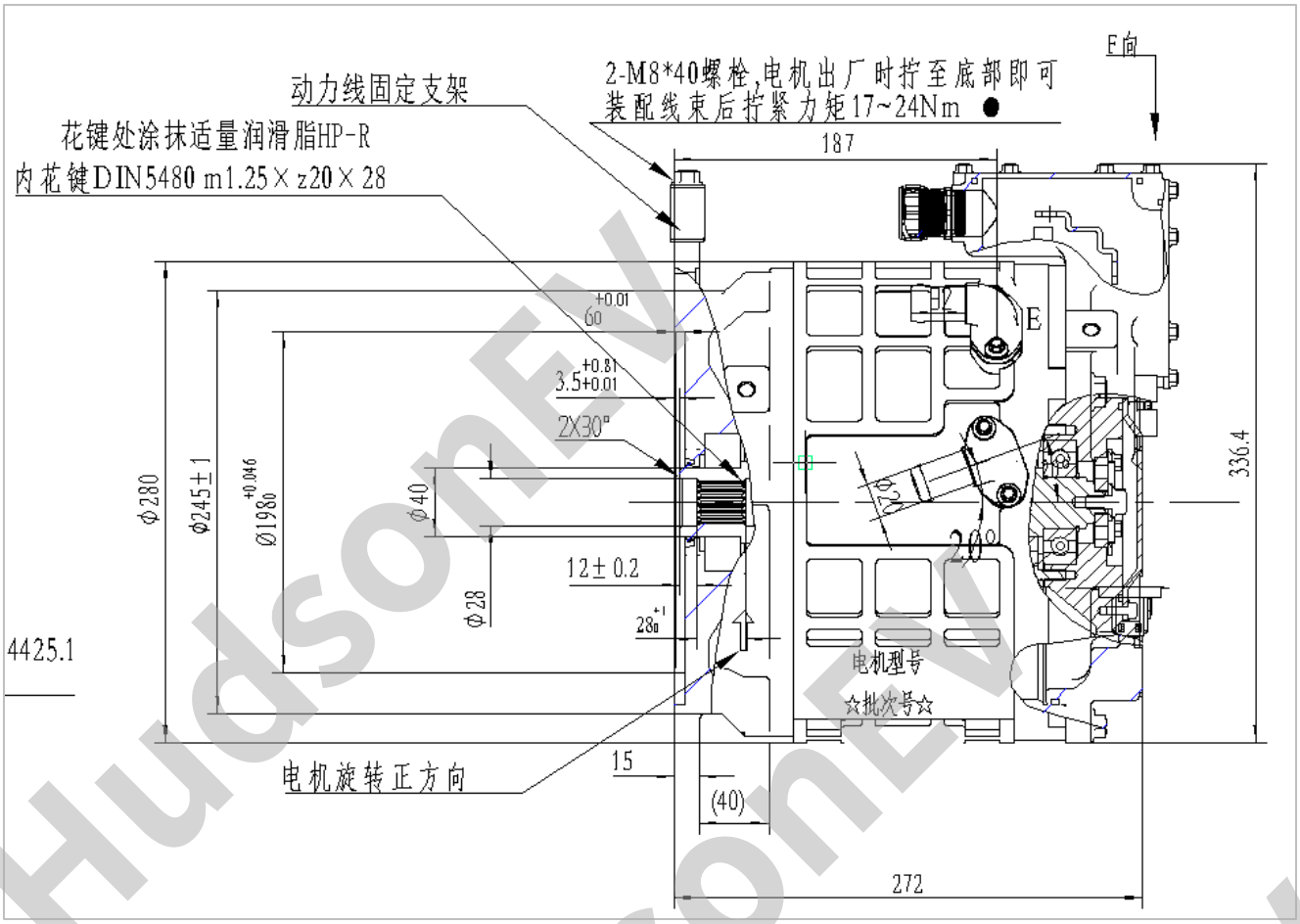
●The oil change interval mileage is 100000 kilometers per year, whichever comes first.

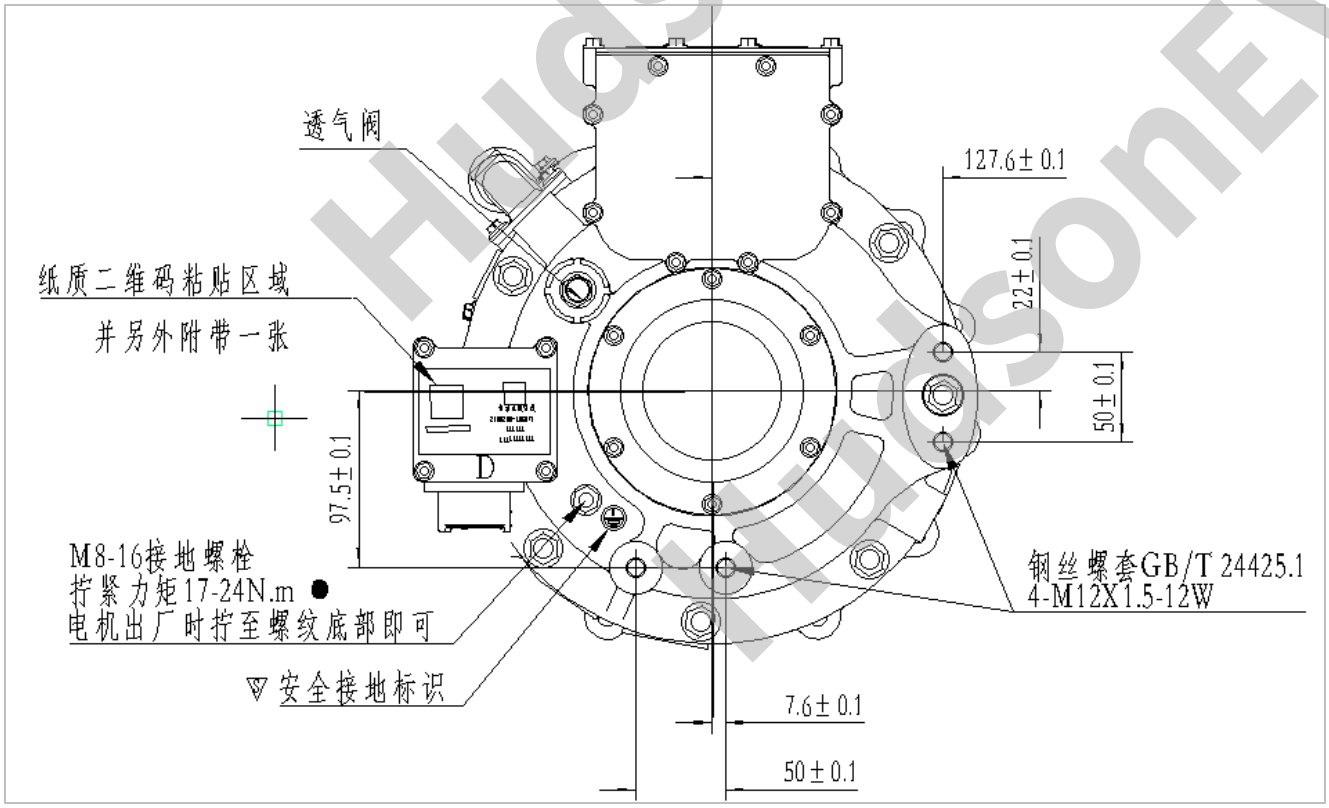
Structural dimensions of the electric drive bridge assembly:

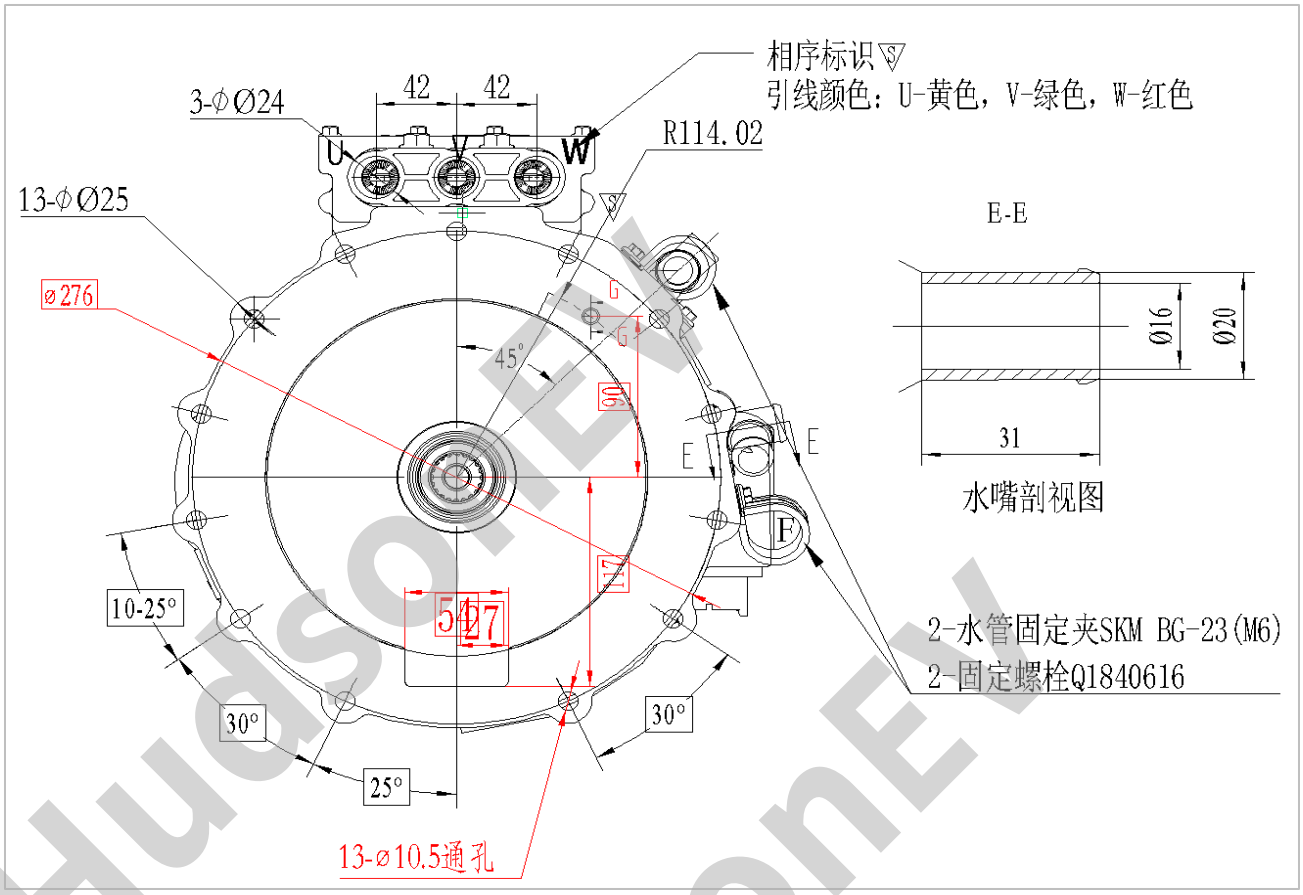


.3 Motor assembly drawing and disassembly torque




F向
2-M8*40螺栓,电机出厂时拧至底部即可
装配线束后拧紧力矩17~24Nm ●
动力线固定支架
花键处涂抹适量润滑脂HP-R
内花键DIN5480 m1.25×z20×28
187
336.4
E
60 +0.01
3.5+0.01 +0.81
2X30°
Φ280
Φ245±1
Ø198 +0.046
Φ40
Φ28
12± 0.2
28 +1
20°
4425.1
电机型号
☆批次号☆
电机旋转正方向
15
(40)
272


透气阀
127.6± 0.1
纸质二维码粘贴区域
并另外附带一张
22± 0.1
50± 0.1
97.5± 0.1
D
M8-16接地螺栓
拧紧力矩17-24N.m ●
电机出厂时拧至螺纹底部即可
钢丝螺套GB/T 24425.1
4-M12X1.5-12W
▽安全接地标识
7.6± 0.1
50± 0.1



.4. Detailed parameter table of the motor

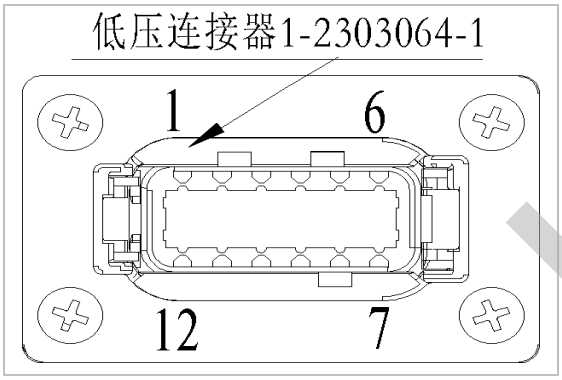
电机参数表			
电机类型	永磁同步电机	额定电压	380VDC
冷却液类型	汽车防冻液	工作电压范围	300-450VDC
冷却方式及流量	液冷≥15L/min	满功率输出最小电压	340VDC
入水口温度	≤65℃	额定电流	180A
水道容积	0.72L	峰值电流	400A
电机极对数	4	额定功率	60kW
绝缘等级	H级	峰值功率	115kW
防护等级	见铭牌	额定转速	4244rpm
定子规格	Φ228mm	峰值转速	12000rpm
转矩波动范围	100Nm以下	额定转矩±3Nm	135Nm
	100Nm以上±3%	峰值转矩	350Nm
最高效率	96%	最高反电势	820Vrms±3%@12000rpm
堵转转矩	350Nm	高效区(效率≥85%)占比	≥85%
峰值扭矩持续时间	60s	最高效率转速范围	4000-6000rpm
峰值功率持续时间	60s	峰值功率转速范围	4000~8500rpm

渐开线内花键参数表		
模数	m	1.25
齿数	z	20
压力角	α	30°
分度圆直径	d	φ25
大径	De	$\phi 27.25^{+0.15}_{+0.05}$
小径	Df	$\phi 24.5^{+0.13}_{0}$
作用齿槽最大值	Evmax	2.385
实际齿槽最大值	Emax	2.418
作用齿槽最小值	Evmin	2.324
实际齿槽最小值	Emin	2.357
量棒直径	Q	2.5
棒间距	M	21.520~21.641
花键等级		6级
齿面粗糙度	Ra	3.2

5. Motor rotary interface definition

Motor side-rotary interface connector model 1-2303064-1; rotary transformer model HX 52.4.0001 (variable ratio 0 ± 10%), temperature sensor type N TC100K;.286

The wire harness connector interface view



Harharness connector interface function definition:

电机端接插件壳体型号：1-2303064-1 配件型号：WM-12P 端子型号：1060-20-0122				
对插件壳体型号：DTM06-12SA 配件型号：WM-12S 适配端子型号：1062-20-0122				
引脚号	信号定义	信号说明	颜色	阻值
1	TEMP-H0	温度1+	红色	$R_{25℃}$: 100±3%KΩ
2	TEMP-L0	温度1-	红色	
3	TEMP-H1	温度2+	红色	$R_{25℃}$: 100±3%KΩ
4	TEMP-L1	温度2-	红色	
5	GND	-		
6	GND	-		
7	Cos+	余弦+	红色	(53.6±5.36)Ω
8	Cos-	余弦-	黑色	
9	Sin+	正弦+	黄色	(51.5±5.15)Ω
10	Sin-	正弦-	蓝色	
11	ref+	励磁+	白色	(28±2.8)Ω
12	ref-	励磁-	绿色	

Electric-hydraulic power steering pump

Catalogue

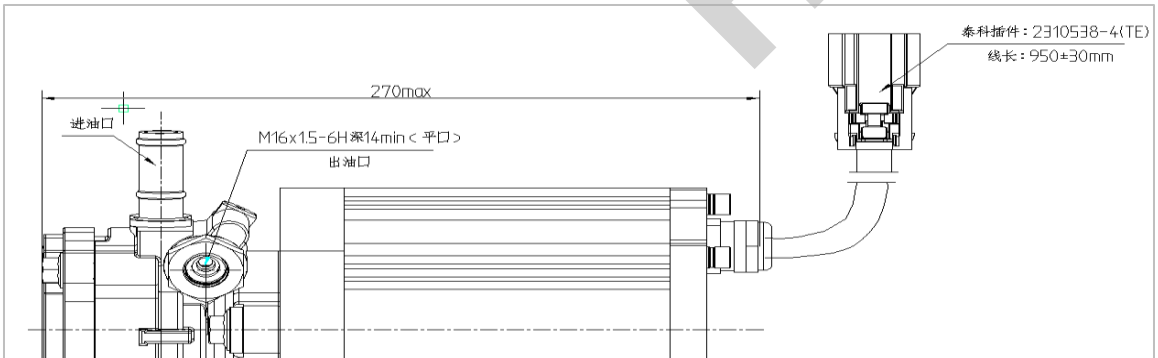
.1. Main technical parameters

Model: EHPS-1010R 1.5 / 111D

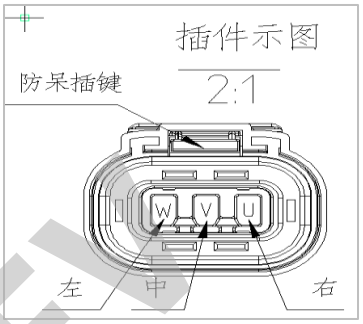
- Motor pump model
- Motor pump rated power
- Motor pump rotation (clockwise from rear of motor)
- Motor pump flow
- Max. motor
- Electric pump series

Steering motor assembly performance parameters					
Rated Voltage (VDC)	336	Peak power (KW)	3	Rated frequency (HZ)	140
Reverse electrical potential (VAC)	197	Rated power (KW)	1.5	Operating Frequency (HZ)	115
Rated rotation speed (r/min)	1680	Peak torque (NM)	17	Line resistance (Euro) / 20℃	2.5
Operating speed (r/min)	1380	Rated torque (NM)	8.5	Q-axis inductance (mH)	5.9
rated current (A)	5.5	Motor type	Permanent magnet synchronization	rated efficiency (%)	⩾92
peak point current (A)	11	Rated Voltage (VAC)	237	insulation grade	H level
D-axis inductance (mH)	6.9	character of service	S 2-3min	levels of protection	I P67
cooling-down method	nature	operating ambient temperature ℃	-40-+85	Displacement (ml / r)	7.2
Maximum pressure (MPa)	10±0.3	volumetric efficiency (%)	⩾80	Spinpin (shaft end)	cum sole

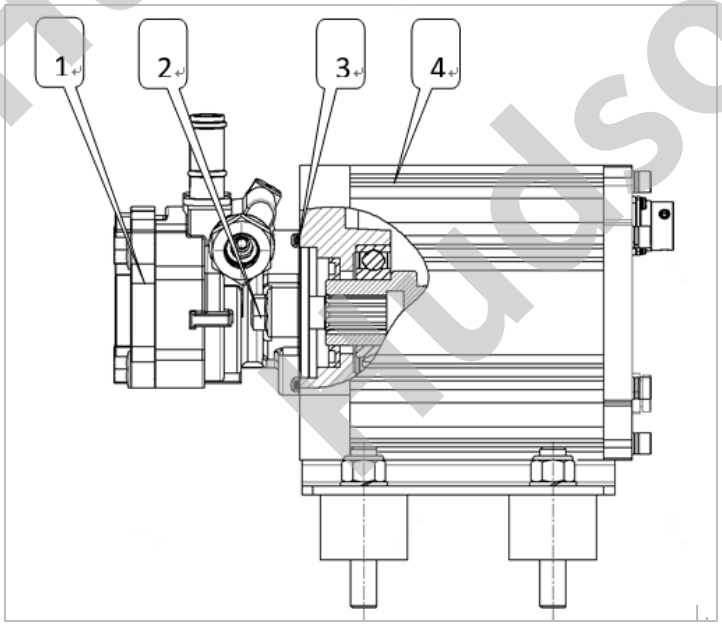
.2. Part drawing and functional principle



High-voltage connector wiring list			
Pump connector Model: Tyco, 2310538-4 (TE)			
Plug-in code	right	center	the left side
Lead definition	U	V	W
Cable harness end connector Model: Tyco, 2310541-4 (TE)			



Part composition and functional principle:



order number	code name	name	quantity
1	ZYB-1010R/489Y B-5A	Automotive power steering pump	1
2	EHPS-1919R3/15D-317	Hexagonal flange face bolt thin teeth small series M10*1.25x30	1
3	070201633	O-ring seal (63 * 3)	1
4	EHPS-1010R1.5/111D -010	Steering motor	1

Working principle: The electric hydraulic power steering pump is the power source for the steering and braking system of a car. It uses an electric motor as the power source to convert mechanical energy into hydraulic energy. The hydraulic oil output by the steering wheel through the pump converts hydraulic energy into mechanical energy, thereby reducing the intensity of the driver's steering and improving the maneuverability of the vehicle.

3. The fault maintenance method of the electric pump

3.1 Electric pump

fault type	Causes	The exclusion method
The motor cannot start	Battery failure	Check whether the high voltage and low voltage batteries are damaged
	Whether the motor is burned	Check the motor UVW three-phase wire resistance
		Check the resistance between the motor single phase and the housing
	Temperature sensor wire is broken	Check the temperature control sensor wiring harness
	The motor has no high-voltage input	Check whether the indirect plug-in of the motor and the controller takes off the needle and whether the high voltage line is open circuit
hard steering	Motor reversal	Check the wiring or procedure and correct the steering
	(If one side is heavy and one side is light)	See the direction machine maintenance manual for details
	The damped hole is blocked	Clean and remove the dirt
	Flow beside the channel turn pressure, the pressure does not come	Check whether the oil circuit is abducted and whether the pressure oil is flowing from the execution piece bypass
Steering pump abnormal sound	The filter element is blocked, and the oil absorption is not smooth	Check if the filter is blocked, repair or replace it
	The oil viscosity is large	Use the recommended viscosity
	There is a gas coming into the steering pump intake pipe	Check the connecting part of the inlet pipe for air leakage or large bending, and repair if any
	The pipe is too thin and too long and bent too much	Bold, shorten the oil pipe, readjust into the oil pipe direction

	Motor does not match the controller parameters	Verify the controller parameters

3.2 Common troubleshooting steps

3.2.1 The motor does not work

When the motor is not working, we need to judge whether it is affected by external factors or the motor itself. The judgment method is as follows:

Use tools: multimeter, sleeve torque wrench

(1). Open the multimeter, open it to the desired measurement gear, and measure whether the high and low voltage battery voltage is in the use of the voltage range

Within (please refer to the battery repair manual for details) to determine that the power source input is correct.

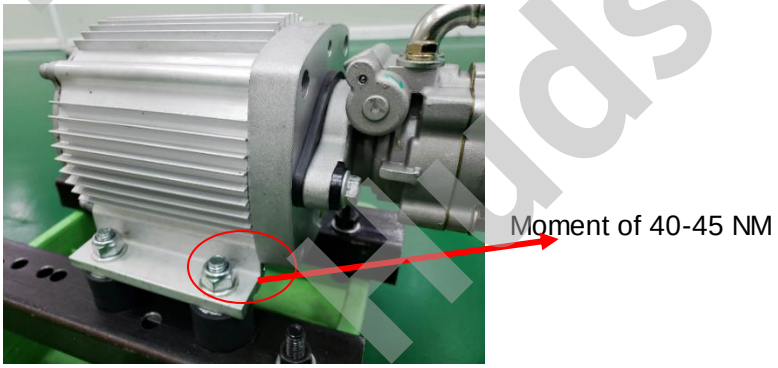
(2) Check whether the motor resistance is normal

Measure whether the resistance value between UVW three-phase lines with a multimeter is about 2.5 ohms (affected by ambient temperature), as shown in the figure (picture reference only); test the insulation resistance between motor single phase line and motor housing shall be greater than 200M ohm. If the insulation resistance value is very small or two lines of electricity

The resistance deviation is the motor fault, the motor needs to be replaced.

(3) Ask the controller manufacturer to check whether the controller program is correct.

(4) If the electric pump needs to be replaced, use the 13mm sleeve torque wrench to tighten it. As as shown in the figure, the recommended torque should be 40 ~ 45 Nm.



3.2.2 Turn heavy

(1) The motor is reversed, the steering pump is not sucking oil, the system has no power assistance, and the steering is heavy. The motor UVW phase sequence should be changed or the motor should be changed through a program

Rotate to ensure the steering pump is working properly.

(2) When the direction machine fails, it will also cause a heavy direction. At this time, the direction machine manufacturer needs to coordinate and solve the problem.

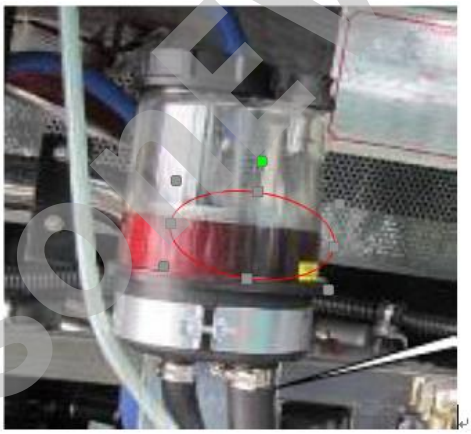
(3) Check whether the oil inlet pipe is suffocated or bent as shown in the figure below. If so, adjust the inlet pipe.

3.2.3 Abnormal sound of the steering pump

(1) The filter element is blocked, resulting in the poor oil return of the system. A long time will cause damage to the filter element, and impurities will enter the steering through the oil can, resulting in the oil pump

If the oil blockage causes abnormal noise or damage, the filter element should be replaced.

(2) Excessive viscosity of the oil at low temperatures, as shown in the figure below, can cause cavitation and noise in the product. At this time, the hydraulic system oil should be replaced. Recommended use: Kunlun Tianrun ATFIII automotive automatic transmission fluid; Shell Spielberg S3 ATFIII automatic transmission fluid and Castrol DEXRON-III automatic transmission fluid.



(3) The air caused by damage to the oil inlet pipe enters the steering pump, causing a large number of bubbles in the oil tank and abnormal sound from the steering pump. Check if the oil inlet pipeline is damaged or if the clamp is not in place. As shown in the figure below, the clamp is not in place and the oil pipe is stuck, causing loud noise.

(4) Improper material selection of the oil inlet pipe can cause the oil inlet pipe to swell and soften due to high temperature, which can easily lead to flattening and noise. A pipeline bend that is too sharp can also cause poor oil suction and produce abnormal noises. It should be avoided as much as possible and inspected carefully.

. 4. Notes for use

(1) The steering wheel must not be left dead for a long time;

(2) Wait for the electric steering pump to operate normally before turning the direction;

(3) When turning the steering wheel to its limit, such as sharp turns, stationary turns, etc., the steering wheel should be immediately turned back a bit (without affecting the turning angle) to avoid turning

Strike to the extreme position of the steering wheel;

(4) Pay attention to replacing low-temperature anti-wear hydraulic oil in winter (below -10 degrees, it is recommended to use winter hydraulic oil (Kunlun Tianrun ATFIII automatic transmission fluid; Shell Shibeili S3 ATFIII automatic transmission fluid and Castrol DEXRON-III automatic transmission fluid).

(5) Do not use engine oil as a hydraulic transmission medium.

Front axle and front suspension

FA chapter

Catalogue

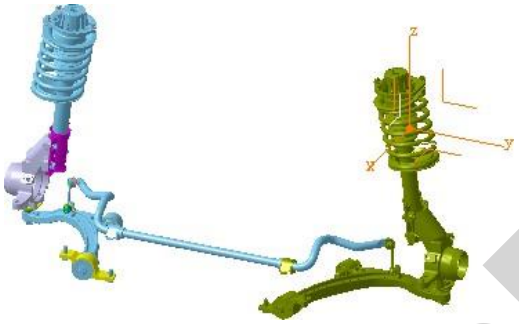
Notes

- When installing the rubber liner, the final locking must be performed when the vehicle has no load and the tire touches the ground. Oil can shorten the service life of the rubber bushing. Be sure to wipe away any spilled oil.
- "No load state" indicates the state where fuel, coolant and lubricant are full and ready to travel. However, tires, jacks and vehicle tools should not be equipped.
- After repairing the suspended parts, repair the wheel positioning.
- Replace the fill nut with a new product. Do not wipe the oil until locking.

Troubleshooting

heel	Front suspension or rear suspension	Check and adjust the wheel positioning parameters when necessary.
		Replace if necessary
	The transmission shaft is damaged	Repair or replace it if necessary.
Run deviation / drift	Tire pressure uneven	Adjust the tire air pressure.
	Vehicle of vehicle unbalanced or overload	Inform customers that the vehicle load is incorrect.
	Main pin rear tilt angle and wheel tilt angle on both sides The difference value exceeds the specified range	Check the tire positioning parameters and adjust them if necessary
	Steering system parts	Repair or replace it if necessary
	brake drag	Check out
Abnormal tire wear	The tire pressure is incorrect	Adjust the tire air pressure value.
	The front bundle value exceeds the standard value	Check the tire positioning parameters and adjust them if necessary
	The inclination angle exceeds the standard value	Check the tire positioning parameters and adjust them if necessary
	Tire imbalance	Adjust tire balance
Poor ride comfort	absorber	Replace new dampers if necessary.
The wheels swing or beat	Wheel nuts loose	Tighten the nut according to the specified torque value
	Front suspension fastener is loose	Tighten the nut according to the specified torque value
	Check front wheel bearings	Repair or replace it if necessary
	Check for the wheel and tire failure	Repair or replace it if necessary
	The ball head is loose, damaged, or worn out	Repair or replace it if necessary
	Steering parts are loose, damaged, or worn out	Repair or replace it if necessary
	Front wheel positioning parameters	Check the tire positioning parameters and adjust them if necessary
Steering block, with poor reversion	Front tire positioning parameters	Check the tire positioning parameters and adjust them if necessary.
	tie rod end	Repair or replace it if necessary
	Steering system parts	Repair or replace it if necessary
Swing or tilting	Overload, and had an uneven or incorrect vehicle load	Inform customers that the vehicle load is incorrect
	Wheel nuts loose	screw home
	absorber	Check and replace it if necessary
	The stabilizer bar assembly is made loose	screw home
The vehicle is tilted on one side	Overload or with an uneven load	Inform customers that the vehicle load is incorrect.
	Front and rear suspension parts	Check the front and rear suspension system.
	Incorrect driving height	Check the body height and adjust it if necessary.

Component Diagram



epipodium

Front wheel bearing clearance

Top high vehicle, and check the front wheel bearings as follows:

- Move the hub in the axial direction by hand and check the clearance of the front wheel bearings.

Axle end clearance (mm): 0.05

- Turn the hub to check for abnormal noise. If any abnormal noise is found, replace the tire bearing.

forward mounting

Looseness, clearance and damage of hanging fixed parts and wiring

Top-high vehicle, and check as follows:

- Check the fixing point of each component for loosening, clearance and damage.
- Check the end clearance of the lower side ball connector.

(1) Install a pointer scale on the car, and make the pointer gauge touch the brake calipers.

(2) Set the front wheel in the straight front position without pressing the brake pedal.

(3) Place the iron rod between the transverse tie rod and the steering knuckle arm.

Note: Be careful not to damage the sheath of the ball joint during the inspection. Axft end clearance (mm): 0

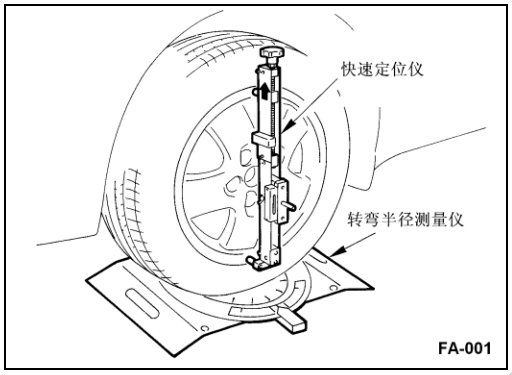
(4) If the shaft end clearance does not match the standard, remove the lateral rod and check the lower ball connect.

wheel alignment

- Measure the wheel positioning without load. "No load status" indicates the fuel, coolant and lubricating oil. However, tires, jacks, and vehicle tools should not be loaded.

trial inspection

1. Check whether the tire has abnormal tire pressure and wear.
2. Check the rim for a deformed deflection.
3. Check the shaft end clearance of the tire bearing.
4. Check the shaft end clearance of the suspended lower side ball joint.
5. Check the movement of the pillar.
6. Check whether each fixed point of the wheel shaft and the suspension is loose and deformed.
7. Check each link and arm for cracking, deformation and other damage.
8. Check the posture of the vehicle.



Front suspension (with front page)

Check the camber angle, caster angle, and kingpin inclination angle

●The camber angle, caster angle, and kingpin inclination angle cannot be adjusted.

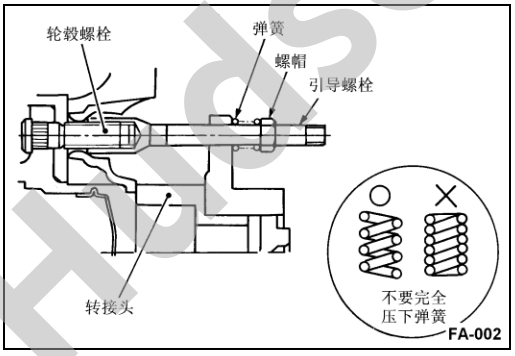
●The use of a quick aligner can accurately and quickly perform front wheel alignment checks.

●For detailed information on how to use a quick locator, please refer to the instruction manual.

●Before inspection, place the front wheel on the turning radius tester, and the rear wheel on a platform at the same height as the tester to keep the vehicle level.

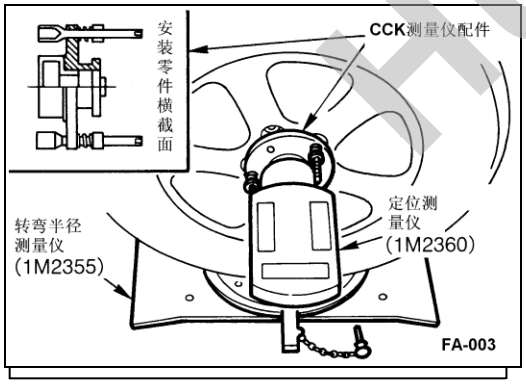
When using the rapid locator

- The rapid locator cannot measure the main pin inclination.
- Place the quick locator vertically on the vehicle floor with the arrow sign pointing up, as shown on the left.
  Roll out: -48 '± 45' rear
  tilt: 2°30 '± 30'



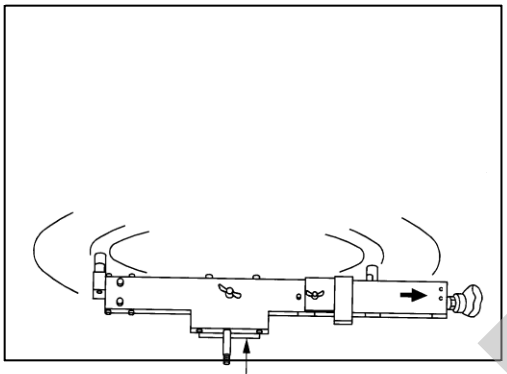
Note: To obtain an appropriate value for the caster angle, multiply the value measured by the quick aligner by 2.865.

When using the CCK instrument



- Remove the wheel rim cover or center cover and wheel rim nut from the vehicle, and install one guide bolt (special maintenance tool) on the wheel hub bolt.
- Lock one adapter (special maintenance tool) into the plate body (special maintenance tool) until it tightly contacts the bottom plate body.
- Lock the central board (special maintenance tool) into the board (special maintenance tool). Insert the plate (special maintenance tool) into the guide bolt (special maintenance tool), place the spring, and then evenly tighten the guide bolt (special maintenance tool). When tightening, do not completely compress the spring.
- Place the concave part of the locator on the central plate convex block and make close contact for measurement.
- Camber angle: -48 '±25' Camber angle: 2 °30 '±30'
- Main pin inclination angle: 12.4 °± 45 ′

If the camber angle, caster angle, or kingpin inclination angle do not meet the standard, check the front suspension parts for wear and damage, and replace the faulty parts if necessary.



FA-004

Front suspension (continue to the front page) front beam check

1. Place the rapid locator body on the ground panel and adjust the measurement before using the module
   The height required for the beam angle.
2. Place the Quick Locator body on the tire to be measured with the arrow mark facing straight ahead.
3. Remove 1 rear wheel nut closest to the centerline and set 1 hub bolt rotor.
4. Set up a connecting bar on the car

Note: Please do adjust the distance of A and B to check the tread so that the connecting rod is parallel to the vehicle.

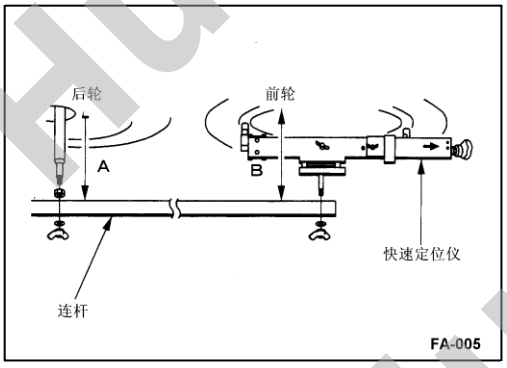
5. Remove the rapid locator body from the car and place it on the ground panel for measurement. Calculate the following conversion procedure to convert the measurements to the appropriate value.

Sin [measurement] * Reset (in decimal) " tire outer diameter (mm) = front beam (mm) Note: measurements represent the sum of measurements on both wheels.

Calculate the example

Measurement ured 0 °± 9.5 ′ (0.158°), outer diameter 728mm Sin0.158728 = 2mm

Front beam (mm): 0 ± 2 or (-2~2)



FA-005

6. If the front harness does not match the standard, relax the bar locking nut to adjust the length to meet the standard.

pay attention to:

- The two rods shall be adjusted equally in turn.
- When locking the locking nut, install the tie bar at the open end of the wrench.

Side slip inspection

Use a sideslip tester to check if the sideslip meets the standard.

In some cases, even if the positioning is the same, the amount of sideslip may vary due to the wear of the tire pattern.

Side slip amount (mm): 5 inside to 5 outside

Attention:

Before checking the lateral slip, please confirm the wheel alignment.

Even if the sideslip meets the standard, please confirm whether the front toe also meets the standard.

Disassembly

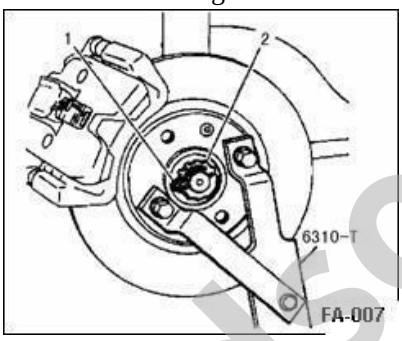
1. Remove the tire and remove the brake oil pipe mounting plate on the sliding column.
2. As shown in the figure, remove the fixed pin 1 and nut cover 2.
3. Use tool 6310-T to fix the wheel hub and unscrew the fastening nut at the end of the drive shaft.
4. Remove the brake caliper from the steering knuckle arm and hang it aside.

Attention: Do not press the brake pedal after removing the brake caliper.

5. Remove the ABS speed sensor and wiring from the steering knuckle arm.

Attention: Do not pull the wiring harness of the ABS speed sensor.

6. Remove the brake disc from the wheel hub.
7. Unscrew the locking nut of the ball joint pin and use a tool to remove the ball joint pin.
8. Remove the steering knuckle arm from the sliding column.



9. Remove the drive shaft from the steering knuckle arm.

Install

Refer to the component diagram and install in the opposite order during disassembly.

Attention: Do not reuse non reusable parts according to the component diagram.

After installing the axle, measure the rotational torque with the tire and brake related parts removed.

1. Rotate the hub in two directions 10 times in each direction to check for smooth rotation.
2. Hook the wheel hub bolt with a spring scale and measure the drag torque.

Drag torque (N-m): 5

inspect

Wheel hub

Check if the tire bearings are damaged, fused, corroded, or rotating abnormally, and also check if the wheel hub is cracked (using dye testing, etc.). Replace if necessary.

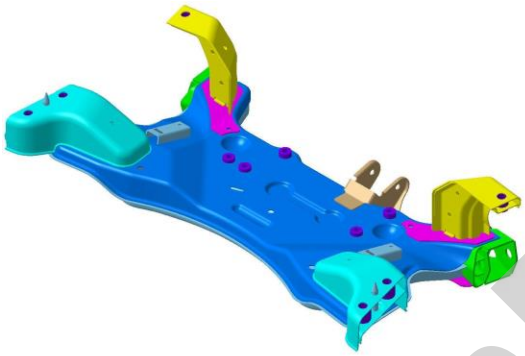
Snap ring

Check if the snap ring is worn or damaged, and replace it if necessary.

Steering knuckle arm

Check if the steering knuckle arm is deformed, cracked, or damaged, and replace it if necessary.

sub-frame



disassembly

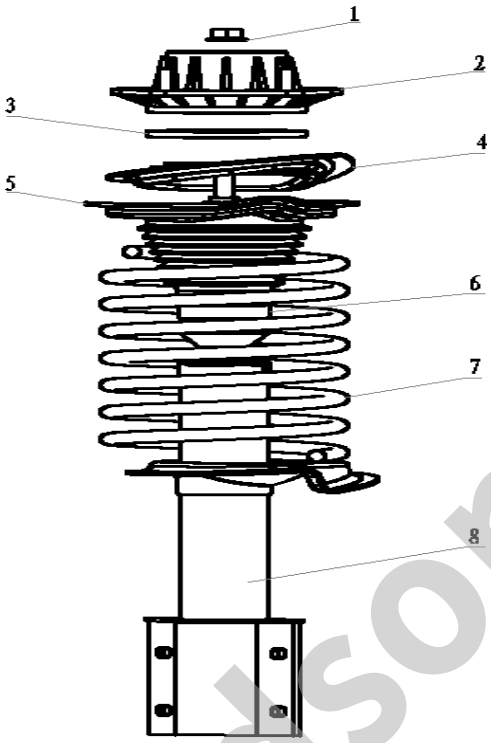
1. Remove the steering knuckle arm from the sliding column assembly.
2. Remove the front section of the exhaust pipe from the vehicle.
3. Remove the high-pressure and low-pressure oil pipes from the gear and rack steering gear.
4. Remove the clamping bolt of the input end fork of the gear rack steering gear, and draw matching marks on the fork and gear rack steering gear.
5. Install a transmission jack under the engine.
6. Remove the engine rear suspension bracket from the subframe.
7. Disassemble the stabilizer bar and suspension bar with joint assembly on the subframe.
8. Install a transmission jack under the subframe and remove the subframe fixing nuts.
9. Lower the transmission jack and remove the subframe from the vehicle.

Install

- Refer to the component diagram and install in the reverse order of disassembly.

Attention: Do not reuse parts marked as non reusable in the component diagram.

- After installation, perform the final locking of each component in a unloaded state with the tire touching the ground. Check the wheel alignment and remove air from the oil pressure pipe of the gear rack steering gear.



Sliding column assembly

Disassembly

1. Fix the shock absorber (8), use a special tool to press the coil spring (7), unscrew the compression nut (1), take out the upper end of the sliding column mounting bracket assembly (2), plastic bearing (3), upper spring seat (4), dust rubber sleeve (5), buffer block (6), and loosen the special tool to remove the coil spring (7);

Install

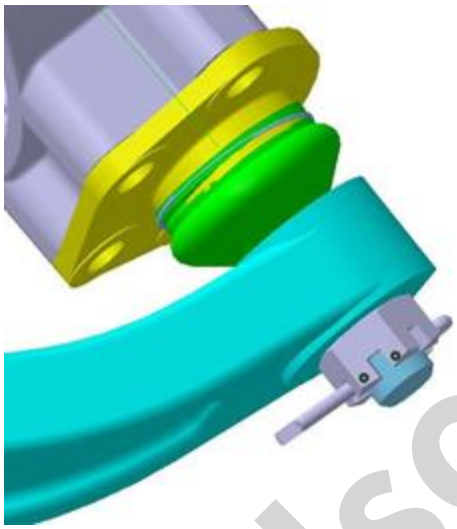
Refer to the component diagram and install in the opposite order of disassembly.

Special attention: 1. Item 8 (front shock absorber); The connecting rod must not have scratches or obvious cracks or other defects. If found, it needs to be replaced immediately. The torque value of part 1 (tightening nut) must reach 110-150N. m. Attention: 1. Check whether the installation position between the front sliding column assembly and the vehicle body is correct during assembly;
2. Do not use hard objects to bump or rub against the surface of the connecting rod to avoid scratching it;
3. Check whether the plastic bearing moves flexibly, whether the dust rubber sleeve is damaged and aged, whether the outer rod buffer sleeve has no permanent deformation, and whether the spiral spring has fatigue attenuation. If there is any damage or failure, new parts must be replaced;
4. The bolts and nuts that connect the entire vehicle to the front sliding column assembly should be replaced promptly after each loading and unloading.

Lower swing arm assembly and ball joint pin assembly

Disassembly

1. Remove the steering knuckle arm with ball joint pin assembly from the lower swing arm assembly.
2. Remove the fixing bolts of the lower swing arm assembly and remove the lower swing arm assembly from the sub-frame.



Inspect

Check if there is any deformation, cracking, or other damage to the lower control arm assembly, ball joint pin assembly, and liner. If necessary, replace the entire lower control arm assembly and ball joint pin assembly.

Ball joint pin assembly

Attention: Before measurement, pull the ball joint by hand at least 10 times to check for flexible movement.

The upper end of the ball joint pin assembly is fixed to the lower end of the steering joint in a threaded manner, and the disassembly torque is not less than 90N • m. The lower end of the ball joint pin assembly is connected to the lower swing arm by inserting a slotted nut into the split pin, and the disassembly torque is not less than 95N. m

Swinging torque

Hook the spring scale onto the installation hole of the split pin and check if the measured value of the spring scale meets the standard when moving the ball joint screw.

Swinging torque (N-m): 0.50 to 7

If the measured value does not match the standard, replace the ball joint pin assembly.

Rotating torque

Install the fixing nut on the ball joint pin assembly screw and check whether the rotational torque meets the standard with a load gauge (special maintenance tool).

Rotation torque (N-m): 0.50 to 7

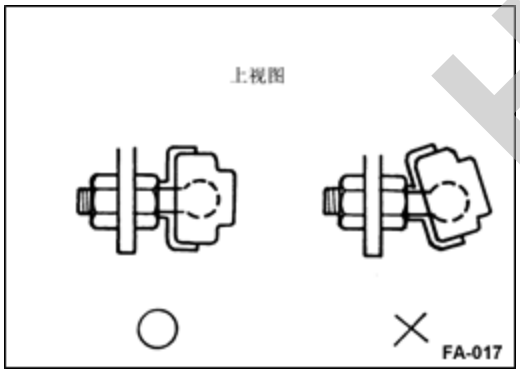
If the measured value does not match the standard, replace the ball joint pin assembly.

End clearance of shaft

Move the top of the ball joint pin assembly in the axial direction to check for looseness.

End clearance of shaft (mm): 0

If any looseness is found, replace the ball joint pin assembly.



Install

Refer to the component diagram and install in the opposite order during disassembly.

Attention: Do not reuse non reusable parts according to the component diagram.

Lateral stabilizer bar (stabilizer bar)

Disassembly

1. Remove the upper and lower fixing nuts of the suspension rod with ball head assembly.
2. Remove the fixing nuts of the two stabilizer bar brackets (on the sub-frame) and remove the brackets.
3. Remove the stabilizer bar (with two bushings) from the car.

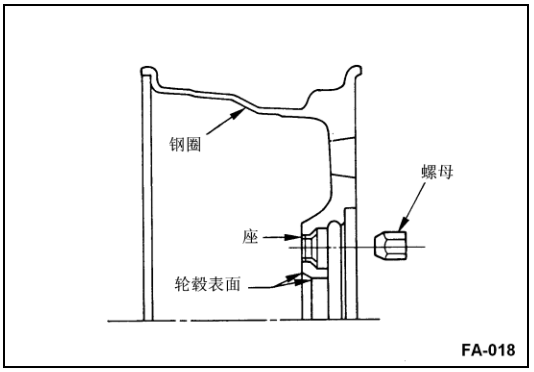
Inspect

Check if the balance bar and suspension bar with ball joint pin assembly are deformed, cracked, or damaged, and replace them if necessary.

Install

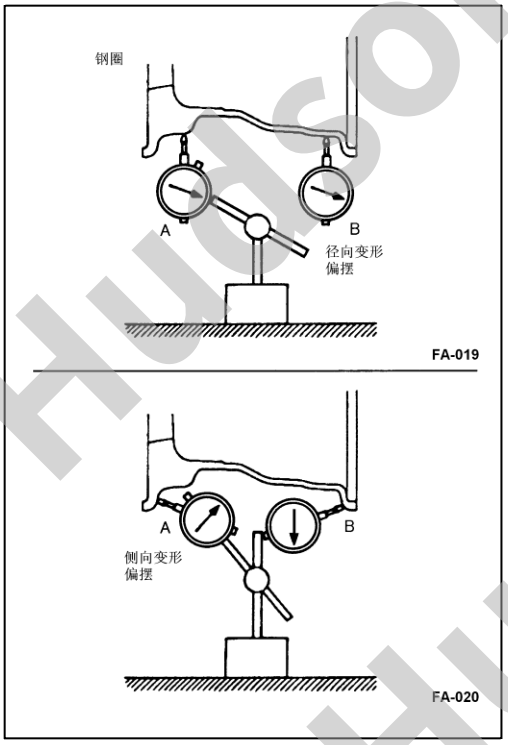
Refer to the component diagram and install in the opposite order during disassembly.

Attention: Do not reuse non reusable parts according to the component diagram.



Rim s note

- Aluminum alloy rims are indeed used after checking the tire balance.
- Because the aluminum alloy rim is easy to damage, you must really pay attention to it when handling. Do not use a sandy soap or steel brush when cleaning. Only a neutral detergent should be used.
- Do not wash the rims at a high-speed car washer.
- Wash the rim thoroughly after running on roads with ice and salt.
- Do clean the back of the rim when replacing the tire or when cleaning the vehicle chassis.



- Before mounting the rim, completely wipe the dust or foreign matter from the surface of the hub.
- Do not stain any oil on the threads and seats of the nuts.
- When driving, do not run over sharp projections, and do not roll over or rub against sidewalks or roadside projections.
- When removing the rim cover, rag the rim and wrench to avoid damaging the aluminum alloy rim.

rim

eyeballing

- Check the rim for deformation, cracking, corrosion and other damage.

Deformation displacement check

- Top high vehicle.
- Remove the tire from the rim.
- Install the rim on the car as shown on the left and set the pointer scale to check the radial offset of the rim.

Deformation Deflection Limit (mm)

Aluminum alloy wheel rim Side deformation deflection: 0.4 or below

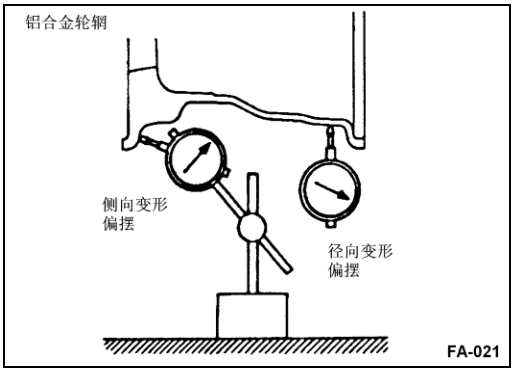
Radial deformation offset:

0.4 or less steel rim (note)

Lateral deformation deflection: 1 or below

radial deformation deflection: 0.6 or below

Note: For the steel rim, use the average of the values measured at points A and B to determine the deformation deflection.



Rims balance

1. Remove the rim from the car.
2. Install the rim on the tire countermachine for adjustment.

- When mounting the rim on the tire counterancer, mark the top of the wheel.
- For rim balancing, use a tire balancing machine with straight cone fixtures and place the cone on the back of the rim.
- If adjusting the steel rim with a normal cone, support the rim from the back.
- When installing counterweight, please use resin hammer.

pay attention to:

- After removing the balanced counterweight, only each type of steel rim and aluminum alloy rim can be used
- Do not reuse the removed counterweight.

Allowed able measure (g)

Dynamic (ear): 5 or below (one side)

install

1. Remove the rim from the tire countermachine.
2. Position the rims on the car toward the bottom.

(Install the rim on the tire balance and retain some space at the fixed point of the ground rim. To exclude the space caused by the tire deformation, set the rim at the opposite position with the attached mark).

Note: Lock the nuts in diagonal order to avoid rim deformation. Lock torque (N-m): 98 to 117.1

Wheels and tires

▲ Warning: Except for emergency cases, different types of tires should not be mixed Use, such as radial tires, oblique, and belt harness. Because this seriously affects the stable driving of the vehicle, and eventually causes the car to be out of control. Violation of this instruction will cause personal injury.

The wheels and tires installed by the manufacturer are designed and calculated and must be inflated according to the recommended tire pressure value. The beating of the wheels and the tires

Radial and axial beating of wheels and tires beyond the specified value range will cause rough working, vibration and wheel swing, tire wear and steering wheel vibration. Avoid rough judgment only on the temporary leveling point on the tire before inspection. The vehicle is required to travel a sufficient distance to heat the tire.

safety precautions

▲ Warning: too low tire pressure will cause the tire burst and reverse vehicle operation, too high pressure will burst the tire, reduce the performance attached to the ground.

▲ Warning: When an engine is off the ground, the engine is absolutely prohibited, such example when the tire is replaced.

▲ Warning: The wheel and tires must be correctly matched and it is important to determine the dimensional parameters before starting the repair operation of any component. Violation of this instruction will cause personal injury.

▲ Warning: Tyres sold on the market may not match the vehicle. Using mismatched tires can cause equipment failure, only allowed Use matching tires. Violation of this instruction will cause personal injury.

▲ Warning: do not use steel wire ball, grinding type cleaning appliance and strong cleaning agent to clean the aluminum wheel.

▲ Careful: Push the valve core to reduce the air pressure as much as possible before removing the valve core. Avoid the face and body parts directly facing the tire in the presence of air pressure.

All inspections and repairs of wheels and tires must follow safety safeguards.

The principle of safety first must be kept in mind when dealing with vehicle tire failure. Compliance with safety measures can prevent fracture damage and even death accidents.

The wheels must be properly maintained. Incorrectly maintained wheels will affect the service life of the wheels and tires. Incharged tires are potentially damaging. Careless operation and inexperience will lead to accidents. The vehicle has established its carrying capacity requirements when the wheels and tires are combined. Remember that the weak weight of the vehicle bearing parts (tires, wheels, axle, bearings, etc.) determines the maximum and safe load capacity of the vehicle.

▲ Warning: All independent axes, wheels and tires have their maximum weight and expansion rate. Avoid exceeding the large satin expansion rate and overload use of the system components. Violation of this instruction will cause personal injury.

Rim and wheel design, the tire and the rim combination of the recommended rim, the maximum width value can ensure the rated load value of the tire.

▲ Warning: Inflatable tires and wheels can be very dangerous when they are misuse or worn. Many accidents, even

fatal accidents are improperly correctly correctly by the tires and wheels

Cause. The precautions described in this section are critical and must be carefully followed.

▲ Warning: Rurusted or cracked tires are dangerous. Blelation shall be performed before removing the rusted or cracked tires from the vehicle. Violation of this instruction will cause personal injury.

From a safety point of view, it is very important to deflate the tires correctly. First, reduce the air pressure by pressing the valve plunger, and remove the valve plunger to completely deflate the tire before removing or breaking down from the vehicle.

Special care should be taken when removing the tires from the vehicle. Standard tire disassembly tools and equipment are required. Avoid removing and mounting the tires with temporary substitutes, which is very dangerous.

▲ Warning: Avoid tapping with a steel hammer, otherwise damaging the rim. Do not knock on the inflatable parts. Violation of this instruction will cause personal injury.

▲ Warning: Preventive measures must be taken to avoid personal injury or damage to the vehicle. Violation of this instruction will cause personal injury.

Check and confirm

road test

Conduct tire maximum performance test for signs of incorrect inflation and tire imbalance, if present, tire dynamic balance, rotation or front suspension adjustment.

Correct tire pressure and driving skills have an important impact on the life of the tire. Poor driving conditions, rapid acceleration and unnecessary sudden braking will lead to tire wear.

The following factors must be considered when replacing the tire:

- Tire size
- speed
- Tire load range
- Tire structural type

Using tires of other sizes or different construction types can cause serious consequences for:

- ride
- operational stability
- Precision of speedometer and odometer
- Minimum ground clearance of the vehicle
- Clearance between tires and vehicle body or chassis system components
- Life of the axle
- Braking effect

New tires must be replaced in the following cases:

- winding
- There are cracks
- There are pits
- Severe corrosion
- blow-by
- The bolt hole is elongated
- Excessive lateral or radial beating

It is mandatory to select tires according to the recommended table of tire specifications attached to the vehicle. Large or small tires can damage the vehicle, affect durability and need to adjust the speedometer. Ensure that the tire size and offset match the recommended value of the old tire used.

1.Check the tire for signs of uneven wear. Refer to the symptoms table below to identify the type of wear and take the correct repair procedure.

2.Check the following tires:

- cut
- Rock hit
- wear and tear
- Air bubble sand eye
- insertion

3. Tire tread groove engraved with tire and wear mark. A new tire should be replaced when the wear mark is obvious. Tire wear

Tire wear is often defined as a reduction in tread depth. Tire tread wear is caused by contact friction on road surfaces. The tread wear is always run evenly around the tire circumference and the wear marks cross the tire surface. If the wear trace does not match the above, abnormal wear exists.

Normal tire wear

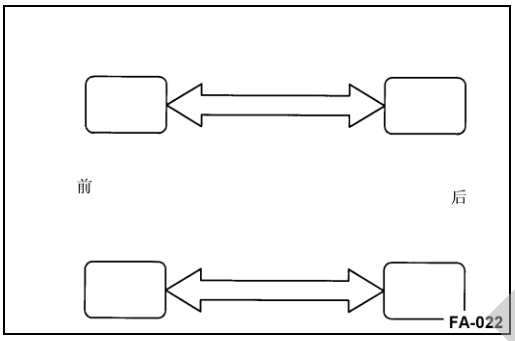
When the tread wear is uniform around the tire circumference and the wear mark crosses with the tire surface, it can be judged as normal tire wear. Due to the numerous factors leading to tire wear (driving mode, road condition, model type, tire form, etc.), the normal wear mileage cannot be determined. The tire may be considered no longer usable when the tread is worn to show the wear mark.

Abnormal, incorrect tire wear

When the tire circumference wear is not uniform and the trace does not cross the tire surface, it can be identified as abnormal, incorrect tire wear, which can lead to the use of performance

The change of.

Many factors can lead to abnormal and incorrect wear of tires, including driving mode, climatic conditions, road conditions, vehicle load and maintenance conditions. It is important to find out the root cause of the tire wear before making repairs.



tire rotation

- Apply the tire mounting lubricant to the tread line before mounting the tire to the rim. After installation, please do balance the tire.
- To avoid uneven tire wear and extend the service life, every 5000km

  The tire position shall be changed as shown.

Tire wear fault diagnosis

symptom	probable cause	measure
Patchy wear on the tread (uneven wear)	The tire or wheel is not round or deformed	Repair or replace
	The wheel drum or steering knuckle is lost or deformed	Repair or replace
	Round drum bearing or ball head creates a clearance	Adjust the clearance and replace it if necessary
	The wheel loses its dynamic balance	Adjust the wheel dynamic balance
The tread was worn on one side	The wheel loses its dynamic balance	Adjust the wheel dynamic balance
	The tire or wheel is not round	Repair or replace
	The wheel drum or steering knuckle loses its circle or deformation	Repair or replace
Partial wear and tear of the tread	Patchy wear caused by rapid braking and rapid start, enabling Local wear becomes larger	Repair or replace
The outer edge of the foetal surface is worn	Improper adjustment of front wheel tilt angle or front beam	adjust
	Repeated sharp turns cause wear along the tread edge	Repair or replace
Ttread symmetry border wear	The tire or wheel is not round or deformed	Repair or replace
	Gap is generated in the front wheel bearing or ball head	Adjust the clearance and replace it if necessary
Overdry wear along the tread edge	The tire is in the insufficient tire pressure	Adjust tire pressure
	Wheel overload	Correct them if necessary
Wear the top of the teeth	Repeated sharp turns cause wear and tear	Repair or replace
	Improper adjustment of front wheel tilt angle or front beam	adjust

Rear axle and rear suspension

RA chapter

catalog

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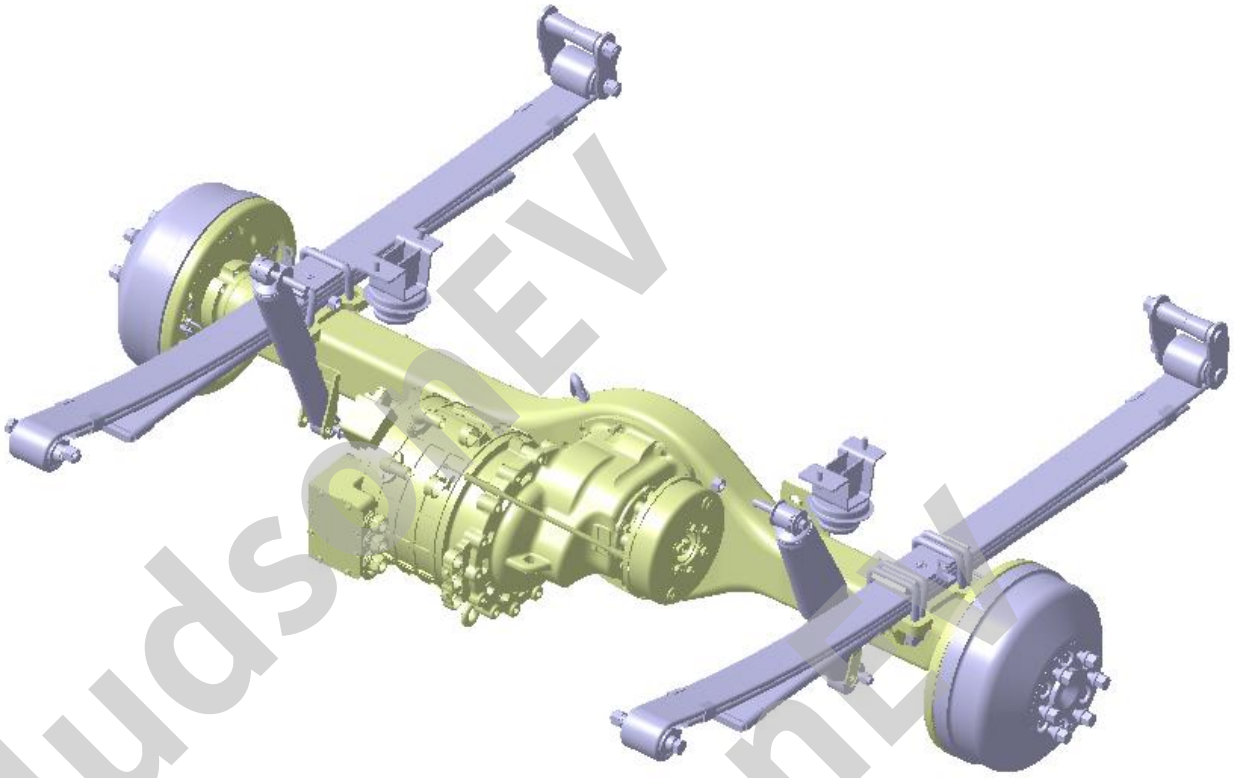
Part group diagram



matters need attention

- When installing the rubber parts, the tire must be placed on the ground to perform the final locking action. Release the oil beforehand, because when it is contaminated with the oil When it will cause the rubber shaft sleeve deterioration and affect the durability.
- Fuel, water tank cooling water and engine oil are filled up. However, the spare tire, jack and manual tools must be removed from the vehicle.
- After installing the removed suspension parts, the wheel positioning must be checked and adjusted if necessary (e. g. thin metal sheet).
- The fill nut shall not be reused. Therefore, the new parts must be used during the installation. Because the new packing screw has been pre-lubricated, it can be locked immediately.

Check the rear wheel bearing for clearance

Do the following when the vehicle is high or on the top.

- Manually remove the wheel hub in the hub direction to check that the clearance of the rear wheel bearings is too large.

  Axft end clearance (mm): 0.05

- Check for abnormal noise when turning the wheel.
- If an excess of the standard or any abnormality is found, the wheel bearing assembly must be replaced.

rear axle assembly

demolish

1. Remove the tire to remove the wiring harness for the brake line, hand brake ABS wheel sensor from the rear axle assembly.
2. Remove the filling part of the wheel hub locking nut. Use the hub lock nut wrench
   (Special service tool) to remove the ABS sensor rotor on the lock nuts and wheel hub.
3. Remove the brakes from the wheel hub.
4. Remove the hand brake wire drawing and brake shoe from the backplane.
5. Remove the brake line from the wheels.

pay attention to:

- The brake line must be protected from brake oil on its surface.
- Do not press the brake pedal when removing the brake line.

install

- Install in the opposite order of dismantling.

Note: Do not reuse parts that cannot be reused. If required, carefully check and confirm the reusable parts according to the component drawing.

- Before installing the tire and brake system components, install the spring scale to use the spring scale to measure the pull rotational torque at the speed of 10 ± 2rpm.

  Rotational torsion (N-m): 1.750 or lower

  Measure the value (N) at the spring scale: 30.6 or less

decompose

1) Using the bearing changer (multi-purpose tool) and retractor (multi-purpose tool), remove the wheel hub bearing (the bearing outer ring cannot be stressed) and remove the brake drum before removing the bearing.
2) Remove the brake base plate from the wheel axle.
3) If there is a damage to the hub bearing or wheel axle, it is recommended to replace it all.

check up

hub for vehicle wheel

- Check wheel hub for damage, stuck, rust, or twisted harness. Also, check the wheels for cracking (by using magnetic exploration or dyeing tests). It must be replaced if necessary.

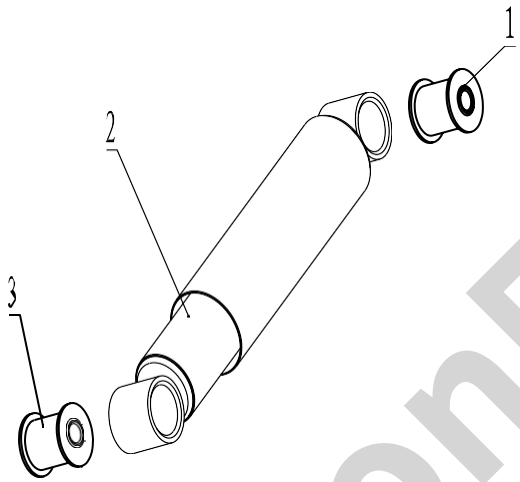
assemble

1. Install the brake base plate to the wheel axle.
2. Using the punch (special service tool), install the wheel hub bearing to the torsion beam assembly.

Note: Do not reuse the wheel bearings.

3. Install the upper brake.
4. Install the brake base plate with the bearing and the wheel axle of the brake on the rear axle.

absorber



demolish

- When removing the shock absorber from the vehicle, support the body with a jack device.

check up

- Check whether the shock absorber is deformed, cracked or damaged, and replace it if necessary.

install

- Refer to component diagram and install in reverse order.

Note: Do not reuse parts that cannot be reused. If required, carefully check and confirm the reusable parts according to the component drawing.

decompose

1. Cover the lower end of the absorber with a cloth to attach the absorber to the clamp.

Note: Do not fix the oil cylinder part of the shock absorber on the vice.

2. Remove the associated parts from the shock absorber.

check up

- Check the piston connecting rod and rubber parts for deformation, cracked or damaged, and replace them if necessary.

assemble

- Refer to the component diagram to install components in the reverse sequence.

Note: Do not reuse parts that cannot be reused. If required, carefully check and confirm the reusable parts according to the component drawing.

brake assembly

BR chapter

catalog

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matters need attention

- Use the DOT 4 brake fluid.
- Do not reuse the discharged brake fluid.
- Be careful not to spray the brake fluid into the painted parts of the car body. If sprayed on the paint surface, wash it away with water immediately.
- Use clean brake fluid to clean all parts such as main pump and disc brake pliers.
- Do not use mineral oil such as gasoline or kerosene for cleaning. They will damage the rubber parts of the hydraulic system.
- Use the tubing nut torque wrench when installing the brake pipe.
- The parts of the brake system are the important safety parts. If the brake fluid leakage is found, remove the parts to find out the cause. If any fault is found, replace the parts in time.
- Before operation, turn the ignition to the OFF position and disconnect the plug of the ABS actuator and the electronic unit (control unit).

Brake fault diagnosis table

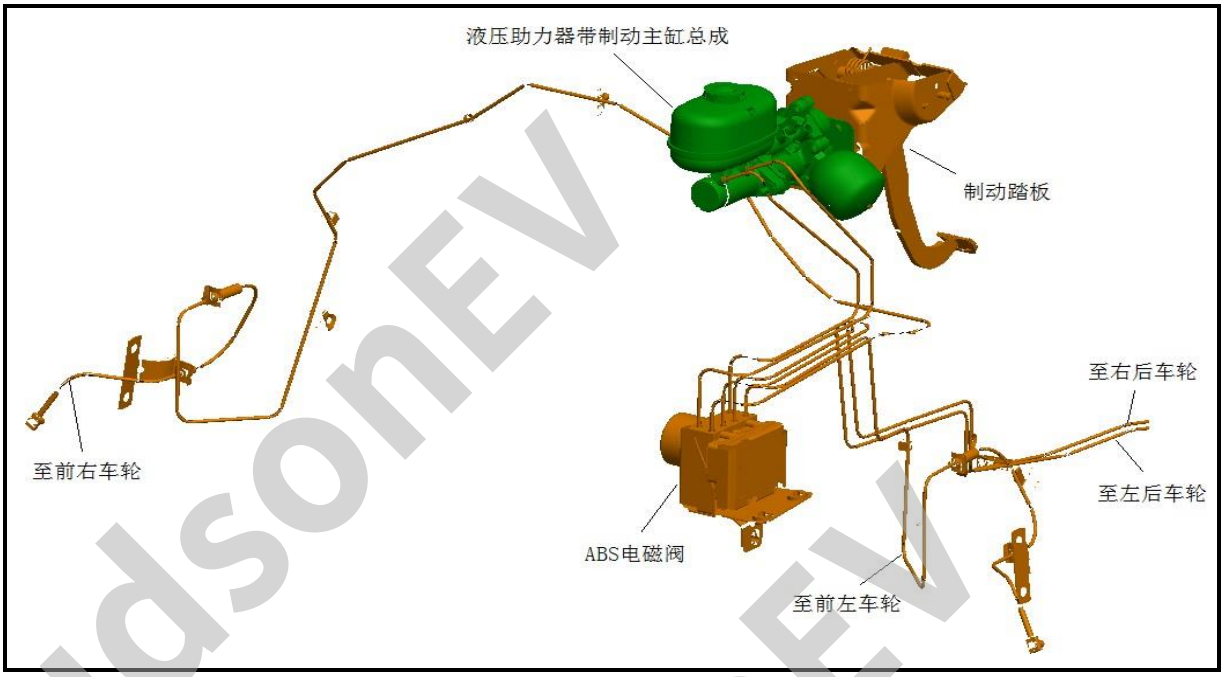
sym pto m	probable cause	mea sure
The brake fluid level alarm indicator light is always on	Brake liquid level	Fill the brake fluid to the brake reservoir to the specified range.check up Check if the system has leaks and repair it as needed
	Indicator light loop	Check for short circuit
Brake deviation or drift	tire pressure	Check the tire for uneven or excessive wear, and the tire gas press.
	Brake friction material	Check the brake friction material for an uneven taper or pass Degrees wear. Repair as needed
	Brake parts	Check the brake disc (brake drum) and wheel resistance Whether there is wear or tear. Repair as needed
	Suspension parts	Check front wheel positioning
	wheel alignment	Check front wheel positioning
The brake pedal goes down too fast	Brake liquid level	Check the system for leaks and repair them as needed. To make Fill the moving tank and exhaust the system
	There is air in the system	Check the system for leaks, repair as needed and tie Unified exhaust
	Brake general pump	Check and replace it if necessary
The brake pedal is released too slowly	There is air in the system	Check the system for leaks, repair as needed and tie Unified exhaust
	Brake general pump	Check and replace it if necessary
Very light brake pedal force brake dead	Brake friction material	Check the brake friction material for an uneven taper or pass Degrees wear. Repair as needed
	Brake parts	Check that the brake parts are running correctly and repair as needed
	Parking brake parts	Repair or replace them as needed
	If equipped, check the anti-lock brake control System	Check the ABS control module
Pedal travel is too large or irregular	System leakage	Check the system for leaks and repair them as needed. Exhaust the system.
	There is air in the system	
	Brake clamp (brake sub-pump)	
	Brake general pump	Repair or replace them as needed

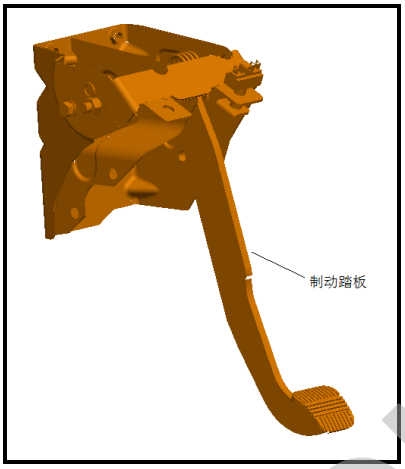
	Brake friction material	Check the brake friction material for excessive wear
	brake pedal	Check the brake pedal for adhesion or obstruction and repair as needed texture
The brake pedal force is too strong	Hydraulic booster with brake master cylinder assembly	Repair or replace them as needed
Insufficient braking force	Brake system leakage	Check the system for leaks and repair them as needed. Exhaust the system.
	There is air in the system	
	Brake parts	Repair or replace them as needed
	The brake does not work effectively	Repair or replace them as needed
The brake is not applied after pressing the brake pedal work	Brake pedal, brake fluid, brake line Brake parts	Repair or replace them as needed

The brake is not back	Brake pedal, brake fluid, brake line Brake parts	Repair or replace them as needed
There is noise	Rear brake hoof sheet	Repair or replace them as needed
	Rear brake bottom plate	Repair or replace them as needed
	Front brake disc or rear brake drum	Repair or replace them as needed
	Wheel drum bearing	Replace as needed
	If equipped, the ABS hydraulic control installation place	Acceptable status

Braking system inspection and maintenance

Brake line system

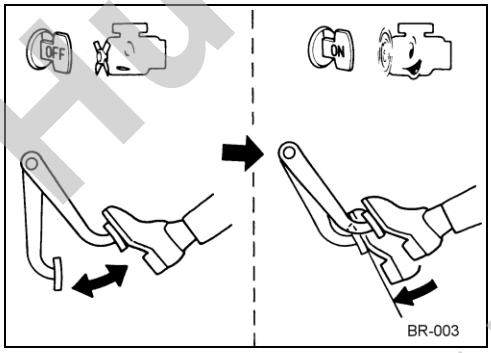




brake pedal

The gap and gap between the brake pedal and the floor when the pedal is pressed.

1. Check the brake pedal free height from the sole plate.
2. Adjust the height with reference to the following specifications.
   - Free travel (mm): 10.8~12
   - (H1-H 2) (mm) ： 142±5
   - In the vehicle start state, the brake pedal force: 700N

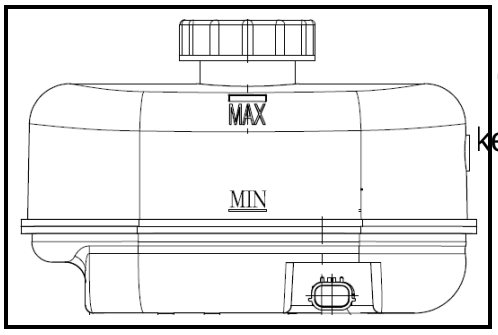


hydraulic booster

function

- Press the brake pedal several times when the engine stops. Then after the brake pedal is fully pressed, start the engine and check for reduced clearance between the brake pedal and the floor.

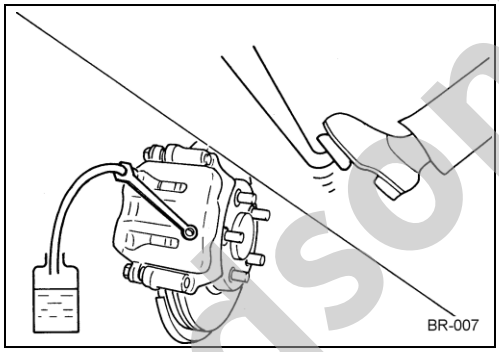
Note: Press the pedal at about 5 seconds intervals.



oil storage tank

ke liquid oil level

- Check that the brake fluid level in the reservoir meets the standards (in MAX and MIN, between the lines).
- Visually inspect for brake fluid leakage around the reservoir.



brake fluid

Replacement cycle

Personal car: the new car for 3 years, after every 2 years.

drain the oil

1. Connect the plastic pipe to the vent ther.
2. Slowly discharge each round of brake fluid from the vent bolt when the brake pedal is pressed.

Reinjection and deflation

1. Turn the ignition lock to the OFF and disassemble the ABS actuator and the control element connector.
2. Determine that there are no foreign matter in the reservoir and reinject new brake fluid.
3. Connect the plastic tube to the vent vent on the left rear wheel and relax the vent.
4. Slowly press the brake pedal and release it. Repeat this step until the new brake fluid flows for about 2 or 3 seconds, then close the vent plug when the brake pedal is pressed.
5. Press the brake pedal several times and hold it on. Relax the vent bolt on the left rear side wheel to drain the air and lock it quickly.
6. Lock the vent bolt with the specified torque.
   Locking torque (N · m): 6.9-8.8
7. When repeating steps 3 to 6, add some brake fluid to the main pump to keep it at least half full at any time and exhaust air in the following order: right rear wheel, left front wheel and right front wheel.

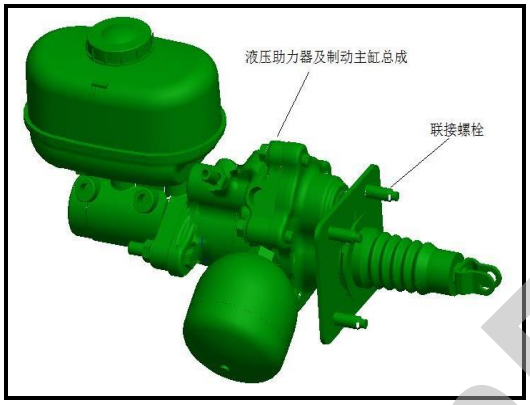
Note: Do not relax the actuator connectors while discharging the air.

brake pipe

check up

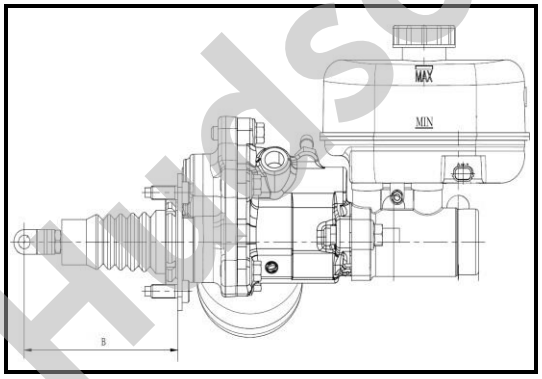
1. Check the hose, oil pipe and the connection for brake fluid leakage, damage, distortion, deformation, touch other parts and the connection is loose.
2. When applying a force of 700N to the brake pedal for about 5 seconds, check for brake fluid leaks from any part.

Hydraulic booster and brake master cylinder assembly



dismantle

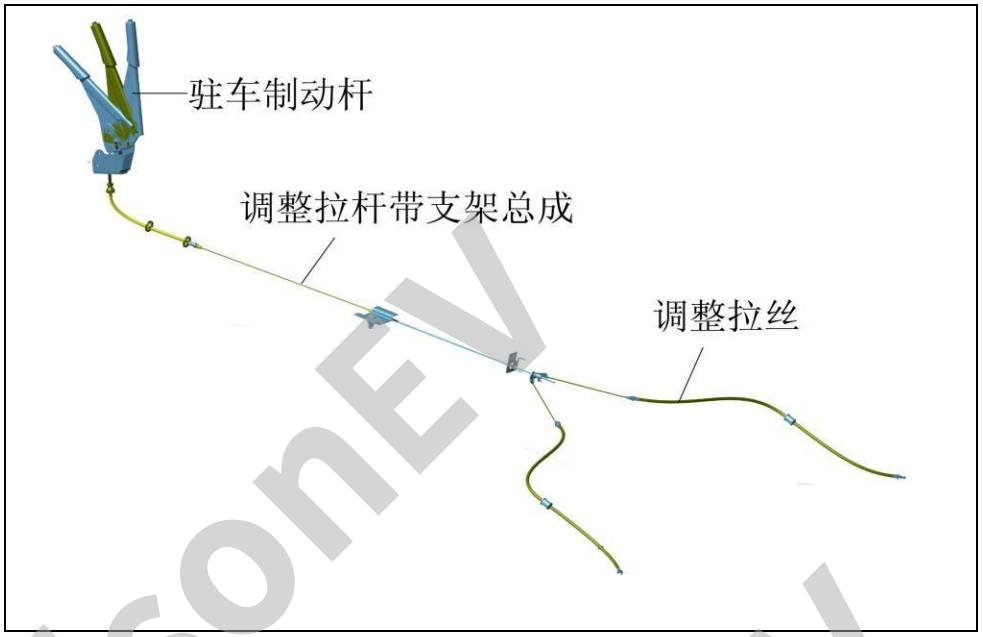
1. Remove the harness connector for the brake fluid oil level sensor.
2. Remove the cockpit middle opening pin and flat opening pin and release the brake pedal arm.
3. Remove the retaining nut from the pedal bracket.
4. Remove the hydraulic booster and the brake master cylinder assembly through the engine compartment.

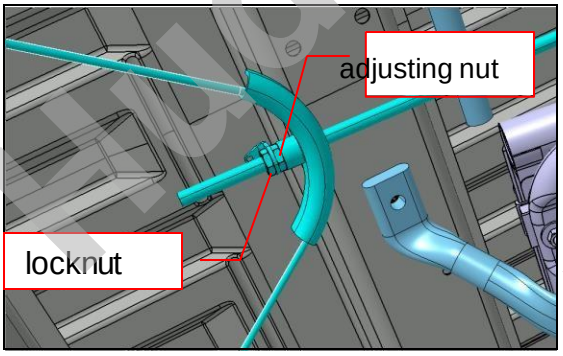


install

1. Relax the locking nut and adjust the length of the pushrod so that length B (left) meets the specified value. **Length B standard (mm): 131**
2. After adjusting B, lock the lock nut to the car temporarily.
3. The threaded fork connecting the brake pedal to the pushrod.
4. Install the retaining nut on the brake pedal assembly and lock it with the specified torque.
5. Adjust the height and swimming gap of the brake pedal.
6. Lock the locking nut of the pusher with the specified torque.
7. Remove the air from the brake line.

parking braking system



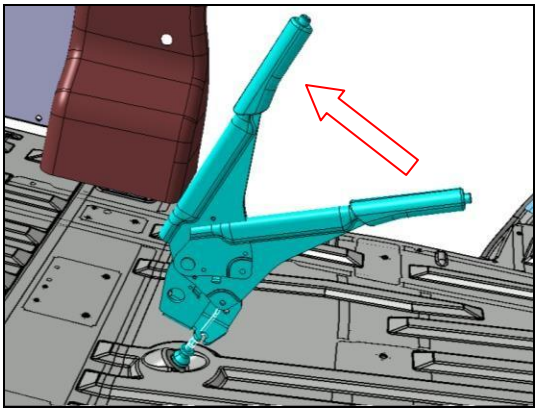


check up

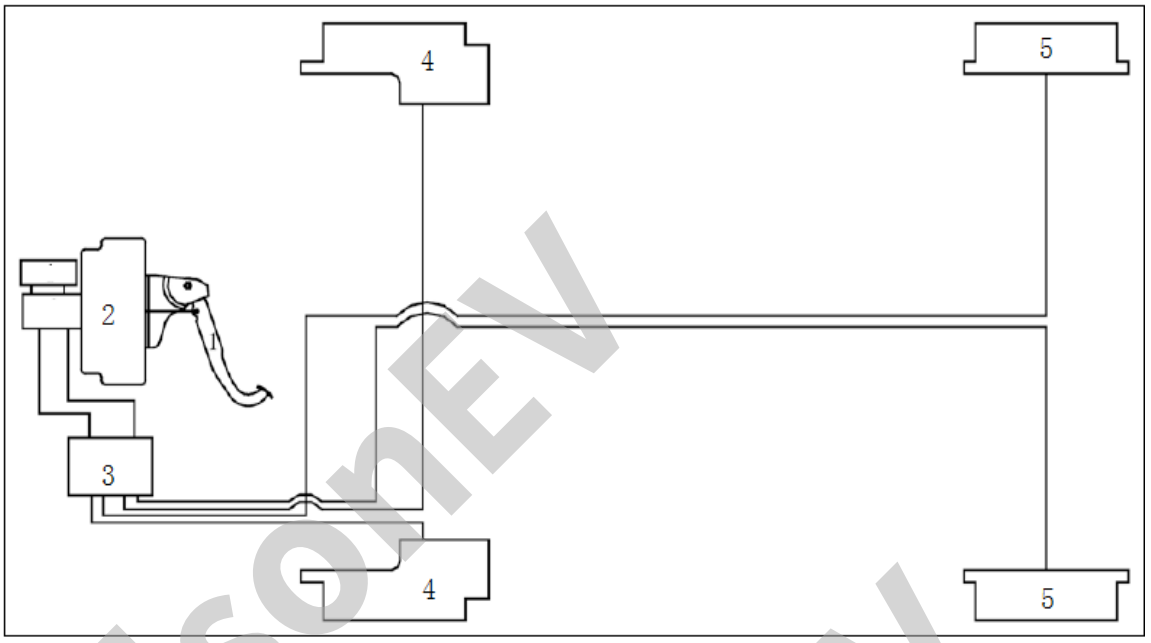
- Check the brake lever assembly for bending, damage, and cracks. If a malfunction takes place, replace it.
- Check the drawing for wear and damage. If a malfunction takes place, replace it.
- Check the hand brake warning lamp switch. If a malfunction takes place, replace it.
- Check each part for deformation or damage caused by touching other parts. If a malfunction takes place, replace it.

Parking brake adjustment

1. One person sitting in the driver's seat, completely relax the handbrake to the bottom end;
2. Another person under the car, using a stupid wrench to adjust the adjustment nut, so that the parking brake wire rope tension;
3. Pull the handbrake with an appropriate force, check whether the hand brake working stroke is in 6~8 teeth. If not within the range, continue to adjust the adjustment nut until it is qualified;
4. After the hand brake adjustment is qualified, tighten the lock nut;
5. When the parking brake lever is put to the end, the brake drum and the brake pad should be completely separated, and the alarm light is off;
6. Parking brake cable installation without discount, distortion phenomenon, cable hanging buckle, tension spring stable, do not loosen.



制动管路原理图



1. 制动踏板
2. 液压助力器带制动主缸总成
3. ABS
4. 前轴制动器
5. 后轴制动器

Steering joint belt front brake

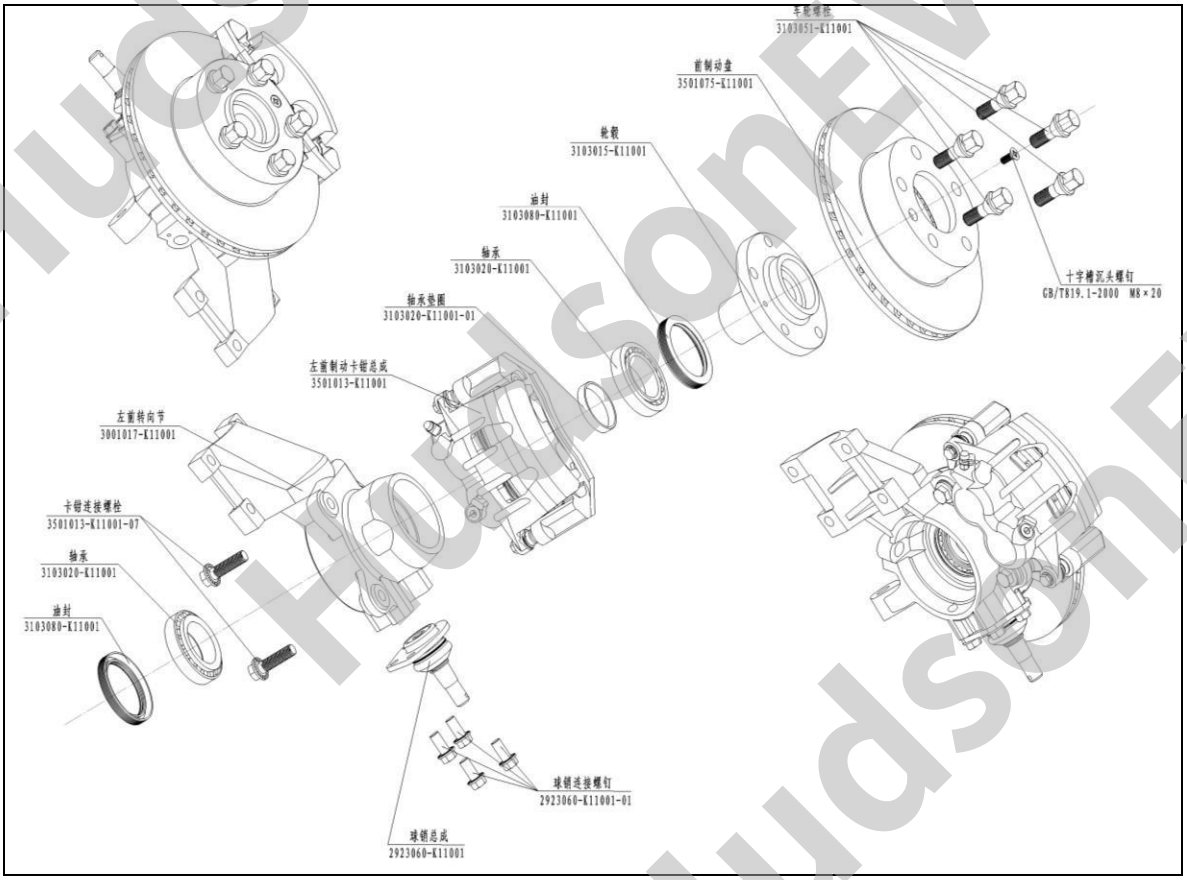
Performance parameters of the system and assembly structure

The thread size is M141.5. During the driving process, When the friction material wears out to a certain extent, The front wheel will give a mechanical alarm, That is, to remind the user of the need to replace the friction plate, The replacement method is to remove the support pin connection screw on the caliper assembly, Turn out of the brake caliper extension guide pin, Remove worn friction plates from the bracket, With a new friction piece, Roating brake caliper body, Lock the support pin connection screw; When the wear of brake disc exceeds 1mm (visually), Need to replace the brake disc, The replacement method is as follows, Loosen the brake caliper connection bolt, Remove the brake caliper assembly, Remove the M8 cross screw on the brake disc, Remove the brake disc, Change of the new brake disc, Tighten the M8 cross screw, Install the brake caliper assembly, Tighten the brake caliper connection screw.

Tightening torque of the front brake assembly

nam e	qua ntity	Connection torque (N.M ）
Support pin connection screw	1	30-36
Guide-pin connection screw	1	30-36
The caliper connects the screws	2	90-110
Ball pin connection screw	4	80-90
Air release screw	1	7-12

Structural diagram of the front brake



Fault analysis

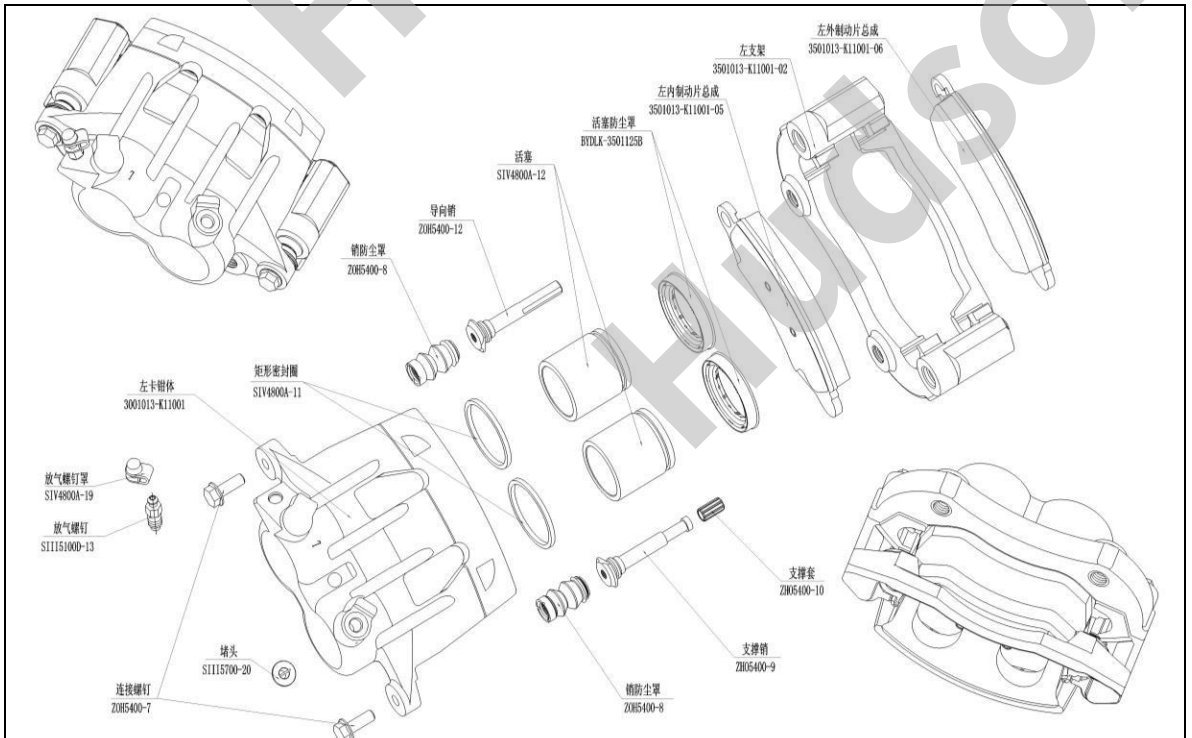
Fault descripti on	failure cause	process mode
After driving for a period of time, the front bridge is loose kuang	The bearing swim gap is too large	Replace the front steering joint belt hub assembly
	The front axle drive shaft lock nut is loose	Tighten the lock nut and add an anti-rotation device (if broken Bad thread, etc.)
	Front axle drive shaft is not assembled in place	Replace the drive shaft and the front loading assembly
The front wheel hugs the death in the car	The bearing swim gap is too small	Replace the front steering joint belt hub assembly
	Front brake caliper dead	Replace the front brake caliper assembly
Brake abnormal noise occurs in the driving brake	Friction material has a poor contact with the brake disc Equal factor	Replace the friction plate and polish the brake disc surface
Lack of braking force in driving	The oil pipe joint is loose	Replace the tubing sealing ring and increase the tightening torque
	The front brake calipers leak oil	Replace the front brake caliper assembly

Front brake disassembly

Disassemble the steering joint belt brake assembly in the following steps:

1. Release the connection bolt of the brake caliper assembly and remove the brake caliper assembly;
2. Release the cross screw and remove the brake disc.
3. Release the ball pin connecting screw and remove the ball pin assembly.
4. Press out of the front hub, use the lamar to pull out the bearing, and take out the front hub, bearing, bearing washer and oil seal.

Structural diagram of the brake caliper



Remove the key points of the brake calipers

1. Remove the brake pad, pay attention to the position of the clamp spring on the brake pad, and take out the brake pad from the non-spring position.
2. Release the connecting screw, remove the bracket with the pin body, remove the support pin and guide pin from the bracket, and remove the pin dust cover from the bracket.
3. Place the buffer block in the arc position of the caliper, aim the oil hole of the caliper with the air gun, inflate the cylinder block, hit the piston inside the cylinder, and take out the piston, rectangular sealing ring and piston dust cover.
4. Release the open air screw and remove the vent screw.
5. So far, all the parts of the brake calipers are disassembled.

Brake caliper maintenance standard and inspection

surveillance project	stan dard	operating limit	Repair measure s
Caliper holder assembly status	Pull on the holder, and on the caliper And the support can slide freely	Can't slide freely	Replace the bracket or support pin and guide melt
Connection thread size on the bracket M14×2	The size is not right		Replace the bracket
Connect the thread center ruler to the bracket inch 125	The size is not right		
Caliper oil hole size M101	The size is not right		Replace calipers
Whether the pin dust cover is cracked	not allow		Replace the pin dust cover immediately after rupture
Whether the piston dust cover is cracked	not allow		Replace the piston for dust prevention after rupture cover
The thickness of friction material		Mechanical alarm	Replace the friction sheet

The brake caliper assembly requirements are as follows:

Assembly points of the brake calipers

1. Clean the brake caliper body to ensure the internal cleaning of the caliper body.
2. Install the defueling screw, tightening torque 7-12N.M
3. Put the rectangular ring coated with GLK 1 lubricating grease into the calipers to ensure that the rectangular circle is without torsion and inclination.
4. Apply a small amount of GLK 1 lubricating grease to the bottom of the piston, and press the piston dust cover into the piston into the caliper to ensure that the piston dust cover has no torsional deformation.
5. Check the high and low pressure air tightness of the calipers.
6, the support pin and guide pin into the bracket, and then into the friction plate, to ensure that the support pin and guide pin position is correct, can not be installed in reverse.
7. Connect the bracket assembly and the caliper assembly through the connecting screw to ensure that the rear assembly bracket can extend the support pin and guide the pin direction freely, and the connecting screw torque is 30-36N.M 。

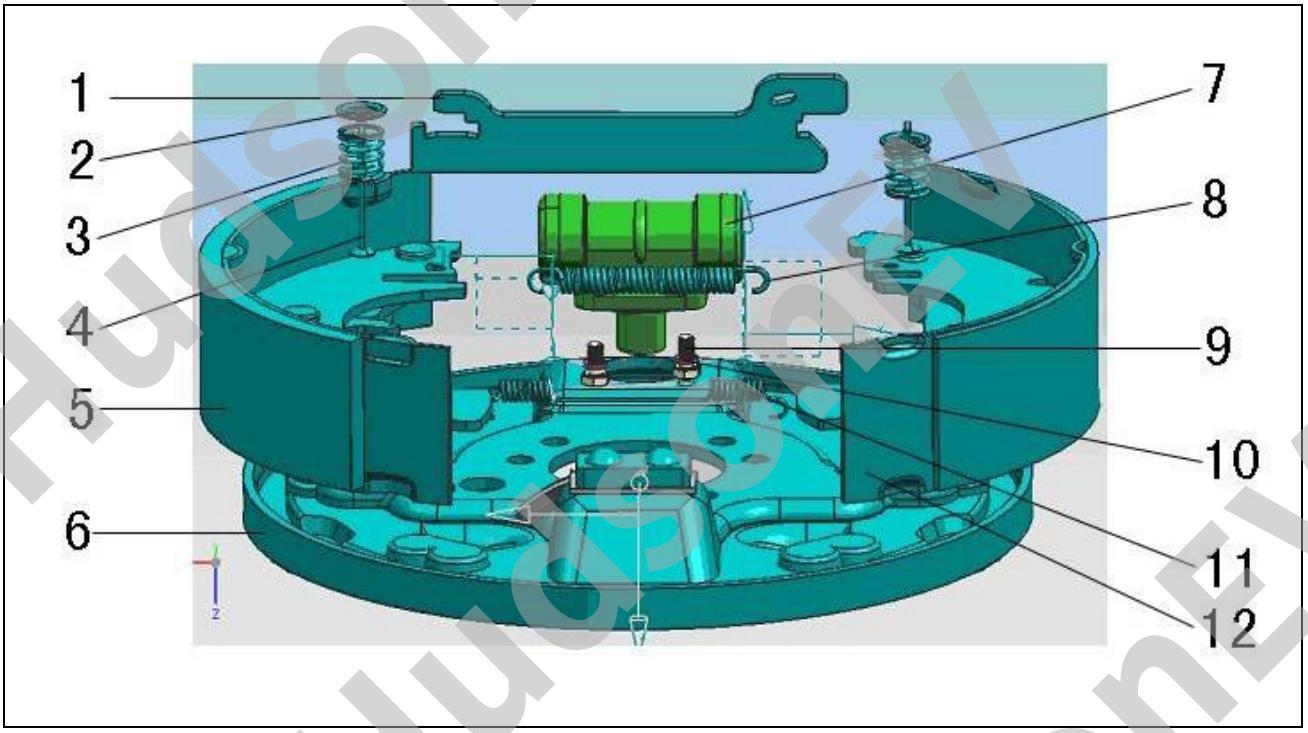
Rear drum type brake assembly

main parameter

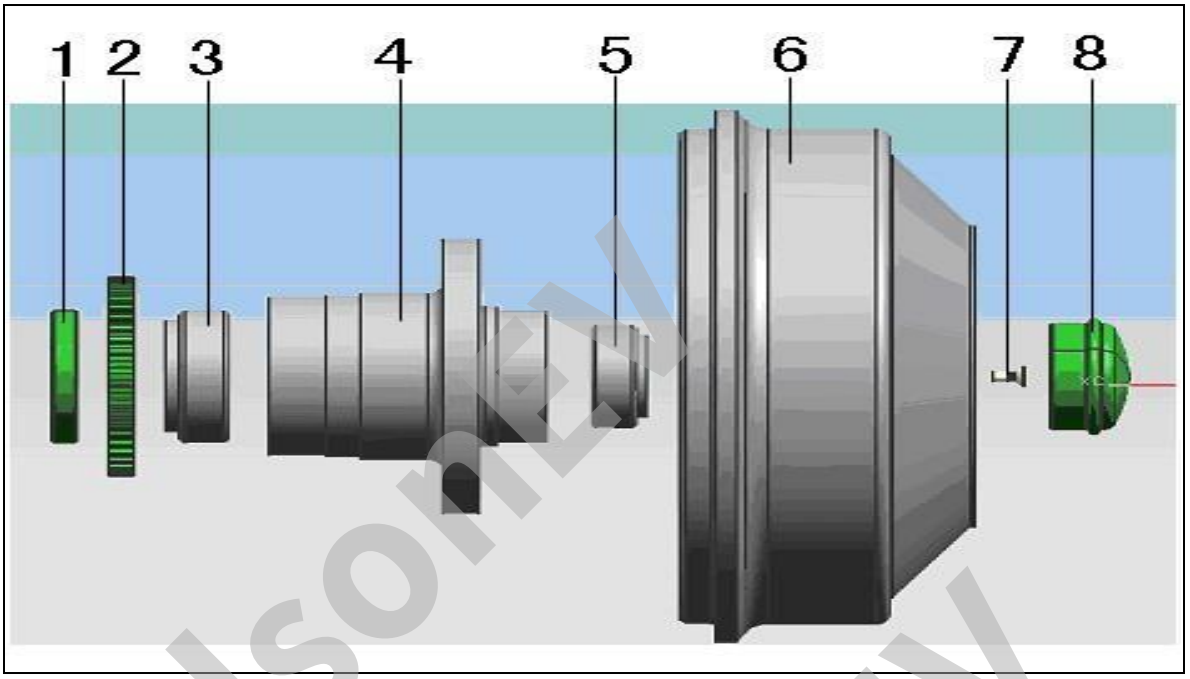
Inner diameter of brake drum		¢280mm
Rear wheel cylinder diameter		¢26.99mm
The center of the rear cylinder is high		31mm
brake facing	thickness	Lead the hoof at 8.8mm And 4mm from the hoof
	width	63mm
	Inclusive Angle	117°
Brake clearance guaranteed by the self-adjustment mechanism		0.35m m ～0.55mm
Rear brake	Maximum outer diameter	¢312.5mm
	maximum altitude	95.4mm
Rear brake drum	Maximum outer diameter	¢322mm
	maximum altitude	112.5mm

Rear drum type brake structure

1. Push rod
2, Brake shoe press spring seat
3, the brake shoe pressure spring
4 Tie rod
5. Self-adjusting assembly of collar and hoof strap
6. Brake base plate assembly
7, the brake wheel cylinder assembly
8. Return spring on the brake shoe
9. The bolt M6
10, washer 6
11. Brake shoe lower return spring
12. Pull arm assembly from the hoof strap

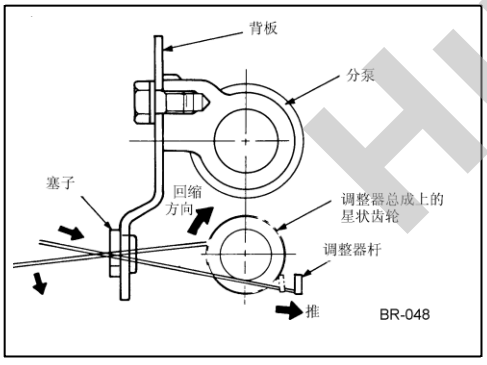


Brake drum belt hub assembly



1. Oil seal
2. Ring gear
3.40 bearings
4. Rear wheel hub
5. 30 bearings
6. Rear brake drum
7. Countersunk screw M8
8. Outer wheel hub cover

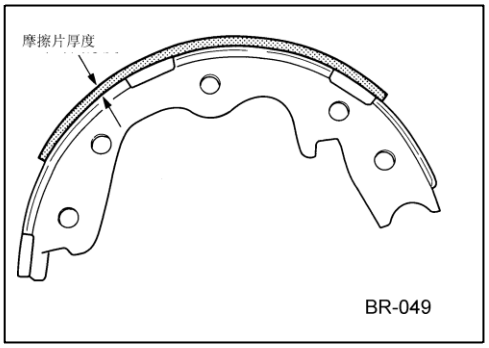
Removing and installing



Disassemble

Note the following items during installation.

- Remove the brake drum when the wheel is removed and the hand brake pull lever is released.
- If it is difficult to remove the brake drum, remove it as follows:
  Using a screwdriver, rotate the crankwheel of the regulator assembly from the adjustment hole (the plug side) in the direction indicated by the arrow in the left image.



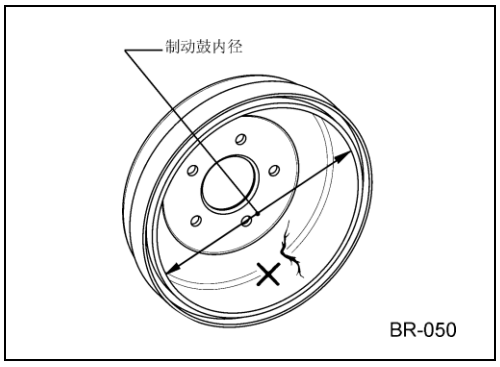
Check up

After disassembly, check the following items. Change a fault if found.

- Visually inspect the friction plate for abnormal wear, damage, and flaking.
- Check the thickness of the friction plate with a ruler.
  Standard thickness [thickness of new brake disc]: 5.2m m repair thickness limit : 1.5mm

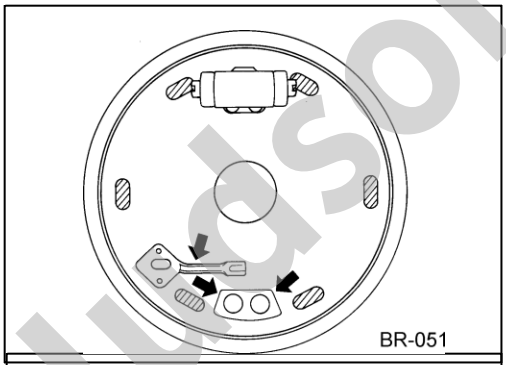
BR-

- Check the sliding surface of the brake shoe for abnormal wear and damage.



check up

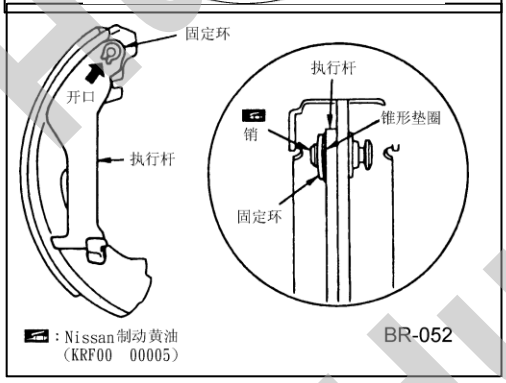
- Check the return spring for slack.
- Check that the regulator is not moving well.
- Visually inspect the inside of the brake drum for abnormal wear, damage, and cracks.
- Using the vernier caliper, check the inner diameter of the brake drum. Standard inner diameter [new brake drum]: φ 260m m Maximum inner diameter : φ 261.5mm
- Visually inspect the backplane for damage, cracks, and deformation.
- Use the open-mouth wrench, and check whether the fixing bolts of the back plate are loose.



install

Refer to the part drawings and be careful of the following.

- Apply brake butter to the brake sliding surface (shaded) and the area indicated in the arrow above the backplane.

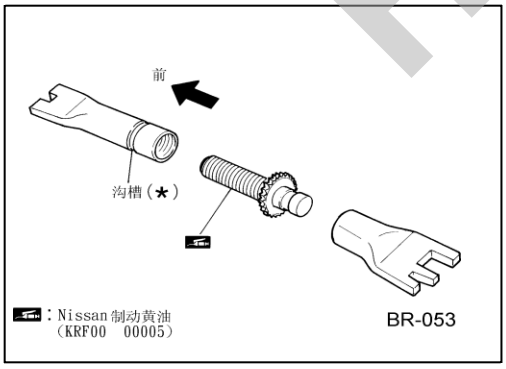


- If the operating lever is lightly removed, install as follows:

（1） Apply brake butter to the sliding surface of the lever and install the lever and tapered spacer on the brake shoe.

（2） Install the buckle on the lever and bend the loop until they touch each other.

Note: Do not reuse the buckle.



- If the regulator has decomposed, apply brake butter to the thread and distinguish the left / right wheel for assembly.

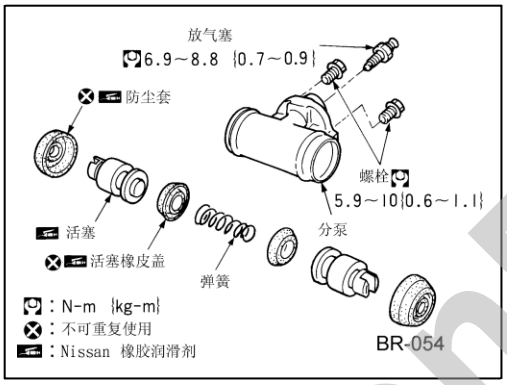
Right rear wheel	Trench (shown in *)	: not have
	Threaded direction	: right hand thread
left rear wheel	Trench (shown in *)	: now available
	Threaded direction	: left-handed screw

- After the assembly, it is determined that each part is indeed properly installed. Measure the inner diameter of the brake drum and adjust the outer diameter of the center of the brake shoe so that the inner diameter is about 0.45 to 0.65mm less than that of the brake drum.
- Install the brake drum with the ring nut and adjust the brake shoe clearance. When the engine is running and a vacuum is applied to the supercharger, repeatedly press the brake pedal until no crash sound is heard from the regulator. This procedure can automatically adjust the hoof gap to the standard values.

Note: Do not attempt manual adjustment after automatic adjustment.

Divide the pump

Replacement period (rubber cover and dust cover for sub-pump)



Disassemble

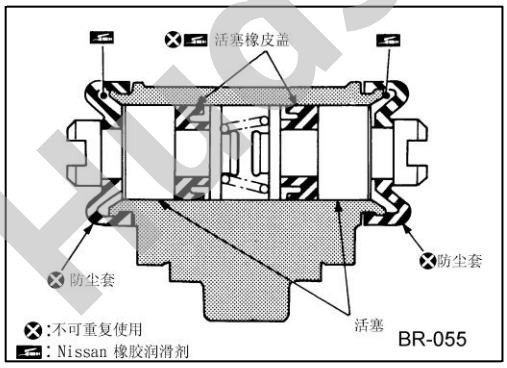
1. Remove the rear-wheel brake shoe piece.
2. Remove the brake fluid tube from the subpump.
3. Remove the retaining nut from the pump and remove the pump from the backplane.

Install

Install in the opposite order of disassembly and pay attention to the following items. After work, drain air from the brake line.

Decompose

1. Remove the dust jacket on the left and right side of the split pump and pull the piston and spring from the piston cylinder.
2. Remove the piston rubber cover from the piston.



Check up

- Check the rubber cover of piston, piston and the inner wall of piston cylinder for wear, rust and damage. If a fault is found, replace it with the applicable part.

Assemble

3. Apply the brake fluid on the piston sliding surface of the sub-pump.
4. Apply rubber lubricant to the piston rubber cover and dust jacket and assemble as shown on the left.

Use and Repair of the Rear Drum Brakes

- When connecting and installing the brake oil pipe, the brake must align the oil pipe mouth with the oil inlet hole of the wheel cylinder before tightening the oil pipe nut and pressing it. To prevent leakage due to improper installation.
- The brake fluid used for the brake should be alcohol based automotive brake fluid, and the use of mineral oil based brake fluids such as gasoline and kerosene is prohibited.
- When cleaning wheel cylinder parts, clean alcohol brake fluid or alcohol should be used (gasoline is strictly prohibited).
- When replacing the brake, wheel cylinder, brake fluid, or disassembling the brake oil circuit, the air must be expelled from the pipeline before the brake can be used.
- The inner working surface of the brake drum and the surface of the brake lining should be clean, dry, and free of contamination.
- After installing or replacing the brake, it is necessary to apply the driving brake several times before adjusting the brake clearance within the specified range. Afterwards, the brake can only be used normally.
- The adjustment of the handbrake cable must be carried out only when the braking clearance of the brake is adjusted to the specified range, in order to prevent the brake from being locked up.
- When the wheel cylinder cup is worn, deformed, or damaged, a new cup of the same specification should be replaced. When replacing a leather cup, clean brake fluid should be applied to the lip of the cup first, and then the cup should be gently pushed into the cylinder facing the cylinder hole (pay attention to the direction of the cup).
- When the size of the wheel cylinder hole and piston outer circle is worn, the wheel cylinder assembly should be replaced.
- When the working inner diameter of the brake drum is worn to Φ At 282 mm, the brake drum must be replaced.
- When the brake lining is worn to a thickness of less than (or equal to) 1 mm, the brake shoe assembly must be replaced.
- When the brake clearance adjusted by the self-adjusting mechanism is greater than 0.8 mm (not too small), or when the braking is not sensitive, the brake shoe assembly must be replaced, or the self-adjusting mechanism must be replaced.

steering system

ST chapter

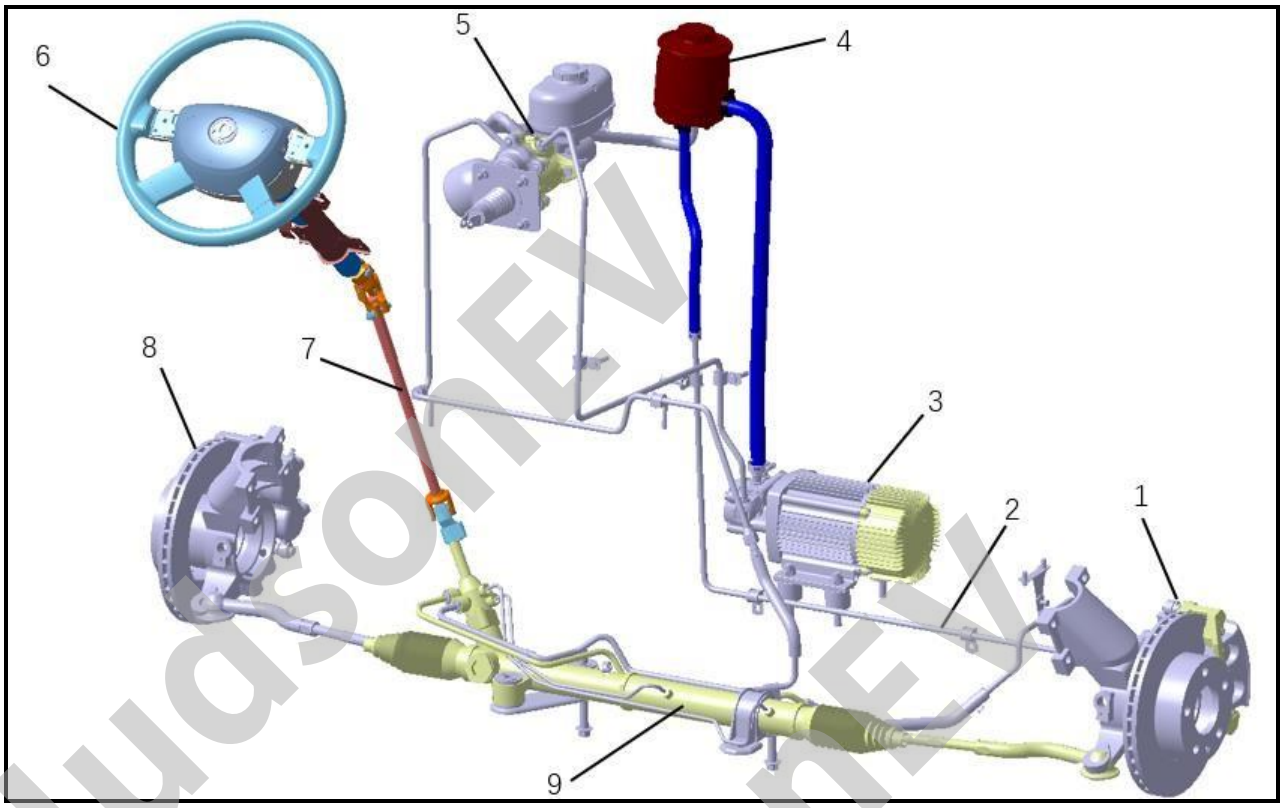
Catalog

ue

Matters need attention

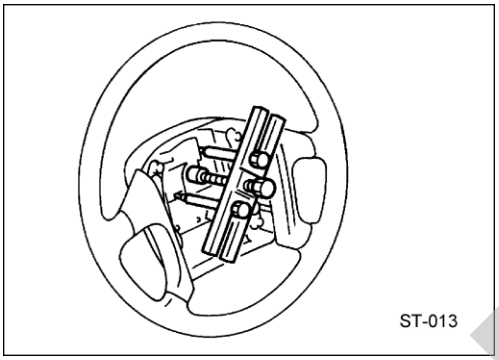
- It is necessary to follow the warnings and precautions under the decomposition procedure:
- It must be in a clean and dust-free area. No dust prevention device is required.
- Clean the outer side of the component before disassembly.
- Clean the parts for disassembly. Be careful not to let dust or other foreign substances come into contact with the parts.
- Assemble the disassembled parts correctly according to the procedures described in the maintenance manual. If assembly work is suspended midway, cover the parts with a clean jacket to prevent them from getting contaminated with impurities.
- Use a tissue to wipe off dust and foreign substances. If a cloth towel is used, cotton lint may remain on the cleaned parts.
- Use kerosene to clean decomposed parts, except for parts made of rubber, and then thoroughly dry them with an air gun or tissue.
- After disassembling the hydraulic pipeline, it is necessary to block the oil pipe to prevent power steering oil from leaking from the pipe opening.

A Schematic diagram of the steering system



1-Right steering joint belt brake assembly
2-Power line
3-Dynamic oil pump
4-Move the oil tank
5-Hydraulic booster with brake master cylinder assembly
6-Steering wheel
7-Steering drive device
8-Right steering joint belt brake assembly
9-steering device

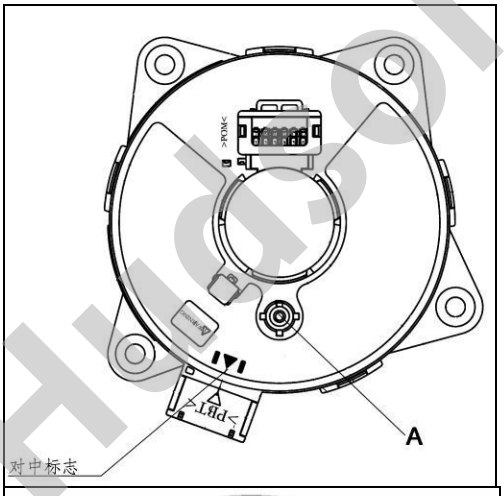
Steering wheel



Disassemble

Note: When reinstalling the spiral cable, tape the cable to align the fixed housing and rotating parts. This will omit the intermediate alignment step when installing the spiral cable.

1. Turn the steering wheel to position where the vehicle goes straight ahead
2. Remove the driver's airbag module.
3. Unplug the cruise switch plug or the volume control plug.
4. Lock the steering wheel position and remove the steering wheel lock nut.
5. Remove the steering wheel with a steering wheel pull-out.



Install

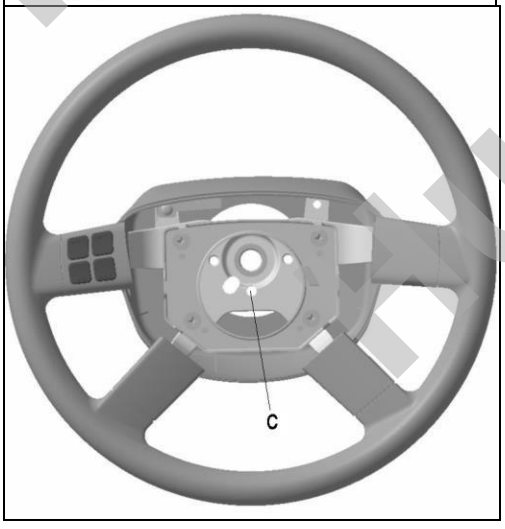
The following steps are the opposite step to disassembly.

Pay attention to:

- The middle position is set as described below.
  Turn the screw cable clockwise until the stop reaches. Then turn the spiral cable (two and a half to three turns) counterclockwise until the center mark and the adjusted mark are aligned. The repair part is fixed in the middle position with the block. If the block is removed, it can be installed on the steering wheel without alignment.

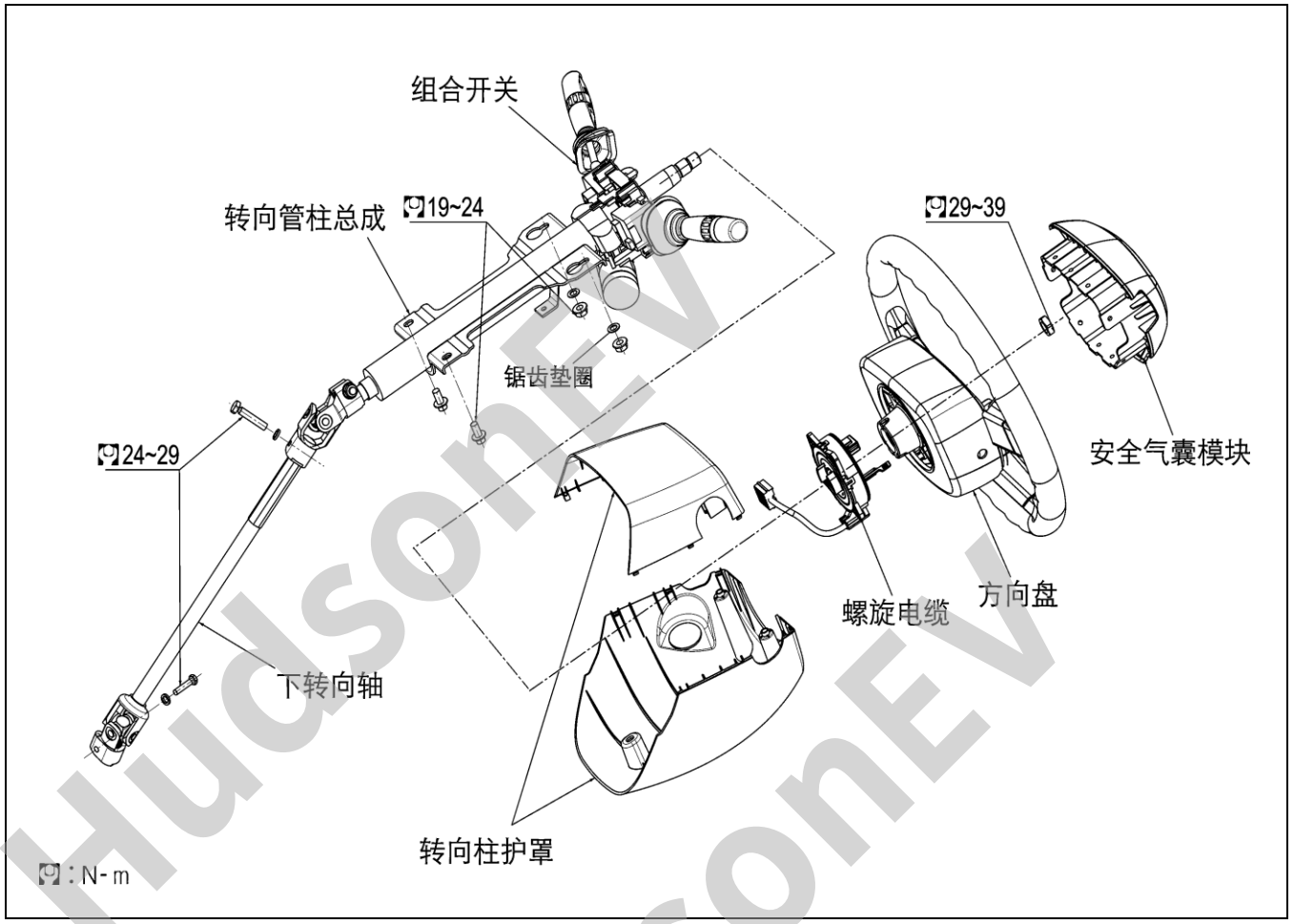
Take care:

Do not idling the spiral cable if it is not necessary. Do not rotate (or break the cable).



Adjust the spiral cable positioning pin (see point A in figure) to the steering wheel positioning pin hole (see point C in figure).

Steering tube column assembly



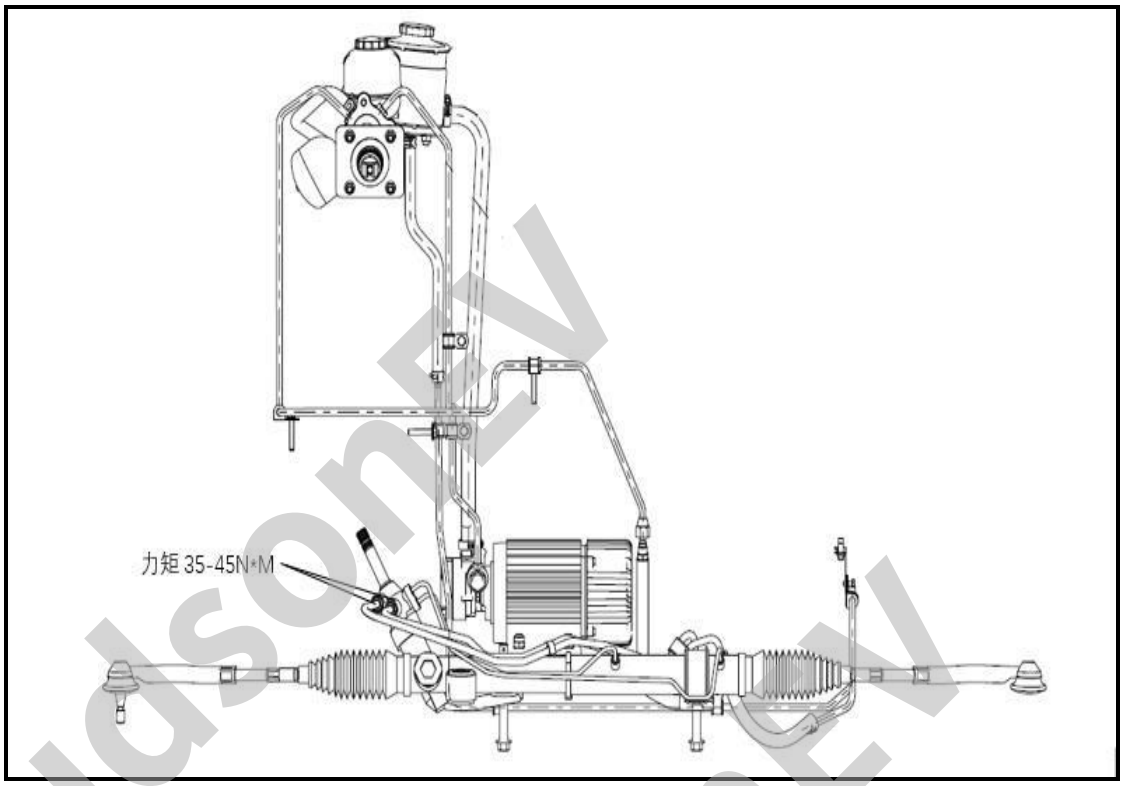
Disassemble

1. Remove the steering wheel and the steering column guard.
2. Remove the spiral cable.
3. Disconnect the ignition switch wiring harness plug.
4. Remove the combination switch.
5. Remove the bolts at the upper end of the lower steering shaft.
6. Remove the lower panel of the instrument.
7. Remove the steering column fixing bolt nut and remove the steering column.

Install

Follow the opposite steps of the disassembly process.

Power steering pump



Disassemble

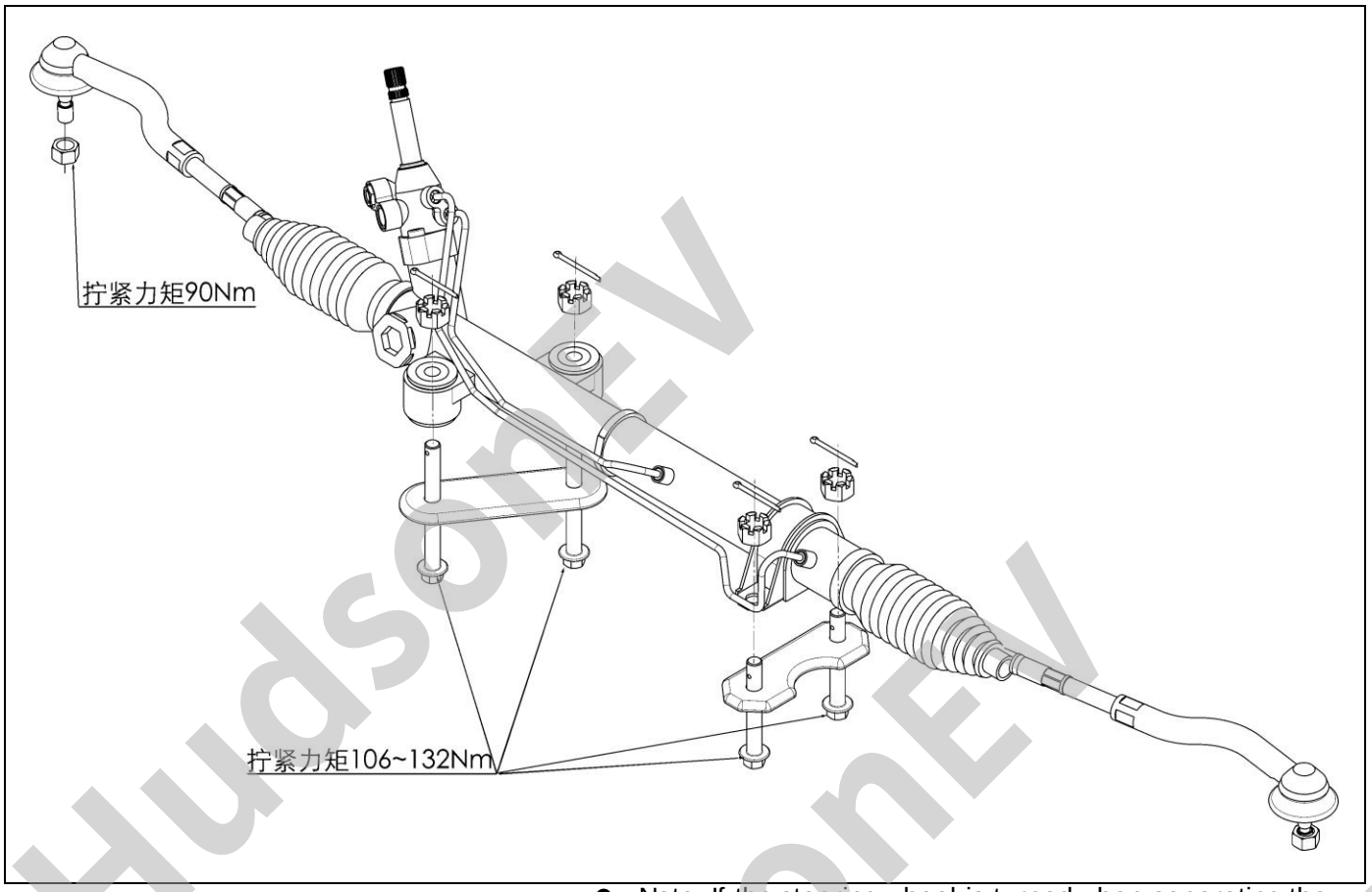
1. Turn the oil dry.
2. Remove the hydraulic line connected to the blade pump.
3. Release the belt tensioning wheel and remove the belt.
4. Remove the fastening bolts for the blade pump.
5. Remove the blade pump assembly.

Install

To remove the opposite procedure, pay attention to the following matters.

- After the installation, adjust the belt tension.
- After installation, exhaust the hydraulic system.

Steering box



- Note: If the steering wheel is turned when separating the steering pipe string and the steering machine assembly, the spiral cable failure may be caused, and ensure that the steering wheel does not turn.

Disassemble

1. Turn the steering wheel to position where the vehicle goes straight ahead.
2. Release the upper and lower bolts of the universal joint at the upper end of the lower steering shaft.
3. Remove the retaining bolt of the lower coupling (upper) and remove the steering drive shaft.
4. Lift the vehicle and remove the front wheel assembly.
5. Remove the self-locking nut from the steering rod tip.
6. Remove the steering lever from the steering joint using the ball remover to ensure that the dust cover is not damaged.

- Note: Wear nuts during removal to avoid damaging the thread and prevent the disassembly device from falling off suddenly.

7. Remove the high pressure pipe and low pressure hose of the hydraulic pipe and drain the power steering fluid.
8. Remove the retaining bolts and nuts on the steering assembly and remove the steering assembly.

Install

1. Install in the reverse order of the disassembly.
2. When installing the steering gear assembly, keep the tires on the level ground under no-load conditions, and finally tighten the nuts and bolts.
3. Check the wheel positioning.

Common faults and troubleshooting methods

The usual fault of the steering system is unstable turning, too large clearance, only one side steering or steering wheel slack, and the front axle deflection causes the steering wheel operation failure.

When the steering wheel is not stable, top up the front axle with the jack, and the previous wheel is guided for inspection. If the steering wheel is still unstable, separate the steering gear and the connection mechanism and check these components.

When the steering wheel is not easy to turn in driving, the reason is that the Angle of the front wheel is not adjusted properly.

The operation and unstable return of the steering wheel due to improper clearance or excessive pretightening force is not easy to be found, unless the steering machine is decomposed. If these problems arise gradually, the reason is usually the poor lubrication of the rod-tied hinges and connection devices.

Steering failure during driving can usually be attributed to the uneven road surface. In this case, it is necessary to drive the vehicle for a steering inspection on each road surface.

The deviation of the steering wheel may be due to the incorrect positioning Angle of the front wheel, the improper balance of the tires, and the steering mechanism.

1） The steering wheel operation is heavy

sign	probable cause	keep in repair
The steering wheel operation is heavy	steering system	
	The oil level is too low	Add the lubricant to the specified plane
	Power steering oil deterioration or impurities in the oil	Replace lubricating oil
	Steering connection wear (ball pin, etc.)	Change the ball head pin
	The power steering system has a fault	
	1) The lubricating oil resistance is too large due to the pipe depression	Measure back pressure, repair or replace pipe if the specified exceeds
	2) The oil pressure is too low because the hydraulic pump does not work	Measure the oil pressure and flow flow, if below the specified value, decompose and repair the hydraulic pump
	3) Gas is present in the hydraulic pipeline	Exhaust and adding lubricating oil
	4) The spool valve does not work	Break down and repair the spool valve and replace the steering pump
	5) Power cylinder wear or damage, the piston "O" shape is dense Wear or damage to the sealing ring	Break down and repair, and replace the power steering device
	6) Excessive oil leakage in the steering housing	Break down and repair the steering housing
	epipodium	
	Improper wheel alignment (excessive tilt)	Check and adjust the positioning
	Stop-push bearing inverse	Correcting the assembly
	Ball head connection is too tight or loose	Replace the ball-head pin assembly
	Tire pressure is too low	Supplement to specified pressure
	Too much tire wear	Replace the tire

2）The steering wheel swing

sign	probable cause	keep in repair
The steering wheel swing	steering system	
	Steering housing bolt or steering column support loose Kuang	Tighten it according to the specified torque
	The internal and outside ball pins of the steering gear are loose	Replace the ball-head pin assembly
	Steering machine clearance is too large	control gap
	epipodium	
	Rms, spokes and wheels are imbalance and wear	Balance all components and replace the faulty components if necessary
	Front wheel bearing wear and tear	Replace the bearing
	The steering section deformation	Replace the steering section
	Inappropriate wheel positioning	Check and adjust the wheel positioning

3）The steering wheel is not correct

sign	probable cause	keep in repair
The steering wheel has failed	steering system	
	The steering gear gear is poorly engaged	Adjust gear engagement
	Ball head pin card stagnation	Replace the ball-head pin assembly
	The tubing nest is folded and deformed	Replace the tubing
	Spring fatigue	Replace the spring

4）The steering wheel runs to either side

sign	probable cause	keep in repair
The steering wheel runs toward any one side	Incorrect positioning adjustment of the front wheel	Check and adjust the front wheel positioning
	Brake hair astringent	Read the "Brake" section
	Front wheel hub bearing nut is loose	Tighten it according to the specified torque
	Left and right tires have unequal air pressure	Supplement to the prescribed pressure
	Different tire sizes were used	Replace the tire with the right one

5）Uneven or premature tire wear

sign	probable cause	keep in repair
Ununiform and premature The tire wear	epipodium	
	Improper front wheel positioning	Check and adjust the front wheel positioning
	Wear or broken hub bearings, loose bearing nuts	Replace the bearings or tighten the nuts as specified
	Ball head pin, main pin and liner are too loose or too tight	Replace the ball-head pin assembly
	tyre	
	Incorrect tire air pressure	Adjust to the specified air pressure
	Tyres and wheels are different from hearts	Replace the tires or wheels
	else	
	Due to the sudden start or sudden braking of the vehicle block	Correct driving mode

	The frame deformation	Check the frame
	U-shaped bolt loose	Tighten the U-shaped bolts
	Both sides of the wheelbase or four-wheel diagonal difference is too large	Reassembly bridge
	overload	Load at the specified capacity

6）There is an oil spill on the power steering oil tank

sign	probable cause	keep in repair
There is an oil spill on the oil tank go out	The filter screen or the oil filter element is blocked	Clean the filter screen and replace the filter element
	There is air in the pipeline	Add oil and exhaust

Adjust the steering gear in the car

Adjust the lock nut

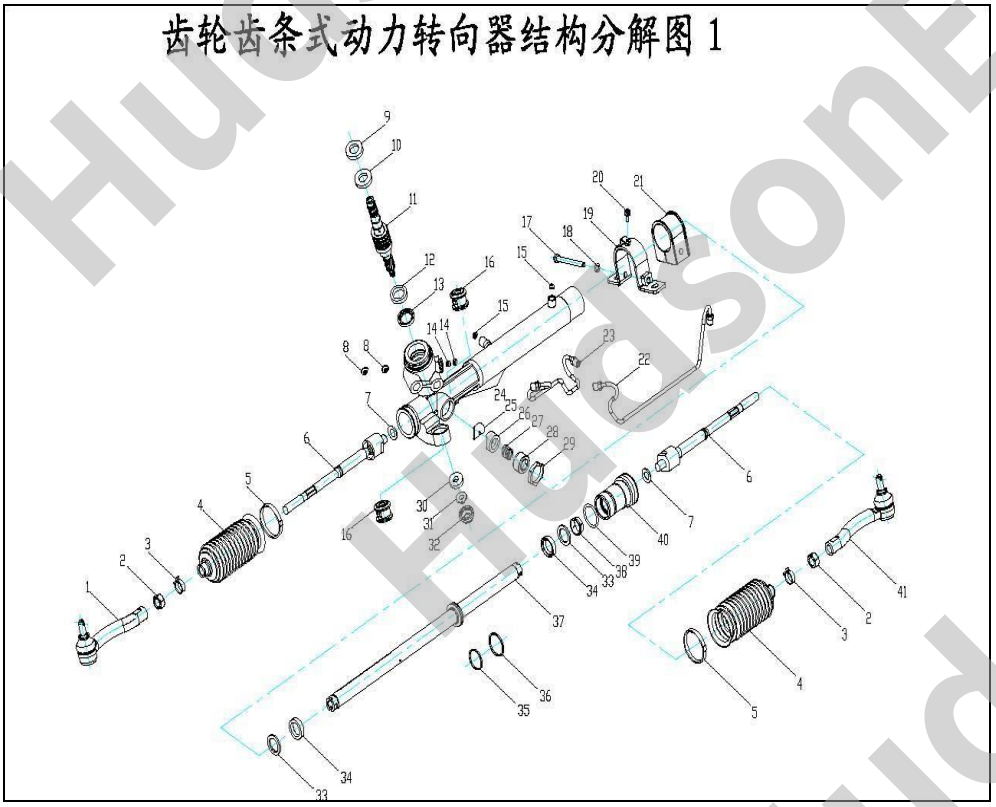
If the locking nut of the rack support seat is easy to adjust, do not remove the steering gear from the car and can be adjusted on the car.

Clearance inspection

Pull the steering lever by hand to make the steering lever swing back and forth, and there is no gap between the rack and the gear shaft.

- Tip: If there is no abnormality during the inspection, there is no need to adjust.

Adjust the locking nut of the rack support seat to eliminate the clearance



If so, release the locking nut 29 and tighten the adjustment plug 28 clockwise until there is absent between the rack 37 and the gear shaft, then take the adjustment plug 28 back 30-40 degrees, then apply 5242 sealant on the lock nut 29 and tighten the lock nut. Tightening torque is 24-49N.m 。

Repair and adjustment of the steering gear after removal from the vehicle

Fastener tightening torque table

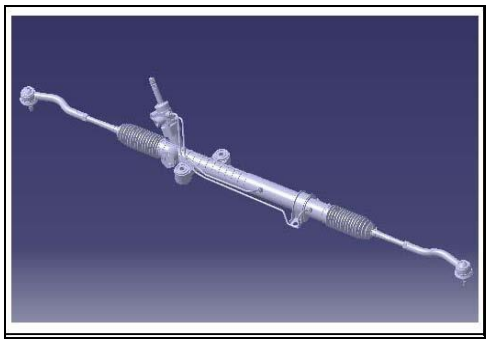
name	specifications	quantity	Tightening Torque (N.m)
locknut	M40X1.5	1	40～50
Oil pipe joint screw bolt	M14X1	2	20～25
Inside the ball section-teeth twig	M18X1.5	2	98～118
hex nut-Outside the ball festival	M16X1.5	2	50～60

Disassemble

Gear rack type power steering gear is the main assembly of automotive steering system, its performance, and life directly affect the reliability and safety of the steering system, there are many precision, dust impurities in the process of repair, the whole parts must be carefully controlled to avoid touching the surface of the machine. Both burrs and cracks can cause damage to the fit. Therefore, before reassembly, it must be removed with a fine grinding oil stone, preferably on the surface is a soft sheet or rubber sheet work table. Please follow the following disassembly principles:

- Remove the coupling on the steering lever and the input shaft.
- Remove the steering gear from the frame and put it in a clean place.
- Wash the surface of the steering gear and dry it before dismantling it.
- Remove the inlet and outlet oil pipe from the steering gear, drain the oil in the steering gear, and plug the inlet and outlet oil mouth blocked.
- When removing the steering gear, the removed parts should be cleaned in clean kerosene and then blow dry.
- Place the removed parts separately one by one to avoid scratches and bumps.
- All the removed oil seals, O-rings and other seals shall be scrapped and replaced with new parts.

Disassemble the steering gear



Fixation of the steering gear (see Figure 5)

1. Attach the steering gear to the vice, so that the input shaft is in a horizontal position. Remove the blocked oil inlet and outlet, and release the oil. Turn the input shaft back and forth several times to drain the oil from the steering gear.

Remove assembly of left and right steering lever (see Figure 6)

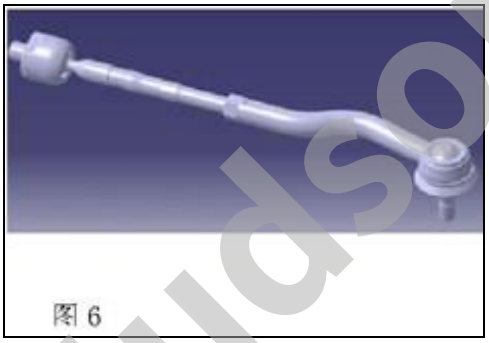


图 6

2. Release the locking nut for the steering lever assembly and remove the outer ball assembly 1.


图 7

Remove the left and right shields (see Figure 7)

3. Remove the clamp 3 and single ear stepless clamp 5, remove the shield 4.

Remove the left and right tubing assembly (see Figure 8)

4. Remove the coupling nuts in left pipe assembly 23 and right pipe assembly 22 and remove the left and right pipe assemblies.

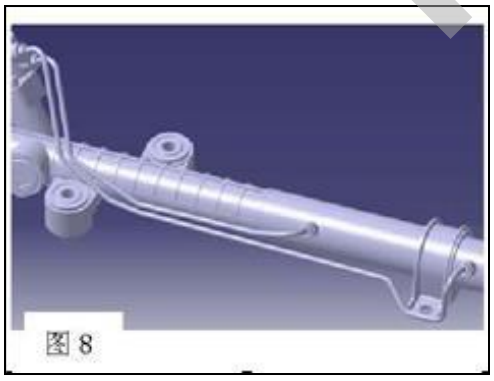
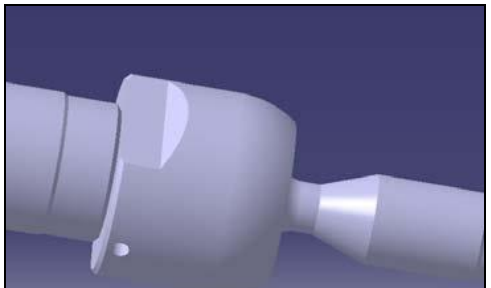
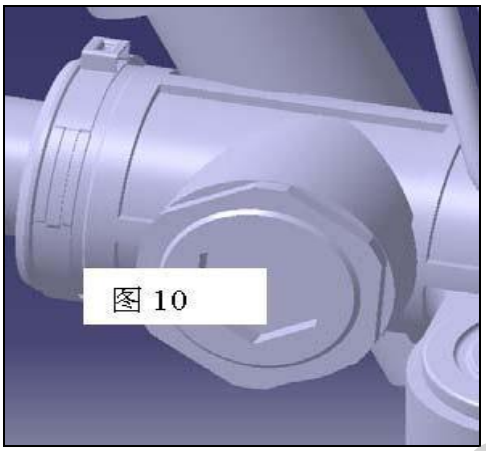


图 8

Strips and inner section (see Figure 9)

5. Unscrew the rack and inner ball joint assembly.



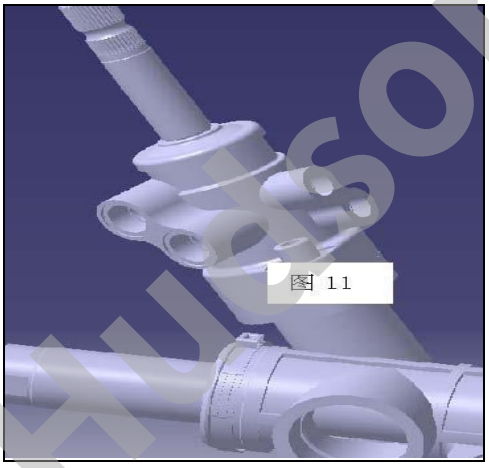


Supporting portion of the strip (see Figure 10)

6. First unscrew the lock nut 29 with a special wrench, then unscrew the adjustment plug 28 to remove the spring 27, rack support seat 26 and rack support cushion 25.

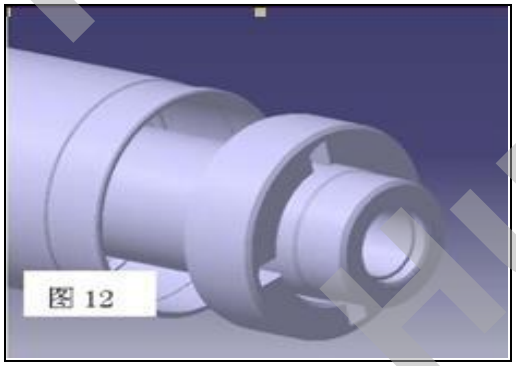
Remove the spool assembly (see Figure 11)

7. Clip the housing cylinder assembly 24 in the control valve assembly to the platform vice and remove the core assembly 11.



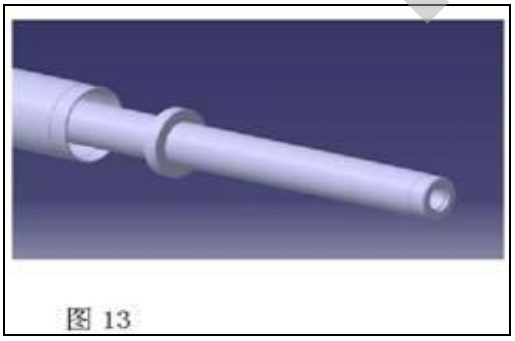
Remove lower sleeve assembly (see Figure 12)

8. Screw the lower limit bit set 40 with a special tool.



Remove the rack assembly (see Figure 13)

9. Press with a special tool off the rack assembly 37.



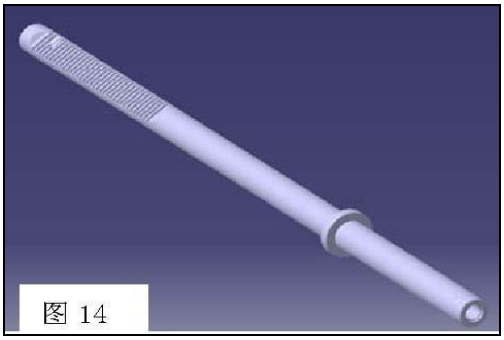


图 14

Inspection and replacement of steering mechanism components check rack piston assembly (see Figure 14)

10. Check the swing of rack 37 in the rack piston assembly with a maximum swing of 0.15mm. Check whether the tooth surface is peeling or pressed, and check whether the working surface of the tooth is cracked or damaged, check whether the back of the tooth is worn or damaged, if necessary, replace the rack piston assembly. Check piston ring 36, O-rubber seal 35 in the piston. If defective, it should be replaced. When replacement, remove the piston ring 36, O rubber ring 35.

- Note: Be careful not to damage the rack. Apply power steering hydraulic oil on the new rubber sealing ring and install the rubber sealing ring. Raise your new piston ring with your finger
- Note: Be careful not to raise the piston ring too high. Install the new piston ring to the piston of the rack piston assembly, apply the power steering hydraulic oil to the piston ring, and use your fingers

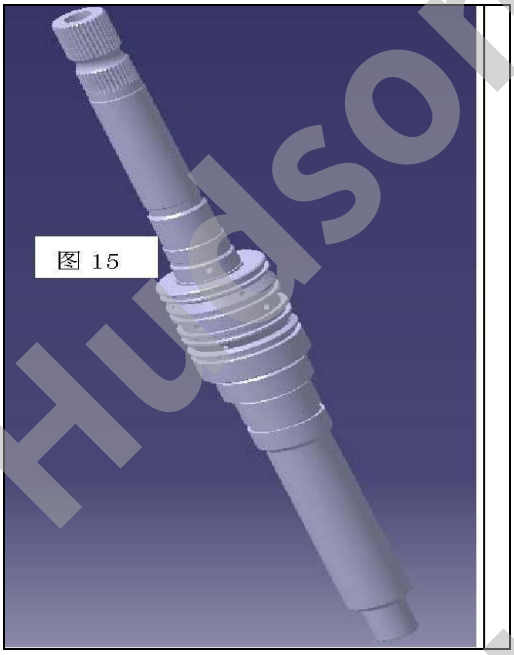


图 15

Check the spool assembly (see Figure 15)

Check the tooth surface of the gear shaft in the valve core assembly 11 for cracks, breakage, pineapple, or deformation. If there is a problem, the valve core assembly should be replaced. Check whether the bearing 12 in the valve assembly is not flexible, otherwise, a new bearing should be replaced. Check the sealing ring in the core assembly for breakage and replace it with a new one if necessary.

When replacement, remove seal ring with screwdriver.

Note: Be careful not to damage the valve sleeve.

Install the new sealing ring on the special tool, and increase it, and install the enlarged sealing ring on the valve sleeve of the valve core assembly, with a fixed shape sleeve.

Assembly of the steering mechanism

Preparation work

Wash all parts in a clean organic solvent before assembly and then blow dry.

- Warning: Because organic solutions are flammable and explosive, they should be very careful when used. Small sparks can cause combustion or explosion and lead to casualties.
- Warning: Always wear protective glasses when using compressed air. Place the clean parts separately one by one to avoid bumping or scratching.

Replace all the oil seal assembly, sealing ring and sealing ring, and the O-ring at each seal shall be coated with grease during assembly.

Ready to replace parts: all parts must be qualified, qualified can be assembled.

- Warning: All fastener bolts, adjustment screws, sealing components, locking nuts, etc., users must use the technical requirements of our company, can not be replaced.

Prepare clean disulfide grease or grease with the same properties used in the assembly.

- Warning: If the grease is not clean, it will damage the seal or scratch the parts, and affect the steering power, and cause driving accidents.

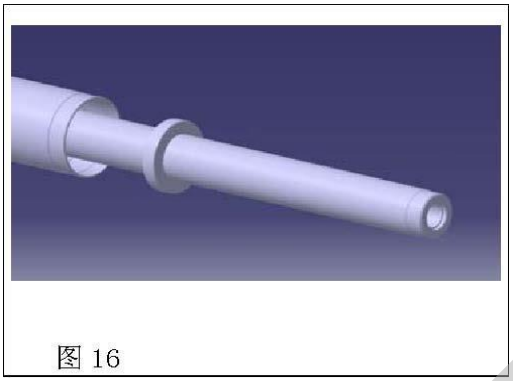


图 16

Assemble

- Warning: All seals are not twisted during assembly.

Install the rack (see Figure 16)

(1) Apply lithium molybdenum disulfide grease to the teeth of the rack assembly 37.

(2) Protect the teeth of the rack with ethylene tape, put the rack piston assembly into the oil cylinder housing, pull out the tape, and check that the tape should be complete.


图 17

Install the valve body and core assembly (see Figure 17)

（1） Apply molybdenum disulfide lithium grease to the teeth of the pinion.

（2） Lithium molybdenum disulfide grease is injected into the needle roller in the housing cylinder assembly 24.

（3） Install the body assembly and core assembly 11 into the housing cylinder assembly.

（4） In the form of 80-100N.m Tighten the fixing bolts of the valve assembly and install the input dust cover.

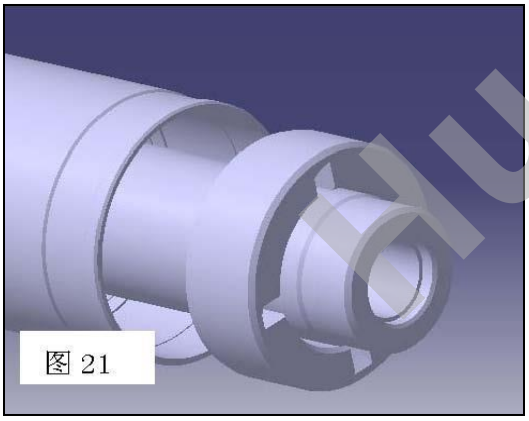


图 21

Install the limit sleeve assembly (see Figure 21)

（1） Apply white special grease to the inner surface of the oil seal 34.

（2） Press the limit sleeve assembly into cylinder block 7.

（3） In the form of 80-100N. Example of m tighten the limit sleeve assembly.

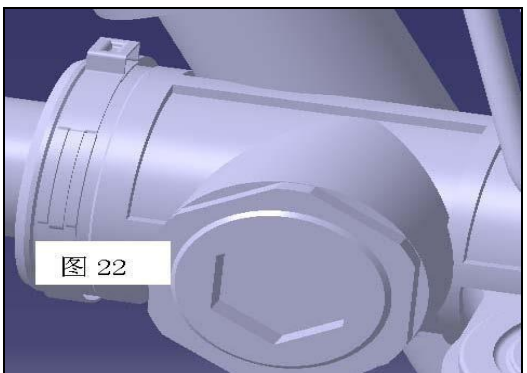


图 22

Mount parts for mounting rack (see Figure 22)

（1） Install the rack mount cushion 25 into the rack mount 26.

（2） Apply lithium molybdenum disulfide grease to the grooves of the rack mount 25 and the rack mount 26.

（3） Install rack holder 26 with rack support cushion 25 into the housing cylinder

Assembly 24 is in the middle.

（4） Install the spring # 27.

（5） After applying 5242 sealant to the thread portion of the adjustment plug 28, screw the adjustment screw into the housing cylinder assembly with a special tool.

（6） Then screw the lock nut 29 on the adjustment plug.

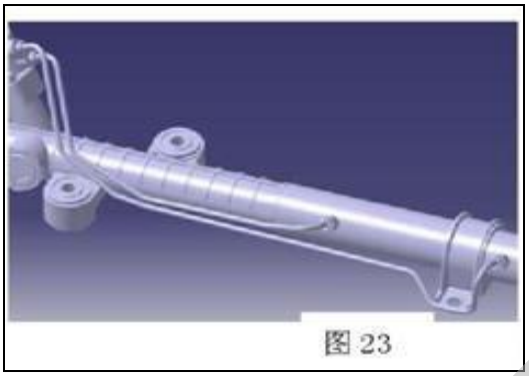


图 23

Install the left and right tubing assembly (see Figure 23)

（1） Install a new cone aper at the interface between left tubing assembly 23 and right tubing assembly 22.

（2） The tightening torque is 15-25N. The torque of m will tighten the left and right tubing assembly.

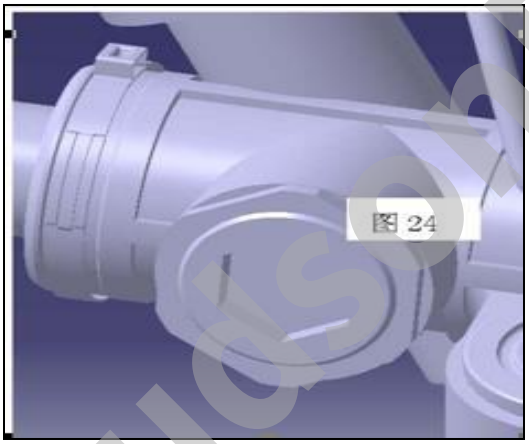


图 24

Assembly adjustment (see Figure 24)

（1） Use the special tool to roll back adjustment plug 28, roll back 30°~ 40°.

（2） Set the shake on the input axis, rotate the input axis, should feel smooth, no lag.

（3） Screw the lock nut with 40~50N. The torque lock of m holds the adjustment plug.

Install rack lock plate and inner ball joint assembly (see Figure 25)

（1） Install a new rack lock piece 7.

（2） Install and tighten the inner ball assembly with special tools, tightening torque of 70-90 N.m 。

（3） Use auxiliary equipment to vet the rack.

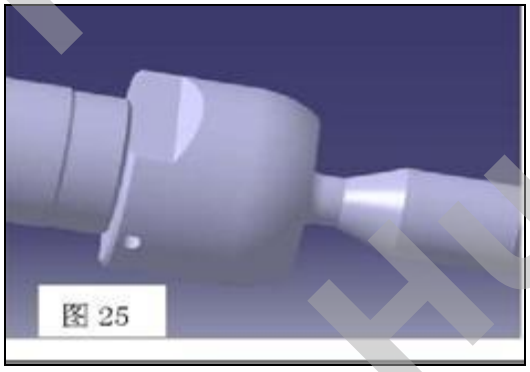


图 25

Install shield, outer ball joint assembly, clamp and single ear stepless clamp (see Figure 26)

（1） After applying grease on the lip of the shield 4, install the housing cylinder assembly and the inner ball joint assembly 6.

（2） Clamp both ends of the shield with a clamp and a single pless clamp.

（3） Load rod lock nut 2.

（4） Screw the outer ball section assembly into the inner ball section.

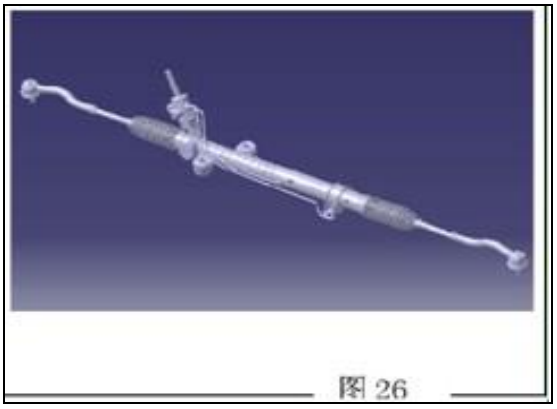


图 26

Reeling of the steering system

Hydraulic oil is used for the steering system

Working oil: ATF DEXRON II

- Warning: Only one of the above fluids can be added to a steering gear, and any unapproved fluid will damage the oil seal and leak, resulting in steering power failure.

Reeling of the steering system

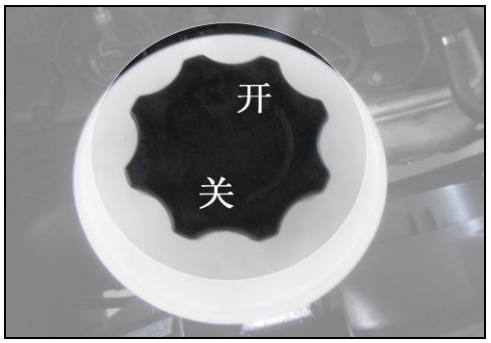
Inject the labeled hydraulic oil into the power steering tank. If the engine runs at idle speed, turn the steering wheel left and right to the extreme position (note that the steering wheel should not stop at the limit position for more than 5 seconds), continue to add hydraulic oil to the oil tank until the height of the oil surface in the tank is no longer falling, no bubbles occurs, and the oil surface is located at half of the height of the filter element.

After refueling, check the parts of the system for oil leakage.

- Note: During the refueling process, prevent any debris from entering the system with the oil.

Service for steering system:

- Warning: Steering gear is an important security part affecting the safety of automobile. If any fault is found in use, users shall maintain at the designated place in time. The Company shall not be responsible for quality accidents caused by disassembly, maintenance and improper use.
- At any time, the maximum flow rate of the system shall not exceed 8.5 L/min, and the maximum working oil pressure shall not exceed 11MPa.
- For each year or 20000km.
- Check and keep tire pressure as required.
- Once the abnormal gap occurs, issue the card, swing the head, analyze the steering drive device, the power steering system or the steering pull rod system, and be solved.
- Always and carefully check the steering system parts for abnormal impact. Damaged parts or defective parts should be replaced in time.
- Parts of the steering gear and system rods shall not be welded in any way.
- The pipeline should be not knocked and worn in the process of use, each section should be loose and tight, no dead bending.
- Check once a month whether the hydraulic oil quantity is reduced, whether the oil is deteriorated, whether impurities are too much. If a bad condition is found, it should be replaced in time. When adding hydraulic oil, the new hydraulic oil should be consistent with the original hydraulic oil number of the power steering system, and mixed use is strictly prohibited.



Instructions for oil tank maintenance

New car first refueling and daily oil refueling

Only need to open the refueling cover assembly according to the arrow direction shown in the end surface of the refueling cover assembly to realize the first refueling and daily oil filling of the new car.

Oil change for every 20,000 kilometers

1. Open the refueling cover assembly, release the low-pressure hose from the steering device to the oil tank, and drain the steering oil;
2. After connecting the low-pressure hose, fill the steering oil with the specified grade.